

CANADIAN MACHINERY

AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical, power, foundry and allied fields.
Published by The MacLean Publishing Company, Limited, Toronto, Montreal, Winnipeg and London, Eng.

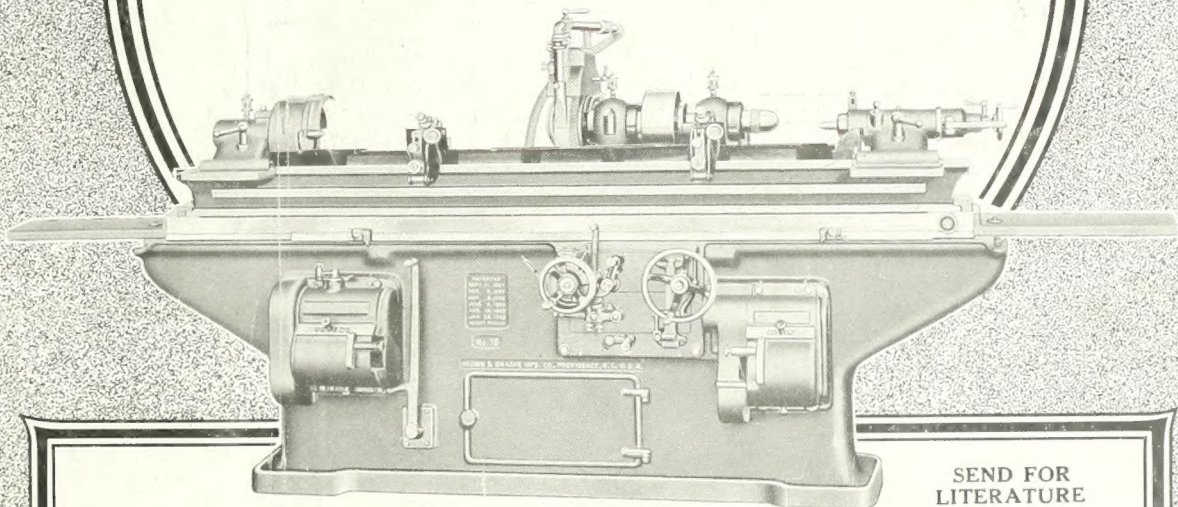
Vol. XVIII—No. 19

Publication Office: Toronto, November 8, 1917

Subscription Price
\$3.00 per Year

FOR HEAVY SERVICE

BROWN & SHARPE PLAIN GRINDING MACHINES

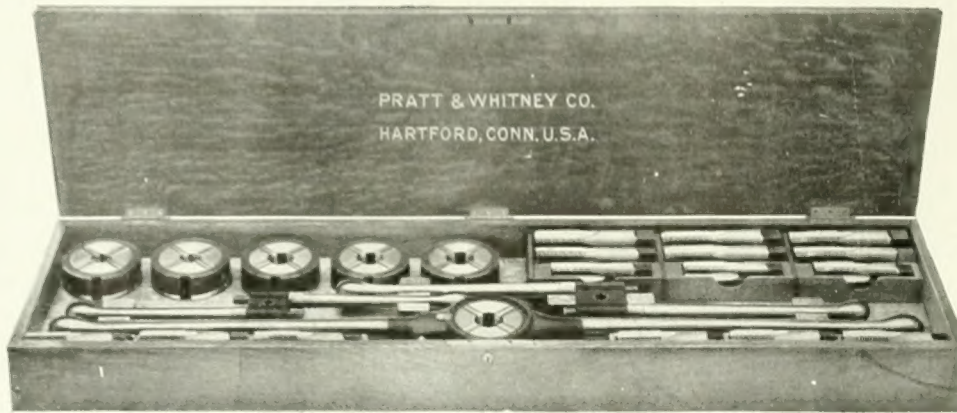


SEND FOR
LITERATURE

BROWN & SHARPE MFG. CO., PROVIDENCE, R.I., U.S.A.

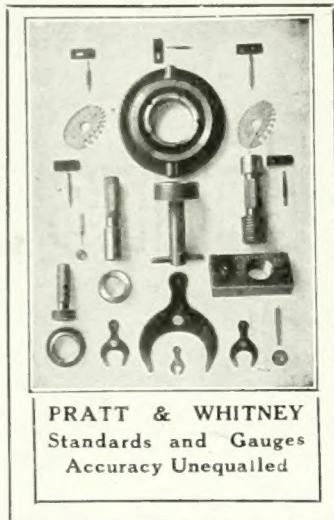
Canadian Representative: **CANADIAN FAIRBANKS-MORSE CO., LIMITED**
TORONTO MONTREAL WINNIPEG CALGARY VANCOUVER ST. JOHN SASKATOON

SMALL TOOLS



P. & W. Die-Stock Set No. 4

These sets are furnished in various capacities for either U. S. Standard, S. A. E. Standard, Whitworth Standard or "V" Form. The Pratt & Whitney Policy of highest quality materials, together with the necessary refinement and accuracy, is maintained in all tools composing these sets.



PROMPT SERVICE

is assured at our nearest store where P. & W. Small Tools are carried in stock. Place your order there to-day.

PRATT & WHITNEY CO.

of Canada, Limited

Works: DUNDAS, ONTARIO

MONTREAL
723 Drummond Bldg.

TORONTO
1002 C.P.R. Bldg.

WINNIPEG
1205 McArthur Bldg.

VANCOUVER
B.C. Equipment Co.



BERTRAM MACHINE TOOLS

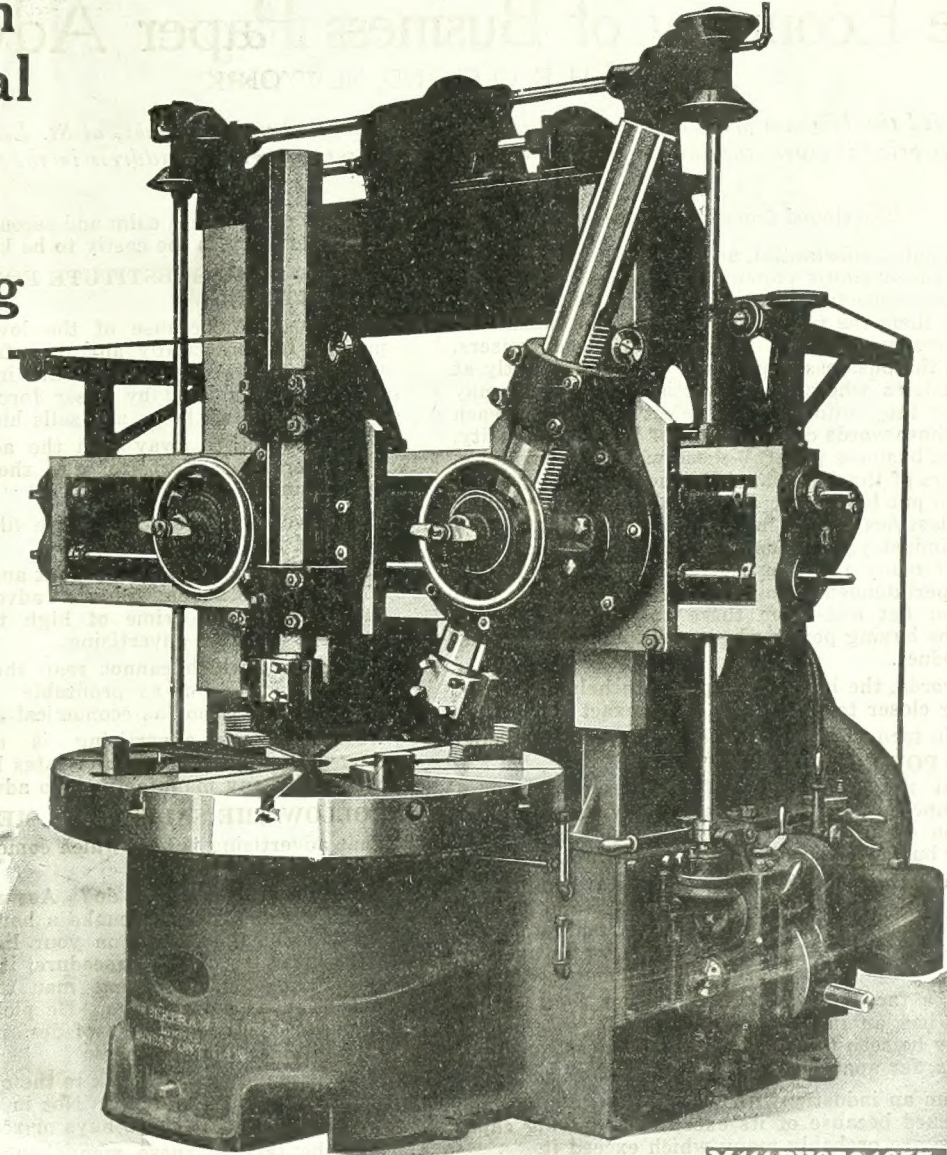
**42-inch
Vertical
Boring
and
Turning
Mill**

*Niles
Type*

Motor
Driven
Through
Speed Box

Built in
sizes from
42-inch to
100-inch
Swing.

Drop us a
line for
Photo-
graphs
and full
particulars.



M111 PHOTO 1057

The John Bertram & Sons Company Limited

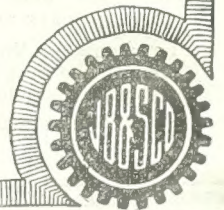
DUNDAS, ONTARIO, CANADA

MONTREAL
723 Drummond Bldg.

TORONTO
1002 C.P.R. Bldg.

VANCOUVER
609 Bank of Ottawa Bldg.

WINNIPEG
1205 McArthur Bldg.



If any advertisement interests you, tear it out now and place with letters to be answered.

The Publisher's Page

TORONTO

November 8, 1917

The Economy of Business Paper Advertising

By H. E. CLELAND, NEW YORK

*Awarded the Higham prize at the convention of Associated Advertising Clubs, at St. Louis, June 1917.
This prize is given annually to the one delivering the most constructive address in the fewest words.*

(Continued from last week)

SO, in a quiet, substantial, and most-times unheralded way, the business papers are leaders of progress in their respective industries and in this character they tie to them the progressive men of the industries. Only progressive men are worth while to advertisers. Therefore, the business papers not only aim directly at those industries where the advertisers' products may be sold, but they automatically select the men in each industry whose words carry weight of buying authority. But modern business papers—those which, for instance, are members of the Associated Business Press—go even further and put before the advertiser the exact number of each classification of subscribers. So that, in a technical industry, for instance, the advertisers are shown how many firms, executive officers, purchasing agents, superintendents, engineers, etc., are on the paid subscription list and from these the advertiser may estimate the buying power which each publication holds for his product.

In other words, the business papers are helping to put advertising closer to the status of an exact science.

And that, in turn, spells greater economy in advertising. **"BUYING POWER" THE TEST.**

I said that the buying power per subscription in a business paper was greater than the buying power per subscription of any other medium because things are bought for business and not private consumption.

To illustrate this, one industry last year bought approximately \$500,000,000 worth of goods and 90 per cent. of this industry is covered by two business papers having a total paid circulation of 22,000, or an average of material bought per subscriber of about \$20,500.

Since it is a fact that less than five per cent. of our population has an income of over \$4,000 per year, it may readily be seen that private and business consumption are far, far apart.

I quote from an industry with which I am familiar and not one picked because of its exceptional buying capacity. There are probably many which exceed it.

So, the thought is that each dollar invested in business paper advertising buys more potential sales results because each appeals to a greater buying power.

And that, too, is economy in advertising.

THE POTENT THING.

Now, all of you advertising men know that the really potent thing in advertising is cumulative effect. You know that even poor and mediocre advertising, persisted in, pays and pays handsomely.

You know, on the other hand, that sporadic advertising, even of the best kind, has only a temporary effect and that effect is seldom of sufficient force to pay.

The splurger makes his splash, the ripples die out and

the surface becomes calm and serene. He loses because his advertising is too costly to be kept up continuously.

THERE IS NO SUBSTITUTE FOR CONTINUITY IN ADVERTISING.

It is possible, because of the low rates in business papers, for practically any manufacturer to advertise week in and week out or month in and month out, to hammer away until by sheer force of persistence he drives his claims home and sells his prospect.

It takes time to sway men the advertiser's way. It takes repeated effort to get the first return from advertising.

The advertising catacombs are filled too full of the bones of half-tried efforts.

There are publishers who permit and agents who induce advertisers to adopt "splurge" advertising, and these I charge with the crime of high treason against the cause of effective advertising.

Advertising which cannot reap the benefits of cumulative effect is not as profitable as it ought to be. Therefore, it is not as economical as it might be.

Business paper advertising is economical because, intensive circulation permits rates low enough to allow practically any manufacturer to advertise continuously.

FOLLOW THE SALESMAN'S METHODS.

That advertising is best which comes closest to the best in salesmanship.

What does the salesman do? Assume that he is selling steam engines, does he make a house-to-house canvass of say, Chicago? Not on your life. Aside from the utter insanity of that procedure, it takes twelve years and eight months for one man to make a house-to-house canvass of Chicago. He picks out steam power plants or plants in course of design or of building and goes to those and no others.

Does he make his sales talk to the office boys and stenographers in those plants? Not in one thousand years. He goes to the man who buys or recommends.

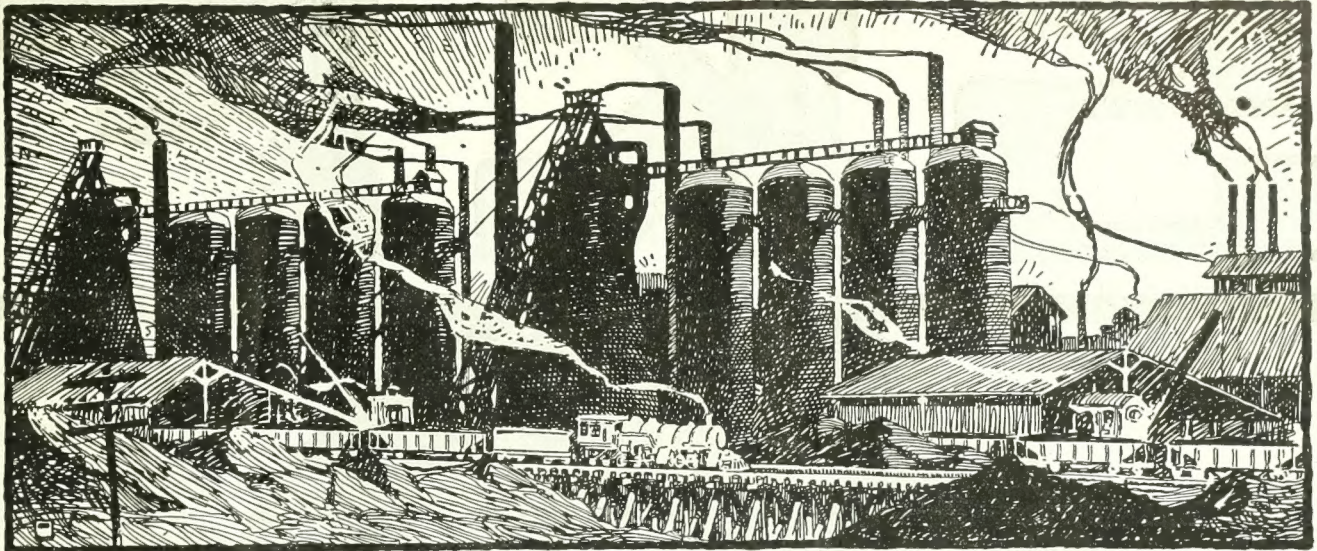
Does he talk to these men about steam calliopes or about steam engines? You know the answer.

Does he endeavor to show the economy and efficiency of the steam engine as a prime mover and does his talk resemble that of an engineer or a chauffeur? You know the answers to that, too.

Now, why does the salesman do these things? Because the efficient salesman knows how to follow the straight line—the shortest distance between two points—and because his concern will not pay for the super-expense of roundabout methods.

For precisely the same reason, the wise manufacturer uses the business papers to carry his advertising message.

(Concluded next week)



LITTLE WORDS WITH BIG MEANING

Quality

According to "Webster," Quality is "an excellence of character; natural superiority."

Service

Webster's definition of "Service" is; "The performance of labor for the benefit of another."

We use these words advisedly—fully understanding their definitions—and realizing the obligation we place upon ourselves by their continued use in connection with our products of Iron and Steel, and our attitude to the people we serve.

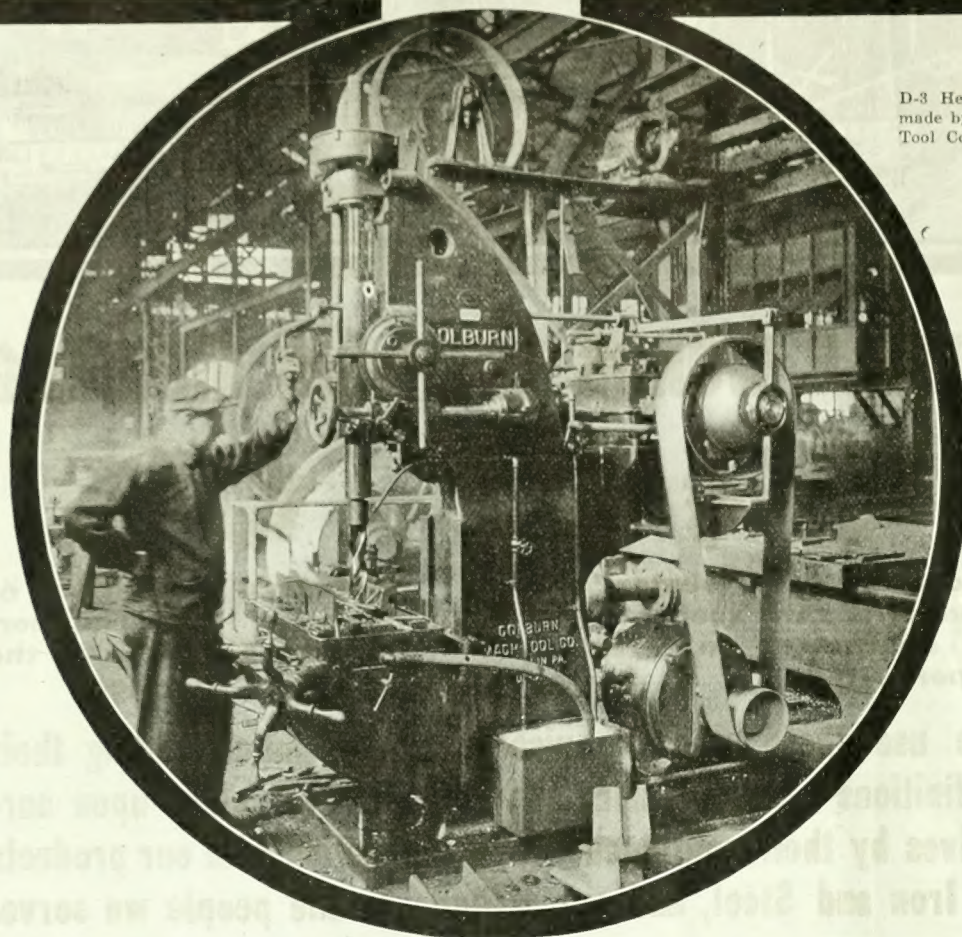
THE
STEEL COMPANY
 OF
CANADA

MONTREAL LIMITED HAMILTON

Pig Iron,
 Steel & Iron Bars,
 Horse Shoes,
 Steel and Iron Products.

Steel Billets,
 Track Spikes &
 Bolts, Forgings, Wire
 of every description.

SKF



D-3 Heavy Duty Drill Press
made by the Colburn Machine
Tool Co., Franklin, Pa.

BALL BEARINGS

No. 3 of a Series of SKF Equipped Drilling Machines
THRUST

Bearings, to withstand the heavy thrust of the drill spindle, must needs be of high quality—able to withstand friction and without heating.

SKF Thrust Bearings are the logical choice. Manufacturers who build quality into every part of their machine recognize the value of high-class, accurate thrust bearings.

May we assist you in the design of your thrust mountings?

Canadian SKF Company, Limited
TORONTO, ONT., CANADA

If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.

"STELLITE" IN FRANCE

THE Fonderie des Gobelins, Paris, France, has increased its daily production of 155 mm. shells from 120 when high-speed steel was used to 200 when stellite was used. According to Metaux et Alliages, of Paris, the cost of stellite for finishing 1,000 shells of the size was about 6c per shell. With a cutting speed of 17 meters (about 56 ft.) the roughing of the shell and the finishing of the shell each took 21 min. with high-speed steel. When stellite was employed, the roughing out period consumed 11 min., while the finishing work required 4 min., the cutting speed in roughing being 25 meters (82 ft.) and in the finishing work 37 meters (121 ft.).

Deloro Smelting & Refining Co., Ltd.

Head Office and Work—DELORO, ONT.

TORONTO: 200 King Street, West.
MONTREAL: 315 Craig Street, West.

Reproduced from Canadian Machinery
Oct. 11, 1917, Page 421

TRADE MARK

of the Famous

“**WACO**”

BRAND

HIGH SPEED STEEL

AND

TWIST DRILLS

“**DOUBLE WACO**” Quality

Specially Adapted for Munition Work

“**TURTLE**” BRAND

High Class Tool Steel, Files, etc., of all descriptions.

ESTABLISHED 1870

W^{M.} ATKINS & C^{O.} L^{TD.}

TRADE MARK



Reliance Steel Works
SHEFFIELD, ENG.

TRADE MARK



For particulars apply to our
Sole Representatives for Canada

GEO. A. MARSHALL & CO.

70 Lombard Street Toronto, Ontario



Steel Castings

No castings too small or too large for the capacity of our plant. Manganese, Vanadium, Titanium, Chrome, Nickel, castings for Marine, Railroad, Mill and hydraulic purposes are our specialty. Made true to specifications and pattern.

Illustration above shows Stern casting for Ice-Breaker, "John D. Hazen."

CANADIAN STEEL FOUNDRIES, LIMITED

Montreal, P. Q.

Welland, Ont.

H. E. W. Service

Our ability to serve is limited by the demands of your organization. Repair work, special marine repairs, machinery built. Our air chucks which are performing such efficient service in the shell industry is but an evidence of our ability. We have a large and complete staff of expert workmen and thorough equipment. Consult us. We will gladly co-operate with you.

Hyde Engineering Co.

27 William Street
Montreal, Que.

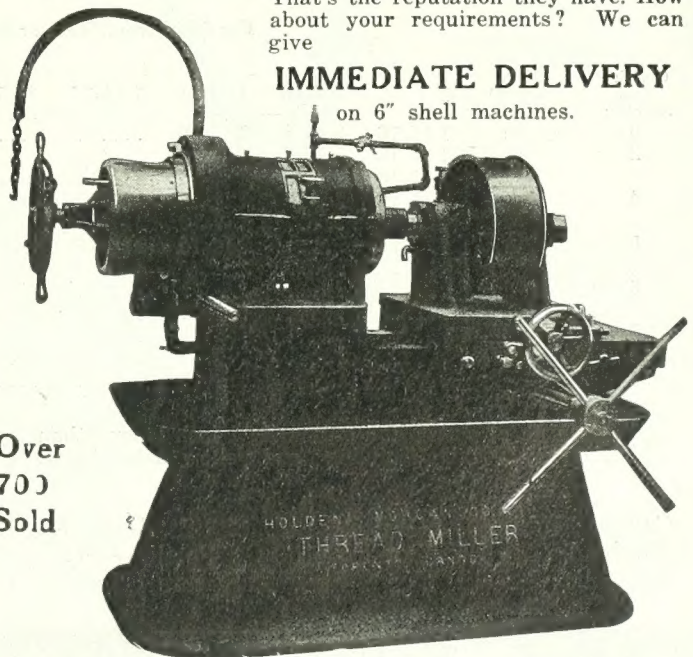
70 Holden-Morgans in One Plant

Another firm would not accept a contract until assured they could get HOLDEN-MORGANS.

That's the reputation they have. How about your requirements? We can give

IMMEDIATE DELIVERY

on 6" shell machines.



Over
700
Sold

THE A. R. WILLIAMS MACHINERY CO.
W. FRONT ST. (Limited) TORONTO

THE JOHNSON FRICTION CLUTCH

JOHNSON FRICTION CLUTCHES

STANDARD CLUTCHES

DIMENSIONS

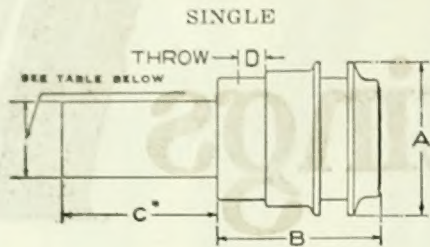


Fig. 8S

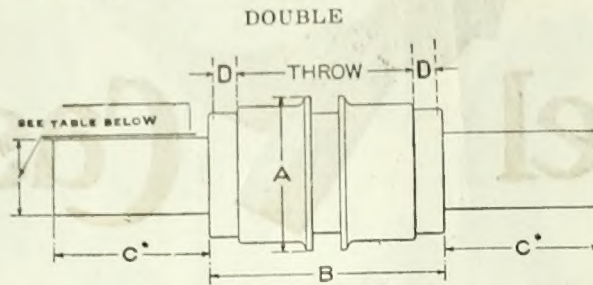


Fig. 9D

SINGLE AND DOUBLE

Clutch Size Number	H.P. at 100 R.P.M.	Max. Bore Inches	Dimensions, Inches				*C	Throw to Engage Clutch D	Weight, Pounds	
			A	Single B	Double B	Single			Double	
0	1/2	1 1/8	3 3-16	3 1/4	5	3	9-16	10	20	
2	3/4	1 7-16	4 1/8	4 3-16	6 3-16	4	23-32	12	25	
4	1	1 11-16	5	5 3-16	7 1/2	5 1/2	25-32	19	32	
5	1 1/2	1 15-16	5 3-16	5 5-16	8 1-16	6	13-16	27	43	
6	2	2 3-16	6 3/8	6 1/8	8 5/8	6 1/2	1	35	54	
8	3	2 7-16	6 11-16	6 13-16	11 1/8	8 1/2	1	53	96	
10	3 1/2	2 15-16	7 5/8	5 1/2	8 1/2	8 1/2	23-32	75	110	
11	4	3 3-16	9 5-16	6 7/8	10 9-16	8 1/2	1 3-16	130	150	

*Any length of hub furnished on special order. The diameter of hub *C is from 1 to 1 1/4 inches larger than the diameter of the shaft used, for standard clutches. It is usually from 1 1/2 inches to 1 3/4 inches larger than the diameter of the shaft used, when equipped with a self-lubricating bearing of any style listed—see table below.

STANDARD CLUTCH HUB DIAMETERS

For Solid Iron, Steel or Wood Split Pulleys

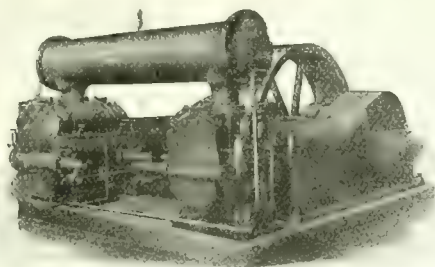
Clutch Size Number	H.P. at 100 R.P.M.	DIAMETER OF SHAFT, INCHES										
		1	1 3-16	1 7-16	1 11-16	1 15-16	2 3-16	2 7-16	2 11-16	2 15-16	3	3 3-16
0	1/2	1 15-16	2 3-16	2 7-16	.....	.....	.....	.....	.....	.....	.....	.....
2	3/4	1 15-16	2 7-16	2 7-16	.....	.....	.....	.....	.....	.....	.....	.....
4	1	1 15-16	2 3-16	2 7-16	2 11-16	.....	.....	.....	.....	.....	.....	.....
		1 15-16	2 7-16	2 11-16	2 15-16	.....	.....	.....	.....	.....	.....	.....
5	1 1/2	.....	.....	2 7-16	2 11-16	2 15-16	3 3-16	3 7-16	.....	.....	.....	.....
		.....	.....	2 11-16	2 15-16	2 15-16	3 3-16	3 7-16	.....	.....	.....	.....
6	2	.....	.....	.....	.....	3 3-16	3 7-16	.....	.....	.....	.....	.....
		.....	.....	.....	.....	3 3-16	3 7-16	.....	.....	.....	.....	.....
8	3	.....	.....	.....	.....	.....	3 11-16	3 11-16	3 15-16	4 3-16	4 7-16	.....
		.....	.....	.....	.....	.....	3 15-16	3 15-16	4 3-16	4 7-16	4 7-16	.....
10	3 1/2	.....	.....	.....	.....	.....	3 15-16	3 15-16	4 3-16	4 7-16	4 7-16	4 15-16
		.....	.....	.....	.....	.....	3 15-16	3 15-16	4 3-16	4 7-16	4 7-16	4 15-16

Length of clutch hub ordinarily 1 inch longer than face of pulley used. Write for booklet "Clutches as Applied in Machine Building" and yellow data sheets.

Canada: Williams & Wilson, Ltd., 320 St. James St., Montreal; Can. Fairbanks-Morse Co., Ltd., Toronto.
 England: The Efandem Co., 159 Gt. Portland St., London, W., Sole Agents British Isles.
 Australia: Edwin Wood, Pty., Hardware Chambers, 231 Elizabeth St., Melbourne, Victoria.

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

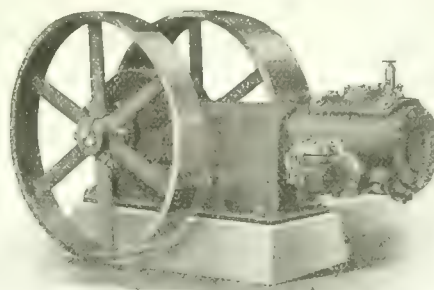
If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.



**JENCKES CLASS DB-2
AIR COMPRESSOR**

If you understand compressors look over the following outline. If you are not acquainted with these machines it would delight us to give you an introduction.

Inlet Valves are of the Corliss type, the outlet valves of the disc type; flood type lubrication, allowing a continuous flood of oil over bearings, crank pins, etc., while in motion. Machine of the enclosed type.



**JENCKES CLASS CB-1
AIR COMPRESSOR**

If your requirements do not justify either of the above machines, just bear in mind that we have a very comprehensive range that will cover all usual and unusual needs. The above is equipped with inlet and outlet disc valves; splash gravity lubrication system; extra large bearings; machine entirely enclosed.

The

Jenckes Machine

Works: St. Catharines, Ont.
Works: Sherbrooke, Que.



Company, Limited

SALES OFFICES: 710 C.P.R. Bldg., Toronto;
908 E.T. Bank Bldg., Montreal; West Chester
Ave., St. Catharines; Cobalt, Ont.; Exchange
Bldg., Vancouver.

**STEEL for
Shrapnel Shells and Shell Blanks**

We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

We can supply forgings of all shapes and sizes made of ordinary or "HARMET" Fluid Compressed Open-Hearth Steel on the Shortest Notice.

**Nova Scotia
Steel and Coal
Co., Limited**

Head Office:
New Glasgow, N.S.

Western Sales Office:
Room 14 Windsor Hotel
MONTREAL



Steel Ingots
by the
HARMET
Liquid Process



HIGHEST IN QUALITY

NATIONALLY KNOWN

OUR Country requires the extreme limit of production from every lathe, planer, miller or other machine tool.

BE PATRIOTIC

"Red Cut Superior"

The Nationally Known
First Quality

HIGH SPEED STEEL

Will enable you greatly
to increase your output

'IT'S THE BEST FOR ALL MACHINE WORK'

VANADIUM-ALLOYS STEEL CO.
PITTSBURGH, PA. Works at LATROBE, PA.

CARRIED IN STOCK AT THESE WAREHOUSES
E. T. HARRIS BROS. CHICAGO, ILL. FIELD BROS. ST. LOUIS, MO. VANADIUM ALLOYS STEEL CO. 650 NASH CO. ST. PAUL, MINN.
44 FARMINGTON ST. 302 HUDSON ST. PITTSBURGH, PA. AND 640 WASHINGTON BLDG. D. BOSTON, MASS. NEW YORK, N. Y. PHILADELPHIA, PA. LATROBE, PA. CHICAGO, ILL.



High-Speed STEEL

The tools that are made with "Wolfram" High Speed Steel are warranted to be super-keen at the edge and super-strong at the neck.

WOLFRAM

Embodies a true and permanent alloy of Tungsten, Chrome, Vanadium and Iron. No better High Speed Steel in the world.

VULCAN CRUCIBLE STEEL COMPANY

ESTABLISHED 1900

Aliquippa Pa., U.S.A.

Represented in Canada by Messrs. Norton, Callard & Company, Montreal.



Electrite

Electric furnaces, automatically regulated, the most modern methods, and the introduction of Uranium—make this a steel of truly remarkably cutting properties.

We know "Electrite" cannot be bettered — and stand ready to prove it to you.

LATROBE ELECTRIC STEEL CO.

LATROBE, PA.

High Speed Steel

uranium

The
Fairley Davidson Steel Co., Inc.
SPECIALISTS

Hot Working Steels
 High Strength Steels
 High Speed Steel
 Tool and Die Steels
 Magnet Steels
 Non-Changeable Die Steel

Brand Name:
 "Xtof" and "Precision"
 "Hehtemnd"
 RUSHITOFF No. 6
 "Fondwot" and "Giant"
 Tungsten or Chrome
 Nugget "B" oil hardening

CHROME VANADIUM, oil hardening or case hardening

CHROME NICKEL, oil hardening or case hardening

Steam Hammer Forgings to Sketch

We guarantee to supply the correct steel at once, eliminating costly experiments

We carry a complete stock at our New York Warehouse, 124 Maiden Lane, New York City

Canadian Agents:

THE FACTORY SUPPLY AND STEEL COMPANY

149 Craig Street West, Montreal, Canada

We carry a complete stock at our Montreal Warehouse



Uranium For Speed

If you want to speed up production in your Machine Tool Department—put Uranium High Speed Steel in your tool holders. You will find that your men will be able to make deeper cuts with greater speed—that they will spend more time at their machines and less at the grinders—that they will not be troubled with breaking tools, etc.

Uranium mixed with the best tungsten steel is the reason. Uranium—the element of toughness, strength and speed—should be helping your men to keep up with the demands of the production manager.

Consult your steel man or write us.

STANDARD ALLOYS COMPANY

Forbes and Meyran Avenues

PITTSBURGH, PENN.

If any advertisement interests you, tear it out now and place with letters to be answered.

"ULTRA CAPITAL" HIGH SPEED STEEL
Balfour's Tool Steel
 "CAPITAL" HIGH SPEED TWIST DRILLS

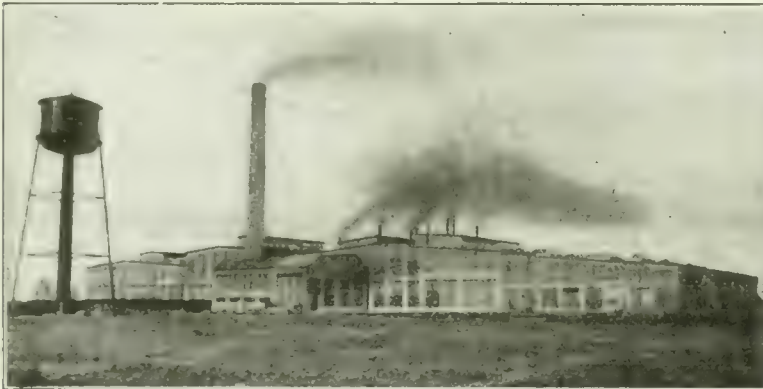
MANUFACTURED BY
Arthur Balfour & Co., Limited
 Dannemora Steel Works,
 Sheffield, England.

The Eagle & Globe Steel Company, Limited

Head Office and Warehouse, Canada and U.S.
 Ontario Office and Warehouse
 Winnipeg Stock
 Vancouver Stock

128 Craig Street West, Montreal
 36 Colborne Street, Toronto
 Dominion Equipment & Supply Co. Limited
 Frank Darling & Co.

W. A. BRADBURY, Agent, 128 Craig Street West, Montreal



Works: LONGUEUIL, QUE.

**Armstrong, Whitworth
 of Canada Limited**

Standard Sizes of
HIGH SPEED STEEL

Carried in Stock
CARBON AND ALLOY STEELS
 Shop Tools, Gauges, etc.

HEAD OFFICE: 298-300 St. James St., Montreal

Branches: Dominion Bank Bldg., TORONTO
 27 King William Street, HAMILTON
 McArthur Bldg., WINNIPEG, MAN.

**Coal
 Coke
 Iron Ore**

Pig Iron

Victoria FOUNDRY & MALLEABLE

Made by The Canadian Furnace Co.
 Port Colborne, Ontario, Canada.

M.A. HANNA & Co.

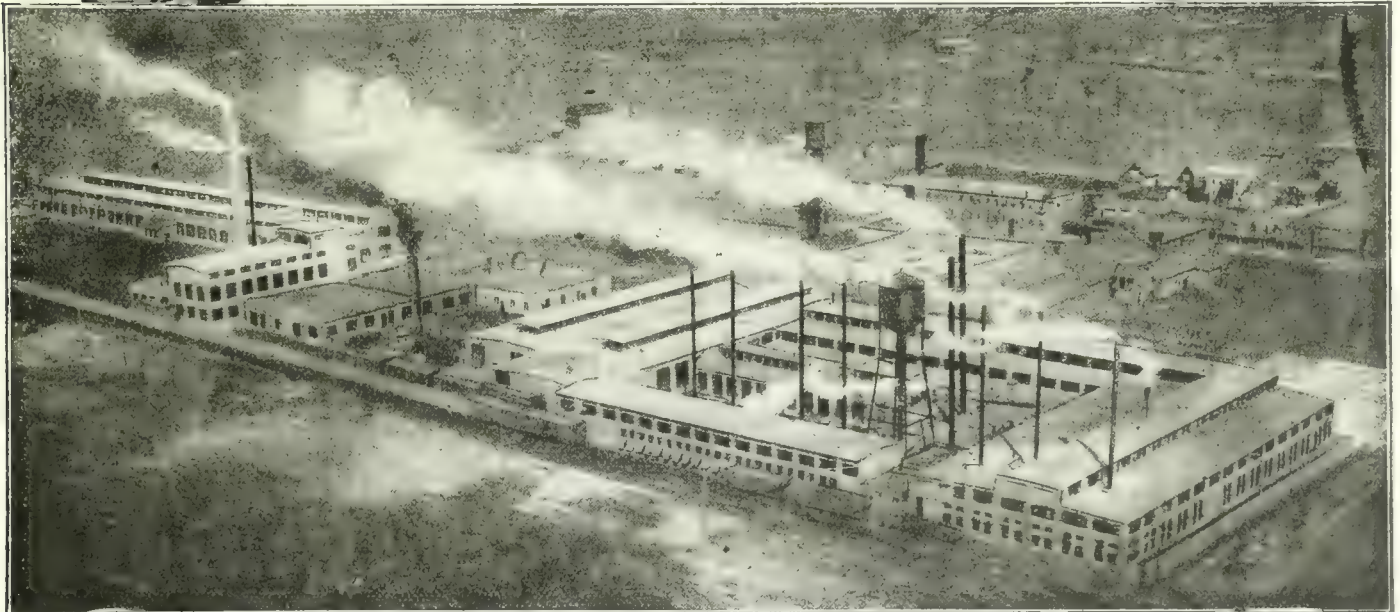
Sales Agents, CLEVELAND

Canadian Office:
 703 C.P.R. Bldg., Toronto



BEAVER BRAND METALS

BRASS BRONZE
CANADA SILVER and GILDING METAL
In Sheets, Rolls, Plates and Rods

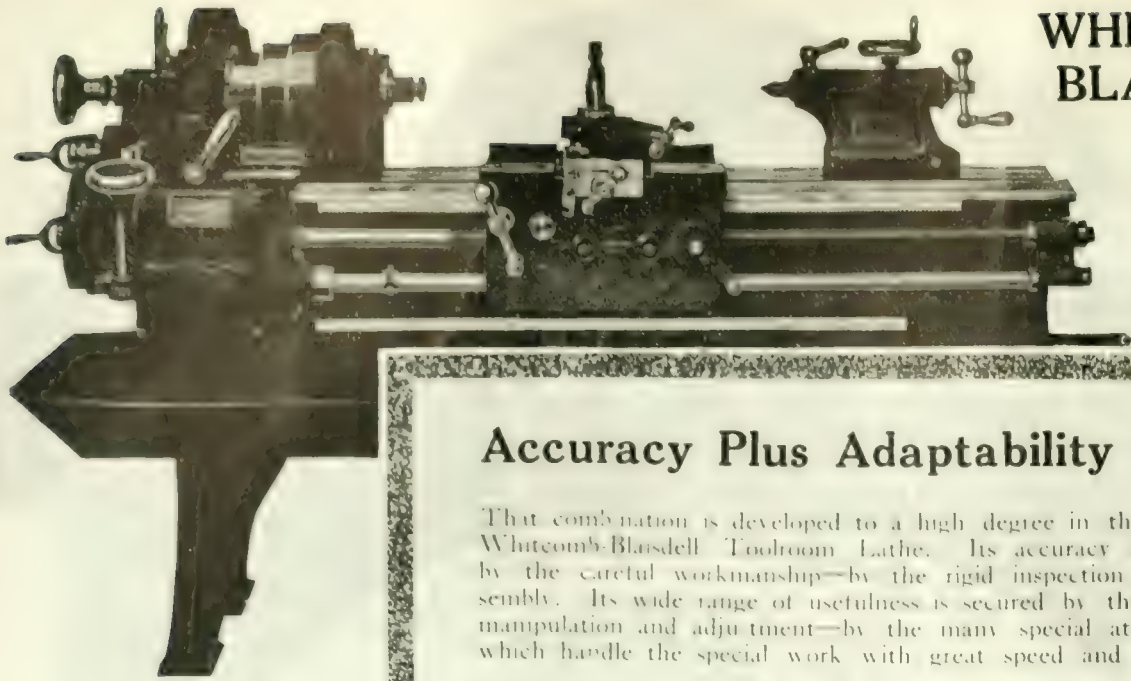


Brown's Copper & Brass Rolling Mills, Limited

General Offices and Works:
New Toronto, Ontario, Canada



If any advertisement interests you, tear it out now and place with letters to be answered.



**WHITCOMB-
BLAISDELL**

**LATHES
AND
PLANERS**

Accuracy Plus Adaptability

That combination is developed to a high degree in this 14-inch Whitcomb-Blaisdell Toolroom Lathe. Its accuracy is secured by the careful workmanship—by the rigid inspection after assembly. Its wide range of usefulness is secured by the ease of manipulation and adjustment—by the many special attachments which handle the special work with great speed and precision.

For the toolroom—for the shop which must turn out a wide variety of lathe work—this Whitcomb-Blaisdell is the ideal lathe equipment. Write for the Bulletin giving full details.

Whitcomb-Blaisdell Machine Tool Co.
Worcester, Mass., U.S.A.

We guarantee shipment
within 24 hours of
receipt of order

"Extra"
"Special"
"High
Speed"
Tool Steels

Made in
Sweden
from selected
Dannemora Ore

We also carry in stock
Solid and Hollow Drill
Steel, Die Blocks, "SIS-
CO" Welding Wire, Drill
Rod and Swedish Iron.

Swedish Steel & Importing Co., Ltd.
MONTREAL, QUE.

James McKay Company
Pittsburgh, Penna., U.S.A.

Manufacturers of

Shell Forgings

We have the Equipment and Experience and
can execute orders for

**Nose Sockets Base Plates
Adapter Plates**

for any size shells. Can execute orders
promptly.

SPECIAL FORGINGS—We can make any forgings
that can be made under Drop Hammers.

CHAINS AND ACCESSORY FORGINGS—We
have a complete line.

ADDRESS OUR REPRESENTATIVE:

JOHN A. BUCHANAN
King Edward Hotel, TORONTO

Roelofson 6-in. Banding Machine

YOU couldn't imagine a more sturdy, compact, serviceable machine than this! A glance at the illustration will show you for yourself. It has been used in Canadian munition plants since the munition business started, and is still giving absolute satisfaction. It's the machine you need if you make shells.

Look over the following outstanding features of its construction:

Integral (en bloc) construction assures perfect rigidity, permanent accuracy and desirable compactness.

Chucking with spring collet chuck insures accurate and speedy checking.

Graduated feed dial, two cutting tools, and ample belt power insure output of accurate work in least possible time.

Machines are built for 15, 18, 60-pdr. and 6" shells.

Roelofson Machine & Tool Co., Ltd.

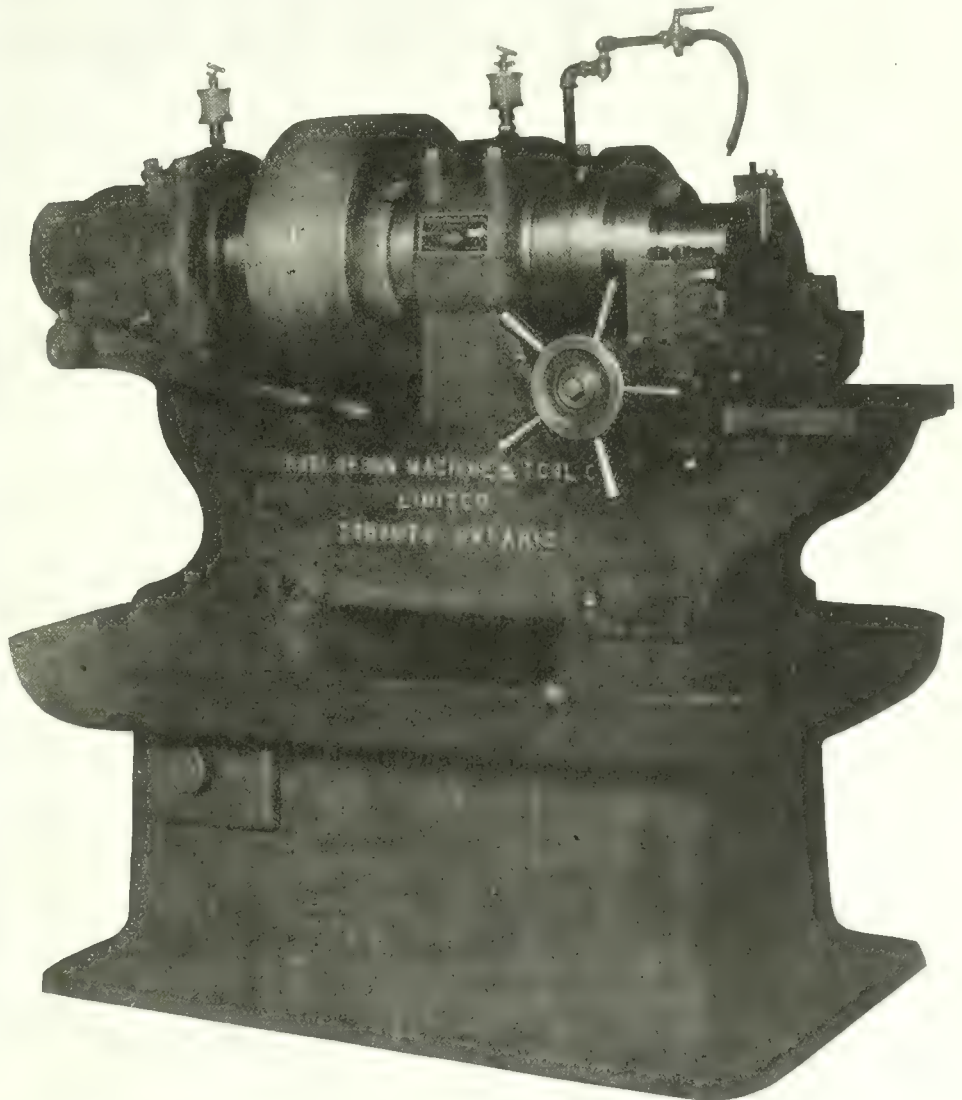
Head Office: 1501 Royal Bank Building, Toronto, Canada

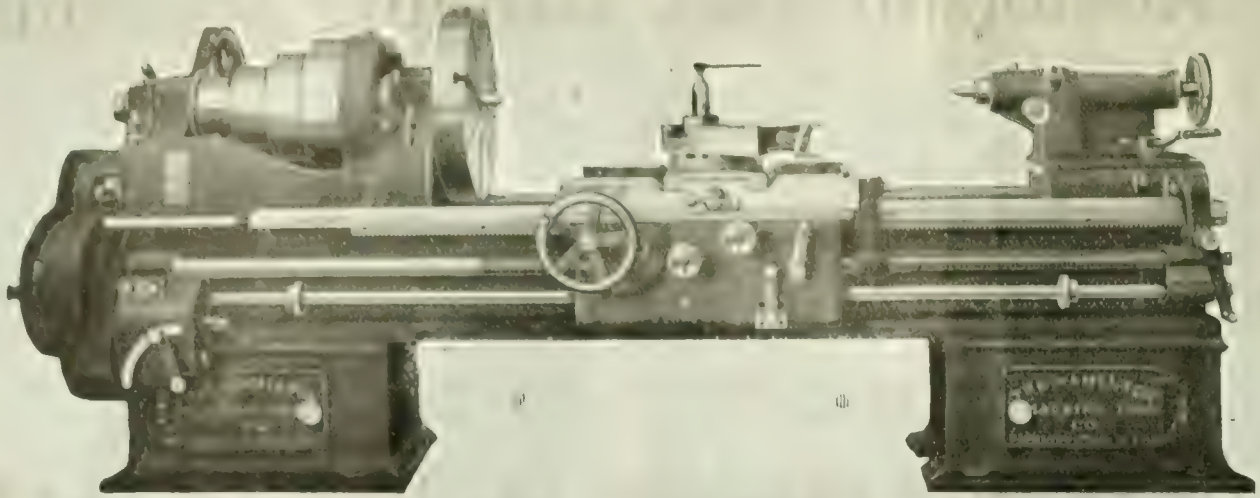
Works and Warehouse: Galt, Ont., Canada

Immediate Delivery

To shell plants changing over from the manufacture of the larger sizes to 6" shells, our ability to make **immediate delivery** should be of especial interest.

And remember that the Roelofson is one of the few banding machines that have stood up from the first of the munition game and are still doing duty.





Hamilton Lathes

*For 25 Years
Makers of
Fine Machine Tools*



*The "Hamilton" Line
has a Reputation
to Sustain.*

THERE are two phases of production that require expert attention; those of *quality* and *quantity*. We have made a study of them for your benefit. The result is that we are able to offer you machine tools that give the highest efficiency and will still keep down the cost of production.

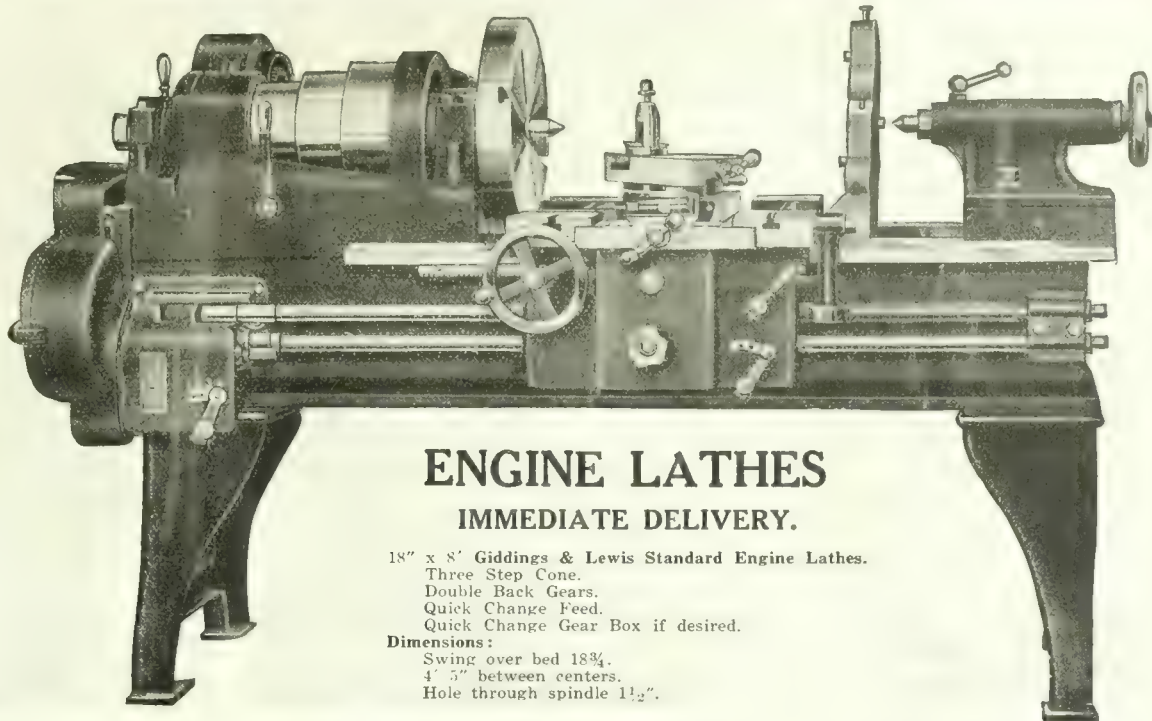
Illustrated here is one of our lathes. A close study on your part will partly reveal the care we have taken to give you a machine that is fitted to the needs of the day—greater production.

The "Hamilton Line" of machine tools is very complete and users are never tired of telling others of their features. A letter will command our immediate attention.

WRITE US TO-DAY.

The Hamilton Machine Tool Co.
HAMILTON Sole Agents for Ontario: OHIO, U.S.A.

H. W. PETRIE. LIMITED, TORONTO, ONT.

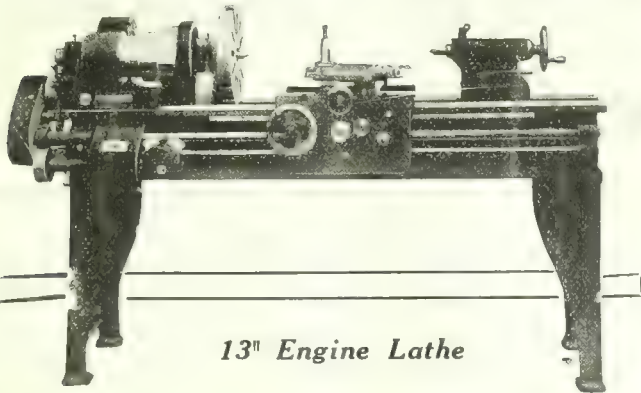


ENGINE LATHES
IMMEDIATE DELIVERY.

18" x 8' Giddings & Lewis Standard Engine Lathes.
 Three Step Cone.
 Double Back Gears.
 Quick Change Feed.
 Quick Change Gear Box if desired.
Dimensions:
 Swing over bed 18¾".
 4' 5" between centers.
 Hole through spindle 1½".

These are strongly built, accurate machines. Will give equal satisfaction in tool-room or shop. The following extras can be furnished if desired: Taper, Relieving or Draw-in attachment, Waving attachment, Hexagon turret on carriage, Pan Pump and piping. Write for full specifications and prices.

Garlock-Walker Machinery Co., Ltd., 32 FRONT ST. WEST, Toronto
 Telephone MAIN 5346



13" Engine Lathe

"Filsmith" Quality

This lathe has won its way through actual experience to be known distinctly as a quality lathe. For the swing it includes, its speed is something to be wondered at. Solid full webbed headstock; 50-point carbon crucible steel spindle; massive, rigidly clamped tailstock. A study of these features on the illustration will give you an idea of its construction. A letter from you would command our immediate attention and secure for you all specifications.

The Philip Smith Mfg. Company
 Sydney Ohio. U.S.A.

Hepburn---
the Lathe that stands the test

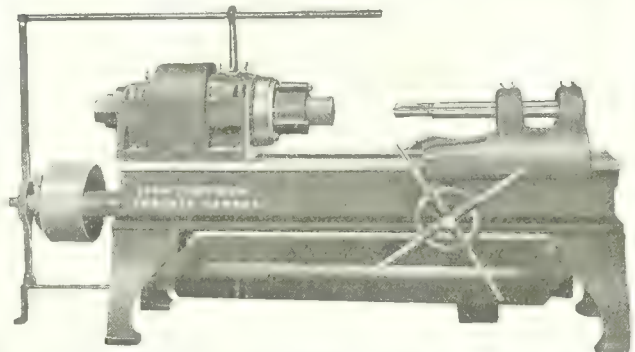
Shell work thoroughly tests the ability of a lathe. The Hepburn Lathe is making a wonderful record in the munitions plants of Canada in boring up to 6" shells. It has shown superior speed and superior quality of work and keeps right at it day in and day out. We also rebuild lathes embodying in them all latest improvements.

The Hepburn is the lathe for you.

JOHN T. HEPBURN, LIMITED

18-60 Van Horne Street

Toronto, Ontario



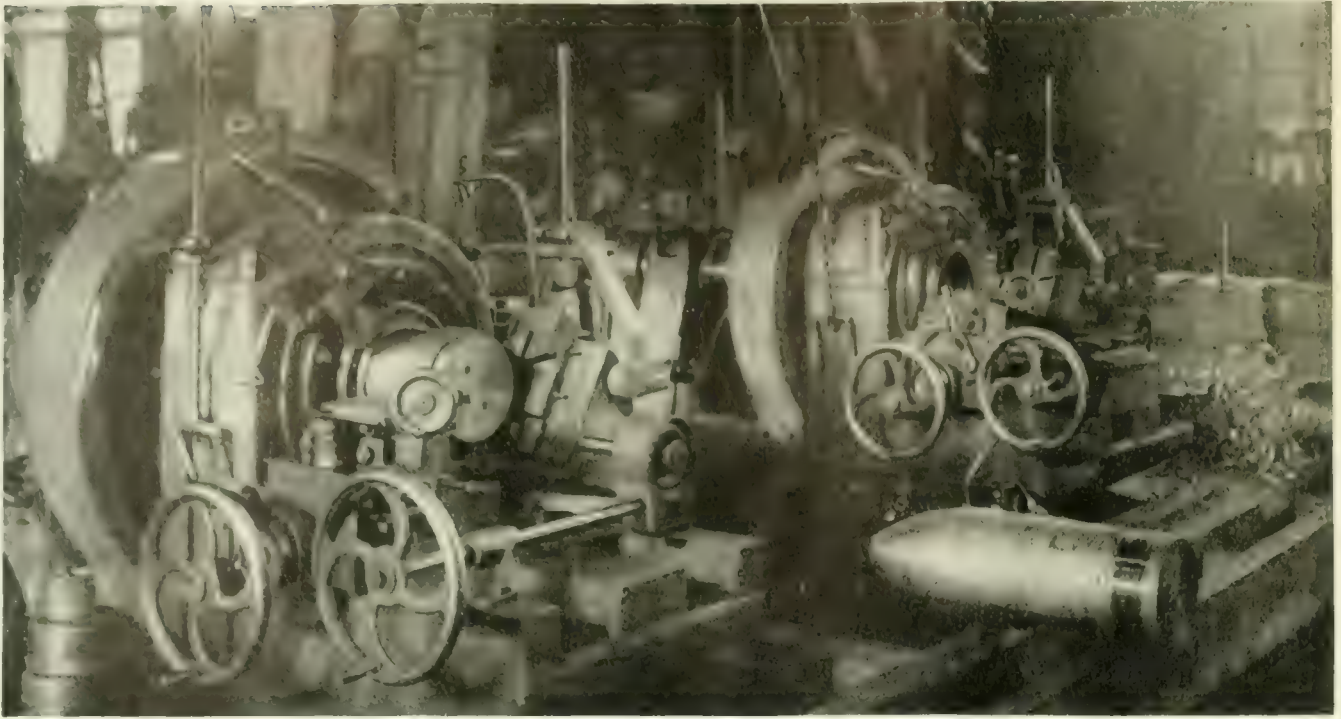
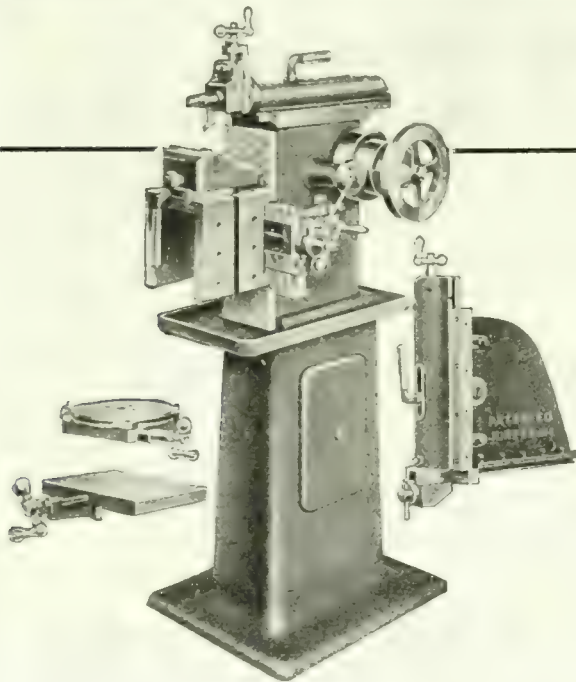


Photo shows two of our Band Turning Machines in one of the largest shell shops in Canada.

These machines are built for turning bands on 8", 9.2" and 12" shells. They are giving perfect satisfaction in several of the largest 9.2" shops in Canada. Let us put you in touch with some of them. Write for full particulars and price.

Bennett Ave. **Warden King Limited** Maisonneuve, P.Q.



Patented—June 23, 1914

The Complete Machine

A machine whose efficiency can be added to by the quick and convenient changes shown here. Nothing cumbersome. A clean-cut machine that answers the most modern requirements in efficiency.

Designed especially for making tools, dies, models, and for slotting and shaping all classes of work.

Increased efficiency gives increased production which offsets increased costs and gives increased profits. A short but vital lesson on "increase." Think it over and write us.

The Rhodes Manufacturing Company, Hartford, Conn., U.S.A.

**TEXTILE BELTING
and PACKINGS**

**J.R. BAXTER
& COMPANY LIMITED,
MONTREAL.**

**HIGH TWIST SPEED
DRILLS**

and GENERAL MACHINERY SUPPLIES

Two Cuts at One Time

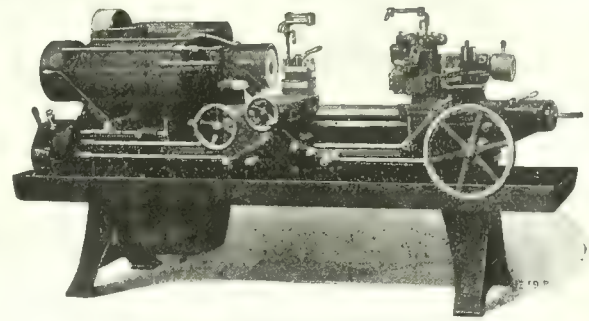
The ability to face, undercut or neck with the square turret while boring or turning with the hollow-hexagon turret contributes largely to the time-saving and economical output of the

Universal Hollow-Hexagon Turret Lathes

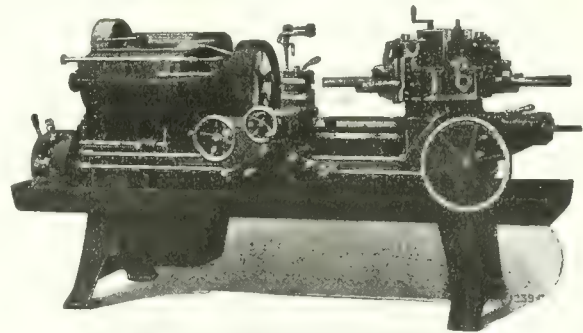
Separate feed shafts, each with ten individual feeds, operate the carriage and turret saddle independently, and provide the exact feed required for each.

And to this great advantage are added the other essentials for rapid and accurate production—excess power, extreme rigidity, great adaptability, and a power rapid traverse that saves time and conserves the energy of the operator.

Without obligation, ask us to show the saving on one of your typical jobs. Send blueprints with rough and finished samples.



No. 2-A -With "Bar Equipment"



No. 2-A -With "Chucking Equipment."

THE WARNER & SWASEY CO., Cleveland, Ohio, U.S.A.

Canadian Agents: A. R. Williams Machinery Company, St. John, Toronto, Winnipeg, Vancouver; Williams & Wilson, Montreal, Benson Bros., Sydney and Melbourne, Australia; A. Asher Smith, Sydney, Australia

CUT YOUR SHOP COSTS

Nobody would think of putting 16-inch lathe work on a 30-inch lathe, then why leave small parts on a large Milling Machine?

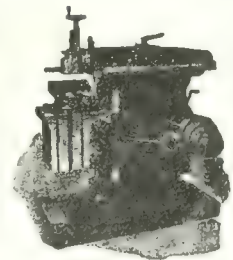
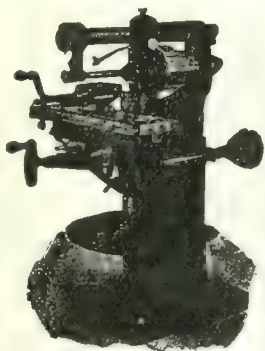
A Steptoe Hand Miller or small power feed can be handled quickly and will cut your production cost. You will have less money invested in your Milling Machines and have more machines to do the work.

That same principle applied to your small planer work will cut the cost of planer work.

A Steptoe Shaper will do the work faster because it can be handled quicker.

The John Steptoe Company, CUMMINSVILLE, OHIO, U.S.A.

Canadian Representatives: Garlock-Walker Machinery Co., Toronto, Ont.



If any advertisement interests you, tear it out now and place with letters to be answered.



Consolidated Presses

appeal to discriminating users because of the massive construction of all working parts, the generous crank shaft bearings, the increased diameter of crank pins, liberal crank cheeks, long and carefully fitted slide bearings, abnormally large connection screws, powerful gearing, and above all, the skill and care exercised in their construction.

These are features which should be considered when purchasing.

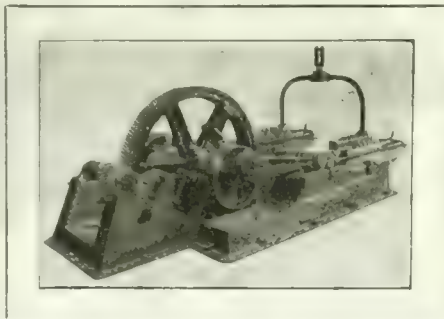
Consolidated Press Company

HASTINGS

LARGEST EXCLUSIVE MANUFACTURERS OF POWER PRESSES IN U.S.A.

MICHIGAN

Canadian Representatives: A. R. WILLIAMS MACHINERY CO., Limited, Toronto, St. John, Winnipeg, Vancouver



ELMES

18" Stroke Hydraulic Pump

for maximum pressures and capacities, for 250 horse-power motor—a pump designed to meet the demand for a high-pressure outfit of large capacity, and one able to withstand the severe usage of present-day practice.

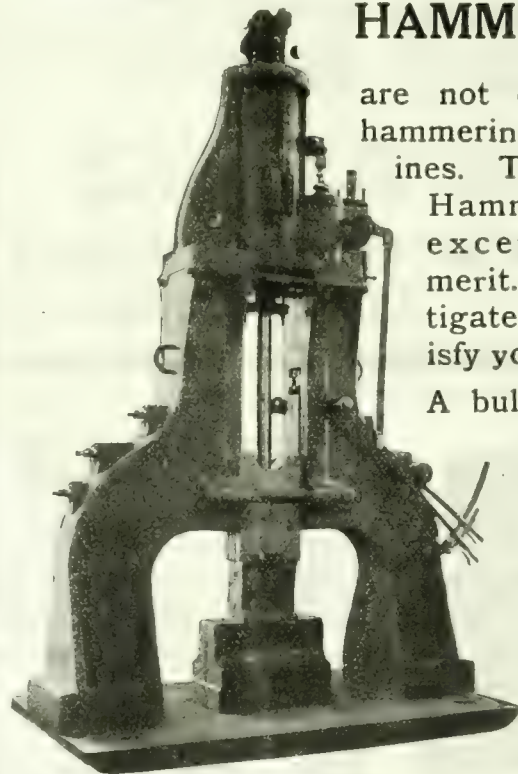
Other designs for all pressures and capacities.

Charles F. Elmes Engineering Works

217 No. Morgan Street

CHICAGO, ILL.

"ERIE" STEAM FORGING HAMMERS

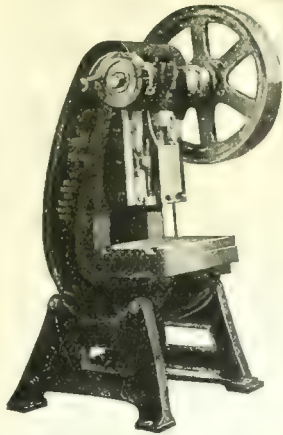


are not ordinary hammering machines. They are Hammers of exceptional merit. Investigate and satisfy yourself.

A bulletin for the asking.

ERIE FOUNDRY COMPANY
ERIE, PENNSYLVANIA, U. S. A.

THE "TOLEDO" OPEN BACK PRESSES



Notable for wide range of usefulness and durability.

Bodies embody the newest ideas in press construction with increased weight, larger bed area and die space.

Shafts are of large diameter and hammer forged from special steel.

Connections and Pitman screw are high carbon steel forgings

with the most effective clamping device in use. *Slides* extra long, moving in long and heavy gibs.

Positive Inclining Attachment.

The Toledo Machine & Tool Co.
TOLEDO, OHIO

Representatives—Allied Machinery Co. of America, 19 Rue de Roeroy, Paris, France; Vie XX Septembre 12, Turin, Italy; 16 Seidengasse, Zurich, Switzerland.



PRODUCT

"Getting it out—and right" goes further back than the selection of the machine. It may go back 10 or 20 or 40 years to some point or problem solved in our 60 years' development of Presses that produce.

If you want machines with production capacity based on longest practical experience, buy "Bliss."



E. W. BLISS CO.



Brooklyn, N.Y., U.S.A.

1857

CHICAGO OFFICE
People's Gas. Bldg.
CLEVELAND OFFICE -
LONDON, S. E., ENGLAND
Pocock St., Blackfriars Road

DETROIT OFFICE 1917
Dime Bank Bldg.
Union Bank Bldg.

PARIS, FRANCE
100 Blvd. Victor-Hugo St. Ouen

Triple Purpose "METALWOOD" COMBINATION

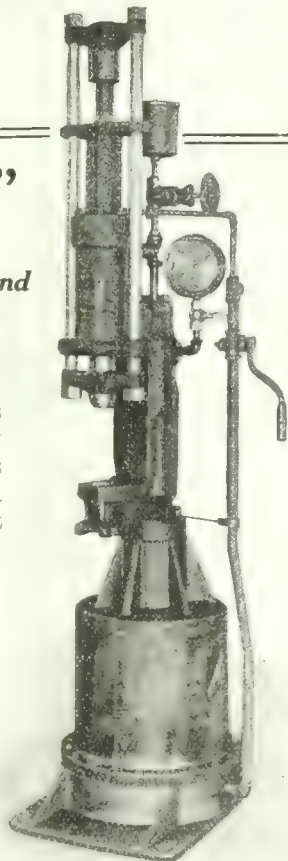
*Forcing, Broaching and
Straightening Press.*

Its value is in the many uses to which it is adaptable. Auxiliary tables and fixtures add greatly to its usefulness. It is not "encumbered" with a single excess part. Built for production.

**Metalwood
Mfg. Co.**

Leib & Wight Sts.,
DETROIT, MICH.
U.S.A.

For Great Britain and
Continent address Gaston
E. Marbaix, Coronation
House, 4 Lloyds Ave.,
London, E.C., England.

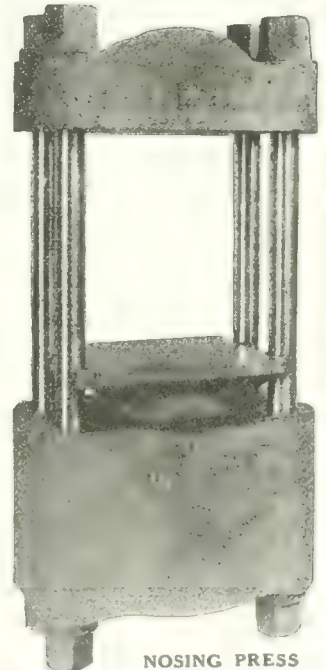


PRESSES

Pumps
and
Accumulators

FOR ALL
PURPOSES

Made in
Canada



NOSING PRESS

WILLIAM R. PERRIN, Limited
TORONTO



“YES, SIR, that’s a real hack saw. Not strapping with notches cut in the edge. Not inferior steel that bends out of shape and stays out of shape. That’s a

Starrett Hack-Saw

with snap and whip to it that means business from the time it gets its teeth in the metal until the cut is finished.

“Just a hack saw, you say. But this common name won’t do for a tungsten steel blade like this. Why, every tooth in it is milled and set just as if this hack saw were to establish the Starrett reputation.

“And it fits its job, too. Maybe you don’t think that’s important, but try it yourself.

“You don’t call in a grocer when you have a toothache. But there are some mechanics who try that stunt with hack saws—put a brittle, coarse-toothed blade on a piece of tubing and then wonder why it strips. Or use a fine-toothed saw on brass rod and wonder why the teeth clog and the blade snaps.

“You can’t treat hack saws mean any more than you can people; and that’s another reason why I like Starrett Hack Saws. You don’t need to go wrong. The L. S. Starrett Company have got good saws and they know how to pick the one that does the work best. Guess that’s why they say that Starrett Hack Saws cut faster and last longer. I know they do.”

Send for catalog No. 21MA.

The L. S. Starrett Co.

The World’s Greatest Toolmakers

ATHOL, MASS.

NEW YORK

LONDON

CHICAGO

42-738



THE BANFIELD PLUG MILLER

Patented in Canada and United States

THE COMPLETE PLUG FINISHED IN SIX MINUTES BY UNSKILLED LABOR

A machine especially designed for finishing base plugs, turning the outside diameter, finishing the face with any camber desired and milling the thread—all in one chucking.

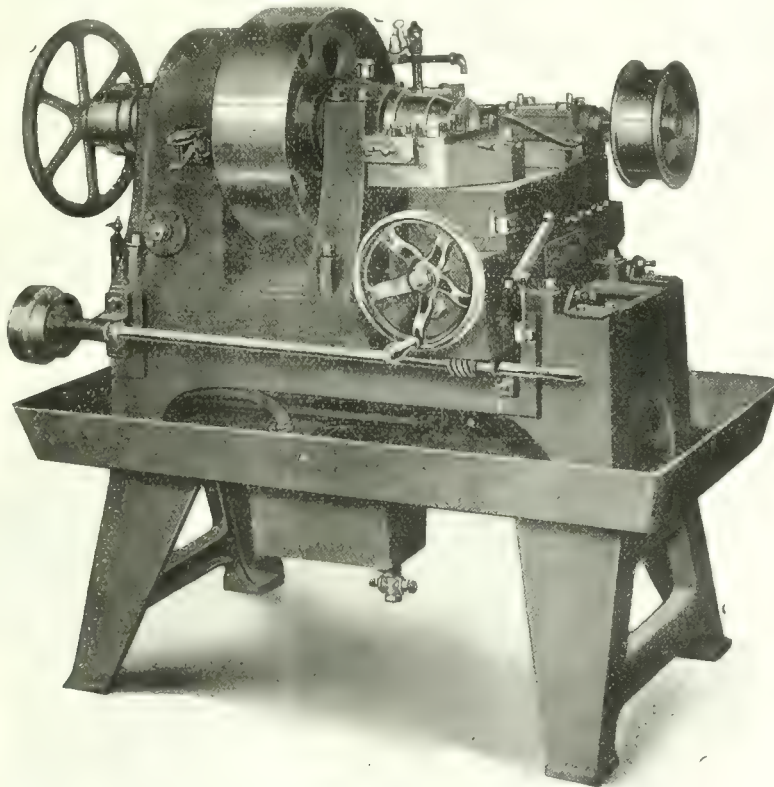
One man can operate two machines, considerably reducing your cost per plug.

The Banfield Plug Miller is equipped with quick draw in collet.

Drive pulley 18" x 6", with bronze bush having cut jaw clutch for turning and facing. Worm gear 100 to 1 ratio with jaw clutch for milling, driven by 10" x 1½" flanged pulley. The milling cutter is driven by an 8" x 2½" flanged pulley. Tool post carriage is equipped with power feed (two speeds), having automatic stop. Power feed pump with relief valve driven from worm shaft (all drives direct from main line shaft). Rigidly built; simple and economical to operate.

Weight 1800 lbs.

For 18-pdr., 4.5 and 60-pdr. High Explosive Shells. Can furnish machines of same type, weighing 1250 lbs. Particulars on request. These machines are tooled up for finishing plain machined or bevel plugs if desired.



For Turning and Milling the Thread on Gas
Check Plugs for 6-inch High Explosive Shells

BASE PLUGS

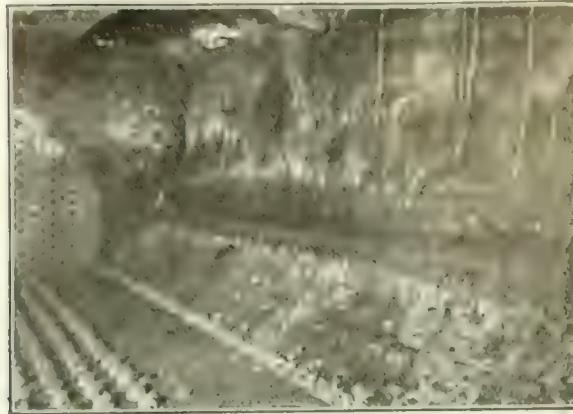
Machined to Government Specification

Have in stock for immediate shipment machined base plugs for 4.5, 60-pdr., and 6" High Explosive Shells, either threaded or beveled.

Machine work subject to acceptance of Government inspector at your plant.

Capacity 4,000 per day. Write for prices.

EDWIN J. BANFIELD
STAIR BUILDING - - TORONTO, ONT.



This work was done by Davis-Bournonville apparatus and operators at
D. L. & W. SHOPS, SCRANTON, PA.
 ENGINE NO. 584

To replace patch welded 40 ft. of $\frac{3}{8}$ metal on both side sheets.

Time—20 hours.

Oxygen used—800 cu. ft.

Cost, including removing and replacing stay bolts—\$48.71.

This patch applied by their old method would have cost \$88.26, and same would not have lasted any length of time, therefore it would be necessary to apply two new

side sheets, which would have cost \$404.04.

This boiler was subjected to test of 275 lbs. water pressure without any leak apparent in the welds.

It is essential to use a positive mixture torch on work of this kind. Let us demonstrate the Davis-Bournonville Apparatus to you. No matter what other outfit you are using, we can cut your cost of operation, giving you a wider range of work.

Carter Welding Company of Toronto, Limited
 Write-us 9 SHEPPARD ST., TORONTO

Bilton Automatic Gear Millers—Spur or Bevel Gears

CAPACITY

No. 1 - - 14 Pitch

No. 2 - - 10 Pitch

No. 3 - - 8 Pitch

The Bilton Machine Tool Company

Succeeding The Standard Mfg. Company

Housatonic Ave., Bridgeport, Conn., U.S.A.

Also Manufacturers of —
 Plain Horizontal Millers
 Automatic Millers
 Plain and Ball Bearing
 Bench and Column Drills
 Milling Cutters
 Riveting Machines

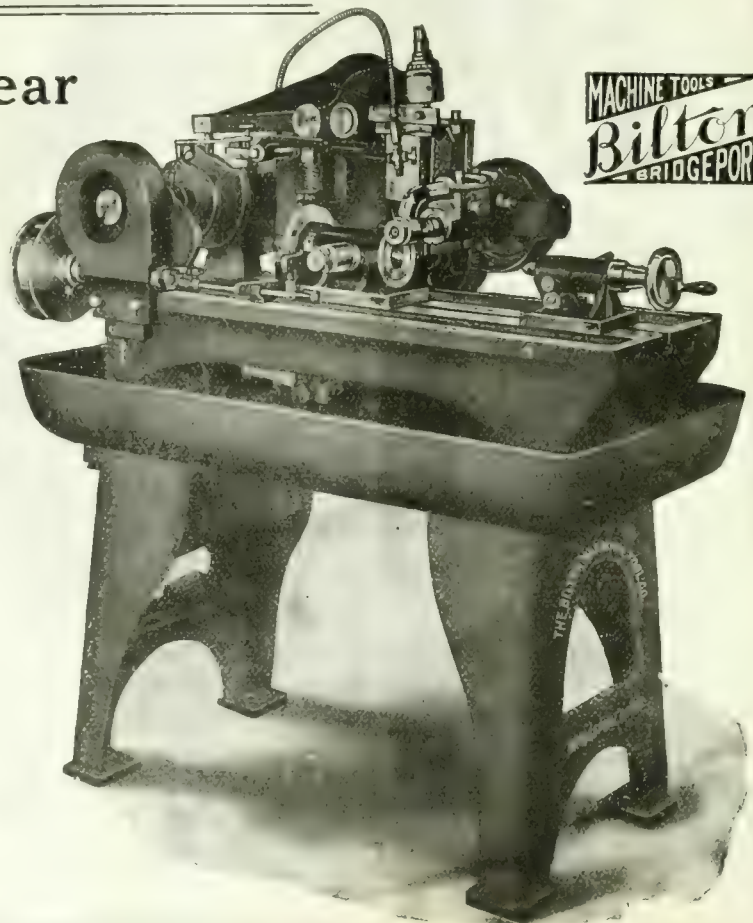
Catalog 30 on request

Foreign Agents:

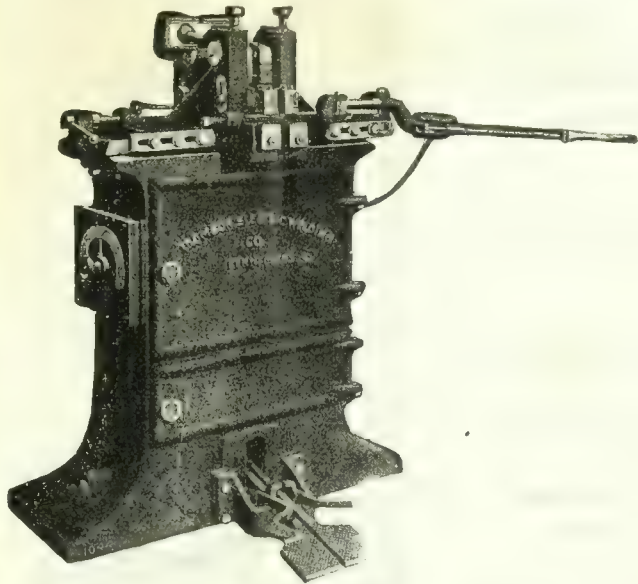
Alfred Herbert, Limited

M. Mett Engineering Company

Chas. Churchill Company, Limited



Thomson Process
Electric Welding

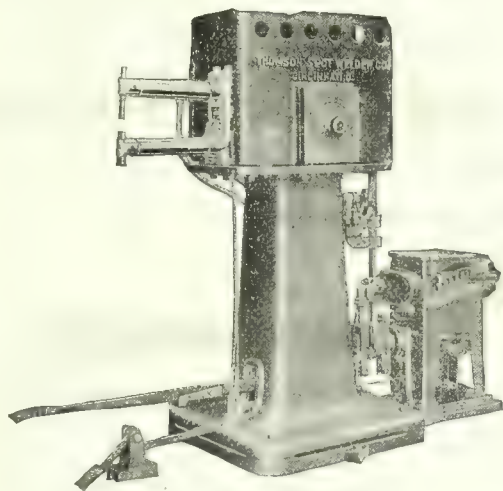


Adopt a "Thomson" For Your Work

We have shown thousands of manufacturers how to lower their costs and obtain better production by the use of Thomson Butt Welding Machines. No doubt there is work in your shop that could be handled faster and better by the "Thomson" Electric Welding Process.

Why not talk it over with us—let us give you actual facts on how we have saved other firms money and how we can benefit you? It costs nothing for the consultation. Get in touch with us to-day.

Write for Bulletin B-4.



Rivets Abolished— Time Saved

A Thomson Spot Welder will do your riveting and soldering 60% to 90% faster. No rivets or solder required, no holes to punch, and a boy can turn out as much work as five men using the old process. A thorough investigation will prove to you the merits of the Thomson Spot Welding Process and show you how to effect a big saving.

Write for Bulletin S-4.

Thomson Electric Welding Co. Thomson Spot Welder Company
 Lynn, Mass.

Canadian Sales Offices, 311 Falls Street, Niagara Falls, N.Y.

Thomson Process
Electric Welding

If any advertisement interests you, tear it out now and place with letters to be answered.

Mining Machinery Parts



Two-key Tappet

Shoes and Dies, Tappets,
Bosses, Cams and
Stamp Heads

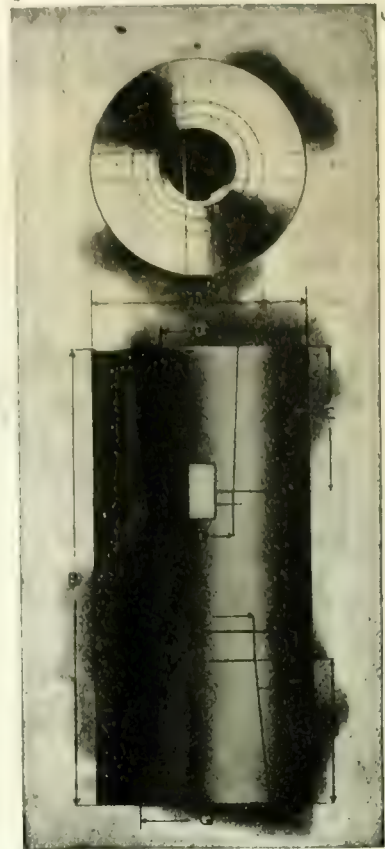
Also Manufacturers of Lining
Plates for Ball and Tube Mills
Concaves and Heads for Gyra-
tory Crushers.

Machine Moulded Gears

Any size up to 18 feet in diameter.
No patterns needed.

*Send Us Your Specifications,
We Do the Rest. Write—*

Hull Iron & Steel Foundries, Limited
HULL, P.Q.

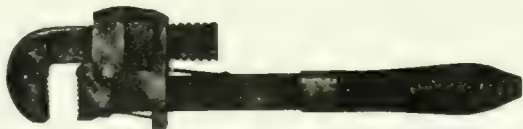


Stamp Head

"W & B" Pipe Wrenches the Only Pipe Wrenches

MADE IN CANADA

The line comprises all sizes from 6 to 48 inches



"W & B" Wood Handle Grips. Length open 6 to 14 inches



"W & B" STEEL Handle Grips. Length open 18 to 48 inches.

These Wrenches are extra strong frames well proportioned.

The Jaws are Drop Forged and tempered, giving them strength to resist the most severe strains.

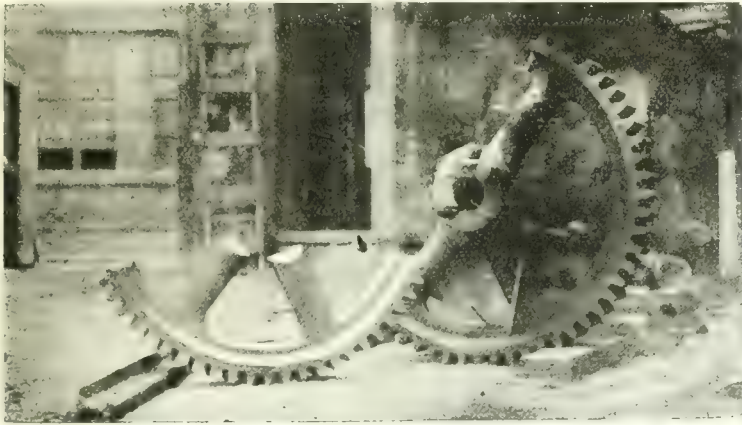
Other patterns of "W & B" SCREW WRENCHES MADE IN CANADA at our St. Catharines factory, are our Machinists' Knife Handle, "Railroad Special," Regular (Agricultural Pattern). Adopt this established line as your standard CANADIAN-MADE WRENCHES.

Complete information and catalog No. 90 on request.

The Whitman & Barnes Manufacturing Company

ESTABLISHED 64 YEARS

ST. CATHARINES, ONT.



Broken Gear Wheel.

Saving the cost of a New Gear Wheel by Oxy-Acetylene Welding.

The Savings in Time and Money in cases of this nature are impossible to calculate, but it is illustrative of the unlimited money-saving possibilities of an Oxy-Acetylene Welding Outfit in your Plant, ready at all times to cope with Machinery "Tie-ups" and to restore the broken parts to use again—in a fraction of the time at a fraction of the cost of renewals.

The time saved soon pays the cost of an Outfit.

Reclaimed by Oxy-Acetylene Welding.

Let us tell you of the many ways by which you may benefit by Oxy-Acetylene Process.

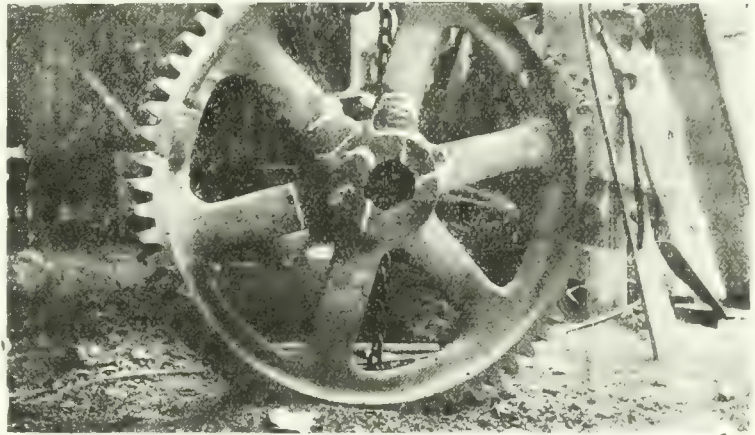
There are innumerable uses for an Oxy-Acetylene Outfit—the reclamation of Broken Machine Parts; Joining Metals without laps or rivets, stronger, neater and cheaper; using up valuable material otherwise scrapped, and many other purposes. We shall be pleased to tell you how you can save money and increase the efficiency of your Plant. Write to-day—no obligation.

L'AIR LIQUIDD SOCIETY

The Pioneers of the Process. Factories the World over.

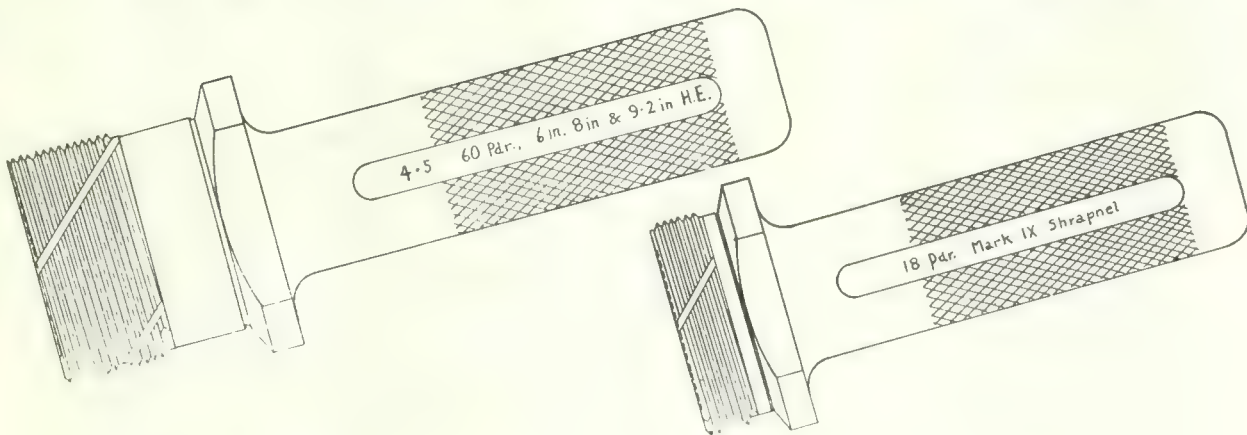
Canadian Factories:

TORONTO MONTREAL WINNIPEG HALIFAX



Courtesy Can. Welding Co., Montreal.

FUSE HOLE GAUGES

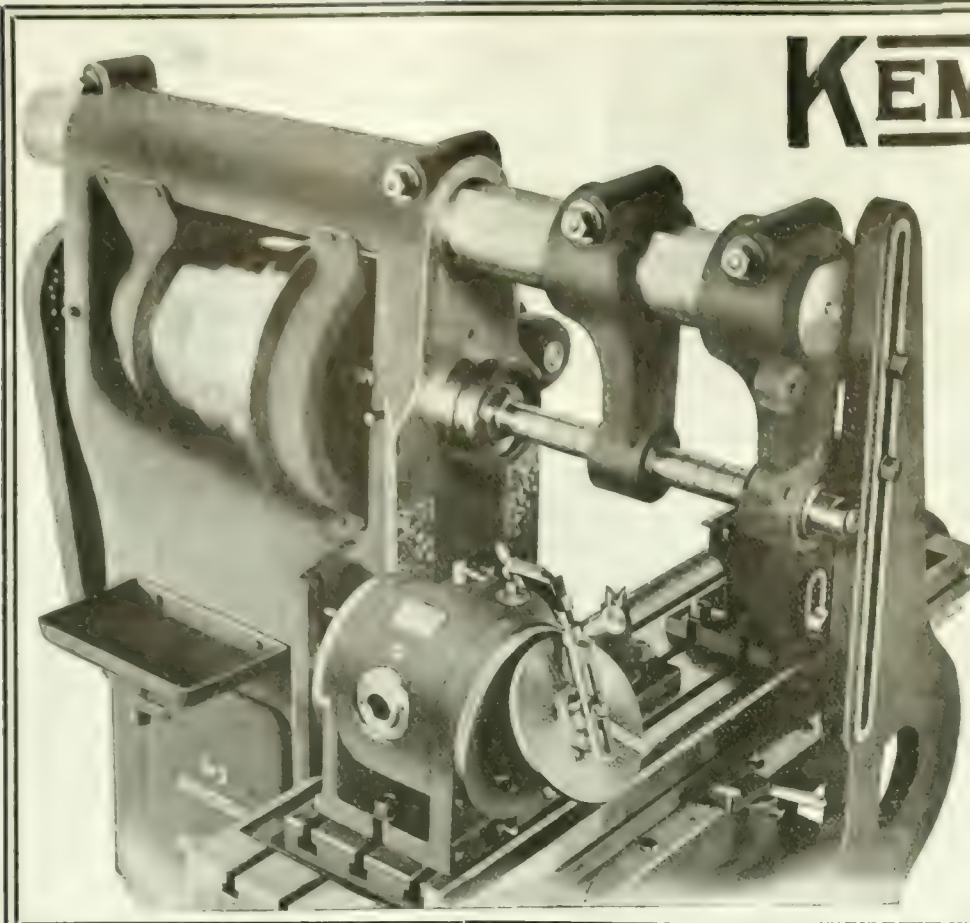


Manufacturing and inspection fuse hole gauges for all size shells. A surplus stock enables us to ship immediately.

Windsor Machine & Tool Works

Windsor, Ontario

If any advertisement interests you, tear it out now and place with letters to be answered.



KEMPSMITH

Milling Machines

The Kemp Smith Overhanging Arm provides for positive alignment of arbor or boring bar, and also holds the cutters positively up to the work. A valuable feature on a tool room machine.

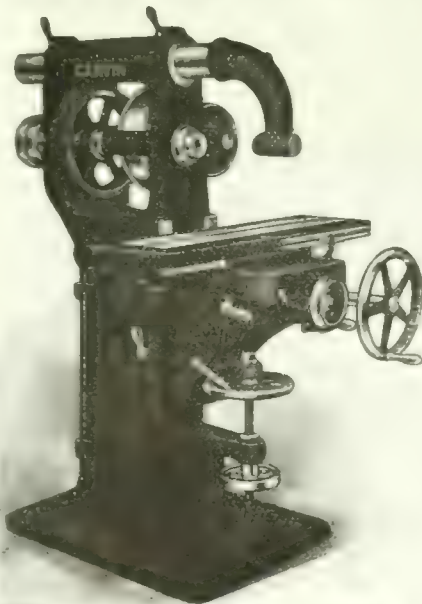
Note the compactness and solidity of the Kemp Smith Universal Dividing Head shown in the accompanying illustration. The Kemp Smith Dividing Head embodies simplicity, convenience, rigidity and accuracy. There is a notable absence of complicated parts. The Kemp Smith Dividing Head is furnished as part of the regular equipment of our Universal Milling Machine.

**Kemp Smith
Mfg. Company**

Milwaukee, Wis., U.S.A.

GARVIN No. 21 Plain Miller

Back Geared



For Plain and Gang Milling for general manufacturing, and is used mostly in gangs of 5 or 6 machines to one operator. Spindle runs in adjustable bronze boxes, and is driven by a 3" belt through back gears (3 to 1).

Knee is our improved solid top design, rigid and stiff to resist side pressure of heavy cuts.

DIMENSIONS:

Automatic Feed at Table	18 in.
Adjustment in line with Spindle	6 in.
Vertical adjustment under Spindle	13 in.
Table, inside Oil Pockets	6 x 10 in.
Changes of Speed	6
Changes of Feed	6
Net Weight, Skidded	1,375 lbs.

For Further Information **{ASK YOUR DEALER
or WRITE US DIRECT**

IMMEDIATE DELIVERIES

Send for Complete Catalog

MANUFACTURED BY

THE GARVIN MACHINE COMPANY

Spring and Varick Streets

(Visitors Welcome)

50 Years New York City

No. 21 B.G. PLAIN MILLING MACHINE
Back Geared
Use Code - Abjeet

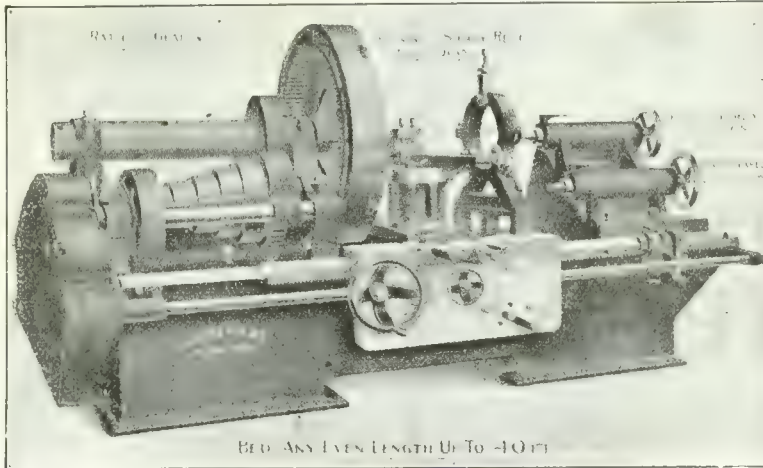
If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.

IMMEDIATE SHIPMENT

30-ft. BED McCabe 2-in-1 Lathe

26 and 48-INCH SWING
TRIPLE-GEARED—RATIO 72 to 1

**J. J.
McCabe,
149
Broad-
way
New
York**



Showing McCabe's Latest Heavy Type "2-in-1" Double-spindle Lathe—26 48-in. Swing.

48-in. Swing. Triple Geared — ratio 72 to 1.

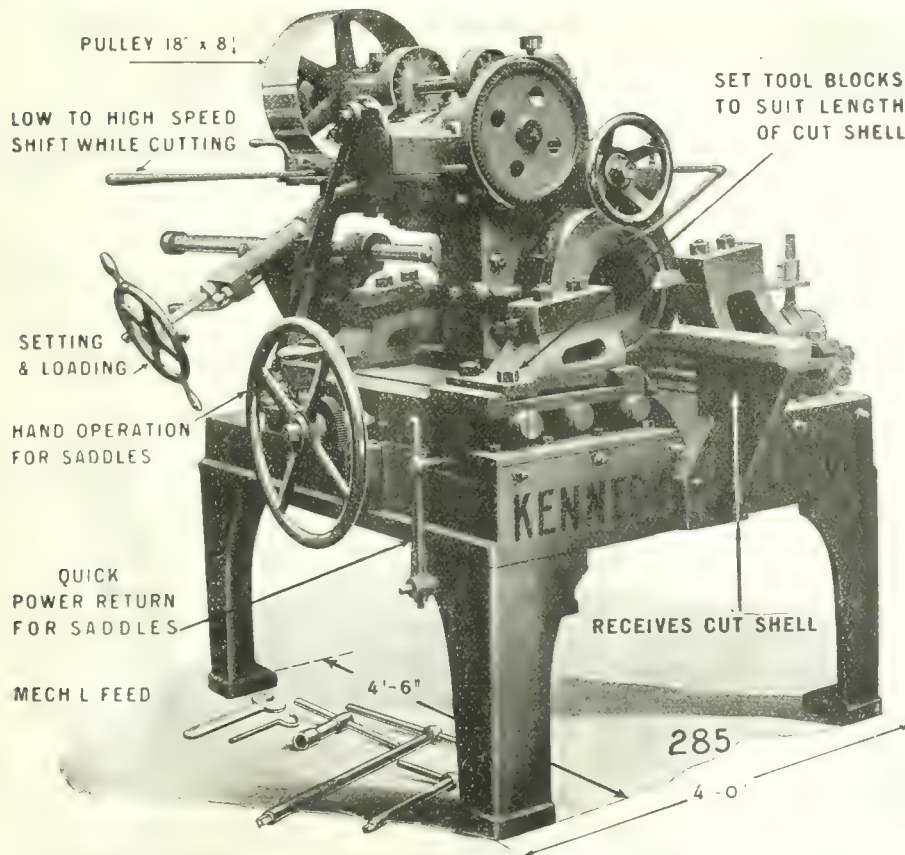
26-in. Swing. Back-geared.

Turns between centers—24 ft.

Swing over carriage on 48-in. Lathe is 40 in.

Prominent ship-builders are using McCabe Lathes on long beds.

Thousands in operation all over the world.



CUTTING-OFF MACHINES

Cuts both ends at once

except 8 in. and 9 in. sizes which cut one end only

Forgings load in one end and discharge out the other when cut

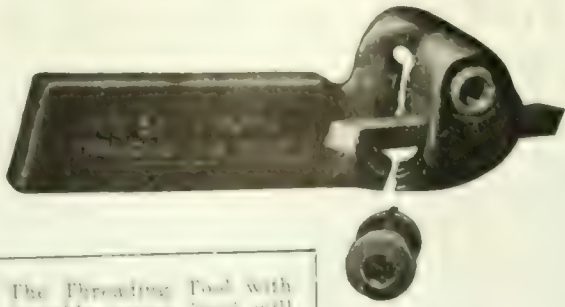
A Girl can operate it

New quick power return for saddles

DELIVERIES REASONABLE

The
Wm. Kennedy & Sons,
Limited
Owen Sound

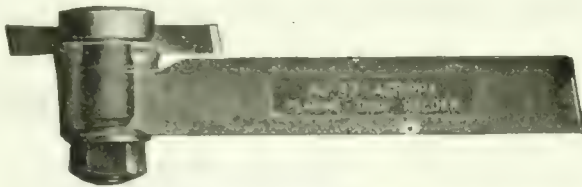
The Measure of Superiority of



The Threading Tool with lockable stop head will do roughing, finishing and threading at one setting of the tool post.

WILLIAMS' "AGRIPPA" Tool Holders

"THE HOLDERS THAT HOLD"



The Planing Tool has a serrated ring of improved steel which affords unequalled variety and rapidity of adjustment. The ring is correctly hardened to resist the wear of the cutter. The body of the holder receives a very different heat treatment that prevents breakage.

is the proportion in which they excel and endure.

You can verify our GUARANTEE of the exceptional resistance, adjustment, interchangeability, usefulness, life and economy by exhaustively testing them on own machines.



High Carbon Steel

Scientifically "heat treated"—

Ground accurately by machinery—

Cut with mathematical accuracy as to depth, number and position of teeth—

Make the

"Famous Five" Files

the standard tools of their class.

It is a pleasure for a mechanic to work with them—

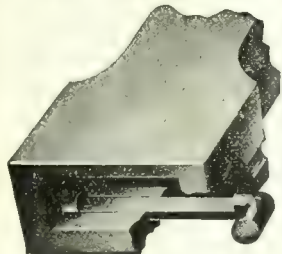
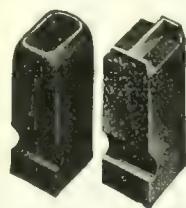
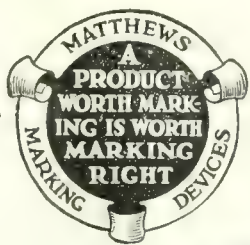
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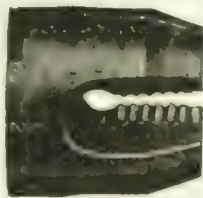
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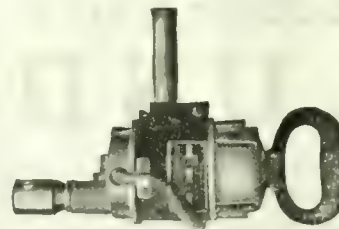
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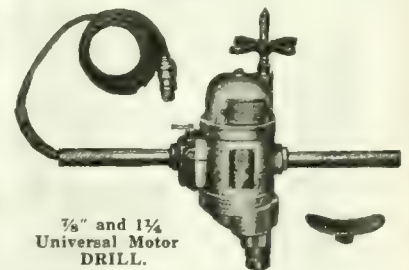
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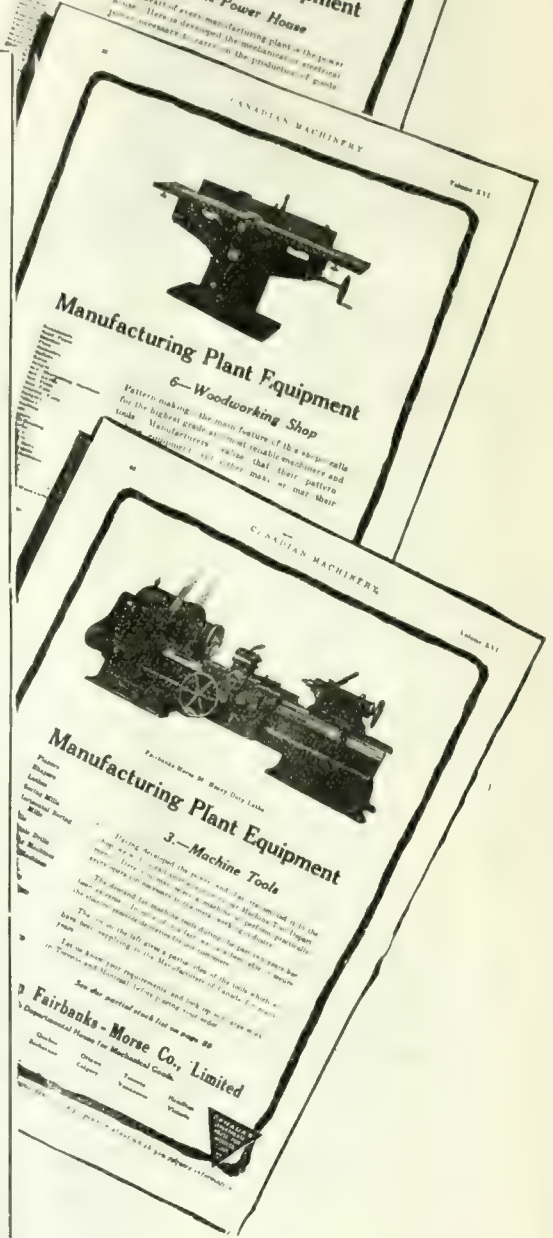
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The Shell Industry in Canada from a Metallurgical Viewpoint*

By Hugh Lamont

In the course of a resumé of Canada's early efforts to produce munitions in quantity and quality, the author mentions several features, more or less insignificant individually, but having, collectively, a vital influence on the ultimate success of the work. The microphotographs demonstrate convincingly the value of expert scientific knowledge, and how it may be applied to the solution of vital problems beyond the scope of ordinary factory routine.

IN the first days of August, 1914, when the European crisis seemed likely to lead Great Britain into hostilities, the Government of Canada, confident in the patriotism of the Canadian people, pledged the support of the Dominion to the Imperial authorities in case war could not be averted. Thus it was that Canada, as an integral part of the British Empire, found herself in a state of war when Britain's declaration of August 4th was issued. The greater part of the militia was called out—bridges, public utilities, strategic points had to be guarded; but the greatest task of all was the enlistment and the equipment of the first Canadian Expeditionary Force, which, amounting to 33,000 men, was mobilized early in September and sailed overseas early in October.

Since that date Canada's contributions in men have gone steadily forward, until to-day her armies at home and abroad are rapidly approaching the half-million mark, with effective measures provided for reinforcements as required—no small contribution from a country of about seven million population scattered over the area which Canada comprises.

But the war could not be won by men alone, and it was quickly demonstrated that the artillery arm of the service was to play a part hitherto undreamed of, and the call for munitions and more munitions was early heard. Britain's arsenals were entirely inadequate, and she quickly began converting her industrial plants into munition factories. The Canadian Government, knowing the need for munitions and hoping to stimulate Canadian business, asked the co-operation of the manufacturers in producing shells.

Initial Attitude

Naturally there was a certain amount of reluctance on the part of the Canadian manufacturers to engage in a business entirely new to them. Different causes contributed to this attitude. The specifications called for a degree of accuracy in machining and strength of metal in the finished product, which to say the least was imposing. But most of all, the size of the original orders and the uncertainty of renewals, in fact, the uncertainty of the war itself as to how long it would last, all tended to caution the manufacturer to go slow, for in every instance it was necessary for the manufacturer to expend considerable capital to equip his plant to handle the business.

The pioneer manufacturers were in-

duced to go into the business, not by the hope of making profits, but rather by a patriotic desire to do their bit in helping to win the war. Then, too, there was the matter of financing which the Canadian Government had to contend with, and at the very outset the munition industry required a considerable outlay of capital. Canada, young and undeveloped, had all along been a borrowing nation, and just at the outbreak of the war was experiencing a period of trade depression brought on by the bursting of the most sensational land boom in her history.

However, the Canadian Government, acting as the agent of the British War Office, was successful in placing the first order for shells, some 200,000 shrapnel, with the Canadian manufacturers about the first week in September, one month after hostilities commenced. This order was split among some half dozen concerns. From that initial order in September, 1914, the business developed, so that by November, 1915, the munition industry was the most important in Canada, embracing in all 320 firms. By April, 1917, when the United States entered the war, 630 firms were engaged in the production of shells and shell parts, giving employment to over 225,000 operatives, and the business involved an expenditure of \$5,000,000 a week, with a daily average output valued at \$1,500,000.

During the first part of the war the purchase of munitions was entrusted to a body known as the Shell Committee, representing and responsible to the British authorities. Later on this committee was replaced by the Imperial Munitions Board, but the business is carried on practically on the same principles.

The steel billets or rolled stock are purchased by the board from the steel manufacturer; it is then allotted to the different forging companies, who are held responsible for each shell less those required for testing purposes. From the forging companies it is distributed to the machining and assembling companies, who in turn are required to turn back to the board an equal number of shells as they receive less those required for test. Provision is also made governing each manufacturer's responsibility, and, considering the extent of the business and the fact that in only a few instances are completed shells produced by any one firm, the very small number of misunderstandings arising speaks well for the way the business is conducted, and especially bears evidence to the efficiency each Canadian manufacturer has

attained in the respective operations allotted to him.

Returning to the original orders which were issued early in September, 1914, the manufacturers interested immediately began to get their plants in shape to handle the work. Machines had to be rebuilt, or new machines bought, but the first orders were practically all turned out on old machines with the necessary machining accessories to cover the requirements. In the matter of heat treating, old equipment, if there was any at all, was not practical, and new equipment had to be purchased.

In these matters each manufacturer had access to the Dominion Arsenal at Quebec, the only plant in Canada manufacturing shells, and was assisted so far as possible by the men in charge of the various departments. As each manufacturer had his equipment installed a trial lot of shell forgings were supplied to him and the problem of meeting the specification began.

Shrapnel Material

In shrapnel this specification called for a yield point or elastic limit of 36 long tons, or 80,640 lbs. per square inch, and ultimate breaking strength of not less than 56 tons, 125,440 lbs. per square inch, with an elongation of not less than 8 per cent. in $\frac{5}{8}$ in. The test specimen is taken from the shell when partly machined, and after receiving final heat treatment at a point where the maximum bursting strain occurs, and known as the set-up point. The forgings were made from $3\frac{1}{2}$ in. rolled stock, plain carbon steel from 0.45 to 0.55 in carbon, under 0.05 in sulphur, under 0.06 in phosphorus, manganese from 0.50 to 1.00, and silicon under 0.30 per cent. In the bar the steel must show a yield of 19 tons, 42,560 lbs., ultimate breaking strength 35 tons, 78,400 lbs., and an elongation of 20 per cent. in 2 in.

As the shell received a final heat treatment no strict specification was issued concerning the physical properties of the steel in the forging. But in order to meet the specification for the finished shell recourse was necessary to the double heat treatment. This necessitated the installation of two furnaces and quenching tanks. Further, each shell had to be nosed, requiring still another furnace and nosing press. Add to this the changes necessary to existing machinery, and it is not surprising that the end of October was reached before installations anywhere were completed,

*A paper read before the Steel Treating Research Society of Detroit, Oct. 19, 1917.

**Manager, Toronto Testing Laboratory, Ltd., Toronto, Ont.

and the actual work of making shells that would be assigned to the War Office began.

There came a period of trouble and tribulation. The rough turning of the shells had to stop for a day or two, the rough turned shells with the recesses for the grooves of the shell and the wave lines in the bottom of this recess formed before the final heat treatment was given, so that failure to pass specification was only avoided by the loss of the shell through the waste. The manufacturer was charged, but all the machine work done on it.

As machined for heat treatment the metal in the base of the shell would be $\frac{1}{2}$ in. thick while the walls would be not more than $\frac{1}{4}$ in. Oil was used as a quenching medium though some water hardening was done, but on the whole it was found too severe and was frowned upon by representatives of the War Office. Pyrometers had been installed to keep accurate watch on the temperatures, scleroscopes to test the hardness after quenching and, after tempering, but if the shells would not harden, they could not pass the physical requirements.

To enumerate all the difficulties that arose would be as easy to set down a list of Job's ailments. Sometimes it was the steel, sometimes the oil, next it would be the furnace that was at fault, and again the pyrometer. Expert and amateur suffered alike. Reputations were shattered and men lost faith in their fellowmen.

Growth Follows Success

By November 15, 1914, the government sent an urgent appeal for shells by November 30. Promises were made which unhappily could not be fulfilled and it was not until the latter part of December that shipment of Canadian shells began. Small at first, but they quickly grew in volume. Before the first orders were complete larger orders came and other manufacturers were preparing their plants to handle the business.

When it is considered that not only had changes in machinery to be made, but in many cases changes in plant layout, considering also the equipment that had to be added, and the general lack of knowledge concerning a business, as it were, hastily thrust upon him, the Canadian manufacturer is entitled to a great deal of credit in that he was shipping completed shells less than four months after receiving his initial order, and five months after war was declared.

To revert to some of the early troubles encountered in heat treating, as a rule the steel supplied was rather close to the lower limit both as to carbon and manganese, if not actually dropping below, though forgings really below specification were rare. But being close to the lower limit, especially in carbon, limited the range in which such shells should be quenched and tempered to get the required physical properties. The man in charge of the heat treating always aimed to carry his steel well past the critical range, but should the shell not show a proper hardness in quench-

ing from that temperature, a higher temperature was tried, many cases of overheating resulting.

Microstructure of one of first shells heat treated in any Canadian plant is shown in Fig. 1.—carbon 0.47, manganese 0.51, magnified 100 diameter. Heat of 1700 deg. F. quenched in oil, reheated to 1000 deg. F. cooled in air. Elastic limit, 34.7 tons, ultimate breaking strength 53.5 tons, elongation 19 per cent. Shells from this steel had previously been quenched from 1490 deg. F., reheated to 1100 deg. F. and failed. It was finally passed by quenching from 1550 deg. F. and reheated to 800 deg. F., the elastic limit reaching 39.6 tons, ultimate breaking strength 58.5 tons with an elongation of 14 per cent.

Whether or not the increased elastic limit and ultimate strength was altogether due to the lower temperature at which these shells were tempered is a question. The repeated heating may have refined the ferrite grain somewhat, the quenching temperature no doubt had an influence, but in the writer's opinion the tempering was the greatest factor.

In the early days numerous instances came under the writer's attention where shells, under 0.50 in carbon, which failed after being tempered at 1000 deg. F., were brought within specification by quenching from exactly the same temperature and reheating not over 800 deg. F., in some instances the ultimate strength being increased 6 tons, while the elongation in no instance went below 12 per cent.

The shrapnel shell being 9 in. deep with an inside diameter of $2\frac{1}{2}$ in., it is obvious that success in hardening depends to a great extent on the manner in which the shell is lowered into the oil. The usual method of dipping base downward, allowing the oil to flow over the edge to the inside and swinging backwards and forwards was on the whole sufficient. An early installation provided for pumping cold oil into the

ed of losing its life when the fault was due to a leak in the tank allowing water from the cooling system to penetrate, forming an emulsion, which as a quenching medium was far from being a success. In some cases the forgings were annealed at about 1200 deg. F. before machining. The better machining qualities were an offset to the extra operation, besides the steel was in better shape to receive final heat treatment.

Steel Makers Help

The steel companies were quick to recognize the value of a few extra points of carbon and manganese, so that as the work progressed less and less difficulty was encountered in hardening and in many cases, after quenching, it was necessary to reheat to a noticeable redness in order to sufficiently temper the steel.

Fig. 2 shows the microstructure of an average shrapnel shell recently made, carbon 0.52, manganese 0.75, magnified 100 diameters. The shell from which this specimen was cut was heated to 1550 deg., quenched in oil, reheated to 1000 deg., and cooled in air. Elastic limit 42 tons, ultimate breaking strength 70 tons, elongation 15 per cent.

Under a higher magnification the sorbitic condition of the steel is plainly seen. This is the condition which the manufacturer aims to produce. The temperatures in average practice vary from about 1450 deg. to 1600 deg. for quenching and from 800 deg. to 1100 deg. for tempering, depending on the carbon content. In ordinary furnace practice 20 minutes would be about the average time required to heat the shells for quenching with possibly a little longer time for tempering.

It would be about April, 1915, that the first orders for high explosive shells were placed in Canada. First came the 3 in. shell, in outer design the same as shrapnel, but with thicker walls. These shells were machined from bar stock and required no heat treating. Later

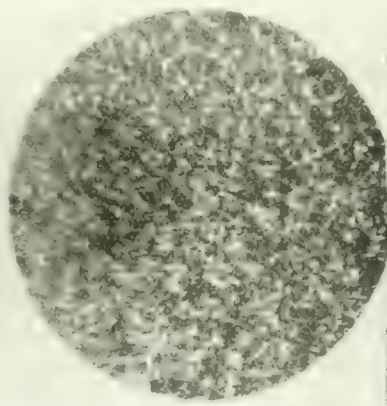


FIG. 1.

interior of the shell as it was being lowered into the tank. This method proved very useful especially in low carbon, low manganese steels.

Quenching oils were another source of trouble especially in the early days. Some were justly condemned and some unjustly. Frequently an oil was accus-

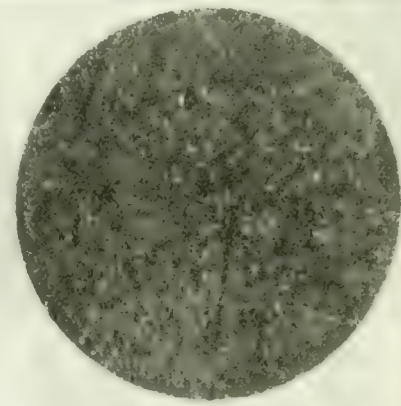


FIG. 2.

came the 4.5 in., and 6 in. high explosive, and later still the 8 in. and 9.2 in., which cover the range of Canadian manufacture. All these shells had to be forged, and as the demand for high explosives grew rapidly, many new forging companies entered the field.

It being necessary for the shrapnel

shell to receive a final heat treatment, no strict specification covering the properties of the steel in the forging was required, whereas the high explosive shell not undergoing such treatment must possess the required physical properties before leaving the forging plant. The specifications covering this type of

up to forging temperature together. The piercing, as a rule, is done in one operation and the shells cooled. The cooling is either retarded or accelerated according to the carbon content.

Where the carbon drops down to 0.40 per cent., accelerated cooling is necessary, whereas in the higher carbon steels

above the critical range and cooling accelerated.

High carbon heats showing too great a strength and low elongation should be heated well up but not through the range and cooled slowly. It is not often that rejected heats fail to respond to the annealing treatment.

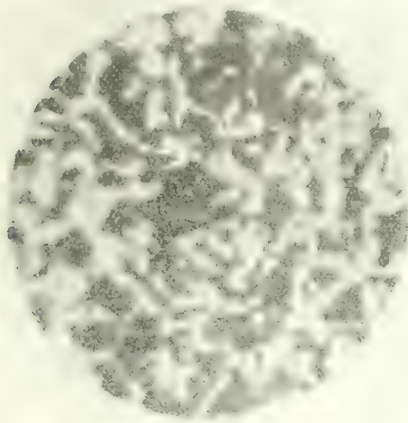


FIG. 3.

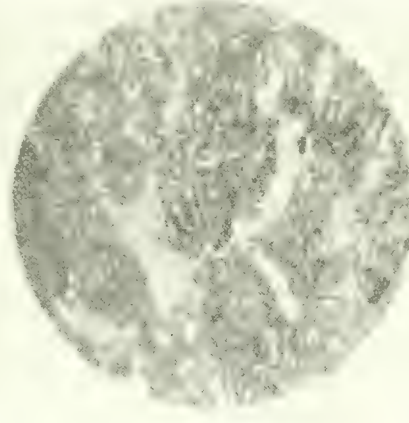


FIG. 4.

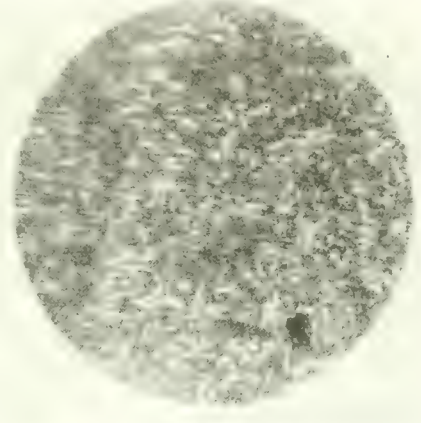


FIG. 5.

shell call for an elastic limit or yield of 19 tons, and ultimate breaking strength of not less than 35 tons, and not more than 50 tons, with an elongation in 2 in. of not less than 14 per cent. The maximum carbon content is 0.55 and while there apparently is no minimum the forging companies are not required to accept anything under 0.40 per cent. The minimum manganese content is 0.40 and maximum 1.00, sulphur and phosphorus under 0.05 and silicon under 0.30 per cent.

The shells are forged from either rolled or cast blanks; while many of the 4.5 in. and 6 in. shells have been forged from cast blanks, the tendency is to produce these types from rolled stock. The 6 in. and under are forged with a solid base. The 8 in. and 9.2 in. are forged with a solid nose, the blanks being cast with a tap-

the cooling must be retarded as much as possible. Practice in this respect varies in different plants and for the different types of shells. As a rule, low carbon heats are stacked in the open, considerable space being left between each shell for circulation of the air. High carbon heats are stacked closely, well protected from the air and may be covered with cinders or some similar medium to retain the heat. In no case is it permissible that the shells be in contact with each other during cooling. Test pieces are taken from each heat after forging, and any heats failing to pass the specifications are set aside to be normalized or annealed.

Failures and Their Treatment

Rejected heats may be either too weak or too strong and must be either brought

Some low carbon, low manganese heats, failing to respond to ordinary air cooling, have been brought up to strength by an air treatment which consists of forcing cold air into the interior of the shell, the exterior at the same time being subjected to similar treatment.

Fig. 3 shows the microstructure of a 0.40 carbon steel as forged which failed in the test, magnified 100 diameters. Yield, under 19 tons, ultimate breaking strength 34.5 tons, elongation 26.5 per cent.

Fig. 4 shows the same steel annealed at a temperature of 1400 deg. Magnified 100 diameters. In this specimen the heating has not been sufficient to break up the ferrite grain, yet the refining of the pearlite has added sufficient to the yield and ultimate breaking strength to pass specifications. Yield over 19 tons, ultimate breaking strength 38 tons, elongation 26 per cent.

Fig. 5, microstructure of a similar steel, 0.440 carbon, 0.76 manganese, heated to 1550 deg., cooling accelerated. Yield over 19 tons, ultimate breaking strength 48 tons, elongation 19 per cent. In this specimen the heating has been carried through the range, a new structure being formed.

Fig. 6 shows the structure of a 0.50 carbon steel as forged, and cooled quickly. Magnified 100 diameters. Failed too short.

Fig. 7, a similar steel as forged, cooling retarded. Magnified 100 diameters. The retarded cooling has permitted the normal amount of ferrite to separate out. This steel passed. Yield over 19 tons, ultimate breaking strength 38.7 tons, elongation 23 per cent.

While it is true that the munition industry in Canada has not developed anything new in heat treatment so far as the science is concerned, still the Canadian manufacturer has proven his ability to meet the demands made upon him. Eight hundred thousand completed shells

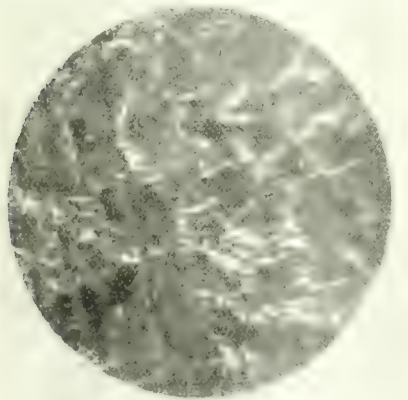


FIG. 6.

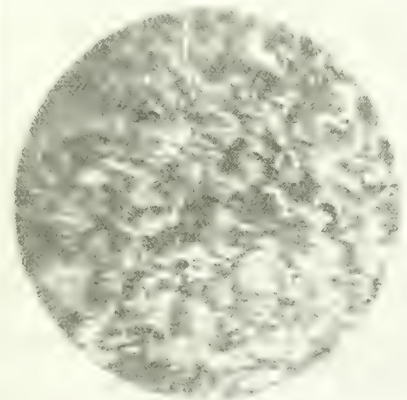


FIG. 7.

cred nose approximating the taper in the finished forging.

For the forging operation, the blanks are generally heated to a temperature of from 2000 deg. to 2200 deg., either in large continuous furnaces or in smaller batteries where the shells are all brought

up or toned down. Failures generally occur in those heats close to the minimum and maximum carbon content. Low carbon heats, showing a failure to reach the minimum breaking strength, low in elastic limit, and high in elongation, should be brought to a heat slightly

every week, a greater production of munitions than that of any other country before the war except Germany. The evidence of the great Canadian industry playing in the Allied cause.

FUTURE DEVELOPMENT OF BRITISH INDUSTRIES

By L. F.

IT IS generally recognized that there must be at an early date a considerable expansion of the British manufacturing facilities, and it is very obvious that if British manufacturers are to be ready for the campaign after the war a great deal of preliminary work will have to be carried out. With the Englishman's inherent instinct of leaving till to-morrow what should be done to-day, very little actual scientific preparation has been even thought of, whilst little or nothing has been done.

It needs only a slight analysis of the position in shipbuilding, in the iron and steel trades, in textiles, in chemicals and other important branches of industry to demonstrate that great as may be the call upon a majority of these for war material the general demands of the world's markets, no less than the large requirements for reconstruction work in the vast territories devastated by the war, will make necessary an increase in output in all these departments of trade. If it be thought, for example, that the facilities for ship construction, which have been provided in the extension of existing and the new yards which have been put in operation since the outbreak of the war, will suffice to meet the demands of shipowners for new ships during the next few years, the idea should be dismissed. This applies to the iron and steel and other great industries.

It requires, however, an intelligent co-operation between the public authorities and land-owners in order that manufacturers seeking to find a factory site where the particular requirements of a branch of industry or business will be best met may be able to complete their arrangements with a minimum of trouble. At the present time, except for purposes of emergency war-work, no expenditure of either capital or labor can be made on the erection of new factories, but there is a great deal of preliminary work which it is absolutely necessary to carry out, including the acquisition of a suitable site, the preparation of plans, and the placing of contracts for construction and equipment in order that the factory may be ready for occupation at the earliest possible moment.

The railway companies have without exception created special departments to deal with questions arising out of the contemplated extension of manufacturing resources. Experience has shown that these new railway departments have served a very useful purpose, and that the information at their disposal has frequently enabled manufacturers to obtain sites in areas where the local conditions best satisfy the demands of par-

ticular trades. The attitude of the railway companies is easily understood. The attraction of new industries to the area served by them must result in additional sources of future traffic, and as the majority of the principal railways are also port-owning authorities, they have a twofold interest in the transport side of commercial development.

On the other hand, only a few of the leading municipalities are taking a broad view of their responsibilities in this respect, and yet they can give immeasurable help to the manufacturer, but their general rule is to regard commercial development as being outside their sphere of influence. Perhaps the mistake lies in placing the sites-for-works branch of municipal activities in the hands of the town clerk or borough surveyor, who is usually overburdened with work and who naturally regards the new task thrust upon him as coming at the end of an interminable list of duties. The only sensible method is to create a new department entirely and to let it co-operate with the existing departments of municipal enterprise. Some action will soon be needed by all British municipalities to devise means whereby their vacant lands can be laid out to the best advantage to serve all the new manufacturing interests and the developments of the old ones, in the commercial struggle which looms ahead.

BOILER FAILURE DUE TO INCRUSTATION

THE formation of a hard boiler incrustation, consisting largely of silicates, was the apparent cause of a peculiar boiler failure, which was reported on recently in the "Chemiker Zeitung."

A series of boilers had for some years been installed in some works, and the boilers, which were in uninterrupted use, had been cleaned every three months. Under the pressure of work the cleaning had to take place at intervals of four or five months; then a crack developed in one of the boilers; the boiler was quickly repaired without much inquiry into the cause of failure, and then a second boiler failed, exactly in the corresponding spot. The boilers, which were combined with superheaters, were provided with two internal flues, which were corrugated in the front part; the cracks occurred in the straight flue near the corrugation. The examination proved that the iron was sound, but that the incrustation was locally abundant and of unusual composition.

Ten samples were taken of the deposit, which was hard in some parts and muddy near the superheater end, and which varied locally in composition to an extraordinary degree. The carbonates were always low, about 1 per cent.; the lime (CaO) percentage ranged from 1 up to 24, the magnesia (MgO) percentage from 2.7 to 25, the calcium sulphate from 2 per cent., up to 83 per cent., the silica (SiO₂) from 9 per cent. to 59 per cent., and the percentage of iron and aluminum oxides (together) from 0.2 to 59. The

iron did not come from the water, but from the boiler plates, which were corroded near the superheater end. The silica percentage was high in general, highest in the muddy portion.

The hard scale, which seemed to be responsible for the local superheating and cracking of the plates, contained 36 per cent. of SiO₂, 2.4 per cent. of iron and aluminum oxide, 20 per cent. of CaO, 8.3 per cent. of MgO, 48 per cent. of CaSO₄, and had also a high percentage (6) of water of hydration. The feed water came from two sources, one of which was rich in silica; such feed water is not worth chemical softening sometimes, but may be used when the boilers are frequently cleaned. A further study on silicate boiler scales is to follow.

ELECTRIC STEEL MANUFACTURE IN DENMARK

A COMPANY has been formed in Denmark, with a capital of 600,000 kronen, for the manufacture of steel from scrap, which is being smelted and refined and a little new iron added. It is said to be the same process which the Krupp works use for the manufacture of their best guns. To commence with, the new undertaking will confine its work to the production of smaller articles, machine parts, etc., but it is proposed to extend it, ere long, also to comprise heavy ingots by the Siemens-Martin furnaces, of which so far only one has been in use in Denmark—in the Burmeister and Wain establishment. Scrap is said to be available in sufficient quantities, but up to now it has principally been exported to Sweden. The new company, consequently, is fairly independent of foreign supplies, which is a very important point under the present circumstances. The undertaking is backed by several prominent men, and the installations will ultimately be on a large scale. The foundry building is two-storied, and has a length of over 100 m. Operations will commence probably by the end of November, and work is expected to be in full swing in the beginning of the new year.

AMERICAN dyestuff manufacturers are now producing large quantities of toluidines, resorcin, xylydine, dianisidine, naphthylamine, diphenylamine, tolidine, benzidine, benzaldehyde, benzylchloride, nitrobenzol, nitrotoluol, H-acid, phthalic, metanilic, saulfanilic, and naphthionic acids, naphtholsulfo acids, naphthylaminosulfo acids, and amidonaphtholsulfo acids, Schaeffer's salt, paranitraniline, dimethylaniline, and numerous others.—United States Commerce Report.

A 10 per cent. aluminum bronze to which was added 1 per cent. of 30 per cent. manganese-copper had the following physical properties: Ultimate strength, 63,800 pounds per square inch; elastic limit, 19,700 pounds per square inch and elongation in two inches, 49.3 per cent.

Press Work Operations in Hospital Equipment Production-II.

By D. A. Hampson

Operations possessing marked features of economy, adaptability and lack of intricacy in the finished product are characteristic of the work described. The factors of labor cost, quantity production, necessary degree of accuracy, and cost of dies are related to each other in a manner which must receive careful consideration if successful results are to be obtained.

MANY articles of hospital equipment sent abroad must be shipped knocked down. This necessitates a construction that can be assembled by hand or with the use of hands and hammer only and to secure this end, various links and connecting pieces are required.

strike first, making impressions deep enough to prevent any drawing.

An Improved Feed Attachment

Another piece was wanted by the twenty thousands, of a shape tapering from $\frac{3}{8}$ in. to $\frac{1}{8}$ in. made of $\frac{1}{16}$ in. steel. This steel was purchased in $\frac{1}{2}$ in.

Pipe and tubing and rods enter largely into the construction of cots and operating tables etc. The rods are cut off in a punch with the punch and die shown. The construction of this is very like that of the angle cutter previously described. That pipe could be successfully cut off by shearing is doubted by most machinists until they see it done; they will naturally say that the upper half would collapse or that a piece would have to be used inside. Shearing does not make a real clean job but it makes one that answers the purpose in this case at least. The pipe does close up a little but not enough to be objectionable.

A further pipe job done on the punch is the closing of ends which are generally closed on the anvil. Such pieces are wanted for braces or ties and have a hole punched in the flattened ends for the rivet fastening.

Various Processes

Though having no connection with press work, the practice on some other jobs is of interest. The $\frac{3}{4}$ in. and $\frac{1}{2}$ in. iron rods which enter so largely into chair and bed work are bought in coils. As

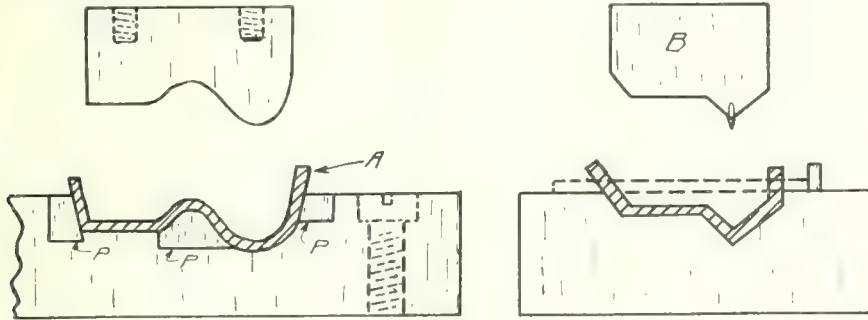


FIG. 1

The piece "A" is a connection that is punched out of $\frac{1}{8}$ in. iron and afterwards formed to shape. The upper and lower dies for this are shown. For some of the bent pieces, the smaller ones, the dies are made in one piece of tool steel but if the piece is large or of a shape that is likely to give trouble in hardening, the body is cut out of soft steel and hardened pieces inserted at the points of wear as at the points P, dotted in the drawing. Some trouble was experienced in controlling the action of the pieces being formed when between the dies, due to the slipping and sliding which is bound to occur. Clamps or spring holders could be used for this trouble but a better way is shown on the die B where the work draws away from the set position. Two points like prick punch ends are inserted in the upper die and they

wide, strips 4 ft. long and was run under the punch between the usual guides and strippers. As the machine had no feed, the arrangement shown was attached to the ram to secure that even spacing which makes for economy and speed. The machine was speeded down to 40 revolutions per minute and the operator had no trouble in following it. A spring plunger was attached to the back of the ram, the plunger at its upmost position just nicely clearing the stock and coming down ahead of the punch. The operator shoved the strip under the plunger as soon as it was up but the latter immediately descended with the plunger inside the space and the operator had time to shove the strip through until it struck the plunger before the punch had reached its cutting position.

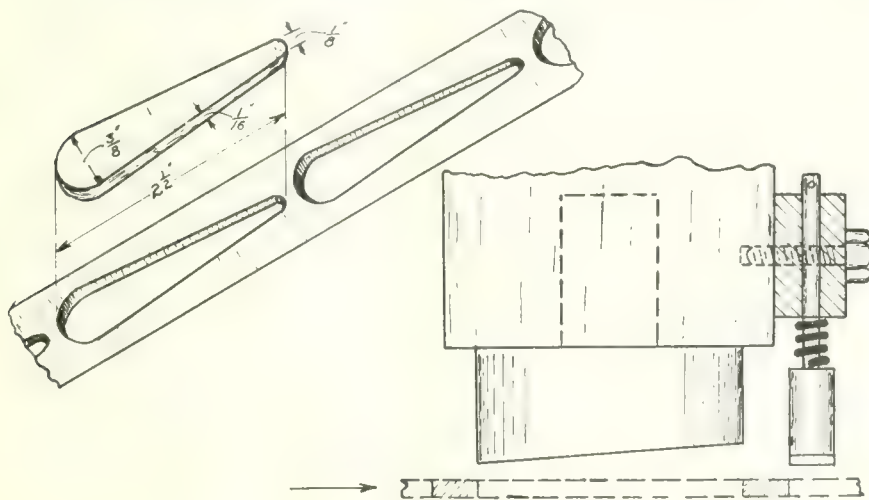


FIG. 2.

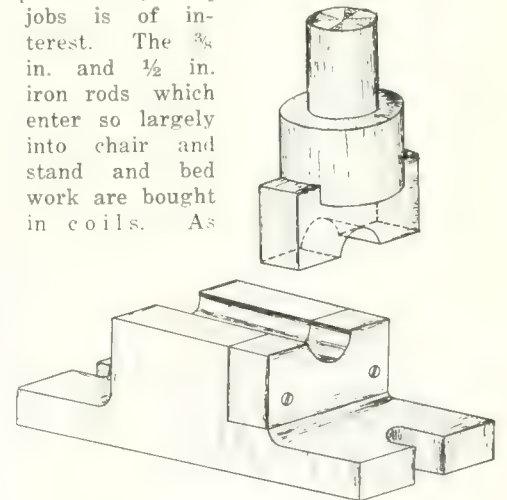


FIG. 3.

wanted these are run through a straightening machine, which also cuts them off to length. There is thus no waste of stock and a saving is effected in buying the rods in coils as against mill length.

As in automobile body practice, stands and chairs and cots are dipped for painting. The process is usually continuous by means of an overhead conveyor system and the approaching chair is lowered in the tank of sanitary white enamel and raised, drips off on to a drain board as it goes, and passes into the oven.

The sockets for hospital beds are cast directly on the ends of the angles which form the side rails. To make the iron a

right and stayed part of the length a bit of some sort of arrangement to be fitted on the end of the punch. One simple way to do this is to use the punch and die (previously described) so their vertical faces do not touch as in regular practice. A slight protrusion known as the "chamfer" from 1/16 in. to 1/16 in. they would slur or bend over the end of the piece being worked. In this case, that is desirable and the burr forms all the grip required.

PERMANENT CAPACITY FOR AIRCRAFT MANUFACTURE A FUTURE NECESSITY

STUDENTS of aviation are well aware and more concerned with the permanent and future development of flying. Conditions and circumstances where this means of locomotion will be paramount are already foreseen; indeed, in certain quarters it is believed that the prospective permanent capacity of those aircraft plants which may remain in the business after the war will be entirely inadequate to meet demands. Certain parts of Canada have had ample opportunity of becoming familiar with aeroplane work, but geographical and social conditions in Europe point to an intense application of this latest art. At a recent discussion before the Aeronautical Society the commercial future of aircraft was discussed, and it was shown that by means of air services Paris can be brought within three hours of London, Rome within 12 hours, and Petrograd and Constantinople within a day's journey. With regard to the costs of running an aerial service, statistics have been compiled showing that it would be possible to commence an aerial service between London and Paris for total costs of 4s 8d per mile, and that such a service could be made to pay at a comparatively modest charge for passengers and mail traffic.

In any case, whether these estimates can be realised or not, it is certain that the aeroplane is going to be used by business men for business purposes. No other mode of transport can touch it. For mail services, it seems certain that the aeroplane can by virtue of speed and moderate cost per letter compete effectively with existing mail services. Specialised services of all sorts will also come into operation. The aeroplane will provide a means of communication for moderate-sized communities in the overseas Dominions pending the development of railway services, and will also act as a feeder for existing railways until development warrants their extension. The case for the extended use of aeroplanes for commercial purposes is quite sound, and needs no further argument.

Manufacturing Capacity

A point which needs to be borne in mind is, if the present manufacturing capacity, which has failed to provide for the full needs of the war, will be sufficient to meet the demands which will set in after the termination of hostilities for commercial aircraft. There is a

general impression that it will not. Many of the works which are at present engaged in the production of aeroplanes and aerodrome engines or are acting as sub-contractors for the supply of parts, have only undertaken this branch of manufacture to meet the national emergency, and in very many instances, owing to the fact that it is emergency work for which their equipment is not well fitted will cease to participate in this industry after the war.

On the other hand, some of the firms now engaged in aircraft manufacture intend to make this their permanent business and are laying plans for considerable extensions either on new sites or adjacent to their present headquarters. This branch of business should lead to the development of many areas where there is ample land available not merely for the erections of works, but for the flying grounds which should be provided in conjunction therewith. One famous Midland town is already in negotiation for the establishment of a large new aircraft factory on a favorable site, and this is only one example of a tendency which is sure to be widely followed by those who are anxious to obtain a footing in what promises to be a lucrative branch of industrial enterprise.

Many of the smaller towns are admirably adapted for works of this description owing to the ample character of the sites available, and the price at which land can be acquired for aerodrome purposes. It is a department of manufacture which above all others ought to be specially catered for by those districts whose industrial importance is still in the making. Even apart from the great use which is certain to be made of the aeroplane for commercial purposes, the military demand is certain to be on a very large scale for many years to come. If there is one lesson of the war which emerges more plainly than any other it is that Great Britain must be as supreme in the air as she has always been on the sea.

Lines of Development

It might have seemed at one time as if the manufacture of aircraft would have been the natural heritage of motor car manufacturers, and although it is probable that many of the leading motor firms will be associated with the new developments the lines of progress are not identical, and the many problems which have to be attacked will lead to the establishment of an entirely independent industry. The aircraft engine of to-day is already as little like the standard motor car engine as that engine is akin to the variety used on a commercial motor vehicle or that installed in a motor boat. The aircraft engine is quite a distinct branch of the development of the internal combustion engine. Hence the need for independent factories where the problems to be solved can be approached free from influence connected with old practice, and quite divorced from any association with motor car manufacture, which is governed by very different conditions.

Industrial development committees who are paying attention to the question of sites for new works would do well to give special consideration to the needs of aircraft manufacture and endeavour to attract to their districts a branch of enterprise which is destined to progress by very rapid strides.

A NEW British built magneto based on French designs, which will give a firing spark at exceedingly low turning speeds, is being made. Report states it cannot be injured by high revolutions, while at the same time it will furnish current for lighting the lamps. The *Commercial Motor* understands that the experimental model has been run well over 100,000 miles, and that the type will be shortly standardised on the cars of one of the oldest and largest manufacturers on the continent.

"BORRODISING" is the name given to a system of electro-deposition of zinc which has been introduced as a preventive against corrosion of the steel fittings of aeroplanes and seaplanes. It is described as a method of cold electro-galvanizing carried out in such a way that the zinc so unites with the underlying metal that only by extreme wear can the surface of the steel be exposed. As the metal is not subjected to the usual pickling bath prior to the galvanizing, it is claimed that there is no reduction in the strength of the metal after treatment.

BEFORE the war the Germans obtained annually about 900,000 tons of iron pyrites from Spain for the manufacture of sulphuric acid, and they themselves produced about 300,000 tons every year at Meigen, in Silesia. In 1912 and 1913, however, they increased their purchases from Spain to 1,200,000 tons per annum. Owing to the stoppage of the Spanish supplies by the war, they had to look about for other sources, and have, no doubt, found some in occupied Poland, and small quantities also in Greece and Turkey. Besides this Germany has received about 400,000 tons of pyrites annually from Norway.

IT is said that the United States of America, as a result of the quiet but unceasing efforts of foreign buyers, have been stripped of their supply of seasoned spruce and walnut. The former is used in making the struts and braces of aeroplanes, while the propellers are almost exclusively manufactured of walnut wood. As it requires three years to properly "cure" this material, the United States aeroplane makers are confronted by a serious situation. The remedy suggested is Government purchase. It is proposed that the Government, through the Bureau of Standards and of Forestry, should enter the market for sufficient quantity of the lumber to tide over the emergency, selling to the smaller manufacturers quantities of the stock as they may be required.

WHAT IS HARDNESS?

JUDGING from recent discussion of the subject, the peculiar property or combination of properties which constitute hardness in one substance, may be altogether different in another substance which would ordinarily be termed hard. In the great majority of engineering applications hardness is assumed to be indicative of resistance to wear by abrasion. In other cases where results have to be proven, it is utilized as an indication of strength in one or other of known aspects.

Just what qualities in a metal can be relied on as a guide to abrasive resistance can not be absolutely specified in a manner suited for general application, because of the lack of a precise definition of hardness. The matter is treated at some length in an editorial article in which "The Engineer" discusses Professor Turner's definition as advanced by him recently. The writer says, we may tentatively advance the view that hardness is not a separate property of a material as its density, specific heat, or elasticity is, and we would suggest that the definitions of hardness hitherto propounded fail, and the various means of measuring it are unsatisfactory, because the combination of properties that we call hardness in the case of one body is not always the same combination that gives us hardness in another. There are some grounds for thinking that there is not one scale of hardness, but many, and, therefore, that not one definition but several are required, and that one means of measuring hardness cannot be universally applicable to all materials.

Scratch Test

Among the different methods that have been proposed for determining "hardness" the scratch test, due in the first instance to Professor Turner, no doubt appeals to us as being most directly in keeping with our primitive conception of the property. It certainly has the sanction of immemorial custom. Yet, when we come to analyse what a scratch is we open a field of controversy from which but one fact clearly emerges, namely, that all scratches are not necessarily of the same nature. It is possible, as our readers can easily verify for themselves, to scratch vulcanite in at least two different ways. With a fairly blunt point and but little pressure the scratch is produced apparently by causing the material to flow from beneath the scratching point to either side. There is no perceptible removal of material in this case. With a sharper point, or with a greater pressure behind the blunt point, the scratch apparently is produced almost entirely by the removal of the material in a powdered form. Some materials scratch in one of these ways, others in the other. Thus, a scratch on lead can be made by causing the material to flow, while the mineral calcite is scratched by the direct removal of material in a powdered form. Now lead and calcite both possess what we call hardness. Yet from

the radically different manners in which they scratch it seems obvious that their hardnesses, as determined by the scratch test, are not of the same nature. The "scratchableness" of lead—if we may use the word—seems to be due primarily to the viscosity of the metal, while the scratchableness of calcite appears to be due to a low degree of cohesion among its particles. Either then the scratch test does not measure "hardness" at all, or it really does, in which case we seem led to believe that hardness in lead is a radically different property from hardness in calcite. If this is so, it seems absurd to attempt to measure the two hardnesses by means of the same instrument, for it appears obvious that the two figures arrived at cannot be comparable.

Brinell Test

It is quite possible, of course, to measure the "hardness" both of lead and calcite by means of a scratch test instrument. That, however, is no proof that the two hardnesses are physically of the same nature. On the other hand, it is not possible to measure the "hardness" of both substances by means of the Brinell method. This method is suitable only for ductile materials like lead. It would fail entirely to give any result with a brittle material like calcite. If our theory is right the explanation is obvious. The Brinell test can only measure the hardness of a material if the hardness of that material is primarily due to the degree of viscosity that it possesses. We are aware that the Brinell ball test figure is very generally regarded as being a reflection of the yield point of the metal tested, and to suggest that it should properly be regarded as a measure of the viscosity of the solid material at normal temperature is to introduce something of a new—and possibly contentious—conception. That the phenomenon of viscosity exists in certain solids, including ductile metals, as well as in the classical examples of pitch and shoemaker's wax, is, however, admitted. That it is the cause of one form of hardness, and that it is measured when we measure the hardness of a ductile metal by the Brinell test, seems to be a reasonable suggestion, particularly when we note that both viscosity and hardness decrease with rise of temperature, and that viscosity and the Brinell ball test figure are both measured in terms of force per unit of area.

Hardness and Abrasion Resistance

If we admit that there are at least two important different kinds of hardness—one a viscous hardness, as measured by the Brinell test, and the other a cohesive hardness, as measured by the scratch test—some light can be thrown on the relationship existing between hardness and resistance to abrasion. In nine cases out of ten, in practical work, hardness in metals is desired because it is commonly accompanied by an enhanced resistance to wear or abrasion. In about nine cases out of ten, too, hardness and resistance

to abrasion are regarded as synonymous. It is not possible at present to say what the relationship between these two properties is; but it is hard to believe that there is any difference other than one of scale between the resistance of a metal to abrasion and its hardness as measured by the scratch test, provided the metal is one to which the scratch test can properly be applied. In both cases a direct removal of material is involved. On the other hand, no simple rough connection can be traced between the viscous flow of a ductile metal under the Brinell ball and the resistance of the metal to abrasion. In one case there is not, in the other there is a direct removal of material, and it would indeed strike us as strange if a test that involved no removal of material could give any satisfactory indication of the result of another form of test that does.

Conclusion

Experiments, so far as we know, are lacking as to the relationship between resistance to abrasion and hardness as measured by the scratch test. It is otherwise in the case of the Brinell test. Dr. Stanton's experiments at the National Physical Laboratory show very definitely that the Brinell ball figure is absolutely worthless as an indication of the resistance of a metal to wear. The ratio between the Brinell hardness figure and the resistance to abrasion varies quite erratically from—in the series of steels tested—0.7 to as high as 64. On examination of the nature of the metals tested it will be found, we think, that in general they are not such as would be expected to owe their hardness to a high viscosity. They are manganese steels, gauge steels, and other steels that have been toughened or hardened by heat treatment or otherwise. We can readily believe that they owe their hardness to a high degree of cohesiveness among their particles, and we would, therefore, suggest that good agreement might be expected between their resistance to abrasion and their hardness as tested by the scratch method. Their hardness is the hardness of calcite and not that of lead. That a method and instrument which can take cognisance only of the latter type of hardness should be able to predict their resistance to abrasion is not, we think, to be expected.



IN co-operation with the Bureau of Mines, an investigation of the electric melting of brass is being conducted at Cornell University. The experiments indicate that the use of a suitable electric furnace will materially reduce melting losses and the Bureau of Mines now is testing an electric furnace built according to the design worked out by the laboratory tests. This furnace is of commercial size and is being tested with a view to ascertaining its suitability for such processes as are used for cartridge and shrapnel cases.

PRODUCTION METHODS AND DEVICES

A Department for the Interchange and Distribution of Shop and Office Data and Ideas Evolved from Actual Practical Application and Experience

NOTES ON THE MANUFACTURE OF CLAY CRUCIBLES

By G. C. WHITE

THE manufacture of crucibles is one of the most important developments in metallurgy. Its production has been hampered by unimproved methods, high cost, and the difficulty of getting any quantity when required without any delay. Formerly those crucibles made from German clays were the best, and when it became necessary to use American clays the results obtained in the experimental stage will long be remembered as being unsatisfactory.

It was found that although the analyses of clays resembled one another there was a vast difference in their resistance to heat and binding power, which two details are obviously the prime requisites of good crucibles. A simple test to establish these factors can be arrived at by making up patties in the laboratory, placing them on a piece of boiler plate, and applying heat. The relative shrinkage, bond, and fusibility can then be observed in a general way.

Composition

Like a commercial fireclay, the mixture for crucibles must be varied to suit the service conditions. For example, too much silica permits of crumbling—although it is fire resisting, it fluxes easily at sometimes low temperatures. Alumin is refractory and has good binding power, while magnesia, manganese, iron, lime, etc., are injurious. Slight additions of coke cut down the shrinkage during drying. The quantity of water present in the clay is important as it affects the general character of the structure of the clay. Its content should not be too low, about 10 per cent. being preferable. A few analyses collected from various sources will show the variations of clays from different localities.

	German	Bohemian	American	English
SiO ₂ ...	64.9	47.6	74.9	73.6
Al ₂ O ₃ ...	—	39.0	17.20	16.50
Fe ₂ O ₃ ..	0.8	0.5	0.79	0.27
CaO ...	—	0.6	0.29	1.17
MeO ...	0.5	0.1	0.46	0.21
Water ...	1.4	9.9	1.61	5.84
Water ..	8.4	13.6	5.44	2.45

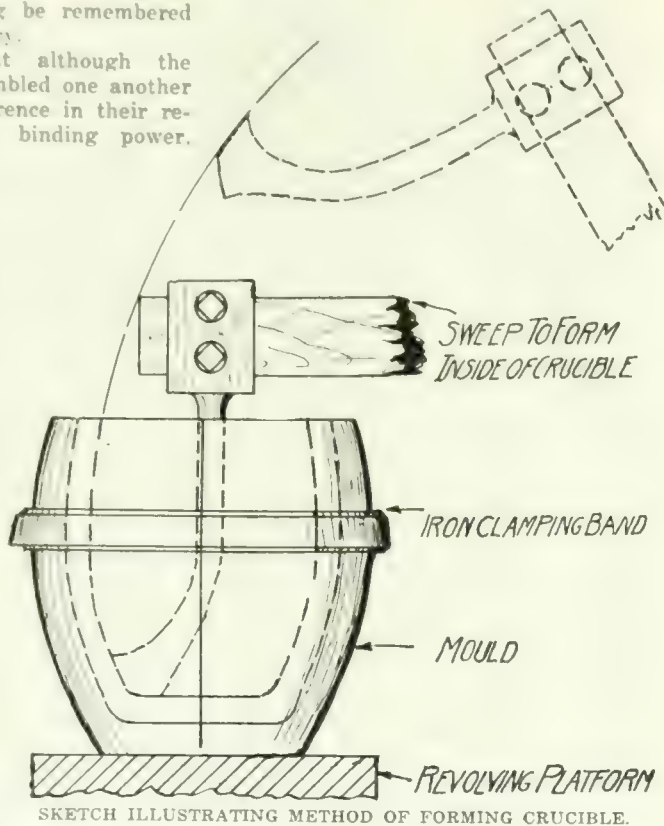
The national analyses of the above show that the clay substance varies from 100 to 52.5 per cent., quartz 0 to 40.72 per cent., and felspar 9 to 25.31 per cent.

In making the crucible the clay is proportioned and thrown into the mill which is in reality a mixer. The mill is a vertical cylinder split at the vertical center line to permit of cleaning. The mixer blades are helically inclined and tend to force the mixture to the bottom of mill where a conveyor screw forces

months and the temperature is varied, increasing as the operation progresses and starting at 200 deg. Fahr. The preliminary heating is done with steam coils and must be very slow as on this heating and the moisture content depends the ultimate structure and strength of the product. Annealing must be done when the crucibles are to be used and the charge must be put in while the crucibles are hot. If the crucibles are allowed to cool after annealing they are useless for the purpose for which they were intended. This annealing is done at 1,300 deg. Fahr. and takes from 12 to 15 hours.

The life of a crucible depends to a large extent on the quality of the steel being melted, which in turn governs the quality of the slag. The slag line cuts into the interior of the crucible, at slightly above the middle, consequently the crucible is weakened at this point and, provided it is strong enough for another charge, the next one is figured so that the second slag line comes below the first slag line. The life is, therefore, from 1 to 3 heats. The absorption of carbon by the steel when made in a clay crucible is practically nil.

Several American companies have gotten away from their crucible troubles by melting in electric furnaces but the high cost of power in some localities makes it necessary that Canadian manufacturers develop the manufacture of crucibles.



the clay out through an orifice which forms an 8 inch diameter sausage. This sausage is put into a revolving mold which is split on the vertical center line. A sweep or arm, having the profile of the inside of the crucible desired to be formed, is now forced down through the center of the clay gradually shaping it, as shown in sketch. When the shape is satisfactory the mold is stood on a post and rocked to loosen crucible. The top of the post is the shape of the removable bottom, or else the mold is opened up, permitting the crucible to remain on the bottom of mold if this is more convenient. The molds are of wood, canvas, silk or jute, and lined and well oiled each time before they are used. A heavy black oil is satisfactory, such as car oil. The drying time is approximately 2

THE MANUFACTURE OF HARDENED THREAD GAUGES—II.*

By G. Doorackers.

THE operations on the male master tool are now proceeded with. Cut off a piece of 7/16 in. diameter silver steel 4.781 in. long, and after removing the tit, centre both ends with a 1/8 in. Slocomb combination centre. Then turn the diameter to .400 in.

Reduce both ends to .218 in. 1/4 in. up, so that the middle part measures about 4.278 in. in length. Turn a nick in the middle with a 3/16 in. wide parting tool to about 1/4 in. diameter, so that the length of the two large diameters is 2.045 in. Then mill a flat over the total length, so that the distance from the flat to the outside diameter measures .330 in., and rough mill the shape of the two 55 deg. points, taking care to run out with the cutter, so as to leave the centres in. Harden both points. Rough grind diameter to .380 in., and finish grind to .375 in. Then grind the flat to .3125 in. As the centres are now no longer wanted, the reduced ends can be ground off, and the points roughly ground to shape on a cutter grinder.

*Contributed to a recent number of The Engineer. No. 1 appeared Oct. 25.

The next operation, the grinding of the angle, is performed on the angle fixture (see Fig. 3). After this operation the two tools are parted with an elastic wheel,

the top of the radius equals O. Then $O = L - (K G + .150475 P)$, $K G = K H - G H$ where $K H$ is measured, and the calculation of $G H$ is as follows:—

the top of the radius equals O. Then $O = L - (K G + .150475 P)$, $K G = K H - G H$ where $K H$ is measured, and the calculation of $G H$ is as follows:—

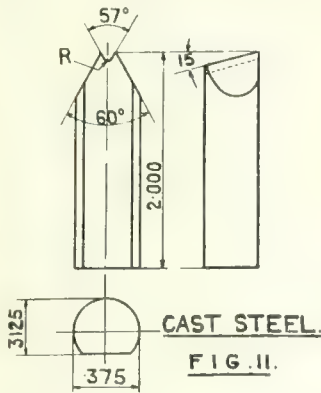


FIG. 11.

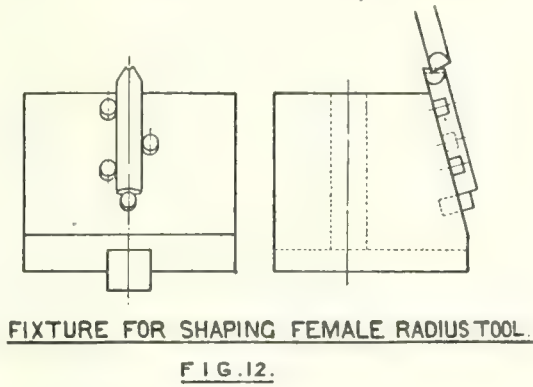
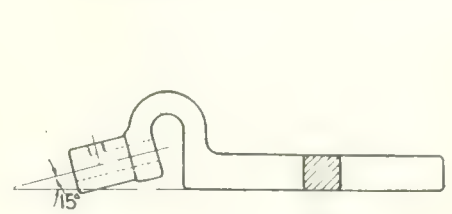


FIG. 12.



SPRING TOOL HOLDER FOR SHAPING FEMALE RADIUS TOOL

FIG. 13.

and the back of each tool is ground perfectly flat in a true solid chuck. The point is then rehardened, the diameter cleaned, and the flat lapped. The tool is then finally ground on the radius fixture, and the number of threads etched on.

Female Master Tool

We have now obtained a tool which will cut the flanks and the radius at the bottom of a screwed plug, but we still want the tool which cuts the correct radius on the top of the thread.

Fig. 11 shows this female radius tool. It will be seen that the tangents to the radius have been taken at 57 instead of 55 deg., to ensure a blending of the radius with the flanks. The error caused by this difference is so small that it can be neglected. The radius is formed with a tool of the required shape, held in a special spring tool holder—Fig. 13—on a shaping machine. The female radius tool is held on a fixture—Fig. 12—and first roughed out. The special holder and tool are only used for the final shape of the radius. The tool used must have an included angle of 57 deg. and the correct radius. This 57 deg. tool can be ground

In Fig. 14

$$a = \text{complement of } 29 \text{ deg. } 20 \text{ min. } 26 \text{ sec.} + b_1$$

$$72 \text{ deg.} = 60 \text{ deg. } 39 \text{ min. } 34 \text{ sec.} + B_1$$

$$b_1 = 11 \text{ deg. } 20 \text{ min. } 26 \text{ sec.}$$

$$\sin b_1 = \frac{\frac{1}{2}(D + d_1)}{R}$$

$$\sin 11 \text{ deg. } 20 \text{ min. } 26 \text{ sec.} = \frac{\frac{1}{2}(D + d_1)}{R}$$

$$.250 \text{ in.} + \frac{1}{2}d_1$$

$$2.4375$$

$$\frac{1}{2}d_1 = 2.4375 + \sin 11 \text{ deg. } 20 \text{ min. } 26 \text{ sec.} - .250 \text{ in.} = .47901 - .250 = .22931$$

$$d_1 = .45862$$

The radius is measured on a gauge made in exactly the same way as the one shown in Fig. 9, except that the tool for locating the top plate is now 57 deg. The distance $K G$ alters and also the distance from the sharp point to the top of the radius of the tool. The radius is, of course the same as for the standard 55 deg. tool = .137328 P —see Fig. 1.

In Fig. 15: $O A$

$$\frac{1}{\sin 28 \text{ deg. } 30 \text{ min.}}$$

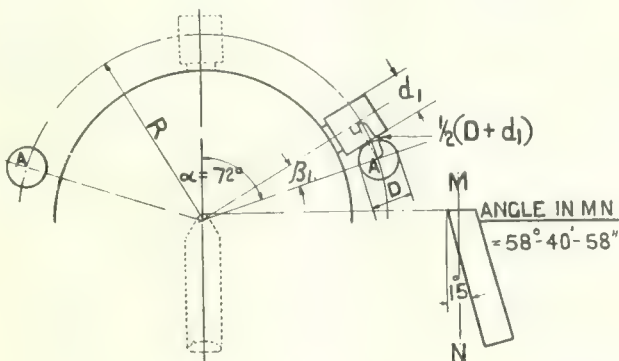


FIG. 14.

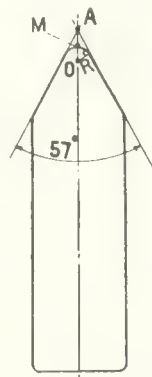


FIG. 15.

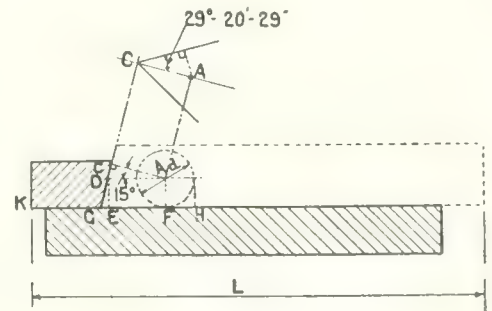


FIG. 15 B

on the radius fixture by changing the peg of diameter d into a new diameter d_1 . The angle of the tool in the cutting edge is 57 deg., but the tool is again tilted at an angle of 15 deg. The tangent of half the angle in the vertical plane = $\frac{\tan 28 \frac{1}{2} \text{ deg.}}{\cos 15 \text{ deg.}}$

$$A M = R \left(\frac{1}{\sin 28 \text{ deg. } 30 \text{ min.}} - 1 \right) = 1.09574 \times .137328 P = .150475 P$$

In Fig. 15

$B =$ half the angle in section $A C = 29 \text{ deg. } 20 \text{ min. } 26 \text{ sec.}$. Assume again the distance from the back of the tool to

$\frac{1}{4}$ -in. ball was .7431.

The calculated distance $G H$ for the $\frac{3}{16}$ -in. ball was .3170.

The calculated distance $G H$ for the $\frac{1}{4}$ -in. ball was .4226.

The distance $K G$ for the gauge in question is, therefore $K H - G H = .3205$.

That distance is $L = K G + .150475 P = 2.2700$

First example—The distance L for a fourteen thread 1/2 deg. tool measured 1.7000

$$O = L - (K G + .150475 P) = 2.2700$$

Second example—The distance L for a twenty four thread 1/2 deg. tool measured 2.2000

$$O = L - (K G + .150475 P) = 2.2687$$

The operations on the female master tool are as follows:

Cut off, face and end, and centre that end with a 5/8 inch diameter lathe centre. The diameter of cutter steel used is 7/16 in., and the length is 4.260 in. Face and centre other end to 4.250 in. length. Turn

the centre line the angle becomes slightly larger.

The calculation of the new angle is as follows: In Fig. 17:

$$O A = 1.500 \text{ in. } O D = .0625 \text{ in. } A B = C = .3750 \text{ in.}$$

$$A D = \sqrt{(1.5 - .0625)^2} = 1.4987$$

$$B D = A D - A B = 1.4987 - .3750 = 1.1237$$

$$O B = \sqrt{(B D^2 + O D^2)} = \sqrt{(1.1237^2 + .0625^2)} = 1.1254$$

$$C = O A - O B = 1.500 - 1.1254 = .3746$$

$$M.L. = C \tan a = \frac{.1955}{.3746} = .522$$

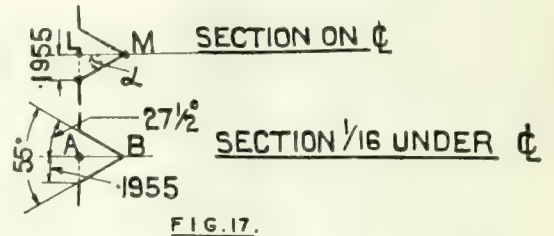
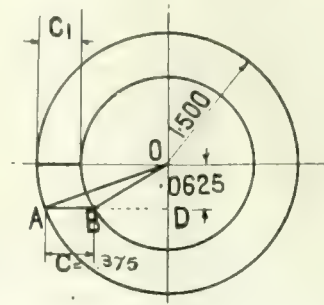
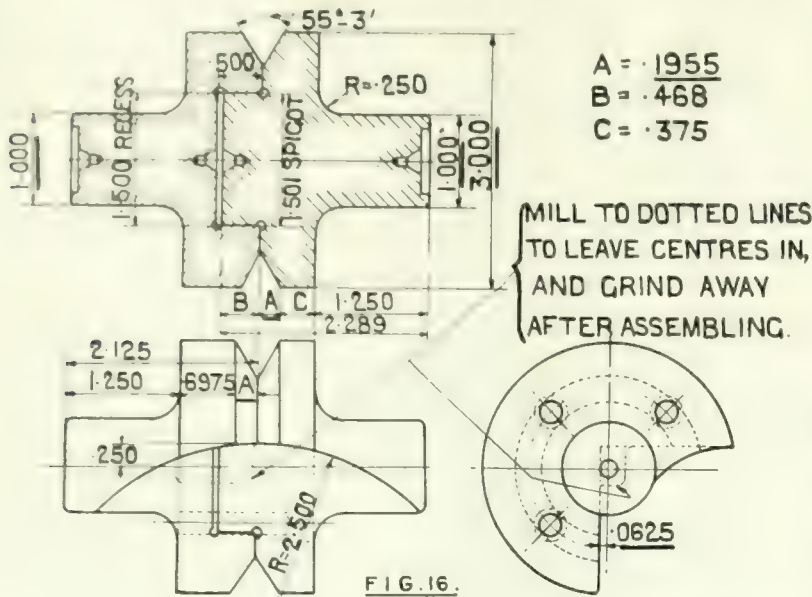
$$a = 27 \text{ deg. } 33 \text{ min. } 35 \text{ sec.}$$

The included angle of the gauge is, therefore, 55 deg. 7 min. 10 sec.

are so essential in the machine shop. The slide rest is useful for turning big work such as columns and pipes, but as it is not to be found in many shops we will confine this article to a description of the more common speed lathe and its accessories.

The Speed Lathe

The headstock spindle should extend through the bearing and be threaded so as to receive faceplates and chucks for turning work of large diameter, and the best arrangement is to have the small end of the cone towards the front of the spindle, Fig. 16, so that the back of a job on the faceplate can be turned to better advantage; the large end of the cone is then not in the way of the tools or operator's hands.



diameter to .390 in. Nick middle to .250 in. diameter and .187 in. wide, leaving two lengths of 2.031 in. Then mill a flat along the whole length to .330 in. and mark the number of threads on the flat. Rough grind diameter to .380 in. and finish grind to .375 in. Grind flat to .3125 in.; after grinding the flat the tools can be parted. The tool is now ready to be roughed out on a shaping machine. The radius is shaped as mentioned before, with the 57 deg. tool in the special tool holder. After that harden the point and clean.

Use of the Master Tools

We have now obtained our master tools, and with their help we can make our tools for cutting internal and external gauges. As it is essential to cut the thread upright a setting piece was made—see Fig. 16.

The cutting edges for both internal and external tools are 1/16 in. under centre, in order to obtain the relief which is necessary for all circular cutting tools. The shape of the thread, therefore, has to be correct 1/16 under centre, and the master tools have to be set that same distance under centre. The setting piece must, therefore, be cut away 1/16 in. under centre, and the angle must be 55 deg. in that section. In a section through

PATTERN-MAKING NOTES—TURNING

By J. W. Broadbent

WHY the average pattern shop should be the dumping ground for all the worn out lathes in the factory, is a difficult question to answer. Some manufacturers regard pattern-making as a total loss, and the loss indeed becomes real, when in the course of a few months enough time is wasted adjusting the tool rest and tailstock as would purchase a "good" lathe.

One pattern shop will have a lathe with a wooden bed, the tool rest support being secured to the bed with a hardwood wedge, and every time the lathe is started, it will have a tendency to take a flight across the room, owing to being too light for a speed lathe, and not securely fastened to the floor. Another again will have a bolt and nut for the clamping arrangement of the tool rest and tailstock which necessitates using a wrench—and the wrench is always missing from the lathe when wanted.

The lathe is the most indispensable machine in the pattern shop and it certainly pays to have one designed for the purpose, for there is no reason why pattern shop machinery should not be provided with labor saving devices which

Owing to the necessary high speed of a wood turning lathe, there should be provided efficient means of lubricating the bearings, for when the bearings become worn and the lathe makes a noise like a steam hammer it is impossible to turn work accurately.

The headstock and tailstock spindles should be in perfect alignment and both have a taper hole to receive the centres and chucks.

All adjustments to the tool rest

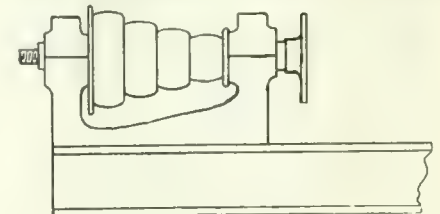


FIG. 16.

and saddle should be so devised that a wrench is not necessary, for during the process of turning a pattern the tool rest may have to be moved twenty times or more and the inconvenience of finding a wrench or adjusting a monkey wrench to fit each nut, not only is a waste of time but tries the temper of the operator.

Greater accuracy is required in pattern turning, than in ornamental wood turning, and although the tools and chucks required may not be so numerous, the building up process of the wood to

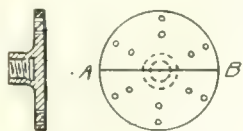


FIG. 17.



FIG. 18.

be turned must be done in such a way that the finished pattern will keep its shape.

Precision Required

If the professional wood turner were turning—say—a bread board 12 in. in diameter, the purchaser would not measure the article with calipers to see that the size was correct because it would not make any appreciable difference if the board warped or shrunk. But when the pattern-maker is called upon to turn a pattern for a 10 in. threaded pipe flange from which fifty or more castings are wanted, and no preliminary turning has to be done to the casting before the tap is run through, it is easily understood that each casting will have to be the same size, and the pattern built up in such a way that it will keep its shape. It will also have to be turned as accurately as the nature of wood and the measuring tool employed will allow.

Accessories

Tool rests should be provided in different shapes, so that awkward corners may be turned with ease. There is no saving in having a tool rest made of cast iron for it is too easily broken; a wrought iron one will last longer, and it won't be necessary for the operator to count his fingers so frequently.

Fig. 17 shows the general style of faceplate used for pattern turning, the wood to be turned being fastened with wood screws. These should be provided in various sizes and if a line A B is scratched accurately across the centre of the face, it will be found a great convenience when turning patterns and core boxes in halves.

In the small size faceplate if a hole is drilled through the centre as in Fig. 18, so that a wood screw can be driven from the back into the piece to be turned, no other fastening is necessary, provided the pattern is small.

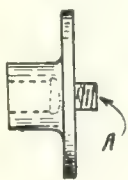


FIG. 20.

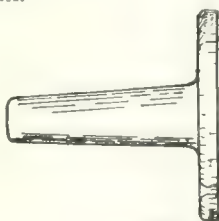


FIG. 22.

When using a centre screw face plate a hole should always be bored in the work a little smaller than the wood screw used; the neglect of this either splits the wood or breaks the screw.

A design for a screw centre chuck to

fit the taper bore of the mandrel is shown in Fig. 19. The work to be turned is screwed onto the piece A, which in turn is screwed to the tapered centre B. The piece being turned may be removed

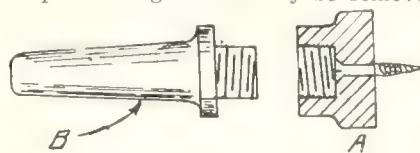


FIG. 19.

as many times as necessary without getting the work "out of true."

When turning gear blanks or other work where holes have to be bored to receive the shanks of core prints, the chuck shown in Fig. 20 is indispensable. The projecting screw A is $\frac{3}{4}$ in. diameter and is cut 8 threads to the inch, the thread having a sharp cutting edge which will cut easily into the wood.

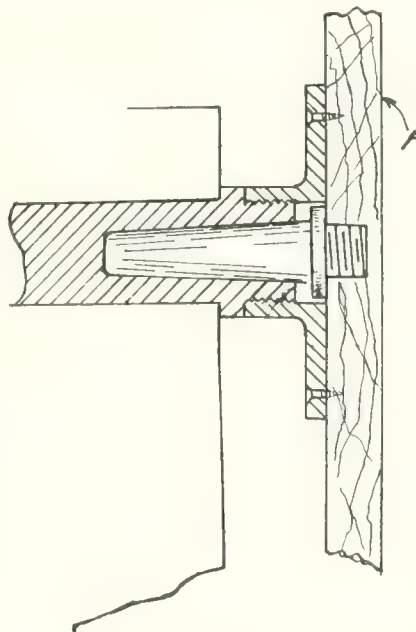


FIG. 23.

For small work fastening to the face plate with wood screws is not necessary, but for larger work where the centre screw is not enough support for the job, a combination of the tapered centre B Fig. 19 and a face plate as shown in section in the diagram Fig. 23 can be used, A representing the work to be turned.

When using this chuck the work will have to be centred first and the wood screws fastening it to the face plate driven in and taken out while the face plate

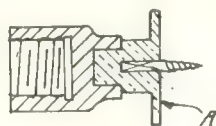


FIG. 21.

is on the mandrel. Fig. 21 shows a screw centre chuck which has given good service; the part A is of brass and the centre screw has a square head which is soldered into a hole bored into the brass face. Behind the face is a hexagonal

shoulder to facilitate removing the work while fastened to the centre screw.

A face plate with a tapered shank to fit the bore of the mandrel Fig. 22 is useful for turning small patterns, the work being secured to the face with wood screw.

ANNEALING CAST IRON

THE detrimental effect on the strength of grey iron castings, due to annealing, is more or less known, and recent experiments by Sir Robert Hadfield have shown that disastrous effects on the strength of such may occur, the micro-structure of treated samples affording a complete explanation.

The strength of grey cast iron depends largely upon the pearlite it contains; by annealing, part at least of the carbide in the pearlite becomes dissociated. Its carbon, thus rendered free, is drawn into positions alongside the already existing graphite plates, the consequent shelling of which further weakens the iron, already rendered weaker by the loss of its pearlite. Any advantage, therefore, which might occur by the lessening of initial stresses is more than counterbalanced by the severe deterioration of the quality of the material which takes place.

Some attempt is made to "anneal" important castings, such as large turbine casings, by subjecting them, by the means of steam, to as high, or to a slightly higher temperature, than they will be subjected to in use, before the final machining is done. It is found that by this means they do slightly change form, and so relieve some initial strains, and it is, of course, advisable that any change that will take place on heating should be dealt with before the final boring out, especially in view of the great precision of form which is required in turbine engines to permit sufficient, but not excessive, clearances of the numerous blades.

EXPERIMENTS to determine the effect of the atmosphere on different kinds of iron sheets have been made recently in the United States and show that the effects differ according to the atmosphere and kind of metal. Prepared pieces were exposed to atmospheric corrosion, and from the first the character of the rust formed on the different materials was found to differ considerably. Whereas on the Bessemer and open-hearth steel samples the rust was of a yellowish-red color and became loose rapidly, the rust on the others was dark in color and much more adherent; this adherent condition reached its maximum in the copper steels, where the rust was very dark and fine-grained. As a result of the tests it is concluded that copper-bearing steels are decidedly superior to pure iron, steel or charcoal iron. The addition of copper to pure iron increases its resistance to corrosion, but not to the same extent as similar additions to steel increase the resistance to corrosion of this material. Charcoal iron and pure iron are superior to steel as regards resistance to atmospheric corrosion.

EDITORIAL CORRESPONDENCE

Embracing the Further Discussion of Previously Published Articles, Inquiries for General Information, Observations and Suggestions—Your Co-operation is Invited

CLOSER RELATION BETWEEN THE EMPLOYER AND THE EMPLOYEE

By E. N.

IN announcing this subject the writer has in mind the main work trail which goes with the human factor in obtaining better results. The human factor must be held at ease in order to be properly efficient.

The modern era of "efficiency" is "materialism run mad." Scientific investigations is being done with materialism. It defines money as the main object of existence and includes many of the refinements which make life really worth living. It states the factors of sound education in relation to the part man's vision for others in relation to his vision for himself.

Within the past few years managers of great organizations have awakened to the fact that men constitute a more important feature of industrial operations than machines or processes. This is somewhat due to the fact that the efficiency of many of the latter has almost reached its limit, whereas the efficiency of the worker's unit is lamentably low.

The day is past when rapid strides toward greater economy can be expected in labor saving machinery, and future progress must now depend more upon scientifically improving the human factor, which has been so much neglected in the past in the mad frenzy to accomplish man's work by machinery.

Men of to-day have merged from the plane of being "bullied." The standard of efficiency to-day, per capita, shows a steady increase over that of a few years ago. "You can lead a horse to water, but you can't make him drink." The man who is deserving should be allowed your confidence at least. In this environment, if you watch, you will see him broaden and gradually hit the stride where he will take an active interest in accomplishing results which his employer has always expected, but which were never attained, due to a missing link for which he was never able to account.

Proper surroundings are the first essential in arriving at the mark. Many employers have been actuated by far more than a selfish purpose in providing against industrial accidents and disease, compensation and better home conditions.

One may ask, To what purpose is this tremendous effort toward human efficiency? Is it the intention to incorporate the physical law of the survival of the fittest as a part of the ethics of industrialism? The product of all this endeavor is yet but a man-made machine, entirely lacking in character.

The average man must be given a responsibility and held accountable for it.

In order for him to show his colors he must be free to accomplish the work laid out for him. His hands must not be tied by having to follow this or that command. He must be made to believe that his services are appreciated. Under reverse conditions he simply is unable to arrive at any point, because he is merely carrying out absolute commands of the man higher up, and then whose fault is it if results obtained are not to the employer's expectations? The power of suggestion is unlimited and oft times if the employee feels that he has the privilege of properly presenting his suggestions to his employer and he receives a slap on the back, instead of, as is general, getting no answer whatsoever, or a reply that such "is not in line with our custom," merely because the employer does not want to admit that the employee has a better idea than his own.

For in business no man can know of the better way and not tell another. Failure to do this is to destroy the main-spring of present-day business, which is efficiency.



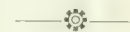
DRAWING ROOM ILLUMINATION

By R. Hamilton

UPON putting the query as to what he considers the best method of artificial lighting for the drawing room, the average draughtsman will reply that he prefers the individual light placed a short distance above the board, the direct rays shielded from the eyes by means of a suitable shade. Where it is only necessary to use the light for a short time toward the close of the day, no serious eye strain may result, as the injurious effect is only of a temporary character. However, should the draughtsman be called upon to work at night, working several consecutive hours under artificial lighting conditions, he will eventually become cognizant of the additional eye strain. This may be partly accounted for by the increased period of time spent at the drawing board, but the eye strain in particular is largely due to the unsuitable lighting. While in some respects the individual unit may increase the illumination to a desired confined area, it is this localized brilliancy that is the primary cause of ultimate eye strain. With the eye fixed on the drawing, the sight is focussed for a certain strength of light, and when reference is made to a text book or other data—out of the direct rays of the lamp—the eye is forced to re-focus itself, often quite suddenly, to the darker surroundings of the general office. This may happen many times in the course of an hour, necessitating the enlargement and contraction of the pupil at each change of light.

Another objectionable feature of the

low individual light is that its position is generally such as to cause the reflected light from the glossy surface of the tracing cloth to indirectly strike the eye. One of the arguments advanced in favor of the close light is that it is necessary to see the lines of the drawing. In answer to this it might be well to suggest the use of a slightly softer pencil that would produce a more distinct line, particularly on work that requires doing at night. For general office artificial lighting a well diffused light is most suitable, one where the distribution is practically uniform, and approximately one candle-power to each square foot of floor space, when the ceilings are of average height. While direct lighting from above is not wholly objectionable, the indirect lighting by means of reflectors is very much to be preferred, together with a ceiling that will assist reflection. Recruits to this method of lighting are not over enthusiastic at first, but in a short time admit that it is much better than the old practice.



STEAM VERSUS DIESEL

AN American sea-going engineer with first-hand knowledge of the service of both types says that while the modern steam engine is a wonderful machine, the Diesel motor is still more wonderful. The manual labor of handling the fuel is done away with altogether. Once the motor is started the fuel supply is kept up by pumps on the engine itself, delivered to the filter and from there to the cylinders, where combustion takes place. After it has done its work in the cylinders it passes off as waste gas to the atmosphere. All this takes place without manual labor, and to the engineer who has been with steam engines and then takes up the Diesel, the change appeals most forcibly, for with the machine developing its power within itself all that is necessary is the occasional manipulation of a valve. It is true, this engineer admits, that the Diesel has not yet reached the state of perfection at which the reciprocating steam engine has arrived, but considering the shortness of the time it has been employed in marine work, that could hardly be expected. There is not the slightest doubt, however, that in a few years' time it will be, in respect of reliability, in advance of the steam engine. At present there are motorships crossing the Atlantic with as great regularity as steamships, keeping as good, if not better, time, and coming through the heavy weather without a hitch. "I have," the writer declares, "spent a good few years on the Atlantic, and I would rather be with a Diesel engine in heavy weather than with a steam job."—Syren and Shipping.

PRESENT POSITION AND FUTURE PROSPECTS OF CANADA'S IRON AND STEEL INDUSTRY*

By D. H. McDougall**

IN reviewing the iron and steel industry in Canada, a clear distinction must be drawn between the position during war time, and the position that may be forecast after the war.

The present condition of the steel and iron industry is one of artificial stimulation, brought about by the action of numerous temporary factors, prominent among which are: Extraordinary demand for munitions steel; increased cost of transportation, accompanied by congested railroads, and shortage of shipping; an unparalleled coal shortage; and a severe and increasing shortage of labor.

These factors, all abnormal and arising out of war conditions, have rendered temporarily obsolete all hitherto accepted standards of economics, and they have been accompanied by an increased cost of living, large increases in wages, and increases in the selling prices of steel and steel products. No one can say how far these extraordinary conditions will extend, or how long they will last, but some day the world will resume its normal course, and the laws that govern normal times will again operate.

Therefore, in considering the after-war situation of the Canadian steel industry, we should see what the permanent essentials of a successful steel industry are, apart from present unusual and evanescent conditions.

Factors that favor success and permanence in steel and iron manufacture are:—

Geographical location, giving cheap access to world markets, and opportunities for the cheap assemblage of raw materials.

Close proximity of metallurgical coal, iron ore of good grade, and limestone deposits of suitable quality. All these raw materials should be accessible in large quantities, and so placed as to render mining costs and transportation reasonably cheap.

General conditions favoring the manufacture of steel in large tonnage.

A review of the iron ore and coal deposits of Canada will show that such a combination is to be found in very few places in Canada, and that already large steel and iron works exist at the localities where the manufacture of iron and steel is permitted by natural conditions to rest upon a permanent and commercial foundation.

The location of iron and steel plants in all parts of the world has been primarily determined by the proximity of coal, and it does not seem probable that any steel plant can exist and pay profits in normal times which has not to hand a plentiful and inexpensive supply of metallurgical coal. It is perhaps hardly an exaggeration to say that the steel industry is always an outgrowth of a coal mining industry.

Present conditions favor the commencement of small war industries. For

example, the time is opportune for the opening up of small and easily accessible coal areas, the operation of which in normal times was not profitable; and in the same way, small smelting plants and small works for making munitions have been commenced and successfully worked because of the unbalanced state of demand and supply. These passing conditions, on the other hand, act to the disadvantage of large and long-established concerns, or at the most they offer merely an opportunity to get rid of the load of debt that is the legacy of the depression that preceded the war and persisted for some time after hostilities commenced.

After-war conditions will eliminate most of these small ventures, and in the days of financial stress that are surely coming the mainstay of industry and the hope of the country will be the large and long-established companies, who, if they are wise, will have stored financial reserves and expended profits on rehabilitation of plant, as a safeguard against the future.

Applying these general principles to specific cases, it would seem advisable that the energies of the country should be concentrated on ensuring the future of the large steel works on Sydney Harbor and on the Great Lakes, and that these existing works should be looked to for the production of steel and iron in large quantities, because in these places only is there available a sufficient quantity of coal, iron-ore and limestone.

For the treatment of steel in small quantities to produce tool-steels, crucible-steel and special alloyed steels, the electric furnace has a future, and industries of this kind will probably increase in the populous parts of Quebec and Ontario.

It is also advisable that any increase in the rolling and forging capacity of Canadian steel works should take place at the large and established plants referred to. These plants have hitherto regarded the manufacture of rails as their chief activity, but in the future, and with a view to after-war conditions, it seems probable that the rolling of ship-plates and other commercial shapes will become necessary. It is self-evident that the manufacture of finished steel products can nowhere be so satisfactorily and economically carried on as at the existing plants.

Considering particularly the question in what way it may be possible to obtain some considerable increase in the production of iron and steel in the future, that is, after the war, the first point to be determined is: Allowing for the rolling in Canada of steel shapes and forgings now finished outside of Canada, for all the export business obtainable, and for all Canada's own requirements in iron and steel, what tonnage of iron and steel over and above the existing capacity of Canadian works will be required?

Summarizing, and applying these principles, it would appear that the Canadian steel industry should be guided towards two main ends, namely:—

That the present abnormal demand for steel should be supplied as far as pos-

sible by the extension of existing plants.

That these existing plants should prepare to enlarge the variety of their finished products.

That should it then appear there was a necessity for greater production of iron and steel such as to require new plants, these plants should comply with the factors that have already been named as requisite to commercial permanence, and as giving ability to compete in world markets.

By following along these general lines, the existing plants will be extended, rehabilitated and modernized, and given an opportunity to accumulate financial reserves to carry them successfully through the troubled days ahead, and they will be placed in a position enabling them to enter world markets, and to compete with other countries, particularly the United States.



GRAPHITE LUBRICATION

IN a paper contributed to the Journal of the American Society of Mechanical Engineers, C. H. Bierbaum states that in 1913 some 30,000 tons of graphite were used for lubrication purposes. He states that both natural and artificial graphites commonly contain impurities in the shape of very hard abrasive materials, the effect of which he demonstrated by using a wooden lap fixed on the end of a high-speed shaft and coated with the graphite to be tested. On applying a glass slip to this rapidly revolving lap the scratches produced by the impurities could be easily seen on examining them through the microscope, using oblique illumination. In the paper a number of micrographs are given showing the results obtained. With thoroughly purified graphite there is no abrasion.

To obtain permanent suspension of graphite in oils or the like the particles of graphite must be less than one two-hundred-thousandth of an inch in diameter, and the oil must be free from acid or from any tendency to form acids by turning rancid. The author maintains that the use of these permanent suspensions of graphite is, however, undesirable, holding that with larger particles than are necessary for permanency of the suspension, the graphite is more effective as a lubricant. His view is that if the particles are large they will be caught and retained between the opposing surfaces of a bearing, should these approach near to each other owing to a failure of the oil film; whilst under similar conditions he asserts particles of the size necessary for forming a permanent colloidal suspension of the graphite would prove ineffective. The point, however, is obviously one to be settled by actual practical experience and not on a purely theoretical basis, and users of these colloidal suspensions do make the claim that, whatever the mechanism at work, their lubricated surfaces do, as a matter of fact, get loaded with graphite, notwithstanding the smallness of the particles.

*Canadian Mining Institute Bulletin.

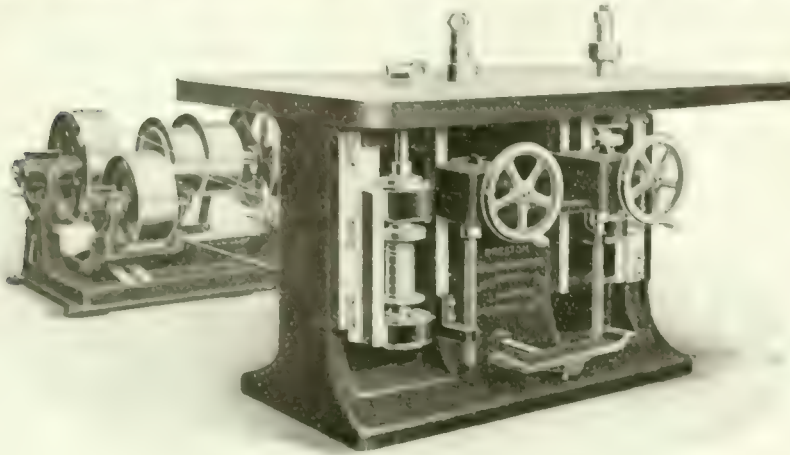
**General Manager Dominion Steel Corporation.

PROGRESS IN NEW EQUIPMENT

A Record of New and Improved Machinery and Accessories for the Machine, Pattern, Boiler and Blacksmith Shops, Planing Mill, Foundry and Power Plant

HIGH SPEED BALL BEARING SHAPER

THE shaper shown in the accompanying illustration is a model C 119, built at the Phoenix Works, Birmingham, England, and has been designed with a special view to increased output with less effort on the part of the operator.



HIGH-SPEED BALL-BEARING SHAPER.

The workmanship and material are of the usual high class necessary for the satisfactory operation of machines of this class, a feature of this machine being the use of SKF self-aligning ball bearings which enable a spindle speed of 7,000 rev. per min. to be maintained without any bearing trouble, and at the same time stand up under the increased output rendered possible thereby.

The spindle top diameter is $1\frac{1}{4}$ in., the table being 58 in. by 41 in., both table and main frame being of massive proportions and ample weight, which, combined with well balanced free running spindles, insures a high quality of work.

The machine, which weighs 2,700 lbs., has a front projection of 17 in., with a height of 35 in. The spindle diameter is $2\frac{3}{16}$ in., the spindles centres being spaced 28 in. apart. The power required is 3 horse-power, and the countershaft is completely equipped with tight and loose pulleys, idler pulleys and belt shipping gear.



MACHINE FOR TESTING SHEET METALS

THE desirability of having some method whereby the suitability of sheet metal for drawing operations can be determined in a reliable and accurate manner will be evident to operators of punching and drawing machinery, and the machine illustrated herewith has been recently introduced into England in connection with

the Ericsson method of testing sheet metal. The apparatus is characterized by extreme simplicity, and the results obtained are claimed to be very reliable.

The machine is shown in Fig. 1, which, with the other illustrations, is reproduced by courtesy of *Engineering*. The principle of operation employs a plunger, 3, having a rounded point and tapering

the plunger shaft are locked together by the spring pin shown, so that their surfaces are exactly flush, and they are rotated together in the main frame of the machine until the sleeve clamps the sheet or test piece, which is $3\frac{1}{2}$ in. by $5\frac{1}{2}$ in. The thickness of the sheet is now indicated by the micrometer scale, and the sleeve is withdrawn .05 mm. to allow play to the metal as it is drawn into the die. The sleeve being now locked securely in position, and disengaged from the plunger, the plunger is forced forward until rupture takes place, the

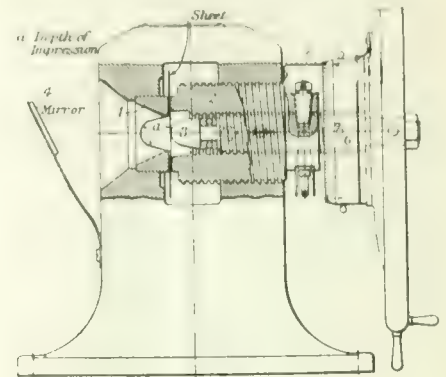


FIG. 1.

body, see Fig. 2, the shape being such that when the punch is pressed slowly against the centre of a test sheet, rupture will take place before the surface of the depression begins to contact with conical surface of the tapered portion of the punch. The diameter of the opening in the die, 1, is also determined from this standpoint. By observing the depth of depression at which rupture occurs, a measure of the drawing quality of the metal is obtained.

distance (a), being read off on scales 5 and 6.

A mirror, 4, is placed so that the behaviour of the metal can be observed during the operation, and the handwheel stopped immediately signs of rupture appear. Tests can be made quite rapidly, and it is claimed that an accuracy of one-hundredth of a millimetre can be obtained with slight practice.

Figs. 3 to 6 show the application of the machine to tests on flat strips, cart-

FIG. 2.

FIG. 3.

FIG. 4.

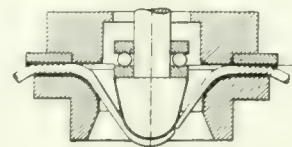
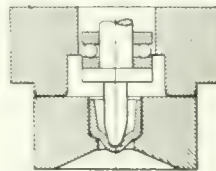
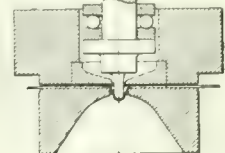
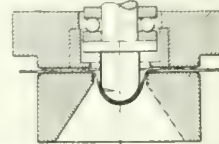
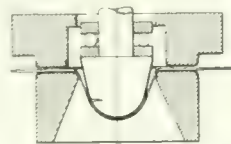


FIG. 5.

FIG. 6.

Pressure is applied to the plunger by a handwheel, operating a threaded shaft working in sleeve 2, the function of the sleeve being to clamp the test sheet against the die preparatory to making the test. In operation, the sleeve and

ridge cups, and wire; it is also possible to make tests of the elasticity of sheets and strips. Numerous tests have enabled diagrams to be prepared showing the minimum depth of depression allowable in various metals used for stamped

work in thicknesses from .02 mm. to 2 mm. Geo. H. Alexander, Coleshill St., Birmingham, Eng., is placing this apparatus on the market.

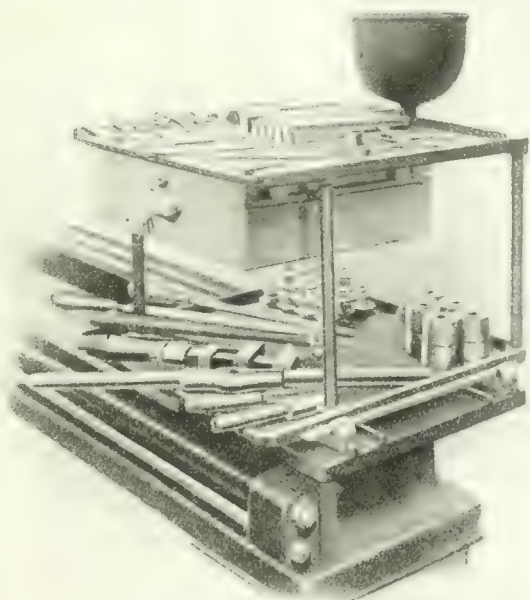


TOOL RACK FOR LATHES

THE provision of suitable accommodation for tools, accessories, and instruments used by lathe operators is, in the great majority of instances, left to the lathe hand, and various devices have come into use, the principal one being a couple of boards laid across the vees at the end of the bed. Such provision, however, is more or less of a makeshift, and the New Britain Machine Co., New Britain, Conn., have developed the lathe rack illustrated herewith, which marks a decided advance in equipment design, and contributes largely toward increased efficiency on the part of the operator.

This double-decked, fireproof rack consists of two cast iron trays, assembled on steel corner posts as shown, and flanged on sides and rear to prevent tools and articles from rolling off. Conspicuous features are, a cast iron bowl for holding waste, preventing it from becoming entangled with small articles and enhancing the neatness and general accessibility of the arrangement, and a tool drawer with lock, which is fitted below the upper shelf and provides safe keeping for micrometers and other valuable tools.

The device is adaptable to various widths of bed by means of fitting strips fastened to the lower shelf by set screws as shown; it may be slid along the ways to any convenient position without marring them. Trays are both 18 in. by 18 in. and height to upper tray is 14 in. The shipping weight is 115 lbs.



DOUBLE-DECK LATHE RACK.

WORLD'S MOST POWERFUL LOCOMOTIVE

IN the vicinity of Philadelphia the Pennsylvania Railroad Company has been testing the world's most powerful locomotive. This locomotive is capable of exerting a maximum horsepower of 7,000, and is intended for the mountain grade electrification between Johnstown and Altoona, Pa., around the famous horseshoe curve. During a recent test this locomotive hauled a train of 68 cars, and the regular large Mikado type of road locomotive. The steam locomotive, however, remained idle.

The mechanical parts of this electric engine were built by the Pennsylvania



THE MOST POWERFUL ELECTRIC LOCOMOTIVE IN THE WORLD.

Railroad Company at their Juniata Shops at Altoona, Pa., and the electrical equipment supplied by the East Pittsburgh works of the Westinghouse Electric & Mfg. Company.

To equal the power of this locomotive it would take 100 trolley cars, or 14,000 horses, or 56,000 of the strongest men. Enough electric current is consumed by it to light over 200,000 25-watt electric lamps; and many a town of 25,000 people has an electric light plant of smaller capacity. This is possible because of the high voltage alternating current used in distributing the strong electric power.

Exerting its maximum pulling force this locomotive will develop 7,000 horse-power, which is greater than its closest electrical rival can do. This locomotive, which weighs 250 tons and is slightly over 76 feet in length, is the first of a type that will be used on the Altoona Grade Electrification of the Pennsyl-

vania Railroad, between Johnstown and Altoona, around the famous Horse Shoe curve. Two of these locomotives are able to haul a 6,000-ton train up this mountain grade at a speed of slightly over 20 miles per hour, thus relieving, when necessary, the congestion that seems apparent in that freight traffic over this division now, which is unusually heavy, amounting to as much as 300,000 tons per day. In addition to the heavy grade over the Alleghany Mountains a long tunnel, which helps to form the "narrow neck in the bottle" in operating over this division, must be passed through.

By electrification the expense of grade reduction has been eliminated and the

capacity of the division will be more than doubled.

The Westinghouse Electric equipment is so designed and built that these locomotives can haul the heavy trains up hill and coast down hill at the same speed of 20 miles per hour. By the motors becoming dynamos or generator in the latter case effective braking action results without the use of air brakes, which prevents runaways. This coasting speed can be regulated just as speed up-hill or under power. Air brakes are therefore not needed while coasting, and are simply held for emergency use and for bringing the train to a full stop.



FOR the protection of ironwork paint is generally used and provided that rusting has not commenced a paint composed of four parts of red lead, one part white lead ground in oil and at least five years old and sufficient raw linseed oil of good quality will be found very efficient if used when freshly made. No driers are needed, as the red lead is a very good oxidising agent, but the paint takes several days to dry and harden. For ironwork red oxide of iron also makes a good paint if no driers are used and the oil is good, but if driers are used the paint soon fails when exposed.

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A weekly newspaper devoted to the machinery and manufacturing interests.

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AN EARNEST OF SINCERITY

THE fourth Christmas of hostilities draws nigh and the prospect of customary methods of celebration once more occupies the minds of mankind. To us, who have counted these three critical years and watched their close, followed by a dawn, at present in sorrow and suffering for many of us and ours, the recurrence of this festival is touched with increasing solemnity.

Time, in this as in other trials of mankind, may either soften the blow or harden the resistance, and while we, as a nation, naturally repel the suggestion of unconscious indifference at this time, we should note that this Christmas is the first which our brethren across the line will spend as a combatant nation.

It is, therefore, to be expected that, in line with their systematic preparations, the magnitude and thoroughness of which is being gradually disclosed, some unique and characteristic action would be suggested whereby the vast number of firms, corporations and business concerns in general could express, in an unassuming but effective manner, their sincerity toward the Allied Cause.

Recent action, originating among Chicago concerns and subscribed to by firms of world-wide repute, is realizing such expectations. Their attitude toward the Red Cross has been stripped of Charity and clothed with Duty. According to their decision, they consider it sheer waste at this time of world war, when money is so sorely needed to alleviate suffering, reduce hunger and care for the sick and wounded, to spend money on greeting cards. The firms referred to, and many others whom they desire to influence, have customarily distributed engraved Christmas and New Year cards, but on this occasion will contribute the money to the Red Cross or other relief organizations where it will do real service. Extensive propaganda is now under way, and it is hoped to obtain very real and substantial results.

The solid merit of the idea warrants our presenting it to our readers. We decline to think that the efforts of our friends and relatives on the fighting line are less

appreciated, or their sufferings less keenly sympathized with than are those of our big Ally.

Extraordinary appeals have been made and will continue to be made to our generosity for a long time, and the opportunity of furthering our efforts, at what is really no unusual cost to ourselves, should be grasped as thoroughly and vigorously here as anywhere else.

At first thought, the suggestion of diverting such a volume of business from a legitimate channel would seem to imply undue hardship on those who formerly benefited by it. Such argument must be judged by the necessity of the case. If we pursued personal promptings and cut out all unnecessary expenditure, the producers of this seasonal work could not validly object. Their profits would be non-existent, except in the possession of former customers. Instead of being overworked they could devote their efforts to staple lines and not suffer real hardship. The real sacrifice, and no good work can be sincere without some degree of sacrifice, would be that of the givers, who might not have given if they had so wished.

As an earnest of our sincerity, individually and otherwise, the suggestion has impelling strength and merit. Time is now short, and may not permit of an organized effort in the Dominion, but let not that thought delay our decision. Oneness of purpose, the maintenance of our Country, the triumph of the Allied Cause and, most of all, our duty to those in the field—these alone not only justify but imperatively demand this offering on our part—the sacrifice is by those whose sufferings call to us.



MUNITIONS AND MARINE CONTRACTS

RECENT developments have considerably improved the outlook for Canadian manufacturers, both in regard to munitions and also orders for marine equipment. The United States Government will place orders in Canada for 75-millimetre shells; the actual contracts only await the completion of necessary arrangements between the manufacturers themselves and the Imperial Munitions Board who are distributing the contracts on behalf of the United States Government. These new contracts in addition to the orders for British shells, now under way, will mean an extended period of increased activity in the munitions industry.

A notice was issued recently by the Government prohibiting the export of shell plants from Canada. From this it may be inferred that the Imperial Munitions Board will be distributing contracts for shells from time to time.

Firms in the United States having shipbuilding contracts welcome the aid of Canadian concerns in supplying ship deck machinery, main engines and auxiliary equipment. We are advised that specifications of requirements will be ready in a week or two and in the meantime would suggest that Canadian firms desiring to obtain orders should prepare detailed particulars of the lines which they are prepared to furnish, so that the United States firms will know exactly what they have to offer. The American firms insist on a delivery guarantee and hold the opinion that the Canadian Government or the Imperial Munitions Board should be responsible for the fulfillment of contracts on time.

Important developments are now under way and we strongly urge Canadian manufacturers to make a big effort to obtain contracts for munitions or marine work. A number of firms in Canada have for some time been engaged upon work of this kind and the opportunity is favorable for others to participate in these United States contracts.

INDUSTRIAL NOTABILITIES

WILLIAM McCULLOUGH ARNOLD, manager, Ottawa Car Mfg. Co., Ltd., Ottawa, Ont., was born in Ottawa, Oct. 26, 1879, son of William and Georgianna (Eaton) Arnold.

He was educated in Model and Public Schools, and subsequently attended Willis' Business College, Ottawa, after which he was employed by H. N. Bate



WILLIAM McCULLOUGH ARNOLD.

& Sons, 1895-1900; and T. Lindsay & Co., 1900-1907. Mr. McCullough was appraiser for Express Branch, Department of Customs, Ottawa, 1902-1911, and during the latter year was appointed purchasing agent for the Ottawa Car Mfg. Co.; assistant general manager, 1913; manager, 1914.

Mr. McCullough is a member Canadian Manufacturers' Association; and also of the following clubs: Canadian, Laurentian, Connaught Park Jockey, Westboro Lawn Tennis and Bowling.

His societies are: I.O.O.F.; A.F. & A.M.—his recreations are bowling and tennis—his politics, Liberal—and in religion he is Presbyterian.

Mr. McCullough's residential address is Westboro, Ont.

—Photo, courtesy British & Colonial Press.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

Open hearth iron	\$4.00
Lake Superior standard iron	\$4.00
Standard low phosphorus iron	\$4.00
Blue	\$4.00
Bessemer Pittsburgh	\$4.00
Basic open hearth	\$4.00
High	\$4.00
Victory	\$4.00

Per lb. to large buyers	Cents
Iron bars base Toronto	3.50
Steel bars base Toronto	3.50
Steel bars 2 1/2 to 4 1/2	6.00
Steel bars 4 1/2 and larger	7.00
Iron bars base Montreal	5.25
Steel bars base Montreal	5.50
Reinforcing bars base	5.25
Steel hoops	7.50
Refined iron	5.50
Norway iron	11.00
Tire steel	5.50
Spring steel	7.00
Band steel No. 10 gauge	5.75
Chequered floor plate, 3-16 in.	15.20
Standard floor plate, 3/16 in.	13.00
Stay iron	8.50
Bessemer rail heavy at mill	28.00
Steel bars Pittsburgh	5.50
Structural shapes Pittsburgh	5.50
Steel bars Pittsburgh	5.50
F. O. B. Toronto Warehouse	5.50
Small shapes	5.75
F. O. B. Chicago Warehouse	5.50
Structural shapes	5.00
Plate	7.00

Pittsburgh to Following Points	Per 100 lbs.
	C.L. L.C.L.
Montreal	23.1 31.5
St. John, N.B.	35.1 45.5
Halifax	35.1 45.5
Toronto	18.9 22.1
Quebec	18.9 22.1
London	18.9 22.1
Windsor	18.9 22.1
Winnipeg	64.9 85.1

Montreal Toronto	
Lake copper	\$21.00 \$22.00
Electro copper	\$21.00 \$22.00
Castings copper	\$20.00 \$21.00
Tin	\$24.00 \$25.00
Spelter	\$19.00 \$20.00
Zinc	\$9.00 \$8.50
Antimony	\$18.00 \$18.00
Aluminum	\$2.00 \$2.00

Montreal Toronto	
Plates 1/4 to 1/2	\$12.00 \$12.00
Heads	\$13.00 \$13.00
Tank plates, 3-16 in.	\$13.10 \$13.25

Effective July 5, 1917.	
Black Galvanized Standard Butt weld.	
Size	Per 100 feet
1/4 in.	\$ 6.00 \$ 6.50
1/2 in.	5.12 7.16
3/4 in.	6.46 8.03
1 in.	8.17 10.29
1 1/4 in.	12.07 15.22
1 1/2 in.	16.33 20.59
2 in.	19.53 24.61
2 1/2 in.	26.27 33.12
3 in.	42.12 52.94
3 1/2 in.	55.08 69.23
4 in.	69.42 86.94
4 1/2 in.	82.84 103.00

2 in.	29.25	36.11
3 in.	43.88	54.11
3 1/2 in.	57.38	70.76
4 in.	71.76	89.70
4 1/2 in.	85.02	106.28
5 in.	96.32	121.29
5 1/2 in.	112.50	141.34
6 in.	145.90	183.36
7 in.	190.40	238.00
8 in.	200.00	250.00
8 1/2 in.	230.40	288.00
9 in.	276.00	345.00
10 in.	266.00	320.00
10 1/2 in.	329.60	412.00

Prices—Ontario, Quebec and Maritime Provinces.

1 and under, 45%.	
4 1/2" and larger, 40%.	
4" and under, running thread, 25%	
Standard couplings, 4" and under, 35%	
4 1/2" and larger, 15%.	

Dealers' Buying Prices.	
Montreal Toronto	
Copper, light	\$19.00 \$19.00
Copper, crucible	\$22.50 21.50
Copper, heavy	\$22.50 21.50
Copper wire	\$22.50 21.50
No. 1 machine com-	
position	20.00 20.50
New brass cuttings	16.00 17.00
No. 1 brass turnings	15.00 15.75
Light brass	11.00 10.00
Medium brass	15.00 14.00
Heavy brass	16.00 16.00
Heavy melting steel	20.00 20.50
Steel turning	12.00 8.00
Shell turnings	12.00 12.00
Boiler plate	23.00 18.00
Axles, wrought iron	30.00 24.00
Rails	26.00 20.50
No. 1 machine cast iron	25.00 25.00
Malleable scrap	20.00 20.00
Pipe, wrought	15.00 9.00
Car wheels, iron	26.00 25.00
Steel axles	32.00 30.00
Mach. shop turn'gs.	8.50 8.50
Cast bearings	15.00 8.50
Stove plate	19.00 19.00
Scrap zinc	5.00 6.50
Heavy lead	7.00 7.00
Tea lead	6.00 5.75
Aluminum	30.00 25.00

Per Cent	
Carriage bolts, 3/4" and less	10
Carriage bolts 7-16 and up	net
Coach and lag screws	25
Stove bolts	55
Plate washers	List plus 20
Machine bolts, 7-16 and over	net
Machine bolts, 3/4" and less	10
Blank bolts	net
Bolt ends	net
Elevator bolts	5
Machine screws, fl. and rd. hd. steel	27 1/2
Machine screws, o. and fl. hd. steel	10
Machine screws, fl. and rd. hd. brass	add 20
Machine screws, o. and fl. hd. brass	add 25
Nuts, square blank	add \$1.50
Nuts, square, tapped	add 1.75
Nuts, hex. blank	add 1.75
Nuts, hex. tapped	add 2.00
Copper rivets and burrs	
Best plus	30
Burr only	50
Iron rivets and burrs	15
Roller screws base 3/4-in. and larger	\$8.50
Structural rivets, as above	\$8.50
Wood screws, flat, bright	72 1/2

Wood screws, flat, brass	.37 1/2
Wood screws, O & R brass	.30 1/2
Wood screws, flat, bronze	.27 1/2
Wood screws, O & R bronze	.25

Percent	
Set screws	25
Eq. & Hex. Head Cap Screws	20
Hex. & Hd. Head Cap Screws	net
Flat 1/2 But Hd. Cap Screws plus	net
Fin. & Semi-fin nuts up to 1 in.	25
Fin. and semi-fin nuts, over 1 in., up to 1 1/2 in.	20
Fin. and semi-fin nuts over 1 1/2 in., up to 2 in., plus	10
Studs	net
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts	
Planer bolt washers	net
Hollow set screws	list plus 20
Collar screws	list plus 30, 10
Thumb screws	20
Thumb nuts	65
Patch bolts	add 40, 10
Cold pressed nuts to 1 1/2 in.	add \$4.50
Cold pressed nuts over 1 1/2 in.	add \$7.00

Per gross ton	
Bessemer billets	\$
Open-hearth billets	
O.H. sheet bars	
Forging billets	
Wire rods	
F.o.b. Pittsburgh.	

Wire nails	5.50 5.45
Cut nails	5.70 5.80
Miscellaneous wire nails	60%
Spikes, 3/4 in. and larger	7.50
Spikes, 1/2 in. and 5-16 in.	8.00

Solder, strictly	0.35
Solder, guaranteed	0.37 1/2
Babbitt metals	18 to 70
Soldering coppers, lb.	0.53
Lead wool, per lb.	0.15
Putty, 100-lb. drum	4.75
White lead, pure, cwt.	16.55
Red dry lead, 100-lb. kegs, per cwt.	16.25
Glue English	0.38
Tarred slaters' paper, roll	0.95
Gasoline, per gal., bulk	0.31 1/2
Benzine, per gal., bulk	0.30 1/2
Pure turpentine, single bbls., gal.	0.78
Linseed oil, raw, single, bbls.	1.42
Linseed oil, boiled, single bbls.	1.45
Plaster of Paris, per bbl.	2.50
Sandpaper, B. & A.	list plus 20
Emery Cloth	list plus 33 1-3
Borax, crystal	15
Sal Soda	0.03 1/2
Sulphur, rolls	0.05
Sulphur, commercial	0.04 1/2
Rosin "D," per lb.	0.03
Rosin "G," per lb.	0.03 1/2
Borax crystal and granular	0.15
Wood alcohol, per gallon	2.15
Whiting, plain, per 100 lbs.	2.20

Plumbers' onkum, per lb.	.09
Packing, square braided	.34
Packing, No. 1 Italian	.40
Packing, No. 2 Italian	.32
Pure Manila rope	.39
British Manila Rope	.33
New Zealand Hemp	.33
Transmission rope, Manila	.46
Drilling cables, Manila	.41
Cotton Rope, 3/4-in. and up	.47

POLISHED DRILL ROD. Discount off list, Montreal and Toronto net

Per Cent.	
S.S. drills, wire sizes up to 52.	30
S.S. drills, wire sizes, No. 53 to 80	net
Standard drills to 1 1/2 in.	30
Standard drills, over 1 1/2 in.	30
3-fluted drills, plus	10
Jobbers' and letter sizes	20
Bit stock	25
Reamer drills	15
S.S. drills for wood	30
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	net
Drills and countersinks	list plus 30
Bridge reamers	52 1/2
Centre reamers	10
Chucking reamers	net
Hand reamers	10

COLD ROLLED SHAFTING. At mill list plus 40% At warehouse list plus 50% Discounts off new list. Warehouse price at Montreal and Toronto.

Canadian malleable, A, add 25%; B and C, plus 25%; cast iron, net; standard bushings, 25%; headers, 60; flanged unions, 5; malleable bushings, 30; nipples, 45; malleable lipped unions, 40.	
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Montreal Toronto	
Sheets, black, No. 28	\$ 9.50 \$ 9.50
Sheets, black, No. 10	12.00 12.00
Canada plates, dull, 52 sheets	12.00 12.00
Canada plates, all bright	12.50 12.50
Ap-ello brand, 10 3/4 oz. galvanized	12.25 12.09
Queen's Head, 28 B. W.G.	11.75 10.75
Fleur-de-Lis, 28 B.W. G.	11.75 10.75
Gorbals Best, No. 28	12.00 10.25
Colborne Crown, No. 28	11.25 10.00
Premier, No. 28 U.S.	13.75 10.95
Premier, 10 3/4 oz.	13.85 11.25
Zinc sheets	20.00 20.00

B	
3/4 in.	\$12.00
5-16 in.	11.50
3/8 in.	11.15
7-16 in.	10.90
1/2 in.	10.70
9-16 in.	10.70
5/8 in.	10.50
3/4 in.	10.40
@ in.	10.25
1 inch	10.10
Extra for B.B. Chain	1.20
Extra for B.B.B. Chain	1.80

ELECTRIC WELD COIL CHAIN B.B.

1/2 in.	\$15 50
3-16 in.	11 70
1/4 in.	8 40
5-16 in.	7 40
3/8 in.	6 35
7-16 in.	6 35
1/2 in.	6 35
5/8 in.	6 35
3/4 in.	6 35

Prices per 100 lbs.

FILES AND RASPS.

	Per Cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	40
Black Diamond	40
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	37 1/2
Diaston	50
Whitman & Barnes	50

COAL AND COKE.

Solvay Foundry Coke	\$
Connellsville Foundry Coke	
Steam Lump Coal	
Best Slack	

Net ton f.o.b. Toronto

BOILER TUBES.

Size.	Seamless	Lap-welded
1 in.	\$36 00	\$
1 1/4 in.	40 00	
1 1/2 in.	43 00	36 00
1 3/4 in.	43 00	36 00
2 in.	50 00	36 00
2 1/4 in.	53 00	38 00
2 1/2 in.	55 00	42 00
3 in.	64 00	50 00
3 1/4 in.		58 00
3 1/2 in.	77 00	60 00
4 in.	90 00	75 00

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS.

Castor oil, per lb.	40
Royalite, per gal., bulk	16
Palacine	19
Machine oil, per gal.	26 1/2

Black oil, per gal.	15
Cylinder oil, Capital	45 1/2
Cylinder oil, Acme	36 1/2
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	2 50
Union thread cutting oil antiseptic	88
Acme cutting oil, antiseptic	37 1/2
Imperial quenching oil	39 1/2
Petroleum fuel oil	12 1/2

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30-5%
Standard	40%
Cut leather lacing, No. 1	1 95
Leather in sides	1 75

TAPES.

Chesterman Metallic, 50 ft.	\$2 00
Luffkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

WASTE.

	White	Cents per lb.
XXX Extra		20
Peerless		20
Grand		19
Superior		19
X L C R		18
Atlas		18
X Empire		18
Ideal		17
X press		16

COLORED.

Lion	14 1/2
Standard	13
No. 1	13
Popular	11 3/4
Keen	10 1/2

WOOL PACKING.

Arrow	25
Axle	20
Anvil	15
Anchor	11

WASHED WIPERS.

Select White	12
Mixed colored	10
Dark colored	09

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard	40%
Best grades	20%

ANODES.

Nickel .....	.50 to .54
Cobalt	1.75 to 2.00
Copper .....	.44 to .46
Tin .....	.49 to .56
Zinc .....	.23 to .25

Prices Per Lb.

COPPER PRODUCTS.

Montreal Toronto

Bars, 1/2 to 2 in.	55 00	53 00
Copper wire, list plus 10.		
Plain sheets, 14 oz.		
14x28 in., 14x60 in.	55 00	53 50
Copper sheet, tinned, 14x60, 14 oz.	60 00	54 25
Copper sheet, planished, 14x60 base.	64 00	60 00
Braziers', in sheets, 6x4 base	55 00	52 00

BRASS.

Brass rods, base 1/2 in to 1 in rd.	0 55
Brass sheets, 8 in. wide, 20 oz.	0 60
Brass tubing, seamless.	0 57
Copper tubing, seamless.	0 58

PLATING SUPPLIES.

Polishing wheels, felt.	3 00
Polishing wheels, bull-neck	1 75
Emery in kegs, American	06
Pumice, ground	05
Emery glue	15 to 20
Tripoli composition	04 to 06
Crocus composition	07 to 08
Emery composition	08 to 09

Rouge, silver	35 to 50
Rouge, powder	30 to 35

Prices Per Lb.

LEAD SHEETS.

Montreal Toronto	
Sheets, 3 lbs. sq. ft.	\$18 00 \$18 00
Sheets, 3 1/2 lbs. sq. ft.	18 00 18 00
Sheets, 4 to 6 lbs. sq. ft.	17 50 17 50
Cut sheets, 1/2 c per lb. extra.	
Cut sheets to size, 1c per lb. extra.	

PLATING CHEMICALS.

Acid, boracic .....	.15
Acid, hydrochloric .....	.05
Acid, hydrofluoric .....	.14 1/2
Acid, nitric .....	.10
Acid, sulphuric .....	.06
Ammonia, aqua .....	.08
Ammonium carbonate .....	.15
Ammonium chloride .....	.11
Ammonium hydrosulphuret .....	.40
Ammonium sulphate .....	.07
Arsenic, white .....	.12
Copper, carbonate, anhy. ....	.35
Copper, sulphate .....	.17
Cobalt sulphate .....	.70
Iron perchloride .....	.20
Lead acetate .....	.16
Nickel ammonium sulphate .....	.12
Nickel carbonate .....	.35
Nickel sulphate .....	.15
Potassium carbonate .....	.75
Potassium sulphide (substitute) .....	.20
Silver chloride (per oz.) .....	.65
Silver nitrate (per oz.) .....	.65
Sodium bisulphite .....	.10
Sodium carbonate crystals .....	.05
Sodium cyanide, 127-130% .....	.41
Sodium hydrate .....	.04
Sodium hyposulphite, per 100 lbs.	5.00
Sodium phosphate .....	.14
Tin chloride .....	.60
Zinc chloride .....	.60
Zinc sulphate .....	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Condition and Tendency

THAT contracts for shells will be placed in Canada by the United States Government is now assured. The shell in question is the 75-millimetre type as used by the French Army. These contracts, together with those for the British Government, will keep a number of plants in Canada busy for at least six months. There is no improvement in conditions in the iron and steel trade and an acute shortage of these materials is likely. The abnormal demand for steel in the States renders the exportation of any considerable tonnage practically impossible. It is not expected that firms engaged upon war orders will be inconvenienced to any great extent, but other consumers relying on the States for their supplies of steel will suffer. No steel can come in for any purpose except under license, which will be difficult to obtain except when the material is required for war purposes or contributory thereto. All consumers are urged to exercise rigid economy in the use of iron and steel products. The situation in the pig-iron market is unchanged and prices are holding firm, due to the shortage in supply and high cost of coke, the scrap market is dull and business quiet. Consumers continue to hold off buying in the expectation of lower prices, which do not appear likely in the meantime. An advance in price of tin, due to scarcity, is the principal feature in the non-ferrous metal markets, otherwise prices are unchanged. The copper situation is unchanged and quotations are nominal. Indications point to a little more activity in the machine tool trade which has been rather quiet lately. Deliveries on imported tools are getting more backward owing to the activity in the States.

various Canadian plants that have during the past three years been engaged in shell production for the British Government. A definite statement has not yet been made, but this is looked for in the course of a few days or a week at the latest. In addition to the contracts that are likely to be placed for shells, it is reported that no small amount of marine work is being, or eventually will be, placed with Canadian firms.

Pig Iron

The market in pig iron continues to be affected by the conditions that prevail in the States, but a slight improvement has been noticed during the past week. The demands of the steel makers are still quite large and domestic customers are still uncertain as to their position under the regulations that are now in force. Under the assumption that furnaces are filled up until well into the new year, few producers can be found that will quote on early delivery. The trend appears to be that any revision of prices at the beginning of the year would probably be based on a higher level than that prevailing at the present time. The final regulation has been made on the Pittsburgh market for pig iron, this being for southern foundry, which is quoted at \$37.55, subject to revision. Canadian situations remain unchanged, with producers still off the market.

MONTREAL, Que., Nov. 5, 1917.—The most interesting feature in connection with the week's business has been the

announcement from Ottawa that extensive orders for American shells may be expected to be distributed among the

Steel

The iron and steel situation is experiencing a quiet period following the recent price fixing of the American Government on certain lines of steel and metals. These regulations have, however, been apparently suspended, and various interpretations are being put upon the delay in taking further action in this direction. The marking of time that seems to characterize the present attitude of the Government may only be temporary, partly due to the difficulties of the situation and partly to the possibility that the committee are for a voluntary adjustment of the remaining commodities on the basis of the regulations that have already been put in force. It is thought at some quarters that if the market is left to itself it will gradually assume a condition more in keeping with the wishes of the Government. On the other hand, the complications that have marked the general transactions of business since the inception of the price fixing regulations, have not been conducive to an active market, as the difficulties and uncertainties that were so pronounced under the old order of things are still the chief factor in maintaining the unsettled conditions that continue to be the characteristic feature of the market. The domestic situation is still a waiting one, owing to the heavy requirements of the various Governments, and in addition producers are showing no anxiety for outside business at the prevailing figures. Canadian consumers of steel, unless such is specially required for war purposes, are practically prohibited from securing supplies, as the license system of obtaining steel has almost put a ban on export from the States. The feature of the week has been the decline announced in the Pittsburgh quotations on black and galvanized sheets. No definite action has been taken by the War Industries Board, but the fact that representatives of the sheet producers are in conference with the said board may account for the weakness that has developed in the sheet situation. The decline on the Pittsburgh market is 2c per lb., the base price on black and blue annealed sheets being 6c per lb., with galvanized sheets quoted at 7½c per lb. The quotation on cold rolled strip steel of 7½c shows a similar decline to that announced on sheets. Pending action on the subject of sheet prices will denote whether actual price-fixing has been deferred, or whether more time will be required to allow matters to adjust themselves. Nothing has transpired to indicate that developments in the States have assisted to relieve the acute situation that has been so marked in Canada for the past several months. The practical embargo that exists on steel has been one of the chief factors in the strength of the market, and it is not thought that the situation here will undergo any great change for some time to come, as manufacturers here are dependent on the States for supplies, and these at present are not obtainable. Dealers here report an unchanged market, with the demand good, but inability to secure

shipment of domestic material. The Montreal quotation on 3 16-inch tank plates has declined ½ cent per lb., the current quotation being \$13.10 per 100.

Metals

With the exception of tin, the metal markets have been devoid of features of any consequence. The American situation is still dominated by the attitude of the Government in relation to the fixing of prices, which at the present time seems to have been deferred for unforeseen reasons. Copper is very inactive, the only business that is passing being confined to Government requirements. Tin has jumped owing to the difficulties experienced in obtaining shipping permits. Spelter is demoralized and weaker. Lead has again reacted, and is becoming stronger. Antimony and aluminum are both quiet, with a weaker tendency.

Copper.—The situation in copper appears to be as confusing as ever. Instead of the price regulation clearing away the uncertainty that so unsettled the market a few months ago, the fixed price that controls the sale and distribution of the metal has had the tendency to increase the stagnation, particularly as regards the supply available to those consumers that are not directly engaged in the manufacture of war essentials. While it is supposed that the situation is gradually becoming clearer, there appears to be little outside indication that this is an actual fact, and inquiry at the smelters emphasizes the feature that dominates the market, that there is practically no metal for sale this year at the regulation price of 23½c per lb. Domestic consumers are anxiously awaiting further developments with the hope that an easier situation will be forthcoming, so as to enable them to cover their immediate and early future requirements. The local situation continues to be affected by the general conditions in the States and dealers report a market devoid of any features, with quotations unchanged at 31c and 30c per lb.

Tin.—A situation has developed in tin that tends to increase the uncertainty that for the past few weeks has shown some signs of clearing. The market has been looking forward to some relief following the attitude of the American Government in regulating the price of commodities on this side of the Atlantic. It was hoped that reciprocity would open the way to better conditions in respect to the obtaining of permits from the British Governments and thus result in making the situation here more tolerable. With the entrance of the States into the war the co-operation of the British authorities was expected to remove the acute conditions that marked the trading in tin before America was involved. The recent advance on the New York market has shown the essential need of a better understanding between the two Governments so as to eliminate such friction as is sure to follow the tight hand that seems to be controlling the shipments of tin from the British possessions. New York is quoting the nominal price of 66c

for Straits tin, this being an advance over last week of 4c per lb. The situation locally is strong, with quotations 1c higher, the price asked being 64c per lb.

Spelter.—The dullness that features the situation in spelter has almost demoralized the market. The price of ore, especially to those smelters that are compelled to purchase their supply from an outside source, is on such a scale that it is becoming a very serious matter for those producers to continue operations, as invariably they are at a loss in so doing. Producers who are fortunate enough to control their own ore mines are still able to operate their smelters, but at very little profit. Unless early action is taken in connection with placing this metal on a better footing, it is expected that additional plants will have to curtail production or possibly discontinue operations entirely. A further decline on the New York market of ½c per lb. has lowered the quotation to 7¾c per lb. Dealers here report a very quiet market, but continue to quote last week's price of 10½c per lb.

Lead.—As was expected, a reaction has begun to develop in the lead situation and the market is becoming firmer. This is reflected in the fact that producers are showing increased reluctance to accept business at the price quoted last week. When sellers are approached, they generally have no metal to dispose of, or request the advanced price; and, while this is not the price asked by the Trust, several sales have been reported at the quotation of 6c per lb., and this may be recognized as the prevailing outside price. The Trust price is still quoted at 5½c, but the indications point to a stronger market. The local market has been quiet, but dealers have maintained their quotations at 9c per lb.

Antimony.—No improvement has been reported in the market. Production continues to outrun the demand, and the situation may be said to be very dull. Weakness on the New York market has resulted in a further decline in the current quotation, the price this week being 14c, ¼c lower than that of last week. Local dealers continue to quote 18c on a quiet market.

Aluminum.—An easier tone has developed in this market, with prices lower in New York. The local situation remains quiet and unchanged, with prices firm at 65c per lb.

Machine Tools and Supplies

The activity in the machine tool industry during the past week has not been very pronounced, although a fair amount of business has been reported. Increased inquiries have been received in connection with six-inch shell equipment, and prospects for improvement in general demand have become greater, following the report that American shell orders are to be placed in Canada. This is very encouraging news, and will renew the interest in machine equipment that has been on the wane ever since the curtailment for British shells was announced. To what extent this new activity will at-

tain is at present problematical, but indications are that the volume will be quite large. However, it is generally supposed that any business placed here will only be the overflow from the plants in the States, as it is only natural that orders will be placed there before recourse is made to the utilization of Canadian plants. However, interesting developments are not unlikely in the very near future. Apart from the supplies required for those plants that are engaged in the making of six-inch shells, the market in supplies has been exceptionally quiet, but price quotations in all particulars are well maintained.

Scrap

Nothing has developed to remove the uncertainty that still characterizes the old metal and scrap situation. Both dealers and consumers are patiently awaiting action on the part of the American Government in connection with their policy of price-fixing. The New York market, with few exceptions, has remained firm; the local situation is not active, but dealers are holding firm on last week's quotations.

TORONTO, Ont., Nov. 6.—A revival in the munitions industry is imminent, due to orders for shells which will be placed in Canada by the United States Government. Some orders have already been placed and negotiations for others which are pending will, it is fully expected, be closed very shortly. Representatives of Canadian shell manufacturers are negotiating with the Imperial Munitions Board in regard to prices and at least a dozen firms are expected to participate in the contracts. The shell covered in the contracts is the French 75 millimetre type which has been adopted by the United States Government for the army. It is a high explosive shell and is similar in design to the British 18 pdr. shrapnel. Quick delivery is doubtless the principal reason for these contracts coming to Canada. The Imperial Munitions Board who are assisting in the negotiations have appointed a prominent manufacturer, Lloyd Harris, to represent them in Washington.

Steel

Although the outlook is clearer in regard to conditions in the steel trade in Canada, the situation still remains serious by reason of the shortage of iron and steel. It is even possible that there will be a scarcity of steel required here for the manufacture of war equipment or articles contributory thereto, that is when steel produced in the States is needed for their manufacture. The reason for the tight situation is the abnormal demand for steel in the States. In fact the demand is so heavy that it may not be possible for mills in the States to supply steel for purely commercial purposes in Canada except in limited tonnages. F. C. T. O'Hara, Deputy Minister of Trade and Commerce, while in Washington recently made arrangements with the Priority

Board which it is hoped will greatly assist the Canadian manufacturer to secure materials which he needs from the United States. In view of the serious situation, the Deputy Minister strongly urges rigid economy in the use of all metals for any purposes whatsoever; this implies a careful conservation of all scrap. The outlook for manufacturers not engaged on war orders is not particularly bright, but it is apparent that very little more can be done to improve their position. It is fortunate however, that Canadian mills will benefit under the new conditions by the elimination of considerable competition although they cannot supply all the different classes of material that will be required. It is here of course where the principal trouble lays, for this material must be imported from the States which is now a difficult matter on account of the embargo.

Prices of steel products continue stationary with the single exception of the lighter gauges of black sheets which have again declined. There is not a particularly heavy demand for this material, and prices at the time of the advance went up in sympathy with other materials rather than for any other reason. It appears to be the intention of the War Industries Board to leave the matter of price fixing in the hands of a sub-committee of the American Iron and Steel Institute who it is expected will announce in due course prices on products not yet fixed. The price regulations have not as yet been reflected in the situation here and the market continues firm. Business of late has not been sufficiently large in volume to really affect the market, the unsettled outlook having caused many consumers to hold off buying until conditions become more favorable. War orders continue to keep the steel trade very active. Considerable steel is being used in the manufacture of marine forgings, while the pending contracts for shells for the United States Government will absorb a large quantity of steel.

A large proportion of the output of steel in the United States is being utilized for war purposes. The shipbuilding branch of the industry alone is responsible for the largest bulk of the steel now on order. All the steel plants in the States are working at a capacity which is only limited by the equipment of the several shops in machinery and men. Prices of steel have a weaker tendency and appear to be gradually declining towards levels recently fixed. Business with the mills is largely for Government account and private consumers are not buying heavily. Price regulation has reached another stage, maximum prices having been fixed, subject to revision Jan. 1st, on certain steel articles including sheets, pipe, cold rolled steel, scrap iron, wire and tin plate. The prices for sheets range from \$4.25 to \$6.25 per 100 lbs. f.o.b. Pittsburg, according to grades. On $\frac{3}{4}$ inch pipe to 3 inch black steel pipe a discount of 52 and 5 and $2\frac{1}{2}\%$ f.o.b. Pittsburg was fixed. The discount on cold rolled steel is 17 per cent.

Pig Iron

An important step towards more settled conditions in the market in the States has been made. A list of differentials has been issued by the American Iron and Steel Institute. The differentials are based on the base price of No. 2 foundry iron which was fixed at \$33 per gross ton f.o.b. cars at furnace. The list is given in another section of this journal. The situation locally shows no improvement and prices continue nominally unchanged. The furnaces are well sold ahead and there is very little iron to be had. Production is not increasing and it is doubtful if it is keeping pace with the requirements. The coke situation has not improved materially. It is almost impossible to secure any desirable quantity for prompt delivery at the established price as operators claim that they can produce no more than is sufficient to fill contracts.

Scrap

The old material market continues dull but the outlook is improving owing to the scarcity of new materials. The volume of business is light as buyers are looking for lower prices and dealers are not anxious to sell at current values. There is not a great deal of scrap to be had and prices are consequently holding firm.

Machine Tools

Some renewed activity in the machine tool business may be expected following the placing of contracts in Canada for shells by the United States Government. The shell in question is the 75 mm. French pattern which has been adopted by the United States Government. It is a high explosive shell and is not unlike the British 18 pdr. shrapnel except of course that there are no bullets inside. The shell has to be heat treated on account of the high bursting pressure required. Machinery used for shrapnel will be suitable for the new shell. The French shell is made from a forging with comparatively thin walls and it is hardened and heat treated to increase its elastic limit and tensile strength. The bursting pressure is as high as 18,000 lbs. per square inch. It has no base plug as is common in British high explosive shells. A notice has been issued by the Dominion Government prohibiting the export of shell machinery except under license, which appears to indicate a continuance of shell contracts for the British Government.

Supplies

Prices of machine shop supplies continue firm with an upward tendency in some lines. The market is steadier however, and business active. Blacksmith's forges and blowers have advanced, one size, the 18 inch round riveted forge, is now quoted at 20 per cent. as against 40 per cent. off list. Blowers which were formerly 10 per cent. on list are now 40 per cent. on list. Iron rivets and burrs which were formerly $17\frac{1}{2}\%$ per cent. are now 15 per cent. off list. Soldering coppers have declined 2c per pound. One

priced copper are now quoted at 71c. 1 1/2 cts at one, 2 1/2 cts at six, the lowest 65 1/2 cts and up 6 1/2 cts per pound.

Metals

An advance in the price of tin is the only feature of importance to note in an otherwise dull situation. The metal markets generally are quiet and signs of activity are wanting. The advance in tin is due to a scarcity of spot metal because of the difficulty which exists in regard to shipping permits. The copper market is dull and weak, a scarcity of spot metal being the principal feature of this market. Lead continues firm but spelter is dull and easy. Both antimony and aluminum are unchanged.

Copper.—The situation in the copper market continues somewhat obscure. While large consumers appear to be getting what they require the position of the dealers and smaller consumers dependent upon them is not yet clearly defined. The primary market is completely in the hands of the Copper Production Committee with deliveries and sales regulated according to consumers' needs and with a view to protect the United States Government and the Allies. Local prices are unchanged and nominal, lake and electrolytic being quoted at 32c and castings at 31c per pound.

Tin.—The development of an acute shortage in spot tin together with the uncertainty as to future supplies has caused the market to become active and higher. Unless the situation speedily improves the shortage threatens to interfere with important contract work for the Government and Allies. While this refers to the products of tin and its alloys in all forms, it especially applies to the manufacture of babbit metal which is of utmost importance in the construction of motors and machinery of almost every description, and into the composition of which tin enters to the extent of 25 to 95 per cent. Tin has advanced 3c and is now quoted at 66c per pound.

Spelter.—The market is dull and weak, although there has been no change in prices. Local quotation 10 1/2 c per pound.

Lead.—Although the Trust price of lead is unchanged at 5 1/2 c per pound the independent producers have raised the price, ranging from 6 1/4 to 6 1/2 c New York for spot metal. The market generally is firmer but little lead is offering. Local price firm at 8 1/2 c per pound.

Antimony.—The position of antimony shows no improvement, the market being weak and demand light, price 18c per pound.

Aluminum.—The market continues quiet and easy with quotations unchanged at 62c per pound.

NEW YORK, Nov. 5.—The American International Corporation has received a second contract from the Emergency Fleet Corporation to build additional cargo boats for the United States Government. The contract calls for 70 ships each of 8,800 tons deadweight and it is understood that the boats are to be com-

pleted in twenty-two months. The building of each of these standardized steel ships calls for 1,760 tons of plates and 1,175 tons of shapes, making a total of 193,310 tons of steel required for the 70 boats.

It will be recalled that the first contract placed with the American Co. covered the construction of 50 7,500 ton boats. In the last week, the company has placed contracts for the fabrication of some of the steel required in the construction of the first lot of 50 boats and in consequence the Priority Board has allowed certificates to be issued for some steel shipments. The most interesting fact connected with this latter transaction is that the fabrication of some of the steel will be done in Canada and as far west in the United States as Minneapolis. One contract has also been placed with the Penn Bridge Co., Beaver Falls, Pa.

UNITED STATES SHELL CONTRACTS FOR CANADA

We understand that orders are being placed in Canada by the United States Government for large quantities of 75 mm., 2 15 16 inches, high explosive shells, the same type as is used by the French Army. Several prominent Canadian manufacturers have been negotiating with the Imperial Munitions Board in connection with the contracts that are being placed. The Imperial Munitions Board are acting for the United States Government in the distribution of these contracts.

The Submarine Boat Co. is said to have placed its fabricated steel contracts, referred to last week, at \$38.50 per ton, but the American Co. claims to have secured a lower rate from small shops. Most of the large fabricators whose shop capacity is now well sold consider \$40.00 per ton on such work a low rate.

The American International Shipbuilding Corporation has purchased 25 locomotive cranes from the Industrial Works, Bay City, Michigan, for installation at the Government Hog Island shipyard and the Submarine Boat Corporation has ordered 5 overhead shop cranes for the Government shipyard at Port Newark. A large order for locomotive cranes has also been placed for the same plant and bids are now being taken on a number of radial drills for the shops now under construction.

The Federal Shipbuilding Co. has issued a list of ten shop cranes which are about to be purchased. The New York Shipbuilding Co. has placed a contract for 1,900 tons of steel with the American Bridge Co. for additional ship ways at Camden and continues to buy shop equipment. The Newburgh Shipyards Co., which has just received a contract to build four large ships for the Emer-

gency Fleet Corporation at Newburgh, N.Y., is now buying machine tools. The Union Iron Works, San Francisco, which has thrown the whole of its energy into the building of torpedo boat destroyers, continues to buy shop equipment in the interior markets.

To Control Export of Tools

The War Industries Board, through its machine tool section, recently organized, has commandeered about 600 machine tools that were originally sold for export and awaiting shipment at New York, to relieve the pressing needs of American manufacturers of war munitions. Hereafter, the Government will permit the exportation of only such tools as are needed by the Allied governments to manufacture war material. All other tools will be diverted to home industries engaged in government work. Steps are also being taken to increase the output of machine tools and to utilize those already installed to the best possible advantage; consequently, future contracts for war munitions will probably be given only to manufacturers experienced in such work and whose shops are already equipped to make munitions.

The Emergency Fleet Corporation is understood to have virtually closed a \$10,000,000 contract with the Allis-Chalmers Co. of Milwaukee to build marine turbine engines. Manufacturers holding government contracts for ordnance and shells are constantly in the market for machinery of various kinds. The Savage Arms Corporation, that is building Lewis machine guns, has placed contracts for \$200,000 worth of tools to be installed at the Utica, N.Y., plant. The Taylor-Wharton Iron & Steel Co. is buying equipment for its Tioga plant to execute a contract for the Government. Shell makers in the central West are now actively in the market for tools of various kinds.

PITTSBURGH, PA., Nov. 3.—The rumors that the price-fixing programme at Washington had been halted, referred to in last letter, were followed by a semi-official statement that such was the case, but the statement meant nothing as there was no intimation how long the halt would continue. Last Wednesday and Thursday the various committees of the American Iron and Steel Institute were in session in New York and immediately afterwards the opinion was expressed by those who had attended the meetings that a batch of prices would be announced at Washington very shortly, covering some or all of the following items: Sheets, tin plates, wire products, tubular goods and scrap. Sheet and tin plate prices at least will probably have been announced before these words are printed.

If all the products just mentioned are set the major products of the steel industry will have been covered and further price-fixing would relate rather to manufactured goods, such as shafting, rivets, bolts and nuts, spikes, etc. These may or may not be taken in hand.

Pig Iron

The market has been fairly active and it has been moving smoothly. Furnaces are disposed to take care of the immediate needs of regular customers and generally are able to do so. Since the general agreement announced Sept. 24 the furnaces have been selling basic and foundry at \$33 at furnace, in all districts, with valley Bessemer at 10 per cent. higher, or \$36.30. A schedule covering details, including analyses, is just about to be promulgated by the American Iron and Steel Institute. Direct testimony to the activity of the market since prices were set is furnished by the monthly compilation of W. P. Snyder & Co. This compilation has been made monthly for years, and takes account of all valley basic and Bessemer sold in a month, in lots of 1,000 tons and over, showing the average price realized on the sales. This average is used in the adjustment of some contracts made on a sliding scale basis. The October averages showed the set price, but the important fact was that the total tonnage included in making up the averages was fully 100,000 tons, while in each of the three preceding months the tonnage reported sold was much less.

Steel Quiet

There has been very little market activity in unfinished steel and finished steel products. The mills are well sold up and buyers are well covered, while the general attitude is that business should not be done at this time for far forward deliveries. In most of the commodities little material is available for early deliveries, but sales when made are at the set prices, when there are any. Prices as announced are stated to be subject to revision Jan. 1 or later and the common view is that if revised the revision will be downwards. While it has seemed improbable, of late, that there would be any occasion to reduce prices, in the past few days this possibility has become less remote, as the curtailment in commercial consumption of steel, due to the country becoming more fully engaged, in sentiment and action, in the war, has become more conspicuous. In some quarters recognition of the changes war would effect has been somewhat tardy.

Decline in Sheets

The break in sheets recorded in last report has been followed by further declines. The existing conditions disclose clearly the fictitious nature of the sheet market in the past few months, something that was appreciated by some of the best posted consumers but certainly was not admitted by the mills. The break had carried the market in blue annealed and black sheets to a level of 6.00c a week ago. At the beginning of this week there were occasional sellers at 5.50c, while later in the week this quotation became common and quotations of 6.00c were not taken seriously by buyers. Two or three mills made occasional quotations of 5.25c on No. 28 gauge black, and it seemed clear that they were doing this merely to sell about

a day's rolling each day. Some of them had practically run out of business. Last April the American Sheet & Tin Plate Company sold its second half output at 5.00c for blue annealed and 5.50c for black, with .25c extra for open-hearth, but the tonnage did not go around and independents immediately began selling at higher prices. Now the market is back to the old level, and the net result of the flight to 9.00c or thereabouts has been to make an extra profit for the mills on a relatively small tonnage and disorganize the business of many consumers whereby the consumption of sheets to-day is undoubtedly at a smaller rate than would be the case if the market had remained on a steady basis.

Coal Supplies Improving

Occasionally the steel mills have lost a little production through shortage of coal, and the majority of them have

MARKET LETTER DEVELOPMENT

The attention of metal working plant executives is directed to the enlargement of the scope and usefulness of our Market Letter Department. In New York and Pittsburgh, expert correspondents have been engaged, and are already furnishing each week concise reports of production activities, price movements, etc., within the territory served by each of these important centres. During the next few weeks, further additions will be made to the number of our United States correspondents, embracing other industrial centres, and enlarging thereby the scope of the meantime service being rendered.

been on the ragged edge for weeks, with practically no stock piles. For the 24 hours of last Monday the priority order in favor of lake coal shipments was suspended and shipments to the line trade were heavy. Yesterday the priority order was removed entirely as relates to fully half the railroad divisions, as the lake shipping season is now nearing its close, and coal supplies promise to be decidedly better to mills and other important consumers. Effective last Monday morning the government coal prices were advanced 45 cents, this covering the wage advance arranged Oct. 6, and probably something in addition. The new prices for Pittsburgh district coal are \$2.20 for slack, \$2.45 for mine-run and \$2.70 for screened, per net ton at mine, with 15c to be added by brokers when they make the sale.

Government Buying

Government buying is somewhat heavier, as the matter of shells is now receiving a great deal of attention. Some additional sheet tonnages are being allotted, making the sheet requirements somewhat larger than had been antici-

pated. There is no occasion to revise former guesses as to the total war steel requirements. For the Government and its Allies these promise to run next year at the rate of something like 1,000,000 gross tons per month, or, as stated formerly, between 30 and 40 per cent. of the total output.

Contract Abrogation

Recently the Federal Trade Commission distributed a questionnaire relating to the abrogation of contracts. The subject is up in connection with the iron and steel price regulation bill the commission is drafting for submission at the next session of Congress, convening Dec. 5. The steel producers are practically a unit against the idea and the suggestion is meeting a storm of protest. While the fixing of prices has doubtless placed some manufacturers in an awkward situation, through their having contracts to accept material at higher prices, it would seem that attempts to abrogate some or all contracts would make the remedy much worse than the disease.

U. S. PIG IRON PRICES FIXED

E. H. GARY, Chairman of the Committee on Steel and Steel Products of the American Iron and Steel Institute, has issued the following statement:—"By agreement between the General Committee on Steel and Steel Products of the American Iron and Steel Institute and the War Industries Board, approved by the President, the base price of No. 2 foundry iron and also basic iron was fixed at \$33 per gross ton, f.o.b. cars at furnace.

"From these base prices the sub-committee on pig iron, iron ore and lake transportation has reported to the general committee a list of differentials which the general committee believes as fair and reasonable and in accordance with the usages of the trade, and therefore recommends to the iron industry that the same be adopted to take effect immediately. It is hoped that there will be no hesitancy in accepting this recommendation.

"The grade of No. 2 foundry iron to be equivalent in analysis to: silicon, \$1.75 to \$2.25; sulphur, not over .05. No. 2 soft southern iron equivalent to No. 2 foundry of same silicon content.

"Differentials from the above base price for No. 2 foundry iron to be made for the following changes in specifications:--

"Forge or mill iron, \$1 per gross ton under base.

"Foundry iron running silicon \$1 to \$1.75, .50 per gross ton under base.

"Foundry iron running silicon \$2.25 to \$2.75, .50 per gross ton over base.

"Foundry iron running silicon \$2.75 to \$3.25, \$1.50 per gross ton over base.

"Foundry iron in excess of \$3.25 silicon and \$1 per gross ton for each ½ per cent. of silicon over the price for \$3.25 silicon iron.

"Manganese, sulphur and phosphorus variations to be adjusted as formerly

customary for each district, based respect to the base price.

"Where there is any irregularity the usual practice prevailing in each district to continue.

"Monday, Feb. 23, any excess ton above base.

"Tuesday, Feb. 24, any excess ton above base.

"Basic iron, base price.

"In general, iron containing 0.04 per cent. silicon, with a maximum gross ton advance for each 1 per cent. silicon, \$1.50 per gross ton above base for iron containing 0.04 to 0.05 per cent. silicon, and \$1.75 per gross ton above base for iron containing 0.05 to 0.06 per cent. silicon.

"The grades running below these grades, corresponding reductions as usual to the trade to be made.

"Cold blast charcoal iron a maximum of \$1.50 per gross ton advance for iron containing 0.04 per cent. silicon, with customary reductions for lower grades, as recognized by the trade.

"Lake Superior iron \$2.50 per gross ton above base for iron averaging \$1.25 silicon. Other grades to be adjusted as per the custom of the trade, depending upon the silicon, phosphorus and manganese contents of the iron.

"All of these charcoal iron differentials to be considered in connection with the base price.

"High silicon or silvery iron—For iron containing 6 per cent. silicon, \$7 per gross ton above base; 7 per cent. silicon, \$9 per gross ton above base; 8 per cent. silicon, \$11.50 per gross ton above base; 9 per cent. silicon, \$14 per gross ton above base; 10 per cent. silicon, \$17 per gross ton above base.

"Three dollars per gross ton advance for each 1 per cent. silicon for 11 per cent. and over.

"Bessemer ferro-silicon—For iron containing 10 per cent. silicon, \$22 per gross ton above base; 11 per cent. silicon, \$25.30 per gross ton above base; 12 per cent. silicon, \$28.60 per gross ton above base.

"Low phosphorus iron—Iron containing phosphorus and sulphur not exceeding .04 and silicon not exceeding 2 per cent. For copper bearing iron, \$17 per gross ton above base; for copper free iron, \$20 per gross ton above base.

"A sliding scale of \$1.50 per gross ton advance for each reduction in phosphorus of .005 per cent. below .04, and \$1.75 per gross ton for each 1 per cent. of silicon in excess of 2 per cent."

FIRM WANTS CATALOGUES

IN the recent fire which destroyed the entire forcing plant of the Cluff Ammunition Co., Ltd., Atlantic Avenue, Toronto, the firm's records were completely lost. They are anxious to renew their catalogue file, and would appreciate new copies of equipment, manufacturers' literature, etc.

THE largest hydraulic power installation in South Africa is at Barberton, and is capable of developing 3,000 horsepower. Only about 1.1 per cent. of the power of the Union is obtained from water.

Enlarged Canadian Trade Intelligence Service

Under the arrangement made by the Minister of Trade and Commerce with Sir Edward Grey in July, 1912, the Department of Trade and Commerce, Ottawa, is able to present the following list of the more important British Consulates whose officers have been instructed by the Foreign Office to answer inquiries from and give information to Canadians who wish to consult them in reference to trade matters.

BRAZIL—Bahia, British Consul. Rio de Janeiro, British Consul General.	NETHERLANDS—Amsterdam, British Consul.
CHILE—Valparaiso, British Consul General.	PANAMA—Colon, British Consul. Panama, British Vice-Consul.
COLOMBIA—Bogota, British Consul General.	PERU—Lima, British Vice-Consul.
ECUADOR—Quito, British Consul General. Guayaquil, British Consul.	PORTUGAL—Lisbon, British Consul.
EGYPT—Alexandria, British Consul General.	RUSSIA—Moscow, British Consul General. Petrograd, British Consul. Vladivostok, British Consul. Odessa, British Consul General.
FRANCE—Havre, British Consul General. Marseilles, British Consul General.	SPAIN—Barcelona, British Consul General. Madrid, British Consul.
INDIA—Calcutta, Director General of Commercial Intelligence.	SWEDEN—Stockholm, British Consul.
ITALY—Genoa, British Consul General. Milan, British Consul.	SWITZERLAND—Geneva, British Consul.
MEXICO—Mexico, British Consul General.	URUGUAY—Monte Video, British Vice-Consul.
	VENEZUELA—Caracas, British Vice-Consul.

Canadian Commercial Intelligence Service

The Department of Trade and Commerce invites correspondence from Canadian exporters or importers upon all trade matters. Canadian Trade Commissioners and Commercial Agents should be kept supplied with catalogues, price lists, discount rates, etc., and the names and addresses of trade representatives by Canadian exporters. Catalogues should state whether prices are at factory point, f.o.b. at port of shipment, or, which is preferable, c.i.f. at foreign port.

CANADIAN TRADE COMMISSIONERS.

- ARGENTINE REPUBLIC—B. S. Webb, Acting Canadian Trade Commissioner, Reconquista, No. 46, Buenos Aires. Cable address, Canadian.
- AUSTRALIA—D. H. Ross, Stock Exchange Building, Melbourne. Cable address, Canadian.
- BRITISH WEST INDIES—E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.
- CHINA—J. W. Ross, 13 Nanking Road, Shanghai. Cable address, Cancom.
- CUBA—Acting Canadian Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.
- FRANCE—Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.
- ITALY—W. Mc. Clarke, c/o H. M. Consul, Milan.
- JAPAN—E. F. Crowe, Acting Canadian Trade Commissioner, P. O. Box 109, Yokohama. Cable address, Canadian.
- HOLLAND—Ph. Geleerd, Acting Canadian Trade Commissioner, Zuiddlaak, 26, Rotterdam. Cable address, Watermill.
- RUSSIA—C. F. Just, Canadian Government Commercial Agent, Alexandrinskaya, Ploshch 9, Petrograd. L. D. Wilgress, Canadian Government Commercial Agent, Bukhgozsa Ulitsa No. 4, Omsk, Siberia.
- NEWFOUNDLAND—W. W. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.
- NEW ZEALAND—W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.
- SOUTH AFRICA—W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.
- UNITED KINGDOM—Harrison Watson, Sub-division E.C., 2, 73 Basinghall Street, London, E.C., England. Cable address, Sleighing, London. N. D. Johnston, Sun Building, Clare Street, Bristol. Cable address, Canadian. J. E. Ray, Central House, Birmingham. Cable address, Canadian. J. Forsyth Smith, 31 North John Street, Liverpool. Cable address, Cantracom. F. A. C. Bickerdike, 4 St. Ann's Square, Manchester. Cable address, Cantracom. J. Forsyth Smith, Acting Canadian Trade Commissioner, 87 Union Street, Glasgow, Scotland. Cable address, Cantracom.

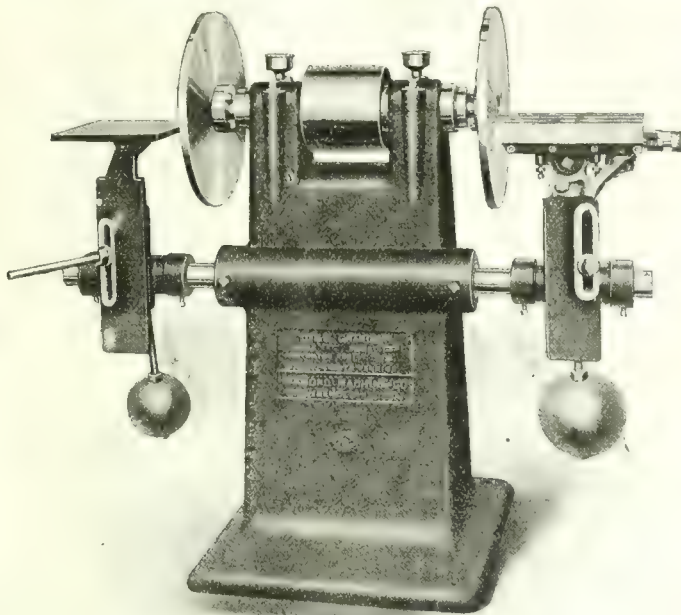
CANADIAN COMMERCIAL AGENTS

- AUSTRALIA—B. Millin, Royal Exchange Building, Sydney, N.S.W.
- BRITISH WEST INDIES—Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian. R. H. Curry, Nassau, Bahamas.
- NORWAY AND DENMARK—C. E. Sontum Grubbegd No. 4, Christiania, Norway. Cable address, Sontums.
- SPAIN—J. F. Roberts, Hotel Cuatro Naciones, Barcelona.

CANADIAN HIGH COMMISSIONER'S OFFICE

- UNITED KINGDOM—W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England. Cable address, Dominion, London.

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- 18" discs
- Ring wheel chuc and emery wheel
- Universa lever table on R.H. side
- Plain swinging table on L.H. side
- 18" Universal cementing press.

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THE HURLBUT-ROGERS CUTTING-OFF AND CENTERING MACHINE has the advantage of two cutting tools.

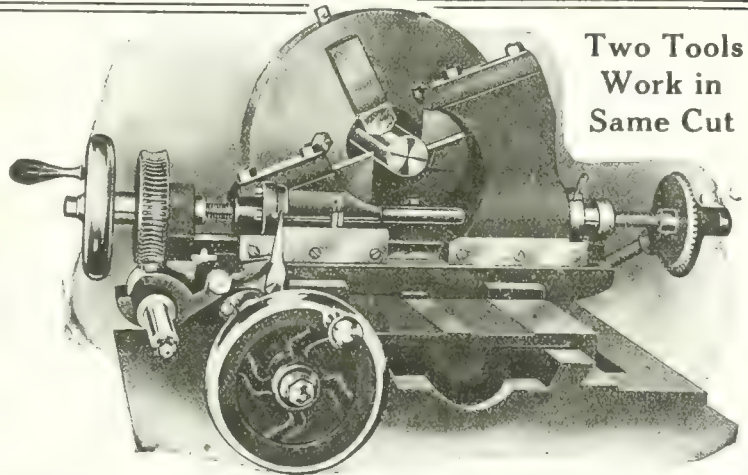
Each tool is rigidly supported in a stationary block at an angle which permits a strong shearing cut.

WITH THIS MACHINE PRODUCTION CAN BE NEARLY DOUBLED, and the utmost accuracy maintained under the hardest of work.

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South Sudbury, Mass., U. S. A.

FOREIGN AGENTS—England, Chas. Churchill & Co., Ltd., London, Manchester, Glasgow, Newcastle-on-Tyne. H. W. Petrie, Toronto, Canada.



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Work in
Same Cut



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is the name of our 36-page book describing each department of the foundry and general method followed in laying out a complete plant. A typical layout is given, list of equipment and numerous illustrations. Send for a copy to-day.

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Types



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INDUSTRIAL ^AND ^D CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

ENGINEERING

Levis, Que.—The Dominion Co. will build the new power plant here.

Hamilton, Ont.—The Lake Wire Rope Co. will extend their factory here.

Bridgewater, N.S.—The Great Maritime Machine Co. will build a plant here.

Welland.—The Canada Foundries & Engineering Co. have recently secured some important orders for marine engines.

New Glasgow, N.S.—The Nova Scotia Steel & Coal Co. will make a number of extensions and improvements to their steel plant.

Sydney, N.S.—The Sydney Foundry & Machine Co., will build a foundry at Halifax at a cost of \$7,500. Wilfred Clarke is manager.

Sarnia.—The Holmes Foundry Co., a recently organized concern, will build a plant here. It is expected that construction work will commence shortly.

Orillia.—The firm at Ragged Rapids will be blown out on Nov. 10. Everything else is ready for starting up the new plant. Two units in the power house are completed, and ready for operation.

Watford, Ont.—The St. Andrews Wire Works of Canada, Ltd., has taken a building at Strathroy, Ont., which it will remodel and equip for the manufacture of wire products, etc. G. M. Haldane is local manager.

Port Arthur.—Work on the new plant of the Port Arthur Pulp & Paper Co. though held up by the advent of cold weather is progressing favorably. It is expected that the mill will be in operation early next month.

Nanaimo, B.C.—Coal was struck recently by Canadian Collieries and the new mine is being opened by them at South Wellington, four miles from this city. The seam was tapped by a slope 12 feet from the surface and development work will be rushed with all possible speed.

Hamilton, Ont.—The Dominion Foundries & Steel Co. has started operations at its new plate mill. In the meantime it is understood that the plates will be made from rejected shells. The mill will roll plates from ¼ inch to ¾ inch thick, 24 inches wide and any weight up to 700 pounds.

Trail, B.C.—Consolidated Mining and Smelting Co. of Canada has completed the purchase of the mines and mining properties in the Camp McKinney and Fairview districts of British Columbia and preparations are being made for production. About 2,000 acres in each area is involved.

Toronto, Ont.—Fire believed to have been caused by spontaneous combustion early Saturday morning destroyed the forging plant of the Cluff Brothers Ammunition Co., of 28 Atlantic Avenue. The

loss is placed at \$200,000, all of which is covered by insurance. After the fire R. J. Cluff intimated that the plant would be rebuilt as soon as possible.

Vancouver.—The West Kootenay Power & Light Co., a subsidiary of the Consolidated, is building a line from Cascade Station to Princeton, B.C., that will enter the McKinney and Fairview fields. The extension of the company's power lines to Princeton, B.C., where it is to furnish power for the Canada Copper Corporation, passes through the camps of McKinney and Fairview, which were abandoned on account of not being able to get the necessary cheap power to work them. Anticipating this extension, the Consolidated Mining & Smelting Co. have got control of these properties for a nominal sum, and with the cheap power available will now develop them.

GENERAL

Medicine Hat.—The Dominion Glass Co. has taken over the Alberta Bottle Works.

Tillsonburg, Ont.—A large gusher struck a few days ago near Port Burwell promises to be one of the richest gas wells in the district.

Three Rivers, Que.—La Manufacture de Seaux et Boites des Trois Rivieres is the name of a company which has just established a factory for the manufacture of pails of all sizes, butter boxes and packing cases in Three Rivers.

Whitby, Ont.—The United Rubber Mfg. & Reclaiming Co. propose establishing a factory here. The town will loan the company \$25,000 and free light and water in return for which they will erect and equip a factory costing at least \$50,000. A by-law will be submitted to the ratepayers on Nov. 26.

Georgetown, Ont.—One of the main buildings of the Provincial Paper Mills here was destroyed by fire on Oct. 29. It will take several weeks before repairs can be made and the plant put in full operation again. The cause of the fire is unknown. The loss is estimated at \$25,000, covered by insurance.

ELECTRICAL

Chatham, Ont.—A movement has been inaugurated by the residents of Merlin to secure Hydro power for the village. Active measures are being taken so that the proposition can be decided on at the polls at the county elections.

Walkerton, Ont.—Mayor Johnston has had word from the District Hydro Electric Engineer that the Hydro is ready to go ahead with their proposition to supply Walkerton with power. The scheme is to take over the two plants of the Saugeen Electric Co. at Walkerton and to develop further power on the Saugeen, to reinforce the Eugenia system.

MUNICIPAL

Sault Ste. Marie.—The City Council are building a pump house and installing new equipment.

Toronto.—The Rosedale section of the Bloor Street Viaduct has been completed, and officially taken over by the city. There was no ceremony in connection with the transfer.

BUILDING

Toronto.—A block of stores will be erected by Frank Stollery at the corner of Yonge and Bloor Streets at a cost of \$100,000.

PERSONAL

Arthur Hatton has been appointed Chairman of the newly-organized Canadian Railway Association of National Defence.

J. J. Scullan, connected with the Toronto plant of Canadian Allis-Chalmers, has been appointed general superintendent of the company's branch at Bridgeburg, Ont.

Lloyd Harris, president of the Russell Motor Co., Toronto, has undertaken, at the request of the Imperial Munitions Board, the duty of representing the Board at Washington, D.C.

J. M. Pouliot, manager of the Gaspé and Baie des Chaleurs Navigation Co., owners of the coasting steamers Gaspésien and Percésien was drowned at Quebec on Oct. 29, by falling between the wharf here and the Gaspésien.

H. J. Fuller of New York, president of the Canadian Fairbanks-Morse Co., has been appointed to represent the Imperial Munitions Board in New York in connection with munitions and marine equipment contracts.

Horace S. Wilcocks, vice-president and managing director of the North American Chemical Co., and director of the Decalcomania Co. of Canada, died suddenly at his home, 34 Nina Avenue, Toronto, last week. Mr. Wilcocks was born at Kingsey, Que., in 1862.

J. Nelson Hunter, of the Combustion Engineering Corporation, New York, has joined the British Royal Flying Corps. Five other members of the Corporation's drafting-room staff have joined various branches of the service in the United States Army and Navy.

W. A. Kirkwood, for some years locomotive foreman on the Grand Trunk for the Stratford, Ont., district, has been promoted to the position of assistant master mechanic of the Allandale Division and will have under his supervision many of the larger places in that district, including Toronto, Fort Erie, Niagara Falls and several other places.

Daylight Saving

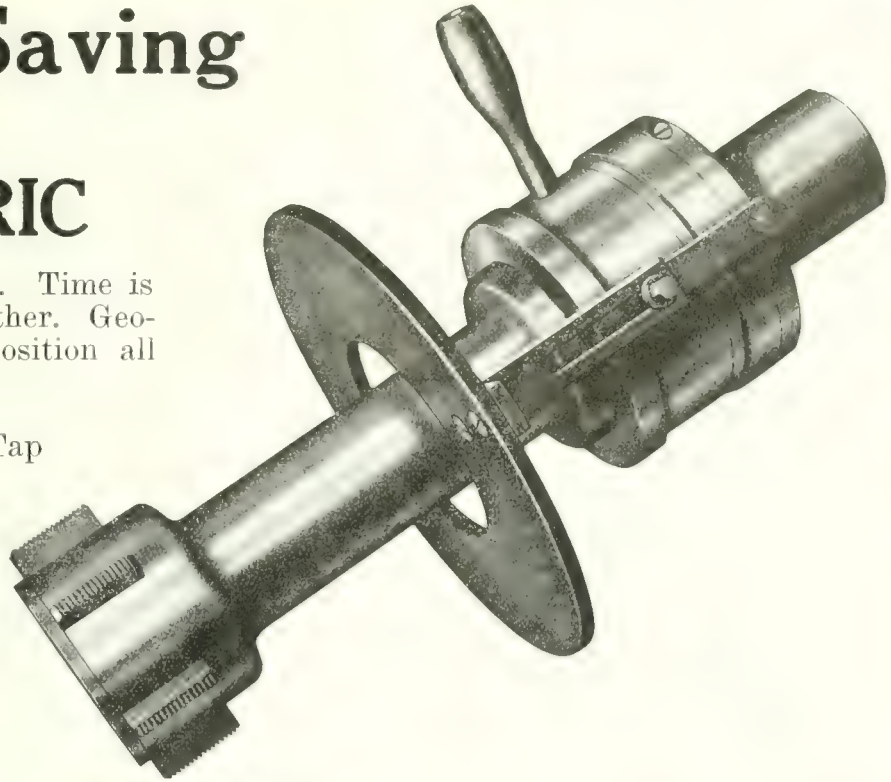
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GEOMETRIC

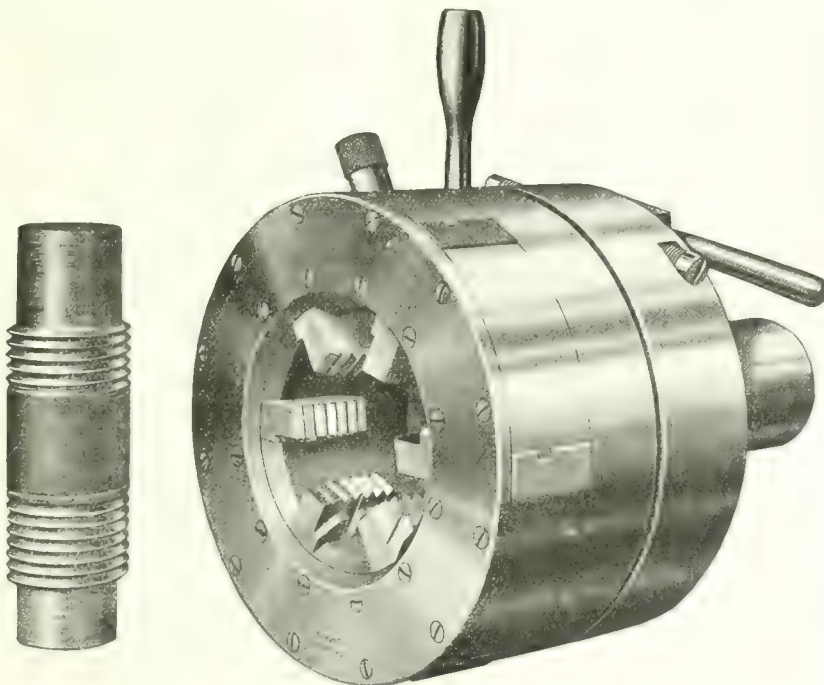
That is what it amounts to. Time is not the only thing saved, either. Geometrics are a saving proposition all around.

This Geometric Collapsing Tap is specially arranged for deep tapping in Projectile Caps.

All classes of thread tapping above $\frac{3}{4}$ -inch diameter are taken care of by Geometric Collapsing Taps.



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When it is an outside thread, Geometric Die Heads cut every style from $\frac{1}{16}$ -inch size up to greatest required diameter.

A U.S. Navy Yard is using this $4\frac{1}{2}$ -inch size Style "D" Geometric Die Head. United States Navy Yards accept no second quality.

Do your Screw Machines and Turret Lathes swing Geometrics?

You have as much right to Geometric benefits as any other manufacturer.

The Geometric Tool Company, New Haven, Conn., U.S.A.

Canadian Agents:

Williams & Wilson, Limited, Montreal. The A. R. William Machinery Company, Limited, Toronto, Winnipeg, St. John, N.B.

If any advertisement interests you, tear it out now and place with letters to be answered.

Mr. Kirkwood is succeeding J. B. Donnelly who is now on the pension list.

Lieut.-Col. Thomas C. Irving, Jr., D.S.O., of Toronto, Commanding Officer of the 1st Canadian Engineers, has been killed in action. Lieut. Col. Irving went overseas with the first Canadian contingent as a captain with the Canadian Engineers. In October, 1915, he was gazetted major of the Second Field Co. Engineers. He was decorated with the D.S.O. for distinguished conduct on the field and later was promoted to a lieutenant-colonel. Before joining the C.E.F., Lieut. Col. Irving was a member of the Moffat-Irving Steel Co., and vice-president of the C. W. Hunt Co., consulting and inspecting engineers of Toronto.

MARINE

Newcastle, N.B.—The International Shipbuilding Corporation has commenced the erection of an extensive plant for wooden vessels at Nordin, on the Miramichi River. The first keel will be laid shortly.

St. John's, Nfld.—It is the intention of the Newfoundland Government to submit to the Legislature at its next session a bill to limit the class of vessels entitled to bounty from the Government under the present shipping bounty law. Hereafter bounty will be payable on vessels not exceeding 120 tons gross measurement. Vessels exceeding 120 tons gross will not qualify for any bounty whatever.

TENDERS

Vancouver.—Tenders are being received for material for the proposed C. N. R. depot here by the contractors, the Northern Construction Co., of Winnipeg.

Strathroy, Ont.—The Town Council are calling for tenders for a pump house and turbine pump. Full particulars may be obtained from the engineers, Kerry & Chace, Toronto.

Chapleau, Ont.—Tenders will be received by the town clerk until Thursday, Nov. 15, 1917, for turbine pump, 400 gallons capacity, operated by 40 h.p. motor. Specification, plan, etc., may be seen at the office of the town clerk at Chapleau, or at the office of Chipman & Power, Mail Building, Toronto.

Winnipeg, Man.—Tenders covering work that will represent an expenditure of approximately \$1,250,000 are being called for by the Administrative Board of the Greater Winnipeg Water District, as follows:—Tenders for the gate house and intake at Shoal Lake will be received up to Nov. 16; for cast iron gate valves, air valves and sluice gates up to Nov. 26; for material to be used for the pipe line from the Red River to the McPhillips Street reservoir up to Dec. 3, and for the construction of the pipe line up to Dec. 3. Chief engineer, W. G. Chace; chairman, R. D. Waugh.

Halifax, N.S.—Tenders addressed to the Naval Store Officer, H.M.C. Dockyard, Halifax, N.S., will be received up to Thursday, Nov. 15, 1917, for the pur-

chase of any or all of the following: Steel, various; iron, various; brass, copper, lead and metal, old; stoves, ranges, kettles, various; rubber boots and rubbers; rubber, old; hoses, rubber, rubber-lined and canvas; leather boots, belting and serap leather; wash stands, lockets, chairs, etc.; sacks, coal; files, old; cordage, old, paperstuff; wire-rope, old; bunting, old; hammocks, old; cable, old; bronze braided and electric; carpets and rugs; ship's boats; miscellaneous tools; diving gear; canvas, old; lamps and lanterns, oil and electric; clocks, telescopes, binoculars, barometers, logs, etc.; pipe elements, ex "Belleville" boilers, life belts, and cork, old; refrigerating plant, including vertical steam engine, copper and iron coils, etc.; rigging returned from patrol vessels; and steam launch, high speed, engine and boiler complete, including spare gear. Complete lists, with quantities offered for sale, may be had on application to the Naval Store Officer, H.M.C. Dockyard, Halifax, N.S.

WOODWORKING

Toronto.—W. Williamson will build an extension to his planing mill on Woodbine Avenue, at a cost of \$3,500.

RAILWAYS & BRIDGES

Toronto.—The Ontario Railway and Municipal Board has issued an order authorizing the Toronto Street Railway to operate a regular street car service on the double tracks recently laid down, connecting the Queen Street line at the Don Bridge with the harbor improvements area.

Ottawa, Ont.—The new Pretoria Avenue bridge, erected at the joint expense of the city and the Dominion Government, is now ready for traffic. The construction of the bridge is complete, with the exception of railings on the north side, which have yet to be erected. Assistant City Engineer Askwith has caused a test to be made of the apparatus by which the centre of the bridge is lifted for the passage of boats in the canal. The lifting required only 45 seconds.

TRADE GOSSIP

Babcock & Wilcox, Montreal, have been awarded the contract for boilers for \$50,000 addition to factory for the Springfield Milk Co. at Springfield, Ont.

Toronto.—The Russell Motor Co. of this city will build a factory at Buffalo, N.Y., for manufacturing war equipment for the United States Government.

The Nova Scotia Steel Co., New Glasgow, N.S., has attached to its staff Miss Whidden of Birmingham, Ala., to inaugurate social welfare work among the employees. Miss Whidden has had large experience in this class of work in the States.

Tungsten More Active.—Improvement is noted in the market for tungsten but the more active demand has not influenced the price which is unchanged at former quotations. Wolframite is quoted as to quality at \$23 to \$25 and Scheelite at \$26 per unit for high grade

on the basis of 60 per cent. metal or 30c per unit additional up to 5 per cent.

Concrete Steamer to be Launched.—The date set for launching the "Concrete" at Montreal has been decided for the 6th or the 8th of this month. The deck has been completed and they are now finishing the hatches. Work has been started on preparing the ways on which she will be launched. Tackle will be used to ease her down the incline.

Canadian Customs Receipts.—Custom receipts for the Dominion during the month of October totalled \$13,722,883. This was an increase of \$1,761,953 over the same month a year ago, when the receipts totalled \$11,960,939. For the seven months of the fiscal year ending October 31 customs receipts totalled \$102,375,295, as compared with \$82,525,477 for the same period last year. This constitutes an increase of \$19,849,817.

Export of Munitions Machinery Prohibited.—An order-in-council has been issued on the recommendation of the acting Minister of Customs ordering that the exportation to the United Kingdom, British possessions and protectorates and to all foreign countries, of plant, machinery and equipment of all kinds for the manufacture or production of munitions of war shall be and is hereby prohibited except under license from the Minister of Customs.

The Canadian Allis-Chalmers Co. has a contract for four 3,500-ton steel steamers for the British Government, to be built at Bridgeburg, Ont. It is understood that the British Government will be granted a long time credit for the full value of the vessels. The four steel freighters will cost the British Government three million dollars, but this sum will not have to be paid to the company for two years. In the meantime it will be carried as an ordinary book account by the big corporation, and without any security being required.

Regulate Ontario Power Output.—The Dominion Government has been asked by Sir Adam Beck, on behalf of the Provincial Government, the Hydro-Electric Commission and the municipalities interested in the Hydro movement to appoint under the War Measures Act a controller to regulate and govern the whole question of production and export of power in Ontario. Sir Adam made a strong plea for effective regulation of the power production, giving primary consideration to the needs of the munitions business and overcoming the difficulties which are encountered at present.

Substitute for Sheet Steel.—An asbestos-cement composition is being manufactured in England as a substitute for sheet steel for various purposes. Ground asbestos is mixed in the proportion of one to six with Portland cement and worked into a paste with water. A machine something on the order of those used in making paper forms it into sheets, which are trimmed to size and if desired corrugated for roofing purposes. After seasoning the material is ready for use. It is durable, resistant to climatic conditions, particularly acids in the atmos-

phere; fireproof and also a non-conductor of heat.

Brantford, Ont.—An announcement has been made from New York that the American Steel Products Corporation has been organized with a capital of one million dollars, the officers being W. P. Kellett, president; D. O. Johnston, vice-president; treasurer, M. M. McGraw; secretary, P. H. Secord; W. S. Brewster, of Brantford, and W. S. Tomlinson, Toronto, directors. All but the latter are Brantford men. The new organization will take in the Dominion Steel Products Co. of this city, and it is expected that as a result the local company will double its present plant. The local plant is now working on the line and propeller shafting for one hundred of the new ships being built in the United States.

New Steel Company Incorporated.—A new concern, the Alloy Steel Works, has been incorporated with an Ontario provincial charter to take over the steel plant on Front Street, Toronto, formerly operated by the Moffatt-Irving Steel Co. The new concern will continue to make steel castings by the electric furnace process which at this plant utilizes flue dust or fines for making steel. The company contemplates enlarging the capacity of the plant by the installation of another furnace. John R. Russell and H. T. Armstrong of Toronto are interested in the new venture which is capitalized at \$100,000.

Maximum Prices Fixed for Steel Supplies.—President Wilson at Washington on Monday approved an agreement made by the War Industries Board with the principal steel manufacturers of fixing maximum prices, subject to revision January 1, on certain steel articles, including sheets, pipe, cold rolled steel, scrap iron, wire and tin plate. The prices for sheets range from \$4.25 to \$6.25 per 100 pounds f.o.b. Pittsburgh, according to grades. On three-quarter-inch pipe to three-inch black steel pipe a discount of 52 and five and 2½ per cent. f.o.b. Pittsburgh was fixed. The agreement on cold rolled steel was 17 per cent.

Concrete Motor Ships.—The Committee of Lloyd's Register of Shipping, London, England, have during the last three months approved the plans for the construction of a number of non-propelling barges, some of them designed to carry 500 tons deadweight, and also of a motor vessel, to be built of ferro-concrete in the United Kingdom and in Norway for the British and Scandinavian coastal trades. These vessels will be built under the inspection of the society's surveyors with a view to classification in Lloyd's Register book. Plans of other ferro-concrete vessels of larger carrying capacity for certain sea trades are at the present moment under consideration.

Big Coal Production in B. C. and Alberta.—A gratifying report in connection with the output of coal in district 18, which comprises part of the Province of British Columbia and part of Alberta, has been received by the Dominion Minister of Labor at Ottawa from W. H. Armstrong, Director of Coal Operators in that section. Mr. Armstrong

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After the war— What?


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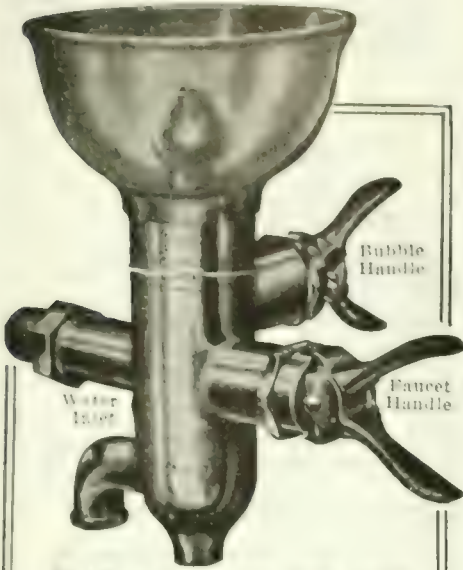
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(MADE IN CANADA)



The law of a man through impure drinking water is the same as the law of a man through impure food. Most men are not aware of this. But true, also, when a man is in a factory or in a shop, he is surrounded by a cloud of dust and dirt. This is a health hazard. The only safe, sanitary, simple, automatic in control and economical drinking fountain is the Puro Sanitary Drinking Fountain. It is the only drinking fountain that is responsible for the health of the man who uses it. It is the only drinking fountain that is a clean, safe, sanitary, simple, automatic in control and economical. Conserve their health and they will improve their work. It is as worthy of the man as the man is worthy of the fountain. The only Sanitary Drinking Fountain that is safe, sanitary, simple, automatic in control and economical. Let us tell you just what it will cost you to

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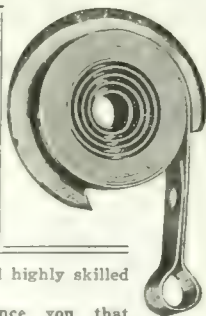
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A trial will convince you that "Barnes-Made" Springs are the best buy.



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 218 South St., Bristol, Ct., U. S. A.

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 Springs, Screw Machine Products Cold Rolled Steel and Wire

states that the total output in Alberta for the third quarter of the year is 1,774,492 tons, an increase over the same period last year of 335,384 tons. His statement does not include the output in the mines of South-eastern British Columbia.

Pneumatic Ash and Flue Dust Plant—A pneumatic ash-handling plant installed by Ed. Bennis & Co., Ltd., Little Hulton, England, and described in *The Engineer*, London, has an auxiliary conveyor pipe for removing flue dust and soot from the flues, economizers, and chimneys entirely separate from the ash pipe, but joined to it at its foot leading up to the ash tank. The dust pipe main is provided with connections, to which may be attached lengths of flexible pipes, which can be taken about as desired and inserted into openings in the flues and economizer chambers, which are provided with cover plates for use when the dust is not being removed. Also a hand hole with an air-tight door, is located at each end of every bend of the ash pipe for removing any obstructions, which may accidentally become lodged in the pipes.

Wooden Ship Launched at Quebec.—The first wooden ship of its kind built in Quebec since the old days of the sailing vessel, when the ship-building industry flourished in the province, was launched on October 28 at St. Laurent, Island of Orleans. The vessel is a four-master, with auxiliary power and its length over all is 223 feet, 42 feet beam and the depth of hold is 20 feet. Its tonnage is figured at about 1,350, while the dead-weight will be about 2,100 tons. The schooner was constructed by the Quebec Shipbuilding and Repair Co., and it was named the Martin Connolly, after the Quebec representative of the company, the head office of which is in Montreal. Mrs. Connolly performed the christening ceremony.

Enemy Patents for U. S. Manufacturers.—The vast store of German scientific information in the United States has been opened to American manufacturers, in regulations issued at Washington, D.C., by the Federal Trade Commission under which enemy-owned patents and copyrights will be licensed for manufacture by citizens of the United States. When the regulations had been made public the commission met a group of medical men to consider licensing the manufacture of certain drugs, principally salvarsan, used in virulent blood diseases, and non-toxic substitutes for local anaesthetics, of which the supply in this country has run dangerously low since the war interrupted commerce. Approximately 20,000 patented and copyrighted articles are said to be affected by the commission's order. These include dyestuff formulas of vital importance to American industries and mechanical devices of wide use.

Railway Board Will Recover Cars.—One of the first things which the Canadian Railway Association of National Defence will undertake is to recover more than 20,000 Canadian freight cars that are on American railways, this number being in excess of the number of American freight cars on Canadian railways, as the association claims that if these "lost" cars are obtained the freight

car shortage in this country will be relieved. It is intended to ask either for the return of the Canadian cars or of an equal number of American cars, and if necessary a committee will go to Washington to arrange that there shall be no repetition of this condition. Thousands of tons of freight are delayed by the habitual under-loading of freight cars, so the association is starting an educational campaign to have shippers fully load cars and thus add about 25 per cent. to the freight cars available for service. Committees have been appointed in the various provinces to this end.

CATALOGUES

Electric Lamps—Bulletin No. 77, issued by the Cooper Hewitt Electric Co., illustrates and describes various types of Cooper Hewitt electric lamps for motion picture studios. Specifications and prices are given for each type of outfit.

The Perfect Machine Co., Galt, have issued a catalogue describing an interesting line of machine shop tools including lathes, drills, power hack saws, grinders, special machinery and tools, jigs, dies, etc. The capacity and dimensions of each tool illustrated are given together with the principal features of construction.

Woodworking Machines.—Bulletin issued by the Preston Woodworking Machinery Co., Preston, Ont., deals with the question of labor-saving and shows two woodworking machines in this connection. The machines are a high-speed ball bearing shaper and a veneer tapping machine. An open letter to Canadian woodworking manufacturers is also a feature of this bulletin.

Conveyors and Elevators.—The Brown Portable Conveying Machinery Co., Chicago, have issued a new bulletin "The Cost Cutter" describing the "Brown Portable" modern money-making machines for piling packed material and also devoted to the economic handling of packed materials. In this bulletin the cost of piling is discussed and "Brown Portable" system fully described accompanied by a number of views showing the system in operation and featuring the wide field of application of these conveyors.

BOOK REVIEW.

International Mercantile Diary, 10 x 7 1/4 inches. Published by Syren & Shipping, Ltd., London, England. Price \$1.25 net. This is a new publication which might also be called a commercial handbook or exporters' guide for it has been compiled with the object of giving in concise form as much information as possible which will be of value and assistance to those engaged in foreign trade. The book contains 250 pages in addition to the diary proper. A valuable feature in the first section of this publication is a series of very complete conversion tables of British sterling from and into foreign moneys at varying rates of exchange, which cover any money in the world at any rate. Having been calculated entirely in decimals, these tables are of equal value whether British currency remains after the war in its present form or be altered to a decimal

system with the pound sterling as the unit of value. In the same way the conversions of foreign weights and measures from and into British, also calculated in decimals, have been complemented with conversions from and into those of the metric system. The equivalents and conversion tables cover the weights and measures principally in use in all countries of the world. The third or international section of the diary contains much useful information on matters of general interest and special data concerning shipping, banking, postal, cable, financial facilities, etc., of each country.



RECORD CANAL TONNAGE

LAKE commerce carried through the American and Canadian waterways of Sault Ste. Marie last month aggregated 12,646,066 tons, and established a new high record for October, despite the fact that freighters were receiving slow despatch the latter part of the month due to frozen ore and shortage of cars at unloading ports.

The statistical report of canal traffic, completed by L. C. Sabin, general superintendent of the American canals, shows an eastbound freight movement of 9,899,660 tons and traffic westbound aggregating 3,645,021 tons.

The ore movement of 8,132,288 short tons fell short of the September showing of 9,298,814 tons, and was lighter also than in October last year. Shipments of soft coal were 2,586,849 tons compared with 3,001,490 tons in September and with 1,457,717 tons in October, 1916. Hard coal shipments of 357,639 tons also fell short of the September total of 402,324 tons, but exceeded the 279,350 tons carried through the canals in October, 1916.

Shipments of flour amounting to 1,204,9940 barrels compares with 918,650 barrels in September, but did not equal October last year, when total was 1,668,250 barrels. The eastbound movement of wheat was 34,714,844 bushels, more than quadrupling the September record of 8,565,177 bushels, and comparing with 18,444,833 bushels in October last year and with 65,387,356 bushels in October, 1915.

Vessel passengers for the month were 3,147, the total being fewer than in September when there were 3,265, or in October, 1916, when there were 3,253.



WHILE in London on a holiday a visitor went to have a look at the Thames near Wapping. There was a steam shovel at work in the river, and he was standing watching it. Suddenly he felt a tap on his shoulder and turned around to find a son of Erin standing there. "Say," said he, "isn't London a wonderful place? By gorry, now, just look at that thing goin' down there; now look at it, isn't that wonderful? But, say, ould man, I wouldn't want to be the cove at the bottom filling that thing up, would you?"

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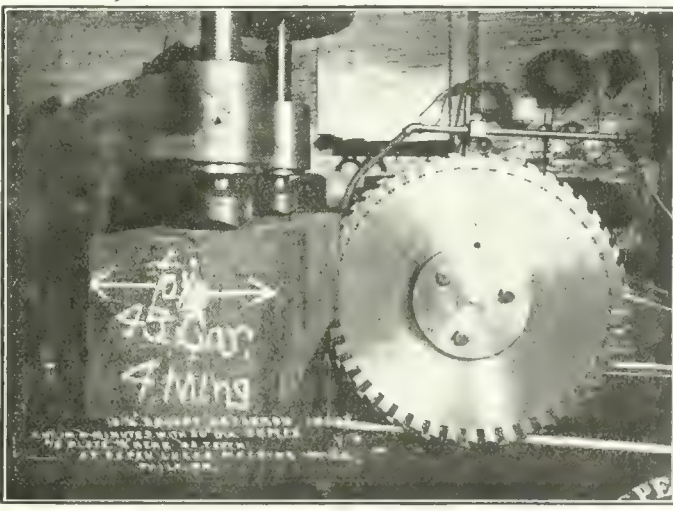
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MACHINE TOOLS for IRON WORKERS
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SECTION

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cheap. The National Quality, 51 St. Peter St.,
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portable engine, water type boiler, 120
H.P., 100 lbs. steam, 120 lbs. steam
engine. Apply The Pacific Mfg. Co. Limited, 100
St. Andrew St., Montreal. c15m

FOR IMMEDIATE SALE—150 No. 1 AND 10
No. 2 Racine back saw machines, in excel-
lent condition. The Box Rolling Mills, Limited,
Montreal, Quebec. c19m

NORTON GRINDERS 10" x 36" IN FINE
condition, complete with stocks of Norton
wheels. Price \$1,400 each, f.o.b. Hamilton, The
National Machinery & Supply Co., Ltd., Hamilton,
Ont. c19m

JONES & LAMSON TURRET LATHES, WITH
change gears, 3' x 36", geared head machines
in fine condition. Price \$1,000 each, f.o.b. Hamil-
ton. The National Machinery & Supply Co.,
121 Hamilton, Ont. c19m

FOR SALE—1 90-FT. THOMAS SPACING
table complete, including one indicator car-
riage, one trolley carriage, stands, adjustable
roller, racks, etc. Adjustable as to length. The
Manitoba Bridge & Iron Works, Winnipeg, Man.
c15m

AGENCIES WANTED

ENGINEER AND BUSINESS MAN WITH
office in Manchester, England, is prepared to
work for a good firm desiring representative in
England. Would attend to the interests of a firm
shipping munitions. Box 337, Canadian Machin-
ery. c19m

AGENCIES WANTED—FRENCH ENGINEER
having large established clientele, desires
direct agency for France of labor-saving machin-
ery of all kinds for wood and iron working, as
well as factory equipment. Headquarters in
hearts of Paris, near the Opera. Write E. A. B.,
Room 144, 14 Phillips Sq., Montreal. c19m

AGENTS WANTED

WANTED—LIVE REPRESENTATIVE TO
handle good specialty; one who hasn't too
many irons in the fire. Apply Box 348, Cana-
dian Machinery, stating lines you now represent
and the ground you are prepared to cover.
c23m

CANADIAN AGENTS WANTED FOR GOOD
chuck, especially adapted for use in munition
plants. Box 349, Canadian Machinery. c23m

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WANTED—SUPERINTENDENT-FOREMAN,
10 6" British shells. Box 340, Canadian Ma-
chinery. c19m

SHOP SUPERINTENDENT WANTED, MAN
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shop, especially engaged in manufacture of small tools.
Must be thoroughly competent and have had some
years' experience. Shop while small at present
offers excellent opening for advancement. Apply,
stating experience, salary, etc., to Box 339, Cana-
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Montreal shop on general work. Six forges
and 1,500-lb. steam hammer. Must be a hustler.
Apply, in confidence, stating experience and
wages expected, to Box 335, Canadian Machinery.
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WANTED—MECHANICAL DRAUGHTSMAN
for engine, compressor, and general work.
State experience and salary expected. Apply The
Jones Machine Company, Limited, Sherbrooke,
Que. c16m

WANTED—MACHINE SHOP FOREMAN FOR
small shop doing general work, not muni-
tions, near Toronto. State experience and sal-
ary expected. Give references. Box 345, Cana-
dian Machinery. c20m

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take charge of erecting 1500 H.P. marine engines.
Apply Box 347, Canadian Machinery. c21m

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position with reliable firm. Possess years of
practical machine shop experience as well as
production methods, including shell work. Box
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established hospitals for three large manu-
facturing concerns. Familiar with social service,
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ploying. At present employed. Less than \$2,400
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change as shop foreman or master mechanic.
Acquainted with scientific management; 26 years'
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A PRACTICAL MACHINE SHOP SUPERIN-
tendent of broad experience in Canada and
States wants position as superintendent or general
foreman. Large or small shop on ammunition or
machinery; All references. Address Box 327,
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experience as machinist, toolmaker, inspector,
superintendent of tool-making and tool-designing,
experimental and development work, heat-treating
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shop superintendent, works manager. Experience
has been on rifle work, electrical work, typeset-
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respondence solicited, and can furnish good refer-
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c14m

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MANUFACTURERS—WE CAN UNDERTAKE
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tion equipment or otherwise. Write W. H.
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WANTED

WANTED—SECOND-HAND CUPOLA AND
other foundry equipment. State full par-
ticulars and price. Box 346, Canadian Machinery.
c21m

WANTED—ONE No. 166 BLISS 2-SPINDLE
automatic trimmer and beader, also 1 No.
156 single spindle trimmer, or machines of simi-
lar design. Must be in good condition. In
replying state fully the name of maker of ma-
chines and lowest price, also where they could
be seen. Box 342, Canadian Machinery. c18m

WANTED—ONE HORIZONTAL RE-DRAWING
or reducing press, fitted with bottom knock-
out, the general dimensions of which should be
equal to Bliss No. 62. Must have flywheel not
less than 725 lbs. weight and approximately 3
ft. 6 in. in diameter. Press must be in good
working order. In replying, give all dimensions,
also state name of maker and lowest price. Box
341, Canadian Machinery. c18m

WANTED TO PURCHASE TWO SECOND-
hand lathes, 24" swing, 8' to 12' bed. Submit
offers with cuts and full description to E. Lang-
ham, General Purchasing Agent, Canadian Nor-
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FOR SALE

- 4—14 x 6 Flather Engine Lathes, C.R.,
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- 3—18 x 8 Davis Engine Lathes, D.B.G.
- 1—18 x 10 Rahn-Larmon Engine Lathe,
new.
- 1—18 x 12 Rahn-Larmon Engine Lathe,
new.
- 1—22" x 10' Nicholson & Waterman En-
gine Lathe.
- 1—No. 13 B. & S. Automatic Gear Cutter.
- 1—30" Newark Automatic Gear Cutter.
- 1—5 x 48 Pratt & Whitney Plain Grinder.
- 1—No. 2 Bath Universal Grinder.
- 1—12 x 60 Modern Plain Grinder, new.
- 2—Lees-Bradner Thread Millers.
- 1—30 x 30 x 8' Powell Planer, new.

Brownell Machinery Co.
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Complete 18-pr. Shrapnel Plant for Sale

PRINCIPAL ITEMS AS FOLLOWS:

- 1—Cutting-off Machine, with 15" three-jawed chuck.
- 1—Lathe, 28" swing, 8' bed.
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- 1—Single End Rough Turning Lathe
- 1—Single End Lathe, for base roughing.
- 1—Single End Base Facing Machine.
- 1—Double End Tool Grinder.
- 1—Jenckes Grinder.
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- 2—C.M.C. Lathes, equipped for nosing and tapping.
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- 1—Jenckes Copper Band Lathe.
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- 1—Tool Grinder, 24" wheel.
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- 1—16" Swing Acme Turret Lathe, for turning sockets, fitted with air chuck.
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- 1—Jenckes Air-operated Copper Band Press
- 1—25 H.P. Canadian General Electric Motor, complete with starting box.
- 1—30 H.P. Westinghouse Motor, 550 volts, complete with starting box.
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- 1—Westinghouse 40 H.P. Induction Motor, 550 volts, complete with starting box.
- 1—Nosing Press, for nosing shells
- 1—5 H.P. Canadian General Electric Motor for same.
- 1—Hoskins Pyrometer.
- 1—Nose Furnace.
- 1—Tempering Furnace.

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- Vertical Boring Mills, 50 to 60" swing.
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- Double, 12" blades, Bar Shear, cap. 2" sq. Cruc.
- Univ. Plate Shear, 18" blades, cap. 3/4", Cleveland, belted.
- Univ. Plate Shear, 26" blades, cap. 1 1/2", Lewis, belted.
- Lennox Rotary Splitting, 30" tht., cap. 1 1/2", belted.
- Lennox Rotary Bevel, 5" tht., cap. 1 1/2", belted.
- Guillotine Shear, cap. 2 1/2" sq., belted, Perkins No. 6.
- Guillotine Shears, No. 0 H. & J., 6 and 7" blades (2).
- Guillotine Shear, Fisher, 21" blade, cap. 8 x 2".
- Squaring Machine, United, 108", cap. 1 1/4".

MISCELLANEOUS.

- Blower, No. 5 Roots, Rotary Pressure.
- Bolt Cutter, 2" Acme, Class A, single head, dies.
- Boring Mill, 10' Niles, Vertical, 2 heads.
- Forging and Upsetting Machine, 1 1/2" Acme, with dies.
- Forging and Upsetting Machine, 2 1/2" Ajax.
- Hammer, 300-lb. Johnson & Jennings, belt driven.
- Hammer, 80-lb. Bradley Cushion Helve, belted.
- Hammer, 40-lb. Bradley, belted (rebuilt).
- Hammer, 35-lb. Maggowan & Finigan (Perfect), belted.
- Rotary Planer, 36" Cleveland, belt driven.
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- 24" x 8" Lodge & Shipley.
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- 2" x 24" Stevens Screw Machines (2).
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- No. 6 Warner & Swasey, friction head

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- 6" x 30" Dalton, B.G., bench.
- 13" x 6" Filsmith, D.B.G., comp. rest.
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- 15" x 6" Sebastian, B.G., comp. rest (3).
- 16" x 8" McDougall, B.G., comp. rest (2).
- 16" x 8" Porter, B.G., comp. rest.
- 18" x 8" C.M.C., D.B.G., comp. rest.
- 18" x 10" Putnam, back geared.
- 20" x 8" Fifield, B.G., plain rest.
- 21" x 8" Bawden, heavy duty (3).
- 24" x 11" Pond, B.G., comp. rest.
- 26" x 14" Gleason, D.B.G.
- 30" x 10" Ames, B.G., plain rest.
- 31" x 16" Fifield, back geared.

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- 14" Excelsior, sliding head, lever feed (6).
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- 26" Prentice, back geared, power feed.
- 40" Bickford, back geared.
- 46" Allfree, back geared, power feed.
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- D-1 Colburn, back geared, heavy duty.

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- 10" x 30" Landis, universal.
- No. 1 Cincinnati, universal (2).
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- No. 2 Sellers, universal.
- No. 3 Modern, universal.
- No. 3 La Salle, plain and surface.
- No. 190 Wells, cutter and reamer.
- 24" Barnes, wet tool.
- 2 1/4" Yankee, twist drill.

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- 20" x 20" x 5" Bertram.
- 24" x 24" x 6 1/2" Bertram.
- 25" x 25" x 12" Lodge & Davis.
- 36" x 36" x 10" Pond, two heads
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- Bertram, plain.
- Brown & Sharpe, power feed, plain.
- Monarch, vertical.
- Cataract, bench, hand feed.
- No. 2 Ford-Smith, plain.
- No. 4 Fox, universal.

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- 16" Petrie, back geared.
- 16" Canada Mach. Corp., back geared.
- 16" Cincinnati, back geared.
- 24" Gould & Eberhardt, back geared.
- 24" Bertram, back geared.
- 30" Morton, back geared, draw cut.

MISCELLANEOUS

- 6" and 12" Racine Hack Saws.
- 4" and 6" Robertson Hack Saws.
- 4 1/2" Martin Cutting-off Machine.
- 12" Hall Pipe Machine.
- 4" Oster Hand Power Pipe Machine.
- No. 2 Grant Rotary Riveting Hammer.
- Nos. 1 and 3 1/2 Greenerd Arbor Presses.
- No. 4 GA Brown & Boggs Punching Press.
- No. 180 Brown-Boggs Power Presses.
- No. 3 Goldie & McCulloch Hydraulic Banding Press.
- Bertram Single-end Punch and Shear.
- No. 3 Dundas Double-end Punch and Shear.
- 7" Geared Bending Rolls.
- 1500-lb. Toledo Drop Hammer.
- 450-lb. Williams Drop Hammer.

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New York's Greatest Stock

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Bullard Vertical Turret Lathes

One 18

One 20

Boring Mills

No. 2 Barrett Cylinder Boring Machine, 5 bar

Four 30" Bullard Vertical, turret head

Drilling Machines

Bausch Horizontal, 16 spindle

Gardam Vertical, 10 spindle

Bausch Vertical, 8 spindle

Foot-Burt, 7 spindle

Barnes, 4 spindle

Rockford, 4 spindle

Foot-Burt, 2 spindle

32" Snyder, sliding head

32" Pratt & Whitney, sliding head

Three 24" Prentice, sliding head

Four 24" Baker Bros. High Speed

3½" Hilbert Radial

Two 3½" Prentice Radials

3½" Gang Radial

3" Fostick Radial

New York Machinery Exchange, Inc.

50 Church Street . . . New York City

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We Own Every Tool Offered

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For Immediate Delivery

- 1-28 x 8 Springfield Q.C.G. Engine Lathe
- 1-28 x 8 Springfield Standard Engine Lathe
- 1-28 x 8 Springfield Q.C.G. Engine Lathe
- 1-28 x 8 Springfield Q.C.G. Engine Lathe
- 1-28 x 8 Springfield Geared Head Engine Lathe
- 1-28 Springfield B.G. Shapers
- 1-28 Springfield B.G. Shapers
- 1-28 Springfield B.G. Shapers
- 1-28 x 8 x 10' Wilson Two-head Planer
- 1-28 Pierce Turret Lathes
- 1-28 x 8 Pierce Hand Screw Machines
- 1-No. 10 American Milling Machines
- 1-No. 20 Bliss O.B.I. Press
- 1-No. 30 Bliss O.B.I. Press
- 1-No. 150 Bliss O.B.I. Press
- 1-No. 25 Bliss O.B.I. Press
- 1-28 Buffalo B.G., P.F. Drill Presses
- 1-28 Canedy Otto B.G., P.F. Drill Presses
- 1-28 Champion B.G., P.F. Drill Presses
- 1-28 Champion Plain Drill Presses
- 1-28 Silver Plain Drill Presses
- 1-28 Canedy Otto Plain Drill Presses
- 1-28 Champion Plain Drill Presses

USED MACHINERY

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- 1-28 x 10 Hamilton Standard Engine Lathe, with turret
- 1-22 x 14 Putman Standard Engine Lathe
- 1-22 x 10 Reed Standard Engine Lathe
- 1-18 x 6 Jones & Lamson Standard Engine
- 1-16 x 8 Porter Standard Engine Lathe
- 2-16 x 8 Reed Stud Lathes
- 1-14 x 8 Sebastian Engine Lathe
- 1-14 x 6 Springfield Engine Lathe
- 1-14 x 6 Prentiss Engine Lathe
- 1-14 x 6 Sebastian Engine Lathe
- 2-14 x 6 Van Werk Engine Lathes
- 2-13 x 8 Barnes Engine Lathes
- 1-13 x 5 Barnes Engine Lathe
- 1-10 x 4 Sebastian Engine Lathe

TURRET AND SCREW MACHINES.

- 2-No. 6 A Potter & Johnston Automatic Lathes
- 1-24" Grady Automatic Screw Machine, motor driven
- 2-4" Foster F.G.H. Hand Screw Machines
- 1-5" Pierson F.G.H. Hand Screw Machine
- 4-12" Warner & Swasey Turret Lathes with air chucks
- 4-16" Warner & Swasey Turret Lathes with air chucks
- 2-2" Cleveland Automatic Screw Machines, jigger feed
- 1-5 1/4" Cleveland Automatic Screw Machines, jigger feed

MILLING MACHINES AND GRINDERS.

- 1-No. 2 Hendey Plain Milling Machine
- 1-No. 0 Brown & Sharpe Plain Milling Machine
- 1-No. 1 Cincinnati Plain Milling Machine
- 2-No. 13 Pratt & Whitney Lincoln Type Milling Machines
- 5-No. 1 1/2 Knight Milling and Drilling Machines
- 3-Fox Milling Machines
- 1-Garvin Hand Miller
- 1-No. 2 1/2 Bath Universal Grinder
- 1-No. 12 Modern Plain Grinder
- 1-No. 1 Lanlis Internal Grinder
- 1-No. 2 W. & M. Surface Grinder
- 1-No. 3 W. & M. Surface Grinder
- 1-Miami Valley Universal Outer Grinder

DRILL PRESSES.

- 1-6" Mueller Plain Radial Drill, old type
- 1-28" Niles, Bement, Pond B.G., P.F. Drill Presses
- 1-3-spindle 8" overhang Henry & Wright High speed Drill
- 4-6-spindle Fox High Speed Drills
- 2-4-spindle Fox High Speed Drills
- 1-16-spindle Nateo Drill

SHAPERS AND PLANERS.

- 1-24" Lodge & Davis Geared Shaper
- 1-18" Hendey Geared Shaper
- 1-26 x 36 x 10' New Haven Planer, S.H.
- 1-27 x 27 x 8' Cincinnati Planer, S.H.
- 1-16 x 16 x 5' Hendey Planer, S.H.

PRESSES AND HAMMERS.

- 1-Waterbury Farrel O.B.I. Press, geared
- 1-No. 30 Perkins Drawing Press
- 3-No. 2-W Bliss Wiring Presses
- 1-300-lb. B. & S. Roll Board Hammer
- 1-300-lb. P. & W. Roll Board Hammer
- 1-150-lb. Bradley Steap Hammer
- 1-25-lb. Fairbanks Belt Hammer

We also carry a large stock of Steam Engines, Steam Pumps and Electrical Equipment of all kinds.

We are in the market to purchase machine tools, both large and small.

RIVERSIDE MACHINERY DEPOT
17-29 St. Aubin Avenue
DETROIT, MICH.

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IMMEDIATE DELIVERY

DRILLING MACHINES.

20" Mechanics.
22" Sibley, S.H., B.G., P.F.
30" Lodge & Davis, S.H., B.G., P.F.
2½" Gang Plain Radial.
3½" Hamilton Plain Radial, tapping attachment.
4" Mueller Plain Radial.
4 No. 310 Baker Heavy Duty.
3-spindle Rockford.
4-spindle Rockford.
4-spindle Washburn, with power feed.
4-spindle Allen.

No. 11 Pratt & Whitney, 10 spindles.

GEAR CUTTERS.

24" x 7" G. & E., spur gears.
No. 3—26" B. & S., spur gears.
No. 4—48" B. & S., spur gears.
No. 13—B. & S., spur gears.
30" x 9" G. & E., spur and bevel gears.
36" x 9" G. & E., spur gears.
36" Walcott, spur gears.
24" Gleason Gear Planer.

GRINDERS.

No. 1 B. & S. Universal.
No. 2 Woods Tool and Cutter.
Brainard Cutter.
Leland Universal, with power feed.
No. 2 Landis Universal.
No. 21 Landis Plain.
No. 1 Gardner Disc.
No. 24 Gardner Disc.

No. 6-A Diamond Universal.

LATHES.

14" x 6' Rockford, C.R.

15" x 6' Rockford Tool Co., C.R.
16" x 8' Bradford, C.R.
18" x 6' Bradford, C.R., taper attachment.
18" x 8' Lodge & Shipley, pat. head, C.R., taper attachment.
18" x 10' Fitchburg, C.R.
20" x 14' Blaisdell, C.R.
21" x 12' New Haven, C.R.
36" x 18' Schumacher & Boye, T.B.G., Q.C.G.
36" x 20' American, T.B.G.
38" x 16' Fifield.
42" x 28' Hamilton, T.B.G., raising blocks to swing 54".

PLANERS.

24" x 24" x 6' American, one head.
26" x 26" x 6' Gray, one head.
26" x 26" x 8' Pease, one head.
30" x 30" x 8' Cincinnati, two heads.
30" x 30" x 8' Woodward & Powell, one head.
36" x 36" x 14' Sellers, one head.
39" x 39" x 12' New Haven, one head.
48" x 48" x 10' Woodward and Powell, two heads.
50" x 50" x 18' New Haven, two heads, two extension heads.

SCREW MACHINES.

No. 2 P. & W., friction head.
No. 2 Foster, plain head, A.C. and W.F.
No. 3 Bardons & Oliver, plain head, A.C. and W.F.
No. 4 Pearson, friction head, A.C. and W.F.
No. 5 Foster, geared friction head, auto. chuck, power feed to turret slide and power feed to cross slide.

No. 5 Foster, all geared head, auto. chuck and wire feed, power feed to turret slide.
1¾" Gridley, 4-spindle Automatic.
2¾" Cleveland Automatic.
3¼" Gridley 1-spindle Automatic.

TURRET LATHES.

No. 2 Foster-Kimball, plain head.
No. 22 Garvin, plain head.
16" Lodge & Davis, back geared.
16" Warner & Swasey, friction head.
2" x 24 J. & L., cone head.
24" Gisholt, 4¼" spindle hole, taper attachment.

No. 3A Warner & Swasey, bar attachment.

PUNCHES AND PRESSES.

No. 74½ Bliss, straight sided, geared.
Blake & Johnson Embossing.
No. 4 Long & Allstatter Single End Punch and Shear, ¾" x ¾", 12" throat; new.
No. 4 Long & Allstatter Single End Punch and Shear, ¾" x ¾", 18" throat; new.
No. 4 Long & Allstatter Single End Punch and Shear, ¾" x ¾", 24" throat; new.

MISCELLANEOUS.

24" Bullard Vertical Turret Lathe, turret head and one side head.
No. 00 Baker Keyseater.
No. 3 B. & S. Universal Miller, with vertical and rack cutting attachments.
6" x 48" P. & W. Thread Miller.
4-spindle Warner & Swasey Valve Milling Machine.
No. 3 Cincinnati Vertical Milling Machine.
No. 3 Burr Cold Saw.

STOCKER-RUMELY-WACHS COMPANY
117-121 NO. JEFFERSON STREET CHICAGO, ILLINOIS

BIG MILLING MACHINE

1 No. 4. LeBlond Plain Milling Machine D. B. Gear, Power Feeds in all directions

Riverside Machinery Depot
29 St. Aubin Ave. - Detroit, Mich.

Gridley Automatic

1-4¼" Gridley Single Spindle Motor Driven Automatic. Motors 220 volt, direct current.

Riverside Machinery Depot
29 St. Aubin Ave. DETROIT, MICH.

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Immediate Shipment

LATHES.

1—32" x 32' BERTRAM ENGINE LATHE, new, double back gear, quick-change gear.
1—42" x 20' PITTSBURGH TRIPLE GEARED ENGINE LATHE, new, quick-change gear and regular equipment, takes 12' between centers.
1—42" x 24' BERTRAM TRIPLE GEARED LATHE, with raising blocks to raise head and tailstock to swing 60". This machine has hollow spindle, compound rest rod and screw feed, and is in excellent working condition.

PLANERS.

1—36" x 36" x 12' McDUGALL PLANER, used, with two heads on cross rail and one side head, has elevating device for cross-rail and is in excellent condition.
1—62" x 62" x 16' CANADA TOOL WORKS PLANER, with two heads; in excellent condition.

BORING MILLS.

1—48" used COLBURN VERTICAL BORING MILL, equipped with two swivel heads, gear box feed; in first-class condition.
1—30" ROGERS BORING MILL, equipped with swivel head, box cone drive and face plate jaws; in good working order.
1—10" NILES BORING MILL, takes 43" under the cross-rail, width of rail 19", two swivel heads, tool bar 6" round by 25" travel, power friction feeds drive, six-step cone for 4" belt; in absolutely first-class condition.
1—BERTRAM HORIZONTAL BORING MACHINE, cone type, headstock, four-step cone for 4" belt, spindle 4", diameter 36", feed slotted adjustable table 18" wide by 36" long.

RADIAL DRILLS.

1—6' BERTRAM HEAVY DUTY RADIAL DRILL, single pulley drive, four speeds in speed box, tapping attachment in spindle, plain box table; excellent condition.
1—6' LONDON DRESSES PATTERN HEAVY DUTY RADIAL DRILL, round column type, speed box drive, arranged for motor drive; in first-class working order.

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 Special Machinery, Gears, Jigs, Fixtures, Punches and Dies,
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Get our Prices on
 Gauges, Boring Bars
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 Etc., for 6 in. SHELL.

GENERAL MACHINE WORK
Brass and Aluminum Castings

Prompt Delivery

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MONARCH BRASS MFG.
 COMPANY, LIMITED

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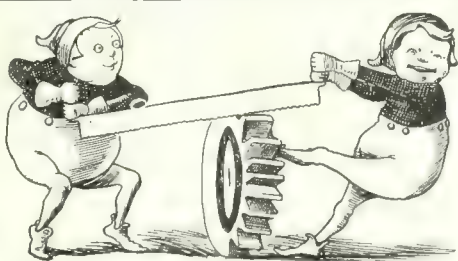
HAMILTON

GEAR & MACHINE CO.

Cor. Concord & Van Horne **TORONTO**

ACCURACY IN CUTTING makes SILENT POWER

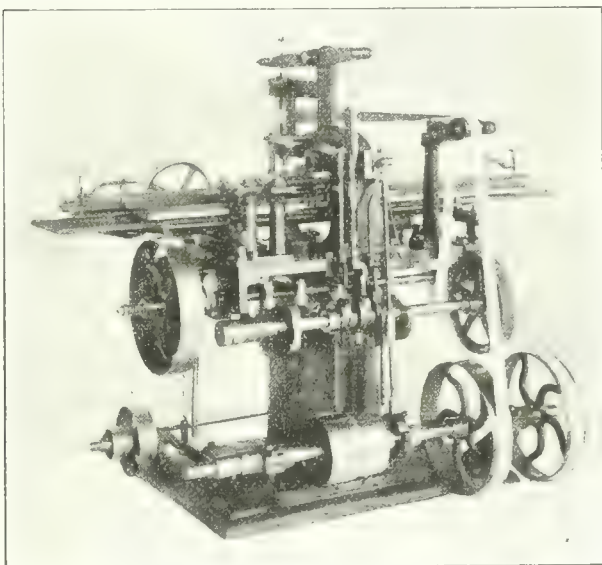
We Cut Gears
 Rawhide, Steel, Iron, Brass.



We Make Grinder Heads, Power Hack Saws, Friction Pulleys, Index Heads.
 DESIGN AND BUILD SPECIAL MACHINERY

WINNIPEG GEAR & ENGINEERING Co.
 197-199 PRINCESS ST., WINNIPEG

We will show here from time to time some machines we build that you may judge our capabilities in this line.



Balan e Rail and Keyframe Boring Machine

Manufactured Solely By

TORONTO TOOL CO.,
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516 Richmond St., West Phone Adel. 1181

If any advertisement interests you, tear it out now and place with letters to be answered.

CHAPMAN

DOUBLE BALL BEARINGS

Chapman Double Ball Bearings fit any adjustable hanger and the change can be made with but little delay to you.

Used in over 2,000 Canadian Factories. They have other good points too. Ask us to send full details.

The ordinary line shafting consumes from 15 to 60 % of power developed--

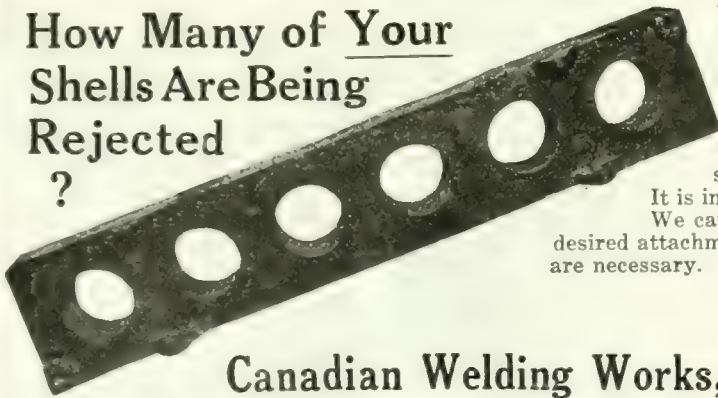
But the line shafting that's equipped with Chapman Double Ball Bearing will save 75 per cent of the friction loads making an average total saving of power from 15 to 30 per cent.

The Chapman Double Ball Bearing Company of Canada, Ltd.

339-351 Spadina Ave., TORONTO, Canada

TRANSMISSION BALL BEARING CO., Inc.
1050 Military Rd., Buffalo, N. Y.

How Many of Your
Shells Are Being
Rejected
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Water Jacket for Nosing Furnace

This STEEL jacket holds a large amount of water, which keeps the body of shell cold, and permits of proper heating of the nose for nosing operations.

Being made of steel, it stands contraction and expansion—not possible with cast iron.

It is indestructible and fool-proof. Made for all sizes of shells. We can make this jacket to any special dimensions, with any desired attachments. No patterns are required—specifications all that are necessary.

Tested and Guaranteed.

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The coupling of expert work with unexcelled equipment enables us to produce on a large scale Brass Castings of any size or alloy.

Our prices, too, are most reasonable; for our large purchases direct from the smelters command their every price favor.

For better Brass Castings at a money saving, send your orders to us. We promise that our work will please you.

The St. Lawrence Welding Company, Ltd., Montreal, P.Q.

Manufacturers of Steel Tanks, Air Receivers, Welded Tanks, Etc. Electric Welders, Oxy-Acetylene Welders. Boiler Repairs.
Lead Burning and Brass Foundry Work.

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IF self-interest be the mainspring of a man's actions, then you should act at once, because the "Clipper" Belt Lacer saves money for you.

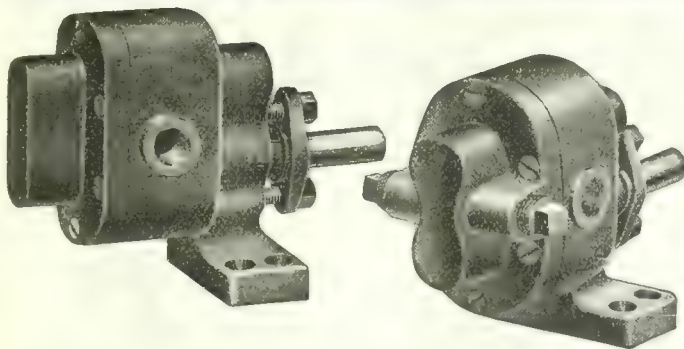
Each time a belt breaks from 1 to 150 men and machines are idle.

"Clipper" lacings have been made in 45 seconds. The maximum time required is only three minutes. How long are *your* men and machines idle when a belt breaks?

Clipper Belt Lacer Company

976 Front Avenue

Grand Rapids, Mich.



Circulating Pumps

Eliminate the separate relief valve and its necessary piping by installing the Roper Circulating Oil Pump. But, you say, why install a new system when the present is good enough? This "good enough" article may appear to be giving satisfaction, *but*, is it giving the best to be obtained. Can you speed up without any fear? With a Roper you need not have any fear of any kind. The oil flows from it in a steady, even stream, and there you can speed up to full capacity and let her go feeling confident.

Inquire. You will get valuable information anyway.

C. F. ROPER & CO.

Hopedale : Mass. : U.S.A.



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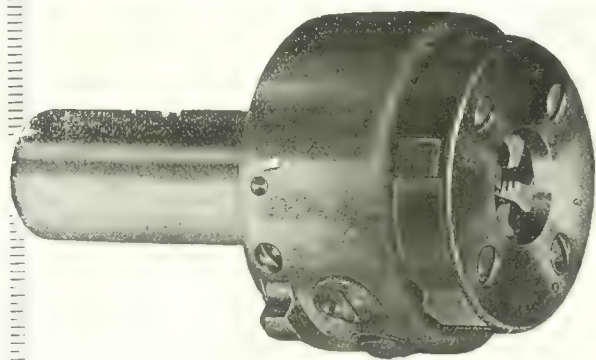
LAMPS

Assist Accurate Production

Everyone admits the necessity for good light in the successful performance of all kinds of work. The better the light the greater production and elimination of accidents and spoilage. For you it is simply a matter to choose the best light for your purpose.

LACO NITRO LAMP "The Light that gives more Light .."
 is daily winning greater popularity throughout Canadian shops, mills, factories, etc., because it fully meets the demands of these places.
 It is a tungsten electric bulb filled with nitrogen gas thus producing a pure white light of greater candle-power per watt than any other type lamp.
 All sizes from 60 watt to 1000 watt in one quality the best.
 Inquire from your nearest dealer

Canadian Laco-Philips Company, Ltd.
 MONTREAL. TORONTO. WINNIPEG and VANCOUVER



Thread Accuracy

Are you satisfied with your threads? Are they all you desire? Do you wish to get better results?

That last question interests us vitally. Our Self-Opening Automatic Die Head will chase your troubles. Its quick release feature not only insures the cutting of the thread to a given point every time, but permits cutting right to the shoulder where required.

Our booklet will tell you about other features.

Eastern Machine Screw Corp.

New Haven, Conn., U.S.A.

H & G

The Right Heat

is the only heat to work with if you are going to turn out good work.

Any ordinary furnace can keep a Gilbert & Barker Furnace steady and even, assuring a uniform temperature.

G. & B. are built right—from the ground up. The built-up construction with heavy sheet metal is reinforced with heavy angle iron straps riveted and bolted. The counter-balanced door clears the opening to full height, admitting the heaviest charge. Fire brick chamber lining, door lining and floor tile are of best quality.

And in every G. & B. furnace you get the benefit of 52 years of experience and study with gaseous and liquid fuels. Our line includes more than one hundred types of furnaces.

At present we are making prompt delivery on many types. Stock list 24 describes them all.

Gilbert & Barker Manufacturing Company

West Springfield, Mass.

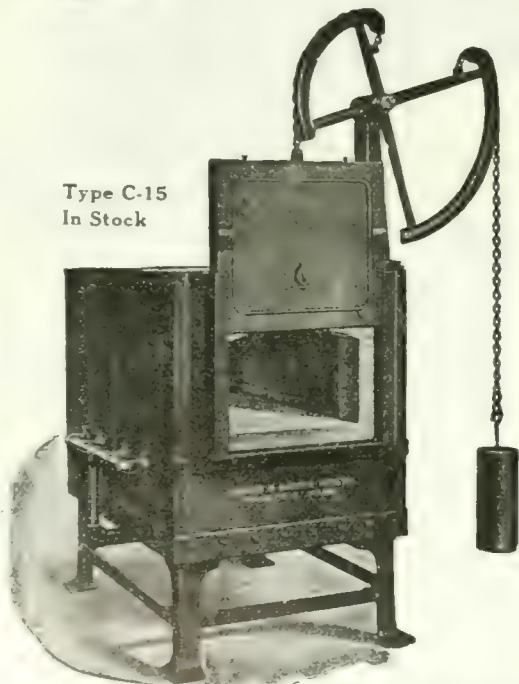
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Type C-15
In Stock



PRACTICALITY

AFTER fifteen years' study of the Miner's and Lumberman's wants, we know just what is and what is not required in tools for them.

Practicality has been the keynote of our organization. Experience has aided us in eliminating all unnecessary parts and in perfecting the design of our tools.

The use of best material and finest workmanship enable us to manufacture tools that are unexcelled.

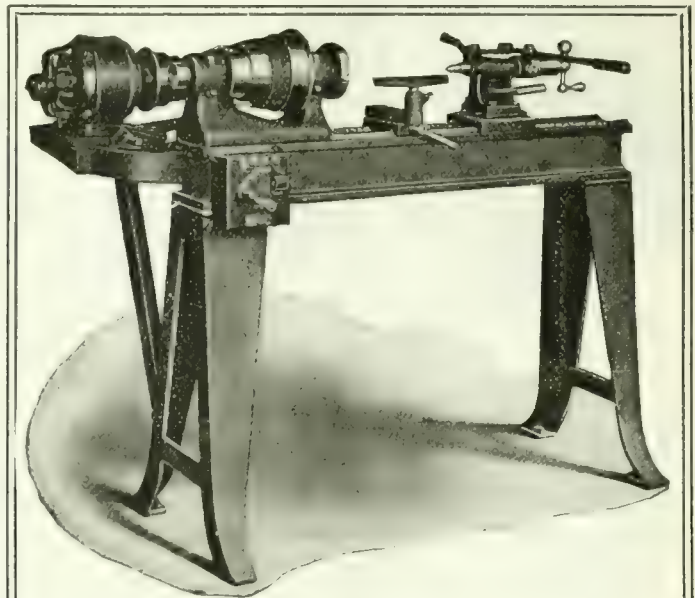
We make a complete line.

Write us for prices.

J. W. CUMMING & SON, LTD.

NEW GLASGOW, CANADA

Wood or Steel, let Cumming's make it.

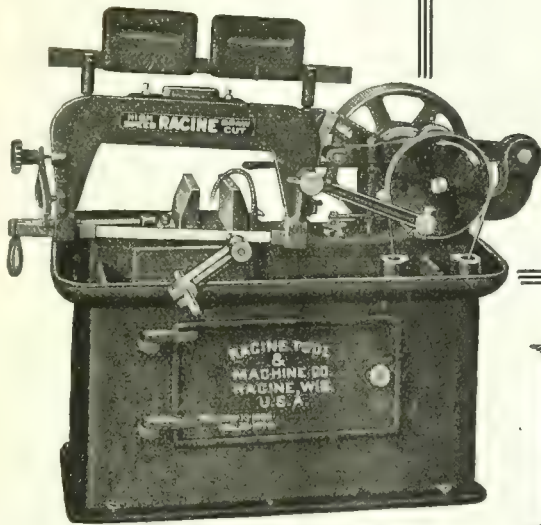


Built For Service

This BLOUNT Motor-driven Lathe is well adapted to all speed lathe uses. It is of late design, and has a number of features in which you will be interested. Provided with constant-speed motor. Lathe spindle made of hollow, high-carbon steel, ground to size and bored for Morse taper. Runs in self-oiling bronze bearings.

J. G. Blount Co., Everett, Mass., U.S.A.

Known the World
Over
Admitted to be
Superior



The Racine for Scientific Metal Cutting

Demonstrate the value of this machine in your own shop, on your own work. Our confidence in the ability of this machine is such that we will send it to you on *trial*. This will give you ample opportunity to study the machine from close quarters; to verify our statements regarding simple construction and operation, accuracy and speed, features that stamp our machine in a class by itself.

We invite your inquiries for full information and installation

Racine Tool & Machine Co.
15 Melbourne Ave. Racine, Wis., U.S.A.

RACINE

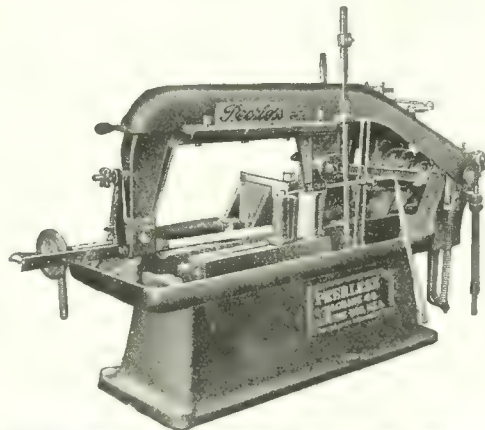
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The quality of our production is one grade — **THE BEST.** Our facilities and equipment enable us to give a very attractive price and prompt service.

Dominion Forge and Stamping Co., Limited
WALKERVILLE, ONTARIO

DROP FORGINGS

**"5 Times More Work from Blades.
3 CUTS TO 1"**



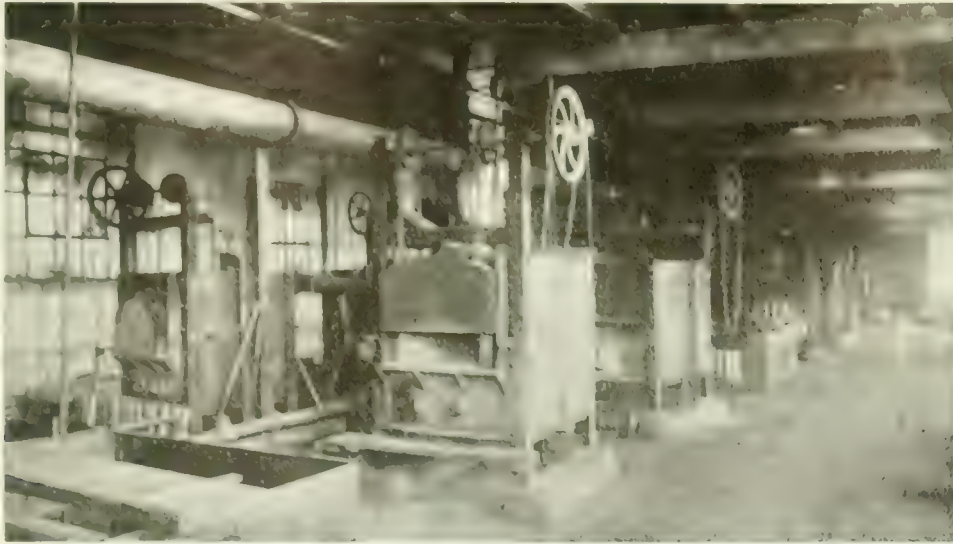
Just what a foreign company reports after making a comparative test on Peerless High Speed Saw cutting 94 in. steel, just made on one 14 x 16 machine, under normal conditions. We would be glad to furnish complete reports of this report and address, some of these tools may be working in your vicinity.

How do these facts will substantiate this report. This firm has reported their order from time to time, before their orders have been shipped from Peersless. The reports are 20% of the shipments are made to about \$1000. At the same time they could save from 1000 their makes and cheaper tools.

When a firm is urgently needed of a tool and will delay production several days, awaiting delivery, the cost of the tool, as to such an emergency and other conditions, some others could be had from stock, such evidence ought to influence your investigating the Peerless High Speed Saw before deciding on any other equipment.

From the reports and repeated orders received would indicate this tool has revolutionized all metal cutting standards. We are, therefore, very anxious to supply them on their own level, but this will allow us to thoroughly test and examine same before deciding to purchase.

PEERLESS MACHINE CO. 1607 Racine St.
RACINE, WIS., U.S.A.



Annealing and Tempering Furnaces installed in the plant of the Canadian Vickers, Limited, Montreal.

“Mecol”

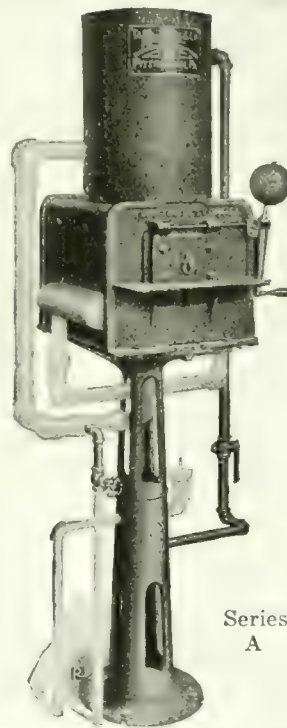
The installation of “Mecol” furnaces shown here is but one instance where a quality furnace was chosen to give maximum production. The furnace you may require is the one we desire to give you complete and full information about. Write us.

Mechanical Engineering Co.
Limited
THREE RIVERS QUE. CANADA

**This is a TATE-JONES
Improved Portable
Recuperative
Gas Oven
Furnace**

For heats, 900 deg. to 1600 deg. Fahr. For hardening carbon steel, preheating or reheating high speed steels, annealing, etc., for artificial or natural gas.

For the plant requiring a small furnace that can be quickly brought up to the proper heat; that delivers a uniform product; that saves time and money—this is the furnace to use.



Series
A

Tate-Jones & Co.
Incorporated
FURNACE ENGINEERS
Pittsburgh - Pa., U.S.A.

**Cut Out the “Rule of Thumb”
in your Heat Treating
Methods.**

It was, is, and always will be risky. To-day—the day of necessary high efficiency and conservation of time, you dare not run any unnecessary risks in output. Aside from its demonstrated money-saving features (which we will explain upon request), it gives your workmen the opportunity of knowing what the furnace will deliver even before the heat is started.

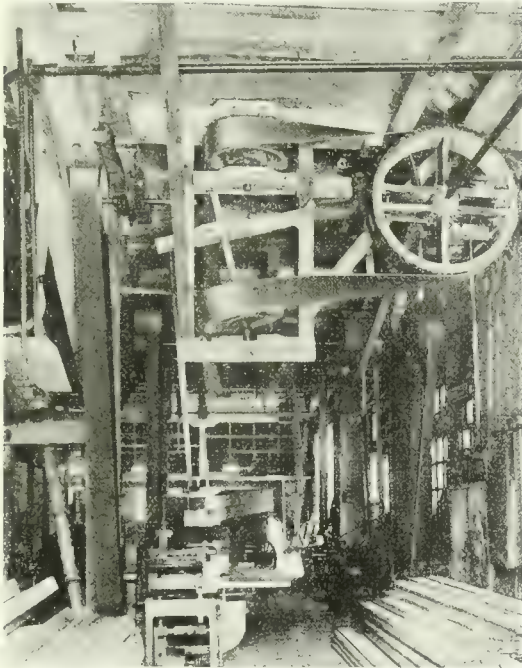
The illustration shows but one of the many styles of furnaces, large and small, made by Tate-Jones Company, of Pittsburgh.

Mention your line of work and we will send information to cover your particular requirements.

Have You A Troublesome Drive?

IN every plant there is a power drive that is a bugbear. A drive that is hard on belts. A drive that is costly and troublesome. Try Extra Power on that drive in your plant.

Almost daily we hear from some customer whose hardest belting problem has been solved by Extra Power. It may be a "wet" drive. It may be a high speed drive. Or a drive with turns. Or just a long, hard pull.



Extra Power is efficient and economical on all kinds of drives—large and small, continuous and intermittent. But it is built good enough for the hardest drives. It has features of construction that make it a superbelt. And the harder the drive, the more enthusiastic is the Extra Power user.

With its fine friction surface Extra Power cuts down power wastage. It works successfully against shifters and on multiple pulley drives. Free from stretch and ply separation, it saves trouble, time, money — lowers operating costs, yields better transmission, lasts longer.

It is a belt whose record for better service qualifies it for use on every kind of drive.

The next time that troublesome drive bobs up, phone or write for a Goodyear belting man. The nearest branch has a man trained in solving such problems as yours.

The Goodyear Tire & Rubber Co. of Canada, Limited

BRANCHES: Halifax, St. John, Montreal, Ottawa, Toronto,
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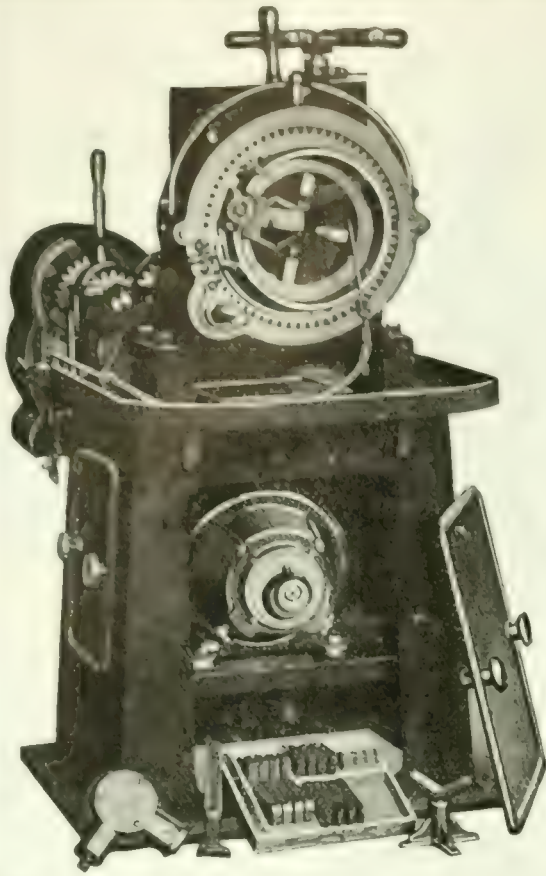
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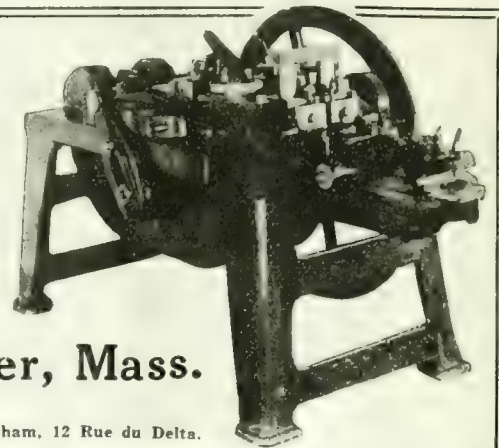
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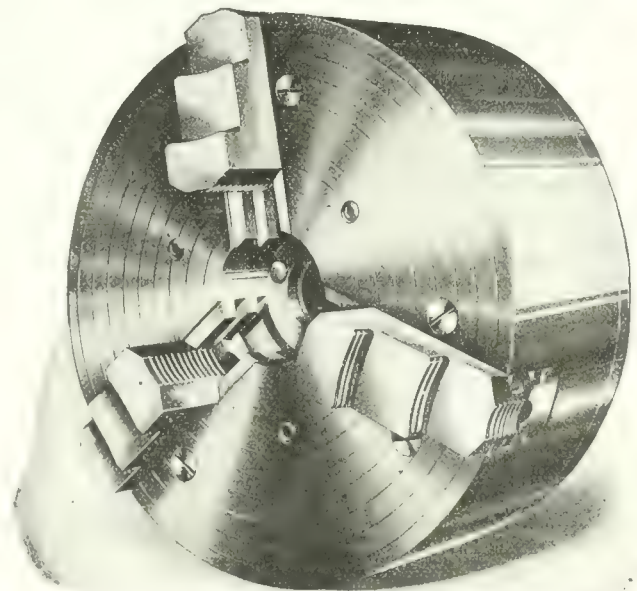
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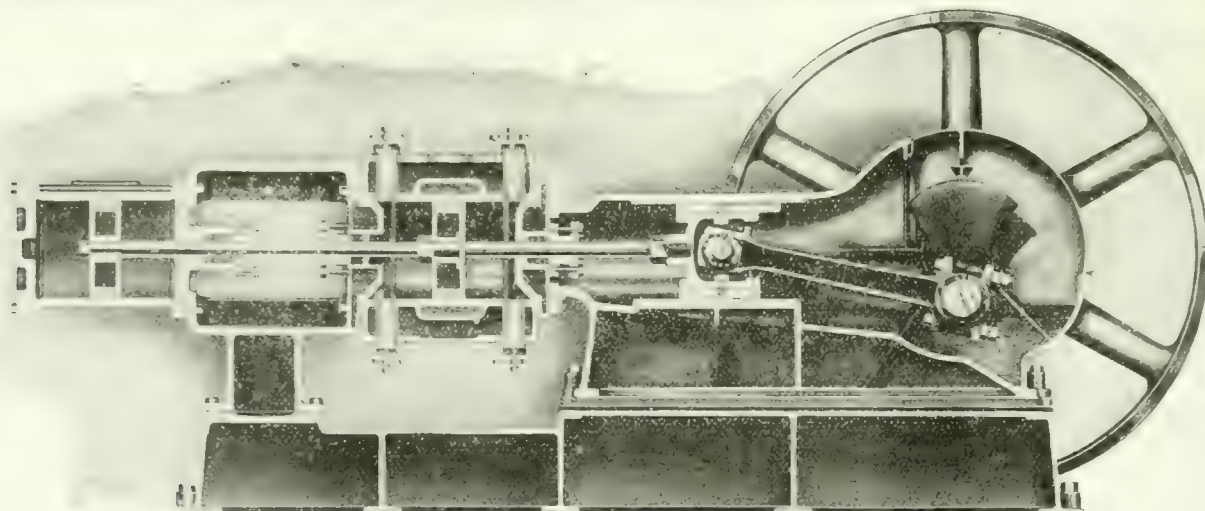
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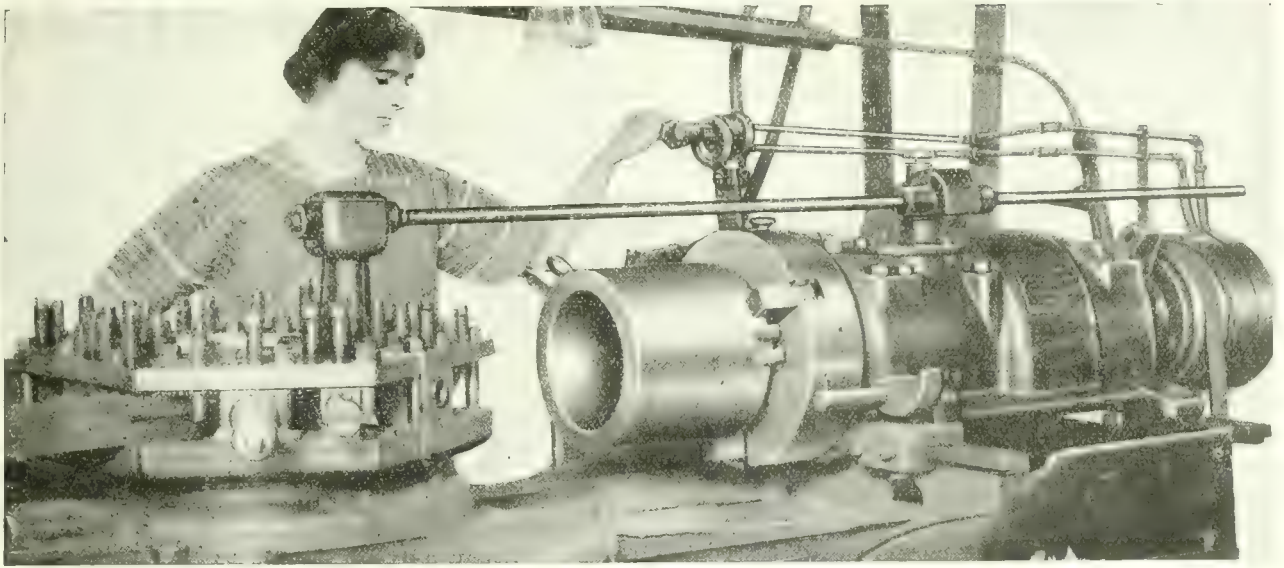
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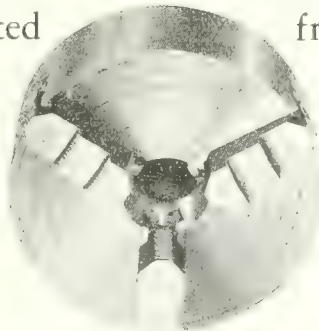
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Escaped from Germany

AN escaped prisoner tells the story of his fearful experiences in Germany in **MACLEAN'S MAGAZINE** for November; and gives a vivid picture of conditions in Germany as he saw them. He got out by way of Holland after appalling perils and hardships. In Holland, he was photographed, but so altered was he that his wife quite failed to recognize him in this photograph. Read this story of this Canadian soldier's escape. It is gripping stuff—a rare tale.

Canadian Finances After the War

WHAT business in Canada collapse when peace comes? It may. What do the big men say? What do they know? What do you think? Are your opinions well informed? The subject is of the greatest possible importance, and you will get light and leading by reading the contribution of Col. John Bayne Maclean, who has taken the trouble to get the opinion of the best and most highly placed men in Canada to help him prepare his article.

Back from the Arctic

WILLIAM THOMPSON, representing the American Geographical Society, was this year in the Arctic Regions. He went to the delta of the Mackenzie River, and took many excellent pictures of the country and its Eskimo inhabitants. He makes the November **MACLEAN'S** the vehicle of many of his pictures and for an account of his journey. Read what this Arctic scientist has to tell us about a remote part of our land.

Slackers and Conscription

WHAT is your attitude towards the draft? You have positive opinions, of course. How do they square with Miss Laut's as they are expressed in her ringing article on Slackers in the November **MACLEAN'S**?

The Nation's Business

THIS is a new feature—a fearless, well-informed survey of national affairs. What we all want is an outspoken—but not vindictive—and clear-visioned presentation of factors and facts affecting our national, political and economic welfare.

Sketches of Trench Life

By Gunner McRitchie

MCRITCHIE was a cartoonist on a Western Canada daily before he went overseas. He has done a number of sketches of trench life "On the Spot," and these he has sent home, for publication in **MACLEAN'S MAGAZINE**. They're interesting and good.

The Late Sir Mortimer Clark

BEFORE he died, a few week ago, the late Sir Mortimer Clark, eminent jurist and an ex-Lieutenant-Governor of Ontario, wrote for **MACLEAN'S** an article on "Safeguarding Your Heirs." It has to do with the functions, service and safety of Trust Companies as executors of estates. This article by a man so distinguished, so cautious, so able, and so wise a counsellor, can be of first-rate value to every man perplexed with the problem of how his estate can be safely and prudently administered after he, the testator, has passed from this life.

A Complete Novelette

By Peter B. Kyne

HIS story in the November **MACLEAN'S** is a thunderingly good story of lumbermen and lumbering. Red blood is in this tale of business. R. M. Brinkerhoff illustrates it.

Short Story

By Ethel Watts Mumford

THE writer of this short story—the first of a delightful series by this author to appear in **MACLEAN'S**—is very well known among short story writers. Delicate fancy, wholesomeness, freshness and finished workmanship characterize all her work.

Short Story

By W. A. Fraser

AMIGHTILY well-written story of India—the kind that we all delight in; tense, bewildering, and lots of action. Fraser never wrote a better short story than this. Ben Ward illustrates it.

Hendryx and Oppenheim

SERIALISTS

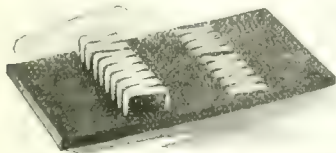
THE "Gun Brand," by Hendryx, comes to an end in the November issue. Oppenheim's greatest story, "The Pawns Count," is continued. Oppenheim's story is the biggest single feature ever secured by **MACLEAN'S**.

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for November

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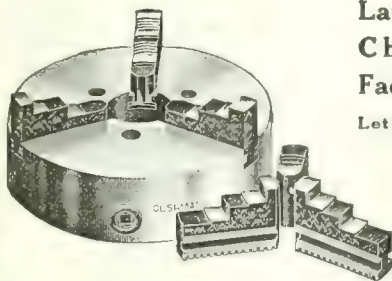
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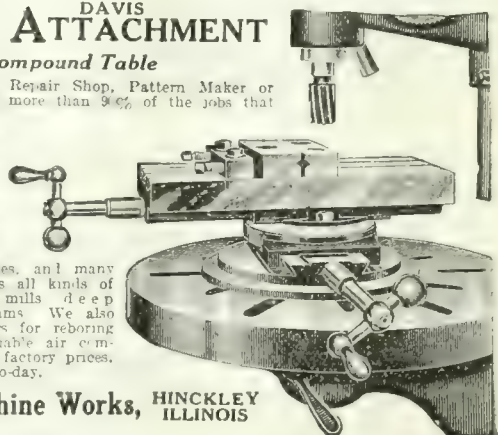
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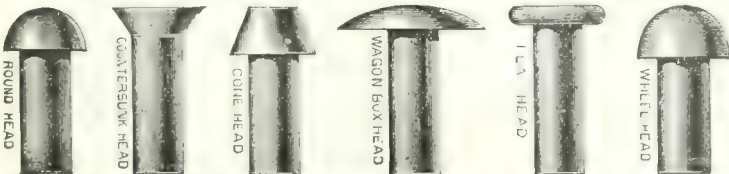
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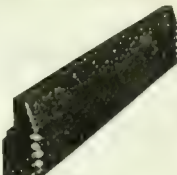
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Clippier Belt Lacer Co., Grand Rapids, Mich.

BELT DRESSING AND CEMENT

Baxter & Co., Ltd., J. R., Montreal, Que.

BELT LACING LEATHER

Aikenhead Hardware Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal
Graton & Knight Mfg. Co., Worcester, Mass.

BELTING, BALATA

Baxter Co., Ltd., J. R., Montreal, Que.
Can. B. K. Morton, Toronto, Montreal
Federal Engineering Co., Toronto, Ont.

BELTING, CHAIN

Canadian Fairbanks-Morse Co., Montreal
Goodyear Tire & Rubber Co., Toronto, Ont.
Jones & Glasco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Petrie, Ltd., H. W., Toronto, Ont.
Whitney Mfg. Co., Hartford, Conn.

BELTING, CONVEYOR

Goodyear Tire & Rubber Co., Toronto, Ont.

BELTING, LEATHER

Canadian Fairbanks-Morse Co., Montreal
Can. B. K. Morton, Toronto, Montreal
Graton & Knight Mfg. Co., Worcester, Mass.
Goodyear Tire & Rubber Co., Toronto, Ont.
McLaren, J. C., Belting Co., Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Petrie, Ltd., H. W., Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.

BELTING, STITCHED COTTON DUCK

Baxter & Co., Ltd., J. R., Montreal, Que.
Bennett, W. P., 51 Montford St., Montreal, Que.
Dominion Belting Co., Hamilton, Ont.
Federal Engineering Co., Toronto, Ont.
Petrie, Ltd., H. W., Toronto, Ont.

BENCH LEGS, STEEL

New Britain Mach. Co., New Britain, Conn.

BENCH DRAWERS, FRICTIONLESS

New Britain Mach. Co., New Britain, Conn.

BENDING MACHINERY

John Bertram & Sons Co., Dundas
Bertrams, Limited, Edinburgh, Scotland
Brown-Boggs Co., Ltd., Hamilton, Can.
Can. Blower & Forge Co., Kitchener, Canada
Ferracuta Mach. Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
Charles F. Elmes Eng. Works, Chicago
Jardine, A. B., & Co., Hespeler, Ont.
National Machinery Co., Tiffin, Ohio
Niles-Bement-Pond Co., New York
Petrie, Ltd., H. W., Toronto, Ont.
Steel Bending Brake Works, Charham, Ont.
Toledo Machine & Tool Co., Toledo, Ohio.

BILLET MARKERS

Matthews & Co., Jas. H., Pittsburgh, Pa.

BINS, STEEL

The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
MacKinnon, Holmes Co., Sherbrooke
Toronto Iron Works, Ltd., Toronto, Ont.

BLASTING MACHINES, SHOT AND STEEL GRIT

Gray Mfg. & Mach. Co., Toronto, Ont.
F. S. Silica Co., Chicago, Ill.

BLOWERS

Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Petrie, Ltd., H. W., Toronto, Ont.
R. E. T. Pringle, Ltd., Toronto, Ont.
Riverside Machinery Depot, Detroit, Mich.
Sturtevant Co., B. F., Galt, Ont.

BLOW PIPES AND REGULATORS

Carter Welding Co., Toronto, Ont.
L'Air Liquide Society, Montreal, Toronto
Prest-O-Lite Co., Inc., Toronto, Ont.

BLUE PRINTING MACHINERY

Mulliner-Enlund Tool Co., Syracuse, N.Y.

BOARTZ

Francis & Co., Hartford, Conn.
Geo. A. Joyce Co., Ltd., New York, N.Y.

BOILERS

The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
MacKinnon, Holmes Co., Sherbrooke
Petrie, Ltd., H. W., Toronto, Ont.
Riverside Machinery Depot, Detroit, Mich.

BOLT CUTTERS AND NUT TAPERS

Aikenhead Hardware Co., Toronto, Ont.
Canada Machinery Corp., Galt, Ont.
Landis Machine Co., Waynesboro, Pa.
Wells Brothers Co. of Canada, Galt, Ont.

BOLTS

Aikenhead Hardware Co., Toronto, Ont.
Cumming & Son, J. W., New Glasgow, Canada
Galt Machine Screw Co., Galt, Ont.
London Bolt & Hinge Works, London, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.
Wilkinson & Kompass, Hamilton, Ont.

BOLT AND NUT MACHINERY

John Bertram & Sons Co., Dundas
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Gardner & Son, Robt., Montreal.
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, Ohio.
Petrie, Ltd., H. W., Toronto, Ont.
Riverside Machinery Depot, Detroit, Mich.
A. R. Williams Machinery Co., Toronto

BOLT THREADING MACHINERY

Landis Machine Co., Waynesboro, Pa.
Victor Tool Co., Waynesboro, Pa.

BORING MACHINES, PNEUMATIC CYLINDER

Cleveland Pneumatic Tool Co. of Canada, Toronto
Canadian Fairbanks-Morse Co., Montreal
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Garlock-Walker Machinery Co., Toronto, Ont.
Petrie, Ltd., H. W., Toronto, Ont.
Stow Mfg. Co., Binghamton, N.Y.

BORING MACHINES, UPRIGHT AND HORIZONTAL

John Bertram & Sons Co., Dundas
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York
Roelofson Machine & Tool Co., Toronto, Ont.
Riverside Machinery Depot, Detroit, Mich.
Stow Mfg. Co., Binghamton, N.Y.

BORING MACHINES, STOVE AND COAL

Cumming & Son, J. W., New Glasgow, Canada

BORING AND TURNING MILLS

John Bertram & Sons Co., Dundas
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal
Niles-Bement-Pond Co., New York
Petrie, Ltd., H. W., Toronto, Ont.
R. E. T. Pringle, Ltd., Toronto, Ont.

BOXES, STEEL SHOP AND TOTE

Cleveland Wire Spring Co., Cleveland
New Britain Mach. Co., New Britain, Conn.

BRAKES

Brown, Boggs & Co., Hamilton, Can.

BRASS AND COPPER BARS, RODS AND SHEETS

Brown's Copper & Brass Rolling Mills, New Toronto

BRASS FOUNDERS

St. Lawrence Welding Co., Montreal, Que.

BRASS WORKING MACHINERY

Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machinery Co., Toronto, Ont.
Warner & Swasey Co., Cleveland
Niles-Bement-Pond Co., New York
Osborn, Ltd., H. W., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
Riverside Machinery Depot, Detroit, Mich.
A. R. Williams Machy. Co., Toronto

BRIDGES, RAILWAY AND HIGHWAY

The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
MacKinnon, Holmes Co., Sherbrooke

BRONZE RODS AND SHEETS

Brown's Copper & Brass Rolling Mills, New Toronto

BUBBLERS

Puro Sanitary De'g Fountain Co., Havtenville, Mass.

BUFFING AND POLISHING MACHINERY

Ford-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
New Britain Machine Co., New Britain, Conn.

BUCKETS, CLAM SHELL CRAB DUMP

Northern Crane Works Ltd., Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

BULLDOZERS

John Deere & Co., Moline, Ill.
Caterpillar Tractor Co., Peoria, Ill.

BURNERS, OIL AND NATURAL GAS

Becker Milling Machine Co., Boston, Mass.
Northern Crane Works Ltd., Walkerville, Ont.

BURNING REAMERS

Wells Brothers Co. of Canada, Galt, Ont.

BURRS, IRON AND COPPER

Wright Mfg. Co., Linton, Ohio.

CANNERS' MACHINERY

John E. W. Co., Linton, Ohio.
Foster Machine Co., Elkhart, Ind.

CARS, INDUSTRIAL

Can. Industrial & Equip. Co., Toronto, Ont.
Caterpillar Tractor Co., Peoria, Ill.

CAR MOVERS

John Deere & Co., Moline, Ill.

CARTRIDGE MAKING MACHINERY

James & Sons, W. Wash. Tower, New York.

CASTINGS, ALUMINUM, BRASS, BRONZE, COPPER

Cumming & Son, J. W., New Glasgow, Canada.
Alexander Mack, Ltd., Ottawa.

CASTINGS, GRAY IRON

Renard Bros. & Co., The A., Forterville, Que.
The Jencks Mach. Co., Ltd., Sherbrooke, Que.

CASTINGS, STEEL CHROME AND MANGANESE STEEL

Can. Steel Foundries, Ltd., Montreal, Que.
Dominion Steel Foundry Co., Ltd., Hamilton, Ont.

CASTINGS, MALLEABLE

Can. Steel Foundries, Ltd., Montreal, Que.

CASTINGS, NICKEL STEEL

Hull Iron & Steel Foundries, Ltd., Hull, Que.

CEMENT MACHINERY

Canadian Fairbanks-Morse Co., Ltd., Montreal.

CENTERING MACHINES

Victoria Foundry Co., Ottawa, Ont.

CENTRE REAMERS

John Bertram & Sons Co., Dundas.
Garrett, Rogers & Sons, South Sudbury, Mass.

CHAIN BLOCKS

Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Ltd., Montreal.

CHEMISTS

Can. Inspection & Testing Lab., Montreal, Que.
The Jencks Mach. Co., Ltd., Sherbrooke, Que.

CHESTS, TOOL

Union Tool Chest Works, Rochester, N.Y.

CHUCKS, AERO, AUTOMATIC

Garvin Machine Co., New York.

CHUCKS, AIR

Hannifin Mfg. Co., Chicago, Ill.

CHUCKS, COLLET

Hannifin Mfg. Co., Chicago, Ill.

CHUCKS, DRILL, LATHE AND UNIVERSAL

Aikenhead Hardware Co., Toronto, Ont.
John Bertram & Sons Co., Dundas, Ont.
Can. Blower & Forge Co., Kitchener, Canada.

John Deere & Co., Moline, Ill.
Kear & Goodwin, Beaufort, Ont.

CHUCKS, DRILL, AUTOMATIC AND KEYLESS

Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Canada.

CHUCKS, FRICTION AND TAP

Wright Mfg. Co., Linton, Ohio.

CHUCKS, MAGNETIC

H. E. Stewart, 57 New Birks Bldg., Montreal.

CHUCKS, RING WHEEL

Garvin Machine Co., New York.

CHUCKS, SPLIT

Becker Milling Machine Co., Boston, Mass.

CHUCKING MACHINES

Canadian Machine Co., New York.
New Britain Machine Co., New Britain, Conn.

CLOCKS, WATCHMAN, PORTABLE

Hardinge Bros., Inc., Chicago, Ill.

CLUTCHES, FRICTION AND PULLEY

Becker Milling Machine Co., Boston, Mass.
Garvin Machine Co., New York.

COAL HANDLING MACHINERY

MacKinnon & Higgins & Co., Sherbrooke, Que.
Northern Crane Works Ltd., Walkerville, Ont.

COILING MACHINERY, WIRE AND SPRING

Steger & Hartley, Inc., Worcester, Mass.

COKE AND COAL

Hess & Co., M. A., Cleveland, O.

COLLARS

Can. Bond Hanger & Oplg. Co., Alexandria, Ont.

COLLECTORS, PNEUMATIC

Can. Blower & Forge Co., Kitchener, Ont.
Sheddons Limited, Galt, Ont.

COLLETS

Becker Milling Machine Co., Boston, Mass.
Hannifin Mfg. Co., Chicago, Ill.

COMPRESSORS, AIR

Can. Ingersoll Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.

CONTRACT WORK

Walling Foundry Equipment Co., Harvey, Ill.

CONTROLLERS AND STARTERS, ELECTRIC MOTORS

Can. Blower & Forge Co., Kitchener, Ont.
John Bertram & Sons Co., Dundas.

CONTROLLING INSTRUMENTS

Taylor Instrument Co., Rochester, N.Y.

CONVERTERS, STEEL, SUDE-BLOW

Whiting Foundry Equipment Co., Harvey, Ill.

COPING MACHINES

Can. Blower & Forge Co., Kitchener, Ont.
John Bertram & Sons Co., Dundas.

COUNTERBORES AND COUNTERSINKS

Aikenhead Hardware Co., Toronto, Ont.
Clark Equipment Co., Buchanan, Mich.

COUNTERSHAFTS

Baird Machine Co., Bridgeport, Conn.
Foster Machine Co., Elkhart, Ind.

COUPLINGS, FRICTION

Bernard Industrial Co., The A., Forterville, Que.

COUPLINGS, PLAIN AND FLEXIBLE

Can. Bond Hanger & Oplg. Co., Alexandria, Ont.
Cleveland Pneumatic Tool Co. of Canada, Toronto.

CRANES, PORTABLE

Aikenhead Hardware Co., Toronto, Ont.
Northern Crane Works, Walkerville.

CRIMPS, LEATHER

Garston & Knight Mfg. Co., Worcester, Mass.

CUTPOLAS

Can. Blower & Forge Co., Kitchener, Ont.
Northern Crane Works, Walkerville.

CUPOLA BLAST GASES AND BLOWERS

Whiting Foundry Equipment Co., Harvey, Ill.

CUTTER GRINDERS AND ATTACHMENTS

Cincinnati Milling Machine Co., Cincinnati.
Garlock-Walker Machinery Co., Toronto, Ont.

CUTTERS, FLUE

Cleveland Pneumatic Tool Co. of Canada, Toronto.

CUTTERS, PIPE (SEE PIPE CUTTERS)

CUTTERS, MILLING

Becker Milling Machine Co., Boston, Mass.
Canadian Fairbanks-Morse Co., Ltd., Montreal.

CUTTING COMPOUND AND CUTTING OIL

Catact Refining & Mfg. Co., Toronto.
Elin Cutting Oil Co., Toronto.

CUTTING-OFF MACHINES

Armstrong Bros. Tool Co., Chicago.
John Bertram & Sons Co., Dundas.

CYLINDERS, AIR

Manufacturers Equipment Co., Chicago, Ill.

CYLINDERS, AUTOMATIC REBORING JIGS AND REAMERS

Hinckley Machine Co., Hinckley, Ill.

CUTTING AND WELDING PLANTS

Prest-O-Lite Co., Inc., Toronto, Ont.

DAMPER REGULATORS

Canadian Fairbanks-Morse Co., Ltd., Montreal.

DERRICKS

Aikenhead Hardware Co., Toronto, Ont.
Dominion Bridge Co., Montreal.

DIAMONDS, BLACK AND ROUGH

Geo. A. Joyce Co., Ltd., New York.

DIAMOND TOOLS

Francis & Co., Hartford, Conn.
Geo. A. Joyce Co., Ltd., New York.

DIES, BRASS PRINTING, EMBOSHING AND LETTERING

Matthews, Jas. H., & Co., Pittsburgh, Pa.
DIES AND DIE STOCKS

Aikenhead Hardware Co., Toronto, Ont.
Barnfield, W. H., & Son, Toronto.

DIES, PIPE THREADING

Landis Machine Co., Warnersboro, Pa.

DIE SINKERS

Becker Milling Machine Co., Boston, Mass.
Garvin Machine Co., New York.

DIES FOR BIT BRACE USE

Wells Brothers Co. of Canada, Galt, Ont.

DIES, NOSING

Marsh & Henthorn, Ltd., Belleville, Ont.

DIES, PIPE THREADING

Landis Machine Co., Warnersboro, Pa.

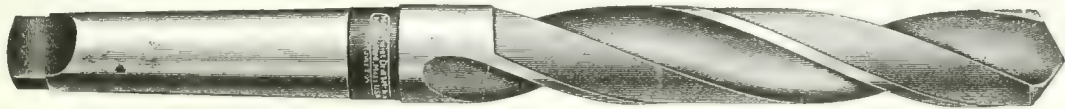
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Aikenhead Hardware Co., Toronto, Ont.
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Chicago F. Moore Eng. Works, Chicago

DIES, SELF-OPENING

Nashua Machine Co., Nashua, N.H.
Cincinnati Tool Co., Cincinnati, Ohio
Foss & Hill Machy. Co., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
Niles-Bement-Pond Co., New York
Pratt & Whitney Co., Dunderas, Ont.
Woods & Kumpass, Hamilton, Ont.

DIES FOR SCREW PLATES

Woods & Kumpass, Hamilton, Ont.

DIES, SHEET METAL WORKING

E. W. Jones & Sons, Toronto, Ont.
Foss & Hill Machy. Co., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
Woods & Kumpass, Hamilton, Ont.

DISCS, LEATHER

Graton & Knight Mfg. Co., Montreal

DIES, SCREW AND THREAD

London Machine Co., Warrington, Pa.
Mason & Co., Montreal
Niles-Bement-Pond Co., New York
Pratt & Whitney Co., Dunderas, Ont.
Woods & Kumpass, Hamilton, Ont.

DRAFT, MECHANICAL

W. H. Blandin & Sons, Toronto
Balfour & Co., Rock Island, Que.
Can. Blower & Forge Co., Kitchener, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Foss & Hill Machy. Co., Montreal
Sturtevant Co., B. F., Galt, Ont.

DISCS, LEATHER

Graton & Knight Mfg. Co., Montreal

DRESSERS, GRINDING AND EMERY WHEEL

Can. Diamond-Stephan Mfg. Co., Hamilton, Ont.
Frost-Smith Mach. Co., Hamilton, Ont.

DRILL PRESSES

Aurora Tool Works, Aurora, Ind.
W. F. & John Barnes Co., Rockford, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
Garlock Machine Co., New York
Niles-Bement-Pond Co., New York
Pratt & Whitney Co., Dunderas, Ont.
Rensselaer Machinery Dept., Detroit, Mich.
Standard Machy & Supplies, Ltd., Montreal
Stow Mfg. Co., Binghamton, N.Y.
United States Mach. Tool Co., Cincinnati, O.
A. R. Williams Machinery Co., Toronto.

DRILLING MACHINES, BENCH

Bilton Mach. Tool Co., Bridgeport, Conn.
Martin Machine Co., Greenfield, Mass.

DRILLING MACHINES, GANG

Barnes, W. F. & John, Co., Rockford, Ill.
Bilton Mach. Tool Co., Bridgeport, Conn.
Canada Machinery Corp., Galt, Ont.
Silver Mfg. Co., Salem, Ohio.

DRILLING MACHINES, LOCOMOTIVE AND MULTIPLE SPINDLE

John Bertram & Sons Co., Dundas
Bilton Mach. Tool Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Canadian Fairbanks-Morse Co., Montreal
Cincinnati Pulley Machy. Co., Cincinnati, Ohio
Foss & Hill Machy. Co., Montreal
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garlock Machine Co., New York
A. B. Jardine & Co., Hespeler, Ont.
National-Acme Co., Cleveland, Ohio
Niles-Bement-Pond Co., New York
Pratt & Whitney Co., Dunderas, Ont.
Rockford Drilling Mach. Co., Rockford, Ill.

DRILLING MACHINES, RADIAL AND TURRET

John Bertram & Sons Co., Dundas
Canadian Fairbanks-Morse Co., Montreal
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
Niles-Bement-Pond Co., New York
Pratt & Whitney Co., Dunderas, Ont.

DRILLING MACHINES, SENSITIVE

Aikenhead Hardware Co., Toronto, Ont.
Bilton Mach. Tool Co., Bridgeport, Conn.
W. F. & John Barnes Co., Rockford, Ill.
Canadian Fairbanks-Morse Co., Montreal
Canada Machinery Corp., Galt, Ont.
De Mory Machine Co., Cleveland, Ohio
Foss & Hill Machy. Co., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
D. McKenna Machinery Co., Guelph, Ont.
Niles-Bement-Pond Co., New York
Pratt & Whitney Co., Dunderas, Ont.
Stow Mfg. Co., Binghamton, N.Y.
United States Mach. Tool Co., Cincinnati, Ohio.

DRILLING MACHINES, UPRIGHT AND HORIZONTAL

Aurora Tool Works, Aurora, Ind.
John Bertram & Sons Co., Dundas
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Cincinnati Pulley Machy. Co., Cincinnati, Ohio
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
E. McDougall Co., Galt
Niles-Bement-Pond Co., New York

Rockford Drilling Mach. Co., Rockford, Ill.
Silver Mfg. Co., Salem, Ohio
A. R. Williams Machinery Co., Toronto.

DRILLING POSTS

Aikenhead Hardware Co., Toronto, Ont.
Knox Mfg. Co., Buffalo, N.Y.
Silver Mfg. Co., Salem, Ohio

DRILLS, BENCH

Aikenhead Hardware Co., Toronto, Ont.
W. F. & John Barnes Co., Rockford, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal
Cincinnati Pulley Machy. Co., Cincinnati, Ohio
Foss & Hill Machy. Co., Montreal
Garlock-Walker Machinery Co., Toronto, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney Co., Dunderas, Ont.
United States Electrical Tool Co., Cincinnati

DRILLS, BLACKSMITH AND BIT STOCK

Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Cleveland Twist Drill Co., Cleveland
Foss & Hill Machy. Co., Montreal
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney Co., Dunderas, Ont.
Woods & Kumpass, Hamilton, Ont.

DRILLS, CENTRE

Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland
Morse Twist Drill & Mach. Co., New Bedford.

DRILLS, ELECTRIC AND PORTABLE

Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Cincinnati Electrical Tool Co., Cincinnati, Ohio
Foss & Hill Machy. Co., Montreal
Independent Pneumatic Tool Co., Chicago
Niles-Bement-Pond Co., New York
Pratt & Whitney Co., Dunderas, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
Stow Mfg. Co., Binghamton, N.Y.
United States Electrical Tool Co., Cincinnati
A. R. Williams Machinery Co., Toronto
Wilkinson & Kompas, Hamilton, Ont.

DRILLS, HIGH SPEED

Aikenhead Hardware Co., Toronto, Ont.
Atkins & Co., Wm., Sheffield, Eng.
Cleveland Twist Drill Co., Cleveland
Canadian Fairbanks-Morse Co., Montreal
Clark Equipment Co., Buchanan, Mich.
Can. B. K. Morton, Toronto, Montreal
H. A. Drury Co., Montreal
Eagle & Globe Steel Co., Montreal, Que.
Foss & Hill Machy. Co., Montreal
Marshall & Co., Geo. A., Toronto, Ont.
McKenna Brothers, Pittsburgh, Pa.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Osborn (Canada), Ltd., Sam'l, Montreal, Que.
W. F. & John Barnes Co., Rockford, Ill.
Balfour & Co., Rock Island, Que.
Pratt & Whitney Co., Dunderas, Ont.
Standard Machy & Supplies, Ltd., Montreal, Que.

DRILLS, MULTIPLE SPINDLE

Henry & Wright Mfg. Co., Hartford, Conn.
Niles-Bement-Pond Co., New York
Garlock-Walker Machinery Co., Toronto, Ont.
Pratt & Whitney Co., Dunderas, Ont.

DRILLS, OIL TUBE

Cleveland Twist Drill Co., Cleveland
Morse Twist Drill & Mach. Co., New Bedford, Mass.

DRILLS, PNEUMATIC

Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Independent Pneumatic Tool Co., Chicago, Ill.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Niles-Bement-Pond Co., New York

DRILLS, PNEUMATIC CORNER

Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

DRILLS, RATCHET AND HAND

Aikenhead Hardware Co., Toronto, Ont.
Armstrong Bros. Tool Co., Chicago, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal
Cincinnati Electrical Tool Co., Cincinnati, Ohio
Cleveland Twist Drill Co., Cleveland
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney Co., Dunderas, Ont.

DRILLS, ROCK

Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Foss & Hill Machy. Co., Montreal
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
A. R. Williams Machy. Co., Toronto.

DRILLS, TRUCK

Cleveland Twist Drill Co., Cleveland
Clark Equipment Co., Buchanan, Mich.
Foss & Hill Machy. Co., Montreal
Morse Twist Drill & Mach. Co., New Bedford.

DRILLS, TWIST

Atkins & Co., Wm., Sheffield, Eng.
Aikenhead Hardware Co., Toronto, Ont.
Armstrong Bros. Tool Co., Chicago
Armstrong, Whitworth of Canada, Ltd., Montreal
Canadian Fairbanks-Morse Co., Montreal
Can. B. K. Morton, Toronto, Montreal
Clark Equipment Co., Buchanan, Mich.
Cleveland Twist Drill Co., Cleveland
Morse Twist Drill & Mach. Co., New Bedford, Mass.

Osborn (Canada), Ltd., Sam'l, Montreal, Que.
Pratt & Whitney Co., Dunderas, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilkinson & Kompas, Hamilton, Ont.

DRINKING FOUNTAINS

Puro Sanitary Dk'g. Fountain Co., Haydenville, Mass.

DRYING APPLIANCES

Baird Machine Co., Bridgeport, Conn.
Sheldons, Ltd., Galt, Ont.

DUMP CARS

Canadian Fairbanks-Morse Co., Montreal
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
MacKinnon, Holmes & Co., Sherbrooke, Que.

DUST SEPARATORS

Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
Sturtevant Co., B. F., Galt, Ont.

DUST ARRESTERS (FOR TUMBLING MILLS)

Northern Crane Works, Walkerville, Sheldons, Ltd., Galt, Ont.
Sturtevant Co., B. F., Galt, Ont.
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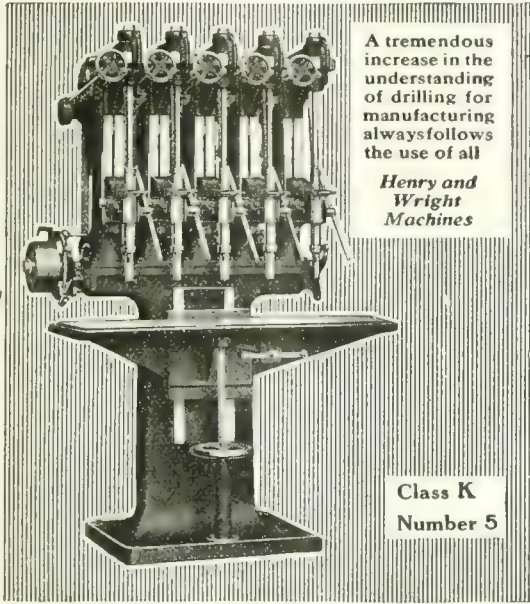
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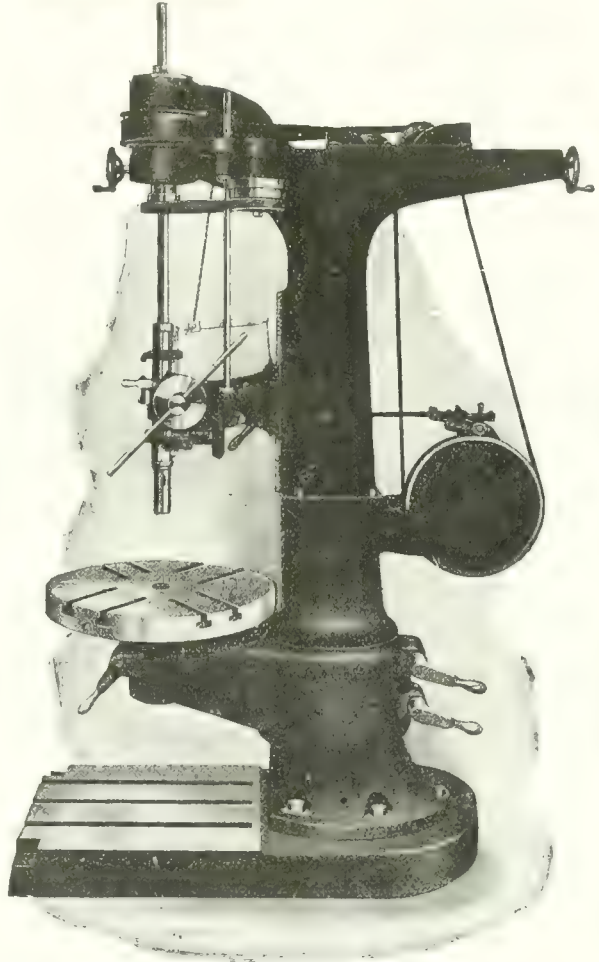
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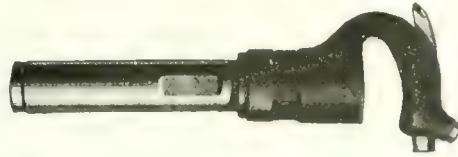
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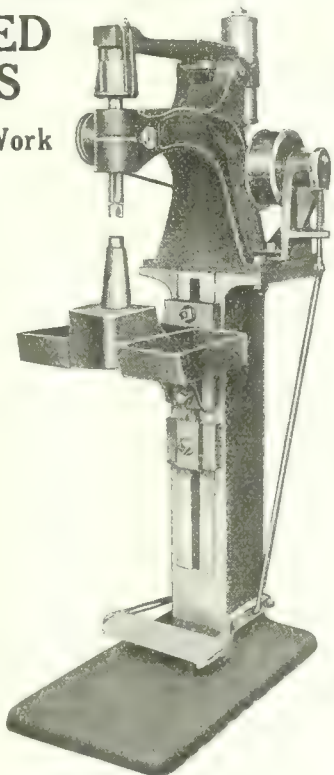
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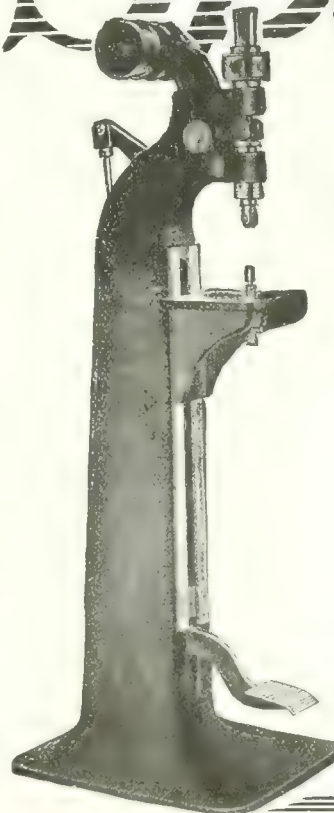
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 Garlock-Walker Machinery Co., Toronto, Ont.
 Metalwood Mfg. Co., Detroit, Mich.
 Niles-Bement-Pond Co., New York.
 William R. Perrin, Ltd., Toronto.
 Pratt & Whitney Co., Hartford, Conn.
 West Tire Setter Co., Rochester, N.Y.

INDICATORS, SPEED
 Aikenhead Hardware Co., Toronto, Ont.
 Brown & Sharpe Mfg. Co., Providence, R.I.
 L. S. Starrett Co., Athol, Mass.

INDEX CENTRES
 Fred C. Dackow, Chicago, Ill.
 Garvin Machine Co., New York.

INDICATING INSTRUMENTS
 Taylor Instrument Co., Rochester, N.Y.

IRON ORE
 Hanna & Co., M. A., Cleveland, O.

JACKS
 Aikenhead Hardware Co., Toronto, Ont.
 Can. Fairbanks-Morse Co., Montreal.
 Northern Crane Works, Walkerville, Ont.
 Norton, A. O., Colton, Que.
 Pratt, Ltd., H. W., Toronto, Ont.

JACKS, HYDRAULIC
 Charles F. Elmes Eng. Works, Chicago.

JACKS, PNEUMATIC
 Northern Crane Works, Walkerville, Ont.

JACKS, PIT AND TRACK
 Can. Fairbanks-Morse Co., Montreal.
 Northern Crane Works, Walkerville, Ont.

JAWS, FACE PLATE
 Cushman Chuck Co., Hartford, Conn.
 Sumner Chuck Co., New Britain, Conn.

JIGS, TOOLS, ETC.
 Brown Engineering Co., Toronto, Ont.
 Homer & Wilson, Hamilton, Ont.
 Illinois Tool Works, Chicago, Ill.
 O'Brien Canada, Ltd., Sarnia, Montreal, Que.
 Toronto Tool Co., Toronto, Ont.

KEY SEATERS
 Garlock-Walker Machinery Co., Toronto, Ont.
 Garvin Machine Co., New York.
 Morton Mfg. Co., Muskegon Heights, Mich.
 A. R. Williams Machy. Co., Toronto.

KEYS, MACHINE
 Whitney Mfg. Co., Hartford, Conn.

KILNS
 Can. Blower & Forge Co., Kitchener, Ont.
 The Jencks Mach. Co., Ltd., Sherbrooke, Que.
 Steelcase Limited, Galt, Ont.

LABELS AND TAGS
 Matthews, Jas. H. & Co., Pittsburgh, Pa.

LABORATORIES, INSPECTION AND TESTING (SEE CHEMISTS)

LADLES, FOUNDRY
 Northern Crane Works, Walkerville, Ont.
 Whiting Foundry Equipment Co., Harvey, Ill.

LAG SCREW GIMLET POINTERS
 National Machy. Co., Tiffin, Ohio.

LAMPS, INCANDESCENT AND NITROGEN
 Can. L. P. Co., Toronto, Ont.

LAMPS, TUNGSTEN (Vacuum and Gas Filled)
 Can. L. P. Co., Toronto, Ont.

LATHES, BENCH
 H. E. Strauer, New Birks Bldg., Montreal, Que.

LATHES, CHUCKING
 Acme Machine Tool Co., Cincinnati, Ohio.

LATHE CHUCKS (SEE CHUCKS)

LATHE DOGS AND ATTACHMENTS
 Armstrong Bros. Tool Co., Chicago.
 Curtis & Curtis Co., Bridgeport, Conn.
 Hendey Machine Co., Torrington, Conn.
 Rivett Lathe & Grinder Co., Boston, Mass.
 Williams & Co., J. H., Brooklyn, N.Y.
 Winnipeg Gear & Eng'g. Co., Winnipeg, Man.

LATHES, AXLE
 Bridgeford Mach. Tool Works, Rochester, N.Y.

LATHES, PRECISION, BENCH
 W. F. & John Barnes Co., Rockford.
 Blount, J. G., & Co., Everett, Mass.
 Can. Fairbanks-Morse Co., Montreal.
 Foss & Hill Machy. Co., Montreal.
 Garlock-Walker Machinery Co., Toronto, Ont.
 Harding Bros., Chicago, Ill.
 New Britain Mach. Co., New Britain, Conn.
 Pratt & Whitney Co., Dundas, Ont.
 Rivett Lathe & Grinder Co., Boston, Mass.

LATHES, BAND TURNING
 The Jencks Mach. Co., Ltd., Sherbrooke, Que.
 Roelofson Machine & Tool Co., Toronto, Ont.
 Warden King Co., Montreal, Que.

LATHES, BRASS
 Acme Machine Tool Co., Cincinnati, Ohio.
 Hardinge Bros., Inc., Chicago, Ill.

LATHES, ENGINE
 Acme Machine Tool Co., Cincinnati, Ohio.
 John Bertram & Sons Co., Dundas.
 Bridgeford Mach. Tool Works, Rochester, N.Y.
 Canada Machinery Corp., Galt, Ont.
 Can. Fairbanks-Morse Co., Montreal.
 Cincinnati Iron & Steel Co., Cincinnati, Ohio.
 Foss & Hill Machy. Co., Montreal.
 Garlock-Walker Machinery Co., Toronto, Ont.
 Garrin Machine Co., New York.
 Hamilton Mach. Tool Co., Hamilton, Ohio.
 Himoff Mach. Co., Inc., Astoria, L.I., New York.
 McCabe, J. J., New York, N.Y.
 R. McDougall Co., Galt.
 Niles-Bement-Pond Co., New York.
 Petrie, Ltd., H. W., Toronto, Ont.
 Rivett Lathe & Grinder Co., Boston, Mass.
 Riverside Machinery Depot, Detroit, Mich.
 Standard Machy. & Supplies, Ltd., Montreal, Que.
 Sebastian Lathe Co., Cincinnati, Ohio.
 Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.
 A. R. Williams Machy. Co., Toronto.

LATHES, JOURNAL TRUEING
 Bridgeford Mach. Tool Works, Rochester, N.Y.
 McCabe, J. J., New York, N.Y.

LATHES, PATTERNMAKERS'
 J. G. Blount Co., Everett, Mass.
 Canada Machinery Corp., Galt, Ont.
 Foss & Hill Machy. Co., Montreal.
 Garlock-Walker Machy. Co., Toronto, Ont.
 The Jencks Mach. Co., Ltd., Sherbrooke, Que.
 McCabe, J. J., New York, N.Y.
 Petrie, Ltd., H. W., Toronto, Ont.

LATHES, SINGLE PURPOSE
 Bertram, John, & Sons Co., Dundas, Ont.
 Canada Machinery Corp., Galt, Ont.
 Can. Fairbanks-Morse Co., Montreal.
 Garlock-Walker Machy. Co., Toronto, Ont.
 Gray Mfg. & Mach. Co., Toronto, Ont.
 Heppburn, John T., Ltd., Toronto.
 Himoff Mach. Co., Inc., Astoria, L.I., New York.
 The Jencks Mach. Co., Ltd., Sherbrooke, Que.
 McCabe, J. J., New York, N.Y.
 Roelofson Mach. & Tool Co., Toronto, Can.

LATHES, SCREW CUTTING
 Bertram, John, & Sons Co., Dundas, Ont.
 Canada Machinery Corp., Galt, Ont.
 Foss & Hill Machy. Co., Montreal.
 Foster Machine Co., Elkhart, Ind.
 Garlock-Walker Machy. Co., Toronto, Ont.
 Hardinge Bros., Inc., Chicago, Ill.
 Heppburn, John T., Ltd., Toronto.
 McCabe, J. J., New York, N.Y.
 Niles-Bement-Pond Co., New York.
 Petrie, Ltd., H. W., Toronto, Ont.

Rivett Lathe & Grinder Co., Boston, Mass.
 Riverside Machinery Depot, Detroit, Mich.
 Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.
 A. R. Williams Machy. Co., Toronto.

LATHES, SPINNING
 Bliss, E. W. Co., Brooklyn, N.Y.
 Fennaco Mach. Co., Bridgeport, N.J.
 Metcalf, J. J., New York, N.Y.

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 John Bertram & Sons Co., Dundas.
 Blount, J. G., & Co., Everett, Mass.
 Brown & Sharpe Mfg. Co., Providence, R.I.
 Can. Fairbanks-Morse Co., Montreal.
 Canada Machinery Corp., Galt, Ont.
 Foss & Hill Machy. Co., Montreal.
 Foster Machine Co., Elkhart, Ind.
 Garlock-Walker Machy. Co., Toronto, Ont.
 Hardinge Bros., Inc., Chicago, Ill.
 Heppburn, John T., Ltd., Toronto, Ont.
 Himoff Mach. Co., Inc., Astoria, L.I., New York.
 The Jencks Mach. Co., Ltd., Sherbrooke, Que.
 R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
 McCabe, J. J., New York, N.Y.
 Mulliner Inland Tool Co., Syracuse, N.Y.
 National-Acme Co., Cleveland, Ohio.
 New Britain Machine Co., New Britain, Conn.
 Niles-Bement-Pond Co., New York.
 Pratt & Whitney Co., Dundas, Ont.
 H. W. Petrie, Toronto.
 Rivett Lathe & Grinder Co., Boston, Mass.
 Riverside Machinery Depot, Detroit, Mich.
 Standard Machy. & Supplies, Ltd., Montreal, Que.
 Warner & Swasey Co., Cleveland, O.
 A. R. Williams Machy. Co., Toronto.

LEAD BURNING
 St. Lawrence Welding Co., Montreal, Que.

LEATHER STRAPPING
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 Whiting Foundry Equipment Co., Harvey, Ill.

LINK BELTING
 Can. Fairbanks-Morse Co., Montreal.
 Jones & Glasco, Montreal, Que.
 Morse Chain Co., Ithaca, N.Y.

LINOLEUM MILL MACHINERY
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LIQUID AIR
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 L'Air Liquide Society, Montreal, Toronto.
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 Trachern Pump Co., Rockford, Ill.

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 Can. Fairbanks-Morse Co., Montreal.
 Dickow, Fred C., Chicago, Ill.
 Garlock-Walker Machy. Co., Toronto, Ont.
 Foss & Hill Machy. Co., Montreal.
 Petrie, Ltd., H. W., Toronto, Ont.
 Standard Machy. & Supplies, Ltd., Montreal, Que.
 A. R. Williams Machy. Co., Toronto.

MACHINERY GUARDS (SEE GUARDS)

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 Prest-O-Lite Co., Inc., Toronto, Ont.
 Sumbing Mach. Co., W. H., Toronto, Ont.

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 Frank H. Scott, Montreal.
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MANDRELS
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 Cleveland Twist Drill Co., Cleveland.
 Hamlin Mfg. Co., Chicago, Ill.
 A. B. Jardine & Co., Hespeler, Ont.
 Manufacturers Equip. Co., Chicago, Ill.
 Monarch Brass Mfg. Co., Toronto, Ont.
 Morse Twist Drill & Mch. Co., New Bedford, Mass.
 Petrie, Ltd., H. W., Toronto, Ont.
 Pratt & Whitney Co., Dundas, Ont.

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 Pritchard-Andrews Co. of Canada, Ottawa, Ont.
 Matthews, Jas. H., & Co., Pittsburgh, Pa.

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 Foss & Hill Machy. Co., Montreal.
 Martin Machine Co., Greenfield, Mass.
 Noble & Westbrook Mfg. Co., Hartford, Conn.
 Perrin, Wm. R., Toronto.

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MEASURING TAPES AND RULES
 James Chesterman & Co., Ltd., Sheffield, Eng.

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 Can. Inspection & Testing Lab., Montreal, Que.
 Toronto Testing Laboratory, Ltd., Toronto.

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 Dom. Iron & Wrecking Co., Ltd., Montreal, Que.
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 Alexander Fleck, Ltd., Ottawa.

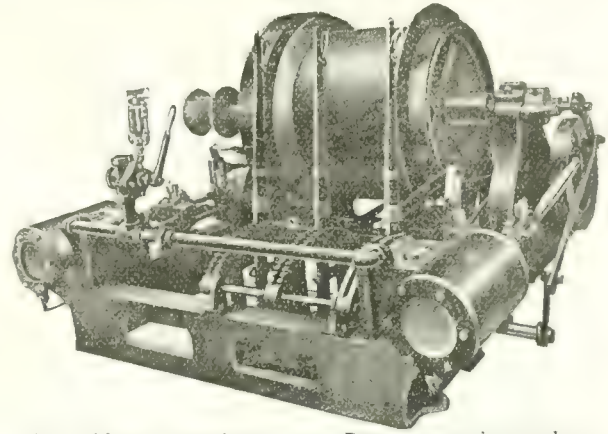
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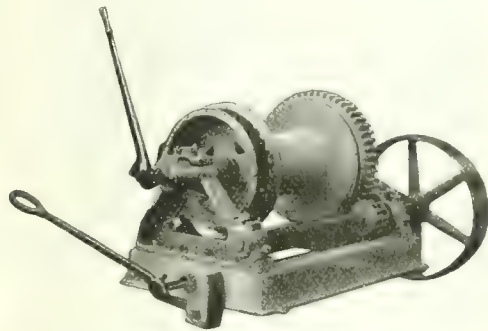
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Ford-Smith Mach. Co., Hamilton, Ont.

MINE CARS

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Cummings & Son, J. W. New Glasgow, Canada.
Veasey Mach. Co., Sherbrooke, Que.

MINE MACHINERY

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Cleveland Pneumatic Tool Co. of Canada, Toronto.
Jencks Mach. Co., Sherbrooke, Que.

MITTENS

Hoskey Steel-Grip Glove Co., Chicago, Ill.

MORTISING MACHINES

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Garlock-Walker Machinery Co., Toronto, Ont.

MOTORS, ELECTRIC

Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Lancash. & Dumais & Mot. Co. Ltd., Toronto.

MOTORS, PNEUMATIC

Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.

MULTIPLE INDEX CENTRES

Garvin Machine Co., New York

NAIL MACHINERY

Sleeper & Harlowe Inc., Worcester, Mass.

NAME PLATES, BRONZE, ETCHED AND STAMPED

Matthews, J. H. & Co., Pittsburgh, Pa.
Pritchard-Andrews Co., Ottawa, Can.

NIPPLE HOLDERS

Curtis & Curtis Co., Bridgeport, Conn.

NIPPLE THREADING MACHINES

John H. Hall & Sons, Ltd., Brantford, Ont.
Lamb Machine Co., Waynesboro, Pa.

NITROGEN

Chatter Wagoning Co., Toronto, Ont.
I. A. J. Co., Sorels, Montreal, Toronto.

NOSE SOCKETS

Jas. McKay Co., Pittsburgh, Pa.

NUTS, SEMI-FINISH AND FINISHED

Canadian H. K. Martin Toronto, Montreal.
Galt Machine Screw Co., Galt, Ont.
National Acme Co., Cleveland, Ohio.

NUT BURRING MACHINES

Norton Co., Worcester, Mass.

NUT MACHINES (HOT)

Norton Co., Worcester, Mass.

NUT FACING AND BOLT SHAVING MACHINES

Garvin Machine Co., New York.
National Mach. Co., Tiffin, O.
Victor Tool Co., Waynesboro, Pa.

PUT TAPPERS

John Bertram & Sons Co., Dundas.
Canada Machinery Co., Galt, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Co., Greenfield, Mass.

OIL

Elm Cutting Oil Co., Toronto, Ont.

OIL SEPARATORS

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Sheldons, Ltd., Galt, Ont.
Smart-Turner Machine Co., The, Hamilton.

OIL STONES

Aikenhead Hardware Co., Toronto, Ont.
Carlsbadum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.

OIL STORAGE SYSTEMS

Rowser & Co., Inc., S. F., Toronto, Ont.

OSCILLATING VALVE GRINDERS (PNEUMATIC)

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OVENS FOR BAKING, BLUING, DRYING, ENAMELING, JAPANING AND LACQUERING

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Oven Equipment & Mfg. Co., New Haven, Conn.
Whiting Foundry Equipment Co., Harvey, Ill.

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Oven Equipment & Mfg. Co., New Haven, Conn.

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Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.

OXY-ACETYLENE WELDING AND CUTTING PLANT

Carter Welding Co., Toronto, Ont.
L'Air Liquide Society, Montreal, Toronto.
Prest-O-Lite Co., Inc., Toronto, Ont.

OXYGEN (SEE ACETYLENE)

L'Air Liquide Society, Montreal, Que.

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Bennett, W. P., 31 Montford St., Montreal, Que.
Cleveland Wire Spring Co., Cleveland.
New Britain Mach. Co., New Britain, Conn.

PACKINGS, LEATHER, HYDRAULICS, ETC.

Graton & Knight Mfg. Co., Worcester, Mass.
William R. Perrin, Ltd., Toronto.
Hoskey Ltd., H. W., Toronto, Ont.

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MacKinnon, Holmes & Co., Sherbrooke, Que.
Sturtevant Co., B. F., Galt, Ont.

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Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.

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Petherstonbaugh & Co., Ottawa.
Marion & Marion, Montreal.
Ridout & Maybee, Toronto.

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Steel Co. of Canada, Ltd., Hamilton, Ont.

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Curtis & Curtis Co., Bridgeport, Conn.
Foss & Hill Machy. Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
John H. Hall & Sons, Brantford, Ont.
A. B. Jardine & Co., Resperler, Ont.

Lamb Machine Co., Waynesboro, Pa.

R. McLaughlin Co., Galt.
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Williams Tool Co., Erie, Pa.
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Toronto Iron Works, Ltd., Toronto.

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Wells Bros. Co. of Canada, Galt, Ont.

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Armstrong Boss Tool Co., Chicago.

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Can. Fairbanks-Morse Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvy Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ohio.
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New Bedford Found. Co., New York.
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Whitcomb-Bridwell Mach. Tool Co., Worcester, Mass.

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Canada Machinery Corp., Galt, Ont.
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Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ohio.
Niles-Bement-Pond Co., New York.
Petrie, Ltd., H. W., Toronto, Ont.
Riverside Machinery Dept., Detroit, Mich.
Stepote, The John Co., Cincinnati, Ohio.
A. R. Williams Machy. Co., Toronto.

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Sheldons, Ltd., Galt, Ont.
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Canadian Billings & Spencer, Ltd., Welland.
Pack, Saw & Vileux Co., Southampton, Conn.

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Atlas Press Co., Kalamazoo, Mich.
Hannifin Mfg. Co., Chicago, Ill.
Metalwood Mfg. Co., Detroit, Mich.

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Atlas Press Co., Kalamazoo, Mich.
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Ferracute Machine Co., Bridgeton, N.J.
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, CAM, TOGGLE, EYELET

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Bliss Co., E. W., Brooklyn, N.Y.
Consolidated Press Co., Hastings, Mich.
Toledo Machine & Tool Co., Toledo.

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Bliss Co., E. W., Brooklyn, N.Y.
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Ferracute Machine Co., Bridgeton, N.J.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Metalwood Mfg. Co., Detroit, Mich.
William R. Perrin, Ltd., Toronto.
Petrie, Ltd., H. W., Toronto, Ont.
West Tire Setter Co., Rochester, N.Y.

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PRESSES, DROP AND FORGING

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Charles F. Elmes Eng. Works, Chicago.
Can. Fairbanks-Morse Co., Montreal.
Erie Foundry Co., Erie, Pa.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Petrie, Ltd., H. W., Toronto, Ont.
Toledo Machine & Tool Co., Toledo.

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John Bertram & Sons Co., Dundas.
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Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Petrie, Ltd., H. W., Toronto, Ont.
Toledo Machine & Tool Co., Toledo.
West Tire Setter Co., Rochester, N.Y.
A. R. Williams Machy. Co., Toronto.

PRESSES, PNEUMATIC

Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, POWER

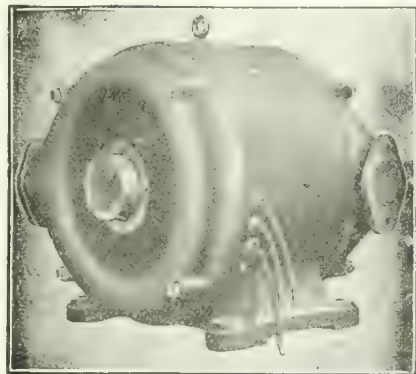
Baird Machine Co., Bridgeport, Conn.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Baggis Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Consolidated Press Co., Hastings, Mich.
Charles F. Elmes Eng. Works, Chicago.
Ferracute Machine Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
William R. Perrin, Ltd., Toronto.
Petrie, Ltd., H. W., Toronto, Ont.
Riverside Machinery Dept., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.

The Lancashire Dynamo & Motor Company, of Canada, Limited

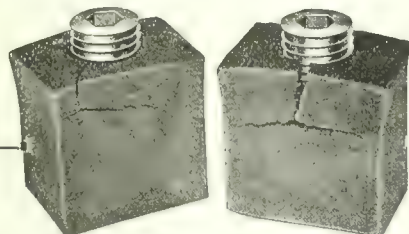
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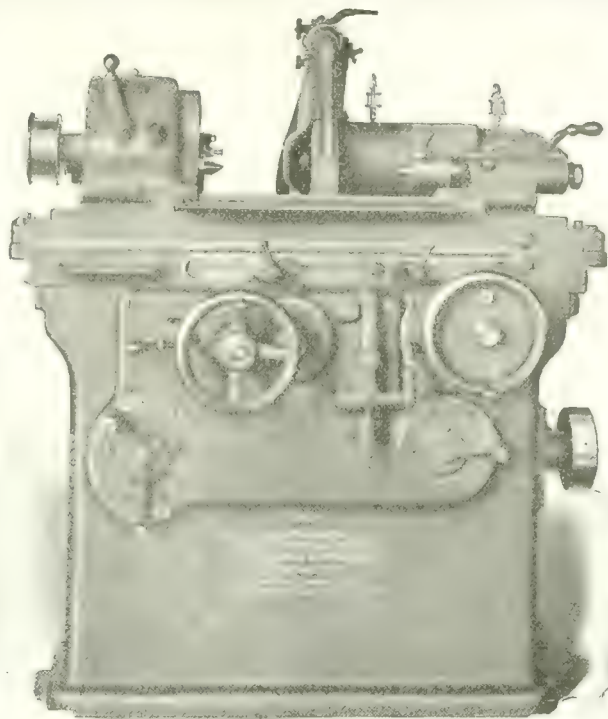
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MODEL "A"

Fitchburg Grinders

Model "A" illustrated here is a machine whose chief feature is its capacity for size, variety and quality of work. Its speed will give you greater production; its size, convenience, increased production, strength and saving in floor space will effect such a saving as to make it preferable over all other machines of similar character.

It is specially adapted for grinding straight or taper shafts.

An inquiry would speedily get you valuable information and data.

Fitchburg Grinding Machine
COMPANY

Fitchburg, Mass., U.S.A.

PRESSES, BAILING
W. H. Bass Co., Brooklyn, N.Y.

PRESSES, SPRING FOOT
Brown & Boggs Co., Ltd., Hamilton, Canada.
Consolidated Press Co., Hastings, Mich.
T. J. Mackay & Co., Ltd., Toronto.

PRESSES, SCREW
Brown & Boggs Co., Ltd., Hamilton, Canada.
Consolidated Press Co., Hastings, Mich.
T. J. Mackay & Co., Ltd., Toronto.

PRESSES, TRIMMING
Brown & Boggs Co., Ltd., Hamilton, Canada.
Consolidated Press Co., Hastings, Mich.
T. J. Mackay & Co., Ltd., Toronto.

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American Pulley Co., Philadelphia, Pa.
Eaton Machine Co., Hamilton, Ont.
Leonard Industrial Co., Fort Erie, Que.
Lynch & Sons Mfg. Co., Providence, R.I.
Can. Bonding & C. Co., Alexandria, Ont.
Can. Fairbanks-Morse Co., Montreal.
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Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Pat & Whitney Co., Dundas, Ont.

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Eaton Machine Co., Hamilton, Ont.
Leonard Industrial Co., Fort Erie, Que.
Lynch & Sons Mfg. Co., Providence, R.I.
Can. Bonding & C. Co., Alexandria, Ont.
Can. Fairbanks-Morse Co., Montreal.
The Jencks Mach. Co., Ltd., Sherbrooke, Que.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Pat & Whitney Co., Dundas, Ont.

PULLEY MACHINERY, DRILLING AND TAPPING
Can. Fairbanks-Morse Co., Montreal.
Clemens, P. & Son, Cincinnati, Ohio.
Wells Bros. Co., Canada, Galt, Ont.

PUMPS, AIR
The Jencks Mach. Co., Ltd., Sherbrooke, Que.
Smart-Turner Mach. Co., Hamilton.

PUMPS, CENTRIFUGAL
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Can. Ingersoll-Rand Co., Sherbrooke, Que.
Lynch & Sons, H. W., Toronto, Ont.
Pat & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.
Smart-Turner Mach. Co., Hamilton.
Sturtevant Co., B. F., Galt, Ont.

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Boswell & Co., Inc., S. F., Toronto, Ont.
Traherm Pump Co., Rockford, Ill.

PUMPS, HIGH PRESSURE
Blake Pump & Condenser Co., Fitchburg, Mass.
Charles F. Elmes Eng. Works, Chicago.
William R. Perrin, Ltd., Toronto.
Smart-Turner Mach. Co., Hamilton.

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Blake Pump & Condenser Co., Fitchburg, Mass.
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William R. Perrin, Ltd., Toronto.
Boswell & Co., Inc., S. F., Toronto, Ont.
Smart-Turner Mach. Co., Hamilton.
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Charles F. Elmes Eng. Works, Chicago.
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A. B. Jardine & Co., Hespeler, Ont.
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Taylor Instrument Co., Rochester, N.Y.
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Niles-Bement-Pond Co., New York.

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Pratt & Whitney Co., Dundas, Ont.
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Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
M. Kenna Brothers, Pittsburgh, Pa.
Osborn (Canada), Ltd., Sam'l, Montreal, Que.
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Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.

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Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Clark Equipment Co., Buchanan, Mich.
Cleveland Twist Drill Co., Cleveland.
Illinois Tool Works, Chicago, Ill.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.

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Bilton Mach. Tool Co., Bridgeport, Conn.
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Grant Mfg. & Machine Co., Bridgeport, Conn.
National Machinery Co., Tiffin, O.

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Parmenter & Bulloch Co., Gananoque.
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIVETS, IRON, COPPER AND BRASS
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Parmenter & Bulloch Co., Gananoque.
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RIVETERS, PNEUMATIC, HYDRAULIC, HAMMER, COMPRESSION
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Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.
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Petrie, Ltd., H. W., Toronto, Ont.

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High-Speed Hammer Co., Rochester, N.Y.
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Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo, O.

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Brown & Sharpe Mfg. Co., Providence.
James Chesterman & Co., Ltd., Sheffield, Eng.
L. S. Starratt Co., Athol, Mass.

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T. A. Wilson, Reading, Pa.

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Curtis Pneumatic Machinery Co., St. Louis, Mo.
The Jencks Mach. Co., Ltd., Sherbrooke, Que.

SANDING MACHINES
Canada Machinery Corp., Galt, Ont.

SAW MILL MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Gardner, Robt., & Son, Montreal.
Curtis Pneumatic Machinery Co., St. Louis, Mo.
Petrie, Ltd., H. W., Toronto, Ont.
A. R. Williams Machy. Co., Toronto.

SAWS, CIRCULAR METAL
Hunter Saw & Machine Co., Pittsburg, Pa.
Napier Saw Works, Springfield, Mass.
Tabor Mfg. Co., Philadelphia, Pa.

SAWS, HACK (SEE HACK SAWS)

SAWS, INSERTED TOOTH
Hunter Saw & Machine Co., Pittsburg, Pa.
Napier Saw Works, Springfield, Mass.
Tabor Mfg. Co., Philadelphia, Pa.

SAWS, BAND AND COPING
Napier Saw Works, Springfield, Mass.

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H. E. Streeter, New Birks Bldg., Montreal, Que.

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Johnson Mach. Co., Carlyle, Manchester, Conn.

SCREW MACHINE PRODUCTS
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Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Garvin Machine Co., New York.
Himoff Mach. Co., Inc., Astoria, L.I., New York.
A. B. Jardine & Co., Hespeler.
New Britain Machine Co., New Britain, Conn.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.
Rivett Lathe & Grinder Co., Brighton, Mass.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.

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Riverside Machinery Depot, Detroit, Mich.

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Galt Machine Screw Co., Galt, Ont.
National-Acme Co., Cleveland, Ohio.
Steel Co. of Canada Ltd., Hamilton, Ont.
Wilkinson & Kompas, Hamilton, Ont.

SCREW PLATES
Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Hespeler.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Wells Bros. Co., Canada, Galt, Ont.
Wilkinson & Kompas, Hamilton, Ont.

SCREW SLOTTERS
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Pratt & Whitney Co., Dundas, Ont.

SECOND-HAND MACHINERY
Davis Machine Tool Co., W. F., New York.
Dominion Machinery Co., Toronto.
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Hill, Clarke & Co., Chicago, Ill.
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New York Machinery Exchange, New York.
Petrie, Ltd., H. W., Toronto, Ont.
Riverside Machinery Depot, Detroit, Mich.
Strelinger Co., Chas. A., Detroit, Mich.
Stocker-Rumely-Wachs, Chicago, Ill.

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Aikenhead Hardware Co., Toronto, Ont.
Allen Mfg. Co., Hartford, Conn.
Wilkinson & Kompas, Hamilton, Ont.

SHANKS, STRAIGHT AND TAPER
Jacobs Mfg. Co., Hartford, Conn.

SHAPERS
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Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Hendey Machine Co., Torrington, Conn.
Hamilton Mach. Tool Co., Hamilton, Ohio.
Petrie, Ltd., H. W., Toronto, Ont.
Rhodes Mfg. Co., Hartford, Conn.
Steppe Co., John, Cincinnati, Ohio.

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Can. Fairbanks-Morse Co., Montreal.
Can. Drawn Steel Co., Hamilton, Ont.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
The Jencks Mach. Co., Ltd., Sherbrooke, Que.
Niles-Bement-Pond Co., New York.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.
Strelinger Co., Chas. A., Detroit, Mich.
A. R. Williams Machy. Co., Toronto.
Wilkinson & Kompas, Hamilton, Ont.

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Stow Mfg. Co., Binghamton, N.Y.

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Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.

SHAVINGS, SEPARATOR
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

Mr. Bruce's Counsel

SPECIFICALLY APPLIED, MR. BRUCE'S COUNSEL may be said to recommend that business men should read every week THE FINANCIAL POST OF CANADA, to inform themselves concerning current events in the realm of Canadian business and public affairs.

Frank E. Mutton, Vice-President of the International Time Recording Company, of Canada, wrote the following letter to the publishers of THE POST:

Attention, Editor:

Recently we sent you a subscription covering the delivery of THE FINANCIAL POST to each of our Sales Agents and Salesmen throughout Canada. This was prompted by the fact that, in our opinion, your paper is the best barometer in Canada of what is going on in the different industries from one ocean to the other in this country. Your paper contains information invaluable to any traveling representative of any firm.

(Signed) F. E. MUTTON.

Dated Oct. 12, 1917.

IN effect, THE FINANCIAL POST represents a Current Events Club, met weekly for the consideration and study of current affairs in Canada in relation to itself and the world at large. It represents the assembly of many, many surpassingly well-informed contributors who discuss intelligently, lucidly and proportionately, Canada's public and business affairs. No more stimulating and worth-while paper is published in Canada for the man who wants to be able to talk confidently, at the club, luncheon, board meeting, business council, public meetings, about Canadian public affairs.

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Talk Current Events

A Talk by H. Addington Bruce, Author of "The Riddle of Personality," "Psychology and Parenthood," Etc.

WHAT do you know about the doings in this great world wherein we live?

Do you try to form a really intelligent and well-considered opinion regarding events the world over?

Do you ever discuss their significance with friends and neighbors?

If asked what you think of any particular event, you are perhaps ready with an answer. Is your answer anything but a snap judgment, determined by prejudice rather than by reasoning analysis?

I put these questions not to be disagreeable, but because, if necessary, I want to spur you to appreciate the value that there is in discussion of current events.

Many people, fortunately, appreciate its value instinctively. Perhaps you are one of these. Many others are beginning to appreciate it.

This is shown by the growing popularity of clubs and classes on current events.

Only a few years ago such clubs and classes were almost unheard of. To-day most of our bigger cities have half a dozen of them or more.

In one city—Boston—a talented woman of my acquaintance draws an income of thousands of dollars a year from her leadership of current events classes.

Other men and women have similarly discovered that interest in current events is increasing so rapidly that they can well afford to organize classes like those conducted by the Boston woman.

Still, there remain many people—thousands of people—who never discuss current events. Many thousands more discuss only such events as come under the headings of "crime," "the theatre," and "sports."

These are the people I want to reach. They are the people I want to rouse to recognition of the practical helpfulness they will find in discussion of current events in general.

Current events clubs and classes might well be organized in every neighborhood, with weekly meetings to take up the outstanding happenings in international affairs, national politics, literature, art, music, science and industry.

Regular attendance at, and active participation in, these meetings will prove to be an education in itself.

It will enlarge the mental horizon and broaden the moral sympathies. By disciplining the mind to active thought it will raise the level of workaday efficiency.

It will make for a more alert, a more conscientious citizenship. It will give zest and color to a life which perhaps has hitherto been pathetically drab.

Unsuspected powers will be awakened. With a better grasp on the realities of life, the whole personality will expand.

One evening a week is certainly not too much to give to a discussion of the day-to-day developments in our wonderful world.

It may mean doing without an evening at cards or at the musical comedy, or at the dance hall. But this, after all, is not a terrible sacrifice.

And from the occasional talk over current events will come more profit than could possibly come from any number of evenings spent in card-playing, dancing, or listening to musical comedies.—Reprinted from the Toronto Daily Star.

Shearing Machines, Angle Iron, Bar and Gate

J. H. Bennett & Sons Co., Dundas
Dundas, Ont.
Leitch & Co., Edinburgh, Scotland
Leitch & Co., Glasgow, Scotland
Leitch & Co., London, England
Leitch & Co., Montreal, Quebec
Leitch & Co., New York, N.Y.
Leitch & Co., Toronto, Ontario

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Dundas, Ont.
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Leitch & Co., Montreal, Quebec
Leitch & Co., New York, N.Y.
Leitch & Co., Toronto, Ontario

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Leitch & Co., Toronto, Ontario

Shears, Squaring

Leitch & Co., Toronto, Ontario

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Sheet Metal Stampings

Leitch & Co., Toronto, Ontario

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Shrapnel Shell Marker

Leitch & Co., Toronto, Ontario

Side Tools

Leitch & Co., Toronto, Ontario

Signs, Enamel

Leitch & Co., Toronto, Ontario

Silver Solder

Leitch & Co., Toronto, Ontario

Skate Sharpeners

Leitch & Co., Toronto, Ontario

Sledges

Leitch & Co., Toronto, Ontario

Slotters

Leitch & Co., Toronto, Ontario

Smokestacks

Leitch & Co., Toronto, Ontario

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Leitch & Co., Toronto, Ontario

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Soldering Irons

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Solders

Leitch & Co., Toronto, Ontario

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Leitch & Co., Toronto, Ontario

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Leitch & Co., Toronto, Ontario

Spring Making Machinery (Automatic)

Leitch & Co., Toronto, Ontario

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Leitch & Co., Toronto, Ontario

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Leitch & Co., Toronto, Ontario

Stairs, Iron

Leitch & Co., Toronto, Ontario

Stampings

Leitch & Co., Toronto, Ontario

Stamping Machinery

Leitch & Co., Toronto, Ontario

Steam Separators and Traps

Leitch & Co., Toronto, Ontario

Steel Alloy (See Alloy Steel)

Leitch & Co., Toronto, Ontario

Steel Bending Brakes

Leitch & Co., Toronto, Ontario

Steel Cold Rolled

Leitch & Co., Toronto, Ontario

Steel Drums

Leitch & Co., Toronto, Ontario

Steel Pressure Blowers

Leitch & Co., Toronto, Ontario

Steel, High Speed

Leitch & Co., Toronto, Ontario

Steels, High Strength, Hot-Working, Die, Magnet

Leitch & Co., Toronto, Ontario

Steel, Vanadium

Leitch & Co., Toronto, Ontario

Stellite, High-Speed Tool Metal

Leitch & Co., Toronto, Ontario

Stock Racks for Bars

Leitch & Co., Toronto, Ontario

Piping, Etc.

Leitch & Co., Toronto, Ontario

Stools, Steel, Shop

Leitch & Co., Toronto, Ontario

Spring Coiling and Winding Machinery

Baird Machine Co., Bridgeport, Conn
Garvin Machine Co., New York
Sleeper & Hartley, Inc., Worcester, Mass.

Spring Making Machinery (Automatic)

Baird Machine Co., Bridgeport, Conn
Sleeper & Hartley, Inc., Worcester, Mass.

Spiral Conveyors

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Sprockets, Chain

Great Gear Works, Boston, Mass.
Morse Chain Co., Ithaca, N.Y.
Philadelphia Gear Works, Philadelphia, Pa.

Solder

Jimmison Gas A., Hamilton, Ont.

Sprocket Wheels, Cast

Beeson, Wm. R., Toronto.

Stairs, Iron

Canada Wire & Iron Goods Co., Hamilton, Ont.

Stampings

Leitch Mfg. Co., Oshawa, Ont.
Dom. Forge & Stamping Co., Walkerville, Ont.
Hunter & Wilson, Hamilton, Ont.

Stamping Machinery

Leitch Mfg. Co., Oshawa, Ont.
Brown Bagg & Co., Hamilton, Canada
Canada Machinery Co., Galt, Ont.
Granite Mfg. Co., Bridgton, N.J.
Noble & Westbrook Mfg. Co., Hartford, Conn.

Stamps, Steel Alphabet, Figures

Matthews, Jas. H. & Co., Hartford, Conn.
Noble & Westbrook Mfg. Co., Hartford, Conn.
Pritchard-Andrews Co., Ottawa, Can.

Staple Machines

Sleeper & Hartley, Inc., Worcester, Mass.

Steam Separators and Traps

Can. Fairbanks-Morse Co., Montreal.
Can. Morehead Mfg. Co., Woodstock, Ont.
Leitch Mfg. Co., Oshawa, Ont.
Sheldons, Ltd., Galt, Ont.
The Smart-Turner Machine Co., Hamilton
Sturtevant Co., B. F., Galt, Ont.

Steel Alloy (See Alloy Steel)

Leitch & Co., Toronto, Ontario

Steel Bending Brakes

Steel Bending Brake Works, Ltd., Chatham, Ont.

Steel for Axes, Plows, Saws, Drills, Etc.

Colonial Steel Co., Pittsburgh, Pa.

Steel, Carbon, Ferro-Tungsten

Can. B. K. Morton, Toronto, Montreal.
Colonial Steel Co., Pittsburgh, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Osborn (Canada), Ltd., Sam'l, Montreal, Que.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.
Zenith Coal & Steel Products, Montreal, Que.

Steel, Cold Rolled

Can. Drawn Steel Co., Hamilton, Ont.
Union Drawn Steel Co., Hamilton, Ont.

Steel Drums

Smart-Turner Machine Co., Hamilton, Ont.

Steel Pressure Blowers

Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.
Sturtevant Co., B. F., Galt, Ont.

Steel, High Speed

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Can. B. K. Morton, Toronto, Montreal.
Century Steel Co. of America, New York
Colonial Steel Co., Pittsburgh, Pa.
H. A. Drury Co., Ltd., Montreal.
Eagle & Globe Steel Co., Montreal, Que.
Fairley Davidson Steel Co., New York, N.Y.
Hawkrige Bros. Co., Boston, Mass.
Latrobe Electric Steel Co., Latrobe, Pa.
Marshall & Co., Geo. A., Toronto, Ont.
Osborn (Canada), Ltd., Sam'l, Montreal, Que.
Petrie, Ltd., H. W., Toronto, Ont.
Standard Alloys Company, Pittsburgh, Pa.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.; represented in Canada by Norton, Callard & Co., Montreal, Que.
Zenith Coal & Steel Products, Montreal, Que.

Steels, High Strength, Hot-Working, Die, Magnet

Fairley Davidson Steel Co., New York, N.Y.

Steel, Vanadium

Drury, H. A., Co., Montreal, Que.
Standard Alloys Co., Pittsburgh, Pa.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

Stellite, High-Speed Tool Metal

Deloro Smelting & Refining Co., Toronto, Ont.

Stock Racks for Bars

Leitch & Co., Toronto, Ontario

Piping, Etc.

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Stools, Pipe

Butterfield & Co., Rock Island, Que.
Wells Bros. Co. of Canada, Galt, Ont.

Stools, Steel, Shop

New Britain Machine Co., New Britain, Conn.

Straightening Machinery

Baird Machinery Co., Bridgeport, Conn.
Bertrams, Ltd., Edinburgh, Scotland.

Switches, Railway

Can. Steel Foundries, Ltd., Montreal.

Tack (Double Point) Machines

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 Independent Pneumatic Tool Co., Chicago, Ill.
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 Can. Ingersoll-Rand Co., Sherbrooke, Que.
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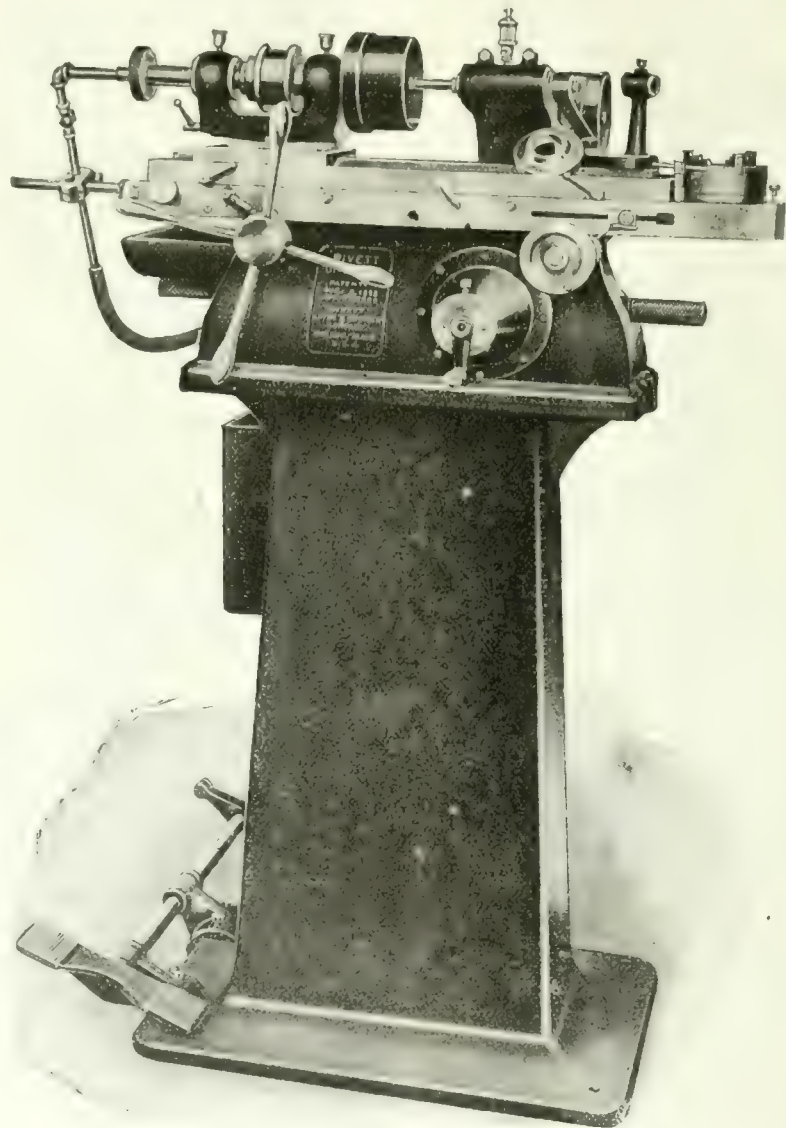
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A weekly newspaper devoted to the machinery and manufacturing interests.

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TORONTO, NOVEMBER 8, 1917

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EDITORIAL CONTENTS

THE SHELL INDUSTRY IN CANADA FROM A METALLURGICAL STANDPOINT	509-512
GENERAL	512
Future Development of British Industries Boiler Failure Due to Incrustation	
Electric Steel Manufacture in Denmark.	
PRESS WORK OPERATIONS IN HOSPITAL EQUIPMENT PRODUCTION—II	513-514
GENERAL	514-515
Permanent Capacity for Aircraft Manufacture a Future Necessity What is Hardness?	
PRODUCTION METHODS AND DEVICES	516-519
Notes on the Manufacture of Clay Crucibles The Manufacture of Hardened Thread Gauges Pattern-Making Notes Annealing Cast Iron.	
EDITORIAL CORRESPONDENCE	520
Closer Relation Between Employer and Employee Drawing-Room Illumination Steam Versus Diesel.	
PRESENT POSITION AND FUTURE PROSPECTS OF CANADA'S IRON AND STEEL INDUSTRY	521
PROGRESS IN NEW EQUIPMENT	522-523
High Speed Ball Bearing Shaper Machine for Testing Sheet Metals Tool Rack for Lathes World's Most Powerful Locomotive.	
EDITORIAL	524
Munitions and Marine Contracts An Earnest of Sincerity.	
INDUSTRIAL NOTABILITIES	525
William McCullough Arnold.	
SELECTED MARKET QUOTATIONS	526-527
THE GENERAL MARKET CONDITIONS AND TENDENCY	527-532
Summary Montreal Letter Toronto Letter New York Letter Pittsburgh Letter.	
INDUSTRIAL AND CONSTRUCTION NEWS (Advtg. Section)	60

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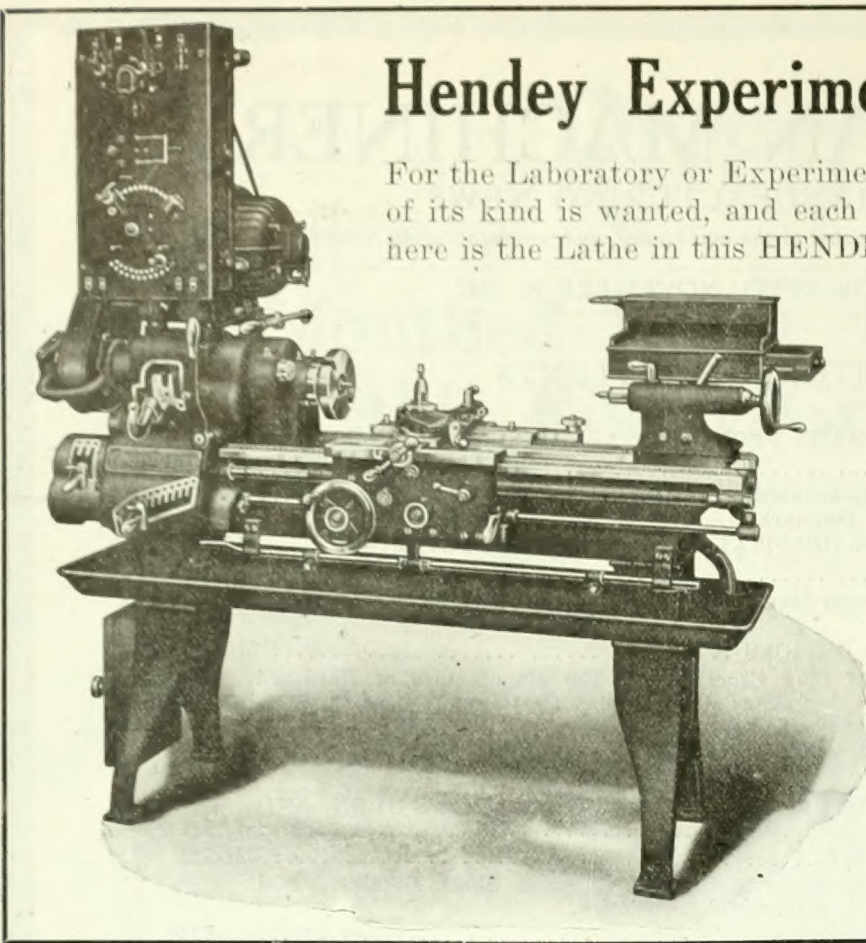
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INDEX TO ADVERTISERS

A	Dominion Forge & Stamping Wks. 75	K	Ridout & Maybee 65
Allen Mfg. Co. 97	Dominion Steel Foundry Co. 83	KempSmith Mfg. Co. 28	Riverside Machy. Depot 68, 69
Armstrong Bros. Tool Co. 86	E	Kennedy & Sons, Wm. 29	Rivett Lathe & Grinder Co. 102
Armstrong, Whitworth of Canada. 12	Eagle & Globe Steel Co. 12	King, Ltd., Warden 18	Roclofson Machine & Tool Co. 15
Atkins & Co., Ltd., Wm. 6	Eastern Machine Screw Corp. 73	L	Roper & Co., C. F. 73
B	Elmes Engr. Works, Charles F. 20	L'Air Liquide Society 24	Russell Motor Car Co., Ltd. 67
Baird Machine Co. 85	Erie Foundry Co. 20	Lancashire Dynamo & Motor Co. 97	S
Banfield, E. J. 23	F	Landis Machine Co. 86	Shuster Co., F. B. 84
Banfield, W. H., & Sons. 63	Fairley-Davidson Steel Co., Inc. 11	Latrobe Electric Steel Co. 10	Silver Mfg. Co. 84
Barnes, Wallace, Co. 64	Federal Engineering Co. 65	M	Skinner Chuck Co. 83
Baxter & Co., Ltd., J. R. 19	Fetherstonhaugh & Co. 65	MacKinnon, Holmes & Co., Ltd. 63	Sleeper & Hartley Co., Inc. 78
Bertram & Sons Co., Ltd., John. 1	Fitchburg Grinding Mach. Co. 97	Magnolia Metal Co. 96	Smith Mfg. Co., Philip 17
Bertram's, Limited 55	Foss & Hill Machinery Co. 24	Manufacturers Equipment Co. 79	Standard Alloys Co. 11
Bilton Machine Tool Co. 24	Francis & Co. 85	Marsh & Henthorn, Ltd. 95	Standard Machy. & Supplies, Ltd. 89
Blake & Johnson 95	G	Matthews & Co., Inc., Jas. H. 31	Starrett Co., L. S. 22
Bliss Co., E. W. 21	Gardner Machine Co. 85	McCabe, J. J. 29	Steel Co. of Canada 3
Blount Co., J. G. 74	Garlock-Walker Machy. Co. 17	McDougall Co., H. 67	Steptoe, John, Co. 19
Brantford Oven & Rack Co. 65	Garvin Machine Co. 28	McCoy-Brandt Machy. Co. 67	St. Lawrence Welding Co. 72
Bridgford Mach. Tool Works. 86	Geometric Tool Co. 61	McKay Co., James 14	Stock-Rumley-Wachs Co. 69
Bristol Company 83	Gilbert & Barker Mfg. Co. 74	McLaren Belting Co., J. C. 85	Stow Mfg. Co. 95
Brownell Machy. Co. 66	Goodyear Tire & Rubber Co. 77	Mechanical Engineering Co. 76	Streeter, H. E. 85
Brown's Copper & Brass Rolling Mills 13	Grant Gear Works, Inc. 85	Merchants Rubber Factory 67	Strong-Kennard & Nutt Co. 85
Brown & Sharpe Mfg. Co., Front cover	Grant Mfg. & Machine Co. 93	Metalwood Mfg. Co. 21	Swedish Steel & Importing Co. 14
Budden, Hanbury A. 64	Greenfield Machine Co. 84	Monarch Brass Mfg. Co. 71	T
C	H	Morton Mfg. Co. 63	Tabor Mfg. Co. 85
Canada Machinery Corporation 78	Hamilton Gear & Machine Co. 71	Morse Twist Drill & Mach. Co. 89	Tate-Jones & Co., Inc. 78
Canada Metal Co., Ltd. 78	Hamilton Machine Tool Works. 16	Murhey Machine & Tool Co. 79	Thomson Electric Welding Co. 28
Can. Fairbanks-Morse Co. 34	Hanna & Co., M. A. 12	N	Thomson Spot Welder Co. 28
Can. Ingersoll-Rand Co. 80	Hannifin Mfg. Co. 81	Napier Saw Works 84	Tolsto Machine & Tool Co. 21
Can. Inspection & Testing Laboratories, Ltd. 83	Hawkridge Bros. 63	National Service Board 63	Toronto Iron Works 83
Can. Laco-Phillips Co., Ltd. 73	Hendey Machine Co. 104	New York Machinery Exchange. 68	Toronto Testing Laboratory 85
Can. Steel Foundries, Ltd. 7	Henry & Wright Mfg. Co. 91	Nicholson File Co. 30	Toronto Tool Co. 71
Can. S K F Co., Ltd. 4	Hepburn, John T. 17	Niles-Bement-Pond. Inside front cover	U
Can. Welding Works 72	High Speed Hammer Co. 93	Northern Crane Works 83	United Hammer Co. 84
Carlyle Johnson Mach. Co. 8	Hinckley Mach. Works 84	Norton, Ltd., A. O. 84	U. S. Electric Tool Co. 32
Carter Welding Co. 24	Hoyt Metal Co. 86	Norton Co. 31	U. S. Silica Co. 79
Chapman Double Ball Bearing Co. 72	Hull Iron & Steel Foundries, Ltd. 26	Norton Grinding Co. 33	V
Cincinnati Pulley Machy. Co. 91	Hunter Saw & Machine Co. 65	Nova Scotia Steel & Coal Co. 9	Vanadium Alloys Steel 10
Cleveland Pneumatic Tool Co. 93	Hurlbut-Rogers Machinery Co. 59	O	Vulcan Crucible Steel Co. 10
Classified Advertising 96	Hyde Engineering Works 7	Oven Equipment & Mfg. Co. 101	W
Clipper Belt Lacer Co. 73	I	P	Warner & Swasey Co. 19
Consolidated Press Co. 20	Independent Pneumatic Tool Co. 91	Parmenter & Bulloch Co. 85	Wells Bros. Co. of Canada. 32
Cummings & Son 74	Iron Works, The 63	Perrin, Wm. R. 21	Whiting Foundry Equipment Co. 59
Curtis & Curtis Co. 78	J	Peerless Machine Co. 75	Whitcomb-Blaisdell Mach. Tool Co. 14
Cushman Chuck Co. 83	Jacobs Mfg. Co. 80	Petrie, Ltd., H. W. 67	Whitman & Barnes Mfg. Co. 26
D	Jenckes Mach. Co. 9, 67	Port Hope File Mfg. Co. 32	Wilkinson & Kompass 86
Davis-Bourneville Co. 85	Johnson Mach. Co., Carlyle 8	Positive Clutch & Pulley Works. 86	Williams, A. R., Machy. Co. 7, 59, 69
Davis Machine Tool Co., W. F. 70	K	Pratt & Whitney. Inside front cover	Williams & Co., J. H. 30
Deloro Smelting & Refining Co. 5	KempSmith Mfg. Co. 28	Puro Sanitary Drink'g Fountain Co. 64	Willson & Co., T. A. 84
Dixon, C. L. 86	Kennedy & Sons, Wm. 29	R	Windsor Mach. & Tool Works. 27
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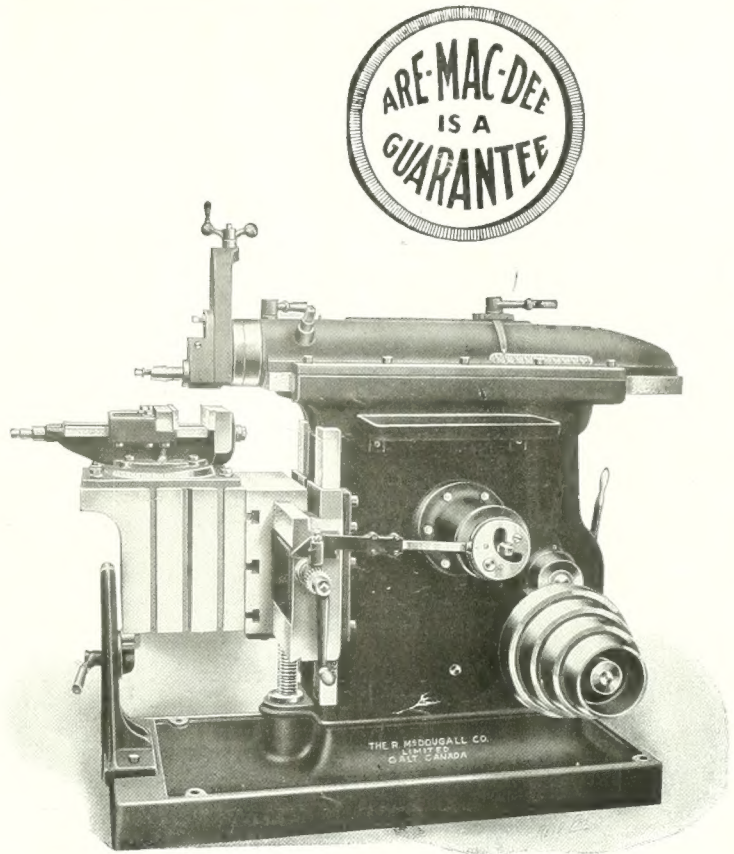
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