

# CANADIAN MACHINERY

## AND MANUFACTURING NEWS

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

Vol. XVIII—No. 4

Publication Office: Toronto, July 26, 1917

Subscription Price  
\$3.00 per Year

# BERTRAM

## MACHINE TOOLS

Our Plate  
and Structural Steel  
Machinery is Particu-  
larly adapted to *Shipbuilding*  
*Plants*. Carefully designed,  
Conservatively rated and  
Built for Heavy Service.

*We will be glad to submit photographs and  
specifications on request.*

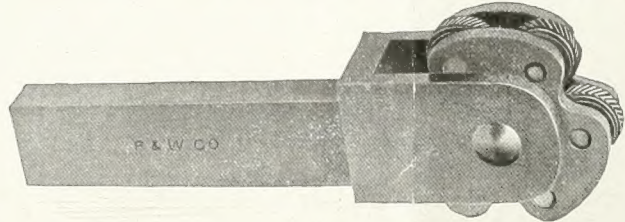
**The John Bertram & Sons Co., Ltd.**  
DUNDAS, ONT., CANADA

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



# SMALL TOOLS

## P. & W. Combination Lathe Knurling Tool



### Combines Three Distinct Knurling Tools in One

You will save time by using this three-in-one Lathe Knurling Tool.

It carries three

itches of knurls, fine,

medium and

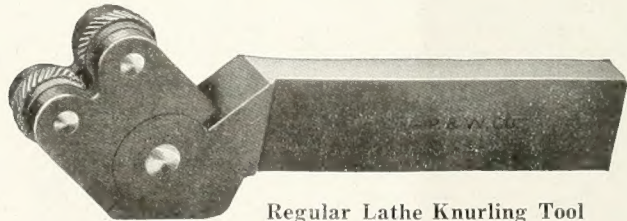
coarse, as shown in sample. This does away with necessity of having three holders or of changing knurls where but one holder is available. Same knurls can be used in this holder as are used in our regular Lathe Knurling Tool.



Fine Medium Coarse

### PROMPT SERVICE

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



Regular Lathe Knurling Tool

*Precision Machine Tools — Standards & Gauges*

# PRATT & WHITNEY CO.

of Canada, Limited

Works: DUNDAS, ONTARIO

TORONTO

1002 C.P.R. Bldg.

WINNIPEG

1205 McArthur Bldg.

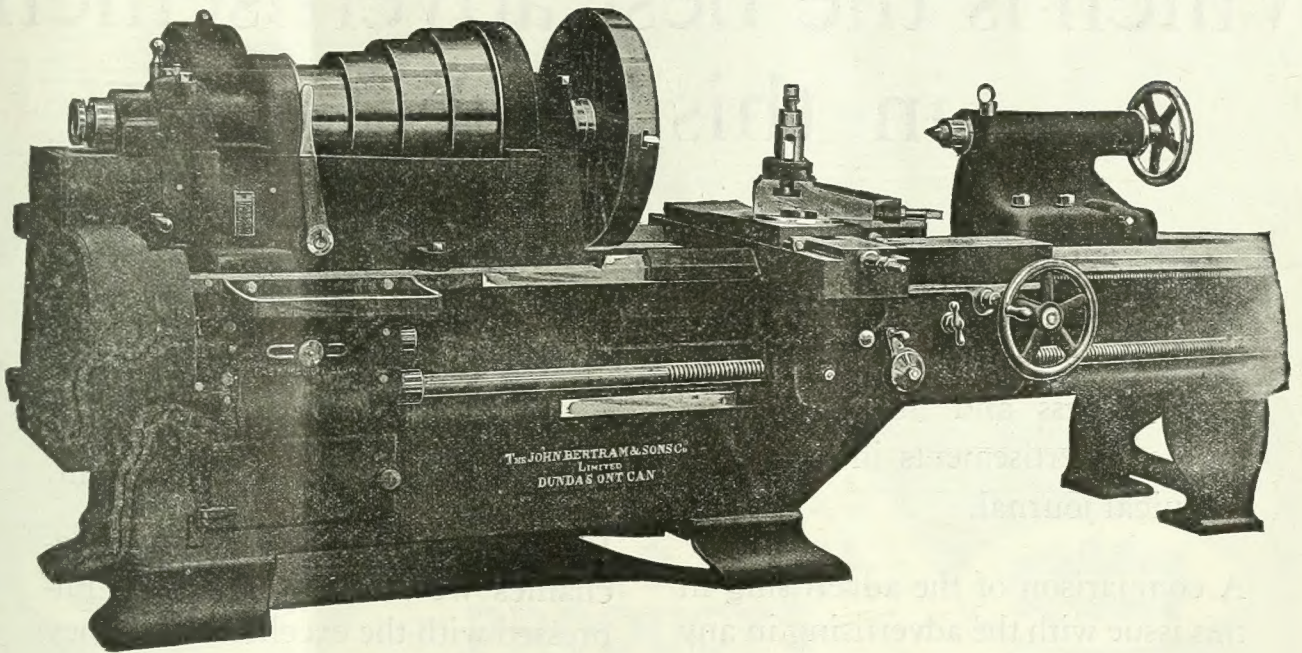
VANCOUVER

B.C. Equipment Co.

MONTREAL

723 Drummond Bldg.

# BERTRAM MACHINE TOOLS



**Double Back-Geared Gap Lathe**  
26-inch x 42-inch Swing

Bertram Machine Tools are built for safety and service, and are backed by a concern with sixty years' experience and the largest of its kind in Canada.

## The John Bertram & Sons Co., Limited

MISCELLANEOUS DEPARTMENT

Dundas, Ontario, Canada



MONTREAL  
723 Drummond Bldg.

TORONTO  
1002 C.P.R. Bldg.

VANCOUVER  
609 Bank of Ottawa Bldg.

WINNIPEG  
1205 McArthur Bldg.



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

# The Publisher's Page

TORONTO

July 26, 1917

## Which is the best advertisement in this issue?

WE believe that the advertisements in CANADIAN MACHINERY are not surpassed in attractiveness and informativeness by the advertisements in any other technical journal.

A comparison of the advertising in this issue with the advertising in any other technical journal will bear us out in this contention.

But good as they are, are the advertisements in CANADIAN MACHINERY all that you would like them? Are they giving you all the information you would like? Are they technical enough? Do they give you the kind of information you want?

It would be very interesting to have the full, frank and free criticism of our readers, and if we mistake not, it would be most helpful to all concerned.

We should like to hear, therefore, from our readers, with expressions of opinion regarding the advertising now appearing in CANADIAN MACHINERY, together with suggestions for possible improvement.

In conversation with many mechanics we have always been impressed with the excellent ideas they have regarding advertising. It has been gratifying indeed to know with what keen interest the advertising pages of CANADIAN MACHINERY are scanned regularly. In this connection we might mention that one superintendent told us recently that he had followed the advertising of a certain machine for *two* years before he found himself in a position to purchase.

We shall treat all letters on the above subject in the strictest confidence and we trust this invitation will meet with a wide acceptance and that we shall hear from many of our readers.



**Quality**

**Service**

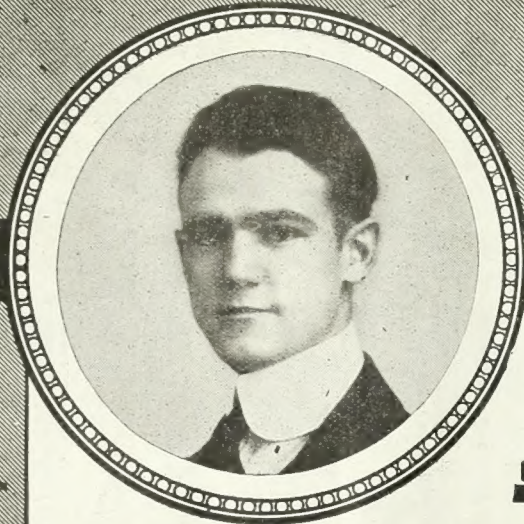
**STEEL & IRON  
PRODUCTS  
OF  
EVERY DESCRIPTION  
THE  
STEEL COMPANY  
OF  
CANADA**

**HAMILTON**

**LIMITED**

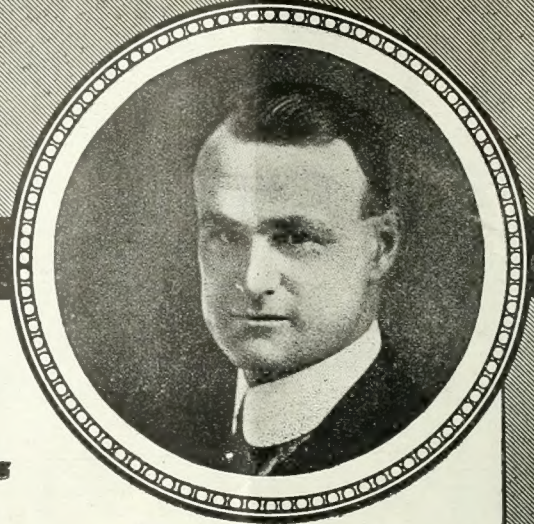
**MONTREAL**

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



G. E. La Page of the Falls Machine Co., Sheboygan Falls, Wis.

"S K F Ball Bearings were selected as standard equipment by this company because of their hardness, uniformity, perfect spacing and self-aligning features."



E. J. Bell of the Dauber Bell Machine Co., Oshkosh, Wis.

"After trying two or three other makes of bearings, we finally adopted your make of self-aligning bearings, and it gives us pleasure to say that out of all bearings of your make we have put on the market, we have not had a single one prove defective."

**SKF**  
BALL BEARINGS

# The Choice of the Woodworking Industry

Some of the first S K F Ball Bearings made were used in woodworking machines. They are running to-day. Thousands upon thousands of S K F have been built into woodworking machines since then. To-day, practically every ball bearing woodworking machine is S K F equipped. Be sure yours is.

Be sure you get the best when you buy. You know how vitally your machines depend on the bearings. Read what prominent manufacturers say of S K F. They use S K F because they know of no better guarantee of service.

To users of woodworking machinery our new Woodworking Folder will be of interest. Send for your copy.

J. A. Taggart, Advance Machinery Co., Toledo, Ohio.

"We have tried every make of ball bearings and while yours cost us more money than any other make we have ever used, we have found them to be superior in every way and much more economical on account of their superiority."

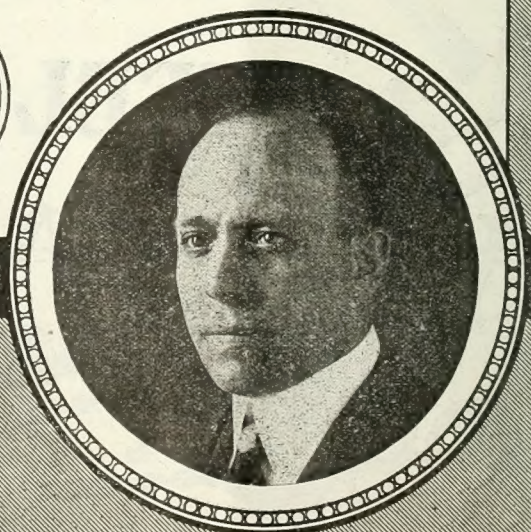
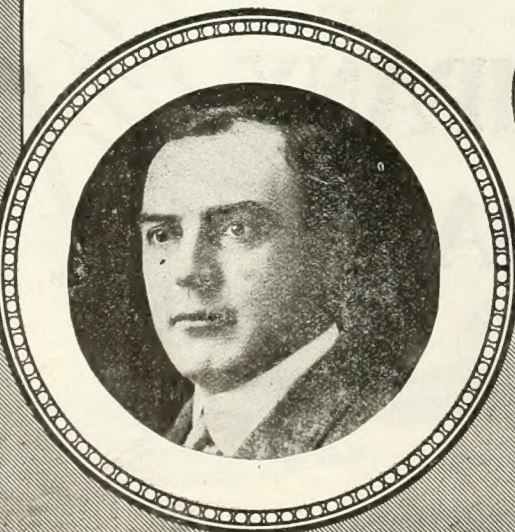
**Canadian SKF Co.**

LIMITED

TORONTO CANADA

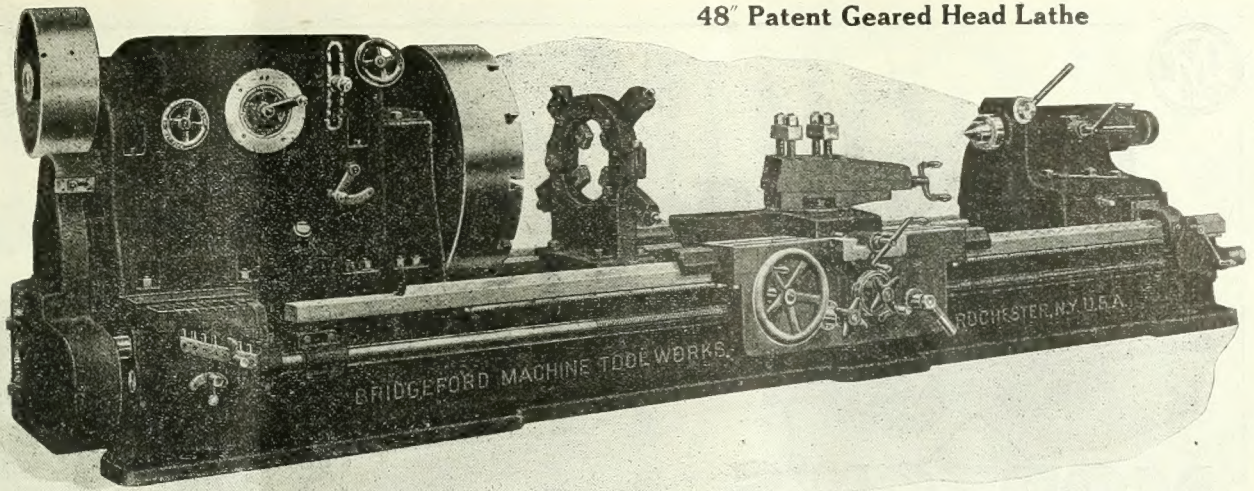
Paul L. Prybil of Paul Prybil Machine Co., New York, N. Y.

"We have been using S K F Ball Bearings on some of our wood-working machines for the past three or four years and are very well pleased and satisfied with the results obtained."



Mention this paper when writing advertisers. It will identify the proposition about which you require information.

48" Patent Geared Head Lathe



## The Bridgeford for Big Work

That's what this powerful Bridgeford is built for—big work. Has strength and rigidity sufficient to perform the heaviest kind of jobs with perfect accuracy—and it goes through them in record time. Smooth in action. Strongly constructed. Fifteen cutting speeds all easily changed.

Bridgeford's Lathes give maximum production at minimum cost. We'll be glad to give you a full account of what they will do. Write

**Bridgeford Machine Tool Works, Rochester, N.Y.**  
161 WINTON ROAD

**Coal  
Coke  
Iron Ore**

# Pig Iron

**FOUNDRY & MALLEABLE**

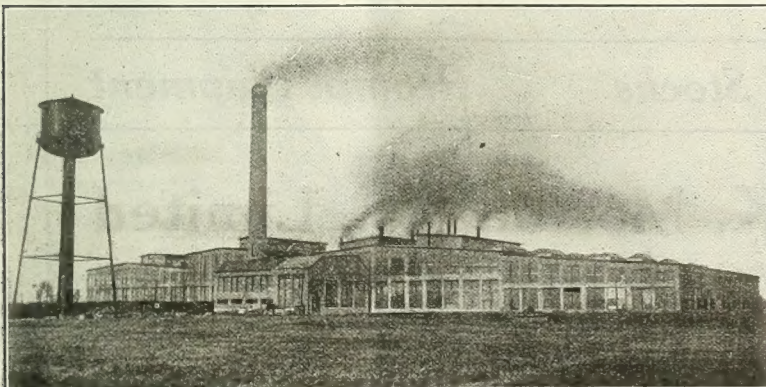
Made by The Canadian Furnace Co.  
Port Colborne, Ontario, Canada.

Victoria

**M.A. HANNA & CO.**

Sales Agents:  
**CLEVELAND**

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



Works: LONGUEUIL, QUE.

**Armstrong Whitworth**  
of Canada, Limited  
MANUFACTURERS OF  
**HIGH SPEED STEEL**  
CARBON AND ALLOY STEEL  
MISCELLANEOUS SHOP TOOLS

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

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

All Products "MADE IN CANADA"

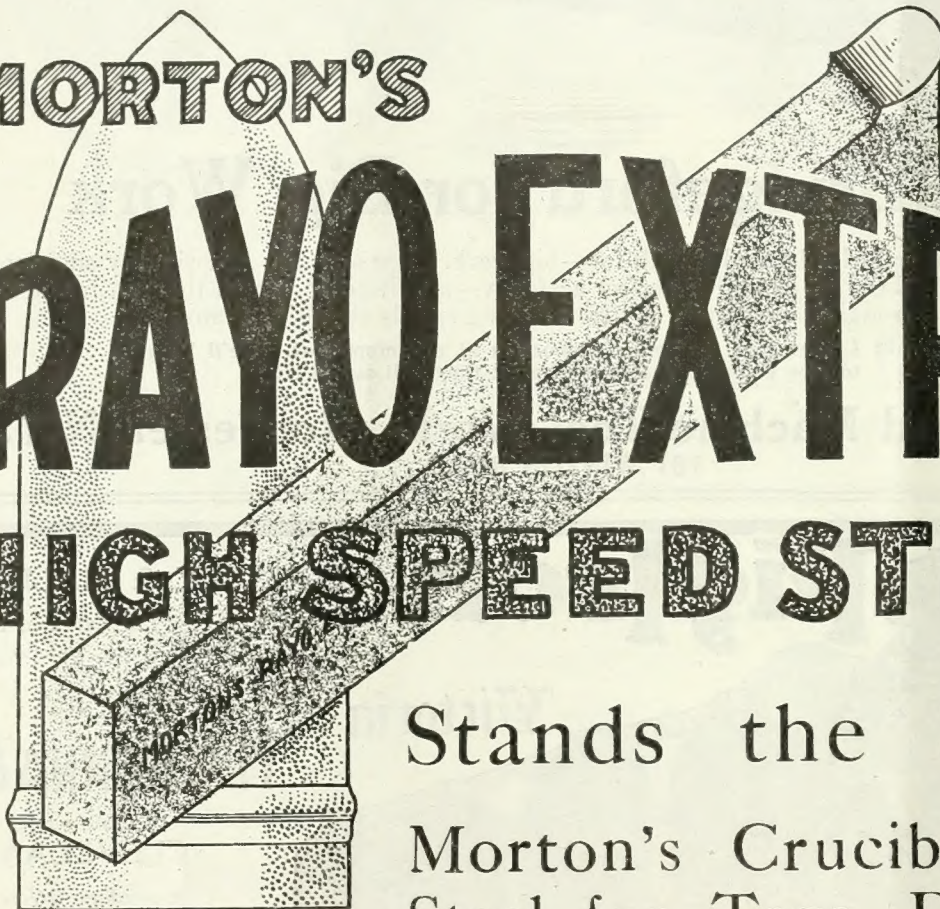
*If any advertisement interests you, tear it out now and place with letters to be answered.*



# Forging Ahead on Quality

MORTON'S

**RAYO EXTRA**  
**HIGH SPEED STEEL**



Stands the Strain

Morton's Crucible Cast  
Steel for Taps, Dies and  
All General Tool Purposes

*Full Stocks*

*Prompt Shipment*

**The Canadian B. K. Morton Co., Limited**

49 Common Street,  
Montreal, Que.

86 Richmond Street E.  
Toronto, Ont.



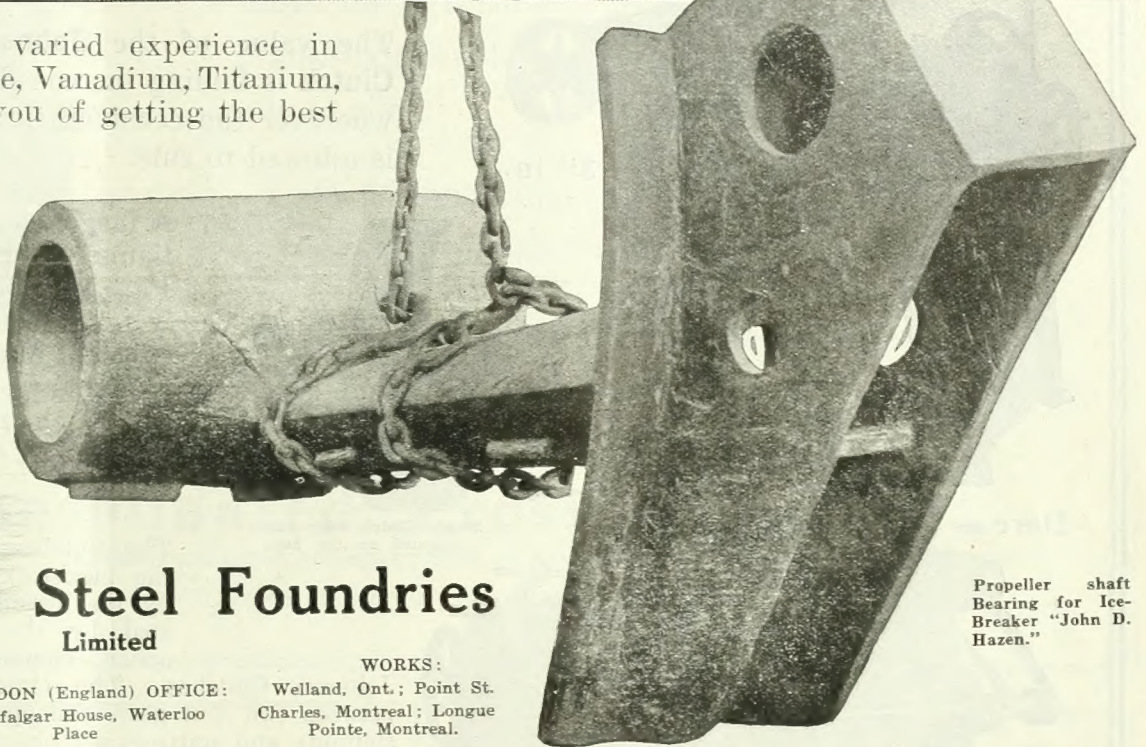
# Steel Castings



Our lengthy and varied experience in making Manganese, Vanadium, Titanium, castings assures you of getting the best of products.

Anything in castings from 1 lb. to 50 tons is right in our line. Ships' castings our specialty.

Castings made true to specifications and patterns.



Propeller shaft Bearing for Ice-Breaker "John D. Hazen."

## Canadian Steel Foundries Limited

GENERAL OFFICE: Transportation Bldg. Montreal, Canada. LONDON (England) OFFICE: Trafalgar House, Waterloo Place. WORKS: Welland, Ont.; Point St. Charles, Montreal; Longue Pointe, Montreal.

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, "SISCO" Welding Wire, Drill Rod and Swedish Iron.

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

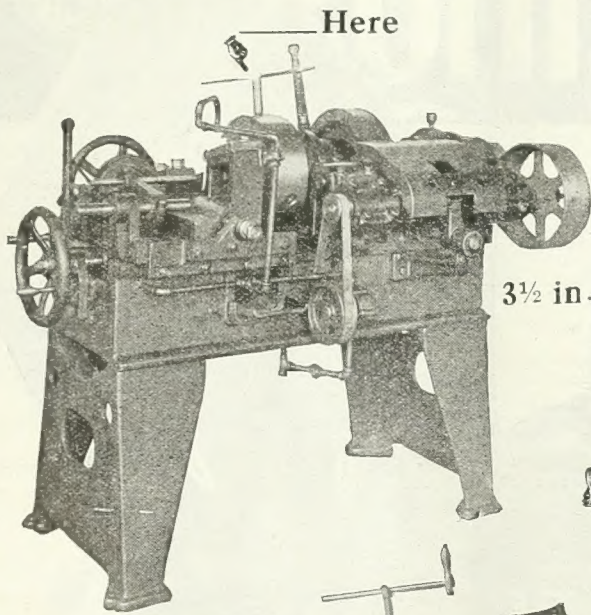
## The Life of a Thread Miller

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  
A.R. 64-66 Front Street West  
Toronto Ontario

HOLDEN-MORGAN CO. LTD.  
**THREAD MILLER**  
TORONTO CANADA

# THE JOHNSON FRICTION CLUTCH

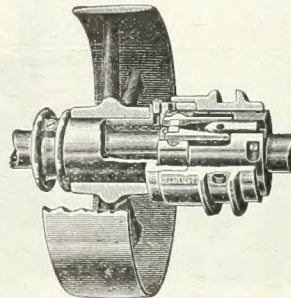


3 1/2 in.

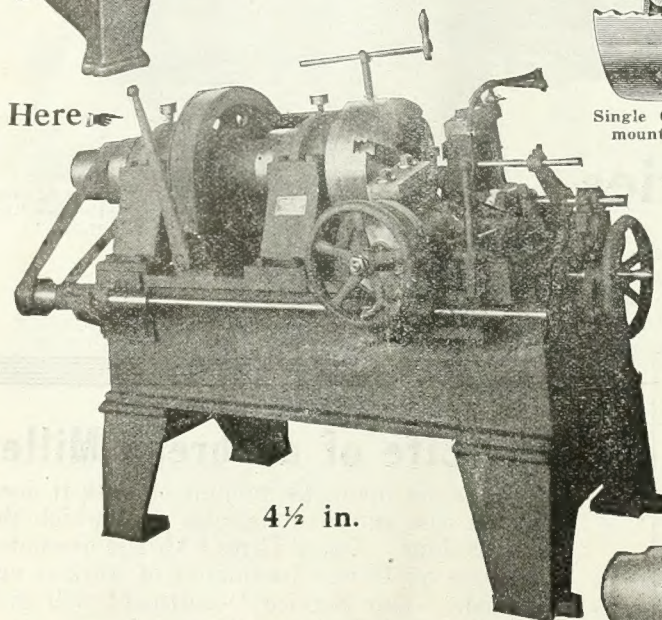
## “Spreading!”

The value of the **Johnson Friction Clutch** is finding increased recognition wherever the consideration of **Quality** is allowed to rule.

A large user is the Williams Tool Co., Erie, Pa., who have adopted it for their heavy Cutting Off Machines illustrated here, the capacity of which ranges from 3 1/2 to 5 in. of heavy bar steel.



Single Clutch with pulley mounted on the hub.

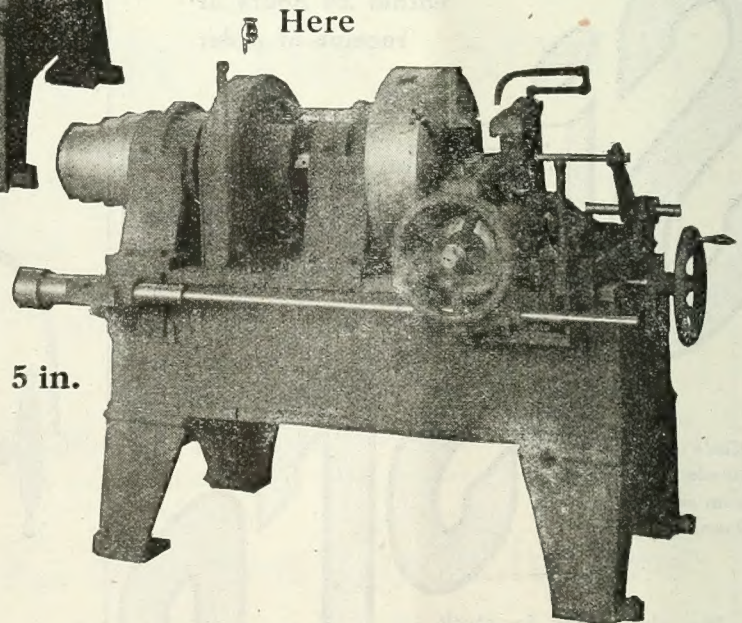


4 1/2 in.

The clutches are located in the headstock, as indicated by the arrows, being operated by the simple lever action characteristic of all Johnson Clutches. The clutch is located between two spur gears and operates both for stopping and starting and change of speed.

If you have not considered the manifold advantages of the **JOHNSON Friction Clutch**—it is nearly time to do so or your machine may suddenly fall into line with the “one-lung” auto and the tall hat—merely objects of curiosity.

“Clutches as applied in Machine Building” is a live book well worth reading by every machinist and machine builder. Why not write for a copy.



5 in.

Send for our yellow data sheets descriptive of these Clutches

**THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.**

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.

Mention this paper when writing advertisers. It will identify the proposition about which you require information.



**T**HE Self-Oiling Bearings on all Consolidated Presses are another source of satisfaction to Consolidated Press users. A constant supply of lubricant is furnished to the main bearings, the crankshaft revolving on a film of oil, automatically applied.

Provision is made for draining off the oil to be renewed from time to time.

This is a feature you cannot conscientiously overlook.

## Consolidated Press Company

HASTINGS

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

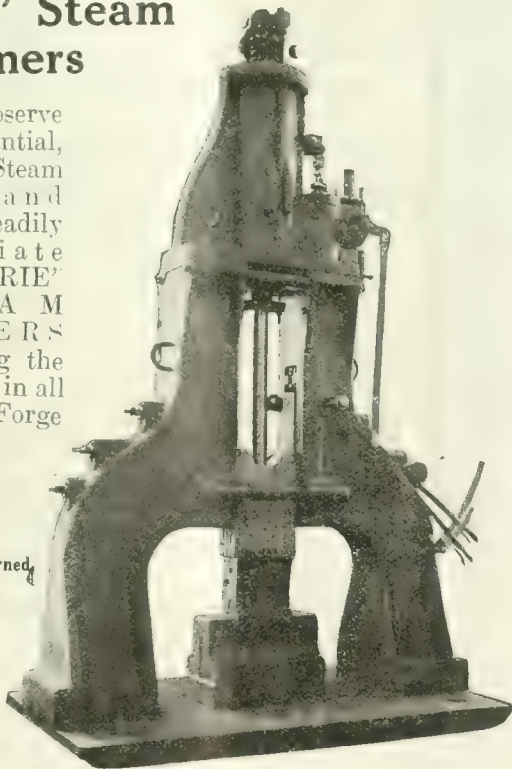
MICHIGAN

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

### "Erie" Steam Hammers

Closely observe this substantial, well built Steam Hammer and you will readily appreciate why "ERIE" STEAM HAMMERS are getting the preference in all modern Forge Shops.

They have earned their enviable reputation.



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

### Here's One Means of Saving Time In Mmunition Manufacture—

The marking of Range Rings, Rifle Parts, Timing Fuses, Gun Sights, Shells, Shrapnel on round or flat surfaces of tools or other work.

*Martin*

No. 6

#### Hand Marking Machine

This machine was designed to cut time and costs in this work. How well it does it is evidenced by the records it has made. With these machines your marking can be accomplished in minimum time at a lower cost than by hand and in a much more satisfactory manner.

Send us your prints or samples and we will give you full particulars. Send now.

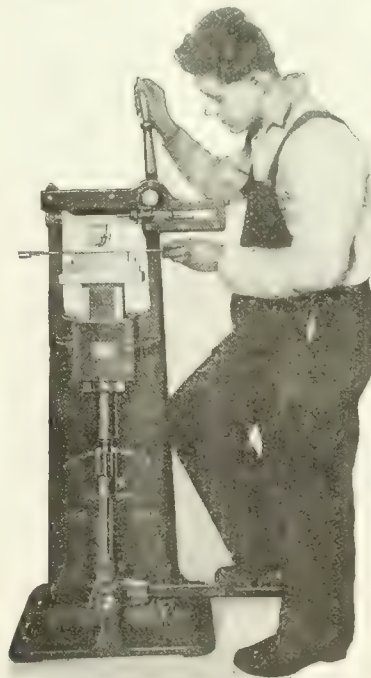
Write to

**"The Marking Machine People"**

**Martin Machine Co.**  
Greenfield, Mass.  
U. S. A.

Manufacturers of both Hand and Power Machines.

Canadian Representatives.—The Canadian Fairbanks Morse Co., Ltd., Calgary, Montreal, Toronto, Vancouver, Winnipeg, St. John.



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



# "Red Cut Superior"

## HIGH SPEED STEEL

YOU have thought of many qualities you would like to have in High Speed Steel Tools—such as cutting edges with long life, freedom from brittleness, great reserve strength and toughness to resist shocks and strains, tools that would not require special heat treatment, tools that would take deep roughing cuts or fine smooth finishing cuts, and in addition, could be worked at higher speeds than you ever dreamed of. All these virtues and many more are contained in "Red Cut Superior", a First Quality High Speed Steel. Furnished in Annealed Bar Stock, Discs, and Treated Tool Holder Bits.

Are your tools made of **Red Cut**?

Send for folder

## VANADIUM - ALLOYS STEEL COMPANY

Pittsburgh, Pa.

Works at Latrobe, 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

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



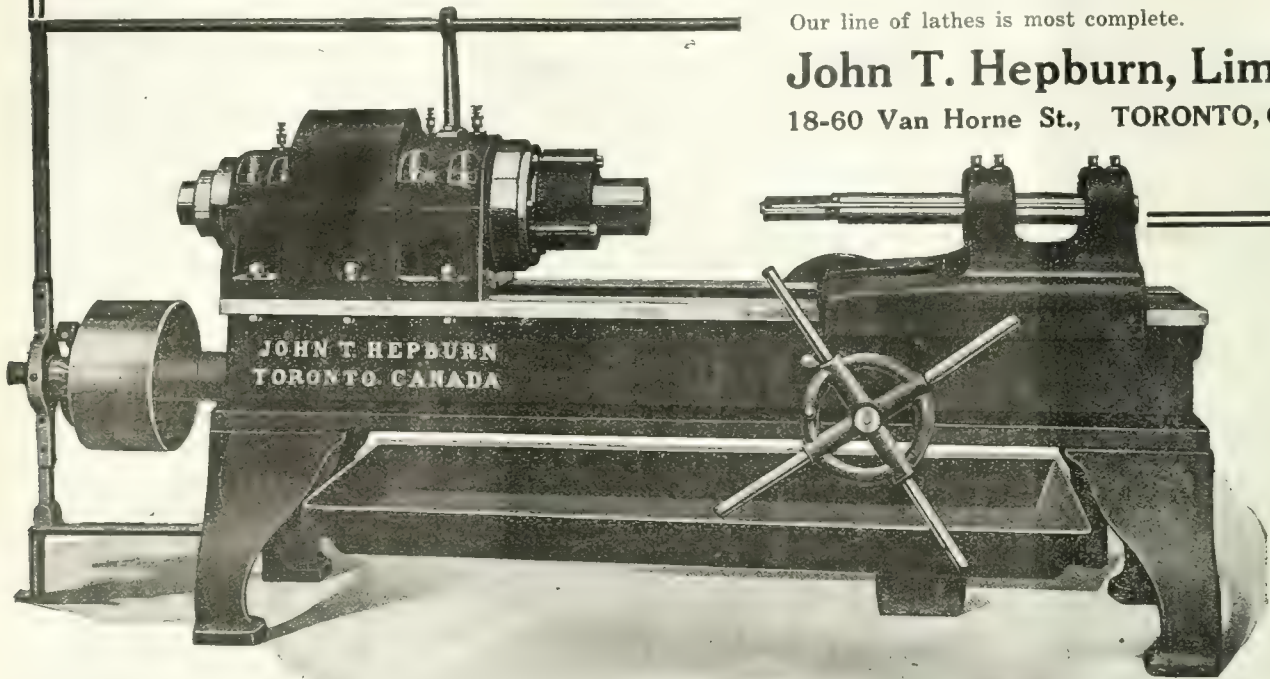
## *Its Construction and Achievements*

The array of performances this lathe has made in boring shells up to 6" is sufficient to warrant the confidence that our clients express in them. While speed is a great asset, yet the quality of work done and the condition of the machine after excess use have excited the most favorable comment. An inquiry would be thoroughly attended to.

Our line of lathes is most complete.

### **John T. Hepburn, Limited**

18-60 Van Horne St., TORONTO, Ontario



# 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

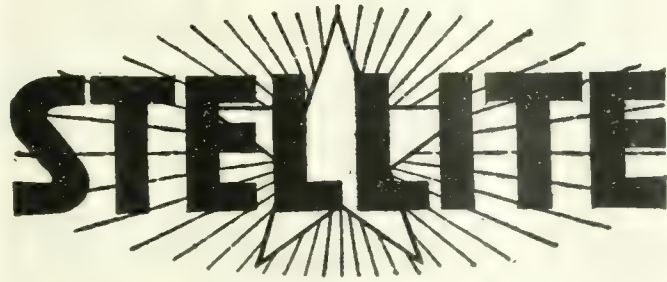


A  
Keen  
Cutter

**WOLFRAM**  
*Is Both*

**VULCAN CRUCIBLE STEEL CO.**  
ESTABLISHED 1900  
Aliquippa Pa. U.S.A.  
Represented in Canada by Messrs Norton  
Callard & Company Que.  
MONTREAL

Strong  
in the  
Neck



## **This Wonderful Metal**

is made in different Grades and can be adapted for  
**A MULTITUDE OF OPERATIONS.**

## **Remarkable Results are Being Obtained**

in machining Steel, Iron, Bronze, Brass,  
Ivory, Celluloid, etc.

## **DIES OF ALL DESCRIPTIONS**

are cast for hot or cold drawn work.

---

*Write us for particulars, stating the class of work  
you are on, and what your difficulties are. Our  
Engineering Staff is at your disposal.*

---

## **DELORO SMELTING & REFINING CO., LIMITED**

*Head Office*

**DELORO, ONTARIO**

**TORONTO**  
200 King Street West

**MONTREAL**  
315 Craig Street West

# CO CO

## TURNING STEEL

### TOOL HOLDER BITS

"THE BIT WITH THE GROOVE"



## What CoCo is Doing on Other Jobs

**"CoCo"** will do the same in your shop.—will cut faster or longer than other steels. Here are some proofs:—

**"CoCo"** is cutting Semi-steel Castings at 100 ft. per minute, cut  $\frac{1}{2}$ " deep. 30 hours' continuous service between grinds.

**"CoCo"** is turning Cast Iron Hydrant Caps at 169 ft. per minute, feed  $\frac{1}{8}$ ", cut  $\frac{3}{8}$ " and turns 4 hydrants per grind where less than one per grind used to be standard.

**"CoCo"** is turning .40 Carbon O. H. Forged Rams at 95 ft. per minute, feed  $\frac{1}{4}$ ", cut  $\frac{3}{32}$ " turning 3 rams in the same time it formerly took to do one.

## CAN YOU BEAT IT?

*CoCo Steel does not do stunts—It does the work. It will do yours as well. Ask us.*

# COLONIAL STEEL COMPANY

PITTSBURGH    BOSTON    DETROIT    NEW YORK    PHILADELPHIA    ST. LOUIS    CHICAGO

*Mention this paper when writing advertisers. It will identify the proposition about which you require information.*





# URANIUM HIGH SPEED STEEL

STANDS UP UNDER  
SHOCKS  
IMPACTS  
STRAINS

WHICH ARE INCIDENTAL IN CUTTING  
STEEL AND IRON

*at*

HIGH SPEEDS

*Due to*

ROUGH SPOTS  
UNEVEN SURFACE  
SANDS, PITS, Etc.

*See Your Tool Steel Man or Write Us*

## Standard Alloys Company

Forbes and Meyran Avenues

PITTSBURGH

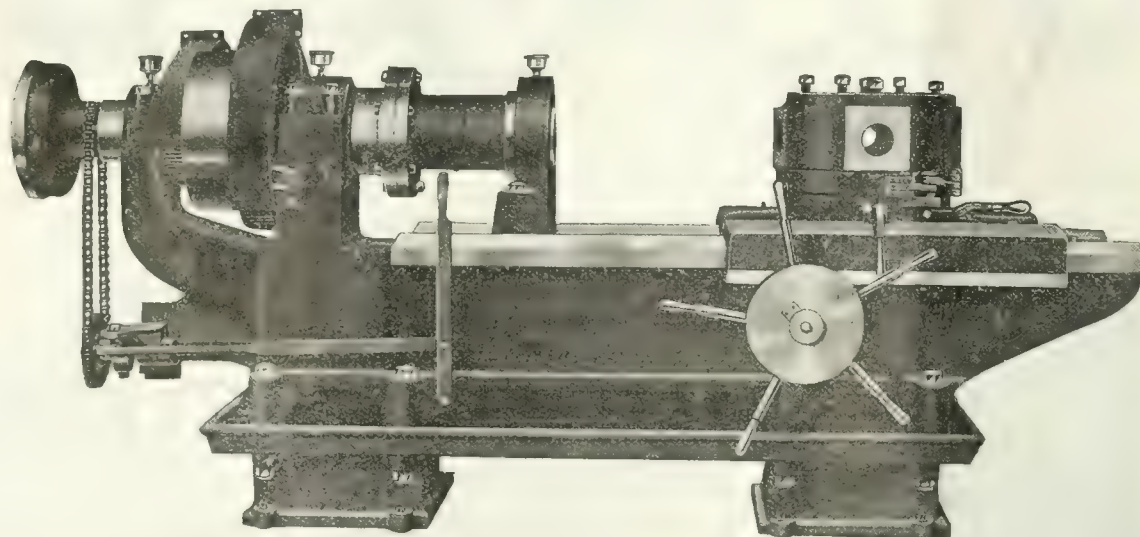
PENNA.

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

# IN STOCK—FOR IMMEDIATE SHIPMENT

SUBJECT TO PRIOR SALE

H.E.W. Boring Lathes To Handle Shells Up To 6"



MADE IN CANADA

SPECIFICATIONS ON REQUEST

## HYDE ENGINEERING WORKS

CONSULTING AND MANUFACTURING ENGINEERS

P.O. Box 1185

27 William Street, MONTREAL, P.Q.

*IF YOU WANT THE*

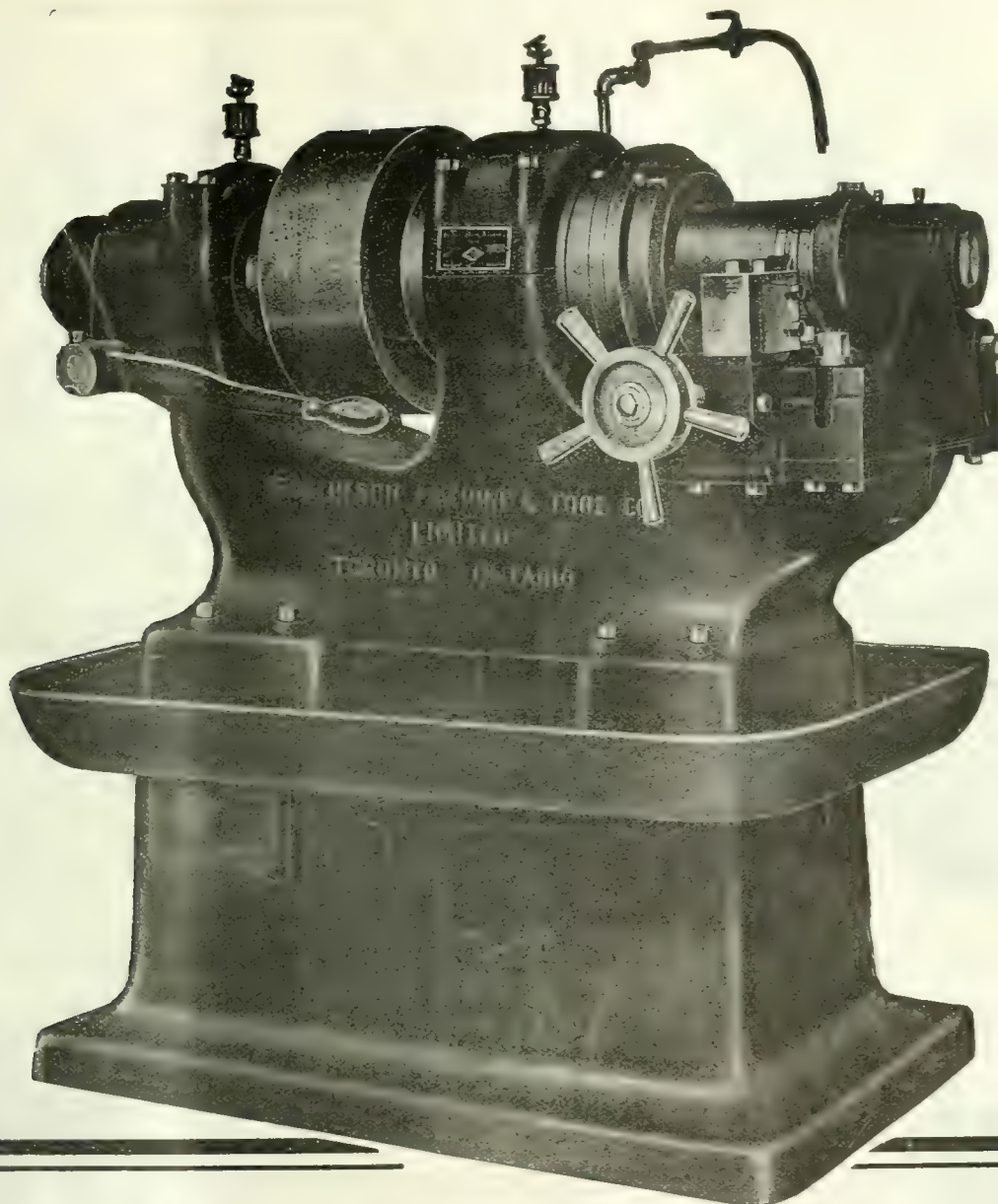
**B**EST  
**A**SE PLUGS,  
**U**Y  
**A**NFIELD'S

Have in stock for immediate shipment either threaded or bevel Plugs for 4.5", 5" and 6" High Explosive Shells. These are shipped subject to acceptance of Government inspector at your plant.

*Capacity, 3,000 per day. Write for prices.*

**EDWIN J. BANFIELD**  
**STAIR BLDG. . . . . TORONTO, ONT.**

Manufacturer of Plug Milling Machines for above size shells. Prices and deliveries on application.



## Just Now—

we have two 4.5 machines ready for immediate delivery

**T**HIS Band Turning Machine, by its ability to perform efficiently month after month under exceptional production strains, has proved its worth to munition makers. It is being used by many Canadian munition plants, where it is giving absolute satisfaction.

A glance over some of the features will interest you.

Integral (en bloc) construction assures

perfect rigidity, permanent accuracy and desirable compactness.

Chucking with spring collet chuck insures accurate and speedy chucking.

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

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

## ROELOFSON MACHINE & TOOL COMPANY, LIMITED

Head Offices: 1501 Royal Bank Bldg., Toronto, Canada. Works: Galt, Canada

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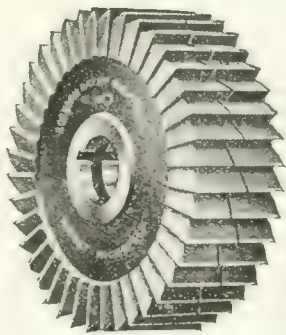
# DOUBLE M U S H E T

High Speed Steel

Carbon Steel

Gauge Steel

Alloy Steels



*Twist Drills and  
Reamers, Milling  
Cutters and Slit-  
ting Saws*

SOLE MAKERS

**Samuel Osborn & Co. Ltd.**  
SHEFFIELD



**Sam'l Osborn (Canada)**  
Limited

Head Office and Works: Montreal, P.Q.

Branch Office: Toronto, Ontario

## Your Riveting?



How is it done? Are you getting the necessary speed? Is the quality of the highest character? How much is it costing you?

The Grant Rivet Machine has established the records of one clean, perfectly finished rivet per second. Is that speedy enough, or is it too speedy? This is the fastest any similar machine will work and if too speedy it could be worked in conjunction with some other work.

Our catalogue is worth writing for. There is one for you.

**THE  
GRANT**

Mfg. & Machine Co.  
Holland Ave.  
Bridgeport Conn.

## HIGH SPEED HAMMERS

For High Speed Work

### FEATURES:

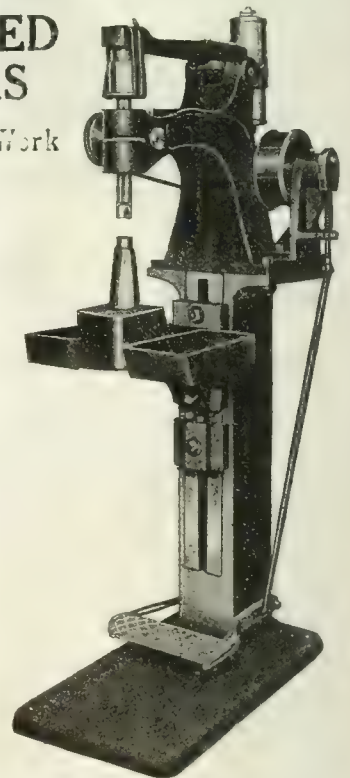
Economy in floor space, elimination of weight and a guaranteed saving of from 15% to 20% on any class of work. The life of the machine is practically indefinite as phosphor bronze bushings are used throughout.

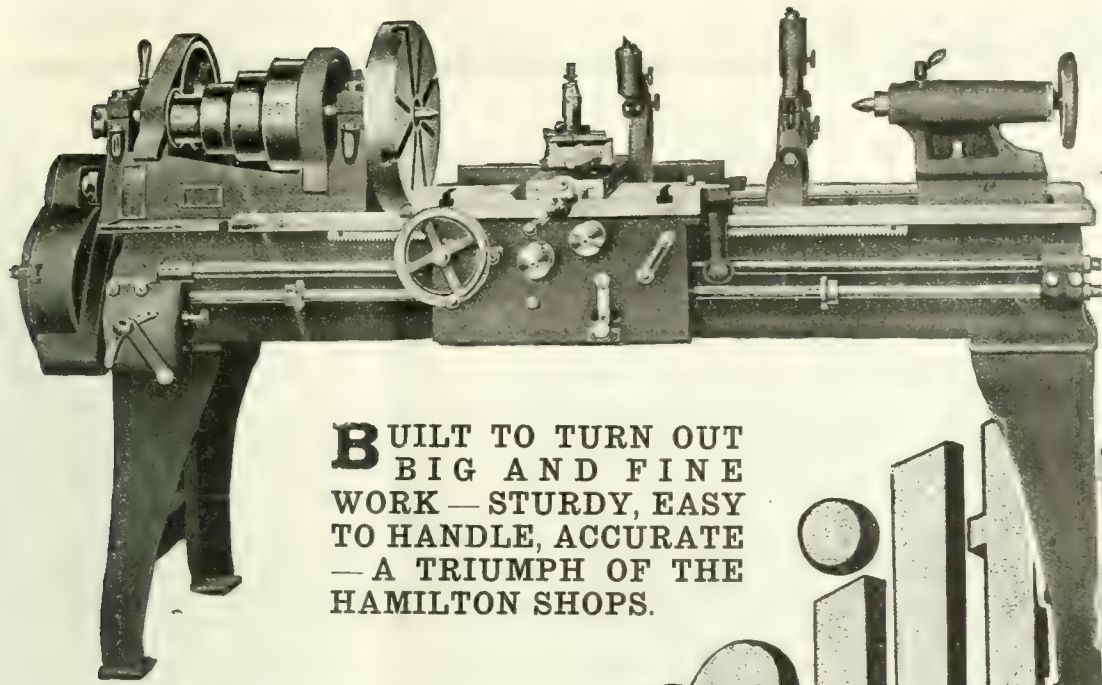
No riveting too intricate for us; no riveting which our machine cannot accomplish.

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.





**B**UILT TO TURN OUT  
BIG AND FINE  
WORK — STURDY, EASY  
TO HANDLE, ACCURATE  
— A TRIUMPH OF THE  
HAMILTON SHOPS.

**Hamilton**

**H**

“The  
Distinguished  
Service Lathe”

In this Lathe you see exemplified the skill of expert workmen with years of “Hamilton” experience—experience which means something. It is a lathe that well represents the best of our high class machines—a lathe most carefully constructed with lasting materials—a lathe that turns out work of the calibre of its own ideal construction.

The illustration shows the sturdy, easy working “Hamilton” complete with equipment—single back gears, hollow steel spindle, self-oiling bronze boxes, power cross feed. There is a good deal more we can tell you about this profit-making quality worker. Write to us and we will send you interesting literature.

**The Hamilton Machine Tool Co.**  
HAMILTON, OHIO

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

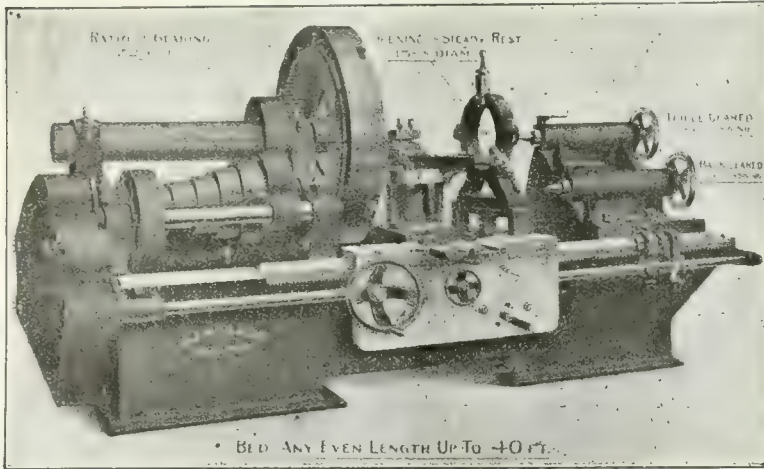


FOR 25 YEARS MAKERS  
OF FINE MACHINE TOOLS

# Do More! ——— — --put on more steam

**is the industrial slogan of to-day**

You can "do more" with McCabe's "2-in-1" lathe than any other big Lathe built, because you have "more" capacity.



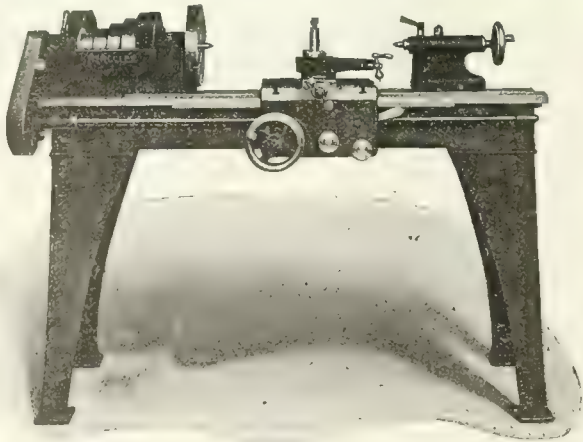
McCABE'S "2-in-1" Double-Spindle Lathe—26-48 inch Swing  
As a 48 inch Triple-Geared Lathe.

It will carry DOUBLE the burden, by handling such work as you would put in a 26-inch lathe when there's no big work to do, as a 48-inch.

Our most valuable resource is time—save the time other big lathes stand still by installing McCabe's "2-in-1" Double Spindle Lathe. Never idle. Save \$1,000 in the price. Other big lathes cost that much more.

Immediate Shipment 12-ft. beds—from stock.

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



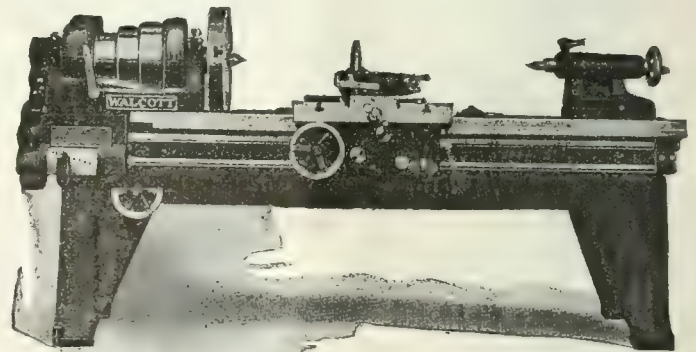
## LATHES

12", 16", 18" and 21" swing

Strictly modern in design, rigidity  
and accuracy guaranteed.

**Himoff Machine Company**

45 Mills Street  
Astoria, City of New York, N.Y.



## THE WALCOTT LATHE

is backed by lathe-building experience  
extending over 35 years

These are features of Walcott Lathes: drop-forged gears in apron; all-steel gears in gear-box; large ways on bed, all gears completely enclosed. Parts are interchangeable. Rigid headstock and tailstock.

You'll get the full story in our printed matter. Send for it surely if you are about to buy a lathe.

**WALCOTT LATHE COMPANY**

Successors to  
Walcott & Wood Machine Tool Co., Calhoun St.,  
Jackson, Michigan

# Improved Centering Machine

## Mr. Shell Manufacturer:

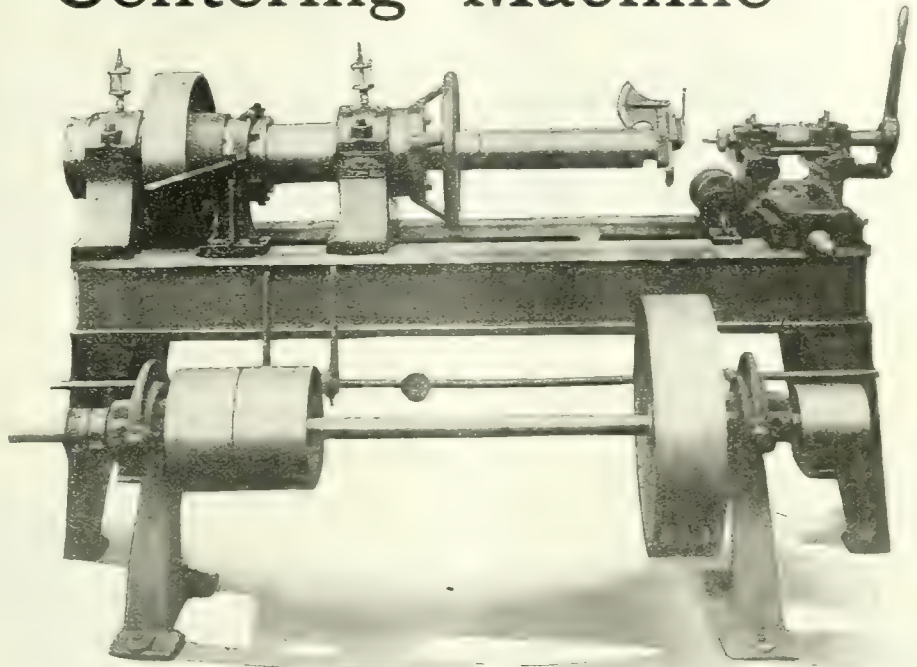
The importance of centering is obvious.

This tool is giving real satisfaction every day and stays on the job.

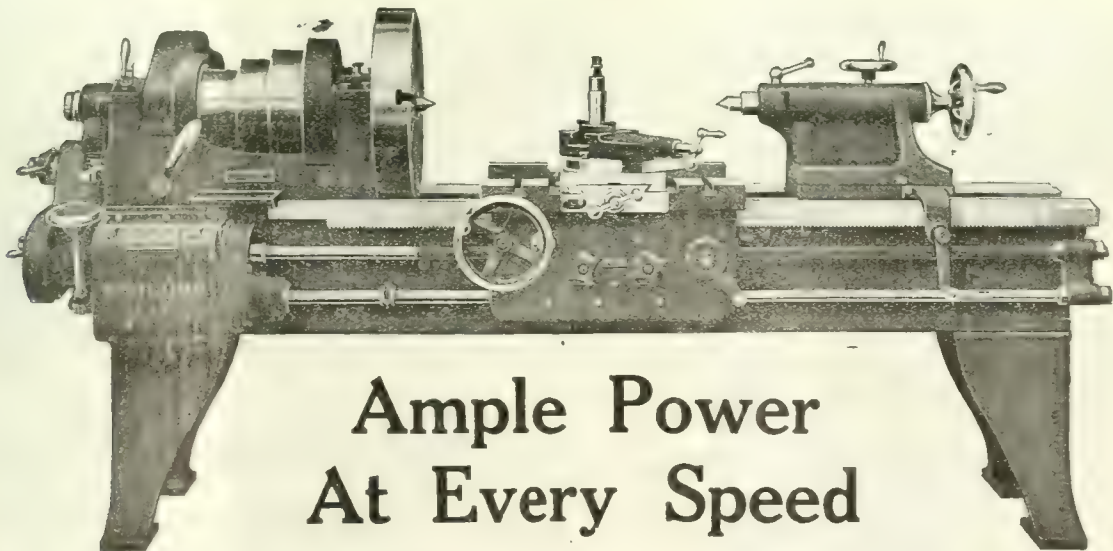
Write for price and description.

Delivery, ship 10 days after order.

Shipping weight 2040 pounds.



VICTORIA FOUNDRY COMPANY, LIMITED  
OTTAWA, ONTARIO



## Ample Power At Every Speed

On this 18-in. Whitcomb-Blaisdell Lathe, the drive is through double back gears and a three-step cone pulley carrying a wide belt. Thus nine changes of spindle speeds are obtained, yet at the different speeds the effective power is far more nearly equal than in the usual construction with plain back gears.

Just one detail—but typical of the many details which unite to make this machine tool capable of turning out the nicest work with great rapidity. Read all about it—in our latest catalog.

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

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

*We will Fill Your Requirements*



*Send us Your Inquiries*

## Air Compressor Evidence

The greatest evidence of the value of any article is the demand for it after investigation and trial. Below are four carloads of our compressors which fills one order to a large concern in Canada. Our line of compressors is very large.

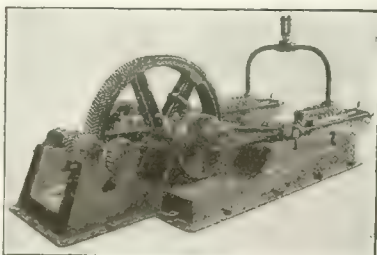
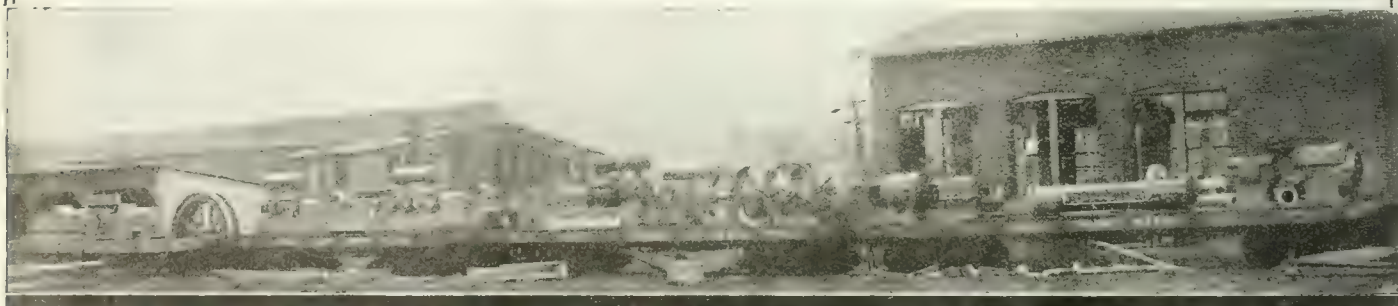
Write us and explain your requirements.

### The Jenckes Machine Company, Limited

WORKS:  
Sherbrooke, Que.

CANADIAN SALES OFFICES:  
Sherbrooke, Montreal St. Catharines, Toronto.  
Cobalt, South Porcupine, Vancouver.

WORKS:  
St. Catharines, Ont.



## ELMES

### 18" Stroke Hydraulic Pump

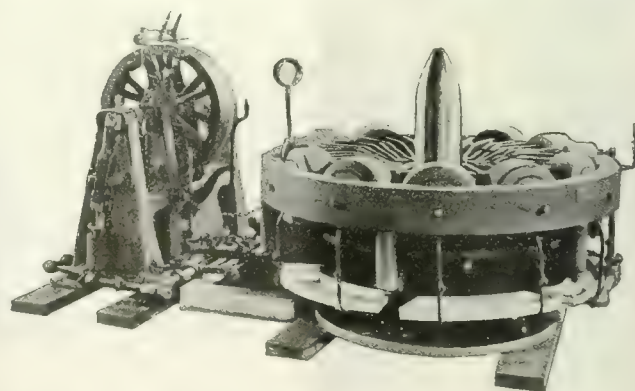
for maximum pressures and capacities, for 250 horse-power motor—a pump designed to meet the demand for a high-pressure outfit of large capacity, and one able to withstand the severe usage of present-day practice.

*Other designs for all pressures and capacities.*

**Charles F. Elmes Engineering Works**

217 No. Morgan Street

CHICAGO, ILL.



## The New "West" Banding Press

For 9.2" and 8" shells

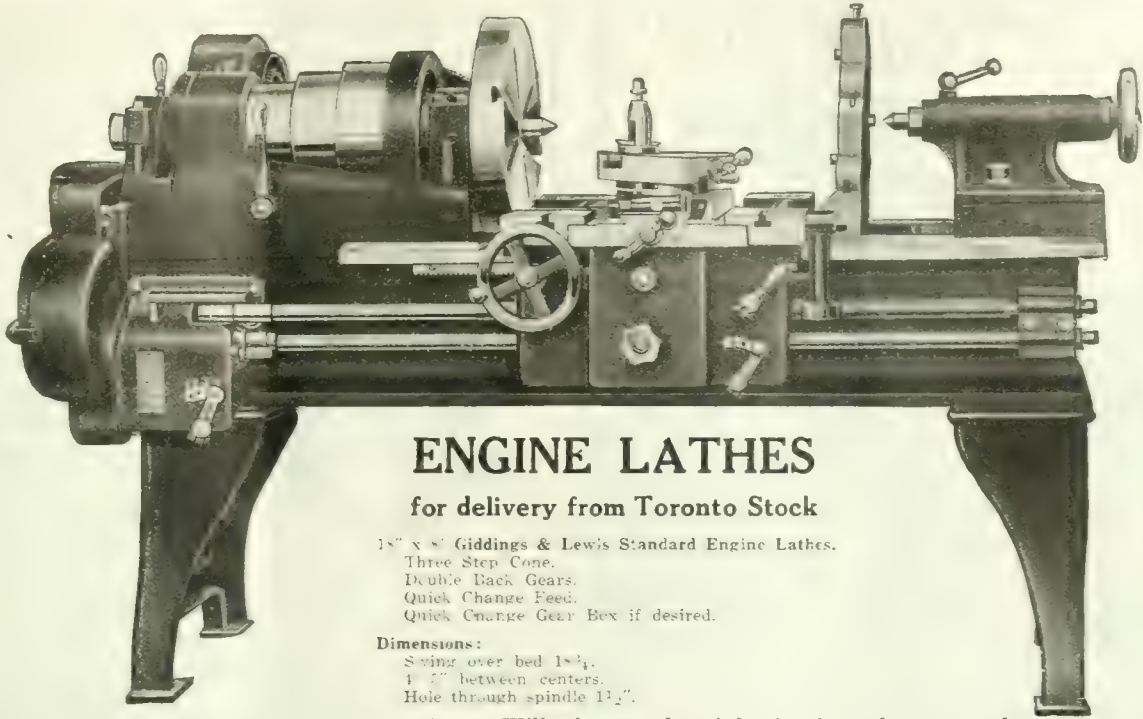
12 Cylinders; Ample Power; Ample Strength; Reasonable Price.

**NO ACCUMULATOR REQUIRED.**

**The West Tire Setter Co.**

255 Mill Street, Rochester, N.Y.





## ENGINE LATHES

for delivery from Toronto Stock

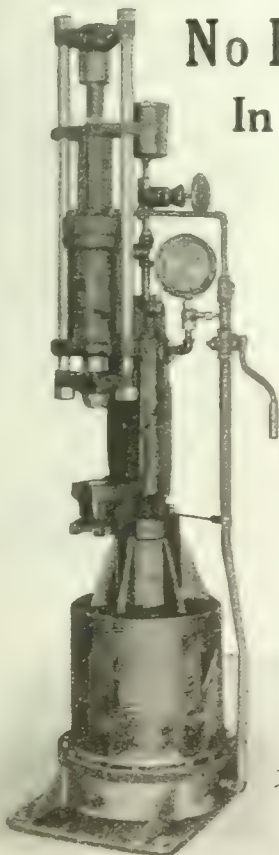
18" x 54" Giddings & Lewis Standard Engine Lathes.  
 Three Step Cone.  
 Double Back Gears.  
 Quick Change Feed.  
 Quick Change Gear Box if desired.

Dimensions:  
 Swing over bed 18 1/4".  
 1' 5" between centers.  
 Hole through spindle 1 1/2".

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

Write for full specifications and prices.

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



## No Excess Parts In This Triple Purpose Machine

"Metalwood" Hydro-Pneumatic Combination Forcing, Broaching and Straightening Press is essentially a production machine. It is adaptable to many uses and is built without a single excess part. Auxiliary tables and fixtures add further to its usefulness.

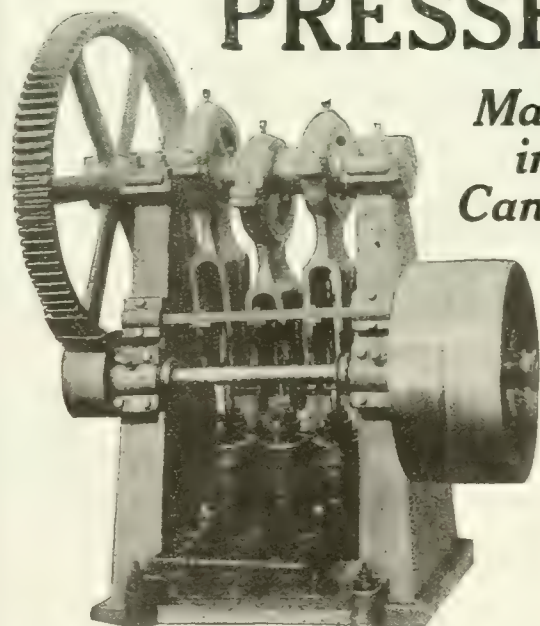
**Metalwood  
 Mfg. Co.**

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

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

## PRESSES

*Made  
 in  
 Canada*



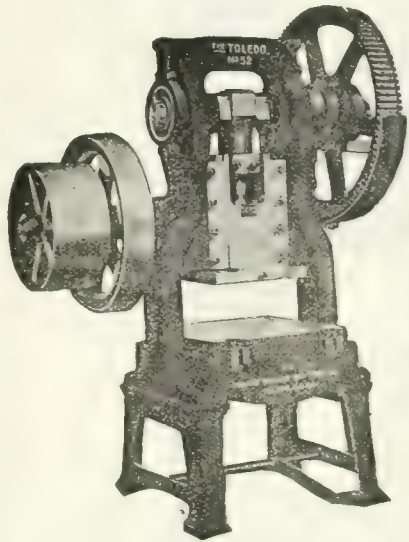
Hydraulic Presses, Pumps and Accumulators for all purposes

WRITE FOR PRICES AND DELIVERIES

**WILLIAM R. PERRIN, Limited**  
 TORONTO, CANADA

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

# The "TOLEDO" ARCH PRESSES



with slight modifications will operate nearly all the blanking, forming, wiring and combination dies ordinarily used in the manufacture of all kinds of pieced tinware, lard pails, buckets, pans, etc. Furnished with solid or removable front piece

to bed and on upright or inclined standards. Particularly efficient for shops where saving of space is an object.

**The Toledo Machine & Tool Co.**  
Toledo, Ohio

## A Combination of Rigidity, Accuracy, Simplicity and Ease of Operation



Bodies are inclinable and convenient for handling dies and material. Slides are long and well gibbed.



## Inclinable Power Presses

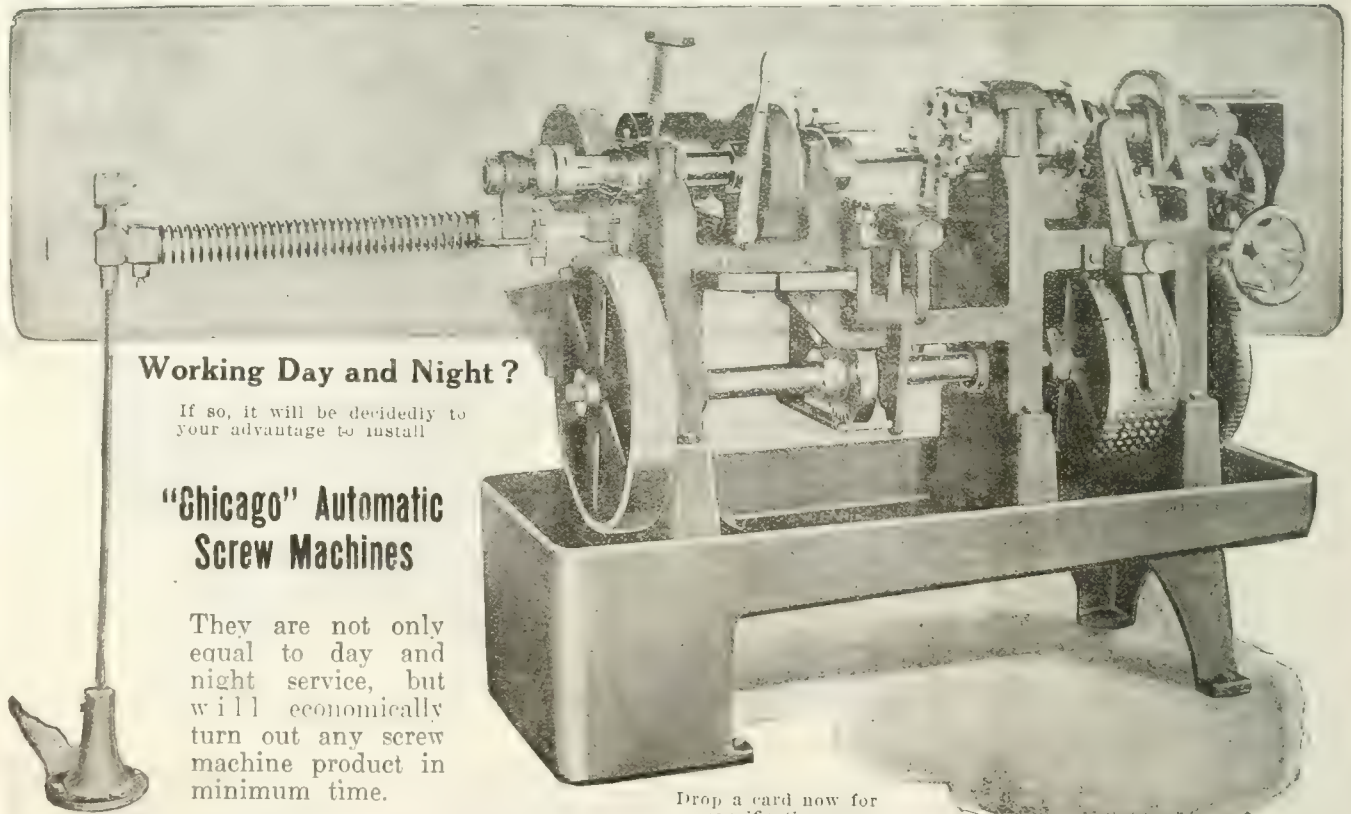
reduce the maintenance cost of both machine and tools.

**BUILT IN EIGHTEEN SIZES.**

Adapted for many operations in the manufacture of tin cans, pieced tinware, metal packages, brass goods, electrical goods, trimmings, etc. *Catalog 2-G, describing them, sent on request.*

**E. W. Bliss Co.,** 20 Adams Street, Brooklyn, N.Y. U.S.A.

Chicago Office: Peoples' Gas Bldg.; Detroit Office: Dime Bank Bldg.; Cleveland Office: Union Bank Bldg. Offices in Europe: 100 Boulevard Victor Hugo, St. Ouen, Paris; Pocock St., Blackfriars Rd., London, S.E.



### Working Day and Night?

If so, it will be decidedly to your advantage to install

### "Chicago" Automatic Screw Machines

They are not only equal to day and night service, but will economically turn out any screw machine product in minimum time.

**READY FOR OPERATION IN YOUR PLANT IN LESS THAN SIX WEEKS** from the time your order reaches us.

Drop a card now for specifications.

**The John MacNab Machinery Co.,** 90 West Street NEW YORK  
European Representative: John MacNab, Hyde, England.

# Bilton Automatic Gear Millers—Spur or Bevel Gears

## CAPACITY

- No. 1 - - 14 Pitch
- No. 2 - - 10 Pitch
- No. 3 - - 8 Pitch

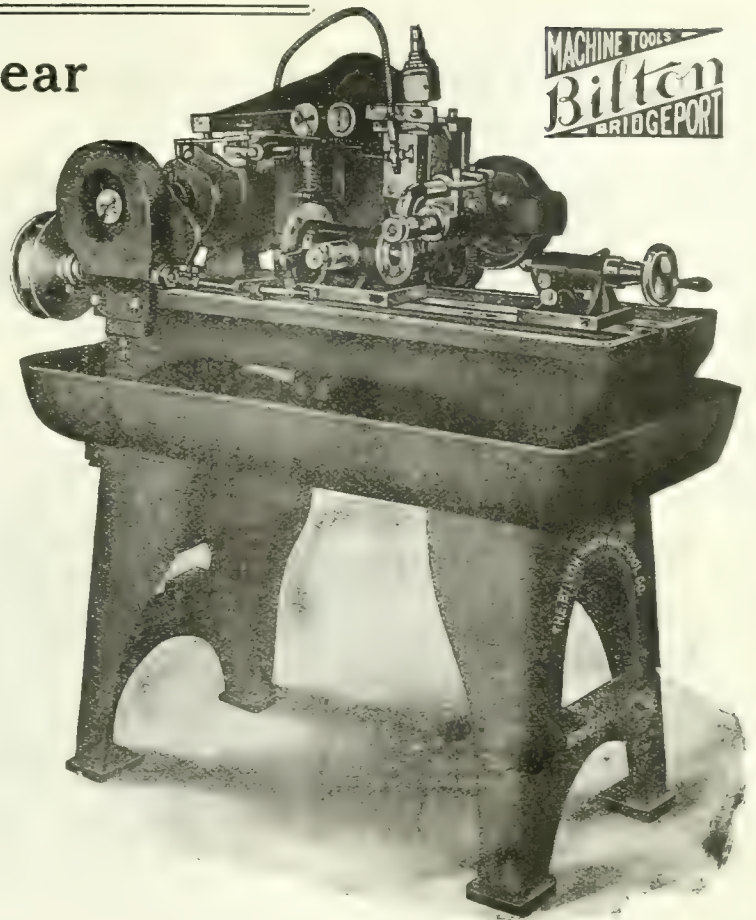
## The Bilton Machine Tool Company

Succeeding The Standard Mfg. Company  
 Housatonic Ave., Bridgeport,  
 Conn., U.S.A.

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

Catalog 30 on request.

Foreign Agents:  
 Alfred Herbert, Limited  
 M. Mett Engineering Company  
 Chas. Churchill Company, Limited



## For Rapid Production and Accurate Work

### USE THE "BRIGGS"

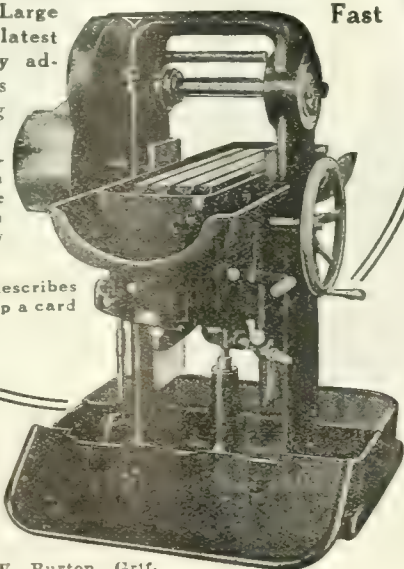
The Briggs Miller handles work no other machine of its size can touch. It is a manufacturing machine. On account of its rigid construction it will produce accurate work when running at a high rate of speed and feed.

The Base Tank and Large Gear Pump is the latest addition to its many advantages. Tank holds 20 gallons of cutting lubricant

Fast

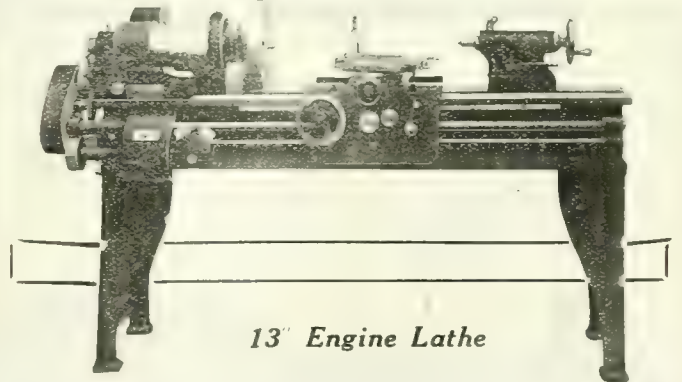
Pump never requires priming and will deliver ten gallons per minute to the cutters, keeping them cool when run at very high speed.

Our booklet describes fully. Drop a card for it.



Gooley & Edlund Inc.  
 Cortland, N.Y., U.S.A

Foreign Agents: Allied America, France, Belgium, Italy, Switzerland, Machinery Company of Russia, Scandinavia, C. W. Burton, Griffiths & Co., London, Manchester and Glasgow, Barandiaran, Metivier, Gazeau & Cia, San Sebastian, Spain.



13' Engine Lathe

## "Filsmith" Quality

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

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

# SMOOTH AS GLASS

That's the kind of grinding you want  
That's the kind you get

WITH THE  
**Dominion Universal Grinder**

ADD TO THIS

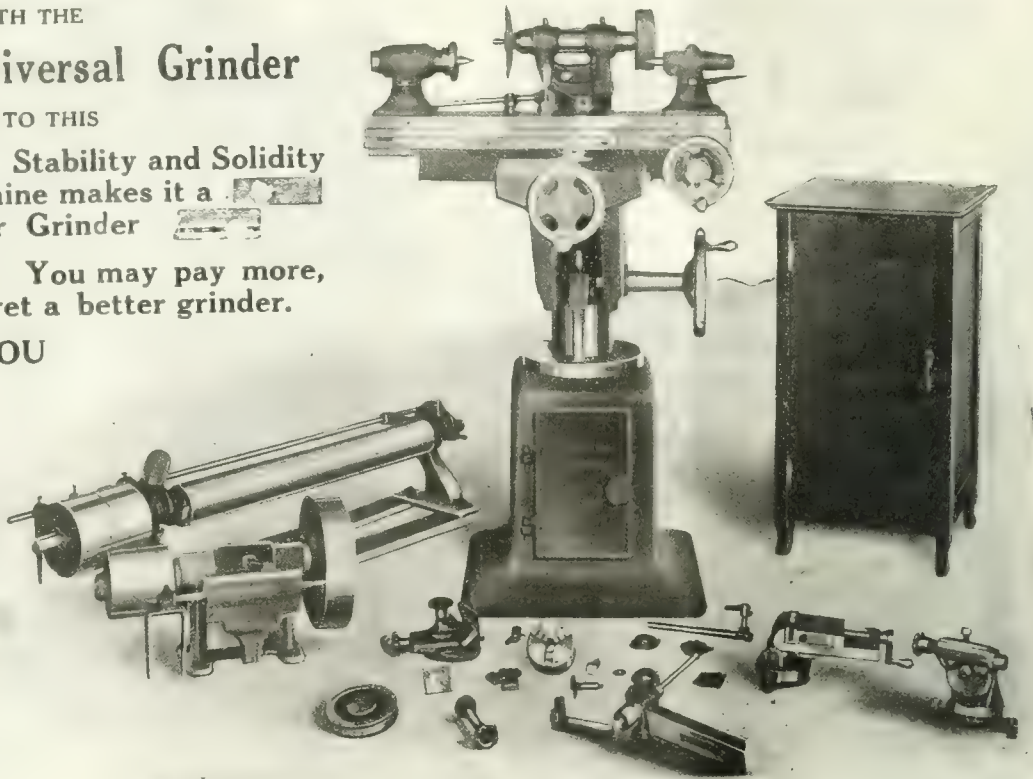
Ease of Operation, Stability and Solidity  
of the Machine makes it a  
**Master Grinder**

Try One and See. You may pay more,  
but you cannot get a better grinder.

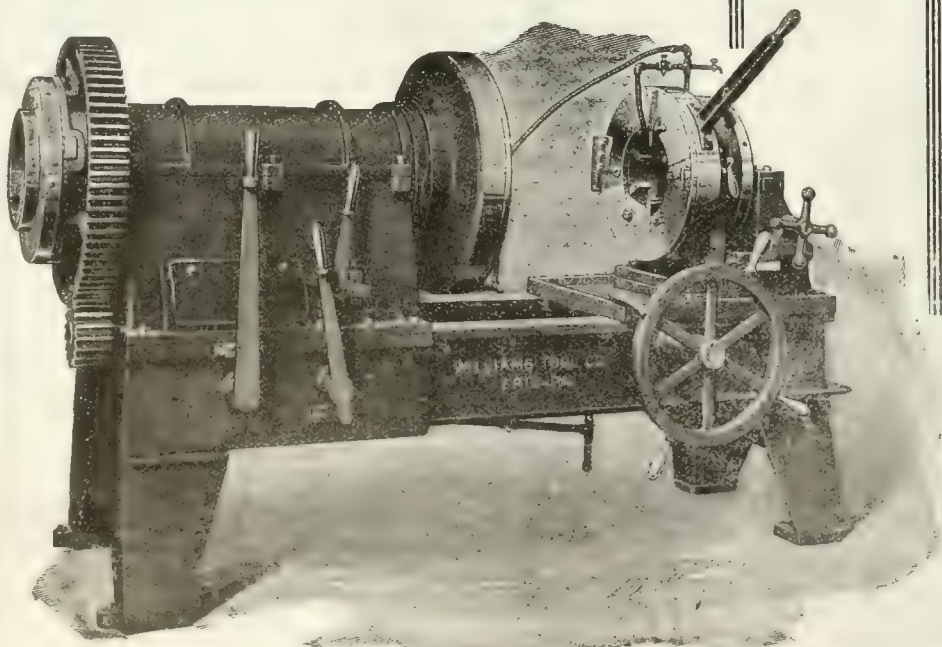
LET US TELL YOU  
MORE  
ABOUT IT

**Dominion  
Machinery  
Company**

110 Church St.  
Toronto, Ont.  
Canada



## Williams Gives You Quality "Insurance"



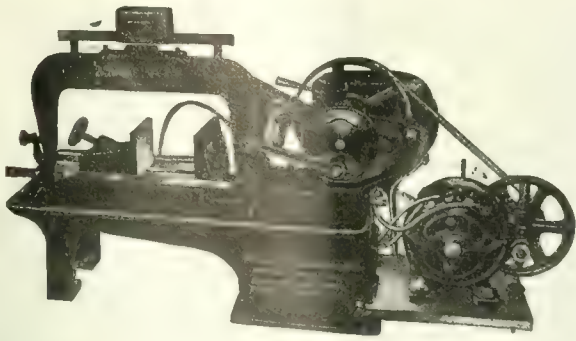
Amongst those who know the value of Williams Cutting and Threading Machine and those who use these machines, there is a confident assurance that at least one department of the works is up to 100% efficiency. They are made in 11 different sizes and each size made to include 10 sizes. For utility and value the Williams have no equal. A letter to us will command our immediate attention.

**Williams Tool Co.**

Erie, Penn. U.S.A.

Can. Agents:

The A. R. Williams Machinery Co.,  
Ltd., Toronto, Canada



**We will send a Racine on a Trial Basis—Why?**

The Racine machine is the only high-speed metal-cutting machine in the world that is absolutely positive in every action, and will duplicate itself in every cut during the entire life of the machine. All wearing parts are adjustable and accurately machined.

**Racine Tool & Machine Co.**  
15 Melbourne Ave., Racine, Wis., U.S.A.



**The Reason For So Many Repeat Orders**

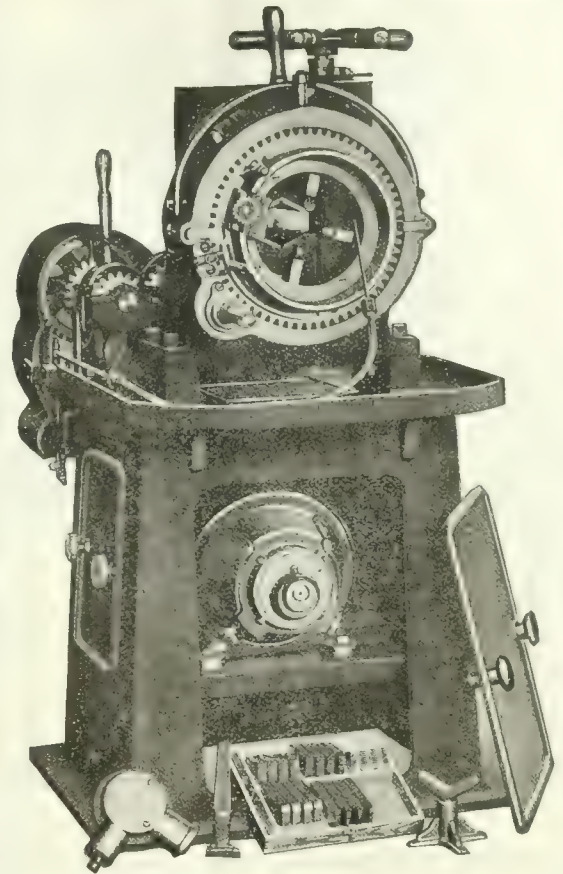
after comparative tests is that no magnifying glass is necessary to distinguish the increased production and the better class of work on the PEERLESS High-Speed Cutting-off Saw.

A third order just came in from one of the largest concerns in the United States, and is it not a fact after a firm has standardized on a certain make of tool that some real results must be produced in order to effect a change?

One of our customers writes: "It takes us only 1-15th of the time to cut our stock on the PEERLESS than it did on our other machine."

If you are open to conviction we have a proposition to offer that no manufacturer can afford to pass up.

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



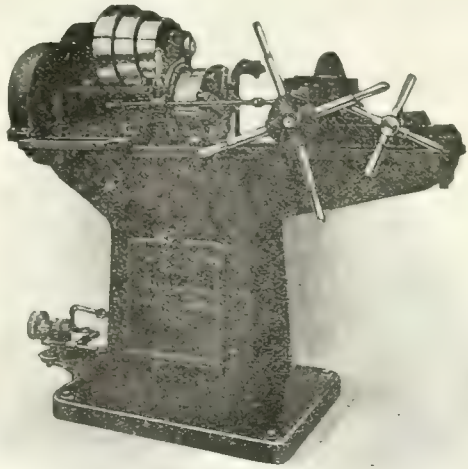
**"Forbes Facts"**

1. One man can do the work of six against the old stock and die method of cutting.
2. It is the only machine on the market with receding gear.
3. It is self-contained and motor-driven.
4. It is portable.

These are convincing arguments for the construction and utility of this machine. Thread cutting can be performed fast, clean and true. Equipped with self-centering vise.

**The Curtis & Curtis Co.**  
115 Garden St. Bridgeport, Conn.

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



## Economical Production More Important Now Than Ever

*Now* is the time to install the Landis Die in your shop when you want continuous production at a minimum cost of upkeep.

Landis Die Heads and Machines will not only stand up to your work, but will give a better quality and quantity of threads at a lower cost than is possible with any other threading machine.

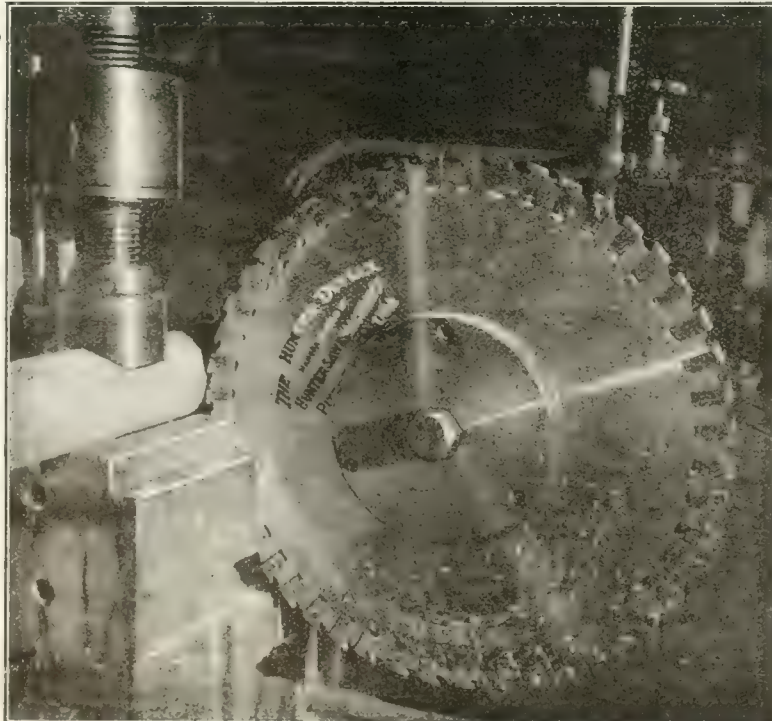
Remember the Landis points of superiority—long life, high cutting speed, variable rake angle, interchangeability of chasers, absence of annealing, hobbing and retempering, permanent throat, etc.

It's up to you to investigate this die—send your specifications and let our Engineering Department show how the Landis Die will handle your requirements.

Catalogues upon request.  
No. 22 Bolt Cutter Die  
Heads and Machines.  
No. 23 Pipe Threading Die  
Heads and Machines.

**LANDIS MACHINE CO.**  
WAYNESBORO, PA.

## A Hunter "Duplex" on Shrapnel Stock



**FAST GOING**  
on Newton Machine

Through  $3\frac{1}{2}$ " 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.**

# 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.

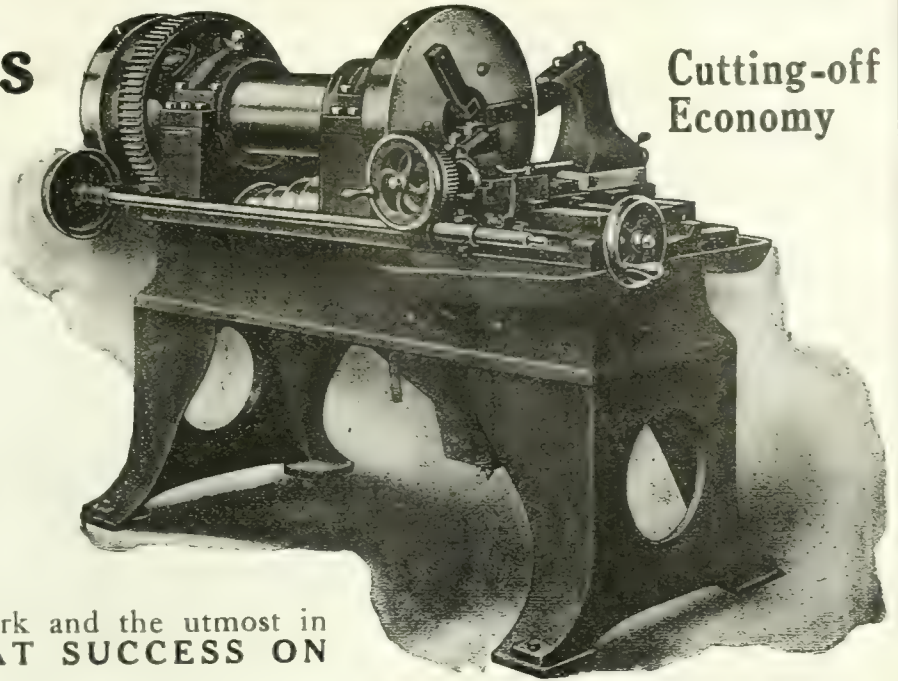
The Hurlbut-Rogers Machine gives you capacity of two machines at the expense and in the floor space of one machine.

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.

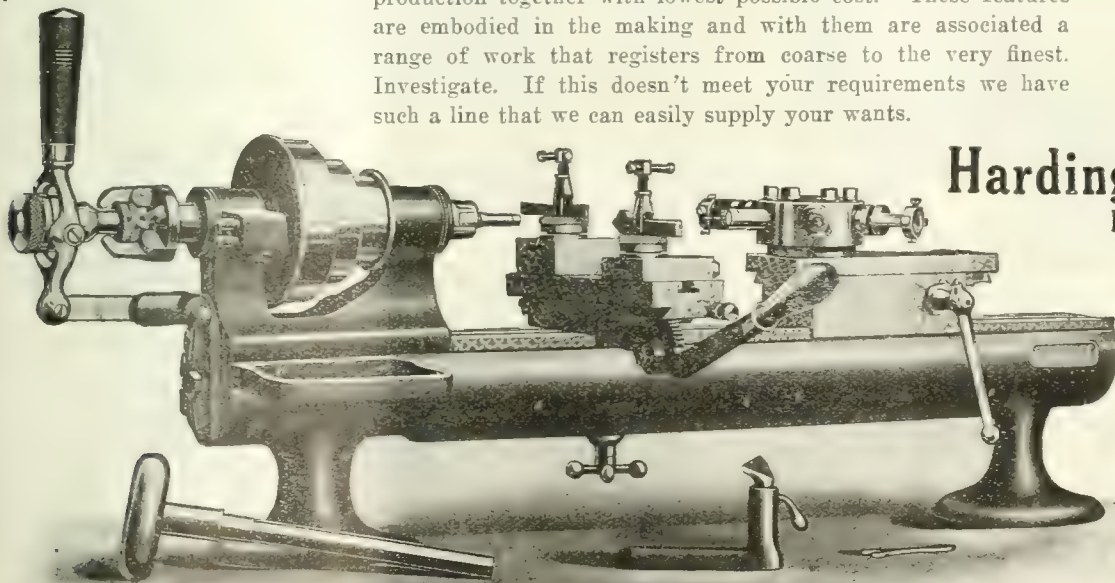


5-inch Cone-Driven Machine

Cutting-off  
Economy

# If it is a Question of Efficiency

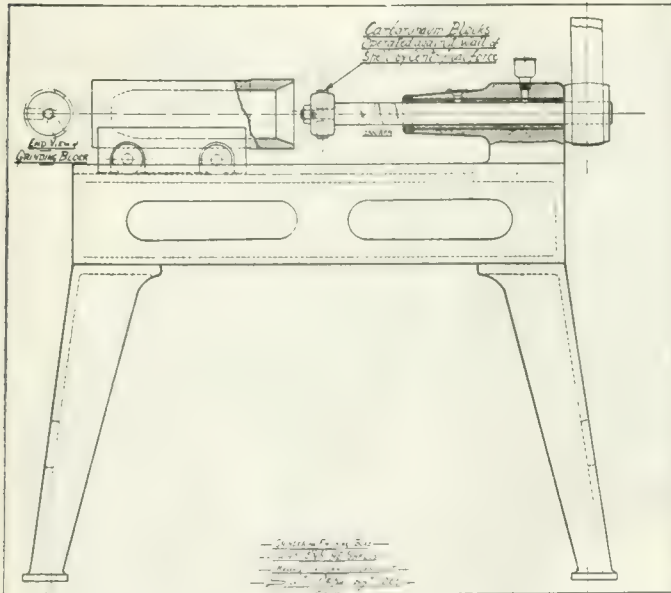
There are lathes that will give you all grades of efficiency. But we interpret efficiency to mean highest speed and quality of production together with lowest possible cost. These features are embodied in the making and with them are associated a range of work that registers from coarse to the very finest.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



**Hardinge Bros.**  
Inc.

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

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



## Smooth Bores

We have designed for our own use a simple and inexpensive grinder to give the final touch to the bore of our shells.

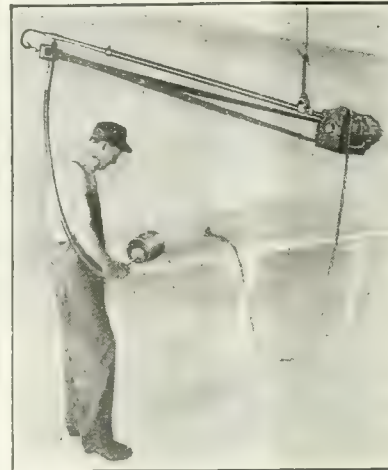
It does the work, and we will have some of these machines on the market shortly.

Write us for our proposition.

**Marsh & Henthorn  
Limited**

**BELLEVILLE, ONTARIO**

## Stow Shell Grinders Increase Production



**Suspended  
Pedestal  
Mounted  
on Truck**

**Any Size  
Any Current**

**Immediate  
Shipment**

**Stow Manufacturing Co.**

**Binghamton, New York, U.S.A.**

**Oldest Portable Tool Manufacturers in America**

**Assuming that you want a grinder that is better than the average—**

A grinder with massive table, micrometer adjustments, very long knee and gibs, and extra heavy head and tailstock—it will pay you to investigate the

### **Standard No. 6 Universal Grinding Machine**

In addition, you'll find that the headstock is fitted with large bearing for chuck spindle and with special bronze bearings of navy specifications, spindle is tapered and bored to take wheel arbors, and bearings are 1 in. in diam. and 2 3/4 in. long, and an exceptionally simple and sturdy countershaft with self-lubricating bearings.

Start the investigation by sending for the full details—to-day.

**Simmons Machine Co., Inc.**

1001 Singer Bldg., New York City  
981 Broadway, Albany, N.Y.



*Mention this paper when writing advertisers. It will identify the proposition about which you require information.*





# PORTABLE ELECTRIC GRINDER

## The Speediest and Most Efficient Grinder on the Market

### 30,000 R.P.M.

This marvellous speed will cut the cost of your grinding operation and pay for the grinder in short time. Built to do perfect work, too.

Dynamically balanced. Motor and internal attachments equipped with S K F Ball Bearings. No end play—no vibration.

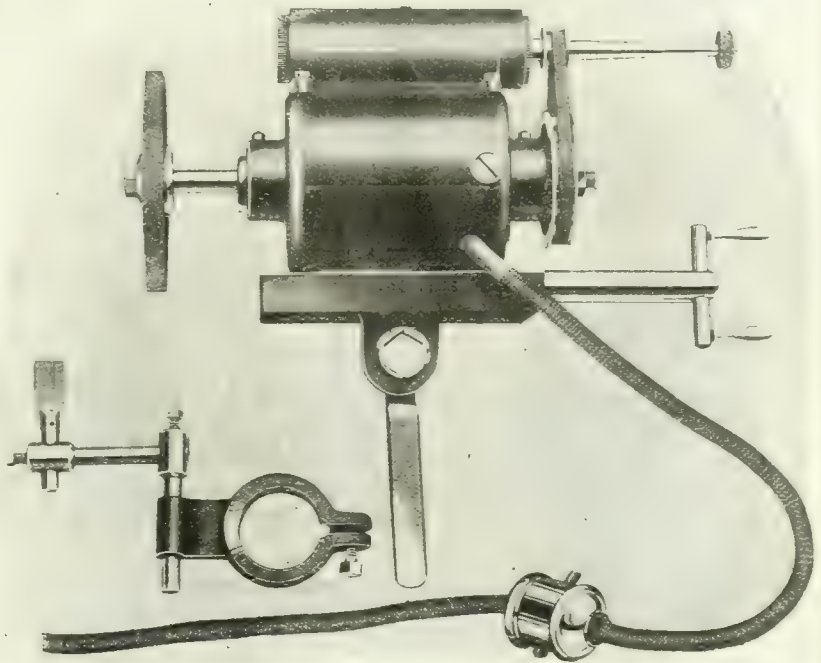
Does all kind of grinding—longitudinal, cylindrical, internal and other hard-to-get-at jobs. Easily portable.

*Write for full details.*

**R. E. T. Pringle, Limited**  
*Manufacturers' Agents*

OFFICES:

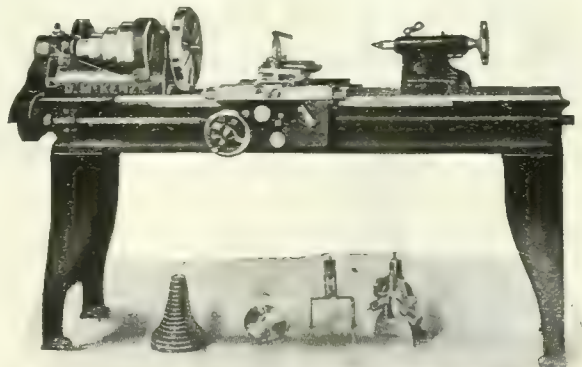
- Tyrrell Bldg. - - 95 King St. East, Toronto
- 809 Unity Bldg. - - - - - Montreal, Que.
- 3402 Osler Ave. - - - - - Vancouver, B.C.
- 302 Donalda Block - - - - - Winnipeg, Man.



## 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 Company**  
Guelph, Ontario

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

# MATTHEWS Marking Devices

Quality of material assured, the success of a steel lettering die depends on its accuracy. Matthews of Pittsburgh made that discovery 67 years ago, and make marking devices accordingly. Matthews facilities are complete. Specially designed machines, expert operators, skilled hand workers—we have them all, plus ability to make prompt deliveries. Mark what you make—mark it right—mark it with a “Matthews” stamp.



## JAS. H. MATTHEWS & COMPANY

67 Years in Business

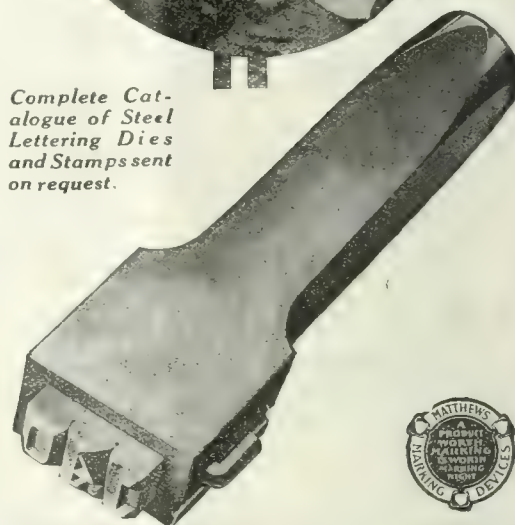
Forbes Field, PITTSBURGH, P.A.

Distributors for Canada.

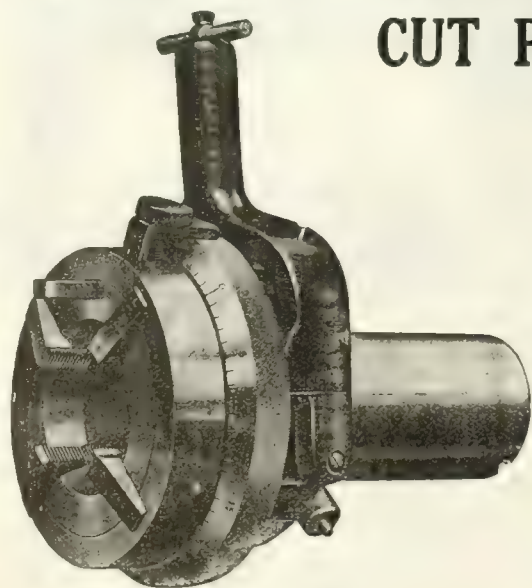
Canadian Fairbanks-Morse Company, Ltd.  
St. John, Quebec, Montreal, Ottawa, Toronto,  
Hamilton, Windsor, Winnipeg, Saskatoon,  
Calgary, Vancouver, Victoria.



Complete Catalogue of Steel Lettering Dies and Stamps sent on request.



# WELLS SELF-OPENING DIES CUT PERFECT SCREW THREADS



WELLS SELF-OPENING DIE  
has both face and hand trip.

The Wells Self-Opening Die cuts the thread with a fine shearing cut, then opens with a quick, positive snap.

### Adaptability

The Wells Self-Opening Die can be used on screw machines, lathes, automatics, drill presses and bolt cutters.

### Chaser Principle

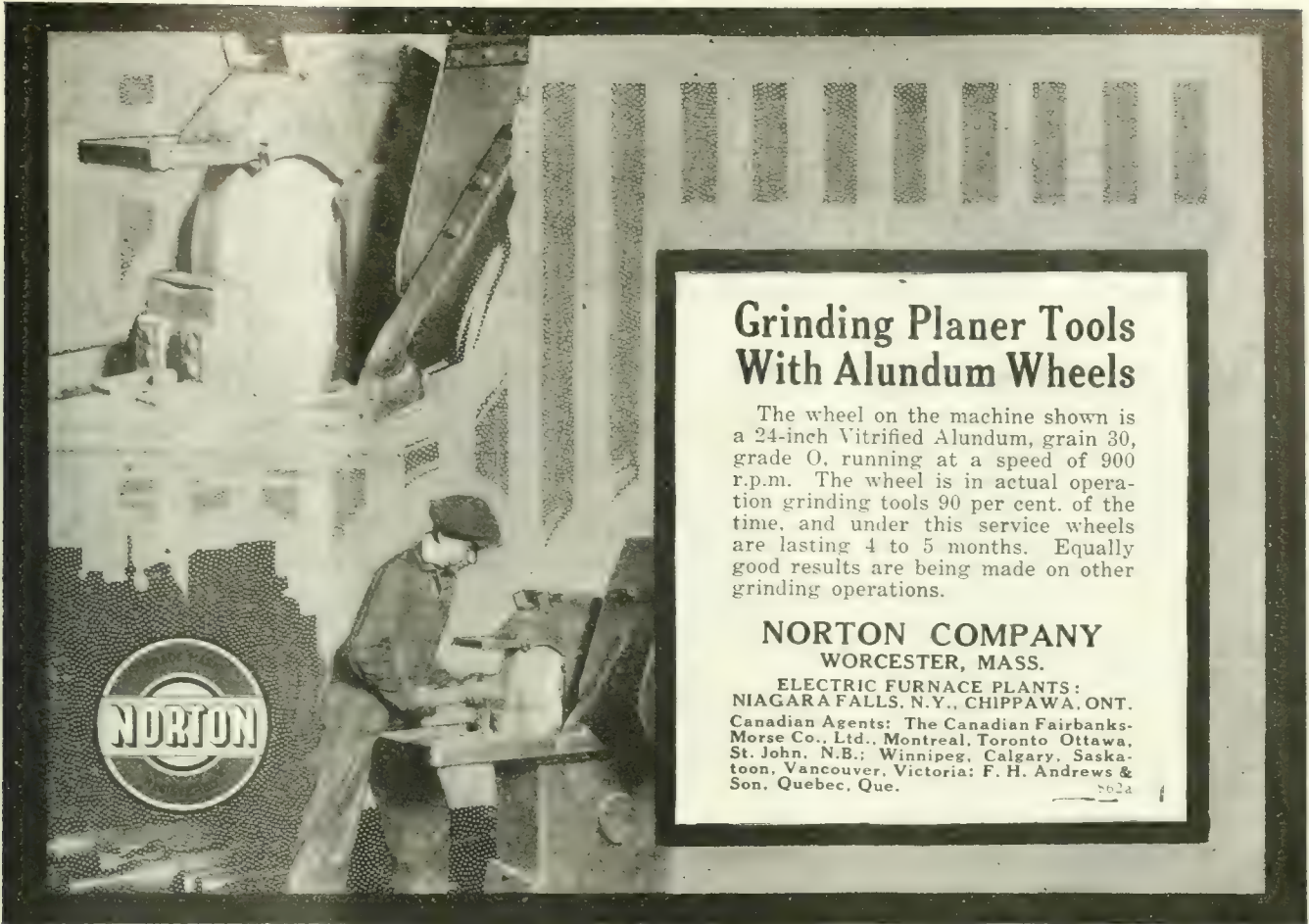
The Wells Self-Opening Die embodies an entirely new principle of design. The chasers are about four times as long as the threaded portions and are supported throughout their entire length and width by the solid sides of the slots in the body. They cannot squirm away from the work. Wear is reduced to a minimum throughout. Adjustment is simple, positive and accurate.

A large number of these Dies in stock for Immediate Shipment.

## Wells Brothers Company of Canada, Limited

GALT, ONTARIO

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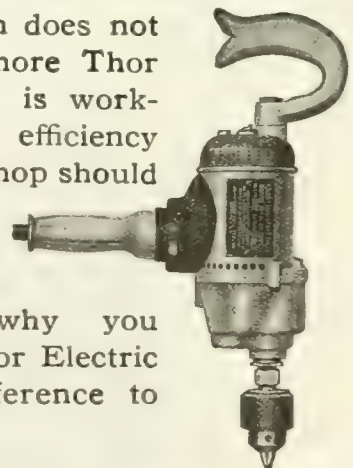
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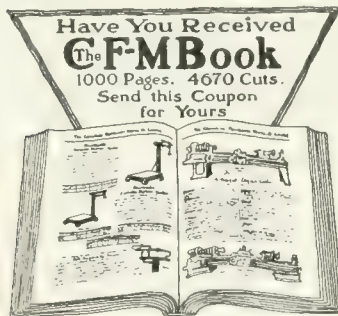
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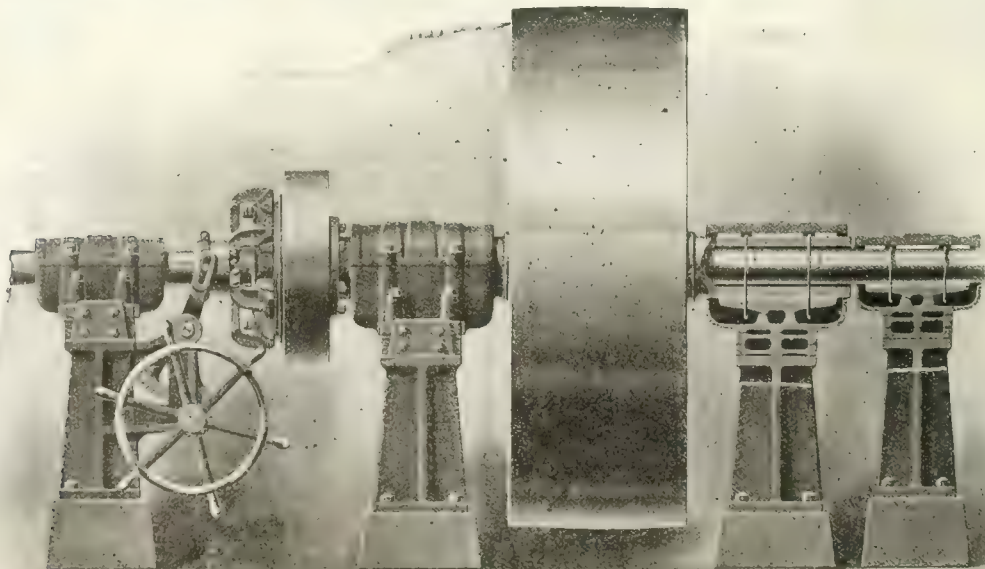
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# Grinding and Setting Lathe and Planer Cutting Tools--II.

Staff Article

*Two of the prime essentials, if not the all-important factors in general machine shop practice, and those that are left entirely to the judgment of the individual operator, more particularly in the smaller shops, are the grinding of the various cutting tools and the setting of same in their respective positions. The efficiency of numerous plants is seriously hampered by the lack of knowledge on the part of many operators of the elementary requirements pertaining to their own work. Lubricating or cutting compounds are undoubtedly a great aid in the removal of metal, but the agents that perform the actual work, should receive every attention before their faults are covered with a flow of cooling fluid.*

**R**UNNING a lathe should not be confused with the operation of same. It is not sufficient that a lathe hand should "run a machine," but every little detail should receive careful attention to insure maximum achievement by economic and accurate manipulation. Owing to the fact that most lathes are adapted for chuck and center work, the head or live center is often removed when work is held in the chuck, and when machining is done in such, it is impossible to prevent the cuttings from lodging in the hollow spindle or the hole provided for the center. When changing from center to chuck work, the opening should be protected by means of a suitable wooden plug or what is more common a piece of waste, while the chuck work is being performed. The importance of this detail is too often overlooked by many lathe hands, and inaccuracy of machine work has very often been traced to carelessness in replacing the centers.

The clinging of a small piece of metal or dirt may prevent the center from attaining its proper position in the spindle; an exaggeration of this fault is illustrated in Fig. 13. Under the conditions here shown it is obvious that the center will be eccentric to the spindle, with the central axis out of alignment as shown at D. Work turned with the head center in this position will be concentric with the lathe spindle, but the head end of the shaft will be eccentric with the center upon which it was turned; this error diminishing toward the tail end. If the tail of the driving dog is placed in the opposite slot, any error will be immediately discovered, or if the work calls for a reversal from end to end, any eccentricity will be at once evident.

Particular care should be given to the

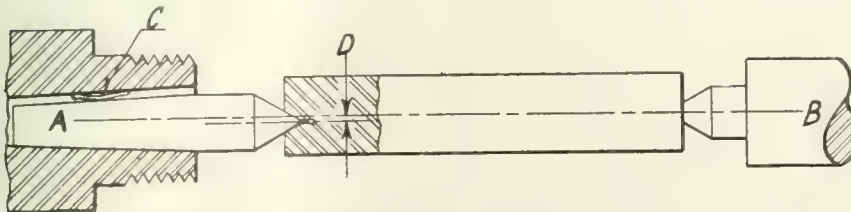


FIG. 13 CENTER TROUBLES.

accuracy of the head center before commencing to machine a piece of work upon the centers; in addition to running perfectly true, the shape of the conical section should be maintained at a

uniform angle of 60 degrees. The centers should always be placed back in the same position, suitable marks being provided for this purpose, and tested for alignment before starting to machine

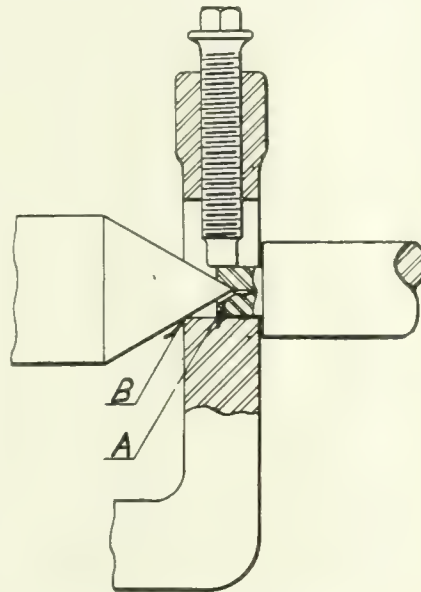


FIG. 14—CENTER TROUBLES

the work. The features above mentioned in connection with the head center also apply to the tail center, but the error is not so marked in the latter case. When grinding the centers, particular attention should be exercised in maintaining a uniform angle of 60 degrees, and the centers in the work should also conform to this standard angle.

One of the troubles occasionally in evidence in machining small shafts is that illustrated in Fig. 14, where a short section is turned to a comparatively small diameter, and when the dog is placed on for driving purposes the lower

operator unless special care is taken to see that the dog is clear before starting the cut.

When using a dog in turning taper work it is necessary to see that the driving of same is maintained during the full revolution of the work. During the turning operation the tail of the dog has a lateral motion in the driving slot, and this action may have either or both of the results illustrated in the sketch Fig. 15. Referring to the cut, it is obvious that the face plate, being fixed to the lathe spindle, will revolve on the axis A—B, while the work will revolve on the line of the lathe centers C—D, thus causing the dog to oscillate as the work is turned upon the centers, the extreme movement in either direction being when the dog is in the horizontal position. When the tail is at the front of the lathe, it will be at its greatest distance in the slot and it is well to see that no interference takes place at G, as this would tend to have the same effect as that noted in Fig. 14. On the other hand, when the tail is at the opposite horizontal position there is the possibility that the tail of the dog will leave the slot, as shown at H.

Owing to the angle that the two axial centers make with each other, it is clear that the lathe centers cannot fit the centers in the work, and this condition is more pronounced when the taper is sharp in proportion to the length. An example of this is illustrated in the sketch Fig. 15, showing the relative position of the centers on either end of the work. It will be noticed that the pressure of the cut comes on the very point of the lathe center in the tail-stock at I, the other contact point being at J, directly opposite and on the outer edge of the work; the opposite conditions being effected at the head end of the work. A brief study of these facts will impress the imperative necessity of having the ends of the work faced perfectly square before off-setting the tail-stock.

In the upper right hand corner of Fig. 15 an enlarged view of these conditions is shown. Here the end of a shaft is shown where the end is not square with the axis of the work, the variation being exaggerated to demonstrate the possibilities more clearly. The full and dotted lines represent the two extreme positions on the horizontal line, while the line E—F shows the neutral line, square with the axis of the shaft. It is therefore clear that the back support between

the lathe center and that of the work will vary in one revolution from the points M to N, thus placing excess pressure at the point O when the high side is opposite. Work performed under these conditions will have a slightly elliptical shape.

### FOUNDRY FACINGS\*

By H. Winterton

**H**OW frequently coal dust has been blamed for many a scabbed casting, when perfectly blameless, will never be known. In too many foundries in past times the question of the

round a coal containing an extremely low percentage of ash, and a high percentage of carbon, forgetting that a coal of this character must necessarily prove low in bituminous qualities, and, in fact, be of too refractory a character altogether to carry out satisfactorily the functions just indicated. On the other hands, there have been tried coals containing as high as 25 per cent. of ash, the results of which when heat is applied can only be to produce a casting with a skin of an extremely grey colour and a rough surface.

A good working coal dust for general foundry use should not exceed 12 per cent. of ash, 37 per cent. of volatiles, and 51 per cent. of fixed carbon. It might be contended that the percentage of ash in this coal is high. But the volatiles have to be taken into consideration, and I knew I am right in saying, that with mixtures in which the ash was much lower, castings were scabbed and the skin had a harsh and uneven appearance. Especially was this the case in some experiments made with a good-class anthracite, in which the percentage was under 4. I arrived at the conclusion that the coal dust had resisted the heat so much, owing to the presence of a high percentage of carbon, that it had acted as a refractory, and actually prevented the escape of the gases from the mould by closing up the pores.

As in all matters appertaining to the foundry, however, there is a limit in the direction indicated, and care should be taken, while not exceeding the minimum in one direction, not to approach too closely the maximum in the other. It would never do, of course, to make use of such a coal as was submitted to me recently as suitable for use in the moulds, the analysis of which came out as follows:—Ash, 43.85; volatile matter, 29.80; fixed carbon, 26.35.

### Varied Grist of Coal

It is well known that it is very necessary to have various grists of coal dust according to the class of work carried out in each foundry, and according to the grade of sand used. For very light castings a coal dust of exceedingly fine grist is necessary, especially if the sand has an open tendency, while a slightly coarser, yet still fine grist should be used for heavier work. The medium and coarse grades come in for the larger classes of castings, in which it is necessary for the gases engendered to be carried away quickly, while the work of providing a skin to the casting is left to a larger extent for the blackings or facings.

In many instances I have found that where a good superfine coal dust is used a splendid casting with a capital skin has been produced, it necessarily following that on account of the lightness of metal the gases formed in the mould have not been overpowering, while the heat of the smaller body of iron would not have been sufficiently great to fuse any coal particles of more than infinitesimal size. This brings me to a source of

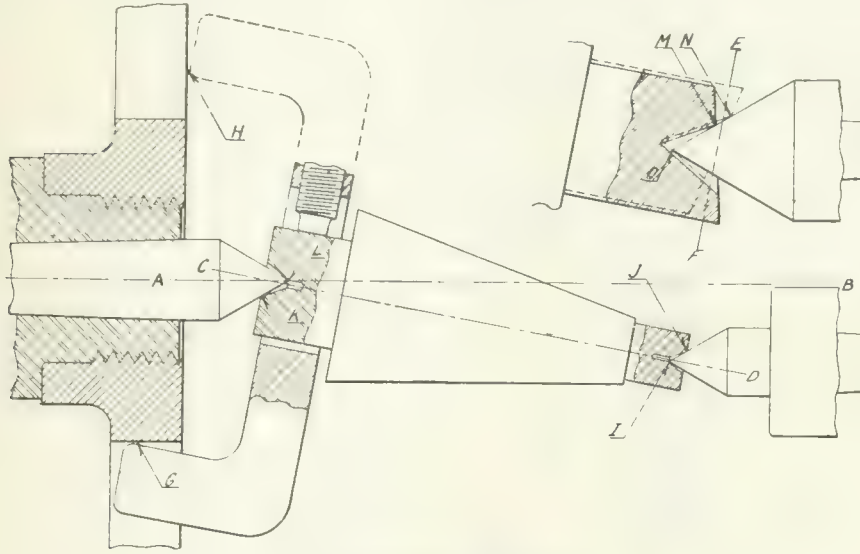


FIG. 15—TAPER WORK SUGGESTIONS.

### WORLD'S SULPHITE OUTPUT DECLINING

CONSIDERING the indispensability of sulphur and its chemical compounds in the manufacture of fertilizer and munitions, it is important to note the recent declining world production of sulphur and the curtailed exports of pyrites from Spain, caused by the scarcity of ships and submarine warfare. The United States domestic production of pyrites in 1916 was about 450,000 tons, and imports from Spain and Portugal amounted to about 1,250,000. The domestic supply is clearly inadequate to meet the sulphuric acid needs of the country, and the National Fertilizer Association estimates that about 600,000 tons of sulphur will be needed during the current year to replace pyrites in the manufacture of sulphuric acid.

Figures indicating the production of sulphur for the world and by the principal countries for 1913-1916, inclusive, in metric tons, follow:—

Country	1913.	1916.
Sicily .....	243,907	355,349
Italy (other regions)..	35,000	38,722
<b>Total Italy .....</b>	<b>278,907</b>	<b>394,071</b>
United States .....	450,000	316,575
Japan .....	*	49,131
Other countries .....	25,000	50,000
	<b>753,907</b>	<b>809,777</b>

\*Figures not available.

The decline in total production especially calls for note when the increasing demand is considered, as it is estimated that the annual consumption of sulphur has grown from 300,000 tons in normal times to 900,000 tons in 1916, and 1917 requirements are estimated at 1,000,000 tons.

admixture of coal dust with sand has been considered of too little importance to warrant either extreme care or even more than cursory attention. In quite a large number of foundries, the "fat" is mixed on scientific lines by experienced hands, whose variations of mixtures are worked out almost to fractions. The functions of coal dust are threefold. In the first place the heat engendered in the mould when in contact with the coal dust forms a gas which gives a lead through the sand to the gases formed by the iron in the mould. Second, the absorption of the coal particles by the heat clears a way for the passage of those gases. Third, and by no means the least important phase, is the formation on the face of the mould of a layer of gas which prevents in a measure the actual contact of the iron with the sand.

### Coal Quality

One result of this is that a skin on fine surface is formed on the face of the casting, and, according to the strength of the coal dust, so is the colour of this skin heightened or deepened. If this be the case it follows that great care should be taken to obtain coal dust of a suitable quantity, and, amongst the points to be noted, it will be necessary to include the bituminous quality of the coal, its comparative freedom from ash, its volatile content, and also its proportion of fixed carbon. I am aware that many differences of opinion exist as to the kind of coal to be used, but for the purposes of this paper, rather than go to extremes, it would be advisable to take a coal of a fairly good quality. Writers on this subject have in the past built their ideals

\*From a paper read before the Birmingham Branch of the British Foundrymen's Association.

# GEAR TOOTH EQUIVALENTS.

Diametral Pitch (P) = Number of teeth divided by pitch diameter in inches.

$$P = \frac{3.14159}{C} = \frac{25.39997}{M}$$

Circular Pitch (C) = Distance from centre of one tooth to centre of next on the pitch line.

$$C = \frac{3.14159}{P} = .123685 \times M$$

Module (M) = Pitch diameter in millimetres divided by number of teeth. Also equal to addendum measured in millimetres.

$$M = \frac{25.39997}{P} = 8.0850 \times C$$

Diametral Pitch.		Circular Pitch in inches.		Module Addendum in m/m.		Diametral Pitch.		Circular Pitch in inches.		Module Addendum in m/m.	
1	1.0000		3.1416		25.3999	7	7.0000		.4488		9.6285
	1.0472	8"	3.0000		25.2552		7.1808	$\frac{7}{16}$ "	.4375	3.5	3.5372
	1.0583		2.9684	24	24.0000		7.2571		.4329		3.5000
1½	1.2500		2.5133		20.3199	8	8.0000		.3927		3.1750
	1.2566	2½"	2.5000		20.2127		8.3776	$\frac{3}{8}$ "	.3750	3.0	3.0319
	1.2700		2.4737	20	20.0000		8.4666		.3710		3.0000
	1.4111		2.2263	18	18.0000	9	9.0000		.3491		2.8222
1½	1.5000		2.0944		16.9333		9.2363	$\frac{1}{2}$ "	.3401	2.75	2.7500
	1.5708	2"	2.0000		16.1701		9.4248		.3333		2.6950
	1.5875		1.9789	16	16.0000		9.5143	$\frac{5}{16}$ "	.3142		2.5400
1¾	1.7500		1.7952		14.5143	10	10.0000		.3125		2.5265
	1.7952	1½"	1.7500		14.1488		10.0531	$\frac{5}{16}$ "	.3092	2.5	2.5000
	1.8143		1.7316	14	14.0000		10.1600		.2783	2.25	2.2500
2	2.0000		1.5708		12.7000	12	12.0000		.2618		2.1166
	2.0944	1½"	1.5000		12.1276		12.5664	$\frac{1}{2}$ "	.2500		2.0212
	2.1166		1.4842	12	12.0000		12.7000		.2474	2.0	2.0000
2½	2.2500		1.3963		11.2888	14	14.0000		.2244		1.8143
	2.3091		1.3605	11	11.0000		14.5143	$\frac{1}{2}$ "	.2164	1.75	1.7500
2½	2.5000		1.2566		10.1600		15.7080	$\frac{3}{8}$ "	.2000		1.6170
	2.5133	1¼"	1.2500		10.1063	16	16.0000		.1963		1.5875
	2.5400		1.2368	10	10.0000		16.7552	$\frac{5}{16}$ "	.1875		1.5159
2¾	2.7500		1.1424		9.2363		16.9333		.1855	1.5	1.5000
	2.8222		1.1131	9	9.0000	18	18.0000		.1745		1.4111
	3.0000		1.0472		8.4666		18.8496	$\frac{1}{2}$ "	.1666		1.3475
3	3.1416	1"	1.0000		8.0850	20	20.0000		.1571		1.2700
	3.1750		.9895	8	8.0000		20.3199	$\frac{1}{2}$ "	.1546	1.25	1.2500
	3.3510	$\frac{3}{16}$ "	.9375		7.5797		21.9911	$\frac{1}{2}$ "	.1428		1.1550
3½	3.5000		.8976		7.2570	22	22.0000		.1428		1.1545
	3.5904	$\frac{7}{8}$ "	.8750		7.0744	24	24.0000		.1309		1.0583
	3.6285		.8658	7	7.0000		25.1327	$\frac{1}{2}$ "	.1250		1.0106
	3.8666	$\frac{11}{16}$ "	.8125		6.5690		25.3999	$\frac{1}{2}$ "	.1236	1.00	1.0000
4	4.0000		.7854		6.3500	26	26.0000		.1208		.9769
	4.1888	$\frac{3}{4}$ "	.7500		6.0638	28	28.0000		.1122		.9071
	4.2333		.7421	6.0	6.0000		28.2743	$\frac{1}{2}$ "	.1111		.8983
	4.5696	$\frac{11}{16}$ "	.6875		5.5584	30	30.0000		.1047		.8466
	4.6182		.6803	5.5	5.5000		31.4159	$\frac{1}{2}$ "	.1000		.8085
	4.7124	$\frac{5}{8}$ "	.6666		5.3900	32	32.0000		.0982		.7937
5	5.0000		.6283		5.0800		33.8666	$\frac{1}{2}$ "	.0927	0.75	.7500
	5.0265	$\frac{5}{8}$ "	.6250		5.0531	34	34.0000		.0924		.7471
	5.0800		.6184	5.0	5.0000	36	36.0000		.0873		.7055
	5.5851	$\frac{9}{16}$ "	.5625		4.5478	38	38.0000		.0827		.6684
	5.6444		.5566	4.5	4.5000	40	40.0000		.0785		.6350
6	6.0000		.5236		4.2332	50	50.0000		.0628		.5080
	6.2832	$\frac{1}{2}$ "	.5000		4.0425		50.2655	$\frac{1}{2}$ "	.0625		.5053
	6.3500		.4947	4.0	4.0000		50.7999	$\frac{1}{2}$ "	.0618	0.50	.5000

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frequent complaint which arises when founders are using a coal dust of too coarse a grist. It is then found that small pits are left on the face of a casting when cooled, and these are easily distinguishable by their formation from those indentations caused by particles of sand insufficiently milled. The application of heat from the molten metal to the small particles of coal forms a gas, as has been previously indicated, and in the case of light castings, the effect can usually be seen on the face in the shape of small pits made by that gas taking the line of least resistance into the molten metal in the endeavor to free itself. Where larger castings are concerned, the heavier weight of metal and the consequent increase of temperature prevent such indentations, particularly as the coating of blacking on big moulds is generally more pronounced, and, in fact, is applied with a particular object in view.

#### Coal Dust and Blemishes

It must not be thought, however, that every blemish on the face of a casting or a great deal of the scabbing is always due to the coal dust. In one splendidly-equipped foundry the presence of small rusty-looking spots was promptly placed to the credit, or discredit, of the coal dust; luckily, after a series of tests, it was definitely established that the fault was due to the presence of lime particles in the sand. Again it has been proved, time after time, that scabs on castings have been due to excessive moisture in the mould, or indifferent ramming. At all events, I think I have said sufficient under this head to show the importance of giving careful consideration to a point which frequently escapes notice. I say nothing upon the question of mixture, though this, too, is a matter of importance, and modern foundry practice tends all in the direction of power mixers.

As to actual mixtures, local circumstances, i.e., class of casting, sand, mixing, quality of coal dust, and the exigencies of the moment, bear largely upon this point. But I may quote two mixtures, the first for heavy castings, and the second for light work, which have been used with good results. One mixture was:—55 parts old sand, 30 parts new, and 15 parts coal dust. The other was: 70 parts old sand, 25 parts new, and 5 parts coal dust. There are, of course, many variations, and I do not for one moment suggest that the above are infallible recipes.

#### Blackings

There is a divergence of opinion on the use of blacking, whether for loam, dry sand, green sand, or cores. The facings may be divided and sub-divided into various classes, and again into further sections. The old-fashioned ideas of blacking moulds with all and sundry compounds, many of them evil smelling, some of doubtful efficacy, and not a few positively deleterious to the casting, seem to be rapidly passing, and in many foundries today the preparation of cores and moulds is carried out with meticulous care. To-day the foundryman de-

mands various facings suitable for the particular class of casting upon which he may be engaged, care being taken to bear in mind the thickness of metal, the heat of the molten iron, and the general characteristics of the finished casting.

For light castings, nothing exceeds in efficiency a charcoal blacking of good quality, though expert practical men are not quite in agreement as to whether a pure wood charcoal or one slightly stiffened by a mineral admixture produces the better results. Some foundries go even further. I have in my mind two light-casting foundries in the Black Country, each of which has a special facing to its own formulae, and which in turn differ to a marked degree in essential particulars. Certain it is that both these foundries enjoy a high reputation for the excellence of their castings, while the proprietor of one assured me that since introducing the new method he had experienced far less trouble in his fettling shop, and at considerably reduced outlay under that head.

For ordinary green-sand work, which requires sleeking, there are now prepared many mineral blackings, sometimes called "patent," which gladden the eyes of the moulder, and assist to bring out a casting with that beautiful blue glossy skin so much sought after by founders. The true functions of these facings are reflected by this very anxiety on the part of the founder. He knows that given a good highly-refractory substance, the pores on the face of the casting will be closed, and therefore the utility of the skin before-mentioned does not end with the colour. He knows, too, that with a blacking of the right character the cleaning off or "fettling" of the casting is going to be a matter of comparative simplicity, and this remark applies, not only to green-sand, but also to loam, dry-sand, and core work.

#### The Refractory Feature

It is of course necessary to have a stronger or, as it is termed, heavier facing for the larger castings, for not only has the weight to be considered, but the casting temperature in large moulds becomes a serious factor. Hence it is necessary to provide a strong refractory in which the percentage of carbon grows higher in accordance with the strain placed upon it. It is on this very point that theory breaks down, and when this happens, as occasionally it may, it becomes necessary to search for the real reason. On the face of the previous remarks it might be thought that to get good results in all cases it would only be necessary to raise the carbon content, but this is not all that is required. Some refractories are of so harsh a character as to preclude all thought of sleeking on a green-sand mould, or mixing with water in a "boss," especially when newly prepared. It is here that the skill of the blender is required, and by his agency devious facings are produced which can be held to cover all classes of moulds. In many instances I have found that the slightest modifications of mix-

tures have made all the difference between a good-looking casting and one that would be described as something worse than indifferent.

It is only seeking trouble to make use of a facing that does not possess refractory characteristics to a high degree to face a mould of considerable size, and which is to be at a high temperature. On the other hand, the presence in the blacking of too great a proportion of siliceous matter would cause infinite trouble in the way of scabbing and burning. But, as previously indicated, the use of a high refractory for light castings is not generally advisable.

For cores a sound refractory must be used, but the necessity of providing something that will not easily rub off after baking must be kept clearly in view. Here, again, the task of the expert has been to provide an article which will perform its work perfectly under varying conditions, and, I think I am right in saying that the work in the fettling shop has been very decidedly lessened in the past few years, and on this account. With regard to graphites, graphite facings may be divided into three parts, and roughly classed as plumbago, graphite, and black-lead. There are numerous qualities but it is more or less a matter of carbon content, and those who are satisfied with the poorer kinds must not expect to obtain such good results as other founders who endeavor to obtain the highest grades. Here, again, it is a matter of individual practical test in the various foundries, but to-day the founder who knows what he wants and asks for it is sure to find satisfactory supplies.

#### Steel Refractories

These are in a class by themselves, and instead of aiming for carbon content the founder looks for materials high in silica. For loam work nothing has been found to exceed in efficiency the silica compositions at present in use. It is not for me to place before experts the various methods of building up the moulds, but I may be permitted to point out the extreme importance of procuring a composition in which, while possessing a high percentage of silicates, is not so closely composed as to interfere with the porosity of the finished mould.

One important factor in these manufacturers is the practical, if not absolute, banishment from the material used of iron oxides. These should be carefully eliminated, for as surely as they enter into the mould in anything like an appreciable proportion so surely will the trouble of the moulder begin. This remark applies with even greater force to the preparation of the facing of "paint," as it is commonly called, with which the mould is finally dressed. The effect of this paint is practically the same as the blacking on an iron mould, and when the high casting temperature of steel is borne in mind it can easily be comprehended how necessary it is to use an article which is above reproach as a refractory.



# PRODUCTION METHODS AND DEVICES

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

## BASE RECESS AND PLUG FACING TOOLS

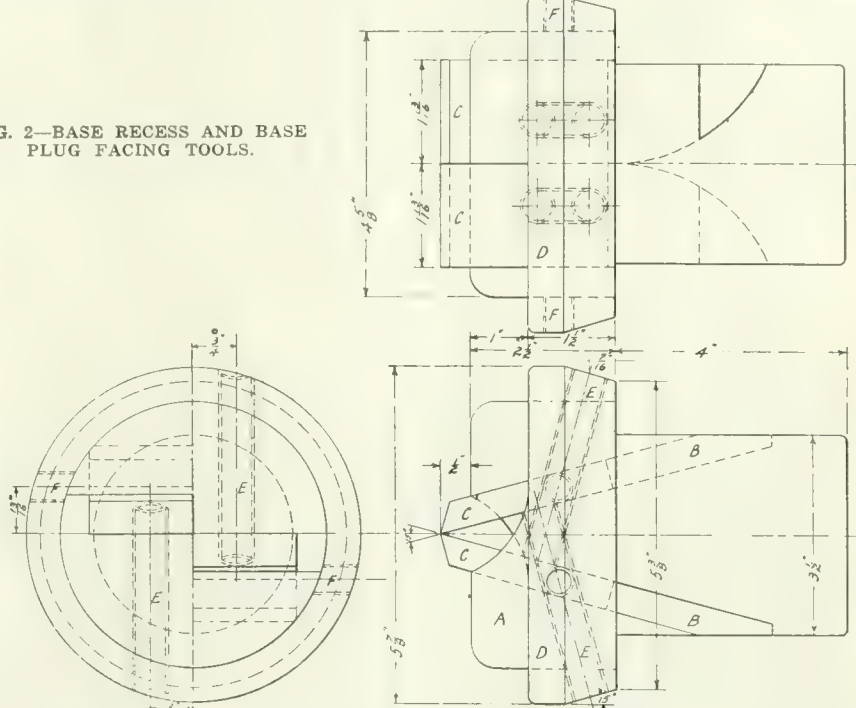
By R. Hamilton.

AN operation that requires considerable attention in order that production be maintained on an economic basis is that of machining the bases of the smaller sizes of high explosive shell to receive the gas plate or base plug. The location and shape of this recess, together with that of the outer portion, necessitates the special arrangement of tooling equipment for satisfactory accomplishment. This operation is now generally performed by means of gang tools set in a special holder or head, in the desired position to cut away the metal by the one movement of the carriage or the turret directly into the work. The tool head shown in Fig. 1 was designed in the plant of the Jenckes Machine Co. and continues to give satisfactory results. The main holder is a steel casting having two cored holes in such a position as to give a tool cutting rake of 15 degrees. Two of these are placed at one side of the center while the other is located on the opposite side. The tool A, of  $\frac{7}{8}$  inch flat face, is set with one edge slightly over the axial line of the fixture to insure cutting to the center; while the tool B, of  $1\frac{1}{2}$  inch flat face, is set to remove the remainder of the stock for the minimum diameter of the recess. The forming tool C is used

provide increased rigidity when cutting; additional clamping being obtained by the end screws shown. When tools are in a cutting position, the working edge

of the center line, and in such a position that the cutting edge of the tools C come  $\frac{1}{2}$  inch from the face of the holder. After the tool slots are milled-

FIG. 2—BASE RECESS AND BASE PLUG FACING TOOLS.

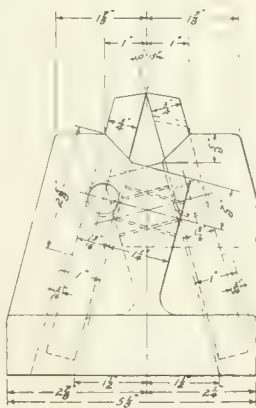
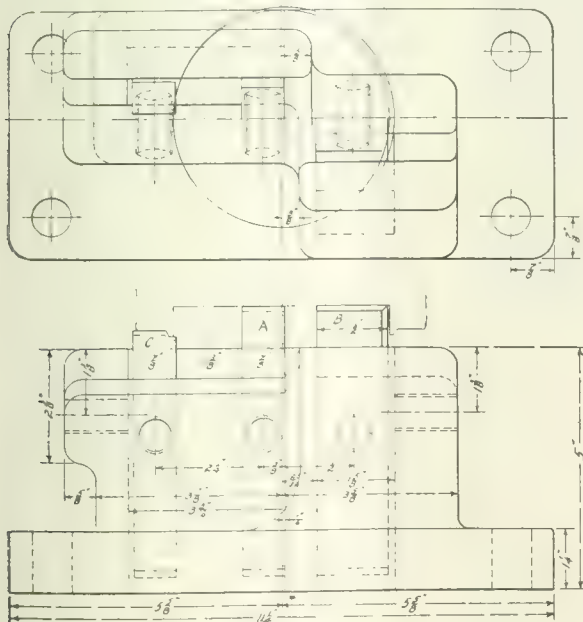


of the recess tools are  $\frac{7}{8}$  inch from the front face of the fixture.

The same firm also uses a somewhat

in. the collar D is shrunk on to provide metal for the holding screws F, and also to prevent the head from springing; the screws E passing through the collar and the head to allow the thrust of the tool to come on the back surface. The cutters are  $1\frac{13}{16}$  inch face, and the base plates are faced off by a direct movement along the axis of the work.

FIG. 1—BASE RECESS ROUGHING TOOL.



to cut the portion outside of the recess and shape the riveting flange. Between the tools A and C, a steel spacing block is placed to bring the forming tool to the correct position. The head is so designed that the holding screws force the back of the tool upon a flat surface, to

similar tool for facing off the base plates after they are riveted in position. This is illustrated in Fig. 2, the head in this case being fitted to the holes in the turret in place of being bolted to the face. The head A has two slots B milled-in at an angle of 15 degrees on either side

## TOOL AND STOCK-ROOM LABELS

By J. E. C.

ONE of the first requisites necessary in starting a factory or when moving into a new building, is that of arranging and putting in order materials, tools, etc., in tool and stock-rooms, and having all properly ticketed or labeled. The work of labeling all tools, is generally a big item, and is a problem requiring a great deal of time and study, for these reasons a considerable number of labels are usually hurriedly required.

The usual procedure is to paint the sizes of tools, materials, etc., on cardboard labels, and in many cases, the marking is done directly on the woodwork, where the tools are placed. This latter method has always been found inconvenient, for the reason that when tools are changed about, it is necessary to scrape off the dimensions indicating sizes, thus marring the woodwork or injuring it otherwise, besides there is the trouble of renewing the figures elsewhere. The work of marking labels is

a long and tedious process, being usually done by hand. Little, if any, attempt has been made to have labels printed and on hand, and to have them in certain standard sizes so that they could be used anywhere as necessary.

after being consulted, unless carefully returned to their proper place, an extended search is required to find any given issue. It is rare also, that the title of an article is remembered, the index therefore, is not of much assistance.

out at some future time, or simply cut out when it is decided that it is liable to be of use. It is as well to err on the side of too many clippings rather than to run the risk of enjoying the doubtful pleasure of kicking oneself for not keeping a certain article. The advertising section of the magazine should not be overlooked. Discounting the fact that the ad. writer is, so to speak, blowing his own horn, there is often as much meat to be found there as in the reading section.

It sometimes happens that two desirable articles on widely different subjects are printed on the opposite sides of the same sheet. It can, of course, only be filed under one head. To care for this a title of the other article with a very brief synopsis may be written out and noted thereon the heading under which the article will be found. This slip should then be filed in place of the article.

Such a method of keeping clippings is open to the objection that is applicable to any other thing that is worth while; in other words, to keep it up-to-date, a certain amount of persistence and patience is required.

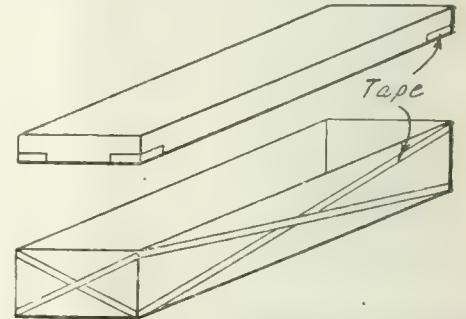
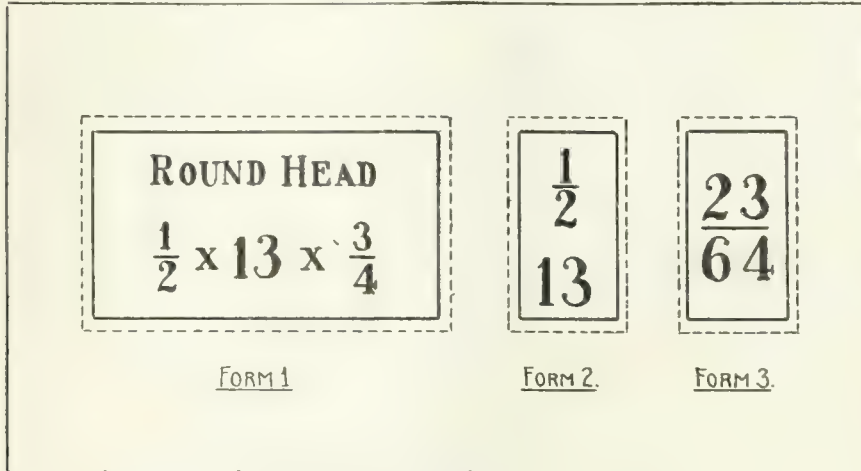


FIG. 2. ENVELOPE STRENGTHENED WITH TAPE GLUED ON.

### SMALL WOOD PULLEY CONSTRUCTION

By J. E. McCormack

MUCH difficulty is often experienced in keeping small wooden pulleys from slipping on the shaft, owing to the fact that efficient clamping facilities are not provided. The writer succeeded in overcoming this objection by designing pulleys similar to those here illustrated. In the construction of a pulley of this description, it is very important that ample space be provided for the manipulation of the wrench when tightening the clamping bolts, and yet have these openings in such a position that the belt surface is not interfered with. For pulleys of average width of face, eight pieces are used, four similar to Fig. 1 and four shaped as in Fig. 2; the dotted portion in each case representing the complete-ment of the one-half section. When these pieces are being prepared, they are planed on all faces except the outer diameter, this being left rough for subsequent turning. When assembling, two of the pieces A are clamped together on the shaft in the ordinary way, and the other pair are treated likewise but at right angles to the first pair. The pieces B are then placed in position and bolted



TOOL AND STOCK ROOM LABELS.

Having had an unusual amount of experience in this line of work I have found that three forms of printed labels are sufficient in nearly all cases to take care of the various sizes of tools, materials, etc., in stock and tool-rooms. The first of these Form 1, see illustration, is for standard machine screws. Screws as is well-known are placed in racks provided for the purpose. This label indicates the diameter of head, pitch of thread, length underhead, and style of head. The size of label is 3-in. long by 1 1/2 in. wide. Several of these labels with standard dimensions and style of heads can be made up by a printer. The style of screws may be stated as headless, round head, filister head, square head, collar head, and hexagon head.

Form 2 label, is 1-in. by 1 1/2 in., and is used for standard size taps, nut arborers, and nuts.

Form 3, in size is the same as above, and is printed with whole and fractional numbers. This form of label will be required in large quantities as compared with the other two mentioned, its chief use being for drills, reamers, rod-drills, butt-mills, etc., and mandrels. The labels indicated look much neater when printed, then when done by hand, and it is as important to keep well stocked up in these, as it is in having on hand, pads, paper or similar factory supplies.

### WHAT HAPPENS TO TECHNICAL MAGAZINES

By A. F. Menzies

THAT a large amount of valuable information published in CANADIAN MACHINERY and other technical magazines is wasted goes without saying. A considerable reduction in this waste would take place if a convenient means of saving the information were available. If the magazines are preserved in their entirety, the amount of space required for their storage is considerable, and,

Should the bound volume method be resorted to, the storage space required, although less, is still enough to make one think, especially if one has not finished ones wanderings. Further, a valuable part of the magazine, the advertising section, is lost. Clipping files of endless variety have been evolved; but for cheapness and convenience the following is hard to beat, specially for a beginning. After the file has grown large enough to warrant it and the owner thereof feels justified in making the investment, a metal filing case large enough to take the sheets without folding can be purchased.

A box of 250 common envelopes was obtained, the box was used as a filing case and the envelopes used to hold the clippings. It was found more convenient to remove the flap of the envelope. The index was arranged as shown in Fig. 1. By keeping the envelopes in alphabetical order no trouble is found in locating the one desired, and when located, the contents can be read at a glance. Care must be taken that the clippings are returned

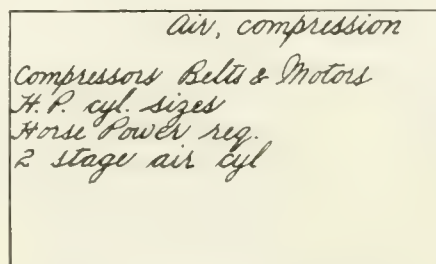


FIG. 1. INDEXED ENVELOPE.

to the envelope and that the envelope itself is returned to its correct place. To strengthen the box, strips of 3/8 in. tape were glued on as shown in Fig. 2. Small pieces of tape will also prevent the corners of the lid from cracking.

In reading over the magazines, the desired material can be marked and cut

to the opposite center section, to bind the component parts together; slots being provided in the pieces B to permit of future adjustment. The slots in the seg-

ment. When the shaft is of large diameter, it is necessary to have the clamping sections of ample thickness to provide sufficient strength back of the center hole. However, it is advisable to keep this dimension as small as possible so as to permit of a heavier segment being used above the spacing pieces. When assembling these, it is best to glue the parts and nail them well, using nails of sufficient length, where practicable, to bind the various sections more firmly together. Nail heads are set in below the depth required for finish turning. The upper portion of Fig. 6 shows the assembled pulley with clamping bolts in position.

**VALVE GRINDING COMPOUND**

By B. Rice

FOR grinding-in the valves of gas engines, the usual method is to use emery and oil. Great care must be exercised to prevent this being carried on down into the cylinders unless it is possible to thoroughly clean them out. This

chines clean. While it certainly has its place for much of this work, we all know how disagreeable it is to be standing nearby and find oneself covered with chips and dirt. Not only that, but these same chips find their way into the bearings of the machines and do endless damage. In going through a large plant devoted to the manufacture of planers, and where work of the highest accuracy had to be maintained, the writer noticed that there were no chips being blown around, and upon inquiry found that they were using a vacuum instead of a pressure system. Long pipes were provided for reaching into holes and good sized pieces of iron could be drawn up into the air hose. This kept down all dust and insured cleanliness and safety.

**AN EXTENDED TOOL POST**

By A. L. Loy.

THE extended tool post shown in the accompanying photo was made of cast

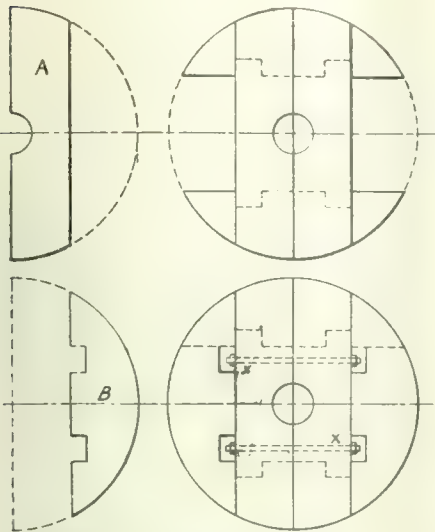


FIG. 2. SMALL WOOD PULLEY CONSTRUCTION.

ment pieces B are made wide enough to permit of easy operation of the wrench. After the parts have been assembled, the pulley is turned to the required diameter and afterwards located in its intended position on the line or counter shaft.

For pulleys of eight to twelve inches

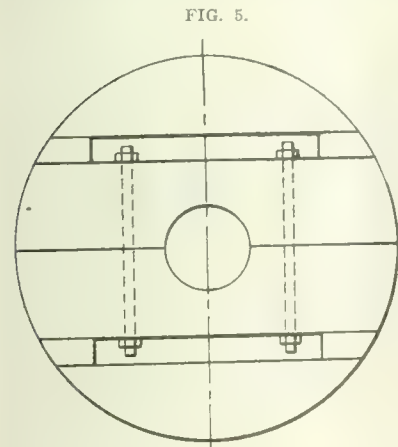


FIG. 5.

FIG. 6.

in diameter, we have followed the successful method illustrated in Fig. 6, where the half pulley consists of five sections; the lower piece being made the full width required for the pulley and the filler pieces placed on as shown; the dotted portion illustrating the added seg-

work often being done directly on the engine without removing the cylinders, it is impossible to get at the inside and any emery which finds its way into the cylinder will do incalculable damage. The following compound has proved to be much superior to oil and emery:—Mix one-half pound of white lead with one cake of yellow laundry soap. To this thick paste add equal parts of No. 80 and 100 carborundum until the desired consistency is obtained. When using, add a drop or two of water instead of oil. Due to its consistency, there is no tendency for the mixture to run off the seat and the particles of grinding compound stay where needed.

**A VACUUM SYSTEM**

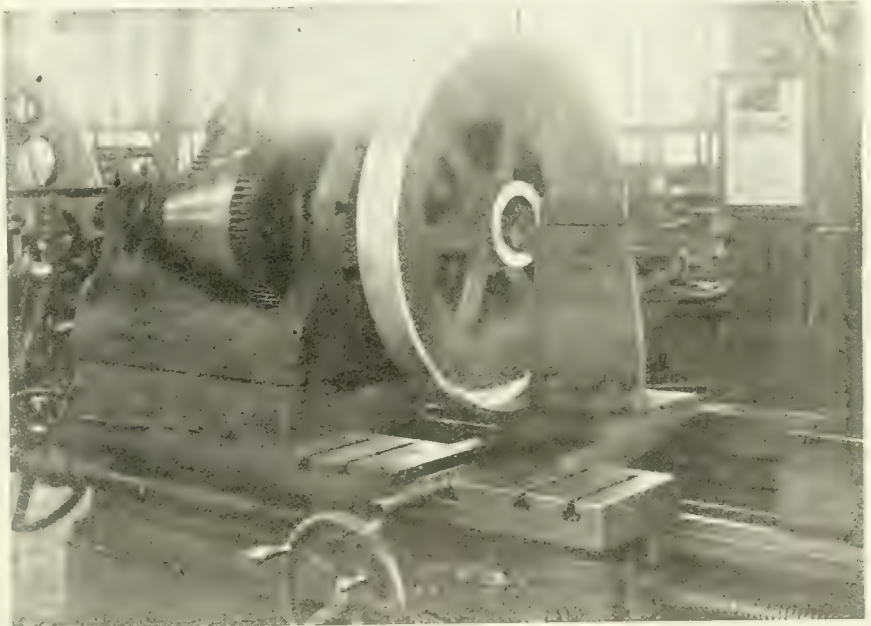
By R. B.

COMPRESSED air is almost universally used in the machine shop for blowing out chips and drillings and keeping the ma-

iron of liberal section, and was arranged to swivel so as to enable it to be used either for right or left hand work. It has proved especially valuable in turning large crank shafts. The tool slot was cored in the one side, the tool being held by the set screws at the top. The writer has seen these tool posts made from steel castings, but they were never as stiff as this one from cast iron, the latter being preferable when it can be made large enough.

**Somebody Did.**—The bride and bridegroom sat side by side.

"Dearest," he said.  
 "Yes, love?" she responded in soft, frightened tones.  
 "If I had known that the tunnel was so long I would have kissed you."  
 "Didn't you kiss me?" she asked, with much surprise.  
 "No," he replied.  
 "Well, somebody did."



AN EXTENDED TOOL POST.

# Practice of Oil Burning Under Stationary Steam Boilers\*

By B. S. Nelson

The scarcity and high price of coal for steam raising, etc., has naturally directed attention to the subject of oil fuel as a substitute. In recent years much progress has taken place in the direction of high degree efficiency of equipment for oil burning, and many installations have been made in consequence. While there is little prospect of an oil scarcity developing, there is nevertheless a tendency of its price to soar, a very material increase being noted in the period covered by the war to date. Advantages of oil over coal, aside from cost, are dealt with in the accompanying article, and are worthy of close study.

**F**UEL oil is oil which is more valuable to the producer as fuel than as a refined product. Due to the rapid increase in use of gasoline in motor vehicles and the use of distillates in stationary engines, and also to the improvements in refining crude oils, it is probable that very little crude oil will be used for fuel, and that the fuel most used will be some sort of residuum or scalped oils; that is,

being distilled and the residue used as fuel. The result of this will be that more attention will have to be paid to the oil-burning system than was necessary with the lighter crude oils used heretofore, because a scalped oil is heavier and more viscous than crude oil. One advantage in using a scalped oil is that there is less fire risk, because its flash point is higher than the flash point of the crude oil.

The flash point of an oil is of interest particularly from the standpoint of safety. On land installations, where the oil is usually buried in a closed tank, the flash point is of less importance than on shipboard, where inflammable vapors are apt to accumulate in the hull or to be freed in a closed boiler room, due to leaky piping.

The viscosity of an oil is the principal

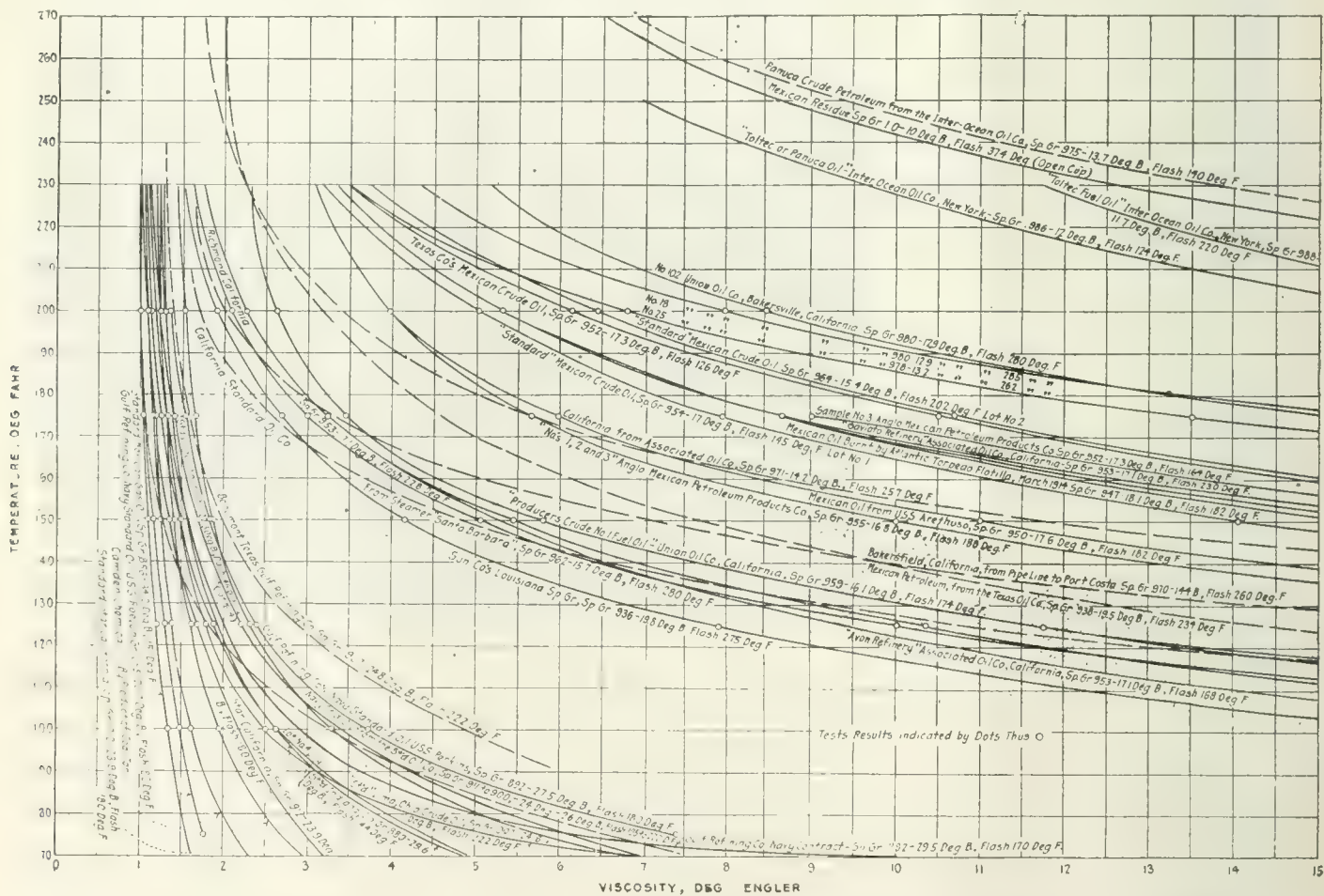


FIG. 1. TEMPERATURE VISCOSITY DIAGRAM OF FUEL OILS, REPRODUCED FROM CURVES OF LT.-COM. JOHN J. HYLAND, U.S.N., WITH ADDITIONS (SHOWN IN DOTTED LINES) BY E. H. PEABODY.

the oil from which the lighter constituents have been distilled off. Though the Mexican oils are, as a rule, heavier and contain less of the lighter constituents than American oils, even they are now

### Fuel Oil Classification

Fuel oils may be classified according to several of their characteristics, which are more or less dependent upon each other. Some of these are the flash point, or temperature at which an oil will give off inflammable vapors; the viscosity, which may be explained as the molecular friction; the specific gravity, the heat value, and the sulphur content.

consideration in the actual burning of that oil, because the success of the burner or atomizer depends largely on its ability to atomize the fuel into sufficiently fine particles to insure satisfactory combustion, and the more viscous the oil the more difficult this atomization. There are various methods of expressing the viscosity, one of the most used being in terms of the Engler scale. Degrees

\*From a paper presented at a joint meeting of the Louisiana Association of Members of the American Society of Civil Engineers and the New Orleans Section of the American Society of Mechanical Engineers.

Engler means simply the ratio of the time it takes a given quantity of an oil to flow through a standard orifice as compared to the time it would take the same volume of water to flow through. Oil is usually sold, however, on the basis of its specific gravity (generally measured in degrees Baume) and its heat value and moisture content. It is usually assumed that the heavier an oil in degrees Baume, the more viscous is that oil, but this is not always strictly true.

Through the courtesy of E. H. Peabody, Mem. Am. Soc. M.E., in Fig. 1 is reproduced a very interesting chart giving the characteristics of some thirty different oils. This chart gives the temperature-viscosity diagram of these fuels, the specific gravity, the degrees Baume and the flash point. Comparing two crude oils from these curves brings out the relation, or rather lack of relation, between degrees Baume and degrees Engler:

	Deg. B.	Flash Pt.	Deg. Eng. at 230 Deg. Fahr.
Panaca Crude	13.7	140	13.75
No. 18 California	12.7	285	5.2

It is to be regretted that oil is not specified in terms of specific gravity instead of degrees Baume, because in any calculations involving the weight of the oil per gallon or per barrel it is necessary to refer back to specific gravity. Further, the heaviest oil that can be designated on the Baume scale for liquids lighter than water is 10 deg. B., or unit specific gravity. There are oils being used now of 10 and 12 deg. B., and no doubt still heavier oils will be used, which will call for two different Baume scales and cause confusion.

Spindle Top oil has a specific gravity of about 0.92, corresponding to 22 deg. B., and its heat value averages about 19,700 B.t.u. California oil is somewhat heavier, the average grade of that oil having a specific gravity of about 0.95, or 18 deg. B., heat value about 18,500 B.t.u. The Mexican oils vary considerably in specific gravity and heat value, but as a rule they are much heavier than either the California or Texas oils; a typical oil now used has 0.99 sp. gr., or 12 deg. B., with a heat value of about 18,200 B.t.u.

Table I compares the prices of coal and oil, taking as a basis coal of the quality of Pratt, Alabama, and Pittsburgh coal, sold in the New Orleans market. While with these coals an evaporation of 10 lb. from and at 212 deg. can be realized with well-designed water-tube boilers when the boilers have ample heating surface and are in the hands of skillful firemen, it is extremely doubtful if any boilers in regular service are showing better than 8 lb., and the great majority are below this figure. Therefore, if we take 8 lb. as a basis, we are giving the coal its full value. Now, with oil giving 19,500 B.t.u. per lb., an evaporation of 14.5 lb. should be readily obtained if the apparatus for supplying the oil to the furnaces is of first-class design and if the furnaces are properly arranged. With this ratio as a basis, it is apparent that a pound of coal is equivalent to 8/14.5 or 0.541 lb. of oil. A barrel of crude oil weighs approximate-

ly 325 lb., therefore one ton (2000 lb.) of coal is equivalent in practical heating value to 3.34 bbl. of oil.

TABLE I—COMPARISON OF PRICES OF COAL AND OIL.

Coal, Dollars per Ton, 2,000 lb.	Oil, Dollars per Bbl.	
5.00	1.50*	1.66†
4.75	1.43	1.60
4.50	1.35	1.50
4.25	1.28	1.42
4.00	1.20	1.33
3.75	1.13	1.25
3.50	1.05	1.02
3.25	.98	1.01
3.00	.90	1.00
2.75	.83	.92
2.50	.75	.83
2.00	.60	.66
2.25	.63	.75

\*Not allowing for labor saving.  
†Assuming 10 per cent. of cost of fuel in labor of firing and handling ashes saved by using oil, a conservative estimate for plants of over 300 h.p.

An interesting point to note with reference to the heat value of an oil is that the B.t.u. usually given is the high heat value or heat value determined in a bomb calorimeter. The actual heat value available in a boiler furnace is less because all fuel

Oil Advantages Over Coal

Oil has numerous other advantages over coal than cost of fuel. The storage space required is much less for an equal number of heat units; there are no ashes to be disposed of; less boiler-room help is required for firing; the wear and tear on the furnace lining is smaller because the firedoors do not have to be opened, with the consequent chilling of the hot brickwork. Very few repairs are necessary to the grate bars; a much smaller stack can be used for the same boiler horse-power; the boiler can be forced with natural draft considerably beyond what it can with coal, an important feature where boiler capacity is scant; where feedwater is bad, it is often possible to carry a load with two oil-fired boilers which would require three boilers were coal used, thus allowing the cleaning and repairing of one dirty boiler at a time. Steam can be raised much more quickly and with no loss due to banking fires. It takes about 10 per cent. of the fuel normally consumed by a boiler at rated load to keep its

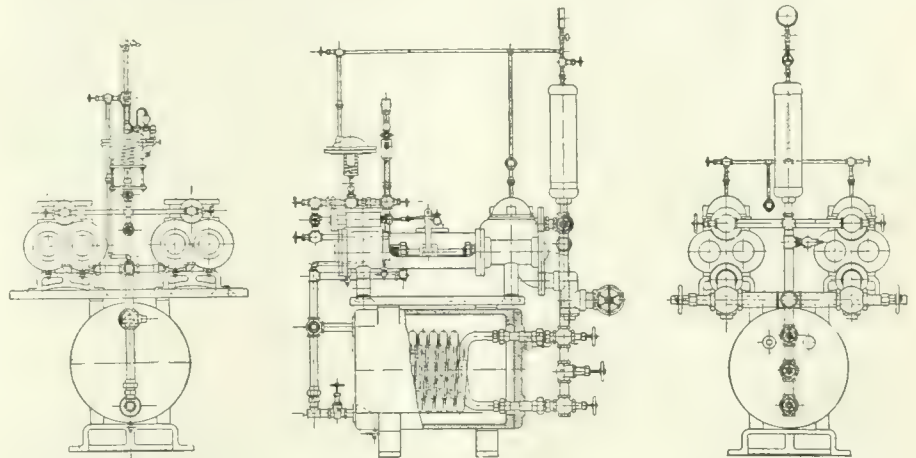


FIG. 2. OIL PUMPING SET, SHOWING DUPLICATE PUMPS WITH PRESSURE GOVERNOR, AIR CHAMBER, GAUGE, SUCTION STRAINERS, RELIEF VALVE AND HEATER.

oil contains a considerable percentage of hydrogen, and the latent heat of the steam formed by the combustion of this hydrogen passes up the stack as waste heat.

In all the heavier grades of fuel, particularly the Mexican oils, water mixed with the oil is in the form of an emulsion and will not settle out in a tank as it will with the lighter American crudes. This is not so much a disadvantage as it would seem, other than causing a lowering of the heat value. With an oil light enough for the water to settle out of its own accord, this water will frequently accumulate in the tank and piping and go over into the burners in a slug, putting the burners out; but with heavy oil a very considerable amount of water can go through the burner with no bad effect. The writer is inclined to believe that a small quantity of water in heavy oil is an advantage in that these oils are usually heated above the boiling point of water to effect atomization, and the vaporizing of the moisture in the oil as it leaves the burner tip probably helps to atomize the oil more thoroughly.

fire banked with coal. In case of an emergency the fire can be instantly extinguished; any one who has had to draw a hot coal fire in an emergency can appreciate this particular advantage.

Successful Oil-Burning Installation Data

There are several factors entering into the successful oil-burning installation, some of which affect the reliability of the system and others its efficient operation.

The first consideration for reliability is the oil supply to the burners, involving the storage tanks, pumping outfit, and heaters. The size of a storage tank varies, of course, with the size of the boiler plant, but it should be large enough, at least, to hold a carload of oil. A very popular size of tank is a 10,000-gal. tank, which is about 8 ft. in diameter and about 30 ft. long. These tanks are usually built of ¼-in. steel with ¾-in. heads, though if the tank is subject to corrosion from the outside it should be made of heavier material. The tank should be equipped with a manhole and filling pipe, a suction opening, a vent opening, and openings for steam-heating-coil connec-

tions. The insurance requirements call for the tank to be below the level of the pumps and burners, which means that it is usually buried in the ground.

#### The Oil Pumps

The oil pumps are the next consideration. The pump that has given the best results is a duplex steam pump, piston-pattern type, with brass valves, metallic packing in the oil piston and special gaskets and piston-rod packing. The size of pump should be based on a very low piston speed.

The pump should be fitted with an air chamber on the discharge side to steady its pulsation of pressure, and a governor on the steam end to maintain the pressure constant. The pressure at which the oil is delivered to the burners depends largely on the character of the oil, varying from 40 lb. for oil of 26 to 30 deg. B. to 80 lb. for oil of 12 deg. B. The pump should also be equipped with strainers on the suction side to keep trash from getting under the pump valves. Duplicate pumps should always be installed, so that if anything goes wrong with one pump the other may be put in service.

The pump should be set as near the level of the oil as possible to give the minimum suction lift, and the suction pipe should be as straight as possible, preferably with bends instead of elbows. Where the suction pipe is long, a foot valve at the bottom of the suction line in the tank is desirable. This should be a valve without leather seats, as fuel oil deteriorates leather. A very good valve to use is a horizontal-swing check used in a vertical position. In addition to air chamber and governor, the pump should be equipped with a relief valve set at a pressure heavier than the working pressure, so as to minimize the danger of breaking the pump. This relief valve should be of the enclosed type, so that its overflow be returned to the tank.

The heavier oils require heating in the suction tank in order to enable the pump to lift them. The temperature must not be high enough to cause the oil to vaporize under the suction pull of the pump. The writer has found a temperature of 110 to 130 deg. about right for Mexican oil of 12 to 18 deg. B. According to Commander John J. Hyland, U.S.N. (*Jour. A. S. N. E.*, May, 1914), the viscosity of the oil had to be reduced to 375 deg. Eng. in order to obtain full capacity from a Blake pump. In order to gauge this temperature accurately, a thermometer should be installed in the suction line near the pump. If this suction line is long, or has several elbows in it, it should be made one or two sizes larger than the suction opening of the pump.

#### The Heater

The next question is that of the heater. Practically all the oil now burned as fuel requires heating in order to reduce its viscosity and facilitate atomization at the burner. There is a wide choice of heaters, but the principal considerations are, first, to have the heater of ample heating surface, and second, to be sure that this heating surface is all utilized

in heating oil with a steam coil in a vessel of oil there is a tendency to local heating; that is, the oil next to the coils may be very warm; but this heat is not readily transmitted to the adjacent oil, so that a heater in which the oil is kept in rapid motion over all the heating surface in the coil is apt to give best results.

There are several pumping sets on the market which combine all the requisites enumerated above in one self-contained unit. Fig. 2 shows such an outfit which, it will be noted, consists of duplicate pumps with pressure governor, air chamber, gauge, suction strainers on pumps, relief valve and heater.

#### Oil Heating Temperature

The temperature to which the oil must be heated naturally varies with its viscosity. For fuel oil usually burned in the South, a temperature from 180 to 220 deg. is satisfactory, the higher temperature being for oil of 12 deg. B. As far as we know, no experiments have been made to determine the degrees Engler to which oil must be heated, but judging from our experience and with the aid of the temperature-viscosity diagrams, we should say that about 8 to 9 deg. Eng. is the viscosity required for a steam-atomizer burner. It has been stated, however, that any oil which can be pumped readily can be atomized by a steam atomizer. After the oil is heated at the pump (and its temperature should be read by a thermometer permanently fixed in the discharge line from the pumps), care should be taken to keep the oil hot until it reaches the burner by proper covering of the pipes.

#### Burner Feature

More stress has probably been laid on the oil burner than on any other part of the installation, which has led to the belief on the part of people unfamiliar with the burning of oil that the burner is the whole thing, whereas, as a matter of fact, the burner contributes but a very small part to the success of the installation. The term burner is really a misnomer, because the only function the burner performs is to atomize the fuel into sufficiently fine particles to effect complete combustion in the furnace.

For land installations, the type of burner which has proved best is the steam-atomizer burner with oil supplied to it under pressure. The essentials of such a burner are simplicity, cheaply renewable wearing parts, economy in steam for atomizing, and the production of a flame of such shape that makes good combustion and, hence, high boiler efficiency possible. The burners may be of either the round-flame or flat-flame type. The flat-flame type is preferable because it uses less steam for atomizing and produces a flame of such shape as to permit proper mixture of air to support combustion without excess air, which is not the case with a round-flame burner.

The use of a target wall is not necessary, and may cause injury to the heating surface of the boiler by causing the flame to concentrate on a small portion of the surface, resulting in what is termed "blow-pipe" action.

The general type of flat-flame burner

is a tip in which are two narrow parallel and horizontal slots, the oil flowing out of the upper slot in fan shape on to the fan-shaped jet of steam issuing from the lower slot.

The position of the burner depends largely on the type of boiler. For a boiler with a long unobstructed furnace, such as a horizontal return tubular, or a boiler of the Heine or Erie City type, a burner set in the firing door is very satisfactory. For boilers where the furnace is short and the travel of the gases is upward, such as in the Babcock & Wilcox or Stirling boiler, the best arrangement is to put the burner at the back, shooting toward the front of the boiler. In either case air should be admitted to the furnace through a checkerwork of firebrick laid on the grate bars. The shape of this checker work should approximate the shape of the flame and thus reduce excess air, and the area of all the holes should be equal to 4 sq. in. per boiler horse-power.

Steam and oil connections to a burner should be made to allow for the expansion and contraction of the oil and the steam headers, and should have unions above and below the burner to enable the latter to be taken out quickly for cleaning. A very essential point in installing a burner is to see that it gets dry steam. The simplest way to do this is to take the steam from the top of the auxiliary steam header. A steam connection should be provided on each burner for blowing the oil out of the burner when it is shut down, as otherwise this oil will carbonize, due to the heat radiated from the hot furnace.

The principal consideration affecting the efficiency of an oil-burner installation, other than the choice of a burner economical in the use of steam (and giving the proper shape of flame), is the proper control of the air supply. One of the advantages of burning oil, mentioned above, was the possibility of reducing the excess air to effect combustion. Conversely, one of the principal losses is the ease with which excess air can be admitted. For any particular installation (assuming the setting is tight and checkerwork properly arranged), the best draft should be determined by installing a draft gauge on each boiler connected to the furnace, then gradually closing the damper until there appears just a faint trace of black smoke at the stack, and finally maintaining the draft at that point. It should be noted, however, that there can easily be smoke with excess air for two reasons: first, if the checkerwork is not properly arranged in the furnace there will be excess air, even though the combustion be incomplete, and second, poor atomization of the oil at the burner will give a grayish-white smoke, which is often mistaken for insufficient air. A more accurate method of gauging the air supply is to make periodical analyses of the stack gases and keep a record of the stack temperatures. The stack gases should not be over 100 deg. hotter than the steam, and no difficulty should be experienced in getting 13 to 14 per cent. CO<sub>2</sub> in regular operation.

# EDITORIAL CORRESPONDENCE

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

## MACHINISTS' INSTRUCTION COURSE—XXIV.

By J. Davies

**G**RINDING in some form or other has been employed since the first man sharpened his scythe with a whet stone, and is an absolutely indispensable factor in modern machine shop practice; covering as it does a very wide range of operations, from the rough castings that the apprentice is given to

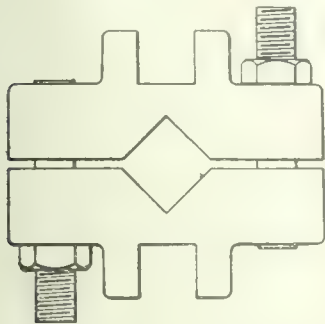


FIG. 89. BALANCED GRINDER DOG.

grind the lumps off, to the very finest work that can be done in the shop. It might be in place here to give just a word of warning to the apprentice on his first few trips to the emery wheel; always take care that the tool rest is close up to the stone, particularly if the object to be ground is a small one. If an opening is left between the surface of the stone and the rest, the tool or material being ground has a tendency to get caught and perhaps your fingers with it—this has happened scores of times, or the wheel might burst or fragments be chipped off, resulting in injury to yourself or nearby workmen. Never grind on the side of the stone if the work can be done as well on the face. I have seen apprentices, and others as well, when grinding the end of a bar or a bolt, gouge a groove in the side of the stone and thus ruin it for good work afterwards. If the side of the wheel must be used move the work gradually and carefully across the surface of the stone, this will help to keep the stone true. To prevent the wheel developing into a useless condition, occasional dressing is very necessary.

The tendency in all machine shops, where it is no one's duty to look after the emery wheels, is to make it to "my" job if possible, no matter what the condition of the stone, and leave the other fellow to true up the wheel. No one would think of using a wheel in a grinding machine that was badly out of true, and it is certainly quite as necessary to have an accurate wheel when grinding by hand. It is not long since that grinding was looked upon as a sort of special method for finishing hardened steel, but now many kinds of work that formerly were per-

formed exclusively by lathe, shaper or planer can be done quite as economically and also more accurately on the grinder. Both the headstock and tail centers of grinding machines are dead; that is, they remain stationary while the work revolves upon them. This overcomes any error there might be through inaccuracy of the spindle or the centers being out of true. If a piece of work is reversed that has been turned or ground between two centers, one live and the other dead, and then tested with an indicator, in nine cases out of ten it will not run perfectly true on account of error in live center, driving spindle, unequal wear of center, etc. Work ground between centers is driven with a special form of dog, similar to that shown in Fig. 89. This should be as light as the general work of the machine will permit, and balanced, so that the centrifugal force will not affect the grinding operations. Usually the dog has two slots, diametrically opposite, and is driven by two pins fastened in the face plate. Following are a few practical examples of machine grinding.

### Grinding Cutters

Cutters may be ground by various methods, in fact the modern tool room grinder affords a large scope for ingenuity and inventiveness and often a job must be done, not as you would like to do it, but the best way you can. Referring to the sketch we will describe one method in common use. It is a well known principle that to turn or grind a taper,

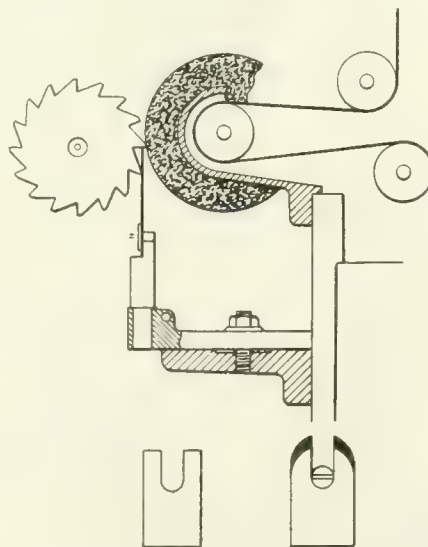


FIG. 90. REST AND FINGER GAUGE.

the cutting point must meet the work in the same horizontal plane as the axis of the work, and that in grinding a tapered reamer it is essential that the cutting edge of the tooth being ground should lie in this horizontal plane. When grinding a straight cutter or reamer this

is not so important, and the cutter is often swung above or below the center to give the necessary clearance. When operating any grinding machine it will be found very useful to first adjust the grinding spindle so that its axis lies in the same plane (horizontally) as the axis of the work, and make a permanent mark

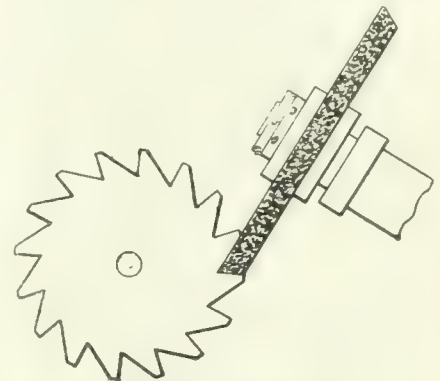


FIG. 91. METHOD OF MAINTAINING ORIGINAL DIAMETER.

on the top of the housing for future reference; this will be the setting for grinding revolving work. To grind a cutter in order to obtain the proper clearance the wheel is set above the center as shown in Fig. 90; only practical experience can determine the amount that the wheel should be raised, as this will vary with the size of the wheel.

Different men have different ideas as to the amount of clearance that a cutter should have, but the general practice is about 3 degrees for iron and steel, and slightly more for softer metals. Too much clearance on a milling cutter makes it dig in and chatter, besides ensuring early destruction of its cutting edge. With too little clearance the cutter refuses to cut, or does not cut freely. Having set the wheel to the desired height for clearance, it is necessary to clamp the tooth rest bracket to coincide with the height of the center of the cutter. The blade Fig. 90 provides a ratchet action as the cutter is moved from tooth to tooth; this blade or finder is adjusted under one of the teeth, as shown in the sketch, so that the grinding wheel is in contact with the back portion of the hand. This finger should be a little wider than the grinding wheel, in order to support the cutter at each end of the tooth, just before it reaches, and after it leaves the grinding wheel. If the finger is too narrow the cutter is liable to slip off before the tooth is completely ground. The wheel should always revolve in such a direction that the tooth being ground is pressed against the finger stop. The teeth are then ground one by one by light cuts, as it is better to take two or

three light cuts around the cutter than attempt to finish with one heavy cut; the latter method producing the tendency to draw the temper and leave the cutter soft.

Blade 1 is the kind generally used for grinding straight cutters and reamers. The second blade is used for spiral or helical cutters; the ends of this blade being on a radius coinciding with the center of the clamping screw. The blade can then be moved in either direction without altering the height. It will be noted in the sketch that the blade is clamped against a concave surface in order that a slight tightening of the screw will hold it in place. Fig. 91 shows a method of sharpening an ordinary straight reamer without altering its diameter. This is done by tilting the spindle to the angle required and surface grinding the face of the tooth with a beveled wheel. As the old solid reamer found in many machine shops is made to a standard size, this is about the only way they can be ground without appreciably changing the diameter.

### DON'TS FOR GRINDING AND SETTING OF CUTTING TOOLS

By J. H. R.

- Don't oil the live center.
- Don't use a broad nose tool on small or slender work.
- Don't force a parting tool into the work if it does not cut freely.
- Don't allow the cuttings to accumulate beneath the tool-post gib.
- Don't set a threading tool by guess work; use a suitable gauge.
- Don't allow the driving dog to bind in the slots of the face plate.
- Don't forget that increased lead will decrease the clearance of the tool.
- Don't forget to lubricate the tail center; seizure might cause the point to twist off.
- Don't allow the tail of the dog to come out of the slot when turning tapers.
- Don't use excessive pressure when grinding tools; overheating will destroy their usefulness.
- Don't forget that a little oil on the tool-post screw will increase the holding power.
- Don't have excessive overhang on the tool; keep the cutting edge as close to the support as possible.
- Don't forget to keep the cutting point level with the center when cutting to the axis of the work.
- Don't sacrifice the rake angle for a keen edge without it; take time to properly grind the tool.
- Don't fail to see that proper clearance is available for backing out an internal threading tool.
- Don't fail to see that the tool-post screw is sufficiently long to prevent binding at the top shoulder.
- Don't allow the chips from a parting or thread cutting tool to curl against either side of the groove.
- Don't fail to face the ends of a shaft square before turning the outer surface; this particularly applies to taper work.

Don't start a finishing cut until you are sure the centers are free from dirt or cuttings, (this also applies to roughing cuts.)

Don't forget that when the work slips in the driver, the feed continues to force the tool into the work and invariably breaks the tool.

### REMOVING IRON PLATE RUST.

By M. M.

AN easy, cheap and effective method of removing rust from corroded and pitted iron plates has been evolved as a result of recent practical experiments in this direction. The method consists in the application to the surface of the iron of a mixture of two parts of finely crushed sodium bisulphate and one part of common salt. This mixture is prepared, then wetted (just sufficiently to be cohesive), and applied to the plate. The moist mixture can be left till the plate is clean, but the action is more rapid if the mixture is scraped off every two or three hours and the iron scrubbed thoroughly with a wire brush and water. The treatment is repeated till the plate is clean. Usually twenty-four hours is sufficient for a badly corroded plate. When the plate is thoroughly clean, it is well washed with an alkaline solution and dried quickly. A coating of paraffin oil is at once applied to protect the surface against oxidation. This method is found to be more effective than hammering, chiseling, the use of wire brushes or even a sand blast.

### BRASS ASHES.

By L. E.

BRASS ashes usually contain from 2 to 8 per cent. of metal. This metallic content is partly due to inefficiency of employees in foundries, but the greater loss, however, is due to the cracking of the crucibles after they have had several heats. There are two methods for recovering the metallic contents in brass ashes, the wet and the dry method. The dry method is not used to any great extent owing to the varying results obtained and this is especially true when the material is damp. The wet method is universally employed in consequence of the accurate and uniform results obtained after the machinery is properly installed. Concentrates from the dry method rarely, if ever, run over 50 per cent. whilst concentrates from the wet method average from 60 per cent. to 65 per cent.

In the wet method, treatment of brass ashes, the latter are first run into an elevated revolving screen by means of a cup elevator. If the material can be run direct from the car, the screen can be elevated close to the car, so that the material can be shovelled direct from the car into the revolving screen. The cup elevator at the start should be avoided, as it easily clogs up, owing to large pieces of coke and metal which fall under the pulley at the bottom of the elevator. The screen should be about 6 feet long, tapered from 2 feet to 1½ feet with ¾ inch opening on the screen. The material that is screened drops into a sluice

box, which is built with a slope of 45 degrees from each end of the revolving screen. This sluice box is also built up to the centre of the screen with a catch box directly under the middle of the screen meeting the sluice box with a 45 degree slope from each end of the screen.

Running water is introduced into the sluice box by means of two one inch pipes at each end of the screen with ¼ inch holes an inch apart in each pipe. The water running into the sluice box under the revolving screen forces the screened material through the catch box into the sluice box from the catch box to the rolls where the material is finely crushed. The fine material is then run into the sluice box, which is built under the rolls to the cup elevator and into the jig where separation takes place. The rough material that does not go through the screen, goes through a box at the small end of the screen and into a crusher or chaser, where the material is crushed. From there it passes into the rolls, where it is crushed more finely and then goes to the jig with the screened material that is first crushed.

The jig is 16 feet long by 6 feet high, by 4 feet wide, and is separated into four hatches. Each hatch is 6 ft. by 4 ft., by 6 feet high, with the inside built with a 45 degree slope so that the metal falling through the grates at the top of each hatch can roll to 3 inch stop cocks placed outside of the middle hatch. The hatches are not built on a level, but each one is about 2 inches lower than its neighbor, so that the material running over the top is slowly separated, the metal going to the bottom and the coke continuing its journey clear over all the hatches, it being of no further value. Each hatch must be filled with water before the machinery is started. Plungers are attached to each hatch and when the machinery is started, the suction formed by the plungers separates the materials as described. The stop cocks at the bottom of each hatch are opened every few minutes to collect concentrates.

### UNMACHINED JOINT FACES.

By D. Street.

CAST iron possesses not only "flow" properties under prolonged stress, but is also much more elastic than is commonly supposed. Indeed, there is a widespread notion among the mechanically educated that cast iron "will break before it will bend." Yet cast iron will spring to a quite appreciable amount, as witness the deflection shown by a cast iron test bar before breaking occurs, or the "wind" of a lathe-bed resting on faulty foundations. Joints in which any kind of sheet jointing material is used have hitherto been rough machined. The machining has been considered necessary in order to true the surfaces, which, at the same time have had to be left rough in order to provide a grip on the packing.

It is now found that, given careful moulding, machining can be eliminated altogether on certain joints, such as those of hydraulic pump-valve covers. The parts are cast with the faces well serrated, and by using stout millboard



jointing, the sand finish is entirely successful, and the joint answers satisfactorily all tests. Up to the present it has been found necessary to machine the joint faces of pump bodies and cylinders, but hopes are entertained that in course of time even this will be eliminated for ordinary pump joint faces. The practice is dependent upon the ability of the foundry to turn out surfaces reasonably flat; more studs are required than would otherwise be employed. Joints tight under 500 lbs. hydraulic pressure can be made with 18 in. by 12 in. rectangular covers over 1 in. thick, having a diagonal wind of  $\frac{1}{8}$  in., using 3-16 in. millboard, and no trouble whatever is experienced under test.

If special attention is paid to the moulding and casting of the parts, the number of wasters in the foundry can be kept very low. Lumps and bumps of a decided character render jointing impossible, but a surface reasonably level, even if it depart considerably from the straight line, is no barrier under the persuasion of the nuts on bolts or studs. Damp sand and molten metal scarcely seem an ideal combination for finished work possessing relative accuracy, but if the foundry product be examined, it will be realized that the normal deviation from truth can be kept well within the permissible tolerance. It may prove requisite to use an adequately reinforced core, levelled properly after storing, and applied at the point where the jointing face is desired, the latter being poured face downwards. If it becomes clear that the work on one moulder under inspection proves more accurate than the rest, it is safe policy to study his precise methods. The practice of finishing cold-water pump covers without machining is in actual daily operation at the present time.

## STANDARD SHIPS AND ROLLING STOCK.

By C. T.

THE movement toward standardization in engineering manufacture has received during the war an enormous impetus, which has spread far beyond the confines of arms and munitions. The provision of transport material is proving to be only second in importance and urgency to the provision of munitions and the engineering mind has naturally been turned to the questions of placing the building of ships and rolling stock on the same basis of standardized repetition production as has yielded such unprecedented results in the making of shells and guns.

The advantages of such a course are obvious. Once let a standard design for, say, a 5,000 ton cargo steamer be agreed upon by the leading shipowners, and it becomes possible for identical ships to be laid down in batches, and for the suppliers of the raw material for shipbuilding to put down special plant for the repetition production of the standard parts; whilst it also means a very considerable economy in the stocking of parts for subsequent replacement. The building of cargo vessels along these lines has been going forward for some

time in England, a company having been formed last year for this especial purpose by a number of leading shipping concerns, and, although the tonnage under construction thus far is minute in comparison with the total volume of British shipbuilding, the results of establishing and constructing standard designs of cargo vessels by one composite shipbuilding company are likely to be far greater than can be measured by its own actual output.

The building of standard ships entails the provision of standard engines, and it is here that the greatest differences of opinion as to which is the best all-round type are likely to be found. The settlement of the point can hardly be left to general discussion or reached by weighing the counter-claims of individual preferences, and the Northeast Coast Institution of Engineering and Shipbuilders has rendered a signal service in appointing a committee to draft specifications for reciprocating engines of various powers for cargo boats. The aim is to arrive at the type of engine which shall be most suitable for the general run of cargo work, and at the same time be designed as to its details with a view to the greatest ease and rapidity of production.

### Rolling Stock Standardization.

Sea transport is of paramount importance to Great Britain, and rail transport is to France, therefore, almost exactly the same procedure is being followed in Great Britain in the case of shipping as is being adopted in France in regard to rolling stock. A company has been formed by the leading steel and rolling stock manufacturers for the purpose of producing standard lines of locomotives, wagons, etc. It is intended that compulsory as well as persuasive powers shall be employed to induce the railways to give up individual whims, and agree to standard patterns which can be produced in quantities cheaply and at a quick rate. Even where special bodies are required, it will still be possible under this arrangement to have the wheels, axles, underframes, coupling gear, fittings, etc., made to the same drawings and the same specifications, and as the old equipment in all its diversified patterns becomes obsolete, all parts for manufacture and repair will be interchangeable on all lines.

### Periodic Revision of Standards.

There is, of course, a danger in all premature specifications. There is always a tendency to believe that the design of the moment is the final word in development, and once a design is standardized and enforced improvements are apt to be difficult of introduction. To guard against such an eventuality, the council of the Northeast Coast Institution of Engineers and Shipbuilders make it clear at the outset that any specifications now agreed upon will be revised annually by the members of the institution, in open discussion, in order to bring it up-to-date. However, there does, in fact, come a stage in the development of some mechanisms when the most cautious can feel assurance that something like finality has been reached. The bicycle is a

case in point. Ships and railway rolling stock are certainly a long way yet from any such finality, but there are elements in both which, in practice, might be standardized to very great advantage.

## CONSERVING AND DEVELOPING CANADIAN TRADE.

THE special committee of the Canadian Senate appointed to consider the best method of conserving and increasing domestic and overseas trade that prosperity may not unduly suffer when the stimulus resulting from munitions orders is removed, have made the following recommendations:

First, the securing of overseas trade to replace munition orders.

Second, the financing of overseas contracts.

The organization of a trade bank is recommended. It would be known as the Canadian Trade Corporation, and would be similar to the British Trade Corporation, recently organized in the Motherland on the recommendation of a committee appointed by the British Government.

The British Trade Corporation has for its objects the giving of advice and financial assistance to British commercial and industrial undertakings generally, and to further development of British trade, industry and commerce; to assist in obtaining orders from abroad for British manufacturers and traders and to grant financial facilities for the execution of such orders; to acquaint themselves with conditions of trade and the business requirements of all countries of the world and to enter into banking arrangements with such countries, or, where necessary to open branches in such countries; to establish information bureaux to furnish British merchants and manufacturers with reliable data upon openings of trade, etc.; to act as an agent for carrying through overseas commercial and financial transactions in which His Majesty's Government may be interested and to receive official recognition and assistance.

The Senate Committee states that the Canadian banks and some of the leading industrial and commercial companies and individuals of Canada are willing to undertake the organization and operation of a Canadian Corporation similar to the British organization, to conserve and extend Canada's trade after the war. It is noted that while the British Trade Corporation, although not directly under the control of the British Government, was nevertheless organized directly at the instigation of that Government, which has accorded them privileges and measures of assistance and official recognition.

The Canadian Senate Committee, therefore, recommends:

"That the Senate of Canada forward to the Right Hon. the Prime Minister Sir Robert Borden, a copy of this report of the special committee on the conservation of Canadian trade, with the request that due regard and consideration be given to the importance and advisability of aiding in such manner as may be deemed prudent and advisable the formation

of a Canadian Trade and Banking Corporation which will meet the requirements as set forth."

The adoption of the report comes up for discussion during the present week.



### CANADIAN RAILROAD LEGISLATION.

LEGISLATION necessitated by the financial difficulties confronting the Canadian Northern and Grand Trunk Railway Companies will be brought before Parliament when the Military Service Bill has left the Commons. It is believed in Ottawa, that, in view of existing conditions, the solution proposed by the Government will be of a temporary character. It will involve complete Government control of the operations of the two companies while preserving their separate identity until a final solution of the railway situation as a whole is possible.

In dealing with the present crisis in the railway companies' affairs the Government has been faced by a number of difficulties. It has to keep before it the necessity of safeguarding Canada's credit, that the country's participation in the war may not be hampered by lack of necessary money. It has also had to frame a policy which will keep the railways in operation in order that Canada may not suffer from lack of transportation facilities and congestion and delay of traffic. The commitments of the two railways maturing in the near future aggregate many million dollars. Since the outbreak of war the companies have been financed by short date loans, which must shortly be liquidated or renewed.

For the railways to meet these loans by repayment is impossible. For the Government, at a time when the money markets are closed to all but war borrowings, to divert such sums from the war treasury is equally not feasible.

#### Control by Government.

Immediate Government ownership would mean the assumption of heavy liabilities, and to permit a receivership would injure the credit of the Dominion and all the Provinces whose guarantees have been given to the companies.

The question, therefore, before Parliament is who best can secure renewals of outstanding loans, the companies or the country. Hence it is felt in the capital that the Government can best secure renewals, which must be forthcoming, and that this must carry with it complete Government control. This control, it is felt, should be maintained until such time as money is available to meet the companies' commitments and the roads are absorbed into the Government system or become self-supporting and a final solution is possible.



### CALCIUM CARBIDE INDUSTRY DEVELOPS.

ONE of the great industries of the Dominion that has grown to an enormous extent, due to the cheap supply of electric power, in the last few years is the manufacture of calcium carbide. In the

report of the Department of Trade and Commerce, recently issued, it is shown that from a small beginning, a few years ago, this industry is now among the largest. Previous to the year 1915 the exports of this material did not exceed \$200,000 in any one year, but in that year the exports increased from five millions to thirty-six million pounds, and the value from \$161,026 to \$1,117,118. The following year, however, showed that exports had increased to over three times the figure for 1916, being 112,974,900 pounds, valued at \$3,485,670.

For the year which ended on March 31, 1917, the value had increased further to \$4,379,564. The demand for this material was formerly to provide acetylene lighting in remote districts and plants where electric light was then not obtainable, but with the coming of electric light the demand fell off until the newer uses of acetylene in oxy-acetylene welding and the manufacture of acetone so increased the demand that it may soon be one of Canada's monopolies—Canadian Chemical Journal.



### C. N. R., MT. ROYAL TUNNEL ELECTRIFICATION.

IN order to obviate the smoke nuisance and generally to improve the working of its terminals in the City of Montreal, the Canadian Northern Railway is adopting electricity instead of steam for working the trains through the Mount Royal tunnel which gives it access to the Montreal Station and the yards adjacent thereto. For the collection of current, overhead conductors will be used, with electric locomotives of a type believed to be specially adapted to give the best results in the conditions under which they will work.

The locomotives are designed for 2,400 volts d.c., and in many respects are very similar to those in use on the Butte, Anaconda, and Pacific Railway. Each has four axles with all the weight on the eight driving wheels. The running gear consists of two four-wheel trucks, articulated together by a strong and heavy hinge. The equalization of the trucks is effected by a semi-elliptic leaf spring over each journal box, connected through spring hangers to the frame and to the equalizer bars. The friction gear is mounted in the end frame casting of the truck. The cab is of the box type and is divided into three compartments, the centre one being for the apparatus and the end ones for the operator. Each of the operator's compartments is fitted with a controller, control switches, ammeter, air brake, and pantograph control, air gauges, and other equipment, thus giving the locomotive double-end control.

#### Locomotive Structure.

The following are some of the principal dimensions and characteristics of the locomotives:

Length inside knuckles, 37 ft. 4 in.; length over cab, 3 ft.; overall height, pantograph down, 15ft. 6 in.; height over cab, 12ft. 10in.; overall width, 10ft.; total wheelbase, 26ft.; rigid wheelbase, 8ft.

8in.; total weight on drivers, 83 tons; wheel diameter, 46in.; tractive effort at 30 per cent. tractive coefficient, 49-800lb.; tractive effort at one-hour rating, 20-300lb.; tractive effort at continuous rating, 14-500lb.

The underframing is of the centre-box girder construction with two 9in., 15lb., channels, spaced 16¾ in. back to back, and fitted with a top cover plate 26in. by ¼ in. and a main bottom plate of 24in. by ¾ in. The body and end cills are of structural steel shapes and the bolsters are built up of plates and angles. The flooring has a bottom layer of spruce, tongued and grooved, upon which is placed a thickness of three-ply "Salamander." Between this and the main floor is an intermediate insulating floor of ¼ in. steel plate, over which is placed another layer of three-ply "Salamander." The main side posts are of 3in. by 5-16in. rolled steel angles, which act as a stiffener to the side sheeting. At the belt rail the sheeting is again stiffened by a 4in. by ½ in. bar, which extends the full length of the body. The corner posts are built up of 3in. by 2in. angles, with 3-16in. pressed steel cover plate. The side sheets are of 0.110in. thick cold-rolled steel plate.

#### Electrical Equipment.

The motor equipment consists of four G. E. 229 A. commutating pole motors wound for 1,200 volts and insulated for 2,400 volts. Two of these motors are permanently connected in series for operating on the 2,400 volt trolley circuit. The one hour rating of each motor is 315 h.p. at 1,200 volts. The motors have forced ventilation, obtained from a blower in the cab. The locomotives are geared for a running speed of about 45 miles an hour, and are operated as two-speed engines with 10 points in series and nine points in series parallel. The master controller is of the non-automatic type. It has the contractor energizing the circuits are designed for 125 volts, the current being supplied to them by a motor generator set, the motor of which has two 1,200 volt. windings and two 1,200 volt commutators in series. This set is mounted in the centre of the cab, and also supplies the lighting current.

The trolleys are on what is known as the Butte roller pantograph type, operated pneumatically and mounted on insulated bases. Each locomotive has two pantographs and a hand pump is used in cases where the locomotive has been standing for a time and therefore has no air supply.—Times Engineering Supplement.



Quebec Bridge Progress.—The new span for the Quebec Bridge is well under way at Sillery, being now about one-third completed—and it is expected that it will be finished in September. No change has been made in the method of putting it in place. Every care is being taken to assure that there be no defect in the material which could cause another disaster. Government engineers visit the scene of the work every week to supervise the construction of the span.

# CONTEMPORARY WAR ARTICLES

Embracing Information and Data Drawn from a Variety of Sources Relative to and Arising from the Prosecution of this Many-Sided European War

## JIGS AND FIXTURES IN MUNITION WORK\*

THE unstinted admiration, even astonishment, which has been accorded to the marvellous and protean aspects of the new machine tools that have been designed to facilitate the production of munitions, has perhaps, with superficial observers, obscured the important part taken by the extraneous appliances which have been designed with the same ultimate object. Among these aids the jigs and fixtures occupy a foremost place, for apart from their assistance, the dilution of labor could not have been accomplished to the enormous extent which has been achieved. Neither would the output have been so vast, nor the very close approximations to accuracy that are demanded have been secured. A large portion of the merit of these achievements must be credited to the tools used in the machines—those which are specially designed and set up—but in most instances also the tools, apart from the control exercised over them by the fixtures and jigs, would have failed to secure the high grade of efficiency required.

The difference between a jig and a fixture is that the first is an extraneous element attached to a piece of work to guide or control the movements of tools, while the second receives the piece to be toolled, holding or enclosing it, and is secured to the machine table in some suitable way. It may or may not include provision for the guidance of the tool or tools. Thus, the fixture may include the element of tool control—the jig—or the latter may be employed alone, or not be used at all. The primary function and the great utility of the jig is, therefore, to locate the tool or tools precisely alike in operating on any number of similar pieces; that of the fixture is that any number of like parts can be set in exactly the same positions, to be submitted to the action of the tools. In each instance an equally important fact is that repetitive results exactly alike are assured without tentative settings and measurements or the exercise of the skill of a trained mechanic.

### Precedence of the Jig

The jig preceded the fixture in point of time, the earliest form being the drilling jig, or "templet," as it was once termed, through the holes in which the correct centring of one or more drills is controlled. Though this has always been used, its employment has extended amazingly. The fixture is an appliance of relatively recent growth, being mainly one of the developments associated with the interchangeable system of manufacture, now grown until it has reached in many instances an unprecedented degree of

complexity, ingenuity, and large dimensions. The tool-room is largely engaged with the design and construction of jigs and fixtures, each of which has to be schemed for just the piece of work that has to be toolled under its coercion.

During the growth of the drilling jig it has developed great improvements over its prototype, the templet. Generally it is built much more stoutly, and it is rendered more durable by the insertion of hardened steel bushes for the guidance of the drills, reamers, and taps. Although the jigs differ with every job, the elements themselves are standardized in shops, and there are differences in fitting the elements to suit varied conditions. The bushes are a large genus, and a study of them would reveal some dozens of variations. Nearly all the earlier drilling templets dealt simply with holes in one plane, but many jigs now include provision for being turned about to various angles to present more than one face to the tool, and having means for locking it at each position during drilling. One of the valuable features of a drilling jig is that it provides the only means by which a hole can be drilled on a sloping surface, to enter accurately, that is, where the drill does not enter normally to the surface. Without the control of the jig the drill would slip and make its hole somewhere below the correct point on the slope. Holes of this class occur in adapters, shell noses, and fuse parts. These are drilled correctly through a jig combined with a fixture, which hugs the curved or tapered contour, and has a considerable substance of metal, with a deep bush in close contact with the surface to coerce the drill.

### Leading Aspects of the Fixture

Into all high-class fixtures that are required for long service, with the embodiment of fine limits, two essential conditions enter—means for exact location of the work and provision for the durability and permanence of the fixture. To secure the first there are a myriad devices, having for their sole object the rapid, accurate, and uniform setting of hundreds or thousands of similar pieces, often, too, of pieces which are as yet rough castings or forgings, having, therefore, uncertain variations in dimensions. The second condition is met by the selection of those materials which are best calculated to fulfil the requirements, in suitable proportioning and in treatment. In consequence, a large classification of the appliances into typical groups exists, such as the open and the box forms, and into standardized elements—the bushes, pins, screws, and so on. Cast iron, wrought iron, mild steel, and carbon steels, hardened and ground, enter into these constructions. Draughtsmen and designers in office and tool-room are occupied exclusively with the scheming of the fix-

tures and jigs, and groups of mechanics in the tool-room are engaged in producing them.

When pieces are held in fixtures, they are either set by portions that have already been toolled, or by rough-cast or rough-forged surfaces. The first are readily dealt with. When a setting surface has not been toolled, its equivalent is often provided so far as the setting is concerned by the method of "spotting," that is, facing an area, or areas, small but sufficient to make accurate contact with a locating plug or pin. When location must be done by rough surfaces, then methods are devised for making slight adjustments of some elements of the fixture in order to accommodate pieces that vary slightly in dimensions. Again, a fixture often has to carry articles that are of a very flimsy character, and liable therefore to become distorted by the exercise of undue pressure. These present similar problems to those which confront the machinist when he fixes such articles directly on machine tables. Packing has to be provided in the fixture in opposition to clamps to afford sufficient support, without severe pressure.

### Rapidity of Action

When the question of the design of fixtures is raised, rapidity of action in setting and removing is of nearly equal importance with that of any other aspect of the problem of production. Fixtures afford many illustrations of alternative methods of this character. One of the most valuable is the hinged bolt, pivoted to be thrown back on one side, instead of requiring time to be spent in unscrewing a nut and pulling a bolt out of its hole. Among the clamping devices which act with rapidity are cam levers. A lever boss has its outline shaped eccentrically, with the result that the movement of the lever through a small arc causes the increasing radius to press on the work and grip it instantaneously. A simple clamp, which is nearly instantaneous in action, is a swinging plate which is pivoted on a bolt at one end and tightened on the work with a bolt at the other. The latter fits in an open-sided slot hole, to avoid running a nut off and on. When the object, say a shell blank, is inserted in the fixture to be cut off or centred, the clamp is swung over it, and one turn of the nut secures it. Similar to this is the hinging of cover plates or the pivoting of a fixture. In making settings, stops against which one particular portion of the piece of work is pushed avoid the waste of time involved in all tentative settings by measurement, and ensure uniformity of setting in hundreds of similar pieces.

Locating plugs form a large group of time-saving elements. They are generally used in preference to fixture faces, even when they locate a plane face, but they have a wider sphere. For plane

\*From Times' Engineering Supplement.

faces they are plane or cylindrical, but for holes they are of conical section, for external cylindrical surfaces they take the form of vee blocks, for the ends of cylinders hollow cones, and so on. The fixture is very often designed to fulfil the function of a dividing plate or head, as when several holes have to be drilled in faces, or on peripheries at exact angular distances apart, or when facets have to be milled in strict geometrical relations. Holes and a plug, or notches and a latch, provide the means of instant location. In those shops where motion studies and route systems are installed these minute economies rank as of far higher value than in those factories where little account is taken of the number of movements made by the operators.

#### Dimensions and Scope of Fixtures

Many of the fixtures used for the parts of guns, rifles, and revolvers are of small dimensions, and are, therefore, easily handled, but at the other extreme the help of a crane is wanted. Large numbers of fixtures are allied to the machine vises, but they are shaped, as far as the arrangements and forms of the jaws are concerned, solely in order to enable them to take the one article for which they are designed. Jaws are as often set at various angles as disposed parallel. Frequently the resemblance to ordinary jaws is disguised, as happens when the shape of a piece entails the fitting of three or more grips disposed at various angles. These are usual in dealing with some parts of revolvers, for milling, shaping, slotting, and drilling operations.

In its wider developments the fixture is not limited to securing a single article. It may include a long row of small pieces, the number being limited only by the maximum capacity of the machine for milling, planing, or drilling. The heavier the fixture or the more severe the character of the tooling done, the more massively must it be proportioned in order to avoid spring and vibration.

#### Some Contingent Results

One utility of the fixture, secondary only in the sense that it is not the original function, is that it, with its contained piece, can have different faces presented to the tools on a single machine, or it can be transferred between several machine tools, where operations of a similar or a different character may be performed on it. How great the resulting economy is may be imagined if comparison is made with the time that would be occupied in resetting an intricate or a flimsy article or a series of such pieces directly on machine tables. The fixture and the piece which it encloses are virtually one and the same element, ensuring that each portion tooled will occupy correct relations to every other portion, and that a thousand or ten thousand pieces so treated will interchange with each other.

Another aspect of the fixture is that a very large amount of care, thought, and labor is frequently spent on an elaborate fixture to enable a small and apparently trifling operation, such perhaps as the drilling of a single small hole, or the milling of an edge, to be performed. The

explanation is that without the employment of a fixture the assembling of thousands of similar pieces on an absolutely interchangeable system would not be possible, and hand correction and adjustment would be entailed. Then, not only would the cost of production be immensely enhanced, but the supply of spares to replace those worn or damaged at the seat of war could not be guaranteed.

#### Predominance of Drilling

Probably three-fourths of the work that is done in fixtures consists of drilling and allied operations, simply because the central fact of exact control is more readily carried out in drilling than in milling, planing, or shaping. A drill or a boring tool can be coerced in holes in fixture or jig, but other tools must be set in some way, so that the function of the fixture in these is limited to securing the work in one unvarying position. Drilling functions may be extended to include a series of drills, or allied tools, reamers, etc., for simultaneous action.

Other machines in which fixtures are employed are milling, planing, shaping, slotting, and face grinders. In the face grinders, and in milling machines and planers, the fixture is utilized in a way which marks a vast extension of its original function, in what is termed continuous tooling. A series of similar pieces is arranged lineally or grouped on a circular table, and gripped in one fixture on the table, while the tool cuts over the series.

In the case of pieces which offer irregular outlines to be milled, forms control the outline. A form on a hinged portion of the fixture, the shape of which will produce the irregular outline to be milled, is moved under the coercion of a roller against the pressure of the milling cutter. Fixtures of this kind are used in milling the outlines of sword bayonets, and in dealing with some of the small parts of rifles.

A good many fixtures are designed merely for drilling the chucking centre in the blank end of a shell forging in a vertical drilling machine. As the forging at this stage is rough, it is centred by the rough interior, through the medium of a stem smaller than the bore, but provided with adjustable hinged fingers which are moved outwards with nuts. The fixture is hinged to its base, which is attached to the table of the machine, and the stem is tilted outwards to an angle for the purpose of slipping the shell over it. In some the stem is lowered to a right angle.

Although the usual practice is to bore, tap, and recess the mouths of shells in a lathe of some kind, yet these operations have been regularly done on vertical drilling machines. The shell is held on the outside in a fixture which carries four vee'd jaws that grip it on the outside through right and left hand screws turned by a hand wheel. The tools are guided through a central hole in a bridge piece. Similarly a shell is set on a stem in a vertical position to have the base plate forced into the end, in cases where it is not screwed in. The post or stem is hinged as before, and the plate is pressed in, riveted, or caulked by ram or hammer,

depending on the system adopted. A shell is gripped in a longitudinal position on vee-blocks, integral with the fixture for the drilling of a hole in the nose. A conical locating plug centres the nose, a swinging clamp plate is brought in opposition against the base, and an arched end receives the bushed hole through which the drill is coerced.

#### Continuous Tooling

Many massive fixtures have been designed solely to perform the preliminary task or cutting off shell blanks from solid bars, or for rough-facing the ends of forged shells. The first include fixtures for use with a single saw, or with the multiple milling cutter type of saws, or with the rotary cutting-off machines. In the second case the ends of the forgings are trimmed with a face mill, either on a plane miller or with cutting tools on the table of a vertical boring machine. When gang saws or face mills are used, and the fixtures occupy the whole length of the machine tables, an additional economy is secured—borrowed from planing machine practice—that of setting up pieces on one portion of the table, while tooling is proceeding on those that occupy the other portion. There is ample time for doing this when a long table may occupy from one to four hours in its total traverse.

#### Fixtures for Fuse Bodies

In the case of fixtures for fuse bodies, problems in drilling are presented which can be solved only by the employment of fixtures or of machines having drill spindles built exclusively for dealing with these bodies. The fixture permits of the employment of the standard machines, but several fixtures are required for a single size of body, since it is necessary to use some holes as the means of location for the drilling and tapping of others, and fixtures of different shapes are required to hold and present the various holes suitably to the drills and taps. The graduated time ring for fuses is the subject of several fixtures and drilling jigs.

#### Milling Fixtures

Extensive employment is found for milling fixtures in the small parts of rifles and revolvers, which include many awkwardly intricate and irregular shapes, all to be tooled to extremely fine limits. Many of the fixtures deal with profile milling. The number of separate and distinct operations in some single pieces is remarkable. The forging termed the "action body" of a Lee-Enfield rifle, which weighs in the rough about 5 lbs., is reduced to 1½ lbs. after 150 operations have been performed on it. The breech bolt entails 46 toolings, the trigger guard 35, the nose cap 48, and other parts run these closely. The "body" of a revolver goes through 76 operations, including milling, copy-milling, drilling slotting, shaping, and drifting, requiring the services of about a dozen machines and double that number of fixtures.

#### The Fixture in the Small Shop

One benefit which the fixture confers, and which has proved of much value at the present period, is that it often en-

ables machines to be used which would, without its aid, not be qualified to deal with the tasks required of them. An enormous volume of work has been done by these alternative methods of manufacture under the stress of necessity. Many small shops to which work has been sublet have been but poorly furnished with machine tools; hence they have taken such sections from the big controlled firms as they have been able to deal with, and produced them with the help of fixtures and jigs adapted to the tools in their possession. The inspectors are not concerned with details of this kind. The final results as revealed by tests is their business.

No operation is too insignificant, even though tooling is not involved, to be dealt with by the aid of a fixture. The tiny percussion needles in fuses are carried each in a small plug, and have to be fastened securely in their plugs. As they are too small to be screwed, they are held frictionally by a process termed "spinning," that is, a small annulus of metal on the face of the plug is closed round the pin after its insertion in the plug by the pressure of two rotating rolls or wheels. The needles have to be dropped into their holes and drilled in the plugs by hand, which would be tedious in the absence of a guide. A fixture is, therefore, made to hold a number of plugs, and a plate is doweled on it, having countersunk holes in alignment with the plug holes below. The pins, being dropped into the bell-mouthed holes in the plate, enter the plugs at once, and, the top plate having been lifted off, the fixture is taken to the machine to have the pins secured.

### CASTING TEMPERATURE OF ALUMINUM

THE casting temperature exercises a decided influence on the physical properties of aluminum alloys, according to F. H. Hurren in his summary of a paper read before the Birmingham branch of the British Foundryman's Association. To a certain point, the lower the casting temperature, the better the mechanical properties. At temperatures below 650 deg. C., there appears to be very little change in the tensile tests, and at this temperature almost any properly-gated casting can be run. It is, of course, absurd to dogmatise, and say that no mould must be poured at a temperature exceeding 650 deg. C., as factors may be present which render it desirable or necessary to cast at a higher temperature. For instance, aluminum aeroplane cylinders require a higher temperature to ensure freedom from mis-runs in the very thin cooling fins, and in the remarks on porosity an example being cited where a temperature of 675 deg. gave the best results. Speaking generally, however, most commercial casting can be performed at a temperature of 650 deg. C., or under, by paying proper attention to the method of gating, and obviation of air locks. Pyrometry is just as important when dealing with molten metals as in annealing and hardening processes. Many aluminum castings are poured

from two crucibles simultaneously, and it is to court trouble to have the two lots of metal at different temperatures. By "drawn" melting in bulk the risk of this happening is not so great as when melting in small crucibles in coke or oil furnaces. Many of the vexatious cracks and "drawn" places are due to this cause.

Again, the "burnt" metal danger appears to be an imaginary one. By proper attention to casting temperature, it does not matter what temperature the metal has attained, nor how long it has remained in the furnace; results may be obtained equalling those from metal which has been melted with every care. I think that most of the trouble which has been ascribed to "burnt" metal, is really due to crude methods of judging temperature, and could be avoided by the introduction of a pyrometer. It is difficult, if not impossible, to correctly estimate the temperature of a body of molten aluminum, by the eye. A crucible of metal has been heated to, say, 880 deg. C.; it is drawn from the furnace, stirred, pieces of scrap or ingot metal added, stirred again, termed "right" (when perhaps the temperature is still as high as 720 deg. C.), and when a "waster" results, it is credited to "burnt" metal. Actually it is due to a high casting temperature, and had a pyrometer been used and the metal cooled to, say 620 deg. C., no doubt a perfect casting would have resulted.

Aluminum is still sufficiently fluid at 540 deg. C. to run thick castings, and there is no visible difference between metal at that temperature and metal at 700 deg. C. No one would deliberately leave metal in the furnace for a long period after it has melted, owing to the waste of fuel and increased melting loss, but where this is unavoidable figures obtained indicate that the metal does not suffer deterioration. There is no danger in using metal which has been left in the furnace for two hours, provided attention is paid to casting temperature.

### CARE OF BELTING

LEATHER belts should be protected against water and other moisture by using a waterproof dressing. Belts made of coarse, loose fibred leather give best service in dry and warm places. For damp or moist conditions, the very finest and firmest leather should be used. Oil should not be allowed to drip on belts. Leather belting may not safely be run constantly when the surrounding temperature is over 110 degs. Fah.

It is usually preferable to joint the ends of a belt by splicing and cementing, as this ensures against irregularity of operation. Laced belts should have the lace holes punched with an oval punch, whose longer axis is parallel to the belt lengthways. Lacing should not be crossed on the driving face. The greatest allowable belt tension is not constant, neither is the belt velocity even with pulleys revolving at constant speed. Ball and roller bearings in the shafting hangers have contributed materially to an increase in over-all efficiency of belt drives.

### BEARING LUBRICATION

A STUDY of the influence of surface velocity on the mean film thickness in the lubrication of bearing forms the subject of the paper which received the student prize of the American Society of Mechanical Engineers in 1917. The paper was prepared by Boynton M. Green, of Leland Stanford, Jr., University.

The apparatus used in the experiments on which the paper was based is shown in Fig. 1. It is non-adjustable and consists of a plain phosphor-bronze sleeve about 3¼ in. in diameter and 7 in. long, pressed into a cast-iron housing which was bolted to a lathe bed. Lubrication was effected by two steel oil rings of rectangular section. Two sets of oil grooves were cut in the upper half of the bronze as shown in the sketch. On assembling the bronze sleeve and housing it was found that the bronze was elliptical in section, the major axle being vertical. The average difference in diameters was 0.001 in.

While for best results the sleeve should have been reamed after pressing it into the housing, the inaccuracy did not seem to affect the results appreciably. The journal was a piece of mild steel ground to a diameter of 3.244 in., giving a running fit allowance of 0.0035 in., or about 0.001 in. per inch of diameter. On each end of the journal a 67-lb. cast-iron fly-wheel was secured by a nut. The total weight of the assembled journal, fly-wheels and nuts was 165.5 lb., making a nominal load on the bearing of 7.275 lb. per sq. in. of projected area. The entire apparatus was mounted on two parallel lathe beds, and three lathe heads with four-step pulleys were utilized for the drive. To locate the position of the journal relative to the bearing, three micrometers were used, spaced 120 deg. apart around the bearing in a plane through its centre and perpendicular to its axis.

In determining the mean thickness of oil films, the following approximations were made:—(a)—The loaded portion of the film was that below the horizontal plane through the centre of the bearing. (b)—The thickness of the film at this plane and on each side of the journal was equal to the radial bearing allowance. (c)—The mean thickness of film was the average of the thickness at this plane and the minimum thickness of the film. The minimum thickness of the film is the radial allowance minus the distance between axes of the journal and bearing.

The curve plotted from the results gave the general equation:

$$y = b + c^a \sqrt{V}$$

in which  $y$  = means thickness of film in inches.

$b$  = one half the radial allowance.

$c$  = constant, dependent on allowance and possibly on viscosity.

$a$  = constant, dependent on viscosity and possibly on allowance.

$V$  = surface velocity of journal in feet per minute.

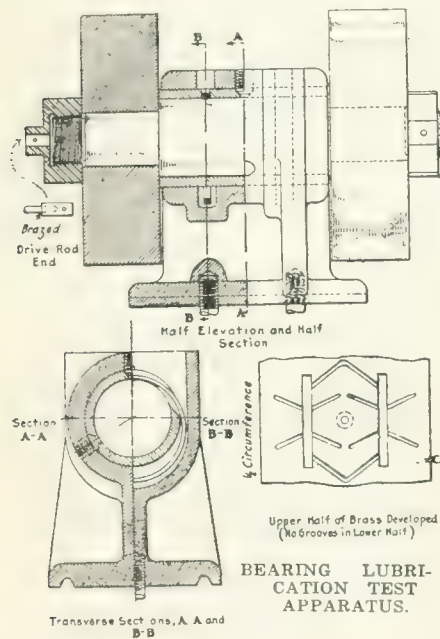
From the experimental figures the values of  $c$  and  $a$  were found to be:  $c =$

0.000049;  $a = 1.8$ , and the resulting empirical equation is

$$y = 0.000049^{1.8} \sqrt{x}$$

As to the application of the empirical equation in the general equation for bearing lubrication, it may be said that it can be used directly for conditions of the same allowance and the lubricants having the same viscosity. For other allowances and lubricants the change of (c) and (a) cannot be stated definitely. In general (c) will change with some function of the allowance and (a) with some function of the viscosity.

The oil used during the experiment was an ordinary mineral oil known as "vacoline," manufactured by the Standard Oil Company. Its viscosity was given by the Engler viscosimeter as 11.0 at 20 deg. C. and 2.95 at 50 deg. C., compared with water at 20 deg. C., which gave a specific viscosity of 38.9 at 20 deg. C. and 8.7 at 50 deg. C.—



**POWER TRANSMISSION BY CHAIN**  
 ALTHOUGH the question of power transmission is only one of many to which the engineer has to give his attention, yet in these days of great and increasing activity, it comes about that none of us can afford to be indifferent to any factor which makes for better, quicker or cheaper production. Plants, factories and mills are extending in every direction as the supply falls short of the demand, and it is the engineer with the knowledge of where to save, who is mainly responsible for these extensions. That chain driving, which has many advantages over other methods of power transmission in many cases is a factor of considerable importance, is evidenced by the fact that in every part of the world engineers are using this drive to a large extent. Space does not permit us to discuss the design of chains and their many applications, opportunity will therefore only be taken to summarize a few of the advantages accruing from their service adoption.

The chain drive is positive, inasmuch as the chain cannot slip on the wheels. It is elastic, inasmuch as the weight of the chain which hangs between the wheels may act as a spring; the lubricant in the bearings, and in certain cases even the shape of the links adding to this quality. The effect of this elasticity is to considerably reduce the vibration and noise inseparable from such a positive power transmission as spur gearing, while the positive nature of the chain drive has in many cases increased the production of machines from 15 to 30 per cent.

Chain driving is highly efficient; experiments having shown that the efficiency of a well-designed chain drive is somewhere between 97-98½ per cent. Also, the nature of the action of the chain upon the wheels is such that this high efficiency is maintained throughout the life of the drive, and is not seriously affected by minute inaccuracies of erection, as in the case with some forms of tooth gearing.

As compared with rope or belt, the centre distance for chain driving never exceeds 8 feet or 9 feet and can, if circumstances require, be made so small that the chain wheels barely clear one another. For this reason it is even possible to take out a pair of spur wheels, replace them by chain wheels of smaller diameter and get, as the result, a highly satisfactory drive as regards efficiency and absence of noise and vibration.

Partly on account of the above advantages, and partly because it is not necessary that there should be any greater initial tension in the chain than such as is caused by its own weight, there are very heavy incidental economies, effected by chain driving. The absence of tension results both in saving of power and in reduction of wear and tear of bearings, shafting and machine parts.

**Chain Drive Limitations**

There are many locations and conditions particularly suited for belts, ropes and gears, and these systems will never be discarded; yet as the system of power transmission by chain has become more widely known, its advantages have been quickly appreciated and its popularity greatly increased among prominent Canadian firms. Chain driving, of course, has its limitations; for instance, where power has to be transmitted at right angles, or where the driving and driven shafts run in opposite directions. This latter instance in itself debars its use on fully half the machine tools in service, and where otherwise it would be applicable. Chains are not affected by moisture, heat or oil; belts and ropes tend to slip under such conditions, with resultant loss of power accompanied by destructive heat. It was, however, in cases where shafts were too far apart for gears, and too close for belts or ropes, that chains made their debut. Their success in these fields suggested trials in others.

**Quiet Running and Compactness**

In many instances, the gear makes no greater sound than a medium-sized belt.

It is impossible to have metallic pieces moving with absolute silence, and its degree is affected by the speed of the chain and the number of teeth in the sprockets. Noise is only produced when the chain speed is excessive, and when the number of teeth becomes very low.

Compactness is probably one of the most important advantages chain transmission offers over belts or ropes, and it secures admission for the system into an unlimited field of application. The chain sprockets are approximately one-half the size of belt pulleys of the same capacity, and they may be placed quite close together, thus economizing in space, and often providing a more convenient and satisfactory arrangement of machines. Again, the width of the chain is usually about one-third the width of a belt for the same power.

**First Cost**

To many, the first cost of a chain drive is an obstruction; this being about 50 per cent. for small powers, and as low as 35 per cent. for large powers, higher than a belt drive of equal capacity. It should be borne in mind, however, that higher efficiency, saving in power and increased production, mean more satisfactory transmission at low cost. There are several hundred chain drives in use in Canada, a large majority of which are transmitting upwards of 200 h.p., with centres as short as six feet.

**ROPE TRANSMISSION**

THE main features of an ideal rope-drive are that the diameter of the pulleys shall not be less than thirty times the diameter of the rope used, and the driving and driven pulleys shall, if possible, be of equal diameter, but where this cannot be arranged, their ratios should not be greater than 5 to 1. The distance between the pulley faces should, if possible, be not less than 25 feet, and the drive should be horizontal, with the slack side of the rope on the top. The speed may be from 2,000 feet to 4,000 feet per minute, but if too low the ropes are apt to slip, and if too high, the action of centrifugal forces affects the efficiency.

There should be a distance of from 4 to 6 feet clearance under the ropes, and these must, of course, not rub on anything. An allowance of 2 or 3 inches clearance between the bearing foundations and the sides of the pulleys must be made so as to leave room for the ropes to be put on to the pulley. The pulleys must also be accurately in line, well balanced, and the grooves exactly alike.

All gears between the prime mover and the rope-drive should, if possible, be avoided; the ropes should be kept dry, properly lubricated, and not too tight. They should all be put on at one time, and the full load applied to them as soon as possible after they are in place. Carrier pulleys, rollers, and angular drives should be avoided as much as possible.

Rope driving is applicable and works satisfactorily in cases of indirect as well as direct requirement.

# PROGRESS IN NEW EQUIPMENT

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

## INDICATOR FOR LEAD ON SCREW THREADS

A DEVICE for testing the lead on external and internal screw threads has been brought out by the Bicknell-Thomas Co., Greenfield, Mass. Screws of any of the customary diam-



THREAD LEAD INDICATOR TESTING EXTERNAL THREAD.

eters can be measured and the smallest size of tapped hole that the indicator will enter is  $\frac{1}{2}$  in. in diameter. This, it is pointed out, enables the lead of the thread on the small sizes of screws and the tapped holes in which they fit to be tested.

The device consists of two points which are capable of adjustment for various leads, mechanism for transmitting the motion of these points to the indicating needle and a set of graduations to show the departure of the lead from the normal amount. A table on which the screw rests when being tested is provided. This can be adjusted to accommodate various diameters of screws and, when internal threads are being measured, the thumb

screw holding the table in place is loosened and the latter removed. A master is furnished with each gauge to enable the operator to make certain that the needle point is on the zero mark when the gauging points are properly spaced. If it is necessary to test threads having odd pitches, such as 13 threads to the inch, a master can be furnished for adjusting the indicating needle.

In use, a screw is placed on the indicator which is held in one hand, preferably the left, and is pressed against the two points which are spaced  $\frac{1}{4}$ ,  $\frac{1}{2}$  or 1 in. apart, as may be desired. The indicator needle will remain at the centre graduation, which is zero, if the lead of the thread is normal, moving downward toward the plus side if the lead is long and in the opposite direction if the lead is short. The exact amount of discrepancy is indicated by the graduations, each of which corresponds to 0.001 in. For internal threads the procedure is the same except that the table is removed as mentioned, and the indicator is inserted in the tapped hole.

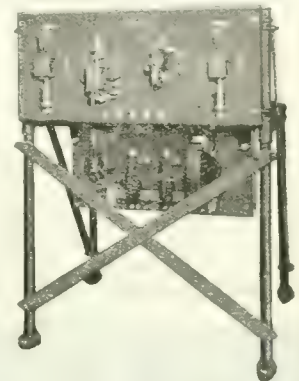


## AUTOMATIC STARTERS FOR INDUCTION MOTORS

DUE to the unprecedented demand for manufactured products of every kind, industrial plants in all parts of the country are being taxed to their utmost capacity. In addition, the cost of labor and machinery has been increasing at an extremely rapid rate. The magnitude of these factors has forced manufacturers to employ every means available in an effort to increase production or to reduce operating expenses. This may be accomplished by reducing the number of operators, by simplifying the duties of the present operators so that more atten-

tion may be devoted to the production of a larger quantity and a higher grade of product, or by furnishing better protection to the apparatus installed, thereby insuring continuity of service.

One of the factors by which the desired results may be accomplished is the use

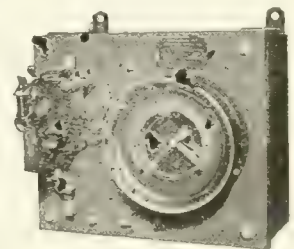


TYPICAL AUTOMATIC STARTER EQUIPMENT.

of automatic starters and controllers for the motor-driven machinery employed. Among the companies producing such control apparatus is the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., several of whose starters are shown in the accompanying illustrations. These automatic starters are for use with single phase or polyphase squirrel cage and wound-rotor induction motors, where it is desired to start the motor from a remote point, or where automatic acceleration is required to guard against improper starting by unskilled operators. They are simple, reliable, and rugged in construction, consisting of a magnetic contactor panel and a master switch, which may be either a push button, a float switch, a pressure regulator, or similar device for closing the control circuit, depending upon the service. The vital element is the magnetic contactor. The contactors used on these starters are of a type which has been used by the Westinghouse Co. with marked success in steel



THREAD LEAD INDICATOR TESTING INTERNAL THREAD.



TYPICAL AUTOMATIC STARTER EQUIPMENT.

mill, cement plant, and mine installations where the requirements are extremely severe. The contactors are opened by strong spring action, assisted by gravity. The destructive action of the arc is reduced to a minimum by strong blow-out coils and arcing horns.

The operation of the starters is exceedingly simple. When starting motors driving line shafting, wood-working and metal-working tools and similar apparatus, it is only necessary to press a button and close a small knife or snap switch. The starter then automatically makes the proper connections to limit the starting current to a suitable value and to vary the time required for acceleration according to the load on the motor, thus preventing damage to the machinery by too slow or too rapid acceleration, and saving time by bringing the motor to full speed at the most rapid permissible rate. When used for pump or compressor service in connection with a float switch or pressure gauge, the action of the starters is entirely automatic, the motors being started when the pressure or liquid level of the tank controlled falls to a predetermined point and stopped when the desired maximum pressure or level is reached, or vice versa.

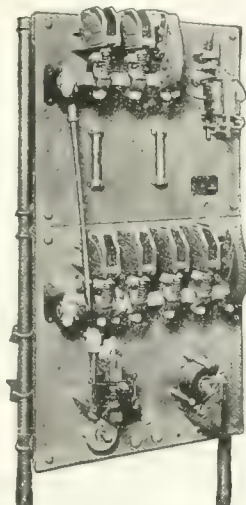
The automatic starters for squirrel cage motors are most frequently employed for starting motors operating centrifugal pumps, air compressors, fans, blow-

cent. full load torque in starting, making automatic starting a very desirable feature.

time until all the resistance is short circuited by the last contactor.

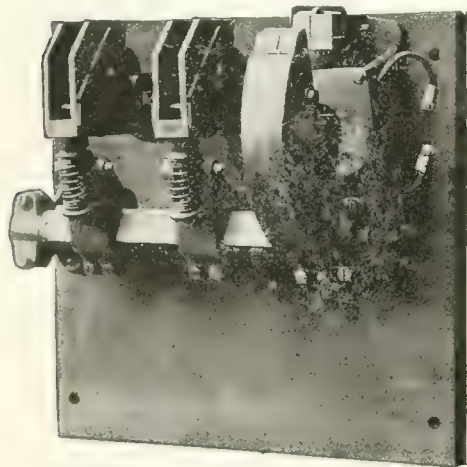
The power on any circuit may fail suddenly; therefore, it is important that some protection be afforded both operator and motor against an unforeseen return of power. This protection may be provided for motors, operating pumps, compressors, etc., by a low-voltage release to disconnect the motor from the line when the voltage is low or power fails entirely; then, as soon as power returns, the motor will automatically start up again. In many applications, however, such as for motors operating metal-working or wood-working machine tools, low voltage protection is required. Motors so protected are disconnected from the line when power fails, and will not start when power comes on again until the operator presses a button or there is no danger from the unexpected starting of a machine.

The advantages resulting from the use of automatic starters for induction motors comprise: absolute protection to both operator and expensive machinery, proper starting at the most rapid permissible rate, economy in operation and maintenance, convenience of remote control, and automatic operation.



TYPICAL AUTOMATIC STARTER EQUIPMENT.

When an automatic starter is used in connection with a wound-rotor motor, the line switch is first closed, with the maximum resistance in the rotor circuit. When the speed falls to a predetermined



TYPICAL AUTOMATIC STARTER EQUIPMENT.

ers, metal-working and wood-working machines, and other apparatus requiring starting torque less than full load torque. This type of starter, however, owing to the wide application of squirrel cage motors for industrial service, can be applied economically for starting service in nearly every industry.

Squirrel cage motors of 5 horse-power and smaller are usually connected direct to the line. Large squirrel cage motors are first impressed with low voltage from auto transformers or connected to the line through resistance, so that in either case the starting current is reduced. When the speed of the motor has reached such a point that the starting current has decreased sufficiently the motor is then automatically connected to the line.

The automatic starters for wound rotor motors are particularly adaptable for starting motors driving plunger pumps, positive pressure blowers, air compressors, long line shafts, and loads having heavy inertia. The severe starting conditions encountered in this class of service require from 100 to 200 per

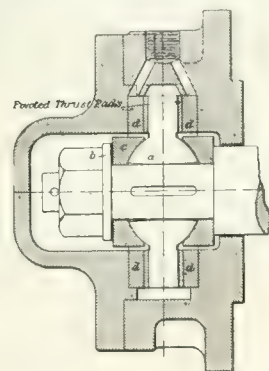


FIG. 1.

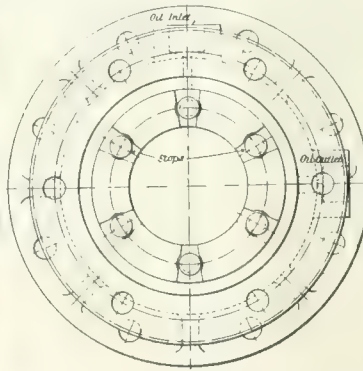


FIG. 2. MICHELL THRUST BEARING DETAILS.

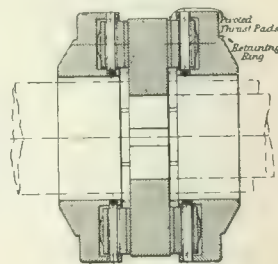


FIG. 3.

value, a relay closes a magnetic contactor, which cuts out a part of the resist-

**"MICHELL" THRUST BEARINGS**

WITH a view to manufacture in quantity and placing them on the market on the same basis as that on which ball bearings have long been sold, Broome & Wade, of High Wycombe, Berks, England, are now standardizing certain sizes of Michell thrust bearings, says Engineering.

One form of standardized design is illustrated in Figs. 1 and 2. In this case the thrust collar (a) is bored to a barrel section and instead of being clamped between its spherical seats is loosely held, as is indicated by the space shown between the washer (b) and the opposing face of the seat (c). It is thus capable of taking slight tilts so as to distribute the load equally, in spite of any bending or deflection of the shaft. The collar transmits the thrust to the series of pivoted blocks or pads shown in position at (dd)—of these one set serves to take a thrust and the other a pull. Provision is made, it will be seen, for a continuous supply of oil. This pattern, being entirely enclosed, is suitable for use on pumps, fans or worm gears.

Another form of standardized thrust



TYPICAL AUTOMATIC STARTER EQUIPMENT.

ance in the rotor circuit. Each contactor operates in a similar manner, cutting out its portion of the resistance at the proper



block is shown in Fig. 3. Here the bearing is not complete in itself, but is designed to fit into seats machined for it in the gear casing or whatever other machine part to which the bearing is to be applied. In this case the blocks are, it will be seen, mounted on two retaining rings. These, when the bearing is mounted in place, fit on bevelled seats, sufficient freedom being allowed to permit of the pressure being fairly distributed over the pads. The rings are prevented from being carried round with the revolving shaft by feathers on the housing of the machine. This pattern is made in sizes to fit shafts from 1 in. up to 3½ in. in diameter, and to carry loads from 1,000 lb. to 8,000 lb. In this case the pads pivot about a point contact, whilst in the case of the pattern represented in Figs. 1 and 2, which is intended for heavier loads, the pads have line contact with the housing. Both types of bearing can be run at very high speeds, since centrifugal action in no way affects their working. With loads of 400 lb. to 500 lb. per square inch the coefficient of friction is commonly about 0.0015.



**MOTOR BOATS IN FISHING INDUSTRY.**

ACCORDING to the latest statistics, there are 9,302 motor boats employed in the Canadian fishing industry, besides a number of motor vessels of the larger type. This is an increase of 600 motor boats in a year, and 3,400 in two years.

The boats are employed almost entirely in the Maritime Provinces and on the Pacific coast, where the greater number are engaged in the halibut fishery, the vessels employed ranging from small motor boats, carrying four to ten men, to large auxiliary schooners and steamers.

The introduction of the motor boat has revolutionized the fishing industry and largely increased the production. It has saved the fisherman time and rendered him independent of the wind. He can also make longer journeys off shore to the fishing grounds, thereby increasing his sphere of operations. One of the most important points is the increase in the catch, owing to the fact that the fishermen can get to the fishing grounds quicker, remain there a longer time, carry a greater load, and get back to port in less time than by the sail and oar method.

In the larger auxiliary schooners, the motor saves towage bills, enables the vessel to be manoeuvred in narrow channels, and brings her into the market quicker, with the fish fresher. There is less risk for the dory fishermen in squally weather on the Banks, as they can be picked up quicker.



**TRADE ENQUIRIES.**

THE following enquiries have been received by the Department of Trade and Commerce, Ottawa, from which further particulars may be obtained.

**1072—Saw-mill Plant**—An important company having a large amount of capi-

tal invested in Zanzibar, wishes to secure from Canada a saw-mill plant to cut about 10,000 feet a day. The plant must include boiler and engine and all machines to turn out lumber dressed four sides, with saws, knives, etc., and spare parts to provide for wear and breakage. Also a shingle machine to cut 16-inch, 18-inch and 20-inch shingles.

**1075.—Railway Sleepers.**—A Birmingham firm wishes to hear from Canadian manufacturers of railway sleepers in position to export large quantities.

**1080—Asbestos Fibre and Board** — A Canadian of high standing who has been established in Japan for many years, wishes to secure supplies of asbestos fibre and board in lots of from one to twenty tons. Sample of the fibre can be seen at the Department of Trade and Commerce, Ottawa. He says those able to supply the present demand will find big business in future with Japan. Canadian producers are asked to send samples with full particulars of prices and code words together with advice as to quantities available.



**BOILER SERVICE MAINTENANCE**

A BOILER is in a dangerous condition when the plates, bolts, braces or rivets of which it is constructed become weakened to such an extent that the internal force or pressure equals the tensile strength of the material at the weakest section or sections. In this condition, strains due to varying temperature will cause rupture and an explosion, the volume and destructiveness of which would be in accordance with the size of the boiler and the pressure carried therein.

The moment a boiler is placed in service it gradually becomes weaker, due to the destroying forces continually acting upon it. These forces are of both a chemical and mechanical nature. Corrosion and oxidation are continually acting on the material from which a boiler is constructed, and take place both internally and externally, these processes being the two most serious and subtle causes of weakening to which a boiler is subjected. Evidences of these are most noticeable in the grooving and pitting of plate, and more especially at locations most subject to deposits of mud, scale and organic substances.

Expansion and contraction also play a very important part in the destruction and weakening of a boiler, more especially when concentrated at any one point, such as at sharp bends or flanges in the plates where the inner and outer sheets are subjected to different temperatures. Constant working or bending of bolts, flanges or angles, however slight, will sooner or later destroy the fibres in the material at points subjected to it, causing crystallization, cracking, and leaving same more susceptible to the chemical action of the feed water.

It is therefore obvious that only thorough examination by competent inspectors who understand the construction, nature of defects, and remedies to be applied, will maintain a steam boiler in safe working condition.



**Feared the Worst.**—An Irishman coming out of ether in the ward after an operation exclaimed audibly: "Thank God! That is over!" "Don't be so sure," said the man in the next bed. "They left a sponge in me and had to cut me open again." And the patient on the other side said: "Why, they had to open me, too, to find one of their instruments." Just then the surgeon who had operated on the Irishman stuck his head in the door and yelled: "Has anybody seen my hat?" Poor Patrick fainted.

**Not Much to Ask.**—The landlady bustled up to her new lodger as he came down to breakfast the first morning.

"Good morning, sir," she wheezed.  
 "Good morning," said the lodger.  
 "I hope you've had a good night's rest," said the landlady.

"No," said the mild-mannered little man. "Your cat kept me awake."

"Oh," said the landlady, tossing her head, "I suppose you're going to ask me to have the poor thing killed."

"No-no, not exactly," said the gentle lodger. "But would you very much mind having it tuned?"

**Hoaxing a Bishop.**—Funny stories are told about Archbishop Trench, who, seeing one day in Dublin a little girl trying to reach a door-knocker, came to her assistance.

"Rap hard!" said the little innocent. He did so.

"Now, run like the very devil!" Trench always feared paralysis. One day at a dinner party he started probing his knee with his fork, and not feeling any pain, exclaimed: "It's come at last, I am afraid."

"It's my knee," said the lady next to him!

**The Scotch of It.**—An enterprising drummer attempted to bribe an old Scotch merchant by offering him a box of cigars.

"Na, na," said the old chap, shaking his head gravely. "I canna take 'em."

"Nonsense," said the drummer. "If you have any conscientious scruples you may pay me a quarter for the box."

"Weel, weel," said the old Scot. "I'll tak' two boxes."

**Hotel Advertising.**—The customer at a London hotel gazed at his plate.

"Waiter," he called. "I should like to know the meaning of this. Yesterday I was served with a portion of pudding twice the size of this."

"Oh," said the waiter. Then, after a moment: "Did ye 'appen to be sittin' by the window, Sir?"

"Yes."  
 "Then that accounts for it," he said confidently. "We always give people by the windows large portions. It's a good advertisement."

# The MacLean Publishing Company

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## CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper devoted to the machinery and manufacturing interests.

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### THE BUSINESS OUTLOOK

**B**USINESS interests are awaiting the announcement of the Minister of Finance regarding the result of his negotiations for a loan in the United States. An important point will, of course, be the amount. Sir Thomas White will undoubtedly secure all the credit he can, and he will be wise to do so at this time, with the future so uncertain. Whether he will be able to secure enough to postpone a domestic loan is questionable.

Reports as to business conditions throughout the country continue to be of a satisfactory character. From some parts of the prairie territory there are indications that depressing crop prospects have had the effect of curtailing credits, but this is not by any means general. Labor conditions are very unsettled, the rising cost of living being an important factor in this connection. June trade figures issued at Ottawa continue to show a development in imports and exports. Exports were \$116,285,841 and imports \$87,515,067. There is still a very fair balance of trade, but it is decreasing. A country so heavily in debt as Canada is and with foreign capital scarce and expensive, should keep the trade balance substantially on the safe side if possible, and it is questionable if some action should not be taken by taxation or other means to curtail imports of luxuries.

The outlook all round may be regarded as satisfactory. High prices will overcome any crop shortage, and demand for manufactured products will continue strong while the war lasts at least. What we need is careful administration of our internal affairs so as to use our rather limited liquid assets to the best advantage.

### HESITANCY IN CANADIAN SHIPBUILDING ENTERPRISE

**T**HE Nova Scotia Government at the last session of the Legislature placed the sum of \$2,000,000 at the disposal of a Commission to be used in any way that they considered wise in order to stimulate steel shipbuilding in Nova Scotia. The Commission is finding difficulties in the way. Even with the tremendous demand for tonnage it is not easy to get capitalists willing to invest the large sums necessary to build a modern shipyard. The element of uncertainty is not lacking in the future. Again, the Commission is faced with the labor difficulty; skilled

men are not to be had. A number of interests have been in touch with the Commission, but so far nothing has materialized. If the Province of Nova Scotia, with the many advantages that it possesses as a shipbuilding centre, is up against trouble and indifference with regard to shipbuilding plant establishment, what hope is there for the industry being other than local and limited elsewhere in the Dominion as at present and in the immediate future?

Don't let us be content with the projected shipbuilding programmes of others; let it be our business to go in and win on this matter of ship construction, and by so doing it will probably be found that instead of being crowded out, we will have contributed to the establishment of an industry, not only of front rank national importance, but comparable in scope and achievement with that operative in any country of the world.

### THE COMING WINTER'S FUEL SUPPLY

**W**E are just now being uncomfortably impressed with the fact that this is "The Good Old Summer Time," therefore, it is somewhat natural that little care or concern should be in evidence with regard to conditions which will prevail, at best only a few months hence. "Lest we forget," or that our indifference have fuller scope for its exercise than it ought, the attention of manufacturers and operators is drawn to the accompanying more or less official memoranda which indicates that there will be a greater coal shortage next winter than last, and that therefore, we should arrange and secure now our fuel requirements.

Great Britain is short 15,000,000 tons of coal; France lacks even more; the coaling of Allied warships on the Atlantic coast, the naval, domestic and industrial requirements incident to the entrance of United States as a belligerent, all mean that the coal production must be increased.

United States officials anticipate that next fall there will be unprecedented demands on rolling stock for handling the production.

The situation is that the United States companies have placed an embargo on coal going out of that country, and the United States desires to keep coal cars in that country for any emergency that may arise.

The present rather acute shortage of coal in many quarters will not be helped by war conditions in the United States.

Coal prices have generally increased, and, unless there is Government regulation, they will reach higher levels.

The United States Geological Survey, as well as other agencies having knowledge of the facts, is urging all consumers of coal, both large and small, to store their winter's fuel during the summer months.

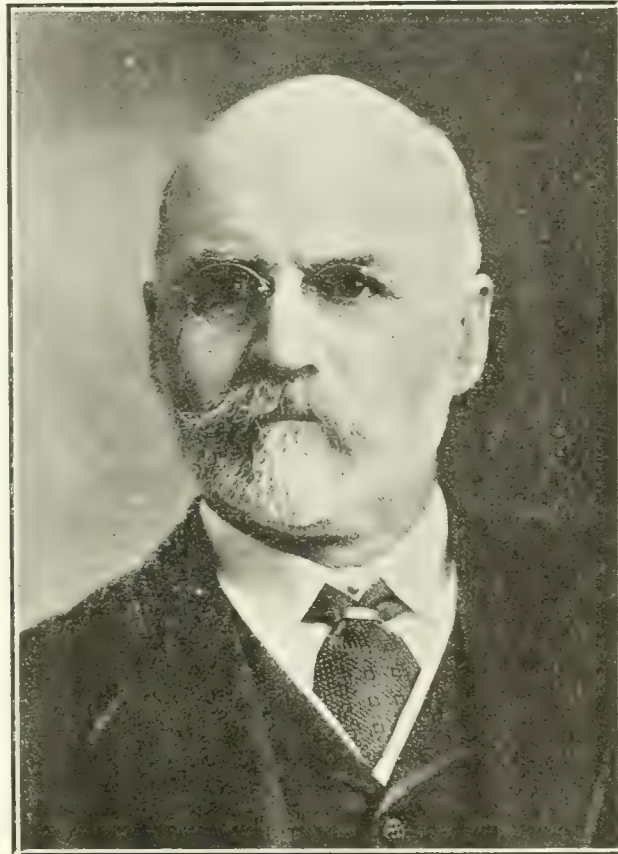
In so far as Central and Western Canada is concerned, the situation is intensified by the fact that owing to the coal strike in the West some 200,000 tons or more has been lost from production this year; also, owing to the shortage of ships and the great demand for iron ore for the manufacture of munitions, much less coal than ordinarily was brought up the Great Lakes last year, so that there are practically no supplies on hand.

From the above it is evident that, to be assured of our winter's supply of coal and, at the same time, save inconvenience and perhaps higher prices, we should buy coal during the summer months wherever and whenever it is available.

The Dominion Government has appointed a Fuel Controller to take charge of the situation, and the coal dealer, the manufacturer and householder can assist by filling their bins now with sufficient coal to last through the whole winter. By so doing they will help out conditions when the railway congestion occurs next fall.

## INDUSTRIAL NOTABILITIES

**W**ILLIAM I. GEAR, Colonel, Justice of the Peace, merchant, steamship owner and agent, Montreal; director of steel shipbuilding, Imperial Munitions Board, Ottawa; vice-pres., the Robt. Reford Co., steamship agents, 20 Hospital Street, Montreal; president, Crown Trust Co.; president, Canada Nitro-Products, Ltd.; director, Bank of Toronto; director, Keewatin Flour Mills Co., director, Cairn Line of Steamships, Ltd., and connected with



WILLIAM I. GEAR

various other enterprises, was born in Toronto, Ont., May 20, 1857, son of Henry J. and Jane (Martin) Gear. He is Lt.-Col. O. C. 1st Regiment (Canadian Grenadier Guards); was president, Corn. Exchange, Montreal, 1902; president, Montreal Board of Trade, 1905; member of Committee, Chambre de Commerce, Montreal, 1913 and 1916, and represented transportation interests on the St. Lawrence River Commission, 1911-1912. He served as Alderman, Longueuil, Que., from 1908-1912.

Col. Gear's clubs are St. James'; Canada; Canadian; M.A.A.A., etc., of Montreal; Rideau (Ottawa); Union (St. John); Halifax (Halifax); British Empire and Royal Colonial Institute, etc., (London, Eng.). His residence is 450 Mackay St., Montreal; the summer he, however, usually spends at Longueuil, Que.

*Photo courtesy British and Colonial Press.*



**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

Prices per 100 lbs.

**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
Globe	50
Vulcan	50
Disston	50

**COAL AND COKE.**

Solvay Foundry Coke	\$10 90
Counelsville Foundry Coke	8 50
Steam Lump Coal	8 50
Best Slack	8 05

Net ton f.o.b. Toronto

**BOILER TUBES.**

Size.	Seamless	Lap-welded
1 in.	\$33 00	
1 1/4 in.	36 00	
1 1/2 in.	38 00	32 00
1 3/4 in.	38 00	32 00
2 in.	45 00	33 00
2 1/4 in.	48 00	35 00
2 1/2 in.	50 00	38 00
3 in.	58 00	45 00
3 1/4 in.		53 00
3 1/2 in.	70 00	55 00
4 in.	82 00	67 00

Prices per 100 feet, Montreal and Toronto.

**OILS AND COMPOUNDS.**

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

Black oil, per gal.	13
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	11

**BELTING—NO. 1 OAK TANNED.**

Extra heavy, single and double	30-5%
Standard	40%
Cut leather lacing, No.1	1 50
Leather in sides	1 35

**TAPES.**

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

**WASTE.**

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

**COLORED.**

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

**WOOL PACKING.**

Arrow	25
Axle	20
Anvil	15
Anchor	11

**WASHED WIPERS.**

Select White	12
Mixed colored	10
Dark colored	09

This list subject to trade discount for quantity.

**RUBBER BELTING.**

Standard	40%
Best grades	20%

**ANODES.**

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

Prices Per Lb.

**COPPER PRODUCTS.**

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

**BRASS.**

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

**PLATING SUPPLIES.**

Polishing wheels, felt.	3 00
Polishing wheels, bull-neck	1 75
Emery in kegs, American	06
Pumice, ground	05
Emery glue	15 to 20
Tripoli composition	04 to 06
Crocus composition	07 to 08
Emery composition	03 to 09

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

Prices Per Lb.

**LEAD SHEETS.**

Montreal Toronto	
Sheets, 3 lbs. sq. ft.	\$18 00 \$18 00
Sheets, 3 1/2 lbs. sq. ft.	
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	.05
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 sulphate	.12
Nickel carbonate	.35
Nickel sulphate	.15
Potassium carbonate	.75
Potassium sulphide (substitute)	.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

## THE MARKETS AT A GLANCE

DEVELOPMENTS at Washington have in many respects an important bearing on the situation in Canada, and the actions of the American Government are being followed closely locally on this account. The steel market is quiet and buying has fallen off pending a definite announcement in regard to prices. There is also considerable uncertainty as to the amount of steel available for private consumers after Government needs have been provided for. This uncertainty and high prices are restricting business and the market will be unsettled until the situation clears up. It is freely predicted that steel prices have about reached the top, but this depends largely on the action of the American Government in its influence on the steel trade. The pig-iron market is marking time pending developments at Washington and the demand has fallen off in view of the possibility of lower prices. The local situation is unchanged and prices are still withdrawn. The scrap market continues weak with a tendency to lower prices, although in the meantime quotations are unchanged. Non-ferrous metals are weaker and prices have declined throughout the list. Consumers are keeping out of the market in anticipation of lower prices following action by the American Government in this direction. For this reason the markets are unsettled and the outlook is uncertain. The machine tool market is quiet with no feature of outstanding importance.

Montreal, Que., July 23, 1917.—While the adjustment period is in progress in the United States the markets maintain a pronounced condition of unsettlement, which has not been confined to America alone but has also effected general conditions here in Canada. Industrial con-

ditions to-day are dependent largely on the attitude to be taken by the American Government concerning the prices to be paid for its war material requirements. No definite decision has as yet been arrived at and meantime the trading is more or less of a hand-to-mouth

nature, buyers being reluctant to place contracts until a final understanding has been reached.

### Pig Iron

The week's market in pig iron has been very quiet, no doubt affected by the developments across the line and the attitude of the American Government in the proposed regulation of prices on all war commodities, either of a direct or indirect nature. In view of early possibilities, the market has not been active, which in comparison with the recent excitement may foreshadow a stationary, if not a declining condition. The quotation on Pittsburgh basic has declined \$1 on the week, the price being now \$54.95 per ton. Bessemer is also 50 cents a ton lower, being quoted at \$57.95. Low phosphorus f.o.b. Lebanon is now quoted at \$85, or five dollars below last week. Canadian conditions are unchanged with producers still out of the market.

### Steel

The warm weather is affecting the production of steel to some extent and curtailment is more pronounced through strikes and labor shortage. With the selective draft system being put into force in the States, it is expected that some readjustment will be necessary to maintain the present industrial strength of the country. The announcement that the American Government will pay a price decided on by the Trade Commission, after a thorough investigation into

the cost of production, has placed the market in a somewhat better position, but owing to the inability of producers to meet the requirements for prompt delivery, the situation continues very quiet as consumers are not over anxious to place orders for far future delivery. The fact also that the finding of the Commission may be on a much lower basis than that prevailing at the present offers some possibility that the cost to domestic consumers may be more on a par with what the Government will have to pay.

Owing to the abnormal demand for all kinds of steel, the price for domestic consumption may not be affected unless specially stipulated in the forthcoming regulations. One prospect however appears, that further advances may be curbed by the attitude of the Government, as the possibility of lower prices being announced may have the effect of restricting a climb to still higher levels. The condition of the steel market for some time to come will however, not provide any considerable relief to the users of steel, with the exception that they may be able to place orders at a fixed price for delivery at mill convenience. The general market is on the same level as the previous week and few changes are reported. American regulations will not directly effect Canadian producers, but owing to the fact that many consumers are dependent on the States for their supplies, trade here are particularly interested in developments across the line. The quiet undertone is reflected in the entire absence of price advances; in fact, the quotations on rolling billets, Philadelphia, has declined \$5 per ton, the price this week being \$105 per ton. The coke situation is also easier, spot furnace having declined \$2 during the week, the quotation being now \$12 per ton. The Canadian situation is practically unchanged, prices remaining firm with delivery not much improved. The past few days of very warm weather has somewhat curtailed production in raw and finished material.

#### Metals

The metal market is still influenced by the situation in the States, as pending developments tend to maintain considerable uncertainty as to early future conditions. This nervousness has been reflected throughout the general market in the weakness that has been evident in nearly all the metals. The Canadian situation is not so affected by American conditions, but the local markets must nevertheless experience some of the reactions of the basic market. Copper is quieter and weaker. Tin is comparatively firm but with an easier tendency. Spelter is inactive and weaker. Lead is declining on poor demand. Antimony is weaker on an inactive market.

**Copper.**—Despite the fact that the American Government have virtually come to an agreement regarding the price to be paid for their copper requirements based on the finding of the Trade Commission, domestic consumers are still in the dark as to their position with the producers, as there is apparently no

definite understanding as to the price to be paid outside of Government requirements. The tone of the market however, would seem to indicate that a settlement price would be made on a much lower basis than that at present prevailing. What market there is seems to be made by the presence of resale metal, as inquiries for metal have not been followed by the placing of orders, and the situation is therefore very quiet. New York quotations on lake have declined one cent on the week, and electro and castings are  $2\frac{1}{4}$  cents lower; the respective prices being 29 cents,  $27\frac{1}{4}$  cents and  $26\frac{1}{2}$  cents per pound.

The market here is active but prices have followed the trend of the American market. Lake and electro are quoted at 35 cents, and castings at 34 cents per pound, a decline in each case of one cent per pound.

**Tin.**—The situation in this metal continues firm although an undertone of weakness has followed a week of light activity. Spot supply is none too plentiful but early arrivals are expected and future positions are easier. New York has been a little unsettled but the pres-

#### 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.

ent quotation of  $62\frac{1}{2}$  cents shows an advance on the week of  $\frac{1}{2}$  cent per pound. The market here is fairly active with prices unchanged at 62 cents per pound.

**Spelter.**—Consumers are very reluctant about filling their requirements and what market exists is being made by the dealers who are apparently stocking up a few supplies, influenced by the comparatively low price level prevailing. The uncertainty as to what the attitude of the American Government will ultimately be regarding the regulated prices of this metal, has resulted in a very dull market, which is likely to continue until a definite announcement has been made. Owing to the total absence of consumer buying, the New York market this week is  $\frac{3}{8}$  cent lower, the quotation being  $8\frac{1}{2}$  cents per pound. The local market is quiet but dealers continue to quote 11 cents per pound.

**Lead.**—Producers continue to make concessions on future positions, but very few buyers are in the market. The situation is marked by pronounced inactivity and prices are still declining. New York reports a further decline of  $\frac{3}{4}$  cent on independent quotations, the nominal

price being  $10\frac{1}{4}$  cents per pound. The "trust" prices is firm at 11 cents per pound. The local market is steady on a decline of  $\frac{3}{4}$  cents, the current quotation being 13 cents per pound.

**Antimony.**—This metal is dull on poor demand, the market being very dull with prices going lower. New York is quoting the nominal figure of 15 cents, a decline of one cent on the week. Local antimony has a weak undertone but present prices are unchanged at 20 cents per pound.

**Aluminum.**—The market in aluminum is steady with prices firm but having a slight undertone of weakness; the nominal quotation in New York having declined approximately 2 cents per pound. Dealers here are quoting last week's price of 70 cents per pound.

#### Machine Tools and Supplies

Canadian machine tool activity is confined to a normal business in general engineering equipment, with a few small orders for munitions machinery. Much of the present activity is for machinery required to meet the demands of the ship building trade, as many shops, both large and small, are more or less engaged in this expanding industry. Owing to a diversity of conditions, the cost of all classes of machinery continues to be the most important factor in the securing of equipment. Conditions in the States have made it increasingly difficult to obtain machine tools from that source and Canadian machine tool plants are quite busy endeavoring to meet the immediate needs. Recent developments have decreased the quantity of second hand machinery on the market. Supplies of all kinds are still in heavy demand, with prices firm or higher.

#### Scrap

The market in old materials, more especially that of metals, is suffering from inactivity, and prices are consequently declining. Added to this is the prolonged period of uncertainty that has accompanied the developments in American political circles in connection with the contemplated price regulation of war and kindred materials. Pending an announcement by the authorities, the New York market has shown a tendency to weaken and quotations have generally declined. The local market is easier on metals, but iron and steel scrap continues firm. Heavy coppers and old brass are one cent lower than last week; also machine compositions. Old lead has declined  $\frac{1}{2}$  cent during the week.

**Toronto, Ont., July 24.**—The industrial situation continues satisfactory in regard to the volume of business, and the trade returns are exceptionally gratifying in spite of the various handicaps, such as shortages of labor, raw materials and coal. Unfortunately there is little prospect of any real relief owing to prevailing conditions, and the industrial situation will continue to be adversely affected. Manufacturers using iron or steel are in a difficult position owing to the increasingly heavy demand for these materials for munitions and other war

purposes. Steel prices are very high and deliveries more backward than ever, while, in addition, the shortage is causing considerable inconvenience and restricting production.

#### Steel

The situation in the steel trade has not improved, and there is a marked absence of activity in the market. The uncertain outlook in regard to prices is restricting business, while the usual summer dullness is also affecting the situation. The steel mills in Canada are not affected by the unsettled situation, but the output will be somewhat curtailed during the hot weather, which will tend to further decrease the available supplies of steel for private consumers. The increase in tonnage of steel required for war purposes is making it more difficult for the mills to promise deliveries to their regular consumers, and because of this uncertainty there has been a considerable falling off in buying. The prevailing high prices of steel are also curtailing business, as manufacturing costs are getting almost prohibitive for many lines. Definite action by the American Government in regard to the fixing of prices on steel products is awaited with interest and some anxiety, as it is not known what effect the Government's decision will have on the market. No further statement has been given out, and it does not appear probable that there will be any important developments for some time. In the meantime the market is very dull, with consumers holding off, pending developments. The opinion is held by many in the trade that prices have about reached the top, and that adjustments in a downward direction are probable. Whether this contingency will materialize or not depends to a large extent upon the action of the American Government as regards the extent of its ability to control prices, more especially to private consumers. There have been no price changes this week.

The situation in sheets is getting tighter in the primary market, as Government requirements of sheets are steadily increasing, and shipments to private consumers are reduced proportionately. Several of the larger sheet mills have been practically out of the market for several months as active sellers. Prices continue practically nominal and are unchanged.

The steel market in the United States is dull and comparatively little new business is being placed pending the final action of the American Government in fixing prices. If the Government has the power and thinks that it is feasible and desirable to fix prices of steel products sold direct to private consumers, there would likely be a general downward readjustment of prices. On the other hand, if the Government decides not to interfere in this direction, prices may continue to advance, although perhaps not so rapidly as has been the case in recent months.

#### Pig Iron

The market is dull for much the same reason as that of the steel situation. It is not likely that there will be much ac-

tivity until the American Government has reached a decision in regard to prices for iron, and until the Government policy as to private transactions in iron is definitely made known. The local situation is unchanged.

#### Scrap

There is no change in the situation in the market for old materials. The market is stagnant and prices have a weak tendency for all metals except heavy melting steel and machinery cast iron, which are holding firm. Consumers are practically out of the market, and are not showing any interest.

#### Machine Tools

Seasonal quietness prevails in the machine tool trade, but the situation in regard to prices and deliveries shows no improvement. The increased activity in the machine tool market in the United States is affecting the local situation more than ever, and deliveries are getting more backward. Prices of machine tools are advancing on account of the

#### 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.

high cost of all raw materials. There is a fair demand for aeroplane-making equipment, while some inquiries have been received recently by local machinery houses for motor car building tools. Tenders are being called by the Military Hospitals Commission for machine tools for the Hart House, Toronto, for a workshop for returned soldiers, which is being established.

#### Supplies

Prices of machine shop supplies continue very firm, and dealers report considerable difficulty in obtaining a number of lines. Ball pein machinists' hammers have advanced, the new prices being as follows:—6-oz., 8-oz., and 12-oz. are \$7.65 per dozen; 1-lb., \$8 per dozen; 1½-lb., \$8.40 dozen; 1½-lb., \$9 per dozen; 1¾-lb., \$10 dozen; 2-lb., \$10.60 dozen; 2½-lb., \$12 dozen. An advance of approximately 10 per cent. has been made on American coil chain, while Challenge and carborundum grinders have also advanced. An advance of approximately

10 per cent. has been made in vises of various descriptions, such as machinists', parallel, pipe and blacksmiths'. Coppered oilers have been advanced a similar amount, namely, 10 per cent. Higher prices in these lines is due largely to the condition in the steel and raw material markets. Steel and wood tackle blocks have advanced 10 per cent., while "Disston" hack saw blades are also 10 per cent. higher.

#### Metals

The metal markets are in a very unsettled condition in New York on account of the fear that the American Government will control prices. In the event of this happening there is little doubt that there would be a general readjustment of prices in a downward direction. This condition is reflected locally and prices of all metals have declined. Consumers are buying hand-to-mouth meantime, and no marked activity is expected until the situation becomes more settled.

**Copper.**—In view of the possibility of considerably lower prices on copper, consumers are keeping out of the market, only covering for more urgent requirements. It is predicted that the Government will compromise with producers at 23c per lb. in fourth quarter metal. The consumption of copper, however, is particularly heavy and production pretty well controlled, which will help to support the market. Copper has declined 1c locally, lake and electrolytic being quoted at 35c and castings 34c per pound.

**Tin.**—A decline in the London market has been followed by lower prices locally. No announcement has yet been made by the tin committee at Washington. Tin has declined 2c locally, and is now quoted at 63c per pound.

**Spelter.**—The market is dull, and prices have declined a half cent. The demand is light, as buyers are keeping out of the market owing to the uncertainty with regard to the Government price situation. Local quotations, 11c per pound.

**Lead.**—The market is still weaker and prices have been forced down. The outlook is uncertain, and the tendency is toward still lower prices. Lead has declined 1c, and is now quoted at 13c per pound.

**Antimony.**—The market is heavy, with stocks in excess of the demand, the result being that prices have declined 4c, making the current quotation 20c lb.

**Aluminum.**—The market is quiet and lack of buying support has weakened it. Aluminum has declined 1c, and is quoted at 64c per pound.

**Sydney, N.S., July 20.**—C. A. Magrath, the newly appointed Fuel Controller was in Halifax on July 13 and 14, and convened a meeting of the coal operators of Nova Scotia on these dates, at which every operating colliery was represented. Mr. Magrath, before proceeding West, wished to satisfy himself that the coal requirements of Nova Scotia and the Maritime Provinces, including Newfoundland, could be met by Nova Scotia's own production, and on this

point the coal operators were able to give assurances that this could be done. The production of coal in Nova Scotia was estimated in the memorandum given to the Controller at almost six million tons, or about 200,000 tons less than last year. As the export to Montreal and St. Lawrence ports will not exceed 200,000 tons, compared with 490,000 tons in 1916, it is evident that the quantity of coal available for use in the Maritime Provinces will be for all practical purposes identical with the quantity available last year. The requirements of the steel industry will be about the same as 1916, and the amount of coal supplied as steamships bunkers will not greatly exceed that supplied last year.

#### Output Distribution.

The enquiries of the Fuel Controller on this occasion were confined to the needs of the Maritime Provinces and Newfoundland, but it will be noted that any assistance that can be given to points outside the Maritime Provinces is extremely small, and even the small tonnage available is destined almost exclusively for the use of the railways.

The operators undertook not to increase the price of coal beyond the current maximum prices, namely \$5.00 per ton for screened coal on the mainland, and \$4.75 to \$5.00 per ton for screened coal in Cape Breton. Run mine coal is fixed at \$4.75 at the mainland collieries and \$4.50 to \$4.75 per ton at the Cape Breton collieries, all prices being per net ton f.o.b. at the pit-mouth. These prices are subject to the continuance of present conditions of wages and cost of material, but any change in price necessitated by extraordinary conditions which increase the cost of mining, is first to be submitted to the Controller. It will be seen that these prices represent only a moiety of the price delivered to the consumer, but the question of transportation costs is one that is not under the control of the coal operators.

The operators estimated the shortage of production due to the lack of men at 1,750,000 tons over the calendar year 1917, and stated the output could be restored to the normal rate of production provided men could be obtained—which is of course a sheer impossibility so long as the war lasts.

**New York, July 23.**—The inharmony at Washington over the shipbuilding programme has delayed for another precious week the placing of contracts to construct two Government shipyards and 400 cargo boats, the country's need of which is most imperative. Two groups of large financial interests are willing, ready and eager to assist General Goethals, general manager of the United States Emergency Fleet Corporation, to make an immediate start to carry out the plans he has outlined. One of these groups include the American International Corporation, which is already building a large number of wooden boats for the Government in conjunction with the American Bridge Co. and the McClintic-Marshall Construction Co. The other combination includes the Sub-

marine Boat Co., the Lackawana Bridge Co., the Worden & Allen, the Phoenix Bridge Co., the Hay Foundry & Machinery Co., and several independent fabricating shops. It is believed that President Wilson will take long-delayed action this week to settle the controversy between Gen. Goethals and Chairman Denman, of the Shipping Board. In the meantime, the two large shipbuilding corporations concerned have not been idle, but have placed additional large contracts for cranes, transmission machinery, power equipment and machine tools that will be needed eventually.

Several other shipbuilding interests are actively in the market for machinery, the most important inquiries coming from the Foundation Co., which has just secured a contract to build 40 steel cargo boats for the French Government. These boats are expected to be constructed at the Newark yards. It will be recalled that the Foundation Co. recently secured orders for 100 ships from the Entente Allies, which boats will probably be built in yards near Vancouver, B.C.

The Downey Shipbuilding Co., with a Government contract to build ten steel ships, has made its final payment of \$1,300,000 to secure the Millikin structural plant on Staten Island, and is now in the market for cranes to be installed at the six ship ways, and for machine tools to equip the eight buildings, which are to be erected at once.

#### Equipment Purchases Heavy.

The Newport News Shipbuilding & Drydock Co. has added \$50,000 worth of machine tools to its recent heavy purchases of shop equipment. The Globe Shipbuilding Co. is rushing work on the equipment of its shipyards at Superior, Wisconsin, and expects to begin construction of ocean-going cargo boats before the end of the month. The United States Navy Department continues to place orders for tools for its \$4,000,000 machine shop at the Norfolk Navy Yards. This shop is designed to be the largest in America, with five acres of floor space, according to Admiral Harris, chief of the Bureau of Yards and Docks. The Navy Department is also buying power equipment and transmission machinery for the power house and drydock at Norfolk. The Government will spend approximately \$30,000,000 for the improvements to the Norfolk Navy Yards.

The heavy sales made by manufacturers of electric cranes are indicated in the bids recently made to the Navy Department on travelling cranes to be installed in the structural shop at the New York Navy Yard; the builder's specified deliveries to be made in 180 to 400 days. A feeling is prevalent in the trade that the oversold condition of the machinery and machine tool manufacturers will prevent the equipment of shipyards as speedily as anticipated by the Government, but it is understood that the Navy Department will not hesitate to commandeer plants whenever necessary.

Manufacturers of ordnance, shrapnel and high explosive shells have received additional orders from the Government, and have placed new orders for tools, and

others are now actively in the market for shop equipment. The America Brake Shoe & Foundry Co. has put out a list for 240 machines, and an Ohio manufacturer is in the market for 60 machines. The Erie Forge Co. is buying tools for making six-inch guns. The T. H. Symington Co. has just received an additional order from the Government, and is buying machinery heavily in New York.

**Pittsburgh, Pa., July 21.**—The stagnation in the markets which had developed just ahead of our report of a week ago has continued during the past week, and has, indeed, been intensified. There has been practically nothing done in pig iron except a few small transactions in prompt deliveries together with a little reselling by consumers at prices under the regular furnace levels. For two or three weeks past there has been nothing of importance done in billets or sheet bars. All the finished steel markets are very quiet as regards actual transactions.

#### Price Regulation.

The cause commonly assigned for the stagnation in the markets is the statement of President Wilson, published throughout the country on the morning of July 12, appealing to mine operators and manufacturers to "forego unusual profits," and enunciating the doctrine that there should be one price for both the Government and private consumers. Taken in connection with the knowledge that prices for Government steel would be fixed at a relatively low level, compared with the recent market, it was assumed that prices to the general trade would, therefore, be at a comparatively low level also.

While all the surface indications are that the stagnation is due to the President's statement, it must be admitted that there were contributing causes. The buying of finished steel products for regular forward deliveries, such as the large mills could make, practically ceased two or three months ago, sales of steel lately having been almost entirely of small lots for delivery in from two to five months, such deliveries as some of the smaller mills could make. The buying of pig iron had come to be on a reduced scale. There is every reason to believe that the buying movement was rapidly petering out, and that buyers were coming to the conclusion that they could not stand the pace and had better wait developments. The statement of the President served to crystallize sentiment.

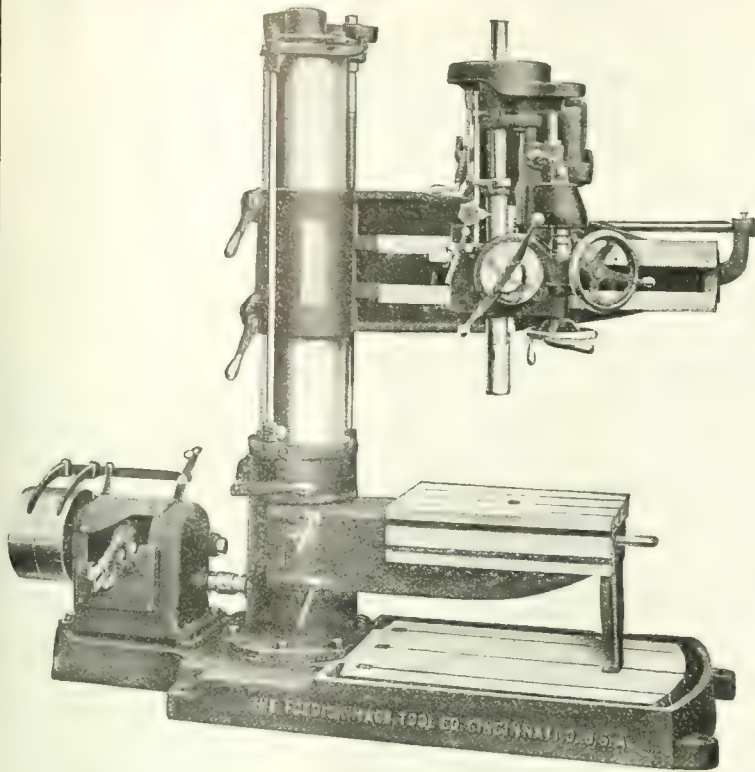
Thus the situation was fully ripe for a cessation in activity, particularly so as the proverbially dull summer months had been entered upon, and President Wilson's appeal came at the psychological moment. He is a psychologist, which has made him an astute politician. Perhaps he knows more about the psychology of business than he would naturally be entitled to know considering his training and experience.

#### Mills and Furnaces Booked Months Ahead

The mills and furnaces are very well filled with business for months to come,

(Continued on page 64.)





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# 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

**Hull, Que.**—Fire at the Hull Iron & Steel Co.'s plant recently did about \$5,000 damage.

**Windsor, Ont.**—The Maxwell Motor Co., of Detroit, Mich., will erect an automobile factory here.

**Shawinigan Falls, Que.**—The Electric Products, Light & Power Co. propose building an extension to their plant here to cost \$56,000.

**Chatham, Ont.**—The plan to establish a municipal cold storage plant has been abandoned as the Department of Agriculture is not granting subsidies for this purpose.

**St. Lambert, Que.**—This town will get a cotton and textile plant, if the people will vote the company a bonus of \$95,000 and a tax exemption for twenty years. About seventy-six acres have been acquired as a site between Lapiniere road and the G.T.R. tracks.

**Winnipeg, Man.**—A plant will probably be installed near here for treating lignite and converting it into fuel. Manufacturers have keenly interested themselves in the matter and steps are now being taken to secure the necessary finances to get the requisite plant into operation. The research council has asked the federal government for a \$500,000 grant for this new department, and a portion of the grant will be for the construction of the coal-treating plant.

## ELECTRICAL

**Kingston, Ont.**—The Utilities Commission hopes to have Hydro-Electric power in Kingston by October. Delays have been caused owing to the difficulty of getting electrical apparatus.

**Brantford, Ont.**—Two weeks must elapse after the passing of the Township Hydro-Electric by-law before any action can be taken toward the erection of equipment or installation can be proceeded with by the Township Council.

## MUNICIPAL

**Woodstock, N.B.**—A by-law will be submitted to the ratepayers on Aug. 10 to authorize the installation of a mechanical filtration plant.

**St. Marys, Ont.**—At the special meeting of the Town Council the by-law giving a bonus of \$5,000 to the Thames Quarry Co. was carried. The by-law will be submitted to a vote of the ratepayers on August 18.

**Owen Sound, Ont.**—At a special meeting of the Town Council held recently it was decided to grant a loan of \$75,000, in three instalments, to a company who propose building a factory here for making screws by a new process.

**Toronto, Ont.**—The Board of Control has received only one tender for the construction of the temporary single track line extension of the Bloor street civic car line from Quebec Avenue to Runnymede Road. The contractor will

do the work for \$7,655, and will supply second-hand T rails and second-hand quality of ties. If the city supplies the rails, bolts, spikes and plates, there will be a reduction of \$2,500 in the contract price. The contractor agrees to complete the work in twenty days.

## PITTSBURG MARKET LETTER

(Continued from page 108.)

and consumers are likewise covered. There is every prospect that there will be a stagnant market for months, until a new alignment occurs. No one can tell whether the pressure will come first from producers, to sell, or from buyers, to buy, but in all the past, once the market has become stagnant at a high level, the staying powers of the buyers have easily been the greater.

At this time it is to be considered that the ordinary consumptive requirements of the country are decreasing rapidly. The report of the Bridge Builders' and Structural Society showed fabricated steel lettings in June equal to only 47½ per cent. of the fabricating capacity, about 180,000 tons per month, against 56½ per cent. in May. The railroads have ceased buying altogether. Ordinary building has almost stopped.

Government requirements in steel for war purposes are not involving as large a tonnage as was estimated from 30 to 60 days ago. When war was declared, there were estimates that the requirements would be from 5 to 15 per cent. of the output. Later the estimates were swelled to a possible 40 or 50 per cent. Now the estimates are lower again. Thus, if the Government were to take out of the situation 25 per cent. of the production and the ordinary requirements were to decrease only 25 per cent. the situation would be unchanged. The reduction, however, promises to be much more than 25 per cent., hence lower prices are practically assured, when the market against develops itself.

### Pig Iron.

Furnace quotations are unchanged, but practically nothing is being done. Resale Bessemer iron has gone at \$1 or \$2 below furnace quotations. Market quotations can hardly be said to be changed, but instead of its being a trading market, it is now merely a nominal asking market.

### Steel.

Based on transactions several weeks old, billets are \$95 to \$100, and sheet bars \$105 to \$110, but there has been nothing done lately. It is doubtful whether any large tonnage of billets, say 100,000 tons, could be sold even at \$75. Finished steel products for early deliveries are quotable at same prices as formerly. The mills, being sold up, have no incentive to quote lower prices until it is seen that there would be a reasonable amount of buying.

## GENERAL

**Listowel, Ont.**—The Perfect Knit Mill Co. will build a factory here.

**New Westminster, B.C.**—Fire at the Glenrose Cannery recently caused a loss of \$1,000.

**Toronto, Ont.**—The Dominion Envelope Co., has been given a permit to erect a factory at Duchess street at a cost of \$40,000.

**Davidson, Sask.**—A. C. Paulson & Co. will extend their elevator here to increase the capacity to 40,000 bushels. All the present machinery will be replaced with new equipment.

**Montreal, Que.**—Confirmation of the rumor recently reported that the Dominion Textile Co., was interested in the alleged cotton mill project for St. Lambert, was received in an interview with F. G. Daniel, the general manager. The company contemplates the erection of a mill with an installation of 100,000 spindles, and 3,000 looms. It is expected that the number of hands employed would range from 1,500 to 2,000. The cost of the undertaking, including the machinery, based on pre-war prices, will be about \$2,750,000.

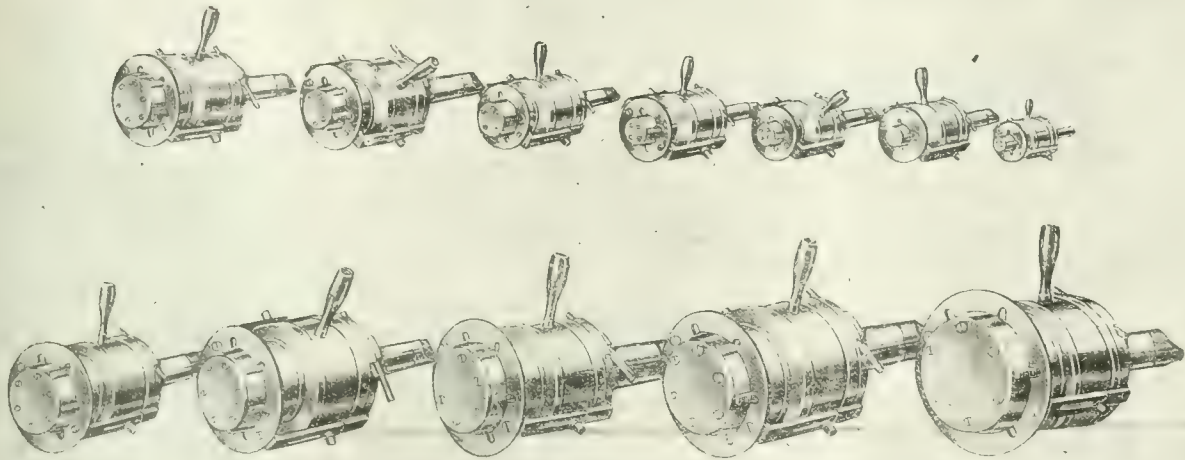
## TENDERS

**Dorval, Que.**—Tenders will be received until July 31, for the construction of a filtration plant for the Town of Dorval, Que. Plans and specifications may be seen at the office of Dupont, Roy & Beaudoin, engineers, 225 St. James, Montreal.

**Montreal, Que.**—Tenders will be received up to the July 27, by the East End District Commissioners of the Catholic School Commissioners of Montreal, for alterations in the heating system of the St. Paul School, 2nd Avenue, Viauville, Paroisse St. Clement. For plans and specifications, apply to the Modern Heating & Engineering Company, Limited, 83 Bleury Street, Montreal.

**Toronto, Ont.**—Tenders addressed to the Secretary-Treasurer of the Board of Education, will be received until July 27, for steam fitting, plumbing, electrical work, tinsmithing, castings for repairs to furnaces and other trades required for midsummer repairs. Specifications may be seen and all information obtained at the office of the Superintendent of Buildings, Administration Building, 155 College Street, Toronto.

# GEOMETRIC TAPS



## FOR U.S.

**SIZES  $\frac{3}{4}$ " TO 6" — AT A U.S. ARSENAL**

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.

These taps are equipped with the roughing and finishing attachment, a feature of Geometric Taps that are required for close work.

A micrometer scale adjusts them for a tight or loose thread. Because of the adjustable feature, Geometric Taps always produce accurate threads, no matter how often the chasers have been ground.

When ground beyond further use, the chasers may be replaced, while the tap remains as good as new.

Chasers recede automatically when the required depth of thread is reached.

Geometric Collapsing Taps can be fitted to Screw Machine or Turret Lathe, also live spindle.

Why not put your tapping proposition up to a Geometric?

**THE GEOMETRIC TOOL COMPANY**  
**NEW HAVEN** **CONNECTICUT**

*Canadian Agents:*

Williams & Wilson, Ltd., Montreal. The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg, St. John, N.B.

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

**Toronto, Ont.**—Tenders will be received at this department until July 21, for new boiler plant to be installed in the main boiler house, now in course of erection, and alterations to heating system, at the Hospital for Insane, Hamilton. Plans and specifications can be seen at this department and at the office of the Bursar of the Institution. H. F. McNaughten, Secretary, Public Works Department, Toronto.

**Hamilton, Ont.**—Tenders will be received up to July 30, for supplying and installing one 10 million Imperial gallon steam turbine driven centrifugal pumping unit; one synchronous motor; two transformers; switching apparatus; two venturi meters; two water-tube boilers, and one 10 million Imperial gallon motor-driven centrifugal pump, at Beach pumping station. Specifications and forms of tender can be obtained from office of City Engineer E. R. Gray.

**Toronto, Ont.**—Tenders will be received addressed to the chairman, Board of Control, City Hall, up to July 31, for the complete construction and equipment of a single track extension to the Bloor Street Division of the Toronto Civic Railway. Specifications and forms of tender may be obtained upon application at Room No. 313, Department of Works, City Hall, on payment of ten dollars (\$10), this sum to be refunded upon return of specifications, forms of tender, and plans.

**Halifax, N.S.**—Tenders, addressed to J. W. Pugsley, secretary, Department of

Railways and Canals, Ottawa, Ont., will be received up to July 25, for the construction of a freight shed extension at Halifax, N.S. Plans, specifications, and blank form of contract may be seen at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, at the office of the Chief Engineer, Moncton, N.B.; at the office of the Resident Engineer, Truro, N.S., and at the office of the Resident Engineer, Halifax Ocean Terminals, Halifax, N.S.

**Toronto, Ont.**—Tenders will be received by registered post only, addressed to the Purchasing Agent, Military Hospitals Commission, "D" Unit, 1 Queen's Park, up to 12 o'clock noon, on Thursday, July 26., for the following Work-shop Equipment, to be delivered to Hart House, University Bldgs., Toronto, during the week of August 24 to 31.

1—Browne & Sharpe (or Cincinnati) Universal Miller, No. 1 (with improved spiral dividing head and swivel vise).

1—McKenzie Engine Lathe, 14" x 6' with 8" four-jaw independent chuck.

1—Barnes Drill Press, 15", with chuck and arbor.

1—3-h.p. Motor, 110 d.c. compound wound (1,200 to 1,700 r.p.m.), (Westinghouse or General Electric).

1—No. 2 American Bench Gas Forge.

1—No. 3 Root's Acme Blower.

1—No. 2 "Perfect" power hack saw.

Set Stock and Dies, ¼" to ¾" (Little Giant).

Set Stocks and Dies, 1-64" to 14-20" (Little Giant).

1—Preston Dimension Saw, No. 125.

1—20" Sidney Band Saw.

1—Blount Speed Lathe, 11" x 5'.

1—Bench Emery Stand, 8" diameter x 1" wheel.

1—Universal Grinder, No. 1, with automatic feed (Le Blonde).

36 ft. of 1 7-16" Shafting, one pair couplings, five 16" hangers.

Tenders may be for all or part of the equipment above mentioned. Lowest or any tender not necessarily accepted.

T. HARBRON, Lieut.,  
Purchasing Agent.

## BUILDINGS

**Toronto, Ont.**—The Imperial Oil Co., will construct a one storey exhibition building at 56 Church street to cost \$35,000.

**Toronto, Ont.**—The Women's Cottage Hospital, 125 Rusholme road, have received permission to extend their premises at a cost of \$30,000.

**Toronto, Ont.**—The Canadian Hanson Van Winkle Co., have been granted a permit to erect an office building and garage at 12 Morrow avenue, to cost \$8,000.

**Toronto, Ont.**—Construction work on the Harbor Commission office building, which is being erected just to the east of the T. Eaton Co.'s dock on the waterfront is now well under way. It is hoped that the building will be ready for occupation by the end of next January.

## RAILWAYS—BRIDGES

**Three Rivers, Que.**—The Three Rivers Shipyards Co. will establish a shipbuilding plant here.

**St. Catharines, Ont.**—The G.T.R. are to build a modern station building here. Work will be started at once.

**St. Catharines, Ont.**—The by-law authorizing the construction of an extension of the N.S. & T. R. local line, has been passed by the Council.

**London, Ont.**—The London Railway Commission has stated that it would put down a switch into Beattie Bros.' factory at Chelsea Green on the usual terms.

**Toronto, Ont.**—Four new steel bridges must be built along the Toronto-Hamilton highway to replace the old structures now in use, and the Ontario Railway Board has been asked to apportion the cost. The spans of the new bridges vary from 100 to 140 feet. There is a new bridge to be built over the Mimico Creek, one over the Etobicoke Creek, another across the Credit River, and the fourth over the Twelve Mile Creek at Bronte.

**St. Catharines, Ont.**—At a special meeting of the City Council, a motion was carried that the City Council join with Lincoln County Council in forwarding a memorial to the Minister of Railways and Canals, asking that safety devices, in the way of gates or watchmen be placed at each of the Welland Canal bridges, and also that the Queenston street bridge, where recently a serious accident occurred, should be replaced with a wider bridge to accommodate vehicular and pedestrian traffic.

## AUXILIARY MACHINERY REQUIRED.

Tender forms and specifications have been received from D. H. Ross, Canadian Trade Commissioner, Melbourne, for supply and delivery of auxiliary machinery for the Flinders naval base, via Melbourne, Victoria, and are open for inspection at the Department of Trade and Commerce, Ottawa (refer to File No. A-1901). Tenders addressed to the Director of Navy Contracts, Navy Office, Melbourne, close on October 24, 1917. The particulars are as follows:

Two electrically-driven air pumps, with complete set spare parts.

One steam driven air pump, with complete set of spare parts.

Two small circulating pumps.

One large circulating pump.

One large feed pump, with complete set of spare parts.

One small feed pump, with complete set of spare parts.

One oil fuel pump with complete set of spare parts.

## PUMPING EQUIPMENT REQUIRED

Tender forms, specifications and drawings have been received from D. H. Ross, Canadian Trade Commissioner, Melbourne, for the supply and delivery of pumping plant and equipment for the Commonwealth naval dockyard, Cockatoo Island, Sydney, N.S.W., and are open for inspection at the Department of Trade and Commerce, Ottawa (refer to File No. A-1901). Tenders addressed to either the Director of Navy Contracts, Navy Office, Melbourne, or the Director of Naval Contracts, care Commonwealth Naval Dockyard, Cockatoo Island, Sydney, N.S.W., close on October 10, 1917. The particulars are as follows:

Two main dock pumps with vertical spindle motors and control equipments.

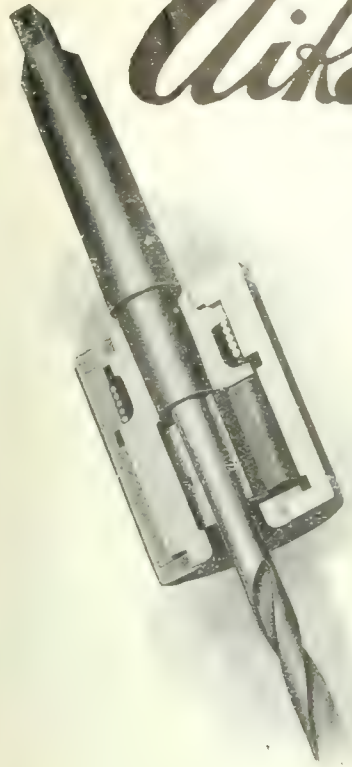
One vertical spindle motor and control equipment.

Four sluice valves with four motors and control equipment.

Two drainage pumps with motors and equipment.

Two air exhaust pumps with motors and equipment.

One enclosed motor and equipment for deck caisson.



# Aikenhead's New Chuck

**Will stop you losing your drilling profits**

Minutes mean profit—are you losing minutes? There is no loss of time in tool changes when you use a

## WAHLSTROM CHUCK

It is entirely automatic in its action — tool changes may be made without stopping the spindle—just grasp the shell of the chuck with one hand and make the tool change with the other. The change is made in a tenth of the time required with the ordinary chuck—and the tool automatically centers itself.

The Wahlstrom comes in two types—one for straight shank tools—the other for Nos. 1, 2 and 3 M.T. shank tools—they are both "Production Increaseers," which demands your attention. Write for information now.

**AIKENHEAD HARDWARE LIMITED**

17, 19, 21 Temperance Street - Toronto, Canada



## Modern Drilling Methods

By constructing the "Van Dorn" Portable Drill 100% overstrength, we have made great strides in promoting the efficiency and utility of a shop.

The "Van Dorn" Universal Portable Drills consume power only when in operation, and may be attached to any lamp socket.

The special fan-cooled "Van Dorn" motor is capable of 100% overload. The switch is quick acting.

Sticking and fusing of contacts practically eliminated.

Phosphor bronze and ball bearings. Hardened gears.

We will gladly forward any information you may desire regarding portable drills, grinders, blowers, die filers, riveters, etc. Write us to-day.

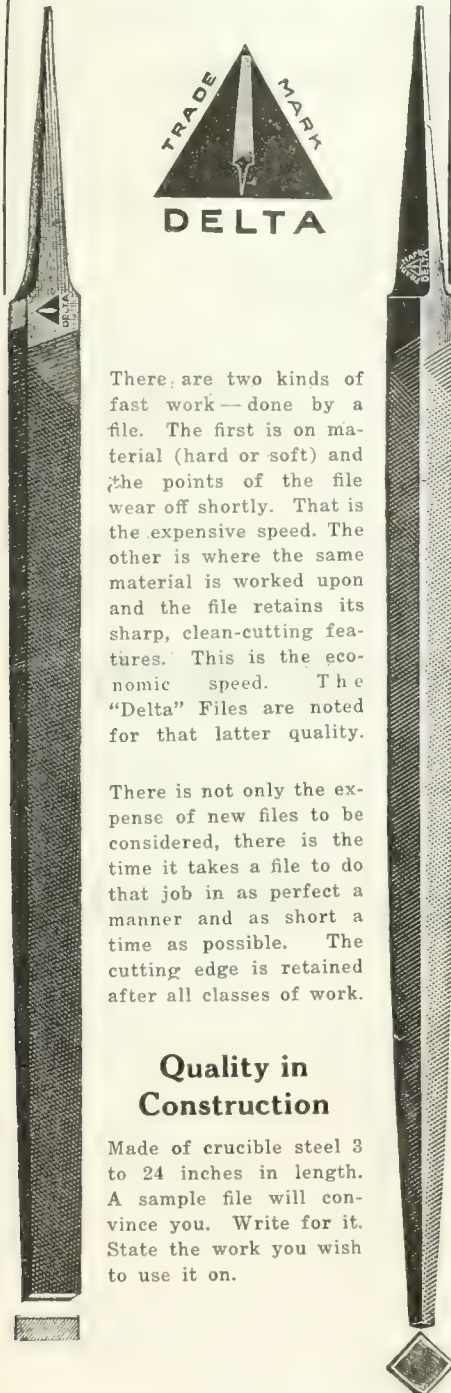
# Aikenhead's

17, 19, 21 TEMPERANCE STREET  
TORONTO, ONTARIO, CANADA

*Canada's Leading Tool House*

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

# 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.

## Quality in Construction

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.

—All Leading Jobbers—

## Delta File Works

Philadelphia, Pa. U.S.A.

Can. Agents:

H. S. Howland, Sons & Co., Toronto;  
Starke, Seybold, Montreal, Quebec; Wm.  
Stairs, Son & Morrow, Halifax, N.S. Mer-  
rick Anderson, Co., Winnipeg, Man.

## TRADE GOSSIP

The Eastern Machinery Co. of Montreal, has increased its capital stock to \$95,000.

**Tungsten Prices Advance.**—The demand for tungsten continues active with only light supplies of ore coming on the market. Prices have advanced under buying pressure to between \$22 and \$23 for Wolframite and \$26 for Scheelite. Inquiries are in the New York market to cover the balance of the year and a portion of next.

**Cobalt, Ont.**—The Dominion Reduction Co. of Cobalt, expect to have their hot dern furnaces for the treatment of the concentrates from their oil flotation process in operation within the next few weeks. Experiments have proven very satisfactory, and the process will greatly facilitate the marketing of the produce of the oil flotation plants in the camp.

The Eagle & Globe Steel Co., sole Canadian agents for Arthur Balfour & Co., Sheffield, England, have moved their Toronto office and warehouse from 373 Front street East, to more central and commodious premises at 36 Colborne street which will enable them to deal more effectively and promptly with the increasing business. John L. Milner, Ontario representative is in charge of the Toronto office.

**Big Order For Blankets.**—Orders for \$1,000,000 worth of blankets have been placed among Canadian manufacturers by the United States Government for army purposes, according to the head of one of the largest industrial corporations in Canada. Orders have been distributed with Penmans Ltd., and the Toronto Carpet Co., and the Smart-Woods Co. has been awarded a large contract for tents. The specifications were submitted to Canadian mills, with prices fixed by the United States Authorities.

**Molybdenite Property.**—Private advices from Halifax, N.S., state that Molybdenite mine has been discovered in that province, and after operating it on a small scale for some time it has turned out to be one of the richest in Nova Scotia. As this metal has increased greatly in value since the war the property has attracted considerable attention in interested circles, several people from the United States having inspected the property to which they were conducted by C. L. Normandin of Halifax, who is in charge of its affairs.

The International Engineering Works, Inc., Framingham, Mass., has purchased the plant and business of the International Engineering Works, a Canadian corporation, in the United States. The new company is organized under the laws of Massachusetts, with capital stock of \$500,000, and has no connection with the Canadian company. J. Philip Bird, general manager of the National Association of Manufacturers, is president; Harry V. Bady, vice-president; Frew W. Chipman, treasurer; William H. Walker, sales manager.

**India's Trade With Canada.**—The Imperial Institute in London has been charged by the Secretary of State for India with an enquiry into the openings within the Empire for the various raw materials of India which have hitherto gone in large amount to enemy countries. Already one important result of this action is that tanners in Canada have stated that they are interested in the raw cowhides which formerly went from India chiefly to Germany, and from which a high-class leather can be manufactured. Another subject of importance to Canada is the possibility of direct trade with India in shellac.

**Pine Oil in Northern Ontario.**—Albert A. Grigg Deputy Minister of Lands and Mines for Ontario, has received a sample of red pine oil, manufactured in the north, which oil is extensively used to recover ore from the dumps in the mining fields. Before the war it had been obtained in Germany, but recently a variety made in California has been used. If it is found that the oil can be made economically from the red pine stumps of Northern Ontario, a new and important industry will no doubt be developed. In addition to the oil a black tar is extracted from the stumps and the remnants can be converted into an excellent charcoal.

**Nova Scotia Steel Output.**—The output of the Nova Scotia Steel & Coal Co., continues to reflect satisfactory progress. Tons of coal mined show an increase of 5,551 tons in the second quarter, as compared with the first. Steel ingots and finished steel forgings showed a large increase of 33,683 tons. Comparisons with the first quarter are as follows:

	2nd Q'ter	1st Q'ter	Ins.
Tons, coal ..	152,076	146,525	5,551
Tons, ore ..	14,238	12,177	2,061
Limestone ..	20,896	21,074	x178
Tons, coke ..	25,784	25,555	329
Tons, iron ..	21,971	21,103	868
Steel, ingots	33,377	28,598	33,683
Finished steel	28,904	.....	.....

xDecrease.

**Bordeaux Exhibit Shows World Trade.**—The May bulletin of the Chambre de Commerce, Montreal, calls the attention of the business community to the opportunities of expansion of Canadian trade offered by the Bordeaux Exhibition, which will be held from September 1 to September 15 this year. This fair has been conducted annually for eleven years and even the war has not interfered with its usefulness. It is international in its scope and has proved one of the most valuable centres for exchange of international commodities. Owing to difficulties of transportation it is not expected that there will be any large Canadian exhibit this year, but both exporters and importers are displaying considerable interest. E. Lacas, 11 St. Sacrament street, Montreal, has been appointed official representative of the Bordeaux Fair and is working energetically to develop Canadian interest. He plans to attend the fair himself.

**PERSONAL**

Geo. E. Templeman has succeeded R. H. Balfour as chief engineer of the Montreal Electrical Commission.

Capt. William Matthews, a well-known mariner of the Great Lakes, died at Cobourg, Ont., on July 17, aged 69.

John Webber, manager of the steel department at the Toronto office of the Steel Company of Canada, has left for a trip up the Saguenay.

Paul G. Chace, Vice-President of the Port Arthur Shipbuilding Co., who was in Port Arthur, Ont., recently for a few days, has returned to his home in New York.

Chas. B. Ellis, formerly supply sales specialist, Northern Electric Co., Montreal, has recently been appointed superintendent of supply sales, Canadian General Electric Co., Montreal.

W. J. Lynch, for some time controller of the Quebec Railway, Light, Heat & Power Co. has been appointed general manager to fill the vacancy caused by the death of H. E. Matthews.

R. Bruce Wallace, for many years with the Western Dry Dock & Shipbuilding Co., Port Arthur, Ont., has been appointed manager of the American Shipbuilding Co., at Norfolk, Va.

R. B. Priestman, formerly connected with the Eagle & Globe Steel Co., Montreal, has enlisted for overseas, having signed up with the Cobourg Heavy Battery. He has since been promoted to the position of Corporal.

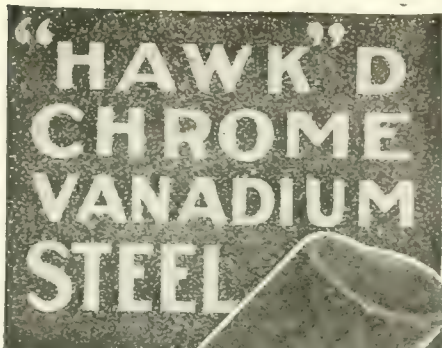
Capt. David Sylvester, well known on the Great Lakes, died in Toronto on July 18. Capt. Sylvester was born in Scarborough, Ont., in 1838. For some years he conducted a commission and brokerage business at Church Street Wharf, Toronto.

Harry A. McKnight has resigned as superintendent of the plant of the American Car & Foundry Co., Jeffersonville, Ind., to enter the operating department of the Canadian Car & Foundry Co., Montreal, Que.

H. C. Opie for several years connected with the sales staff of Alexander Gibb, Montreal, has become associated with the Eagle & Globe Steel Co. of Montreal, following the resignation of R. B. Priestman who has enlisted for overseas.

Fred S. Henning, who was superintendent of the Island filtration plant, Toronto for a number of years died recently in Toronto after a long illness. Mr. Henning was born at St. Catharines, Ont., in 1856 and was at one time Grand President of the Canadian Marine Engineers.

Allen O. Leach, of Toronto, has been appointed supervising engineer in charge of construction of Camp Dodge, six miles from Des Moines, Iowa. Mr. Leach has been granted six months leave of absence by his employers, the Canadian Northern Railway. Mr. Leach is 25 years of age, having been appointed valuation engineer of the C. N. R. two years ago.



Will Give You Exceptional

**Shell Forging Production**

WITHOUT AN EQUAL FOR BOTH FIRST AND SECOND OPERATION PUNCHES.

Comes to you heat-treated and ready for use.

It does not stick to the work.

There are many cases where each punch has turned out over 2,000 shells.

It means more shells, per machine per day.

STEEL OF EVERY DESCRIPTION.

**Hawkrige Brothers Company**

303 Congress St., BOSTON, MASS. U. S. A.

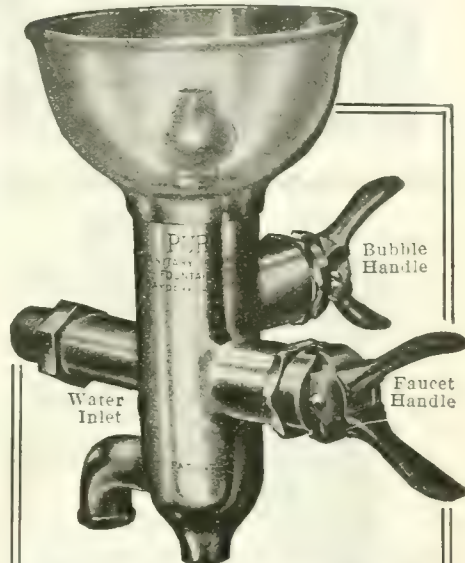
TRY HAMILTON **BABBITTS**  
We Make Nothing Else  
GEO. E. JOBBORN, Hamilton, Ont.

**I BELIEVE**

In Safety First and always.  
In providing for the Health of my Fellow Workmen.  
In Light and Air and Sanitary Working Conditions.  
In clean, fresh drinking water for everybody.  
In the Safety, Economy and Manbetterment.

**PURO** SANITARY DRINKING FOUNTAIN

(MADE IN CANADA)



The loss of a man through impure drinking water is a crime that "the front office" must bear.

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.

Let us tell you just what it will cost you to

**"PURO - FY"**

YOUR WATER SUPPLY

Puro Sanitary Drinking Fountain Company  
147 University Ave., Toronto, Canada

**A MAN**

was wanted as Tool-room Foreman. He was found by a condensed ad. in

CANADIAN MACHINERY  
Classified Advertising Section

143-153 University Ave., Toronto

**OVENS**  
Enameling and Varnishing Ovens heated by Gas, Electricity, Steam or Coal.  
Write for Booklet.  
Brantford Oven, & Raak Co., Ltd.  
Brantford, Canada.

**THE IRON WORKS LIMITED**

Successors to  
Owen Sound Iron Works  
Owen Sound, Ont.  
Engineers  
Boiler-makers  
Founders  
Machinists

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



The  
"Dupont"  
PATENT  
Power  
Hammer

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

Made carefully from carefully selected, high-class materials.

Positively  
Guaranteed

Seven sizes.

With rams from 35 to 300 lbs.

Write for full details.

**THE PLESSISVILLE FOUNDRY**

Plessisville, Que.

Ontario and Western Agents:  
The General Supply Co. of Canada Ltd  
Ottawa Toronto Winnipeg

**GAUGES**

DIES, TOOLS AND REPAIRS  
OXY-ACETYLENE WELDING

**WORTH ENGINEERING CO.**

163 Spadina Ave., Toronto, Ont.

Phone Adel. 3734

B. H. AYLSWORTH A. E. HACKWORTH

Sizes.—"I want a ton of coal, please."  
"Yes, ma'am. What size?"  
"Dear me, I didn't know coal came in sizes. I wear a No. 3 shoe and a No. 6 glove."

**REFRIGERATION**

Belleville, Ont.—The Graham Co., will build a cold storage plant and warehouse here.

Toronto, Ont.—The Harris Abattoir Co. have been given a permit to build a bone drying room on St. Clair Avenue to cost \$2,000.

Toronto, Ont.—The Swift Canadian Co. will build an extension to their packing plant which will include cooling rooms and a larger fertilizer plant.

Vancouver, B.C.—The Great Northern Canneries is having its fish canning and preserving plant equipped with refrigerating machinery.

Toronto, Ont.—The Swift Canadian Co., St. Clair Avenue and Keele Street, will erect an addition to the fertilizer building on Keele street, at a cost of \$13,000.

Vancouver, B.C.—Geo. E. Mitchell, 1028 Pender street, W., merchant, has purchased a 5-ton refrigerating machine from the Armstrong Machinery Co., Spokane, Wash., for installation in his store.

Cornwall, Ont.—The Cornwall Dairy Co. have equipped a new creamery and dairy in connection with same built cold storage rooms for butter, eggs, cheese, etc., and will install a refrigerating plant manufactured in the United States.

St. Johns, Nfld.—The Reid Newfoundland Co. are erecting a cold storage and fish freezing plant, three stories high. The storage rooms will have a capacity of about 10,000,000 pounds of fish. They are also planning to build six branch houses at different points with an approximate capacity of 500,000 pounds each.

**WOODWORKING**

Owen Sound, Ont.—Fire on July 22, did considerable damage to the North American Bent Chair Co. factory.

North Vancouver, B.C.—A fire broke out recently at Mosquito Creek, totally destroying the lumber mill there, owned by Messrs. Chubb, Barton & Campbell. The loss will be about \$6,000, and there was no insurance on the mill.

**CONTRACTS**

Stratford, Ont.—The Weber Chimney Co., Chicago, Ill., have been awarded the contract for \$4,000 chimney for city.

Toronto, Ont.—The S. F. Bowser Co. have been awarded a contract by the Ottawa Car Co. for tanks and pumps, etc.

Coaticook, Que.—The Wm. Hamilton Co., Peterboro, have the contract for water-wheel for power plant for Penman's, Ltd.

St. Johns, Que.—City Council have awarded the contract for the construction of filter, tank and the improvements to the city waterworks to Laurin & Leitch, Montreal, for the sum of \$195,975, made up as follows:—Filter, \$109,

975; water tank, \$26,000; improvements, \$60,000.

Winnipeg, Man.—The Board of Control have awarded a contract to Babcock & Wilcox for a boiler for the incinerator at \$4,970.

Oshawa, Ont.—The Water Commission have accepted the tender of the Turbine Equipment Co., of Toronto, for the installation of a 1,000 gallon a minute, 2-stage electric turbine pump, for \$2,265.

Montreal, Que.—The G. T. R. has placed an order for one thousand box cars with the American Car & Foundry Co. The cars are to be of 80,000 pounds capacity, and of the most modern type, with steel underframe and standard safety appliances.

Islington, Ont.—Tenders for waterworks supplies were opened at a recent meeting of the York County Council, and that of T. Tomlinson & Son, quoting 100 large frames and covers at \$21 each; 14 small frames and plugs at \$21 each, and four special frames at \$42 each were accepted.

Toronto, Ont.—The contract for the 36-inch pipe to be laid by the city from the main pumping station at the foot of John street to Front street, has been awarded to the National Iron Works, at \$215 a length, and the contract for the steel castings to the Reid & Brown Structural Steel & Iron Works, Ltd.

**INCORPORATIONS**

The Federal Steel & Foundry Co., has changed its name to that of the Monarch Tractor Co. of Canada, Ltd.

Leather Products Ltd., has been incorporated at Ottawa, with a capital of \$20,000, by George S. Gibbons, Thomas G. Wilson and Edward H. Brund all of Toronto to manufacture leather and leather products at London, Ont.

The Burns Cement-Gun Construction Co., has been incorporated at Toronto by G. C. Loveys, G. W. Morley and W. M. Smith of Toronto, to carry on the business of general contractors, with a capital of \$40,000.

Dann Spring Insert Ltd., has been incorporated at Ottawa by G. R. Harvey, C. V. Langs and E. G. Binkley all of Hamilton, Ont., to manufacture automobile parts and accessories at Hamilton, with \$40,000 capital.

The Nicu Steel Corporation has been incorporated at Ottawa by Joseph M. Gordon, Donald R. Hossack and M. L. Chamberlain of Toronto to manufacture and deal in iron, steel, nickel, copper, etc., at Toronto with a capital of \$200,000.

The Canadian Incinerator Co., has been incorporated at Ottawa by Samuel Rogers, Henry M. Frickle and Alan G. Keith of Toronto to manufacture furnaces, incinerators, boilers, engines, pumps, etc., at Toronto with a capital of \$50,000.

Gas Processes Ltd., has been incorporated at Ottawa by George C. Loveys, George W. Morley and William M. Smith to carry on the business of electrical



mechanical and gas engineers. The company is capitalized at \$50,000 and the head office is at Toronto.

The New Mfg. Co., has been incorporated at Ottawa with a capital of \$45,000 to manufacture all kinds of heating devices and apparatus at Ottawa, Ont. The incorporators are Thomas R. Beament, Alan H. Armstrong and Robert J. Smith all of Ottawa.

Chambers, McQuigge & McCaffrey Co., have been incorporated at Ottawa with a capital of \$450,000 to carry on business as a general engineering and construction-company at Toronto. The incorporators are R. H. Parmenter, A. J. Thompson and S. D. Fowler all of Toronto.

The Canadian Life Buoy Co., has been incorporated at Toronto with a capital of \$100,000 to purchase the British and Canadian patents of a new life preserver and to manufacture same at Windsor, Ont. The provisional directors are C. W. Coldwell, O. E. Fleming and F. E. Harvey all of Windsor, Ont.

## MARINE

St. John, N.B.—After being in commission less than six months the new four masted schooner Letitia T. Mackay, has been sold at Bordeaux, France, for \$110,000.

Kingston, Ont.—The Kingston Shipbuilding Co. is asking for the consent of the municipality to extend its plant 75 feet further into the harbor, in view of the great increase in shipbuilding operations here.

Sarnia, Ont.—The old steamer Saronic, at one time known as the United Empire, is again in commission, and is now the W. L. Kennedy, having been converted into a bulk steamer. The Saronic was launched at this port in 1882.

Vancouver, B.C.—The auxiliary schooner Janet Carruthers, which was launched recently at North Vancouver, has been chartered by the Canadian Trading Co. to load lumber at Vancouver for Port Adelaide, Australia. The lumber will be supplied by the Rat Portage mill.

Vancouver, B.C.—The other auxiliary schooners on passage besides the Mabel Brown, are the Margaret Haney, for Bombay; the Geraldine Wolvin, for Sydney; the Laura Whalen, for Port Adelaide. The Jessie Norcross is now at Genoa Bay loading for Port Adelaide.

Owen Sound, Ont.—Word has been received here that the Great Lakes steamer Scottish Hero, has been torpedoed while en route from Sidney, N.S., to Havre, France, with a cargo of steel products. She was commanded by Captain Luke Holmes, of Sydney, N.S.

Victoria, B.C.—Announcement was made at the plant of the Cameron Genoa Mills Shipbuilders, Ltd., that the fifth auxiliary schooner, which is now in an advanced stage of construction at the yard for the Canada West Coast Navigation Co., will be christened "Jean Steedman."

New Westminster, B.C.—The first carload of machinery for the shipbuilding

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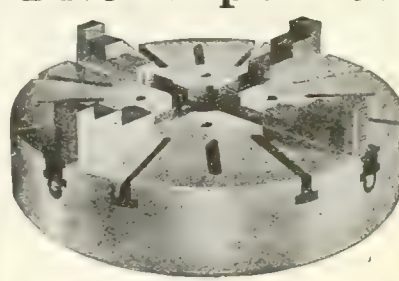
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## ON PAGE 74

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## TURN TO IT!

plant now in course of being established on Poplar Island by New Westminster Construction and Engineering Co., has arrived, and installation will begin shortly. The company have a contract for building four vessels for the Imperial Munitions Board.

**Vancouver, B.C.**—The building of the auxiliary fleet has meant a great deal for the British Columbia lumber trade. There are 12 vessels in the programme and of these seven have been launched. As each vessel uses a million and a quarter feet of lumber in her construction it is seen that 15,000,000 feet will be used in construction alone. Each vessel carries at least 1,500,000 feet, so that the vessels will take out of this province 18,000,000 feet as cargo.

**Fort William, Ont.**—Benjamin Leavitt, a Toledo man, descended 180 feet into the waters of Lake Superior recently, and located the hulk of the steamer Pewabic, which was sunk with a valuable copper cargo on the night of August 9, 1865. The Pewabic went down at a point seven miles off Thunder Bay Island, after being rammed by the steamer Meteor. One hundred and twenty-five persons lost their lives. The copper cargo is reported to be worth a million dollars.

**Victoria, B.C.**—The auxiliary schooner Mable Brown arrived at Sydney, Australia, on June 29, with a cargo of British Columbia lumber, having made the voyage from Vancouver in 80 days. The Mabel Brown was launched from Wallace Shipyard No. 2, North Vancouver, on January 27, and she had her trials in the Gulf on March 22 and March 25. On March 29 she left Vancouver for Chemainus, where she loaded 1,534,903 feet of lumber. The vessel left Chemainus early on April 15, with Capt. Boyd in command.

**Vancouver, B.C.**—The Lyall Shipbuilding Co., expects to lay the keel immediately for the first of the six wooden ships, which this company has contracts to build for the Imperial Munitions Board. About four and one-half months will be required for the construction of each of the ships. Pending the completion of the two wooden vessels at present under construction by the Wallace Shipyards Co., the Lyall Company will start operations on the western portion of the property. On this two new shipbuilding berths will be constructed at once.

**Vancouver, B.C.**—The auxiliary schooner Janet Carruthers was launched at the Wallace Shipyards on June 29, being christened by Mrs. Norman Burkinshaw. This vessel is the seventh to take the water within the past year of the fleet of twelve ordered by the H. W. Brown Co. The Janet Carruthers is of wooden construction, 260 feet over all with 44 feet beam. She is equipped with semi-Diesel engines, Bolinder type, which generate 320 horse-power. She has twin screws. Three more vessels are under construction at the Cameron-Genoa Mills Shipbuilders' plant, where the others were built, and two more are nearing completion at the Wallace shipyard.

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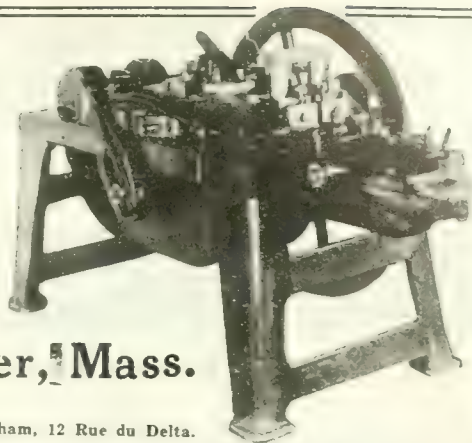
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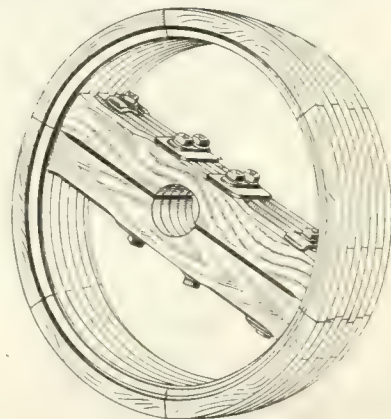
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- Bertram, plain.
- Brown & Sharpe, power feed, plain.
- Fitchburg, geared, plain.
- No. 2 Ford-Smith.
- Monarch, vertical.

### SHAPERS.

- 16" Canada Mach. Corp.
- 16" Hendey.
- 16" Queen City, back geared.
- 20" Cincinnati, back geared.
- 24" Gould & Eberhardt.
- 30" Morton, draw cut.

### MISCELLANEOUS

- 6" and 12" Racine Hack Saws.
- 4" and 6" Robertson Hack Saws.
- 6" Kennedy Cutting-off Machine.
- 12" Hall Pipe Machine.
- No. 2 Colburn Keysester.
- No. 5 Grant Rotary Riveting Hammer.
- Nos. 1 and 2 1/2, Greenard Arbor Presses.
- No. 2 Bliss Foot-power Press.
- Brown-Boggs Punching Press.
- Bertram Single-end Punch and Shear.
- No. 3 Dundas Double end Punch and Shear
- 7" Geared Bending Rolls.
- 1500-lb. Toledo Drop Hammer.
- 450-lb. Williams Drop Hammer.

**H. W. PETRIE, LTD.**  
FRONT STREET WEST, TORONTO

## RIVERSIDE Machinery List

We Own Every Tool Offered

### ENGINE LATHES

- 1-28 x 10 Hamilton Standard Engine Lathe, with table.
- 1-28 x 15 Putnam Standard Engine Lathe.
- 1-28 x 14 Putnam Standard Engine Lathe.
- 1-New 18 x 8 Springfield Engine Lathes.
- 1-New 16 x 8 Springfield Engine Lathe.
- 1-New 14 x 8 Springfield Engine Lathe.
- 1-18 x 6 Jones & Lamson Standard Engine Lathe.
- 1-10 x 8 Porter Standard Engine Lathe.
- 1-10 x 8 Reed Stud Lathes.
- 1-14 x 8 Sebastian Standard Engine Lathe.
- 1-14 x 6 Lodge & Shipley Engine Lathe.
- 1-14 x 6 Springfield Engine Lathe.
- 1-14 x 6 Pontius Engine Lathe.
- 1-14 x 6 Sebastian Engine Lathe.
- 1-14 x 6 Van Work Engine Lathes.
- 1-11 x 5 Seneca Falls Engine Lathe.
- 1-No. 3 Hartiarge Bench Lathe.

### TURRET AND SCREW MACHINES

- 1-24 x 24 Jones & Lamson Flat Turret Lathe, S.G.H.
- 1-2 x 24 Jones & Lamson Flat Turret Lathe, cone head.
- 2-No. 6-A Potter & Johnson Automatic Lathes.
- 2-No. 4 Foster F.G.H. Hand Screw Machines.
- 2-No. 3 Foster F.G.H. Hand Screw Machines.
- 1-No. 5 Poirson F.G.H. Hand Screw Machines.
- 1-New 4 Smurr & Kamon Hand Screw Machine.
- 4-New 14" Pierce Turret Lathes.
- 2-New 1 x 8 Pierce Hand Screw Machines.
- 2-New Cleveland Automatic Screw Machines, jogger feed.

### MILLING MACHINES AND GRINDERS

- 2-No. 3 Cincinnati Universal, cone type.
- 5-No. 1½ Knight Milling & Drilling Machines.
- 2-No. 13 Pratt & Whitney Lincoln Type Milling Machines.
- 1-No. 1 Cincinnati Plain Milling Machine.
- 1-No. 13 ½ Garvin Plain Milling Machine.
- 1-No. 2 Hendey Plain Milling Machine.
- 3-Fox Hand Milling Machines.
- 1 Garvin Hand Miller.
- 1-No. 2½ Bath Universal Grinder.
- 1-No. 17½ Wells Cutter Grinder.
- 1-Mina Valley Universal Cutter Grinder.
- 1-No. 9 Burke Bench Millers (new).

### DRILL PRESSES

- 1-3-spindle 8" overhang Henry & Wright High Speed Drill.
- 3-12" Leland & Gifford High Speed Bench Drills.
- 1-12" Buffalo Plain Drill Presses.
- 1-4-spindle Fox High Speed Drill Presses.
- 2-4-spindle Fox High Speed Drill Presses.
- 1-Mueller Plain Radial Drill.
- 1-Bickford Radial Drill, with T.A.
- 1-Mueller Plain Radial Drill.
- 1-40-spindle Notes.

### SHAPERS AND PLANERS

- 1-92" Ohio H.D. B.G. Crank Shaper.
- 1-92" New Banker Crank Shaper.
- 1-92" Lakes & Doves Crank Shaper.
- 1-82" Bentley Gear Shaper.
- 1-82" Huskey Gear Shaper.
- 1-62" Weston Shaper.
- 2-10" New Springfield B.G. Crank Shapers.

### PRESSES

- 1-Walton Patent Steady Rest Geared Press, with double cam knock-out.
- 1-No. 10 Perkins Drawing Press.
- 1-No. 2 W. Bliss Wiring Press.
- 1-800-lb. D. & S. Bell Press Hammer.
- 1-800-lb. D. & W. Bell Press Hammer.
- 1-800-lb. Sebastian Belt Hammer.
- 1-25-lb. Pradley Helve Hammer.

### AIR COMPRESSORS

- 1-8 x 6 Westinghouse Steam Air Compressor.
- 1-10 x 18 x 12 Union Steam Pump Co. steam driven air compressor.
- 1-10 x 10 Ingersoll Sargent Belt Driven Air Compressor.
- 1-10 x 10 Clayton Belt Driven Air Compressor.
- 1-8 x 6 Ingersoll Morse Electrical Driven Air Compressor.
- 1-8 x 8 Gardner Single Belt Driven Air Compressor.
- 1-8 x 8 Union Steam Pump Co. Belt Driven Air Compressor.
- 1-7 ½ x 6 Chicago Pneumatic Tool Co. Belt Driven Air Compressor.
- 1-6 x 6 Chicago Pneumatic Tool 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 machines tools both large and small.

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

## GOOD USED EQUIPMENT

### ELECTRIC TRAVELING CRANES.

- 50-Ton, 61' 7" span, four motor, 550 volts, D.C.
- 25-Ton, 40' 0" span, four motor, 220 volts, D.C.
- 25-Ton trolley, three motor, 220 volts, D.C.
- 10-Ton, 40' span, 80' lift, three motor.
- 2½, 14 and 1½ H.P. Shaw crane motors, 220 volts, D.C.
- 10 H.P. Akron crane motor, 220 volts, D.C.
- 2 to 7½ Ton hand cranes, 22' span.
- 10-Ton hand crane, 55' 0" span.
- 20-Ton hand crane, 29' 6" span.

### BRAKE AND PRESSES.

- No. 11 Perkins (Trimming), 4" stroke, 16,500 lbs.
- No. 25 Adriance (Punch), 2" stroke, 7,000 lbs.
- No. 65 Toledo (Cam Drawing), B.G., 13,000 lbs.

### PUNCHES AND SHEARS.

- Lever Shear (double), cap. 2" sq.
- 28" throat (single), cap. ¾x¾" (belt).
- 36" throat (single), cap. 1¼x1" (belt).
- 48" throat (single), cap. 3x1½" (steam).
- 16" throat (single), cap. 1x1½" (belt).
- 38" throat (single), cap. 1x1" (belt).
- 36" throat (single), cap. ¾x¾" (belt).
- 17" throat (single), cap. ¾x¾" (belt).
- 15" throat (single), cap. ¾x¾" (hand).
- 10" throat (double), cap. 1½x1" (belt).
- Angle Shear (double), cap. 6x6x½" (belt).
- Angle Shear (double), cap. 6x6x¾" (belt).
- Plate Shear (Univ.), 18" blade, cap. ¾".
- Rotary splitting, 30" throat, cap. ½".
- Rotary bevel, 5" throat, cap. ½".
- Collter & McKenzie, cap. 3x½", spring steel.
- Alligator, 7" blade, cap. 1" squares.
- Gilholm, Perkins, No. 6, cap. 2½ sq.

### MISCELLANEOUS.

- Acme Rivet and Upsetter, 1½" cap.
- Banding Roll, 6", drop end, 6½ and 8" rolls.
- Bending and Straightening Mch., 24" cap. 1" stroke.
- Cold Saw, Newton 40" blade two tables.
- Rotary Planer, 36", Cleveland No. 2.
- First-class condition—quick shipments.

**McCoy-Brandt Machinery Co.**

Office and Warehouse:

216-218 Penn Ave., Pittsburgh, Pa.

## FOR SALE

Equipment used for making  
18-pr. Shells.

- 1-Warner & Swasey Turret Lathe, 2" x 24", with attachments.
- 1-Linderman Double Spindle Boring Machine, with attachments for finish boring shrapnel and nose turning H.E.
- 1-Flather & Co. 14" x 5' 0" Lathe, with chuck and countershaft.
- 1-Fosdick 16" x 6' 0" Lathe, with collet chuck and countershaft.
- 1-Raopose 16" x 6' 0" Lathe, collet chuck and taper attachment.
- 1-Goldie & McCulloch Nosing Press with Dies.
- 1-Reatty Accumulator.
- 1-Lees Pradner Thread Miller, with attachments and countershaft.
- 1-Jones & Lamson Turret Lathe, 2" x 24".
- 1-4-gallon Rowser Tank and Pump; good as new.
- 1-Cold Saw, with variable speed motor, 60 cycle, 220 volt, cuts up to 9" stock, complete with three saws.
- 1-4-Connection Pyrometer with Rheostat, made by Taylor Instrument Co.
- 1-Thermo Couples, 39" long, bent 12¼" from nose.
- 1-Thermo Couples, 39" long, straight.
- 1-One-Connection Tycoos Pyrometer, made by Taylor Co.
- 1-Bertram Band Turning Attachment, for 24" Lathe, Ball-bearing Centre.

All the above located at Welland. Prices. Delivery and full particulars gladly furnished.

**M. Beatty & Sons, Limited**  
Welland, Ont.

**CHAS. A. STRELINGER CO.**  
43-51 Larned St. East Detroit, Mich.

Machine Tools In Stock For Immediate Shipment

### DRILLING MACHINES.

- No. 3 Barnes Horizontal Radial Drill.
  - No. 4 B 8" overhang Henry & Wright Sensitive Drill.
  - No. 1 Class 1, 12" overhang Henry & Wright Sensitive Drill.
  - No. 1-8 Garvin B.G. Horizontal Drill, with pump and piping.
- ### GRINDERS.
- Six-Fifteen Fitchburg Grinder (Automatic Feed)
  - Six-Fifteen Fitchburg Grinder (Hand Feed).
  - No. 2 Diamond Aut. Surface Grinder, belt driven.
  - No. 2 Bath Universal Grinder (10x25), with "C" equipment.
  - No. 2½ Bath Universal Grinder (10x36), with "C" equipment.
  - No. 1 Wilmarth & Morman Aut. Universal Grinder, complete.

Small and Large Quick work Power Hammers.

LATHES.

- No. 5½ Sloane & Chase 7" x 35" Precision Bench Lathe, with compound rest and cshaft.
- 14" x 8" American Q.C. Lathe, with Taper Attachment and regular equipment.
- 14" x 6" Monarch Q.C., S.B.G. Engine Lathe.
- 17" x 8" Sidney Q.C., 3-step Cone, D.B.G. Engine Lathe.
- No. 65 E 13" x 6' Seneca Falls Lathe, with countershaft.
- 9" x 12" Porter-Cable Lathe, with regular equipment.

MILLING MACHINES—HAND.

- No. 1 Standard Hand Miller, with oil pump equipment and countershaft.
- No. 6 Whitney Hand Miller with countershaft.

POWER PRESSES.

- No. 4 Niagara O.B.I. Power Press.
- No. 5 Niagara O.B.I. Power Press.

SAWS—HACK.

- No. 1 Racine H.S. Metal Hack Saw, cap. 6" x 6".
- Peerless H.S. Metal Hack Saw, cap. 6" x 6".

SHEARS—ROTARY.

- No. 1 Quick work Rotary Shear.
- No. 5 Quick work Rotary Shear.

TAPPING MACHINES.

- No. 1 Garvin Aut. Tapper, cap. ¾" with countershaft.
- 3-16" and 5-16" Rickart-Safer Tapping Machines.

## C. W. CULLEN MACHINERY CO.

LEADER-NEWS BUILDING  
CLEVELAND, OHIO

American 6' Plain Radial Drill, 3" spindle, box table, b.g., tapping attachment, M.D. Bickford 4' Plain Radial Drill, cone drive, La Pointe Boring Machine.

Toledo No. 204 Sp. Double Crank Press. Toledo 400-lb. Board Drop Hammer.

2-P. & W. No. 2 Cutting-off Machines. Bement Miles & Co. 7½" Spindle, Vertical Drilling and Boring Mill, 68" swing.

Gardner No. 24 Belt-driven Disc Grinder. Bradley 150-lb. Upright Strap, 150-lb. helve, 75-lb. Upright Strap Hammers. Detroit Japanning Ovens, 8' 10" x 8' x 152".

Gisholt 28" Turret Lathe, taper attachment, M.D.

Pratt & Whitney 48" Gap Lathe. Hanna 30-ton Riveter. Pangborn Sand Blast, 84" rotary table, M.D.

3-800-ton G.E. Hydraulic Double Action Presses.

1-Toledo Toggle Press, No. 165½.

1-Ferracute Press, Dagg 66.

Bliss Presses 3 No. 60½, rack and pinion; 1 No. 77½; 1 No. 87 special geared.

3-2¼ Cleveland Automatics; prac. new.

10-¾" B. & S. Automatics.

5 3" x 36" J. & L.

Allis-Chalmers 150 H.P. Corliss Engine, 12' F.W.

Bruce MacBeth 150 H.P. Gas Engine; new.

2-Rathmann Jones Gas Engines, 125 and 225 H.P.

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

# ReMANUFACTURED —(ORIGINATED BY US)— MACHINE TOOLS

GUARANTEED TOOLS FOR IMMEDIATE DELIVERY

—Our Guarantee—

Your money back if you return a machine within 30 days  
from date of shipment, freight prepaid.  
NO EXCUSES NECESSARY.

## Some Choice Ones

### ENGINE LATHES —Latest Models

- 24—22" x 8' Hamilton, D.B.G., C.R., Semi-Q-C.
- 5—22" x 8' Hamilton, D.B.G., Turret tool post.
- 4—22" x 8' Davenport, D.B.G., Turret tool post.
- 7—22" x 10' Hamilton, D.B.G., C.R., Semi-Q.C.G.
- 2—22" x 10' Hamilton, D.B.G., Turret tool post, Semi-Q.C.G.
- 20—22" x 10' Davis, D.B.G., C.R., Q.C.G.
- 8—24" x 10' Lodge & Shipley, D.B.G., C.R., Q.C.G.
- 8—24" x 10' Lodge & Shipley, Selective Gd. Hd.
- 11—26" x 10' American, D.B.G., C.R., and carriage turret.
- 2—26" x 10' American, D.B.G., carriage turret.
- 19—26" x 12' Putnam, carriage turret, semi-Q.C.
- 9—25" x 12' Putnam, C.R., Semi-Q.C.
- 2—26" x 12' Wickes, D.B.G., C.R., Semi-Q.C.G.
- 10—28" x 10' Niles, Bement, Pond, D.B.G., Q.C.G.
- 4—28" x 14' Lodge & Shipley, Select, Gd. Hd., motor drive, turret and taper.
- 3—30" x 16' Lodge & Shipley, D.B.G., C.R., turret and taper.
- 11—40" x 18' Pittsburgh, triple geared, Q.C.G.

### TURRET MACHINES —Latest Models

- 25—21" Gisholts, 3 1/2" hole, 2-step, 5" belt.
- 25—21" Gisholts, 3 1/2" hole, motor arrangement.
- 15—24" Gisholts, 4 1/4" hole, 3-step, 4" belt.
- 40—24" Gisholts, 6" hole, 2-step, 6" belt.
- 42—24" Gisholts, 6" hole, motor arrangement.
- 2—2 1/4" x 26" Greenlee Flat Turrets.
- 2—2 1/2" x 26" Pratt & Whitney, Gd. Hd. Turrets.
- 4—3-A Warner & Swasey (bar machines).

### DRILLING MACHINES.

- 1—24" Baker High Duty.
- 1 2 spindle Foote-Burt
- 4—2 spindle Baker Vert. Cyl. Bor., adj. spindle.
- 1—4 spindle Foote-Burt Rail Drill.
- 1—10 spindle Foote-Burt Rail Drill.
- 1—12 spindle Moline Rail Drill.

### HORIZONTAL BORING MACHINES.

- 1—Beaman & Smith, 2 1/2" bar.
- 1 Bement, 2 1/2" bar.
- 1—Betts, 2 1/4" bar.
- 1—No. 3 Barnes Double End.
- 1—Newark, 3" bar.
- 1—No. 4 Newton 2 spindle, 1".

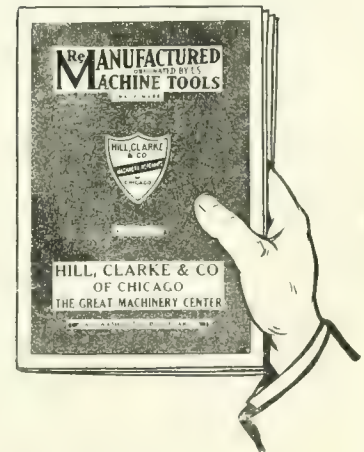
- 1 2-spindle Beaman & Smith Cyl. Boring.
- 4—P. & W. 2-spindle Rifle Barrel Drilling.

### SHAPERS.

- 1—15" Hendey Friction.
- 1—16" Perkins Friction.
- 2—16" Barker Plain Crank.
- 1—24" Gould & Eberhardt Back Geared Crank.
- 1 21" Queen City Back Geared Crank.
- 2—48" Morton Draw Cut.

### MILLING MACHINES.

- 2 No. 5 Brainard.
- 1 No. 3 Brainard Plain.
- 1 No. 20 Oesterlein Universal.



## New Green List Just Out

Write or wire for this "Green List" as it gives full description of the above list of machines and also hundreds of others.

- 1 No. 1 1/2 Brown & Sharpe Universal.
- 1 No. 25 Becker Plain
- 1 No. 2 Cincinnati Universal
- 1—No. 5 Schuchardt & Schutte Plain.
- 1 No. 3 Hendey Plain.
- 4 No. 2 Pratt & Whitney Lincoln.
- 1—60"x48"x8" Ingersoll Slab.
- 1—Beaman & Smith, 2 vert. heds., 1 hor. cross bor. hd.
- 1—No. 2 Beaman & Smith Combination Horizontal and Vertical.

### MISCELLANEOUS.

- 1—10" Bement Slotter.
- 1—15" Betts Slotter.
- 1 No. 15 Garvin Profiler.

# HILL, CLARKE & CO. OF CHICAGO

625 WASHINGTON BLVD., CHICAGO, ILL.

# IMMEDIATE DELIVERY

## DRILLING MACHINES

Leland H.S.B.B., Bench type.  
 No. 1½ Knight Driller and Miller.  
 14" Rockford Sensitive.  
 20" Kern, b.g.  
 22" W. F. & J. Barnes, s.h., b.g., p.f.  
 No. 25 Foote-Burt 24" Drill (new).  
 32" W. F. & J. Barnes, s.h., b.g., p.f.  
 32" Hamilton s.h., b.g., p.f.  
 No. 30-C Baush, 12-spindle.  
 20" W. F. & J. Barnes, 4-spindle.  
 3" W. E. Gang Plain Radial.  
 3½" W. E. Gang Plain Radial.

## 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.  
 Leland Universal, with power feed.  
 No. 23 B. & S. Gear Cutter.  
 8" x 30" Modern Plain (new).  
 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

6" x 30" Dalton.

No. 3½ Rivett.  
 No. 3 Cataract.  
 No. 5 Cataract.  
 13" x 5' P. & W. c.r. taper.  
 14" x 6' Davis, p.r.  
 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' Blaisdell, c.r.  
 21" x 12' New Haven, c.r.  
 24" x 13' New Haven, c.r.  
 32" x 16' Blaisdell, c.r.  
 36" x 20' American, t.b.g.  
 3½" x 60" Fitchburg Lo-Swing.

## PLANERS.

36" x 36" x 16" Sellers, one head.  
 40" x 38" x 14" Putnam, one head.  
 40" x 40" x 12" New Haven, one head, one side head.

## SCREW MACHINES.

1" B. & S., Plain.  
 16" P. & W., Plain.  
 No. 2 Foster, Plain Head.  
 No. 2 Costello, Plain Head.  
 No. 2 P. & W., Friction Head.  
 No. 3 Foster, Geared Head.  
 No. 4 Pearson, Geared Head.  
 No. 3 Bardons & Oliver, Plain Head.  
 No. 12½ Garvin, Friction Head.  
 No. 2-G B. & S. Automatic.  
 7½" Cleveland Automatic.

## TURRET LATHES.

16" Lodge & Shipley.  
 25' Niles.  
 No. 2 Warner & Swasey, Hollow Hexagon.  
 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 attach.

## PUNCHES AND SHEARS.

No. 2 L. & A. Angle Iron Shears, 5" x 5" x ½" (new).  
 No. 5 L. & A. Double Punch and Shear, 5½" x 3½", 3" x 5½", 1½" (new).  
 No. 1 L. & A. Multiple Punch (new).  
 No. 2 L. & A. Multiple Punch (new).  
 No. 1 L. & A. Horizontal Punch, ½" in 1" (new).

## MISCELLANEOUS.

No. 2 Kempsmith Universal Miller.  
 50-lb. Bradley Strap Hammer.  
 100-lb. Bradley Helve Hammer.  
 ¾" Acme Forging Machine.  
 52" Niles Car Wheel Boring Mill.  
 3" Stover Pipe Machine.  
 6" x 14" P. & W. Thread Miller.  
 No. 3A La Point Broacher.  
 No. 1 American Air Tempering Furnace.  
 Belt Lacing Machine.  
 3-Ton Yale Duplex Hoist.  
 3-Ton Yale Triplex Hoist.

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

## Polson Iron Works

Limited

TORONTO

## 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, 4'
- 1—Symington Band Turn Lathe, 3"
- 1—Goldie McCullough Band Press and Pump, 3"
- 1—3" Stamping Machine
- 2—Tate-Jones Shell Furnaces
- 3—Blowers

## MACHINE TOOLS IN STOCK

- 13" x 7' 6" NEW Carroll-Jamieson.
- 15" x 8' NEW Carroll-Jamieson.
- 12—17" x 8' NEW National, quick change.
- 18" x 10' Rahn Mayer H.S., C.R., T.A.
- 17" x 8' NEW Sidney, D.B.G., quick change.
- 6—19" x 8' NEW Sidney, D.B.G., quick change.
- 20" x 8' Prentice, H.S., C.R., T.A.
- 26"-48" x 14' NEW style, McCabe, double spindle, heavy pattern, new lathes.
- No. 3 Cincinnati high power Universal Miller.
- 3—No. 1½ NEW American plain Millers.
- No. 1 NEW Hendey Universal Miller.
- No. 0 Steptoe New hand Millers.
- 14" NEW Steptoe Shaper.
- 16" NEW Steptoe B.G. Shaper.
- 15" Bement traveling head Shaper.
- 20" NEW Steptoe B.G. Shaper.
- 24" Flather, B.G. Shaper.
- No. 3 B.&S. Universal Grinder.
- Bath Universal Grinder, 10" x 25".
- 50" x 11" Gould & Eberhardt Gear Cutter.
- 28" NEW Superior sliding head Drill.
- 3—25" NEW Superior sliding head Drills.
- D4 Colburn high duty Drills.
- 3—20" Rockford high duty drills.
- 4' Harrington Radial Drill.

**FRANK TOOMEY, INC.**

127-131 North Third St., PHILADELPHIA, PA., U.S.A.



**We Have for Immediate Delivery  
the Following Second-hand  
Machinery in Good Oper-  
ative Condition**

- 1 Landis No. 3 Universal Grinder  
12" x 42", complete equipment, less  
internal grinding attachment. \$1,500
- 1 Gisholt Turret Lathe, 21", complete  
with boring bar equipment and coun-  
tershaft .....\$2,200
- 1 Gisholt Turret Lathe, 21", complete  
with boring bar equipment and coun-  
tershaft .....\$1,800

These machines are particularly good  
value, and may be seen at our works.

**A. B. JARDINE & COMPANY**  
HESPELER, ONT.

**Rebuilt Machines For Sale**

**PLANERS**

- 1-Pond 24x24
- 1-Pond 24x24
- 5-Sellers 25x25
- 2-Sellers 25x25
- 1-Putnam 25x25
- 1-Putnam 25x25
- 1-Wheeler Heavy 30x30x8' 6"
- 1-Lathe-Morse 24x24x5' 6"
- 1-New Haven 24x24
- 1-Wood Light 24x24
- 1-Putnam 42x40x12' 6"

- 1-30x8' Fitchburg, C.R., P.C.F.
- 1-Putnam C.R. taper.
- 1-Putnam C.R. semi-ques, taper.
- 1-Putnam C.R. pan. pump taper.

- 10-16x8' Graves-Klusman, C.R., pan, pump.
- 8-19x6' Perkins Plain Turning. pan. pump.
- 1-14x6' Porter, C.R.
- 1-23x8' LeBlond, C.R.
- 1-Putnam Perkins Lathes, pan. bed, stock, Lay & Scott Turbines

**GRINDERS**

- 1-LeBlond Universal Tool and Cutter, power tool, same as new.
- 1-Bridgeport Plain Grinder, 14"
- 1-No. 3 Landis Universal Grinder
- 2-No. 6X Universal Double Disc Grinders.
- 1-Ford Smith Plain Grinder

**MISCELLANEOUS**

- 1-16" Niles B. G. Shaper.
- 2-30 Baker Drills.
- 1-8" Industrial Works Slotter.
- 1-24" Aurora Sliding Head Back Geared Drill.
- 3-Prentice 24" Sliding Head Drills.
- 2-Industrial 40" Drills.
- 1-Western Hydraulic Banding Machine.
- 1-Jenckes Band Turning Lathe, with 3" Universal Chuck.
- 1-36" Aurora Drill.
- 1-Bement Travelling Head Shaper.
- 1-12" Juengst Crank Shaper.
- 1-Sellers Slab Miller, 24x24x12".
- 1-No. 21 Lee-Simplex Saw.
- 1-28x10 Cincinnati Gear Cutter.

**AUTOMATICS**

- 1-1" National Acme Double End Type.
- 1-1 1/2" National Acme Double End Type.
- 1-No. 55 National Acme.
- 1-1" National Acme four spindle.
- 2-No. 54 National Acme four spindle.
- 3-2" Cleveland.
- 1 2 1/2" Cleveland.
- 2-2 1/2" Gridley Single Spindle Motors.
- 1-3 1/2" Gridley Single Spindle Motor.

**LATHES**

- 1-32x12' Draper Lathe, C.R., H.S.
- 1-36x22' Fitchburg Lathe, C.R., P.C.F.

*This is only partial list—Send for full list*

**Simmons Machine Company, Inc.**

NEW YORK, 1001 Singer Bldg., Telephone Cortlandt 6575  
ALBANY, N. Y., 985 Broadway, Telephone 4876 Main

**New York's  
Greatest  
Stock**

(Partial List)

**HAMMERS**

- 10,000 lb. Sellers double leg Steam
- 5,000 lb. Sellers double leg Steam
- Two 5,000 lb. Bement double leg Steam
- 2,000 lb. Morgan Steam Drop Hammer
- 1,800 lb. Billings & Spencer Board Drop
- Two 1,600 lb. Bement single leg Steam
- Two 1,500 lb. Billings & Spencer Board Drop
- Three 1,200 lb. Billings & Spencer Board Drop
- 1,100 lb. Miles-Bement single leg Steam
- 1,000 lb. Pratt & Whitney Board Drop
- 800 lb. Cockburn & Barrow single leg Steam
- 750 lb. Toledo Rope Drop
- Two 600 lb. Niles-Bement-Pond single frame Steam
- New 400 lb. Bement-Miles double leg Steam
- 200 lb. Bradley Upright Strap
- 200 lb. Bradley Upright Cushioned Compact
- 100 lb. Niles-Bement-Pond Hand Drop
- 75 lb. Belden Strap
- Two 60 lb. Bradley Cushioned Helve
- 40 lb. Bradley Cushioned Helve
- Four 40 lb. Gould & Eberhardt Hand Rope Drop

**BORING MILLS**

- 10' Poole heavy duty Vertical, two heads, motor driven
- 52' Bement-Miles Vertical, two heads, motor driven
- Three 34" Rogers Vertical, single pulley drive, turret head
- Five 30" Bullard Vertical, turret head
- 20" Bullard Vertical Turret Lathe, two heads
- 18" Bullard Vertical Turret Lathe, two heads
- Betts Horizontal, 4" bar
- Bement Horizontal, 3 3/8" bar
- Betts Horizontal, 2" bar
- Pratt & Whitney Horizontal, 2 1/4" bar
- 48" Niles Car Wheel
- Underwood Automobile Cylinder, 3 5/8" bar

**MILLING MACHINES**

- No. 4B Brown & Sharpe Plain, single pulley drive
- No. 4 Cincinnati Plain, heavy duty, single pulley drive
- No. 4 Brown & Sharpe Plain
- No. 2 Hendey-Norton Universal
- No. 2 Cincinnati Universal
- No. 2 Cincinnati Plain
- No. 1 1/2 New American Improved Plain
- No. 1 Kempsmith Plain
- No. 14A Garvin Plain, table 13 1/4" x 44"
- No. 3 1/2 Garvin Plain, table 12" x 36"
- Beaman & Smith 2 spindle Vertical Slab, two spindles
- Two No. 5 Brown & Sharpe Vertical
- Four Brown & Sharpe Plain Manufacturing, table 9 1/2" x 19"
- Two No. 1 Garvin 2 spindle Profilers
- No. 4 Garvin Profiler

**PLANERS**

- 25 FT. NILES PLATE
- 16' Dunkirk Plate
- 60" x 60" x 28' Betts, two heads
- 55" x 46" x 14' Lincoln, four heads
- 48" x 48" x 12' Powell heavy duty, three heads

**New York Machinery  
Exchange, Inc.**

50 Church Street . . . New York City

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





# SPECIAL MACHINERY

Special Machinery, Jigs, Fixtures, Punches and Dies, Small Tools, Screw Machine Products, Gauges, Forgings, Etc.

# CONTRACT WORK

## Jobbing Machine Shop Owners

will find it to their advantage to mail us a list of their equipment and state what line of work they prefer to undertake.

Address

## METAL MANUFACTURERS SERVICE

75 Sun Life Building, Toronto, Ontario

D. C. SWEET, Manager



## GEAR

Wheels Cutting  
of every description

Matchless Rawhide Pinions in 24 hours.

**PHILADELPHIA, GEAR WORKS**  
Vine Street, Philadelphia, Pa.



## 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.

# CUT GEARS

*Theoretically Correct*

PROMPT SERVICE

**ROBERT GARDNER & SON**

LIMITED

52 NAZARETH ST., MONTREAL, P. Q.

**RAWHIDE**

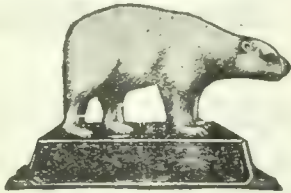
**OR METAL**

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

# SPECIAL MACHINERY

Special Machinery, Gears, Jigs, Fixtures, Punches and Dies,  
Small Tools, Screw Machine Products, Gauges, Etc.

# CONTRACT WORK



## Brass, Phosphor Bronze, Copper and Aluminum CASTINGS

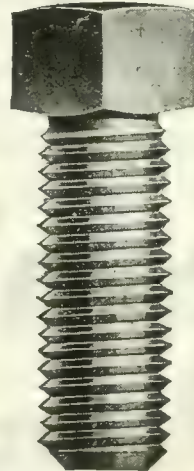
We have the largest Jobbing  
Brass Foundry in Canada.  
Can make prompt delivery.

*Tallman's reputation is in the goods.*

**Tallman Brass & Metal Co.**  
**HAMILTON, ONT.**

CANADA

## ACCURACY



The discriminating buyer is the one we like to meet—the one who insists on accurate product. He will eventually buy "GALT" Cap and Set Screws because they measure up to his standard.

Your rush orders for S. F. Hex. nuts taken prompt care of. Better finished nuts—try a sample.

THE  
**GALT MACHINE SCREW CO.,**  
LIMITED  
GALT, ONTARIO

Eastern Representatives: The Canadian B. K. Morton Company,  
Limited, 49 Common St., Montreal, Que.

## GAUGES AND TOOLS

OUR SPECIALTY

How is This?

No. 28 THREAD GAUGE FOR NOSE OF SHELL

ONLY \$35.00

CAN DELIVER FROM STOCK.

**THE MONARCH BRASS MFG. COMPANY, LIMITED**  
71 Browns Ave., Toronto

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

# Col. MacLean was in Germany When War Broke Out

**H**OW he got out, what he saw, heard, learned and concluded, he tells in the August number of **MACLEAN'S MAGAZINE**. Colonel MacLean knows Europe thoroughly. He knows high-up men in all the great political and commercial capitals of Europe—diplomats, bankers and great merchants. These men told him freely and plainly many startling things about Germany and her intentions.

In a contribution of truly sensational interest, abounding in most startling facts, Colonel MacLean points out "The Dangers Ahead." His aim is to arouse Canadians out of their unwarranted confidence and out of their content. You will

find in this article by Colonel MacLean strange, even shocking revelations, and things hard to believe—and you ought to read "The Dangers Ahead" in order that you may help in their avoidance by Canada and her people.

# MacLean's for August Is a Midsummer Number

The August **MACLEAN'S** is excellently balanced, as you will see from these contents:

## CONTENTS

The Dangers Ahead. By John Bayne MacLean.  
The Menace of Canadian Titles. By Joseph Martin, M.P.P.  
Rev. C. A. Eaton—A Canadian Who Speaks Out. By Beatrice Redpath.  
Frenzied Fiction for the Dog Days—(Done by the Dipperful.) By Stephen Leacock.  
The Human Side of Conscription. By H. F. Gadsby.  
Winning the War in the Air. By Agnes C. Laut.  
A Circus Story. By L. B. Yates.  
Mam'selle Butterfly. By Arthur Beverly Baxter.  
The Captain of the Susan Drew. By Jack London.  
An Andy Doolin Yarn. By Hopkins Moorhouse.  
A Detective Story. By Robert E. Pinkerton.  
The Gun Brand. By Jas. B. Hendryx.  
Canada's First Woman Member.  
Economy in Preserving and Canning.  
Women and Their Work—A New Department. Review of Reviews—Regular Department.

**Yates** who writes the Circus Story, was born in Hamilton. He wrote those stories about Paragon Pete and The Singin' Kid in the *Saturday Evening Post*.

**Leacock** is excessively humorous in his Dog Days Sketch, in which he talks about summering and simmering.

**Miss Laut** fancies that the war may be won by the birdmen, and if Uncle Sam produces 100,000 planes, she may be right.

**Gadsby** sits in the Press Gallery at Ottawa, and writes brilliantly always. His "Conscription" article is in order.

**Pinkerton** who writes the detective story, "Old Twilight," knows how to write this class of story.

By the way, Lord Northcliffe has promised an article for the September **MACLEAN'S**.

You can see that **MACLEAN'S** for August is just the right type for August.

---

At All News-Dealers  
15 cents

One of the  
 Steels of the Century  
**Centurion High-Speed**

Made from the **BEST** Materials  
 Iron, Tungsten, Chrome, Vanadium

Melted by the **BEST** Process  
 The Crucible Furnace Method

Handled by the **BEST** Workmen  
 Melters, Forgemen, Annealers, Metallurgists

**CONSEQUENTLY**  
 Will do the **BEST** Work

---

*Quality*

*Delivery*

*Service*

---

*We have a catalog waiting for you. Write for it.*

**THE CENTURY STEEL CO. OF AMERICA**

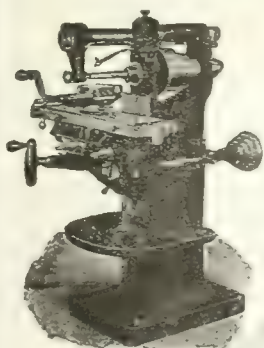
**MANUFACTURERS OF HIGH-GRADE CRUCIBLE STEELS**

*Works:*  
**POUGHKEEPSIE,**  
**N.Y.**

*Sales Offices:*  
**120 BROADWAY,**  
**NEW YORK**

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

## Cut Your Shop Costs

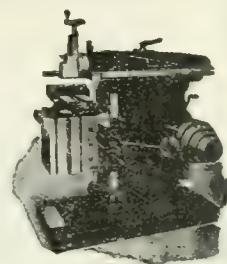


Nobody would think of putting 16-inch lathe work on a 30-inch lathe, then why leave small parts on a large Milling Machine?

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

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

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



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

WHY TOLERATE

# TROUBLE

in YOUR Grinding Department?

Eliminate all difficulties by using High-Grade Selected

## DIAMONDS

Direct from the South African Diamond Fields. All sizes at your command, either unmounted or mounted in any style holder, **MADE IN CANADA.**

Try our **CAST STEEL** mounting for complete satisfaction of performance.

Wheel Trueing Tool Company

88 West Pitt Street

WINDSOR, ONTARIO

"DIAMO-CARBO"

You can make your dull or coated grinding wheels like new in efficiency by dressing them with

### DESMOND-STEPHAN GRINDING WHEEL DRESSERS

and you will eliminate delayed production and lost time, due to the loss of their cutting properties.

Insist upon having your dealer supply you with one of our tools for trial. If he cannot, write us, and we will send any of them on approval.

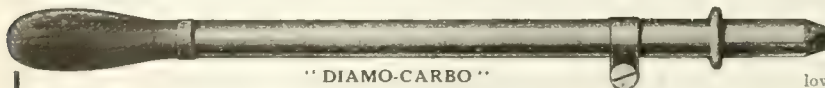
The Canadian Desmond-Stephan Mfg. Company  
HAMILTON, ONTARIO

Our "Diamo-Carbo" Dressers are the economical substitute for the Black Diamond Dressers. They are so low-priced that each grinding stand may be provided with its own dresser.

Our "Sherman-Huntington" Dressers are for use on large and coarse wheels upon which the Diamond cannot be used. It is the most satisfactory Dresser ever designed.

"SHERMAN  
HUNTINGTON"

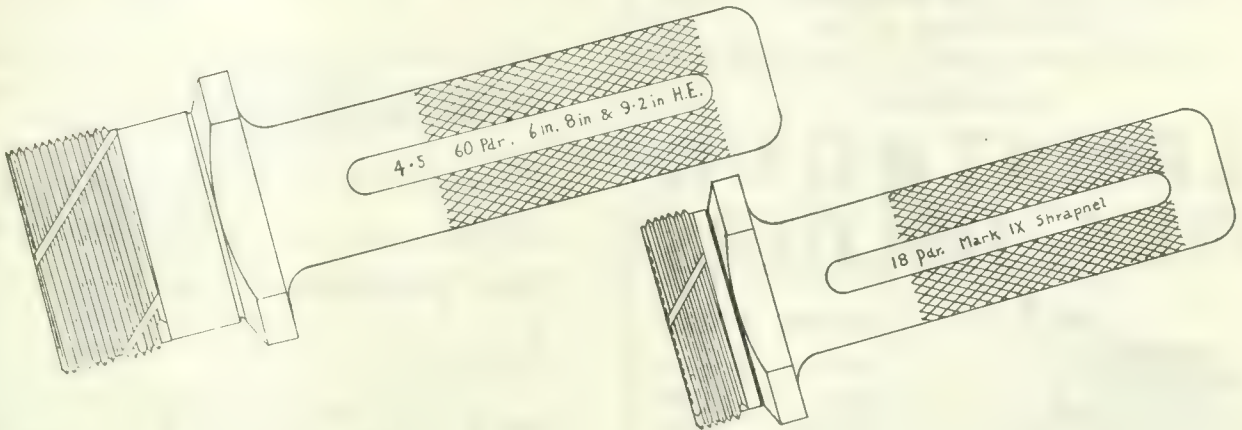
Alfred Herbert, Ltd.,  
Coventry, Agents for  
Great Britain



Mention this paper when writing advertisers. It will identify the proposition about which you require information.



# FUSE HOLE GAUGES



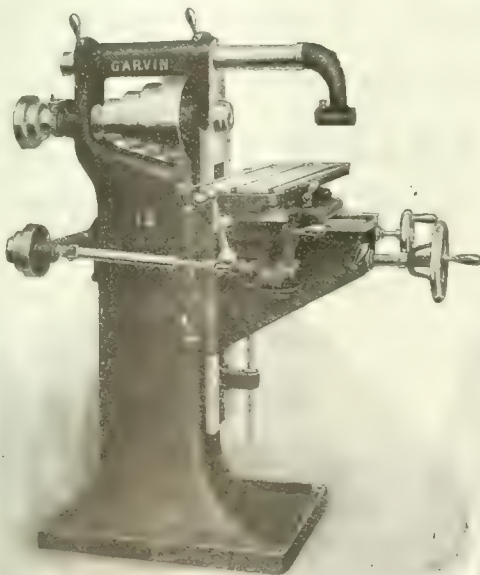
Manufacturing and inspection fuse hole gauges for all size shells. A surplus stock enables us to ship immediately.

**Windsor Machine & Tool Works**

Windsor, Ontario

# GARVIN

## NO. 12 PLAIN MILLING MACHINE FOR ALL LIGHT MANUFACTURING



No. 12 Plain Milling Machine—Use Code Abrade

This machine is built especially strong and substantial for a tool of its capacity, and has many valuable features worthy of special mention. The slide is fitted with a quick pitch screw, giving one inch per turn. This combines the rapidity of a rack feed with the steadiness of the screw feed. The table has an oil pan all around it, with finished edges—automatic feed, trip and reverse—adjustable nut on the feed screw to take wear—the Feed Screw is hardened.

Adjustments.....18 x 6 x 15 in.

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* )

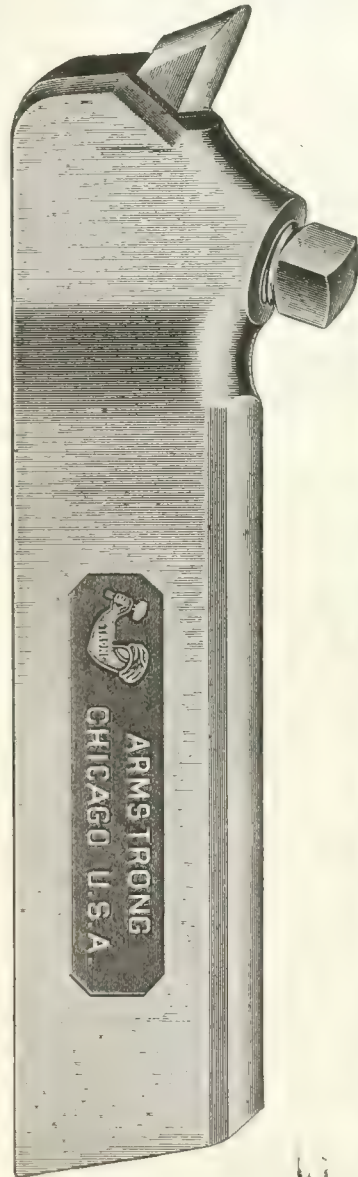
50 Years New York City

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# 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 Exposition  
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.

# High Carbon Steel

Scientifically "heat treated"—

Ground accurately by ma-  
chinery—

Cut with mathematical ac-  
curacy as to depth, number  
and position of teeth—

Make the

## "Famous Five" Files

the standard tools of their  
class.

It is a pleasure for a me-  
chanic to work with them—

Consequently they give  
good results economically.

Always specify them when  
ordering files.

## KEARNEY & FOOT GREAT WESTERN AMERICAN ARCADE GLOBE

Made in Canada by



**NICHOLSON FILE CO.**  
PORT HOPE  
ONTARIO

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



**"TANGENT"**

**HAND SHEET SHEARING MACHINE**

Can. Pat. No. 167666

Capacity 3/16-in. steel; 1/4-in. softer metals. Weight 60 lbs.  
**SELF-FEEDING** **EASILY PORTABLE**

Invaluable in Boiler Shops, Shipyards, Railway Shops, etc.

*Gives clean cut with minimum distortion.*

Fully illustrated descriptive pamphlet sent on application

**Montgomery, Smith & Co., Limited**

Patentees and Manufacturers

**Tangent Works, Keynsham, Somerset, England**

Applications for selling agencies or rights to manufacture under license will be considered.

**Don't Keep It--Sell It!**

- If you have a lathe
- a drill
- a milling machine
- a planer
- a chain block
- a chuck
- a motor
- a crane
- a stock of belting
- an engine
- a compressor

or any other machine shop equipment for which you really have no further use, why not turn it into *cash*?

Someone may be looking for just the machine you may want to sell. Let us bring you together.

A "classified" ad. in CANADIAN MACHINERY, costing a few cents per issue, has done wonders for others. Why not try it?

Turn to the "Classified" section in this issue and see what is being offered and what is wanted at present.

**CANADIAN MACHINERY**

*Classified Advertising Section*

143-153 University Avenue TORONTO, ONT.



**STEEL STAMPS**

FOR MARKING SHELLS, ETC.

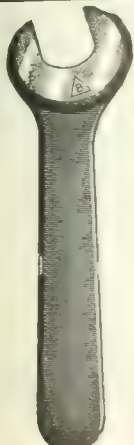
We will Give You Satisfaction on All Work of this Kind

SEND FOR PRICES

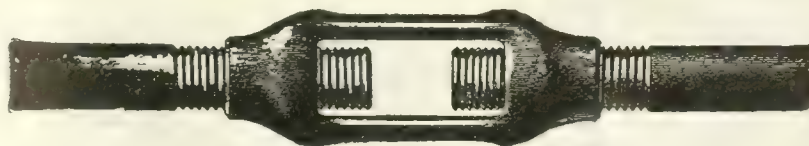
**Pritchard-Andrews Co., of Ottawa**

General Engravers and Die Sinkers

264 SPARKS ST. OTTAWA, CANADA



Plyers, Structural Wrenches, Track Wrenches, Machine Wrenches, Eye Bolts, Lathe Dogs, Journal Box Wedges, Etc.



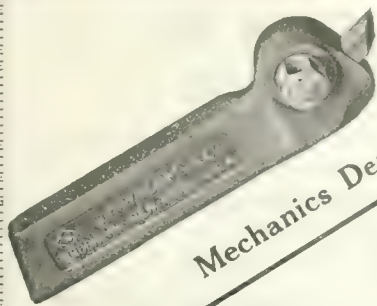
**All Kinds Of Special Drop Forgings**

Send Models or Blue Prints for Estimates

**WRITE FOR CATALOG**

**Canadian Billings & Spencer, Limited, Welland, Ontario**

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



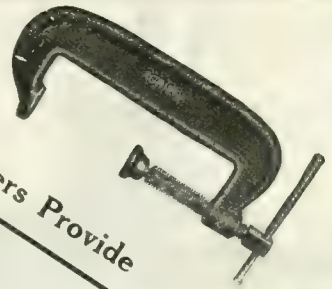
Mechanics Demand

Turn Where You Will  
The World Employs

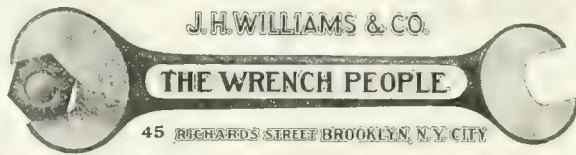
**WILLIAMS'**

GRAND  PRIZE

**Drop Forged Tools**



Dealers Provide



J.H. WILLIAMS & CO.

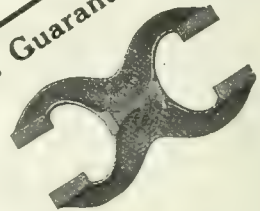
**THE WRENCH PEOPLE**

45 RICHARDS STREET BROOKLYN, N.Y. CITY

Publicity Promotes

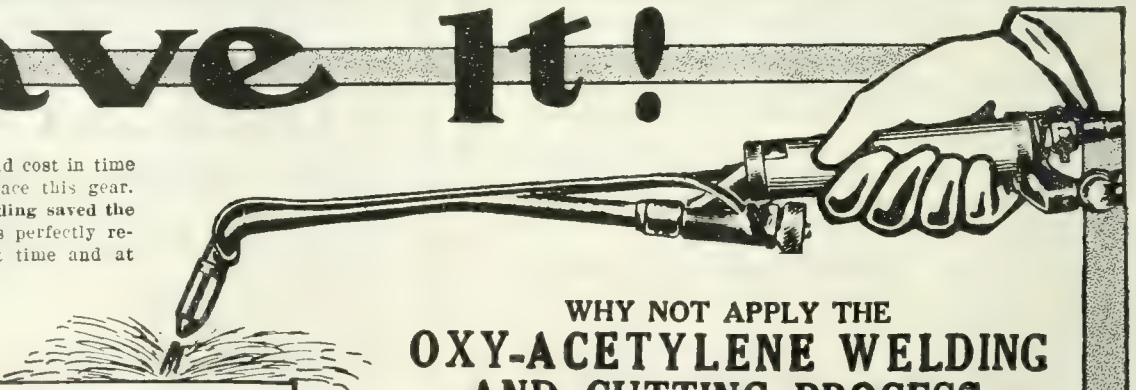


Makers Guarantee



# Save It!

Think what it would cost in time and money to replace this gear. Oxy-Acetylene Welding saved the day. The gear was perfectly reclaimed in a short time and at low cost.



## WHY NOT APPLY THE OXY-ACETYLENE WELDING AND CUTTING PROCESS

for your REPAIRS and in your MANUFACTURE?

It saves you money, delays and trouble. It brings you money. We manufacture Welding and Cutting Plants — Portable and Stationary.

**"CLAUDE" OXYGEN**—made from liquid air. The most efficient —absolutely sold in purest form—full measure—at low price.

We also supply **PURE DISSOLVED ACETYLENE**.

Put your name and address on this coupon and mail it to us. Full particulars will be sent at once.

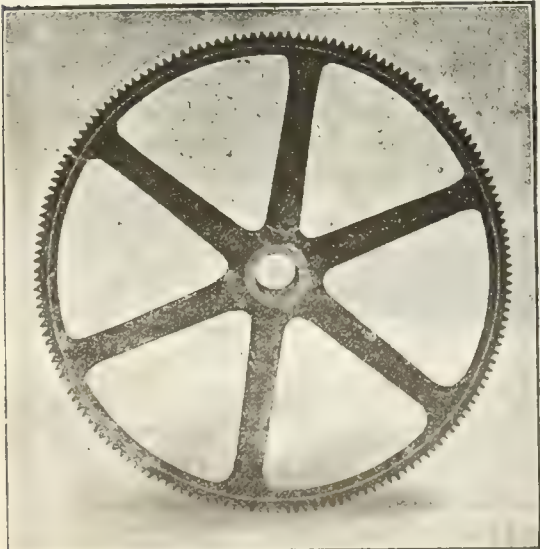
**L'AIR LIQUIDE SOCIETY**

Factories the World over: 26 Boler St., WEST TORONTO; Maisonneuve, MONTREAL; 325 William Ave., WINNIPEG.

L'Air Liquide Society, Maisonneuve, MONTREAL, P.Q.

Gentlemen,—Will you please send, without obligation to me, post-paid, your New Booklet?

Name .....  
Address .....  
Province ..... Date .....  
Business .....



# Starrett

TRADE MARK

REG. U. S. PAT.

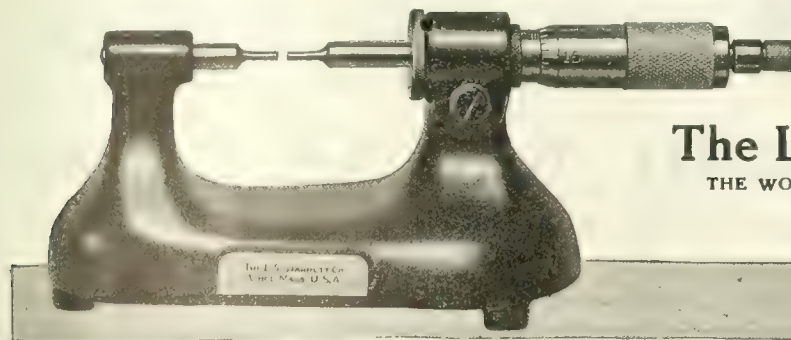
## Bench Micrometer



Here are facts that will interest manufacturers in their inspection work.

In the first place the Starrett Bench Micrometer Caliper, because of the lock nut, can be used as a gage to determine the accuracy of duplicate parts of any size up to an inch. You will notice, it has a heavy base and a three-point support so that it will stand firmly on any surface.

It is readily adjustable for wear, too, a most important feature. Just bring the points together, turn the graduated sleeve with the small spanner wrench until the lines marked zero coincide—and there you are. You have a gage that may be used to maintain the accuracy of parts of a thousand different sizes—and it is always accurate.



Send for free catalog No. 213 describing 2100 styles and sizes of fine tools.

**The L. S. Starrett Co.**  
THE WORLD'S GREATEST TOOLMAKERS  
Athol, Mass.



42-687

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

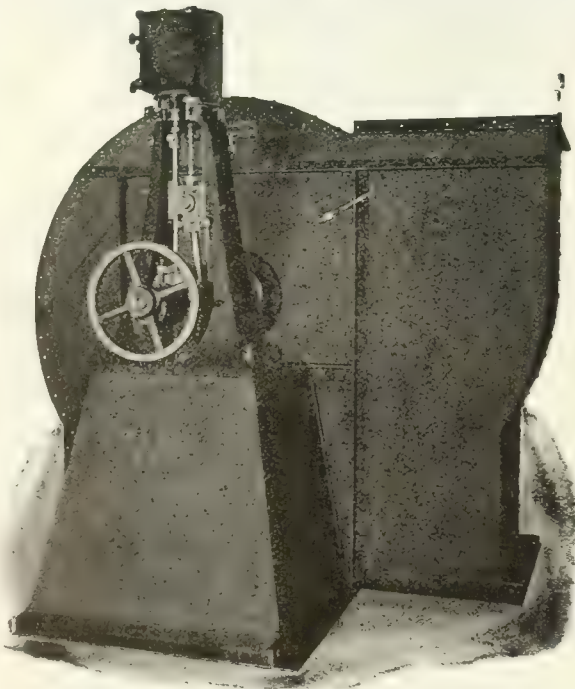


**Convenience**  
**Quality**=====

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.



## 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.

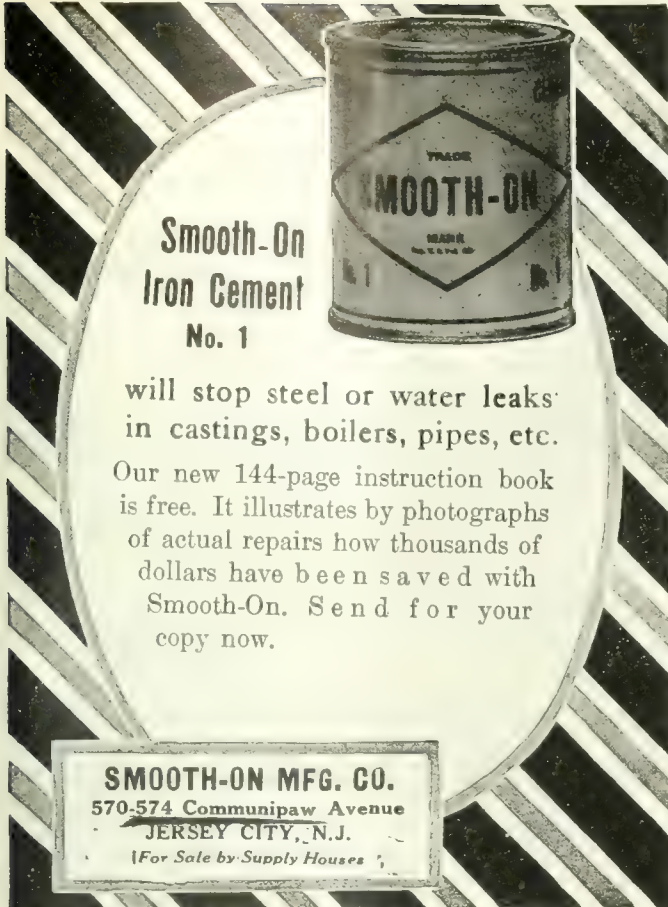
**SHELDONS LIMITED, Galt, Ont., Canada**

Toronto (Canada) Office: 609 Kent Building.

AGENTS:

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

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



**Smooth-On  
Iron Cement  
No. 1**

will stop steel or water leaks in castings, boilers, pipes, etc.

Our new 144-page instruction book is free. It illustrates by photographs of actual repairs how thousands of dollars have been saved with Smooth-On. Send for your copy now.

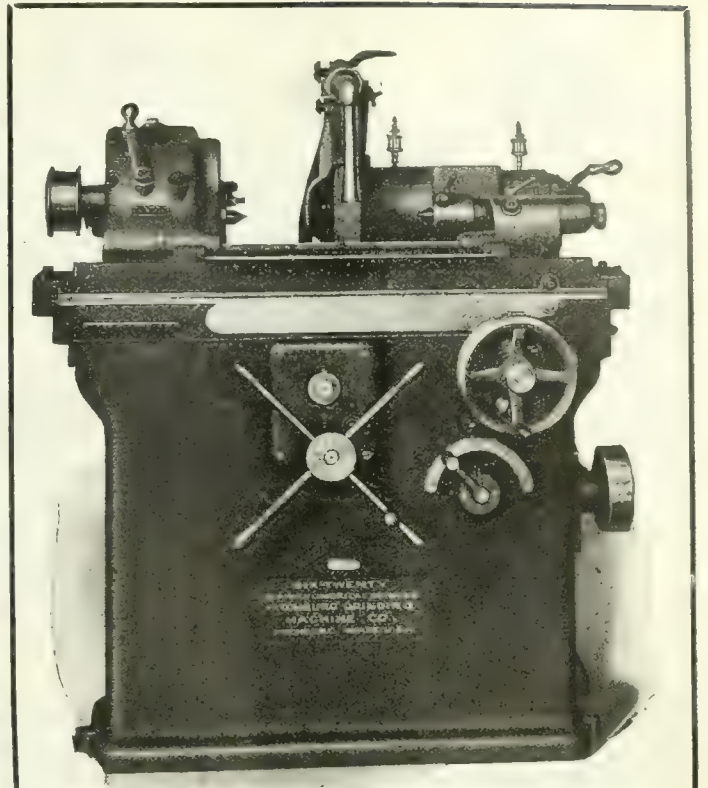
**SMOOTH-ON MFG. CO.**  
570-574 Communipaw Avenue  
JERSEY CITY, N.J.  
(For Sale by Supply Houses)



**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.



## Fitchburg Grinders

Model "A" illustrated here is a machine whose chief feature is its capacity for size, variety and quality of work. Its speed will give you greater production; its size, convenience, increased production, strength and saving in floor space will effect such a saving as to make it preferable over all other machines of similar character.

It is specially adapted for grinding straight or taper shafts.

An inquiry would speedily get you valuable information and data.

**Fitchburg Grinding Machine**  
COMPANY

Fitchburg,

Mass.

U.S.A.

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



*IN STOCK READY TO SHIP*  
**"STAR BRAND"**  
**SEAMLESS BRASS**  
**CONDENSER TUBES**

TINNED INSIDE AND OUTSIDE

5/8 and 3/4 inch O.D., No. 18 Stubs Gauge—12, 14, 16, 18 and 20 foot lengths  
 AND

**"STAR BRAND" BRASS CONDENSER TUBE FERRULES**  
 Standard 14 Thread for 5/8 and 3/4 in. Tubes

OUR STOCK ON HAND READY FOR IMMEDIATE SHIPMENT ALSO INCLUDES A FULL LINE OF REGULAR STOCK SIZES AND SHAPES OF THE FOLLOWING

**"STAR BRAND" SPECIALTIES**

Seamless Brass and Copper Pipe and Tubing, Brass Fittings, Sheet Copper, Copper Bar, Rods and Wire, Copper Nails, Sheet Brass, Brass Rods, Tobin Bronze Rods, Copper Rivets and Burs AND OTHER PRODUCTS IN BRASS, COPPER, PHOSPHOR BRONZE, ARCHITECTURAL BRONZE, ETC., ETC.

**U. T. HUNGERFORD BRASS & COPPER CO.**

BRANCHES:  
 BOSTON  
 BALTIMORE  
 PHILADELPHIA  
 SAN FRANCISCO

HUNGERFORD BUILDING  
 Lafayette, White and Franklin Sts.  
 NEW YORK, U.S.A.

KINDLY ADDRESS  
 INQUIRIES  
 FOR ATTENTION OF  
 DEPARTMENT D.

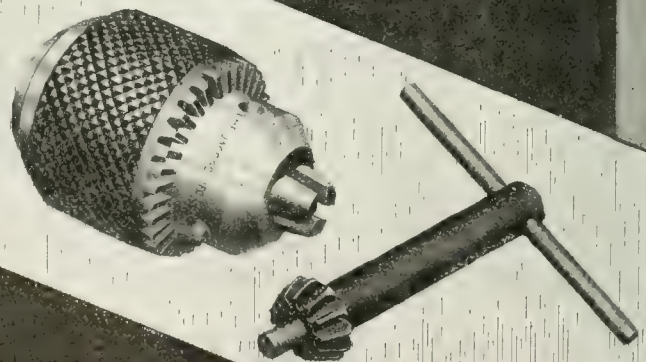
**Jacobs**  
*IMPROVED*  
**Drill Chuck**

**A**  
**Winner**  
**By Sheer Merit**

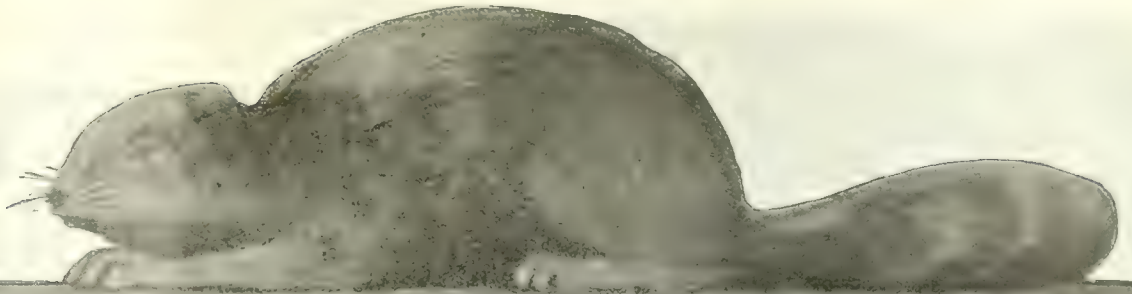
Jacobs Improved Drill Chucks are recognized as the STANDARD the world over. Once tried—always used.

Try them and see for yourself.

MADE BY  
**The Jacobs**  
**Manufacturing Co.**  
 Hartford, Conn., U.S.A.



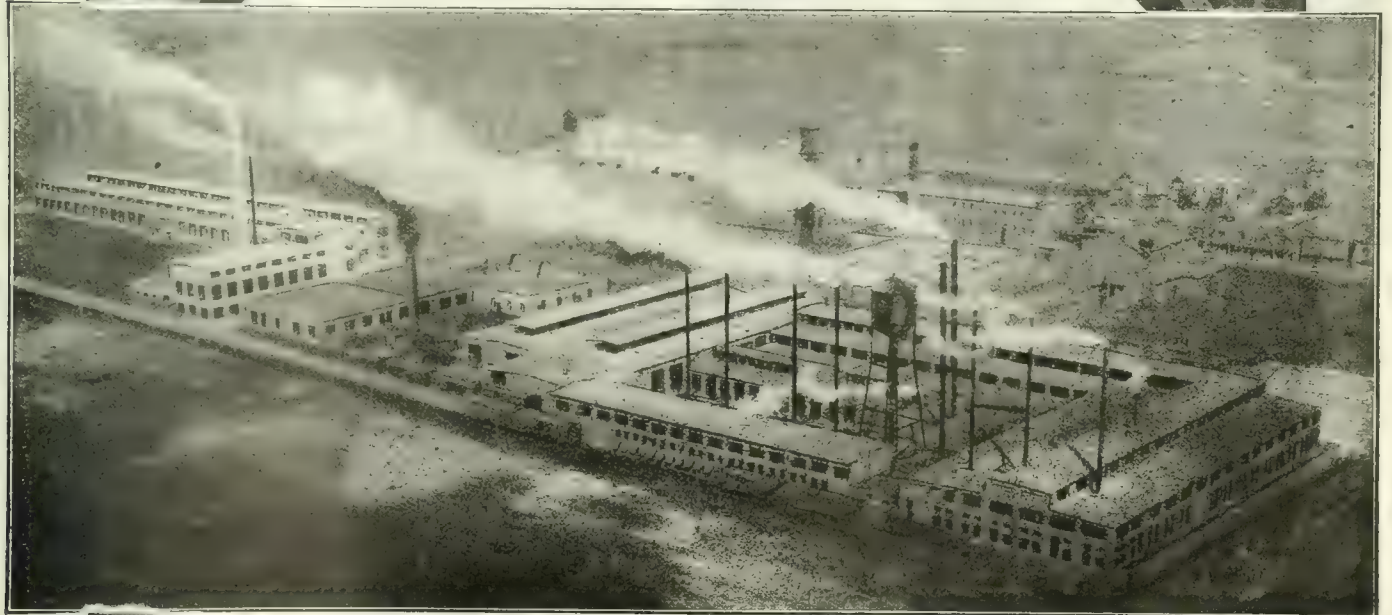




# BROWN'S

## BEAVER BRAND METALS

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

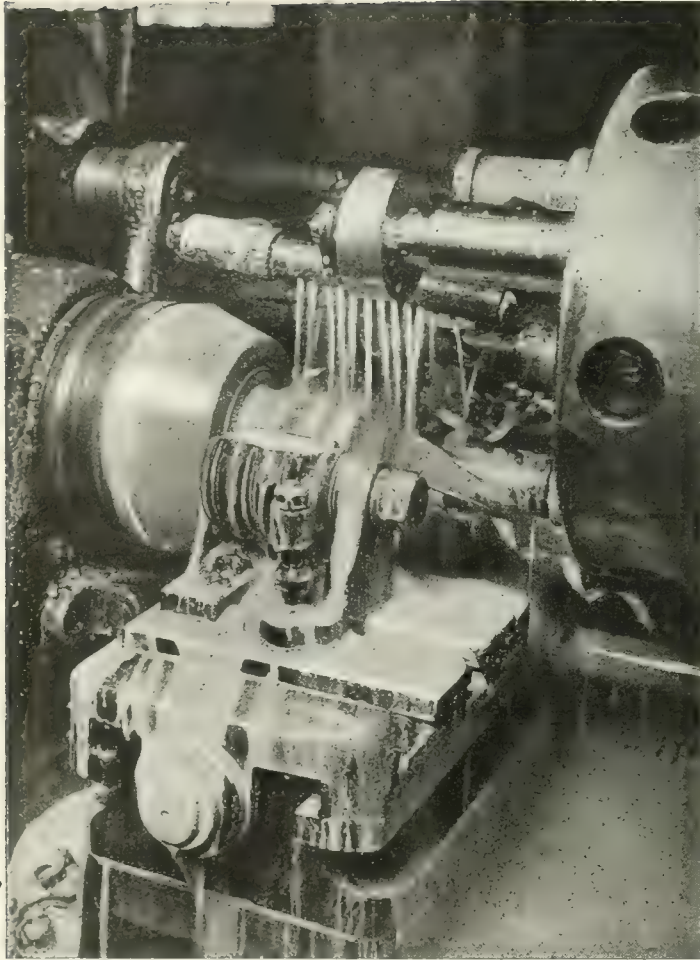


## Brown's Copper & Brass Rolling Mills, Limited

General Offices and Works:  
New Toronto, Ontario, Canada



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# MYSTIC

## [ CUTTING COMPOUND

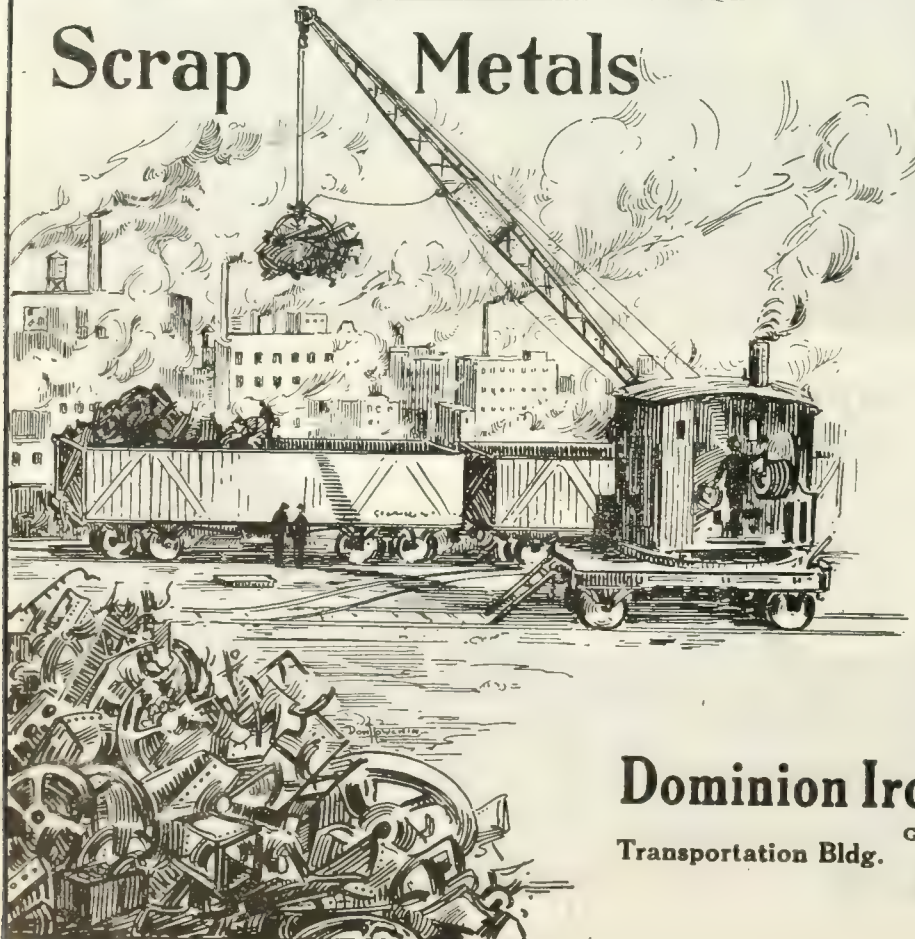
Increases production because it keeps tools in best of condition.

It is far more efficient than any oil. The ideal lubricant for shell work.

Let us demonstrate its merits in your plant, free of cost, in order to show you what a really remarkable cutting compound it is.

**CATARACT REFINING CO., LTD.**  
TORONTO, CANADA.

## Scrap Metals



## Scrap Iron, Steel and Metals

No undertaking is too large for us. We are Scrap Metal Specialists, and can co-operate with you in the dismantling of railway equipment, bridges, plants, steamers, mills and will take your rails and machinery.

**Shell Makers.** We can take care of all your scrap materials, at highest prices.

Give us particulars and we will relieve you of all worry.

## Dominion Iron & Wrecking Co.

Transportation Bldg.

General Offices:

-

LIMITED  
Montreal, Quebec

Quebec, Que.

## FREEDOM FROM PUMP PROBLEMS

if you use a TRAHERN ROTARY GEAR-ED PUMP. Will deliver in a full even stream, free from pulsations, all the coolant that can be forced through the discharge opening; this increases the production capacity of your present equipment. Positively will not clog or lose its prime. With TRAHERN positive drive you can shoot lubricant into deep bores, or other work difficult to cool; this is not possible with a centrifugal pump. These are FACTS, not statements of prediction, and we will prove them by submitting sample free of charge, if you will but send in your address.

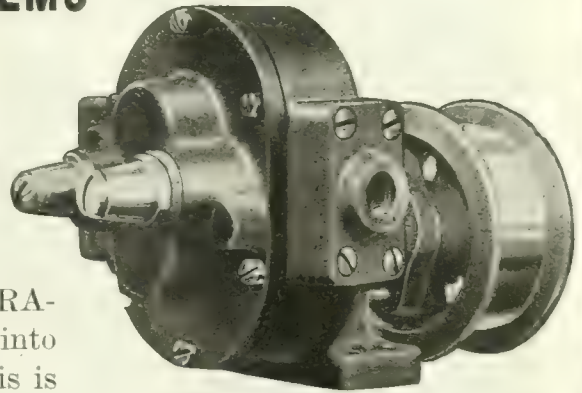


Fig. 1854  
Reversible  
with double  
automatic  
relief valve.

## TRAHERN PUMP COMPANY ROCKFORD, ILLINOIS

Canadian Agents: A. R. WILLIAMS MACHINERY CO., Toronto, Ontario

# 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 Sorauren Ave., TORONTO, Canada

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



## That is a **HANNIFIN** Air Chuck

**If your work requires quick handling and a rigid-slip grip, the chuck for the job is the "Hannifin" — increases output from 20 to 100 per cent.**

*Catalog of Air Operated  
Chucking and Clamping  
Equipment on request.*

At the Worthington Pump and Machinery Corporation's Hazelton, Pa., plant, Hannifin Air Chucks are in sole possession of the field. The machine photographed shows a 3" Russian shell Hannifin-chucked for inside operations.

These chucks do their work under 75 pounds air pressure and "Aid greatly in speeding up production," says the master mechanic; for outside turning, shells are held on Hannifin Air Operated Mandrels with similar results.

In another busy shell department one operator reports an increase of ten 5" shells per day through the change to Hannifin Chucking, and considerably less fatigue when the day's work is done.

Hannifin Chucks are doing important work on every shell making "front" — also in other lines of manufacture.

# **HANNIFIN MFG. COMPANY, Chicago, U.S.A.**

R. E. Ellis Engineering Company, Chicago, Ill.; Coats Machine Tool Co., New York City, N.Y.; Naumann-Firman Co., Detroit, Mich.; A. R. Williams Machinery Co., Toronto, Ont., Can.; A. R. Williams Machinery Co., Winnipeg, and St. John, N.B.; Williams & Wilson, Montreal, Quebec, Can.; Coats Machine Tool Co., Ltd., Caxton House, Westminster, London, Glasgow and Newcastle-on-Tyne; Fenwick-Freres Company, 1500 Rue Fenelon, Paris, France; Iznoskoff & Co., Petrograd, Moscow, Ekaterinberg, and Odessa, Russia.

*Mention this paper when writing advertisers. It will identify the proposition about which you require information*

# MORSE Silent Chain

## POWER

## TRANSMISSION

means

### Sensible Conservation and Practical Thrift

## The Law of the Land To-day:

*"Get All The Power You Pay For"*

This is possible: But *only by using the Morse "Rocker-Joint"* wherever power is used. *Why?* Because the "Rocker-Joint" is the Only Frictionless Joint.

*Results:*

- 1. No Power Loss.
- 2. Longest Service.
- 3. Minimum Lubrication.
- 4. Highest Speed.

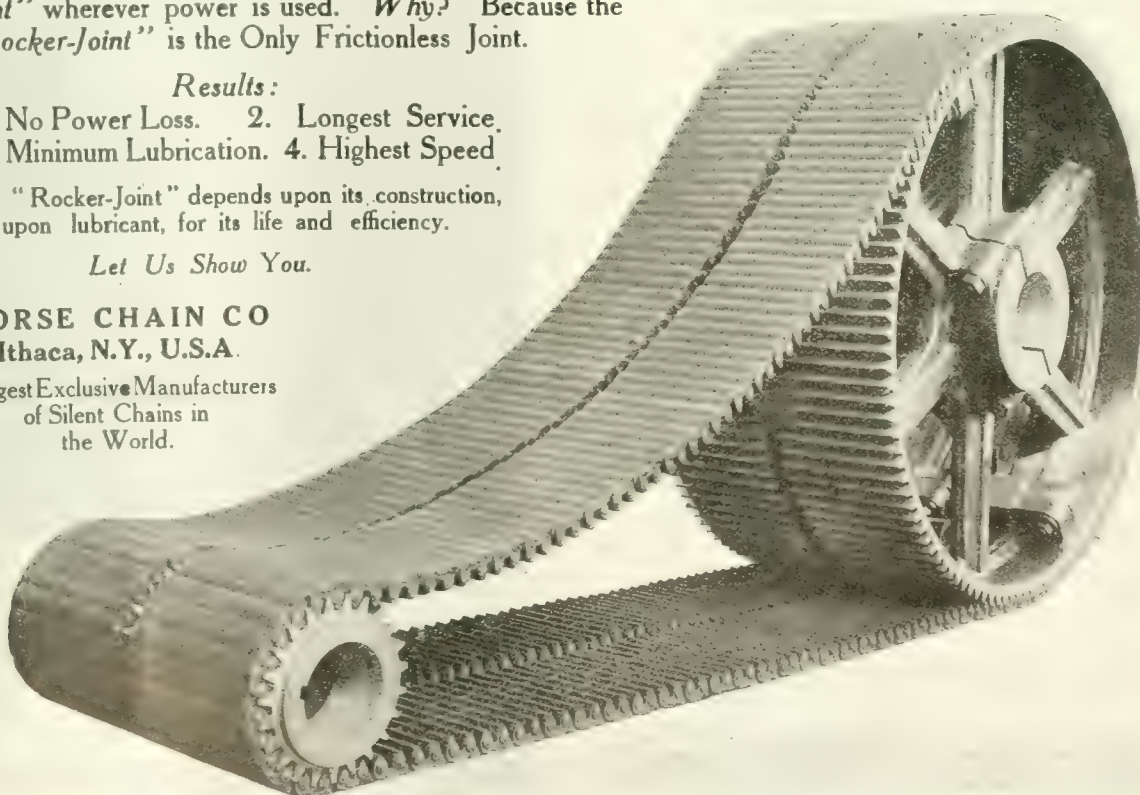
The "Rocker-Joint" depends upon its construction, not upon lubricant, for its life and efficiency.

*Let Us Show You.*

**MORSE CHAIN CO**  
Ithaca, N.Y., U.S.A.

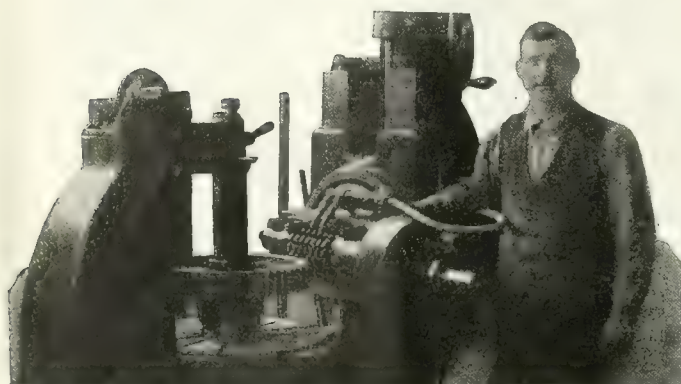
Largest Exclusive Manufacturers  
of Silent Chains in  
the World.

C-8



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# CUT GEAR



54-in. Hobber for Spur, Helical or Worm Gears

You appreciate real Gear Service  
Try what we can do for you

\_\_\_\_\_  
*Write for quotations*  
\_\_\_\_\_

**Hamilton Gear & Machine Co.**  
Van Horne Street - TORONTO

# FORD TRIBLOC

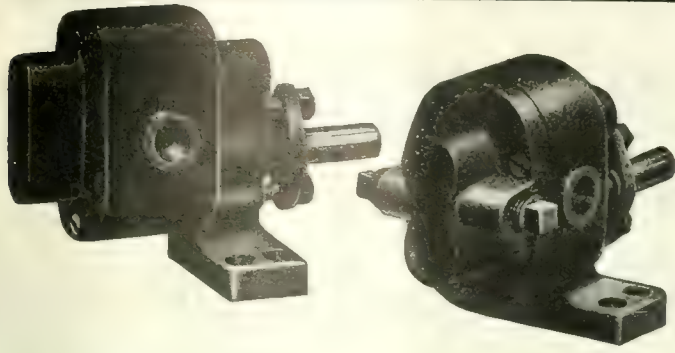


The Chain Hoist in the Foreground of Service

They say you can always tell whether a picture of a street scene is real by looking for the Fords. The same is true of shop scenes—only in this case the Fords are Ford Tribloc Chain Hoists. Manufactured, marketed and guaranteed for five years by Ford of Philadelphia.

Ask For Catalogue

**FORD CHAIN BLOCK & MFG. CO.**  
139-141 Oxford Street - PHILADELPHIA, PA.

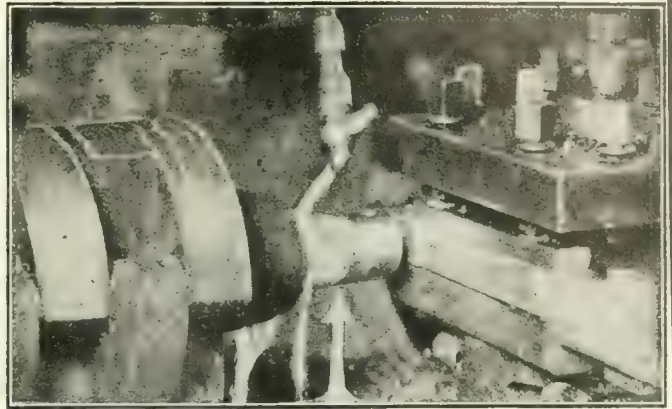


## Circulating Pumps

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.



## ECONOMIC WATER OIL

SHELL MANUFACTURERS use ECONOMIC WATER OIL for METAL CUTTING of every description; it will not gum nor rust, and it SAVES TIME AND LABOR.

WE CAN SAVE YOU 50% in the COST of your CUTTING MIXTURE BECAUSE

ONE GALLON of ECONOMIC WATER OIL will mix readily with 30 to 50 gallons of WATER, making a thick, creamy emulsion, and giving you a cutting mixture which will not only be satisfactory, but will produce very ECONOMIC RESULTS.

One TRIAL ORDER will prove our STATEMENT.

*Made in Canada*

**Canadian Economic Lubricant Co.**  
 LIMITED  
 1040-1042 Durocher St. MONTREAL



## The WHITING CONVERTER

The increasing demand for steel castings on machinery of all kinds and the savings effected by the side-blow converter process prove that

### It Pays to Make Your Own Steel Castings

right at home.

A more uniform product of whatever analysis required, reduced pattern expense, and castings when you want them are some of the reasons why every user of steel castings should investigate the Whiting Converter.

*Write for Catalog 106*

Complete  
 Foundry  
 Plants



Cranes  
 of all  
 kinds

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

# CANADIAN NATIONAL EXHIBITION

AUGUST 25 TORONTO SEPTEMBER 10

## Fiftieth Anniversary of Canadian Confederation

1200 PERFORMERS

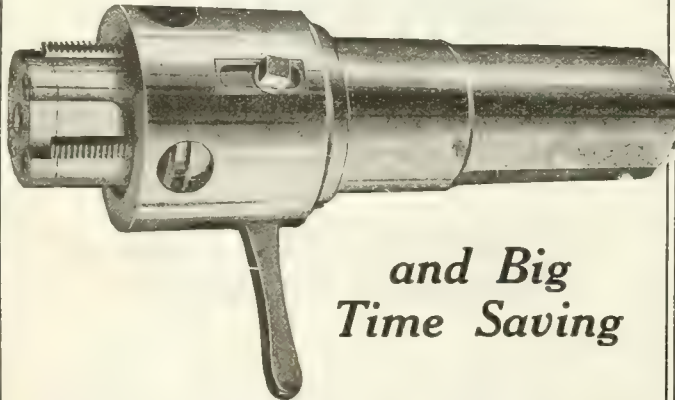
JUBILEE SPECTACLE

1200 PERFORMERS

Super-Climax in Spectacular Pageantry. Mobilization of Resources. National Service Exemplified. Motor Show—First Showing of 1918 Models. Fine Arts from Many Lands. Innes' and a Score of other Leading Bands. Giant Display of Livestock and Agriculture. Tractor Display.

NEW FEATURES IN EVERY DEPARTMENT. REDUCED FARES AND EXCURSIONS ON ALL LINES OF TRAVEL.

*For Positive Accuracy—*



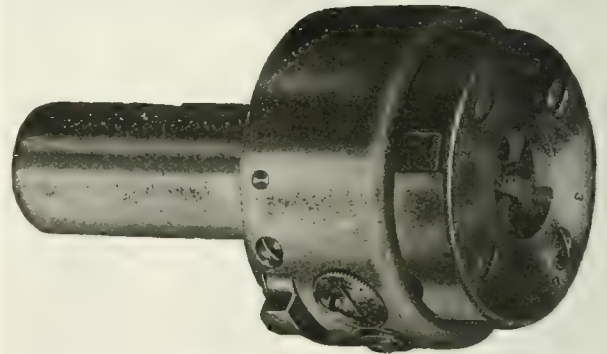
*and Big  
Time Saving*

"Victor" Collapsible Taps are simple in construction; the few parts can be made large and strong; the body is machine steel, and the chasers are high-speed; screw adjustment from front end makes it easy to maintain close accuracy; trip is automatic; reset by means of lever. The above features

and others make the "Victor" a time and money saver for severe service. It is being used by many shell manufacturers.

**VICTOR  
Collapsible  
TAPS**

**Victor Tool Company**  
Waynesboro, Pa., U.S.A.



**Desirable Threads**

Are easily obtainable with an H. & G. Automatic Self-opening Die Head.

The Chasers are set and held in place by a steel cam which, once adjusted, locks. No stopping or changing required to keep to size. There are a good many other features on this Die Head.

*"Write us!—write now."*

**EASTERN MACHINE SCREW CORP.**  
NEW HAVEN CONN., U.S.A.

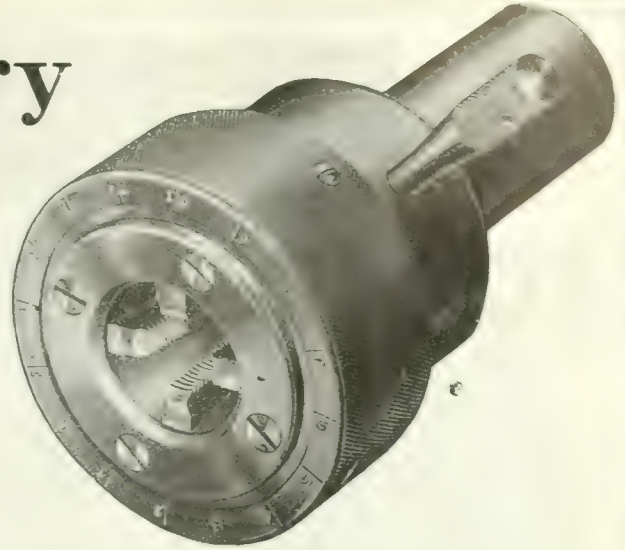
**H & G**

Mention this paper when writing advertisers. It will identify the proposition about which you require information.



# Rapid Delivery

*Users of Murchey  
Tools Get Chasers  
Without Delay*



Lightning deliveries—that is a big advantage of using Murchey Tools. No work held up for chasers. We get your order, fill it, and it's on the way back to you just as quickly as the most rapid means of transportation can bring it to you.

There is no service like the Murchey service, and there are no tools like the Murchey Tools. Send blueprints for estimates.

MURCHEY TAPS are accurate and simple and can be worked with great speed. On 4.5 Mark VII shells Murchey tapping time is just ONE MINUTE.

## Murchey Machine & Tool Company

75 PORTER STREET

DETROIT, MICHIGAN

The Coats Machine Tool Company, Ltd., Caxton House, Westminster, London, S.W., England, Glasgow, Newcastle-on-Tyne, and Fenwick Freres & Company, 15 Rue Fenelon, Paris, France.

### The Stamp of Approval

has been placed on

## M.E.C. Double Acting Air Cylinders

by every one who has used them, including the largest munition works, automobile factories and gas engine builders in the country.

They increase output, decrease operating cost and improve product.

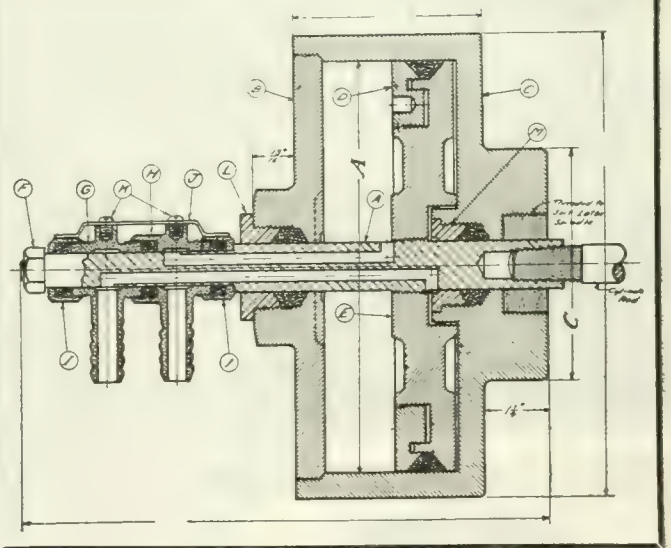
Our catalog explaining the salient features of this and other M.E.C. Labor-Saving Devices will prove interesting and profitable to you. Send for it now—use the coupon.

**Manufacturers Equipment Co.**  
171 West 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 Building, Detroit, Mich.

Foreign Agents C. W. Burton, Griffiths & Co., Ludgate, Ludgate Square, London, England.



Gentlemen:—

Please send me copy of your catalog entitled "Labor Saving Devices," according to your advertisement in Canadian Machinery.

Name .....

Address .....

Position .....

With .....

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# FOR HIGH SPEED ENGINES

Encanto, Calif.,

March 3, 1916.

Magnolia Metal Co.,

Gentlemen:—

You may use this letter for publication, if the same will in any way help to further your best interest.

Your metal has given me the best satisfactory results in high speed engines.

I have used this metal for main bearings and crossheads, it has stood up under all conditions and I never have found MAGNOLIA METAL anything but what you have represented it to be.

Very respectfully yours,

J. L. WURTHMANN.

## 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. Ambroise St.

MONTREAL



## 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



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

Every Butterfield Tap comes to you ready for long, hard service.

It is made by expert workmen—from the finest materials obtainable—and thoroughly tested before shipment.

For the tap that is uniformly dependable in service—specify Butterfield.

**Butterfield & Co., Inc.**  
Rock Island :: Quebec

Toronto Office:

1505 Traders Bank Building : Phone Main 1382

H. A. Harrison, Manager.

Catalog No. 16 containing the complete line of Butterfield Tools awaits your request.

# BUTTERFIELD

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# HINTS TO BUYERS



## Eliminate Danger

Accidents break down the efficiency of your organization, lead to legal troubles, loss of time and money.

TRADE MARK

## BRISTO

REG. U. S. PAT. OFFICE

### SAFETY SET SCREWS

insure safety. They also protect themselves because of their patented construction. The dove-tailed design of wrench and screw contracts the metal under pressure. The harder you twist the wrench the more the metal of the screw is compressed.

Write for BULLETIN I-809

**THE BRISTOL COMPANY**  
Waterbury, Conn., U.S.A.

**T**HOUSANDS of Dollars are saved every year by our clients, because we have experts who are trained to make exhaustive tests of all the material you are purchasing, whether raw material or finished products.

## CANADIAN INSPECTION AND TESTING LABORATORIES, LIMITED

Head Office and Main Laboratories—MONTREAL

Branch Offices and Laboratories:

TORONTO, WINNIPEG, EDMONTON, VANCOUVER, NEW GLASGOW.

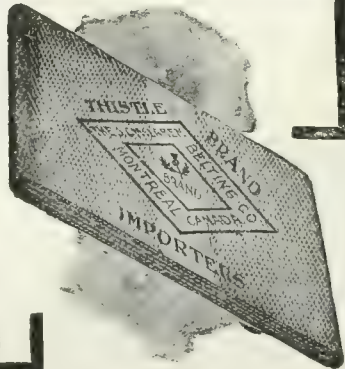
## "THISTLE" BRAND RUBBER BELTING

### "Maintenance of Quality"

is our motto, and our experience in the manufacture of belting since the year 1856 should be invaluable to you. Let us tell you all about this friction faced belting. The price will appeal to you.

Write to-day.

**J. C. McLAREN BELTING CO., LTD.**  
TORONTO, MONTREAL, WINNIPEG



## 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

## IS YOUR RIVETING PROFITABLY DONE?

Our Elastic Rotary Blow Riveting Machine does profitable work, because one machine will do the work of several hand riveters, and do it better.

Every head is perfectly formed, any shape, round, flat, oval, rectangular, etc.

Catalogue C tells more about it.

**The F. B. SHUSTER COMPANY**  
New Haven, Conn.

Formerly John Adt & Son. Established 1866.  
Also makers of Wire Straighteners and Cutter, Cotter Pin Machines, etc.



## RIVETED STEEL TANKS FOR EVERY PURPOSE



OIL STORAGE - GASOLINE TANKS - AIR RECEIVERS  
PNEUMATIC WATER SUPPLY TANKS - SMOKE STACKS  
BOILER BREECHING - RIVETED STEEL PIPE - BINS & HOPPERS

**Northern Crane Works**  
LIMITED  
WALKERVILLE  
ONTARIO  
Electric Cranes  
Hand Cranes  
Foundry Equipment

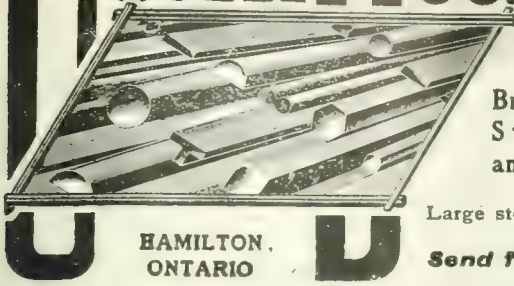


## NORTHERN CRANES

**CRANES**  
MADE IN CANADA  
Electric Hoists  
Air Hoists  
Cupolas  
Ladles



# UNION DRAWN STEEL CO. LTD.



Manufacturers of

**Bright Finished Steel Shafting and Shapes.**

Large stock of all sizes.

**HAMILTON, ONTARIO**

**Send for Price List**

## SKINNER DRILL PRESS VISE

A substantial, durable tool which will pay for itself in short order in any machine shop. Four sizes to accommodate a wide range of work. Try one and you'll buy more.

Printed matter promptly mailed on request.

### THE SKINNER CHUCK COMPANY

New York Office, 94 Reade Street  
 London Office, 149 Queen Victoria St.  
 San Francisco Office, Rialto Bldg.  
 Factory and Main Office, New Britain, Conn., U.S.A.

## Zenith Coal & Steel Products Limited

**COAL COKE HACK SAW BLADES**  
**CARBON STEEL MACHINERY STEEL**  
**HIGH SPEED STEEL**

Royal Bank Bldg., Toronto; McGill Bldg., Montreal, Que.

Trade Mark Reg. U. S. Pat. Office

A universal grinder. A grinder with all attachments. A grinder that will handle all kinds of tool-sharpening as well as cylindrical, internal and surface grinding. An all-around machine for your tool-room.

Catalog No. 6.

## Greenfield Machine Co.

Greenfield, Mass., U.S.A.

## Oxy-Acetylene Welding and Cutting Apparatus

**Carter Welding Co., General Toronto**  
 For Davis-Bournonville Oxy-Acetylene Apparatus

General Office and Factory, Jersey City, N.J.  
 Canadian Factory, Niagara Falls, Ont.  
 Sales Offices: New York, Boston, Philadelphia, Pittsburgh, Cleveland, Cincinnati, Chicago, Detroit, St. Louis, San Francisco, Seattle.

## For Hardness Testing

in shop and laboratory use the **Standard Scleroscope**

Universally adopted; direct reading; inexpensive, and the only instrument that agrees with others of its kind in all parts of the world, thus solving problems of ordering materials to specification.

BOOKLET FREE.

## Heat Indication

by optical means is fast becoming the correct thing. The **PYROSCOPE** has solved the problem. Perfect constancy, inexpensive, no electricity used. Built to stand rough usage and open common-sense lines. Used by the Government and best firms.

**Shore Instrument & Mfg. Co. 555-7 W. 22nd St. New York**  
 Agents for Canada: A. R. Williams Machy, Co., Ltd., Toronto, Can.

# PULLEYS

**ALL WOOD—COMBINATION—IRON—STEEL**

Every pulley fully guaranteed.

Write for interesting printed matter.

## The Positive Clutch & Pulley Works, Ltd.

Montreal Factory: Aurora, Ont. Toronto

## Adjustoglas

Goggles are absolutely protective and comfortable.

**THE STRONG, KENNARD & NUTT COMPANY**  
 2042 E. 9th Street Cleveland, Ohio

**YOURS IS READY TO MAIL YOUR WHAT?**

YOUR CIRCULAR regarding Surface Grinders, New Yankee Drill Grinders, Universal Grinders.

Manufactured by **WILMARTH & MORMAN COMPANY**  
 1200 Monroe Ave. N.W. Grand Rapids, Mich.  
**SEND FOR YOUR CIRCULAR NOW**

# SHAFTING

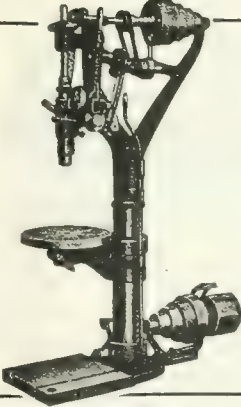
**Cold Drawn, Turned and Polished Steel, Rounds, Squares, Hexagons and Flats, Steel Piston Rods, Pump Rods.**

Special facilities for Keyseating up to 6 in. diameter.

## THE Canadian Drawn Steel Co.

HAMILTON Limited CANADA

**SEE PAGE 74**



### Its Construction

Rigid construction allows greater speed. Greater speed promotes production. No matter which way you work it, you benefit in the long run. Precision and quality of work feature these machines when on rush orders. Inquire for our printed matter. The price is surprising.

**Silver Mfg. Company**  
290 Broadway, Salem, Ohio.

### NEW AIR-TIGHT BLAST GATE FOR LOW PRESSURE AIR



Patented

Save that air (money) you are now losing through leaky blast gates. Our NEW AIR-TIGHT BLAST GATE stops this loss. Circular 123-B explains its many other advantages, outlining clearly its all-round superiority over the ordinary light, flimsy, cheap, leaky and unreliable blast gates, and the heavy, cumbersome, expensive and slow-acting gate valves and stop cocks. Ask for circular and list of users.

**W. S. ROCKWELL COMPANY**  
FURNACE ENGINEERS AND CONTRACTORS  
50 Church Street New York  
(Hudson Terminal Building)

**FERALIUM**  
THE ULTIMATE  
IN DIAMOND SETTING  
IT IS GUARANTEED

Finest Diamonds and Diamond Tools  
**THE GENERAL SUPPLY CO.**  
of Canada, Limited


OTTAWA TORONTO MONTREAL WINNIPEG  
366 Sparks St., 125 Adelaide St. W., 408 McGill Bldg., 85 Water St.

Sole Canadian Agents for  
**GEO. A. JOYCE CO., Ltd.**  
NEW YORK LONDON

Norton Shank  
Exact Size

Lands Shank  
Exact Size

Our Ballas Diamonds  
Give Excellent  
Service



### NORTON JACKS

FOR ALL KINDS OF HEAVY LIFTING

Send for complete catalogue showing 50 styles 10 to 100 tons capacity.


Made only by  
**A. O. NORTON, LIMITED**  
Coaticook, Prov. Quebec Canada

Every Tooth Cuts on Every *Quality*

They cut straighter.  
They last longer.

**SAW**

NAPIER SAW WORKS, Inc., Springfield, Mass., U. S. A.



### Eye Protectors For All Work

Standard designs for chippers, machinists, grinders, furnacemen, etc. Can be worn over other glasses. Full particulars for the asking.

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23 Scott Street, Toronto, Ontario

9 Hatton Garden, London. Head Bldg., San Francisco.  
Mallers Bldg., Chicago.

Factory and Main Offices: **READING, Pa., U. S. A.**



### GEARS AND GEAR CUTTING SPROCKETS AND CHAINS

In stock and to order any size from one-quarter inch to six-foot in diameter, any material. Estimates and gear advice cheerfully furnished.

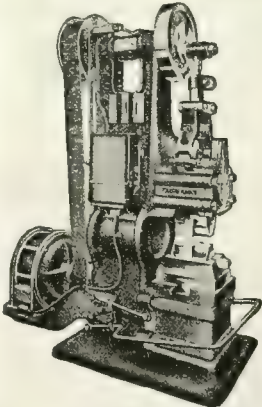
**Grant Gear Works, Inc.** 151 Pearl St.  
G. B. GRANT Boston, Mass. U.S.A.



### RICHMOND CHUCKS

Universal Geared Scroll Type with either one or two sets Jaws.

**Richmond Mfg. Co., Ltd.**  
183-185 George Street TORONTO, CAN.



### Fairbanks Hammers

25 to 300 lbs.

### Belt or Motor Drive

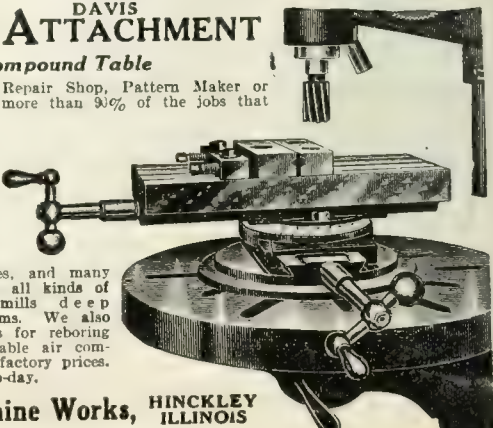
These Hammers Embody a Design and Workmanship that are Unsurpassed.

Send for Catalog  
**UNITED HAMMER CO.**  
Oliver Building Boston, Mass.

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For the Die Maker, Repair Shop, Pattern Maker or Garage; will perform more than 90% of the jobs that come up.

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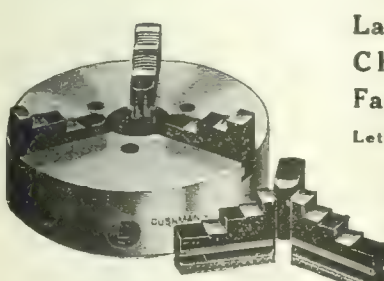
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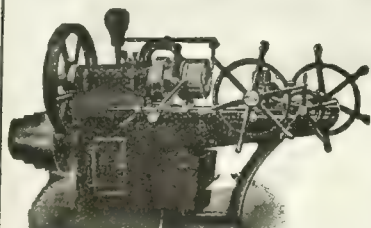
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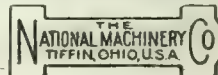
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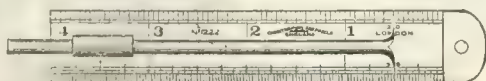
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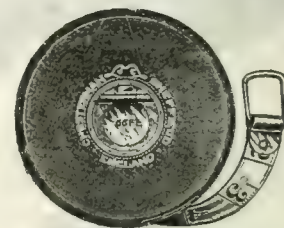
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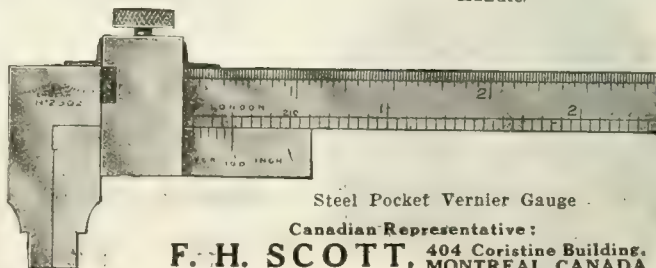
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H. E. Streeter, 523 New Birks Bldg., Montreal, Que.

**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.

**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., B. F., Galt, Ont.

**COLLETS**  
Becker Milling Machine Co., Boston, Mass.  
Hannifin Mfg. Co., Chicago, Ill.  
Hardinge Bros., Inc., Chicago, Ill.  
Hyde Engineering Works, Montreal.  
Manufacturers' Equipment Co., Chicago, Ill.  
Rivett Lathe & Grinder Co., Boston, Mass.  
Stone Tool & Supply Co., J. R., Detroit, Mich.

**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.  
H. W. Petrie, Ltd., Montreal.  
H. W. Petrie, Toronto.  
Riverside Machinery Depot, Detroit, Mich.  
Smart-Turner Machine Co., Hamilton, Ont.  
Taylor Instrument Cos., Rochester, N.Y.

**CONDENSER TUBES AND FERRULES, BRASS**  
Hungerford Brass & Copper Co., New York, N.Y.

**CONTROLLERS AND STARTERS, ELECTRIC MOTORS**  
Dominion Machy. Co., Toronto, Ont.  
H. W. Petrie, Toronto.  
R. E. T. Pringle, Ltd., Toronto, Ont.  
A. R. Williams Machy. Co., Toronto.

**CONTROLLING INSTRUMENTS**  
Taylor Instrument Cos., 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.  
Cleveland Twist Drill Co., Cleveland.  
Morse Twist Drill & Machine Co., New Bedford.  
Pratt & Whitney Co., Dundas, Ont.

**COUNTERSHAFTS**  
Baird Machine Co., Bridgeport, Conn.  
Foster Machine Co., Elkhart, Ind.

**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, GANTRY**  
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, TRAVELING, 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.  
H. W. Petrie, Toronto.  
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.  
H. W. Petrie, Ltd., Montreal.

**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.  
Dominion Machy. Co., Toronto, Ont.  
Foss & Hill Machinery Co., Montreal.  
Garvin Machine Co., New York.  
Goddard Tool Co., Chicago, Ill.  
Illinois Tool Works, Chicago, Ill.  
Morse Twist Drill & Mach. Co., New Bedford, Mass.  
Osborn (Canada), Ltd., Sam'l, Montreal, Que.  
H. W. Petrie, Ltd., Montreal.  
H. W. Petrie, Toronto.  
Pratt & Whitney Co., Dundas, Ont.  
Tabor Mfg. Co., Philadelphia, Pa.  
Whitney Mfg. Co., Hartford, Conn.

**CUTTING COMPOUND AND CUTTING OIL**  
Can. Economic Lubricant Co., Montreal.  
Cataract Refining & Mfg. Co., Toronto.  
Elm Cutting Oil Co., Toronto.  
Racine Tool & Machine Co., Racine, Wis.

**CUTTING-OFF MACHINES**  
Armstrong Bros. Tool Co., Chicago.  
John Bertram & Sons Co., Dundas.  
Canadian Fairbanks-Morse Co., Ltd., Montreal.  
Curtis & Curtis Co., Bridgeport, Conn.  
Foss & Hill Machinery Co., Montreal.  
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.  
Peerless Machine Co., Racine, Wis.  
H. W. Petrie, Ltd., Montreal.  
H. W. Petrie, Toronto.  
Prest-O-Lite Co., Inc., Toronto, Ont.  
Racine Tool & Machine Co., Racine, Wis.  
Standard Machy. & Supplies, Ltd., Montreal, Que.  
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Manufacturers Equip. Co., Chicago, Ill.

**CYLINDERS, AUTOMATIC REBORING JIGS AND REAMERS**  
Hinckley Machine Co., Hinckley, Ill.

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Prest-O-Lite Co., Inc., Toronto, Ont.

**DAMPER REGULATORS**  
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Geo. A. Joyce Co., Ltd., New York.

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Francis & Co., Hartford, Conn.  
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Matthews, Jas. H., & Co., Pittsburgh, Pa.

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Banfield, W. H., & Son, Toronto.  
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.  
Modern Tool Co., Erie, Pa.  
Morse Twist Drill & Mach. Co., New Bedford, Mass.  
H. W. Petrie, Ltd., Montreal.  
H. W. Petrie, Toronto.  
Pratt & Whitney Co., Dundas, Ont.  
Rickert-Shafer Co., Erie, Pa.  
Standard Machy. & Supplies, Ltd., Montreal, Que.  
Wells Brothers of Canada, Galt, Ont.

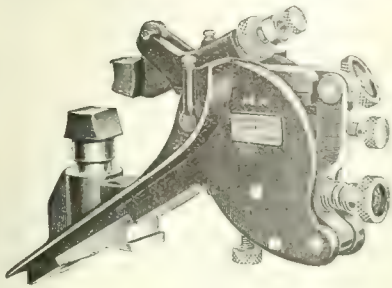
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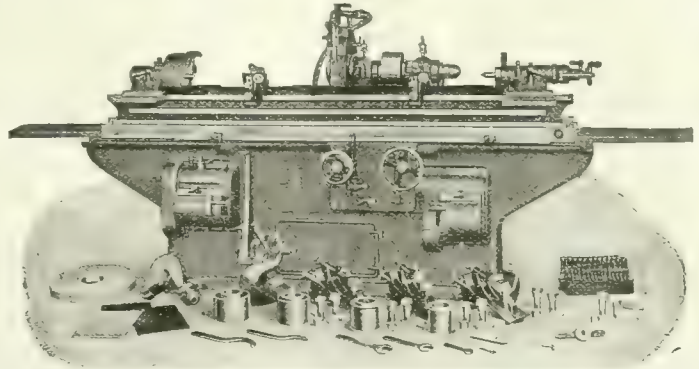
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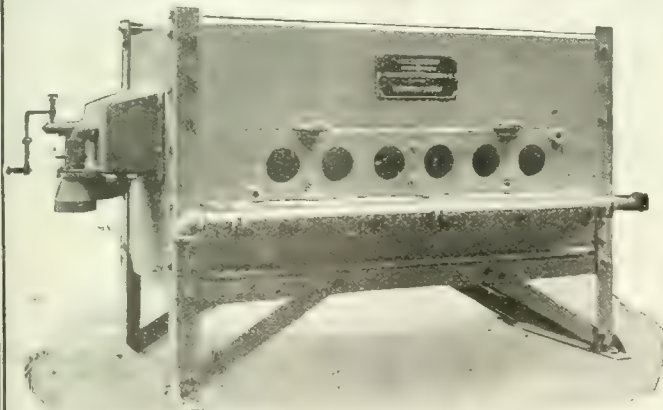
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 W. F. & John Barnes Co., Rockford.  
 Can. Blower & Forge Co., Kitchener, Ont.  
 Canada Machinery Corp., Galt, Ont.  
 Dominion Machy. Co., Toronto, Ont.  
 Foss & Hill Machy. Co., Montreal.  
 Garlock-Walker Machinery Co., Toronto, Ont.  
 Garvin Machine Co., New York.  
 Niles-Bement-Pond Co., New York.  
 Petrie of Montreal, Ltd., H. W., Montreal, Que.  
 H. W. Petrie, Toronto.  
 R. E. T. Pringle, Ltd., Toronto, Ont.  
 Riverside Machinery Depot, Detroit, Mich.  
 Standard Machy. & Supplies, Ltd., Montreal, Que.  
 United States Mach. Tool Co., Cincinnati, Ohio.  
 A. B. Williams Machinery Co., Toronto.

**DRILLING MACHINES, BENCH**

Bilton Mach. Tool Co., Bridgeport, Conn.  
 Martin Machine Co., Greenfield, Mass.

**DRILLING MACHINES, GANG**

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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.  
 Dominion Machy. Co., Toronto, Ont.  
 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.  
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 Rockford Drilling Mach. Co., Rockford, Ill.

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 Niles-Bement-Pond Co., New York.  
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 W. F. & John Barnes Co., Rockford, Ill.  
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 Canada Machinery Corp., Galt, Ont.  
 Moore 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.  
 R. E. T. Pringle, Ltd., Toronto, Ont.  
 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.  
 Dominion Machy. Co., Toronto, Ont.  
 Garlock-Walker Machinery Co., Toronto, Ont.  
 A. B. Jardine & Co., Hespeler, Ont.  
 R. McDougall Co., Galt.  
 Niles-Bement-Pond Co., New York.

Petrie of Montreal, Ltd., H. W., Montreal, Que.  
 H. W. Petrie, Toronto.

Rockford Drilling Mach. Co., Rockford, Ill.

Silver Mfg. Co., Salem, Ohio.

A. B. Williams Machinery Co., Toronto

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Aikenhead Hardware Co., Toronto, Ont.  
 Keystone Mfg. Co., Buffalo, N.Y.  
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Aikenhead Hardware Co., Toronto, Ont.  
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 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.  
 H. W. Petrie, Ltd., Montreal.  
 Pratt & Whitney Co., Dundas, Ont.  
 R. E. T. Pringle, Ltd., Toronto, Ont.  
 United States Electrical Tool Co., Cincinnati.

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 Foss & Hill Machy. Co., Montreal.  
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 Morse Twist Drill & Machine Co., New Bedford.  
 Petrie of Montreal, Ltd., H. W., Montreal, Que.  
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Aikenhead Hardware Co., Toronto, Ont.  
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 Can. Blower & Forge Co., Kitchener, Ont.  
 Cincinnati Electrical Tool Co., Cincinnati, Ohio.  
 Dominion Machy. Co., Toronto, Ont.  
 Foss & Hill Machy. Co., Montreal.  
 Independent Pneumatic Tool Co., Chicago.  
 Niles-Bement-Pond Co., New York.  
 H. W. Petrie, Ltd., Montreal.  
 H. W. Petrie, Toronto.  
 Prest-O-Lite Co., Inc., Toronto, Ont.  
 R. E. T. Pringle, Ltd., Toronto, Ont.  
 Stow Mfg. Co., Binghamton, N.Y.  
 United States Electrical Tool Co., Cincinnati.  
 A. B. Williams Machy. Co., Toronto.

**DRILLS, HIGH SPEED**

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 Atkins & Co., Wm., Sheffield, Eng.  
 Cleveland Twist Drill Co., Cleveland.  
 Canadian Fairbanks-Morse Co., Montreal.  
 Can. B. K. Morton, Toronto, Montreal.  
 H. A. Drury Co., Montreal.  
 Foss & Hill Machy. Co., Montreal.  
 Marshall, Geo. A., 70 Lombard St., Toronto.  
 McKenna Brothers, Pittsburgh, Pa.  
 Morse Twist Drill & Mach. Co., New Bedford, Mass.

Osborn (Canada) Ltd., Sam'l, Montreal, Que.

W. F. & John Barnes Co., Rockford, Ill.

H. W. Petrie, Toronto.

Pratt & Whitney Co., Dundas, Ont.

Standard Machy. & Supplies, Ltd., Montreal, Que.

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 Garlock-Walker Machinery Co., Toronto, Ont.  
 Pratt & Whitney Co., Dundas, Ont.

**DRILLS, OIL TUBE**

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 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.  
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 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 & Mach. Co., New Bedford.  
 H. W. Petrie, Ltd., Montreal.  
 H. W. Petrie, Toronto.  
 Pratt & Whitney Co., Dundas, Ont.

**DRILLS, ROCK**

Can. Ingersoll-Rand Co., Sherbrooke, Que.  
 Cleveland Pneumatic Tool Co. of Canada, Toronto.  
 Dominion Machy. Co., Toronto.  
 Foss & Hill Machy. Co., Montreal.  
 The Jencks Mach. Co., Ltd., Sherbrooke, Que.  
 A. B. Williams Machy. Co., Toronto.

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Cleveland Twist Drill Co., Cleveland.  
 Foss & Hill Machy. Co., Montreal.  
 Morse Twist Drill & Mach. Co., New Bedford.

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 Aikenhead Hardware Co., Toronto, Ont.  
 Armstrong, Whitworth of Canada, Ltd., Montreal.  
 Canadian Fairbanks-Morse Co., Montreal.  
 Can. B. K. Morton, Toronto, Montreal.  
 Clark Equipment Co., Buchanan, Mich.

Cleveland Twist Drill Co., Cleveland.

Morse Twist Drill & Mach. Co., New Bedford.

Osborn (Canada) Ltd., Sam'l, Montreal, Que.

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 Dominion Machy. Co., Toronto, Ont.  
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 Pratt & Whitney Co., Dundas, Ont.  
 A. B. Williams Machy. Co., Toronto.

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 Whiting Foundry Equipment Co., Harvey, Ill.

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 Can. Matthews Gravity Carrier Co., Toronto, Ont.

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 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 of Montreal, Ltd., H. W., Montreal, Que.  
 H. W. Petrie, Toronto.  
 R. E. T. Pringle, Ltd., Toronto, Ont.  
 Standard Machy. & Supplies, Ltd., Montreal, Que.

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 Riverside Machinery Depot, Detroit, Mich.

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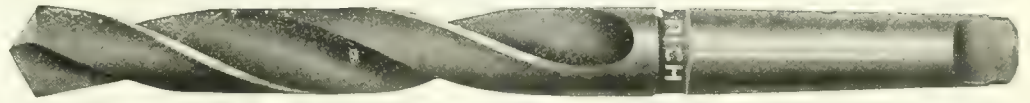
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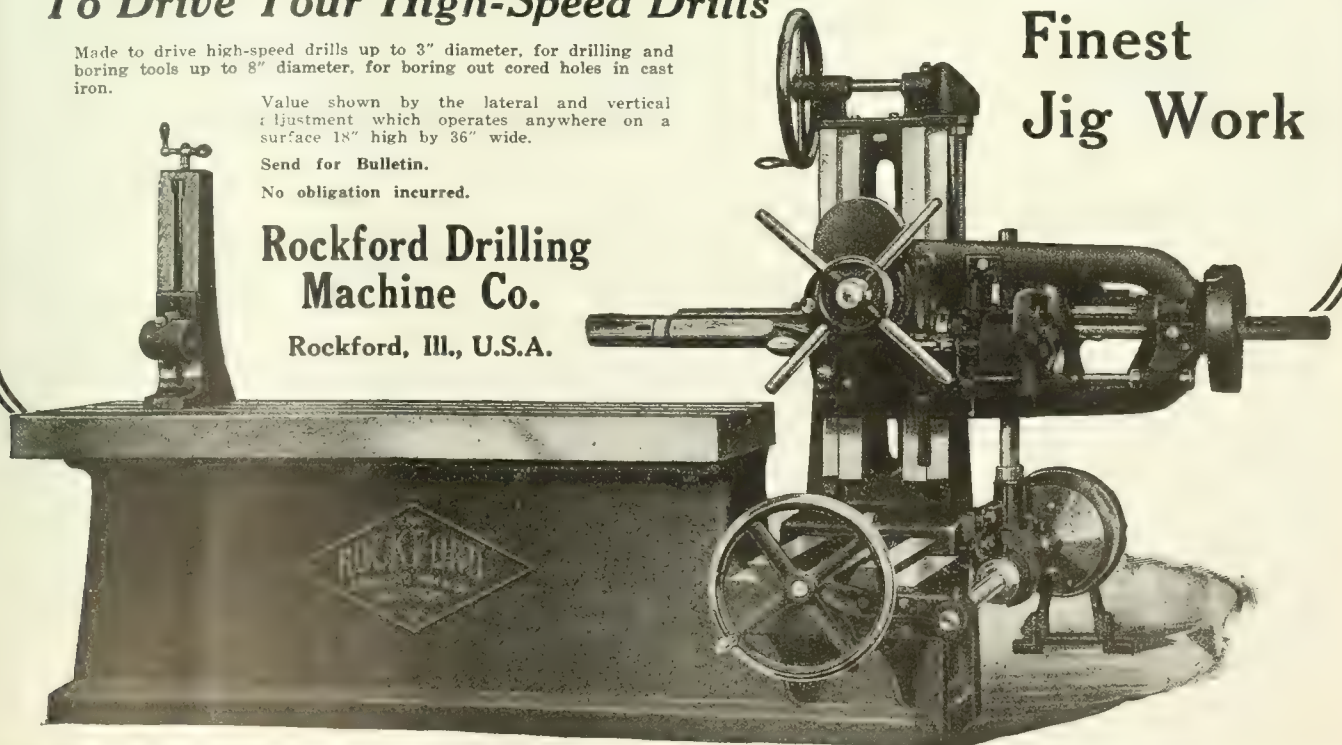
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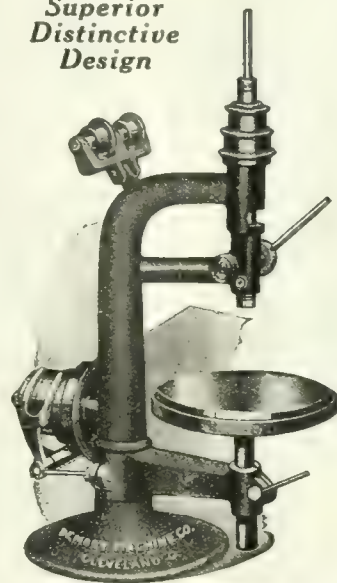
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 Can. Fairbanks-Morse Co., Montreal.  
 Cincinnati Iron & Steel Co., Cincinnati, Ohio.  
 Dominion Machinery Co., Toronto.  
 Foss & Hill Machy. Co., Montreal.  
 Garlock-Walker Machy. Co., Toronto, Ont.  
 Garvin Machine Co., New York.  
 Hamilton Mach. Tool Co., Hamilton, Ohio.  
 Hendey Machine Co., Torrington, Conn.  
 Himoff Machine Co., New York.  
 Houston, Stanwood & Gamble Co., Cincinnati, O.  
 Hyde Engineering Works, Montreal.  
 McCabe, J. J., New York, N.Y.  
 R. McDougal Co., Galt.  
 Niles-Bement-Pond Co., New York.  
 Oliver Machinery Co., Grand Rapids, Mich.  
 H. W. Petrie, Toronto.  
 Rivett Lathe & Grinder Co., Boston, Mass.  
 Riverside Machinery Depot, Detroit, Mich.  
 Standard Machy. & Supplies, Ltd., Montreal, Que.  
 Sebastian Lathe Co., Cincinnati, Ohio.  
 Walcott Lathe Co., Jackson, Mich.  
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**Wlokes Bros., Saginaw, Mich.**  
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 McCabe, J. J., New York, N.Y.

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 Foss & Hill Machy. Co., Montreal.  
 Garlock-Walker Machy. Co., Toronto, Ont.  
 Jenckes Mach. Co., Sherbrooke, Que.  
 McCabe, J. J., New York, N.Y.  
 H. W. Petrie, Ltd., Montreal.  
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 Can. Fairbanks-Morse Co., Montreal, Que.  
 Garlock-Walker Machinery Co., Toronto, Ont.  
 Gray Mfg. & Mach. Co., Toronto, Ont.  
 Hepburn, John T., Ltd., Toronto.  
 Himoff Machine Co., Inc., New York, N.Y.  
 The Jenckes Mach. Co., Ltd., Sherbrooke, Que.  
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 Foss & Hill Machy. Co., Montreal.  
 Foster Machine Co., Elkhart, Ind.  
 Garlock-Walker Machinery Co., Toronto, Ont.  
 Harding Bros., Inc., Chicago, Ill.  
 Hepburn, John T., Ltd., Toronto, Ont.  
 McCabe, J. J., New York, N.Y.  
 Niles-Bement-Bond Co., New York.  
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 Foss & Hill Machy. Co., Montreal.  
 Foster Machine Co., Elkhart, Ind.  
 Garlock-Walker Machy. Co., Toronto, Ont.  
 Harding Bros., Inc., Chicago, Ill.  
 Hepburn, John T., Ltd., Toronto, Ont.  
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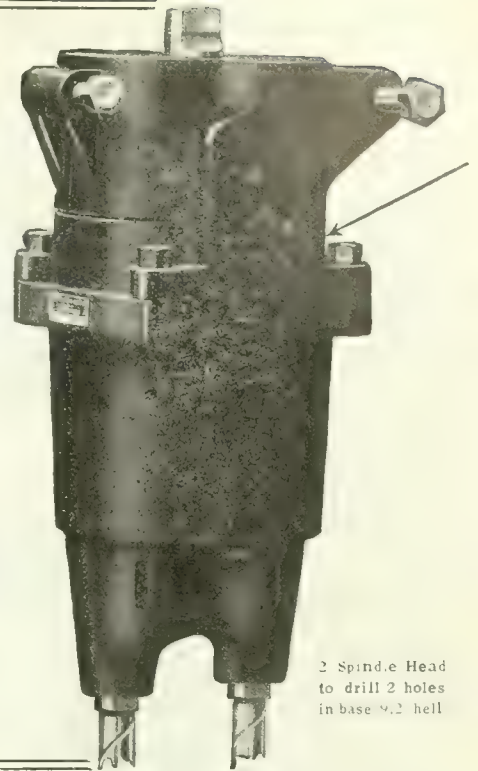
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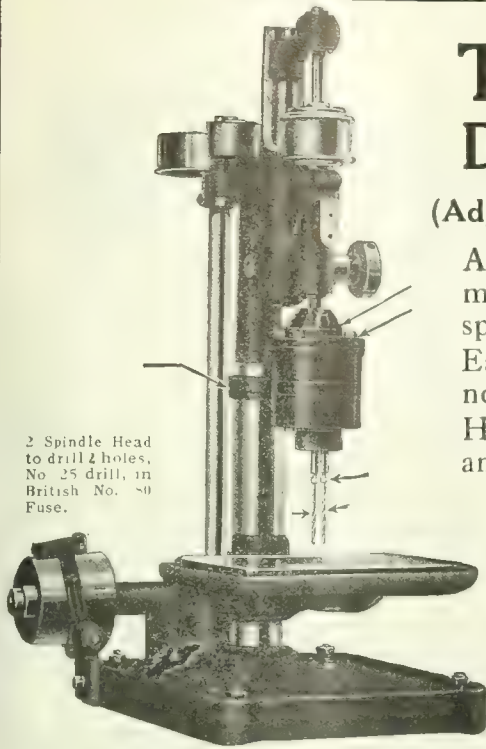
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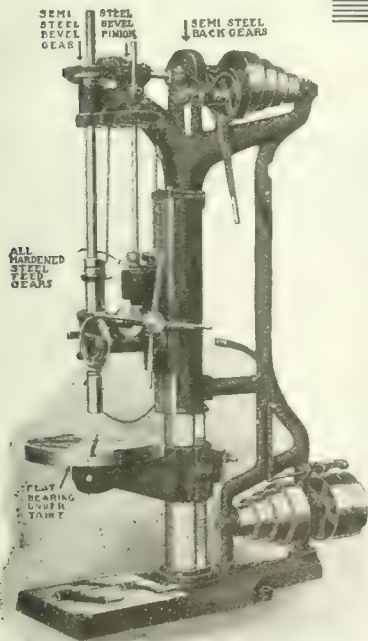
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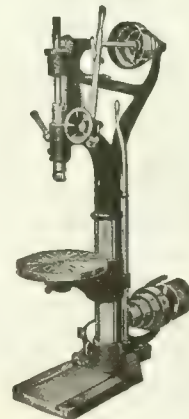
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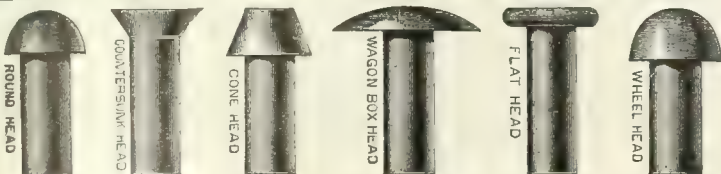


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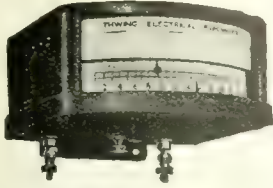
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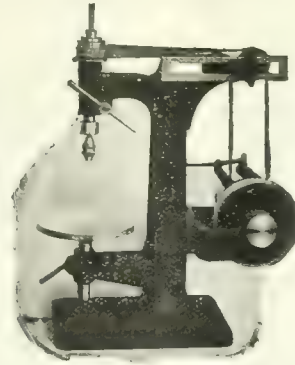
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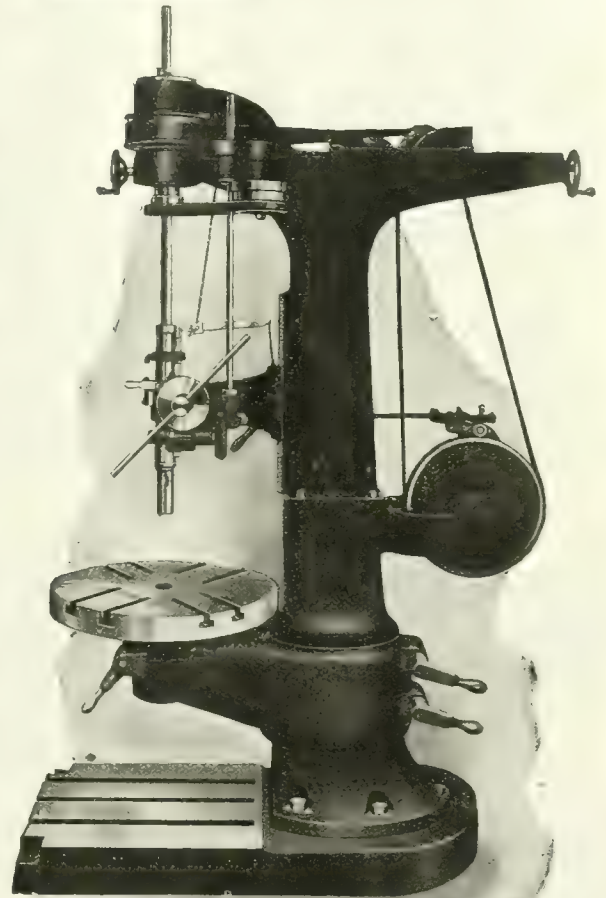
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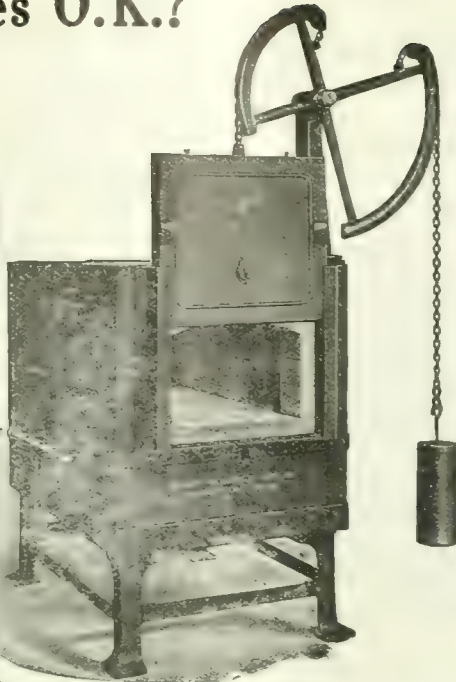
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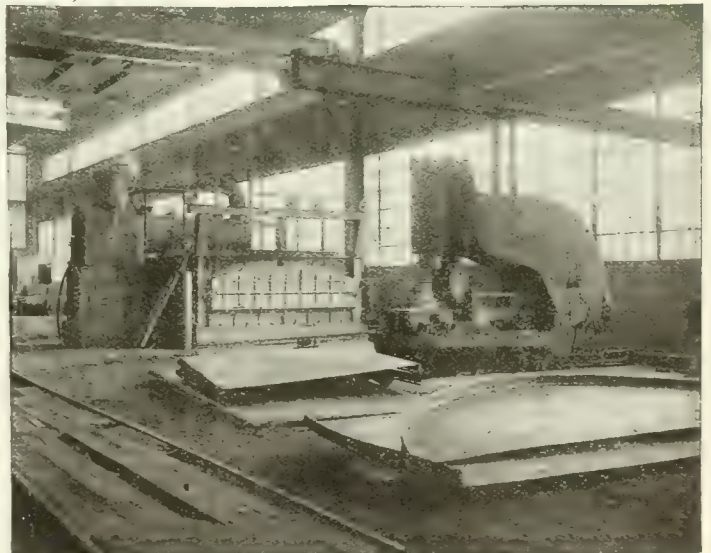
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Rhodes Mfg. Co., Hartford, Conn.

#### SLOTTERS

Garvin Machine Co., New York.  
National-Acme Co., Cleveland, Ohio.  
Niles-Bement-Pond Co., New York.  
Rhodes Mfg. Co., Hartford, Conn.

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Niles-Bement-Pond Co., New York.  
Rhodes Mfg. Co., Hartford, Conn.

#### SPRING COILING AND WINDING

#### MACHINERY

Baird Machine Co., Bridgeport, Conn.  
Garvin Machine Co., New York.  
Sleeper & Hartley, Inc., Worcester, Mass.

#### SPRING MAKING MACHINERY

#### (AUTOMATIC)

Baird Machine Co., Bridgeport, Conn.  
Sleeper & Hartley, Inc., Worcester, Mass.

#### SPIRAL CONVEYORS

Can. Matthews Gravity Carrier Co., Toronto, Ont.

#### SPROCKETS, CHAIN

Grant Gear Works, Boston, Mass.  
Morse Chain Co., Ithaca, N.Y.  
Philadelphia Gear Works, Philadelphia, Pa.

#### SOLDER

Jobborn, Geo. A., Hamilton, Ont.

#### SPROCKET WHEELS, CAST

Ferrin, Wm. R., Toronto.

#### STAIRS, IRON

Canada Wire & Iron Goods Co., Hamilton, Ont.

#### STAMPINGS

Dillon Mfg. Co., Oshawa, Ont.  
Dom. Forge & Stpg. Co., Walkerville, Ont.  
Homer & Wilson, Hamilton, Ont.

#### STAMPING MACHINERY

Brown, Boggs & Co., Hamilton, Can.  
Canada Machinery Corp., Galt, Ont.  
Noble & Westbrook Mfg. Co., Hartford, Conn.

#### STAMPS, STEEL ALPHABET, FIGURES

Matthews, Jas. H. & Co., Pittsburgh, Pa.  
Noble & Westbrook Mfg. Co., Hartford, Conn.  
Pritchard-Andrews Co., Ottawa, Can.

#### STAPLE MACHINES

Sleeper & Hartley, Inc., Worcester, Mass.

#### STEAM SEPARATORS AND TRAPS

Can. Fairbanks-Morse Co., Montreal.  
Can. Morehead Mfg. Co., Woodstock, Ont.  
H. W. Petrie, Toronto.  
Sheldons, Ltd., Galt, Ont.

#### STEEL ALLOY (SEE ALLOY STEEL)

#### STEEL BENDING BRAKES

Steel Bending Brake Works, Ltd., Chatham, Ont.

#### STEEL FOR AXES, PLOWS, SAWS, DRILLS, ETC.

Colonial Steel Co., Pittsburgh, Pa.

#### STEEL, CARBON, FERRO-TUNGSTEN

Can. B. K. Morton, Toronto, Montreal.  
Colonial Steel Co., Pittsburgh, Pa.  
Comstedt, Josef F. A., 120 Broadway, N.Y.  
Labroe Electric Steel Co., Labroe, Pa.  
Michigan Steel Exchange, Inc., Detroit, Mich.  
Osborn (Canada), Ltd., Sam'l, Montreal, Que.  
Vanadium-Alloys Steel Co., Pittsburgh, Pa.  
Vulcan Crucible Steel Co., Aliquippa, Pa.  
Zenith Coal & Steel Products, Montreal, Que.

#### STEEL, COLD ROLLED

Can. Drawn Steel Co., Hamilton, Ont.  
Union Drawn Steel Co., Hamilton, Ont.

#### STEEL DRUMS

Smart-Turner Machine Co., Hamilton, Ont.

#### STEEL PRESSURE BLOWERS

Can. Blower & Forge Co., Kitchener, Ont.  
Can. Fairbanks-Morse Co., Montreal.  
Sheldons, Ltd., Galt, Ont.

#### STEEL, HIGH SPEED

Armstrong Whitworth of Canada, Ltd., Montreal.  
Can. Fairbanks-Morse Co., Montreal.  
Can. B. K. Morton, Toronto, Montreal.  
Colonial Steel Co., Pittsburgh, Pa.  
Comstedt, Josef F. A., 120 Broadway, N.Y.  
Fairley Davidson Steel Co., New York, N.Y.  
Hawley Bros. Co., Boston, Mass.  
Labroe Electric Steel Co., Labroe, Pa.  
Marshall, Geo. A., 70 Lombard, Toronto.  
Michigan Steel Exchange, Inc., Detroit, Mich.  
Osborn (Canada), Ltd., Sam'l, Montreal, Que.  
H. W. Petrie, Toronto.  
Standard Alloys Company, Pittsburgh, Pa.  
Vanadium-Alloys Steel Co., Pittsburgh, Pa.  
Vulcan Crucible Steel Co., Aliquippa, Pa.; represented in Canada by Norton, Callard & Co., Montreal, Que.  
Zenith Coal & Steel Products, Montreal, Ont.

#### STEELS, HIGH STRENGTH, HOT-WORKING, DIE, MAGNET

Fairley Davidson Steel Co., New York, N.Y.

#### STEEL, VANADIUM

Comstedt, Josef F. A., 120 Broadway, N.Y.  
Drury, H. A., Co., Montreal, Que.  
Michigan Steel Exchange, Inc., Detroit, Mich.  
Standard Alloys Co., Pittsburgh, Pa.  
Vanadium-Alloys Steel Co., Pittsburgh, Pa.  
Vulcan Crucible Steel Co., Aliquippa, Pa.

#### STEELITE, HIGH-SPEED TOOL METAL

Can. B. K. Morton Co., Montreal, Que.  
Deloro Smelting & Refining Co., Toronto, Ont.

#### STOCK RACKS FOR BARS, PILING, ETC.

New Britain Machine Co., New Britain, Conn.

#### STOCKS FOR DIES

Wells Bros. Co. of Canada, Galt, Ont.

#### STOCKS, PIPE

Butterfield & Co., Rock Island, Que.

#### STOOLS, STEEL, SHOP

Dennis Wire & Iron Works, London, Canada.  
New Britain Mach. Co., New Britain, Conn.

#### STRAIGHTENING MACHINERY

Baird Machine Co., Bridgeport, Conn.  
Bertrams, Ltd., Edinburgh, Scotland

#### SWITCHES, RAILWAY

Can. Steel Foundries, Ltd., Montreal.

#### TACK (DOUBLE POINT) MACHINES

Sleeper & Hartley, Inc., Worcester, Mass.

#### TANKS, GASOLINE AND OIL

Dominion Forge & Stpg. Co., Walkerville, Ont.  
The Jencks Mach. Co., Ltd., Sherbrooke, Que.  
MacKinnon, Holmes & Co., Sherbrooke, Que.

#### TANKS, STEEL, WATER PRESSURE

Can. Welding Works, Montreal, Que.  
Jencks Mach. Co., Sherbrooke, Que.  
MacKinnon, Holmes Co., Sherbrooke, Toronto Iron Works, Ltd., Toronto.

#### TANK WAGONS

Jencks Mach. Co., Sherbrooke, Que.  
MacKinnon, Holmes Co., Sherbrooke, Toronto Iron Works, Ltd., Toronto.

#### TAPES, MEASURING

James Chesterman & Co., Ltd., Sheffield, Eng.

#### TAPPING MACHINES (PNEUMATIC)

Cleveland Pneumatic Tool Co. of Canada, Toronto.  
Greenfield Tap & Die Corp., Greenfield, Mass.

#### TAPPING MACHINES AND ATTACHMENTS

John Bertram & Sons Co., Dundas.  
Canada Machinery Corp., Galt, Ont.  
Garvin Machine Co., New York.  
The Geometric Tool Co., New Haven.  
J. H. Hall & Sons, Brantford, Ont.  
A. B. Jardine & Co., Hespeler.  
Landis Machine Co., Waynesboro, Pa.  
Manufacturers Equipment Co., Chicago, Ill.  
Modern Tool Co., Erie, Pa.  
Murphy Machine & Tool Co., Detroit.  
Niles-Bement-Pond Co., New York.  
Petrie of Montreal, Ltd., H. W., Montreal, Que.  
H. W. Petrie, Toronto.  
Kickert-Shaler Co., Erie, Pa.  
L. S. Starrett Co., Athol, Mass.  
Whitney Mfg. Co., Hartford, Conn.

#### TAPS, ADJUSTABLE

Baxter Co., Ltd., J. R., Montreal, Que.  
Geometric Tool Co., New Haven.  
Manufacturers Equipment Co., Chicago, Ill.  
Murphy Machine & Tool Co., Detroit.  
National-Acme Co., Cleveland, Ohio.  
Osborn (Canada, Ltd., Sam'l), Montreal, Que.

#### TAPS, COLLAPSIBLE

Geometric Tool Co., New Haven, Conn.  
Manufacturers Equipment Co., Chicago, Ill.  
Modern Tool Co., Erie, Pa.  
Murphy Machine & Tool Co., Detroit, Mich.  
Osborn (Canada, Ltd., Sam'l), Montreal, Que.  
Victor Tool Co., Waynesboro, Pa.

#### TAPS, DIES AND WRENCHES

Butterfield & Co., Rock Island, Que.  
Can. Fairbanks-Morse Co., Montreal.  
Cleveland Twist Drill Co., Cleveland.  
Foss & Hill Machy. Co., Montreal.  
Geometric Tool Co., New Haven, Conn.  
A. B. Jardine & Co., Hespeler.  
Morse Twist Drill & Machine Co., New Bedford.  
Murphy Machine & Tool Co., Detroit.  
Osborn (Canada, Ltd., Sam'l), Montreal, Que.  
Petrie of Montreal, Ltd., H. W., Montreal, Que.  
H. W. Petrie, Toronto.  
Pratt & Whitney Co., Dundas, Ont.  
L. S. Starrett Co., Athol, Mass.  
Wells Bros. Co. of Canada, Galt, Ont.

#### TESTING INSTRUMENTS

Shore Instrument & Mfg. Co., New York City.

#### THERMOMETERS, ALL KINDS

Taylor Instrument Co., Rochester, N.Y.  
Bellevue Industrial Furnace Co., Detroit, Mich.

#### TESTING LABORATORIES

Can. Inspection & Testing Lab., Montreal, Que.  
Toronto Testing Laboratory, Toronto.

#### THREAD-CUTTING MACHINES

Can. Fairbanks-Morse Co., Montreal.  
Curtis & Curtis Co., Bridgeport, Conn.  
Garlock-Walker Machinery Co., Toronto, Ont.  
Geometric Tool Co., New Haven, Conn.  
Landis Machine Co., Waynesboro, Pa.  
National-Acme Co., Cleveland, Ohio.  
National Machy. Co., Tiffin, Ohio.  
H. W. Petrie, Ltd., Toronto, Ont.  
Pratt & Whitney Co., Dundas, Ont.  
Wells Bros. Co. of Canada, Galt, Ont.

#### THREADING TOOLS

Rivett Lathe & Grinder Co., Brighton, Mass.

#### THREAD MILLING MACHINES

Gray Mfg. & Mach. Co., Toronto, Ont.  
Taft-Peirce Co., New York, N.Y.  
T. C. M. Mfg. Co., Harrison, N.J.

#### TINSMITHS' TOOLS

Brown, Roggs & Co., Hamilton, Can.  
Steel Bending Brake Works, Ltd., Chatham, Ont.  
Peck, Stow & Wilcox, Cleveland, Ohio.

#### TIRE SETTING MACHINES, HYDRAULIC

William R. Perrin, Ltd., Toronto.  
West Tire Setter Co., Rochester, N.Y.

#### TOOL CASES

Union Tool Chest Works, Rochester, N.Y.

#### TOOL HOLDERS

Aikenhead Hardware Co., Toronto, Ont.  
Armstrong Bros. Tool Co., Chicago.  
Cleveland Twist Drill Co., Cleveland.  
Can. B. K. Morton, Toronto, Montreal.  
Deloro Smelting & Refining Co., Toronto, Ont.  
Modern Tool Co., Erie, Pa.  
Pratt & Whitney Co., Dundas, Ont.  
J. H. Williams Co., Brooklyn, N.Y.

#### TOOL POSTS, LATHE

Armstrong Bros. Tool Co., Chicago.

#### TOOL ROOM PARTITIONS

Canada Wire & Iron Goods Co., Hamilton.

#### TOOL STEEL

Atkins & Co., Wm., Sheffield, Eng.  
Armstrong, Whitworth, Ltd. of Canada, Montreal.  
Can. Fairbanks-Morse Co., Montreal.  
Can. B. K. Morton, Toronto, Montreal.  
Colonial Steel Co., Pittsburgh, Pa.  
Deloro Smelting & Refining Co., Toronto, Ont.  
H. A. Drury Co., Montreal.  
Hawley Bros. Co., Boston, Mass.  
Labroe Electric Steel Co., Labroe, Pa.  
Marshall, Geo. A., 70 Lombard, Toronto.  
Michigan Steel Exchange, Inc., Detroit, Mich.

# 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.*

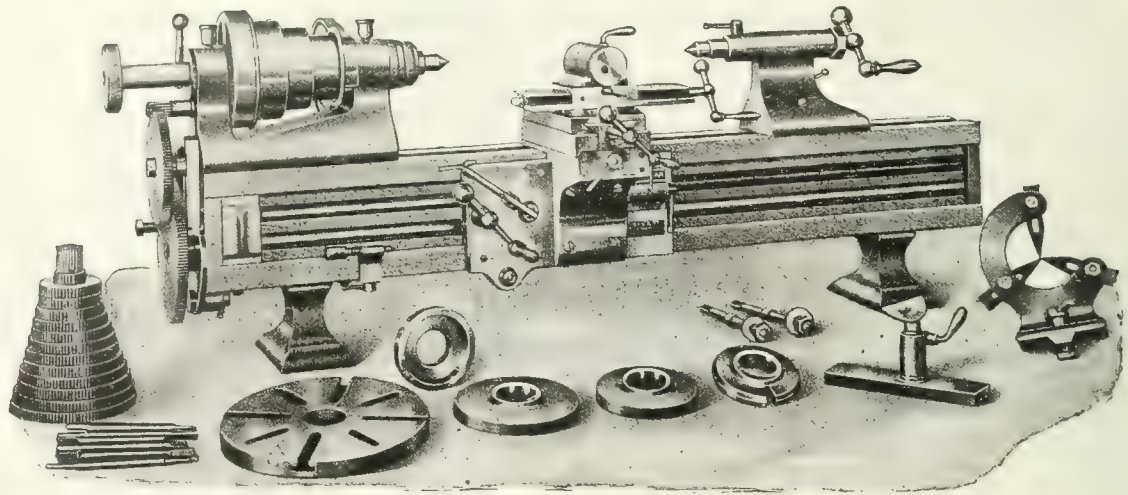
*Builders of All-Steel Oven Trucks with Roller Bearings.*

Canadian Representatives: The A. R. WILLIAMS MACHINERY COMPANY, Ltd.

ST. JOHN, N.B. TORONTO WINNIPEG VANCOUVER

- Osborn Canada, Ltd., San. I., Montreal, Que.  
H. W. Petrie, Ltd., Toronto, Ont.  
Swedish Steel & Importing Co., Montreal, Que.  
Vanadium-Steel Co., Pittsburgh, Pa.  
Vulcan Crucible Steel Co., Alliquippa, Pa.
- TOOLS, ELECTRIC**  
Independent Pneumatic Tool Co., Chicago, Ill.  
H. W. Petrie, Ltd., Montreal.  
R. E. T. Pringle, Ltd., Toronto, Ont.  
Stow Mfg. Co., Binghamton, N.Y.  
A. R. Williams Machy. Co., Toronto.  
United States Elec. Tool Co., Cincinnati, O.
- TOOLS, PNEUMATIC**  
Can. Ingersoll-Rand Co., Sherbrooke, Que.  
Cleveland Pneumatic Tool Co. of Canada, Toronto.  
Curtis Pneumatic Machinery Co., St. Louis, Mo.  
Garlock-Walker Machinery Co., Toronto, Ont.  
Independent Pneumatic Tool Co., Chicago, Ill.
- TOOLS, LATHE, PLANER, SLOTTER**  
Armstrong Bros. Tool Co., Chicago.
- TOOLS, SCREW MACHINE**  
Foster Machine Tool Co., Elkhart, Ind.
- TORCHES, STEEL**  
Armstrong Whitworth of Canada Ltd., Montreal.  
Frest-O-Lite Co., Inc., Toronto, Ont.
- TRACK SYSTEMS**  
Dillon Mfg. Co., Oshawa, Ont.  
Northern Crane Works, Walkerville.  
Whiting Foundry Equipment Co., Harvey, Ill.
- TRANSMISSION MACHINERY**  
American Pulley Co., Philadelphia, Pa.  
A. R. Williams Machy. Co., Toronto.  
Can. Bond Hanger & Cplg. Co., Alexandria, Ont.  
Can. Fairbanks-Morse Co., Montreal.  
Can. Drawn Steel Co., Hamilton, Ont.  
Hamilton Gear & Mach. Co., Toronto.  
Lyman Tube & Supply Co., Montreal, Que.  
Main Belting Co., Montreal.  
Morse Chain Co., Ithaca, N.Y.  
H. W. Petrie, Ltd., Toronto, Ont.  
The Smart-Turner Machine Co., Hamilton.
- TRANSMISSION TOWERS**  
Curtis Pneumatic Machinery Co., St. Louis, Mo.  
Northern Crane Works, Walkerville.  
Tallman Brass & Metal Co., Hamilton.
- TRUCKS, FACTORY, FREIGHT, ETC**  
Canada Machinery Corp., Galt, Ont.  
Chapman Double Ball Bearing Co., Toronto.  
Whiting Foundry Equipment Co., Harvey, Ill.
- TRUCKS, LUMBER AND KILN**  
Sheldons, Ltd., Galt, Ont.  
Northern Crane Works, Walkerville.
- TUBING, SEAMLESS, BRASS & COPPER**  
Hungerford Brass & Copper Co., New York, N.Y.  
Lynn Tube & Supply Co., Montreal, Que.  
Standard Tube & Fence Co., Woodstock, Ont.
- TUMBLING BARRELS**  
Baird Machine Co., Bridgeport, Conn.  
Northern Crane Works, Walkerville.  
Whiting Foundry Equipment Co., Harvey, Ill.
- TUNGSTEN FILAMENT COILING MACHINERY**  
Sleeper & Hartley, Inc., Worcester, Mass.
- TURNBUCKLES**  
Canadian Billings & Spencer, Ltd., Welland.
- TURNABLES**  
Whiting Foundry Equipment Co., Harvey, Ill.
- TURRET MACHINES**  
Brown & Sharpe Mfg. Co., Providence, R.I.  
Garlock-Walker Machinery Co., Toronto, Ont.  
New Britain Machine Co., New Britain, Conn.  
H. W. Petrie, Toronto.  
Pratt & Whitney, Hartford, Conn.  
Riverside Machinery Depot, Detroit, Mich.  
Warner & Swasey, Cleveland, O.  
Garrin Machine Co., New York.
- TURBINE WATER WHEELS**  
Jencks Mach. Co., Sherbrooke, Que.  
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
- UPSETTING AND BENDING MACHINERY**  
John Bertram & Sons Co., Dundas.  
Brown, Boggs Co., Ltd., Hamilton, Canada.  
Cook, Asa S., Co., Hartford, Conn.  
A. B. Jandine & Co., Hesperia.  
National Machy. Co., Tiffin, O.
- Canada Machinery Corp., Galt, Ont.  
Niles-Bement-Pond Co., New York.  
The Jencks Mach. Co., Ltd., Sherbrooke, Que.  
Petrie of Montreal, Ltd., H. W., Montreal, Que.  
H. W. Petrie, Ltd., Toronto, Ont.  
A. R. Williams Machy. Co., Toronto.
- VACUUM PUMPS**  
Can. Blower & Forge Co., Kitchener, Ont.  
Smart-Turner Machine Co., Hamilton, Ont.
- VALVE LEATHERS**  
Can. B. K. Morton, Toronto, Montreal.  
Graton & Knight Mfg. Co., Montreal.
- VALVE GRINDERS (PNEUMATIC)**  
Cleveland Pneumatic Tool Co. of Canada, Toronto.
- VALVES, FOOT**  
Smart-Turner Mach. Co., Hamilton.
- VALVES, HYDRAULIC**  
Charles F. Elmes Eng. Works, Chicago, Ill.  
Metalwood Mfg. Co., Detroit, Mich.
- VALVES, BACK PRESSURE, STEAM**  
Sheldons, Limited, Galt, Ont.
- VENTILATING APPARATUS**  
Brantford Oven & Rack Co., Brantford, Ont.  
Can. Blower & Forge Co., Kitchener, Ont.  
Sheldons, Limited, Galt.  
H. W. Petrie, Toronto.  
A. R. Williams Machy. Co., Toronto.
- VICES, AIR OPERATED**  
Hannula Mfg. Co., Chicago, Ill.
- VICE STANDS, PORTABLE**  
New Britain Mach. Co., New Britain, Conn.
- VICES, BENCH**  
Aikenhead Hardware Co., Toronto, Ont.  
Becker Milling Machine Co., Boston, Mass.  
Foss & Hill Machy. Co., Montreal.  
New Britain Machine Co., New Britain, Conn.  
H. W. Petrie, Ltd., Montreal.  
H. W. Petrie, Toronto.
- VICES, PIPE**  
Aikenhead Hardware Co., Toronto, Ont.  
Butterfield & Co., Rock Island, Que.  
J. H. Williams & Co., Brooklyn, N.Y.
- VICES, PLANER AND SHAPER**  
Aikenhead Hardware Co., Toronto, Ont.  
Skinner Chuck Co., New Britain, Conn.
- WASHER MACHINES**  
National Machy. Co., Tiffin, Ohio.
- WASHERS**  
Barnes, Wallace, Co., Bristol, Conn.  
Dillon Mfg. Co., Oshawa, Ont.  
Graton & Knight Mfg. Co., Worcester, Mass.  
Hungerford Brass & Copper Co., New York, N.Y.  
London Bolt & Hinge Works, London, Ont.  
Steel Co. of Canada, Ltd., Hamilton, Ont.
- WATCHES, TIME STUDY**  
Silberberg, M. J., Chicago, Ill.
- WATER PURIFYING AND SOFTENING APPARATUS**  
Wm. B. Sealie & Sons Co., Pittsburgh, Pa.
- WATER CINDER MILLS**  
Whiting Foundry Equipment Co., Harvey, Ill.
- WATER JACKETS**  
Can. Welding Works, Montreal, Que.
- WATER TOWERS**  
The Jencks Mach. Co., Ltd., Sherbrooke, Ont.  
Toronto Iron Works, Ltd., Toronto.
- WATER WHEELS**  
The Jencks Mach. Co., Ltd., Sherbrooke, Ont.  
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.  
Sleeper & Hartley, Inc., Worcester, Mass.
- WAVING AND UNDERCUTTING MACHINES AND ATTACHMENTS**  
Gray Mfg. & Mach. Co., Toronto, Ont.
- WELDING MASKS**  
Strong Kennard & Nutt Co., Cleveland, Ohio.
- WELDERS, ELECTRIC, SPOT, BUTT, ETC.**  
National Electric Welder Co., Warren, O.  
Tabor Mfg. Co., Philadelphia, Pa.  
Thomson Electric Welding Co., Lynn, Mass.  
Windsor Electric Welder Co., Warren, Ohio.
- WELDING, WORK AND SUPPLIES (Autogenous and Oxy-Acetylene). SEE OXY-ACETYLENE VINCHEs**  
John H. Hall & Sons, Brantford.
- Kennedy & Son, Wm., Owen Sound, Ont.  
Northern Crane Works, Walkerville.
- WIRE COILING AND POINTING MACHINERY**  
Baird Machine Co., Bridgeport, Conn.  
F. B. Shuster Co., New Haven, Conn.  
Sleeper & Hartley, Inc., Worcester, Mass.
- WIRE CLOTH AND PERFORATED METALS**  
Canada Wire & Iron Goods Co., Hamilton.  
Hungerford Brass & Copper Co., U. T., New York.
- WIRE FORMING AND STAMPING MACHINERY**  
Baird Machine Co., Bridgeport, Conn.  
Brown, Boggs Co., Ltd., Hamilton, Canada.  
McClellan & Son, F. W., Niagara Falls, Ont.  
F. B. Shuster Co., New Haven, Conn.
- WIRE NAILS**  
Parmenter & Bulloch Co., Gananoque, Steel Co. of Canada, Ltd., Hamilton, Ont.
- WIRE NAIL MACHINERY**  
National Machy. Co., Tiffin, Ohio.  
Sleeper & Hartley, Inc., Worcester, Mass.  
A. R. Williams Machy. Co., Toronto.
- WIRE SOLDER**  
Hungerford Brass & Copper Co., U. T., New York.
- WIRE, STEEL, BRASS, COPPER, BRONZE**  
Hungerford Brass & Copper Co., U. T., New York.  
Steel Co. of Canada, Ltd., Hamilton, Ont.
- WOOD BORING MACHINES**  
Canada Machinery Corp., Galt, Ont.  
Cleveland Pneumatic Tool Co. of Canada, Toronto.  
Garlock-Walker Machinery Co., Toronto.  
Petrie of Montreal, Ltd., H. W., Montreal, Que.  
H. W. Petrie, Toronto.
- WIRE STRAIGHTENERS AND CUTTERS**  
Baird Machine Co., Bridgeport, Conn.  
Brown, Boggs Co., Ltd., Hamilton, Canada.  
F. B. Shuster Co., New Haven, Conn.
- WOODWORKING MACHINERY**  
Canada Machinery Corp., Galt, Ont.  
Can. Fairbanks-Morse Co., Montreal.  
Can. Ingersoll-Rand Co., Sherbrooke, Que.  
Garlock-Walker Machinery Co., Toronto.  
New Britain Machine Co., New Britain, Conn.  
Oliver Machy. Co., Grand Rapids, Mich.  
H. W. Petrie, Toronto.  
Petrie of Montreal, Ltd., H. W., Montreal, Que.  
R. E. T. Pringle, Ltd., Toronto, Ont.  
Silver Mfg. Co., Salem, Ohio.  
A. R. Williams Machy. Co., Toronto.
- WOOD LATHES**  
Canada Machinery Corp., Galt, Ont.  
Garlock-Walker Machinery Co., Toronto, Ont.  
Oliver Machy. Co., Grand Rapids, Mich.
- WORKS STANDS, PORTABLE**  
New Britain Mach. Co., New Britain, Conn.
- WRENCHES**  
Armstrong Bros. Tool Co., Chicago, Ill.  
Butterfield & Co., Rock Island, Que.  
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Keystone Mfg. Co., Buffalo, N.Y.  
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# CANADIAN MACHINERY

## AND MANUFACTURING NEWS

*A weekly newspaper devoted to the machinery and manufacturing interests.*

Vol. XVIII.

TORONTO, JULY 26, 1917

No. 4

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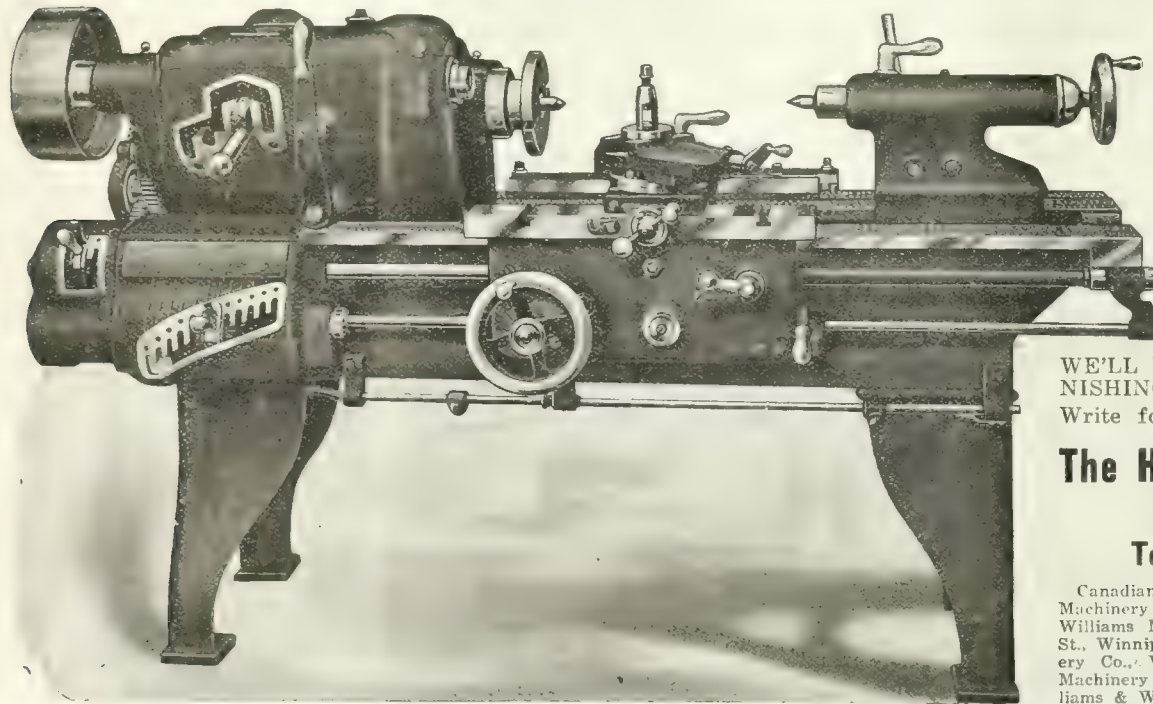
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These are up-to-date Shapers, designed for modern shop production.

They are plain in design, yet embody all essential features necessary for efficient work.

Every adjustment is convenient for the operator and fine for the most accurate work.

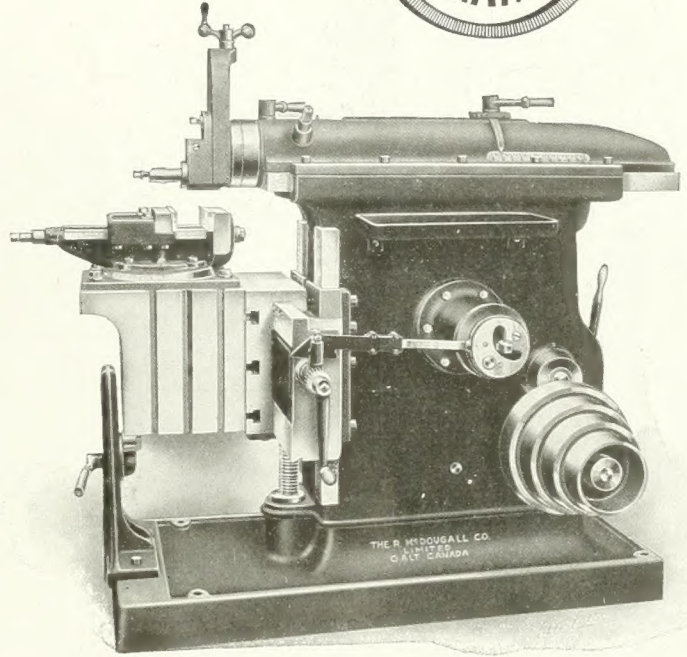
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# MACHINE TOOLS

## SHAPERS.

- 1—16" Ohio Heavy Duty.
- 1—20" Ohio Heavy Duty.
- 1—20" Smith & Mills.
- 1—20" Queen City.

## LATHES.

- 3—30 x 14 Boye & Emmes Q. C. G. and D. B. G.
- 2—28 x 12 " " " "
- 2—26 x 12 " " " "
- 2—24 x 12 " " " "
- 2—19 x 10 Sidney Lathes, Q. C. G. and D. B. G.
- 1—17 x 8 Sidney Lathes, Q. C. G. and D. B. G.
- 1—19 x 10 Sidney Lathes, Q. C. G., D. B. G. with taper attachments, draw-in attachment and collets.
- 3—18 x 8 Mueller Lathes, Q. C. G. and D. B. G.
- 2—13 x 5 Champion Standard Engine Lathes.
- 1—13 x 5 Perfect, Standard Engine Lathe.
- 1—12 x 4 Mulliner Tool Room Lathe.
- 1—24 x 24' New Haven Standard Engine Lathe (used).
- 5—21 x 8 Le Blond Heavy Duty Turret Lathes (used).
- 5—18 x 8 Battle Creek Heavy Duty Shell Lathes (used).
- 8—21 x 8 LeBlond Automobile Lathes for 4.5 shells (used).
- 1—36 x 14 Conradson Turret Lathe (used).
- 1—Fay & Scott Turret for 24" lathe.
- 1—18 x 8 Gardener Standard Lathe (used).
- 1—12" Speed Lathe.

## DRILLING MACHINES.

- 1—3' 0" Swift Radial Drill.
- 1—24" Sibley Sliding Head.
- 1—28" Sibley Sliding Head.
- 1—28" Barns Sliding Head.
- 1—14" Henry & Wright 4-spindle.
- 2—14" Reed Sensitive Drills, 3 spindles.
- 2—14" Reed Sensitive Drills, 2 spindles.
- 4—14" Single Spindle Sensitive Drills.
- 14—20" Back Geared Presses.

## MILLING MACHINES.

- 2—No. 25 Ohio Heavy Duty, universal miller.
- 1—No. 2 Kempsmith Universal Miller.
- 1—No. 2 Ford Smith Miller.
- 2—12" Garvin Dividing Heads.

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- 1—24" Skinner Round Body Planer Vise.
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- 1—No. 6 Foster Screw Machine.
- 1—No. 4 Foster Screw Machine.
- 1—1" Himoff Turret Screw Machine.
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- 1—180 Brown & Boggs Power Press.
- 1—700 lb. Bell Steam Hammer (used).
- 1—No. 2 Brown & Sharp Chucking Machine (vertical).

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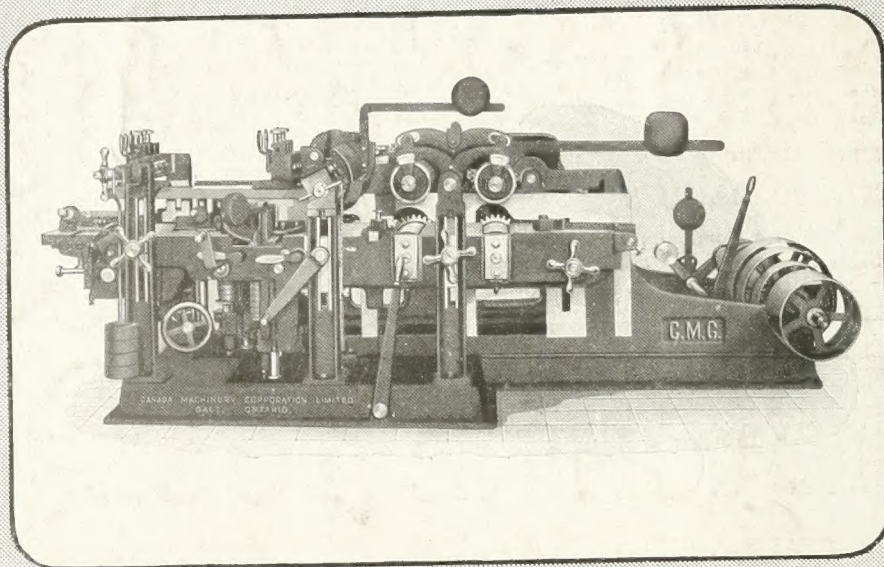
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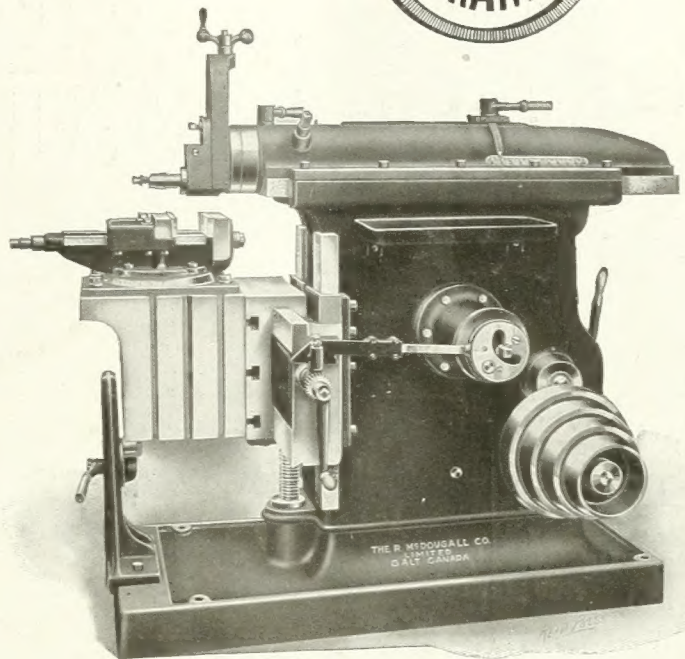
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# MACHINE TOOLS

## LATHES

- 4—30" x 14' Boye & Emmes 4 step cone D.B.G., instantaneous change gear and double plate apron
- 3—28 x 12 Boye & Emmes 4 step cone D.B.G., instantaneous change gear and double plate apron
- 3—26 x 12 Boye & Emmes 3 step cone D.B.G., instantaneous change gear and double plate apron
- 2—24 x 12 Boye & Emmes 3 step cone, D.B.G., instantaneous change gear and double plate apron
- 2—19 x 10 Sidney Engine Lathes, quick change gear, D.B.G.
- 3—18 x 8 Mueller Engine Lathes, quick change gear, D.B.G.
- 1—24' x 24" New Haven Standard Engine Lathe, 5 step cone, single back gear
- 5—21 x 8 Le Blond heavy duty turret lathes, Q.C. gear box, air cylinders and chucks for 4.5 shells (used)
- 5—18 x 8 Battle Creek heavy duty shell turning lathes (used)
- 1—15 x 10 South Bend standard engine lathe
- 2—13 x 5 Champion standard engine lathes
- 1—13 x 5 Perfect standard engine lathe
- 1—19 x 12 Sidney Q.C.G. Lathe, with taper attachment, draw-in attachment and collets

- 10—21 x 8 Le Blond Q.C.G. Automobile Lathes for turning 4.5 shells (used)
- 1—36 x 14 Conradson Turret Lathe, 3 step cone, triple back geared (used)

## SHAPERS

- 1—20" Queen City Back Geared
- 1—20" Ohio Heavy Duty Crank Shaper
- 1—20" Smith & Mills Back Geared

## MILLING MACHINES

- 1—No. 2 Brown & Sharpe plain Milling Machine (used)
- 1—No. 2 Ford-Smith plain Milling Machine
- 1—No. 2B Hendey Heavy Duty Universal Miller
- 1—No. 25 Ohio Heavy Universal Miller
- 1—No. 1 Standard Hand Miller
- 2—12 Garvin Dividing Heads

## GRINDING MACHINES

- 1—W. F. Fraser Universal Cutter & Tool Grinder
- 2—No. 3 Ohio Universal Cutter & Tool Grinder
- 2—Garvin Surface Grinder
- 1—Style B Yankee Twist Drill Grinder
- 1—Style F Yankee Twist Drill Grinder
- 3—Pedestal grinders for 8 to 10" wheels
- 4—Pedestal grinders for 12" wheels
- 3—Pedestal grinders for 14" wheels
- 2—Pedestal grinders for 18" wheels

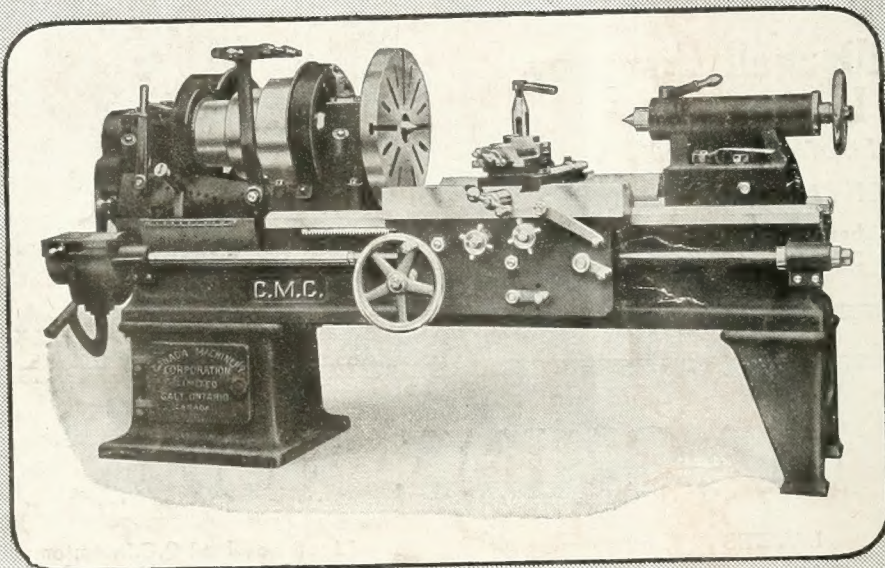
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