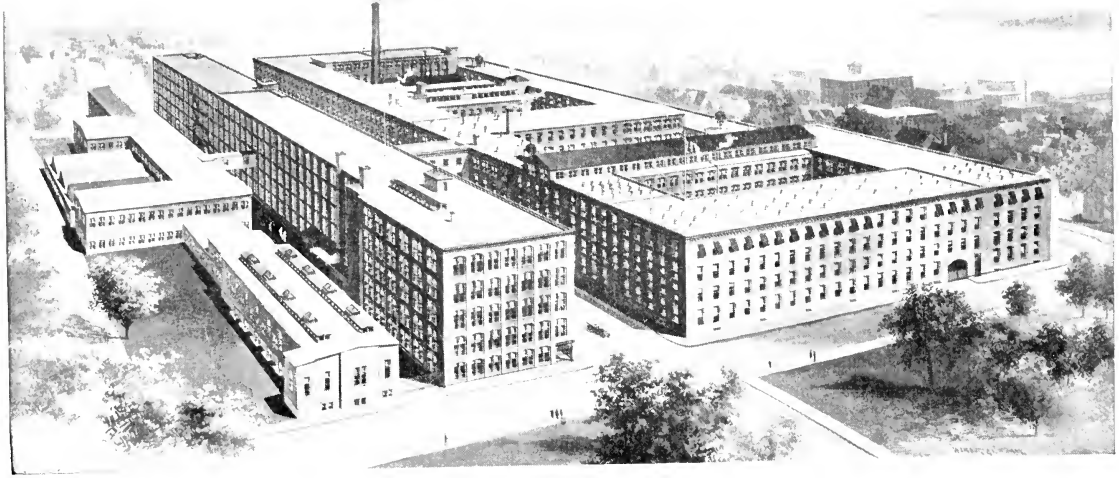


WORKS OF THE MORSE TWIST DRILL AND MACHINE COMPANY,

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

Griffith-Stillings Press
Boston, Mass.

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

For High Speed Steel Numbers Add 1000

For High Speed Steel Numbers Add 1000

For High Speed Steel Numbers Add 1000

For High Speed Steel Numbers Add 1000

For High Speed Steel Numbers Add 1000

Reamers (continued)

Round Dies

For High Speed Steel Numbers Add 1000

For High Speed Steel Numbers Add 1000

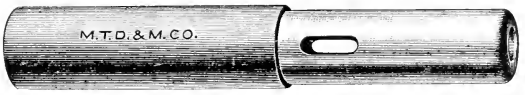
To avoid a confusion of figures, High Speed Steel Tools are not incorporated in this index as the catalog numbers are the same as those of Carbon Steel plus 1,000.

RECAPITULATION OF INDEX BY NUMBERS

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	1/4 to 9/16 in.	7	1 1/16	4
2	1.80	37/64 to 29/32 in.	8	1 1/4	4 1/4
3	2.50	59/64 to 1 1/4 in.	10	1 1/2	5 3/8
4	4.00	1 17/64 to 2 in.	12	2	6 3/8
5	7.50	2 1/64 to 3 in.	16	2 5/8	9
6	14.00	3 1/64 to 6 in.	22	3 5/8	12 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 1/8
1 to 3	2.50	1	3	6 7/8
1 to 4	3.20	1	4	7 7/8
1 to 5	4.80	1	5	9 1/8
2 to 3	2.50	2	3	7 1/2
2 to 4	3.20	2	4	8 1/2
2 to 5	4.80	2	5	9 3/4
3 to 2	3.20	3	2	7 5/8
3 to 3	3.20	3	3	8 3/8
3 to 4	3.20	3	4	9 3/8
3 to 5	4.80	3	5	10 5/8
4 to 3	4.80	4	3	9 3/8
4 to 4	4.80	4	4	10 3/8
4 to 5	4.80	4	5	11 5/8
4 to 6	12.00	4	6	14 1/16
5 to 4	12.00	5	4	11 11/16
5 to 5	12.00	5	5	12 15/16
5 to 6	12.00	5	6	15 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

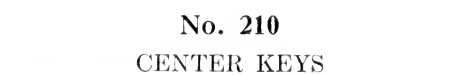
Size	Price Each	Size Hole, Morse Taper, Number	Size Outside, Morse Taper, Number	Whole Length
1 to 2	$1.80	1	2	$3\frac{9}{16}$
1 to 3	2.40	1	3	$3\frac{15}{16}$
1 to 4	3.00	1	4	$4\frac{7}{8}$
1 to 5	4.40	1	5	$6\frac{1}{8}$
2 to 3	2.40	2	3	$4\frac{7}{16}$
2 to 4	3.00	2	4	$4\frac{7}{8}$
2 to 5	4.40	2	5	$6\frac{1}{8}$
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	$\frac{37}{64}$ to $\frac{29}{32}$ "	$5\frac{1}{2}$
3	3.55	$\frac{59}{64}$ to $1\frac{1}{4}$ "	$6\frac{3}{4}$
4	4.80	$1\frac{17}{64}$ to 2 "	8
5	7.50	$2\frac{1}{64}$ to 3 "	10

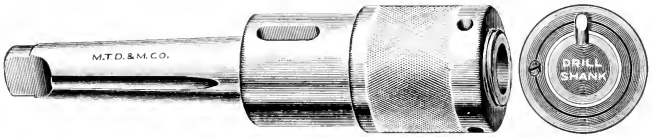
The end fitting the Lathe Center is deeply countersunk to insure a good bearing. These Sockets are hardened.

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.

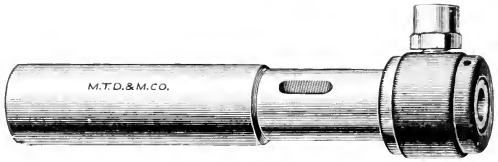
For illustration of drill with Andrew's shank see page 12.

Prices upon application.

No. 220

MORSE TAPER SOCKETS

FOR OIL DRILLS

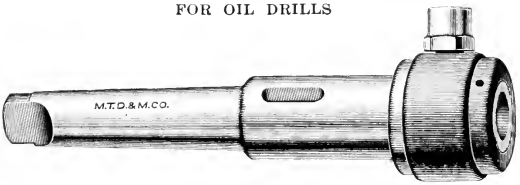


Size Hole, M. T. No.	Price Each	Holds Drills, Sizes	Whole Length, Inches	Blank End	
				Diam. Inches	Length, Inches
1	$4.00	1/4 to 9/16 in.	7	1 1/16	4
2	5.00	37/64 to 29/32 in.	8	1 1/4	4 1/4
3	6.50	59/64 to 1 1/4 in.	10	1 1/2	5 3/8
4	9.25	1 17/64 to 2 in.	12	2	6 3/8
5	10.25	2 1/64 to 3 in.	16	2 5/8	9

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 1/8
1 to 3	4.50	1	3	6 7/8
2 to 3	5.50	2	3	7 1/2
2 to 4	6.75	2	4	8 1/2
3 to 4	7.00	3	4	9 3/8
4 to 5	10.00	4	5	11 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	1/4 to 9/16 in.	7	1 1/16	4
2	1.80	37/64 to 29/32 in.	8	1 1/4	4 1/4
3	2.50	59/64 to 1 1/4 in.	10	1 1/2	5 3/8
4	4.00	1 17/64 to 2 in.	12	2	6 3/8
5	7.50	2 1/64 to 3 in.	16	2 5/8	9
6	14.00	3 1/64 to 6 in.	22	3 5/8	12 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 1/8
1 to 3	2.50	1	3	6 7/8
2 to 3	2.50	2	3	7 1/2
2 to 4	3.20	2	4	8 1/2
3 to 4	3.20	3	4	9 1/8
3 to 5	4.80	3	5	10 3/8
4 to 5	4.80	4	5	11 5/8
4 to 6	12.00	4	6	14
5 to 6	12.00	5	6	15 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.

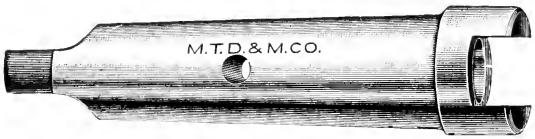
No. 232
STEEL SLEEVES FOR SHORT SHANKS
MORSE TAPER

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.

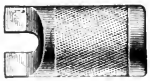
No. 240
STEEL SLEEVES WITH CLUTCH DRIVE
FOR MORSE TAPER SHANK DRILLS



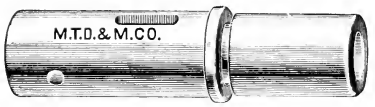
No. 301

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	1¼	3	4½	$3.50
2	1	1½	3¼	5¼	3.50
3	1	1¾	3¼	5¼	3.50
4	2	1¼	3	4½	4.00
5	2	1½	3¼	5¼	4.00
6	2	1¾	3¼	5¼	4.00
7	3	1½	3¼	5¼	4.75
8	3	1¾	3¼	5¼	4.75
9	3	2	3½	6¼	4.75
10	4	2	3½	6¼	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	3½	3½	$2.00
2	1	1¼	3½	3½	2.00
3	1	1½	3½	3½	2.00
4	2	1	3⅝	4	2.65
5	2	1¼	3⅝	4	2.65
6	2	1½	3⅝	4	2.65
7	2	1¾	3⅝	4	2.65
8	2	2	3⅝	4	2.65
9	3	1¼	4⅛	4¾	3.55
10	3	1½	4⅛	4¾	3.55
11	3	1¾	4⅛	4¾	3.55
12	3	2	4⅛	4¾	3.55
13	4	1½	4⅝	6	4.10
14	4	1¾	4⅝	6	4.10
15	4	2	4⅝	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

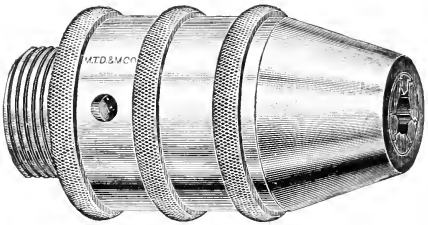
Morse Taper Hole, Number	Brown & Sharpe Taper, Outside, Number	Price Each	
		Style A	Style B
1	7	$2.40	$2.40
1	9	3.25	3.50
2	9	3.25	3.50
1	10	4.00	4.25
2	10	4.00	4.25
3	10	4.00	4.25
1	11	5.25	5.50
2	11	5.25	5.50
3	11	5.25	5.50
4	11	5.25	5.50

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

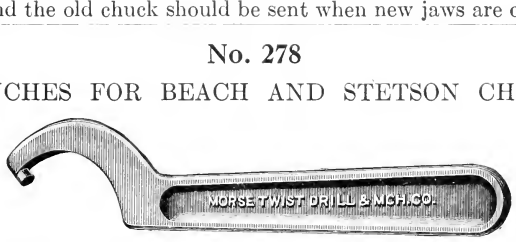
	List Price
Price each, not hardened, roughly shaped to size	$0.50
Price per set, not hardened, roughly shaped to size	1.50
Price per set, hardened, and ground closely to size	3.50

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

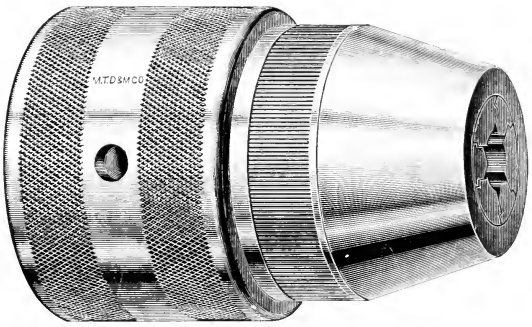
WRENCHES FOR BEACH AND STETSON CHUCKS



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.

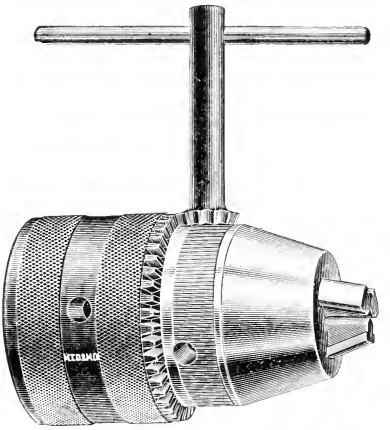
With Chuck No. 2 is furnished a spanner wrench illustrated on page 9.

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

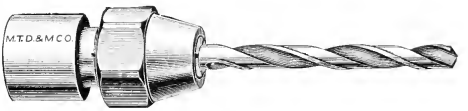


	Price Each
No. 2. Holds from 0 to $\frac{3}{8}$ inch diameter	$8.50

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.

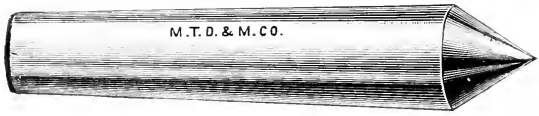
No. 2 Chuck can be made to hold any one size drill from $\frac{3}{16}$ to $\frac{5}{16}$ inch. Outside diameter of Chuck is $1\frac{1}{8}$ inches, whole length, $2\frac{1}{8}$ inches.

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 from 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	41/64	$1.70	9	5 1/8	No. 2
9/64	.45	5 1/4	2 5/16		21/32	1.70	9	5 1/8	
5/32	.45	5 3/8	2 7/16		43/64	1.80	9 1/4	5 3/8	
11/64	.50	5 1/2	2 9/16		11/16	1.80	9 1/4	5 3/8	
3/16	.50	5 3/4	2 13/16		45/64	1.90	9 1/2	5 5/8	
13/64	.55	5 7/8	2 7/8		23/32	1.90	9 1/2	5 5/8	
7/32	.55	6	3		47/64	2.00	9 3/4	5 7/8	
15/64	.60	6 1/8	3		3/4	2.00	9 3/4	5 7/8	
1/4	.60	6 1/8	2 13/16		49/64	2.10	9 7/8	6	
17/64	.65	6 1/4	2 15/16		25/32	2.10	9 7/8	6	
9/32	.65	6 1/4	2 15/16		51/64	2.20	10	6 1/8	
19/64	.70	6 3/8	3 1/16		13/16	2.20	10	6 1/8	
5/16	.70	6 3/8	3 1/16		53/64	2.40	10 1/4	6 3/8	
21/64	.75	6 1/2	3 3/16		27/32	2.40	10 1/4	6 3/8	
11/32	.75	6 1/2	3 3/16		55/64	2.60	10 1/2	6 5/8	
23/64	.80	6 3/4	3 7/16		7/8	2.60	10 1/2	6 5/8	
3/8	.80	6 3/4	3 7/16		57/64	2.80	10 5/8	6 3/4	
25/64	.90	7	3 11/16		29/32	2.80	10 5/8	6 3/4	
13/32	.90	7	3 11/16						
27/64	1.00	7 1/4	3 15/16		59/64	3.00	10 3/4	6 1/8	No. 3
7/16	1.00	7 1/4	3 15/16		15/16	3.00	10 3/4	6 1/8	
29/64	1.10	7 1/2	4 3/16		61/64	3.25	10 7/8	6 1/4	
15/32	1.10	7 1/2	4 3/16		31/32	3.25	10 7/8	6 1/4	
31/64	1.20	7 3/4	4 7/16		63/64	3.50	11	6 3/8	
1/2	1.20	7 3/4	4 7/16		1	3.50	11	6 3/8	
33/64	1.30	8	4 11/16		1 1/64	3.75	11 1/8	6 1/2	
17/32	1.30	8	4 11/16		1 1/32	3.75	11 1/8	6 1/2	
35/64	1.40	8 1/4	4 15/16		1 3/64	4.00	11 1/4	6 5/8	
9/16	1.40	8 1/4	4 15/16		1 1/16	4.00	11 1/4	6 5/8	
					1 5/64	4.25	11 1/2	6 7/8	
37/64	1.50	8 1/2	4 5/8		1 3/32	4.25	11 1/2	6 7/8	
19/32	1.50	8 1/2	4 5/8		1 7/64	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	

For prices of Sets of Taper Shank Drills, see pages 94 and 95.

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
1 5/32	$4.75	11 7/8	7 1/4	No. 3
1 11/64	5.00	12	7 3/8	
1 3/16	5.00	12	7 3/8	
1 13/64	5.25	12 1/8	7 1/2	
1 7/32	5.25	12 1/8	7 1/2	
1 15/64	5.50	12 1/2	7 7/8	
1 1/4	5.50	12 1/2	7 7/8	
1 17/64	5.75	14 1/8	8 1/2	No. 4
1 9/32	5.75	14 1/8	8 1/2	
1 19/64	6.00	14 1/4	8 5/8	
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 9/16	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	
1 11/16	$11.50	15 3/4	10 1/8	No. 4
1 45/64	12.00	15 3/4	10 1/8	
1 23/32	12.00	15 3/4	9 11/16	
1 47/64	12.50	16	9 15/16	
1 3/4	12.50	16	9 15/16	
1 25/32	13.25	16	9 15/16	
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 15/16	17.00	16 1/2	10 1/4	
1 31/32	17.75	16 1/2	10 1/4	
2	18.50	16 1/2	10 1/4	
2 1/32	19.25	16 1/2	9 1/2	No. 5
2 1/16	20.00	17	10	
2 3/32	20.75	17	10	
2 1/8	21.50	17	10	
2 5/32	22.25	17	10	
2 3/16	23.00	17	10	
2 7/32	23.75	17 1/2	10 1/2	
2 1/4	24.50	17 1/2	10 1/8	
2 5/16	26.00	17 1/2	10 1/8	
2 3/8	27.50	18	10 1/2	
2 7/16	29.00	18 1/2	11	
2 1/2	30.50	19	11 3/8	
2 9/16	32.00	19 1/4	11 5/8	
2 5/8	34.00	19 1/2	11 3/4	
2 11/16	36.00	20	12 1/4	
2 3/4	38.00	20 1/2	12 5/8	
2 13/16	40.50	20 1/2	12 5/8	
2 7/8	43.00	21	13	
2 15/16	45.50	21	13	
3	48.00	22	13 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
1/8	$ .90	5 1/8	1 5/8	
9/64	.90	5 3/8	1 7/8	
5/32	.90	5 3/8	1 7/8	
11/64	.90	5 3/4	2 1/4	
3/16	.90	5 3/4	2 1/4	
13/64	1.00	6	2 1/2	
7/32	1.00	6	2 1/2	
15/64	1.10	6 1/8	2 5/8	
1/4	1.10	6 1/8	2 5/8	
17/64	1.20	6 1/4	2 3/4	
9/32	1.20	6 1/4	2 3/4	
19/64	1.30	6 3/8	3	
5/16	1.30	6 3/8	3	
21/64	1.40	6 1/2	3 1/8	
11/32	1.40	6 1/2	3 1/8	
23/64	1.50	6 3/4	3 1/2	
3/8	1.50	6 3/4	3 1/2	
25/64	1.65	7	3 5/8	
13/32	1.65	7	3 5/8	
27/64	1.75	7 1/4	3 7/8	
7/16	1.75	7 1/4	3 7/8	
29/64	1.90	7 1/2	4 1/8	
15/32	1.90	7 1/2	4 1/8	
31/64	2.00	8 1/4	4 3/8	
1/2	2.00	8 1/4	4 3/8	
33/64	2.15	8 1/2	4 5/8	
17/32	2.15	8 1/2	4 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	
41/64	$2.75	9	5 1/8	
21/32	2.75	9	5 1/8	
43/64	3.00	9 1/4	5 3/8	
11/16	3.00	9 1/4	5 3/8	
45/64	3.25	9 1/2	5 5/8	
23/32	3.25	9 1/2	5 5/8	
47/64	3.50	9 3/4	5 7/8	
3/4	3.50	9 3/4	5 7/8	
49/64	3.75	9 7/8	6	
25/32	3.75	9 7/8	6	
51/64	4.00	10 3/4	6 1/8	
13/16	4.00	10 3/4	6 1/8	
53/64	4.40	10 3/4	6 1/8	
27/32	4.40	10 3/4	6 1/8	
55/64	4.75	10 3/4	6 1/8	
7/8	4.75	10 3/4	6 1/8	
57/64	5.15	10 3/4	6 1/8	
29/32	5.15	10 3/4	6 1/8	
59/64	5.50	10 3/4	6 1/8	
15/16	5.50	10 3/4	6 1/8	
61/64	5.90	11	6 3/8	
31/32	5.90	11	6 3/8	
63/64	6.25	11	6 3/8	
1	6.25	11	6 3/8	
1 1/64	6.75	11 1/8	6 1/2	
1 1/32	6.75	11 1/8	6 1/2	
1 3/64	7.25	11 1/4	6 5/8	
1 1/16	7.25	11 1/4	6 5/8	
1 5/64	7.75	12 1/2	6 7/8	
1 3/32	7.75	12 1/2	6 7/8	
1 7/64	8.25	12 3/4	7 1/8	
1 1/8	8.25	12 3/4	7 1/8	
1 9/64	8.90	12 7/8	7 1/4	

No. 1 | No. 2 | No. 3 | No. 4

No. 1302
High Speed Steel

MORSE TAPER SHANK TWIST DRILLS

Unless otherwise speicfied, 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
1 5/32	**$8.90**	12 7/8	7 1/4	
1 11/64	**9.50**	13	7 3/8	
1 3/16	**9.50**	13	7 3/8	
1 13/64	**10.15**	13 1/8	7 1/2	
1 7/32	**10.15**	13 1/8	7 1/2	
1 15/64	**10.75**	13 1/2	7 7/8	
1 1/4	**10.75**	13 1/2	7 7/8	
1 17/64	**11.50**	14 1/8	8 1/2	
1 9/32	**11.50**	14 1/8	8 1/2	
1 19/64	**12.25**	14 1/4	8 5/8	
1 5/16	**12.25**	14 1/4	8 5/8	No. 4
1 21/64	**13.00**	14 3/8	8 3/4	
1 11/32	**13.00**	14 3/8	8 3/4	
1 23/64	**13.75**	14 1/2	8 7/8	
1 3/8	**13.75**	14 1/2	8 7/8	
1 25/64	**14.65**	14 5/8	9	
1 13/32	**14.65**	14 5/8	9	
1 27/64	**15.50**	14 3/4	9 1/8	
1 7/16	**15.50**	14 3/4	9 1/8	
1 29/64	**16.40**	14 7/8	9 1/4	
1 15/32	**16.40**	14 7/8	9 1/4	
1 31/64	**17.25**	15	9 3/8	
1 1/2	**17.25**	15	9 3/8	
1 33/64	**18.15**	16 3/4	9 3/4	
1 17/32	**18.15**	16 3/4	9 3/4	
1 35/64	**19.00**	16 5/8	9 5/8	
1 9/16	**19.00**	16 5/8	9 5/8	
1 37/64	**20.00**	16 15/16	9 15/16	No. 5
1 19/32	**20.00**	16 15/16	9 15/16	
1 39/64	**21.00**	17 1/16	10 1/16	
1 5/8	**21.00**	17 1/16	10 1/16	
1 41/64	**22.00**	17 3/16	10 3/16	
1 21/32	**22.00**	17 3/16	10 3/16	
1 43/64	**$23.00**	17 3/16	10 3/16	
1 11/16	**23.00**	17 3/16	10 3/16	
1 45/64	**24.00**	17 3/16	10 3/16	
1 23/32	**24.00**	17 3/16	10 3/16	
1 47/64	**25.00**	17 3/16	10 3/16	
1 3/4	**25.00**	17 3/16	10 3/16	
1 25/32	**26.25**	17 3/16	10 3/16	
1 13/16	**27.50**	17 3/16	10 3/16	
1 27/32	**28.75**	17 3/16	10 3/16	
1 7/8	**30.00**	17 3/8	10 3/8	
1 29/32	**31.25**	17 3/8	10 3/8	
1 15/16	**32.50**	17 3/8	10 3/8	
1 31/32	**33.75**	17 3/8	10 3/8	
2	**35.00**	17 3/8	10 3/8	
2 1/32	**36.25**	17 3/8	10 3/8	
2 1/16	**37.50**	17 3/8	10 3/8	
2 1/32	**38.75**	17 3/8	10 3/8	
2 1/8	**40.00**	17 3/8	10 3/8	
2 3/32	**41.25**	17 3/8	10 3/8	
2 3/16	**42.50**	17 3/8	10 3/8	
2 7/32	**43.75**	17 3/8	10 3/8	
2 1/4	**45.00**	17 3/8	10 3/8	
2 5/16	**50.00**	17 3/8	10 3/8	
2 3/8	**55.00**	17 3/8	10 3/8	
2 7/16	**60.00**	18 3/4	11 1/4	
2 1/2	**65.00**	18 3/4	11 1/4	
2 9/16	**70.00**	19 1/2	11 7/8	
2 5/8	**75.00**	19 1/2	11 7/8	
2 11/16	**80.00**	20 3/8	12 3/4	
2 3/4	**85.00**	20 3/8	12 3/4	
2 13/16	**90.00**	21 1/8	13 1/4	
2 7/8	**95.00**	21 1/8	13 1/4	
2 15/16	**100.00**	21 3/4	13 3/4	
3	**105.00**	21 3/4	13 3/4	No. 5

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
31/64	$2.00	7 11/16	4 3/8	No. 1
1/2	2.00	7 11/16	4 3/8	
33/64	2.15	7 11/16	4 5/8	
17/32	2.15	7 15/16	4 5/8	
35/64	2.25	8 3/16	4 7/8	
9/16	2.25	8 3/16	4 7/8	
51/64	4.00	10	6 1/8	No. 2
13/16	4.00	10	6 1/8	
53/64	4.40	10	6 1/8	
27/32	4.40	10	6 1/8	
55/64	4.75	10	6 1/8	
7/8	4.75	10	6 1/8	
57/64	5.15	10	6 1/8	
29/32	5.15	10	6 1/8	
1 5/64	7.75	11 1/2	6 7/8	No. 3
1 3/32	7.75	11 1/2	6 7/8	
1 7/64	8.25	11 3/4	7 1/8	
1 1/8	8.25	11 3/4	7 1/8	
1 9/64	8.90	11 7/8	7 1/4	
1 5/32	8.90	11 7/8	7 1/4	
1 11/64	9.50	12	7 3/8	
1 3/16	9.50	12	7 3/8	
1 13/64	10.15	12 1/8	7 1/2	
1 7/32	10.15	12 1/8	7 1/2	
1 15/64	10.75	12 1/2	7 7/8	
1 1/4	10.75	12 1/2	7 7/8	
1 33/64	$18.15	15	9 3/8	No. 4
1 17/32	18.15	15	9 3/8	
1 35/64	19.00	15 1/4	9 5/8	
1 9/16	19.00	15 1/4	9 5/8	
1 37/64	20.00	15 9/16	9 15/16	
1 19/32	20.00	15 9/16	9 15/16	
1 39/64	21.00	15 11/16	10 1/16	
1 5/8	21.00	15 11/16	10 1/16	
1 41/64	22.00	15 13/16	10 3/16	
1 21/32	22.00	15 13/16	10 3/16	
1 43/64	23.00	15 13/16	10 3/16	
1 11/16	23.00	15 13/16	10 3/16	
1 45/64	24.00	15 13/16	10 3/16	
1 23/32	24.00	16 1/4	10 3/16	
1 47/64	25.00	16 1/4	10 3/16	
1 3/4	25.00	16 1/4	10 3/16	
1 25/32	26.25	16 1/4	10 3/16	
1 13/16	27.50	16 5/16	10 3/16	
1 27/32	28.75	16 5/16	10 3/16	
1 7/8	30.00	16 1/2	10 3/8	
1 29/32	31.25	16 1/2	10 3/8	
1 15/16	32.50	16 5/8	10 3/8	
1 31/32	33.75	16 5/8	10 3/8	
2	35.00	16 5/8	10 3/8	

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
3/8	$1.50	7 3/8	3 1/2	No. 2	2	$35.00	19 13/16	10 3/8	No. 6
25/64	1.65	7 1/2	3 5/8		2 1/32	36.25	19 13/16	10 3/8	
13/32	1.65	7 1/2	3 5/8		2 1/16	37.50	19 13/16	10 3/8	
27/64	1.75	7 3/4	3 7/8		2 3/32	38.75	19 13/16	10 3/8	
7/16	1.75	7 3/4	3 7/8		2 1/8	40.00	19 13/16	10 3/8	
29/64	1.90	8	4 1/8		2 5/32	41.25	19 13/16	10 3/8	
15/32	1.90	8	4 1/8		2 3/16	42.50	19 13/16	10 3/8	
					2 7/32	43.75	19 13/16	10 3/8	
41/64	2.75	9 3/4	5 1/8	No. 3	2 1/4	45.00	19 13/16	10 3/8	
21/32	2.75	9 3/4	5 1/8		2 5/16	50.00	19 13/16	10 3/8	
43/64	3.00	10	5 3/8		2 3/8	55.00	19 13/16	10 3/8	
11/16	3.00	10	5 3/8		2 7/16	60.00	20 11/16	11 1/4	
45/64	3.25	10 1/4	5 5/8		2 1/2	65.00	20 11/16	11 1/4	
23/32	3.25	10 1/4	5 5/8		2 9/16	70.00	21 5/16	11 7/8	
47/64	3.50	10 1/2	5 7/8		2 5/8	75.00	21 5/16	11 7/8	
3/4	3.50	10 1/2	5 7/8		2 11/16	80.00	22 3/16	12 3/4	
49/64	3.75	10 5/8	6		2 3/4	85.00	22 3/16	12 3/4	
25/32	3.75	10 5/8	6		2 13/16	90.00	22 11/16	13 1/4	
					2 7/8	95.00	22 11/16	13 1/4	
1	6.25	12	6 3/8	No. 4	2 15/16	100.00	23 3/16	13 3/4	
1 1/64	6.75	12 1/8	6 1/2		3	105.00	23 3/16	13 3/4	
1 1/32	6.75	12 1/8	6 1/2						
1 3/64	7.25	12 1/4	6 5/8						
1 1/16	7.25	12 1/4	6 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
5/16	$1.40	6 1/2	2 5/8	No. 2
21/64	1.40	6 3/4	2 7/8	
11/32	1.40	6 3/4	2 7/8	
23/64	1.40	7	3 1/8	
3/8	1.40	7	3 1/8	
25/64	1.40	7 1/4	3 3/8	
13/32	1.40	7 1/4	3 3/8	
27/64	1.40	7 1/2	3 5/8	
7/16	1.40	7 1/2	3 5/8	
29/64	1.45	7 3/4	3 7/8	
15/32	1.45	7 3/4	3 7/8	
31/64	1.50	8	4 1/8	
1/2	1.50	8	4 1/8	
33/64	1.60	8 1/4	4 3/8	
17/32	1.60	8 1/4	4 3/8	
35/64	1.70	8 1/2	4 5/8	
9/16	1.70	8 1/2	4 5/8	
37/64	2.50	9 3/8	4 3/4	No. 3
19/32	2.50	9 3/8	4 3/4	
39/64	2.50	9 1/2	4 7/8	
5/8	2.50	9 1/2	4 7/8	
41/64	2.50	9 5/8	5	
21/32	2.50	9 5/8	5	
43/64	2.60	9 3/4	5 1/8	
11/16	2.60	9 3/4	5 1/8	
45/64	2.70	9 7/8	5 1/4	
23/32	2.70	9 7/8	5 1/4	
47/64	2.80	10	5 3/8	
3/4	2.80	10	5 3/8	
49/64	2.90	10 1/8	5 1/2	
25/32	$2.90	10 1/8	5 1/2	No. 3
51/64	3.00	10 1/4	5 5/8	
13/16	3.00	10 1/4	5 5/8	
53/64	3.10	10 3/8	5 3/4	
27/32	3.10	10 3/8	5 3/4	
55/64	3.20	10 1/2	5 7/8	
7/8	3.20	10 1/2	5 7/8	
57/64	3.30	10 5/8	6	
29/32	3.30	10 5/8	6	
1 1/8	5.40	12	6 3/8	No. 4
1 9/64	5.60	12 1/4	6 5/8	
1 5/32	5.60	12 1/4	6 5/8	
1 11/64	5.80	12 1/2	6 7/8	
1 3/16	5.80	12 1/2	6 7/8	
1 13/64	6.00	12 3/4	7 1/8	
1 7/32	6.00	12 3/4	7 1/8	
1 15/64	6.20	13	7 3/8	
1 1/4	6.20	13	7 3/8	
1 47/64	13.25	16 1/2	9 5/8	No. 5
1 3/4	13.25	16 1/2	9 5/8	
1 25/32	14.00	16 1/2	9 5/8	
1 13/16	14.75	16 1/2	9 5/8	
1 27/32	15.50	16 1/2	9 5/8	
1 7/8	16.25	16 1/2	9 5/8	
1 29/32	17.00	16 1/2	9 5/8	
1 15/16	17.75	16 1/2	9 5/8	
1 31/32	18.50	16 1/2	9 5/8	
2	19.25	16 1/2	9 5/8	

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	
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	No. 1
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	
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	No. 2
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	
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	No. 3
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	
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	No. 3
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	
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	No. 4
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	
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	No. 4
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	
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	No. 5
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	
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	No. 5
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**			
1/8	$ .45	$ .90	5 1/8	2 1/2	.125
9/64	.45	.90	5 1/4	2 3/4	.1406
5/32	.45	.90	5 3/8	3	.1562
11/64	.50	.90	5 1/2	3 1/4	.1718
3/16	.50	.90	5 3/4	3 1/2	.1875
13/64	.55	**1.00**	5 7/8	3 3/4	.2031
7/32	.55	**1.00**	6	4	.2187
15/64	.60	**1.10**	6 1/8	4	.2343
1/4	.60	**1.10**	6 1/8	4	.25
17/64	.65	**1.20**	6 1/4	4	.2656
9/32	.65	**1.20**	6 1/4	4	.2812
19/64	.70	**1.30**	6 3/8	4 1/16	.2968
5/16	.70	**1.30**	6 3/8	4 1/16	.3125
21/64	.75	**1.40**	6 1/2	4 1/8	.3281
11/32	.75	**1.40**	6 1/2	4 1/8	.3437
23/64	.80	**1.50**	6 3/4	4 1/4	.3593
3/8	.80	**1.50**	6 3/4	4 1/4	.375
25/64	.90	**1.65**	7	4 3/8	.3906
13/32	.90	**1.65**	7	4 3/8	.4062
27/64	1.00	**1.75**	7 1/4	4 5/8	.4218
7/16	1.00	**1.75**	7 1/4	4 5/8	.4375
29/64	1.10	**1.90**	7 1/2	4 7/8	.4531
15/32	1.10	**1.90**	7 1/2	4 7/8	.4687
31/64	1.20	**2.00**	7 3/4	5	.4843
1/2	1.20	**2.00**	7 3/4	5	.5
33/64	1.30	**2.15**	8	5 1/4	.5156
17/32	1.30	**2.15**	8	5 1/4	.5312
35/64	1.40	**2.25**	8 1/4	5 3/8	.5468
9/16	1.40	**2.25**	8 1/4	5 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**			
37/64	$1.50	**$2.40**	8½	5⅝	.5781
19/32	1.50	**2.40**	8½	5⅝	.5937
39/64	1.60	**2.50**	8¾	5¾	.6093
5/8	1.60	**2.50**	8¾	5¾	.625
41/64	1.70	**2.75**	9	5⅞	.6406
21/32	1.70	**2.75**	9	5⅞	.6562
43/64	1.80	**3.00**	9¼	6	.6718
11/16	1.80	**3.00**	9¼	6	.6875
45/64	1.90	**3.25**	9½	6 3/16	.7031
23/32	1.90	**3.25**	9½	6 3/16	.7187
47/64	2.00	**3.50**	9¾	6⅜	.7343
3/4	2.00	**3.50**	9¾	6⅜	.75
49/64	2.10	**3.75**	9⅞	6½	.7656
25/32	2.10	**3.75**	9⅞	6½	.7812
51/64	2.20	**4.00**	10	6⅝	.7968
13/16	2.20	**4.00**	10	6⅝	.8125
53/64	2.40	**4.40**	10¼	6¾	.8281
27/32	2.40	**4.40**	10¼	6¾	.8437
55/64	2.60	**4.75**	10½	7	.8593
7/8	2.60	**4.75**	10½	7	.875
57/64	2.80	**5.15**	10⅝	7	.8906
29/32	2.80	**5.15**	10⅝	7	.9062
59/64	3.00	**5.50**	10¾	7	.9218
15/16	3.00	**5.50**	10¾	7	.9375
61/64	3.25	**5.90**	10⅞	7⅛	.9531
31/32	3.25	**5.90**	10⅞	7⅛	.9687
63/64	3.50	**6.25**	11	7 3/16	.9843
1	3.50	**6.25**	11	7 3/16	1.
1 1/64	3.75	**6.75**	11⅛	7 5/16	1.0156
1 1/32	3.75	**6.75**	11⅛	7 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 3/64	$4.00	**$7.25**	11 1/4	7 3/8	1.0468
1 1/16	4.00	**7.25**	11 1/4	7 3/8	1.0625
1 5/64	4.25	**7.75**	11 1/2	7 5/8	1.0781
1 3/32	4.25	**7.75**	11 1/2	7 5/8	1.0937
1 7/64	4.50	**8.25**	11 3/4	7 7/8	1.1093
1 1/8	4.50	**8.25**	11 3/4	7 7/8	1.125
1 9/64	4.75	**8.90**	11 7/8	8	1.1406
1 5/32	4.75	**8.90**	11 7/8	8	1.1562
1 11/64	5.00	**9.50**	12	8 1/8	1.1718
1 3/16	5.00	**9.50**	12	8 1/8	1.1875
1 13/64	5.25	**10.15**	12 1/8	8 1/8	1.2031
1 7/32	5.25	**10.15**	12 1/8	8 1/8	1.2187
1 15/64	5.50	**10.75**	12 1/2	8 1/2	1.2343
1 1/4	5.50	**10.75**	12 1/2	8 1/2	1.25
1 9/32	5.75	**11.50**	14 1/8	9 1/8	1.2812
1 5/16	6.00	**12.25**	14 1/4	9 1/4	1.3125
1 11/32	6.25	**13.00**	14 3/8	9 3/8	1.3437
1 3/8	6.50	**13.75**	14 1/2	9 1/2	1.375
1 13/32	7.00	**14.65**	14 5/8	9 1/2	1.4062
1 7/16	7.50	**15.50**	14 3/4	9 5/8	1.4375
1 15/32	8.00	**16.40**	14 7/8	9 3/4	1.4687
1 1/2	8.50	**17.25**	15	9 7/8	1.5
1 9/16	9.50	**19.00**	15 1/4	9 3/4	1.5625
1 5/8	10.50	**21.00**	15 1/2	10	1.625
1 11/16	11.50	**23.00**	15 3/4	10 1/4	1.6875
1 3/4	12.50	**25.00**	16	10 1/2	1.75
1 13/16	14.00	**27.50**	16 1/4	10 3/4	1.8125
1 7/8	15.50	**30.00**	16 1/2	11	1.875
1 15/16	17.00	**32.50**	16 1/2	11	1.9375
2	18.50	**35.00**	16 1/2	11	2.

Drills 1 9/16 to 2 inches have shanks 1 1/2 inches in diameter, 4 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

JOBBERS' LENGTHS

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

JOBBERS' 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**		
3/32	$1.70	**$5.70**	2 3/4	1 9/16	5/16	$4.35	**$10.50**	4 1/2	2 3/8
7/64	1.75	**5.90**	2 7/8	1 11/16	21/64	4.70	**12.00**	4 5/8	2 1/2
1/8	1.80	**5.90**	3	1 3/4	11/32	5.05	**12.00**	4 3/4	2 9/16
9/64	1.85	**6.10**	3 1/8	1 7/8	23/64	5.50	**13.50**	4 7/8	2 11/16
5/32	1.90	**6.10**	3 1/4	2	3/8	6.00	**13.50**	5	2 13/16
11/64	2.00	**6.30**	3 3/8	2 1/16	25/64	6.50	**15.00**	5 1/8	2 7/8
3/16	2.25	**6.30**	3 1/2	2 3/16	13/32	7.00	**15.00**	5 1/4	3
13/64	2.50	**7.00**	3 5/8	2 5/16	27/64	7.75	**17.00**	5 3/8	3 1/8
7/32	2.75	**7.00**	3 3/4	2 3/8	7/16	8.50	**17.00**	5 1/2	3 1/4
15/64	3.00	**7.35**	3 7/8	2 1/2	29/64	9.25	**18.75**	5 5/8	3 1/4
1/4	3.25	**7.35**	4	1 15/16	15/32	10.00	**18.75**	5 3/4	3 3/8
17/64	3.50	**9.10**	4 1/8	2 1/16	31/64	11.00	**20.00**	5 7/8	3 1/2
9/32	3.80	**9.10**	4 1/4	2 3/16	1/2	12.00	**20.00**	6	3 5/8
19/64	4.00	**10.50**	4 3/8	2 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	$5\frac{1}{4}$	$3\frac{27}{32}$

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	$3\frac{7}{8}$	$2\frac{19}{32}$
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	$2\frac{7}{16}$	$1\frac{13}{32}$
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	$1\frac{9}{16}$	$\frac{11}{16}$
60	1.55	**5.70**	.0400	$1\frac{9}{16}$	$\frac{11}{16}$
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	$\frac{13}{16}$	$\frac{2}{16}$
80	1.50		.0135	$\frac{3}{4}$	$\frac{3}{16}$

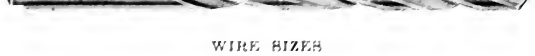
No. 341
STRAIGHT SHANK JEWELERS' DRILLS

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	9/16
67	1.50	.032	1 7/16	9/16
68	1.50	.031	1 7/16	9/16
69	1.50	.029	1⅜	9/16
70	1.50	.028	1 5/16	9/16
71	1.50	.026	1 5/16	½
72	1.50	.025	1¼	7/16
73	1.50	.024	1 3/16	⅜
74	1.50	.0225	1⅛	5/16
75	1.50	.021	1 1/16	¼
76	1.50	.02	1	¼
77	1.50	.018	15/16	7/32
78	1.50	.016	⅞	7/32
79	1.50	.0145	13/16	3/16
80	1.50	.0135	¾	3/16

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
1/32	$1.50	.0312	1 7/16	9/16
3/64	1.55	.0468	1 11/16	25/32
1/16	1.60	.0625	1⅞	⅞
5/64	1.65	.0781	2	1¼
3/32	1.70	.0937	2	1¼
7/64	1.75	.1093	2	1¼
1/8	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
1/8	$ .40	3	1 13/16	23/32	$1.80	7 1/4	5 1/2
5/32	.45	3 1/4	2 3/32	3/4	1.90	7 1/2	5 11/16
3/16	.50	3 1/2	2 5/16	25/32	2.00	7 3/4	5 7/8
7/32	.55	3 3/4	2 17/32	13/16	2.10	8	6 1/16
1/4	.60	4	2 3/4	27/32	2.30	8 1/4	6 1/4
9/32	.65	4 1/4	2 31/32	7/8	2.50	8 1/2	6 7/16
5/16	.70	4 1/2	3 3/16	29/32	2.70	8 3/4	6 5/8
11/32	.75	4 3/4	3 13/32	15/16	2.90	9	6 13/16
3/8	.80	5	3 5/8	31/32	3.00	9 1/4	7
13/32	.85	5 1/4	3 27/32	1	3.25	9 1/2	7 3/16
7/16	.90	5 1/2	4 1/16	1 1/16	3.75	11 1/4	8 1/2
15/32	1.00	5 3/4	4 9/32	1 1/8	4.25	11 3/4	8 7/8
1/2	1.10	6	4 1/2	1 3/16	4.75	12	9
17/32	1.20	6 1/8	4 19/32	1 1/4	5.25	12 1/2	9 3/8
9/16	1.30	6 1/4	4 11/16	1 5/16	5.75	12 1/2	9 3/8
19/32	1.40	6 3/8	4 3/4	1 3/8	6.25	12 1/2	9 3/8
5/8	1.50	6 1/2	4 7/8	1 7/16	7.25	12 1/2	9 3/8
21/32	1.60	6 3/4	5	1 1/2	8.25	12 1/2	9 3/8
11/16	1.70	7	5 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 ½ INCH DIAMETER, 2½ INCHES LONG

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

No. 357

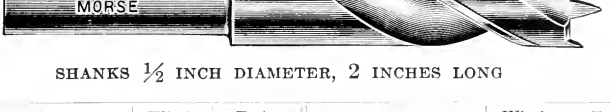
MACHINE BITS FOR WOOD

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
1/8	$ .50	4 5/8	1 13/16		23/32	$1.90	9 1/2	5 11/16	
5/32	.55	4 7/8	2 3/32		3/4	2.00	9 3/4	5 15/16	
3/16	.60	5	2 5/16		25/32	2.10	9 7/8	6 1/16	
7/32	.65	5 1/4	2 17/32		13/16	2.20	10	6 3/16	No. 2
1/4	.70	6 1/8	3		27/32	2.40	10 1/4	6 7/16	
9/32	.75	6 1/4	2 15/16		7/8	2.60	10 1/2	6 11/16	
5/16	.80	6 3/8	3 1/16		29/32	2.80	10 5/8	6 13/16	
11/32	.85	6 1/2	3 3/16	No. 1					
3/8	.90	6 3/4	3 7/16		15/16	3.00	10 3/4	6 1/4	
13/32	.95	7	3 11/16		31/32	3.25	10 7/8	6 3/8	
7/16	1.00	7 1/4	3 15/16		1	3.50	11	6 1/2	No. 3
15/32	1.10	7 1/2	4 3/16		1 1/16	4.00	11 1/4	6 3/4	
1/2	1.20	7 3/4	4 7/16		1 1/8	4.50	11 3/4	7 1/4	
17/32	1.30	8	4 11/16		1 3/16	5.00	12	7 1/2	
9/16	1.40	8 1/4	4 15/16		1 1/4	5.50	12 1/2	8	
19/32	1.50	8 1/2	4 5/8		1 5/16	6.00	14 1/4	8 3/4	
5/8	1.60	8 3/4	4 15/16	No. 2	1 3/8	6.50	14 1/2	9	No. 4
21/32	1.70	9	5 3/16		1 7/16	7.50	14 3/4	9 1/4	
11/16	1.80	9 1/4	5 7/16		1 1/2	8.50	15	9 1/2	

No. 358

MACHINE BITS FOR WOOD

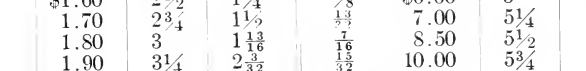


SHANKS 1/2 INCH DIAMETER, 2 INCHES LONG

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	2 3/8	19/32	$1.25	5	2 3/8
5/32	.55	5	2 3/8	5/8	1.30	5	2 3/8
3/16	.60	5	2 3/8	21/32	1.35	5	2 3/8
7/32	.65	5	2 3/8	11/16	1.40	5	2 3/8
1/4	.65	5	2 3/8	23/32	1.45	5	2 3/8
9/32	.70	5	2 3/8	3/4	1.50	5	2 3/8
5/16	.70	5	2 3/8	25/32	1.60	5	2 3/8
11/32	.75	5	2 3/8	13/16	1.70	5	2 3/8
3/8	.80	5	2 3/8	27/32	1.80	5	2 3/8
13/32	.85	5	2 3/8	7/8	1.90	5	2 3/8
7/16	.90	5	2 3/8	29/32	2.00	5	2 3/8
15/32	.95	5	2 3/8	15/16	2.10	5	2 3/8
1/2	1.00	5	2 3/8	31/32	2.20	5	2 3/8
17/32	1.10	5	2 3/8	1	2.30	5	2 3/8
9/16	1.20	5	2 3/8				

No. 360

STRAIGHT SHANK DRILLS FOR WOOD



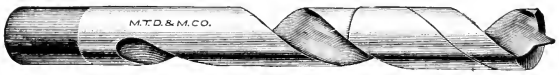
Diam., Inches	Price Per Dozen	Whole Length, Inches	Twist Cut, Inches	Diam., Inches	Price Per Dozen	Whole Length, Inches	Twist Cut, Inches
1/16	$1.60	2 1/2	1 1/4	3/8	$6.00	5	3 5/8
3/32	1.70	2 3/4	1 1/2	13/32	7.00	5 1/4	3 21/32
1/8	1.80	3	1 13/16	7/16	8.50	5 1/2	4 1/16
5/32	1.90	3 1/4	2 3/32	15/32	10.00	5 3/4	4 9/32
3/16	2.25	3 1/2	2 5/16	1/2	12.00	6	4 1/2
7/32	2.75	3 3/4	2 17/32	17/32	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	19/32	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

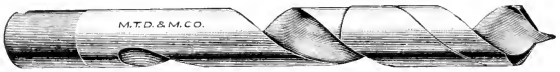
When tools made as illustrated below are desired, designate them by number, giving whole length and length of twist.

SINGLE GROOVE DRILLS

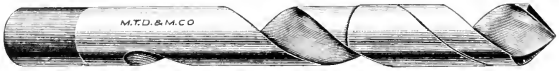
No. 365



No. 366



No. 367

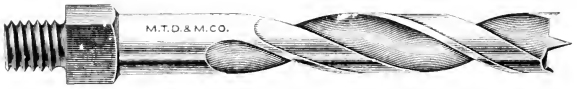


If Taper Shanks are desired give number of Socket when ordering.

No. 370

SCREW SHANK MACHINE BITS

FITTING PRYIBIL MACHINES

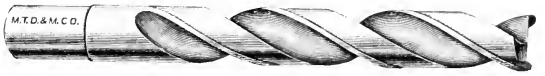


When ordering these Bits, in addition to whole length and length of twist always give diameter and length of Screw Shank, also pitch and form of thread.

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

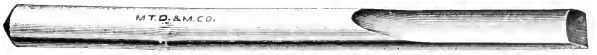
No. 374

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.

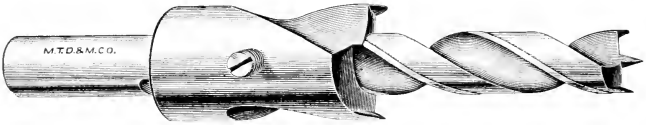
SOLID AND ADJUSTABLE COUNTERBORES AND DRILLS FOR WOOD

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

No. 380

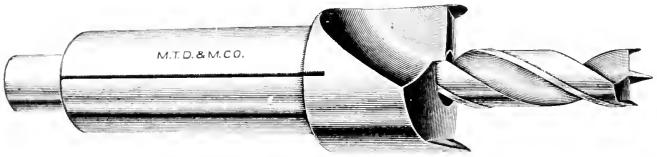
Give diameter and length of large and small parts.

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
1/16	$2.50	3 5/16	7/8	1 1/2
5/64	2.60	3 7/16	1 3/32	1 21/32
3/32	2.70	3 5/8	1 1/4	1 27/32
7/64	2.85	3 7/8	1 1/2	2 3/32
1/8	3.00	3 5/8	1 3/4	2 9/32
9/64	3.25	3 11/16	1 13/16	2 11/32
5/32	3.50	3 15/16	2	2 15/32
11/64	3.75	4 1/8	2 5/32	2 25/32
3/16	4.00	4 5/16	2 5/16	2 31/32
13/64	4.25	4 3/8	2 7/16	3 1/32
7/32	4.50	4 11/16	2 5/8	3 11/32
15/64	4.75	5 3/16	3 3/16	3 15/16
1/4	5.00	5 3/16	3 3/16	3 15/16
17/64	5.50	5 3/8	3 3/8	4 1/8
9/32	6.00	5 3/8	3 3/8	4 1/8
19/64	6.50	5 1/2	3 1/2	4 1/4
5/16	7.00	5 1/2	3 1/2	4 1/4
21/64	7.50	5 7/8	3 7/8	4 5/8
11/32	8.00	5 7/8	3 7/8	4 5/8
3/8	8.50	5 7/8	3 7/8	4 5/8
13/32	9.25	5 7/8	3 5/8	4 1/8
7/16	10.50	6 1/4	4	4 1/2
15/32	$11.75	6 5/8	4 3/8	4 7/8
1/2	13.00	6 3/4	4 7/16	5
17/32	14.25	7 1/2	5 3/16	5 3/4
9/16	15.50	7 1/2	5 3/16	5 3/4
19/32	16.75	7 1/2	5 3/16	5 3/4
5/8	18.00	7 1/2	5 1/16	5 3/4
21/32	19.50	7 1/2	5 1/16	5 3/4
11/16	21.00	7 1/2	5 1/16	5 3/4
23/32	22.50	7 1/2	5 1/16	5 3/4
3/4	24.00	7 1/2	5	5 3/4
25/32	25.50	7 1/2	5	5 3/4
13/16	27.00	7 1/2	5	5 3/4
27/32	28.50	7 1/2	5	5 3/4
7/8	30.00	7 1/2	5	5 3/4
29/32	31.50	7 1/2	5	5 3/4
15/16	33.00	7 1/2	4 15/16	5 3/4
31/32	34.50	7 1/2	4 15/16	5 3/4
1	36.00	7 1/2	4 15/16	5 3/4
1 1/16	39.00	7 1/2	4 15/16	5 3/4
1 1/8	42.00	7 1/2	4 7/8	5 3/4
1 3/16	45.00	7 1/2	4 7/8	5 3/4
1 1/4	48.00	7 1/2	4 7/8	5 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 Decimals of 1 Inch	Whole Length, M. M.	Twist Cut M. M.	Diam. M. M.	Price Per Dozen	Diam. in Decimals 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
2/32	$3.25	3 1/2
3/32	3.25	4
4/32	3.25	4 5/8
5/32	3.50	5 3/16
6/32	4.00	5 11/16
7/32	4.50	6 1/8
8/32	5.00	6 9/16
9/32	5.50	7
10/32	6.00	7 1/2
11/32	6.50	7 7/8
12/32	7.00	8
13/32	7.50	8 1/4
14/32	8.00	8 1/2
15/32	8.75	8 5/8
16/32	9.50	9
17/32	10.25	9
18/32	11.00	9 3/8
19/32	11.75	9 1/2
20/32	12.50	9 5/8
21/32	14.50	9 7/8
22/32	16.50	9 7/8
23/32	18.50	9 7/8
24/32	21.00	10
25/32	24.00	10
26/32	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 3/8 inch x 5/8 inch x 1½ 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**		
1/8	$ .90		4 3/16	1 13/16	27/32	$1.90	**$4.20**	7 1/4	4 15/16
5/32	.95		4 7/16	2 3/32	7/8	2.05	**4.50**	7 1/2	5 3/16
3/16	.95		4 11/16	2 5/16	29/32	2.20	**4.70**	7 3/4	5 7/16
7/32	1.00		4 13/16	2 17/32	15/16	2.30	**5.00**	8	5 11/16
1/4	1.00	**$2.50**	5	2 9/16	31/32	2.40	**5.25**	8 1/4	5 15/16
9/32	1.05	**2.55**	5	2 9/16	1	2.55	**5.50**	8 1/2	6 3/16
5/16	1.10	**2.60**	5	2 9/16	1 1/32	2.70	**5.75**	8 3/4	6 7/16
11/32	1.15	**2.65**	5	2 3/4	1 1/16	2.85	**6.00**	9	6 11/16
3/8	1.20	**2.70**	6	3 3/4	1 3/32	3.00	**6.30**	9	6 11/16
13/32	1.25	**2.75**	6 1/4	4	1 1/8	3.10	**6.70**	9	6 11/16
7/16	1.25	**2.80**	6 1/4	4	1 5/32	3.25	**7.00**	9	6 11/16
15/32	1.30	**2.85**	6 1/4	4	1 3/16	3.35	**7.30**	9	6 11/16
1/2	1.30	**2.90**	6 1/2	4 1/4	1 7/32	3.50	**7.60**	9	6 11/16
17/32	1.35	**2.95**	6 1/2	4 1/4	1 1/4	3.65	**7.90**	9	6 11/16
9/16	1.35	**3.00**	6 1/2	4 1/4	1 9/32	3.75	**8.25**	9	6 11/16
19/32	1.40	**3.10**	6 1/2	4 1/4	1 5/16	3.90	**8.60**	9	6 11/16
5/8	1.40	**3.20**	6 1/2	4 1/4	1 11/32	4.05	**9.00**	9	6 11/16
21/32	1.45	**3.30**	6 1/2	4 3/16	1 3/8	4.20	**9.40**	9	6 11/16
11/16	1.45	**3.40**	6 1/2	4 3/16	1 13/32	4.35	**9.80**	9	6 11/16
23/32	1.50	**3.50**	6 1/2	4 3/16	1 7/16	4.50	**10.20**	9	6 11/16
3/4	1.55	**3.65**	6 1/2	4 3/16	1 15/32	4.65	**10.60**	9	6 11/16
25/32	1.65	**3.80**	6 3/4	4 7/16	1 1/2	4.80	**11.00**	9	6 11/16
13/16	1.75	**4.00**	7	4 11/16					

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

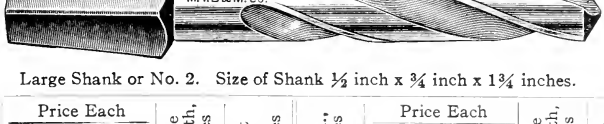
64th sizes furnished at price of next larger size.

No. 401
Carbon Steel

No. 1401
High Speed Steel

TAPER SQUARE SHANK DRILLS

FITTING RATCHETS



Large Shank or No. 2. Size of Shank ½ inch x ¾ inch x 1¾ inches.

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

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

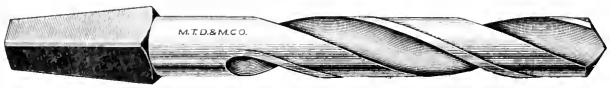
64th sizes furnished at price of next larger size.

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 9½ x 16 x 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					

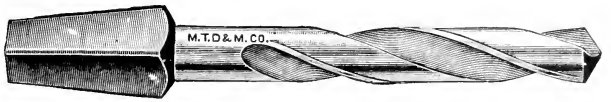
When ordering Taper Square Shank Drills for Packer Ratchets please state number of ratchet and name of manufacturer.

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 Carbon Steel	Price Each **High Speed Steel**	Whole Length, M. M.	Twist Cut, M. M.	Diam., M. M.	Price Each Carbon Steel	Price Each **High Speed Steel**	Whole Length, M. M.	Twist Cut, M. M.
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.

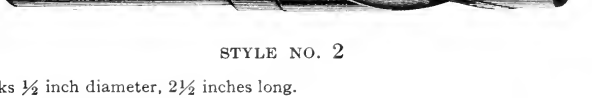
Note.—In ordering drills for above, specify manufacturer and size of press or list number of drills desired.

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 ½ inch diameter, 2½ inches long.

Diam. Inches	Price Each Carbon Steel	Price Each High Speed Steel	Whole Length, Inches	Twist Cut, Inches	Diam. Inches	Price Each Carbon Steel	Price Each High Speed Steel	Whole Length, Inches	Twist Cut, Inches
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 ½ inch diameter, 2½ inches long.

Diam., Inches	Price Each	Whole Length, Inches	Twist Cut, Inches
3/8	$ .80	6¾	3½
13/32	.90	7	3¾
7/16	1.00	7¼	4
15/32	1.10	7½	4¼
1/2	1.20	7¾	4½
17/32	1.30	8	4¾
9/16	1.40	8¼	5
19/32	1.50	8½	5¼
5/8	1.60	8¾	5½
21/32	1.70	9	5¾
11/16	1.80	9¼	6
23/32	1.90	9½	6¼
3/4	2.00	9¾	6½
25/32	2.10	9⅞	6⅝
13/16	2.20	10	6¾
27/32	2.40	10¼	7
7/8	2.60	10½	7¼
29/32	2.80	10⅝	7⅜
15/16	3.00	10¾	7½
31/32	3.25	10⅞	7⅝
1	3.50	11	7⅜

For sizes smaller than 3/8 see style No. 412.
For list of Blacksmiths' Drill presses see page 62.

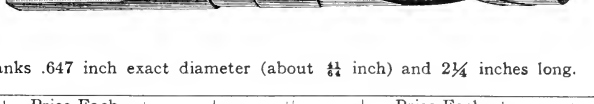
No. 418
Carbon Steel

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 $\frac{41}{64}$ inch) and 2¼ 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: Carbon Steel	Price Each: High Speed Steel	Whole Length, Inches	Morse Taper Shank
1/4	$ .60	**$1.10**	6 1/8	No. 1
9/32	.65	**1.20**	6 1/4	
5/16	.70	**1.30**	6 3/8	
11/32	.75	**1.40**	6 1/2	
3/8	.80	**1.50**	6 3/4	
13/32	.90	**1.65**	7	
7/16	1.00	**1.75**	7 1/4	
15/32	1.10	**1.90**	7 1/2	
1/2	1.20	**2.00**	7 3/4	
17/32	1.30	**2.15**	8	
9/16	1.40	**2.25**	8 1/4	
19/32	1.50	**2.40**	8 1/2	No. 2
5/8	1.60	**2.50**	8 3/4	
21/32	1.70	**2.75**	9	
11/16	1.80	**3.00**	9 1/4	
23/32	1.90	**3.25**	9 1/2	
3/4	2.00	**3.50**	9 3/4	
25/32	2.10	**3.75**	9 7/8	
13/16	2.20	**4.00**	10	
27/32	2.40	**4.40**	10 1/4	
7/8	2.60	**4.75**	10 1/2	
29/32	2.80	**5.15**	10 5/8	
15/16	3.00	**5.50**	10 3/4	No. 3
31/32	3.25	**5.90**	10 7/8	
1	3.50	**6.25**	11	
1 1/32	3.75	**6.75**	11 1/8	
1 1/16	4.00	**7.25**	11 1/4	
1 3/32	4.25	**7.75**	11 1/2	

Diameter, Inches	Price Each: Carbon Steel	Price Each: High Speed Steel	Whole Length, Inches	Morse Taper Shank
1 1/8	$4.50	**$8.25**	11 3/4	No. 3
1 5/32	4.75	**8.90**	11 7/8	
1 3/16	5.00	**9.50**	12	
1 7/32	5.25	**10.15**	12 1/8	
1 1/4	5.50	**10.75**	12 1/2	
1 9/32	5.75	**11.50**	14 1/8	No. 4
1 5/16	6.00	**12.25**	14 1/4	
1 11/32	6.25	**13.00**	14 3/8	
1 3/8	6.50	**13.75**	14 1/2	
1 13/32	7.00	**14.65**	14 5/8	
1 7/16	7.50	**15.50**	14 3/4	
1 15/32	8.00	**16.40**	14 7/8	
1 1/2	8.50	**17.25**	15	
1 17/32	9.00	**18.15**	15	
1 9/16	9.50	**19.00**	15 1/4	
1 19/32	10.00	**20.00**	15 1/4	
1 5/8	10.50	**21.00**	15 1/2	
1 21/32	11.00	**22.00**	15 1/2	
1 11/16	11.50	**23.00**	15 3/4	
1 23/32	12.00	**24.00**	15 3/4	
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	
1 27/32	14.75	**28.75**	16 1/4	
1 7/8	15.50	**30.00**	16 1/2	
1 29/32	16.25	**31.25**	16 1/2	
1 15/16	17.00	**32.50**	16 1/2	
1 31/32	17.75	**33.75**	16 1/2	
2	18.50	**35.00**	16 1/2	

No. 428
Carbon Steel

No. 1428
High Speed Steel

STRAIGHTWAY DRILLS

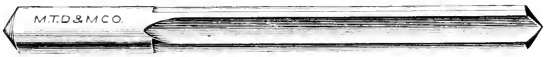
STRAIGHT SHANK TAPER LENGTH

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 3/16	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**		
1/16	$1.60	**$5.70**	2 1/2	1 1/4
5/64	1.65	**5.70**	2 5/8	1 3/8
3/32	1.70	**5.70**	2 3/4	1 1/2
7/64	1.75	**5.90**	2 7/8	1 11/16
1/8	1.80	**5.90**	3	1 13/16
9/64	1.85	**6.10**	3 1/8	1 15/16
5/32	1.90	**6.10**	3 1/4	2 3/32
11/64	2.00	**6.30**	3 3/8	2 7/32
3/16	2.25	**6.30**	3 1/2	2 5/16
13/64	2.50	**7.00**	3 5/8	2 7/16
7/32	2.75	**7.00**	3 3/4	2 17/32
15/64	3.00	**7.35**	3 7/8	2 21/32
1/4	3.25	**7.35**	4	2 3/4
17/64	3.50	**9.10**	4 1/8	2 7/8
9/32	3.80	**9.10**	4 1/4	2 31/32
19/64	4.00	**10.50**	4 3/8	3 3/32
5/16	4.35	**10.50**	4 1/2	3 3/16
21/64	4.70	**12.00**	4 5/8	3 5/16
11/32	5.05	**12.00**	4 3/4	3 13/32
23/64	5.50	**13.50**	4 7/8	3 17/32
3/8	6.00	**13.50**	5	3 5/8
25/64	6.50	**15.00**	5 1/8	3 3/4
13/32	7.00	**15.00**	5 1/4	3 27/32
27/64	7.75	**17.00**	5 3/8	3 31/32
7/16	8.50	**17.00**	5 1/2	4 1/16
29/64	9.25	**18.75**	5 5/8	4 3/16
15/32	10.00	**18.75**	5 3/4	4 9/32
31/64	11.00	**20.00**	5 7/8	4 13/32
1/2	12.00	**20.00**	6	4 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
1/32	$1.50	1 1/8	5/8	3/16	$2.25	1 1/2	1
3/64	1.55	1 1/8	5/8	13/64	2.50	1 1/2	1
1/16	1.60	1 1/4	3/4	7/32	2.75	1 1/2	1
5/64	1.65	1 1/4	3/4	15/64	3.00	1 1/2	1
3/32	1.70	1 1/4	3/4	1/4	3.25	1 1/2	1
7/64	1.75	1 1/4	3/4	17/64	3.50	1 1/2	1
1/8	1.80	1 1/4	3/4	9/32	3.80	1 1/2	1
9/64	1.85	1 1/4	3/4	19/64	4.00	1 1/2	1
5/32	1.90	1 1/2	1	5/16	4.35	1 1/2	1
11/64	2.00	1 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 1/4	3/4	45	$1.70	1 1/4	3/4
35	1.75	1 1/4	3/4	50	1.65	1 1/4	3/4
40	1.75	1 1/4	3/4	55	1.60	1 1/4	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

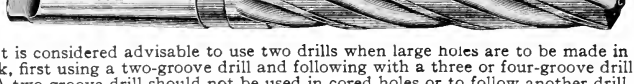
Diameter, Inches	Price Per Dozen		Whole Length, Inches	Twist Cut, Inches	Diam. Shank, Inches	Decimal Equivalent
	Carbon Steel	**High Speed Steel**				
9/32	$3.80	**$9.10**	3	1¾	9/32	.2812
3/8	6.00	**13.50**	3	1¾	9/32	.375
3/8	6.00	**13.50**	3	1¾	3/8	.375

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.

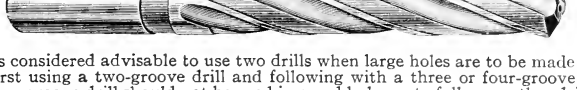
Diam., Inches	Price Each		Whole Length, Inches	Morse Taper Shank
	Carbon Steel	**High Speed Steel**		
1/4	$1.00	**$2.00**	6 1/8	No. 1
9/32	1.05	**2.15**	6 1/4	
5/16	1.10	**2.25**	6 3/8	
11/32	1.15	**2.40**	6 1/2	
3/8	1.20	**2.50**	6 3/4	
13/32	1.25	**2.65**	7	
7/16	1.30	**2.75**	7 1/4	
15/32	1.40	**2.90**	7 1/2	
1/2	1.50	**3.00**	7 3/4	
17/32	1.60	**3.15**	8	
9/16	1.70	**3.25**	8 1/4	
19/32	1.80	**3.50**	8 1/2	No. 2
5/8	1.90	**3.75**	8 3/4	
21/32	2.00	**4.00**	9	
11/16	2.10	**4.25**	9 1/4	
23/32	2.25	**4.65**	9 1/2	
3/4	2.40	**5.00**	9 3/4	
25/32	2.55	**5.40**	9 7/8	
13/16	2.70	**5.75**	10	
27/32	2.85	**6.15**	10 1/4	
7/8	3.00	**6.50**	10 1/2	
29/32	3.15	**7.00**	10 5/8	
15/16	3.30	**7.50**	10 3/4	No. 3
31/32	3.45	**8.00**	10 7/8	
1	3.60	**8.50**	11	
1 1/32	3.75	**9.00**	11 1/8	
1 1/16	4.00	**9.50**	11 1/4	
1 3/32	4.25	**10.25**	11 1/2	
1 1/8	4.50	**11.00**	11 3/4	
1 5/32	4.75	**11.75**	11 7/8	
1 3/16	5.00	**12.50**	12	
1 7/32	5.25	**13.25**	12 1/8	
1 1/4	5.50	**14.00**	12 1/2	
1 9/32	5.75	**14.75**	14 1/8	No. 4
1 5/16	6.00	**15.50**	14 1/4	
1 11/32	6.25	**16.25**	14 3/8	
1 3/8	6.50	**17.00**	14 1/2	

Diam., Inches	Price Each		Whole Length, Inches	Morse Taper Shank
	Carbon Steel	**High Speed Steel**		
1 13/32	$7.00	**$17.75**	14 5/8	No. 4
1 7/16	7.50	**18.50**	14 3/4	
1 15/32	8.00	**19.25**	14 7/8	
1 1/2	8.50	**20.00**	15	
1 17/32	9.00	**20.75**	15	
1 9/16	9.50	**21.50**	15 1/4	
1 19/32	10.00	**22.25**	15 1/4	
1 5/8	10.50	**23.00**	15 1/2	
1 21/32	11.00	**23.75**	15 1/2	
1 11/16	11.50	**24.50**	15 3/4	
1 23/32	12.00	**25.50**	15 3/4	
1 3/4	12.50	**26.50**	16	
1 25/32	13.25	**27.50**	16	
1 13/16	14.00	**28.50**	16 1/4	
1 27/32	14.75	**29.50**	16 1/4	
1 7/8	15.50	**30.50**	16 1/2	
1 29/32	16.25	**31.50**	16 1/2	
1 15/16	17.00	**32.50**	16 1/2	
1 31/32	17.75	**33.50**	16 1/2	
2	18.50	**34.50**	16 1/2	
2 1/32	19.25	**36.00**	16 1/2	No. 5
2 1/16	20.00	**37.50**	17	
2 1/8	21.50	**40.50**	17	
2 3/16	23.00	**43.75**	17	
2 1/4	24.50	**47.50**	17 1/2	
2 5/16	26.00	**52.50**	17 1/2	
2 3/8	27.50	**60.00**	18	
2 7/16	29.00	**65.00**	18 1/2	
2 1/2	30.50	**70.00**	19	
2 9/16	32.00	**76.25**	19 1/4	
2 5/8	34.00	**82.50**	19 1/2	
2 11/16	36.00	**88.75**	20	
2 3/4	38.00	**95.00**	20 1/2	
2 13/16	40.50	**102.50**	20 1/2	
2 7/8	43.00	**110.00**	21	
2 15/16	45.50	**117.50**	21	
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 17/32	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 19/32	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 21/32	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 or drilling solid stock but for enlarging a hole already made.

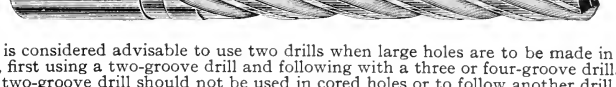
Diam., Inches	Price Each: Carbon Steel	Price Each: **High Speed Steel**	Whole Length, Inches	Morse Taper Shank
1/2	$1.50	**$3.00**	7 3/4	No. 1
17/32	1.60	**3.15**	8	
9/16	1.70	**3.25**	8 1/4	
19/32	1.80	**3.50**	8 1/2	No. 2
5/8	1.90	**3.75**	8 3/4	
21/32	2.00	**4.00**	9	
11/16	2.10	**4.25**	9 1/4	
23/32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

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.

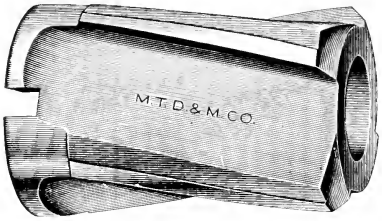
A two-groove drill should not be used in cored holes or to follow another drill.

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

No. 460
Carbon Steel

No. 1460
High Speed Steel



SHELL DRILLS

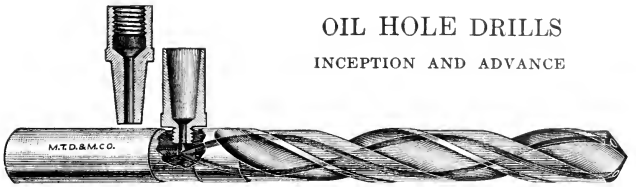
WITH TAPER HOLES

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 11/16	$5.10	**$9.75**	3 1/2	1	3 1/8	$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 5/16	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 11/16	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 11/16 inches to and including 3 1/2 inches have four flutes; 3 9/16 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 2½ inches and smaller in diameter have holes through the solid metal, while with sizes larger than 2½ inches it has been found advisable to mill the oil channels and cover them. These drills are not made smaller than $\frac{3}{64}$ diameter except at customer's risk. Sizes $\frac{1}{32}$ 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

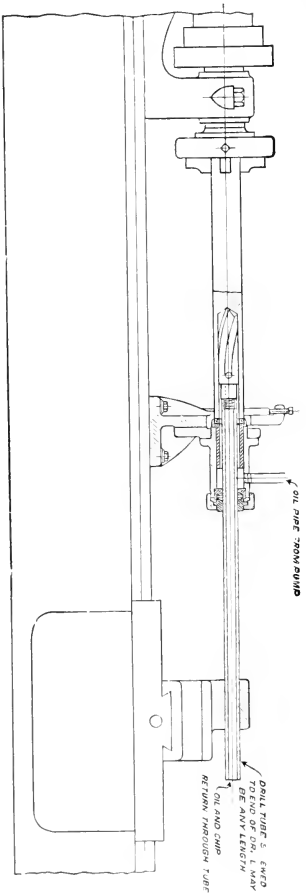
WITH TAPER SHANKS

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 3½ inches, whole length 52 inches, length of shank $8\frac{5}{16}$ inches.

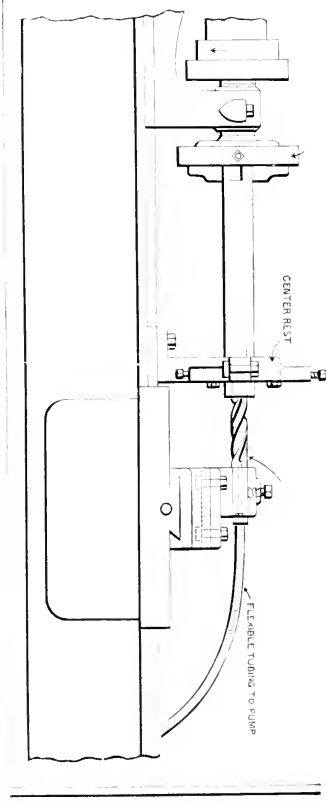
INFORMATION AS TO USE OF DRILLS

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.

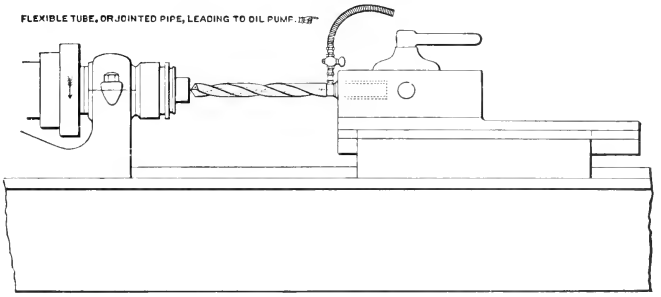


In using the Hollow Drill the hole is first to be started by means of a short drill of the size of the hole desired, and drilled to a depth equal to the length of the body of the Hollow Drill afterwards to be employed. The body of the Hollow Drill acts as a stuffing, compelling the oil to follow the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

INFORMATION AS TO USE OF DRILLS

WITH HOLES FOR LUBRICANTS

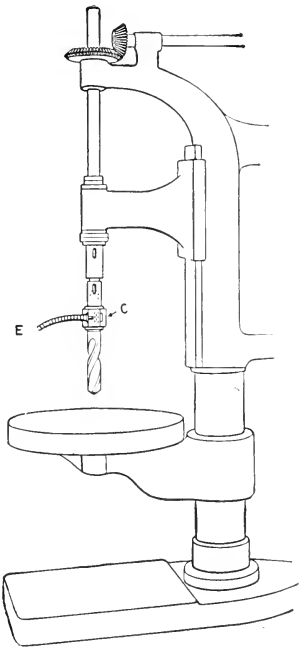
Cut showing a Drill with Oil Holes as used in a Turret Head Lathe.
For Drills with Oil Holes of style shown below, see page 86.
The Drills are furnished with Straight or Taper Shanks, as desired.



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.



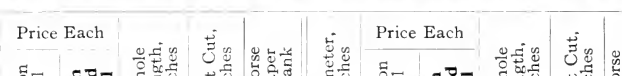
A flexible tube *E* conveys oil from the oil pump to the chuck *C*, which admits of passage of oil to the point of the Drill.

OIL HOLE DRILLS

WITH MORSE TAPER SHANKS AND HOLES THROUGH SOLID METAL FOR LUBRICANT

No. 473 Carbon Steel — **No. 1473 High Speed Steel**

No. 474 Carbon Steel — **No. 1474 High Speed Steel**



Diameter, Inches	Price Each: Carbon Steel	Price Each: High Speed Steel	Whole Length, Inches	Twist Cut, Inches	Morse Taper Shank
3/8	$3.00	Prices upon application	6 3/4	3 7/16	No. 1
25/64	3.15		7	3 11/16	
13/32	3.15		7	3 11/16	
27/64	3.30		7 1/4	3 15/16	
7/16	3.30		7 1/4	3 15/16	
29/64	3.85		7 1/2	4 3/16	
* 15/32	3.85		7 1/2	4 3/16	
31/64	4.00		7 3/4	4 7/16	
1/2	4.00		7 3/4	4 7/16	
33/64	4.15		8	4 11/16	
17/32	4.15		8	4 11/16	
35/64	4.30		8 1/4	4 15/16	
9/16	4.30		8 1/4	4 15/16	
37/64	4.50		8 1/2	4 5/8	No. 2
19/32	4.50		8 1/2	4 5/8	
39/64	4.70		8 3/4	4 7/8	
5/8	4.70		8 3/4	4 7/8	
41/64	4.80		9	5 1/8	
21/32	4.80		9	5 1/8	
43/64	4.95		9 1/4	5 3/8	
11/16	4.95		9 1/4	5 3/8	
45/64	5.10		9 1/2	5 5/8	

Diameter, Inches	Price Each: Carbon Steel	Price Each: High Speed Steel	Whole Length, Inches	Twist Cut, Inches	Morse Taper Shank
23/32	$5.10	Prices upon application	9 1/2	5 5/8	No. 2
47/64	5.20		9 3/4	5 7/8	
3/4	5.20		9 3/4	5 7/8	
49/64	5.35		9 7/8	6	
25/32	5.35		9 7/8	6	
51/64	5.50		10	6 1/8	
13/16	5.50		10	6 1/8	
53/64	5.70		10 1/4	6 3/8	
27/32	5.70		10 1/4	6 3/8	
55/64	5.90		10 1/2	6 5/8	
7/8	5.90		10 1/2	6 5/8	
57/64	6.05		10 5/8	6 3/4	
29/32	6.05		10 5/8	6 3/4	
59/64	6.20		10 3/4	6 1/8	No. 3
15/16	6.20		10 3/4	6 1/8	
61/64	6.35		10 7/8	6 1/4	
31/32	6.35		10 7/8	6 1/4	
63/64	6.50		11	6 3/8	
1	6.50		11	6 3/8	
1 1/64	6.80		11 1/8	6 1/2	
1 1/32	6.80		11 1/8	6 1/2	
1 3/64	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 1/4 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: Carbon Steel	Price Each: High Speed Steel	Whole Length, Inches	Twist Cut, Inches	Morse Taper Shank
1 1/16	$7.10	Prices upon application	11 1/4	6 5/8	No. 3
1 5/64	7.45		11 1/2	6 7/8	
1 3/32	7.45		11 1/2	6 7/8	
1 7/64	7.80		11 3/4	7 1/8	
1 1/8	7.80		11 3/4	7 1/8	
1 9/64	8.00		11 7/8	7 1/4	
1 5/32	8.00		11 7/8	7 1/4	
1 11/64	8.20		12	7 3/8	
1 3/16	8.20		12	7 3/8	
1 13/64	8.40		12 1/8	7 1/2	
1 7/32	8.40		12 1/8	7 1/2	
1 15/64	8.70		12 1/2	7 7/8	
1 1/4	8.70		12 1/2	7 7/8	
1 17/64	9.40		14 1/8	8 1/2	No. 4
1 9/32	9.40		14 1/8	8 1/2	
1 19/64	10.15		14 1/4	8 5/8	
1 5/16	10.15		14 1/4	8 5/8	
1 21/64	10.95		14 3/8	8 3/4	
1 11/32	10.95		14 3/8	8 3/4	
1 23/64	11.80		14 1/2	8 7/8	
1 3/8	11.80		14 1/2	8 7/8	
1 25/64	12.30		14 5/8	9	
1 13/32	12.30		14 5/8	9	
1 27/64	12.85		14 3/4	9 1/8	
1 7/16	12.85		14 3/4	9 1/8	
1 29/64	13.35		14 7/8	9 1/4	
1 15/32	13.35		14 7/8	9 1/4	
1 31/64	14.00		15	9 3/8	
1 1/2	14.00		15	9 3/8	
1 33/64	14.20		15	9 3/8	

Diam., Inches	Price Each: Carbon Steel	Price Each: High Speed Steel	Whole Length, Inches	Twist Cut, Inches	Morse Taper Shank
1 17/32	$14.20	Prices upon application	15	9 3/8	No. 4
1 35/64	14.40		15 1/4	9 5/8	
1 9/16	14.40		15 1/4	9 5/8	
1 37/64	14.70		15 1/4	9 5/8	
1 19/32	14.70		15 1/4	9 5/8	
1 39/64	15.00		15 1/2	9 7/8	
1 5/8	15.00		15 1/2	9 7/8	
1 41/64	15.35		15 1/2	9 7/8	
1 21/32	15.35		15 1/2	9 7/8	
1 43/64	15.70		15 3/4	10 1/8	
1 11/16	15.70		15 3/4	10 1/8	
1 45/64	16.10		15 3/4	10 1/8	
1 23/32	16.10		15 3/4	9 11/16	
1 47/64	16.50		16	9 15/16	
1 3/4	16.50		16	9 15/16	
1 49/64	16.75		16	9 15/16	
1 25/32	16.75		16	9 15/16	
1 51/64	17.00		16 1/4	10 3/16	
1 13/16	17.00		16 1/4	10 1/8	
1 53/64	17.25		16 1/4	10 1/8	
1 27/32	17.25		16 1/4	10 1/8	
1 55/64	17.50		16 1/2	10 3/8	
1 7/8	17.50		16 1/2	10 3/8	
1 57/64	17.85		16 1/2	10 3/8	
1 29/32	17.85		16 1/2	10 3/8	
1 59/64	18.20		16 1/2	10 3/8	
1 15/16	18.20		16 1/2	10 1/4	
1 61/64	18.60		16 1/2	10 1/4	
1 31/32	18.60		16 1/2	10 1/4	
1 63/64	19.00		16 1/2	10 1/4	
2	19.00		16 1/2	10 1/4	

No. 479
Carbon Steel

OIL HOLE DRILLS

WITH STRAIGHT SHANKS

AND HOLES THROUGH SOLID METAL FOR LUBRICANT

No. 1479
High Speed Steel

Diam. Inches	Price Each Carbon Steel	Price Each High Speed Steel	Whole Length Inches	Twist Cut, Inches	Diam. Inches	Price Each Carbon Steel	Price Each High Speed Steel	Whole Length Inches	Twist Cut, Inches
3/8	$3.00	Prices upon application	6 3/4	4 1/4	25/32	$5.35	Prices upon application	9 7/8	6 1/2
25/64	3.15		7	4 3/8	51/64	5.50		10	6 5/8
13/32	3.15		7	4 3/8	13/16	5.50		10	6 5/8
27/64	3.30		7 1/4	4 5/8	53/64	5.70		10 1/4	6 3/4
7/16	3.30		7 1/4	4 5/8	27/32	5.70		10 1/4	6 3/4
29/64	3.85		7 1/2	4 7/8	55/64	5.90		10 1/2	7
*15/32	3.85		7 1/2	4 7/8	7/8	5.90		10 1/2	7
31/64	4.00		7 3/4	5	57/64	6.05		10 5/8	7
1/2	4.00		7 3/4	5	29/32	6.05		10 5/8	7
33/64	4.15		8	5 1/4	59/64	6.20		10 3/4	7
17/32	4.15		8	5 1/4	15/16	6.20		10 3/4	7
35/64	4.30		8 1/4	5 3/8	61/64	6.35		10 7/8	7 1/8
9/16	4.30		8 1/4	5 3/8	31/32	6.35		10 7/8	7 1/8
37/64	4.50		8 1/2	5 5/8	63/64	6.50		11	7 3/16
19/32	4.50		8 1/2	5 5/8	1	6.50		11	7 3/16
39/64	4.70		8 3/4	5 3/4	1 1/64	6.80		11 1/8	7 5/16
5/8	4.70		8 3/4	5 3/4	1 1/32	6.80		11 1/8	7 5/16
41/64	4.80		9	5 7/8	1 3/64	7.10		11 1/4	7 3/8
21/32	4.80		9	5 7/8	1 1/16	7.10		11 1/4	7 3/8
43/64	4.95		9 1/4	6	1 5/64	7.45		11 1/2	7 5/8
11/16	4.95		9 1/4	6	1 3/32	7.45		11 1/2	7 5/8
45/64	5.10		9 1/2	6 3/16	1 7/64	7.80		11 3/4	7 7/8
23/32	5.10		9 1/2	6 3/16	1 1/8	7.80		11 3/4	7 7/8
47/64	5.20		9 3/4	6 3/8	1 9/64	8.00		11 7/8	8
3/4	5.20		9 3/4	6 3/8	1 5/32	8.00		11 7/8	8
49/64	5.35		9 7/8	6 1/2	1 11/64	8.20		12	8 1/8

*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.

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.

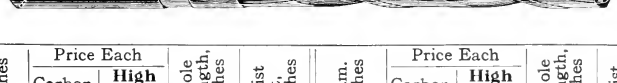
No. 479
Carbon Steel

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	Prices upon application	12	8 1/8	1 39/64	$15.00	Prices upon application	15 1/2	10
1 13/64	8.40		12 1/8	8 1/8	1 5/8	15.00		15 1/2	10
1 7/32	8.40		12 1/8	8 1/8	1 41/64	15.35		15 1/2	10
1 15/64	8.70		12 1/2	8 1/2	1 21/32	15.35		15 1/2	10
1 1/4	8.70		12 1/2	8 1/2	1 43/64	15.70		15 3/4	10 1/4
1 17/64	9.40		14 1/8	9 1/8	1 11/16	15.70		15 3/4	10 1/4
1 9/32	9.40		14 1/8	9 1/8	1 45/64	16.10		15 3/4	10 1/4
1 19/64	10.15		14 1/4	9 1/4	1 23/32	16.10		15 3/4	10 1/4
1 5/16	10.15		14 1/4	9 1/4	1 47/64	16.50		16	10 1/2
1 21/64	10.95		14 3/8	9 3/8	1 3/4	16.50		16	10 1/2
1 11/32	10.95		14 3/8	9 3/8	1 49/64	16.75		16	10 1/2
1 23/64	11.80		14 1/2	9 1/2	1 25/32	16.75		16	10 1/2
1 3/8	11.80		14 1/2	9 1/2	1 51/64	17.00		16 1/4	10 3/4
1 25/64	12.30		14 5/8	9 1/2	1 13/16	17.00		16 1/4	10 3/4
1 13/32	12.30		14 5/8	9 1/2	1 53/64	17.25		16 1/4	10 3/4
1 27/64	12.85		14 3/4	9 5/8	1 27/32	17.25		16 1/4	10 3/4
1 7/16	12.85		14 3/4	9 5/8	1 55/64	17.50		16 1/2	11
1 29/64	13.35		14 7/8	9 3/4	1 7/8	17.50		16 1/2	11
1 15/32	13.35		14 7/8	9 3/4	1 57/64	17.85		16 1/2	11
1 31/64	14.00		15	9 7/8	1 29/32	17.85		16 1/2	11
1 1/2	14.00		15	9 7/8	1 59/64	18.20		16 1/2	11
1 33/64	14.20		15	9 1/2	1 15/16	18.20		16 1/2	11
1 17/32	14.20		15	9 1/2	1 61/64	18.60		16 1/2	11
1 35/64	14.40		15 1/4	9 3/4	1 31/32	18.60		16 1/2	11
1 9/16	14.40		15 1/4	9 3/4	1 63/64	19 00		16 1/2	11
1 37/64	14.70		15 1/4	9 3/4	2	19.00		16 1/2	11
1 19/32	14.70		15 1/4	9 3/4					

For information in regard to manner of use see page 78.
These Drills 1 33/64 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 Carbon Steel: Whole Length, 8½ Inches	Carbon Steel: Whole Length, 10½ Inches	Carbon Steel: Whole Length, 13 Inches	High Speed Steel	Twist Cut, Inches: Whole Length, 8½ Inches	Twist Cut, Inches: Whole Length, 10½ Inches	Twist Cut, Inches: Whole Length, 13 Inches
31/64	1/2	$4.60	$5.30	$5.90	Prices upon application	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

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

No. 480
Carbon Steel

OIL HOLE DRILLS

No. 1480
High Speed Steel

WITH STRAIGHT SHANKS
AND HOLES THROUGH SOLID METAL FOR LUBRICANT

Diameter, Inches		Price Each Carbon Steel: Whole Length, 8½ Inches	Whole Length, 10½ Inches	Whole Length, 13 Inches	High Speed Steel	Twist Cut, Inches: Whole Length, 8½ Inches	Whole Length, 10½ Inches	Whole Length, 13 Inches
1 17/64	1 9/32	$7.10	$8.30	$9.30		5	6¾	9
1 19/64	1 5/16	7.40	8.60	9.60		5	6¾	9
1 21/64	1 11/32	7.70	9.00	10.00		5	6¾	9
1 23/64	1⅜	8.00	9.30	10.30		5	6¾	9
1 25/64	1 13/32	8.30	9.60	10.70		5	6¾	9
1 27/64	1 7/16	8.60	9.90	11.20		5	6¾	9
1 29/64	1 15/32	8.90	10.30	11.50		5	6¾	9
1 31/64	1½	9.20	10.50	11.90		5	6¾	9
1 33/64	1 17/32	9.40	10.70	12.00		4¾	6½	8¾
1 35/64	1 9/16	9.60	10.90	12.10		4¾	6½	8¾
1 37/64	1 19/32	9.80	11.00	12.20		4¾	6½	8¾
1 39/64	1⅝	10 00	11.20	12.40		4¾	6½	8¾
1 41/64	1 21/32	10.20	11.40	12.50		4¾	6½	8¾
1 43/64	1 11/16	10.30	11.50	12.70		4¾	6½	8¾
1 45/64	1 23/32	10.40	11.60	12.90		4¾	6½	8¾
1 47/64	1¾	10.50	11.80	13.00		4¾	6½	8¾
1 49/64	1 25/32	10.70	12.00	13.20		4¾	6½	8¾
1 51/64	1 13/16	10.90	12.20	13.40		4¾	6½	8¾
1 53/64	1 27/32	11.00	12.40	13.60		4¾	6½	8¾
1 55/64	1⅞	11.20	12.50	13.70		4¾	6½	8¾
1 57/64	1 29/32	11.40	12.70	14.00		4¾	6½	8¾
1 59/64	1 15/16	11.60	12.90	14.20		4¾	6½	8¾
1 61/64	1 31/32	11.90	13.10	14.40		4¾	6½	8¾
1 63/64	2	12.10	13.30	14.60		4¾	6½	8¾

Prices upon application

Drills 1 33/64 to 2 inches diameter, 8½ inches long, have shanks 1½ inches diameter, 3 inches long.

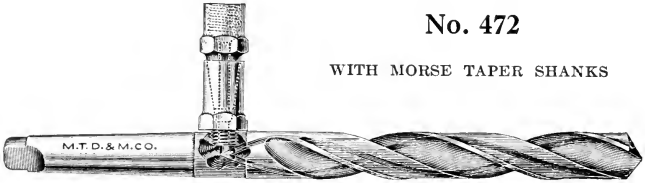
Drills 1 33/64 to 2 inches diameter, 10½ inches long, have shanks 1½ inches diameter, 3¼ inches long.

Drills 1 33/64 to 2 inches diameter, 13 inches long, have shanks 1½ inches diameter, 3½ inches long.

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

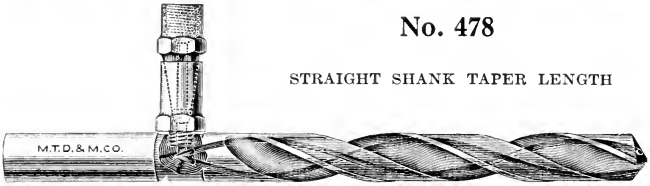
OIL HOLE DRILLS

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 1¼ INCHES DIAMETER, 3 INCHES LONG

WHOLE LENGTH 8½, 10½ 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

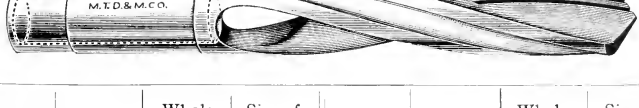
WITH STRAIGHT SHANKS 32 M. M. DIAMETER, 76 M. M. LONG

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
5/8	$5.50	6	3/8	1 7/8	$14.00	9	1 1/8
11/16	5.75	6	3/8	1 15/16	15.00	9	1 1/8
3/4	6.00	6	7/16	2	16.00	9	1 1/8
13/16	6.25	6 1/2	7/16	2 1/16	17.00	10	1 1/4
7/8	6.50	6 1/2	1/2	2 1/8	18.00	10	1 1/4
15/16	6.75	6 1/2	1/2	2 3/16	19.00	10	1 1/4
1	7.00	7	9/16	2 1/4	20.00	10	1 3/8
1 1/16	7.25	7	9/16	2 5/16	21.25	10	1 3/8
1 1/8	7.50	7	5/8	2 3/8	22.50	10	1 3/8
1 3/16	7.75	7	11/16	2 7/16	23.75	10	1 3/8
1 1/4	8.00	7 1/2	3/4	2 1/2	25.00	10	1 3/8
1 5/16	8.25	7 1/2	13/16	2 9/16	26 50	12	1 1/2
1 3/8	8.50	7 1/2	7/8	2 5/8	28.00	12	1 1/2
1 7/16	9.00	7 1/2	7/8	2 11/16	29.50	12	1 1/2
1 1/2	9.50	8	15/16	2 3/4	31.00	12	1 1/2
1 9/16	10.00	8	15/16	2 13/16	32.50	12	1 1/2
1 5/8	10.50	8	1	2 7/8	34.00	12	1 1/2
1 11/16	11.00	8	1	2 15/16	35.50	12	1 1/2
1 3/4	12.00	9	1 1/8	3	37.00	12	1 1/2
1 13/16	13.00	9	1 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.

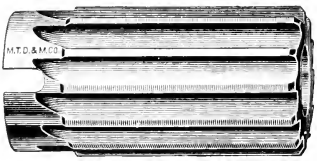
TOOLS FOR USE IN TURRETS OF SCREW MACHINES, TURRET LATHES AND BORING MILLS

Floating Sockets, No. 250, page 7.

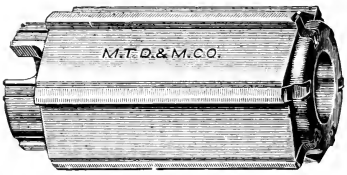
Solid Sockets, No. 251, page 7.

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.

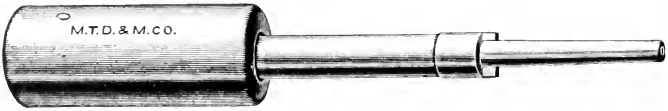


Expanding Shell Reamer, No. 741, with straight holes
Prices upon application.



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.

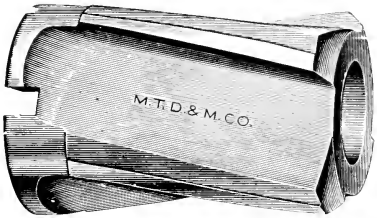


TOOLS FOR TURRET MACHINES

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
3/8	$ .50	4 1/4	2 1/4	3
1/2	.60	4 1/4	1 15/16	2 1/2
5/8	.75	4 1/4	1 13/16	2 1/2
3/4	.90	5	2 1/2	3 1/4
7/8	1.05	5	2 1/2	3 1/4
1	1.20	5	2 7/16	3 1/4

No. 491

STRAIGHT SHANK THREE-GROOVE COUNTERSINKS

Included angle of cutting point is 82°

STRAIGHT SHANKS 1/2 INCH DIAMETER BY 2 INCHES LONG

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

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

No. 495
Carbon Steel

No. 1495
High Speed Steel

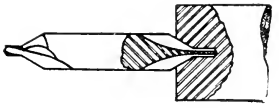
COMBINED DRILLS AND COUNTERSINKS

A C B

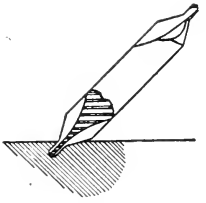
Included Angle, 60°. Other angles made to order at special prices.

Always specify Style Number and Size Number

Size No.	Diam. of Drill at A B	Approx. Fractional Equivalents	Price Per Dozen		Diameter of Body C, Inches	Decimal Equivalents A B
			Carbon Steel	High Speed Steel		
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	$\frac{3}{32}$ x $\frac{1}{8}$	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

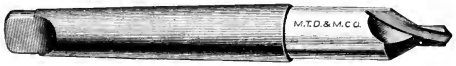
Size Number	Diameter of Drill at A B	Price Per Dozen: Carbon Steel	Price Per Dozen: **High Speed Steel**	Diameter of Body C, Inches
1	$\frac{7}{32}$ x $\frac{7}{32}$	$4.60	**$12.00**	$\frac{1}{2}$
2	$\frac{7}{32}$ x $\frac{9}{32}$	4.60	**12.00**	$\frac{1}{2}$
3	$\frac{9}{32}$ x $\frac{9}{32}$	4.60	**12.00**	$\frac{1}{2}$
4	$\frac{11}{32}$ x $\frac{11}{32}$	5.00	**12.00**	$\frac{1}{2}$
5	$\frac{11}{32}$ x $\frac{13}{32}$	5.00	**12.00**	$\frac{1}{2}$
6	$\frac{13}{32}$ x $\frac{13}{32}$	5.00	**12.00**	$\frac{1}{2}$
7	$\frac{7}{32}$ x $\frac{7}{32}$	7.25	**18.00**	$\frac{5}{8}$
8	$\frac{7}{32}$ x $\frac{9}{32}$	7.25	**18.00**	$\frac{5}{8}$
9	$\frac{9}{32}$ x $\frac{9}{32}$	7.25	**18.00**	$\frac{5}{8}$
10	$\frac{11}{32}$ x $\frac{11}{32}$	7.75	**18.00**	$\frac{5}{8}$
11	$\frac{11}{32}$ x $\frac{13}{32}$	7.75	**18.00**	$\frac{5}{8}$
12	$\frac{13}{32}$ x $\frac{13}{32}$	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	$\frac{7}{16}$

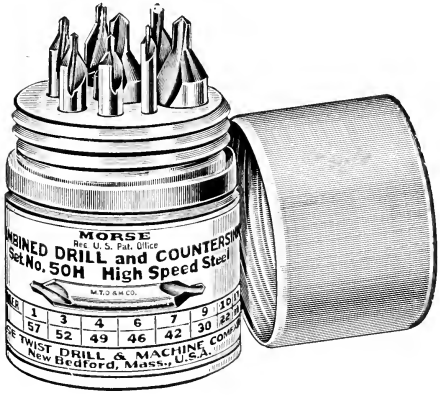
Other angles made to order at Special prices.

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

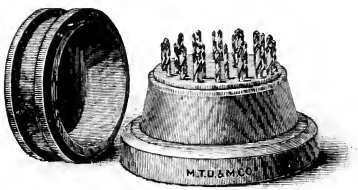
1 Combined Drill and Countersink each. No. 1-3-4-6-7-9-10-11.

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 (⅛ 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

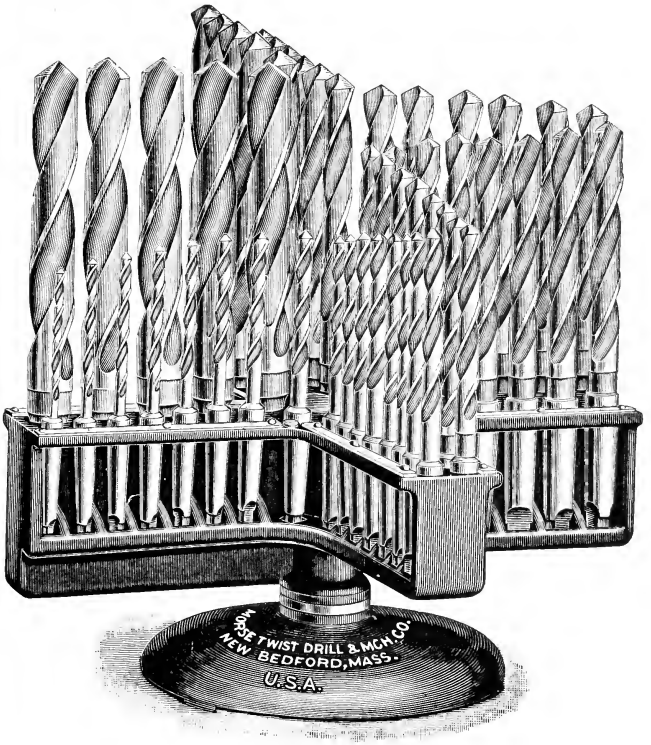
Set No.	Sizes Included	Price Per Set
1	¼ to 1 inch by 16ths	$22.40
2	⅜ to 1¼ by 16ths	40.10
3	⅜ to ¾ by 32nds, 13/16 to 1¼ by 16ths	48.50
4	⅜ to ¾ by 32nds, 13/16 to 2 by 16ths	186.00
11	⅜ to 2 by 32nds	345.30

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.

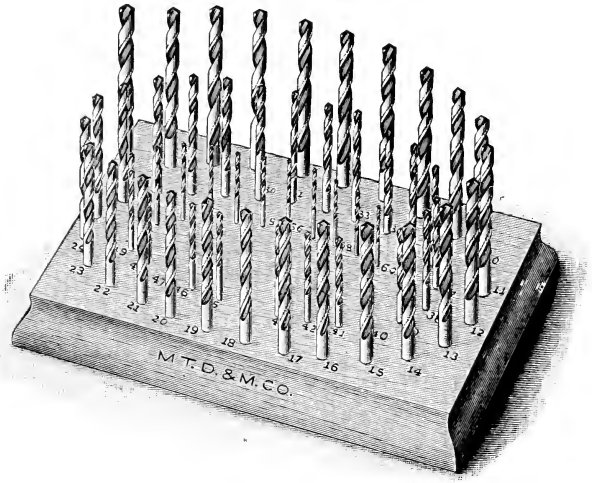
Dimensions of Stand 14 x 14 x 6¼ inches.

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	Price Per Set: Without Block
5	1/16 to 1/2 inch by 64ths	330	35	$15.00	$12.50
5H	**1/16 to 1/2 inch by 64ths, high speed**	**1330**	**35**	.....	**26.20**
6	1/16 to 1/2 inch by 32nds	330	35	9.50	7.00
7	Nos. 1 to 60 and 1/4 to 3/8 inch by 32nds	340 330	42–44 35	15.75	13.25
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 1/10 M.M.	333	38–41	13.35	10.00
19	1 M.M. to 13 M.M. by 1/2 M.M.	333	38–41	13.40	11.00
20	1 M.M. to 6 M.M. by 1/4 M.M.	333	38–41	6.75	4.50
21	6 1/4 M.M. to 10 M.M. by 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

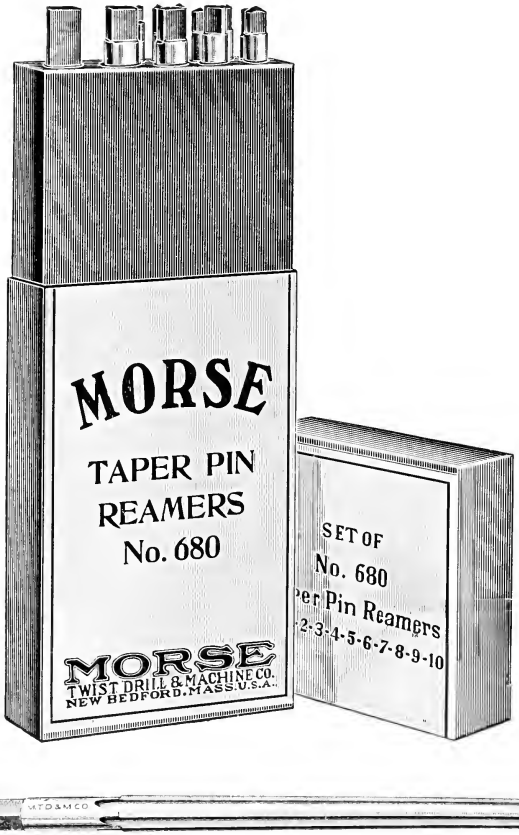
No. 13. Set Bit Stock Drills, $\frac{1}{16}$ to $\frac{1}{4}$ inch by 32nds, $\frac{5}{16}$ to $\frac{3}{8}$ inch by 16ths, boxed (see page 55) $3.75

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:

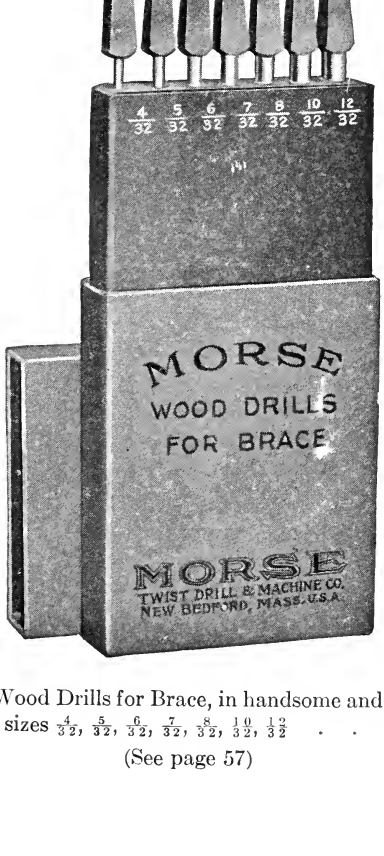
Nos. 00 to 5 inclusive	$13.25
Nos. 0 to 5 inclusive	9.75
Nos. 0 to 10 inclusive	28.50

For lengths and list prices see page 143.

Set No. 26

WOOD DRILLS FOR BRACE

Style No. 392

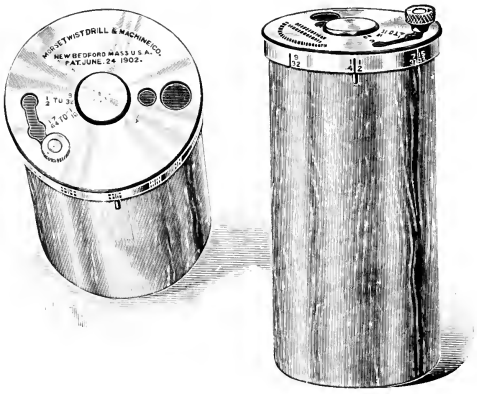


No. 26. Set of Wood Drills for Brace, in handsome and durable box; sizes $\frac{4}{32}$, $\frac{5}{32}$, $\frac{6}{32}$, $\frac{7}{32}$, $\frac{8}{32}$, $\frac{10}{32}$, $\frac{12}{32}$ $3.70

(See page 57)

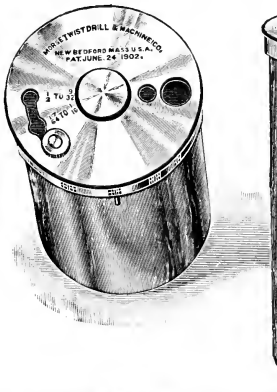
INDEXED CASES WITHOUT DRILLS

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	340 330	42–44 35	16.75
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

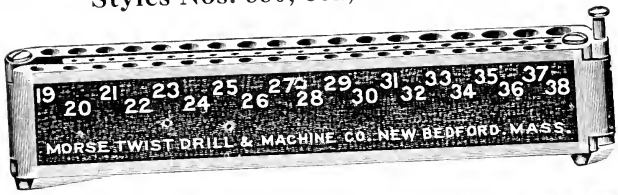
BIT STOCK DRILLS
Style No. 390

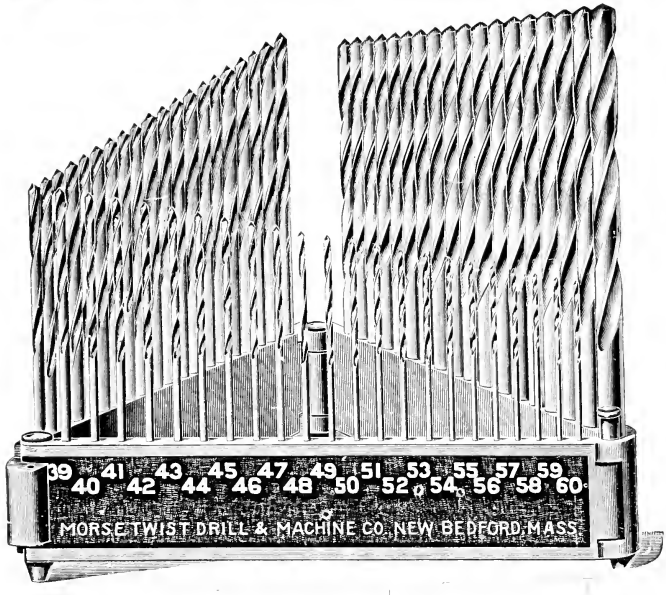
No. 13 A. Set Bit Stock Drills, $\frac{1}{16}$ to $\frac{1}{4}$ inch by 32nds, $\frac{5}{16}$ to $\frac{3}{8}$ inch by 16ths (see page 55) $6.80

FOLDING DRILL HOLDER

FOR STRAIGHT SHANK DRILLS

Styles Nos. 330, 332, 333 and 340



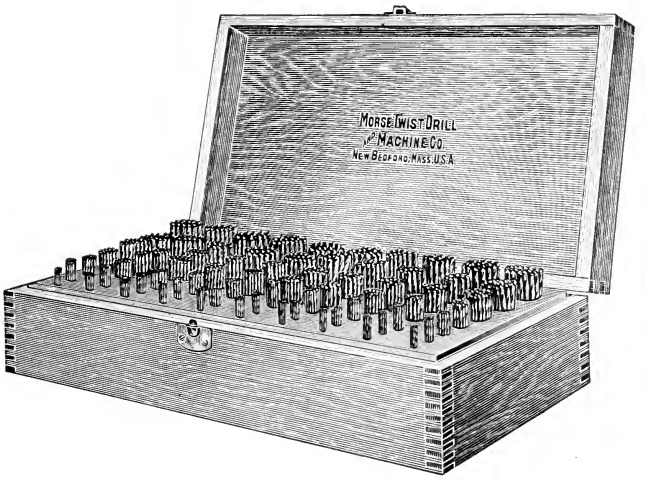


Set No.	Sizes Included	Style No.	Page	Price Per Set
5B	$\frac{1}{16}$ to $\frac{1}{2}$ inch by 64ths	330	35	$16.00
7B	Nos. 1 to 60 and $\frac{1}{4}$ to $\frac{3}{8}$ by 32nds	340 330	42–44 35	16.75
8B	Nos 1 to 60	340	42–44	14.35
15B	A to Z	332	37	14.50
18B	.5 M.M. to 6 M.M. by $\frac{1}{10}$ M.M.	333	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, 10¼ 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 $\frac{21}{64}$ to $\frac{1}{2}$ inch, inclusive.

The case is of oak, similar in style to above; outside dimensions: length, 19 inches; width, 10¼ 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.

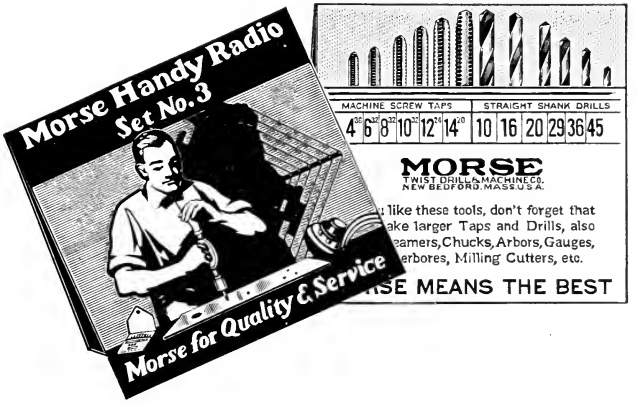
Set No. 40. One Style 330 Drill each size:

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

Packed in durable container. Per set..... $1.60

RADIO SET No. 3

STRAIGHT SHANK DRILLS AND TAPS



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

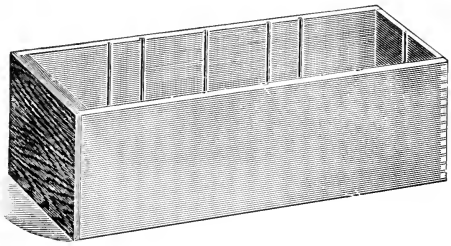
Radio Set No. 3. One Style 340 Straight Shank Drill each No. 10, 16, 20, 29, 36, 45, and one Style No. 1066 plug tap each 4^{36}, 6^{32}, 8^{32}, 10^{32}, 12^{24}, 14^{20}.

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

SECTIONAL CASES

CONSISTING OF BOXES WITH OAK FRONTS

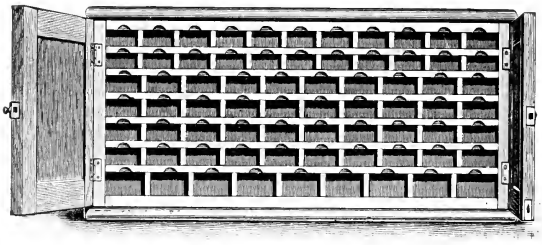
Many customers do not find the cases illustrated practical, therefore we keep in stock boxes as shown below. They can be placed upon the shelves and present a very satisfactory appearance. They are furnished with partitions to make 2, 3 or 4 equal spaces; specify number required.



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

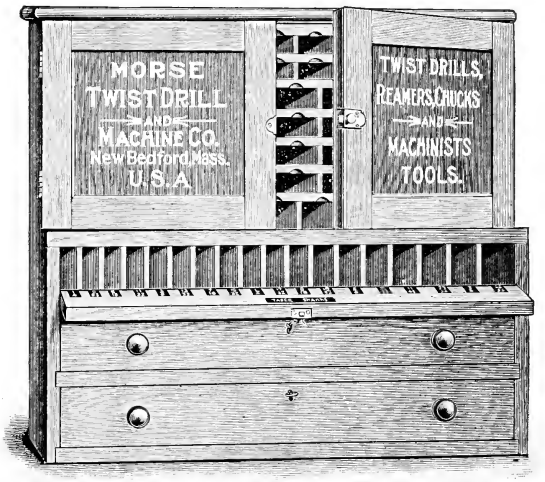


No. 1—CASE, OUTSIDE DIMENSIONS:
$14\frac{1}{2}$ inches high
$28\frac{1}{8}$ inches wide
$8\frac{9}{16}$ inches deep

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

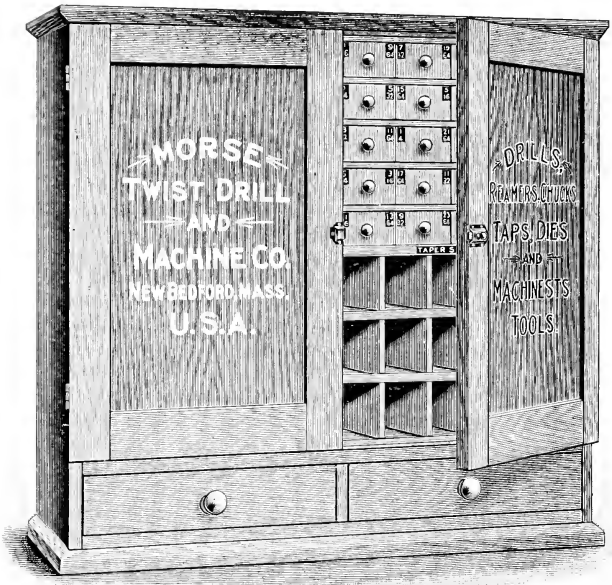
This Case is usually furnished in oak. It can be supplied in other woods at special prices.

This Case will hold Drills, viz:—
Drills, Steel Wire Gauge, from No. 1 to No. 80. (See pages 42–44.)
Jobbers' Straight Shank Drills, $\frac{1}{16}$ to ½ inch, by 64ths. (See page 35.)
Taper Shank Drills, ¼ to ¾ inch, varying by 32nds. (See page 14.)
Taper Shank Drills, $\frac{13}{16}$ to 1¼ 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 ½ inch by 64ths. (See page 35.)
Taper Shank Drills, ¼ to 1¼ inch, varying by 32nds. (See pages 14–15.)
Bit Stock Drills, $\frac{1}{16}$ to $\frac{11}{32}$ inch, varying by 32nds. (See page 55.)
Bit Stock Drills, $\frac{3}{8}$ to ½ 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.

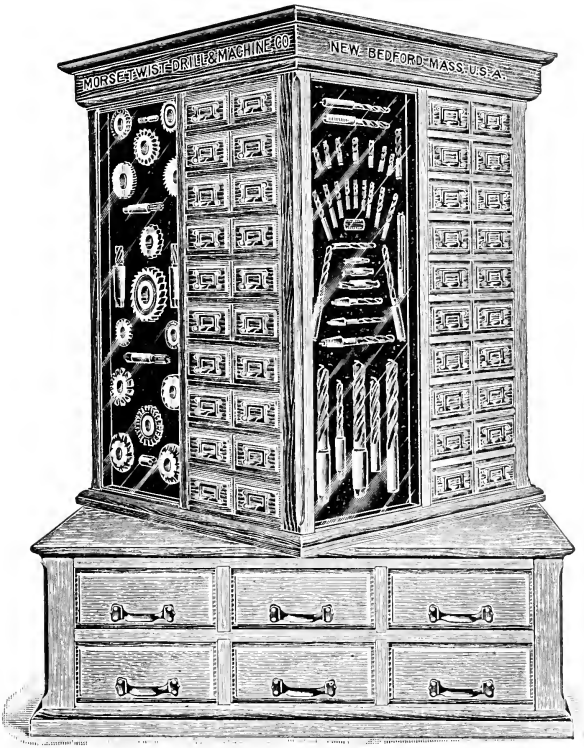
Weight of Base boxed for shipment, 200 lbs.

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 35½ inches long by 29 inches wide and contains 12 drawers, inside dimensions being 12½ inches long by 8¼ inches wide by 3¼ inches deep.

The top revolves in a 39 inch circle.

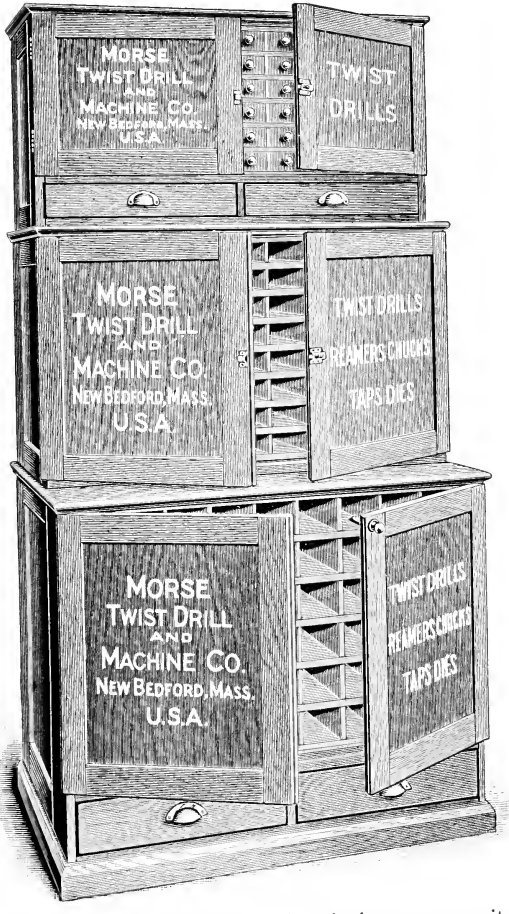
Each side of the top contains an exhibition space 29 inches by 10⅜ inches by ⅞ inch, and 20 drawers, inside dimensions of which are 10⅜ inches long by 4¼ inches wide by 2 inches deep. These drawers are grooved to take one partition lengthwise or one to four partitions crosswise.

Height of Case including base, 46½ 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 ½ 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 1½ 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 11¾ 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, 77⅝ 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	$\frac{1}{2}$ to $\frac{5}{8}$	8	$5\frac{1}{2}$	$\frac{7}{16}$
4	2.70	$\frac{21}{32}$ to $\frac{25}{32}$	9	$6\frac{5}{32}$	$\frac{1}{2}$
5	3.00	$\frac{13}{16}$ to $1\frac{1}{32}$	$9\frac{1}{2}$	$6\frac{11}{32}$	$\frac{5}{8}$
6	3.30	$1\frac{1}{16}$ to $1\frac{9}{32}$	10	$6\frac{15}{32}$	$\frac{3}{4}$
7	3.60	$1\frac{5}{16}$ to $1\frac{21}{32}$	11	$7\frac{5}{32}$	$\frac{7}{8}$
8	4.00	$1\frac{11}{16}$ to 2	12	$7\frac{17}{32}$	$1\frac{1}{8}$
9	4.50	$2\frac{1}{16}$ to $2\frac{1}{2}$	13	$8\frac{7}{32}$	$1\frac{3}{8}$
10	5.25	$2\frac{9}{16}$ to 3	14	$8\frac{27}{32}$	$1\frac{5}{8}$
11	7.50	$3\frac{1}{16}$ to $3\frac{1}{2}$	15	$9\frac{5}{32}$	2
12	10.50	$3\frac{9}{16}$ to 4	16	$9\frac{15}{32}$	$2\frac{1}{8}$
13	13.50	$4\frac{1}{8}$ to $4\frac{1}{2}$	17	$9\frac{23}{32}$	$2\frac{3}{8}$
14	18.00	$4\frac{5}{8}$ to $5\frac{1}{2}$	18	$10\frac{1}{16}$	$2\frac{5}{8}$

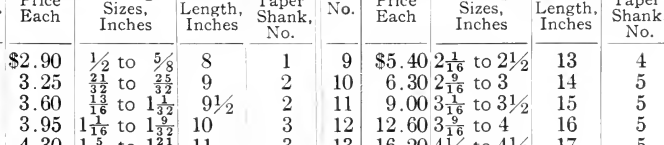
Shanks on above arbors are ground standard to sizes listed.

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	$\frac{1}{2}$ to $\frac{5}{8}$	8	1	9	$5.40	$2\frac{1}{16}$ to $2\frac{1}{2}$	13	4
4	3.25	$\frac{21}{32}$ to $\frac{25}{32}$	9	2	10	6.30	$2\frac{9}{16}$ to 3	14	5
5	3.60	$\frac{13}{16}$ to $1\frac{1}{32}$	$9\frac{1}{2}$	2	11	9.00	$3\frac{1}{16}$ to $3\frac{1}{2}$	15	5
6	3.95	$1\frac{1}{16}$ to $1\frac{9}{32}$	10	3	12	12.60	$3\frac{9}{16}$ to 4	16	5
7	4.30	$1\frac{5}{16}$ to $1\frac{21}{32}$	11	3	13	16.20	$4\frac{1}{8}$ to $4\frac{1}{2}$	17	5
8	4.80	$1\frac{11}{16}$ to 2	12	4	14	21.60	$4\frac{5}{8}$ to $5\frac{1}{2}$	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

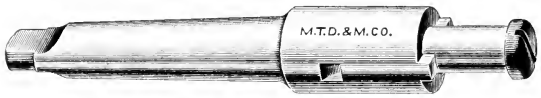
State whether Arbors are desired for Right or Left Hand Mills.
These Arbors fit Shell End Mills shown on page 204.

No. 512

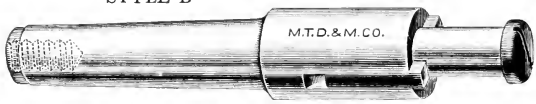
ARBORS FOR SHELL END MILLS

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	3/8, 20, R or L	5 1/8
2	5.00	9	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 11/16	1 1/8	11/16
2	1.50	4 3/8	1 1/4	1
3	1.75	5 3/8	1 1/2	1
4	1.75	6 5/8	1 3/4	1 3/8
5	2.00	8 3/8	2 1/4	1 5/8

No. 525

ARBORS FOR CENTER DRILL CHUCKS

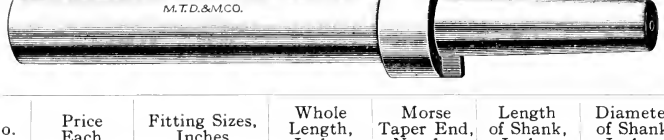
This Arbor fits Center Drill Chucks illustrated on page 11.

Price Each	Whole Length, Inches	Length of Shank, Inches	Diameter of Shank, Inches
$ .80	4 3/4	3 1/2	13/16

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

No. 528

ARBORS FOR EXPANDING AND ADJUSTABLE SHELL REAMERS



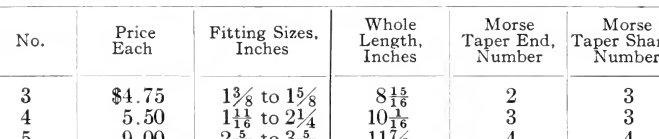
No.	Price Each	Fitting Sizes, Inches	Whole Length, Inches	Morse Taper End, Number	Length of Shank, Inches	Diameter of Shank, Inches
3	$3.60	$1\frac{3}{8}$ to $1\frac{5}{8}$	$8\frac{15}{16}$	2	$5\frac{1}{2}$	$\frac{7}{8}$
4	4.50	$1\frac{11}{16}$ to $2\frac{1}{4}$	$10\frac{1}{16}$	3	$5\frac{29}{32}$	$1\frac{1}{8}$
5	7.50	$2\frac{5}{16}$ to $3\frac{5}{16}$	$11\frac{7}{8}$	4	$6\frac{21}{32}$	$1\frac{3}{8}$
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	3/8	6
2	6.75	1/2	6
3	6.75	5/8	6
4	6.75	3/4	6
5	6.75	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	1/2 to 5/8	7 1/2	1	3 1/4
4	7.50	1/2 to 5/8	7 1/2	1 1/4	3 1/4
5	7.50	1/2 to 5/8	7 1/2	1 1/2	3 1/4
6	7.70	21/32 to 25/32	8 1/2	1	3 1/4
7	7.70	21/32 to 25/32	8 1/2	1 1/4	3 1/4
8	7.70	21/32 to 25/32	8 1/2	1 1/2	3 1/4
9	8.00	13/16 to 1 1/32	9	1 1/4	3 1/4
10	8.00	13/16 to 1 1/32	9	1 1/2	3 1/4
11	9.00	1 1/16 to 1 9/32	11	1 1/2	3 1/4
12	9.00	1 1/16 to 1 9/32	11	1 3/4	3 1/4
13	9.00	1 1/16 to 1 9/32	11	2	3 1/4
14	9.35	1 5/16 to 1 21/32	13 1/2	1 1/2	3 1/4
15	9.35	1 5/16 to 1 21/32	13 1/2	1 3/4	3 1/4
16	9.35	1 5/16 to 1 21/32	13 1/2	2	3 1/4
17	9.75	1 11/16 to 2	13 1/2	1 3/4	3 1/4
18	9.75	1 11/16 to 2	13 1/2	2	3 1/4
19	10.10	2 1/16 to 2 1/2	13 1/2	1 3/4	3 1/4
20	10.10	2 1/16 to 2 1/2	13 1/2	2	3 1/4
21	10.50	2 9/16 to 3	13 1/2	2	3 1/4
22	10.85	3 1/16 to 3 1/2	13 1/2	2	3 1/4
23	10.85	3 9/16 to 4	13 1/2	2	3 1/4

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

No. 550

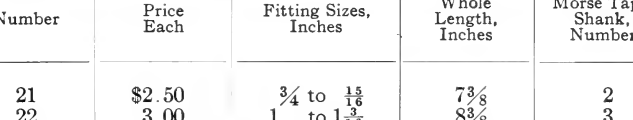
ARBORS
FOR ONE-LOCK ADJUSTABLE REAMERS, No. 730

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



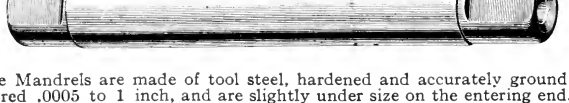
Number	Price Each	Fitting Sizes, Inches	Whole Length, Inches	Morse Taper Shank, Number
21	$2.50	$\frac{3}{4}$ to $\frac{15}{16}$	$7\frac{3}{8}$	2
22	3.00	1 to $1\frac{3}{16}$	$8\frac{3}{8}$	3
23	3.50	$1\frac{1}{4}$ to $1\frac{11}{16}$	$8\frac{7}{8}$	3
24	4.50	$1\frac{3}{4}$ to $2\frac{3}{16}$	$9\frac{1}{2}$	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
1/4	$ .80	3 3/4	1 15/16	$6.00	10 3/4
5/16	.90	4	2	6.50	11
3/8	1.00	4 1/4	2 1/16	7.00	11 1/2
7/16	1.10	4 1/2	2 1/8	7.50	11 1/2
1/2	1.20	5	2 3/16	8.00	12
9/16	1.30	5 1/4	2 1/4	8.50	12
5/8	1.40	5 1/2	2 5/16	9.00	12
11/16	1.50	5 3/4	2 3/8	9.50	12
3/4	1.60	6	2 7/16	10.00	12 1/2
13/16	1.70	6 1/4	2 1/2	10.50	12 1/2
7/8	1.85	6 1/2	2 9/16	11.25	12 1/2
15/16	2.00	6 3/4	2 5/8	12.00	12 1/2
1	2.15	7	2 11/16	12.75	13
1 1/16	2.30	7 1/4	2 3/4	13.50	13
1 1/8	2.45	7 1/2	2 13/16	14.25	13
1 3/16	2.60	7 3/4	2 7/8	15.00	13
1 1/4	2.80	8	2 15/16	15.75	13
1 5/16	3.00	8 1/4	3	16.50	13
1 3/8	3.25	8 1/2	3 1/8	18.00	14
1 7/16	3.50	8 3/4	3 1/4	19.50	14
1 1/2	3.75	9	3 3/8	21.00	15
1 9/16	4.00	9 1/4	3 1/2	23.00	15
1 5/8	4.25	9 1/2	3 5/8	25.00	16
1 11/16	4.50	9 3/4	3 3/4	27.00	16
1 3/4	4.75	10	3 7/8	29.00	17
1 13/16	5.00	10 1/4	4	31.00	17
1 7/8	5.50	10 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
1/2	$ .95	1 1/2	4	$1.85	5
17/32	.95	1 1/2	4	1.85	5
9/16	1.05	1 5/8	6	2.00	5 1/4
19/32	1.05	1 5/8	6	2.00	5 1/4
5/8	1.15	1 3/4	8	2.15	5 1/2
21/32	1.15	1 3/4	8	2.15	5 1/2
11/16	1.25	1 7/8	10	2.30	5 3/4
23/32	1.25	1 7/8	10	2.30	5 3/4
3/4	1.35	2	12	2.50	6
25/32	1.35	2	12	2.50	6
13/16	1.45	2 1/8	14	2.70	6 1/2
27/32	1.45	2 1/8	14	2.70	6 1/2
7/8	1.55	2 1/4	14	2.70	6 1/2
29/32	1.55	2 1/4	14	2.70	6 1/2
15/16	1.80	2 3/8	16	3.00	7 1/2
31/32	1.80	2 3/8	16	3.00	7 1/2
1	1.95	2 3/8	16	3.00	7 1/2
1 1/32	1.95	2 1/2	16	3.00	7 1/2
1 1/16	2.10	2 1/2	16	3.00	7 1/2
1 3/32	2.10	2 1/2	16	3.00	7 1/2
1 1/8	2.40	2 5/8	18	4.15	8 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 5/32	$2.40	2 5/8	18	$4.15	8 1/2
1 3/16	2.50	2 5/8	18	4.15	8 1/2
1 7/32	2.50	2 5/8	18	4.15	8 1/2
1 1/4	2.60	2 3/4	18	4.15	8 1/2
1 9/32	2.60	2 3/4	18	4.15	8 1/2
1 5/16	2.70	2 3/4	18	4.15	8 1/2
1 11/32	2.70	2 3/4	18	4.15	8 1/2
1 3/8	3.10	3	20	5.30	9 1/2
1 13/32	3.10	3	20	5.30	9 1/2
1 7/16	3.20	3	20	5.30	9 1/2
1 15/32	3.20	3	20	5.30	9 1/2
1 1/2	3.30	3 1/4	20	5.30	9 1/2
1 17/32	3.30	3 1/4	20	5.30	9 1/2
1 9/16	3.40	3 1/4	20	5.30	9 1/2
1 19/32	3.40	3 1/4	20	5.30	9 1/2
1 5/8	3.70	3 3/8	22	6.50	10 1/2
1 21/32	3.70	3 3/8	22	6.50	10 1/2
1 11/16	3.80	3 3/8	22	6.50	10 1/2
1 23/32	3.80	3 3/8	22	6.50	10 1/2
1 3/4	3.90	3 3/8	22	6.50	10 1/2
1 25/32	3.90	3 1/2	22	6.50	10 1/2
1 13/16	4.00	3 1/2	22	6.50	10 1/2
1 27/32	4.00	3 1/2	22	6.50	10 1/2
1 7/8	4.10	3 1/2	22	6.50	10 1/2
1 29/32	4.10	3 1/2	22	6.50	10 1/2
1 15/16	4.40	3 3/4	24	7.75	11 1/2
1 31/32	4.40	3 3/4	24	7.75	11 1/2
2	4.50	3 3/4	24	7.75	11 1/2
2 1/32	4.50	3 3/4	24	7.75	11 1/2
2 1/16	4.60	3 3/4	24	7.75	11 1/2
2 3/32	4.60	3 7/8	24	7.75	11 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 1/8	$4.70	3 7/8	24	$7.75	11 1/2
2 5/32	4.70	3 7/8	24	7.75	11 1/2
2 3/16	4.80	3 7/8	24	7.75	11 1/2
2 7/32	4.80	3 7/8	24	7.75	11 1/2
2 1/4	5.10	4	26	9.00	12 1/2
2 9/32	5.10	4	26	9.00	12 1/2
2 5/16	5.20	4	26	9.00	12 1/2
2 11/32	5.20	4	26	9.00	12 1/2
2 3/8	5.30	4	26	9.00	12 1/2
2 13/32	5.30	4 1/4	26	9.00	12 1/2
2 7/16	5.40	4 1/4	26	9.00	12 1/2
2 15/32	5.40	4 1/4	26	9.00	12 1/2
2 1/2	5.50	4 1/4	26	9.00	12 1/2
2 17/32	5.50	4 1/4	26	9.00	12 1/2
2 9/16	5.90	4 1/2	28	12.10	13 1/2
2 19/32	5.90	4 1/2	28	12.10	13 1/2
2 5/8	6.00	4 1/2	28	12.10	13 1/2
2 21/32	6.00	4 1/2	28	12.10	13 1/2
2 11/16	6.10	4 1/2	28	12.10	13 1/2
2 23/32	6.10	4 1/2	28	12.10	13 1/2
2 3/4	6.20	4 3/4	28	12.10	13 1/2
2 25/32	6.20	4 3/4	28	12.10	13 1/2
2 13/16	6.30	4 3/4	28	12.10	13 1/2
2 27/32	6.30	4 3/4	28	12.10	13 1/2
2 7/8	6.40	4 3/4	28	12.10	13 1/2
2 29/32	6.40	4 3/4	28	12.10	13 1/2
2 15/16	6.80	5	30	15.50	14 1/2
2 31/32	6.80	5	30	15.50	14 1/2
3	6.90	5	30	15.50	14 1/2
3 1/32	6.90	5	30	15.50	14 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 1/16	$7.10	5	30	$15.50	14 1/2
3 3/32	7.10	5	30	15.50	14 1/2
3 1/8	7.30	5 1/4	30	15.50	14 1/2
3 5/32	7.30	5 1/4	30	15.50	14 1/2
3 3/16	7.50	5 1/4	30	15.50	14 1/2
3 7/32	7.50	5 1/4	30	15.50	14 1/2
3 1/4	7.70	5 1/4	30	15.50	14 1/2
3 9/32	7.70	5 1/4	30	15.50	14 1/2
3 5/16	7.90	5 1/2	32	19.50	15 1/2
3 11/32	7.90	5 1/2	32	19.50	15 1/2
3 3/8	8.10	5 1/2	32	19.50	15 1/2
3 13/32	8.10	5 1/2	32	19.50	15 1/2
3 7/16	8.30	5 1/2	32	19.50	15 1/2
3 15/32	8.30	5 1/2	32	19.50	15 1/2
3 1/2	8.50	5 1/2	32	19.50	15 1/2
3 17/32	8.50	5 3/4	32	19.50	15 1/2
3 9/16	8.70	5 3/4	32	19.50	15 1/2
3 19/32	8.70	5 3/4	32	19.50	15 1/2
3 5/8	8.90	5 3/4	32	19.50	15 1/2
3 21/32	8.90	5 3/4	32	19.50	15 1/2
3 11/16	9.10	5 3/4	32	19.50	15 1/2
3 23/32	9.10	5 3/4	32	19.50	15 1/2
3 3/4	9.30	6	34	24.00	16 1/2
3 25/32	9.30	6	34	24.00	16 1/2
3 13/16	9.50	6	34	24.00	16 1/2
3 27/32	9.50	6	34	24.00	16 1/2
3 7/8	9.70	6	34	24.00	16 1/2
3 29/32	9.70	6	34	24.00	16 1/2
3 15/16	9.90	6	34	24.00	16 1/2
3 31/32	9.90	6	34	24.00	16 1/2
4	10.10	6	34	24.00	16 1/2

No. 585
TAPER PINS

Taper ¼ 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	9/64	5/32	11/64	3/16	7/32	1/4	19/64	11/32	13/32	1/2	19/32	23/32
Length, Inches												
½	$1.80	$1.80	....	....	....	....	....	....	....	....	....	.....
¾	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	....	....	....	....	.....
1¼	2.30	2.30	2.50	2.60	2.80	3.00	3.25	$3.50	....	....	....	.....
1½	....	2.55	2.75	2.85	3.05	3.25	3.50	3.75	....	....	....	.....
1¾	....	....	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	....	.....
2¼	....	....	....	3.60	3.80	4.00	4.40	4.75	5.25	6.25	....	.....
2½	....	....	....	3.85	4.05	4.25	4.75	5.20	5.75	6.75	....	.....
2¾	....	....	....	....	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	.....
3¼	....	....	....	....	....	....	....	6.75	7.25	8.40	11.20	.....
3½	....	....	....	....	....	....	....	7.25	7.75	9.00	11.90	$15.25
3¾	....	....	....	....	....	....	....	7.75	8.25	9.60	12.60	16.25
4	....	....	....	....	....	....	....	8.25	8.75	10.20	13.30	17.25
4¼	....	....	....	....	....	....	....	....	....	10.80	14.00	18.25
4½	....	....	....	....	....	....	....	....	....	11.40	14.70	19.25
4¾	....	....	....	....	....	....	....	....	....	12.00	15.40	20.25
5	....	....	....	....	....	....	....	....	....	12.60	16.10	21.25
5¼	....	....	....	....	....	....	....	....	....	....	16.80	22.25
5½	....	....	....	....	....	....	....	....	....	....	17.50	23.25
5¾	....	....	....	....	....	....	....	....	....	....	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 — JOBBERS' 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	31/32	$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 1/32	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 3/32	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 5/32	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 7/32	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 15/32	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 3/16	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
15/16	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.

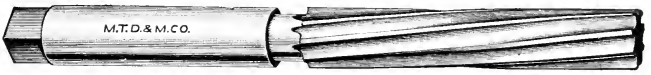
Jobbers' Reamers with threaded ends and all sizes and dimensions not listed are special and subject to special prices.

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

No. 602
Carbon Steel

No. 1602
High Speed Steel

JOBBERS' 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**		
1/8	$1.20		3	1 1/2	27/32	$3.70	**$9.35**	9 3/8	4 11/16
5/32	1.45		3 1/4	1 5/8	7/8	3.70	**9.35**	9 3/4	4 7/8
3/16	1.45		3 1/2	1 3/4	29/32	4.10	**10.45**	10	5
7/32	1.70		3 3/4	1 7/8	15/16	4.10	**10.45**	10 1/4	5 1/8
1/4	1.70	**$3.85**	4	2	31/32	4.45	**11.55**	10 5/8	5 5/16
9/32	1.80	**4.15**	4 1/4	2 1/8	1	4.45	**11.55**	10 7/8	5 7/16
5/16	1.80	**4.15**	4 1/2	2 1/4	1 1/16	4.80	**12.65**	11 1/4	5 5/8
11/32	1.90	**4.70**	4 3/4	2 3/8	1 1/8	5.15	**14.00**	11 5/8	5 13/16
3/8	1.90	**4.70**	5	2 1/2	1 3/16	5.50	**15.70**	12	6
13/32	2.10	**5.25**	5 1/4	2 5/8	1 1/4	5.90	**17.35**	12 1/4	6 1/8
7/16	2.10	**5.25**	5 1/2	2 3/4	1 5/16	6.25	**19.00**	12 1/2	6 1/4
15/32	2.30	**5.80**	5 3/4	2 7/8	1 3/8	6.70	**20.65**	12 5/8	6 5/16
1/2	2.30	**5.80**	6	3	1 7/16	7.20	**22.55**	12 7/8	6 7/16
17/32	2.40	**6.35**	6 1/4	3 1/8	1 1/2	7.70	**24.50**	13	6 1/2
9/16	2.40	**6.35**	6 1/2	3 1/4	1 9/16	8.15		13	6 1/2
19/32	2.65	**6.90**	6 3/4	3 3/8	1 5/8	8.65		13	6 1/2
5/8	2.65	**6.90**	7	3 1/2	1 11/16	9.10		13 1/2	6 3/4
21/32	2.90	**7.45**	7 3/8	3 11/16	1 3/4	9.60		13 1/2	6 3/4
11/16	2.90	**7.45**	7 3/4	3 7/8	1 13/16	10.10		13 1/2	6 3/4
23/32	3.10	**8.00**	8 1/8	4 1/16	1 7/8	10.55		14	7
3/4	3.10	**8.00**	8 3/8	4 3/16	1 15/16	11.05		14	7
25/32	3.35	**8.55**	8 3/4	4 3/8	2	11.50		14	7
13/16	3.35	**8.55**	9 1/8	4 9/16					

64th sizes, 1/8 to 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

JOBBERS' 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

JOBBERS' REAMERS

WITH MORSE TAPER SHANKS

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

JOBBERS' REAMERS

Set, ¼ to 1 inch in diameter, by 16ths	$38.50
Set, ¼ to 1¼ inches in diameter, by 16ths	58.25
Set, ¼ to 1½ inches in diameter, by 16ths	82.00
Set, ¼ to 2 inches in diameter, by 16ths	154.00
Set, ¼ to 1 inch in diameter, by 32nds	68.75
Set, ¼ to 1¼ inches in diameter, by 32nds	112.25
Set, ¼ to 1½ 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

For lengths and list prices see page 136.

No. 692

BIT STOCK TAPER REAMERS

Set of No. 692 Reamers consisting of 1 each, ¼ to ½ by 16ths	$4.00
Set of No. 692 Reamers consisting of 1 each, ¼ to ¾ by 16ths	8.50

For lengths and list prices see page 148.

No. 680

TAPER-PIN REAMERS

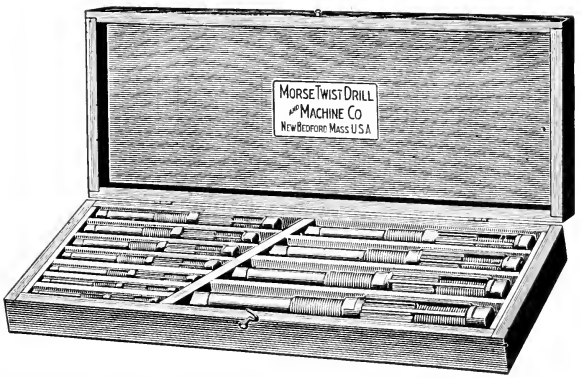
Set of No. 680 Reamers consisting of 1 each:	
Nos. 00 to 5 inclusive	$13.25
Nos. 0 to 5 inclusive	11.75
Nos. 0 to 10 inclusive	28.50

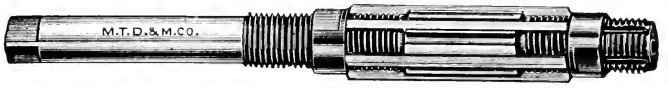
For lengths and list prices see page 143.

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.

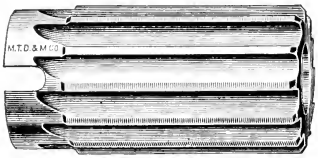
For length and list prices see page 165.

No. 625 Carbon Steel
No. 1625 High Speed Steel

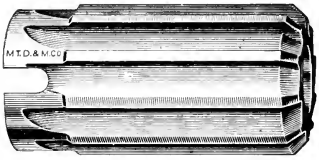
No. 626 Carbon Steel
No. 1626 High Speed Steel

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 11/32	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 13/32	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.

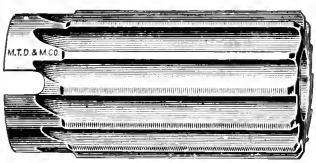
All sizes and dimensions not listed are special and subject to special prices.

No. 625 Carbon Steel
No. 1625 High Speed Steel

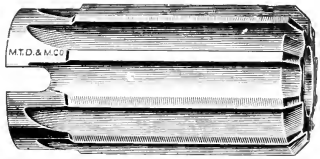
No. 626 Carbon Steel
No. 1626 High Speed Steel

SHELL REAMERS

SHELL REAMER



ROSE SHELL REAMER

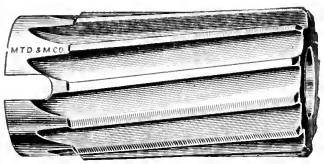


Diam., Inches	Price Each		Whole Length, Inches	Size Hole, Inches	Diam., Inches	Price Each		Whole Length, Inches	Size Hole, Inches
	Carbon Steel	**High Speed Steel**				Carbon Steel	**High Speed Steel**		
2 1/8	$7.30	**$15.00**	3 3/4	1 1/4	3 3/8	$15.60	**$42.50**	4 1/2	1 3/4
2 3/16	7.65	**15.75**	3 3/4	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
	Carbon Steel	**High Speed Steel**		
1/2	$2.05	**$3.60**	2	1/4
17/32	2.15	**3.75**	2	1/4
9/16	2.15	**3.75**	2	1/4
19/32	2.30	**3.90**	2	1/4
5/8	2.30	**3.90**	2	1/4
21/32	2.40	**4.05**	2 1/4	3/8
11/16	2.40	**4.05**	2 1/4	3/8
23/32	2.50	**4.25**	2 1/4	3/8
3/4	2.50	**4.25**	2 1/4	3/8
25/32	2.65	**4.40**	2 1/4	3/8
13/16	2.65	**4.40**	2 1/2	1/2
27/32	2.75	**4.70**	2 1/2	1/2
7/8	2.75	**4.70**	2 1/2	1/2
29/32	2.90	**4.95**	2 1/2	1/2
15/16	2.90	**4.95**	2 1/2	1/2
31/32	3.00	**5.25**	2 1/2	1/2
1	3.00	**5.25**	2 1/2	1/2
1 1/32	3.25	**5.50**	2 1/2	1/2
1 1/16	3.25	**5.50**	2 3/4	5/8
1 3/32	3.50	**5.80**	2 3/4	5/8
1 1/8	3.50	**5.80**	2 3/4	5/8
1 5/32	3.70	**6.05**	2 3/4	5/8
1 3/16	3.70	**6.05**	2 3/4	5/8
1 7/32	3.95	**6.35**	2 3/4	5/8
1 1/4	3.95	**6.35**	2 3/4	5/8
1 9/32	4.25	**6.60**	2 3/4	5/8
1 5/16	4.25	**6.60**	3	3/4
1 11/32	4.55	**7.15**	3	3/4
1 3/8	4.55	**7.15**	3	3/4
1 13/32	$4.85	**$7.70**	3	3/4
1 7/16	4.85	**7.70**	3	3/4
1 15/32	5.15	**8.25**	3	3/4
1 1/2	5.15	**8.25**	3	3/4
1 9/16	5.45	**9.10**	3	3/4
1 5/8	5.75	**9.90**	3	3/4
1 11/16	6.10	**10.75**	3 1/2	1
1 3/4	6.50	**11.55**	3 1/2	1
1 13/16	6.85	**12.40**	3 1/2	1
1 7/8	7.20	**13.20**	3 1/2	1
1 15/16	7.55	**14.05**	3 1/2	1
2	7.90	**14.85**	3 1/2	1
2 1/16	8.35	**15.70**	3 3/4	1 1/4
2 1/8	8.75	**16.50**	3 3/4	1 1/4
2 3/16	9.20	**17.35**	3 3/4	1 1/4
2 1/4	9.60	**18.15**	3 3/4	1 1/4
2 5/16	10.00	**19.00**	3 3/4	1 1/4
2 3/8	10.45	**19.80**	3 3/4	1 1/4
2 7/16	10.85	**20.65**	3 3/4	1 1/4
2 1/2	11.30	**21.45**	3 3/4	1 1/4
2 9/16	11.75	**22.55**	4	1 1/2
2 5/8	12.25	**23.95**	4	1 1/2
2 11/16	12.70	**25.30**	4	1 1/2
2 3/4	13.20	**26.70**	4	1 1/2
2 13/16	13.70	**28.05**	4	1 1/2
2 7/8	14.15	**29.70**	4	1 1/2
2 15/16	14.65	**31.35**	4	1 1/2
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.

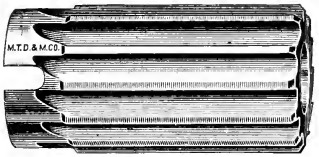
All sizes and dimensions not listed are special and subject to special prices.

No. 628 Carbon Steel
No. 1628 High Speed Steel

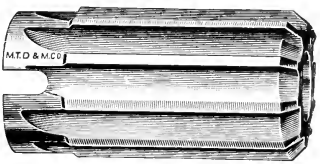
No. 629 Carbon Steel
No. 1629 High Speed Steel

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	3¾	2¼	.367	.250
1	2.00	2.40	5½	3	.517	.367
2	2.60	3.10	7	3½	.745	.569
3	3.40	4.10	8	4¼	.988	.775
4	4.20	5.05	9	5¼	1.289	1.017
5	6.60	7.90	10	6¼	1.799	1.471
6	12.00	14.40	12	8½	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.

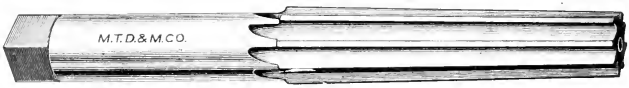
Reamers for Short Shanks made to order. Prices quoted on application.

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	$\frac{1}{2}$x$\frac{3}{4}$x$1\frac{3}{4}$

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	4¾	2⅞
2	2.00	2.40	5⅛	3⅛
3	2.25	2.70	5½	3⅜
4	2.50	3.00	5⅞	3 11/16
5	3.00	3.60	6⅜	4
6	3.25	3.90	6⅞	4⅜
7	3.50	4.20	7½	4⅞
8	3.75	4.50	8⅛	5½
9	4.00	4.80	8⅞	6⅛
10	5.00	6.00	9¾	6⅞
11	6.00	7.20	10⅝	7⅝
12	8.00	9.60	11⅜	8¼

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**		
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					

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

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

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 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 3/8
00	1.35		.114	2 1/4	1 1/2
0	1.00	**$2.80**	.127	2 3/8	1 5/8
1	1.00	**2.90**	.146	2 1/2	1 3/4
2	1.25	**3.00**	.162	3	2
3	1.50	**3.00**	.183	3 1/2	2 1/4
4	1.75	**3.25**	.208	4	2 1/2
5	2.00	**3.50**	.240	4 1/2	3
6	2.25	**4.25**	.279	5	3 5/8
7	2.50	**5.25**	.331	6	4 1/2
8	3.00	**6.75**	.398	6 3/4	5 1/4
9	3.50	**8.25**	.482	8	6 1/8
10	4.50	**9.00**	.581	9	7
11	6.00		.706	11 1/4	8 1/4
12	7.50		.842	13 3/8	10
13	9.00		1.009	16	12
14	11.00		1.250	18 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 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 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. ½ In. from Small End, Inches	Price Each		Whole Length, Inches	Length of Flutes, Inches	Diam. ½ 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 ½ 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	
$\frac{15}{16}$	8.00	**23.40**	$16\frac{1}{2}$	12	No. 3
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	
$1\frac{3}{16}$	12.30	**39.85**	$20\frac{1}{2}$	16	
$1\frac{1}{4}$	13.50	**45.15**	$21\frac{1}{2}$	16	No. 4
$1\frac{5}{16}$	15.50	**53.25**	$23\frac{1}{2}$	18	
$1\frac{3}{8}$	16.20	**57.35**	$23\frac{1}{2}$	18	
$1\frac{7}{16}$	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 A	B	C	Price Each	Whole Length, Inches	Length of Flutes, Inches	Length from B to C, Inches
5/16	1/4	3/16	$2.40	5 3/4	4 1/4	1 1/8
3/8	5/16	1/4	2.50	5 3/4	4 1/4	1 1/8
7/16	3/8	5/16	2.60	5 3/4	4 1/4	1 1/8
1/2	7/16	3/8	2.75	5 3/4	4 1/4	1 1/8
9/16	15/32	5/16	2.90	9 1/2	7	2
5/8	17/32	3/8	3.05	9 1/2	7	2
11/16	19/32	7/16	3.20	9 1/2	7	2
3/4	21/32	1/2	3.35	9 1/2	7	2
13/16	23/32	9/16	3.50	9 1/2	7	2
7/8	25/32	5/8	3.75	9 1/2	7	2
15/16	27/32	11/16	4.00	9 1/2	7	2
1	29/32	3/4	4.25	9 1/2	7	2
1 1/16	31/32	13/16	4.50	9 1/2	7	2
1 1/8	1 1/32	7/8	4.75	9 1/2	7	2
1 3/16	1 3/32	15/16	5.00	9 1/2	7	2
1 1/4	1 5/32	1	5.50	9 1/2	7	2
1 5/16	1 7/32	1 1/16	6.00	9 1/2	7	2
1 3/8	1 9/32	1 1/8	6.50	9 1/2	7	2
1 7/16	1 11/32	1 3/16	7.00	9 1/2	7	2
1 1/2	1 13/32	1 1/4	8.00	9 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

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

Diameter, Inches at A	B	C	Price Each: Carbon Steel	Price Each: High Speed Steel	Whole Length, Inches	Length of Flutes, Inches	Length of Taper B to C, Inches	Morse Taper Shank
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	3/16	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		
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 3/16	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 5/16 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 A	B	C	Price Each: Carbon Steel	Price Each: **High Speed Steel**	Whole Length, Inches	Length of Flutes, Inches	Length of Taper B to C, Inches
1/4	1/4	5/32	$2.30	**$2.50**	4 1/4	3 3/8	1
5/16	5/16	3/16	2.40	**2.70**	4 3/4	3 3/4	1
3/8	3/8	7/32	2.50	**2.90**	5 1/2	4	1
7/16	7/16	1/4	2.60	**3.10**	6 1/2	4 3/8	1
1/2	1/2	5/16	2.75	**3.30**	8 1/8	5 3/8	2
9/16	9/16	3/8	2.90	**3.50**	8 1/8	5 3/8	2
5/8	5/8	3/8	3.05	**3.70**	9 1/8	6 1/8	2
11/16	11/16	3/8	3.20	**3.90**	10 1/8	7 1/8	3
3/4	3/4	7/16	3.35	**4.10**	10 1/2	7 3/8	3
13/16	13/16	1/2	3.50	**4.40**	10 1/2	7 3/8	3
7/8	7/8	9/16	3.75	**4.70**	10 5/8	7 3/8	3
15/16	15/16	5/8	4.00	**5.00**	10 5/8	7 3/8	3
1	1	11/16	4.25	**5.30**	10 5/8	7 3/8	3
1 1/16	1 1/16	3/4	4.50	**5.85**	10 5/8	7 3/8	3
1 1/8	1 1/8	13/16	4.75	**6.40**	10 5/8	7 3/8	3
1 3/16	1 3/16	7/8	5.00	**6.95**	10 5/8	7 3/8	3
1 1/4	1 1/4	15/16	5.50	**7.50**	10 5/8	7 3/8	3
1 5/16	1 5/16	1	6.00	**8.25**	10 5/8	7 3/8	3
1 3/8	1 3/8	1 1/16	6.50	**9.00**	10 5/8	7 3/8	3
1 7/16	1 7/16	1 1/8	7.00	**10.00**	10 5/8	7 3/8	3
1 1/2	1 1/2	1 3/16	8.00	**11.00**	10 5/8	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 to 5/8 inch inclusive have 4 flutes; from 11/16 inch to 1 1/4 inches inclusive have 5 flutes; from 1 5/16 inches to 1 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
1/4	5/32	$3.00	5 7/16	2 1/2	No. 1
9/32	5/32	3.00	5 7/16	2 1/2	
5/16	3/16	3.00	5 11/16	2 3/4	
11/32	13/64	3.20	5 11/16	2 3/4	
3/8	15/64	3.20	5 11/16	2 3/4	
13/32	17/64	3.35	6 3/16	2 3/4	No. 2
7/16	11/64	3.35	6 15/16	3 1/2	
15/32	11/64	3.50	7 1/16	3 1/2	
1/2	11/64	3.50	7 9/16	4	
17/32	11/64	3.70	7 9/16	4	
9/16	3/16	3.70	7 9/16	4	
5/8	13/64	3.75	8 1/16	4 1/2	
11/16	17/64	3.85	8 13/16	4 1/2	No. 3
3/4	5/16	4.00	9 1/2	5	
13/16	11/32	4.25	9 1/2	5	
7/8	13/32	4.55	9 1/2	5	
15/16	7/16	4.80	9 1/2	5	
1	1/2	5.20	9 1/2	5	
1 1/16	17/32	5.60	9 1/2	5	
1 1/8	19/32	6.00	9 1/2	5	
1 3/16	5/8	6.40	9 1/2	5	
1 1/4	11/16	7.00	9 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
1/4	5/32	**$3.00**	5 7/16	2 1/2	No. 1
9/32	5/32	**3.00**	5 7/16	2 1/2	
5/16	3/16	**3.00**	5 11/16	2 3/4	
11/32	13/64	**3.20**	5 11/16	2 3/4	
3/8	15/64	**3.20**	5 11/16	2 3/4	
13/32	17/64	**3.35**	6 3/16	2 3/4	No. 2
7/16	11/64	**3.35**	6 15/16	3 1/2	
15/32	11/64	**3.50**	7 1/16	3 1/2	
1/2	11/64	**3.50**	7 9/16	4	
17/32	11/64	**3.70**	7 9/16	4	
9/16	3/16	**3.70**	7 9/16	4	
5/8	13/64	**3.75**	8 1/16	4 1/2	
11/16	17/64	**3.85**	8 13/16	4 1/2	No. 3
3/4	5/16	**4.00**	9 1/2	5	
13/16	11/32	**4.25**	9 1/2	5	
7/8	13/32	**4.55**	9 1/2	5	
15/16	7/16	**4.80**	9 1/2	5	
1	1/2	**5.20**	9 1/2	5	
1 1/16	17/32	**5.60**	9 1/2	5	
1 1/8	19/32	**6.00**	9 1/2	5	
1 3/16	5/8	**6.40**	9 1/2	5	
1 1/4	11/16	**7.00**	9 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

No. 1702
High Speed Steel

THREE GROOVE STRUCTURAL REAMERS

Diameter, Inches at A	Diameter, Inches at B	Diameter, Inches at C	Price Each High Speed Steel	Whole Length, Inches	Length of Flutes, Inches	Length of Taper B to C, Inches	Morse Taper Shank
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	
7/8	7/8	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	
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	No. 4
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 3/16	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

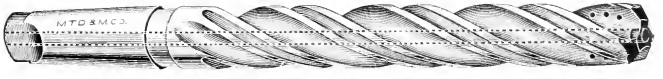
WITH STRAIGHT SHANKS

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
1/4	$3.00	4	1 1/2	1 1/32	$7.25	10	4 1/2
9/32	3.10	4	1 1/2	1 1/16	7.25	10	4 1/2
5/16	3.10	4	1 1/2	1 3/32	7.75	10	4 1/2
11/32	3.20	4	1 1/2	1 1/8	7.75	10 1/2	4 3/4
3/8	3.20	5	2	1 5/32	8.30	10 1/2	4 3/4
13/32	3.30	5	2	1 3/16	8.30	10 1/2	4 3/4
7/16	3.30	5	2	1 7/32	8.90	10 1/2	4 3/4
15/32	3 40	5	2	1 1/4	8.90	11	5
1/2	3.40	6	2 1/2	1 9/32	9.50	11	5
17/32	3.65	6	2 1/2	1 5/16	9.50	11	5
9/16	3.65	6	2 1/2	1 11/32	10.50	11	5
19/32	4.00	6	2 1/2	1 3/8	10.50	11 1/2	5 1/4
5/8	4.00	7	3	1 13/32	11.50	11 1/2	5 1/4
21/32	4.40	7	3	1 7/16	11.50	11 1/2	5 1/4
11/16	4.40	7	3	1 15/32	12.50	11 1/2	5 1/4
23/32	4.80	7	3	1 1/2	12.50	12	5 1/2
3/4	4.80	8	3 1/2	1 9/16	13.00	12	5 1/2
25/32	5.25	8	3 1/2	1 5/8	13.50	12 1/2	5 3/4
13/16	5.25	8	3 1/2	1 11/16	14.00	12 1/2	5 3/4
27/32	5.75	8	3 1/2	1 3/4	14.50	13	6
7/8	5.75	9	4	1 13/16	15.00	13	6
29/32	6.25	9	4	1 7/8	15.50	13 1/2	6 1/4
15/16	6.25	9	4	1 15/16	16.00	13 1/2	6 1/4
31/32	6.75	9	4	2	16.50	14	6 1/2
1	6.75	10	4 1/2				

Limits of expansion recommended for these Reamers are as follows: Sizes 1/4 to 1 1/2 .005 inch; 1/2 to 3 1/2 .008 inch; 1" to 1 23/32 .010 inch; 1 3/4 to 2 15/32" .012 inch; 2 31/64 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 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
3/8	$5.60	1 7/8	1 1/2	6 1/8	7/8	$10.00	3 3/8	2	9 3/8
13/32	5.80	1 27/32	1 1/2	6 1/8	29/32	10.40	3 1/2	2	9 5/8
7/16	5.80	1 27/32	1 1/2	6 3/16	15/16	10.80	3 5/8	2	9 7/8
15/32	6.00	1 57/64	1 1/2	6 7/32	31/32	11.30	3 13/16	2	10 3/32
1/2	6.00	1 53/64	1 1/2	6 7/16	1	11.80	3 7/8	2	10 1/4
17/32	6.20	1 15/16	1 1/2	6 5/8	1 1/32	12.20	4	2	10 1/2
9/16	6.40	2 1/16	1 1/2	6 25/32	1 1/16	12.60	4 1/16	2	10 11/16
19/32	6.70	2 3/16	1 1/2	7	1 3/32	13.10	4 1/8	2	10 13/16
.6093	6.70	2 5/16	2	7 31/32	1 1/8	13.60	4 1/8	2	10 7/8
5/8	7.00	2 5/16	2	7 31/32	1 5/32	14.10	4 3/16	2	11 1/32
21/32	7.30	2 1/2	2	8 5/32	1 3/16	14.60	4 3/16	2	11 1/8
.668	7.70	2 11/16	2	8 3/8	1 7/32	15.60	4 1/4	2	11 9/32
11/16	7.70	2 11/16	2	8 3/8	1.225	15.60	4 1/4	2	11 3/8
23/32	8.00	2 3/4	2	8 15/32	1.234	15.60	4 1/4	2	11 3/8
.734	8.40	2 13/16	2	8 17/32	1 1/4	15.60	4 1/4	2	11 3/8
.740	8.40	2 13/16	2	8 17/32	1 9/32	16.60	4 3/8	2	11 1/2
3/4	8.40	2 13/16	2	8 17/32	1 5/16	16.60	4 7/16	2	11 9/16
25/32	8.80	3	2	8 13/16	1 11/32	18.00	4 1/2	2	11 11/16
13/16	9.20	3 1/16	2	9	1 3/8	18.00	4 7/16	2	11 3/4
27/32	9.60	3 1/4	2	9 1/4	1 13/32	20.00	4 1/2	2	11 7/8
.850	10.00	3 3/8	2	9 3/8	1 7/16	20.00	4 7/16	2	11 15/16
.855	10.00	3 3/8	2	9 3/8	1 15/32	22.00	4 1/2	2	12
.860	10.00	3 3/8	2	9 3/8	1 1/2	22.00	4 1/2	2	12 1/16
.865	10.00	3 3/8	2	9 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.

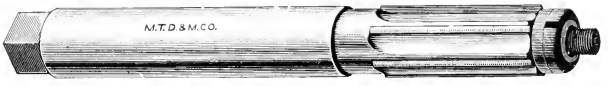
All sizes and dimensions not listed are special and subject to special prices.

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

Limits of expansion recommended for these Reamers are as follows: Sizes 1/4 to 15/32 .005 inch; 1/2 to 3/4 .008 inch; 1" to 1 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; $1\frac{9}{16}$ to 3 inches adjust $\frac{1}{64}$ 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	10¼	No. 3	1½	$10.00	12⅛	No. 4
1 1/16	7.40	10¼		1 9/16	10.30	12⅛	
1⅛	7.80	10⅝		1⅝	10.60	12⅝	
1 3/16	8.20	10⅝		1 11/16	10.90	12⅝	
1¼	8.60	11⅛	No. 4	1¾	11.20	13½	No. 5
1 5/16	9.00	11¼		1 13/16	11.60	13⅝	
1⅜	9.40	11⅝		1⅞	12.00	14⅛	
1 7/16	9.70	11⅝		1 15/16	12.40	14⅛	
				2	12.80	14⅛	

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
3/4	$4.00	7 13/16	1 7/16	$7.40	12 3/16
13/16	4.40	8 3/16	1 1/2	7.80	12 9/16
7/8	4.70	8 9/16	1 9/16	8.20	12 15/16
15/16	5.00	8 15/16	1 5/8	8.50	13 5/16
1	5.30	9 7/16	1 11/16	8.80	13 11/16
1 1/16	5.60	9 13/16	1 3/4	9.10	14 3/16
1 1/8	5.90	10 3/16	1 13/16	9.40	14 9/16
1 3/16	6.20	10 9/16	1 7/8	9.60	14 15/16
1 1/4	6.50	10 15/16	1 15/16	9.80	15 5/16
1 5/16	6.80	11 7/16	2	10.00	15 11/16
1 3/8	7.10	11 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
3/4	$4.00	9 1/2	2	1 7/16	$7.40	12	4
13/16	4.40	9 1/2	2	1 1/2	7.80	12 1/2	4
7/8	4.70	10	2	1 9/16	8.20	12 1/2	4
15/16	5.00	10	3	1 5/8	8.50	13	4
1	5.30	10 1/2	3	1 11/16	8.80	13	4
1 1/16	5.60	10 1/2	3	1 3/4	9.10	13 1/2	5
1 1/8	5.90	11	3	1 13/16	9.40	13 1/2	5
1 3/16	6.20	11	3	1 7/8	9.60	14	5
1 1/4	6.50	11 1/2	4	1 15/16	9.80	14	5
1 5/16	6.80	11 1/2	4	2	10.00	14	5
1 3/8	7.10	12	4				

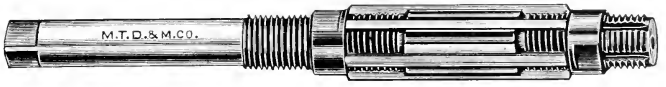
The cuts show the construction of the Expanding Reamers. Wedge-shaped pins are adjusted to the blades and driving the pins increases the diameter of the Reamers. When new blades or pins are required, the Reamers should accompany the order. Expanding Reamers are not furnished smaller than 3/4 inch diameter. 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	15/32 to	17/32	5 1/2	1 11/16
B	4.50	**5.75**	1.80	**4.20**	.30	17/32 to	19/32	5 3/4	1 13/16
C	4.75	**6.00**	1.80	**4.20**	.30	19/32 to	21/32	6 1/2	2 1/4
D	4.75	**6.25**	1.80	**4.20**	.30	21/32 to	23/32	6 3/4	2 1/4
E	5.00	**6.50**	2.10	**4.50**	.35	23/32 to	25/32	7	2 7/16
F	5.00	**6.80**	2.10	**4.50**	.35	25/32 to	27/32	7 1/2	2 19/32
G	5.50	**7.10**	2.40	**4.80**	.40	27/32 to	15/16	8	3
H	5.80	**7.85**	2.40	**4.80**	.40	15/16 to	1 1/16	9	3 1/4
I	7.00	**8.75**	2.70	**5.10**	.45	1 1/16 to	1 3/16	10	3 3/8
J	8.00	**10.00**	2.70	**5.10**	.45	1 3/16 to	1 11/32	11	3 15/16
K	10.00	**12.50**	3.30	**6.00**	.50	1 11/32 to	1 17/32	12	4 3/16
L	11.50	**15.00**	3.90	**8.10**	.65	1 17/32 to	1 25/32	14	4 3/4
M	15.00	**18.75**	4.20	**9.90**	.70	1 25/32 to	2 3/32	16	5

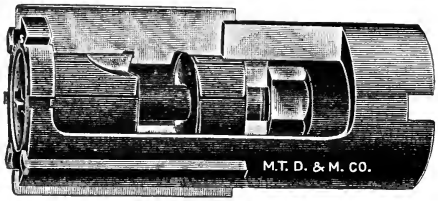
Set of Reamers A to H, inc., in case. Per Set, $41.50. See page 131.

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 Carbon Steel — ONE-LOCK ADJUSTABLE REAMERS — No. 1730 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
3/4	$6.00	$7.00	$2.80	$4.00	2 7/16	$11.70	$14.30	$4.30	$6.65
13/16	6.00	7.00	2.80	4.00	2 1/2	12.00	14.65	4.40	6.80
7/8	6.00	7.00	2.80	4.00	2 9/16	12.30	15.00	4.50	6.95
15/16	6.00	7.00	2.80	4.00	2 5/8	12.60	15.30	4.60	7.10
1	6.00	7.00	2.80	4.00	2 11/16	12.90	15.65	4.70	7.25
1 1/16	6.00	7.00	2.80	4.10	2 3/4	13.20	16.00	4 80	7.40
1 1/8	6.00	7.25	2.80	4.20	2 13/16	13.70	16.55	4.90	7.55
1 3/16	6.00	7.50	2.80	4.30	2 7/8	14.20	17.10	5.00	7.70
1 1/4	6.00	7.60	2.80	4.40	2 15/16	14.70	17.65	5.10	7.85
1 5/16	6.30	7.95	2.85	4.50	3	15.20	18.20	5.20	8.00
1 3/8	6.60	8.30	2.90	4.60	3 1/16	17.75	20.95	5.30	8.15
1 7/16	6.90	8.65	2.95	4.70	3 1/8	18.00	21.20	5.40	8.30
1 1/2	7.20	9.00	3.00	4.80	3 3/16	18.25	21.45	5.50	8.45
1 9/16	7.50	9.35	3.05	4.90	3 1/4	19.00	22.35	5.60	8.60
1 5/8	7.80	9.65	3.10	5.00	3 5/16	19.25	22.60	5.70	8.75
1 11/16	8.10	10.00	3.15	5.10	3 3/8	19.50	22.85	5.80	8.90
1 3/4	8.40	10.35	3.20	5.20	3 7/16	19.75	23.10	5.90	9.05
1 13/16	8.70	10.70	3.30	5.30	3 1/2	20.50	24.00	6.00	9.20
1 7/8	9.00	11.05	3.40	5.40	3 9/16	20.75	24.25	6.10	9.35
1 15/16	9.30	11.40	3.50	5.50	3 5/8	21.00	24.50	6.20	9.50
2	9.60	11.75	3.60	5.60	3 11/16	21.25	24.75	6.30	9.65
2 1/16	9.90	12.05	3.70	5.75	3 3/4	23.00	27.60	7.50	11.00
2 1/8	10.20	12.40	3.80	5.90	3 13/16	23.25	27.85	7.60	11.20
2 3/16	10.50	12.75	3 90	6.05	3 7/8	23.50	28.10	7.70	11.40
2 1/4	10.80	13.25	4.00	6.20	3 15/16	23.75	28.35	7.80	11.60
2 5/16	11.10	13.60	4.10	6.35	4	24.50	29.30	7.90	11.80
2 3/8	11.40	13.95	4.20	6.50					

For Arbors fitting these Reamers see page 119.

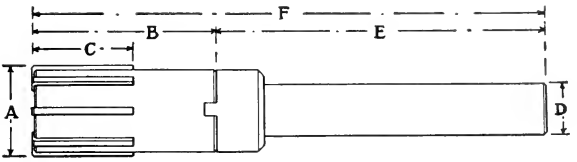
An Adjustment Socket Wrench and a Key are furnished without charge with each Reamer.

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 Diameter of Reamer, Inches	B Length of Reamer, Inches	C Length of Blade, Inches	D Diameter of Arbor, Inches	E Length Straight or Morse Taper Arbor, Inches	F 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.

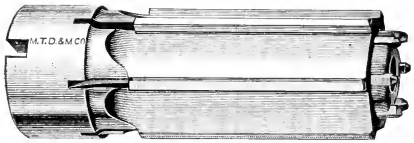
Wrenches No. 1 fit Reamers $\frac{3}{4}$ to $\frac{15}{16}$ inch inclusive.
Wrenches No. 2 fit Reamers 1 inch to $1\frac{3}{16}$ inches inclusive.
Wrenches No. 3 fit Reamers $1\frac{1}{4}$ to $1\frac{11}{16}$ inches inclusive.
Wrenches No. 4 fit Reamers $1\frac{3}{4}$ to $2\frac{3}{16}$ inches inclusive.
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 $\frac{15}{16}$ inch diameter will adjust $\frac{1}{64}$ inch; 1 to $1\frac{3}{16}$ inches adjust .025 inch; $1\frac{1}{4}$ to $1\frac{7}{16}$ inches adjust $\frac{1}{32}$ inch; $1\frac{1}{2}$ to $1\frac{15}{16}$ inches adjust $\frac{3}{64}$ inch; 2 to $2\frac{11}{16}$ inches adjust $\frac{1}{16}$ inch; $2\frac{3}{4}$ to 4 inches adjust $\frac{5}{64}$ 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	$5\frac{3}{16}$	
$2\frac{1}{4}$	16.00	$5\frac{3}{16}$	
$2\frac{5}{16}$	16.25	$5\frac{7}{16}$	No. 4
$2\frac{3}{8}$	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	$5\frac{7}{16}$	
$2\frac{3}{4}$	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

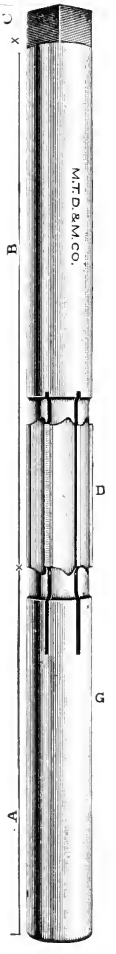
EXPANDING SHELL REAMERS

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

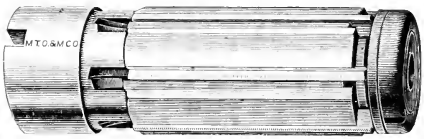


These Reamers are made to order only, and are not furnished smaller than $\frac{3}{4}$ inch diameter.

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 3/8 inches, but can be made solid as small as 3/4 inch.

A Wrench furnished with each Reamer.

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

These Reamers, sizes 1 3/4 inches to 2 7/8 inches, have an expansion of .009 inch; sizes 2 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.

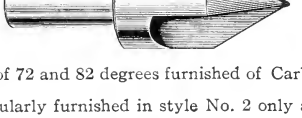
No. 750
Carbon Steel

No. 1750
High Speed Steel

No. 750
CENTER REAMERS
INCLUDED ANGLE 60°

STYLE NO. 1

STYLE NO. 2



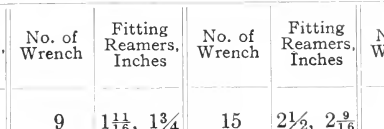
Style No. 2 Reamers with included Angle of 72 and 82 degrees furnished of Carbon Steel at regular prices.

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 Carbon Steel	Style No. 2 Price Each Carbon Steel	Style No. 2 Price Each **High Speed Steel**	Whole Length, Inches	Diam. Shank, Inches	Length Shank, Inches
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



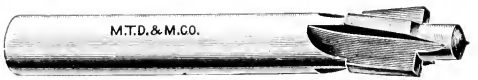
A WRENCH FURNISHED WITH EACH REAMER

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 3/16, 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



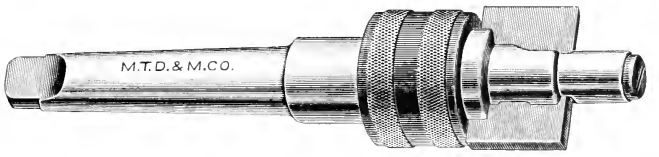
MACHINE SCREWS A. S. M. E. STANDARD

Number and Pitch of Screw	Price Each	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	$ .60	.062	.046	.090	.046	.090	.062	.136	.062	.136	.062	2	.060
1–72	.60	.075	.059	.112	.059	.112	.073	.159	.073	.159	.073	2	.073
2–64	.60	.088	.070	.134	.070	.134	.086	.185	.086	.185	.086	2	.086
3–56	.60	.101	.078	.155	.078	.155	.099	.209	.099	.209	.099	2	.099
4–48	.60	.114	.089	.176	.089	.176	.113	.232	.113	.232	.113	2	.112
5–44	.60	.127	.099	.198	.099	.198	.125	.256	.125	.256	.125	2¼	.125
6–40	.60	.140	.110	.219	.110	.219	.140	.280	.140	.280	.140	2¼	.138
7–36	.60	.153	.120	.240	.120	.240	.152	.304	.152	.304	.152	2¼	.151
8–36	.60	.166	.136	.262	.136	.262	.166	.328	.166	.328	.166	2¼	.164
9–32	.60	.179	.140	.284	.140	.284	.177	.352	.177	.352	.177	2¼	.177
10–30	.60	.192	.152	.305	.152	.305	.191	.375	.191	.375	.191	2½	.190
12–28	.60	.218	.173	.348	.173	.348	.218	.424	.218	.424	.218	2½	.216
14–24	.75	.244	.193	.390	.193	.390	.242	.476	.242	.476	.242	2½	.242
16–22	.75	.270	.213	.433	.213	.433	.272	.528	.272	.528	.272	3	.268
18–20	.75	.296	.234	.476	.234	.476	.295	.580	.295	.580	.295	3	.294
20–20	.90	.322	.261	.518	.261	.518	.323	.632	.323	.632	.323	3¼	.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	¾–1	$ .85	½–¾	$1.00	2
		1 1/16–1½	.95	13/16–1	1.25	
2	8.75	1 9/16–2	1.25	⅞–1	1.25	3
		2 1/16–2½	1.40	1 1/16–1¼	1.45	
3	10.00	2 9/16–2¾	1.65	1⅛–1¼	1.60	4
		2 13/16–3	1.85	1 5/16–1½	1.75	
		3 1/16–3¼	2.15	1 9/16–1¾	1.95	
		3 5/16–3½	2.50	1 13/16–2	2.50	

Special sizes made to order. Prices quoted on application.

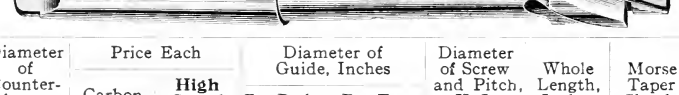
No. 765 Carbon Steel

COUNTERBORES

No. 1765 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			
3/16	$1.65	**$2.40**		.133	3/16-24	5	1
1/4	1.75	**2.40**		.133	3/16-24	5	1
1/4	1.75	**2.40**	3/16		3/16-24	5	1
1/4	1.75	**2.60**		.1865	1/4-20	5 3/4	1
5/16	1.85	**2.75**		.241	5/16-18	6 1/8	1
3/8	2.00	**2.60**		.1865	1/4-20	5 3/4	1
3/8	2.00	**2.60**	1/4		1/4-20	5 3/4	1
3/8	2.00	**2.90**		.301	3/8-16	6 1/2	1
7/16	2.10	**2.75**		.241	5/16-18	6 1/8	1
7/16	2.10	**2.75**	5/16		5/16-18	6 1/8	1
7/16	2.10	**3.50**		.347	7/16-14	7	2
1/2	2.20	**3.60**		.4057	1/2-13	7 1/4	2
9/16	2.35	**3.00**		.301	3/8-16	6 1/2	1
9/16	2.35	**3.00**	3/8		3/8-16	6 1/2	1
9/16	2.35	**3.70**		.452	9/16-12	7 1/2	2
5/8	2.55	**3.50**		.347	7/16-14	7	2
5/8	2.55	**3.50**	7/16		7/16-14	7	2
5/8	2.55	**3.80**		.5146	5/8-11	7 3/4	2
11/16	2.70	**5.00**		.5771	11/16-11	8 1/2	3
3/4	2.85	**3.60**		.4057	1/2-13	7 1/4	2
3/4	2.85	**3.60**	1/2		1/2-13	7 1/4	2
3/4	2.85	**5.25**		.624	3/4-10	9	3
13/16	3.10	**4.00**		.452	9/16-12	7 1/2	2
13/16	3.10	**4.00**	9/16		9/16-12	7 1/2	2
13/16	3.10	**5.25**		.6865	13/16-10	9	3
7/8	3.30	**4.50**		.5146	5/8-11	7 3/4	2
7/8	3.30	**4.50**	5/8		5/8-11	7 3/4	2
7/8	3.30	**5.50**		.7333	7/8- 9	9 1/4	3
15/16	3.55	**5.00**		.5771	11/16-11	8 1/2	3
15/16	3.55	**5.00**	11/16		11/16-11	8 1/2	3
15/16	3.55	**5.50**		.7958	15/16- 9	9 1/4	3
1	3.85	**6.00**		.624	3/4-10	9	3
1	3.85	**6.00**	3/4		3/4-10	9	3
1	3.85	**6.50**		.8427	1 - 8	9 1/2	3

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

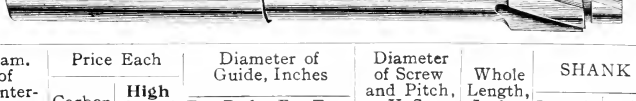
No. 766
Carbon Steel

COUNTERBORES

No. 1766
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
3/16	$1.50	$2.10		.133	3/16-24	5 1/4	2 9/16	1/2
1/4	1.60	2.10		.133	3/16-24	5 1/4	2 9/16	1/2
1/4	1.60	2.10	3/16		3/16-24	5 1/4	2 9/16	1/2
1/4	1.60	2.30		.1865	1/4-20	5 3/4	2 9/16	1/2
5/16	1.70	2.50		.241	5/16-18	6 1/8	2 9/16	1/2
3/8	1.80	2.30		.1865	1/4-20	5 3/4	2 9/16	1/2
3/8	1.80	2.30	1/4		1/4-20	5 3/4	2 9/16	1/2
3/8	1.80	3.00		.301	3/8-16	6 1/2	2 9/16	1/2
7/16	1.90	2.50		.241	5/16-18	6 1/8	2 9/16	1/2
7/16	1.90	2.50	5/16		5/16-18	6 1/8	2 9/16	1/2
7/16	1.90	3.25		.347	7/16-14	7	3 1/8	11/16
1/2	2.00	3.60		.4057	1/2-13	7 1/4	3 1/8	11/16
9/16	2.15	3.00		.301	3/8-16	6 1/2	2 9/16	1/2
9/16	2.15	3.00	3/8		3/8-16	6 1/2	2 9/16	1/2
9/16	2.15	4.00		.452	9/16-12	7 1/2	3 1/8	11/16
5/8	2.30	3.25		.347	7/16-14	7	3 1/8	11/16
5/8	2.30	3.25	7/16		7/16-14	7	3 1/8	11/16
5/8	2.30	4.50		.5146	5/8-11	7 3/4	3 1/8	11/16
11/16	2.45	5.00		.5771	11/16-11	8 1/2	3 7/8	15/16
3/4	2.60	3.60		.4057	1/2-13	7 1/4	3 1/8	11/16
3/4	2.60	3.60	1/2		1/2-13	7 1/4	3 1/8	11/16
3/4	2.60	6.00		.624	3/4-10	9	3 7/8	15/16
13/16	2.80	4.00		.452	9/16-12	7 1/2	3 1/8	11/16
13/16	2.80	4.00	9/16		9/16-12	7 1/2	3 1/8	11/16
13/16	2.80	6.00		.6865	13/16-10	9	3 7/8	1
7/8	3.00	4.50		.5146	5/8-11	7 3/4	3 1/8	11/16
7/8	3.00	4.50	5/8		5/8-11	7 3/4	3 1/8	11/16
7/8	3.00	6.25		.7333	7/8- 9	9 1/4	3 7/8	1
15/16	3.25	5.00		.5771	11/16-11	8 1/2	3 7/8	15/16
15/16	3.25	5.00	11/16		11/16-11	8 1/2	3 7/8	15/16
15/16	3.25	6.25		.7958	15/16- 9	9 1/4	3 7/8	1
1	3.50	6.00		.624	3/4-10	9	3 7/8	15/16
1	3.50	6.00	3/4		3/4-10	9	3 7/8	15/16
1	3.50	6.50		.8427	1 - 8	9 1/2	3 7/8	1

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

SCREW SETS IN BLOCKS

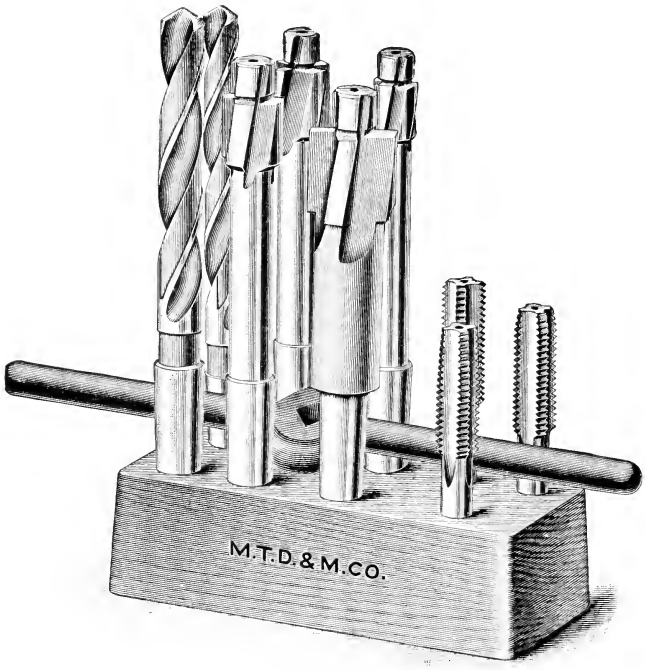
No. 770

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
				Tap Size For Body		Tap Size For Fil. Head		Body Size For Fil. Head		Body Size Seat Hex. Head			
		Tap Size	Body Size	Dia. Bore	Dia. Guide	Dia. Bore	Dia. Guide	Dia. Bore	Dia. Guide	Dia. Bore	Dia. Guide	Taper, Plug, Bottom'g	Size No.
*1/4 20	$23.60	3/16	1/4	1/4	3/16	3/8	3/16	3/8	1/4	5/8	1/4	1/4 20	4
5/16 18	21.25	C	5/16	5/16	C	7/16	C	7/16	5/16	11/16	5/16	5/16 18	5
3/8 16	22.40	N	3/8	3/8	N	9/16	N	9/16	3/8	13/16	3/8	3/8 16	6
7/16 14	24.40	S	7/16	7/16	S	5/8	S	5/8	7/16	15/16	7/16	7/16 14	7
1/2 13	25.00	3/2	1/2	1/2	13/32	3/4	13/32	3/4	1/2	1 1/16	1/2	1/2 13	7
9/16 12	26.75	29/64	9/16	9/16	29/64	13/16	29/64	13/16	9/16	1 1/8	9/16	9/16 12	8
5/8 11	30.00	33/64	5/8	5/8	33/64	7/8	33/64	7/8	5/8	1 1/4	5/8	5/8 11	8
3/4 10	34.50	5/8	3/4	3/4	5/8	1	5/8	1	3/4	1 1/2	3/4	3/4 10	9
7/8 9	44.25	47/64	7/8	7/8	47/64	1 1/8	47/64	1 1/8	7/8	1 11/16	7/8	7/8 9	10
1 8	56.25	27/32	1	1	27/32	1 1/4	27/32	1 1/4	1	1 15/16	1	1 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

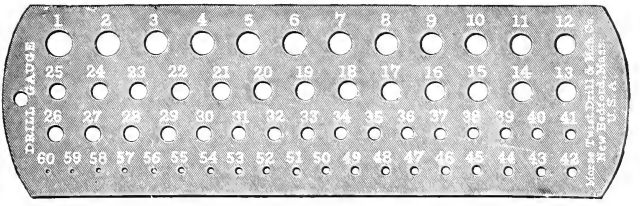
Number and Pitch of Screw	Price Per Set	Straight Shank Drills		STRAIGHT SHANK COUNTERBORES										Taps	Wrench
				Tap Size For Body		Tap Size For Fil. Head		Body Size For Fil. Head		Body Size For Round Hd.		Body Size For Flat Head			
		Tap Size	Body Size	Dia. Bore	Dia. Guide	Dia. Bore	Dia. Guide	Dia.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

For illustration see page 176

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

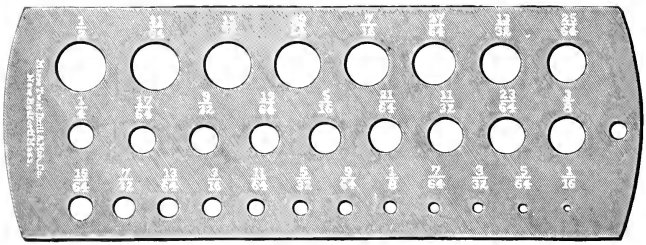
Decimal Equivalents stamped on the reverse side of this gauge. See table.

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 $\frac{1}{2}$



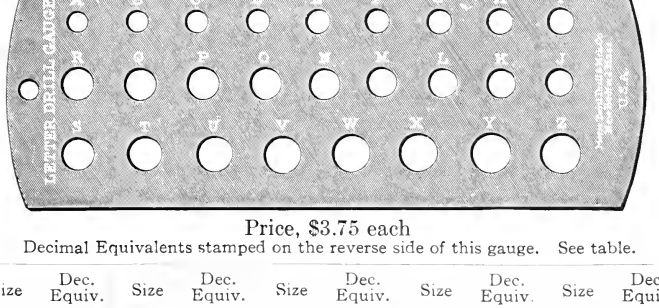
Price, $2.75 each

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

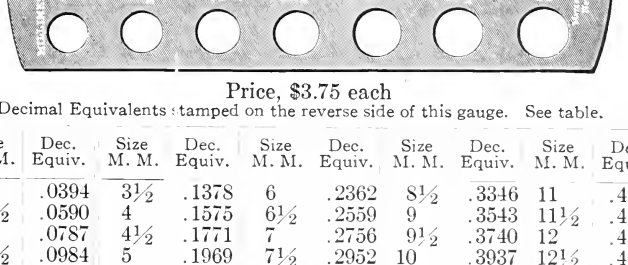


Price, $3.75 each

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.

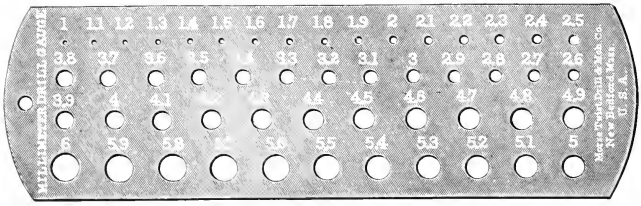
Size M. M.	Dec. Equiv.	Size M. M.	Dec. Equiv.	Size M. M.	Dec. Equiv.	Size M. M.	Dec. Equiv.	Size M. M.	Dec. Equiv.
1	.0394	3½	.1378	6	.2362	8½	.3346	11	.4331
1½	.0590	4	.1575	6½	.2559	9	.3543	11½	.4527
2	.0787	4½	.1771	7	.2756	9½	.3740	12	.4724
2½	.0984	5	.1969	7½	.2952	10	.3937	12½	.4921
3	.1181	5½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



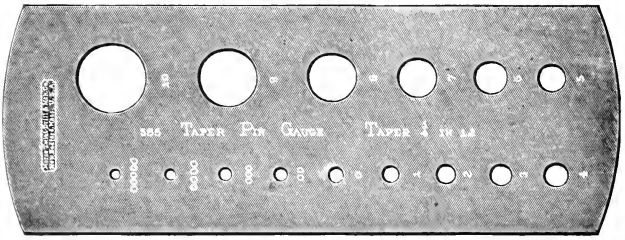
Price, $3.25 each

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

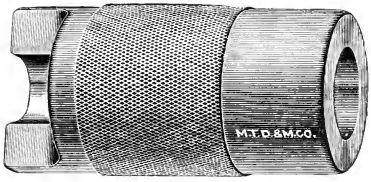
Decimal Equivalents of large end of Taper Pin stamped on the reverse side of this gauge.

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

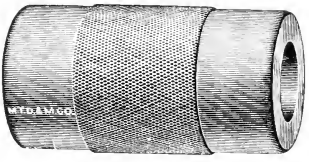
No. 790

MORSE TAPER PLUG AND RING GAUGES

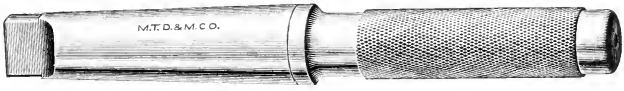
STYLE A RING



STYLE B RING



STYLE A PLUG

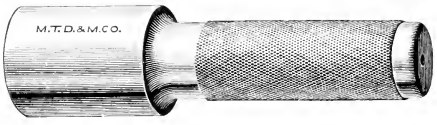


STYLE B PLUG

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

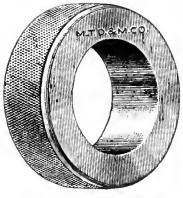


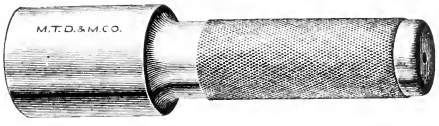
The Plug Gauge is made with a straight, knurled handle.
The Ring Gauge is knurled on its periphery.

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

No. 793

PLUG AND RING CYLINDRICAL GAUGES





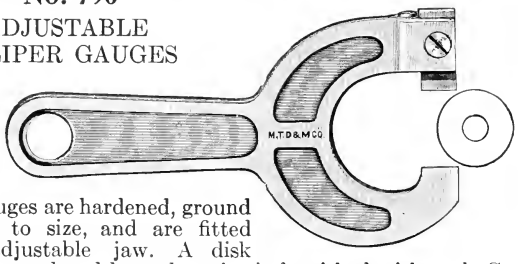
The Plug Gauge is made with a straight, knurled handle.
The Ring Gauge is knurled on its periphery.

Size	Price Each Plug Gauge	Price Each Ring Gauge	Price Both Plug and Ring
2 3/8	$9.80	$15.30	$25.10
2 7/16	10.15	15.65	25.80
2 1/2	10.30	15.95	26.25
2 9/16	10.50	16.25	26.75
2 5/8	10.70	16.55	27.25
2 11/16	10.90	16.90	27.80
2 3/4	11.05	17.20	28.25
2 13/16	11.25	17.50	28.75
2 7/8	11.45	17.80	29.25
2 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 1/8	$12.25	$14.25	$26.50
3 1/4	13.25	15.20	28.45
3 3/8	14.25	16.15	30.40
3 1/2	15.20	17.15	32.35
3 5/8	16.55	18.05	34.60
3 3/4	18.00	19.05	37.05
3 7/8	19.45	19.95	39.40
4	20.95	21.05	42.00
4 1/4	23.25	22.75	46.00
4 1/2	25.65	24.50	50.15
4 3/4	28.25	26.05	54.30
5	30.80	27.80	58.60
5 1/4	33.90	29.40	63.30
5 1/2	36.80	30.95	67.75
5 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
1/4	$3.75	13/16	$3.85	1 3/8	$4.50	1 15/16	$5.70	2 1/2	$6.90
5/16	3.75	7/8	3.90	1 7/16	4.60	2	5.85	2 9/16	7.50
3/8	3.75	15/16	4.00	1 1/2	4.65	2 1/16	5.95	2 5/8	7.90
7/16	3.75	1	4.05	1 9/16	4.80	2 1/8	6.00	2 11/16	8.25
1/2	3.75	1 1/16	4.15	1 5/8	4.95	2 3/16	6.15	2 3/4	8.25
9/16	3.75	1 1/8	4.20	1 11/16	5.10	2 1/4	6.30	2 13/16	9.00
5/8	3.75	1 3/16	4.30	1 3/4	5.25	2 5/16	6.45	2 7/8	9.00
11/16	3.75	1 1/4	4.35	1 13/16	5.40	2 3/8	6.60	2 15/16	9.00
3/4	3.75	1 5/16	4.45	1 7/8	5.55	2 7/16	6.75	3	9.75

SET NO. 1

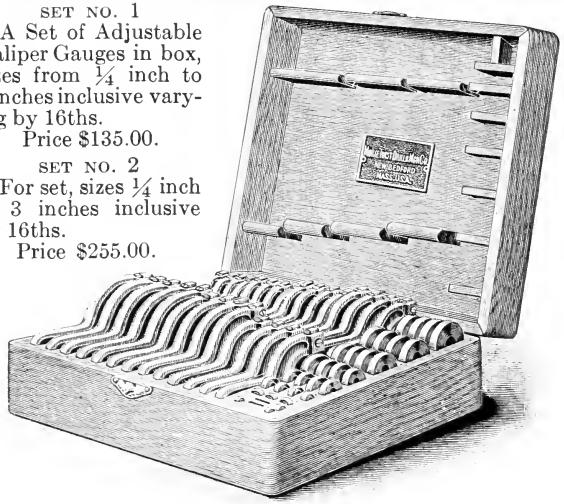
A Set of Adjustable Caliper Gauges in box, sizes from 1/4 inch to 2 inches inclusive varying by 16ths.

Price $135.00.

SET NO. 2

For set, sizes 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 ¼ 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
¼	$1.50	1	$1.10	1¾	$1.40	2½	$1.80
5/16	1.50	1 1/16	1.10	1 13/16	1.55	2 9/16	1.95
⅜	.90	1⅛	1.10	1⅞	1.55	2⅝	1.95
7/16	.90	1 3/16	1.10	1 15/16	1.55	2 11/16	1.95
½	1.00	1¼	1.10	2	1.55	2¾	2.10
9/16	1.00	1 5/16	1.25	2 1/16	1.65	2 13/16	2.10
⅝	1.00	1⅜	1.25	2⅛	1.65	2⅞	2.25
11/16	1.00	1 7/16	1.25	2 3/16	1.65	2 15/16	2.25
¾	1.05	1½	1.25	2¼	1.65	3	2.25
13/16	1.05	1 9/16	1.40	2 5/16	1.80		
⅞	1.05	1⅝	1.40	2⅜	1.80		
15/16	1.05	1 11/16	1.40	2 7/16	1.80		

Disks ¼ and 5/16 inches are always furnished with handles.

HANDLES	Price Each
For Disks from ⅜ inch to 9/16 inch, inclusive	$ .65
For Disks from ⅝ inch to 1 1/16 inches, inclusive	.75
For Disks from 1⅛ inches to 1¾ inches, inclusive	.80
For Disks from 1 13/16 inches to 3 inches, inclusive	.90

For the greatest production,—

For the smoothest surfaces,—

For the least power,—

For the longest life,—

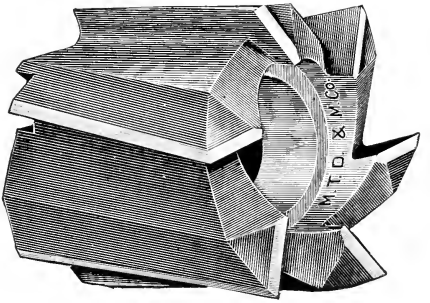
For the highest economy,—

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 1/4	1 1/4	1/2	$6.00
1 3/8	1 1/4	1/2	6.25
1 1/2	1 1/4	1/2	6.50
1 5/8	1 3/4	3/4	8.25
1 3/4	1 3/4	3/4	8.65
1 7/8	1 3/4	3/4	9.00
2	1 3/4	3/4	9.65
2 1/8	1 3/4	3/4	10.30
2 1/4	2 1/4	1	11.75
2 3/8	2 1/4	1	12.90
2 1/2	2 1/4	1	12.90
2 3/4	2 1/4	1	14.60
3	2 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.

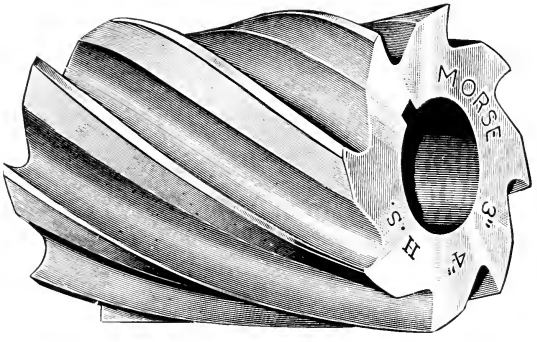
Carbon Steel Coarse Tooth Shell End Mills are special.

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.

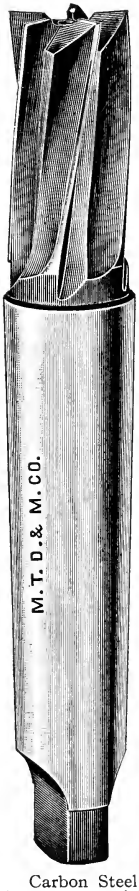
Coarse Tooth Plain Milling Cutters of carbon steel are special.

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
1/4	$2.10	4	2 7/16	13/16
1/4	2.80	5	3	13/16
5/16	2.10	4	2 1/2	7/8
5/16	2.90	5	3 1/16	7/8
3/8	2.10	4	2 1/2	7/8
3/8	2.90	5	3 1/16	7/8
7/16	2.90	5	3 1/8	15/16
1/2	2.90	5	3 3/16	1
1/2	4.60	7	5 1/8	1 1/8
5/8	4.60	7	5 1/2	1 1/2
3/4	4.70	7	5 5/8	1 5/8
3/4	7.40	9	6 7/8	1 5/8
7/8	5.30	7	5 3/4	1 3/4
7/8	7.40	9	7	1 3/4
1	6.00	7	5 7/8	1 7/8
1	7.60	9	7 1/8	1 7/8
1 1/8	6.80	7	6	2
1 1/8	7.60	9	7 1/4	2
1 1/4	7.80	7	6	2
1 1/4	8.90	9	7 1/4	2
1 3/8	9.40	9	7 3/8	2 1/8
1 1/2	10.40	9	7 1/2	2 1/4
1 5/8	11.90	9	7 5/8	2 3/8
1 3/4	13.15	9	7 3/4	2 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	3/8	1 1/4	$6.65	5	3/4	1 1/4	$17.10
3	7/16	1 1/4	7.15	5	3/4	1 1/2	17.10
3	1/2	1 1/4	7.65	5	7/8	1 1/4	18.75
4	1/2	1 1/4	11.90	5	7/8	1 1/2	18.75
4	1/2	1 1/2	11.90	5	1	1 1/2	20.20
4	5/8	1 1/4	13.15	6	3/4	1 1/2	22.25
4	5/8	1 1/2	13.15	6	1	1 1/2	26.40
4	3/4	1 1/4	14.40	8	1	1 1/2	55.20
4	3/4	1 1/2	14.40				
4	7/8	1 1/4	17.30				
4	7/8	1 1/2	17.30				

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

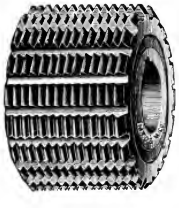
Coarse Tooth Side Milling Cutters of carbon steel are special.

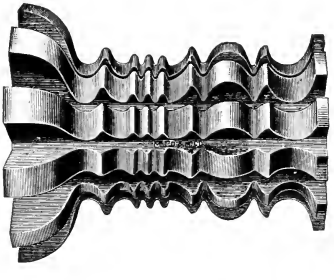
No. 815

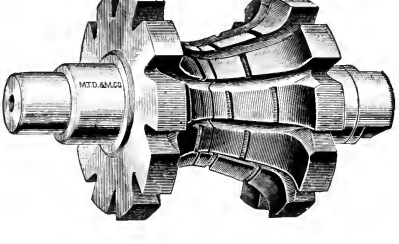
FORMED MILLING CUTTERS

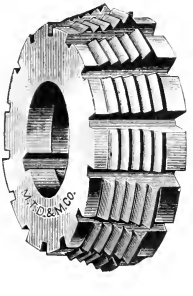
Formed Milling Cutters furnished in outlines as desired. With an order, send a sketch, a templet, or a sample piece, as required, to be milled, with the diameter of the hole for the Cutter, and state the direction in which the Cutter is to revolve. Formed Cutters are stamped with date and number, and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

These Cutters can be Sharpened Without Changing Their Form. Prices furnished on application.



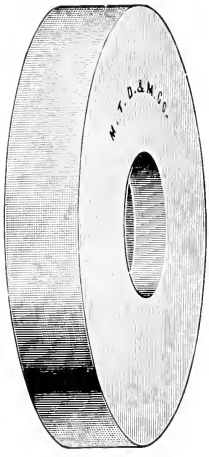






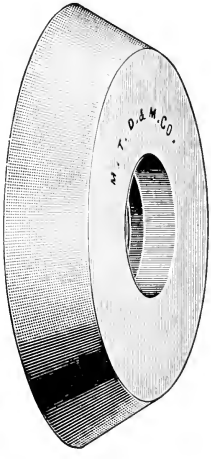
CIRCULAR CUTTING DISKS

No. 810
No. 1810



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.

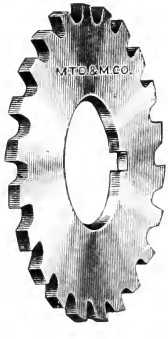
No. 811
No. 1811



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.

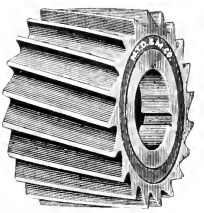
These saws are made to order.

Prices on application.

No. 830
Carbon Steel

No. 1830
High Speed Steel

MILLING CUTTERS



Diam. Inches	Face, Inches	Hole, Inches	Price Each Carbon Steel	Price Each **High Speed Steel**	Diam. Inches	Face, Inches	Hole, Inches	Price Each Carbon Steel	Price Each **High Speed Steel**
2¼	½	⅞	$2.25	**$4.15**	3	1	1¼	$4.60	**$9.10**
2¼	1	⅞	3.20	**6.00**	3	1¼	1¼	5.10	**10.35**
2½	3/16	1	1.65	**3.25**	3	1½	1¼	5.50	**11.50**
2½	¼	1	1.80	**3.50**	3	1¾	1¼	5.70	**12.30**
2½	5/16	1	1.90	**3.75**	3	2	1¼	6.00	**13.30**
2½	⅜	1	2.10	**4.00**	3	2½	1¼	6.60	**15.25**
2½	7/16	1	2.20	**4.25**	3	3	1¼	7.00	**17.00**
2½	½	1	2.30	**4.50**	3	3½	1¼	7.50	**18.80**
2½	⅝	1	2.50	**4.80**	3	4	1¼	8.15	**20.75**
2½	¾	1	2.80	**5.40**	3	5	1¼	9.90	**25.50**
2½	⅞	1	3.10	**6.00**	3	6	1¼	13.70	**33.00**
2½	1	1	3.30	**6.50**	4	¼	1	2.60	**5.50**
2½	1¼	1	3.70	**7.50**	4	¼	1¼	2.60	**5.50**
2½	1½	1	4.00	**8.25**	4	5/16	1	3.20	**6.50**
2½	1¾	1	4.35	**9.15**	4	5/16	1¼	3.20	**6.50**
2½	2	1	4.75	**10.10**	4	⅜	1	3.85	**7.70**
2½	2½	1	5.25	**11.60**	4	⅜	1¼	3.85	**7.70**
2½	3	1	5.70	**13.00**	4	7/16	1¼	4.50	**8.85**
2½	4	1	7.00	**16.35**	4	½	1¼	5.00	**9.75**
3	3/16	1	1.75	**3.60**	4	⅝	1¼	5.50	**10.90**
3	¼	1	2.10	**4.00**	4	¾	1¼	6.00	**12.10**
3	5/16	1	2.35	**4.50**	4	⅞	1¼	6.50	**13.35**
3	⅜	1	2.70	**5.10**	4	1	1¼	7.15	**14.70**
3	⅜	1¼	2.70	**5.10**	4	1¼	1¼	7.90	**16.70**
3	7/16	1¼	2.85	**5.40**	4	1½	1¼	8.40	**18.40**
3	½	1¼	3.10	**5.90**	4	2	1¼	9.50	**21.90**
3	⅝	1¼	3.50	**6.75**	4	3	1¼	11.50	**28.50**
3	¾	1¼	3.85	**7.50**	4	4	1¼	14.00	**36.75**
3	⅞	1¼	4.20	**8.25**					

Cutters of less than ¾ inch face have straight teeth.

Cutters of **¾ 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.

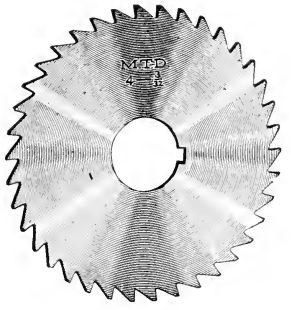
No. 833
Carbon Steel

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	3/16	1/2	$2.35	**$3.60**	4	1/2	1 1/4	$6.50	**$11.90**
2	3/16	5/8	2.35	**3.60**	4	5/8	1	7.10	**13.15**
2	1/4	1/2	2.60	**4.10**	4	5/8	1 1/4	7.10	**13.15**
2	1/4	5/8	2.60	**4.10**	4	3/4	1	7.65	**14.40**
2	3/8	1/2	2.80	**4.50**	4	3/4	1 1/4	7.65	**14.40**
2	3/8	5/8	2.80	**4.50**	4	7/8	1	8.25	**17.30**
2 1/2	1/4	7/8	2.80	**4.65**	4	7/8	1 1/4	8.25	**17.30**
2 1/2	5/16	7/8	2.90	**4.90**	5	1/2	1	6.70	**13.60**
2 1/2	3/8	7/8	3.15	**5.30**	5	1/2	1 1/4	6.70	**13.60**
2 1/2	7/16	7/8	3.25	**5.50**	5	5/8	1	7.30	**15.20**
2 1/2	1/2	7/8	3.40	**5.80**	5	5/8	1 1/4	7.30	**15.20**
3	1/4	1	3.15	**5.40**	5	3/4	1	8.10	**17.10**
3	5/16	1	3.60	**6.25**	5	3/4	1 1/4	8.10	**17.10**
3	3/8	1	3.85	**6.65**	5	1	1	9.90	**20.20**
3	7/16	1	4.10	**7.15**	5	1	1 1/4	9.90	**20.20**
3	1/2	1	4.30	**7.65**	6	1/2	1	8.60	**18.65**
3 1/2	7/16	1	4.80	**8.65**	6	3/4	1	9.65	**22.25**
3 1/2	1/2	1	5.35	**9.60**	6	3/4	1 1/4	9.65	**22.25**
3 1/2	9/16	1	5.80	**10.65**	6	1	1 1/4	11.00	**26.40**
3 1/2	5/8	1	5.80	**10.65**	7	3/4	1 1/4	17.50	**36.25**
4	1/4	1	3.70	**7.00**	7	1	1 1/4	20.40	**43.15**
4	3/8	1	5.20	**9.50**	8	1	1 1/4	24.75	**55.20**
4	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	1/32	7/8	$1.30	**$3.15**	4	5/32	1	$2.10	**$4.65**
2½	3/64	7/8	1.20	**3.00**	4	3/16	1	2.10	**4.65**
2½	1/16	7/8	1.15	**3.00**	5	1/16	1	2.30	**5.15**
2½	3/32	7/8	1.15	**3.00**	5	3/32	1	2.00	**4.70**
2½	1/8	7/8	1.15	**3.00**	5	1/8	1-1¼	2.00	**5.20**
2½	5/32	7/8	1.65	**3.25**	5	5/32	1	2.90	**7.40**
3	1/32	1	1.60	**3.75**	5	3/16	1	2.90	**7.40**
3	3/64	1	1.50	**3.25**	6	1/16	1	5.10	**9.40**
3	1/16	1	1.30	**3.15**	6	3/32	1	3.85	**7.65**
3	3/32	1	1.30	**3.15**	6	1/8	1-1¼	3.50	**7.70**
3	1/8	1	1.30	**3.15**	6	3/16	1-1¼	4.50	**10.20**
3	5/32	1	1.75	**3.60**	7	1/16	1	9.50	**16.00**
4	1/32	1	2.85	**5.75**	7	3/32	1	5.70	**10.75**
4	3/64	1	1.85	**4.00**	7	1/8	1-1¼	4.85	**10.80**
4	1/16	1	1.60	**3.75**	7	3/16	1¼	6.50	**14.70**
4	3/32	1	1.60	**3.60**	8	1/8	1-1¼	7.30	**15.00**
4	1/8	1	1.60	**3.60**	8	3/16	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 SLOTTING 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	2¾	1
6	.75	**$2.75**	.162	2¾	1
7	.65	**2.50**	.144	2¾	1
8	.55	**2.25**	.128	2¾	¾, 1
9	.50	**2.00**	.114	2¾	¾, 1
10	.45	**1.80**	.102	2¾	¾, 1
11	.40	**1.60**	.091	2¾	¾, 1
12	.35	**1.40**	.081	2¾	¾, 1
13	.35	**1.30**	.072	2¾	¾, 1
14	.35	**1.20**	.064	2¾	½, ⅝, ¾, 1
15	.30	**1.10**	.057	2¾	½, ⅝, ¾, 1
16	.30	**1.00**	.051	2¾	½, ⅝, ¾, 1
17	.25	**1.00**	.045	2¾	½, ⅝, ¾, 1
18	.25	**1.00**	.040	2¾	½, ⅝, ¾, 1
19	.25	**1.00**	.035	2¾	½, ⅝, ¾, 1
20	.25	**1.00**	.032	2¾	½, ⅝, ¾, 1
21	.20	**1.00**	.028	2¾	½, ⅝, ¾, 1
22	.20	**1.00**	.025	2¾	½, ⅝, ¾, 1
23	.20	**1.00**	.023	2¾	½, ⅝, ¾, 1
24	.20	**1.00**	.020	2¾	½, ⅝, ¾, 1
25	.20		.018	2¾	½, ⅝, ¾, 1
26	.20		.016	2¾	¾, 1
27	.20		.014	2¾	¾, 1
28	.20		.012	2¾	¾, 1
30	.20		.010	2¾	¾, 1
32	.20		.008	2¾	¾, 1
34	.20		.006	2¾	¾, 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	2¼	⅝
11	.35	.091	2¼	⅝
12	.30	.081	2¼	⅝
13	.25	.072	2¼	⅝
14	.25	.064	2¼	⅝
15	.20	.057	2¼	⅝
16	.20	.051	2¼	⅝
17	.20	.045	2¼	⅝
18	.20	.040	2¼	⅝
19	.20	.035	2¼	⅝
20	.20	.032	2¼	⅝
21	.20	.028	2¼	⅝
22	.20	.025	2¼	⅝
23	.20	.023	2¼	⅝
24	.20	.020	2¼	⅝
25	.20	.018	2¼	⅝
26	.20	.016	2¼	⅝
27	.20	.014	2¼	⅝
28	.20	.012	2¼	⅝
30	.20	.010	2¼	⅝
32	.20	.008	2¼	⅝
34	.20	.006	2¼	⅝
14	.20	.064	1¾	⅝
15	.20	.057	1¾	⅝
16	.20	.051	1¾	⅝
17	.20	.045	1¾	⅝
18	.20	.040	1¾	⅝
19	.20	.035	1¾	⅝
20	.20	.032	1¾	⅝
21	.20	.028	1¾	⅝
22	.20	.025	1¾	⅝
23	.20	.023	1¾	⅝
24	.15	.020	1¾	½, ⅝
25	.15	.018	1¾	½, ⅝
26	.15	.016	1¾	½, ⅝
27	.15	.014	1¾	½, ⅝
28	.15	.012	1¾	½, ⅝
30	.15	.010	1¾	½, ⅝
32	.15	.008	1¾	½, ⅝
34	.15	.006	1¾	½, ⅝

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.

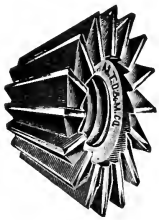
Angular Cutters are for cutting the teeth of Cutters and Mills and the side teeth of Heading or Straddle Mills, but are not adapted for Spiral Milling.

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**	$\frac{7}{16}$	⅜	20
1⅝	3.60	**5.80**	$\frac{9}{16}$	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

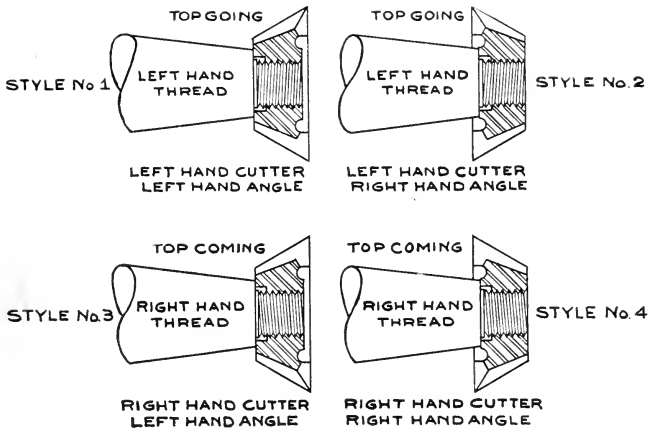
These Cutters are carried in stock as illustrated with the included angle of either 45°, 60°, or 90°.

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. 1865
High Speed Steel

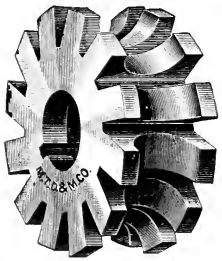
CONVEX

CONVEX AND CONCAVE CUTTERS

FOR MILLING HALF CIRCLES

No. 866
Carbon Steel

No. 1866
High Speed Steel



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**
1/8	2	7/8	$2.30	**$3.40**	$3.50	**$5.30**
3/16	2	7/8	2.70	**4.00**	3.70	**5.75**
1/4	2	7/8	3.50	**5.30**	3.80	**6.00**
5/16	2 1/4	7/8	3.75	**5.90**	4.20	**6.70**
3/8	2 1/4	7/8	3.85	**6.10**	4.40	**7.15**
7/16	2 1/4	7/8	4.00	**6.40**	4.70	**7.75**
1/2	2 1/4	7/8	4.20	**6.70**	5.00	**8.30**
5/8	2 3/4	1	5.15	**8.75**	6.40	**11.25**
3/4	3	1	6.10	**10.65**	7.50	**13.65**
7/8	3 1/4	1	7.15	**12.75**	8.60	**16.00**
1	3 1/4	1	7.70	**13.90**	9.10	**17.50**

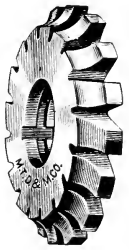
These Cutters have formed teeth and can be sharpened without changing their outline.

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

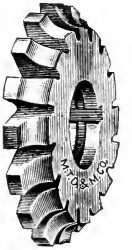
No. 868
Carbon Steel

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**
1/8	2	7/8	$3.50	**$5.30**
1/4	2 1/4	7/8	4.00	**6.40**
3/8	3	1	5.60	**9.65**
1/2	3 1/4	1	7.15	**12.75**
5/8	3 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.

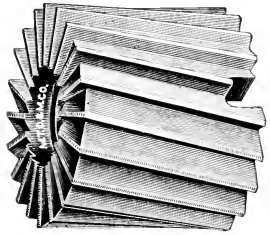
The number of revolutions per minute to get the required surface speeds will be found in tables on pages XXVIII and XXIX of the appendix.

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.

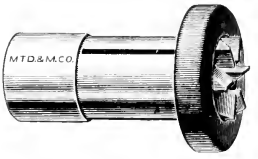
Shell End Mills with straight teeth or those having dimensions other than listed are special and subject to special prices.

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: Carbon Steel	Price Each: High Speed Steel	Diam. Shank, Inches	Whole Length, Inches	Diam. of Hole, Inches	Price Each: Carbon Steel	Price Each: High Speed Steel	Diam. Shank, Inches	Whole Length, Inches
3/32	$1.85	**$4.25**	5/8	1 1/2	7/16	$3.50	**$5.20**	3/4	2
1/8	1.85	**4.25**	5/8	1 1/2	1/2	3.50	**5.20**	1	2 1/4
5/32	1.85	**4.25**	5/8	1 1/2	9/16	4.00	**6.85**	1	2 1/4
3/16	1.85	**4.25**	5/8	1 1/2	5/8	4.00	**6.85**	1	2 1/4
7/32	1.85	**4.25**	5/8	1 1/2	11/16	4.60	**8.45**	1 1/4	2 1/2
1/4	1.85	**4.25**	5/8	1 1/2	3/4	4.60	**8.45**	1 1/4	2 1/2
9/32	2.60	**4.70**	3/4	2	13/16	4.60	**8.45**	1 1/4	2 1/2
5/16	2.60	**4.70**	3/4	2	7/8	5.50	**10.40**	1 1/2	2 3/4
11/32	2.60	**4.70**	3/4	2	15/16	5.50	**10.40**	1 1/2	2 3/4
3/8	3.50	**5.20**	3/4	2	1	5.50	**10.40**	1 1/2	2 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: Carbon Steel	Price Each: High Speed Steel	Outside Diam., Inches	Whole Length, Inches	Diam. of Hole, Inches	Price Each: Carbon Steel	Price Each: High Speed Steel	Outside Diam., Inches	Whole Length, Inches
3/32	$1.35	**$3.60**	5/8	1 1/2	3/8	$2.70	**$4.25**	1	1 3/4
1/8	1.35	**3.60**	5/8	1 1/2	7/16	2.70	**4.25**	1	1 3/4
5/32	1.35	**3.60**	5/8	1 1/2	1/2	2.70	**4.25**	1	1 3/4
3/16	1.35	**3.60**	5/8	1 1/2	9/16	3.00	**5.55**	1 1/4	2
7/32	1.35	**3.60**	5/8	1 1/2	5/8	3.00	**5.55**	1 1/4	2
1/4	1.35	**3.60**	5/8	1 1/2	11/16	3.35	**6.85**	1 1/2	2
9/32	2.00	**3.90**	3/4	1 1/2	3/4	3.35	**6.85**	1 1/2	2
5/16	2.00	**3.90**	3/4	1 1/2	7/8	4.00	**8.45**	1 3/4	2 1/4
11/32	2.00	**3.90**	3/4	1 1/2	1	4.00	**8.45**	1 3/4	2 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 1/8 TO 5/16 INCH INCLUSIVE

No. 891
Carbon Steel

No. 1891
High Speed Steel

STRAIGHT SHANK END MILLS

WITH SPIRAL FLUTES

SIZES 3/8 TO 3/4 INCH INCLUSIVE

IN ORDERING STATE WHETHER RIGHT OR LEFT HAND MILLS ARE WANTED

No. 890
No. 1890

WITH STRAIGHT FLUTES

Diam. Inches	Price Each	
	Carbon Steel	**High Speed Steel**
1/8	$0.70	**$1.00**
5/32	.70	**1.00**
3/16	.70	**1.00**
7/32	.70	**1.00**
1/4	.80	**1.15**
5/16	.90	**1.30**

No. 891
No. 1891

WITH SPIRAL FLUTES

Diam. Inches	Price Each	
	Carbon Steel	**High Speed Steel**
3/8	$1.00	**$1.50**
7/16	1.25	**1.90**
1/2	1.60	**2.40**
9/16	1.70	**2.65**
5/8	1.80	**2.80**
3/4	2.15	**3.50**

Straight Shank End Mills under 3/8 inch diameter have straight flutes; those 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**
1/4	1	$1.90	**$2.90**	3/4	2	$2.70	**$4.60**
5/16	1	1.90	**2.90**	3/4	3	3.15	**6.00**
3/8	1	1.90	**2.90**	7/8	2	2.90	**5.30**
7/16	1	1.90	**2.90**	7/8	3	3.25	**6.20**
7/16	2	2.50	**4.15**	1	2	3.10	**5.75**
1/2	1	1.90	**3.00**	1	3	3.25	**6.20**
1/2	2	2.70	**4.60**	*1 1/8	3	3.50	**7.10**
5/8	2	2.70	**4.60**	*1 1/4	3	3.75	**8.25**

Sizes 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**
1/4	4	$1.35	**$2.10**	3/4	7	$2.70	**$4.70**
1/4	5	1.80	**2.80**	*3/4	9	3.60	**7.40**
5/16	4	1.35	**2.10**	7/8	7	2.90	**5.30**
5/16	5	1.80	**2.90**	*7/8	9	3.60	**7.40**
3/8	4	1.35	**2.10**	1	7	3.15	**6.00**
3/8	5	1.80	**2.90**	*1	9	3.60	**7.60**
7/16	4	1.35	**2.10**	*1 1/8	7	3.40	**6.80**
7/16	5	1.80	**2.90**	1 1/8	9	3.60	**7.60**
1/2	5	1.80	**2.90**	*1 1/4	7	3.65	**7.80**
1/2	7	2.70	**4.60**	1 1/4	9	3.85	**8.90**
*9/16	5	1.80	**2.90**	*1 3/8	9	4.10	**9.40**
*9/16	7	2.70	**4.60**	*1 1/2	9	4.40	**10.40**
5/8	5	1.90	**3.10**	*1 5/8	9	4.70	**11.90**
5/8	7	2.70	**4.60**	*1 3/4	9	5.00	**13.15**
*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

SLOTTING END MILLS, "TWO-LIPPED"

WITH BROWN & SHARPE TAPER SHANKS

IN ORDERING STATE WHETHER RIGHT OR LEFT HAND IS WANTED

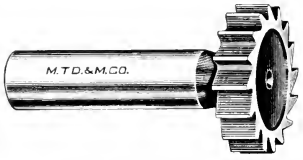
Diameter, Inches	Price Each		Number of Shank	Whole Length, Inches	Length of Flutes, Inches
	Carbon Steel	**High Speed Steel**			
1/4	$1.10	**$1.65**	4	2	3/8
1/4	1.80	**2.80**	5	2 1/2	3/8
1/4	2.50	**4.15**	7	4 3/8	3/8
5/16	1.80	**2.80**	5	2 19/32	15/32
5/16	2.50	**4.15**	7	4 15/32	15/32
3/8	2.70	**4.60**	7	4 9/16	9/16
7/16	2.70	**4.60**	7	4 21/32	21/32
1/2	2.70	**4.60**	7	4 3/4	3/4
9/16	2.70	**4.60**	7	4 27/32	27/32
5/8	2.70	**4.60**	7	4 15/16	15/16
11/16	2.70	**4.60**	7	5 1/32	1 1/32
3/4	2.70	**4.60**	7	5 1/8	1 1/8
13/16	2.90	**5.30**	7	5 7/32	1 7/32
7/8	2.90	**5.30**	7	5 5/16	1 5/16
7/8	3.60	**7.40**	9	6 9/16	1 5/16
1	3.60	**7.40**	9	6 3/4	1 1/2
1 1/8	3.60	**7.40**	9	6 15/16	1 11/16
1 1/4	3.85	**8.90**	9	7 1/8	1 7/8
1 1/2	4.40	**10.40**	9	7 1/2	2 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 *ill*ustrated 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
1/2	6.283	6	.523
3/4	4.188	5	.628
1	3.141	4	.785
1 1/4	2.513	3 1/2	.897
1 1/2	2.094	3	1.047
1 3/4	1.795	2 3/4	1.142
2	1.571	2 1/2	1.256
2 1/4	1.396	2 1/4	1.396
2 1/2	1.257	2	1.571
2 3/4	1.142	1 7/8	1.676
3	1.047	1 3/4	1.795
3 1/2	.898	1 5/8	1.933
4	.785	1 1/2	2.094
5	.628	1 7/16	2.185
6	.524	1 3/8	2.285
7	.449	1 5/16	2.394
8	.393	1 1/4	2.513
9	.349	1 3/16	2.646
10	.314	1 1/8	2.793
11	.286	1 1/16	2.957
12	.262	1	3.142
14	.224	15/16	3.351
16	.196	7/8	3.590
18	.175	13/16	3.867
20	.157	3/4	4.189
22	.143	11/16	4.570
24	.131	5/8	5.027
26	.121	9/16	5.585
28	.112	1/2	6.283
30	.105	7/16	7.181
32	.098	3/8	8.378
36	.087	5/16	10.053
40	.079	1/4	12.566
48	.065	3/16	16.755
		1/8	25.133
		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

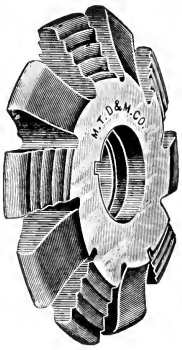
Pitch of Cutter	Depth to be Cut in Gear, Inches	Thickness of Tooth at Pitch Line, Inches	Pitch of Cutter	Depth to be Cut in Gear, Inches	Thickness of Tooth at Pitch Line, Inches
1¼	1.726	1.257	11	.196	.143
1½	1.438	1.047	12	.180	.131
1¾	1.233	.898	14	.154	.112
2	1.079	.785	16	.135	.098
2¼	.959	.698	18	.120	.087
2½	.863	.628	20	.108	.079
2¾	.784	.571	22	.098	.071
3	.719	.524	24	.090	.065
3½	.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

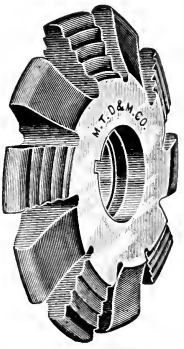
Diametral Pitch	Price Each		Diameter of Cutter, Inches		Diam. of Hole, Inches
	Carbon Steel	**High Speed Steel**	Carbon Steel	**High Speed Steel**	
1	$57.00	**$135.65**	8½	**8½**	2
1¼	48.00	**116.65**	7¾	**7¾**	2
1½	40.50	**86.90**	7	**7**	1¾
1¾	30.35	**63.75**	6½	**6½**	1¾
2	20.25	**43.75**	5¾	**5¾**	1½
2½	13.90	**33.15**	5½	**5¾**	1½
3	10.10	**22.50**	4⅜	**4¾**	1¼
4	7.60	**15.35**	3⅞	**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. 1931
High Speed Steel



No. 932
Carbon Steel

No. 1932
High Speed Steel

WITH 1 INCH HOLE				
Diam. Pitch	Price Each		Diam. of Cutter	
	Carbon Steel	**High Speed Steel**	Carbon Steel	**High Speed Steel**
4	$7.00	**$13.65**	3½	3⅝
5	6.00	**11.15**	3¼	3⅜
6	5.50	**10.00**	3	3⅛
7	5.15	**8.75**	2⅞	2⅞
8	5.00	**8.50**	2⅞	2⅞

WITH 1¼ INCH HOLE				
Diam. Pitch	Price Each		Diam. of Cutter	
	Carbon Steel	**High Speed Steel**	Carbon Steel	**High Speed Steel**
3	$10.10	**$22.50**	4⅜	4¾
4	7.60	**15.35**	3⅞	4¼
5	6.90	**12.50**	3⅝	3¾
6	6.00	**10.50**	3½	3½
7	5.90	**10.00**	3⅜	3⅜
8	5.60	**9.40**	3¼	3¼

No. 933
Carbon Steel

No. 1933
High Speed Steel

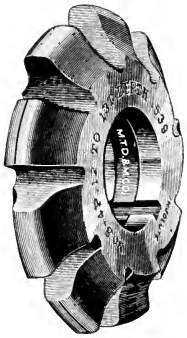
No. 934
Carbon Steel

No. 1934
High Speed Steel

WITH 1½ INCH HOLE				
Diam. Pitch	Price Each		Diam. of Cutter	
	Carbon Steel	**High Speed Steel**	Carbon Steel	**High Speed Steel**
2	$20.25	**$43.75**	5¾	5¾
2½	13.90	**33.15**	5½	5¾
3	11.40	**25.40**	5	5¼
4	7.90	**16.90**	4¼	4½
5	7.00	**14.10**	4	4¼
6	6.70	**12.20**	3¾	3⅞

WITH 1¾ INCH HOLE				
Diam. Pitch	Price Each		Diam. of Cutter	
	Carbon Steel	**High Speed Steel**	Carbon Steel	**High Speed Steel**
1¾	$30.35	**$63.75**	6½	6½
2	21.50	**48.65**	6½	6½
2½	14.60	**36.50**	5⅞	6⅛
3	12.00	**29.40**	5⅜	5⅝
4	8.65	**18.15**	4⅝	4¾
5	7.60	**15.00**	4⅜	4⅜
6	7.30	**13.40**	4¼	4¼

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 1/2	**8 1/2**	2
1 1/4	48.00	**116.65**	7 3/4	**7 3/4**	2
1 1/2	40.50	**86.90**	7	**7**	1 3/4
1 3/4	30.35	**63.75**	6 1/2	**6 1/2**	1 3/4
2	20.25	**43.75**	5 3/4	**5 3/4**	1 1/2
2 1/2	13.90	**33.15**	5 1/2	**5 3/4**	1 1/2
3	10.10	**22.50**	4 3/8	**4 3/4**	1 1/4
4	7.60	**15.35**	3 7/8	**4 1/4**	1 1/4
5	6.90	**12.50**	3 5/8	**3 3/4**	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
9	4.70	**7.65**	2 3/4	**2 3/4**	1
10	4.50	**7.10**	2 1/4	**2 3/8**	7/8
11	4.20	**6.65**	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
18	3.00	**4.70**	1 7/8	**2**	7/8
20	2.90	**4.60**	1 7/8	**2**	7/8
22	2.80	**4.50**	1 7/8	**2**	7/8
24	2.65	**4.25**	1 3/4	**1 3/4**	7/8
26	2.60	**4.20**	1 3/4	**1 3/4**	7/8
28	2.25	**3.75**	1 3/4	**1 3/4**	7/8
30	2.25	**3.75**	1 3/4	**1 3/4**	7/8
32	2.25	**3.75**	1 3/4	**1 3/4**	7/8
36	2.25	**3.75**	1 3/4	**1 3/4**	7/8
40	2.25	**3.75**	1 3/4	**1 3/4**	7/8
48	2.25	**3.75**	1 3/4	**1 3/4**	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.

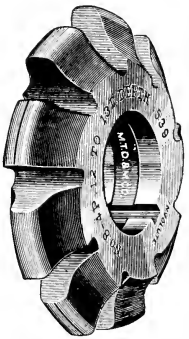
Cutters having dimensions other than listed are special and subject to special prices.

INVOLUTE CUTTERS

FOR TEETH OF GEAR WHEELS

No. 942
Carbon Steel

No. 1942
High Speed Steel



No. 943
Carbon 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				
Diametral Pitch	Price Each		Diameter of Cutter		Diametral 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.

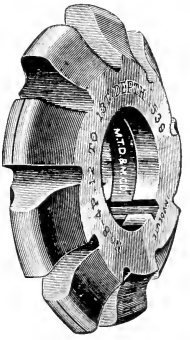
Cutters having dimensions other than listed are special and subject to special prices.

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				
Diametral Pitch	Price Each		Diameter of Cutter		Diametral 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	**6⅛**
4	7.90	**16.90**	4¼	**4½**	3	12.00	**29.40**	5⅜	**5⅝**
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**	4⅜	**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.

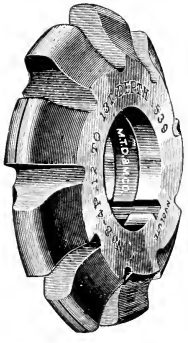
EXAMPLE: To select a cutter for mitres of 40 T, multiply 40 by 1.41. The product 56.4 shows that a cutter of shape No. 2 for 55 to 134 T. is the one required.

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**	$1\frac{1}{4}$
4	7.00	**13.65**	$3\frac{1}{2}$	$3\frac{5}{8}$	$1\frac{1}{4}$
5	6.00	**11.15**	$3\frac{1}{4}$	$3\frac{3}{8}$	$1\frac{1}{4}$
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
10	4.50	**7.10**	$2\frac{1}{4}$	$2\frac{3}{8}$	$\frac{7}{8}$
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	$2\frac{1}{8}$	$\frac{7}{8}$
20	2.90	**4.60**	$1\frac{7}{8}$	**2**	$\frac{7}{8}$
24	2.65	**4.25**	$1\frac{3}{4}$	$1\frac{3}{4}$	$\frac{7}{8}$

No. 965
Carbon Steel

No. 1965
High Speed Steel

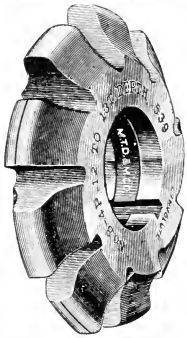
CUTTERS FOR MITRE AND BEVEL GEARS

WITH $\frac{7}{8}$ 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**	$3\frac{3}{8}$	$3\frac{1}{2}$	$\frac{7}{8}$
5	6.00	**10.30**	$3\frac{1}{8}$	$3\frac{1}{4}$	$\frac{7}{8}$
6	5.50	**10.00**	3	$3\frac{1}{8}$	$\frac{7}{8}$
7	5.15	**8.75**	$2\frac{3}{4}$	$2\frac{7}{8}$	$\frac{7}{8}$
8	5.00	**8.50**	$2\frac{3}{4}$	$2\frac{7}{8}$	$\frac{7}{8}$
10	4.60	**7.30**	$2\frac{5}{8}$	$2\frac{5}{8}$	$\frac{7}{8}$
12	4.00	**6.25**	$2\frac{1}{2}$	$2\frac{1}{2}$	$\frac{7}{8}$

Eight cutters made for each pitch. See page 212.

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



No. 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 3/4	**1 3/4**	7/8 or 22 M.M.
.75	3.25	**4.75**	1 3/4	**1 3/4**	7/8 or 22
1	3.65	**5.25**	1 3/4	**1 3/4**	7/8 or 22
1.25	3.90	**5.60**	1 7/8	**2**	7/8 or 22
1.5	4.20	**6.25**	2	**2 1/8**	7/8 or 22
1.75	4.40	**6.65**	2	**2 1/8**	7/8 or 22
2	4.90	**7.00**	2 1/8	**2 1/4**	7/8 or 22
2.25	5.20	**7.65**	2 1/4	**2 3/8**	7/8 or 22
2.5	5.50	**8.10**	2 1/4	**2 3/8**	7/8 or 22
2.75	5.70	**8.65**	2 3/4	**2 3/4**	1 or 27
3	6.00	**9.50**	2 7/8	**2 7/8**	1 or 27
3.25	6.15	**9.75**	2 7/8	**2 7/8**	1 or 27
3.5	6.15	**9.75**	2 7/8	**2 7/8**	1 or 27
3.75	6.50	**10.15**	2 7/8	**2 7/8**	1 or 27
4	6.50	**11.00**	3	**3 1/8**	1 or 27
4.25	7.00	**11.30**	3	**3 1/8**	1 or 27
4.5	7.90	**13.50**	3 5/8	**3 3/4**	1 1/4 or 32
4.75	7.90	**13.50**	3 5/8	**3 3/4**	1 1/4 or 32
5	7.90	**13.50**	3 5/8	**3 3/4**	1 1/4 or 32
5.25	8.30	**14.65**	3 5/8	**3 3/4**	1 1/4 or 32
5.5	8.30	**15.40**	3 3/4	**4**	1 1/4 or 32
5.75	8.30	**15.40**	3 3/4	**4**	1 1/4 or 32
6	8.60	**16.35**	3 7/8	**4 1/4**	1 1/4 or 32
7	10.50	**21.00**	4 1/8	**4 1/2**	1 1/4 or 32
8	11.10	**23.50**	4 3/8	**4 3/4**	1 1/4 or 32
9	13.75	**28.50**	5 1/8	**5 1/2**	1 1/2 or 40
10	14.90	**34.15**	5 1/2	**5 3/4**	1 1/2 or 40
11	17.00	**37.00**	5 3/4	**5 3/4**	1 1/2 or 40
12	21.25	**44.75**	5 3/4	**5 3/4**	1 1/2 or 40

Eight Cutters made for each pitch. See page 212.

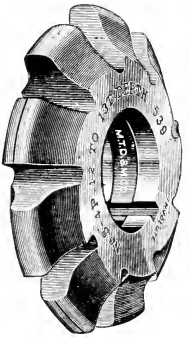
Cutters having dimensions other than listed are special and subject to special prices.

METRIC INVOLUTE CUTTERS

FOR TEETH OF GEAR WHEELS

No. 971
Carbon Steel

No. 1971
High Speed Steel



No. 972
Carbon Steel

No. 1972
High Speed Steel

WITH 1 IN. OR 27 M.M. HOLE					WITH 1¼ IN OR 32 M.M. HOLE				
Module, M.M.	Price Each		Diameter of Cutter		Module, 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**
.75	$4.00	**$5.70**	2¼	**2¼**	1.25	$4.50	**$6.25**	2¾	**2¾**
1	4.00	**5.70**	2¼	**2¼**	1.5	4.90	**7.50**	2⅞	**2⅞**
1.25	4.25	**6.00**	2⅜	**2⅜**	1.75	5.00	**7.65**	2⅞	**2⅞**
1.5	4.50	**6.65**	2½	**2½**	2	5.60	**8.40**	2⅞	**2⅞**
1.75	4.75	**7.00**	2½	**2½**	2.25	5.80	**8.80**	2⅞	**2⅞**
2	5.25	**7.70**	2⅝	**2⅝**	2.5	6.00	**9.10**	3	**3**
2.25	5.50	**8.10**	2⅝	**2⅝**	3	6.60	**10.40**	3¼	**3¼**
2.5	5.60	**8.30**	2¾	**2¾**	3.5	6.90	**11.00**	3⅜	**3⅜**
3	6.00	**9.50**	2⅞	**2⅞**	4	7.00	**11.50**	3½	**3½**
3.5	6.15	**9.75**	2⅞	**2⅞**	4.5	7.90	**13.50**	3⅝	**3¾**
4	6.50	**11.00**	3	**3⅛**	5	7.90	**13.50**	3⅝	**3¾**
4.5	6.80	**11.00**	3⅛	**3¼**	5.5	8.30	**15.40**	3¾	**4**
5	7.00	**12.15**	3¼	**3⅜**	6	8.60	**16.35**	3⅞	**4¼**
5.5	8.00	**13.50**	3⅜	**3½**	7	10.50	**21.00**	4⅛	**4½**
6	8.00	**14.65**	3½	**3⅝**	8	11.10	**23.50**	4⅜	**4¾**

Eight Cutters made for each pitch. See page 212.

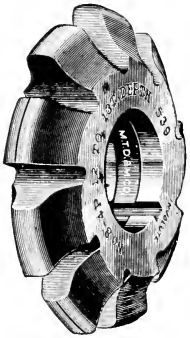
Cutters having dimensions other than listed are special and subject to special prices.

METRIC INVOLUTE CUTTERS

FOR TEETH OF GEAR WHEELS

No. 973
Carbon Steel

No. 1973
High Speed Steel



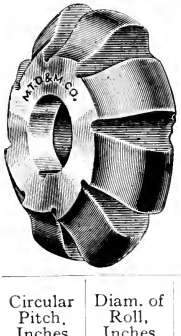
No. 974
Carbon Steel

No. 1974
High Speed Steel

WITH 1¼ IN. OR 40 M.M. HOLE					WITH 1¾ IN. OR 45 M.M. HOLE				
Module, M.M.	Price Each		Diameter of Cutter		Module, 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	15/32	1	$4.80	**$8.00**
		7–8	2 3/4	15/32		4.80	**8.00**
		9–11	2 3/4	15/32		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	13/32		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	23/32		6.60	**11.65**
		35 & over	3 1/8	11/16		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	23/32		6.60	**11.65**
		35 & over	3 1/4	11/16		6.60	**11.65**
3/4	.469	6	3 1/4	29/32	1	7.70	**13.90**
		7–8	3 1/4	29/32		7.70	**13.90**
		9–11	3 3/8	29/32		8.50	**15.50**
		12–17	3 3/8	7/8		7.85	**14.15**
		18–34	3 3/8	27/32		7.85	**14.15**
		35 & over	3 3/8	13/16		7.85	**14.15**

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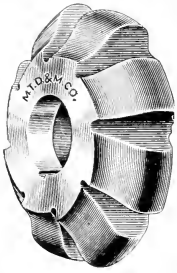

No. 987
Carbon Steel

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	3¾	1¼	1¼	$9.85	**$18.75**
		7–8	3⅞	1¼		10.75	**20.65**
		9–11	3⅞	1 3/16		10.75	**20.65**
		12–17	4	1 5/32		10.75	**20.65**
		18–34	4	1⅛		10.40	**19.65**
		35 & over	4	1 3/32		10.40	**19.65**
1 and 1¼	.625	6	3⅞	1½	1¼	11.40	**22.50**
		7–8	4	1½		11.40	**22.50**
		9–11	4⅛	1 5/32		12.25	**24.50**
		12–17	4⅛	1 5/32		12.25	**24.50**
		18–34	4¼	1 13/32		12.25	**24.50**
		35 & over	4¼	1 11/32		11.90	**23.50**
1¼ and 1½	.750	6	4¼	1 13/16	1¼	13.65	**28.65**
		7–8	4⅜	1 13/16		14.65	**31.25**
		9–11	4½	1 25/32		14.65	**31.25**
		12–17	4½	1¾		13.85	**28.90**
		18–34	4⅝	1 11/16		14.85	**31.25**
		35 & over	4⅝	1⅝		14.50	**30.15**
1½	.875	6	4⅜	1 13/16	1¼	14.65	**31.25**
		7–8	4½	1 13/16		14.65	**31.25**
		9–11	4⅝	1 25/32		15.75	**33.90**
		12–17	4⅝	1¾		14.85	**31.25**
		18–34	4¾	1 11/16		14.85	**31.25**
		35 & over	4¾	1⅝		14.50	**30.15**

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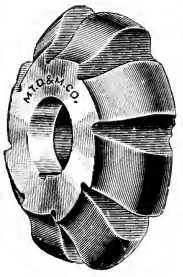


No. 987
Carbon Steel

No. 1987
High Speed Steel

SPROCKET WHEEL CUTTERS
FOR ROLLER CHAINS
(Concluded)

AMERICAN STANDARD TOOTH FORMS

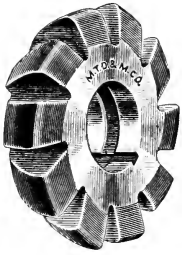
ADOPTED BY S.A.E., A.S.M.E., A.G.M.A.

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**
1¾	1.000	6	5	2 3/32	1¼	$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 1/32		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	1½	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**
2½	1.550	6	6 3/8	3	1¾	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 19/32		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	$1\frac{1}{16}$ 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	$3\frac{1}{16}$ to $3\frac{1}{2}$	14	3	1	6.60	**11.60**
10	$3\frac{9}{16}$ 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.

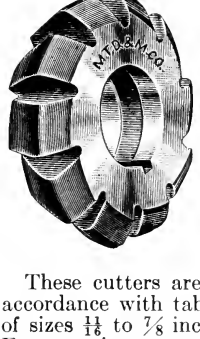
No. 916

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 $\frac{11}{16}$ 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

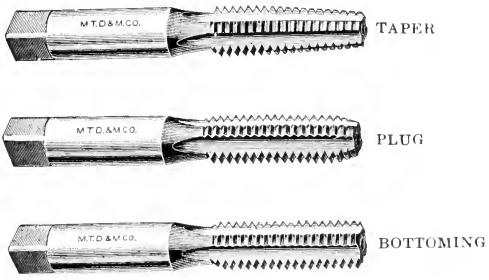
In ordering give number of cutter, or diameter and number of flutes of reamer.

No. 1040

HAND TAPS

UNDER ¼ INCH

Shanks full size of thread



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			$2\frac{1}{2}$

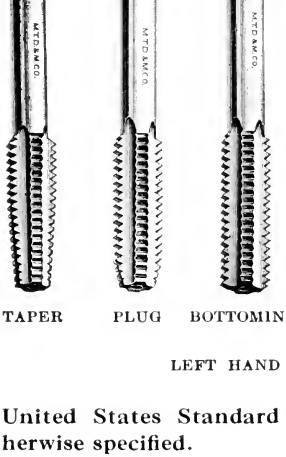
No. 1040
Carbon Steel

No. 2040
High Speed Steel

HAND TAPS

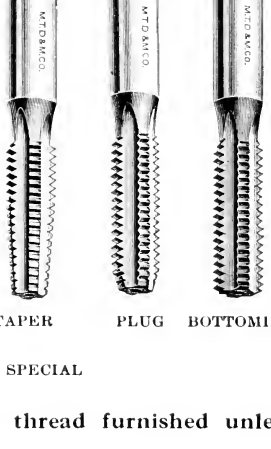
¼ INCH AND LARGER

Shanks size of bottom of thread.



TAPER PLUG BOTTOMING

Shanks full size of thread.



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 ⅜ 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 ⅜ 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

¼ 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: U.S. St'd	S.A.E. St'd	Whitworth St'd	British St'd Fine	U.S. Form Threads Also Furnished	Length, Inches
¼	$ .45	$1.35	20	28	20	26	24, 27, 32	2½
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 5/32
½	.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 13/16
11/16	1.05	3.15	11	16	11	14		4 1/32
¾	1.20	3.60	10	16	10	12	12, 27	4 1/4
13/16	1.40	4.20	10		10	12		4 5/32
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
1½	3.50	10.50	6	12	6	8		6 3/8
1 5/8	4.20	12.60	5½		5			6 11/16
1 3/4	5.00	15.00	5		5			7
1 7/8	5.80	17.40	5		4½			7 5/16
2	6.70	20.10	4½		4½			7 5/8
2 1/8	8.00	24.00	4½		4½			8
2 1/4	9.20	27.60	4½		4			8 1/4
2 3/8	10.50	31.50	4		4			8½
2½	11.50	34.50	4		4			8 3/4

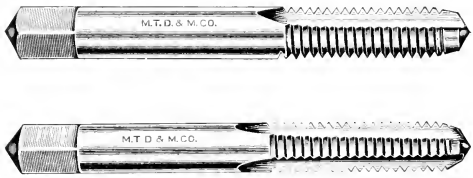
No. 2040 High Speed Steel

¼	**$ .85**		**20**	**28**				**2½**
5/16	**.95**		**18**	**24**				**2 23/32**
3/8	**1.10**		**16**	**24**				**2 15/16**
7/16	**1.30**		**14**	**20**				**3 5/32**
½	**1.55**		**13**	**20**				**3 3/8**
9/16	**1.85**		**12**	**18**				**3 19/32**
5/8	**2.20**		**11**	**18**				**3 13/16**
11/16	**2.60**		**11**	**16**				**4 1/32**
¾	**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**
1½	**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 $\frac{1}{2}$ 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	$2\frac{23}{32}$
$\frac{3}{8}$	**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.

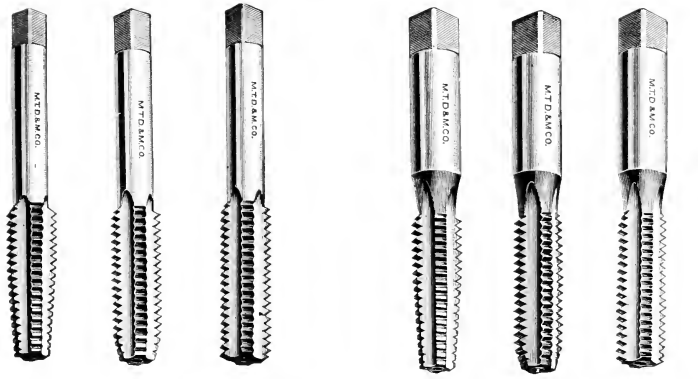
SIZES AND PRICES

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	$2\frac{11}{16}$
$\frac{7}{16}$	.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	$5\frac{1}{8}$

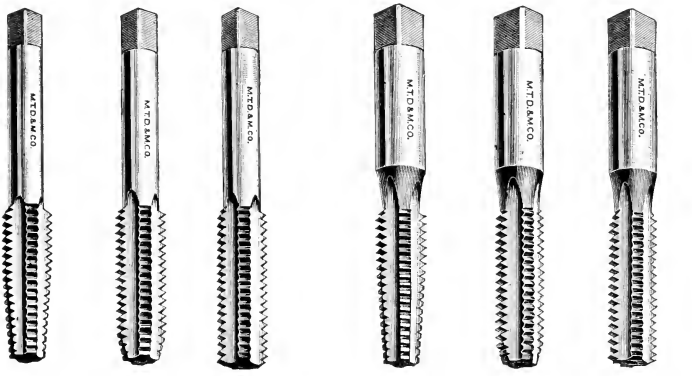
No. 1043

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	Whitworth St'd		U.S. St'd	S.A.E. St'd
3/16	$ .60		24, 32		24	4 1/2	1 3/8	1
1/4	.60	**$1.50**	20	28	20	5	1 5/8	1 1/4
5/16	.70	**1.70**	18	24	18	5 1/2	1 13/16	1 3/8
3/8	.80	**2.00**	16	24	16	6	2	1 1/2
7/16	.90	**2.40**	14	20	14	6 1/2	2 3/8	1 3/4
1/2	1.00	**2.70**	13	20	12	7	2 1/2	1 7/8
9/16	1.15		12	18	12	7 1/2	2 3/4	2
5/8	1.35	**4.05**	11	18	11	8	3	2 1/4
11/16	1.60		11	16	11	8 1/2	3	2 1/4
3/4	1.85	**5.65**	10	16	10	9	3 1/4	2 1/2
13/16	2.15		10		10	9 1/2	3 1/4	
7/8	2.45	**7.90**	9	14, 18	9	10	3 5/8	2 3/4
15/16	2.80		9		9	10 1/2	3 5/8	
1	3.15	**10.55**	8	14	8	11	4	3
1 1/8	3.70		7	12	7	11 1/2	4 3/4	3 1/2
1 1/4	4.50		7	12	7	12	4 3/4	3 1/2
1 3/8	5.50		6	12	6	12 1/2	5 3/8	4
1 1/2	6.75		6	12	6	13	5 3/8	4
1 5/8	8.00		5 1/2		5	13 1/2	5 1/2	
1 3/4	9.25		5		5	14	5 1/2	
1 7/8	10.75		5		4 1/2	14 1/2	5 1/2	
2	12.25		4 1/2		4 1/2	15	6 1/8	
2 1/8	14.00		4 1/2		4 1/2	15 1/2	6 1/8	
2 1/4	15.75		4 1/2		4	16	6 1/8	
2 3/8	17.75		4		4	16 1/2	6 7/8	
2 1/2	20.00		4		4	17	6 7/8	

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 ¾ 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
¼	$ .45	18, 20, 24	2½
5/16	.50	16, 18, 20	3 5/16
⅜	.55	14, 16, 18	3 13/16
7/16	.60	14, 16, 18	4⅛
½	.70	12, 13, 14, 16	4 5/16
9/16	.80	12, 14	4⅝
⅝	.90	10, 11, 12	4⅞
¾	1.20	10, 12	5 1/16
⅞	1.60	9, 10	5⅝
1	2.00	8	6
1⅛	2.25	7, 8	6⅝
1¼	2.60	7, 8	7 1/16
1½	3.50	6	7⅞

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.

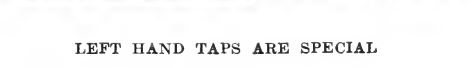
FOUR FLUTED TAPS

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		$1\frac{5}{8}$
1	.073	.50	6.00	72	56, 64	$1\frac{11}{16}$
2	.086	.45	5.40	64	56	$1\frac{3}{4}$
3	.099	.40	4.80	56	48	$1\frac{13}{16}$
4	.112	.40	4.80	48	32, 36, 40	$1\frac{7}{8}$
5	.125	.35	4.20	44	36, 40	$1\frac{15}{16}$
6	.138	.35	4.20	40	32, 36	2
7	.151	.35	4.20		32	$2\frac{1}{16}$
8	.164	.35	4.20	36	30, 32, 40	$2\frac{1}{8}$
9	.177	.35	4.20	32		$2\frac{1}{4}$
10	.190	.40	4.80	30	24, 28, 32	$2\frac{3}{8}$
12	.216	.45	5.40	28	24, 32	$2\frac{3}{8}$
14	.242	.45	5.40	24	20	$2\frac{1}{2}$
16	.268	.45	5.40		18	$2\frac{1}{2}$
18	.294	.50	6.00		18	$2\frac{23}{32}$

No. 2066—High Speed Steel

4	**.112**	**$ .70**	**$8.40**	**48**	**36, 40**	$1\frac{7}{8}$
6	**.138**	**.70**	**8.40**	**40**	**32**	**2**
8	**.164**	**.70**	**8.40**	**36**	**32**	$2\frac{1}{8}$
10	**.190**	**.75**	**9.00**		**24, 32**	$2\frac{3}{8}$
12	**.216**	**.80**	**9.60**	**28**	**24**	$2\frac{3}{8}$
14	**.242**	**.85**	**10.20**	**24**	**20**	$2\frac{1}{2}$

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

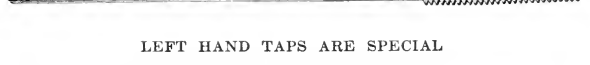
Screw Gauge No.	Approx. Diam. of Tap, Inches	Price Each	No. of Threads to the Inch		No. of Flutes	Whole Length, Inches
			Standard	Also Furnished		
3	.099	$ .60	56	48	2	$1\frac{13}{16}$
4	.112	.50	48	36, 40	2	$1\frac{7}{8}$
5	.125	.45		40	2	$1\frac{15}{16}$
6	.138	.45	40	32, 36	2	2
8	.164	.45	36	32	2	$2\frac{1}{8}$
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	Whitworth 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 13/16	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	1¾	1.	1.
7	.75	.90	1¾	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	2¼		1.5
12	1.15	1.35	2¼	1.5	1.75
14	1.35	1.55	2½	2.	2.
16	1.50	1.75	2½	2.	2.
18	1.70	1.95	2½	2.5	2.5
20	2.20	2.35	2¾	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	3½	3.	
27		4.15	3½		3.
28		4.15	3½	3.	
30		5.10	3½	3.5	3.5
32		5.10	3½	3.5	
33		6.00	3½		3.5
34		6.00	3½	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

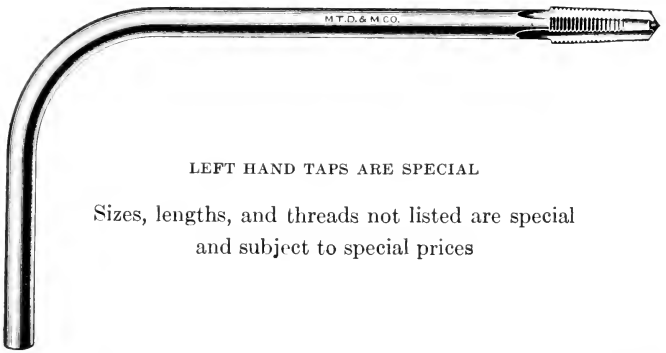
LEFT HAND TAPS ARE SPECIAL

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

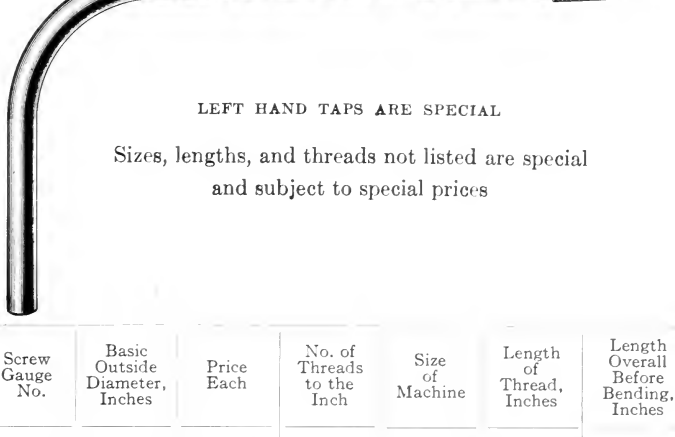
Sizes, lengths, and threads not listed are special and subject to special prices

Diam. of Tap, Inches	Price Each	No. of Threads to the Inch			Size of Machine	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	
1/8	$.60			32	3/16			1/2	4 15/16
5/32	.60			28	3/16			9/16	4 15/16
3/16	.60			24	3/16			21/32	4 15/16
1/8	.65	40		32	1/4	9/16		1/2	6 1/2
5/32	.65			28	1/4			9/16	6 1/2
3/16	.65	24		24	1/4	43/64		21/32	6 1/2
7/32	.65			22	1/4			11/16	6 1/2
1/4	.65	20	28	18	1/4	53/64	25/32	29/32	6 1/2
1/4	.70	20	28		3/8	53/64	25/32		8 3/4
5/16	.80	18	24		3/8	15/16	59/64		8 3/4
3/8	.90	16	24		3/8	1 1/16	31/32		8 3/4
3/8	.95	16	24		1/2	1 1/16	31/32		12
7/16	1.05	14	20		1/2	1 1/8	1 1/32		12
1/2	1.15	13	20		1/2	1 13/64	1 1/32		12
9/16	1.55	12	18		5/8	1 29/64	1 3/8		15
5/8	1.75	11	18		5/8	1 39/64	1 3/8		15
3/4	2.10		16		5/8		1 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

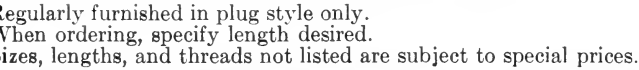
LEFT HAND TAPS ARE SPECIAL

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
3/16	$ .40	$4.80	24	5/16	$ .50	$6.00	18
1/4	.45	5.40	18	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 U.S. Standard	Price Each by Lengths 6 in.	8 in.	10 in.	12 in.	14 in.
1/4	20	$ .65	$ .70			
5/16	18	.70	.75			
3/8	16	.80	.85	$ .90	$ .95	$1.00
7/16	14	.85	.95	1.00	1.05	1.15
1/2	13	.95	1.05	1.10	1.15	1.25
9/16	12	1.00	1.15	1.25	1.35	1.45
5/8	11	1.10	1.35	1.40	1.50	1.65
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	
1/4	$2.25	20	20	6 1/8
5/16	2.35	18	18	6 1/2
3/8	2.50	16	16	6 3/4
7/16	2.75	14	14	7 1/8
1/2	3.00	13	12	7 5/8
5/8	3.50	11	11	8 1/4
3/4	4.25	10	10	8 7/8
7/8	5.00	9	9	9 3/8
1	5.75	8	8	10 1/8
1 1/8	7.00	7	7	10 5/8
1 1/4	8.00	7	7	11 1/8
1 3/8	9.00	6	6	11 5/8
1 1/2	10.00	6	6	12 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.

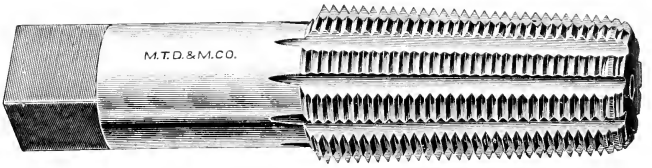
Oversize or undersize hobs will be considered special and subject to special prices.

Diameter, Inches	Price Each	Threads Per Inch		Whole Length, Inches
		U.S. Standard	Whitworth Standard	
1/4	$1.50	20	20	2 1/2
5/16	1.60	18	18	2 23/32
3/8	1.75	16	16	2 15/16
7/16	1.85	14	14	3 5/32
1/2	2.00	13	12	3 3/8
5/8	2.25	11	11	3 13/16
3/4	2.65	10	10	4 1/4
7/8	3.00	9	9	4 11/16
1	3.50	8	8	5 1/8
1 1/8	4.25	7	7	5 7/16
1 1/4	4.75	7	7	5 3/4
1 3/8	5.50	6	6	6 1/16
1 1/2	6.25	6	6	6 3/8

No. 1094

PIPE HOB TAPS

AMERICAN (BRIGGS) STANDARD



LEFT HAND HOBS ARE SPECIAL

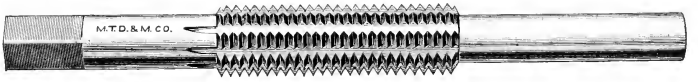
American (Briggs) Standard Right Hand Pipe Hobs are furnished unless otherwise specified.

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
1/8	$1.75	27	1 7/8	3 1/2
1/4	2.00	18	2 5/8	4 1/2
3/8	2.30	18	2 5/8	4 1/2
1/2	2.75	14	3 1/4	5 1/2
3/4	3.25	14	3 1/4	5 1/2
1	4.00	11 1/2	4	6
1 1/4	5.00	11 1/2	4	6 1/4
1 1/2	6.60	11 1/2	4	6 1/4
2	10.00	11 1/2	4	6 1/2
2 1/2	15.00	8	5 7/8	8 1/2
3	22.50	8	5 7/8	8 3/4
3 1/2	30.00	8	5 7/8	9
4	45.00	8	6	9 1/2

No. 1093

SELLERS' HOB TAPS

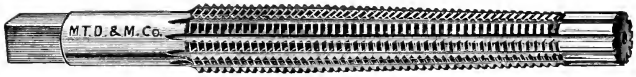


Prices on application.

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		
1/4	$ .55		**$1.30**		20	28	3/8	2 3/4
5/16	.55		**1.35**		18	24	3/8	3
3/8	.55		**1.40**		16	24	3/8	3 1/4
7/16	.75		**1.90**		14	20	1/2	3 1/2
1/2	.75		**1.95**		13	20	1/2	3 3/4
9/16	.80		**2.35**		12	18	1/2	4
5/8	.90		**2.70**		11	18	1/2	4
5/8		$1.20		**$3.50**	11	18	3/4	4
11/16		1.20		**3.60**	11	16	3/4	4 1/8
3/4		1.20		**3.80**	10	16	3/4	4 7/16
13/16		1.50			10		3/4	4 3/4
7/8		1.60			9	14, 18	3/4	5 1/16
15/16		1.80			9		3/4	5 3/8
1		2.20			8	14	3/4	5 11/16

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	$\frac{11}{16}$

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	$\frac{11}{16}$

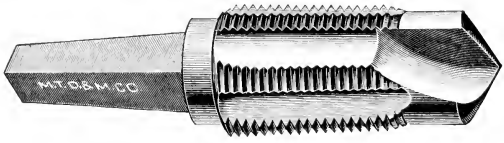
Numbers $1\frac{1}{2}$ E and $2\frac{1}{2}$ E are made of various tapers per foot. When writing for prices or in ordering, specify number, size, and taper per foot.

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



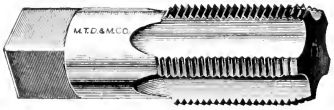
STANDARD TAPER $\frac{3}{4}$ INCH TO THE FOOT

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



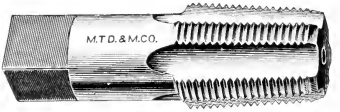
The list on these Taps and the number of threads per inch is the same as on No. 1115, page 263.

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.

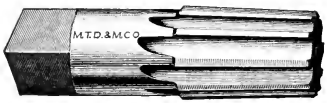
All other left hand pipe taps are special.

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

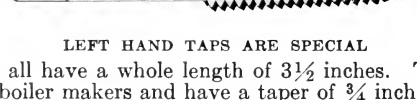


These Pipe Reamers are tapered ¾ of an inch to the foot and are for reaming holes to be tapped with American (Briggs) Standard Taper Pipe Taps.

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
⅛	$1.00	2⅛	1½	$6.60	4¼
¼	1.20	2 7/16	2	10.00	4½
⅜	1.60	2 9/16	2½	15.00	5½
½	2.00	3⅛	3	22.50	6
¾	2.80	3¼	3½	30.00	6½
1	4.40	3¾	4	45.00	6¾
1¼	5.00	4			

No. 1125
PATCH-BOLT TAPS



LEFT HAND TAPS ARE SPECIAL

These Taps all have a whole length of 3½ inches. They are made especially for boiler makers and have a taper of ¾ 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.

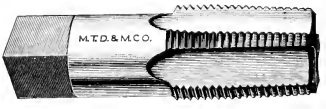
Patch Bolt Taps with V form of thread are special.

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
½	12	$1.00	13/16	12	$1.95	1 1/16	12	$2.90
9/16	12	1.10	⅞	12	2.25	1⅛	12	3.00
⅝	12	1.25	15/16	12	2.40	1 3/16	12	3.15
11/16	12	1.45	1	12	2.80	1¼	12	3.35
¾	12	1.70						

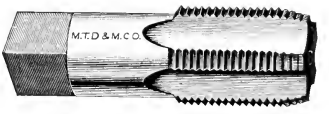
No. 1117

WHITWORTH PIPE TAPS

J



H



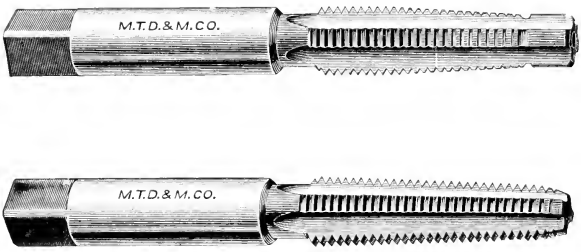
LEFT HAND TAPS ARE SPECIAL

Size, Inches	Price Each	Diam. of Threads, Inches	Pitch	Whole Length, Inches	Taper "J" Inches	Plug "H" Inches	Length Threads, Inches
1/8	$1.00	.385	28	2 1/8	5/8	3/16	3/4
1/4	1.20	.521	19	2 7/16	3/4	3/16	1 1/16
3/8	1.60	.660	19	2 9/16	3/4	3/16	1 1/16
1/2	2.00	.830	14	3 1/8	7/8	1/4	1 3/8
5/8	2.80	.906	14	3 3/16	1	5/16	1 3/8
3/4	2.80	1.046	14	3 1/4	1 1/16	5/16	1 3/8
7/8	4.40	1.195	14	3 1/2	1 1/16	5/16	1 9/16
1	4.40	1.315	11	3 3/4	1 1/8	3/8	1 3/4
1 1/4	5.00	1.656	11	4	1 3/16	3/8	1 3/4
1 1/2	6.60	1.890	11	4 1/4	1 1/4	3/8	1 3/4
1 3/4	8.00	2.168	11	4 3/8	1 3/8	3/8	1 3/4
2	10.00	2.355	11	4 1/2	1 1/2	3/8	1 3/4
2 1/4	12.00	2.595	11	5	1 5/8	7/16	2 1/8
2 1/2	15.00	3.008	11	5 1/2	2	1/2	2 9/16
2 3/4	18.00	3.255	11	5 3/4	2 1/8	1/2	2 9/16
3	22.50	3.493	11	6	2 3/8	1/2	2 5/8
3 1/4	25.50	3.706	11	6 1/4	2 1/2	1/2	2 5/8
3 1/2	30.00	3.920	11	6 1/2	2 5/8	1/2	2 11/16
3 3/4	36.00	4.133	11	6 5/8	2 3/4	9/16	2 11/16
4	45.00	4.348	11	6 3/4	2 7/8	9/16	2 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.

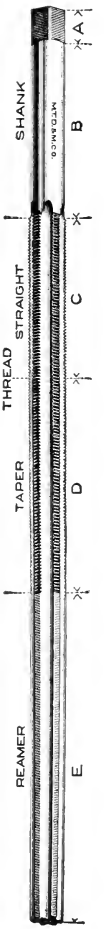
Taps shorter than 20 inches will be charged as if 20 inches long, and fractions of an inch in length will be charged as a full extra inch.

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	$6\frac{1}{2}$	$7\frac{1}{2}$



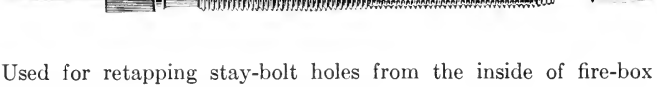
The Table of Lengths given below is one made up of average lengths taken from a large number of orders, and is listed merely as a suggestion or aid in making up specifications.

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.

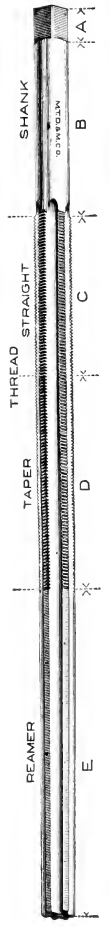
Diameter, Inches	Price Per Set	Diameter, Inches	Price Per Set
$\frac{7}{8}$	$21.90	$1\frac{1}{4}$	$27.70
$\frac{15}{16}$	22.90	$1\frac{5}{16}$	28.65
1	23.85	$1\frac{3}{8}$	29.60
$1\frac{1}{16}$	24.80	$1\frac{7}{16}$	30.55
$1\frac{1}{8}$	25.75	$1\frac{1}{2}$	31.50
$1\frac{3}{16}$	26.70		

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.

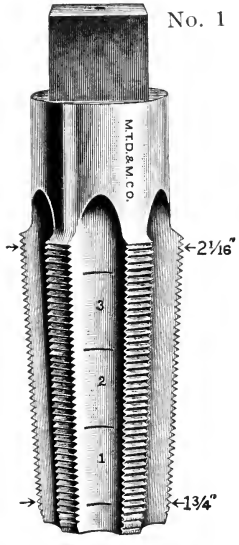
Length over all	$7\frac{5}{8}$″
Length of fluted Thread	$3\frac{1}{4}$″
Length of unfluted Thread	$2\frac{3}{4}$″
Diameter of Spindle	$\frac{3}{8}$″
Length of Spindle	11 ″

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

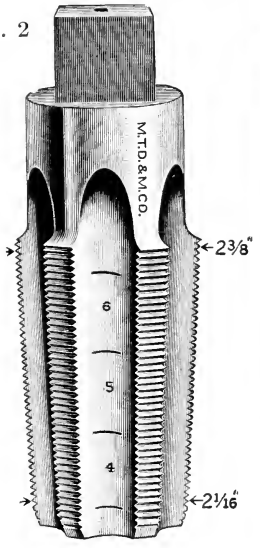
No. 1135

MUD OR WASHOUT TAPS

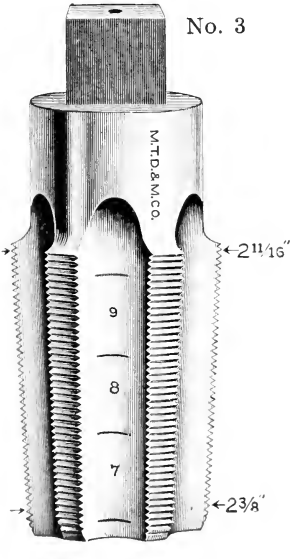
No. 1



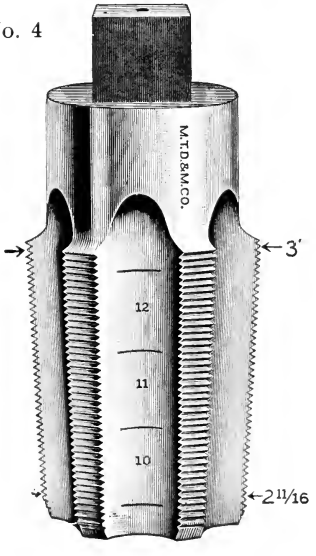
No. 2



No. 3



No. 4



No. 1135

MUD OR WASHOUT TAPS

Used for tapping washout holes in locomotives.

A set consists of four taps having 1¼ inch taper in 12 inches.

Tap No. 1 is 1¾ 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 6½ 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.

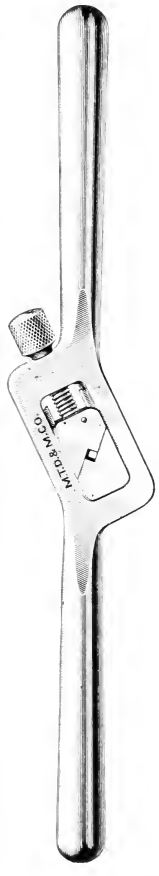
These Taps with V form of thread are special.

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

Left hand taps are special.

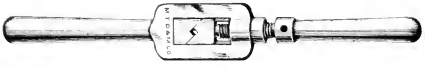
Number	Price Each	Diameter, Inches		Dimensions, Inches			
		Small End	Large End	Diameter Shank	Size Square	Length Thread	Length Overall
1	$7.60	1¾	2 1/16	2	1½	3⅝	6½
2	9.50	2 1/16	2⅜	2	1½	3⅝	6½
3	12.50	2⅜	2 11/16	2	1½	3⅝	6½
4	14.45	2 11/16	3	2	1½	3⅝	6½

No. 1146



TAP WRENCHES

No. 1145



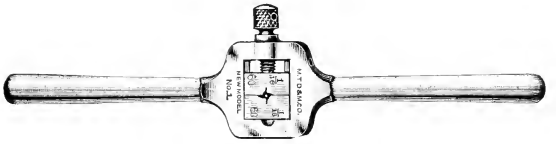
Size	Price Each	Whole Length, Inches	Fitting Taps	Fitting Reamers	Fitting Squares
0	$1.60	5 1/8	1/16 to 1/4	1/8 to 11/32	1/16 to 3/16
1	2.00	6	1/16 to 5/16	1/8 to 15/32	1/16 to 1/4

No. 1146

2	2.50	8 1/2	3/16 to 9/16	3/16 to 15/32	1/8 to 5/16
A	3.00	12 3/4	1/4 to 13/16	1/4 to 11/16	3/16 to 7/16
B	4.00	17 1/8	1/2 to 1 1/8	3/8 to 1 11/32	1/4 to 3/4
C	5.00	23	3/4 to 1 5/8	11/16 to 1 21/32	7/16 to 1
D	15.00	45 1/4	1 1/4 to 2 1/16	1 1/16 to 2 1/16	3/4 to 1 1/4
E	47.50	50	1 3/4 to 2 1/2	1 7/16 to 2 1/2	1 to 1 5/8
F	62.50	56	2 1/8 to 3 1/8	2 1/8 to 3	1 1/4 to 2

Sizes D, E, and F have handles that screw into body.

No. 1151
SCREW PLATES

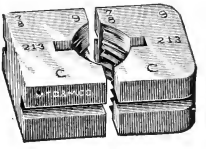


Our Patent Screw Plates are of an improved pattern and finish. They are light and durable, and are so perfected as to admit of a change of Die most quickly. The Dies and Plates are carefully finished to standard gauges, and are warranted as to accuracy of size. The Dies are interchangeable. Under or 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	6½	1/16 to ¼
A	2.50	13¾	¼ to ⅝
B	3.25	19	¼ to ⅞
C	4.00	21⅞	⅜ to 1
D	5.00	28¾	13/16 to 1½
E	15.00	40⅝	1⅜ 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	1/16 to ¼ by 32nds
A	1.00	¼ to ⅝ by 16ths
B	1.25	¼ to ⅞ by 16ths
C	1.75	⅜ to 1 by 16ths
D	2.00	⅞ to 1 by 16ths, 1⅛ to 1½ by 8ths
E	3.00	1⅜ to 2 by 8ths

No. 1158

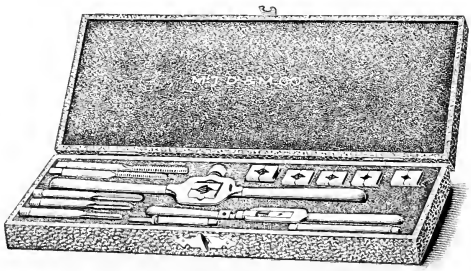
SETS OF SCREW PLATES

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 $\frac{1}{8}^{40}$, $\frac{5}{32}^{36}$, $\frac{3}{16}^{24}$, $\frac{7}{32}^{24}$, $\frac{1}{4}^{20}$, 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



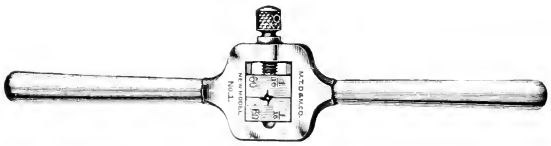
SET IN CASE

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

No. 1159

SETS OF SCREW PLATES

WITH DIES ONLY

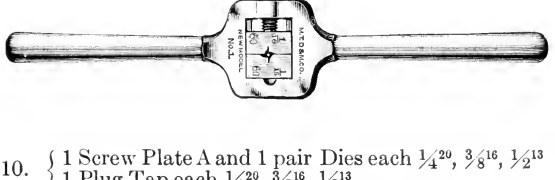


Set No. 5.	Plate A, with 3 pair Dies, cutting $\frac{1}{4}^{20}$, $\frac{3}{8}^{16}$, $\frac{1}{2}^{13}$.	$6.50
Set No. 6.	Plate B, with 4 pair Dies, cutting $\frac{3}{8}^{16}$, $\frac{1}{2}^{13}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$	9.50
Set No. 7.	Plate C, with 4 pair Dies, cutting $\frac{1}{2}^{13}$, $\frac{5}{8}^{11}$, $\frac{3}{4}^{10}$, $\frac{7}{8}^{9}$	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 $1\frac{3}{8}^{6}$, $1\frac{1}{2}^{6}$, $1\frac{5}{8}^{6\frac{1}{2}}$, $1\frac{3}{4}^{5}$, $1\frac{7}{8}^{5}$, $2^{4\frac{1}{2}}$	37.75

No. 1161

SETS OF SCREW PLATES

WITH TAPS, DIES, AND WRENCHES



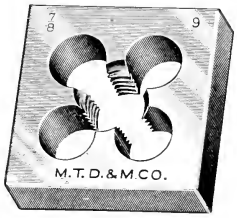
		Price Per Set
Set No. 10.	1 Screw Plate A and 1 pair Dies each $\frac{1}{4}^{20}$, $\frac{3}{8}^{16}$, $\frac{1}{2}^{13}$ 1 Plug Tap each $\frac{1}{4}^{20}$, $\frac{3}{8}^{16}$, $\frac{1}{2}^{13}$	$7.75
Set No. 11.	Same as above, with 1 Tap Wrench A	11.25
Set No. 12.	1 Screw Plate A and 1 pair Dies $\frac{1}{4}^{20}$, $\frac{3}{8}^{16}$, $\frac{1}{2}^{13}$, $\frac{5}{8}^{11}$ . . . . . 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



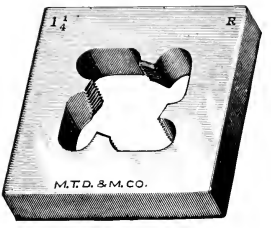
All sizes and threads not listed will be considered as special and subject to special prices.

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	
1/4	20	2 1/2	1/2	$1.80
5/16	18	2 1/2	1/2	1.80
3/8	16	2 1/2	1/2	1.80
7/16	14	2 1/2	1/2	1.80
1/2	13	2 1/2	3/4	1.80
9/16	12	2 1/2	3/4	1.90
5/8	11	2 1/2	3/4	2.00
11/16	11	2 1/2	3/4	2.10
3/4	10	2 1/2	3/4	2.20
13/16	10	2 1/2	3/4	2.30
7/8	9	2 1/2	3/4	2.40
15/16	9	2 1/2	3/4	2.55
1	8	2 1/2	1	2.70
1 1/8	7	2 1/2	1	3.00
1 1/4	7	2 1/2	1	3.30
1 3/8	6	2 1/2	1	3.60
1 1/2	6	3	1	3.90
1 5/8	5 1/2	3	1	4.20
1 3/4	5	3	1 1/4	5.40
1 7/8	5	3 1/2	1 1/2	6.50
2	4 1/2	3 1/2	2	7.50

No. 1170

SOLID PIPE DIES



STANDARD TAPER IS ¾ INCH TO THE FOOT

LEFT HAND DIES ARE SPECIAL

Solid square pipe dies are regularly furnished in American (Briggs) Standard right hand taper thread.

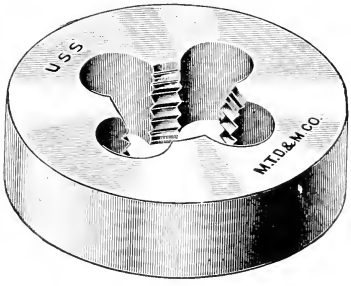
Sizes, dimensions, and threads not listed are subject to special prices.

*These dies are thick enough to cut to American (Briggs) Standard.

Cutting Size Pipe, Inches	Size of Square, — Thickness, — Price Each				
	2″ Square ½″ Thick	2½″ Square ¾″ Thick	3″ Square ¾″ Thick	4″ Square 1″ Thick	5″ Square 1¼″ Thick
⅛	*$1.80	*$1.80			
¼	1.90	* 1.90			
⅜	2.10	* 2.10			
½	2.40	* 2.40	*$3.10		
¾		* 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		
5/8	1/4	4, 48; 6, 40; 8, 36; 10, 30; 12, 28; 14, 24	$ .40
5/8	1/4	1/16, 3/32, 1/8, 3/16, 1/4	.40
1	3/8	3/16, 1/4, 5/16, 3/8, 7/16	.75
1 5/16	7/16	3/16, 1/4, 5/16, 3/8, 7/16, 1/2	1.25
1 9/16	9/16	1/4, 5/16, 3/8, 7/16, 1/2, 9/16, 5/8	1.50
2 1/4	3/4	1/4, 5/16, 3/8, 7/16, 1/2	3.00
2 1/4	3/4	9/16	3.00
2 1/4	3/4	5/8	3.00
2 1/4	3/4	3/4	3.00
2 1/4	3/4	7/8	3.00
2 1/4	3/4	1	3.00

No. 1180

DIE STOCKS

FOR

ROUND ADJUSTABLE DIES

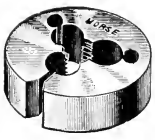
Size of Die Stock, No.	Price Each Without Dies	Whole Length of Die Stock, Inches	Holding Round Dies		Limits of Cutting Size	
			Outside Diam.	Thickness	Fractional	Machine Screw Gauge
21	$ .40	5	5/8	1/4	1/16 to 17/64	0 to 14
22	.50	7 3/8	13/16	1/4	1/16 to 5/16	0 to 20
23	1.00	10 1/4	1	3/8	1/8 to 17/32	4 to 30
25	1.25	12 1/8	1 5/16	7/16	3/16 to 17/32	
26	1.25	14 1/8	1 1/2	1/2	3/16 to 5/8	
27	1.50	14 1/8	1 9/16	9/16	1/4 to 21/32	
28	1.50	18	1 3/4	9/16	1/4 to 3/4	
29	1.50	22	2	5/8	1/4 to 7/8	
30	1.75	26	2 1/4	3/4	1/4 to 1	
31	1.75	30	2 1/2	3/4	3/8 to 1	
32	2.25	42	3	1	3/4 to 1 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.

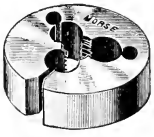
For Sets of No. 1180 Die Stocks, Round Dies, Taps and Wrenches complete, see pages 290-295.

Nos. 1191, 1192 and 1193 Carbon Steel



ROUND ADJUSTABLE DIES

A. S. M. E. STANDARD

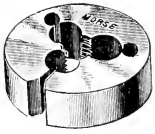


$\frac{5}{8}$, $\frac{13}{16}$ AND 1 INCH DIAMETERS FITTING STYLE 1180 DIE STOCKS NOS. 21, 22 AND 23

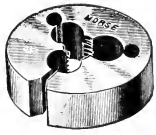
Left Hand Dies are special.
Sizes, dimensions and threads not listed are subject to special prices.
High Speed Steel Dies are special.
See tables in appendix, pages xviii and xix.
For Die Stocks for these Dies, see page 281.

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



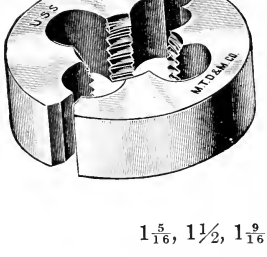
$\frac{5}{8}$, $\frac{13}{16}$ AND 1 INCH DIAMETERS

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	Whitworth 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

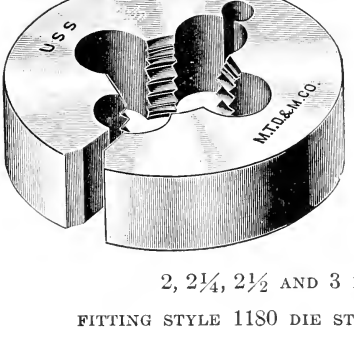
$1\frac{5}{16}$, $1\frac{1}{2}$, $1\frac{9}{16}$ AND $1\frac{3}{4}$ INCHES DIAMETER

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. 1196	No. 1200	No. 1203	No. 1207
						Outside Diameter, Price Each			
	U.S. St'd	S.A.E. St'd	Whitworth St'd	British St'd Fine	U.S. Threads also Furnished	$1\frac{5}{16}$ In.	$1\frac{1}{2}$ In.	$1\frac{9}{16}$ In.	$1\frac{3}{4}$ In.
$\frac{1}{4}$	20	28	20	26	24,27,32	$1.25	$1.25	$1.50	$2.00
$\frac{5}{16}$	18	24	18	22	20,27,32	1.25	1.25	1.50	2.00
$\frac{3}{8}$	16	24	16	20	20, 27	1.25	1.25	1.50	2.00
$\frac{7}{16}$	14	20	14	18	24, 27	1.25	1.25	1.50	2.00
$\frac{1}{2}$	13	20	12	16	12,24,27	1.25	1.25	1.50	2.00
$\frac{9}{16}$	12	18	12	16	27		1.25	1.50	2.00
$\frac{5}{8}$	11	18	11	14	12, 27		1.25	1.50	2.00
$\frac{11}{16}$	11	16	11	14					2.00
$\frac{3}{4}$	10	16	10	12	12, 27				2.00

Nos. 1211, 1214, 1217 and 1220 Carbon Steel



ROUND

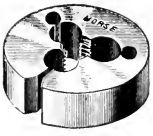
ADJUSTABLE DIES

2, 2¼, 2½ AND 3 INCH DIAMETERS

FITTING STYLE 1180 DIE STOCKS NOS. 29, 30, 31 AND 32

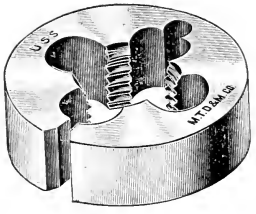
Left Hand Dies are special.
Sizes, dimensions and threads not listed are subject to special prices.
U. S. Form of thread furnished unless otherwise specified.
High Speed Steel Dies are special.
For Die Stocks for these Dies, see page 281.
For Sets of Dies see pages 290-295.

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		
5/16	18	24	18	22	20, 27, 32	2.00	3.00		
⅜	16	24	16	20	20, 27	2.00	3.00		
7/16	14	20	14	18	24, 27	2.00	3.00		
½	13	20	12	16	12, 24, 27	2.00	3.00	$3.00	
9/16	12	18	12	16	27	2.00	3.00	3.00	
⅝	11	18	11	14	12, 27	2.00	3.00	3.00	
11/16	11	16	11	14		2.00	3.00	3.00	
¾	10	16	10	12	12, 27	2.00	3.00	3.00	
13/16	10		10	12		2.00	3.00	3.00	
⅞	9	14, 18	9	11	12, 27	2.00	3.00	3.00	$5.00
15/16	9		9				3.00	3.00	5.00
1	8	14	8	10	12, 27		3.00	3.00	5.00
1⅛	7	12	7	9					5.00
1¼	7	12	7	9					5.00
1⅜	6	12	6	8					5.00
1½	6	12	6	8					5.00



ROUND ADJUSTABLE DIES

FRENCH AND INTERNATIONAL STANDARD METRIC SYSTEM

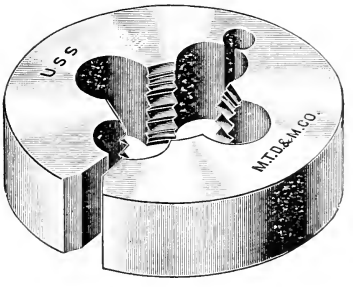


Left hand dies are special.

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	International	$\frac{5}{8}$ 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 INTERNATIONAL STANDARD

METRIC SYSTEM

Left Hand Dies are special.

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

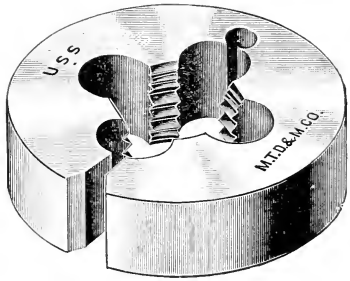
Cutting Size, M. M.	Pitch, M. M.		No. 1237 Fitting Stock No. 25	No. 1235 Fitting Stock No. 26	No. 1238 Fitting Stock No. 27	No. 1240 Fitting Stock No. 28
	French	International	$1\frac{5}{16}$ Inch Diam.	$1\frac{1}{2}$ Inch Diam.	$1\frac{9}{16}$ Inch Diam.	$1\frac{3}{4}$ Inch Diam.
6	1.	1.	$1.25	$1.25		
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.

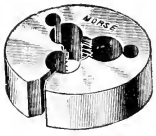
Sizes and threads not listed are subject to special prices.

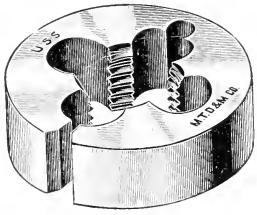
Cutting Size, M. M.	Pitch, M. M.		**No. 1241** Fitting Stock No. 29	**No. 1239** Fitting Stock No. 30	**No. 1242** Fitting Stock No. 31	**No. 1243** Fitting Stock No. 32
	French	Inter-national	2 Inch Diam.	2¼ Inch Diam.	2½ Inch Diam.	3 Inch Diam.
12	1.5	1.75	$2.00	$3.00	$3.00	
14	2.	2.	2.00	3.00	3.00	
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

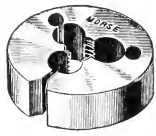
ROUND ADJUSTABLE DIES

FOR IRON PIPE

AMERICAN (BRIGGS) STANDARD, TAPER ¾ 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 1 In. Diam. ⅜ In. Thick	**No. 1246** Fitting Stock No. 25 1 5/16 In. Diam. 7/16 In. Thick	**No. 1247** Fitting Stock No. 27 1 9/16 In. Diam. 9/16 In. Thick	**No. 1248** Fitting Stock No. 30 2¼ In. Diam. ¾ In. Thick
⅛	27	$ .75	$1.25	$1.50	$3.00
¼	18		1.25	1.50	3.00
⅜	18		1.50	1.50	3.00
½	14			1.75	3.00
¾	14				3.25
1	11½				3.50

ROUND ADJUSTABLE DIES

FOR BRASS PIPE

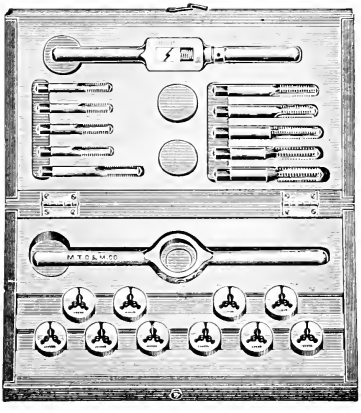
Cutting Size	Thread	**No. 1250** Fitting Stock No. 23 1 In. Diam. ⅜ In. Thick	**No. 1251** Fitting Stock No. 25 1 5/16 In. Diam. 7/16 In. Thick	**No. 1252** Fitting Stock No. 27 1 9/16 In. Diam. 9/16 In. Thick
¼	27, 40	$ .75		
5/16	27, 40	.75		
⅜	27, 40	.75		
7/16	27, 40	.75		
½	27, 40	.75		
⅝	27, 40		$1.50	
¾	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 WRENCHES

WITH DIES 5/8 INCH DIAMETER



		Price Per Set
Set No. 35.	Stock 5 inches long; Tap Wrench 5 1/8 inches long; 6 Dies 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 1/8 inches long; 5 Dies 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 1/8 inches long; 4 Dies 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 1/8 inches long; 8 Dies 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 1/8 inches long; 10 Dies 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 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 WRENCHES

WITH DIES $\frac{13}{16}$ INCH DIAMETER

		Price Per Set
Set No. 51.	Stock 7⅜ inches long; Tap Wrench 5⅛ inches long; 5 Dies $\frac{13}{16}$ 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 7⅜ inches long; Tap Wrench 6 inches long; 6 Dies $\frac{13}{16}$ 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 7⅜ inches long; Tap Wrench 6 inches long; 5 Dies $\frac{13}{16}$ 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 7⅜ inches long; Tap Wrench 6 inches long; 8 Dies $\frac{13}{16}$ inch diameter, and 8 Taps, cutting $\frac{1}{16}^{64}$, $\frac{3}{32}^{50}$, $\frac{1}{8}^{40}$, $\frac{5}{32}^{36}$, $\frac{3}{16}^{24}$, $\frac{7}{32}^{24}$, $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$ . . .	12.50

No. 1265

SETS OF ROUND ADJUSTABLE DIES, TAPS, DIE STOCKS AND WRENCHES

WITH DIES $\frac{13}{16}$ INCH DIAMETER

A. S. M. E. STANDARD

Set No. 55.	Stock 7⅜ inches long; Tap Wrench 5⅛ inches long; 5 Dies $\frac{13}{16}$ inch diameter, and 5 Taps, cutting 4^{48}, 6^{40}, 8^{36}, 10^{30}, 12^{28}	$8.00
Set No. 56.	Stock 7⅜ inches long; Tap Wrench 5⅛ inches long; 6 Dies $\frac{13}{16}$ inch diameter, and 6 Taps, cutting 4^{48}, 6^{40}, 8^{36}, 10^{30}, 12^{28}, 14^{24}	9.25
Set No. 59.	Stock 7⅜ inches long; Tap Wrench 5⅛ inches long; 8 Dies $\frac{13}{16}$ 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 $\frac{13}{16}$ 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

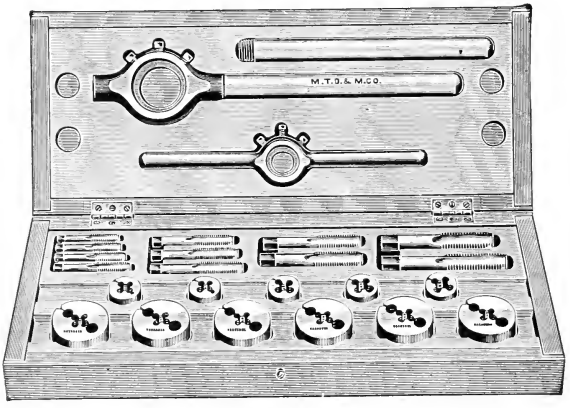
Set No. 69. Stock $10\frac{1}{4}$ inches long; 5 Dies 1 inch diameter, and 5 Taps,
cutting $\frac{3}{16}^{24}$, $\frac{1}{4}^{20}$, $\frac{5}{16}^{18}$, $\frac{3}{8}^{16}$, $\frac{7}{16}^{14}$ $10.75
No Tap Wrench is furnished with this set.

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 $\frac{1}{4}^{28}$, $\frac{5}{16}^{24}$, $\frac{3}{8}^{24}$, $\frac{7}{16}^{20}$, $\frac{1}{2}^{20}$ $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 $\frac{1}{4}^{28}$, $\frac{5}{16}^{24}$, $\frac{3}{8}^{24}$, $\frac{7}{16}^{20}$, $\frac{1}{2}^{20}$.
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 12¾ inches long	26.50

No. 1288

SETS OF ROUND ADJUSTABLE DIES, TAPS, DIE STOCKS AND WRENCHES

WITH DIES 2½ INCHES DIAMETER

		Price Per Set
Set No. 114.	U. S. Standard Sizes. Stock 30 inches long, with 5 Dies 2½ inches diameter, 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 17⅛ inches long	35.75

No. 1291

SETS OF ROUND ADJUSTABLE DIES, TAPS, DIE STOCKS AND WRENCHES

WITH DIES 3 INCHES DIAMETER

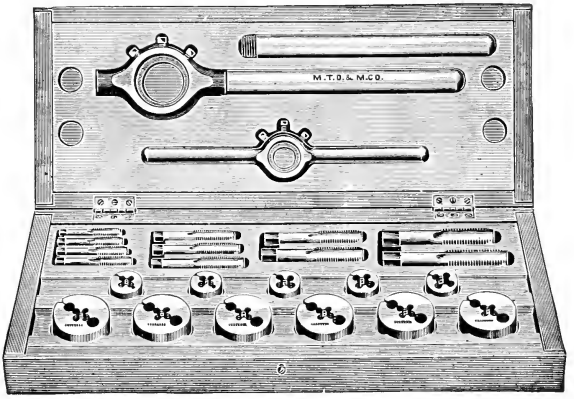
		Price Per Set
Set No. 132.	U. S. Standard Sizes. Stock 42 inches long, with 4 Dies 3 inches diameter, and 4 Taper Taps, cutting $1\frac{1}{8}^{7}$, $1\frac{1}{4}^{7}$, $1\frac{3}{8}^{6}$, $1\frac{1}{2}^{6}$	$42.50
Set No. 133.	Same as above, with Tap Wrench 23 inches long	47.50
Set No. 138.	U. S. Standard 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



Price Per Set

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}, $1\frac{1}{8}^{7}$, $1\frac{1}{4}^{7}$. $60.25

Set No. 150. Same as above, with 1 Tap Wrench 12¾ inches long and 1 Tap Wrench 17⅛ inches long 67.50

No. 1296

TRIPLE SETS OF ROUND ADJUSTABLE DIES, TAPS, DIE STOCKS AND WRENCHES

WITH DIES 1½, 2½ AND 3 INCHES DIAMETER

Price Per Set

Set No. 160. U. S. Standard Sizes.
One Stock 14⅛ inches long, one Stock 30 inches long, one Stock 42 inches long, 5 Dies 1½ inches diameter, 4 Dies 2½ 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}, $1\frac{1}{8}^{7}$, $1\frac{1}{4}^{7}$, $1\frac{3}{8}^{6}$, $1\frac{1}{2}^{6}$. $73.25

Set No. 161. Same as above, with 3 Tap Wrenches, one 12¾ inches long, one 17⅛ 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.

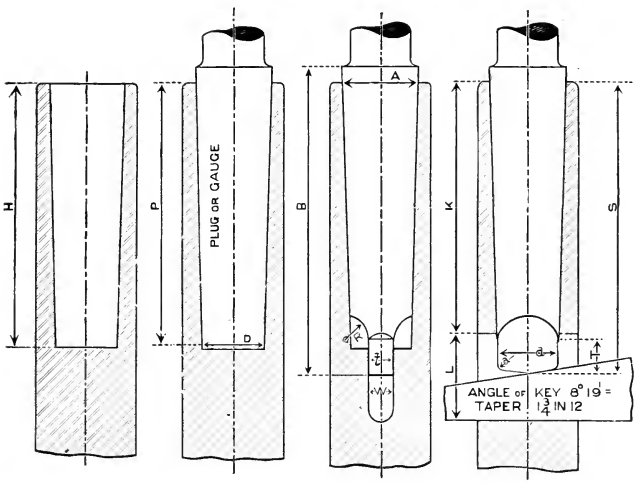
APPENDIX

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.

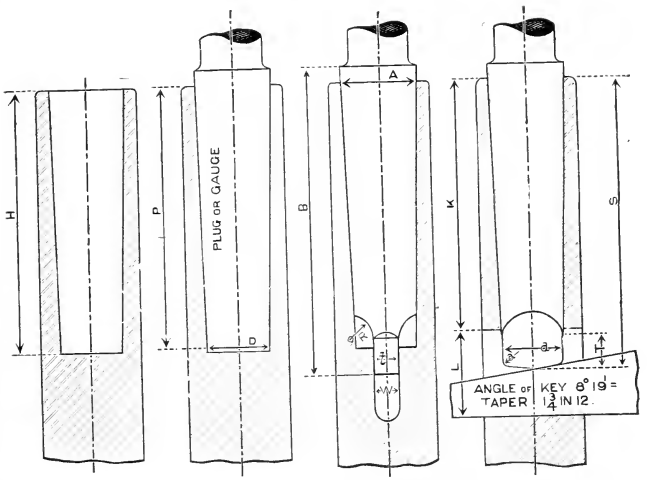
INDEX

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
			Whole Length of Shank	Shank Depth			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 11/32	2 7/32	2 1/32	2	.1562	1/4	5/32	.235	.04	.160	9/16	1 15/16	.62460	.05205	0
1	.369	.475	2 9/16	2 7/16	2 3/16	2 1/16	.2031	3/8	3/16	.343	.05	.213	3/4	2 1/16	.59858	.04988	1
2	.572	.700	3 1/8	2 15/16	2 5/8	2 9/16	.250	7/16	1/4	17/32	.06	.260	7/8	2 1/2	.59941	.04995	2
3	.778	.938	3 7/8	3 11/16	3 1/4	3 3/16	.3125	9/16	9/32	23/32	.08	.322	1 3/16	3 1/16	.60235	.05019	3
4	1.020	1.231	4 7/8	4 5/8	4 1/8	4 1/16	.4687	5/8	5/16	31/32	.10	.478	1 1/4	3 7/8	.62326	.05193	4
5	1.475	1.748	6 1/8	5 7/8	5 1/4	5 3/16	.6250	3/4	3/8	1 13/32	.12	.635	1 1/2	4 15/16	.63151	.05262	5
6	2.116	2.494	8 9/16	8 1/4	7 3/8	7 1/4	.750	1 1/8	1/2	2	.15	.760	1 3/4	7	.62565	.05213	6
7	2.750	3.270	11 5/8	11 1/4	10 1/8	10	1.1250	1 3/8	3/4	2 5/8	.18	1.135	2 5/8	9 1/2	.62400	.05200	7

MORSE TAPERS
SHORT SHANKS

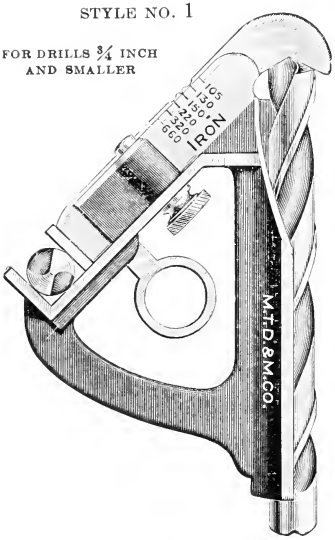


Number of Taper	SHANK							TONGUE				KEYWAY			Taper per Foot	Taper per Inch	Number of Key
	Diam. of Plug at small End	Diam. at End of Socket	Whole Length of Shank	Shank Depth	Depth of Hole	Standard Plug Depth	Thickness of Tongue	Length of Tongue	Rad. of Mill for Tongue	Diameter of Tongue	Radius of Tongue	Width of Keyway	Length of Keyway	End of Socket to Keyway			
	D	A	B	S	H	P	t	T	R	d	a	W	L	K			
0	.2715	.356	1 31/32	1 27/32	1 31/32	1 5/8	.1875	1/4	3/16	258	3/64	.195	5/8	1 17/32	.62460	.05205	0
1	.3877	.475	2 3/16	2	1 13/16	1 3/4	.250	5/16	1/4	.371	1/16	.260	13/16	1 21/32	.59858	.04988	1
2	.6001	.700	2 9/16	2 3/8	2 1/16	2	.3750	7/16	9/32	.575	1/16	.385	1 3/16	1 27/32	.59941	.04995	2
3	.8156	.938	3 1/8	2 15/16	2 1/2	2 7/16	.500	9/16	5/16	.783	3/32	.510	1 5/16	2 7/32	.60235	.05019	3
4	1.0622	1.231	4 1/16	3 13/16	3 5/16	3 1/4	.6250	5/8	3/8	1.023	3/32	.635	1 1/2	2 31/32	.62326	.05193	4
5	1.5369	1.748	5 1/16	4 13/16	4 3/16	4 1/8	1.000	3/4	1/2	1.483	1/8	1.010	2	3 31/32	.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 11/16	9 5/16	8 1/16	7 15/16	1.6250	1 1/2	3/4	2.769	3/16	1.637	3 5/8	7 1/8	.62400	.05200	7

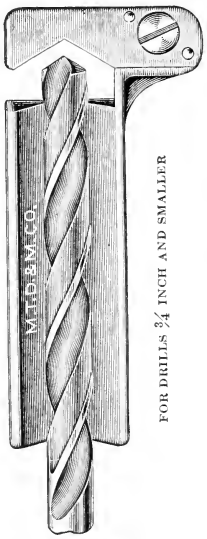
GAUGES FOR GRINDING DRILLS

STYLE NO. 1

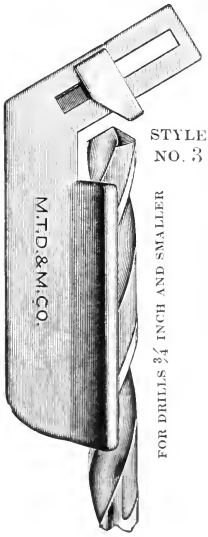
FOR DRILLS 3/4 INCH AND SMALLER



STYLE NO. 2



FOR DRILLS 3/4 INCH AND SMALLER



STYLE NO. 3

FOR DRILLS 3/4 INCH AND SMALLER

STYLE NO. 4

MADE IN 2 SIZES

FOR 1/4 INCH AND SMALLER — FOR 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

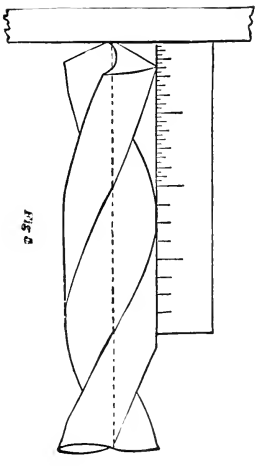


Fig. 2

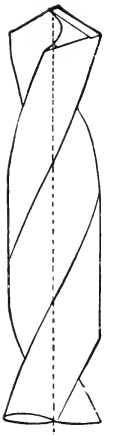


Fig. 1

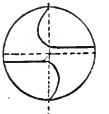


Fig. 5

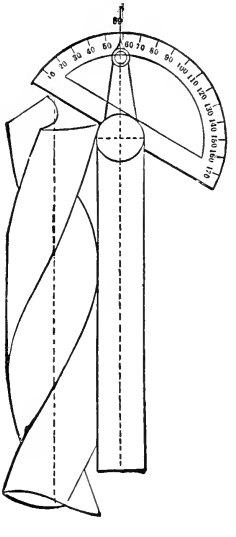


Fig. 6

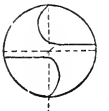


Fig. 3

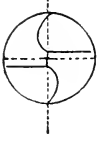


Fig. 4

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″	1/4″	.006″
.009″	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

Diam. Inches	Revolutions Per Minute		
	Wrought Iron and Steel	Cast Iron	Brass
1/16	1833	2320	3667
1/8	917	1160	1833
3/16	611	773	1222
1/4	458	580	917
5/16	342	465	733
3/8	285	386	611
7/16	244	331	524
1/2	214	290	458
9/16	176	238	407
5/8	159	214	367
11/16	144	194	333
3/4	132	178	306
13/16	112	165	282
7/8	105	153	262
15/16	98	143	244
1	90	134	229
1 1/16	80	126	216
1 1/8	75	119	204
1 3/16	71	113	193
1 1/4	67	107	183
1 5/16	64	102	175
1 3/8	61	97	167
1 1/2	56	89	153
1 5/8	52	82	141
1 3/4	48	76	131
1 7/8	45	71	122
2	42	67	115
2 1/8	40	63	108
2 1/4	38	59	102
2 3/8	36	56	96
2 1/2	34	53	92
2 5/8	32	51	87
2 3/4	30	49	83
2 7/8	28	47	80
3	26	45	76

High Speed Steel

Diam. Inches	Revolutions Per Minute		
	Wrought Iron and Steel	Cast Iron	Brass
1/8	1832	2440	Periphery Speed 100 to 140 feet per minute
3/16	1221	1627	
1/4	916	1220	
5/16	733	976	
3/8	611	813	
7/16	523	697	
1/2	458	610	
9/16	407	510	
5/8	366	459	
11/16	333	417	
3/4	305	383	
13/16	282	353	
7/8	262	328	
15/16	244	306	
1	229	287	
1 1/16	215	270	
1 1/8	204	255	
1 3/16	193	242	
1 1/4	183	229	
1 5/16	174	219	
1 3/8	166	209	
1 1/2	153	191	
1 5/8	138	176	
1 3/4	127	164	
1 7/8	112	153	
2	104	143	
2 1/8	95	126	
2 1/4	89	118	
2 3/8	80	112	
2 1/2	76	106	

DECIMAL EQUIVALENTS OF DRILL SIZES

Inch	M.M.	Wire Gauge	Decimals of an Inch
		80	.0135
		79	.0145
1/64			.015625
	.4		.015748
		78	.016
		77	.018
	.5		.019685
		76	.02
		75	.021
	.55		.021653
		74	.0225
	.6		.023622
		73	.024
		72	.025
	.65		.02559
		71	.026
	.7		.027559
		70	.028
		69	.02925
	.75		.029527
		68	.031
1/32			.03125
	.8		.031496
		67	.032
		66	.033
	.85		.033464
		65	.035
	.9		.035433
		64	.036
		63	.037
	.95		.037401
		62	.038
		61	.039
	1		.03937
		60	.04
		59	.041
	1.05		.041338
		58	.042
		57	.043
	1.1		.043307
	1.15		.045275
		56	.0465
3/64			.046875
	1.2		.047244
		1.25	.049212
		1.3	.051181
			.052
		1.35	.053149
			.055
		1.4	.055118
		1.45	.057086
		1.5	.059055
			.0595
		1.55	.061023
1/16			.0625
		1.6	.062992
			.0635
		1.65	.06496
		1.7	.066929
			.067
		1.75	.068897
			.07
		1.8	.070866
		1.85	.072834
			.073
		1.9	.074803
			.076
		1.95	.076771
5/64			.078125
			.0785
		2	.07874
		2.05	.080708
			.081
			.082
		2.1	.082677
		2.15	.084645
			.086
		2.2	.086614
		2.25	.088582
			.089
		2.3	.090551
		2.35	.092519
			.0935
3/32			.09375
		2.4	.094488
			.096
		2.45	.096456
			.098
		2.5	.098425
			.0995
			.1015
		2.6	.102362
			.104
		2.7	.106299
			.1065
		2.75	.108267
7/64			.109375
			.11
		2.8	.110236
			.111
			.113
		2.9	.114173
			.116
		3	.11811
			.12
		3.1	.122047
1/8			.125
		3.2	.125984
		3.25	.127952
			.1285
		3.3	.129921
		3.4	.133858
			.136
		3.5	.137795
			.1405
9/64			.140625
		3.6	.141732
			.144
		3.7	.145669
			.147
		3.75	.147637
			.1495
		3.8	.149606
			.152
		3.9	.153543
			.154
5/32			.15625
			.157
		4	.15748
			.159
			.161
		4.1	.161417

DECIMAL EQUIVALENTS OF DRILL SIZES

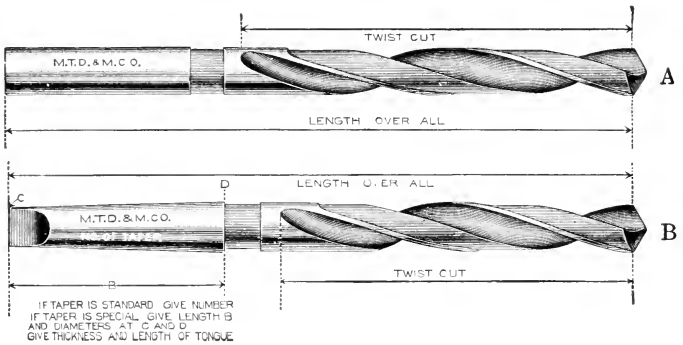
Inch	M.M.	Wire Gauge	Decimals of an Inch	Inch	M.M.	Letter Sizes	Decimals of an inch	Inch	M.M.	Letter Sizes	Decimals of an Inch
	4.2		.165354		5.9		.232283		8		.31496
		19	.166			A	.234			O	.316
	4.25		.167322	15/64			.234375		8.1		.318897
	4.3		.169291		6		.23622		8.2		.322834
		18	.1695			B	.238			P	.323
11/64			.171875		6.1		.240157		8.25		.324802
		17	.173			C	.242		8.3		.326771
	4.4		.173228		6.2		.244094	21/64			.328125
		16	.177			D	.246		8.4		.330708
	4.5		.177165		6.25		.246062			Q	.332
		15	.18		6.3		.248031		8.5		.334645
	4.6		.181102	1/4		E	.25		8.6		.338582
		14	.182		6.4		.251968			R	.339
		13	.185		6.5		.255905		8.7		.342519
	4.7		.185039			F	.257	11/32			.34375
	4.75		.187007		6.6		.259842		8.75		.344487
3/16			.1875			G	.261		8.8		.346456
	4.8		.188976		6.7		.263779			S	.348
		12	.189	17/64			.265625		8.9		.350393
		11	.191		6.75		.265747		9		.35433
	4.9		.192913			H	.266			T	.358
		10	.1935		6.8		.267716		9.1		.358267
		9	.196		6.9		.271653	23/64			.359375
	5		.19685			I	.272		9.2		.362204
		8	.199		7		.27559		9.25		.364172
	5.1		.200787			J	.277		9.3		.366141
		7	.201		7.1		.279527			U	.368
13/64			.203125			K	.281		9.4		.370078
		6	.204	9/32			.28125		9.5		.374015
	5.2		.204724		7.2		.283464	3/8			.375
		5	.2055		7.25		.285432			V	.377
	5.25		.206692		7.3		.287401		9.6		.377952
	5.3		.208661			L	.29		9.7		.381889
		4	.209		7.4		.291338		9.75		.383857
	5.4		.212598			M	.295		9.8		.385826
		3	.213		7.5		.295275			W	.386
	5.5		.216535	19/64			.296875		9.9		.389763
7/32			.21875		7.6		.299212	25/64			.390625
	5.6		.220472			N	.302		10.		.3937
		2	.221		7.7		.303149			X	.397
	5.7		.224409		7.75		.305117			Y	.404
	5.75		.226377		7.8		.307086	13/32			.40625
		1	.228		7.9		.311023			Z	.413
	5.8		.228346	5/16			.3125		10.5		.413385

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
27/64		.421875		20.5	.807085	1 3/16		1.1875
	11	.43307	13/16		.8125		30.5	1.200785
7/16		.4375		21	.82677	1 13/64		1.203125
	11.5	.452755	53/64		.828125	1 7/32		1.21875
29/64		.453125	27/32		.84375		31	1.22047
15/32		.46875		21.5	.846455	1 15/64		1.234375
	12	.47244	55/64		.859375		31.5	1.240155
31/64		.484375		22	.86614	1 1/4		1.25
	12.5	.492125	7/8		.875		32	1.25984
1/2		.5		22.5	.885825	1 17/64		1.265625
	13	.51181	57/64		.890625		32.5	1.279525
33/64		.515625		23	.90551	1 9/32		1.28125
17/32		.53125	29/32		.90625	1 19/64		1.296875
	13.5	.531495	59/64		.921875		33	1.29921
35/64		.546875		23.5	.925195	1 5/16		1.3125
	14	.55118	15/16		.9375		33.5	1.318895
9/16		.5625		24	.94488	1 21/64		1.328125
	14.5	.570865	61/64		.953125		34	1.33858
37/64		.578125		24.5	.964565	1 11/32		1.34375
	15	.59055	31/32		.96875		34.5	1.358265
19/32		.59375		25	.98425	1 23/64		1.359375
39/64		.609375	63/64		.984375	1 3/8		1.375
	15.5	.610235	1		1.		35	1.37795
5/8		.625		25.5	1.003935	1 25/64		1.390625
	16	.62992	1 1/64		1.015625		35.5	1.397635
41/64		.640625		26	1.02362	1 13/32		1.40625
	16.5	.649605	1 1/32		1.03125		36	1.41732
21/32		.65625		26.5	1.043305	1 27/64		1.421875
	17	.66929	1 3/64		1.046875		36.5	1.437005
43/64		.671875	1 1/16		1.0625	1 7/16		1.4375
11/16		.6875		27	1.06299	1 29/64		1.453125
	17.5	.688975	1 5/64		1.078125		37	1.45669
45/64		.703125		27.5	1.082675	1 15/32		1.46875
	18	.70866	1 3/32		1.09375		37.5	1.476375
23/32		.71875		28	1 10236	1 31/64		1.484375
	18.5	.728345	1 7/64		1.109375		38	1.49606
47/64		.734375		28.5	1 122045	1 1/8		1.5
	19	.74803	1 1/8		1.125	1 33/64		1.515625
3/4		.75	1 9/64		1.140625		38.5	1.515745
49/64		765625		29	1.14173	1 17/32		1.53125
	19.5	.767715	1 5/32		1.15625		39	1.53543
25/32		.78125		29.5	1.161415	1 35/64		1.546875
	20	.7874	1 11/64		1.171875		39.5	1.555115
51/64		.796875		30	1.1811	1 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 61/64		1.953125		59.5	2.342515
1 37/64		1.578125		50	1.9685	2 11/32		2.34375
1 19/32		1.59375	1 31/32		1.96875	2 23/64		2.359375
	40.5	1.594485	1 63/64		1.984375		60	2.3622
1 39/64		1.609375		50.5	1.988185	2 3/8		2.375
	41	1.61417	2		2.		60.5	2.381885
1 5/8		1.625		51	2.00787	2 25/64		2.390625
	41.5	1.633855	2 1/64		2.015625		61	2.40157
1 41/64		1.640625		51.5	2.027555	2 13/32		2.40625
	42	1.65354	2 1/32		2.03125		61.5	2.421255
1 21/32		1.65625	2 3/64		2.046875	2 27/64		2.421875
1 43/64		1.671875		52	2.04724	2 7/16		2.4375
	42.5	1.673225	2 1/16		2.0625		62	2.44094
1 11/16		1.6875		52.5	2.066925	2 29/64		2.453125
	43	1.69291	2 5/64		2.078125		62.5	2.460625
1 45/64		1.703125		53	2.08661	2 15/32		2.46875
	43.5	1.712595	2 3/32		2.09375		63	2.48031
1 23/32		1.71875		53.5	2.106295	2 31/64		2.484375
	44	1.73228	2 7/64		2.109375		63.5	2.499995
1 47/64		1.734375	2 1/8		2.125	2 1/2		2.5
1 3/4		1.75		54	2.12598	2 33/64		2.515625
	44.5	1.751965	2 9/64		2.140625		64	2.51968
1 49/64		1.765625		54.5	2.145665	2 17/32		2.53125
	45	1.77165	2 5/32		2.15625		64.5	2.539365
1 25/32		1.78125		55	2.16535	2 35/64		2.546875
	45.5	1.791335	2 11/64		2.171875		65	2.55905
1 51/64		1.796875		55.5	2.185035	2 9/16		2.5625
	46	1.81102	2 3/16		2.1875	2 37/64		2.578125
1 13/16		1.8125	2 13/64		2.203125		65.5	2.578735
1 53/64		1.828125		56	2.20472	2 19/32		2.59375
	46.5	1.830705	2 7/32		2.21875		66	2.59842
1 27/32		1.84375		56.5	2.224405	2 39/64		2.609375
	47	1.85039	2 15/64		2.234375		66.5	2.618105
1 55/64		1.859375		57	2.24409	2 5/8		2.625
	47.5	1.870075	2 1/4		2.25		67	2.63779
1 7/8		1.875		57.5	2.263775	2 41/64		2.640625
	48	1.88976	2 17/64		2.265625	2 21/32		2.65625
1 57/64		1.890625	2 9/32		2.28125		67.5	2.657475
1 29/32		1.90625		58	2.28346	2 43/64		2.671875
	48.5	1.909445	2 19/64		2.296875		68	2.67716
1 59/64		1.921875		58.5	2.303145	2 11/16		2.6875
	49	1.92913	2 5/16		2 3125		68.5	2.696845
1 15/16		1.9375		59	2.32283	2 45/64		2.703125
	49.5	1.948815	2 21/64		2.328125		69	2.71653



SUGGESTIONS FOR ORDERING DRILLS

REGULAR DRILLS. — Always order by catalog number.

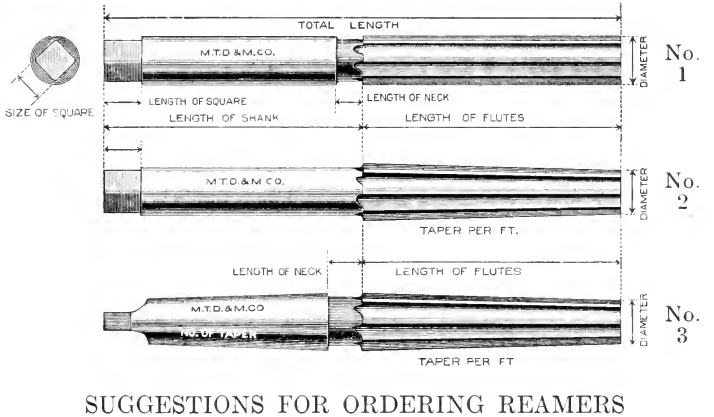
SPECIAL DRILLS. — Refer to the catalog number for general style of tool required, giving also the following information: —

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.

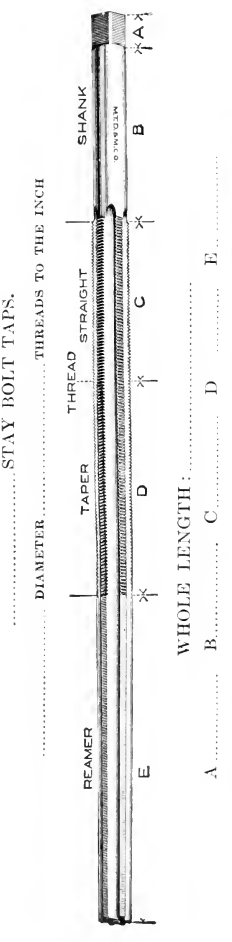
TO SHARPEN REAMERS

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.

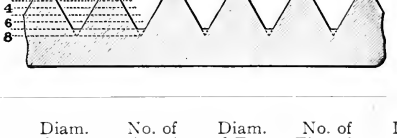
If ROUND DIES, give diameter and thickness and state whether split or solid.

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

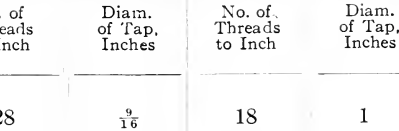
UNITED STATES STANDARD



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
1/4	20	1	8	2 1/8	4 1/2	3 1/8	3 1/2
5/16	18	1 1/8	7	2 1/4	4 1/2	3 1/4	3 1/2
3/8	16	1 1/4	7	2 3/8	4	3 3/8	3 1/4
7/16	14	1 3/8	6	2 1/2	4	3 1/2	3 1/4
1/2	13	1 1/2	6	2 5/8	4	3 5/8	3 1/4
9/16	12	1 5/8	5 1/2	2 3/4	4	3 3/4	3
5/8	11	1 3/4	5	2 7/8	3 1/2	3 7/8	3
3/4	10	1 7/8	5	3	3 1/2	4	3
7/8	9	2	4 1/2				

S. A. E. STANDARD

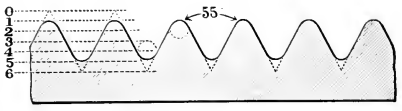
SAME SHAPE THREADS AS U. S. S., BUT PITCHES ARE FINER



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
1/4	28	9/16	18	1	14
5/16	24	5/8	18	1 1/8	12
3/8	24	11/16	16	1 1/4	12
7/16	20	3/4	16	1 3/8	12
1/2	20	7/8	14	1 1/2	12

TAP THREADS

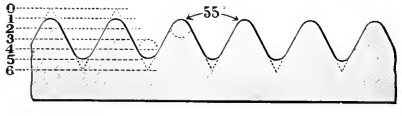
WHITWORTH STANDARD



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
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	3 1/4	3 1/4
7/16	14	1 3/8	6	2 3/8	4	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	3 1/2	3 3/4	3
7/8	9	1 7/8	4 1/2	2 7/8	3 1/2	3 7/8	3
						4	3

BRITISH STANDARD FINE

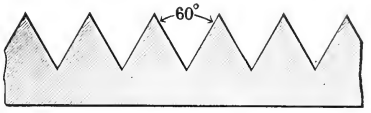
SAME SHAPE THREADS AS WHITWORTH, BUT PITCHES ARE FINER



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
1/4	26	1	10	2	7	3	5
5/16	22	1 1/8	9	2 1/8	7	3 1/8	5
3/8	20	1 1/4	9	2 1/4	6	3 1/4	5
7/16	18	1 3/8	8	2 3/8	6	3 3/8	5
1/2	16	1 1/2	8	2 1/2	6	3 1/2	4 1/2
5/8	14	1 5/8	8	2 5/8	6	3 5/8	4 1/2
3/4	12	1 3/4	7	2 3/4	6	3 3/4	4 1/2
7/8	11	1 7/8	7	2 7/8	6	3 7/8	4 1/2
						4	4 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.

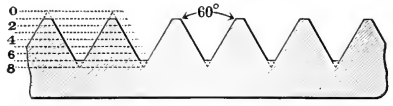
Taps and Dies to this Standard are made only to order, and prices will be given on application.

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
1/16–64	.0625	.0524	.0422	3/64	.0469
72	.0625	.0535	.0445	3/64	.0469
5/64–60	.0781	.0673	.0563	1/16	.0625
72	.0781	.0691	.0601	52	.0635
3/32–48	.0938	.0803	.0667	49	.0730
50	.0938	.0808	.0678	49	.0730
7/64–48	.1094	.0959	.0823	43	.0890
1/8–32	.1250	.1047	.0844	3/32	.0937
40	.1250	.1088	.0925	38	.1015
9/64–40	.1406	.1244	.1081	32	.1160
5/32–32	.1563	.1360	.1157	1/8	.1250
36	.1563	.1382	.1202	30	.1285
11/64–32	.1719	.1505	.1313	9/64	.1406
3/16–24	.1875	.1604	.1334	26	.1470
32	.1875	.1672	.1469	22	.1570
13/64–24	.2031	.1760	.1490	20	.1610
7/32–24	.2188	.1919	.1646	16	.1770
32	.2188	.1985	.1782	12	.1890
15/64–24	.2344	.2073	.1806	10	.1935
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	7/32	.2187
5/16–18	.3125	.2764	.2403	F	.2570
20	.3125	.2800	.2476	17/64	.2656
24	.3125	.2854	.2584	I	.2720
27	.3125	.2884	.2644	J	.2770
32	.3125	.2922	.2719	9/32	.2812

(*Continued on following page*)

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

(Concluded on following page)

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
15/16 - 9	.9375	.8654	.7932	53/64	.8281
1 - 8	1.0000	.9188	.8376	7/8	.8750
12	1.0000	.9459	.8918	59/64	.9219
14	1.0000	.9536	.9072	15/16	.9375
27	1.0000	.9759	.9519	31/32	.9687
1 1/8 - 7	1.1250	1.0322	.9394	63/64	.9844
12	1.1250	1.0709	1.0168	1 3/64	1.0469
1 1/4 - 7	1.2500	1.1572	1.0644	1 7/64	1.1094
12	1.2500	1.1959	1.1418	1 11/64	1.1719
1 3/8 - 6	1.3750	1.2668	1.1585	1 7/32	1.2187
12	1.3750	1.3209	1.2668	1 19/64	1.2969
1 1/2 - 6	1.5000	1.3917	1.2835	1 11/32	1.3437
12	1.5000	1.4459	1.3918	1 27/64	1.4219
1 5/8 - 5 1/2	1.6250	1.5070	1.3888	1 29/64	1.4531
1 3/4 - 5	1.7500	1.6201	1.4902	1 9/16	1.5625
1 7/8 - 5	1.8750	1.7451	1.6152	1 11/16	1.6875
2 - 4 1/2	2.0000	1.8557	1.7113	1 25/32	1.7812
2 1/8 - 4 1/2	2.1250	1.9807	1.8363	1 29/32	1.9062
2 1/4 - 4 1/2	2.2500	2.1057	1.9613	2 1/32	2.0312
2 3/8 - 4	2.3750	2.2126	2.0502	2 1/8	2.1250
2 1/2 - 4	2.5000	2.3376	2.1752	2 1/4	2.2500
2 3/4 - 4	2.7500	2.5876	2.4252	2 1/2	2.5000
3 - 3 1/2	3.0000	2.8145	2.6288	2 23/32	2.7187
3 1/4 - 3 1/2	3.2500	3.0645	2.8788	2 31/32	2.9687
3 1/2 - 3 1/4	3.5000	3.3002	3.1003	3 3/16	3.1875
3 3/4 - 3	3.7500	3.5335	3.3170	3 7/16	3.4375
4 - 3	4.0000	3.7835	3.5670	3 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
1/8	27	.3145	.3339	R	.339
1/4	18	.4043	.4329	7/16	.437
3/8	18	.5393	.5676	37/64	.578
1/2	14	.6651	.7013	23/32	.719
3/4	14	.8751	.9105	59/64	.921
1	11 1/2	1.1017	1.1441	1 5/32	1.156
1 1/4	11 1/2	1.4447	1.4876	1 1/2	1.500
1 1/2	11 1/2	1.6828	1.7265	1 47/64	1.734
2	11 1/2	2.1578	2.1995	2 7/32	2.218
2 1/2	8	2.5617	2.6195	2 5/8	2.625
3	8	3.1828	3.2406	3 1/4	3.250
3 1/2	8	3.6789	3.7375	3 3/4	3.750
4	8	4.1750	4.2344	4 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
1/4-20	0.2500	0.2175	0.2520	0.2535	.0015	0.2180	0.2190	.0010
5/16-18	.3125	.2764	.3145	.3160	.0015	.2769	.2779	.0010
3/8-16	.3750	.3344	.3770	.3785	.0015	.3349	.3359	.0010
7/16-14	.4375	.3911	.4400	.4415	.0015	.3916	.3926	.0010
1/2-13	.5000	.4500	.5025	.5040	.0015	.4505	.4515	.0010
9/16-12	.5625	.5084	.5650	.5665	.0015	.5089	.5099	.0010
5/8-11	.6250	.5660	.6275	.6290	.0015	.5665	.5675	.0010
3/4-10	.7500	.6850	.7530	.7550	.0020	.6855	.6865	.0010
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 1/8- 7	1.1250	1.0322	1.1290	1.1310	.0020	1.0327	1.0342	.0015
1 1/4- 7	1.2500	1.1572	1.2540	1.2560	.0020	1.1577	1.1592	.0015
1 3/8- 6	1.3750	1.2668	1.3790	1.3810	.0020	1.2673	1.2688	.0015
1 1/2- 6	1.5000	1.3917	1.5040	1.5060	.0020	1.3922	1.3937	.0015
1 3/4- 5	1.7500	1.6201	1.7550	1.7570	.0020	1.6206	1.6221	.0015
2 - 4 1/2	2.0000	1.8557	2.0050	2.0070	.0020	1.8562	1.8577	.0015
2 1/4- 4 1/2	2.2500	2.1057	2.2560	2.2580	.0020	2.1062	2.1082	.0020
2 1/2- 4	2.5000	2.3376	2.5060	2.5080	.0020	2.3381	2.3401	.0020
2 3/4- 4	2.7500	2.5876	2.7570	2.7590	.0020	2.5881	2.5901	.0020
3 - 3 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.	Minimum	Maximum	Tolerance	Minimum	Maximum	Tolerance
1/4–28	0.2500	0.2268	0.2520	0.2535	.0015	0.2273	0.2283	.0010
5/16–24	.3125	.2854	.3145	.3160	.0015	.2859	.2869	.0010
3/8–24	.3750	.3479	.3770	.3785	.0015	.3484	.3494	.0010
7/16–20	.4375	.4050	.4395	.4410	.0015	.4055	.4065	.0010
1/2–20	.5000	.4675	.5020	.5035	.0015	.4680	.4690	.0010
9/16–18	.5625	.5264	.5645	.5660	.0015	.5269	.5279	.0010
5/8–18	.6250	.5889	.6270	.6285	.0015	.5894	.5904	.0010
11/16–16	.6875	.6469	.6895	.6910	.0015	.6474	.6484	.0010
3/4–16	.7500	.7094	.7520	.7535	.0015	.7099	.7109	.0010
7/8–14	.8750	.8286	.8775	.8790	.0015	.8291	.8301	.0010
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 1/8–12	1.1250	1.0709	1.1275	1.1290	.0015	1.0714	1.0729	.0015
1 1/4–12	1.2500	1.1959	1.2525	1.2540	.0015	1.1964	1.1979	.0015
1 3/8–12	1.3750	1.3209	1.3775	1.3790	.0015	1.3214	1.3229	.0015
1 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	$D - \frac{.866}{P}$	$\frac{.866}{P}$
1/4	20	.2176	.0324	1/4	24	.2139	.0361
5/16	18	.2765	.0360	1/4	20	.2067	.0433
3/8	16	.3344	.0406	5/16	20	.2692	.0433
7/16	14	.3911	.0464	5/16	18	.2644	.0481
1/2	13	.4501	.0499	3/8	18	.3269	.0481
9/16	12	.5084	.0541	3/8	16	.3209	.0541
5/8	11	.566	.0590	7/16	16	.3834	.0541
3/4	10	.6851	.0649	7/16	14	.3756	.0619
7/8	9	.8029	.0721	1/2	14	.4381	.0619
1	8	.9188	.0812	1/2	13	.4334	.0666
1 1/8	7	1.0322	.0928	1/2	12	.4278	.0722
1 1/4	7	1.1572	.0928	9/16	14	.5006	.0619
1 3/8	6	1.2668	.1082	9/16	12	.4903	.0722
1 1/2	6	1.3918	.1082	5/8	11	.5463	.0787
1 5/8	5 1/2	1.507	.1180	5/8	10	.5384	.0866
1 3/4	5	1.6201	.1299	11/16	10	.6009	.0866
1 7/8	5	1.7451	.1299	3/4	10	.6634	.0866
2	4 1/2	1.8557	.1443	7/8	9	.7788	.0962
2 1/2	4	2.3376	.1624	1	8	.8918	.1082
3	3 1/2	2.8145	.1855	1 1/8	8	1.0168	.1082
3 1/2	3 1/4	3.3002	.1998	1 1/4	7	1.1263	.1237
4	3	3.7835	.2165	1 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

FEET PER MINUTE

Diam. Inches	15	20	25	30	35	40	45	50	55	60
	REVOLUTIONS PER MINUTE									
1/4	229	306	382	458	535	611	688	764	840	917
3/8	153	204	255	306	357	407	458	509	560	611
1/2	115	153	191	229	267	306	344	382	420	458
5/8	91.7	122	153	183	214	244	275	306	336	367
3/4	76.4	102	127	153	178	204	229	255	280	306
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 1/8	50.9	68.0	84.9	102	119	136	153	170	187	204
1 1/4	45.8	61.1	76.4	91.7	107	122	138	153	168	183
1 3/8	41.7	55.6	69.5	83.3	97.2	111	125	139	153	167
1 1/2	38.2	50.9	63.7	76.4	89.1	102	115	127	140	153
1 5/8	35.3	47.0	58.8	70.5	82.3	94	106	118	129	141
1 3/4	32.7	43.7	54.6	65.5	76.4	87.3	98.2	109	120	131
1 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 1/4	25.5	34.0	42.4	50.9	59.4	67.9	76.4	84.9	93.4	102
2 1/2	22.9	30.6	38.2	45.8	53.5	61.1	68.8	76.4	84.0	91.7
2 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 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 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 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

FEET PER MINUTE

Diam. Inches	65	70	80	90	100	110	120	130	140	150
	REVOLUTIONS PER MINUTE									
1/4	993	1070	1222	1375	1528	1681	1833	1986	2139	2292
3/8	662	713	815	917	1019	1120	1222	1324	1426	1528
1/2	497	535	611	688	764	840	917	993	1070	1146
5/8	397	428	489	550	611	672	733	794	856	917
3/4	331	357	407	458	509	560	611	662	713	764
7/8	284	306	349	393	437	480	524	567	611	655
1	248	267	306	344	382	420	458	497	535	573
1 1/8	221	238	272	306	340	373	407	441	475	509
1 1/4	199	214	244	275	306	336	367	397	428	458
1 3/8	181	194	222	250	278	306	333	361	389	417
1 1/2	166	178	204	229	255	280	306	331	357	382
1 5/8	153	165	188	212	235	259	282	306	329	353
1 3/4	142	153	175	196	218	240	262	284	306	327
1 7/8	132	143	163	183	204	224	244	265	285	306
2	124	134	153	172	191	210	229	248	267	287
2 1/4	110	119	136	153	170	187	204	221	238	255
2 1/2	99.3	107	122	138	153	168	183	199	214	229
2 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 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 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 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
1/16	.013	.010	2 1/2	21.25	16.69
1/8	.053	.042	9/16	22.33	17.53
3/16	.120	.094	5/8	23.43	18.40
1/4	.213	.167	11/16	24.56	19.29
5/16	.332	.261	3/4	25.71	20.20
3/8	.478	.376	13/16	26.90	21.12
7/16	.651	.511	7/8	28.10	22.07
1/2	.850	.668	15/16	29.34	23.04
9/16	1.076	.845	3	30.60	24.03
5/8	1.328	1.043	1/16	31.89	25.05
11/16	1.607	1.262	1/8	33.20	26.08
3/4	1.913	1.502	3/16	34.54	27.13
13/16	2.245	1.763	1/4	35.91	28.21
7/8	2.603	2.044	5/16	37.31	29.30
15/16	2.988	2.347	3/8	38.73	30.42
1	3.400	2.670	7/16	40.18	31.55
1/16	3.838	3.015	1/2	41.65	32.71
1/8	4.303	3.380	9/16	43.15	33.89
3/16	4.795	3.766	5/8	44.68	35.09
1/4	5.313	4.172	11/16	46.23	36.31
5/16	5.857	4.600	3/4	47.81	37.55
3/8	6.428	5.049	13/16	49.42	38.81
7/16	7.026	5.518	7/8	51.05	40.10
1/2	7.650	6.008	15/16	52.71	41.40
9/16	8.301	6.519	4	54.40	42.73
5/8	8.978	7.051	1/16	56.11	44.07
11/16	9.682	7.604	1/8	57.85	45.44
3/4	10.413	8.178	3/16	59.62	46.83
13/16	11.170	8.773	1/4	61.41	48.23
7/8	11.953	9.388	5/16	63.23	49.66
15/16	12.763	10.024	3/8	65.08	51.11
2	13.600	10.681	7/16	66.95	52.58
1/16	14.463	11.359	1/2	68.85	54.07
1/8	15.353	12.058	9/16	70.78	55.59
3/16	16.270	12.778	5/8	72.73	57.12
1/4	17.213	13.519	11/16	74.71	58.67
5/16	18.182	14.280	3/4	76.71	60.25
3/8	19.178	15.062	13/16	78.74	61.85
7/16	20.201	15.866	7/8	80.80	63.46
			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
1/16	87.1	68.4	1/8	172.6	135.6
1/8	89.3	70.1	1/4	178.7	140.4
3/16	91.5	71.9	3/8	184.9	145.2
1/4	93.7	73.6	1/2	191.3	150.2
5/16	96.0	75.4	5/8	197.7	155.3
3/8	98.2	77.2	3/4	204.2	160.4
7/16	100.5	79.0	7/8	210.9	165.6
1/2	102.9	80.8	8	217.6	170.9
9/16	105.2	82.6	1/4	231.4	181.8
5/8	107.6	84.5	1/2	245.7	192.9
11/16	110.0	86.4	3/4	260.3	204.5
3/4	112.4	88.3	9	275.4	216.3
13/16	114.9	90.2	1/4	290.9	228.5
7/8	117.4	92.2	1/2	306.9	241.0
15/16	119.9	94.1	3/4	323.2	253.9
6	122.4	96.1	10	340.0	267.0
1/8	127.6	100.2	1/4	357.2	280.6
1/4	132.8	104.3	1/2	374.9	294.4
3/8	138.2	108.5	3/4	392.9	308.6
1/2	143.7	112.8	11	411.4	323.1
5/8	149.2	117.2	1/4	430.3	338.0
3/4	154.9	121.7	1/2	449.7	353.2
7/8	160.7	126.2	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 1/3 Crude Petroleum, 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	10.57	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.