

# CANADIAN MACHINERY

## AND MANUFACTURING NEWS

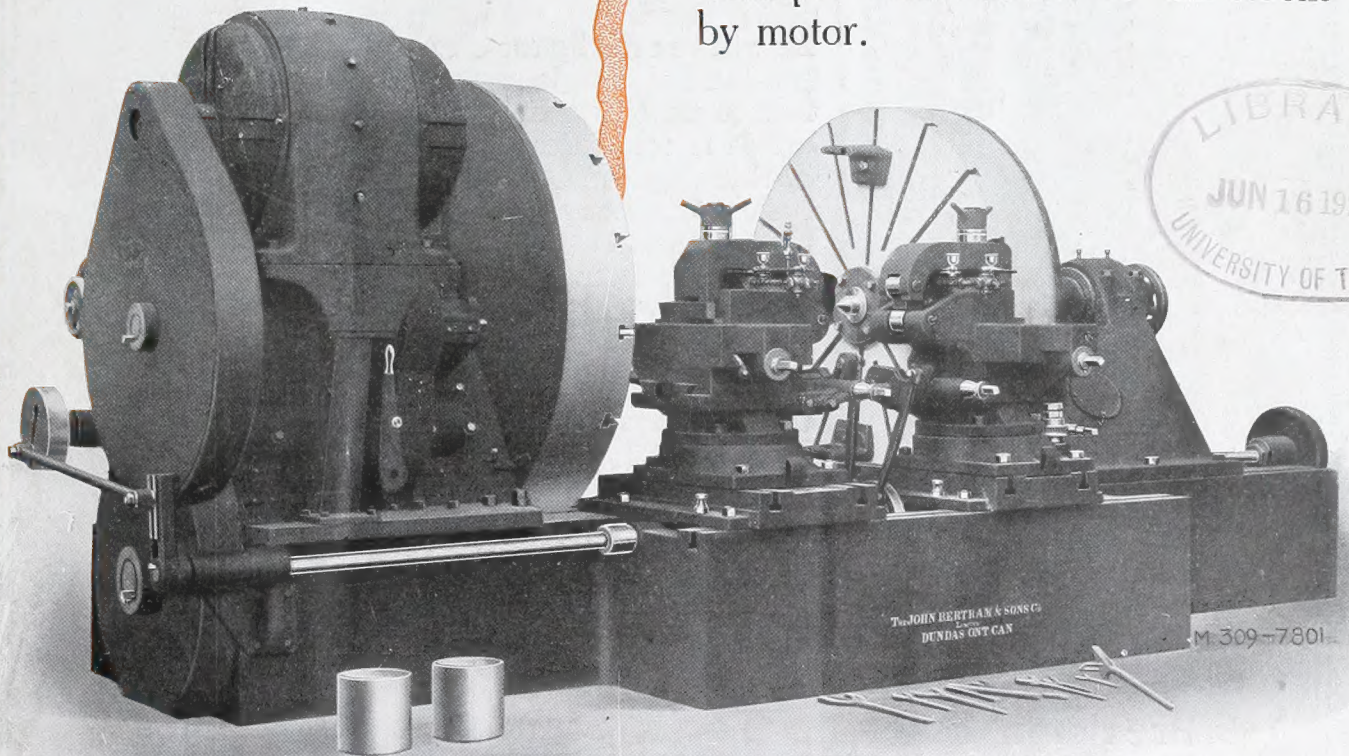
A weekly newspaper covering in a practical manner the mechanical, power, foundry and allied fields.  
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Vol. XVIII—No. 13

Publication Office: Toronto, September 27, 1917

Subscription Price  
 \$3.00 per Year

### BERTRAM MACHINE TOOLS



### 80-in. Motor Driven Extra Heavy Driving Wheel Chucking Lathe

One of our large line of heavy tools for Locomotive and Car Shops. Equipped with Teas Patent Sure-Grip Drivers and Pneumatic Tool Clamps. Movement of tail stocks by motor.

PHOTOGRAPHS AND FULL PARTICULARS GLADLY MAILED ON REQUEST.

### The John Bertram & Sons Company, Limited

DUNDAS --- ONTARIO

TORONTO	-	-	-	-	1002 C.P.R. Bldg.
MONTREAL	-	-	-	-	723 Drummond Bldg
WINNIPEG	-	-	-	-	1205 McArthur Bldg.
VANCOUVER	-	-	-	-	609 Bank of Ottawa Bldg.





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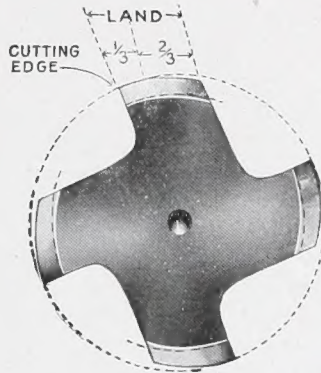


# SMALL TOOLS



## P. & W. TAPS

Insure the Greatest Accuracy



The Taps  
with the  
Con-eccentric  
Trade-Mark Registered  
Land

As will be seen by the cross-section cut above, one-third of the land from the cutting edge has concentric relief. The remaining two-thirds is eccentrically relieved. A tap made in this way can be ground for sharpening at the only correct point—on the face of the cutting edge. Sharpening in no way affects its size or the form of the thread.

The Taper Tap has a cylindrical pilot and on the chamfered portion of the tap the top of the thread is relieved clear to the cutting edge to secure keen cutting qualities.

The construction of Pratt & Whitney Taps not only insures greater accuracy and refinement than has heretofore been possible to obtain in a commercial tool, but also insures the freest cutting tap with the longest life—an exclusive P. & W. Combination.

### PROMPT SERVICE

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

Precision Machine Tools, Standards & Gauges

# 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

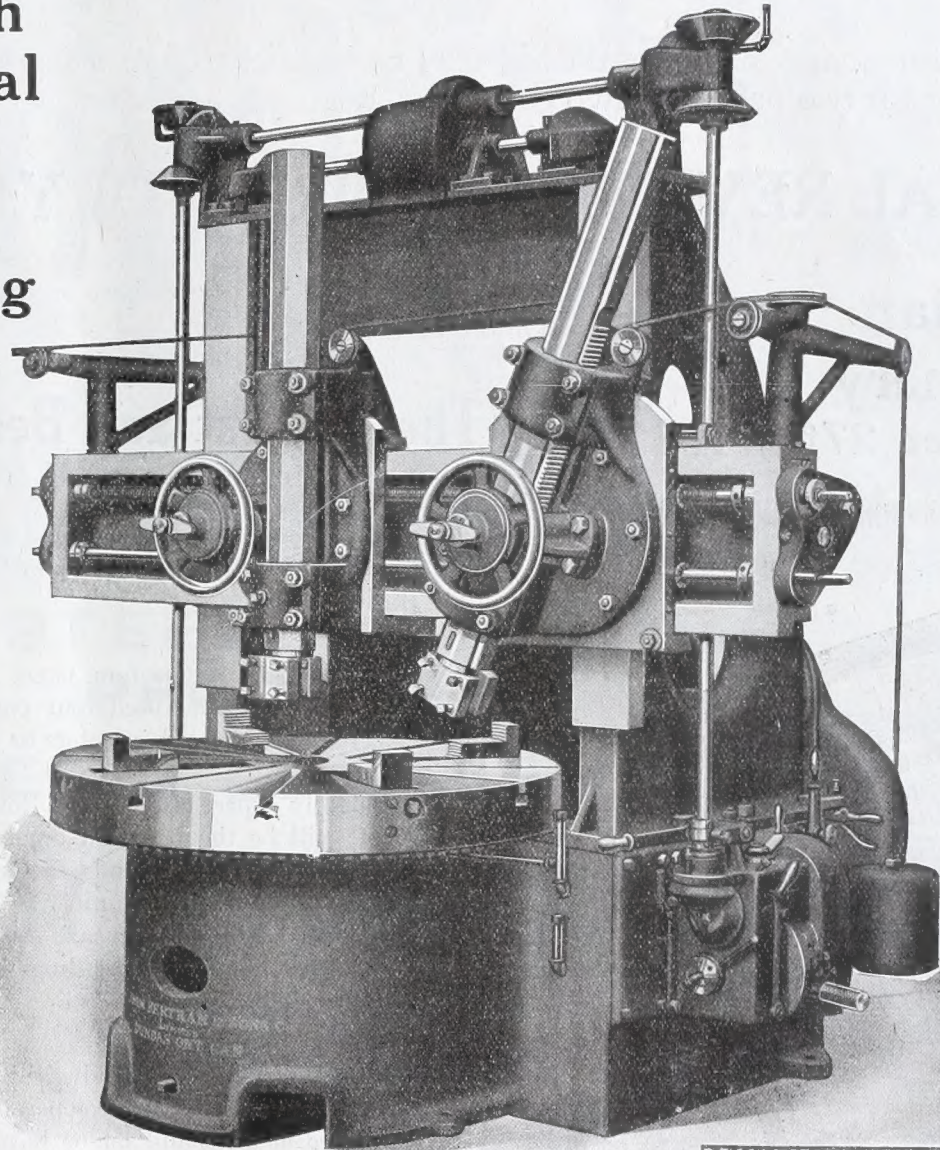
**42-inch  
Vertical  
Boring  
and  
Turning  
Mill**

***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.



M 111 PHOTO 1057

## The John Bertram & Sons Company Limited

DUNDAS, ONTARIO, CANADA

MONTREAL  
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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

September 27, 1917

THE sales-manager of one of the big steel companies told us a few days ago to book his order for two pages (in two colors), in the

## ANNUAL REVIEW AND DIRECTORY NUMBER

**Canadian  
Machinery**  
December 27th, 1917

Many of the leading manufacturers have arranged for big representation in this important issue.

### The Biggest and Best Yet

Our Annual Number has come to be generally recognized as the greatest business influencing agent in industrial Canada. It has grown year after year until in 1916 it broke all records for Canadian publications, containing as it did 432 pages.

One advertiser alone carried twenty-four pages in last year's annual. Another used six pages. Several used four pages, many two pages. Many announcements were printed in colors or on colored paper.

This year we confidently expect our Annual Review Number will run over 500 pages. It will be the best and biggest and most complete Buyers' Guide ever placed in the hands of Canadian buyers. And that's just exactly what our Annual Number is—a Buyers' Guide and reference. Hundreds of copies of last year's Annual are still hanging beside the desks of buyers in the biggest shops in Canada—time-worn and soiled but still influencing business.

It is our intention to classify and group advertising as much as possible for the convenience of buyers and your co-operation is invited. If you will reserve your space at once and let us have your copy and cuts within a reasonable time it will enable us to render a much better service than would otherwise be possible.

Several firms were very much disappointed last year because we were compelled to go to press without their advertisements. Cuts forwarded by express were delayed in transit, some not arriving for two weeks after our Annual Number was in the mails! So we ask you to immediately reserve your space and to let us have copy instructions just as soon as possible. Some forms *must go to press early* and in order to properly arrange advertisements and do them justice it is absolutely necessary to press for immediate action.







**STEEL & IRON  
PRODUCTS  
OF  
Every Description  
THE  
STEEL COMPANY  
OF  
CANADA**

LIMITED  
HAMILTON - MONTREAL

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



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

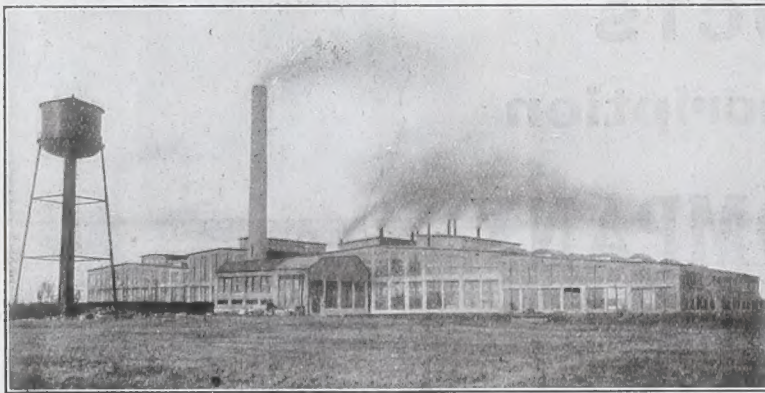
We carry a complete stock at our New York Warehouse, 124 Maiden Lane, New York City

Canadian Agents:

**The Canadian Utilities Steel & Engineering, Limited**

149 Craig Street West, Montreal, Canada

We carry a complete stock at our Montreal Warehouse



Works: LONGUEUIL, QUE.

**CANADIAN MANUFACTURERS**

are you using Steel

**MADE IN CANADA?**

We are manufacturing at our works at  
 LONGUEUIL, QUE.

**SPECIAL HIGH SPEED AND CARBON  
 TOOL STEELS, MISCELLANEOUS  
 SHOP TOOLS, GAUGES, Etc.**

**ARMSTRONG WHITWORTH of CANADA  
 LIMITED**

HEAD OFFICE: 298-300 St. James St., Montreal  
 27 King William Street, HAMILTON

Branches: Dominion Bank Bldg., TORONTO  
 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



ESTABLISHED 1870

# W<sup>M.</sup> ATKINS & C<sup>O.</sup>, L<sup>TD.</sup>

TRADE MARK



*Reliance Steel Works*  
SHEFFIELD, ENG.

TRADE MARK



TRADE MARK

*of the Famous*

# “WACO”

Brand

## High Speed Steel and Twist Drills

### “DOUBLE WACO” Quality

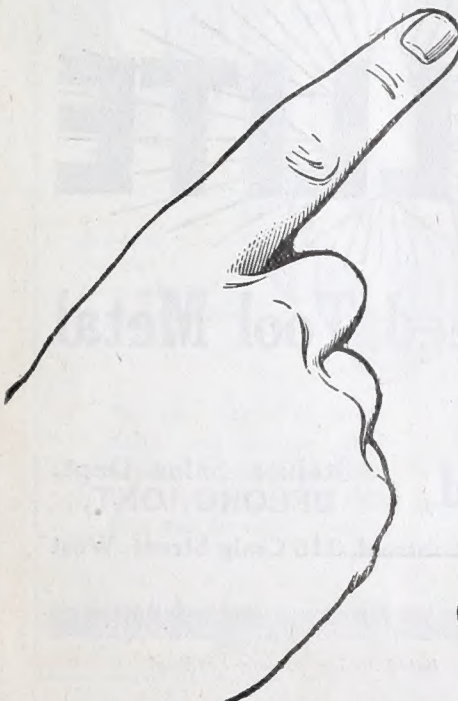
Specially Adapted for all kinds of  
MUNITION WORK

“Turtle” Brand  
High Class Tool Steel, Files, etc.  
of all descriptions.

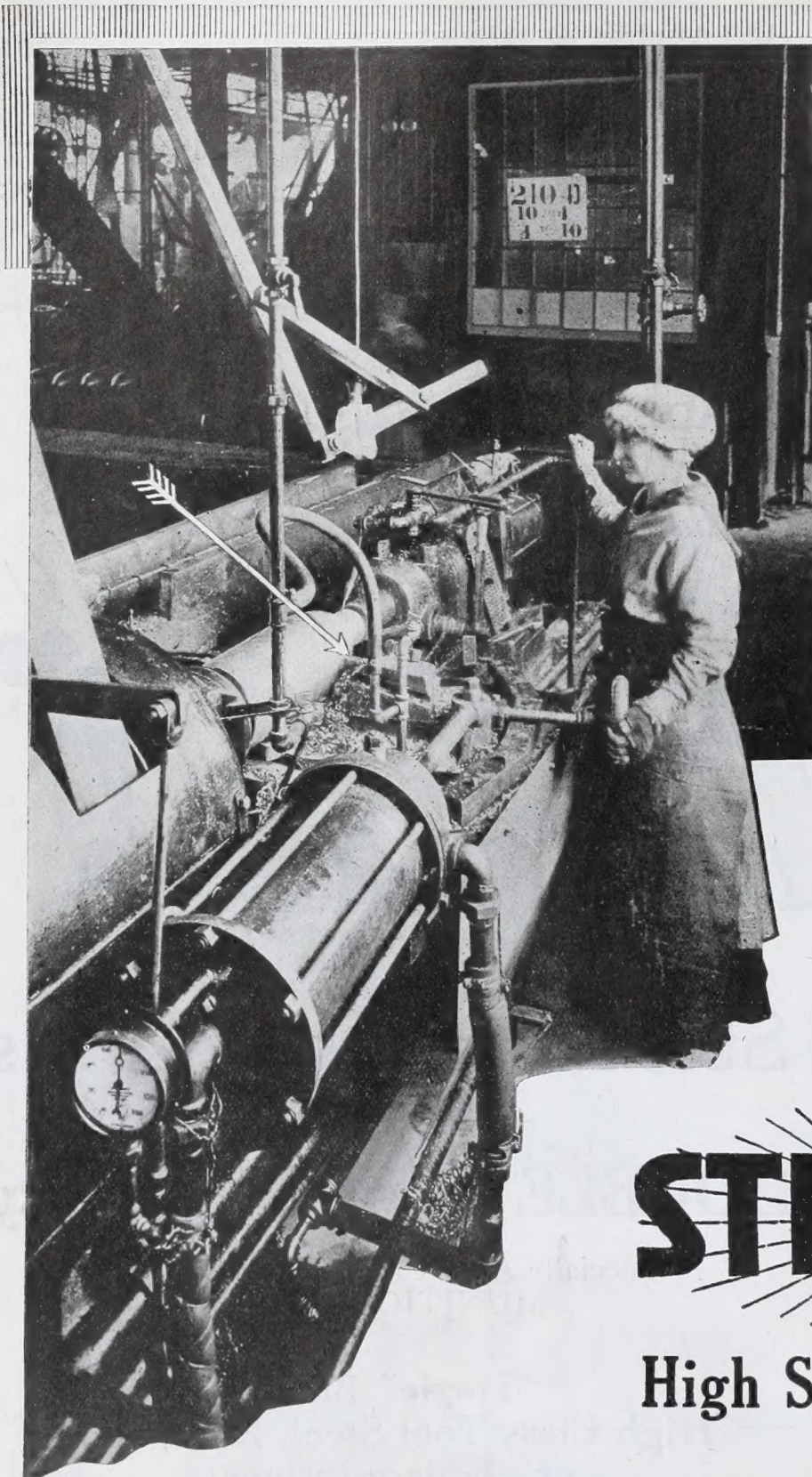
*For particulars apply to our  
Sole Representatives for Canada*

## GEO. A. MARSHALL & CO.

70 Lombard Street Toronto, Ontario







**"Not a Steel,  
but its Master"**

**F**INISHING the profile of 8-in. Howitzer shells made from rolled steel forgings.

The cut starts at a speed exceeding 200 ft. per min. and machines the surface 9 in. long in 1 min. 24 sec.

The tool is given a feed of  $\frac{1}{8}$  in. per revolution and imparts a highly finished surface to the work.

An output of 55 shells per grinding is maintained easily.

An instance of extreme conditions which Stellite is meeting successfully every day.

Stellite is harder and tougher than steel. Cuts longer and 25 to 300% faster. Requires no forging, and cuts as well when running at red heat as when cold—does not lose its temper. Convince yourself that STELLITE stands behind bigger production and tool economy by giving it a try-out.

# STELLITE

## High Speed Tool Metal

**Deloro Smelting & Refining Co., Limited,**

Toronto, 200 King St., West

Stellite Sales Dept.  
DELORO, ONT.

Montreal, 315 Craig Street, West





Manganese, Vanadium, Titanium, Chrome, Nickel Castings made in sizes from 1 lb. to 50 tons. Made to specifications and true to pattern. You can thoroughly depend on our products.

**CANADIAN STEEL FOUNDRIES.**  
 Limited

*MONTREAL* *WELLAND*



We guarantee shipment within 24 hours of receipt of order

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

**SISCO**

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.

**The Life of a Thread Miller**

Depends not upon the amount of work it does, but the ease and thoroughness with which the work is done. These Thread Millers are noted for these qualities. Its quality of work is unrivalled. Our Service Department will give you all the particulars. *Write us!*

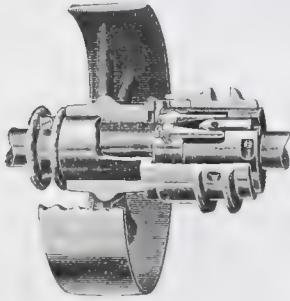
**THE WILLIAMS MACHINERY CO., Limited**  
 64-66 Front Street West  
 Toronto  
 Ontario



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



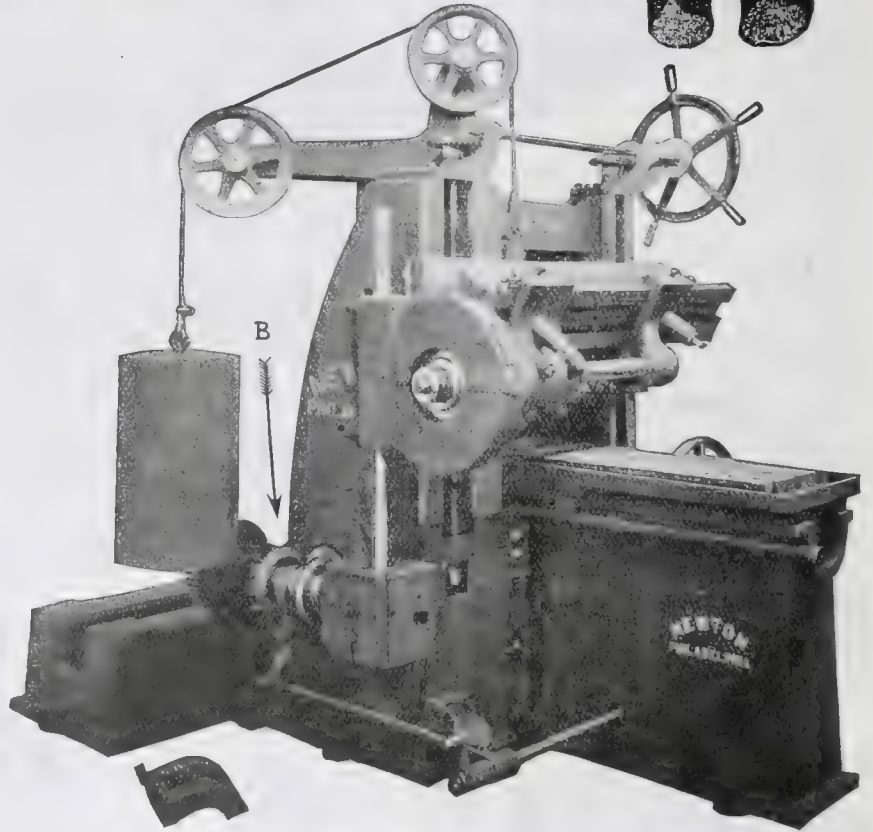
# The Johnson Friction Clutch Is Being Used As A Part Of This Machine



Single Clutch with Pulley on Hub.

## It's a Newton Miller

Many types of Newton Machine Tools have Johnson Friction Clutches in their make-up. The Milling Machine illustrated has a Johnson Double Friction Clutch incorporated between the gears at the point indicated by the arrow.



Courtesy, Newton Machine Tool Works, Philadelphia, Pa.

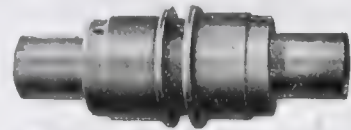
## Johnson Friction Clutches Are Being Used on All Types of Machine Tools

Designers of all kinds of machine tools and special devices requiring clutches are invited to consult our engineering department for a solution to their problems. We are rendering this service free every day and are able to save you valuable time and many costly experiments. The con-

struction of Johnson Friction Clutches makes them adaptable to all types of machine tools and mechanical devices.

If you are a builder of machines, let us show you how a Johnson Friction Clutch will increase its efficiency.

Send for our yellow data sheets and latest free booklet, "Clutches as Applied in Machine Building," now.



Standard Double Clutch Exterior

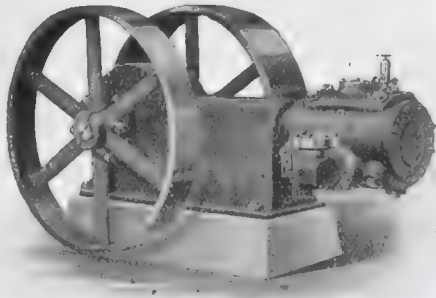


**England**—The Efadem Co., 159 Gt. Portland St., London, W., England. Sole Agents for the British Isles.

**Canada**—Williams & Wilson, Ltd., 320 St. James St., Montreal. Canadian Fairbanks-Morse Co., Limited, Toronto.

**Australia**—Edwin Wood, Pty., Hardware Chambers, 231 Elizabeth St., Melbourne, Victoria.





## CB-1 Air Compressor

Equipped with disc inlet and outlet valves, machine is noiseless in operation; lubrication is of the splash gravity type; extra large bearings; machine entirely enclosed. Built and designed to give the most service that can be obtained with a compressor of this size, thus conforming to the Jenckes standard of construction.

We also manufacture boilers, engines, hoists, pulp mill machinery, stamp mills, ore cars and special machinery.

*Write for further information.*

# JENCKES

**Machine Co., Limited**

Works:

Sherbrooke, Que. St. Catharines, Ont.

Offices:

Sherbrooke, Montreal, St. Catharines,  
Toronto, Cobalt, South Porcupine,  
Vancouver

## FERRO-URANIUM *The Latest Discovery in Alloys for Efficient*

### High-Speed and Other Steels of Quality

IT INSURES TOOLS THAT STAND UP ON THE JOB

Largest Producers in the World of URANIUM

---

WRITE US FOR PARTICULARS

---

## STANDARD ALLOYS COMPANY

Forbes and Meyran Aves.

--

Pittsburgh, Pa.



# 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 Company Limited

Head Office: NEW GLASGOW, N.S.

Western Sales Office:

Room 14, Windsor Hotel, MONTREAL



HIGHEST IN QUALITY

NATIONALLY KNOWN

**O**UR 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. WARD & SONS 44 PARSONS ST. BOSTON, MASS. U.S.O. NASH CO. 304 HUDSON ST. NEW YORK, N. Y. FIRD & CO. INC. 321 ARCH ST. PHILADELPHIA, PA. VANADIUM ALLOYS STEEL CO. PITTSBURGH, PA. AND 648 WASHINGTON BLVD. CHICAGO, ILL. LATROBE, PA.



# 6-inch Shell Cutting-off Machine



**Cuts both ends at once**  
 Forgings load in one end and discharge out the other end when cut

**A Girl can operate it.**  
*New quick power return for saddles*  
**DELIVERIES REASONABLE**

**Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.**

*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, 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

**Electrite**

Electric furnaces, automatically regulated, the most modern methods, and the introduction of Uranium—make this a steel of truly remarkable 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**



**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.





# Roelofson 6-in. Banding Machine

**Y**OU 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.

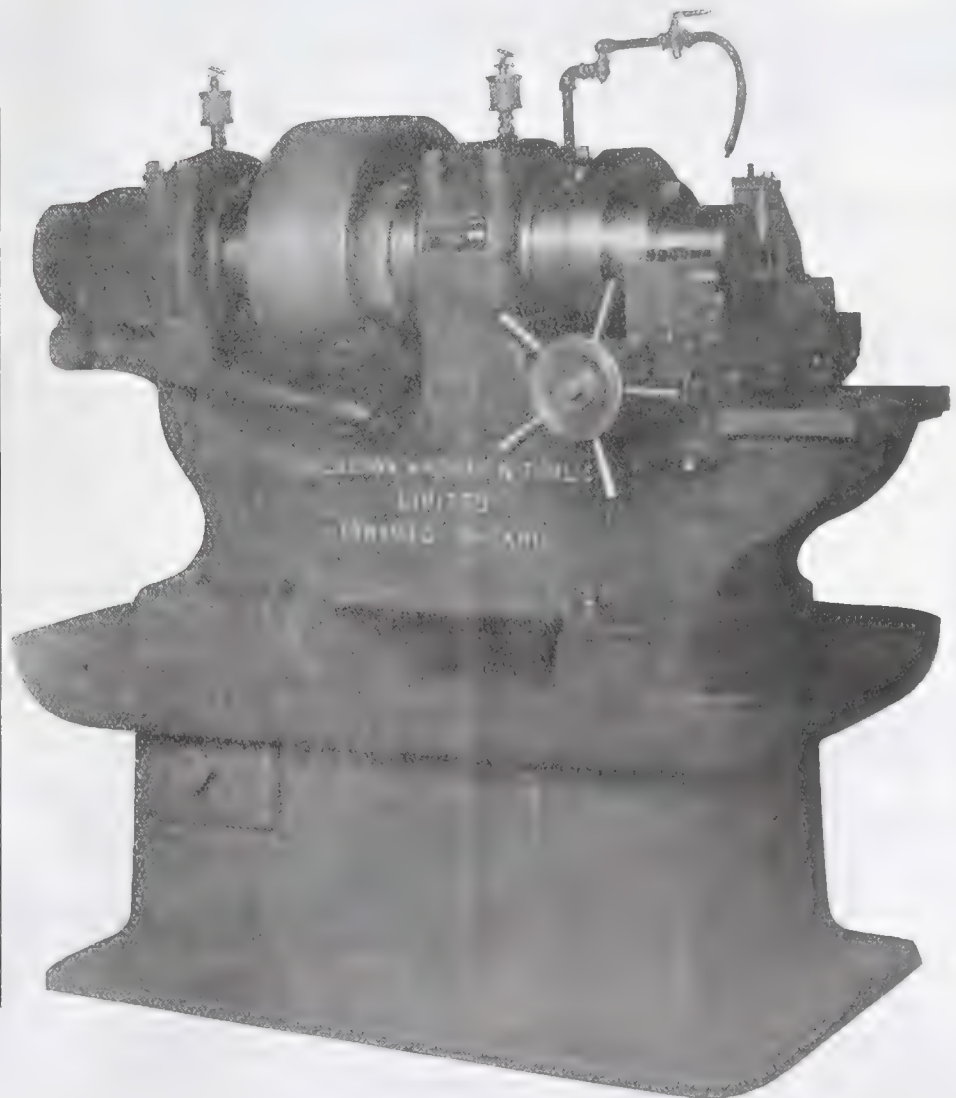
Head Office 1501 Royal Bank Building, Toronto, Canada

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.

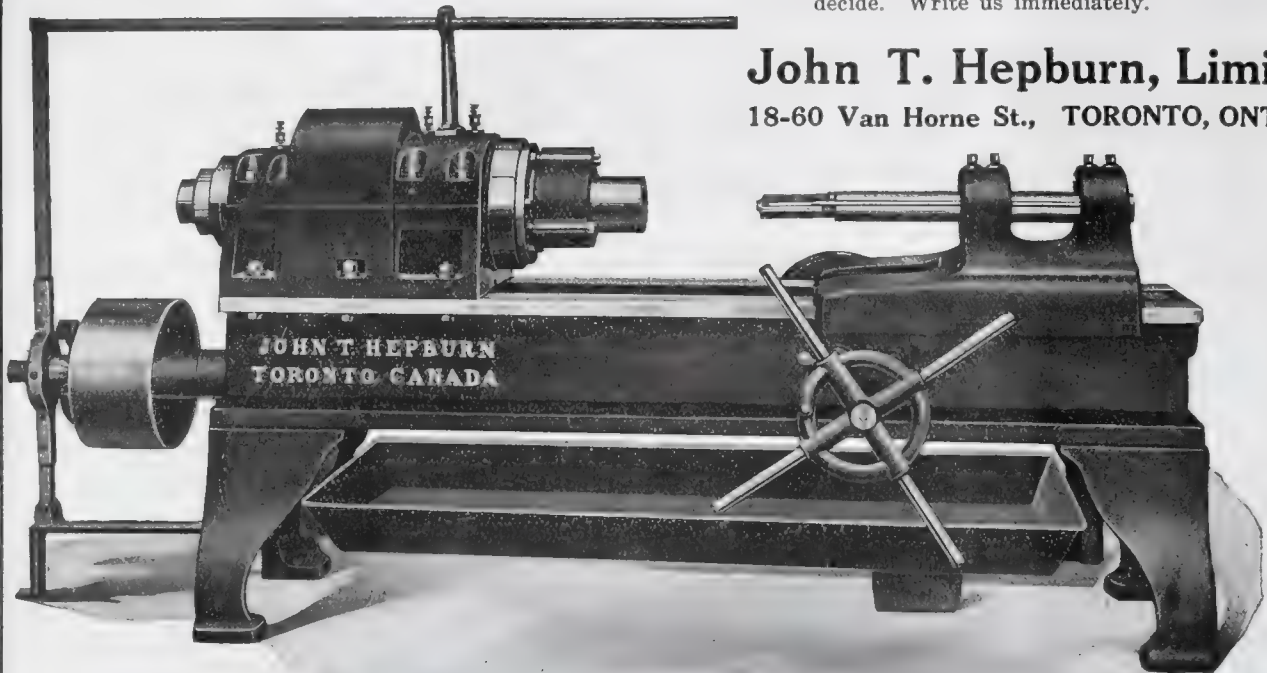




## Renew Your Old Lathe

Not necessarily by securing a new one but take advantage of our thoroughly equipped machine shop. We repair lathes, plane the lathe beds. We build lathes and in our repairing the same care is exercised. If you intend securing a new lathe, get a list of the Hepburn line before you to help you decide. Write us immediately.

**John T. Hepburn, Limited**  
18-60 Van Horne St., TORONTO, ONTARIO

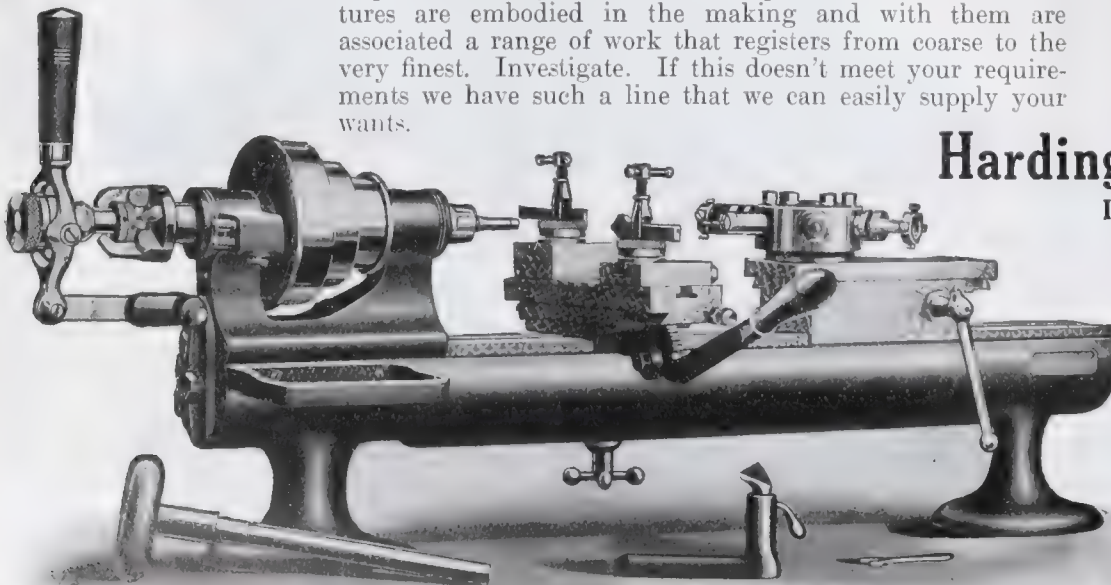


## If it is a Question of Efficiency

There are lathes that will give you all grades of efficiency. But we interpret efficiency to mean highest speed and quality of production together with lowest possible cost. These features are embodied in the making and with them are associated a range of work that registers from coarse to the very finest. Investigate. If this doesn't meet your requirements we have such a line that we can easily supply your wants.

**Hardinge Bros.**  
Inc.

1770 Berteau  
Avenue,  
CHICAGO,  
ILL., U.S.A.



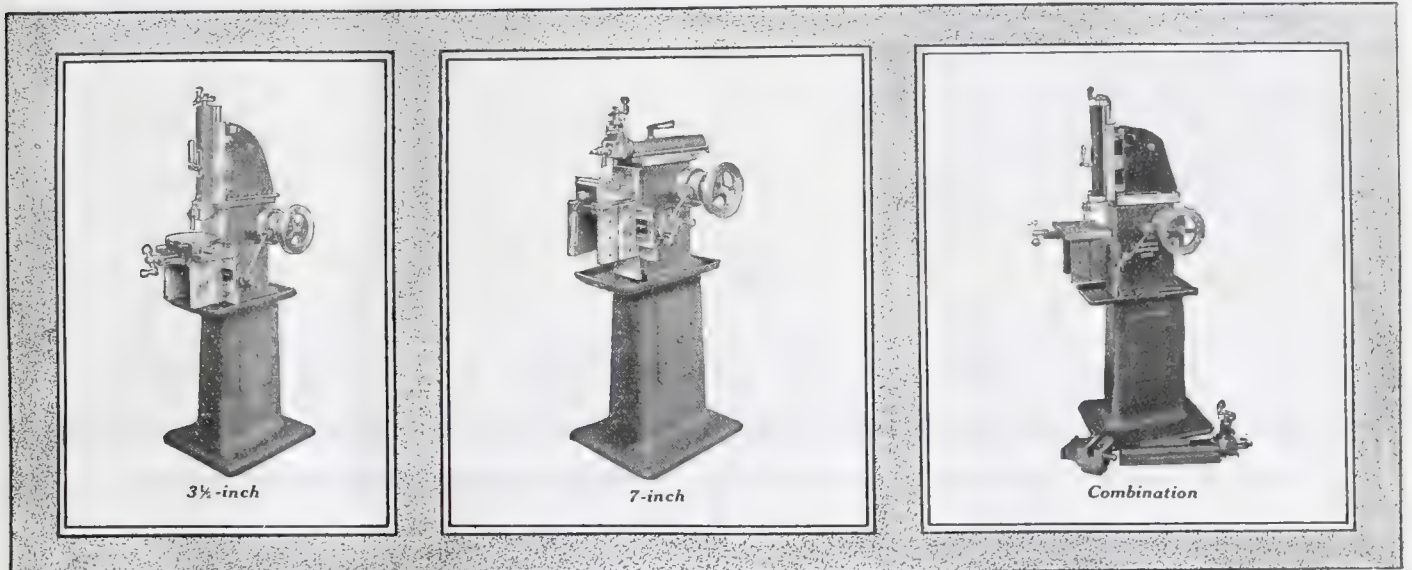


TEXTILE BELTING  
and PACKINGS

JR BAXTER  
& COMPANY LIMITED,  
MONTREAL.

HIGH SPEED  
TWIST DRILLS

and GENERAL MACHINERY SUPPLIES



Three of the machines that by their cost-reducing features have established themselves "solid" with the home users and by these same merits are reaching out in foreign countries. A silent, but powerful message of the Rhodes efficiency.

Their capacity is greatly promoted by the adjustments which may easily and quickly be attached. For shaping, slotting, die making, tool making, etc., these machines stand paramount. An inquiry on your stationery will receive prompt attention.

**The Rhodes Mfg. Company**  
Hartford, Conn.. U. S. A.

**MAKE NAILS! NOT NOISE!**

We offer the trade new types of

**WIRE NAIL MACHINES**

QUIET IN OPERATION; WITH VERY HIGH OUTPUT; ALL PARTS ACCESSIBLE; DECREASED MAINTENANCE COSTS; GREAT CAPACITY; OCCUPYING SMALL FLOOR SPACE.

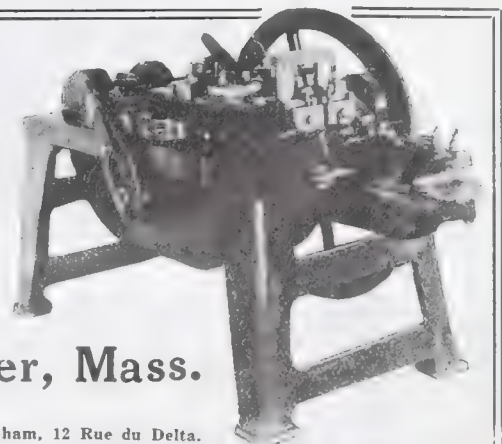
Smoothly running machines, with balanced mechanical motions and no rotating cams. Built in 5 sizes, handling wire from No. 17 to 3/8" diam.

**PRACTICALLY NOISELESS IN OPERATION**

**Sleeper & Hartley, Inc., Worcester, Mass.**

CANADIAN BRANCH, COATICOOK, P.Q.

London, England, F. A. Perry, 63 Queen Victoria Street, E.C. 4. Paris, France, Edgar Bloxham, 12 Rue du Delta.



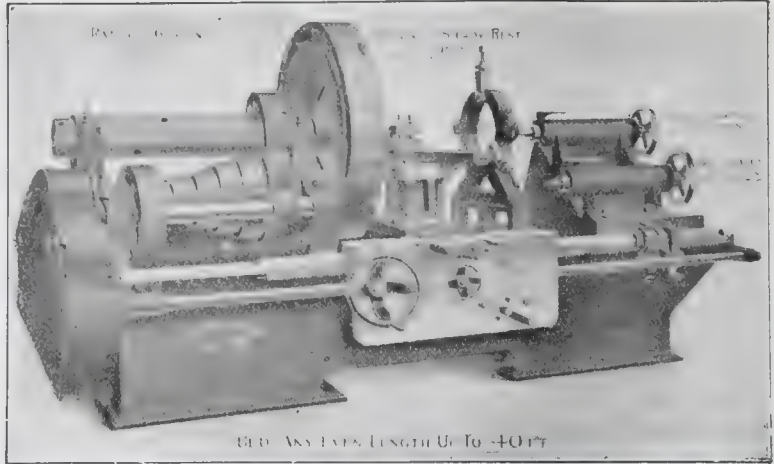
*If any advertisement interests you, tear it out now and place with letters to be answered.*



# One Ship-building Plant

wrote to six different Lathe-Builders

and bought McCabe's "2-in-1" Double-spindle Lathe—on a 30-ft. bed—because it was "different" and built especially for such a wide range of work.



McCABE'S "2-in-1" Double-Spindle Lathe—26-48 inch Swing As a 48 inch Triple-Geared Lathe

What other big Lathe can you get, and have full use of your Lathe, whether you have big or small work?  
 What Lathe Manufacturers except McCabe could make such a low price possible?  
 No other Lathe builder turns out 48-inch Lathes in such big lots at a time, making the parts all duplicate and interchangeable.  
 And in addition to the 48-inch Triple-geared Lathe, the 26-inch is the "Lathe plus" feature McCabe offers you—at no extra cost.  
 DOUBLE service—convenience and capacity—all described in Latest Bulletins.

**J. J. McCABE, 149 BROADWAY, NEW YORK**

## Quality Points

The headstock is the point where the size, strength and life of the machine is decided. The carriage decides the utility and the tailstock is the general assistant to both. At these points is the value of a machine judged. We invite your close inspection of the Filsmith 13" Engine Lathe, fully confident that you will reiterate the statements of praise that our clients are now expressing. An inquiry will receive prompt and intelligent attention.

**The Philip-Smith Mfg. Co.**

Sidney, Ohio, U.S.A.



## 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 Cummings make it.*

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



## Two Cuts at One Time

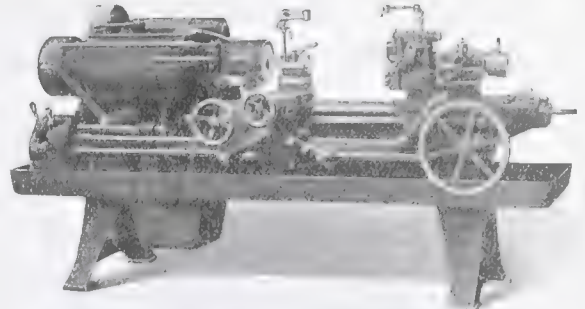
The ability to face, undercut or neck with the square turret while boring or turning with the hollow-hexagon turret contributes largely to the time-saving and economical output of the

### Universal Hollow-Hexagon Turret Lathes

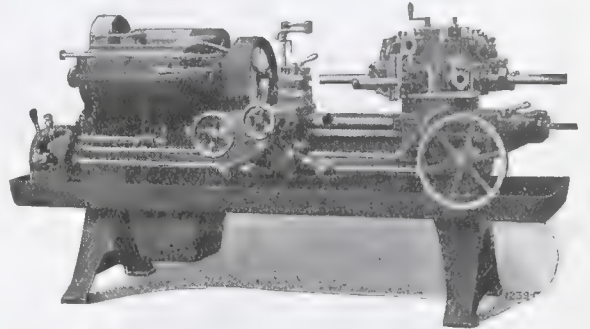
Separate feed shafts, each with ten individual feeds, operate the carriage and turret saddle independently, and provide the exact feed required for each.

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

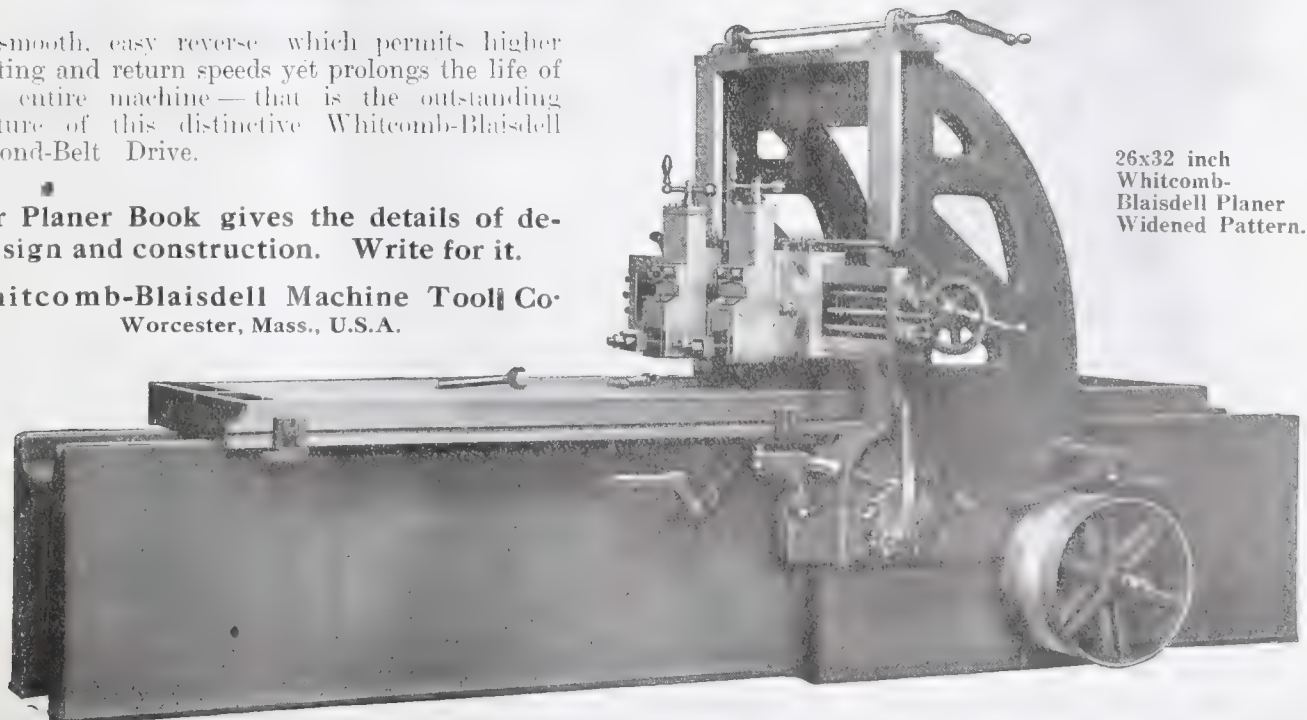
# WHITCOMB-BLAISDELL

## The Planer With the Second-Belt Drive

A smooth, easy reverse which permits higher cutting and return speeds yet prolongs the life of the entire machine—that is the outstanding feature of this distinctive Whitcomb-Blaisdell Second-Belt Drive.

Our Planer Book gives the details of design and construction. Write for it.

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



26x32 inch  
Whitcomb-Blaisdell Planer  
Widened Pattern.

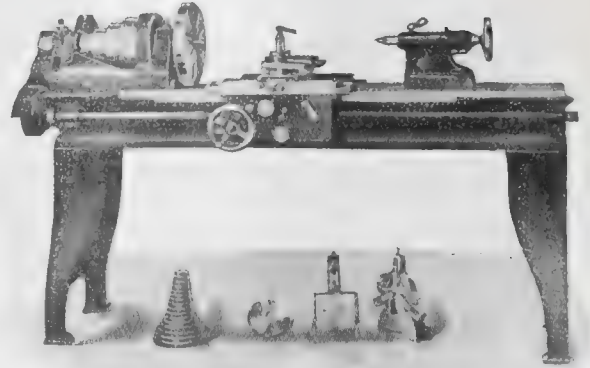
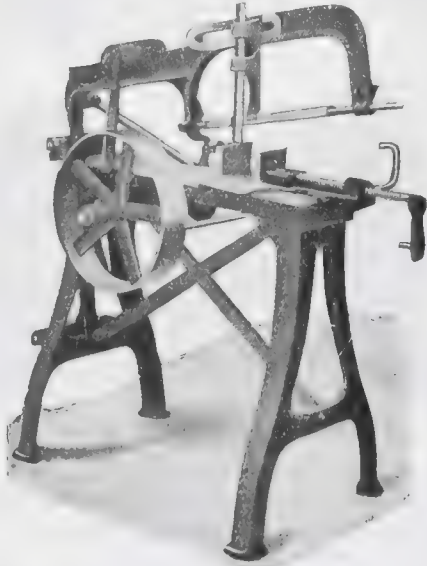


## The "McKenzie" Engine Lathe

The Standard of Accuracy

Made from new patterns, of improved design, and constructed of the very best material by expert workmen. Every part is mechanically perfect and excellently finished. Its accuracy and durability mean a big saving of money to you.

Let us put full details before you. Write!



## The Improved Power Hack Saw

will cover its cost many times over with the money it saves through long, efficient service.

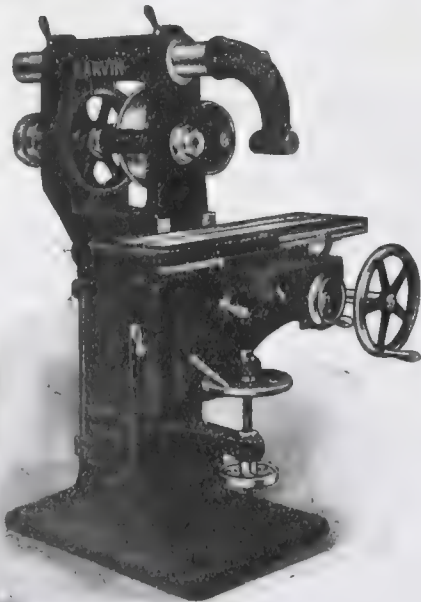
Saws bars 6 x 6 in., either round or square, and is so constructed as to require no attention after work is put in vise, and stops automatically when piece is cut off.

**The Improved Saw Guide is a Special Feature** — it keeps the saw perfectly in line at all times.

**The D. McKenzie Machinery Co.**  
Guelph, Ontario

# GARVIN No. 21 Plain Miller

## Back Geared



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

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 of Table .....	18 in.
Adjustment in line with Spindle .....	6 in.
Vertical adjustment under Spindle .....	13 in.
Table, inside Oil Pockets .....	6 x 30 in.
Changes of Speed .....	6
Changes of Feed .....	6
Net Weight, Skidded .....	1,575 lbs.

For Further Information (ASK YOUR DEALER or WRITE US DIRECT

**IMMEDIATE DELIVERIES**

*Send for Complete Catalog*

MANUFACTURED BY

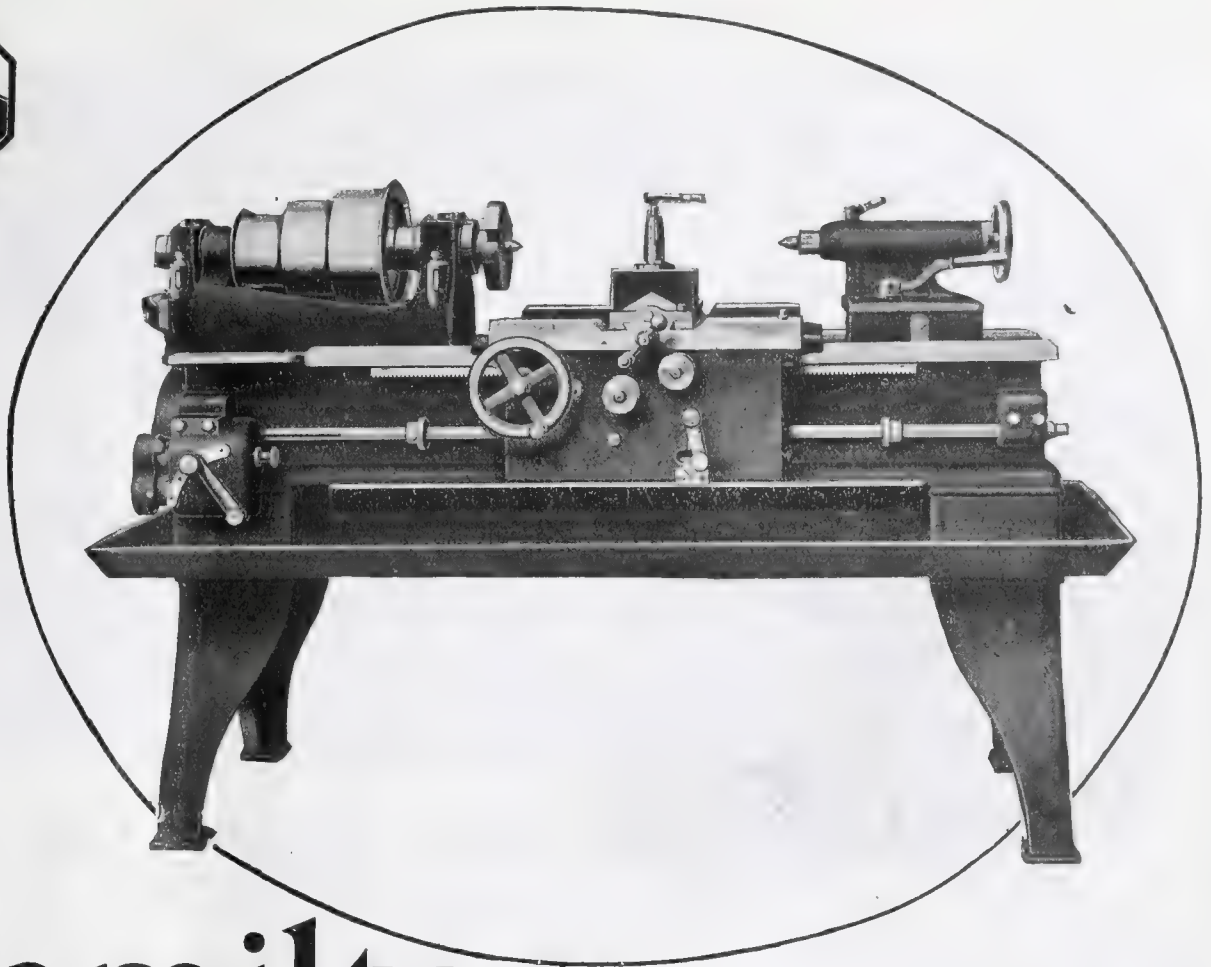
**THE GARVIN MACHINE COMPANY**

Spring and Varick Streets

(Visitors Welcome)

50 Years New York City





# Hamilton Lathes

Equipped with a complete range of feeds with quick changes. Automatic Stop and other Hamilton features which make it an indispensable lathe for the shop in need of a speedy, cost-cutting, efficient machine.

Its simplicity of design to ensure ease of operation is a big factor in favor of this lathe.

For long runs on duplicate pieces we highly recommend this New Hamilton Lathe, built for plain turning, boring, etc. This machine meets the popular demand for a single-purpose machine for automobile and manufacturing of a like nature.

They can be converted and adapted to a wide range of operations by equipping with back gears, screw-cutting mechanism, etc. 14, 16 and 18-inch sizes. Bulletin with full descriptions on request.

*Ask to-day.*

## The Hamilton Machine Tool Co., Hamilton, Ohio

Sole Agents for Ontario: H. W. Petrie, Limited, Toronto, Ontario

PLS

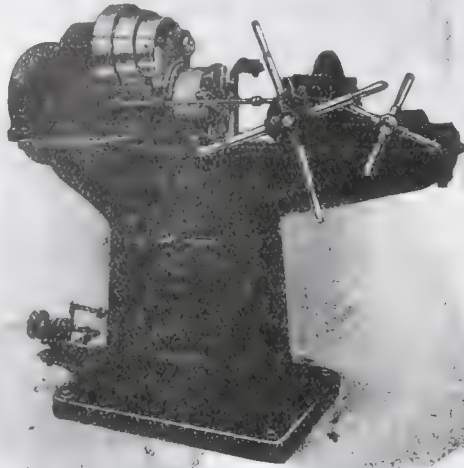
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## Landis Threading Method Means Less Labor

As labor becomes scarce and wages increase, industry requires the most efficient and most economical machine for every line of work.

Meeting that condition in regards to thread-cutting is the **Landis Threading Machine or Die Head** for bolt, pipe and special threads. The Landis Die can be used advantageously for cut-



ting every thread in your shop. No matter what form of thread, pitch or shape of the part to be threaded, the Landis will handle it to your complete satisfaction. Many threading jobs which were formerly done on lathes are now threaded with a Landis die head or machine and the results are equal accuracy, a higher production and a lower threading cost.

One customer writes:—"We have made an increase in production of 30 to 40%, and a savings in the cost of chasers of 50 to 60% since installing your machine."

Does not that prove the efficiency of the Landis Threading Method?

Write for catalogues.

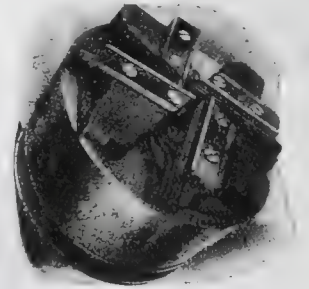
No. 22—Bolt Threading Machinery.

No. 23—Pipe Threading Machinery

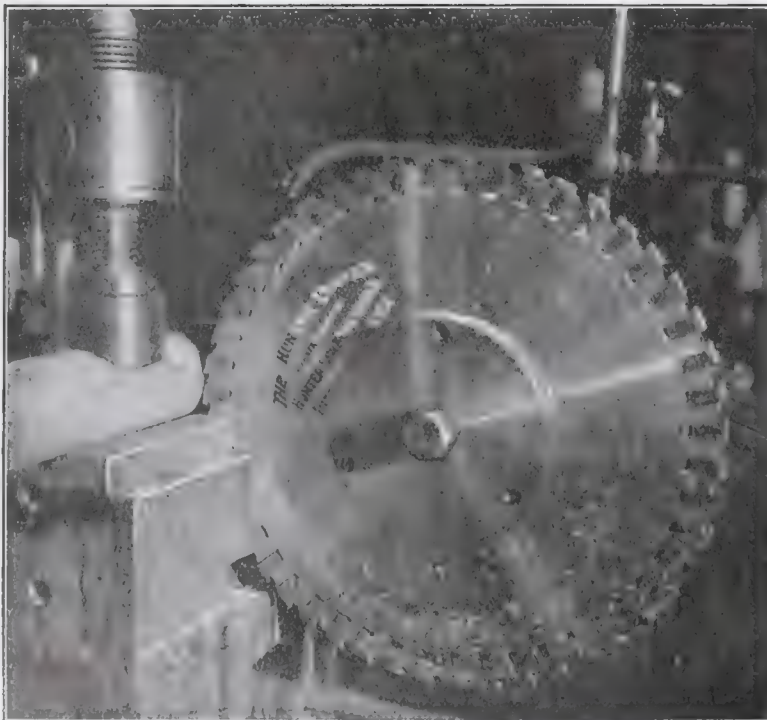
### Landis Machine Company

WAYNESBORO, PA.

Exclusive Canadian Agents: Williams & Wilson, Limited, Montreal



## A Hunter "Duplex" on Shrapnel Stock



### FAST GOING

on Newton Machine

Through 3½" round 60  
Carbon, 70 Manganese  
Shrapnel Stock every

### 2 MINUTES

The secret of Hunter  
"Duplex" Saw speed is  
the method of holding the  
high speed teeth.

You can use this speed  
profitably — on shrapnel  
or any other stock.

*Let us send full  
Particulars.*

### HUNTER SAW & MACHINE COMPANY, Pittsburg, Pa.



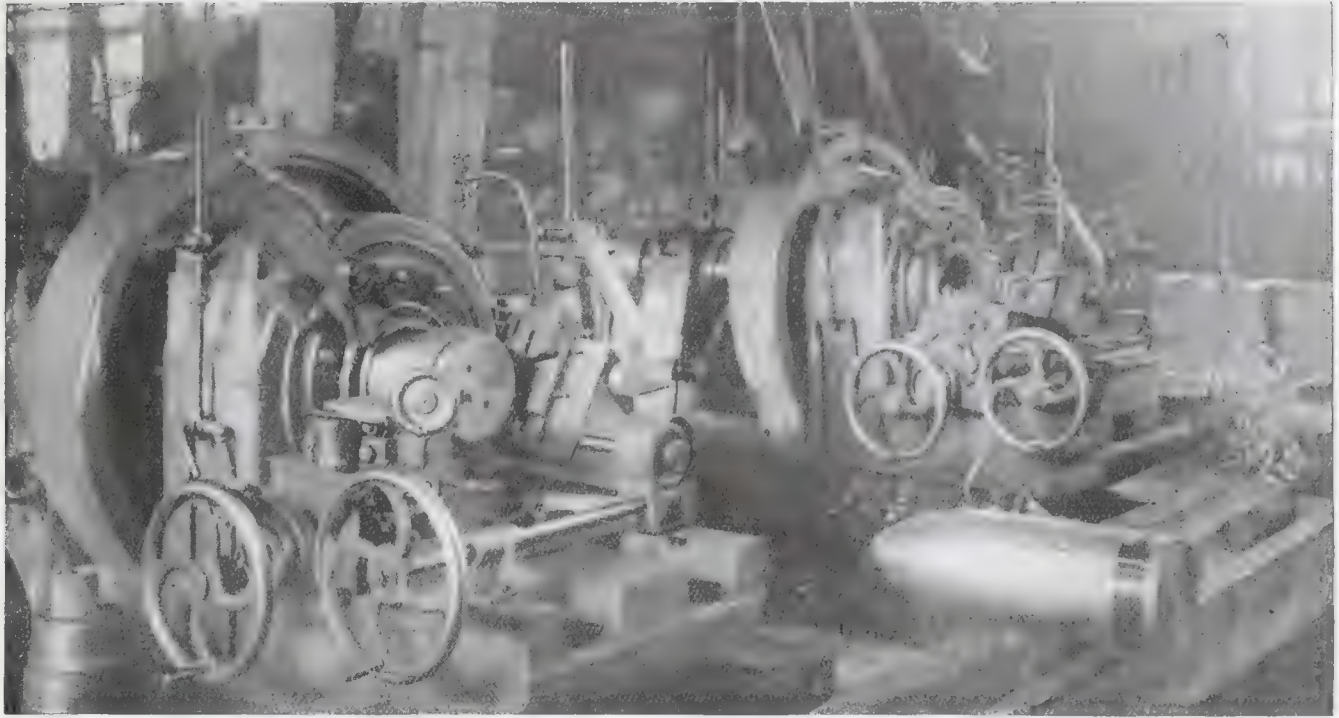


Photo shows two of our Band Turning Machines in one of the largest shell shops in Canada.

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.

## Two Cuts Simultaneously

One up, the other down. This is what makes the **Hurlbut-Rogers Cutting-Off and Centering Machine** virtually double the output and reduce the cost per piece about one-half.

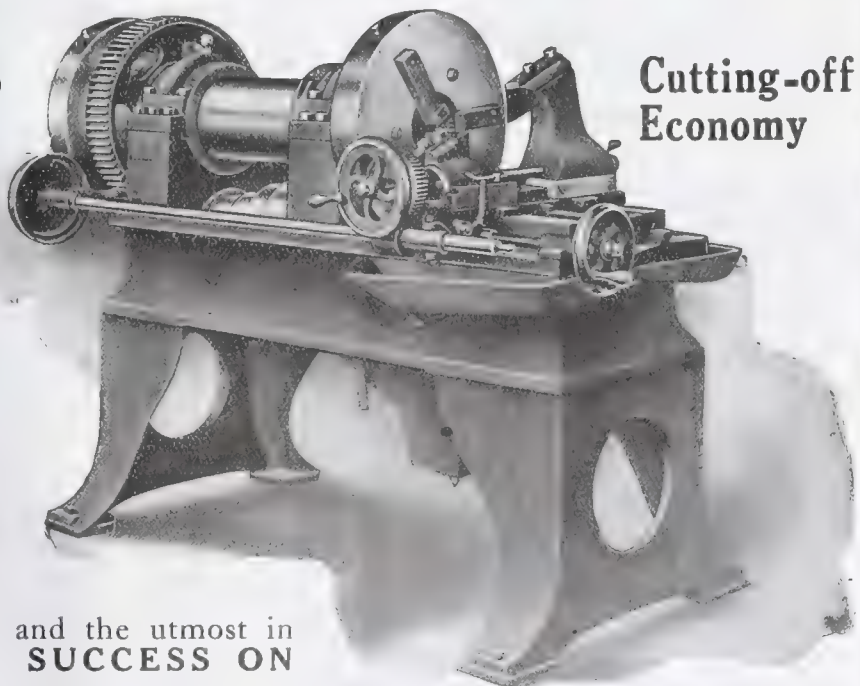
The Hurlbut-Rogers Machine gives you capacity of two machines at the expense and in the floor space of one machine.

We build them for hard work and the utmost in accuracy—and their **GREAT SUCCESS ON SHELLS** shows it.

Let us go into details.

**HURLBUT-ROGERS MACHINERY CO., South Sudbury, Mass.**

FOREIGN AGENTS—England, Chas. Churchill & Co., Ltd., London, Manchester, Glasgow and Newcastle-on-Tyne. H. W. PETRIE, TORONTO, CANADA.



**Cutting-off  
Economy**

5-inch Cone-Driven Machine

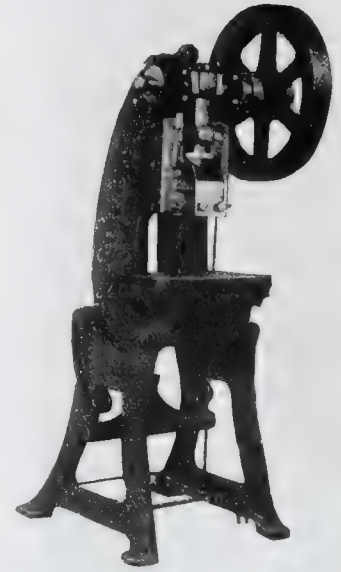


## The Success Obtained by Consolidated Presses

is due to the generous and correct proportion of the frame, the rigid bed construction, the extra long and wide slideways, the lengthy main bearings, the powerful clutch, large diameter and wide faced gears, steel pinions, the accurate machining and fitting of the various parts.

These are all vital points to be considered in buying presses.

Duplicate orders from satisfied Consolidated Press users are an indication that these features count.



## Consolidated Press Company

HASTINGS

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

MICHIGAN

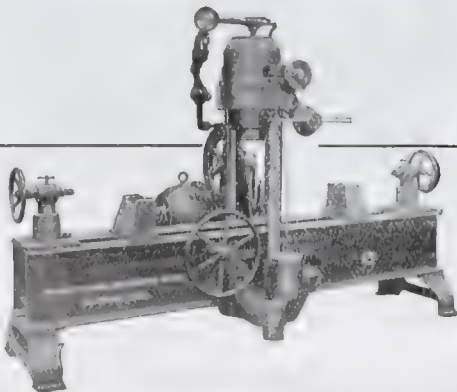
Canadian Representatives: A. R. WILLIAMS MACHINERY CO., Limited, Toronto, St. John, Winnipeg, Vancouver

## ELMES

Motor Driven Straightening Press for shafts up to 5 in. Movable head, height adjustable, close regulation of action, strong screw centre parts. One of our many types.

**Charles F. Elmes Engineering Works.**

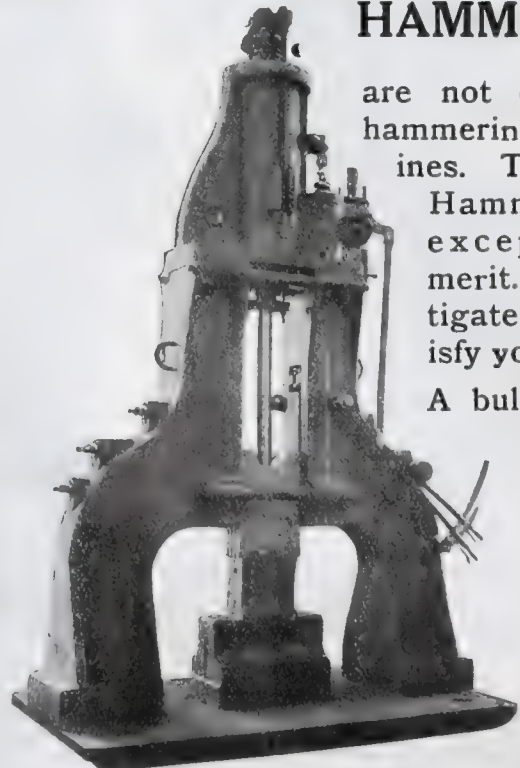
217 N. Morgan St. Chicago, U.S.A.



## "ERIE" STEAM FORGING HAMMERS

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

A bulletin for the asking.

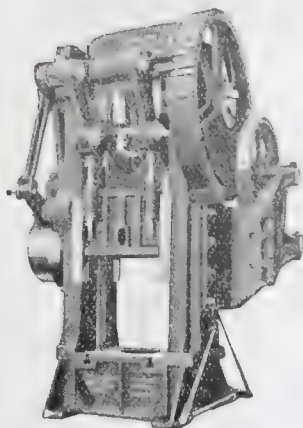


**ERIE FOUNDRY COMPANY**  
ERIE, PENNSYLVANIA, U. S. A.



# THE "TOLEDO"

Toggle Drawing and Deep Stamping Presses



A few of the advantages: Perfect dwell of blank holder during entire drawing operation; the exertion of all the required power; elimination of wasters due to undulation of the blank holder pressure; perfect timing and consequent effective balancing of entire machine assuring smooth, silent running and safety for operator.

Toggle arms, rocker arms and yokes are made throughout of steel with inserted bronze bushings at each bearing.

Built in all sizes for work from tin cups to road scrapers.

**The Toledo Machine & Tool Co.**  
TOLEDO, OHIO

## Triple Purpose "METALWOOD" COMBINATION

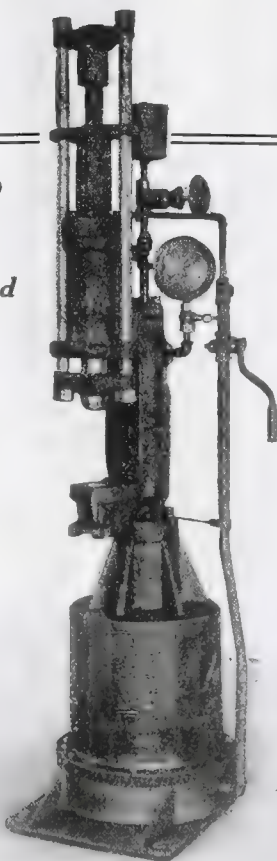
*Forcing, Broaching and Straightening Press.*

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.



**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  
Pecock St., Blackfriars Road

DETROIT OFFICE

Dime Bank Bldg.

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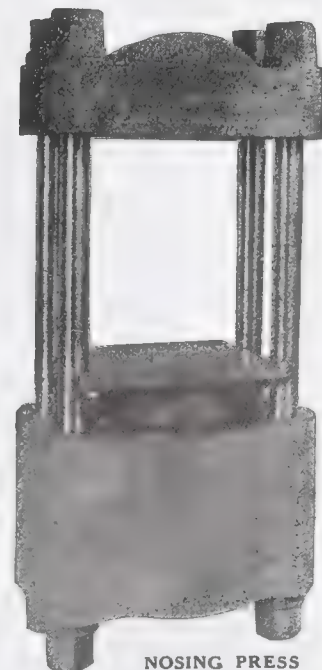
1917  
PARIS, FRANCE  
100 Blvd. Victor-Hugo St. Ouen

# PRESSES

Pumps  
and  
Accumulators

FOR ALL  
PURPOSES

Made in  
Canada



NOSING PRESS

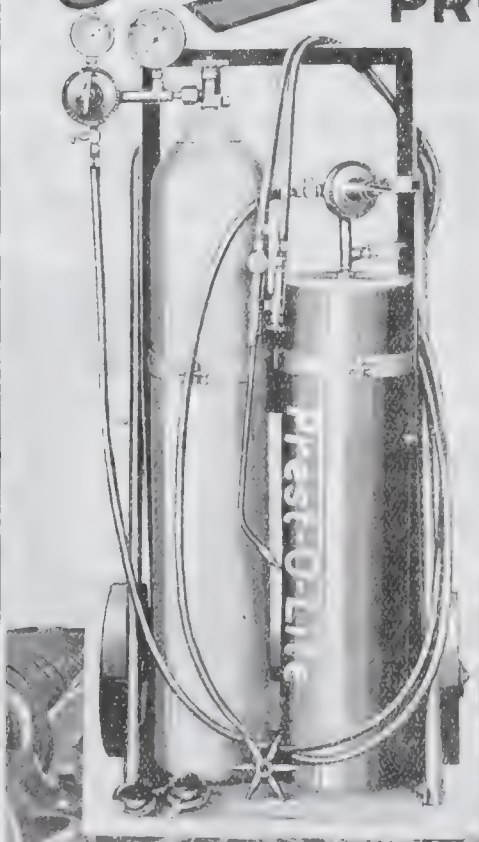
**WILLIAM R. PERRIN, Limited**  
TORONTO



# Conserve Steel and Iron - Cut Out the Scrap Pile

## Prest-O-Lite

### PROCESS



**M**ILLIONS of dollars worth of damaged or worn metal parts, castings and tools lie rusting in the scrap-piles of Canadian railroads, factories, mines, foundries, repair shops, etc.

By oxy-acetylene welding much of this enormous waste can be eliminated, and losses due to breakdowns—resulting in “tie-ups” of operating equipment—can be greatly reduced. The Prest-O-Lite Process is ideal for all classes of metal repair work. It handles repairs quickly and efficiently—often right on-the-spot—makes the broken or worn part strong as new—saves time which would be wasted waiting for replacements—avoids the “scrapping” of valuable metal parts. The welding outfit is portable—available at all times for outside work as well as for shop use.

In the manufacture of war munitions, ships, railway supplies, boilers, metal furniture, implements and tools this same process makes possible many striking economies—gives neater, stronger joints at less cost.

*No matter what other welding method you now use, a Prest-O-Lite outfit put to work in your shops will speedily pay you profits. Write for special literature and data—now. Address Dept. C 107.*

#### The Prest-O-Lite Co., Inc.

Canadian General Offices: 913-14 C.P.R. BUILD-  
ING, TORONTO

Direct Factory

Canadian Plants:

Branches:

Toronto, Ont.

Toronto, Ont., Merritton, Ont.

Montreal, P.Q.

Winnipeg, Man.

Merritton, Ont.

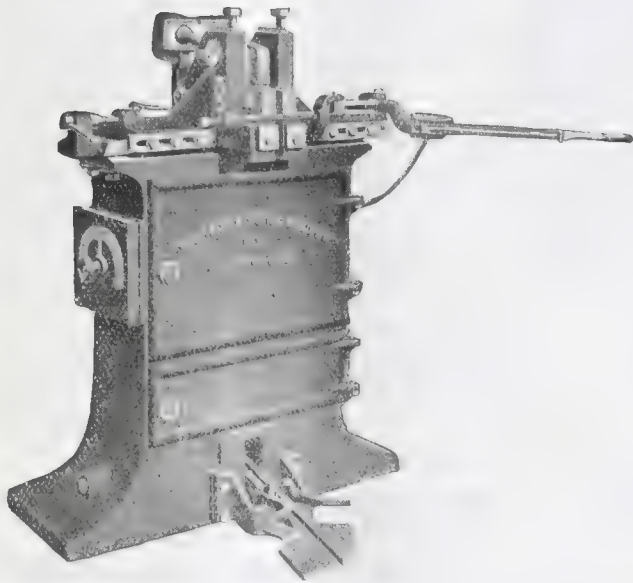
Shawinigan Falls, P.Q.

Winnipeg, Man.

(Under Construction)



Thomson Process  
**Electric Welding**

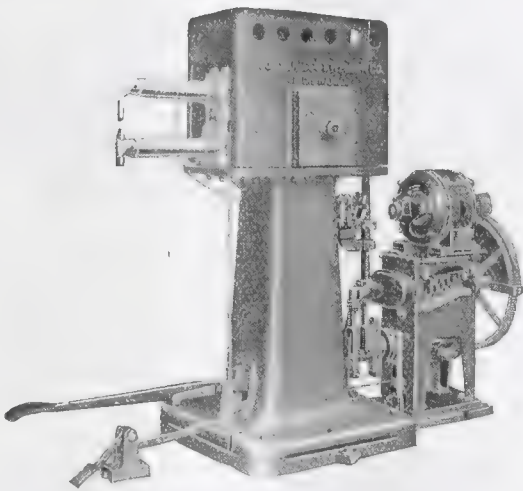


## Adopt a "Thomson" For Your Work

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 this 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.

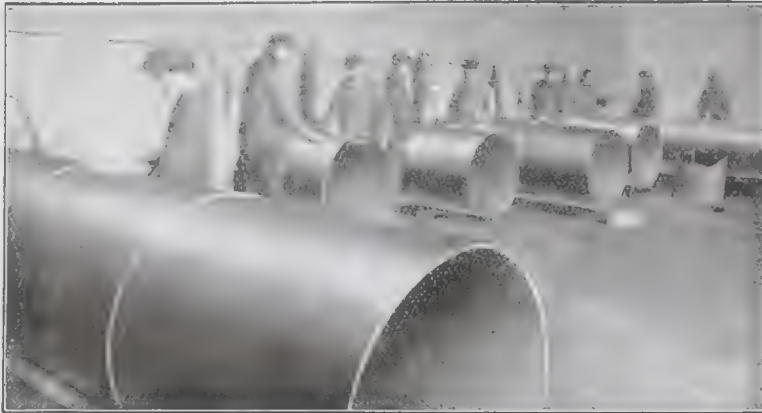
Canadian Sales Offices, 311 Falls Street, Niagara Falls, N.Y.

Thomson Process  
**Electric Welding**

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



# Strength, Durability and Low Cost



Welding Shells for Large Water Mains.

are three essential features of all metal constructional work, and which invariably differentiate the article that is manufactured and produced by means of

## Oxy-Acetylene Welding

This fact is indisputable, and is why, during the comparatively short time since its inception, nearly all leading Canadian Manufacturers and others employing running machinery, have taken advantage of the benefits it offers in their manufacturing process and for the reclamation of broken machinery, etc., or for any other purpose that necessitates the joining of two pieces of metal.

### Oxy-Acetylene Welding gives a better Product at a Lower Cost

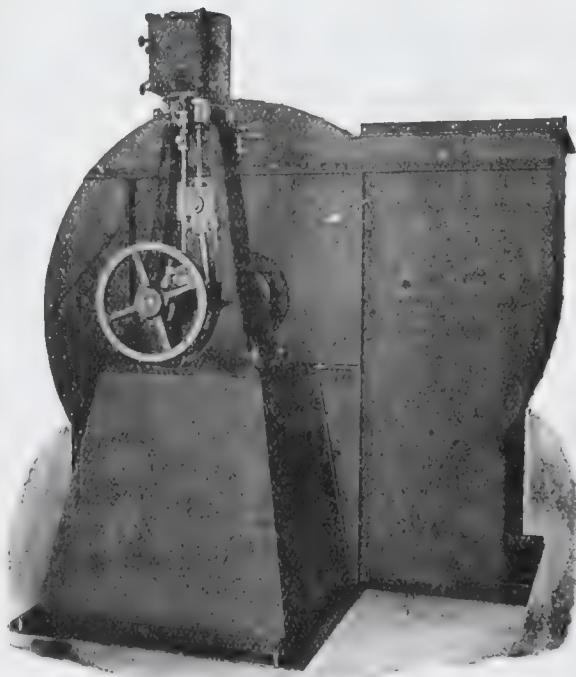
Why not take advantage of this fact? The initial cost of an Oxy-Acetylene Installation for Welding and Cutting metals is incomparably less than the money saved, and for the reduction of maintenance costs of machinery in any Plant it is a permanent investment that often saves the total outlay the first time it is used. Further proof on application.

Write to-day for full particulars—no obligation.

## L'AIR LIQUIDE SOCIETY

THE PIONEERS OF THE PROCESS  
FACTORIES THE WORLD OVER

Canadian Factories: TORONTO MONTREAL WINNIPEG HALIFAX, Factory under construction



# HEATING and VENTILATING

"Keith" Fans will be found more economical and have a greater efficiency where conditions are unusually severe, because they possess advantages over other Fans used for the same purpose.

The "Keith" Fan is the one that will give you continued and unqualified satisfaction.

Our New Catalogue No. 55 has just come from the Press. Tell us where to address it and you will receive one by first mail.

## SHELDONS LIMITED, Galt, Ont., Canada

Toronto (Canada) Office: 609 Kent Building.

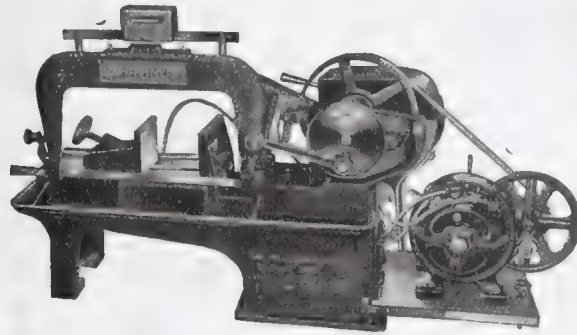
Messrs. Ross & Greig, 412 St. James St., Montreal, Que.  
Messrs. Walkers, Ltd., 259-261 Stanley St., Winnipeg, Man.

#### AGENTS:

Messrs. Gorman, Clancy & Grindley, Ltd., Calgary and Edmonton, Alta.  
Messrs. Robert Hamilton Co., Ltd., Bank of Ottawa Bldg., Vancouver, B.C.

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





# RACINE

All bearings long, heavy and adjustable, so that you can take up any wear that may occur from time to time.

Saw frame guide of heavy semi-steel that will not spring. It holds the saw frame rigid, insuring accurate cuts.

*Write Us*

**Racine Tool & Machine Company**

15 Melbourne Ave.

Racine, Wis., U.S.A.

# KEMPSMITH

## UNIVERSAL MILLING MACHINES

Every Kempsmith Milling Machine of whatever size, is provided with a slotted spindle nose for positive drive of arbor and for positive drive of face milling cutter in either direction.

Every machine is equipped with our patented keyed overhanging arm which insures positive alignment of arbor and boring bar and also prevents the cutter being pounded out of line under cut.

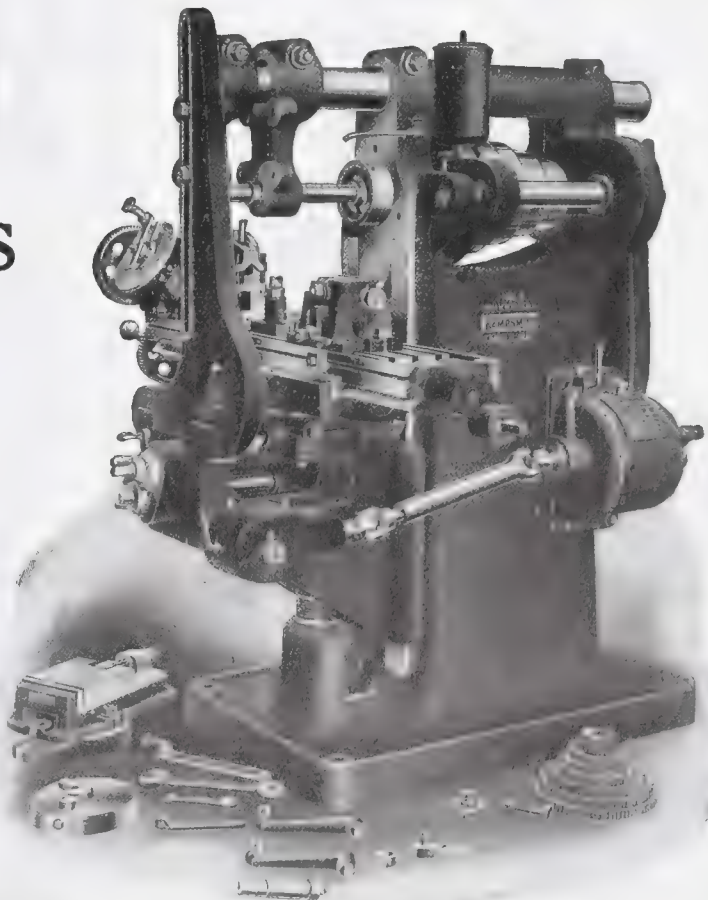
Kempsmith machines are heavy, with weight well distributed and their accuracy is guaranteed within very close limits.

*Send for Illustrated Catalogue.*

**Kempsmith Manufacturing Co.**  
MILWAUKEE, WIS., U.S.A.

**AGENTS:**

Foss & Hill Machinery Co., Montreal.  
General Supply Company, Toronto and Ottawa.  
Canadian Western Foundry & Supply Co., Calgary, Alta.



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



# Universal Gear Hobber

The machine which completes our lines to cut all types of small gears except internal, within 10" dia. S Pitch.

The Bilton Gear Hobber will cut spur spiral gears, worm gears, also various special shapes of teeth. It can cut a spiral gear on end of a shaft 1 1/2" diam. 24" long.

## SPECIFICATIONS

- Capacity Gears: 10 Diametral Pitch
- 10 in. Outside Diameter
- 10 in. Width of Face
- Range of hob feed 50-250 R.P.M.
- Range hob feed to each rev. of worm .010 to .125
- Drive: 3 Steps Cone Pulley; 2 1/2 in. Belt
- Weight 2,100 lbs.

A machine of latest design, introducing new features which increase production without sacrificing accuracy. The hob is cutting continuously; operation of machine entirely automatic.

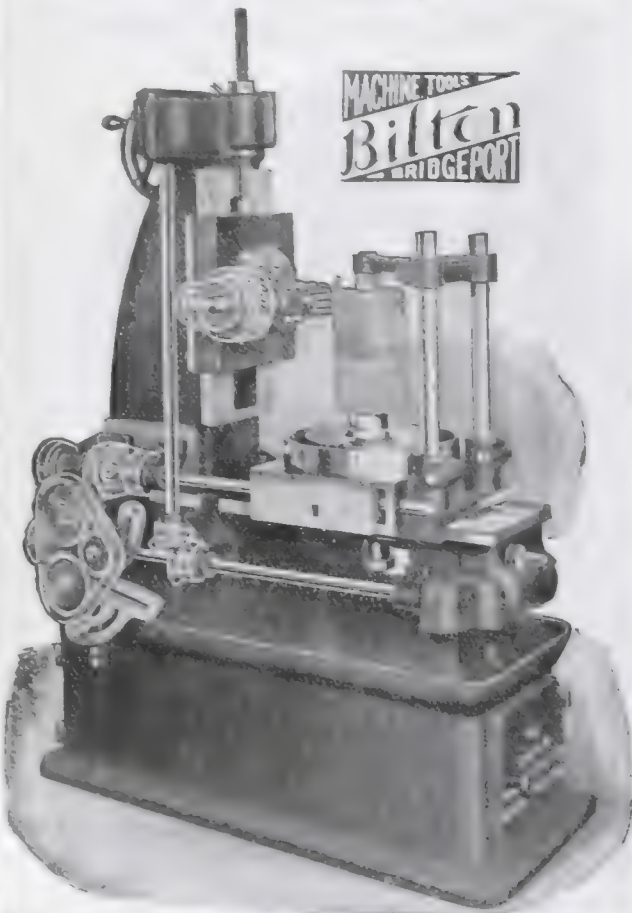
## DELIVERY

A few of these machines are now available for October delivery.

See *Illustration of this machine No. 20, and Bulletin describing this machine.*

**The Bilton Machine Tool Co.**  
Bridgeport, Conn.

Foreign Agents: Alfred Herbert Ltd., M. Mett Engineering Co., Chas. Churchill & Co.



## DOUBLE SAVINGS

in cutting on PEERLESS HIGH SPEEDMETAL SAWS;  
they save both Time and Material.

Supposing you save only 1.00 on each cut, 20 lbs. of material are saved on 100 cuts of 10 in. metal. Your savings may be several times 1.00.

Have you ever tried to consider the waste of material in wide cuts, resulting in 100 percent loss that will pay for a PEERLESS in a short time?

There is no other saw on the market for so many different sizes and high accuracy being obtained, the PEERLESS. Try many other saws but you will be disappointed after comparative test.

Write for a list of names of these machines may be working in your vicinity. A careful examination always arouses enthusiasm.

**PEERLESS MACHINE CO.** 1607 Racine St.  
RACINE, WIS., U.S.A.



# WELDING

## Oxy-Acetylene or Electric

**A**N EFFICIENT staff of consulting engineers; portable electric and oxy-acetylene welding apparatus; ability to undertake the most difficult welding on any metal of any nature: these are features that are at your disposal at any time.

Our consulting engineers will help you to decide the most economical manner in which your particular work may be accomplished.

Marine repairs undertaken by our Marine Welding Tug, Albert C., which is equipped with electric and oxy-acetylene apparatus, together with complete compressed air plant.

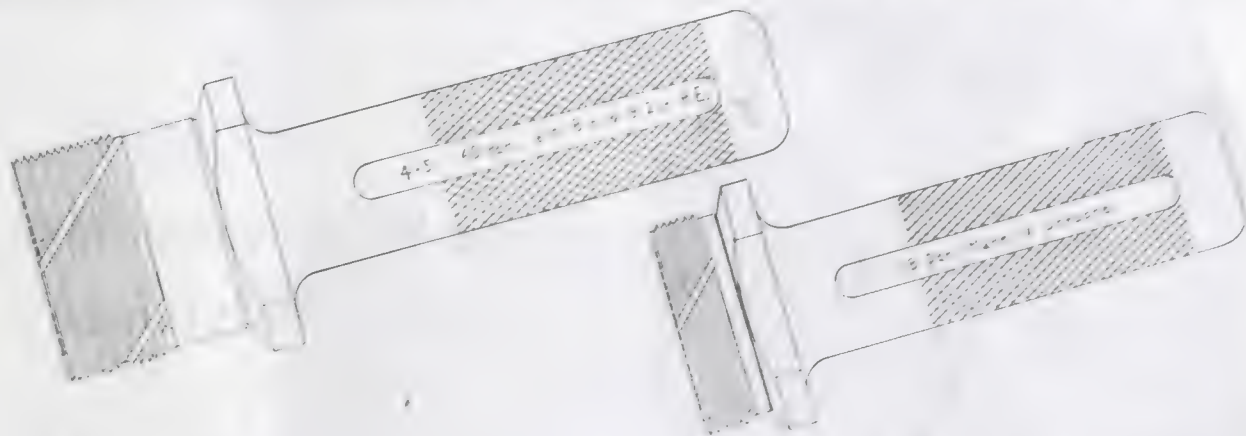
*Get in Touch with Us.*

## The St. Lawrence Welding Co., Limited

MONTREAL QUEBEC CANADA  
Office—138 Inspector St. Telephone—Office: Main 5779  
Works 39 Olier St. Manager's Res.: West 3483



# FUSE HOLE GAUGES

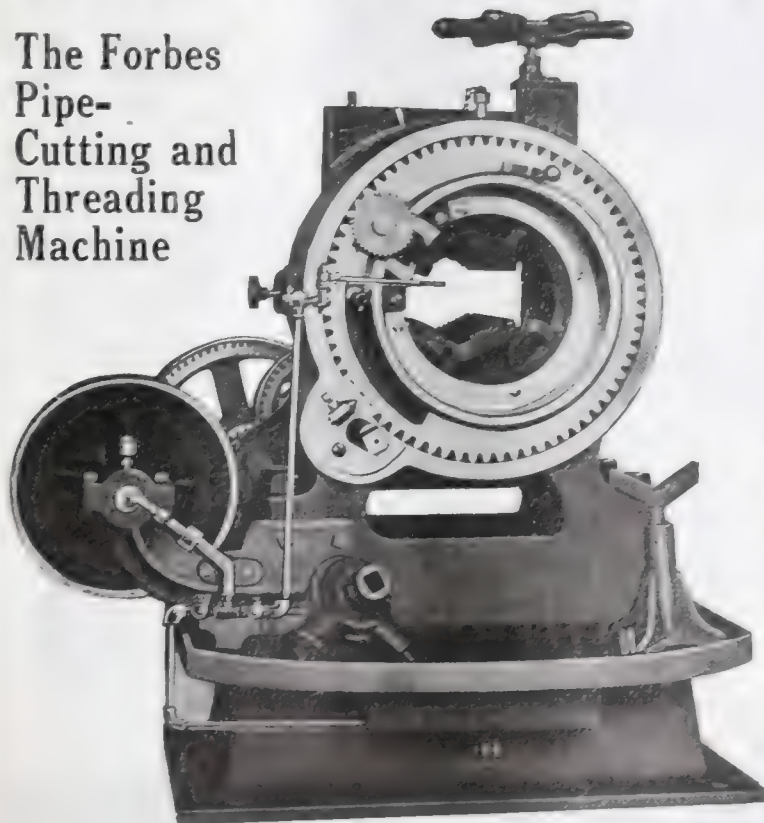


Manufacturing and inspection fuse hole gauges for all size shells. A surplus stock enables us to ship immediately.

**Windsor Machine & Tool Works**  
Windsor, Ontario

# CUTS THREADS FAST, CLEAN and TRUE

The Forbes  
Pipe-  
Cutting and  
Threading  
Machine



*One man can do the work of six against old Stock and Die method of cutting*

There are no complicated assemblies—there are dies that set long threads every day for Forbes' Users. Inquire for yourself. Investigate its performance closely and you can't help but admit its superiority, and its working value.

**Inexpensive to Operate**

It is simple, sturdy, self-contained and all bearing parts are self-lubricating. One man can remove it and cut down pipe work of any size taken right to the job.

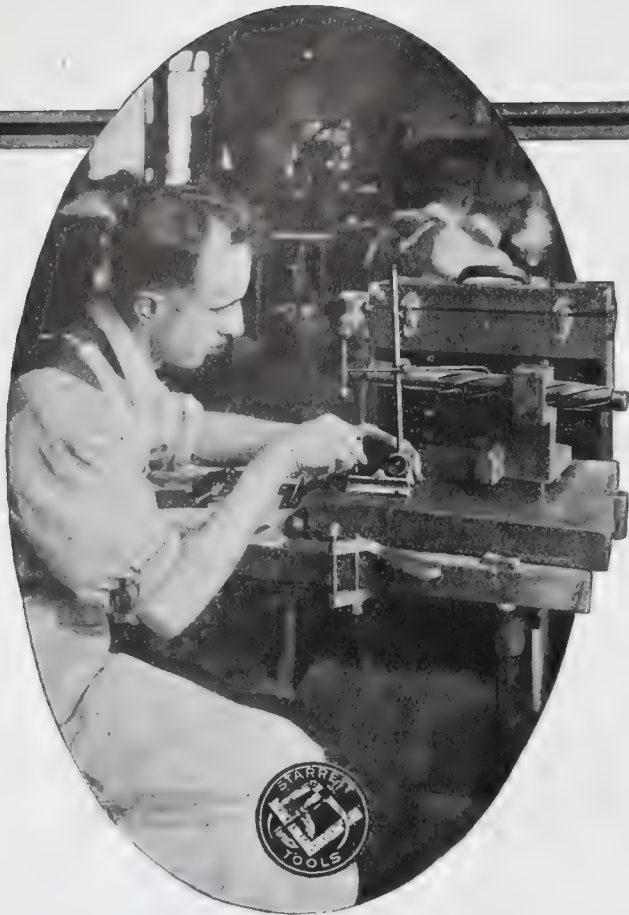
It has self-feeding rollers that hold the pipe steady while the die cuts the threads around it. The latter are changed and placed in a frame of the tool.

*Write for our latest bulletin giving full details.*

**THE CURTIS & CURTIS CO.**  
Garden Street, Bridgeport, Connecticut, U.S.A.

If any other material is desired, please refer to our catalogue and specifications for full details.





## More Work, Fewer Men, Quality Maintained

The same demands that are now filling our factories with orders are taking away the very men who could do the work. Those men who remain must do more work. But accuracy cannot be sacrificed to speed.

Accuracy is more important than ever. Each step in a process must be made sure. In maintaining high standards

## Starrett Tools

have played a large part. The finest mechanics the world over use them and know them to be reliable.

To meet every need there are 2100 styles and sizes of micrometer calipers, vernier height gages, depth gages, caliper squares, rules, squares, calipers, test indicators and many others.

All are described in our free catalog. Ask for Catalog No. 213.

## The L.S. Starrett Co.

*The World's Greatest  
Tool Makers*

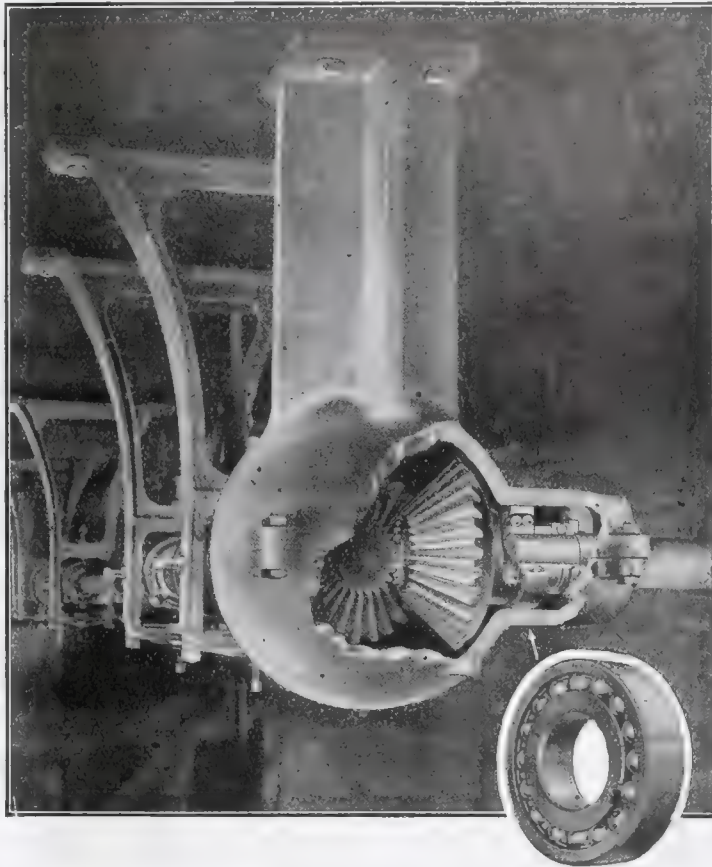
ATHOL - MASS.  
NEW YORK LONDON CHICAGO



42-723



# SKF



**I**N designing the stoker drive for the Niagara Power Station the engineers were not content merely to provide bearings that would operate reasonably well—they demanded every provision for certain and economical operation of the stokers.

They realized that a stoker drive must stand heavy loads and shocks. There must be no chance of failure, no binding, no hot boxes, no breakdown.

Here is a view of a drive shaft and a connecting shaft in the Niagara Station. The gear case is cut away to expose the mitre gear and one set of S K F Bearings. All of the shafting is supported by S K F Ball Bearing Hangers.

This illustrates the strict attention engineers now pay to the elimination of journal friction.

**CANADIAN SKF COMPANY, LIMITED, Toronto, Ont.**

SALES AGENTS:

**THE CANADIAN FAIRBANKS-MORSE CO., LIMITED**

St. John

Quebec  
Winnipeg

Montreal  
Saskatoon

Ottawa  
Calgary

Toronto  
Vancouver

Hamilton  
Victoria

Windsor

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



# For Polishing Stove Tops

The polishing of stove tops on automatic machines is an interesting operation, and one where the quality of the work done depends largely upon the selection of the grinding wheels and abrasives.

The photograph shows a stove top set on an automatic machine and being roughed by a 10 x 2 x 1 Crystolon wheel, grain 90, grade O.

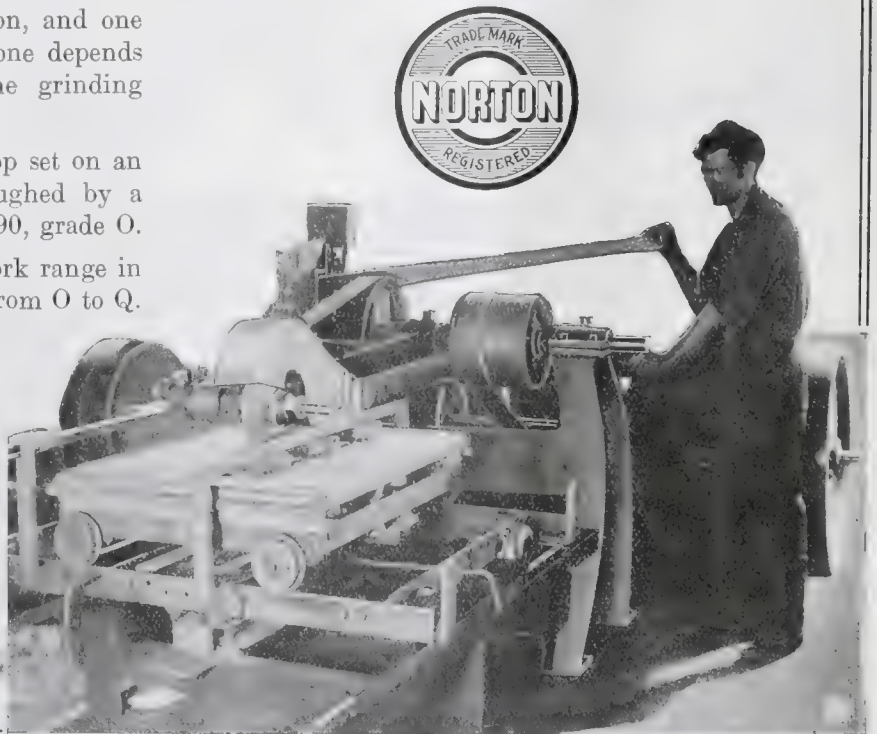
The wheels usually sold for this work range in grain from 60 to 90 and in grade from O to Q.

Crystolon grain is the abrasive used for the final polishing operation.

## Norton Company Worcester, Mass.

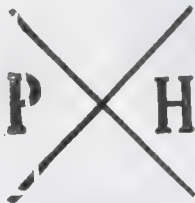
Canadian Agents: The Canadian Fairbanks-Morse Co., Ltd., Montreal, Toronto, Ottawa, St. John, N.B., Winnipeg, Calgary, Saskatoon, Vancouver, Victoria. F. H. Andrews & Son, Quebec, Que.

ELECTRIC FURNACE PLANTS  
Niagara Falls, N.Y. Chippawa, Ont., Canada



May We Repeat

THAT



## QUALITY FILES

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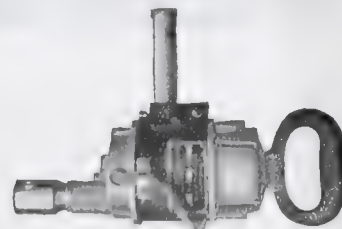
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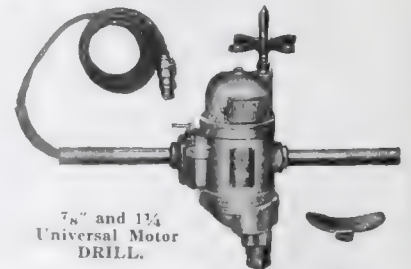
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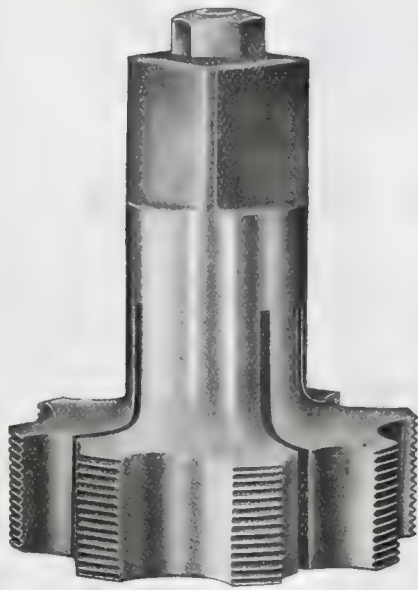
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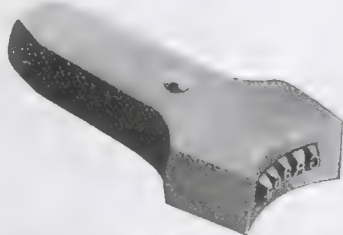
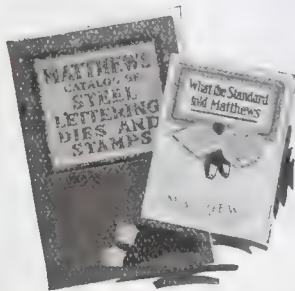


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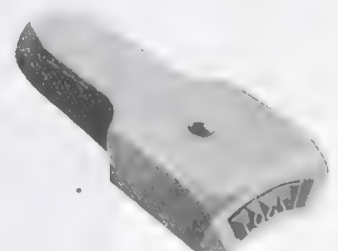
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# Manufacturing Uses of Low Temperature Electric Ovens\*

By C. F. Hirshfeld\*\*

*The utilization of electric heat on a large scale found excellent opportunity in the japanning of automobile bodies, and investigation of the reasons for the superior quality of product has yielded much valuable information. Following a detailed description of the art of japanning, the author deals with the application of low-temperature heating to foundry work and indicates the economies and improvements possible by its use in this industry.*

THOSE who have become familiar with the various uses of electric furnaces of one sort and another have come to recognize the fact that, in a general sense, the electric furnace can not be considered a commercial competitor of furnaces heated by combustion. The use of the electric furnace must make possible the attainment of something unattainable by combustion methods or else there is no possibility of its being used in place of the older type excepting, possibly, under very unusual conditions as to the relative costs of fuel and electrical energy.

If this is true of high-temperature processes such as are commonly associated with electric furnaces it needs no argument to prove it true for low-temperature processes in which combustion methods have a greater advantage on an energy cost basis, because of the lower temperatures at which the products of combustion can be discharged.

This condition is frankly admitted, and it should be understood at the start that it is not the intention of this paper to urge the general substitution of electric heating for combustion heating in low-temperature processes in general, or in some low-temperature processes exclusively. There are certain low-temperature processes which, under certain circumstances, can be conducted to better commercial advantage by means of electric heating than is possible by means of combustion heating, and it is the purpose of this paper to point out some of these processes, some of the phenomena connected therewith which indicate the advisability of heating electrically, and some of the possibilities which electric heating unfolds.

## Electric Heating Not New

The term low temperature is not exact, but for present purposes may be taken as referring to temperatures below about 290 deg. C. (554 deg. F.). Such temperatures are below practically all commercial metal-melting temperatures but are common in numerous baking and drying operations which form a surprisingly large part of industrial processes.

The exploitation of electric heating for such low temperatures in industrial practice is really comparatively old, since numerous small electrically heated appliances operating at such temperatures have been used as a matter of convenience in manufacturing establishments for a number of years. During the past few years, however, the use of electric heating

for such temperatures has been adopted in cases calling for the installation of equipments with capacities ranging from several hundred to several thousand kilowatts. This is obviously a different sort of a proposition, and must be based on a far broader consideration than mere convenience.

The best example of the extensive adoption of electric heating for low-temperature work is furnished by the electric japanning equipment installed during the past few years. For this reason this in-

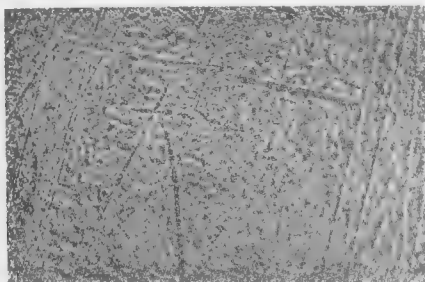


FIG. 1.

dustry will be discussed at some length.

The name "japan" originally referred to a sort of liquid lacquer or varnish made from vegetable sources in Japan and used as a protective or decorative coating on objects made of wood and other materials. This original japan was converted into a hard, brilliant material by exposure to sunlight. At the present time the word japan is used as a sort of collective title for a number of paint-like materials which are intended to be baked at various temperatures between 100 deg. C. (212

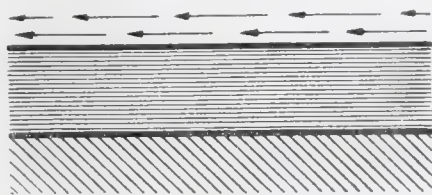


FIG. 2.

deg. F.) and 260 deg. C. (500 deg. F.) and which are generally used for decorative or protective coatings on metal objects.

Originally, these baking japons were much like varnishes to which pigments had been added, but as the development of industry made more and more specific demands the number of japons manufactured was greatly increased and many different type formulas were adopted. At the present time one can purchase under the name of "japan" materials varying all the way from combinations of pigments with driers, linseed oil and expensive

gums to materials which are little more than Gilsonite or other asphaltic compound carried in a suitable solvent with enough oil or similar material to make it resilient after baking. Driers are often included in the mixture, but this is not a universal practice.

The changes which occur during the baking of these japons are very complicated, and are not yet entirely analyzed from the scientific standpoint. It is certain that the solvent partly or wholly evaporates during the baking, and it is also certain that the oils and gums undergo oxidation and polymerization. It is also probable that complicated reactions occur between the numerous varieties of hydrocarbons and hydrocarbon derivatives present in the mixture.

The general lack of exact knowledge is shown by the fact that few, if any, makers of japan can predict the behavior of their materials under unusual conditions.

At the present time a number of chemists who have been specially trained in the technology of paints and varnishes are at work on japons, and it is probable that more exact information with regard to these materials will be available in the future.

## Former Status of Japanning

When electric baking of japan was first considered a few years ago, it was found that practically all japanning practice was of an empirical character. Moreover, no two japanners seemed to agree upon the proper methods of applying and baking a given japan even when all essential variables, such as weight and character of work, were the same. Discussion of the various problems with many users and with many makers of japons brought out the fact that practically all agreed upon certain rules and regulations, but that there was a large mass of so-called trade secrets which were, partly or wholly, mutually contradictory.

Obviously, this particular art had not yet progressed beyond the empirical state. Scientific analysis had not been extensively undertaken, no consistent mass of scientifically accurate facts had been accumulated, and operators were hired on the basis of a self-advertised collection of rules of thumb combined with most wonderful and weird imaginary charms of various sorts for insuring excellent results. The executives responsible for factory production were entirely at the mercy of these self-styled experts, some of whom were really remarkably clever men, but many of whom could really lay no claim to such a title. It is not surprising that under such conditions, the japanning room should have been a source of constant

\*Paper presented at the general meeting of the American Electrochemical Society, Detroit, 1917.

\*\*Chief of Research Department, The Detroit Edison Co.



worry. On one day very satisfactory results were obtained, and on the next all sorts of imperfections appeared.

In many establishments an average rejection of as much as 10 per cent. of the finished work was regarded as a characteristic of japanning processes and was taken as a matter of course. In some instances on record rejection of over 50 per cent. for several days in succession occurred at irregular intervals.

After many abortive efforts to find means of studying what actually occurred during baking it was decided to resort to the microscope, in the hope that surface structure might throw some light on the matter. The results obtained greatly exceeded anticipations.

#### Microscopic Structure

A typical structure resulting from baking japan slowly in a direct-fired gas oven is shown in Fig. 1. This is a reproduction of a microphotograph. The straight and curved lines have no significance, the pock-marked surface being the feature of interest. Several perfect craters, which show at different points in the figure, indicate the probable origin of the pock marks as collapsed craters.

The formation of these craters seems to be typical of all baking methods in which the heating is done by means of hot gases bathing the work. It is possible that their occurrence may be explained by what may be called sub-surface vaporization. Imagine, for instance, that the diagonally hatched part of Fig. 2 represents a part section of a piece of metal and that the horizontally hatched part represents a section through a coat of japan applied to the surface of the metal. Assume now that hot gases, such as heated air or hot products of combustion, pass horizontally over the surface as indicated by the arrows.

It is obvious that vaporization of the solvent will occur at the surface of the liquid japan and that the temperature of the surface will be raised rapidly. Chemical change will, therefore, occur first at the exposed surface, and it seems probable that this surface films over rapidly.

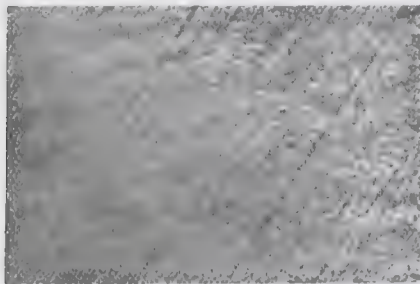


FIG. 3.

The condition would then be similar to that in a can of paint which has been left open to the atmosphere for several days; there would be a rather tough film on the side next the air with practically unchanged material below. If a can of paint in this condition be imagined to be heated from below to such an extent as to cause vaporization of some of the constituents one of two things must happen;

either the vapor must work its way along the under side of the film until it reaches the walls of the can and escapes or it must blow a crater in the film and escape in that way. In the case of japanned surfaces heated from the outside such subsurface vaporization could only escape through the surface, as there is ordinarily no break such as occurs at the wall of the can assumed above. The microphotograph reproduced in Fig. 1 would seem to indicate that vapors do escape through the surface while this is still in a somewhat plastic condition.

These craters are probably partly self-sealing, as the process is ordinarily conducted, but it is obvious from the illustration that the healing is not perfect. A collection of such craters is all that is necessary to account for poor gloss and poor weathering qualities.

It would be expected that the crater formation would be least severe with very long bakes, with gradually rising temperature, that it would be most severe with short time bakes and steep temperature gradients, and that a very short bake might actually result in pushing off flakes of the crater surface. No evidence of such flaking has been found, but finished work has been known to flake in a way which suggested a possibility of such a cause.

In Fig. 3 is shown a microphotograph of a piece of work directly comparable with that shown in Fig. 1. The metal was exactly the same in both cases, the pieces were prepared and dipped in the same japan, at the same time by the same man. They were dipped exactly alike and then baked, one in a direct-fired gas oven for 90 minutes and the other in an electrically heated oven for 45 minutes. It is obvious that the electrically baked piece has smaller and more evenly distributed craters, and that the surface is more perfect.

Similar comparative photographs of second and third coats show far more perfect surfaces resulting from electric heating. Reproductions of microphotographs of the fluid coats are given as Figs. 4 and 5. It is perfectly obvious that the electrically baked coat shown in Fig. 5 is much smoother and more perfect than the other which was baked by pure convection heating. It should be noted that many, if not all, of the large black spots which show in these two figures are small particles of carbon and that they were probably thrown out of the volatiles by a species of cracking, in contact with the air used for ventilation.

#### Remarkable Time Saving

It is interesting to note that the baking of the coats in the gas oven consumed a total of 5½ hours while the three corresponding coats were baked electrically in 2 hours and 40 minutes.

Inspection of pieces baked in direct-fired gas ovens and similar pieces baked in electrically heated ovens always shows that the electrically baked material has a higher and more perfect gloss or finish.

This could be accounted for by assuming some action between products of combustion and the japan itself, and some

evidence seems to indicate such action under certain conditions. However, in view of the microphotographs already referred to and the explanation given to account for the craters, it seems more likely that the difference is due to the way in which heat is applied.

As a matter of fact, practically all heat transferred to the work in a direct-fired gas oven is carried to it by hot gases, that is, the transfer is by convection. In an

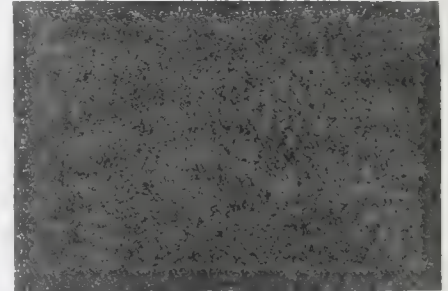


FIG. 4.

electrically heated oven at least part of the heat is brought to the work in the same way because of the circulation of oven atmosphere set up by the presence of the heaters. The rest of the heat is transferred by radiation from the hot heaters, and it seems probable that the action of the heat received in this way is different from that received by convection. It is at least probable that radiant energy penetrates the japan coat to a considerable depth before being entirely absorbed and converted into heat, and this causes more rapid setting of the inner portions of that coat.

If craters are due to the causes assumed above, it should be possible to eliminate them entirely by baking the japan in a reversed direction, that is, from the inside out. This can be done electrically by heating the metal itself either by the direct passage of current or by induced eddy currents.

#### Methods of Applying Heat

Certain experiments were conducted on a small scale for the purpose of determining the relative effects of baking by pure convection, baking by combined radiation and convection and baking by heating of the metal itself. For this purpose similar samples, dipped in the same japan, were baked in bottles. For convection baking filtered air was heated in an electric oven to the proper temperature and was then drawn through a bottle in such a way as to make it bathe the enclosed sample. For combined convection and radiation, the sample was surrounded by electric heaters enclosed with it in a bottle, the volatiles being drawn off and circulation being maintained by means of a small laboratory pump. For baking by internal heating the bottle and its enclosed sample were suspended in an alternating magnetic field of sufficient intensity to give the desired temperature gradient. During baking volatiles were removed by a small laboratory pump as before.

Inspection showed the sample baked by convection heating to have the poorest



surface and that baked by internal heating very obviously had the highest gloss and most perfect surface. It was hoped that reproduction of micro-photographs of these samples could be given in this paper, but it was unfortunately impossible to prepare them in time for inclusion.

It is of particular interest to note that baking by internal heating is essentially an electric method, and that it is far removed in every way from methods previously in use. It is further important to note that with this method a maximum metal temperature of the order of 170 deg. C. (338 deg. F.) and a bake of 15 minutes are perfectly capable of giving better results than can be obtained with external electric heating with 45-minute bake and a maximum temperature of 230 deg. C. (446 deg. F.). It seems probable that one coat baked in this way will prove the equal of two or three baked by the older methods. The effect of all this upon energy charges for a given weight of metal baked is perfectly obvious.

It seems hardly necessary to discuss at greater length the various phases of the japanning art. It should be evident that electric heating opens up opportunities for improving the product and the production methods used in obtaining that product. It should also be evident that electric heating is capable of reducing factory operations in this field to so exact a procedure that accurate laboratory control is made possible. With industrial conditions brought to this point it becomes possible for research chemists to work to advantage toward the improvement of the japans themselves and toward the improvement of the methods of their utilization.

#### Application to Foundry Work

An equally promising field exists in foundry core rooms. The baking of foundry cores is at present a most haphazard process in the majority of foundries. A casual inspection of one batch of exactly similar cores will generally show colors

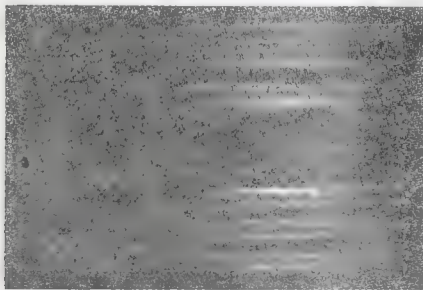


FIG. 5.

varying from a light tan or even lemon-yellow to a dark chocolate brown. One of the numerous varieties is certainly better than all the rest, and it would seem desirable to determine which one is the best for a given set of conditions and then to make all of them like it.

Preliminary experiments conducted for the purpose of discovering whether the essential properties of cores varied as greatly as their colors gave most astounding results. Strength was taken as reference in this case, although admittedly it is only one of numerous properties which must be considered in defining a perfect core.

One set of experiments was made upon

exactly similar cores, made of the same materials and tamped to the same extent. They were baked at different rates and also with different maximum temperatures. Curves of strength plotted against time of bake and also plotted against maximum temperatures were sharply domed in all cases, and showed variations of several hundred per cent. in any one case. Samples of these cores were shown to experienced foundry men after rupture, so that both exterior and interior were visible, and they picked out as good cores which had shown relative variations of over 100 per cent.

Another set of experiments was made to determine the effect of air circulation. Again a number of exactly similar cores were tested. Baking methods were alike in every respect excepting for the quantity of air drawn over the core during baking. Strength of core was plotted against quantity of air passed in unit time, and again a sharply domed curve was obtained. Apparently, excess air is detrimental, though not to the same extent as a deficiency of air. What is most important is the demonstration that some definite quantity of air gives the best results.

#### Probable Developments

It seems probable that investigation will show that porosity, brittleness, character of surface, and all of the other properties which must be considered in connection with cores will be affected in some such way as strength has been shown to be affected by the variables studied. If this is true, it certainly seems as though the foundries which carefully study their production methods and costs will ultimately demand more perfect control of the core-baking process. When this time arrives it seems probable that electric heating will play a part similar to that which it has played in the japanning field during the past few years.

As a matter of fact, there are now in operation several electrically heated core-baking ovens, and their users all appear highly enthusiastic over the results attained.

The core problem appears to the author as one of the most promising fields for combined chemical and engineering investigation, and he feels certain that improvements such as those shown possible in japanning will appear insignificant in comparison with these which are possible of attainment in the core room.

Japanning and core-baking have been used as examples because of the tremendous extent of both of these industries, and because it happens to be possible to record the results of a small amount of experimental work in both of these fields. It must not be assumed, however, that they represent the only possibilities for the application of electricity to low-temperature baking.

There are numerous other low-temperature baking processes, and the majority are in the same undeveloped state as are the two cited above. One very important field in which little has been done is the baking of food stuffs, such as bread and other cereal products. Electric heating has been applied to the baking of such materials in several cases with very gratifying results, improving both the appearance and quality of the product.

In conclusion, it is well to call attention to the fact that the introduction of electrical methods for such purposes as enumerated above should be of particular interest to the chemist, because it makes it possible to reproduce on an industrial scale a sequence of operations and conditions which have been worked out on a small scale in the laboratory. It makes it possible to control industrial production to the same extent that laboratory investigations are controllable, and it thus opens to the chemist in the industrial field a tremendous opportunity for improvement of product and increased production.



#### RAILWAYS' HANDICAP INCREASING

"THE returns of railway revenues and expenses for June and for the first six months of the year 1917," says the Railway Age Gazette, "show that the railways of the United States are still breaking all previous records except in the vitally important item of operating income, which represents what is left, after expenses and taxes are paid, as a return on the capital invested and therefore determines the credit of the railways and their ability to finance improvements or additions to their facilities.

"They are, therefore, in much the same position as the man whose pay has been raised, but not quite enough to keep up with the increased cost of living.

"Total operating revenues for June were greater than in any previous month in history, the total of \$349,739,636 being about \$4,000,000 greater than for May, in which the highest earnings for a month were previously recorded, and \$49,720,256, or 16.3 per cent. per mile greater than for June, 1916, but the figures for six months of the year show a decrease in operating income per mile of 4.2 per cent., as compared with the first six months of 1916. The total revenues for the six months were over \$201,000,000 greater than in 1916, but expenses were \$207,000,000 greater, taxes were \$12,500,000 more, and the operating income was therefore over \$18,000,000 less.

"These facts explain clearly why the stocks of some of our best railroads are selling at prices less than when the exchanges closed in July, 1914, and why in the same week that the figures were issued by the Interstate Commerce Commission, Pennsylvania fell below par for the first time in twenty years.

"For the month of June total operating revenues reached the record figure of \$1,514 per mile of line, as compared with \$1,301 in June, 1916, and \$1,498 in the month of May of this year. This was an increase over June, 1916, of 16.3 per cent. Operating expenses, \$1.020 per mile, increased 19.8 per cent. per mile over June, 1916, but were slightly less than for May, thereby reflecting the remarkable improvement in operating efficiency being obtained in the way of securing increased tonnage and mileage



for each freight car and locomotive in service. It is a noteworthy fact, however, that the decrease in expenses in June as compared with May is largely accounted for by the expenditure of \$10 a mile less for maintenance of equipment.

"Operating income for June was \$422 a mile, 8.1 per cent. greater than for June, 1916. Taken by themselves the June figures make the best showing of any month this year, although for the roads in the eastern district operating income per mile decreased 1.4 per cent.

"When the six months' figures are compared, however, the effect which the unprecedented increases in expenses of all kinds are having, in spite of the stupendous increase in the volume of business and in gross earnings, becomes plainly apparent. Total operating revenues were \$1,898,210,538 as compared with \$1,697,051,238 in the first six months of 1916, an increase per mile of line of 11.6 per cent. Operating expenses were \$1,354,295,438 as compared with \$1,147,093,778, an increase for mile of 17.7 per cent. Net operating revenue was \$543,914,600 as compared with \$549,957,460, a decrease per mile of 1.4 per cent., while taxes increased from \$76,241,598 to \$88,936,624, or 16.3 per cent., and the operating income was \$454,661,633 as compared with \$473,295,808, a decrease of 4.2 per cent.

"The biggest increase in expenses is naturally found in the cost of conducting transportation, in which wages and the coal bill are the most important factors. This item shows an increase for the six months of \$147,000,000. Maintenance of way and structures expenses increased \$14,000,000, maintenance of equipment \$35,000,000, traffic expenses less than \$2,000,000, while miscellaneous and general expenses account for an increase of about \$9,000,000. These items make up the total increase of \$207,000,000 in expenses, or from \$4,977 to \$5,761 per mile of line.

"With an increase in earnings of over \$200,000,000 over the calendar year and of over \$400,000,000 over the fiscal year 1916, operating income for the twelve months ending June 30, 1917, was \$20,000,000 less than in the calendar year and only \$40,000,000 greater than for the fiscal year, the increase in what is loosely termed profits being only one-tenth of the increase in earnings."

#### TORONTO HYDRO REPORT

THE Toronto Hydro-Electric system's total income for the six months ending June 30, was \$998,956.40, according to a report made to the Board of Control recently. This was made up as follows:—Lighting, \$345,389.91; power, \$392,110.37; street lighting, \$183,405.30; bull-supply and other municipalities, \$932,630.91; income from sundry sources, \$66,325.49.

The net income from operations of the period was \$353,680.65, which is available for fixed charges. The balance available for depreciation was \$138,-

680.65, being \$14,000 over the corresponding period last year. The volume of new business shows an increase of 15,000,000 kilowatt hours, being equal to 23 per cent. The revenue from the sale of current has increased approximately 16½ per cent. The cost of power purchased shows an increase of 28½ per cent.

#### ONTARIO FIRE LOSSES VERY HIGH

THERE were 852 fires reported in Ontario during the month of July and the total loss during the first seven months of the year is \$6,449,435.

The summary is as follows:

Month	No. of Fires.	Loss
January . . . . .	789	\$ 808,419
February . . . . .	1,020	1,329,369
March . . . . .	765	1,144,373
April . . . . .	666	896,461
May . . . . .	908	1,242,486
June . . . . .	682	515,936
July . . . . .	852	512,391
Totals . . . . .	5,691	\$6,449,435

"The record for July is disappointing," says the Public Service Bulletin. "The number of fires reported (852) is made up largely of lightning fires, which accounts for nearly one-half of the total. The aggregate loss is a little less than June. The chief items are shown above. The monthly aggregate is, however, very much too large."

#### GREAT INCREASE IN CANADA'S TRADE

TRADE figures for August and the first five months of the present fiscal year, made public on Sept. 19, by Hon. J. D. Reid, shows that Canada's great trade expansion continues unabated. Last fiscal year Canada's trade aggregated two billion dollars, but at the present rate the trade for the present fiscal year should be at least 500,000,000 more than last year's great record. For the first five months of the previous fiscal year our total trade was \$768,635,214, while for the corresponding period this year it is \$1,128,274,119. The trade balance in our favor for the first five months of the present fiscal year is \$180,000,000.

The total imports for August amounted to \$91,931,000, as against \$72,331,014 for August last year. For the five months of the present fiscal year, ending with August, our total imports were valued at \$474,031,859, and for the same period last year \$322,198,881. With this increase in our import trade has come a corresponding increase in revenue for August of \$3,075,000, and for the five months, \$17,540,000.

The export trade shows a corresponding increase of from \$96,832,161 in August last year to \$152,563,345 during the corresponding month this year. For five months our export trade totalled \$672,022,649, an increase of \$217,291,385 over the same period last year. Fisheries show an increase for the month of

\$200,000 in export, animals and the produce \$8,000,000, agricultural products \$25,000,000, and manufactures \$27,000,000. There was a slight decrease in exports of minerals, and \$2,000,000 decrease in products of the forest.

#### IRON WEAPONS OF THE AZTECS

WHEN Cortez had completed the conquest of Mexico, the Spaniards, among a great many other peculiar and extraordinary observations which they made in that remarkable country, were particularly struck and puzzled by one fact.

They noticed that the Aztecs possessed certain implements, such as knives, daggers, etc., made of iron, but it seemed that only the most distinguished of the natives possessed such, that iron was a great rarity and was prized higher than gold. At first the Spaniards believed that the Aztecs extracted the metal in some crude fashion from its ore, which abounds in many parts of the country, but they soon ascertained that this was not the case. They found that not a single smelting furnace existed in the empire, and their surprise was not small when they learned that the Aztecs were totally unacquainted with any method of extracting the iron from the ore, which, indeed, they had never suspected of any kinship with the highly valued metal.

The question whence the Aztecs had procured the little iron they possessed became a perplexing problem to the Spaniards, which they were never able to solve. The natives do not seem to have enlightened them much on the subject, for when asked they mysteriously pointed to the sky, and indicated that they obtained their iron from the regions above. Such assertions, no doubt, the Spaniards received with an incredulous smile, and they concluded that the Aztecs procured it by way of traffic from some other, perhaps more civilized, nation which they suspected to exist and kept looking for north and south for more than a hundred years.

It was left to modern science to unravel the mystery. The Aztecs were quite correct; the iron of which they had made their implements was not fashioned from materials of this terrestrial globe, but had come to them from the unknown regions of space. Their iron was, in fact, of meteoric origin, like that of the Mayas of Yucatan, and the Incas of Peru, of which many weapons are still preserved for collections.—Hensoldt.

#### GEAR MANUFACTURERS' CONVENTION

THE American Gear Manufacturers' Association held its semi-annual session in Chicago, Sept. 13-15, special importance being attached to the meeting because of urgency for standardisation in many products due to war demands and conditions arising therefrom. F. W. Sinram, president, opened the sessions at which a number of topical papers were presented by members. Social activities were prominently featured.



# Performing Complex Lathe Work by Turret Lathe Methods\*

Herbert's Monthly

*Extreme urgency of demand coupled with extreme accuracy of dimensions has featured much of the work which in recent months has absorbed the genius and effort of the Allies' technical resources. The accompanying article describes recent English practice, the sequence of operations having been developed to yield results conforming to rigid requirements. The increasing prominence of aeroplane engine manufacture imparts added interest to the data.*

IT IS almost an axiom to state with regard to lathe work that the more complicated and involved it is, the greater are the savings when turret lathe methods are adopted.

The economy of the turret lathe is achieved in several ways:—

By the reduction of time required in setting, due to the use of specially adapted chucks and fixtures.

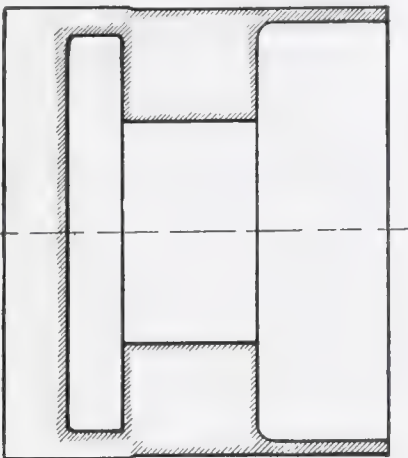
By the fact that a number of cutting tools can be in operation at once, thus reducing the cutting time.

By the saving of the time occupied in changing tools upon an ordinary lathe, all the tools being in position and ready to be brought up to the work.

By the elimination of measurements when the work is in progress by the use of stops.

By the possibility of using different kinds and more efficient forms of cutting

No. 9. Combination Turret Lathe by the following sequence of operations. In the line drawings the shaded portions show the machining at each operation.

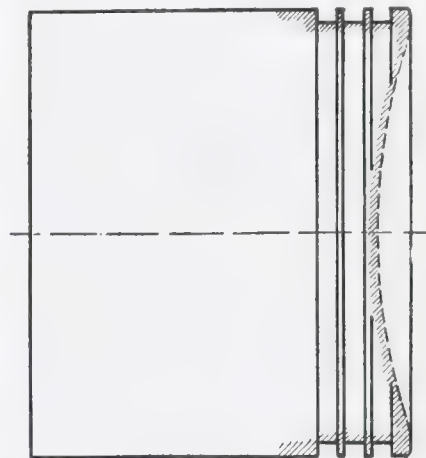


FIRST OPERATION.

**First Operation.**—The blank is held in hard jaws of a 15 in. Coventry Chuck, where it is drilled, counter-bored, recessed, and rough turned as far as the chuck jaws. The time for this operation is 35 minutes.

distort it. The time for this operation is 15 minutes.

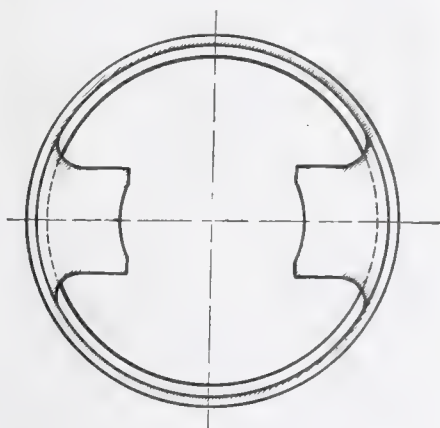
**Third Operation.**—This is done on a slotting machine or a vertical milling machine, where the ring of metal left at



SECOND OPERATION.

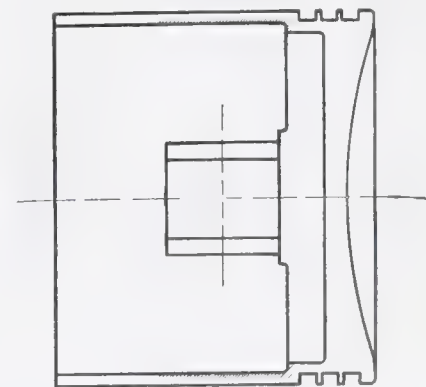
the first operation is removed as shown to form the gudgeon pin bosses.

**Fourth Operation.**—Here the piston is held in a special fixture on the No. 9 Combination Turret Lathe, whilst the gudgeon pin hole is rough drilled, and the bosses rough turned. The latter op-



THIRD OPERATION.

**Second Operation.**—The piston is turned end for end, and gripped by the diameter finished at the previous operation in a draw-back collet chuck, whilst the remainder of the outside diameter is rough turned, the head cupped out, and the grooves rough formed. The collet type of chuck is necessary at this operation, as the walls of the work are thin and a 3-jaw chuck would be certain to



FOURTH OPERATION.

eration is done by means of hollow mills carried on a cutter bar passed through the hole. This operation takes 15 minutes.

**Fifth Operation.**—The convex end of the interior is now formed, the piston being chucked with soft jaws gripping on the outside diameter. The machining time is 15 minutes.

**Heat Treatment.**—Having now been

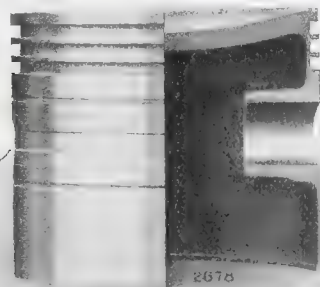


FIG. 1.

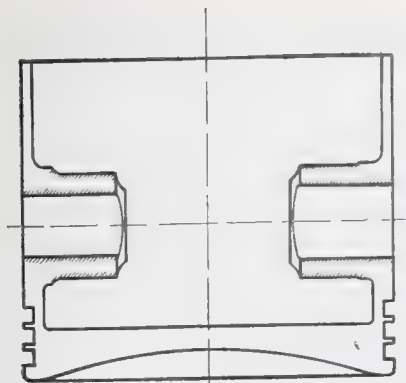
tools than can be employed on an ordinary lathe.

In Fig. 1 is shown an aeroplane engine piston which is made from steel; owing to the necessity of cutting down the weight and ensuring sound construction the ideal way is to make it all in one piece from a solid blank, as designers of aeroplane engines, in striving for the ideally efficient engine cannot allow difficulties of machining to stand in the way of any design which may seem likely to have advantages.

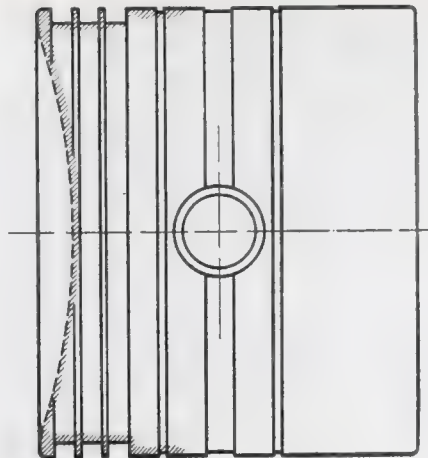
The finished piston is about 5 1/4 in. dia. by 4 3/4 in. long; in the rough the steel blank, which is of 40 tons tensile strength, weighs 27 1/2 lbs. The machining operations at first sight seem formidable, but by the use of specially designed tools and fixtures this work is being handled without difficulty on a

\*Reproduced by courtesy Alfred Herbert, Ltd.

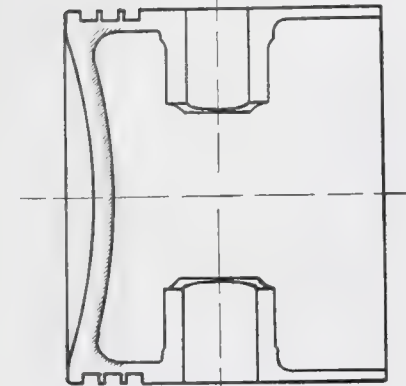




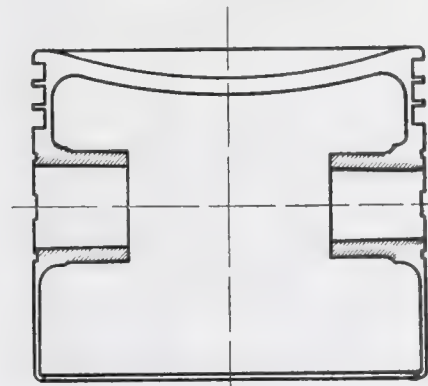
FOURTH OPERATION.



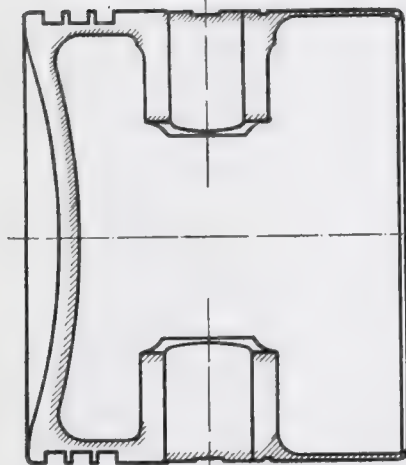
SEVENTH OPERATION.



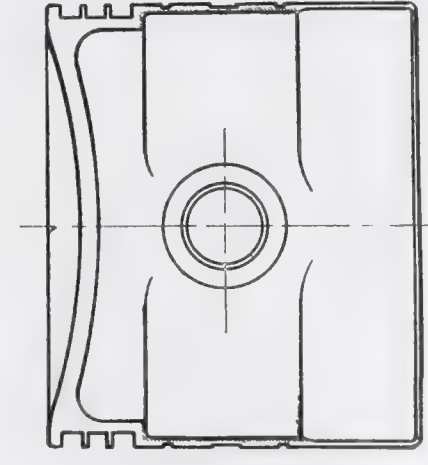
FIFTH OPERATION.



EIGHTH OPERATION.



SIXTH OPERATION.



NINTH OPERATION.

roughed out all over, it is necessary to heat treat the piston in order to normalize the material and remove the machining stresses; after which the machining operations proceed.

**Sixth Operation.**—The piston is chucked as in the fifth operation; the outside is finish turned as far as the chuck jaws, and grooved; whilst the whole of the interior is rebored, recessed and profiled. This operation occupies 60 minutes.

**Seventh Operation.**—At this operation the piston is held in a draw-back collet chuck, whilst the remainder of the outside diameter is finish turned, the cupped end finish faced, and the grooves

finish formed. This operation takes 10 minutes.

**Eighth Operation.**—The piston is now held as at the fourth operation, whilst the gudgeon pin hole is finish bored and reamed taper, the gudgeon pin bosses finish turned with hollow mills as before, and the ends faced up flat. This operation takes 20 minutes.

**Ninth Operation.**—The lathe operations are now complete, and the last operation is to finish mill the walls around the gudgeon pin bosses. This is done on a vertical milling machine.

There remains a little metal to be removed around the gudgeon pin bosses, which cannot be reached by a straight

forward milling machine operation, and this is removed by hand.

The total machining time on the No. 9 Combination Turret Lathe is 2 hours 50 minutes, whilst the finished weight of the piston is 4 lbs.



### INTERNAL GRINDING ON HARD AND SOFT METALS

THE efficient and economical production of holes of accurate diameters and with a good finish in such parts as bushings, gears, cylinders, cutters, gauges, etc., is a problem which is solved most satisfactorily by the use of the internal grinding machine.

While it is true that reaming is more or less successful in soft metals, this method involves large expense for reamers which become undersize very quickly, when accurate limits are insisted upon, and with adjustable reamers there will always be continual variation as to size in the different pieces according to the frequency of readjusting and regrinding the reamers.

With the improvements made in internal grinding machines, the field has been developed and extended to such a degree that not only is it considered good practice to grind hardened work, but also parts made of cast iron, soft steel and bronze, whenever accurately round and straight holes of accurate diameters are desired so that proper uniform fits can be secured. In fact, on parts made of bronze, lumen and cast iron, it is often less expensive and far more satisfactory than finishing by reaming.

The internal grinding machine has completely displaced lapping from the rough, so that at the present time lapping as a finishing operation is used only when surfaces of great smoothness, or extreme accuracy, are to be produced beyond the usual limits of commercial work.

A good grinding machine will finish holes day after day rapidly and within a limit of one-quarter thousandth or better as desired, directly from the rough boring, and without any expense for reamers or for keeping such reamers sharp and in proper condition.

This method of finishing holes is doubly valuable when the piece to be finished is difficult to hold for reaming without distortion because of thin walls which go and come under pressure of the reamers, or under pressure of the chuck jaws, resulting in either case in very unsatisfactory work.

Furthermore, the improvements in the character of materials used in the construction of machinery, such as chrome nickel steel, manganese steel and other alloys, have made the use of the grinding machine an absolute necessity, because of the impossibility of finishing these materials satisfactorily in any way other than by the grinding process.

Carbonizing, heat treating and hardening always produce more or less distortion and also make the use of the grinding process imperative to secure accurate diameters and true surfaces.—James N. Heald, in "Grits and Grinds."



# EDITORIAL CORRESPONDENCE

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

## REMINISCENCES OF A 4.5 in. HIGH EXPLOSIVE SHELL

By W. J. M.

**M**Y trials and vicissitudes, from babyhood, through childhood and youth to mature age, were many and varied. We were an innumerable family, and of rapid growth, millions of us having attained our complete status during the last three years, although some of us were indifferent, and some were of no use at all.

The first thing I remember was feeling fearfully hot and uncomfortable, and while in that state I received a heavy blow. This was my christening—when I received my name, which would go with me to the end of my life, and I would always in future be known as Z  $\times$  123. Presently I felt more comfortable and much cooler, and I was placed with some of my brothers and sisters in a quiet corner. I was not allowed much time for thought, however, and just as I was nicely settled, a big rough man suddenly picked me up and placed me on a lot of rollers, on which I was carried—or rather rolled down an incline for a short distance, till I fell off the end into a railway car which was waiting to take some fifteen hundred of us on our journey to a place where we would receive our preparatory education, and the initial formation of our characters.

### My First Scare

Eventually the last of us was in his respective place, the doors were shut, locked and sealed, and we commenced our journey. Details of this journey need not be described—suffice it to say that after about two days, the doors were thrown open and we were lifted out one by one, thrown on to another set of rollers or "gravity carrier," and rolled into a large dark building.

In due course, not knowing what was to become of me, I was picked up and put with some of my fraternity in front of an iron door. When the door was raised, a fearful sight met my gaze—a roaring, fiery furnace, heated to 2,160° Fahr. What! Was I to undergo torture? If so, what for? Slowly I rolled down and yet further down an incline, getting hotter and hotter till my whole body became red—first a dull red, then brighter and brighter until I was in a semi-molten condition and writhing in agony. In that state I was seized, swung through the air and dropped into my place in a great "die." What was coming next? Down came a plunger right on the centre of my head, pressing with 350 tons till a hole was made almost right through me and my sides were squeezed and squelched in between the plunger and the die. I fairly screamed in pain and rage that I should be so mauled. At last it was over and after being lifted out and placed in the

cooling room, I must admit that the experience, bad as it was, had done me good. I was a better child. I had been through the fire, my shape being changed from "billet" to "forging," and was now fit for further education.

### Medical Inspection

I was now placed on a spindle by a government inspector who measured my walls, my length, looked to see if he could find any flaws or cracks in my constitution, and when he found I was perfect, he drove a steel stamp, shaped like the letter C with an arrow in the centre, into my flesh, and I was rolled down another "carrier" into another railway car for transportation to another school, i.e., a shell factory, where I would be further initiated into higher degrees of knowledge, and shaped into the finished article.

After a journey of a couple of days or so, I, along with my brothers and sisters—we were still together, except a few of us who had been discarded as not fit for further training—was lifted or rather thrown out of the car into a well lighted factory, where I was first looked at to see if the C with the arrow in it, was on me. Now came more pain. I was placed in a machine—a sort of vise and a steel saw was laid on one side of my head. I had not noticed an uneven growth which had been there since my release from the plunger of the forging press, and this growth had to be cut off. It was also necessary to cut off a portion of my head to see if there were any little pipe holes which could not be seen from the outside.

This being done, I was removed from the vise and put into a cavity which was called a "chuck." I began to turn round and round till I became quite giddy, and I felt a biting, tearing, pain, which began at my head and slowly travelled towards my base end. They were shearing off my outer skin, and when this operation was completed, I shone with a brightness I had never before felt. My appearance, however, — in spite of the brightness—was very rough, and when I was taken away from this machine and put into another, a little more skin was removed, which made me look and feel much better. I was getting used to being pulled about by now, but when, in yet another machine I felt an instrument cutting into my very bowels. I thought life had ended for me. After this operation I was bright inside and out, which made me feel really good. A bevel was now formed round my head and my name, Z  $\times$  123, was stamped on my side. I then had a cut taken from my base and my name was restamped there again.

### Shaping My Cranium

Now came another sore trial. I was thrust head first into one more fiery fur-

nace and all my shrieking and writhing was of no avail. As my head got hotter and hotter, I felt myself being turned so that the heat could get at me evenly, and then I was pulled quickly out, my head only being red hot, and placed in a vise which held my body tightly. I then began to rise up bodily, when suddenly—Oh!—my head was squeezed till I thought it would burst. But no, it was merely pressed into a pointed shape like the nose of a bullet.

When I had cooled off, they put another intrument into my breast and formed my "inside profile." Then I was taken and "finish turned," a fine cutting being taken from my entire length. I had a little respite after that while my name was transformed from my base to my body and the C and arrow placed alongside it. I lay on a pile of my brethren for two days, resting and getting back some of the strength I had lost during my rough travels. I had grown much thinner, but was considerably more refined that when I first arrived at the factory.

On the morning of the third day of my vacation, as it were, I was put into a machine that cut a groove in my body close to my base, and at the same time an instrument which wobble-wobbled backwards and forwards, put my "wave ribs" in the centre of the groove. This groove would later on hold a copper band—so I was informed, and those ribs would prevent this band from turning, when—but I am anticipating. At this time I knew nothing of future events, but I was learning fast. I learned that I would very soon have to sit for an examination, which, if I passed, would enable me to go forward to the higher classes of this wonderful, but trying school. Before this, I must have my base "hogged out," and my base recess finished. I remember crying aloud when these things were being done, and afterwards they nearly suffocated me with a mixture of steel shot and sand, which was called "blasting the bore."

### On the Carpet

I well remember the excitement we were all under the next morning when we were taken to a bench to undergo an examination for our characters, and knowledge. Men examined us inside and out, gauged our dimensions and "grilled" us from end to end. Some of us had to go back to school for special coaching, others merely required polishing up a bit, but the majority passed with honors. But—this was only the "shop examination." Although we had passed this, we had to go before men who had been sent by the government of the country, who would put us through a stiffer examination. Five hundred and one of us were sent before these men in batches of one hundred. Out of 501,



only 480 passed, and out of the 21 who failed, three were rejected as being no use at all. Poor fellows! They were stamped as unfit and ended their days in the scrap heap.

When I came out of the "preliminary" examination room, I was placed head down in a machine which rivetted my base plate; then another machine "faced off" my base plate and a nice radius was made all round it with a file. Next I had my nose slots cut. These were put in to prevent my timefuse—which would come to me later on — from turning loose. Then my "fuse seat," my "exploder-container" seat, and recess, were put on me and my nose was "tapped."

During one of my earlier operations, a thread was "milled" in my nose, and this it was which was "tapped." Although I suffered a little during these operations, the pain was not so bad, as I was getting more accustomed to the necessity of being trained and formed for usefulness in life. Little did I think, at that time, how short my life would be.

I suffered great discomfort when my "driving band" was squeezed on with forty ton pressure, but when this was "turned," I felt proud of the bright copper ring which enhanced my general appearance, and when after undergoing another shop examination and being washed inside and out, I felt really good and very happy. A coat of varnish was now shot into me and I was placed in an oven for a little over two hours, where the varnish was baked hard. The heat was not very great, being only 300° Fahr., so it did not cause me much discomfort after the extreme torture of the forging furnaces.

I was now informed that I would have to sit for my "final" examination by the government men, and that if I passed this, I would be nicely dressed in a new suit of clothes, and would be taken on a long journey, and possibly have a voyage across the ocean. I did not fully understand what was to become of me, but determined to pass, if possible. Eventually I did, but before passing, had to return to school to have some of my ideas "rectified." I was, however, very proud when I received my "uniform of khaki" paint my threads were greased and I was laid with two others in a "three-round" box.

#### We Depart En Masse

Nearly two thousand of us left that factory one morning in a railway car on our way to the seaport from which we were to be shipped. In due course, after a rough passage, during which I was very sick, we arrived at our destination, and for a long time were laid aside in a storehouse where we had a thorough rest. I learned, about this time, what my work in life would be, and I made up my mind to do it to the best of my ability: I was told I was a good 4.5 in. high-explosive shell, that I would be filled up with a very high explosive, and that I must ever hold myself in readiness to "burst" whenever I was told to do so by the "time-fuse," which would accompany me. One day I was taken to the loading factory, and after being properly "prepared" was filled with a sticky, harmless-looking stuff which, when slowly

stirred, gradually hardened. I was then carefully packed and sent on my last journey but one. Oh how I swelled with indignation when I was informed of the cruelties the Germans had practised! I said to myself that I would kill all I could at one time, and with one great explosion.

Well! Well! I reached the end of this second last journey, and had a little time for thoughts, which were many and varied. All the trouble and expense—the detail and exactness with which I had been made—were to go for naught. I would just die, but in dying I would render a service to my country, and I was proud to think that this service would be of some great and lasting benefit to the world in general and to my own community in particular—to those who had spent so much time and trouble in making me what I now was—a perfect 4.5 high explosive shell.

#### Finis

To me, Z X 342, has fallen the duty and honor of telling of the last moments of my beloved brother, Z X 123. He was taken behind a howitzer gun, his time fuse was screwed into his head and was "timed." He was placed in the gun, the firing charge was inserted behind him, and the "breech" was closed. With a blow of 200 tons on his base, he left the gun at a speed of 2,600 feet per second, at the same time revolving at 3,000 revolutions per minute. What a majestic "trajectory" he made in the air, when!! he disappeared in flame and smoke. He was too far away for us to be able to distinguish his last vengeful cry, but if he were alive, he would be proud to know the damage he did to the enemy. May he rest in "pieces."



#### MANGANESE IN STEEL MAKING\*

By Dr. Henry M. Howe.

**P**ASSING by the deoxidizing and desulphurizing effect of manganese as foreign to our present purpose, its effect on the mechanical properties of the steel seems to me in the last analysis due primarily to its retarding action both on the transformation and on the coalescence of the micro-constituents into progressively coarser masses, which while increasing the ductility lessens the cohesion in general, including the hardness and the elastic limit, and thus lessens the effective strength.

Before considering the retarding of the transformations by manganese let us refresh our memory as to these transformations, and as to the three prominent states of steel, between which they play:

The common low-temperature alpha or pearlitic state;

The high temperature or non-magnetic austenite state into which the metal passes spontaneously when heated up through the transformation range, say 725 to 900 deg. C., Ac<sup>1</sup>-Ac<sup>2</sup>;

The intermediate or martensitic state, in which carbon steel is caught in transit from the austenite to the pearlite

state by means of a rapid cooling, as for instance on hardening by quenching small pieces in water.

The alpha state is magnetic and relatively soft and ductile, as in annealed carbon steel; the intermediate or martensitic state is magnetic, hard, and brittle as in hardened steel; while the non-magnetic high temperature or austenitic state when preserved in the cold, as in manganese steel, combines great ductility with hardness of a peculiar kind to which I will refer shortly.

In carbon steel this transformation is so rapid that it occurs to a very marked degree even in the water quenching of thin pieces, as is familiar to us in the fact that when this steel is made non-magnetic and austenitic by heating say to 900 deg. C., and is then quenched in water, it transforms as far as the magnetic, hard, brittle, martensitic state of common hardened steel even in this rapid cooling.

Most of the alloying elements, and notably carbon, manganese and nickel, retard this transformation greatly. Thus 2 per cent. of manganese plus 2 per cent. of carbon retard it so that in the water quenching of thin pieces the austenitic state is preserved. With 5 to 7 per cent. of manganese it is so slow that even in air cooling it goes only as far as the intermediate martensitic state. Hence the brittleness of these steels of manganese content. With about 12 per cent. of manganese the transformation is so sluggish that the austenitic state is preserved even through a common slow cooling.

The water-quenching of manganese steel in current manufacture is not to prevent the loss of the austenitic state, but to suppress the precipitation of the iron-manganese carbide, cementite, which would occur during slow cooling. The broad plates of this cementite would embrittle the mass by forming partings of low cohesion. It is derived from the large carbon content of the ferromanganese used, the cheapest source of manganese. Carbon-free manganese steel should not need quenching.

#### Industrial Value of Manganese Steel

The industrial value of this manganese austenite or manganese steel seems to be due to its combination of great ductility with great effective hardness. I say effective hardness, because initially it is rather soft. My own experiments indicate that the Brinell hardness of an undeformed specimen is only 125, or that of steel of about 0.22 per cent. of carbon when annealed, that of ultra low-carbon steel being about 75. But the hardness increases very greatly on the slightest deformation. Even that incidental to the Brinell test increases the observed Brinell hardness to 223 easily, or to that of 0.60 per cent. carbon steel when annealed.

This hardening under deformation is one of the first things that forces itself on the user of this material. The first strokes of the hacksaw cut it rather easily, but the deformation thus set up in

\*Presented at the annual meeting of the American Society for Testing Materials.



the path of the saw quickly causes such hardness as to bring the sawing to an abrupt end, thus giving the absolutely false impression that the material has a soft skin. This hardening causes the apparently contradictory combination of effective hardness with very low proportional limit, even as low as 28,250 lb. per square inch. The proportional limit represents the cohesion of the undeformed material, the effective hardness represents the cohesion as exaggerated by the deformation incidental to service. In the same way the act of tensile rupture may increase the Brinell hardness of 540, or that of about 0.50 per cent. carbon steel when hardened.

The surface of the jaw of a manganese steel rock crusher, deforming under the great pressure, quickly hardens itself, so that the combination of a very hard surface with a ductile back develops spontaneously. As fast as this hard surface wears away it is replaced by a new one made equally hard by the deformation which it at once receives.

This hardening probably represents in part the same cause which leads to the increase of cohesion in general, including the hardness, of all the malleable metals under all forms of deformation, such as wire drawing, and in part the martensitization of the austenite. That is to say, the arrested transformation from austenite through martensite to the alpha state which is due in cooling through the transformation range but is restrained by the retarding action of the manganese, is now stimulated by the deformation sufficiently to cause it to proceed as far as the martensitic state, with consequent hardening and embrittling effect. This martensitization through the stimulation of the arrested transformation is a common property of austenitic steels which have only a moderate excess of the retarding elements over the quantity needed for causing the retention of the austenitic state. It occurs strikingly in austenitic 20 per cent. nickel steel.

The retarding effect of manganese on the structural changes of carbon steel shows itself by leading in general to finer structure, to finer ferrite masses, finer network structure, and finer pearlite, indeed probably often to the replacing of lamellar pearlite with sorbite. This greater fineness leads to better quality in general and to a higher elastic limit in particular, though of course with a corresponding sacrifice of ductility.

**Value of High-Manganese in Low-Carbon Steel**

The great value of manganese for this purpose has not begun to receive the attention which it deserves. It is probable that a manganese content of say 1.25 per cent., with a correspondingly lessened carbon content, may be used so as to lessen the danger of cracking and the residual stresses when a high elastic limit is sought, because this large manganese content in and by itself raises the elastic limit by giving a fineness of structure which otherwise would be sought

by increased violence of cooling or by the use of a lower drawing temperature. In other words, the use of 1.25 per cent. of manganese lessens the needed violence of cooling, and permits the use of a higher drawing temperature, in both ways tending to mitigate the residual stresses, and in the former way lessening the chances of cracking.



**INVESTIGATING DEFECTIVE MAGNETO**

By J. E. McCormack.

A gasoline engine was equipped with a rotary magneto and with batteries also. The idea was to start on the batteries and switch onto the magneto when speed was up, but as the engine failed to operate on the magneto (in fact the magneto was supposed to be of no use) the batteries were used entirely for some months. One day I removed the magneto, coil spark plug and connecting wires and placed the magneto on the stand of an old sewing machine from which the head had been removed. I removed the governor pulley from the magneto and bored out an empty (sewing thread) spool to fit the arbor, then used this for a pulley and a grip strap for a belt, I ran the magneto up to approximate speed by pedaling and kept it going and kept adjusting the vibrator on the coil until I got some buzz, and then found that a half turn of the screw either way would stop the buzz. This shows the fineness of the adjustment necessary in that case. The proper point thus located was 3 or 4 turns from where it had been set for use on the batteries. With the new adjustment of the vibrator it was possible to start on the batteries and then run on the magneto, thus greatly saving the said batteries. With the magneto connected up on the engine it had been practically impossible to adjust the vibrator to it, because the engine would not hold up speed sufficiently long, but now with the vibrator set for the magneto, the batteries will work with the same adjustment and it is O.K.

No fastening was required to hold the magneto on the sewing machine stand for testing. Its weight was sufficient to hold it steady and in place. During the testing, I had the ground connection bound to the outer nut of the sparkplug, and the secondary attached to the end of the plug in the ordinary way. This completed the circuit the same as though the spark plug had been screwed into place on the engine and the ground wire attached to the engine frame in the customary manner.



**DEVELOPMENT OF OXYGEN MANUFACTURE**

By J. W. G.

THE use of oxygen in connection with welding processes, carbon removal from engine cylinders, etc., has become such a commonplace matter in the ordinary routine of manufacturing activities that

little or no thought is ever given to the processes whereby this now indispensable gas is separated and prepared for use.

The commercial production of oxygen dates from the year 1836, in which year operations were commenced by an English concern to develop a process invented by two Frenchmen, the Brin brothers, their process being based on previous discovery by Boussingault in 1851, that barium monoxide absorbs oxygen from the atmosphere when it is heated to 1,000 deg. F., and gives it up again when the temperature is raised to 1,600 deg. F. This cycle of operations was repeated indefinitely, the barium monoxide remaining unaffected by the alternate heating and cooling.

Despite the lapse of time from the original discovery of the process, many practical difficulties still remained until Brin's Oxygen Co. succeeded in developing the manufacture to such a high degree of perfection, that the barium process maintained its superiority against all efforts to develop other processes of obtaining oxygen on a commercial scale.

The commercial liquefaction of air had meanwhile been developed by Prof. Linde of Munich, in 1895, and from that time on the ultimate eclipse of the barium process became more and more a matter of time. The actual process of obtaining oxygen through liquefying air is a highly specialized proceeding and its success has been very complete, the barium process being entirely discarded, although the possibilities of electrolytic cells are the subject of intense experiment and research by interests allied with electric power supply companies, and developments in this direction are pending.

Despite the decadence of the original process, it is gratifying to know, especially at this time that oxygen production in Germany, France and United States was first put on a commercial basis with barium plants designed and erected by the original Brins' Oxygen Co.

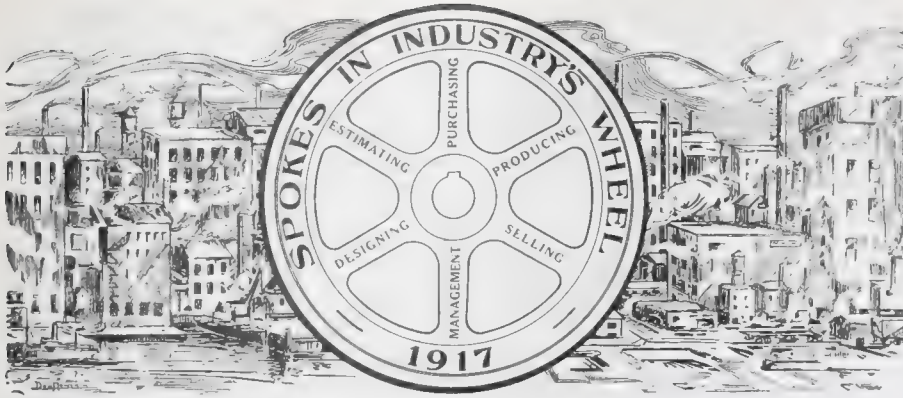


**NEW ALLIED TONNAGE**

FIGURES of the new tonnage built during the six months from October, 1916, to April, 1917, have been published by the Bureau Veritas. No distinction is made in the figures between steamers and sailing vessels, but the number of the latter cannot be large:

	No. of ships.	Gross tonnage.
Great Britain .. . . .	261	680,946
United States .. . . .	150	484,381
Holland .. . . .	103	190,619
Japan .. . . .	46	128,913
France .. . . .	42	61,988
Italy .. . . .	20	34,051
Norway .. . . .	42	34,044
Denmark .. . . .	20	26,348
Sweden .. . . .	26	20,023
Spain .. . . .	7	4,422
Chili .. . . .	3	823
Russia .. . . .	5	750
Portugal .. . . .	3	216
<b>Total .. . . .</b>	<b>728</b>	<b>1,667,524</b>





*The constitution of industrial enterprise is largely departmental—"spokes in a wheel." This series of articles has for its object the featuring in a racy, interesting and instructive fashion, the training, experience and achievement of those who to-day are transmitting, effectively, energy in their capacity as "spokes in the wheels" of our metal-working establishments.*

#### ROBERT MORTON HAMILTON

**T**HE career of the subject of this sketch began about the same time as the machine tool industry in Galt had its inception. Robert Morton Hamilton was born in Brantford, Ont., on March 8, 1864, of Scotch parentage, as his name indicates. He was educated partly at the Public School, Brantford, and later moving to Listowel, attended the High School there for two years, which he left at the age of 14, in 1878, to start an apprenticeship in McIlwraith & Austin's machine shop in that town. This concern was in a small way of business, the work consisting chiefly of repairs to farm and general machinery usually found in country districts. The company went out of business not long after young Hamilton joined it, so he had to look around for another job.

There was at Baden, Ont., at that time a machine shop owned by the Livingston family, who were also the proprietors of a linseed oil mill. This machine shop was originally the property of the father of Adam Beck, of Hydro-Electric fame, but was turned over to Mr. Livingston a short time before our youthful mechanic resumed his apprenticeship after his brief stay at Listowel. Our spoke in his early days must have exhibited a natural liking for machinery, and while in Baden got plenty of experience, as the firm made a varied line of machinery and also Corliss engines.

The fame of Galt as a town with good machine shops spread to Baden, where our spoke was busy absorbing mechanical knowledge and aroused his ambition. Realizing that opportunities would be greater in Galt, he went to that town in 1882, and secured a position as machinist at McGregor & Gourlay's Works. He stayed with this firm until 1886, when an opportunity presented itself to start in business on his own account. Our spoke, who was then only 22 years of age, joined J. J. Stevens in an enterprise which was the foundation of the machine tool industry in Galt. Mr. Stevens was a draftsman with McGregor & Gourlay. These two

ambitious young men started in building machine tools with a capital of less than \$1,000, in an old blacksmith shop in Ainslie Street. They admit that they had more nerve than capital, but this did not prevent them from making a success of the enterprise, for, two years later, in



ROBERT MORTON HAMILTON

1888, they built a new shop, which is now owned by the S. J. Shimer Co. Some encouragement may be gleaned from this phase of our spoke's career, for it showed that a large amount of capital is not necessarily essential to success. It also proves that a good deal can be accomplished by a judicious mixture of pluck and hard work. This firm, Stevens, Hamilton & Co., were well known for the good quality of their product and they achieved considerable success until 1895, when they sold the plant to McGregor & Gourlay. In passing it should be mentioned that Mr. Stevens ultimately opened up another machine shop where

he specialized in building the Jones & Lamson turret lathe. This concern is still in existence. When Stevens, Hamilton & Co. sold their business, Mr. Hamilton received stock in the McGregor, Gourlay Co. as his share of the transaction and remained with the latter concern as head of the machine tool branch of the business. The McGregor & Gourlay Co. moved the plant to their own premises in Concession Street, which is now the head works of the Canada Machinery Corporation.

From about this period the machine tool industry in Galt began to grow from comparatively small proportions until now it is the most important machine tool centre in Canada, when considering the number of firms engaged in the business and various types of tools built there. A few years later, in 1910, the Canada Machinery Corporation was formed, one of the firms absorbed being the McGregor, Gourlay Co. About this time Mr. Hamilton, needing a rest and change of scenery, took an extended vacation, returning to the Canada Machinery Corporation in the fall of 1914 as works manager. Since then the C.M.C. has enjoyed a most prosperous run of business, which coincided with Mr. Hamilton's return to the scene of his former activities. While the C.M.C. has not been actually engaged on production of munitions, they were for some time working night and day on machine tools for this purpose, and, although not so busy now, are actively engaged on work of a more general character.

Mr. Hamilton is fond of traveling, having recently returned from a combined business and pleasure trip to the Pacific Coast. He went as far North as Skagway and visited Prince Rupert and other important points while en route; this being his third trip to the Pacific Coast in recent years. Mr. Hamilton is of the opinion that the shipbuilding industry will be of material advantage to that province, and it will be a more permanent character if raw materials can be obtained readily.

From the foregoing it will be seen that the subject of this sketch has truly grown up with the machine tool industry in Galt. When he went to Galt in 1882, the town had a population of about 6,000; now it has a population of over 12,000, the increase having mostly taken place in recent years. It was the reputation of the Galt machine shops and also the opportunities for advancement for mechanics through the Mechanics Institute and Free Library that attracted our friend to this town. While following his vocation during the day-time he was able to attend night school at the Institute. This is an advantage which few of the smaller towns possess and it means a great deal to the ambitious apprentice. Mr. Hamilton is a firm believer in technical education and study of technical journals. He urges apprentices to embrace every opportunity of acquiring knowledge by these means, and in no better way can this be done than by study in the evening particularly when day classes are not

(Continued on page 70)



# PROGRESS IN NEW EQUIPMENT

There is Here Provided in Compact Form a Monthly Compendium of Shipbuilding and Marine Engineering Auxiliary Product Achievement

## RECENT DEVELOPMENTS IN BLAST FURNACE BLOWING EQUIPMENT

**A**FTER the general adoption of the steam turbine in large central power, the erroneous impression gained ground that the replacing of the reciprocating blowing engine by the turbo blower could only be a question of a comparatively short time. This expectation of the uninitiated was not realized and it is doubtful if it will ever be realized.

The same laws of nature which give the steam turbine advantages over the steam engine, are obstacles in the case of the turbo blower. Firstly, the steam turbine excels the steam engine only in the region below atmosphere, and in the compression of air for blast furnace use this region is absent, because, naturally the compression must start with atmospheric pressure. Secondly, the losses in the earlier or high pressure stages of the steam turbine are converted into heat which can be utilized in the latter stages, while in the turbo blower the losses in the early or low pressure stages mean additional work to be done in the latter stages. Thirdly, the steam turbine utilizes the highly efficient process of converting pressure into velocity, whereas, the turbo blower tries to utilize the very inefficient process of converting velocity into pressure. Fourthly, the central power station utilizing large turbo generators, makes power for the sake of selling it. High steam pressure, superheat and vacua which are impracticable around a blast furnace, can be introduced in the central station. Larger and larger units can also be installed, whereas the size of

the turbo blower is limited by the size of the blast furnace.

While for these very reasons engineers with knowledge of the underlying principles always had their doubts concerning general adoption of the turbo blower, another rather unexpected reason has considerably delayed and hindered its introduction. The reason in question is, incorrect governing of the blower and consequent dusting of the furnace. The turbo blower is a machine supposedly free from pulsations, and great advantages were expected from a steady stream of air going to the furnace. But practice has shown that, quite on the contrary, the vast majority of turbo blowers vary in volume delivery a much greater amount than reciprocating blowing engines do. The amount of ore lost by dusting due to this fluctuation of air supply is so great that most blast furnace managers are, at the present time, afraid to install turbo blowers.

In blowing engines the course of development likewise has been following rather unexpected lines. By comparison of the number of new furnaces built with the number of new blowing engines and new turbo blowers installed, it is found that a comparatively small amount of new blowing equipment has been added. This surprising result is explained by the fact that a very large number of existing blowing engines have been rebuilt in such a way as to have a larger capacity and to serve a greater number of furnaces than heretofore. The possibility of increasing the capacity of existing blowing engines is largely due to the increase in piston speeds made possible by the introduction of plate valves which have been mentioned before in our columns. A great

amount of rebuilding of existing blowing engines has been done by the Mesta Machine Company of Pittsburgh, Pa., with plate valves manufactured under Iversen patents.

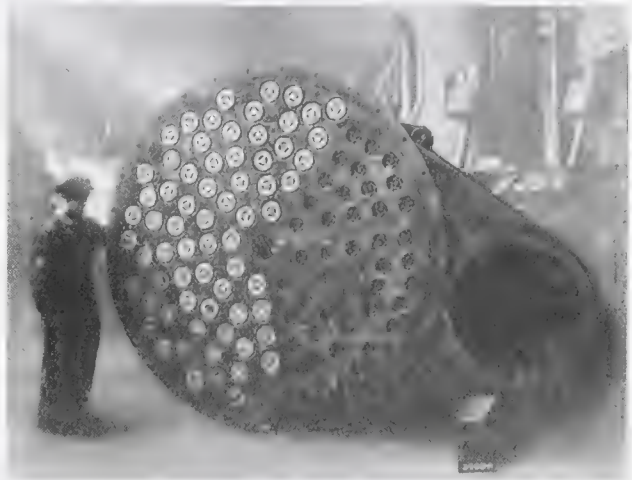


FIG. 3. ILLUSTRATING METHOD OF INSTALLING PLATE VALVES IN PLACE OF EXISTING VALVES IN THE HEAD.

The so-called rebuilding of blowing engines is, in some cases, limited to the simple replacing of the existing valves by automatic plate valves. In other instances it means more than that, namely, the removing of old cylinder heads and replacing them by heads containing plate valves. In the most extreme cases it means the removal of the whole air end including the air cylinder.

An illustration of the methods employed in replacing an old type of valves by plate valves is shown on Fig. No. 1. Here are seen plate valves arranged in cages, which take the place of large poppet valves, originally operating in the head. The cages are dished in order to reduce clearance to a very small amount. In many cases the clearance volume is smaller than it was with the original valves, while in other cases it is increased slightly, depending upon the type of valves being replaced by the cages. But even in this latter case, the advantages gained by the instantaneous opening of the valves, and the larger area secured, are so overwhelming, that the slight increase in clearance volume fades into insignificance.

The arrangement of the valves in cages offers several advantages. The removal of one cover plate exposes all outlet valves of the cage to inspection on the delivery side. The inlet cages are made in two parts so that the removal of one cover and the top of a cage exposes all the valves of that cage to inspection. In the extremely rare case of breakage of a valve, the whole cage can be easily removed and replaced by a spare one.

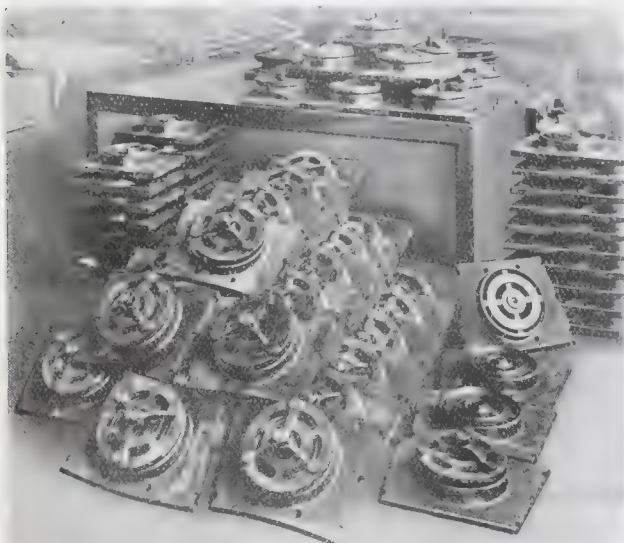


FIG. 2. SHOWING HOW VALVES HAVE BEEN MADE TO FIT A PREVIOUS SEGMENTAL ARRANGEMENT.



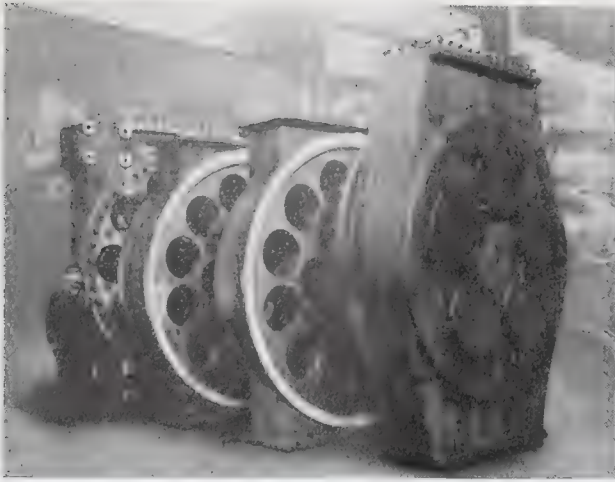


FIG. 4. REPLACING OLD AIR HEADS WITH NEW ONES.

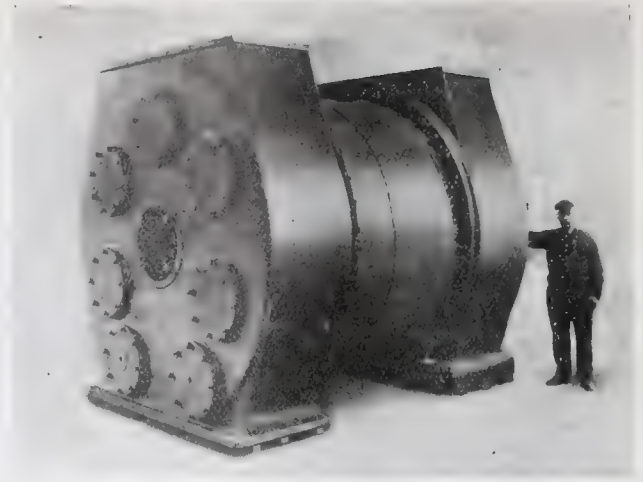


FIG. 5. NEW AIR ENDS WHICH HAVE REPLACED OLD ONES.

Fig. No. 2 shows how valves have been made to fit a segmental arrangement of old valves. Fig. No. 3 illustrates the method of installing valves in place of existing valves in the head. This latter method as a rule gives some increase in valve area, but not enough to warrant increasing the speed of the engine materially. This method is to be recommended particularly in the case of old blowing engines equipped with leather valves. The advantage is two-fold: first, the plate valves are always tight and in consequence deliver more air, whereas leather valves soon begin to leak, due to warping or charring of the leather; second, higher pressure can be blown.

The second method, namely, that of replacing old air heads with new ones, is very widely practised at the present time. Fig. No. 4 shows the appearance of such air heads. The third and last method, namely, that of replacing the old air end has been necessary only very occasionally. Fig. No. 5 shows the appearance of such an air end.

Mention has already been made of the fact that plate valves allow higher piston speeds. This feature is beneficial in several ways. Right now, due to the poor trade of coke available, many furnaces are troubled by the necessity of more air than was used in the past when better coke was on hand. Increasing the supply of air has pulled several furnaces out of a bad predicament. More air means not only more pig iron, but in addition, more furnace gas, more steam and steady profitable operation.

The installation of plate valves, and the resulting possible increase in speed of the blowing engines, has enabled a number of plants to erect another furnace without installing additional blowing units. The heretofore customary practice of blowing a furnace with three or sometimes four tubs, has given way to the present possibility of blowing a furnace with two tubs only; and, in fact, a great many furnaces in this country are being blown to-day, using only two 84 in. diameter blowing tubs equipped with automatic plate valves. From this it can be seen that the blowing capacity of existing plants can be

increased 50 to 100 per cent. by equipping the present engines with automatic plate valves.



#### PASSING OF THE WOODEN CAR

A REPORT of the American special committee on relations of railway operation to legislation, just issued, shows that only three wooden cars for passenger service were built in 1916, and only ten wooden cars for passenger train service were under construction on Jan. 1, 1917.

"The building of wooden passenger train cars," the report says, "has practically ceased. There were in passenger train service on Jan. 1, 1909, approximately 629 all steel cars and 673 cars having steel underframes. On Jan. 1, 1917, there were in such service 15,754 all steel cars, and 6,136 cars having steel underframes, representing increases of 2,405 per cent. and 812 per cent., respectively. There are now in service

39,169 wooden cars in passenger train service, indicating a retirement of 8,957 wooden cars from service since Jan. 1, 1912, the date of the previous census. Of this number, 2,213 were retired during the calendar year 1916. This record includes a total of 615,309 passenger train cars and covers reports from roads representing 235,406 miles of railway in the United States.

The average cost per car on the first of January varied for the different classes of passenger train equipment from \$14,800 for a baggage or express to \$37,000 for a parlor, sleeping or dining car.



A class of boys were undergoing an examination in Scripture. The subject was the Good Samaritan. "And why do you consider the Pharisee, after looking at him, passed by on the other side?" "Because he saw he had been robbed already," was the answer given.



FIG. 1. PLATE VALVES ARRANGED IN CAGES TO REPLACE LARGE POPPET VALVES PREVIOUSLY EMPLOYED.



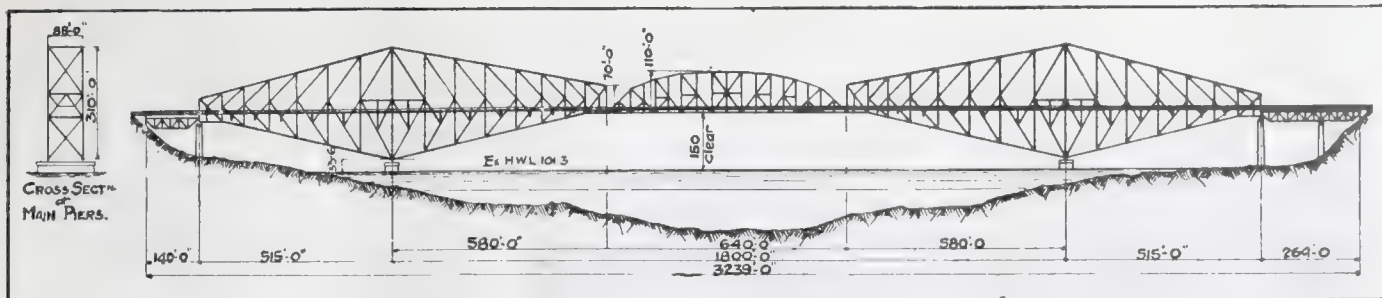


DIAGRAM OF QUEBEC BRIDGE SUPERSTRUCTURE GIVING PRINCIPAL DIMENSIONS.

# Elevation of Span Insures Final Success of Quebec Bridge

Staff Article

*After eleven years of unremitting toil, painstaking perseverance and overcoming of seemingly insuperable obstacles, the Quebec Bridge is now a unit structure uniting extensive provinces on the south side of the River St. Lawrence with the main portion of the Dominion. Heart-breaking disasters failed to shake the determination of the builders, and for years to come the structure and the men who built it will be the objects of endless eulogy.*

LIKE a star passing across the meridian that records an epoch in the movement of the celestial bodies, the final connecting of the centre span of the Quebec Bridge marks an achievement in engineering feats that will stand out as one of the most remarkable of its kind ever attempted. Disappointed but undaunted by the failure of last year, the engineers went about the plans for the next attempt, profiting by their past experience, making such necessary changes and alterations that would entirely eliminate—as far as engineering ingenuity can at present devise—any possibility of a repetition of last year's disaster. Investigation proved that the primary cause of the collapse of last September was the breaking of one of the steel castings supporting one of the four corners of the span upon which it rested during its construction, and also during the actual raising of the span. The fact that this condition had existed for several months previous to September 11, 1916, might indicate to many that some other fault may have developed to result in the failure of the casting. It is undoubtedly true that the variable conditions, be they ever so small, that must subsequently have followed the removal of such a structure from a fixed resting place to the flexible support of the scows, and from there to the elevating chains, would subject the frame work to incalculable stresses, which in the case of these par-

ticular steel castings might develop serious defects, and probably early or inevitable disaster.

Satisfied that this feature was the vital weakness in the previous design of the lifting apparatus, the engineers concentrated all their energies on changing and perfecting this detail to avoid a similar occurrence. In some respects the principle of the pivoted support was the same as last year, but the round pins formerly used were eliminated and replaced by forged steel pieces of rectangular cross section, the top or pivot surface being curved to a two-foot radius, thus providing a wider bearing and, consequently, greater distribution of resultant pressure. During erection the span did not rest upon this support, but upon two specially designed rectangular bearings, located on either side of the central support; this construction, of course, being identical at each corner of the suspended span. These bearings were so designed as to allow for lateral movement, due to the expansion or contraction of the 640 feet of steel structure. The surface of the steel bearing piece had a length of 2 feet 6 inches, and the bronze plate upon which it rested a length of 3 feet, thus providing for a lateral movement of approximately 6 inches; the upper or friction surface of the bronze plate was polished and well lubricated. Special guides were provided to prevent side motion in the supports, with two steel plates

beneath the bronze plate, the lower one resting on a bed of lead about 1½ inches thick. The side bearings upon which the span rested during its erection were not close fitting on the sides, the side guides in this particular instance being more of an emergency detail should anything happen to the central main bearing. When the bents had been removed from beneath the span previous to floating the scows into position, the entire weight of the structure was supported upon the two outer or sliding bearings, but when the weight was transferred from these bearings to the scow supports, the bronze plates and the top steel plate was removed so that when the hoisting chains were connected the falling of the tide again shifted the weight, which this time was taken by the main or central bearing, this bearing maintaining the weight during the entire lifting process. An additional precaution was provided at this point to prevent the span slipping off should accident happen to any of the main bearings. Whereas last year this detail of construction was entirely exposed, this year each corner was enclosed in a box girder built up of steel plates, and through which the pins that held the lower ends of the fixed links were secured, the upper end of this latter member receiving the lower end of the hoisting chain when the span was finally moored in the desired position beneath the cantilever arms.



THE COMPLETED BRIDGE AND ITS BUILDERS. FROM LEFT TO RIGHT: W. P. COPP, COL. C. N. MONTERRAT, E. C. KERRIGAN, H. P. BORDEN, PHELPS JOHNSTON, E. H. PACEY.





THE SPAN SUSPENDED FROM THE BRIDGE AFTER SCOWS FLOATED AWAY.

#### Precautionary Measures

While these main supports were the essential details upon which the efforts of the engineers were concentrated, other minor changes were effected and additional precautionary measures were adopted to assist in the successful accomplishment of this wonderful and historic enterprise. Chief among the other alterations was the strengthening of the hanger chains described in another section of this article. Additional stiffening was provided in the lower top chord member, and in addition to the mooring arms being used for steadying the span during the initial connection of the hoisting chains, they were also utilized for anchoring the partly elevated span during such periods when actual hoisting operations were suspended. Despite the optimistic assurance that was silently expressed by those in control of the proceedings, no workmen were allowed to remain on the span after the scows had been floated from beneath; the only time that anyone ventured upon the hanging structure was when an intrepid engineer was lowered on to the span to inspect the various connections upon which so much depended.

#### Floating the Span

The actual elevation of the span from its erection supports was entirely dependent upon the weather, and while ideal conditions were not absolutely essential, it was highly important that wind and water be favorable to counteract those agents that tend to make such an undertaking increasingly difficult; namely, the

tide and the current of the river, the tide running between twelve and sixteen feet, and the current at this particular part of the river about six or eight miles an hour. Under these circumstances it was necessary, owing to the high wind prevailing on the previous Saturday—the day or-

day that the wind had sufficiently abated to insure success. In preparation for the time when the span would be floated, the scows or pontoons were placed in position under each end of the span and allowed to settle with the falling tide on to the cement foundations that had been previously constructed in the bed of the cove. When resting in this position, the valves in the hulls of the scows were left open, so that the water flowed freely in and out as the tide rose and fell each day. As the time required to float the scows, when taking the weight of the span, was nearly five hours, it was necessary to close the valves about midnight on the morning intended for the operation, in order that the span should be lifted clear at the favorable moment for floating up the river.

#### Towing Span to Bridge Site

Shortly after midnight on the morning of Monday, Sept. 17, the valves in the six pontoons were securely closed, and when the forces of Neptune arrived and failed to find an entrance, they began to exert



CONNECTING HOISTING CHAINS TO SPAN SUPPORTS AFTER MOORING SPAN.

iginally set for the commencement of the final task—to postpone the floating of the span until the wind had abated. Some hopes had been entertained that operation could be started on the following morning, but it was not until late Sun-

a pressure on the exterior of the hulls, and after nearly five hours of resisting attack, the mighty forces of the sea god succeeded in accomplishing what would otherwise have been impossible. It was therefore about five o'clock in the morning that the various tugs took up their allotted positions under the directors of towing operations, who were on one of the smallest of the tugs in the fleet, and which was seen to dart from one position to another in order to see that every detail was carefully and accurately carried out. After much manoeuvring, the span was successfully towed to a position in the middle of the river, where the full force of the tide began to propel the massive structure up the river toward the site of the bridge. With the tugs guiding rather than towing the span up the river—the incoming tide being the propelling agent—the procession slowly advanced, followed by a fleet of river craft of every make and description. With the memory of last year's event still vividly impressed



SPAN PARTLY RAISED. S.S. QUEBEC PASSING BELOW NORTH CANTILEVER.



upon the minds of the sightseers, and with a fuller appreciation of the magnitude of the task and the risk involved for the men upon the structure, the enthusiasm, while none the less apparent, was more of the silent character, not only in the trip up the river, but also during the mooring operations and the raising of the span.

**Mooring the Span**

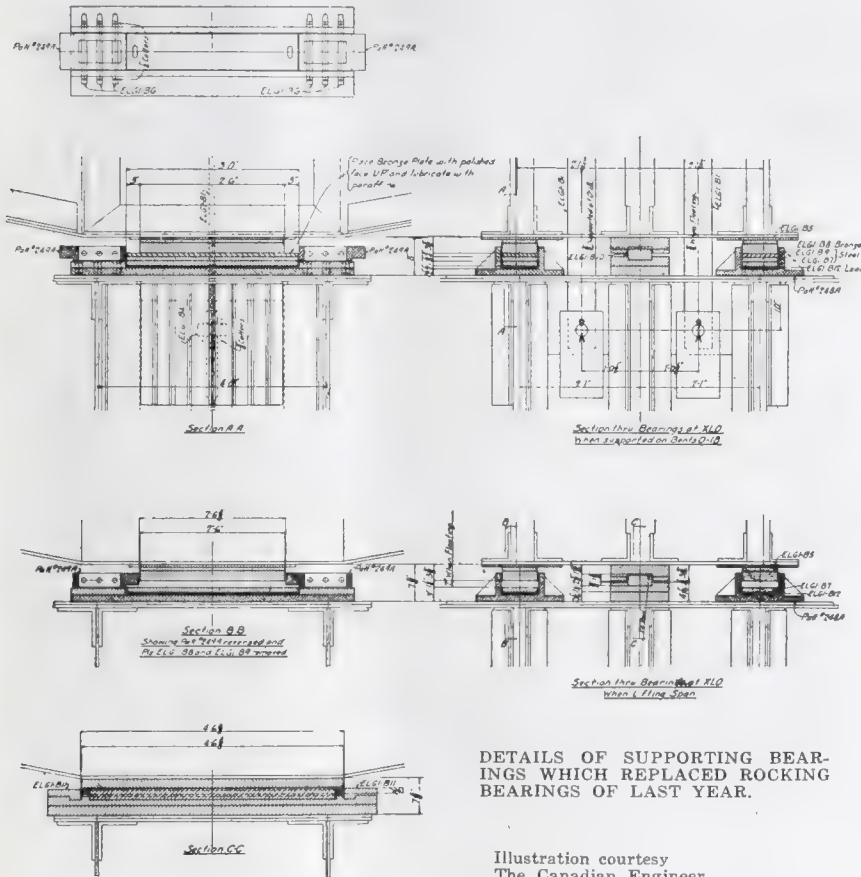
As the span approached a position below and between the cantilever arms it was necessary to manipulate the different tugs very accurately to bring and maintain the span in a steady position in order that the mooring frame might be properly attached to the four corners of the span. The operations were directed by the "captain" located on one of the four

the current of the river carried them down stream, tugs steamed alongside and guided them to a location a short distance above the site at Sillery Cove.

**Period of Suspense**

From the very moment that the scows floated clear of the span a concealed feeling of expectancy predominated throughout the multitudes that were perched upon all available observation points within a considerable distance on either side of the river; but while the average onlooker may have journeyed to the site to see a repetition of last year's tragedy, the attitude of the engineering profession that had carefully followed the events and circumstances surrounding the whole progress of the undertaking, particularly

several hoisting chains to allow the engineers to examine the different link connections to see that everything was in order for the raising operations. This precaution was adopted at different stages of the hoisting process. It might be here stated that the hoisting chains had undergone some changes over those of last year, the strength being actually doubled. Where those of a year ago were composed of links in pairs, this year this detail has been doubled to four links in series. Each link is composed of rolled steel plate 30 feet in length, 30 inches in width and with a thickness of 2 1/4 inches, and provided with four hoisting holes located 6 feet apart, and the two holes for the link connections 24 feet apart; thus permitting of 12 lifts of two feet each for every link in the chain. The 12-inch diameter pins that connect the link sections are held in position by means of caps on either end, bound together by a 1 3/4-inch bolt passing through the centre of the 12-inch pin. In order to obtain a lift of 2 feet with the holes in the chains 6 feet apart, the jacking girders are provided with a series of three holes 2 feet apart, so that each hole in the hoisting chains is engaged three times during the lift of six feet, the locking pins being alternately placed in the three holes in the upper and lower jacking girders. On the central line of the link holes the cross sectional area of each link is (30-12) x 2 1/4 or 40 1/2 square inches, which gives an area of 162 square inches on each of the eight chains, or a total of 1,296 square inches supporting the total weight of the suspended span



DETAILS OF SUPPORTING BEARINGS WHICH REPLACED ROCKING BEARINGS OF LAST YEAR.

Illustration courtesy The Canadian Engineer.

**Hoisting Details**

It is needless to dwell upon the gradual but successful upward movement of the span during the three and a half days occupied for the complete elevation of 150 feet; it is sufficient to say that nothing of importance occurred to mar the steady progress of the span from its initial position on the scows till the hour on Thursday afternoon when the final pins in the permanent connecting links were driven into position. The total casualties for the four days were confined to a broken nose and a few bruises sustained by workmen slipping on the wet plates of the steel structure.

Before describing the actual lifting operation it might be well to give a brief survey of the construction of the various members that makes this feat possible. Dealing with one corner only, all four corners being alike, there is placed across the end of the upper chord of the cantilever arm, vertically over the point of intersection, and supported on a bearing similar to that beneath the suspended span, a heavy cross girder, from either end of which is suspended by means of hanger plates, another cross girder B, known as a fixed girder and placed at about the floor level of the cantilever arm. On each of the outer top ends of this lower girder are placed the hydraulic lifting jacks with a working stroke of slightly over two feet. Resting on the upper end of the rams of these jacks and

corners, and it was certainly no sinecure to "dock" such a liner with the use of those floating anchors—the tugs. When the mooring lines had been properly adjusted to bring the span to the exact position desired, the long slender plate chains were lowered to a vertical position and the ends bolted to the fixed link that extended up from each of the supporting girders located beneath the four corners of the span. No actual hoisting operations took place while the scows remained under the span, but the weight of upwards of 5,000 tons was gradually transferred from the six pontoons to the eight hanging chains as the outgoing tide lowered the level of the river. As the scows floated freely from beneath the span and

those engineers directly associated with the work of construction, was that of silent but hopeful optimism, coupled, however, with a nervous tension that was unavoidable under such trying and eventful conditions.

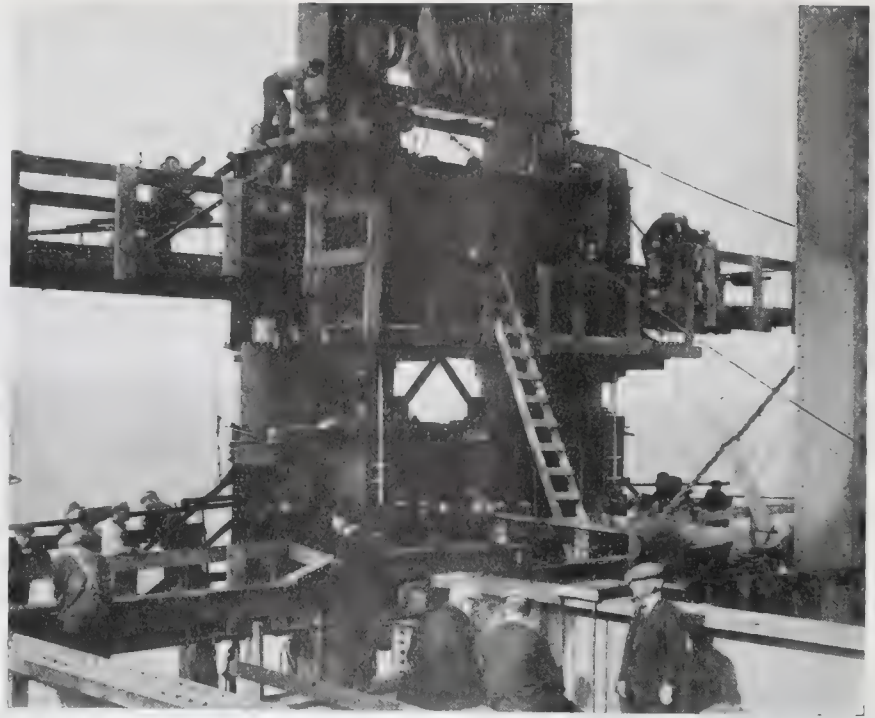
**Changes in the Hoisting Chains**

Following the final connecting of the lower ends of the hoisting chains to the fastenings upon the span, the leading engineers of the enterprise—who had ridden up the river on the span from Sillery—were hoisted up to the cantilever arm in a large cage secured to the end of a steel cable. After the men had had breakfast and before the first lift was made, a cage was lowered alongside the



operated by them is the third or movable girder C, to which are connected the hoisting chains during the raising of the span. The hoisting chains pass through openings in the lower or fixed box girder, while a similar space is provided for a clearance for the hangers supporting the lower girder. The emergency jacks described in another section are located in a central line with a pair of lifting jacks, but nearer the centre of the girders. The slots in either girder through which the hoisting chains pass are provided with a set of three equi-distant holes, 24 inches apart, to permit of an elevation of two feet at each complete operation of the jacks.

Assuming that the lower ends of the hoisting chains have been connected to the span supports, the upper end of the chains would be connected to one of the holes in the top or movable girder so that with the removal of the scows the weight of the suspended span would be resting upon the rams of the hydraulic jacks. The operation of these jacks was accomplished by water being forced from hydraulic pumps through  $\frac{3}{8}$  in. copper pipes into the cylinders, which are 22 in. in diameter inside and  $33\frac{1}{2}$  in. outside, or a thickness of metal of nearly six in. The air that operated the pumps was supplied from compressors located in a power plant at the shore end of each cantilever; these compressors being electrically driven. The air was delivered to



JACKS AND UPPER GIRDER BEING LOWERED WHILE LOWER PIN IS IN POSITION.

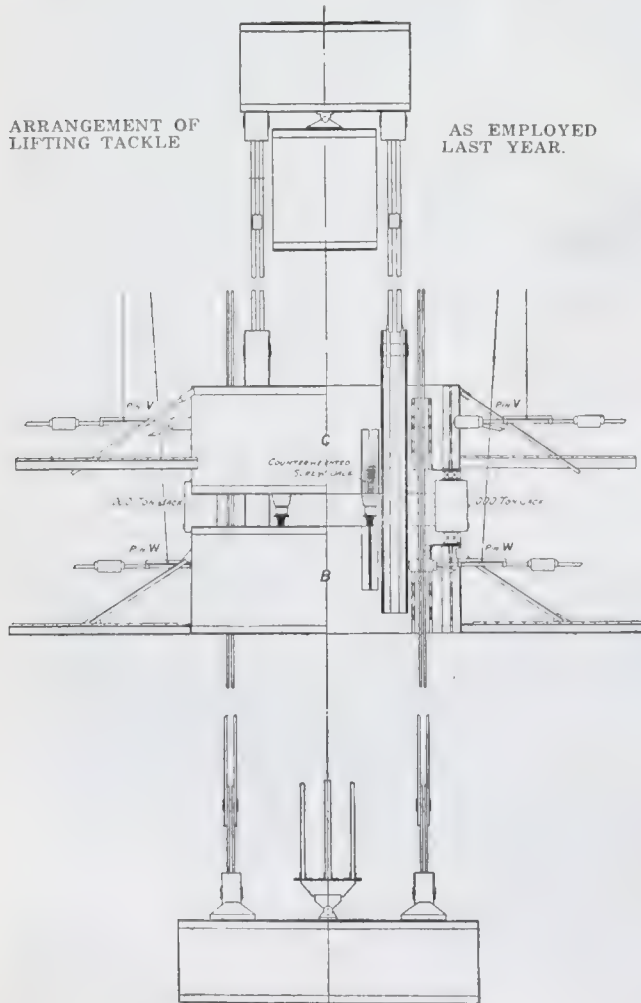
the pumps at a pressure of about 110 lbs. per sq. in., which in turn forced the water into the cylinder of the jacks at a pressure approximately 4000 lbs. per sq.

in. As this water was forced into the cylinders of the jacks the rams were slowly pushed upward, in turn raising the top girder that supported the hoisting chains. When the complete lift of two feet had been accomplished and the lower hole in the chain came in line with one of those in the lower girder, the locking pins were placed in. When this had been attained at each one of the four corners of the span, the top pins were removed and the water allowed to drain from the jacks, thus permitting the rams and the top girders to fall to their initial position in readiness for the next lift. When at the lower extreme position the upper pins were inserted through holes in the top girder, and after removing those in the lower girder the process of another lift was proceeded with. In making these connections and also those that joined the various links together, paraffin was used to lubricate the bearings.

in various holes during many operations, holes in the girders and hanger chains are of an oval shape, thus eliminating the absolute accuracy that would be necessary if the holes were perfectly round. This was a feature that did not detract from the safety of the work, but assisted greatly in the rapidity with which the many connections were accomplished. The locking pins used in the top and bottom jacking girders were of a counter-weighted character, both as regards the horizontal position and gravity action, the latter being taken care of by a balance weight supported on the opposite end of a small steel cable. When in operating position these pins were locked by means of trip levers bearing against the inner edge of the vertical slot, and it was necessary to raise this trip lever before the pins could be removed.

**Emergency Jacking Facilities**

In order to provide for any emergency through the blowing out of the pump packing or any unforeseen failure of the hydraulic jacks, a system of counter-weighted screw jacks was fitted between the two main jacking girders and adjacent to the hydraulic jacks; each corner of both cantilever arms being identically equipped. By means of a large hand wheel these emergency screw jacks, which had an outside diameter of 12 in., were operated through a system of shafts and gearing so as to follow up the upper or movable girder as it was forced upwards by the action of the hydraulic jacks. This feature of construction was not for the purpose of facilitating the elevation of the span, but to maintain at all times a rigid support constantly adjusted to the gradually increasing space as each separate lifting operation pro-



**Locking Pin Details**

In order to facilitate the placing of the pins



gressed, to avoid any minute but sudden drop that might prove harmful to the enterprise. The counter-weight was a steel pin 12 in. dia., with a length of about 11 1/4 inches, and had an approximate travel of 16 feet 9 inches; fitted to the hangers was a bracket that supported a wooden block, upon which the counter-weight came to rest when the screw was within 1/4 inch of normal high position for driving pin in the lower girder. The weight was supported by a 1/4 inch steel cable, the opposite end of which was wound about a small drum secured to one of the horizontal screw jack operating shafts.

#### Tell-tale System of Indicating

An interesting feature in connection with the operation of the hydraulic jacks so as to control the flow of water, and thus maintain at all times a uniform movement in each set, was the tell-tale system of indicators and telephones; the latter for communicating from one canti-

arate circuit. Each circuit was arranged with a sliding contact depending on the elevation of a pair of screws geared together and was closed during 23 1/2 in. of vertical motion of the screws, starting at the commencement of the 2 ft. lift, with the screws bearing against the upper lifting girder and ended when the screws had been lifted through a distance of 23 1/2 in. In addition to the tell-tale electric lights for the emergency screw jacks, the proportional amount of lift at any time is shown by the central indicators, directly in front of the chief operator. This indicator consists of a graduated scale attached to a frame work fitted to the lower jacking girder, and a pointer attached to a sliding block hanging on the end of a thin cable, the opposite end of which is secured to the movable or upper lifting girder. Not only for each lift were these tell-tales provided, but one was installed to indicate to the engineers and workmen the number of lifts that

to permit of floating the span and towing in to the middle of the stream.

#### Explanation of the Lift

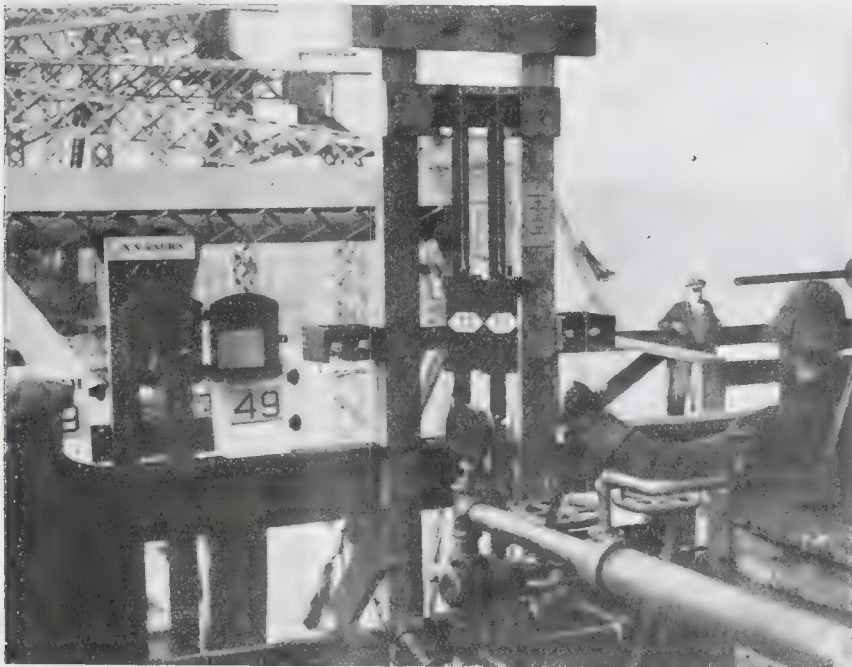
From the dimensions given of the clearance in the centre of the channel at high tide it may seem ambiguous to some as to why it was necessary to have 75 lifts of two feet in order to raise the span to its final position. The statement that the clearance is 150 feet at high tide is relatively true, but this is only a nominal expression and one that refers to the highest approximate tide during the year. Had the engineers been in a position to float the span at an earlier date the tide would have been more favorable, inasmuch as the actual number of lifts would have been reduced, but the tide at that particular time during which the recent operations were accomplished was about 8 feet lower than the extreme high tide, and the time of arrival at the site and the subsequent delay in making the hoisting chain connections prevented the placing of the pins until the tide had ebbed somewhat, this accounting for the recorded number of lifts of seventy-five, the lower chords of the span being about eight feet above the surface of the river, due to the buoyancy of the scows and the supporting girders.

Despite the hazardous nature of the enterprise it is a noteworthy and commendable feature that with the exception of the loss of life that accompanied the falling of the span last year, the fatalities or even serious casualties have been surprisingly few. Boatmen were kept constantly in the river during the whole period of erection, immediately below the bridge so as to rescue anyone who might inadvertently fall into the river. The efforts of the company to provide comfortable and attractive camp life for the men have been greatly appreciated by the many workmen and has doubtless been a restraining and beneficial factor in influencing the character of the men and assisting them to exercise more than ordinary care in the performance of their varied and dangerous duties.

Owing to the climatic conditions, and the wide range of temperature between midsummer and midwinter, which may be anywhere from 100 to 125 degrees F., about 30 inches has been allowed for expansion and contraction throughout the entire length of the bridge. It is expected that three years will be required for the painting of the complete structure, and when the gang of painters have finished at one end they will immediately start at the other, thus assuring a permanent job for several workmen in order that the steel work will be sufficiently protected from the effects of the weather.

#### Forth Bridge Comparison

In reviewing the Quebec bridge, undoubtedly the greatest achievement of man's genius in the spanning of marine highways, the mind naturally reverts to its nearest rival, the Forth bridge, built over the Firth of Forth near Edinburgh. This is the next greatest structure of its kind in the world and comparisons are, therefore, interesting. Total cantilever of the Quebec bridge, including centre



CONTROL PLATFORM SHOWING ELECTRIC TELLTALLES AND ELEVATION INDICATORS.

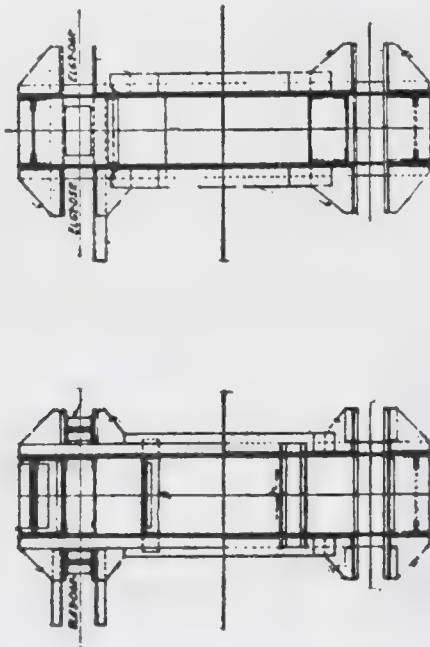
lever to the other and checking the progress at either end. An electric tell-tale was provided at the outer end of each cantilever arm to indicate to the central valve operator the vertical position of the safety screws at two critical stages of the lifting operation. First, to indicate that the screws are all bearing against the upper lifting girder before commencing a lift; and second, to show that the screws were lowered far enough to clear the upper girder when transferring the load from the jacks. As shown in one of the illustrations, the tell-tale was placed directly in front of the operator so that he could have an unobstructed view at all times and by a slight movement of either hand could regulate the flow of water to either the right or left hand set so as to maintain a uniform elevation at each corner of the span. This tell-tale consists of four incandescent lamps, each in a sep-

had been accomplished, as shown to the right of the communicating telephone.

During the erection of the span at Silvery, the structure rested upon steel bents supported on concrete foundations set in the river bed, these being clear at low tide and entirely submerged when the tide was full. A bent was provided for the main upright between each panel, and to allow for the camber of the lower chord suitable sand jacks were provided at each bent so that the level could be more easily adjusted as the upper members were gradually placed in position. The extreme camber at the commencement of operations was approximately 12 inches at the centre support. When the span had been constructed as far as was necessary for raising into position, the camber had been reduced to a few inches. Previous to the placing of the scows the majority of the bents had been removed



span, is 2,830; that of the Forth bridge, including two spans, 2,349 feet. Width of channel between the main piers, 1,800 feet for the former against 1,710 for the latter. The Quebec bridge is designed to carry per lineal foot, exclusive of its own weight, approximately 14,000 pounds; the Forth bridge a weight of only 4,480 pounds per lineal foot. The total weight of steel used in the construction of the Quebec bridge is approximately 66,000 tons; that of the Forth bridge 57,000 tons. Weight per lineal foot for the cantilevers, 48,300 lbs. on the Quebec, and 21,360 lbs. on the Forth. Greatest depth of the main piers below high water is 101 feet for the Quebec bridge and 87 feet for the Forth. The weight of per lineal foot of the Quebec bridge is 2.3 times that of the Forth Bridge. The load for which the Quebec bridge was designed is 3.1 times greater



PLAN, SIDE AND FRONT ELEVATIONS OF SUPPORTING AND JACKING GIRDERS WITH HANGER CHAINS IN POSITION.

than that of the Forth bridge, while the prescribed test load for the former exceeds that for the latter about 4 1-3 times. The centre span of the Quebec bridge is the longest in the world and is approximately 100 feet longer than either of the spans that unite the cantilevers of the Forth bridge.

**Brief History of Construction**

The enormous structure that now spans the St. Lawrence is the successful fulfilment of a vision that has been in the minds of nation builders for nearly three-quarters of a century. As far back as 1852 a project for a bridge over the river at or near Quebec was considered, and again, in 1884 designs were prepared and plans submitted to the Quebec Board of Trade for a bridge at about the present site, but no definite action was taken until about 1900, when the Quebec Bridge and Railway Company located a site near Cap Rouge and took steps for the erection of such a structure; this initial site is vir-

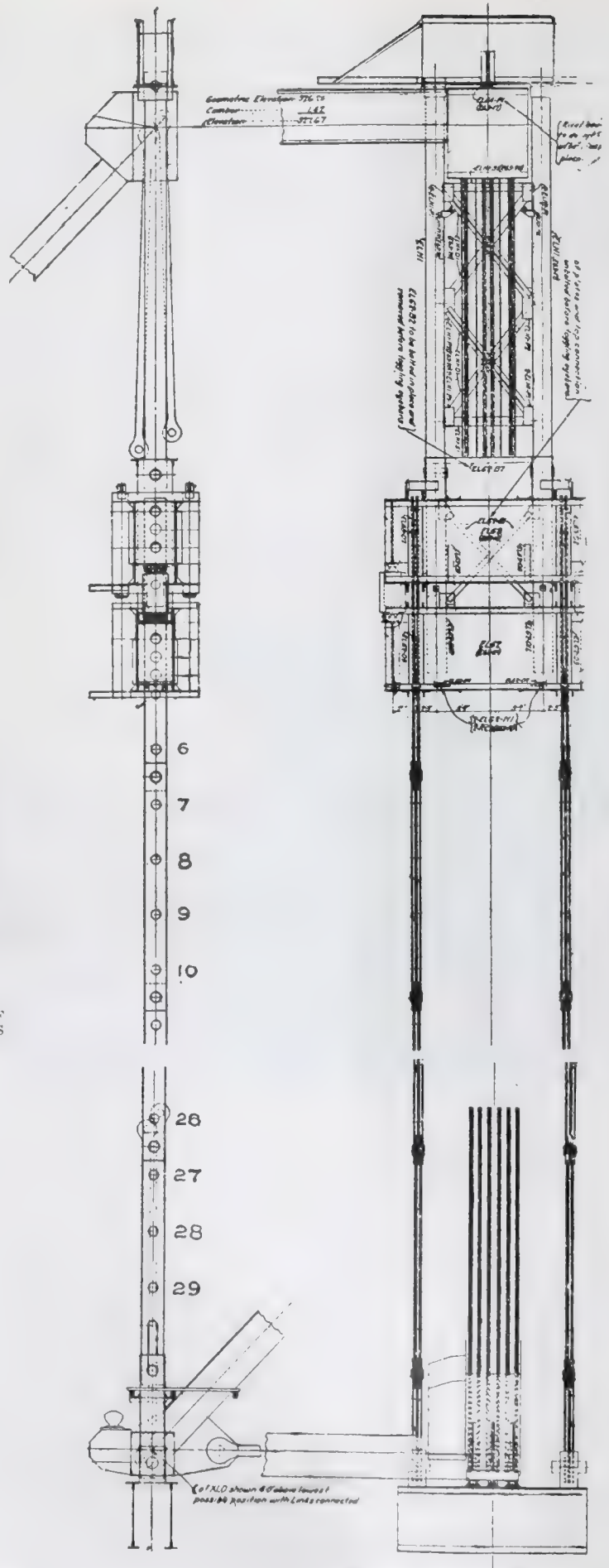


Illustration courtesy The Canadian Engineer.



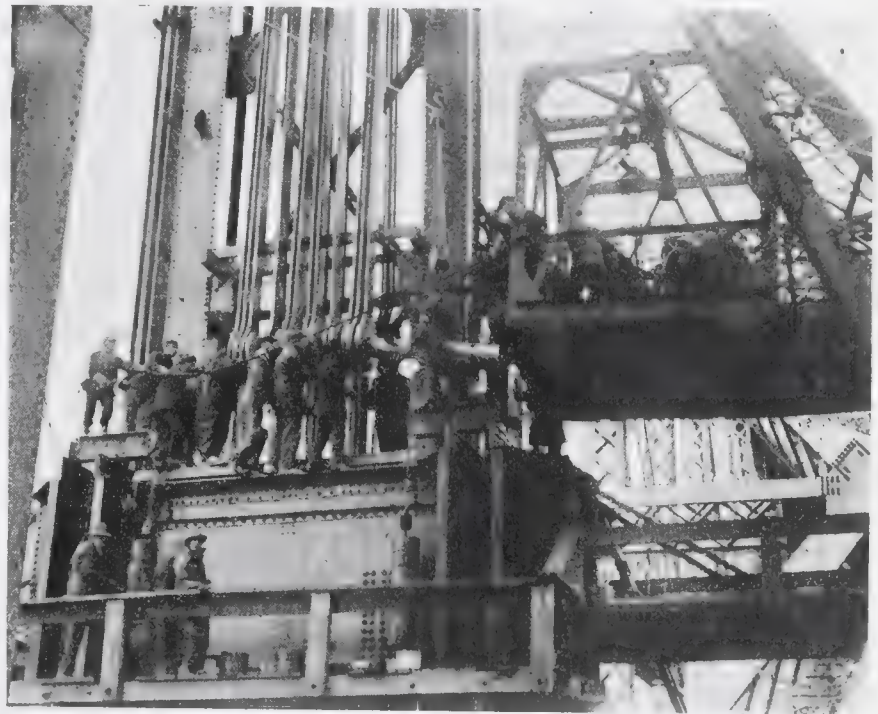
tually that of the present bridge. The width of the river at this point is the narrowest between Montreal and the sea and is approximately six miles above Quebec; the distance across at mean water level being about 2,000 feet. In 1900 the Company awarded contracts for a structure of the cantilever type, having a span between the main piers of 1,800 feet. After seven years of fabrication and erection, the superstructure, which was then about half completed, collapsed into the river, carrying with it from sixty to seventy of the workmen.

Following this disaster the reconstruction was undertaken by the Dominion Government, then under the leadership of Sir Wilfrid Laurier, and the task was assigned to the Railway Department, with M. J. Butler as deputy minister and chief engineer. A commission comprised of such eminent men as Henry Holgate, Professor J. G. G. Kerry, of McGill, and Dr. Galbraith, of Toronto University, were appointed to examine and report on the fallen structure. Following the presentation of this report it was decided to select a commission who would have full charge of this mammoth enterprise. The parties named for this responsible work were H. E. Vautelet, of Montreal, chairman; Ralph Modjeska, of Chicago; and Maurice Fitzmaurice, chief engineer of the County Council of London, England. After a year's studies of the problems involved the last mentioned member of the commission resigned, and for some time difficulty was experienced in agreeing upon a suitable successor to Mr. Fitzmaurice. However, after some negotiations Charles McDonald, formerly of Gananoque, Ontario, was induced to act on the board until such time as a contract had been signed. Tenders were requested, either on the designs then in the hands of the Board or on plans prepared by the tendering companies. Upon the acceptance of the designs submitted by the present contractors of the bridge, the St. Lawrence Bridge Company was organized and the erection of a suitable plant was immediately proceeded with at Rockfield, Quebec, situated on the Island of Montreal, this location offering ideal facilities for fabrication and shipment to the erection at the site. Despite the nature and the magnitude of the enterprise the work of construction progressed with remarkable rapidity so that in the summer of 1916 the work upon the two cantilever arms had practically been completed, with the erection of the centre span being accomplished simultaneously with that year's work. The centre span, the link that was to connect the two protruding arms, was erected at Silery Cove about three miles below the bridge site, and floated into position on September 11 of last year, but after being successfully floated to the site and supported from the hoisting chains, the failure of one of the main castings caused the lower support to slip from its position and within less than 10 seconds the entire centre span had been released from its remaining supports and was resting on the bed of the river a mass of tangled and useless metal.

The final attempt, which has been successfully achieved during the past week, marks the culmination of effort that has taxed the engineering ability and utmost resources of those associated with the work of constructing the bridge from the very date of its inception. To the average layman it is difficult, if not utterly impossible, to conceive of the magnitude of this great and mighty undertaking, and to appreciate, even in a small and unlearned measure, the many problems of design and construction, it would be necessary to view the enormous structure as it now extends from one shore to the other, a fitting monument and everlasting memorial to those engineers whose ability has

ries. With the completion of such terminals as are now under construction and those contemplated, the increased facilities will eventually make the City of Quebec one of the leading railway centres in Canada.

The work has been carried out under the supervision of a Government Board of Engineers, composed of Messrs. C. N. Monserrat (chairman and chief engineer), Ralph Modjeska, and H. P. Borden. The St. Lawrence Bridge Company are the contractors for the superstructure, Phelps Johnston, president; G. H. Duggan, chief engineer; George F. Porter, engineers of construction; W. B. Fortune, superintendent of erection; and S. P.



INSERTING THE FINAL PIN IN THE MAIN HANGERS.

made this feat possible. There yet remain many minor, but essential, details to complete before the bridge is finally finished and ready for traffic, and it will probably be the spring of 1918 before the structure is officially opened, although it is anticipated that sufficient progress will have been made by November to allow trains to cross over. It is probable that very few of the vast crowds that patiently watched the massive structure mount slowly into position during the early half of last week, fully realized the chief object of the bridge and the inestimable importance that its successful completion would mean to the Dominion and particularly to that portion of the country immediately surrounding the bridge location. In addition to being the last link that will form the unbroken highway of the Transcontinental Railway from ocean to ocean, the bridge will provide communication to either side of the river for ten other converging transportation companies, the transferring of whose freight has until now been accomplished by railroad fer-

Mitchell, consulting engineer of erection; Works Superintendent Ladd being responsible for the fabrication. For the accompanying photographs we are indebted to Mr. E. N. Finn, bridge photographer; also to Mr. Millar, of the *Montreal Star*.



OXIDE of aluminum is so nearly of the same specific gravity as the metal that it does not allow the molten metal to clear itself when in small globules or grains. For this reason mechanical aid has to be given. In practice the scrap is so far heated in the crucible that it becomes a pasty mass, in which state it is squeezed and kneaded for some time, preferably with an oak or other hardwood rod of fair cross area, and then the heat is raised, and with some manipulation of the rod the metal is cleared of the dross and dirt. If melted rapidly, a dirty mass of metal and oxide is produced with a heavy loss of actual metal held in the skimmings from which it cannot dissociate itself, owing to its slight weight.



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PUBLISHERS OF

## CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper devoted to the machinery and manufacturing interests.

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### FIVE TALENTS OR ONE?

**T**HE turmoil of world affairs during the past three years has been instrumental in bringing forcibly to the attention of the public, more particularly that section directly concerned with engineering activities, the degree of development attained by the various nations of the world, and of no nation can it be truly said that its efforts are in the fierce blaze of publicity so much as of Great Britain.

Born colonizers, successful traders, masterful administrators, the energies of the British people found outlet in every conceivable form of industrial activity, their world-wide markets and methods of merchandizing permitting them to control their own progress in their own manner until the present cataclysmic struggle shook precedent and conservatism to the winds, and drove the nation's engineers to unparalleled efforts in many more or less dormant fields of science and industry.

During the early months of war, many students of historical events drew inspiration from the saying that "history repeats itself," and on every hand one heard forecast after forecast which were all in turn completely upset as each phase of Armageddon unfolded itself to the world's inhabitants. At least one parallel drawn by a writer has been justified by the course of events. He drew attention to the fact, and it has not so far been contradicted, that at the close of the Napoleonic wars, the world was really more civilized, judged from the standpoint of intellectual knowledge and industrial achievement than it was at the beginning of those troublous times. Numerous advances in the arts and sciences, manufacturing developments, and political economy took place, which marked great progress at the time and formed a solid foundation for that phenomenal development of the British nation, the envy of which is not the least of the present war's causes.

Now that the threatened avalanche of militarism has been definitely averted, and seems in a fair way of being rendered harmless, the strain of recent events has found expression in many ways, not the least valuable of which is that of "self-search" as typified by some recently published books by authoritative writers. We refer specifically to the book "Eclipse or Empire," by H. B. Gray and S. Turner. The theme of this book is the subserviency of everything to the industrial national aspect. Extracts

received from an English contemporary indicate the exceedingly chastened spirit in which the authors view the industrial placidity of the British nation during the past two or three decades. They state "that during the last twenty to forty years most of the inventions, new ideas and developments have been given to the world by countries other than our own; furthermore, that their value has been more quickly appreciated and put to practical use in foreign lands." As our authority expresses it, "the book, condensed to the point of extreme brevity, is a valuable resumé of alleged national shortcomings, and should be in the hands of every engineer; indeed, just such a compilation, cataloguing and digesting for easy reference a survey of the entire industrial field from one viewpoint was badly needed.

The burden of the foregoing remarks in their bearing on our past, present and future development is sufficiently obvious. We were not able, nor did circumstances give us the opportunity, to benefit industrially, at the time, by events of a hundred years ago, but now every force at the service of mankind is directly engaged in military, industrial and scientific activity, the results of which are, so to speak, immediately at our disposal.

True, the return of peace will see the re-entrance of our present enemies, under due limitations no doubt, into the world's industrial arena, but what of the present? Is the cessation of hostilities to find us where we were at the start? Shall we lack interest for the present, and avoid effort in the future to avail ourselves of the world's advance marked in years instead of decades or centuries as formerly? Amidst the wealth of information being spread almost daily, are we to find no atoms which we may retain and benefit thereby? Shall our record in the present forceful era be one of assimilation only, or one of forceful origination. The future alone can tell, but the making of the answer is in the hands of our manufacturers now. They are in the position of the talent receivers—the point is whether they wish to be known as the man who received five talents and doubled them, or the man who received one—and "hung on to it."

To quote from the work which prompts these remarks "It matters but little what a man is to-day—the great matter is what he desires and intends to be in one, or two, or three years' time. He is not a mere machine with two hands and two feet—but a living pulsating energy. He has a trinity of powers—spirit, mind and hand, and the least of these three is hand. For it is only the spirit to do, and the mind to create, that can make the hand move at all. . . . The progress of our nation will depend on the rate at which we turn the principles and theories of science into terms of ascertained facts."

### A CANADIAN MONUMENT

**T**HE final and permanent success of the Quebec Bridge undertaking seems now to be an assured fact. Nothing in the province of the humanly expected course of events can prevent it taking its place in that galaxy of notable accomplishments which have made the names of Canada familiar wherever perseverance and resource are estimated at their true worth. Of its ultimate economic influence on the country's development, it is yet early to more than approximate, but as a symbol of the unity of the confederation it holds a unique place in the hearts of all Canadians. It is the keystone of the Dominion, filling the final gap which geographically and physically has existed, albeit intangibly, as a barrier between the Maritime Provinces and the others.

That it may have a long and useful existence, and serve successfully the purposes and aims which prompted its creation, is the wish of all from now on.



## INDUSTRIAL NOTABILITIES

**P**ERCY McCUTCHEON YEATES, president, National Machinery & Supply Co., Ltd., Hamilton, Ont., was born in London, Ont., Oct. 29, 1882, son of William Yeates, and after attending public and private schools of London, completed his education at University of Toronto.

He commenced his business career with the London Machine Tool Co., Hamilton, afterwards with the Baldwin Locomotive Works, Philadelphia; and



PERCY McCUTCHEON YEATES.

later with the London Tool Co. Mr. Yeates organized the present business in 1909 and was vice-president and general manager until 1916 since when he has been president.

On Jan. 6, 1908, he married Emma Gilmour, daughter of Dr. J. T. Gilmour, of Toronto, their family consisting of one son and one daughter.

Mr. Yeates is a member of the following clubs: Hamilton; Tamahaac; Hamilton Golf and Country; Hamilton Jockey; University, Toronto. He also holds membership in Delta Upsilon Society (University of Toronto).

Golf, Motoring, Fishing, and Hunting are his principal recreations, while in politics he is Conservative and in religion, Methodist. His residence is 24 Undercliff Ave., Hamilton, 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.

PIG IRON.	
Grey large, Pittsburgh	\$46 95
Lake Superior, charcoal, Chicago	58 00
Standard low phos., Philadelphia	87 00
Bessemer, Pittsburgh	51 95
Basic, Valley furnace	48 00
Montreal Toronto	
Hamilton	60 00
Victoria	60 00

FINISHED IRON AND STEEL.	
Per lb. to Large Buyers.	Cents
Iron bars, base, Toronto	5 25
Steel bars, base, Toronto	5 50
Steel bars, 2 in. to 4 in. base	6 00
Steel bars, 4 in. and larger base	7 00
Iron bars, base, Montreal	6 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
Chequered floor plate, 1/4 in.	15 00
Staybolt iron	8 50
Bessemer rails, heavy, at mill	38 00
Steel bars, Pittsburgh	4 00
Tank plates, Pittsburgh	9 00
Structural shapes, Pittsburgh	4 00
Steel hoops, Pittsburgh	5 25
F.O.B. Toronto Warehouse.	
Steel bars	5 50
Small shapes	5 75
F.O.B. Chicago Warehouse	
Steel bars	5 00
Structural shapes	5 00
Plates	8 00

FREIGHT RATES.	
Pittsburgh to Following Points	Per 100 lbs.
	C.L. L.C.L.
Montreal	31 5
St. John, N.B.	35 1
Halifax	35 1
Toronto	18 9
Guelph	18 9
London	18 9
Windsor	18 9
Winnipeg	64 9

METALS.	
Montreal Toronto	
Lake copper	\$31 00 \$32 00
Electro copper	31 00 32 00
Castings, copper	30 00 31 00
Tin	63 00 63 00
Spelter	10 50 10 50
Lead	11 00 11 50
Antimony	18 00 19 00
Aluminum	65 00 62 00

PLATES.	
Montreal Toronto	
Plates, 1/4 to 1/2	\$12 00 \$13 00
Heads	12 30 13 30
Tank plates, 3-16 in.	12 65 13 25

WROUGHT PIPE.	
Effective July 5, 1917.	
Black Galvanized Standard Butt weld.	
Size	Per 100 feet
1/2 in.	\$ 5 00
3/4 in.	5 12
1 in.	6 46
1 1/4 in.	8 17
1 1/2 in.	12 07
2 in.	16 33
2 1/2 in.	19 58
3 in.	26 27
3 1/2 in.	42 12
4 in.	55 08
4 1/2 in.	69 92
5 in.	82 84

Standard Lapweld.	
2 in.	29 23
2 1/2 in.	43 88
3 in.	57 38
3 1/2 in.	71 76
4 in.	85 02
4 1/2 in.	96 52
5 in.	112 50
6 in.	145 90
7 in.	190 40
8 L in.	200 00
8 in.	230 40
9 in.	276 00
10 L in.	256 00
10 in.	329 60

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES.	
4" 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%.	

OLD MATERIAL.	
Dealers' Buying Prices.	
Montreal Toronto	
Copper, light	\$20 00 \$18 00
Copper, crucible	23 00 20 50
Copper, heavy	23 00 20 50
Copper wire	22 00 20 50
No. 1 machine composition	20 00 18 00
New brass cuttings	16 00 17 00
No. 1 brass turnings	14 00 15 75
Light brass	12 00 10 00
Medium brass	16 00 14 00
Heavy brass	16 00 16 00
Heavy melting steel	21 00 17 00
Steel turning	12 00 8 00
Shell turnings	12 00 12 00
Boiler plate	22 00 10 50
Axles, wrought iron	30 00 24 00
Rails	25 00 18 00
No. 1 machine cast iron	25 00 25 00
Malleable scrap	20 00 20 00
Pipe, wrought	19 00 9 00
Car wheels, iron	26 00 25 00
Steel axles	29 00 30 00
Mach. shop turn'gs.	8 50 8 50
Cast borings	12 00 8 50
Stove plate	19 00 19 00
Scrap zinc	6 50 9 50
Heavy lead	10 00 10 50
Tea lead	7 00 7 00
Aluminum	30 00 35 00

BOLTS, NUTS AND SCREWS.	
	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 10
Machine bolts, 7-16 and over	net
Machine bolts, 3/4" and less.	10
Blank bolts	net
Bolt ends	net
Elevator bolts	50 and 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.	30
list plus	50
Burrs only list plus	17 1/2
Iron rivets and burrs	17 1/2
Boiler rivets, base 3/4-in. and larger	\$7 60
Structural rivets, as above.	7 50
Wood screws, flat, bright.	72 1/2

Wood screws, O. & R., bright	.67 1/2
Wood screws, flat, brass	.37 1/2
Wood screws, O. & R., brass	.32 1/2
Wood screws, flat, bronze	.27 1/2
Wood screws, O. & R., bronze	.25

MILLED PRODUCTS.	
	Per cent.
Set screws	35
Sq. & Hex. Head Cap Screws	30
Rd. & Fl. Head Cap Screws	10
Flat 1/2 But. Hd. Cap Screws plus	10
Fin. & Semi-fin. nuts up to 1 in.	25
Fin. and semi-fin. nuts, over 1 in., up to 1 1/2 in.	30
Fin. and semi-fin. nuts, over 1 1/2 in., up to 2 in.	10
Studs	20
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, without fllet, list plus	10
Planer head bolts, with fllet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	net
Planer bolt washers	net
Hollow set screws, list plus	20
Collar screws, list plus 30, 10	20
Thumb screws	20
Thumb nuts	65
Patch bolts, add 40, 10	in.
Cold pressed nuts to 1 1/2 in.	add \$4.50
Cold pressed nuts over 1 1/2 in.	add \$7.00

BILLETS.	
	Per gross ton
Bessemer billets	\$ 65 00
Open-hearth billets	65 00
O.H. sheet bars	75 00
Forging billets	100 00
Wire rods	90 00

NAILS AND SPIKES.	
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, 1/4 and 5-16 in.	8 00

MISCELLANEOUS.	
Solder, strictly	0 36
Solder, guaranteed	0 38 1/2
Babbitt metals	18 to 70
Soldering coppers, lb.	0 53
Lead wool, per lb.	0 16
Putty, 100-lb. drum	4 35
White lead, pure, cwt.	19 00
Red dry lead, 100 lb. kegs, per cwt.	15 45
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 61
Linseed oil, raw, single, bbls.	1 49
Linseed oil, boiled, single, bbls.	1 52
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 08 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

ROPE AND PACKINGS	
Plumbers' oakum, per lb.	.09
Packing, square braided	.34
Packing, No. 1 Italian	.40
Packing, No. 2 Italian	.32
Pure Manila rope	.37
British Manila Rope	.31
New Zealand Hemp	.31
Transmission rope, Manila	.43
Drilling cables, Manila	.39
Cotton Rope, 1/4-in. and up.	.47

Discount off list, Montreal and Toronto 25%

CARBON DRILLS AND REAMERS.	
	Per Cent.
S.S. drills, wire sizes up to 52	40
S.S. drills, wire sizes, No. 53 to 80	25
Standard drills to 1 1/2 in.	40
Standard drills, over 1 1/2 in.	15
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	20
Drills and countersinks	list plus 30
Bridge reamers	45
Centre reamers	10
Chucking reamers	10
Hand reamers	15

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

IRON PIPE FITTINGS.	
Canadian malleable, A, add 7 1/2% ; B and C, 10% ; cast iron, 35% ; standard bushings, 50% ; headers, 60% ; flanged unions, 40% ; malleable bushings, 50% ; nipples, 55% ; malleable lipped unions, 50.	

SHEETS.	
Montreal Toronto	
Sheets, black, No. 28	\$11 00 \$11 00
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
Apollo brand, 10 1/4 oz. galvanized	12 25 12 09
Queen's Head, 28 B. W.G.	11 75 10 75
Fleur-de-Lis, 28 B.W.	11 75 10 75
G. Colborne's Best, No. 28	12 00 10 25
Colborne Crown, No. 28	11 25 10 00
Premier, No. 28 U.S.	13 75 11 70
Premier, 10 1/4 oz.	13 85 12 00
Zinc sheets	20 00 20 00

PROOF COIL CHAIN.	
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.**

1/8 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

**FILES AND RASPS.**

Per Cent.	
Great Western, American ...	50
Kearney & Foot, Arcade.....	50
J. Barton Smith, Eagle.....	50
McClelland, Globe.....	50
Whitman & Barnes.....	50
Black Diamond.....	40
Delta Files.....	37 1/2
Nicholson.....	40
P.H. and Imperial.....	50
Globe.....	50
Vulcan.....	50
Disston.....	50

**COAL AND COKE.**

Solvay Foundry Coke.....*	
Connelsville Foundry Coke...	
Steam Lump Coal.....	
Best Slack.....	

**BOILER TUBES.**

Size.	Seam- less	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

**OILS AND COMPOUNDS.**

Castor oil, per lb. ....	40
Royalite, per gal., bulk.....	16
Palatine.....	19
Machine oil, per gal.....	26 1/4

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
Lufkin 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

**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, plan- ished, 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, Ameri- can.....	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

**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, 1/2c per lb. extra. Cut sheets to size, 1c per lb extra.		

**PLATING CHEMICALS.**

Acid, boracic.....	\$ 15
Acid, hydrochloric.....	06
Acid, hydrofluoric.....	14 1/2
Acid, nitric.....	10
Acid, sulphuric.....	05
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 sul- phate.....	12
Nickel carbonate.....	35
Nickel sulphate.....	15
Potassium carbonate.....	75
Potassium sulphide (sub- stitute).....	20
Silver chloride (per oz.)....	65
Silver nitrate (per oz.)....	55
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

CONDITIONS in the steel trade are becoming more complex on account of the embargo, and indications point to a difficult situation for consumers to contend with. The market is consequently very unsettled and the trade is anxiously awaiting developments. What is likely to happen is difficult to foretell as the outlook is so obscure. The situation, however, will be relieved now that the United States Government has fixed prices on steel, iron ore, pig-iron and coke. The effort made to have the embargo modified does not appear to have met with much success as the situation is as acute as ever. Existing conditions will benefit the Canadian mills to a certain extent, but those consumers who rely on imported steel products will suffer considerable inconvenience. Shipbuilding will not be interfered with, but other industries using iron and steel will be seriously hampered in their manufacturing activities. One effect of the embargo is seen in higher prices on steel plate, boiler tubes and black sheets. The embargo seems to have changed the whole aspect of the situation with regard to prices. Until quite recently recessions were anticipated, but now indications point the other way. The pig-iron situation is unchanged and quotations are holding firm locally, although there is a downward tendency in prices across the line. The embargo and shortage of cars is keeping the market firm here. The scrap metal market is weaker and declines have been registered in copper and brass scrap, although steel and iron prices are unchanged. The non-ferrous metal markets are in a rather chaotic condition. An embargo on copper has been placed by the United States Government, which has also fixed a price to all consumers at 23 1/2c a pound, or 3c below the market. Tin is higher, but lead has declined, otherwise prices are unchanged. The machine tool market is quiet and the general situation unchanged.

and while nothing definite has been learned as to the extent of this new business, it is believed that enough contracts have been obtained to operate many of the large plants at full capacity for a considerable time, probably well into 1918. A feature of the present situation is the difficulty that promises to become serious in the near future, of securing permission to get such steel from the States as is most urgently required for some domestic purposes. In some respects this material is not required directly for war purposes, but the loss likely to be sustained by certain industries will eventually result in serious disorganization of trade in general.

## Pig Iron

The general situation has developed little of interest and the market is still marking time in respect to any alterations in pig iron quotations; apparently awaiting further action on the part of the U. S. Government regarding the regulations that are contemplated. The situation in the States is beginning to reflect the possibilities that may result on the announcement of the investigating committee, and an easier tone is evident in the declining quotations. The Pittsburgh price on basic pig is now quoted at \$42.95 per ton, a decline over last week of \$6 per ton. The composite price has been lowered during the week to the amount of \$1.32 per ton, and is now below the \$50 mark. The fuel situation is not so acute, but transportation facilities are still inadequate for all requirements. The Canadian situation is still unchanged, with prices withheld.

Montreal, Que., Sept. 24, 1917.—Renewed interest has developed over the announcement that additional orders have been placed for the six-inch shells,



### Steel

The increasing requirements of the American Government in meeting and filling the many demands that have arisen out of the prosecution of the war have necessitated a readjustment of conditions, so that everyone will realize the importance of any action taken in this connection. It is these conditions that should stimulate production, as there is a possibility of a steel shortage in the States, particularly for purposes other than war necessities. The fact that Canada is entirely dependent on United States mills for certain classes of steel makes the present developments much more serious for domestic consumers in this country, as it is practically impossible to secure supplies unless it is especially certified that they are to be used expressly for war requirements. Unless concerted action is brought to bear on the Governments by those manufacturers suffering under existing conditions, it will eventually result in very serious inconvenience and subsequently disorganize the business of this country. Some provision should be made so as to allow dealers to obtain such steel as might be required for urgent requirements, as certain delays, even in domestic enterprise, might have serious results in the advancement of the cause for which the present conditions are supposed to assist. Producers are apparently offering inducements for the placing of additional future business, as indicated in the easier market that has developed in certain directions. This, however, has not had the desired effect, as the market remains quiet and uncertain. A sharp decline has been reported on the Pittsburgh quotations for rolling and forging billets, the former on a drop of \$25 being quoted at \$75 per ton; the price of \$85 on the latter showing a decline of \$40 per ton. Steel bars are lower with the New York price having declined  $\frac{1}{2}$ c per lb. Tank plates have an easier tendency, but the demand continues very heavy. The situation in blue annealed and galvanized sheets is not so acute, and American quotations have declined. It is not expected that the announcement of the American Government in respect to price regulations will materially affect the demand, although the price to be paid for steel for war requirements is considerably lower than present quotations on the open market. The effect of existing conditions on the Canadian market may well be one to receive the immediate attention of both the manufacturer and the Government, as a famine in domestic supply would seriously handicap many industries throughout the country. Dealers here are not favorably impressed with the outlook for the near future, and are making efforts to have the authorities at Ottawa take some action to relieve the situation. In the meantime conditions are very unsettled and prices continue uncertain and nominal at last week's level.

### Metals

The market is beginning to feel the effects of the readjustment, as outlined by the American Government, and in respect to copper and lead, and also anti-

mony the situation has weakened. Copper has declined to meet the price fixed by the Government, and will likely continue steady for some considerable time. Tin has again become stronger after a spell of weakness. Spelter is quiet and unchanged. Lead has been reduced by all interests. Antimony has declined on a quiet market. Aluminum continues firm and strong.

**Copper.**—The announcement that the American Government has made a statement regarding the copper situation and the fixing of a price to all buyers of  $23\frac{1}{2}$ c per lb. has relieved the market of much of the tension that has characterized it during the past few months. The price mentioned was agreed upon after extended negotiations between the War Industries Board and some of the leading producers, with the stipulation that it will be subject to revision after a period of four months. One of the chief features of the agreement is that the wages of employees shall not be reduced during the time the agreement is in force; this clause will assure the full co-operation of all workmen and production will likely be maintained at maximum capacity. Unless this is done the small consumer may find himself in as bad a position as before, as the large buyer will possibly have the first call on covering his requirements. Under existing conditions and until further developments are reported, the price quotations for copper will remain constant, even though the market may have an uncertain character. The New York quotation is on the flat price of  $23\frac{1}{2}$ c. per lb. With local prices set at 31c. for lake and electro, and 30c for castings, dealers here believe that these prices will prevail during the coming four months.

**Tin.**—This market is kept in a more or less unsettled position owing to the irregular advices that are received from London. The New York market which developed a weakness during the earlier part of the week has shown signs of recovering some of its previous strength, but present quotations of  $61\frac{1}{2}$ c. are still one cent lower than last week. It is not likely that this market will be affected by Government regulations unless some understanding can be arrived at between the British and American authorities. Dealers here report a stronger market, with prices up one cent; price quoted being 63c. per lb.

**Spelter.**—Developments in the States have resulted in again placing the spelter market in a very unsettled state and further complications are apparently making the situation more difficult to define. A misunderstanding has apparently arisen between the investigating committee and the Government which will mean further delay in coming to an agreement as to the price that will be fixed for this metal. The New York market has shown a little increased strength due to a better demand, the current quotation of  $8\frac{3}{8}$ c. being  $\frac{1}{8}$ c. higher than last week. Local spelter is firm and unchanged at  $10\frac{1}{2}$ c. per lb.

**Lead.**—The recent rumor that this metal would soon experience another decline has at last materialized, and the

drop of 1c per lb. during the week has placed the market at the base figure of 8c. Production has been stepped up so much during the last two months that supplies have been increasing in face of a quiet market, and one that has become rather demoralized owing to existing conditions and the uncertainty that characterized the entire situation. However, it is not to be supposed that this market is due to fall still further, as Government requirements at any time may result in another advance. There are those who think that this recent decline has been made more to stimulate buying than as a fair indication as to the actual condition of the market. So far no increased activity has resulted. Following the lower market in the States, local dealers have declined their quotations 1c per lb., the price asked being 11c per lb.

**Antimony.**—The market is quiet on light demand, with nothing of interest to report. New York is a little easier, the quotation of  $15\frac{3}{8}$ c per lb. being  $\frac{1}{8}$ c lower than last week. The market here has weakened to the extent of 2c per lb., the price quoted being 18c per lb.

**Aluminum.**—No change has taken place in the condition of the market, and prices are unchanged at 65c to 70c per lb.

### Machine Tools and Supplies

While no pronounced activity has been reported in the machine tool industry, the fact that additional contracts have been placed for the 6-inch high explosive shells has again revived the waning interest throughout the trade. It is not anticipated that the demand for equipment will be very great, as many of the plants are already well supplied with the necessary machinery; others who have been fortunate in obtaining orders have been manufacturing the larger sizes and their requirements will be more for accessory attachments than for unit equipment. In fitting the latter machines for the making of the smaller shells it is expected that the demand for special devices and attachments will be renewed, as the experience gained during the past will result in the adoption of the most efficient devices for the filling of these latest orders. The demands for supplies and machine shop accessories has shown improvement since the placing of the additional business for the 6-inch shells. The difficulties that are still experienced in the securing of raw materials continues to maintain a very firm market and steady prices.

### Scrap

All interests are transacting business in a more or less guarded fashion, and little heavy trading is reported. No action has been announced as to what steps will be taken to regulate the scrap situation. It is very likely, however, that this feature of industrial necessity will be subjected to similar regulations as that under consideration in other branches of activity. In view of the possibility that the iron and steel markets will undergo a change on the Government announcement re the fixing of prices, it is anticipated that the market in old materials will be likewise affected. The New York



market has developed a weaker tone, and dealers here report a very unsettled situation, with prices very uncertain and nominal. Local quotations are higher on old copper than that asked for new metal.

**Toronto, Ont., Sept. 25.**—Trade locally continues in satisfactory volume and many industries are still deriving considerable benefit from war orders. Business of this nature however, depends largely, as far as British Government contracts are concerned, upon the ability of the Canadian Government to finance these orders. As large credits are being, and will continue to be placed at the disposal of the British Government for war supplies, Canadian industries will benefit to that extent. The U.S. Government has also placed large contracts for supplies in Canada and there is a possibility of further development in this respect. While the munitions industry is not as active as formerly contracts for shells are still being placed representing in the aggregate a large sum of money.

#### Steel

The unsettled situation in the steel market arising out of the embargo on importations from United States continues to cause considerable delay and inconvenience to domestic consumers. Conditions at the present time are such that no one knows what is likely to develop either in regard to the supply of material or prices. The embargo has created unusual conditions in the trade in so far as it affects certain materials not produced in Canada among which may be included boiler tubes, plates, larger size structural shapes. These materials can be obtained for shipbuilding or for marine boilers but for any other purpose or for merchants' stocks it is very difficult to obtain an export license. Indications point to a much tighter situation owing to the heavy demand for steel which will ultimately develop in the United States. The capacity of the mills, although very large, is limited while the demand is apparently unlimited. It is not known publicly what action the United States Government may take in regard to its requirements of steel for war purposes but it appears likely that a considerable percentage of the output of steel will be taken over for this purpose. A report is current that the U.S. Government contemplates taking over 95 per cent. of that country's output to be utilized in the manufacture of munitions and war equipment generally. Whether there be any foundation in this report or not, the fact that the Government's needs are increasing is sufficient to indicate that a shortage of steel for private consumers is likely to become more acute than ever before. Developments across the line will benefit Canadian steel concerns who will be called upon to supply considerable more tonnage for private consumers than in normal times. The production of shell steel is still considerable and although there has been some decrease in output of steel for this pur-

pose the demand for this material is still sufficient to keep the mills busy while with the additional tonnage requirements for domestic consumers will in the aggregate represent a large volume of business.

What the future has in store with regard to prices is problematical. The general consensus of opinion for some time has been that the market is due for a decline in values. Conditions prevailing, particularly in regard to the embargo, have changed the aspect of the situation and a continuance of firm prices now appears more probable than it did a few weeks ago. The influence of conditions in the States upon prices in Canada is another factor in the situation about which there is considerable difference of opinion now. The question seems to be, will the embargo neutralize that influence and the Canadian market have its own basis of prices, that is for steel products such as are rolled in Canada. The market is

#### 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.**

so unsettled and outlook so obscure that it is impossible to predict what will develop. Until quite recently it was generally believed that prices were about to decline or at least remain stationary. This week there has been an advance of about 10 per cent. on seamless and lap-welded boiler tubes, while plates and black sheets have also advanced.

The tense situation in the trade in the United States has been relieved by the announcement of prices which the Government has fixed on steel products. All prices are considerably reduced from current quotations and are as follows: Steel bars, plates and shapes are prices at Pittsburg and Chicago. Bars are now \$2.90 per 100 lbs. recent price being \$5.50; plates \$3.25 as against \$11. Shapes \$3.00 now, were \$6 per 100 lbs. Pig iron is now \$33. per gross ton, the recent price being \$58.00 a ton. Connellsville coke is now \$6.00 as against \$16 a ton. Iron ore \$5.05 per gross ton, no change. These prices are subject to revision Jan. 1, 1918, but will become effective immediately. It will

be interesting to see what effect these prices will have on the situation as they are lower than were predicted. Business has been largely confined to Government requirements and private consumers are only buying to fill urgent needs.

#### Pig Iron

The pig iron market continues unsettled with the trend of prices downwards. There is however so little pig iron changing hands that there is practically no market price at the present time. The embargo and shortage of cars are both tending to keep prices up in spite of the belief that the market will decline. Buying is generally hand-to-mouth and stocks are low both at the foundries and furnaces. Coke production is still being hampered on account of shortage of labor and cars. Lately the labor supply has been more liberal but the car shortage is more acute. The fact that the U.S. Government has at last fixed prices on pig iron, ore and coke will relieve the situation. Iron ore is unchanged at \$5.05 a gross ton, basis lower lake ports. Coke in Connellsville, is \$6. net ton, the recent price being \$16. a reduction of 62.5 per cent. The price agreed upon for pig iron is \$33 gross ton, the recent price being \$58. net ton, a reduction of 43.1 per cent.

#### Scrap

A supervisor will be appointed by the Government to investigate the scrap situation and go into the question of prices and efficient utilisation of all old materials. The market is weaker and there has been a decline in prices of all coppers and brass scrap equivalent to about 3c per pound. The embargo which has been placed by the U.S. Government on the import of all metals has unsettled the local market and it is difficult to say to what extent it will affect the situation. There is only a moderate demand for non-ferrous scrap although there is a fair enquiry for steel and iron scrap at unchanged prices.

#### Machine Tools

The machine tool market continues dull with no outstanding feature of importance to note. The concerns who have contracts for 6 inch shells are buying a few special tools, but generally speaking the existing equipment will be utilized for the new work. New fixtures etc., will however, be required to suit the size of shell. Canadian machine tool builders are busy but not to the same extent as a few months ago. A number of machine shops are actively engaged on marine work but this will not necessitate new equipment. The Canadian Car & Foundry Co. have purchased some of the new tools for their car works at Fort William, Ont.

#### Supplies

There has been less activity in machine shop supplies since the shell orders declined in volume, but business is keeping up fairly well in general lines. Prices continue firm but there have been fewer changes of late. An advance in prices of oakum is expected



shortly and is due to the big demand for this material for shipbuilding. For the construction of wooden ships oakum is used in considerable quantities for caulking the seams. Prices of linseed oil have dropped 6c due to the decline in flax seed. Turpentine on the other hand has advanced 3c per gallon at a firm market. An advance of 50c per barrel has been made in resins. Gasoline and coal oil are firm but unchanged.

### Metals

Interesting developments are taking place in the metal markets. An embargo has been placed on the export of copper by the U.S. Government and it is expected that it will be extended to include all other non-ferrous metals. This has naturally caused some excitement in the trade and the market consequently is unsettled. It is not clear at present what the full effect will be, but it cannot help but cause much inconvenience and will probably result in higher prices. As in the case of iron and steel a license has to be obtained before metal can be imported into Canada which is difficult to obtain except for certain specified purposes, such as munitions. The U.S. Government has also fixed a price of 23½c per pound, New York, on copper but this has not yet been reflected in the market price. Tin is a shade firmer and has advanced but lead is weaker and lower. All other prices are unchanged.

**Copper.**—The situation has been cleared up by the U.S. Government fixing a price of 23½c on copper f.o.b. New York. This is 3c below the market price. It has been agreed that sales to the Government, Allies and the public will be at this price. The producers pledged themselves to maintain maximum production and to prevent copper falling into the hand of speculators. What effect this new price will have on the local market is not easy to determine as the embargo has changed the aspect of the situation. Lake and electro are still quoted at 32c and castings at 31c per pound.

**Tin.**—The market is firmer in sympathy with the London situation and prices have advanced 1c a pound. Tin is now quoted at 63c a pound.

**Spelter.**—The market is firm but less active at unchanged quotations. Local price 10½c per pound.

**Lead.**—The Trust has again reduced its price of lead to 8c New York and the independents are quoting the same figure. The price has now dropped to the basis of the U.S. Government price, viz. 8c a pound. Locally the demand for lead has fallen off and there is less activity in the market than formerly. Lead is now quoted at 11½c a pound.

**Antimony.**—The general situation is unchanged although the market has a weaker tendency. Local price 19c per pound.

**Aluminum.**—The market is quiet and demand light with quotations unchanged at 62c a pound.

**New York, Sept. 24.**—Steel manufacturers in the United States are much interested in the report that the British Government is about to resume the purchase of shells on a large scale in Canada, through the Imperial Munitions Board. It is estimated that purchases on English account will cover at least 6,000,000 shells running from 4 to 12-in. in diameter. The United States Government is also actively negotiating with various manufacturers for shells of various calibers; in fact, some contracts have already been placed for 3-inch shells and negotiations now cover 6, 8 and 9.2 in. shells. The expectation is that the United States alone, will distribute orders for 9,000,000 shells. The orders placed by the two Governments, it is estimated, will require at least 1,500,000 tons of steel. In the Chicago territory manufacturers expect orders to be placed soon and machinery makers are preparing for a flood of orders for small sizes of tools in consequence.

The Ordnance Bureau of the Army, has recently closed contracts for about 3,000 3-in. field guns which will require about 25,000 tons of steel forgings. The War Department also has ordered 2,500,000 3-in. shells calling for 18,000 tons of forgings. The Ordnance Bureau of the Navy has given a contract for rough machine forgings for 4-in. guns to the Tioga Steel & Iron Co., a subsidiary of the Taylor-Wharton Iron & Steel Co., and the latter has purchased \$600,000 worth of tools for installation in the forge and machine shops that are now building at the Philadelphia shops of the subsidiary company. It is understood that 40,000 tons of forgings will be machined.

The Army Department continues to place contracts for structural steel and machinery for export to France. In the last few days, orders have been distributed among ten fabricating shops for 13,000 tons of steel shapes for the building of ordnance stores in France. Orders are also being placed for buildings in which to manufacture 5,000 Liberty airplane motors in the French territory occupied by the American army. To equip these factories, army officials have just closed contracts for \$3,000,000 worth of machine tools. Orders were distributed through the J. G. White Engineering Corporation for 1,000 tools, deliveries being demanded in thirty to sixty days. The Government also has awarded contracts for 15,000 Liberty motors to be manufactured in the United States. The Packard Motor Car Co. and Henry M. Leland & Son, Detroit, will each build 6,000 motors while the Trego Motors Corporation, New Haven, and the Nordyke-Marmon Co., Indianapolis, will each build 1,500 engines. Many automobile manufacturers will also have a share in building parts of the engines which will expedite the filling of the initial contracts.

The Stone & Webster Corporation, that assisted the Government in placing structural contracts for barracks, warehouses and ordnance stores in France,

are now placing orders for 359 machine tools for installation in the United States gun repair plant in France. The Army Department has also awarded contracts for 90 cranes among domestic manufacturers to be installed at railway and ship terminals in France. Manufacturers of these cranes are now in the market for 5,000 to 10,000 tons of steel bars, plates and shapes to be used in the building of this machinery.

Many other manufacturers having orders for war munitions from the Army and Navy Departments are actively in the market for machinery of various kinds, The Holt Manufacturing Co., Peoria, building caterpillar tractors, is buying tools in the Chicago market as are also Fairbanks Morse & Co., Beloit, Wis., and the Inland Steel Co., Indiana Harbor. These orders call for the expenditure of \$150,000.

**Pittsburg, Sept. 22.**—While the iron and steel markets have continued stagnant, as regards the volume of transactions, some further, although slight, progress has been made in the price readjustment and there have been some interesting developments besides, as a general 10 per cent. wage increase has been inaugurated and the Government and copper producers have reached an agreement on copper prices such as to suggest what may be done in iron and steel.

### Basic Iron Down

A striking development, illustrating how stagnant the market has been, was a sale of 2,000 tons of basic pig iron at \$42, valley, when the market had been nominally quotable at \$48. There was a sale of 5,000 tons in the closing days of August at \$48, and afterwards the market was quotable at that figure, as representing the last sale. When, however, a steel interest in the Mahoning valley which had 16,000 tons stock and desired to reduce the stock by 6,000 tons, offered this tonnage there were no bidders among consumers and a merchant furnace interest agreed to take 2,000 tons at \$42. There remains 4,000 tons offered at this price, which may now be quoted as the maximum rather than the minimum of the market. No similar effort has been made to dispose of Bessemer or basic iron, and these grades remain quotable at \$50, an occasional lot, a carload to 200 tons, being sold at this figure. Any effort to force a few thousand tons upon the market would undoubtedly result in a much lower price.

### Unfinished Steel

Transactions in billets and sheet bars are limited to pressing needs of consumers, for immediate deliveries, and thus involve very small tonnages. The offerings are by middlemen and consumers, mills refusing to quote, and there is a wide range of prices, depending on how closely the offering, as to size and analysis, fits the needs of the prospective purchaser. In general the billet market is \$65 to \$75, as evidenced by sales in the past ten days, while sheet bars and slabs are \$75 and upwards.



### Finished Steel

A fortnight and more ago there was some expectation that the finished steel market might be given some life by the buying of jobbers for fourth quarter deliveries, but the demand expected has not materialized and it appears that the jobbers will buy very little. They still have deliveries due them on second quarter and third quarter contracts, and their general policy at this time is to reduce stocks to the lowest possible level. As to manufacturing consumers, all are probably covered fully to the end of the year by contracts, and in some instances for the fore part of next year. Thus the position is that no buyer is forced to buy and the incentive of an expectation of higher prices later is totally lacking. Everyone expects prices to decline rather than advance.

Black sheets have been offered a couple dollars a ton lower, at 8.25c, and there are rumors of 7.75c having been quoted, this not being confirmed. Rumors continue of merchant steel bars being sold on contract at 3.50c, the commonly quoted market being 4.00c. They Carnegie Steel Co. states that it is not offering bars, because it is so well filled with Government orders for plates and shapes that it is diverting crude steel from its bar mills and has all it can do to fill its present bar obligations, but that if it were to sell the price would be 3.50c.

### Mill Operations

Furnace and mill operations continue to be conducted with great difficulty owing to shortages of coke and of labor. The coke shortage results in merchant furnaces paying fancy prices for spot Connellsville coke, about \$13, while the Steel Corporation, unwilling to buy coke, simply curtails its blast furnace operations, and generally has several furnaces banked, while a few are entirely out of blast. The production of steel is correspondingly restricted, the present rate of output being about 45,000,000 tons per annum, against about 44,000,000 tons in July and August, while the actual capacity is close to 50,000,000 tons. Some of the mills have feared they would be forced to curtail production on account of coal shortage, but thus far they have been able to get along. The danger from the fixed Government price, whereby the operators prefer to ship their output on the higher priced contracts, is less than from the diversion of so much coal to the lake trade.

### Wage Advance

The United States Steel Corporation has just announced a general wage advance of about 10 per cent. for its various operating companies, to become effective Oct. 1. In 1916 there were three such advances, effective Feb. 1, May 1 and Dec. 15 respectively. Prior to the previous advance, early in 1913, the wages had been substantially as high as at any time in the history of the steel industry, so that wage rates are now very high, relatively speaking. The in-

dependents will necessarily make the same advance as the Steel Corporation. While a wage advance may seem strange at a time when market prices are falling, the real point is that realized prices on shipments have been constantly advancing as older and lower priced orders were worked out, and there is still a wide divergence between the average prices at which shipments are being made and the prices quoted as representing the market. These prices are still in large measure fictitious or nominal. Thus since last June black sheets have been quoted at 8.00c or higher, yet the sliding scale wage settlement with the Amalgamated Association showed that the average price realized on 26, 27 and 28 gauge sheets shipped during July and August lay between 5.00c and 5.05c.

### The Copper Agreement

It was announced yesterday that the Government and the copper producers had reached an agreement whereby for the next four months copper will be sold to the Government, its Allies and

#### CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion \$100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the Commission headquarters are at Ottawa.

the general public at 23½ cents. The average quoted price for the ten years ending 1913 was 15.36c, while the existing market was 27 cents. The Government has no authority to fix copper or steel prices, except upon its own purchases, but can reach an amicable agreement with producers and hold them to the agreement by the fact that it can at will commandeer plants to furnish materials for its own use. Washington advices are that an important meeting has just been held with the steel producers and it is possible that an agreement in steel is being reached similar to that just announced for copper. What the steel prices would be, however, is another matter, as the conditions are quite different in copper and in steel. The agreed price on copper is 55 per cent. above the average of the ten years before the war, and 13 per cent. below the market existing at the time of the war but a price for steel 55 per cent. above the ten-year average would be very much below a price 13 per cent. below the existing market.

### TO HELP EMPIRE TRADE

PROPOSALS of a far-reaching character have been put forward by the British Foreign Office and the Board of Trade for

the purpose of improving the scope and completeness of the information placed at the disposal of the commercial community by the Government, according to the London *Daily Chronicle*.

At the present the Board of Trade has a Commercial Intelligence Department—which, by the way, has done excellent work under the guidance of Sir William Clark—and Trade Commissioners for dealing with matters affecting the Mother Country and the Dominion. Working side-by-side with these, and in many cases covering the same ground, the Foreign Office has its Commercial Attaches and its Consular service.

It is proposed to bring all these various agencies under one head in the shape of a Commercial Intelligence Department with a Parliamentary Secretary, who is to be appointed jointly by the Secretary for Foreign Affairs and the President of the Board of Trade and who will be responsible to both.

This is a unique departure so far as the Civil Service is concerned, but the question has been carefully considered by the Foreign Office and the Board of Trade. It was felt that this was the only way out of the difficulty, and the solution has received the approbation of the War Cabinet.

There is to be a great extension of the work under the new department. The staffs will be largely increased by the addition of trained men, and it is hoped to cover the whole world with an efficient service so as to give the fullest possible information on all points of interest to British traders. The Dominions have their own services of commercial information, but the British department will be prepared to give every assistance to them and to act as a clearing house between them.

The new department will also be in a position to furnish the Government with the information required before any changes can be made in tariffs or other international commercial relations.

The scheme has been laid before the Commercial Committee of the House of Commons by Lord Robert Cecil. That body has thanked the Under Secretary for Foreign Affairs for the action which has been decided upon, and has taken steps to lay the scheme before the British Chambers of Commerce and the Federation of British Industries. At the same time, the Commercial Committee has expressed the opinion that the agreement arrived at between the Foreign Office and the Board of Trade "seems to make a considerable step forward in the direction desired by the industrial and commercial community."

### HOW TO RELIEVE THE CAR SHORTAGE

A WARNING on the facilities of the railroads which cannot be minimized, according to transportation officials in Toronto, has been issued by the Board of Railway Commissioners through the Toronto Board of Trade to merchants, manufacturers and all who do business with the railroads. It says:



"War conditions interfere with car movements. The weather conditions of last winter increased the congestion and the coming winter may repeat this. Additional freight cars can be obtained only with the greatest difficulty. Prompt deliveries of new rolling stock do not exist.

"If each freight car does more work the difficulty can be faced. A freight car saved is a freight car gained for extra service. More service per car equals more cars in service. If all shippers load to full capacity, or better, to 110 per cent., when practicable, the car shortage will largely disappear.

"Railways by cutting out road delays, and by improved handling in terminals, can make each car do more work. Prompt and heavy lading per car gives prompt service per car. So also does prompt release of cars. Consignors and consignees are interested in getting cars. Their co-operation in efficient car handling will help not only others but themselves as well."



#### WILL TEST LIGNITE

THE Scientific and Industrial Research Commission is arranging for the rental from the United States of a lignite testing plant for use in Western Canada to test some of the immense undeveloped low-grade coal-bearing areas of the Prairie Provinces. A proposal was made to the Government for the purchase by Canada of a complete plant for experimental Government operation of selected areas thought to be commercially feasible, but which private enterprise will not touch owing to the uncertainty as to economic development. This proposal of the Commission was, however, after consideration by the Government, turned down for this year. The Commission will now carry on the work through a rented American plant.



THE production of boron and ferro-boron of uniform quality requires expert study. Cheap and pure chromium is now obtainable; the electrolysis of its fused salts is difficult on account of their high melting points, but perhaps the electrolysis of aqueous solutions of chromium salts could be so controlled that heavy deposits would be produced. Then, too, chromium electro-plating is for many purposes superior to nickel, but the technique of constantly producing perfect plating has not been accomplished.—Dr. R. F. Bacon.



Mr. John T. Tussaud, the present "Madame Tussaud," tells many amusing stories of visitors to his well known establishment.

One relates to a parlor maid who was being interviewed by her mistress just after a recent bank holiday.

"And how did you spend your day off, Polly?" the mistress asked.

"Oh, we went to Madame Tussaud's," was the reply. "We always go there, mum. You see, having an uncle in the Chamber of Horrors, gives the place a family interest, so to speak."

## 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. Vladivostock, 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, Cancoma.
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, Zuidblaak, 26, Rotterdam. Cable address, Watermill.
RUSSIA—C. F. Just, Canadian Government Commercial Agent, Alexandrinskaya, Plosh 9, Petrograd. L. D. Wilgress, Canadian Government Commercial Agent, Bukhgalza Ulitza 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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CANADA'S LEADING  
MACHINERY  
HOUSE

# The A.R. WILLIAMS Machinery Company Limited

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## Complete 8-in. Shell Plant

Capacity---2,000 Per Week

Machines are tooled for British 8-in. Howitzer Shell but can be easily changed over for 6-in. shell.

### TOOL ROOM

- 1—16" x 6' HENDEY lathe with complete tool-room equipment
- 1—14" x 6' LEBLOND tool-room lathe
- 2—19" x 8' LEBLOND heavy duty lathes, double back gear, quick change
- 1—26" x 12' PERKINS engine lathe
- 2—20" Wet Grinders, J. G. Blount
- 1—DOMINION Universal tool and cutter grinder
- 1—Profile Grinder
- 1—GISHOLT Universal Tool Grinder
- 1—STEVENS Universal Tool and Cutter Grinder
- 1—Drill Grinder
- 1—17" AVERBUCK Shaper
- 1—No. 3B LEBLOND Universal Miller
- 1—No. 3 BECKER Vertical Miller
- 1—RACINE Hack-saw
- 1—HENRY & WRIGHT Sensitive Drill
- 1—20" McDOUGALL Drill
- 1—BARNES all-gear drill press
- 2—S C & H Crude Oil Heat Treating Furnaces

### SHELL PLANT

- 4—26" W. B. DOUGLAS heavy duty projectile boring lathe
- 6—27" x 12' BRIDGEFORD Heavy Duty Projectile Boring Lathes

- 6—27" x 12' BRIDGEFORD Heavy Duty Profiling Lathes
- 1—26" x 12' DOUGLAS Heavy Duty Profiling Lathe
- 1—20" x 9' FAIRBANKS profiling lathe
- 1—22" x 12' STANDARD ENGINE LATHE
- 1—20" x 9' FAIRBANKS waving and grooving lathe
- 2—FAIRBANKS 28" x 10' Heavy Duty Profiling lathes
- 1—16" x 8' EVANS HAMILTON Standard Engine Lathe
- 1—16" x 6' FITCHBURG Engine Lathe
- 1—20" x 8' FAIRBANKS Heavy Duty Engine Lathe
- 6—No. 6A POTTER & JOHNSON Automatics
- 1—JENCKES Copper Band Turning Lathe
- 3—HOLDEN MORGAN Thread Millers for base of 8" shell
- 2—WILLIAMS Cut-Off Machines
- 1—METALWOOD 6 cylinder banding press
- 1—PERRIN Triplex high pressure hydraulic pump
- 2—HOLDEN MORGAN external thread millers for base plugs
- 1—No. 6 PERFECT Pedestal Grinder, for 12" x 2" wheels
- 1—20" McDOUGALL Drill Press
- 1—HOSKINS Oil Furnace for heating copper bands
- 1—HOSKINS Type FG Electric Furnace

*With complete set of tools and full equipment required to operate and maintain the plant. Also transmission belting, motors, etc. All this Equipment is in excellent condition. Inspection can be made by appointment.*

This is an exceptional opportunity for American firms intending manufacturing shells as practically every machine can be shipped into the U. S. Free of Duty.

FULL DETAILS ON REQUEST



# INDUSTRIAL <sup>A</sup><sub>N</sub><sup>D</sup> CONSTRUCTION NEWS

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

## ENGINEERING

**London, Ont.**—The London Art Woodwork Co., will erect a factory here.

**Granby, Que.**—The Miner Rubber Co., contemplate the erection of a \$3,000 power house.

**Alix, Alta.**—A syndicate is contemplating developing coal properties on the Red Deer River.

**Rigaud, Que.**—It is understood that Curtis & Harvey will not rebuild their plant at Dragon near here.

**Sarnia, Ont.**—Retails have been completed for the location of a branch of the Mueller Manufacturing Co., in Port Huron, Mich. This concern has also a factory at Decatur, Ill.

**Welland, Ont.**—Fire caused \$3,500 damage to the plant of the Welland Machine and Foundries, Ltd., last Sunday. The blaze was confined to the roof of the molding shop.

**Toronto, Ont.**—The Imperial Oil Co., contemplate the construction of a large oil tank having a capacity of 1,470,000 gallons, for the storage of gasoline in the Ashbridge's Bay industrial district.

**Sydney, N.S.**—It is reported here that the Imperial Munitions Board are asking the Dominion Steel Corporation for a monthly output of at least 140,000 blanks which will mean a large increase since 17,000 was the average output for previous months.

**Sarnia, Ont.**—The plans for the new Romeo foundry, locating at the corner of Christina and Exmouth streets, are being prepared, and the machinery and other equipment has been ordered. It is expected that the new plant will be nearly completed by the end of the year.

**Trenton, N.S.**—Fire on Sept. 19 destroyed the machine shop at the Eastern Steel Co's. Plant. The damage is estimated at \$125,000 which was practically all covered by insurance. The building which was constructed of reinforced concrete was reduced to ruins and the machinery badly damaged.

**Woodstock, Ont.**—The Canadian Linderman Co., has rented the Tobin Arms Factory, and will instal machinery at once and put the factory in operation, working day and night on the order which the company has received for \$14,000,000 worth of munitions for the United States Government. The Linderman people have their head office and factories in Muskegon, Mich.

**Vancouver, B.C.**—The Coughlan Shipyards, at which six big steel steamers will be constructed and at which four are already under construction, will also build the boilers for the vessels and a permit has been taken out for the construction of a boiler shop. The work

done will be on a big scale as the steamers are to be 425 feet long and each will have a deadweight carrying capacity of 8800 tons.

**Princeton, B.C.**—The Canada Copper Corporation, will begin erection of its 3,000-ton mill on its property near Princeton, B.C., immediately. Development in the mines is being pushed, that mill may run to capacity as soon as possible after it is completed. Anticipating operations on a large scale, the company is building a modern town on its property and an extensive power plant is being installed.

**Sault Ste. Marie, Ont.**—The Algoma Steel Corporation is erecting another blast furnace, which when completed will have a capacity of 400 tons of pig iron per day. The furnace will be finished by the new year. The company recently completed its latest open-hearth furnace at the "Soo" plant, with a capacity of 75 tons per hearth, or about 200 tons per day, and makes the tenth open-hearth furnace which the company has in operation, as well as the duplex furnace, which has been most satisfactory.

**Sherbrooke, Que.**—The Southern Canada Power Co. is building 88 miles of high tension transmission lines, connecting up the cities of Sherbrooke, Magog, Waterloo, Granby and St. Johns. It is expected that these lines will be completed this fall. When completed this will give the company over 160 miles of high tension transmissions, principally 50,000 volt. The company have recently purchased property on the main street in Granby, almost opposite the Post Office, and are erecting a new substation, office and store for the sale of electrical equipment.

## ELECTRICAL

**Welland, Ont.**—The new hydro substation is now in operation. The voltage in the system has been increased to 46,000 volts.

**Brantford, Ont.**—The city's terms not being acceptable, Brantford Township will itself go ahead with the construction of a hydro-electric system throughout the township.

**Fort William, Ont.**—E. F. Espenchied, of the Hydro-Electric Commission, has advised the city to close down the Current River power plant and not spend over \$150,000 in repairs to dams, flumes, and equipment.

**Kingston, Ont.**—It is expected that this town will be connected up with the hydro-electric system on or about Oct. 1. Work on the line from Napanee is almost completed, and it is expected that the hydro will be able to furnish the entire need of the city this fall and winter.

**Fort William, Ont.**—By a vote of 548

to 82, the ratepayers on Sept. 19 ratified a by-law to enter into an agreement with the Hydro-Electric Commission of Ontario.

## MUNICIPAL

**Aurora, Ont.**—The town has sold \$8,000 debentures for installing a water-works system.

**West Lorne, Ont.**—It is proposed to grant a loan of \$5,000 to Bernard C. Weisbrood who will establish a factory here.

**Three Rivers, Que.**—The City Council have decided to proceed with the construction of a pumping station and reservoir.

**Portage la Prairie, Man.**—The Town Council will instal a 100 h.p. boiler with mechanical stoker in its electric station at a cost of \$5,000.

**Perth, Ont.**—A by-law will be submitted to the ratepayers on Oct. 6, to sanction the purchase of the Canadian Electric & Water Power Co's. plant for \$130,000.

**Perth, Ont.**—The Hydro by-law and a by-law to purchase the local electric power company carried here last Monday by a sweeping vote and Perth will have Hydro power before many months.

**Weston, Ont.**—At a special meeting of the Weston Water, Power and Light Commission held recently steps were taken to increase the capacity of the present machinery in the sub-station by exchanging three of the present 50 k.w. transformers for three of 100 k.w. development.

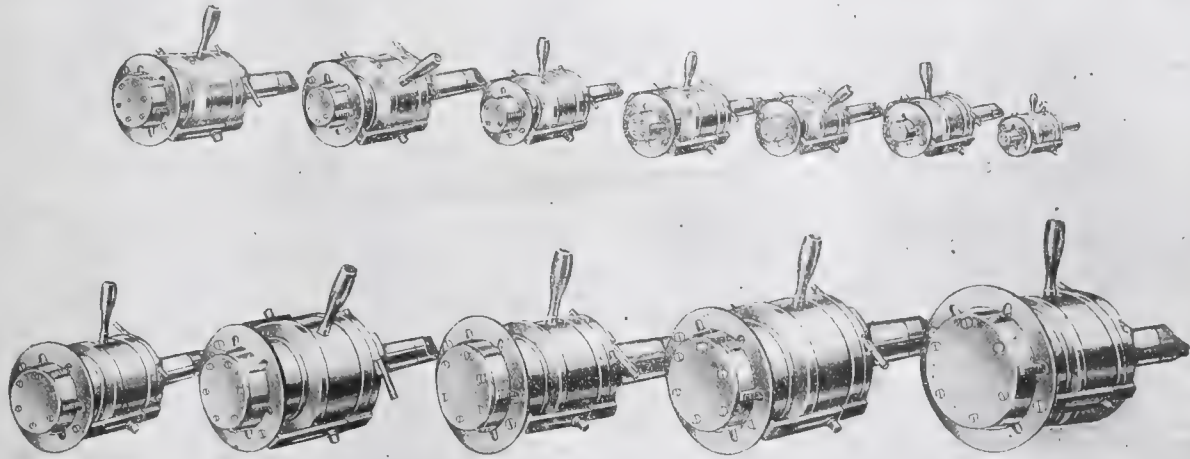
**Calgary, Alta.**—F. W. Lent, president of the Alberta Automobile League, at a meeting held here last Thursday, stated that the Alberta Legislature would hold a special meeting for the purpose of passing a vote of \$30,000,000 to be used on construction of highways in the province.

**Hamilton, Ont.**—City Engineer Gray and engineer Bain have appealed to the Board of Control to have the proposed turbine pumps installed at the Beach pumping station without any further delay. It appears probable that the matter will be left over until the January elections when a by-law will be voted on to sanction the necessary expenditure.

**Walkerville, Ont.**—The ratepayers by a vote of 231 to 116, passed a by-law giving the Sandwich, Windsor & Amherstburg Street Railway Co. the right to build an extension on Ottawa St. from Walker road to Lincoln road. In the agreement made with the company the town may purchase the entire system on giving one year's notice. The franchise for the extension will expire automatically in 1922, with other franchises held by the company.



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This illustrates only one of the groups of Geometric Collapsing Taps that have gone into United States Arsenals and Navy Yards to bear out the reputation that attaches to all Geometric Thread Cutting Tools.

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Canadian Agents: Williams & Wilson, Limited, Montreal; The A. R. Williams Machinery Co., Limited, Toronto, Winnipeg and St. John, N.B.



## TRADE GOSSIP

**The International Harvester Co. of Canada, Ltd.** of Hamilton, Ont., has increased its capital stock to \$15,000,000.

**Painting Quebec Bridge.**—It is estimated that it will take three years to paint the Quebec Bridge. It is figured that the cost will be about \$35,000. The work will be continuous, when the men have finished at one end, they will start again at the other.

**Limit Export of Steel Rails.**—An Order-in-Council has been passed at Ottawa, under the War Measures Act prohibiting the exportation of steel rails from Canada abroad to countries other than the United Kingdom, British possessions and protectorates.

**Coal Prices for Vacouer.**—Dominion Fuel Controller C. A. Magrath has fixed the price of coal in Vancouver as follows: Screened, delivered in sacks per ton, \$8.50; screened, at wharf in sacks, per ton, \$7.50; delivered in bulk, wagon-side, \$8.00; wharf, in bulk \$7.00.

**Sherbrooke Firm Gets Marine Contracts.**—It is understood that the firm of MacKinnon, Holmes & Co., Sherbrooke, Que., have recently received from the Imperial authorities a large order for marine work which will keep their plant in operation for many months to come.

**Will Fix Coal Price.**—At a conference with mine operators at Vancouver last Friday, Dominion Fuel Controller Macgrath intimated that the price of coal would be fixed at an early date by his department. Dealers present at the meeting declared that they would be satisfied with a profit of fifty cents per ton.

**Inspecting the C.P.R.**—Sir George Bury, vice-president of the C.P.R. accompanied by Grant Hall, western vice-president and general manager have arrived in Vancouver on a periodical inspection trip. Messrs. R. B. Angus and A. Wanklyn, Directors, and J. G. Sullivan, chief engineer, are also at the Coast.

**Salonika to Be Re-Planned.**—Thomas H. Mawson, the noted English town planner, well-known in Canada, has cabled Noian Cauchon, consulting engineer, of Ottawa, requesting that he collaborate with him immediately in the re-planning of Salonika, the commission for which has just been awarded him by the Greek Premier Venizelos.

**Big Lumber Order Lost.**—Owing to the lack of bottoms to transport freight to Australia, British Columbia is losing orders for ten million feet of lumber, and the orders will be given to mills in Washington and Oregon States, says Neil Neilson, of San Francisco, California, trade commissioner for New South Wales, who is now in Vancouver, B.C.

**The Crane Packing Co.,** Chicago, manufacturers of the well known "John Crane" flexible metallic packing for all vapors and liquids, announce the establishment of their Eastern office in the Woolworth Building, New York City.

Their engineer, A. W. Payne, with much experience with packing problems in the oil, mining and industrial fields, has been placed in charge of this branch.

**Favored Building of Two Drydocks.**—That the British Admiralty had recommended the construction of big drydocks at Esquimalt and Halifax and that the British Treasury Department had given favorable consideration to the matter, was made known to the Commons at Ottawa by Hon. Robert Rogers in explaining the steps taken by the Government to secure drydocks at those ports.

**Canadian Explosives Ltd., Get Big Contract.**—Announcement has been made in Washington, D.C., that the trinitrotoloul contract which the British Government had let to Curtis and Harvey, Canada, Ltd., and which they were unable to fill because of the blowing up of their plant at Dragon, Que., has been turned over to Canadian Explosives, Ltd. of Montreal. The contract is for several million dollars, and the profit will be correspondingly large.

**Canadian Coal Imports.**—An arrangement has been made with Dr. Garfield, Fuel Controller of the United States, whereby no general licensing system will be instituted as far as Canadian imports are concerned, but the authorities at Washington will call for periodical statements from United States exports showing the daily movements of coal to Canada. No serious inconvenience is anticipated as the result of these arrangements.

**Submarine Boat Orders.**—The Submarine Boat Corp., New York, has received an order for 90 submarine chasers from the Italian Government. The English Government has ordered 30 vessels of the same type. The English contract is a repeat order. This company completed an order for 550 of these vessels for England not long ago. The boats have given great satisfaction. In addition to these orders, the Submarine Boat Corp. is building 16 motor boats for the United States Navy.

**Will Build Fifty Cargo Ships.**—The Submarine Boat Corporation of New York has announced that it had entered into a contract with the Emergency Fleet Corporation for the immediate construction of fifty steel cargo ships which will be supplemented later by another contract for one hundred and fifty more vessels of the same type. The ships will be built in the Metropolitan district in a plant which will be among the largest in the country. The first keels will be laid in December it was said and the first launching will be in February.

**Warning to Coal Men.**—The office of the Dominion Fuel Controller repeats the warning to coal dealers throughout the country that objection will be taken to any advance in the price of coal being made without notification first being sent to the Fuel Controller. The view of the Fuel Controller is that the coal dealers had a liberal profit last summer, sufficiently so to enable them to continue the present prices into the winter,

and give the smaller users of coal the same price notwithstanding any increase that the mines make at this time.

**U. S. Government Fix Price of Copper.** A Washington despatch states that the United States Government has fixed the price of copper at 23½c per pound, about 3c below the prevailing market, by agreement between the Government and leading copper producers, effective for four months. Sales to the Government, the public and the allies will be at this price, f.o.b. New York, and producers agreed not to reduce wages now paid in the industry. They also pledged themselves to maintain maximum production and to prevent copper from falling into the hands of speculators.

**Standard Ship Great Success.**—A despatch from London, England, states that complete success has attended the trial of the first standardized ships built to the order of the British Government. It was of a most exhaustive nature, and experts are unanimous in their praise of the vessel, which, with its sisters which will now be taking to the water in quick time, is destined to play an important part in the campaign against submarines. The standardized ship has been designed to provide a good style of cargo carrier in the shortest possible time, with the minimum expenditure of material. The keel was laid last February, and in less than the full six months the vessel was fully loaded and ready to go to sea.

**Metal Supervisor Will Be Appointed.**—The appointment of a supervisor of metal and fibre by the Dominion Government is indicated in an order-in-Council, which also authorizes the Minister of Customs to fix the price of scrap iron and scrap steel, rags, waste and other materials of metal or of animal, vegetable or mineral fibre. The supervisor is authorized to make such enquiries as the Minister of Customs deems necessary into the quantity, location and ownership of such materials, as well as into the prices at which they are held for sale. It is provided that any person who contravenes the provisions of this order-in-Council shall be guilty of an indictable offence and liable to a fine not exceeding \$5,000 or to imprisonment for a term not exceeding three years.

**Quebec Bridge Span Completed.**—The central span of the Quebec Bridge was successfully lifted and secured in position on Thursday, after operations covering approximately four days. The span weighs 5,000 tons, is 640 feet long, and was lifted nearly 150 feet. The principal dimensions of the Quebec Bridge are: Length, from shore to shore, 3,239 feet; width, between anchor buttresses, 1,800 feet; length of central span, 640 feet; height of central span above water, 150 feet; number of railroad tracks carried, 2; street car tracks, 2; and roads, 2. The bridge has a central span 90 feet longer than the Forth Bridge, hitherto the holder of the world's record. The steel used in the bridge weighs 180,000,000 pounds, and cost \$11,000,000 without the cost of



the central span. The masonry pier work cost \$1,500,000.

**Big Glove Contract for Canada.**—It is reported that military contracts for twelve million pairs of woolen gloves for the United States army will be placed in Canada. It is believed that one of the principal reasons why the houses in the States could not keep these government contracts from going over the line to English and Canadian firms is the wool scarcity in the United States. It is understood the contract calls for all-wool gloves and this demanded an amount of the fiber greater than the U.S. manufacturers could supply. Under present working conditions in the United States, it is said the best possible price manufacturers could make the government for first grade woolen gloves was from \$5.50 to \$6 a dozen. The Canadians, with their past experience in filling army contracts for exactly the sort of gloves needed by our men, are able to quote prices as low as \$3.50 a dozen.

**New Canadian Patents Issued.**—The following is a list of Canadian patents recently issued through the agency of Messrs. Ridout & Maybee, 59 Yonge street, Toronto, from whom further particulars may be obtained:—Louis E. Barton, methods of producing composite titanic oxide products; Louis E. Barton, paints or pigments; Titanium Alloy Manufacturing Co., Titaniferous products and methods of producing the same; Wm. T. Graham, means for supplying liquid hydrocarbon to carburettors; Reginald T. Marshall; means for promoting circulation in steam generators and the like; T. Young, arithmetical educational apparatus; Richard A. Ducan, devices for preventing wastage of lubricant in axles of motor cars; James T. King, electrolytic apparatus; Nicolaus Rasmussen, spring bearing for centrifugal separators; Frederick H. Stevenson; attachments for fastening wires to springs; John W. Myatt, loose leaf books; James E. Haines, pneumatic tires; Thomas Rigby, peat gasification.

**PERSONAL**

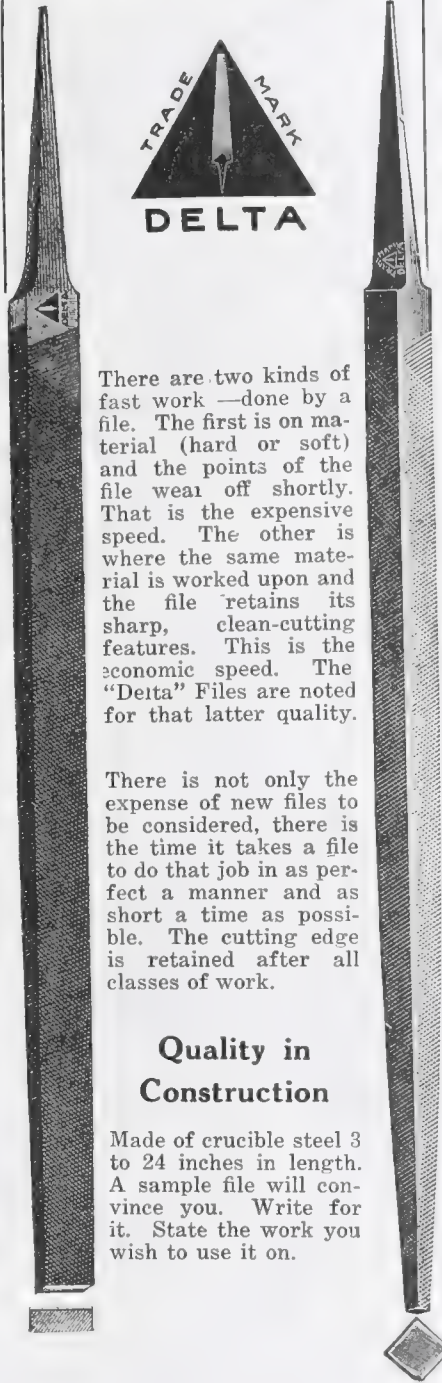
**J. B. Musselman**, secretary of the Saskatchewan Grain Growers, has been appointed fuel controller for that province.

**Thomas Russell**, one of the best known mining men in British Columbia, died at Michel, B.C., on September 20. He was mine manager for the Crow's Nest Pass Coal Company.

**C. Manning** has been appointed assistant to W. D. Robb, vice-president in charge of motive power, car equipment and machinery, Grand Trunk Railway System. Mr. Manning was secretary to Mr. Robb when the latter was Superintendent of Motive Power, and has been more than thirty years in the Grand Trunk service.

**John J. Hart** has been appointed president of the Canadian Locomotive Co., Kingston, Ont. Mr. Hart was previously vice-president and general manager of

**Fast Work**



There are two kinds of fast work —done by a file. The first is on material (hard or soft) and the points of the file wear off shortly. That is the expensive speed. The other is where the same material is worked upon and the file retains its sharp, clean-cutting features. This is the economic speed. The "Delta" Files are noted for that latter quality.

There is not only the expense of new files to be considered, there is the time it takes a file to do that job in as perfect a manner and as short a time as possible. The cutting edge is retained after all classes of work.

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Made of crucible steel 3 to 24 inches in length. A sample file will convince you. Write for it. State the work you wish to use it on.

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IT CAN BE USED on all Direct Drives, whether straight or crossed.

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The strength, durability, economy of power and simplicity of adjustment of the Dupont Power Hammer make it a decidedly superior tool.

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each punch has turned out  
over 2,000 shells.

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sixty years' experience in  
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with unsurpassed equip-  
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ship of men who have  
been with us, ten, twenty  
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Springs, Screw Machine Products, Cold Rolled Steel and Wire

this concern. He is also a director of the Dominion Foundries & Steel Co. He is a son of the Hon. William Harty, who was some years ago president of the Locomotive Works, and is still one of its largest shareholders.

A. W. McLimont, a leading traction expert, has been appointed general manager of the Winnipeg Electric Railway Co., in succession to Wilford Phillips who has retired. Mr. McLimont is a Canadian and was born in the city of Quebec. Although a young man, he has held a number of important positions, but the work which brought him most prominently in the public eye was the electrification and operation of a considerable proportion of the transportation lines of New York. Mr. McLimont was employed as engineer under the New York Public Service Commission in New York, and became so successful that his services were in demand throughout the United States. Latterly he has been in control of some nine hundred miles of road, constituting the Michigan United Railway System.

## TENDERS

Winnipeg, Man.—Tenders will be received up to Oct. 1, for the plant and properties of the Western Steel & Iron Co. The plant comprises, a foundry, machine shop and blacksmith shop etc. For full particulars apply Harry M. Agnew, Elmwood, Winnipeg.

Toronto, Ont.—Tenders will be received, addressed to the Chairman, Board of Control, City Hall, Toronto, up to October 2, for the construction and delivery of stop valves, valve operating pump and special castings, for main pumping station. Specifications and forms of tender may be obtained at the Works Department, Room 12, City Hall.

Winnipeg, Man.—Tenders, addressed to the Chairman, Board of Control, will be received up to Wednesday, October 3rd, 1917, for the supply and delivery f.o.b. Lac du Bonnet of quantity of cast iron pipe and specials; valves and accessories; vitrified clay pipe and cable clips. Instructions to bidders, specification and form of tender may be obtained at the office of the City Light and Power Department, 54 King Street.

## CONTRACTS

Emerson, Man.—The contract for building a new Town Hall here has been let to Gray & Davidson, of Winnipeg, for \$32,307.

Verdun, Que.—The City Council have awarded tenders for sidewalks and sewers to the M. J. Stock Paving & Construction Co.

Ottawa, Ont.—Announcement is made by the Department of Public Works that the contract for plumbing, pipes and fixtures for the new Parliament Buildings has been let to W. J. McGuire, Ltd., Toronto. The contract price \$129,900, was the lowest tender received for the work.

## BUILDINGS

Toronto, Ont.—The Harris Abattoir Co., will build a one-storey brick addition to evaporation house on St. Clair avenue, near Symes road, to cost \$1,500.

Toronto, Ont.—The T. Eaton Co., propose buying a site for a warehouse between Gerard street and the G.T.R. right of way. The property belongs to the city and the purchase price is \$30,000.

Winnipeg, Man.—The Dominion Government will erect an explosive store and magazine on the St. Charles rifle range property. Major T. W. Hawker, Great West Permanent Loan Bldg., Winnipeg has the matter in hand.

Fredericton, N.B.—The contract for the erection of the buildings in connection with the Soldiers' Convalescent Home to be established on Old Government House grounds, has been awarded to William J. Scott of this city, and Robert D. Forbes of Devon, who submitted a joint tender. Their tender was in the vicinity of \$100,000 and is said to have been the lowest of six or seven submitted.

## RAILWAYS—BRIDGES

Montreal, Que.—The Grand Trunk Pacific will purchase 100 refrigerator cars for the fish service from Prince Rupert, B.C., and the Eastern markets.

Campbellford, Ont.—The construction of the Trent Canal has made it necessary for the Grand Trunk to build a new bridge here, to give the necessary clearance for shipping passing through the canal, and work is now proceeding on this new structure. The new bridge will consist of seven spans and have a total length of 269 ft. 9 in.

Guelph, Ont.—Col. Boyce, president of the Toronto and Suburban Railway, arrived in the city recently over the radial line, on a tour of inspection. It is understood that this inspection tour means that the road is being turned over to the operating department for the first time, having been in the hands of the construction department since the line was built.

## INCORPORATIONS

Tonsmore Truck Co., has been incorporated at Ottawa by E. D. Girardot, C. A. Smith and J. B. McLeod of Windsor, Ont., to manufacture motor truck and vehicles of all kinds at Windsor, with a capital of \$100,000.

The Allied Truck Co., has been incorporated at Toronto with a capital of \$40,000 to manufacture motor trucks, Toronto. The provisional directors are J. G. Bankat, C. E. A. Carr and F. W. Burrows all of Toronto.

McKinnon Industries Ltd., has been incorporated at Ottawa by L. E. McKinnon, W. A. Notman and J. W. McKinnon all of St. Catharines, Ont., to manufacture trucks, cars, wagons and metal goods of all kinds at St. Catharines, Ont., with a capital of \$1,000,000.



**MARINE**

**Toronto, Ont.**—The new drydock of the Toronto Drydock Co., was used for the first time a few days ago when the freighter John Ralph was docked for repairs.

**North Vancouver, B.C.**—The Steamer Cassiar which was wrecked on Aug. 26, off Privett Island has been salvaged and will be repaired at the Wallace Shipyards.

**Victoria, B.C.**—The five-masted schooner Malahat, built by the Cameron-Genoa Mills Co., will make its maiden voyage as a sailing ship, owing to the non-arrival of the auxiliary engines. They will be installed on the completion of the first voyage.

**Little Current, Ont.**—The steel steamer Western Star of Buffalo sunk in the fall of 1915, with seven thousand tons of coal, was successfully raised and towed to a sheltered bay on Sept. 17. Captain Alex. Cummings, superintendent for the Great Lakes Wrecking Co., was in charge of the operations.

**Shelburne, N.S.**—The new steamer Keith Cann was launched on Sept. 18 at the shipyard of the Shelburne Shipbuilders Ltd. The vessel was christened by Miss M. Cann, daughter of Chas. W. Cann of Yarmouth, N.S. The Keith Cann is 130 ft. long, 25 ft., wide and 11 ft. 6 ins. deep.

**Vancouver, B.C.**—Frames for the second wooden steamer of the six being constructed by the Western Canada Shipyards, Ltd., at Vancouver, for the Imperial Munitions Board, have been hoisted into place. The first vessel has taken shape, the last frame having already been placed in position.

**Fort William, Ont.**—J. F. Paige, general manager of the Port Arthur Shipbuilding Co., stated a few days ago that the new freighter War-Fish, built to the order of James Playfair, of the Great Lakes Transportation, Co., will be delivered shortly and will be used in the coal trade on the Great Lakes.

**Victoria, B.C.**—The Cameron-Genoa Mill Shipbuilders will launch the fifth auxiliary schooner contracted for by the H. W. Brown interests shortly and the sixth vessel of the same type will be launched about November 15 thus completing the orders for the ships, which the company now has on hand and leaving it free to give all its attention to the building of the four wooden steamers for which it has been given contracts by the Imperial Munitions Board.

**CATALOGUES**

**Reducing Valves.**—Bulletin issued by Chaplin-Fulton Mfg. Co., Pittsburg, Pa., describes the "Fulton" steam reducing valve, and also gives directions for setting and operating this device. Two types are illustrated together with prices for the various sizes.

**Radial Brick Chimneys.** The Alphons Custodis Chimney Construction Co., New York, have gotten out an interesting

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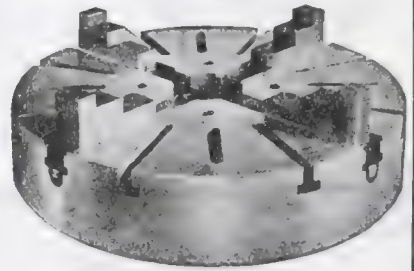
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 We do any kind of sheet metal stamping that you require. Our improved presses and plating plant enable us to produce the finest quality of work in a surprisingly short time.  
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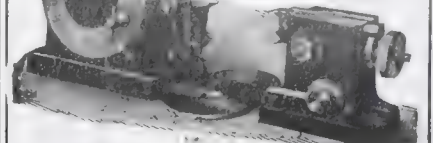
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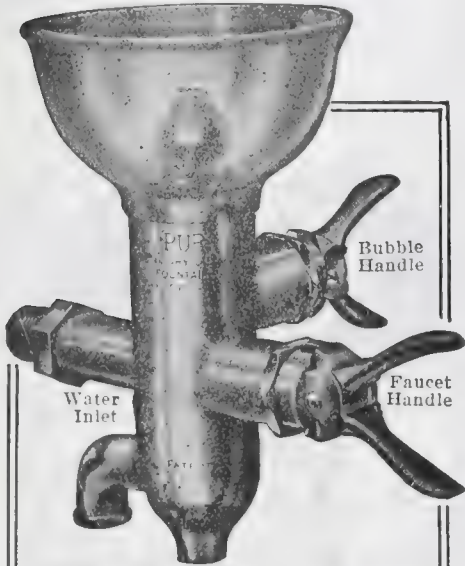


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In Light and Air and sanitary Working Con-  
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In clean, fresh drinking water for everybody.  
In the Safety, Economy and Man-betterment.*

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(MADE IN CANADA)



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An ugly statement, isn't it? But true, absolutely.

When a man comes to work in your factory he puts his health in your keeping.

Are you willing to take chances on such a trust?

Impure drinking conditions are responsible for more tragedies than any machine ever built.

Apply the "Safety First" Principles to your water supply; don't deny your men a clean, fresh drink of water.

Conserve their health and they will improve your profits, make yourself as worthy of the name of "Employer."

Install the Gold Medal winner Puro in your plant, office and shop alike.

The only Sanitary Drinking Fountain that is safe, sanitary, simple, automatic in control and easily attached.

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Boiler-makers  
Founders  
Machinists

Tank Work  
Smoke Stacks,  
Grey Iron and  
Brass Castings,  
Special  
Machinery  
Made to  
Order

bulletin showing a number of tall chimneys which they have constructed, with principal dimensions. The bulletin also contains details of the radial brick used and a copy of Kent's table of size of chimneys for steam boilers.

**Boiler House Elevators** is the title of a 28 page catalogue recently issued by the Ed. Bennis & Co., Little Hulton, Bolton, England. The catalogue after dealing with the advantages of elevating and conveying machinery in boiler plants, proceeds to describe the "Bennis" elevator, drawing attention to its principal constructional features and also to the economies that can be effected by its use. The greater part of the catalogue comprises several very clear views, covering a number of installations showing the wide field of application. A brief description accompanies each illustration detailing the chief points of interest.

**Electro Platers Equipments and Supplies.**—The Canadian Hanson & Van Winkle Co., Toronto, have issued a new illustrated catalogue and price list "B," dealing with an interesting and extensive line of electro-plating and polishing supplies which they manufacture. In this catalogue particular attention is called to the new plating dynamo, which is fully described, to a complete line of new polishing and buffing lathes and grinding machinery. Other products featured include polishing wheels and a complete line of lacquers, while in addition the catalogue describes at length a line of anodes, chemicals, and plating solutions, etc. The catalogue is gotten up in an attractive style and contains 104 pages, with a large number of illustrations.

**Machine Stoking.**—A new catalogue entitled "Recent Developments in Machine Stoking," has been issued by Ed. Bennis & Co., Little Hulton, Bolton, England. The opening pages contain a description of the "Bennis" patent improved smokeless chain grate, including matters relating to its durability and draught feature. Following are a number of views showing important installations, each briefly described. The catalogue also contains several sectional views of Bennis chain grates under various types of boiler. An interesting table is shown giving results of tests of this stoker under different types of boiler. The concluding pages contain a table of sizes of Bennis Chain grate stokers and also a table of properties of saturated steam. The catalogue contains 39 pages and is gotten up in attractive style.

## BOOK REVIEW.

**United States Artillery Ammunition** by Ethan Vial, managing editor *American Machinist*. 97 pages, 8 3/4 x 11 1/2 in. Fully illustrated. Published by The McGraw-Hill Book Co., Inc., New York. Price \$2. This is the third of the series of munitions books compiled by the editorial staff of the *American Machinist*. The book was published for the purpose of giving shop men, engineers and manufacturers an accurate knowledge

of the sizes, tools, shop work and gauges necessary in the production of the most common United States shells and cartridge cases. The book contains six chapters describing in turn the machinery operations used in the production of the following types and sizes of shell. 3 in., common shrapnel; 3 in., common high explosive shell; 3 in. naval shells; 3.8 in. to 6 in., shrapnel and high explosive shells; 6 in., naval shells and lastly 3 to 6 in. cartridge cases. For each type of shell every important machining operation is shown in a separate drawing. Several operations are also shown by means of half-tone illustrations. The operations on each type of shell are described in detail and particular features of each are also given. The book has list of contents and index, and is bound in substantial cloth covers.

—❁—

**ROBERT MORTON HAMILTON**

(Continued from page 352.)

available or if the apprentice cannot spare the time during the day as is usually the case. He advises apprentices to work when they are young if they want to accomplish anything. He believes that any young mechanic with application, good habits and thrift, and able to grasp opportunities now presented by technical schools and journals, etc., can forge ahead so that by middle life he should be in a good position and able to enjoy the good things that life offers. Although our spoke is a hard worker, he is able to find time for activities in other useful directions. Being an Elder of the Knox Presbyterian Church, he takes a prominent part in the work of that body, and is also a member of the Galt Business Men's Club. He is not an active politician, but is a firm believer in the necessity of raising more troops in Canada to aid in the successful prosecution of the war. Mr. Hamilton is fond of outdoor life, but does not claim to be an athlete of any distinction. He says that he is too busy working to play ball, but gets lots of pleasure from motoring. His thoughts turned to more serious things, even in his younger days, for at the age of 24 he married Miss H. J. Webster, daughter of William Webster of Galt. He has a family consisting of three daughters and one son.

Mr. Hamilton believes that there is a bright future for the machine tool industry in Canada, providing that Canadian manufacturers specialize more in the design of tools they make; this, of course, presumes a demand sufficient to encourage manufacturers to do this. He believes that mechanics in Canada are fully as well trained as those in the United States, but admitting this, the business will have to grow until firms are able to specialize more so than at the present time.

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**BIG CUT IN STEEL PRICES  
ANNOUNCED**

UNIFORM steel prices for U.S. Government, the public and the Allies, which



represent reductions of from 40 to 70 per cent. in the present market quotations, were approved on Monday by President Wilson.

The prices were determined in an agreement reached between steel producers and the War Industries Board after conferences lasting more than a month. The prices, all subject to revision January 1, 1918, but to become effective immediately, follow:

"Iron ore, basis, lower lake ports, price agreed upon \$5.05, gross ton. No change.

"Coke, Connellsville, price agreed upon \$6 net ton; recent price \$16 a ton; a reduction of 62.5 per cent.

"Steel plates, basis Chicago and Pittsburgh, price agreed upon \$3.25 hundredweight, recent price \$11 hundredweight; a reduction of 70.5 per cent.

"Pig iron, price agreed upon \$33 gross ton; recent price \$58 gross ton; a reduction of 43.1 per cent.

"Steel bars, Pittsburgh and Chicago basis price agreed upon \$2.90 per hundredweight, recent price, \$5.50 per hundredweight; a reduction of 47.3 per cent.

"Steel shapes, basis Chicago and Pittsburgh, price agreed upon \$3 hundredweight; recent price \$6 hundredweight; a reduction of 50 per cent."



**ENGINEERING STANDARD LOWER**

IT has been decided by the Faculty of Applied Science of Queen's University, Kingston, Ont., that it is advisable during the period of the war to admit students with a lower requirements in mathematics, namely, pass matriculation. This decision was brought about because war conditions have caused a larger demand for men with education in engineering, and it is evident that after the war there will be a call for more such men. It is desirable, therefore, under these circumstances, to take measures to hasten the preparation of men for engineering work and to encourage young men to enter upon engineering courses. The deficiency will be made up the first year by devoting a larger amount of time to mathematics, so that the total requirements for a degree will remain exactly the same.

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4—No. 2 Foster Plain Head Screw Machines and 2—No. 3 Foster Friction Head Screw Machines all completely equipped with air cylinders and air chucks suitable for use on No. 80 Time Fuse Bodies. These machines have never been used. Also one Graduating Machine made by the American Ammunition Co.

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**WANTED—SMALL SECOND-HAND POWER** press, in good condition. Hosmer Stamping & Die Works, Ltd., 831 Dundas St., Toronto, Ont. c13m

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**MAN WANTED TO ACT AS SUPERINTEND-** ent of a fast growing die and stamping plant in City of Toronto. Box 329, Canadian Machinery. c12m

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**FOREMAN WANTED—FOR SHOP IN CEN-** tre of Toronto, with up-to-date equipment, employing about thirty men, doing jobbing business and making fine special machinery and tools. When applying state experience and give references, also wages expected. Only first-class men need apply. Box 326, Canadian Machinery. c8m

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- 4—14 x 6 Flather Engine Lathes, C.R., Q.C.G., new.
- 4—14 x 5 Reed Engine Lathes, R. & F.
- 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 Engine Lathe.
- 1—No. 13 B. & S. Automatic Gear Cutter.
- 1—30" Newark Automatic Gear Cutter.
- 1—5 x 48 Pratt & Whitney Plain Grinder.
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- 1—12 x 60 Modern Plain Grinder, new.
- 2—Lees-Bradner Thread Millers.
- 1—30 x 30 x 8' Powell Planer, new.

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- New No. 1 DIAMOND Automatic
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- 4—19" x 8' Double Back Gear.
- 5—19" x 10' Double Back Gear.
- 2—21" x 8' Double Back Gear.
- 1—25" x 10' Double Back Gear.
- 5—24" x 12' CMC, double back gear.
- 3—18" x 10' CISCO, double back gear.

## Planers.

- 24 x 24 x 6 LONDON.
- 36 x 36 x 8 LONDON.
- 36 x 36 x 11 INDUSTRIAL.
- 62 x 62 x 20 CANADA TOOL WKS. 2 heads.
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- CMC double end 18" throat punch, 1" hole in 1" plate.
- CMC double end 16" throat punch, 5/8" hole in 5/8" plate.
- CMC double end 26" throat punch, 1" hole in 1" plate.
- BERTRAM single end 30" throat punch 3/4" hole in 3/4" plate.
- BERTRAM SINGLE end 24" throat punch, 1" hole in 1" plate.
- BERTRAM single end 18" throat punch, 1½" hole in 1" plate.

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## Complete 18-pr. Shrapnel Plant for Sale

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One 22" x 50" Wheelock Engine, left-hand, arranged for direct shaft coupling, with heavy balance wheel 8½ x 14' x 17' 7" in dia.

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New Holden-Morgan Thread Miller for nose of 6 inch British H.E. Shell.

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- 20" x 7' Fay & Scott.
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- 16" x 8' Porter, B.G., comp. rest.
- 18" x 8' C.M.C., D.B.G., comp. rest.
- 20" x 8' New Haven, B.G., plain rest
- 21" x 8' Bawden, heavy duty (3).
- 24" x 11' Pond, B.G., comp. rest.
- 25" x 16' Niles, B.G., turret tool post.
- 30" x 10' Ames, B.G., plain rest.
- 18" x 32" x 12' C.M.C. 200, D.B.G., compound rest.
- 20" x 38" x 14' C.M.C. gap, D.B.G., compound rest.
- 24" x 44" x 24' C.M.C. gap, D.B.G., compound rest.

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- 16" Barr, sliding head, lever feed.
- 20" Silver, back geared, power feed (3).
- 20" Barnes, 3-spindle, lever feed.
- 22" Barnes, back geared, power feed.
- 24" Kerkoff, back geared, power feed
- 26" Prentice, back geared, power feed.
- 40" Bickford, back geared.
- 46" Allfree, back geared, power feed.
- 64" Canedy-Otto, wall radial, power feed.
- No. 10a Baush, 16-spindle.
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### GRINDERS.

- No. 1 Cincinnati, universal (2).
- No. 2 Landis, universal.
- No. 2 Sellers, universal.
- No. 3 Modern, universal.
- No. 3 La Salle, plain and surface.
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- 1-22 x 10 Reed Standard Engine Lathe.
- 1-22 x 8 Reed Standard Engine Lathe.
- 3-18 x 8 New Springfield Engine Lathes.
- 1-18 x 6 Jones & Lamson Standard Engine Lathe.
- 1-16 x 8 New Springfield Engine Lathe.
- 1-16 x 8 Porter Standard Engine Lathe.
- 2-16 x 8 Reed Stud Lathes.
- 1-14 x 8 Sebastian Standard Engine Lathe.
- 1-14 x 6 Springfield Engine Lathe.
- 1-13 x 6 Prentiss Engine Lathe.
- 1-13 x 6 Sebastian Engine Lathe.
- 2-14 x 6 Van Werk Engine Lathes.

### TURRET AND SCREW MACHINES.

- 2-No. 6 A Potter & Johnston Automatic Lathes.
- 1-2 1/2 x 24 Jones & Lamson Flat Turret Lathe, S.G.H.
- 1-2 x 24 Jones & Lamson Flat Turret Lathe, cone head.
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- 1-No. 4 Smurr & Kamen Hand Screw Machine.
- 1-No. 5 Pierson F. G. H. Hand Screw Machine.
- 4-New 14" Pierce Turret Lathes.
- 2-New 1 x 8 Pierce Hand Screw Machines.
- 2-2" Cleveland Automatic Screw Machines, jigger feed.

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- 3-New No. 1 1/2 American Plain Milling Machine.
- 1-No. 1 3/4 Garvin Plain Milling Machine.
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- 1-No. 1 Cincinnati Plain Milling Machine.
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- 3-Fox Hand Milling Machines.
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- 4-New No. 0 Burke Bench Mills.
- 1 No. 3/4 Bath Universal Grinder.
- 1-No. 2 W. & M. Surface Grinder.
- 1-No. 3 W. & M. Surface Grinder.
- 1-Miami Valley Universal Cutter Grinder.

### DRILL PRESSES.

- 1-5' Mueller Plain Radial Drill, old type.
- 1-30" Baker H. D. Drill.
- 5-30" Buffalo Plain 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.
- 1-6-spindle Natco Drill.
- 3-12" Leland & Gifford High Speed Bench Drills.

### SHAPERS AND PLANERS.

- 1-34" Lodge & Davis Geared Shaper.
- 1-18" Hendey Geared Shaper.
- 2-15" New Springfield B.G. Crank Shapers.
- 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. 10 Perkins Drawing Press.
- 5-No. 2 W. Bliss Wiring Presses.
- 1-300 lb. B. & S. Roll Board Hammer.
- 1-800 lb. P. & W. Roll Board Hammer.
- 1-25 lb. Fairbanks Belt Hammer.
- 1-25 lb. Bradley Helve Hammer.

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- 1-16 x 18 x 12 Union Steam Pump Co. Steam Driven Air Compressor.
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- 1-10 x 10 Clayton Belt-driven Air Compressor.
- 1-8 x 8 Fairbanks-Morse Electrical-driven Air Compressor.
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- 1-8 x 8 Union Steam Pump Co. Belt-driven Air Compressor.

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.

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DETROIT, MICH.

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The following used machinery, guaranteed to be in first-class condition, at lowest prices:—

- 2—LeBlond Heavy Duty 19" x 8' Engine Lathes.
  - 1—Fay Scott Engine Lathe, 24" x 8', with extra turret.
  - 1—LeBlond Engine Lathe, 17" x 6'.
  - 1—Oliver 16" x 7' Double Back-geared Engine Lathe.
  - 1—14" x 7' Niles Engine Lathe.
  - 1—16" x 8' Butler Engine Lathe.
  - 1—Boring Lathe for 9.2 or 12" shells.
  - 1—Turning Lathe for 9.2 or 12" shells.
  - 19—Jones & Lamson 3 x 36 Flat Harkness Turret Lathes.
  - 2—No. 50 Foster Turret Lathes, 16" swing.
  - 4 John Hall & Sons No. 4 Cutting-off Machines.
  - 5—10" x 36" Norton Grinding Machines.
  - 1—6" x 32" Norton Grinding Machine.
  - 1—Wilmarth & Morman Wet Tool and Twist Drill Grinder.
  - 1—Banfield Plug Milling Machine.
  - 2—Otis-Fensom Bench Thread Millers.
  - 1—Cincinnati Universal Milling Machine, No. 5.
  - 1—Brown & Sharpe Milling Machine, No. 1B.
  - 1—Surface Grinder.
  - 1—Gardner Grinder, No. 4, complete with discs.
  - 1—Gould Triplex Hydraulic Pump, Fig. 997, single acting, 1 1/4" x 6".
  - 1—Cincinnati Bickford Drill, 24".
  - 1—Holden-Morgan Marking Machine.
  - 2—Northern Electric Co.'s Electric Soldering Irons.
  - 1-1/15 H.P. General Electric Motor.
  - 1—Brown-Boggs Nosing Press, No. 320.
  - 1—Hisey Wolf Grinder, Portable Electric.
  - 1—Dumore Grinder, Portable Electric.
  - 8—Mech. Engr. Co. Fuel Oil Burners.
  - 4—Mech. Engr. Co. Fuel Oil Burning Furnaces, 24" x 36".
  - 1—Gilbert & Barker Fuel Oil Burning Furnace, 24" x 36", C-15.
  - 6—Gilbert & Barker Fuel Oil Burners, 2".
  - 2—Gilbert & Barker Positive Pressure Blowers, 3".
  - 2—Canadian Buffalo Forge Co. Blowers, No. 6, 30".
  - 1—Portable Blacksmith's Forge.
  - 1—Circular Banding Press, suitable for 18-pdr. shells.
  - 4—Shore Instrument Co.'s Scleroscopes.
  - 3—Resin Pots, Simplex Electric Co.'s make.
  - 3—Chapman Double Ball-bearing Trucks.
  - 2—Oil Quenching Tanks, 8' long x 3' 4" wide x 2' 6" deep water jackets.
  - 1—Bury Air Compressor, 6 x 8.
  - 2—Brown Instrument Co.'s Pyrometers.
  - 1—Thwing Pyrometer.
  - 3—Fairbanks 25-lb. Scales.
  - 1—International Time Clock for 200 men, with racks for tickets.
  - 1—Voltmeter, Western Electric Instrument Co.'s make 0-300, model 155.
  - 1—Acetylene Cutting and Welding Outfit, without tanks, Presto Lite make.
- Also small tools, rotary pumps, vises, pulleys, belting and shafting, etc., etc
- For Further Information Apply to  
**Zenith Coal & Steel  
Products, Limited**  
MONTREAL—402 McGill Building  
TORONTO—1410 Royal Bank Bldg.

## GOOD USED EQUIPMENT

### OVERHEAD TRAVELING CRANES

- 20-Ton, 56' 3" span, three motor, 110 volts, D.C.
- 25-Ton trolley, three motor, 220 volts, D.C.
- 10-Ton, 40' span, 80' lift, three motor.
- 5-Ton, 47' 0" span, three motor, 220 V., D.C.
- Crane Motors, 10 and 4 1/2 H.P., 220 V., D.C.
- 10-Ton hand crane, 56' 0" span.
- 20-Ton hand crane, 39' 0" span.
- 2-Ton hand cranes, 22' span.

### PUNCHES AND SHEARS

- Lever Shear (double), cap. 2" sq.
- 28" throat (single), cap. 3/4 x 7/8" (belt).
- 48" throat (single), cap. 3 x 1 1/4" (steam).
- 16" throat (single), cap. 1 1/2 x 1 1/2" (belt).
- 36" throat (single), cap. 3/4 x 7/8" (belt).
- 15" throat (single), cap. 3/4 x 7/8" (hand).
- 10" throat (double), cap. 1 1/2 x 1" (belt).
- Squaring Shear, 53" cap., 14 gauge.
- Angle Shear (double), cap. 6 x 6 x 3/4" (belt).
- Plate Shear (Univ.), 18" blade, cap. 3/4".
- Rotary splitting, 36" throat, cap. 1/2".
- Rotary level, 5" throat, cap. 1/2".
- Coulter & McKenzie, cap. 3 x 1/2", spring steel.
- Guillotine, Perkins, No. 6, cap. 2 1/2" sq.
- Butterfly shear for light scrap.

### MISCELLANEOUS.

- Ajax Bolt Header and Upsetter, 2 1/2" cap.
  - Acme Bolt Header and Upsetter, 1 1/2" cap.
  - Bulldozer, No. 12 Ajax, 30" stroke.
  - Bending Roll, 6", drop end, 6 1/2 and 8" rolls.
  - Lathe, 24" x 10" American, latest.
  - Grinder, No. 10 B. & S. Plain.
  - Grinder, No. 13, B. & S. Universal and Tool.
  - Rotary Planer, 36", Cleveland No. 2.
  - Saw, cold, 28" blade, 48" travel.
  - Press (trimming) No. 11 Perkins, 16,500 lbs.
  - Rolling Mill, 1 stand; 2 high, 30" bet. housings.
- First-class condition—quick shipments.

**McCoy-Brandt Machinery Co.**

Office and Warehouse:  
216-218 Penn Ave., Pittsburgh, Pa.

# WANTED

Hendey Lathe, 14" swing  
6 ft. bed, with taper and  
standard attachments.

No. 2 Cincinnati or B&S  
Universal Milling Machine.

Sensitive Drill, must be in  
good condition.

Box 323  
CANADIAN MACHINERY

c14m

# NOW!

You've been going to send  
in that ad for weeks, so  
why not mail it now for  
next week's issue?

**CANADIAN MACHINERY**

Classified Advertising Section  
143-153 University Ave. Toronto



# We Have For Sale the Following Machines

At Plant of Canada Malleable Steel & Range Co., Oshawa, Ont.

1—No. 27 Double Floor Grinder—Canadian Hart Wheel make. Equipped with two 12" wheels and two spindles 33" long. Shaft bearings 24" long.....	\$100	21—Heavy Gringer, same as No. 20. No wheels .....	\$ 50
2—Heavy Blount Double Floor Grinder, 45" spindle, two 8" wheels .....	100	22—8-Wheel Robinson Detroit Grinder....	825
3—Heavy Petrie Floor Grinders. No rest or c/s. Shaft 36" long, two 9" wheels.....	50	23—60" Steel Plate exhaust for 23" L.H.B.II. discharge .....	85
4—Stouffville Floor Grinder. No rest or c/s. Shaft 32", two 8" wheels .....	30	24—Anvil, 154-lb. ....	15
5—Large Polishing Stand (new). 4' shaft. Bearings 1 1/4" x 6 .....	35	27—5 H.P. Vertical Boiler, Submerged tubes, and one Steam Pump 3 x 2 x 3.....	125
6—Brown & Boggs Lever Splitting Shear..	50	28—Revolving Electric Plating Machine...	140
9—Hanson & Van Winkle Polishing Stand (no c/s) .....	75	29—Platers Electric Dynamo 600 Amperes..	200
11—Hanson & Van Winkle Polishing Stand. Shaft 5', Bearings 2 1/4 x 12" .....	60	30—Tumbling Barrel, 18" x 4' .....	50
15—No. 7 Jarecki Pipe Machine, 1 1/4" .....	150	32—No. 23 Brown & Boggs Hand Punch and Shear .....	60
18—Brown & Boggs 6' 6" Power Shears ....	450	35—Fairbanks Scale, 5-Ton .....	75
19—No. 21 Crosby Punch Press, Inclinable..	350	36—Hand Former, Toggle Type .....	15
20—Heavy Grinder, Bearings 2 1/4 x 12"—cross adjustment slide, one 12" wheel... ..	50	31—15 H.P. Westinghouse, 550 volt, 60 cycle, 3 phase, 1,120 R.P.M. ....	325
		33—40 H.P. Westinghouse, 550 volt, 60 cycle, 3 phase, 850 R.P.M. ....	600
		34—3 Westinghouse Transformers, 30 kw., 3,200—550 volt .....	684

## Garlock-Walker Machinery Company, Limited

32 FRONT STREET WEST, TORONTO

### Eastern Machinery & Equipment Co., Inc.

319 COMMERCIAL TRUST BUILDING PHILADELPHIA, PA.

#### NEW TOOLS FOR IMMEDIATE DELIVERY.

- 4—12" x 36" Bridgeport Grinders.
- 1—2 1/2" x 2" Wm. Sellers Tool Grinder.
- 30—18" x 9" Turning and Boring Lathes.
- 3—26 x 14" Am. Patt. Eng. Lathe.
- 3—Double head Sullivan Grinders.
- 1—32" x 12" Pittsburgh Engine Lathe.
- 1—24" Ohio Shaper.

#### USED MACHINERY ENGINE LATHES.

- 4—New 36" x 25" Wickes Engine Lathes, quick-change gear, double back gear.
- 8—30" x 10" American Gear head A-1.
- 5—20" x 8" Lodge & Shipley, geared head, q.c.g.
- 1—30" x 10" Bullard.
- 1—24" x 6" Bullard.
- 3—24" x 14" American.

#### TURRET LATHES.

- 9—18" x 6" Warner & Swasey Hexagon Turret, geared friction head.
- 36—Potter & Johnson 6A Automatic Turret Machines.
- 3—3 x 36 Jones & Lamson Flat Turret.
- 2—24" x 21" Jones & Lamson Flat Turret, bar equipment. Full set Turret Tools.
- 9—26" Gisholt 12" Collet chuck 6 1/2" hole in spindle threading lathe.
- 3—26" Putnam heavy duty lathe.
- 14" x 6" Lodge & Shipley Turret. Backgeared.
- 5—24" Gisholt 2-step cone, 6 1/4 H.S.

#### BORING MILLS.

- 1—Binse Horizontal Boring Mill, 3" bar.
- 6—66" swing Bement-Miles Tire Turning Mills, two swivel heads—15 1/2" under rail.
- 1—37" Bausch Boring Mill, 2 heads, good as new.
- 1—Cylinder boring mill, capacity of 2 1/2" diam. to 36" diam. 10' long.

Tool equipment included, good as new.

- 1—22" Bullard Boring Mill (2) heads.

#### MILLING MACHINES.

- 1—No. 3 LeBlond Plain Miller, table 13 1/2 x 58 1/2.
- 1—No. 2 Kenysmith, table 10' x 45".
- 1—24" x 8' Beaman & Smith Open Side Slab Miller, with two vertical spindles.
- 1—No. 2 Universal Milling Machine.

#### GEAR CUTTERS.

- 1—24" Fellows Gear Shaper.
- 2—36" Fellows Gear Shapers.

#### SCREW CUTTING MACHINES.

- 1—2" Cleveland automatic.
- 1—No. 55 National Acme 4 spindle, good as new.
- 1—No. 54 National Acme 4 spindle, good as new.

#### SLOTTERS AND SHAPERS.

- 1—9" Bement Slotter.
- 1—12" Bement Slotter.
- 1—20" Wharton Slotter.
- 1—20" Gould & Eberhardt Shaper. B.G. Vise. C.S.
- 1—16" Steptoe Shaper.

#### GRINDERS.

- 8—12" x 36" Bridgeport.
- 1—1 1/2" Full Universal Landis Machine.
- 1—No. 13 Brown & Sharpe Universal and Tool Grinder. Full equipment.
- No. 1 1/2 Universal Cutter and Reamer Grinder.
- 1—22" Bridgeport Face Grinder, with magnetic chuck.
- 5—Fisher Profile Grinders for Cutters.
- 1—No. 28 Brown & Sharpe Plain Grinder, 17" x 96".
- 5—No. 6 Std. Universal Tool & Cutter Grinders.

#### DRILL PRESSES.

- 1—24" Bickford Upright back gear sliding head lever and wheel feed drill.
- 1—4" Bickford Radial, with Tapping attachment, motor drive, with motor.

### Machinery, Bar Stock, Twist Drills, Dies & Taps For Sale

#### MACHINE TOOLS.

- 5—Rickert-Shafer Vertical Tapping Machines (used).
- 1—Power Hack Saw (used).
- 1—Nq. 1 Sheldons Exhauster.
- 1—Stewart Gas Furnace (used).
- 1—No. 200 Oil Extractor (new).
- 6—No. 4 Smurr & Kamen Screw Machines, Auto. Chuck, W.F., B.G. (used).

#### BAR STOCK.

- 33,000 lbs. 1 3/8" Round C.D. Screw Stock.
- 1,500 lbs. 1/4" Round C.D. Screw Stock.

#### TWIST DRILLS (Straight Shank)

- 48—13/16" Left-hand, high speed steel.
- 18—21/32" Right hand, high speed steel.
- 36—41/64" Left hand, high speed steel.
- 12—17/32" Right hand, high speed steel.
- 108—33/64" Right hand, high speed steel.
- 84—33/64" Right hand, carbon steel.
- 191—13/32" Right hand, carbon steel.
- 59—1 1/4" Left hand, carbon steel.
- 36 B Right hand, carbon steel.
- 71—No. 1 Left hand, carbon steel.
- 48—No. 4 Right hand, carbon steel.
- 161—No. 6 Right hand, high speed steel.
- 61—No. 25 Left hand, carbon steel.
- 50—No. 26 Right hand, high speed steel.
- 200—No. 27 Right hand, carbon steel.
- 240—No. 45 Right hand, high speed steel.

#### DIES AND TAPS.

- 13—No. 5B Modern Opening Dies (used).
- 16—Set 1.998"-14 Whitworth Chasers for above heads (new).
- 4—No. 4B Modern Opening Dies (used).
- 12—Set 1 3/8"-14 Whitworth Chasers for above.
- 10—No. 4 Manufacturers Equipment Co. Collapsible Taps (used).
- 15—Set 1.378"-14 Whitworth Chasers for above taps.

The Packard Fuse Co., Ltd.  
St. Catharines, Ont. c 13m

## The Cost is Trifling

It will cost you very little to adequately tell your wants in this section. Send in your copy to-day for next week's issue.

### CANADIAN MACHINERY

Classified Advertising Section  
143 University Avenue. Toronto



# IMMEDIATE DELIVERY

## DRILLING MACHINES

Leland H.S., B.B., bench type.  
No. 1½ Knight Driller and Miller.  
32" Hamilton, s.h., b.g., p.f.  
32" W. F. & J. Barnes, s.h., b.g., p.f.  
20" W. F. & J. Barnes, 4 spindle.  
No. 11 P. & W. Multiple, 10 spindles.  
3' W. E. Gang Plain Radial.  
3½' W. E. Gang Plain Radial.  
4' Mueller Plain Radial.  
Pawling & Harnischfeger Horizontal Driller.

## GEAR CUTTERS

Reynolds Hobber.  
No. 11 B. & S. automatic.  
30" x 9" G. & E. auto. for spur and bevel.  
24" x 7" G. & E. for spur.  
No. 3-26" B. & S. for spur.  
36" Walcott for spur.

## GRINDERS

Yankee Drill.  
No. 1-½ Cincinnati Cutter and Tool.  
No. 2 Woods Universal Cutter and Tool.  
No. 23 B. & S. Gear Cutter.  
No. 1 Brown & Sharpe Universal.  
14" x 20" B. & S. Plain.  
Garvin hole grinder.  
Gisholt tool grinder.  
No. 5 Diamond water tool.  
No. 16 Gardner disc grinder.  
No. 24 Gardner disc grinder.

## LATHES

13" x 5' P. & W., c.r., taper.  
14" x 6' Fairbanks, c.r. taper.  
16" x 6' Prentice, c.r.  
18" x 8' L. & S. pat. head, c.r. taper.  
18" x 10' Fitchburg, c.r.  
18" x 12' Barker, c.r.  
20" x 14' Blaisdall, c.r.  
21" x 12' New Haven, c.r.  
24" x 13' New Haven, c.r.  
36" x 20' American, t.b.g.  
36" x 22' New Haven, t.b.g.

## PLANERS

24" x 24" x 4' Gray, one head.  
24" x 24" x 8' Cincinnati, one head.  
26" x 26" x 8' Pease, one head.  
30" x 30" x 8' Woodward & Powell, one head.  
30" x 30" x 8' Cincinnati, two heads.  
36" x 36" x 14' Sellers, one head.  
40" x 38" x 14' Putnam, one head.  
50" x 50" x 18' New Haven, two heads, two extension heads.

## SCREW MACHINES

No. 1 Foster, Plain, A.C. and W.F.  
1" B. & S. Plain.  
16" P. & W. Plain.  
No. 2 Costello, plain head.  
No. 2 P. & W. friction head.  
No. 4 Pearson, geared head.  
No. 3 Bardons & Oliver, plain head.  
7½" Cleveland, automatic.

## TURRET LATHES

No. 22 Garvin.

16" Lodge & Shipley.  
26' Niles.  
2 x 24" Jones & Lamson.  
3 x 36" Jones & Lamson, chucking equipment.  
3 x 36" Jones & Lamson, bar equipment.  
21" Gisholt, with taper.  
2-24" Gisholt turret lathes, taper attachment.

## PUNCHES AND SHEARS

No. 3 American Can.  
No. 3 Bauroth, O.B.I.  
No. 5 Bauroth Geared, O.B.I.  
No. 6 N. American Can.  
No. 2 L. & A. Angle Iron Shears, 5"x5"x½" (new).  
No. 5 L. & A. Double Punch & Shear, 5"x5"x½", 3"x5/8", 1½" rd. (new).  
No. 1 L. & A. Multiple Punch (new).  
No. 1 L. & A. Horizontal Punch, ½" in 1" (new).

## MISCELLANEOUS

No. 0 Mitts & Merrill Keyseater.  
50-lb. Bradley Strap Hammer.  
¾" Acme Forging Machine.  
52" Niles car wheel boring mill.  
3" Stover Pipe Machine.  
6" x 14" P. & W. Thread Miller.  
No. 1 American Air Tempering Furnace.  
Belt Lacing Machine.  
3-ton Yale Duplex Hoist.

**Stocker-Rumely-Wachs Company, 117-121 N. Jefferson St., CHICAGO, ILL.**

**Chas. A. Strelinger Co.,**  
43-51 E. Larned St.,  
DETROIT MICH.

### Machine Tools For Immediate Delivery

#### DRILLING MACHINES.

American Sensitive Radials.  
No. 1-8 Garvin B.G. Horiz. Drill with Pump and Pumping.  
No. 1-8 Hamilton S.S. Drill, belt drive, cleat on table.  
No. 1-8 8" overhang Henry & Wright H. S. Sensitive Drills.  
No. 1-8 S. Sensitive Drills.

#### GRINDERS.

No. 1-8 Webster & Parks Grinders, with countershafts.  
No. 1-8 Wilmath & Norman Surface Grinders.  
No. 2 Oakes Universal Cutter and Tool Grinder.  
Model "B" Hand Feed Fitchburg Grinders.  
No. 1 Wilmath & Norman Aut. Fin. Grinders, complete.

Complete Chaco Grinders, with countershafts.  
No. 1-8 Gardner B.B. Type "B" Polishing Lathes.

#### LATHES.

13" x 5' Blount Speed Lathes, with counter shaft and hand rest.  
No. 1-8 13" x 6' Seneca Falls Lathe, with countershaft.  
No. 1-8 13" x 6' South Bend Screw Cutting Lathe.  
14" x 6' Monarch Q.C., D.B.G. New Style Head Engine Lathes.  
18" x 8' Monarch Q.C., D.B.G. Engine Lathes.  
17" x 8' Sidney Q.C., 3-step cone, D.B.G. Engine Lathes.

#### MILLING MACHINES.

No. 1 Standard Hand Millers with shafts.  
H. B. Smith Hand Miller, with countershaft.  
Wisconsin Hand Miller with countershaft, vise and arbor.

No. 1-8 Valley City Universal Miller.

#### SCREW MACHINES.

No. 5 Federal Pl. Hd. Turret Lathe, with double cut off rest and countershaft.  
No. 1 New Howe Pl. Hd. Screw Machine, with Aut. Chuck and Wire Feed.  
No. 11 Garvin Aut. Collet and Wire Feed Screw Machine.

#### MISCELLANEOUS.

No. 38 Curtis & Curtis Hand Power Pipe Machine, complete.  
Type "A" Steam Valve Seating Machine.  
No. 1 Garvin Sens. Slotted.

*They must be getting results—*

or why would they continue to advertise week after week? That's logic, isn't it? This is *direct-result* department.

Have you noticed that each week the same firms's lists appear? If you don't care to use large space, insert a "liner" ad.

**Canadian Machinery**

*Classified Advertising Section*

143 University Ave. - Toronto



# STOP—MAYBE IT'S HERE

## BORING MACHINES—Vertical

- 1-30" Flather, one turret head
- 2-36" B. & S. one turret head, Dec. Delivery
- 1-42" McCabe, one swivel head.
- 1-42" Ballant, two heads.
- 2-Used 42" Colburn, one swivel head.
- 1-56" Niles, two heads.
- 1-64" Colburn, two swivel heads.
- 1-72" Niles, 2 swivel heads
- 1-90" Vertical Cylinder
- 1-NEW 8' Bickford
- 1 Used Niles 10' 16' extension, two heads.

## BORING MACHINES—Horizontal

- 1 Lucas 2 1/2" bar
- 1 E2 Cleveland, 2 1/2" bar takes 1' 6", compound table.
- 1 Betts Knee Type, 3" bar.
- 1-No. 1 Barrett Cylinder Borer, 3 1/2" bar type.

## BULLDOZERS

- 1-No. 7 High Speed Ajax 16" stroke
- 1-No. 9 Williams & White Belt Drive
- 1 No. 12 Ajax, single pulley drive.
- 2 No. 23 Williams & White, belt drive.
- 1-No. 26 Williams & White, belt drive.

## CRANES

- 1 Case 5 ton, 47' span.
- 1-50-ton Niles, 61' span
- 1 Locomotive 35' boom, standard gaged, steam driven, 15 ton.

## CUTTING-OFF MACHINES

- 10-4 1/2" Williams.
- 30-Davis 4 1/2" Davis.
- 2-NEW 4 1/2" Davis.
- 2-NEW 6" Davis.

## DRILLING MACHINES—Radial

- 2-NEW 2' American cone drive
- 6 NEW 3' Mueller, speed box drive, Dec. del
- 1-3' Bickford Semi-Universal table
- 1-3' Bickford, gear drive
- 3-NEW 3' American, sensitive tapping attachment.
- 1-NEW 3' Mueller, plain speed box drive
- 1-NEW 3 1/2' Western Drill, 86" circle.
- 2-4' Mueller Plain, speed box drive
- 1-NEW 4' Ryerson-belt drive
- 6 NEW 5' Mueller, speed box drive, Dec. del.
- 1-5' Bausch Radial, arranged for motor drive
- 1-5 1/2' American Full Universal
- 1-NEW 6' Triumph Motor Drive, Sept. delivery.

## DRILLING MACHINES—Heavy Duty

- 4-No. 310 Baker Single Pulley Drive, late type
- 2-NEW No. 2 Colburn
- 3-No. 14 Colburn, 24" swing, capacity 2" in solid steel.

## DRILLING MACHINES—Sliding Head.

- 2 NEW 24" Barnes Drills and Tappers.
- 5-NEW 24" Barnes Drills.

## DRILLING MACHINES—Multiple Spindle

- 1-No. 5 Fox, 12-spindle, capacity 1".
- 1-No. 20-C Bausch, 12-spindle, capacity 1 1/2" holes, 36" circle.
- 1-14 Spindle Bausch, capacity 1" holes, 36" circle

## DRILLING MACHINES—Sensitive.

- 3 NEW 12" Albany High Speed Tool Room.
- 1-NEW No. P-4 Allen, one spindle.
- 1 NEW No. P-2-8 Allen, two spindles.
- 2-NEW No. B-1 Allen, one spindle, 7" overhang.
- 1-NEW No. B-2 Allen, two spindle, 7" overhang.
- 3-NEW No. B-3 Allen, three spindle, 7" overhang, tapping attachment.
- 3-NEW No. B-4 Allen, four spindle, 7" overhang.

## GEAR CUTTING MACHINES

- 1-NEW No. 3 Bickett Gear Rack Planer, delivery 60 days.
- 1-No. 3 Brown & Sharpe Auto. Gear Cutter spur
- 1-NEW 6" Standard Gear Cutter, spur.
- 1-15" Gleason Bevel Gear Planer
- 1 1/2" Pilgram Bevel Gear Generator.
- 1-30" Becker-Brainard.
- 1-30" x 8" G. & E. for spur and bevel
- 1-24" Fellows Gear Shaper
- 2-NEW Flather Solid Pattern Automatic Gear Cutter.
- 3-25" Fellows Gear Shapers

## GRINDERS—Universal, for Cutters, Drills, Reamers, etc.

- 8-NEW No. 190 Wells.
- 2-NEW No. 1 Wood Universal
- 1-NEW Wilmarth & Morman, Style B.K.
- 1 NEW Walker, No. 1 Outfit B
- 5-NEW No. 2 Wood Universal
- 1-NEW Walker, No. 2 Outfit K capacity 9" x 3 1/2"
- 1 NEW Norton No. 1
- 2 NEW No. 2 Osterlein Universal.
- 7-NEW LeBlond.
- 1-NEW Gisholt Universal.

## GRINDERS—Cylindrical Plain

- 2-NEW 8" x 18" Modern, self contained
- 1-NEW No. 12 B. & S. 8" x 26", Sept. del
- 7-NEW 8" x 36" Modern, self contained
- 1-NEW 12" x 24" Modern, self contained
- 6-NEW 12" x 36" Modern, self contained.
- 3-NEW 12" x 48" Modern, self contained
- 2-12 x 42" Landis, self contained.
- 1-NEW 10" x 50" Norton, Sept. delivery
- 1-44" x 72" Norton.
- 1-NEW 12" x 48" Modern, self contained
- 1-NEW 16" x 72 Norton, plain.

## GRINDERS—Cylindrical—Universal.

- 2-NEW No. 2 Bath, 9" x 26".
- 1-NEW No. 2 Walker, 9" x 26"
- 1-Brown & Sharpe No. 13-8" x 24"
- 1-NEW No. 2 1/2 (10" x 36") Bath
- 2-NEW No. 3 (12" x 46") Brown & Sharpe.
- 1-42" x 42" Landis
- 2-NEW No. 3 Modern, 13" x 40", Sept. del
- 1-No. 4 Cincinnati, capacity 12 x 72"

## GRINDERS—Internal

- 1-NEW No. 6 Modern, capacity 10" x 10".
- 1-No. 70 Heald.
- 1-No. 75 Heald.

## GRINDERS—Cylinder

- 1-No. 60 Heald, single pulley drive

## GRINDERS—Profile

- 1-NEW Cleveland
- 5-Fisher Profile Grinders.

## GRINDERS—Surface

- 1-NEW No. 1 Wilmarth & Morman
- 2-NEW No. 1 1/2 Walker's complete
- 2-NEW No. 2 American with Walker No. 1 1/2 plain flat mag, chucks.
- 4-NEW No. 2 Reid (same as B. & S.)
- 1-NEW No. 2 Brown & Sharpe.

## HAMMERS—Board-Lift, Drop.

- 1-No. 4 Standard Machinery Co. 400 lbs.
- 1-E. W. Bliss 800 lbs.

## HAMMERS—Steam Forging

- 1-360-lb. Bell Single Frame Hammer
- 1-600-lb. Niles Single Frame
- 1-18" Morgan & Williams, 600 to 800 lbs., 21" gap
- 1-NEW 2,000 lbs. Morgan Single Frame
- 1-3,000 lbs. Morgan Double Frame
- 1-7,000-lb. Morgan Special Double Stand.

## KEYSEATERS

- 2-NEW No. 1 Davis.
- 1-NEW No. 2 Davis.
- 1-No. 2 Mitts & Merrill.
- 1-No. 2 Knowles, 60" stroke.

## LATHES—Manufacturing, Not Screw Cutting

- 2-NEW No. 3 Harding Bros. Bench Lathe
- 3-16" x 8' Fairbanks-Morse, heavy duty.
- 70-NEW Simplex, 16" x 8'.
- 14-Recd-Prattice Shell Lathes for 4" or 18 lbs. American shells.
- 22-18" x 5' Battle Creek, heavy duty.
- 50-20" x 10' Hindman, high duty.

## LATHES—Engine

- 8" Wade Precision, Sept. delivery
- 3-NEW 12" x 6' Bradford, quick change
- 1-NEW 14" x 8' Champion.
- 14-NEW 15" x 6' Rockford.
- 4-NEW 16" x 8' Bradford, quick change.
- 3-NEW 18" x 6' Cleveland Tool Room Lathes, complete equipment
- 1-NEW 17" x 8' National, quick change gears.
- 12-17" x 8' LeBlond, pan bed, quick change gears
- 1-18 x 10 Hendey quick-change gear, 14" chuck
- 1-NEW 19" x 8' LeBlond heavy duty
- 3-NEW 20" x 12' Bradford, quick change.
- 5-NEW 20" x 10' Bradford, quick change.
- 1-NEW 20" x 10' Cleveland Geared Head
- 19-NEW 22" x 10' Porter, S.B.G.
- 9-22" x 10' Putnam oil pan turrets
- 1-NEW 24" x 10' Bradford, quick change.
- 5-NEW 24" x 12' Bradford, quick change
- 1-NEW 24" x 14' Bradford, quick change.
- 3-24" x 14' American, quick change.
- 1-24 x 45 x 22" McCabe, double spindle.
- 1-24" x 24" Perkins, single back-gear, raising blocks to 40", 16" chucks.
- 4-27" x 14' Patent Head, Lodge & Shipley, double back-gear
- 1-28" x 18" S. & B.
- 1-28" x 18" New Haven, single back gear.
- 1-NEW 30" x 14' American Double Back-Geared, Quick-Change
- 2-NEW 32" x 12' Pittsburgh Pattern
- 6-NEW 36" x 21' Putnam, triple geared
- 1-50" x 12' American Gear Head, quick change
- 1-71" x 20' Fifeled, triple-geared.
- 1-72" x 30' Fanal, triple geared.

## LATHES—Turret

- 1-NEW 13" Gisholt, G-13.
- 1-NEW 21" Gisholt, H.L.

- 2-NEW 14" Gisholt, I-24.
- 9-24 x 26" Greenlee Flat Turret Lathes
- 5-2 x 24" Jones & Lamson
- 2-24" Libby
- 18-6-A Potter & Johnson.
- 1-NEW 18" Libby.

## MILLING MACHINES—Knee Type—Universal

- 1 NEW No. 1 Kempsmith.
- 1-No. 2 Kempsmith, 13" dividing head.
- 1-No. 2 Kempsmith, vertical attach.
- 1-NEW No. 2 Hendey.
- 1-NEW No. 2 Rockford High Power
- 1-NEW No. 3 Kempsmith
- 3-NEW No. 3-H LeBlond
- 1-NEW No. 3 Hendey.
- 1-No. 4 Cincinnati
- 1-NEW No. 4 LeBlond, heavy duty, immediate

## MILLING MACHINES—Knee Type—Plan

- 9-NEW No. 0 Rockford.
- 1-NEW No. 1-B Hendey.
- 2-NEW No. 1 Kempsmith.
- 2-NEW No. 1 1/2 American back gear
- 1-NEW No. 1 Rockford, high power.
- 2-NEW No. 2 Rockford
- 1-No. 3 LeBlond
- 2-NEW No. 3 Kempsmith
- 1-NEW No. 4 LeBlond.
- 1 No. 4 Brown & Sharpe

## MILLING MACHINE—Hand.

- 3-NEW No. 1 Rockford, without column.
- 3-NEW No. 2 Rockford, on column.
- 2-NEW No. 3 Rockford, on column.
- 3-NEW No. 3 Rockford, on column, power feed

## MILLING MACHINES—Vertical

- 1-NEW Bickett, No. 0
- 4-NEW No. 4-B Becker
- 2-No. 5 Becker.

## MILLING MACHINES—Planer Type

- 1-No. 2 Beaman & Smith Vertical Spindle, open side.
- 1-Ingersoll Slab, 16" x 48" cap.
- 1-Bement Niles, heavy duty planer type, 24" x 34" x 12".
- 2-Ingersoll Slab Millers, working surface of table 60" x 20"
- 1 No. 33 Becker-Brainard Slab Miller, working surface 7' x 20"

## MILLING MACHINES—Lincoln Type.

- 3-NEW No. 1 American.

## PLANERS

- 24" x 24" x 8' Cincinnati, one head, used three months
- 2-NEW 30" x 30" x 8' Cincinnati Medium Planer, one head.
- 1-30 x 30" x 10' Ohio Machine Tool Co., 2 heads
- 2-NEW 36" x 36" x 12' Woodward & Powell, two heads on cross-rail, one side head. Oct. delivery
- 1-36" x 36" x 12' Gray, two heads
- 1-38" x 38" x 11' Dutrick & Harvey, open side
- 1-40" x 40" x 11' Niles, four heads
- 1-Gray 42" widened to 56" x 42" x 16", two heads
- 1-NEW 48" x 48" x 11' Cincinnati, two heads
- 1-48" x 12' Peckick, open side, one head.
- 1-50" x 50" x 16' Pond, 2 heads on rail
- 1-62" x 52" x 16' Betts, 2 heads, right angle drive.
- 1-54" x 42" x 16' Gray, 2 heads on cross rail, one side head.

## SCREW MACHINES—Hand

- 4-NEW No. 2 Foster, geared friction head
- 1-NEW No. 4 Foster, geared friction head, power feed to turret slide.
- 2-NEW No. 5 Foster, all geared, power feed to turret slide.
- 3-NEW No. 5 Foster, all geared head, power feed to turret slide, power cross feed.
- 2-NEW No. 6 Foster, geared friction head, power feed to turret, power cross feed.
- 5-NEW No. 7, geared friction head, power feed to turret, power cross feed.
- 1-NEW No. 10, geared friction head, power feed to turret, power cross feed.
- 2-NEW 24" Dresser, F.G.R., power feed

## SCREW MACHINES—Automatic

- 2-NEW 5 1/2" Cleveland, Model A.
- 1-NEW 3" Gridley Mult. Spindle, belt drive
- 2-NEW 1 1/2" Gridley Mult. Spindle, belt drive
- 2-NEW 1 1/2" Gridley Mult. Spindle, belt drive.
- 1-NEW 2 1/2" Gridley Mult. Spindle, belt drive.
- 1-NEW 3 1/2" Gridley Single Spindle, belt drive
- 2-No. 63 National Acme
- 1 No. 55 National Acme
- 1-No. 515 National Acme.

## SHAPERS

- 1-NEW 18" Springfield
- 1-16" Motor Driven Rockford
- 1-NEW Barker 24"
- 1-NEW 24" Milwaukee
- 2-25" Smith & Mills, Back-Geared
- 1-28" Smith & Mills, Triple-Geared
- 2-30" Morton Draw Cut.

## SLOTTERS

- 1-NEW 12" Betts, belt drive.
- 1-18" Betts, heavy duty.

# W. F. DAVIS MACHINE TOOL COMPANY

CHICAGO, ILL.  
549 Washington Blvd.

CINCINNATI, OHIO  
1018 Union Central Life Bldg.

CLEVELAND, OHIO  
508 Leader News Bldg.

NEW YORK CITY  
Singer Bldg.

WRITE OR WIRE OUR NEAREST OFFICE FOR QUOTATIONS  
THIS IS ONLY A PARTIAL LIST OF AVAILABLE MACHINES

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



## New York's Greatest Stock

(Partial List)

### BORING MILLS

- 52" Bement-Miles Vertical, two heads; motor driven, A.C., 250 volts.
- 36" Bridgeport Vertical, two heads.
- 34" Rogers Vertical, single turret head.
- Five 30" Bullard Vertical, single turret head.
- 20" Bullard Vertical Turret Lathe, with side and turret heads.
- 18" Bullard Vertical Turret Lathe, with side head and turret head.
- Betts Horizontal, 2 1/4" bar.
- 48" Niles Car Wheel.

### MILLING MACHINES

- No. 4B Brown & Sharpe Plain, single pulley drive.
- No. 4 Cincinnati heavy duty Plain, single pulley drive.
- No. 4 Brown & Sharpe Plain.
- No. 2 Hendey-Norton Universal, dividing head, vise, arbor, vertical attachment.
- No. 2 Cincinnati Universal, dividing head.
- No. 2 Cincinnati Plain.
- No. 14A Garvin Plain.
- No. 1 Kempsmith Plain, gear box feeds.
- Two No. 5 Brown & Sharpe Vertical.
- Beaman & Smith 2 spindle Vertical Slab, table 24" x 48".

### LATHES

- 60" Fifield, 9' centers, face plate drive.
- Two 60" x 20' New Haven, face plate drive.
- 48" x 16' Niles Tire or Car Wheel, double head type, face plate drive, triple geared.
- 36" x 20' New Haven, compound rest, power cross feed, 14' 6" between centers.
- 36" x 16' Bradford, compound rest, power cross feed.
- 36" x 14' Putnam, heavy duty, triple geared, face plate drive.
- 30" x 28' Fifield, compound rest, power cross feed.
- 30" x 16' Fifield, raising blocks to swing 38", compound rest, power cross feed.
- 28" x 17' New Haven, raising blocks to swing 30", hollow spindle, full swing rest, compound rest, power cross feed.
- 24" x 24' Fitchburg, raising blocks to swing 30", compound rest, power cross feed, 19' between centers.

**New York Machinery  
Exchange, Inc.**

50 Church Street . . . New York City

## SURPLUS MACHINERY FOR SALE

- 2—3" Hall cut-off machines
- 1—Lodge & Shipley Turret Lathe, 22" x 10'
- 1—Lodge & Shipley Turret Lathe, 24" x 10'
- 2—Libby Turret Lathes, 18"
- 1—Gisholt Turret Lathe, 18"
- 2—Gisholt Turret Lathes, 21"
- 1—Gardner Shell Base Grinder, 4A
- 1—Ford-Smith Grinder, 20"
- 2—Landis Traverse Grinders, No. 4 and 12 x 66
- 1—Symington Band Turn Lathe, 3"
- 1—3" Stamping Machine
- 2—Tate-Jones Shell Furnaces
- 1—16' Rushworth Plate Planer
- 1—16' Bertram Plate Planer
- 1—Coping Machine

**Polson Iron Works, Ltd.**  
TORONTO, ONTARIO

## Let them know it's there

In complimenting us upon the results secured from their advertisement in this section, one advertiser said:

"Of course we would not have sold it without letting people know it was here, that is obvious, and thanks are due you for letting the people know it was for sale."

If you have any old or used equipment for sale, let people know it's there. Your message in Canadian Machinery will be placed before the probable buyers of such equipment.

**Canadian Machinery**

*Classified Advertising Section*

143 University Ave., TORONTO



# 4.5 H.E. Shell Plant FOR SALE

*We offer the following Used Machinery and Equipment, subject to prior sale:*

- 2—Hall Cutting-off Machines.
  - 1—24" x 8' Bertram Engine Lathes, B.G., with plain saddle and tool post and arbor for rough turning.
  - 1—20" x 16' Bertram Engine Lathe, B.G., with two head stocks, plain saddles with tool posts and arbors for rough turning.
  - 1—20" x 10' Bertram Engine Lathe, B.G., with 3-jaw scroll chuck and Bertram waving attachment. Tooled for Mark VII. wave rib.
  - 1—18" x 12' Engine Lathe, B.G., with 3-jaw scroll chuck and Bertram waving attachment. Tooled for Mark VII. wave rib.
  - 1—Newton 2-spindle Boring Machine, fitted with tool holders and chucks for boring fuse hole.
  - 1—Brown, Boggs Marking Machine, converted for finished tapping fuse hole, with tap holder and sliding chuck.
  - 1—Special 3-spindle Finished Turning Machine, complete with tool holders and profile cam.
  - 1—18" x 6' Draper Engine Lathe, with split chuck and steady rest. Equipped with boring bar for inside profile.
  - 1—Holden-Morgan Thread Milling Machine for Base Recess Thread, with attachment for threading base plates.
  - 3—18" Single Drive Head Stocks, with hinged chucks, suitable for repair work on shells.
  - 1—18" Single Drive Head Stock, with 3-jaw scroll chuck, steady rest and saddle. Suitable for correcting weight, etc.
  - 1—3-Spindle Drill Press for Drills No. 0 to 1/4".
  - 1—Steel Ring Banding Press, complete with Lymburner belt-driven power pump, tank, piping and valves.
  - 1—Copper Band Turning Machine, with friction clutch on countershaft. Tooled for Mark VII. band.
  - 1—7-hole Tate-Jones Nose Heating Furnace, oil fired. Equipped with high and low pressure burner. Complete with Root L.P. blower and piping.
  - 1—80-shell capacity Varnish Baking Oven.
  - 1—Fixture for Nicking Nose.
  - 1—Single Spindle, Motor-driven Paint Table, 250 volts, D.C.
  - 1—Single Spindle, Motor-driven Varnish Table, 250 volts, D.C.
  - 1—Paasche Air Varnishing Outfit.
  - 4—4-Jaw Screwed Ring Type Chucks, with babbitted steady rests.
  - 2—4-Jaw Hand-operated Draw Chucks, with steady rests.
  - 5—Hinged Vices, for hand tapping or rivetting base.
  - 1—3-Jaw Scroll Chuck, with extension and steady rest.
  - 4—Finished Turning Profile Attachments.
  - 22—Drip Pans with 18" legs and C.I. settling tanks.
  - 2—38 lbs. capacity Fairbanks Scales, with weights.
- Assorted Gauges, Boring Bars, Tool Holder Sets.

**READY FOR SHIPMENT. CAN BE EXAMINED AT ANY TIME AT OUR PLANT.**

## JENKINS BROS., LIMITED

103 ST. REMI STREET

MONTREAL, QUE.



**SPECIAL MACHINERY**

Special Machinery, Jigs, Fixtures, Punches and Dies, Small Tools, Screw Machine Products, Gauges, Forgings, Etc.

**CONTRACT WORK**

# CUT GEARS

*Theoretically Correct*

PROMPT SERVICE

**ROBERT GARDNER & SON**

LIMITED

52 NAZARETH ST., MONTREAL, P. Q.

**RAWHIDE**

**OR METAL**

AT  
**YOUR SERVICE**

FOR

**Tools, Gauges, Jigs, Fixtures  
Special Machinery**

**GENERAL MACHINE WORK**

Experimental work

**Brass and Aluminum Castings**

in large or small quantities

**GENERAL JOBBING AND REPAIRS**

THE

**MONARCH BRASS MFG.**

COMPANY, LIMITED

71 Browns Ave., Toronto, Ont.

**Buying  
made easy**

By grouping together these manufacturers of Special Machinery, Gears, Gauges, Dies, etc., we are making buying easy for you. Here you have a directory of the firms who can fill your requirements on any of these lines. When you are in need of any of the above, consult the firms listed here.

**Canadian Machinery**

*Contract Work Section*

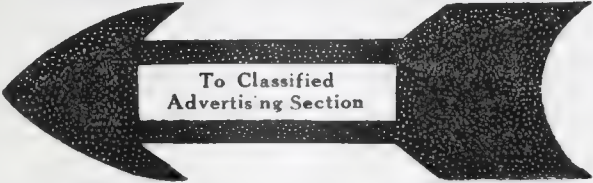
143 University Ave., Toronto



**SPECIAL MACHINERY**

Special Machinery, Gears, Jigs, Fixtures, Punches and Dies,  
Small Tools, Screw Machine Products, Gauges, Etc.

**CONTRACT WORK**



To Classified  
Advertising Section

**CUT GEARS**

Rawhide — Steel — Brass — Cast  
Iron

Try our W-G Rawhide Silent  
Gear. Designers and Builders  
of Special Machinery.

**Winnipeg Gear & Engineering Co.**  
197-199 Princess St., Winnipeg, Man.




**Brass, Phosphor Bronze,  
Copper and Aluminum  
CASTINGS**

We have the largest Jobbing  
Brass Foundry in Canada.  
Can make prompt delivery.

*Tallman's reputation is in the goods.*

**Tallman Brass & Metal Co.**  
**HAMILTON, ONT.**  
CANADA




**SPECIAL TOOLS**

Gauges Taps Jigs

**AUTOMATIC MACHINERY  
FOR MUNITIONS**

**4.5 Mark VII Shell  
Milling Machines**

**TORONTO TOOL CO.**  
TORONTO, ONT.  
516 Richmond St. West Phone A. 1181



# The "Feel" of a Good File

Did you ever watch a really capable mechanic test a file? He has a way of passing a sensitive thumb over its teeth. Instinctively, unfailingly, he thereby determines whether it is fit for use.

This man always chooses a "FAMOUS FIVE." He never buys blindly. He can "feel" that a "FAMOUS FIVE" is right. He can "feel" its sharp, keen-cutting teeth, arranged in rows of perfect uniformity. There is no doubt in his mind. He buys "FAMOUS FIVE." He makes sure of satisfaction.

Specify "FAMOUS FIVE" files when ordering.

**KEARNEY & FOOT**  
**GREAT WESTERN**  
**AMERICAN**  
**ARCADE**  
**GLOBE**  
*Made in Canada by*  
**NICHOLSON FILE CO.**  
**PORT HOPE**  
**ONTARIO**

# Speed



When the quality of the work is the best obtainable, the next item is speed. For upon speed depends your costs.

One rivet per second is the speed this machine will maintain indefinitely. Adapt that speed to your requirements and find out the value the Grant Riveter would be to you.

Write for our catalogue. It will give you complete information.

**Grant Mfg. & Machine Company**  
**Bridgeport, Conn., U.S.A.**

## HIGH SPEED HAMMERS

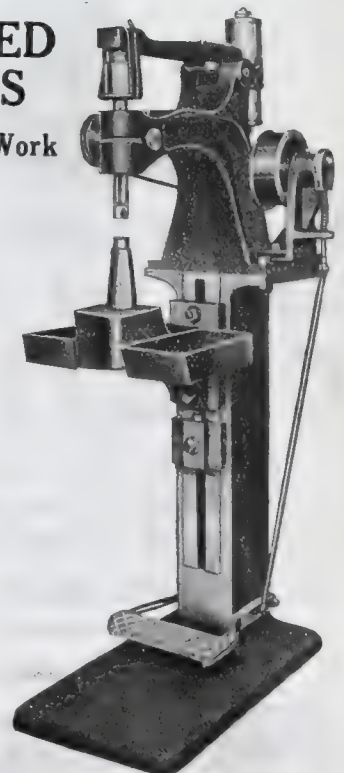
For High Speed Work

### FEATURES:

Economy in floor space, elimination of weight and a guaranteed saving of from 15% to 20% on any class of work. The life of the machine is practically indefinite as phosphor bronze bushings are used throughout.

No riveting too intricate for us; no riveting which our machine cannot accomplish.

Send for our High Speed Hammer Book.

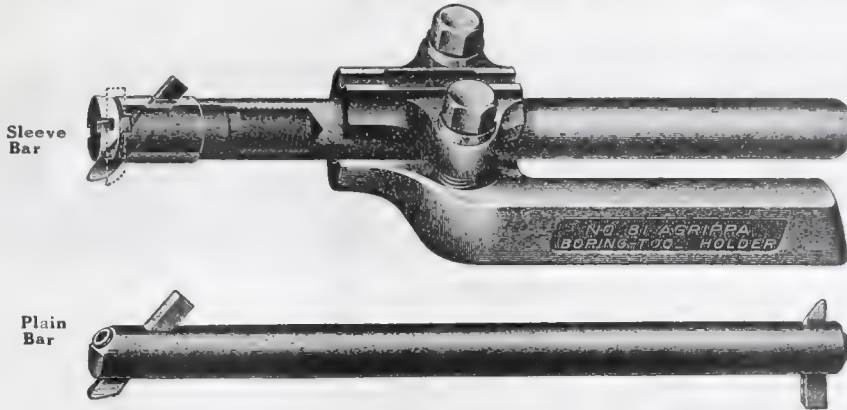


**THE HIGH SPEED HAMMER CO.**  
**Rochester, N.Y.**

Sales Agents: The A. R. Williams Machinery Company, Limited, Toronto, Ontario.



## Williams' "AGRIPPA" Multiple Bar Boring-Tool Holder Stops Waste



ALL  
"AGRIPPA"  
TOOL HOLDERS  
CAN BE  
SHIPPED  
PROMPTLY

ITS sleeve bar cap admits a straight or angular cutter; and you can quickly insert either at the business end of the bar without removing the cap or disturbing the setting of either the bar or the holder. You need neither make nor buy any bushings hereafter, for the "twin screw" fastenings of "AGRIPPAS" within their range accommodate any bar section you may have handy. Now's the time to begin saving—caps, bushings and time!

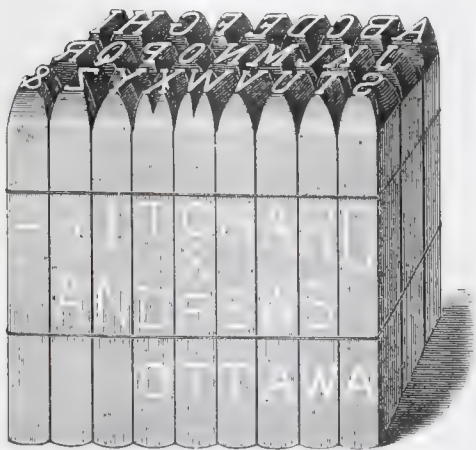
Procure your tool holder text book here or from your dealer and learn the many other economies afforded by

**Williams' Grand Prize "AGRIPPA" Tool Holders**  
**"THE HOLDERS THAT HOLD"**

Western Office and Warehouse  
40 S. Clinton Street  
Chicago, Ill.



Quality alone is our  
measure of "AGRIPPA"  
Tool Holder Value



## STEEL STAMPS

FOR MARKING SHELLS, ETC.

We will Give You Satisfaction on All Work  
of this Kind

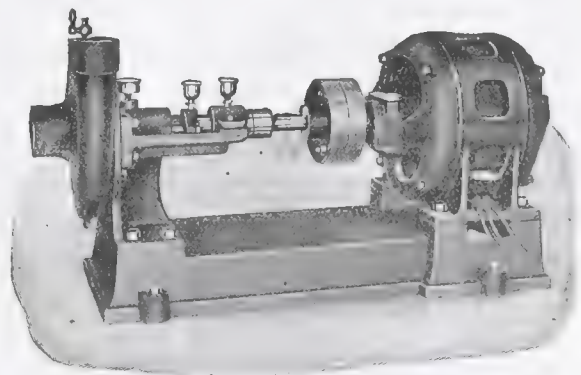
SEND FOR PRICES

**Pritchard-Andrews Co., of Ottawa**

General Engravers and Die Sinkers

264 SPARKS ST. OTTAWA, CANADA

## We are building a very wide range of sizes and types in Centrifugal PUMPING MACHINERY



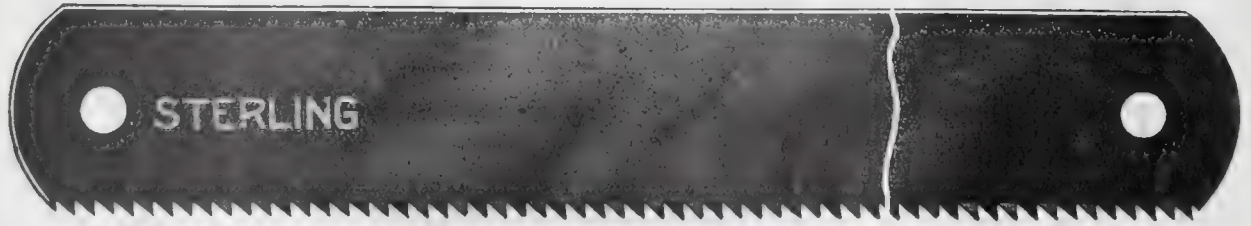
Also Steam and Power Pumps of other  
patterns.

Send us your inquiries

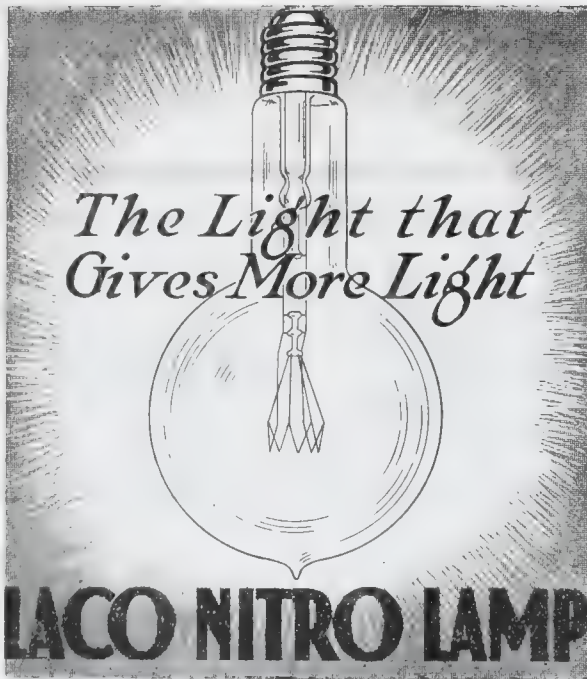
The Smart-Turner Machine Co., Limited  
HAMILTON, CANADA.



# HACK "STERLING" SAWS



MANUFACTURED BY  
**DIAMOND SAW & STAMPING WORKS** -- **BUFFALO, N.Y., U.S.A.**



*The Light that Gives More Light*

## LACO NITRO LAMP

**The Best Light for All Metal Working Plants**

THE LACO NITRO LAMP is the highest development of Nitro Tungsten Lights.

The Tungsten filament, burning in the nitrogen filled bulb, gives a clearer, whiter light, more closely approximating daylight than any other light on the market.

Your nearest dealer can supply your demands. Stocks available at Montreal, Toronto, Winnipeg, Vancouver Warehouses.

**CANADIAN LACO-PHILIPS COMPANY, LTD.**



## Tap Extensions

A small tap attached to our extension has the same value in strength and quality as a solid tap of similar length. Made in sets of three, two, four and six inches long, and can be combined to make six different lengths, ranging up to eleven inches. The sockets are formed by the Allen patent process and may be used on all standard taps. Special sizes made to order.

Write us for further particulars.

## The Allen Mfg. Company

Hartford, nn. U.S.A.

For Oil or Water

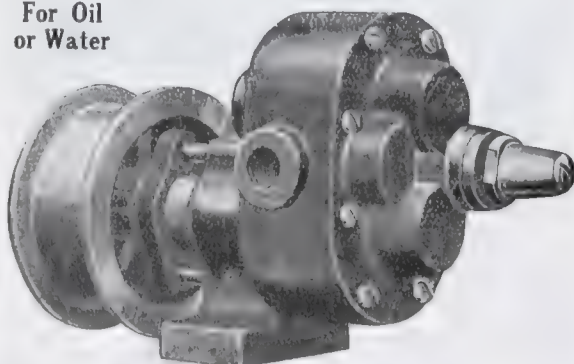


Fig. 1850—With Automatic Relief Valve

## A NIAGARA of COOLANT

if you wish it, or just enough to cool the tool—whichever you prefer. That is the way TRAHERN ROTARY GEARED PUMPS deliver the lubricant. Don't delay another day—write at once.

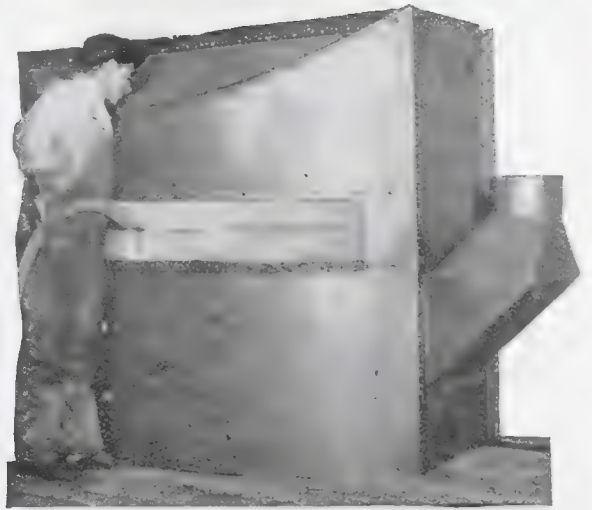
## TRAHERN PUMP COMPANY, ROCKFORD ILLINOIS

Canadian Agents:

**A. R. Williams Machinery Co., Toronto**



# Humanizing the Sand Blast



Many kindly employers refuse to adopt sand blasting in spite of its evident advantages because they do not want to ask any employee to work in an atmosphere of flying sand and dust.

In most cases their impression of the sand blast is based upon the primitive methods of yesterday rather than the advanced state of the art today.

We illustrate, for instance, a Wadsworth Cabinet, made by the American Foundry Equipment Company of Cleveland, as a general type of humane apparatus now being built by several of the leading sand blast equipment manufacturers. The operator stands outside, breathing the clean air of the workshop, and only his gloved hands are inside the cabinet. He manipulates the hose or the

work while peering through an opening protected by glass or a fine mesh brass screen.

This is only one of a number of modern humane devices.

Wrong notions about sand blasting have also resulted from the use of soft, dirty sand.

This, too, is being corrected by the widespread use of FLINT SHOT, a collection of clean, hard, pearl-like nodules of pure flint, free from dust.

Whether you have, as yet, installed a sand-blasting service in your plant, or not, we will welcome correspondence.

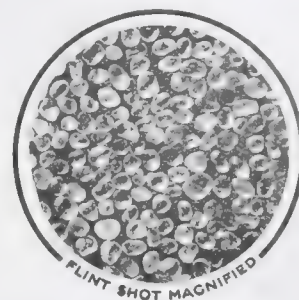


**UNITED STATES  
SILICA COMPANY**

*Sole Producers of Flint Shot*

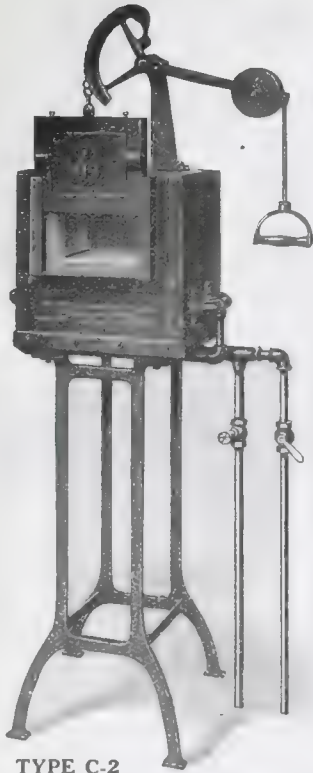
430 Peoples Gas Bldg.

Chicago, Ill.





# The Right Furnace for Every Purpose



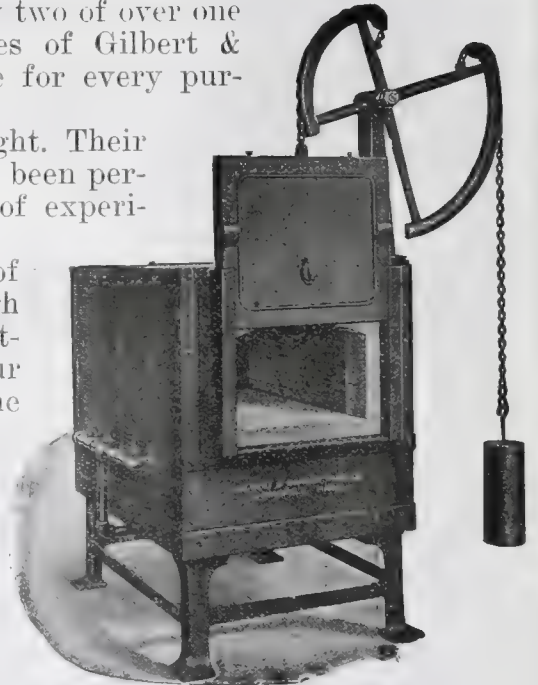
TYPE C-2

THE types shown are only two of over one hundred types and sizes of Gilbert & Barker Furnaces—a furnace for every purpose.

G. & B. Furnaces are built right. Their construction and design have been perfected by our half century of experience.

We offer you the benefit of this experience and thorough knowledge of modern heat-treating methods through our engineering department. The service is free. Put your problems up to us.

Just now we are making prompt delivery of these two types and many others. Send for Stock List 24.



TYPE C-15

**Gilbert & Barker Mfg. Co.** West Springfield, Mass.

Canadian Agents:

James DeVon, 227 Davenport Rd., Toronto, Ont.

Williams & Wilson, Montreal, Que.

## The Oven Equipment & Manufacturing Company NEW HAVEN, CONN.

### "CRAWFORD SECTIONAL" OVENS

Heated with our Enclosed Flame Gas Burners, or Electricity  
FOR BAKING JAPANS AND OTHER FINISHES ON METAL.

*Ovens carried in stock and built to meet requirements of manufacturers.*

*Builders of All-Steel Oven Trucks with Roller Bearings.*

Canadian Representatives: The A. R. WILLIAMS MACHINERY COMPANY, Ltd.

ST. JOHN, N.B. TORONTO WINNIPEG VANCOUVER

**SHEET  
METAL  
STAMPINGS**

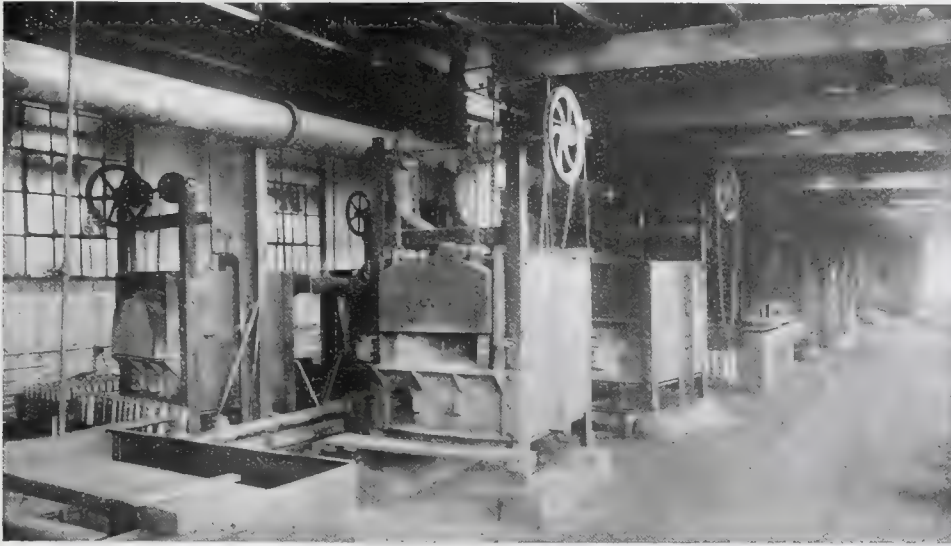
**Dominion Forge  
& Stamping Co., Limited**  
WALKERVILLE ONTARIO

**DROP  
FORGINGS**

Our facilities  
and equipment enable us to  
give you a top-notch quality at a very  
reasonable price.

**AUTOMOBILE FENDERS, HOODS AND GASOLINE TANKS**





**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

H&M Thermometers



## Tycos Thermometers

can be depended on  
**FOR ACCURACY**

They are scientifically designed and skilfully made for practical power plant requirements.

Extreme precision is guaranteed. Made in all styles in straight and angle patterns.

We also make Indicating, Controlling and Recording Thermometers, Pyrometers, Mercury Columns, etc.

Why not consult us on your temperature and pressure measurement problems? Write us to-day for Catalogs.

**Taylor Instrument Companies**

Rochester, N.Y.

201 Royal Bank Building, Toronto

There's a **Tycos** or **Taylor** Thermometer for Every Purpose.



## 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.

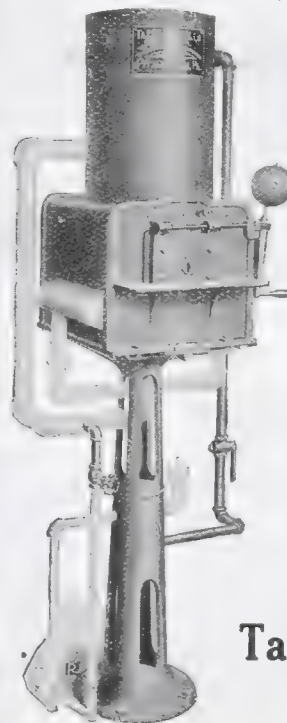
Aside from its demonstrated money-saving features (which we will explain upon request), the Tate-Jones Recuperative Gas Oven Furnace shown here, gives your workmen the opportunity of knowing what the furnace will deliver even before the heat is started.

### This Series A Furnace

is for heats of 900 to 1600° Fahr. For hardening carbon steel, reheating or preheating high-speed steels, annealing, etc. Uses artificial or natural gas. This is but one of the many styles of furnaces, large and small, made by the Tate-Jones Company of Pittsburgh.

For the plant requiring a small furnace that can be brought quickly to the proper heat, one that delivers a uniform product and saves time and money—this is the one to use.

Mention your line of work and we will send information to cover your particular requirements.



## Tate-Jones & Co., Inc.

Furnace Engineers  
 PITTSBURGH, PA.

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



# "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.



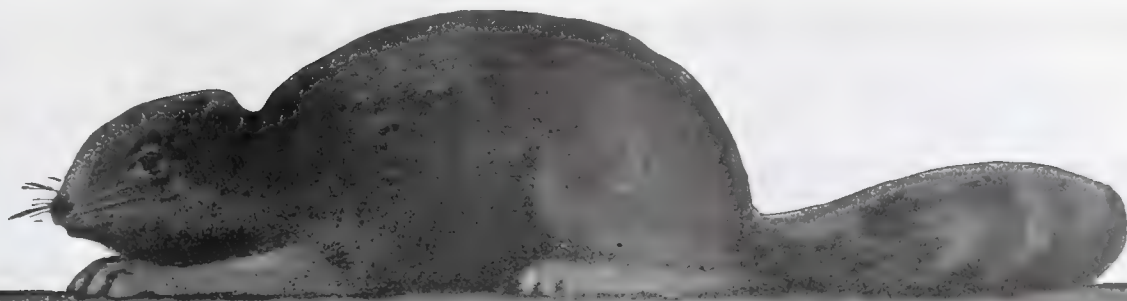
### Convenience Quality

Keystone tools bear the stamp of quality that makes them to be desired because they are made in the most convenient shapes and give the maximum in service and economy.

Our ratchets and adjustable wrench illustrated here are samples of our line. The Keystone brand are carried by the best houses. Inquire of your dealer.

**The Keystone Mfg. Co.**  
BUFFALO N.Y. U.S.A.

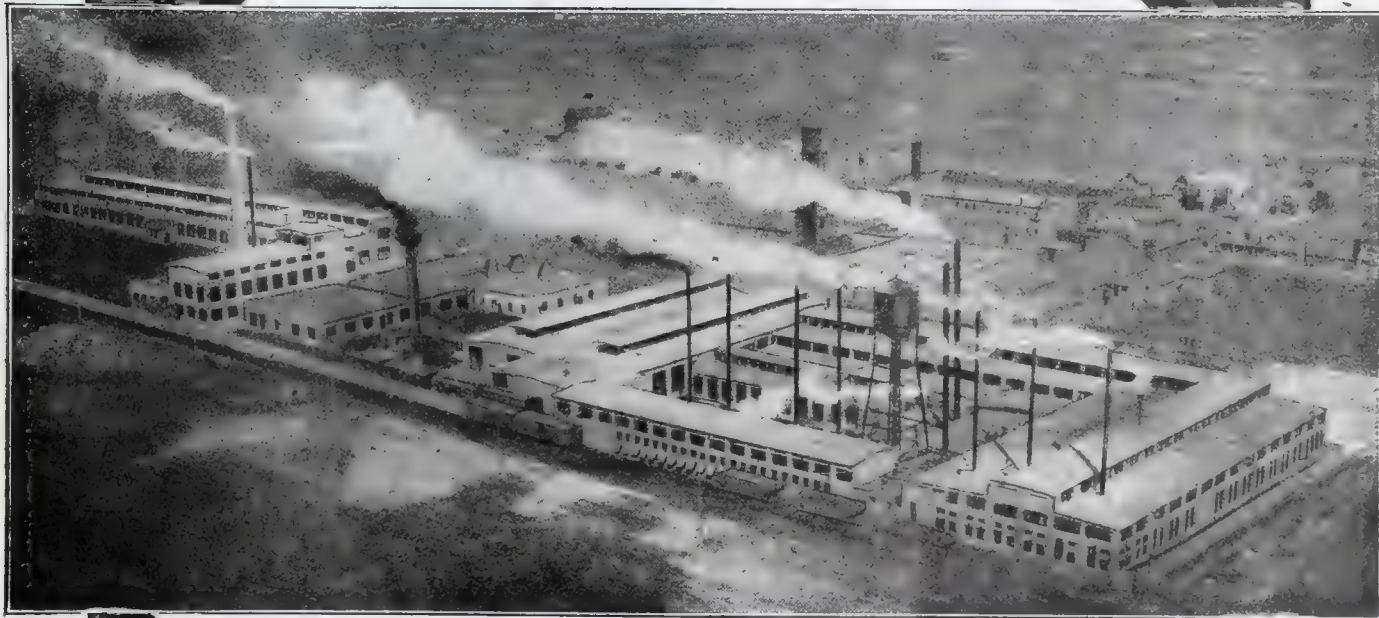




# BROWN'S

**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.*



# FORD TRIBLOC



## Making the World Safe for Workmen

Safety has always been one of the outstanding features of the Ford Tribloc Chain Hoist. Our contribution to the world's safety is a chain hoist with steel working parts, a **LOOP Hand Chain GUIDE** that prevents "gagging," and planetary type spur gearing that converts 80% of the applied power into lifting energy.

Details and 5-year guarantee explained in Catalog 3. Write for it to-day.

**FORD CHAIN BLOCK & MFG. CO.**  
139-141 OXFORD STREET, 2096-D PHILADELPHIA, PA.

# SMOOTH-ON

TRADE MARK-REG. U.S. PAT. OFF.

## Iron Cements

Positively stop all leaks of steam, water, fire or oil in iron or steel. Unequalled for smoothing over rough and defective castings.

Smooth-On Cements are easy to apply, harden quickly and make permanent repairs.

**Every Engineer should have a copy of our new illustrated instruction book. It is free.**

*Smooth-On Iron Cements are sold by supply houses.*

**Smooth-On Mfg. Co.**  
JERSEY CITY, N.J. U.S.A.

**Send for New No. 16 Illustrated Instruction Book**



## Convenience

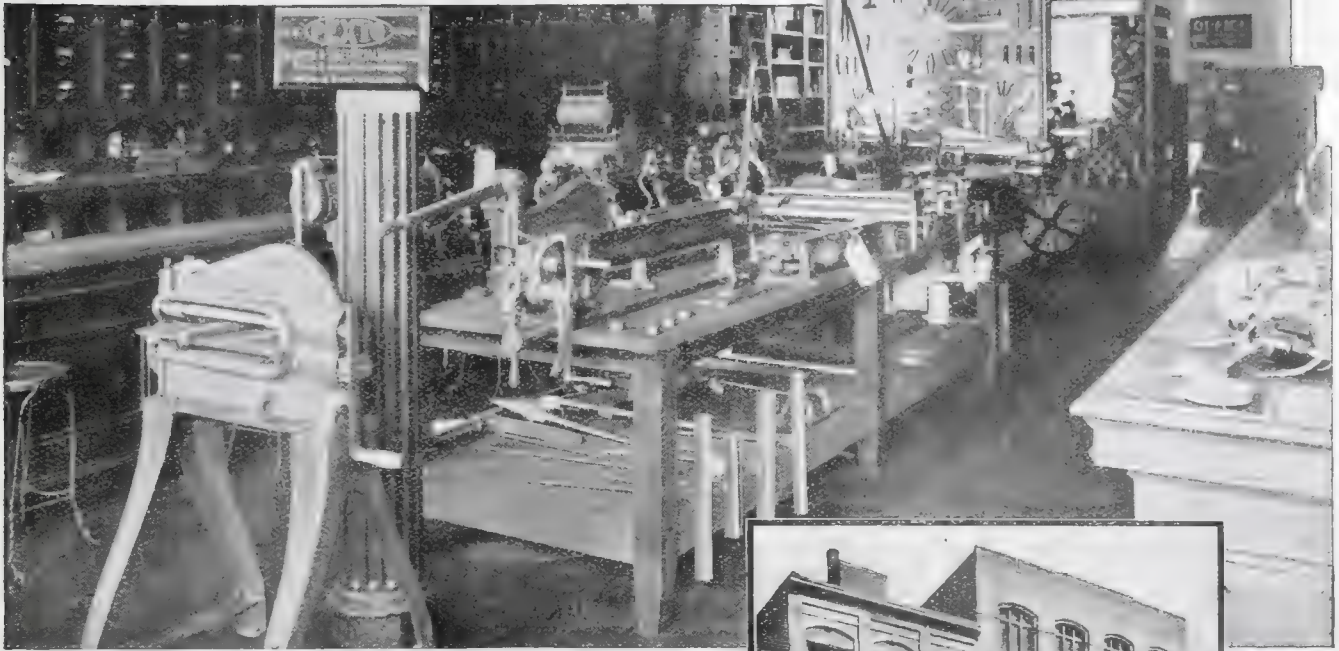
This wrench will conveniently get at that nut "just around the corner" or in other inconvenient places where a straight handled wrench would be awkward. Easily operated and handled by one hand. We can give you service and good prices.

**BEMIS & CALL**

Hardware & Tool Company  
Springfield Mass., U.S.A.



# PEXTO TRAVELS MONTREAL



The Home of Williams & Wilson, Limited,  
and the Pexto Display

**W**ILLIAMS & WILSON, LTD., of Montreal, hold Pexto Sheet Metal Workers' Machines and Tools in such high regard that the Pexto Display pictured above, is a permanent feature with them.

It is indeed significant when such a well established house expresses its approval of a product in this substantial way. There is no better evidence of Pexto Quality.

You'll find much of practical value in this display. Pexto Sheet Metal Machines and Tools embody many important improvements. They record the rapid advancement made in the Sheet Metal Trades during the past few years. They have more than kept pace.

The great need of trained mechanics in the Sheet Metal Industry gives added importance to Manual Training and Vocational Education. School Officials and School Shop Instructors will appreciate the practical assistance Williams & Wilson, Ltd., can give in the selection of proper school equipment.

Send for the Pexto Pocket Manual. It tells about the new ideas in sheet-metal working machines and contains other valuable information. Free.

## The Peck, Stow & Wilcox Company

MFRS. Mechanics' Hand Tools, Tinsmiths' and Sheet Metal Workers' Tools and Machines, Builders' and General Hardware

Southington, Conn.

Cleveland, Ohio

Address correspondence to 205 W. Center Street, Southington, Conn.



# PEXTO

**SHEET METAL WORKERS' MACHINES & TOOLS**

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





# FOR CROSS HEAD BEARINGS

Magnolia Metal Company,  
New York City.

Beloit, Wis.,  
Oct. 11, 1916.

Gentlemen:

I am using Magnolia Metal in all bearings that I re-babbitt. In one place in particular is crosshead bearings of Corliss engines. The original crosshead bearings were brass, running on steel pins, and when they were down I bored out the brasses, leaving a rib on the ends, drilled holes for anchoring and lined the brasses with Magnolia Metal with success.

You may use my letter if you so desire. I remain,

Yours very truly,

E. A. McKEE,  
953 Moore Street.

Engineer for P. B. Yates Machine Company.

### PRACTICAL ENGINEER POCKET BOOK:

Over 600 pages. A valuable reference work imported from England and sold as an advertising medium at the low price of 40c post paid.

Address Montreal Office.

SOLD BY LEADING DEALERS EVERYWHERE OR BY

## MAGNOLIA METAL CO.

OFFICE AND FACTORY:

225 St. Ambrose Street

Montreal



## BOLT, NUT, FORGING AND WIRE NAIL MACHINERY

"National" Bolt Cutters, "Wedge Grip" Bolt and Rivet Headers, Forging Machines, Nut Machines, Roll Threaders and Wire Nail Machines are used by leading Railroads and Industrials.



CANADIAN AGENT:  
H. W. PETRIE, Ltd.

TORONTO, ONT.  
MONTREAL, QUE.  
VANCOUVER, B. C.

## Measuring Tapes, Steel Rules, Straight Edges, Surveyors' Band Chains, Engineers' Tools

MANUFACTURED BY

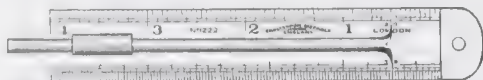
# JAMES CHESTERMAN & CO., Limited

SHEFFIELD, ENGLAND

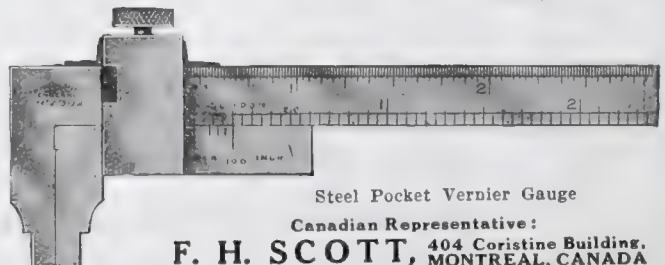
Chesterman tools are the highest standard of accuracy in the British Empire, and the quality of steel and substantial build guarantee a maximum of service and economy.



Wind-up Measures, Steel, Linen and Metallic. With Improved Patent Flush Handle.



Steel Depth Gauge

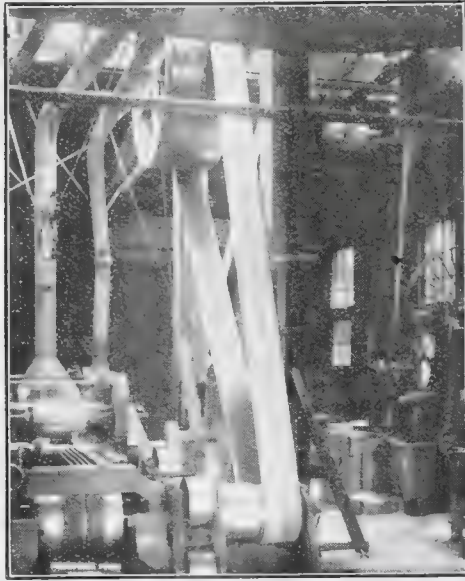


Steel Pocket Vernier Gauge

Canadian Representative:

F. H. SCOTT, 404 Coristine Building, MONTREAL, CANADA





## 50% Longer Life 50% Lower Cost

We have claimed that Extra Power Belting has special features of construction that make it last longer and so give lower cost. We have claimed that it gives this service on hard drives. We have claimed that it delivers more power.

Now Mickle, Dymont & Son join with many other users of Extra Power in backing up our

claims. They found that Extra Power lasted longer than belts that cost much more.

They found Extra Power service "beyond our expectations" on a very difficult drive. Read their letter:—

MICKLE, DYMENT & SON.

Gentlemen,—

In March, 1915, we purchased one of your 10 in. 6 ply extra power rubber belts for what we consider a very difficult drive.

We have much pleasure in informing you that same has stood up beyond our expectations, having lasted 50% or longer than the special leather belting which we previously used, besides being approximately 50% less in cost at that time.

Yours very truly,

MICKLE, DYMENT & SON,

(Signed) T. A. PATERSON, Manager.

Extra Power's goodness is the result of scientific building. It is the result of using high-grade materials—of forcing generous quantities of fine rubber through and through the fabric, welding it together—of sealing the seam with solid rubber—of using a friction surface.

These features give Extra Power long life—reduce stretching—prevent ply separation and seam opening—make the belt flexible on the pulleys—give it an

irresistible grip to combat slipping and lost power.

Engineers in every line of industry have found that Extra Power is better for most of their drives. They have found that it saves shut-downs and delays—increases production—helps make a pleasant record to show the chief executive.

It will cost you nothing to have a trained Goodyear belting man visit you and advise with you on belting problems. Write or telephone our nearest branch.

### The Goodyear Tire & Rubber Company Of Canada, Limited

BRANCHES:

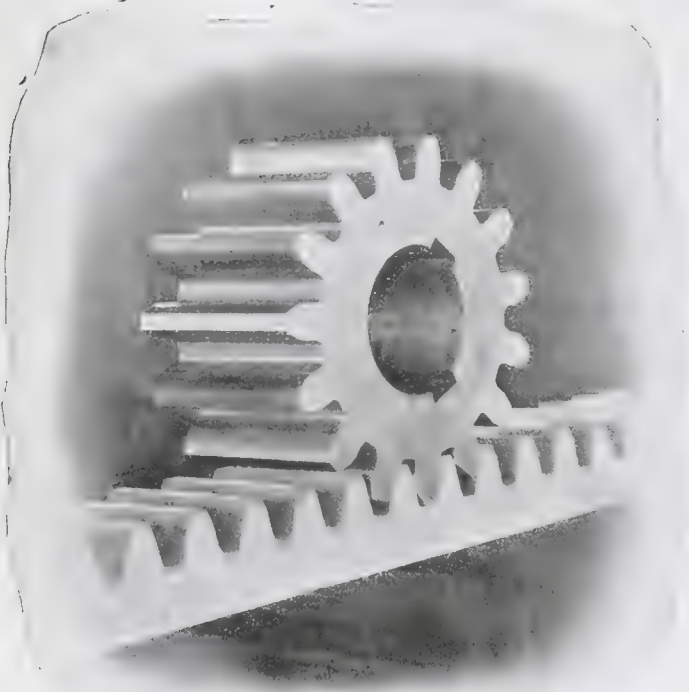
St. John, Montreal, Ottawa, Toronto, Hamilton, London, Winnipeg, Regina,  
Edmonton, Vancouver. Service Stocks in Smaller Cities.

# EXTRA POWER BELTING



# CUT GEARS

CUT GEARS



## Note Our Shop Capacities

- Spur Gears up to 91 ins. diam.
- Bevel Gears " " 62 ins. "
- Worm Gears " " 108 ins. "
- Helical or Herringbone " " 54 ins. "
- Rack " " 16 ft. length

*Write us for quotations.*

**Hamilton Gear & Machine Co.**  
 Van Horne Street - TORONTO

## The Only Grand Prize for TOOL HOLDERS

Awarded separately and independent of other lines exhibited at the  
**PANAMA-PACIFIC EXPOSITION**  
 WAS WON BY

# ARMSTRONG TOOL HOLDERS

HIGHEST AWARD

at 4 World's Expositions

- Paris - - - 1900
- St. Louis - 1905
- Liege - - - 1904
- San Francisco 1915

THEY ALWAYS MAKE GOOD



They Are Saving Millions of Dollars in High Speed Steel

CATALOG FREE



**Armstrong Bros. Tool Co.**

"The Tool Holder People"

306 N. Francisco Ave., CHICAGO, U.S.A.

The Panama-Pacific MEDAL OF HONOR was also won by ARMSTRONG Drop Forged Wrenches, Ratchets, Clamps, Lathe Dogs, Etc.

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

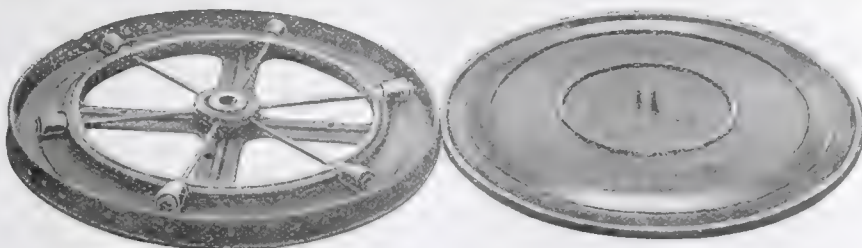
# Whiting Turntables and Trucks

## TURNTABLES

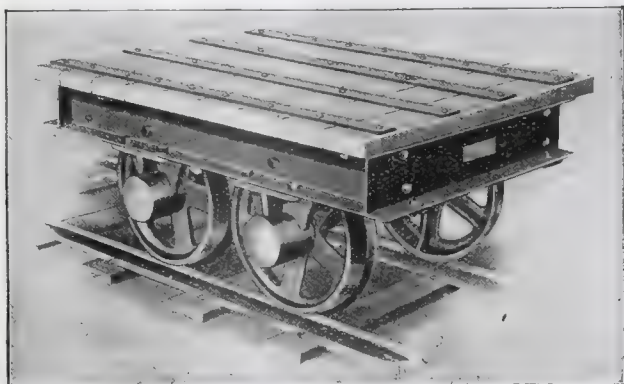
**RIGID**, self-contained construction. No tipping, no getting out of line, no journal friction.

Load is carried on conical chilled rollers, running on machined path, giving long life and smooth, easy operation.

Tops furnished plain or with raised or grooved tracks. Smaller sizes with plain tops kept in stock, also frogs.



TURNTABLE, Showing Cover Removed



668—Standard Steel Truck

## Trucks and Cars

Built for severe service in the foundry, shop or yard.

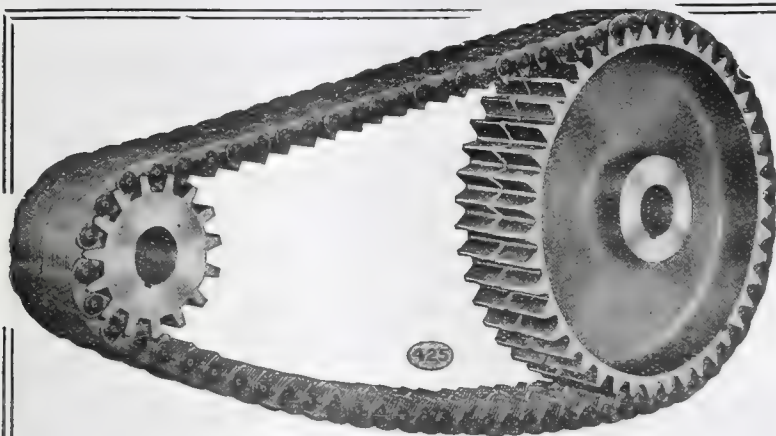
Heavy steel frames and castings of ample section give long life. Our design of roller bearings results in a very light-running truck.

*Send for Catalog 124*



Complete  
Foundry  
Equipments

Cranes  
of all  
Types



# RENOLD CHAINS

*The proven efficient form of Power Transmission.*

PATENT SILENT

Equally suitable for main shaft or machine drives. Save space and power, increase output and ensure durability.

Chain and Parts Carried in Stock.

*Sole Canadian Agents*

## Jones & Glassco. (Reg'd)

Branch Office: ENGINEERS St. Nicholas Bldg.  
TORONTO, ONT. MONTREAL, P.Q.

# Scandinavia Belts



Can be used anywhere that leather can be used.

Scandinavia Belting is a solid woven cotton belt, made of long fibre cotton. It is impregnated to give further solidity, and the impregnation also acts as a moisture resistant. For direct drives where atmospheric conditions remain approximately the same, this belt is probably the best on the market to-day.

It stands up well on shifters.

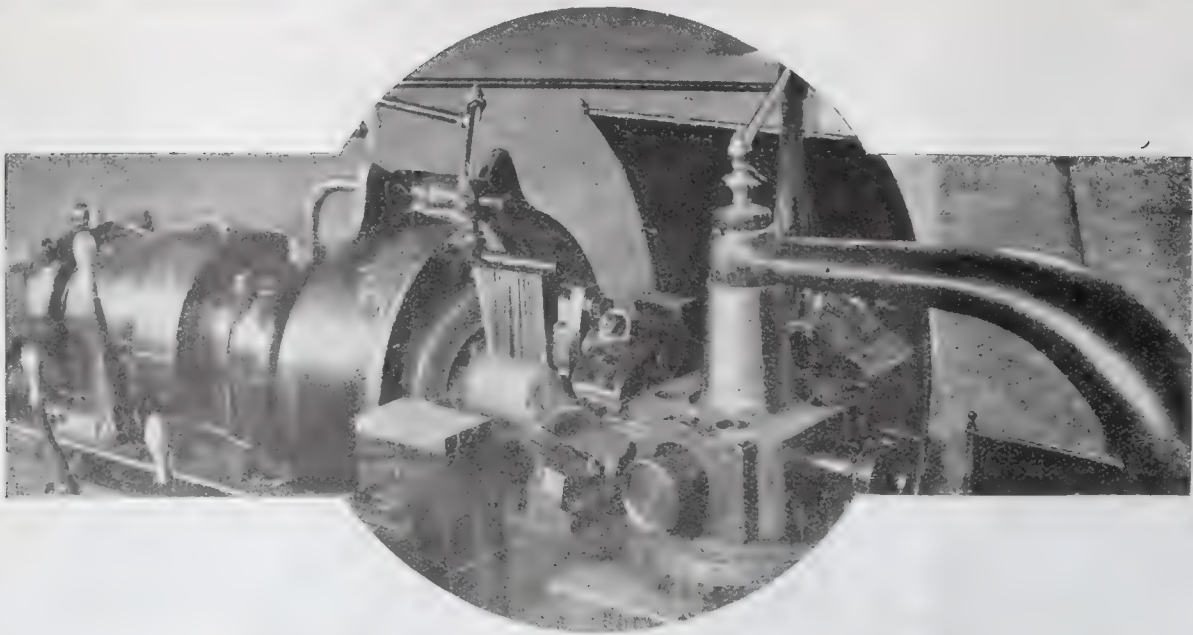
**W. P. BENNETT**  
51 Montfort Street, Montreal, P.Q.

Beltings

Packings

Asbestos





## MYSTIC CUTTING COMPOUND

A free-flowing, unsaponified animal oil lubricant. Does not separate in solution, grow rancid or cause rust. It is non-combustible and will not harm operator's hands.

Mystic Cutting Compound increases production and keeps tools in best of condition. Your machines need it. Your operators like it. Test it at our expense.

Cataract Refining Co., Limited, Toronto, Ont.



Did you ever notice somebody starting a conversation in a low voice with the two words "They say"? The moment you hear it you know it is gossip, scandal, and most likely a lie. But when you hear everyone saying that HARRIS HEAVY PRESSURE is the best BABBITT METAL they can use for all general machinery bearings, isn't it about time to believe them?

*Send to our nearest factory for a trial box.*

*Manufactured and guaranteed by*

**The Canada Metal Company, Limited**

Hamilton    Montreal    TORONTO    Winnipeg    Vancouver



**Electric Travelling Cranes**

(Direct or Alternating Current)

**Steam and Electric Derricks**

(Stationary or Travelling)

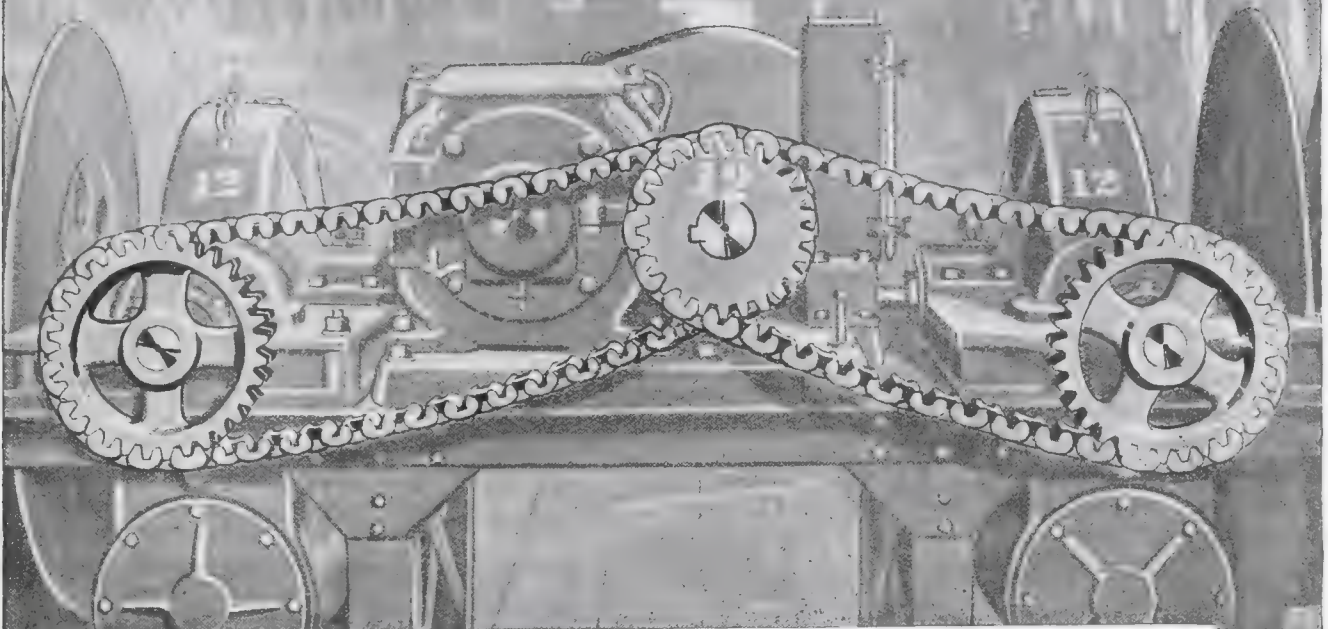
Up-to-date design. Built for fast, continuous service.

ACCESSIBILITY—DURABILITY.

**Dominion Bridge Company, Limited**

MONTREAL

# MORSE SILENT CHAINS OPERATE PANAMA CANAL EMERGENCY GATES



## FURTHER EVIDENCE OF Morse Dependability

**T**HE UNITED STATES GOVERNMENT, before selecting the form of POWER TRANSMISSION which should operate the Emergency Gates of the Panama Canal Locks, made a comparative investigation of all the large manufacturers of Silent Chains, putting their products through searching tests of STRENGTH and ADAPTABILITY.

MORSE SILENT CHAINS showed a much higher tensile strength than any other make, and were selected as the chains which could be depended upon in emergencies. Accordingly, the Otis Elevator Co., which installed the 36 Control Units was instructed to operate them through MORSE SILENT CHAINS. One of the units is pictured above.

Write us for still further evidence of the Government's confidence in "MORSE." Government tests are worth investigating.

**MORSE CHAIN CO., - Ithaca, New York**

*Largest manufacturers of silent chains in the world.*



*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 Sorauen Ave., TORONTO, Canada

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

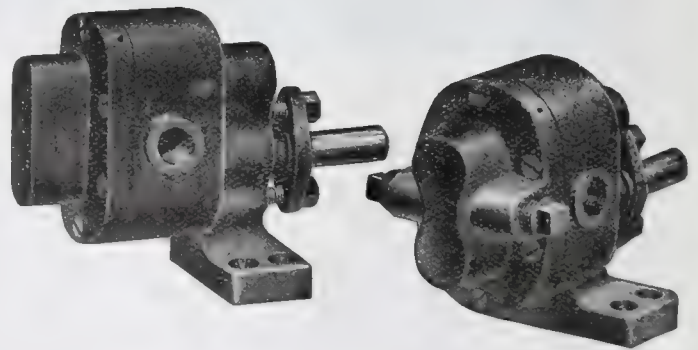


IN the midst of your busy day, with a thousand details crowding in on you from all sides, there are few things more unpleasant, as well as time-consuming, than to have your main drive belt break.

With a "Clipper" Belt Lacer this annoying situation can be overcome in three minutes.

A thirty days' trial would convince you.

**Clipper Belt Lacer Company**  
976 Front Avenue      Grand Rapids, Mich.

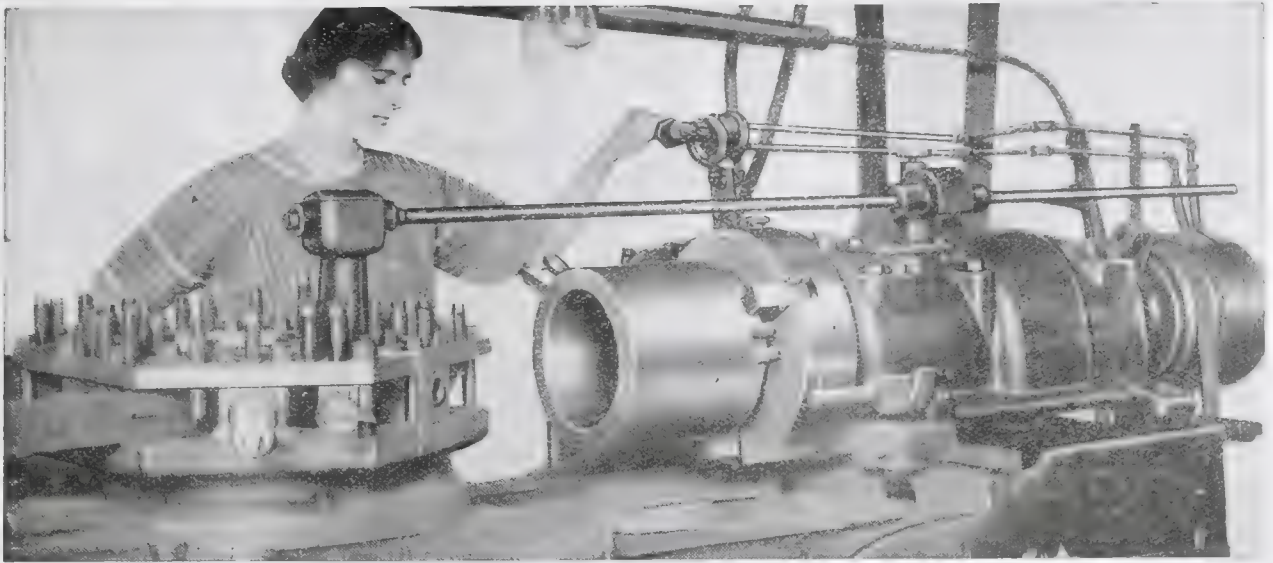


## Circulating Pumps

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.



## Hannifin Air Chucks

The fact that the Hannifin Air Chuck will answer instantly to the touch of a woman operator, that it can be operated just as easily by female labor, is a convincing argument to the simplicity of this chuck.

Operating under a 75-lb. pressure, a grip on the material is obtained that is vise-like in its rigidity, yet the simple turn of a lever will release it immediately. We have made the statement that an actual increase of 20% to 100% is made by the use of this chuck. We wish to prove it to you. Get in touch with us.

## Hannifin Manufacturing Co.

Chicago,

Illinois,

U.S.A.

REPRESENTATIVES:—R. E. Ellis Engineering Co., Chicago; Coats Machine Tool Co., New York City; A. R. Williams Machinery Co., Toronto; Williams & Wilson, Montreal; The Canadian Fairbanks-Morse Co., Montreal. EUROPEAN REPRESENTATIVES:—Coats Machine Tool Co., Ltd., London; Fenwick Freres & Co., Paris; Iznoskoff & Co., Petrograd, Russia.



# Jacobs

IMPROVED

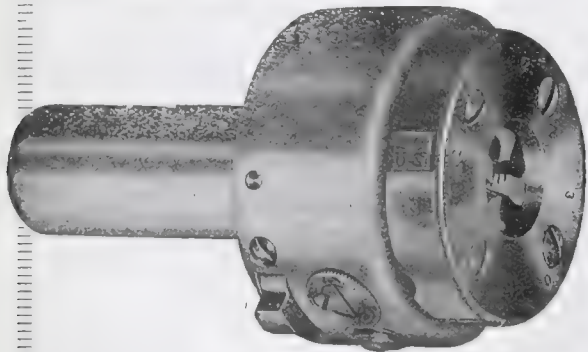
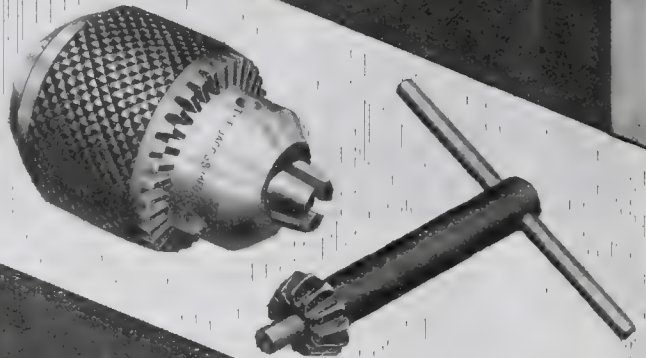
## Drill Chuck

**A  
Winner  
By Sheer Merit**

Jacobs Improved Drill Chucks are recognized as the **STANDARD** the world over. Once tried—always used.

Try them and see for yourself.

MADE BY  
**The Jacobs  
Manufacturing Co.**  
Hartford, Conn., U.S.A.



## 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.

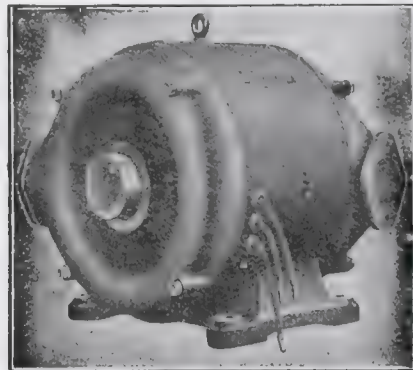
**H & G**

## The Lancashire Dynamo & Motor Company, of Canada, Limited

107-109 Duke Street, TORONTO

ELECTRICAL MACHINERY for all Purposes.

ELLIOTT BROS. { INSTRUMENTS  
RECORDING GAUGES



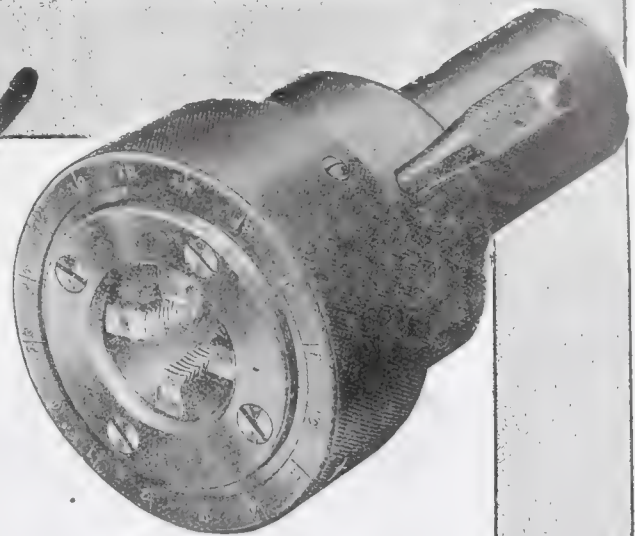
PIPE VENTILATED A.C. MOTOR  
FOR VERY DIRTY PLACES

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

# Murchey

**C**OLLAPSING Taps are superior to other types of taps for many reasons. A study of their construction will show that individual chasers may be adjusted (this allows you to compensate for any wear). When the chasers are finally worn out a new set may be inserted. The adjusting features maintain absolute and original accuracy of the chasers. (What happens a solid tap after first sharpening?) When in operation all parts are rigid and have the stability of a solid tap, yet with ease and convenience the adjustments may be effected.

These are a few of the facts that have put the Murchey Taps in their place as leaders in efficiency and service. We maintain a special chaser service for our clients. An investigation will reveal how great savings may be effected.



## Murchey Machine & Tool Co.

75 Porter St.

Detroit, Mich.

The Coats Machine Tool Co., Ltd., Caxton House, Westminster, London, S.W., England. Fenwick Freres & Co., 15 Rue Fenelon, Paris, France.

## Think of it—

# A 20 to 90% Increase in Production

**T**HE M. E. C. Three-Jaw Air-operated Chuck shown herewith eliminates the waste usually experienced in ordinary chucking processes. It takes all classes of work of the hand-operated chuck, but grips much better and gives top-notch service day in and day out. Only the best materials obtainable go into its manufacture. It is made entirely of steel, including the body. A special process steel is used in making the actuating levers and all parts subjected to strain. The M.E.C. Three-jaw Chuck will do good work long after others have been discarded. Take it on thirty days' free trial.

*Write for catalog on all M.E.C. Labor-Saving Devices.*

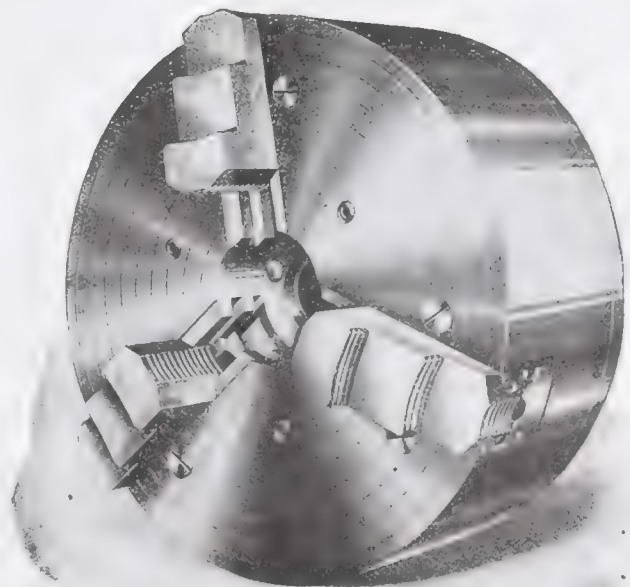
## Manufacturers Equipment Co.

171 North Jefferson Street, Chicago, Ill.

Also makers of M. E. C. Two and Three-Jaw Air-Operated Chucks, Expanding Mandrels and Collapsible Taps

CANADIAN AGENTS:

J. R. Stone Tool & Supply Co., Goebel Bldg., Detroit, Mich.



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



# Oppenheim

## John Bayne MacLean

COL. MACLEAN contributes another chapter on the war situation as he knows it, in his forceful, smashing style. These articles by Colonel MacLean are truly startling by reason of their revelations.

## Germany's Secret Work in Canada

GERMANY is plotting in Canada and the United States right now. If you are curious to know just what she is doing, learn from Miss Agnes C. Laut's article in the October MACLEAN'S, "The Plot Behind the Pacifists."

THE biggest single feature ever secured by MACLEAN'S MAGAZINE is a serial story by E. Phillips Oppenheim, British author and a great writer of romantic stories.

The serial beginning in MACLEAN'S for October is "The Pawn's Count," a story of the present war, dealing with the work of the secret service agents of the various belligerent countries. You can depend on its being a strong, thrilling story, told by a master of his craft.

## BELAND Prisoner of War

THE HON. LOUIS BELAND, a prisoner in Belgium since the beginning of the war, gives the story of his captivity, chiefly in the form of letters to Sir Wilfrid Laurier, in whose last cabinet he held a portfolio.

The story is intimate, vivid, gripping, wholly unusual, and appears in the October MACLEAN'S.

## Beating the Customs

AN article full of actual occurrences of how the public attempts to "beat" the Customs, and of how the Customs authorities beat the public. This absorbingly interesting narrative is by J. D. Ronald who, as a Customs officer, came into close touch with offenders and offences. A semi-detective article, this true story makes great reading.

## Stringer, Fraser, Leacock and Hendryx

THE work of these masters of the short and long story appears in the October MACLEAN'S. Stringer's story is "The Redeemer of Waste Lands"; W. A. Fraser writes a love story, "For Catherine's Sake"; Leacock has a humorous sketch; and Hendryx continues his captivating story of the Canadian Northwest, "The Gun Brand."

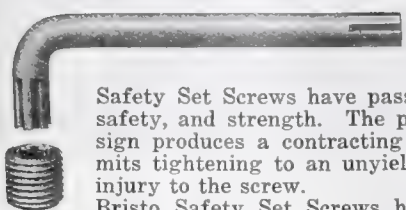
# MacLean's Magazine

## For OCTOBER

At All News-dealers 15 cents

# HINTS TO BUYERS

**BUILDERS OF MACHINERY  
WHAT SET SCREWS DO YOU USE?**



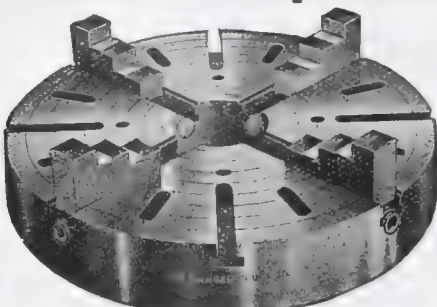
TRADE MARK  
**BRISTO**  
REG. U.S. PAT. OFF.

Safety Set Screws have passed every test for safety, and strength. The patented fluted design produces a contracting effect which permits tightening to an unyielding grip without injury to the screw.

Bristo Safety Set Screws have been adopted as the standard by many prominent machine builders. Ask for free samples and Bulletin I-809.

**THE BRISTOL CO., Waterbury, Conn.**  
U. S. A.

**Skinner Independent Chucks**  
FOR HIGH SPEED WORK  
IRON OR STEEL BODY



The last word in chuck construction. Wide jaws; hardened steel thrust bearings; adjusting screws of large diameter, threaded full length; jaws ground after hardening, etc.

Write us to-day for prices.

**THE SKINNER CHUCK COMPANY,** New Britain, Conn.  
New York Office: Factory and Main Office:  
94 Reade St., N.Y. New Britain, Conn.  
London Office: 149 Queen Victoria Street  
San Francisco Office: Rialto Building.

**Eliminate All Guesswork**

Make sure you are getting the quality and standard you are paying for. Our International Bureau of Inspection, Tests and Consultations is at your disposal.

**CANADIAN INSPECTION AND TESTING LABORATORIES, LIMITED**

Head Office and Main Laboratories—MONTREAL

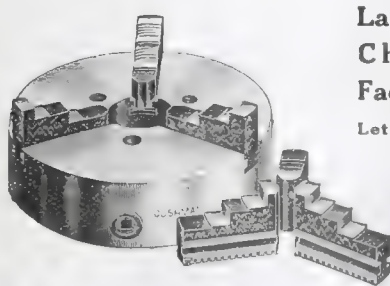
Branch Offices and Laboratories:  
TORONTO, WINNIPEG, EDMONTON, VANCOUVER, NEW GLASGOW

**STEEL CASTINGS**

We are well equipped to make all kinds of steel castings, 100 lbs. to 50,000 lbs.

**Dominion Steel Foundry Co.**  
Hamilton LIMITED Ontario

**Cushman Chucks**

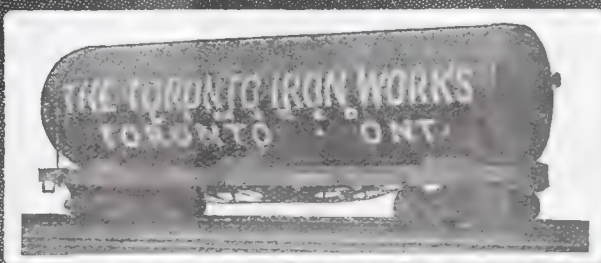


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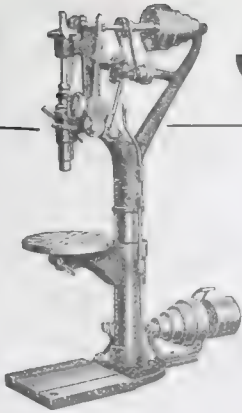
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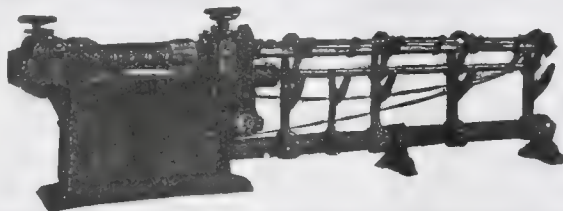
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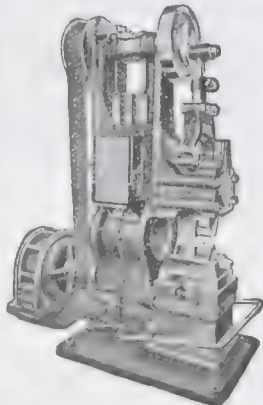
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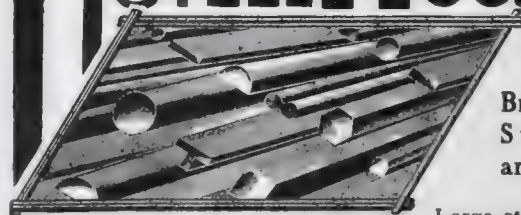
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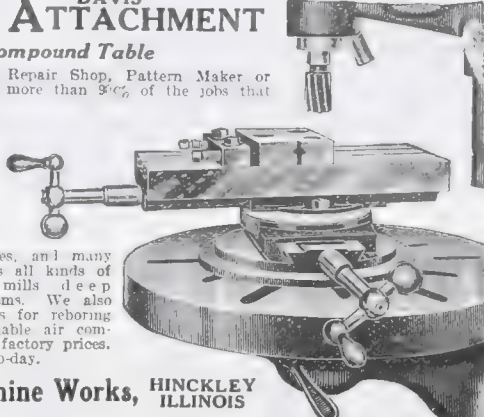
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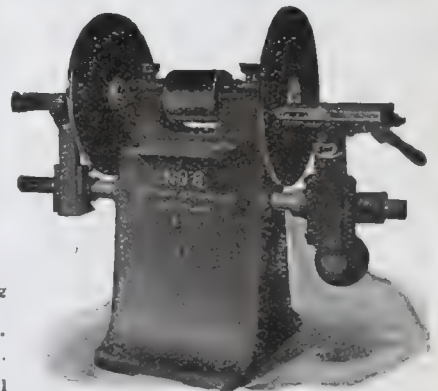
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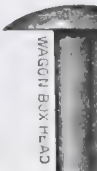
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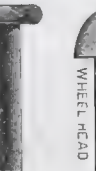
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**CENTERING MACHINES**

Victoria Foundry Co., Ottawa, Ont.

**CENTRE REAMERS**

John Bertram & Sons Co., Dundas.  
Gardner, Robt., & Son, Montreal.  
Hurlbut, Rogers Mach. Co., South Sudbury, Mass.  
Niles-Bement-Pond Co., New York.  
Pratt & Whitney Co., Dundas, Ont.  
Wells Bros. Co. of Canada, Galt, Ont.

**CHAIN BLOCKS**

Aikenhead Hardware Co., Toronto, Ont.  
Canadian Fairbanks-Morse Co., Ltd., Montreal.  
Ford Chain Block & Mfg. Co., Philadelphia, Pa.  
Foss & Hill Machy. Co., Montreal.  
Garlock-Walker Machy. Co., Toronto, Ont.  
Petrie, Ltd., H. W., Toronto, Ont.  
Wright Mfg. Co., Lisbon, Ohio.

**CHEMISTS**

Can. Inspection & Testing Lab., Montreal, Que.  
The Jencks Mach. Co., Ltd., Sherbrooke, Que.  
Toronto Testing Laboratory, Ltd., Toronto.

**CHESTS, TOOL**

Union Tool Chest Works, Rochester, N.Y.

**CHUCKS, AERO, AUTOMATIC**

Garvin Machine Co., New York.  
Hannifin Mfg. Co., Chicago, Ill.

**CHUCKS, AIR**

Hannifin Mfg. Co., Chicago, Ill.  
Manufacturers Equipment 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.  
Canadian Fairbanks-Morse Co., Ltd., Montreal.  
Cushman Chuck Co., Hartford, Conn.  
Foss & Hill Machy. Co., Montreal.  
Gardner, Robt., & Son, Montreal.  
Garlock-Walker Machinery Co., Toronto, Ont.  
Hannifin Mfg. Co., Chicago, Ill.  
Hardinge Bros., Chicago, Ill.  
Jacobs Mfg. Co., Hartford, Conn.  
Ker & Goodwin, Bradford.

**Manufacturers Equipment Co., Chicago, Ill.**

Modern Tool Co., Erie, Pa.  
Morse Twist Drill & Mch. Co., New Bedford, Mass.  
Richmond Mfg. Co., Toronto, Ont.  
Petrie, Ltd., H. W., Toronto, Ont.  
Skinner Chuck Co., New Britain, Conn.  
D. E. Whiton Machine Co., New London, Conn.

**CHUCKS, DRILL, AUTOMATIC AND KEYLESS**

Aikenhead Hardware Co., Toronto, Ont.  
Can. Blower & Forge Co., Kitchener, Canada.  
Whitney Mfg. Co., Hartford, Conn.  
Richmond Mfg. Co., Toronto, Ont.

**CHUCKS, FRICTION AND TAP**

Victor Tool Co., Waynesboro, Pa.  
Wells Bros. Co. of Canada, Galt, Ont.

**CHUCKS, GEARED SCROLL**

Richmond Mfg. Co., Toronto, Ont.

**CHUCKS, MAGNETIC**

H. E. Streeter, 523 New Birks Bldg., Montreal.

**CHUCKS, RING WHEEL**

Ford-Smith Mach. Co., Hamilton, Ont.  
Gardner Machine Co., Beloit, Wis.

**CHUCKS, SPLIT**

Rivett Lathe & Grinder Co., Brighton, Mass.

**CHUCKING MACHINES**

Garvin Machine Co., New York.  
New Britain Machine Co., New Britain, Conn.  
Niles-Bement-Pond Co., New York.  
Roelofson Machine & Tool Co., Toronto, Ont.  
Warner & Swasey Co., Cleveland, O.

**CLOCKS, WATCHMAN, PORTABLE**

Hardinge Bros., Inc., Chicago, Ill.

**CLUTCHES, FRICTION AND PULLEY**

Bernard Industrial Co., A., Fortierville, Que.  
Johnson Machine Co., Carlyle, Manchester, Conn.  
Positive Clutch & Pulley Works, Ltd., Toronto.

**COAL HANDLING MACHINERY**

MacKinnon, Holmes & Co., Sherbrooke, Que.  
Northern Crane Works, Ltd., Walkerville, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.

**COILING MACHINERY, WIRE AND SPRING**

Sleeper & Hartley, Inc., Worcester, Mass.

**COKE AND COAL**

Hanna & Co., M. A., Cleveland, O.  
Zenith Steel & Coal Products, Montreal, Que.

**COLLARS**

Can. Bond Hanger & Cplg. Co., Alexandria, Ont.

**COLLECTORS, PNEUMATIC**

Can. Blower & Forge Co., Kitchener, Ont.  
Sheldons, Limited, Galt, Ont.  
Sturtevant Co., E. F., Galt, Ont.

**COLLETS**

Becker Milling Machine Co., Boston, Mass.  
Hannifin Mfg. Co., Chicago, Ill.  
Hardinge Bros., Inc., Chicago, Ill.  
Manufacturers' Equipment Co., Chicago, Ill.  
Rivett Lathe & Grinder Co., Boston, Mass.

**COMPRESSORS, AIR**

Can. Ingersoll-Rand Co., Sherbrooke, Que.  
Cleveland Pneumatic Tool Co. of Canada, Toronto  
Curtis Pneumatic Machy. Co., St. Louis, Mo.  
Garlock-Walker Machinery Co., Toronto, Ont.  
Hinckley Machine Co., Hinckley, Ill.  
The Jencks Mach. Co., Ltd., Sherbrooke, Que.  
Petrie, Ltd., H. W., Toronto, Ont.  
Riverside Machinery Depot, Detroit, Mich.  
Smart-Turner Machine Co., Hamilton, Ont.  
Taylor Instrument Co., Rochester, N.Y.

**CONTROLLERS AND STARTERS, ELECTRIC MOTORS**

Petrie, Ltd., H. W., Toronto, Ont.  
A. R. Williams Machy. Co., Toronto.

**CONTROLLING INSTRUMENTS**

Taylor Instrument Co., Rochester, N.Y.

**CONVERTERS, STEEL SLIDE-BLOW**

Whiting Foundry Equipment Co., Harvey, Ill.

**COPING MACHINES**

Can. Blower & Forge Co., Kitchener, Ont.  
John Bertram & Sons Co., Dundas.  
Niles-Bement-Pond Co., New York.

**COUNTERBORES AND COUNTERSINKS**

Aikenhead Hardware Co., Toronto, Ont.  
Clark Equipment Co., Buchanan, Mich.  
Cleveland Twist Drill Co., Cleveland.  
Morse Twist Drill & Mch. Co., New Bedford, Mass.  
Pratt & Whitney Co., Dundas, Ont.

**COUNTERSHAFTS**

Baird Machine Co., Bridgeport, Conn.  
Foster Machine Co., Elkhart, Ind.  
Stow Mfg. Co., Binghamton, N.Y.

**COUPLINGS, FRICTION**

Bernard Industrial Co., The A., Fortierville, Que.

**COUPLINGS, PLAIN AND FLEXIBLE**

Can. Bond Hanger & Cplg. Co., Alexandria, Ont.  
Cleveland Pneumatic Tool Co. of Canada, Toronto.  
Gardner, Robt., & Son, Montreal.  
Independent Pneumatic Tool Co., Chicago, Ill.

**CRANES, LOCOMOTIVE**

Northern Crane Works, Walkerville.

**CRANES, GENTRY**

Northern Crane Works, Walkerville.  
Smart-Turner Machine Co., Hamilton, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.

**CRANES, GOLIATH AND PNEUMATIC**

Northern Crane Works, Walkerville.  
Whiting Foundry Equipment Co., Harvey, Ill.

**CRANES, TRAVELLING, ELECTRIC AND HAND POWER**

Curtis Pneumatic Machy. Co., St. Louis, Mo.  
Dominion Bridge Co., Montreal.  
Hepburn, John T., Ltd., Toronto, Ont.  
Niles-Bement-Pond Co., New York.  
Northern Crane Works, Walkerville.

**CRANES, PORTABLE**

Aikenhead Hardware Co., Toronto, Ont.  
Northern Crane Works, Walkerville.  
Whiting Foundry Equipment Co., Harvey, Ill.

**CRIMPS, LEATHER**

Graton & Knight Mfg. Co., Worcester, Mass.

**CUPOLAS**

Can. Blower & Forge Co., Kitchener, Ont.  
Northern Crane Works, Walkerville.  
Petrie, Ltd., H. W., Toronto, Ont.  
Sheldons, Ltd., Galt, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.

**CUPOLA BLAST GAUGES & BLOWERS**

Sheldons, Ltd., Galt, Ont.

**CUTTER GRINDERS AND ATTACHMENTS**

Cincinnati Milling Machine Co., Cincinnati.  
Garlock-Walker Machinery Co., Toronto, Ont.  
Garvin Machine Co., New York.  
Monarch Brass Mfg. Co., Toronto, Ont.  
Norton Grinding Co., Worcester, Mass.  
Pratt & Whitney Co., Dundas, 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.  
Cleveland Milling Mach. Co., Cleveland, Ohio.  
Cleveland Twist Drill Co., Cleveland.  
Foss & Hill Machinery Co., Montreal.  
Garvin Machine Co., New York.  
Illinois Tool Works, Chicago, Ill.  
Morse Twist Drill & Mch. Co., New Bedford, Mass.  
Osborn (Canada), Ltd., Sam'l, Montreal, Que.  
Petrie, Ltd., H. W., Toronto, Ont.  
Pratt & Whitney Co., Dundas, Ont.  
Tabor Mfg. Co., Philadelphia, Pa.  
Whitney Mfg. Co., Hartford, Conn.

**CUTTING COMPOUND AND CUTTING OIL**

Cataract Refining & Mfg. Co., Toronto.  
Elma Cutting Oil Co., Toronto.  
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**CUTTING-OFF MACHINES**

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John Bertram & Sons Co., Dundas.  
Canadian Fairbanks-Morse Co., Ltd., Montreal.  
Curtis & Curtis Co., Bridgeport, Conn.  
Foss & Hill Machinery Co., Montreal.  
Galt & Walker Machinery Co., Toronto, Ont.  
Garlock-Walker Machinery Co., Toronto, Ont.  
Garvin Machine Co., New York.  
Hurlbut, Rogers Machy. Co., South Sudbury, Mass.  
John H. Hall & Sons, Brantford, Ont.  
Wm. Kennedy & Sons, Owen Sound, Ont.  
Niles-Bement-Pond Co., New York, N.Y.  
Peerless Machine Co., Racine, Wis.  
Petrie, Ltd., H. W., Toronto, Ont.  
Prest-O-Lite Co., Inc., Toronto, Ont.  
Racine Tool & Machine Co., Racine, Wis.  
Standard Mch. & Supplies, Ltd., Montreal, Que.  
Tabor Mfg. Co., Philadelphia, Pa.

**CYLINDERS, AIR**

Manufacturers Equipment Co., Chicago, Ill.

**CYLINDERS, AUTOMATIC REBORING JIGS AND REAMERS**

Hinckley Machine Co., Hinckley, Ill.

**CUTTING AND WELDING PLANTS**

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**DERRICKS**

Aikenhead Hardware-Co., Toronto, Ont.  
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Winnipeg Gear & Engr. Co., Winnipeg, Man.

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Geo. A. Joyce Co., Ltd., New York.

**DIAMOND TOOLS**

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Geo. A. Joyce Co., Ltd., New York.  
Wheel Trueing Tool Co., Windsor, Ont.

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Mathews, Jas. H., & Co., Pittsburgh, Pa.

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Butterfield & Co., Rock Island, Que.  
Brown, Boggs Co., Hamilton, Ont.  
Canadian Fairbanks-Morse Co., Montreal.  
Foss & Hill Machy. Co., Montreal.  
Gardner, Robt., & Son, Montreal.  
A. B. Jardine & Co., Hespeler, Ont.  
Landis Machine Co., Waynesboro, Pa.  
Modern Tool Co., Erie, Pa.  
Morse Twist Drill & Mch. Co., New Bedford, Mass.  
Petrie, Ltd., H. W., Toronto, Ont.  
Pratt & Whitney Co., Dundas, Ont.  
Rickert-Shafer Co., Erie, Pa.  
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Garvin Machine Co., New York.  
Pratt & Whitney Co., Dundas, Ont.

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Wells Brothers Co. of Canada, Galt, Ont.

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Pratt & Whitney Co., Dundas, Ont.  
Sheldons, Ltd., Galt, Ont.  
Sturtevant Co., B. F., Galt, Ont.

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Ford-Smith Mach. Co., Hamilton, Ont.

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W. F. & John Barnes Co., Rockford.  
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Canada Machinery Corp., Galt, Ont.  
Foss & Hill Machy. Co., Montreal.  
Garlock-Walker Machinery Co., Toronto, Ont.  
Garvin Machine Co., New York.  
Niles-Bement-Pond Co., New York.  
Petrie, Ltd., H. W., Toronto, Ont.  
Riverside Machinery Depot, 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.

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Martin Machine Co., Greenfield, Mass.

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Bilton Mach. Tool Co., Bridgeport, Conn.  
Canada Machinery Corp., Galt, Ont.  
Silver Mfg. Co., Salem, Ohio.

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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.  
Garvin Machine Co., New York.  
A. B. Jardine & Co., Hespeler, Ont.  
National-Acme Co., Cleveland, Ohio.  
Niles-Bement-Pond Co., New York.  
Petrie, Ltd., H. W., Toronto, Ont.  
Rockford Drilling Mach. Co., Rockford, Ill.

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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.  
Petrie, Ltd., H. W., Toronto, 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 Mooy Machine Co., Cleveland, Ohio.  
Foss & Hill Machy. Co., Montreal.  
Garlock-Walker Machinery Co., Toronto, Ont.  
Henry & Wright Mfg. Co., Hartford, Conn.  
D. McKenzie Machinery Co., Guelph, Ont.  
Niles-Bement-Pond Co., New York.  
Pratt & Whitney Co., Dundas, Ont.  
R. E. T. Pringle, Ltd., Toronto, Ont.  
Stow Mfg. Co., Binghamton, N.Y.  
United States Mach. Tool Co., Cincinnati, Ohio.

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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.  
R. McDougall Co., Galt.  
Niles-Bement-Pond Co., New York.

Petrie, Ltd., H. W., Toronto, Ont.  
Rockford Drilling Mach. Co., Rockford, Ill.  
Silver Mfg. Co., Salem, Ohio.  
A. R. Williams Machinery Co., Toronto.

**DRILLING POSTS**

Aikenhead Hardware Co., Toronto, Ont.  
Keystone Mfg. Co., Buffalo, N.Y.  
Silver Mfg. Co., Salem, Ohio.

**DRILLS, BENCH**

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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.  
Millers Falls Co., Millers Falls, Mass.  
Pratt & Whitney Co., Dundas, 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 & Mch. Co., New Bedford, Mass.  
Petrie, Ltd., H. W., Toronto, Ont.

**DRILLS, CENTRE**

Aikenhead Hardware Co., Toronto, Ont.  
Cleveland Twist Drill Co., Cleveland.  
Morse Twist Drill & Machine Co., New Bedford.

**DRILLS, ELECTRIC AND PORTABLE**

Aikenhead Hardware Co., Toronto, Ont.  
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Cincinnati Electrical Tool Co., Cincinnati, Ohio.  
Foss & Hill Machy. Co., Montreal.  
Independent Pneumatic Tool Co., Chicago.  
Niles-Bement-Pond Co., New York.  
Petrie, Ltd., H. W., Toronto, 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.

**DRILLS, HIGH SPEED**

Aikenhead Hardware Co., Toronto, Ont.  
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Cleveland Twist Drill Co., Cleveland.  
Canadian Fairbanks-Morse Co., Montreal.  
Clark Equipment Co., Buchanan, Mich.  
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 & Mch. Co., New Bedford, Mass.  
Osborn (Canada), Ltd., Sam'l, Montreal, Que.  
W. F. & John Barnes Co., Rockford, Ill.  
Petrie, Ltd., H. W., Toronto, Ont.  
Pratt & Whitney Co., Dundas, Ont.  
Standard Machy. & Supplies, Ltd., Montreal, Que.

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Niles-Bement-Pond Co., New York.  
Garlock-Walker Machinery Co., Toronto, Ont.  
Pratt & Whitney Co., Dundas, Ont.

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Cleveland Twist Drill Co., Cleveland.  
Morse Twist Drill & Mch. 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 Jencks 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.  
Millers Falls Co., Millers Falls, Mass.  
Morse Twist Drill & Mch. Co., New Bedford, Mass.  
Petrie, Ltd., H. W., Toronto, Ont.  
Pratt & Whitney Co., Dundas, Ont.

**DRILLS, ROCK**

Can. Ingersoll-Rand Co., Sherbrooke, Que.  
Cleveland Pneumatic Tool Co. of Canada Toronto  
Foss & Hill Machy. Co., Montreal.  
The Jencks Mach. Co., Ltd., Sherbrooke, Que.  
A. R. Williams Machy. Co., Toronto.

**DRILLS, TRACK**

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, Wright & Co., 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 & Mch. Co., New Bedford, Mass.  
Osborn (Canada), Ltd., Sam'l, Montreal, Que.  
Petrie, Ltd., H. W., Toronto, Ont.  
Pratt & Whitney Co., Dundas, Ont.  
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

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Canadian Fairbanks-Morse Co., Montreal.  
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**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.  
Whiting Foundry Equipment Co., Harvey, Ill.

**DYNAMOS AND ELECTRICAL SUPPLIES**

Canadian Fairbanks-Morse Co., Montreal.  
Lancashire Dynamo & Motor Co., Ltd., Toronto.  
Petrie of Montreal, Ltd., H. W., Montreal, Que.  
Standard Machy. & Supplies, Ltd., Montreal, Que.  
Pratt & Whitney Co., Dundas, Ont.  
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**ELEVATORS AND BUCKETS**

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Whiting Foundry Equipment Co., Harvey, Ill.

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Stow Mfg. Co., Binghamton, N.Y.

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Foss & Hill Machy. Co., Montreal.  
Garvin Machine Co., New York.  
Canadian Fairbanks-Morse Co., Montreal.  
Ford-Smith Mach. Co., Hamilton, Ont.  
Francis & Co., Hartford, Conn.  
Norton Co., Worcester, Mass.  
Petrie, Ltd., H. W., Toronto, Ont.  
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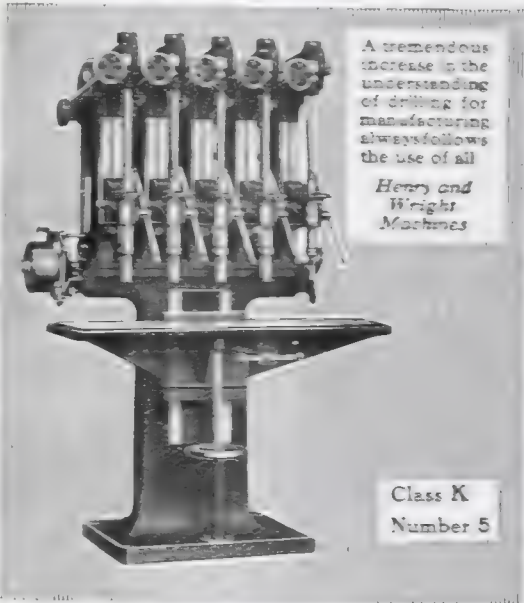
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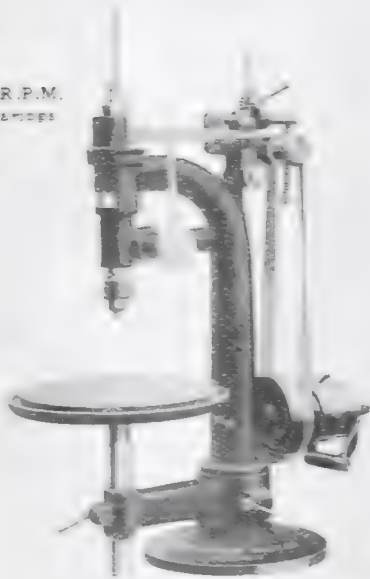


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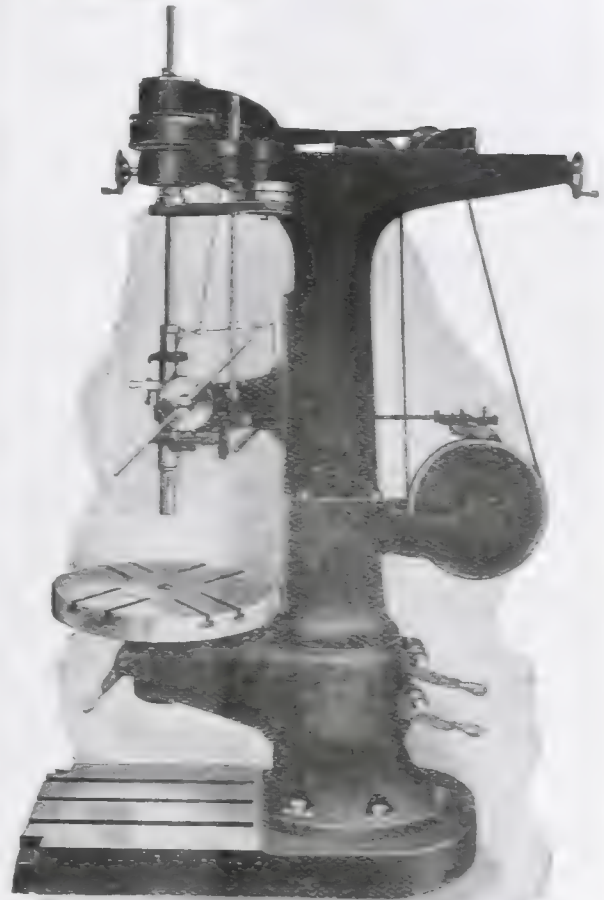
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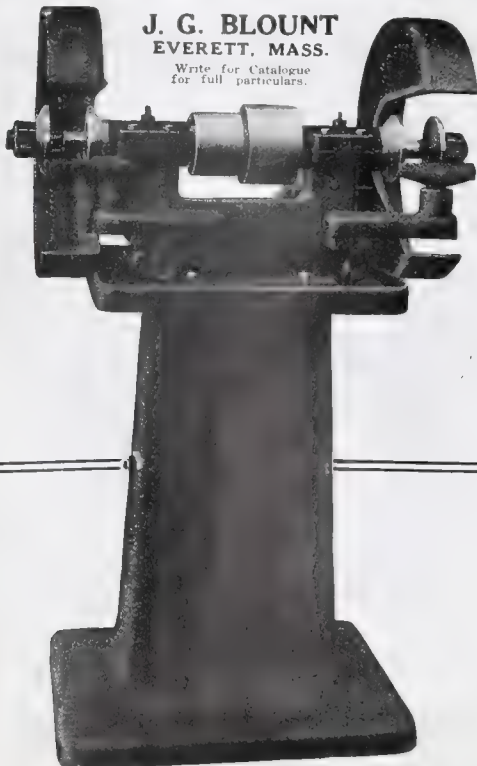
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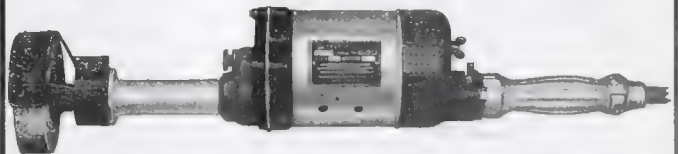
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Garlock-Walker Machinery Co., Toronto, Ont.  
Garvin Machine Co., New York.  
Morton Mfg. Co., Muskegon Heights, Mich.  
A. R. Williams Machy. Co., Toronto.

**KEYS, MACHINE**

Whitney Mfg. Co., Hartford, Conn.

**KILNS**

Can. Blower & Forge Co., Kitchener, Ont.  
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.  
Sheldons, Limited, Galt, Ont.

**LABELS AND TAGS**

Mathews, Jas. H. & Co., Pittsburgh, Pa.

**LABORATORIES, INSPECTION AND TESTING (SEE CHEMISTS)****LADLES, FOUNDRY**

Northern Crane Works, Walkerville.  
Whiting Foundry Equipment Co., Harvey, Ill.

**LAG SCREW GIMLET POINTERS**

National Machy. Co., Tiffin, Ohio.

**LAMPS, INCANDESCENT AND NITROGEN**

Can. Laco-Philips Co., Toronto, Ont.

**LAMPS, TUNGSTEN (Vacuum and Gas Filled)**

Can. Laco-Philips Co., Toronto, Ont.

**LATHES, BENCH**

H. E. Streeter, 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 & Engng 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.  
Hardinge 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 Jenckes 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.  
Garvin 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 Jenckes Mach. Co., Ltd., Sherbrooke, Que.  
McCabe, J. J., New York, N.Y.  
Patric. 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.  
Heppburn, John T., Ltd., Toronto.  
Himoff Mach. Co., Inc., Astoria, L.I., New York.  
The Jenckes 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.  
Patric. 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.  
Ferracute Mach. Co., Bridgeton, N.J.  
McCabe, J. J., New York, N.Y.

**LATHES, TURRET AND HAND**

Acme Machine Tool Co., Cincinnati, Ohio.  
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 Jenckes Mach. Co., Ltd., Sherbrooke, Que.  
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.  
McCabe, J. J., New York, N.Y.  
Mulliner-Enlund 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**

Graton & Knight Mfg. Co., Worcester, Mass.

**LIFTS, PNEUMATIC**

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**

Bertrams, Ltd., Edinburgh, Scotland.

**LIQUID AIR**

Carter Welding Co., Toronto, Ont.  
L'Air Liquide Society, Montreal, Toronto.  
Prest-O-Lite Co., Inc., Toronto, Ont.

**LOCKERS, STEEL WARDROBE AND STEEL MATERIAL**

Canada Wire & Iron Goods Co., Hamilton, Ont.

**LUBRICANTS**

Cataract Refining & Mfg. Co., Toronto.

**LUBRICATORS**

Roper, C. F., & Co., Hopedale, Mass.  
Trahern Pump Co., Rockford, Ill.

**MACHINERY DEALERS**

Baird Machy. Co., W. J., Detroit, Mich.  
Can. Fairbanks-Morse Co., Montreal.  
Dickow, Fred C., Chicago, Ill.  
Garlock-Walker Machy. Co., Toronto, Ont.  
Foss & Hill Machy. Co., Montreal.  
Patric. Ltd., H. W., Toronto, Ont.  
Standard Machy. & Supplies, Ltd., Montreal, Que.  
A. R. Williams Machy. Co., Toronto.

**MACHINERY GUARDS (SEE GUARDS)****MACHINERY REPAIRS**

Prest-O-Lite Co., Inc., Toronto, Ont.  
Sumbling Mach. Co., W. H., Toronto, Ont.

**MACHINISTS' SCALES, SMALL TOOLS AND SUPPLIES**

Can. Fairbanks-Morse Co., Montreal.  
Frank H. Scott, Montreal.  
J. H. Williams & Co., Brooklyn, N.Y.

**MANDRELS**

Can. Fairbanks-Morse Co., Montreal.  
Cleveland Twist Drill Co., Cleveland.  
Hannifin Mfg. Co., Chicago, Ill.  
A. B. Janine & Co., Hesperia, Ont.  
Manufacturers Equip. Co., Chicago, Ill.  
Monarch Bras Mfg. Co., Toronto, Ont.  
Morse Twist Drill & Mch. Co., New Bedford, Mass.  
Patric. Ltd., H. W., Toronto, Ont.  
Pratt & Whitney Co., Dundas, Ont.

**MARKING DEVICES**

Pritchard-Andrews Co. of Canada, Ottawa, Ont.  
Mathews, Jas. H., & Co., Pittsburgh, Pa.

**MARKING MACHINERY**

Brown, Rogers Co., Hamilton, Ont.  
Foss & Hill Machy. Co., Montreal.  
Martin Machine Co., Greenfield, Mass.  
Noble & Westbrook Mfg. Co., Hartford, Conn.  
Perrin, Wm. R., Toronto.

**MEASURING MACHINES**

Pratt & Whitney Co., Dundas, Ont.

**MEASURING TAPES AND RULES**

James Chesterman & Co., Ltd., Sheffield, Eng.

**METALLURGISTS**

Can. Inspection & Testing Lab., Montreal, Que.  
Toronto Testing Laboratory, Ltd., Toronto.

**METALS**

Can. B. K. Morton, Toronto, Montreal.  
Dom. Iron & Wrecking Co., Ltd., Montreal, Que.  
Standard Machy. & Supplies, Ltd., Montreal, Que.

**METERS, OIL, WATER**

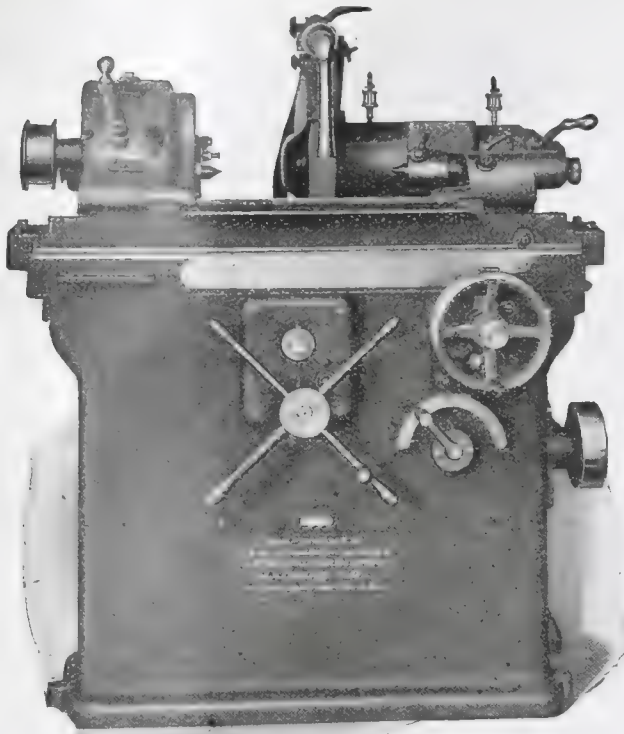
Bowser & Co., Inc., S. F., Toronto, Ont.

**MILL MACHINERY**

Alexander Fleck, Ltd., Ottawa.

**MILLING MACHINES, AUTOMATIC**

Bilton Mach. Tool Co., Bridgeport, Conn.



## Model "B"

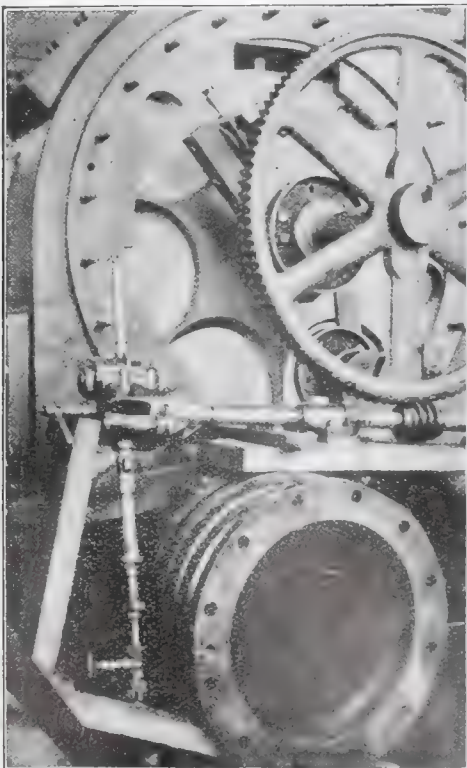
Constructed on simple lines yet capable of taking in a wide range of work and of attaining and maintaining great speed.

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Business .....

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 John Bertram & Sons Co., Dundas.  
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 Canada Machinery Corp., Galt, Ont.  
 Cincinnati Milling Machine Co., Cincinnati.  
 Cleveland Milling Mach. Co., Cleveland, Ohio.  
 Ford-Smith Mach. Co., Hamilton, Ont.  
 Fox Machine Co., Jackson, Mich.  
 Hardinge Bros., Inc., Chicago, Ill.  
 Hendey Mach. Co., Torrington, Conn.  
 Hincley Machine Works, Hincley, Wis.  
 Kemp Smith Mfg. Co., Milwaukee, Wis.  
 Niles-Bement-Pond Co., New York.  
 Pratt & Whitney Co., Dundas, Ont.  
 Tait-Paine Mfg. Co., Woonsocket, R.I.

**MILLING MACHINES, HAND**

Hardinge Bros., Inc., Chicago, Ill.  
 United States Mach. Tool Co., Cincinnati, Ohio.  
 Pratt & Whitney Co., Dundas, Ont.  
 Whitney Mfg. Co., Hartford, Conn.

**MILLING MACHINES, HORIZONTAL AND VERTICAL**

Becker Milling Machine Co., Boston, Mass.  
 Brown & Sharpe Mfg. Co., Providence.  
 John Bertram & Sons Co., Dundas.  
 Cleveland Milling Machine Co., Cleveland, Ohio.  
 Canada Machinery Corp., Galt, Ont.  
 Ford-Smith Mach. Co., Hamilton, Ont.  
 Foss & Hill Machy. Co., Montreal.  
 Fox Machine Co., Jackson, Mich.  
 Garlock-Walker Machinery Co., Toronto, Ont.  
 Gooley & Edlund, Cortland, N.Y.  
 Harlinge Bros., Inc., Chicago, Ill.  
 Kemp Smith Mfg. Co., Milwaukee, Wis.  
 R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.  
 Niles-Bement-Pond Co., New York.  
 Petrie, Ltd., H. W., Toronto, Ont.  
 Pratt & Whitney Co., Dundas, Ont.  
 Riverside Machinery Depot, Detroit, Mich.  
 Steptoe, The John Co., Cincinnati, Ohio.  
 United States Mach. Tool Co., Cincinnati, Ohio.  
 Whitney Mfg. Co., Hartford, Conn.  
 A. R. Williams Machy Co., Toronto.

**MILLING MACHINES, PLAIN, BENCH AND UNIVERSAL**

Becker Milling Machine Co., Boston, Mass.  
 Bilton Mach. Tool Co., Bridgeport, Conn.  
 Brown & Sharpe Mfg. Co., Providence.  
 Canada Machinery Corp., Galt, Ont.  
 Cincinnati Milling Machine Co., Cincinnati.  
 Ford-Smith Mach. Co., Hamilton, Ont.  
 Foss & Hill Machy. Co., Montreal.  
 Fox Machine Co., Jackson, Mich.  
 Garlock-Walker Machinery Co., Toronto, Ont.  
 Garvin Machine Co., New York.  
 Gooley & Edlund, Cortland, N.Y.  
 Hardinge Bros., Inc., Chicago, Ill.  
 Hendey Machine Co., Torrington, Conn.  
 Kemp Smith Mfg. Co., Milwaukee, Wis.  
 R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.  
 Niles-Bement-Pond Co., New York.  
 Petrie, Ltd., H. W., Toronto, Ont.  
 Pratt & Whitney Co., Dundas, Ont.  
 Steptoe, The John Co., Cincinnati, Ohio.  
 A. R. Williams Machy Co., Toronto.

**MILLING MACHINES, PROFILE**

Brown & Sharpe Mfg. Co., Providence.  
 Can. Fairbanks-Morse Co., Montreal.  
 Foss & Hill Machy. Co., Montreal.  
 Garlock-Walker Machinery Co., Toronto, Ont.  
 Garvin Machine Co., New York.  
 Petrie, Ltd., H. W., Toronto, Ont.  
 Pratt & Whitney Co., Dundas, Ont.  
 Riverside Machinery Depot, Detroit, Mich.

**MILLING TOOLS**

Aikenhead Hardware Co., Toronto, Ont.  
 Brown & Sharpe Mfg. Co., Providence.  
 Ford-Smith Mach. Co., Hamilton, Ont.  
 Geometric Tool Co., New Haven, Conn.  
 Kemp Smith Mfg. Co., Milwaukee, Wis.  
 Tabor Mfg. Co., Philadelphia, Pa.

**MINE CARS**

Can. Fairbanks-Morse Co., Montreal.  
 Cummings & Son, J. W., New Glasgow, Canada.  
 Jenckes Mach. Co., Sherbrooke, Que.  
 MacKinnon, Holmes & Co., Sherbrooke.  
 Marsh & Henthorn, Belleville, Ont.  
 Modern Tool Co., Erie, Pa.  
 Pratt & Whitney Co., Dundas, Ont.  
 Sheldons, Ltd., Galt, Ont.

**MINING MACHINERY**

Can. Fairbanks-Morse Co., Montreal.  
 Cleveland Pneumatic Tool Co. of Canada, Toronto.  
 Jenckes Mach. Co., Sherbrooke, Que.  
 Petrie, Ltd., H. W., Toronto, Ont.  
 A. R. Williams Machy. Co., Toronto.

**MITTENS**

Hickory Steel-Grip Glove Co., Chicago, Ill.

**MORTISING MACHINES**

Canada Machinery Corp., Galt, Ont.  
 Garlock-Walker Machinery Co., Toronto, Ont.  
 New Britain Mach. Co., New Britain, Conn.

**MOTORS, ELECTRIC**

Can. Fairbanks-Morse Co., Montreal.  
 Garlock-Walker Machinery Co., Toronto, Ont.  
 Lancashire Dynamo & Motor Co., Ltd., Toronto.  
 A. R. Williams Machy. Co., 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 & Hartley, Inc., Worcester, Mass.

**NAME PLATES, BRONZE, ETCHED AND STAMPED**

Matthews, Jas 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.  
 Landis Machine Co., Waynesboro, Pa.

**NITROGEN**

Carter Welding Co., Toronto, Ont.  
 L'Air Liquide Society, Montreal, Toronto.

**NUTS, SEMI-FINISH AND FINISHED**

Canadian B. K. Morton, Toronto, Montreal.  
 Galt Machine Screw Co., Galt, Ont.  
 National-Acme Co., Cleveland, Ohio.

**NUT BURRING MACHINES**

National Machy. Co., Tiffin, O.

**NUT MACHINES (HOT)**

National Machy. Co., Tiffin, O.

**NUT FACING AND BOLT SHAVING MACHINES**

Garvin Machine Co., New York.  
 National Machy. Co., Tiffin, O.  
 Victor Tool Co., Waynesboro, Pa.

**NUT TAPPERS**

John Bertram & Sons Co., Dundas.  
 Canada Machinery Corp., Galt, Ont.  
 Garvin Machine Co., New York.  
 Greenfield Tap & Die Corp., Greenfield, Mass.  
 Hall, J. H., & Son, Brantford, Ont.  
 A. B. Jardine & Co., Hespeler.  
 Landis Machine Co., Waynesboro, Pa.  
 National Machy. Co., Tiffin, O.

**OIL, DRAWING**

Elm Cutting Oil Co., Toronto, Ont.

**OIL SEPARATORS**

Can. Fairbanks-Morse Co., Montreal.  
 Sheldons, Ltd., Galt, Ont.  
 Smart-Turner Machine Co., The, Hamilton.

**OIL STONES**

Aikenhead Hardware Co., Toronto, Ont.  
 Carborundum Co., Niagara Falls, N.Y.  
 Norton Co., Worcester, Mass.

**OIL STORAGE SYSTEMS**

Bowser & Co., Inc., S. F., Toronto, Ont.

**OSCILLATING VALVE GRINDERS (PNEUMATIC)**

Cleveland Pneumatic Tool Co. of Canada, Toronto

**OVENS FOR BAKING, BLUING, DRYING, ENAMELING, JAPANNING AND LACQUERING**

Brantford Oven & Rack Co., Brantford, Ont.  
 Oven Equipment & Mfg. Co., New Haven, Conn.  
 Whiting Foundry Equipment Co., Harvey, Ill.

**OVEN TRUCKS, STEEL**

Brantford Oven & Rack Co., Brantford, Ont.  
 MacKinnon, Holmes & Co., Sherbrooke, Que.  
 Oven Equipment & Mfg. Co., New Haven, Conn.  
 Whiting Foundry Equipment Co., Harvey, Ill.

**OVENS FOR DRYING, TEMPER AND UNDER TRUCKS**

Brantford Oven & Rack Co., Brantford, Ont.  
 Oven Equipment & Mfg. Co., New Haven, Conn.

**OXY-ACETYLENE WELDING AND CUTTING**

Can. Welding Works, Montreal, Que.  
 Carter Welding Co., Toronto, Ont.  
 Prest-O-Lite Co., Inc., Toronto, Ont.  
 St. Lawrence Welding Co., Montreal, Que.

**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.

**PACKINGS, ASBESTOS**

Bennett, W. P., 51 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.  
 Petrie, Ltd., H. W., Toronto, Ont.

**PAPER MILL MACHINERY**

Bertrams, Ltd., Edinburgh, Scotland.  
 MacKinnon, Holmes & Co., Sherbrooke, Que.  
 Sturtevant Co., B. F., Galt, Ont.

**PATTERN SHOP EQUIPMENT**

Canada Machinery Corp., Galt, Ont.  
 Fox Machine Co., Jackson, Mich.  
 Garlock-Walker Machinery Co., Toronto, Ont.

**PATENT SOLICITORS**

Bidden, Hanbury, A., Montreal.  
 Fetherstonhaugh & Co., Ottawa.  
 Marion & Marion, Montreal.  
 Ridout & Maybee, Toronto.

**PATTERNS**

Winnipeg Gear & Engr. Co., Winnipeg, Man.

**PERFORATED METALS AND ORNAMENTAL IRON GOODS**

Canada Wire & Iron Goods Co., Hamilton.

**PIG IRON**

Hanna & Co., M. A., Cleveland, O.  
 Steel Co. of Canada, Ltd., Hamilton, Ont.

**PIPE CUTTING AND THREADING MACHINES**

Butterfield & Co., Rock Island, Que.  
 Can. Fairbanks-Morse Co., Montreal.  
 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.  
 A. B. Jardine & Co., Hespeler, Ont.  
 Landis Machine Co., Waynesboro, Pa.  
 R. McDougall Co., Galt.

Petrie, Ltd., H. W., Toronto, Ont.  
 Wells Bros. Co. of Canada, Galt, Ont.  
 Williams Tool Co., Erie, Pa.  
 A. R. Williams Machy. Co., Toronto.

**PIPE RIVETED STEEL**

The Jenckes Mach. Co., Ltd., Sherbrooke, Que.  
 Toronto Iron Works, Ltd., Toronto.

**PIPE CUTTERS, ROLLING**

Curtis & Curtis Co., Bridgeport, Conn.  
 John H. Hall & Sons, Ltd., Brantford, Ont.  
 Wells Bros. Co. of Canada, Galt, Ont.

**PLANER JACKS**

Armstrong Bros. Tool Co., Chicago.

**PLANERS, STANDARD AND ROTARY**

John Bertram & Sons Co., Dundas.  
 Canada Machinery Corp., Galt, Ont.  
 Can. Fairbanks-Morse Co., Montreal.  
 Foss & Hill Machy. Co., Montreal.  
 Gardner, Robt., & Son, Montreal.  
 Garlock-Walker Machinery Co., Toronto, Ont.  
 Garvin Machine Co., New York.  
 Hamilton Machine Tool Co., Hamilton, Ohio.  
 Morton Mfg. Co., Muskegon Heights, Mich.  
 Niles-Bement-Pond Co., New York.  
 Petrie, Ltd., H. W., Toronto, Ont.  
 Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.

**PLANING AND SHAPING MACHINERY**

Canada Machinery Corp., Galt, Ont.  
 Can. Fairbanks-Morse Co., Montreal.  
 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.  
 Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.

**PLANING MILL EXHAUSTERS**

Can. Blower & Forge Co., Kitchener, Ont.  
 Sheldons, Ltd., Galt, Ont.  
 Niles-Bement-Pond Co., New York.

**PLIERS**

Aikenhead Hardware Co., Toronto.  
 Canadian Billings & Spencer, Ltd., Welland.  
 Peck, Stow & Wilcox Co., Southington, Conn.

**PRESSES, ARBOR**

Atlas Press Co., Kalamazoo, Mich.  
 Hannifin Mfg. Co., Chicago, Ill.  
 Metalwood Mfg. Co., Detroit, Mich.

**PRESSES, BROACHING, FORGING AND FLANGING**

Atlas Press Co., Kalamazoo, Mich.  
 E. W. Bliss Co., Brooklyn, N.Y.  
 Ferracute Machine Co., Bridgeton, N.J.  
 Metalwood Mfg. Co., Detroit, Mich.  
 Toledo Machine & Tool Co., Toledo.

**PRESSES, CAM, TOGGLE, EYELET**

Baird Machine Co., Bridgeport, Conn.  
 Bliss Co., E. W., Brooklyn, N.Y.  
 Consolidated Press Co., Hastings, Mich.  
 Toledo Machine & Tool Co., Toledo.

**PRESSES FOR SHELLS**

Atlas Press Co., Kalamazoo, Mich.  
 Bliss Co., E. W., Brooklyn, N.Y.  
 Charles F. Elmes Eng. Works, Chicago.  
 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.

**PRESSES, FILTER**

William R. Perrin, Ltd., Toronto.

**PRESSES, DROP AND FORGING**

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 Brown, Roggs Co., Ltd., Hamilton, Canada.  
 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.  
 Dominion Machinery Co., Toronto, Ont.  
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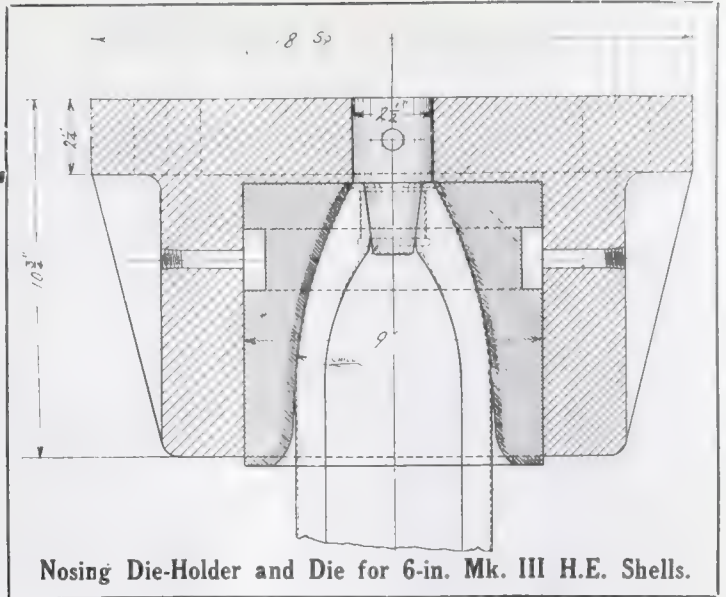
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Garvin Machine Co., New York.  
Himoff Mach. Co., Inc., Astoria, L.I., New York.  
A. B. Jardine & Co., Hespeler.  
New Britain Machine Co., New Britain, Conn.  
Petrie, Ltd., H. W., Toronto, Ont.  
Pratt & Whitney Co., Dundas, Ont.  
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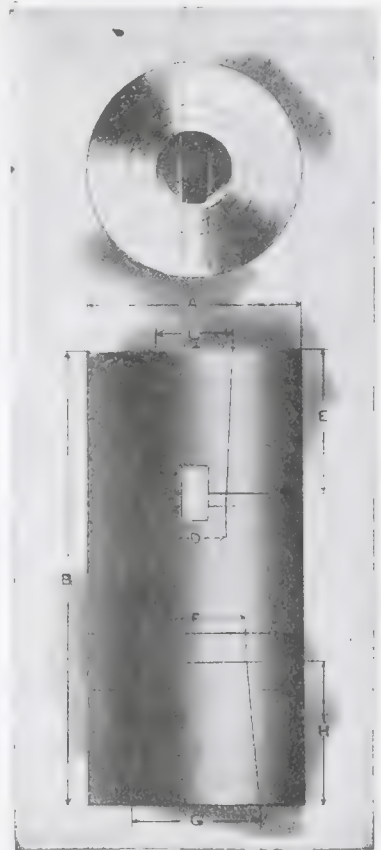
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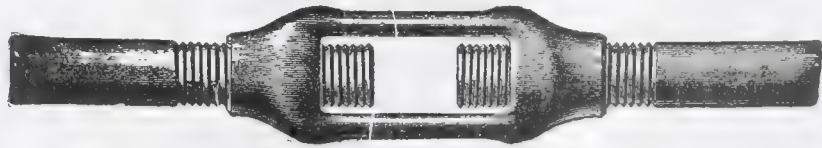
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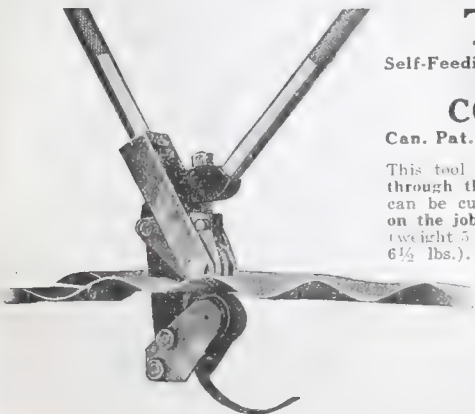


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McClellan & Son, F. W., Niagara Falls, Ont.  
National-Acme Co., Cleveland, Ohio.  
D. McKenzie Machinery Co., Guelph, Ont.  
Mullner & Endlund Tool Co., Syracuse, N.Y.  
Prest-O-Lite Co., Inc., Toronto, Ont.  
Rhodes Mfg. Co., Hartford, Conn.  
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Sleeper & Hartley, Inc., Worcester, Mass.  
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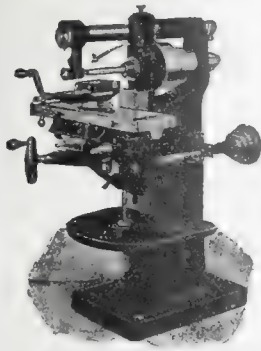
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# CANADIAN MACHINERY AND MANUFACTURING NEWS

*A weekly newspaper devoted to the machinery and manufacturing interests.*

Vol. XVIII.

TORONTO, SEPTEMBER 27, 1917

No. 13

## EDITORIAL CONTENTS

MANUFACTURING USES OF LOW-TEMPERATURE ELECTRIC OVENS .....	341-345
GENERAL .....	345-346
Railways' Handicap Increasing.... Toronto Hydro Report.... Great Increase in Canada's Trade.... Iron Weapons of the Aztecs.... Gear Manufacturers' Convention.	
PERFORMING COMPLEX LATHE WORK BY TURRET LATHE METHODS .....	347-348
GENERAL .....	348
Internal Grinding on Hard and Soft Metals.	
EDITORIAL CORRESPONDENCE .....	349-351
Reminiscences of a 4.5 in. High Explosive Shell.... Manganese in Steel Making.... Investigating Defective Magneto.... Development of Oxygen Manufacture.	
GENERAL .....	351
New Allied Tonnage.	
SPOKES IN INDUSTRY'S WHEEL .....	352
Robert Morton Hamilton.	
PROGRESS IN NEW EQUIPMENT .....	353-354
Recent Developments in Blast Furnace Blowing Equipment.	
ELEVATION OF SPAN INSURES SUCCESS OF QUEBEC BRIDGE .....	355-361
EDITORIAL .....	362
Five Talents or One?.... A Canadian Monument.	
INDUSTRIAL NOTABILITIES .....	363
Percy McCutcheon Yeates.	
SELECTED MARKET QUOTATIONS .....	364-365
THE GENERAL MARKET CONDITION AND TENDENCY.....	365-370
Summary.... Montreal Letter.... Toronto Letter.... New York Letter.... Pittsburgh Letter.	
INDUSTRIAL AND CONSTRUCTION NEWS (Advtg. Section) .....	64

## THE MACLEAN PUBLISHING COMPANY, LIMITED

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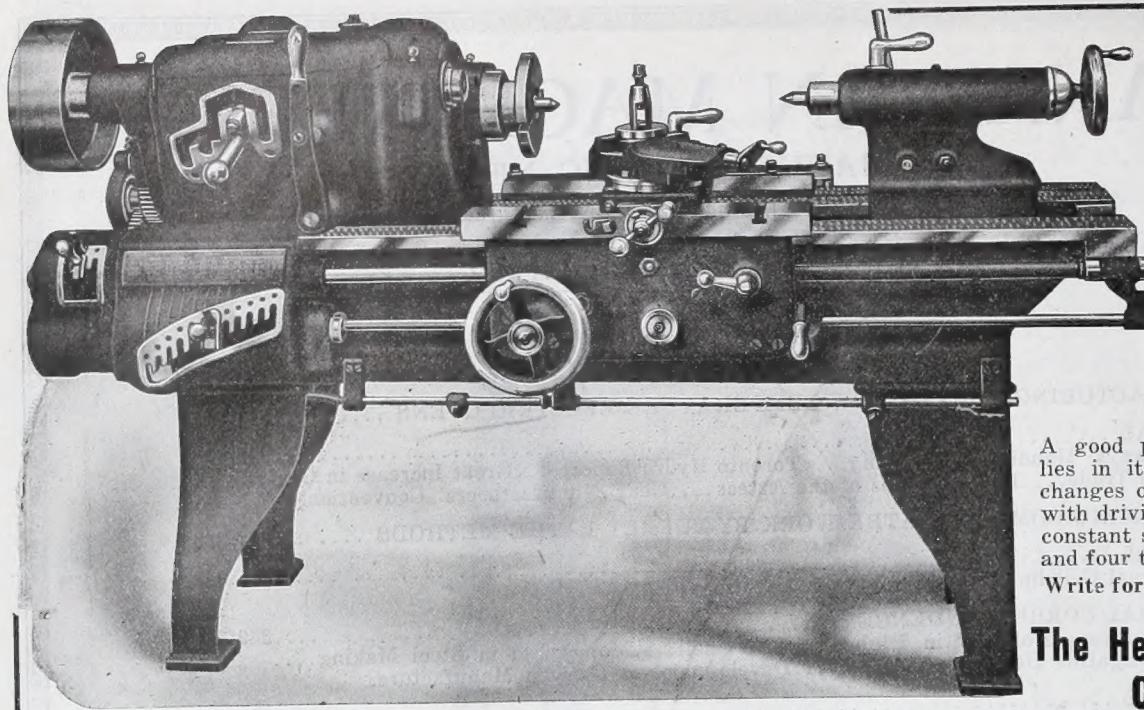
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## INDEX TO ADVERTISERS

Allen Mfg. Co. .... 84	Dominion Steel Foundry Co. .... 103	King, Ltd., Warden ..... 21	Roelofson Machine & Tool Co. .... 13
Armstrong Bros. Tool Co. .... 94	Eagle & Globe Steel Co. .... 12	L'Air Liquide Society ..... 26	Roper & Co., C. F. .... 98
Armstrong, Whitworth of Canada. .... 4	Eastern Machine Screw Corp. .... 100	Lancashire Dynamo & Motor Co. .... 100	Sheldons, Ltd. .... 26
Atkins & Co., Ltd., Wm. .... 5	Eastern Machy. & Equipment Co. .... 75	Landis Machine Co. .... 20	Shuster Co., F. B. .... 104
Baird Machine Co. .... 105	Elmes Engine Works, Charles F. .... 22	Latrobe Electric Steel Co. .... 12	Silver Mfg. Co. .... 104
Banfield, W. H., & Sons. .... 69	Erle Foundry Co. .... 22	London Bolt & Hinge Co. .... 71	Skinner Chuck Co. .... 133
Barnes, Wallace, Co. .... 68	Fairley-Davidson Steel Co., Inc. .... 4	Mackinnon, Holmes & Co. .... 71	Sleeper & Hartley Co., Inc. .... 15
Baxter & Co., Ltd., J. R. .... 15	Federal Engineering Co. .... 67	Magnolia Metal Co. .... 92	Smart-Turner Mach. Co., Ltd. .... 83
Bemis & Call Hardware & Tool Co. .... 91	Fetherstonhaugh & Co. .... 69	Manufacturers Equipment Co. .... 101	Smith Mfg. Co., Philip .... 16
Bennett, W. P. .... 95	Fitchburg Grinding Mach. Co. .... 115	Marsh & Hawthorn, Ltd. .... 117	Standard Alloys Co. .... 9
Bertram & Sons Co., Ltd., John. .... 1	Fleek, Alexander, Limited ..... 71	Matthews & Co., Inc., Jas. H. .... 33	Standard Machy. & Supplies, Ltd. .... 179
Bertram's, Limited ..... 71	Ford Chain Block & Mfg. Co. .... 93	McCabe, J. J. .... 16	Starratt Co., L. S. .... 39
Bilton Machine Tool Co. .... 28	Foss & Hill Machinery Co. .... 22	McCoy-Brandt Machy. Co. .... 74	Steele, Ltd., James. .... 71
Blake & Johnson ..... 117	Francis & Co. .... 105	McDougall Co., H. .... Inside back cover	Steel Co. of Canada. .... 3
Bliss Co., E. W. .... 23	Gardner Machine Co. .... 106	McKenzie Machy. Co., D. K. .... 18	Steppe, John, Co. .... 121
Blount Co., J. G. .... 113	Gardner & Sons, Robt. .... 89	McLaren Belting Co., J. C. .... 105	Stirk & Sons, John. .... 69
Brantford Oven & Rack Co. .... 71	Garlock-Walker Machy. Co. .... 75	Mechanical Engineering Co. .... 87	St. Lawrence Welding Co. .... 28
Bridgford Mach. Tool Works .... 106	Garvin Machine Co. .... 18	Merchants Rubber Factory .... 73	Stock-Rumley-Wachs Co. .... 76
Bristol Company ..... 103	Geometric Tool Co. .... 65	Metalwood Mfg. Co. .... 23	Stow Mfg. Co. .... 107
Brownell Machy. Co. .... 72	Gilbert & Barker Mfg. Co. .... 86	Monarch Brass Mfg. Co. .... 83	Streeter, H. E. .... 105
Brown's Copper & Brass Rolling Mills ..... 89	Goodyear Tire & Rubber Co. of Canada, Ltd. .... 93	Montgomery Smith & Co. .... 97	Strlinger Co., Chas. .... 105
Budden, Hanbury A. .... 69	Grant Gear Works, Inc. .... 104	Morse Chain Co. .... 71	Strong-Kennard & Nutt Co. .... 105
Canada Machinery Corporation ..... Outside back cover	Grant Mfg. & Machine Co. .... 82	Mortin Mfg. Co. .... 69	Swedish Steel & Importing Co. .... 7
Canada Metal Co., Ltd. .... 95	Greenfield Machine Co. .... 104	Muir, Wm., & Co. .... 119	Tabor Mfg. Co. .... 105
Can. Fairbanks-Morse Co. .... 34	Hamilton Gear & Machine Co. .... 94	Murphy Twist Drill & Mach. Co. .... 179	Tallman Brass & Metal Co. .... 81
Can. Billings & Spencer ..... 119	Hamilton Machine Tool Works .... 19	Murchey Machine & Tool Co. .... 191	Tate-Jones & Co., Inc. .... 87
Can. Ingersoll-Rand Co. .... 115	Hanna & Co., M. A. .... 4	Napier Saw Works ..... 104	Taylor Instrument Co. .... 87
Can. Inspection & Testing Laboratories, Ltd. .... 103	Hannifin Mfg. Co. .... 99	National Machinery Co. .... 92	Thomson Electric Welding Co. .... 27
Can. Laco-Phillips Co., Ltd. .... 84	Hardinge Bros. .... 14	New York Machinery Exchange. .... 78	Thomson Spot Welder Co. .... 27
Can. Steel Foundries, Ltd. .... 31	Hawkridge Bros. .... 68	Nicholson File Co. .... 82	Toledo Machine & Tool Co. .... 103
Can. S K F Co., Ltd. .... 8	Hendey Machine Co. .... 111	Niles-Bement-Pond. .... Inside front cover	Toronto Iron Works .... 176
Carlyle Johnson Mach. Co. .... 96	Henry & Wright Mfg. Co. .... 14	Northern Crane Works .... 103	Toronto Testing Laboratory .... 81
Cataract Refining Co. .... 98	Heppburn, John T. .... 82	Norton, Ltd., A. O. .... 104	Toronto Tool Co. .... 81
Chapman Double Ball Bearing Co. .... 98	High Speed Hammer Co. .... 106	Norton Co. .... 32	Trarhem Pump Co. .... 84
Chesterman & Co., Ltd., Jas. .... 92	Hinckley Mach. Co. .... 105	Nova Scotia Steel & Coal Co. .... 19	Union Drawn Steel Co. .... 104
Cincinnati Pulley Machy. Co. .... 111	Holden-Morgan Thread Miller, Ltd. .... 72	Oven Equipment & Mfg. Co. .... 86	U. S. Electric Tool Co. .... 32
Cleveland Pneumatic Tool Co. .... 113	Holt Metal Co. .... 106	Packard Fuse Co. .... 75	United Hammer Co. .... 104
Classified Advertising ..... 72	Hull Iron & Steel Foundries, Ltd. .... 119	Parmenter & Bulloch Co. .... 106	U. S. Silica Co. .... 85
Cleveland Wire Spring Co. .... 71	Hunter Saw & Machine Co. .... 20	Peck, Stow & Wilcox ..... 91	Vanadium Alloys Steel .... 10
Clipper Belt Lacer Co. .... 98	Hurlbut-Rogers Machinery Co. .... 21	Perrin, Wm. R. .... 53	Vulcan Crucible Steel Co. .... 12
Consolidated Press Co. .... 22	Independent Pneumatic Tool Co. .... 113	Peerless Machine Co. .... 28	Warner & Swasey Co. .... 17
Cummings & Son ..... 16	Iron Works, The ..... 70	Petrie, Ltd., H. W. .... 73	Wells Bros. Co. of Canada .... 33
Curtis & Curtis Co. .... 29	Jacobs Mfg. Co. .... 100	Plevissville Foundry ..... 67	Whiting Foundry Equipment Co. .... 95
Cushman Chuck Co. .... 103	Jenckes Mach. Co. .... 73	Port Hope File Mfg. Co. .... 32	Whitcomb-Blaisdell Mach. Tool Co. .... 17
Davis-Bourmonville Co. .... 104	Jenkins Bros., Ltd. .... 79	Positive Clutch & Pulley Works. .... 106	Whitman & Barnes Mfg. Co. .... 88
Davis Machine Tool Co., W. F. .... 77	Jobborn, Geo. E. .... 71	Polsen Iron Works ..... 78	Whitton Mach. Co., D. E. .... 105
Deloro Smelting & Refining Co. .... 6	Johnson Mach. Co., Carlyle ..... 8	Pratt & Whitney. .... Inside front cover	Wilkinson & Kompass. .... 106
Delta File Works ..... 57	Jones & Glasco ..... 95	Prest-O-Lite Co. of Ottawa. .... 83	Williams, A. R., Machy. Co. .... 7, 63, 73
De Mooy Mach. Co. .... 111	Kemp Smith Mfg. Co. .... 27	Pritchard-Andrews Co., of Ottawa. .... 83	Williams & Co., J. H. .... 83
Diamond Saw & Stamping Works. .... 84	Kennedy & Sons, Wm. .... 11	Puro Sanitary Drink'g Fountain Co. .... 70	Wilson & Co., T. A. .... 104
Dickow, Fred C. .... 69	Ker & Goodwin ..... 69	Racine Tool & Machine Co. .... 27	Windsor Mach. & Tool Works. .... 29
Dominion Belting Co., Ltd. .... 71	Keystone Mfg. Co. .... 88	Rhodes Mfg. Co. .... 15	Willmarth & Morman Co. .... 105
Dominion Bridge Co. .... 98	King, Ltd., Warden ..... 21	Richmond Mfg. Co. .... 105	Winnipeg Gear & Engineering Co. .... 81
Dominion Forge & Stamping Wks. .... 86	L'Air Liquide Society ..... 26	Ridout & Maybee ..... 53	Worth Engineering Co. .... 71
	Lancashire Dynamo & Motor Co. .... 100	Riverside Machy. Depot ..... 122	Zenith Coal & Steel Products Co. .... 74, 104
	Landis Machine Co. .... 20		
	Latrobe Electric Steel Co. .... 12		
	London Bolt & Hinge Co. .... 71		
	Mackinnon, Holmes & Co. .... 71		
	Magnolia Metal Co. .... 92		
	Manufacturers Equipment Co. .... 101		
	Marsh & Hawthorn, Ltd. .... 117		
	Matthews & Co., Inc., Jas. H. .... 33		
	McCabe, J. J. .... 16		
	McCoy-Brandt Machy. Co. .... 74		
	McDougall Co., H. .... Inside back cover		
	McKenzie Machy. Co., D. K. .... 18		
	McLaren Belting Co., J. C. .... 105		
	Mechanical Engineering Co. .... 87		
	Merchants Rubber Factory .... 73		
	Metalwood Mfg. Co. .... 23		
	Monarch Brass Mfg. Co. .... 83		
	Montgomery Smith & Co. .... 97		
	Morse Chain Co. .... 71		
	Mortin Mfg. Co. .... 69		
	Muir, Wm., & Co. .... 119		
	Murphy Twist Drill & Mach. Co. .... 179		
	Murchey Machine & Tool Co. .... 191		
	Napier Saw Works ..... 104		
	National Machinery Co. .... 92		
	New York Machinery Exchange. .... 78		
	Nicholson File Co. .... 82		
	Niles-Bement-Pond. .... Inside front cover		
	Northern Crane Works .... 103		
	Norton, Ltd., A. O. .... 104		
	Norton Co. .... 32		
	Nova Scotia Steel & Coal Co. .... 19		
	Oven Equipment & Mfg. Co. .... 86		
	Packard Fuse Co. .... 75		
	Parmenter & Bulloch Co. .... 106		
	Peck, Stow & Wilcox ..... 91		
	Perrin, Wm. R. .... 53		
	Peerless Machine Co. .... 28		
	Petrie, Ltd., H. W. .... 73		
	Plevissville Foundry ..... 67		
	Port Hope File Mfg. Co. .... 32		
	Positive Clutch & Pulley Works. .... 106		
	Polsen Iron Works ..... 78		
	Pratt & Whitney. .... Inside front cover		
	Prest-O-Lite Co. of Ottawa. .... 83		
	Pritchard-Andrews Co., of Ottawa. .... 83		
	Puro Sanitary Drink'g Fountain Co. .... 70		
	Racine Tool & Machine Co. .... 27		
	Rhodes Mfg. Co. .... 15		
	Richmond Mfg. Co. .... 105		
	Ridout & Maybee ..... 53		
	Riverside Machy. Depot ..... 122		
	Rivett Lathe & Grinder Co. .... 122		



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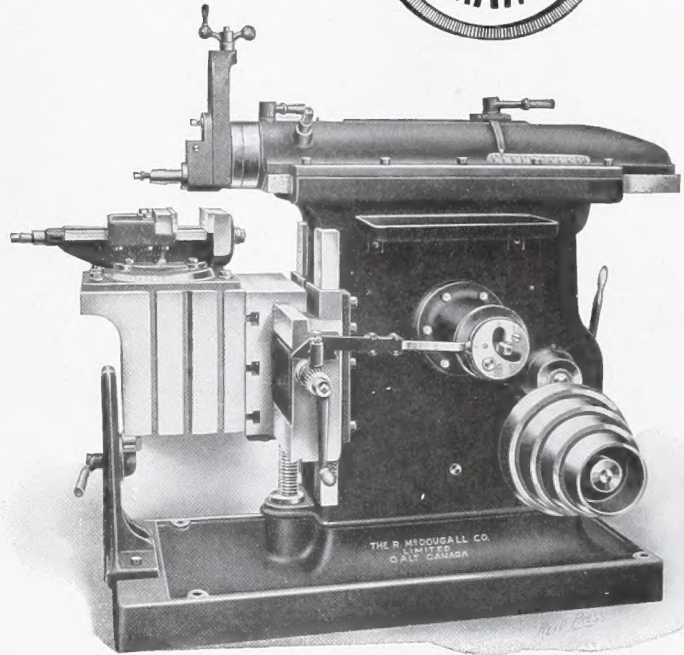
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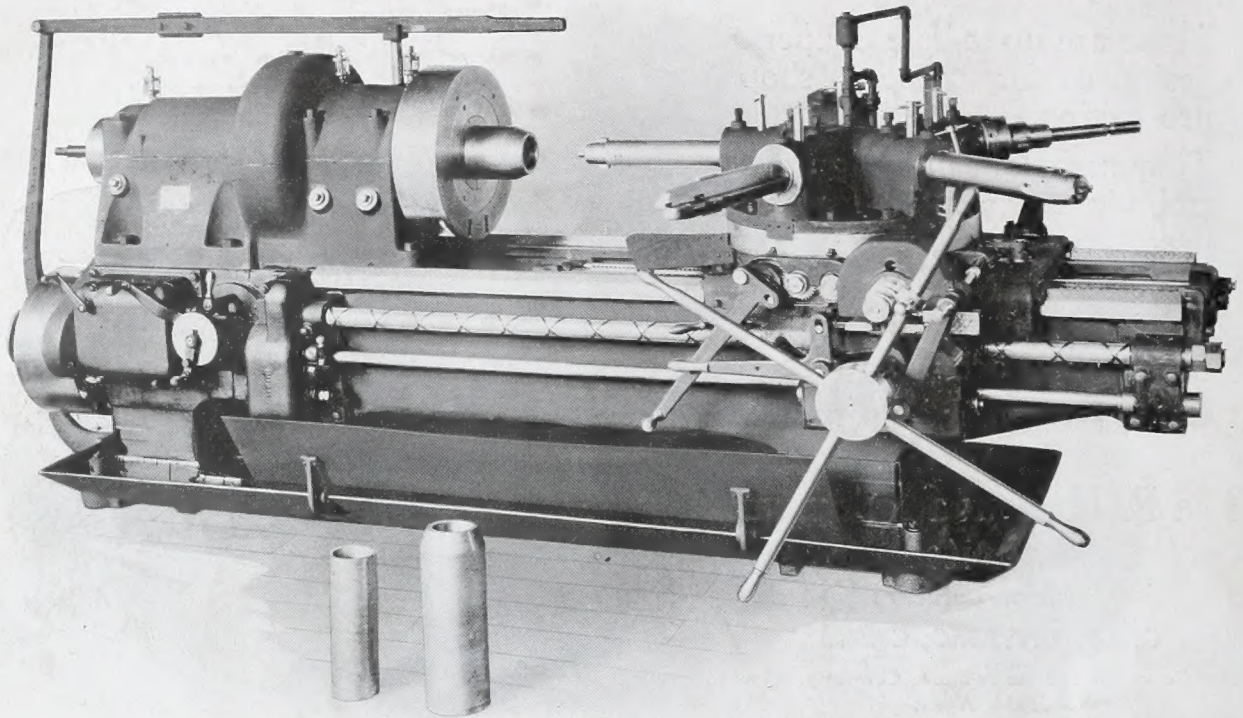
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