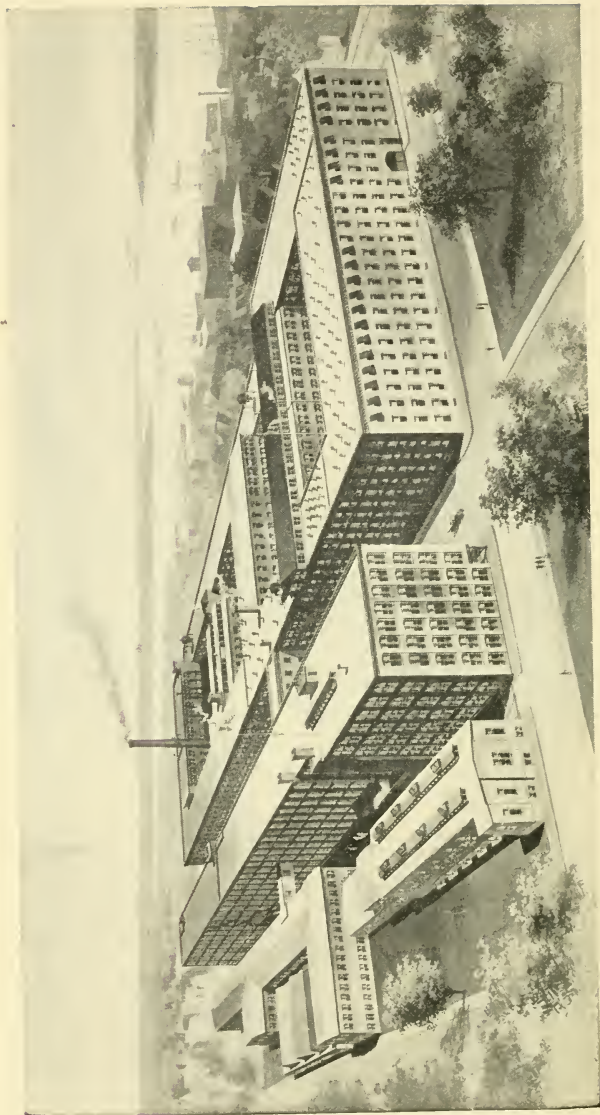


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WORKS OF THE MORSE TWIST DRILL AND MACHINE COMPANY,
NEW BEDFORD, MASS., U. S. A.

CATALOG
OF THE
MORSE TWIST DRILL AND
MACHINE CO.

INCORPORATED 1864

MAKERS OF
TWIST DRILLS, REAMERS,
MILLING CUTTERS, TAPS,
DIES, SOCKETS, GAUGES,
CHUCKS, MACHINERY
AND MACHINISTS' TOOLS

NEW BEDFORD, MASS.

U. S. A.

○

No. 63

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MORSE TWIST DRILL & MACHINE CO.

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Griffith-Stillings Press
Boston, Mass.

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1915

In ordering tools, and in correspondence, we strongly urge the use of our catalog numbers. This is as important to the customer as it is to us, and will often prevent misunderstandings, delays and annoyances.

We make many special tools of varying styles and dimensions and will gladly submit prices upon receipt of specifications. In the appendix we give sketches and suggestions to be followed when ordering special goods.

Catalog numbers of High Speed Steel Tools are the same as those of Carbon Steel plus 1000.

THIS CATALOG CANCELS ALL PREVIOUS EDITIONS

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

MORSE TWIST DRILL & MACHINE CO.

INDEX

Arbors	NUMBER	PAGE
Blank End.....	515.....	115
for Drill Chucks.....	501, 502, 525.....	112-115
for Expanding and Adjustable Shell Reamers.....	528, 529, 550, 551.....	116, 119
Floating, for Shell Reamers and Shell Drills.....	540, 541.....	117-118
for Screw Slotting Cutters.....	536.....	117
for Shell End Mills.....	510, 512.....	114
for Shell Reamers and Shell Drills....	505, 506.....	113
	533.....	116
	540, 541 }	117-118
	545, 546 }	
Solid, for Shell Reamers and Shell Drills with Straight Holes.....	545, 546.....	117
Threaded End.....	509.....	115
Center Keys for Sockets and Sleeves.....		
	210.....	2
Chucks		
Beach.....	275.....	9
Center Drill.....	290.....	11
Stetson.....	280, 281.....	10-11
Chuck Jaws.....	276.....	9
Counterbores		
with Interchangeable Blades and Guides 760.....		173
Straight Shanks.....	757, 766.....	172-175
Taper Shanks, Morse.....	765.....	174
Sets in Blocks.....	770, 771.....	176-178
Solid and Adjustable, for Wood.....	380, 381, 382.....	54
Countersinks		
and Drills Combined.....	495, 496, 497.....	91, 92
and Drills Combined, in Set.....	495.....	93
Three-Groove.....	490, 491.....	90
Cups for Use in Oil Drills.....		
		77
Cutters (SEE MILLS)		
Angular.....	850, 851, 854, 855.....	200, 201
Angular, with Threaded Holes.....	851.....	200
Coarse Tooth.....	1801, 1802, 1805, 1808.....	189-192
Concave and Convex.....	865, 866.....	202
Corner Rounding.....	868.....	203
Double Angle.....	854, 855.....	201
Disks, Circular Cutting.....	1810, 1811.....	194
Formed.....	815.....	193
Formed, with Double Angle.....	855.....	201

For High Speed Steel Numbers Add 1000

Cutters (continued)	NUMBER	PAGE
Gear.....		212-224
for Grooving Reamers.....	991.....	228
for Grooving Taps and Reamers.....	992.....	229
Heading Mills or Side Milling.....	808, 833.....	192, 196
Involute for Teeth of Gear Wheels.....	{ 940, 941.....	216, 217
	{ 942, 943.....	218
	{ 944, 945.....	219
Involute, for Teeth of Gear Wheels, Metric System.....	{ 970.....	222
	{ 971, 972.....	223
	{ 973, 974.....	224
Keyway, Woodruff.....	917.....	210
Milling.....	830.....	195
Mitre and Bevel Gear.....	964, 965.....	220, 221
Screw Slotting.....	845.....	198-199
Side Milling or Heading Mills.....	1808, 833.....	192, 196
Slitting Saws.....	840, 841.....	194, 197
Sprocket Wheel, for Roller Chain.....	987.....	225-227
Stocking, for Involute Gears.....	{ 930.....	214
	{ 931, 932, 933, 934.....	215
T Slot.....	916.....	228
Woodruff, Keyway.....	917.....	210

Die Stocks

for Round Adjustable Dies.....	1180.....	281
for Screw Plate Dies.....	1151.....	275

Dies

Round Adjustable.....		282-289
Round Adjustable, Sets of.....		290-295
Solid Bolt.....	1165.....	278
Stocks for Round Adjustable.....	1180.....	281
Screw Plate.....	1155.....	275
Screw Plate, Sets of.....	{ 1158 } { 1159 } { 1161 }	276-277
Solid Pipe.....	1170.....	279
Solid Round.....	1175.....	280

Disks, Circular Cutting	1810, 1811.....	194
--------------------------------------	-----------------	-----

Disks, Standard Reference	798.....	187
--	----------	-----

Drills

Bit Point, Morse Taper Shanks.....	357.....	50
Bit Point, fitting Pryibil Machines.....	370.....	52
Bit Point, 1-2" Shanks.....	356-358.....	49, 51
Bit Point, with Solid and Adjustable Counterbores.....	380, 381, 382.....	54
Bit Point, Straight Shanks.....	355.....	48
Bit Stock.....	390, 391.....	55-56
Bit Stock, Wood Drills for Brace.....	392.....	57
fitting Blacksmiths' Drill Presses.....	412, 413, 418.....	63, 64, 65
Center.....	440, 441, 442.....	70-71

For High Speed Steel Numbers Add 1000

Drills (continued)	NUMBER	PAGE
Clutch Drive	301	6
fitting Coe's Drill Press	418	65
combined with Pipe Taps	1109, 1110	261-262
Four-Groove	454, 456	74, 75
Grooved Shank, for Andrew's Sockets	300	12
Grooved Shank, fitting Two-Jawed Chucks	316, 331	36
Hollow, for Deep Drilling or Long Holes	488	87
Hollow, Use of		78
Left Hand		47
MACHINE BITS FOR WOOD		
{ Screw Shank, fitting Pryibil Machines	370	52
{ Single Groove	365, 366, 367	52
{ Special Points	371, 372, 373, 374 376, 377	53
{ Straight Shank, 1/2" diam	358	51
Oil Hole, Morse Taper Shanks	472, 473, 474	80, 81, 86
Oil Hole, for Screw or Chucking Ma- chines	481	86
Oil Hole, for Screw or Chucking Ma- chines, M. M. Sizes	483	86
Oil Hole, Special Lengths	470, 471	77
Oil Hole, Straight Shanks	478, 479, 480, 481 482, 483	82-86
Oil Hole, Use of		78-79
Paper	377	53
Pod	376	53
fitting Prentice Drill Press, 1-2" Shank, Taper Length	413	64
Presses, Manufacturers of		62
Ratchet, Taper Square Shank	400, 401, 404, 405	58-61
Routing Bits	378	54
Screw Shank Machine Bits	370	52
SETS OF		93-105
{ Bit Point		97, 101
{ Bit Stock		97-101
{ Drills, and Taps, Radio Set No. 3		105
{ Morse Taper Shanks		94, 95
{ Straight Shanks, Jewelers		94
{ Straight Shanks, Jobbers' Lengths	96, 101, 102, 103, 104	94
{ Straight Shanks, Jobbers' Lengths, M. M. Sizes	96, 102	96, 102
{ Straight Shanks, Letter Sizes	96, 102	96, 102
{ Straight Shanks, Taper Length		94
{ Straight Shanks, Wire Sizes	96, 101, 102, 103	94
{ Wood Drills for Brace	392	99
Shell	460	76
fitting Silver & Deming's Press, Short Length	412	63
Single Groove	365, 366, 367	52
Straight Shank, Grooved Shanks	316, 331	36

For High Speed Steel Numbers Add 1000

Drills (continued)	NUMBER	PAGE
Straight Shank, Jewelers'	341, 342	45-46
Straight Shank, Jobbers' Length	330	35
Straight Shank, Jobbers' Length, M. M. Sizes	333	38-41
Straight Shank, Letter Sizes	332	37
Straight Shank, Taper Length	314	27-29
Straight Shank, Taper Length, M. M. Sizes	317	30-34
Straight Shank, Wire Sizes	340	42-44
Straight Shank, Wire Sizes for Jewelers	341, 342	45-46
Straight Shank for Wood	360	51
Straightway, Morse Taper Shanks	425	66
Straightway, Straight Shanks	428, 432	67, 69
Straightway, Straight Shanks, Wire Sizes	430	68
Taper Shank	302, 305, 1302	14-17, 21-26
Taper Shank, Large Shanks	303, 1303	19-20
Taper Shank, Small Shanks	1303A	18
Taper Square Shank	400, 401	58-59
Taper Square Shank, M. M. Sizes	404, 405	60-61
Three-Groove	450, 452	72-73
Track	446	71
Wood Drills for Brace	392	57
Drill Cases		
Nos. 1, 2, 3, 5, 6		106-111
Indexed		100
Sectional Cases, Boxes for		106
Drill Press Manufacturers 62		
Drill Stands and Holders		
Blocks		96
Flat Case		98
Folding or Portable Drill Holder		102
Indexed Cases		100-101
Revolving Drill Stand		95
Round Boxes		97
Gauges		
Adjustable Caliper	796	186
Morse Taper	790	183
Plug and Ring	793	184-185
Sets	796, 798	186-187
Standard Reference Disks	798	187
Tang for Short Shank Sockets	246	6
Taper Pin	788	182
Twist Drill, Fractional Sizes	782	180
Twist Drill, Letter Sizes	783	181
Twist Drill, M. M. Sizes	784, 785	181-182
Twist Drill, Number Sizes	780, 781	179-180
Lathe Centers 295 12		

	NUMBER	PAGE
Mandrels		
Solid, Hardened and Ground	570	120
Taper, with Expanding Sleeves	575	121-124
Manufacturers of Drill Presses		62
Metal Slitting Saws	840, 841	194, 197
Mills (SEE CUTTERS)		
End, with Coarse Teeth	1805	191
End, with Spiral Flutes (Taper Shanks) ..	907, 908	207, 208
End, with Straight Shanks	890, 891	206
End, with Taper Shanks	905, 906	207, 208
Hollow	885, 886	205
Shell End, with Spiral Flutes	1801, 871	189, 204
Slotting End, Two Lipped	911	209
Reamers		
Adjustable	{ 720, 721, 722, 728 } 730, 743	161-170
Adjustable, M. M. Sizes	722	163
Adjustable, Morse Taper Shanks	721	162
Adjustable Shell	743	170
Adjustable Shell, One Lock	730	166-167
Bit Stock Taper	692	148
Bit Stock Taper in Sets	692	130
Boiler	697, 698	152-153-157
Bridge	695, 696	150-151
Bridge, Morse Taper Shanks	696, 697	151-152-157
Center	750	171
CHUCKING		
{ Floating	670	88-89
{ Fluted	655, 656	139-140
{ Four-Groove	650	88-89
{ Rose	662, 663	141-142
{ Three-Groove	{ 705, 706, 707 } 708, 709, 710	157
Expanding	725, 726	164
Expanding, with Guide	738	169
Expanding, Morse Taper Shanks	726	164
Expanding Shell	735	168-169
Expansion, Floating	671	88-89
Expansion, with Guide	715	158
Expansion, with Guide, M. M. Sizes	716	159
Expansion Shell, with Straight Holes	741	88-89
Expansion, Spiral Fluted	717	160
Four-Groove Chucking, Morse Taper Shanks	650	88-89
Floating	670	88-89
Floating Expansion	671	88-89
Fluted Chucking	655, 656	139-140
Jobbers'	601	126
Jobbers', M. M. Sizes	604	128

For High Speed Steel Numbers Add 1000

Reamers (continued)

	NUMBER	PAGE
Jobbers', Morse Taper Shanks	617	129
Jobbers', in Sets		130
Jobbers', with Spiral Flutes	602	127
Locomotive	686	146
Locomotive, Morse Taper Shanks	687	147
Morse Taper	636, 637	136
Morse Taper, Morse Taper Shanks	640, 641	137
Morse Taper, in Sets	636	130
Morse Taper, Taper Square Shanks	642	137
One-Lock Adjustable	730	166-167
Pin, Taper	680	143
Pin, Taper, Half Round	682	145
Pin, Taper, Morse Taper Shanks	681	144
Pin, Taper in Sets	680	130
Pipe	1116	264
Rose Chucking	662, 663	141-142
Rose Shell	626	132-133
Rose Shell, M. M. Sizes	629	135
Sets of		98-130-131
Shell	625	132-133
Shell, Adjustable	730, 743	166, 170
Shell, Expanding	735	168
Shell, M. M. Sizes	628	135
Shell, with Spiral Flutes	627	134
Shell, with Straight Holes	630	88-89
Structural	698	153
Structural, Morse Taper Shanks	697	152
Structural, Spiral Flutes, Morse Taper Shanks, H. S.	1701	156
Structural, Short Body, Morse Taper Shanks, H. S.	1699	154
Structural, Short Body, Morse Taper Shanks, Spiral Flutes, H. S.	1700	155
Taper, Bit Stock	692	148
Taper, B. & S. Standard	643, 644	138
Taper, Morse		130, 136, 137
Taper Pin	680	143
Taper Pin, Half Round	682	145
Taper Pin, Morse Taper Shanks	681	144
Taper Pin, Quick Spiral	683	145
Taper Pin, in Sets	680	143
Taper, Special	638, 639	136
Taper, Straight Shanks	693	149
Three-Groove Chucking	{ 705, 706, 707 } { 708, 709, 710 }	157

Round Dies

Round Adjustable	282-289
Round Adjustable, Sets of	290-295
Round Adjustable, Stocks for	1180 281
Solid Round	1175 280

For High Speed Steel Numbers Add 1000

Screw Plates

	NUMBER	PAGE
Size No. 1, A, B, C, D and E.....	1151	275
Sets of.....	{ 1158 1159 1161}	276-277

Sleeves

with Clutch Drive.....	240	6
Morse Taper.....	202	2
Morse Taper Holes and B. & S. Taper Shanks.....	260	8
for Short Shanks.....	232	6

Sockets

Andrew's.....	225, 226	3
Floating.....	250	7
Lathe.....	217	3
Morse Taper.....	200, 201	1
for Oil Drills.....	220, 221	4
for Short Shanks.....	230, 231	5
Solid.....	251	7

Socket Keys	210	2
--------------------------	-----	---

Taper Pins	585	125
-------------------------	-----	-----

Tables

Average Length of Stay-Bolt Taps.....	267
Depth of Space and Thickness of Teeth of Spur Wheels.....	213
Showing Corresponding Diametral and Circular Pitches.....	211

Taps

for Beaman & Smith Holders.....	1102	260
Bent Shank Tapper.....	1074	252
Bit Brace.....	1086	245
Blacksmiths' Taper.....	1057	245
Boiler, Straight and Taper.....	1126	266
Hand.....	1040	231-234
Hand, French and International Stand- ard.....	1043	240-241
Hand, French and International Stand- ard, Serial.....	1044	242
Hand, Ground Thread, H. S. Steel only..	2046	236
Hand, Ground Thread, Spiral Pointed, H. S. Steel only.....	2047	237
Hand, Serial.....	1042	238-239
Hob.....	{ 1091 1092 1094 1096 1098}	255-259
Hob or Master.....	1091	255

For High Speed Steel Numbers Add 1000

Taps (continued)	NUMBER	PAGE
Hob, Sellers	1093	257
Hob or Master, French and International Standard	1096	258
Machine or Nut	1050	243
Machine or Nut, French and International Standard	1051	244
Machine Screw, A. S. M. E. Standard	1066	246-247
Machine Screw, Spiral Pointed, A.S.M.E.	1067	248
Mud or Washout	1135	272-273
Nut	1050	243
Patch Bolt	1125	264
Pipe	{ 1115	263
	{ 1117, 1118	262, 265
Pipe and Drills Combined	1109, 1110	261-262
Pipe Hob	1094	257
Plug Pipe	1118	262
Pulley	1081	254
Sellers' Hob	1093	257
Short Plug Hob	1092	256
Short Plug Hob, French and International Standard, M. M. Sizes	1098	259
Spindle Stay-Bolt	1131	268
Spindle Stay-Bolt, French and International Standard	1134	271
Spindle Stay-Bolt with Threaded Spindle	1132	269
Spiral Pointed Hand	1045	235
Spiral Pointed Machine Screw	1067	248
Stay-Bolt	1130	267
Stay-Bolt, M. M. Sizes	1133	270
Stove Bolt	1076	254
Straight Plug Pipe	1118	262
Taper Pipe	1115	263
Tapper	1071	249
Tapper, Machine Screw Sizes, A. S. M. E. Standard	1073	251
Tapper, Bent Shank	1074	252
Tapper, Bent Shank, Machine Screw Sizes, A. S. M. E. Standard	1075	253
Tapper, French and International Standard	1072	250
Two and Three Fluted	1040	234
Whitworth Pipe	1117	265

Turret Machines, Tools for 88-89

Wrenches

Adjustable	1145, 1146	274
for Adjustable Reamers	753	171
for Beach and Stetson Chucks	278	9

To avoid a confusion of figures, High Speed Steel Tools are not incorporated in this index as the catalog numbers are the same as those of Carbon Steel plus 1,000.

RECAPITULATION OF INDEX BY NUMBERS

NUMBER	PAGE
1 Drill Cases	106
2 Drill Cases	107
3 Drill Cases	108
5 Drill Cases (Revolving)	109
6 Drill Cases (In Sections)	110-111
200 Sockets, Morse Taper, with blank ends	1
201 Sockets, Morse Taper Shanks	1
202 Sleeves, Morse Taper	2
210 Socket Keys	2
217 Lathe Sockets	3
220 Sockets for Oil Drills with blank ends	4
221 Sockets for Oil Drills, Taper Shanks	4
225 Andrew's Sockets with blank ends	3
226 Andrew's Sockets, Taper Shanks	3
230 Sockets for Short Shanks with blank ends	5
231 Sockets for Short Shanks, Taper Shanks	5
232 Sleeves for Short Shanks	6
240 Sleeves with Clutch Drive	6
246 Tang Gauge for Short Shank Sockets	6
250 Floating Sockets	7
251 Solid Sockets	7
260 Sleeves, Morse Taper Holes and B. & S. Taper Shanks	8
275 Beach Chucks	9
276 Jaws for Beach Chucks	9
278 Wrenches for Beach and Stetson Chucks	9
280 Stetson Chucks	10
281 Stetson Geared Chucks	11
290 Center Drill Chucks	11
295 Lathe Centers	12
300 Drills with Grooved Shanks for Andrew's Sockets	12
301 Drills for Clutch Drive	6
302 Morse Taper Shank Drills	14-18
303 Morse Taper Shank Drills, shanks larger than regular	19-20
305 Morse Taper Shank Drills, M. M. Sizes	21-26
306 Left Hand Morse Taper Shank Drills	47
314 Straight Shank Taper Length Drills	27-29
316 Drills with Grooved Shanks, Taper Lengths	36
317 Straight Shank Taper Length Drills, M. M. Sizes	30-34
318 Left Hand Straight Shank Taper Length Drills	47
330 Straight Shank Drills, Jobbers' Lengths	35
331 Drills with Grooved Shanks, Jobbers' Lengths	36
332 Straight Shank Drills, Letter Sizes	37
333 Straight Shank Drills, Wire and Jobbers' Lengths, M. M. Sizes	38-41

NUMBER	PAGE	
334	Left Hand Straight Shank Drills, Jobbers' Lengths	47
340	Straight Shank Drills, Wire Sizes	42-44
341	Straight Shank Jewelers' Drills, Wire Sizes	45-46
342	Straight Shank Jewelers' Drills, Fractional Sizes	46
343	Left Hand Straight Shank Wire Drills	47
355	Bit Point Drills, Straight Shanks	48
356	Bit Point Drills, $\frac{1}{2}$ " Shanks fitting Prentice Drill Press	49
357	Bit Point Drills, Morse Taper Shanks	50
358	Machine Bits for Wood	51
360	Straight Shank Drills for Wood	51
365	Single Groove Drills	52
366	Single Groove Drills	52
367	Single Groove Drills	52
370	Screw Shank Drills fitting Prybil Machines	52
371	Special Machine Bits	53
372	Special Machine Bits	53
373	Special Machine Bits	53
374	Special Machine Bits	53
376	Pod Bits	53
377	Paper Drills	53
378	Routing Bits	54
380	Bit Point Drills and Counterbores	54
381	Bit Point Drills and Counterbores	54
382	Bit Point Drills and Counterbores	54
390	Bit Stock Drills	55
391	Bit Stock Drills, M. M. Sizes	56
392	Wood Drills for Brace	57
400	Taper Square Shank Drills, Small Shanks	58
401	Taper Square Shank Drills, Large Shanks	59
404	Taper Square Shank Drills, M. M. Sizes, Small Shanks	60
405	Taper Square Shank Drills, M. M. Sizes, Large Shanks	61
412	Drills fitting S. & D.'s and Prentice Drill Presses, Short Lengths	63
413	Drills fitting Prentice Press, Taper Lengths	64
418	Drills fitting Coe's Press	65
425	Straightway Drills, Morse Taper Shanks	66
428	Straightway Drills, Straight Shanks, Taper Lengths	67
430	Straightway Drills, Wire Sizes	68
432	Straightway Drills, Straight Shanks, Jobbers' Lengths	69
440	Center Drills, Fractional Sizes	70
441	Center Drills, Wire Sizes	70
442	Center Drills, M. M. Sizes	71
446	Track Drills	71
450	Three-Groove Drills, Morse Taper Shanks	72
452	Three-Groove Drills, Straight Shanks	73
454	Four-Groove Drills, Morse Taper Shanks	74
456	Four-Groove Drills, Straight Shanks	75
460	Shell Drills with Taper Holes	76
461	Shell Drills with Straight Holes	89
470	Oil Drills, Special Lengths, Straight Shanks	77
471	Oil Drills, Special Lengths, Morse Taper Shanks	77
472	Drills with Oil Holes, Morse Taper Shanks	86

NUMBER	PAGE
473 Drills with Oil Holes, Morse Taper Shanks	80-81
474 Drills with Oil Holes, Morse Taper Shanks	80-81
478 Drills with Oil Holes, Straight Shanks	86
479 Drills with Oil Holes, Straight Shanks	82-83
480 Drills with Oil Holes, Straight Shanks	84-85
481 Drills with Oil Holes, for Screw or Chucking Machines	86
482 Drills with Oil Holes, Straight Shanks, M. M. Sizes	86
483 Drills with Oil Holes, for Screw or Chucking Machines, M. M. Sizes	86
488 Hollow Drills	87
490 Three-Groove Countersinks with Bit Stock Shanks	90
491 Three-Groove Countersinks with Straight Shanks	90
495 Combined Drills and Countersinks	91
496 Combined Drills and Countersinks with $\frac{1}{2}$ and $\frac{5}{8}$ inch Bodies	92
497 Combined Drills and Countersinks, Morse Taper Shanks	92
501 Arbors for Beach and Stetson Drill Chucks	112
502 Arbors for Beach and Stetson Drill Chucks, Morse Taper Shanks	112
505 Arbors for Shell Reamers and Shell Drills with Taper Holes	113
506 Arbors for Shell Reamers and Shell Drills, with Taper Holes, Morse Taper Shanks	113
509 Arbors for Shell End Mills with Threaded Holes	115
510 Arbors for Shell End Mills, Morse Taper Shanks	114
512 Arbors for Shell End Mills, B. & S. Taper Shanks	114
515 Arbors with Blank Ends	115
525 Arbors for Center Drill Chucks	115
528 Arbors for Expanding and Adjustable Shell Reamers	116
529 Arbors for Expanding and Adjustable Shell Reamers, Morse Taper Shanks	116
533 Arbors for Shell Reamers and Shell Drills	116
536 Arbors for Screw Slotting Cutters	117
540 Floating Arbors for Shell Reamers and Shell Drills with Straight Holes	88
541 Floating Arbors for Shell Reamers and Shell Drills with Taper Holes	118
545 Solid Arbors for Shell Reamers and Shell Drills with Straight Holes	88
546 Solid Arbors for Shell Reamers and Shell Drills with Straight Holes, Morse Taper Shanks	88
550 Arbors for One-Lock Adjustable Reamers	119
551 Arbors for One-Lock Adjustable Reamers, Morse Taper Shanks	119
570 Hardened and Ground Mandrels	120
575 Taper Mandrels with Expanding Sleeves	121-124
585 Taper Pins	125
601 Jobbers' Reamers	126
602 Jobbers' Reamers with Spiral Flutes	127
604 Jobbers' Reamers, M. M. Sizes	128
617 Jobbers' Reamers, Morse Taper Shanks	129
625 Shell Reamers	132-133

NUMBER	PAGE	
626	Rose Shell Reamers	132-133
627	Shell Reamers, Spiral Flutes	134
628	Shell Reamers, M. M. Sizes	135
629	Rose Shell Reamers, M. M. Sizes	135
630	Shell Reamers with Straight Holes	88
636	Morse Taper Finishing Reamers	136
637	Morse Taper Roughing Reamers	136
638	Taper Finishing Reamers, Special Lengths	136
639	Taper Roughing Reamers, Special Lengths	136
640	Morse Taper Finishing Reamers, Morse Taper Shanks	137
641	Morse Taper Roughing Reamers, Morse Taper Shanks	137
642	Morse Taper Reamers, Taper Square Shanks	137
643	Taper Finishing Reamers, B. & S. Standard	138
644	Taper Roughing Reamers, B. & S. Standard	138
650	Four-Groove Chucking Reamers, Morse Taper Shanks	88
655	Fluted Chucking Reamers, Straight Shanks	139
656	Fluted Chucking Reamers, Morse Taper Shanks	140
662	Rose Chucking Reamers, Straight Shanks	141
663	Rose Chucking Reamers, Morse Taper Shanks	142
670	Floating Chucking Reamers	88-89
671	Floating Expansion Reamers	88-89
680	Taper Pin Reamers	143
681	Taper Pin Reamers, Morse Taper Shanks	144
682	Taper Pin Reamers, Half Round	145
683	Taper Pin Reamers, Quick Spiral	145
686	Locomotive Reamers	146
687	Locomotive Reamers, Morse Taper Shanks	147
692	Bit Stock Taper Reamers	148
693	Straight Shank Taper Reamers	149
695	Taper Bridge Reamers	150
696	Taper Bridge Reamers, Morse Taper Shanks	151
697	Straight Reamers with Taper End, Morse Taper Shanks	152
698	Straight Reamers with Taper End	153
1699	Structural Reamers, Short Body, Morse Taper Shanks, H. S.	154
1700	Structural Reamers, Short Body, Morse Taper Shanks, Spiral Flutes, H. S.	155
1701	Structural Reamers, Regular Length, Morse Taper Shanks, Spiral Flutes, H. S.	156
705	Three-Groove Chucking Reamers, Morse Taper Shanks	157
706	Three-Groove Chucking Reamers, Straight Shanks	157
707	Three-Groove Chucking Reamers with Oil Holes, Morse Taper Shanks	157
708	Three-Groove Chucking Reamers with Oil Holes, Straight Shanks	157
709	Three-Groove Chucking Reamers with Oil Holes, Morse Taper Shanks	157
710	Three-Groove Chucking Reamers with Oil Holes, Straight Shanks	157
715	Expansion Reamers	158
716	Expansion Reamers, M. M. Sizes	159
717	Spiral Fluted Expansion Reamer	160

NUMBER	PAGE
720 Adjustable Reamers	161
721 Adjustable Reamers, Morse Taper Shanks	162
722 Adjustable Reamers, M. M. Sizes	163
725 Expanding Reamers	164
726 Expanding Reamers, Morse Taper Shanks	164
728 Adjustable Reamers	165
730 One-Lock Adjustable Reamers	166-167
735 Expanding Shell Reamers	168-169
738 Expanding Reamers	169
741 Expanding Shell Reamers with Straight Holes	88
743 Adjustable Shell Reamers	170
750 Center Reamers	171
753 Wrenches for Adjustable Reamers	171
757 Straight Shank Counterbores for A. S. M. E. Standard Screws	172
760 Counterbores with Interchangeable Blades and Guides	173
765 Counterbores with Morse Taper Shanks	174
766 Counterbores with Straight Shanks	175
770 Screw Sets in Blocks, U. S. Standard	176-177
771 Screw Sets in Blocks, A. S. M. E. Standard	176-178
780 Twist Drill Gauges, Number Sizes 1 to 60	179
781 Twist Drill Gauges, Number Sizes 61 to 80	180
782 Twist Drill Gauges, Fractional Sizes	180
783 Twist Drill Gauges, Letter Sizes	181
784 Twist Drill Gauges, M. M. Sizes 1 to 13	181
785 Twist Drill Gauges, M. M. Sizes 1 to 6	182
788 Taper Pin Gauge	182
790 Morse Taper Plug and Ring Gauges	183
793 Plug and Ring Gauges	184-185
796 Adjustable Caliper Gauges	186
798 Standard Reference Disks	187
801 Shell End Mill with Coarse Teeth	189
802 Milling Cutter with Radial Grooves and Coarse Teeth	190
805 End Mill with Coarse Teeth	191
808 Side Milling Cutters with Coarse Teeth	192
810 Circular Cutting Disks	194
811 Circular Cutting Disks	194
815 Formed Milling Cutters	193
830 Milling Cutters	195
833 Side Milling Cutters	196
840 Formed Saws for Slitting Copper	190
841 Metal Slitting Saws	197
845 Screw Slotting Cutters	198-199
850 Angular Cutters	200
851 Angular Cutters with Threaded Holes	200
854 Cutters with Double Angle	201
855 Formed Cutters with Double Angle	201
865 Convex Milling Cutters	202
866 Concave Milling Cutters	202
868 Corner Rounding Cutters	203
871 Shell End Mills, Spiral Flutes	204
885 Adjustable Hollow Mills	205
886 Hollow Mills	205

NUMBER	PAGE	
890	Straight Shank End Mills, with Straight Flutes	206
891	Straight Shank End Mills, with Spiral Flutes	206
905	End Mills, Morse Taper Shanks	207
906	End Mills, B. & S. Taper Shanks	208
907	End Mills, Spiral Flutes, Morse Taper Shanks	207
908	End Mills, Spiral Flutes, B. & S. Taper Shanks	208
911	Slotting End Mills, Two-Lipped	209
916	T Slot Cutters, B. & S. Taper Shanks	228
917	Woodruff Keyway Cutters	210
930	Stocking Cutters for Involute Gears	214
931	Stocking Cutters for Involute Gears, 1" Hole	215
932	Stocking Cutters for Involute Gears, 1 $\frac{1}{4}$ " Hole	215
933	Stocking Cutters for Involute Gears, 1 $\frac{1}{2}$ " Hole	215
934	Stocking Cutters for Involute Gears, 1 $\frac{3}{4}$ " Hole	215
940	Involute Cutters for Teeth of Gear Wheels	216
941	Involute Cutters for Teeth of Gear Wheels, Large Diameters	217
942	Involute Cutters for Teeth of Gear Wheels, 1" Hole	218
943	Involute Cutters for Teeth of Gear Wheels, 1 $\frac{1}{4}$ " Hole	218
944	Involute Cutters for Teeth of Gear Wheels, 1 $\frac{1}{2}$ " Hole	219
945	Involute Cutters for Teeth of Gear Wheels, 1 $\frac{3}{4}$ " Hole	219
964	Cutters for Mitre and Bevel Gears	221
965	Cutters for Mitre and Bevel Gears, $\frac{7}{8}$ " Hole	221
970	Metric Involute Cutters	222
971	Metric Involute Cutters, 1" or 27 M. M. Hole	223
972	Metric Involute Cutters, 1 $\frac{1}{4}$ " or 32 M. M. Hole	223
973	Metric Involute Cutters, 1 $\frac{1}{2}$ " or 40 M. M. Hole	224
974	Metric Involute Cutters, 1 $\frac{3}{4}$ " or 45 M. M. Hole	224
987	Sprocket Wheel Cutters for Roller Chains	225-227
991	Cutters for Grooving Reamers	228
992	Cutters for Grooving Taps and Reamers	229
1040	Hand Taps	231-234
1042	Hand Taps, Serial	238-239
1043	Hand Taps, French and International Standard	240-241
1044	Hand Taps, Serial, M. M. Sizes	242
1045	Hand Taps, Spiral Pointed	235
2046	Hand Taps, Ground Thread, H. S. Steel only	236
2047	Hand Taps, Ground Thread, Spiral Pointed, H. S. Steel only	237
1050	Nut Taps	243
1051	Nut Taps, M. M. Sizes	244
1057	Blacksmiths' Taper Taps	245
1066	Machine Screw Taps, A. S. M. E. Standard	246-247
1067	Machine Screw Taps, Spiral Pointed, A. S. M. E. Standard	248
1071	Tapper Taps	249
1072	Tapper Taps, M. M. Sizes	250
1073	Tapper Taps, Machine Screw Sizes, A. S. M. E. Standard	251
1074	Tapper Taps, Bent Shank	252
1075	Tapper Taps, Bent Shank, Machine Screw Sizes, A. S. M. E. Standard	253
1076	Stove Bolt Taps	254
1081	Pulley Taps	254
1086	Bit Brace Taps	245

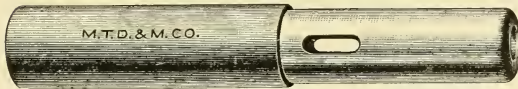
NUMBER	PAGE	
1091	Hob or Master Taps	255
1092	Short Plug Hob Taps	256
1093	Sellers Hob Taps	257
1094	Pipe Hob Taps	257
1096	Hob or Master Taps, M. M. Sizes	258
1098	Short Plug Hob Taps, M. M. Sizes	259
1102	Taps for Beaman & Smith Holders	260
1109	Combined Pipe Taps and Drills	261
1110	Combined Pipe Taps and Drills	262
1115	Taper Pipe Taps	263
1116	Taper Pipe Reamers	264
1117	Whitworth Pipe Taps	265
1118	Straight Plug Pipe Taps	262
1125	Patch-Bolt Taps	264
1126	Straight and Taper Boiler Taps	266
1130	Stay-Bolt Taps	267
1131	Spindle Stay-Bolt Taps	268
1132	Spindle Stay-Bolt Taps with Threaded Spindle	269
1133	Stay-Bolt Taps, M. M. Sizes	270
1134	Spindle Stay-Bolt Taps, M. M. Sizes	271
1135	Mud or Washout Taps	272-273
1145	Adjustable Tap Wrenches, Nos. 0, 1	274
1146	Adjustable Tap Wrenches, Nos. 2 A, B, C, D, E, F	274
1151	Screw Plates	275
1155	Screw Plate Dies	275
1158	Sets of Machinists' Screw Plates with Taps, Dies and Wrenches	276
1159	Sets of Machinists' Screw Plates with Dies only	276
1161	Sets of Machinists' Screw Plates with Taps, Dies and Wrenches	277
1165	Machine or Solid Bolt Dies	278
1170	Solid Pipe Dies	279
1175	Solid Round Dies	280
1180	Die Stocks for Round Adjustable Dies	281
1185	Round Adjustable Dies, $\frac{5}{8}$ " Diameter	283
1187	Round Adjustable Dies, $\frac{1}{16}$ " Diameter	283
1189	Round Adjustable Dies, 1" Diameter	283
1191	Round Adjustable Dies, A. S. M. E. Standard, $\frac{5}{8}$ " Diameter	282
1192	Round Adjustable Dies, A. S. M. E. Standard, $\frac{13}{16}$ " Diameter	282
1193	Round Adjustable Dies, A. S. M. E. Standard, 1" Diameter	282
1196	Round Adjustable Dies, $1\frac{5}{16}$ " Diameter	284
1200	Round Adjustable Dies, $1\frac{1}{2}$ " Diameter	284
1203	Round Adjustable Dies, $1\frac{9}{16}$ " Diameter	284
1207	Round Adjustable Dies, $1\frac{3}{4}$ " Diameter	284
1211	Round Adjustable Dies, 2" Diameter	285
1214	Round Adjustable Dies, $2\frac{1}{4}$ " Diameter	285
1217	Round Adjustable Dies, $2\frac{1}{2}$ " Diameter	285
1220	Round Adjustable Dies, 3" Diameter	285
1233	Round Adjustable Dies, $\frac{5}{8}$ " Diameter, M. M. Sizes	286

NUMBER	PAGE
1234 Round Adjustable Dies, 1" Diameter, M. M. Sizes	286
1235 Round Adjustable Dies, 1½" Diameter, M. M. Sizes	287
1236 Round Adjustable Dies, 1⅜" Diameter, M. M. Sizes	286
1237 Round Adjustable Dies, 1⅝" Diameter, M. M. Sizes	287
1238 Round Adjustable Dies, 1⅞" Diameter, M. M. Sizes	287
1239 Round Adjustable Dies, 2¼" Diameter, M. M. Sizes	288
1240 Round Adjustable Dies, 1¾" Diameter, M. M. Sizes	287
1241 Round Adjustable Dies, 2" Diameter, M. M. Sizes	288
1242 Round Adjustable Dies, 2½" Diameter, M. M. Sizes	288
1243 Round Adjustable Dies, 3" Diameter, M. M. Sizes	288
1245 Round Adjustable Dies, 1" Diameter, for Iron Pipe	289
1246 Round Adjustable Dies, 1⅝" Diameter, for Iron Pipe	289
1247 Round Adjustable Dies, 1⅞" Diameter, for Iron Pipe	289
1248 Round Adjustable Dies, 2¼" Diameter, for Iron Pipe	289
1250 Round Adjustable Dies, 1" Diameter, for Brass Pipe	289
1251 Round Adjustable Dies, 1⅝" Diameter, for Brass Pipe	289
1252 Round Adjustable Dies, 1⅞" Diameter, for Brass Pipe	289
1261 Sets of Round Adjustable Dies, ⅝" Diameter	290
1264 Sets of Round Adjustable Dies, ⅞" Diameter	291
1265 Sets of Round Adjustable Dies, 1⅜" Diameter, A. S. M. E. Standard	291
1268 Sets of Round Adjustable Dies, 1" Diameter	292
1271 Sets of Round Adjustable Dies, 1⅝" Diameter	292
1274 Sets of Round Adjustable Dies, 1⅝" and 2¼" Diameter	293
1277 Sets of Round Adjustable Dies, 1¾" Diameter	293
1281 Sets of Round Adjustable Dies, 1⅜", 1⅝", 1⅞" and 2¼" Diameter, French Standard	293
1285 Sets of Round Adjustable Dies, 2" Diameter	294
1288 Sets of Round Adjustable Dies, 2½" Diameter	294
1291 Sets of Round Adjustable Dies, 3" Diameter	294
1293 Double Sets of Round Adjustable Dies, 2" and 3" Diameter	295
1296 Triple Sets of Round Adjustable Dies, 1½", 2½" and 3" Diameter	295
Dimensions of One-Lock Reamer parts	167
Drill Press Manufacturers	62
Drills in Sets	93-105
General information in ordering Gear Cutters	212-213
Reamers in Sets	130-131
Sectional Cases (boxes for)	106
TABLES	
Average lengths of Stay-Bolt Taps	267
Depth of space and thickness of Tooth in Spur Wheels	212-213
Showing corresponding Diametral and Circular Pitches	211
Tools for use in Turret Machines	88-89
Use of Drills with Oil Holes	78-79
Use of Hollow Drills	78



No. 200 STEEL SOCKETS

FOR MORSE TAPER SHANK DRILLS



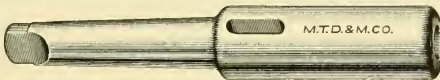
Size Hole, M. T. No.	Price Each	Holds Drills, Sizes	Whole Length, Inches	Blank End	
				Diam. Inches	Length, Inches
1	\$1.20	$\frac{1}{4}$ to $\frac{9}{16}$ in.	7	$1\frac{1}{16}$	4
2	1.80	$\frac{3}{8}$ to $\frac{29}{32}$ in.	8	$1\frac{1}{4}$	$4\frac{1}{4}$
3	2.50	$\frac{5}{8}$ to $1\frac{1}{4}$ in.	10	$1\frac{1}{2}$	$5\frac{3}{8}$
4	4.00	$1\frac{1}{4}$ to 2 in.	12	2	$6\frac{3}{8}$
5	7.50	$2\frac{1}{4}$ to 3 in.	16	$2\frac{5}{8}$	9
6	14.00	$3\frac{1}{4}$ to 6 in.	22	$3\frac{5}{8}$	$12\frac{3}{4}$

Plugs are furnished with these Sockets for turning shanks.

These Sockets can be furnished hardened and ground, inside and out, at special prices.

No. 201 STEEL SOCKETS

FOR MORSE TAPER SHANK DRILLS



Size	Price Each	Size Hole Morse Taper, Number	Size Shank Morse Taper, Number	Whole Length
1 to 2	\$2.00	1	2	$6\frac{1}{8}$
1 to 3	2.50	1	3	$6\frac{7}{8}$
1 to 4	3.20	1	4	$7\frac{7}{8}$
1 to 5	4.80	1	5	$9\frac{1}{8}$
2 to 3	2.50	2	3	$7\frac{1}{2}$
2 to 4	3.20	2	4	$8\frac{1}{2}$
2 to 5	4.80	2	5	$9\frac{3}{4}$
3 to 2	3.20	3	2	$7\frac{5}{8}$
3 to 3	3.20	3	3	$8\frac{3}{8}$
3 to 4	3.20	3	4	$9\frac{3}{8}$
3 to 5	4.80	3	5	$10\frac{5}{8}$
4 to 3	4.80	4	3	$9\frac{3}{8}$
4 to 4	4.80	4	4	$10\frac{3}{8}$
4 to 5	4.80	4	5	$11\frac{5}{8}$
4 to 6	12.00	4	6	$14\frac{1}{16}$
5 to 4	12.00	5	4	$11\frac{11}{16}$
5 to 5	12.00	5	5	$12\frac{15}{16}$
5 to 6	12.00	5	6	$15\frac{3}{8}$

These Sockets can be furnished hardened and ground, inside and out, at special prices.

No. 202

STEEL SLEEVES

FOR MORSE TAPER SHANK DRILLS



Size	Price Each	Size Hole, Morse Taper, Number	Size Outside, Morse Taper, Number	Whole Length
1 to 2	\$1.80	1	2	$3\frac{9}{16}$
1 to 3	2.40	1	3	$3\frac{15}{16}$
1 to 4	3.00	1	4	$4\frac{7}{8}$
1 to 5	4.40	1	5	$6\frac{1}{8}$
2 to 3	2.40	2	3	$4\frac{7}{16}$
2 to 4	3.00	2	4	$4\frac{7}{8}$
2 to 5	4.40	2	5	$6\frac{1}{8}$
3 to 4	3.00	3	4	$5\frac{3}{8}$
3 to 5	4.40	3	5	$6\frac{1}{8}$
4 to 5	4.40	4	5	$6\frac{5}{8}$
4 to 6	10.00	4	6	$8\frac{5}{8}$
5 to 6	10.00	5	6	$8\frac{5}{8}$

These sleeves can be furnished hardened and ground, inside and out, at special prices.

No. 210

CENTER KEYS

FOR SOCKETS AND SLEEVES



Size	Price Each	Fitting Socket or Sleeve, Morse Taper, Number
1	\$.30	1
2	.35	2
3	.40	3
4	.50	4
5	.60	5
6	.75	6

These Keys are drop-forged, from Steel, and are finished and hardened.

No. 217
LATHE SOCKETS

FOR MORSE TAPER SHANK DRILLS



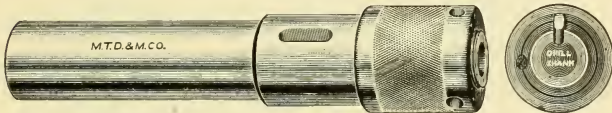
Number	Price Each	Holds Morse Taper Shank Drills Sizes	Whole Length, Inches
1	\$2.00	$\frac{1}{16}$ to $\frac{9}{16}$ inclusive	$4\frac{3}{4}$
2	2.65	$\frac{3}{16}$ to $\frac{29}{32}$ "	$5\frac{1}{2}$
3	3.55	$\frac{5}{16}$ to $1\frac{1}{4}$ "	$6\frac{3}{4}$
4	4.80	$1\frac{1}{2}$ to 2 "	8
5	7.50	$2\frac{1}{4}$ to 3 "	10

The end fitting the Lathe Center is deeply countersunk to insure a good bearing. These Sockets are hardened.

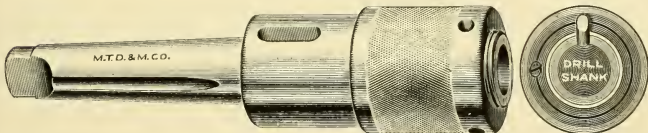
ANDREW'S PATENT DRILL SOCKETS

FOR MORSE TAPER SHANK DRILLS

No. 225



No. 226

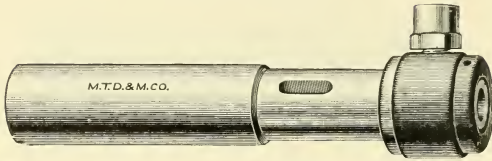


These Sockets are fitted with a Key sliding in a radial slot in the holding head. The Key bears upon the inclined seat in the shank of the drill and is forced to its seat by a cap fitting over the holding head. Turning the cap by the hand in one direction holds the drill firmly in place, while turning it in the opposite direction releases its grip so that the drill can be easily removed.

For illustration of drill with Andrew's shank see page 12.

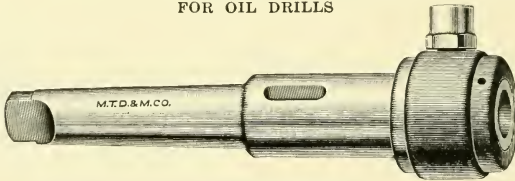
Prices upon application.

No. 220
MORSE TAPER SOCKETS
 FOR OIL DRILLS



Size Hole, M. T. No.	Price Each	Holds Drills, Sizes	Whole Length, Inches	Blank End	
				Diam. Inches	Length, Inches
1	\$4.00	$\frac{1}{4}$ to $\frac{9}{16}$ in.	7	$1\frac{1}{16}$	4
2	5.00	$\frac{3}{8}$ to $\frac{29}{32}$ in.	8	$1\frac{1}{4}$	$4\frac{1}{4}$
3	6.50	$\frac{5}{8}$ to $1\frac{1}{4}$ in.	10	$1\frac{1}{2}$	$5\frac{3}{8}$
4	9.25	$1\frac{1}{4}$ to 2 in.	12	2	$6\frac{3}{8}$
5	10.25	$2\frac{1}{4}$ to 3 in.	16	$2\frac{5}{8}$	9

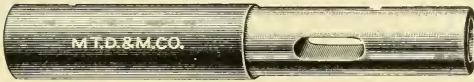
No. 221
MORSE TAPER SOCKETS
 FOR OIL DRILLS



Size	Price Each	Size Hole, Morse Taper, Number	Size Shank, Morse Taper, Number	Whole Length
1 to 2	\$4.50	1	2	$6\frac{1}{8}$
1 to 3	4.50	1	3	$6\frac{7}{8}$
2 to 3	5.50	2	3	$7\frac{1}{2}$
2 to 4	6.75	2	4	$8\frac{1}{2}$
3 to 4	7.00	3	4	$9\frac{3}{8}$
4 to 5	10.00	4	5	$11\frac{5}{8}$

Sockets Nos. 220 and 221 are used in connection with No. 474 oil drills which are illustrated on pages 80 to 81, and the method of using is illustrated on page 79. As the use of oil sockets and oil drills is now quite generally understood, we do not furnish further explanation in this catalog, but will gladly do so when requested.

No. 230
STEEL SOCKETS FOR SHORT SHANKS
MORSE TAPER

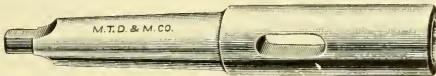


SOCKETS FOR SHANKS OF REGULAR LENGTH LISTED ON PAGE 1

Size Hole, M. T. No.	Price Each	Holds Drills, Sizes	Whole Length, Inches	Blank End	
				Diam. Inches	Length, Inches
1	\$1.20	$\frac{1}{4}$ to $\frac{9}{16}$ in.	7	$1\frac{1}{16}$	4
2	1.80	$\frac{3}{8}$ to $\frac{29}{32}$ in.	8	$1\frac{1}{4}$	$4\frac{1}{4}$
3	2.50	$\frac{5}{8}$ to $1\frac{1}{4}$ in.	10	$1\frac{1}{2}$	$5\frac{3}{8}$
4	4.00	$1\frac{1}{2}$ to 2 in.	12	2	$6\frac{3}{8}$
5	7.50	$2\frac{1}{4}$ to 3 in.	16	$2\frac{5}{8}$	9
6	14.00	$3\frac{1}{4}$ to 6 in.	22	$3\frac{5}{8}$	$12\frac{3}{4}$

Plugs are furnished with these Sockets for turning shanks.
See note at bottom of page.

No. 231
STEEL SOCKETS FOR SHORT SHANKS
MORSE TAPER



SOCKETS FOR SHANKS OF REGULAR LENGTH LISTED ON PAGE 1

Size	Price Each	Size Hole, M. T., Short, Number	Size Shank, Morse Taper, Number	Whole Length
1 to 2	\$2.00	1	2	$6\frac{1}{8}$
1 to 3	2.50	1	3	$6\frac{7}{8}$
2 to 3	2.50	2	3	$7\frac{1}{2}$
2 to 4	3.20	2	4	$8\frac{1}{2}$
3 to 4	3.20	3	4	$9\frac{1}{8}$
3 to 5	4.80	3	5	$10\frac{3}{8}$
4 to 5	4.80	4	5	$11\frac{5}{8}$
4 to 6	12.00	4	6	14
5 to 6	12.00	5	6	$15\frac{1}{2}$

Short Shank Sockets are for use with drills on which the original tangs have been broken, the shanks reduced in length and fitted with thicker and wider tangs, thus insuring a strong drive. Gauges for fitting drills with broken tangs to Short Shank Sockets can be furnished on receipt of order, see page 6.

Shank is Morse Standard Taper. Hole only is for Short Shanks.



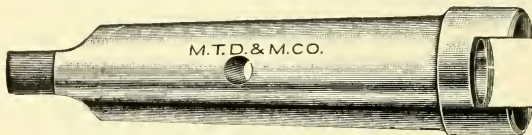
No. 232
STEEL SLEEVES
FOR SHORT SHANKS
MORSE TAPER

SLEEVES FOR SHANKS OF REGULAR LENGTH LISTED ON PAGE 2.

Size	Price Each	Size Hole, Morse Taper, Number	Size Outside, Morse Taper, Number	Whole Length, Inches
1 to 2	\$1.80	1	2	$3\frac{9}{16}$
1 to 3	2.40	1	3	$3\frac{15}{16}$
2 to 3	2.40	2	3	$4\frac{7}{16}$
2 to 4	3.00	2	4	$4\frac{7}{8}$
3 to 4	3.00	3	4	$5\frac{3}{8}$
3 to 5	4.40	3	5	$6\frac{1}{8}$
4 to 5	4.40	4	5	$6\frac{5}{8}$
4 to 6	10.00	4	6	$8\frac{5}{8}$
5 to 6	10.00	5	6	$8\frac{5}{8}$

See note on page 5. See Gauge illustrated below.
 Inside Taper only for Short Shanks, outside Taper is Morse Standard.

No. 240
STEEL SLEEVES WITH CLUTCH DRIVE
FOR MORSE TAPER SHANK DRILLS



No. 301



Designed for use with High Speed Drills or where a strong positive drive is necessary. The drill has no tang, being driven entirely by the clutch. Prices on application.

No. 246
TANG GAUGE FOR SHORT SHANK SOCKETS



Prices on application



No. 250

FLOATING SOCKETS
 WITH MORSE TAPER HOLES

Number	Morse Taper Hole, Number	Diameter of Collet, Inches	Length of Collet, Inches	Whole Length, Inches	Price Each
1	1	$1\frac{1}{4}$	3	$4\frac{1}{2}$	\$3.50
2	1	$1\frac{1}{2}$	$3\frac{1}{4}$	$5\frac{1}{4}$	3.50
3	1	$1\frac{3}{4}$	$3\frac{1}{4}$	$5\frac{1}{4}$	3.50
4	2	$1\frac{1}{4}$	3	$4\frac{1}{2}$	4.00
5	2	$1\frac{1}{2}$	$3\frac{1}{4}$	$5\frac{1}{4}$	4.00
6	2	$1\frac{3}{4}$	$3\frac{1}{4}$	$5\frac{1}{4}$	4.00
7	3	$1\frac{1}{2}$	$3\frac{1}{4}$	$5\frac{1}{4}$	4.75
8	3	$1\frac{3}{4}$	$3\frac{1}{4}$	$5\frac{1}{4}$	4.75
9	3	2	$3\frac{1}{2}$	$6\frac{1}{4}$	4.75
10	4	2	$3\frac{1}{2}$	$6\frac{1}{4}$	5.30



No. 251

SOLID SOCKETS
 WITH MORSE TAPER HOLES

Number	Morse Taper Hole, Number	Diameter of Shank, Inches	Length of Shank, Inches	Whole Length, Inches	Price Each
1	1	1	$3\frac{1}{2}$	$3\frac{1}{2}$	\$2.00
2	1	$1\frac{1}{4}$	$3\frac{1}{2}$	$3\frac{1}{2}$	2.00
3	1	$1\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{2}$	2.00
4	2	1	$3\frac{5}{8}$	4	2.65
5	2	$1\frac{1}{4}$	$3\frac{5}{8}$	4	2.65
6	2	$1\frac{1}{2}$	$3\frac{5}{8}$	4	2.65
7	2	$1\frac{3}{4}$	$3\frac{5}{8}$	4	2.65
8	2	2	$3\frac{5}{8}$	4	2.65
9	3	$1\frac{1}{4}$	$4\frac{1}{8}$	$4\frac{3}{4}$	3.55
10	3	$1\frac{1}{2}$	$4\frac{1}{8}$	$4\frac{3}{4}$	3.55
11	3	$1\frac{3}{4}$	$4\frac{1}{8}$	$4\frac{3}{4}$	3.55
12	3	2	$4\frac{1}{8}$	$4\frac{3}{4}$	3.55
13	4	$1\frac{1}{2}$	$4\frac{5}{8}$	6	4.10
14	4	$1\frac{3}{4}$	$4\frac{5}{8}$	6	4.10
15	4	2	$4\frac{5}{8}$	6	4.10

The above listed Solid and Floating Sockets are for use in the turrets of Chucking Machines, Screw Machines, and Boring Mills for holding Reamers and Arbors with Morse Taper Shanks.

Other sizes made to order.

No. 260 STEEL SLEEVES

WITH MORSE TAPER HOLES AND
BROWN & SHARPE TAPER OUTSIDE



STYLE A



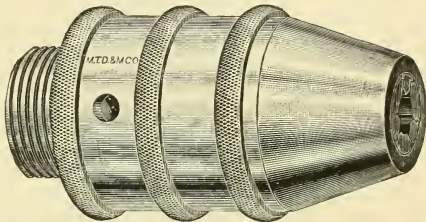
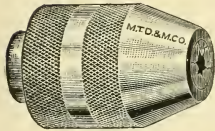
STYLE B

Morse Taper Hole, Number	Brown & Sharpe Taper, Outside, Number	Price Each	
		Style A	Style B
1	7	\$2.40	\$2.40
1	9	3.25	3.50
2	9	3.25	3.50
1	10	4.00	4.25
2	10	4.00	4.25
3	10	4.00	4.25
1	11	5.25	5.50
2	11	5.25	5.50
3	11	5.25	5.50
4	11	5.25	5.50

No. 275
BEACH DRILL CHUCK

NO. 0

NOS. 1, 2, 3 AND 4



Price Each

No. 0.	Holds from 0 to $\frac{1}{8}$ inch diameter (for jewelers)	.. .	\$8.00
No. 1.	Holds from 0 to $\frac{1}{4}$ inch diameter	.. .	8.00
No. 2.	Holds from 0 to $\frac{3}{8}$ inch diameter	.. .	8.50
No. 3.	Holds from $\frac{1}{16}$ to $\frac{1}{2}$ inch diameter	.. .	10.00
No. 4.	Holds from $\frac{3}{16}$ to $\frac{5}{8}$ inch diameter	.. .	11.00

For Arbors fitting these Chucks, see page 112.

No. 276
EXTRA JAWS FOR BEACH CHUCKS



List Price

Price each, not hardened, roughly shaped to size	.. .	\$0.50
Price per set, not hardened, roughly shaped to size	.. .	1.50
Price per set, hardened, and ground closely to size	.. .	3.50

Extra jaws are furnished soft, roughly shaped to size, unless otherwise specified, and they need to be fitted to the chuck and hardened. Hardened jaws are ground very closely to size.

We would much prefer to correctly fit the jaws to your chuck at our factory and the old chuck should be sent when new jaws are ordered.

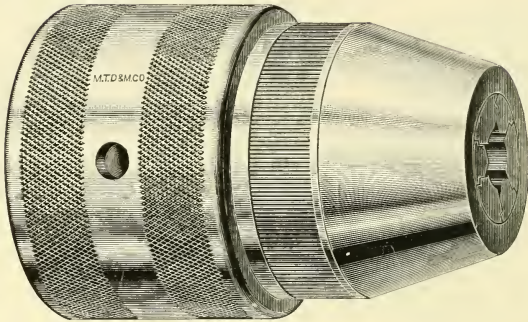
No. 278
WRENCHES FOR BEACH AND STETSON CHUCKS



Wrenches are furnished for Beach Chucks Nos. 1, 2, 3, 4, and for Stetson Chuck No. 2. These wrenches are of steel, drop forged, finished and case hardened.

No. 280

STETSON DRILL CHUCK



This chuck is strong and of heavy construction. The jaws are controlled by separate drivers, and are guided in that part of the chuck which is attached to the driving spindle. This arrangement gives increased strength to the chuck.

The threaded and working parts of the Chuck are covered, and thereby protected from injury and dirt.

		Price Each
No. 2.	Holds from 0 to $\frac{3}{8}$ inch diameter	\$8.50
No. 3.	Holds from $\frac{1}{16}$ to $\frac{1}{2}$ inch diameter	25.00
No. 4.	Holds from $\frac{3}{16}$ to $\frac{5}{8}$ inch diameter	25.00

Extra Jaws and Drivers for Stetson Chucks furnished when required, prices quoted on application.

These Chucks are so designed that a hole can be drilled through the center if desired.

No. 2 will permit of a hole $\frac{1}{4}$ inch in diameter.

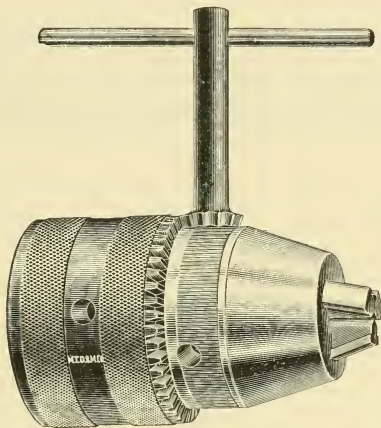
Nos. 3 and 4 will permit of a hole $\frac{3}{8}$ inch in diameter.

With Chuck No. 2 is furnished a spanner wrench illustrated on page 9.

With Chucks Nos. 3 and 4 instead of a spanner wrench there is furnished a special pin used in tightening and for rapid adjustment.

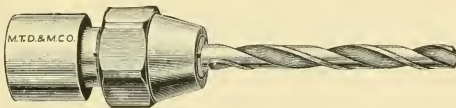
For Arbors fitting these Chucks, see page 112.

No. 281
STETSON GEARED CHUCKS



No. 2. Holds from 0 to $\frac{3}{8}$ inch diameter \$8.50
For Arbors fitting this Chuck, see page 112.

No. 290
CENTER DRILL CHUCKS



Center Drill Chucks are made of steel, have hardened jaws, and are made in two sizes. Each Chuck will hold but one size of drill—that for which it is especially made. Always specify diameter of drill to be used.

No. 1 Chuck can be made to hold any one size drill from $\frac{1}{16}$ to $\frac{3}{16}$ inch. Outside diameter of Chuck is $\frac{7}{8}$ inch, whole length $2\frac{1}{16}$ inches.

No. 2 Chuck can be made to hold any one size drill from $\frac{3}{16}$ to $\frac{5}{16}$ inch. Outside diameter of Chuck is $1\frac{1}{8}$ inches, whole length, $2\frac{1}{8}$ inches.

Size	Price Each
No. 1 Chuck	\$2.50
No. 2 Chuck	2.50

For Arbors fitting these Chucks, see page 115.

No. 295

LATHE CENTERS



Morse Taper Shank, Number	Price Each	Whole Length, Inches
0	\$.50	2 $\frac{7}{8}$
1	.60	3 $\frac{5}{16}$
2	.75	4 $\frac{3}{16}$
3	1.25	5 $\frac{1}{4}$
4	1.75	6 $\frac{3}{4}$
5	3.50	8 $\frac{1}{2}$

These Lathe Centers are made from Tool Steel, both ends being hardened. The shanks are ground to standard Morse tapers. Included angle of point is 60° and ground true. Other tapers made to order.

No. 300

MORSE TAPER SHANK DRILLS

FITTING ANDREW'S SOCKET



The above cut represents the shank of the drill used in the Andrew's Socket. The drills are held in place by the key in the socket. As the groove extends the entire length of the shank, there is no difficulty in PLACING the shank in the proper position.

The groove in the shank is deeper near the shoulder than at the outer end of the shank which prevents the drill from being pulled out of the socket as well as turning in it.

Drills having shanks milled or fitted in this way are furnished at regular No. 302 list.

For illustrations of Andrew's Sockets, see page 3.

No. 302
Carbon Steel

MORSE TAPER SHANK TWIST DRILLS



Drills of Carbon Steel with shanks LARGER than regular style No. 303, listed on page 20.

Diam., Inches	Price Each, Carbon Steel	Whole Length, Inches	Twist Cut, Inches	Morse Taper Shank	Diam., Inches	Price Each, Carbon Steel	Whole Length, Inches	Twist Cut, Inches	Morse Taper Shank
1/8	\$0.45	5 1/8	2 3/16	No. 1	4 1/64	\$1.70	9	5 1/8	No. 2
9/64	.45	5 1/4	2 5/16		4 2/22	1.70	9	5 1/8	
5/32	.45	5 3/8	2 7/16		4 43/64	1.80	9 1/4	5 3/8	
11/64	.50	5 1/2	2 9/16		4 11/16	1.80	9 1/4	5 3/8	
3/16	.50	5 3/4	2 13/16		4 45/64	1.90	9 1/2	5 5/8	
13/64	.55	5 7/8	2 1/8		4 64/32	1.90	9 1/2	5 5/8	
7/32	.55	6	3		4 47/64	2.00	9 3/4	5 7/8	
15/64	.60	6 1/8	3		4 64/64	2.00	9 3/4	5 7/8	
1/4	.60	6 1/8	2 13/16		4 3/4	2.00	9 3/4	5 7/8	
17/64	.65	6 1/4	2 15/16		4 49/64	2.10	9 7/8	6	
9/32	.65	6 1/4	2 15/16		4 45/32	2.10	9 7/8	6	
19/64	.70	6 3/8	3 1/16		4 32/32	2.20	10	6 1/8	
5/16	.70	6 3/8	3 1/16		4 51/64	2.20	10	6 1/8	
21/64	.75	6 1/2	3 3/16		4 13/16	2.40	10 1/4	6 3/8	
11/32	.75	6 1/2	3 3/16		4 53/64	2.40	10 1/4	6 3/8	
23/64	.80	6 3/4	3 7/16		4 64/32	2.60	10 1/2	6 5/8	
3/8	.80	6 3/4	3 7/16		4 55/64	2.60	10 1/2	6 5/8	
25/64	.90	7	3 11/16		4 7/8	2.80	10 1/2	6 5/8	
13/32	.90	7	3 11/16		4 57/64	2.80	10 5/8	6 3/4	
27/64	1.00	7 1/4	3 15/16		4 64/32	2.80	10 5/8	6 3/4	
7/16	1.00	7 1/4	3 15/16	4 59/64	3.00	10 3/4	6 1/8		
29/64	1.10	7 1/2	4 3/16	4 15/16	3.00	10 3/4	6 1/8		
15/32	1.10	7 1/2	4 3/16	4 16/64	3.25	10 7/8	6 1/4		
31/64	1.20	7 3/4	4 7/16	4 61/32	3.25	10 7/8	6 1/4		
1/2	1.20	7 3/4	4 7/16	4 32/64	3.50	11	6 3/8		
33/64	1.30	8	4 11/16	4 63/64	3.50	11	6 3/8		
17/32	1.30	8	4 11/16	1	3.50	11 1/8	6 1/2		
35/64	1.40	8 1/4	4 15/16	1 1/64	3.75	11 1/8	6 1/2		
9/16	1.40	8 1/4	4 15/16	1 3/32	4.00	11 1/4	6 5/8		
				1 64/32	4.00	11 1/4	6 5/8		
				1 5/64	4.25	11 1/2	6 7/8		
				1 3/32	4.25	11 1/2	6 7/8		
37/64	1.50	8 1/2	4 5/8	1 7/64	4.50	11 3/4	7 1/8		
19/32	1.50	8 1/2	4 5/8	1 64/32	4.50	11 3/4	7 1/8		
39/64	1.60	8 3/4	4 7/8	1 1/8	4.50	11 3/4	7 1/8		
5/8	1.60	8 3/4	4 7/8	1 9/64	4.75	11 7/8	7 1/4		

No. 302
Carbon Steel

MORSE TAPER SHANK TWIST DRILLS

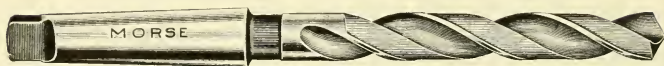


Drills of Carbon Steel with shanks LARGER than regular, style No. 303, listed on page 20.

Diam., Inches	Price Each, Carbon Steel	Whole Length, Inches	Twist Cut, Inches	Morse Taper Shank	Diam., Inches	Price Each, Carbon Steel	Whole Length, Inches	Twist Cut, Inches	Morse Taper Shank
1 ⁵ / ₃₂	\$4.75	11 ⁷ / ₈	7 ¹ / ₄	No. 3	1 ¹¹ / ₁₆	\$11.50	15 ³ / ₄	10 ¹ / ₈	No. 4
1 ¹¹ / ₆₄	5.00	12	7 ³ / ₈		1 ⁴⁵ / ₆₄	12.00	15 ³ / ₄	10 ¹ / ₈	
1 ³ / ₁₆	5.00	12	7 ³ / ₈		1 ²³ / ₃₂	12.00	15 ³ / ₄	9 ¹¹ / ₁₆	
1 ¹³ / ₆₄	5.25	12 ¹ / ₈	7 ¹ / ₂		1 ⁴⁷ / ₆₄	12.50	16	9 ¹⁵ / ₁₆	
1 ⁷ / ₃₂	5.25	12 ¹ / ₈	7 ¹ / ₂		1 ³ / ₄	12.50	16	9 ¹⁵ / ₁₆	
1 ¹⁵ / ₆₄	5.50	12 ¹ / ₂	7 ⁷ / ₈		1 ²⁵ / ₃₂	13.25	16	9 ¹⁵ / ₁₆	
1 ¹ / ₄	5.50	12 ¹ / ₂	7 ⁷ / ₈		1 ¹³ / ₁₆	14.00	16 ¹ / ₄	10 ¹ / ₈	
					1 ²⁷ / ₃₂	14.75	16 ¹ / ₄	10 ¹ / ₈	
					1 ⁷ / ₈	15.50	16 ¹ / ₂	10 ³ / ₈	
					1 ²⁹ / ₃₂	16.25	16 ¹ / ₂	10 ³ / ₈	
1 ¹⁷ / ₆₄	5.75	14 ¹ / ₈	8 ¹ / ₂	No. 4	1 ¹⁵ / ₁₆	17.00	16 ¹ / ₂	10 ¹ / ₄	No. 5
1 ⁹ / ₃₂	5.75	14 ¹ / ₈	8 ¹ / ₂		1 ³¹ / ₃₂	17.75	16 ¹ / ₂	10 ¹ / ₄	
1 ¹⁹ / ₆₄	6.00	14 ¹ / ₄	8 ⁵ / ₈		2	18.50	16 ¹ / ₂	10 ¹ / ₄	
1 ⁵ / ₁₆	6.00	14 ¹ / ₄	8 ⁵ / ₈						
1 ²¹ / ₆₄	6.25	14 ³ / ₈	8 ³ / ₄						
1 ¹¹ / ₃₂	6.25	14 ³ / ₈	8 ³ / ₄						
1 ²³ / ₆₄	6.50	14 ¹ / ₂	8 ⁷ / ₈						
1 ³ / ₈	6.50	14 ¹ / ₂	8 ⁷ / ₈						
1 ²⁵ / ₆₄	7.00	14 ⁵ / ₈	9						
1 ¹³ / ₃₂	7.00	14 ⁵ / ₈	9						
1 ²⁷ / ₆₄	7.50	14 ³ / ₄	9 ¹ / ₈						
1 ⁷ / ₁₆	7.50	14 ³ / ₄	9 ¹ / ₈						
1 ²⁹ / ₆₄	8.00	14 ⁷ / ₈	9 ¹ / ₄						
1 ¹⁵ / ₃₂	8.00	14 ⁷ / ₈	9 ¹ / ₄						
1 ³¹ / ₆₄	8.50	15	9 ³ / ₈						
1 ¹ / ₂	8.50	15	9 ³ / ₈						
1 ³³ / ₆₄	9.00	15	9 ³ / ₈						
1 ¹⁷ / ₃₂	9.00	15	9 ³ / ₈						
1 ³⁵ / ₆₄	9.50	15 ¹ / ₄	9 ⁵ / ₈						
1 ¹⁹ / ₁₆	9.50	15 ¹ / ₄	9 ⁵ / ₈						
1 ³⁷ / ₆₄	10.00	15 ¹ / ₄	9 ⁵ / ₈						
1 ¹⁹ / ₃₂	10.00	15 ¹ / ₄	9 ⁵ / ₈						
1 ³⁹ / ₆₄	10.50	15 ¹ / ₂	9 ⁷ / ₈						
1 ⁵ / ₈	10.50	15 ¹ / ₂	9 ⁷ / ₈						
1 ⁴¹ / ₆₄	11.00	15 ¹ / ₂	9 ⁷ / ₈						
1 ²¹ / ₃₂	11.00	15 ¹ / ₂	9 ⁷ / ₈						
1 ⁴³ / ₆₄	11.50	15 ³ / ₄	10 ¹ / ₈						

No. 1302 High Speed Steel

MORSE TAPER SHANK TWIST DRILLS



Unless otherwise specified, drills of High Speed Steel will be furnished with shanks as listed below.

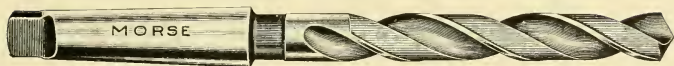
Drills with other sizes of shanks are listed on pages 18 and 19.

All sizes and dimensions not listed are special and subject to special prices.

Diam., Inches	Price Each High Speed Steel	Whole Length, Inches	Twist Cut, Inches	Morse Taper Shank	Diam., Inches	Price Each High Speed Steel	Whole Length, Inches	Twist Cut, Inches	Morse Taper Shank
1/8	\$.90	5 1/8	1 5/8	No. 1	41/64	\$2.75	9	5 1/8	No. 2
9/64	.90	5 3/8	1 7/8		41/32	2.75	9	5 1/8	
5/32	.90	5 3/8	1 7/8		64/64	3.00	9 1/4	5 3/8	
11/64	.90	5 3/4	2 1/4		11/16	3.00	9 1/4	5 3/8	
3/16	.90	5 3/4	2 1/4		45/64	3.25	9 1/2	5 5/8	
13/64	1.00	6	2 1/2		23/32	3.25	9 1/2	5 5/8	
7/32	1.00	6	2 1/2		47/64	3.50	9 3/4	5 7/8	
15/64	1.10	6 1/8	2 5/8		3/4	3.50	9 3/4	5 7/8	
1/4	1.10	6 1/8	2 5/8		49/64	3.75	9 7/8	6	
17/64	1.20	6 1/4	2 3/4		25/32	3.75	9 7/8	6	
9/32	1.20	6 1/4	2 3/4		32				
19/64	1.30	6 3/8	3		51/64	4.00	10 3/4	6 1/8	No. 3
5/16	1.30	6 3/8	3		13/16	4.00	10 3/4	6 1/8	
21/64	1.40	6 1/2	3 1/8		16/16	4.40	10 3/4	6 1/8	
64/64	1.40	6 1/2	3 1/8		53/64	4.40	10 3/4	6 1/8	
1/2	1.40	6 1/2	3 1/8		64/64	4.40	10 3/4	6 1/8	
23/64	1.50	6 3/4	3 1/2		27/32	4.40	10 3/4	6 1/8	
3/8	1.50	6 3/4	3 1/2		35/64	4.75	10 3/4	6 1/8	
25/64	1.65	7	3 5/8		64/64	4.75	10 3/4	6 1/8	
13/32	1.65	7	3 5/8		7/8	5.15	10 3/4	6 1/8	
27/64	1.75	7 1/4	3 7/8	57/64	5.15	10 3/4	6 1/8		
7/16	1.75	7 1/4	3 7/8	64/64	5.15	10 3/4	6 1/8		
29/64	1.90	7 1/2	4 1/8	29/32	5.50	10 3/4	6 1/8	No. 4	
5/32	1.90	7 1/2	4 1/8	64/64	5.50	10 3/4	6 1/8		
				15/16	5.50	10 3/4	6 1/8		
				16/16	5.50	10 3/4	6 1/8		
				61/64	5.90	11	6 3/8		
				64/64	5.90	11	6 3/8		
				31/32	6.25	11	6 3/8		
				64/64	6.25	11	6 3/8		
				64/64	6.75	11 1/8	6 1/2		
				1	6.75	11 1/8	6 1/2		
31/64	2.00	8 1/4	4 3/8		6.75	11 1/8	6 1/2		
1/2	2.00	8 1/4	4 3/8		7.25	11 1/4	6 5/8		
33/64	2.15	8 1/2	4 5/8		7.25	11 1/4	6 5/8		
17/32	2.15	8 1/2	4 5/8		7.25	11 1/4	6 5/8		
35/64	2.25	8 3/4	4 7/8						
9/16	2.25	8 3/4	4 7/8						
37/64	2.40	8 3/4	4 7/8						
19/32	2.40	8 3/4	4 7/8						
39/64	2.50	8 3/4	4 7/8						
5/8	2.50	8 3/4	4 7/8						

No. 1302 High Speed Steel

MORSE TAPER SHANK TWIST DRILLS



Unless otherwise specified, drills of High Speed Steel will be furnished with shanks as listed below.

Drills with other sizes of shanks are listed on pages 18 and 19.

All sizes and dimensions not listed are special and subject to special prices.

Diam., Inches	Price Each High Speed Steel	Whole Length, Inches	Twist Cut, Inches	Morse Taper Shank	Diam., Inches	Price Each High Speed Steel	Whole Length, Inches	Twist Cut, Inches	Morse Taper Shank
1 $\frac{5}{32}$	\$8.90	12 $\frac{7}{8}$	7 $\frac{1}{4}$	No. 4	1 $\frac{143}{64}$	\$23.00	17 $\frac{3}{16}$	10 $\frac{3}{16}$	No. 5
1 $\frac{11}{64}$	9.50	13	7 $\frac{3}{8}$		1 $\frac{11}{16}$	23.00	17 $\frac{3}{16}$	10 $\frac{3}{16}$	
1 $\frac{3}{16}$	9.50	13	7 $\frac{3}{8}$		1 $\frac{45}{64}$	24.00	17 $\frac{3}{16}$	10 $\frac{3}{16}$	
1 $\frac{13}{64}$	10.15	13 $\frac{1}{8}$	7 $\frac{1}{2}$		1 $\frac{23}{32}$	24.00	17 $\frac{3}{16}$	10 $\frac{3}{16}$	
1 $\frac{7}{32}$	10.15	13 $\frac{1}{8}$	7 $\frac{1}{2}$		1 $\frac{47}{64}$	25.00	17 $\frac{3}{16}$	10 $\frac{3}{16}$	
1 $\frac{15}{64}$	10.75	13 $\frac{1}{2}$	7 $\frac{7}{8}$		1 $\frac{3}{4}$	25.00	17 $\frac{3}{16}$	10 $\frac{3}{16}$	
1 $\frac{1}{4}$	10.75	13 $\frac{1}{2}$	7 $\frac{7}{8}$		1 $\frac{25}{32}$	26.25	17 $\frac{3}{16}$	10 $\frac{3}{16}$	
1 $\frac{17}{64}$	11.50	14 $\frac{1}{8}$	8 $\frac{1}{2}$		1 $\frac{13}{16}$	27.50	17 $\frac{3}{16}$	10 $\frac{3}{16}$	
1 $\frac{9}{32}$	11.50	14 $\frac{1}{8}$	8 $\frac{1}{2}$		1 $\frac{27}{32}$	28.75	17 $\frac{3}{16}$	10 $\frac{3}{16}$	
1 $\frac{19}{64}$	12.25	14 $\frac{1}{4}$	8 $\frac{5}{8}$		1 $\frac{7}{8}$	30.00	17 $\frac{3}{8}$	10 $\frac{3}{8}$	
1 $\frac{5}{16}$	12.25	14 $\frac{1}{4}$	8 $\frac{5}{8}$		1 $\frac{29}{32}$	31.25	17 $\frac{3}{8}$	10 $\frac{3}{8}$	
1 $\frac{21}{64}$	13.00	14 $\frac{3}{8}$	8 $\frac{3}{4}$		1 $\frac{15}{16}$	32.50	17 $\frac{3}{8}$	10 $\frac{3}{8}$	
1 $\frac{11}{32}$	13.00	14 $\frac{3}{8}$	8 $\frac{3}{4}$		1 $\frac{31}{32}$	33.75	17 $\frac{3}{8}$	10 $\frac{3}{8}$	
1 $\frac{23}{64}$	13.75	14 $\frac{1}{2}$	8 $\frac{7}{8}$		2	35.00	17 $\frac{3}{8}$	10 $\frac{3}{8}$	
1 $\frac{3}{8}$	13.75	14 $\frac{1}{2}$	8 $\frac{7}{8}$		2 $\frac{1}{32}$	36.25	17 $\frac{3}{8}$	10 $\frac{3}{8}$	
1 $\frac{25}{64}$	14.65	14 $\frac{5}{8}$	9		2 $\frac{1}{16}$	37.50	17 $\frac{3}{8}$	10 $\frac{3}{8}$	
1 $\frac{13}{32}$	14.65	14 $\frac{5}{8}$	9		2 $\frac{3}{32}$	38.75	17 $\frac{3}{8}$	10 $\frac{3}{8}$	
1 $\frac{27}{64}$	15.50	14 $\frac{3}{4}$	9 $\frac{1}{8}$		2 $\frac{1}{8}$	40.00	17 $\frac{3}{8}$	10 $\frac{3}{8}$	
1 $\frac{7}{16}$	15.50	14 $\frac{3}{4}$	9 $\frac{1}{8}$		2 $\frac{5}{32}$	41.25	17 $\frac{3}{8}$	10 $\frac{3}{8}$	
1 $\frac{29}{64}$	16.40	14 $\frac{7}{8}$	9 $\frac{1}{4}$		2 $\frac{3}{16}$	42.50	17 $\frac{3}{8}$	10 $\frac{3}{8}$	
1 $\frac{15}{32}$	16.40	14 $\frac{7}{8}$	9 $\frac{1}{4}$	2 $\frac{7}{32}$	43.75	17 $\frac{3}{8}$	10 $\frac{3}{8}$		
1 $\frac{31}{64}$	17.25	15	9 $\frac{3}{8}$	2 $\frac{1}{4}$	45.00	17 $\frac{3}{8}$	10 $\frac{3}{8}$		
1 $\frac{1}{2}$	17.25	15	9 $\frac{3}{8}$	2 $\frac{5}{16}$	50.00	17 $\frac{3}{8}$	10 $\frac{3}{8}$		
1 $\frac{33}{64}$	18.15	16 $\frac{3}{8}$	9 $\frac{3}{8}$	2 $\frac{3}{8}$	55.00	17 $\frac{3}{8}$	10 $\frac{3}{8}$		
1 $\frac{17}{32}$	18.15	16 $\frac{3}{8}$	9 $\frac{3}{8}$	2 $\frac{7}{16}$	60.00	18 $\frac{3}{4}$	11 $\frac{1}{4}$		
1 $\frac{35}{64}$	19.00	16 $\frac{5}{8}$	9 $\frac{5}{8}$	2 $\frac{1}{2}$	65.00	18 $\frac{3}{4}$	11 $\frac{1}{4}$		
1 $\frac{9}{16}$	19.00	16 $\frac{5}{8}$	9 $\frac{5}{8}$	2 $\frac{9}{16}$	70.00	19 $\frac{1}{2}$	11 $\frac{7}{8}$		
1 $\frac{37}{64}$	20.00	16 $\frac{15}{16}$	9 $\frac{15}{16}$	2 $\frac{5}{8}$	75.00	19 $\frac{1}{2}$	11 $\frac{7}{8}$		
1 $\frac{19}{32}$	20.00	16 $\frac{15}{16}$	9 $\frac{15}{16}$	2 $\frac{11}{16}$	80.00	20 $\frac{3}{8}$	12 $\frac{3}{4}$		
1 $\frac{39}{64}$	21.00	17 $\frac{1}{16}$	10 $\frac{1}{16}$	2 $\frac{3}{4}$	85.00	20 $\frac{3}{8}$	12 $\frac{3}{4}$		
1 $\frac{9}{8}$	21.00	17 $\frac{1}{16}$	10 $\frac{1}{16}$	2 $\frac{13}{16}$	90.00	21 $\frac{1}{8}$	13 $\frac{1}{4}$		
1 $\frac{41}{64}$	22.00	17 $\frac{3}{16}$	10 $\frac{3}{16}$	2 $\frac{7}{8}$	95.00	21 $\frac{1}{8}$	13 $\frac{1}{4}$		
1 $\frac{21}{32}$	22.00	17 $\frac{3}{16}$	10 $\frac{3}{16}$	2 $\frac{15}{16}$	100.00	21 $\frac{3}{4}$	13 $\frac{3}{4}$		
				3	105.00	21 $\frac{3}{4}$	13 $\frac{3}{4}$		

No. 1303A High Speed Steel

MORSE TAPER SHANK TWIST DRILLS

Shanks SMALLER than regular



SPECIFY SIZE OF SHANK WANTED

All sizes and dimensions not listed are special and subject to special prices.

Diam., Inches	Price Each	Whole Length, Inches	Twist Cut, Inches	Morse Taper Shank	Diam., Inches	Price Each	Whole Length, Inches	Twist Cut, Inches	Morse Taper Shank	
$\frac{31}{64}$	\$2.00	$7\frac{11}{16}$	$4\frac{3}{8}$	No. 1	$1\frac{33}{64}$	\$18.15	15	$9\frac{3}{8}$	No. 4	
$1\frac{1}{2}$	2.00	$7\frac{11}{16}$	$4\frac{3}{8}$		$1\frac{17}{32}$	18.15	15	$9\frac{3}{8}$		
$\frac{33}{64}$	2.15	$7\frac{15}{16}$	$4\frac{5}{8}$		$1\frac{35}{64}$	19.00	$15\frac{1}{4}$	$9\frac{5}{8}$		
$\frac{17}{32}$	2.15	$7\frac{15}{16}$	$4\frac{5}{8}$		$1\frac{9}{16}$	19.00	$15\frac{1}{4}$	$9\frac{5}{8}$		
$\frac{35}{64}$	2.25	$8\frac{3}{16}$	$4\frac{7}{8}$		$1\frac{37}{64}$	20.00	$15\frac{9}{16}$	$9\frac{15}{16}$		
$\frac{9}{16}$	2.25	$8\frac{3}{16}$	$4\frac{7}{8}$		$1\frac{64}{64}$	20.00	$15\frac{9}{16}$	$9\frac{15}{16}$		
					$1\frac{39}{64}$	21.00	$15\frac{11}{16}$	$10\frac{1}{16}$		
$\frac{51}{64}$	4.00	10	$6\frac{1}{8}$		$1\frac{5}{8}$	21.00	$15\frac{11}{16}$	$10\frac{1}{16}$		
$\frac{13}{16}$	4.00	10	$6\frac{1}{8}$		$1\frac{41}{64}$	22.00	$15\frac{13}{16}$	$10\frac{3}{16}$		
$\frac{53}{64}$	4.40	10	$6\frac{1}{8}$		No. 2	$1\frac{21}{32}$	22.00	$15\frac{13}{16}$		$10\frac{3}{16}$
$\frac{27}{32}$	4.40	10	$6\frac{1}{8}$	$1\frac{43}{64}$		23.00	$15\frac{13}{16}$	$10\frac{3}{16}$		
$\frac{55}{64}$	4.75	10	$6\frac{1}{8}$	$1\frac{11}{16}$		23.00	$15\frac{13}{16}$	$10\frac{3}{16}$		
$\frac{7}{8}$	4.75	10	$6\frac{1}{8}$	$1\frac{45}{64}$		24.00	$15\frac{13}{16}$	$10\frac{3}{16}$		
$\frac{57}{64}$	5.15	10	$6\frac{1}{8}$	$1\frac{23}{32}$		24.00	$16\frac{1}{4}$	$10\frac{3}{16}$		
$\frac{29}{32}$	5.15	10	$6\frac{1}{8}$	$1\frac{47}{64}$		25.00	$16\frac{1}{4}$	$10\frac{3}{16}$		
				$1\frac{3}{4}$		25.00	$16\frac{1}{4}$	$10\frac{3}{16}$		
$1\frac{5}{64}$	7.75	$11\frac{1}{2}$	$6\frac{7}{8}$	No. 3		$1\frac{25}{32}$	26.25	$16\frac{1}{4}$		$10\frac{3}{16}$
$1\frac{3}{32}$	7.75	$11\frac{1}{2}$	$6\frac{7}{8}$			$1\frac{13}{16}$	27.50	$16\frac{5}{16}$		$10\frac{3}{16}$
$1\frac{7}{64}$	8.25	$11\frac{3}{4}$	$7\frac{1}{8}$			$1\frac{27}{32}$	28.75	$16\frac{5}{16}$		$10\frac{3}{16}$
$1\frac{1}{8}$	8.25	$11\frac{3}{4}$	$7\frac{1}{8}$		$1\frac{7}{8}$	30.00	$16\frac{1}{2}$	$10\frac{3}{8}$		
$1\frac{9}{64}$	8.90	$11\frac{7}{8}$	$7\frac{1}{4}$		$1\frac{29}{32}$	31.25	$16\frac{1}{2}$	$10\frac{3}{8}$		
$1\frac{5}{32}$	8.90	$11\frac{7}{8}$	$7\frac{1}{4}$		$1\frac{15}{16}$	32.50	$16\frac{5}{8}$	$10\frac{3}{8}$		
$1\frac{11}{64}$	9.50	12	$7\frac{3}{8}$		$1\frac{16}{32}$	33.75	$16\frac{5}{8}$	$10\frac{3}{8}$		
$1\frac{3}{16}$	9.50	12	$7\frac{3}{8}$		2	35.00	$16\frac{5}{8}$	$10\frac{3}{8}$		
$1\frac{13}{64}$	10.15	$12\frac{1}{8}$	$7\frac{1}{2}$							
$1\frac{37}{32}$	10.15	$12\frac{1}{8}$	$7\frac{1}{2}$							
$1\frac{15}{16}$	10.75	$12\frac{1}{2}$	$7\frac{7}{8}$							
$1\frac{1}{4}$	10.75	$12\frac{1}{2}$	$7\frac{7}{8}$							

No. 1303
High Speed Steel

MORSE TAPER SHANK TWIST DRILLS

Shanks LARGER than regular



SPECIFY SIZE OF SHANK WANTED

All sizes and dimensions not listed are special and subject to special prices.

Diam., Inches	Price Each	Whole Length, Inches	Twist Cut, Inches	Morse Taper Shank	Diam., Inches	Price Each	Whole Length, Inches	Twist Cut, Inches	Morse Taper Shank
$\frac{3}{8}$	\$1.50	$7\frac{3}{8}$	$3\frac{1}{2}$	No. 2	2	\$35.00	$19\frac{13}{16}$	$10\frac{3}{8}$	No. 6
$\frac{25}{64}$	1.65	$7\frac{1}{2}$	$3\frac{5}{8}$		$2\frac{1}{32}$	36.25	$19\frac{13}{16}$	$10\frac{3}{8}$	
$\frac{13}{32}$	1.65	$7\frac{1}{2}$	$3\frac{5}{8}$		$2\frac{1}{16}$	37.50	$19\frac{13}{16}$	$10\frac{3}{8}$	
$\frac{27}{64}$	1.75	$7\frac{3}{4}$	$3\frac{7}{8}$		$2\frac{3}{32}$	38.75	$19\frac{13}{16}$	$10\frac{3}{8}$	
$\frac{7}{16}$	1.75	$7\frac{3}{4}$	$3\frac{7}{8}$		$2\frac{1}{8}$	40.00	$19\frac{13}{16}$	$10\frac{3}{8}$	
$\frac{19}{64}$	1.90	8	$4\frac{1}{8}$		$2\frac{5}{32}$	41.25	$19\frac{13}{16}$	$10\frac{3}{8}$	
$\frac{15}{32}$	1.90	8	$4\frac{1}{8}$		$2\frac{3}{16}$	42.50	$19\frac{13}{16}$	$10\frac{3}{8}$	
$\frac{41}{64}$	2.75	$9\frac{3}{4}$	$5\frac{1}{8}$		$2\frac{7}{32}$	43.75	$19\frac{13}{16}$	$10\frac{3}{8}$	
$\frac{21}{32}$	2.75	$9\frac{3}{4}$	$5\frac{1}{8}$		$2\frac{1}{4}$	45.00	$19\frac{13}{16}$	$10\frac{3}{8}$	
$\frac{43}{64}$	3.00	10	$5\frac{3}{8}$		No. 3	$2\frac{5}{16}$	50.00	$19\frac{13}{16}$		$10\frac{3}{8}$
$\frac{43}{64}$	3.00	10	$5\frac{3}{8}$	$2\frac{3}{8}$		55.00	$19\frac{13}{16}$	$10\frac{3}{8}$	
$\frac{11}{16}$	3.00	10	$5\frac{3}{8}$	$2\frac{7}{16}$		60.00	$20\frac{11}{16}$	$11\frac{1}{4}$	
$\frac{45}{64}$	3.25	$10\frac{1}{4}$	$5\frac{5}{8}$	$2\frac{1}{2}$		65.00	$20\frac{11}{16}$	$11\frac{1}{4}$	
$\frac{63}{64}$	3.25	$10\frac{1}{4}$	$5\frac{5}{8}$	$2\frac{9}{16}$		70.00	$21\frac{5}{16}$	$11\frac{7}{8}$	
$\frac{23}{32}$	3.50	$10\frac{1}{2}$	$5\frac{7}{8}$	$2\frac{5}{8}$		75.00	$21\frac{5}{16}$	$11\frac{7}{8}$	
$\frac{47}{64}$	3.50	$10\frac{1}{2}$	$5\frac{7}{8}$	$2\frac{11}{16}$		80.00	$22\frac{3}{16}$	$12\frac{3}{4}$	
$\frac{3}{4}$	3.75	$10\frac{5}{8}$	6	$2\frac{3}{4}$		85.00	$22\frac{3}{16}$	$12\frac{3}{4}$	
$\frac{49}{64}$	3.75	$10\frac{5}{8}$	6	$2\frac{13}{16}$		90.00	$22\frac{11}{16}$	$13\frac{1}{4}$	
$\frac{25}{32}$				$2\frac{7}{8}$		95.00	$22\frac{11}{16}$	$13\frac{1}{4}$	
1	6.25	12	$6\frac{3}{8}$	No. 4	$2\frac{15}{16}$	100.00	$23\frac{3}{16}$	$13\frac{3}{4}$	
$1\frac{1}{64}$	6.75	$12\frac{1}{8}$	$6\frac{1}{2}$		3	105.00	$23\frac{3}{16}$	$13\frac{3}{4}$	
$1\frac{1}{32}$	6.75	$12\frac{1}{8}$	$6\frac{1}{2}$						
$1\frac{3}{64}$	7.25	$12\frac{1}{4}$	$6\frac{5}{8}$						
$1\frac{1}{16}$	7.25	$12\frac{1}{4}$	$6\frac{5}{8}$						

No. 303
Carbon Steel

MORSE TAPER SHANK TWIST DRILLS



SHANKS LARGER THAN REGULAR

Diam., Inches	Price Each	Whole Length, Inches	Twist Cut, Inches	Morse Taper Shank	Diam., Inches	Price Each	Whole Length, Inches	Twist Cut, Inches	Morse Taper Shank		
$\frac{5}{16}$	\$1.40	$6\frac{1}{2}$	$2\frac{5}{8}$	No. 2	$\frac{25}{32}$	\$2.90	$10\frac{1}{8}$	$5\frac{1}{2}$	No. 3		
$\frac{11}{64}$	1.40	$6\frac{3}{4}$	$2\frac{7}{8}$		$\frac{51}{64}$	3.00	$10\frac{1}{4}$	$5\frac{5}{8}$			
$\frac{11}{32}$	1.40	$6\frac{3}{4}$	$2\frac{7}{8}$		$\frac{13}{16}$	3.00	$10\frac{1}{4}$	$5\frac{5}{8}$			
$\frac{23}{64}$	1.40	7	$3\frac{1}{8}$		$\frac{16}{64}$	3.10	$10\frac{3}{8}$	$5\frac{3}{4}$			
$\frac{3}{8}$	1.40	7	$3\frac{1}{8}$		$\frac{53}{64}$	3.10	$10\frac{3}{8}$	$5\frac{3}{4}$			
$\frac{25}{64}$	1.40	$7\frac{1}{4}$	$3\frac{3}{8}$		$\frac{27}{32}$	3.20	$10\frac{1}{2}$	$5\frac{7}{8}$			
$\frac{13}{32}$	1.40	$7\frac{1}{4}$	$3\frac{3}{8}$		$\frac{55}{64}$	3.20	$10\frac{1}{2}$	$5\frac{7}{8}$			
$\frac{27}{64}$	1.40	$7\frac{1}{2}$	$3\frac{5}{8}$		$\frac{7}{8}$	3.20	$10\frac{1}{2}$	$5\frac{7}{8}$			
$\frac{17}{64}$	1.40	$7\frac{1}{2}$	$3\frac{5}{8}$		$\frac{57}{64}$	3.30	$10\frac{5}{8}$	6			
$\frac{17}{32}$	1.40	$7\frac{1}{2}$	$3\frac{5}{8}$		$\frac{29}{32}$	3.30	$10\frac{5}{8}$	6			
$\frac{29}{64}$	1.45	$7\frac{3}{4}$	$3\frac{7}{8}$		No. 3	$1\frac{1}{8}$	5.40	12		$6\frac{3}{8}$	No. 4
$\frac{15}{32}$	1.45	$7\frac{3}{4}$	$3\frac{7}{8}$			$1\frac{9}{64}$	5.60	$12\frac{1}{4}$		$6\frac{5}{8}$	
$\frac{31}{64}$	1.50	8	$4\frac{1}{8}$			$\frac{5}{32}$	5.60	$12\frac{1}{4}$		$6\frac{5}{8}$	
$\frac{1}{2}$	1.50	8	$4\frac{1}{8}$			$\frac{11}{64}$	5.80	$12\frac{1}{2}$		$6\frac{7}{8}$	
$\frac{33}{64}$	1.60	$8\frac{1}{4}$	$4\frac{3}{8}$			$\frac{3}{16}$	5.80	$12\frac{1}{2}$		$6\frac{7}{8}$	
$\frac{17}{32}$	1.60	$8\frac{1}{4}$	$4\frac{3}{8}$	$\frac{13}{64}$		6.00	$12\frac{3}{4}$	$7\frac{1}{8}$			
$\frac{35}{64}$	1.70	$8\frac{1}{2}$	$4\frac{5}{8}$	$\frac{7}{32}$		6.00	$12\frac{3}{4}$	$7\frac{1}{8}$			
$\frac{9}{16}$	1.70	$8\frac{1}{2}$	$4\frac{5}{8}$	$\frac{115}{64}$		6.20	13	$7\frac{3}{8}$			
$\frac{37}{64}$	2.50	$9\frac{3}{8}$	$4\frac{3}{4}$	$1\frac{1}{4}$		6.20	13	$7\frac{3}{8}$	No. 5		
$\frac{19}{32}$	2.50	$9\frac{3}{8}$	$4\frac{3}{4}$	$\frac{147}{64}$		13.25	$16\frac{1}{2}$	$9\frac{5}{8}$			
$\frac{39}{64}$	2.50	$9\frac{1}{2}$	$4\frac{7}{8}$	$\frac{13}{4}$		13.25	$16\frac{1}{2}$	$9\frac{5}{8}$			
$\frac{41}{64}$	2.50	$9\frac{1}{2}$	$4\frac{7}{8}$	$\frac{125}{32}$		14.00	$16\frac{1}{2}$	$9\frac{5}{8}$			
$\frac{5}{8}$	2.50	$9\frac{5}{8}$	5	$\frac{113}{64}$		14.75	$16\frac{1}{2}$	$9\frac{5}{8}$			
$\frac{21}{32}$	2.50	$9\frac{5}{8}$	5	$\frac{127}{64}$		15.50	$16\frac{1}{2}$	$9\frac{5}{8}$			
$\frac{23}{32}$	2.60	$9\frac{3}{4}$	$5\frac{1}{8}$	$\frac{17}{8}$		16.25	$16\frac{1}{2}$	$9\frac{5}{8}$			
$\frac{25}{32}$	2.60	$9\frac{3}{4}$	$5\frac{1}{8}$	$\frac{129}{32}$	17.00	$16\frac{1}{2}$	$9\frac{5}{8}$				
$\frac{27}{32}$	2.70	$9\frac{7}{8}$	$5\frac{1}{4}$	$\frac{115}{64}$	17.75	$16\frac{1}{2}$	$9\frac{5}{8}$				
$\frac{29}{32}$	2.70	$9\frac{7}{8}$	$5\frac{1}{4}$	$\frac{131}{32}$	18.50	$16\frac{1}{2}$	$9\frac{5}{8}$				
$\frac{31}{32}$	2.80	10	$5\frac{3}{8}$	2	19.25	$16\frac{1}{2}$	$9\frac{5}{8}$				
$\frac{33}{32}$	2.80	10	$5\frac{3}{8}$								
$\frac{35}{32}$	2.90	$10\frac{1}{8}$	$5\frac{1}{2}$								

No. 305
Carbon Steel

No. 1305
High Speed Steel

MORSE TAPER SHANK TWIST DRILLS

MILLIMETER SIZES



Diameter, M. M.	Price Each		Diameter in Decimals of 1 Inch	Whole Length, M. M.	Twist Cut, M. M.	Morse Taper Shank
	Carbon Steel	High Speed Steel				
1	\$.45		.0394	92	16	No. 1
1.5	.45		.0591	98	21	
2	.45	\$.90	.0787	105	28	
2.5	.45	.90	.0984	111	34	
3	.45	.90	.1181	116	43	
3.5	.45	.90	.1378	130	56	
4	.50	.90	.1575	137	62	
4.5	.50	.90	.1771	140	65	
5	.55	1.00	.1968	149	73	
5.5	.55	1.00	.2165	152	76	
6	.60	1.10	.2362	156	76	
6.5	.65	1.20	.2559	156	72	
7	.65	1.20	.2756	159	75	
7.5	.70	1.30	.2953	162	78	
8	.75	1.40	.3149	162	78	
8.5	.75	1.40	.3346	165	81	
9	.80	1.50	.3543	172	87	
9.5	.80	1.50	.3740	172	87	
10	.90	1.65	.3937	178	94	
10.5	1.00	1.75	.4134	184	100	
11	1.00	1.75	.4330	184	100	
11.5	1.10	1.90	.4527	191	106	
12	1.20	2.00	.4724	191	106	
12.5	1.20	2.00	.4921	197	113	
13	1.30	2.15	.5118	203	119	
13.5	1.40	2.25	.5315	203	119	
14	1.40	2.25	.5512	210	125	

No. 305
Carbon Steel

No. 1305
High Speed Steel

MORSE TAPER SHANK TWIST DRILLS

MILLIMETER SIZES



Diameter, M. M.	Price Each		Diameter in Decimals of 1 Inch	Whole Length, M. M.	Twist Cut, M. M.	Morse Taper Shank
	Carbon Steel	High Speed Steel				
14.5	\$1.50	\$2.40	.5708	216	117	No. 2
15	1.50	2.40	.5905	216	117	
15.5	1.60	2.50	.6102	222	124	
16	1.70	2.75	.6299	222	124	
16.5	1.70	2.75	.6496	229	130	
17	1.80	3.00	.6693	235	137	
17.5	1.90	3.25	.6890	235	137	
18	1.90	3.25	.7086	241	143	
18.5	2.00	3.50	.7283	247	149	
19	2.00	3.50	.7480	247	149	
19.5	2.10	3.75	.7677	251	152	
20	2.20	4.00	.7874	254	156	
20.5	2.20	4.00	.8071	254	156	
21	2.40	4.40	.8267	260	162	
21.5	2.60	4.75	.8464	260	162	
22	2.60	4.75	.8661	267	168	
22.5	2.80	5.15	.8858	270	171	
23	2.80	5.15	.9055	270	171	
23.5	3.00	5.50	.9252	273	156		No. 3
24	3.25	5.90	.9449	276	159	
24.5	3.25	5.90	.9646	276	159	
25	3.50	6.25	.9842	279	162	
25.5	3.75	6.75	1.0039	279	162	
26	3.75	6.75	1.0236	282	165	
26.5	4.00	7.25	1.0433	286	168	

No. 305
Carbon Steel

No. 1305
High Speed Steel

MORSE TAPER SHANK TWIST DRILLS

MILLIMETER SIZES



Diameter M. M.	Price Each		Diameter in Decimals of 1 Inch	Whole Length, M. M.	Twist Cut, M. M.	Morse Taper Shank	
	Carbon Steel	High Speed Steel					
27	\$4.25	\$7.75	1.0629	286	168	No. 3	
27.5	4.25	7.75	1.0827	292	175		
28	4.50	8.25	1.1024	298	181		
28.5	4.50	8.25	1.1220	298	181		
29	4.75	8.90	1.1417	302	184		
29.5	5.00	9.50	1.1614	302	184		
30	5.00	9.50	1.1811	305	187		
30.5	5.25	10.15	1.2008	308	190		
31	5.50	10.75	1.2205	308	190		
31.5	5.50	10.75	1.2401	317	200		
32	5.75	11.50	1.2598	317	200		
32.5	5.75	11.50	1.2795	359	216		No. 4
33	6.00	12.25	1.2992	362	219		
33.5	6.25	13.00	1.3190	365	222		
34	6.25	13.00	1.3386	365	222		
34.5	6.50	13.75	1.3583	368	225		
35	7.00	14.65	1.3779	368	225		
35.5	7.00	14.65	1.3977	372	229		
36	7.50	15.50	1.4173	375	232		
36.5	7.50	15.50	1.4370	375	232		
37	8.00	16.40	1.4567	378	235		
37.5	8.50	17.25	1.4764	381	238		
38	8.50	17.25	1.4961	381	238		
38.5	9.00	18.15	1.5157	381	238		

No. 305
Carbon Steel

No. 1305
High Speed Steel

MORSE TAPER SHANK TWIST DRILLS

MILLIMETER SIZES



Diameter, M. M.	Price Each		Diameter in Decimals of 1 Inch	Whole Length, M. M.	Twist Cut, M. M.	Morse Taper Shank
	Carbon Steel	High Speed Steel				
39	\$9.50	\$19.00	1.5354	381	238	No. 4
39.5	9.50	19.00	1.5551	387	244	
40	10.00	20.00	1.5748	387	244	
40.5	10.50	21.00	1.5945	387	244	
41	10.50	21.00	1.6142	394	251	
41.5	11.00	22.00	1.6338	394	251	
42	11.00	22.00	1.6536	394	251	
42.5	11.50	23.00	1.6733	400	257	
43	12.00	24.00	1.6929	400	257	
43.5	12.00	24.00	1.7126	400	246	
44	12.50	25.00	1.7323	406	252	
44.5	13.25	26.25	1.7519	406	252	
45	13.25	26.25	1.7717	406	252	
45.5	14.00	27.50	1.7914	413	259	
46	14.00	27.50	1.8110	413	257	
46.5	14.75	28.75	1.8307	413	257	
47	15.50	30.00	1.8504	419	264	
47.5	15.50	30.00	1.8701	419	264	
48	16.25	31.25	1.8898	419	264	
48.5	17.00	32.50	1.9094	419	264	
49	17.00	32.50	1.9291	419	260	
49.5	17.75	33.75	1.9488	419	260	
50	17.75	33.75	1.9685	419	260	
50.5	18.50	35.00	1.9882	419	260	

No. 305
Carbon Steel

No. 1305
High Speed Steel

MORSE TAPER SHANK TWIST DRILLS

MILLIMETER SIZES



Diameter, M. M.	Price Each		Diameter in Decimals of 1 Inch	Whole Length, M. M.	Twist Cut, M. M.	Morse Taper Shank
	Carbon Steel	High Speed Steel				
51	\$19.25	\$36.25	2.0079	419	241	} No. 5
51.5	19.25	36.25	2.0276	419	241	
52	20.00	37.50	2.0473	432	254	
52.5	20.75	38.75	2.0670	432	254	
53	20.75	38.75	2.0866	432	254	
53.5	21.50	40.00	2.1063	432	254	
54	22.25	41.25	2.1259	432	254	
54.5	22.25	41.25	2.1456	432	254	
55	23.00	42.50	2.1654	432	254	
55.5	23.00	42.50	2.1851	432	254	
56	23.75	43.75	2.2047	445	267	
56.5	24.50	45.00	2.2244	445	267	
57	24.50	45.00	2.2441	445	257	
57.5	25.25	47.50	2.2637	445	257	
58	26.00	50.00	2.2835	445	257	
58.5	26.00	50.00	2.3031	445	257	
59	26.75	52.50	2.3228	457	270	
59.5	26.75	52.50	2.3425	457	270	
60	27.50	55.00	2.3622	457	270	
60.5	28.25	57.50	2.3819	470	279	
61	28.25	57.50	2.4015	470	279	
61.5	29.00	60.00	2.4212	470	279	
62	29.75	62.50	2.4409	470	279	
62.5	29.75	62.50	2.4606	483	292	
63	30.50	65.00	2.4803	483	292	

No. 305
Carbon Steel

No. 1305
High Speed Steel

MORSE TAPER SHANK TWIST DRILLS

MILLIMETER SIZES

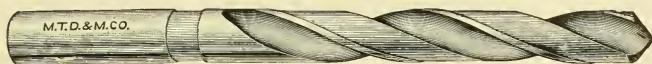


Diameter, M. M.	Price Each		Diameter in Decimals of 1 Inch	Whole Length, M. M.	Twist Cut, M. M.	Morse Taper Shank
	Carbon Steel	High Speed Steel				
63.5	\$30.50	\$65.00	2.5000	483	289	No. 5
64	31.25	67.50	2.5197	489	295	
64.5	32.00	70.00	2.5393	489	295	
65	32.00	70.00	2.5591	489	295	
65.5	33.00	72.50	2.5787	495	302	
66	34.00	75.00	2.5984	495	302	
66.5	34.00	75.00	2.6181	495	298	
67	35.00	77.50	2.6378	508	311	
67.5	36.00	80.00	2.6574	508	311	
68	36.00	80.00	2.6772	508	311	
68.5	37.00	82.50	2.6969	521	324	
69	37.00	82.50	2.7165	521	324	
69.5	38.00	85.00	2.7362	521	324	
70	39.25	87.50	2.7559	521	321	
70.5	39.25	87.50	2.7756	521	321	
71	40.50	90.00	2.7952	521	321	
71.5	41.75	92.50	2.8149	521	321	
72	41.75	92.50	2.8347	533	333	
72.5	43.00	95.00	2.8543	533	333	
73	43.00	95.00	2.8740	533	330	
73.5	44.25	97.50	2.8937	533	330	
74	45.50	100.00	2.9134	533	330	
74.5	45.50	100.00	2.9330	533	330	
75	46.75	102.50	2.9527	559	356	
75.5	48.00	105.00	2.9724	559	356	
76	48.00	105.00	2.9921	559	352	

No. 314
Carbon Steel

No. 1314
High Speed Steel

STRAIGHT SHANK TAPER LENGTH
TWIST DRILLS



Diameter, Inches	Price Each		Whole Length, Inches	Twist Cut, Inches	Decimal Equivalent
	Carbon Steel	High Speed Steel			
$\frac{1}{8}$	\$.45	\$.90	$5\frac{1}{8}$	$2\frac{1}{2}$	.125
$\frac{9}{64}$	.45	.90	$5\frac{1}{4}$	$2\frac{3}{4}$	.1406
$\frac{5}{32}$	.45	.90	$5\frac{3}{8}$	3	.1562
$\frac{11}{64}$	.50	.90	$5\frac{1}{2}$	$3\frac{1}{4}$	.1718
$\frac{3}{16}$	.50	.90	$5\frac{3}{4}$	$3\frac{1}{2}$	.1875
$\frac{13}{64}$	.55	1.00	$5\frac{7}{8}$	$3\frac{3}{4}$	.2031
$\frac{7}{32}$	.55	1.00	6	4	.2187
$\frac{15}{64}$	.60	1.10	$6\frac{1}{8}$	4	.2343
$\frac{1}{4}$	.60	1.10	$6\frac{1}{8}$	4	.25
$\frac{17}{64}$	.65	1.20	$6\frac{1}{4}$	4	.2656
$\frac{9}{32}$	.65	1.20	$6\frac{1}{4}$	4	.2812
$\frac{19}{64}$	.70	1.30	$6\frac{3}{8}$	$4\frac{1}{16}$	.2968
$\frac{5}{16}$	.70	1.30	$6\frac{3}{8}$	$4\frac{1}{16}$	.3125
$\frac{21}{64}$	.75	1.40	$6\frac{1}{2}$	$4\frac{1}{8}$	.3281
$\frac{11}{32}$	.75	1.40	$6\frac{1}{2}$	$4\frac{1}{8}$	.3437
$\frac{23}{64}$	.80	1.50	$6\frac{3}{4}$	$4\frac{1}{4}$	.3593
$\frac{3}{8}$	.80	1.50	$6\frac{3}{4}$	$4\frac{1}{4}$	.375
$\frac{25}{64}$	.90	1.65	7	$4\frac{3}{8}$	.3906
$\frac{13}{32}$	.90	1.65	7	$4\frac{3}{8}$	.4062
$\frac{27}{64}$	1.00	1.75	$7\frac{1}{4}$	$4\frac{5}{8}$	.4218
$\frac{7}{16}$	1.00	1.75	$7\frac{1}{4}$	$4\frac{5}{8}$	.4375
$\frac{29}{64}$	1.10	1.90	$7\frac{1}{2}$	$4\frac{7}{8}$	.4531
$\frac{15}{32}$	1.10	1.90	$7\frac{1}{2}$	$4\frac{7}{8}$	.4687
$\frac{31}{64}$	1.20	2.00	$7\frac{3}{4}$	5	.4843
$\frac{1}{2}$	1.20	2.00	$7\frac{3}{4}$	5	.5
$\frac{33}{64}$	1.30	2.15	8	$5\frac{1}{4}$	.5156
$\frac{17}{32}$	1.30	2.15	8	$5\frac{1}{4}$	.5312
$\frac{35}{64}$	1.40	2.25	$8\frac{1}{4}$	$5\frac{3}{8}$	.5468
$\frac{9}{16}$	1.40	2.25	$8\frac{1}{4}$	$5\frac{3}{8}$	.5625

For prices of Sets of Straight Shank Drills, see page 94.

No. 314
Carbon Steel

No. 1314
High Speed Steel

STRAIGHT SHANK TAPER LENGTH
TWIST DRILLS

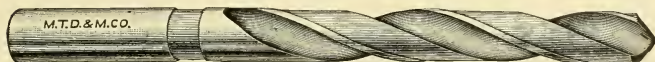


Diameter, Inches	Price Each		Whole Length, Inches	Twist Cut, Inches	Decimal Equivalent
	Carbon Steel	High Speed Steel			
$\frac{37}{64}$	\$1.50	\$2.40	$8\frac{1}{2}$	$5\frac{5}{8}$	.5781
$\frac{19}{32}$	1.50	2.40	$8\frac{1}{2}$	$5\frac{5}{8}$	.5937
$\frac{39}{64}$	1.60	2.50	$8\frac{3}{4}$	$5\frac{3}{4}$	.6093
$\frac{5}{8}$	1.60	2.50	$8\frac{3}{4}$	$5\frac{3}{4}$	.625
$\frac{41}{64}$	1.70	2.75	9	$5\frac{7}{8}$	.6406
$\frac{21}{32}$	1.70	2.75	9	$5\frac{7}{8}$	.6562
$\frac{43}{64}$	1.80	3.00	$9\frac{1}{4}$	6	.6718
$\frac{11}{16}$	1.80	3.00	$9\frac{1}{4}$	6	.6875
$\frac{45}{64}$	1.90	3.25	$9\frac{1}{2}$	$6\frac{3}{16}$	.7031
$\frac{23}{32}$	1.90	3.25	$9\frac{1}{2}$	$6\frac{3}{16}$	.7187
$\frac{47}{64}$	2.00	3.50	$9\frac{3}{4}$	$6\frac{3}{8}$	.7343
$\frac{3}{4}$	2.00	3.50	$9\frac{3}{4}$	$6\frac{3}{8}$	.75
$\frac{49}{64}$	2.10	3.75	$9\frac{7}{8}$	$6\frac{1}{2}$	.7656
$\frac{25}{32}$	2.10	3.75	$9\frac{7}{8}$	$6\frac{1}{2}$	.7812
$\frac{51}{64}$	2.20	4.00	10	$6\frac{5}{8}$	.7968
$\frac{13}{16}$	2.20	4.00	10	$6\frac{5}{8}$	.8125
$\frac{53}{64}$	2.40	4.40	$10\frac{1}{4}$	$6\frac{3}{4}$	.8281
$\frac{27}{32}$	2.40	4.40	$10\frac{1}{4}$	$6\frac{3}{4}$	.8437
$\frac{55}{64}$	2.60	4.75	$10\frac{1}{2}$	7	.8593
$\frac{7}{8}$	2.60	4.75	$10\frac{1}{2}$	7	.875
$\frac{57}{64}$	2.80	5.15	$10\frac{5}{8}$	7	.8906
$\frac{29}{32}$	2.80	5.15	$10\frac{5}{8}$	7	.9062
$\frac{59}{64}$	3.00	5.50	$10\frac{3}{4}$	7	.9218
$\frac{15}{16}$	3.00	5.50	$10\frac{3}{4}$	7	.9375
$\frac{61}{64}$	3.25	5.90	$10\frac{7}{8}$	$7\frac{1}{8}$	.9531
$\frac{31}{32}$	3.25	5.90	$10\frac{7}{8}$	$7\frac{1}{8}$	.9687
$\frac{63}{64}$	3.50	6.25	11	$7\frac{3}{16}$	.9843
1	3.50	6.25	11	$7\frac{3}{16}$	1.
$1\frac{1}{64}$	3.75	6.75	$11\frac{1}{8}$	$7\frac{5}{16}$	1.0156
$1\frac{1}{32}$	3.75	6.75	$11\frac{1}{8}$	$7\frac{5}{16}$	1.0312

No. 314
Carbon Steel

No. 1314
High Speed Steel

STRAIGHT SHANK TAPER LENGTH
TWIST DRILLS



Diameter, Inches	Price Each		Whole Length, Inches	Twist Cut, Inches	Decimal Equivalent
	Carbon Steel	High Speed Steel			
$1\frac{3}{64}$	\$4.00	\$7.25	$11\frac{1}{4}$	$7\frac{3}{8}$	1.0468
$1\frac{1}{16}$	4.00	7.25	$11\frac{1}{4}$	$7\frac{3}{8}$	1.0625
$1\frac{5}{64}$	4.25	7.75	$11\frac{1}{2}$	$7\frac{5}{8}$	1.0781
$1\frac{3}{32}$	4.25	7.75	$11\frac{1}{2}$	$7\frac{5}{8}$	1.0937
$1\frac{7}{64}$	4.50	8.25	$11\frac{3}{4}$	$7\frac{7}{8}$	1.1093
$1\frac{1}{8}$	4.50	8.25	$11\frac{3}{4}$	$7\frac{7}{8}$	1.125
$1\frac{9}{64}$	4.75	8.90	$11\frac{7}{8}$	8	1.1406
$1\frac{5}{32}$	4.75	8.90	$11\frac{7}{8}$	8	1.1562
$1\frac{11}{64}$	5.00	9.50	12	$8\frac{1}{8}$	1.1718
$1\frac{3}{16}$	5.00	9.50	12	$8\frac{1}{8}$	1.1875
$1\frac{13}{64}$	5.25	10.15	$12\frac{1}{8}$	$8\frac{1}{8}$	1.2031
$1\frac{7}{32}$	5.25	10.15	$12\frac{1}{8}$	$8\frac{1}{8}$	1.2187
$1\frac{15}{64}$	5.50	10.75	$12\frac{1}{2}$	$8\frac{1}{2}$	1.2343
$1\frac{1}{4}$	5.50	10.75	$12\frac{1}{2}$	$8\frac{1}{2}$	1.25
$1\frac{9}{32}$	5.75	11.50	$14\frac{1}{8}$	$9\frac{1}{8}$	1.2812
$1\frac{5}{16}$	6.00	12.25	$14\frac{1}{4}$	$9\frac{1}{4}$	1.3125
$1\frac{11}{32}$	6.25	13.00	$14\frac{3}{8}$	$9\frac{3}{8}$	1.3437
$1\frac{3}{8}$	6.50	13.75	$14\frac{1}{2}$	$9\frac{1}{2}$	1.375
$1\frac{13}{32}$	7.00	14.65	$14\frac{5}{8}$	$9\frac{1}{2}$	1.4062
$1\frac{7}{16}$	7.50	15.50	$14\frac{3}{4}$	$9\frac{5}{8}$	1.4375
$1\frac{15}{32}$	8.00	16.40	$14\frac{7}{8}$	$9\frac{3}{4}$	1.4687
$1\frac{1}{2}$	8.50	17.25	15	$9\frac{7}{8}$	1.5
$1\frac{9}{16}$	9.50	19.00	$15\frac{1}{4}$	$9\frac{3}{4}$	1.5625
$1\frac{5}{8}$	10.50	21.00	$15\frac{1}{2}$	10	1.625
$1\frac{11}{16}$	11.50	23.00	$15\frac{3}{4}$	$10\frac{1}{4}$	1.6875
$1\frac{3}{4}$	12.50	25.00	16	$10\frac{1}{2}$	1.75
$1\frac{13}{16}$	14.00	27.50	$16\frac{1}{4}$	$10\frac{3}{4}$	1.8125
$1\frac{7}{8}$	15.50	30.00	$16\frac{1}{2}$	11	1.875
$1\frac{15}{16}$	17.00	32.50	$16\frac{1}{2}$	11	1.9375
2	18.50	35.00	$16\frac{1}{2}$	11	2.

Drills $1\frac{3}{8}$ to 2 inches have shanks $1\frac{1}{2}$ inches in diameter, $4\frac{3}{4}$ inches long.

No. 317
Carbon Steel

No. 1317
High Speed Steel

STRAIGHT SHANK TAPER LENGTH
TWIST DRILLS
MILLIMETER SIZES



Diameter, M.M.	Price Each		Diameter in Decimals of 1 Inch	Whole Length, M. M.	Twist Cut, M. M.
	Carbon Steel	High Speed Steel			
1	\$.45	\$.90	.0394	57	25
1.5	.45	.90	.0591	76	32
2	.45	.90	.0787	95	35
2.5	.45	.90	.0984	108	41
3	.45	.90	.1181	130	63
3.5	.45	.90	.1378	133	70
4	.50	.90	.1575	137	76
4.5	.50	.90	.1771	140	83
5	.55	1.00	.1968	149	95
5.5	.55	1.00	.2165	152	102
6	.60	1.10	.2362	156	102
6.5	.65	1.20	.2559	156	102
7	.65	1.20	.2756	159	102
7.5	.70	1.30	.2953	162	103
8	.75	1.40	.3149	162	103
8.5	.75	1.40	.3346	165	105
9	.80	1.50	.3543	172	108
9.5	.80	1.50	.3740	172	108
10	.90	1.65	.3937	178	111
10.5	1.00	1.75	.4134	184	117
11	1.00	1.75	.4330	184	117
11.5	1.10	1.90	.4527	191	124
12	1.20	2.00	.4724	191	124
12.5	1.20	2.00	.4921	197	127
13	1.30	2.15	.5118	203	133
13.5	1.40	2.25	.5315	203	133
14	1.40	2.25	.5512	210	137
14.5	1.50	2.40	.5708	216	143
15	1.50	2.40	.5905	216	143
15.5	1.60	2.50	.6102	222	146

No. 317
Carbon Steel

No. 1317
High Speed Steel

STRAIGHT SHANK TAPER LENGTH
TWIST DRILLS

MILLIMETER SIZES



Diameter, M. M.	Price Each		Diameter in Decimals of 1 Inch	Whole Length, M. M.	Twist Cut, M. M.
	Carbon Steel	High Speed Steel			
16	\$1.70	\$2.75	.6299	222	146
16.5	1.70	2.75	.6496	229	149
17	1.80	3.00	.6693	235	152
17.5	1.90	3.25	.6890	235	152
18	1.90	3.25	.7086	241	157
18.5	2.00	3.50	.7283	247	162
19	2.00	3.50	.7480	247	162
19.5	2.10	3.75	.7677	251	165
20	2.20	4.00	.7874	254	168
20.5	2.20	4.00	.8071	254	168
21	2.40	4.40	.8267	260	171
21.5	2.60	4.75	.8464	260	171
22	2.60	4.75	.8661	267	178
22.5	2.80	5.15	.8858	270	178
23	2.80	5.15	.9055	270	178
23.5	3.00	5.50	.9252	273	178
24	3.25	5.90	.9449	276	181
24.5	3.25	5.90	.9646	276	181
25	3.50	6.25	.9842	279	183
25.5	3.75	6.75	1.0039	279	183
26	3.75	6.75	1.0236	282	186
26.5	4.00	7.25	1.0433	286	187
27	4.25	7.75	1.0629	286	187
27.5	4.25	7.75	1.0827	292	194
28	4.50	8.25	1.1024	298	200
28.5	4.50	8.25	1.1220	298	200
29	4.75	8.90	1.1417	302	203

No. 317
Carbon Steel

No. 1317
High Speed Steel

STRAIGHT SHANK TAPER LENGTH
TWIST DRILLS

MILLIMETER SIZES



Diameter, M. M.	Price Each		Diameter in Decimals of 1 Inch	Whole Length, M. M.	Twist Cut, M. M.
	Carbon Steel	High Speed Steel			
29.5	\$5.00	\$9.50	1.1614	302	203
30	5.00	9.50	1.1811	305	206
30.5	5.25	10.15	1.2008	308	206
31	5.50	10.75	1.2205	308	206
31.5	5.50	10.75	1.2401	317	216
32	5.75	11.50	1.2598	317	216
32.5	5.75	11.50	1.2795	359	232
33	6.00	12.25	1.2992	362	235
33.5	6.25	13.00	1.3190	365	238
34	6.25	13.00	1.3386	365	238
34.5	6.50	13.75	1.3583	368	241
35	7.00	14.65	1.3779	368	241
35.5	7.00	14.65	1.3977	372	241
36	7.50	15.50	1.4173	375	244
36.5	7.50	15.50	1.4370	375	244
37	8.00	16.40	1.4567	378	248
37.5	8.50	17.25	1.4764	381	251
38	8.50	17.25	1.4961	381	251
38.5	9.00	18.15	1.5157	381	241
39	9.50	19.00	1.5354	381	241
39.5	9.50	19.00	1.5551	387	248
40	10.00	20.00	1.5748	387	248
40.5	10.50	21.00	1.5945	387	248
41	10.50	21.00	1.6142	394	254
41.5	11.00	22.00	1.6338	394	254
42	11.00	22.00	1.6536	394	254
42.5	11.50	23.00	1.6733	400	260
43	12.00	24.00	1.6929	400	260
43.5	12.00	24.00	1.7126	400	260
44	12.50	25.00	1.7323	406	267
44.5	13.25	26.25	1.7519	406	267

Drills 38½ to 50½ M.M. diameter have shanks 38 M.M. diameter, 120 M.M. long.

No. 317
Carbon Steel

No. 1317
High Speed Steel

STRAIGHT SHANK TAPER LENGTH
TWIST DRILLS

MILLIMETER SIZES

Diameter, M. M.	Price Each		Diameter in Decimals of 1 Inch	Whole Length, M. M.	Twist Cut, M. M.
	Carbon Steel	High Speed Steel			
45	\$13.25	\$26.25	1.7717	406	267
45.5	14.00	27.50	1.7914	413	273
46	14.00	27.50	1.8110	413	273
46.5	14.75	28.75	1.8307	413	273
47	15.50	30.00	1.8504	419	279
47.5	15.50	30.00	1.8701	419	279
48	16.25	31.25	1.8898	419	279
48.5	17.00	32.50	1.9094	419	279
49	17.00	32.50	1.9291	419	279
49.5	17.75	33.75	1.9488	419	279
50	17.75	33.75	1.9685	419	279
50.5	18.50	35.00	1.9882	419	279
51	19.25	36.25	2.0079	419	244
51.5	19.25	36.25	2.0276	419	244
52	20.00	37.50	2.0473	432	257
52.5	20.75	38.75	2.0670	432	257
53	20.75	38.75	2.0866	432	257
53.5	21.50	40.00	2.1063	432	257
54	22.25	41.25	2.1259	432	257
54.5	22.25	41.25	2.1456	432	257
55	23.00	42.50	2.1654	432	257
55.5	23.00	42.50	2.1851	432	257
56	23.75	43.75	2.2047	445	270
56.5	24.50	45.00	2.2244	445	270
57	24.50	45.00	2.2441	445	260
57.5	25.25	47.50	2.2637	445	260
58	26.00	50.00	2.2835	445	260
58.5	26.00	50.00	2.3031	445	260
59	26.75	52.50	2.3228	457	273
59.5	26.75	52.50	2.3425	457	273
60	27.50	55.00	2.3622	457	273

Drills 38½ to 50½ M.M. diameter have shanks 38 M.M. diameter, 120 M.M. long.
Drills 51 to 76 M.M. diameter have shanks 45 M.M. diameter, 152 M.M. long.

No. 317
Carbon Steel

No. 1317
High Speed Steel

STRAIGHT SHANK TAPER LENGTH
TWIST DRILLS
MILLIMETER SIZES

Diameter M. M.	Price Each		Diameter in Decimals of 1 Inch	Whole Length, M. M.	Twist Cut, M. M.
	Carbon Steel	High Speed Steel			
60.5	\$28.25	\$57.50	2.3819	470	283
61	28.25	57.50	2.4015	470	283
61.5	29.00	60.00	2.4212	470	283
62	29.75	62.50	2.4409	470	283
62.5	29.75	62.50	2.4606	483	295
63	30.50	65.00	2.4803	483	295
63.5	30.50	65.00	2.5	483	292
64	31.25	67.50	2.5197	489	298
64.5	32.00	70.00	2.5393	489	298
65	32.00	70.00	2.5591	489	298
65.5	33.00	72.50	2.5787	495	305
66	34.00	75.00	2.5984	495	305
66.5	34.00	75.00	2.6181	495	302
67	35.00	77.50	2.6378	508	314
67.5	36.00	80.00	2.6574	508	314
68	36.00	80.00	2.6772	508	314
68.5	37.00	82.50	2.6969	521	327
69	37.00	82.50	2.7165	521	327
69.5	38.00	85.00	2.7362	521	327
70	39.25	87.50	2.7559	521	324
70.5	39.25	87.50	2.7756	521	324
71	40.50	90.00	2.7952	521	324
71.5	41.75	92.50	2.8149	521	324
72	41.75	92.50	2.8347	533	337
72.5	43.00	95.00	2.8543	533	337
73	43.00	95.00	2.8740	533	333
73.5	44.25	97.50	2.8937	533	333
74	45.50	100.00	2.9134	533	333
74.5	45.50	100.00	2.9330	533	333
75	46.75	102.50	2.9527	559	359
75.5	48.00	105.00	2.9724	559	359
76	48.00	105.00	2.9921	559	356

Drills 51 to 76 M.M. diameter have shanks 45 M.M. diameter, 152 M.M. long.

No. 330
Carbon Steel

No. 1330
High Speed Steel

STRAIGHT SHANK DRILLS



JOBBER'S' LENGTHS

Diameter, Inches	Price Per Dozen		Whole Length, Inches	Twist Cut, Inches	Decimal Equivalent
	Carbon Steel	High Speed Steel			
$\frac{1}{32}$	\$1.50		$1\frac{7}{16}$	$\frac{9}{16}$	.0312
$\frac{3}{64}$	1.55		$1\frac{11}{16}$	$\frac{25}{32}$	.0468
$\frac{1}{16}$	1.60	\$5.70	$2\frac{1}{2}$	$1\frac{1}{4}$	.0625
$\frac{5}{64}$	1.65	5.70	$2\frac{5}{8}$	$1\frac{3}{8}$	.0781
$\frac{3}{32}$	1.70	5.70	$2\frac{3}{4}$	$1\frac{1}{2}$	.0937
$\frac{7}{64}$	1.75	5.90	$2\frac{7}{8}$	$1\frac{11}{16}$	.1093
$\frac{1}{8}$	1.80	5.90	3	$1\frac{13}{16}$	.125
$\frac{9}{64}$	1.85	6.10	$3\frac{1}{8}$	$1\frac{15}{16}$	.1406
$\frac{5}{32}$	1.90	6.10	$3\frac{1}{4}$	$2\frac{3}{32}$	.1562
$\frac{11}{64}$	2.00	6.30	$3\frac{3}{8}$	$2\frac{7}{32}$	.1718
$\frac{3}{16}$	2.25	6.30	$3\frac{1}{2}$	$2\frac{5}{16}$	.1875
$\frac{13}{64}$	2.50	7.00	$3\frac{5}{8}$	$2\frac{7}{16}$	.2031
$\frac{7}{32}$	2.75	7.00	$3\frac{3}{4}$	$2\frac{17}{32}$	.2187
$\frac{15}{64}$	3.00	7.35	$3\frac{7}{8}$	$2\frac{21}{32}$	.2343
$\frac{1}{4}$	3.25	7.35	4	$2\frac{3}{4}$	.25
$\frac{17}{64}$	3.50	9.10	$4\frac{1}{8}$	$2\frac{7}{8}$	.2656
$\frac{9}{32}$	3.80	9.10	$4\frac{1}{4}$	$2\frac{31}{32}$	.2812
$\frac{19}{64}$	4.00	10.50	$4\frac{3}{8}$	$3\frac{3}{32}$	.2968
$\frac{5}{16}$	4.35	10.50	$4\frac{1}{2}$	$3\frac{3}{16}$	.3125
$\frac{21}{64}$	4.70	12.00	$4\frac{5}{8}$	$3\frac{5}{16}$	.3281
$\frac{11}{32}$	5.05	12.00	$4\frac{3}{4}$	$3\frac{13}{32}$	.3437
$\frac{23}{64}$	5.50	13.50	$4\frac{7}{8}$	$3\frac{17}{32}$	.3593
$\frac{3}{8}$	6.00	13.50	5	$3\frac{5}{8}$	.375
$\frac{25}{64}$	6.50	15.00	$5\frac{1}{8}$	$3\frac{3}{4}$	.3906
$\frac{13}{32}$	7.00	15.00	$5\frac{1}{4}$	$3\frac{27}{32}$	.4062
$\frac{27}{64}$	7.75	17.00	$5\frac{3}{8}$	$3\frac{31}{32}$	.4218
$\frac{7}{16}$	8.50	17.00	$5\frac{1}{2}$	$4\frac{1}{16}$	.4375
$\frac{29}{64}$	9.25	18.75	$5\frac{5}{8}$	$4\frac{3}{16}$	.4531
$\frac{15}{32}$	10.00	18.75	$5\frac{3}{4}$	$4\frac{9}{32}$	.4687
$\frac{31}{64}$	11.00	20.00	$5\frac{7}{8}$	$4\frac{13}{32}$	.4843
$\frac{1}{2}$	12.00	20.00	6	$4\frac{1}{2}$	.5

For prices of Sets of these Drills, see pages 96, 101, 102, 103.

No. 331
Carbon Steel

No. 1331
High Speed Steel

DRILLS WITH GROOVED SHANKS



JOBBER'S' LENGTHS

Diam., Inches	Price Per Dozen		Whole Length, Inches	Twist Cut, Inches	Diam., Inches	Price Per Dozen		Whole Length, Inches	Twist Cut, Inches
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel		
$\frac{3}{32}$	\$1.70	\$5.70	$2\frac{3}{4}$	$1\frac{9}{16}$	$\frac{5}{16}$	\$4.35	\$10.50	$4\frac{1}{2}$	$2\frac{3}{8}$
$\frac{7}{64}$	1.75	5.90	$2\frac{7}{8}$	$1\frac{11}{16}$	$\frac{21}{64}$	4.70	12.00	$4\frac{5}{8}$	$2\frac{1}{2}$
$\frac{1}{8}$	1.80	5.90	3	$1\frac{3}{4}$	$\frac{11}{32}$	5.05	12.00	$4\frac{3}{4}$	$2\frac{9}{16}$
$\frac{9}{64}$	1.85	6.10	$3\frac{1}{8}$	$1\frac{7}{8}$	$\frac{23}{64}$	5.50	13.50	$4\frac{7}{8}$	$2\frac{11}{16}$
$\frac{5}{32}$	1.90	6.10	$3\frac{1}{4}$	2	$\frac{3}{8}$	6.00	13.50	5	$2\frac{13}{16}$
$\frac{11}{64}$	2.00	6.30	$3\frac{3}{8}$	$2\frac{1}{16}$	$\frac{25}{64}$	6.50	15.00	$5\frac{1}{8}$	$2\frac{7}{8}$
$\frac{3}{16}$	2.25	6.30	$3\frac{1}{2}$	$2\frac{3}{16}$	$\frac{13}{32}$	7.00	15.00	$5\frac{1}{4}$	3
$\frac{13}{64}$	2.50	7.00	$3\frac{5}{8}$	$2\frac{5}{16}$	$\frac{27}{64}$	7.75	17.00	$5\frac{3}{8}$	$3\frac{1}{8}$
$\frac{7}{32}$	2.75	7.00	$3\frac{3}{4}$	$2\frac{3}{8}$	$\frac{7}{16}$	8.50	17.00	$5\frac{1}{2}$	$3\frac{1}{4}$
$\frac{15}{64}$	3.00	7.35	$3\frac{7}{8}$	$2\frac{1}{2}$	$\frac{29}{64}$	9.25	18.75	$5\frac{5}{8}$	$3\frac{1}{4}$
$\frac{1}{4}$	3.25	7.35	4	$1\frac{15}{16}$	$\frac{15}{32}$	10.00	18.75	$5\frac{3}{4}$	$3\frac{3}{8}$
$\frac{17}{64}$	3.50	9.10	$4\frac{1}{8}$	$2\frac{1}{16}$	$\frac{31}{64}$	11.00	20.00	$5\frac{7}{8}$	$3\frac{1}{2}$
$\frac{9}{32}$	3.80	9.10	$4\frac{1}{4}$	$2\frac{3}{16}$	$\frac{1}{2}$	12.00	20.00	6	$3\frac{5}{8}$
$\frac{19}{64}$	4.00	10.50	$4\frac{3}{8}$	$2\frac{1}{4}$					

Letter size drills with Grooved Shanks furnished at same list as No. 332 Drills.

No. 316

DRILLS WITH GROOVED SHANKS

TAPER SHANK LENGTHS

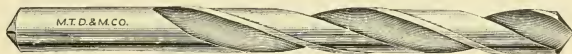


Prices upon application.

No. 332
Carbon Steel

No. 1332
High Speed Steel

STRAIGHT SHANK DRILLS



LETTER SIZES

Size by Gauge	Price Per Dozen		Decimal Equivalent	Whole Length, Inches	Twist Cut, Inches
	Carbon Steel	High Speed Steel			
A	\$3.00	\$7.35	.234	$3\frac{13}{16}$	$2\frac{19}{32}$
B	3.05	7.35	.238	$3\frac{13}{16}$	$2\frac{19}{32}$
C	3.10	7.35	.242	$3\frac{13}{16}$	$2\frac{19}{32}$
D	3.15	7.35	.246	$3\frac{13}{16}$	$2\frac{19}{32}$
E	3.25	7.35	.250	$3\frac{13}{16}$	$2\frac{9}{16}$
F	3.35	9.10	.257	$4\frac{1}{4}$	3
G	3.45	9.10	.261	$4\frac{1}{4}$	3
H	3.55	9.10	.266	$4\frac{1}{4}$	3
I	3.65	9.10	.272	$4\frac{1}{4}$	3
J	3.70	9.10	.277	$4\frac{1}{4}$	3
K	3.80	9.10	.281	$4\frac{1}{4}$	3
L	3.90	10.50	.290	$4\frac{1}{4}$	$2\frac{31}{32}$
M	4.00	10.50	.295	$4\frac{1}{4}$	$2\frac{31}{32}$
N	4.25	10.50	.302	$4\frac{1}{4}$	$2\frac{31}{32}$
O	4.40	10.50	.316	$4\frac{1}{4}$	$2\frac{15}{16}$
P	4.60	12.00	.323	$4\frac{1}{2}$	$3\frac{3}{16}$
Q	4.75	12.00	.332	$4\frac{5}{8}$	$3\frac{5}{16}$
R	5.00	12.00	.339	$4\frac{5}{8}$	$3\frac{5}{16}$
S	5.15	13.50	.348	$4\frac{3}{4}$	$3\frac{13}{32}$
T	5.30	13.50	.358	$4\frac{3}{4}$	$3\frac{13}{32}$
U	5.50	13.50	.368	$4\frac{7}{8}$	$3\frac{17}{32}$
V	6.00	13.50	.377	5	$3\frac{5}{8}$
W	6.50	15.00	.386	5	$3\frac{5}{8}$
X	6.75	15.00	.397	$5\frac{1}{8}$	$3\frac{3}{4}$
Y	7.00	15.00	.404	$5\frac{1}{8}$	$3\frac{3}{4}$
Z	7.25	17.00	.413	$5\frac{1}{4}$	$3\frac{7}{16}$

For prices of Sets of these Drills, see pages 96, 102.

No. 333
Carbon Steel

No. 1333
High Speed Steel

STRAIGHT SHANK DRILLS



WIRE AND JOBBERS' LENGTHS
MILLIMETER SIZES

Diameter, M. M.	Price Per Dozen		Diameter in Decimals of 1 Inch	Approximate Whole Length, M. M.	Approximate Length Twist Cut, M. M.
	Carbon Steel	High Speed Steel			
.5	\$1.50		.0197	25	6.5
.55	1.50		.0216	27	6.5
.6	1.50		.0236	30	9.5
.65	1.50		.0256	31	11.
.7	1.50		.0276	34	14.5
.75	1.50		.0296	35	14.5
.8	1.50		.0315	37	14.5
.85	1.50		.0335	37	14.5
.9	1.50		.0354	38	16.
.95	1.50		.0374	38	16.
1.	1.50	\$5.70	.0394	39	17.5
1.05	1.55	5.70	.0413	39	17.5
1.1	1.55	5.70	.0433	43	20.
1.15	1.55	5.70	.0453	43	20.
1.2	1.55	5.70	.0472	44	20.5
1.25	1.55	5.70	.0492	44	20.5
1.3	1.60	5.70	.0512	44	20.5
1.35	1.60	5.70	.0532	45	21.5
1.4	1.60	5.70	.0551	46	21.5
1.45	1.60	5.70	.0571	46	21.5
1.5	1.60	5.70	.0591	46	21.5
1.55	1.60	5.70	.0610	48	22.
1.6	1.60	5.70	.0630	48	22.
1.65	1.60	5.70	.0650	49	24.
1.7	1.60	5.70	.0669	49	24.
1.75	1.60	5.70	.0689	49	24.
1.8	1.65	5.70	.0709	51	25.5
1.85	1.65	5.70	.0728	51	25.5
1.9	1.65	5.70	.0748	52	27.
1.95	1.65	5.70	.0768	53	28.
2.	1.65	5.70	.0787	53	28

For prices of Sets of these Drills, see pages 96, 102.

No. 333
Carbon Steel

No. 1333
High Speed Steel

STRAIGHT SHANK DRILLS



WIRE AND JOBBERS' LENGTHS
MILLIMETER SIZES

Diameter M. M.	Price Per Dozen		Diameter in Decimals of 1 Inch	Approximate Whole Length, M. M.	Approximate Twist Cut, M. M.
	Carbon Steel	High Speed Steel			
2.05	\$1.70	\$5.70	.0807	54	28.5
2.1	1.70	5.70	.0827	56	30.
2.15	1.70	5.70	.0846	56	30.
2.2	1.70	5.70	.0866	57	31.
2.25	1.70	5.70	.0886	57	31.
2.3	1.70	5.70	.0905	58	31.5
2.35	1.70	5.70	.0925	58	31.5
2.4	1.70	5.70	.0945	59	33.5
2.45	1.70	5.70	.0965	59	33.5
2.5	1.70	5.90	.0984	60	34.
2.6	1.75	5.90	.1024	63	36.5
2.7	1.75	5.90	.1063	65	38.
2.75	1.75	5.90	.1082	66	38.
2.8	1.75	5.90	.1102	67	39.5
2.9	1.75	5.90	.1142	69	41.5
3.	1.75	5.90	.1181	70	43.
3.1	1.80	5.90	.1220	70	43.
3.2	1.80	6.10	.1260	71	43.5
3.25	1.80	6.10	.1279	71	43.5
3.3	1.80	6.10	.1299	71	43.5
3.4	1.80	6.10	.1339	72	44.5
3.5	1.80	6.10	.1378	73	46.
3.6	1.90	6.10	.1417	73	46.
3.7	1.90	6.10	.1457	74	47.
3.75	1.90	6.10	.1476	76	48.5
3.8	1.90	6.10	.1496	76	48.5
3.9	1.90	6.10	.1535	78	50.
4.	1.90	6.10	.1575	79	51.
4.1	2.00	6.30	.1614	81	52.5
4.2	2.00	6.30	.1653	83	53.
4.25	2.00	6.30	.1673	84	54.
4.3	2.00	6.30	.1693	84	54.
4.4	2.00	6.30	.1732	85	55.
4.5	2.00	6.30	.1772	86	55.5
4.6	2.25	6.30	.1811	88	57.

No. 333
Carbon Steel

No. 1333
High Speed Steel

STRAIGHT SHANK DRILLS



WIRE AND JOBBERS' LENGTHS
MILLIMETER SIZES

Diameter, M. M.	Price Per Dozen		Diameter in Decimals of 1 Inch	Approximate Whole Length, M. M.	Approximate Length Twist Cut, M. M.
	Carbon Steel	High Speed Steel			
4.7	\$2.25	\$6.30	.1850	89	58.
4.75	2.25	6.30	.1870	90	58.5
4.8	2.25	6.30	.1890	90	58.5
4.9	2.25	7.00	.1929	92	60.5
5.	2.25	7.00	.1968	93	62.
5.1	2.60	7.00	.2008	95	63.5
5.2	2.60	7.00	.2047	96	64.5
5.25	2.60	7.00	.2067	96	64.5
5.3	2.60	7.00	.2087	98	66.
5.4	2.60	7.00	.2126	99	66.5
5.5	2.60	7.00	.2165	100	66.5
5.6	2.95	7.00	.2205	100	66.5
5.7	2.95	7.00	.2244	100	66.5
5.75	2.95	7.00	.2263	102	67.5
5.8	2.95	7.00	.2283	102	67.5
5.9	2.95	7.00	.2323	102	67.5
6.	2.95	7.35	.2362	102	67.5
6.1	3.30	7.35	.2402	102	67.5
6.2	3.30	7.35	.2441	102	67.5
6.25	3.30	7.35	.2461	102	67.5
6.3	3.30	7.35	.2480	102	67.5
6.4	3.30	9.10	.2520	102	67.5
6.5	3.30	9.10	.2559	105	73.
6.6	3.65	9.10	.2598	105	73.
6.7	3.65	9.10	.2638	105	73.
6.75	3.65	9.10	.2657	105	73.
6.8	3.65	9.10	.2677	108	76.
6.9	3.65	9.10	.2716	108	76.
7.	3.65	9.10	.2756	108	76.
7.1	4.00	9.10	.2795	108	76.
7.2	4.00	10.50	.2835	108	76.
7.25	4.00	10.50	.2854	108	76.
7.3	4.00	10.50	.2874	108	76.
7.4	4.00	10.50	.2913	108	76.
7.5	4.00	10.50	.2953	111	78.5
7.6	4.50	10.50	.2992	111	78.5
7.7	4.50	10.50	.3031	111	78.5

No. 333
Carbon Steel

No. 1333
High Speed Steel

STRAIGHT SHANK DRILLS



WIRE AND JOBBERS' LENGTHS

MILLIMETER SIZES

Diameter, M. M.	Price Per Dozen		Diameter in Decimals of 1 Inch	Approximate Whole Length, M. M.	Approximate Length Twist Cut, M. M.
	Carbon Steel	High Speed Steel			
7.75	\$4.50	\$10.50	.3051	111	78.5
7.8	4.50	10.50	.3071	111	78.5
7.9	4.50	10.50	.3110	111	78.5
8.	4.50	10.50	.3150	114	81.
8.1	5.00	12.00	.3189	114	81.
8.2	5.00	12.00	.3228	117	84.
8.25	5.00	12.00	.3248	117	84.
8.3	5.00	12.00	.3268	117	84.
8.4	5.00	12.00	.3307	117	84.
8.5	5.00	12.00	.3346	117	84.
8.6	5.50	12.00	.3386	121	87.5
8.7	5.50	12.00	.3425	121	87.5
8.75	5.50	13.50	.3445	121	87.5
8.8	5.50	13.50	.3465	121	87.5
8.9	5.50	13.50	.3504	121	87.5
9.	5.50	13.50	.3543	124	89.5
9.1	6.00	13.50	.3583	124	89.5
9.2	6.00	13.50	.3622	124	89.5
9.25	6.00	13.50	.3642	124	89.5
9.3	6.00	13.50	.3661	124	89.5
9.4	6.00	13.50	.3701	124	89.5
9.5	6.00	13.50	.3740	127	93.
9.6	6.50	15.00	.3779	127	93.
9.7	6.50	15.00	.3819	127	93.
9.75	6.50	15.00	.3839	130	95.
9.8	6.50	15.00	.3858	130	95.
9.9	6.50	15.00	.3898	130	95.
10.	6.50	15.00	.3937	130	95.
10.5	7.25	17.00	.4134	133	97.5
11.	8.00	17.00	.4331	140	104.
11.5	9.00	18.75	.4528	143	106.5
12.	10.00	20.00	.4724	146	108.5
12.5	11.00	20.00	.4921	162	111.
13.	12.50	21.50	.5118	167	114.5

No. 340
Carbon Steel

No. 1340
High Speed Steel

STRAIGHT SHANK WIRE DRILLS



WIRE SIZES

Number by Gauge	Price Per Dozen		Decimals of 1 Inch	Approximate Length, Inches	Twist Cut, Inches
	Carbon Steel	High Speed Steel			
1	\$2.75	\$7.00	.2280	4	2 $\frac{21}{32}$
2	2.75	7.00	.2210	3 $\frac{15}{16}$	2 $\frac{5}{8}$
3	2.75	7.00	.2130	3 $\frac{15}{16}$	2 $\frac{5}{8}$
4	2.75	7.00	.2090	3 $\frac{7}{8}$	2 $\frac{13}{32}$
5	2.75	7.00	.2055	3 $\frac{13}{16}$	2 $\frac{9}{16}$
6	2.50	7.00	.2040	3 $\frac{13}{16}$	2 $\frac{17}{32}$
7	2.50	7.00	.2010	3 $\frac{3}{4}$	2 $\frac{1}{2}$
8	2.50	7.00	.1990	3 $\frac{11}{16}$	2 $\frac{15}{32}$
9	2.50	7.00	.1960	3 $\frac{11}{16}$	2 $\frac{7}{16}$
10	2.50	7.00	.1935	3 $\frac{5}{8}$	2 $\frac{3}{8}$
11	2.25	6.30	.1910	3 $\frac{9}{16}$	2 $\frac{11}{32}$
12	2.25	6.30	.1890	3 $\frac{9}{16}$	2 $\frac{5}{16}$
13	2.25	6.30	.1850	3 $\frac{1}{2}$	2 $\frac{9}{32}$
14	2.25	6.30	.1820	3 $\frac{7}{16}$	2 $\frac{1}{4}$
15	2.25	6.30	.1800	3 $\frac{7}{16}$	2 $\frac{7}{32}$
16	2.00	6.30	.1770	3 $\frac{3}{8}$	2 $\frac{3}{16}$
17	2.00	6.30	.1730	3 $\frac{5}{16}$	2 $\frac{5}{32}$
18	2.00	6.30	.1695	3 $\frac{5}{16}$	2 $\frac{1}{8}$
19	2.00	6.30	.1660	3 $\frac{1}{4}$	2 $\frac{3}{32}$
20	2.00	6.30	.1610	3 $\frac{3}{16}$	2 $\frac{1}{16}$
21	1.90	6.10	.1590	3 $\frac{3}{16}$	2 $\frac{1}{16}$
22	1.90	6.10	.1570	3 $\frac{1}{8}$	2
23	1.90	6.10	.1540	3 $\frac{1}{16}$	1 $\frac{31}{32}$
24	1.90	6.10	.1520	3 $\frac{1}{16}$	1 $\frac{15}{16}$
25	1.90	6.10	.1495	3	1 $\frac{29}{32}$
26	1.80	6.10	.1470	2 $\frac{15}{16}$	1 $\frac{7}{8}$
27	1.80	6.10	.1440	2 $\frac{15}{16}$	1 $\frac{27}{32}$

For prices of Sets of these Drills, see pages 96, 101, 102.

No. 340
Carbon Steel

No. 1340
High Speed Steel

STRAIGHT SHANK WIRE DRILLS



WIRE SIZES

Number by Gauge	Price Per Dozen		Decimals of 1 Inch	Approximate Length, Inches	Twist Cut, Inches
	Carbon Steel	High Speed Steel			
28	\$1.80	\$6.10	.1405	2 $\frac{7}{8}$	1 $\frac{13}{16}$
29	1.80	6.10	.1360	2 $\frac{13}{16}$	1 $\frac{3}{4}$
30	1.80	6.10	.1285	2 $\frac{13}{16}$	1 $\frac{23}{32}$
31	1.75	5.90	.1200	2 $\frac{3}{4}$	1 $\frac{11}{16}$
32	1.75	5.90	.1160	2 $\frac{11}{16}$	1 $\frac{5}{8}$
33	1.75	5.90	.1130	2 $\frac{11}{16}$	1 $\frac{5}{8}$
34	1.75	5.90	.1110	2 $\frac{5}{8}$	1 $\frac{9}{16}$
35	1.75	5.90	.1100	2 $\frac{9}{16}$	1 $\frac{1}{2}$
36	1.75	5.90	.1065	2 $\frac{9}{16}$	1 $\frac{1}{2}$
37	1.75	5.90	.1040	2 $\frac{1}{2}$	1 $\frac{7}{16}$
38	1.75	5.90	.1015	2 $\frac{7}{16}$	1 $\frac{3}{8}$
39	1.75	5.90	.0995	2 $\frac{7}{16}$	1 $\frac{11}{32}$
40	1.75	5.90	.0980	2 $\frac{3}{8}$	1 $\frac{11}{32}$
41	1.70	5.70	.0960	2 $\frac{5}{16}$	1 $\frac{5}{16}$
42	1.70	5.70	.0935	2 $\frac{5}{16}$	1 $\frac{1}{4}$
43	1.70	5.70	.0890	2 $\frac{1}{4}$	1 $\frac{7}{32}$
44	1.70	5.70	.0860	2 $\frac{3}{16}$	1 $\frac{3}{16}$
45	1.70	5.70	.0820	2 $\frac{3}{16}$	1 $\frac{1}{8}$
46	1.65	5.70	.0810	2 $\frac{1}{8}$	1 $\frac{1}{8}$
47	1.65	5.70	.0785	2 $\frac{1}{16}$	1 $\frac{3}{32}$
48	1.65	5.70	.0760	2 $\frac{1}{16}$	1 $\frac{1}{16}$
49	1.65	5.70	.0730	2	1
50	1.65	5.70	.0700	1 $\frac{15}{16}$	$\frac{31}{32}$
51	1.60	5.70	.0670	1 $\frac{15}{16}$	$\frac{15}{16}$
52	1.60	5.70	.0635	1 $\frac{7}{8}$	$\frac{7}{8}$
53	1.60	5.70	.0595	1 $\frac{13}{16}$	$\frac{27}{32}$
54	1.60	5.70	.0550	1 $\frac{13}{16}$	$\frac{27}{32}$

No. 340
Carbon Steel

No. 1340
High Speed Steel

STRAIGHT SHANK WIRE DRILLS



WIRE SIZES

Number by Gauge	Price Per Dozen		Decimals of 1 Inch	Approximate Length, Inches	Twist Cut, Inches
	Carbon Steel	High Speed Steel			
55	\$1.60	\$5.70	.0520	1 $\frac{3}{4}$	$\frac{13}{16}$
56	1.55	5.70	.0465	1 $\frac{11}{16}$	$\frac{25}{32}$
57	1.55	5.70	.0430	1 $\frac{11}{16}$	$\frac{23}{32}$
58	1.55	5.70	.0420	1 $\frac{5}{8}$	$\frac{23}{32}$
59	1.55	5.70	.0410	1 $\frac{9}{16}$	$\frac{11}{8}$
60	1.55	5.70	.0400	1 $\frac{9}{16}$	$\frac{11}{8}$
61	1.50		.0390	1 $\frac{1}{2}$	$\frac{5}{8}$
62	1.50		.0380	1 $\frac{1}{2}$	$\frac{5}{8}$
63	1.50		.0370	1 $\frac{1}{2}$	$\frac{5}{8}$
64	1.50		.0360	1 $\frac{1}{2}$	$\frac{5}{8}$
65	1.50		.0350	1 $\frac{1}{2}$	$\frac{5}{8}$
66	1.50		.0330	1 $\frac{1}{2}$	$\frac{9}{16}$
67	1.50		.0320	1 $\frac{7}{16}$	$\frac{9}{16}$
68	1.50		.0310	1 $\frac{7}{16}$	$\frac{9}{16}$
69	1.50		.0292	1 $\frac{3}{8}$	$\frac{9}{16}$
70	1.50		.0280	1 $\frac{5}{16}$	$\frac{9}{16}$
71	1.50		.0260	1 $\frac{5}{16}$	$\frac{1}{2}$
72	1.50		.0250	1 $\frac{1}{4}$	$\frac{7}{16}$
73	1.50		.0240	1 $\frac{3}{16}$	$\frac{3}{8}$
74	1.50		.0225	1 $\frac{1}{8}$	$\frac{5}{16}$
75	1.50		.0210	1 $\frac{1}{16}$	$\frac{1}{4}$
76	1.50		.0200	1	$\frac{1}{4}$
77	1.50		.0180	$\frac{15}{16}$	$\frac{7}{32}$
78	1.50		.0160	$\frac{7}{8}$	$\frac{7}{32}$
79	1.50		.0145	$\frac{13}{16}$	$\frac{3}{16}$
80	1.50		.0135	$\frac{3}{4}$	$\frac{3}{16}$

No. 341

STRAIGHT SHANK JEWELERS' DRILLS



WIRE SIZES

Number by Gauge	Price Per Dozen	Decimals of 1 Inch	Whole Length, Inches	Twist Cut, Inches
30	\$1.80	.1285	$1\frac{29}{32}$	$1\frac{5}{16}$
31	1.75	.1200	$1\frac{29}{32}$	$1\frac{5}{16}$
32	1.75	.1160	$1\frac{29}{32}$	$1\frac{5}{16}$
33	1.75	.1130	$1\frac{29}{32}$	$1\frac{5}{16}$
34	1.75	.1110	$1\frac{29}{32}$	$1\frac{5}{16}$
35	1.75	.1100	$1\frac{29}{32}$	$1\frac{5}{16}$
36	1.75	.1065	$1\frac{29}{32}$	$1\frac{5}{16}$
37	1.75	.1040	$1\frac{29}{32}$	$1\frac{5}{16}$
38	1.75	.1015	$1\frac{29}{32}$	$1\frac{5}{16}$
39	1.75	.0995	$1\frac{29}{32}$	$1\frac{5}{16}$
40	1.75	.0980	$1\frac{29}{32}$	$1\frac{5}{16}$
41	1.70	.0960	$1\frac{29}{32}$	$1\frac{5}{16}$
42	1.70	.0935	$1\frac{29}{32}$	$1\frac{1}{4}$
43	1.70	.0890	$1\frac{29}{32}$	$1\frac{7}{32}$
44	1.70	.0860	$1\frac{29}{32}$	$1\frac{3}{16}$
45	1.70	.0820	$1\frac{29}{32}$	$1\frac{1}{8}$
46	1.65	.0810	$1\frac{29}{32}$	$1\frac{1}{8}$
47	1.65	.0785	$1\frac{29}{32}$	$1\frac{3}{32}$
48	1.65	.0760	$1\frac{29}{32}$	$1\frac{1}{16}$
49	1.65	.0730	$1\frac{29}{32}$	1
50	1.65	.0700	$1\frac{15}{16}$	$\frac{31}{32}$
51	1.60	.0670	$1\frac{15}{16}$	$\frac{15}{16}$
52	1.60	.0635	$1\frac{7}{8}$	$\frac{7}{8}$
53	1.60	.0595	$1\frac{13}{16}$	$\frac{27}{32}$
54	1.60	.0550	$1\frac{13}{16}$	$\frac{27}{32}$
55	1.60	.0520	$1\frac{3}{4}$	$\frac{13}{16}$
56	1.55	.0465	$1\frac{11}{16}$	$\frac{25}{32}$
57	1.55	.0430	$1\frac{11}{16}$	$\frac{23}{32}$
58	1.55	.0420	$1\frac{5}{8}$	$\frac{23}{32}$
59	1.55	.0410	$1\frac{9}{16}$	$\frac{11}{16}$
60	1.55	.0400	$1\frac{9}{16}$	$\frac{11}{16}$

For prices of Sets of Jewelers' Drills, see page 94.

No. 341

STRAIGHT SHANK JEWELERS' DRILLS



WIRE SIZES

Number by Gauge	Price Per Dozen	Decimals of 1 Inch	Whole Length, Inches	Twist Cut, Inches
61	\$1.50	.039	1½	⅝
62	1.50	.038	1½	⅝
63	1.50	.037	1½	⅝
64	1.50	.036	1½	⅝
65	1.50	.035	1½	⅝
66	1.50	.033	1½	⅞
67	1.50	.032	1⅞	⅞
68	1.50	.031	1⅞	⅞
69	1.50	.029	1⅜	⅞
70	1.50	.028	1⅝	⅞
71	1.50	.026	1⅞	½
72	1.50	.025	1¼	⅞
73	1.50	.024	1⅜	⅜
74	1.50	.0225	1⅞	⅝
75	1.50	.021	1⅞	¼
76	1.50	.02	1	¼
77	1.50	.018	1⅝	⅞
78	1.50	.016	⅞	⅞
79	1.50	.0145	1⅞	⅝
80	1.50	.0135	¾	⅝

For prices of Sets of Jewelers' Drills, see page 94.

No. 342

STRAIGHT SHANK JEWELERS' DRILLS

FRACTIONAL SIZES

Diameter, Inches	Price Per Dozen	Decimals of 1 Inch	Whole Length, Inches	Twist Cut, Inches
¼	\$1.50	.0312	1⅞	⅞
⅜	1.55	.0468	1⅞	⅞
½	1.60	.0625	1⅞	⅞
⅝	1.65	.0781	2	1¼
¾	1.70	.0937	2	1¼
⅞	1.75	.1093	2	1¼
1	1.80	.1250	2	1¼

LEFT HAND DRILLS

No. 306

LEFT HAND MORSE TAPER SHANK DRILLS



No. 318

LEFT HAND STRAIGHT SHANK TAPER LENGTH DRILLS



No. 334 Carbon Steel

No. 1334 High Speed Steel

LEFT HAND STRAIGHT SHANK DRILLS, JOBBERS' LENGTHS



Carried in stock in sizes $\frac{1}{8}$ inch to $\frac{1}{2}$ inch by 64ths, Carbon Steel.
 Carried in stock in sizes $\frac{1}{8}$ inch to $\frac{1}{2}$ inch by 64ths, High Speed Steel.

No. 343 Carbon Steel

No. 1343 High Speed Steel

LEFT HAND STRAIGHT SHANK WIRE DRILLS



Carried in stock in sizes No. 1 to No. 65, Carbon Steel.
 Carried in stock in sizes No. 1 to No. 60, High Speed Steel.

Prices quoted on application.

No. 355

STRAIGHT SHANK MACHINE BITS

FOR WOOD



Diam., Inches	Price Each	Whole Length, Inches	Twist Cut, Inches	Diam., Inches	Price Each	Whole Length, Inches	Twist Cut, Inches
$\frac{1}{8}$	\$.40	3	$1\frac{13}{16}$	$\frac{3}{32}$	\$1.80	$7\frac{1}{4}$	$5\frac{1}{2}$
$\frac{5}{32}$	.45	$3\frac{1}{4}$	$2\frac{3}{32}$	$\frac{3}{4}$	1.90	$7\frac{1}{2}$	$5\frac{11}{16}$
$\frac{3}{16}$	.50	$3\frac{1}{2}$	$2\frac{5}{16}$	$\frac{25}{32}$	2.00	$7\frac{3}{4}$	$5\frac{7}{8}$
$\frac{7}{32}$	.55	$3\frac{3}{4}$	$2\frac{17}{32}$	$\frac{13}{16}$	2.10	8	$6\frac{1}{16}$
$\frac{1}{4}$	.60	4	$2\frac{3}{4}$	$\frac{27}{32}$	2.30	$8\frac{1}{4}$	$6\frac{1}{4}$
$\frac{9}{32}$	.65	$4\frac{1}{4}$	$2\frac{31}{32}$	$\frac{7}{8}$	2.50	$8\frac{1}{2}$	$6\frac{7}{16}$
$\frac{5}{16}$	.70	$4\frac{1}{2}$	$3\frac{3}{16}$	$\frac{29}{32}$	2.70	$8\frac{3}{4}$	$6\frac{5}{8}$
$\frac{11}{32}$	.75	$4\frac{3}{4}$	$3\frac{13}{32}$	$\frac{15}{16}$	2.90	9	$6\frac{13}{16}$
$\frac{3}{8}$	.80	5	$3\frac{5}{8}$	$\frac{31}{32}$	3.00	$9\frac{1}{4}$	7
$\frac{13}{32}$	.85	$5\frac{1}{4}$	$3\frac{27}{32}$	1	3.25	$9\frac{1}{2}$	$7\frac{3}{16}$
$\frac{7}{16}$	.90	$5\frac{1}{2}$	$4\frac{1}{16}$	$1\frac{1}{16}$	3.75	$11\frac{1}{4}$	$8\frac{1}{2}$
$\frac{15}{32}$	1.00	$5\frac{3}{4}$	$4\frac{9}{32}$	$1\frac{1}{8}$	4.25	$11\frac{3}{4}$	$8\frac{7}{8}$
$\frac{1}{2}$	1.10	6	$4\frac{1}{2}$	$1\frac{3}{16}$	4.75	12	9
$\frac{17}{32}$	1.20	$6\frac{1}{8}$	$4\frac{19}{32}$	$1\frac{1}{4}$	5.25	$12\frac{1}{2}$	$9\frac{3}{8}$
$\frac{9}{16}$	1.30	$6\frac{1}{4}$	$4\frac{11}{16}$	$1\frac{5}{16}$	5.75	$12\frac{1}{2}$	$9\frac{3}{8}$
$\frac{19}{32}$	1.40	$6\frac{3}{8}$	$4\frac{3}{4}$	$1\frac{3}{8}$	6.25	$12\frac{1}{2}$	$9\frac{3}{8}$
$\frac{5}{8}$	1.50	$6\frac{1}{2}$	$4\frac{7}{8}$	$1\frac{7}{16}$	7.25	$12\frac{1}{2}$	$9\frac{3}{8}$
$\frac{21}{32}$	1.60	$6\frac{3}{4}$	5	$1\frac{1}{2}$	8.25	$12\frac{1}{2}$	$9\frac{5}{8}$
$\frac{11}{16}$	1.70	7	$5\frac{5}{16}$				

For prices of Sets of Machine Bits, see pages 97, 101.

No. 356

MACHINE BITS FOR WOOD

TAPER LENGTHS

FITTING THE PRENTICE BLACKSMITHS' DRILL PRESSES NOS. 1 AND 2

SHANKS $\frac{1}{2}$ INCH DIAMETER, $2\frac{1}{2}$ INCHES LONG

Diam., Inches	Price Each	Whole Length, Inches	Twist Cut, Inches	Diam., Inches	Price Each	Whole Length, Inches	Twist Cut, Inches
$\frac{1}{8}$	\$.50	$4\frac{5}{8}$	$1\frac{13}{16}$	$\frac{23}{32}$	\$1.90	$9\frac{1}{2}$	$6\frac{1}{4}$
$\frac{5}{32}$	.55	$4\frac{7}{8}$	$2\frac{3}{32}$	$\frac{3}{4}$	2.00	$9\frac{3}{4}$	$6\frac{1}{2}$
$\frac{3}{16}$	.60	5	$2\frac{5}{16}$	$\frac{25}{32}$	2.10	$9\frac{7}{8}$	$6\frac{5}{8}$
$\frac{7}{32}$	.65	$5\frac{1}{4}$	$2\frac{17}{32}$	$\frac{13}{16}$	2.20	10	$6\frac{3}{4}$
$\frac{1}{4}$	.70	$6\frac{1}{8}$	3	$\frac{27}{32}$	2.40	$10\frac{1}{4}$	7
$\frac{9}{32}$	.75	$6\frac{1}{4}$	3	$\frac{7}{8}$	2.60	$10\frac{1}{2}$	$7\frac{1}{4}$
$\frac{5}{16}$	.80	$6\frac{3}{8}$	$3\frac{1}{8}$	$\frac{29}{32}$	2.80	$10\frac{5}{8}$	$7\frac{3}{8}$
$\frac{11}{32}$	.85	$6\frac{1}{2}$	$3\frac{1}{4}$	$\frac{15}{16}$	3.00	$10\frac{3}{4}$	$7\frac{1}{2}$
$\frac{3}{8}$	.90	$6\frac{3}{4}$	$3\frac{1}{2}$	$\frac{31}{32}$	3.25	$10\frac{7}{8}$	$7\frac{5}{8}$
$\frac{13}{32}$	.95	7	$3\frac{3}{4}$	1	3.50	11	$7\frac{3}{8}$
$\frac{7}{16}$	1.00	$7\frac{1}{4}$	4	$1\frac{1}{16}$	4.00	$11\frac{1}{4}$	$7\frac{5}{8}$
$\frac{15}{32}$	1.10	$7\frac{1}{2}$	$4\frac{1}{4}$	$1\frac{1}{8}$	4.50	$11\frac{3}{4}$	8
$\frac{1}{2}$	1.20	$7\frac{3}{4}$	$4\frac{1}{2}$	$1\frac{3}{16}$	5.00	12	$8\frac{1}{4}$
$\frac{17}{32}$	1.30	8	$4\frac{3}{4}$	$1\frac{1}{4}$	5.50	$12\frac{1}{2}$	$8\frac{5}{8}$
$\frac{9}{16}$	1.40	$8\frac{1}{4}$	5	$1\frac{5}{16}$	6.00	$12\frac{1}{2}$	$8\frac{5}{8}$
$\frac{19}{32}$	1.50	$8\frac{1}{2}$	$5\frac{1}{4}$	$1\frac{3}{8}$	6.50	$12\frac{1}{2}$	$8\frac{1}{2}$
$\frac{5}{8}$	1.60	$8\frac{3}{4}$	$5\frac{1}{2}$	$1\frac{7}{16}$	7.50	$12\frac{1}{2}$	$8\frac{1}{2}$
$\frac{21}{32}$	1.70	9	$5\frac{3}{4}$	$1\frac{1}{2}$	8.50	$12\frac{1}{2}$	$8\frac{3}{8}$
$\frac{11}{16}$	1.80	$9\frac{1}{4}$	6				

No. 357

MACHINE BITS FOR WOOD

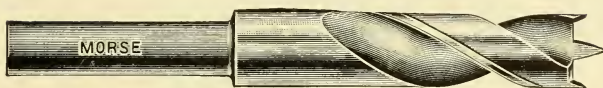
WITH MORSE TAPER SHANKS



Diam., Inches	Price Each	Whole Length, Inches	Twist Cut, Inches	Morse Taper Shank	Diam., Inches	Price Each	Whole Length, Inches	Twist Cut, Inches	Morse Taper Shank	
$\frac{1}{8}$	\$.50	$4\frac{5}{8}$	$1\frac{13}{16}$	No. 1	$\frac{23}{32}$	\$1.90	$9\frac{1}{2}$	$5\frac{11}{16}$	No. 2	
$\frac{5}{32}$	.55	$4\frac{7}{8}$	$2\frac{3}{32}$		$\frac{3}{4}$	2.00	$9\frac{3}{4}$	$5\frac{15}{16}$	
$\frac{3}{16}$	.60	5	$2\frac{5}{16}$		$\frac{25}{32}$	2.10	$9\frac{7}{8}$	$6\frac{1}{16}$	
$\frac{7}{32}$	.65	$5\frac{1}{4}$	$2\frac{13}{32}$		$\frac{13}{16}$	2.20	10	$6\frac{3}{16}$	
$\frac{1}{4}$	.70	$6\frac{1}{8}$	3		$\frac{27}{32}$	2.40	$10\frac{1}{4}$	$6\frac{7}{16}$	
$\frac{9}{32}$	.75	$6\frac{1}{4}$	$2\frac{15}{16}$		$\frac{7}{8}$	2.60	$10\frac{1}{2}$	$6\frac{11}{16}$	
$\frac{5}{16}$	.80	$6\frac{3}{8}$	$3\frac{1}{16}$		$\frac{29}{32}$	2.80	$10\frac{5}{8}$	$6\frac{13}{16}$	
$\frac{11}{32}$.85	$6\frac{1}{2}$	$3\frac{3}{16}$		$\frac{15}{16}$	3.00	$10\frac{3}{4}$	$6\frac{1}{4}$		No. 3
$\frac{3}{8}$	.90	$6\frac{3}{4}$	$3\frac{7}{16}$		$\frac{3}{2}$	3.25	$10\frac{7}{8}$	$6\frac{3}{8}$	
$\frac{13}{32}$	.95	7	$3\frac{11}{16}$		1	3.50	11	$6\frac{1}{2}$	
$\frac{7}{16}$	1.00	$7\frac{1}{4}$	$3\frac{15}{16}$		$\frac{1}{16}$	4.00	$11\frac{1}{4}$	$6\frac{3}{4}$		
$\frac{15}{32}$	1.10	$7\frac{1}{2}$	$4\frac{3}{16}$		$\frac{1}{8}$	4.50	$11\frac{3}{4}$	$7\frac{1}{4}$		
$\frac{1}{2}$	1.20	$7\frac{3}{4}$	$4\frac{7}{16}$		$\frac{1}{16}$	5.00	12	$7\frac{1}{2}$		
$\frac{17}{32}$	1.30	8	$4\frac{11}{16}$		No. 2	$1\frac{1}{4}$	5.50	$12\frac{1}{2}$		8	No. 4
$\frac{9}{16}$	1.40	$8\frac{1}{4}$	$4\frac{15}{16}$	$\frac{5}{16}$		6.00	$14\frac{1}{4}$	$8\frac{3}{4}$		
$\frac{19}{32}$	1.50	$8\frac{1}{2}$	$4\frac{5}{8}$	$\frac{3}{8}$		6.50	$14\frac{1}{2}$	9		
$\frac{5}{8}$	1.60	$8\frac{3}{4}$	$4\frac{15}{16}$	$\frac{7}{16}$		7.50	$14\frac{3}{4}$	$9\frac{1}{4}$		
$\frac{21}{32}$	1.70	9	$5\frac{3}{16}$	$1\frac{1}{2}$		8.50	15	$9\frac{1}{2}$		
$\frac{11}{16}$	1.80	$9\frac{1}{4}$	$5\frac{7}{16}$							

No. 358

MACHINE BITS FOR WOOD



SHANKS 1/2 INCH DIAMETER, 2 INCHES LONG

Diam., Inches	Price Each	Whole Length, Inches	Twist Cut, Inches	Diam., Inches	Price Each	Whole Length, Inches	Twist Cut, Inches
1/8	\$0.50	5	23/8	19/32	\$1.25	5	23/8
5/32	.55	5	23/8	9/8	1.30	5	23/8
3/16	.60	5	23/8	21/32	1.35	5	23/8
7/32	.65	5	23/8	11/16	1.40	5	23/8
1/4	.65	5	23/8	23/32	1.45	5	23/8
9/32	.70	5	23/8	3/4	1.50	5	23/8
5/16	.70	5	23/8	25/32	1.60	5	23/8
11/32	.75	5	23/8	13/16	1.70	5	23/8
3/8	.80	5	23/8	27/32	1.80	5	23/8
13/32	.85	5	23/8	7/8	1.90	5	23/8
7/16	.90	5	23/8	29/32	2.00	5	23/8
15/32	.95	5	23/8	15/16	2.10	5	23/8
1/2	1.00	5	23/8	31/32	2.20	5	23/8
13/16	1.10	5	23/8	1	2.30	5	23/8
9/16	1.20	5	23/8				

No. 360

STRAIGHT SHANK DRILLS FOR WOOD



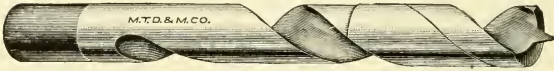
Diam., Inches	Price Per Dozen	Whole Length, Inches	Twist Cut, Inches	Diam., Inches	Price Per Dozen	Whole Length, Inches	Twist Cut, Inches
1/16	\$1.60	2 1/2	1 1/4	3/8	\$6.00	5	3 5/8
3/32	1.70	2 3/4	1 1/2	13/32	7.00	5 1/4	3 27/32
1/8	1.80	3	1 13/16	7/16	8.50	5 1/2	4 1/16
5/32	1.90	3 1/4	2 3/32	15/32	10.00	5 3/4	4 9/32
3/16	2.25	3 1/2	2 5/16	1/2	12.00	6	4 1/2
7/16	2.75	3 3/4	2 17/32	1 1/8	12.50	6	4 1/2
1/4	3.25	4	2 3/4	9/16	13.00	6	4 1/2
9/32	3.80	4 1/4	2 31/32	1 1/4	13.50	6	4 1/2
5/16	4.35	4 1/2	3 3/16	5/8	14.00	6	4 1/2
11/32	5.05	4 3/4	3 13/32				

SPECIAL MACHINE BITS FOR WOOD

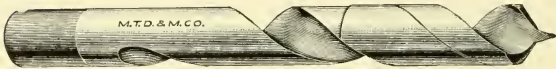
When tools made as illustrated below are desired, designate them by number, giving whole length and length of twist.

SINGLE GROOVE DRILLS

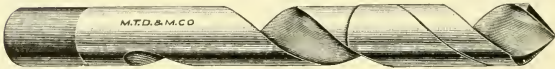
No. 365



No. 366



No. 367

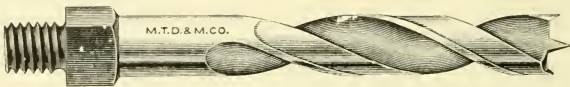


If Taper Shanks are desired give number of Socket when ordering.

No. 370

SCREW SHANK MACHINE BITS

FITTING PRYIBIL MACHINES

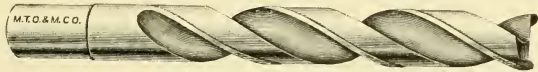


When ordering these Bits, in addition to whole length and length of twist always give diameter and length of Screw Shank, also pitch and form of thread.

SPECIAL MACHINE BITS FOR WOOD

When tools made as illustrated below are desired, designate them by number, giving whole length and length of twist or pod.

No. 371



No. 372



No. 373

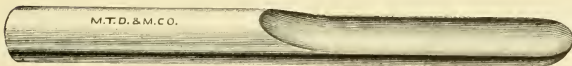


No. 374



No. 376

POD BITS



No. 377

PAPER DRILLS



If taper shanks are desired give number of socket when ordering.

No. 378

ROUTING BITS

FOR CUTTING WOOD, SOFT METAL, ZINC, ETC.



In ordering state diameter, whole length, length of cut and style of shank required.

SOLID AND ADJUSTABLE COUNTERBORES AND DRILLS FOR WOOD

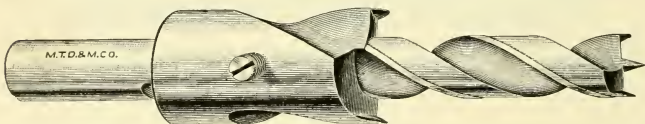
In ordering tools as below follow closely instructions given. If other than straight shank are required, give dimensions in detail.

No. 380



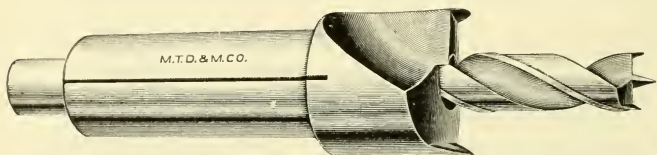
Give diameter and length of large and small parts.

No. 381



Give diameter and length of drill as well as diameter and length of counterbore.

No. 382



Give diameter and length of drill as well as diameter and length of both body and cutting parts of counterbore.

No. 390

BIT STOCK DRILLS

FOR METAL OR WOOD



Diam. Inches	Price Per Dozen	Whole Length Inches	Twist Cut, Inches	Length from Shank to Point Inches	Diam. Inches	Price Per Dozen	Whole Length Inches	Twist Cut, Inches	Length from Shank to Point Inches
$\frac{1}{16}$	\$2.50	$3\frac{5}{16}$	$\frac{7}{8}$	$1\frac{1}{2}$	$\frac{15}{32}$	\$11.75	$6\frac{5}{8}$	$4\frac{3}{8}$	$4\frac{7}{8}$
$\frac{5}{64}$	2.60	$3\frac{7}{16}$	$1\frac{3}{32}$	$1\frac{21}{32}$	$\frac{1}{2}$	13.00	$6\frac{3}{4}$	$4\frac{7}{16}$	5
$\frac{3}{32}$	2.70	$3\frac{5}{8}$	$1\frac{1}{4}$	$1\frac{27}{32}$	$\frac{17}{32}$	14.25	$7\frac{1}{2}$	$5\frac{3}{16}$	$5\frac{3}{4}$
$\frac{7}{64}$	2.85	$3\frac{7}{8}$	$1\frac{1}{2}$	$2\frac{3}{32}$	$\frac{9}{16}$	15.50	$7\frac{1}{2}$	$5\frac{3}{16}$	$5\frac{3}{4}$
$\frac{1}{8}$	3.00	$3\frac{5}{8}$	$1\frac{3}{4}$	$2\frac{9}{32}$	$\frac{19}{32}$	16.75	$7\frac{1}{2}$	$5\frac{3}{16}$	$5\frac{3}{4}$
$\frac{9}{64}$	3.25	$3\frac{11}{16}$	$1\frac{13}{16}$	$2\frac{11}{32}$	$\frac{5}{8}$	18.00	$7\frac{1}{2}$	$5\frac{1}{16}$	$5\frac{3}{4}$
$\frac{5}{32}$	3.50	$3\frac{15}{16}$	2	$2\frac{19}{32}$	$\frac{21}{32}$	19.50	$7\frac{1}{2}$	$5\frac{1}{16}$	$5\frac{3}{4}$
$\frac{11}{64}$	3.75	$4\frac{1}{8}$	$2\frac{5}{32}$	$2\frac{25}{32}$	$\frac{11}{16}$	21.00	$7\frac{1}{2}$	$5\frac{1}{16}$	$5\frac{3}{4}$
$\frac{3}{16}$	4.00	$4\frac{5}{16}$	$2\frac{1}{16}$	$2\frac{31}{32}$	$\frac{3}{4}$	22.50	$7\frac{1}{2}$	$5\frac{1}{16}$	$5\frac{3}{4}$
$\frac{13}{64}$	4.25	$4\frac{3}{8}$	$2\frac{7}{16}$	$3\frac{1}{32}$	$\frac{25}{32}$	24.00	$7\frac{1}{2}$	5	$5\frac{3}{4}$
$\frac{7}{32}$	4.50	$4\frac{11}{16}$	$2\frac{5}{8}$	$3\frac{11}{32}$	$\frac{25}{32}$	25.50	$7\frac{1}{2}$	5	$5\frac{3}{4}$
$\frac{15}{64}$	4.75	$5\frac{3}{16}$	$3\frac{3}{16}$	$3\frac{15}{16}$	$\frac{13}{16}$	27.00	$7\frac{1}{2}$	5	$5\frac{3}{4}$
$\frac{1}{4}$	5.00	$5\frac{1}{16}$	$3\frac{3}{16}$	$3\frac{15}{16}$	$\frac{13}{16}$	28.50	$7\frac{1}{2}$	5	$5\frac{3}{4}$
$\frac{17}{64}$	5.50	$5\frac{3}{8}$	$3\frac{3}{8}$	$4\frac{1}{8}$	$\frac{7}{8}$	30.00	$7\frac{1}{2}$	5	$5\frac{3}{4}$
$\frac{9}{32}$	6.00	$5\frac{3}{8}$	$3\frac{3}{8}$	$4\frac{1}{8}$	$\frac{29}{32}$	31.50	$7\frac{1}{2}$	5	$5\frac{3}{4}$
$\frac{19}{64}$	6.50	$5\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{4}$	$\frac{15}{16}$	33.00	$7\frac{1}{2}$	$4\frac{15}{16}$	$5\frac{3}{4}$
$\frac{5}{16}$	7.00	$5\frac{1}{2}$	$3\frac{1}{2}$	$4\frac{1}{4}$	$\frac{3}{32}$	34.50	$7\frac{1}{2}$	$4\frac{15}{16}$	$5\frac{3}{4}$
$\frac{21}{64}$	7.50	$5\frac{7}{8}$	$3\frac{7}{8}$	$4\frac{5}{8}$	1	36.00	$7\frac{1}{2}$	$4\frac{15}{16}$	$5\frac{3}{4}$
$\frac{11}{32}$	8.00	$5\frac{7}{8}$	$3\frac{7}{8}$	$4\frac{5}{8}$	$1\frac{1}{16}$	39.00	$7\frac{1}{2}$	$4\frac{15}{16}$	$5\frac{3}{4}$
$\frac{3}{8}$	8.50	$5\frac{7}{8}$	$3\frac{7}{8}$	$4\frac{5}{8}$	$1\frac{1}{8}$	42.00	$7\frac{1}{2}$	$4\frac{7}{8}$	$5\frac{3}{4}$
$\frac{13}{32}$	9.25	$5\frac{7}{8}$	$3\frac{5}{8}$	$4\frac{1}{8}$	$1\frac{3}{16}$	45.00	$7\frac{1}{2}$	$4\frac{7}{8}$	$5\frac{3}{4}$
$\frac{7}{16}$	10.50	$6\frac{1}{4}$	4	$4\frac{1}{2}$	$1\frac{1}{4}$	48.00	$7\frac{1}{2}$	$4\frac{7}{8}$	$5\frac{3}{4}$

Our Bit Stock Drills will fit any brace in the market, and will drill steel, iron or other metals as well as wood. They are not injured by contact with screws or nails, and will bore straight any kind of wood without splitting it.

For prices of Sets of Bit Stock Drills see pages 97, 101.

32d sizes not listed furnished at intermediate prices and 64th sizes at price of next larger 32d size.

No. 391

BIT STOCK DRILLS

FOR METAL OR WOOD

MILLIMETER SIZES



Diam. M. M.	Price Per Dozen	Diam. in Deci- mals of 1 Inch	Whole Length, M. M.	Twist Cut M. M.	Diam. M. M.	Price Per Dozen	Diam. in Deci- mals of 1 Inch	Whole Length, M. M.	Twist Cut, M. M.
1.5	\$2.50	.0591	83	21	13.5	\$15.50	.5315	190	132
2	2.70	.0787	87	28	14	15.50	.5512	190	132
2.5	2.85	.0984	95	34	14.5	16.75	.5709	190	132
3	3.00	.1181	103	43	15	16.75	.5905	190	132
3.5	3.25	.1378	94	46	15.5	18.00	.6102	190	132
4	3.75	.1575	100	51	16	19.50	.6299	190	129
4.5	4.00	.1772	106	56	16.5	19.50	.6496	190	129
5	4.25	.1969	113	62	17	21.00	.6693	190	129
5.5	4.50	.2165	119	67	17.5	22.50	.6890	190	129
6	5.00	.2362	132	81	18	22.50	.7087	190	129
6.5	5.50	.2559	132	81	18.5	24.00	.7283	190	129
7	6.00	.2756	137	86	19	24.00	.7480	190	127
7.5	6.50	.2953	140	89	19.5	25.50	.7677	190	127
8	7.50	.3150	140	89	20	27.00	.7874	190	127
8.5	8.00	.3446	149	98	20.5	27.00	.8071	190	127
9	8.50	.3543	149	98	21	28.50	.8268	190	127
9.5	8.50	.3740	149	98	21.5	30.00	.8465	190	127
10	9.25	.3937	149	92	22	30.00	.8661	190	127
10.5	10.50	.4134	159	102	22.5	31.50	.8858	190	127
11	10.50	.4331	149	102	23	31.50	.9055	190	127
11.5	11.75	.4528	168	111	23.5	33.00	.9252	190	127
12	13.00	.4724	168	111	24	34.50	.9449	190	125
12.5	13.00	.4921	171	113	24.5	34.50	.9646	190	125
13	14.25	.5118	190	132	25	36.00	.9842	190	125

Our Bit Stock Drills will fit any brace in the market, and will drill steel, iron, or other metals as well as wood. They are not injured by contact with screws or nails, and will bore straight any kind of wood without splitting it.

No. 392

WOOD DRILLS FOR BRACE



Diameter, Inches	Price Per Dozen	Length Over All, Inches
$\frac{2}{32}$	\$3.25	$3\frac{1}{2}$
$\frac{3}{32}$	3.25	4
$\frac{4}{32}$	3.25	$4\frac{5}{8}$
$\frac{5}{32}$	3.50	$5\frac{3}{16}$
$\frac{6}{32}$	4.00	$5\frac{11}{16}$
$\frac{7}{32}$	4.50	$6\frac{1}{8}$
$\frac{8}{32}$	5.00	$6\frac{9}{16}$
$\frac{9}{32}$	5.50	7
$\frac{10}{32}$	6.00	$7\frac{1}{2}$
$\frac{11}{32}$	6.50	$7\frac{7}{8}$
$\frac{12}{32}$	7.00	8
$\frac{13}{32}$	7.50	$8\frac{1}{4}$
$\frac{14}{32}$	8.00	$8\frac{1}{2}$
$\frac{15}{32}$	8.75	$8\frac{5}{8}$
$\frac{16}{32}$	9.50	9
$\frac{17}{32}$	10.25	9
$\frac{18}{32}$	11.00	$9\frac{3}{8}$
$\frac{19}{32}$	11.75	$9\frac{1}{2}$
$\frac{20}{32}$	12.50	$9\frac{5}{8}$
$\frac{22}{32}$	14.50	$9\frac{7}{8}$
$\frac{24}{32}$	16.50	$9\frac{7}{8}$
$\frac{26}{32}$	18.50	$9\frac{7}{8}$
$\frac{28}{32}$	21.00	10
$\frac{30}{32}$	24.00	10
$\frac{32}{32}$	27.00	10

These drills are designed especially for cutting freely and rapidly in wood, and will drill straight any way of the grain without splitting.

Furnished singly or in sets. See page 99.

No. 400
Carbon Steel

No. 1400
High Speed Steel

TAPER SQUARE SHANK DRILLS

FITTING RATCHETS



Small Shank or No. 1. Size of Shank $\frac{3}{8}$ inch x $\frac{5}{8}$ inch x $1\frac{1}{2}$ inches.
This size Shank always furnished unless otherwise specified.

Diam., Inches	Price Each		Whole Length, Inches	Twist Cut, Inches	Diam., Inches	Price Each		Whole Length, Inches	Twist Cut, Inches
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel		
$\frac{1}{8}$	\$.90		$4\frac{3}{16}$	$1\frac{13}{16}$	$\frac{27}{32}$	\$1.90	\$4.20	$7\frac{1}{4}$	$4\frac{15}{16}$
$\frac{5}{32}$	.95		$4\frac{7}{16}$	$2\frac{3}{32}$	$\frac{7}{8}$	2.05	4.50	$7\frac{1}{2}$	$5\frac{3}{16}$
$\frac{3}{16}$	.95		$4\frac{11}{16}$	$2\frac{5}{16}$	$\frac{29}{32}$	2.20	4.70	$7\frac{3}{4}$	$5\frac{7}{16}$
$\frac{7}{32}$	1.00		$4\frac{13}{16}$	$2\frac{17}{32}$	$\frac{15}{16}$	2.30	5.00	8	$5\frac{11}{16}$
$\frac{1}{4}$	1.00	\$2.50	5	$2\frac{9}{16}$	$\frac{31}{32}$	2.40	5.25	$8\frac{1}{4}$	$5\frac{15}{16}$
$\frac{9}{32}$	1.05	2.55	5	$2\frac{9}{16}$	1	2.55	5.50	$8\frac{1}{2}$	$6\frac{3}{16}$
$\frac{5}{16}$	1.10	2.60	5	$2\frac{9}{16}$	$1\frac{1}{32}$	2.70	5.75	$8\frac{3}{4}$	$6\frac{7}{16}$
$\frac{11}{32}$	1.15	2.65	5	$2\frac{3}{4}$	$1\frac{1}{16}$	2.85	6.00	9	$6\frac{11}{16}$
$\frac{3}{8}$	1.20	2.70	6	$3\frac{3}{4}$	$1\frac{3}{32}$	3.00	6.30	9	$6\frac{11}{16}$
$\frac{13}{32}$	1.25	2.75	$6\frac{1}{4}$	4	$1\frac{1}{8}$	3.10	6.70	9	$6\frac{11}{16}$
$\frac{7}{16}$	1.25	2.80	$6\frac{1}{4}$	4	$1\frac{3}{32}$	3.25	7.00	9	$6\frac{11}{16}$
$\frac{15}{32}$	1.30	2.85	$6\frac{1}{4}$	4	$1\frac{1}{16}$	3.35	7.30	9	$6\frac{11}{16}$
$\frac{1}{2}$	1.30	2.90	$6\frac{1}{2}$	$4\frac{1}{4}$	$1\frac{3}{32}$	3.50	7.60	9	$6\frac{11}{16}$
$\frac{17}{32}$	1.35	2.95	$6\frac{1}{2}$	$4\frac{1}{4}$	$1\frac{1}{4}$	3.65	7.90	9	$6\frac{11}{16}$
$\frac{9}{16}$	1.35	3.00	$6\frac{1}{2}$	$4\frac{1}{4}$	$1\frac{9}{32}$	3.75	8.25	9	$6\frac{11}{16}$
$\frac{19}{32}$	1.40	3.10	$6\frac{1}{2}$	$4\frac{1}{4}$	$1\frac{5}{16}$	3.90	8.60	9	$6\frac{11}{16}$
$\frac{5}{8}$	1.40	3.20	$6\frac{1}{2}$	$4\frac{1}{4}$	$1\frac{11}{32}$	4.05	9.00	9	$6\frac{11}{16}$
$\frac{21}{32}$	1.45	3.30	$6\frac{1}{2}$	$4\frac{3}{16}$	$1\frac{3}{8}$	4.20	9.40	9	$6\frac{11}{16}$
$\frac{11}{16}$	1.45	3.40	$6\frac{1}{2}$	$4\frac{3}{16}$	$1\frac{13}{32}$	4.35	9.80	9	$6\frac{11}{16}$
$\frac{23}{32}$	1.50	3.50	$6\frac{1}{2}$	$4\frac{3}{16}$	$1\frac{7}{16}$	4.50	10.20	9	$6\frac{11}{16}$
$\frac{3}{4}$	1.55	3.65	$6\frac{1}{2}$	$4\frac{3}{16}$	$1\frac{15}{32}$	4.65	10.60	9	$6\frac{11}{16}$
$\frac{25}{32}$	1.65	3.80	$6\frac{3}{4}$	$4\frac{7}{16}$	$1\frac{1}{2}$	4.80	11.00	9	$6\frac{11}{16}$
$\frac{13}{16}$	1.75	4.00	7	$4\frac{11}{16}$					

When ordering Taper Square Shank Drills for Packer Ratchets please state number of ratchet and name of manufacturer.

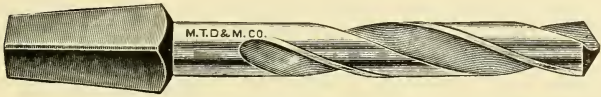
64th sizes furnished at price of next larger size.

No. 401
Carbon Steel

No. 1401
High Speed Steel

TAPER SQUARE SHANK DRILLS

FITTING RATCHETS



Large Shank or No. 2. Size of Shank $\frac{1}{2}$ inch x $\frac{3}{4}$ inch x $1\frac{3}{4}$ inches.

Diam., Inches	Price Each		Whole Length, Inches	Twist Cut, Inches	Diam., Inches	Price Each		Whole Length, Inches	Twist Cut, Inches
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel		
$\frac{1}{8}$	\$.90		4 $\frac{7}{16}$	1 $\frac{3}{16}$	$1\frac{3}{16}$	\$3.00	\$6.30	9	6 $\frac{7}{16}$
$\frac{5}{32}$	.95		4 $\frac{11}{16}$	2 $\frac{3}{32}$	$1\frac{1}{8}$	3.10	6.70	9	6 $\frac{7}{16}$
$\frac{3}{16}$	.95		4 $\frac{15}{16}$	2 $\frac{5}{16}$	$1\frac{5}{32}$	3.25	7.00	9	6 $\frac{7}{16}$
$\frac{7}{32}$	1.00		5 $\frac{1}{16}$	2 $\frac{7}{32}$	$1\frac{3}{16}$	3.35	7.30	9	6 $\frac{7}{16}$
$\frac{1}{4}$	1.00	\$2.50	5	2 $\frac{5}{16}$	$1\frac{3}{2}$	3.50	7.60	9	6 $\frac{7}{16}$
$\frac{9}{32}$	1.05	2.55	5	2 $\frac{5}{16}$	$1\frac{1}{4}$	3.65	7.90	9	6 $\frac{7}{16}$
$\frac{5}{16}$	1.10	2.60	5	2 $\frac{5}{16}$	$1\frac{3}{2}$	3.75	8.25	9	6 $\frac{7}{16}$
$\frac{11}{32}$	1.15	2.65	5	2 $\frac{1}{2}$	$1\frac{9}{16}$	3.90	8.60	9	6 $\frac{7}{16}$
$\frac{3}{8}$	1.20	2.70	6	3 $\frac{1}{2}$	$1\frac{11}{32}$	4.05	9.00	9	6 $\frac{7}{16}$
$\frac{13}{32}$	1.25	2.75	6 $\frac{1}{4}$	3 $\frac{3}{4}$	$1\frac{3}{8}$	4.20	9.40	9	6 $\frac{7}{16}$
$\frac{7}{16}$	1.25	2.80	6 $\frac{1}{4}$	3 $\frac{3}{4}$	$1\frac{3}{2}$	4.35	9.80	9	6 $\frac{7}{16}$
$\frac{15}{32}$	1.30	2.85	6 $\frac{1}{4}$	3 $\frac{3}{4}$	$1\frac{1}{16}$	4.50	10.20	9	6 $\frac{7}{16}$
$\frac{1}{2}$	1.30	2.90	6 $\frac{1}{2}$	4	$1\frac{15}{32}$	4.65	10.60	9	6 $\frac{7}{16}$
$\frac{17}{32}$	1.35	2.95	6 $\frac{1}{2}$	4	$1\frac{1}{2}$	4.80	11.00	9	6 $\frac{7}{16}$
$\frac{9}{16}$	1.35	3.00	6 $\frac{1}{2}$	4	$1\frac{7}{32}$	4.95		9	6 $\frac{7}{16}$
$\frac{19}{32}$	1.40	3.10	6 $\frac{1}{2}$	4	$1\frac{9}{16}$	5.10		9	6 $\frac{7}{16}$
$\frac{5}{8}$	1.40	3.20	6 $\frac{1}{2}$	4	$1\frac{11}{32}$	5.25		9	6 $\frac{7}{16}$
$\frac{21}{32}$	1.45	3.30	6 $\frac{1}{2}$	4	$1\frac{5}{8}$	5.40		9	6 $\frac{7}{16}$
$\frac{11}{16}$	1.45	3.40	6 $\frac{1}{2}$	4	$1\frac{21}{32}$	5.55		9	6 $\frac{7}{16}$
$\frac{23}{32}$	1.50	3.50	6 $\frac{1}{2}$	4	$1\frac{1}{16}$	5.75		9	6 $\frac{7}{16}$
$\frac{3}{4}$	1.55	3.65	6 $\frac{1}{2}$	4	$1\frac{23}{32}$	5.90		9	6 $\frac{7}{16}$
$\frac{25}{32}$	1.65	3.80	6 $\frac{3}{4}$	4 $\frac{3}{16}$	$1\frac{3}{4}$	6.10		9	6 $\frac{7}{16}$
$\frac{13}{16}$	1.75	4.00	7	4 $\frac{7}{16}$	$1\frac{25}{32}$	6.30		9	6 $\frac{7}{16}$
$\frac{16}{16}$	1.90	4.20	7 $\frac{1}{4}$	4 $\frac{1}{16}$	$1\frac{11}{16}$	6.50		9	6 $\frac{7}{16}$
$\frac{27}{32}$	2.05	4.50	7 $\frac{1}{2}$	4 $\frac{15}{16}$	$1\frac{27}{32}$	6.70		9	6 $\frac{7}{16}$
$\frac{29}{32}$	2.20	4.70	7 $\frac{3}{4}$	5 $\frac{3}{16}$	$1\frac{7}{8}$	6.90		9	6 $\frac{7}{16}$
$\frac{15}{16}$	2.30	5.00	8	5 $\frac{7}{16}$	$1\frac{29}{32}$	7.10		9	6 $\frac{7}{16}$
$\frac{31}{32}$	2.40	5.25	8 $\frac{1}{4}$	5 $\frac{1}{16}$	$1\frac{15}{16}$	7.30		9	6 $\frac{7}{16}$
1	2.55	5.50	8 $\frac{1}{2}$	5 $\frac{15}{16}$	$1\frac{31}{32}$	7.50		9	6 $\frac{7}{16}$
$1\frac{1}{32}$	2.70	5.75	8 $\frac{3}{4}$	6 $\frac{3}{16}$	2	7.75		9	6 $\frac{7}{16}$
$1\frac{1}{16}$	2.85	6.00	9	6 $\frac{7}{16}$					6 $\frac{7}{16}$

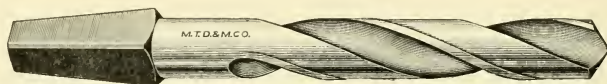
When ordering Taper Square Shank Drills for Packer Ratchets please state number of ratchet and name of manufacturer.
64th sizes furnished at price of next larger size.

No. 404
Carbon Steel

No. 1404
High Speed Steel

TAPER SQUARE SHANK DRILLS

FITTING RATCHETS—MILLIMETER SIZES



Small Shank or No. 1. Size of Shank $9\frac{1}{2} \times 16 \times 38$ M. M.
This size Shank always furnished unless otherwise specified.

Diam., M. M.	Price Each		Whole Length, M. M.	Twist Cut, M. M.	Diam., M. M.	Price Each		Whole Length, M. M.	Twist Cut, M. M.
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel		
3	\$.85		106	43	19.5	\$1.65	\$3.80	171	113
3.5	.85		110	46	20	1.65	4.00	171	113
4	.90		113	51	20.5	1.75	4.00	178	119
4.5	.90		119	56	21	1.85	4.20	184	125
5	.95		119	62	21.5	1.95	4.50	184	125
5.5	1.00	\$2.45	122	67	22	2.05	4.50	190	132
6	1.00	2.50	124	67	22.5	2.15	4.70	197	138
6.5	1.00	2.55	127	65	23	2.20	4.70	197	138
7	1.05	2.55	127	65	23.5	2.25	5.00	203	144
7.5	1.10	2.60	127	65	24	2.30	5.25	203	144
8	1.10	2.65	127	65	24.5	2.40	5.25	210	151
8.5	1.15	2.65	127	70	25	2.50	5.50	216	157
9	1.20	2.70	152	95	25.5	2.60	5.75	216	157
9.5	1.20	2.70	152	95	26	2.70	5.75	222	164
10	1.25	2.75	159	102	26.5	2.75	6.00	229	170
10.5	1.25	2.80	159	102	27	2.85	6.30	229	170
11	1.25	2.80	159	102	27.5	3.00	6.30	229	170
11.5	1.30	2.85	159	102	28	3.05	6.70	229	170
12	1.30	2.90	159	102	28.5	3.10	6.70	229	170
12.5	1.30	2.90	165	108	29	3.25	7.00	229	170
13	1.35	2.95	165	108	29.5	3.30	7.30	229	170
13.5	1.35	3.00	165	108	30	3.35	7.30	229	170
14	1.35	3.00	165	108	30.5	3.40	7.60	229	170
14.5	1.40	3.10	165	108	31	3.50	7.90	229	170
15	1.40	3.10	165	108	31.5	3.65	7.90	229	170
15.5	1.40	3.20	165	108	32	3.70	8.25	229	170
16	1.45	3.30	165	108	33	3.90	8.60	229	170
16.5	1.45	3.30	165	106	34	4.05	9.00	229	170
17	1.45	3.40	165	106	35	4.20	9.80	229	170
17.5	1.50	3.50	165	106	36	4.45	10.20	229	170
18	1.50	3.50	165	106	37	4.65	10.60	229	170
18.5	1.55	3.65	165	106	38	4.80	11.00	229	170
19	1.55	3.65	165	106					

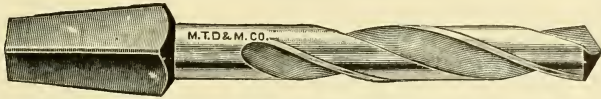
When ordering Taper Square Shank Drills for Packer Ratchets please state number of ratchet and name of manufacturer.

No. 405
Carbon Steel

No. 1405
High Speed Steel

TAPER SQUARE SHANK DRILLS

FITTING RATCHETS
MILLIMETER SIZES



Large Shank or No. 2. Size of Shank 12½ x 19 x 44½ M. M.

Diam., M. M.	Price Each		Whole Length, M. M.	Twist Cut, M. M.	Diam., M. M.	Price Each		Whole Length, M. M.	Twist Cut, M. M.
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel		
3	\$.85		113	43	19.5	\$1.65	\$3.80	171	106
3.5	.85		116	46	20	1.65	4.00	171	106
4	.90		119	51	20.5	1.75	4.00	178	113
4.5	.90		125	56	21	1.85	4.20	184	119
5	.95		125	62	21.5	1.95	4.50	184	119
5.5	1.00	\$2.45	129	67	22	2.05	4.50	190	125
6	1.00	2.50	130	67	22.5	2.15	4.70	197	132
6.5	1.00	2.55	127	59	23	2.20	4.70	197	132
7	1.05	2.55	127	59	23.5	2.25	5.00	203	138
7.5	1.10	2.60	127	59	24	2.30	5.25	203	138
8	1.10	2.65	127	59	24.5	2.40	5.25	210	144
8.5	1.15	2.65	127	63	25	2.50	5.50	216	151
9	1.20	2.70	152	89	25.5	2.60	5.75	216	151
9.5	1.20	2.70	152	89	26	2.70	5.75	222	157
10	1.25	2.75	159	95	26.5	2.75	6.00	229	164
10.5	1.25	2.80	159	95	27	2.85	6.30	229	164
11	1.25	2.80	159	95	27.5	3.00	6.30	229	164
11.5	1.30	2.85	159	95	28	3.05	6.70	229	164
12	1.30	2.90	159	95	28.5	3.10	6.70	229	164
12.5	1.30	2.90	165	102	29	3.25	7.00	229	164
13	1.35	2.95	165	102	29.5	3.30	7.30	229	164
13.5	1.35	3.00	165	102	30	3.35	7.30	229	164
14	1.35	3.00	165	102	30.5	3.40	7.60	229	164
14.5	1.40	3.10	165	102	31	3.50	7.90	229	164
15	1.40	3.10	165	102	31.5	3.65	7.90	229	164
15.5	1.40	3.20	165	102	32	3.70	8.25	229	164
16	1.45	3.30	165	102	33	3.90	8.60	229	164
16.5	1.45	3.30	165	102	34	4.05	9.00	229	164
17	1.45	3.40	165	102	35	4.20	9.80	229	164
17.5	1.50	3.50	165	102	36	4.45	10.20	229	164
18	1.50	3.50	165	102	37	4.65	10.60	229	164
18.5	1.55	3.65	165	102	38	4.80	11.00	229	164
19	1.55	3.65	165	102					

When ordering Taper Square Shank Drills for Packer Ratchets please state number of ratchet and name of manufacturer.

DRILLS WITH SHANKS AS PER LIST No. 418 ON PAGE 65 WILL FIT DRILL PRESSES OF

BOYNTON & PLUMMER, Worcester, Mass.,	All sizes except Nos. 14, 15, 16
BUDA FOUNDRY & MFG. Co., Harvey, Ill.,	Paulus Track Drills
CANEDY-OTTO MFG. Co., Chicago Heights, Ill.,	
ASA GODDARD, Worcester, Mass.,	No. 3
ILLINOIS IRON & BOLT Co., Carpentersville, Ill.,	Bailey No. 5 and Illinois Upright
B. B. NOYES & Co., Greenfield, Mass.,	All sizes Little Giant Drills
FRANCIS REED Co., Worcester, Mass.,	Nos. 3, 6, 7, 12, 14, 19
SILVER MFG. Co., Salem, Ohio	Nos. 3, 4
WILEY & RUSSELL MFG. Co., Greenfield, Mass., . . .	Nos. 732, 742, 743, 744, 745
CHAMPION BLOWER FORGE Co., Lancaster, Pa.,	All sizes if ordered
D. H. POTTS, Lancaster, Pa.,	Nos. 1, 2, 3½, 10, 11, 12

DRILLS WITH SHANKS AS PER LISTS Nos. 412 and 413 ON PAGES 63-64 WILL FIT DRILL PRESSES OF

BOYNTON & PLUMMER, Worcester, Mass.,	All sizes except Nos. 14, 15, 16
BUFFALO FORGE Co., Buffalo, N. Y.,	All sizes
CANEDY-OTTO MFG. Co., Chicago Heights, Ill.,	
CHAMPION BLOWER & FORGE Co., Lancaster, Pa.,	All sizes
ASA GODDARD, Worcester, Mass.,	Nos. 2, 4
ILLINOIS IRON & BOLT Co., Carpentersville, Ill.,	Bailey Nos. 2, 3, 4; 0, 1, Handy
D. H. POTTS, Lancaster, Pa.	All sizes
FRANCIS REED Co., Worcester, Mass.,	Nos. 0, 1, 1½, 2, 5, 8, 9, 11, 13, 18
SILVER MFG. Co., Salem, Ohio	Nos. 1, 1½, 2, 3, 12, 13, 14
GEO. C. TAFT, Worcester, Mass.,	No. 2 old or new style or horizontal 2½, 3
WILEY & RUSSELL MFG. Co., Greenfield, Mass.,	Nos. 701, 706, 730, 734, 740, 751
M. L. EDWARDS Co., Salem, Ohio	All sizes
B. B. NOYES & Co., Greenfield, Mass.,	Nos. 2, 4, 5, 6, 12, 14, 16, 18, D5
GEO. S. COMSTOCK, Mechanicsburg, Pa.,	Comstock's Ball-Bearing Fig. 500

DRILLS WITH MORSE TAPER SHANKS AS PER LIST No. 302 ON PAGES 14-20 WILL FIT DRILL PRESSES OF

AURORA TOOL WORKS, Aurora, Ind.
 W. F. & JOHN BARNES Co., Rockford, Ill.
 CINCINNATI BICKFORD TOOL Co., Cincinnati, Ohio
 HENDEY MACHINE Co., Torrington, Conn.
 NEW HAVEN MFG. Co., New Haven, Conn.
 NILES TOOL WORKS, Hamilton, Ohio
 POND MACHINE TOOL Co., Plainfield, N. J.
 PUTNAM MACHINE Co., Fitchburg, Mass.
 PRENTICE BROS., Worcester, Mass.
 SIGOURNEY TOOL Co., Hartford, Conn.

NOTE.—In ordering drills for above, specify manufacturer and size of press or list number of drills desired.

No. 412
Carbon Steel

No. 1412
High Speed Steel

SHORT LENGTH DRILLS

FITTING SILVER & DEMING'S AND PRENTICE BLACKSMITHS' DRILL PRESSES NOS. 1 AND 2



STYLE NO. 2

Shanks 1/2 inch diameter, 2 1/2 inches long.

Diam. Inches	Price Each		Whole Length, Inches	Twist Cut, Inches	Diam. Inches	Price Each		Whole Length, Inches	Twist Cut, Inches
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel		
1/8	\$.45		5 1/8	2 3/16	25/32	\$1.80	\$2.90	6	2 3/4
5/32	.45		5 3/8	2 7/16	13/16	1.90	3.00	6	2 3/4
3/16	.50		5 3/4	2 13/16	27/32	2.00	3.15	6	2 3/4
7/32	.55		6	3	7/8	2.10	3.30	6	2 3/4
1/4	.60		6	3	29/32	2.20	3.50	6	2 3/4
9/32	.65		6	2 3/4	15/16	2.30	3.70	6	2 3/4
5/16	.70		6	2 3/4	31/32	2.40	3.90	6	2 3/4
11/32	.75		6	2 3/4	1	2.50	4.10	6	2 3/4
3/8	.80		6	2 3/4	1 1/32	2.60		6	2 3/4
13/32	.85		6	2 3/4	1 1/16	2.70		6	2 3/4
7/16	.90		6	2 3/4	1 3/32	2.80		6	2 3/4
15/32	.95		6	2 3/4	1 1/8	2.90		6	2 3/4
1/2	1.00	\$1.75	6	2 3/4	1 5/32	3.00		6	2 3/4
17/32	1.05	1.90	6	2 3/4	1 3/16	3.10		6	2 3/4
9/16	1.10	2.05	6	2 3/4	1 7/32	3.20		6	2 3/4
19/32	1.20	2.20	6	2 3/4	1 1/4	3.30		6	2 3/4
5/8	1.30	2.30	6	2 3/4	1 5/16	3.60		6	2 3/4
21/32	1.40	2.40	6	2 3/4	1 3/8	3.90		6	2 3/4
11/16	1.50	2.50	6	2 3/4	1 7/16	4.20		6	2 3/4
23/32	1.60	2.65	6	2 3/4	1 1/2	4.50		6	2 3/4
3/4	1.70	2.75	6	2 3/4					

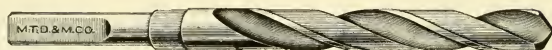
For list of Blacksmiths' Drill Presses see opposite page.

No. 413

TAPER LENGTH DRILLS

FITTING PRENTICE BLACKSMITHS' DRILL PRESSES NOS. 1 AND 2

STYLE NO. 2

Shanks $\frac{1}{2}$ inch diameter, $2\frac{1}{2}$ inches long.

Diam., Inches	Price Each	Whole Length, Inches	Twist Cut, Inches
$\frac{3}{8}$	\$.80	$6\frac{3}{4}$	$3\frac{1}{2}$
$\frac{13}{32}$	.90	7	$3\frac{3}{4}$
$\frac{7}{16}$	1.00	$7\frac{1}{4}$	4
$\frac{15}{32}$	1.10	$7\frac{1}{2}$	$4\frac{1}{4}$
$\frac{1}{2}$	1.20	$7\frac{3}{4}$	$4\frac{1}{2}$
$\frac{17}{32}$	1.30	8	$4\frac{3}{4}$
$\frac{9}{16}$	1.40	$8\frac{1}{4}$	5
$\frac{19}{32}$	1.50	$8\frac{1}{2}$	$5\frac{1}{4}$
$\frac{5}{8}$	1.60	$8\frac{3}{4}$	$5\frac{1}{2}$
$\frac{21}{32}$	1.70	9	$5\frac{3}{4}$
$\frac{11}{16}$	1.80	$9\frac{1}{4}$	6
$\frac{23}{32}$	1.90	$9\frac{1}{2}$	$6\frac{1}{4}$
$\frac{3}{4}$	2.00	$9\frac{3}{4}$	$6\frac{1}{2}$
$\frac{25}{32}$	2.10	$9\frac{7}{8}$	$6\frac{5}{8}$
$\frac{13}{16}$	2.20	10	$6\frac{3}{4}$
$\frac{27}{32}$	2.40	$10\frac{1}{4}$	7
$\frac{7}{8}$	2.60	$10\frac{1}{2}$	$7\frac{1}{4}$
$\frac{29}{32}$	2.80	$10\frac{5}{8}$	$7\frac{3}{8}$
$\frac{15}{16}$	3.00	$10\frac{3}{4}$	$7\frac{1}{2}$
$\frac{31}{32}$	3.25	$10\frac{7}{8}$	$7\frac{5}{8}$
1	3.50	11	$7\frac{3}{8}$

For sizes smaller than $\frac{3}{8}$ see style No. 412.

For list of Blacksmiths' Drill presses see page 62.

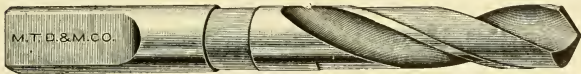
No. 418
Carbon Steel

No. 1418
High Speed Steel

DRILLS

FITTING COE'S BLACKSMITHS' DRILL PRESS AND
PRENTICE DRILL PRESS NO. 3

STYLE NO. 2



Shanks .647 inch exact diameter (about $\frac{1}{16}$ inch) and $2\frac{1}{4}$ inches long.

Diam., Inches	Price Each		Whole Length, Inches	Twist Cut, Inches	Diam., Inches	Price Each		Whole Length, Inches	Twist Cut, Inches
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel		
$\frac{1}{8}$	\$.50		$4\frac{7}{8}$	$2\frac{3}{16}$	$\frac{25}{32}$	\$1.80	\$2.90	6	3
$\frac{5}{32}$	.55		$5\frac{1}{8}$	$2\frac{7}{16}$	$\frac{13}{16}$	1.90	3.00	6	3
$\frac{3}{16}$	.60		$5\frac{1}{2}$	$2\frac{13}{16}$	$\frac{27}{32}$	2.00	3.15	6	3
$\frac{7}{32}$	.65		$5\frac{3}{4}$	3	$\frac{7}{8}$	2.10	3.30	6	3
$\frac{1}{4}$	.70		6	3	$\frac{29}{32}$	2.20	3.50	6	3
$\frac{9}{32}$	.75		6	3	$\frac{15}{16}$	2.30	3.70	6	3
$\frac{5}{16}$	.80		6	3	$\frac{31}{32}$	2.40	3.90	6	3
$\frac{11}{32}$	.85		6	3	1	2.50	4.10	6	3
$\frac{3}{8}$	.90		6	3	$1\frac{1}{32}$	2.60	4.30	6	3
$\frac{13}{32}$	.95		6	3	$1\frac{1}{16}$	2.70	4.50	6	3
$\frac{7}{16}$	1.00		6	3	$1\frac{3}{32}$	2.80	4.75	6	3
$\frac{15}{32}$	1.05		6	3	$1\frac{1}{8}$	2.90	5.00	6	3
$\frac{1}{2}$	1.10	\$1.85	6	3	$1\frac{5}{32}$	3.00	5.25	6	3
$\frac{17}{32}$	1.15	1.95	6	3	$1\frac{3}{16}$	3.10	5.50	6	3
$\frac{9}{16}$	1.20	2.05	6	3	$1\frac{7}{32}$	3.20	5.80	6	3
$\frac{19}{32}$	1.25	2.20	6	3	$1\frac{1}{4}$	3.30	6.10	6	3
$\frac{5}{8}$	1.30	2.30	6	3	$1\frac{5}{16}$	3.60		6	3
$\frac{21}{32}$	1.40	2.40	6	3	$1\frac{3}{8}$	3.90		6	3
$\frac{11}{16}$	1.50	2.50	6	3	$1\frac{7}{16}$	4.20		6	3
$\frac{23}{32}$	1.60	2.65	6	3	$1\frac{1}{2}$	4.50		6	3
$\frac{3}{4}$	1.70	2.75	6	3					

For list of Blacksmiths' Drill Presses see page 62.

No. 425
Carbon Steel

No. 1425
High Speed Steel

STRAIGHTWAY DRILLS

WITH MORSE TAPER SHANKS



Diameter, Inches	Price Each		Whole Length, Inches	Morse Taper Shank	Diameter, Inches	Price Each		Whole Length, Inches	Morse Taper Shank	
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel			
1/4	\$.60	\$1.10	6 1/8	No. 1	1 1/8	\$4.50	\$8.25	11 3/4	No. 3	
3/8	.65	1.20	6 1/4		1 5/32	4.75	8.90	11 7/8		
5/16	.70	1.30	6 3/8		1 3/16	5.00	9.50	12		
11/32	.75	1.40	6 1/2		1 3/32	5.25	10.15	12 1/8		
3/8	.80	1.50	6 3/4		1 1/4	5.50	10.75	12 1/2		
13/32	.90	1.65	7							
7/16	1.00	1.75	7 1/4			1 9/32	5.75	11.50		14 1/8
15/32	1.10	1.90	7 1/2			1 5/16	6.00	12.25		14 1/4
1/2	1.20	2.00	7 3/4			1 1/32	6.25	13.00		14 3/8
17/32	1.30	2.15	8			1 3/8	6.50	13.75		14 1/2
9/16	1.40	2.25	8 1/4	No. 2	1 13/32	7.00	14.65	14 5/8	No. 4	
19/32	1.50	2.40	8 1/2		1 7/16	7.50	15.50	14 3/4		
5/8	1.60	2.50	8 3/4		1 15/32	8.00	16.40	14 7/8		
21/32	1.70	2.75	9		1 1/2	8.50	17.25	15		
11/16	1.80	3.00	9 1/4		1 17/32	9.00	18.15	15		
23/32	1.90	3.25	9 1/2		1 9/16	9.50	19.00	15 1/4		
3/4	2.00	3.50	9 3/4		1 19/32	10.00	20.00	15 1/4		
25/32	2.10	3.75	9 7/8		1 5/8	10.50	21.00	15 1/2		
13/16	2.20	4.00	10		1 21/32	11.00	22.00	15 1/2		
27/32	2.40	4.40	10 1/4		1 11/16	11.50	23.00	15 3/4		
7/8	2.60	4.75	10 1/2	1 23/32	12.00	24.00	15 3/4			
29/32	2.80	5.15	10 5/8	1 3/4	12.50	25.00	16			
				1 25/32	13.25	26.25	16			
				1 13/16	14.00	27.50	16 1/4			
15/16	3.00	5.50	10 3/4	1 27/32	14.75	28.75	16 1/4			
31/32	3.25	5.90	10 7/8	1 7/8	15.50	30.00	16 1/2			
1	3.50	6.25	11	1 29/32	16.25	31.25	16 1/2			
1 1/32	3.75	6.75	11 1/8	1 15/16	17.00	32.50	16 1/2			
1 1/16	4.00	7.25	11 1/4	1 31/32	17.75	33.75	16 1/2			
1 3/32	4.25	7.75	11 1/2	2	18.50	35.00	16 1/2			

No. 428
Carbon Steel

No. 1428
High Speed Steel

STRAIGHTWAY DRILLS

STRAIGHT SHANK TAPER LENGTH



Diam., Inches	Price Each		Whole Length, Inches	Length of Flute Inches	Diam., Inches	Price Each		Whole Length, Inches	Length of Flute Inches
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel		
1/4	\$.60	\$1.10	6 1/8	4	1 1/32	\$3.75	\$6.75	11 1/8	7 5/16
9/32	.65	1.20	6 1/4	4	1 1/16	4.00	7.25	11 1/4	7 3/8
5/16	.70	1.30	6 3/8	4 1/16	1 3/32	4.25	7.75	11 1/2	7 5/8
11/32	.75	1.40	6 1/2	4 1/8	1 1/8	4.50	8.25	11 3/4	7 7/8
3/8	.80	1.50	6 3/4	4 1/4	1 5/32	4.75	8.90	11 7/8	8
13/32	.90	1.65	7	4 3/8	1 3/16	5.00	9.50	12	8 1/8
7/16	1.00	1.75	7 1/4	4 5/8	1 7/32	5.25	10.15	12 1/8	8 1/8
15/32	1.10	1.90	7 1/2	4 7/8	1 1/4	5.50	10.75	12 1/2	8 1/2
1/2	1.20	2.00	7 3/4	5	1 9/32	5.75	11.50	14 1/8	9 1/8
17/32	1.30	2.15	8	5 1/4	1 5/16	6.00	12.25	14 1/4	9 1/4
9/16	1.40	2.25	8 1/4	5 3/8	1 11/32	6.25	13.00	14 3/8	9 3/8
19/32	1.50	2.40	8 1/2	5 5/8	1 3/8	6.50	13.75	14 1/2	9 1/2
5/8	1.60	2.50	8 3/4	5 3/4	1 13/32	7.00	14.65	14 5/8	9 1/2
21/32	1.70	2.75	9	5 7/8	1 7/16	7.50	15.50	14 3/4	9 5/8
11/16	1.80	3.00	9 1/4	6	1 15/32	8.00	16.40	14 7/8	9 3/4
23/32	1.90	3.25	9 1/2	6 1/16	1 1/2	8.50	17.25	15	9 7/8
3/4	2.00	3.50	9 3/4	6 3/8	1 9/16	9.50	19.00	15 1/4	9 3/4
25/32	2.10	3.75	9 7/8	6 1/2	1 5/8	10.50	21.00	15 1/2	10
13/16	2.20	4.00	10	6 5/8	1 11/16	11.50	23.00	15 3/4	10 1/4
27/32	2.40	4.40	10 1/4	6 3/4	1 3/4	12.50	25.00	16	10 1/2
7/8	2.60	4.75	10 1/2	7	1 13/16	14.00	27.50	16 1/4	10 3/4
29/32	2.80	5.15	10 5/8	7	1 7/8	15.50	30.00	16 1/2	11
15/16	3.00	5.50	10 3/4	7	1 15/16	17.00	32.50	16 1/2	11
31/32	3.25	5.90	10 7/8	7 1/8	2	18.50	35.00	16 1/2	11
1	3.50	6.25	11	7 3/16					

No. 430
Carbon Steel

No. 1430
High Speed Steel

STRAIGHTWAY DRILLS



STRAIGHT SHANK—WIRE SIZES

Number by Gauge	Price Per Dozen	
	Carbon Steel	High Speed Steel
1 to 5	\$2.75	\$7.00
6 to 10	2.50	7.00
11 to 15	2.25	6.30
16 to 20	2.00	6.30
21 to 25	1.90	6.10
26 to 30	1.80	6.10
31 to 40	1.75	5.90
41 to 45	1.70	5.70
46 to 50	1.65	5.70
51 to 52	1.60	5.70
53 to 55	1.60	
56 to 60	1.55	

For whole lengths, lengths of Flute, and for sizes in decimals of 1 inch, see pages 42-44.

No. 432
Carbon Steel

No. 1432
High Speed Steel

STRAIGHTWAY DRILLS



STRAIGHT SHANK JOBBERS' LENGTHS

Diameter, Inches	Price Per Dozen		Whole Length, Inches	Length of Flute, Inches
	Carbon Steel	High Speed Steel		
$\frac{1}{16}$	\$1.60	\$5.70	2 $\frac{1}{2}$	1 $\frac{1}{4}$
$\frac{5}{64}$	1.65	5.70	2 $\frac{5}{8}$	1 $\frac{3}{8}$
$\frac{3}{32}$	1.70	5.70	2 $\frac{3}{4}$	1 $\frac{1}{2}$
$\frac{7}{64}$	1.75	5.90	2 $\frac{7}{8}$	1 $\frac{11}{16}$
$\frac{1}{8}$	1.80	5.90	3	1 $\frac{13}{16}$
$\frac{9}{64}$	1.85	6.10	3 $\frac{1}{8}$	1 $\frac{15}{16}$
$\frac{5}{32}$	1.90	6.10	3 $\frac{1}{4}$	2 $\frac{3}{32}$
$\frac{11}{64}$	2.00	6.30	3 $\frac{3}{8}$	2 $\frac{3}{16}$
$\frac{3}{16}$	2.25	6.30	3 $\frac{1}{2}$	2 $\frac{5}{16}$
$\frac{13}{64}$	2.50	7.00	3 $\frac{5}{8}$	2 $\frac{7}{16}$
$\frac{7}{32}$	2.75	7.00	3 $\frac{3}{4}$	2 $\frac{17}{32}$
$\frac{15}{64}$	3.00	7.35	3 $\frac{7}{8}$	2 $\frac{21}{32}$
$\frac{1}{4}$	3.25	7.35	4	2 $\frac{3}{4}$
$\frac{17}{64}$	3.50	9.10	4 $\frac{1}{8}$	2 $\frac{7}{8}$
$\frac{9}{32}$	3.80	9.10	4 $\frac{1}{4}$	2 $\frac{31}{32}$
$\frac{19}{64}$	4.00	10.50	4 $\frac{3}{8}$	3 $\frac{3}{32}$
$\frac{5}{16}$	4.35	10.50	4 $\frac{1}{2}$	3 $\frac{3}{16}$
$\frac{21}{64}$	4.70	12.00	4 $\frac{5}{8}$	3 $\frac{5}{16}$
$\frac{11}{32}$	5.05	12.00	4 $\frac{3}{4}$	3 $\frac{13}{32}$
$\frac{23}{64}$	5.50	13.50	4 $\frac{7}{8}$	3 $\frac{17}{32}$
$\frac{3}{8}$	6.00	13.50	5	3 $\frac{5}{8}$
$\frac{25}{64}$	6.50	15.00	5 $\frac{1}{8}$	3 $\frac{3}{4}$
$\frac{13}{32}$	7.00	15.00	5 $\frac{1}{4}$	3 $\frac{27}{32}$
$\frac{27}{64}$	7.75	17.00	5 $\frac{3}{8}$	3 $\frac{31}{32}$
$\frac{7}{16}$	8.50	17.00	5 $\frac{1}{2}$	4 $\frac{1}{16}$
$\frac{29}{64}$	9.25	18.75	5 $\frac{5}{8}$	4 $\frac{3}{16}$
$\frac{15}{32}$	10.00	18.75	5 $\frac{3}{4}$	4 $\frac{3}{16}$
$\frac{31}{64}$	11.00	20.00	5 $\frac{7}{8}$	4 $\frac{13}{32}$
$\frac{1}{2}$	12.00	20.00	6	4 $\frac{1}{2}$

No. 440

CENTER DRILLS



FRACTIONAL SIZES

Diam. Inches	Price Per Doz.	Whole Length, Inches	Twist Cut, Inches	Diam. Inches	Price Per Doz.	Whole Length, Inches	Twist Cut, Inches
$\frac{1}{32}$	\$1.50	$1\frac{1}{8}$	$\frac{5}{8}$	$\frac{3}{16}$	\$2.25	$1\frac{1}{2}$	1
$\frac{3}{64}$	1.55	$1\frac{1}{8}$	$\frac{5}{8}$	$\frac{13}{64}$	2.50	$1\frac{1}{2}$	1
$\frac{1}{16}$	1.60	$1\frac{1}{4}$	$\frac{3}{4}$	$\frac{7}{32}$	2.75	$1\frac{1}{2}$	1
$\frac{5}{64}$	1.65	$1\frac{1}{4}$	$\frac{3}{4}$	$\frac{15}{64}$	3.00	$1\frac{1}{2}$	1
$\frac{3}{32}$	1.70	$1\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{4}$	3.25	$1\frac{1}{2}$	1
$\frac{7}{64}$	1.75	$1\frac{1}{4}$	$\frac{3}{4}$	$\frac{17}{64}$	3.50	$1\frac{1}{2}$	1
$\frac{1}{8}$	1.80	$1\frac{1}{4}$	$\frac{3}{4}$	$\frac{9}{32}$	3.80	$1\frac{1}{2}$	1
$\frac{9}{64}$	1.85	$1\frac{1}{4}$	$\frac{3}{4}$	$\frac{19}{64}$	4.00	$1\frac{1}{2}$	1
$\frac{5}{32}$	1.90	$1\frac{1}{2}$	1	$\frac{5}{16}$	4.35	$1\frac{1}{2}$	1
$\frac{11}{64}$	2.00	$1\frac{1}{2}$	1				

No. 441

CENTER DRILLS



WIRE SIZES

No. by Gauge	Price Per Doz.	Whole Length, Inches	Twist Cut, Inches	No. by Gauge	Price Per Doz.	Whole Length, Inches	Twist Cut, Inches
30	\$1.80	$1\frac{1}{4}$	$\frac{3}{4}$	45	\$1.70	$1\frac{1}{4}$	$\frac{3}{4}$
35	1.75	$1\frac{1}{4}$	$\frac{3}{4}$	50	1.65	$1\frac{1}{4}$	$\frac{3}{4}$
40	1.75	$1\frac{1}{4}$	$\frac{3}{4}$	55	1.60	$1\frac{1}{4}$	$\frac{3}{4}$

For sizes in decimals of 1 inch see pages 42-44.

No. 442

CENTER DRILLS



MILLIMETER SIZES

Diameter M. M.	Price Per Dozen	Diameter in Decimals of 1 Inch	Whole Length, M. M.	Twist Cut, M. M.
1	\$1.50	.0393	27	13½
1½	1.60	.0590	27	13½
2	1.65	.0787	27	13½
2½	1.70	.0984	27	13½
3	1.75	.1181	27	13½
3½	1.80	.1378	27	13½
4	1.90	.1575	27	13½
4½	2.00	.1771	27	13½
5	2.25	.1968	27	13½

No. 446
Carbon Steel

No. 1446
High Speed Steel

TRACK DRILLS



Diameter, Inches	Price Per Dozen		Whole Length, Inches	Twist Cut, Inches	Diam. Shank, Inches	Decimal Equivalent
	Carbon Steel	High Speed Steel				
¾	\$3.80	\$9.10	3	1¾	¾	.2812
⅜	6.00	13.50	3	1¾	¾	.375
⅜	6.00	13.50	3	1¾	⅜	.375

These drills are especially adapted for drilling rails for bonding work and are of a construction and temper guaranteed to give best results.

No. 450
Carbon Steel

No. 1450
High Speed Steel

THREE-GROOVE DRILLS—MORSE TAPER SHANKS



It is considered advisable to use two drills when large holes are to be made in solid stock, first using a two-groove drill and following with a three or four-groove drill.

A two-groove drill should not be used in cored holes or to follow another drill.

The points of the three and four-groove drills show that they are not to be used for drilling solid stock but for enlarging a hole already made.

Diam., Inches	Price Each		Whole Length, Inches	Morse Taper Shank	Diam., Inches	Price Each		Whole Length, Inches	Morse Taper Shank
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel		
1/4	\$1.00	\$2.00	6 1/8	No. 1	1 1/32	\$7.00	\$17.75	14 5/8	No. 4
9/32	1.05	2.15	6 1/4		1 1/16	7.50	18.50	14 3/4	
5/16	1.10	2.25	6 3/8		1 1/8	8.00	19.25	14 7/8	
11/32	1.15	2.40	6 1/2		1 1/2	8.50	20.00	15	
3/8	1.20	2.50	6 3/4		1 3/4	9.00	20.75	15	
13/32	1.25	2.65	7		1 9/16	9.50	21.50	15 1/4	
7/16	1.30	2.75	7 1/4		1 1/2	10.00	22.25	15 1/4	
15/32	1.40	2.90	7 1/2		1 5/8	10.50	23.00	15 1/2	
1/2	1.50	3.00	7 3/4		1 1/2	11.00	23.75	15 1/2	
13/16	1.60	3.15	8		1 3/4	11.50	24.50	15 3/4	
3/4	1.70	3.25	8 1/4		1 23/32	12.00	25.50	15 3/4	
19/32	1.80	3.50	8 1/2		1 3/4	12.50	26.50	16	
5/8	1.90	3.75	8 3/4	1 25/32	13.25	27.50	16		
21/32	2.00	4.00	9	1 1/2	14.00	28.50	16 1/4		
11/16	2.10	4.25	9 1/4	1 27/32	14.75	29.50	16 1/4		
23/32	2.25	4.65	9 1/2	1 7/8	15.50	30.50	16 1/2		
3/4	2.40	5.00	9 3/4	1 29/32	16.25	31.50	16 1/2		
25/32	2.55	5.40	9 7/8	1 15/16	17.00	32.50	16 1/2		
13/16	2.70	5.75	10	1 31/32	17.75	33.50	16 1/2		
27/32	2.85	6.15	10 1/4	2	18.50	34.50	16 1/2		
7/8	3.00	6.50	10 1/2	No. 2	2 1/32	19.25	36.00	16 1/2	No. 5
29/32	3.15	7.00	10 5/8		2 1/16	20.00	37.50	17	
15/16	3.30	7.50	10 3/4		2 1/8	21.50	40.50	17	
31/32	3.45	8.00	10 7/8		2 3/16	23.00	43.75	17	
1	3.60	8.50	11		2 1/4	24.50	47.50	17 1/2	
1 1/32	3.75	9.00	11 1/8		2 5/16	26.00	52.50	17 1/2	
1 1/16	4.00	9.50	11 1/4		2 3/8	27.50	60.00	18	
1 3/32	4.25	10.25	11 1/2		2 7/16	29.00	65.00	18 1/2	
1 1/8	4.50	11.00	11 3/4		2 1/2	30.50	70.00	19	
1 5/32	4.75	11.75	11 7/8		2 9/16	32.00	76.25	19 1/4	
1 3/16	5.00	12.50	12		2 5/8	34.00	82.50	19 1/2	
1 7/32	5.25	13.25	12 1/8		2 11/16	36.00	88.75	20	
1 1/4	5.50	14.00	12 1/2	2 3/4	38.00	95.00	20 1/2		
1 9/32	5.75	14.75	14 1/8	2 13/16	40.50	102.50	20 1/2		
1 5/16	6.00	15.50	14 1/4	2 7/8	43.00	110.00	21		
1 11/32	6.25	16.25	14 3/8	2 15/16	45.50	117.50	21		
1 3/8	6.50	17.00	14 1/2	3	48.00	125.00	22		

No. 452
Carbon Steel

No. 1452
High Speed Steel

THREE-GROOVE DRILLS—WITH STRAIGHT SHANKS



It is considered advisable to use two drills when large holes are to be made in solid stock, first using a two-groove drill and following with a three or four-groove drill.

A two-groove drill should not be used in cored holes or to follow another drill.

The points of the three and four-groove drills show that they are not to be used for drilling solid stock but for enlarging a hole already made.

Diam., Inches	Price Each		Whole Length, Inches	Diam., Inches	Price Each		Whole Length, Inches
	Carbon Steel	High Speed Steel			Carbon Steel	High Speed Steel	
1/4	\$1.00	\$2.00	6 1/8	1 13/32	\$7.00	\$17.75	14 5/8
9/32	1.05	2.15	6 1/4	1 7/16	7.50	18.50	14 3/4
5/16	1.10	2.25	6 3/8	1 15/32	8.00	19.25	14 7/8
11/32	1.15	2.40	6 1/2	1 1/2	8.50	20.00	15
3/8	1.20	2.50	6 3/4	1 1 7/32	9.00	20.75	15
13/32	1.25	2.65	7	1 9/16	9.50	21.50	15 1/4
7/16	1.30	2.75	7 1/4	1 11/32	10.00	22.25	15 1/4
15/32	1.40	2.90	7 1/2	1 5/8	10.50	23.00	15 1/2
1/2	1.50	3.00	7 3/4	1 3/4	11.00	23.75	15 1/2
17/32	1.60	3.15	8	1 11/16	11.50	24.50	15 3/4
9/16	1.70	3.25	8 1/4	1 23/32	12.00	25.50	15 3/4
19/32	1.80	3.50	8 1/2	1 3/4	12.50	26.50	16
5/8	1.90	3.75	8 3/4	1 25/32	13.25	27.50	16
21/32	2.00	4.00	9	1 13/16	14.00	28.50	16 1/4
11/16	2.10	4.25	9 1/4	1 27/32	14.75	29.50	16 1/4
23/32	2.25	4.65	9 1/2	1 7/8	15.50	30.50	16 1/2
3/4	2.40	5.00	9 3/4	1 29/32	16.25	31.50	16 1/2
25/32	2.55	5.40	9 7/8	1 15/16	17.00	32.50	16 1/2
13/16	2.70	5.75	10	1 31/32	17.75	33.50	16 1/2
27/32	2.85	6.15	10 1/4	2	18.50	34.50	16 1/2
7/8	3.00	6.50	10 1/2	2 1/32	19.25	36.00	16 1/2
29/32	3.15	7.00	10 5/8	2 1/16	20.00	37.50	17
15/16	3.30	7.50	10 3/4	2 1/8	21.50	40.50	17
31/32	3.45	8.00	10 7/8	2 3/16	23.00	43.75	17
1	3.60	8.50	11	2 1/4	24.50	47.50	17 1/2
1 1/32	3.75	9.00	11 1/8	2 5/16	26.00	52.50	17 1/2
1 1/16	4.00	9.50	11 1/4	2 3/8	27.50	60.00	18
1 3/32	4.25	10.25	11 1/2	2 7/16	29.00	65.00	18 1/2
1 1/8	4.50	11.00	11 3/4	2 1/2	30.50	70.00	19
1 5/32	4.75	11.75	11 7/8	2 9/16	32.00	76.25	19 1/4
1 3/16	5.00	12.50	12	2 5/8	34.00	82.50	19 1/2
1 7/32	5.25	13.25	12 1/8	2 11/16	36.00	88.75	20
1 1/4	5.50	14.00	12 1/2	2 3/4	38.00	95.00	20 1/2
1 9/32	5.75	14.75	14 1/8	2 13/16	40.50	102.50	20 1/2
1 5/16	6.00	15.50	14 1/4	2 7/8	43.00	110.00	21
1 11/32	6.25	16.25	14 3/8	2 15/16	45.50	117.50	21
1 3/8	6.50	17.00	14 1/2	3	48.00	125.00	22

No. 454
Carbon Steel

No. 1454
High Speed Steel

FOUR-GROOVE DRILLS—MORSE TAPER SHANKS



It is considered advisable to use two drills when large holes are to be made in solid stock, first using a two-groove drill and following with a three or four-groove drill.

A two-groove drill should not be used in cored holes or to follow another drill.

The points of the three and four-groove drills show that they are not to be used on drilling solid stock but for enlarging a hole already made.

Diam., Inches	Price Each		Whole Length, Inches	Morse Taper Shank	Diam., Inches	Price Each		Whole Length, Inches	Morse Taper Shank
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel		
$\frac{1}{2}$	\$1.50	\$3.00	$7\frac{3}{4}$	No. 1	$1\frac{1}{32}$	\$9.00	\$20.75	15	No. 4
$\frac{1}{4}$	1.60	3.15	8		$1\frac{1}{16}$	9.50	21.50	$15\frac{1}{4}$	
$\frac{3}{8}$	1.70	3.25	$8\frac{1}{4}$		$1\frac{1}{8}$	10.00	22.25	$15\frac{1}{4}$	
$\frac{7}{16}$	1.80	3.50	$8\frac{1}{2}$		$1\frac{1}{4}$	10.50	23.00	$15\frac{1}{2}$	
$\frac{1}{2}$	1.90	3.75	$8\frac{3}{4}$		$1\frac{1}{2}$	11.00	23.75	$15\frac{1}{2}$	
$\frac{9}{16}$	2.00	4.00	9		$1\frac{5}{8}$	11.50	24.50	$15\frac{3}{4}$	
$\frac{5}{8}$	2.10	4.25	$9\frac{1}{4}$		$1\frac{3}{4}$	12.00	25.50	$15\frac{3}{4}$	
$\frac{11}{16}$	2.25	4.65	$9\frac{1}{2}$		$1\frac{7}{8}$	12.50	26.50	16	
$\frac{3}{4}$	2.40	5.00	$9\frac{3}{4}$		$1\frac{1}{2}$	13.25	27.50	16	
$\frac{13}{16}$	2.55	5.40	$9\frac{7}{8}$		$1\frac{3}{2}$	14.00	28.50	$16\frac{1}{4}$	
$\frac{7}{8}$	2.70	5.75	10	$1\frac{7}{8}$	14.75	29.50	$16\frac{1}{4}$		
$\frac{15}{16}$	2.85	6.15	$10\frac{1}{4}$	No. 2	$1\frac{1}{2}$	15.50	30.50	$16\frac{1}{2}$	No. 4
$\frac{1}{2}$	3.00	6.50	$10\frac{1}{2}$		$1\frac{1}{4}$	16.25	31.50	$16\frac{1}{2}$	
$\frac{1}{4}$	3.15	7.00	$10\frac{5}{8}$		$1\frac{1}{8}$	17.00	32.50	$16\frac{1}{2}$	
$\frac{3}{8}$	3.30	7.50	$10\frac{3}{4}$		$1\frac{1}{4}$	17.75	33.50	$16\frac{1}{2}$	
$\frac{1}{2}$	3.45	8.00	$10\frac{7}{8}$		2	18.50	34.50	$16\frac{1}{2}$	
$\frac{3}{4}$	3.60	8.50	11		$2\frac{1}{32}$	19.25	36.00	$16\frac{1}{2}$	
$\frac{7}{8}$	3.75	9.00	$11\frac{1}{8}$		$2\frac{1}{16}$	20.00	37.50	17	
$\frac{15}{16}$	4.00	9.50	$11\frac{1}{4}$		$2\frac{1}{8}$	21.50	40.50	17	
1	4.25	10.25	$11\frac{1}{2}$		$2\frac{3}{16}$	23.00	43.75	17	
$1\frac{1}{8}$	4.50	11.00	$11\frac{3}{4}$		$2\frac{1}{4}$	24.50	47.50	$17\frac{1}{2}$	
$1\frac{1}{4}$	4.75	11.75	$11\frac{7}{8}$	$2\frac{5}{16}$	26.00	52.50	$17\frac{1}{2}$		
$1\frac{3}{8}$	5.00	12.50	12	$2\frac{3}{8}$	27.50	60.00	18		
$1\frac{1}{2}$	5.25	13.25	12	$2\frac{7}{16}$	29.00	65.00	$18\frac{1}{2}$		
$1\frac{5}{8}$	5.50	14.00	$12\frac{1}{2}$	$2\frac{1}{2}$	30.50	70.00	19		
$1\frac{3}{4}$	5.75	14.75	$14\frac{1}{8}$	$2\frac{9}{16}$	32.00	76.25	$19\frac{1}{4}$		
$1\frac{7}{8}$	6.00	15.50	$14\frac{1}{4}$	$2\frac{5}{8}$	34.00	82.50	$19\frac{1}{2}$		
$1\frac{15}{16}$	6.25	16.25	$14\frac{3}{8}$	$2\frac{1}{2}$	36.00	88.75	20		
2	6.50	17.00	$14\frac{3}{4}$	$2\frac{3}{4}$	38.00	95.00	$20\frac{1}{2}$		
$2\frac{1}{8}$	6.50	17.00	$14\frac{1}{2}$	$2\frac{1}{2}$	40.50	102.50	$20\frac{1}{2}$		
$2\frac{1}{4}$	7.00	17.75	$14\frac{5}{8}$	$2\frac{7}{8}$	43.00	110.00	21		
$2\frac{3}{8}$	7.50	18.50	$14\frac{3}{4}$	$2\frac{15}{16}$	45.50	117.50	21		
$2\frac{1}{2}$	8.00	19.25	$14\frac{7}{8}$	3	48.00	125.00	22		
$2\frac{5}{8}$	8.50	20.00	15						

No. 456
Carbon Steel

No. 1456
High Speed Steel

FOUR-GROOVE DRILLS
STRAIGHT SHANKS

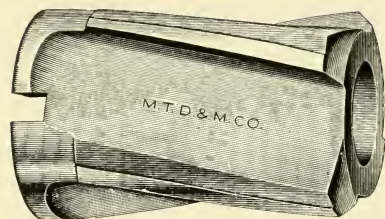


It is considered advisable to use two drills when large holes are to be made in solid stock, first using a two-groove drill and following with a three or four-groove drill. A two-groove drill should not be used in cored holes or to follow another drill. The points of the three and four-groove drills show that they are not to be used for drilling solid stock but for enlarging a hole already made.

Diam., Inches	Price Each		Whole Length, Inches	Diam., Inches	Price Each		Whole Length, Inches
	Carbon Steel	High Speed Steel			Carbon Steel	High Speed Steel	
1/2	\$1.50	\$3.00	7 3/4	1 17/32	\$9.00	\$20.75	15
5/8	1.60	3.15	8	1 9/16	9.50	21.50	15 1/4
3/4	1.70	3.25	8 1/4	1 19/32	10.00	22.25	15 1/4
7/8	1.80	3.50	8 1/2	1 5/8	10.50	23.00	15 1/2
1	1.90	3.75	8 3/4	1 21/32	11.00	23.75	15 1/2
1 1/8	2.00	4.00	9	1 11/16	11.50	24.50	15 3/4
1 1/4	2.10	4.25	9 1/4	1 23/32	12.00	25.50	15 3/4
1 1/2	2.25	4.65	9 1/2	1 3/4	12.50	26.50	16
1 3/4	2.40	5.00	9 3/4	1 25/32	13.25	27.50	16
1 7/8	2.55	5.40	9 7/8	1 13/16	14.00	28.50	16 1/4
2	2.70	5.75	10	1 27/32	14.75	29.50	16 1/4
2 1/8	2.85	6.15	10 1/4	1 7/8	15.50	30.50	16 1/2
2 1/4	3.00	6.50	10 1/2	1 29/32	16.25	31.50	16 1/2
2 1/2	3.15	7.00	10 5/8	1 15/16	17.00	32.50	16 1/2
2 3/4	3.30	7.50	10 3/4	1 31/32	17.75	33.50	16 1/2
2 7/8	3.45	8.00	10 7/8	2	18.50	34.50	16 1/2
3	3.60	8.50	11	2 1/32	19.25	36.00	16 1/2
3 1/8	3.75	9.00	11 1/8	2 1/16	20.00	37.50	17
3 1/4	4.00	9.50	11 1/4	2 1/8	21.50	40.50	17
3 1/2	4.25	10.25	11 1/2	2 3/16	23.00	43.75	17
3 3/4	4.50	11.00	11 3/4	2 1/4	24.50	47.50	17 1/2
3 7/8	4.75	11.75	11 7/8	2 5/16	26.00	52.50	17 1/2
4	5.00	12.50	12	2 3/8	27.50	60.00	18
4 1/8	5.25	13.25	12 1/8	2 7/16	29.00	65.00	18 1/2
4 1/4	5.50	14.00	12 1/2	2 1/2	30.50	70.00	19
4 1/2	5.75	14.75	14 1/8	2 9/16	32.00	76.25	19 1/4
4 3/4	6.00	15.50	14 1/4	2 5/8	34.00	82.50	19 1/2
4 7/8	6.25	16.25	14 3/8	2 11/8	36.00	88.75	20
5	6.50	17.00	14 1/2	2 3/4	38.00	95.00	20 1/2
5 1/8	7.00	17.75	14 5/8	2 13/16	40.50	102.50	20 1/2
5 1/4	7.50	18.50	14 3/4	2 7/8	43.00	110.00	21
5 1/2	8.00	19.25	14 7/8	2 15/8	45.50	117.50	21
5 3/4	8.50	20.00	15	3	48.00	125.00	22

No. 460
Carbon Steel

No. 1460
High Speed Steel



SHELL DRILLS

WITH TAPER HOLES

ANGLE OF SPIRAL 15°

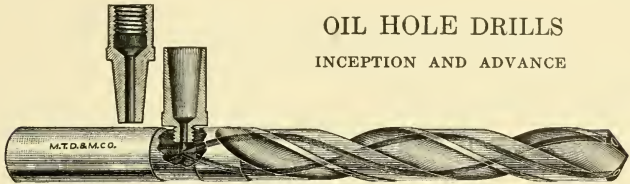
Diam., Inches	Price Each		Whole Length, Inches	Size Hole, Inches	Diam., Inches	Price Each		Whole Length, Inches	Size Hole, Inches
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel		
1 1/16	\$5.10	\$9.75	3 1/2	1	3/8	\$13.60	\$33.25	4 1/2	1 3/4
1 3/4	5.40	10.50	3 1/2	1	3 3/16	14.10	35.25	4 1/2	1 3/4
1 13/16	5.70	11.25	3 1/2	1	3 1/4	14.60	37.50	4 1/2	1 3/4
1 7/8	6.00	12.00	3 1/2	1	3 5/8	15.10	40.00	4 1/2	1 3/4
1 15/16	6.30	12.75	3 1/2	1	3 3/8	15.60	42.50	4 1/2	1 3/4
2	6.60	13.50	3 1/2	1	3 7/16	16.10	45.25	4 1/2	1 3/4
2 1/16	6.95	14.25	3 3/4	1 1/4	3 1/2	16.60	48.00	4 1/2	1 3/4
2 1/8	7.30	15.00	3 3/4	1 1/4	3 9/16	17.20	50.75	5	2
2 3/16	7.65	15.75	3 3/4	1 1/4	3 5/8	17.80	53.50	5	2
2 1/4	8.00	16.50	3 3/4	1 1/4	3 1 1/16	18.40	56.50	5	2
2 5/16	8.35	17.25	3 3/4	1 1/4	3 3/4	19.00	59.50	5	2
2 3/8	8.70	18.00	3 3/4	1 1/4	3 13/16	19.60	62.75	5	2
2 7/16	9.05	18.75	3 3/4	1 1/4	3 7/8	20.20	66.00	5	2
2 1/2	9.40	19.50	3 3/4	1 1/4	3 15/16	20.80	69.25	5	2
2 9/16	9.80	20.50	4	1 1/2	4	21.40	72.50	5	2
2 5/8	10.20	21.75	4	1 1/2	4 1/8	22.90	79.00	5 1/2	2 1/4
2 11/16	10.60	23.00	4	1 1/2	4 1/4	24.40	85.50	5 1/2	2 1/4
2 3/4	11.00	24.25	4	1 1/2	4 3/8	25.90	92.00	5 1/2	2 1/4
2 13/16	11.40	25.50	4	1 1/2	4 1/2	27.40	98.50	5 1/2	2 1/4
2 7/8	11.80	27.00	4	1 1/2	4 5/8	29.30	105.00	6	2 1/2
2 15/16	12.20	28.50	4	1 1/2	4 3/4	31.20	111.50	6	2 1/2
3	12.60	30.00	4	1 1/2	4 7/8	33.10	118.00	6	2 1/2
3 1/16	13.10	31.50	4 1/2	1 3/4	5	35.00	125.00	6	2 1/2

Shell Drills 1 1/8 inches to and including 3 1/2 inches have four flutes; 3 3/8 inches to and including 5 inches have six flutes.

Shell Drills take the same arbors as regular Shell Reamers. These arbors are illustrated on pages 113, 116, 118.

OIL HOLE DRILLS

INCEPTION AND ADVANCE



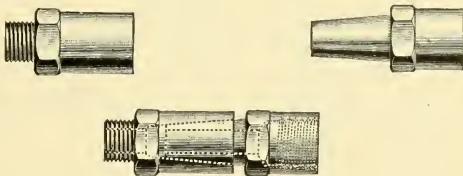
This method of conveying lubricants to the point of a drill or cutting tool was exhibited by the Morse Twist Drill & Machine Company at the World's Fair at Chicago in 1893, the drills then exhibited being duplicates of some made during the two previous years. The "American Machinist" and "Iron Age" in the year 1893 illustrated and explained this style of tool.

Various devices have been used to convey the lubricant to the points, the early methods providing for an inserted tube. The latest improvements, however, provide holes through the solid metal.

All oil drills $2\frac{1}{2}$ inches and smaller in diameter have holes through the solid metal, while with sizes larger than $2\frac{1}{2}$ inches it has been found advisable to mill the oil channels and cover them. These drills are not made smaller than $\frac{3}{8}$ diameter except at customer's risk. Sizes $\frac{3}{8}$ and smaller are furnished with one oil hole only. They can be furnished with two if especially ordered, but at customer's risk.

Oil drills are illustrated and their manner of use fully explained on pages 77 to 86.

CUPS FOR USE IN OIL DRILLS



In ordering new cups give size of drill in which they are to be used.

OIL DRILLS OF SPECIAL LENGTHS

No. 470

WITH STRAIGHT SHANKS



No. 471

WITH TAPER SHANKS

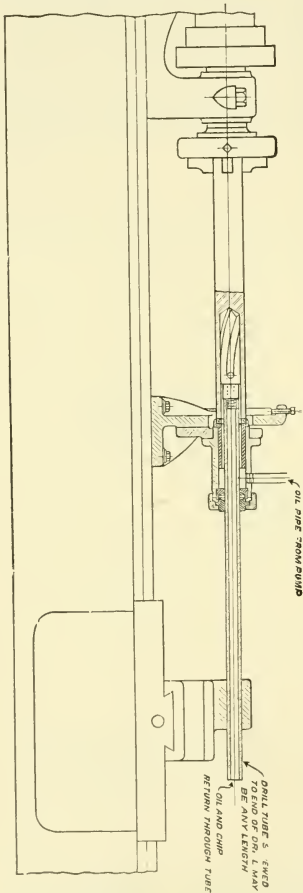


These cuts are a reproduction on a small scale of drills which were actually made and used with eminent satisfaction, the proportion of the cuts to the drills being correct. The actual dimensions of the drills were, diameter $3\frac{1}{2}$ inches, whole length 52 inches. length of shank $8\frac{5}{16}$ inches.

INFORMATION AS TO USE OF DRILLS

WITH CHANNELS OR HOLES FOR LUBRICANTS

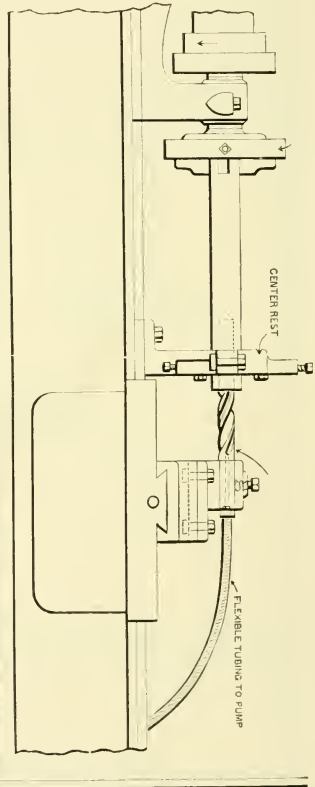
Cut showing manner of applying a Hollow Drill for drilling deep holes. For Hollow Drills, see page 87.



Cut showing method of applying a Drill with Oil Holes; the drill not to revolve.

The Drills are furnished with Straight or Taper Shanks, as desired.

For Drills with Oil Holes of style shown below, see pages 80-86.

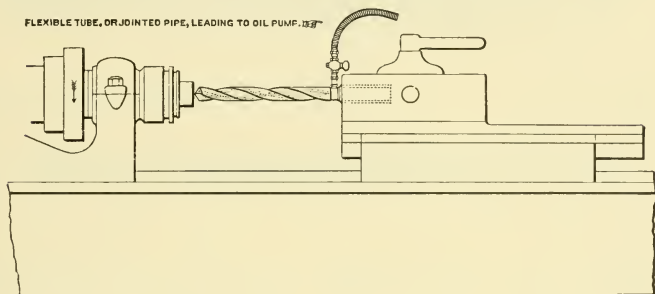


In using the Hollow Drill the hole is first to be started by means of a short drill of the size of the hole desired, and drilled to a depth equal to the length of the body of the Hollow Drill afterwards to be employed. The body of the Hollow Drill acts as a stuffing, compelling the oil to follow the grooves and the chips to flow out through the hollow shank.

INFORMATION AS TO USE OF DRILLS

WITH HOLES FOR LUBRICANTS

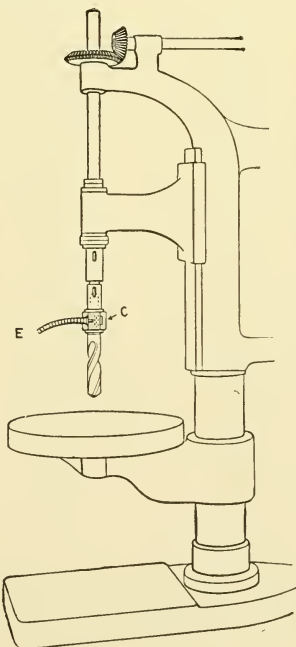
Cut showing a Drill with Oil Holes as used in a Turret Head Lathe. For Drills with Oil Holes of style shown below, see page 86. The Drills are furnished with Straight or Taper Shanks, as desired.



Cut showing method of supplying a Drill with Oil, the Drill revolving.

For Drills with Oil Holes of this style see pages 80-81.

For Sockets of this style see page 4, Nos. 220 and 221.



A flexible tube *E* conveys oil from the oil pump to the chuck *C*, which admits of passage of oil to the point of the Drill.

No. 473
Carbon Steel

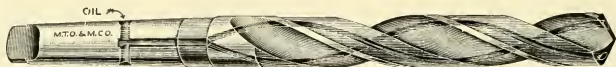
OIL HOLE DRILLS
WITH MORSE TAPER SHANKS
AND HOLES THROUGH SOLID
METAL FOR LUBRICANT

No. 1473
High Speed Steel



No. 474
Carbon Steel

No. 1474
High Speed Steel



Diameter, Inches	Price Each		Whole Length, Inches	Twist Cut, Inches	Morse Taper Shank	Diameter, Inches	Price Each		Whole Length, Inches	Twist Cut, Inches	Morse Taper Shank
	Carbon Steel	High Speed Steel					Carbon Steel	High Speed Steel			
3/8	\$3.00		6 3/4	3 7/16	No. 1	5/16	\$5.10		9 1/2	5 5/8	No. 2
3/16	3.15		7	3 11/16		3/8	5.20		9 3/4	5 7/8	
1/2	3.15		7	3 11/16		1/2	5.20		9 3/4	5 7/8	
5/16	3.30		7 1/4	3 15/16		3/4	5.35		9 7/8	6	
3/8	3.30		7 1/4	3 15/16		7/8	5.35		9 7/8	6	
7/16	3.30		7 1/2	4 3/16		1	5.50		10	6 1/8	
1/2	3.85		7 1/2	4 3/8		1 1/8	5.50		10	6 1/8	
5/8	3.85		7 1/2	4 7/16		1 1/4	5.70		10 1/4	6 3/8	
3/4	4.00		7 3/4	4 7/16		1 1/2	5.70		10 1/4	6 3/8	
7/8	4.00		7 3/4	4 11/16		1 3/4	5.90		10 1/2	6 5/8	
1	4.15		8	4 11/16		2	5.90		10 1/2	6 5/8	
1 1/16	4.15		8	4 15/16		2 1/8	6.05		10 5/8	6 3/4	
1 1/8	4.30		8 1/4	4 15/16		2 1/4	6.05		10 5/8	6 3/4	
1 1/4	4.30		8 1/4	5 1/8		2 1/2	6.20		10 3/4	6 1/8	
1 1/2	4.50		8 1/2	4 5/8	2 3/4	6.20		10 3/4	6 1/8		
1 3/4	4.50		8 1/2	4 5/8	3	6.35		10 7/8	6 1/4		
1 5/8	4.70		8 3/4	4 7/8	3 1/4	6.35		10 7/8	6 1/4		
1 3/4	4.70		8 3/4	4 7/8	3 1/2	6.35		10 7/8	6 1/4		
1 7/8	4.80		9	5 1/8	3 3/4	6.50		11	6 3/8		
2	4.80		9	5 1/8	4	6.50		11	6 3/8		
2 1/16	4.95		9 1/4	5 3/8	4 1/8	6.80		11 1/8	6 1/2		
2 1/8	4.95		9 1/4	5 3/8	4 1/4	6.80		11 1/8	6 1/2		
2 1/4	5.10		9 1/2	5 5/8	4 1/2	7.10		11 1/4	6 5/8		

These drills have holes through the solid metal and have great advantages over any other drill devised for conveying lubricants as well as air to the point. When drilling cast iron, air is sometimes used for blowing out the chips and keeping the drill cool.

*These drills 1/2 and smaller are furnished with one oil hole only. They can be furnished with two if ordered, but at customer's risk.

For information in regard to manner of use see pages 4, 78, 79.

No. 473
 No. 474
Carbon Steel

No. 1473
 No. 1474
High Speed Steel

OIL HOLE DRILLS

WITH MORSE TAPER SHANKS

AND HOLES THROUGH SOLID METAL FOR LUBRICANT

Illustrated on opposite page

Diam., Inches	Price Each		Whole Length, Inches	Twist Cut, Inches	Morse Taper Shank	Diam., Inches	Price Each		Whole Length, Inches	Twist Cut, Inches	Morse Taper Shank
	Carbon Steel	High Speed Steel					Carbon Steel	High Speed Steel			
1 ¹ / ₁₆	\$7.10		11 ¹ / ₄	6 ⁵ / ₈	No. 3	1 ¹ / ₁₆	\$14.20		15	9 ³ / ₈	No. 4
1 ⁵ / ₁₆	7.45		11 ¹ / ₂	6 ⁷ / ₈		1 ³ / ₁₆	14.40		15 ¹ / ₄	9 ⁵ / ₈	
1 ³ / ₈	7.45		11 ¹ / ₂	6 ⁷ / ₈		1 ⁹ / ₁₆	14.40		15 ¹ / ₄	9 ⁵ / ₈	
1 ⁷ / ₁₆	7.80		11 ³ / ₄	7 ¹ / ₈		1 ⁵ / ₈	14.70		15 ¹ / ₄	9 ⁵ / ₈	
1 ¹ / ₈	7.80		11 ³ / ₄	7 ¹ / ₈		1 ⁵ / ₈	14.70		15 ¹ / ₄	9 ⁵ / ₈	
1 ⁹ / ₁₆	8.00		11 ⁷ / ₈	7 ¹ / ₄		1 ³ / ₂	15.00		15 ¹ / ₂	9 ⁷ / ₈	
1 ⁵ / ₈	8.00		11 ⁷ / ₈	7 ¹ / ₄		1 ³ / ₂	15.00		15 ¹ / ₂	9 ⁷ / ₈	
1 ³ / ₂	8.20		12	7 ³ / ₈		1 ⁵ / ₈	15.35		15 ¹ / ₂	9 ⁷ / ₈	
1 ¹ / ₄	8.20		12	7 ³ / ₈		1 ⁵ / ₈	15.35		15 ¹ / ₂	9 ⁷ / ₈	
1 ¹ / ₈	8.40	Prices upon application	12 ¹ / ₈	7 ¹ / ₂		1 ³ / ₂	15.70		15 ³ / ₄	10 ¹ / ₈	
1 ¹ / ₄	8.40		12 ¹ / ₈	7 ¹ / ₂		1 ³ / ₂	15.70		15 ³ / ₄	10 ¹ / ₈	
1 ³ / ₈	8.40		12 ¹ / ₂	7 ⁷ / ₈		1 ³ / ₂	16.10		15 ³ / ₄	10 ¹ / ₈	
1 ³ / ₂	8.70		12 ¹ / ₂	7 ⁷ / ₈	1 ³ / ₂	16.10		15 ³ / ₄	10 ¹ / ₈		
1 ¹ / ₄	8.70		12 ¹ / ₂	7 ⁷ / ₈	1 ³ / ₂	16.50		15 ³ / ₄	9 ¹ / ₁₆		
						1 ⁴ / ₄	16.50		16	9 ¹ / ₁₆	
						1 ¹ / ₂	16.50		16	9 ¹ / ₁₆	
						1 ³ / ₄	16.75		16	9 ¹ / ₁₆	
						1 ³ / ₄	16.75		16	9 ¹ / ₁₆	
						1 ⁵ / ₈	17.00		16 ¹ / ₄	10 ¹ / ₁₆	
						1 ⁵ / ₈	17.00		16 ¹ / ₄	10 ¹ / ₁₆	
						1 ¹ / ₂	17.25		16 ¹ / ₄	10 ¹ / ₈	
					1 ¹ / ₂	17.25		16 ¹ / ₄	10 ¹ / ₈		
					1 ³ / ₂	17.50		16 ¹ / ₂	10 ³ / ₈		
					1 ³ / ₂	17.50		16 ¹ / ₂	10 ³ / ₈		
					1 ⁷ / ₈	17.85		16 ¹ / ₂	10 ³ / ₈		
					1 ⁷ / ₈	17.85		16 ¹ / ₂	10 ³ / ₈		
					1 ³ / ₂	17.85		16 ¹ / ₂	10 ³ / ₈		
					1 ³ / ₂	18.20		16 ¹ / ₂	10 ³ / ₈		
					1 ⁵ / ₈	18.20		16 ¹ / ₂	10 ³ / ₈		
					1 ⁵ / ₈	18.20		16 ¹ / ₂	10 ³ / ₈		
					1 ¹ / ₂	18.60		16 ¹ / ₂	10 ¹ / ₄		
					1 ¹ / ₂	18.60		16 ¹ / ₂	10 ¹ / ₄		
					1 ³ / ₂	18.60		16 ¹ / ₂	10 ¹ / ₄		
					1 ³ / ₂	19.00		16 ¹ / ₂	10 ¹ / ₄		
					1 ³ / ₂	19.00		16 ¹ / ₂	10 ¹ / ₄		

No. 479
Carbon Steel

OIL HOLE DRILLS

No. 1479
High Speed Steel

WITH STRAIGHT SHANKS

AND HOLES THROUGH SOLID METAL FOR LUBRICANT



Diam. Inches	Price Each		Whole Length Inches	Twist Cut, Inches	Diam. Inches	Price Each		Whole Length Inches	Twist Cut, Inches
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel		
$\frac{3}{8}$	\$3.00		$6\frac{3}{4}$	$4\frac{1}{4}$	$\frac{25}{32}$	\$5.35		$9\frac{7}{8}$	$6\frac{1}{2}$
$\frac{25}{64}$	3.15		7	$4\frac{3}{8}$	$\frac{51}{64}$	5.50		10	$6\frac{5}{8}$
$\frac{13}{32}$	3.15		7	$4\frac{3}{8}$	$\frac{13}{16}$	5.50		10	$6\frac{5}{8}$
$\frac{27}{64}$	3.30		$7\frac{1}{4}$	$4\frac{5}{8}$	$\frac{33}{64}$	5.70		$10\frac{1}{4}$	$6\frac{3}{4}$
$\frac{7}{16}$	3.30		$7\frac{1}{4}$	$4\frac{5}{8}$	$\frac{27}{32}$	5.70		$10\frac{1}{4}$	$6\frac{3}{4}$
$\frac{29}{64}$	3.85		$7\frac{1}{2}$	$4\frac{7}{8}$	$\frac{55}{64}$	5.90		$10\frac{1}{2}$	7
* $\frac{15}{32}$	3.85		$7\frac{1}{2}$	$4\frac{7}{8}$	$\frac{7}{8}$	5.90		$10\frac{1}{2}$	7
$\frac{31}{64}$	4.00		$7\frac{3}{4}$	5	$\frac{57}{64}$	6.05		$10\frac{5}{8}$	7
$\frac{1}{2}$	4.00	Prices upon application	$7\frac{3}{4}$	5	$\frac{29}{32}$	6.05		$10\frac{5}{8}$	7
$\frac{33}{64}$	4.15		8	$5\frac{1}{4}$	$\frac{59}{64}$	6.20		$10\frac{3}{4}$	7
$\frac{17}{32}$	4.15		8	$5\frac{1}{4}$	$\frac{15}{16}$	6.20		$10\frac{3}{4}$	7
$\frac{35}{64}$	4.30		$8\frac{1}{4}$	$5\frac{3}{8}$	$\frac{61}{64}$	6.35		$10\frac{7}{8}$	$7\frac{1}{8}$
$\frac{9}{16}$	4.30		$8\frac{1}{4}$	$5\frac{3}{8}$	$\frac{31}{32}$	6.35		$10\frac{7}{8}$	$7\frac{1}{8}$
$\frac{37}{64}$	4.50		$8\frac{1}{2}$	$5\frac{5}{8}$	$\frac{63}{64}$	6.50		11	$7\frac{3}{16}$
$\frac{19}{32}$	4.50		$8\frac{1}{2}$	$5\frac{5}{8}$	1	6.50		11	$7\frac{3}{16}$
$\frac{39}{64}$	4.70		$8\frac{3}{4}$	$5\frac{3}{4}$	$1\frac{1}{64}$	6.80		$11\frac{1}{8}$	$7\frac{5}{16}$
$\frac{5}{8}$	4.70		$8\frac{3}{4}$	$5\frac{3}{4}$	$1\frac{1}{32}$	6.80		$11\frac{1}{8}$	$7\frac{5}{16}$
$\frac{41}{64}$	4.80		9	$5\frac{7}{8}$	$1\frac{3}{64}$	7.10		$11\frac{1}{4}$	$7\frac{3}{8}$
$\frac{21}{32}$	4.80		9	$5\frac{7}{8}$	$1\frac{1}{16}$	7.10		$11\frac{1}{4}$	$7\frac{3}{8}$
$\frac{43}{64}$	4.95		$9\frac{1}{4}$	6	$1\frac{5}{64}$	7.45		$11\frac{1}{2}$	$7\frac{5}{8}$
$\frac{11}{16}$	4.95		$9\frac{1}{4}$	6	$1\frac{3}{32}$	7.45		$11\frac{1}{2}$	$7\frac{5}{8}$
$\frac{45}{64}$	5.10		$9\frac{1}{2}$	$6\frac{3}{16}$	$1\frac{7}{64}$	7.80		$11\frac{3}{4}$	$7\frac{7}{8}$
$\frac{23}{32}$	5.10		$9\frac{1}{2}$	$6\frac{3}{16}$	$1\frac{1}{8}$	7.80		$11\frac{3}{4}$	$7\frac{7}{8}$
$\frac{47}{64}$	5.20		$9\frac{3}{4}$	$6\frac{3}{8}$	$1\frac{9}{64}$	8.00		$11\frac{7}{8}$	8
$\frac{3}{4}$	5.20	$9\frac{3}{4}$	$6\frac{3}{8}$	$1\frac{3}{32}$	8.00		$11\frac{7}{8}$	8	
$\frac{49}{64}$	5.35	$9\frac{7}{8}$	$6\frac{1}{2}$	$1\frac{11}{64}$	8.20		12	$8\frac{1}{8}$	

*These drills $\frac{1}{8}$ and smaller are furnished with one oil hole only. They can be furnished with two if ordered, but at customer's risk.

These drills have holes through the solid metal and have great advantages over any other drill devised for conveying lubricants as well as air to the point. When drilling cast iron, air is sometimes used for blowing out the chips and keeping the drill cool.

For information in regard to manner of use see page 78.

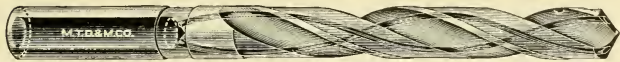
No. 479
Carbon Steel

No. 1479
High Speed Steel

OIL HOLE DRILLS

WITH STRAIGHT SHANKS

AND HOLES THROUGH SOLID METAL FOR LUBRICANT



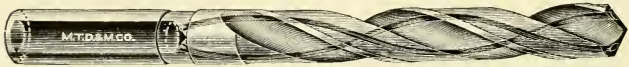
Diam. Inches	Price Each		Whole Length, Inches	Twist Cut, Inches	Diam. Inches	Price Each		Whole Length, Inches	Twist Cut, Inches
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel		
1 ³ / ₁₆	\$8.20		12	8 ¹ / ₈	1 ³ / ₈	\$15.00		15 ¹ / ₂	10
1 ¹ / ₈	8.40		12 ¹ / ₈	8 ¹ / ₈	1 ⁵ / ₈	15.00		15 ¹ / ₂	10
1 ⁷ / ₁₆	8.40		12 ¹ / ₈	8 ¹ / ₈	1 ¹ / ₂	15.35		15 ¹ / ₂	10
1 ¹ / ₂	8.70		12 ¹ / ₂	8 ¹ / ₂	1 ³ / ₂	15.35		15 ¹ / ₂	10
1 ¹ / ₄	8.70		12 ¹ / ₂	8 ¹ / ₂	1 ¹ / ₄	15.70		15 ³ / ₄	10 ¹ / ₄
1 ¹ / ₈	9.40		14 ¹ / ₈	9 ¹ / ₈	1 ¹ / ₈	15.70		15 ³ / ₄	10 ¹ / ₄
1 ⁹ / ₁₆	9.40		14 ¹ / ₈	9 ¹ / ₈	1 ¹ / ₄	16.10		15 ³ / ₄	10 ¹ / ₄
1 ¹ / ₄	10.15		14 ¹ / ₄	9 ¹ / ₄	1 ³ / ₂	16.10		15 ³ / ₄	10 ¹ / ₄
1 ⁵ / ₁₆	10.15	Prices upon application	14 ¹ / ₄	9 ¹ / ₄	1 ¹ / ₂	16.50	Prices upon application	16	10 ¹ / ₂
1 ³ / ₈	10.95		14 ³ / ₈	9 ³ / ₈	1 ³ / ₄	16.50		16	10 ¹ / ₂
1 ¹ / ₂	10.95		14 ³ / ₈	9 ³ / ₈	1 ¹ / ₄	16.75		16	10 ¹ / ₂
1 ¹ / ₄	11.80		14 ¹ / ₂	9 ¹ / ₂	1 ¹ / ₂	16.75		16	10 ¹ / ₂
1 ³ / ₈	11.80		14 ¹ / ₂	9 ¹ / ₂	1 ¹ / ₄	17.00		16 ¹ / ₄	10 ³ / ₄
1 ⁵ / ₁₆	12.30		14 ⁵ / ₈	9 ¹ / ₂	1 ¹ / ₈	17.00		16 ¹ / ₄	10 ³ / ₄
1 ¹ / ₂	12.30		14 ⁵ / ₈	9 ¹ / ₂	1 ¹ / ₄	17.25		16 ¹ / ₄	10 ³ / ₄
1 ⁷ / ₁₆	12.85		14 ³ / ₄	9 ⁵ / ₈	1 ¹ / ₂	17.25		16 ¹ / ₄	10 ³ / ₄
1 ¹ / ₄	12.85		14 ³ / ₄	9 ⁵ / ₈	1 ⁵ / ₈	17.50		16 ¹ / ₂	11
1 ⁹ / ₁₆	13.35		14 ⁷ / ₈	9 ³ / ₄	1 ⁷ / ₈	17.50		16 ¹ / ₂	11
1 ¹ / ₂	13.35		14 ⁷ / ₈	9 ³ / ₄	1 ¹ / ₂	17.85		16 ¹ / ₂	11
1 ³ / ₄	14.00		15	9 ⁷ / ₈	1 ³ / ₂	17.85		16 ¹ / ₂	11
1 ¹ / ₂	14.00		15	9 ⁷ / ₈	1 ⁵ / ₄	18.20		16 ¹ / ₂	11
1 ³ / ₄	14.20		15	9 ¹ / ₂	1 ¹ / ₆	18.20		16 ¹ / ₂	11
1 ¹ / ₄	14.20		15	9 ¹ / ₂	1 ¹ / ₄	18.60		16 ¹ / ₂	11
1 ³ / ₈	14.40		15 ¹ / ₄	9 ³ / ₄	1 ³ / ₂	18.60		16 ¹ / ₂	11
1 ⁹ / ₁₆	14.40	15 ¹ / ₄	9 ³ / ₄	1 ⁵ / ₄	19.00	16 ¹ / ₂	11		
1 ³ / ₄	14.70	15 ¹ / ₄	9 ³ / ₄	2	19.00	16 ¹ / ₂	11		
1 ¹ / ₂	14.70	15 ¹ / ₄	9 ³ / ₄			16 ¹ / ₂	11		

For information in regard to manner of use see page 78.
These Drills 1 ¹/₄ to 2 inches have shanks 1 ¹/₂ inches in diameter, 4 ³/₄ inches long.

No. 480
Carbon Steel

No. 1480
High Speed Steel

OIL HOLE DRILLS
WITH STRAIGHT SHANKS
AND HOLES THROUGH SOLID METAL FOR LUBRICANT



Diameter, Inches	Price Each			High Speed Steel	Twist Cut, Inches		
	Carbon Steel				Whole Length, 8 1/4 Inches	Whole Length, 10 1/4 Inches	Whole Length, 13 Inches
31/64	1/2	\$4.60	\$5.30	\$5.90	5 1/2	7	9 1/4
33/64	17/32	4.60	5.30	6.00	5 1/4	7	9 1/4
35/64	9/16	4.70	5.40	6.00	5 1/4	7	9 1/4
37/64	19/32	4.70	5.40	6.10	5 1/4	7	9 1/4
39/64	5/8	4.70	5.40	6.10	5 1/4	7	9 1/4
41/64	21/32	4.70	5.40	6.20	5 1/4	7	9 1/4
43/64	11/16	4.80	5.40	6.20	5 1/4	7	9 1/4
45/64	23/32	4.80	5.40	6.30	5 1/4	7	9 1/4
47/64	3/4	4.80	5.40	6.30	5 1/4	7	9 1/4
49/64	25/32	4.90	5.50	6.40	5 1/4	7	9 1/4
51/64	13/16	5.00	5.60	6.50	5 1/4	7	9 1/4
53/64	27/32	5.00	5.80	6.60	5 1/4	7	9 1/4
55/64	7/8	5.10	5.90	6.80	5 1/4	7	9 1/4
57/64	29/32	5.20	6.00	6.90	5 1/4	7	9 1/4
59/64	15/16	5.30	6.10	7.00	5 1/4	7	9 1/4
61/64	31/32	5.40	6.20	7.10	5 1/4	7	9 1/4
63/64	1	5.50	6.30	7.20	5 1/4	7	9 1/4
1 1/64	1 1/32	5.60	6.50	7.40	5	6 3/4	9
1 3/64	1 1/16	5.80	6.80	7.70	5	6 3/4	9
1 5/64	1 3/32	6.00	7.00	7.90	5	6 3/4	9
1 7/64	1 1/8	6.10	7.20	8.10	5	6 3/4	9
1 9/64	1 5/32	6.30	7.40	8.30	5	6 3/4	9
1 11/64	1 3/16	6.50	7.60	8.60	5	6 3/4	9
1 13/64	1 7/32	6.70	7.80	8.80	5	6 3/4	9
1 15/64	1 1/4	6.80	7.90	9.00	5	6 3/4	9

Prices upon application

No. 480
Carbon Steel

OIL HOLE DRILLS High Speed Steel

WITH STRAIGHT SHANKS
AND HOLES THROUGH SOLID METAL FOR LUBRICANT



Diameter, Inches		Price Each			High Speed Steel	Twist Cut, Inches		
		Carbon Steel				Whole Length, 8 1/2 Inches	Whole Length, 10 1/2 Inches	Whole Length, 13 Inches
		Whole Length, 8 1/2 Inches	Whole Length, 10 1/2 Inches	Whole Length, 13 Inches				
1 17/64	1 9/32	\$7.10	\$8.30	\$9.30	Prices upon application	5	6 3/4	9
1 19/64	1 5/16	7.40	8.60	9.60		5	6 3/4	9
1 21/64	1 11/32	7.70	9.00	10.00		5	6 3/4	9
1 23/64	1 3/8	8.00	9.30	10.30		5	6 3/4	9
1 25/64	1 13/32	8.30	9.60	10.70		5	6 3/4	9
1 27/64	1 7/16	8.60	9.90	11.20		5	6 3/4	9
1 29/64	1 15/32	8.90	10.30	11.50		5	6 3/4	9
1 31/64	1 1/2	9.20	10.50	11.90		5	6 3/4	9
1 33/64	1 17/32	9.40	10.70	12.00		4 3/4	6 1/2	8 3/4
1 35/64	1 9/16	9.60	10.90	12.10		4 3/4	6 1/2	8 3/4
1 37/64	1 19/32	9.80	11.00	12.20		4 3/4	6 1/2	8 3/4
1 39/64	1 5/8	10.00	11.20	12.40		4 3/4	6 1/2	8 3/4
1 41/64	1 21/32	10.20	11.40	12.50		4 3/4	6 1/2	8 3/4
1 43/64	1 11/16	10.30	11.50	12.70		4 3/4	6 1/2	8 3/4
1 45/64	1 23/32	10.40	11.60	12.90		4 3/4	6 1/2	8 3/4
1 47/64	1 3/4	10.50	11.80	13.00		4 3/4	6 1/2	8 3/4
1 49/64	1 25/32	10.70	12.00	13.20		4 3/4	6 1/2	8 3/4
1 51/64	1 13/16	10.90	12.20	13.40		4 3/4	6 1/2	8 3/4
1 53/64	1 27/32	11.00	12.40	13.60		4 3/4	6 1/2	8 3/4
1 55/64	1 7/8	11.20	12.50	13.70		4 3/4	6 1/2	8 3/4
1 57/64	1 29/32	11.40	12.70	14.00	4 3/4	6 1/2	8 3/4	
1 59/64	1 15/16	11.60	12.90	14.20	4 3/4	6 1/2	8 3/4	
1 61/64	1 31/32	11.90	13.10	14.40	4 3/4	6 1/2	8 3/4	
1 63/64	2	12.10	13.30	14.60	4 3/4	6 1/2	8 3/4	

Drills 1 1/4 to 2 inches diameter, 8 1/2 inches long, have shanks 1 1/2 inches diameter, 3 inches long.

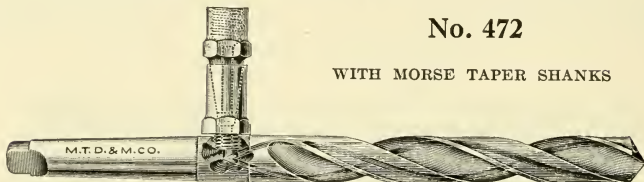
Drills 1 3/4 to 2 inches diameter, 10 1/2 inches long, have shanks 1 1/2 inches diameter, 3 1/4 inches long.

Drills 1 1/2 to 2 inches diameter, 13 inches long, have shanks 1 1/2 inches diameter, 3 1/2 inches long.

For information in regard to manner of use see page 78.

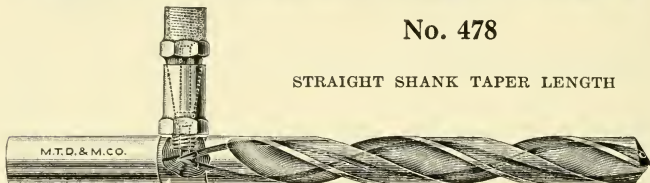
OIL HOLE DRILLS

WITH HOLES THROUGH SOLID METAL FOR LUBRICANT



No. 472

WITH MORSE TAPER SHANKS



No. 478

STRAIGHT SHANK TAPER LENGTH

No. 481

FOR SCREW OR CHUCKING MACHINES

WITH STRAIGHT SHANKS $1\frac{1}{4}$ INCHES DIAMETER, 3 INCHES LONG
WHOLE LENGTH $8\frac{1}{2}$, $10\frac{1}{2}$ OR 13 INCHES

No. 482

MILLIMETER SIZES

WITH STRAIGHT SHANKS

WHOLE LENGTH 216, 267 OR 330 M.M.



No. 483

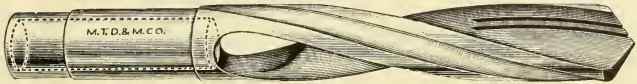
MILLIMETER SIZES

FOR SCREW OR CHUCKING MACHINES

WITH STRAIGHT SHANKS 32 M. M. DIAMETER, 76 M. M. LONG
WHOLE LENGTH 216, 267 OR 330 M. M.Furnished in Carbon Steel and High Speed Steel.
Prices and Details on Application.

No. 488 HOLLOW DRILLS

FOR DEEP DRILLING OR LONG HOLES



Diam. Inches	Price Each	Whole Length, Inches	Size of Hole, Inches	Diam. Inches	Price Each	Whole Length, Inches	Size of Hole, Inches
$\frac{5}{8}$	\$5.50	6	$\frac{3}{8}$	$\frac{17}{8}$	\$14.00	9	$1\frac{1}{8}$
$\frac{11}{16}$	5.75	6	$\frac{3}{8}$	$1\frac{15}{16}$	15.00	9	$1\frac{1}{8}$
$\frac{3}{4}$	6.00	6	$\frac{7}{16}$	2	16.00	9	$1\frac{1}{8}$
$\frac{13}{16}$	6.25	$6\frac{1}{2}$	$\frac{7}{16}$	$2\frac{1}{16}$	17.00	10	$1\frac{1}{4}$
$\frac{7}{8}$	6.50	$6\frac{1}{2}$	$\frac{1}{2}$	$2\frac{1}{8}$	18.00	10	$1\frac{1}{4}$
$\frac{15}{16}$	6.75	$6\frac{1}{2}$	$\frac{1}{2}$	$2\frac{3}{16}$	19.00	10	$1\frac{1}{4}$
1	7.00	7	$\frac{9}{16}$	$2\frac{1}{4}$	20.00	10	$1\frac{3}{8}$
$1\frac{1}{16}$	7.25	7	$\frac{9}{16}$	$2\frac{5}{16}$	21.25	10	$1\frac{3}{8}$
$1\frac{1}{8}$	7.50	7	$\frac{5}{8}$	$2\frac{3}{8}$	22.50	10	$1\frac{3}{8}$
$1\frac{3}{16}$	7.75	7	$\frac{11}{16}$	$2\frac{7}{16}$	23.75	10	$1\frac{3}{8}$
$1\frac{1}{4}$	8.00	$7\frac{1}{2}$	$\frac{3}{4}$	$2\frac{1}{2}$	25.00	10	$1\frac{3}{8}$
$1\frac{5}{16}$	8.25	$7\frac{1}{2}$	$\frac{13}{16}$	$2\frac{9}{16}$	26.50	12	$1\frac{1}{2}$
$1\frac{3}{8}$	8.50	$7\frac{1}{2}$	$\frac{7}{8}$	$2\frac{5}{8}$	28.00	12	$1\frac{1}{2}$
$1\frac{7}{16}$	9.00	$7\frac{1}{2}$	$\frac{7}{8}$	$2\frac{11}{16}$	29.50	12	$1\frac{1}{2}$
$1\frac{1}{2}$	9.50	8	$\frac{15}{16}$	$2\frac{3}{4}$	31.00	12	$1\frac{1}{2}$
$1\frac{9}{16}$	10.00	8	$\frac{15}{16}$	$2\frac{13}{16}$	32.50	12	$1\frac{1}{2}$
$1\frac{5}{8}$	10.50	8	1	$2\frac{7}{8}$	34.00	12	$1\frac{1}{2}$
$1\frac{11}{16}$	11.00	8	1	$2\frac{15}{16}$	35.50	12	$1\frac{1}{2}$
$1\frac{3}{4}$	12.00	9	$1\frac{1}{8}$	3	37.00	12	$1\frac{1}{2}$
$1\frac{13}{16}$	13.00	9	$1\frac{1}{8}$				

The above drills have a hole lengthwise through the shank connecting with the grooves of the drill. The shank can be threaded and fitted to a metal tube of such length as desired. Tubes are made to order and to fit any size of drill. When ordering give diameter of drill and depth of hole to be drilled.

The lubricant is conveyed to the point of the drill on the outside of tube, as illustrated on page 78, while the hollow tube admits of the passage of oil and chips from the point.

These drills are accurately ground on centers.

In drilling crucible steel the best results are obtained by revolving the work at a speed equalling a periphery speed for the drill of 20 feet per minute and feeding at the rate of .0025 inch per revolution. Machinery steel will admit of increased revolution to 40 feet per minute, and a feed of .0035 inch per revolution.

For information as to the use of this drill see page 78.

32nd sizes not listed furnished at intermediate prices and 64th sizes at price of next larger 32nd size.

TOOLS FOR USE IN TURRETS OF SCREW MACHINES, TURRET LATHES AND BORING MILLS

Floating Sockets, No. 250, page 7.



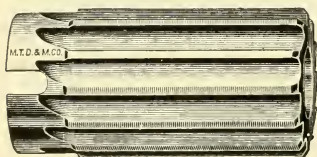
Solid Sockets, No. 251, page 7.



No. 545 and No. 546 Arbors fitting Shell Reamers and Shell Drills with Straight Holes.
Prices upon application



Shell Reamers, Nos. 625, 626, pages
132 to 135, inclusive.
Shell Reamer with straight hole, No. 630.
Prices upon application.



Expanding Shell Reamer, No. 741, with
straight holes
Prices upon application.



Floating Arbor, No. 540, for shell drills and shell reamers with straight holes.
Prices upon application.



Floating Arbor No. 541, page 122, for shell drills and shell reamers with taper holes.



TOOLS FOR TURRET MACHINES

Drills with

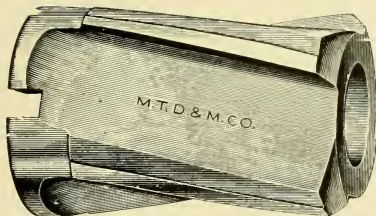
Oil Holes, pages 80 to 89 inclusive.



Four-Groove Chucking Reamer No. 650.
Prices upon application.



Fluted Chucking Reamers No. 655, page 139.



SHELL DRILLS

WITH TAPER HOLES

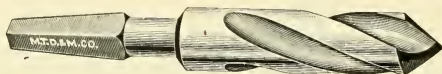
Page 76, with straight holes No. 461.
Prices upon application.

Floating Solid and Expansion Reamers Nos. 670 and 671.



No. 490

THREE-GROOVE BIT STOCK COUNTERSINKS

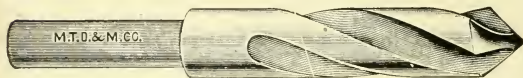


Included angle of cutting point is 82°. Countersinks with other angles made to order at special prices.

Diameter, Inches	Price Each	Whole Length, Inches	Twist Cut, Inches	Length Body, Inches
$\frac{3}{8}$	\$.50	$4\frac{1}{4}$	$2\frac{1}{4}$	3
$\frac{1}{2}$	.60	$4\frac{1}{4}$	$1\frac{15}{16}$	$2\frac{1}{2}$
$\frac{5}{8}$	.75	$4\frac{1}{4}$	$1\frac{13}{16}$	$2\frac{1}{2}$
$\frac{3}{4}$	.90	5	$2\frac{1}{2}$	$3\frac{1}{4}$
$\frac{7}{8}$	1.05	5	$2\frac{1}{2}$	$3\frac{1}{4}$
1	1.20	5	$2\frac{7}{16}$	$3\frac{1}{4}$

No. 491

STRAIGHT SHANK THREE-GROOVE COUNTERSINKS



Included angle of cutting point is 82°

STRAIGHT SHANKS $\frac{1}{2}$ INCH DIAMETER BY 2 INCHES LONG

Diameter, Inches	Price Each	Whole Length, Inches	Twist Cut, Inches	Length Body, Inches
$\frac{3}{8}$	\$.50	$4\frac{3}{8}$	$2\frac{1}{8}$	$2\frac{3}{8}$
$\frac{1}{2}$	.60	$4\frac{1}{2}$	$2\frac{1}{4}$	$2\frac{1}{2}$
$\frac{5}{8}$	.75	$4\frac{5}{8}$	$2\frac{3}{8}$	$2\frac{5}{8}$
$\frac{3}{4}$	.90	$4\frac{3}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$
$\frac{7}{8}$	1.05	$4\frac{7}{8}$	$2\frac{5}{8}$	$2\frac{7}{8}$
1	1.20	5	$2\frac{3}{4}$	3

Countersinks with other angles or dimensions made to order at special prices.

No. 495
Carbon Steel

No. 1495
High Speed Steel

COMBINED DRILLS AND COUNTERSINKS

A C B



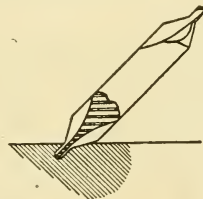
Included Angle, 60°. Other angles made to order at special prices.

Always specify Style Number and Size Number

Size No.	Diam. of Drill at		Approx. Fractional Equivalents	Price Per Dozen		Diameter of Body C, Inches	Decimal Equivalents	
	A	B		Carbon Steel	High Speed Steel		A	B
1	No. 57	x No. 57	$\frac{3}{64}$	\$2.00	\$6.00	$\frac{1}{8}$	.043	x .043
2	No. 55	x No. 55		2.25	6.00	$\frac{13}{64}$	.052	x .052
3	No. 52	x No. 52	$\frac{1}{16}$	2.25	6.00	$\frac{13}{64}$	.063	x .063
4	No. 49	x No. 49		2.50	6.00	$\frac{15}{64}$	.073	x .073
5	No. 49	x No. 45		2.50	6.00	$\frac{15}{64}$	.073	x .082
6	No. 46	x No. 46	$\frac{5}{64}$	2.50	6.00	$\frac{15}{64}$	.081	x .081
7	No. 42	x No. 42	$\frac{3}{32}$	2.75	6.00	$\frac{3}{10}$	.093	x .093
8	No. 42	x No. 30	$\frac{3}{32} \times \frac{1}{8}$	2.75	6.00	$\frac{3}{10}$	.093	x .128
9	No. 30	x No. 30	$\frac{1}{8}$	2.75	6.00	$\frac{3}{10}$	.128	x .128
10	No. 22	x No. 22	$\frac{5}{32}$	3.50	9.00	$\frac{7}{16}$	.157	x .157
11	No. 13	x No. 13	$\frac{3}{16}$	3.50	9.00	$\frac{7}{16}$	.185	x .185
12	$\frac{3}{64}$	x $\frac{3}{64}$		2.25	6.00	$\frac{5}{32}$	.046	x .046
14	$\frac{1}{16}$	x No. 45		2.25	6.00	$\frac{13}{64}$	.062	x .082
15	$\frac{3}{16}$	x $\frac{5}{32}$		3.50	9.00	$\frac{7}{16}$	.187	x .156



The above cut illustrates the most common use for Combined Drills and Countersinks, that of drilling and countersinking Center Holes.



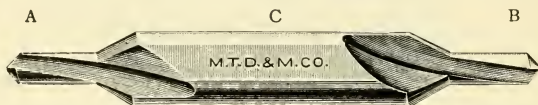
The above cut illustrates one of the uses for Combined Drills and Countersinks, and for which they are especially adapted, that of starting holes at an angle.

No. 496
Carbon Steel

No. 1496
High Speed Steel

COMBINED DRILLS AND COUNTERSINKS

FOR WAGON IRON WORK



Included Angle, 60°

Always specify Style Number and Size Number

Size Number	Diameter of Drill at A B		Price Per Dozen		Diameter of Body C, Inches
			Carbon Steel	High Speed Steel	
1	$\frac{7}{32}$	$\times \frac{7}{32}$	\$4.60	\$12.00	$\frac{1}{2}$
2	$\frac{7}{32}$	$\times \frac{9}{32}$	4.60	12.00	$\frac{1}{2}$
3	$\frac{9}{32}$	$\times \frac{9}{32}$	4.60	12.00	$\frac{1}{2}$
4	$\frac{11}{32}$	$\times \frac{11}{32}$	5.00	12.00	$\frac{1}{2}$
5	$\frac{11}{32}$	$\times \frac{13}{32}$	5.00	12.00	$\frac{1}{2}$
6	$\frac{13}{32}$	$\times \frac{13}{32}$	5.00	12.00	$\frac{1}{2}$
7	$\frac{7}{32}$	$\times \frac{7}{32}$	7.25	18.00	$\frac{5}{8}$
8	$\frac{7}{32}$	$\times \frac{9}{32}$	7.25	18.00	$\frac{5}{8}$
9	$\frac{9}{32}$	$\times \frac{9}{32}$	7.25	18.00	$\frac{5}{8}$
10	$\frac{11}{32}$	$\times \frac{11}{32}$	7.75	18.00	$\frac{5}{8}$
11	$\frac{11}{32}$	$\times \frac{13}{32}$	7.75	18.00	$\frac{5}{8}$
12	$\frac{13}{32}$	$\times \frac{13}{32}$	7.75	18.00	$\frac{5}{8}$

Other angles made to order at special prices.

No. 497

COMBINED DRILLS AND COUNTERSINKS

WITH NO. 1 MORSE TAPER SHANKS



Included Angle, 60°

Always specify Style Number and Size Number

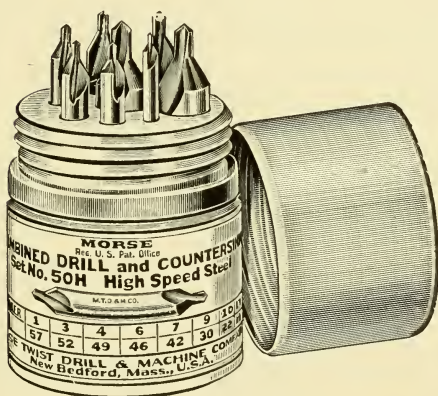
Size Number	Diameter of Drill, Inches	Price Each	Diameter of Body, Inches
1	$\frac{1}{16}$	\$.75	$\frac{7}{16}$
2	$\frac{3}{32}$	.75	$\frac{7}{16}$
3	$\frac{1}{8}$	.75	$\frac{7}{16}$
4	$\frac{5}{32}$	.75	$\frac{7}{16}$
5	$\frac{3}{16}$	.75	$\frac{7}{16}$

Other angles made to order at Special prices.

SETS OF
COMBINED DRILLS AND COUNTERSINKS

Style No. 495 Carbon Steel

Style No. 1495 High Speed Steel



No. 50. Carbon Steel..... Per Set \$2.25

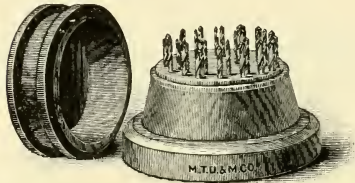
1 Combined Drill and Countersink each. No. 1-3-4-6-7-9-10-11.

No. 50 H. High Speed Steel Per Set \$5.00

1 Combined Drill and Countersink each. No. 1-3-4-6-7-9-10-11.

JEWELERS' SET OF DRILLS

Style No. 341



- No. 10. Jewelers' Set of 36 Drills, No. 30 ($\frac{1}{8}$ inch) to No. 65
 Wire Drill Gauge, mounted in a mahogany case with cap . . . \$9.50
 Jewelers' Case without Drills 3.50

For list prices see pages 45-46.

SETS OF TAPER SHANK DRILLS

Style No. 302

See pages 14-15

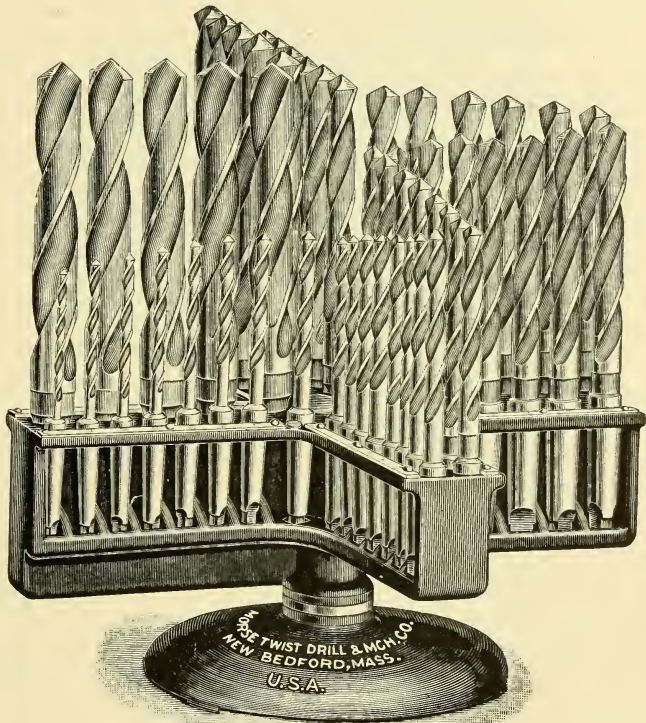


Set No.	Sizes Included	Price Per Set
1	$\frac{1}{4}$ to 1 inch by 16ths	\$22.40
2	$\frac{3}{8}$ to $1\frac{1}{4}$ by 16ths	40.10
3	$\frac{3}{8}$ to $\frac{3}{4}$ by 32nds, $\frac{13}{16}$ to $1\frac{1}{4}$ by 16ths	48.50
4	$\frac{3}{8}$ to $\frac{3}{4}$ by 32nds, $\frac{13}{16}$ to 2 by 16ths	186.00
11	$\frac{3}{8}$ to 2 by 32nds	345.30

Note. — Prices of Sets of Straight Shank Drills, style No. 314, will be the same as above list.

Set No. 30
REVOLVING DRILL STANDS FOR TAPER
SHANK DRILLS

Style No. 302



The Revolving Head in which the Drills are placed is mounted on ball bearings.

Holds Taper Shank Drills from $\frac{3}{16}$ to 1 inch by 64ths.

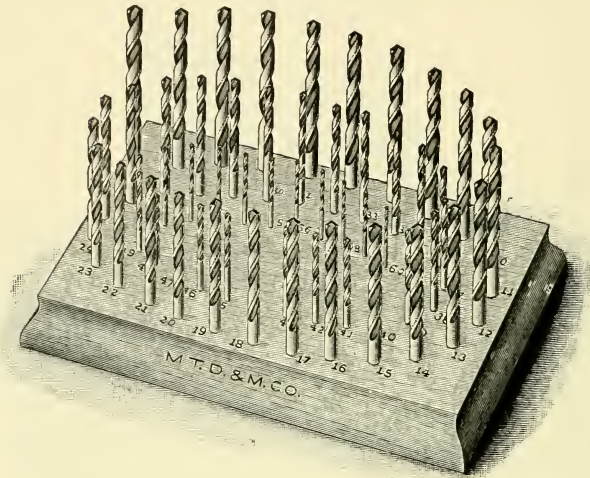
Dimensions of Stand 14 x 14 x $6\frac{1}{4}$ inches.

Height including Drills 14 inches.

Prices upon application.

SETS OF STRAIGHT SHANK DRILLS

Style Nos. 330, 332, 333, and 340



PRICES OF SETS MOUNTED AS ABOVE

Set No.	Sizes Included	Style No.	Page	Price Per Set	
				With Block as Above	Without Block
5	$\frac{1}{16}$ to $\frac{1}{2}$ inch by 64ths	330	35	\$15.00	\$12.50
5H	$\frac{1}{16}$ to $\frac{1}{2}$ inch by 64ths, high speed	1330	35	.....	26.20
6	$\frac{1}{16}$ to $\frac{1}{2}$ inch by 32nds	330	35	9.50	7.00
7	Nos. 1 to 60 and $\frac{1}{4}$ to $\frac{3}{8}$ inch by 32nds	340	42-44	15.75	13.25
		330	35		
8	Nos. 1 to 60	340	42-44	13.35	10.85
8H	Nos. 1 to 60, high speed	1340	42-44	.....	30.60
9	Nos. 1 to 59, alternate numbers	340	42-44	8.50	6.00
15	A to Z	332	37	13.50	11.00
16	Nos. 1 to 70	340	42-44	15.25	12.50
17	Nos. 1 to 80	340	42-44	16.50	13.75
18	.5 M.M. to 6 M.M. by $\frac{1}{10}$ M.M.	333	38-41	13.35	10.00
19	1 M.M. to 13 M.M. by $\frac{1}{2}$ M.M.	333	38-41	13.40	11.00
20	1 M.M. to 6 M.M. by $\frac{1}{4}$ M.M.	333	38-41	6.75	4.50
21	$6\frac{1}{4}$ M.M. to 10 M.M. by $\frac{1}{4}$ M.M.	333	38-41	9.75	7.50

Block without drills, for above sets, each \$2.50
 Block without drills, for Set No. 12, each 1.67

SET OF STRAIGHT SHANK MACHINE BITS

Style No. 355



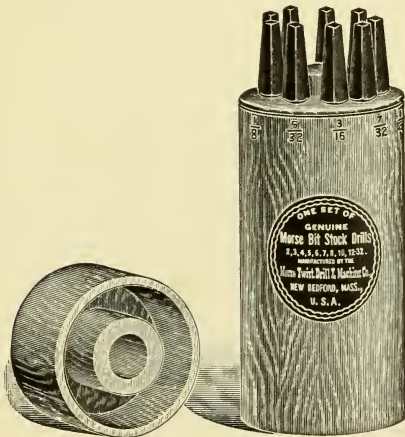
- No. 12. Set Machine Bits, $\frac{1}{8}$ to $\frac{1}{2}$ inch, mounted, varying by 32nds (see page 48) \$11.17

SETS OF BIT STOCK DRILLS

Style No. 390



- No. 13. Set Bit Stock Drills, $\frac{1}{16}$ to $\frac{1}{4}$ inch by 32nds, $\frac{5}{16}$ to $\frac{3}{8}$ inch by 16ths, boxed (see page 55) \$3.75



- No. 14. Set of Bit Stock Drills, in Round Box, $\frac{1}{16}$, $\frac{3}{32}$, $\frac{1}{8}$, $\frac{5}{32}$, $\frac{3}{16}$, $\frac{7}{32}$, $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$ inch (see page 55) \$4.25

SETS OF
TAPER-PIN REAMERS

Style No. 680
IN CASES

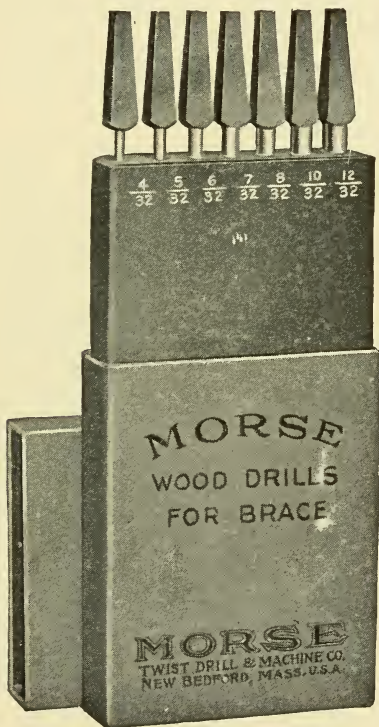


Set of No. 680 Reamers consisting of 1 each:	
Nos. 00 to 5 inclusive	\$13.25
Nos. 0 to 5 inclusive	9.75
Nos. 0 to 10 inclusive	28.50
For lengths and list prices see page 143.	

Set No. 26

WOOD DRILLS FOR BRACE

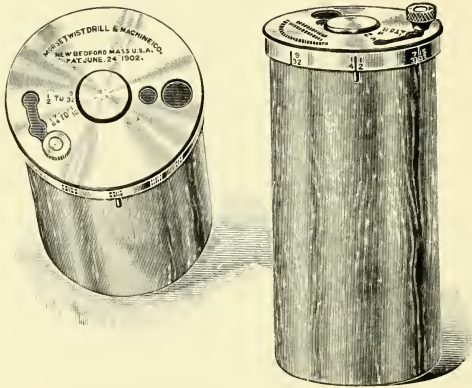
Style No. 392



No. 26. Set of Wood Drills for Brace, in handsome and durable box; sizes $\frac{4}{32}$, $\frac{5}{32}$, $\frac{6}{32}$, $\frac{7}{32}$, $\frac{8}{32}$, $\frac{10}{32}$, $\frac{12}{32}$ \$3.70
(See page 57)

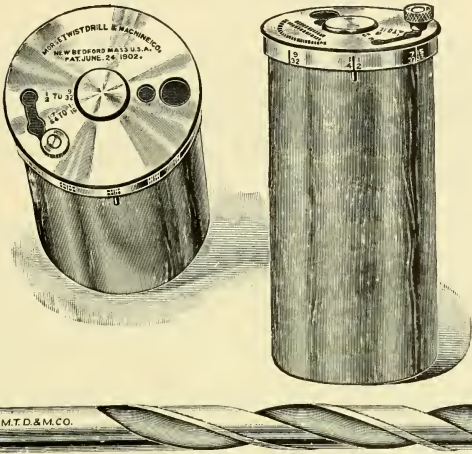
INDEXED CASES WITHOUT DRILLS

The Drills in Patented Indexed Case, as illustrated below, are contained in holes arranged in concentric circles in the block. Over them is a swinging cover with holes to match each circle. The swinging cover can be moved by the small knob shown so that its holes will register with the holes in the outer cover or cap. Around the edge of the cap are stamped the sizes of the various drills. The cap is turned to bring any size in line with an index mark, and by inverting the case the selected drill will drop out.



No. 5 A.	Holds Straight Shank Drills $\frac{1}{16}$ to $\frac{1}{2}$ inch by 64ths	\$3.50
No. 6 A.	Holds Straight Shank Drills $\frac{1}{16}$ to $\frac{1}{2}$ inch by 32nds	3.50
No. 7 A.	Holds Straight Shank Drills from No. 60 to $\frac{3}{8}$ inch	3.50
No. 8 A.	Holds Wire Gauge Drills from No. 1 to 60 . . .	3.50
No. 9 A.	Holds Half Set Drills, alternate numbers from No. 1 to 59	3.50
No. 12 A.	Holds Machine Bits $\frac{1}{8}$ to $\frac{1}{2}$ inch by 32nds . . .	3.50
No. 13 A.	Holds Bit Stock Drills $\frac{1}{16}$ to $\frac{1}{4}$ by 32nds, $\frac{5}{16}$ to $\frac{3}{8}$ by 16ths	3.50

SETS OF DRILLS IN INDEXED CASES
 Styles Nos. 330 and 340



Set No.	Sizes Included	Style No.	Page	Price Per Set
5A	$\frac{1}{16}$ to $\frac{1}{2}$ inch by 64ths	330	35	\$16.00
6A	$\frac{1}{16}$ to $\frac{1}{2}$ inch by 32nds	330	35	10.50
7A	Nos. 1 to 60 and $\frac{1}{4}$ to $\frac{3}{8}$ by 32nds	340	42-44	16.75
		330	35	
8A	Nos. 1 to 60	340	42-44	14.35
9A	Nos. 1 to 59, alternate numbers	340	42-44	9.50

STRAIGHT SHANK MACHINE BITS
 Style No. 355



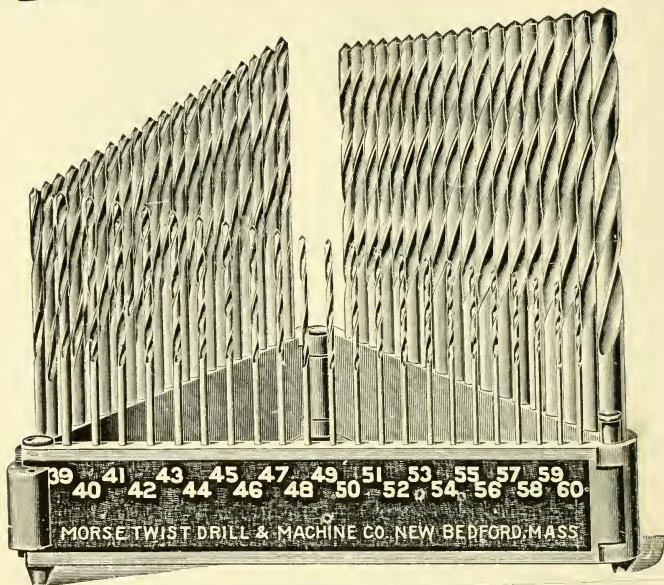
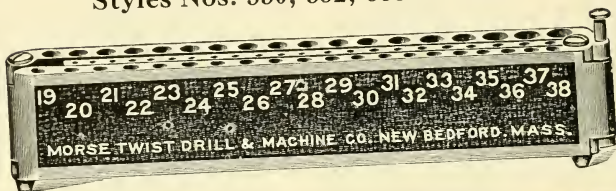
No. 12 A. Set Machine Bits, $\frac{1}{8}$ to $\frac{1}{2}$ inch by 32nds (see page 48) \$12.17

BIT STOCK DRILLS
 Style No. 390



No. 13 A. Set Bit Stock Drills, $\frac{1}{16}$ to $\frac{1}{4}$ inch by 32nds, $\frac{5}{16}$ to $\frac{3}{8}$ inch by 16ths (see page 55) \$6.80

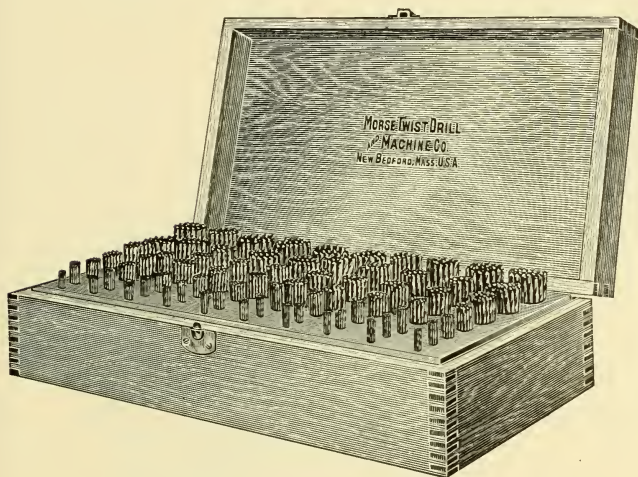
FOLDING DRILL HOLDER
 FOR STRAIGHT SHANK DRILLS
 Styles Nos. 330, 332, 333 and 340



Set No.	Sizes Included	Style No.	Page	Price Per Set
5B	$\frac{1}{16}$ to $\frac{1}{2}$ inch by 64ths	330	35	\$16.00
7B	Nos. 1 to 60 and $\frac{1}{4}$ to $\frac{3}{8}$ by 32nds	340	42-44	} 16.75
		330	35	
8B	Nos 1 to 60	340	42-44	14.35
15B	A to Z	332	37	14.50
18B	.5 M.M. to 6 M.M. by $\frac{1}{10}$ M.M.	333	38-41	14.35
19B	1 M.M. to 13 M.M. by $\frac{1}{2}$ M.M.	333	38-41	15.00
Holders without Drills, for above sets, each				\$3.50

SETS OF STRAIGHT SHANK DRILLS

Set No. 35



This set consists of 24 Straight Shank Wire Drills, Style 340, of each size from No. 1 to No. 70 inclusive.

The case is strongly made of oak; outside dimensions, closed, are: length, 19 inches; width, $10\frac{1}{4}$ inches; height, 5 inches. The drills stand on end in holes of graduated sizes, 24 to each hole, 10 holes to a row and 7 rows of holes. This makes easy the selection of any size or quantity of drills.

Price of drills and case complete as above, each \$280.00.

Subject to regular drill discount.

Weight complete, boxed for shipment, 32 lbs.

Set No. 36

This set consists of 24 Straight Shank Jobbers' Drills, Style 330, of each size $\frac{1}{16}$ to $\frac{5}{16}$ and 12 of each size $\frac{3}{4}$ to $\frac{1}{2}$ inch, inclusive.

The case is of oak, similar in style to above; outside dimensions: length, 19 inches; width, $10\frac{1}{4}$ inches; height, 7 inches.

Price of drills and case complete as above, each \$197.50.

Subject to regular drill discount.

Weight complete, boxed for shipment, 49 lbs.

SET No. 40

RADIO SET OF STRAIGHT SHANK DRILLS

Style No. 330



This convenient assortment of 9 Jobbers' Drills is made up with the Radio constructor in mind. It furnishes the sizes which he is most likely to need.

Set No. 40. One Style 330 Drill each size:

- $\frac{1}{16}$, $\frac{5}{64}$, $\frac{3}{32}$, $\frac{7}{64}$, $\frac{1}{8}$, $\frac{9}{64}$, $\frac{5}{32}$, $\frac{11}{64}$, $\frac{3}{16}$.

Packed in durable container. Per set. \$1.60

RADIO SET No. 3

STRAIGHT SHANK DRILLS AND TAPS

Morse Handy Radio Set No. 3

Morse for Quality & Service

MACHINE SCREW TAPS						STRAIGHT SHANK DRILLS					
4 ³²	6 ³²	8 ³²	10 ³²	12 ²⁴	14 ²⁰	10	16	20	29	36	45

MORSE
TWIST DRILL & MACHINE CO.
NEW BEDFORD, MASS. U.S.A.

Like these tools, don't forget that we make larger Taps and Drills, alsoreamers, Chucks, Arbors, Gauges, Reamers, Milling Cutters, etc.

MORSE MEANS THE BEST

Home construction of Radio sets is greatly facilitated by the use of one of these sets, which comprise 6 drills and 6 taps.

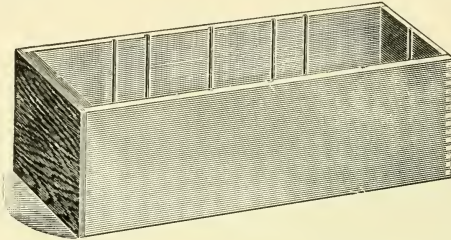
Radio Set No. 3. One Style 340 Straight Shank Drill each No. 10, 16, 20, 29, 36, 45, and one Style No. 1066 plug tap each 4³⁶, 6³², 8³², 10³², 12²⁴, 14²⁰.

Packed in durable container. Per set..... \$2.00

SECTIONAL CASES

CONSISTING OF BOXES WITH OAK FRONTS

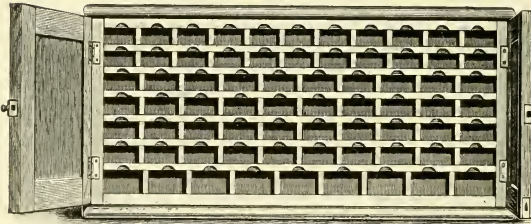
Many customers do not find the cases illustrated practical, therefore we keep in stock boxes as shown below. They can be placed upon the shelves and present a very satisfactory appearance. They are furnished with partitions to make 2, 3 or 4 equal spaces; specify number required.



OUTSIDE DIMENSIONS:

15 $\frac{1}{16}$ inches long, 5 $\frac{5}{8}$ inches wide, 5 $\frac{15}{16}$ inches deep
 15 $\frac{1}{16}$ inches long, 5 $\frac{5}{8}$ inches wide, 4 $\frac{15}{16}$ inches deep
 15 $\frac{1}{16}$ inches long, 5 $\frac{5}{8}$ inches wide, 3 $\frac{15}{16}$ inches deep
 Price on application.

CASE FOR DRILLS



No. 1—CASE, OUTSIDE DIMENSIONS:

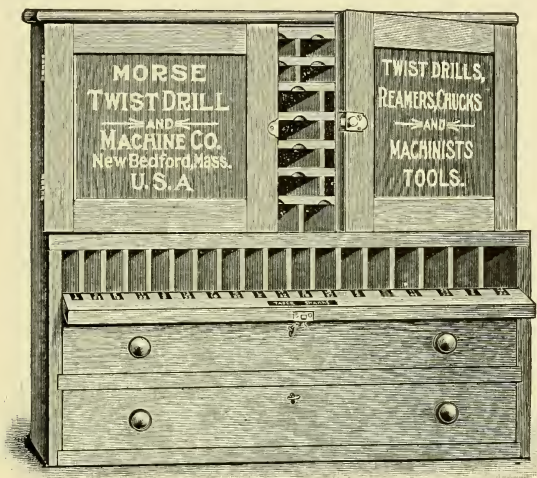
14 $\frac{1}{2}$ inches high
 28 $\frac{1}{8}$ inches wide
 8 $\frac{9}{16}$ inches deep

This Case will hold Steel Wire Gauge and Jobbers' Drills only, and is usually furnished in oak. It can be supplied in other woods at special prices.

Weight of Case boxed for shipment, 55 lbs.

Price on application.

CASE FOR DRILLS



No. 2—CASE, OUTSIDE DIMENSIONS:

25½ inches high

28⅛ inches wide

12 inches deep at the base

This Case is usually furnished in oak. It can be supplied in other woods at special prices.

This Case will hold Drills, viz:—

Drills, Steel Wire Gauge, from No. 1 to No. 80. (See pages 42-44.)

Jobbers' Straight Shank Drills, $\frac{1}{8}$ to $\frac{1}{2}$ inch, by 64ths. (See page 35.)

Taper Shank Drills, $\frac{1}{4}$ to $\frac{3}{4}$ inch, varying by 32nds. (See page 14.)

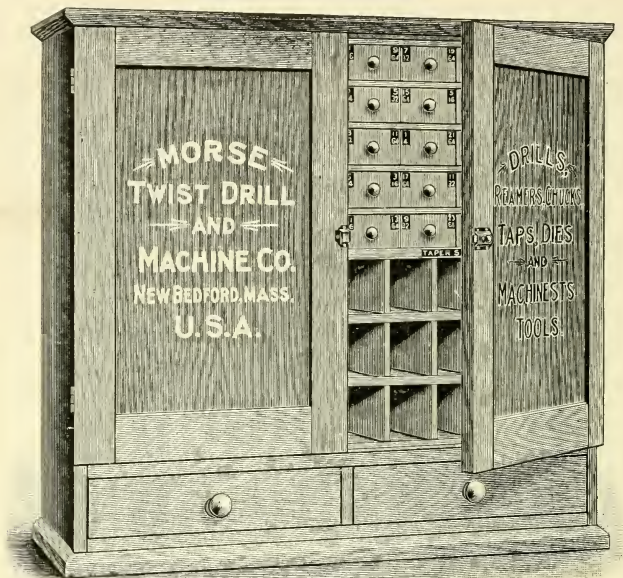
Taper Shank Drills, $\frac{1}{8}$ to $1\frac{1}{4}$ inch, varying by 16ths. (See pages 14-15.)

Jewelers' Drills, Chucks, and Sockets.

Weight of Case boxed for shipment, 95 lbs.

Price on application.

CASE FOR DRILLS



No. 3—CASE, OUTSIDE DIMENSIONS:

33½ inches high, 34¾ inches wide, 15½ inches deep without base.

This Case will hold Drills, viz:—

Drills, Steel Wire Gauge, from No. 1 to No. 65. (See pages 42–44.)

Jobbers' Straight Shank Drills, $\frac{1}{16}$ to $\frac{1}{2}$ inch by 64ths. (See page 35.)

Taper Shank Drills, $\frac{1}{4}$ to $1\frac{1}{4}$ inch, varying by 32nds. (See pages 14–15.)

Bit Stock Drills, $\frac{1}{16}$ to $\frac{1}{2}$ inch, varying by 32nds. (See page 55.)

Bit Stock Drills, $\frac{3}{8}$ to $\frac{1}{2}$ inch, varying by 16ths. (See page 55.)

This Case has two drawers at the bottom which will hold sockets and assorted tools.

Weight of Case boxed for shipment, 175 lbs.

Price on application.

BASE FOR CASE NO. 3

Base for Case No. 3 can be furnished as desired of the following dimensions, with partitions similar to the lower part of No. 3 Case.

DIMENSIONS:

33¼ inches high, 41 inches wide, 26 inches deep.

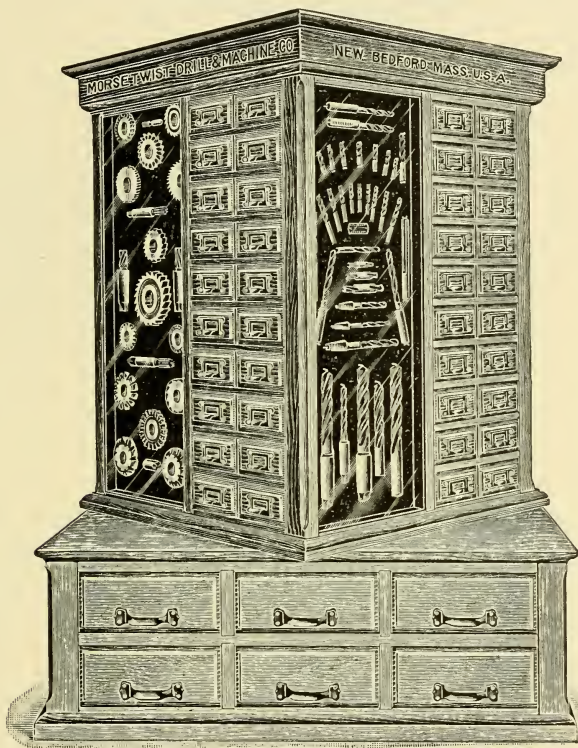
Base fitted with metal partitions which are adjustable and can be spaced about 1 inch apart.

Weight of Base boxed for shipment, 200 lbs.

Price on application.

This Case and Base are usually furnished in oak. They can be supplied in other woods at special prices.

No. 5 REVOLVING DRILL CASE



This illustrates a combination stock and exhibition case, made in two parts, consisting of a base, and a top which revolves on ball bearings.

The base is $35\frac{1}{2}$ inches long by 29 inches wide and contains 12 drawers, inside dimensions being $12\frac{1}{2}$ inches long by $8\frac{1}{4}$ inches wide by $3\frac{1}{4}$ inches deep.

The top revolves in a 39 inch circle.

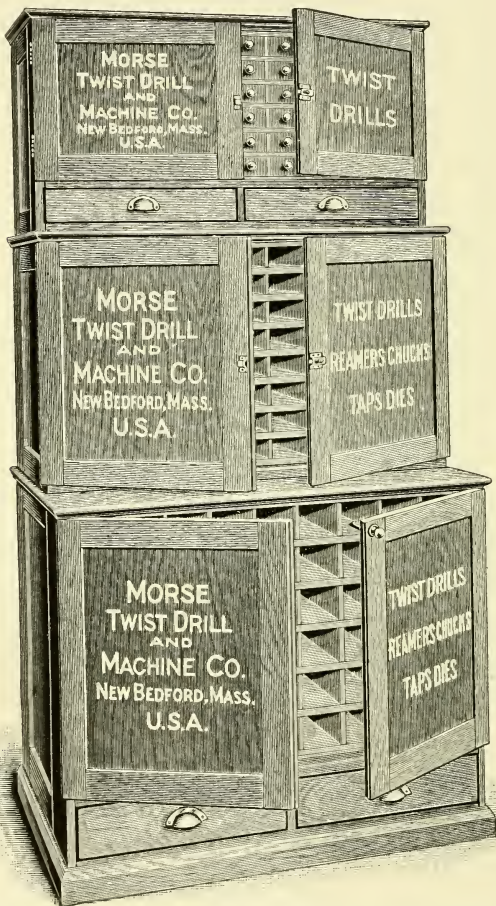
Each side of the top contains an exhibition space 29 inches by $10\frac{3}{8}$ inches by $\frac{7}{8}$ inch, and 20 drawers, inside dimensions of which are $10\frac{3}{8}$ inches long by $4\frac{1}{4}$ inches wide by 2 inches deep. These drawers are grooved to take one partition lengthwise or one to four partitions crosswise.

Height of Case including base, $46\frac{1}{2}$ inches.

Price on application.

No. 6

SECTIONAL DRILL CASES



For assortment of tools and general description see opposite page.
Weight boxed for shipment, 700 lbs.
Weight crated for shipment, 580 lbs.
Prices on application.

SECTIONAL DRILL CASES

No. 6 — Case

SECTION A — DIMENSIONS:

21 inches high
 40½ inches wide
 14⅝ inches deep

This Case holds the following Drills:

Wire Drills No. 1 to No. 80. (See pages 42-44.)

Jobbers' Drills $\frac{1}{16}$ to $\frac{1}{2}$ by 64ths. (See page 35.)

Bit Stock Drills $\frac{1}{16}$ to $\frac{17}{32}$ by 32nds and $\frac{9}{16}$ to 1 inch by 16ths. (See page 55.)

Two large drawers at bottom.

Weight of Section A: Boxed, 180 lbs. Crated, 140 lbs.

SECTION B—DIMENSIONS:

23⅜ inches high
 40½ inches wide
 18⅛ inches deep

Holds Taper Shank Drills from $\frac{33}{64}$ to $1\frac{1}{2}$ inches by 64ths. (See pages 14-15.)

Fitted with Metal Partitions.

Weight of Section B: Boxed, 200 lbs. Crated, 160 lbs.

SECTION C—DIMENSIONS:

33¼ inches high
 41 inches wide
 26 inches deep

Holds Taper Shank Drills from $1\frac{17}{32}$ to 3 inches by 16ths. (See pages 14-15.)

Fitted with metal partitions or drawers of the following dimensions:

$3\frac{3}{16}$ x $11\frac{3}{4}$ x 18 inches.

Two large drawers at bottom.

Can use partitions or remove them and use instead 18 drawers.

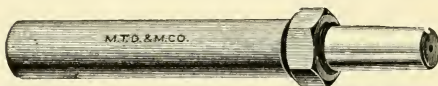
Weight of Section C: Boxed, 320 lbs. Crated, 280 lbs.

Total height of sections A, B and C, $77\frac{5}{8}$ inches.

This Case can be used to hold other tools than those mentioned above.

Further information will be furnished on application.

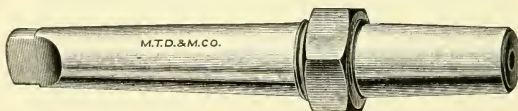
No. 501
ARBORS
FOR BEACH AND STETSON DRILL CHUCKS



No.	Price Each	Fitting Chucks	Whole Length, Inches	Length, of Shank, Inches	Diameter of Shank, Inches
0	\$1.05	No. 0 Beach	$4\frac{3}{8}$	$3\frac{3}{8}$	$\frac{1}{2}$
1	1.15	No. 1 Beach	$6\frac{1}{2}$	$4\frac{1}{2}$	$\frac{13}{16}$
2	1.15	{ No. 2 Beach, No. 2 Stetson & No. 2 Stetson Geared }	$6\frac{1}{2}$	$4\frac{1}{2}$	$\frac{7}{8}$
3	1.45	Nos. 3 & 4 Beach	$6\frac{13}{16}$	$4\frac{1}{2}$	1
4	2.00	Nos. 3 & 4 Stetson	$7\frac{1}{2}$	$4\frac{7}{8}$	$1\frac{1}{4}$

These Arbors have one end blank to be fitted to Lathe Spindle.
 These Arbors fit Chucks illustrated on pages 9, 10, 11.

No. 502
ARBORS
FOR BEACH AND STETSON DRILL CHUCKS
WITH MORSE TAPER SHANKS



No.	Price Each	Fitting Chucks	Whole Length, Inches	Morse Taper Shank, Number
0	\$1.30	No. 0 Beach	$3\frac{5}{8}$	1
1	1.30	No. 1 Beach	$4\frac{1}{2}$	1
1A	1.40	No. 1 Beach	$5\frac{3}{16}$	2
2	1.40	{ No. 2 Beach, No. 2 Stetson & No. 2 Stetson Geared }	$5\frac{3}{16}$	2
2A	1.75	{ No. 2 Beach, No. 2 Stetson & No. 2 Stetson Geared }	$5\frac{15}{16}$	3
3	1.75	Nos. 3 & 4 Beach	$6\frac{1}{4}$	3
3A	2.25	Nos. 3 & 4 Beach	$7\frac{5}{16}$	4
4	2.00	Nos. 3 & 4 Stetson	$6\frac{1}{2}$	3
4A	2.50	Nos. 3 & 4 Stetson	$7\frac{9}{16}$	4

These Arbors fit Chucks illustrated on pages 9, 10 and 11.
 For Arbor fitting Center Drill Chuck see page 115.

No. 505
ARBORS

FOR SHELL REAMERS NOS. 625, 627, 628; ROSE SHELL REAMERS NOS. 626, 629 AND SHELL DRILLS NO. 460

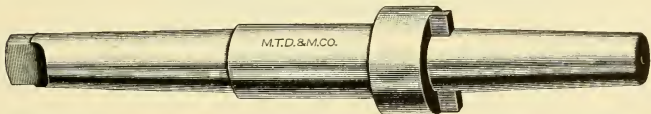


Number	Price Each	Fitting Sizes, Inches	Whole Length, Inches	Length of Shank, Inches	Diameter of Shank, Inches
3	\$2.40	1/2 to 5/8	8	5 1/2	7/16
4	2.70	21/32 to 25/32	9	6 3/2	1/2
5	3.00	13/16 to 1 1/32	9 1/2	6 11/32	5/8
6	3.30	1 1/16 to 1 9/32	10	6 5/2	3/4
7	3.60	1 5/16 to 1 21/32	11	7 5/2	7/8
8	4.00	1 11/16 to 2	12	7 7/2	1 1/8
9	4.50	2 1/16 to 2 1/2	13	8 7/2	1 3/8
10	5.25	2 9/16 to 3	14	8 3/2	1 5/8
11	7.50	3 1/16 to 3 1/2	15	9 5/2	2
12	10.50	3 9/16 to 4	16	9 15/2	2 1/8
13	13.50	4 1/8 to 4 1/2	17	9 3/2	2 3/8
14	18.00	4 5/8 to 5 1/2	18	10 1/16	2 5/8

Shanks on above arbors are ground standard to sizes listed.

No. 506
ARBORS

FOR SHELL REAMERS NOS. 625, 627, 628; ROSE SHELL REAMERS NOS. 626, 629 AND SHELL DRILLS NO. 460
WITH MORSE TAPER SHANKS



No.	Price Each	Fitting Sizes, Inches	Whole Length, Inches	Morse Taper Shank, No.	No.	Price Each	Fitting Sizes, Inches	Whole Length, Inches	Morse Taper Shank, No.
3	\$2.90	1/2 to 5/8	8	1	9	\$5.40	2 1/16 to 2 1/2	13	4
4	3.25	21/32 to 25/32	9	2	10	6.30	2 9/16 to 3	14	5
5	3.60	13/16 to 1 1/32	9 1/2	2	11	9.00	3 1/16 to 3 1/2	15	5
6	3.95	1 1/16 to 1 9/32	10	3	12	12.60	3 9/16 to 4	16	5
7	4.30	1 5/16 to 1 21/32	11	3	13	16.20	4 1/8 to 4 1/2	17	5
8	4.80	1 11/16 to 2	12	4	14	21.60	4 5/8 to 5 1/2	18	5

For Nos. 625, 626, 627, 628, and 629, see pages 132-135; No. 460, page 76.

No. 510
ARBORS FOR SHELL END MILLS
 WITH MORSE TAPER SHANKS



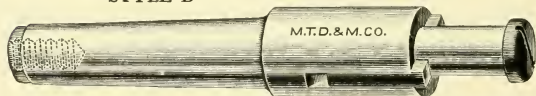
Number	Price Each	Fitting Sizes, Inches	Morse Taper Shank, Number
1	\$5.00	$1\frac{1}{4}$ to $1\frac{1}{2}$	3
2	5.35	$1\frac{9}{16}$ to $2\frac{1}{8}$	4
3	5.35	$2\frac{1}{4}$ to 3	4

State whether Arbors are desired for Right or Left Hand Mills.
 These Arbors fit Shell End Mills shown on page 204.

No. 512
ARBORS FOR SHELL END MILLS
 WITH BROWN & SHARPE TAPER SHANKS
 STYLE A



STYLE B



Number	Price Each	Fitting Sizes, Inches	Style of Arbor	Taper Shank, Number
1	\$8.00	$1\frac{1}{4}$ to $1\frac{1}{2}$	A	7
2	8.00	$1\frac{1}{4}$ to $1\frac{1}{2}$	A	9
3	8.00	$1\frac{1}{4}$ to $1\frac{1}{2}$	B	9
4	8.00	$1\frac{9}{16}$ to $2\frac{1}{8}$	A	9
5	9.25	$1\frac{9}{16}$ to $2\frac{1}{8}$	A	10
7	8.00	$1\frac{9}{16}$ to $2\frac{1}{8}$	B	9
8	9.25	$1\frac{9}{16}$ to $2\frac{1}{8}$	B	10
11	8.25	$2\frac{1}{4}$ to 3	A	9
12	9.75	$2\frac{1}{4}$ to 3	A	10
14	8.25	$2\frac{1}{4}$ to 3	B	9
15	9.75	$2\frac{1}{4}$ to 3	B	10

State whether Arbors are desired for Right or Left Hand Mills.
 These Arbors fit Shell End Mills shown on page 204.

No. 509

ARBORS FOR
ANGULAR CUTTERS WITH THREADED HOLES

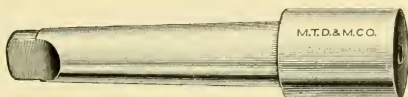
WITH BROWN AND SHARPE TAPER SHANKS

Number of Arbor	Price Each	Taper Shank, Number	Threaded End	Whole Length, Inches
1	\$3.75	7	$\frac{3}{8}$, 20, R or L	$5\frac{1}{8}$
2	5.00	9	$\frac{1}{2}$, 16, R or L	7

No. 515

ARBORS WITH BLANK ENDS

WITH MORSE TAPER SHANKS



Morse Taper Shank, Number	Price Each	Whole Length, Inches	Length of Blank End, Inches	Diameter of Blank End, Inches
1	\$1.50	$3\frac{11}{16}$	$1\frac{1}{8}$	$\frac{11}{16}$
2	1.50	$4\frac{3}{8}$	$1\frac{1}{4}$	1
3	1.75	$5\frac{3}{8}$	$1\frac{1}{2}$	1
4	1.75	$6\frac{5}{8}$	$1\frac{3}{4}$	$1\frac{3}{8}$
5	2.00	$8\frac{3}{8}$	$2\frac{1}{4}$	$1\frac{5}{8}$

No. 525

ARBORS FOR CENTER DRILL CHUCKS

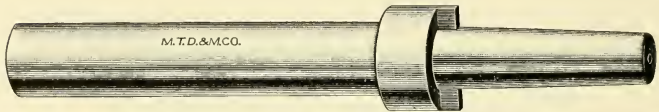


This Arbor fits Center Drill Chucks illustrated on page 11.

Price Each	Whole Length, Inches	Length of Shank, Inches	Diameter of Shank, Inches
\$.80	$4\frac{3}{4}$	$3\frac{1}{2}$	$1\frac{3}{16}$

These Arbors have one end blank to be fitted to Lathe Spindle.

No. 528

ARBORS FOR EXPANDING AND ADJUSTABLE
SHELL REAMERS

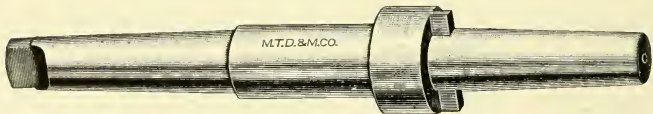
No.	Price Each	Fitting Sizes, Inches	Whole Length, Inches	Morse Taper End, Number	Length of Shank, Inches	Diameter of Shank, Inches
3	\$3.60	$1\frac{3}{8}$ to $1\frac{5}{8}$	$8\frac{15}{16}$	2	$5\frac{1}{2}$	$\frac{7}{8}$
4	4.50	$1\frac{11}{16}$ to $2\frac{1}{4}$	$10\frac{1}{16}$	3	$5\frac{3}{2}$	$1\frac{1}{8}$
5	7.50	$2\frac{5}{16}$ to $3\frac{5}{16}$	$11\frac{7}{8}$	4	$6\frac{3}{2}$	$1\frac{3}{8}$
6	13.50	$3\frac{3}{8}$ to $4\frac{3}{8}$	$14\frac{3}{8}$	5	$7\frac{21}{32}$	2
7	22.00	$4\frac{1}{2}$ to 6	$17\frac{1}{2}$	6	$9\frac{13}{32}$	$2\frac{5}{8}$

Shanks on above Arbors are ground standard to sizes listed.
These Arbors fit Reamers illustrated on pages 168, 169, and 170.

No. 529

ARBORS FOR EXPANDING AND ADJUSTABLE
SHELL REAMERS

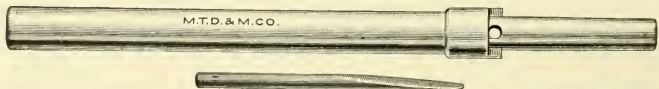
WITH MORSE TAPER SHANKS



No.	Price Each	Fitting Sizes, Inches	Whole Length, Inches	Morse Taper End, Number	Morse Taper Shank, Number
3	\$4.75	$1\frac{3}{8}$ to $1\frac{5}{8}$	$8\frac{15}{16}$	2	3
4	5.50	$1\frac{11}{16}$ to $2\frac{1}{4}$	$10\frac{1}{16}$	3	3
5	9.00	$2\frac{5}{16}$ to $3\frac{5}{16}$	$11\frac{7}{8}$	4	4
6	16.20	$3\frac{3}{8}$ to $4\frac{3}{8}$	$14\frac{3}{8}$	5	5
7	26.40	$4\frac{1}{2}$ to 6	$17\frac{1}{2}$	6	6

These Arbors fit Reamers illustrated on pages 168, 169, and 170.

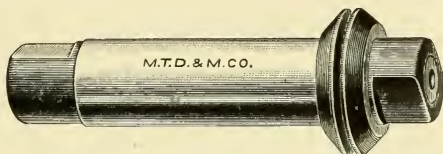
No. 533



Above illustration shows method which can be followed to force a Shell Reamer from the Arbor without damage to the Reamer.

No. 536

ARBORS FOR SCREW SLOTTING CUTTERS



Number	Price Each	Fitting Holes, Inches	Whole Length, Inches
1	\$6.75	$\frac{3}{8}$	6
2	6.75	$\frac{1}{2}$	6
3	6.75	$\frac{5}{8}$	6
4	6.75	$\frac{3}{4}$	6
5	6.75	$\frac{7}{8}$	6
6	6.75	1	6

These Arbors fit Cutters shown on pages 198-199.

No. 540

FLOATING ARBORS

FITTING SHELL REAMERS AND SHELL DRILLS
WITH STRAIGHT HOLES



No. 545

SOLID ARBORS

FITTING SHELL REAMERS AND SHELL DRILLS
WITH STRAIGHT HOLES



No. 546

SOLID ARBORS

WITH MORSE TAPER SHANKS
FITTING SHELL REAMERS AND SHELL DRILLS
WITH STRAIGHT HOLES



See pages 88 and 89.

No. 541

FLOATING ARBORS

FOR SHELL REAMERS NOS. 625, 627 AND 628; ROSE SHELL REAMERS NOS.
626, 629 AND SHELL DRILLS NO. 460

WITH TAPER HOLES



Number	Price Each	Fitting Sizes, Inches	Whole Length, Inches	Diameter Bushing, Inches	Length Bushing, Inches
3	\$7.50	$\frac{1}{2}$ to $\frac{5}{8}$	$7\frac{1}{2}$	1	$3\frac{1}{4}$
4	7.50	$\frac{1}{2}$ to $\frac{5}{8}$	$7\frac{1}{2}$	$1\frac{1}{4}$	$3\frac{1}{4}$
5	7.50	$\frac{1}{2}$ to $\frac{5}{8}$	$7\frac{1}{2}$	$1\frac{1}{2}$	$3\frac{1}{4}$
6	7.70	$\frac{21}{32}$ to $\frac{25}{32}$	$8\frac{1}{2}$	1	$3\frac{1}{4}$
7	7.70	$\frac{21}{32}$ to $\frac{25}{32}$	$8\frac{1}{2}$	$1\frac{1}{4}$	$3\frac{1}{4}$
8	7.70	$\frac{21}{32}$ to $\frac{25}{32}$	$8\frac{1}{2}$	$1\frac{1}{2}$	$3\frac{1}{4}$
9	8.00	$\frac{13}{16}$ to $1\frac{1}{32}$	9	$1\frac{1}{4}$	$3\frac{1}{4}$
10	8.00	$\frac{13}{16}$ to $1\frac{1}{32}$	9	$1\frac{1}{2}$	$3\frac{1}{4}$
11	9.00	$1\frac{1}{16}$ to $1\frac{9}{32}$	11	$1\frac{1}{2}$	$3\frac{1}{4}$
12	9.00	$1\frac{1}{16}$ to $1\frac{9}{32}$	11	$1\frac{3}{4}$	$3\frac{1}{4}$
13	9.00	$1\frac{1}{16}$ to $1\frac{9}{32}$	11	2	$3\frac{1}{4}$
14	9.35	$1\frac{5}{16}$ to $1\frac{21}{32}$	$13\frac{1}{2}$	$1\frac{1}{2}$	$3\frac{1}{4}$
15	9.35	$1\frac{5}{16}$ to $1\frac{21}{32}$	$13\frac{1}{2}$	$1\frac{3}{4}$	$3\frac{1}{4}$
16	9.35	$1\frac{5}{16}$ to $1\frac{21}{32}$	$13\frac{1}{2}$	2	$3\frac{1}{4}$
17	9.75	$1\frac{11}{16}$ to 2	$13\frac{1}{2}$	$1\frac{3}{4}$	$3\frac{1}{4}$
18	9.75	$1\frac{11}{16}$ to 2	$13\frac{1}{2}$	2	$3\frac{1}{4}$
19	10.10	$2\frac{1}{16}$ to $2\frac{1}{2}$	$13\frac{1}{2}$	$1\frac{3}{4}$	$3\frac{1}{4}$
20	10.10	$2\frac{1}{16}$ to $2\frac{1}{2}$	$13\frac{1}{2}$	2	$3\frac{1}{4}$
21	10.50	$2\frac{9}{16}$ to 3	$13\frac{1}{2}$	2	$3\frac{1}{4}$
22	10.85	$3\frac{1}{16}$ to $3\frac{1}{2}$	$13\frac{1}{2}$	2	$3\frac{1}{4}$
23	10.85	$3\frac{9}{16}$ to 4	$13\frac{1}{2}$	2	$3\frac{1}{4}$

For Nos. 625, 626, 627, 628, and 629, see pages 132-135.
For No. 460 see page 76.

No. 550

ARBORS

FOR ONE-LOCK ADJUSTABLE REAMERS, No. 730



Number	Price Each	Fitting Sizes, Inches	Whole Length, Inches	Length of Shank, Inches	Diameter of Shank, Inches
1	\$2.00	$\frac{3}{4}$ to $\frac{15}{16}$	$7\frac{3}{8}$	$5\frac{15}{16}$	$\frac{5}{8}$
2	2.50	1 to $1\frac{3}{16}$	$8\frac{3}{8}$	$6\frac{11}{16}$	$\frac{3}{4}$
3	2.90	$1\frac{1}{4}$ to $1\frac{11}{16}$	$8\frac{7}{8}$	$6\frac{15}{16}$	$\frac{7}{8}$
4	3.75	$1\frac{3}{4}$ to $2\frac{3}{16}$	$9\frac{1}{2}$	$7\frac{5}{16}$	$1\frac{1}{8}$
5	4.15	$2\frac{1}{4}$ to $2\frac{11}{16}$	$10\frac{1}{4}$	$7\frac{11}{16}$	$1\frac{3}{8}$
6	5.80	$2\frac{3}{4}$ to $3\frac{11}{16}$	11	$8\frac{1}{16}$	$1\frac{3}{4}$
7	7.50	$3\frac{3}{4}$ to 4	12	$8\frac{7}{16}$	$2\frac{1}{4}$

No. 551

ARBORS

FOR ONE-LOCK ADJUSTABLE REAMERS, No. 730

WITH MORSE TAPER SHANKS



Number	Price Each	Fitting Sizes, Inches	Whole Length, Inches	Morse Taper Shank, Number
21	\$2.50	$\frac{3}{4}$ to $\frac{15}{16}$	$7\frac{3}{8}$	2
22	3.00	1 to $1\frac{3}{16}$	$8\frac{3}{8}$	3
23	3.50	$1\frac{1}{4}$ to $1\frac{11}{16}$	$8\frac{7}{8}$	3
24	4.50	$1\frac{3}{4}$ to $2\frac{3}{16}$	$9\frac{1}{2}$	4
25	5.00	$2\frac{1}{4}$ to $2\frac{11}{16}$	$10\frac{1}{4}$	4
26	7.00	$2\frac{3}{4}$ to $3\frac{11}{16}$	11	5
27	9.00	$3\frac{3}{4}$ to 4	12	5

For One-Lock Adjustable Reamers see page 166.

No. 570
STEEL MANDRELS
 HARDENED AND GROUND



These Mandrels are made of tool steel, hardened and accurately ground. They are tapered .0005 to 1 inch, and are slightly under size on the entering end. They correspond in size to our Reamers and will fit holes reamed by them. Other tapers per foot can be furnished at special prices. Size of Mandrel stamped on large end.

Diameter, Inches	Price Each	Whole Length, Inches	Diameter, Inches	Price Each	Whole Length, Inches
$\frac{1}{4}$	\$.80	$3\frac{3}{4}$	$1\frac{15}{16}$	\$6.00	$10\frac{3}{4}$
$\frac{5}{16}$	.90	4	2	6.50	11
$\frac{3}{8}$	1.00	$4\frac{1}{4}$	$2\frac{1}{16}$	7.00	$11\frac{1}{2}$
$\frac{7}{16}$	1.10	$4\frac{1}{2}$	$2\frac{1}{8}$	7.50	$11\frac{1}{2}$
$\frac{1}{2}$	1.20	5	$2\frac{3}{16}$	8.00	12
$\frac{9}{16}$	1.30	$5\frac{1}{4}$	$2\frac{1}{4}$	8.50	12
$\frac{5}{8}$	1.40	$5\frac{1}{2}$	$2\frac{5}{16}$	9.00	12
$\frac{11}{16}$	1.50	$5\frac{3}{4}$	$2\frac{3}{8}$	9.50	12
$\frac{3}{4}$	1.60	6	$2\frac{7}{16}$	10.00	$12\frac{1}{2}$
$\frac{13}{16}$	1.70	$6\frac{1}{4}$	$2\frac{1}{2}$	10.50	$12\frac{1}{2}$
$\frac{7}{8}$	1.85	$6\frac{1}{2}$	$2\frac{9}{16}$	11.25	$12\frac{1}{2}$
$\frac{15}{16}$	2.00	$6\frac{3}{4}$	$2\frac{5}{8}$	12.00	$12\frac{1}{2}$
1	2.15	7	$2\frac{11}{16}$	12.75	13
$1\frac{1}{16}$	2.30	$7\frac{1}{4}$	$2\frac{3}{4}$	13.50	13
$1\frac{1}{8}$	2.45	$7\frac{1}{2}$	$2\frac{13}{16}$	14.25	13
$1\frac{3}{16}$	2.60	$7\frac{3}{4}$	$2\frac{7}{8}$	15.00	13
$1\frac{1}{4}$	2.80	8	$2\frac{15}{16}$	15.75	13
$1\frac{5}{16}$	3.00	$8\frac{1}{4}$	3	16.50	13
$1\frac{3}{8}$	3.25	$8\frac{1}{2}$	$3\frac{1}{8}$	18.00	14
$1\frac{7}{16}$	3.50	$8\frac{3}{4}$	$3\frac{1}{4}$	19.50	14
$1\frac{1}{2}$	3.75	9	$3\frac{3}{8}$	21.00	15
$1\frac{9}{16}$	4.00	$9\frac{1}{4}$	$3\frac{1}{2}$	23.00	15
$1\frac{5}{8}$	4.25	$9\frac{1}{2}$	$3\frac{5}{8}$	25.00	16
$1\frac{11}{16}$	4.50	$9\frac{3}{4}$	$3\frac{3}{4}$	27.00	16
$1\frac{3}{4}$	4.75	10	$3\frac{7}{8}$	29.00	17
$1\frac{13}{16}$	5.00	$10\frac{1}{4}$	4	31.00	17
$1\frac{7}{8}$	5.50	$10\frac{1}{2}$			

No. 575

TAPER MANDRELS WITH EXPANDING SLEEVES



The entire Mandrel is hardened and the taper ground. The taper is such that it will hold the Sleeve and the work rigid. The Sleeve is of crucible steel, not hardened, and has several longitudinal slots, giving the Sleeve greater flexibility. One of the slots is cut through, allowing the Sleeve to expand or contract.

Diameter Sleeve, Inches	Price Each, Sleeve Without Mandrel	Length of Sleeve, Inches	Fitting Taper Mandrel, Number	Price Each, Mandrel Without Sleeve	Whole Length, Inches
$\frac{1}{2}$	\$.95	$1\frac{1}{2}$	4	\$1.85	5
$\frac{17}{32}$	.95	$1\frac{1}{2}$	4	1.85	5
$\frac{9}{16}$	1.05	$1\frac{5}{8}$	6	2.00	$5\frac{1}{4}$
$\frac{19}{32}$	1.05	$1\frac{5}{8}$	6	2.00	$5\frac{1}{4}$
$\frac{5}{8}$	1.15	$1\frac{3}{4}$	8	2.15	$5\frac{1}{2}$
$\frac{21}{32}$	1.15	$1\frac{3}{4}$	8	2.15	$5\frac{1}{2}$
$\frac{11}{16}$	1.25	$1\frac{7}{8}$	10	2.30	$5\frac{3}{4}$
$\frac{23}{32}$	1.25	$1\frac{7}{8}$	10	2.30	$5\frac{3}{4}$
$\frac{3}{4}$	1.35	2	12	2.50	6
$\frac{25}{32}$	1.35	2	12	2.50	6
$\frac{13}{16}$	1.45	$2\frac{1}{8}$	14	2.70	$6\frac{1}{2}$
$\frac{27}{32}$	1.45	$2\frac{1}{8}$	14	2.70	$6\frac{1}{2}$
$\frac{7}{8}$	1.55	$2\frac{1}{4}$	14	2.70	$6\frac{1}{2}$
$\frac{29}{32}$	1.55	$2\frac{1}{4}$	14	2.70	$6\frac{1}{2}$
$\frac{15}{16}$	1.80	$2\frac{3}{8}$	16	3.00	$7\frac{1}{2}$
$\frac{31}{32}$	1.80	$2\frac{3}{8}$	16	3.00	$7\frac{1}{2}$
1	1.95	$2\frac{3}{8}$	16	3.00	$7\frac{1}{2}$
$1\frac{1}{32}$	1.95	$2\frac{1}{2}$	16	3.00	$7\frac{1}{2}$
$1\frac{1}{16}$	2.10	$2\frac{1}{2}$	16	3.00	$7\frac{1}{2}$
$1\frac{3}{32}$	2.10	$2\frac{1}{2}$	16	3.00	$7\frac{1}{2}$
$1\frac{1}{8}$	2.40	$2\frac{5}{8}$	18	4.15	$8\frac{1}{2}$

No. 575

TAPER MANDRELS WITH EXPANDING
SLEEVES

Diameter Sleeve, Inches	Price Each, Sleeve Without Mandrel	Length of Sleeve, Inches	Fitting Taper Mandrel, Number	Price Each, Mandrel Without Sleeve	Whole Length, Inches
$1\frac{5}{32}$	\$2.40	$2\frac{5}{8}$	18	\$4.15	$8\frac{1}{2}$
$1\frac{3}{16}$	2.50	$2\frac{5}{8}$	18	4.15	$8\frac{1}{2}$
$1\frac{7}{32}$	2.50	$2\frac{5}{8}$	18	4.15	$8\frac{1}{2}$
$1\frac{1}{4}$	2.60	$2\frac{3}{4}$	18	4.15	$8\frac{1}{2}$
$1\frac{9}{32}$	2.60	$2\frac{3}{4}$	18	4.15	$8\frac{1}{2}$
$1\frac{5}{16}$	2.70	$2\frac{3}{4}$	18	4.15	$8\frac{1}{2}$
$1\frac{11}{32}$	2.70	$2\frac{3}{4}$	18	4.15	$8\frac{1}{2}$
$1\frac{3}{8}$	3.10	3	20	5.30	$9\frac{1}{2}$
$1\frac{13}{32}$	3.10	3	20	5.30	$9\frac{1}{2}$
$1\frac{7}{16}$	3.20	3	20	5.30	$9\frac{1}{2}$
$1\frac{15}{32}$	3.20	3	20	5.30	$9\frac{1}{2}$
$1\frac{1}{2}$	3.30	$3\frac{1}{4}$	20	5.30	$9\frac{1}{2}$
$1\frac{17}{32}$	3.30	$3\frac{1}{4}$	20	5.30	$9\frac{1}{2}$
$1\frac{9}{16}$	3.40	$3\frac{1}{4}$	20	5.30	$9\frac{1}{2}$
$1\frac{19}{32}$	3.40	$3\frac{1}{4}$	20	5.30	$9\frac{1}{2}$
$1\frac{5}{8}$	3.70	$3\frac{3}{8}$	22	6.50	$10\frac{1}{2}$
$1\frac{21}{32}$	3.70	$3\frac{3}{8}$	22	6.50	$10\frac{1}{2}$
$1\frac{11}{16}$	3.80	$3\frac{3}{8}$	22	6.50	$10\frac{1}{2}$
$1\frac{23}{32}$	3.80	$3\frac{3}{8}$	22	6.50	$10\frac{1}{2}$
$1\frac{3}{4}$	3.90	$3\frac{3}{8}$	22	6.50	$10\frac{1}{2}$
$1\frac{25}{32}$	3.90	$3\frac{1}{2}$	22	6.50	$10\frac{1}{2}$
$1\frac{13}{16}$	4.00	$3\frac{1}{2}$	22	6.50	$10\frac{1}{2}$
$1\frac{27}{32}$	4.00	$3\frac{1}{2}$	22	6.50	$10\frac{1}{2}$
$1\frac{7}{8}$	4.10	$3\frac{1}{2}$	22	6.50	$10\frac{1}{2}$
$1\frac{29}{32}$	4.10	$3\frac{1}{2}$	22	6.50	$10\frac{1}{2}$
$1\frac{15}{16}$	4.40	$3\frac{3}{4}$	24	7.75	$11\frac{1}{2}$
$1\frac{31}{32}$	4.40	$3\frac{3}{4}$	24	7.75	$11\frac{1}{2}$
2	4.50	$3\frac{3}{4}$	24	7.75	$11\frac{1}{2}$
$2\frac{1}{32}$	4.50	$3\frac{3}{4}$	24	7.75	$11\frac{1}{2}$
$2\frac{1}{16}$	4.60	$3\frac{3}{4}$	24	7.75	$11\frac{1}{2}$
$2\frac{3}{32}$	4.60	$3\frac{7}{8}$	24	7.75	$11\frac{1}{2}$

No. 575

TAPER MANDRELS WITH EXPANDING
SLEEVES

Diameter Sleeve, Inches	Price Each, Sleeve Without Mandrel	Length of Sleeve, Inches	Fitting Taper Mandrel, Number	Price Each, Mandrel Without Sleeve	Whole Length, Inches
$2\frac{1}{8}$	\$4.70	$3\frac{7}{8}$	24	\$7.75	$11\frac{1}{2}$
$2\frac{5}{32}$	4.70	$3\frac{7}{8}$	24	7.75	$11\frac{1}{2}$
$2\frac{3}{16}$	4.80	$3\frac{7}{8}$	24	7.75	$11\frac{1}{2}$
$2\frac{7}{32}$	4.80	$3\frac{7}{8}$	24	7.75	$11\frac{1}{2}$
$2\frac{1}{4}$	5.10	4	26	9.00	$12\frac{1}{2}$
$2\frac{9}{32}$	5.10	4	26	9.00	$12\frac{1}{2}$
$2\frac{5}{16}$	5.20	4	26	9.00	$12\frac{1}{2}$
$2\frac{11}{32}$	5.20	4	26	9.00	$12\frac{1}{2}$
$2\frac{3}{8}$	5.30	4	26	9.00	$12\frac{1}{2}$
$2\frac{13}{32}$	5.30	$4\frac{1}{4}$	26	9.00	$12\frac{1}{2}$
$2\frac{7}{16}$	5.40	$4\frac{1}{4}$	26	9.00	$12\frac{1}{2}$
$2\frac{15}{32}$	5.40	$4\frac{1}{4}$	26	9.00	$12\frac{1}{2}$
$2\frac{1}{2}$	5.50	$4\frac{1}{4}$	26	9.00	$12\frac{1}{2}$
$2\frac{17}{32}$	5.50	$4\frac{1}{4}$	26	9.00	$12\frac{1}{2}$
$2\frac{9}{16}$	5.90	$4\frac{1}{2}$	28	12.10	$13\frac{1}{2}$
$2\frac{19}{32}$	5.90	$4\frac{1}{2}$	28	12.10	$13\frac{1}{2}$
$2\frac{5}{8}$	6.00	$4\frac{1}{2}$	28	12.10	$13\frac{1}{2}$
$2\frac{21}{32}$	6.00	$4\frac{1}{2}$	28	12.10	$13\frac{1}{2}$
$2\frac{11}{16}$	6.10	$4\frac{1}{2}$	28	12.10	$13\frac{1}{2}$
$2\frac{23}{32}$	6.10	$4\frac{1}{2}$	28	12.10	$13\frac{1}{2}$
$2\frac{3}{4}$	6.20	$4\frac{3}{4}$	28	12.10	$13\frac{1}{2}$
$2\frac{25}{32}$	6.20	$4\frac{3}{4}$	28	12.10	$13\frac{1}{2}$
$2\frac{13}{16}$	6.30	$4\frac{3}{4}$	28	12.10	$13\frac{1}{2}$
$2\frac{27}{32}$	6.30	$4\frac{3}{4}$	28	12.10	$13\frac{1}{2}$
$2\frac{7}{8}$	6.40	$4\frac{3}{4}$	28	12.10	$13\frac{1}{2}$
$2\frac{29}{32}$	6.40	$4\frac{3}{4}$	28	12.10	$13\frac{1}{2}$
$2\frac{15}{16}$	6.80	5	30	15.50	$14\frac{1}{2}$
$2\frac{31}{32}$	6.80	5	30	15.50	$14\frac{1}{2}$
3	6.90	5	30	15.50	$14\frac{1}{2}$
$3\frac{1}{32}$	6.90	5	30	15.50	$14\frac{1}{2}$

No. 575
TAPER MANDRELS WITH EXPANDING
SLEEVES

Diameter Sleeve, Inches	Price Each, Sleeve Without Mandrel	Length of Sleeve, Inches	Fitting Taper Mandrel, Number	Price Each, Mandrel Without Sleeve	Whole Length, Inches
$3\frac{1}{16}$	\$7.10	5	30	\$15.50	$14\frac{1}{2}$
$3\frac{3}{32}$	7.10	5	30	15.50	$14\frac{1}{2}$
$3\frac{1}{8}$	7.30	$5\frac{1}{4}$	30	15.50	$14\frac{1}{2}$
$3\frac{5}{32}$	7.30	$5\frac{1}{4}$	30	15.50	$14\frac{1}{2}$
$3\frac{3}{16}$	7.50	$5\frac{1}{4}$	30	15.50	$14\frac{1}{2}$
$3\frac{7}{32}$	7.50	$5\frac{1}{4}$	30	15.50	$14\frac{1}{2}$
$3\frac{1}{4}$	7.70	$5\frac{1}{4}$	30	15.50	$14\frac{1}{2}$
$3\frac{9}{32}$	7.70	$5\frac{1}{4}$	30	15.50	$14\frac{1}{2}$
$3\frac{5}{16}$	7.90	$5\frac{1}{2}$	32	19.50	$15\frac{1}{2}$
$3\frac{11}{32}$	7.90	$5\frac{1}{2}$	32	19.50	$15\frac{1}{2}$
$3\frac{3}{8}$	8.10	$5\frac{1}{2}$	32	19.50	$15\frac{1}{2}$
$3\frac{13}{32}$	8.10	$5\frac{1}{2}$	32	19.50	$15\frac{1}{2}$
$3\frac{7}{16}$	8.30	$5\frac{1}{2}$	32	19.50	$15\frac{1}{2}$
$3\frac{15}{32}$	8.30	$5\frac{1}{2}$	32	19.50	$15\frac{1}{2}$
$3\frac{1}{2}$	8.50	$5\frac{1}{2}$	32	19.50	$15\frac{1}{2}$
$3\frac{17}{32}$	8.50	$5\frac{3}{4}$	32	19.50	$15\frac{1}{2}$
$3\frac{9}{16}$	8.70	$5\frac{3}{4}$	32	19.50	$15\frac{1}{2}$
$3\frac{19}{32}$	8.70	$5\frac{3}{4}$	32	19.50	$15\frac{1}{2}$
$3\frac{5}{8}$	8.90	$5\frac{3}{4}$	32	19.50	$15\frac{1}{2}$
$3\frac{21}{32}$	8.90	$5\frac{3}{4}$	32	19.50	$15\frac{1}{2}$
$3\frac{11}{16}$	9.10	$5\frac{3}{4}$	32	19.50	$15\frac{1}{2}$
$3\frac{23}{32}$	9.10	$5\frac{3}{4}$	32	19.50	$15\frac{1}{2}$
$3\frac{3}{4}$	9.30	6	34	24.00	$16\frac{1}{2}$
$3\frac{25}{32}$	9.30	6	34	24.00	$16\frac{1}{2}$
$3\frac{13}{16}$	9.50	6	34	24.00	$16\frac{1}{2}$
$3\frac{27}{32}$	9.50	6	34	24.00	$16\frac{1}{2}$
$3\frac{7}{8}$	9.70	6	34	24.00	$16\frac{1}{2}$
$3\frac{29}{32}$	9.70	6	34	24.00	$16\frac{1}{2}$
$3\frac{15}{16}$	9.90	6	34	24.00	$16\frac{1}{2}$
$3\frac{31}{32}$	9.90	6	34	24.00	$16\frac{1}{2}$
4	10.10	6	34	24.00	$16\frac{1}{2}$



No. 585 TAPER PINS

Taper $\frac{1}{4}$ inch to the foot. If ordering sizes other than those included in the list specify the length and the size at the large end.

For Taper Pin Reamers see pages 143-145.

PRICE PER HUNDRED

No.	00	0	1	2	3	4	5	6	7	8	9	10
Diam. at Large End, Inches	.141	.156	.172	.193	.219	.250	.289	.341	.409	.492	.591	.706
Approx. Frac. Sizes	$\frac{9}{64}$	$\frac{5}{32}$	$\frac{11}{64}$	$\frac{3}{16}$	$\frac{7}{32}$	$\frac{1}{4}$	$\frac{19}{64}$	$\frac{11}{32}$	$\frac{13}{32}$	$\frac{1}{2}$	$\frac{19}{32}$	$\frac{23}{32}$
Length, Inches												
$\frac{1}{2}$	\$1.80	\$1.80	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
$\frac{3}{4}$	1.80	1.80	\$2.00	\$2.10	\$2.30	\$2.50	.....	.....	.....	.....	.....	.....
1	2.05	2.05	2.25	2.35	2.55	2.75	\$3.00	.....	.....	.....	.....	.....
$1\frac{1}{4}$	2.30	2.30	2.50	2.60	2.80	3.00	3.25	\$3.50	.....	.....	.....	.....
$1\frac{1}{2}$	.....	2.55	2.75	2.85	3.05	3.25	3.50	3.75	.....	.....	.....	.....
$1\frac{3}{4}$	.....	.....	3.00	3.10	3.30	3.50	3.75	4.00	.....	.....	.....	.....
2	.....	.....	3.25	3.35	3.55	3.75	4.05	4.35	\$4.75	\$5.80	.....	.....
$2\frac{1}{4}$	.....	.....	.....	3.60	3.80	4.00	4.40	4.75	5.25	6.25	.....	.....
$2\frac{1}{2}$	.....	.....	.....	3.85	4.05	4.25	4.75	5.20	5.75	6.75	.....	.....
$2\frac{3}{4}$	.....	.....	.....	.....	4.30	4.50	5.10	5.70	6.25	7.25	\$9.80	.....
3	.....	.....	.....	.....	4.55	4.75	5.45	6.25	6.75	7.80	10.50	.....
$3\frac{1}{4}$	.....	.....	.....	.....	.....	.....	.....	6.75	7.25	8.40	11.20	.....
$3\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	7.25	7.75	9.00	11.90	\$15.25
$3\frac{3}{4}$	.....	.....	.....	.....	.....	.....	.....	7.75	8.25	9.60	12.60	16.25
4	.....	.....	.....	.....	.....	.....	.....	8.25	8.75	10.20	13.30	17.25
$4\frac{1}{4}$	.....	.....	.....	.....	.....	.....	.....	.....	.....	10.80	14.00	18.25
$4\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	.....	.....	11.40	14.70	19.25
$4\frac{3}{4}$	.....	.....	.....	.....	.....	.....	.....	.....	.....	12.00	15.40	20.25
5	.....	.....	.....	.....	.....	.....	.....	.....	.....	12.60	16.10	21.25
$5\frac{1}{4}$	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	16.80	22.25
$5\frac{1}{2}$	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	17.50	23.25
$5\frac{3}{4}$	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.20	24.25
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.90	25.25

All sizes listed above the heavy line are of suitable length for use with our regular No. 680 Taper Pin Reamers.

All sizes listed below the heavy line require a special reamer having longer flutes than standard.

All sizes and dimensions not listed are special and subject to special prices.

Special attention is called to the fact that our Taper Pins are highly polished and finely finished.

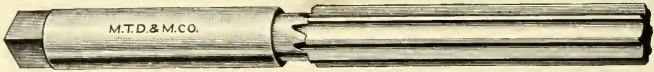
Special Assorted Set of Taper Pins for Automobile Use.

Price and Details on Application.

No. 601
Carbon Steel

JOBBER'S
REAMERS

No. 1601
High Speed Steel



Diam. Inches	Price Each		Whole Length, Inches	Length of Flutes, Inches	Diam. Inches	Price Each		Whole Length, Inches	Length of Flutes, Inches
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel		
1/8	\$1.00		3	1 1/2	3 1/2	\$3.70	\$10.50	10 5/8	5 5/16
5/32	1.20		3 1/4	1 5/8	1	3.70	10.50	10 7/8	5 7/16
3/16	1.20		3 1/2	1 3/4	1 3/2	4.00	11.50	11 1/8	5 9/16
7/32	1.40		3 3/4	1 7/8	1 1/16	4.00	11.50	11 1/4	5 5/8
1/4	1.40	\$3.50	4	2	1 3/2	4.30	12.75	11 1/2	5 3/4
9/32	1.50	3.75	4 1/4	2 1/8	1 1/8	4.30	12.75	11 5/8	5 13/16
5/16	1.50	3.75	4 1/2	2 1/4	1 5/2	4.60	14.25	11 7/8	5 15/16
11/32	1.60	4.25	4 3/4	2 3/8	1 3/16	4.60	14.25	12	6
3/8	1.60	4.25	5	2 1/2	1 3/2	4.90	15.75	12 1/8	6 1/16
13/32	1.75	4.75	5 1/4	2 5/8	1 1/4	4.90	15.75	12 1/4	6 1/8
7/16	1.75	4.75	5 1/2	2 3/4	1 9/32	5.20	17.25	12 3/8	6 3/16
15/32	1.90	5.25	5 3/4	2 7/8	1 5/16	5.20	17.25	12 1/2	6 1/4
1/2	1.90	5.25	6	3	1 11/32	5.60	18.75	12 1/2	6 1/4
17/32	2.00	5.75	6 1/4	3 1/8	1 3/8	5.60	18.75	12 5/8	6 5/16
9/16	2.00	5.75	6 1/2	3 1/4	1 13/32	6.00	20.50	12 5/8	6 5/16
19/32	2.20	6.25	6 3/4	3 3/8	1 7/16	6.00	20.50	12 7/8	6 7/16
5/8	2.20	6.25	7	3 1/2	1 15/2	6.40	22.25	12 7/8	6 7/16
21/32	2.40	6.75	7 3/8	3 11/16	1 1/2	6.40	22.25	13	6 1/2
11/16	2.40	6.75	7 3/4	3 7/8	1 9/16	6.80		13	6 1/2
23/32	2.60	7.25	8 1/8	4 1/16	1 5/8	7.20		13	6 1/2
3/4	2.60	7.25	8 3/8	4 1/16	1 11/16	7.60		13 1/2	6 3/4
25/32	2.80	7.75	8 3/4	4 3/8	1 3/4	8.00		13 1/2	6 3/4
13/16	2.80	7.75	9 1/8	4 9/16	1 13/16	8.40		13 1/2	6 3/4
27/32	3.10	8.50	9 3/8	4 11/16	1 7/8	8.80		14	7
7/8	3.10	8.50	9 3/4	4 7/8	1 15/16	9.20		14	7
29/32	3.40	9.50	10	5	2	9.60		14	7
15/8	3.40	9.50	10 1/4	5 1/8					

64th sizes, 1/8 to 1 inch inclusive, of carbon steel furnished at price of next larger size.

All other 64th sizes at special prices.

For prices of these Reamers per set see page 130.

Jobbers' Reamers with threaded ends and all sizes and dimensions not listed are special and subject to special prices.

Reamers for Brass or Bronze require special clearance and are so furnished on request.

No. 602
Carbon Steel

No. 1602
High Speed Steel

JOBBER'S' REAMERS—WITH SPIRAL FLUTES



Diam., Inches	Price Each		Whole Length, Inches	Length of Flutes, Inches	Diam., Inches	Price Each		Whole Length, Inches	Length of Flutes, Inches
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel		
$\frac{1}{8}$	\$1.20		3	$1\frac{1}{2}$	$\frac{27}{32}$	\$3.70	\$9.35	$9\frac{3}{8}$	$4\frac{11}{16}$
$\frac{5}{32}$	1.45		$3\frac{1}{4}$	$1\frac{5}{8}$	$\frac{7}{8}$	3.70	9.35	$9\frac{3}{4}$	$4\frac{7}{8}$
$\frac{3}{16}$	1.45		$3\frac{1}{2}$	$1\frac{3}{4}$	$\frac{29}{32}$	4.10	10.45	10	5
$\frac{7}{32}$	1.70		$3\frac{3}{4}$	$1\frac{7}{8}$	$\frac{15}{16}$	4.10	10.45	$10\frac{1}{4}$	$5\frac{1}{8}$
$\frac{1}{4}$	1.70	\$3.85	4	2	$\frac{31}{32}$	4.45	11.55	$10\frac{5}{8}$	$5\frac{5}{16}$
$\frac{9}{32}$	1.80	4.15	$4\frac{1}{4}$	$2\frac{1}{8}$	1	4.45	11.55	$10\frac{7}{8}$	$5\frac{7}{16}$
$\frac{5}{16}$	1.80	4.15	$4\frac{1}{2}$	$2\frac{1}{4}$	$1\frac{1}{16}$	4.80	12.65	$11\frac{1}{4}$	$5\frac{3}{8}$
$\frac{11}{32}$	1.90	4.70	$4\frac{3}{4}$	$2\frac{3}{8}$	$1\frac{1}{8}$	5.15	14.00	$11\frac{5}{8}$	$5\frac{13}{16}$
$\frac{3}{8}$	1.90	4.70	5	$2\frac{1}{2}$	$1\frac{3}{16}$	5.50	15.70	12	6
$\frac{13}{32}$	2.10	5.25	$5\frac{1}{4}$	$2\frac{5}{8}$	$1\frac{1}{4}$	5.90	17.35	$12\frac{1}{4}$	$6\frac{1}{8}$
$\frac{7}{16}$	2.10	5.25	$5\frac{1}{2}$	$2\frac{3}{4}$	$1\frac{5}{16}$	6.25	19.00	$12\frac{1}{2}$	$6\frac{1}{4}$
$\frac{15}{32}$	2.30	5.80	$5\frac{3}{4}$	$2\frac{7}{8}$	$1\frac{3}{8}$	6.70	20.65	$12\frac{5}{8}$	$6\frac{5}{16}$
$\frac{1}{2}$	2.30	5.80	6	3	$1\frac{7}{16}$	7.20	22.55	$12\frac{7}{8}$	$6\frac{7}{16}$
$\frac{17}{32}$	2.40	6.35	$6\frac{1}{4}$	$3\frac{1}{8}$	$1\frac{1}{2}$	7.70	24.50	13	$6\frac{1}{2}$
$\frac{9}{16}$	2.40	6.35	$6\frac{1}{2}$	$3\frac{1}{4}$	$1\frac{9}{16}$	8.15		13	$6\frac{1}{2}$
$\frac{19}{32}$	2.65	6.90	$6\frac{3}{4}$	$3\frac{3}{8}$	$1\frac{5}{8}$	8.65		13	$6\frac{1}{2}$
$\frac{5}{8}$	2.65	6.90	7	$3\frac{1}{2}$	$1\frac{11}{16}$	9.10		$13\frac{1}{2}$	$6\frac{3}{4}$
$\frac{21}{32}$	2.90	7.45	$7\frac{3}{8}$	$3\frac{11}{16}$	$1\frac{3}{4}$	9.60		$13\frac{1}{2}$	$6\frac{3}{4}$
$\frac{11}{16}$	2.90	7.45	$7\frac{3}{4}$	$3\frac{7}{8}$	$1\frac{13}{16}$	10.10		$13\frac{1}{2}$	$6\frac{3}{4}$
$\frac{23}{32}$	3.10	8.00	$8\frac{1}{8}$	$4\frac{1}{16}$	$1\frac{7}{8}$	10.55		14	7
$\frac{3}{4}$	3.10	8.00	$8\frac{3}{8}$	$4\frac{3}{16}$	$1\frac{15}{16}$	11.05		14	7
$\frac{25}{32}$	3.35	8.55	$8\frac{3}{4}$	$4\frac{3}{8}$	2	11.50		14	7
$\frac{13}{16}$	3.35	8.55	$9\frac{1}{8}$	$4\frac{9}{16}$					

64th sizes, $\frac{1}{8}$ to $\frac{1}{2}$ inch inclusive, of carbon steel furnished at price of next larger size.

All other 64th sizes at special prices.

Spiral Fluted Jobbers' Reamers with threaded ends and all sizes and dimensions not listed are special and subject to special prices.

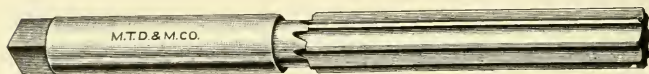
Reamers for Brass or Bronze require special clearance and are so furnished on request.

No. 604
Carbon Steel

No. 1604
High Speed Steel

JOBBER'S' REAMERS

MILLIMETER SIZES



Diam., M. M.	Price Each		Whole Length, M. M.	Length of Flutes, M. M.	Diam., M. M.	Price Each		Whole Length, M. M.	Length of Flutes, M. M.
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel		
3	\$1.00		76	38	23	\$3.40	\$9.50	254	127
3.5	1.20		83	41	24	3.70	10.50	270	135
4	1.20		83	41	25	3.70	10.50	276	138
4.5	1.20		89	44	26	4.00	11.50	283	141
5	1.40		95	48	27	4.00	11.50	286	143
5.5	1.40		95	48	28	4.30	12.75	295	148
6	1.40		102	51	29	4.60	14.25	302	151
6.5	1.50	\$3.75	102	51	30	4.60	14.25	305	152
7	1.50	3.75	108	54	31	4.90	15.75	308	154
7.5	1.50	3.75	114	57	32	5.20	17.25	311	156
8	1.60	4.25	114	57	33	5.20	17.25	317	159
8.5	1.60	4.25	121	60	34	5.60	18.75	317	159
9	1.60	4.25	127	63	35	6.00	20.50	321	160
9.5	1.60	4.25	127	63	36	6.00	20.50	327	164
10	1.75	4.75	133	67	37	6.40	22.25	327	164
10.5	1.75	4.75	133	67	38	6.40	22.25	330	165
11	1.75	4.75	140	70	39	6.80		330	165
11.5	1.90	5.25	146	73	40	7.20		330	165
12	1.90	5.25	146	73	41	7.20		330	165
13	2.00	5.75	159	79	42	7.60		330	165
14	2.00	5.75	165	83	43	8.00		343	171
15	2.20	6.25	171	86	44	8.00		343	171
16	2.40	6.75	178	89	45	8.40		343	171
17	2.40	6.75	197	98	46	8.40		343	171
18	2.60	7.25	206	103	47	8.80		356	178
19	2.60	7.25	213	106	48	9.20		356	178
20	2.80	7.75	222	111	49	9.20		356	178
21	3.10	8.50	238	119	50	9.60		356	178
22	3.10	8.50	248	124					

Reamers for Brass or Bronze require special clearance and are so furnished on request.

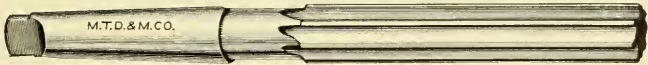
Jobbers' Reamers in M. M. sizes with spiral flutes or threaded ends and all sizes and dimensions not listed are special and subject to special prices.

No. 617
Carbon Steel

No. 1617
High Speed Steel

JOBBER'S' REAMERS

WITH MORSE TAPER SHANKS



Diam., Inches	Price Each		Whole Length, Inches	Length of Flutes, Inches	Morse Taper Shank	Diam., Inches	Price Each		Whole Length, Inches	Length of Flutes, Inches	Morse Taper Shank
	Carbon Steel	High Speed Steel					Carbon Steel	High Speed Steel			
1/4	\$1.70	\$4.00	5 3/16	2	No. 1	5/8	\$2.65	\$6.75	7 9/16	3 1/2	No. 2
17/64	1.80	4.25	5 5/16	2 1/8		21/32	2.90	7.25	7 3/4	3 11/16	
9/32	1.80	4.25	5 5/16	2 1/8		11/16	2.90	7.25	8	3 7/8	
19/64	1.80	4.25	5 1/2	2 1/4		23/32	3.10	7.75	8 3/16	4 1/16	
5/16	1.80	4.25	5 1/2	2 1/4		3/4	3.10	7.75	8 3/8	4 3/16	
21/64	1.90	4.75	5 5/8	2 3/8		25/32	3.35	8.50	8 9/16	4 3/8	
11/32	1.90	4.75	5 5/8	2 3/8		13/16	3.35	8.50	8 13/16	4 9/16	
23/64	1.90	4.75	5 13/16	2 1/2		27/32	3.70	9.50	8 15/16	4 11/16	
3/8	1.90	4.75	5 13/16	2 1/2		7/8	3.70	9.50	9 3/16	4 7/8	
25/64	2.15	5.25	5 15/16	2 5/8		29/32	4.10	10.50	9 5/16	5	
13/32	2.15	5.25	5 15/16	2 5/8		No. 3	15/16	4.10	10.50	10 3/16	5 1/8
27/64	2.15	5.25	6 1/8	2 3/4			31/32	4.45	11.50	10 3/8	5 5/16
7/16	2.15	5.25	6 1/8	2 3/4			1	4.45	11.50	10 9/16	5 7/16
29/64	2.30	5.75	6 1/4	2 7/8			1 1/16	4.80	12.50	10 13/16	5 5/8
15/32	2.30	5.75	6 1/4	2 7/8			1 1/8	5.15	13.75	11 1/16	5 13/16
31/64	2.30	5.75	6 7/16	3			1 3/16	5.50	15.25	11 5/16	6
1/2	2.30	5.75	6 7/16	3	No. 4		1 1/4	5.90	16.75	12 1/2	6 1/8
17/32	2.40	6.25	6 9/16	3 1/8			1 5/16	6.25	18.25	12 11/16	6 1/4
9/16	2.40	6.25	6 3/4	3 1/4		1 3/8	6.70	19.75	12 13/16	6 5/16	
19/32	2.65	6.75	6 7/8	3 3/8		1 7/16	7.20	21.50	13	6 7/16	
						1 1/2	7.70	23.25	13 3/8	6 1/2	

Flutes are slightly tapered on end.

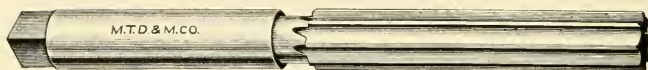
Taper Shank Jobbers' Reamers with threaded ends or spiral flutes and all sizes and dimensions not listed are special and subject to special prices.

Reamers for Brass or Bronze require special clearance and are so furnished on request.

SETS OF REAMERS IN CASES

No. 601

JOBBER'S' REAMERS



Set, $\frac{1}{4}$ to 1 inch in diameter, by 16ths	\$38.50
Set, $\frac{1}{4}$ to $1\frac{1}{4}$ inches in diameter, by 16ths	58.25
Set, $\frac{1}{4}$ to $1\frac{1}{2}$ inches in diameter, by 16ths	82.00
Set, $\frac{1}{4}$ to 2 inches in diameter, by 16ths	154.00
Set, $\frac{1}{4}$ to 1 inch in diameter, by 32nds	68.75
Set, $\frac{1}{4}$ to $1\frac{1}{4}$ inches in diameter, by 32nds	112.25
Set, $\frac{1}{4}$ to $1\frac{1}{2}$ inches in diameter, by 32nds	164.75

For lengths and list prices see page 126.

No. 636

MORSE TAPER REAMERS



Set of No. 636 Reamers consisting of 1 each, Nos. 1, 2, 3, 4, 5	\$25.00
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For lengths and list prices see page 136.

No. 692

BIT STOCK TAPER REAMERS



Set of No. 692 Reamers consisting of 1 each, $\frac{1}{4}$ to $\frac{1}{2}$ by 16ths	\$4.00
Set of No. 692 Reamers consisting of 1 each, $\frac{1}{4}$ to $\frac{3}{4}$ by 16ths	8.50

For lengths and list prices see page 148.

No. 680

TAPER-PIN REAMERS



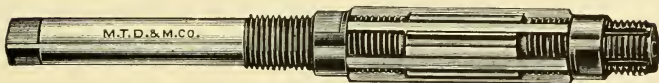
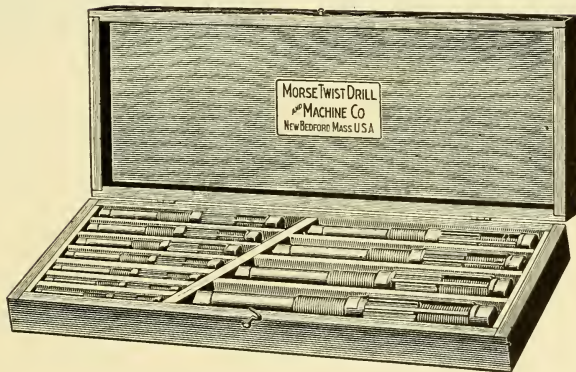
Set of No. 680 Reamers consisting of 1 each:	
Nos. 00 to 5 inclusive	\$13.25
Nos. 0 to 5 inclusive	11.75
Nos. 0 to 10 inclusive	28.50

For lengths and list prices see page 143.

SETS OF REAMERS IN CASES

No. 728

ADJUSTABLE REAMERS



A to H inclusive, in case.	Per set	\$41.50
A to K inclusive, in case.	Per set	67.00

These Reamers will be furnished ground for brass or bronze unless otherwise specified.

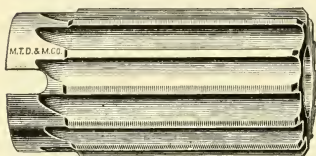
For length and list prices see page 165.

No. 625 Carbon Steel
No. 1625 High Speed Steel

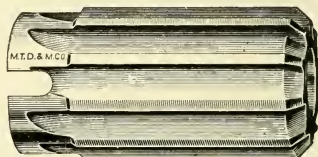
No. 626 Carbon Steel
No. 1626 High Speed Steel

SHELL REAMERS

SHELL REAMER



ROSE SHELL REAMER



Diam., Inches	Price Each		Whole Length, Inches	Size Hole, Inches	Diam., Inches	Price Each		Whole Length, Inches	Size Hole, Inches
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel		
1/2	\$1.70	\$3.25	2	1/4	1 5/32	\$3.10	\$5.50	2 3/4	5/8
17/32	1.80	3.40	2	1/4	1 3/16	3.10	5.50	2 3/4	5/8
9/16	1.80	3.40	2	1/4	1 7/32	3.30	5.75	2 3/4	5/8
19/32	1.90	3.55	2	1/4	1 1/4	3.30	5.75	2 3/4	5/8
5/8	1.90	3.55	2	1/4	1 9/32	3.55	6.00	2 3/4	5/8
21/32	2.00	3.70	2 1/4	3/8	1 5/16	3.55	6.00	3	3/4
11/16	2.00	3.70	2 1/4	3/8	1 3/32	3.80	6.50	3	3/4
23/32	2.10	3.85	2 1/4	3/8	1 3/8	3.80	6.50	3	3/4
3/4	2.10	3.85	2 1/4	3/8	1 3/32	4.05	7.00	3	3/4
25/32	2.20	4.00	2 1/4	3/8	1 7/16	4.05	7.00	3	3/4
13/16	2.20	4.00	2 1/2	1/2	1 15/32	4.30	7.50	3	3/4
27/32	2.30	4.25	2 1/2	1/2	1 1/2	4.30	7.50	3	3/4
7/8	2.30	4.25	2 1/2	1/2	1 9/16	4.55	8.25	3	3/4
29/32	2.40	4.50	2 1/2	1/2	1 5/8	4.80	9.00	3	3/4
15/16	2.40	4.50	2 1/2	1/2	1 11/16	5.10	9.75	3 1/2	1
31/32	2.50	4.75	2 1/2	1/2	1 3/4	5.40	10.50	3 1/2	1
1	2.50	4.75	2 1/2	1/2	1 13/16	5.70	11.25	3 1/2	1
1 1/32	2.70	5.00	2 1/2	1/2	1 7/8	6.00	12.00	3 1/2	1
1 1/16	2.70	5.00	2 3/4	5/8	1 15/16	6.30	12.75	3 1/2	1
1 3/32	2.90	5.25	2 3/4	5/8	2	6.60	13.50	3 1/2	1
1 1/8	2.90	5.25	2 3/4	5/8	2 1/16	6.95	14.25	3 3/4	1 1/4

Shell Reamers have taper holes, the diameter given being at the large end.

For Arbors fitting these Reamers see pages 113 and 118.

Reamers style 626 have no radial clearance but are ground with a longitudinal clearance. Keep cutting points sharp.

Reamers for Brass or Bronze require special clearance and are so furnished on request.

All sizes and dimensions not listed are special and subject to special prices.

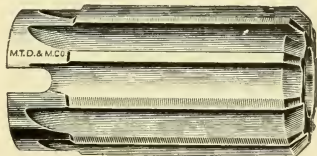
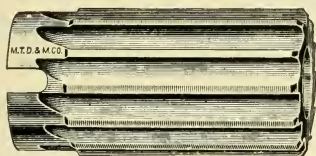
No. 625 Carbon Steel
No. 1625 High Speed Steel

No. 626 Carbon Steel
No. 1626 High Speed Steel

SHELL REAMERS

SHELL REAMER

ROSE SHELL REAMER



Diam., Inches	Price Each		Whole Length, Inches	Size Hole, Inches	Diam., Inches	Price Each		Whole Length, Inches	Size Hole, Inches
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel		
2 1/8	\$7.30	\$15.00	3 3/4	1 1/4	3 3/8	\$15.60	\$42.50	4 1/2	1 3/4
2 3/16	7.65	15.75	3 3/4	1 1/4	3 7/16	16.10	45.25	4 1/2	1 3/4
2 1/4	8.00	16.50	3 3/4	1 1/4	3 1/2	16.60	48.00	4 1/2	1 3/4
2 5/16	8.35	17.25	3 3/4	1 1/4	3 9/16	17.20	50.75	5	2
2 3/8	8.70	18.00	3 3/4	1 1/4	3 5/8	17.80	53.50	5	2
2 7/16	9.05	18.75	3 3/4	1 1/4	3 11/16	18.40	56.50	5	2
2 1/2	9.40	19.50	3 3/4	1 1/4	3 3/4	19.00	59.50	5	2
2 9/16	9.80	20.50	4	1 1/2	3 13/16	19.60	62.75	5	2
2 5/8	10.20	21.75	4	1 1/2	3 7/8	20.20	66.00	5	2
2 11/16	10.60	23.00	4	1 1/2	3 15/16	20.80	69.25	5	2
2 3/4	11.00	24.25	4	1 1/2	4	21.40	72.50	5	2
2 13/16	11.40	25.50	4	1 1/2	4 1/8	22.90	79.00	5 1/2	2 1/4
2 7/8	11.80	27.00	4	1 1/2	4 1/4	24.40	85.50	5 1/2	2 1/4
2 15/16	12.20	28.50	4	1 1/2	4 3/8	25.90	92.00	5 1/2	2 1/4
3	12.60	30.00	4	1 1/2	4 1/2	27.40	98.50	5 1/2	2 1/4
3 1/16	13.10	31.50	4 1/2	1 3/4	4 5/8	29.30	105.00	6	2 1/2
3 1/8	13.60	33.25	4 1/2	1 3/4	4 3/4	31.20	111.50	6	2 1/2
3 3/16	14.10	35.25	4 1/2	1 3/4	4 7/8	33.10	118.00	6	2 1/2
3 1/4	14.60	37.50	4 1/2	1 3/4	5	35.00	125.00	6	2 1/2
3 5/16	15.10	40.00	4 1/2	1 3/4					

Shell Reamers have taper holes, the diameter given being at the large end.

For Arbors fitting these Reamers see pages 113 and 118.

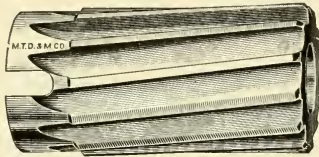
Reamers Style 626 have no radial clearance but are ground with a longitudinal clearance. Keep cutting points sharp.

Reamers for Brass or Bronze require special clearance and are so furnished on request.

All sizes and dimensions not listed are special and subject to special prices.

No. 627
Carbon Steel

No. 1627
High Speed Steel



SHELL REAMERS

WITH SPIRAL FLUTES

Diam., Inches	Price Each		Whole Length, Inches	Size Hole, Inches	Diam., Inches	Price Each		Whole Length, Inches	Size Hole, Inches
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel		
1/2	\$2.05	\$3.60	2	1/4	1 13/32	\$4.85	\$7.70	3	3/4
1 1/32	2.15	3.75	2	1/4	1 7/16	4.85	7.70	3	3/4
1 9/16	2.15	3.75	2	1/4	1 15/32	5.15	8.25	3	3/4
1 3/32	2.30	3.90	2	1/4	1 1/2	5.15	8.25	3	3/4
5/8	2.30	3.90	2	1/4	1 9/16	5.45	9.10	3	3/4
21/32	2.40	4.05	2 1/4	3/8	1 5/8	5.75	9.90	3	3/4
1 1/16	2.40	4.05	2 1/4	3/8	1 11/16	6.10	10.75	3 1/2	1
1 3/32	2.50	4.25	2 1/4	3/8	1 3/4	6.50	11.55	3 1/2	1
3/4	2.50	4.25	2 1/4	3/8	1 13/16	6.85	12.40	3 1/2	1
25/32	2.65	4.40	2 1/4	3/8	1 7/8	7.20	13.20	3 1/2	1
1 1/16	2.65	4.40	2 1/2	1/2	1 15/16	7.55	14.05	3 1/2	1
1 1/2	2.75	4.70	2 1/2	1/2	2	7.90	14.85	3 1/2	1
7/8	2.75	4.70	2 1/2	1/2	2 1/16	8.35	15.70	3 3/4	1 1/4
29/32	2.90	4.95	2 1/2	1/2	2 1/8	8.75	16.50	3 3/4	1 1/4
1 1/16	2.90	4.95	2 1/2	1/2	2 3/16	9.20	17.35	3 3/4	1 1/4
1 1/32	3.00	5.25	2 1/2	1/2	2 1/4	9.60	18.15	3 3/4	1 1/4
1	3.00	5.25	2 1/2	1/2	2 5/16	10.00	19.00	3 3/4	1 1/4
1 1/32	3.25	5.50	2 1/2	1/2	2 3/8	10.45	19.80	3 3/4	1 1/4
1 1/16	3.25	5.50	2 3/4	5/8	2 7/16	10.85	20.65	3 3/4	1 1/4
1 3/32	3.50	5.80	2 3/4	5/8	2 1/2	11.30	21.45	3 3/4	1 1/4
1 1/8	3.50	5.80	2 3/4	5/8	2 9/16	11.75	22.55	4	1 1/2
1 5/32	3.70	6.05	2 3/4	5/8	2 5/8	12.25	23.95	4	1 1/2
1 3/16	3.70	6.05	2 3/4	5/8	2 11/16	12.70	25.30	4	1 1/2
1 7/32	3.95	6.35	2 3/4	5/8	2 3/4	13.20	26.70	4	1 1/2
1 1/4	3.95	6.35	2 3/4	5/8	2 13/16	13.70	28.05	4	1 1/2
1 9/32	4.25	6.60	2 3/4	5/8	2 7/8	14.15	29.70	4	1 1/2
1 5/16	4.25	6.60	3	3/4	2 15/16	14.65	31.35	4	1 1/2
1 3/8	4.55	7.15	3	3/4	3	15.10	33.00	4	1 1/2

Shell Reamers with spiral flutes have taper holes, the diameter given being at the large end.

For Arbors fitting these Reamers see pages 113 and 118.

Reamers for Brass or Bronze require special clearance and are so furnished on request.

All sizes and dimensions not listed are special and subject to special prices.

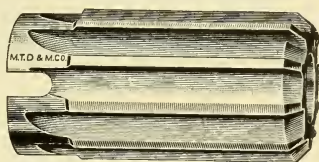
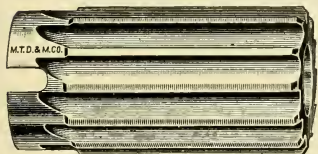
No. 628 Carbon Steel
No. 1628 High Speed Steel

No. 629 Carbon Steel
No. 1629 High Speed Steel

SHELL REAMERS—MILLIMETER SIZES

SHELL REAMER

ROSE SHELL REAMER



Diam., M. M.	Price Each		Whole Length, M. M.	Fitting Arbor, No.	Diam., M. M.	Price Each		Whole Length, M. M.	Fitting Arbor, No.
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel		
13	\$1.80	\$3.40	51	3	45	\$5.70	\$11.25	89	8
14	1.80	3.40	51	3	46	5.70	11.25	89	8
15	1.90	3.55	51	3	47	6.00	12.00	89	8
16	2.00	3.70	51	3	48	6.30	12.75	89	8
17	2.00	3.70	57	4	49	6.30	12.75	89	8
18	2.10	3.85	57	4	50	6.60	13.50	89	8
19	2.10	3.85	57	4	51	6.95	14.25	89	8
20	2.20	4.00	57	4	52	6.95	14.25	95	9
21	2.30	4.25	63	5	53	7.30	15.00	95	9
22	2.30	4.25	63	5	54	7.65	15.75	95	9
23	2.40	4.50	63	5	55	7.65	15.75	95	9
24	2.50	4.75	63	5	56	8.00	16.50	95	9
25	2.50	4.75	63	5	57	8.00	16.50	95	9
26	2.70	5.00	63	5	58	8.35	17.25	95	9
27	2.70	5.00	70	6	59	8.70	18.00	95	9
28	2.90	5.25	70	6	60	8.70	18.00	95	9
29	3.10	5.50	70	6	61	9.05	18.75	95	9
30	3.10	5.50	70	6	62	9.40	19.50	95	9
31	3.30	5.75	70	6	63	9.40	19.50	95	9
32	3.55	6.00	70	6	64	9.80	20.50	95	9
33	3.55	6.00	76	7	65	9.80	20.50	102	10
34	3.80	6.50	76	7	66	10.20	21.75	102	10
35	4.05	7.00	76	7	67	10.60	23.00	102	10
36	4.05	7.00	76	7	68	10.60	23.00	102	10
37	4.30	7.50	76	7	69	11.00	24.25	102	10
38	4.30	7.50	76	7	70	11.40	25.50	102	10
39	4.55	8.25	76	7	71	11.40	25.50	102	10
40	4.80	9.00	76	7	72	11.80	27.00	102	10
41	4.80	9.00	76	7	73	11.80	27.00	102	10
42	5.10	9.75	76	7	74	12.20	28.50	102	10
43	5.40	10.50	89	8	75	12.60	30.00	102	10
44	5.40	10.50	89	8					

Shell Reamers have taper holes.

For Arbors fitting these Reamers see pages 113 and 118.

Reamers Style 629 have no radial clearance but are ground with a longitudinal clearance. Keep cutting points sharp.

Reamers for Brass or Bronze require special clearance and are so furnished on request. These Reamers with spiral flutes and all sizes and dimensions not listed are special and subject to special prices.

MORSE TAPER REAMERS

No. 636

FINISHING REAMER



No. 637

ROUGHING REAMER



No. of Taper	Price Each		Whole Length, Inches	Length of Flutes, Inches	Size of Finishing Reamer	
	Finishing No. 636	Roughing No. 637			Large End	Small End
0	\$1.60	\$1.90	3 $\frac{3}{4}$	2 $\frac{1}{4}$	.367	.250
1	2.00	2.40	5 $\frac{1}{2}$	3	.517	.367
2	2.60	3.10	7	3 $\frac{1}{2}$	.745	.569
3	3.40	4.10	8	4 $\frac{1}{4}$	.988	.775
4	4.20	5.05	9	5 $\frac{1}{4}$	1.289	1.017
5	6.60	7.90	10	6 $\frac{1}{4}$	1.799	1.471
6	12.00	14.40	12	8 $\frac{1}{2}$	2.555	2.112

Morse Taper Reamers larger than No. 1 can be made with oil holes, as illustrated in Three-Groove Chucking Reamers, page 157, at special prices.
Reamers for Short Shanks made to order. Prices quoted on application.
For Set of Morse Taper Reamers see page 130.

TAPER ROUGHING AND FINISHING REAMERS OF SPECIAL DIMENSIONS

No. 638

FINISHING REAMER



No. 639

ROUGHING REAMER



When ordering above give diameter at large and small ends, whole length, length of flutes and taper per foot required.

Prices quoted on application.

Reamers for Brass or Bronze require special clearance and are so furnished on request.

MORSE TAPER REAMERS

WITH MORSE TAPER SHANKS

No. 640

FINISHING REAMER



No. 641

ROUGHING REAMER



No. of Taper	Price Each		Whole Length, Inches	Length of Flutes, Inches	Size of Finishing Reamer		Morse Taper Shank No.
	Finishing No. 640	Roughing No. 641			Large End	Small End	
0	\$2.65	\$3.20	5 $\frac{11}{32}$	2 $\frac{1}{4}$	.367	.250	0
1	2.95	3.55	6 $\frac{5}{16}$	3	.517	.367	1
2	3.25	3.90	7 $\frac{3}{8}$	3 $\frac{1}{2}$	.745	.569	2
3	4.45	5.35	8 $\frac{7}{8}$	4 $\frac{1}{4}$	.988	.775	3
4	6.00	7.20	10 $\frac{7}{8}$	5 $\frac{1}{4}$	1.289	1.017	4
5	10.10	12.10	13 $\frac{1}{8}$	6 $\frac{1}{4}$	1.799	1.471	5
6	21.35	25.60	17 $\frac{13}{16}$	8 $\frac{1}{2}$	2.555	2.112	6

Morse Taper Reamers, larger than No. 1, can be made with oil holes, as illustrated in Three-Groove Chucking Reamers, page 157.

Reamers for Short Shanks made to order.

Prices quoted on application.

No. 642

MORSE TAPER REAMERS

WITH TAPER SQUARE SHANKS

FITTING RATCHETS



No. of Taper	Price Each	Whole Length, Inches	Length of Flutes, Inches	Diameter of Flutes		Size of Shank, Inches
				Large End	Small End	
3	\$3.40	6 $\frac{3}{4}$	4 $\frac{1}{4}$	.988	.775	1/2x3/4x13/4

Used by Street Railways in Bonding Work.

Reamers for Brass or Bronze require special clearance and are so furnished on request.

TAPER REAMERS

BROWN & SHARPE STANDARD

No. 643

FINISHING REAMER



No. 644

ROUGHING REAMER



Number of Taper	Price Each		Whole Length, Inches	Length of Flutes, Inches
	Finishing No. 643	Roughing No. 644		
1	\$1.75	\$2.10	4 $\frac{3}{4}$	2 $\frac{7}{8}$
2	2.00	2.40	5 $\frac{1}{8}$	3 $\frac{1}{8}$
3	2.25	2.70	5 $\frac{1}{2}$	3 $\frac{3}{8}$
4	2.50	3.00	5 $\frac{7}{8}$	3 $\frac{11}{16}$
5	3.00	3.60	6 $\frac{3}{8}$	4
6	3.25	3.90	6 $\frac{7}{8}$	4 $\frac{3}{8}$
7	3.50	4.20	7 $\frac{1}{2}$	4 $\frac{7}{8}$
8	3.75	4.50	8 $\frac{1}{8}$	5 $\frac{1}{2}$
9	4.00	4.80	8 $\frac{7}{8}$	6 $\frac{1}{8}$
10	5.00	6.00	9 $\frac{3}{4}$	6 $\frac{7}{8}$
11	6.00	7.20	10 $\frac{5}{8}$	7 $\frac{5}{8}$
12	8.00	9.60	11 $\frac{3}{8}$	8 $\frac{1}{4}$

Reamers for Brass or Bronze require special clearance and are so furnished on request.

No. 655
Carbon Steel

No. 1655
High Speed Steel

FLUTED CHUCKING REAMERS

WITH STRAIGHT SHANKS



Diam., Inches	Price Each		Whole Length, Inches	Length of Flutes, Inches	Diam., Inches	Price Each		Whole Length, Inches	Length of Flutes, Inches
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel		
$\frac{1}{8}$	\$.90	\$2.00	$3\frac{1}{2}$	$\frac{7}{8}$	$\frac{25}{32}$	\$2.80	\$7.25	$9\frac{1}{2}$	$2\frac{1}{2}$
$\frac{5}{32}$	1.00	2.50	4	1	$\frac{13}{16}$	2.80	7.25	$9\frac{1}{2}$	$2\frac{1}{2}$
$\frac{3}{16}$	1.00	2.50	$4\frac{1}{2}$	$1\frac{1}{8}$	$\frac{27}{32}$	3.00	8.00	$9\frac{1}{2}$	$2\frac{1}{2}$
$\frac{7}{32}$	1.20	3.00	5	$1\frac{1}{4}$	$\frac{7}{8}$	3.00	8.00	10	$2\frac{5}{8}$
$\frac{1}{4}$	1.20	3.00	6	$1\frac{1}{2}$	$\frac{29}{32}$	3.25	9.00	10	$2\frac{5}{8}$
$\frac{9}{32}$	1.30	3.25	6	$1\frac{1}{2}$	$\frac{15}{16}$	3.25	9.00	10	$2\frac{5}{8}$
$\frac{5}{16}$	1.30	3.25	6	$1\frac{1}{2}$	$\frac{31}{32}$	3.45	10.00	10	$2\frac{5}{8}$
$\frac{11}{32}$	1.45	3.75	6	$1\frac{1}{2}$	1	3.45	10.00	$10\frac{1}{2}$	$2\frac{3}{4}$
$\frac{3}{8}$	1.45	3.75	7	$1\frac{3}{4}$	$1\frac{1}{32}$	3.70	11.25	$10\frac{1}{2}$	$2\frac{3}{4}$
$\frac{13}{32}$	1.60	4.25	7	$1\frac{3}{4}$	$1\frac{1}{16}$	3.70	11.25	$10\frac{1}{2}$	$2\frac{3}{4}$
$\frac{7}{16}$	1.60	4.25	7	$1\frac{3}{4}$	$1\frac{3}{32}$	3.90	12.50	$10\frac{1}{2}$	$2\frac{3}{4}$
$\frac{15}{32}$	1.80	4.75	7	$1\frac{3}{4}$	$1\frac{1}{8}$	3.90	12.50	11	$2\frac{7}{8}$
$\frac{1}{2}$	1.80	4.75	8	2	$1\frac{5}{32}$	4.15	13.75	11	$2\frac{7}{8}$
$\frac{17}{32}$	2.00	5.25	8	2	$1\frac{3}{16}$	4.15	13.75	11	$2\frac{7}{8}$
$\frac{9}{16}$	2.00	5.25	8	2	$1\frac{7}{32}$	4.35	15.25	11	$2\frac{7}{8}$
$\frac{19}{32}$	2.25	5.75	8	2	$1\frac{1}{4}$	4.35	15.25	$11\frac{1}{2}$	3
$\frac{5}{8}$	2.25	5.75	9	$2\frac{1}{4}$	$1\frac{5}{16}$	4.60	17.00	$11\frac{1}{2}$	3
$\frac{21}{32}$	2.40	6.25	9	$2\frac{1}{4}$	$1\frac{3}{8}$	4.80	18.75	12	$3\frac{1}{4}$
$\frac{11}{16}$	2.40	6.25	9	$2\frac{1}{4}$	$1\frac{7}{16}$	5.05	20.50	12	$3\frac{1}{4}$
$\frac{23}{32}$	2.55	6.75	9	$2\frac{1}{4}$	$1\frac{1}{2}$	5.25	22.25	$12\frac{1}{2}$	$3\frac{1}{2}$
$\frac{3}{4}$	2.55	6.75	$9\frac{1}{2}$	$2\frac{1}{2}$					

Reamers for Brass or Bronze require special clearance and are so furnished on request.

All sizes and dimensions not listed are special and subject to special prices.

No. 656
Carbon Steel

No. 1656
High Speed Steel

FLUTED CHUCKING REAMERS

WITH MORSE TAPER SHANKS



Diam., Inches	Price Each		Whole Length, Inches	Length of Flutes, Inches	Morse Taper Shank	Diam., Inches	Price Each		Whole Length, Inches	Length of Flutes, Inches	Morse Taper Shank	
	Carbon Steel	High Speed Steel					Carbon Steel	High Speed Steel				
1/4	\$1.45	\$3.50	6	1 1/2	No. 1	15/16	\$3.90	\$10.00	10	25/8	No. 3	
9/32	1.55	3.75	6	1 1/2		31/2	4.15	11.00	10	25/8		
5/16	1.55	3.75	6	1 1/2		1	4.15	11.00	10 1/2	23/4		
11/32	1.75	4.25	6	1 1/2		1 1/32	4.45	12.25	10 1/2	23/4		
3/8	1.75	4.25	7	1 3/4		1 1/16	4.45	12.25	10 1/2	23/4		
13/32	1.90	4.75	7	1 3/4		1 3/32	4.70	13.50	10 1/2	23/4		
7/16	1.90	4.75	7	1 3/4		1 1/8	4.70	13.50	11	27/8		
15/32	2.15	5.25	7	1 3/4		1 5/32	5.00	14.75	11	27/8		
1/2	2.15	5.25	8	2		1 3/16	5.00	14.75	11	27/8		
17/32	2.40	5.75	8	2		1 7/32	5.20	16.25	11	27/8		
9/16	2.40	5.75	8	2								
19/32	2.70	6.25	8	2								
5/8	2.70	6.25	9	2 1/4		1 1/4	5.20	16.25	11 1/2	3		No. 4
21/32	2.90	6.75	9	2 1/4		1 5/16	5.50	18.00	11 1/2	3		
11/16	2.90	6.75	9	2 1/4		1 3/8	5.75	19.75	12	3 1/4		
23/32	3.05	7.25	9	2 1/4	1 7/16	6.05	21.50	12	3 1/4			
3/4	3.05	7.25	9 1/2	2 1/2	1 1/2	6.30	23.25	12 1/2	3 1/2			
25/32	3.35	8.00	9 1/2	2 1/2								
13/16	3.35	8.00	9 1/2	2 1/2								
27/32	3.60	9.00	9 1/2	2 1/2								
7/8	3.60	9.00	10	2 5/8								
29/32	3.90	10.00	10	2 5/8								

Reamers for Brass or Bronze require special clearance and are so furnished on request.

Sizes and dimensions not listed are special and subject to special prices.

No. 662
Carbon Steel

No. 1662
High Speed Steel

ROSE CHUCKING REAMERS

WITH STRAIGHT SHANKS



Diam., Inches	Price Each		Whole Length, Inches	Length of Flutes, Inches	Diam., Inches	Price Each		Whole Length, Inches	Length of Flutes, Inches
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel		
1/8	\$.90	\$2.00	3 1/2	7/8	25/32	\$2.80	\$7.25	9 1/2	2 1/2
5/32	1.00	2.50	4	1	13/16	2.80	7.25	9 1/2	2 1/2
3/16	1.00	2.50	4 1/2	1 1/8	27/32	3.00	8.00	9 1/2	2 1/2
7/32	1.20	3.00	5	1 1/4	7/8	3.00	8.00	10	2 5/8
1/4	1.20	3.00	6	1 1/2	29/32	3.25	9.00	10	2 5/8
9/32	1.30	3.25	6	1 1/2	15/16	3.25	9.00	10	2 5/8
5/16	1.30	3.25	6	1 1/2	31/32	3.45	10.00	10	2 5/8
11/32	1.45	3.75	6	1 1/2	1	3.45	10.00	10 1/2	2 3/4
3/8	1.45	3.75	7	1 3/4	1 1/32	3.70	11.25	10 1/2	2 3/4
13/32	1.60	4.25	7	1 3/4	1 1/16	3.70	11.25	10 1/2	2 3/4
7/16	1.60	4.25	7	1 3/4	1 3/32	3.90	12.50	10 1/2	2 3/4
15/32	1.80	4.75	7	1 3/4	1 1/8	3.90	12.50	11	2 7/8
1/2	1.80	4.75	8	2	1 5/32	4.15	13.75	11	2 7/8
17/32	2.00	5.25	8	2	1 3/16	4.15	13.75	11	2 7/8
9/16	2.00	5.25	8	2	1 7/32	4.35	15.25	11	2 7/8
19/32	2.25	5.75	8	2	1 1/4	4.35	15.25	11 1/2	3
5/8	2.25	5.75	9	2 1/4	1 5/16	4.60	17.00	11 1/2	3
21/32	2.40	6.25	9	2 1/4	1 3/8	4.80	18.75	12	3 1/4
11/16	2.40	6.25	9	2 1/4	1 7/16	5.05	20.50	12	3 1/4
23/32	2.55	6.75	9	2 1/4	1 1/2	5.25	22.25	12 1/2	3 1/2
3/4	2.55	6.75	9 1/2	2 1/2					

These Reamers have no radial clearance but are ground with a longitudinal clearance. Keep cutting points sharp.

All sizes and dimensions not listed are special and subject to special prices.

No. 663
Carbon Steel

No. 1663
High Speed Steel

ROSE CHUCKING REAMERS

WITH MORSE TAPER SHANKS



Diam., Inches	Price Each		Whole Length, Inches	Length of Flutes, Inches	Morse Taper Shank	Diam., Inches	Price Each		Whole Length, Inches	Length of Flutes, Inches	Morse Taper Shank	
	Carbon Steel	High Speed Steel					Carbon Steel	High Speed Steel				
1/4	\$1.45	\$3.50	6	1 1/2	No. 1	1 5/16	\$3.90	\$10.00	10	2 5/8	No. 3	
3/8	1.55	3.75	6	1 1/2		3 3/2	4.15	11.00	10	2 5/8		
5/16	1.55	3.75	6	1 1/2		1	4.15	11.00	10 1/2	2 3/4		
11/32	1.75	4.25	6	1 1/2		1 3/2	4.45	12.25	10 1/2	2 3/4		
3/8	1.75	4.25	7	1 3/4		1 1/16	4.45	12.25	10 1/2	2 3/4		
13/32	1.90	4.75	7	1 3/4		1 3/2	4.70	13.50	10 1/2	2 3/4		
7/16	1.90	4.75	7	1 3/4		1 1/8	4.70	13.50	11	2 7/8		
15/32	2.15	5.25	7	1 3/4		1 5/2	5.00	14.75	11	2 7/8		
1/2	2.15	5.25	8	2		1 3/16	5.00	14.75	11	2 7/8		
17/32	2.40	5.75	8	2		1 3/2	5.20	16.25	11	2 7/8		
9/16	2.40	5.75	8	2								
19/32	2.70	6.25	8	2								
5/8	2.70	6.25	9	2 1/4		No. 2	1 1/4	5.20	16.25	11 1/2		3	No. 4
21/32	2.90	6.75	9	2 1/4	1 5/16		5.50	18.00	11 1/2	3		
11/16	2.90	6.75	9	2 1/4	1 3/8		5.75	19.75	12	3 1/4		
23/32	3.05	7.25	9	2 1/4	1 7/16		6.05	21.50	12	3 1/4		
3/4	3.05	7.25	9 1/2	2 1/2	1 1/2		6.30	23.25	12 1/2	3 1/2		
25/32	3.35	8.00	9 1/2	2 1/2								
13/16	3.35	8.00	9 1/2	2 1/2								
27/32	3.60	9.00	9 1/2	2 1/2								
7/8	3.60	9.00	10	2 5/8								
29/32	3.90	10.00	10	2 5/8								

These Reamers have no radial clearance but are ground with a longitudinal clearance. Keep cutting points sharp.

All sizes and dimensions not listed are special and subject to special prices.

No. 680
Carbon Steel

No. 1680
High Speed Steel

TAPER-PIN REAMERS

TAPER $\frac{1}{4}$ INCH PER FOOT

Size Number	Price Each		Diameter at Small End, Inches	Whole Length, Inches	Length of Flutes, Inches
	Carbon Steel	High Speed Steel			
000	\$1.50		.101	2	$1\frac{3}{8}$
00	1.35		.114	$2\frac{1}{4}$	$1\frac{1}{2}$
0	1.00	\$2.80	.127	$2\frac{3}{8}$	$1\frac{5}{8}$
1	1.00	2.90	.146	$2\frac{1}{2}$	$1\frac{3}{4}$
2	1.25	3.00	.162	3	2
3	1.50	3.00	.183	$3\frac{1}{2}$	$2\frac{1}{4}$
4	1.75	3.25	.208	4	$2\frac{1}{2}$
5	2.00	3.50	.240	$4\frac{1}{2}$	3
6	2.25	4.25	.279	5	$3\frac{5}{8}$
7	2.50	5.25	.331	6	$4\frac{1}{2}$
8	3.00	6.75	.398	$6\frac{3}{4}$	$5\frac{1}{4}$
9	3.50	8.25	.482	8	$6\frac{1}{8}$
10	4.50	9.00	.581	9	7
11	6.00		.706	$11\frac{1}{4}$	$8\frac{1}{4}$
12	7.50		.842	$13\frac{3}{8}$	10
13	9.00		1.009	16	12
14	11.00		1.250	$18\frac{1}{4}$	14

These Reamers have the same taper, and each will overlay in convenient measure the next size smaller.

All sizes, dimensions and styles not listed are special and subject to special prices.

Half round Taper-Pin Reamers will be furnished at regular prices; specify No. 682.

For Taper Pins see page 125.

For sets of Taper-Pin Reamers see page 130.

Reamers for Brass or Bronze require special clearance and are so furnished on request.

No. 681

TAPER-PIN REAMERS

WITH MORSE TAPER SHANKS

TAPER $\frac{1}{4}$ INCH PER FOOT

Size Number	Price Each	Diameter at Small End, Inches	Whole Length, Inches	Length of Flutes, Inches	Morse Taper Shank
0	\$2.15	.119	$4\frac{7}{8}$	2	1
1	2.25	.135	$5\frac{1}{8}$	$2\frac{1}{4}$	1
2	2.40	.152	$5\frac{3}{8}$	$2\frac{1}{2}$	1
3	2.50	.160	$6\frac{3}{16}$	$3\frac{5}{16}$	1
4	2.65	.191	$6\frac{5}{16}$	$3\frac{5}{16}$	1
5	2.85	.233	$6\frac{5}{16}$	$3\frac{5}{16}$	1
6	3.30	.263	$7\frac{1}{2}$	$4\frac{3}{8}$	1
7	3.60	.331	$7\frac{5}{8}$	$4\frac{1}{2}$	1
8	3.95	.398	$8\frac{3}{8}$	$5\frac{1}{4}$	1
9	4.20	.482	$9\frac{1}{4}$	$6\frac{1}{8}$	1
10	4.75	.581	$10\frac{7}{8}$	7	2
11	5.70	.706	$12\frac{1}{8}$	$8\frac{1}{4}$	2
12	7.60	.842	$14\frac{5}{8}$	10	3
13	9.65	1.009	$17\frac{5}{8}$	12	4
14	13.10	1.250	$19\frac{5}{8}$	14	4

These Reamers have the same taper, and each will overlay in convenient measure the next size smaller.

Special sizes made to order at special prices.

For Taper Pins see page 125.

Reamers for Brass or Bronze require special clearance and are so furnished on request.

No. 683
Carbon Steel

No. 1683
High Speed Steel

TAPER-PIN REAMER



TAPER $\frac{1}{4}$ INCH PER FOOT

Size Number	Price Each		Diameter at Small End, Inches	Whole Length, Inches	Length of Flutes, Inches
	No. 683 Carbon Steel	No. 1683 High Speed Steel			
6/0	\$2.00	\$2.50	.0632	1 $\frac{3}{4}$	$\frac{7}{8}$
5/0	2.00	2.50	.075	2	1 $\frac{1}{8}$
4/0	2.00	2.50	.088	2 $\frac{3}{16}$	1 $\frac{1}{4}$
3/0	1.75	2.25	.101	2 $\frac{3}{8}$	1 $\frac{3}{8}$
2/0	1.75	2.25	.114	2 $\frac{9}{16}$	1 $\frac{1}{2}$
0	1.75	2.25	.127	3	1 $\frac{5}{8}$
1	2.00	2.50	.146	3 $\frac{3}{16}$	1 $\frac{3}{4}$
2	2.25	2.75	.162	3 $\frac{9}{16}$	2
3	2.50	3.00	.183	3 $\frac{7}{8}$	2 $\frac{1}{4}$
4	2.75	3.50	.208	4 $\frac{3}{16}$	2 $\frac{1}{2}$
5	3.00	3.75	.240	4 $\frac{11}{16}$	3
6	3.50	4.25	.279	5 $\frac{7}{16}$	3 $\frac{5}{8}$
7	4.00	5.00	.331	6 $\frac{7}{16}$	4 $\frac{1}{2}$
8	4.50	5.75	.398	7 $\frac{3}{8}$	5 $\frac{1}{4}$
9	5.00	6.25	.482	8 $\frac{3}{8}$	6 $\frac{1}{8}$
10	6.00	7.50	.581	9 $\frac{3}{8}$	7
11	7.50	10.00	.706	11 $\frac{5}{8}$	8 $\frac{1}{4}$
12	9.00	13.50	.842	13 $\frac{7}{8}$	10
13	11.00	19.25	1.009	16 $\frac{3}{8}$	12
14	13.50	23.75	1.250	18 $\frac{3}{4}$	14

No. 682

HALF ROUND TAPER-PIN REAMERS



TAPER $\frac{1}{4}$ INCH PER FOOT

Half Round Taper-Pin Reamers will be furnished at the same list prices as our regular No. 680 style.

For Taper Pins see page 125.

No. 686
Carbon Steel

No. 1686
High Speed Steel

LOCOMOTIVE TAPER REAMERS



TAPER $\frac{1}{16}$ INCH PER FOOT

Diam. $\frac{1}{2}$ In. from Small End, Inches	Price Each		Whole Length, Inches	Length of Flutes, Inches	Diam. $\frac{1}{2}$ In. from Small End, Inches	Price Each		Whole Length, Inches	Length of Flutes, Inches
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel		
$\frac{3}{8}$	\$3.00	\$5.35	$6\frac{5}{16}$	5	$1\frac{1}{8}$	\$10.60	\$33.30	$18\frac{1}{4}$	16
$\frac{7}{16}$	3.20	6.50	$7\frac{5}{16}$	6	$1\frac{3}{16}$	11.15	36.00	$18\frac{1}{4}$	16
$\frac{1}{2}$	3.70	7.65	$8\frac{5}{8}$	7	$1\frac{1}{4}$	11.70	38.90	$18\frac{1}{4}$	16
$\frac{9}{16}$	3.80	9.00	$9\frac{7}{8}$	8	$1\frac{5}{16}$	13.50	46.50	$20\frac{1}{2}$	18
$\frac{5}{8}$	4.00	10.00	$9\frac{7}{8}$	8	$1\frac{3}{8}$	14.15	50.00	$20\frac{1}{2}$	18
$\frac{11}{16}$	4.20	10.90	$9\frac{7}{8}$	8	$1\frac{7}{16}$	14.80	53.85	$20\frac{1}{2}$	18
$\frac{3}{4}$	5.80	15.25	$13\frac{7}{8}$	12	$1\frac{1}{2}$	15.50	57.85	$20\frac{1}{2}$	18
$\frac{13}{16}$	6.25	17.60	$14\frac{1}{4}$	12	$1\frac{5}{8}$	18.40	73.00	$22\frac{1}{2}$	20
$\frac{7}{8}$	6.50	19.20	$14\frac{1}{4}$	12	$1\frac{3}{4}$	20.65	83.50	$22\frac{1}{2}$	20
$\frac{15}{16}$	7.00	20.85	$14\frac{1}{4}$	12	$1\frac{7}{8}$	22.80	94.85	$22\frac{1}{2}$	20
1	7.50	22.65	$14\frac{1}{4}$	12	2	25.00	107.20	$22\frac{1}{2}$	20
$1\frac{1}{16}$	10.00	30.80	$18\frac{1}{4}$	16					

All sizes, dimensions and tapers per foot not listed are special and subject to special prices.

Locomotive Taper Reamers with spiral flutes are special and subject to special prices.

No. 687
Carbon Steel

No. 1687
High Speed Steel

LOCOMOTIVE TAPER REAMERS

WITH MORSE TAPER SHANKS



TAPER $\frac{1}{16}$ INCH PER FOOT

Diameter $\frac{1}{2}$ Inch from Small End, Inches	Price Each		Whole Length, Inches	Length of Flutes, Inches	Morse Taper Shank
	Carbon Steel	High Speed Steel			
$\frac{3}{8}$	\$3.70	\$7.65	$8\frac{5}{16}$	5	No. 1
$\frac{7}{16}$	3.70	8.20	$9\frac{5}{16}$	6	
$\frac{1}{2}$	4.00	8.75	$10\frac{5}{16}$	7	
$\frac{9}{16}$	4.20	10.25	$11\frac{5}{16}$	8	
$\frac{5}{8}$	4.70	13.50	$11\frac{13}{16}$	8	No. 2
$\frac{11}{16}$	4.70	13.50	$11\frac{13}{16}$	8	
$\frac{3}{4}$	6.50	16.90	$15\frac{13}{16}$	12	
$\frac{13}{16}$	6.70	18.50	$15\frac{13}{16}$	12	
$\frac{7}{8}$	7.00	20.20	$15\frac{13}{16}$	12	No. 3
$1\frac{1}{16}$	8.00	23.40	$16\frac{1}{2}$	12	
1	8.50	25.40	$16\frac{1}{2}$	12	
$1\frac{1}{16}$	11.10	34.00	$20\frac{1}{2}$	16	
$1\frac{1}{8}$	11.70	36.85	$20\frac{1}{2}$	16	No. 4
$1\frac{3}{16}$	12.30	39.85	$20\frac{1}{2}$	16	
$1\frac{1}{4}$	13.50	45.15	$21\frac{1}{2}$	16	
$1\frac{5}{16}$	15.50	53.25	$23\frac{1}{2}$	18	
$1\frac{3}{8}$	16.20	57.35	$23\frac{1}{2}$	18	No. 5
$1\frac{7}{16}$	17.00	61.75	$23\frac{1}{2}$	18	
$1\frac{1}{2}$	17.70	66.35	$23\frac{1}{2}$	18	
$1\frac{5}{8}$	20.80	82.75	$25\frac{1}{2}$	20	
$1\frac{3}{4}$	26.10	98.20	$26\frac{3}{4}$	20	No. 5
$1\frac{7}{8}$	28.80	111.40	$26\frac{3}{4}$	20	
2	31.60	125.60	$26\frac{3}{4}$	20	

All sizes, dimensions and tapers per foot not listed are special and subject to special prices.

Locomotive Taper Reamers with spiral flutes are special and subject to special prices.

No. 692

BIT STOCK TAPER REAMERS



Taper 1 inch to the foot. Diameter at large end of flutes is $\frac{1}{16}$ inch larger than nominal size.

Nominal Size, Inches	Price Each	Whole Length, Inches	Length of Flutes, Inches	Diameter Small End, Inches	Diameter Large End, Inches
$\frac{1}{8}$	\$.60	$3\frac{3}{4}$	$1\frac{5}{8}$	.052	$\frac{3}{16}$
$\frac{3}{16}$	.60	$3\frac{7}{8}$	$1\frac{3}{4}$	.104	$\frac{1}{4}$
$\frac{1}{4}$	.60	4	$1\frac{7}{8}$	.156	$\frac{5}{16}$
$\frac{5}{16}$	.60	$4\frac{1}{8}$	2	.208	$\frac{3}{8}$
$\frac{3}{8}$	.65	$4\frac{1}{4}$	$2\frac{1}{8}$	.260	$\frac{7}{16}$
$\frac{7}{16}$	.70	$4\frac{3}{8}$	$2\frac{1}{4}$	.313	$\frac{1}{2}$
$\frac{1}{2}$	.75	$4\frac{1}{2}$	$2\frac{3}{8}$	.365	$\frac{9}{16}$
$\frac{9}{16}$	.80	$4\frac{5}{8}$	$2\frac{1}{2}$	.417	$\frac{5}{8}$
$\frac{5}{8}$	.95	$4\frac{3}{4}$	$2\frac{5}{8}$	.469	$\frac{11}{16}$
$\frac{11}{16}$	1.10	$4\frac{7}{8}$	$2\frac{3}{4}$	.521	$\frac{3}{4}$
$\frac{3}{4}$	1.25	5	$2\frac{7}{8}$	.573	$\frac{13}{16}$
$\frac{13}{16}$	1.50	$5\frac{1}{8}$	3	.626	$\frac{7}{8}$
$\frac{7}{8}$	1.75	$5\frac{1}{4}$	$3\frac{1}{8}$	.677	$\frac{15}{16}$
$\frac{15}{16}$	2.00	$5\frac{3}{8}$	$3\frac{1}{4}$	.730	1
1	2.25	$5\frac{1}{2}$	$3\frac{3}{8}$	.782	$1\frac{1}{16}$

For Sets of Bit Stock Taper Reamers see page 130.

No. 693

STRAIGHT SHANK TAPER REAMERS



Taper 1 inch to the foot. Diameter at large end of flutes is $\frac{1}{16}$ inch larger than nominal size.

STRAIGHT SHANKS $\frac{1}{2}$ INCH DIAMETER BY 2 INCHES LONG

Nominal Size, Inches	Price Each	Whole Length, Inches	Length of Flutes, Inches	Diameter Small End, Inches	Diameter Large End, Inches
$\frac{1}{8}$	\$.60	4	$1\frac{5}{8}$	.052	$\frac{3}{16}$
$\frac{3}{16}$	.60	$4\frac{1}{4}$	$1\frac{3}{4}$	.104	$\frac{1}{4}$
$\frac{1}{4}$	.60	$4\frac{3}{4}$	$1\frac{7}{8}$	.156	$\frac{5}{16}$
$\frac{5}{16}$	.60	$4\frac{7}{8}$	2	.208	$\frac{3}{8}$
$\frac{3}{8}$	.65	5	$2\frac{1}{8}$	.260	$\frac{7}{16}$
$\frac{7}{16}$	.70	$5\frac{1}{8}$	$2\frac{1}{4}$	.313	$\frac{1}{2}$
$\frac{1}{2}$	.75	$5\frac{1}{4}$	$2\frac{3}{8}$	.365	$\frac{9}{16}$
$\frac{9}{16}$	.80	$5\frac{3}{8}$	$2\frac{1}{2}$	.417	$\frac{5}{8}$
$\frac{5}{8}$	.95	$5\frac{1}{2}$	$2\frac{5}{8}$	.469	$\frac{11}{16}$
$\frac{11}{16}$	1.10	$5\frac{5}{8}$	$2\frac{3}{4}$	.521	$\frac{3}{4}$
$\frac{3}{4}$	1.25	$5\frac{3}{4}$	$2\frac{7}{8}$	.573	$\frac{13}{16}$
$\frac{13}{16}$	1.50	$5\frac{7}{8}$	3	.626	$\frac{7}{8}$
$\frac{7}{8}$	1.75	6	$3\frac{1}{8}$	.677	$\frac{15}{16}$
$\frac{15}{16}$	2.00	$6\frac{1}{8}$	$3\frac{1}{4}$	.730	1
1	2.25	$6\frac{1}{4}$	$3\frac{3}{8}$	.782	$1\frac{1}{16}$

No. 695

TAPER BRIDGE REAMERS



Diameter, Inches at			Price Each	Whole Length, Inches	Length of Flutes, Inches	Length from B to C, Inches
A	B	C				
$\frac{5}{16}$	$\frac{1}{4}$	$\frac{3}{16}$	\$2.40	$5\frac{3}{4}$	$4\frac{1}{4}$	$1\frac{1}{8}$
$\frac{3}{8}$	$\frac{5}{16}$	$\frac{1}{4}$	2.50	$5\frac{3}{4}$	$4\frac{1}{4}$	$1\frac{1}{8}$
$\frac{7}{16}$	$\frac{3}{8}$	$\frac{5}{16}$	2.60	$5\frac{3}{4}$	$4\frac{1}{4}$	$1\frac{1}{8}$
$\frac{1}{2}$	$\frac{7}{16}$	$\frac{3}{8}$	2.75	$5\frac{3}{4}$	$4\frac{1}{4}$	$1\frac{1}{8}$
$\frac{9}{16}$	$\frac{15}{32}$	$\frac{5}{16}$	2.90	$9\frac{1}{2}$	7	2
$\frac{5}{8}$	$\frac{17}{32}$	$\frac{3}{8}$	3.05	$9\frac{1}{2}$	7	2
$\frac{11}{16}$	$\frac{19}{32}$	$\frac{7}{16}$	3.20	$9\frac{1}{2}$	7	2
$\frac{3}{4}$	$\frac{21}{32}$	$\frac{1}{2}$	3.35	$9\frac{1}{2}$	7	2
$\frac{13}{16}$	$\frac{23}{32}$	$\frac{9}{16}$	3.50	$9\frac{1}{2}$	7	2
$\frac{7}{8}$	$\frac{25}{32}$	$\frac{5}{8}$	3.75	$9\frac{1}{2}$	7	2
$\frac{15}{16}$	$\frac{27}{32}$	$\frac{11}{16}$	4.00	$9\frac{1}{2}$	7	2
1	$\frac{29}{32}$	$\frac{3}{4}$	4.25	$9\frac{1}{2}$	7	2
$1\frac{1}{16}$	$\frac{31}{32}$	$\frac{13}{16}$	4.50	$9\frac{1}{2}$	7	2
$1\frac{1}{8}$	$1\frac{1}{32}$	$\frac{7}{8}$	4.75	$9\frac{1}{2}$	7	2
$1\frac{3}{16}$	$1\frac{3}{32}$	$\frac{15}{16}$	5.00	$9\frac{1}{2}$	7	2
$1\frac{1}{4}$	$1\frac{5}{32}$	1	5.50	$9\frac{1}{2}$	7	2
$1\frac{5}{16}$	$1\frac{7}{32}$	$1\frac{1}{16}$	6.00	$9\frac{1}{2}$	7	2
$1\frac{3}{8}$	$1\frac{9}{32}$	$1\frac{1}{8}$	6.50	$9\frac{1}{2}$	7	2
$1\frac{7}{16}$	$1\frac{11}{32}$	$1\frac{3}{16}$	7.00	$9\frac{1}{2}$	7	2
$1\frac{1}{2}$	$1\frac{13}{32}$	$1\frac{1}{4}$	8.00	$9\frac{1}{2}$	7	2

Special sizes made to order at special prices.

For Taper Reamers especially designed for use in Structural Iron and Steel, Boiler Plate, etc., where precision is not required, see Nos. 697, 698, 1699, 1700 and 1701 on pages 152-156.

No. 696

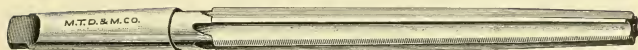
TAPER BRIDGE REAMERS

WITH MORSE TAPER SHANKS

A

B

C



Diameter, Inches at			Price Each	Whole Length, Inches	Length of Flutes, Inches	Length from B to C, Inches	Morse Taper Shank
A	B	C					
$\frac{5}{16}$	$\frac{1}{4}$	$\frac{3}{16}$	\$2.40	$7\frac{9}{16}$	$4\frac{1}{4}$	$1\frac{1}{8}$	No. 1
$\frac{3}{8}$	$\frac{5}{16}$	$\frac{1}{4}$	2.50	$7\frac{9}{16}$	$4\frac{1}{4}$	$1\frac{1}{8}$	
$\frac{7}{16}$	$\frac{3}{8}$	$\frac{5}{16}$	2.60	$7\frac{9}{16}$	$4\frac{1}{4}$	$1\frac{1}{8}$	
$\frac{1}{2}$	$\frac{7}{16}$	$\frac{3}{8}$	2.75	$7\frac{9}{16}$	$4\frac{1}{4}$	$1\frac{1}{8}$	
$\frac{9}{16}$	$\frac{15}{32}$	$\frac{5}{16}$	2.90	$10\frac{5}{16}$	7	2	
$\frac{5}{8}$	$\frac{17}{32}$	$\frac{3}{8}$	3.05	$10\frac{7}{8}$	7	2	No. 2
$\frac{11}{16}$	$\frac{19}{32}$	$\frac{7}{16}$	3.20	$10\frac{7}{8}$	7	2	
$\frac{3}{4}$	$\frac{21}{32}$	$\frac{1}{2}$	3.35	$10\frac{7}{8}$	7	2	
$\frac{13}{16}$	$\frac{23}{32}$	$\frac{9}{16}$	3.50	$10\frac{7}{8}$	7	2	
$\frac{7}{8}$	$\frac{25}{32}$	$\frac{5}{8}$	3.75	$10\frac{7}{8}$	7	2	
$\frac{15}{16}$	$\frac{27}{32}$	$\frac{11}{16}$	4.00	$11\frac{5}{8}$	7	2	No. 3
1	$\frac{29}{32}$	$\frac{3}{4}$	4.25	$11\frac{5}{8}$	7	2	
$1\frac{1}{16}$	$\frac{31}{32}$	$\frac{13}{16}$	4.50	$11\frac{5}{8}$	7	2	
$1\frac{1}{8}$	$1\frac{1}{32}$	$\frac{7}{8}$	4.75	$11\frac{5}{8}$	7	2	
$1\frac{3}{16}$	$1\frac{3}{32}$	$\frac{15}{16}$	5.00	$11\frac{5}{8}$	7	2	
$1\frac{1}{4}$	$1\frac{5}{32}$	1	5.50	$12\frac{5}{8}$	7	2	No. 4
$1\frac{5}{16}$	$1\frac{7}{32}$	$1\frac{1}{16}$	6.00	$12\frac{5}{8}$	7	2	
$1\frac{3}{8}$	$1\frac{9}{32}$	$1\frac{1}{8}$	6.50	$12\frac{5}{8}$	7	2	
$1\frac{7}{16}$	$1\frac{11}{32}$	$1\frac{3}{16}$	7.00	$12\frac{5}{8}$	7	2	
$1\frac{1}{2}$	$1\frac{13}{32}$	$1\frac{1}{4}$	8.00	$12\frac{5}{8}$	7	2	

Special sizes made to order at special prices.

For Taper Reamers especially designed for use in Structural Iron and Steel, Boiler Plate, etc., where precision is not required, see Nos. 697, 698, 1699, 1700 and 1701 on pages 152-156.

No. 697
Carbon Steel

No. 1697
High Speed Steel

STRUCTURAL REAMERS

FOR BOILER MAKERS, BRIDGE AND SHIP BUILDERS
WITH MORSE TAPER SHANKS

A

B

C



Diameter, Inches at			Price Each		Whole Length, Inches	Length of Flutes, Inches	Length of Taper B to C, Inches	Morse Taper Shank
A	B	C	Carbon Steel	High Speed Steel				
1/4	1/4	5/32	\$2.30		6 3/8	3 3/8	1	No. 1
9/32	9/32	11/64	2.40		6 3/4	3 3/4	1	
5/16	5/16	3/8	2.40		6 3/4	3 3/4	1	
11/32	11/32	13/64	2.50		7 1/4	4	1	
3/8	3/8	7/32	2.50		7 1/4	4	1	
13/32	13/32	15/64	2.60	\$3.75	8 1/4	4 3/8	1	No. 2
7/16	7/16	1/4	2.60	3.75	8 1/4	4 3/8	1	
15/32	15/32	9/32	2.75	4.00	9	5 1/8	2	
1/2	1/2	5/16	2.75	4.00	9	5 1/8	2	
17/32	17/32	11/32	2.90	4.25	9	5 1/8	2	
9/16	9/16	3/8	2.90	4.25	9	5 1/8	2	
5/8	5/8	3/8	3.05	4.50	10	6 1/8	2	
11/16	11/16	3/8	3.20	4.75	11 3/4	7 1/8	3	No. 3
3/4	3/4	7/16	3.35	5.00	12	7 3/8	3	
13/16	13/16	1/2	3.50	5.30	12	7 3/8	3	
7/8	7/8	9/16	3.75	5.70	12	7 3/8	3	
15/16	15/16	5/8	4.00	6.00	12	7 3/8	3	
1	1	11/16	4.25	6.50	12	7 3/8	3	
1 1/16	1 1/16	3/4	4.50	7.00	12	7 3/8	3	
1 1/8	1 1/8	13/16	4.75	7.50	12	7 3/8	3	
1 3/16	1 3/16	7/8	5.00	8.00	12	7 3/8	3	
1 1/4	1 1/4	15/16	5.50	8.75	13	7 3/8	3	No. 4
1 5/16	1 5/16	1	6.00	9.50	13	7 3/8	3	
1 3/8	1 3/8	1 1/16	6.50	10.50	13	7 3/8	3	
1 7/16	1 7/16	1 1/8	7.00	12.00	13	7 3/8	3	
1 1/2	1 1/2	1 3/8	8.00	14.00	13	7 3/8	3	

These Reamers are designed for hard and rough work and are not ground closely to size. These Reamers from 1/4 inch to 5/8 inch inclusive have 4 flutes; from 11/16 inch to 1 1/4 inches inclusive have 5 flutes; from 1 1/8 inches to 1 1/2 inches inclusive have 6 flutes.

All sizes, dimensions and styles not listed are special and subject to special prices.

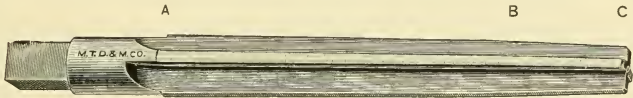
This type of Reamer with spiral flutes, No. 1701, is listed on page 156.

No. 698
Carbon Steel

No. 1698
High Speed Steel

STRUCTURAL REAMERS

FOR BOILER MAKERS, BRIDGE AND SHIP BUILDERS



Diameter, Inches at			Price Each		Whole Length, Inches	Length of Flutes, Inches	Length of Taper B to C, Inches
A	B	C	Carbon Steel	High Speed Steel			
$\frac{1}{4}$	$\frac{1}{4}$	$\frac{5}{32}$	\$2.30	\$2.50	$4\frac{1}{4}$	$3\frac{3}{8}$	1
$\frac{5}{16}$	$\frac{5}{16}$	$\frac{3}{16}$	2.40	2.70	$4\frac{3}{4}$	$3\frac{3}{4}$	1
$\frac{3}{8}$	$\frac{3}{8}$	$\frac{7}{32}$	2.50	2.90	$5\frac{1}{2}$	4	1
$\frac{7}{16}$	$\frac{7}{16}$	$\frac{1}{4}$	2.60	3.10	$6\frac{1}{2}$	$4\frac{3}{8}$	1
$\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{16}$	2.75	3.30	$8\frac{1}{8}$	$5\frac{3}{8}$	2
$\frac{9}{16}$	$\frac{9}{16}$	$\frac{3}{8}$	2.90	3.50	$8\frac{1}{8}$	$5\frac{3}{8}$	2
$\frac{5}{8}$	$\frac{5}{8}$	$\frac{3}{8}$	3.05	3.70	$9\frac{1}{8}$	$6\frac{1}{8}$	2
$\frac{11}{16}$	$\frac{11}{16}$	$\frac{3}{8}$	3.20	3.90	$10\frac{1}{8}$	$7\frac{1}{8}$	3
$\frac{3}{4}$	$\frac{3}{4}$	$\frac{7}{16}$	3.35	4.10	$10\frac{1}{2}$	$7\frac{3}{8}$	3
$\frac{13}{16}$	$\frac{13}{16}$	$\frac{1}{2}$	3.50	4.40	$10\frac{1}{2}$	$7\frac{3}{8}$	3
$\frac{7}{8}$	$\frac{7}{8}$	$\frac{9}{16}$	3.75	4.70	$10\frac{5}{8}$	$7\frac{3}{8}$	3
$\frac{15}{16}$	$\frac{15}{16}$	$\frac{5}{8}$	4.00	5.00	$10\frac{5}{8}$	$7\frac{3}{8}$	3
1	1	$\frac{11}{16}$	4.25	5.30	$10\frac{5}{8}$	$7\frac{3}{8}$	3
$1\frac{1}{16}$	$1\frac{1}{16}$	$\frac{3}{4}$	4.50	5.85	$10\frac{5}{8}$	$7\frac{3}{8}$	3
$1\frac{1}{8}$	$1\frac{1}{8}$	$\frac{13}{16}$	4.75	6.40	$10\frac{5}{8}$	$7\frac{3}{8}$	3
$1\frac{3}{16}$	$1\frac{3}{16}$	$\frac{7}{8}$	5.00	6.95	$10\frac{5}{8}$	$7\frac{3}{8}$	3
$1\frac{1}{4}$	$1\frac{1}{4}$	$\frac{15}{16}$	5.50	7.50	$10\frac{5}{8}$	$7\frac{3}{8}$	3
$1\frac{5}{16}$	$1\frac{5}{16}$	1	6.00	8.25	$10\frac{5}{8}$	$7\frac{3}{8}$	3
$1\frac{3}{8}$	$1\frac{3}{8}$	$1\frac{1}{16}$	6.50	9.00	$10\frac{5}{8}$	$7\frac{3}{8}$	3
$1\frac{7}{16}$	$1\frac{7}{16}$	$1\frac{1}{8}$	7.00	10.00	$10\frac{5}{8}$	$7\frac{3}{8}$	3
$1\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{3}{16}$	8.00	11.00	$10\frac{5}{8}$	$7\frac{3}{8}$	3

These Reamers are designed for hard and rough work and are not ground closely to size. These Reamers from $\frac{1}{4}$ to $\frac{5}{8}$ inch inclusive have 4 flutes; from $\frac{11}{16}$ inch to $1\frac{1}{4}$ inches inclusive have 5 flutes; from $1\frac{3}{8}$ inches to $1\frac{1}{2}$ inches inclusive have 6 flutes. All sizes, dimensions and styles not listed are special and subject to special prices.

No. 1699 High Speed Steel

STRUCTURAL REAMERS—SHORT BODY

WITH MORSE TAPER SHANK



Full Diameter, Inches	Diameter at Point, Inches	Price Each High Speed Steel	Whole Length, Inches	Length of Flutes, Inches	Morse Taper Shank, Number
$\frac{1}{4}$	$\frac{5}{32}$	\$3.00	$5\frac{7}{16}$	$2\frac{1}{2}$	No. 1
$\frac{9}{32}$	$\frac{5}{32}$	3.00	$5\frac{7}{16}$	$2\frac{1}{2}$	
$\frac{5}{16}$	$\frac{3}{16}$	3.00	$5\frac{11}{16}$	$2\frac{3}{4}$	
$\frac{11}{32}$	$\frac{13}{64}$	3.20	$5\frac{11}{16}$	$2\frac{3}{4}$	
$\frac{3}{8}$	$\frac{15}{64}$	3.20	$5\frac{11}{16}$	$2\frac{3}{4}$	
$\frac{13}{32}$	$\frac{17}{64}$	3.35	$6\frac{3}{16}$	$2\frac{3}{4}$	No. 2
$\frac{7}{16}$	$\frac{11}{64}$	3.35	$6\frac{15}{16}$	$3\frac{1}{2}$	
$\frac{15}{32}$	$\frac{11}{64}$	3.50	$7\frac{1}{16}$	$3\frac{1}{2}$	
$\frac{1}{2}$	$\frac{11}{64}$	3.50	$7\frac{9}{16}$	4	
$\frac{17}{32}$	$\frac{11}{64}$	3.70	$7\frac{9}{16}$	4	
$\frac{9}{16}$	$\frac{3}{16}$	3.70	$7\frac{9}{16}$	4	No. 3
$\frac{5}{8}$	$\frac{13}{64}$	3.75	$8\frac{1}{16}$	$4\frac{1}{2}$	
$\frac{11}{16}$	$\frac{17}{64}$	3.85	$8\frac{13}{16}$	$4\frac{1}{2}$	
$\frac{3}{4}$	$\frac{5}{16}$	4.00	$9\frac{1}{2}$	5	
$\frac{13}{16}$	$\frac{11}{32}$	4.25	$9\frac{1}{2}$	5	
$\frac{7}{8}$	$\frac{13}{32}$	4.55	$9\frac{1}{2}$	5	No. 3
$\frac{15}{16}$	$\frac{7}{16}$	4.80	$9\frac{1}{2}$	5	
1	$\frac{1}{2}$	5.20	$9\frac{1}{2}$	5	
$1\frac{1}{16}$	$\frac{17}{32}$	5.60	$9\frac{1}{2}$	5	
$1\frac{1}{8}$	$\frac{19}{32}$	6.00	$9\frac{1}{2}$	5	
$1\frac{3}{16}$	$\frac{5}{8}$	6.40	$9\frac{1}{2}$	5	No. 3
$1\frac{1}{4}$	$\frac{11}{16}$	7.00	$9\frac{1}{2}$	5	

Carbon Steel Structural Reamers, short length and all sizes, dimensions and styles not listed are special and subject to special prices.

No. 1700 High Speed Steel

STRUCTURAL REAMERS—SHORT BODY

WITH SPIRAL FLUTES
WITH MORSE TAPER SHANKS



Full Diameter, Inches	Diameter at Point, Inches	Price Each High Speed Steel	Whole Length, Inches	Length of Flutes, Inches	Morse Taper Shank Number
$\frac{1}{4}$	$\frac{5}{32}$	\$3.00	$5\frac{7}{16}$	$2\frac{1}{2}$	No. 1
$\frac{9}{32}$	$\frac{5}{32}$	3.00	$5\frac{7}{16}$	$2\frac{1}{2}$	
$\frac{5}{16}$	$\frac{3}{16}$	3.00	$5\frac{11}{16}$	$2\frac{3}{4}$	
$\frac{11}{32}$	$\frac{13}{64}$	3.20	$5\frac{11}{16}$	$2\frac{3}{4}$	
$\frac{3}{8}$	$\frac{15}{64}$	3.20	$5\frac{11}{16}$	$2\frac{3}{4}$	
$\frac{13}{32}$	$\frac{17}{64}$	3.35	$6\frac{3}{16}$	$2\frac{3}{4}$	No. 2
$\frac{7}{16}$	$\frac{11}{64}$	3.35	$6\frac{15}{16}$	$3\frac{1}{2}$	
$\frac{15}{32}$	$\frac{11}{64}$	3.50	$7\frac{1}{16}$	$3\frac{1}{2}$	
$\frac{1}{2}$	$\frac{11}{64}$	3.50	$7\frac{9}{16}$	4	
$\frac{17}{32}$	$\frac{11}{64}$	3.70	$7\frac{9}{16}$	4	
$\frac{9}{16}$	$\frac{3}{16}$	3.70	$7\frac{9}{16}$	4	
$\frac{5}{8}$	$\frac{13}{64}$	3.75	$8\frac{1}{16}$	$4\frac{1}{2}$	
$\frac{11}{16}$	$\frac{17}{64}$	3.85	$8\frac{13}{16}$	$4\frac{1}{2}$	No. 3
$\frac{3}{4}$	$\frac{5}{16}$	4.00	$9\frac{1}{2}$	5	
$\frac{13}{16}$	$\frac{11}{32}$	4.25	$9\frac{1}{2}$	5	
$\frac{7}{8}$	$\frac{13}{32}$	4.55	$9\frac{1}{2}$	5	
$\frac{15}{16}$	$\frac{7}{16}$	4.80	$9\frac{1}{2}$	5	
1	$\frac{1}{2}$	5.20	$9\frac{1}{2}$	5	
$1\frac{1}{16}$	$\frac{17}{32}$	5.60	$9\frac{1}{2}$	5	
$1\frac{1}{8}$	$\frac{19}{32}$	6.00	$9\frac{1}{2}$	5	
$1\frac{3}{16}$	$\frac{5}{8}$	6.40	$9\frac{1}{2}$	5	
$1\frac{1}{4}$	$\frac{11}{16}$	7.00	$9\frac{1}{2}$	5	

Carbon Steel Structural Reamers, short length and all sizes, dimensions and styles not listed are special and subject to special prices.

No. 1701
High Speed Steel

STRUCTURAL REAMERS

WITH SPIRAL FLUTES — MORSE TAPER SHANKS
 FOR BOILER MAKERS, BRIDGE AND SHIP BUILDERS

A

B

C



No. 1702
High Speed Steel

THREE GROOVE STRUCTURAL REAMERS



Diameter, Inches at			Price Each High Speed Steel	Whole Length, Inches	Length of Flutes, Inches	Length of Taper B to C, Inches	Morse Taper Shank
A	B	C					
13/32	13/32	15/64	\$3.75	8 1/4	4 3/8	1	No. 2
7/16	7/16	1/4	3.75	8 1/4	4 3/8	1	
15/32	15/32	9/32	4.00	9	5 1/8	2	
1/2	1/2	5/16	4.00	9	5 1/8	2	
17/32	17/32	11/32	4.25	9	5 1/8	2	
9/16	9/16	3/8	4.25	9	5 1/8	2	
5/8	5/8	3/8	4.50	10	6 1/8	2	
11/16	11/16	3/8	4.75	11 3/4	7 1/8	3	No. 3
3/4	3/4	7/16	5.00	12	7 3/8	3	
13/16	13/16	1/2	5.30	12	7 3/8	3	
1/2	1/2	9/16	5.70	12	7 3/8	3	
15/16	15/16	5/8	6.00	12	7 3/8	3	
1	1	11/16	6.50	12	7 3/8	3	
1 1/16	1 1/16	3/4	7.00	12	7 3/8	3	
1 1/8	1 1/8	13/16	7.50	12	7 3/8	3	No. 4
1 3/16	1 3/16	7/8	8.00	12	7 3/8	3	
1 1/4	1 1/4	15/16	8.75	13	7 3/8	3	
1 5/16	1 5/16	1	9.50	13	7 3/8	3	
1 3/8	1 3/8	1 1/16	10.50	13	7 3/8	3	
1 7/16	1 7/16	1 1/8	12.00	13	7 3/8	3	
1 1/2	1 1/2	1 3/8	14.00	13	7 3/8	3	

All sizes, dimensions and styles not listed are special and subject to special prices.

THREE-GROOVE CHUCKING REAMERS

No. 705

WITH MORSE TAPER SHANKS



No. 706

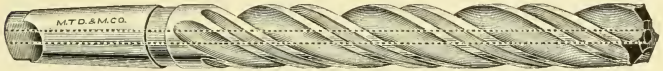
WITH STRAIGHT SHANKS



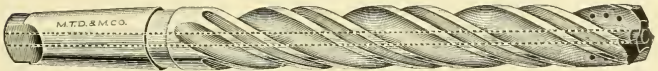
These Reamers are specially adapted for enlarging cored holes and have shank and fluted portion ground on centers to size. Special lengths made to order at special prices.

WITH MORSE TAPER SHANKS
AND HOLES THROUGH SOLID METAL FOR LUBRICANT

No. 707

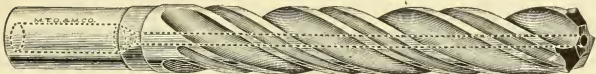


No. 709



WITH STRAIGHT SHANKS
AND HOLES THROUGH SOLID METAL FOR LUBRICANT

No. 708



No. 710



These Reamers are specially adapted for enlarging cored holes and have shank and fluted portion ground on centers to size. Special lengths made to order at special prices. These Reamers can be made for use in the same manner as oil drills illustrated on pages 77 to 86 inclusive.

No. 709 and 710 Reamers shown above are to be used for passing completely through the work.

Prices upon application.

No. 715

EXPANSION REAMERS



Diam. Inches	Price Each	Whole Length, Inches	Length of Flutes, Inches	Diam. Inches	Price Each	Whole Length, Inches	Length of Flutes, Inches
$\frac{1}{4}$	\$3.00	4	$1\frac{1}{2}$	$1\frac{1}{32}$	\$7.25	10	$4\frac{1}{2}$
$\frac{9}{32}$	3.10	4	$1\frac{1}{2}$	$1\frac{1}{16}$	7.25	10	$4\frac{1}{2}$
$\frac{5}{16}$	3.10	4	$1\frac{1}{2}$	$1\frac{3}{32}$	7.75	10	$4\frac{1}{2}$
$\frac{11}{32}$	3.20	4	$1\frac{1}{2}$	$1\frac{1}{8}$	7.75	$10\frac{1}{2}$	$4\frac{3}{4}$
$\frac{3}{8}$	3.20	5	2	$1\frac{5}{32}$	8.30	$10\frac{1}{2}$	$4\frac{3}{4}$
$\frac{13}{32}$	3.30	5	2	$1\frac{3}{16}$	8.30	$10\frac{1}{2}$	$4\frac{3}{4}$
$\frac{7}{16}$	3.30	5	2	$1\frac{7}{32}$	8.90	$10\frac{1}{2}$	$4\frac{3}{4}$
$\frac{15}{32}$	3.40	5	2	$1\frac{1}{4}$	8.90	11	5
$\frac{1}{2}$	3.40	6	$2\frac{1}{2}$	$1\frac{9}{32}$	9.50	11	5
$\frac{17}{32}$	3.65	6	$2\frac{1}{2}$	$1\frac{5}{16}$	9.50	11	5
$\frac{9}{16}$	3.65	6	$2\frac{1}{2}$	$1\frac{11}{32}$	10.50	11	5
$\frac{19}{32}$	4.00	6	$2\frac{1}{2}$	$1\frac{3}{8}$	10.50	$11\frac{1}{2}$	$5\frac{1}{4}$
$\frac{5}{8}$	4.00	7	3	$1\frac{13}{32}$	11.50	$11\frac{1}{2}$	$5\frac{1}{4}$
$\frac{21}{32}$	4.40	7	3	$1\frac{7}{16}$	11.50	$11\frac{1}{2}$	$5\frac{1}{4}$
$\frac{11}{16}$	4.40	7	3	$1\frac{15}{32}$	12.50	$11\frac{1}{2}$	$5\frac{1}{4}$
$\frac{23}{32}$	4.80	7	3	$1\frac{1}{2}$	12.50	12	$5\frac{1}{2}$
$\frac{3}{4}$	4.80	8	$3\frac{1}{2}$	$1\frac{9}{16}$	13.00	12	$5\frac{1}{2}$
$\frac{25}{32}$	5.25	8	$3\frac{1}{2}$	$1\frac{5}{8}$	13.50	$12\frac{1}{2}$	$5\frac{3}{4}$
$\frac{13}{16}$	5.25	8	$3\frac{1}{2}$	$1\frac{11}{16}$	14.00	$12\frac{1}{2}$	$5\frac{3}{4}$
$\frac{27}{32}$	5.75	8	$3\frac{1}{2}$	$1\frac{3}{4}$	14.50	13	6
$\frac{7}{8}$	5.75	9	4	$1\frac{13}{16}$	15.00	13	6
$\frac{29}{32}$	6.25	9	4	$1\frac{7}{8}$	15.50	$13\frac{1}{2}$	$6\frac{1}{4}$
$\frac{15}{16}$	6.25	9	4	$1\frac{15}{16}$	16.00	$13\frac{1}{2}$	$6\frac{1}{4}$
$\frac{31}{32}$	6.75	9	4	2	16.50	14	$6\frac{1}{2}$
1	6.75	10	$4\frac{1}{2}$				

Limits of expansion recommended for these Reamers are as follows: Sizes $\frac{1}{4}$ to $\frac{11}{32}$.005 inch; $\frac{1}{2}$ to $\frac{11}{16}$.008 inch; $1''$ to $1\frac{1}{16}''$.010 inch; $1\frac{1}{4}''$ to $2\frac{1}{8}''$.012 inch; $2\frac{1}{4}''$ to $3''$.015 inch.

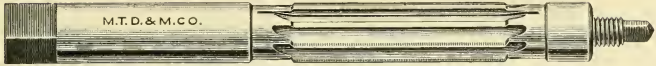
The guides to these Reamers are ground .005 inch under size. Reamers for Brass or Bronze require special clearance and are so furnished on request.

64th sizes from $\frac{1}{4}$ to 1 inch inclusive furnished at list price of next larger listed size.

No. 716

EXPANSION REAMERS

MILLIMETER SIZES



Diam. M. M.	Price Each	Whole Length, M. M.	Length of Flutes, M. M.	Diam. M. M.	Price Each	Whole Length, M. M.	Length of Flutes, M. M.
6	\$3.00	102	38	29	\$8.30	267	121
7	3.10	102	38	30	8.30	267	121
8	3.20	102	38	31	8.90	267	121
9	3.20	127	51	32	9.50	279	127
10	3.30	127	51	33	9.50	279	127
11	3.30	127	51	34	10.50	279	127
12	3.40	127	51	35	11.50	292	133
13	3.65	152	63	36	11.50	292	133
14	3.65	152	63	37	12.50	292	133
15	4.00	152	63	38	12.50	305	140
16	4.40	178	76	39	13.00	305	140
17	4.40	178	76	40	13.50	305	140
18	4.80	178	76	41	13.50	317	146
19	4.80	203	89	42	14.00	317	146
20	5.25	203	89	43	14.50	317	146
21	5.75	203	89	44	14.50	330	152
22	5.75	229	102	45	15.00	330	152
23	6.25	229	102	46	15.00	330	152
24	6.75	229	102	47	15.50	343	159
25	6.75	254	114	48	16.00	343	159
26	7.25	254	114	49	16.00	343	159
27	7.25	254	114	50	16.50	343	159
28	7.75	267	121				

Limits of expansion recommended for these Reamers are as follows: Sizes 6 to 12 M. M. .005 inch; 13 to 25 M. M. .008 inch; 26 to 44 M. M. .010 inch; 45 to 50 M. M. .012 inch.

The Guides to these Reamers are ground .005 inch under size.

Reamers for Brass or Bronze require special clearance and are so furnished on request.

Expansion Reamers with spiral flutes are special and subject to special prices.

All sizes and dimensions not listed are special and subject to special prices.

No. 717

EXPANSION REAMER, SPIRAL FLUTED



Diam. Inches	Price Each	Length of Flute Inches	Length of Pilot Inches	Length Over-all Inches	Diam. Inches	Price Each	Length of Flute Inches	Length of Pilot Inches	Length Over-all Inches
$\frac{3}{8}$	\$5.60	$1\frac{7}{8}$	$1\frac{1}{2}$	$6\frac{1}{8}$	$\frac{7}{8}$	\$10.00	$3\frac{3}{8}$	2	$9\frac{3}{8}$
$\frac{13}{32}$	5.80	$1\frac{27}{32}$	$1\frac{1}{2}$	$6\frac{1}{8}$	$\frac{29}{32}$	10.40	$3\frac{1}{2}$	2	$9\frac{5}{8}$
$\frac{7}{16}$	5.80	$1\frac{57}{64}$	$1\frac{1}{2}$	$6\frac{3}{16}$	$\frac{15}{16}$	10.80	$3\frac{5}{8}$	2	$9\frac{7}{8}$
$\frac{15}{32}$	6.00	$1\frac{57}{64}$	$1\frac{1}{2}$	$6\frac{7}{32}$	$\frac{31}{32}$	11.30	$3\frac{13}{16}$	2	$10\frac{3}{32}$
$\frac{1}{2}$	6.00	$1\frac{53}{64}$	$1\frac{1}{2}$	$6\frac{7}{16}$	1	11.80	$3\frac{7}{8}$	2	$10\frac{1}{4}$
$\frac{17}{32}$	6.20	$1\frac{15}{16}$	$1\frac{1}{2}$	$6\frac{5}{8}$	$1\frac{1}{32}$	12.20	4	2	$10\frac{1}{2}$
$\frac{9}{16}$	6.40	$2\frac{1}{16}$	$1\frac{1}{2}$	$6\frac{23}{32}$	$1\frac{1}{16}$	12.60	$4\frac{1}{16}$	2	$10\frac{11}{16}$
$\frac{19}{32}$	6.70	$2\frac{3}{16}$	$1\frac{1}{2}$	7	$1\frac{3}{32}$	13.10	$4\frac{1}{8}$	2	$10\frac{13}{16}$
.6093	6.70	$2\frac{5}{16}$	2	$7\frac{31}{32}$	$1\frac{1}{8}$	13.60	$4\frac{1}{8}$	2	$10\frac{7}{8}$
$\frac{5}{8}$	7.00	$2\frac{5}{16}$	2	$7\frac{31}{32}$	$1\frac{5}{32}$	14.10	$4\frac{3}{16}$	2	$11\frac{1}{32}$
$\frac{21}{32}$	7.30	$2\frac{1}{2}$	2	8	$1\frac{5}{16}$	14.60	$4\frac{3}{16}$	2	$11\frac{1}{8}$
.668	7.70	$2\frac{11}{16}$	2	$8\frac{3}{8}$	$1\frac{7}{32}$	15.60	$4\frac{1}{4}$	2	$11\frac{9}{32}$
$\frac{11}{16}$	7.70	$2\frac{11}{16}$	2	$8\frac{3}{8}$	1.225	15.60	$4\frac{1}{4}$	2	$11\frac{3}{8}$
$\frac{23}{32}$	8.00	$2\frac{3}{4}$	2	$8\frac{15}{32}$	1.234	15.60	$4\frac{1}{4}$	2	$11\frac{3}{8}$
.734	8.40	$2\frac{13}{16}$	2	$8\frac{31}{32}$	$1\frac{1}{4}$	15.60	$4\frac{1}{4}$	2	$11\frac{3}{8}$
.740	8.40	$2\frac{13}{16}$	2	$8\frac{17}{32}$	$1\frac{3}{32}$	16.60	$4\frac{3}{8}$	2	$11\frac{1}{2}$
$\frac{3}{4}$	8.40	$2\frac{13}{16}$	2	$8\frac{17}{32}$	$1\frac{5}{16}$	16.60	$4\frac{7}{16}$	2	$11\frac{9}{16}$
$\frac{25}{32}$	8.80	3	2	$8\frac{13}{16}$	$1\frac{11}{32}$	18.00	$4\frac{1}{2}$	2	$11\frac{11}{16}$
$\frac{13}{16}$	9.20	$3\frac{1}{16}$	2	9	$1\frac{3}{8}$	18.00	$4\frac{7}{16}$	2	$11\frac{3}{4}$
$\frac{27}{32}$	9.60	$3\frac{1}{4}$	2	$9\frac{1}{4}$	$1\frac{13}{32}$	20.00	$4\frac{1}{2}$	2	$11\frac{7}{8}$
.850	10.00	$3\frac{3}{8}$	2	$9\frac{3}{8}$	$1\frac{7}{16}$	20.00	$4\frac{7}{16}$	2	$11\frac{15}{16}$
.855	10.00	$3\frac{3}{8}$	2	$9\frac{3}{8}$	$1\frac{15}{32}$	22.00	$4\frac{1}{2}$	2	12
.860	10.00	$3\frac{3}{8}$	2	$9\frac{3}{8}$	$1\frac{1}{2}$	22.00	$4\frac{1}{2}$	2	$12\frac{1}{16}$
.865	10.00	$3\frac{3}{8}$	2	$9\frac{3}{8}$					

The spiral flutes make it an easy free cutting tool and if there is a longitudinal slot, keyway or chamber in the hole the reamer does not catch or chatter. It has a long guide and is especially adapted for reaming piston pin holes. It is easily adjustable to a few thousandths over-size.

All sizes and dimensions not listed are special and subject to special prices.

These reamers will be furnished ground for brass or bronze unless otherwise specified.

Limits of expansion recommended for these Reamers are as follows: Sizes $\frac{1}{4}$ to $\frac{1}{2}$.005 inch; $\frac{1}{2}$ to $\frac{3}{4}$.008 inch; 1 " to $1\frac{1}{2}$ " .010 inch.

No. 720

ADJUSTABLE REAMERS



A WRENCH FURNISHED WITH EACH REAMER

Diameter, Inches	Price Each	Whole Length, Inches	Diameter, Inches	Price Each	Whole Length, Inches
1	\$5.90	9	$2\frac{5}{16}$	\$19.50	14
$1\frac{1}{16}$	6.20	10	$2\frac{3}{8}$	21.00	14
$1\frac{1}{8}$	6.50	10	$2\frac{7}{16}$	22.50	14
$1\frac{3}{16}$	6.80	10	$2\frac{1}{2}$	24.00	14
$1\frac{1}{4}$	7.10	10	$2\frac{9}{16}$	25.00	$14\frac{1}{2}$
$1\frac{5}{16}$	7.40	11	$2\frac{5}{8}$	26.00	$14\frac{1}{2}$
$1\frac{3}{8}$	7.80	11	$2\frac{11}{16}$	27.00	$14\frac{1}{2}$
$1\frac{7}{16}$	8.20	11	$2\frac{3}{4}$	28.00	$14\frac{1}{2}$
$1\frac{1}{2}$	8.60	11	$2\frac{13}{16}$	28.75	15
$1\frac{9}{16}$	9.00	12	$2\frac{7}{8}$	29.50	15
$1\frac{5}{8}$	9.30	12	$2\frac{15}{16}$	30.75	15
$1\frac{11}{16}$	9.60	12	3	32.00	15
$1\frac{3}{4}$	9.90	12	$3\frac{1}{8}$	36.00	$15\frac{1}{2}$
$1\frac{13}{16}$	10.20	13	$3\frac{1}{4}$	40.00	$15\frac{1}{2}$
$1\frac{7}{8}$	10.40	13	$3\frac{3}{8}$	44.00	16
$1\frac{15}{16}$	10.60	13	$3\frac{1}{2}$	48.50	16
2	10.80	13	$3\frac{5}{8}$	53.50	$16\frac{1}{2}$
$2\frac{1}{16}$	11.80	$13\frac{1}{2}$	$3\frac{3}{4}$	58.50	$16\frac{1}{2}$
$2\frac{1}{8}$	12.80	$13\frac{1}{2}$	$3\frac{7}{8}$	63.50	17
$2\frac{3}{16}$	15.60	$13\frac{1}{2}$	4	67.50	17
$2\frac{1}{4}$	18.00	$13\frac{1}{2}$			

A ground, tapered plug, acting upon the chasers, adjusts the Reamers to the size desired.

To operate the plug, the Head Nut should be loosened, and the plug then turned until size desired is obtained. The Head Nut should then be tightened. Reamers 1 inch diameter will adjust .02 inch; $1\frac{1}{16}$ to $1\frac{1}{2}$ inches adjust $\frac{1}{32}$ inch; $1\frac{1}{8}$ to 3 inches adjust $\frac{1}{16}$ inch; $3\frac{1}{8}$ to 4 inches adjust .055 inch.

For illustration and sizes of wrenches fitting these Reamers see page 171.

Reamers for Brass or Bronze require special clearance and are so furnished on request.

No. 721

ADJUSTABLE REAMERS

WITH MORSE TAPER SHANKS



A WRENCH FURNISHED WITH EACH REAMER

Diam. Inches	Price Each	Whole Length, Inches	Morse Taper Shank	Diam. Inches	Price Each	Whole Length, Inches	Morse Taper Shank
1	\$7.00	10 $\frac{1}{4}$	No. 3	1 $\frac{1}{2}$	\$10.00	12 $\frac{1}{8}$	No. 4
1 $\frac{1}{16}$	7.40	10 $\frac{1}{4}$		1 $\frac{9}{16}$	10.30	12 $\frac{1}{8}$	
1 $\frac{1}{8}$	7.80	10 $\frac{5}{8}$		1 $\frac{5}{8}$	10.60	12 $\frac{5}{8}$	
1 $\frac{3}{16}$	8.20	10 $\frac{5}{8}$		1 $\frac{11}{16}$	10.90	12 $\frac{5}{8}$	
1 $\frac{1}{4}$	8.60	11 $\frac{1}{8}$	No. 4	1 $\frac{3}{4}$	11.20	13 $\frac{1}{2}$	No. 5
1 $\frac{5}{16}$	9.00	11 $\frac{1}{4}$		1 $\frac{13}{16}$	11.60	13 $\frac{5}{8}$	
1 $\frac{3}{8}$	9.40	11 $\frac{5}{8}$		1 $\frac{7}{8}$	12.00	14 $\frac{1}{8}$	
1 $\frac{7}{16}$	9.70	11 $\frac{5}{8}$		1 $\frac{15}{16}$	12.40	14 $\frac{1}{8}$	
				2	12.80	14 $\frac{1}{8}$	

For a general description of these Reamers see No. 720, page 161.

For illustration and sizes of wrenches fitting these Reamers see page 171.

Reamers for Brass or Bronze require special clearance and are so furnished on request.

No. 722

ADJUSTABLE REAMERS

MILLIMETER SIZES



A WRENCH FURNISHED WITH EACH REAMER

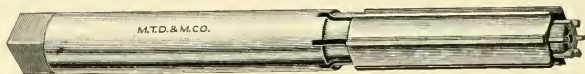
Diameter, M. M.	Price Each	Whole Length, M. M.	Diameter, M. M.	Price Each	Whole Length, M. M.
25	\$5.90	229	51	\$11.30	330
26	6.05	229	52	11.80	343
27	6.35	254	53	12.30	343
28	6.50	254	54	14.20	343
29	6.65	254	55	15.60	343
30	6.80	254	56	16.80	343
31	7.10	254	57	18.00	343
32	7.25	254	58	19.50	343
33	7.40	254	59	20.25	356
34	7.60	279	60	21.00	356
35	8.00	279	61	21.75	356
36	8.20	279	62	23.25	356
37	8.40	279	63	24.00	356
38	8.60	279	64	24.50	356
39	9.00	279	65	25.00	368
40	9.15	305	66	26.00	368
41	9.30	305	67	26.50	368
42	9.45	305	68	27.00	368
43	9.60	305	69	27.50	368
44	9.90	305	70	28.40	368
45	10.05	305	71	28.75	381
46	10.20	330	72	29.15	381
47	10.40	330	73	29.50	381
48	10.50	330	74	30.75	381
49	10.60	330	75	31.40	381
50	10.70	330	76	32.00	381

For a general description of these Reamers see No. 720, page 161.

For illustration and sizes of Wrenches fitting these Reamers see page 171.

Reamers for Brass or Bronze require special clearance and are so furnished on request.

No. 725 EXPANDING REAMERS



Diameter, Inches	Price Each	Whole Length, Inches	Diameter, Inches	Price Each	Whole Length, Inches
$\frac{3}{4}$	\$4.00	$7\frac{13}{16}$	$1\frac{7}{16}$	\$7.40	$12\frac{3}{16}$
$\frac{13}{16}$	4.40	$8\frac{3}{16}$	$1\frac{1}{2}$	7.80	$12\frac{9}{16}$
$\frac{7}{8}$	4.70	$8\frac{9}{16}$	$1\frac{9}{16}$	8.20	$12\frac{15}{16}$
$\frac{15}{16}$	5.00	$8\frac{15}{16}$	$1\frac{5}{8}$	8.50	$13\frac{5}{16}$
1	5.30	$9\frac{7}{16}$	$1\frac{11}{16}$	8.80	$13\frac{11}{16}$
$1\frac{1}{16}$	5.60	$9\frac{13}{16}$	$1\frac{3}{4}$	9.10	$14\frac{3}{16}$
$1\frac{1}{8}$	5.90	$10\frac{3}{16}$	$1\frac{13}{16}$	9.40	$14\frac{9}{16}$
$1\frac{3}{16}$	6.20	$10\frac{9}{16}$	$1\frac{7}{8}$	9.60	$14\frac{15}{16}$
$1\frac{1}{4}$	6.50	$10\frac{15}{16}$	$1\frac{15}{16}$	9.80	$15\frac{3}{16}$
$1\frac{5}{16}$	6.80	11 $\frac{7}{16}$	2	10.00	$15\frac{11}{16}$
$1\frac{3}{8}$	7.10	11 $\frac{13}{16}$			

These Reamers have an expansion of .009 inch.

No. 726 EXPANDING REAMERS WITH MORSE TAPER SHANKS



Diam. Inches	Price Each	Whole Length, Inches	Morse Taper Shank, Number	Diam. Inches	Price Each	Whole Length, Inches	Morse Taper Shank, Number
$\frac{3}{4}$	\$4.00	$9\frac{1}{2}$	2	$1\frac{7}{16}$	\$7.40	12	4
$\frac{13}{16}$	4.40	$9\frac{1}{2}$	2	$1\frac{1}{2}$	7.80	$12\frac{1}{2}$	4
$\frac{7}{8}$	4.70	10	2	$1\frac{9}{16}$	8.20	$12\frac{1}{2}$	4
$\frac{15}{16}$	5.00	10	3	$1\frac{5}{8}$	8.50	13	4
1	5.30	$10\frac{1}{2}$	3	$1\frac{11}{16}$	8.80	13	4
$1\frac{1}{16}$	5.60	$10\frac{1}{2}$	3	$1\frac{3}{4}$	9.10	$13\frac{1}{2}$	5
$1\frac{1}{8}$	5.90	11	3	$1\frac{13}{16}$	9.40	$13\frac{1}{2}$	5
$1\frac{3}{16}$	6.20	11	3	$1\frac{7}{8}$	9.60	14	5
$1\frac{1}{4}$	6.50	$11\frac{1}{2}$	4	$1\frac{15}{16}$	9.80	14	5
$1\frac{5}{16}$	6.80	$11\frac{1}{2}$	4	2	10.00	14	5
$1\frac{3}{8}$	7.10	12	4				

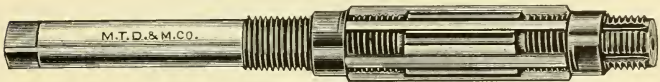
The cuts show the construction of the Expanding Reamers. Wedge-shaped pins are adjusted to the blades and driving the pins increases the diameter of the Reamers. When new blades or pins are required, the Reamers should accompany the order. Expanding Reamers are not furnished smaller than $\frac{3}{4}$ inch diameter. These Reamers have an expansion of .009 inch.

Reamers for Brass or Bronze require special clearance and are so furnished on request.

No. 728
Carbon Steel

No. 1728
High Speed Steel

ADJUSTABLE REAMERS



Size Letter	Price Each		Extra Blades, Per Set		Extra Nuts, Each	Range of Adjustment		Whole Length, Inches	Length of Blade, Inches
	Carbon Steel	High Speed Steel	Carbon Steel	High Speed Steel		Minimum	Maximum		
A	\$4.50	\$5.75	\$1.80	\$4.20	\$.30	$\frac{15}{32}$	to $\frac{17}{32}$	5½	1½
B	4.50	5.75	1.80	4.20	.30	$\frac{17}{32}$	to $\frac{19}{32}$	5¾	1½
C	4.75	6.00	1.80	4.20	.30	$\frac{19}{32}$	to $\frac{21}{32}$	6½	2¼
D	4.75	6.25	1.80	4.20	.30	$\frac{21}{32}$	to $\frac{23}{32}$	6¾	2¼
E	5.00	6.50	2.10	4.50	.35	$\frac{23}{32}$	to $\frac{25}{32}$	7	2½
F	5.00	6.80	2.10	4.50	.35	$\frac{25}{32}$	to $\frac{27}{32}$	7½	2½
G	5.50	7.10	2.40	4.80	.40	$\frac{27}{32}$	to $\frac{15}{16}$	8	3
H	5.80	7.85	2.40	4.80	.40	$\frac{15}{16}$	to $1\frac{1}{16}$	9	3¼
I	7.00	8.75	2.70	5.10	.45	$1\frac{1}{16}$	to $1\frac{3}{16}$	10	3⅝
J	8.00	10.00	2.70	5.10	.45	$1\frac{3}{16}$	to $1\frac{11}{32}$	11	3½
K	10.00	12.50	3.30	6.00	.50	$1\frac{11}{32}$	to $1\frac{17}{32}$	12	4⅜
L	11.50	15.00	3.90	8.10	.65	$1\frac{17}{32}$	to $1\frac{25}{32}$	14	4¾
M	15.00	18.75	4.20	9.90	.70	$1\frac{25}{32}$	to $2\frac{3}{32}$	16	5

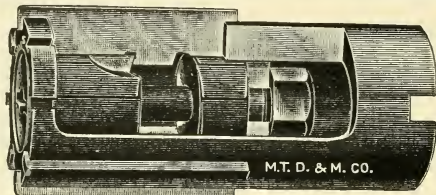
Set of Reamers A to H, inc., in case. Per Set, \$41.50. See page 131.

Set of Reamers A to K, inc., in case. Per Set, \$67.00. See page 131.

The six tapered blades slide lengthwise in the body slots and are firmly held by the two collars in the position that gives the size desired. No special wrench is needed.

These Reamers will be furnished ground for brass or bronze unless otherwise specified.

No. 730 ONE-LOCK ADJUSTABLE No. 1730
Carbon Steel REAMERS High Speed Steel



BLADES FURNISHED ONLY IN SETS

Diam., Inches	Price Each		Extra Blades, Per Set		Diam., Inches	Price Each		Extra Blades, Per Set	
	Carbon Steel	High Speed Steel	Carbon Steel	High Speed Steel		Carbon Steel	High Speed Steel	Carbon Steel	High Speed Steel
$\frac{3}{4}$	\$6.00	\$7.00	\$2.80	\$4.00	$2\frac{7}{16}$	\$11.70	\$14.30	\$4.30	\$6.65
$\frac{13}{16}$	6.00	7.00	2.80	4.00	$2\frac{1}{2}$	12.00	14.65	4.40	6.80
$\frac{7}{8}$	6.00	7.00	2.80	4.00	$2\frac{9}{16}$	12.30	15.00	4.50	6.95
$\frac{15}{16}$	6.00	7.00	2.80	4.00	$2\frac{5}{8}$	12.60	15.30	4.60	7.10
1	6.00	7.00	2.80	4.00	$2\frac{11}{16}$	12.90	15.65	4.70	7.25
$1\frac{1}{16}$	6.00	7.00	2.80	4.10	$2\frac{3}{4}$	13.20	16.00	4.80	7.40
$1\frac{1}{8}$	6.00	7.25	2.80	4.20	$2\frac{13}{16}$	13.70	16.55	4.90	7.55
$1\frac{3}{16}$	6.00	7.50	2.80	4.30	$2\frac{7}{8}$	14.20	17.10	5.00	7.70
$1\frac{1}{4}$	6.00	7.60	2.80	4.40	$2\frac{15}{16}$	14.70	17.65	5.10	7.85
$1\frac{5}{16}$	6.30	7.95	2.85	4.50	3	15.20	18.20	5.20	8.00
$1\frac{3}{8}$	6.60	8.30	2.90	4.60	$3\frac{1}{16}$	17.75	20.95	5.30	8.15
$1\frac{7}{16}$	6.90	8.65	2.95	4.70	$3\frac{1}{8}$	18.00	21.20	5.40	8.30
$1\frac{1}{2}$	7.20	9.00	3.00	4.80	$3\frac{3}{16}$	18.25	21.45	5.50	8.45
$1\frac{9}{16}$	7.50	9.35	3.05	4.90	$3\frac{1}{4}$	19.00	22.35	5.60	8.60
$1\frac{5}{8}$	7.80	9.65	3.10	5.00	$3\frac{5}{16}$	19.25	22.60	5.70	8.75
$1\frac{11}{16}$	8.10	10.00	3.15	5.10	$3\frac{3}{8}$	19.50	22.85	5.80	8.90
$1\frac{3}{4}$	8.40	10.35	3.20	5.20	$3\frac{7}{16}$	19.75	23.10	5.90	9.05
$1\frac{13}{16}$	8.70	10.70	3.30	5.30	$3\frac{1}{2}$	20.50	24.00	6.00	9.20
$1\frac{7}{8}$	9.00	11.05	3.40	5.40	$3\frac{9}{16}$	20.75	24.25	6.10	9.35
$1\frac{15}{16}$	9.30	11.40	3.50	5.50	$3\frac{5}{8}$	21.00	24.50	6.20	9.50
2	9.60	11.75	3.60	5.60	$3\frac{11}{16}$	21.25	24.75	6.30	9.65
$2\frac{1}{16}$	9.90	12.05	3.70	5.75	$3\frac{3}{4}$	23.00	27.60	7.50	11.00
$2\frac{1}{8}$	10.20	12.40	3.80	5.90	$3\frac{13}{16}$	23.25	27.85	7.60	11.20
$2\frac{3}{16}$	10.50	12.75	3.90	6.05	$3\frac{7}{8}$	23.50	28.10	7.70	11.40
$2\frac{1}{4}$	10.80	13.25	4.00	6.20	$3\frac{15}{16}$	23.75	28.35	7.80	11.60
$2\frac{5}{16}$	11.10	13.60	4.10	6.35	4	24.50	29.30	7.90	11.80
$2\frac{3}{8}$	11.40	13.95	4.20	6.50					

For Arbors fitting these Reamers see page 119.

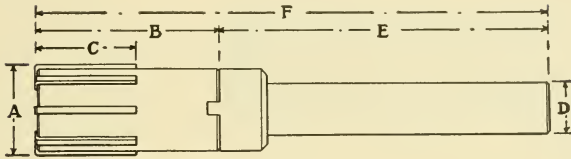
An Adjustment Socket Wrench and a Key are furnished without charge with each Reamer.

Turning the Cam Bolt in the Shell by the slotted head moves all blades at once and all exactly alike, outward from the center. When the desired diameter is reached be sure all blades are firmly seated on Cam Bolt before the Lock Nut is tightened.

Nothing to get out of order. Only three parts besides blades. One movement operates all blades at once. One nut locks them.

Exact adjustment is quickly made to any size within range without regrinding blades. See page 167.

Reamers for Brass or Bronze require special clearance and are so furnished on request.



DIMENSIONS OF ONE-LOCK REAMER PARTS

A	B	C	D	E	F
Diameter of Reamer, Inches	Length of Reamer, Inches	Length of Blade, Inches	Diameter of Arbor, Inches	Length Straight or Morse Taper Arbor, Inches	Whole Length Reamer and Arbor, Inches
$\frac{3}{4}$ to $\frac{15}{16}$	$2\frac{13}{16}$	$1\frac{15}{32}$	$\frac{5}{8}$	$6\frac{5}{8}$	$9\frac{7}{16}$
1 to $1\frac{3}{16}$	$3\frac{1}{16}$	$1\frac{17}{32}$	$\frac{3}{4}$	$7\frac{1}{2}$	$10\frac{9}{16}$
$1\frac{1}{4}$ to $1\frac{11}{16}$	$3\frac{11}{16}$	$1\frac{15}{16}$	$\frac{7}{8}$	$7\frac{7}{8}$	$11\frac{9}{16}$
$1\frac{3}{4}$ to $2\frac{3}{16}$	$4\frac{5}{16}$	$2\frac{3}{16}$	$1\frac{1}{8}$	$8\frac{1}{4}$	$12\frac{9}{16}$
$2\frac{1}{4}$ to $2\frac{11}{16}$	$4\frac{13}{16}$	$2\frac{5}{8}$	$1\frac{3}{8}$	$8\frac{3}{4}$	$13\frac{9}{16}$
$2\frac{3}{4}$ to $3\frac{3}{16}$	$5\frac{3}{16}$	3	$1\frac{3}{4}$	$9\frac{1}{4}$	$14\frac{7}{16}$
$3\frac{1}{4}$ to $3\frac{11}{16}$	6	$3\frac{3}{4}$	$1\frac{3}{4}$	$9\frac{1}{4}$	$15\frac{1}{4}$
$3\frac{3}{4}$ to 4	$6\frac{1}{2}$	4	$2\frac{1}{4}$	10	$16\frac{1}{2}$

Keys No. 1 fit Reamers $\frac{3}{4}$ to $1\frac{3}{16}$ inches inclusive.

Keys No. 2 fit Reamers $1\frac{1}{4}$ to $2\frac{3}{16}$ inches inclusive.

Keys No. 3 fit Reamers $2\frac{1}{4}$ to 4 inches inclusive.

Wrenches No. 1 fit Reamers $\frac{3}{4}$ to $1\frac{1}{8}$ inch inclusive.

Wrenches No. 2 fit Reamers 1 inch to $1\frac{1}{16}$ inches inclusive.

Wrenches No. 3 fit Reamers $1\frac{1}{4}$ to $1\frac{11}{16}$ inches inclusive.

Wrenches No. 4 fit Reamers $1\frac{3}{4}$ to $2\frac{3}{16}$ inches inclusive.

Wrenches No. 5 fit Reamers $2\frac{1}{4}$ to $2\frac{11}{16}$ inches inclusive.

Wrenches No. 6 fit Reamers $2\frac{3}{4}$ to $3\frac{11}{16}$ inches inclusive.

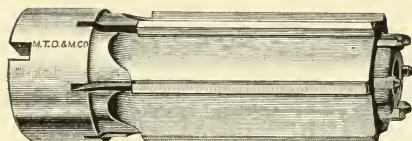
Wrenches No. 7 fit Reamers $3\frac{3}{4}$ to 4 inches inclusive.

One-Lock Reamers $\frac{3}{4}$ to $1\frac{1}{8}$ inch diameter will adjust $\frac{1}{64}$ inch; 1 to $1\frac{1}{16}$ inches adjust .025 inch; $1\frac{1}{4}$ to $1\frac{1}{16}$ inches adjust $\frac{1}{32}$ inch; $1\frac{1}{2}$ to $1\frac{11}{16}$ inches adjust $\frac{1}{16}$ inch; 2 to $2\frac{1}{16}$ inches adjust $\frac{1}{16}$ inch; $2\frac{3}{4}$ to 4 inches adjust $\frac{1}{8}$ inch.

The One-Lock Reamer can be adjusted larger or smaller with equal facility. The blades have no endwise movement in the shell, and can always ream to the bottom of a blind hole.

In ordering blades, state size of Reamer and also length of shell.

For list prices of these Reamers see page 166.



No. 735

EXPANDING
SHELL REAMERS

The cut shows the construction of the Expanding Shell Reamer. Wedge-shaped pins are adjusted to the blades and driving the pins increases the diameter of the Reamer. When new blades or pins are required, the Reamer should accompany the order. The Reamers can be increased but not reduced in size. Special sizes of larger diameter than 4 inches furnished to order at special prices.

Diameter, Inches	Price Each	Whole Length, Inches	Morse Taper Hole
$1\frac{3}{8}$	\$9.20	$4\frac{11}{16}$	No. 2
$1\frac{7}{16}$	9.60	$4\frac{11}{16}$	
$1\frac{1}{2}$	10.00	$4\frac{11}{16}$	
$1\frac{9}{16}$	10.50	$4\frac{11}{16}$	
$1\frac{5}{8}$	11.00	$4\frac{11}{16}$	
$1\frac{11}{16}$	11.50	$5\frac{3}{16}$	No. 3
$1\frac{3}{4}$	12.00	$5\frac{3}{16}$	
$1\frac{13}{16}$	12.75	$5\frac{3}{16}$	
$1\frac{7}{8}$	13.50	$5\frac{3}{16}$	
$1\frac{15}{16}$	14.25	$5\frac{3}{16}$	
2	15.00	$5\frac{3}{16}$	
$2\frac{1}{16}$	15.25	$5\frac{3}{16}$	
$2\frac{1}{8}$	15.50	$5\frac{3}{16}$	
$2\frac{3}{16}$	15.75	$5\frac{3}{16}$	No. 4
$2\frac{1}{4}$	16.00	$5\frac{3}{16}$	
$2\frac{5}{16}$	16.25	$5\frac{7}{16}$	
$2\frac{3}{8}$	16.50	$5\frac{7}{16}$	
$2\frac{7}{16}$	16.75	$5\frac{7}{16}$	
$2\frac{1}{2}$	17.00	$5\frac{7}{16}$	
$2\frac{9}{16}$	17.25	$5\frac{7}{16}$	
$2\frac{5}{8}$	17.50	$5\frac{7}{16}$	
$2\frac{11}{16}$	17.75	$5\frac{7}{16}$	No. 4
$2\frac{3}{4}$	18.00	$5\frac{7}{16}$	
$2\frac{13}{16}$	18.25	$5\frac{7}{16}$	

These Reamers have an expansion of .009 inch.

For Arbors fitting these Reamers see page 116.

For Expanding Shell Reamers with straight holes see page 88-89.

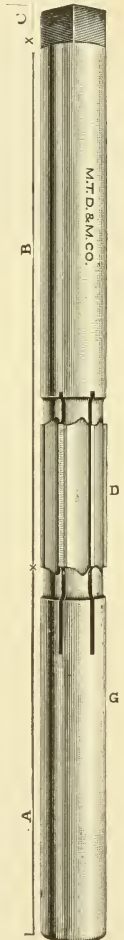
Reamers for Brass or Bronze require special clearance and are so furnished on request.

No. 735

EXPANDING SHELL REAMERS

No. 738

Diameter, Inches	Price Each	Whole Length, Inches	Morse Taper Hole
2 $\frac{7}{8}$	\$18.50	5 $\frac{7}{16}$	No. 4
2 $\frac{15}{16}$	18.75	5 $\frac{7}{16}$	
3	19.00	5 $\frac{7}{16}$	
3 $\frac{1}{16}$	19.50	5 $\frac{7}{16}$	
3 $\frac{1}{8}$	20.00	5 $\frac{7}{16}$	
3 $\frac{3}{16}$	20.50	5 $\frac{7}{16}$	
3 $\frac{1}{4}$	21.00	5 $\frac{7}{16}$	
3 $\frac{5}{16}$	21.50	5 $\frac{7}{16}$	
3 $\frac{3}{8}$	22.00	6	No. 5
3 $\frac{7}{16}$	22.50	6	
3 $\frac{1}{2}$	23.00	6	
3 $\frac{9}{16}$	23.50	6	
3 $\frac{5}{8}$	24.00	6	
3 $\frac{11}{16}$	24.50	6	
3 $\frac{3}{4}$	25.00	6	
3 $\frac{13}{16}$	25.75	6	
3 $\frac{7}{8}$	26.50	6	
3 $\frac{15}{16}$	27.25	6	
4	28.00	6	



These Reamers have an expansion of .009 inch.
 For Arbors fitting these Reamers see page 116.
 For Expanding Shell Reamers with straight holes see page 88-89.
 Reamers for Brass or Bronze require special clearance and are so furnished on request.

No. 738

EXPANDING REAMERS

These Reamers are made to order only, and are not furnished smaller than $\frac{3}{4}$ inch diameter.

In ordering state diameter at letters D and G, and the lengths as by letters A, B, and C, also size of square. Wedge-shaped pins are adjusted to the blades of the Reamer and driving the pins increases its diameter.

Reamers for Brass or Bronze require special clearance and are so furnished on request.

No. 743 ADJUSTABLE SHELL REAMERS



The cut shows the construction of our Patent Adjustable Shell Reamer. The wedge-shaped blades are held rigidly in slots by means of taper keys.

The bottom of the slots is inclined to the axis of the reamer, and the size may be adjusted by first driving back the keys and turning the nut in the required direction. The keys should then be driven home to lock the blades.

This style of Adjustable Shell Reamer is not made smaller than $1\frac{3}{8}$ inches, but can be made solid as small as $\frac{3}{4}$ inch.

A Wrench furnished with each Reamer.

Diam. Inches	Price Each	Whole Length, Inches	Morse Taper Hole	Diam. Inches	Price Each	Whole Length, Inches	Morse Taper Hole
$1\frac{3}{8}$	\$10.60	$4\frac{7}{8}$	No. 2	$2\frac{3}{4}$	\$20.70	6	No. 4
$1\frac{7}{16}$	11.05	$4\frac{7}{8}$		$2\frac{13}{16}$	20.95	6	
$1\frac{1}{2}$	11.50	$4\frac{7}{8}$		$2\frac{7}{8}$	21.25	6	
$1\frac{9}{16}$	12.05	$4\frac{7}{8}$		$2\frac{15}{16}$	21.55	6	
$1\frac{5}{8}$	12.65	$4\frac{7}{8}$		3	21.85	6	
				$3\frac{1}{16}$	22.40	6	
$1\frac{11}{16}$	13.20	$5\frac{1}{4}$	No. 3	$3\frac{1}{8}$	23.00	6	No. 5
$1\frac{3}{4}$	13.80	$5\frac{1}{4}$		$3\frac{3}{16}$	23.55	6	
$1\frac{13}{16}$	14.65	$5\frac{1}{4}$		$3\frac{1}{4}$	24.15	6	
$1\frac{7}{8}$	15.50	$5\frac{1}{4}$		$3\frac{5}{16}$	24.70	6	
$1\frac{15}{16}$	16.40	$5\frac{1}{4}$		$3\frac{3}{8}$	25.30	$6\frac{1}{2}$	
2	17.25	$5\frac{1}{2}$		$3\frac{7}{16}$	25.85	$6\frac{1}{2}$	
$2\frac{1}{16}$	17.55	$5\frac{1}{2}$	No. 4	$3\frac{1}{2}$	26.45	$6\frac{1}{2}$	No. 5
$2\frac{1}{8}$	17.85	$5\frac{1}{2}$		$3\frac{9}{16}$	27.00	$6\frac{1}{2}$	
$2\frac{3}{16}$	18.15	$5\frac{1}{2}$		$3\frac{5}{8}$	27.60	$6\frac{1}{2}$	
$2\frac{1}{4}$	18.40	$5\frac{1}{2}$		$3\frac{11}{16}$	28.15	$6\frac{1}{2}$	
				$3\frac{3}{4}$	28.75	$6\frac{1}{2}$	
$2\frac{5}{16}$	18.70	$5\frac{3}{4}$		$3\frac{13}{16}$	29.60	$6\frac{1}{2}$	
$2\frac{3}{8}$	19.00	$5\frac{3}{4}$	No. 4	$3\frac{1}{2}$	30.45	$6\frac{1}{2}$	No. 5
$2\frac{7}{16}$	19.25	$5\frac{3}{4}$		$3\frac{7}{8}$	31.30	$6\frac{1}{2}$	
$2\frac{1}{2}$	19.55	$5\frac{3}{4}$		$3\frac{15}{16}$	32.20	$6\frac{1}{2}$	
$2\frac{9}{16}$	19.85	$5\frac{3}{4}$		4		$6\frac{1}{2}$	
$2\frac{5}{8}$	20.10	6					
$2\frac{11}{16}$	20.40	6					

These Reamers, sizes $1\frac{3}{8}$ inches to $2\frac{9}{16}$ inches, have an expansion of .009 inch; sizes $2\frac{5}{8}$ inches to 4 inches an expansion of .012 inch.

For Arbors fitting these Reamers see page 116.

Reamers for Brass or Bronze require special clearance and are so furnished on request.

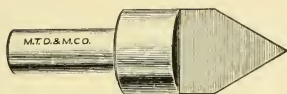
No. 750
Carbon Steel

No. 1750
High Speed Steel

No. 750
CENTER REAMERS
INCLUDED ANGLE 60°

STYLE NO. 1

STYLE NO. 2



Style No. 2 Reamers with included Angle of 72 and 82 degrees furnished of Carbon Steel at regular prices.

High Speed Steel Center Reamers are regularly furnished in style No. 2 only and with 60 degree or 72 degree Inclusive Angle.

All sizes, dimensions and styles not listed are special and subject to special prices.

Size Cut, Inches	Style No. 1 Price Each		Style No. 2 Price Each		Whole Length, Inches	Diam. Shank, Inches	Length Shank, Inches
	Carbon Steel	High Speed Steel	Carbon Steel	High Speed Steel			
1/4	\$.25	\$.30	\$1.00	1 1/2	3/16	3/4	
3/8	.30	.35	1.50	1 13/16	1/4	7/8	
1/2	.35	.40	2.00	2	3/8	7/8	
5/8	.60	.65	2.75	2 1/8	3/8	7/8	
3/4	.80	.85	3.50	2 3/8	1/2	1	

No. 753
WRENCHES FOR ADJUSTABLE REAMERS

STYLE NOS. 720, 721, 722, AND 743



A WRENCH FURNISHED WITH EACH REAMER

No. of Wrench	Fitting Reamers, Inches	No. of Wrench	Fitting Reamers, Inches	No. of Wrench	Fitting Reamers, Inches	No. of Wrench	Fitting Reamers, Inches
3	1	9	1 11/16, 1 3/4	15	2 1/2, 2 9/16	21	3 1/4, 3 5/16
4	1 1/16, 1 1/8	10	1 13/16, 1 7/8	16	2 5/8, 2 11/16	22	3 3/8, 3 7/16
5	1 1/8, 1 1/4	11	1 15/16, 2, 2 1/16	17	2 3/4, 2 13/16	23	3 1/2, 3 9/16
6	1 5/16, 1 3/8	12	2 1/8, 2 3/16	18	2 7/8, 2 15/16	24	3 5/8, 3 11/16
7	1 7/16, 1 1/2	13	2 1/4, 2 5/16	19	3, 3 1/16	25	3 3/4, 3 13/16
8	1 9/16, 1 5/8	14	2 3/8, 2 7/16	20	3 1/8, 3 3/16	26	3 7/8, 3 15/16
						27	4

For Additional Wrenches prices quoted on application.

For Reamers Nos. 720, 721, 722, and 743 see pages 161-163, and 170.

No. 757

STRAIGHT SHANK COUNTERBORES

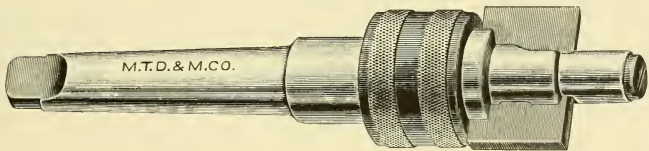


MACHINE SCREWS A. S. M. E. STANDARD

Number and Pitch of Screw	Tap Size For Body		Tap Size For Fil. Head		Body Size For Fil. Head		Body Size For Round Hd.		Body Size For Flat Head		Whole Length, Inches	Dec. Equiv. of Body of Screw
	Dia. Bore	Dia. Guide	Dia. Bore	Dia. Guide	Dia. Bore	Dia. Guide	Dia. Bore	Dia. Guide	Dia. Bore	Dia. Guide		
0-80	.062	.046	.090	.046	.090	.062	.136	.062	.136	.062	2	.060
1-72	.075	.059	.112	.059	.112	.073	.159	.073	.159	.073	2	.073
2-64	.088	.070	.134	.070	.134	.086	.185	.086	.185	.086	2	.086
3-56	.101	.078	.155	.078	.155	.099	.209	.099	.209	.099	2	.099
4-48	.114	.089	.176	.089	.176	.113	.232	.113	.232	.113	2	.112
5-44	.127	.099	.198	.099	.198	.125	.256	.125	.256	.125	2 1/4	.125
6-40	.140	.110	.219	.110	.219	.140	.280	.140	.280	.140	2 1/4	.138
7-36	.153	.120	.240	.120	.240	.152	.304	.152	.304	.152	2 1/4	.151
8-36	.166	.136	.262	.136	.262	.166	.328	.166	.328	.166	2 1/4	.164
9-32	.179	.140	.284	.140	.284	.177	.352	.177	.352	.177	2 1/4	.177
10-30	.192	.152	.305	.152	.305	.191	.375	.191	.375	.191	2 1/2	.190
12-28	.218	.173	.348	.173	.348	.218	.424	.218	.424	.218	2 1/2	.216
14-24	.244	.193	.390	.193	.390	.242	.476	.242	.476	.242	2 1/2	.242
16-22	.270	.213	.433	.213	.433	.272	.528	.272	.528	.272	3	.268
18-20	.296	.234	.476	.234	.476	.295	.580	.295	.580	.295	3	.294
20-20	.322	.261	.518	.261	.518	.323	.632	.323	.632	.323	3 1/4	.320

No. 760

COUNTERBORES
WITH INTERCHANGEABLE BLADES AND GUIDES
AND MORSE TAPER SHANKS



Size No.	Price Each, No. Blade or Guide	BLADES		GUIDES		M. T. Shank No.
		Sizes by 16ths	Price Each	Sizes by 16ths	Price Each	
1	\$6.50	$\frac{3}{4}$ -1	\$.85	$\frac{1}{2}$ - $\frac{3}{4}$	\$1.00	2
		$1\frac{1}{16}$ - $1\frac{1}{2}$	.95	$\frac{13}{16}$ -1	1.25
2	8.75	$1\frac{9}{16}$ -2	1.25	$\frac{7}{8}$ -1	1.25	3
		$2\frac{1}{16}$ - $2\frac{1}{2}$	1.40	$1\frac{1}{16}$ - $1\frac{1}{4}$	1.45	
3	10.00	$2\frac{9}{16}$ - $2\frac{3}{4}$	1.65	$1\frac{1}{8}$ - $1\frac{1}{4}$	1.60	4
		$2\frac{13}{16}$ -3	1.85	$1\frac{5}{16}$ - $1\frac{1}{2}$	1.75	
		$3\frac{1}{16}$ - $3\frac{1}{4}$	2.15	$1\frac{9}{16}$ - $1\frac{3}{4}$	1.95	
		$3\frac{5}{16}$ - $3\frac{1}{2}$	2.50	$1\frac{13}{16}$ -2	2.50	

Special sizes made to order. Prices quoted on application.

No. 765
Carbon Steel

No. 1765
COUNTERBORES High Speed Steel

WITH MORSE TAPER SHANKS

Counterbores given in the table below are furnished either singly or in sets. A set consists of one counterbore for head of screw with guide of body size, one counterbore for head with guide of tap drill size, and one counterbore to enlarge a tap drill hole to body size. Counterbores of other sizes are made to order at special prices.



Diameter of Counterbore, Inches	Price Each		Diameter of Guide, Inches		Diameter of Screw and Pitch, U. S. Standard	Whole Length, Inches	Morse Taper Shank
	Carbon Steel	High Speed Steel	For Body Size Hole	For Tap Drill Hole			
$\frac{3}{16}$	\$1.65	\$2.40		.133	$\frac{3}{16}$ -24	5	1
$\frac{1}{4}$	1.75	2.40		.133	$\frac{3}{16}$ -24	5	1
$\frac{1}{4}$	1.75	2.40	$\frac{3}{16}$		$\frac{3}{16}$ -24	5	1
$\frac{1}{4}$	1.75	2.60		.1865	$\frac{1}{4}$ -20	$5\frac{3}{4}$	1
$\frac{5}{16}$	1.85	2.75		.241	$\frac{5}{16}$ -18	$6\frac{1}{8}$	1
$\frac{3}{8}$	2.00	2.60		.1865	$\frac{1}{4}$ -20	$5\frac{3}{4}$	1
$\frac{3}{8}$	2.00	2.60	$\frac{1}{4}$		$\frac{1}{4}$ -20	$5\frac{3}{4}$	1
$\frac{3}{8}$	2.00	2.90		.301	$\frac{3}{8}$ -16	$6\frac{1}{2}$	1
$\frac{7}{16}$	2.10	2.75		.241	$\frac{5}{16}$ -18	$6\frac{1}{8}$	1
$\frac{7}{16}$	2.10	2.75	$\frac{5}{16}$		$\frac{5}{16}$ -18	$6\frac{1}{8}$	1
$\frac{7}{16}$	2.10	3.50		.347	$\frac{7}{16}$ -14	7	2
$\frac{1}{2}$	2.20	3.60		.4057	$\frac{1}{2}$ -13	$7\frac{1}{4}$	2
$\frac{9}{16}$	2.35	3.00		.301	$\frac{3}{8}$ -16	$6\frac{1}{2}$	1
$\frac{9}{16}$	2.35	3.00	$\frac{3}{8}$		$\frac{3}{8}$ -16	$6\frac{1}{2}$	1
$\frac{9}{16}$	2.35	3.70		.452	$\frac{9}{16}$ -12	$7\frac{1}{2}$	2
$\frac{5}{8}$	2.55	3.50		.347	$\frac{7}{16}$ -14	7	2
$\frac{5}{8}$	2.55	3.50	$\frac{7}{16}$		$\frac{7}{16}$ -14	7	2
$\frac{5}{8}$	2.55	3.80		.5146	$\frac{5}{8}$ -11	$7\frac{3}{4}$	2
$\frac{11}{16}$	2.70	5.00		.5771	$\frac{11}{16}$ -11	$8\frac{1}{2}$	3
$\frac{3}{4}$	2.85	3.60		.4057	$\frac{1}{2}$ -13	$7\frac{1}{4}$	2
$\frac{3}{4}$	2.85	3.60	$\frac{1}{2}$		$\frac{1}{2}$ -13	$7\frac{1}{4}$	2
$\frac{3}{4}$	2.85	5.25		.624	$\frac{3}{4}$ -10	9	3
$\frac{13}{16}$	3.10	4.00		.452	$\frac{9}{16}$ -12	$7\frac{1}{2}$	2
$\frac{13}{16}$	3.10	4.00	$\frac{9}{16}$		$\frac{9}{16}$ -12	$7\frac{1}{2}$	2
$\frac{13}{16}$	3.10	5.25		.6865	$\frac{13}{16}$ -10	9	3
$\frac{7}{8}$	3.30	4.50		.5146	$\frac{5}{8}$ -11	$7\frac{3}{4}$	2
$\frac{7}{8}$	3.30	4.50	$\frac{5}{8}$		$\frac{5}{8}$ -11	$7\frac{3}{4}$	2
$\frac{7}{8}$	3.30	5.50		.7333	$\frac{7}{8}$ -9	$9\frac{1}{4}$	3
$\frac{15}{16}$	3.55	5.00		.5771	$\frac{11}{16}$ -11	$8\frac{1}{2}$	3
$\frac{15}{16}$	3.55	5.00	$\frac{11}{16}$		$\frac{11}{16}$ -11	$8\frac{1}{2}$	3
$\frac{15}{16}$	3.55	5.50		.7958	$\frac{15}{16}$ -9	$9\frac{1}{4}$	3
1	3.85	6.00		.624	$\frac{3}{4}$ -10	9	3
1	3.85	6.00	$\frac{3}{4}$		$\frac{3}{4}$ -10	9	3
1	3.85	6.50		.8427	1 - 8	$9\frac{1}{2}$	3

For sets of Counterbores, Taps, Tap Drills and Wrench in Blocks see pages 176-178.

No. 766
Carbon Steel

No. 1766
COUNTERBORES High Speed Steel

WITH STRAIGHT SHANKS

Counterbores given in the table below are furnished either singly or in sets. A set consists of one counterbore for head of screw with guide of body size, one counterbore for head with guide of tap drill size, and one counterbore to enlarge a tap drill hole to body size. Counterbores of other sizes are made to order at special prices.



Diam. of Counterbore, Inches	Price Each		Diameter of Guide, Inches		Diameter of Screw and Pitch, U. S. Standard	Whole Length, Inches	SHANK	
	Carbon Steel	High Speed Steel	For Body Size Hole	For Tap Drill Hole			Length, Inches	Diam., Inches
$\frac{3}{16}$	\$1.50	\$2.10		.133	$\frac{3}{16}$ -24	5 $\frac{1}{4}$	2 $\frac{9}{16}$	$\frac{1}{2}$
$\frac{1}{4}$	1.60	2.10		.133	$\frac{3}{16}$ -24	5 $\frac{1}{4}$	2 $\frac{9}{16}$	$\frac{1}{2}$
$\frac{1}{4}$	1.60	2.10	$\frac{3}{16}$		$\frac{3}{16}$ -24	5 $\frac{1}{4}$	2 $\frac{9}{16}$	$\frac{1}{2}$
$\frac{1}{4}$	1.60	2.30		.1865	$\frac{1}{4}$ -20	5 $\frac{3}{4}$	2 $\frac{9}{16}$	$\frac{1}{2}$
$\frac{5}{16}$	1.70	2.50		.241	$\frac{5}{16}$ -18	6 $\frac{1}{8}$	2 $\frac{9}{16}$	$\frac{1}{2}$
$\frac{3}{8}$	1.80	2.30		.1865	$\frac{1}{4}$ -20	5 $\frac{3}{4}$	2 $\frac{9}{16}$	$\frac{1}{2}$
$\frac{3}{8}$	1.80	2.30	$\frac{1}{4}$		$\frac{1}{4}$ -20	5 $\frac{3}{4}$	2 $\frac{9}{16}$	$\frac{1}{2}$
$\frac{3}{8}$	1.80	3.00		.301	$\frac{3}{8}$ -16	6 $\frac{1}{2}$	2 $\frac{9}{16}$	$\frac{1}{2}$
$\frac{7}{16}$	1.90	2.50		.241	$\frac{5}{16}$ -18	6 $\frac{1}{8}$	2 $\frac{9}{16}$	$\frac{1}{2}$
$\frac{7}{16}$	1.90	2.50	$\frac{5}{16}$		$\frac{5}{16}$ -18	6 $\frac{1}{8}$	2 $\frac{9}{16}$	$\frac{1}{2}$
$\frac{7}{16}$	1.90	3.25		.347	$\frac{7}{16}$ -14	7	3 $\frac{1}{8}$	$\frac{11}{16}$
$\frac{1}{2}$	2.00	3.60		.4057	$\frac{1}{2}$ -13	7 $\frac{1}{4}$	3 $\frac{1}{8}$	$\frac{11}{16}$
$\frac{9}{16}$	2.15	3.00		.301	$\frac{3}{8}$ -16	6 $\frac{1}{2}$	2 $\frac{9}{16}$	$\frac{1}{2}$
$\frac{9}{16}$	2.15	3.00	$\frac{3}{8}$		$\frac{3}{8}$ -16	6 $\frac{1}{2}$	2 $\frac{9}{16}$	$\frac{1}{2}$
$\frac{9}{16}$	2.15	4.00		.452	$\frac{9}{16}$ -12	7 $\frac{1}{2}$	3 $\frac{1}{8}$	$\frac{11}{16}$
$\frac{5}{8}$	2.30	3.25		.347	$\frac{7}{16}$ -14	7	3 $\frac{1}{8}$	$\frac{11}{16}$
$\frac{5}{8}$	2.30	3.25	$\frac{7}{16}$		$\frac{7}{16}$ -14	7	3 $\frac{1}{8}$	$\frac{11}{16}$
$\frac{5}{8}$	2.30	4.50		.5146	$\frac{5}{8}$ -11	7 $\frac{3}{4}$	3 $\frac{1}{8}$	$\frac{11}{16}$
$\frac{11}{16}$	2.45	5.00		.5771	$\frac{11}{16}$ -11	8 $\frac{1}{2}$	3 $\frac{7}{8}$	$\frac{15}{16}$
$\frac{3}{4}$	2.60	3.60		.4057	$\frac{1}{2}$ -13	7 $\frac{1}{4}$	3 $\frac{1}{8}$	$\frac{11}{16}$
$\frac{3}{4}$	2.60	3.60	$\frac{1}{2}$		$\frac{1}{2}$ -13	7 $\frac{1}{4}$	3 $\frac{1}{8}$	$\frac{11}{16}$
$\frac{3}{4}$	2.60	6.00		.624	$\frac{3}{4}$ -10	9	3 $\frac{7}{8}$	$\frac{15}{16}$
$\frac{13}{16}$	2.80	4.00		.452	$\frac{9}{16}$ -12	7 $\frac{1}{2}$	3 $\frac{1}{8}$	$\frac{11}{16}$
$\frac{13}{16}$	2.80	4.00	$\frac{9}{16}$		$\frac{9}{16}$ -12	7 $\frac{1}{2}$	3 $\frac{1}{8}$	$\frac{11}{16}$
$\frac{13}{16}$	2.80	6.00		.6865	$\frac{13}{16}$ -10	9	3 $\frac{7}{8}$	1
$\frac{7}{8}$	3.00	4.50		.5146	$\frac{5}{8}$ -11	7 $\frac{3}{4}$	3 $\frac{1}{8}$	$\frac{11}{16}$
$\frac{7}{8}$	3.00	4.50	$\frac{5}{8}$		$\frac{5}{8}$ -11	7 $\frac{3}{4}$	3 $\frac{1}{8}$	$\frac{11}{16}$
$\frac{7}{8}$	3.00	6.25		.7333	$\frac{7}{8}$ -9	9 $\frac{1}{4}$	3 $\frac{7}{8}$	1
$\frac{15}{16}$	3.25	5.00		.5771	$\frac{11}{16}$ -11	8 $\frac{1}{2}$	3 $\frac{7}{8}$	$\frac{15}{16}$
$\frac{15}{16}$	3.25	5.00	$\frac{11}{16}$		$\frac{11}{16}$ -11	8 $\frac{1}{2}$	3 $\frac{7}{8}$	$\frac{15}{16}$
$\frac{15}{16}$	3.25	6.25		.7958	$\frac{15}{16}$ -9	9 $\frac{1}{4}$	3 $\frac{7}{8}$	1
1	3.50	6.00		.624	$\frac{3}{4}$ -10	9	3 $\frac{7}{8}$	$\frac{15}{16}$
1	3.50	6.00	$\frac{3}{4}$		$\frac{3}{4}$ -10	9	3 $\frac{7}{8}$	$\frac{15}{16}$
1	3.50	6.50		.8427	1 - 8	9 $\frac{1}{2}$	3 $\frac{7}{8}$	1

SCREW SETS IN BLOCKS

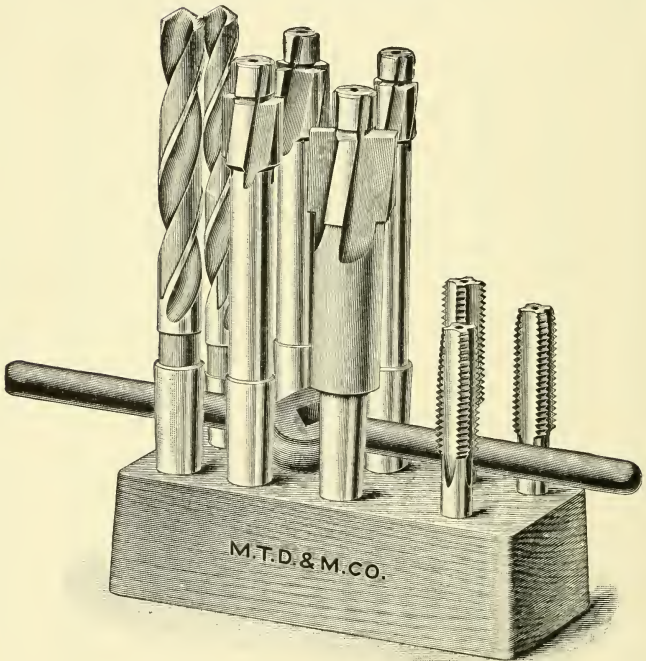
No. 770

U. S. STANDARD

AND

No. 771

A. S. M. E. STANDARD



These sets illustrated above are listed on pages 177-178.

They are carried in stock for U. S. Standard screws and machine screws to the A. S. M. E. Standard only. Each set complete with Drills, Taps, Counterbores, and Wrench as listed.

No. 770

SCREW SETS IN BLOCKS

FOR

U. S. STANDARD SCREWS

Diameter and Pitch of Screws	Price Per Set	Taper Shank Drills		TAPER SHANK COUNTERBORES										Taps		Wrench Size No.
		Tap Size	Body Size	Tap Size For Body		Tap Size For Fil. Head		Body Size For Fil. Head		Body Size Seat Hex. Head		Taper, Plug, Bottom'g	Dia. Guide			
				Dia. Bore	Dia. Guide	Dia. Bore	Dia. Guide	Dia. Bore	Dia. Guide	Dia. Bore	Dia. Guide			Dia. Bore	Dia. Guide	
*1/4	\$23.60	3/16	1/4	3/16	3/8	3/16	1/4	3/8	1/4	5/8	1/4	1/4	1/4	1/4	20	4
5/16	21.25	C	5/16	7/16	7/16	C	5/16	7/16	5/16	11/16	5/16	5/16	11/16	18	5	
3/8	22.40	N	3/8	9/16	9/16	N	3/8	9/16	3/8	13/16	3/8	3/8	13/16	16	6	
7/16	24.40	S	7/16	5/8	5/8	S	7/16	5/8	7/16	15/16	7/16	7/16	15/16	14	7	
1/2	25.00	2	1/2	3/4	3/4	2	1/2	3/4	1/2	1 1/16	1/2	1/2	1 1/16	13	7	
9/16	26.75	29/64	9/16	13/16	13/16	29/64	9/16	13/16	9/16	1 1/8	9/16	9/16	1 1/8	12	8	
5/8	30.00	33/64	5/8	7/8	7/8	33/64	5/8	7/8	5/8	1 1/4	5/8	5/8	1 1/4	11	8	
3/4	34.50	5/8	3/4	1	1	5/8	3/4	1	1	1 1/2	3/4	3/4	1 1/2	10	9	
7/8	44.25	47/64	7/8	1 1/8	1 1/8	47/64	7/8	1 1/8	1 1/8	1 5/8	7/8	7/8	1 5/8	9	10	
1	56.25	27/32	1	1 1/4	1 1/4	27/32	1	1 1/4	1 1/4	1 5/8	1	1	1 5/8	8	12	

*For 1/4 20 Set only, there is furnished in addition to the counterbores listed, one for flathead screws: Diameter of Guide 1/4, Diameter of Bore 3/8. Price on this size only, includes five counterbores.

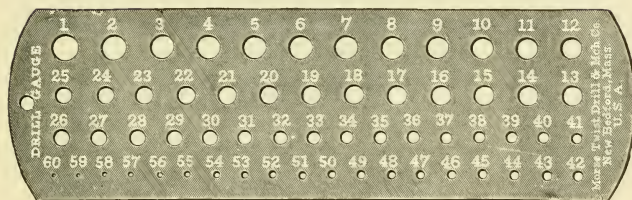
No. 771
SCREW SETS IN BLOCKS
 FOR
MACHINE SCREWS A. S. M. E. STANDARD

Number and Pitch of Screw	Price Per Set	Straight Shank Drills		STRAIGHT SHANK COUNTERBORES												Taps		Wrench Size No.
		Tap Size	Body Size	Tap Size For Body		Tap Size For Fil. Head		Body Size For Fil. Head		Body Size For Round Hd.		Body Size For Flat Head		Taper, Plug, Botto'g				
				Dia. Bore	Dia. Guide	Dia. Bore	Dia. Guide	Dia. Bore	Dia. Guide	Dia. Bore	Dia. Guide	Dia. Bore	Dia. Guide			Dia. Bore	Dia. Guide	
0-80	\$23.00	No. 56	$\frac{1}{16}$	.062	.046	.090	.046	.090	.062	.062	.136	.062	.136	.062	0-80	1	
1-72	23.00	No. 53	No. 49	.075	.059	.112	.059	.112	.073	.073	.159	.073	.159	.073	1-72	1		
2-64	23.00	No. 50	No. 44	.088	.070	.134	.070	.134	.086	.086	.185	.086	.185	.086	2-64	1		
3-56	23.00	No. 47	No. 39	.101	.078	.155	.078	.155	.099	.099	.209	.099	.209	.099	3-56	1		
4-48	23.00	No. 43	No. 33	.114	.089	.176	.089	.176	.113	.113	.232	.113	.232	.113	4-48	1		
5-44	23.75	No. 39	$\frac{1}{8}$	.127	.099	.198	.099	.198	.125	.125	.256	.125	.256	.125	5-44	2	
6-40	23.75	No. 35	No. 28	.140	.110	.219	.110	.219	.140	.140	.280	.140	.280	.140	6-40	2		
7-36	23.75	No. 31	No. 24	.153	.120	.240	.120	.240	.152	.152	.304	.152	.304	.152	7-36	2		
8-36	23.75	No. 29	No. 19	.166	.136	.262	.136	.262	.166	.166	.328	.166	.328	.166	8-36	3		
9-32	23.75	No. 28	No. 16	.179	.140	.284	.140	.284	.177	.177	.352	.177	.352	.177	9-32	3		
10-30	23.75	No. 24	No. 11	.192	.152	.305	.152	.305	.191	.191	.375	.191	.375	.191	10-30	3		
12-28	24.50	No. 17	$\frac{3}{32}$	.218	.173	.348	.173	.348	.218	.218	.424	.218	.424	.218	12-28	4	
14-24	24.50	No. 10	C	.244	.193	.390	.193	.390	.242	.242	.476	.242	.476	.242	14-24	4		
16-22	24.50	No. 3	I	.270	.213	.433	.213	.433	.272	.272	.528	.272	.528	.272	16-22	4		
18-20	24.50	A	M	.296	.234	.476	.234	.476	.295	.295	.580	.295	.580	.295	18-20	5		
20-20	25.25	G	P	.322	.261	.518	.261	.518	.323	.323	.632	.323	.632	.323	20-20	5		

No. 780

MORSE TWIST DRILL GAUGE

NUMBER SIZES 1 TO 60



Price, \$2.00 each

Decimal Equivalents stamped on the reverse side of this gauge. See table.

Number	Decimal Equivalent	Number	Decimal Equivalent	Number	Decimal Equivalent
1	.2280	21	.1590	41	.0960
2	.2210	22	.1570	42	.0935
3	.2130	23	.1540	43	.0890
4	.2090	24	.1520	44	.0860
5	.2055	25	.1495	45	.0820
6	.2040	26	.1470	46	.0810
7	.2010	27	.1440	47	.0785
8	.1990	28	.1405	48	.0760
9	.1960	29	.1360	49	.0730
10	.1935	30	.1285	50	.0700
11	.1910	31	.1200	51	.0670
12	.1890	32	.1160	52	.0635
13	.1850	33	.1130	53	.0595
14	.1820	34	.1110	54	.0550
15	.1800	35	.1100	55	.0520
16	.1770	36	.1065	56	.0465
17	.1730	37	.1040	57	.0430
18	.1695	38	.1015	58	.0420
19	.1660	39	.0995	59	.0410
20	.1610	40	.0980	60	.0400

Furnished either black or polished.

No. 781
MORSE TWIST DRILL GAUGE
 NUMBER SIZES 61 TO 80

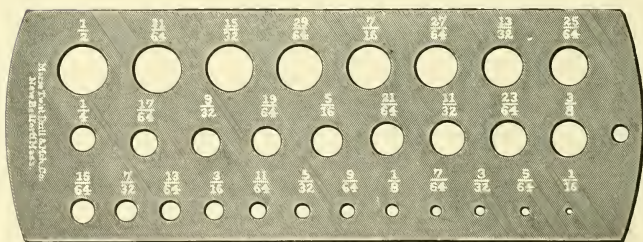


Price, \$2.40 each

Decimal Equivalents stamped on the reverse side of this gauge. See table.

Number	Decimal Equivalent	Number	Decimal Equivalent
61	.039	71	.026
62	.038	72	.025
63	.037	73	.024
64	.036	74	.0225
65	.035	75	.021
66	.033	76	.02
67	.032	77	.018
68	.031	78	.016
69	.0292	79	.0145
70	.028	80	.0135

No. 782
MORSE TWIST DRILL GAUGE
 FRACTIONAL SIZES $\frac{1}{16}$ TO $\frac{1}{2}$



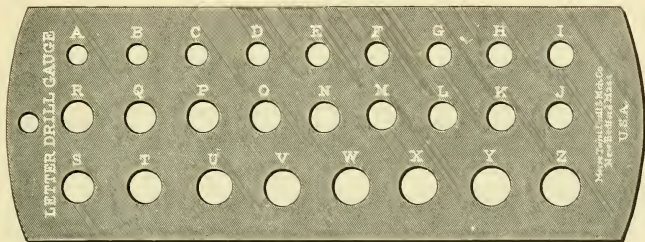
Price, \$2.75 each

Decimal Equivalents stamped on the reverse side of this gauge. See table.

Size	Dec. Equiv.	Size	Dec. Equiv.	Size	Dec. Equiv.	Size	Dec. Equiv.	Size	Dec. Equiv.
$\frac{1}{16}$	.0625	$\frac{5}{32}$	.1562	$\frac{1}{4}$	.2500	$\frac{11}{32}$	.3437	$\frac{7}{16}$	.4375
$\frac{5}{64}$	.0781	$\frac{11}{64}$	.1718	$\frac{17}{64}$	.2656	$\frac{23}{64}$	.3593	$\frac{29}{64}$	.4531
$\frac{3}{32}$	.0937	$\frac{3}{16}$	.1875	$\frac{9}{32}$	.2812	$\frac{3}{8}$	.3750	$\frac{15}{32}$	.4687
$\frac{7}{64}$	.1093	$\frac{13}{64}$	.2031	$\frac{19}{64}$	.2968	$\frac{25}{64}$	.3906	$\frac{31}{64}$	.4843
$\frac{1}{8}$	.1250	$\frac{7}{32}$	.2187	$\frac{5}{16}$	.3125	$\frac{13}{32}$	.4062	$\frac{1}{2}$	.5000
$\frac{9}{64}$	.1406	$\frac{15}{64}$	.2343	$\frac{21}{64}$	.3281	$\frac{27}{64}$	.4218		

Furnished either black or polished.

No. 783
MORSE TWIST DRILL GAUGE
LETTER SIZES A TO Z

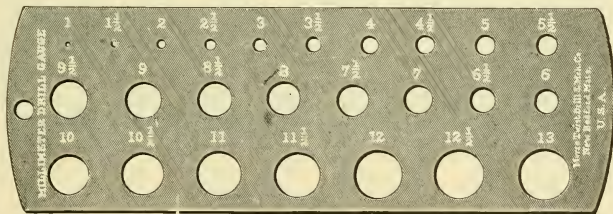


Price, \$3.75 each

Decimal Equivalents stamped on the reverse side of this gauge. See table.

Size	Dec. Equiv.	Size	Dec. Equiv.	Size	Dec. Equiv.	Size	Dec. Equiv.	Size	Dec. Equiv.
A	.234	F	.257	K	.281	P	.323	U	.368
B	.238	G	.261	L	.290	Q	.332	V	.377
C	.242	H	.266	M	.295	R	.339	W	.386
D	.246	I	.272	N	.302	S	.348	X	.397
E	.250	J	.277	O	.316	T	.358	Y	.404
								Z	.413

No. 784
MORSE TWIST DRILL GAUGE
MILLIMETER SIZES 1 TO 13



Price, \$3.75 each

Decimal Equivalents stamped on the reverse side of this gauge. See table.

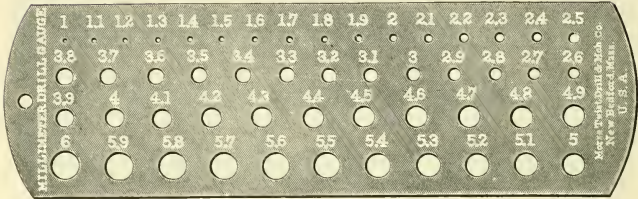
Size M. M.	Dec. Equiv.	Size M. M.	Dec. Equiv.	Size M. M.	Dec. Equiv.	Size M. M.	Dec. Equiv.	Size M. M.	Dec. Equiv.
1	.0394	3½	.1378	6	.2362	8½	.3346	11	.4331
1½	.0590	4	.1575	6½	.2559	9	.3543	11½	.4527
2	.0787	4½	.1771	7	.2756	9½	.3740	12	.4724
2½	.0984	5	.1969	7½	.2952	10	.3937	12½	.4921
3	.1181	5½	.2165	8	.3150	10½	.4134	13	.5118

Gauges Styles 783 and 784 furnished either black or polished.

No. 785

MORSE TWIST DRILL GAUGE

MILLIMETER SIZES 1 TO 6



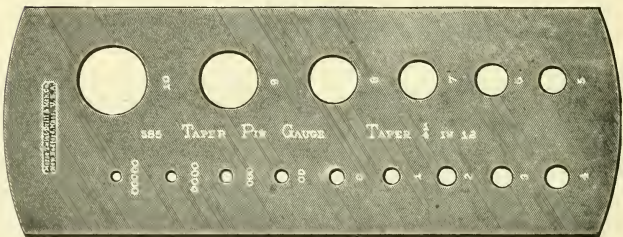
Price, \$3.25 each

Decimal Equivalents stamped on the reverse side of this gauge.

No. 788

MORSE TAPER PIN GAUGE

NUMBER SIZES 00000 TO 10



Price, \$4.00 each

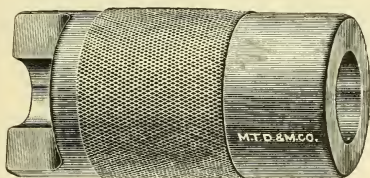
Decimal Equivalents of large end of Taper Pin stamped on the reverse side of this gauge.

Size of Taper Pin, Number	Decimal Equivalent, Large End	Size of Taper Pin, Number	Decimal Equivalent, Large End	Size of Taper Pin, Number	Decimal Equivalent, Large End
00000	.094	1	.172	6	.341
0000	.109	2	.193	7	.409
000	.125	3	.219	8	.492
00	.141	4	.250	9	.591
0	.156	5	.289	10	.706

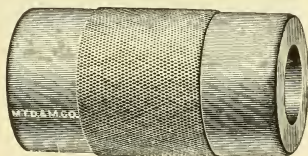
No. 790

MORSE TAPER PLUG AND RING GAUGES

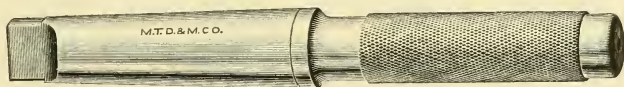
STYLE A RING



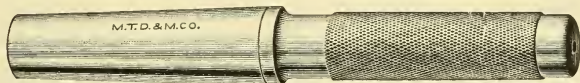
STYLE B RING



STYLE A PLUG



STYLE B PLUG



Number	Price Each Plug Gauge	Price Each Ring Gauge	Price Both Plug and Ring
0	\$5.25	\$10.50	\$15.75
1	5.25	10.50	15.75
2	6.75	13.50	20.25
3	8.25	16.50	24.75
4	10.50	21.00	31.50
5	14.25	25.50	39.75
6	19.50	33.00	52.50
7	60.00	120.00	180.00

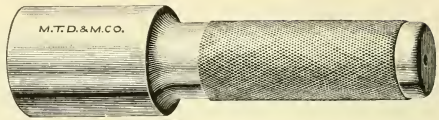
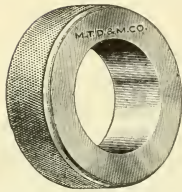
When ordering give style of Plug or Ring as well as number.

The line on each Plug Gauge denotes the depth of hole.

Gauges for Short Shanks made to order. Prices quoted on application.

No. 793

PLUG AND RING CYLINDRICAL GAUGES

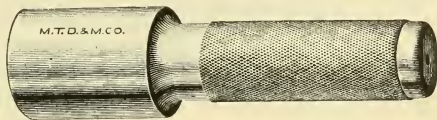
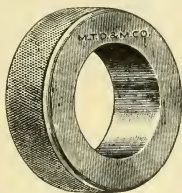


The Plug Gauge is made with a straight, knurled handle.
The Ring Gauge is knurled on its periphery.

Size	Price Each Plug Gauge	Price Each Ring Gauge	Price Both Plug and Ring
$\frac{1}{4}$	\$3.75	\$5.65	\$9.40
$\frac{5}{16}$	3.75	5.75	9.50
$\frac{3}{8}$	3.90	5.95	9.85
$\frac{7}{16}$	4.00	6.15	10.15
$\frac{1}{2}$	4.15	6.30	10.45
$\frac{9}{16}$	4.25	6.50	10.75
$\frac{5}{8}$	4.40	6.70	11.10
$\frac{11}{16}$	4.50	6.90	11.40
$\frac{3}{4}$	4.65	7.05	11.70
$\frac{13}{16}$	4.75	7.25	12.00
$\frac{7}{8}$	4.90	7.45	12.35
$\frac{15}{16}$	5.00	7.65	12.65
1	5.15	7.80	12.95
$1\frac{1}{16}$	5.25	8.15	13.40
$1\frac{1}{8}$	5.40	8.45	13.85
$1\frac{3}{16}$	5.50	8.75	14.25
$1\frac{1}{4}$	5.65	9.05	14.70
$1\frac{5}{16}$	5.80	9.40	15.20
$1\frac{3}{8}$	6.00	9.70	15.70
$1\frac{7}{16}$	6.20	10.00	16.20
$1\frac{1}{2}$	6.40	10.30	16.70
$1\frac{9}{16}$	6.55	10.65	17.20
$1\frac{5}{8}$	6.75	10.95	17.70
$1\frac{11}{16}$	6.95	11.25	18.20
$1\frac{3}{4}$	7.15	11.55	18.70
$1\frac{13}{16}$	7.35	11.90	19.25
$1\frac{7}{8}$	7.50	12.20	19.70
$1\frac{15}{16}$	7.70	12.50	20.20
2	7.90	12.80	20.70
$2\frac{1}{16}$	8.75	13.75	22.50
$2\frac{1}{8}$	8.95	14.05	23.00
$2\frac{3}{16}$	9.15	14.40	23.55
$2\frac{1}{4}$	9.30	14.70	24.00
$2\frac{5}{16}$	9.50	15.00	24.50

No. 793

PLUG AND RING CYLINDRICAL GAUGES



The Plug Gauge is made with a straight, knurled handle.
The Ring Gauge is knurled on its periphery.

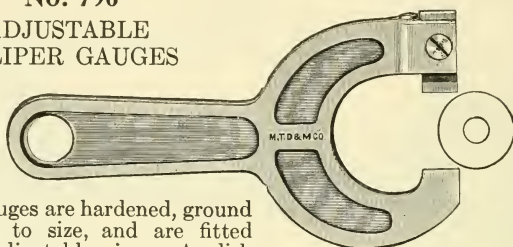
Size	Price Each Plug Gauge	Price Each Ring Gauge	Price Both Plug and Ring
$2\frac{3}{8}$	\$9.80	\$15.30	\$25.10
$2\frac{7}{16}$	10.15	15.65	25.80
$2\frac{1}{2}$	10.30	15.95	26.25
$2\frac{9}{16}$	10.50	16.25	26.75
$2\frac{5}{8}$	10.70	16.55	27.25
$2\frac{11}{16}$	10.90	16.90	27.80
$2\frac{3}{4}$	11.05	17.20	28.25
$2\frac{13}{16}$	11.25	17.50	28.75
$2\frac{7}{8}$	11.45	17.80	29.25
$2\frac{15}{16}$	11.65	18.15	29.80
3	11.80	18.45	30.25

Gauges larger than 3 inches take a different discount than 3 inches and smaller.

$3\frac{1}{8}$	\$12.25	\$14.25	\$26.50
$3\frac{1}{4}$	13.25	15.20	28.45
$3\frac{3}{8}$	14.25	16.15	30.40
$3\frac{1}{2}$	15.20	17.15	32.35
$3\frac{5}{8}$	16.55	18.05	34.60
$3\frac{3}{4}$	18.00	19.05	37.05
$3\frac{7}{8}$	19.45	19.95	39.40
4	20.95	21.05	42.00
$4\frac{1}{4}$	23.25	22.75	46.00
$4\frac{1}{2}$	25.65	24.50	50.15
$4\frac{3}{4}$	28.25	26.05	54.30
5	30.80	27.80	58.60
$5\frac{1}{4}$	33.90	29.40	63.30
$5\frac{1}{2}$	36.80	30.95	67.75
$5\frac{3}{4}$	40.00	32.50	72.50
6	43.30	34.05	77.35

No. 796

ADJUSTABLE CALIPER GAUGES



These Gauges are hardened, ground and lapped to size, and are fitted with an adjustable jaw. A disk accurately ground and lapped to size is furnished with each Gauge for testing and correcting the same. Sizes 2 to 3 inches have no handles.

Size	Price Each	Size	Price Each	Size	Price Each	Size	Price Each	Size	Price Each
$\frac{1}{4}$	\$3.75	$\frac{13}{16}$	\$3.85	$1\frac{3}{8}$	\$4.50	$1\frac{15}{16}$	\$5.70	$2\frac{1}{2}$	\$6.90
$\frac{5}{16}$	3.75	$\frac{7}{8}$	3.90	$1\frac{7}{16}$	4.60	2	5.85	$2\frac{9}{16}$	7.50
$\frac{3}{8}$	3.75	$\frac{15}{16}$	4.00	$1\frac{1}{2}$	4.65	$2\frac{1}{16}$	5.95	$2\frac{5}{8}$	7.90
$\frac{7}{16}$	3.75	1	4.05	$1\frac{9}{16}$	4.80	$2\frac{1}{8}$	6.00	$2\frac{11}{16}$	8.25
$\frac{1}{2}$	3.75	$1\frac{1}{16}$	4.15	$1\frac{5}{8}$	4.95	$2\frac{3}{16}$	6.15	$2\frac{3}{4}$	8.25
$\frac{9}{16}$	3.75	$1\frac{1}{8}$	4.20	$1\frac{11}{16}$	5.10	$2\frac{1}{4}$	6.30	$2\frac{13}{16}$	9.00
$\frac{5}{8}$	3.75	$1\frac{3}{16}$	4.30	$1\frac{3}{4}$	5.25	$2\frac{5}{16}$	6.45	$2\frac{7}{8}$	9.00
$\frac{11}{16}$	3.75	$1\frac{1}{4}$	4.35	$1\frac{13}{16}$	5.40	$2\frac{3}{8}$	6.60	$2\frac{15}{16}$	9.00
$\frac{3}{4}$	3.75	$1\frac{5}{16}$	4.45	$1\frac{7}{8}$	5.55	$2\frac{7}{16}$	6.75	3	9.75

SET NO. 1

A Set of Adjustable Caliper Gauges in box, sizes from $\frac{1}{4}$ inch to 2 inches inclusive varying by 16ths.

Price \$135.00.

SET NO. 2

For set, sizes $\frac{1}{4}$ inch to 3 inches inclusive by 16ths.

Price \$255.00.



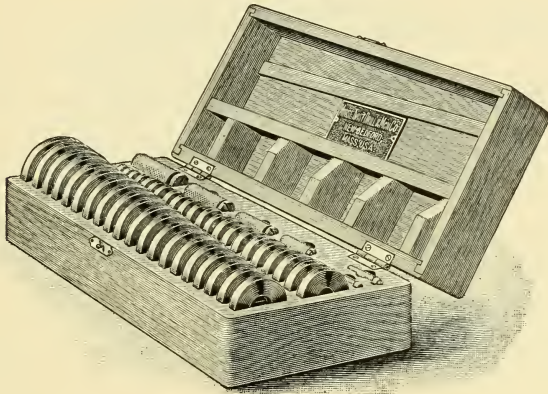
No. 798

STANDARD REFERENCE DISKS

These Disks are hardened, ground and lapped to size. They are furnished singly or in sets. A set consists of 45 Disks from $\frac{1}{4}$ inch to 3 inches by 16ths, including six Handles, in a wooden case.

These Disks are not recommended for use in place of Standard size Cylindrical Gauges, but are useful for setting calipers, testing snap gauges, and for reference for accurate sizes in shop practice.

Price per Set in Case \$70.00.



Size	Price Each	Size	Price Each	Size	Price Each	Size	Price Each
$\frac{1}{4}$	\$1.50	1	\$1.10	$1\frac{3}{4}$	\$1.40	$2\frac{1}{2}$	\$1.80
$\frac{5}{16}$	1.50	$1\frac{1}{16}$	1.10	$1\frac{13}{16}$	1.55	$2\frac{9}{16}$	1.95
$\frac{3}{8}$	.90	$1\frac{1}{8}$	1.10	$1\frac{7}{8}$	1.55	$2\frac{5}{8}$	1.95
$\frac{7}{16}$	.90	$1\frac{3}{16}$	1.10	$1\frac{5}{16}$	1.55	$2\frac{11}{16}$	1.95
$\frac{1}{2}$	1.00	$1\frac{1}{4}$	1.10	2	1.55	$2\frac{3}{4}$	2.10
$\frac{9}{16}$	1.00	$1\frac{5}{16}$	1.25	$2\frac{1}{16}$	1.65	$2\frac{13}{16}$	2.10
$\frac{5}{8}$	1.00	$1\frac{3}{8}$	1.25	$2\frac{1}{8}$	1.65	$2\frac{7}{8}$	2.25
$\frac{11}{16}$	1.00	$1\frac{7}{16}$	1.25	$2\frac{3}{16}$	1.65	$2\frac{15}{16}$	2.25
$\frac{3}{4}$	1.05	$1\frac{1}{2}$	1.25	$2\frac{1}{4}$	1.65	3	2.25
$\frac{13}{16}$	1.05	$1\frac{9}{16}$	1.40	$2\frac{5}{16}$	1.80		
$\frac{7}{8}$	1.05	$1\frac{5}{8}$	1.40	$2\frac{3}{8}$	1.80		
$\frac{15}{16}$	1.05	$1\frac{11}{16}$	1.40	$2\frac{7}{16}$	1.80		

Disks $\frac{1}{4}$ and $\frac{5}{16}$ inches are always furnished with handles.

HANDLES

Price Each

For Disks from $\frac{3}{8}$ inch to $\frac{9}{16}$ inch, inclusive	\$.65
For Disks from $\frac{5}{8}$ inch to $1\frac{1}{16}$ inches, inclusive . . . . .	.75
For Disks from $1\frac{1}{8}$ inches to $1\frac{3}{4}$ inches, inclusive . . . . .	.80
For Disks from $1\frac{1}{2}$ inches to 3 inches, inclusive . . . . .	.90

For the greatest production,—

For the smoothest surfaces,—

For the least power,—

For the longest life,—

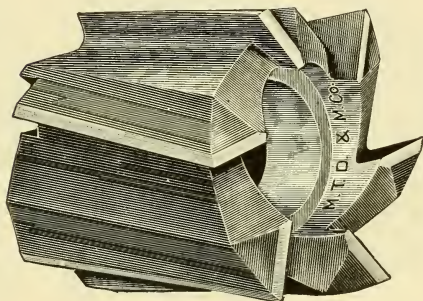
For the highest economy,—

KEEP CUTTERS SHARP

No. 1801 High Speed Steel

COARSE TOOTH SHELL END MILLS

FOR HEAVY MILLING



Diameter, Inches	Length of Cut, Inches	Diameter of Hole, Inches	Price Each High Speed Steel
1 $\frac{1}{4}$	1 $\frac{1}{4}$	$\frac{1}{2}$	\$6.00
1 $\frac{3}{8}$	1 $\frac{1}{4}$	$\frac{1}{2}$	6.25
1 $\frac{1}{2}$	1 $\frac{1}{4}$	$\frac{1}{2}$	6.50
1 $\frac{5}{8}$	1 $\frac{3}{4}$	$\frac{3}{4}$	8.25
1 $\frac{3}{4}$	1 $\frac{3}{4}$	$\frac{3}{4}$	8.65
1 $\frac{7}{8}$	1 $\frac{3}{4}$	$\frac{3}{4}$	9.00
2	1 $\frac{3}{4}$	$\frac{3}{4}$	9.65
2 $\frac{1}{8}$	1 $\frac{3}{4}$	$\frac{3}{4}$	10.30
2 $\frac{1}{4}$	2 $\frac{1}{4}$	1	11.75
2 $\frac{3}{8}$	2 $\frac{1}{4}$	1	12.90
2 $\frac{1}{2}$	2 $\frac{1}{4}$	1	12.90
2 $\frac{3}{4}$	2 $\frac{1}{4}$	1	14.60
3	2 $\frac{1}{4}$	1	16.65

Coarse Tooth Shell End Mills are regularly furnished of high speed steel, either right or left hand, and with spiral teeth.

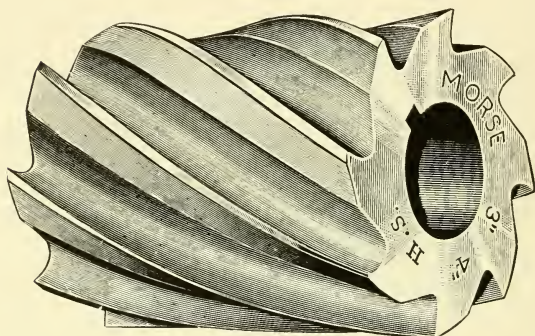
Coarse Tooth Shell End Mills with straight teeth or having dimensions other than listed are special and subject to special prices.

Carbon Steel Coarse Tooth Shell End Mills are special.

For Arbors fitting these Mills see page 114.

No. 1802 High Speed Steel

COARSE TOOTH PLAIN MILLING CUTTERS FOR HEAVY MILLING



Diameter of Cutter, Inches	Width of Face, Inches	Diameter of Hole, Inches	Price Each High Speed Steel
2½	2	1	\$10.10
2½	2½	1	11.60
2½	3	1	13.00
2½	4	1	16.35
3	2	1¼	13.30
3	2½	1¼	15.25
3	3	1¼	17.00
3	4	1¼	20.75
3	5	1¼	25.50
3	6	1¼	33.00
4	2	1½	21.90
4	3	1½	28.50
4	4	1½	36.75
4	5	1½	45.20
4	6	1½	54.10

Cutters having straight teeth, nicked teeth, or dimensions other than listed, are special and subject to special prices.

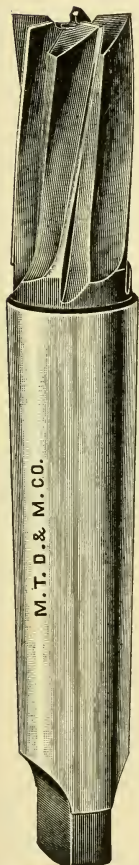
Coarse Tooth Plain Milling Cutters of carbon steel are special.

No. 1805 High Speed Steel

COARSE TOOTH SPIRAL END MILLS

FOR HEAVY MILLING

WITH BROWN & SHARPE TAPER SHANK



Diam., Inches	Price Each High Speed Steel	Number of Shank	Whole Length, Inches	Length of Flutes, Inches
$\frac{1}{4}$	\$2.10	4	$2\frac{7}{16}$	$\frac{13}{16}$
$\frac{1}{4}$	2.80	5	3	$\frac{13}{16}$
$\frac{5}{16}$	2.10	4	$2\frac{1}{2}$	$\frac{7}{8}$
$\frac{5}{16}$	2.90	5	$3\frac{1}{16}$	$\frac{7}{8}$
$\frac{3}{8}$	2.10	4	$2\frac{1}{2}$	$\frac{7}{8}$
$\frac{3}{8}$	2.90	5	$3\frac{1}{16}$	$\frac{7}{8}$
$\frac{7}{16}$	2.90	5	$3\frac{1}{8}$	$\frac{15}{16}$
$\frac{1}{2}$	2.90	5	$3\frac{3}{16}$	1
$\frac{1}{2}$	4.60	7	$5\frac{1}{8}$	$1\frac{1}{8}$
$\frac{5}{8}$	4.60	7	$5\frac{1}{2}$	$1\frac{1}{2}$
$\frac{3}{4}$	4.70	7	$5\frac{5}{8}$	$1\frac{5}{8}$
$\frac{3}{4}$	7.40	9	$6\frac{7}{8}$	$1\frac{5}{8}$
$\frac{7}{8}$	5.30	7	$5\frac{3}{4}$	$1\frac{3}{4}$
$\frac{7}{8}$	7.40	9	7	$1\frac{3}{4}$
1	6.00	7	$5\frac{7}{8}$	$1\frac{7}{8}$
1	7.60	9	$7\frac{1}{8}$	$1\frac{7}{8}$
$1\frac{1}{8}$	6.80	7	6	2
$1\frac{1}{8}$	7.60	9	$7\frac{1}{4}$	2
$1\frac{1}{4}$	7.80	7	6	2
$1\frac{1}{4}$	8.90	9	$7\frac{1}{4}$	2
$1\frac{3}{8}$	9.40	9	$7\frac{3}{8}$	$2\frac{1}{8}$
$1\frac{1}{2}$	10.40	9	$7\frac{1}{2}$	$2\frac{1}{4}$
$1\frac{5}{8}$	11.90	9	$7\frac{5}{8}$	$2\frac{3}{8}$
$1\frac{3}{4}$	13.15	9	$7\frac{3}{4}$	$2\frac{1}{2}$

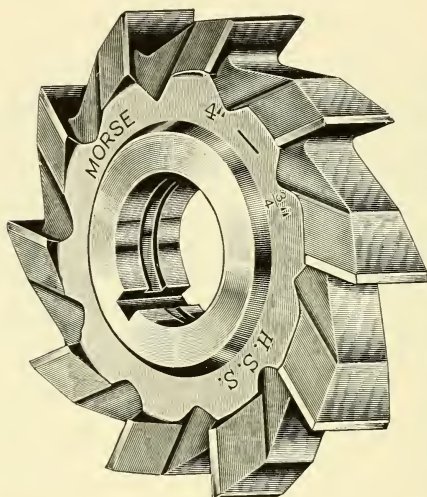
Carbon Steel Coarse Tooth End Mills, or those having dimensions other than listed, are special and subject to special prices.

These End Mills will be regularly furnished in either right or left hand.

End Mills with tapped hole for drawback spindle are special and subject to special prices.

No. 1808 High Speed Steel

COARSE TOOTH SIDE MILLING CUTTERS FOR HEAVY MILLING



Diam., Inches	Width of Face, Inches	Diam. of Hole, Inches	Price Each High Speed Steel	Diam., Inches	Width of Face, Inches	Diam. of Hole, Inches	Price Each High Speed Steel
3	$\frac{3}{8}$	$1\frac{1}{4}$	\$6.65	5	$\frac{3}{4}$	$1\frac{1}{4}$	\$17.10
3	$\frac{7}{16}$	$1\frac{1}{4}$	7.15	5	$\frac{3}{4}$	$1\frac{1}{2}$	17.10
3	$\frac{1}{2}$	$1\frac{1}{4}$	7.65	5	$\frac{7}{8}$	$1\frac{1}{4}$	18.75
4	$\frac{1}{2}$	$1\frac{1}{4}$	11.90	5	$\frac{7}{8}$	$1\frac{1}{2}$	18.75
4	$\frac{1}{2}$	$1\frac{1}{2}$	11.90	5	1	$1\frac{1}{2}$	20.20
4	$\frac{5}{8}$	$1\frac{1}{4}$	13.15	6	$\frac{3}{4}$	$1\frac{1}{2}$	22.25
4	$\frac{5}{8}$	$1\frac{1}{2}$	13.15	6	1	$1\frac{1}{2}$	26.40
4	$\frac{3}{4}$	$1\frac{1}{4}$	14.40	8	1	$1\frac{1}{2}$	55.20
4	$\frac{3}{4}$	$1\frac{1}{2}$	14.40				
4	$\frac{7}{8}$	$1\frac{1}{4}$	17.30				
4	$\frac{7}{8}$	$1\frac{1}{2}$	17.30				

Cutters having dimensions other than listed are special and subject to special prices.

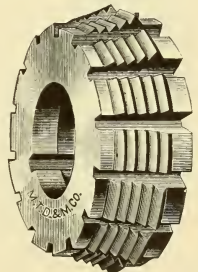
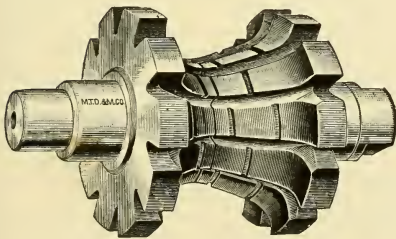
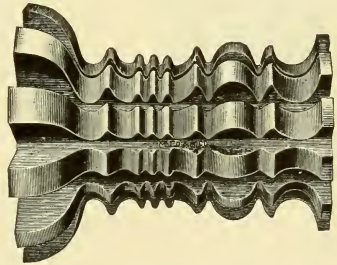
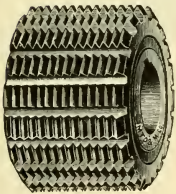
Coarse Tooth Side Milling Cutters of carbon steel are special.

No. 815

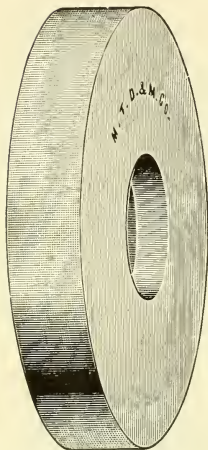
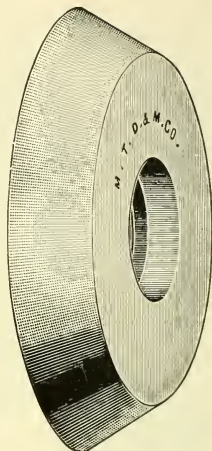
FORMED MILLING CUTTERS

Formed Milling Cutters furnished in outlines as desired. With an order, send a sketch, a templet, or a sample piece, as required, to be milled, with the diameter of the hole for the Cutter, and state the direction in which the Cutter is to revolve. Formed Cutters are stamped with date and number, and can be duplicated, the date and number being furnished.

THESE CUTTERS CAN BE SHARPENED WITHOUT CHANGING THEIR FORM. Prices furnished on application.



CIRCULAR CUTTING DISKS

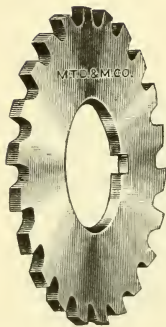
No. 810
No. 1810No. 811
No. 1811

These Disks are used for cutting thin sheet metals, paper, etc. They are hardened and accurately ground to size. Furnished singly or in gangs with spacing collars. In ordering specify diameter, thickness, size of hole and angle of face.

No. 840

FORMED SAWS

FOR SLITTING COPPER



These saws are designed especially for the slitting or sawing of metals that are of a soft or tenacious character and are superior to the ordinary saw usually employed for this purpose. The teeth are formed and backed off the same as in all formed milling cutters, and are sharpened by grinding the face, thus retaining the outline of the saw. The sides of the saw are ground concave for clearance.

These saws are made to order.

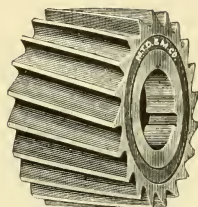
Prices on application.



No. 830
Carbon Steel

No. 1830
High Speed Steel

MILLING CUTTERS



Diam. Inches	Face, Inches	Hole, Inches	Price Each		Diam. Inches	Face, Inches	Hole, Inches	Price Each	
			Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel
2 1/4	1/2	7/8	\$2.25	\$4.15	3	1	1 1/4	\$4.60	\$9.10
2 1/4	1	7/8	3.20	6.00	3	1 1/4	1 1/4	5.10	10.35
2 1/2	3/16	1	1.65	3.25	3	1 1/2	1 1/4	5.50	11.50
2 1/2	1/4	1	1.80	3.50	3	1 3/4	1 1/4	5.70	12.30
2 1/2	5/16	1	1.90	3.75	3	2	1 1/4	6.00	13.30
2 1/2	3/8	1	2.10	4.00	3	2 1/2	1 1/4	6.60	15.25
2 1/2	7/16	1	2.20	4.25	3	3	1 1/4	7.00	17.00
2 1/2	1/2	1	2.30	4.50	3	3 1/2	1 1/4	7.50	18.80
2 1/2	5/8	1	2.50	4.80	3	4	1 1/4	8.15	20.75
2 1/2	3/4	1	2.80	5.40	3	5	1 1/4	9.90	25.50
2 1/2	7/8	1	3.10	6.00	3	6	1 1/4	13.70	33.00
2 1/2	1	1	3.30	6.50	4	1/4	1	2.60	5.50
2 1/2	1 1/4	1	3.70	7.50	4	1/4	1 1/4	2.60	5.50
2 1/2	1 1/2	1	4.00	8.25	4	5/16	1	3.20	6.50
2 1/2	1 3/4	1	4.35	9.15	4	5/16	1 1/4	3.20	6.50
2 1/2	2	1	4.75	10.10	4	3/8	1	3.85	7.70
2 1/2	2 1/2	1	5.25	11.60	4	3/8	1 1/4	3.85	7.70
2 1/2	3	1	5.70	13.00	4	7/16	1 1/4	4.50	8.85
2 1/2	4	1	7.00	16.35	4	1/2	1 1/4	5.00	9.75
3	3/16	1	1.75	3.60	4	5/8	1 1/4	5.50	10.90
3	1/4	1	2.10	4.00	4	3/4	1 1/4	6.00	12.10
3	5/16	1	2.35	4.50	4	7/8	1 1/4	6.50	13.35
3	3/8	1	2.70	5.10	4	1	1 1/4	7.15	14.70
3	3/8	1 1/4	2.70	5.10	4	1 1/4	1 1/4	7.90	16.70
3	7/16	1 1/4	2.85	5.40	4	1 1/2	1 1/4	8.40	18.40
3	1 1/2	1 1/4	3.10	5.90	4	2	1 1/4	9.50	21.90
3	5/8	1 1/4	3.50	6.75	4	3	1 1/4	11.50	28.50
3	3/4	1 1/4	3.85	7.50	4	4	1 1/4	14.00	36.75
3	7/8	1 1/4	4.20	8.25					

Cutters of less than 3/4 inch face have straight teeth.

Cutters of 3/4 inch face and over have spiral teeth.

In ordering, carefully state diameter and face of Cutter and size of hole desired.

Cutters having nicked teeth or dimensions other than listed are special and subject to special prices.



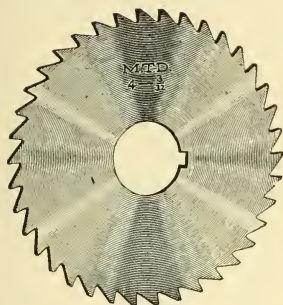
No. 833
Carbon Steel

No. 1833
High Speed Steel

SIDE MILLING CUTTERS

Diam. Inches	Face, Inches	Hole, Inches	Price Each		Diam. Inches	Face, Inches	Hole Inches,	Price Each	
			Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel
2	$\frac{3}{16}$	$\frac{1}{2}$	\$2.35	\$3.60	4	$\frac{1}{2}$	$1\frac{1}{4}$	\$6.50	\$11.90
2	$\frac{3}{16}$	$\frac{5}{8}$	2.35	3.60	4	$\frac{5}{8}$	1	7.10	13.15
2	$\frac{1}{4}$	$\frac{1}{2}$	2.60	4.10	4	$\frac{5}{8}$	$1\frac{1}{4}$	7.10	13.15
2	$\frac{1}{4}$	$\frac{5}{8}$	2.60	4.10	4	$\frac{3}{4}$	1	7.65	14.40
2	$\frac{3}{8}$	$\frac{1}{2}$	2.80	4.50	4	$\frac{3}{4}$	$1\frac{1}{4}$	7.65	14.40
2	$\frac{3}{8}$	$\frac{5}{8}$	2.80	4.50	4	$\frac{7}{8}$	1	8.25	17.30
$2\frac{1}{2}$	$\frac{1}{4}$	$\frac{7}{8}$	2.80	4.65	4	$\frac{7}{8}$	$1\frac{1}{4}$	8.25	17.30
$2\frac{1}{2}$	$\frac{5}{16}$	$\frac{7}{8}$	2.90	4.90	5	$\frac{1}{2}$	1	6.70	13.60
$2\frac{1}{2}$	$\frac{3}{8}$	$\frac{7}{8}$	3.15	5.30	5	$\frac{1}{2}$	$1\frac{1}{4}$	6.70	13.60
$2\frac{1}{2}$	$\frac{7}{16}$	$\frac{7}{8}$	3.25	5.50	5	$\frac{5}{8}$	1	7.30	15.20
$2\frac{1}{2}$	$\frac{1}{2}$	$\frac{7}{8}$	3.40	5.80	5	$\frac{5}{8}$	$1\frac{1}{4}$	7.30	15.20
3	$\frac{1}{4}$	1	3.15	5.40	5	$\frac{3}{4}$	1	8.10	17.10
3	$\frac{5}{16}$	1	3.60	6.25	5	$\frac{3}{4}$	$1\frac{1}{4}$	8.10	17.10
3	$\frac{3}{8}$	1	3.85	6.65	5	1	1	9.90	20.20
3	$\frac{7}{16}$	1	4.10	7.15	5	1	$1\frac{1}{4}$	9.90	20.20
3	$\frac{1}{2}$	1	4.30	7.65	6	$\frac{1}{2}$	1	8.60	18.65
$3\frac{1}{2}$	$\frac{7}{16}$	1	4.80	8.65	6	$\frac{3}{4}$	1	9.65	22.25
$3\frac{1}{2}$	$\frac{1}{2}$	1	5.35	9.60	6	$\frac{3}{4}$	$1\frac{1}{4}$	9.65	22.25
$3\frac{1}{2}$	$\frac{9}{16}$	1	5.80	10.65	6	1	$1\frac{1}{4}$	11.00	26.40
$3\frac{1}{2}$	$\frac{5}{8}$	1	5.80	10.65	7	$\frac{3}{4}$	$1\frac{1}{4}$	17.50	36.25
4	$\frac{1}{4}$	1	3.70	7.00	7	1	$1\frac{1}{4}$	20.40	43.15
4	$\frac{3}{8}$	1	5.20	9.50	8	1	$1\frac{1}{4}$	24.75	55.20
4	$\frac{1}{2}$	1	6.50	11.90					

Cutters having dimensions other than listed are special and subject to special prices.



No. 841
Carbon Steel

No. 1841
High Speed Steel

METAL SLITTING

SAWS

Diam. In.	Width of Face, Inches	Diam. of Hole, Inches	Price Each		Diam. In.	Wid. of Face, In.	Diam. of Hole, Inches	Price Each	
			Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel
2½	⅓	⅞	\$1.30	\$3.15	4	⅝	1	\$2.10	\$4.65
2½	⅜	⅞	1.20	3.00	4	⅜	1	2.10	4.65
2½	⅜	⅞	1.15	3.00	5	⅜	1	2.30	5.15
2½	⅜	⅞	1.15	3.00	5	⅜	1	2.00	4.70
2½	⅜	⅞	1.15	3.00	5	⅜	1-¼	2.00	5.20
2½	⅝	⅞	1.65	3.25	5	⅝	1	2.90	7.40
3	⅜	1	1.60	3.75	5	⅜	1	2.90	7.40
3	⅜	1	1.50	3.25	6	⅜	1	5.10	9.40
3	⅜	1	1.30	3.15	6	⅜	1	3.85	7.65
3	⅜	1	1.30	3.15	6	⅜	1-¼	3.50	7.70
3	⅜	1	1.30	3.15	6	⅜	1-¼	4.50	10.20
3	⅝	1	1.75	3.60	7	⅜	1	9.50	16.00
4	⅜	1	2.85	5.75	7	⅜	1	5.70	10.75
4	⅜	1	1.85	4.00	7	⅜	1-¼	4.85	10.80
4	⅜	1	1.60	3.75	7	⅜	1¼	6.50	14.70
4	⅜	1	1.60	3.60	8	⅜	1-¼	7.30	15.00
4	⅜	1	1.60	3.60	8	⅜	1¼	8.90	18.90

These saws have holes ground to standard size, and the sides are ground with a proper clearance to allow the cutting of deep slots.

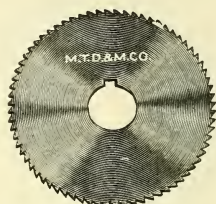
Cutters having dimensions other than listed are special and subject to special prices.

No. 845
Carbon Steel



SCREW
SLOTING
CUTTERS

No. 1845
High Speed Steel



Number of Gauge	Price Each		Thickness in Decimals of 1 Inch	Diameter of Cutter, Inches	Diameter of Hole, Inches, Carbon Steel only
	Carbon Steel	High Speed Steel 1 Inch Hole only			
5	\$.90		.182	2 ³ / ₄	1
6	.75	\$2.75	.162	2 ³ / ₄	1
7	.65	2.50	.144	2 ³ / ₄	1
8	.55	2.25	.128	2 ³ / ₄	3/4, 1
9	.50	2.00	.114	2 ³ / ₄	3/4, 1
10	.45	1.80	.102	2 ³ / ₄	3/4, 1
11	.40	1.60	.091	2 ³ / ₄	3/4, 1
12	.35	1.40	.081	2 ³ / ₄	3/4, 1
13	.35	1.30	.072	2 ³ / ₄	3/4, 1
14	.35	1.20	.064	2 ³ / ₄	3/4, 1
15	.30	1.10	.057	2 ³ / ₄	1/2, 5/8, 3/4, 1
16	.30	1.00	.051	2 ³ / ₄	1/2, 5/8, 3/4, 1
17	.25	1.00	.045	2 ³ / ₄	1/2, 5/8, 3/4, 1
18	.25	1.00	.040	2 ³ / ₄	1/2, 5/8, 3/4, 1
19	.25	1.00	.035	2 ³ / ₄	1/2, 5/8, 3/4, 1
20	.25	1.00	.032	2 ³ / ₄	1/2, 5/8, 3/4, 1
21	.20	1.00	.028	2 ³ / ₄	1/2, 5/8, 3/4, 1
22	.20	1.00	.025	2 ³ / ₄	1/2, 5/8, 3/4, 1
23	.20	1.00	.023	2 ³ / ₄	1/2, 5/8, 3/4, 1
24	.20	1.00	.020	2 ³ / ₄	1/2, 5/8, 3/4, 1
25	.20		.018	2 ³ / ₄	1/2, 5/8, 3/4, 1
26	.20		.016	2 ³ / ₄	3/4, 1
27	.20		.014	2 ³ / ₄	3/4, 1
28	.20		.012	2 ³ / ₄	3/4, 1
30	.20		.010	2 ³ / ₄	3/4, 1
32	.20		.008	2 ³ / ₄	3/4, 1
34	.20		.006	2 ³ / ₄	3/4, 1

For Arbors fitting these Cutters see page 117.

Screw Slotting Cutters are not ground on the sides.

Cutters having dimensions other than listed are special and subject to special prices.

No. 845

SCREW SLOTTING CUTTERS (Continued)

Number of Gauge	Price Each Carbon Steel	Thickness in Decimals of 1 Inch	Diameter of Cutter, Inches	Diameter of Hole, Inches
10	\$.40	.102	2 $\frac{1}{4}$	$\frac{5}{8}$
11	.35	.091	2 $\frac{1}{4}$	$\frac{5}{8}$
12	.30	.081	2 $\frac{1}{4}$	$\frac{5}{8}$
13	.25	.072	2 $\frac{1}{4}$	$\frac{5}{8}$
14	.25	.064	2 $\frac{1}{4}$	$\frac{5}{8}$
15	.20	.057	2 $\frac{1}{4}$	$\frac{5}{8}$
16	.20	.051	2 $\frac{1}{4}$	$\frac{5}{8}$
17	.20	.045	2 $\frac{1}{4}$	$\frac{5}{8}$
18	.20	.040	2 $\frac{1}{4}$	$\frac{5}{8}$
19	.20	.035	2 $\frac{1}{4}$	$\frac{5}{8}$
20	.20	.032	2 $\frac{1}{4}$	$\frac{5}{8}$
21	.20	.028	2 $\frac{1}{4}$	$\frac{5}{8}$
22	.20	.025	2 $\frac{1}{4}$	$\frac{5}{8}$
23	.20	.023	2 $\frac{1}{4}$	$\frac{5}{8}$
24	.20	.020	2 $\frac{1}{4}$	$\frac{5}{8}$
25	.20	.018	2 $\frac{1}{4}$	$\frac{5}{8}$
26	.20	.016	2 $\frac{1}{4}$	$\frac{5}{8}$
27	.20	.014	2 $\frac{1}{4}$	$\frac{5}{8}$
28	.20	.012	2 $\frac{1}{4}$	$\frac{5}{8}$
30	.20	.010	2 $\frac{1}{4}$	$\frac{5}{8}$
32	.20	.008	2 $\frac{1}{4}$	$\frac{5}{8}$
34	.20	.006	2 $\frac{1}{4}$	$\frac{5}{8}$
14	.20	.064	1 $\frac{3}{4}$	$\frac{5}{8}$
15	.20	.057	1 $\frac{3}{4}$	$\frac{5}{8}$
16	.20	.051	1 $\frac{3}{4}$	$\frac{5}{8}$
17	.20	.045	1 $\frac{3}{4}$	$\frac{5}{8}$
18	.20	.040	1 $\frac{3}{4}$	$\frac{5}{8}$
19	.20	.035	1 $\frac{3}{4}$	$\frac{5}{8}$
20	.20	.032	1 $\frac{3}{4}$	$\frac{5}{8}$
21	.20	.028	1 $\frac{3}{4}$	$\frac{5}{8}$
22	.20	.025	1 $\frac{3}{4}$	$\frac{5}{8}$
23	.20	.023	1 $\frac{3}{4}$	$\frac{5}{8}$
24	.15	.020	1 $\frac{3}{4}$	$\frac{1}{2}$, $\frac{5}{8}$
25	.15	.018	1 $\frac{3}{4}$	$\frac{1}{2}$, $\frac{5}{8}$
26	.15	.016	1 $\frac{3}{4}$	$\frac{1}{2}$, $\frac{5}{8}$
27	.15	.014	1 $\frac{3}{4}$	$\frac{1}{2}$, $\frac{5}{8}$
28	.15	.012	1 $\frac{3}{4}$	$\frac{1}{2}$, $\frac{5}{8}$
30	.15	.010	1 $\frac{3}{4}$	$\frac{1}{2}$, $\frac{5}{8}$
32	.15	.008	1 $\frac{3}{4}$	$\frac{1}{2}$, $\frac{5}{8}$
34	.15	.006	1 $\frac{3}{4}$	$\frac{1}{2}$, $\frac{5}{8}$

No. 850 Carbon Steel

No. 1850 High Speed Steel



ANGULAR CUTTERS

RIGHT AND LEFT HAND

45°, 50°, 60°, 70°, 80° angle in stock

Diameter, Inches	Price Each		Thickness, Inches	Diameter of Hole, Inches
	Carbon Steel	High Speed Steel		
2½	\$3.40	\$5.80	½	⅞
2¾	3.60	6.40	½	1
*3	4.30	7.65	½	1¼

*45° and 60° only.

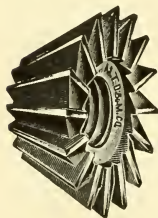
Angular Cutters are for cutting the teeth of Cutters and Mills and the side teeth of Heading or Straddle Mills, but are not adapted for Spiral Milling.

When ordering, state whether Cutter is to be Right or Left Hand. Illustration shows Right Hand Cutter.

Cutters having dimensions other than listed are special and subject to special prices.

No. 851 Carbon Steel

No. 1851 High Speed Steel



ANGULAR CUTTERS

WITH THREADED HOLES

These Cutters have an angle of 60°, and are made both Right and Left Hand

Diameter, Inches	Price Each		Thickness, Inches	Diameter of Hole, Inches	Thread
	Carbon Steel	High Speed Steel			
1¼	\$3.00	\$4.75	7/16	3/8	20
1⅝	3.60	5.80	9/16	½	16

In ordering these cutters, in addition to specifying right or left hand, advise style cutter wanted, in accordance with sketch on opposite page.

Cutters having dimensions other than listed are special and subject to special prices.

For arbors fitting these mills see page 115.

No. 854
Carbon Steel

DOUBLE ANGLE
CUTTERS

No. 1854
High Speed Steel



Diameter, Inches	Price Each		Thickness, Inches	Diameter of Hole, Inches
	Carbon Steel	High Speed Steel		
2½	\$3.40	\$5.80	½	⅞
2¾	3.60	6.40	½	1
3	4.30	7.65	½	1¼

These Cutters are carried in stock as illustrated with the included angle of either 45°, 60°, or 90°.

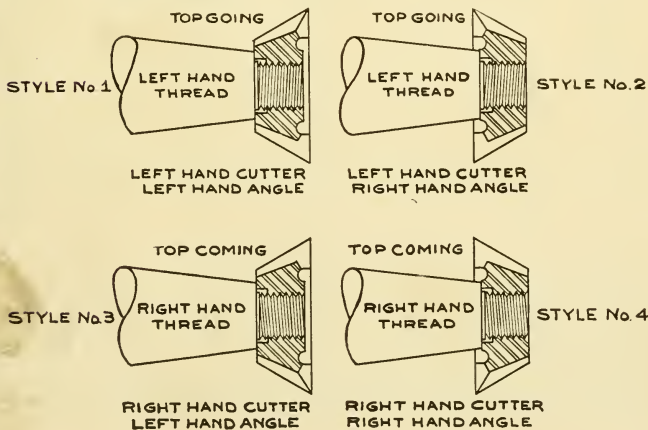


No. 855
FORMED CUTTERS
WITH DOUBLE ANGLE

These Cutters are of the same dimensions as No. 854. They are made to order and can be sharpened by grinding without changing their form. Prices furnished on application.

No. 851
ANGULAR CUTTERS

WITH THREADED HOLES—See opposite page

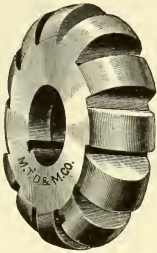


No. 865
Carbon Steel

No. 866
Carbon Steel

No. 1865
High Speed Steel

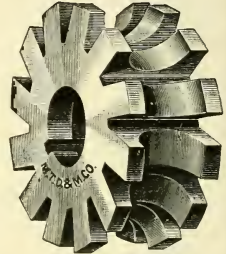
No. 1866
High Speed Steel



CONVEX

CONVEX AND
CONCAVE
CUTTERS

FOR MILLING HALF CIRCLES



CONCAVE

Diam. of Circle, Inches	Diam. of Cutter, Inches	Diam. of Hole, Inches	Price Each			
			CONVEX		CONCAVE	
			No. 865 Carbon Steel	No. 1865 High Speed Steel	No. 866 Carbon Steel	No. 1866 High Speed Steel
$\frac{1}{8}$	2	$\frac{7}{8}$	\$2.30	\$3.40	\$3.50	\$5.30
$\frac{3}{16}$	2	$\frac{7}{8}$	2.70	4.00	3.70	5.75
$\frac{1}{4}$	2	$\frac{7}{8}$	3.50	5.30	3.80	6.00
$\frac{5}{16}$	$2\frac{1}{4}$	$\frac{7}{8}$	3.75	5.90	4.20	6.70
$\frac{3}{8}$	$2\frac{1}{4}$	$\frac{7}{8}$	3.85	6.10	4.40	7.15
$\frac{7}{16}$	$2\frac{1}{4}$	$\frac{7}{8}$	4.00	6.40	4.70	7.75
$\frac{1}{2}$	$2\frac{1}{4}$	$\frac{7}{8}$	4.20	6.70	5.00	8.30
$\frac{5}{8}$	$2\frac{3}{4}$	1	5.15	8.75	6.40	11.25
$\frac{3}{4}$	3	1	6.10	10.65	7.50	13.65
$\frac{7}{8}$	$3\frac{1}{4}$	1	7.15	12.75	8.60	16.00
1	$3\frac{1}{4}$	1	7.70	13.90	9.10	17.50

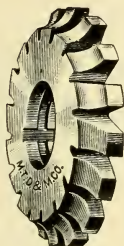
These Cutters have formed teeth and can be sharpened without changing their outline.

Cutters having dimensions other than listed are special and subject to special prices.

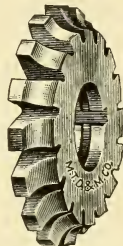
No. 868
Carbon Steel

No. 1868
High Speed Steel

CORNER ROUNDING CUTTERS



LEFT HAND



RIGHT HAND

Radius of Circle, Inches	Diameter of Cutter, Inches	Diameter of Hole, Inches	Price Each	
			Carbon Steel	High Speed Steel
$\frac{1}{8}$	2	$\frac{7}{8}$	\$3.50	\$5.30
$\frac{1}{4}$	$2\frac{1}{4}$	$\frac{7}{8}$	4.00	6.40
$\frac{3}{8}$	3	1	5.60	9.65
$\frac{1}{2}$	$3\frac{1}{4}$	1	7.15	12.75
$\frac{5}{8}$	$3\frac{1}{2}$	1	8.70	16.10

These Cutters have side and radial clearance, and can be sharpened by grinding without changing their form.

In ordering, state whether Right or Left Hand are wanted.

Cutters having dimensions other than listed are special and subject to special prices.

FEEDS AND SPEEDS

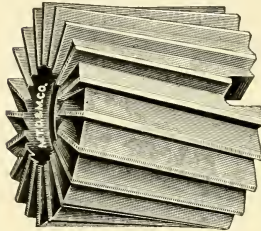
Feeds and speeds vary considerably according to the materials used. We would recommend the following surface speeds as correct for most requirements, to be varied according to the work as seems necessary. With carbon steel cutters for brass 80 to 100 feet per minute; for cast iron 40 to 60 feet per minute; for machinery steel 30 to 40 feet per minute; for annealed tool steel 20 to 30 feet per minute. With High Speed Steel Cutter for brass 150 to 200 feet per minute; for cast iron 80 to 100 feet per minute; for machinery steel 80 to 100 feet per minute; for annealed tool steel 60 to 80 feet per minute.

The number of revolutions per minute to get the required surface speeds will be found in tables on pages XXVIII and XXIX of the appendix.

No. 871
Carbon Steel

No. 1871
High Speed Steel

SHELL END MILLS
WITH SPIRAL FLUTES



LEFT HAND MILL

IN ORDERING STATE WHETHER RIGHT OR LEFT HAND MILLS ARE WANTED

Diameter, Inches	Length of Cut, Inches	Diameter of Hole, Inches	Price Each	
			Carbon Steel	High Speed Steel
1¼	1¼	½	\$3.90	\$6.00
1⅜	1¼	½	4.00	6.25
1½	1¼	½	4.10	6.50
1⅝	1¾	¾	5.00	8.25
1¾	1¾	¾	5.20	8.65
1⅞	1¾	¾	5.30	9.00
2	1¾	¾	5.50	9.65
2⅛	1¾	¾	5.60	10.30
2¼	2¼	1	6.20	11.75
2⅜	2¼	1	6.50	12.90
2½	2¼	1	6.50	12.90
2¾	2¼	1	7.15	14.60
3	2¼	1	8.00	16.65

Shell End Mills are regularly furnished either right or left hand and with spiral teeth.

Shell End Mills with straight teeth or those having dimensions other than listed are special and subject to special prices.

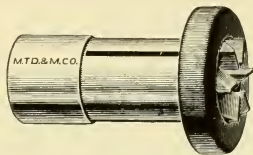
For Arbors fitting these Mills see page 114.

These Mills can be furnished with threaded holes. Prices furnished upon application. When ordering give size and form of thread required.

No. 885
Carbon Steel

No. 1885
High Speed Steel

ADJUSTABLE HOLLOW MILLS



Diam. of Hole, Inches	Price Each		Diam. Shank, Inches	Whole Length, Inches	Diam. of Hole, Inches	Price Each		Diam. Shank, Inches	Whole Length, Inches
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel		
$\frac{3}{32}$	\$1.85	\$4.25	$\frac{5}{8}$	$1\frac{1}{2}$	$\frac{7}{16}$	\$3.50	\$5.20	$\frac{3}{4}$	2
$\frac{1}{8}$	1.85	4.25	$\frac{5}{8}$	$1\frac{1}{2}$	$\frac{1}{2}$	3.50	5.20	1	$2\frac{1}{4}$
$\frac{5}{32}$	1.85	4.25	$\frac{5}{8}$	$1\frac{1}{2}$	$\frac{9}{16}$	4.00	6.85	1	$2\frac{1}{4}$
$\frac{3}{16}$	1.85	4.25	$\frac{5}{8}$	$1\frac{1}{2}$	$\frac{5}{8}$	4.00	6.85	1	$2\frac{1}{4}$
$\frac{7}{32}$	1.85	4.25	$\frac{5}{8}$	$1\frac{1}{2}$	$\frac{11}{16}$	4.60	8.45	$1\frac{1}{4}$	$2\frac{1}{2}$
$\frac{1}{4}$	1.85	4.25	$\frac{5}{8}$	$1\frac{1}{2}$	$\frac{3}{4}$	4.60	8.45	$1\frac{1}{4}$	$2\frac{1}{2}$
$\frac{9}{32}$	2.60	4.70	$\frac{3}{4}$	2	$\frac{13}{16}$	4.60	8.45	$1\frac{1}{4}$	$2\frac{1}{2}$
$\frac{5}{16}$	2.60	4.70	$\frac{3}{4}$	2	$\frac{7}{8}$	5.50	10.40	$1\frac{1}{2}$	$2\frac{3}{4}$
$\frac{11}{32}$	2.60	4.70	$\frac{3}{4}$	2	$\frac{15}{16}$	5.50	10.40	$1\frac{1}{2}$	$2\frac{3}{4}$
$\frac{3}{8}$	3.50	5.20	$\frac{3}{4}$	2	1	5.50	10.40	$1\frac{1}{2}$	$2\frac{3}{4}$

Forcing the Ring on the Mill will correct any slight wear.

No. 886
Carbon Steel

No. 1886
High Speed Steel

HOLLOW MILLS



Diam. of Hole, Inches	Price Each		Outside Diam., Inches	Whole Length, Inches	Diam. of Hole, Inches	Price Each		Outside Diam., Inches	Whole Length, Inches
	Carbon Steel	High Speed Steel				Carbon Steel	High Speed Steel		
$\frac{3}{32}$	\$1.35	\$3.60	$\frac{5}{8}$	$1\frac{1}{2}$	$\frac{3}{8}$	\$2.70	\$4.25	1	$1\frac{3}{4}$
$\frac{1}{8}$	1.35	3.60	$\frac{5}{8}$	$1\frac{1}{2}$	$\frac{7}{16}$	2.70	4.25	1	$1\frac{3}{4}$
$\frac{5}{32}$	1.35	3.60	$\frac{5}{8}$	$1\frac{1}{2}$	$\frac{1}{2}$	2.70	4.25	1	$1\frac{3}{4}$
$\frac{3}{16}$	1.35	3.60	$\frac{5}{8}$	$1\frac{1}{2}$	$\frac{9}{16}$	3.00	5.55	$1\frac{1}{4}$	2
$\frac{7}{32}$	1.35	3.60	$\frac{5}{8}$	$1\frac{1}{2}$	$\frac{5}{8}$	3.00	5.55	$1\frac{1}{4}$	2
$\frac{1}{4}$	1.35	3.60	$\frac{5}{8}$	$1\frac{1}{2}$	$\frac{11}{16}$	3.35	6.85	$1\frac{1}{2}$	2
$\frac{9}{32}$	2.00	3.90	$\frac{3}{4}$	$1\frac{1}{2}$	$\frac{3}{4}$	3.35	6.85	$1\frac{1}{2}$	2
$\frac{5}{16}$	2.00	3.90	$\frac{3}{4}$	$1\frac{1}{2}$	$\frac{7}{8}$	4.00	8.45	$1\frac{3}{4}$	$2\frac{1}{4}$
$\frac{11}{32}$	2.00	3.90	$\frac{3}{4}$	$1\frac{1}{2}$	1	4.00	8.45	$1\frac{3}{4}$	$2\frac{1}{4}$

The holes in these Mills are carefully ground to size, and have a proper relief. Hollow Mills having dimensions other than listed are special and subject to special prices.

No. 890
Carbon Steel

No. 1890
High Speed Steel

STRAIGHT SHANK END MILLS

WITH STRAIGHT FLUTES

SIZES $\frac{1}{8}$ TO $\frac{5}{16}$ INCH INCLUSIVE



No. 891
Carbon Steel

No. 1891
High Speed Steel

STRAIGHT SHANK END MILLS

WITH SPIRAL FLUTES

SIZES $\frac{3}{8}$ TO $\frac{3}{4}$ INCH INCLUSIVE



IN ORDERING STATE WHETHER RIGHT OR LEFT HAND MILLS ARE WANTED

No. 890
No. 1890

No. 891
No. 1891

WITH STRAIGHT FLUTES

WITH SPIRAL FLUTES

Diam. Inches	Price Each		Diam. Inches	Price Each	
	Carbon Steel	High Speed Steel		Carbon Steel	High Speed Steel
$\frac{1}{8}$	\$0.70	\$1.00	$\frac{3}{8}$	\$1.00	\$1.50
$\frac{5}{32}$	.70	1.00	$\frac{7}{16}$	1.25	1.90
$\frac{3}{16}$	.70	1.00	$\frac{1}{2}$	1.60	2.40
$\frac{7}{32}$	.70	1.00	$\frac{9}{16}$	1.70	2.65
$\frac{1}{4}$	.80	1.15	$\frac{5}{8}$	1.80	2.80
$\frac{5}{16}$	.90	1.30	$\frac{3}{4}$	2.15	3.50

Straight Shank End Mills under $\frac{3}{8}$ inch diameter have straight flutes; those $\frac{3}{8}$ inch diameter and over have spiral flutes.

End Mills having dimensions other than listed are special and subject to special prices.

No. 905
Carbon Steel

No. 1905
High Speed Steel

END MILLS

WITH MORSE TAPER SHANKS



No. 907
Carbon Steel

No. 1907
High Speed Steel

END MILLS WITH SPIRAL FLUTES

WITH MORSE TAPER SHANKS



Diam. Inches	Morse Taper Shank No.	Price Each		Diam. Inches	Morse Taper Shank No.	Price Each	
		Carbon Steel	High Speed Steel			Carbon Steel	High Speed Steel
$\frac{1}{4}$	1	\$1.90	\$2.90	$\frac{3}{4}$	2	\$2.70	\$4.60
$\frac{5}{16}$	1	1.90	2.90	$\frac{3}{4}$	3	3.15	6.00
$\frac{3}{8}$	1	1.90	2.90	$\frac{7}{8}$	2	2.90	5.30
$\frac{7}{16}$	1	1.90	2.90	$\frac{7}{8}$	3	3.25	6.20
$\frac{7}{16}$	2	2.50	4.15	1	2	3.10	5.75
$\frac{1}{2}$	1	1.90	3.00	1	3	3.25	6.20
$\frac{1}{2}$	2	2.70	4.60	* $\frac{1}{8}$	3	3.50	7.10
$\frac{5}{8}$	2	2.70	4.60	* $\frac{1}{4}$	3	3.75	8.25

Sizes $\frac{1}{4}$ " to 1" are furnished regularly with either straight or spiral flutes. Sizes marked * with spiral flutes only.

These End Mills are regularly furnished in right hand.

End Mills having dimensions other than listed and Left Hand End Mills are special and subject to special prices.

No. 906
Carbon Steel

No. 1906
High Speed Steel

END MILLS

WITH BROWN & SHARPE TAPER SHANKS



LEFT HAND
MILL

IN ORDERING STATE WHETHER RIGHT OR LEFT HAND IS WANTED

No. 908
Carbon Steel

No. 1908
High Speed Steel

END MILLS WITH SPIRAL FLUTES

WITH BROWN & SHARPE TAPER SHANKS



LEFT HAND
MILL

IN ORDERING STATE WHETHER RIGHT OR LEFT HAND IS WANTED

Diam. Inches	No. of Shank	Price Each		Diam. Inches	No. of Shank	Price Each	
		Carbon Steel	High Speed Steel			Carbon Steel	High Speed Steel
$\frac{1}{4}$	4	\$1.35	\$2.10	$\frac{3}{4}$	7	\$2.70	\$4.70
$\frac{1}{4}$	5	1.80	2.80	* $\frac{3}{4}$	9	3.60	7.40
$\frac{5}{16}$	4	1.35	2.10	$\frac{7}{8}$	7	2.90	5.30
$\frac{5}{16}$	5	1.80	2.90	* $\frac{7}{8}$	9	3.60	7.40
$\frac{3}{8}$	4	1.35	2.10	1	7	3.15	6.00
$\frac{3}{8}$	5	1.80	2.90	*1	9	3.60	7.60
$\frac{7}{16}$	4	1.35	2.10	* $1\frac{1}{8}$	7	3.40	6.80
$\frac{7}{16}$	5	1.80	2.90	$1\frac{1}{8}$	9	3.60	7.60
$1\frac{1}{2}$	5	1.80	2.90	* $1\frac{1}{4}$	7	3.65	7.80
$1\frac{1}{2}$	7	2.70	4.60	$1\frac{1}{4}$	9	3.85	8.90
* $\frac{9}{16}$	5	1.80	2.90	* $1\frac{3}{8}$	9	4.10	9.40
* $\frac{9}{16}$	7	2.70	4.60	* $1\frac{1}{2}$	9	4.40	10.40
$\frac{5}{8}$	5	1.90	3.10	* $1\frac{5}{8}$	9	4.70	11.90
$\frac{5}{8}$	7	2.70	4.60	* $1\frac{3}{4}$	9	5.00	13.15
* $\frac{11}{16}$	7	2.70	4.60				

Sizes marked * are furnished regularly with spiral flutes only.

These End Mills are regularly furnished in right or left hand.

End Mills having dimensions other than listed are special and subject to special prices.

No. 911
Carbon Steel

No. 1911
High Speed Steel

SLOTING END MILLS, "TWO-LIPPED"

WITH BROWN & SHARPE TAPER SHANKS



IN ORDERING STATE WHETHER RIGHT OR LEFT HAND IS WANTED

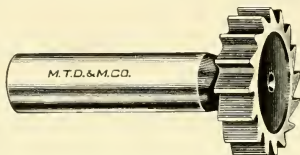
Diameter, Inches	Price Each		Number of Shank	Whole Length, Inches	Length of Flutes, Inches
	Carbon Steel	High Speed Steel			
$\frac{1}{4}$	\$1.10	\$1.65	4	2°	$\frac{3}{8}$
$\frac{1}{4}$	1.80	2.80	5	$2\frac{1}{2}$	$\frac{3}{8}$
$\frac{1}{4}$	2.50	4.15	7	$4\frac{3}{8}$	$\frac{3}{8}$
$\frac{5}{16}$	1.80	2.80	5	$2\frac{13}{32}$	$\frac{13}{32}$
$\frac{5}{16}$	2.50	4.15	7	$4\frac{15}{32}$	$\frac{15}{32}$
$\frac{3}{8}$	2.70	4.60	7	$4\frac{9}{16}$	$\frac{9}{16}$
$\frac{7}{16}$	2.70	4.60	7	$4\frac{21}{32}$	$\frac{21}{32}$
$\frac{1}{2}$	2.70	4.60	7	$4\frac{3}{4}$	$\frac{3}{4}$
$\frac{9}{16}$	2.70	4.60	7	$4\frac{27}{32}$	$\frac{27}{32}$
$\frac{5}{8}$	2.70	4.60	7	$4\frac{15}{16}$	$\frac{15}{16}$
$\frac{11}{16}$	2.70	4.60	7	$5\frac{1}{32}$	$1\frac{1}{32}$
$\frac{3}{4}$	2.70	4.60	7	$5\frac{1}{8}$	$1\frac{1}{8}$
$\frac{13}{16}$	2.90	5.30	7	$5\frac{7}{32}$	$1\frac{7}{32}$
$\frac{7}{8}$	2.90	5.30	7	$5\frac{5}{16}$	$1\frac{5}{16}$
$\frac{7}{8}$	3.60	7.40	9	$6\frac{9}{16}$	$1\frac{5}{16}$
1	3.60	7.40	9	$6\frac{3}{4}$	$1\frac{1}{2}$
$1\frac{1}{8}$	3.60	7.40	9	$6\frac{15}{16}$	$1\frac{11}{16}$
$1\frac{1}{4}$	3.85	8.90	9	$7\frac{1}{8}$	$1\frac{7}{8}$
$1\frac{1}{2}$	4.40	10.40	9	$7\frac{1}{2}$	$2\frac{1}{4}$

These mills are regularly furnished either right or left hand and with straight flutes. Slotting End Mills with spiral flutes or having dimensions other than listed are special and subject to special prices.

No. 917
Carbon Steel

No. 1917
High Speed Steel

KEYSEAT CUTTERS FOR WOODRUFF KEYS



REGULARLY FURNISHED RIGHT HAND ONLY

Cutter No.	Price Each		Diam. of Cutter, Inches	Thickness, Inches	Whole Length, Inches	Diam. of Shank, Inches
	Carbon Steel	High Speed Steel				
1	\$1.20		1/2	1/16	2 1/16	1/2
2	1.20		1/2	3/32	2 3/32	1/2
3	1.20	\$1.80	1/2	1/8	2 1/8	1/2
4	1.35	2.10	5/8	3/32	2 3/32	1/2
5	1.35	2.10	5/8	1/8	2 1/8	1/2
6	1.35	2.10	5/8	5/32	2 5/32	1/2
7	1.60	2.50	3/4	1/8	2 1/8	1/2
8	1.60	2.50	3/4	5/32	2 5/32	1/2
9	1.60	2.50	3/4	3/16	2 3/16	1/2
10	1.75	2.75	7/8	5/32	2 5/32	1/2
11	1.75	2.75	7/8	3/16	2 3/16	1/2
12	1.75	2.75	7/8	7/32	2 7/32	1/2
A	1.75	2.75	7/8	1/4	2 1/4	1/2
13	2.15	3.60	1	3/16	2 3/16	1/2
14	2.15	3.60	1	7/32	2 7/32	1/2
15	2.15	3.60	1	1/4	2 1/4	1/2
B	2.15	3.60	1	5/16	2 5/16	1/2
16	2.30	4.00	1 1/8	3/16	2 7/16	1/2
17	2.30	4.00	1 1/8	7/32	2 15/32	1/2
18	2.30	4.00	1 1/8	1/4	2 1/2	1/2
C	2.30	4.00	1 1/8	5/16	2 9/16	1/2
19	2.50	4.50	1 1/4	3/16	2 7/16	1/2
20	2.50	4.50	1 1/4	7/32	2 15/32	1/2
21	2.50	4.50	1 1/4	1/4	2 1/2	1/2
D	2.50	4.50	1 1/4	5/16	2 9/16	1/2
E	2.50	4.50	1 1/4	3/8	2 5/8	1/2
22	2.65	5.00	1 3/8	1/4	2 1/2	1/2
23	2.65	5.00	1 3/8	5/16	2 9/16	1/2
F	2.65	5.00	1 3/8	3/8	2 5/8	1/2
24	2.85	5.30	1 1/2	1/4	2 1/2	1/2
25	2.85	5.30	1 1/2	5/16	2 9/16	1/2
G	2.85	5.30	1 1/2	3/8	2 5/8	1/2

Left Hand Cutters or Cutters having dimensions other than listed are special and subject to special prices.

T Slot Cutters No. 916 are illustrated on page 228.

TABLES SHOWING THE CORRESPONDING DIAMETRAL AND CIRCULAR PITCHES

No. 1 table shows the diametral pitches with the corresponding circular pitches.

No. 2 table shows the circular pitches with the corresponding diametral pitches.

TABLE NO. 1

TABLE NO. 2

Diametral Pitch	Circular Pitch, Inches	Circular Pitch, Inches	Diametral Pitch
$\frac{1}{2}$	6.283	6	.523
$\frac{3}{4}$	4.188	5	.628
1	3.141	4	.785
$1\frac{1}{4}$	2.513	$3\frac{1}{2}$	.897
$1\frac{1}{2}$	2.094	3	1.047
$1\frac{3}{4}$	1.795	$2\frac{3}{4}$	1.142
2	1.571	$2\frac{1}{2}$	1.256
$2\frac{1}{4}$	1.396	$2\frac{1}{4}$	1.396
$2\frac{1}{2}$	1.257	2	1.571
$2\frac{3}{4}$	1.142	$1\frac{7}{8}$	1.676
3	1.047	$1\frac{3}{4}$	1.795
$3\frac{1}{2}$	.898	$1\frac{5}{8}$	1.933
4	.785	$1\frac{1}{2}$	2.094
5	.628	$1\frac{7}{16}$	2.185
6	.524	$1\frac{3}{8}$	2.285
7	.449	$1\frac{5}{16}$	2.394
8	.393	$1\frac{1}{4}$	2.513
9	.349	$1\frac{3}{16}$	2.646
10	.314	$1\frac{1}{8}$	2.793
11	.286	$1\frac{1}{16}$	2.957
12	.262	1	3.142
14	.224	$\frac{5}{16}$	3.351
16	.196	$\frac{7}{8}$	3.590
18	.175	$\frac{13}{16}$	3.867
20	.157	$\frac{3}{4}$	4.189
22	.143	$\frac{11}{16}$	4.570
24	.131	$\frac{5}{8}$	5.027
26	.121	$\frac{9}{16}$	5.585
28	.112	$1\frac{1}{2}$	6.283
30	.105	$\frac{7}{16}$	7.181
32	.098	$\frac{3}{8}$	8.378
36	.087	$\frac{5}{16}$	10.053
40	.079	$\frac{1}{4}$	12.566
48	.065	$\frac{3}{16}$	16.755
		$\frac{1}{8}$	25.133
		$\frac{1}{16}$	50.266

The diametral pitch of a gear is the number of teeth to each inch of its pitch diameter.

The circular pitch is the distance from the center of one tooth to the center of the next tooth, measured along the pitch circle.

INVOLUTE CUTTERS

FOR THE TEETH OF GEAR WHEELS

These cutters can be sharpened by grinding the faces of the teeth. To preserve the form of the cutter care must be used in grinding to keep the face of each tooth radial.

To cut a set of interchangeable wheels with theoretical accuracy, as many cutters would be required as there are different wheels in the set, for the reason that, strictly speaking, the shape of the teeth should vary with every change in the number of teeth in the wheels. As this change of form is slight and becomes less with each increase in the number of teeth, it has been found that a set of wheels ranging from a pinion of twelve teeth to a rack can be cut with sufficient accuracy for most purposes by the use of eight cutters, as follows: —

No. 1	will cut wheels from	135 teeth to a rack.
No. 2	will cut wheels from	55 teeth to 134 teeth.
No. 3	will cut wheels from	35 teeth to 54 teeth.
No. 4	will cut wheels from	26 teeth to 34 teeth.
No. 5	will cut wheels from	21 teeth to 25 teeth.
No. 6	will cut wheels from	17 teeth to 20 teeth.
No. 7	will cut wheels from	14 teeth to 16 teeth.
No. 8	will cut wheels from	12 teeth to 13 teeth.

For work requiring still more accurate teeth a set of 15 range cutters for each pitch is often used, using half numbers for the intermediates as follows:

No. 1	will cut wheels from	135 teeth to a rack.
No. 1½	will cut wheels from	80 teeth to 139 teeth.
No. 2	will cut wheels from	55 teeth to 79 teeth.
No. 2½	will cut wheels from	42 teeth to 54 teeth.
No. 3	will cut wheels from	35 teeth to 41 teeth.
No. 3½	will cut wheels from	30 teeth to 34 teeth.
No. 4	will cut wheels from	26 teeth to 29 teeth.
No. 4½	will cut wheels from	23 teeth to 25 teeth.
No. 5	will cut wheels from	21 teeth to 22 teeth.
No. 5½	will cut wheels from	19 teeth to 20 teeth.
No. 6	will cut wheels from	17 teeth to 18 teeth.
No. 6½	will cut wheels from	15 teeth to 16 teeth.
No. 7	will cut wheels of	14 teeth.
No. 7½	will cut wheels of	13 teeth.
No. 8	will cut wheels of	12 teeth.

Each cutter is marked with its number, also the diametral pitch and number of teeth for which it is adapted. In ordering, give number of cutter and diametral pitch required.

See table on opposite page.

INVOLUTE CUTTERS

FOR THE TEETH OF GEAR WHEELS

TABLE SHOWING DEPTH OF SPACE AND THICKNESS OF TOOTH IN SPUR
WHEELS WHEN CUT WITH THESE CUTTERS

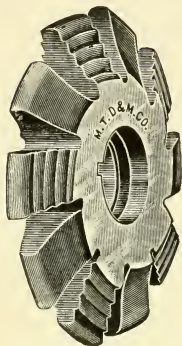
Pitch of Cutter	Depth to be Cut in Gear, Inches	Thickness of Tooth at Pitch Line, Inches	Pitch of Cutter	Depth to be Cut in Gear, Inches	Thickness of Tooth at Pitch Line, Inches
1 $\frac{1}{4}$	1.726	1.257	11	.196	.143
1 $\frac{1}{2}$	1.438	1.047	12	.180	.131
1 $\frac{3}{4}$	1.233	.898	14	.154	.112
2	1.079	.785	16	.135	.098
2 $\frac{1}{4}$	.959	.698	18	.120	.087
2 $\frac{1}{2}$	.863	.628	20	.108	.079
2 $\frac{3}{4}$	.784	.571	22	.098	.071
3	.719	.524	24	.090	.065
3 $\frac{1}{2}$	.616	.449	26	.083	.060
4	.539	.393	28	.077	.056
5	.431	.314	30	.072	.052
6	.360	.262	32	.067	.049
7	.308	.224	36	.060	.044
8	.270	.196	40	.054	.039
9	.240	.175	48	.045	.033
10	.216	.157			

CUTTER CLEARANCE

Correct clearance on cutters is important and should always be considered when a cutter is being sharpened. The cutting edge only should come in contact with the work and sufficient stock should be removed back from the cutting edge so that there is no scraping or dragging action.

No. 930
Carbon Steel

No. 1930
High Speed Steel

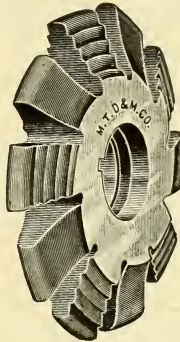


STOCKING CUTTERS
FOR
INVOLUTE GEARS

Diametral Pitch	Price Each		Diameter of Cutter, Inches		Diam. of Hole, Inches
	Carbon Steel	High Speed Steel	Carbon Steel	High Speed Steel	
1	\$57.00	\$135.65	8½	8½	2
1¼	48.00	116.65	7¾	7¾	2
1½	40.50	86.90	7	7	1¾
1¾	30.35	63.75	6½	6½	1¾
2	20.25	43.75	5¾	5¾	1½
2½	13.90	33.15	5½	5¾	1½
3	10.10	22.50	4¾	4¾	1¼
4	7.60	15.35	3¾	4¼	1¼
5	6.90	12.50	3⅝	3¾	1¼
6	5.50	10.00	3	3⅛	1
7	5.15	8.75	2⅞	2⅞	1
8	5.00	8.50	2⅞	2⅞	1

Cutters having dimensions other than listed are special and subject to special prices.

STOCKING CUTTERS FOR INVOLUTE GEARS



No. 931
Carbon Steel

No. 932
Carbon Steel

No. 1931
High Speed Steel

No. 1932
High Speed Steel

WITH 1 INCH HOLE					WITH 1/4 INCH HOLE				
Diam. Pitch	Price Each		Diam. of Cutter		Diam. Pitch	Price Each		Diam. of Cutter	
	Carbon Steel	High Speed Steel	Carbon Steel	High Speed Steel		Carbon Steel	High Speed Steel	Carbon Steel	High Speed Steel
4	\$7.00	\$13.65	3 1/2	3 5/8	3	\$10.10	\$22.50	4 3/8	4 3/4
5	6.00	11.15	3 1/4	3 3/8	4	7.60	15.35	3 7/8	4 1/4
6	5.50	10.00	3	3 1/8	5	6.90	12.50	3 5/8	3 3/4
7	5.15	8.75	2 7/8	2 7/8	6	6.00	10.50	3 1/2	3 1/2
8	5.00	8.50	2 7/8	2 7/8	7	5.90	10.00	3 3/8	3 3/8
					8	5.60	9.40	3 1/4	3 1/4

No. 933
Carbon Steel

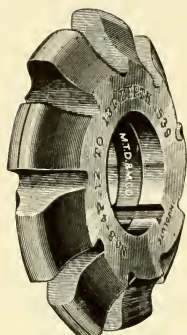
No. 934
Carbon Steel

No. 1933
High Speed Steel

No. 1934
High Speed Steel

WITH 1 1/2 INCH HOLE					WITH 1 3/4 INCH HOLE				
Diam. Pitch	Price Each		Diam. of Cutter		Diam. Pitch	Price Each		Diam. of Cutter	
	Carbon Steel	High Speed Steel	Carbon Steel	High Speed Steel		Carbon Steel	High Speed Steel	Carbon Steel	High Speed Steel
2	\$20.25	\$43.75	5 3/4	5 3/4	1 3/4	\$30.35	\$63.75	6 1/2	6 1/2
2 1/2	13.90	33.15	5 1/2	5 3/4	2	21.50	48.65	6 1/2	6 1/2
3	11.40	25.40	5	5 1/4	2 1/2	14.60	36.50	5 7/8	6 1/8
4	7.90	16.90	4 1/4	4 1/2	3	12.00	29.40	5 3/8	5 5/8
5	7.00	14.10	4	4 1/4	4	8.65	18.15	4 5/8	4 3/4
6	6.70	12.20	3 3/4	3 7/8	5	7.60	15.00	4 3/8	4 3/8
					6	7.30	13.40	4 1/4	4 1/4

Cutters having dimensions other than listed are special and subject to special prices.



No. 940
Carbon Steel

No. 1940
High Speed Steel

INVOLUTE CUTTERS

FOR TEETH OF GEAR WHEELS

ALL GEARS OF SAME PITCH CUT WITH THESE CUTTERS WILL INTERCHANGE

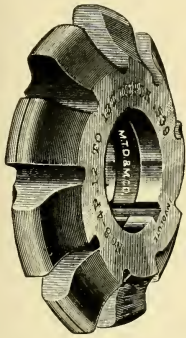
Diametral Pitch	Price Each		Diameter of Cutter		Diameter of Hole
	Carbon Steel	High Speed Steel	Carbon Steel	High Speed Steel	
1	\$57.00	\$135.65	8 $\frac{1}{2}$	8 $\frac{1}{2}$	2
1 $\frac{1}{4}$	48.00	116.65	7 $\frac{3}{4}$	7 $\frac{3}{4}$	2
1 $\frac{1}{2}$	40.50	86.90	7	7	1 $\frac{3}{4}$
1 $\frac{3}{4}$	30.35	63.75	6 $\frac{1}{2}$	6 $\frac{1}{2}$	1 $\frac{3}{4}$
2	20.25	43.75	5 $\frac{3}{4}$	5 $\frac{3}{4}$	1 $\frac{1}{2}$
2 $\frac{1}{2}$	13.90	33.15	5 $\frac{1}{2}$	5 $\frac{3}{4}$	1 $\frac{1}{2}$
3	10.10	22.50	4 $\frac{3}{8}$	4 $\frac{3}{4}$	1 $\frac{1}{4}$
4	7.60	15.35	3 $\frac{7}{8}$	4 $\frac{1}{4}$	1 $\frac{1}{4}$
5	6.90	12.50	3 $\frac{5}{8}$	3 $\frac{3}{4}$	1 $\frac{1}{4}$
6	5.50	10.00	3	3 $\frac{1}{8}$	1
7	5.15	8.75	2 $\frac{7}{8}$	2 $\frac{7}{8}$	1
8	5.00	8.50	2 $\frac{7}{8}$	2 $\frac{7}{8}$	1
9	4.70	7.65	2 $\frac{3}{4}$	2 $\frac{3}{4}$	1
10	4.50	7.10	2 $\frac{1}{4}$	2 $\frac{3}{8}$	$\frac{7}{8}$
11	4.20	6.65	2 $\frac{1}{4}$	2 $\frac{3}{8}$	$\frac{7}{8}$
12	3.90	6.00	2 $\frac{1}{8}$	2 $\frac{1}{4}$	$\frac{7}{8}$
14	3.40	5.65	2	2 $\frac{1}{8}$	$\frac{7}{8}$
16	3.20	5.25	2	2 $\frac{1}{8}$	$\frac{7}{8}$
18	3.00	4.70	1 $\frac{7}{8}$	2	$\frac{7}{8}$
20	2.90	4.60	1 $\frac{7}{8}$	2	$\frac{7}{8}$
22	2.80	4.50	1 $\frac{7}{8}$	2	$\frac{7}{8}$
24	2.65	4.25	1 $\frac{3}{4}$	1 $\frac{3}{4}$	$\frac{7}{8}$
26	2.60	4.20	1 $\frac{3}{4}$	1 $\frac{3}{4}$	$\frac{7}{8}$
28	2.25	3.75	1 $\frac{3}{4}$	1 $\frac{3}{4}$	$\frac{7}{8}$
30	2.25	3.75	1 $\frac{3}{4}$	1 $\frac{3}{4}$	$\frac{7}{8}$
32	2.25	3.75	1 $\frac{3}{4}$	1 $\frac{3}{4}$	$\frac{7}{8}$
36	2.25	3.75	1 $\frac{3}{4}$	1 $\frac{3}{4}$	$\frac{7}{8}$
40	2.25	3.75	1 $\frac{3}{4}$	1 $\frac{3}{4}$	$\frac{7}{8}$
48	2.25	3.75	1 $\frac{3}{4}$	1 $\frac{3}{4}$	$\frac{7}{8}$

Eight Cutters made for each pitch. See page 212.

Cutters having dimensions other than listed are special and subject to special prices.

No. 941
Carbon Steel

No. 1941
High Speed Steel



INVOLUTE CUTTERS

FOR TEETH OF GEAR WHEELS

LARGE DIAMETERS

ALL GEARS OF SAME PITCH CUT WITH THESE CUTTERS WILL INTERCHANGE

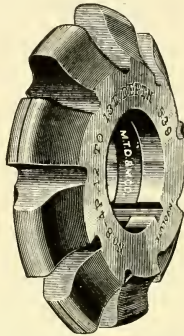
Diametral Pitch	Price Each		Diameter of Cutter		Diam. of Hole, Inches
	Carbon Steel	High Speed Steel	Carbon Steel	High Speed Steel	
1	\$57.00	\$135.65	8½	8½	1½-2
1¼	48.00	116.65	7¾	7¾	1½-2
1½	41.75	91.90	7¼	7¼	1½-2
1¾	31.65	70.00	6¾	6¾	1½-2
2	21.50	48.65	6¼	6¼	1½-2
2¼	17.10	40.60	6¼	6¼	1½-2
2½	15.20	36.50	6¼	6¼	1½-2
2¾	13.75	34.65	5¾	6¼	1½-2
3	12.00	25.40	5¼	5¼	1½-2
4	10.00	20.75	5¼	5¼	1½-2
5	8.75	19.10	5¼	5¼	1½-2
6	7.30	13.40	4¼	4¼	1½-2
7	7.10	12.50	4¼	4¼	1½-2
8	6.80	12.20	4¼	4¼	1½-2
10	6.60	11.50	4¼	4¼	1½-2
12	6.00	10.90	4¼	4¼	1½-2
14	5.00	9.40	4¼	4¼	1½-2
16	5.00	9.40	4¼	4¼	1½-2

Eight Cutters made for each pitch. See page 212.

Cutters having dimensions other than listed are special and subject to special prices.

INVOLUTE CUTTERS

FOR TEETH OF GEAR WHEELS



No. 942
Carbon Steel

No. 943
Carbon Steel

No. 1942
High Speed Steel

No. 1943
High Speed Steel

ALL GEARS OF SAME PITCH CUT WITH THESE CUTTERS WILL INTERCHANGE

WITH 1 INCH HOLE					WITH 1¼ INCH HOLE				
Diam- etral Pitch	Price Each		Diameter of Cutter		Diam- etral Pitch	Price Each		Diameter of Cutter	
	Carbon Steel	High Speed Steel	Carbon Steel	High Speed Steel		Carbon Steel	High Speed Steel	Carbon Steel	High Speed Steel
4	\$7.00	\$13.65	3½	3⅝	3	\$10.10	\$22.50	4⅜	4¾
5	6.00	11.15	3¼	3⅜	4	7.60	15.35	3⅞	4¼
6	5.50	10.00	3	3⅛	5	6.90	12.50	3⅝	3¾
7	5.15	8.75	2⅞	2⅞	6	6.00	10.50	3½	3½
8	5.00	8.50	2⅞	2⅞	7	5.90	10.00	3⅜	3⅜
9	4.70	7.65	2¾	2¾	8	5.60	9.40	3¼	3¼
10	4.60	7.30	2¾	2¾	9	5.35	8.75	3⅛	3⅛
11	4.50	7.10	2⅝	2⅝	10	5.00	8.10	3	3
12	4.25	6.70	2⅝	2⅝	12	4.60	7.40	2⅞	2⅞
14	3.75	6.00	2½	2½					
16	3.50	5.65	2½	2½					
18	3.35	5.35	2⅜	2⅜					
20	3.25	5.00	2⅜	2⅜					
22	3.10	4.80	2¼	2¼					
24	3.00	4.70	2¼	2¼					

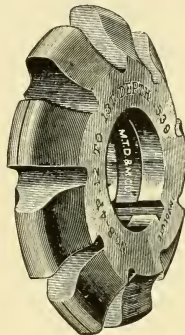
Eight Cutters made for each pitch. See page 212.
Cutters having dimensions other than listed are special and subject to special prices.

INVOLUTE CUTTERS

FOR TEETH OF GEAR WHEELS

No. 944
Carbon Steel

No. 1944
High Speed Steel



No. 945
Carbon Steel

No. 1945
High Speed Steel

ALL GEARS OF SAME PITCH CUT WITH THESE CUTTERS WILL INTERCHANGE

WITH 1½ INCH HOLE					WITH 1¾ INCH HOLE				
Diam- etral Pitch	Price Each		Diameter of Cutter		Diam- etral Pitch	Price Each		Diameter of Cutter	
	Carbon Steel	High Speed Steel	Carbon Steel	High Speed Steel		Carbon Steel	High Speed Steel	Carbon Steel	High Speed Steel
2	\$20.25	\$43.75	5¾	5¾	1¾	\$30.35	\$63.75	6½	6½
2½	13.90	33.15	5½	5¾	2	21.50	48.65	6½	6½
3	11.40	25.40	5	5¼	2½	14.60	36.50	5⅞	6⅞
4	7.90	16.90	4¼	4½	3	12.00	29.40	5⅞	5⅞
5	7.00	14.10	4	4¼	4	8.65	18.15	4⅝	4¾
6	6.70	12.20	3¾	3⅞	5	7.60	15.00	4⅝	4⅝
					6	7.30	13.40	4¼	4¼

Eight Cutters made for each pitch. See page 212.

Cutters having dimensions other than listed are special and subject to special prices.

CUTTERS FOR MITRE AND BEVEL GEARS

Mitre Gears are Bevel Gears having the same number of teeth and whose center lines intersect at right angles.

A pair of Mitre Gears can be cut with one cutter, but a pair of Bevel Gears that are not Mitres may require two cutters.

Cutters for Bevel Gears are of similar form to those for spur gears except for thickness, which must be no greater than the space between the teeth of the gear at their inside ends. As usually made, cutters are thin enough to cut a gear whose tooth face is not longer than one-third the distance from the outer ends of the teeth to the point where the center lines of the gears intersect.

Eight cutters are made for each pitch. In cutting a Bevel Gear it is usually necessary to use a cutter of a shape adapted for a greater number of teeth than the number of teeth in the gear to be cut. The number of cutter for each gear of a pair may be found as follows: First, find the center angle of the larger gear by dividing the number of teeth in same by the number of teeth in the smaller gear; the result will be the tangent of the center angle which may be found by reference to a table of tangents. The number of teeth in the larger gear divided by the cosine of this center angle will give the number of teeth for which a cutter should be selected to cut the larger gear. The number of teeth in the smaller gear divided by the sine of this same center angle will give the number of teeth for which a cutter should be selected to cut the smaller gear. In the case of Mitre Gears, this is equivalent to multiplying the number of teeth in one of the gears by 1.41 and selecting a cutter for the number of teeth indicated by the product.

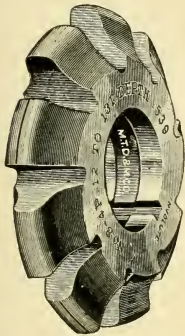
EXAMPLE: To select a cutter for mitres of 40 T, multiply 40 by 1.41. The product 56.4 shows that a cutter of shape No. 2 for 55 to 134 T. is the one required.

In ordering cutters for Bevel Gears, if the number of teeth in each gear, the pitch and length of face are given, also the angle of the shafts, we can select the proper cutters.

No. 964
Carbon Steel

No. 1964
High Speed Steel

CUTTERS FOR MITRE AND BEVEL GEARS



Diametral Pitch	Price Each		Diam. of Cutter		Diam. of Hole, Inches
	Carbon Steel	High Speed Steel	Carbon Steel	High Speed Steel	
3	\$9.50	\$17.90	4	4	1 1/4
4	7.00	13.65	3 1/2	3 5/8	1 1/4
5	6.00	11.15	3 1/4	3 3/8	1 1/4
6	5.50	10.00	3	3 1/8	1
7	5.15	8.75	2 7/8	2 7/8	1
8	5.00	8.50	2 7/8	2 7/8	1
10	4.50	7.10	2 1/4	2 3/8	7/8
12	3.90	6.00	2 1/8	2 1/4	7/8
14	3.40	5.65	2	2 1/8	7/8
16	3.20	5.25	2	2 1/8	7/8
20	2.90	4.60	1 7/8	2	7/8
24	2.65	4.25	1 3/4	1 3/4	7/8

No. 965
Carbon Steel

No. 1965
High Speed Steel

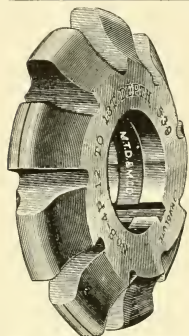
CUTTERS FOR MITRE AND BEVEL GEARS

WITH 7/8 INCH HOLE

Diametral Pitch	Price Each		Diam. of Cutter		Diameter of Hole, Inches
	Carbon Steel	High Speed Steel	Carbon Steel	High Speed Steel	
4	\$7.00	\$12.50	3 3/8	3 1/2	7/8
5	6.00	10.30	3 1/8	3 1/4	7/8
6	5.50	10.00	3	3 1/8	7/8
7	5.15	8.75	2 3/4	2 7/8	7/8
8	5.00	8.50	2 3/4	2 7/8	7/8
10	4.60	7.30	2 5/8	2 5/8	7/8
12	4.00	6.25	2 1/2	2 1/2	7/8

Eight cutters made for each pitch. See page 212

Cutters having dimensions other than listed are special and subject to special prices.



No. 970
Carbon Steel

No. 1970
High Speed Steel

METRIC INVOLUTE CUTTERS

FOR TEETH OF GEAR WHEELS

Module, M.M.	Price Each		Diameter of Cutter		Diameter of Hole. Inches or M.M.
	Carbon Steel	High Speed Steel	Carbon Steel	High Speed Steel	
.5	\$3.25	\$4.75	1 $\frac{3}{4}$	1 $\frac{3}{4}$	$\frac{7}{8}$ or 22 M.M.
.75	3.25	4.75	1 $\frac{3}{4}$	1 $\frac{3}{4}$	$\frac{7}{8}$ or 22
1	3.65	5.25	1 $\frac{3}{4}$	1 $\frac{3}{4}$	$\frac{7}{8}$ or 22
1.25	3.90	5.60	1 $\frac{7}{8}$	2	$\frac{7}{8}$ or 22
1.5	4.20	6.25	2	2 $\frac{1}{8}$	$\frac{7}{8}$ or 22
1.75	4.40	6.65	2	2 $\frac{1}{8}$	$\frac{7}{8}$ or 22
2	4.90	7.00	2 $\frac{1}{8}$	2 $\frac{1}{4}$	$\frac{7}{8}$ or 22
2.25	5.20	7.65	2 $\frac{1}{4}$	2 $\frac{3}{8}$	$\frac{7}{8}$ or 22
2.5	5.50	8.10	2 $\frac{1}{4}$	2 $\frac{3}{8}$	$\frac{7}{8}$ or 22
2.75	5.70	8.65	2 $\frac{3}{4}$	2 $\frac{3}{4}$	1 or 27
3	6.00	9.50	2 $\frac{7}{8}$	2 $\frac{7}{8}$	1 or 27
3.25	6.15	9.75	2 $\frac{7}{8}$	2 $\frac{7}{8}$	1 or 27
3.5	6.15	9.75	2 $\frac{7}{8}$	2 $\frac{7}{8}$	1 or 27
3.75	6.50	10.15	2 $\frac{7}{8}$	2 $\frac{7}{8}$	1 or 27
4	6.50	11.00	3	3 $\frac{1}{8}$	1 or 27
4.25	7.00	11.30	3	3 $\frac{1}{8}$	1 or 27
4.5	7.90	13.50	3 $\frac{5}{8}$	3 $\frac{3}{4}$	1 $\frac{1}{4}$ or 32
4.75	7.90	13.50	3 $\frac{5}{8}$	3 $\frac{3}{4}$	1 $\frac{1}{4}$ or 32
5	7.90	13.50	3 $\frac{5}{8}$	3 $\frac{3}{4}$	1 $\frac{1}{4}$ or 32
5.25	8.30	14.65	3 $\frac{5}{8}$	3 $\frac{3}{4}$	1 $\frac{1}{4}$ or 32
5.5	8.30	15.40	3 $\frac{3}{4}$	4	1 $\frac{1}{4}$ or 32
5.75	8.30	15.40	3 $\frac{3}{4}$	4	1 $\frac{1}{4}$ or 32
6	8.60	16.35	3 $\frac{7}{8}$	4 $\frac{1}{4}$	1 $\frac{1}{4}$ or 32
7	10.50	21.00	4 $\frac{1}{8}$	4 $\frac{1}{2}$	1 $\frac{1}{4}$ or 32
8	11.10	23.50	4 $\frac{3}{8}$	4 $\frac{3}{4}$	1 $\frac{1}{4}$ or 32
9	13.75	28.50	5 $\frac{1}{8}$	5 $\frac{1}{2}$	1 $\frac{1}{2}$ or 40
10	14.90	34.15	5 $\frac{1}{2}$	5 $\frac{3}{4}$	1 $\frac{1}{2}$ or 40
11	17.00	37.00	5 $\frac{3}{4}$	5 $\frac{3}{4}$	1 $\frac{1}{2}$ or 40
12	21.25	44.75	5 $\frac{3}{4}$	5 $\frac{3}{4}$	1 $\frac{1}{2}$ or 40

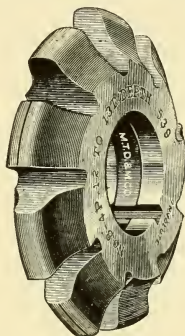
Eight Cutters made for each pitch. See page 212.

Cutters having dimensions other than listed are special and subject to special prices.

METRIC INVOLUTE CUTTERS

FOR TEETH OF GEAR WHEELS

No. 971
Carbon Steel



No. 972
Carbon Steel

No. 1971
High Speed Steel

No. 1972
High Speed Steel

WITH 1 IN. OR 27 M.M. HOLE

Mod- ule, M.M.	Price Each		Diameter of Cutter	
	Carbon Steel	High Speed Steel	Carbon Steel	High Speed Steel
.75	\$4.00	\$5.70	2 $\frac{1}{4}$	2 $\frac{1}{4}$
1	4.00	5.70	2 $\frac{1}{4}$	2 $\frac{1}{4}$
1.25	4.25	6.00	2 $\frac{3}{8}$	2 $\frac{3}{8}$
1.5	4.50	6.65	2 $\frac{1}{2}$	2 $\frac{1}{2}$
1.75	4.75	7.00	2 $\frac{1}{2}$	2 $\frac{1}{2}$
2	5.25	7.70	2 $\frac{5}{8}$	2 $\frac{5}{8}$
2.25	5.50	8.10	2 $\frac{5}{8}$	2 $\frac{5}{8}$
2.5	5.60	8.30	2 $\frac{3}{4}$	2 $\frac{3}{4}$
3	6.00	9.50	2 $\frac{7}{8}$	2 $\frac{7}{8}$
3.5	6.15	9.75	2 $\frac{7}{8}$	2 $\frac{7}{8}$
4	6.50	11.00	3	3 $\frac{1}{8}$
4.5	6.80	11.00	3 $\frac{1}{8}$	3 $\frac{1}{4}$
5	7.00	12.15	3 $\frac{1}{4}$	3 $\frac{3}{8}$
5.5	8.00	13.50	3 $\frac{3}{8}$	3 $\frac{1}{2}$
6	8.00	14.65	3 $\frac{1}{2}$	3 $\frac{5}{8}$

WITH 1 $\frac{1}{4}$ IN. OR 32 M.M. HOLE

Mod- ule, M.M.	Price Each		Diameter of Cutter	
	Carbon Steel	High Speed Steel	Car- bon Steel	High Speed Steel
1.25	\$4.50	\$6.25	2 $\frac{3}{4}$	2 $\frac{3}{4}$
1.5	4.90	7.50	2 $\frac{7}{8}$	2 $\frac{7}{8}$
1.75	5.00	7.65	2 $\frac{7}{8}$	2 $\frac{7}{8}$
2	5.60	8.40	2 $\frac{7}{8}$	2 $\frac{7}{8}$
2.25	5.80	8.80	2 $\frac{7}{8}$	2 $\frac{7}{8}$
2.5	6.00	9.10	3	3
3	6.60	10.40	3 $\frac{1}{4}$	3 $\frac{1}{4}$
3.5	6.90	11.00	3 $\frac{3}{8}$	3 $\frac{3}{8}$
4	7.00	11.50	3 $\frac{1}{2}$	3 $\frac{1}{2}$
4.5	7.90	13.50	3 $\frac{5}{8}$	3 $\frac{3}{4}$
5	7.90	13.50	3 $\frac{5}{8}$	3 $\frac{3}{4}$
5.5	8.30	15.40	3 $\frac{3}{4}$	4
6	8.60	16.35	3 $\frac{7}{8}$	4 $\frac{1}{4}$
7	10.50	21.00	4 $\frac{1}{8}$	4 $\frac{1}{2}$
8	11.10	23.50	4 $\frac{3}{8}$	4 $\frac{3}{4}$

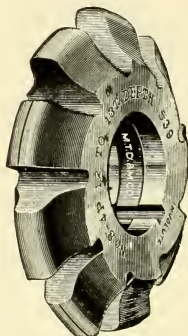
Eight Cutters made for each pitch. See page 212.

Cutters having dimensions other than listed are special and subject to special prices.

METRIC INVOLUTE CUTTERS

FOR TEETH OF GEAR WHEELS

No. 973
Carbon Steel



No. 974
Carbon Steel

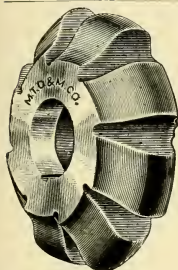
No. 1973
High Speed Steel

No. 1974
High Speed Steel

WITH 1½ IN. OR 40 M.M. HOLE					WITH 1¼ IN. OR 45 M.M. HOLE				
Mod- ule, M.M.	Price Each		Diameter of Cutter		Mod- ule, M.M.	Price Each		Diameter of Cutter	
	Carbon Steel	High Speed Steel	Carbon Steel	High Speed Steel		Carbon Steel	High Speed Steel	Carbon Steel	High Speed Steel
2.5	\$6.60	\$10.35	3½	3½	3	\$7.40	\$12.25	4	4
3	6.80	10.70	3½	3½	3.5	8.10	13.50	4⅛	4⅛
3.5	7.50	12.65	3⅝	3⅝	4	8.30	14.40	4¼	4¼
4	7.70	13.20	3¾	3⅞	4.5	8.60	16.00	4⅜	4⅜
4.5	8.00	15.10	3⅞	4⅛	5	8.60	16.00	4⅜	4⅜
5	8.00	15.10	4	4¼	5.5	9.25	19.15	4½	4⅝
5.5	8.90	17.90	4⅛	4⅜	6	9.65	19.15	4⅝	4¾
6	8.90	17.90	4¼	4½	7	12.40	26.40	5	5¼
7	11.75	24.15	4⅝	4⅞	8	13.00	30.40	5⅜	5⅝
8	12.40	26.40	5	5¼	9	14.75	32.25	5⅝	5⅞
9	13.75	28.50	5⅛	5½	10	15.60	37.50	5⅞	6⅛
10	14.90	34.15	5½	5¾	11	18.10	41.60	6¼	6½
11	17.00	37.00	5¾	5¾	12	22.50	49.65	6½	6½
12	21.25	44.75	5¾	5¾					

Eight Cutters made for each pitch. See page 212.

Cutters having dimensions other than listed are special and subject to special prices.



No. 987
Carbon Steel

No. 1987
High Speed Steel

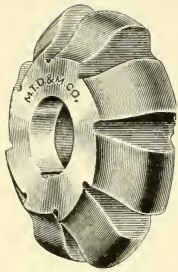
SPROCKET WHEEL CUTTERS
FOR ROLLER CHAINS

AMERICAN STANDARD TOOTH FORMS

ADOPTED BY S.A.E., A.S.M.E., A.G.M.A.

Circular Pitch, Inches	Diam. of Roll, Inches	Number of Teeth in Sprocket	Diam. Cutter, Inches	Width Cutter, Inches	Size Hole in Cutter, Inches	Price Each	
						Carbon Steel	High Speed Steel
3/8	.200	6	2 3/4	1 5/32	1	\$4.80	\$8.00
		7-8	2 3/4	1 5/32		4.80	8.00
		9-11	2 3/4	1 5/32		4.80	8.00
		12-17	2 3/4	7/16		4.60	7.65
		18-34	2 3/4	7/16		4.60	7.65
		35 & over	2 3/4	1 3/32		4.60	7.65
1/2 and 5/8	.313	6	3	3/4	1	6.10	10.65
		7-8	3	3/4		6.10	10.65
		9-11	3 1/8	3/4		6.60	11.65
		12-17	3 1/8	3/4		6.60	11.65
		18-34	3 1/8	2 3/32		6.60	11.65
		35 & over	3 1/8	1 1/16		6.60	11.65
5/8	.400	6	3 1/8	3/4	1	6.60	11.65
		7-8	3 1/8	3/4		6.60	11.65
		9-11	3 1/4	3/4		6.60	11.65
		12-17	3 1/4	3/4		6.60	11.65
		18-34	3 1/4	2 3/32		6.60	11.65
		35 & over	3 1/4	1 1/16		6.60	11.65
3/4	.469	6	3 1/4	2 9/32	1	7.70	13.90
		7-8	3 1/4	2 9/32		7.70	13.90
		9-11	3 3/8	2 9/32		8.50	15.50
		12-17	3 3/8	7/8		7.85	14.15
		18-34	3 3/8	2 7/32		7.85	14.15
		35 & over	3 3/8	1 13/16		7.85	14.15

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No. 987
Carbon Steel

No. 1987
High Speed Steel

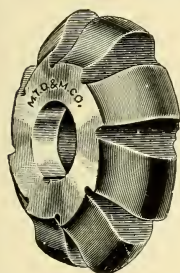
SPROCKET WHEEL CUTTERS
FOR ROLLER CHAINS
(Continued)

AMERICAN STANDARD TOOTH FORMS

ADOPTED BY S.A.E., A.S.M.E., A.G.M.A.

Circular Pitch, Inches	Diam. of Roll, Inches	Number of Teeth in Sprocket	Diam. Cutter, Inches	Width Cutter, Inches	Size Hole in Cutter, Inches	Price Each	
						Carbon Steel	High Speed Steel
1	.563	6	3 $\frac{3}{4}$	1 $\frac{1}{4}$	1 $\frac{1}{4}$	\$9.85	\$18.75
		7-8	3 $\frac{7}{8}$	1 $\frac{1}{4}$		10.75	20.65
		9-11	3 $\frac{7}{8}$	1 $\frac{3}{16}$		10.75	20.65
		12-17	4	1 $\frac{5}{32}$		10.75	20.65
		18-34	4	1 $\frac{1}{8}$		10.40	19.65
		35 & over	4	1 $\frac{3}{32}$		10.40	19.65
1 and 1 $\frac{1}{4}$	.625	6	3 $\frac{7}{8}$	1 $\frac{1}{2}$	1 $\frac{1}{4}$	11.40	22.50
		7-8	4	1 $\frac{1}{2}$		11.40	22.50
		9-11	4 $\frac{1}{8}$	1 $\frac{5}{32}$		12.25	24.50
		12-17	4 $\frac{1}{8}$	1 $\frac{5}{32}$		12.25	24.50
		18-34	4 $\frac{1}{4}$	1 $\frac{3}{32}$		12.25	24.50
		35 & over	4 $\frac{1}{4}$	1 $\frac{11}{32}$		11.90	23.50
1 $\frac{1}{4}$ and 1 $\frac{1}{2}$	.750	6	4 $\frac{1}{4}$	1 $\frac{13}{16}$	1 $\frac{1}{4}$	13.65	28.65
		7-8	4 $\frac{3}{8}$	1 $\frac{13}{16}$		14.65	31.25
		9-11	4 $\frac{1}{2}$	1 $\frac{25}{32}$		14.65	31.25
		12-17	4 $\frac{1}{2}$	1 $\frac{3}{4}$		13.85	28.90
		18-34	4 $\frac{5}{8}$	1 $\frac{11}{16}$		14.85	31.25
		35 & over	4 $\frac{5}{8}$	1 $\frac{5}{8}$		14.50	30.15
1 $\frac{1}{2}$	.875	6	4 $\frac{3}{8}$	1 $\frac{13}{16}$	1 $\frac{1}{4}$	14.65	31.25
		7-8	4 $\frac{1}{2}$	1 $\frac{13}{16}$		14.65	31.25
		9-11	4 $\frac{5}{8}$	1 $\frac{25}{32}$		15.75	33.90
		12-17	4 $\frac{5}{8}$	1 $\frac{3}{4}$		14.85	31.25
		18-34	4 $\frac{3}{4}$	1 $\frac{11}{16}$		14.85	31.25
		35 & over	4 $\frac{3}{4}$	1 $\frac{5}{8}$		14.50	30.15

Continued on next page



No. 987
Carbon Steel

No. 1987
High Speed Steel

SPROCKET WHEEL CUTTERS
FOR ROLLER CHAINS
(Concluded)

AMERICAN STANDARD TOOTH FORMS

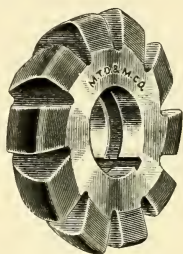
ADOPTED BY S.A.E., A.S.M.E., A.G.M.A.

Circular Pitch, Inches	Diam. of Roll, Inches	Number of Teeth in Sprocket	Diam. Cutter, Inches	Width Cutter, Inches	Size Hole in Cutter, Inches	Price Each	
						Carbon Steel	High Speed Steel
1 3/4	1.000	6	5	2 3/32	1 1/2	\$18.50	\$40.50
		7-8	5 1/8	2 3/32		19.70	44.90
		9-11	5 1/4	2 1/16		19.70	44.90
		12-17	5 3/8	2 3/32		21.00	48.30
		18-34	5 1/2	1 31/32		19.10	43.75
		35 & over	5 1/2	1 7/8		19.10	43.75
2	1.125	6	5 3/8	2 13/32	1 1/2	23.00	53.00
		7-8	5 1/2	2 13/32		23.00	53.00
		9-11	5 5/8	2 3/8		24.50	57.00
		12-17	5 3/4	2 5/16		24.50	57.00
		18-34	5 7/8	2 1/4		23.80	57.75
		35 & over	5 7/8	2 5/32		23.80	57.75
2 1/2	1.550	6	6 3/8	3	1 3/4	34.80	85.65
		7-8	6 5/8	3		37.00	91.50
		9-11	6 3/4	2 15/16		37.00	91.50
		12-17	6 7/8	2 29/32		39.50	97.90
		18-34	7	2 3/4		36.40	90.30
		35 & over	7 1/8	2 11/16		38.90	96.60
3	1.900	6	7 1/2	3 19/32	2	58.85	142.65
		7-8	7 3/4	3 15/32		59.60	147.40
		9-11	7 7/8	3 17/32		63.50	157.00
		12-17	8	3 15/32		59.15	146.65
		18-34	8	3 11/32		59.15	146.65
		35 & over	8 1/4	3 7/32		58.20	150.80

No. 991
Carbon Steel

No. 1991
High Speed Steel

CUTTERS FOR GROOVING REAMERS



Cutter No.	Diameter of Reamer, Inches	No. Teeth in Reamer	Diameter of Cutter, Inches	Hole in Cutter, Inches	Price Each	
					Carbon Steel	High Speed Steel
1	$\frac{1}{8}$ to $\frac{3}{16}$	6	2	1	\$2.70	\$4.00
2	$\frac{1}{4}$ to $\frac{5}{16}$	6	2	1	3.50	5.30
3	$\frac{3}{8}$ to $\frac{7}{16}$	6	2	1	3.70	5.75
4	$\frac{1}{2}$ to $\frac{11}{16}$	6 to 8	$2\frac{1}{4}$	1	4.00	6.40
5	$\frac{3}{4}$ to 1	8	$2\frac{1}{4}$	1	4.20	6.70
6	$1\frac{1}{8}$ to $1\frac{1}{2}$	10	$2\frac{1}{4}$	1	4.40	7.15
7	$1\frac{9}{16}$ to $2\frac{1}{8}$	12	$2\frac{1}{2}$	1	4.80	8.00
8	$2\frac{1}{4}$ to 3	14	$2\frac{3}{4}$	1	5.60	9.60
9	$3\frac{1}{8}$ to $3\frac{1}{2}$	14	3	1	6.60	11.60
10	$3\frac{3}{8}$ to 5	14 to 16	$3\frac{1}{4}$	1	7.70	13.90

The above cutters are especially adapted for fluting reamers and have greater strength than those made for grooving both taps and reamers.

In ordering give number of cutter, or diameter and number of flutes of reamer.

Cutters having dimensions other than listed are special and subject to special prices.

No. 916

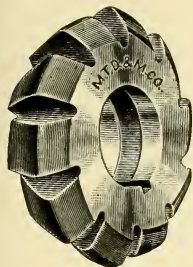
T SLOT CUTTERS

WITH BROWN & SHARPE TAPER SHANKS



LEFT HAND
CUTTER

T Slot Cutters are furnished either right or left hand. Prices upon application.



No. 992
Carbon Steel

No. 1992
High Speed Steel

CUTTERS FOR GROOVING
TAPS AND REAMERS

These cutters are designed for grooving either taps or reamers, in accordance with tables below; for example, Number 5 will flute taps of sizes $\frac{1}{16}$ to $\frac{7}{8}$ inches or reamers of sizes $1\frac{5}{32}$ to $1\frac{3}{4}$ inches diameter. For grooving reamers it is necessary only to cut one or more grooves of a less depth in order to flute unevenly.

Cutter No.	Price Each		Diameter of Cutter, Inches	Hole in Cutter, Inches
	Carbon Steel	High Speed Steel		
1	\$2.30	\$3.40	2	1
2	2.70	4.00	2	1
3	3.75	5.90	$2\frac{1}{8}$	1
4	4.00	6.40	$2\frac{1}{4}$	1
5	4.80	8.00	$2\frac{3}{8}$	1
6	5.10	8.60	$2\frac{1}{2}$	1
7	6.40	11.25	$2\frac{5}{8}$	1
8	7.25	13.15	$2\frac{7}{8}$	1

Cutter No.	Diameter of Tap, Inches	No. Flutes in Tap	Diameter of Reamer, Inches	No. Flutes in Reamer
1	0 to $\frac{1}{8}$	4	$\frac{1}{8}$ to $\frac{1}{4}$	6
2	$\frac{5}{32}$ to $\frac{1}{4}$	4	$\frac{9}{32}$ to $\frac{3}{8}$	6
3	$\frac{9}{32}$ to $\frac{3}{8}$	4	$\frac{13}{32}$ to $\frac{1}{2}$	6
4	$\frac{7}{16}$ to $\frac{5}{8}$	4	$\frac{17}{32}$ to $1\frac{1}{8}$	6 to 8
5	$\frac{11}{16}$ to $\frac{7}{8}$	4	$1\frac{5}{32}$ to $1\frac{3}{4}$	8 to 10
6	$\frac{15}{16}$ to $1\frac{1}{4}$	4	$1\frac{25}{32}$ to 2	10
7	$1\frac{5}{16}$ to $1\frac{5}{8}$	4	$2\frac{1}{16}$ to $2\frac{1}{2}$	10
8	$1\frac{11}{16}$ to 2	4	$2\frac{9}{16}$ to 3	10

In ordering give number of cutter, or diameter and number of flutes of reamer.

No. 1040
 HAND TAPS
 UNDER ¼ INCH

Shanks full size of thread



TAPER



PLUG



BOTTOMING

LEFT HAND TAPS ARE SPECIAL

U.S. Standard form of thread furnished unless otherwise specified. Sizes, lengths, and threads not listed are subject to special prices. Taps $\frac{9}{64}$ inch diameter and under have three flutes; $\frac{5}{32}$ inch diameter and over have four flutes.

Two and three fluted plug taps are listed on page 234.

Diam. Inches	Price Each	Price Per Set	Number of Threads to the Inch			Length, Inches
			U.S.S. Form	Whitworth St'd	U.S. Form Threads Also Furnished	
$\frac{1}{16}$	\$.50	\$1.50	64	60		$1\frac{5}{8}$
$\frac{5}{64}$	.45	1.35	60			$1\frac{11}{16}$
$\frac{3}{32}$	.40	1.20	50	48	48	$1\frac{13}{16}$
$\frac{7}{64}$	.40	1.20	48			$1\frac{7}{8}$
$\frac{1}{8}$	.35	1.05	40	40		$1\frac{15}{16}$
$\frac{9}{64}$	.35	1.05	40			2
$\frac{5}{32}$	.35	1.05	36	32	32	$2\frac{1}{16}$
$\frac{11}{64}$	.35	1.05	32			$2\frac{1}{4}$
$\frac{3}{16}$	.40	1.20	24	24	32	$2\frac{3}{8}$
$\frac{13}{64}$	.40	1.20	24			$2\frac{3}{8}$
$\frac{7}{32}$	.45	1.35	24	24	32	$2\frac{3}{8}$
$\frac{15}{64}$	.45	1.35	24			$2\frac{1}{2}$

No. 1040
Carbon Steel

No. 2040
High Speed Steel

HAND TAPS

$\frac{1}{4}$ INCH AND LARGER

Shanks size of bottom of thread.

Shanks full size of thread.



TAPER



PLUG



BOTTOMING



TAPER



PLUG



BOTTOMING

LEFT HAND TAPS ARE SPECIAL

United States Standard form of thread furnished unless otherwise specified.

Orders for hand taps to and including $\frac{3}{8}$ inch will be filled with taps having shanks full diameter of thread. Taps $\frac{7}{16}$ inch and larger will be furnished with shanks smaller than root diameter of thread.

We will furnish at regular prices $\frac{3}{8}$ inch hand taps with shanks smaller than root diameter of thread.

Sizes, lengths, and threads not listed are subject to special prices.

For list of sizes and prices, see opposite page.

For two and three fluted taps see page 234.

No. 1040
Carbon Steel

HAND TAPS
1/4 INCH AND LARGER
No. 1040 Carbon Steel

No. 2040
High Speed Steel

Diam. Inches	Price Each	Price Per Set	Number of Threads to the Inch					Length, Inches
			U.S. St'd	S.A.E. St'd	Whitworth St'd	British St'd Fine	U.S. Form Threads Also Furnished	
1/4	\$.45	\$1.35	20	28	20	26	24, 27, 32	2 1/2
5/16	.50	1.50	18	24	18	22	20, 27, 32	2 23/32
3/8	.55	1.65	16	24	16	20	20, 27	2 15/16
7/16	.60	1.80	14	20	14	18	24, 27	3 5/8
1/2	.70	2.10	13	20	12	16	12, 24, 27	3 3/8
9/16	.80	2.40	12	18	12	16	27	3 19/32
5/8	.90	2.70	11	18	11	14	12, 27	3 11/16
11/16	1.05	3.15	11	16	11	14		4 1/32
3/4	1.20	3.60	10	16	10	12	12, 27	4 1/4
13/16	1.40	4.20	10		10	12		4 15/32
7/8	1.60	4.80	9	14, 18	9	11	12, 27	4 11/16
15/16	1.80	5.40	9		9			4 29/32
1	2.00	6.00	8	14	8	10	12, 27	5 1/8
1 1/8	2.25	6.75	7	12	7	9		5 7/16
1 1/4	2.60	7.80	7	12	7	9		5 3/4
1 3/8	3.00	9.00	6	12	6	8		6 1/16
1 1/2	3.50	10.50	6	12	6	8		6 3/8
1 5/8	4.20	12.60	5 1/2		5			6 11/16
1 3/4	5.00	15.00	5		5			7
1 7/8	5.80	17.40	5		4 1/2			7 5/16
2	6.70	20.10	4 1/2		4 1/2			7 5/8
2 1/8	8.00	24.00	4 1/2		4 1/2			8
2 1/4	9.20	27.60	4 1/2		4			8 1/4
2 3/8	10.50	31.50	4		4			8 1/2
2 1/2	11.50	34.50	4		4			8 3/4

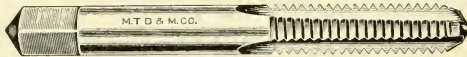
No. 2040 High Speed Steel

1/4	\$.85		20	28				2 1/2
5/16	.95		18	24				2 23/32
3/8	1.10		16	24				2 15/16
7/16	1.30		14	20				3 5/8
1/2	1.55		13	20				3 3/8
9/16	1.85		12	18				3 19/32
5/8	2.20		11	18				3 11/16
11/16	2.60		11	16				4 1/32
3/4	3.10		10	16				4 1/4
7/8	4.30		9	14, 18				4 11/16
1	5.75		8	14				5 1/8
1 1/8	7.45		7	12				5 7/16
1 1/4	9.55		7	12				5 3/4
1 3/8	11.95		6	12				6 1/16
1 1/2	14.75		6	12				6 3/8

No. 1040
Carbon Steel

No. 2040
High Speed Steel

TWO AND THREE FLUTED HAND TAPS



United States Standard form of thread furnished unless otherwise specified.

Flat Taps, Left Hand Taps and all sizes and pitches not listed will be considered special and subject to special prices.

These hand taps have the same dimensions as the hand taps listed on pages 231-233.

Plug Taps furnished unless otherwise specified.

TWO FLUTED TAPS

Furnished in plug style only to $\frac{5}{16}$ inch diameter inclusive. Taper and Bottoming Two Fluted Taps will be considered special.

THREE FLUTED TAPS

Furnished in Taper, Plug or Bottoming style to $\frac{1}{8}$ inch diameter inclusive, and in plug style only $\frac{3}{16}$ inch diameter and over. Taper and Bottoming Three Fluted Taps $\frac{3}{16}$ inch diameter and over will be considered special.

No. 1040—Carbon Steel

Diameter of Tap, Inches	Price Each		Number of Threads to the Inch		
	Two Flute	Three Flute	U.S. St'd	S.A.E. St'd	U.S. Form Also Furnished
$\frac{1}{16}$	\$.50	\$.50	64		
$\frac{1}{8}$	.35	.35	40		
$\frac{3}{16}$	.40	.40	24		32
$\frac{7}{32}$	.45	.45	24		32
$\frac{1}{4}$	.45	.45	20	28	24
$\frac{5}{16}$	.50	.50	18	24	20
$\frac{3}{8}$		.55	16	24	20
$\frac{7}{16}$		.60	14	20	24
$\frac{1}{2}$		.70	13	20	12, 24

No. 2040—High Speed Steel

$\frac{1}{4}$	\$.85	\$.85	20	28	
$\frac{5}{16}$	.95	.95	18	24	
$\frac{3}{8}$		1.10	16	24	
$\frac{7}{16}$		1.30	14	20	
$\frac{1}{2}$		1.55	13	20	

No. 1045
Carbon Steel

No. 2045
High Speed Steel

SPIRAL POINTED HAND TAPS

LEFT HAND TAPS ARE SPECIAL



Spiral Pointed Hand Taps are furnished in plug style only. They have the same dimensions as the hand taps listed on pages 231-233.

United States Standard form of thread furnished unless otherwise specified.

Orders for spiral pointed hand taps to and including $\frac{3}{8}$ inch will be filled with taps having shanks full diameter of thread. Taps $\frac{7}{16}$ inch and larger will be furnished with shanks smaller than root diameter of thread.

We will furnish at regular prices $\frac{3}{8}$ inch spiral pointed hand taps with shanks smaller than root diameter of thread.

Sizes, lengths, and threads not listed are subject to special prices.

No. 1045—Carbon Steel

Diameter of Tap, Inches	Price Each	Number of Threads to the Inch			Number of Flutes
		U.S. St'd	S.A.E. St'd	U.S. Form Also Furnished	
$\frac{1}{8}$	\$.45	40			2
$\frac{3}{16}$	.50	24		32	2
$\frac{1}{4}$	.55	20	28	24	2
$\frac{5}{16}$	.60	18	24	20	2
$\frac{3}{8}$	.70	16	24		3
$\frac{7}{16}$	.75	14	20		3
$\frac{1}{2}$	.85	13	20		3
$\frac{9}{16}$	1.00	12	18		3
$\frac{5}{8}$	1.10	11	18		3
$\frac{3}{4}$	1.45	10	16		3
$\frac{7}{8}$	1.90	9	14, 18		4
1	2.40	8	14		4

No. 2045—High Speed Steel

$\frac{1}{4}$	\$.95	20	28		2
$\frac{5}{16}$	1.05	18	24		2
$\frac{3}{8}$	1.25	16	24		3
$\frac{7}{16}$	1.45	14	20		3
$\frac{1}{2}$	1.70	13	20		3
$\frac{9}{16}$	2.05	12	18		3
$\frac{5}{8}$	2.40	11	18		3
$\frac{3}{4}$	3.35	10	16		3
$\frac{7}{8}$	4.60	9	14, 18		4
1	6.15	8	14		4

No. 2046 High Speed Steel

GROUND THREAD HAND TAPS

Ground thread hand taps are ground in the angle, on the outside and in the root of the thread, and the shank is also ground concentric with the thread. They will be furnished in taper, plug or bottoming style.

Unless otherwise specified, orders for ground thread hand taps to and including $\frac{3}{8}$ inch will be filled with taps having shanks full diameter of thread. Taps $\frac{7}{16}$ inch and larger will be furnished with shanks smaller than root diameter of thread.

When specified we will furnish at regular prices $\frac{3}{8}$ inch high speed steel ground thread hand taps with shanks smaller than root diameter of thread.

Sizes $\frac{1}{4}$ inch to $\frac{1}{2}$ inch diameter inclusive 3 Fluted Plug Style only will be furnished at regular prices.

Ground thread hand taps are made to standard dimensions and tolerances as shown in appendix, pages XXIV and XXV.

United States Standard Form of thread furnished unless otherwise specified.

Sizes, lengths and threads not listed are subject to special prices.

Carbon steel ground thread hand taps are special.

Left hand taps are special.

SIZES AND PRICES

Diameter of Tap, Inches	Price Each High Speed Steel	Number of Threads to the Inch		Length Overall, Inches
		U.S. St'd	S.A.E. St'd	
$\frac{1}{4}$	\$1.35	20	28	$2\frac{1}{2}$
$\frac{5}{16}$	1.50	18	24	$2\frac{2}{3}$
$\frac{3}{8}$	1.75	16	24	$2\frac{15}{16}$
$\frac{7}{16}$	2.05	14	20	$3\frac{5}{32}$
$\frac{1}{2}$	2.40	13	20	$3\frac{3}{8}$
$\frac{9}{16}$	2.80	12	18	$3\frac{19}{32}$
$\frac{5}{8}$	3.25	11	18	$3\frac{13}{16}$
$\frac{11}{16}$	3.65	11	16	$4\frac{1}{32}$
$\frac{3}{4}$	4.30	10	16	$4\frac{1}{4}$
$\frac{7}{8}$	5.75	9	14-18	$4\frac{11}{16}$
1	7.40	8	14	$5\frac{1}{8}$
$1\frac{1}{8}$	9.30	7	12	$5\frac{7}{16}$
$1\frac{1}{4}$	11.65	7	12	$5\frac{3}{4}$
$1\frac{3}{8}$	14.35	6	12	$6\frac{1}{16}$
$1\frac{1}{2}$	17.50	6	12	$6\frac{3}{8}$

No. 2047

High Speed Steel

GROUND THREAD SPIRAL POINTED HAND TAPS

Ground thread spiral pointed or spiral fluted hand taps are furnished in plug style only, they are ground in the angle, on the outside and in the root of the thread and the shank is also ground concentric with the thread.

These taps have the same dimensions and tolerances as ground thread hand taps listed on page 236.

Unless otherwise specified, orders for Ground Thread Spiral Pointed hand taps to and including $\frac{3}{8}$ inch will be filled with taps having shanks full diameter of thread. Taps $\frac{7}{16}$ inch and larger will be furnished with shanks smaller than root diameter of thread.

When specified we will furnish at regular prices $\frac{3}{8}$ inch high speed steel ground thread spiral pointed hand taps with shanks smaller than root diameter of thread.

United States Standard Form of thread furnished unless otherwise specified.

Sizes, lengths and threads not listed are subject to special prices.

Carbon steel ground thread spiral pointed or spiral fluted hand taps are special.

Left hand taps are special.

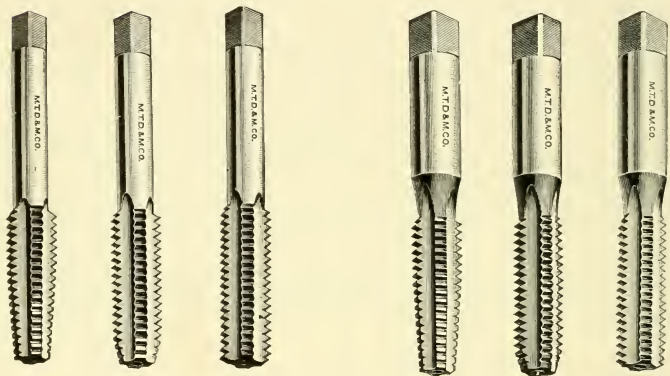
SIZES AND PRICES

Diameter of Tap, Inches	Price Each High Speed Steel	Number of Threads to the Inch		Number of Flutes
		U.S. St'd	S.A.E. St'd	
$\frac{1}{4}$	\$1.35	20	28	2
$\frac{5}{16}$	1.50	18	24	2
$\frac{3}{8}$	1.75	16	24	3
$\frac{7}{16}$	2.05	14	20	3
$\frac{1}{2}$	2.40	13	20	3
$\frac{9}{16}$	3.00	12	18	3
$\frac{5}{8}$	3.45	11	18	3
$\frac{3}{4}$	4.55	10	16	3
$\frac{7}{8}$	6.05	9	14-18	4
1	7.80	8	14	4

No. 1042

SERIAL HAND TAPS

FOR USE IN STEEL OR OTHER TOUGH MATERIAL



TAPER

PLUG

BOTTOMING

TAPER

PLUG

BOTTOMING

These Taps are particularly adapted for use in tough steel, such as generally used in boiler and locomotive work. They are furnished in sets of three taps so designed that a proportionate amount of the metal is cut out by each succeeding tap.

The No. 1 Tap roughs out the thread, the No. 2 being a little larger in pitch diameter cuts the thread a little fuller, and the No. 3 finishes the thread to full size.

The advantages of these taps over other styles of hand taps are, that by their use the possibility of torn threads is practically eliminated, the life of the taps is greatly increased, and the power required to complete the tapping operation is materially lessened.

(Continued on opposite page)

No. 1042

SERIAL HAND TAPS

LEFT HAND TAPS ARE SPECIAL

United States Standard form of thread furnished unless otherwise specified.

Orders for hand taps to and including $\frac{3}{8}$ inch will be filled with taps having shanks full diameter of thread. Taps $\frac{7}{16}$ inch and larger will be furnished with shanks smaller than root diameter of thread.

Sizes, lengths, and threads not listed are subject to special prices.

Diameter, Inches	Price Each	Price Per Set	Number of Threads to the Inch		Whole Length, Inches
			U.S. St'd	Whitworth Standard	
$\frac{1}{4}$	\$.45	\$1.35	20	20	$2\frac{1}{2}$
$\frac{5}{16}$	.50	1.50	18	18	$2\frac{23}{32}$
$\frac{3}{8}$	.55	1.65	16	16	$2\frac{15}{16}$
$\frac{7}{16}$	.60	1.80	14	14	$3\frac{5}{32}$
$\frac{1}{2}$	.70	2.10	13	12	$3\frac{3}{8}$
$\frac{9}{16}$	.80	2.40	12	12	$3\frac{19}{32}$
$\frac{5}{8}$	.90	2.70	11	11	$3\frac{13}{16}$
$\frac{3}{4}$	1.20	3.60	10	10	$4\frac{1}{4}$
$\frac{7}{8}$	1.60	4.80	9	9	$4\frac{11}{16}$
1	2.00	6.00	8	8	$5\frac{1}{8}$

No. 1043

HAND TAPS

FRENCH AND INTERNATIONAL STANDARD

METRIC SYSTEM

Shanks size of bottom of thread.

Shanks full size of thread.



TAPER



PLUG



BOTTOMING



TAPER



PLUG



BOTTOMING

LEFT HAND TAPS ARE SPECIAL

Diameter of Tap, M. M.	Price		Standard Pitches M. M.	
	Each	Per Set	French	International
2	\$.45	\$1.35		.45
2.5	.40	1.20		.45
3	.40	1.20	.5	.60
3.5	.35	1.05		.60
4	.35	1.05	.75	.75
4.5	.35	1.05		.75
5	.40	1.20	.75	.90
5.5	.40	1.20		.90
6	.45	1.35	1.	1.
7	.45	1.35	1.	1.
8	.50	1.50	1.	1.25
9	.55	1.65	1.	1.25
10	.55	1.65	1.5	1.5
11	.60	1.80		1.5
12	.70	2.10	1.5	1.75

Sizes and threads not listed are subject to special prices.

No. 1043

HAND TAPS

FRENCH AND INTERNATIONAL STANDARD METRIC SYSTEM

Diameter of Tap, M. M.	Price		Standard Pitches M. M.	
	Each	Per Set	French	International
14	\$.80	\$2.40	2.	2.
16	.90	2.70	2.	2.
18	1.05	3.15	2.5, 1.5	2.5
20	1.40	4.20	2.5	2.5
22	1.60	4.80	2.5	2.5
24	1.80	5.40	3.	3.
26	2.00	6.00	3.	
27	2.25	6.75		3.
28	2.25	6.75	3.	
30	2.60	7.80	3.5	3.5
32	2.60	7.80	3.5	
33	3.00	9.00		3.5
34	3.00	9.00	3.5	
36	3.50	10.50	4.	4.
38	3.50	10.50	4.	
39	4.20	12.60		4.
40	4.20	12.60	4.	
42	4.20	12.60	4.5	4.5
44	5.00	15.00	4.5	
45	5.00	15.00		4.5
46	5.80	17.40	4.5	
48	5.80	17.40	5.	5.
50	6.70	20.10	5.	

Orders for Hand Taps to and including 8 M. M. will be filled with taps having shanks full diameter of thread. Taps 9 M. M. and larger will be furnished with shanks size of bottom of thread.

Sizes, lengths, and threads not listed are subject to special prices.

No. 1044

SERIAL HAND TAPS

FRENCH AND INTERNATIONAL STANDARD

LEFT HAND TAPS ARE SPECIAL

Diameter of Tap, M. M.	Price		Standard Pitches M. M.	
	Each	Per Set	French	International
6	\$.45	\$1.35	1.	1.
7	.45	1.35	1.	1.
8	.50	1.50	1.	1.25
9	.55	1.65	1.	1.25
10	.55	1.65	1.5	1.5
11	.60	1.80		1.5
12	.70	2.10	1.5	1.75
14	.80	2.40	2.	2.
16	.90	2.70	2.	2.
18	1.05	3.15	2.5	2.5
20	1.40	4.20	2.5	2.5
22	1.60	4.80	2.5	2.5
24	1.80	5.40	3.	3.
26	2.00	6.00	3.	
27	2.25	6.75		3.
28	2.25	6.75	3.	
30	2.60	7.80	3.5	3.5
32	2.60	7.80	3.5	
33	3.00	9.00		3.5
34	3.00	9.00	3.5	
36	3.50	10.50	4.	4.
38	3.50	10.50	4.	

The above Taps are furnished with shanks full size of thread from 6 M. M. to 8 M. M. inclusive and with shanks smaller than root diameter of thread on 9 M. M. and larger.

Sizes, lengths, and threads not listed are subject to special prices.

No. 1050
Carbon Steel

No. 2050
High Speed Steel

NUT TAPS

LEFT HAND TAPS ARE SPECIAL

High Speed Steel Nut Taps will be regularly furnished in United States Standard and S.A.E. standard only. All other High Speed Steel Nut Taps are special and subject to special prices.

United States Standard Form of thread always furnished unless otherwise ordered.

Sizes, lengths, and threads not listed are subject to special prices.



Diam., Inches	Price Each		No. of Threads to the Inch			Whole Length Inches	Length of Thread, Inches	
	Carbon Steel	High Speed Steel	U.S. St'd	S.A.E. St'd	Whit- worth St'd		U.S. St'd	S.A.E. St'd
$\frac{3}{16}$	\$.60		24, 32		24	4½	1⅜	1
$\frac{1}{4}$	.60	\$1.50	20	28	20	5	1⅝	1¼
$\frac{5}{16}$	.70	1.70	18	24	18	5½	1⅞	1⅜
$\frac{3}{8}$	.80	2.00	16	24	16	6	2	1½
$\frac{7}{16}$	.90	2.40	14	20	14	6½	2⅜	1¾
$\frac{1}{2}$	1.00	2.70	13	20	12	7	2½	1⅞
$\frac{9}{16}$	1.15		12	18	12	7½	2¾	2
$\frac{5}{8}$	1.35	4.05	11	18	11	8	3	2¼
$\frac{11}{16}$	1.60		11	16	11	8½	3	2¼
$\frac{3}{4}$	1.85	5.65	10	16	10	9	3¼	2½
$\frac{13}{16}$	2.15		10		10	9½	3¼	
$\frac{7}{8}$	2.45	7.90	9	14, 18	9	10	3⅝	2¾
$\frac{15}{16}$	2.80		9		9	10½	3⅝	
1	3.15	10.55	8	14	8	11	4	3
$1\frac{1}{8}$	3.70		7	12	7	11½	4¾	3½
$1\frac{1}{4}$	4.50		7	12	7	12	4¾	3½
$1\frac{3}{8}$	5.50		6	12	6	12½	5⅜	4
$1\frac{1}{2}$	6.75		6	12	6	13	5⅜	4
$1\frac{5}{8}$	8.00		5½		5	13½	5½	
$1\frac{3}{4}$	9.25		5		5	14	5½	
$1\frac{7}{8}$	10.75		5		4½	14½	5½	
2	12.25		4½		4½	15	6⅞	
$2\frac{1}{8}$	14.00		4½		4½	15½	6⅞	
$2\frac{1}{4}$	15.75		4½		4	16	6⅞	
$2\frac{3}{8}$	17.75		4		4	16½	6⅞	
$2\frac{1}{2}$	20.00		4		4	17	6⅞	

No. 1051

NUT TAPS

FRENCH AND INTERNATIONAL STANDARD

LEFT HAND TAPS ARE SPECIAL

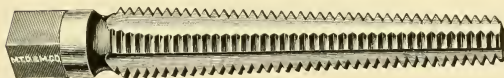


Diameter of Tap M. M.	Price Each	Standard Pitches M. M.	
		French	International
6	\$.60	1.	1.
7	.60	1.	1.
8	.70	1.	1.25
9	.80	1.	1.25
10	.80	1.5	1.5
11	.90		1.5
12	1.00	1.5	1.75
14	1.15	2.	2.
16	1.35	2.	2.
18	1.60	2.5	2.5
20	2.15	2.5	2.5
22	2.45	2.5	2.5
24	2.80	3.	3.
26	3.15	3.	
27	3.70		3.
28	3.70	3.	
30	4.50	3.5	3.5
32	4.50	3.5	
33	5.50		3.5
34	5.50	3.5	
36	6.75	4.	4.
38	6.75	4.	
39	8.00		4.
40	8.00	4.	
42	8.00	4.5	4.5
44	9.25	4.5	
45	9.25		4.5
46	10.75	4.5	
48	10.75	5.	5.
50	12.25	5.	

Sizes, lengths, and threads not listed are subject to special prices.

No. 1057

BLACKSMITHS' TAPER TAPS



LEFT HAND TAPS ARE SPECIAL

These Taps are furnished with the V form of thread and are tapered $\frac{3}{4}$ of an inch to the foot.

Sizes, lengths, and threads not listed are subject to special prices.

Diameter Tap, Inches	Price Each	Number of V Threads to the Inch	Whole Length, Inches
$\frac{1}{4}$	\$.45	18, 20, 24	$2\frac{1}{2}$
$\frac{5}{16}$	.50	16, 18, 20	$3\frac{5}{16}$
$\frac{3}{8}$	.55	14, 16, 18	$3\frac{13}{16}$
$\frac{7}{16}$	.60	14, 16, 18	$4\frac{1}{8}$
$\frac{1}{2}$	.70	12, 13, 14, 16	$4\frac{5}{16}$
$\frac{9}{16}$	.80	12, 14	$4\frac{5}{8}$
$\frac{5}{8}$	.90	10, 11, 12	$4\frac{7}{8}$
$\frac{3}{4}$	1.20	10, 12	$5\frac{1}{16}$
$\frac{7}{8}$	1.60	9, 10	$5\frac{5}{8}$
1	2.00	8	6
$1\frac{1}{8}$	2.25	7, 8	$6\frac{5}{8}$
$1\frac{1}{4}$	2.60	7, 8	$7\frac{1}{16}$
$1\frac{1}{2}$	3.50	6	$7\frac{7}{8}$

No. 1086

BIT BRACE TAPS



Prices on application.

No. 1066
Carbon Steel

No. 2066
High Speed Steel

MACHINE SCREW TAPS
A. S. M. E. STANDARD



LEFT HAND TAPS ARE SPECIAL

GENERAL

Plug Taps are furnished unless otherwise specified.

Unless otherwise specified Machine Screw Taps up to and including No. 6 will be furnished with three flutes; No. 7 and larger with four flutes.

Sizes, lengths and threads not listed are subject to special prices. Left hand taps are special.

TWO FLUTED TAPS

Furnished in plug style only, up to No. 14 inclusive. Taper and bottoming Two Fluted Taps and Two Fluted Taps, No. 16 and larger are special.

THREE FLUTED TAPS

Furnished in taper, plug or bottoming style up to No. 6 inclusive, and in plug style only No. 7 and larger. Taper and Bottoming Three Fluted Taps, No. 7, and larger will be considered special.

FOUR FLUTED TAPS

Furnished in taper, plug or bottoming style in No. 7 and larger. All others will be considered special.

No. 1066
Carbon Steel

No. 2066
High Speed Steel

MACHINE SCREW TAPS
A. S. M. E. STANDARD



LEFT HAND TAPS ARE SPECIAL

No. 1066—Carbon Steel

Size of Screw Gauge No.	Approx. Diam. of Tap, Inches	Price Each	Price Per Doz.	St'd No. of Thr'ds	Threads as follows furnished at regular list and discount	Whole Length, Inches
0	.060	\$.50	\$6.00	80		1 ⁵ / ₈
1	.073	.50	6.00	72	56, 64	1 ¹¹ / ₁₆
2	.086	.45	5.40	64	56	1 ³ / ₄
3	.099	.40	4.80	56	48	1 ¹³ / ₁₆
4	.112	.40	4.80	48	32, 36, 40	1 ⁷ / ₈
5	.125	.35	4.20	44	36, 40	1 ¹⁵ / ₁₆
6	.138	.35	4.20	40	32, 36	2
7	.151	.35	4.20		32	2 ¹ / ₁₆
8	.164	.35	4.20	36	30, 32, 40	2 ¹ / ₈
9	.177	.35	4.20	32		2 ¹ / ₄
10	.190	.40	4.80	30	24, 28, 32 ✓	2 ³ / ₈
12	.216	.45	5.40	28	24, 32	2 ³ / ₈
14	.242	.45	5.40	24	20	2 ¹ / ₂
16	.268	.45	5.40		18	2 ¹ / ₂
18	.294	.50	6.00		18	2 ² / ₃

No. 2066—High Speed Steel

4	.112	\$.70	\$8.40	48	36, 40	1 ⁷ / ₈
6	.138	.70	8.40	40	32	2
8	.164	.70	8.40	36	32	2 ¹ / ₈
10	.190	.75	9.00		24, 32	2 ³ / ₈
12	.216	.80	9.60	28	24	2 ³ / ₈
14	.242	.85	10.20	24	20	2 ¹ / ₂

No. 1067
Carbon Steel

No. 2067
High Speed Steel

SPIRAL POINTED MACHINE SCREW TAPS

TWO FLUTED

A. S. M. E. STANDARD



LEFT HAND TAPS ARE SPECIAL

Spiral Pointed Machine Screw Taps are furnished in plug style only. They have the same dimensions as No. 1066 Machine Screw Taps listed on page 247.

Sizes, lengths, and threads not listed are subject to special prices.

No. 1067—Carbon Steel

Screw Gauge No.	Approx. Diam. of Tap, Inches	Price Each	No. of Threads to the Inch		No. of Flutes	Whole Length, Inches
			Standard	Also Furnished		
3	.099	\$.60	56	48	2	1 $\frac{3}{16}$
4	.112	.50	48	36, 40	2	1 $\frac{7}{8}$
5	.125	.45		40	2	1 $\frac{5}{16}$
6	.138	.45	40	32, 36	2	2
8	.164	.45	36	32	2	2 $\frac{1}{8}$
10	.190	.50	30	24, 32	2	2 $\frac{3}{8}$
12	.216	.55	28	24, 32	2	2 $\frac{3}{8}$
14	.242	.55	24	20	2	2 $\frac{1}{2}$

No. 2067—High Speed Steel

4	.112	\$.80	48	36, 40	2	1 $\frac{7}{8}$
6	.138	.80	40	32	2	2
8	.164	.80	36	32	2	2 $\frac{1}{8}$
10	.190	.85		24, 32	2	2 $\frac{3}{8}$
12	.216	.90	28	24	2	2 $\frac{3}{8}$
14	.242	.95	24	20	2	2 $\frac{1}{2}$

No. 1071

TAPPER TAPS



LEFT HAND TAPS ARE SPECIAL

When ordering specify length desired.

U. S. Form of thread always furnished unless otherwise ordered.

Tapper Taps will be furnished with plain round, squared, flatted, Acme or all styles of National shanks at regular prices.

All others will be considered special.

Sizes, lengths, and threads not listed are subject to special prices.

Diameter Inches	Price Each by Lengths		Threads Per Inch			Length of Thread, Inches	
	12 in.	15 in.	U.S. St'd	S.A.E. St'd	Whit- worth St'd	U.S. St'd	S.A.E. St'd
1/4	\$.75	\$.90	20	28	20	1 5/8	1 1/4
5/16	.85	1.00	18	24	18	1 11/16	1 3/8
3/8	.95	1.10	16	24	16	2	1 1/2
7/16	1.05	1.25	14	20	14	2 1/4	1 11/16
1/2	1.15	1.35	13	20	12	2 1/4	1 11/16
9/16	1.35	1.55	12	18	12	2 1/2	1 7/8
5/8	1.50	1.75	11	18	11	2 1/2	1 7/8
11/16	1.70	1.95	11	16	11	2 1/2	1 7/8
3/4	1.95	2.10	10	16	10	2 3/4	2
13/16	2.20	2.35	10		10	2 3/4	
7/8	2.50	2.75	9	14, 18	9	3	2
15/16	2.90	3.15	9		9	3	
1	3.30	3.65	8	14	8	3 1/2	2 5/8
1 1/8		4.15	7	12	7	3 1/2	2 5/8
1 1/4		5.10	7	12	7	3 1/2	2 5/8
1 3/8		6.00	6	12	6	4	3
1 1/2		7.35	6	12	6	4	3
1 5/8		8.35	5 1/2		5	4	
1 3/4		9.65	5		5	4 1/2	
1 7/8		10.75	5		4 1/2	4 1/2	
2		12.25	4 1/2		4 1/2	4 1/2	

No. 1072 TAPPER TAPS

FRENCH AND INTERNATIONAL STANDARD



LEFT HAND TAPS ARE SPECIAL

When ordering specify length desired.

Tapper Taps will be furnished with plain round, squared, flatted, Acme, or National shanks at regular prices.

All others will be considered special.

Sizes, lengths, and threads not listed are subject to special prices.

Diameter of Tap M. M.	Length over all. Price each		Length of Thread, Inches	Standard Pitches M. M.	
	12 in.	15 in.		French	International
6	\$.75	\$.90	1 $\frac{3}{4}$	1.	1.
7	.75	.90	1 $\frac{3}{4}$	1.	1.
8	.85	1.00	2	1.	1.25
9	.95	1.10	2	1.	1.25
10	.95	1.10	2	1.5	1.5
11	1.05	1.25	2 $\frac{1}{4}$		1.5
12	1.15	1.35	2 $\frac{1}{4}$	1.5	1.75
14	1.35	1.55	2 $\frac{1}{2}$	2.	2.
16	1.50	1.75	2 $\frac{1}{2}$	2.	2.
18	1.70	1.95	2 $\frac{1}{2}$	2.5	2.5
20	2.20	2.35	2 $\frac{3}{4}$	2.5	2.5
22	2.50	2.75	3	2.5	2.5
24	2.90	3.15	3	3.	3.
26	3.30	3.65	3 $\frac{1}{2}$	3.	
27		4.15	3 $\frac{1}{2}$		3.
28		4.15	3 $\frac{1}{2}$	3.	
30		5.10	3 $\frac{1}{2}$	3.5	3.5
32		5.10	3 $\frac{1}{2}$	3.5	
33		6.00	3 $\frac{1}{2}$		3.5
34		6.00	3 $\frac{1}{2}$	3.5	
36		7.35	4	4.	4
38		7.35	4	4.	

No. 1073

TAPPER TAPS

MACHINE SCREW SIZES

A.S.M.E. STANDARD



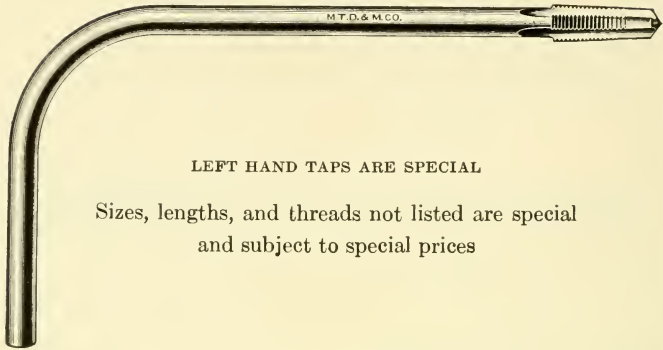
LEFT HAND TAPS ARE SPECIAL

Sizes, lengths and threads not listed are subject to special prices.

Screw Gauge No.	Basic Outside Diameter, Inches	Price Each	No. of Threads to the Inch	Length of Thread Incl. Point, Inches	Whole Length, Inches
2	.086	\$.70	56, 64	$\frac{15}{32}$	5
3	.099	.70	48, 56	$\frac{17}{32}$	5
4	.112	.70	36, 40	$\frac{5}{8}$	6
5	.125	.70	40	$\frac{11}{16}$	8
6	.138	.70	32, 40	$\frac{3}{4}$	8
8	.164	.70	32	$\frac{13}{16}$	9
10	.190	.70	24, 32	$\frac{15}{16}$	11
12	.216	.70	24	$1\frac{1}{16}$	11
14	.242	.70	20, 24	$1\frac{1}{8}$	11

No. 1074

BENT SHANK TAPPER TAPS



LEFT HAND TAPS ARE SPECIAL

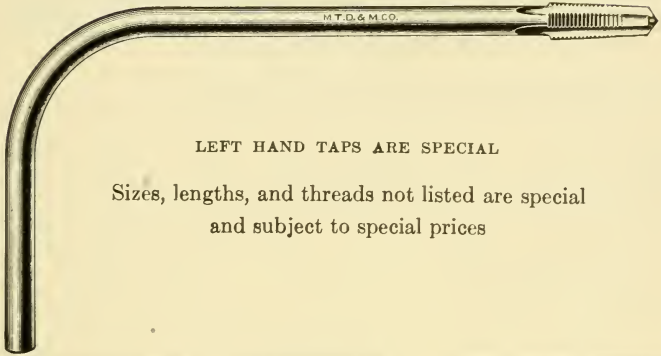
Sizes, lengths, and threads not listed are special
and subject to special prices

Diam. of Tap, Inches	Price Each	No. of Threads to the Inch			Size of Ma- chine	Length of Thread, Inches			Whole Length Before Bending Inches
		U.S. St'd	S.A.E. St'd	Stove Bolt St'd		U.S. St'd	S.A.E. St'd	Stove Bolt St'd	
$\frac{1}{8}$	\$.60			32	$\frac{3}{16}$			$\frac{1}{2}$	$4\frac{15}{16}$
$\frac{5}{32}$	.60			28	$\frac{3}{16}$			$\frac{9}{16}$	$4\frac{15}{16}$
$\frac{3}{16}$	.60			24	$\frac{3}{16}$			$\frac{21}{32}$	$4\frac{15}{16}$
$\frac{1}{8}$	.65	40		32	$\frac{1}{4}$	$\frac{9}{16}$		$\frac{1}{2}$	$6\frac{1}{2}$
$\frac{5}{32}$	.65			28	$\frac{1}{4}$			$\frac{9}{16}$	$6\frac{1}{2}$
$\frac{3}{16}$	.65	24		24	$\frac{1}{4}$	$\frac{43}{64}$		$\frac{21}{32}$	$6\frac{1}{2}$
$\frac{7}{32}$	.65			22	$\frac{1}{4}$			$\frac{7}{8}$	$6\frac{1}{2}$
$\frac{1}{4}$	.65	20	28	18	$\frac{1}{4}$	$\frac{53}{64}$	$\frac{25}{32}$	$\frac{29}{32}$	$6\frac{1}{2}$
$\frac{1}{4}$	.70	20	28		$\frac{3}{8}$	$\frac{53}{64}$	$\frac{25}{32}$		$8\frac{3}{4}$
$\frac{5}{16}$	.80	18	24		$\frac{3}{8}$	$\frac{15}{16}$	$\frac{59}{64}$		$8\frac{3}{4}$
$\frac{3}{8}$	.90	16	24		$\frac{3}{8}$	$1\frac{1}{16}$	$\frac{31}{32}$		$8\frac{3}{4}$
$\frac{3}{8}$	.95	16	24		$\frac{1}{2}$	$1\frac{1}{16}$	$\frac{31}{32}$		12
$\frac{7}{16}$	1.05	14	20		$\frac{1}{2}$	$1\frac{1}{8}$	$1\frac{1}{32}$		12
$\frac{1}{2}$	1.15	13	20		$\frac{1}{2}$	$1\frac{13}{64}$	$1\frac{1}{32}$		12
$\frac{9}{16}$	1.55	12	18		$\frac{5}{8}$	$1\frac{29}{64}$	$1\frac{3}{8}$		15
$\frac{5}{8}$	1.75	11	18		$\frac{5}{8}$	$1\frac{39}{64}$	$1\frac{3}{8}$		15
$\frac{3}{4}$	2.10		16		$\frac{5}{8}$		$1\frac{3}{4}$		15

No. 1075

BENT SHANK TAPPER TAPS

MACHINE SCREW SIZES



LEFT HAND TAPS ARE SPECIAL

Sizes, lengths, and threads not listed are special
and subject to special prices

Screw Gauge No.	Basic Outside Diameter, Inches	Price Each	No. of Threads to the Inch	Size of Machine	Length of Thread, Inches	Length Overall Before Bending, Inches
2	.086	\$.60	56	1/8	9/32	3 9/16
2	.086	.60	64	1/8	1/4	3 9/16
3	.099	.60	48	1/8	11/32	3 9/16
3	.099	.60	56	1/8	19/64	3 9/16
4	.112	.60	36	1/8	27/64	3 9/16
4	.112	.60	40	1/8	25/64	3 9/16
5	.125	.60	40	1/8	25/64	3 9/16
6	.138	.60	32	1/8	31/64	3 9/16
6	.138	.60	32	3/16	31/64	4 15/16
8	.164	.60	32	3/16	1/2	4 15/16
10	.190	.60	24	3/16	21/32	4 15/16
10	.190	.60	32	3/16	33/64	4 15/16
12	.216	.60	24	3/16	25/32	4 15/16
6	.138	.65	32	1/4	9/16	6 1/2
8	.164	.65	32	1/4	37/64	6 1/2
10	.190	.65	24	1/4	43/64	6 1/2
10	.190	.65	32	1/4	19/32	6 1/2
12	.216	.65	24	1/4	25/32	6 1/2
14	.242	.65	20	1/4	53/64	6 1/2
14	.242	.65	24	1/4	51/64	6 1/2

No. 1076

STOVE BOLT TAPS



LEFT HAND TAPS ARE SPECIAL

Stove Bolt Taps are furnished in plug style only.
 Sizes, lengths, and threads not listed are subject to special prices.

Diam. Inches	Price Each	Price Per Doz.	Threads Per Inch	Diam. Inches	Price Each	Price Per Doz.	Threads Per Inch
$\frac{3}{16}$	\$.40	\$4.80	24	$\frac{5}{16}$	\$.50	\$6.00	18
$\frac{1}{4}$	.45	5.40	18	$\frac{3}{8}$	.55	6.60	16

No. 1081

PULLEY TAPS



LEFT HAND TAPS ARE SPECIAL

United States Standard form of thread will be furnished.
 Regularly furnished in plug style only.
 When ordering, specify length desired.
 Sizes, lengths, and threads not listed are subject to special prices.

Diam. Inches	Threads per Inch	Price Each by Lengths				
	U.S. Standard	6 in.	8 in.	10 in.	12 in.	14 in.
$\frac{1}{4}$	20	\$.65	\$.70			
$\frac{5}{16}$	18	.70	.75			
$\frac{3}{8}$	16	.80	.85	\$.90	\$.95	\$1.00
$\frac{7}{16}$	14	.85	.95	1.00	1.05	1.15
$\frac{1}{2}$	13	.95	1.05	1.10	1.15	1.25
$\frac{9}{16}$	12	1.00	1.15	1.25	1.35	1.45
$\frac{5}{8}$	11	1.10	1.35	1.40	1.50	1.65
$\frac{3}{4}$	10			1.85	1.95	2.00

No. 1091

HOB OR MASTER TAPS



LEFT HAND HOBS ARE SPECIAL

Hob or Master Taps will be furnished exact size unless otherwise specified. Oversize or undersize die hobs will be considered special and subject to special prices.

U. S. Form of thread always furnished unless otherwise ordered.

Sizes, lengths, and threads not listed are subject to special prices.

In ordering Hob Taps always state whether they are required for hobbing chasers in Bolt Cutters, Solid Dies, or Screw Plate Dies.

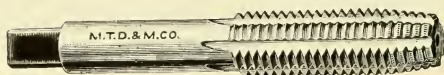
Taps furnished for solid dies unless otherwise specified.

Hob Taps of special design made from description or drawings submitted with orders, giving details of lengths and diameter required.

Diameter, Inches	Price Each	Threads Per Inch		Whole Length, Inches
		U.S. Standard	Whitworth Standard	
$\frac{1}{4}$	\$2.25	20	20	$6\frac{1}{8}$
$\frac{5}{16}$	2.35	18	18	$6\frac{1}{2}$
$\frac{3}{8}$	2.50	16	16	$6\frac{3}{4}$
$\frac{7}{16}$	2.75	14	14	$7\frac{1}{8}$
$\frac{1}{2}$	3.00	13	12	$7\frac{5}{8}$
$\frac{5}{8}$	3.50	11	11	$8\frac{1}{4}$
$\frac{3}{4}$	4.25	10	10	$8\frac{7}{8}$
$\frac{7}{8}$	5.00	9	9	$9\frac{3}{8}$
1	5.75	8	8	$10\frac{1}{8}$
$1\frac{1}{8}$	7.00	7	7	$10\frac{5}{8}$
$1\frac{1}{4}$	8.00	7	7	$11\frac{1}{8}$
$1\frac{3}{8}$	9.00	6	6	$11\frac{5}{8}$
$1\frac{1}{2}$	10.00	6	6	$12\frac{1}{8}$

No. 1092

SHORT PLUG HOB TAP



LEFT HAND HOBS ARE SPECIAL

Short Plug Hob Taps will be furnished exact size unless otherwise specified.

U. S. form of thread always furnished unless otherwise ordered.

Sizes, lengths, and threads not listed are subject to special prices.

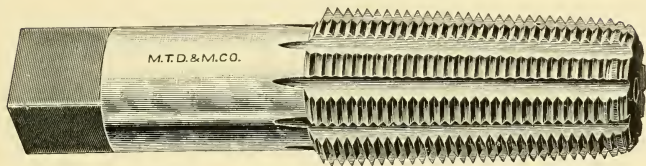
These Hobs are intended especially for recutting Opening and Screw Plate Dies.

When wanted for Screw Plate Dies it should be so stated on the order, as they are made larger for this particular work.

Oversize or undersize hobs will be considered special and subject to special prices.

Diameter, Inches	Price Each	Threads Per Inch		Whole Length, Inches
		U.S. Standard	Whitworth Standard	
$\frac{1}{4}$	\$1.50	20	20	$2\frac{1}{2}$
$\frac{5}{16}$	1.60	18	18	$2\frac{2}{3}$
$\frac{3}{8}$	1.75	16	16	$2\frac{1}{2}$
$\frac{7}{16}$	1.85	14	14	$3\frac{1}{2}$
$\frac{1}{2}$	2.00	13	12	$3\frac{3}{8}$
$\frac{5}{8}$	2.25	11	11	$3\frac{1}{2}$
$\frac{3}{4}$	2.65	10	10	$4\frac{1}{4}$
$\frac{7}{8}$	3.00	9	9	$4\frac{1}{2}$
1	3.50	8	8	$5\frac{1}{8}$
$1\frac{1}{8}$	4.25	7	7	$5\frac{1}{2}$
$1\frac{1}{4}$	4.75	7	7	$5\frac{3}{4}$
$1\frac{3}{8}$	5.50	6	6	$6\frac{1}{2}$
$1\frac{1}{2}$	6.25	6	6	$6\frac{3}{8}$

No. 1094
PIPE HOB TAPS
 AMERICAN (BRIGGS) STANDARD



LEFT HAND HOBS ARE SPECIAL

American (Briggs) Standard Right Hand Pipe Hobs are furnished unless otherwise specified.

Sizes, lengths, and threads not listed are subject to special prices.

Nominal Size, Inches	Price Each	Number of Threads to the Inch	Length of Thread, Inches	Whole Length, Inches
$\frac{1}{8}$	\$1.75	27	$1\frac{7}{8}$	$3\frac{1}{2}$
$\frac{1}{4}$	2.00	18	$2\frac{5}{8}$	$4\frac{1}{2}$
$\frac{3}{8}$	2.30	18	$2\frac{5}{8}$	$4\frac{1}{2}$
$\frac{1}{2}$	2.75	14	$3\frac{1}{4}$	$5\frac{1}{2}$
$\frac{3}{4}$	3.25	14	$3\frac{1}{4}$	$5\frac{1}{2}$
1	4.00	$11\frac{1}{2}$	4	6
$1\frac{1}{4}$	5.00	$11\frac{1}{2}$	4	$6\frac{1}{4}$
$1\frac{1}{2}$	6.60	$11\frac{1}{2}$	4	$6\frac{1}{4}$
2	10.00	$11\frac{1}{2}$	4	$6\frac{1}{2}$
$2\frac{1}{2}$	15.00	8	$5\frac{7}{8}$	$8\frac{1}{2}$
3	22.50	8	$5\frac{7}{8}$	$8\frac{3}{4}$
$3\frac{1}{2}$	30.00	8	$5\frac{7}{8}$	9
4	45.00	8	6	$9\frac{1}{2}$

No. 1093
SELLERS' HOB TAPS

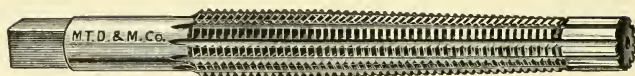


Prices on application.

No. 1096

HOB OR MASTER TAPS

FRENCH AND INTERNATIONAL STANDARD



LEFT HAND HOBS ARE SPECIAL

Sizes, lengths, and threads not listed are subject to special prices.

Diameter of Hob M. M.	Price Each	Standard Pitches M. M.	
		French	International
6	\$1.25	1.	1.
7	1.25	1.	1.
8	1.35	1.	1.25
9	1.50	1.	1.25
10	1.50	1.5	1.5
11	1.70		1.5
12	1.90	1.5	1.75
14	2.20	2.	2.
16	2.50	2.	2.
18	2.85	2.5	2.5
20	3.60	2.5	2.5
22	4.00	2.5	2.5
24	4.50	3.	3.
26	5.00	3.	
27	5.75		3.
28	5.75	3.	
30	6.50	3.5	3.5
32	6.50	3.5	
33	7.50		3.5
34	7.50	3.5	
36	8.50	4.	4.
38	8.50	4.	

No. 1098

SHORT PLUG HOB TAPS

FRENCH AND INTERNATIONAL STANDARD



LEFT HAND HOBS ARE SPECIAL

Sizes, lengths, and threads not listed are subject to special prices.

Diameter of Hob M. M.	Price Each	Standard Pitches M. M.	
		French	International
6	\$.65	1.	1
7	.65	1.	1.
8	.70	1.	1.25
9	.75	1.	1.25
10	.75	1.5	1.5
11	.85		1.5
12	1.00	1.5	1.75
14	1.10	2.	2.
16	1.25	2.	2.
18	1.45	2.5	2.5
20	1.95	2.5	2.5
22	2.25	2.5	2.5
24	2.50	3.	3.
26	2.80	3.	
27	3.15		3.
28	3.15	3.	
30	3.65	3.5	3.5
32	3.65	3.5	
33	4.20		3.5
34	4.20	3.5	
36	4.60	4.	4.
38	4.60	4.	

No. 1102
Carbon Steel

No. 2102
High Speed Steel

TAPS FOR BEAMAN & SMITH HOLDERS



LEFT HAND TAPS ARE SPECIAL

Taps for Beaman and Smith Holders are regularly furnished in plug style only.

United States Standard form of thread furnished unless otherwise specified.

Sizes, lengths and threads not listed are subject to special prices.

Prices of taps fitting No. 2½ and No. 3 Holders given on application.

Diam. of Tap, Inches	Price Each Carbon Steel		Price Each High Speed Steel		No. of Threads to the Inch		Diam. Shank, Inches	Whole Length, Inches
	Fitting No. 1 Holder	Fitting No. 2 Holder	Fitting No. 1 Holder	Fitting No. 2 Holder	U.S. St'd	S.A.E. St'd		
¼	\$.55		\$1.30		20	28	⅜	2¾
⅕	.55		1.35		18	24	⅜	3
⅜	.55		1.40		16	24	⅜	3¼
7/16	.75		1.90		14	20	½	3½
½	.75		1.95		13	20	½	3¾
9/16	.80		2.35		12	18	½	4
5/8	.90		2.70		11	18	½	4
5/8		\$1.20		\$3.50	11	18	¾	4
11/16		1.20		3.60	11	16	¾	4⅛
¾		1.20		3.80	10	16	¾	4⅞
13/16		1.50			10		¾	4¾
7/8		1.60			9	14, 18	¾	5⅛
15/16		1.80			9		¾	5⅜
1		2.20			8	14	¾	5⅞

No. 1109

COMBINED PIPE TAPS AND DRILLS

FOR TAPPING GAS AND WATER PIPES UNDER
PRESSURE WITH TAPPING MACHINES

STANDARD TAPER $\frac{3}{4}$ INCH TO THE FOOT



Size, Inches	Price Each	Size, Inches	Price Each	Size, Inches	Price Each
$\frac{1}{4}$	\$3.00	$\frac{3}{4}$	\$4.50	$1\frac{1}{2}$	\$7.00
$\frac{3}{8}$	3.00	1	5.00	2	8.00
$\frac{1}{2}$	4.00	$1\frac{1}{4}$	6.00		

ABOVE PRICES APPLY FOR LENGTHS GIVEN IN
FOLLOWING TABLE

Style Number	Whole Length, Inches	Diameter of Shank, Inches	Size of Square
1	$9\frac{3}{4}$	.831	$\frac{5}{8}$
2	$10\frac{3}{4}$	.831	$\frac{5}{8}$
3	$10\frac{3}{4}$	.831	$\frac{5}{8}$
4	13	.831	$\frac{5}{8}$
1 E	$13\frac{3}{4}$	.831	$\frac{5}{8}$
2 E	16	.935	$\frac{1}{16}$

FOR CORPORATION COCKS

PRICES QUOTED ON APPLICATION

Style Number	Whole Length, Inches	Diameter of Shank, Inches	Size of Square
$1\frac{1}{2}$ E	$15\frac{3}{4}$	.831	$\frac{5}{8}$
$2\frac{1}{2}$ E	$19\frac{3}{4}$	.935	$\frac{1}{16}$

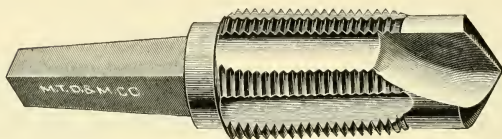
Numbers $1\frac{1}{2}$ E and $2\frac{1}{2}$ E are made of various tapers per foot. When writing for prices or in ordering, specify number, size, and taper per foot.

Other sizes and styles furnished on receipt of order and sketch giving necessary data. Prices quoted on application.

No. 1110

COMBINED PIPE TAPS AND DRILLS

FOR TAPPING GAS AND WATER PIPE

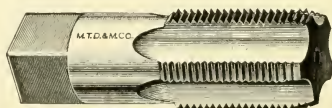
STANDARD TAPER $\frac{3}{4}$ INCH TO THE FOOT

These tools will be furnished with special shanks fitting Pipe Tapping Machines on receipt of order and sketch giving necessary data. Prices quoted on application.

Nominal Size, Inches	Price Each	Size of Square			Length			Diameter		
		Small End	Large End	Length Square	Over All	Thread	Drill, Incl. Point	Large End Thread	Small End Thread	Drill Point
$\frac{1}{8}$	\$2.25	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{3}{4}$	$3\frac{5}{8}$	$\frac{3}{4}$	$\frac{5}{8}$	.421	.374	.339
$\frac{1}{4}$	2.50	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{3}{4}$	$3\frac{7}{8}$	$1\frac{1}{16}$	$\frac{11}{16}$	.559	.493	.437
$\frac{3}{8}$	3.00	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{3}{4}$	$3\frac{7}{8}$	$1\frac{1}{16}$	$\frac{3}{4}$	.694	.628	.578
$\frac{1}{2}$	3.75	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{3}{4}$	$4\frac{1}{4}$	$1\frac{3}{8}$	$\frac{7}{8}$	.865	.779	.719
$\frac{3}{4}$	5.00	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{3}{4}$	$4\frac{1}{4}$	$1\frac{3}{8}$	1	1.075	.989	.921
1	6.25	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{3}{4}$	$4\frac{5}{8}$	$1\frac{3}{4}$	$1\frac{1}{8}$	1.350	1.241	1.156
$1\frac{1}{4}$	7.50	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{3}{4}$	$4\frac{3}{4}$	$1\frac{3}{4}$	$1\frac{1}{4}$	1.693	1.584	1.500
$1\frac{1}{2}$	9.25	$\frac{1}{2}$	$\frac{3}{4}$	$1\frac{3}{4}$	$4\frac{7}{8}$	$1\frac{3}{4}$	$1\frac{3}{8}$	1.931	1.822	1.734
2	12.00	$\frac{3}{4}$	1	2	$5\frac{3}{8}$	$1\frac{3}{4}$	$1\frac{5}{8}$	2.406	2.297	2.218
$2\frac{1}{2}$	21.00	$\frac{3}{4}$	1	2	$6\frac{3}{8}$	$2\frac{9}{16}$	$1\frac{13}{16}$	2.922	2.762	2.625
3	30.00	$\frac{3}{4}$	1	2	$6\frac{3}{4}$	$2\frac{5}{8}$	$2\frac{1}{8}$	3.547	3.383	3.250

No. 1118

STRAIGHT PLUG PIPE TAPS



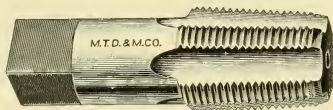
The list on these Taps and the number of threads per inch is the same as on No. 1115, page 263.

TAPER PIPE TAPS

No. 1115
Carbon Steel

No. 2115
High Speed Steel

AMERICAN (BRIGGS) STANDARD



American (Briggs) Standard Right Hand Pipe Taps are furnished unless otherwise specified.

High Speed Steel Pipe Taps will be regularly furnished in American (Briggs) Standard Taper right hand only. All other High Speed Pipe Taps are special and subject to special prices.

Straight (Plug) pipe taps to 2 inch diameter inclusive, will be furnished at regular prices. See No. 1118 on page 262.

American (Briggs) Standard Left Hand Pipe Taps take a different discount from right hand.

All other left hand pipe taps are special.

Sizes, lengths, and threads not listed are subject to special prices.

Reamers for American (Briggs) Standard Pipe Taps are listed on next page.

Nominal Size, Inches	Price Each		Number of Threads to the Inch	Length of Thread, Inches	Whole Length, Inches
	Carbon Steel	High Speed Steel			
1/8	\$1.00	\$1.10	27	3/4	2 1/8
1/4	1.20	1.50	18	1 1/16	2 7/16
3/8	1.60	1.95	18	1 1/16	2 9/16
1/2	2.00	3.10	14	1 3/8	3 1/8
3/4	2.80	4.40	14	1 3/8	3 1/4
1	4.40	7.80	11 1/2	1 3/4	3 3/4
1 1/4	5.00	12.10	11 1/2	1 3/4	4
1 1/2	6.60	16.60	11 1/2	1 3/4	4 1/4
2	10.00	27.25	11 1/2	1 3/4	4 1/2
2 1/2	15.00		8	2 9/16	5 1/2
3	22.50		8	2 5/8	6
3 1/2	30.00		8	2 11/16	6 1/2
4	45.00		8	2 3/4	6 3/4

No. 1116 PIPE REAMERS

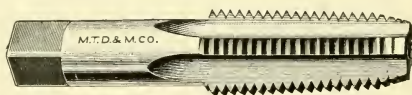


These Pipe Reamers are tapered $\frac{3}{4}$ of an inch to the foot and are for reaming holes to be tapped with American (Briggs) Standard Taper Pipe Taps.

Sizes and dimensions not listed are subject to special prices.

Nominal Size, Inches	Price Each	Whole Length, Inches	Nominal Size, Inches	Price Each	Whole Length, Inches
$\frac{1}{8}$	\$1.00	$2\frac{1}{8}$	$1\frac{1}{2}$	\$6.60	$4\frac{1}{4}$
$\frac{1}{4}$	1.20	$2\frac{7}{16}$	2	10.00	$4\frac{1}{2}$
$\frac{3}{8}$	1.60	$2\frac{9}{16}$	$2\frac{1}{2}$	15.00	$5\frac{1}{2}$
$\frac{1}{2}$	2.00	$3\frac{1}{8}$	3	22.50	6
$\frac{3}{4}$	2.80	$3\frac{1}{4}$	$3\frac{1}{2}$	30.00	$6\frac{1}{2}$
1	4.40	$3\frac{3}{4}$	4	45.00	$6\frac{3}{4}$
$1\frac{1}{4}$	5.00	4			

No. 1125 PATCH-BOLT TAPS



LEFT HAND TAPS ARE SPECIAL

These Taps all have a whole length of $3\frac{1}{2}$ inches. They are made especially for boiler makers and have a taper of $\frac{3}{4}$ inch to the foot for the purpose of making the bolt a steam-tight fit.

United States Standard form of thread furnished unless otherwise specified.

Sizes, lengths, and threads not listed are subject to special prices.

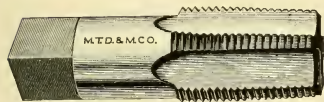
Patch Bolt Taps with V form of thread are special.

Diam. of Tap, Inches	Thr'ds per In. U.S.F.	Price Each	Diam. of Tap, Inches	Thr'ds per In. U.S.F.	Price Each	Diam. of Tap, Inches	Thr'ds per In. U.S.F.	Price Each
$\frac{1}{2}$	12	\$1.00	$\frac{13}{16}$	12	\$1.95	$1\frac{1}{16}$	12	\$2.90
$\frac{9}{16}$	12	1.10	$\frac{7}{8}$	12	2.25	$1\frac{1}{8}$	12	3.00
$\frac{5}{8}$	12	1.25	$\frac{15}{16}$	12	2.40	$1\frac{3}{16}$	12	3.15
$\frac{11}{16}$	12	1.45	1	12	2.80	$1\frac{1}{4}$	12	3.35
$\frac{3}{4}$	12	1.70						

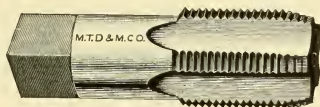
No. 1117

WHITWORTH PIPE TAPS

J



H



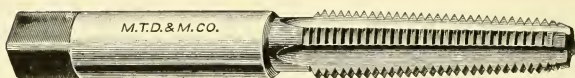
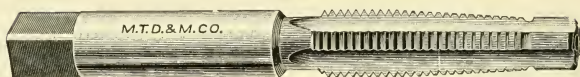
LEFT HAND TAPS ARE SPECIAL

Size, Inches	Price Each	Diam. of Threads, Inches	Pitch	Whole Length, Inches	Taper "J" Inches	Plug "H" Inches	Length Threads, Inches
$\frac{1}{8}$	\$1.00	.385	28	$2\frac{1}{8}$	$\frac{5}{8}$	$\frac{3}{16}$	$\frac{3}{4}$
$\frac{1}{4}$	1.20	.521	19	$2\frac{7}{16}$	$\frac{3}{4}$	$\frac{3}{16}$	$1\frac{1}{16}$
$\frac{3}{8}$	1.60	.660	19	$2\frac{9}{16}$	$\frac{3}{4}$	$\frac{3}{16}$	$1\frac{1}{16}$
$\frac{1}{2}$	2.00	.830	14	$3\frac{1}{8}$	$\frac{7}{8}$	$\frac{1}{4}$	$1\frac{3}{8}$
$\frac{5}{8}$	2.80	.906	14	$3\frac{3}{16}$	1	$\frac{5}{16}$	$1\frac{3}{8}$
$\frac{3}{4}$	2.80	1.046	14	$3\frac{1}{4}$	$1\frac{1}{16}$	$\frac{5}{16}$	$1\frac{3}{8}$
$\frac{7}{8}$	4.40	1.195	14	$3\frac{1}{2}$	$1\frac{1}{16}$	$\frac{5}{16}$	$1\frac{9}{16}$
1	4.40	1.315	11	$3\frac{3}{4}$	$1\frac{1}{8}$	$\frac{3}{8}$	$1\frac{3}{4}$
$1\frac{1}{4}$	5.00	1.656	11	4	$1\frac{3}{16}$	$\frac{3}{8}$	$1\frac{3}{4}$
$1\frac{1}{2}$	6.60	1.890	11	$4\frac{1}{4}$	$1\frac{1}{4}$	$\frac{3}{8}$	$1\frac{3}{4}$
$1\frac{3}{4}$	8.00	2.168	11	$4\frac{3}{8}$	$1\frac{3}{8}$	$\frac{3}{8}$	$1\frac{3}{4}$
2	10.00	2.355	11	$4\frac{1}{2}$	$1\frac{1}{2}$	$\frac{3}{8}$	$1\frac{3}{4}$
$2\frac{1}{4}$	12.00	2.595	11	5	$1\frac{5}{8}$	$\frac{7}{16}$	$2\frac{1}{8}$
$2\frac{1}{2}$	15.00	3.008	11	$5\frac{1}{2}$	2	$\frac{1}{2}$	$2\frac{9}{16}$
$2\frac{3}{4}$	18.00	3.255	11	$5\frac{3}{4}$	$2\frac{1}{8}$	$\frac{1}{2}$	$2\frac{9}{16}$
3	22.50	3.493	11	6	$2\frac{3}{8}$	$\frac{1}{2}$	$2\frac{5}{8}$
$3\frac{1}{4}$	25.50	3.706	11	$6\frac{1}{4}$	$2\frac{1}{2}$	$\frac{1}{2}$	$2\frac{5}{8}$
$3\frac{1}{2}$	30.00	3.920	11	$6\frac{1}{2}$	$2\frac{5}{8}$	$\frac{1}{2}$	$2\frac{11}{16}$
$3\frac{3}{4}$	36.00	4.133	11	$6\frac{5}{8}$	$2\frac{3}{4}$	$\frac{9}{16}$	$2\frac{11}{16}$
4	45.00	4.348	11	$6\frac{3}{4}$	$2\frac{7}{8}$	$\frac{9}{16}$	$2\frac{3}{4}$

NOTE: — The sizes in above list are taken from "Practical Engineer's Pocket Book," 1897, published by Technical Publishing Co., Ltd., Whitworth St., Manchester, England. The list is declared to be the one most generally recognized in England.

No. 1126

STRAIGHT AND TAPER BOILER TAPS



LEFT HAND TAPS ARE SPECIAL

All taps have 12 threads to the inch, and will be furnished with United States Standard form of thread.

Boiler Taps with V form of thread are special.

Sizes, lengths, and threads not listed are subject to special prices.

Taper Boiler Taps have a taper of $\frac{3}{4}$ inch to the foot.

Diameter, Inches	Price Each	Whole Length, Inches	Diameter, Inches	Price Each	Whole Length, Inches
$\frac{1}{2}$	\$1.05	$4\frac{1}{4}$	$1\frac{3}{16}$	\$3.85	7
$\frac{9}{16}$	1.25	$4\frac{5}{8}$	$1\frac{1}{4}$	4.05	$7\frac{1}{8}$
$\frac{5}{8}$	1.40	5	$1\frac{5}{16}$	4.35	$7\frac{1}{4}$
$\frac{11}{16}$	1.60	$5\frac{1}{4}$	$1\frac{3}{8}$	4.70	$7\frac{3}{8}$
$\frac{3}{4}$	1.95	$5\frac{1}{2}$	$1\frac{7}{16}$	5.30	$7\frac{1}{2}$
$\frac{13}{16}$	2.25	$5\frac{3}{4}$	$1\frac{1}{2}$	5.50	$7\frac{5}{8}$
$\frac{7}{8}$	2.50	6	$1\frac{5}{8}$	5.80	$7\frac{3}{4}$
$\frac{15}{16}$	2.80	$6\frac{1}{4}$	$1\frac{3}{4}$	6.10	$7\frac{7}{8}$
1	3.35	$6\frac{1}{2}$	$1\frac{7}{8}$	6.40	8
$1\frac{1}{16}$	3.50	$6\frac{3}{4}$	2	6.70	8
$1\frac{1}{8}$	3.65	$6\frac{7}{8}$			

No. 1130 STAY-BOLT TAPS

In ordering, state diameter, pitch, and form of thread, also lengths of parts A, B, C, D and E.

These Taps will be furnished in either U. S. form, Whitworth form, or V form of thread, 12 to the inch.

U. S. Standard form of thread furnished unless otherwise specified.

Diameter given is that of the thread at its straight part.

Taps shorter than 20 inches will be charged as if 20 inches long, and fractions of an inch in length will be charged as a full extra inch.

Blank order slips furnished on application.

Diameter	Per Inch	Diameter	Per Inch	Diam.	Per Inch
$\frac{3}{4}, \frac{13}{16}$	\$.40	$1\frac{1}{16}$	\$.60	$1\frac{5}{16}$	\$.80
$\frac{7}{8}$	.45	$1\frac{1}{8}$	.65	$1\frac{3}{8}$	.85
$\frac{15}{16}$	.50	$1\frac{3}{16}$	.70	$1\frac{7}{16}$	.90
1	.55	$1\frac{1}{4}$	.75	$1\frac{1}{2}$	.95

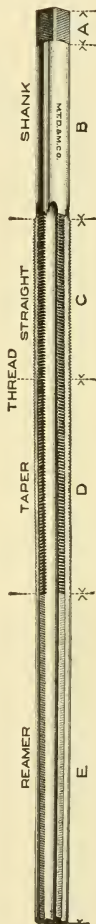
Stay-bolt taps 20 inches, 24 inches and 27 inches long in sizes from $\frac{3}{4}$ to $1\frac{1}{2}$ inches diameter, having the following proportions, will be considered regular; all others will be considered special.

Length	A	B	C	D	E
20"	1	6	$1\frac{1}{2}$	6	$5\frac{1}{2}$
24"	1	8	2	6	7
27"	1	10	2	$6\frac{1}{2}$	$7\frac{1}{2}$

The Table of Lengths given below is one made up of average lengths taken from a large number of orders, and is listed merely as a suggestion or aid in making up specifications.

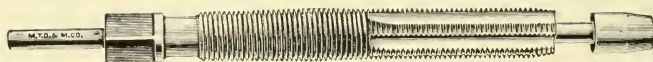
AVERAGE LENGTHS

Whole Length of Tap, Inches	Length, Inches				
	A	B	C	D	F
12	1	3	2	3	3
14	1	4	2	$3\frac{1}{2}$	$3\frac{1}{2}$
16	1	$4\frac{1}{2}$	2	4	$4\frac{1}{2}$
18	1	5	2	5	5
21	1	6	2	$5\frac{1}{2}$	$6\frac{1}{2}$
24	1	8	2	6	7
27	1	9	3	$6\frac{1}{2}$	$7\frac{1}{2}$
30	1	10	4	$6\frac{1}{2}$	$8\frac{1}{2}$
33	1	11	4	$6\frac{1}{2}$	$10\frac{1}{2}$
36	1	12	4	$6\frac{1}{2}$	$12\frac{1}{2}$
39	1	13	5	$7\frac{1}{2}$	$12\frac{1}{2}$
42	1	14	5	$8\frac{1}{2}$	$13\frac{1}{2}$
48	1	16	6	10	15
54	1	18	6	11	18



No. 1131

SPINDLE STAY-BOLT TAPS



Used for retapping stay-bolt holes from the inside of fire-box of locomotives.

These Taps will be furnished with United States Standard form of thread, 12 to the inch.

These Taps with V form of thread are special.

Other sizes and lengths than those listed will be furnished to order at special prices per inch as listed below.

Taps shorter than 12 inches will be charged as if 12 inches long and fractions of an inch in length will be charged as a full extra inch.

Diam. Inches	Price		Length of Fluted Thread, Inches	Length of Unfluted Thread, Inches	Whole Length, Inches	Diam. of Spindle, Inches	Length of Spindle, Inches
	For a Tap 12" Long	Per Inch for Other Lengths					
$\frac{3}{4}$	\$12.00	\$1.00	4	6	12	$\frac{3}{8}$	$15\frac{3}{8}$
$\frac{13}{16}$	12.60	1.05	4	6	12	$\frac{3}{8}$	$15\frac{3}{8}$
$\frac{7}{8}$	13.20	1.10	4	6	12	$\frac{3}{8}$	$15\frac{3}{8}$
$\frac{15}{16}$	13.80	1.15	4	6	12	$\frac{3}{8}$	$15\frac{3}{8}$
1	14.40	1.20	4	6	12	$\frac{3}{8}$	$15\frac{3}{8}$
$1\frac{1}{16}$	15.00	1.25	4	6	12	$\frac{3}{8}$	$15\frac{3}{8}$
$1\frac{1}{8}$	15.60	1.30	4	6	12	$\frac{3}{8}$	$15\frac{3}{8}$
$1\frac{3}{16}$	16.20	1.35	4	6	12	$\frac{3}{8}$	$15\frac{3}{8}$
$1\frac{1}{4}$	16.80	1.40	4	6	12	$\frac{3}{8}$	$15\frac{3}{8}$
$1\frac{5}{16}$	17.40	1.45	4	6	12	$\frac{3}{8}$	$15\frac{3}{8}$
$1\frac{3}{8}$	18.00	1.50	4	6	12	$\frac{3}{8}$	$15\frac{3}{8}$
$1\frac{7}{16}$	18.60	1.55	4	6	12	$\frac{3}{8}$	$15\frac{3}{8}$
$1\frac{1}{2}$	19.20	1.60	4	6	12	$\frac{3}{8}$	$15\frac{3}{8}$

No. 1132

SPINDLE STAY-BOLT TAPS

WITH THREADED SPINDLE

These Taps are so constructed that the lead of the internal and external threads exactly coincides, which insures the tapping of a continuous thread in the two boiler sheets where the stay-bolt is to be located. The distance between the sheets may be anything within the limits of the length of the spindle.

These Taps will be furnished in sizes of $\frac{7}{8}$ to $1\frac{1}{2}$ inches diameter, inclusive, as per list below, with the United States Standard form of thread, 12 to the inch.

These Taps with V form of thread are special.

The length over all and the length of threads of these Taps is the same as our regular spindle stay-bolt taps, No. 1131, page 268.

Sizes, lengths, and threads not listed are subject to special prices.

Spindles $\frac{7}{16}$ inch diameter and 36 inches long will be furnished unless otherwise ordered.

Each set consists of two taps and a spindle.



Diameter, Inches	Price Per Set	Diameter, Inches	Price Per Set
$\frac{7}{8}$	\$21.90	$1\frac{1}{4}$	\$27.70
$\frac{15}{16}$	22.90	$1\frac{5}{16}$	28.65
1	23.85	$1\frac{3}{8}$	29.60
$1\frac{1}{16}$	24.80	$1\frac{7}{16}$	30.55
$1\frac{1}{8}$	25.75	$1\frac{1}{2}$	31.50
$1\frac{3}{16}$	26.70		

No. 1133

STAY-BOLT TAPS

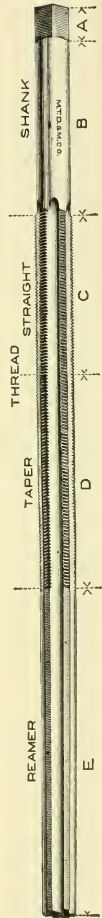
FOR BOILER WORK

METRIC SYSTEM

Taps shorter than 20 inches will be charged as if 20 inches long, and fractions of an inch in length will be charged as a full extra inch.

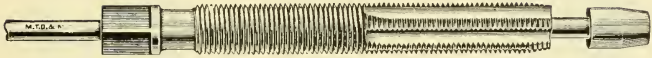
All metric Stay-bolt Taps are special, and discount depends upon the quantity ordered.

Diameter of Tap M. M.	Price Per Inch
20	\$.40
22	.45
24	.50
26	.55
27	.60
28	.65
30	.70
32	.75
33	.80
34	.85
36	.90
38	.95



No. 1134

SPINDLE STAY-BOLT TAPS



METRIC SYSTEM

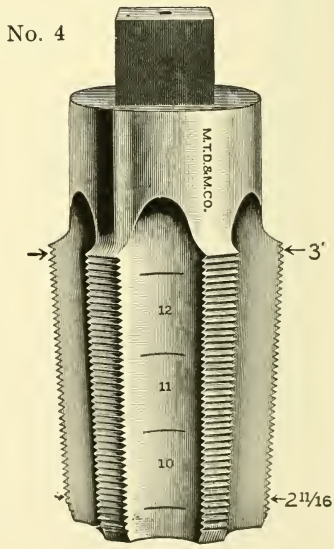
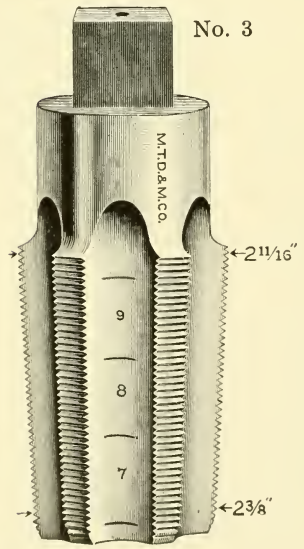
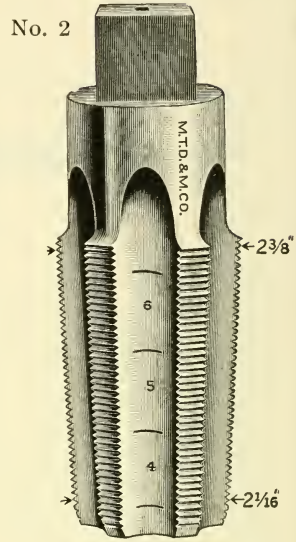
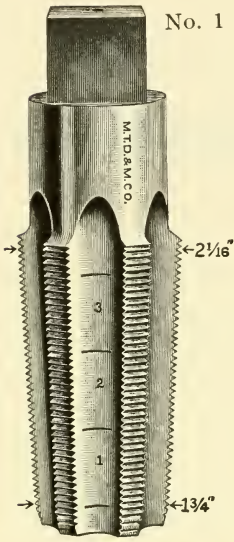
Taps shorter than 8 inches will be charged as if 8 inches long and fractions of an inch in length will be charged as a full extra inch.

Spindle Stay-bolt Taps having the following proportions have been found by experience to answer for the average requirements.

Length over all	7 $\frac{5}{8}$ "
Length of fluted Thread	3 $\frac{1}{4}$ "
Length of unfluted Thread	2 $\frac{3}{4}$ "
Diameter of Spindle	$\frac{3}{8}$ "
Length of Spindle	11 "

Diameter Tap M. M.	Price	
	For a Tap 7 $\frac{5}{8}$ " Long	Per Inch For Other Lengths
20	\$8.40	\$1.05
22	8.80	1.10
24	9.20	1.15
26	9.60	1.20
27	10.00	1.25
28	10.40	1.30
30	10.80	1.35
32	11.20	1.40
33	11.60	1.45
34	12.00	1.50
36	12.40	1.55
38	12.80	1.60

No. 1135
MUD OR
WASHOUT
TAPS



No. 1135

MUD OR WASHOUT TAPS

Used for tapping washout holes in locomotives.

A set consists of four taps having $1\frac{1}{4}$ inch taper in 12 inches.

Tap No. 1 is $1\frac{3}{4}$ inches in diameter at small end, and tap No. 4 is 3 inches in diameter at large end.

The taps are marked as shown in the illustrations and correspond with taper plugs bearing the same numbers as the twelve diameters shown on the four taps.

The taps are $6\frac{1}{2}$ inches long and all have the same size square on shank.

All taps have 12 threads to the inch and will be furnished with United States Standard form of thread.

These Taps with V form of thread are special.

Sizes, lengths, and threads not listed are subject to special prices.

Left hand taps are special.

Number	Price Each	Diameter, Inches		Dimensions, Inches			
		Small End	Large End	Diameter Shank	Size Square	Length Thread	Length Overall
1	\$7.60	$1\frac{3}{4}$	$2\frac{1}{16}$	2	$1\frac{1}{2}$	$3\frac{5}{8}$	$6\frac{1}{2}$
2	9.50	$2\frac{1}{16}$	$2\frac{3}{8}$	2	$1\frac{1}{2}$	$3\frac{5}{8}$	$6\frac{1}{2}$
3	12.50	$2\frac{3}{8}$	$2\frac{11}{16}$	2	$1\frac{1}{2}$	$3\frac{5}{8}$	$6\frac{1}{2}$
4	14.45	$2\frac{11}{16}$	3	2	$1\frac{1}{2}$	$3\frac{5}{8}$	$6\frac{1}{2}$

No. 1146



TAP WRENCHES

No. 1145



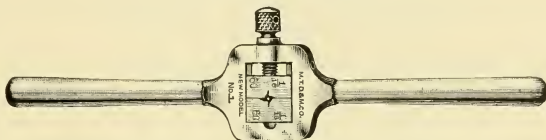
Size	Price Each	Whole Length, Inches	Fitting Taps	Fitting Reamers	Fitting Squares
0	\$1.60	5½	⅛ to ¼	⅛ to ⅜	⅛ to ⅜
1	2.00	6	⅛ to ⅝	⅛ to ⅜	⅛ to ¼

No. 1146

2	2.50	8½	⅜ to ⅝	⅜ to ⅝	⅜ to ⅝
A	3.00	12¾	¼ to ⅜	¼ to ⅜	⅜ to ⅝
B	4.00	17⅛	½ to 1⅛	⅜ to 1⅜	¼ to ¾
C	5.00	23	¾ to 1⅝	⅜ to 1⅜	⅝ to 1
D	15.00	45¼	1¼ to 2⅛	1⅛ to 2⅛	¾ to 1¼
E	47.50	50	1¾ to 2½	1⅞ to 2½	1 to 1⅝
F	62.50	56	2⅛ to 3⅛	2⅛ to 3	1¼ to 2

Sizes D, E, and F have handles that screw into body.

No. 1151 SCREW PLATES

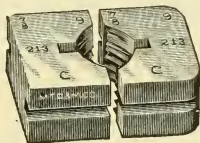


Our Patent Screw Plates are of an improved pattern and finish. They are light and durable, and are so perfected as to admit of a change of Die most quickly. The Dies and Plates are carefully finished to standard gauges, and are warranted as to accuracy of size. The Dies are interchangeable. Under or over size Bolts are always properly cut with standard size Dies.

Screw Plates D & E have handles that screw into body.

Size	Price of Screw Plate Without Dies	Whole Length, Inches	Capacity, Inches
No. 1	\$1.60	6 $\frac{1}{2}$	$\frac{1}{16}$ to $\frac{1}{4}$
A	2.50	13 $\frac{3}{4}$	$\frac{1}{4}$ to $\frac{5}{8}$
B	3.25	19	$\frac{1}{4}$ to $\frac{7}{8}$
C	4.00	21 $\frac{7}{8}$	$\frac{3}{8}$ to 1
D	5.00	28 $\frac{3}{4}$	$\frac{1}{16}$ to 1 $\frac{1}{2}$
E	15.00	40 $\frac{5}{8}$	$\frac{1}{8}$ to 2

No. 1155 SCREW PLATE DIES



All sizes of Dies not listed and Dies with other than standard number of threads per inch furnished at special prices.

U. S. form of thread always furnished unless otherwise ordered.

S. A. E. Standard threads furnished at regular prices.

Blank Dies one-half above prices.

Size	Price Per Pair	Cutting Sizes, Inches
No. 1	\$.40	$\frac{1}{16}$ to $\frac{1}{4}$ by 32nds
A	1.00	$\frac{1}{4}$ to $\frac{5}{8}$ by 16ths
B	1.25	$\frac{1}{4}$ to $\frac{7}{8}$ by 16ths
C	1.75	$\frac{3}{8}$ to 1 by 16ths
D	2.00	$\frac{7}{8}$ to 1 by 16ths, 1 $\frac{1}{8}$ to 1 $\frac{1}{2}$ by 8ths
E	3.00	$\frac{1}{8}$ to 2 by 8ths

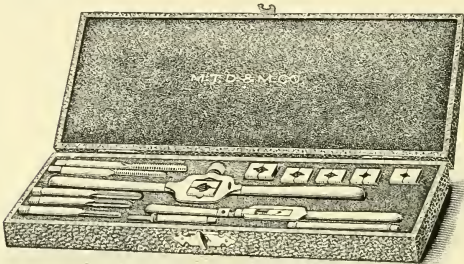
No. 1158

SETS OF SCREW PLATES

WITH TAPS, DIES, AND WRENCHES
PLATES STYLE NO. 1151

FOR THE USE OF MODEL MAKERS AND JEWELERS

		Price Per Set
Set No. 1.	No. 1 Screw Plate, with 5 pair of Dies and 5 Taps cutting $\frac{1}{8}^{40}$, $\frac{5}{32}^{38}$, $\frac{3}{16}^{24}$, $\frac{7}{32}^{24}$, $\frac{1}{4}^{20}$, in wooden box .	\$5.50
Set No. 2.	No. 1 Screw Plate, with 5 pair Dies and 5 Taps, cutting sizes listed above, and an Adjustable Tap Wrench, in wooden box	7.25



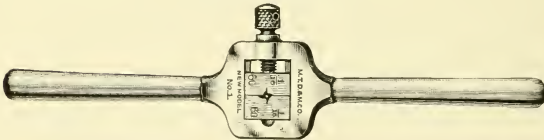
SET IN CASE

Set No. 3.	No. 1 Screw Plate complete, with 6 pairs of Dies, 6 Taps and Tap Wrench, in case, cutting $\frac{1}{16}^{64}$, $\frac{1}{8}^{40}$, $\frac{5}{32}^{36}$, $\frac{3}{16}^{24}$, $\frac{7}{32}^{24}$, $\frac{1}{4}^{20}$	\$9.75
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No. 1159

SETS OF SCREW PLATES

WITH DIES ONLY

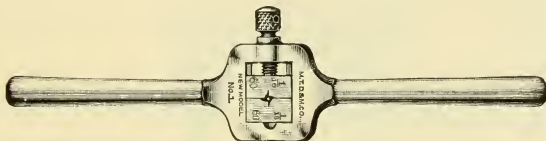


Set No. 5.	Plate A, with 3 pair Dies, cutting $\frac{1}{4}^{20}$, $\frac{3}{8}^{16}$, $\frac{1}{2}^{13}$.	\$6.50
Set No. 6.	Plate B, with 4 pair Dies, cutting $\frac{3}{8}^{16}$, $\frac{1}{2}^{13}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$	9.50
Set No. 7.	Plate C, with 4 pair Dies, cutting $\frac{1}{2}^{13}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$, $\frac{7}{8}^9$	12.75
Set No. 8.	Plate D, with 4 pair Dies, cutting $\frac{7}{8}^9$, 1^8 , $1\frac{1}{8}^7$, $1\frac{1}{4}^7$	15.00
Set No. 9.	Plate E, with 6 pair Dies, cutting $1\frac{3}{8}^6$, $1\frac{1}{2}^6$, $1\frac{5}{8}^6$, $1\frac{3}{4}^5$, $1\frac{7}{8}^5$, 2^4	37.75

No. 1161

SETS OF SCREW PLATES

WITH TAPS, DIES, AND WRENCHES



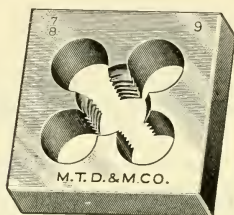
		Price Per Set
Set No. 10.	{ 1 Screw Plate A and 1 pair Dies each $\frac{1}{4}^{20}$, $\frac{3}{8}^{16}$, $\frac{1}{2}^{13}$ 1 Plug Tap each $\frac{1}{4}^{20}$, $\frac{3}{8}^{16}$, $\frac{1}{2}^{13}$ }	\$7.75
Set No. 11.	Same as above, with 1 Tap Wrench A	11.25
Set No. 12.	{ 1 Screw Plate A and 1 pair Dies $\frac{1}{4}^{20}$, $\frac{3}{8}^{16}$, $\frac{1}{2}^{13}$, $\frac{5}{8}^{11}$ } 1 Plug Tap each $\frac{1}{4}^{20}$, $\frac{3}{8}^{16}$, $\frac{1}{2}^{13}$, $\frac{5}{8}^{11}$ }	9.75
Set No. 13.	Same as above, with 1 Tap Wrench A	13.00
Set No. 14.	{ 1 Screw Plate B and 1 pair Dies $\frac{3}{8}^{16}$, $\frac{1}{2}^{13}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$ } 1 Plug Tap $\frac{3}{8}^{16}$, $\frac{1}{2}^{13}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$ }	12.50
Set No. 15.	Same as above, with 1 Tap Wrench each A and B	20.50
Set No. 16.	{ 1 Screw Plate B and 1 pair Dies each $\frac{1}{4}^{20}$, $\frac{3}{8}^{16}$, $\frac{1}{2}^{13}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$, $\frac{7}{8}^9$ } 1 Plug Tap each $\frac{1}{4}^{20}$, $\frac{3}{8}^{16}$, $\frac{1}{2}^{13}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$, $\frac{7}{8}^9$ }	17.25
Set No. 17.	Same as above, with 1 Tap Wrench each A and B	25.25
Set No. 18.	{ 1 Screw Plate C and 1 pair Dies $\frac{1}{2}^{13}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$, $\frac{7}{8}^9$ } 1 Plug Tap each $\frac{1}{2}^{13}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$, $\frac{7}{8}^9$ }	16.75
Set No. 19.	Same as above, with 1 Tap Wrench B	21.50
Set No. 20.	{ 1 Screw Plate C and 1 pair Dies each $\frac{3}{8}^{16}$, $\frac{1}{2}^{13}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$, $\frac{7}{8}^9$, 1^8 } 1 Plug Tap each $\frac{3}{8}^{16}$, $\frac{1}{2}^{13}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$, $\frac{7}{8}^9$, 1^8 }	23.00
Set No. 21.	Same as above, with 1 Tap Wrench each A and B	31.00
Set No. 22.	{ 1 Screw Plate D and 1 pair Dies each $\frac{7}{8}^9$, 1^8 , $1\frac{1}{8}^7$, $1\frac{1}{4}^7$ } 1 Plug Tap each $\frac{7}{8}^9$, 1^8 , $1\frac{1}{8}^7$, $1\frac{1}{4}^7$ }	24.00
Set No. 23.	Same as above, with 1 Tap Wrench C	30.00
Set No. 24.	{ 1 Screw Plate D and 1 pair Dies $\frac{7}{8}^9$, 1^8 , $1\frac{1}{8}^7$, $1\frac{1}{4}^7$, $1\frac{3}{8}^6$ } 1 Plug Tap each $\frac{7}{8}^9$, 1^8 , $1\frac{1}{8}^7$, $1\frac{1}{4}^7$, $1\frac{3}{8}^6$ }	30.50
Set No. 25.	Same as above, with 1 Tap Wrench C	36.00

U. S. form of thread always furnished unless otherwise ordered.

No. 1165

SOLID BOLT DIES

LEFT HAND DIES ARE SPECIAL



All sizes and threads not listed will be considered as special and subject to special prices.

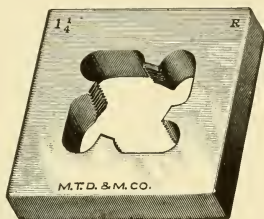
United States form of thread always furnished unless otherwise ordered.

Cutting Size, Inches	Number of Threads to Inch U.S.S.	Outside Dimensions		Price Each
		Size of Square, Inches	Thickness, Inches	
$\frac{1}{4}$	20	$2\frac{1}{2}$	$\frac{1}{2}$	\$1.80
$\frac{5}{16}$	18	$2\frac{1}{2}$	$\frac{1}{2}$	1.80
$\frac{3}{8}$	16	$2\frac{1}{2}$	$\frac{1}{2}$	1.80
$\frac{7}{16}$	14	$2\frac{1}{2}$	$\frac{1}{2}$	1.80
$\frac{1}{2}$	13	$2\frac{1}{2}$	$\frac{3}{4}$	1.80
$\frac{9}{16}$	12	$2\frac{1}{2}$	$\frac{3}{4}$	1.90
$\frac{5}{8}$	11	$2\frac{1}{2}$	$\frac{3}{4}$	2.00
$\frac{11}{16}$	11	$2\frac{1}{2}$	$\frac{3}{4}$	2.10
$\frac{3}{4}$	10	$2\frac{1}{2}$	$\frac{3}{4}$	2.20
$\frac{13}{16}$	10	$2\frac{1}{2}$	$\frac{3}{4}$	2.30
$\frac{7}{8}$	9	$2\frac{1}{2}$	$\frac{3}{4}$	2.40
$\frac{15}{16}$	9	$2\frac{1}{2}$	$\frac{3}{4}$	2.55
1	8	$2\frac{1}{2}$	1	2.70
$1\frac{1}{8}$	7	$2\frac{1}{2}$	1	3.00
$1\frac{1}{4}$	7	$2\frac{1}{2}$	1	3.30
$1\frac{3}{8}$	6	$2\frac{1}{2}$	1	3.60
$1\frac{1}{2}$	6	3	1	3.90
$1\frac{5}{8}$	$5\frac{1}{2}$	3	1	4.20
$1\frac{3}{4}$	5	3	$1\frac{1}{4}$	5.40
$1\frac{7}{8}$	5	$3\frac{1}{2}$	$1\frac{1}{2}$	6.50
2	$4\frac{1}{2}$	$3\frac{1}{2}$	2	7.50

No. 1170

SOLID PIPE DIES

STANDARD TAPER IS $\frac{3}{4}$ INCH TO
THE FOOT



LEFT HAND DIES ARE SPECIAL

Solid square pipe dies are regularly furnished in American (Briggs) Standard right hand taper thread.

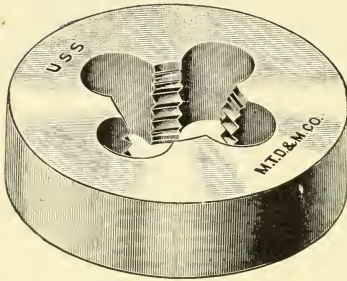
Sizes, dimensions, and threads not listed are subject to special prices.

*These dies are thick enough to cut to American (Briggs) Standard.

Cutting Size Pipe, Inches	Size of Square, — Thickness, — Price Each				
	2" Square $\frac{1}{2}$ " Thick	2½" Square $\frac{3}{4}$ " Thick	3" Square $\frac{3}{4}$ " Thick	4" Square 1" Thick	5" Square $1\frac{1}{4}$ " Thick
$\frac{1}{8}$	*\$1.80	*\$1.80			
$\frac{1}{4}$	1.90	* 1.90			
$\frac{3}{8}$	2.10	* 2.10			
$\frac{1}{2}$	2.40	* 2.40	*\$3.10		
$\frac{3}{4}$		* 3.00	* 3.45		
1		3.60	3.75	*\$5.00	
1¼			5.40	* 6.50	
1½				* 7.50	
2				8.50	
2½					\$12.50
3					15.00

No. 1175

SOLID ROUND DIES



Left Hand Dies are special.

U.S. form of thread always furnished unless otherwise ordered.

Whitworth Standard threads furnished if desired.

Sizes and threads not listed are subject to special prices.

Size of Die		Cutting Size	Price Each
Diam. Inches	Thickness Inches		
$\frac{5}{8}$	$\frac{1}{4}$	4, 48; 6, 40; 8, 36; 10, 30; 12, 28; 14, 24	\$.40
$\frac{5}{8}$	$\frac{1}{4}$	$\frac{1}{16}, \frac{3}{32}, \frac{1}{8}, \frac{3}{16}, \frac{1}{4}$	.40
1	$\frac{3}{8}$	$\frac{3}{16}, \frac{1}{4}, \frac{5}{16}, \frac{3}{8}, \frac{7}{16}$	.75
$1\frac{5}{16}$	$\frac{7}{16}$	$\frac{3}{8}, \frac{1}{4}, \frac{5}{16}, \frac{3}{8}, \frac{7}{16}, \frac{1}{2}$	1.25
$1\frac{9}{16}$	$\frac{9}{16}$	$\frac{1}{4}, \frac{5}{16}, \frac{3}{8}, \frac{7}{16}, \frac{1}{2}, \frac{9}{16}, \frac{5}{8}$	1.50
$2\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{4}, \frac{5}{16}, \frac{3}{8}, \frac{7}{16}, \frac{1}{2}$	3.00
$2\frac{1}{4}$	$\frac{3}{4}$	$\frac{9}{16}$	3.00
$2\frac{1}{4}$	$\frac{3}{4}$	$\frac{5}{8}$	3.00
$2\frac{1}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	3.00
$2\frac{1}{4}$	$\frac{3}{4}$	$\frac{7}{8}$	3.00
$2\frac{1}{4}$	$\frac{3}{4}$	1	3.00

No. 1180

DIE STOCKS

FOR

ROUND ADJUSTABLE DIES



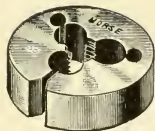
Size of Die Stock, No.	Price Each Without Dies	Whole Length of Die Stock, Inches	Holding Round Dies		Limits of Cutting Size	
			Outside Diam.	Thick-ness	Fractional	Machine Screw Gauge
21	\$.40	5	$\frac{5}{8}$	$\frac{1}{4}$	$\frac{1}{16}$ to $\frac{17}{64}$	0 to 14
22	.50	$7\frac{3}{8}$	$\frac{13}{16}$	$\frac{1}{4}$	$\frac{1}{16}$ to $\frac{5}{16}$	0 to 20
23	1.00	$10\frac{1}{4}$	1	$\frac{3}{8}$	$\frac{1}{8}$ to $\frac{17}{32}$	4 to 30
25	1.25	$12\frac{1}{8}$	$1\frac{5}{16}$	$\frac{7}{16}$	$\frac{3}{16}$ to $\frac{17}{32}$	
26	1.25	$14\frac{1}{8}$	$1\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{16}$ to $\frac{5}{8}$	
27	1.50	$14\frac{1}{8}$	$1\frac{9}{16}$	$\frac{9}{16}$	$\frac{1}{4}$ to $\frac{21}{32}$	
28	1.50	18	$1\frac{3}{4}$	$\frac{9}{16}$	$\frac{1}{4}$ to $\frac{3}{4}$	
29	1.50	22	2	$\frac{5}{8}$	$\frac{1}{4}$ to $\frac{7}{8}$	
30	1.75	26	$2\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{4}$ to 1	
31	1.75	30	$2\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{8}$ to 1	
32	2.25	42	3	1	$\frac{3}{4}$ to $1\frac{1}{2}$	

For Dies fitting these Stocks, see pages 282-289.

The Handles on Die Stocks Nos. 28, 29, 30, 31, and 32 screw into the body instead of being made solid.

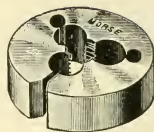
For Sets of No. 1180 Die Stocks, Round Dies, Taps and Wrenches complete, see pages 290-295.

Nos. 1191, 1192 and 1193 Carbon Steel



ROUND ADJUSTABLE DIES

A. S. M. E. STANDARD



$\frac{5}{8}$, $\frac{13}{16}$ AND 1 INCH DIAMETERS FITTING STYLE 1180 DIE STOCKS

NOS. 21, 22 AND 23

Left Hand Dies are special.

Sizes, dimensions and threads not listed are subject to special prices.

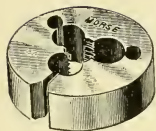
High Speed Steel Dies are special.

See tables in appendix, pages xviii and xix.

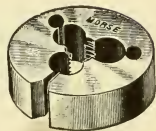
For Die Stocks for these Dies, see page 281.

Size of Screw Gauge	Standard No. of Threads	Threads also Furnished	No. 1191	No. 1192	No. 1193
			Price Each		
			$\frac{5}{8}$ Inch Diameter	$\frac{13}{16}$ Inch Diameter	1 Inch Diameter
0	80		\$.80	\$.90	
1	72	56, 64	.80	.90	
2	64	56	.70	.80	
3	56	48	.60	.70	
4	48	32, 36, 40	.50	.60	
5	44	36, 40	.50	.60	
6	40	32, 36	.50	.60	\$.75
7		32	.50	.60	.75
8	36	30, 32, 40	.50	.60	.75
9	32		.50	.60	.75
10	30	24, 28, 32	.50	.60	.75
12	28	24, 32	.50	.60	.75
14	24	20	.50	.60	.75
16		18		.60	.75
18		18		.60	.75

Nos. 1185, 1187 and 1189 Carbon Steel



ROUND ADJUSTABLE DIES



$\frac{5}{8}$, $\frac{13}{16}$ AND 1 INCH DIAMETERS

FITTING STYLE 1180 DIE STOCKS NOS. 21, 22 AND 23

Left Hand Dies are special.

Sizes, dimensions and threads not listed are subject to special prices.

U.S. Form of thread furnished unless otherwise specified.

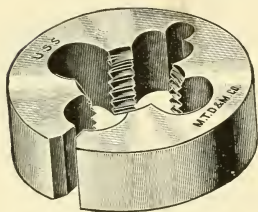
High Speed Steel Dies are special.

For Die Stocks for these Dies, see page 281.

For Sets of Dies, see pages 290-295.

Cutting Size, Inches	Number of Threads to Inch					No. 1185	No. 1187	No. 1189
	U.S. St'd	S.A.E. St'd	Whit- worth St'd	British St'd Fine	U. S. Threads also Furnished	Outside Diameter, Price Each		
						$\frac{5}{8}$ In.	$\frac{13}{16}$ In.	1 In.
$\frac{1}{16}$	64		60			\$.80	\$.90	
$\frac{5}{64}$	60					.70	.80	
$\frac{3}{32}$	50		48		48	.60	.70	
$\frac{7}{64}$	48					.50	.60	
$\frac{1}{8}$	40		40			.50	.60	\$.75
$\frac{9}{64}$	40					.50	.60	.75
$\frac{5}{32}$	36		32		32	.50	.60	.75
$\frac{11}{64}$	32					.50	.60	.75
$\frac{3}{16}$	24		24		32	.50	.60	.75
$\frac{13}{64}$	24					.50	.60	.75
$\frac{7}{32}$	24		24		32	.50	.60	.75
$\frac{15}{64}$	24					.50	.60	.75
$\frac{1}{4}$	20	28	20	26	24, 27, 32	.50	.60	.75
$\frac{5}{16}$	18	24	18	22	20, 27, 32		.60	.75
$\frac{3}{8}$	16	24	16	20	20, 27			.75
$\frac{7}{16}$	14	20	14	18	24, 27			.75

Nos. 1196, 1200, 1203 and 1207 Carbon Steel



ROUND ADJUSTABLE DIES

1 $\frac{5}{16}$, 1 $\frac{1}{2}$, 1 $\frac{9}{16}$ AND 1 $\frac{3}{4}$ INCHES DIAMETER

FITTING STYLE 1180 DIE STOCKS NOS. 25, 26, 27 AND 28

Left Hand Dies are special.

Sizes, dimensions and threads not listed are subject to special prices.

U. S. Form of thread furnished unless otherwise specified.

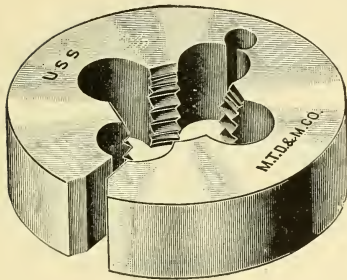
High Speed Steel Dies are special.

For Die Stocks for these Dies, see page 281.

For Sets of Dies, see pages 290-295.

Cutting Size, Inches	Number of Threads to Inch					No.	No.	No.	No.
						1196	1200	1203	1207
						Outside Diameter, Price Each			
	U.S. St'd	S.A.E. St'd	Whit- worth St'd	British St'd Fine	U.S. Threads also Fur- nished	1 $\frac{5}{16}$ In.	1 $\frac{1}{2}$ In.	1 $\frac{9}{16}$ In.	1 $\frac{3}{4}$ In.
1/4	20	28	20	26	24,27,32	\$1.25	\$1.25	\$1.50	\$2.00
5/16	18	24	18	22	20,27,32	1.25	1.25	1.50	2.00
3/8	16	24	16	20	20, 27	1.25	1.25	1.50	2.00
7/16	14	20	14	18	24, 27	1.25	1.25	1.50	2.00
1/2	13	20	12	16	12,24,27	1.25	1.25	1.50	2.00
9/16	12	18	12	16	27		1.25	1.50	2.00
5/8	11	18.	11	14	12, 27		1.25	1.50	2.00
11/16	11	16	11	14					2.00
3/4	10	16.	10	12	12, 27				2.00

Nos. 1211, 1214, 1217 and 1220 Carbon Steel



ROUND
ADJUSTABLE DIES

2, 2¼, 2½ AND 3 INCH DIAMETERS

FITTING STYLE 1180 DIE STOCKS NOS. 29, 30, 31 AND 32

Left Hand Dies are special.

Sizes, dimensions and threads not listed are subject to special prices.

U. S. Form of thread furnished unless otherwise specified.

High Speed Steel Dies are special.

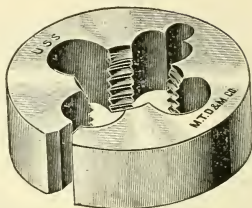
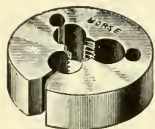
For Die Stocks for these Dies, see page 281.

For Sets of Dies see pages 290-295.

Cutting Size, Inches	Number of Threads to Inch					No. 1211	No. 1214	No. 1217	No. 1220
	U.S. St'd	S.A.E. St'd	Whitworth, St'd	British St'd Fine	U. S. Threads also Furnished	Outside Diameter, Price Each			
						2 In.	2¼ In.	2½ In.	3 In.
¼	20	28	20	26	24, 27, 32	\$2.00	\$3.00		
⅕	18	24	18	22	20, 27, 32	2.00	3.00		
⅜	16	24	16	20	20, 27	2.00	3.00		
⅞	14	20	14	18	24, 27	2.00	3.00		
½	13	20	12	16	12, 24, 27	2.00	3.00	\$3.00	
⅝	12	18	12	16	27	2.00	3.00	3.00	
⅜	11	18	11	14	12, 27	2.00	3.00	3.00	
⅞	11	16	11	14		2.00	3.00	3.00	
¾	10	16	10	12	12, 27	2.00	3.00	3.00	
⅞	10		10	12		2.00	3.00	3.00	
1	9	14, 18	9	11	12, 27	2.00	3.00	3.00	\$5.00
1 ⅛	9		9				3.00	3.00	5.00
1 ¼	8	14	8	10	12, 27		3.00	3.00	5.00
1 ⅜	7	12	7	9					5.00
1 ½	7	12	7	9					5.00
1 ⅝	6	12	6	8					5.00
1 ¾	6	12	6	8					5.00

ROUND
ADJUSTABLE
DIES

FRENCH AND
INTERNATIONAL STANDARD
METRIC SYSTEM

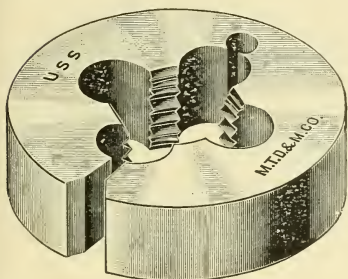


Left hand dies are special.

Sizes, dimensions, and threads not listed are subject to special prices.

For Die Stocks see page 281.

Cutting Size, M. M.	Pitch, M. M.		No. 1233 Fitting Stock No. 21	No. 1236 Fitting Stock No. 22	No. 1234 Fitting Stock No. 23
	French	Inter- national	$\frac{5}{8}$ Inch Diam.	$\frac{11}{16}$ Inch Diam.	1 Inch Diam.
2		.45	\$.70	\$.80	
2.5		.45	.60	.70	
3	.5	.60	.50	.60	
3.5		.60	.50	.60	\$.75
4	.75	.75	.50	.60	.75
4.5		.75	.50	.60	.75
5	.75	.90	.50	.60	.75
5.5		.90	.50	.60	.75
6	1.	1.	.50	.60	.75
7	1.	1.		.60	.75
8	1.	1.25		.60	.75
9	1.	1.25			.75
10	1.5	1.5			.75
11		1.5			.75



ROUND ADJUSTABLE DIES

FRENCH AND INTERNA-
TIONAL STANDARD

METRIC SYSTEM

Left Hand Dies are special.

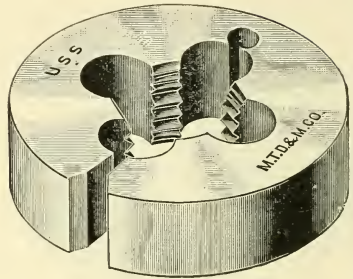
Sizes, dimensions, and threads not listed are subject to special prices.

Cutting Size, M. M.	Pitch, M. M.		No. 1237 Fitting Stock No. 25	No. 1235 Fitting Stock No. 26	No. 1238 Fitting Stock No. 27	No. 1240 Fitting Stock No. 28
	French	Inter- national	1 $\frac{5}{16}$ Inch Diam.	1 $\frac{1}{2}$ Inch Diam.	1 $\frac{9}{16}$ Inch Diam.	1 $\frac{3}{4}$ Inch Diam.
6	1.	1.	\$1.25	\$1.25		
7	1.	1.	1.25	1.25		
8	1.	1.25	1.25	1.25		
9	1.	1.25	1.25	1.25	\$1.50	\$2.00
10	1.5	1.5	1.25	1.25	1.50	2.00
11		1.5	1.25	1.25	1.50	2.00
12	1.5	1.75	1.25	1.25	1.50	2.00
14	2.	2.		1.25	1.50	2.00
16	2.	2.		1.25	1.50	2.00
18	2.5, 1.5	2.5				2.00
20	2.5	2.5				2.00

ROUND
ADJUSTABLE DIES

FRENCH AND INTERNATIONAL
STANDARD

METRIC SYSTEM



Left Hand Dies are special.

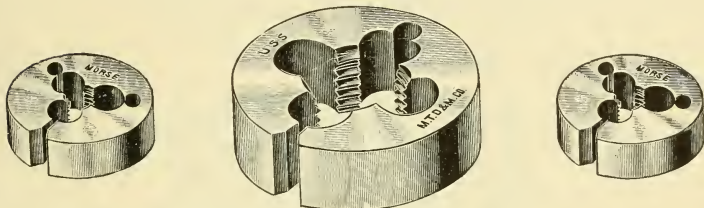
Sizes and threads not listed are subject to special prices.

Cutting Size, M. M.	Pitch, M. M.		No. 1241 Fitting Stock No. 29	No. 1239 Fitting Stock No. 30	No. 1242 Fitting Stock No. 31	No. 1243 Fitting Stock No. 32
	French	Inter- national	2 Inch Diam.	2¼ Inch Diam.	2½ Inch Diam.	3 Inch Diam.
12	1.5	1.75	\$2.00	\$3.00	\$3.00	
14	2.	2.	2.00	3.00	3.00	
16	2.	2.	2.00	3.00	3.00	
18	2.5, 1.5	2.5	2.00	3.00	3.00	
20	2.5	2.5	2.00	3.00	3.00	
22	2.5	2.5	2.00	3.00	3.00	\$5.00
24	3.	3.		3.00	3.00	5.00
26	3.			3.00	3.00	5.00
27		3.				5.00
28	3.					5.00
30	3.5	3.5				5.00
32	3.5					5.00
33		3.5				5.00
34	3.5					5.00
36	4.	4.				5.00
38	4.					5.00

ROUND ADJUSTABLE DIES

FOR IRON PIPE

AMERICAN (BRIGGS) STANDARD, TAPER $\frac{3}{4}$ INCH TO THE FOOT



Left Hand Dies are special.

Sizes and threads not listed are subject to special prices.

Cutting Size	Thread	No. 1245 Fitting Stock No. 23	No. 1246 Fitting Stock No. 25	No. 1247 Fitting Stock No. 27	No. 1248 Fitting Stock No. 30
		1 In. Diam. $\frac{3}{8}$ In. Thick	$1\frac{1}{8}$ In. Diam. $\frac{1}{2}$ In. Thick	$1\frac{5}{8}$ In. Diam. $\frac{3}{8}$ In. Thick	$2\frac{1}{4}$ In. Diam. $\frac{3}{4}$ In. Thick
$\frac{1}{8}$	27	\$.75	\$1.25	\$1.50	\$3.00
$\frac{1}{4}$	18		1.25	1.50	3.00
$\frac{3}{8}$	18		1.50	1.50	3.00
$\frac{1}{2}$	14			1.75	3.00
$\frac{3}{4}$	14				3.25
1	$11\frac{1}{2}$				3.50

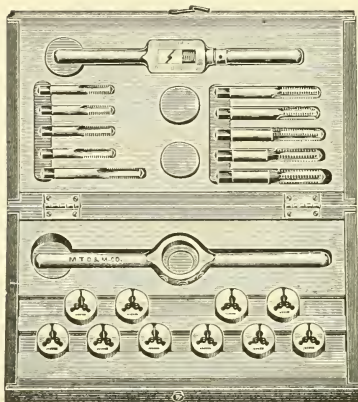
ROUND ADJUSTABLE DIES

FOR BRASS PIPE

Cutting Size	Thread	No. 1250 Fitting Stock No. 23	No. 1251 Fitting Stock No. 25	No. 1252 Fitting Stock No. 27
		1 In. Diam. $\frac{3}{8}$ In. Thick	$1\frac{5}{8}$ In. Diam. $\frac{1}{2}$ In. Thick	$1\frac{7}{8}$ In. Diam. $\frac{3}{8}$ In. Thick
$\frac{1}{4}$	27, 40	\$.75		
$\frac{5}{16}$	27, 40	.75		
$\frac{3}{8}$	27, 40	.75		
$\frac{7}{16}$	27, 40	.75		
$\frac{1}{2}$	27, 40	.75		
$\frac{5}{8}$	27, 40		\$1.50	
$\frac{3}{4}$	27, 40			\$1.75

These Dies fit Die Stocks Nos. 23, 25, 27, and 30 respectively listed on page 281.

No. 1261

SETS OF ROUND ADJUSTABLE DIES, TAPS,
DIE STOCKS AND WRENCHESWITH DIES $\frac{5}{8}$ INCH DIAMETER

	Price Per Set
Set No. 35. Stock 5 inches long; Tap Wrench $5\frac{1}{8}$ inches long; 6 Dies $\frac{5}{8}$ inch diameter, and 6 Taps, cutting 4^{36} , 6^{32} , 8^{32} , 10^{24} , 12^{24} , 14^{20}	\$9.00
Set No. 36. Stock 5 inches long; Tap Wrench $5\frac{1}{8}$ inches long; 5 Dies $\frac{5}{8}$ inch diameter, and 5 Taps, cutting 4^{36} , 6^{32} , 8^{32} , 10^{24} , 12^{24}	8.00
Set No. 37. Stock 5 inches long; Tap Wrench $5\frac{1}{8}$ inches long; 4 Dies $\frac{5}{8}$ inch diameter, and 4 Taps, cutting 6^{32} , 8^{32} , 10^{24} , 12^{24}	7.25
Set No. 38. Stock 5 inches long; Tap Wrench $5\frac{1}{8}$ inches long; 8 Dies $\frac{5}{8}$ inch diameter, and 8 Taps, cutting 2^{56} , 3^{48} , 4^{36} , 6^{32} , 8^{32} , 10^{24} , 12^{24} , 14^{20}	11.50
Set No. 39. Stock 5 inches long; Tap Wrench $5\frac{1}{8}$ inches long; 10 Dies $\frac{5}{8}$ inch diameter, and 10 Taps, cutting 2^{56} , 3^{48} , 4^{36} , 5^{36} , 6^{32} , 8^{32} , 10^{32} , 10^{24} , 12^{24} , 14^{20}	12.75

Extra Stocks listed on page 281.

Extra Dies $\frac{5}{8}$ inch diameter listed on pages 282-283.

Each Set as listed furnished in a hardwood case.

No. 1264

SETS OF ROUND ADJUSTABLE DIES, TAPS,
DIE STOCKS AND WRENCHESWITH DIES $\frac{1}{16}$ INCH DIAMETER

	Price Per Set
Set No. 51. Stock $7\frac{3}{8}$ inches long; Tap Wrench $5\frac{1}{8}$ inches long; 5 Dies $\frac{1}{16}$ inch diameter, and 5 Taps, cutting $\frac{1}{8}^{40}$, $\frac{5}{32}^{36}$, $\frac{3}{16}^{24}$, $\frac{7}{32}^{24}$, $\frac{1}{4}^{20}$	\$9.50
Set No. 52. Stock $7\frac{3}{8}$ inches long; Tap Wrench 6 inches long; 6 Dies $\frac{1}{16}$ inch diameter, and 6 Taps, cutting $\frac{1}{8}^{40}$, $\frac{5}{32}^{36}$, $\frac{3}{16}^{24}$, $\frac{7}{32}^{24}$, $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$	11.00
Set No. 53. Stock $7\frac{3}{8}$ inches long; Tap Wrench 6 inches long; 5 Dies $\frac{1}{16}$ inch diameter, and 5 Taps, cutting $\frac{1}{16}^{64}$, $\frac{1}{8}^{40}$, $\frac{3}{16}^{24}$, $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$	10.75
Set No. 54. Stock $7\frac{3}{8}$ inches long; Tap Wrench 6 inches long; 8 Dies $\frac{1}{16}$ inch diameter, and 8 Taps, cutting $\frac{1}{16}^{64}$, $\frac{3}{32}^{60}$, $\frac{1}{8}^{40}$, $\frac{5}{32}^{36}$, $\frac{3}{16}^{24}$, $\frac{7}{32}^{24}$, $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$	12.50

No. 1265

SETS OF ROUND ADJUSTABLE DIES, TAPS,
DIE STOCKS AND WRENCHESWITH DIES $\frac{1}{8}$ INCH DIAMETER

A. S. M. E. STANDARD

Set No. 55. Stock $7\frac{3}{8}$ inches long; Tap Wrench $5\frac{1}{8}$ inches long; 5 Dies $\frac{1}{8}$ inch diameter, and 5 Taps, cutting 4^{48} , 6^{40} , 8^{36} , 10^{30} , 12^{28}	\$8.00
Set No. 56. Stock $7\frac{3}{8}$ inches long; Tap Wrench $5\frac{1}{8}$ inches long; 6 Dies $\frac{1}{8}$ inch diameter, and 6 Taps, cutting 4^{48} , 6^{40} , 8^{36} , 10^{30} , 12^{28} , 14^{24}	9.25
Set No. 59. Stock $7\frac{3}{8}$ inches long; Tap Wrench $5\frac{1}{8}$ inches long; 8 Dies $\frac{1}{8}$ inch diameter, and 8 Taps, cutting 2^{64} , 3^{56} , 4^{48} , 6^{40} , 8^{36} , 10^{30} , 12^{28} , 14^{24}	10.75

For extra dies $\frac{1}{16}$ inch diameter see pages 282-283.

For extra taps see pages 231-247.

Each set as listed furnished in a hardwood case.

No. 1268

SETS OF ROUND ADJUSTABLE DIES, TAPS AND DIE STOCKS

WITH DIES 1 INCH DIAMETER

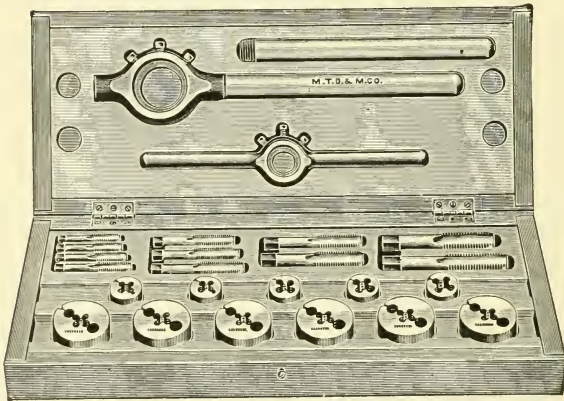
Price
Per Set

- Set No. 69. Stock $10\frac{1}{4}$ inches long; 5 Dies 1 inch diameter, and 5 Taps, cutting $\frac{3}{16}^{24}$, $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$, $\frac{3}{8}^{16}$, $\frac{7}{16}^{14}$ \$10.75
No Tap Wrench is furnished with this set.
- Set No. 70. Stock $10\frac{1}{4}$ inches long; 4 Dies 1 inch diameter, and 4 Taps, cutting $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$, $\frac{3}{8}^{16}$, $\frac{7}{16}^{14}$ 9.50
No Tap Wrench is furnished with this set.

No. 1271

SETS OF ROUND ADJUSTABLE DIES, TAPS AND DIE STOCKS

WITH DIES $1\frac{5}{16}$ INCHES DIAMETER



Price
Per Set

- Set No. 79. Stock $12\frac{1}{8}$ inches long; 5 Dies $1\frac{5}{16}$ inches diameter, and 5 Taps, cutting $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$, $\frac{3}{8}^{16}$, $\frac{7}{16}^{14}$, $\frac{1}{2}^{13}$ \$14.75
- Set No. 80. Stock $12\frac{1}{8}$ inches long; 4 Dies $1\frac{5}{16}$ inches diameter, and 4 Taps, cutting $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$, $\frac{3}{8}^{16}$, $\frac{1}{2}^{13}$ 13.00
- Set No. 81. Stock $12\frac{1}{8}$ inches long; 3 Dies $1\frac{5}{16}$ inches diameter, and 3 Taps, cutting $\frac{1}{4}^{20}$, $\frac{3}{8}^{16}$, $\frac{1}{2}^{13}$ 11.25

No Tap Wrenches are furnished with the Sets as listed on this page.
For Extra Dies see pages 282-284.
For Die Stocks see page 281.
Each complete Set as listed, furnished in a hardwood case

No. 1274

SETS OF ROUND ADJUSTABLE DIES

WITH DIES $1\frac{5}{16}$ AND $2\frac{1}{4}$ INCHES DIAMETER

S. A. E. FORMERLY A. L. A. M. STANDARD

Price
Per Set

- Set No. 82. Stock $12\frac{1}{8}$ inches long, with 5 Dies $1\frac{5}{16}$ inches diameter, and 5 Taps, cutting $\frac{1}{4}^{23}$, $\frac{5}{16}^{24}$, $\frac{3}{8}^{24}$, $\frac{7}{16}^{20}$, $\frac{1}{2}^{20}$ \$14.75
- Set No. 83. One Stock $12\frac{1}{8}$ inches long, with 5 Dies $1\frac{5}{16}$ inches diameter, and 5 Taps, cutting $\frac{1}{4}^{23}$, $\frac{5}{16}^{24}$, $\frac{3}{8}^{24}$, $\frac{7}{16}^{20}$, $\frac{1}{2}^{20}$.
One Stock 26 inches long, with 6 Dies $2\frac{1}{4}$ inches diameter, and 6 Taps, cutting $\frac{9}{16}^{18}$, $\frac{5}{8}^{18}$, $\frac{11}{16}^{16}$, $\frac{3}{4}^{16}$, $\frac{7}{8}^{14}$, 1^{14} 42.50

No. 1277

SETS OF ROUND ADJUSTABLE DIES, TAPS AND DIE STOCKS

WITH DIES $1\frac{3}{4}$ INCHES DIAMETER

Price
Per Set

- Set No. 88. Stock 18 inches long; 7 Dies $1\frac{3}{4}$ inches diameter, and 7 Taps, cutting $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$, $\frac{3}{8}^{16}$, $\frac{7}{16}^{14}$, $\frac{1}{2}^{13}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$ \$23.75
- Set No. 89. Stock 18 inches long; 5 Dies $1\frac{3}{4}$ inches diameter, and 5 Taps, cutting $\frac{3}{8}^{16}$, $\frac{7}{16}^{14}$, $\frac{1}{2}^{13}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$ 18.75
- Set No. 90. Stock 18 inches long; 3 Dies $1\frac{3}{4}$ inches diameter, and 3 Taps, cutting $\frac{1}{2}^{13}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$ 14.00

No. 1281

SETS OF ROUND ADJUSTABLE DIES, TAPS AND DIE STOCKS

FRENCH STANDARD (METRIC SYSTEM)

WITH DIES $1\frac{5}{16}$, AND $2\frac{1}{4}$ INCHES DIAMETER

Price
Per Set

- Set No. 92. French Standard (Metric System).
Stock $12\frac{1}{8}$ inches long, with 6 Dies $1\frac{5}{16}$ inches diameter, and 6 Taps, cutting 6 M.M., 1.0; 7 M.M., 1.0; 8 M.M., 1.0; 9 M.M., 1.0; 10 M.M., 1.5; 12 M.M., 1.5;
Stock 26 inches long, with 6 Dies $2\frac{1}{4}$ inches diameter, and 6 Taps, cutting 14 M.M., 2.0; 16 M.M., 2.0; 18 M.M., 2.5; 20 M.M., 2.5; 22 M.M., 2.5; 24 M.M., 3.0 \$45.00

No Tap Wrenches are furnished with the Sets as listed on this page.
For Extra Dies see page 284-285.
For Extra Dies, French Standard (Metric System), see pages 287-288.
Die Stocks listed on page 281.
Tap Wrenches listed on page 274.

No. 1285

**SETS OF ROUND ADJUSTABLE DIES, TAPS,
DIE STOCKS AND WRENCHES**

WITH DIES 2 INCHES DIAMETER

		Price Per Set
Set No. 102.	U. S. Standard Sizes. Stock 22 inches long, with 7 Dies 2 inches diameter, and 7 Taper Taps, cutting $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$, $\frac{3}{8}^{16}$, $\frac{7}{16}^{14}$, $\frac{1}{2}^{13}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$	\$22.25
Set No. 103.	Same as above, with Tap Wrench $12\frac{3}{4}$ inches long	26.50

No. 1288

**SETS OF ROUND ADJUSTABLE DIES, TAPS,
DIE STOCKS AND WRENCHES**

WITH DIES $2\frac{1}{2}$ INCHES DIAMETER

		Price Per Set
Set No. 114.	U. S. Standard Sizes. Stock 30 inches long, with 5 Dies $2\frac{1}{2}$ inches diam- eter, and 5 Taper Taps, cutting $\frac{1}{2}^{13}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$, $\frac{7}{8}^9$, 1^8	\$31.75
Set No. 115.	Same as above, with Tap Wrench $17\frac{1}{8}$ inches long	35.75

No. 1291

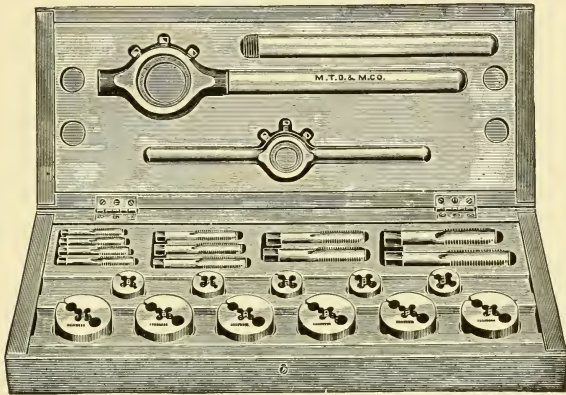
**SETS OF ROUND ADJUSTABLE DIES, TAPS,
DIE STOCKS AND WRENCHES**

WITH DIES 3 INCHES DIAMETER

		Price Per Set
Set No. 132.	U. S. Standard Sizes. Stock 42 inches long, with 4 Dies 3 inches diameter, and 4 Taper Taps, cutting $1\frac{1}{8}^7$, $1\frac{1}{4}^7$, $1\frac{3}{8}^6$, $1\frac{1}{2}^6$	\$42.50
Set No. 133.	Same as above, with Tap Wrench 23 inches long	47.50
Set No. 138.	U. S. Standard Sizes. Stock 42 inches long, with 6 Dies 3 inches diameter and 6 Taper Taps, cutting $\frac{7}{8}^9$, 1^8 , $1\frac{1}{8}^7$, $1\frac{1}{4}^7$, $1\frac{3}{8}^6$, $1\frac{1}{2}^6$	57.25
Set No. 139.	Same as above, with Tap Wrench 23 inches long	62.25

Each Set as listed furnished in a hardwood case.
For Extra Dies see page 285.
For Die Stocks see page 281.
For Tap Wrenches see page 274.
Plug or bottoming taps furnished instead of taper, if so specified.

No. 1293
DOUBLE SETS OF ROUND ADJUSTABLE DIES,
TAPS, DIE STOCKS AND WRENCHES
WITH DIES 2 AND 3 INCHES DIAMETER



- | | | |
|--------------|--|------------------|
| Set No. 149. | U. S. Standard Sizes.
One Stock 22 inches long, one Stock 42 inches long,
7 Dies 2 inches diameter, 4 Dies 3 inches diameter,
and 11 Taper Taps,
cutting $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$, $\frac{3}{8}^{16}$, $\frac{7}{16}^{14}$, $\frac{1}{2}^{13}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$, $\frac{7}{8}^9$, 1^8 ,
$1\frac{1}{8}^7$, $1\frac{1}{4}^7$ | Price
Per Set |
| | \$60.25 | |
| Set No. 150. | Same as above, with 1 Tap Wrench $12\frac{3}{4}$ inches long
and 1 Tap Wrench $17\frac{1}{8}$ inches long | 67.50 |

No. 1296
TRIPLE SETS OF ROUND ADJUSTABLE DIES,
TAPS, DIE STOCKS AND WRENCHES
WITH DIES $1\frac{1}{2}$, $2\frac{1}{2}$ AND 3 INCHES DIAMETER

- | | | |
|--------------|--|------------------|
| Set No. 160. | U. S. Standard Sizes.
One Stock $14\frac{1}{8}$ inches long, one Stock 30 inches
long, one Stock 42 inches long, 5 Dies $1\frac{1}{2}$ inches
diameter, 4 Dies $2\frac{1}{2}$ inches diameter, 4 Dies 3
inches diameter, and 13 Taper Taps,
cutting $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$, $\frac{3}{8}^{16}$, $\frac{7}{16}^{14}$, $\frac{1}{2}^{13}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$, $\frac{7}{8}^9$, 1^8 ,
$1\frac{1}{8}^7$, $1\frac{1}{4}^7$, $1\frac{3}{8}^6$, $1\frac{1}{2}^6$ | Price
Per Set |
| | \$73.25 | |
| Set No. 161. | Same as above, with 3 Tap Wrenches, one $12\frac{3}{4}$
inches long, one $17\frac{1}{8}$ inches long, and one 23
inches long | 85.75 |

Each Set as listed furnished in a hardwood case.
 For Extra Dies see page 285.
 For Tap Wrenches see page 274.
 For Die Stocks see page 281.
 Plug or bottoming taps furnished instead of taper if so specified.

APPENDIX

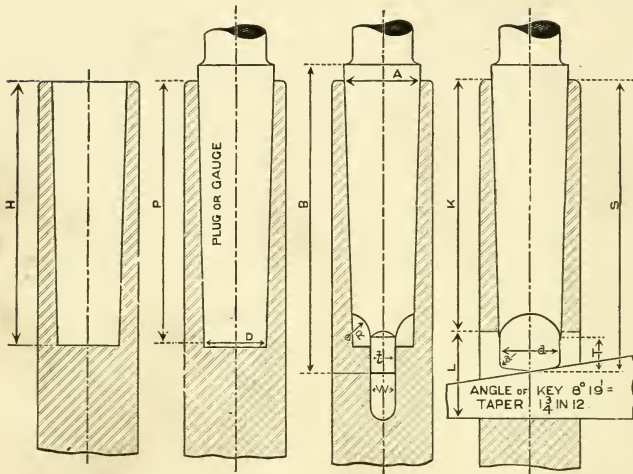
On the following pages will be found information that has been distributed throughout our former catalogs and which we now condense to make it easier for reference. We have also added other information which we trust will be of value to all our customers.

MORSE TWIST DRILL & MACHINE Co.

INDEX

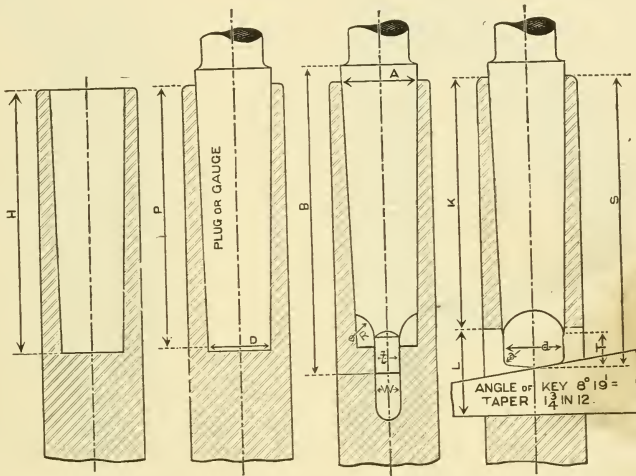
DRILLS	I to XII
REAMERS	XIII
TAPS AND DIES	XIV to XXIV
CUTTERS	XXV to XXVII
MISCELLANEOUS INFORMATION	XXVII to XXXII

MORSE TAPERS



Number of Taper	Diam. of Plug at small End		Diam. at End of Socket		SHANK		Depth of Hole	Standard Plug Depth	TONGUE			KEYWAY		End of Socket to Keyway	Taper per Foot	Taper per Inch	Number of Key
	D	A	B	S	Shank Depth	Whole Length of Shank			Thickness of Tongue	Length of Tongue	Rad. of Mill for Tongue	Diameter of Tongue	Radius of Tongue					Width of Keyway	Length of Keyway
	D	A	B	S	H	P	t	T	R	d	a	W	L	K			
0	.252	.3561	$2\frac{3}{32}$	$2\frac{3}{32}$	$2\frac{3}{32}$	2	.1562	$\frac{1}{4}$	$\frac{3}{32}$	.235	.04	.160	$\frac{1}{16}$	$1\frac{1}{16}$	.62460	.05205	0
1	.369	.475	$2\frac{1}{16}$	$2\frac{1}{16}$	$2\frac{1}{16}$	$2\frac{1}{8}$	.2031	$\frac{3}{8}$	$\frac{1}{16}$	.343	.05	.213	$\frac{3}{4}$	$2\frac{1}{16}$	.59858	.04988	1
2	.572	.700	$3\frac{1}{8}$	$2\frac{1}{8}$	$2\frac{5}{8}$	$2\frac{1}{16}$	.250	$\frac{1}{16}$	$\frac{1}{4}$	$\frac{1}{2}$	.06	.260	$\frac{7}{8}$	$2\frac{1}{2}$	.59941	.04995	2
3	.778	.938	$3\frac{3}{8}$	$3\frac{1}{4}$	$3\frac{1}{4}$	$3\frac{1}{16}$	.3125	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{3}{4}$	.08	.322	$1\frac{1}{16}$	$3\frac{1}{16}$	.60235	.05019	3
4	1.020	1.231	$4\frac{7}{8}$	$4\frac{5}{8}$	$4\frac{1}{8}$	$4\frac{1}{16}$	.4687	$\frac{5}{8}$	$\frac{1}{8}$	$\frac{3}{4}$	.10	.478	$1\frac{1}{4}$	$3\frac{7}{8}$	.62326	.05193	4
5	1.475	1.748	$6\frac{1}{8}$	$5\frac{7}{8}$	$5\frac{1}{4}$	$5\frac{3}{16}$	.6250	$\frac{3}{4}$	$\frac{3}{8}$	$1\frac{1}{2}$	.12	.635	$1\frac{1}{2}$	$4\frac{1}{16}$	.63151	.05262	5
6	2.116	2.494	$8\frac{1}{8}$	$8\frac{1}{4}$	$7\frac{3}{8}$	$7\frac{1}{4}$	.750	$1\frac{1}{8}$	$\frac{1}{2}$	2	.15	.760	$1\frac{3}{4}$	7	.62565	.05213	6
7	2.750	3.270	$11\frac{3}{8}$	$11\frac{1}{4}$	$10\frac{1}{8}$	10	1.1250	$1\frac{3}{8}$	$\frac{3}{4}$	$2\frac{5}{8}$	.18	1.135	$2\frac{5}{8}$	$9\frac{1}{2}$	.62400	.05200	7

MORSE TAPERS
SHORT SHANKS

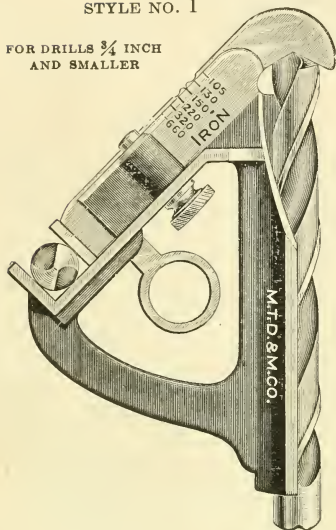


Number of Taper	SHANK				TONGUE				KEYWAY				End of Socket to Keyway	Taper per Foot	Taper per Inch	Number of Key	
	Diam. at End of Socket	Whole Length of Shank	Shank Depth	Depth of Hole	Standard Plug Depth	Thickness of Tongue	Length of Tongue	Rad. of Mill for Tongue	Diameter of Tongue	Radius of Tongue	Width of Keyway	Length of Keyway					K
D	A	B	S	H	P	t	T	R	d	a	W	L	K				
0	.2715	.356	1 3/16	1 3/8	1 3/8	1 5/8	.1875	1/4	3/16	.258	3/16	.195	5/8	1 3/8	.62160	.05205	0
1	.3877	.475	2 1/16	2	1 1/2	1 3/4	.250	5/16	1/4	.371	1/16	.260	1 1/2	1 3/8	.59858	.04988	1
2	.6001	.700	2 5/16	2 3/8	2 1/16	2	.3750	7/16	3/8	.575	1/16	.385	1 5/8	1 3/4	.59941	.04995	2
3	.8156	.938	3 1/8	2 1/2	2 1/2	2 7/16	.500	9/16	5/16	.783	3/32	.510	1 5/8	2 1/8	.60235	.05019	3
4	1.0622	1.231	4 1/16	3 1/2	3 5/16	3 1/4	.6250	5/8	3/8	1.023	3/32	.635	1 1/2	2 3/8	.62326	.05193	4
5	1.5309	1.748	5 1/16	4 1/2	4 3/16	4 1/2	1.000	3/4	1/2	1.483	1/8	1.010	2	3 1/8	.63151	.05262	5
6	2.2007	2.494	7 1/16	6 3/4	5 3/4	5 5/8	1.250	1 1/8	5/8	2.128	1/8	1.262	2 3/4	5 1/16	.62565	.05213	6
7	2.8572	3.270	9 1/4	9 5/8	8 1/8	7 1/2	1.6250	1 1/2	3/4	2.769	1/8	1.637	3 5/8	7 1/8	.62400	.05200	7

GAUGES FOR GRINDING DRILLS

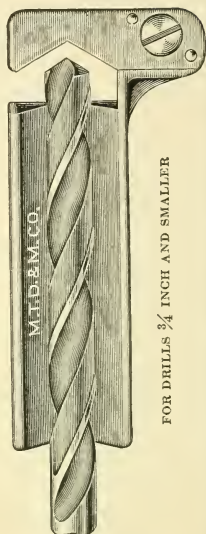
STYLE NO. 1

FOR DRILLS $\frac{3}{4}$ INCH
AND SMALLER



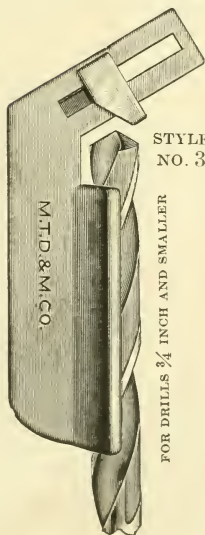
STYLE NO. 2

FOR DRILLS $\frac{3}{4}$ INCH AND SMALLER



STYLE
NO. 3

FOR DRILLS $\frac{3}{4}$ INCH AND SMALLER



STYLE
NO. 4

MADE IN 2 SIZES

FOR $\frac{1}{4}$ INCH AND SMALLER FOR $\frac{3}{4}$ INCH AND SMALLER



GRINDING TWIST DRILLS

Few operations on tools in the shop are more frequently disappointing than the grinding or sharpening of drills. That the cutting edges have a proper and uniform angle with the longitudinal axis of the drill (see Fig. 6), having them of exactly equal length, and the lips of the drill well and sufficiently backed off or cleared, are points generally understood as requisite to the satisfactory performance of a drill, though not always attained. Practical suggestions for the grinding of drills have been published from time to time. We append in part from these, hoping they will be found useful. "If the clearance of a drill is insufficient or imperfect it will not cut. When force is applied it resists the power of the drilling machine, and is crushed or split. It is well to start a drill, after grinding, by hand, observing the character of the chips, which should characterize a clean cutting tool. In wrought metal the chip will sometimes attain a length of several feet. Prof. Sweet suggests that the rear of the lip of a drill be removed, as shown by the cut, No. 1; this makes the

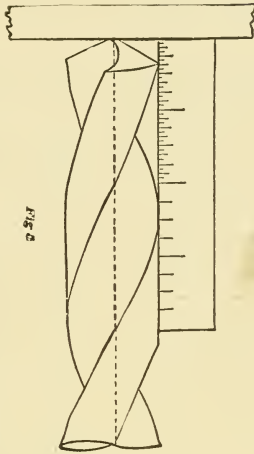


Fig. 1

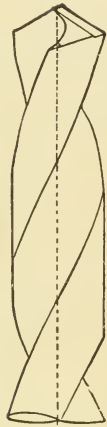


Fig. 2



Fig. 3

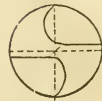


Fig. 4

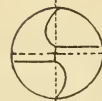


Fig. 5

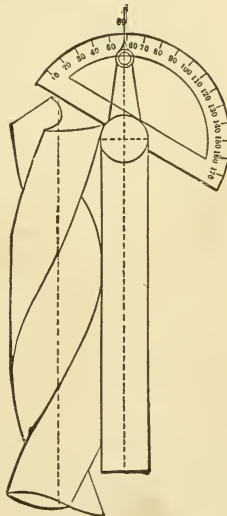


Fig. 6

GRINDING TWIST DRILLS—CONTINUED

cutting edge much like a flat drill. Drills properly made have their cutting edges straight when ground to a proper angle, which is 59° , as shown in cut No. 6. Grinding to less angle leaves the lip hooking, and is likely to produce a crooked and irregular hole. The grinding lines to a drill are placed slightly above the center, to allow for the proper angle of point, which is an important factor. This angle is an index to the clearance. If the angle is too much, the drill cuts rank; if not enough, the drill may not cut. Fig. 2 shows a proper angle. In Fig. 3 the angle is too sharp. In Fig. 4 the angle runs backward, and shows the want of clearance. An effective method of determining the clearance is to set the point of the drill on a plane surface, holding a scale as shown in cut No. 5; by revolving the drill its clearance is shown, as well as the height of the cutting lips, which should be equal; also the cutting edges should be of exactly equal length,—any inequality of lengths doubles itself in work. To strengthen the drill, the center is made thicker toward the shank. As the drill is shortened through use, the center shows thicker, and will work hard in drilling. To overcome this, the center should be thinned, care being taken to remove an equal amount of stock on each side, and so keep the point central. In grinding a drill preserve the original form, which usually will insure rapid and satisfactory work."

FEED PER REVOLUTION

CARBON STEEL DRILLS		HIGH SPEED STEEL DRILLS
.005"	$\frac{1}{4}$ "	.006"
.009"	$\frac{5}{8}$ "	.010"
.012"	1	.015"
.015"	2	.020"

The above Speeds and Feeds are approximate for average conditions. They can be greatly exceeded under some conditions but under others both would have to be reduced.

SPEED OF DRILLS

CARBON STEEL

HIGH SPEED STEEL

Diam. Inches	Revolutions Per Minute			Diam. Inches	Revolutions Per Minute		
	Wrought Iron and Steel	Cast Iron	Brass		Wrought Iron and Steel	Cast Iron	Brass
$\frac{1}{16}$	1833	2320	3667				
$\frac{1}{8}$	917	1160	1833	$\frac{1}{8}$	1832	2440	
$\frac{3}{16}$	611	773	1222	$\frac{3}{16}$	1221	1627	
$\frac{1}{4}$	458	580	917	$\frac{1}{4}$	916	1220	
$\frac{5}{16}$	342	465	733	$\frac{5}{16}$	733	976	
$\frac{3}{8}$	285	386	611	$\frac{3}{8}$	611	813	
$\frac{7}{16}$	244	331	524	$\frac{7}{16}$	523	697	
$\frac{1}{2}$	214	290	458	$\frac{1}{2}$	458	610	
$\frac{9}{16}$	176	238	407	$\frac{9}{16}$	407	510	
$\frac{5}{8}$	159	214	367	$\frac{5}{8}$	366	459	
$\frac{11}{16}$	144	194	333	$\frac{11}{16}$	333	417	
$\frac{3}{4}$	132	178	306	$\frac{3}{4}$	305	383	
$\frac{13}{16}$	112	165	282	$\frac{13}{16}$	282	353	
$\frac{7}{8}$	105	153	262	$\frac{7}{8}$	262	328	
$\frac{15}{16}$	98	143	244	$\frac{15}{16}$	244	306	
1	90	134	229	1	229	287	
$1\frac{1}{16}$	80	126	216	$1\frac{1}{16}$	215	270	
$1\frac{1}{8}$	75	119	204	$1\frac{1}{8}$	204	255	
$1\frac{3}{16}$	71	113	193	$1\frac{3}{16}$	193	242	
$1\frac{1}{4}$	67	107	183	$1\frac{1}{4}$	183	229	
$1\frac{5}{16}$	64	102	175	$1\frac{5}{16}$	174	219	
$1\frac{3}{8}$	61	97	167	$1\frac{3}{8}$	166	209	
$1\frac{1}{2}$	56	89	153	$1\frac{1}{2}$	153	191	
$1\frac{5}{8}$	52	82	141	$1\frac{5}{8}$	138	176	
$1\frac{3}{4}$	48	76	131	$1\frac{3}{4}$	127	164	
$1\frac{7}{8}$	45	71	122	$1\frac{7}{8}$	112	153	
2	42	67	115	2	104	143	
$2\frac{1}{8}$	40	63	108	$2\frac{1}{8}$	95	126	
$2\frac{1}{4}$	38	59	102	$2\frac{1}{4}$	89	118	
$2\frac{3}{8}$	36	56	96	$2\frac{3}{8}$	80	112	
$2\frac{1}{2}$	34	53	92	$2\frac{1}{2}$	76	106	
$2\frac{5}{8}$	32	51	87				
$2\frac{3}{4}$	30	49	83				
$2\frac{7}{8}$	28	47	80				
3	26	45	76				

Periphery Speed 100 to 140 feet
per minute

DECIMAL EQUIVALENTS OF DRILL SIZES

Inch	M.M.	Wire Gauge	Decimals of an Inch	Inch	M.M.	Wire Gauge	Decimals of an Inch	Inch	M.M.	Wire Gauge	Decimals of an Inch
$\frac{1}{64}$.4	80	.0135	$\frac{1}{16}$	1.25	55	.049212	$\frac{7}{64}$	2.5	39	.098425
		79	.0145		1.3		.051181		38		.0995
	.5	78	.015625		1.35	.052	38		.1015		
		77	.015748		1.4	.053149	37		.102362		
	.55	76	.016		1.45	.055	36		.104		
		75	.018		1.5	.055118	36		.106299		
	.6	74	.019685		1.55	.057086	35		.1065		
		73	.02		1.6	.059055			35	.108267	
	.65	72	.021		1.65	.0595	34		.109375		
		71	.021653		1.7	.061023			34	.11	
	.7	70	.0225		1.75	.0625	33		.110236		
		69	.023622		1.8	.062992			33	.111	
.75	68	.024	1.85	.0635	32	.113					
	67	.025	1.9	.06496		32	.114173				
.8	66	.02559	1.95	.066929	31	.116					
	65	.026	2	.067		31	.11811				
.85	64	.027559	2.05	.068897	30	.12					
	63	.028	2	.07		30	.122047				
.9	62	.02925	2.1	.070866	29	.125					
	61	.029527	2.15	.072834		29	.125984				
.95	60	.031	2.2	.073	28	.127952					
	59	.03125	2.25	.074803		28	.1285				
1	58	.031496	2.3	.076	27	.129921					
	57	.032	2.35	.076771		27	.133858				
1.05	56	.033	2.4	.078125	26	.136					
	55	.033464	2.45	.0785		26	.137795				
1.1	54	.035	2.5	.07874	25	.1405					
	53	.035433	2.55	.080708		25	.140625				
1.15	52	.036	2.6	.081	24	.141732					
	51	.037	2.65	.082		24	.144				
1.2	50	.037401	2.7	.082677	23	.145669					
	49	.038	2.75	.084645		23	.147				
$\frac{3}{64}$	48	.039	2.8	.086	22	.147637					
	47	.03937	2.85	.086614		22	.1495				
$\frac{3}{32}$	46	.04	2.9	.088582	21	.149606					
	45	.041	2.95	.089		21	.152				
$\frac{3}{16}$	44	.041338	3	.090551	20	.153543					
	43	.042	3.05	.092519		20	.154				
$\frac{1}{8}$	42	.043	3.1	.0935	19	.15625					
	41	.043307	3.15	.09375		19	.157				
$\frac{1}{4}$	40	.045275	3.2	.094488	18	.15748					
	39	.0465	3.25	.096		18	.159				
$\frac{1}{2}$	38	.046875	3.3	.096456	17	.161					
	37	.047244	3.35	.098		17	.161417				

DECIMAL EQUIVALENTS OF DRILL SIZES

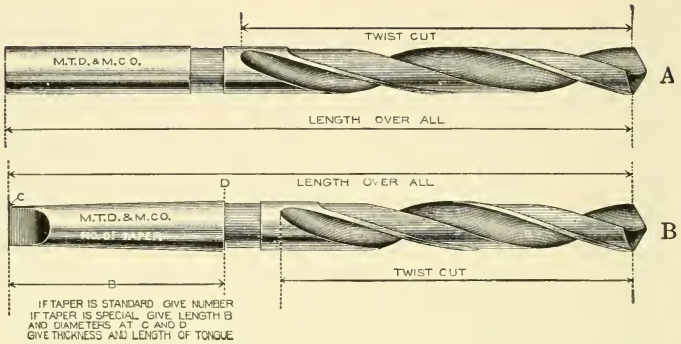
Inch	M.M.	Wire Gauge	Decimals of an Inch	Inch	M.M.	Letter Sizes	Decimals of an inch	Inch	M.M.	Letter Sizes	Decimals of an Inch	
$\frac{1}{64}$	4.2	19	.165354	$\frac{15}{64}$	5.9	A	.232283	$\frac{21}{64}$	8	O	.31496	
			.166						.234			
	4.25	18	.167322			6	B		.234375	8.1	P	.318897
	4.3		.169291						.23622	8.2		.322834
			.1695			6.1			.238	8.25		.323
			.171875				.240157		8.3	.324802		
			.173			6.2	C		.242	Q		.326771
	4.4		.173228						.244094				.328125
			.177			6.25	D		.246	R		.330708
	4.5		.177165						.246062				.332
	.18	15	.181102	$\frac{1}{4}$	6.3	E	.248031	8.5	S	.334645		
4.6	.185						.25			.338582		
	.182	14	.185039		6.4	F	.251968	8.6	T	.339		
	.185				.255905			.342519				
	.185039	13	.187007		6.5	G	.257	$\frac{1}{32}$	U	.34375		
4.7	.1875				.259842					.344487		
	.1875	12	.188976		6.6	H	.261	8.75	V	.346456		
4.8	.188976				.263779			.348				
	.189	11	.191	$\frac{17}{64}$	6.7	I	.265625	8.8	W	.350393		
	.191						.265747			.35433		
	.192913	10	.1935		6.75	J	.266	9	X	.358		
4.9	.1935				.267716			.358267				
	.196	9	.19685		6.8	K	.271653	$\frac{23}{64}$	Y	.359375		
	.19685				.272					.362204		
	.199	8	.200787		7	L	.27559	9.1	Z	.364172		
5	.200787				.277			.366141				
	.201	7	.203125		7.1	M	.279527	$\frac{25}{64}$	A	.368		
	.203125				.281					.370078		
	.204	6	.204724	$\frac{9}{32}$	7.2	N	.28125	9.4	B	.370078		
5.2	.204724						.283464			.374015		
	.2055	5	.206692		7.25	O	.285432	$\frac{3}{8}$	C	.375		
	.206692				.287401					.377		
	.208661	4	.209		7.3	P	.29	9.6	D	.377952		
5.3	.208661				.291338			.381889				
	.209	3	.212598		7.4	Q	.295	9.7	E	.383857		
5.4	.212598				.295275			.385826				
	.213	2	.216535	$\frac{19}{64}$	7.5	R	.296875	9.75	F	.386		
	.216535						.299212			.389763		
	.21875	1	.220472		7.6	S	.302	$\frac{25}{64}$	G	.390625		
5.6	.220472				.303149					.3937		
	.221	2	.224409		7.7	T	.305117	10.	H	.397		
	.224409				.307086			.404				
	.226377	1	.228		7.75	U	.311023	$\frac{13}{32}$	I	.40625		
5.7	.226377				.3125					.413		
	.228	1	.228346	$\frac{5}{16}$	7.8	V		10.5	J	.413385		
5.8	.228346											

DECIMAL EQUIVALENTS OF DRILL SIZES

Inch	M.M.	Decimals of an Inch	Inch	M.M.	Decimals of an Inch	Inch	M.M.	Decimals of an Inch
$\frac{27}{64}$		.421875		20.5	.807085	$1\frac{3}{16}$		1.1875
	11	.43307	$\frac{13}{16}$		.8125		30.5	1.200785
$\frac{7}{16}$		.4375		21	.82677	$1\frac{13}{64}$		1.203125
	11.5	.452755	$\frac{53}{64}$		.828125	$1\frac{7}{32}$		1.21875
$\frac{29}{64}$		.453125	$\frac{27}{32}$		.84375		31	1.22047
$\frac{15}{32}$		.46875		21.5	.846455	$1\frac{15}{64}$		1.234375
	12	.47244	$\frac{55}{64}$		.859375		31.5	1.240155
$\frac{31}{64}$		.484375		22	.86614	$1\frac{1}{4}$		1.25
	12.5	.492125	$\frac{7}{8}$		.875		32	1.25984
$\frac{1}{2}$		.5		22.5	.885825	$1\frac{17}{64}$		1.265625
	13	.51181	$\frac{57}{64}$		.890625		32.5	1.279525
$\frac{33}{64}$		.515625		23	.90551	$1\frac{9}{32}$		1.28125
$\frac{17}{32}$		.53125	$\frac{29}{32}$		.90625	$1\frac{19}{64}$		1.296875
	13.5	.531495	$\frac{59}{64}$		.921875		33	1.29921
$\frac{35}{64}$		.546875		23.5	.925195	$1\frac{5}{16}$		1.3125
	14	.55118	$\frac{15}{16}$		.9375		33.5	1.318895
$\frac{9}{16}$		.5625		24	.94488	$1\frac{21}{64}$		1.328125
	14.5	.570865	$\frac{61}{64}$		.953125		34	1.33858
$\frac{37}{64}$		.578125		24.5	.964565	$1\frac{11}{32}$		1.34375
	15	.59055	$\frac{31}{32}$		.96875		34.5	1.358265
$\frac{19}{32}$		.59375		25	.98425	$1\frac{23}{64}$		1.359375
$\frac{39}{64}$		.609375	$\frac{63}{64}$		.984375	$1\frac{3}{8}$		1.375
	15.5	.610235	1		1.		35	1.37795
$\frac{5}{8}$		.625		25.5	1.003935	$1\frac{25}{64}$		1.390625
	16	.62992	$1\frac{1}{64}$		1.015625		35.5	1.397635
$\frac{41}{64}$		.640625		26	1.02362	$1\frac{13}{32}$		1.40625
	16.5	.649605	$1\frac{1}{32}$		1.03125		36	1.41732
$\frac{21}{32}$		.65625		26.5	1.043305	$1\frac{27}{64}$		1.421875
	17	.66929	$1\frac{3}{64}$		1.046875		36.5	1.437005
$\frac{43}{64}$		.671875	$1\frac{1}{16}$		1.0625	$1\frac{7}{16}$		1.4375
$\frac{11}{16}$		.6875		27	1.06299	$1\frac{29}{64}$		1.453125
	17.5	.688975	$1\frac{5}{64}$		1.078125		37	1.45669
$\frac{45}{64}$		.703125		27.5	1.082675	$1\frac{15}{32}$		1.46875
	18	.70866	$1\frac{3}{32}$		1.09375		37.5	1.476375
$\frac{23}{32}$		.71875		28	1.10236	$1\frac{31}{64}$		1.484375
	18.5	.728345	$1\frac{7}{64}$		1.109375		38	1.49606
$\frac{47}{64}$		.734375		28.5	1.122045	$1\frac{1}{2}$		1.5
	19	.74803	$1\frac{1}{8}$		1.125	$1\frac{33}{64}$		1.515625
$\frac{3}{4}$		.75	$1\frac{9}{64}$		1.140625		38.5	1.515745
$\frac{49}{64}$		.765625		29	1.14173	$1\frac{17}{32}$		1.53125
	19.5	.767715	$1\frac{5}{32}$		1.15625		39	1.53543
$\frac{25}{32}$		.78125		29.5	1.161415	$1\frac{35}{64}$		1.546875
	20	.7874	$1\frac{11}{64}$		1.171875		39.5	1.555115
$\frac{51}{64}$		.796875		30	1.1811	$1\frac{9}{16}$		1.5625

DECIMAL EQUIVALENTS OF DRILL SIZES

Inch	M.M.	Decimals of an Inch	Inch	M.M.	Decimals of an Inch	Inch	M.M.	Decimals of an Inch
	40	1.5748	$1\frac{61}{64}$		1.953125		59.5	2.342515
$1\frac{37}{64}$		1.578125		50	1.9685	$2\frac{11}{32}$		2.34375
$1\frac{19}{32}$		1.59375	$1\frac{31}{32}$		1.96875	$2\frac{23}{64}$		2.359375
	40.5	1.594485	$1\frac{63}{64}$		1.984375		60	2.3622
$1\frac{39}{64}$		1.609375		50.5	1.988185	$2\frac{3}{8}$		2.375
	41	1.61417	2		2.		60.5	2.381885
$1\frac{5}{8}$		1.625		51	2.00787	$2\frac{25}{64}$		2.390625
	41.5	1.633855	$2\frac{1}{64}$		2.015625		61	2.40157
$1\frac{41}{64}$		1.640625		51.5	2.027555	$2\frac{13}{32}$		2.40625
	42	1.65354	$2\frac{1}{32}$		2.03125		61.5	2.421255
$1\frac{21}{32}$		1.65625	$2\frac{3}{64}$		2.046875	$2\frac{27}{64}$		2.421875
$1\frac{43}{64}$		1.671875		52	2.04724	$2\frac{7}{16}$		2.4375
	42.5	1.673225	$2\frac{1}{16}$		2.0625		62	2.44094
$1\frac{11}{16}$		1.6875		52.5	2.066925	$2\frac{29}{64}$		2.453125
	43	1.69291	$2\frac{5}{64}$		2.078125		62.5	2.460625
$1\frac{45}{64}$		1.703125		53	2.08661	$2\frac{15}{32}$		2.46875
	43.5	1.712595	$2\frac{3}{32}$		2.09375		63	2.48031
$1\frac{23}{32}$		1.71875		53.5	2.106295	$2\frac{31}{64}$		2.484375
	44	1.73228	$2\frac{7}{64}$		2.109375		63.5	2.499995
$1\frac{47}{64}$		1.734375	$2\frac{1}{8}$		2.125	$2\frac{1}{2}$		2.5
$1\frac{3}{4}$		1.75		54	2.12598	$2\frac{33}{64}$		2.515625
	44.5	1.751965	$2\frac{9}{64}$		2.140625		64	2.51968
$1\frac{49}{64}$		1.765625		54.5	2.145665	$2\frac{17}{32}$		2.53125
	45	1.77165	$2\frac{5}{32}$		2.15625		64.5	2.539365
$1\frac{25}{32}$		1.78125		55	2.16535	$2\frac{35}{64}$		2.546875
	45.5	1.791335	$2\frac{11}{64}$		2.171875		65	2.55905
$1\frac{51}{64}$		1.796875		55.5	2.185035	$2\frac{9}{16}$		2.5625
	46	1.81102	$2\frac{3}{16}$		2.1875	$2\frac{37}{64}$		2.578125
$1\frac{13}{16}$		1.8125	$2\frac{13}{64}$		2.203125		65.5	2.578735
$1\frac{53}{64}$		1.828125		56	2.20472	$2\frac{19}{32}$		2.59375
	46.5	1.830705	$2\frac{7}{32}$		2.21875		66	2.59842
$1\frac{27}{32}$		1.84375		56.5	2.224405	$2\frac{39}{64}$		2.609375
	47	1.85039	$2\frac{15}{64}$		2.234375		66.5	2.618105
$1\frac{55}{64}$		1.859375		57	2.24409	$2\frac{5}{8}$		2.625
	47.5	1.870075	$2\frac{1}{4}$		2.25		67	2.63779
$1\frac{7}{8}$		1.875		57.5	2.263775	$2\frac{41}{64}$		2.640625
	48	1.88976	$2\frac{17}{64}$		2.265625	$2\frac{21}{32}$		2.65625
$1\frac{57}{64}$		1.890625	$2\frac{9}{32}$		2.28125		67.5	2.657475
$1\frac{29}{32}$		1.90625		58	2.28346	$2\frac{43}{64}$		2.671875
	48.5	1.909445	$2\frac{19}{64}$		2.296875		68	2.67716
$1\frac{59}{64}$		1.921875		58.5	2.303145	$2\frac{11}{16}$		2.6875
	49	1.92913	$2\frac{5}{16}$		2.3125		68.5	2.696845
$1\frac{15}{16}$		1.9375		59	2.32283	$2\frac{45}{64}$		2.703125
	49.5	1.948815	$2\frac{21}{64}$		2.328125		69	2.71653



SUGGESTIONS FOR ORDERING DRILLS

REGULAR DRILLS. — Always order by catalog number.

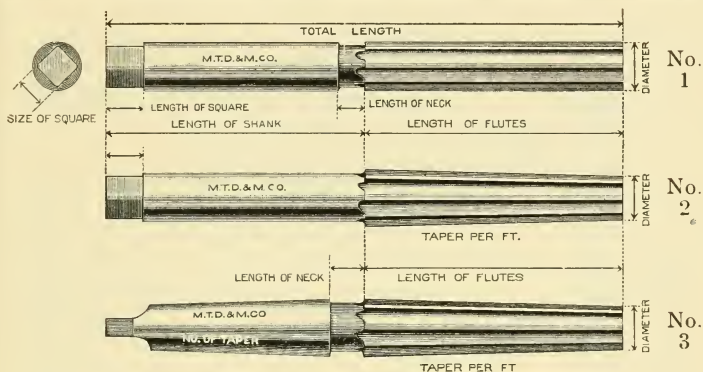
SPECIAL DRILLS. — Refer to the catalog number for general style of tool required, giving also the following information: —

SPECIAL STRAIGHT SHANK DRILLS. — Give length over all and length of twist cut. See sketch A.

SPECIAL MORSE TAPER SHANK DRILLS. — Give length over all and length of twist cut. See sketch B. If a special taper shank is required, give diameter at C and D and length. See sketch B. If the shank has a tang give thickness and length. If no tang so state on the order.

We will gladly furnish copies of this page to any of our customers who desire them for distribution.

It is always understood that when orders for SPECIAL GOODS are accepted they are not subject to cancellation.



SUGGESTIONS FOR ORDERING REAMERS

REGULAR REAMERS. — Always order by catalog number.

SPECIAL REAMERS. — Refer to the catalog number for general style of tool required, giving also the following information: —

SPECIAL SOLID REAMERS. — Give total length and length of flutes. See sketch No. 1.

SPECIAL TAPER REAMERS. — Give whole length, length of flutes, size at large and small ends of flutes; or size at one end and taper per foot. State whether style No. 2 or No. 3 is required. If style No. 3 give dimensions of taper shank or if Morse Taper is required state number.

SPECIAL SHELL REAMERS. — Give whole length and length of flutes. When these reamers are longer than catalog lengths they are made with Straight Hole and diameter of hole should be given.

We will gladly furnish copies of this page to any of our customers who desire them for distribution.

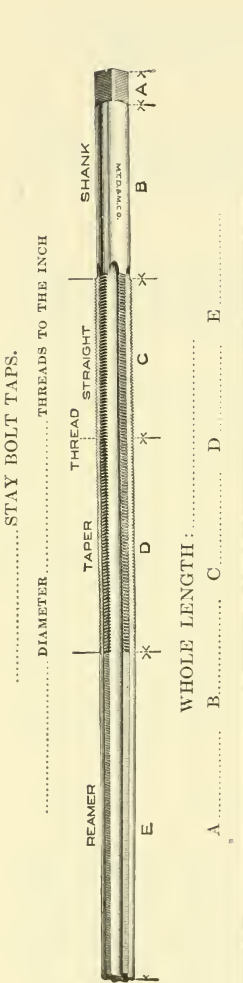
TO SHARPEN REAMERS

HAND REAMERS, when dull through wear, should be stoned first on the face of the flutes, then on top of the flutes. The stone should be always held perfectly flat with the face and clearance that the original shape of the flutes may be preserved.

END CUTTING REAMERS should be first ground on centres with a wheel, and then recleared to insure reaming a hole the same size of Reamer.

THE NORTON Co. make a stone which is adapted for the purpose, and gives quicker results than any oil stone. The stone should be kept clean by the use of turpentine.

It is always understood that when orders for **SPECIAL GOODS** are accepted they are not subject to cancellation.



SUGGESTIONS FOR ORDERING TAPS

REGULAR TAPS. Always order by catalog number. Unless specified to the contrary we fill all orders with U. S. form of thread.

SPECIAL TAPS. Give exact diameter of thread, whole length and length of thread, number of threads to the inch. Also state whether U. S. S., Whitworth or V shape of thread is desired. Reference should also be made to catalog number showing style.

When **HAND TAPS** are ordered state whether Taper, Plug or Bottoming.

For **STAY BOLT TAPS** give shape and number of threads to the inch, whole length and lengths of parts A, B, C, D, E, as shown by cut.

We will gladly furnish slips for ordering Stay Bolt Taps to any customer who desires them for distribution.

SPECIAL DIES

If for **SCREW PLATES**, give number of plate, size of die together with number of threads to the inch and shape of thread.

If **SOLID DIES**, give size, number and shape of thread, and square and thickness.

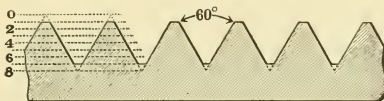
If **ROUND DIES**, give diameter and thickness and state whether split or solid.

If sizes of Taps and Dies cannot be accurately given, a plug showing what is required should be furnished.

It is always understood that when orders for **SPECIAL GOODS** are accepted they are not subject to cancellation.

TAP THREADS

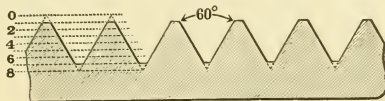
UNITED STATES STANDARD



Diam. of Tap, Inches	No. of Threads to Inch	Diam. of Tap, Inches	No. of Threads to Inch	Diam. of Tap, Inches	No. of Threads to Inch	Diam. of Tap, Inches	No. of Threads to Inch
$\frac{1}{4}$	20	1	8	$2\frac{1}{8}$	$4\frac{1}{2}$	$3\frac{1}{8}$	$3\frac{1}{2}$
$\frac{5}{16}$	18	$1\frac{1}{8}$	7	$2\frac{1}{4}$	$4\frac{1}{2}$	$3\frac{1}{4}$	$3\frac{1}{2}$
$\frac{3}{8}$	16	$1\frac{1}{4}$	7	$2\frac{3}{8}$	4	$3\frac{3}{8}$	$3\frac{1}{4}$
$\frac{7}{16}$	14	$1\frac{3}{8}$	6	$2\frac{1}{2}$	4	$3\frac{1}{2}$	$3\frac{1}{4}$
$\frac{1}{2}$	13	$1\frac{1}{2}$	6	$2\frac{5}{8}$	4	$3\frac{5}{8}$	$3\frac{1}{4}$
$\frac{9}{16}$	12	$1\frac{5}{8}$	$5\frac{1}{2}$	$2\frac{3}{4}$	4	$3\frac{3}{4}$	3
$\frac{5}{8}$	11	$1\frac{3}{4}$	5	$2\frac{7}{8}$	$3\frac{1}{2}$	$3\frac{7}{8}$	3
$\frac{3}{4}$	10	$1\frac{7}{8}$	5	3	$3\frac{1}{2}$	4	3
$\frac{7}{8}$	9	2	$4\frac{1}{2}$				

S. A. E. STANDARD

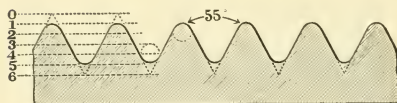
SAME SHAPE THREADS AS U. S. S., BUT PITCHES ARE FINER



Diam. of Tap, Inches	No. of Threads to Inch	Diam. of Tap, Inches	No. of Threads to Inch	Diam. of Tap, Inches	No. of Threads to Inch
$\frac{1}{4}$	28	$\frac{9}{16}$	18	1	14
$\frac{5}{16}$	24	$\frac{5}{8}$	18	$1\frac{1}{8}$	12
$\frac{3}{8}$	24	$\frac{11}{16}$	16	$1\frac{1}{4}$	12
$\frac{7}{16}$	20	$\frac{3}{4}$	16	$1\frac{3}{8}$	12
$\frac{1}{2}$	20	$\frac{7}{8}$	14	$1\frac{1}{2}$	12

TAP THREADS

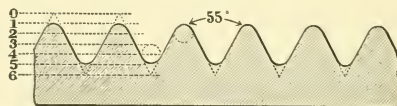
WHITWORTH STANDARD



Diam. of Tap, Inches	No. of Threads to Inch	Diam. of Tap, Inches	No. of Threads to Inch	Diam. of Tap, Inches	No. of Threads to Inch	Diam. of Tap, Inches	No. of Threads to Inch
$\frac{1}{4}$	20	1	8	2	$4\frac{1}{2}$	3	$3\frac{1}{2}$
$\frac{5}{16}$	18	$1\frac{1}{8}$	7	$2\frac{1}{8}$	$4\frac{1}{2}$	$3\frac{1}{8}$	$3\frac{1}{2}$
$\frac{3}{8}$	16	$1\frac{1}{4}$	7	$2\frac{1}{4}$	4	$3\frac{1}{4}$	$3\frac{1}{4}$
$\frac{7}{16}$	14	$1\frac{3}{8}$	6	$2\frac{3}{8}$	4	$3\frac{3}{8}$	$3\frac{1}{4}$
$\frac{1}{2}$	12	$1\frac{1}{2}$	6	$2\frac{1}{2}$	4	$3\frac{1}{2}$	$3\frac{1}{4}$
$\frac{5}{8}$	11	$1\frac{5}{8}$	5	$2\frac{5}{8}$	4	$3\frac{5}{8}$	$3\frac{1}{4}$
$\frac{3}{4}$	10	$1\frac{3}{4}$	5	$2\frac{3}{4}$	$3\frac{1}{2}$	$3\frac{3}{4}$	3
$\frac{7}{8}$	9	$1\frac{7}{8}$	$4\frac{1}{2}$	$2\frac{7}{8}$	$3\frac{1}{2}$	$3\frac{7}{8}$	3
						4	3

BRITISH STANDARD FINE

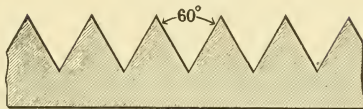
SAME SHAPE THREADS AS WHITWORTH, BUT PITCHES ARE FINER



Diam. of Tap, Inches	No. of Threads to Inch	Diam. of Tap, Inches	No. of Threads to Inch	Diam. of Tap, Inches	No. of Threads to Inch	Diam. of Tap, Inches	No. of Threads to Inch
$\frac{1}{4}$	26	1	10	2	7	3	5
$\frac{5}{16}$	22	$1\frac{1}{8}$	9	$2\frac{1}{8}$	7	$3\frac{1}{8}$	5
$\frac{3}{8}$	20	$1\frac{1}{4}$	9	$2\frac{1}{4}$	6	$3\frac{1}{4}$	5
$\frac{7}{16}$	18	$1\frac{3}{8}$	8	$2\frac{3}{8}$	6	$3\frac{3}{8}$	5
$\frac{1}{2}$	16	$1\frac{1}{2}$	8	$2\frac{1}{2}$	6	$3\frac{1}{2}$	$4\frac{1}{2}$
$\frac{5}{8}$	14	$1\frac{5}{8}$	8	$2\frac{5}{8}$	6	$3\frac{5}{8}$	$4\frac{1}{2}$
$\frac{3}{4}$	12	$1\frac{3}{4}$	7	$2\frac{3}{4}$	6	$3\frac{3}{4}$	$4\frac{1}{2}$
$\frac{7}{8}$	11	$1\frac{7}{8}$	7	$2\frac{7}{8}$	6	$3\frac{7}{8}$	$4\frac{1}{2}$
						4	$4\frac{1}{2}$

TAP THREADS

V-THREAD



Diam. of Tap, Inches	No. of Threads to Inch	Diam. of Tap, Inches	No. of Threads to Inch	Diam. of Tap, Inches	No. of Threads to Inch	Diam. of Tap, Inches	No. of Threads to Inch
1/4	20	1	8	2	4 1/2	3	3 1/2
5/16	18	1 1/8	7	2 1/8	4 1/2	3 1/8	3 1/2
3/8	16	1 1/4	7	2 1/4	4 1/2	3 1/4	3 1/2
7/16	14	1 3/8	6	2 3/8	4 1/2	3 3/8	3 1/4
1/2	12	1 1/2	6	2 1/2	4	3 1/2	3 1/4
5/8	11	1 5/8	5	2 5/8	4	3 5/8	3 1/4
3/4	10	1 3/4	5	2 3/4	4	3 3/4	3
7/8	9	1 7/8	4 1/2	2 7/8	4	3 7/8	3
						4	3

ACME STANDARD

29° THREAD



This Thread has been devised to take the place of the Square Thread. It has the same depth as the Square Thread, but is stronger, as the bottom of the thread is wider than the Square Thread. The sides of this Thread are at the same inclination as is now generally adopted in cutting Worms.

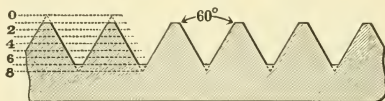
Taps and Dies to this Standard are made only to order, and prices will be given on application.

TABLE OF THREAD PARTS

No. of Threads Per Inch	Depth of Thread	Thickness at Top of Thread	Width Space at Bottom of Thread	Space at Top of Thread	Thickness at Root of Thread
1	.5100	.3707	.3655	.6293	.6345
1 1/3	.3850	.2880	.2728	.4720	.4772
2	.2600	.1853	.1801	.3147	.3199
3	.1767	.1235	.1183	.2098	.2150
4	.1350	.0927	.0875	.1573	.1625
5	.1100	.0741	.0689	.1259	.1311
6	.0933	.0618	.0566	.1049	.1101
7	.0814	.0529	.0478	.0899	.0951
8	.0725	.0463	.0411	.0787	.0839
9	.0655	.0413	.0361	.0699	.0751
10	.0600	.0371	.0319	.0629	.0681

A. S. M. E. STANDARD THREADS

BASIC THREAD DIMENSIONS AND TAP DRILL SIZES



Nominal Size	Outside Diameter, Inches	Pitch Diameter, Inches	Root Diameter, Inches	Commercial Tap Drill to Produce Approx. 75% Full Thread	Decimal Equivalent of Tap Drill
0-80	.0600	.0519	.0438	$\frac{3}{64}$	.0469
1-56	.0730	.0614	.0498	54	.0550
64	.0730	.0629	.0527	53	.0595
72	.0730	.0640	.0550	53	.0595
2-56	.0860	.0744	.0628	50	.0700
64	.0860	.0759	.0657	50	.0700
3-48	.0990	.0855	.0719	47	.0785
56	.0990	.0874	.0758	45	.0820
4-32	.1120	.0917	.0714	45	.0820
36	.1120	.0940	.0759	44	.0860
40	.1120	.0958	.0795	43	.0890
48	.1120	.0985	.0849	42	.0935
5-36	.1250	.1078	.0889	40	.0980
40	.1250	.1088	.0925	38	.1015
44	.1250	.1102	.0955	37	.1040
6-32	.1380	.1177	.0974	36	.1065
36	.1380	.1200	.1019	34	.1110
40	.1380	.1218	.1055	33	.1130
7-30	.1510	.1294	.1077	31	.1200
32	.1510	.1307	.1104	31	.1200
36	.1510	.1330	.1149	$\frac{1}{8}$	.1250
8-30	.1640	.1423	.1207	30	.1285
32	.1640	.1437	.1234	29	.1360
36	.1640	.1460	.1279	29	.1360
40	.1640	.1478	.1315	28	.1405
9-24	.1770	.1499	.1229	29	.1360
30	.1770	.1553	.1337	27	.1440
32	.1770	.1567	.1364	26	.1470

(Concluded on following page)

A. S. M. E. STANDARD THREADS

BASIC THREAD DIMENSIONS

AND TAP DRILL SIZES

(Concluded)

Nominal Size	Outside Diameter, Inches	Pitch Diameter, Inches	Root Diameter, Inches	Commercial Tap Drill to Produce Approx. 75% Full Thread	Decimal Equivalent of Tap Drill
10-24	.1900	.1629	.1359	25	.1495
28	.1900	.1668	.1436	23	.1540
30	.1900	.1684	.1467	22	.1570
32	.1900	.1697	.1494	21	.1590
12-24	.2160	.1889	.1619	16	.1770
28	.2160	.1928	.1696	14	.1820
32	.2160	.1957	.1754	13	.1850
14-20	.2420	.2095	.1770	10	.1935
24	.2420	.2149	.1879	7	.2010
16-18	.2680	.2319	.1966	3	.2130
20	.2680	.2355	.2030	$\frac{7}{32}$	.2187
22	.2680	.2385	.2090	2	.2210
18-18	.2940	.2579	.2218	B	.2380
20	.2940	.2615	.2290	D	.2460
20-16	.3200	.2794	.2388	G	.2610
18	.3200	.2839	.2478	$\frac{17}{64}$	.2656
20	.3200	.2875	.2550	I	.2720
22-16	.3460	.3054	.2648	$\frac{9}{32}$	.2812
18	.3460	.3099	.2738	L	.2900
24-16	.3720	.3314	.2908	$\frac{5}{16}$	.3125
18	.3720	.3359	.2998	O	.3160
26-14	.3980	.3516	.3052	$\frac{21}{64}$	.3281
16	.3980	.3574	.3168	R	.3390
28-14	.4240	.3776	.3312	T	.3580
16	.4240	.3834	.3428	$\frac{23}{64}$	.3594
30-14	.4500	.4036	.3572	V	.3770
16	.4500	.4094	.3688	$\frac{25}{64}$	.3906

UNITED STATES THREAD

BASIC THREAD DIMENSIONS

AND

TAP DRILL SIZES

Nominal Size	Outside Diameter, Inches	Pitch Diameter, Inches	Root Diameter, Inches	Commercial Tap Drill to Produce Approx. 75% Full Thread	Decimal Equivalent of Tap Drill
$\frac{1}{16}$ -64	.0625	.0524	.0422	$\frac{3}{64}$	.0469
72	.0625	.0535	.0445	$\frac{3}{64}$	.0469
$\frac{5}{64}$ -60	.0781	.0673	.0563	$\frac{1}{16}$	.0625
72	.0781	.0691	.0601	52	.0635
$\frac{3}{32}$ -48	.0938	.0803	.0667	49	.0730
50	.0938	.0808	.0678	49	.0730
$\frac{7}{64}$ -48	.1094	.0959	.0823	43	.0890
$\frac{1}{8}$ -32	.1250	.1047	.0844	$\frac{3}{32}$	.0937
40	.1250	.1088	.0925	38	.1015
$\frac{9}{64}$ -40	.1406	.1244	.1081	32	.1160
$\frac{5}{32}$ -32	.1563	.1360	.1157	$\frac{1}{8}$	.1250
36	.1563	.1382	.1202	30	.1285
$\frac{11}{64}$ -32	.1719	.1505	.1313	$\frac{9}{64}$	.1406
$\frac{3}{16}$ -24	.1875	.1604	.1334	26	.1470
32	.1875	.1672	.1469	22	.1570
$\frac{13}{64}$ -24	.2031	.1760	.1490	20	.1610
$\frac{7}{32}$ -24	.2188	.1919	.1646	16	.1770
32	.2188	.1985	.1782	12	.1890
$\frac{15}{64}$ -24	.2344	.2073	.1806	10	.1935
$\frac{1}{4}$ -20	.2500	.2175	.1850	7	.2010
24	.2500	.2229	.1959	4	.2090
27	.2500	.2260	.2019	3	.2130
28	.2500	.2268	.2036	3	.2130
32	.2500	.2297	.2094	$\frac{7}{32}$	.2187
$\frac{5}{16}$ -18	.3125	.2764	.2403	F	.2570
20	.3125	.2800	.2476	$\frac{11}{64}$.2656
24	.3125	.2854	.2584	I	.2720
27	.3125	.2884	.2644	J	.2770
32	.3125	.2922	.2719	$\frac{9}{32}$.2812

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UNITED STATES THREAD

BASIC THREAD DIMENSIONS
AND TAP DRILL SIZES*(Continued)*

Nominal Size	Outside Diameter, Inches	Pitch Diameter, Inches	Root Diameter, Inches	Commercial Tap Drill to Produce Approx. 75% Full Thread	Decimal Equivalent of Tap Drill
$\frac{3}{8}$ -16	.3750	.3344	.2938	$\frac{5}{16}$	.3125
20	.3750	.3425	.3100	$\frac{21}{64}$	.3281
24	.3750	.3479	.3209	Q	.3320
27	.3750	.3509	.3269	R	.3390
$\frac{7}{16}$ -14	.4375	.3911	.3447	U	.3680
20	.4375	.4050	.3726	$\frac{25}{64}$	.3906
24	.4375	.4104	.3834	X	.3970
27	.4375	.4134	.3894	Y	.4040
$\frac{1}{2}$ -12	.5000	.4459	.3918	$\frac{27}{64}$	.4219
13	.5000	.4501	.4001	$\frac{27}{64}$	.4219
20	.5000	.4675	.4351	$\frac{29}{64}$	.4531
24	.5000	.4729	.4459	$\frac{29}{64}$	.4531
27	.5000	.4759	.4519	$\frac{15}{32}$	.4687
$\frac{9}{16}$ -12	.5625	.5084	.4542	$\frac{31}{64}$	.4844
18	.5625	.5264	.4903	$\frac{33}{64}$	.5156
27	.5625	.5384	.5144	$\frac{17}{32}$	.5312
$\frac{5}{8}$ -11	.6250	.5660	.5069	$\frac{17}{32}$	.5312
12	.6250	.5709	.5168	$\frac{35}{64}$	.5469
18	.6250	.5889	.5528	$\frac{37}{64}$	.5781
27	.6250	.6009	.5769	$\frac{19}{32}$	.5937
$\frac{11}{16}$ -11	.6875	.6285	.5694	$\frac{19}{32}$	.5937
16	.6875	.6469	.6063	$\frac{5}{8}$	.6250
$\frac{3}{4}$ -10	.7500	.6850	.6201	$\frac{21}{32}$	.6562
12	.7500	.6959	.6418	$\frac{43}{64}$	.6719
16	.7500	.7094	.6688	$\frac{11}{16}$	.6875
27	.7500	.7259	.7019	$\frac{23}{32}$	.7187
$\frac{13}{16}$ -10	.8125	.7476	.6826	$\frac{23}{32}$	.7187
$\frac{7}{8}$ -9	.8750	.8029	.7307	$\frac{49}{64}$	.7656
12	.8750	.8209	.7668	$\frac{51}{64}$	.7969
14	.8750	.8286	.7822	$\frac{13}{16}$.8125
18	.8750	.8389	.8028	$\frac{53}{64}$.8281
27	.8750	.8509	.8269	$\frac{27}{32}$.8437

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UNITED STATES THREAD

 BASIC THREAD DIMENSIONS
 AND TAP DRILL SIZES
 (Concluded)

Nominal Size	Outside Diameter, Inches	Pitch Diameter, Inches	Root Diameter, Inches	Commercial Tap Drill to Produce Approx. 75% Full Thread	Decimal Equivalent of Tap Drill
$\frac{15}{16}$ - 9	.9375	.8654	.7932	$\frac{53}{64}$	.8281
1 - 8	1.0000	.9188	.8376	$\frac{7}{8}$	.8750
12	1.0000	.9459	.8918	$\frac{59}{64}$	.9219
14	1.0000	.9536	.9072	$\frac{15}{16}$	.9375
27	1.0000	.9759	.9519	$\frac{31}{32}$	.9687
$1\frac{1}{8}$ - 7	1.1250	1.0322	.9394	$\frac{63}{64}$	.9844
12	1.1250	1.0709	1.0168	$1\frac{3}{64}$	1.0469
$1\frac{1}{4}$ - 7	1.2500	1.1572	1.0644	$1\frac{7}{64}$	1.1094
12	1.2500	1.1959	1.1418	$1\frac{11}{64}$	1.1719
$1\frac{3}{8}$ - 6	1.3750	1.2668	1.1585	$1\frac{7}{32}$	1.2187
12	1.3750	1.3209	1.2668	$1\frac{19}{64}$	1.2969
$1\frac{1}{2}$ - 6	1.5000	1.3917	1.2835	$1\frac{11}{32}$	1.3437
12	1.5000	1.4459	1.3918	$1\frac{27}{64}$	1.4219
$1\frac{5}{8}$ - $5\frac{1}{2}$	1.6250	1.5070	1.3888	$1\frac{29}{64}$	1.4531
$1\frac{3}{4}$ - 5	1.7500	1.6201	1.4902	$1\frac{9}{16}$	1.5625
$1\frac{7}{8}$ - 5	1.8750	1.7451	1.6152	$1\frac{11}{16}$	1.6875
2 - $4\frac{1}{2}$	2.0000	1.8557	1.7113	$1\frac{25}{32}$	1.7812
$2\frac{1}{8}$ - $4\frac{1}{2}$	2.1250	1.9807	1.8363	$1\frac{29}{32}$	1.9062
$2\frac{1}{4}$ - $4\frac{1}{2}$	2.2500	2.1057	1.9613	$2\frac{3}{32}$	2.0312
$2\frac{3}{8}$ - 4	2.3750	2.2126	2.0502	$2\frac{1}{8}$	2.1250
$2\frac{1}{2}$ - 4	2.5000	2.3376	2.1752	$2\frac{1}{4}$	2.2500
$2\frac{3}{4}$ - 4	2.7500	2.5876	2.4252	$2\frac{1}{2}$	2.5000
3 - $3\frac{1}{2}$	3.0000	2.8145	2.6288	$2\frac{33}{32}$	2.7187
$3\frac{1}{4}$ - $3\frac{1}{2}$	3.2500	3.0645	2.8788	$2\frac{31}{32}$	2.9687
$3\frac{1}{2}$ - $3\frac{1}{4}$	3.5000	3.3002	3.1003	$3\frac{3}{16}$	3.1875
$3\frac{3}{4}$ - 3	3.7500	3.5335	3.3170	$3\frac{7}{16}$	3.4375
4 - 3	4.0000	3.7835	3.5670	$3\frac{11}{16}$	3.6875

AMERICAN (BRIGGS) STANDARD TAPER PIPE TAPS

DRILL SIZES FOR TAPPING WITHOUT REAMING

Size of Pipe	Threads per Inch	Root Diam. Small End of Tap	Root Diam. Small End of Pipe and Gauge	Tap Drill	
				Size	Decimal Equivalent
$\frac{1}{8}$	27	.3145	.3339	R	.339
$\frac{1}{4}$	18	.4043	.4329	$\frac{7}{16}$	.437
$\frac{3}{8}$	18	.5393	.5676	$\frac{31}{64}$	.578
$\frac{1}{2}$	14	.6651	.7013	$\frac{23}{32}$	.719
$\frac{3}{4}$	14	.8751	.9105	$\frac{59}{64}$	.921
1	11 $\frac{1}{2}$	1.1017	1.1441	1 $\frac{5}{32}$	1.156
1 $\frac{1}{4}$	11 $\frac{1}{2}$	1.4447	1.4876	1 $\frac{1}{2}$	1.500
1 $\frac{1}{2}$	11 $\frac{1}{2}$	1.6828	1.7265	1 $\frac{47}{64}$	1.734
2	11 $\frac{1}{2}$	2.1578	2.1995	2 $\frac{7}{32}$	2.218
2 $\frac{1}{2}$	8	2.5617	2.6195	2 $\frac{5}{8}$	2.625
3	8	3.1828	3.2406	3 $\frac{1}{4}$	3.250
3 $\frac{1}{2}$	8	3.6789	3.7375	3 $\frac{3}{4}$	3.750
4	8	4.1750	4.2344	4 $\frac{1}{4}$	4.250

COMMERCIAL TOLERANCES FOR GROUND THREAD TAPS

UNITED STATES STANDARD

Size	Basic		Tap Measurements					
			Outside Diameter			Pitch Diameter		
	Outside Diam.	Pitch Diam.	Minimum	Maximum	Tolerance	Minimum	Maximum	Tolerance
$\frac{1}{4}$ -20	0.2500	0.2175	0.2520	0.2535	.0015	0.2180	0.2190	.0010
$\frac{5}{16}$ -18	.3125	.2764	.3145	.3160	.0015	.2769	.2779	.0010
$\frac{3}{8}$ -16	.3750	.3344	.3770	.3785	.0015	.3349	.3359	.0010
$\frac{7}{16}$ -14	.4375	.3911	.4400	.4415	.0015	.3916	.3926	.0010
$\frac{1}{2}$ -13	.5000	.4500	.5025	.5040	.0015	.4505	.4515	.0010
$\frac{9}{16}$ -12	.5625	.5084	.5650	.5665	.0015	.5089	.5099	.0010
$\frac{5}{8}$ -11	.6250	.5660	.6275	.6290	.0015	.5665	.5675	.0010
$\frac{3}{4}$ -10	.7500	.6850	.7530	.7550	.0020	.6855	.6865	.0010
$\frac{7}{8}$ -9	.8750	.8028	.8780	.8800	.0020	.8033	.8043	.0010
1 - 8	1.0000	.9188	1.0030	1.0050	.0020	.9193	.9203	.0010
$1\frac{1}{8}$ -7	1.1250	1.0322	1.1290	1.1310	.0020	1.0327	1.0342	.0015
$1\frac{1}{4}$ -7	1.2500	1.1572	1.2540	1.2560	.0020	1.1577	1.1592	.0015
$1\frac{3}{8}$ -6	1.3750	1.2668	1.3790	1.3810	.0020	1.2673	1.2688	.0015
$1\frac{1}{2}$ -6	1.5000	1.3917	1.5040	1.5060	.0020	1.3922	1.3937	.0015
$1\frac{3}{4}$ -5	1.7500	1.6201	1.7550	1.7570	.0020	1.6206	1.6221	.0015
2 - $4\frac{1}{2}$	2.0000	1.8557	2.0050	2.0070	.0020	1.8562	1.8577	.0015
$2\frac{1}{4}$ - $4\frac{1}{2}$	2.2500	2.1057	2.2560	2.2580	.0020	2.1062	2.1082	.0020
$2\frac{1}{2}$ -4	2.5000	2.3376	2.5060	2.5080	.0020	2.3381	2.3401	.0020
$2\frac{3}{4}$ -4	2.7500	2.5876	2.7570	2.7590	.0020	2.5881	2.5901	.0020
3 - $3\frac{1}{2}$	3.0000	2.8144	3.0070	3.0090	.0020	2.8149	2.8169	.0020

LEAD TOLERANCE

A maximum lead error of plus or minus .0005" in one inch of thread is permitted.

COMMERCIAL TOLERANCES FOR GROUND THREAD TAPS

S. A. E. STANDARD

Size	Basic		Tap Measurements					
			Outside Diameter			Pitch Diameter		
	Outside Diam.	Pitch Diam.	Mini- mum	Maxi- mum	Toler- ance	Mini- mum	Maxi- mum	Toler- ance
$\frac{1}{4}$ -28	0.2500	0.2268	0.2520	0.2535	.0015	0.2273	0.2283	.0010
$\frac{5}{16}$ -24	.3125	.2854	.3145	.3160	.0015	.2859	.2869	.0010
$\frac{3}{8}$ -24	.3750	.3479	.3770	.3785	.0015	.3484	.3494	.0010
$\frac{7}{16}$ -20	.4375	.4050	.4395	.4410	.0015	.4055	.4065	.0010
$\frac{1}{2}$ -20	.5000	.4675	.5020	.5035	.0015	.4680	.4690	.0010
$\frac{9}{16}$ -18	.5625	.5264	.5645	.5660	.0015	.5269	.5279	.0010
$\frac{5}{8}$ -18	.6250	.5889	.6270	.6285	.0015	.5894	.5904	.0010
$\frac{11}{16}$ -16	.6875	.6469	.6895	.6910	.0015	.6474	.6484	.0010
$\frac{3}{4}$ -16	.7500	.7094	.7520	.7535	.0015	.7099	.7109	.0010
$\frac{7}{8}$ -14	.8750	.8286	.8775	.8790	.0015	.8291	.8301	.0010
$\frac{7}{8}$ -18	.8750	.8389	.8770	.8785	.0015	.8394	.8404	.0010
1 -14	1.0000	.9536	1.0025	1.0040	.0015	.9541	.9551	.0010
$1\frac{1}{8}$ -12	1.1250	1.0709	1.1275	1.1290	.0015	1.0714	1.0729	.0015
$1\frac{1}{4}$ -12	1.2500	1.1959	1.2525	1.2540	.0015	1.1964	1.1979	.0015
$1\frac{3}{8}$ -12	1.3750	1.3209	1.3775	1.3790	.0015	1.3214	1.3229	.0015
$1\frac{1}{2}$ -12	1.5000	1.4459	1.5025	1.5040	.0015	1.4464	1.4479	.0015

LEAD TOLERANCE

A maximum lead error of plus or minus .0005" in one inch of thread is permitted.

TABLE FOR USE WITH
SCREW THREAD MICROMETER CALIPER

READING OF CALIPER.

FOR U. S. S. THREADS, $D - \frac{.6495}{P}$.

FOR "V" THREADS, $D - \frac{.866}{P}$.

U. S. STD. THREADS.				"V" THREADS.			
Diam.	Pitch.	Caliper Reading.		Diam.	Pitch.	Caliper Reading.	
D	P	$D - \frac{.6495}{P}$	$\frac{.6495}{P}$	D	P	$D - \frac{.866}{P}$	$\frac{.866}{P}$
$\frac{1}{4}$	20	.2176	.0324	$\frac{1}{4}$	24	.2139	.0361
$\frac{5}{16}$	18	.2765	.0360	$\frac{1}{4}$	20	.2067	.0433
$\frac{3}{8}$	16	.3344	.0406	$\frac{5}{16}$	20	.2692	.0433
$\frac{7}{16}$	14	.3911	.0464	$\frac{5}{16}$	18	.2644	.0481
$\frac{1}{2}$	13	.4501	.0499	$\frac{3}{8}$	18	.3269	.0481
$\frac{9}{16}$	12	.5084	.0541	$\frac{3}{8}$	16	.3209	.0541
$\frac{5}{8}$	11	.566	.0590	$\frac{7}{16}$	16	.3834	.0541
$\frac{3}{4}$	10	.6851	.0649	$\frac{7}{16}$	14	.3756	.0619
$\frac{7}{8}$	9	.8029	.0721	$\frac{1}{2}$	14	.4381	.0619
1	8	.9188	.0812	$\frac{1}{2}$	13	.4334	.0666
$1\frac{1}{8}$	7	1.0322	.0928	$\frac{1}{2}$	12	.4278	.0722
$1\frac{1}{4}$	7	1.1572	.0928	$\frac{9}{16}$	14	.5006	.0619
$1\frac{3}{8}$	6	1.2668	.1082	$\frac{9}{16}$	12	.4903	.0722
$1\frac{1}{2}$	6	1.3918	.1082	$\frac{5}{8}$	11	.5463	.0787
$1\frac{5}{8}$	$5\frac{1}{2}$	1.507	.1180	$\frac{5}{8}$	10	.5384	.0866
$1\frac{3}{4}$	5	1.6201	.1299	$\frac{11}{16}$	10	.6009	.0866
$1\frac{7}{8}$	5	1.7451	.1299	$\frac{3}{4}$	10	.6634	.0866
2	$4\frac{1}{2}$	1.8557	.1443	$\frac{7}{8}$	9	.7788	.0962
$2\frac{1}{2}$	4	2.3376	.1624	1	8	.8918	.1082
3	$3\frac{1}{2}$	2.8145	.1855	$1\frac{1}{8}$	8	1.0168	.1082
$3\frac{1}{2}$	$3\frac{1}{4}$	3.3002	.1998	$1\frac{1}{4}$	7	1.1263	.1237
4	3	3.7835	.2165	$1\frac{1}{2}$	6	1.3557	.1443

The right hand column gives the number to be subtracted from the diameter to obtain the caliper reading.

The figures in above table apply only to screws made accurately to standard size.

Taps are always made oversize, screws as well as taps, having the V Form of Thread are usually made considerably larger than the figures in above table.

SUGGESTIONS FOR ORDERING CUTTERS

REGULAR CUTTERS. — Always order by catalog number giving diameter, face, and size of hole.

SPECIAL MILLING CUTTERS. — Give diameter, face, size of hole and keyway and refer to catalog number for style. When End Mills, Angular Mills, Facing Mills and T Slot Cutters are desired, be particular to state whether RIGHT OR LEFT HAND.

FORMED CUTTERS. — Sketches showing form and all dimensions, or template showing form together with all dimensions, should be furnished when ordering Formed Cutters. Also state whether Cutter is "coming" or "going" at the bottom. Formed Cutters are adopted for work where uniformity is required, and are sharpened by grinding the faces of the teeth.

GEAR CUTTERS. — Give number of cutter and diametral pitch when ordering. Diametral pitch means the number of teeth to the inch in diameter in pitch circle of any wheel. These cutters are sharpened by grinding the faces of the teeth.

To get best results be sure Cutters are KEPT SHARP.

It is always understood that when orders for SPECIAL GOODS are accepted they are not subject to cancellation.

CUTTING SPEEDS

Diam. Inches	FEET PER MINUTE									
	15	20	25	30	35	40	45	50	55	60
	REVOLUTIONS PER MINUTE									
$\frac{1}{4}$	229	306	382	458	535	611	688	764	840	917
$\frac{3}{8}$	153	204	255	306	357	407	458	509	560	611
$\frac{1}{2}$	115	153	191	229	267	306	344	382	420	458
$\frac{5}{8}$	91.7	122	153	183	214	244	275	306	336	367
$\frac{3}{4}$	76.4	102	127	153	178	204	229	255	280	306
$\frac{7}{8}$	65.5	87.3	109	131	153	175	196	218	240	262
1	57.3	76.4	95.5	115	134	153	172	191	210	229
$1\frac{1}{8}$	50.9	68.0	84.9	102	119	136	153	170	187	204
$1\frac{1}{4}$	45.8	61.1	76.4	91.7	107	122	138	153	168	183
$1\frac{3}{8}$	41.7	55.6	69.5	83.3	97.2	111	125	139	153	167
$1\frac{1}{2}$	38.2	50.9	63.7	76.4	89.1	102	115	127	140	153
$1\frac{5}{8}$	35.3	47.0	58.8	70.5	82.3	94	106	118	129	141
$1\frac{3}{4}$	32.7	43.7	54.6	65.5	76.4	87.3	98.2	109	120	131
$1\frac{7}{8}$	30.6	40.7	50.9	61.1	71.3	81.5	91.7	102	112	122
2	28.7	38.2	47.7	57.3	66.8	76.4	85.9	95.5	105	115
$2\frac{1}{4}$	25.5	34.0	42.4	50.9	59.4	67.9	76.4	84.9	93.4	102
$2\frac{1}{2}$	22.9	30.6	38.2	45.8	53.5	61.1	68.8	76.4	84.0	91.7
$2\frac{3}{4}$	20.8	27.8	34.7	41.7	48.6	55.6	62.5	69.5	76.4	83.3
3	19.1	25.5	31.8	38.2	44.6	50.9	57.3	63.7	70.0	76.4
$3\frac{1}{2}$	16.4	21.8	27.3	32.7	38.2	43.7	49.1	54.6	60.0	65.5
4	14.3	19.1	23.9	28.7	33.4	38.2	43.0	47.7	52.5	57.3
$4\frac{1}{2}$	12.7	17.0	21.2	25.5	29.7	34.0	38.2	42.4	46.7	50.9
5	11.5	15.3	19.1	22.9	26.7	30.6	34.4	38.2	42.0	45.8
$5\frac{1}{2}$	10.4	13.9	17.4	20.8	24.3	27.8	31.3	34.7	38.2	41.7
6	9.6	12.7	15.9	19.1	22.3	25.5	28.7	31.8	35.0	38.2
7	8.2	10.9	13.6	16.4	19.1	21.8	24.6	27.3	30.0	32.7
8	7.2	9.5	11.9	14.3	16.7	19.1	21.5	23.9	26.3	28.7
9	6.4	8.5	10.6	12.7	14.9	17.0	19.1	21.2	23.3	25.5
10	5.7	7.6	9.5	11.5	13.4	15.3	17.2	19.1	21.0	22.9
11	5.2	6.9	8.7	10.4	12.2	13.9	15.6	17.4	19.1	20.8
12	4.8	6.4	8.0	9.5	11.1	12.7	14.3	15.9	17.5	19.1

CUTTING SPEEDS

Diam. Inches	FEET PER MINUTE									
	65	70	80	90	100	110	120	130	140	150
	REVOLUTIONS PER MINUTE									
$\frac{1}{4}$	993	1070	1222	1375	1528	1681	1833	1986	2139	2292
$\frac{3}{8}$	662	713	815	917	1019	1120	1222	1324	1426	1528
$\frac{1}{2}$	497	535	611	688	764	840	917	993	1070	1146
$\frac{5}{8}$	397	428	489	550	611	672	733	794	856	917
$\frac{3}{4}$	331	357	407	458	509	560	611	662	713	764
$\frac{7}{8}$	284	306	349	393	437	480	524	567	611	655
1	248	267	306	344	382	420	458	497	535	573
$1\frac{1}{8}$	221	238	272	306	340	373	407	441	475	509
$1\frac{1}{4}$	199	214	244	275	306	336	367	397	428	458
$1\frac{3}{8}$	181	194	222	250	278	306	333	361	389	417
$1\frac{1}{2}$	166	178	204	229	255	280	306	331	357	382
$1\frac{5}{8}$	153	165	188	212	235	259	282	306	329	353
$1\frac{3}{4}$	142	153	175	196	218	240	262	284	306	327
$1\frac{7}{8}$	132	143	163	183	204	224	244	265	285	306
2	124	134	153	172	191	210	229	248	267	287
$2\frac{1}{4}$	110	119	136	153	170	187	204	221	238	255
$2\frac{1}{2}$	99.3	107	122	138	153	168	183	199	214	229
$2\frac{3}{4}$	90.3	97.2	111	125	139	153	167	181	194	208
3	82.8	89.1	102	115	127	140	153	166	178	191
$3\frac{1}{2}$	70.9	76.4	87.3	98.2	109	120	131	142	153	164
4	62.1	66.8	76.4	85.9	95.5	105	115	132	134	143
$4\frac{1}{2}$	55.2	59.4	67.9	76.4	84.9	93.4	102	110	119	127
5	49.7	53.5	61.1	68.8	76.4	84.0	91.7	99.3	107	115
$5\frac{1}{2}$	45.1	48.6	55.6	62.5	69.5	76.4	83.3	90.3	97.2	104
6	41.4	44.6	50.9	57.3	63.7	70.0	76.4	82.8	89.1	95.5
7	35.5	38.2	43.7	49.1	54.6	60.0	65.5	70.9	76.4	81.9
8	31.0	33.4	38.2	43.0	47.7	52.5	57.3	62.1	66.8	71.6
9	27.6	29.7	34.0	38.2	42.4	46.7	50.9	55.2	59.4	63.6
10	24.8	26.7	30.6	34.4	38.2	42.0	45.8	49.7	53.5	57.3
11	22.6	24.3	27.8	31.3	34.7	38.2	41.7	45.1	48.6	52.1
12	20.7	22.3	25.5	28.6	31.8	35.0	38.2	41.4	44.6	47.7

WEIGHTS OF SQUARE AND ROUND STEEL BARS

IN POUNDS PER LINEAR FOOT
STEEL WEIGHING 489.6 LBS. PER CUBIC FOOT
FOR IRON SUBTRACT 2 PER CENT

Size Inches	Weight, Pounds Per Linear Foot		Size Inches	Weight, Pounds Per Linear Foot	
	Square	Round		Square	Round
			2½	21.25	16.69
1/16	.013	.010	9/16	22.33	17.53
1/8	.053	.042	5/8	23.43	18.40
3/16	.120	.094	11/16	24.56	19.29
1/4	.213	.167	3/4	25.71	20.20
5/16	.332	.261	13/16	26.90	21.12
3/8	.478	.376	7/8	28.10	22.07
7/16	.651	.511	15/16	29.34	23.04
1/2	.850	.668	3	30.60	24.03
9/16	1.076	.845	1/16	31.89	25.05
5/8	1.328	1.043	1/8	33.20	26.08
11/16	1.607	1.262	3/16	34.54	27.13
3/4	1.913	1.502	1/4	35.91	28.21
13/16	2.245	1.763	5/16	37.31	29.30
7/8	2.603	2.044	3/8	38.73	30.42
15/16	2.988	2.347	7/16	40.18	31.55
1	3.400	2.670	1/2	41.65	32.71
1/16	3.838	3.015	9/16	43.15	33.89
1/8	4.303	3.380	5/8	44.68	35.09
3/16	4.795	3.766	11/16	46.23	36.31
1/4	5.313	4.172	3/4	47.81	37.55
5/16	5.857	4.600	13/16	49.42	38.81
3/8	6.428	5.049	7/8	51.05	40.10
7/16	7.026	5.518	15/16	52.71	41.40
1/2	7.650	6.008	4	54.40	42.73
9/16	8.301	6.519	1/16	56.11	44.07
5/8	8.978	7.051	1/8	57.85	45.44
11/16	9.682	7.604	3/16	59.62	46.83
3/4	10.413	8.178	1/4	61.41	48.23
13/16	11.170	8.773	5/16	63.23	49.66
7/8	11.953	9.388	3/8	65.08	51.11
15/16	12.763	10.024	7/16	66.95	52.58
2	13.600	10.681	1/2	68.85	54.07
1/16	14.463	11.359	9/16	70.78	55.59
1/8	15.353	12.058	5/8	72.73	57.12
3/16	16.270	12.778	11/16	74.71	58.67
1/4	17.213	13.519	3/4	76.71	60.25
5/16	18.182	14.280	13/16	78.74	61.85
3/8	19.178	15.062	7/8	80.80	63.46
7/16	20.201	15.866	15/16	82.89	65.10

WEIGHTS OF SQUARE AND ROUND STEEL BARS

(CONTINUED)

IN POUNDS PER LINEAR FOOT

STEEL WEIGHING 489.6 LBS. PER CUBIC FOOT, FOR IRON SUBTRACT 2 PER CENT.

Size Inches	Weight, Pounds Per Linear Foot		Size Inches	Weight, Pounds Per Linear Foot	
	Square	Round		Square	Round
5	85.0	66.8	7	166.6	130.9
$\frac{1}{16}$	87.1	68.4	$\frac{1}{8}$	172.6	135.6
$\frac{1}{8}$	89.3	70.1	$\frac{1}{4}$	178.7	140.4
$\frac{3}{16}$	91.5	71.9	$\frac{3}{8}$	184.9	145.2
$\frac{1}{4}$	93.7	73.6	$\frac{1}{2}$	191.3	150.2
$\frac{5}{16}$	96.0	75.4	$\frac{5}{8}$	197.7	155.3
$\frac{3}{8}$	98.2	77.2	$\frac{3}{4}$	204.2	160.4
$\frac{7}{16}$	100.5	79.0	$\frac{7}{8}$	210.9	165.6
$\frac{1}{2}$	102.9	80.8	8	217.6	170.9
$\frac{9}{16}$	105.2	82.6	$\frac{1}{4}$	231.4	181.8
$\frac{5}{8}$	107.6	84.5	$\frac{1}{2}$	245.7	192.9
$\frac{11}{16}$	110.0	86.4	$\frac{3}{4}$	260.3	204.5
$\frac{3}{4}$	112.4	88.3	9	275.4	216.3
$\frac{13}{16}$	114.9	90.2	$\frac{1}{4}$	290.9	228.5
$\frac{7}{8}$	117.4	92.2	$\frac{1}{2}$	306.9	241.0
$\frac{15}{16}$	119.9	94.1	$\frac{3}{4}$	323.2	253.9
6	122.4	96.1	10	340.0	267.0
$\frac{1}{8}$	127.6	100.2	$\frac{1}{4}$	357.2	280.6
$\frac{1}{4}$	132.8	104.3	$\frac{1}{2}$	374.9	294.4
$\frac{3}{8}$	138.2	108.5	$\frac{3}{4}$	392.9	308.6
$\frac{1}{2}$	143.7	112.8	11	411.4	323.1
$\frac{5}{8}$	149.2	117.2	$\frac{1}{4}$	430.3	338.0
$\frac{3}{4}$	154.9	121.7	$\frac{1}{2}$	449.7	353.2
$\frac{7}{8}$	160.7	126.2	$\frac{3}{4}$	469.4	368.7
			12	489.6	384.5

LUBRICANTS FOR CUTTING TOOLS

Material	Turning	Chucking	Drilling Milling	Reaming	Tapping
Tool Steel	Dry or Oil	Oil or Soda Water	Oil	Lard Oil	Oil
Soft Steel	Dry or Soda Water	Soda Water	Oil or Soda Water	Lard Oil	Oil
Wrought Iron	Dry or Soda Water	Soda Water	Oil or Soda Water	Lard Oil	Oil
Cast Iron	Dry	Dry	Dry	Dry	Oil
Brass	Dry	Dry	Dry	Dry	Oil
Copper	Dry	Oil	Oil	Mixture	Oil
Babbitt	Dry	Dry	Dry	Dry	Oil
Glass			Turpentine	or Kerosene	

Mixture is $\frac{1}{3}$ Crude Petroleum, $\frac{2}{3}$ Lard Oil. Oil is Lard. When two lubricants are mentioned the first is preferable.

WEIGHT OF IRON AND STEEL SHEETS

WEIGHTS PER SQUARE FOOT

TAKEN FROM KENT'S MECHANICAL ENGINEERS' POCKET BOOK

THICKNESS BY BIRMINGHAM GAUGE				THICKNESS BY AMERICAN (B.&S.) GAUGE			
Number of Gauge	Thickness in Inches	Iron	Steel	Number of Gauge	Thickness in Inches	Iron	Steel
0000	.454	18.16	18.52	0000	.46	18.40	18.77
000	.425	17.00	17.34	000	.4096	16.38	16.71
00	.38	15.20	15.50	00	.3648	14.59	14.88
0	.34	13.60	13.87	0	.3249	13.00	13.26
1	.3	12.00	12.24	1	.2893	11.57	11.80
2	.284	11.36	11.59	2	.2576	10.30	10.51
3	.259	10.36	10.67	3	.2294	9.18	9.36
4	.238	9.52	9.71	4	.2043	8.17	8.34
5	.22	8.80	8.98	5	.1819	7.28	7.42
6	.203	8.12	8.28	6	.1620	6.48	6.61
7	.18	7.20	7.34	7	.1443	5.77	5.89
8	.165	6.60	6.73	8	.1285	5.14	5.24
9	.148	5.92	6.04	9	.1144	4.58	4.67
10	.134	5.36	5.47	10	.1019	4.08	4.16
11	.12	4.80	4.90	11	.0907	3.63	3.70
12	.109	4.36	4.45	12	.0808	3.23	3.30
13	.095	3.80	3.88	13	.0720	2.88	2.94
14	.083	3.32	3.39	14	.0641	2.56	2.62
15	.072	2.88	2.94	15	.0571	2.28	2.33
16	.065	2.60	2.65	16	.0508	2.03	2.07
17	.058	2.32	2.37	17	.0453	1.81	1.85
18	.049	1.96	2.00	18	.0403	1.61	1.64
19	.042	1.68	1.71	19	.0359	1.44	1.46
20	.035	1.40	1.43	20	.0320	1.28	1.31
21	.032	1.28	1.31	21	.0285	1.14	1.16
22	.028	1.12	1.14	22	.0253	1.01	1.03
23	.025	1.00	1.02	23	.0226	.904	.922
24	.022	.88	.898	24	.0201	.804	.820
25	.02	.80	.816	25	.0179	.716	.730
26	.018	.72	.734	26	.0159	.636	.649
27	.016	.64	.653	27	.0142	.568	.579
28	.014	.56	.571	28	.0126	.504	.514
29	.013	.52	.530	29	.0113	.452	.461
30	.012	.48	.490	30	.0100	.400	.408
31	.01	.40	.408	31	.0089	.356	.363
32	.009	.36	.367	32	.0080	.320	.326
33	.008	.32	.326	33	.0071	.284	.290
34	.007	.28	.286	34	.0063	.252	.257
35	.005	.20	.204	35	.0056	.224	.228
						Iron	Steel
Specific Gravity						7.7	7.854
Weight per Cubic Foot						480.	489.6
Weight per Cubic Inch . . . . .						.2778	.2833

As there are many gauges in use differing from each other, and even the thicknesses of a certain specified gauge, as the Birmingham, are not assumed the same by all manufacturers, orders for sheets and wires should always state the weight per square foot, or the thickness in thousandths of an inch.

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