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# CANADIAN MACHINERY AND MANUFACTURING NEWS

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

Vol. XIV

Publication Office: Toronto, September 30, 1915

No. 14

## BERTRAM MACHINE TOOLS

This 24" Crank Slotter is a splendid example of the Bertram Safety First line of machine tools.

Every possible point of danger is thoroughly guarded.

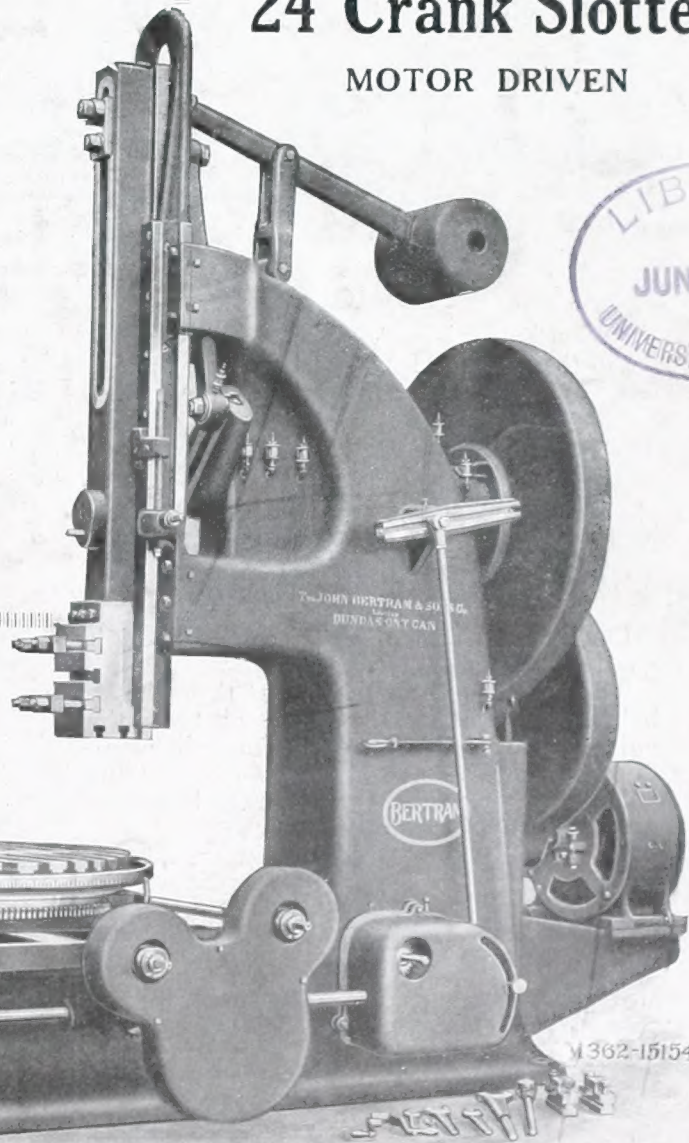
Link up with Bertram Tools and you'll ensure both safety and service.

Drop a line for full particulars.



### 24" Crank Slotter

MOTOR DRIVEN



### The John Bertram & Sons Co. Limited

Dundas, Ontario

MONTREAL  
723 Drummond Bldg.

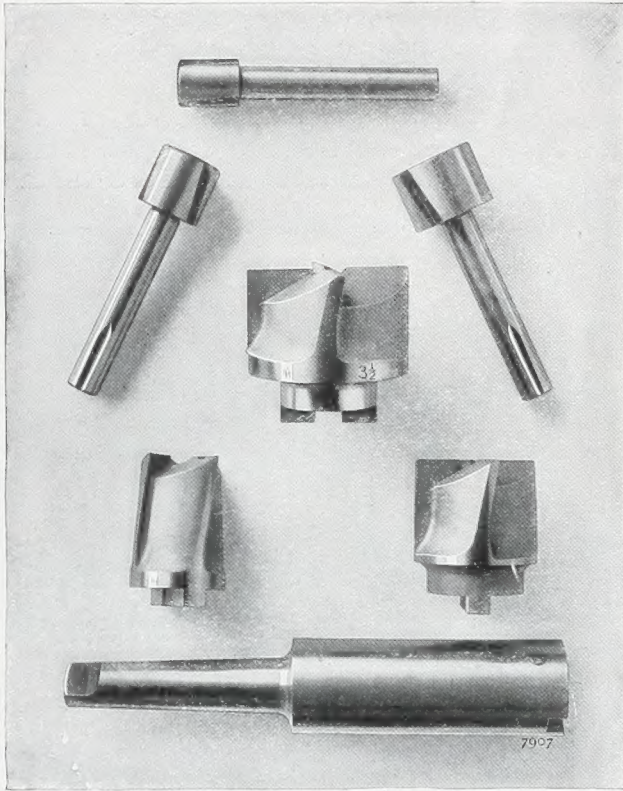
VANCOUVER  
609 Bank of Ottawa Bldg.

WINNIPEG  
1205 McArthur Bldg.

362-15154



# Make Your Own Combination



## HOLDERS

End of holder is milled to receive the driving lug of the cutter and there is also a hole and set screw to accommodate the shank of the guides.

## GUIDES

Are of hardened tool steel. They are held in place by means of a set screw in the holder engaging a V-slot in the shank of the guide.

## CUTTERS

Can be furnished of either carbon or high speed steel.

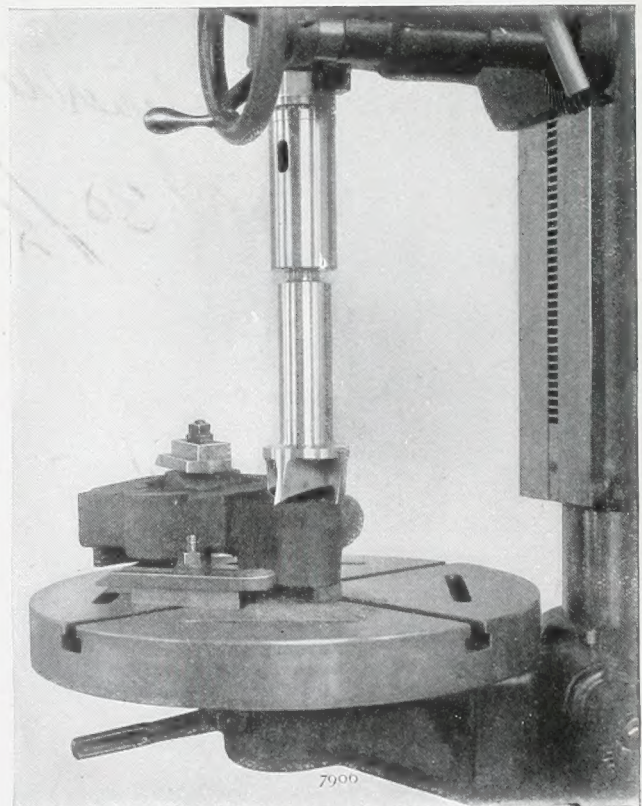
The shank of the guide passes through the hole in the cutter and the shoulder between the guide and its shank keeps the cutter in place. Cutters can be sharpened on the face and the guide is simply pushed further in the hole after grinding.

Write for catalog "Small Tools" showing our complete line.

For every counterboring job you can make immediately the right combination of holder, cutter and guide if your tool room is equipped with

## P. & W. Interchangeable Cutter Counterbores

Holders, Cutters and Guides furnished in wide range of sizes.



Spot Facing  
with a P. & W. Interchangeable Cutter Counterbore

Place a trial order with our nearest store.

# Pratt & Whitney Company of Canada, Limited

DUNDAS  
Ontario

MONTREAL  
723 Drummond Bldg.

WINNIPEG  
Bank of Hamilton Bldg.

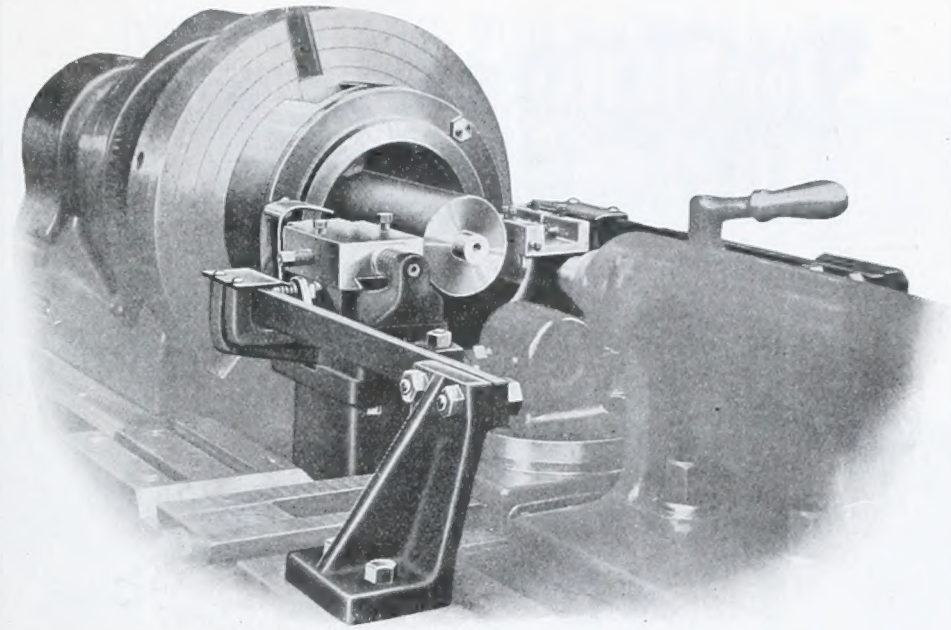
VANCOUVER  
B.C. Equipment Co.

The advertiser would like to know where you saw his advertisement—tell him.





# Why Go to a big expenditure for Machinery for Shell Making?



WAVE RIBBING ATTACHMENT FOR 4.5" H.E. SHELLS.  
Similar Fixture also supplied for 18 Pr. Shrapnel and 18 Pr. H.E. Shells.

*We can supply you with attachments to  
fit your regular lathes for all operations*

THE OUTPUT WILL PROVE VERY INTERESTING. Let us tell  
you about it and quote you prices.

## The John Bertram & Sons Co. Limited

Dundas, Ontario, Canada

MONTREAL  
723 Drummond Bldg.

VANCOUVER  
609 Bank of Ottawa Building

WINNIPEG  
1205 McArthur Bldg.




*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*



# The Publisher's Page

By B.G.N.



## JOHN H. HALL & SONS, LIMITED.

### ENGINEERS

#### PIPE THREADING AND SPECIAL MACHINERY.

JOHN H. HALL, PRESIDENT  
 LESLIE S. HALL, VICE-PRESIDENT  
 WINTON E. HALL, SECY & TREASURER  
 ERNEST L. HALL, DIRECTOR  
 REGINALD A. HALL, DIRECTOR

PHONE 647

BRANTFORD, CANADA.

Sept. 10, 1915.

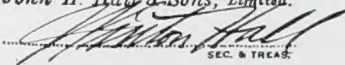
The Canadian Machinery & Manufacturing News,  
 143 University Ave.,  
 Toronto, Ont.

Gentlemen;-

-Attention of Mr. Newton-

Answering your favor of the 9th inst. in reference to the report that we had received a large order from a British concern as the result of our advertisement in your previous Shell issue, we would say that we received many inquiries from British firms and are now negotiating with one of the largest and feel quite confident that we will secure a large volume of business.

Very truly yours,

*John H. Hall & Sons, Limited.*  
  
WINTON E. HALL, SECY & TREAS.

*Rate cards and full information will be sent on application.*

**CANADIAN MACHINERY**  
 143-153 UNIVERSITY AVE. . . . . TORONTO, CANADA

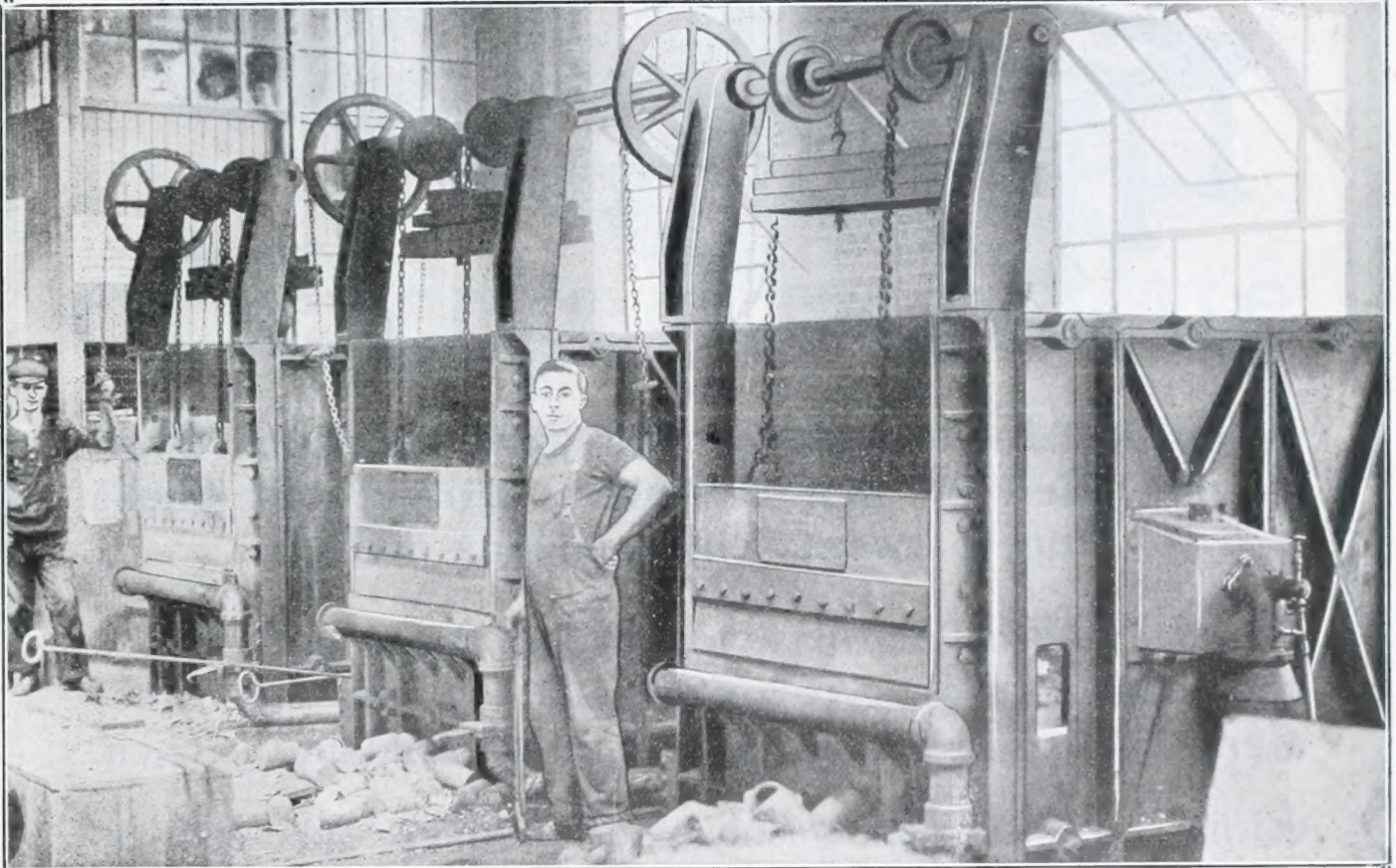
*The advertiser would like to know where you saw his advertisement—tell him.*



# Heat-Treating Furnaces for **SHELL WORK**

**“MECOL” FURNACES** especially designed for this work  
are giving entire satisfaction with **OIL,**  
**GAS,** and other fuel

**DESIGNED AND BUILT IN CANADA**



**Battery of our Furnaces in Operation in the Shell Shop of Canadian Vickers, Limited**

‡ Shell, Howitzers and Cartridge Cases must be accurately **HEAT TREATED** for successful manufacture.

‡ See our Special Continuous Furnace for annealing Brass Cartridge Cases before buying your equipment.

‡ Largest manufacturers have them in use. Full particulars on request.

*All Furnaces designed and built under personal supervision of*

**F. DITCHFIELD, “THE FURNACE MAN”**

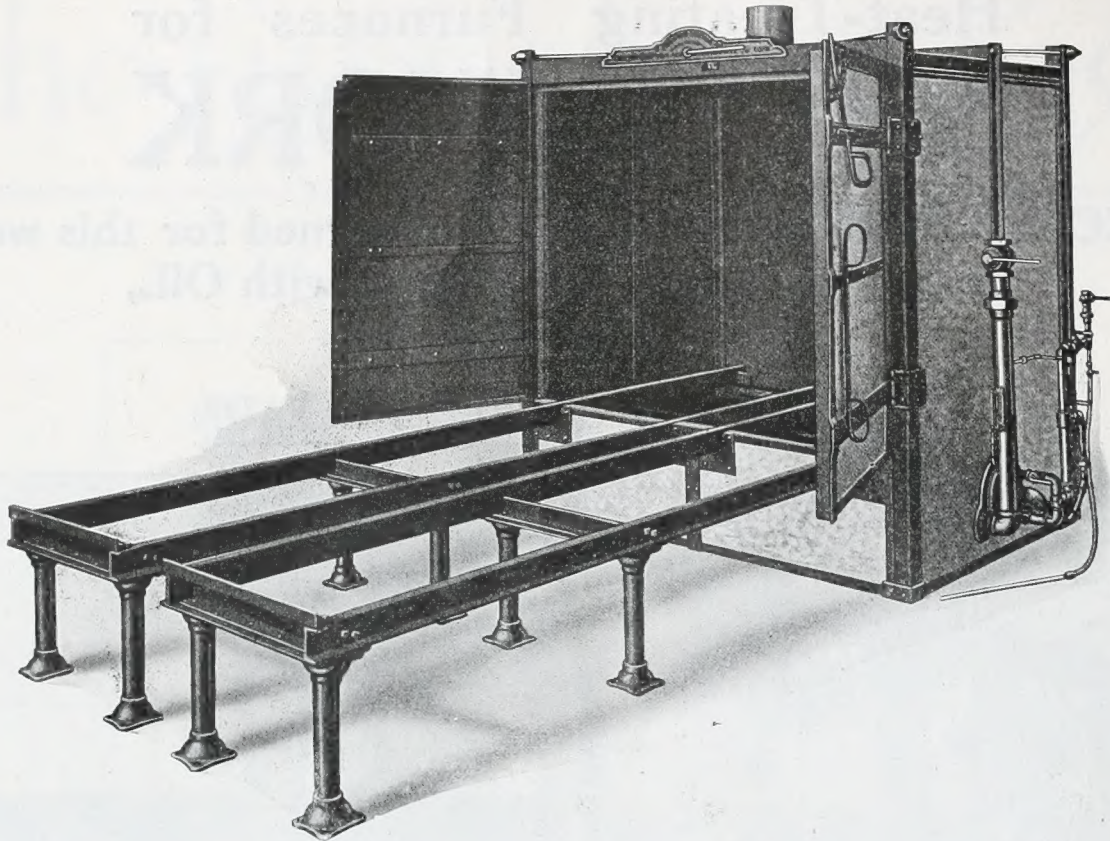
**Mechanical Engineering Company, Limited**

PHONE—MAIN 3585

55 COTE STREET, MONTREAL, QUE.

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*





**A convenient type of Crawford Sectional Oven largely used by manufacturers turning out Shells up to twenty-eight pounds each.**

The method of heating explained in previous issues is the same with all types of Crawford Ovens—no direct flame coming in contact with the material in the oven.

Either city, natural, gasolene or producer gas can be used with any type of oven.

Ovens and trucks built for baking the varnish or finish on any number or size of shells required at a time.

**The Oven Equipment & Manufacturing Company**  
NEW HAVEN, CONN.

Canadian Representatives: THE A. R. WILLIAMS MACHINERY COMPANY, LIMITED, TORONTO, CANADA

*The advertiser would like to know where you saw his advertisement—tell him.*



# High Speed Steels

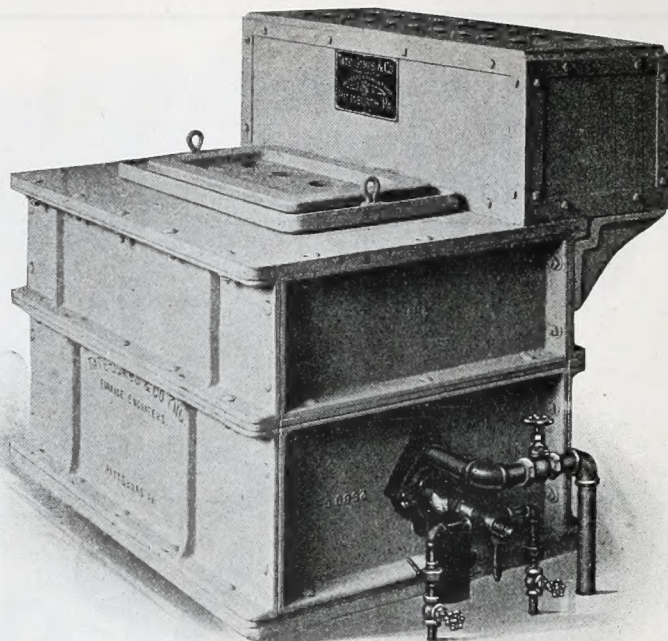
of exceptional value

VANADIUM-ALLOYS STEEL  
COMPANY

PITTSBURGH, PENNA.



# 36 Tate-Jones FURNACES for THIS PLANT



AMERICAN CAN COMPANY,  
DEPARTMENT B  
120 BROADWAY NEW YORK  
PURCHASING DEPARTMENT ORDER

SHOW THIS NO. ON INVOICE

ORDER No. P.P. 7196

Dept. B. \_\_\_\_\_ FACTORY

PLEASE SHIP TO Shipping instructions to be furnished

ADDRESS later.

September 5th, 1915.

VIA \_\_\_\_\_

Tate-Jones & Co., Inc.,

Pittsburgh,

Pa.

SEND ACKNOWLEDGMENT OF ORDER, INVOICES IN DUPLICATE,  
AND ALL SHIPPING DOCUMENTS TO ABOVE FACTORY ADDRESS.

COMMODITY

36 #3029-A preheater furnaces. at \$200.00 each Furnace.  
8 of the above to be fitted with 8 spindles for nose heating, but  
are the same Furnaces as the pre-heating Furnace.  
DELIVERY. Two pre-heaters and one with spindles in two weeks,  
balance in six weeks.

P. O. B. 10073100, Pa.

TERMS: 1/10, net 30 days.

THIS MATERIAL MUST BE DELIVERED NOT LATER THAN  
OTHERWISE ADVISE, AT ONCE.

AMERICAN CAN COMPANY

*W. B. Sullivan*  
General Purchasing Agent

WHEN THIS IS DELIVERED OUR WORKS FREIGHT TO DESTINATION.  
WHEN P. O. B. SHIPPING POINT, LET CHARGES FOLLOW SHIPMENT.  
SEND MONTHLY STATEMENT OF ACCOUNT TO THE AMERICAN CAN COMPANY, DEPT. B, 120 B'WAY, NEW YORK

WHEN REFERRING TO THIS ORDER USE ABOVE ORDER NUMBER

FORM 101, 1914

## Pre-Heater Lead Bath Furnace

This furnace particularly adapted for heat-treating the Russian Shrapnel.

Capacity:  
20 shells in pre-heater.  
8 shells in lead bath.

Shells heated to 700 degrees or 800 degrees F. in pre-heater, saving time and considerable fuel.

Ask for list of users and complete information.

WRITE FOR BULLETINS:  
"SHELLS AND SHELL FURNACES"

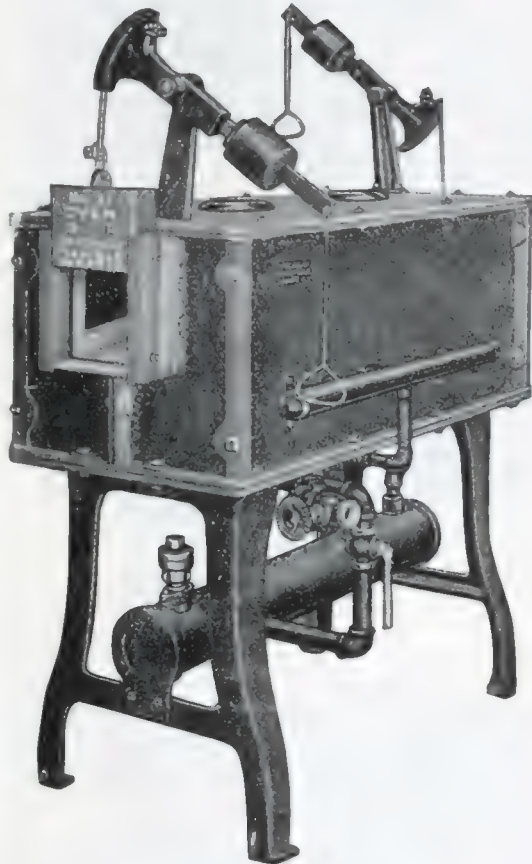
**TATE-JONES & CO., Inc., Pittsburgh, Pa.**  
FURNACE ENGINEERS

The advertiser would like to know where you saw his advertisement—tell him.



# Stewart Gas and Oil Furnaces

## FOR MUNITION MAKERS



**STEWART SPECIAL No. 21 OVEN**  
For Heat Treating Brass Shells, etc.

One of our Canadian customers has a contract for 12,000,000 Charger Clips.

For economical fuel consumption and for convenience in handling he has installed three furnaces similar in appearance to the No. 25 Stewart Oven, but with opening 6" high, 18" wide and 24" deep—complete with separate blowers and pyrometers. Gas was not available at this plant, so the equipment was fitted with oil burners. The price on the furnace just named is \$160.00 and \$40.00 for the blower.

The No. 25 Oven (illustrated) has an opening 14" x 22" x 60" and the price is \$495.00 with blower, and \$360.00 without blower.

This Special Stewart No. 21 Oven was designed especially for one of the largest manufacturers of high explosive shells; they are now using 14 of them. It has an opening at both ends and is fitted with a U-shaped bottom slab (to prevent the flame from striking the work and to prevent the parts from falling into the combustion chamber). The opening is 6" high, 8" wide and 42" deep, and occupies a floor space 31" x 60", and consumes about 250 cubic feet of gas per hour.

Dimensions may be varied to take care of different sizes.

**Price complete with blower - \$330.00**  
**Price without blower - - - 265.00**

There is a Stewart Furnace suitable for practically every heat-treating job and which will show a big saving in the cost of the finished product. The saving is not always shown on the cost of fuel, but if you could double your output with the same number of men at a fuel increase cost of one-half, you would still be ahead—to say nothing of the lower per cent. of spoilage.

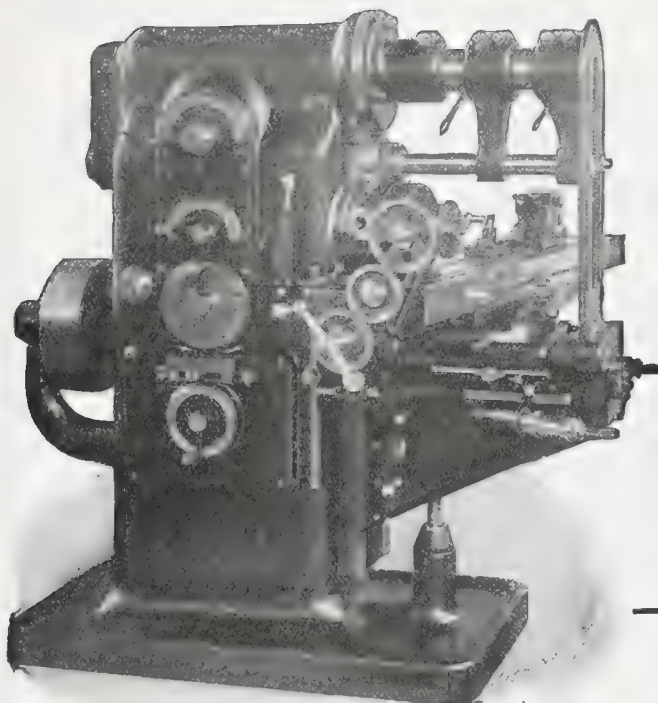


**STEWART No. 25 OVEN**

## Chicago Flexible Shaft Co.

210 to 230 Ontario St., CHICAGO

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*



## The New No. 2 Rockford Universal Miller

has back gearing which furnishes unusual power to spindle.

It takes extreme cuts with **speed** and **accuracy**.

A wide range of work can be put up to this new "Rockford," obtaining most efficient service and **results**.

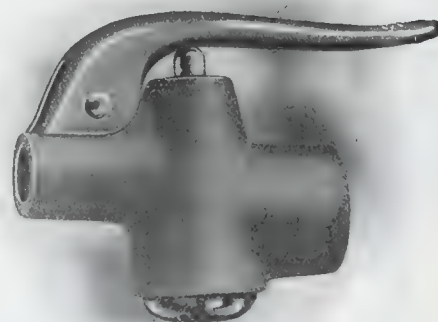
Circulars describe many exclusive features.

Send for them now.

**Rockford Milling Machine Co.**  
ROCKFORD, ILLINOIS, U.S.A.

Utility  
Rigidity  
Strength

# CLEAN WITH AIR



At slight cost a whole shop may be equipped with a system for cleaning inaccessible parts of machinery, tools, patterns, etc.

If air is available a series of small pipe lines may be placed so that hose connections can be made at desirable points.

Put an "Imperial" blow gun on the end of each length of hose and do away with the necessity of opening and closing a globe valve. The gun will not leak.

"One blast will clean a drilled hole."

**Get one for experimental purposes. It will pay.**

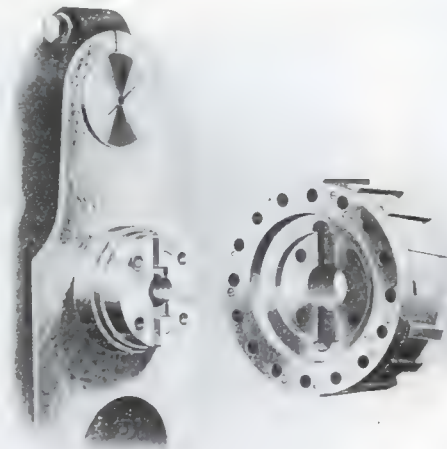
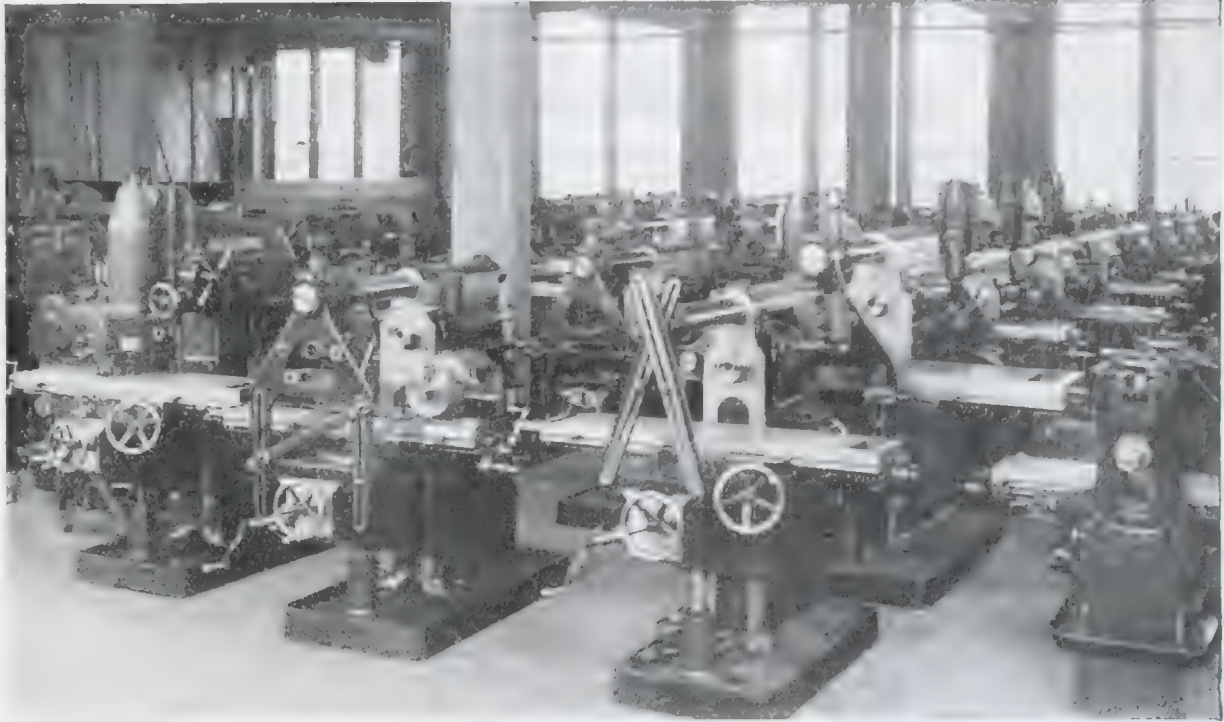
**CANADIAN  
INGERSOLL-RAND  
COMPANY, LIMITED**

Montreal, Canada

Sydney Toronto Cobalt Timmins Winnipeg  
Nelson Vancouver

*The advertiser would like to know where you saw his advertisement—tell him.*





*The Bulletin which describes this latest Cincinnati Milling improvement is just off the press. Where shall we address your copy?*

## The Cincinnati Milling Machine Company

CINCINNATI, OHIO, U.S.A.

Canadian Agents: H. W. Petrie, Ltd., Toronto, Ont.  
H. W. Petrie of Montreal, Ltd., Montreal, Que.  
Taylor Engineering Co., Ltd., Vancouver, B.C.

## Complete Interchangeability of Face Mills

### Another Big Cincinnati Milling Improvement

We designed these flanged spindle ends, with hardened keys, for our large size High Power Millers and then adopted them for all Cincinnati Millers of High Power Design, Plain, Universal and Vertical, also 28" Semi-Automatics. These spindle ends are all of the same size. Hence any one face mill will fit all of the 22 different sizes of Cincinnati Milling Machines shown above.

#### Now for further advantages :

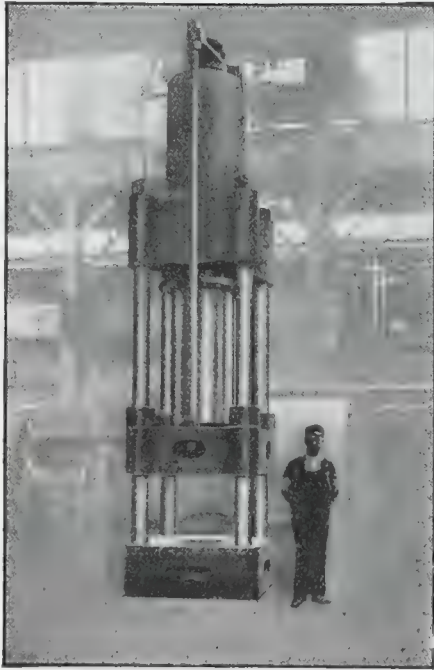
Understand, first, the cutter is slightly counterbored to fit closely over the spindle end for centering it and is held in place by bolts. There is no centering plug required.

The drive is entirely through the hardened keys which are fitted to and form part of the spindle end.

The drive is powerful, durable and positive. And the face mills are easily put on and, even after heavy service, easily taken off.

Cutter arbors for these machines have a similar flange with a corresponding keyway. They are driven direct by the same keys in the flanged spindle end that are used for driving face mills. There is no intermediate driving collar.

# QUICK DELIVERIES OF PRESSES and ACCUMULATORS ALL TYPES AND SIZES

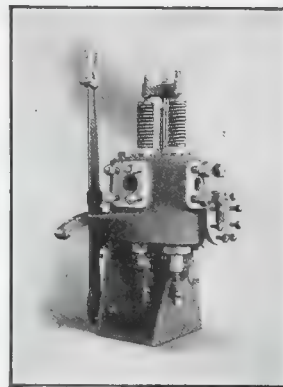


300-TON HYDRAULIC PRESS

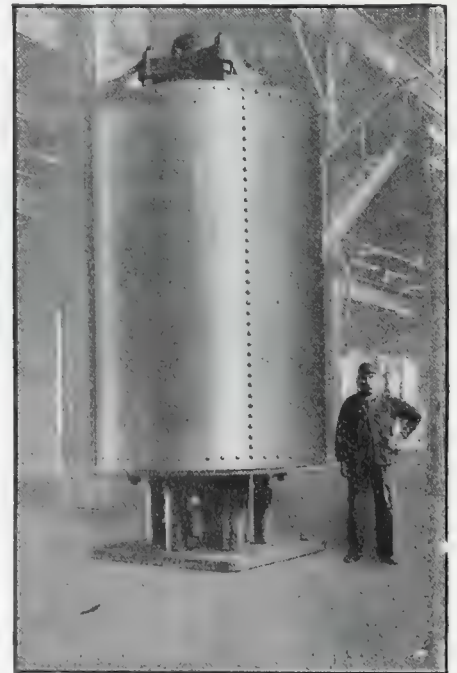
HYDRAULIC PRESSES FOR PIERCING, DRAWING,  
CUPPING, ETC.

STEAM-HYDRAULIC PRESSES FOR GENERAL  
FORGING WORK.

ACCUMULATORS AND PRESS  
OPERATING VALVES.



PRESS OPERATING  
VALVE



HYDRAULIC ACCUMULATOR

OUR LONG EXPERIENCE AND UNEXCELLED  
FACILITIES ENABLE US TO GIVE YOU  
EFFICIENT SERVICE IN DESIGNING AND  
BUILDING THIS CLASS OF MACHINERY.

## MESTA MACHINE COMPANY

PITTSBURGH, PA., U. S. A.

DESIGNERS AND BUILDERS

GAS AND STEAM ENGINES, ROLLING MILL MACHINERY, SHEARS, SAWS, ETC.

*The advertiser would like to know where you saw his advertisement—tell him.*



# SOUTHWARK

## HYDRAULIC MACHINERY

### For All Purposes

- |                  |               |
|------------------|---------------|
| Presses          | Pumps         |
| Riveters         | Accumulators  |
| Cranes           | Hoists        |
| Intensifiers     | Jacks         |
| Leather Packings | Pipe Fittings |
| Gauges           | Valves        |
| Etc.             | Etc.          |

### Other Southwark Products

- Centrifugal Pumps.
- Turbo Generators for Direct and Alternating Current.
- Turbo Blowers.
- Turbo Pumps.
- Surface and Jet Condensers with their Auxiliaries.
- Southwark-Harris Valveless Oil Engine for Marine and Stationary use, built in sizes up to 1500 B.H.P.



700-Ton Press

## Southwark Foundry & Machine Company

PHILADELPHIA

Founded 1836

Old Colony Building, Chicago

Brown-Marx Building, Birmingham

"First Builders of Large Centrifugal Pumps in America."

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*

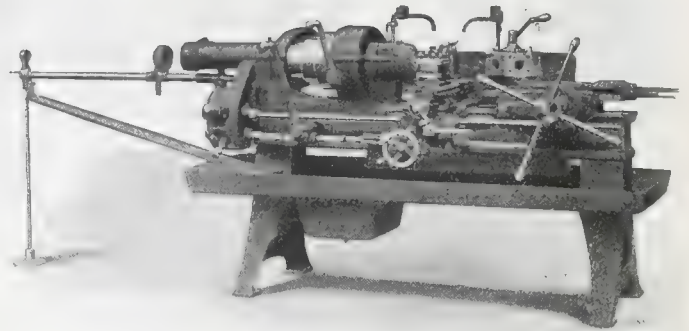
## For Double Duty

While the tools of the hexagon turret are boring or turning, you can face or form or undercut with the tools of the square turret on the carriage, thus taking two cuts at one time on the

### No. 4 UNIVERSAL Turret Screw Machine

This is because the carriage and turret saddle have separate feed shafts, entirely independent of each other, and each with a wide range of feeds adaptable to any diameter within the capacity of the machine.

Incidentally, the exceptionally broad equipment of standard tools provided for this machine makes it possible, without special tools, to handle almost any kind of work with great rapidity, accuracy and economy.



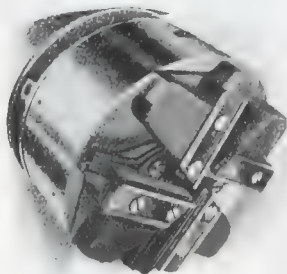
No. 4 Universal Turret Screw Machine with Bar Equipment.

To find the time-saving on your work, send blueprints with rough and finished samples.

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

Canadian Agents: A. R. Williams Machinery Company, St. John, Toronto, Winnipeg, Vancouver; Williams & Wilson, Montreal

## Use the Landis Die Head to Reduce the Cost of Threading



Steel Die Head.

The Landis die head is constructed on an economic basis. The chasers have a life which averages from fifteen to twenty times that of any other type of die. They are interchangeable to the extent that any one or more can be replaced without renewing the entire die. They have a flexible rake angle, a permanent throat and never require annealing, hobbing or retempering.

The one sure way to reduce the cost of bolt and pipe threading is to install the Landis die head. Prices on request.

WRITE FOR DETAILS.

**LANDIS MACHINE COMPANY, Incorporated**  
WAYNESBORO, PA., U.S.A.

Exclusive Canadian Agents:—Williams & Wilson, Limited, Montreal, Canada

*The advertiser would like to know where you saw his advertisement—tell him.*



# KEMPSMITH

## MILLING MACHINES

Embody the following three distinctive features of construction, which make them unusually rigid and convenient in operation:

### Keyed Overhanging Arm

This patented feature provides for positive alignment of arbor and boring bar, and prevents the cutter being pounded out of line under cut.

### Keyed Spindle Nose

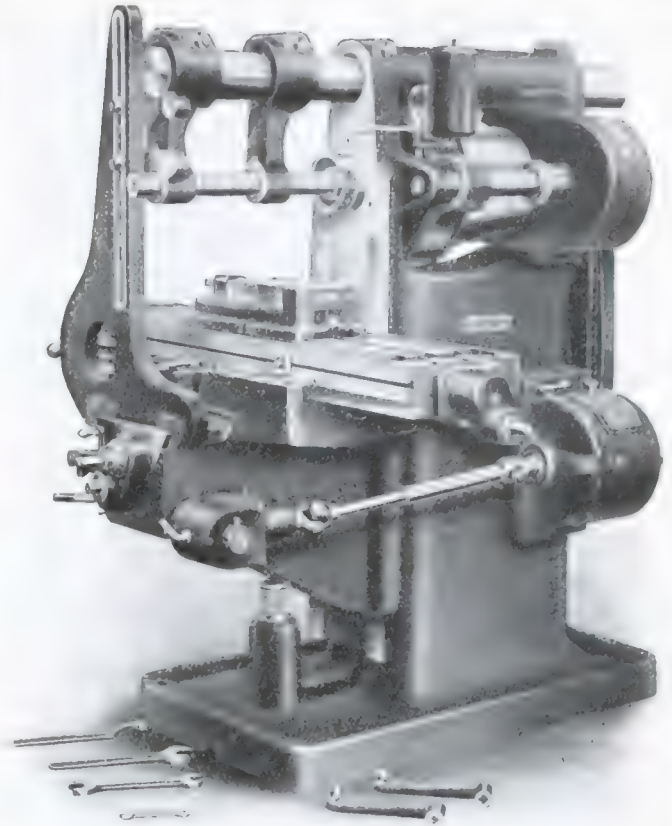
Our patented spindle nose is slotted for positive drive of arbor, and also permits the use of either right hand or left hand face milling cutters.

### Reversible Outboard Support

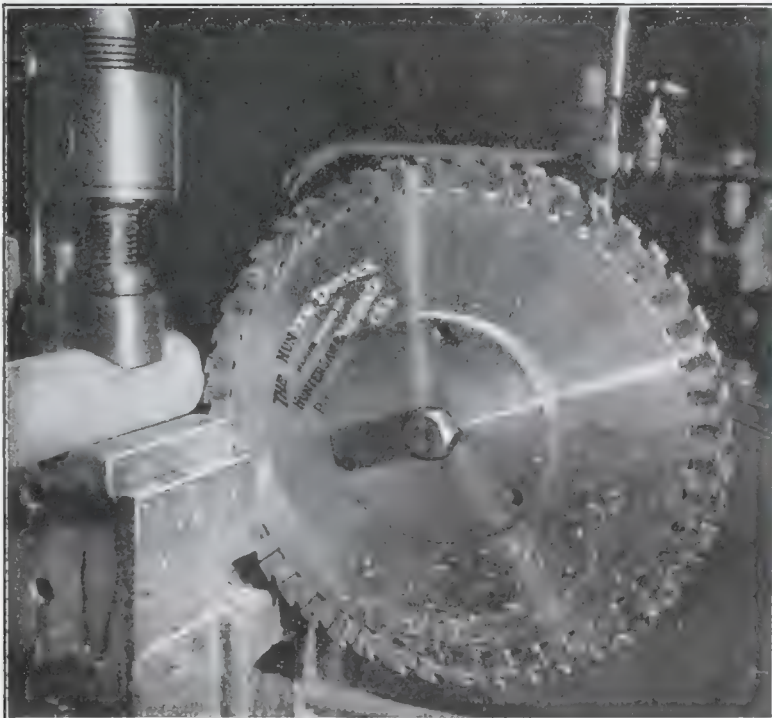
Outboard support is a rigid one piece casting, reversible according to direction of cut. It leaves ample room for the operator to handle his work.

Catalog explaining this and other features gladly sent on request.

**KEMPSMITH MFG. COMPANY**  
MILWAUKEE, WIS.



## A Hunter "Duplex" on Shrapnel Stock



**FAST GOING**  
on Newton Machine

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

**2 MINUTES**

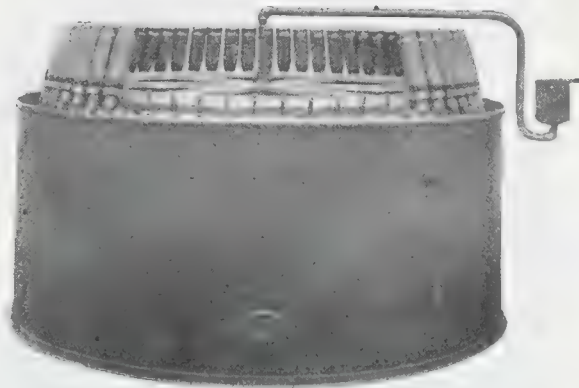
The secret of Hunter "Duplex" Saw speed is the method of holding the high speed teeth.

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

*Let us send full Particulars.*

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

## Shell Painting, Nosing and Banding Machines



PAINTING MACHINE



4.5 and 60 POUNDER SHELL  
BANDING and STAMPING MACHINE

**SIMPLICITY:** That is the beauty of these machines; they are so simple that a woman or even a child can control them. This is an important feature in reducing operating expenses.

Banding Press is sold without stamping attachment if desired.

Painting Machine is operated with an ordinary air drill, and, if desired, a heating coil under table, enclosed in a sheet steel shell, can be supplied, as shown in cut.

**Canadian Locomotive Company, Limited, Kingston, Ont.**

SALES HANDLED EXCLUSIVELY BY

The John Bertram & Sons Company, Limited, Dundas, Ontario, our agents for these machines

# Shell Banding

The action of this pneumatically operated Banding Press is such that the dies strike a sharp blow and exert a heavy pressure, firmly forcing the band into the shell groove.

It is all ready to connect to your shop line. Production is only limited to your operator's ability to handle the shells. One operator and helper could easily produce three to four shells per minute.

The capacity of the machine is up to 5½" shells.

For full details and price write



**THE MOTT & MERRYWEATHER MACHINERY CO.**

CLEVELAND

DETROIT

CINCINNATI

PITTSBURGH

In our Cleveland warehouse we have some 500 second-hand machines of all kinds, ready for immediate delivery.

*The advertiser would like to know where you saw his advertisement—tell him.*



# HYDRAULIC PRESSES

For Piercing and Drawing

## SHELLS AND PROJECTILES

Our facilities for manufacturing Hydraulic Presses assure you a product of very high quality and efficiency at reasonable cost.

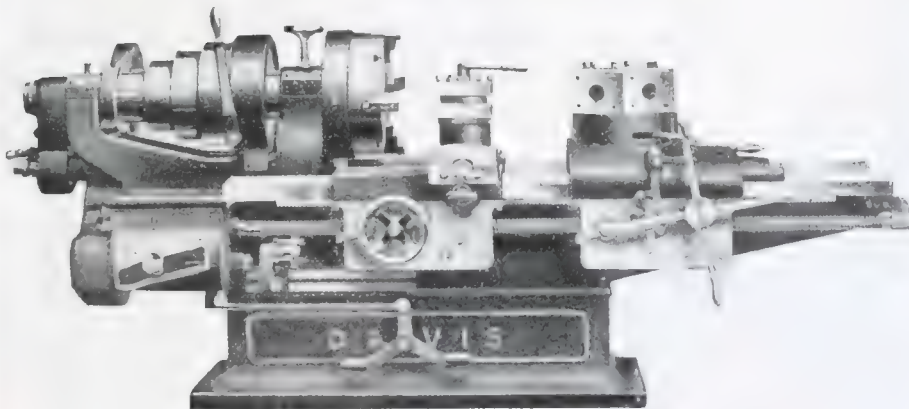
Write us now. We are in a position to give you **PROMPT DELIVERY.**

The William Cramp & Sons Ship and Engine Building Company  
PHILADELPHIA, PA.

DRAWING PRESSES



# SHELLS!



Heavy Duty 26' Turret Lathe

Particularly adapted for 4.5, 5 and 6 inch shells.

WRITE FOR PRICES AND DELIVERIES

## GARLOCK—MACHINERY

197 Wellesley Street

TORONTO

Telephone North 6849

Also  
ENGINE LATHES,  
CUTTING-OFF  
MACHINES,  
DOUBLE and  
SINGLE SPINDLE  
HORIZONTAL DRILLS

Prompt Shipment



# Two Cuts

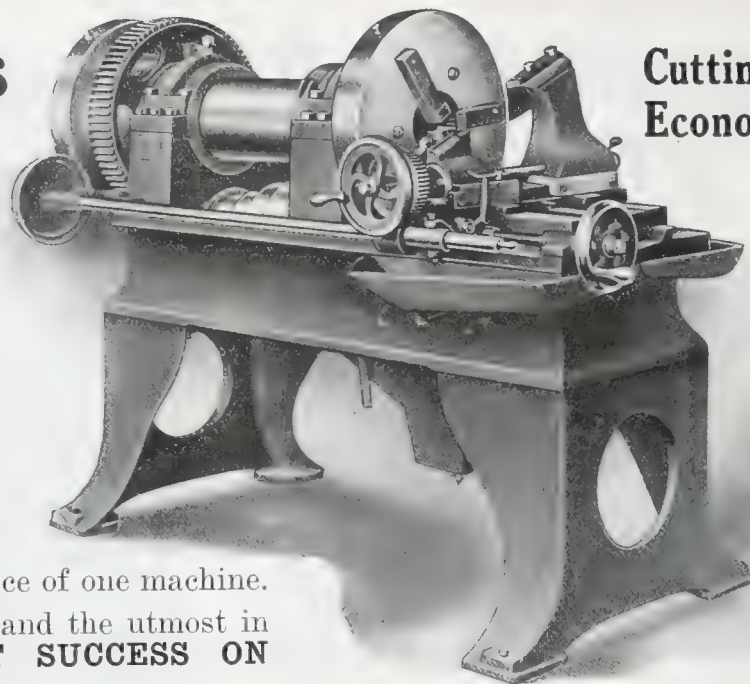
## Simultaneously

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.



**Cutting-off  
Economy**

5-inch Accelerated Machine

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

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



No. 314 Heavy Pattern High-Speed Drill

**IT'S A BAKER**

**Enlarging 2½" hole to 4" in  
hammered steel forgings at  
the rate of 4" feed per minute**

THIS DRILL PRESS HAS AMPLE CAPACITY TO DRIVE 3-INCH, HIGH-SPEED DRILLS TO THE LIMIT OF THEIR EFFICIENCY IN STEEL. IT WILL BORE WITH GREAT EFFICIENCY IN STEEL OR CAST IRON UP TO 6 INS.

A rigid, rapid, powerful machine, driven by positive, fast-running gears immersed in oil. Eight speed and twelve feed changes within easy control of the operator.

BAKER DRILLS ARE POPULAR TOOLS ON LYDDITE AND SHRAPNEL because they produce accurate and dependable work at extremely low labor cost, low installation cost and they take small floor space.

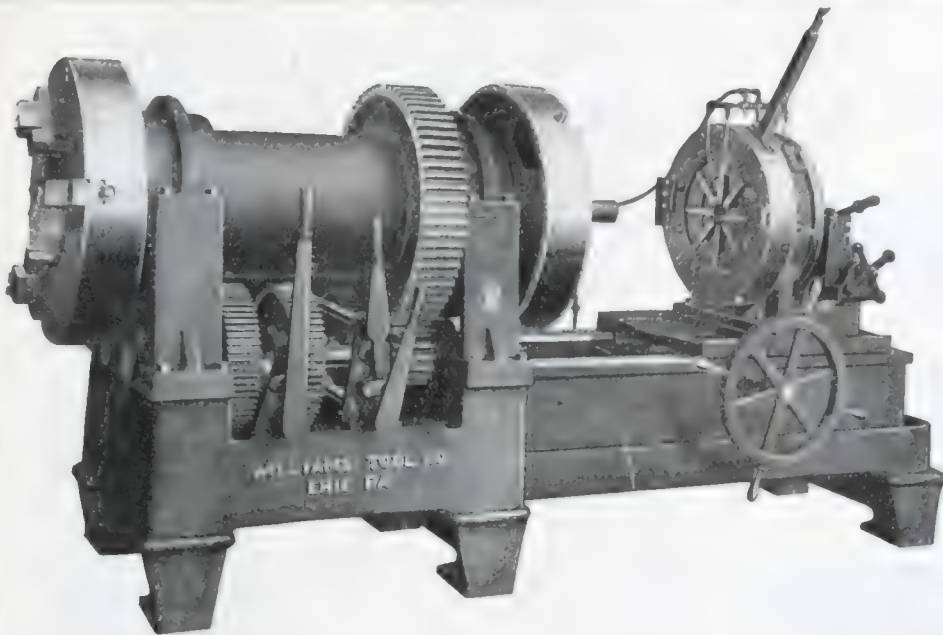
May we furnish more reasons why you need them?

**BAKER BROTHERS**  
TOLEDO, OHIO, U.S.A.

Sales Agents: The A. R. Williams Machinery Company, Limited, Toronto, Canada

*The advertiser would like to know where you saw his advertisement—tell him.*





The gas light was a big improvement over the tallow dip, but it had to give way to the electric light; and the Tungsten has superseded the little glimmer that once delighted us.

If you are still employing pipe-cutting methods as antiquated as the tallow dip, you need a Williams Pipe Machine, which occupies the same position in the pipe-cutting field as the Tungsten does in the lighting world, to bring you up-to-date.

*Let us quote you prices and terms: any machine to cut 10' sizes of pipe between 1-4 inch and 18 inch, with any kind of power.*

Anyone making, selling or buying a pipe machine, claimed to be a Canadian-made Williams Pipe Machine, does so without right or authority from us, and is liable to prosecution for damages.

## Williams Tool Co., Erie, Pa., U.S.A.

AGENTS:

**A. R. WILLIAMS MACHINERY COMPANY**  
ST. JOHN, N.B.    TORONTO    WINNIPEG    VANCOUVER

# A MODERN SAVER

of Time, Money, Space and Labor

Here is a machine that is well worthy of your attention — our "Double C Punch and Shear" with 48-inch throat.

This machine has an enormous capacity for doing rapid, accurate and economical work of quality.

Let us send full description. If you are interested in up-to-date money-saving machinery you cannot afford to remain uninformed.

We manufacture a complete line of

### LABOR-SAVING MACHINERY

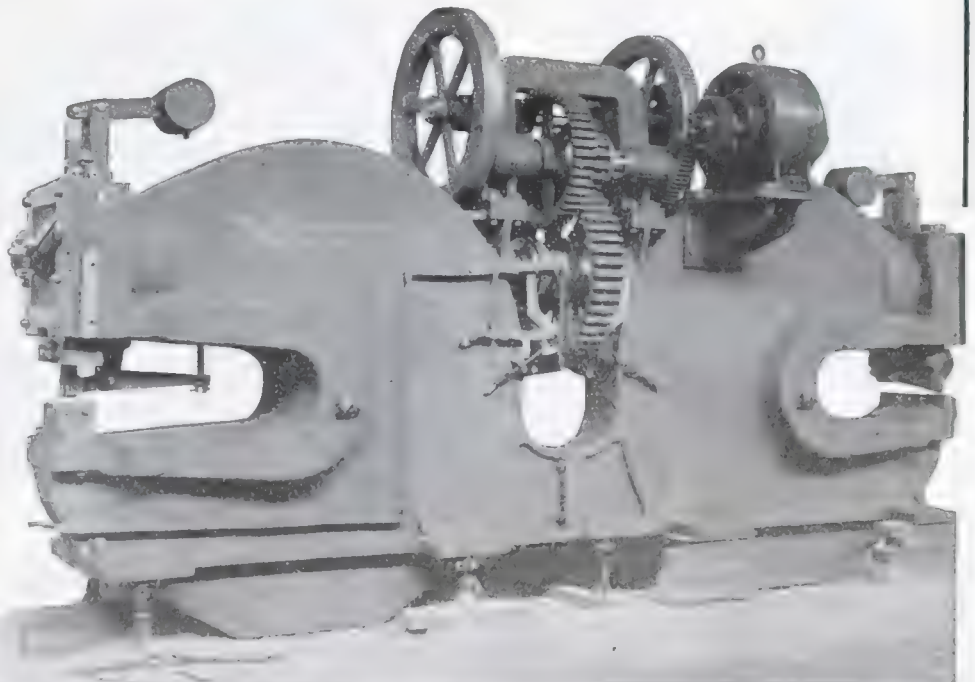
all kinds and sizes, for

Structural Iron Works, Railroad and Locomotive Shops, Boiler Shops, Rolling Mills, Agricultural Implement and Plow Shops, etc

**The Long & Allstatter Co.**  
HAMILTON, OHIO

Canadian Representatives  
**RUDEL-BELNAP CO.**

Montreal, P.Q.    Toronto, Ont.



*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*

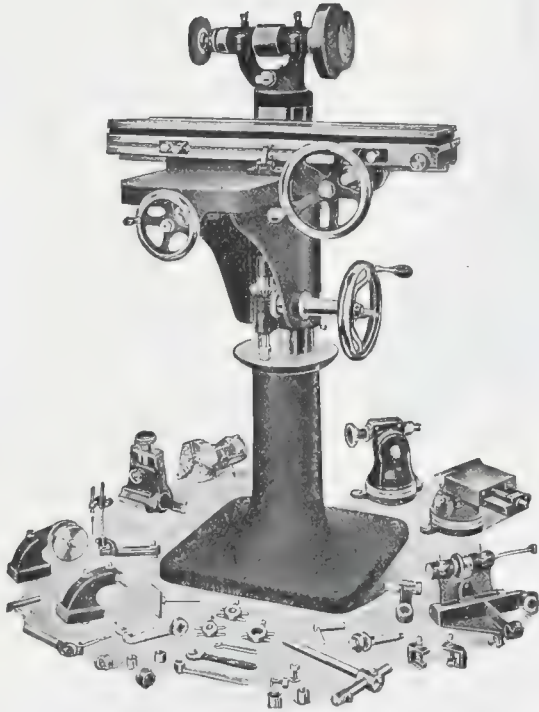
## Those Ammunition and Rifle Contracts

require a lot of special tools, jigs and other appliances.

The

*Greenfield*

### Universal Grinder



with its many attachments is just the machine needed to handle the many and varied jobs of grinding that are necessary in tooling up for special work.

Then after the tools are made they must be frequently sharpened or the full production of the machines will not be obtained.

The "Greenfield" Universal Grinder has the attachments for conveniently and accurately producing such work. Wouldn't one be handy in your tool room?

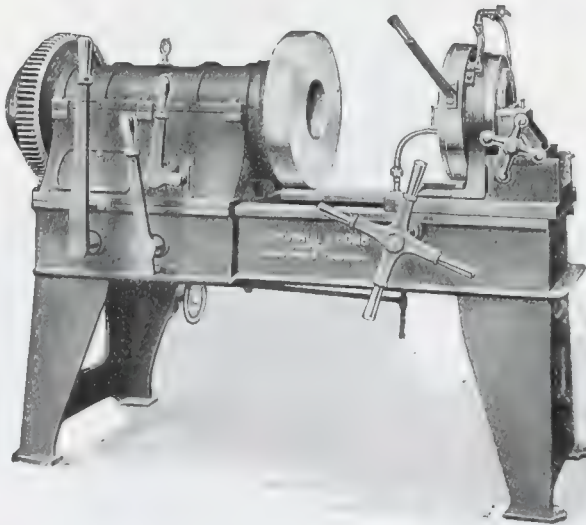
We also build PLAIN CYLINDRICAL GRINDING MACHINES for production work.

**Greenfield Machine Co.**

Greenfield, Mass., U.S.A.

(MADE IN CANADA)

## THE HALL NO. 6 PIPE MACHINE



When you buy Hall Machinery you keep Canadians employed. We are a Canadian firm, employing none but Canadian labor. Our guarantees are not at "Long Distance." We are at your door.

Our Machinery is the best that mechanical ability can produce and does not cost as much as imported machinery.

Write us for catalog and prices on pipe-threading lathes, any capacity, from  $\frac{1}{8}$  to 18-in., also single and double head rapid nipple machines. No delays, delivery from stock.

**JOHN H. HALL & SONS, LIMITED**  
**BRANTFORD, CANADA**

*The advertiser would like to know where you saw his advertisement—tell him.*



Established 1840

# Firth's "SPEEDICUT" High-Speed Steel

FOR LATHE, PLANER AND BORING TOOLS, ETC.

THE IDEAL STEEL FOR MACHINING  
**SHELLS**

Being one of the largest manufacturers of Armour-Piercing and High Explosive Projectiles we possess unusual facilities for testing the cutting capabilities of High Speed Steel, and our improved SPEEDICUT has been elaborated after many years of scientific research to meet the demand for a steel of the highest efficiency.

It is sold in Annealed Bars and Discs.

High - Grade Tool Steel for Every Purpose.  
The Largest Stock in Canada.

## Thos. Firth & Sons, Limited

Norfolk Works and Tinsley Works  
**SHEFFIELD, ENGLAND**

Works also at Riga, Russia; McKeesport, Pa., and Washington, D.C.



Weight 1400 lbs.



13 1/2 inches Dia.

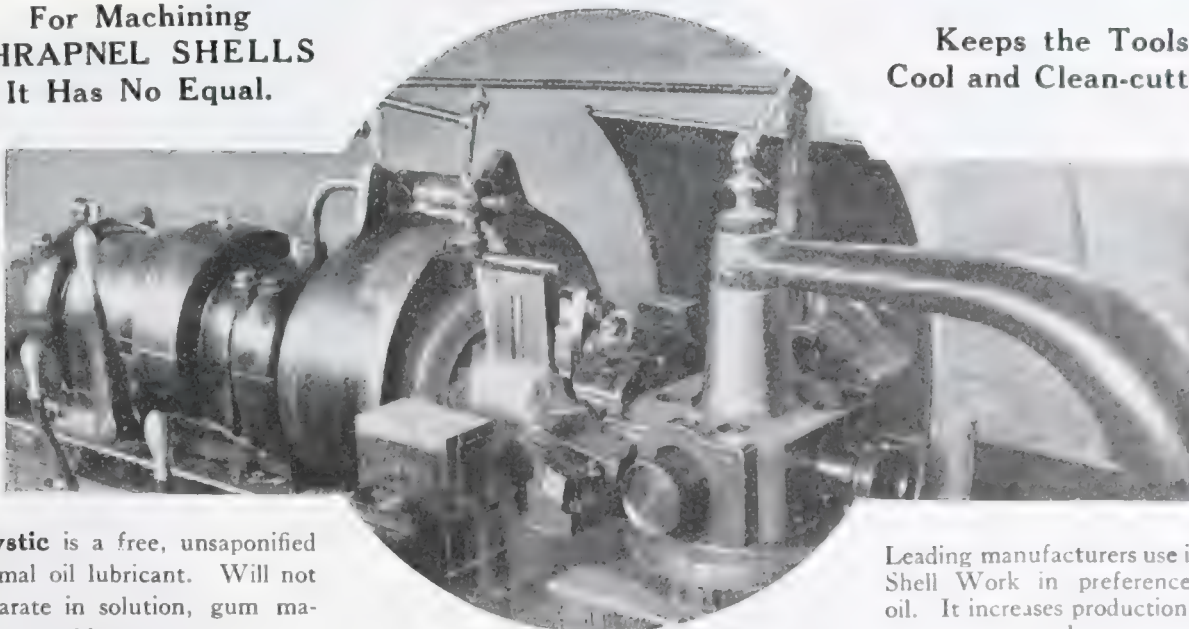
Canadian Warehouses { 507 St. Paul Street, MONTREAL  
179 Adelaide St. W., TORONTO

J. A. SHERWOOD,  
Canadian Manager

# Mystic Cutting Compound

For Machining  
**SHRAPNEL SHELLS**  
It Has No Equal.

Keeps the Tools  
Cool and Clean-cutting



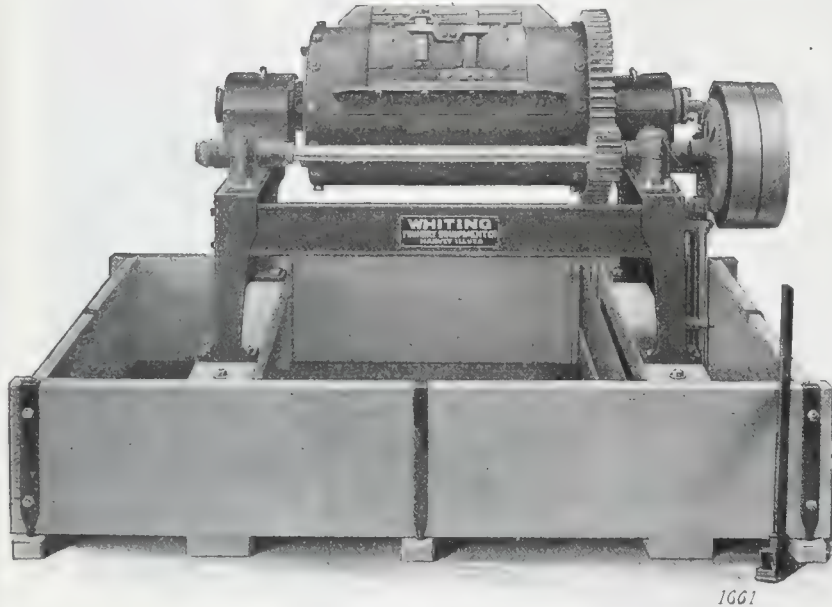
Mystic is a free, unsaponified animal oil lubricant. Will not separate in solution, gum machines or rust.

Leading manufacturers use it on Shell Work in preference to oil. It increases production and costs less.

## Cataract Refining Company, Limited, Toronto, Ont.

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*

# Combination Brass Water Cinder Mill and Casting Tumbler



Saves 90% of brass contained in ashes, skimmings, etc.

It is also designed for tumbling or water polishing castings.

The mill is furnished complete with heavy wood tank, making a complete unit.

*Send for specifications.*

**COMPLETE FOUNDRY PLANTS**  
Designed, equipped and put into operation.  
**CRANES OF ALL KINDS.**



**IDEAL  
FOR  
CRANE  
ELEVATOR  
OR  
OVERHEAD  
SYSTEM**



CURTIS POWER JIB CRANES

WRITE FOR  
CATALOG  
A-1

**CURTIS AIR HOISTS**  
OR REGULATABLE AIR CYLINDERS

are virtually straight line motors, capable of the widest application to shop and industrial requirements.

FOR GENERAL HOISTING, they are superior to electric motors, are cheaper, more reliable, simpler, and have lower maintenance cost.

FOR DELICATE HOISTING, as for instance,

**DRAWING PATTERNS—SETTING CORES—POURING METAL**

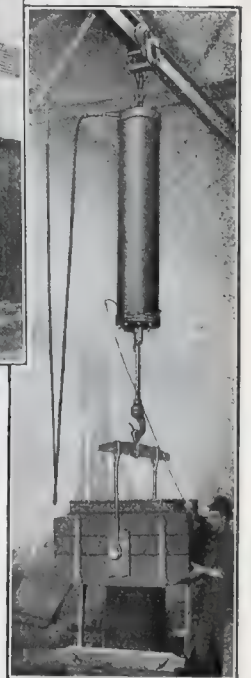
and machine shop and foundry SERVICE GENERALLY. They start or stop as slowly and gently as you please, absolutely without jerk or jar. Any speed operator desires. Will hold the load at any point of the lift and cannot drop load, even should air line break or air supply fail.

If you have hoisting or other problems, requiring hoists, air compressors, cranes, pneumatic or hydro-pneumatic elevators, sand blasts, or overhead trolley systems, give our Engineers an opportunity to help you. Their advice will cost you nothing.

WRITE FOR CATALOG 62 AND NAME OF NEAREST CANADIAN AGENT.

**CURTIS PNEUMATIC MCHY. CO.**

1585 Kienlen, St. Louis, Mo.  
New York Office: 531F Hudson  
Terminal Building



*The advertiser would like to know where you saw his advertisement—tell him.*



# “Sirocco”

## Summer Cooling

by the



## Fan System

Operatives to work at their highest point of efficiency must be comfortable.

The atmospheric condition of your plant plays a most important part in this connection. The “Sirocco” System will provide for a Cool, Comfortable atmosphere in Summer, and a warm, comfortable atmosphere in Winter, with Positive Ventilation in all seasons.

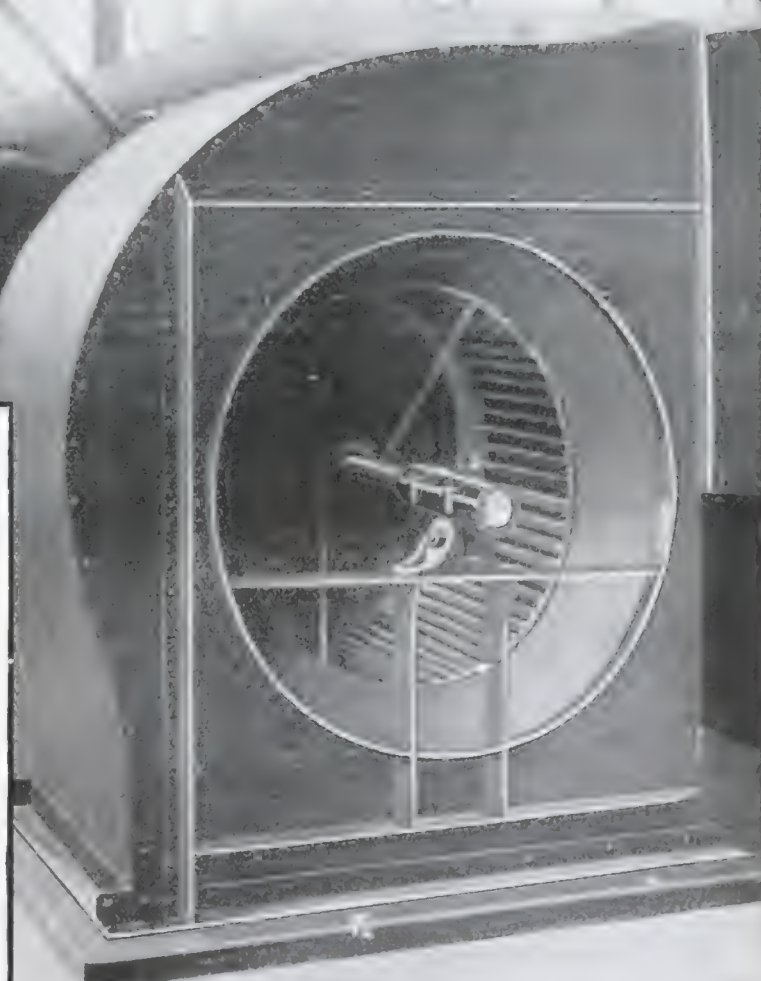
Let our Engineers tell you how “Sirocco” could be adapted to your plant. No cost for this service. Interesting literature on “Sirocco” will be sent at your request.

**CANADIAN Sirocco COMPANY**  
LIMITED

WINDSOR, ONTARIO.

**Sales Engineers:**

- |   |   |  |
|---|---|--|
| S. S. Clarke,<br>605 2nd St.,<br>Calgary.               | A. M. Nichol,<br>391 McGill Bldg.,<br>Montreal. | C. T. Morse,<br>St. Wilson Ave.,<br>Toronto. |
| H. V. Heard,<br>604 Credit Foncier Bldg.,<br>Vancouver. | W. P. Eddy,<br>214 Donald St.,<br>Winnipeg.     |  |





# A MAN WHO KNOWS

Mr. Johnson's opinion of Magnolia Metal, which we value very highly, is based on practical use for many years in mills and power plants, which he operated before joining the Editorial Staff of "Power."

HILL PUBLISHING COMPANY,  
Hill Building, Tenth Avenue, at Thirty-sixth St.,  
New York, May 22, 1915.

Gentlemen:—

I know that the experience I have had with your Magnolia Metal will interest you. A short time ago, while our engines were still in the engine builder's hands, I had occasion to reabbitt a crank pin box and, despite the objections of the engine builder's representative, used Magnolia Metal.

The result more than proved the correctness of my position. Much to the engine man's surprise, the Magnolia box from the start ran very much cooler than boxes on the other engines, which were babbitted with a high-priced metal, and were running under the same conditions.

I have used Magnolia Metal for years, and it always lives up to my good opinion of it.

Very truly yours,

F. L. JOHNSON,  
Ch. Eng., Hill Building.

## PRACTICAL ENGINEER POCKET BOOK:

1915 Edition. Over 600 pages. A valuable reference work imported from England and sold as an advertising medium at the very low price of 40c. post paid.

Address Montreal Office.

SOLD BY LEADING DEALERS EVERYWHERE OR BY

## MAGNOLIA METAL CO.

OFFICE AND FACTORY:  
225 St. Ambrose St. MONTREAL

*Our ELEVATING TRUCK is indispensable in the handling of*



# Shrapnel Shells

or any factory product where numerous operations are required.

We also manufacture Loading Funnels, Ball-Bearing Tightening Nuts, Belt-Driven Loading Vibrators, Bench Vises, and Presses with attachments for pressing in band—fixtures especially adapted for the manufacture of 18 pr. Shrapnel Shells.

We shall be pleased to submit prices and give any particulars required.

THE CHAPMAN DOUBLE BALL BEARING CO. OF CANADA LIMITED

339-351 Sorauren Ave. - TORONTO, CANADA

Showing truck raised ready to be drawn to destination.

*The advertiser would like to know where you saw his advertisement—tell him.*





If you are hot-forging SHRAPNEL CASES you cannot afford to overlook the merits of  
**“HAWK” D CHROME VANADIUM STEEL**

for both first and second operation Punches. This steel comes to you heat-treated and ready for use. It gives exceptional production. Many cases have been reported to us where each Punch turned out over 2,000 Shells. It does not stick to the work. This enables you to turn out more Shells, per machine, per day.

STEEL OF EVERY DESCRIPTION.

HAWKRIDGE BROTHERS COMPANY, 303 Congress St., BOSTON, MASS.

**ARMSTRONG WHITWORTH OF CANADA**  
 LIMITED

MANUFACTURERS OF CELEBRATED BRANDS OF  
**HIGH SPEED STEEL & DRILLS**

“AW” FOR CUTTING ALL METALS  
 AT HIGH SPEEDS

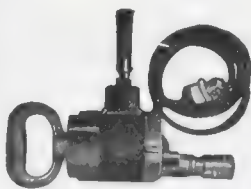
FOR HARD METALS — “TYR”  
 RAILWAY & TRAM TYRES

OFFICE 22 VICTORIA SQ. MONTREAL

WORKS LONGUEUIL QUE.

**U. S. Electric Drills and Grinders**

Save Time, Labor and Money



3 SIZES.  
 3-16 inch, W.G.T. 6 lbs.  
 1/4 inch, W.G.T. 9 lbs.  
 3/8 inch, W.G.T. 12 lbs.

All motors wound for 110 or 220 volts. Direct or alternating current.

Try a few of our Electric Drills and Grinders and you'll send us an order for more. Our guarantee protects you.

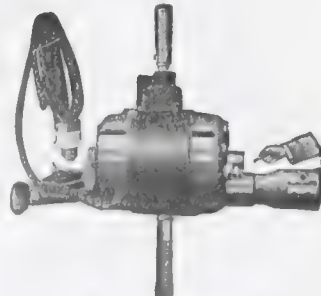
For Sale By  
**The Canadian Fairbanks-Morse Co., Limited**

Montreal. St. John, N.B. Toronto. Winnipeg. Calgary. Vancouver.

**THE UNITED STATES ELECTRICAL TOOL CO.**  
 CINCINNATI, OHIO

They can be attached to any lamp socket.

For drilling in metal they are superior to any other kind of portable drill. Cost 50% less to run than air drills.



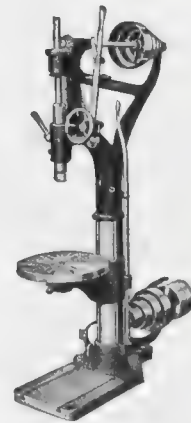
1/2 inch—2 SPEED.  
 Speed, 400-750 R.P.M.

The



B  
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Complete line. 8-inch to 50-inch swing

**Gang Drills.—Horizontal Drills.**

SEND FOR CATALOG.

**W. F. & JOHN BARNES CO.**

104 Ruby Street - ROCKFORD, ILL.

Canadian Agents—A. R. WILLIAMS MACHINERY CO.

Toronto, Winnipeg, Vancouver, and St. John, N.B.

WILLIAMS & WILSON, Montreal

*The advertiser would like to know where you saw his advertisement—tell him.*



# Steel for Shells!

## PROMPT SHIPMENT

Billets and rounds of suitable physical and chemical specification for forging and turning into shrapnel cases and lyddite shells of any size.

## LACKAWANNA STEEL COMPANY

Standard structural shapes,  
Standard heavy and light rails,  
Sheared and universal mill plates,  
Sheet bars, and Lackawanna  
Sheet Steel Piling.

General Sales Offices: LACKAWANNA, ERIE CO., N.Y.

Canadian Correspondents:

H. A. DRURY & CO., LTD., 309 Craig St. W., MONTREAL

# SaBeN Extra HIGH SPEED STEEL



*The most economical and  
efficient steel for  
machining shells*

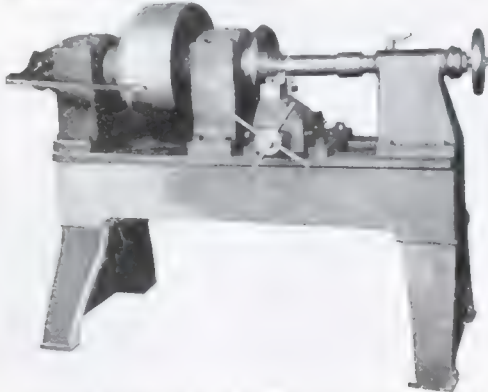
Manufactured by Sanderson  
Bros. and Newbold, Limited,  
Sheffield, England

**H. A. Drury Company**  
LIMITED  
Montreal and Toronto

# SPEED and ACCURACY

The two most important factors in the machining of shrapnel and 15 shells, speed and accuracy, can be achieved when turning a prop. heads by using this machine.

The cut below shows our model lathe with Collet chuck on stock wheel. We have had it used for one of the biggest steel makers in the United States. His daily output averages 40 to 45 shells per hour.



This lathe was designed and built by us especially for this work. It is of simple construction and is easy to set up under the conditions of work demanded of shrapnel machinery.

Most of the largest manufacturers have found it profitable to adopt it. Let us tell you why. We invite your inquiry.

## The Jenckes Machine Co., Limited SHERBROOKE, QUEBEC

Branches at Toronto, Ontario; 725 Traders Bank Bldg.  
Montreal, Que., 303 E. T. Bank Building.  
St. Catharines, Ont.; Cobalt, Ont.;  
Vancouver, B.C.; Nelson, B.C.



Wolfram Cobalt High Speed Steel. Best For Turning Shrapnel. Vulcan Hot Piercing Steel. For All kinds of Hot Work. Vulcan Regal No. 2 Steel. For Brass Finishing. Vulcan Special "W" Steel. For Special Taps and Dies. Vulcan Non-Shrinkable Steel. For Intensive Dies. Vulcan Special Vanadium Steel Dies. For the Work of Regular Carbon Steels. Vulcan Tungsten Magnet Steel. For Permanent Magnets. Chrome Vanadium Steel. For Automobile Parts. Regular Carbon Tool Steels. Alloy Steels.

**VULCAN CRUCIBLE STEEL COMPANY**  
ALIQUIPPA, PA.

# OXYGEN

We sell our gas by *flat rate* only, depending on the excellence of our product and reliable service to merit your continued patronage.

**Better Oxygen  
Lower Cost  
Higher Efficiency**

*Write for quotations.*

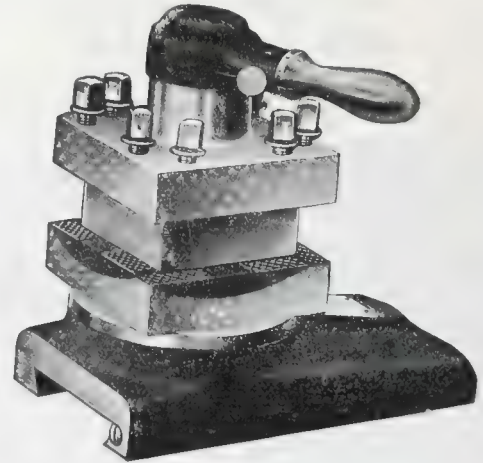
**Lever Bros., Limited**  
TORONTO

## Making SHRAPNEL ?

**Here is Standard Equipment**

The Fay & Scott turret tool post shown here is being universally adopted as standard equipment for the manufacture of shrapnel.

The square head turret, style G, is used for turning the outside of the shell. We have made these turrets for years, and can fit them to any make or size of lathe, old or new.

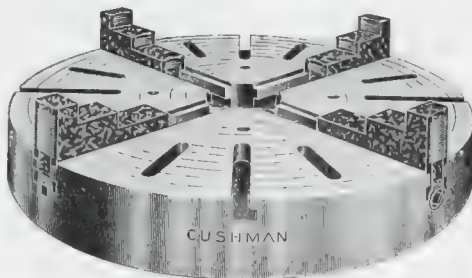


Style G

*Catalog and full details on request*

**Fay & Scott, Dexter, Me.**

## Cushman Chucks



When you buy a "Cushman" Chuck you are absolutely sure of getting one having strength, accuracy and durability. Being specialists in these goods we are able to furnish Chucks of quality at a very moderate price.

Our line of styles and sizes is very complete—

**Lathe Chucks, Drill Chucks, Centering Chucks, Portable Face Plate Jaws**

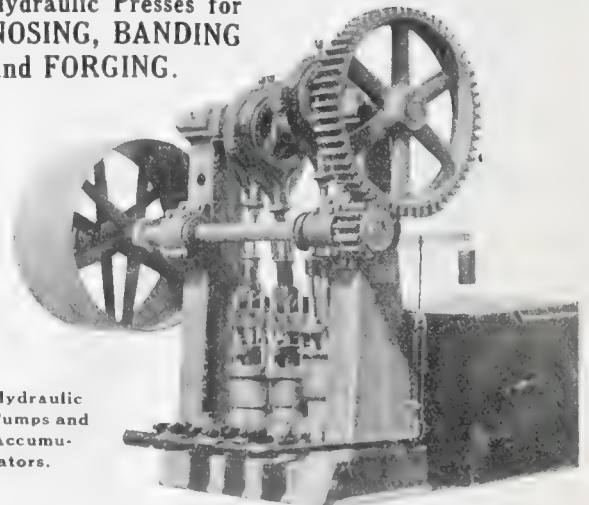
Our regular chucks are known as the heavy pattern, but we now have a new line called "Blue Line" Chucks, made entirely of steel.

Let us send you our catalog.

**The Cushman Chuck Co.**  
Hartford, Conn., U.S.A.

## Presses for Shrapnel

**Hydraulic Presses for  
NOSING, BANDING  
and FORGING.**



Hydraulic  
Pumps and  
Accumulators.

**Hydraulic Presses for all purposes.**

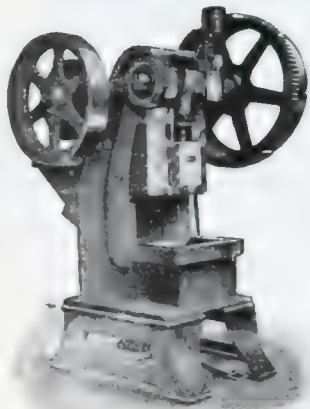
KNOWING MEANS USING

*Write for full details now.*

**William R. Perrin, Limited**  
TORONTO, ONTARIO



Broad General Efficiency  
 Practical Simplicity  
 Economical Production *Distinguish*  
**THE "TOLEDO"**  
 OPEN BACK PRESSES



Built on fixed legs, upright or inclined.

No. 76 Built for both light and heavy work, as it is arranged for both geared and plain direct belt drive.

Used for punching, shearing, perforating, bending and forming operations in the manufacture of agricultural implements, autos, etc.

15 sizes—2,600 to 60,000 lbs.

A Toledo Press for every need.

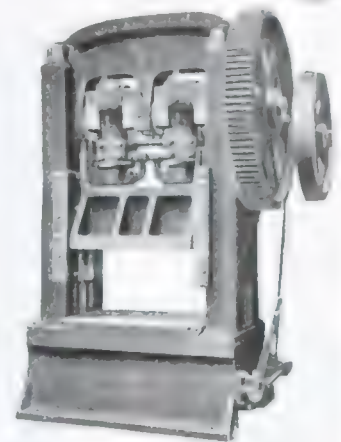
**The Toledo Machine & Tool Co.**  
 Toledo, Ohio

We build a size that will successfully meet your requirements



These presses are built with correct proportions for use in the manufacture of large sheet iron and steel goods.

The large diameter of shafts and the well gibbed slides allow quantity production that proves very profitable.



**BLISS  
 DOUBLE CRANK  
 PRESSES**

Adapted for the economical manufacture of vapor stoves, wrought iron ranges, agricultural implements, paneled ceilings, metal doors, window frames, iron safes, metal furniture, shingles and all similar classes of goods.

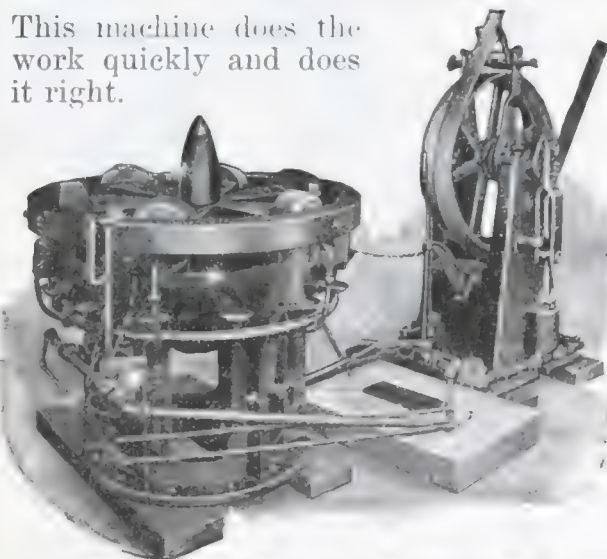
150 different sizes and styles. Our Catalog 9-G will be sent to you on request. Visit our exhibit at the Panama-Pacific International Exposition, Machinery Palace, Block 16.

*Talk to us about Presses for any and every purpose*

**E. W. Bliss Co.,** No. 20 Adams Street  
 Brooklyn, N.Y., U.S.A.  
 Chicago Office: 622 West Washington Boulevard.  
 Detroit Office: Dime Bank Building.

**Hydraulic Banding Machine**  
 For compressing bands on shrapnel shells  
 and other projectiles

This machine does the work quickly and does it right.



In writing for information or quotation please advise width and thickness of bands and diameter of shells or projectiles. Machines of our Canadian Customers are built in Hamilton, Ont.

We also manufacture machines for setting wagon and carriage tires, cold.

Please address all communications to our Rochester Office

**THE WEST TIRE SETTER COMPANY**  
 ROCHESTER, NEW YORK

**For Rapid Production  
 and Accurate Work**

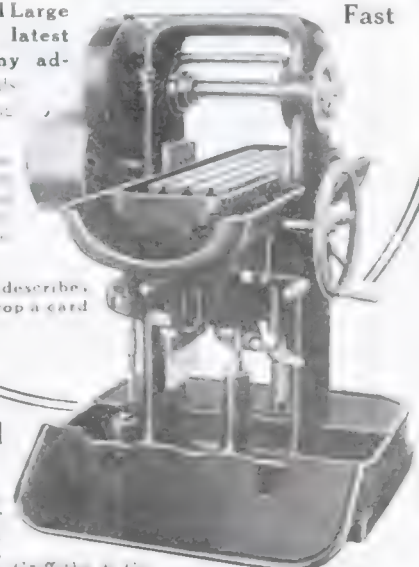
USE THE  
**"BRIGGS"**

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.

Patented in U.S.A. and other countries. It is the most accurate and reliable machine of its kind ever made.

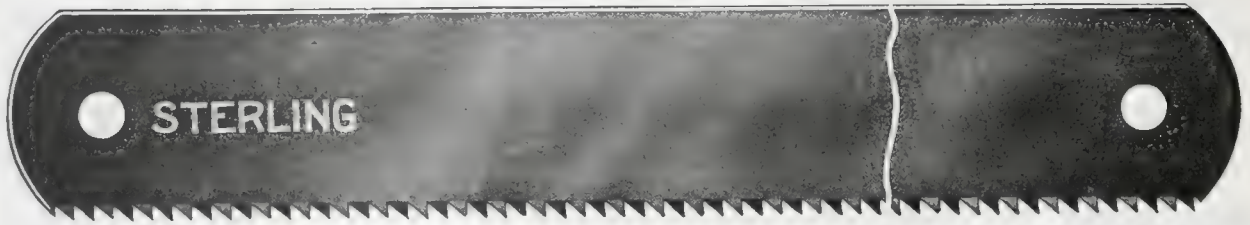
Our booklet describes fully. Drop a card for it.



**Gooley & Edlund**  
 Inc.  
 Cortland, U.S.A.

Foreign Agents: Alton, Mass.; Albany, N.Y.; Amoy, China; Antwerp, Belgium; Aoste, Italy; Switzerland, Russia, Scandinavia; E. W. Bliss, Goetz & Co., London, Manchester and Glasgow; Baranofsky, Moscow; Galloway & Co., San Sebastian, Spain.

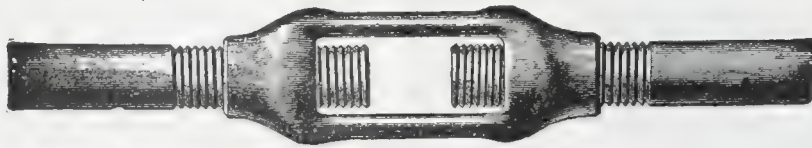
# "STERLING" HACK SAWS



MANUFACTURED BY  
**DIAMOND SAW & STAMPING WORKS** **BUFFALO, N.Y., U.S.A.**



**Pliers, 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**

## KEYSTONE "Model K" Wrench

All drop-forged steel.

No. 1 Polished all over.  
No. 2 Polished Head Enamelled Handle.  
Look for the trade-mark "Keystone" on the handle.



## KEYSTONE TOOLS

—the cheapest in the end.

Their utility, strength and convenience,  
recommend them to the most discriminating  
workman.

Any better class wholesale house will supply  
you. Ask us to refer you to our nearest dealer.

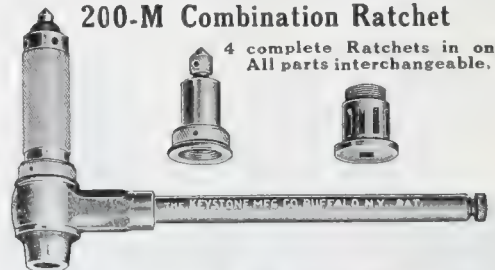
**THE KEYSTONE MFG. CO.**  
**BUFFALO, N.Y.**

**"Keystone Quality"**

## "KEYSTONE"

### 200-M Combination Ratchet

4 complete Ratchets in one.  
All parts interchangeable.



### The Original

### "WESTCOTT" Adjustable "S" Wrench

HANDLE MALLEABLE IRON. JAW FORGED STEEL.  
The "Westcott" Wrench is acknowledged to be the most convenient and useful wrench for general use, and can be used in many places inaccessible to the Monkey Wrench. These wrenches are made of first class material, are strong and durable.

The genuine "Westcott" Wrenches have the trade mark "Westcott" on the handle.

### "KEYSTONE" Weston Ratchet

For Square Shank Drills Only.  
STRONGEST RATCHET MADE.

Fully guaranteed.





# TAYLOR-NEWBOLD COLD SAWS



STAND PRE-EMINENT! A SAW FOR EVERY PURPOSE. OUR SAW BULLETIN TELLS THE STORY—MAY WE SEND YOU ONE?

**TABOR MANUFACTURING COMPANY**  
PHILADELPHIA, PA., U.S.A.

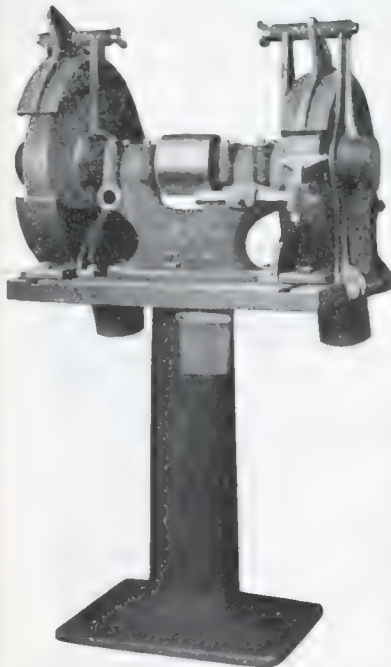
## Riveting Base of Explosive Projectile



A very essential operation in shell manufacture is the riveting of the explosive charge to the shell from beneath the explosive materials of the shell itself. Neglect of this operation would probably cause the shell to explode and kill the operator. After the shell is in position, the riveting is started and the shell is rotated over automatic rollers to the riveting machine. With the machine running about 2000 rpm per minute, the rivet can be riveted perfectly in about 10 seconds. CHANGE OF FIXTURE ENABLES MACHINE TO BE ADAPTED FOR 100 LB. OR SMALLER, OR EVEN LARGER THAN 100.

Drop a line for further particulars.

**The Grant Mfg. and Machine Co.**  
Bridgeport, Conn.

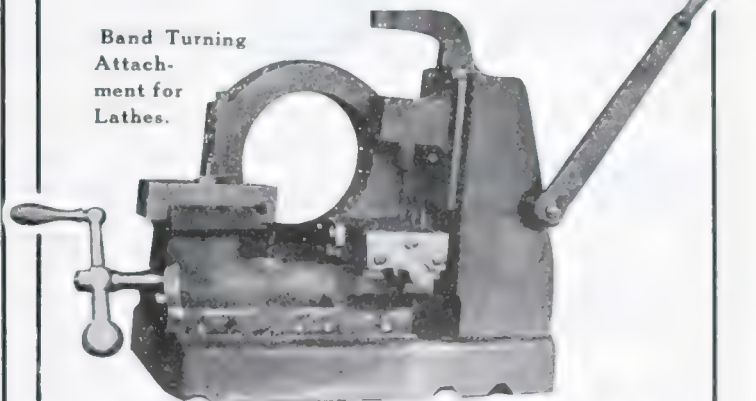


**Partridge Grinders ARE GOOD GRINDERS With The Price Ground Down.**

If you don't write for full particulars, you will miss something good.

MANUFACTURED BY  
**E. O. PARTRIDGE**  
2039 Lake Street West CHICAGO  
Good Canadian Agents Wanted—WRITE NOW

## A Time-Saver for Turning Copper Band on Shells



Band Turning Attachment for Lathes.

This attachment will fit any engine lathe, and with its use you can turn the copper band on Shrapnel shells down to size required and finish them all in one operation.

With this device we will guarantee an output of

**50 Turned Copper Bands per Hour**

Used with a specially constructed tool block, setting of which can be finished on the lathe on which the attachment will be used.

Castings are supplied by us.

WRITE FOR PARTICULARS.

**LYMBURNER LIMITED**  
5-15 Commissioners St. Montreal, P. Que.

# THE BANNER OF MERIT

Showing the Official  
Award Ribbon of the  
Medal of Honor  
awarded TRIMO



TOOLS at the  
PANAMA-PACIFIC  
INTERNATIONAL  
EXPOSITION.



SEND FOR CATALOGUE No. 200.

TRIMONT MFG. CO., ROXBURY, MASS.

## CLEVELAND RIVETING, CHIPPING, CALKING AND BEADING HAMMERS

MOST POWERFUL AND EFFICIENT AIR TOOLS ON THE MARKET



Cleveland Riveters are made in 20 styles and sizes with driving capacities of  $\frac{1}{4}$ -in. to  $1\frac{1}{2}$ -in. rivets in Boilers, Tanks, Stacks, etc.

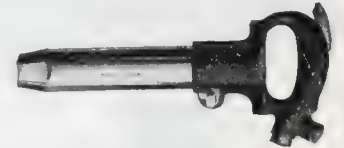


They have an enviable record for durability and economy in service.



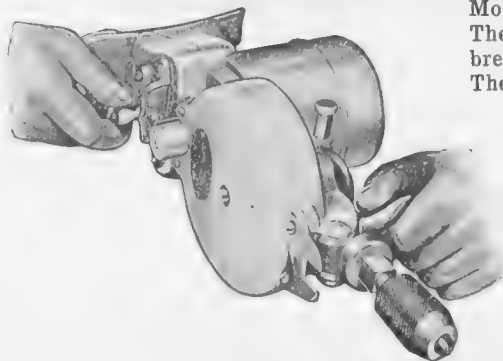
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are made in 20 styles and sizes to suit all classes of work. They are ideal tools for foundries, as they have high speed, no recoil and are practically dust-proof.



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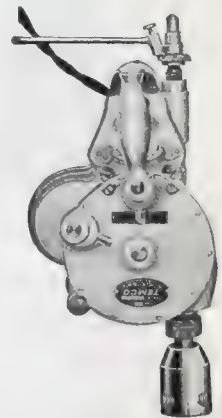


Model "B" Drill illustrated, shows compactness of design. The Casing, Switch and Gear Covers are aluminum; the breast plate, motor-head and handle supports are of steel. The machine is light in weight, convenient in shape; has high speed; operates on either A.C. or D.C. currents and runs either forward or reverse as desired. Model "C" has two speeds and in construction is similar to Model B.

Bulletins mailed on request.

**Cleveland Pneumatic Tool Co.  
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80 Duchess Street, - Toronto, Ont.



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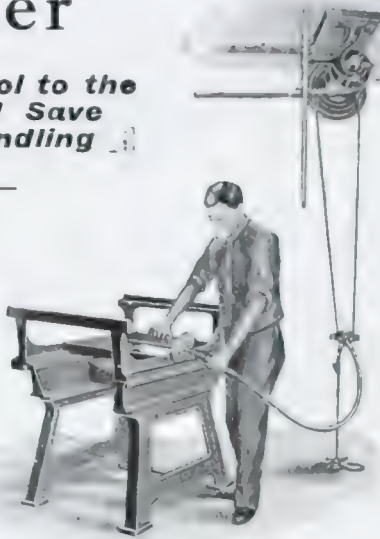


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**Take the Tool to the  
Work and Save  
Heavy Handling**

We are inventors  
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**Flexible Shaft**  
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CAN FURNISH MOTOR DRIVEN WHEN DESIRED  
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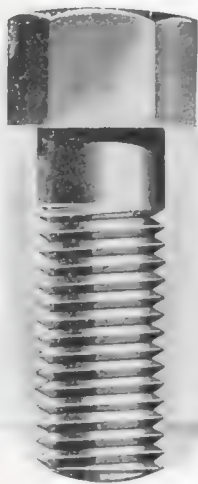
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Because a small diameter screw enters the tapped hole is no guarantee that it fits properly.

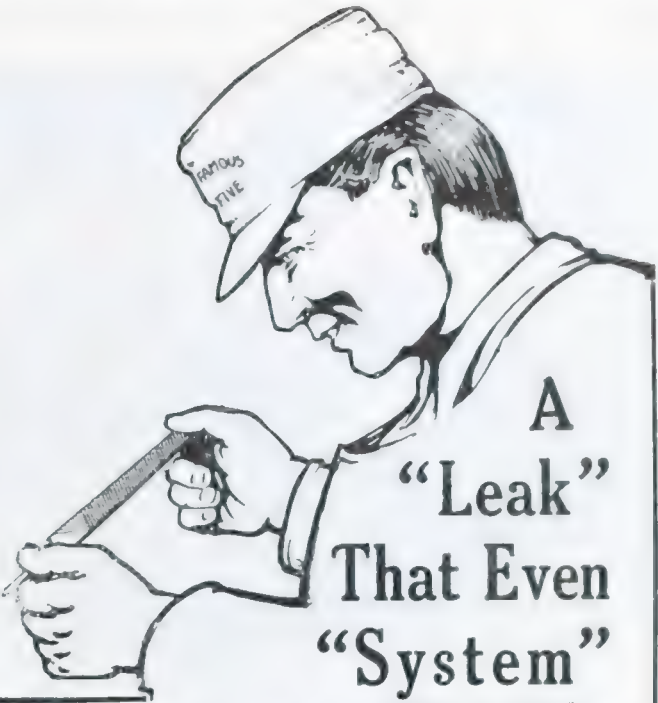
The pitch may be long or short, and therefore cause resistance, but be a poor fit.

Cap and Set Screws should fit all the way like a shaft in its bearing.

"Galt Screws do. Try them."

*Specialists in Cap and Set Screws.*

THE  
**GALT MACHINE SCREW CO.,**  
GALT, ONTARIO LIMITED



## A "Leak" That Even "System" Couldn't Catch

**A** MANUFACTURER was boasting that his shops were so systematized, that no "leak" nor waste could possibly occur.

We knew something of his product—equipment—methods—and output. So we asked how many files he used each year.

When he mentioned the figure, we said we could show him a "leak" that would astonish him.

"Do it," he said.

And we did!

Showed him how his workmen were using their files too long. Were wasting time getting the last bit of wear from each file—instead of discarding them when their BEST efficiency was gone. Were saving "pennies" in file-cost—and throwing away "dollars" in filing-time.

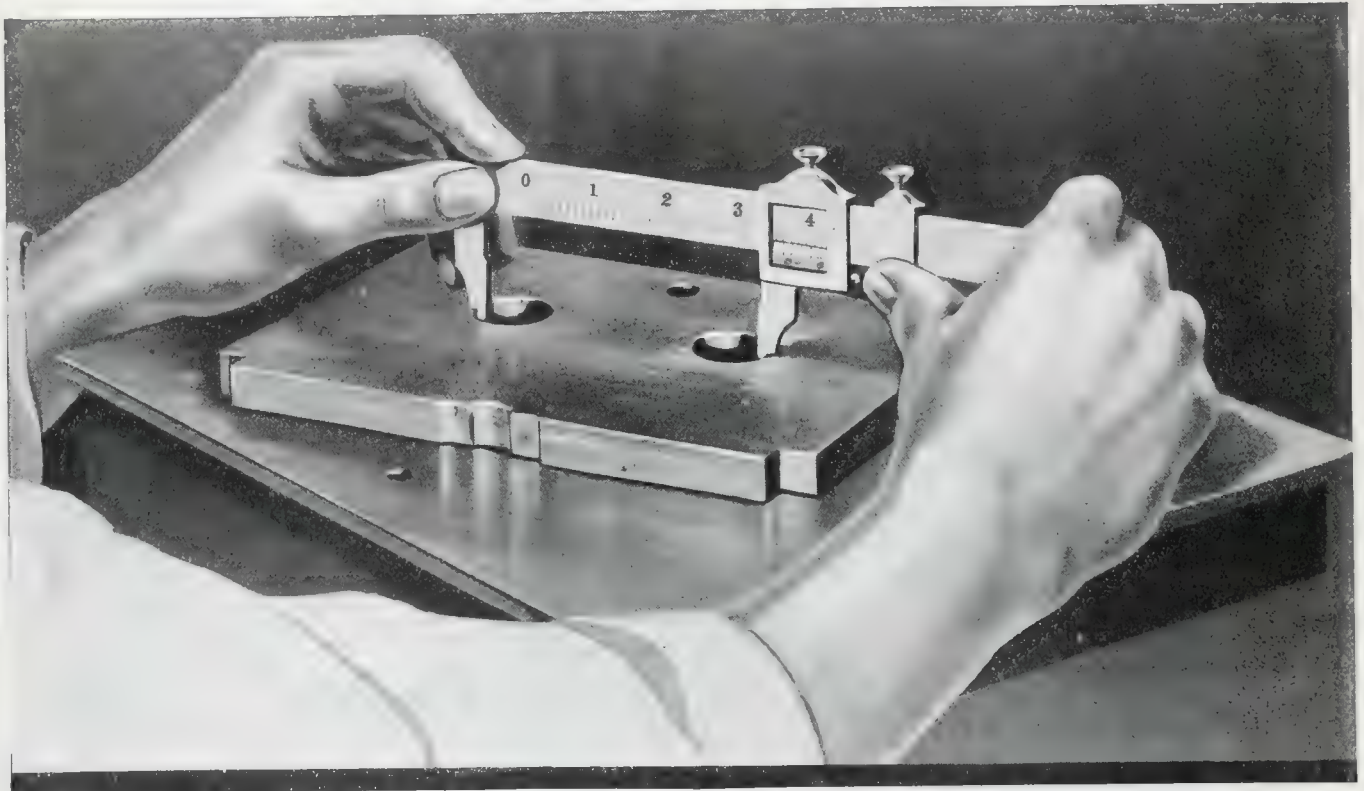
We proved to him, by personal experience in his own shops—on his own work—that the more files he used the more money he SAVED. That the time saved and the extra work produced by using only EFFICIENT files, more than paid for the slight extra cost of additional files. While his old way of wearing-out files costs many times its price in wasted labor.

He "saw the light." To-day, his workmen use only EFFICIENT files. And of course they're the "Famous Five":

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GREAT WESTERN  
AMERICAN  
ARCADE  
GLOBE**

*(Made in Canada)*

**Nicholson File Company**  
Port Hope Dealers Everywhere Ontario



## This Man Must Have Instruments of Precision

**H**IS work demands tools of extreme accuracy—his job depends upon them. When he wants tools or instruments that he can depend upon he goes to the leading dealer and asks for Starrett Tools by name.

# Starrett Tools

are mathematically accurate. Every engineer, machinist and high-class workman whose work requires accuracy knows Starrett Tools to be standard. The time saved in accurate fitting and machining is of value not only to manufacturers but makes the man with Starrett Tools a better workman.

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**THE L. S. STARRETT COMPANY**

*"The World's Greatest Tool Makers"*

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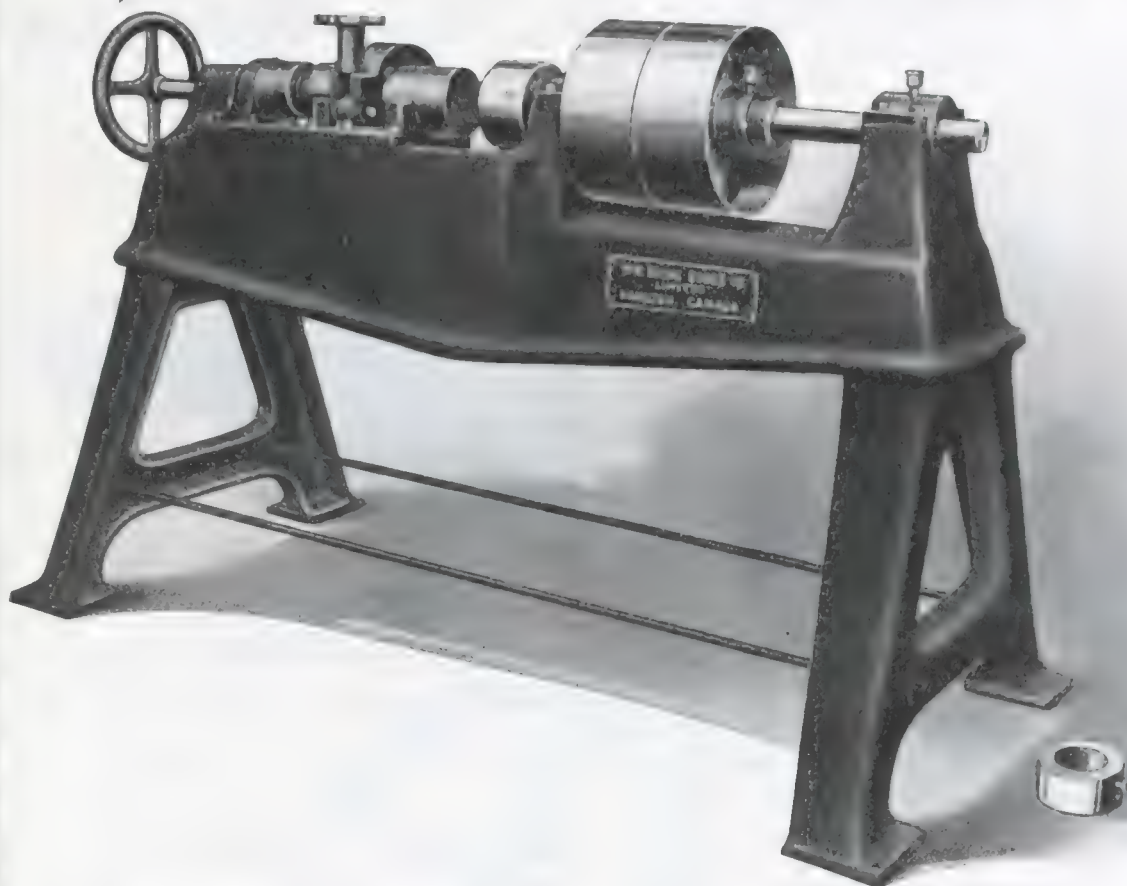
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# SHELL BASE MARKING MACHINES



**ONE OF THE MOST IMPORTANT OPERATIONS IN SHELL MANUFACTURING IS THE "MARKING." OUR BASE MARKING MACHINE WILL SOLVE YOUR MARKING TROUBLES. IT IS A WONDERFUL INVENTION.**

The mechanical device employed in marking the base of Shells in this machine is somewhat of a departure from the general principles. It is so arranged that the entire pressure of the machine is exerted on each individual letter and figure successively.

By this action a very deep impression is obtained with very little power and consequently no crushing strain. The depth of the impression can be increased or decreased as desired.

The method of operation is exceedingly simple. First, the Marking Chuck (shown in cut) is fastened on the end of the Shell by means of Thumb Screw. The Shell is then placed on Saddle, clamped, and by the aid of Hand Wheel the Shell is moved up to the Revolving Pressure Chuck, whence the operation is completed.

It only requires a few seconds to do the marking; the balance of the time being consumed inserting and removing the Shell. An output of sixty Shells per hour should easily be obtained.

We make these machines for 3" Russian, 4.5 and 5" British High Explosive Shells. We can also make them for any size Shell desired.

## BODY SHELL MARKING MACHINES

Our Body Shell Marking Machines are, without doubt, the most efficient on the market. Sixty Shells per minute is what we claim for it. *If interested, write for prices.*

# The Brown Boggs Co., Limited, Hamilton, Can.

Tinsmiths' Tools, Sheet Metal Working Machinery, etc.

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# ARMSTRONG "Quality First"

## DROP-FORGED STEEL LATHE DOGS

Well Designed and Balanced, they have the Strength and Stiffness needed to stand the Wear and Tear of Modern Shop Practice.



### The Armstrong Safety Dog

combines the convenience and efficiency of the common lathe dog with a perfect shield for the set screw head. No special wrench is needed, and the extra leverage provided by the safety cap makes adjustment with the fingers easy and fast.

### Armstrong Dog Screws

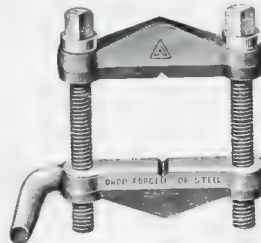
are made from tool steel with improved Bevelled and Hardened point, and are guaranteed against upsetting or flanging. They will outlast two screws made from common steel.



### Armstrong Heavy Duty Double Screw Dogs

are made from 2 in. to 8 in. capacity, and their extreme rigidity makes heavy feeds and cuts possible with the minimum shock to Lathe and Tool.

On some classes of work a Clamp Dog is best. The ARMSTRONG Drop-Forged CLAMP DOG is strong, simple and convenient. Its design permits of considerable tilting without bending the screws.



### The Armstrong Safety Clamp Dog

This dog is so constructed as to combine a wide range of adjustment with the convenient features of the clamp dog and the simplicity and strength of the ordinary lathe dog. It will accommodate itself readily to work of any shape and will hold it securely and squarely, being especially adapted for use on finished work which would be liable to be damaged by the set screw of a common lathe dog. The sliding jaw is operated by a loose-fitting U bolt, the ends of which are protected by SAFETY Sleeve Nuts and can be adjusted to size very quickly, a wrench being necessary to tighten only.

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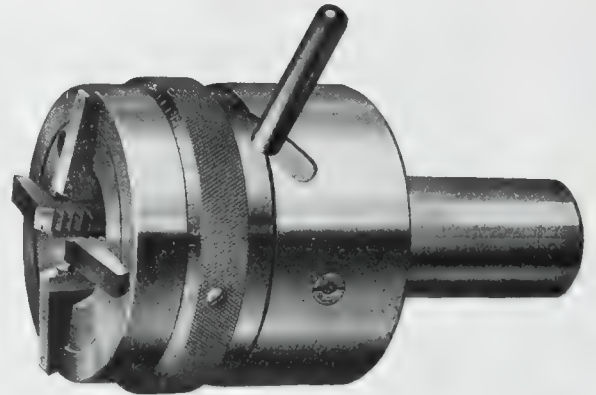
## Armstrong Bros. Tool Co.

"The Tool Holder People"

306 N. Francisco Ave., CHICAGO, U.S.A.

Our complete line is on exhibition at Block 41, Palace of Machinery, Panama-Pacific Exposition, San Francisco.

# Good Threads Cost Less Than Poor Ones



Wells Self-Opening Die—Model B.

The advent of the W.S.O.D. in his shop, has opened the eyes of many a manufacturer producing screw threads to the fact that he can

## Increase Production Decrease Costs and Cut Perfect Threads

all at one and the same time.

Do you want us to prove it? We are ready.

We want to send you the booklet describing the different models. Are you willing to try the W.S.O.D. in your shop under your own conditions?

## Wells Brothers Company of Canada, Limited GALT - ONTARIO

Sales Agents:

The Canadian Fairbanks-Morse Co., Limited, Montreal, Toronto, Vancouver, Winnipeg, St. John, Calgary.

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# Williams' "AGRIPPA" Tool Holders Won

THE HIGHEST AWARD

Our Panama-Pacific  
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"THE MEDAL OF HONOR"

Confers Tool Holder  
Supremacy



All our Tool-Holders Positively  
Guaranteed.

Money Refunded within 90 days  
if unsatisfactory.

### TURNING-TOOL HOLDERS

Cam lock.  
Rapid and positive.  
The greater the  
pressure, the  
tighter the lock.  
No set-screws to  
strip or upset.  
No holders to  
scrap.

### CUTTING-OFF & SIDE-TOOL HOLDERS.

Cam lock.  
Rapid and positive.  
The greater the  
pressure, the  
tighter the lock.  
Interchangeable  
blades.  
One holder for both  
cutting-off and  
side-tool work.

### BORING-TOOL HOLDERS

Take multiple bars of all  
commercial shapes.  
No bushings required.

#### SLEEVE BAR

Universal cap for straight  
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No loose or extra parts.

#### PLAIN BAR

Simplicity itself—a solid  
bar.

### THREADING- TOOL HOLDERS

Combination rigid  
and spring tool  
for rough or fin-  
ishing cuts.  
Lockable spring  
head.  
Equally efficient for  
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Alloy steel cutters.  
Cam lock.

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36 angles of adjustment—  
note serrations in the  
adjustment ring.  
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Uniform locking pressure.  
Adjustment ring takes the  
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Excellent also for offset  
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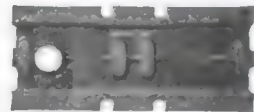
## Williams' Vulcan Caliper Gauges

For External, Internal and External Use

Capacities 3"  
to 7 1/4".



Capacities 1/4" to 3".



Capacities 1" to 3".

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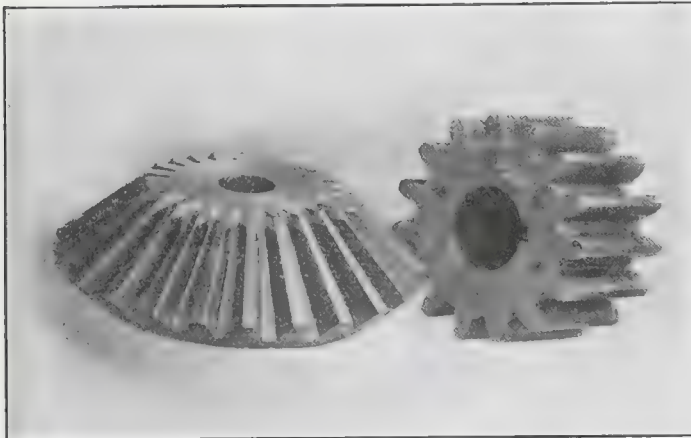
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PANAMA-PACIFIC  
EXPOSITION  
Block 18, Machinery Building.  
Your call will please us.

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Raw Hide Pinions are  
Silent at High Speeds  
and, when Well Made, are Durable



*We carry a good stock  
and can ship promptly.*

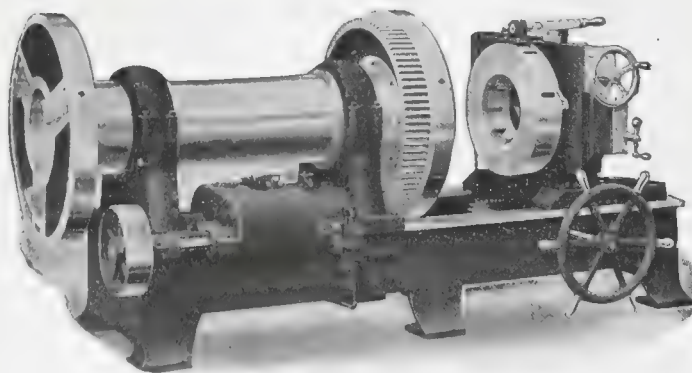
**The Hamilton Gear & Machine Co.**  
Cor. Concord and Van Horne, TORONTO

## 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.**



## It's Up to You

With your plant equipped  
with suitable machines from  
this line, you can cut and  
thread pipe month after month  
and year after year. Continu-  
ous, satisfactory performance in  
a pipe machine is a question of  
rugged construction. There is  
nothing more discouraging

than to have a machine start off well, and then rapidly fail and go to pieces.

Some B & K machines are in use to-day that are 30 years old.

**Bignall & Keeler Machine Works,**      **Edwardsville, Ill.**

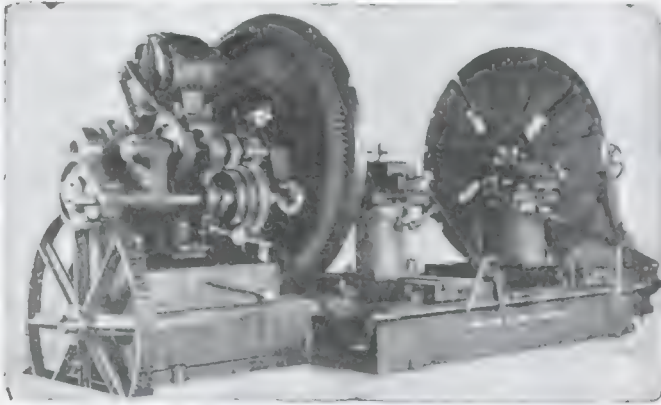
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Renold Chain Driving Heavy Duty Lathe.

## RENOLD Patent Silent Chains

For  
Driving Lathes, making Shells give

- (1) - 20' speed lathe
- (2) - 24' speed lathe
- (3) - 30' speed lathe
- (4) - 36' speed lathe
- (5) - 42' speed lathe
- (6) - 48' speed lathe
- (7) - 54' speed lathe
- (8) - 60' speed lathe
- (9) - 66' speed lathe
- (10) - 72' speed lathe

Write for particulars.

Sole Canadian Agents:

**JONES & GLASSCO (Regd.)**  
Branch Office  
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St. Nicholas Bldg.  
MONTREAL

Another aid to large scale production is

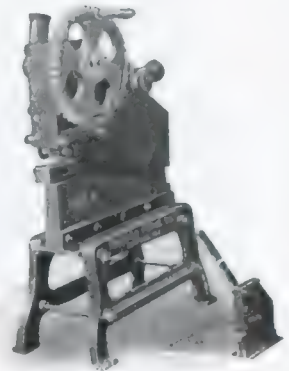
## "Canadian" Armor-Plate Punches and Shears

Write for Catalog 179-16

**CANADIAN BLOWER and FORGE COMPANY,  
LIMITED**

Berlin, Ontario

ST. JOHN    MONTREAL    TORONTO    WINNIPEG    VANCOUVER



# Alundum

TRADE MARK REGISTERED

The use of every new material is a world-giving production. Alundum wheels are destined to operate for years. This is particularly true in the grinding field, where the production problem is most important and greatest. In a matter of only a few years we have kept constant of grinding progress and growth with Alundum wheels. We are now specifying Norton ALUNDUM Grinding Wheels mainly because the wide range in which they are available allows these smooth, efficient processes.

Both the strength and toughness of grades of ALUNDUM wheels, and the grain of bonded structure of the wheels, are varied to meet grinding requirements. These are the factors which have made Norton ALUNDUM Wheels the most popular wheels from them in the grinding world. Grinding establishments of all sizes and all kinds of work are the first choice of the most progressive purchasers of grinding wheels.

ALUNDUM for steel and steel alloys.

CRYSTOLON for cast iron, brass, bronze, etc.

## NORTON COMPANY

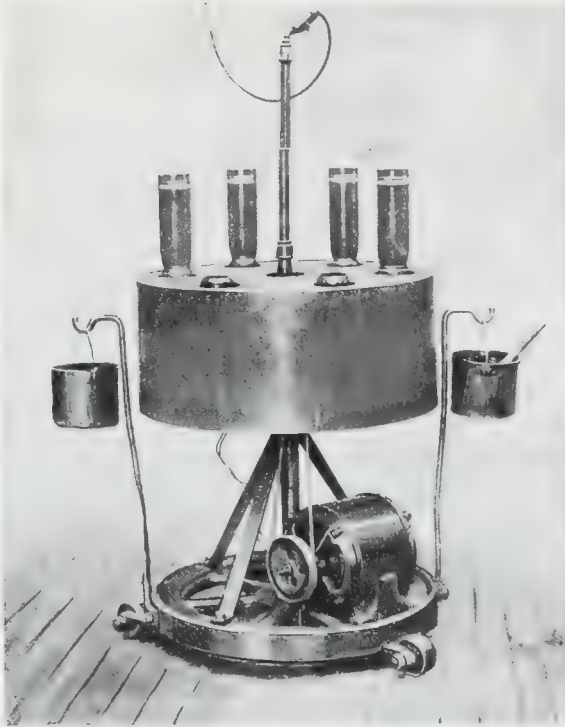
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Canadian Agents: The Canadian Fairbanks-Morse Co., Limited.

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F. H. Andrews & Son, Quebec, P.Q.





## Shell Painting Machine

(Made in Canada)

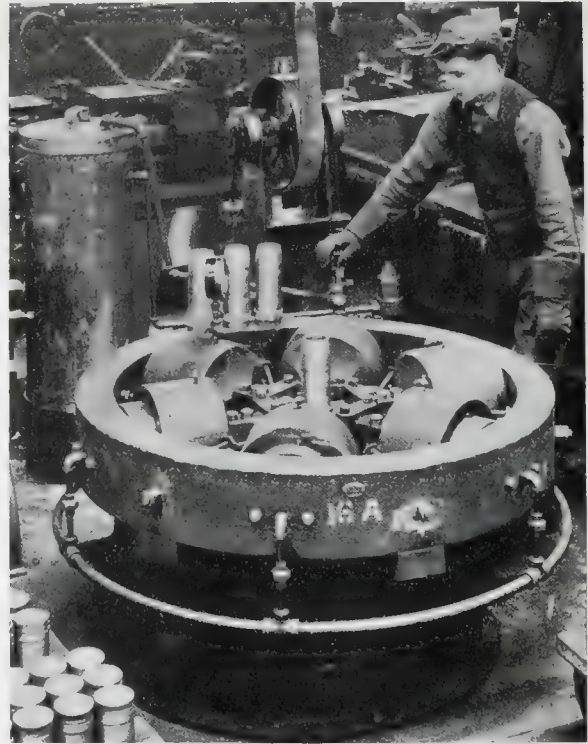
**T**HIS machine consists of a portable revolving table operated by a motor at its base which receives its current through a lamp socket from the ceiling.

There are six vertical spindles built into the table and the shells are placed on these in an inverted position. These spindles rotate at about 250 R.P.M., and the painting is done with a flat pad from the paint receptacle conveniently attached to the machine. The time required for the painting is—

*Less than One Minute per Shell*

i.e., for the three coats specified by the Government.

The Shells are then lifted from the spindles with a special holder which grips them at the copper band, and are placed in racks to dry.



## Shell Banding Press

(Made in Canada)

**T**HE machine illustrated above is a very powerful hydraulic press consisting of six pressure cylinders 9" in diameter and six plungers. The shell is placed in the centre and the plungers are brought up to the copper band and squeeze it under a pressure of 750 lbs. per square inch into its groove.

The entire control is by means of the small hand valve. Oil is used to transmit the pressure secured from a small high pressure power pump. A safety valve is provided to prevent accidents.

It is easy to operate and at the same time capable of being adapted to the banding of 18 pr. Shrapnel, 4.5 and Russian Shrapnel and Lyddite Shells. This machine can operate as fast as any mechanic can feed it.

Let us know what calibre of shell you are making and we shall be glad to quote you for a suitable press.

## The Canadian Fairbanks-Morse Co., Limited

St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton, Winnipeg,  
Saskatoon, Calgary, Edmonton, Vancouver, Victoria

Canada's Departmental House for Mechanical Goods

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# Shrapnel Shell Manufacture

In a Plant Producing  
Sheet Metal Working  
Machinery

Staff Article

*The diversity of products formerly manufactured by what are now shell making establishments is perhaps only equalled by the originality and resource displayed in the methods invoked in the prosecution of the new industry. Dissimilarity between past and present activity has certainly had no deterrent effect on the continuity of successful operation which the plant described has always enjoyed, a fact which reflects credit on all concerned.*

**S**HRAPNEL shell production has now attained such proportions that the detail description of its manufacture has become familiar to a large number of readers of mechanical and other papers; but, although the general cycle of operations in most establishments are similar to each other, the method of obtaining these results in the various plants differ to such an extent that a visit to the different factories impresses upon the observer the energies and resources employed and adopted by enterprising men to meet and overcome these problems with which they have been confronted.

The object of this article is not to describe the manufacture of shrapnel shells, but to show the means whereby some interesting and original methods were practised to eliminate and overcome obstacles that often become evident in cases of this kind where a new article must be produced from equipment intended for an entirely different product.

To describe these various methods, a brief outline of the different operations in this plant may be advisable.

After the rough forging has been marked for length, it is taken to the machine shown in Fig. 1. This tool (an old Hurlbut Rogers cutting-off machine) was practically in the scrap heap at the time, but was taken and remodeled as

shown. The original friction drive from the front and rear was replaced by a powerful clutch drive from the end of the machine.

#### Roughing the Body.

Roughing the body was done on a Stevens & Co. 2¼ in. flat turret lathe, shown in Fig. 2. The shell is held on an expanding arbor and driven by the dog shown. A light cut is taken for a short distance, until the shell is supported from the rear with the two rolls shown in the cutter head. The feed is then thrown in and the rough cut taken. To put the round corner on the end of shell the cutter head, shown in Fig. 3, is used. The cutter (C) is securely held between two pieces (b) (b) in the head (d) and adjusted by the screw (a).

#### Roughing the Nose.

The fourth operation is the roughing of the nose and finishing the recess at

the base of the shell for the powder cup.

This is also done on a Stevens 2¼ in. flat turret lathe. The shell is held in a special chuck designed in the shop, which proves very satisfactory. The details are shown in Fig. 4.

The casting A is bolted to a face plate on the spindle. The three section collet B is drawn in by means of the piece C, which is connected with a hand wheel at the rear of the lathe spindle by the rod D. The collet is kept expanded when released by means of the coil springs E.

#### Undercutting and Grooving.

The cutting of the groove, undercutting and waving are done on a Bertram lathe, with Bertram's waving and undercutting attachments. The waves are then nicked with a flat chisel to allow the air to escape when the copper band is pressed on; this also aids in preventing the band from turning when shell is leaving the gun.

#### Hardening and Nosing.

The shells are now heated in a natural gas furnace to a temperature of about 1,450° F. and hardened in a bath of special oil.

After buffing and testing with the scleroscope for the proper degree of hardness, which is about 45° on the graduated scale, they are re-heated in a special nose-heating furnace in a bath of

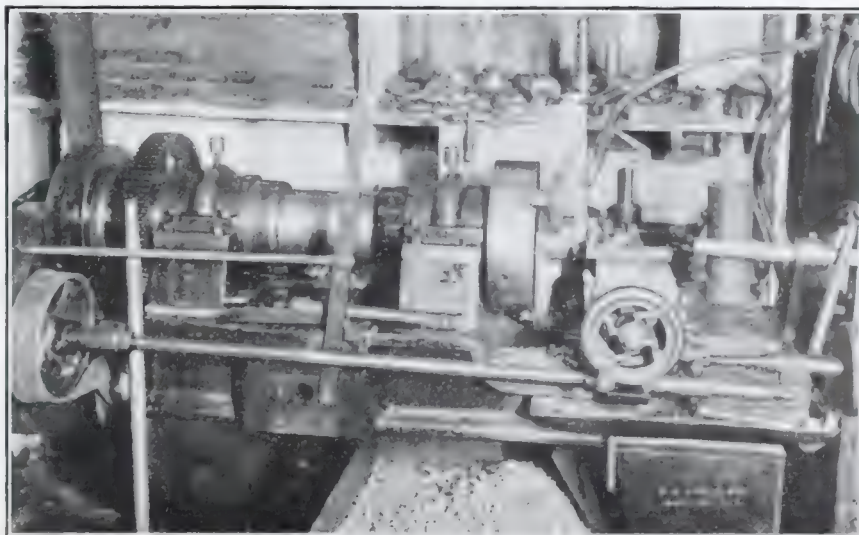


FIG. 1. OLD "HURLBUT-ROGERS" CUTTING-OFF MACHINE REMODELLED FOR FIRST AND SECOND OPERATION ON SHRAPNEL SHELLS

molten lead a short distance from the end and placed in a nosing press. Before the operation of nosing takes place the steel diaphragm is dropped in and the nose is then formed and placed in a box of lime to anneal for further machining.

**Machining the Nose.**

After annealing, the shells are taken to a Jones & Lamson flat turret and

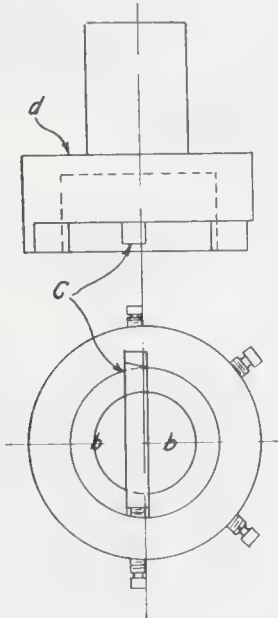


FIG. 3. RADIUS FORMING TOOL.

held in a chuck of the type shown in Fig. 4, and the nose rough-turned to the desired shape, faced, bored and undercut, and threaded for the fuse socket.

**Grinding.**

A centre plug is then screwed in the nose, and they are placed in a Ford Smith grinding machine and ground with a shaped wheel to the desired size of

body and contour of nose.

While being ground the butt end of the shell is held in the chuck shown in Fig. 5: The piece of machine steel A is threaded internally to fit the lathe spindle and threaded outside to receive the nut B. This nut

clamps the collet ring C (which is of 4 sections) upon the butt end of the shell. The spring D shown in the cross fits in the groove

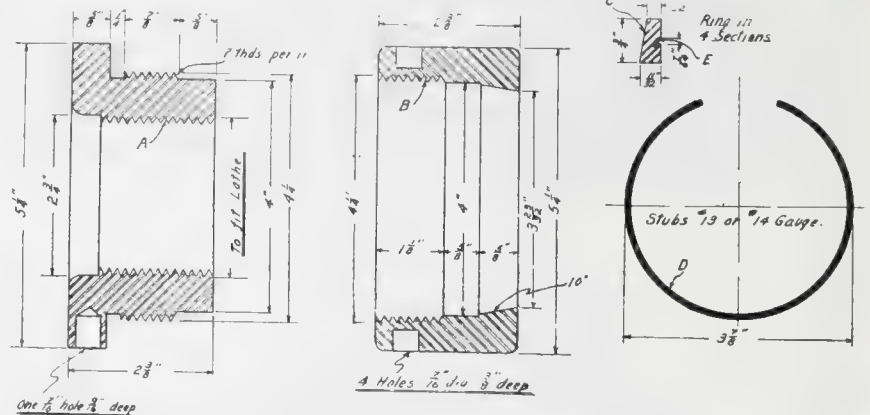


FIG. 5. CHUCK FOR HOLDING BUTT END OF SHELL WHILE BODY OF LATTER IS BEING GROUND.

section of the ring at E for keeping section expanded when chuck is released.

**Putting on Copper Band.**  
After being ground the copper bands are pressed on in a hydraulic press at a pressure of 30 or 35 tons; three appli-

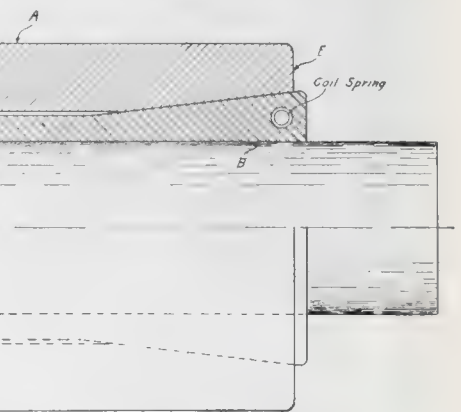


FIG. 4. SPECIAL CHUCK, USED ON A "JONES & LAMSON" AND "STEVENS" FLAT TURRET LATHE, FOR HOLDING SHELLS WHILE ROUGH TURNING NOSE AND BORING.

cations are given, the shell being turned a little each time.

**Filling the Shells.**

After the band turning operation the shells are ready to receive the charge

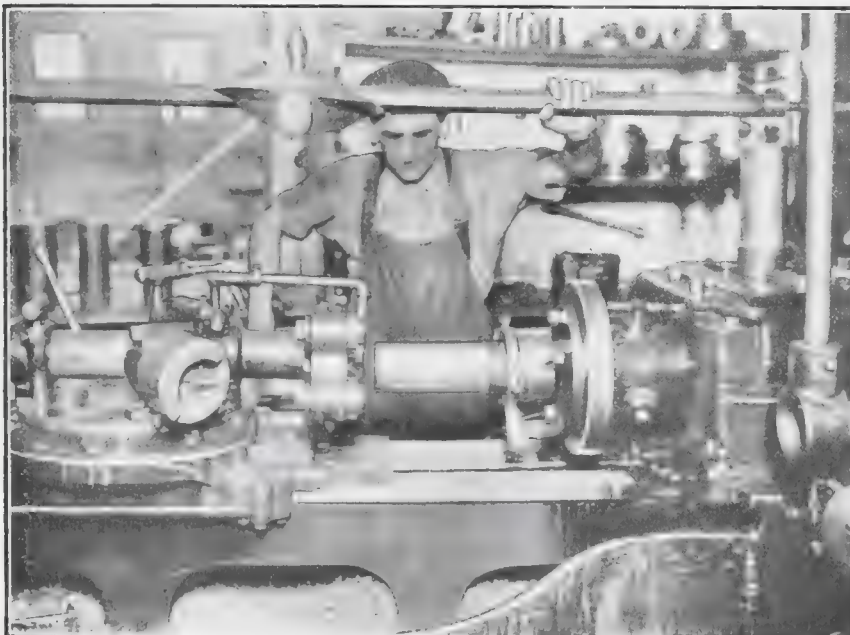


FIG. 2. ROUGH TURNING SHELL BODY ON "STEVENS" FLAT TURRET LATHE.

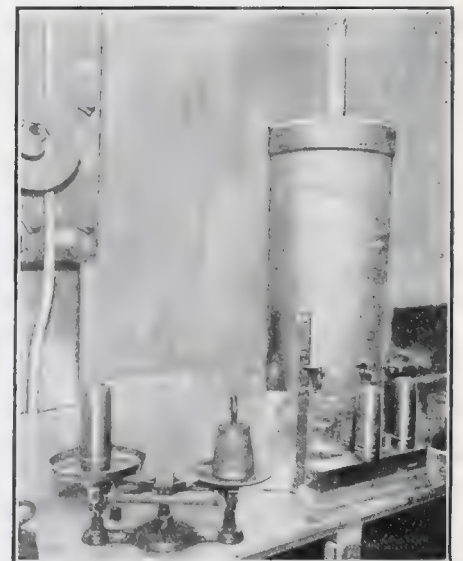


FIG. 6. RESIN MELTING FURNACE SHOWING SHELL FILLING AND WEIGHING ARRANGEMENTS.



of bullets and resin. The tin powder cup is first put in and allowed to fall into position beneath the diaphragm. The shell is placed on end and the brass tube screwed into the diaphragm. After

size. A feature of this operation was the replacing of the ordinary cone pulleys by a special made tread pulley to increase the driving power. This operation is shown in Fig. 7.

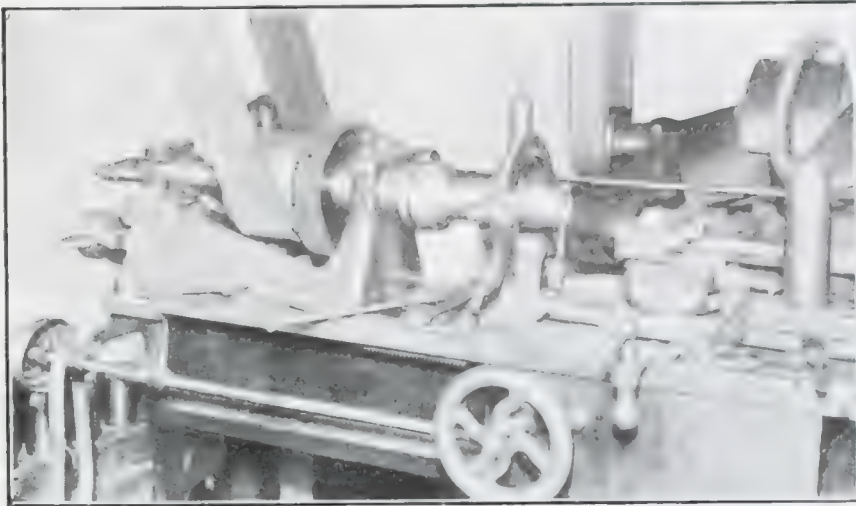


FIG. 7. FINISHING NOSE OF FUSE SOCKET ON LATHE WITH SPECIAL DRIVE.

filling the space around the tube with bullets the shell is placed on an air vibrator and the shot jarred and packed in until the weight of shell and bullets equal 16 lbs. 6 oz. 7 dr. The shell is then placed beneath the tap in the resin melting furnace shown in Fig. 6 and sufficient molten resin allowed to run in to bring the weight up to 17 lbs. 2 oz. 10 dr., one of the balls in the

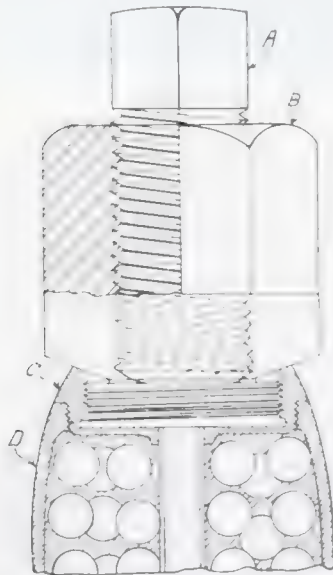


FIG. 8. TOOL FOR REMOVING BRASS SOCKETS.

shell being placed over the opening in the tube to prevent the resin from flowing in.

**Finishing the Fuse Socket.**

The shells are then held in a chuck and the fuse socket firmly screwed in. They are then held in a chuck similar to that shown in Fig. 5 on a London tool lathe and the rough part of the fuse socket finished to the desired shape and

socket after it is finished requires some careful handling. The tool shown in Fig. 8 was used for this purpose. It is a threaded plug which screws into the fuse socket C. The thread of plug B is threaded left hand and squared on the end, the nut A is threaded to fit the thread on the shank. The plug is securely held in a chuck and the plug

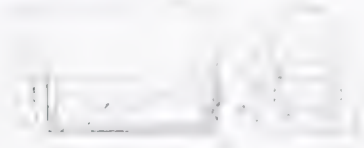


FIG. 13. PAINTING JIG.

screwed in, then the nut is screwed on until it comes in contact with nose of fuse socket, further pressure causes the socket to unscrew when the additional weight is inserted and socket separated.

**Facing Fuse Socket.**

The beveled bearing on the nose of the socket is then finished by facing

**Final Weight Test.**

The shell is now ready for the final test for weight and inspection before painting. The weight at this point

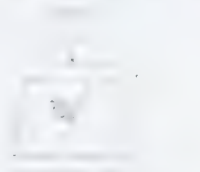


FIG. 11. LIMIT WEIGHT

should be 17 lbs. 10 oz. 14 1/2 dr. This was done on a Gurney scale. Now, if the shell weighs more than the limit allowed the base is faced off until the desired weight is obtained, but, if on the other hand the shell is too light the fuse socket must be removed and sufficient small shot added to bring it up to the required weight. To remove this fuse

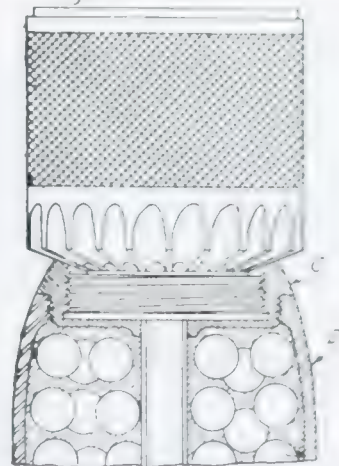


FIG. 9. TOOL FOR BEVELLING BRASS SOCKETS.

with the tool shown in Fig. 9. The threaded plug with shaft extended at

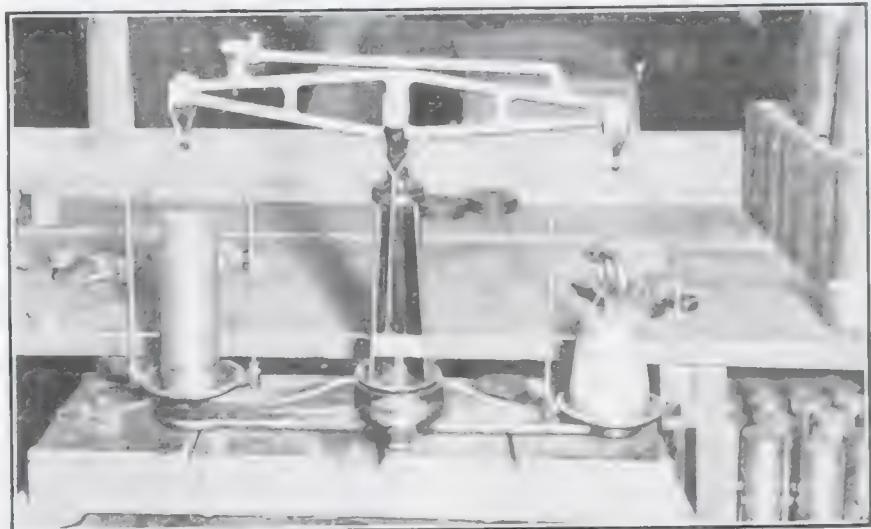


FIG. 10. INSPECTION BENCH SHOWING A FEATURE IN THE USE OF A SINGLE WEIGHT TO TAKE THE PLACE OF SEVERAL STANDARD WEIGHTS.

at A, Fig. 8, is screwed into the socket and the knurled rosebit B placed over the shank and turned by hand making a smooth joint for the time fuse piece.

#### Weighing Feature.

A feature in connection with the weighing of the shells at various stages was the replacing of several standard weights by one solid weight, as that shown on the scales in Fig. 10. This weight is more clearly shown in Fig. 11. The piece A was cast of a weight about equal to the required weight then drilled and tapped to receive the eye bolt B. The ends of piece A were then turned off until the exact weight was reached and then used in preference to the other weights and the adjustable weight on the upper beam. Instead of using this movable weight on the beam for finding the amount under or over, the piece of string solder, shown at C, was made the exact weight allowed over and above. This piece is shown on the top of weight in Fig. 10.

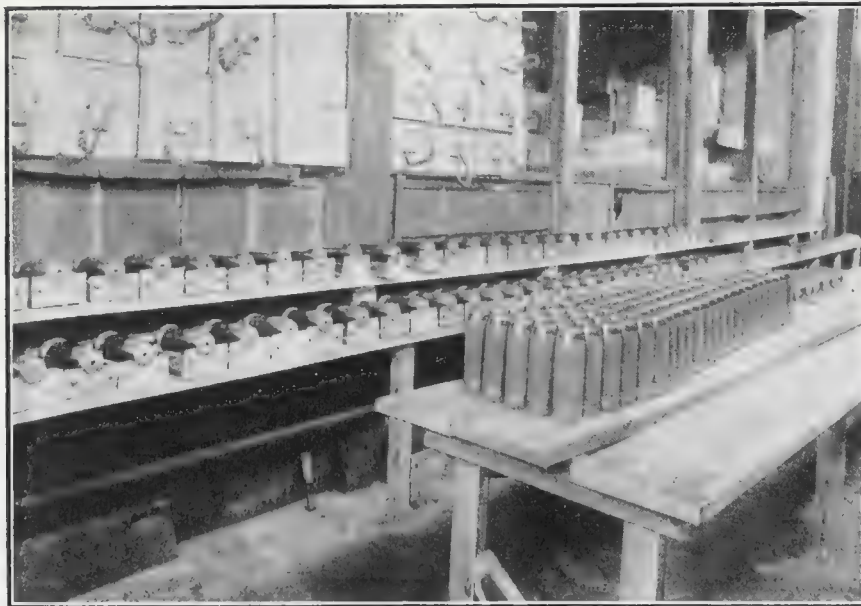


FIG. 12. SHELL PAINTING DEPARTMENT.

#### Marking and Painting.

After the shells have been finally passed they are marked in a Brown Boggs marking machine. They then go to the painting department a view of which is shown in Fig. 12. The cases in the upper left hand corner are used in shipping the finished shell. The jig used for painting the shell, of which there are a large number, is shown in Fig. 13. The frame is a light casting which carries the two shafts C on which are the rollers D held in position as shown. At the front end is a thin piece of board secured to the frame and hollowed out to receive the nose of the shell; a crank handle is fitted in the square hole and

the shell revolved while being painted.

This plant is turning out from two to three series, (240 to 360) shells a day.



#### CANADIAN LIGNITE INVESTIGATION.

LIGNITE obtained from the Province of Alberta has been under investigation by the Department of Mines, Ottawa, and a report of over 100 pages has been issued covering the results. This report, which is made by B. F. Haanel, chief of the Fuels and Fuel Testing Division of the Department, and John Blizzard, states that in an extended number of trials in gas producers the fuel was found eminently suited for such gas production. In fact, it is suggested that the nitrogen content is sufficiently high to make recovery of ammonia or ammonium sulphate profitable. It is added that no trouble was experienced in utilizing the gas in a gas engine.

The tests cover also the use of the lignite under steam boilers, and it was

wearing properties of metals have been made, using specimens supplied by Sir Robert Hadfield. The comparisons made up to the present time have been between the results of the "Brinell" ball hardness test and the "Saniter" wear test.

For the purpose of making the latter test, the existing Wöhler fatigue testing machine was used with a 1-in. specimen rotating at 2,200 r.p.m. A hardened steel ring of 1½-in. internal diameter and 0.25 in. wide, was placed on the specimen and loaded with a weight of 210 lb. The wear was taken as the reduction in diameter of the specimen in ten-thousandths of an inch after 200,000 revolutions of the specimen. The results showed that the relation between the "Brinell" hardness number and the resistance to wear (as given by the reciprocal of the wear in ten-thousandths of an inch multiplied by 1,000), depends largely on the composition of the steel. In ordinary carbon steels a high resistance to wear (18 to 20) corresponded with a high hardness number (720), whereas, in manganese steels having a relatively low hardness number (241 to 286), the resistance to wear was extremely high (27 to 30).

In the wear test it was found that the effect of the vibrations of the wearing ring on the wear was very marked, so that it was difficult to repeat the tests. At the suggestion of the Committee, designs for a wear testing machine are being prepared, in which it is hoped that this difficulty will be overcome.—National Physical Laboratory Sectional Report.



#### QUEER HABITS

PEOPLE engaged on repetition work sometimes form queer habits, which appear to have no useful connection with their work. In a certain shop the heads of hexagon bolts were chamfered in a simple lathe, the bolts being screwed into a cylindrical block or chuck mounted on the spindle. As soon as the screw was tight the workman hit the chuck a resounding whack with a spanner. Both chuck and spanner showed that this must have been done millions of times during the years that the man had been on the machine. No useful purpose was served, but the habit had become automatic and could not be discontinued. The man could give no explanation as to why he did it and the origin of this curious habit remains wrapped in mystery.

A similar case is that of a workman who had to wheel broken stone in a barrow and tip it into a deep excavation for the foundation of a building. After tipping his barrow he would let go the handles and raise his hands above his head with an expression of horror on his face, apparently at the awful fate of the stones.



#### HARDNESS AND WEARING TESTS OF METALS

AT the suggestion of the Hardness Tests Research Committee of the Institution of Mechanical Engineers, some comparisons of the results of the different methods of testing the hardness and



# Radiator and Boiler Manufacture in a Modern Foundry

Staff Article

*The production of steam and hot water heating apparatus is a highly specialized development in modern iron founding. Systematic care and increasing attention are necessary for the continued production of satisfactory work.—In the following article a brief description is given of a visit to one of those plants which have earned for Canadian manufacturers in this line, an enviable reputation for quality of product, due to good workmanship and material.*

**T**HE No. 3 plant of Steel & Radiation, Ltd., is situated on the outskirts of the town of St. Catharines, Ont., a progressive and flourishing community of over 14,000 inhabitants

which to secure labor, materials, etc. The plant, which is comparatively new specializes in apparatus for steam and hot water heating and full advantage has been taken of such methods and

connected by a spacious cross aisle. The pattern shop, pattern store, and stock room are separately housed in detached buildings to the north of the main structure. All of the buildings are of modern design, an important constructional feature being the liberal use made of "Fenestra" steel sash, which is manufactured in Canada by this company. The efficiency of this product in providing light and ventilation is widely recognized, and its use, combined with ample height and floor space, provides ideal conditions for



FIG. 1 FINISHED CORE AND CORE OVEN DEPARTMENT

The Grand Trunk Railway System supplies convenient transportation facilities and the comparatively close proximity of such manufacturing centres as Toronto, Hamilton, Welland, Niagara Falls, and Buffalo, ensures a favorable market in

equipment as can be adopted where high class repetition work is required.

### Buildings

The buildings consist of three principal bays running north and south and



FIG. 2 MOLDING MACHINE FOR RADIATOR SECTIONS



FIG. 3 RADIATOR MOLDING SHOP

foundry operations. With the exception of the moulding department which is paved with brick, the shop has wooden floors throughout and in all respects is thoroughly representative of this particular sphere of modern foundry practice.

Raw material consisting of pig iron, coke, sand, scrap iron, etc., is delivered on the railway siding close to the cupola, a suitable covered storage space enabling a stock of material to be kept on hand



should weather conditions interfere with its handling in the open.

#### Cupola Installation

The cupola is installed at the east end of the cross aisle and ample space is provided to allow of safe and rapid hand-

The cupola elevator gear is conveniently situated in this room and is operated by a 15-horse power motor. Electrical energy is obtained from Niagara Falls, the shop equipment including a transformer set which supplies 3-phase 25-cycle current at a pressure of 550 volts.

fer truck runs on a track across each end of the core ovens thus allowing any rack to be put into any oven, and when dried, to be placed in any desired position, in the storage space, where the cores are arranged on frames for transference to the moulding department.



FIG. 5. GENERAL VIEW OF FETTLING SHOP.

ling of the ladles. Close to the cupola is the blower room in which is a large "Connersville" blower of ample capacity, belt driven by a 50-horse power motor. Two belt driven air compressors supply compressed air for hoists, etc.

Owing to the high grade of work required, metal patterns are used almost exclusively. After the cores are formed of specially prepared sand, they are placed on trucks with suitable bodies and run into the drying ovens. A trans-

#### Modern Methods

As would be expected in a plant of this description, moulding machines are largely used, Fig. 2 showing one type of machine which is simple, strong, accurate, and quick. Fig. 3 shows a view in the



FIG. 4. HEATING BOILER MOLDING SHOP.



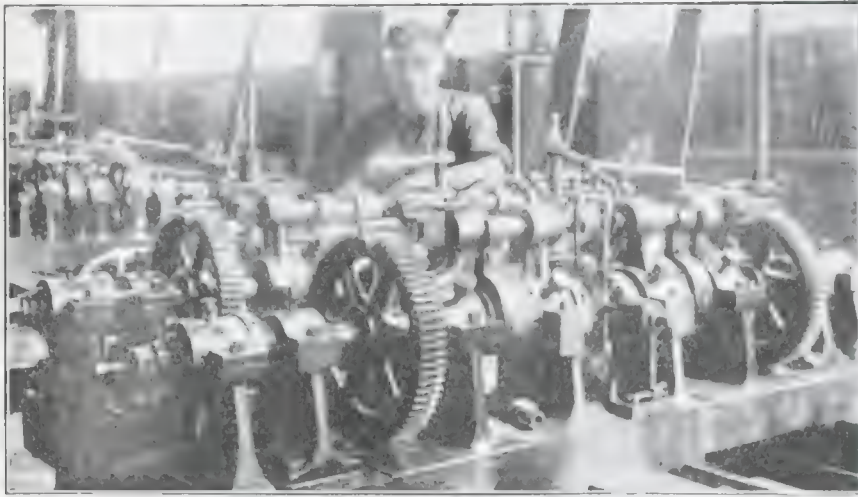


FIG. 6. TAPING AND FACING MACHINE.

moulding shop, it being amply equipped with traveling air hoists, which save considerable time and labor in conveying the ladles of hot metal to the moulds. An overhead electric hoist travels on a track along the cross aisle and is used for transferring work from one bay to another.

A view of boiler moulds in course of preparation is shown in Fig. 4. The number of different pieces required in producing the boilers is greater than with radiators, in addition, the shape of the parts does not allow of the same moulding methods being pursued. As a result of this, the methods in use are similar to those generally adopted in the production of high grade foundry work, skilled labor and the best of materials and equipment being indispensable to the maintenance of the company's standard of excellence. A complete equipment of sand blasting and rambling machinery is installed, and after being thoroughly cleaned the various parts are tested

under hydraulic pressure. Specially designed fixtures enable this operation to be accomplished rapidly and satisfactorily.

Although the actual amount of machine work on radiators is not great, it has to be performed with a considerable degree of accuracy. The faces of the bosses which join each other must all be parallel; there must be exactly the same thickness from face to face, and the two faces on either side must be exactly in line. While slight inaccuracies do not appreciably affect a radiator composed of say six or less sections, the cumulative affect of bad machine work on 18 or 20 sections is quite apparent to a casual observer. Special machines finish top and face the four bosses of a section simultaneously with the required

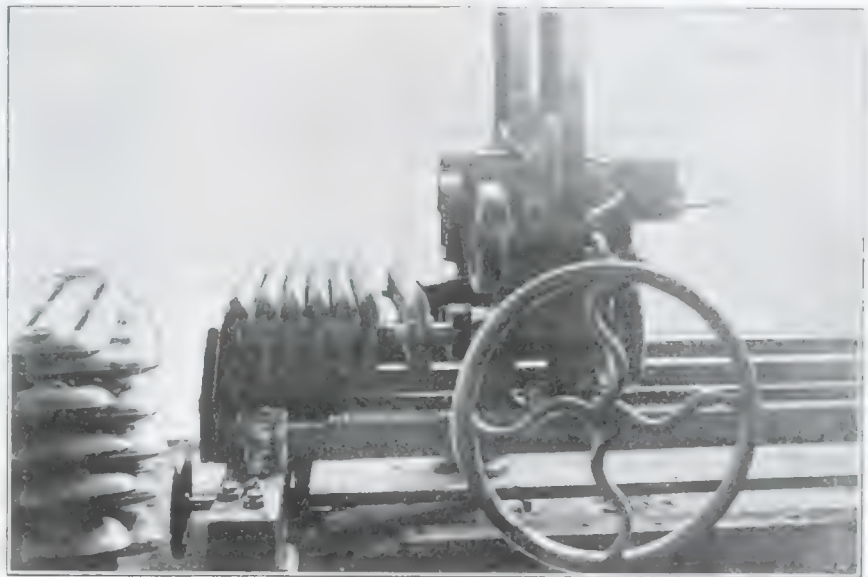


FIG. 7. RADIATOR ASSEMBLING MACHINE.



FIG. 8. HEATING BOILER ASSEMBLY DEPARTMENT.

degree of accuracy have been designed and built in the plant.

As can be observed in photograph, Fig. 5, the machine consists of two carriages, each of which carries two spindles. One of the carriages is rigid while the other is adjustable along the ways in the foreground of the picture. The machine shown has an adjustment of from 20 inches to 45 inches between centres of spindles, sufficient to handle all ordinary radiator sections.

#### Radiator Assembly

The threaded nipple system of construction is used exclusively in the company's radiators, making it thereby possible to produce tighter joints with less possibility of damage to the castings than when the push nipple joint is used. The latter method involves the use of tie rods or braces, which are unsightly when used externally, and interfere with the circulation when used internally. Furthermore, it is an easy matter to disassemble a threaded nipple for repairs, whereas a push nipple joint can only be separated at considerable risk of damage to sound parts of the radiator. As a result of this method of construction, few, if any, sections fail when the final hydraulic test is applied to the assembled unit.

Conditions render the use of push nipples desirable in the construction of steam and hot water boiler of which this firm has a large output. Push nipples of the spherical type as used by the company allow the component parts of a boiler to adjust themselves in use so that undue strains are avoided and all possibility of leakage is entirely prevented.

A well equipped machine shop and tool room are, as might be expected, a necessary adjunct of such a plant, and contribute to that quality of product for which the company have earned quite an enviable reputation.

#### LAKE SUPERIOR CORPORATION

SURPLUS profits from operation of the subsidiary companies of the Lake Superior Corporation in the year ended June 30 last amounted to \$1,366,210, a decrease of \$1,145,125, or about 45 per cent. The return does not include any figures from the Algoma Central & Hudson Bay Railway, which went into a receivership during the year, and to that extent the comparison cannot be exact.

The return giving the output of the main company in the group, the Algoma Steel Corporation, reveals, however, the source of the great shrinkage in earnings. "The production of pig iron, rails and merchants' mill material," says the directors' report, "is less than for the previous year on account of the sharp

falling off in demand which was experienced towards the end of the year." The output, in tons, compared with the preceding year, was as follows:

	1913-14	1914-15
Pig iron .....	311,904	212,917
Steel rails ... ..	325,680	174,536
Merchant mill material ... ..	15,575	8,903

The subsidiary companies, after paying interest on bonds amounting to \$1,166,414, writing off \$62,000, providing \$134,423 for sinking funds, appropriating \$54,209 for reserves and paying to the holding company \$342,859 as interest on bonds, etc., showed a deficiency of \$393,695 for the year. This wiped out the \$61,930 carried as unappropriated profits and left a net deficiency of \$331,765 at the end of the year.

The total income of the holding company, Lake Superior Corporation, was \$369,032, against \$448,054 the previous year. After paying interest and expenses the balance remaining as net income for the year was only \$1,661.

#### MELTING FURNACE DATA

IN the course of a paper read before the British Foundrymen's Association, F. C. Barker referred to the various forms of tilting type coke-fired furnace, both those heated on the regenerative system and ordinary firing. He specified one of the former in which the furnace body consists of two light steel shells, one within the other, the grate-bars being carried within the inner body and a pre-heater being fitted above. The working results for this furnace are given for the 400 lb. size as follows:—Time of melting  $8\frac{1}{2}$  hours; average metal to coke 5 lb. or 6 lb. to 1 lb.; life of crucible 60 heats.

For another furnace of the same general construction, but without pre-heating for the air, the following results were attained from practical foundry working over a period of 12 months:—450 lb. size furnace, average life of crucible 50 heats, coke consumption 4 to 1; 250 lb. size furnace, average life of crucible 60 heats, coke consumption 6 to 1.

Compared with coke-fired pit furnaces, these tilting furnaces show a saving of 50 per cent. in crucibles, and 50 per cent. in coke, while the amount of ash, owing to the better combustion of the fuel, is less by 80 per cent. The first-mentioned of these furnaces can be adapted to burn crude oil.

Oil fuel has several distinct advantages. The furnace can be started up directly the oil and air jets are opened up. One man can look after several furnaces. There is no cleaning out of the furnace at the end of the day, and little storage room is required. The

furnaces require no stoking or poking, and the melting can be conducted in a reducing atmosphere. A long life is assured to the crucibles, and a wide range of temperatures can be obtained.

#### GOLD OUTPUT INCREASES

THE Department of Mines reports that the total gold output in Ontario for the six months ending June 30, 1915, amounted to \$3,570,072. Last year the value of the output was \$2,011,069. Of the total yield for the half year, \$3,267,620 was mined in Porcupine. This shows that the output from the Porcupine mines is growing, and if maintained will show a 50 per cent. increase over the yield for 1914.

The department reports progress in many of the mining districts, and says that the prospects for a large output of gold ore from these mines are very bright. Some of the mines mentioned are: The Huronia at Kirkland Lake, Goodfish Lake camps, Munro camps, Howard's Falls (Kow Kash).

The output of silver continues to diminish. There is a difference of \$1,864,655 between the output of 1914 and the decreased output for the half year of 1915. Nickel has been mined more extensively. Compared with the previous year, the value of the nickel mined has increased 18 per cent., and that of copper 2 per cent.

The figures for the six months in 1915 and 1914 are, respectively: Gold—\$3,570,072, \$2,011,069; silver—\$5,188,763, \$7,053,418; copper—\$1,229,894, \$1,197,059; nickel—\$3,393,528, \$2,872,843; iron ore—\$288,296, \$118,119; pig iron—\$2,856,040, \$4,429,664; cobalt—\$34,443, \$22,581; cobalt oxide (including nickel oxide)—\$56,812, \$379,152.

**Experience.**—A graduate should emerge from the engineering school possessed with intellectual humility rather than intellectual arrogance, and should realize that without experience his engineering judgment will be of little value.—Professor Swain.

**Studies.** No man ever gained much from studies pursued for the selfish purpose of broadening himself out, without some definite relation to his usefulness as a citizen. We have an example of futility in the literary education pursued in China for 2,000 years, with no possible relation to the students' subsequent careers. If a student's inner motive is not greater power for the service of others, his education is a flat failure and his satisfactions are barren of happiness.—Professor Adams.



# 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

## SHAPING CIRCULAR PIECES

By G. E. Luck

A USEFUL device for machining circular pieces on a shaper is here shown. The piece shown at A is a rocker for a small punch press, though any similar piece may be machined in the same way. This rocker has a hole bored in its widest part for the crank pin, and this bored hole is used to locate by, as it is set over

Let us now unroll the circle made by the bottom of the grooves where it is only half the diameter, and we get a rectangle with a height of 6 in. and a base-line of  $3.1416 \div 2 = 1.5708$ . Again,  $1.5708 \div 6 = .2618$ , and the angle corresponding to this is  $15^\circ 11'$ .

Now, if Mr. Miller has a cutter cutting an angle of  $15^\circ 11'$  at one part of the groove and  $31^\circ 35'$  at another, to which angle does he set his miller?

Another point in the article which is not very clear to me is where he says the difference in the length of the base-line and the upright line is the ratio between the turning gears and the feeding gears.

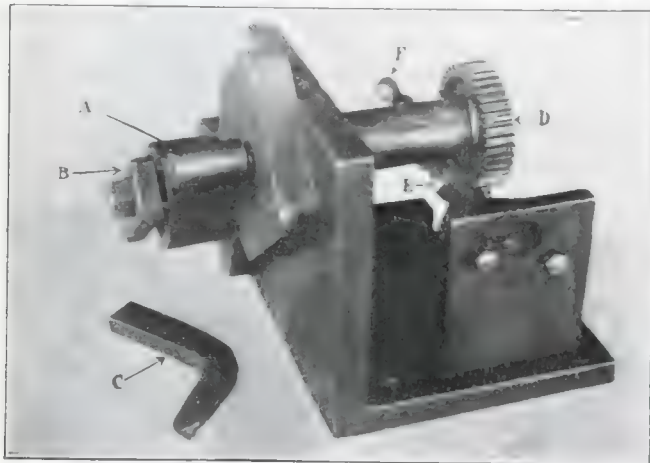
If Mr. Miller means that the ratio between the length of the two lines is the same as that between the revolutions of the

caption. I am not sure of the accuracy of purchasing another.

The work that was wanted most was the marking of vast quantities of a steel piece that for all practical purposes may be considered as  $1\frac{1}{2}$  in. x  $\frac{3}{4}$  in. x  $11\frac{1}{2}$  in. These came to the machine more or less oily which, added to their thin shape, made handling difficult and production aggravatingly slow. Some study of the problem convinced the writer that improvements could be made—accordingly the work was done, and it fulfilled all expectations.

### The Improvements

The photograph shows the machine as "improved." An extension on the table carries a vertical feeding chute that holds sixty pieces. To the horizontal slide (which carries the roll stamp) will be seen fastened a casting extending past the chute; it has, at its lower side, a dog which pushes out the bottom piece of the pile. The handle has also been changed from the back to the front of the machine, the pinion shaft lengthened, and provided with an outboard support. Further, the shaft drives a casting having an



SHAPING CIRCULAR PIECES

a large pin inserted in the holding plate. The clamp B holds the work securely in place. A pointed pin in the holder-plate marks the centre of rotation and a punch mark in the piece to be machined is set over this pin in order to line up properly for the cut. The cutting is done with an extension tool like that shown at C. The holder-plate is attached to a spindle which has the gear D on its opposite end. A worm E meshes with the teeth of this gear, so that as the ball crank F is slowly turned, the work is revolved under the cutter. Once set, work may be machined about as rapidly in this way as ordinary flat work.

## SUGGESTION FOR CUTTING SPIRALS

By S. Loebman

I WAS very much interested in reading Mr. Miller's suggestions in your issue of Sept. 9 for cutting spirals.

Suppose we were cutting spiral grooves 6-in. lead and  $\frac{1}{4}$ -in. deep in a 1-in. piece, then according to his method of laying out or unrolling the piece, we would have a rectangle 6 in. x 3.1416 with a groove diagonally across from corner to corner. Now,  $3.1416 \div 6 = .5236$ , which is the sine of the angle between the diagonal groove and the side of the rectangle. Looking this up in a table of sines we get  $31^\circ 35'$ .

two gears, he is hardly correct, for as I have shown, we may get different rectangles, giving different ratios, from different diameters and yet having the same lead produced by the same gearing.

If we call the base-line in all cases one, to represent one revolution of the work, and multiply it by 40 to get the revolutions of the gear necessary to revolve the work once, and we multiply the height of the rectangle, 6 in., by the pitch of the table screw, usually 4, to get the revolutions of the screw necessary to traverse the work that distance, we get 40 and 24 as the gears to use, or 5 to 3 as the ratio of the gearing; but as the table screw must turn fewer times than the worm, we must put the larger of the gears on the screw and the smaller on the index head.

## INCREASED PRODUCTION ON MARKING MACHINE

By D. A. Harrison

A MACHINE that was little known in most quarters before the recent manufacture of munitions was begun is the Dwight State marking machine. It is made in two styles, one for marking cylindrical work, and one for marking flat work. We had used one for years and not many months after the war's in-



IMPROVED MARKING MACHINE

internal runway for the two rollers that will be noted at the upper end of the diagonal bar. This bar raises the work table instead of having it done by the foot of the operator. The rollers drop

off the runways at the end of the stroke and the table returns by gravity. One end of the runways is hinged—as may be seen—this permits the return and the drop into position, ready to pick up the rollers for a new stroke. So arranged, a complete stroke of the handle feeds a new piece to the stamp, raises the table, marks the piece, and returns all parts to the starting point.

**Reduced Labor**

After loading the chute, the operator has but one thing to do—move the handle—as the pieces are confined in a trough that leads out at the back into work boxes. Relieving the operator of the mental and physical exertions of a hand movement, or foot movement for unloading, and for most of the loading increased the production two hundred per cent. A less skilled operator now does the same work and congestion no longer exists at the marking machine.

**A TURRET CROSS-SLIDE FEED**

By A. E. Granville

IN machining the piece shown at A, it is chucked by the stem and faced off. Being considered easier for the operator, and less liable to throw chips in his eyes, a cross-slide feed was made to be operated by means of the turret capstan. This was done by placing a hardened roller on the cross-slide at B, and a diagonal slide C on the turret. From this it will be seen that as the turret is fed toward the chuck, the cross-slide will be forced to move toward the back and carry the cutting tool across the face of the work. As the turret is run back a spring pushes the cross-slide toward the front and clear of the work.

**A SIMPLE DRILL CHUCK**

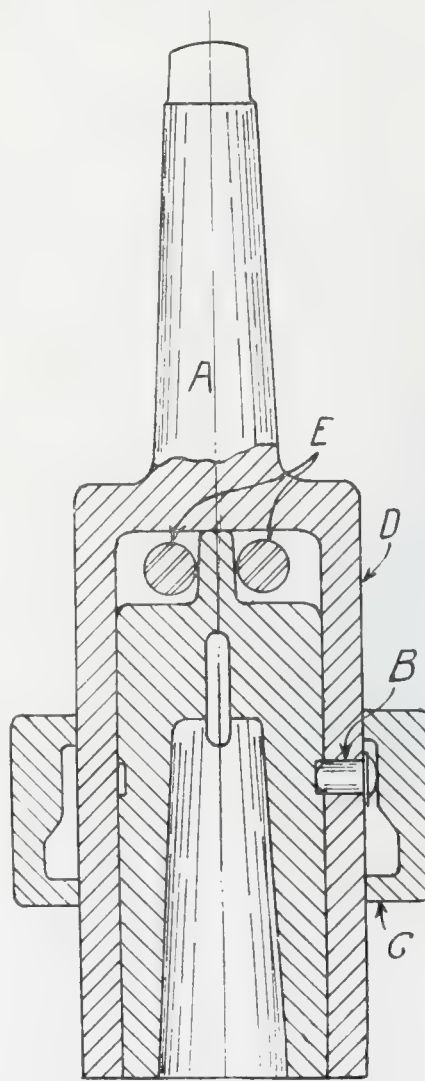
THE removal of drills from their sockets by means of a drift is at best a poor method. This is especially true when used on multiple spindle drills. On these machines, since there are several drills in

simultaneous action, the waste of time required in removing one by the old method is indeed quite costly.

There are several drill chucks on the market which allow the drill to be re-

up into the body of the chuck when the collar is in its top position and is held in place by means of the pin B engaging with the annular groove machined on D.

From the foregoing the operation of the chuck can be easily followed. To remove the adapter from the chuck body it is only necessary to hold it lightly in one hand while the other pushes up the sliding collar. This allows the large diameter of the bore to come opposite the head of the pin B. A slight downward pressure on the adapter causes the pin to slide out from the groove, thus leaving the adapter free to be removed. With this appliance it is advisable to carry a full line of adapters bored out for the complete range of drills. Where this chuck has been used it has been found to give complete satisfaction.



A SIMPLE DRILL CHUCK.

moved while the machine is in motion, and that here described and illustrated is among the simplest we have seen. The chuck body A has a tapered shank which fits the machine spindle. Through the chuck body is fitted the pin B, and this pin is operated by the sliding collar C. After the pin has been fitted in place, the collar C is slipped over, this being accomplished by means of a slot in bottom face of the collar. Through the top of the body are fitted two circular pins E. These engage with the tang of the adapter, thus driving it. The adapter D is pushed

**SHRAPNEL SHELL SOCKET TOOL**

By Geo. Armstrong

NO doubt several manufacturers in the shell industry have found more or less difficulty in securing a suitable apparatus for screwing the fuse sockets into place, or in removing a finished socket from the shell without marring the same. The latter is often necessary and must be done in order to rectify faulty weights. When the shells are finally inspected, they are often found to be under weight and in order to bring them to the desired standard it is necessary to remove the brass socket and place shot in the shell, till the correct weight is reached.

The tool described in this article is one that has been found to give entire satisfaction for this particular feature of the work. Referring to Fig. 1, the stud is turned from the solid and is made in two diameters, the larger diameter being threaded 14 threads per inch, R.H., to fit the thread in the fuse socket. The thread pitch of the smaller diameter is the same but the thread is left hand. A square head is milled on the top of the thread, and is made to fit a standard size wrench. The L.H. nut is made as shown in the sketch, the large diameter being bored to a bevel similar to that of the outside diameter of the fuse socket.

When it is required to screw a semi-finished socket into place, the nut C, Fig. 2, is first run back a sufficient distance in order to allow the larger thread to be screwed into the fuse socket, and within two threads of the bottom. The nut C is then turned back till it binds against the top of the socket. A wrench is placed on the head D of the stud and is turned to the left, or in the direction required to screw the R.H. thread. The action of the right and left hand thread is to bind the nut C, and the fuse socket tightly together. The fuse socket, nut



TURRET CROSS SLIDE FEED.



and stud then screw down as before and tilt the shoulder of the shell socket against the stud. To remove the stud, all that is necessary is to put a wrench

on the nut C, and loosen it by turning to the left, at the same time holding the stud stationary with the other wrench. The plug, thus released, can be easily screwed out of the socket.

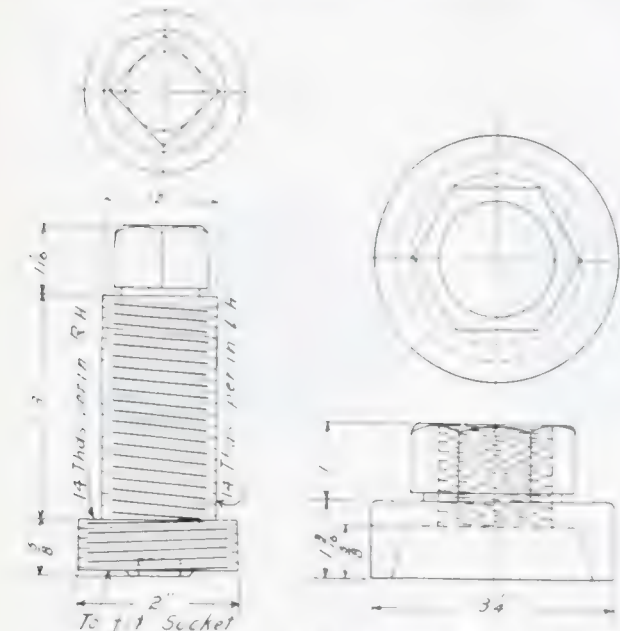


FIG. 1. STEEL AND NUT FOR SHELL SOCKET TOOL.

The removal of a fused socket from the shell is done in the manner illustrated in Fig. 2. The plug A is screwed into the socket to within one thread of the bottom, and the nut C is screwed

connecting to an overhead shaft of wood in the smelting-house. Four bellows are shown attached by as many connecting rods.

Mr. Charles Dawson, of Lewes, has a photograph of a clock-face made at Ashburnham, which was the centre of one of the Sussex ironmaking areas. The dial shows in a quaint fashion some of the phases of the industry: digging the ore, cutting down the trees, charcoal-burning, the interior of the forge, the foundry, and even the cheek-weighting of the cannon and other output of the works. The picture is the only contemporary representation of a Sussex iron-works of which I have any knowledge.

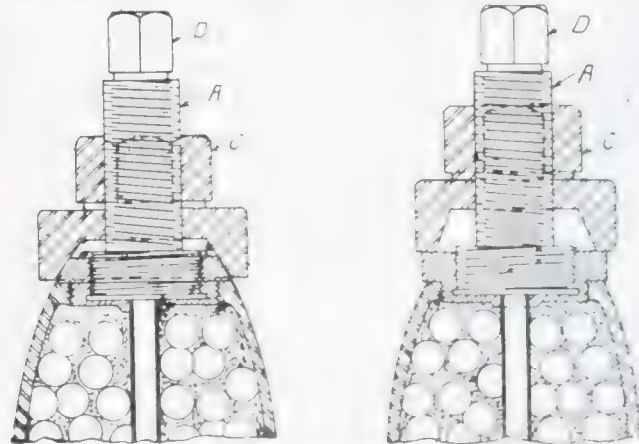


FIG. 2. APPLICATIONS OF SHELL SOCKET TOOL.

down against the socket, a wrench being then placed on the nut C, and turned to the right. The action is similar to the previous arrangement, the right and left hand threads again having the tendency to bind both the nut and socket together, thus allowing the latter to be withdrawn. The tool is removed by the socket in a similar manner as already stated, that is, a wrench is placed on the head P, and is held stationary while the nut C is loosened by the other wrench.

With regard to tilt hammers, Mr. Lewis, another Sussex antiquarian, suggested that the original tilt hammer was merely pivoted a little out of the centre. There was a free end opposite the tup, on which one or two men stepped to raise it. When they stepped off, the blow fell on the metal on the anvil. Afterwards the blow depended upon a cam, or the sprocket of a star wheel on the water-wheel shaft. Sometimes the pressure was exerted on the top of the free end of the hammer beam, at others under the beam between the pivot and the tup. By

using a counter weight a good hammer could be made to work with a minimum out of the bloom. It is on record that as early as 1300 the farrones, or ironmongers, of London were agitating against the Sussex ironmasters, who were delivering iron bars so short that making a good cast would waste a great deal of metal. Practical Foundrymen.



A NOTABLE example of the "reconstruction of the foundry" has been effected almost entirely within the past twenty years, as it is during this period that the greatest advances have been made, not only in the purely mechanical side of the business, the production of castings and methods of melting and mixing of the metals, but in easing the lot of the worker and making the foundry a more desirable place in which human beings shall live their working hours. In place of the dark, damp, unventilated and unheated frame buildings of the past, we now have fine structures of steel, brick and concrete, lighted by large arc and incandescent lamps at night. The various improvements that have been made are too extensive to be enumerated, even were it necessary; they have extended to all branches of the foundry industry, as every foundryman is well aware whose active career has covered the period in question.

These changed conditions are primarily due to the great educational movement that had its inception in the formation of the American Foundrymen's Association twenty years ago; the most notable event in the history of founding, an event that could hardly fail to result in good to the entire trade, for had little else been accomplished other than to bring foundrymen together to become acquainted with each other and with the men who furnish the supplies and build the machines, the formation of such an organization would have been well worth while, for once foundrymen got to know each other, distrust vanished, and it did not take long to discover that none had a monopoly of foundry knowledge, and that mutual advantage resulted from discussing with each other the various problems and difficulties encountered and the manner in which they were solved or surmounted. -Brass World Editorial.



Corrected. In the issue of September 26th, describing the Lea Simplex Cold Saw the statement was made that "the stock . . . is moved far enough ahead to cut possibly within one-sixteenth of an inch of the finished length." This is quite in error. The makers of the machine guarantee that by means of this gauge plate, "stock is cut to the exact finished length, and absolutely square."

# 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

## NEW PLAIN-TURNING LATHE

**U**NDER usual circumstances, the plain-turning lathe as such, because of its elementary simplicity would probably not be looked upon as a highly economical manufacturing machine for a shrapnel or projectile shop; but an analysis of its feeds and speeds in their improved forms, and of the manner in which the machine does its work, will show to what extent improvements in its design have made it a manufacturing tool of high rank.

The accompanying illustration gives a good idea of the general character of one of these lathes, as made by the Earl Gear & Machine Co., Philadelphia, builders of the "Lea-Simplex" cold saws. The machine shown here happens to be one with a two-step cone and back gears in the headstock, the swing being 18 in.

recessed deeply enough (at a diameter larger than the maximum shell the lathe is intended to take) to allow about four and four and one-half inches of the shell to enter. This leaves about four inches for the chuck grip, and gives the lathe tool unrestricted access to the nose. These lathes also take the French 75 m.m. shell.

As the illustration shows the machine is quite simple in design—and its sturdiness is evidenced in the different parts visible in the picture.

The bed which is seven feet long, is cast in one piece with the headstock. This carries with it several decided advantages. In the first place, it establishes permanently the parallelism between headstock spindle and bed; furthermore, it assures alignment of the carriage and tailstock with the headstock spindle. The unusual width of the bear-

power when moving under power feed. Feed changes are handled through slip gears, plunger controlled, which are in a gear box attached to the head end of the bed. A considerable variety for different metals is achieved by the combination of gear box feeds and spindle speeds. In the belt-driven machine, with two-step headstock cone, the combination with the two-speed countershaft gives eight spindle speeds, or 24 combinations of feeds and speeds, of which the highest is 68 feet per minute. Of course, the eight-spindle speeds include the two back-gear speeds, which are produced through gear ratios of  $5\frac{1}{4}$  to 1. Naturally, the machine with variable speed motor drive may be made to offer more than 24 combinations.

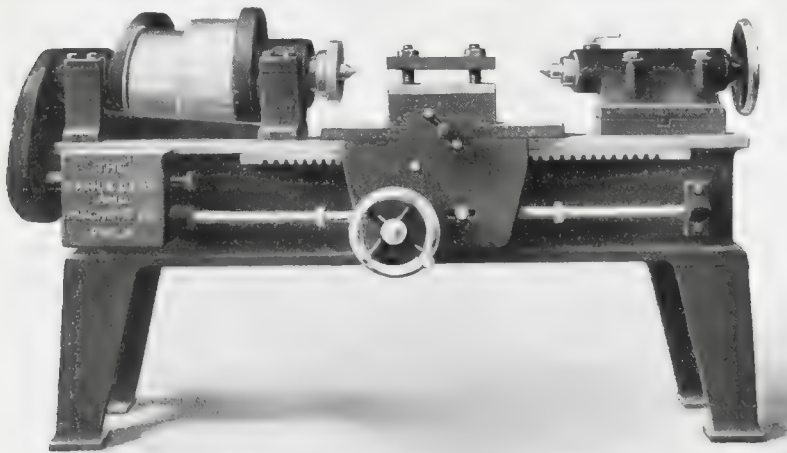
One of the most interesting features of the machine is the headstock spindle, which is furnished either solid or bored, as specified. When it is fitted with a face plate, it takes a No. 5 Morse taper (as does the tailstock). This spindle is bored only when it is to be used in taking nosing operations. A one-inch hole passes through the entire spindle. This makes it tubular, and adds very much to its stiffness, reducing weight at the same time. At the face plate end, a larger hole is recessed into it in a way that provides: First, sufficient depth for any length of shrapnel shell having a diameter within the machine's capacity; secondly, sufficient bearing surface for the chuck jaws, assuring an absolutely tight and vibrationless grip, without digging into the stock; thirdly, the required amount of protrusion beyond the chuck jaws to permit complete nosing with one setting; and, fourthly, minimum overhang beyond the chuck, which prevents chattering and assures smooth, accurate work.



## NOVEL COLLAPSIBLE TAP

THIS collapsible tap has been developed by the Modern Tool Co., Erie, Pa., and is designed to meet all requirements of internal threaded work.

As will be observed in the illustration, the tap proper is formed in two halves, being similar to an ordinary solid tap split along the centre line. Instead of having grooves cut at equal intervals around the body, the grooves are confined to opposite sectors of the two halves and are made fewer in number. The shanks of these tap-chasers, as they should be termed, terminate in the form of a square of generous proportions. These square ends are made a push fit in



NEW PLAIN TURNING LATHE.

over a 7 ft. bed. Where preferred it may be had with a variable speed motor, direct connected to the spindle through gears. Other sizes of 20 in. x 8 ft. and 24 in. x 8 ft., are also built, and being much heavier and more substantial, are obviously fitted for heavy work such as  $4\frac{1}{2}$  in., 6 in., and larger shells.

Everything is arranged for the rapid and easy execution of the various operations. Questions of spindle alignment are avoided in the method of construction. The popular compound rest for the tool post becomes unnecessary, for the simplest form of cross-slide on the saddle will do everything the machine is intended to do.

The turning of the shell nose requires the addition of a forming attachment milled to the contour of the nose. For this operation the headstock spindle is

ing surfaces of the bed make more than a single "V" unnecessary, the purpose of this being to take up reactions occasioned by the lathe tool.

The greatest distance between centres is 28 inches. The swing over the bed is 18 in. and 10 in. over the carriage. The height from floor to horizontal centre is 40 inches. Much attention has been given the design of the bearings. The front and rear spindles measure 5 in. x  $6\frac{3}{4}$  in. and  $4\frac{1}{2}$  in. x  $5\frac{1}{2}$  in. diameter and length respectively, and are of the ring oiling type. Governed by these dimensions, the diameter of the tailstock spindle was made  $3\frac{1}{2}$  in. and given 6 in. travel.

The carriage, which is power driven, has long and wide bearings on the bed. This makes movement by hand very easy, and of course utilizes but little



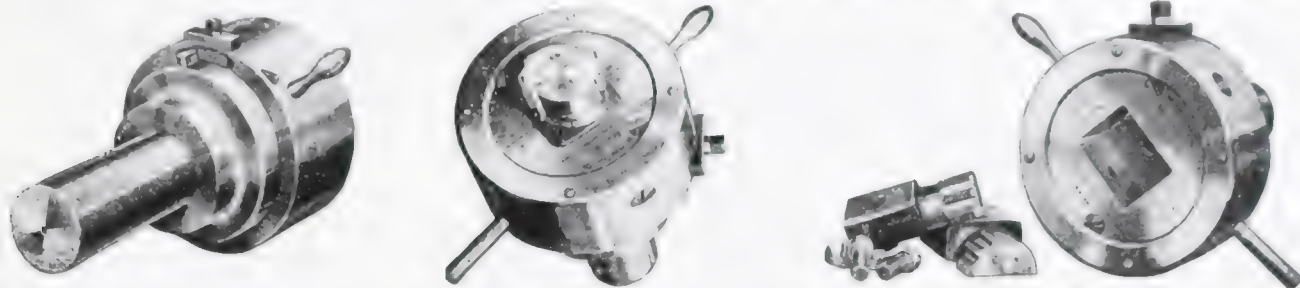
The recess formed in the chaser blocks which slide in opposite directions, each block moving its chaser across the face of the other chaser.

By continuing the cutting test, the suitable portion of each chaser, the device immediately assumes all the characteristics of a collapsible tap, the blank surface on each chaser allowing them to be brought toward the centre to withdraw

material until the entire process of cutting.

Generally to increase the diameter of a thread in one way, the method is usually carried in a radial direction to the wheel centre, the cutter in this process is fed at a tangent to the circumference of the work, the cutting first with the tapered end into the solid metal. The rest of the wheel

they may secure it indirectly. Mr. Cochrane, of New York, had a yacht built for him the finest and largest ever built, valued at about \$1,000,000, a million dollars. The hull was an experiment in using ballast, instead of iron, made of nickel metal, it was put on the market by the International Nickel Co., and named after its president, Augustus M. Sells.



"MODERN" ADJUSTABLE COLLAPSING TAPS, SHOWING FRONT AND REAR, ALSO TAP WITH CHASERS REMOVED.

the teeth from the thread. The chaser-blocks slide in a tap head which in turn is driven in a positive manner by the shank. The action of the mechanism is controlled by a cam ring and suitable means are provided for automatic release, resetting, and adjusting to size.

This tap is suitable for use on the various makes of screw machines, turret lathes and other tools where the tap is stationary and the work revolves. It can also be applied on machines where the work is stationary and the tap is revolved, a simple device for closing the tap automatically as it revolves, being easily attached.

The "Modern" collapsible tap is built in four sizes having a range as follows:

No. 1, having a capacity from 1/2 in. to 1 in.

No. 2, having a capacity from 3/4 in. to 1 3/8 in.

No. 3, having a capacity from 1 1/4 in. to 1 3/4 in.

No. 4, having a capacity from 1 3/4 in. to 2 in.

**WORM WHEEL CUTTING MACHINE**

THE accompanying illustration shows a new worm wheel cutting or generating machine recently placed on the market by the Newton Machine Tool Works, Philadelphia, Pa. The wheel is cut by either fly cutters or a taper hob. The cutter or hob has the form of a tap and is set to the same distance of axis between worm and wheel and the same angle to the plane of wheel at which the worm actually runs. These measurements remain un-

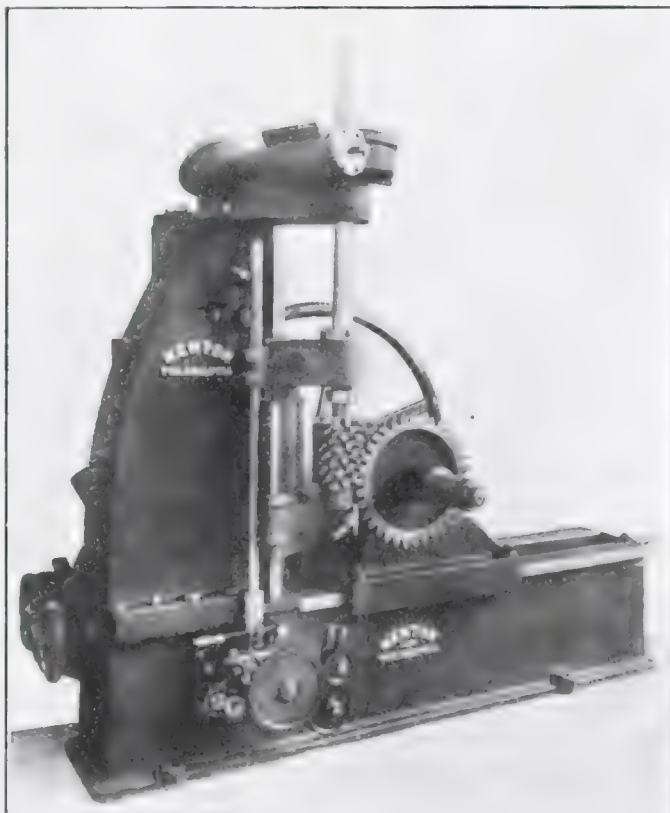
will become gradually deeper as the cutter, while being fed across the surface, grows larger in diameter, the full end finishing the teeth.

A large worm wheel having 92 teeth, triple lead, 47 1/2 inches outside diameter, 5 1/2 inches face, and of 2 diametral pitch was cut in ten hours.

**INTERNATIONAL NICKEL**

IF the Germans are not securing all the Canadian nickel they want direct, they are not neglecting any ways by which

tons were used in the construction. Unfortunately it proved a failure. The metal would not withstand the action of the salt water, and after about three months the yacht leaked so badly that Mr. Cochrane sent it to the scrap heap in Boston. As it was being broken up, two Germans arrived from Washington and began negotiations for its purchase. Arrangements were made for repairing the vessel and the adding of large additional quantities of nickel wherever possible. The agent explained that the matter had been discussed at Washington and began negotiations for its purchase. Arrangements were made for repairing the vessel and the adding of large additional quantities of nickel wherever possible. The agent explained that the matter had been discussed at Washington, and it was arranged that, being an American pleasure yacht, it could cross the ocean under the Stars and Stripes, and sail into a German port with an American crew without interference from the Allies. The boat in question is the largest American yacht afloat, and undoubtedly hundreds of tons of nickel could be worked into the hull and used as ballast and for other purposes, and thus evade the scrutiny of British and French naval scouts. How much more Canadian nickel may have got to Germany by these indirect methods is hard to say.



WORM WHEEL CUTTING MACHINE

London, Ont.—The city council have decided to purchase five machines, each at a cost of \$7,000.

# How to Keep Men in Your Employ? A Possible Solution \*

By W. A. Grieves \*\*

*The necessity of hiring an extra percentage of help in order to maintain the required number of men up to a proper standard is and always has been a source of considerable loss to large employers of labor. The writer clearly explains how one firm avoided this loss and at the same time contributed not a little to the material welfare and happiness of employees.*

**I**F you are a manufacturer employing 2,200 men and are shown that it costs you, on an average, about \$88,000 more each year than it should, to maintain this force, you are at once interested. At the Jeffrey plant, methods have been adopted for meeting this problem with favorable results and the principles that have been applied can be adapted to other concerns.

Thinking our experience might be abnormal, we sent letters to 40 manufacturing concerns, in the middle west. This letter told how we had been able in five years, by adopting different methods, to reduce the cost of maintaining our force by \$24,000 per year.

Fifty per cent., 20 firms, replied and gave their experience for the past year. Others wrote that their experience had been so bad, they felt diffident in putting it upon paper. The replies of the 20 firms revealed that to keep an average force of 44,000 men at work, during the year, they had employed 69,000 men.

## Why Men Quit

If more care and thought were exerted to find out why men quit their jobs so frequently, this condition could be improved, and there would be a larger balance on the credit side of the ledger at the end of the year. A certain percentage of any force will change, including loss by death, 1 per cent.; by sickness, 5 per cent.; through removal, 10 per cent., and through mistakes in selecting the right man for the right place, 25 per cent. To maintain an average working force of 44,000 men, taking the foregoing percentages, only 18,000 should have been hired. Instead, 69,000 were hired, or 51,000 more than can be accounted for.

To arrive at the financial loss, group the employes into the following classes:

- 1—Highly skilled mechanics.
- 2—Semi-skilled mechanics.
- 3—Helpers and handy men.
- 4—Laborers.
- 5—Clerks.

Then distribute the cost as follows:

- 1—Expense of employing.
- 2—Time loss in giving instructions.

3—Breakage of tools and machinery by new men.

4—Spoiled work.

5—Decreased production.

Analyzing these five divisions, their cost in dollars is secured. The clerical work in hiring and discharging men is the least expensive. This cost can be placed very conservatively at 50 cents per man. The instruction expense depends largely upon the nature of the work and the skill and experience of the new employe. The unskilled laborer will cost from \$1 to \$2 each, for instruction. Experiments in our machine shops show that \$10 is not too high for the average skilled mechanic. It is reasonable to figure the expense for semi-skilled men at one and a half time this amount. Helpers and handy men will require at least \$5 for instruction; while training new clerks will add a few more dollars. Experience shows that the total cost of instruction can be conservatively placed at \$20 per man.

The cost of increased wear and tear and damage done to tools and machinery is difficult to determine, but is about \$1 for the highly skilled mechanic and from \$7 to \$10 for helpers and handy men, an average of \$7.

Loss due to reduced production is undoubtedly the largest item. Our experience has been, that mechanics after six months in our employ will gain an average of three to five hours' time per day, while the average new mechanic takes from one month to three months to be able to meet the time limits. At the average wage of 35 cents per hour, the old men gain four hours per day. At 50 per cent. of the day rate, the gain is 70 cents per day. As these men have also saved a like amount for the company, in one month of 24 working days, the company loses \$16.80 per man. If the average period during which time is lost by the new men is placed at two months, the loss totals \$33.60 per man for decreased production.

The expense incident to spoiled work also is hard to get at, but is at least \$15 for skilled and semi-skilled mechanics and \$5 for handy men and helpers.

These losses total \$81.10 per man. To be conservative, reduce this to \$40 per man average. For each of the 20 firms, averaging their employes at 2,200 men each, this means \$88,000 of unnecessary expense, or \$1,760,000 for all of them.

And we have not counted the increased overhead. These figures clearly indicate the need of greater stability of employment in our industrial institutions.

## Salesmen vs. Workmen

Industry is composed of two major divisions, producing and selling. What has been your attitude toward the inefficient salesman? In some cases you discharge him. Generally you are no better off. In replacing him, you take the same chances of getting one just as inefficient. Therefore, you reason that the best solution is to educate the salesman. Why not do the same in the manufacturing departments?

The first plan of attack should be through education. The better educated a man is, the more ground for believing that he can be reasoned with. As an example, while conversing with one of our best paid and highly skilled mechanics, recently, he remarked that the company must make an enormous profit on a certain product. Material and labor costs were the only two elements he had considered. Of the immense overhead burden, such as sales, expense, supervision, upkeep, insurance, interest on investment, advertising, etc., he was entirely ignorant.

Is it any wonder that such men fall easy victims to the misleading arguments of the selfish and unprincipled labor agitator? The trouble rests with the manufacturers. They have allowed themselves to be advertised by those who do not know — allowed themselves to be shown wrong side up.

Do your men know that if you make money this year, it probably will go into new machinery and equipment next year? Do they know that through changes in design, this new machinery may be good only for the scrap heap next year? Do they know that during periods of depressed business, you are compelled to take work below cost, simply to give them work and hold your organization together? Do your men know that while you are eager to pay higher wages, provide better equipment, and have more ideal working conditions, you are restrained by competition? You are willing to pay \$5 per day to mechanics, but others may pay only \$3 per day. Do your employes know this?

In the Jeffrey betterment policy, we

(Continued on page 71)

\* A paper read before the Detroit Board of Commerce.

\*\* Assistant secretary and supervisor of welfare, Jeffrey Mfg. Co., Columbus, O.





# SELECTED MARKET QUOTATIONS

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

## PIG IRON.

Grey forge, Pittsburgh	\$14 70
Lake Superior, charcoal, Chicago	15 75
Ferro Nickel pig iron (Soo)	25 00
	<b>Montreal. Toronto.</b>
Middlesboro, No. 3	22 00
Carron, special	23 00
Carron, soft	23 00
Cleveland, No. 3	22 00
Clarence, No. 3	22 50
Glengarnock	26 00
Summerlee, No. 1	28 00
Summerlee, No. 3	27 00
Michigan charcoal iron	26 00
Victoria, No. 1	23 00
Victoria, No. 2X	22 00
Victoria, No. 2 plain	22 00
Hamilton, No. 1	22 00
Hamilton, No. 2	22 00

## FINISHED IRON AND STEEL.

	<b>Cents.</b>
Common bar iron, f.o.b., Toronto	2.20
Steel bars, f.o.b., Toronto	2.20
Common bar iron, f.o.b., Montreal	2.20
Steel bars, f.o.b., Montreal	2.20
Twisted reinforcing bars	2.20
Bessemer rails, heavy, at mill	1.25
Steel bars, Pittsburgh	1.30
Tank plates, Pittsburgh	1.30
Beams and angles, Pittsburgh	1.30
Steel hoops, Pittsburgh	1.40
	<b>F.O.B. Toronto Warehouse. Cents.</b>
Steel bars	2.10
Small shapes	2.35
	<b>Warehouse, Freight and Duty to Pay. Cents.</b>
Steel bars	1.90
Structural shapes	1.95
Plates	1.95
	<b>Freight, Pittsburgh to Toronto.</b>
	18.9 cents carload; 22.1 cents less carload.

## BOILER PLATES.

	<b>Montreal.</b>	<b>Toronto.</b>
Plates, 1/4 to 1/2 in., 100 lb.	\$2 35	\$2 25
Heads, per 100 lb.	2 55	2 45
Tank plates, 3-16 in.	2 60	2 45

## OLD MATERIAL.

	<b>Dealers' Buying Prices. Montreal.</b>	<b>Toronto.</b>
Copper, light	\$12 25	\$12 00
Copper, crucible	13 25	13 00
Copper, unch-bleed, heavy	13 25	13 00
Copper, wire, unch-bleed	14 00	14 00
No. 1 machine compos'n	11 50	11 50
No. 1 compos'n turnings	9 00	9 00
No. 1 wrought iron	8 50	6 50
Heavy melting steel	7 00	7 00
No. 1 machin'y cast iron	13 50	10 50
New brass clippings	11 00	11 00
No. 1 brass turnings	9 00	9 00
Heavy lead	4 00	5 00

Tea lead	\$ 3 25	\$ 3 50
Scrap zinc	10 50	9 00

## W. I. PIPE DISCOUNTS.

Following are Toronto jobbers' discounts on pipe in effect Aug. 27, 1915:

	<b>Buttweld Black Standard</b>	<b>Gal.</b>	<b>Lapweld Black</b>	<b>Gal.</b>
1 1/4, 3/8 in.	63	38 1/2		
1/2 in.	68	47 1/2		
3/4 to 1 1/2 in.	73	52 1/2		
2 in.	73	52 1/2	69	48 1/2
2 1/2 to 4 in.	73	52 1/2	72	51 1/2
4 1/2, 5, 6 in.			70	49 1/2
7, 8, 10 in.			67	44 1/2
	<b>X Strong P. E.</b>			
1 1/4, 3/8 in.	56	38 1/2		
1/2 in.	63	45 1/2		
3/4 to 1 1/2 in.	67	49 1/2		
2, 2 1/2, 3 in.	68	50 1/2		
2 in.			63	45 1/2
2 1/2 to 4 in.			63	48 1/2
4 1/2, 5, 6 in.			66	48 1/2
7, 8 in.			59	39 1/2
	<b>XX Strong P. E.</b>			
1/2 to 2 in.	44	26 1/2		
2 1/2 to 6 in.			43	25 1/2
7 to 8 in.			40	20 1/2
	<b>Genuine Wrot Iron.</b>			
3/8 in.	57	32 1/2		
1/2 in.	62	41 1/2		
3/4 to 1 1/2 in.	67	46 1/2		
2 in.	67	46 1/2	63	42 1/2
2 1/2, 3 in.	67	46 1/2	66	45 1/2
3 1/2, 4 in.			66	45 1/2
4 1/2, 5, 6 in.			63	42 1/2
7, 8 in.			60	37 1/2

## Wrought Nipples.

4 in. and under	77 1/2%
4 1/2 in. and larger	72 1/2%
4 in. and under, running thread.	57 1/2%

## Standard Couplings.

4 in. and under	60%
4 1/2 in. and larger	40%

## MILLED PRODUCTS.

Sq. & Hex. Head Cap Screws	65%
Sq. Head Set Screws	65 & 10%
Rd. & Fil. Head Cap Screws	45%
Flat & But. Head Cap Screws	40%
Finished Nuts up to 1 in.	70%
Finished Nuts over 1 in. N.	70%
Semi-Fin. Nuts up to 1 in.	70%
Semi-Fin. Nuts over 1 in.	72%
Studs	65%

## METALS.

	<b>Montreal.</b>	<b>Toronto.</b>
Lake copper, carload	\$20 00	\$19 00
Electrolytic copper	20 00	18 75
Castings, copper	19 75	18 50
Tin	39 00	39 00
Spelter	18 00	18 00
Lead	6 15	6 25
Antimony	35 00	35 00
Aluminum	50 00	55 00

Prices per 100 lbs.

## BILLETS.

	<b>Per Gross Ton</b>
Bessemer, billets, Pittsburgh	\$24 50
Openhearth billets, Pittsburgh	25 00
Forging billets, Pittsburgh	32 00
Wire rods, Pittsburgh	30 00

## NAILS AND SPIKES.

Standard steel wire nails, base	\$2 40	\$2 35
Cut nails	2 50	2 70
Miscellaneous wire nails	75	per cent.
Pressed spikes, 5/8 diam., 100 lbs.	2 85	

## BOLTS, NUTS AND SCREWS.

	<b>Per Cent.</b>
Coach and lag screws	75
Stove bolts	80
Plate washers	40
Machine bolts, 3/8 and less	70
Machine bolts, 7-16 and over	60
Blank bolts	60
Bolt ends	60
Machine screws, iron, brass	35 p.c.
Nuts, square, all sizes. 4 1/4 c per lb. off	
Nuts, Hexagon, all sizes. 4 3/4 c per lb. off	
Iron rivets	72 1/2 per cent.
Boiler rivets, base, 3/4-in. and larger	\$3.75
Structural rivets, as above	3.75
Wood screws, flathead, bright	.85, 10, 7 1/2, 10 p.c. off
Wood screws, flathead, Brass	.75 p.c. off
Wood screws, flathead, Bronze	.70 p.c. off

## LIST PRICES OF W. I. PIPE.

	<b>Standard.</b>	<b>Extra Strong.</b>	<b>D. Ex. Strong.</b>
	<b>Nom. Price.</b>	<b>Size Price</b>	<b>Size Price</b>
	<b>Diam. per ft.</b>	<b>Ins. per ft.</b>	<b>Ins. per ft.</b>
1/8 in.	\$.05 1/2	1/8 in. \$.12	1/2 \$ .32
1/4 in.	.06	1/4 in. .07 1/2	3/4 .35
3/8 in.	.06	3/8 in. .07 1/2	1 .37
1/2 in.	.08 1/2	1/2 in. .11	1 1/4 .52 1/2
3/4 in.	.11 1/2	3/4 in. .15	1 1/2 .65
1 in.	.17 1/2	1 in. .22	2 .91
1 1/4 in.	.23 1/2	1 1/2 in. .30	2 1/2 1.37
1 1/2 in.	.27 1/2	1 1/2 in. .36 1/2	3 1.86
2 in.	.37	2 in. .50 1/2	3 1/2 2.30
2 1/2 in.	.58 1/2	2 1/2 in. .77	4 2.76
3 in.	.76 1/2	3 in. 1.03	4 1/2 3.26
3 1/2 in.	.92	3 1/2 in. 1.25	5 3.86
4 in.	1.09	4 in. 1.50	6 5.32
4 1/2 in.	1.27	4 1/2 in. 1.80	7 6.35
5 in.	1.48	5 in. 2.08	8 7.25
6 in.	1.92	6 in. 2.86	
7 in.	2.38	7 in. 3.81	
8 in.	2.50	8 in. 4.34	
8 in.	2.88	9 in. 4.90	
9 in.	3.45	10 in. 5.48	
10 in.	3.20		
10 in.	3.50		
10 in.	4.12		



**COKE AND COAL.**

Solvay Foundry Coke .....	\$5.75
Connellsville Foundry Coke .....	5.00
Yough, Steam Lamp Coal .....	3.83
Penn. Steam Lamp Coal .....	3.63
Best Slack .....	2.99
Net ton f.o.b. Toronto.	

**COLD DRAWN STEEL SHAFTING.**

At mill .....	45%
At warehouse .....	40%
Discounts off new list. Warehouse price at Montreal and Toronto.	

**MISCELLANEOUS.**

Solder, half and half .....	0.25
Putty, 100-lb. drums .....	2.70
Red dry lead, 100-lb. kegs, per cwt.	9.65
Glue, French medal, per lb. ....	0.18
Tarred slaters' paper, per roll ..	0.95
Motor gasoline, single bbls., gal...	0.18
Benzine, single bbls., per gal. ....	0.18
Pure turpentine, single bbls. ....	0.64
Linseed oil, raw, single bbls. ....	0.65
Linseed oil, boiled, single bbls. ...	0.68
Plaster of Paris, per bbl. ....	2.50
Plumbers' Oakum, per 100 lbs. ....	4.00
Lead wool, per lb. ....	0.10
Pure Manila rope .....	0.16
Transmission rope, Manila .....	0.20
Drilling cables, Manila .....	0.17
Lard oil, per gal. ....	0.73
Union thread cutting oil .....	0.60
Imperial quenching oil .....	0.35

**POLISHED DRILL ROD.**

Discount off list, Montreal and Toronto .....	40%
---	-----

**PROOF COIL CHAIN.**

1/4 inch .....	\$8.00
5-16 inch .....	5.35
3/8 inch .....	4.60
7-16 inch .....	4.30
1/2 inch .....	4.05
9-16 inch .....	4.05
5/8 inch .....	3.90
3/4 inch .....	3.85
7/8 inch .....	3.65
1 inch .....	3.45

Above quotations are per 100 lbs.

**TWIST DRILLS.**

Carbon up to 1 1/2 in. ....	%	60
Carbon over 1 1/2 in. ....		25
High Speed .....		40
Blacksmith .....		60
Bit Stock .....		.60 and 5
Centre Drill .....		20
Ratchet .....		20
Combined drill and c.t.s.k. ....		15

Discounts off standard list.

**REAMERS.**

Hand .....	%	25
Shell .....		25
Bit Stock .....		25
Bridge .....		65
Taper Pin .....		25
Centre .....		25
Pipe Reamers .....		80

Discounts off standard list.

**IRON PIPE FITTINGS.**

Canadian malleable, A, 25 per cent; B and C, 35 per cent; cast iron, 60; standard bushings, 60 per cent.; headers, 60; flanged unions, 60; malleable bushings, 60; nipples, 75; malleable, lipped unions, 65.

**TAPES.**

Chesterman Metallic, 50 ft. ....	\$2.00
Lufkin Metallic, 603, 50 ft. ....	2.00
Admiral Steel Tape, 50 ft. ....	2.75
Admiral Steel Tape, 100 ft. ....	4.45
Major Jun., Steel Tape, 50 ft. ....	3.50
Rival Steel Tape, 50 ft. ....	2.75
Rival Steel Tape, 100 ft. ....	4.45
Reliable Jun., Steel Tape, 50 ft. ...	3.50

**SHEETS.**

	Montreal	Toronto
Sheets, black, No. 28. ....	\$2 70	\$2 70
Canada plates, dull,		
52 sheets .....	3 15	3 15
Canada Plates, all bright..	4 75	4 75
Apollo brand, 10 3/4 oz.		
galvanized .....	6 40	5 95
Queen's Head, 28 B.W.G.	6 00	6 25
Fleur-de-Lis, 28 B. W. G...	5 75	5 75
Gorbals' Best, No. 28 .....	6 00	6 00
Viking metal, No. 28....	6 00	6 00
Colborne Crown, No. 28..	5 38	5 30
Premier No. 28 .....	5 60	5 50

**BOILER TUBES.**

Size	Seamless	Lapwelded
1 in. ....	\$11 00	.....
1 1/4 in. ....	11 00	.....
1 1/2 in. ....	11 00	.....
1 3/4 in. ....	11 00	.....
2 in. ....	11 50	8 75
2 1/4 in. ....	13 00	10 50
2 1/2 in. ....	14 00	11 15
3 in. ....	16 00	12 10
3 1/2 in. ....	20 00	14 15
4 in. ....	25 50	18 00

Prices per 100 feet, Montreal and Toronto.

**WASTE.**

	Cents per lb.
<b>WHITE.</b>	
XXX Extra .....	0 11
X Grand .....	0 10 1/2
XLGR .....	0 09 3/4
X Empire .....	0 09
X Press .....	0 08 1/4
<b>COLORED.</b>	
Lion .....	0 07 1/2
Standard .....	0 06 3/4
Popular .....	0 06
Keen .....	0 05 1/2

**WOOL PACKING.**

Arrow .....	0 16
Axle .....	0 11
Anvil .....	0 08
Anchor .....	0 07

**WASHED WIPERS.**

Select White .....	0 08 1/2
Mixed Colored .....	0 06 1/4
Dark Colored .....	0 05 1/4

This list subject to trade discount for quantity.

**BELTING RUBBER.**

Standard .....	50%
Best grades .....	30%

**BELTING—NO. 1 OAK TANNED.**

Extra heavy, sole and drole .....	50%
Standard .....	50 & 10%
Cut leather lacing, No. 1 .....	\$1.20
Leather in sides .....	1.10

**ELECTRIC WELD COIL CHAIN B.B.**

3-16 in. ....	\$9.00
1/4 in. ....	6.25
5-16 in. ....	4.65
3/8 in. ....	4.00
7-16 in. ....	4.00
1/2 in. ....	4.00

Prices per 100 lbs.

**PLATING CHEMICALS.**

Acid, boracic .....	\$ .15
Acid, hydrochloric .....	.05
Acid, hydrofluoric .....	.06
Acid, Nitric .....	.10
Acid, sulphuric .....	.05
Ammonia, aqua .....	.08
Ammonium carbonate .....	.15
Ammonium chloride .....	.11
Ammonium hydrosulphuret .....	.35
Ammonium sulphate .....	.07
Arsenic, white .....	.10
Copper sulphate .....	.10
Cobalt Sulphate .....	.50
Iron perchloride .....	.20
Lead acetate .....	.16
Nickel ammonium sulphate .....	.10
Nickel carbonate .....	.50
Nickel sulphate .....	.17
Potassium carbonate .....	.40
Potassium sulphide .....	.30
Silver chloride .....	(per oz.) .65
Silver nitrate .....	(per oz.) .45
Sodium bisulphite .....	.10
Sodium carbonate crystals .....	.04
Sodium cyanide, 127-130% .....	.35
Sodium hydrate .....	.04
Sodium hyposulphite (per 100 lbs.)	3.00
Sodium phosphate .....	.14
Tin chloride .....	.45
Zinc chloride .....	.20
Zinc sulphate .....	.08

Prices Per Lb. Unless Otherwise Stated.

**ANODES.**

Nickel .....	.47 to .52
Cobalt .....	1.75 to 2.00
Copper .....	.22 to .25
Tin .....	.45 to .50
Silver .....	.55 to .60
Zinc .....	.22 to .25

Prices Per Lb.

**PLATING SUPPLIES.**

Polishing wheels, felt.....	1.50 to 1.75
Polishing wheels, bullneck..	.80
Emery in kegs .....	.4 1/2 to .06
Pumice, ground .....	.05
Emery glue .....	.15 to .20
Tripoli composition .....	.04 to .06
Crocus composition .....	.04 to .06
Emery composition .....	.05 to .07
Rouge, silver .....	.25 to .50
Rouge, nickel and brass...	.15 to .25

Prices Per Lb.

# The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents.

**Montreal, Que., Sept. 27, 1915.**—The recent favorable news from the front has had a cheering effect in business circles and will assist materially in stimulating business. The manufacture of shells is proceeding in a satisfactory manner, and it is generally believed that further contracts will be placed at no distant date. The manufacture of field guns is being contemplated, but nothing has been done beyond making preliminary investigations. A committee has been appointed to look into the matter.

## Steel

Steel, as usual, is still holding the central position in the market, as the demand, both for bars and billets is still heavy. The demand for shells seems as urgent as ever and with the prospect of larger shells being manufactured the steel makers will be kept busy for some time to come. With the possible advent of gun making having the attention of the Canadian manufacturer, the steel industry will necessarily have to face a new problem in producing the required raw material.

## Pig Iron

Quotations on pig iron remain firm, there being very little change in the situation. There has only been a moderate turnover during the week, the strength of the market being due to the sales already made.

## Machine Tools and Supplies

The machinery outlook for the week is little changed. Deliveries are still very backward for certain tools, especially those required for the production of high-explosive shells.

That new possibilities for the machine tool builder are becoming evident, is the fact that steps are now being taken to see what can be done in the making of field guns for the Allied Governments. The manufacture of these guns would create a demand for new and heavier types of machine tools and would tax the resources of the tool manufacturers. There would also be a bigger demand for small tools and attachments.

## Metals

Quotations on the different metals show little change over those of the previous week. Prices are holding firm with the exception of antimony, which shows a slight decline.

## Old Materials

Several fluctuations have been noticed in the scrap prices during the week. The present price of wrought iron scrap is \$2

per 100 lbs. higher than a week ago; machinery scrap iron shows an advance of \$3 and scrap zinc \$2, while a decline of 20 per cent. is shown in heavy lead.

**Toronto, Ont., Sept. 28.**—The remarkable development in the export trade of Canada is shown in the returns recently issued by the Department of Trade and Commerce. In August alone the export of manufactured goods reached a total of over two million dollars, practically double that of the corresponding month last year. This heavy increase is largely attributable to the heavy output of war munitions. The returns of the export trade for the five months of the present fiscal year show a total of over two hundred million dollars, representing an increase of fifty million dollars. The value of imported goods shows a falling off of about four million dollars.

## 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.

While the above condition is distinctly beneficial to the Dominion, the full effect has not yet begun to be felt. The domestic trade is still comparatively quiet, although a more optimistic spirit prevails in business circles. There is, generally speaking, a feeling of returning confidence, due to the large crops and encouraging trade returns.

The steel trade continues very active, due to the heavy demand for steel for munitions. The outlook in the trade was never better. The demand for machine tools has fallen off, on account of there being no new orders for shells placed recently. It is, however, confidently expected that there will be a revival of business at no distant date. There is little of interest to note this week in the metal markets. The trade is awaiting developments in the sterling exchange situation. The scarcity of aluminum is becoming more pronounced and prices have made a sharp advance. Apart from this the markets are steady.

## Steel Market

The market is very firm, and the mills continue to do big business. The demand for steel for munitions is so great that Canadian firms have been obliged to import billets and steel rounds from the States, notwithstanding the fact that some of these concerns have recently increased their producing capacity. Prices are holding very firm, and an advance in bars may be announced at any time. The demand for steel, other than for shells, and export trade, is light.

The high-speed tool steel situation continues to cause considerable anxiety to consumers owing to scarcity and advancing prices. Stocks are getting lower, and the demand is becoming heavier. The Vanadium Alloys Steel Co., of Pittsburgh, announce a further advance of 15c per pound, while other makers have also been obliged to raise their prices. Makers in Sheffield, England, are having the greatest difficulty in supplying their Canadian customers on account of the heavy demand in the home market. Prices of galvanized sheets are easier owing to the downward tendency in the spelter market. Sales are not very heavy, largely due to the mills refusing to sell for extended delivery. Prices of black sheets are firm, and there is a tendency towards higher prices.

Heavy export business is becoming a more dominant factor in the steel trade in the States than at any time since the beginning of the war. Large orders for bars for shells are being placed and deliveries are running into next year, being practically unobtainable this year. Prices are very firm, and the market generally has an upward tendency. There is a big demand for billets, and prices are naturally advancing. Bessemer and open-hearth billets have advanced again, and are being quoted at \$24.50 and \$25 respectively.

## Pig Iron

There is practically no improvement in the foundry pig iron situation, and foundries are moving cautiously in buying for future requirements. Prices have advanced and Hamilton and Victoria brands are being quoted at \$20.50 per ton.

## Machine Tools

The demand for new tools has fallen off considerably, due to the lack of new shell orders, and also the difficulty of obtaining new machinery. Makers are in a sold-up condition, and deliveries are as backward as ever. This situation has resulted in a demand for second-hand equipment, although even in this case business has fallen off to some extent. Inquiries now are principally for tools for making shell parts, and quite a number of second-hand tools have been sold recently for making that part of a shell called a "Gaines."



### Supplies

Business continues good and prices firm. Prices of high speed steel cutters of all descriptions have been withdrawn or a record of the difficulty in obtaining raw material. Boiler and structural rivets,  $\frac{1}{2}$  in. and larger, have been advanced from \$1.25 to \$1.75. Solder, half and half, has declined 1c, and its cost quoted at 2c per pound.

### Metals

The markets are firm and prices steady, with the exception of aluminum, which has made a sharp advance. The entire market is awaiting the outcome of the loan negotiations now being carried on between representatives of the British and French Governments and American financial interests in New York. The market is being affected by the sterling exchange situation, and it is generally believed that the situation will improve considerably if the price of the pound sterling rises to a more normal basis. Business conditions locally are unchanged, the principal demand being for metals for munitions.

**Tin.**—The market is firm, with an upward tendency in London. There is, however, comparatively little interest being shown in either spot or future deliveries. The market is being adversely affected by the sterling exchange situation. Local quotations are unchanged at 39c per pound.

**Copper.**—The market is still awaiting the big buying movement, which showed some evidence of starting about three weeks ago. Production of copper at the present rate is believed to be in excess of consumption, and hence it is believed that buyers of the metal are better able to hold off and purchase only for immediate needs than they were a few months back, owing to the heavy demand for copper for munitions. There is every probability of an increase in consumption when the sterling exchange situation improves. Quotations for copper locally are unchanged at 19c per pound.

**Spelter.**—The market is stronger with the possibility of higher prices. Consumers are taking more interest in spot and near-by positions, but the demand is not heavy. Quotations are unchanged at 18c per pound.

**Lead.**—The market is firm and unchanged. The "Trust" price of \$4.50 New York is being maintained, and it is generally believed that this will hold steady for some time. Local quotations are unchanged at 67c per pound.

**Antimony.**—The market is dull and featureless. Quotations are unchanged at .55c per pound.

**Aluminum.**—Supplies of this metal are becoming more difficult to obtain, and with an increasing demand the situation may be said to be acute. Quota-

tions have advanced 1c, and are entirely nominal at 55c per pound.

**St. John, N.B., Sept. 25.**—Local industrial conditions continue to be satisfactory, the only effects of the war so far as can be noticed, being the absence of new building enterprises, though as regards the volume of trade with most houses it goes along in a steady and encouraging manner. Collections throughout the province are fair. The lumbering season has been better than was generally anticipated last spring. Fishing, particularly along the North Shore, has been exceptionally good, and except in some quarters, the crops have been well up to the standard. Thus it follows that manufacturers are finding at least a good home market, and few complaints are heard as to the falling off of business. It is not so good, of course, as if there had been no war, but all things consid-

### ALLIES PURCHASING AGENTS

The Trade and Commerce Department, Ottawa, has published the following list of purchasing agents for military purposes for the allied Governments:

**International Purchasing Commission, India House, Kingsway, London, Eng.**

**French.**—Hudson Bay Co., 56 McGill Street, Montreal; Captain Lafoulloux, Hotel Brevort, New York; Direction de l'Intendance Ministere de la Guerre, Bordeaux, France; M. De la Chaume, 28 Broadway, Westminster, London.

**Russian.**—Messrs. S. Ruperti and Alexsief, care Military Attache, Russian Embassy, Washington, D.C.

ered there is no reason to complain. The orders for war supplies have also been an important factor in Maritime Province towns and cities, and have helped to keep the economy on a good footing. There promises to be considerable shipping from Halifax and St. John this winter, and at the latter port the C. P. R. are now seeking extra accommodation.

A new flour mill is to be built at Newcastle, N.B., to cost in the vicinity of \$6,500. Its capacity will be one barrel an hour. The matter has been decided upon favorably by the Board of Trade, and a committee composed of Messrs. J. J. Morrissy, Secretary E. A. McCurdy and John Betts have been appointed to look into the matter and report back. About fifteen million feet of lumber on the dock yard of the Bathurst Lumber Co. at Bathurst, N.B., were destroyed in a fire

last week. The other mill on the site of \$200,000 worth was well covered by insurance.

The expectation is that early in October the street lamp will be connected to new spandril arch bridge across the Reversing Falls, St. John, N.B., just recently completed. A diamond crossing has been ordered and the plans are about completed. The old Suspension Bridge has been dismantled and removed by men under Contractor McVey. The granite blocks are being taken to Moncton for use in the new bridge there. The death of a well known business man in St. John occurred this week in the person of Frank H. Foster, aged 62 years. He was secretary-treasurer of the Canada Brush Co., of St. John and had been one of its promoters. Mr. Foster was also head of the wholesale firm of Foster & Co. He was particularly well known throughout Eastern Canada and very highly respected.



### A POSSIBLE STEEL FAMINE

THE First National Bank of Boston, Mass., in a recent letter, says:—

"Although a brand new furnace may be blown in here and there, it takes a year or two to make a general increase in steel-making capacity. This question is being discussed because authorities in the trade announce that the steel industry is running almost at capacity—that it is from 60 to 90 days behind in deliveries, especially on bars, and that it is sold out through 1915 with contracts offering for 1916. It is even hinted that a famine in steel will develop in 1916 if the present trend continues. Moreover, it is pointed out that the railroads have not been in the market for equipment since 1906; and that they will be driven in by the existing activity and this time for heavier equipment than has ever been known. For example, the Pennsylvania is ordering a 140,000-pound 'Dreadnought' freight car—the heaviest ever constructed, which will necessitate either all steel wheels or a 6-wheel truck, and may ultimately lead to a heavier rail, heavier trestle, and freer use of heavier steel throughout. Buying of this character by the railroads might prolong the revival in steel over years.

"Analysis of the steel trade shows a somewhat peculiar condition. At the bottom of the boom is, of course, the war orders. It is probable that export orders for steel take up some 40 to 50 per cent. of present production. Domestic business lags; car building is comparatively light as yet; new construction of buildings requiring structural steel is sub-normal; and only a few more rails have been bought in 1915 than in 1914. The automobile industry is about the only domestic consuming steel line which

is fully active. Despite the lack of domestic steel consumption, the trade is reported full and sold out. On the basis of contracts received, the steel trade is probably sold out as stated, but October is awaited as the test month of the genuineness of the boom as regards specifications and production March and October being the best steel months of the year."



### CANADA'S TRADE STATEMENT

A FAVORABLE showing is made in Canada's trade statement for August and for the five months of the fiscal year ended with that month. The total trade in merchandise in August was \$81,926,976 against \$75,901,335 in the corresponding month, an increase of six million. In the five months of the fiscal year the aggregate was \$375,824,612, as against \$364,197,801, an increase of eleven millions. Imports in August were

\$40,832,822, a falling off of four millions and exports \$41,094,154, an increase of ten millions. Total imports in the five months were \$175,562,199, a decrease of forty millions, while the exports were \$200,262,413, an increase of fifty millions.

#### Various Exports

The export of manufactured goods in August was \$10,690,464, practically double that of last year, while for the five months they were \$62,231,845, as against \$26,728,965. The marked increase is largely attributable to the heavy output of war munitions.

Agricultural exports in August totalled \$6,895,726, a falling off of half a million, while for the five months domestic agricultural exports were \$48,207,048, a decrease of two millions.

Mineral exports totalling \$6,090,370 increased in August by a million and a half and in the five months by three

millions. Animals and animal products likewise show an increase. In August the total was \$9,193,103. Forest products exported in August were \$5,846,890, an increase of a million and a half. In the five months the total was slightly over twenty-two millions, an increase of three millions.

#### Duty Collected

The total duty collected in August was \$8,431,565, an increase of \$70,000 over August of last year, while for the five months it aggregated \$36,514,037, a decrease of \$300,000.

It is apparent that the extra duties, designed to keep the revenue abreast of the ante-bellum period are accomplishing that purpose.



The Dominion Stamping Co., Walkerville, Ont., will in future be known as the Dominion Forge and Stamping Co.

## CANADIAN COMMERCIAL INTELLIGENCE SERVICE

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

### CANADIAN TRADE COMMISSIONERS.

#### Argentine Republic.

H. R. Poussette, 278 Balcarce, Buenos Aires. Cable Address, Canadian.

#### Australasia.

D. H. Ross, Stock Exchange Building, Melbourne, Cable address, Canadian.

#### British West Indies.

E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

#### China.

J. W. Ross, 6 Klukiang Road, Shanghai. Cable Address Cancoma.

#### Cuba.

Acting Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.

#### France.

Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona

#### Japan.

G. B. Johnson, P.O. Box 109, Yokohama. Cable Address, Canadian.

#### Holland.

J. T. Lithgow, Zuidblaak, 26, Rotterdam. Cable address, Watermill.

#### Newfoundland.

W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

#### New Zealand.

W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.

#### South Africa.

W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

#### United Kingdom.

E. de B. Arnaud, Sun Building, Clare Street, Bristol. Cable address, Canadian.

J. E. Ray, Central House, Birmingham. Cable address, Canadian.

Acting Trade Commissioner, North British Building East Parade, Leeds. Cable address, Canadian.

F. A. C. Bickerdike, Canada Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.

Fred. Dane, 87 Union Street, Glasgow, Scotland. Cable address, Cantracom.

Harrison Watson, 73 Basinghall Street, London, E.C., England. Cable address, Sleighting, London.

### CANADIAN COMMERCIAL AGENTS.

#### British West Indies.

Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.

R. H. Curry, Nassau, Bahamas.

#### Colombia.

A. E. Beckwith, c-o Tracey Hmos, Medellin, Colombia. Cables to Marmato, Colombia. Cable address, Canadian.

#### Norway and Denmark.

C. E. Sontum, Grubbedg No. 4, Christiana, Norway. Cable address, Sontums

#### South Africa.

D. M. McKibbin, Parker, Wood & Co., Buildings, P.O. Box 559, Johannesburg.

E. J. Wilkinson, Durban, 41 St. Andrew's Buildings, Durban, Natal.

### CANADIAN HIGH COMMISSIONER'S OFFICE.

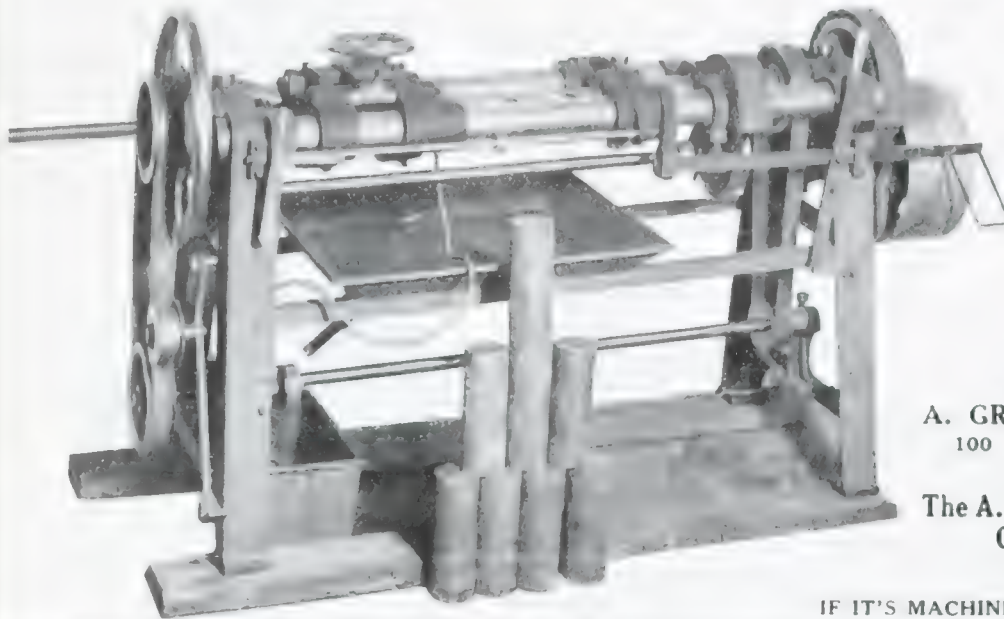
#### United Kingdom.

W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England.



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Sturdy in construction, rigidly built, does not vibrate or sag. Bille-  
 ts are placed in position, drilled and re-  
 moved in four minutes. There are no drill chips to remove after the operation is completed. Requires less than half the power of the ordinary Heavy Duty Drill.

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 Toronto, Ontario

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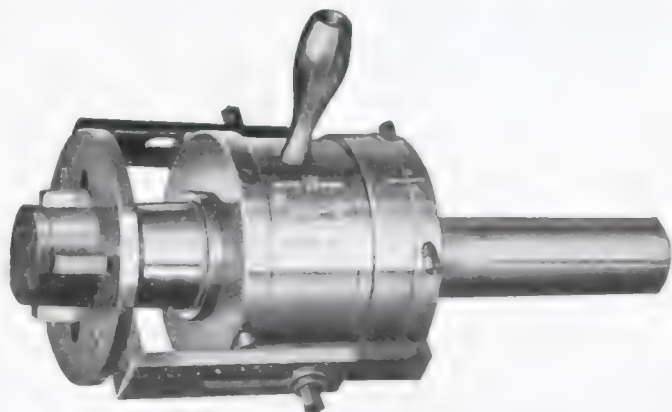
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**TO YOUR BEST ADVANTAGE**

Geometric Collapsing Taps are arranged for all classes of thread tapping above 3/4-inch diameter. Rigid while tapping, but collapse the chasers when the required depth is reached. Can be fitted to screw machine or turret lathe, also to live spindle, such as a drill press.

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 The A. R. Williams Machinery Co., Ltd. Toronto,  
 Winnipeg and St. John, N.B.



Geometric Collapsing Tap, Class "N-L," Equipped with Chasers for Plug Tapping.

# 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

**Mount Brydges, Ont.**—The Crow Motor Co. plans a factory to manufacture automobile motors, to cost \$10,000.

**Medicine Hat, Alta.**—The Medicine Hat Pump & Brass Mfg. Co. is in the market for three new lathes, 14 to 18 in., for immediate delivery.

**Eustis, Que.**—The Eustis Mining Co. will rebuild their mill, which was recently destroyed by fire. The cost is estimated at about \$85,000.

## Electrical

**St. Hilaire, Que.**—The Century Electric Co., of Montreal, will install an electrical transmission system for the town.

**Weston, Ont.**—Etobicoke township has agreed to all the conditions laid down by the Weston Hydro-Electric Commission for the lighting of, Thistleton, and the work is to go on-at once.

**Chesley, Ont.**—The ratepayers last Monday voted in favor of the Hydro by-law, which passed by a large majority. The power will be turned on about Christmas, and it will come from Eugenia Falls.

**Toronto, Ont.**—Arrangements have been made between the Mimico Power Co. and the Etobicoke Township Council which will result in the extending of the system to Humber Bay. At a cost of about \$1,500, a line will be run along George and Church Streets, following the request of the citizens who desire to become Hydro customers.

**London, Ont.**—Work on the new street lighting system which the utilities board will give to the city out of its surplus funds has already commenced, and it is expected that the 2,400 new lamps will be installed in the course of about six months. General Manager Buchanan states that the new lights will be 150 c.p. instead of 75, as at present.

## Municipal

**Verdun, Que.**—The council have decided to make an extension to the 36-in. intake pipe.

**Cranton, Ont.**—The town council proposes to install a hydro-electric system at a cost of \$5,000.

**Owen Sound, Ont.**—The town council contemplate making extensions to the waterworks system.

**Petrolea, Ont.**—The town council will take over the Petrolea Utilities Co. power plant at \$15,000.

**Crediton, Ont.**—The council contemplates the installation of a power distribution and lighting system.

**Perth, Ont.**—The Canadian Electric and Water Power Co. are in the market for cast iron pipes and specials.

### EQUIPMENT FOR AUSTRALIAN RAILWAYS.

Tender forms, specifications and drawings have been forwarded by Commissioner D. H. Ross, Melbourne, for equipment required by the Victorian and Queensland Government Railways. These tender forms will be open to the inspection of Canadian manufacturers when received at the Department of Trade and Commerce, Ottawa (refer File No. 1435). Particulars of the requirements, together with the date on which the tenders close at Melbourne are briefly outlined thus:—

#### Victorian Railways.

No. 29,410. November 24.—2 duplex boiler feed pumps as specified.

No. 29,421. November 24.—750 sq. yds. compressed felt as specified.

#### Queensland Railways.

Tenders close at the office of the Queensland Railways, Brisbane, on November 2, 1915, for 10—30,000 gallons conical wrought iron tanks.

The departure of mails from Vancouver are indicated thus:

From Vancouver, October 27, due at Melbourne on November 20.

**Rosthern, Sask.**—The town council will call for tenders shortly for the supply of a fire engine, hose, etc.

**Ridgetown, Ont.**—It is proposed to install an ornamental street lighting system here in connection with the new hydro system.

**Port Dover, Ont.**—The town council have decided to build a new pumping plant. James St. Pierre, Bear Line, Ont., is the commissioner.

**Owen Sound, Ont.**—The town council have authorized a \$16,000 debenture issue to cover the cost of waterworks extensions. Cast iron pipe will be required.

**Dorchester, Ont.**—The construction of gas mains and connections in this town is being considered by the Southern Ontario Gas Co., St. Thomas, Ont. F. B. Tomb, London, is manager.

**Markham, Ont.**—Property owners, by a majority of 49, last Monday, voted in favor of the plan of waterworks extension drawn up by Engineer E. A. James. The cost of the work is about \$20,000.

**Lumsden, Ont.**—The town council are negotiating with the local electric light company to purchase the plant in operation here. The question will be referred to the ratepayers before the deal is completed.

**Hamilton, Ont.**—Preliminary steps have been taken by the Board of Control to spend \$35,000 on draining of all the low-lying territory in the north-east end of the city, below the Jockey Club ground.

**Windsor, Ont.**—If the recommendation made by the fire committee is approved by the city council, apparatus of a total value of \$11,000 will be added to the equipment of the fire department. Tenders will shortly be asked for the contract of supplying Windsor with a new tractor and motor service truck.

**Port Colborne, Ont.**—A by-law to authorize an agreement with the Ontario Power Co. of Niagara Falls, Ont., to supply power to Port Colborne and Humberstone for a term of five years, was voted on recently and carried in Port Colborne, 124 for and 59 against, and at Humberstone 104 for and 7 against.

**St. Catharines, Ont.**—The ratepayers on September 21, by an almost unanimous vote carried a by-law granting a franchise for 20 years to the Relief Gas Co., which will supply natural gas wholesale to the municipal system. The city purchases the gas at 25 cents per thousand feet, and will distribute it to consumers at an estimated cost of 35 cents per thousand feet.

**Sarnia, Ont.**—A recommendation that the City Council negotiate for the purchase of the present electrical plant for \$192,000, and submit a by-law to the

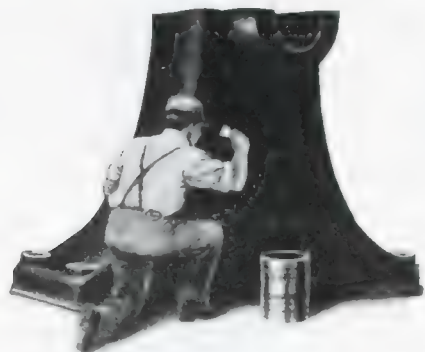




**JOHNS-MANVILLE SERVICE TO THE MANUFACTURER**

**T**HIS Emblem is rapidly becoming one of the most widely known trade-marks on this continent; but even though it belted the earth, it could not stand more staunchly than it does to-day for the business principles underlying J-M Responsibility.

**J-M Ferro Compound saves many a casting from the scrap pile and cuts down re-melting costs**



J-M Ferro Compound makes many a casting, big or little, fit to send out that would otherwise be scrapped and melted for re-casting on account of blow-holes, sand holes, etc.

J-M Ferro Compound is a chemical iron cement that becomes, when dry, a part of the casting itself and so acts as a permanent repair.

It fills up sand holes and other defects permanently. It cannot dry up and fall out.

J-M Ferro Compound is mixed with water, applied with a trowel and hardens in a few hours. It can then be finished with a file or emery wheel, and as it is the same color as the casting, its presence can never be detected.

Its cost per casting is insignificant, but the sum of its savings is an important item in every foundry or machine shop business.

*Ask our Nearest Branch for Descriptive Literature of Applications, Uses, etc., and let us Quote Your Prices and Discounts.*

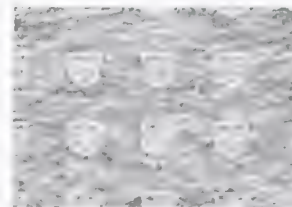
**J-M Permanite—the Packing that has won its way on performance**

J-M Permanite is a handy sheet because it is equally efficient on wet or dry joints. It has no respect for temperature or pressure, nor is it affected by ammonia, acids or alkali.

Then, too, it stays where it's put. It does not compress under any stress; in fact it expands under working conditions, making tight joints tighter.

J-M Permanite is very light in weight. When the J-M Salesman suggests J-M Permanite, say, "I'll try it once."

We are willing to let it sell for you on the job.



**J-M Permanite**

**The Canadian H. W. Johns-Manville Co., Ltd.**

Manufacturers of Asbestos Roofings; Pipe Coverings; Packings; Mastic Flooring; Conduit; Stack Lining; Fireproof Paint; Fire Extinguishers; Fuses; etc.

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## Rumely-Wachs Machinery Co.

121 N. JEFFERSON ST.

CHICAGO ILLINOIS

A Few of Our Second-Hand Tools in  
Stock for Immediate Delivery:

### LATHES

15" x 6' Von Wyck.  
16" x 6' Porter.  
18" x 12' Blaisdell.  
20" x 10' Fifield.  
24" x 8' Sherman.  
36" x 16' Fifield.

### TURRET LATHES and SCREW MACHINES

Pratt & Whitney No. 1 Screw Mach.  
Garvin 1/2" Screw Machine.  
Pearson 1 1/2" Screw Machine.  
Cleveland 1" Automatic (6).  
Cleveland 1 1/2" Automatic.  
Cleveland 2 1/2" Automatic (2).  
Acme 7/8" Automatic.  
Lodge & Davis 18" Monitor.  
Gisholt 24" Manufacturers' Turret.

### PLANERS AND SHAPERS

36" x 36" x 8' American, 2 heads.  
36" x 35" x 15' Powell, 2 heads.  
14" Gould & Eberhardt Crank.  
15" Hendey Tool Room.  
16" Stockbridge Crank P.D.F.  
21" Averbeck B.G. Crank.

### DRILL PRESSES

20" Miscellaneous Makes (20).  
21" Cincinnati (2).  
2 1/2" Barnes.  
26" Sibley & Ware.  
28" Barnes.  
28" Sibley & Ware.  
31" Barnes.  
Avey 2-spindle ball-bearing.  
Bausch No. 10, 16" Cluster.  
Andrews 6-spindle, adjustable.  
Bickford 3 1/2" Plain Radial.  
Prentice 5' Plain Radial.

### MILLING MACHINES

No. 3 Fox Hand and Power.  
No. 0 LeBlond, plain.  
No. 2 Owen, plain.  
No. 3 Pratt & Whitney, plain.  
No. 3-A Owen Universal.  
No. 4 Becker Vertical.  
Becker No. 7 Lincoln.  
Phoenix No. 1 Lincoln.

### PRESSES

Bliss No. 18 o.b.l.  
Bliss No. 19 o.b.l.  
Bliss No. 42 o.b.l.  
Rockford No. 2 o.b.l.  
American Can No. 3 o.b.l.  
Walsh No. 4 o.b.l.  
American Can No. 4 1/2 o.b.l.  
Bauroth No. 5 o.b.l.  
Bliss No. 69-N Double Acting.  
Adriance No. 12-A Double Acting.  
Toledo No. 14 Horning.  
Toledo No. 94-A Double Crank.

### MISCELLANEOUS

Bullard 42" Boring Mill.  
Newark No. 2-A Auto Gear Cutter.  
Lanliss 12 x 42" Plain Grinder.  
Gisholt Universal Tool Room Grinder.  
Acme 1 1/2" Bolt Cutter.  
Acme 2 1/4" Bolt Cutter.  
No. 2 and No. 3 M & M. Keyseaters  
No. 3 Baker Keyseater with rotary  
table.

ratepayers regarding the immediate installation of hydro was made at a special meeting of the council on September 22 by Messrs. J. J. Jeffery and L. F. Jeffery, engineers, of Toronto. The council decided to act on the advice and will take definite action at the next meeting.

## General Industrial

**Brantford, Ont.**—The Concrete Post Co. has secured a site at Winnipeg, Man., and will erect a factory.

**Georgetown, Ont.**—The Glass Garden Builders propose establishing a factory here for building greenhouses, etc.

**Wallaceburg, Ont.**—An addition is being built to the Wallaceburg Cut Glass Works. A. Gregory, Dresden, Ont., is the contractor.

**Renfrew, Ont.**—Fire, on September 26, destroyed the flour mill at Pakenham owned and operated by the Renfrew Flour Mills Co. The mill, which was a stone structure and modern in every way, was totally destroyed. The elevator and office was also burned.

**Woodstock, N.B.**—Representatives of the Potato Products Co., of Belleville, Ont., have been looking over the ground in connection with the establishment of a business for the manufacture of starch, potato flour and dried potatoes. R. G. Graham, of Belleville, is the head of the business.

**Wallaceburg, Ont.**—The Dominion Sugar Co. is ready to start the erection of a million-dollar sugar factory in Chatham, and the only thing that is holding them up is the question of getting two railway spurs into their property, one from the Grand Trunk and the other from the C. P. R.

## Tenders

**The Pas, Man.**—Tenders will be received up to October 5 for the supply and delivery of cast iron or steel water pipe and specials, also fire hydrants and valves. Particulars may be obtained from the resident engineer's office, or from Murphy & Underwood, engineers, Saskatoon, Sask.

**St. Lambert, Que.**—Tenders will be received up to October 4, 1915, for the installation of 42 lamp standards complete with about 6,500 feet of duplex underground cable terminals, etc. Plans may be seen, specifications and tender form read on application at the office of town engineer E. D. Drankwater.

**Orillia, Ont.**—Tenders will be received until October 7 for miscellaneous iron work, heating, plumbing and electric

wiring in connection with the rebuilding of the Municipal Buildings. Particulars may be obtained from the town clerk, Orillia, or from the architects, Burke, Horwood & White, Toronto.

**Toronto, Ont.**—Tenders will be received, addressed to the chairman, Board of Control, up to Tuesday, October 12, 1915, for the construction and delivery of 36-inch stop valves, valve operating mechanism and special castings, for main pumping station. Specifications and forms of tender may be obtained at the Works Department, Room 12, City-Hall.

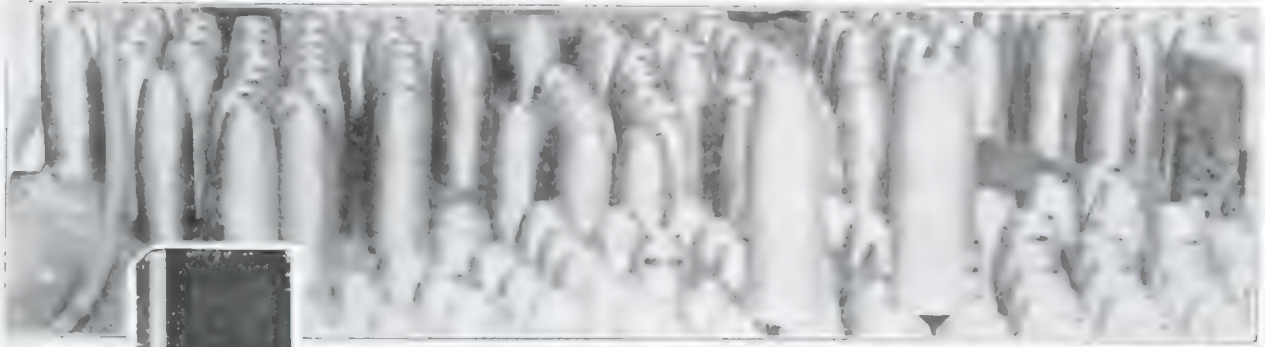
**Ste. Martine, Que.**—Tenders will be received by the Municipal Council of the Parish of Ste. Martine, County of Chateauguay, up to the 4th of October next for the construction of a steel bridge, 85 feet span, on concrete abutments, at the outlet of the Beau River, in this parish, according to plans and specifications to be seen at office of the undersigned. Nap. Mallette, secretary-treasurer.

**Ottawa, Ont.**—Tenders will be received until Tuesday, September 28, 1915, for one (1) motor generator set, one (1) induction motor, three (3) power transformers and switchboard apparatus to be delivered at the Government Printing Bureau, Ottawa, Ont. Specification and forms of contract can be seen and forms of tender obtained at the Department of Public Works and at the offices of Thos. Hastings, clerk of works, Postal Station "F," Toronto, Ont., and R. L. Deschamps, Superintendent of Public Buildings, Montreal, Que.

**Toronto, Ont.**—Tenders, addressed to the secretary-treasurer of the Board of Education, will be received until Friday, October 1st, 1915, for temperature regulators, sundry schools; cabinet work, including work benches, tables, cupboards, etc., for manual training and domestic science centres; concrete retaining wall, Roden School; local telephones, sundry schools; electrical work for science rooms, Harbord Street and Malvern Avenue Collegiate Institutes. Specifications may be seen and all information obtained at the office of the Superintendent of Buildings, City Hall, Toronto.

**Ottawa, Ont.**—Tenders will be received up to Tuesday, October the 19th, for the undermentioned items for delivery to H.M.C. Dockyards at Halifax, N.S., and Esquimalt, B.C.: Brass bars, antimony, iron firebar, brass sheets, aluminum, pig iron, brass tubes, steel angles, iron angles, copper sheet, steel boltstaves, iron boltstaves, copper tubes, steel plates, iron sheets, zinc plates, steel sheets, India rubber, lead, milled steel for tools, sheet packing, or sheet, etc. Forms of tender and all information may be obtained by application to the





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CANADA**

# Butterfield Taps

**are strengthening popularity  
by their work on munitions.**

They have been wonderfully successful and superior on ordinary jobs, but their work on munitions proves that they have the backbone essential to the economical and rapid production on the toughest of materials.

Get a Butterfield Tap and put it up against the same proposition as the kind you are now using. Keep close tab on it and see for yourself.

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## Butterfield & Co., Inc.

Rock Island, Quebec

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Describe your equipment fully. Rate for one insertion 2 cents per word. Subsequent insertions 1 cent per word.

**Canadian Machinery**

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TORONTO

undersigned, or to the Naval Store Officer at H.M.C. Dockyard, Halifax, N.S., or Esquimalt, B.C. Applicants for forms are requested to state definitely the item or items on which they desire to tender. G. J. Desbarats, Deputy Minister of the Naval Service.

## Trade Gossip

**The Canadian Malleable and Steel Range Mfg. Co.** has increased the capital stock of the company to \$350,000.

**Phosphate of Lime.**—Officials of the Conservation Commission report the discovery of extensive deposits of phosphate of lime in the National Park at Banff. The importance of the discovery to the agricultural industry of the West will be great, as phosphate of lime is of value in maintaining the fertility of the soil.

**Big Orders from Italy.**—A contract for 100,000 pairs of blankets and 600,000 woollen shirts has been placed with Canadian mills by the Italian Government Commission in London. The Dominion Department of Trade and Commerce has assumed responsibility for the inspection of the goods. Representatives of Canadian firms sent to London secured the orders, which approximate one million dollars.

**Antimony Mine at Lake George.**—There is a prospect of the early re-opening of the antimony mines at Lake George, York County, N.B. These mines have not been opened since 1909, owing to the low price of the ore. With an appreciable increase in ore prices, a proposal has been made by a syndicate to lease the mines for a term of years. The company have also under consideration an offer of sale.

**Grain Moving East.**—A despatch from Fort William, Ont., states that grain shipments from the West approximate 1,200 cars for the past few days, and none of the elevators have yet been forced to run full capacity. The railroads expect the receipts to increase until about October 10, when indications are that upwards of 2,500 cars will be received daily. Lake shipments, so far, have been small, but steamship men here are confident that the Canadian fleet will be capable, or nearly so, of handling the grain from Fort William as fast as the Eastern elevators can receive it. Many of the steamships which were chartered by the Canada Steamship Lines and other companies last spring for the Atlantic Coast trade are being returned to the lakes.

**Regina C.M.A.**—The manufacturers' committee of the Regina Board of Trade Council has been instructed to investi-

gate and report on the advisability of organizing a Regina Manufacturers' Association and seek affiliation with the Canadian Manufacturers' Association.

**The Tate-Jones Co., Inc.**, of Pittsburg, Pa., have received the contract for the large new heat treating plant to be erected at the Toronto factory of the Chapman Double Ball Bearing Co. The work, which has been rendered necessary by the greatly increased demand for ball bearings, includes large capacity oil-fired furnaces of the latest type, with complete equipment of oil storage, tank pumps, etc. **The Rudel Belnap Machinery Co.** of Toronto are Canadian representatives for Tate-Jones Co., Inc.

**Oshawa Railway Co.**—The annual meetings of the Thousand Islands Railway Co. and the Oshawa Railway Co. were held at Deseronto, Ont., on Monday, September 13, 1915, at which meeting the following directors were elected: E. Walter Rathbun, Deseronto; H. W. Cooper, Gananoque; J. H. Valteau, Gananoque; B. R. Hepburn, Pieton; D. A. Valteau, Oshawa.

## Personal

**W. J. Gage**, of Toronto, has donated \$10,000 to the Government for the purpose of buying an armored biplane.

**Sir Lyman Melvin Jones**, president of the Massey-Harris Co., Toronto, is in the West inspecting the company's Western agencies.

**Sarnia, Ont.**—From now until the close of navigation Capt. Foote will sail the steamer *Hamonic*, and Capt. Campbell will sail the *Huronie*, while Capt. Wright will remain ashore and perform the duties of shore captain.

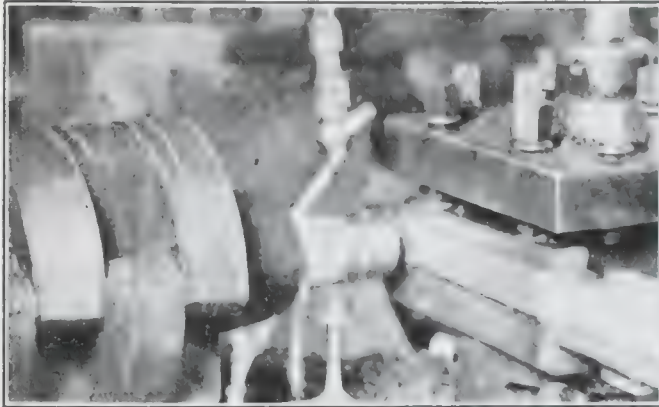
**Walter F. Wright**, manager of motor sales, Canadian General Electric Co., Toronto, has resigned to accept a position as Ontario manager for the Eugene F. Phillips Electrical Works. Mr. Wright's headquarters will be in Toronto.

**R. B. Larmour**, assistant general freight agent of the C. P. R. at Vancouver, B.C., has been appointed to succeed the late W. F. Stevenson, of New York as general agent of the C. P. R. freight department, New York City.

**Collingwood Schreiber, C.M.G.** general consulting engineer of the Department of Railways and Canals, and L. K. Jones, Assistant Deputy Minister, are leaving on a semi-annual inspection trip through the West, and will go as far as Prince Rupert, the terminus of the G. T. P.

**The A. R. Williams Machinery Co.**, Toronto, have a booth at the American Foundrymen's Convention and Exhibi-





## 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

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ANACONDA  
BELTING**



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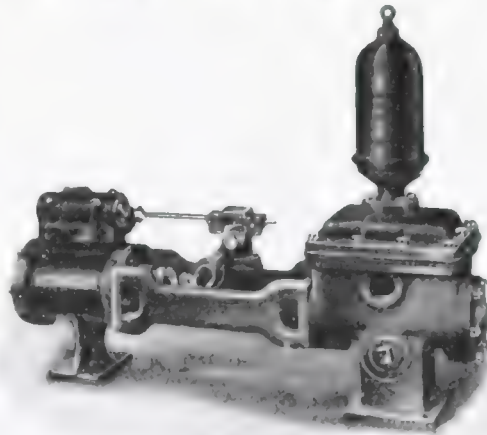
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Of the thousands of steam pumps installed every year, a large percentage of them bear the name of "Burnham," the *Steam Pump* endorsed by leading Architects, Consulting Engineers and Heating Contractors as the best, simplest and most economical pump on the market.

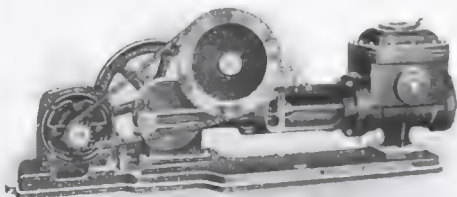
If you want a pump for handling hot water, use the "Burnham."



Burnham Boiler Feed Pump

Thousands of Burnham pumps are in operation in connection with *Vacuum Heating Systems*; they are specially adapted for this service. Standard Burnham Boiler Feed Pumps and Burnham Vacuum Pumps are kept in stock and can be shipped promptly.

*Ask for Catalog  
"B.P."*



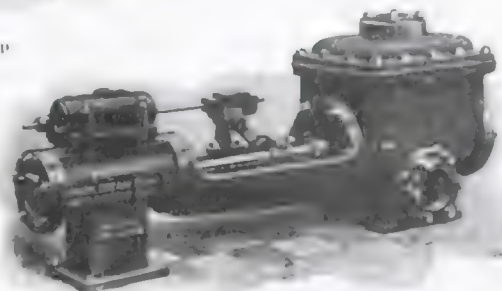
Union Electrically Driven Vacuum Pump

**Darling  
Brothers**

Limited

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MONTREAL

Toronto Winnipeg



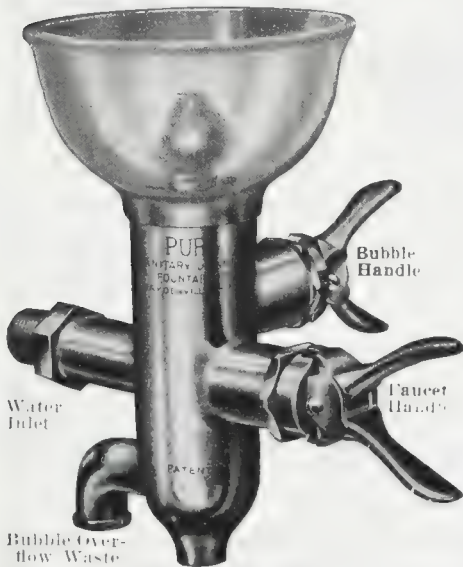
Burnham Vacuum Pump

*If what you want is not advertised in this issue, consult the Buyers' Directory at the back.*

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**Don't Pay Good Money for Impractical, Unmechanical and Often Worthless Fountains**



Actual Size 7" High

Here is a practical Fountain, which combines the Faucet and Bubble Features takes care of the overflow waste, and insures

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This is an age of sanitary plumbing and the Sanitary Drinking Fountain is one of its important subdivisions.

**SAFETY FIRST PURO SERVICE ALWAYS**

Is made of heavy brass with extra heavy nickel plate. Bubbler easily controlled by separate "squeeze" handle. No spurts no choking inside regulation prevents "showerbath." Faucet is controlled by another squeeze handle. Faucet gives full water pressure. Has thread for hose if wanted.

Write us the number of your employees and water pressure and we'll present an interesting proposition to you promptly.

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## Advertising

"Advertising is the education of the public as to who you are, where you are, and what you have to offer in the way of skill, talent or commodity. The only man who should not advertise is the man who has nothing to offer the world in the way of commodity or service."—*Elbert Hubbard.*

tion at Atlantic City, Pa. T. C. McDonald is in charge of the exhibit, which consists of literature and other matter dealing with shell making machinery. It was the intention of the company to have an exhibit of machine tools, but the idea had to be abandoned on account of the difficulty in obtaining the tools.

## New Incorporations

**Leek & Co., Ltd.**, Vancouver, B.C., has been incorporated with a capital stock of \$100,000 to manufacture electrical goods, machinery, iron, steel, etc.

**The Specialty Paper Bag Co.** has been incorporated at Ottawa with a capital of \$100,000 to manufacture jute, cotton, paper and all other kinds of bags at Ottawa. Incorporators: Irving Wells Smith, Gerald Morphy Malone, of Toronto.

**The Lindsay Factories, Ltd.**, has been incorporated at Toronto with a capital of \$50,000 to do a general manufacturing business with head office at Toronto. Provisional directors are G. E. Lindsay, S. W. Burns and Thomas W. Horn, all of Toronto.

**The Electric Zinc Co., Ltd.**, has been incorporated at Ottawa with a capital of \$24,000 to operate zinc smelters and refineries at Sherbrooke, Que. Incorporators: Leland Drew Adams and Charles Herbert May, of Oakland, Cal., and John P. Wells, of Sherbrooke, Que.

**The A. T. Wattie Cold Storage Co., Ltd.**, has been incorporated at Toronto with a capital of \$40,000 to carry on a cold storage business at Bracebridge, Ont. The provisional directors are John E. Wattie, Mervyn L. Watt and Ernest Green, all of Bracebridge, Ont.

**The Orillia Molybdenum Co., Ltd.**, has been incorporated at Toronto with a capital of \$200,000 to acquire and develop mineral lands and deposits. Head office at Orillia, Ont. Provisional directors are R. C. Dunbar, John E. Tudhope and J. Fraser Tudhope, all of Orillia, Ont.

**The Russell Natural Gas & Oil Co., Ltd.**, has been incorporated at Ottawa with a capital of \$1,000,000 to carry on the business of producing and refining petroleum products and natural gas, at Ottawa, Ont. Incorporators: Orlando Arthur Letts, John George Hackland, all of Ottawa, Ont.

**The Harris Heating & Engineering Co., Ltd.**, has been incorporated at Ottawa with a capital of \$25,000 to carry on the business of mechanical engineers, founders, smiths, etc., at Montreal, Que. Incorporators: Joseph Albert Harris,

Avila Mayer and Louis A. Desy, all of Montreal, Que.

**The Sorel Steel Foundries Co., Ltd.**, has been incorporated at Ottawa with a capital of \$100,000 to acquire and take over as a going concern the business now carried on at Sorel, Que., by Beauchemin & Fils, Ltd. Incorporators: Louis Philippe Tremblay and Napoleon Latraverse of Sorel, Que.

**The Canadian Cartridge Co., Ltd.**, has been incorporated at Toronto with a capital of \$400,000 to manufacture copper, brass and steel products, also cartridges and shells, etc. Head office at Toronto. Provisional directors are William S. Morlock, Bruce McKinnon and Roy B. Whitehead, all of Toronto.

## Railways—Bridges

**Owen Sound, Ont.**—The Grand Trunk will rebuild a large section of the wharf fronting on their property during the coming winter. Local contractors are being asked for tenders on the work, which will probably run as high as \$10,000.

**Weston, Ont.**—Engineers of the Toronto Suburban Railway Co. have surveyed an extension of the radial line from Woodbridge to Kleinburg. Another branch line of the Weston division has been surveyed east of Weston and connects with the Davenport line at Davenport station.

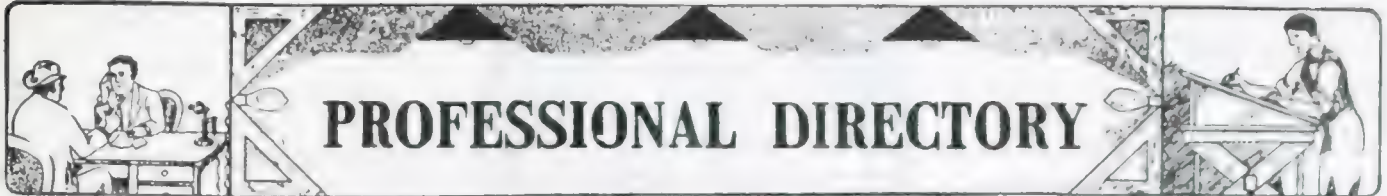
**Edmonton, Alta.**—J. D. McArthur, president of the Dunvegan and Waterways Railways, states that steel laying will begin on the Waterways Railways by the end of September. The condition of the grading work is such that steel will be laid continuously until McMurray is reached, probably by the end of the year.

**Cobourg, Ont.**—Several municipalities in the counties of Northumberland and Durham are petitioning the Ontario Hydro-Electric Commission to make a report on the advisability of constructing electric railways from Peterboro and Campbellford to Cobourg, passing through the municipalities interested. Such roads would open a territory now devoid of railway facilities, especially the northern part of Northumberland County.

## Contracts Awarded

**Toronto, Ont.**—The National Regulator Co. has been awarded a contract for heat regulating apparatus for the Gledhill Avenue School.





**PROFESSIONAL DIRECTORY**

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 Registered Patent Attorney, U.S. and  
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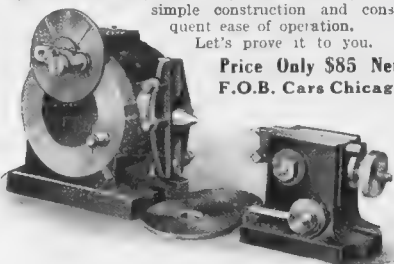
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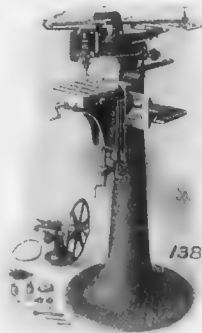
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## Building Notes

**Hamilton, Ont.**—The T. Eaton Co. has secured a permit to build a \$110,000 factory here.

**Saskatoon, Sask.**—MacDonald-Crawford, Ltd., propose building a warehouse here to cost \$50,000.

**Ottawa, Ont.**—The Bate Realty Co. will build an addition to their warehouse at a cost of \$25,000.

**Markham, Ont.**—The Bank of Nova Scotia will at once begin the erection of a substantial brick structure on Main Street.

**Toronto, Ont.**—The Board of Education has obtained a building permit for a new school on Bartlett Avenue, to cost \$52,900.

**Clayton, Ont.**—It is proposed to build a summer hotel here to cost \$400,000. F. A. Wright, of New York, has prepared the plans.

**Toronto, Ont.**—The Toronto Pharmacal Co., has applied for a permit to erect a \$7,000 addition to their factory on Brockton avenue.

**Toronto, Ont.**—A new school building will be erected at Fairbank, in York township. Edwards & Saunders, of Toronto, are the architects.

**Toronto, Ont.**—McGregor & McIntyre have obtained a building permit from the city architect's department for the erection of a two-storey brick factory, costing \$8,700, at 1139 Shaw Street.

**Toronto, Ont.**—The C. P. R. has secured a permit from the city architect for the erection of the new North Toronto station, to be built of brick and stone, and to cost \$125,000. It is to be a one-storey structure.

## Catalogues

**Split Pulleys.**—The "National" All-Steel Split Pulleys are illustrated and described in a bulletin issued by Patten Co., of Chicago, Ill.

**Electric Grinder.**—The Hamilton-Beach portable electric grinder for grinding dies, reamers, cutters, etc., is the subject of a bulletin issued by the Canadian General Electric Co., Toronto. A description is given of the grinder, which is accompanied by illustrations showing the grinder in operation on different kinds of work.

**A Chain of Evidence.**—Publication No. 14 contains a number of illustrations of large power drives where Morse chains are used, accompanied by details of each. Other matter included deals with the Morse silent chain and the

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clude views of numerous installations in addition to several cross sections showing the general construction of the appliances and method of operation. This catalogue is well gotten up. It contains 62 pages of matter printed in clear type and is bound in attractive covers. Copies of this catalogue may be obtained on application to the Canadian Allis-Chalmers, Ltd., Toronto, Ont., who are the exclusive agents for Canada.

**Turret Lathes.**—Catalogue J-7, issued by the Gisholt Machine Co., Madison, Wis., illustrates and describes the standard "Gisholt" turret lathe. The introduction briefly describes the range of work covered by these machines. Following is a general description of the standard turret lathes, in the form of a specification in which the principal parts of the lathe are discussed. A half-tone engraving of the standard machine with weights and dimensions covering all sizes, are found on pages 8 and 9. Motor-driven lathes are described and illustrated on pages 10 and 11, while page 12 contains particulars and views of standard boring and turning tools, being a new design of standard tool equipment. Bar tools, facing heads and accessories are shown on pages 13 and 14, while the full-swing wing rest is described on page 15. Following are several pages devoted to cuts, showing various operations on "Gisholt" lathes, and a variety of parts which have been finished on these machines. A number of half-tones show "Gisholt" lathes installed in various shops.

**The A. R. Williams Machinery Co.,** Toronto, Ont., have recently issued a new catalogue, No. 40, dealing with machinery and tools, mill and railroad supplies. The catalogue contains 782 pages, is bound in cloth covers and is fully indexed, having in addition an index to figure numbers. The large number of lines listed precludes mention of any particular product, but it is sufficient to say that a full line of machinery and supplies for various trades is illustrated and the essential particulars given for each. The compilation of this catalogue has entailed considerable work owing to the great amount of detail involved in the preparation of the price lists and arrangement of the illustrations. This is a most useful book of reference and should be in the hands of all managers, superintendents and purchasing agents. The cuts are very clear and the press-work generally of a high order. Copies of this catalogue will be sent to responsible persons on request.

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- One 72" Niles vertical boring mill with two heads.
- One 48" Bement Car Wheel borer with crane.
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- One 48" Dresser Machine Company radial drill.

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## Book Reviews

"Buoys, Beacons, and Day Marks, and other aids to navigation on the Pacific Coast of the Dominion of Canada," is the title of a publication issued by the Department of Marine and Fisheries, Ottawa. This is the fourth edition of a list of buoys, etc., which gives the exact location of each, also description and remarks arranged in tabulated form. A copy of this list will be sent free to any shipmaster on application to the chief engineer of the Department at Ottawa, or agent of the Department at Victoria, B. C.

**United States Mining Statutes Annotated**, by J. W. Thompson. 1915. 1,772 pp. In two parts. Cloth. Not sold separately. \$2.50. The Bulletin No. 94 is intended for persons engaged in mining enterprises that come within the scope of the Federal mining laws, and as a guide in the determination of mining rights and duties. It shows the status of every Federal mining law, both laws relating to metal mining and those relating to coal, oil, and phosphate, and to mining on public, Indian, and railroad lands. It includes references to Alaska and the Philippine Islands, and is the only complete work in its field. Owing to the expense involved in the preparation and publication of this bulletin and the limited printing funds available for the use of the Bureau of Mines, it has been necessary to place a price of \$2.50 on the work. Orders should not be sent to the Bureau of Mines, but should be addressed to the Superintendent of Documents, Government Printing Office, Washington, D.C.



### HOW TO KEEP MEN IN YOUR EMPLOY—A POSSIBLE SOLUTION

(Continued from page 334)

have avoided all suggestion of paternalistic motives. The work has been from the men to the company, not from the company to the men. If anything new is to be introduced, we get hold of the leaders—those men whose intelligence is most developed. Having gained their favor, the less thoughtful will fall in line.

#### Importance of the Foreman

In our organization, we have paid particular attention to selecting the foremen. You cannot have an unintelligent head of a department, and expect the men to be up to standard. In such men, a well defined policy is adopted. This policy is known to the heads of departments and thoroughly understood in the employment office. It requires cer-



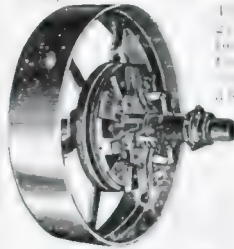
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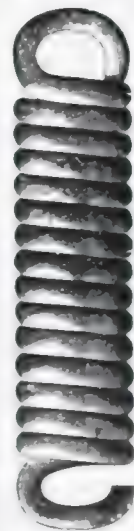
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tain standards and no man is sent to a department who does not fulfill these requirements. The rest lies with the foreman.

Employees are encouraged to work out their own problems, and are largely instrumental in developing the conditions under which they work. As an example, a mutual aid association was organized 20 years ago, but for 15 years it was a failure. The officers were company officials and the men showed little interest. Each year there was a deficit which the company has to meet. The promise to pay half the dues, did not induce the men to join.

The association was reorganized and its success or failure put up to the men themselves. A new management was elected. At the end of the first year, the membership had increased more than 300 per cent., and \$2,000 were in the treasury. The record has been maintained each year.

### The Restaurant

The next feature was a restaurant. At the suggestion of the men, a small lunch counter was established about five years ago. It was well patronized and in a few months was moved to larger quarters. It has been moved to larger quarters on three different occasions. We now have a completely equipped restaur-

ant serving 600 daily, and this will be doubled shortly.

Everything sells for three cents, except meat, which is four cents. Nevertheless, we have saved enough to pay for the equipment for which the company advanced \$8,000. The food is excellent and for 15 to 20 cents a good-sized meal is secured.

Three years ago, we started to sell small quantities of sugar, coffee, flour, tobacco, etc., in the restaurant. Since that time, this department has become a large co-operative store, doing \$10,000 to \$12,000 business each month. All kinds of groceries, meats, boots, shoes, rough clothing, etc., are handled. Last year, through the store, 35 carloads of coal, 20 carloads of potatoes and five carloads of apples were sold at a large saving to employees.

Two years ago a bakery was started which now bakes 3,000 loaves per day. Everything used in the restaurant comes from this bakery. A lard rendering plant furnishes employees lard at 5 to 6 cents a pound less than other stores. An ice cream factory sells a large dish of ice cream, made from cream from our own dairy farm, for 3 cents per dish. Bread sells at 4 cents, for a loaf 2 ounces larger than the usual size. In the shoe department, \$3.50 and \$4.50 shoes sell for \$2.50 and \$3. Employees

save from \$3 to \$12 per month per family on goods purchased.

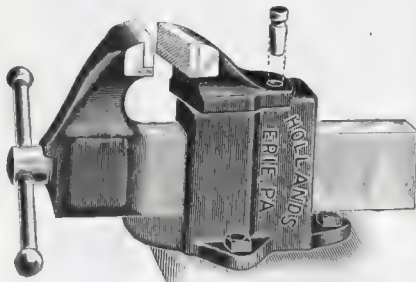
### Building and Loan Association

Three years ago, our employees organized a building and loan association. Since that time, business totaling over \$200,000 has been done. The assets are over \$100,000 and 73 employees have bought and built homes. A dividend of 5 per cent. has been paid each year. Money is loaned at 5½ per cent. There are more than 700 stock and savings accounts with employees.

These activities are fostered and encouraged by the company, but the management and organization is carried on entirely by committees of shop men. The company advanced the money, but almost all of it has been paid back by the employees.

No reason exists why any business concern cannot put the question of handling men and their welfare on a business basis and frankly state the business reason for such an undertaking. Our employees distinctly understand that anything the company fosters for their benefit is based upon the belief that it will bring returns in dollars to both. The employees have learned that capital and labor are interdependent—that both must prosper on the same basis. They are learning that demagogues and agitators do not fill pay envelopes and never will.

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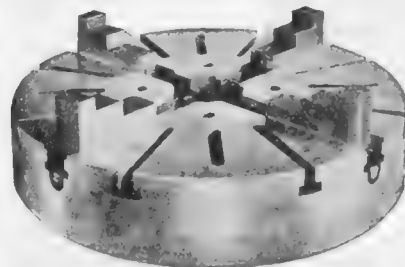
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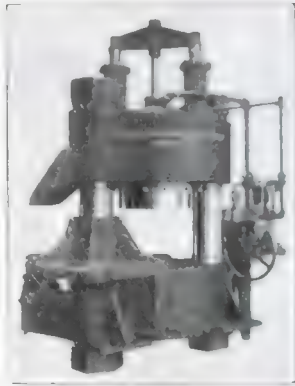
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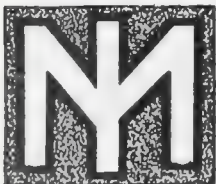
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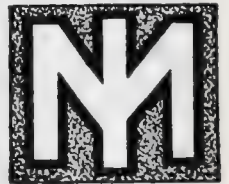
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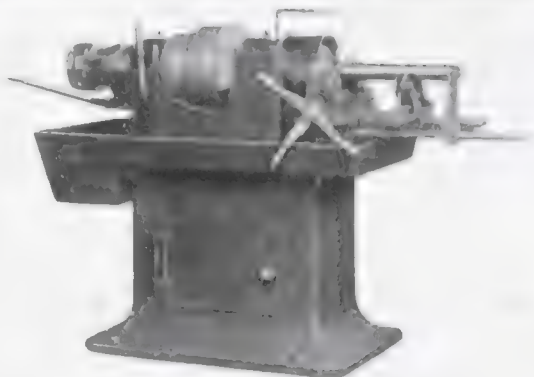
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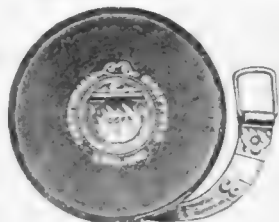
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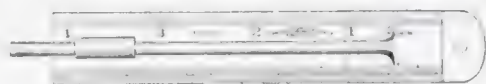


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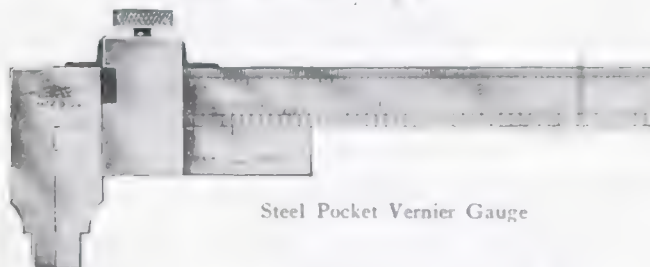
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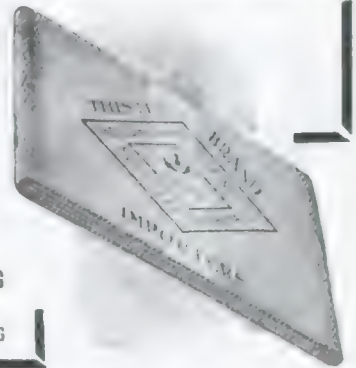
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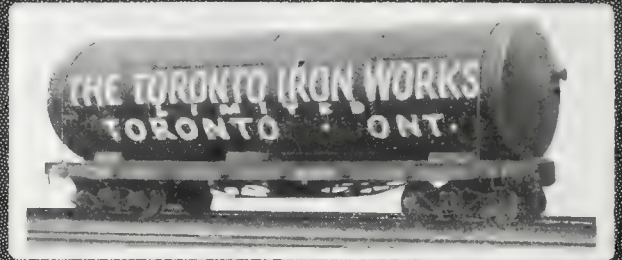
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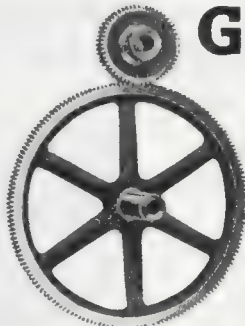
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Wheels  
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Matchless Raw-  
hid Pinions in  
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Power Hammer

BEST FOR Durability, Economy of Power, Simplicity of Adjustment.

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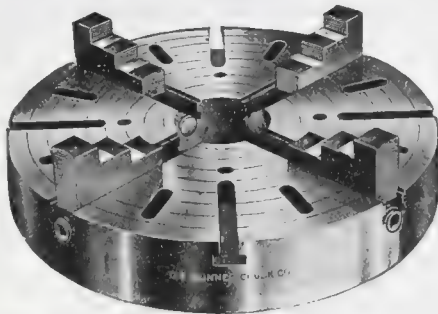
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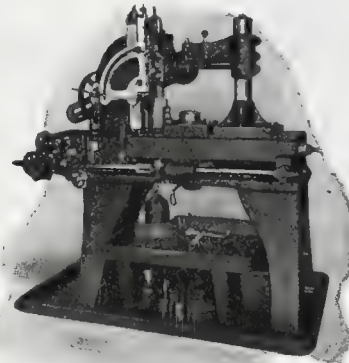
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Wide jaws;  
 hardened steel  
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 jaws ground after  
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 Factory and Main Office, New Britain, Conn.

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 AUTOMATIC  
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Only about  
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Every head is perfectly formed, any shape, round, flat, oval, rectangular, etc.

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Also makers of Wire Straighteners and Cutter, Cotter Pin Machines, etc.

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Combined Jaw and Friction. Friction only Gas Engine Clutches. Jaw Clutches.

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Our illustrated catalogue is sent upon request.

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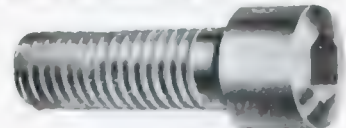
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Send for circular No. 3 and free sample screws.

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Press Attachments, Automatic. Metal and Wire Forming Machines. Tumblers—Large Line. Burnishing Machines. Grinders. Special Machines.

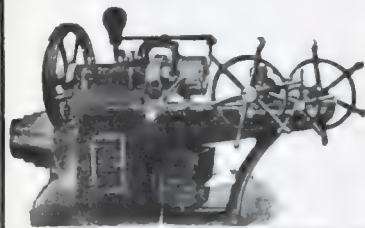
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For all kinds of heavy lifting  
Send for complete catalogue showing 50 styles  
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"National" Bolt Cutters, "Wedge Grip" Bolt and Rivet Headers, Forging Machines, Nut Machines, Roll Threaders and Wire Nail Machines are used by leading Railroads and Industrials.



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WE MANUFACTURE RIVETS of every description, 1/2 inch. dia. and smaller.

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# AUTOMATIC WOOD SCREW MACHINES

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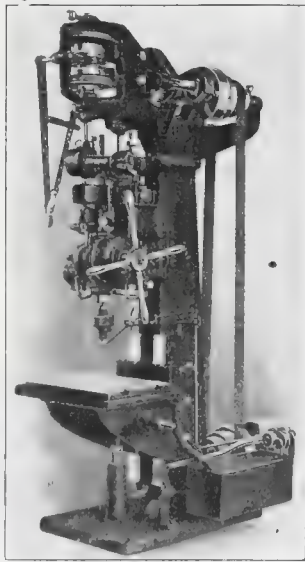
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# In the Manufacture of Shrapnel and Lyddite Shells the

# TURNER TURRET

has produced top-notch results.

It gives satisfaction for accuracy and rapidity in drilling, threading, reaming, undercutting, counterboring, etc., on Fuse Timing and Detonator Parts of Shells.



With the Turret 4, 5, 6, operations are possible without resetting. The Tools revolve, and Turret automatically indexes successive tools to exactly the same working centre. Only the working spindle rotates.

There is no fatigue from indexing Turret and no lost time through stopping for chucking or shifting of work.

The Trunnion Chuck makes working on several sides possible with one chucking.

The Turner Turret minimizes idle movements, there being but a fraction of a second between successive tools.

Turret is suspended within rigid, accurate case. Detent located in case and fits adjustable sockets in turret. Very wide range of work. Hand and power feed.

*Mail us your blue prints, and let us give you estimates on the Turner Turret. Ask for catalog.*

**Turner Machine Company**  
Danbury, Conn., U.S.A.

## Our Newly Designed

# Shrapnel Shell Cleaning Machine

Cleans all **Standard** Sizes  
and accommodates various **other** sizes

The table of this machine has six shell pockets. Three of these are in the Blasting Department, and the other three, as shown in the illustration, are in the open. Thus, while three of the shells are being cleaned, the operator can remove the other three that have been cleaned, replacing them with three more to be blasted.

Consequently the machine can be kept in constant operation.

This machine, if connected to any exhaust system, will be nearly dustless and absolutely automatic in operation.

On the sand blasting table proper the division plates are lined with wood. This protects the steel plate. The wood is inexpensive and easily replaced.

The machine is so designed that the copper band groove is blasted on the exterior of the shell and another nozzle blasts the upper part of the exterior of the shell.

Its capacity for continuous running is from 150 to 200 shells per hour.

We are anxious to tell you all about it.

Write us.



*We are manufacturers of Sand Blast equipment for any particular need. Also cleaning mills, dust arresters, cinder mills, resin grinders and other foundry equipment.*

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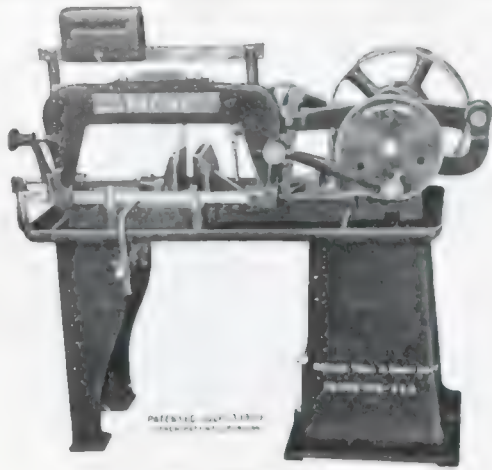
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Can. Fairbanks-Morse Co., Montreal.
- Cleveland Twist Drill Co., Cleveland.**  
Cushman Chuck Co., Hartford, Conn.  
Gardner, Robt., & Son, Montreal.  
Girard Machine & Tool Co., Philadelphia, Pa.  
Wells Brothers Co., Greenfield, Mass.  
Jacobs Mfg. Co., Hartford, Conn.  
Ker & Goodwin, Brantford.  
Modern Tool Co., Erie, Pa.  
Morse Twist Drill & Machine Co., New Bedford.  
National Machinery & Supply Co., Hamilton.  
Skinner Chuck Co., New Britain, Conn.  
D. E. Whiton Machine Co., New London, Conn.  
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.
- Chucks, Drill, Automatic and Keyless.**  
Buffalo Forge Co., Buffalo, N.Y.
- Chucks, Ring Wheel.**  
Gardner Machine Co., Beloit, Wis.
- Chucking Machines.**  
Garvin Machine Co., New York.  
Girard Machine & Tool Co., Philadelphia, Pa.  
New Britain Machine Co., New Britain, Conn.  
Niles-Bement-Pond Co., New York.  
Turner Machine Co., Danbury, Conn.  
Warner & Swasey Co., Cleveland, O.
- Clocks, Time and Watchman's.**  
Lintz-Porter Co., Toronto.
- Cloth and Wool Dryers.**  
Canada Wire & Iron Goods Co., Hamilton, Ont.  
Sheldons, Limited, Galt.
- Clutches.**  
Eastern Machinery Co., New Haven, Conn.  
Jones & Glasco, Montreal.  
Owen Sound Iron Works Co., Owen Sound.  
Positive Clutch & Pulley Works, Ltd., Toronto.
- Coal Handling Machinery.**  
Whiting Foundry Equipment Co., Harvey, Ill.
- Coke and Coal.**  
Hanna & Co., M. A., Cleveland, O.
- Collectors, Pneumatic.**  
Can. Buffalo Forge Co., Montreal.  
Sheldons, Limited, Galt.
- Compressors, Air.**  
Cleveland Pneumatic Tool Co. of Canada, Toronto.  
Independent Pneumatic Tool Co., Chicago.  
Mesta Machine Co., Pittsburg, Pa.  
National Machinery & Supply Co., Hamilton.  
Southwark Foundry & Machine Co., Philadelphia, Pa.  
The Smart-Turner Machine Co., Hamilton.
- Concentrating Plant.**  
Gardner, Robt., & Son, Montreal.
- Concrete Mixers.**  
A. R. Williams Machy. Co., Toronto.  
Can. Fairbanks-Morse Co., Montreal.  
National Machinery & Supply Co., Hamilton.
- Concrete Reinforcement.**  
Canada Wire Goods Mfg. Co., Hamilton.
- Condensers.**  
Can. Buffalo Forge Co., Montreal.  
Mesta Machine Co., Pittsburg, Pa.  
The Smart-Turner Machine Co., Hamilton.  
Southwark Foundry & Machine Co., Philadelphia, Pa.  
Wm. Tod Company, Youngstown, O.
- Contracting Engineers, Electrical.**  
Lintz-Porter Co., Toronto.
- Controllers and Starters, Electric Motor.**  
A. R. Williams Machy. Co., Toronto.  
Toronto & Hamilton Electric Co., Hamilton, Ont.
- Conveyor Machinery.**  
Can. Fairbanks-Morse Co., Montreal.  
National Machinery & Supply Co., Hamilton, Ont.  
Plessisville Foundry, Plessisville, Que.  
The Smart-Turner Machine Co., Hamilton.
- Coping Machines.**  
Can. Buffalo Forge Co., Montreal.  
John Bertram & Sons Co., Dundas.  
National Machinery & Supply Co., Hamilton, Ont.  
Niles-Bement-Pond Co., New York.
- Cornice Brakes.**  
Brown Boggs Co., Ltd., Hamilton, Canada.  
Steel Bending Brake Wks., Chatham.
- Counting Machines.**  
National Scale Co., Chicopee Falls, Mass.  
C. J. Root Co., Bristol, Conn.
- Counterbores and Countersinks.**  
Cleveland Twist Drill Co., Cleveland.  
Morse Twist Drill & Machine Co., New Bedford.  
Pratt & Whitney Co., Dundas, Ont.  
Wells Bros. Co., Greenfield, Mass.  
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.
- Countershafts.**  
Baird Machine Co., Bridgeport, Conn.  
Wells Bros. Co., Greenfield, Mass.
- Country House Lighting and Cooking.**  
Can. Blaugas Co., Montreal.
- Couplings.**  
Can. H. W. Johns-Manville Co., Ltd., Toronto.  
Eastern Machinery Co., New Haven, Conn.  
Gardner, Robt., & Son, Montreal.  
Owen Sound Iron Works Co., Owen Sound, Ont.
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Cleveland Pneumatic Tool Co. of Canada, Toronto.
- Crabs, Travelling.**  
Owen Sound Iron Works Co., Owen Sound.
- 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.**  
Herbert Morris Crane & Hoist Co., Ltd., Toronto.  
Northern Crane Works, Walkerville.  
Whiting Foundry Equipment Co., Harvey, Ill.
- Cranes, Hydraulic.**  
Watson-Stillman Co., Aldene, N.J.
- Cranes, Pneumatic.**  
Northern Crane Works, Walkerville.  
Whiting Foundry Equipment Co., Harvey, Ill.
- Cranes, Post Jib.**  
Northern Crane Works, Walkerville.  
Smart-Turner Machine Co., Hamilton, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.
- Cranes, Portable.**  
Northern Crane Works, Walkerville.  
Whiting Foundry Equipment Co., Harvey, Ill.
- Cranes, Swing Jib.**  
Northern Crane Works, Walkerville.  
Smart-Turner Machine Co., Hamilton, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.
- Cranes, Transfer.**  
Northern Crane Works, Walkerville.  
Smart-Turner Machine Co., Hamilton, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.
- Cranes, Wall.**  
Northern Crane Works, Walkerville.  
Smart-Turner Machine Co., Hamilton, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.
- Cranes, Travelling Electric and Hand Power.**  
Dominion Bridge Co., Montreal.  
Niles-Bement-Pond Co., New York.  
Northern Crane Works, Walkerville.  
Whiting Foundry Equipment Co., Harvey, Ill.
- Crane, Chain.**  
Northern Crane Works, Walkerville.
- Cranes, All Kinds.**  
Northern Crane Works, Walkerville.  
Owen Sound Iron Works Co., Owen Sound, Ont.  
Southwark Foundry & Machine Co., Philadelphia, Pa.  
Whiting Foundry Equipment Co., Harvey, Ill.
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Niles-Bement-Pond Co., New York.
- Crimps, Leather.**  
Graton & Knight Mfg. Co., Montreal.
- Cupolas.**  
Can. Buffalo Forge Co., Montreal.  
Northern Crane Works, Walkerville.  
Sheldons, Ltd., Galt, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.
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- Cupola Blast Gauges & Blowers.**  
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Can. Buffalo Forge Co., Montreal.
- Cutters, Flue.**  
Independent Pneumatic Tool Co., Chicago.  
Cleveland Pneumatic Tool Co. of Canada, Toronto.
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A. B. Jardine & Co., Hespeler, Ont.  
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Can. Economic Lubricant Co., Montreal.  
Can. Oil Companies, Toronto.  
Cataract Refining Co., Buffalo, N.Y.  
Crescent Oil Co., New York.  
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Cincinnati Milling Machine Co., Cincinnati.  
Garvin Machine Co., New York.  
Girard Machine & Tool Co., Philadelphia, Pa.
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A. R. Williams Machy. Co., Toronto.  
Can. Fairbanks-Morse Co., Montreal.  
Cleveland Twist Drill Co., Cleveland.  
Garvin Machine Co., New York.  
Morse Twist Drill and Machine Co., New Bedford.  
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Pratt & Whitney Co., Dundas, Ont.  
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Armstrong Bros. Tool Co., Chicago.  
John Bertram & Sons Co., Dundas.  
Can. Fairbanks-Morse Co., Montreal.  
Espen-Lucas Machine Wks., Philadelphia, Pa.  
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Garlock Machinery, Toronto.  
Garvin Machine Co., New York.  
Girard Machine & Tool Co., Philadelphia, Pa.  
Geo. Gorton Machine Co., Racine, Wis.  
Hurlbut, Rogers Machinery Co., South Sudbury, Mass.  
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Nutter & Barnes Co., Hinsdale, N.H.  
Pratt & Whitney Co., Dundas, Ont.  
Tabor Mfg. Co., Philadelphia, Pa.  
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Can. Fairbanks-Morse Co., Montreal.
- Derricks.**  
Dominion Bridge Co., Montreal.  
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Baird Machine Co., Bridgeport, Conn.
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Butterfield & Co., Rock Island, Que.  
Brown, Boggs & Co., Hamilton, Ont.  
Can. Fairbanks-Morse Co., Montreal.  
Duncan Electrical Co., Montreal.  
Gardner, Robt., & Son, Montreal.  
Greenfield Tap & Die Corporation, Greenfield, Mass.  
A. B. Jardine & Co., Hespeler, Ont.  
Modern Tool Co., Erie, Pa.  
Morse Twist Drill and Machine Co., New Bedford.  
Pratt & Whitney Co., Dundas, Ont.  
Wiley & Russell, Greenfield, Mass.
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- Die Sinks.**  
Garvin Machine Co., New York.
- Dies for Machines.**  
Wells Brothers Co., Greenfield, Mass.
- Die Sinking Presses, Hydraulic.**  
Charles F. Elmes Eng. Works, Chicago.  
Watson-Stillman Co., Aldene, N.J.
- Dies, Self-opening.**  
Duncan Electrical Co., Montreal.  
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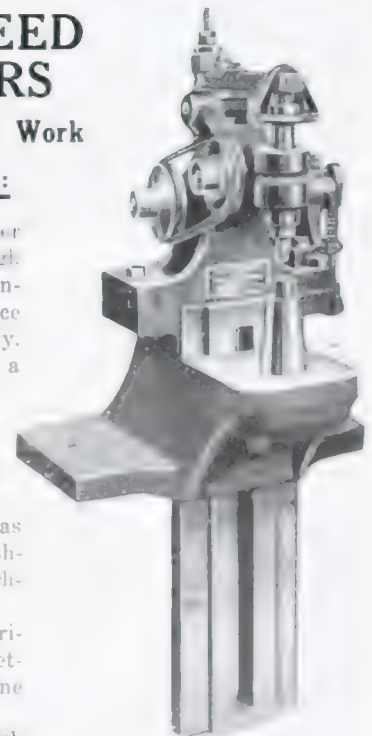
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 Garvin Machine Co., New York.  
 Girard Machine & Tool Co., Phila-  
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 Can. Fairbanks-Morse Co., Montreal.  
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 Garvin Machine Co., New York.  
 Girard Machine & Tool Co., Phila-  
 delphia, Pa.  
 A. B. Jardine & Co., Hespeler, Ont.  
 Niles-Bement-Pond Co., New York.

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 John Bertram & Sons Co., Dundas.  
 Can. Fairbanks-Morse Co., Montreal.  
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 John Bertram & Sons Co., Dundas.  
 Garlock Machinery, Toronto.  
 Girard Machine & Tool Co., Phila-  
 delphia, Pa.  
 A. B. Jardine & Co., Hespeler, Ont.  
 Rockford Machine Tool Co., Rockford.  
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 Motch & Merryweather Machy. Co.,  
 Cleveland, O.  
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 Morse Twist Drill and Machine Co.,  
 New Bedford.  
 Wilt Twist Drill Co., of Canada, Ltd.,  
 Walkerville, Ont.

**Drills, Centre.**

Cleveland Twist Drill Co., Cleveland.  
 Morse Twist Drill and Machine Co.,  
 New Bedford.  
 Pratt & Whitney Co., Dundas, Ont.  
 L. S. Starrett Co., Athol, Mass.  
 Wilt Twist Drill Co., of Canada, Ltd.,  
 Walkerville, Ont.

**Drills Corner (Pneumatic).**

Cleveland Pneumatic Tool Co. of  
 Canada, Toronto.

**Drills, Electric and Portable.**

A. R. Williams Machy. Co., Toronto.  
 Can. Buffalo Forge Co., Montreal.  
 Niles-Bement-Pond Co., New York.  
 Stow Mfg. Co., Binghamton, N.Y.  
 United States Electrical Tool Co.,  
 Cincinnati, O.

**Drills, High Speed.**

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 Cleveland Twist Drill Co., Cleveland.  
 Can. Fairbanks-Morse Co., Montreal.  
 Morse Twist Drill and Machine Co.,  
 New Bedford.  
 W. F. & John Barnes Co., Rockford,  
 Ill.  
 Pratt & Whitney Co., Dundas, Ont.  
 Whitman & Barnes Mfg. Co., St.  
 Catharines, Ont.  
 Wilt Twist Drill Co., of Canada, Ltd.,  
 Walkerville, Ont.

**Drills, Multiple Spindle.**

Pratt & Whitney Co., Dundas, Ont.  
 Niles-Bement-Pond Co., New York.

**Drills, Oil Tube.**

Cleveland Twist Drill Co., Cleveland.  
 Morse Twist Drill and Machine Co.,  
 New Bedford.

**Drills, Pneumatic.**

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 Cleveland Pneumatic Tool Co. of  
 Canada, Toronto.  
 Independent Pneumatic Tool Co.,  
 Chicago, Ill.  
 Niles-Bement-Pond Co., New York.

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 Can. Buffalo Forge Co., Montreal.  
 Can. Fairbanks-Morse Co., Montreal.  
 Cleveland Twist Drill Co., Cleveland.  
 A. B. Jardine & Co., Hespeler, Ont.  
 Morse Twist Drill and Machine Co.,  
 New Bedford.  
 Pratt & Whitney Co., Dundas, Ont.  
 Wilt Twist Drill Co., of Canada, Ltd.,  
 Walkerville, Ont.

**Drills, Rock.**

A. R. Williams Machy. Co., Toronto.  
 Cleveland Pneumatic Tool Co. of  
 Canada, Toronto.

**Drills, Track.**

Cleveland Twist Drill Co., Cleveland.  
 Morse Twist Drill and Machine Co.,  
 New Bedford.  
 Wilt Twist Drill Co. of Canada, Ltd.,  
 Walkerville, Ont.

**Drills, Twist.**

Armstrong, Whitworth of Canada,  
 Ltd., Montreal.  
 Can. Fairbanks-Morse Co., Montreal.  
 Cleveland Twist Drill Co., Cleveland.  
 John Morrow Screw Co., Ingersoll,  
 Ont.  
 Morse Twist Drill and Machine Co.,  
 New Bedford.  
 Pratt & Whitney Co., Dundas, Ont.  
 Wilt Twist Drill Co. of Canada, Ltd.,  
 Walkerville, Ont.

**Drill Holders.**

Wells Brothers Co., Greenfield, Mass.

**Drill Sockets.**

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 Morse Twist Drill and Machine Co.,  
 New Bedford.  
 Wilt Twist Drill Co. of Canada, Ltd.,  
 Walkerville, Ont.

**Drying Appliances.**

Can. Buffalo Forge Co., Montreal.  
 Can. Sirocco Co., Ltd., Windsor, Ont.  
 Sheldons, Ltd., Galt, Ont.

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Bald Machine Co., Bridgeport, Conn.

**Drying Ovens.**

Oven Equipment & Mfg. Co., New  
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 Whiting Foundry Equipment Co.,  
 Harvey, Ill.

**Dump Cars.**

Can. Fairbanks-Morse Co., Montreal.  
 National Machinery & Supply Co.,  
 Hamilton, Ont.  
 Owen Sound Iron Works Co., Owen  
 Sound.  
 Plessisville Foundry, Plessisville, Que.

**Dust Separators.**

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 Sheldons, Ltd., Galt, Ont.

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 Harvey, Ill.

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Duncan Electrical Co., Montreal.  
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Canada Wire & Iron Goods Co.,  
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 Ont.

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Machinery.**

Can. Mathews Gravity Co., Toronto.  
 Plessisville Foundry, Plessisville, Que.

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Cleveland Pneumatic Tool Co. of  
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 Stow Mfg. Co., Binghamton, N.Y.

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 Canadian Hart Wheels, Hamilton,  
 Ont.  
 Ford-Smith Machine Co., Hamilton.  
 Garvin Machine Co., New York.  
 Girard Machine & Tool Co., Phila-  
 delphia, Pa.  
 Stevens, F. B., Detroit, Mich.

**Emery Wheels, Dressers and  
Stands.**

Canadian Hart Wheels, Hamilton,  
 Ont.  
 Gardner, Robt., & Son, Montreal.  
 National Machinery & Supply Co.,  
 Hamilton, Ont.  
 Norton Co., Worcester, Mass.

**Emery Wheel Safety Flanges.**

Canadian Hart Wheels, Hamilton,  
 Ont.

**Enameling Ovens.**

Oven Equipment & Mfg. Co., New  
 Haven, Conn.

**Engines, Corliss, Compound,  
and Pumping.**

Mesta Machine Co., Pittsburg, Pa.  
 Wm. Tod Company, Youngstown, O.

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Can. Fairbanks-Morse Co., Montreal.  
 Jones & Glassco, Montreal.  
 Mesta Machine Co., Pittsburg, Pa.  
 National Machinery & Supply Co.,  
 Hamilton.  
 Wm. Tod Company, Youngstown, O.

**Engines, Horizontal and Vertical.**

Can. Buffalo Forge Co., Montreal.  
 Can. Sirocco Co., Ltd., Windsor, Ont.  
 Mesta Machine Co., Pittsburg, Pa.  
 A. R. Williams Machy. Co., Toronto.  
 Sheldons, Ltd., Galt, Ont.  
 Wm. Tod Co., Youngstown, O.

**Engines, High-Speed, Automatic.**

Can. Buffalo Forge Co., Montreal.

**Engines, Steam.**

Can. Buffalo Forge Co., Montreal.  
 Mesta Machine Co., Pittsburg, Pa.  
 Plessisville Foundry, Plessisville, Que.  
 Southwark Foundry & Machine Co.,  
 Philadelphia, Pa.  
 Wm. Tod Company, Youngstown, O.

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 Philadelphia, Pa.

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 Toronto.

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Eastern Machinery Co., New Haven,  
 Conn.  
 Whiting Foundry Equipment Co.,  
 Harvey, Ill.

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 Garvin Machine Co., New York.  
 Wm. Tod Co., Youngstown, O.

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Parmenter & Bulloch Co., Gananoque.

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Brown, Boggs & Co., Hamilton, Can.

**Exhaust Heads and Hoods.**

Can. Buffalo Forge Co., Montreal.  
 Can. Steel Products Co., Montreal.  
 Can. Fairbanks-Morse Co., Montreal.  
 Sheldons, Ltd., Galt, Ont.

**Exhausters.**

Can. Buffalo Forge Co., Montreal.  
 Can. Sirocco Co., Ltd., Windsor, Ont.

**Experimental Machinery.**

Owen Sound Iron Works Co., Owen  
 Sound.

**Extractors, Ingot.**

Mesta Machine Co., Pittsburg, Pa.

**Fans.**

Can. Buffalo Forge Co., Berlin, Ont.  
 Baird Machine Co., Bridgeport, Conn.  
 Can. Sirocco Co., Ltd., Windsor, Ont.  
 Lintz-Porter Co., Toronto.  
 Plessisville Foundry, Plessisville, Que.  
 Sheldons, Ltd., Galt, Ont.  
 The Smart-Turner Machine Co., Ham-  
 iltion.

**Feed Water Heaters.**

Can. Fairbanks-Morse Co., Montreal.  
 The Smart-Turner Machine Co., Ham-  
 iltion.

**Fence, Iron Factory.**

Canada Wire & Iron Goods Co.,  
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 Dennis Wire & Iron Works Co., Ltd.,  
 London, Canada.  
 Standard Tube & Fence Co., Wood-  
 stock, Ont.

**Files.**

Delta File Works, Philadelphia, Pa.  
 Nicholson File Co., Port Hope, Ont.

**Fire Alarm Apparatus.**

Lintz-Porter Co., Toronto.

**Fire Extinguishers.**

Can. H. W. Johns-Manville Co.,  
 Limited, Toronto.

**Fire Escapes.**

Canada Wire & Iron Goods Co.,  
 Hamilton, Ont.  
 Dennis Wire & Iron Works, London,  
 Ont.

**Flash Lamps.**

Lintz-Porter Co., Toronto.

**Flexible Shafts.**

Chicago Flexible Shaft Co., Chicago,  
 Ill.  
 Stow Mfg. Co., Binghamton, N.Y.

**Flumes.**

Toronto Iron Works, Ltd., Toronto.

**Forges, Hand, etc.**

Can. Buffalo Forge Co., Montreal.  
 Independent Pneumatic Tool Co.,  
 Chicago, Ill.  
 National Machinery & Supply Co.,  
 Hamilton.  
 Sheldons, Limited, Galt, Ont.

**Forgings, Drop, Automobile and  
Locomotive.**

Bliss, E. W., Co., Brooklyn, N.Y.  
 Canadian Billings & Spencer, Ltd.,  
 Welland.

Mesta Machine Co., Pittsburg, Pa.  
 J. H. Williams Co., Brooklyn, N.Y.

**Forging Hammers, Belt-Driven.**

Bliss, E. W., Co., Brooklyn, N.Y.  
 Plessisville Foundry, Plessisville, Que.

**Forging Hammers, Steam.**

Erie Foundry Co., Erie, Pa.

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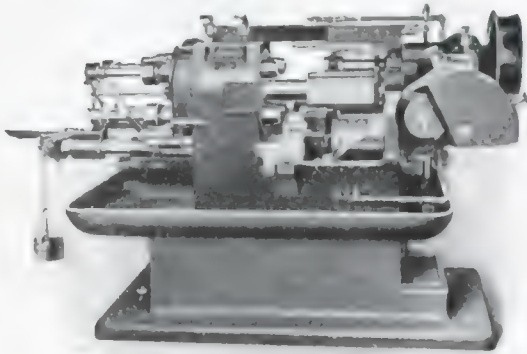
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Cleveland Twist Drill Co., Cleveland, O.  
A. B. Jardine & Co., Hespeler, Ont.  
Morse Twist Drill and Machine Co., New Bedford.  
Pratt & Whitney Co., Dundas, Ont.  
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.
- Marine Engines.**  
Cunningham & Sons, St. Catharines, Ont.
- Marking Machinery.**  
Brown, Boggs Co., Hamilton, Ont.  
Noble & Westbrook Mfg. Co., Hartford, Conn.
- Marquises.**  
Dennis Wire & Iron Works, London, Ont.
- Measuring Tapes and Rules.**  
James Chesterman & Co., Ltd., Sheffield, Eng.
- Metallurgists.**  
Toronto Testing Laboratory, Ltd., Toronto.
- Metal Cutting Machines.**  
Hurlbut, Rogers Machinery Co., South Saubury, Mass.  
Racine Tool & Machine Co., Racine, Wis.
- Metal Stamping.**  
Duncan Electrical Co., Montreal.
- Meters, Electrical.**  
Can. H. W. Johns-Manville Co., Ltd., Toronto.  
Lintz-Porter Co., Toronto.
- Mill Machinery.**  
Cunningham & Sons, St. Catharines, Ont.  
Alexander Fleck, Ltd., Ottawa.
- Milling Attachments.**  
John Bertram & Sons Co., Dundas.  
Brown & Sharpe Mfg. Co., Providence.  
Cincinnati Milling Machine Co., Cincinnati, Ohio.  
Hendey Mach. Co., Torrington, Conn.  
Kemp Smith Mfg. Co., Milwaukee, W. Mesta Machine Co., Pittsburg, Pa.  
Niles-Bement-Pond Co., New York.  
Pratt & Whitney Co., Dundas, Ont.  
Rockford Milling Machine Co., Rockford, Ill.
- Milling Machines, Horizontal and Vertical.**  
A. R. Williams Machy. Co., Toronto.  
Brown & Sharpe Mfg. Co., Providence.  
Hill, Clarke & Co. of Chicago, Chicago, Ill.  
John Bertram & Sons Co., Dundas.  
Foss & Hill Machy. Co., Montreal.  
Girard Machine & Tool Co., Philadelphia, Pa.  
Gooley & Edlund, Cortland, N.Y.  
Kemp Smith Mfg. Co., Milwaukee, W. Motch & Merryweather Machy. Co., Cleveland, O.  
Niles-Bement-Pond Co., New York.  
Pratt & Whitney Co., Dundas, Ont.  
Rockford Milling Machine Co., Rockford, Ill.
- Milling Machines, Plain, Bench and Universal.**  
Brown & Sharpe Mfg. Co., Providence, R.I.  
Cincinnati Milling Machine Co., Cincinnati, Ohio.  
Foss & Hill Machy. Co., Montreal.  
Garvin Machine Co., New York.  
Gooley & Edlund, Cortland, N.Y.  
Hill, Clarke & Co., of Chicago, Chicago, Ill.  
Hendey Machine Co., Torrington.  
Kemp Smith Mfg. Co., Milwaukee, Wis.  
Mesta Machine Co., Pittsburg, Pa.  
Motch & Merryweather Machy. Co., Cleveland, O.  
Niles-Bement-Pond Co., New York.  
Pratt & Whitney Co., Dundas, Ont.  
Rockford Milling Machine Co., Rockford, Ill.  
A. R. Williams Machy. Co., Toronto.
- Milling Machines, Profile.**  
Brown & Sharpe Mfg. Co., Providence.  
Can. Fairbanks-Morse Co., Montreal.  
Foss & Hill Machy. Co., Montreal.  
Garvin Machine Co., New York.  
Girard Machine & Tool Co., Philadelphia, Pa.  
Mesta Machine Co., Pittsburg, Pa.  
Motch & Merryweather Machy. Co., Cleveland, O.  
Pratt & Whitney Co., Dundas, Ont.
- Milling Tools.**  
Brown & Sharpe Mfg. Co., Providence.  
Geometric Tool Co., New Haven, Conn.  
Kemp Smith Mfg. Co., Milwaukee, W.
- Mine Cars and Hitchings.**  
Pratt & Whitney Co., Dundas, Ont.  
Modern Tool Co., Erie, Pa.  
Can. Fairbanks-Morse Co., Montreal.
- Mining Machinery.**  
A. R. Williams Machy. Co., Toronto.  
Can. Fairbanks-Morse Co., Montreal.  
Cleveland Pneumatic Tool Co., of Canada, Toronto.  
Toronto & Hamilton Electric Co., Hamilton, Ont.
- Mixers, Hot Metal.**  
Mesta Machine Co., Pittsburg, Pa.
- Mortising Machines.**  
Jones & Glasco, Montreal.
- Motors, Electric.**  
A. R. Williams Machy. Co., Toronto.  
Can. Fairbanks-Morse Co., Montreal.  
Lancashire Dynamo & Motor Co., Ltd., Toronto.  
Lintz-Porter Co., Toronto.  
Toronto & Hamilton Electric Co., Hamilton, Ont.
- Motors, Pneumatic.**  
Cleveland Pneumatic Tool Co. of Canada, Toronto.  
Independent Pneumatic Tool Co., Chicago.
- Multiple Index Centres.**  
Garvin Machine Co., New York.
- Nipple Threading Machines.**  
John H. Hall & Sons, Ltd., Brantford, Ont.  
Landis Machine Co., Waynesboro, Pa.
- Nitrogen.**  
L'Air Liquide Society, Montreal, Toronto.  
Lever Bros., Toronto.
- Nozzles, Spray.**  
Can. Buffalo Forge Co., Montreal.
- Nuts, Semi-Finish and Finished.**  
Galt Machine Screw Co., Galt, Ont.
- Nut Burring Machines.**  
National Machy. Co., Tiffin, O.  
National Mach. & Sup. Co., Hamilton
- Nut Machines (Hot).**  
National Machy. Co., Tiffin, O.
- Nut Facing and Bolt Shaving Machines.**  
Garvin Machine Co., New York.  
National Machy. Co., Tiffin, O.  
National Mach. & Sup. Co., Hamilton
- Nut Tappers.**  
John Bertram & Sons Co., Dundas.  
Garvin Machine Co., New York.  
Greenfield Tap & Die Corporation, Greenfield, Mass.  
Hall, J. H., & Son, Brantford, Ont.  
A. B. Jardine & Co., Hespeler.  
Landis Machine Co., Waynesboro, Pa.  
National Machy. Co., Tiffin, O.  
National Mach. & Sup. Co., Hamilton
- Nut Wrenches.**  
Wells Brothers Co., Greenfield, Mass.
- Oil Separators.**  
Can. Fairbanks-Morse Co., Montreal.  
Sheldons, Ltd., Galt, Ont.  
Smart-Turner Machine Co., Hamilton.
- Oil Stones.**  
Carborundum Co., Niagara Falls, N.Y.  
Norton Co., Worcester, Mass.
- Ovens for Baking, Bluing, Drying, Enamelling, Japanning, and Laquering.**  
Geo. Gorton Machine Co., Racine, Wis.  
Oven Equipment & Mfg. Co., New Haven, Conn.  
Whiting Foundry Equipment Co., Harvey, Ill.
- Oven Trucks, Steel.**  
Oven Equipment & Mfg. Co., New Haven, Conn.
- Ovens for Drying, Temper and Under Trucks.**  
Oven Equipment & Mfg. Co., New Haven, Conn.
- Oscillating Valve Grinders (Pneumatic).**  
Cleveland Pneumatic Tool Co. of Canada, Toronto.
- Oxy-Acetylene Welding and Cutting Plants.**  
L'Air Liquide Society, Montreal, Toronto.  
Lever Bros., Toronto.
- Oxygen.**  
L'Air Liquide Society, Montreal, Toronto.  
Lever Bros., Toronto.
- Packings, Leather, Hydraulics, Etc.**  
William R. Perrin, Ltd., Toronto.  
Graton & Knight Mfg. Co., Montreal.
- Packing, Rubber, etc.**  
Can. H. W. Johns-Manville Co., Ltd., Toronto.
- Pans, Lathe.**  
Cleveland Wire Spring Co., Cleveland
- Pans, Steel Shop.**  
Cleveland Wire Spring Co., Cleveland
- Paper Mill Machinery.**  
Bertrams, Ltd., Edinburgh, Scotland.  
Can. Sirocco Co., Ltd., Windsor, Ont.
- Partitions.**  
Canada Wire & Iron Goods Co., Hamilton, Ont.  
Dennis Wire & Iron Works Co., Ltd., London, Canada.
- Patent Solicitors.**  
H. J. S. Dennison, Toronto.  
Fetherstonhaugh & Co., Ottawa.  
Marion & Marion, Montreal.  
Ridout & Maybee, Toronto.  
Ross Thomson & Co., Ottawa, Ont.  
Harold Shipman & Co., Ottawa.
- Patterns.**  
Galt Malleable Iron Co., Galt.  
Guelph Pattern Works, Guelph.  
Hamilton Pattern & Foundry Co., Hamilton, Ont.  
Owen Sound Iron Works Co., Owen Sound, Ont.  
Plessisville Foundry, Plessisville, Que.  
Toronto Pattern Works, Toronto.  
Wells Pattern & Machine Works, Toronto.
- Patterns, Metal and Wood.**  
Guelph Pattern Works, Guelph, Ont.
- Perforated Metals and Ornamental Iron Goods.**  
Canada Wire & Iron Goods Co., Hamilton.
- Phosphor Bronze Castings.**  
Thallman Brass & Metal Co., Hamilton.
- Pickling Machines**  
Mesta Machine Co., Pittsburgh.
- Pig Iron.**  
Hanna & Co., M. A., Cleveland, O.  
Stevens, F. B., Detroit, Mich.
- Pinions, Mill Cut.**  
Mesta Machine Co., Pittsburgh, Pa.  
Wm. Tod Co., Youngstown, O.



# Nova Scotia Steel & Coal Co. Ltd.

Manufacturers of  
**STEEL**

FOR SHRAPNEL SHELLS,  
AND SHELL BLANKS.

*The Only Company in Canada Producing  
Steel Ingots by the "Harmet" Liquid Process*

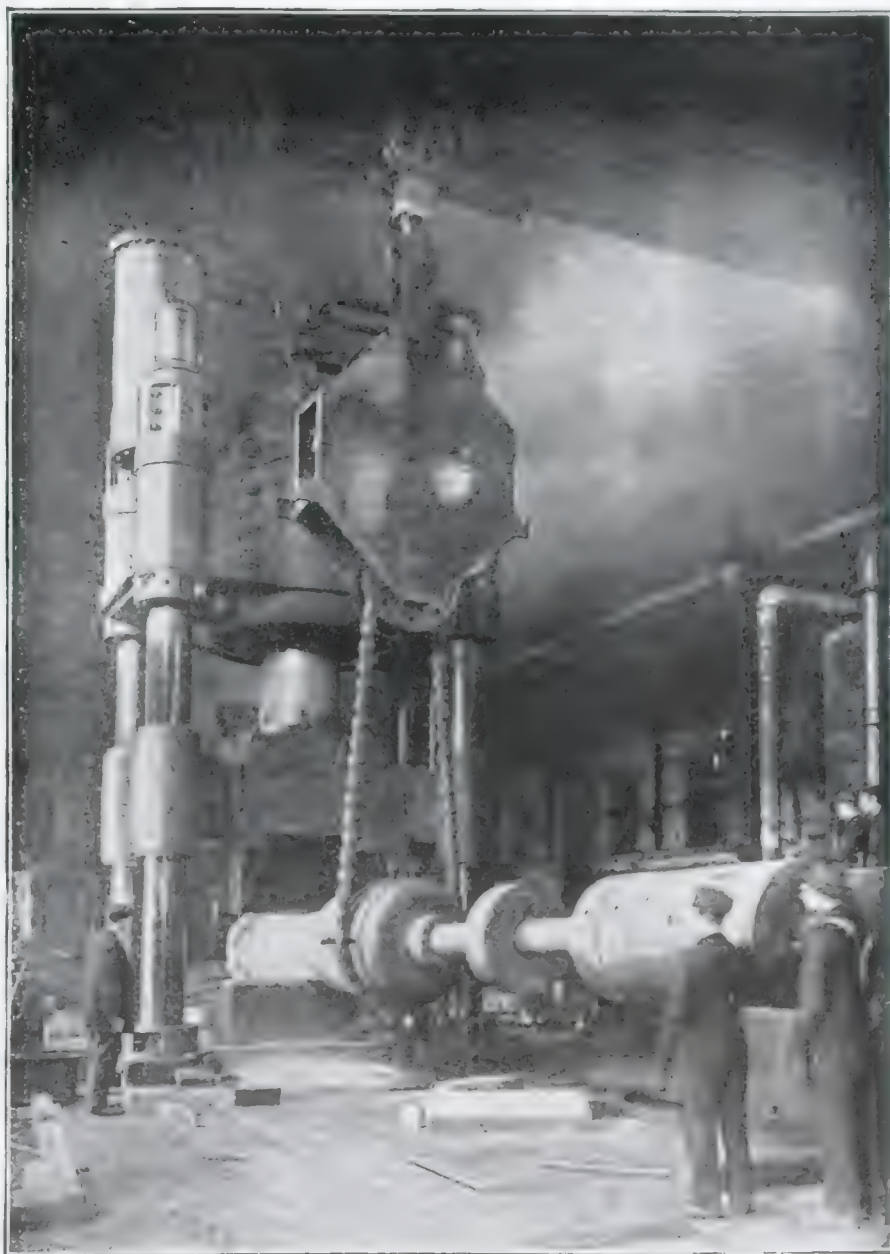
HERE ARE THE SIX REASONS WHY "HARMET" LIQUID PROCESS STEEL INGOTS ARE SUPERIOR TO ORDINARY STEEL INGOTS:

1. Prevention of cracks due to shrinkage of internal stresses and resulting cracks and fissures.
2. Early cessation in the crystallization of the metal, and the production of fine crystallization without cleavage planes.
3. Lessening of segregation, i.e., reduction of tendency of carbon and other impurities to concentrate in the central and upper part of the ingot.
4. Prevention of "Pipes" or interior cavities, and thus preservation of absolute solidity in the ingot.
5. Improvement in physical properties.
6. Reduction in waste of ingot.

*We can supply Forgings  
up to 40 tons in weight.*

Head Office:  
**NEW GLASGOW, N.S.**

Western Steel Sales Office:  
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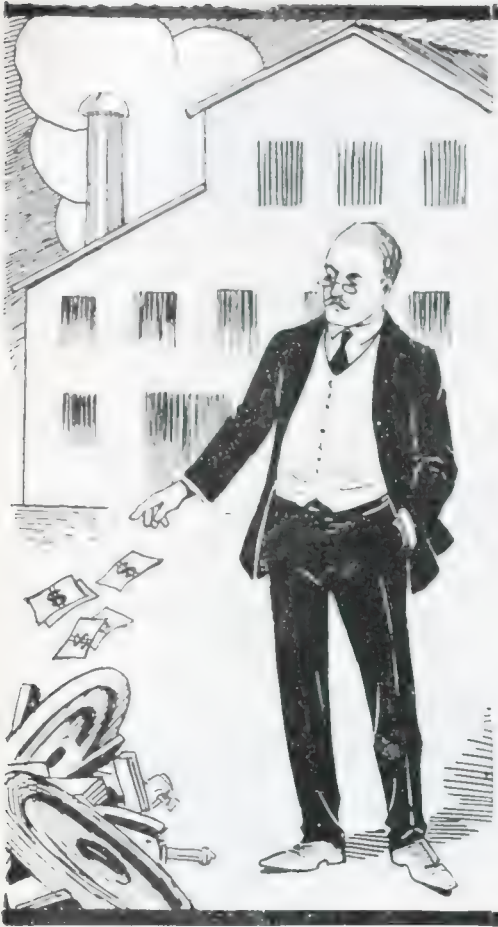


Our Steel Ingots are produced by the "Harmet" Liquid Process, which is the only process in Canada that produces steel ingots of superior quality. The "Harmet" process is a liquid process which produces steel ingots of superior quality. The "Harmet" process is a liquid process which produces steel ingots of superior quality.



- Pipe Cutting and Threading Machines.**  
A. R. Williams Machy. Co., Toronto.  
Armstrong Mfg. Co., Bridgeport, Conn.  
Bignall & Keeler Mfg. Co., Edwardsville, Ill.  
Butterfield & Co., Rock Island, Que.  
Can. Fairbanks-Morse Co., Montreal.  
Foss & Hill Machy. Co., Montreal.  
Garvin Machine Co., New York.  
Girard Machine & Tool Co., Philadelphia, Pa.  
John H. Hall & Sons, Brantford.  
A. B. Jarline & Co., Hespeler, Ont.  
Landis Machine Co., Waynesboro, Pa.  
R. McDougall Co., Galt.  
Trimont Mfg. Co., Roxbury, Mass.  
Williams Tool Co., Erie, Pa.
- Pipe Cutters, Rolling.**  
Armstrong Mfg. Co., Bridgeport, Conn.  
Bignall & Keeler Mfg. Co., Edwardsville, Ill.  
John H. Hall & Sons, Ltd., Brantford, Ont.
- Pipe, Riveted Steel.**  
Toronto Iron Works, Ltd., Toronto.
- Pipe Straightening Machines.**  
Watson-Stillman Co., Aldene, N.J.
- Planer Drives, Electrical.**  
Lancashire Dynamo & Motor Co., Ltd., Toronto.  
Niles-Bement-Pond Co., New York.
- Planer Jacks.**  
Armstrong Bros. Tool Co., Chicago.
- Planers, Standard and Rotary.**  
John Bertram & Sons Co., Dundas.  
Can. Fairbanks-Morse Co., Montreal.  
Foss & Hill Machy. Co., Montreal.  
Gardner, Robt., & Son, Montreal.  
Garvin Machine Co., New York.  
Girard Machine & Tool Co., Philadelphia, Pa.  
Morton Mfg. Co., Muskegon Heights, Mich.  
Niles-Bement-Pond Co., New York.
- Planing and Shaping Machinery.**  
A. R. Williams Machy. Co., Toronto.  
Can. Fairbanks-Morse Co., Montreal.  
Fay & Scott, Dexter, Maine.  
Foss & Hill Machy. Co., Montreal.  
Garvin Machine Co., New York.  
Niles-Bement-Pond Co., New York.
- Planing Mill Exhausters.**  
Can. Buffalo Forge Co., Montreal.  
Sheidons, Ltd., Galt, Ont.
- Pliers.**  
Canadian Billings & Spencer, Ltd., Welland.
- Pneumatic Tools.**  
Cleveland Pneumatic Tool Co. of Canada, Toronto.  
Curtis Pneumatic Machinery Co., St. Louis, Mo.  
Independent Pneumatic Tool Co., Chicago, New York.
- Polishing Machines, Electric and Band.**  
Can. H. W. Johns-Manville Co., Toronto.
- Portable Vise Stands.**  
New Britain Machine Co., New Britain, Conn.
- Portable Steel Tool Racks.**  
New Britain Machine Co., New Britain, Conn.
- Portable Steel Work Stands.**  
New Britain Machine Co., New Britain, Conn.
- Power Plant Equipments.**  
Can. Fairbanks-Morse Co., Montreal.
- Power Transmission.**  
Mesta Machine Co., Pittsburg, Pa.  
The Smart-Turner Mach. Co., Hamilton.
- Press Screw (Adjustable).**  
W. F. & John Barnes Co., Rockford.  
Wm. R. Perrin, Ltd., Toronto.
- Presses, Bench Straightening.**  
Toledo Machine & Tool Co., Toledo.
- Presses for Shells.**  
Can. Boomer & Boschert Press Co., Montreal.  
Can. Locomotive Co., Kingston, Ont.  
Wm. Cramp & Sons Ship & Engine Building Co., Philadelphia, Pa.  
Charles F. Elmes Eng. Works, Chicago.  
Foss & Hill Machy. Co., Montreal.  
Goldie & McCulloch Co., Galt, Ont.  
Mesta Machine Co., Pittsburg, Pa.  
William R. Perrin, Ltd., Toronto.  
Southwark Foundry & Machine Co., Philadelphia, Pa.  
Watson-Stillman Co., Aldene, N.J.  
West Tire Setter Co., Rochester, N.Y.
- Presses, Cam, Toggle, Eyelet.**  
Baird Machine Co., Bridgeport, Conn.  
Toledo Machine & Tool Co., Toledo, O.
- Presses, Broaching.**  
E. W. Bliss Co., Brooklyn, N.Y.  
Toledo Machine & Tool Co., Toledo.  
Watson-Stillman & Co., Aldene, N.J.
- Presses, Drop.**  
W. H. Ranfield & Son, Toronto.  
E. W. Bliss Co., Brooklyn, N.Y.  
Brown, Boggs Co., Ltd., Hamilton, Canada.
- Can. Boomer & Boschert Press Co., Montreal.  
Niles-Bement-Pond Co., New York.  
William R. Perrin, Ltd., Toronto.  
Toledo Machine & Tool Co., Toledo.  
Watson-Stillman Co., Aldene, N.J.
- Presses, Filter.**  
Lymburner, Ltd., Montreal.  
Wm. R. Perrin, Ltd., Toronto.
- Presses, Forging.**  
Can. Boomer & Boschert Press Co., Montreal.  
E. W. Bliss Co., Brooklyn, N.Y.  
Brown, Boggs Co., Ltd., Hamilton, Canada.  
Wm. Cramp & Sons Ship & Engine Building Co., Philadelphia, Pa.  
Charles F. Elmes Eng. Works, Chicago, Ill.  
Can. Fairbanks-Morse Co., Montreal.  
Girard Machine & Tool Co., Philadelphia, Pa.  
Mesta Machine Co., Pittsburg, Pa.  
Niles-Bement-Pond Co., New York.  
Wm. R. Perrin, Ltd., Toronto.  
Southwark Foundry & Machine Co., Philadelphia, Pa.  
Wm. Tod Co., Youngstown, O.  
Toledo Machine & Tool Co., Toledo.  
Watson-Stillman Co., Aldene, N.J.
- Presses, Hydraulic.**  
Can. Boomer & Boschert Press Co., Montreal.  
Wm. Cramp & Sons Ship & Engine Building Co., Philadelphia, Pa.  
A. R. Williams Machy. Co., Toronto.  
John Bertram & Sons Co., Dundas.  
Charles F. Elmes Eng. Works, Chicago, Ill.  
Mesta Machine Co., Pittsburg, Pa.  
Niles-Bement-Pond Co., New York.  
William R. Perrin, Ltd., Toronto.  
Southwark Foundry & Machine Co., Philadelphia, Pa.  
Wm. Tod Company, Youngstown, O.  
Toledo Machine & Tool Co., Toledo.  
Watson-Stillman Co., Aldene, N.J.
- Presses, Pneumatic.**  
Toledo Machine & Tool Co., Toledo.
- Presses, Power.**  
Baird Machine Co., Bridgeport, Conn.  
Can. Boomer & Boschert Press Co., Montreal.  
E. W. Bliss Co., Brooklyn, N.Y.  
Brown, Boggs & Co., Hamilton, Can.  
Can. Fairbanks-Morse Co., Montreal.  
Charles F. Elmes Eng. Works, Chicago, Ill.  
Geo. Gorton Machine Co., Racine.  
Girard Machine & Tool Co., Philadelphia, Pa.  
William R. Perrin, Ltd., Toronto.  
Southwark Foundry & Machine Co., Philadelphia, Pa.  
Toledo Machine & Tool Co., Toledo.  
Watson-Stillman Co., Aldene, N.J.  
A. R. Williams Machy. Co., Toronto.
- Presses, Scrap Baling.**  
Can. Boomer & Boschert Press Co., Montreal.  
William R. Perrin, Ltd., Toronto.  
Watson-Stillman Co., Aldene, N.J.
- Presses, Spring Foot.**  
Baird Machine Co., Bridgeport, Conn.  
Toledo Machine & Tool Co., Toledo.  
Brown, Boggs & Co., Hamilton, Can.
- Presses, Screw.**  
Can. Boomer & Boschert Press Co., Montreal.  
Wm. R. Perrin, Ltd., Toronto.
- Pressure Regulators.**  
Can. Fairbanks-Morse Co., Montreal.
- Protective Paint.**  
Jos. Dixon Crucible Co., Jersey City.
- Pulleys.**  
American Pulley Co., Philadelphia, Pa.  
Baird Machine Co., Bridgeport, Conn.  
Brown & Sharpe Mfg. Co., Providence, R.I.  
A. R. Williams Machy. Co., Toronto.  
Can. Fairbanks-Morse Co., Montreal.  
D. K. McLaren, Ltd., Montreal.  
Positive Clutch & Pulley Works, Ltd., Toronto.  
The Smart-Turner Mach. Co., Hamilton.
- Pulley Machinery, Drilling and Tapping.**  
Can. Fairbanks-Morse Co., Montreal.  
Niles-Bement-Pond Co., New York.
- Pumps, Air.**  
Mesta Machine Co., Pittsburg, Pa.
- Pumps, High Pressure.**  
Charles F. Elmes Eng. Works, Chicago.  
William R. Perrin, Ltd., Toronto.  
Southwark Foundry & Machine Co., Philadelphia, Pa.  
Watson-Stillman Co., Aldene, N.J.
- Pumping Machinery.**  
A. R. Williams Machy. Co., Toronto.  
Can. Buffalo Forge Co., Montreal.  
Can. Fairbanks-Morse Co., Montreal.  
Darling Brothers, Montreal.  
D'Oliver Centrifugal Pump & Mach. Co., Philadelphia, Pa.  
National Mach. & Sup. Co., Hamilton.  
Wm. R. Perrin Co., Toronto.
- The Smart-Turner Mach. Co., Hamilton.  
Southwark Foundry & Machine Co., Philadelphia.  
Wm. Tod Company, Youngstown, O.
- Pumps, all Kinds.**  
Can. Buffalo Forge Co., Montreal.  
Charles F. Elmes Eng. Works, Chicago.  
Darling Brothers, Montreal.  
Owen Sound Iron Works Co., Owen Sound.  
William R. Perrin, Ltd., Toronto.  
The Smart-Turner Mach. Co., Hamilton.  
A. R. Williams Machy. Co., Toronto.  
Watson-Stillman Co., Aldene, N.J.
- Pumps, Electrically Driven.**  
D'Oliver Centrifugal Pump & Mach. Co., Philadelphia, Pa.  
The Smart-Turner Mach. Co., Hamilton.
- Pumps, Hydraulic.**  
Can. Boomer & Boschert Press Co., Montreal.  
Charles F. Elmes Eng. Works, Chicago, Ill.  
Darling Brothers, Montreal.  
Wm. R. Perrin Co., Toronto.  
Southwark Foundry & Machine Co., Philadelphia, Pa.  
Wm. R. Perrin, Ltd., Toronto.  
Wm. Tod Co., Youngstown, O.  
Watson-Stillman Co., Aldene, N.J.
- Pumps for Oiling Systems.**  
S. F. Bowser & Co., Fort Wayne, Ind.
- Pumps, Steam.**  
Darling Brothers, Montreal.  
Wm. Tod Company, Youngstown, O.
- Pump Leathers.**  
Graton & Knight Mfg. Co., Montreal.  
Southwark Foundry & Machine Co., Philadelphia.
- Punches and Dies.**  
W. H. Ranfield & Sons, Toronto.  
E. W. Bliss Co., Brooklyn, N.Y.  
Brown, Boggs Co., Ltd., Hamilton, Canada.  
Can. Buffalo Forge Co., Montreal.  
Can. Fairbanks-Morse Co., Montreal.  
Scott Bros., Halifax, Eng.  
Gardner, Robt., & Son, Montreal.  
Globe Machine & Stamping Co.  
A. B. Jarline & Co., Hespeler, Ont.  
Pratt & Whitney Co., Dundas, Ont.  
Toledo Machine & Tool Co., Toledo, O.
- Punches, Power.**  
John Bertram & Sons Co., Dundas.  
Bliss, E. W. Co., Brooklyn, N.Y.  
Brown, Boggs Co., Ltd., Hamilton, Canada.  
Girard Machine & Tool Co., Philadelphia, Pa.  
Niles-Bement-Pond Co., New York.  
Watson-Stillman Co., Aldene, N.J.
- Punches, Pneumatic.**  
Jno. F. Allen Co., New York.
- Punching Machines, Horizontal.**  
Bertrams, Ltd., Edinburgh, Scotland.  
John Bertram & Sons Co., Dundas.  
Bliss, E. W. Co., Brooklyn, N.Y.  
Brown, Boggs Co., Ltd., Hamilton, Canada.  
Long & Alstatter Co., Hamilton, Ohio.  
Niles-Bement-Pond Co., New York.
- Pyrometers.**  
Canadian Hoskins, Limited, Walkerville, Ont.  
Shore Instrument & Mfg. Co., New York City.  
Thwing Instrument Co., Philadelphia, Pa.
- Quartering Machines.**  
John Bertram & Sons Co., Dundas.  
Niles-Bement-Pond Co., New York.
- Ratchet Wrenches.**  
Wells Brothers Co., Greenfield, Mass.
- Railing, Iron and Brass.**  
Canada Wire & Iron Goods Co., Hamilton, Ont.  
Dennis Wire & Iron Works Co., Ltd., London, Canada.
- Rail Benders.**  
Niles-Bement-Pond Co., New York.
- Railroad Tools.**  
Can. Fairbanks-Morse Co., Montreal.  
Niles-Bement-Pond Co., New York.
- Railroad Tools, Hydraulic.**  
Watson-Stillman Co., Aldene, N.J.
- Rapping Plates.**  
Stevens, F. B., Detroit, Mich.
- Ratchets.**  
Keystone Mfg. Co., Buffalo, N.Y.
- Raw Hide Pinions.**  
Gardner, Robt., & Son, Montreal.  
Hamilton Gear & Machine Co., Toronto.  
Jones & Glasco, Montreal.  
Smart-Turner Machine Co., Hamilton, Ont.
- Reamers, Adjustable.**  
Can. Fairbanks-Morse Co., Montreal.  
Cleveland Twist Drill Co., Cleveland.  
Morse Twist Drill & Machine Co., New Bedford.  
Pratt & Whitney Co., Dundas, Ont.  
Wells Brothers Co., Greenfield, Mass.
- Reamers, Bridge, Expanding and High Speed.**  
Butterfield & Co., Rock Island, Que.  
Can. Fairbanks-Morse Co., Montreal.  
Cleveland Twist Drill Co., Cleveland.  
Morse Twist Drill & Machine Co., New Bedford.  
Pratt & Whitney Co., Dundas, Ont.
- Reamer Fluting Machines.**  
Garvin Machine Co., New York.
- Reamers, Pipe, Cylinder and Locomotive.**  
Butterfield & Co., Rock Island, Que.  
Can. Fairbanks-Morse Co., Montreal.  
Cleveland Twist Drill Co., Cleveland.  
Morse Twist Drill & Machine Co., New Bedford.  
Pratt & Whitney Co., Dundas, Ont.  
Whitman & Barnes Mfg. Co., St. Catharines, Ont.  
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.
- Reaming Machines, Pneumatic.**  
Cleveland Pneumatic Tool Co. of Canada, Toronto.  
Independent Pneumatic Tool Co., Chicago.
- Reamers, Steel Taper and Self-Feeding.**  
Butterfield & Co., Rock Island, Que.  
Can. Fairbanks-Morse Co., Montreal.  
Cleveland Twist Drill Co., Cleveland.  
A. B. Jarline & Co., Hespeler, Ont.  
Morse Twist Drill & Machine Co., New Bedford.  
Pratt & Whitney Co., Dundas, Ont.  
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.
- Rebuilt Machine Tools.**  
New York Machy. Co., New York.
- Reels.**  
Baird Machine Co., Bridgeport, Conn.
- Rheostats.**  
Toronto & Hamilton Electric Co., Hamilton, Ont.
- Rivet Machines.**  
Buffalo Forge Co., Buffalo, N.Y.  
National Machinery Co., Tiffin, O.
- Rivets, Tubular, Bifurcated.**  
Parmenter & Bulloch Co., Gananogue.
- Rivets, Iron, Copper and Brass.**  
Parmenter & Bulloch Co., Gananogue.
- Riveters, Pneumatic, Hydraulic, Hammer, Compression.**  
Jno. F. Allen Co., New York.  
Can. Fairbanks-Morse Co., Montreal.  
Cleveland Pneumatic Tool Co. of Canada, Toronto.  
Independent Pneumatic Tool Co. of Chicago, Ill.  
Mesta Machine Co., Pittsburg, Pa.  
National Mach. & Sup. Co., Hamilton.  
Niles-Bement-Pond Co., New York.  
Watson-Stillman Co., Aldene, N.J.
- Riveting Machines, Elastic Rotary Blow.**  
Girard Machine & Tool Co., Philadelphia, Pa.  
Grant Mfg. & Machine Co., Bridgeport, Conn.  
High-Speed Hammer Co., Rochester, N.Y.  
F. B. Shuster Co., New Haven, Conn.  
Southwark Foundry & Machine Co., Philadelphia.
- Rolls, Bending.**  
John Bertram & Sons Co., Dundas, Ont.  
Brown, Boggs Co., Ltd., Hamilton, Canada.  
Niles-Bement-Pond Co., New York.  
Toledo Machine & Tool Co., Toledo.
- Rolling Mill Machinery.**  
Mesta Machine Co., Pittsburg, Pa.  
Wm. Tod Co., Youngstown, O.
- Roofing.**  
Can. H. W. Johns-Manville Co., Ltd., Toronto.
- Rotary Converters.**  
A. R. Williams Machy. Co., Toronto.  
Toronto and Hamilton Electric Co., Hamilton.
- Rubber Mill Machinery.**  
Bertrams, Ltd., Edinburgh, Scotland.  
Can. H. W. Johns-Manville Co., Ltd., Toronto.
- Rules.**  
Brown & Sharpe Mfg. Co., Providence, R.I.  
James Chesterman & Co., Ltd., Sheffield, Eng.  
L. S. Starrett Co., Athol, Mass.
- Safety Set Screws.**  
Allen Mfg. Co., Inc., Hartford, Conn.
- Sand Blasts.**  
Curtis Pneumatic Machinery Co., St. Louis, Mo.





# Would You Think of Throwing Dollars on Your Scrap Heap? *Certainly Not!*

Why then scrap castings that cost dollars to make just because of blow holes, sand holes, etc., when by using

## SHELTON METALLIC FILLER

you can eliminate these defects and the expense of make-overs? You will not be delayed in filling orders, you will have no dissatisfied customers and no lost business.

Shelton Metallic Filler becomes part of the casting itself; is invisible and can never be detected.

**DON'T SCRAP ANOTHER DOLLAR BY SCRAPPING CASTINGS.**

The fact that Shelton Metallic Filler has been used by many of America's leading manufacturing plants for years proves its reliability.



**SHELTON METALLIC FILLER CO.**  
DERBY, CONN.

Agents: Webster & Sons, Limited, 31 Wellington St., Montreal

# STEEL CASTINGS

WE MANUFACTURE  
Adamantine, Chrome, Manganese and Nickel Steel Castings  
ANNEALED AND UNANNEALED  
NONE TOO LARGE FOR US TO HANDLE.

## MACHINE MOULDED GEARS

Any size up to 18 feet in diameter,  
without the use of patterns

### Hull Iron & Steel Foundries LIMITED

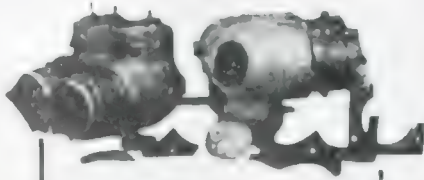
Head Office and Works at HULL, P. Que.  
Branch Office at Montreal, P. Que.

*If what you want is not advertised in this issue consult the Buyers' Directory at the back.*



- Saw Blades.**  
Diamond Saw & Stamping Works, Buffalo, N.Y.
- Saw Tables.**  
Hub Machine Welding & Contracting Co., Philadelphia, Pa.
- Saw Sharpening Machines.**  
Nutter & Barnes Co., Hinsdale, N.H.
- Saw Mill Machinery.**  
A. R. Williams Machy. Co., Toronto.  
Can. Fairbanks-Morse Co., Montreal.  
Gardner, Robt. & Son, Montreal.  
Curtis Pneumatic Machinery Co., St. Louis, Mo.  
National Mach. & Sup. Co., Hamilton.  
Plessisville Foundry, Plessisville, Que.
- Saws, High-Speed, Friction.**  
Hunter Saw & Machine Co., Pittsburg, Pa.  
Mesta Machine Co., Pittsburg, Pa.  
Nutter & Barnes Co., Hinsdale, N.H.
- Saws, Inserted Tooth.**  
Tabor Mfg. Co., Philadelphia, Pa.
- Saws, Hack.**  
Can. Fairbanks-Morse Co., Montreal.  
Diamond Saw & Stamping Works, Buffalo.  
Ford-Smith Machine Co., Hamilton.  
Garvin Machine Co., New York.  
L. S. Starrett Co., Athol, Mass.
- Saws, Circular Metal.**  
Hub Machine Welding & Contracting Co., Philadelphia, Pa.  
Hunter Saw & Machine Co., Pittsburg, Pa.  
Tabor Mfg. Co., Philadelphia, Pa.
- Saws, Hot and Cold.**  
Hunter Saw & Machine Co., Pittsburg, Pa.  
Mesta Machine Co., Pittsburg, Pa.  
Nutter & Barnes Co., Hinsdale, N.H.
- Scleroscopes.**  
Shore Instrument & Mfg. Co., New York City.
- Screw Machine Products.**  
Wallace, Barnes Co., Bristol, Conn.
- Screw Machines, Hand, Automatic.**  
Brown & Sharpe Mfg. Co., Providence, R.I.  
Can. Fairbanks-Morse Co., Montreal.  
Garvin Machine Co., New York.  
Girard Machine & Tool Co., Philadelphia, Pa.  
Hill, Clarke & Co., of Chicago, Chicago, Ill.  
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Moteh & Merryweather Machy. Co., Cleveland, O.  
National Mach. & Sup. Co., Hamilton.  
New Britain Machine Co., New Britain, Conn.  
Pratt & Whitney Co., Dundas, Ont.  
Warner & Swasey Co., Cleveland, O.  
A. R. Williams Machy. Co., Toronto.  
Windsor Machine Co., Windsor, Vt.
- Screw Machines, Multiple Spindle.**  
New Britain Machine Co., New Britain, Conn.  
Windsor Machine Co., Windsor, Vt.
- Screw Plates.**  
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Wells Brothers Co., Greenfield, Mass.  
Wiley & Russell Co., Greenfield, Mass.
- Screw Slotters.**  
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Pratt & Whitney Co., Dundas, Ont.
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New York Machinery Co., New York.  
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Gardner, Robt. & Son, Montreal.  
National Mach. & Sup. Co., Hamilton.  
Niles-Bement-Pond Co., New York.  
Plessisville Foundry, Plessisville, Que.  
The Smart-Turner Machine Co., Hamilton.  
Union Drawn Steel Co., Hamilton.
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Niles-Bement-Pond Co., New York.  
Scott Bros., Halifax, Eng.  
Toledo Machine & Tool Co., Toledo.
- Shears, Power.**  
John Bertram & Sons Co., Dundas.  
Riles, E. W., Co., Brooklyn, N.Y.  
Brown Boggs Co., Ltd., Hamilton, Canada.  
Buffalo Forge Co., Buffalo, N.Y.  
Girard Machine & Tool Co., Philadelphia, Pa.  
Mesta Machine Co., Pittsburg, Pa.  
National Mach. Co., Tiffin, Ohio.  
National Mach. & Sup. Co., Hamilton.  
Niles-Bement-Pond Co., New York.  
Scott Bros., Halifax, Eng.  
Toledo Machine & Tool Co., Toledo.
- Shears, Lever, Hydraulic.**  
Mesta Machine Co., Pittsburg, Pa.  
Watson-Stillman Co., Aldene, N.J.
- Shears, Pneumatic.**  
John F. Allen Co., New York.  
Toledo Machine & Tool Co., Toledo, Ohio.
- Shears, Squaring.**  
Brown, Boggs & Co., Hamilton, Can.
- Sheet Metal Working Tools.**  
Baird Machine Co., Bridgeport, Conn.  
Bliss, E. W., Co., Brooklyn, N.Y.  
Brown, Boggs & Co., Hamilton, Can.  
Steel Bending Brake Works, Ltd., Chatham, Ont.
- Sheet Metal Stampings.**  
Duncan Electrical Co., Montreal.
- Shell Banding Machines, Hydraulic.**  
Wm. Cramp & Sons Ship & Engine Bldg. Co., Philadelphia, Pa.  
Can. Locomotive Co., Kingston, Ont.  
Goldie & McCulloch Co., Galt, Ont.  
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Moteh & Merryweather Machy. Co., Cleveland, O.  
Watson-Stillman Co., Aldene, N.J.  
West Tire Setter Co., Rochester, N.Y.
- Shell Lathes.**  
Garlock-Machinery, Toronto.  
Jenckes Machine Co., Sherbrooke, Que.  
Kellogg & Co., Toronto.
- Shell Manufacturing Tools.**  
Amalgamated Machinery Corporation, Chicago, Ill.  
Frank Toomey, Inc., Philadelphia, Pa.  
Garlock Machinery, Toronto.  
New York Machinery Exchange, New York.  
Hill, Clarke & Co., of Chicago.
- Shell Painting Machine.**  
Can. Buffalo Forge Co., Montreal.  
Can. Locomotive Co., Kingston, Ont.
- Shell Screws, Headless.**  
Blake & Johnson, Waterbury, Conn.
- Shell Riveters.**  
Grant Mfg. & Machine Co., Bridgeport, Conn.
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Canadian Steel Products Company, Montreal.
- Shrapnel Shell Marker.**  
Brown-Boggs Co., Hamilton, Ont.  
Holden-Morgan Co., Toronto.  
Noble & Westbrook Mfg. Co., Hartford, Conn.
- Shrapnel Sand Blasts.**  
W. W. Sly Mfg. Co., Cleveland, O.
- Side Tools.**  
Armstrong Bros. Tool Co., Chicago.
- Sirens, Electric.**  
Lintz-Porter Co., Toronto.
- Silver Solder.**  
Geo. H. Lees & Co., Ltd., Hamilton, Ont.
- Slotters.**  
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Niles-Bement-Pond Co., New York.
- Sruokestacks.**  
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Keystone Mfg. Co., Buffalo, N.Y.  
Modern Tool Co., Erie, Pa.  
Morse Twist Drill & Machine Co., New Bedford.  
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.  
Whitman & Barnes Mfg. Co., St. Catharines, Ont.  
J. H. Williams Co., Brooklyn, N.Y.
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Brown, Boggs & Co., Hamilton, Can.
- Solders.**  
Tallman Brass & Metal Co., Hamilton.
- Specialties, Electric.**  
Lintz-Porter Co., Toronto.
- Special Machinery.**  
Armstrong Bros., Toronto.  
W. H. Banfield & Sons, Toronto.  
John Bertram & Sons Co., Dundas.  
Baird Machine Co., Bridgeport, Conn.  
Bliss, E. W. Co., Brooklyn, N.Y.  
Brown, Boggs & Co., Hamilton, Can.  
Can. Fairbanks-Morse Co., Montreal.  
Canada Machy. Agency, Montreal.  
Cunningham & Sons, St. Catharines, Ont.  
Charles F. Elmes Eng. Works, Chicago.  
Ford-Smith Machine Co., Hamilton.  
Garvin Machine Co., New York.  
Gooley & Edmund, Inc., Courtland, N.Y.  
John H. Hall & Sons, Brantford.  
Jardine, A. B., & Co., Hespeler.  
National Electric Welder Co., Warren, Ohio.  
National Forge & Tool Co., Erie, Pa.  
National Mach. & Sup. Co., Hamilton.  
Plessisville Foundry, Plessisville, Que.  
Smart-Turner Machine Co., Hamilton, Ont.  
William R. Perrin, Ltd., Toronto.  
Wm. Tod Company, Youngstown, O.
- Spike Machines.**  
The Smart-Turner Machine Co., Hamilton.
- Spring Collars.**  
Baird Machine Co., Bridgeport, Conn.  
Garvin Machine Co., New York.
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Cleveland Wire Spring Co., Cleveland.  
Jas. Steele, Ltd., Guelph, Ont.  
Wallace, Barnes Co., Bristol, Conn.
- Spring Making Machinery (Automatic).**  
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Morse Chain Co., Ithaca, N.Y.  
Philadelphia Gear Works, Philadelphia, Pa.
- Stairs, Iron.**  
Canada Wire & Iron Goods Co., Hamilton, Ont.  
Dennis Wire & Iron Works Co., Ltd., London, Canada.
- Stamping.**  
Duncan Electrical Co., Montreal.
- Stamping Machinery.**  
Brown, Boggs & Co., Hamilton, Can.
- Stationary Ladders.**  
New Britain Machine Co., New Britain, Conn.
- Steam Specialties.**  
Sheldons, Ltd., Galt, Ont.
- Steam Separators and Traps.**  
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Can. Sirocco Co., Ltd., Windsor, Ont.  
Sheldons, Ltd., Galt, Ont.  
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- Steel Alloy.**  
Vanadium Alloys Steel Co., Pittsburg, Pa.  
Vulcan Crucible Steel Co., Aliquippa, Pa.
- Steel Chains for Pulp Mill and Saw Mill.**  
Plessisville Foundry, Plessisville, Que.
- Steel Bench Legs.**  
New Britain Machine Co., New Britain, Conn.
- Steel Bending Brakes.**  
Steel Bending Brake Works, Ltd., Chatham, Ont.
- Steel, Cold Rolled.**  
Can. Drawn Steel Co., Hamilton, Ont.  
A. C. Leslie & Co., Ltd., Montreal.  
Union Drawn Steel Co., Hamilton, Ont.  
Wallace, Barnes Co., Bristol, Conn.
- Steel Pressure Blowers.**  
Can. Buffalo Forge Co., Montreal.  
Can. Fairbanks-Morse Co., Montreal.  
Sheldons, Ltd., Galt, Ont.
- Steel, all kinds.**  
Lackawanna Steel Co., Lackawanna, N.Y.
- Steel, High Speed.**  
Armstrong Whitworth of Canada, Ltd., Montreal.  
Can. Fairbanks-Morse Co., Montreal.  
H. A. Drury Co., Ltd., Montreal.  
Thos. Pirth & Sons, Montreal.  
Hawkrige Bros. Co., Boston, Mass.  
National Mach. & Sup. Co., Hamilton.  
Vanadium Alloys Steel Co., Pittsburg, Pa.  
Vulcan Crucible Steel Co., Aliquippa, Pa.
- Steel Die Engraving.**  
Noble & Westbrook Mfg. Co., Hartford, Conn.
- Steel Machinery.**  
Hawkrige Bros. Co., Boston, Mass.
- Steel Vanadium.**  
Vanadium Alloys Steel Co., Pittsburg, Pa.  
Vulcan Crucible Steel Co., Aliquippa, Pa.
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- Stocks, Pipe.**  
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Greenfield Tap & Die Corporation, Greenfield, Mass.
- Stools, Steel Shop.**  
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S. F. Bowser & Co., Fort Wayne, Ind.
- Stoves, Electric.**  
Lintz-Porter Co., Toronto.
- Straight Edges.**  
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- Straightening Machinery.**  
Baird Machine Co., Bridgeport, Conn.  
Bertrams, Ltd., Edinburgh, Scotland.  
National Mach. & Sup. Co., Hamilton.
- Structural Steel.**  
Hamilton Bridge Works Co., Hamilton, Ont.  
Lackawanna Steel Co., Lackawanna, N.Y.  
Owen Sound Iron Works Co., Owen Sound, Ont.
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Keystone Mfg. Co., Buffalo, N.Y.
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- Tanks, Steel.**  
John Inglis Co., Toronto.  
Plessisville Foundry, Plessisville, Que.  
Toronto Iron Works, Ltd., Toronto.
- Tanks, Pressure.**  
Toronto Iron Works, Ltd., Toronto.
- Tank Wagons.**  
Toronto Iron Works, Ltd., Toronto.
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- Tapes, Friction.**  
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Independent Pneumatic Tool Co., Chicago, Ill.
- Tapping Machines and Attachments.**  
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Garvin Machine Co., New York.  
The Geometric Tool Co., New Haven.  
Girard Machine & Tool Co., Philadelphia, Pa.  
Greenfield Tap & Die Corporation, Greenfield, Mass.  
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.  
Murchey Machine & Tool Co., Detroit.  
Niles-Bement-Pond Co., New York.  
Rickart Shaper Co., Erie, Pa.  
L. S. Starrett Co., Athol, Mass.

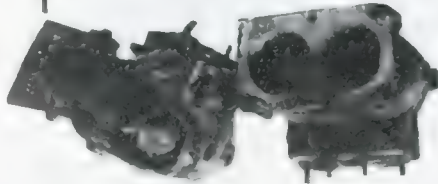




## A Total Wreck Salvaged

Hole in Cylinder Head.

Head of Cylinder repaired by Oxy-Blaugas.



## Continuous Operation

means larger profits in shell making.

A break in a machine means heavy loss in time and labor and burden.

"Oxy-Blaugas" will repair the break immediately.

"Blaugas" is the safest gas to use, so protect our Canadian mechanics on war munitions.

Having one of our outfits will enable you to save its cost in repairing one break-down.

"Blaugas" itself is a big saving where heat is required in the process of shell manufacturing, owing to its extremely high heat value.

Write for list of its many and varied money-saving applications.

## Canadian Blaugas Co., Limited

263 St. James St., Montreal, P. Q.

# No, Stevens' Stopper won't stop a train, but it will stop the blow hole in a defective casting so that you cannot find it.

In this way, it helps your bank account. The casting that otherwise would have to go to the scrap heap can be converted into good coin of the realm.

Same color as the rest of the casting. Doesn't look like a blue patch on Casey's faded overalls.

*How to use Stevens' Stopper, or Circle Cement:*

Stevens' Stopper is a fine powder, used with a little water and made into a paste—the hole is easily filled with a putty knife or trowel. It takes anywhere from two to twenty-four hours, depending upon the size of the patch, for the filler to become as hard as the casting itself. When rubbed with a file it shows the color of the casting, hence it is the best filler and the one thing that saves your castings, and that means the saving of your dollars.

Another thing—I do not ask a fancy price for it.

A pound will save many dollars' worth of castings. Put up in 5-lb., 10-lb., and 25-lb. cans.

## FREDERIC B. STEVENS

Manufacturer of  
Foundry Facings and Supplies, Buffing Compositions  
and Platers' Supplies

Corner Larned and Third Sts. DETROIT, MICH.

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WINDSOR, ONTARIO, 20 PITT STREET

INDIANAPOLIS, IND., 138-140 SOUTH DELAWARE STREET

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Murphy Machine & Tool Co., Detroit.  
Pratt & Whitney Co., Dundas, Ont.  
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**Telephone Systems.**

Lintz-Porter Co., Toronto.

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Shore Instrument &amp; Mfg. Co., New York City.

**Testing Laboratories.**

Toronto Testing Laboratory, Toronto.

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Geometric Tool Co., New Haven, Conn.  
Girard Machine & Tool Co., Philadelphia, Pa.  
Greenfield Tap & Die Corporation, Greenfield, Mass.  
Landa Machine Co., Waynesboro, Pa.  
Pratt & Whitney Co., Dundas, Ont.  
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West Tire Setter Co., Rochester, N.Y.**Tire, Wheels.**

Wells Bros. Co., Greenfield, Mass.

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American Swiss File &amp; Tool Co., New York.

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Modern Tool Co., Erie, Pa.  
Pratt & Whitney Co., Dundas, Ont.  
J. H. Williams Co., Brooklyn, N.Y.**Tool Room Partitions.**

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**Tool Posts, Lathe.**

Armstrong Bros. Tool Co., Chicago.

**Tool Steel.**Armstrong, Whitworth, Ltd., of Canada, Montreal.  
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Thos. Firth & Sons, Montreal.  
Hawkrige Bros. Co., Boston, Mass.  
A. C. Leslie & Co., Ltd., Montreal.  
National Mach. & Sup. Co., Hamilton.  
Vulcan Crucible Steel Co., Aliquippa, Pa.**Tools, Blacksmiths', Etc.**

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**Tools, Electrical.**A. R. Williams Machy. Co., Toronto.  
Can. H. W. Johns-Manville Co., Ltd., Toronto.  
United States Elec. Tool Co., Cincinnati, O.**Tools, Lathe, Planer and Slotter.**

Armstrong Bros. Tool Co., Chicago.

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Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

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Can. Fairbanks-Morse Co., Montreal.  
Toronto & Hamilton Electric Co., Hamilton, Ont.**Transmission Machinery.**American Pulley Co., Philadelphia, Pa.  
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Can. Fairbanks-Morse Co., Montreal.  
Can. Drawn Steel Co., Hamilton, Ont.  
Hamilton Gear & Mach. Co., Toronto.  
Jones & Glasco, Montreal.  
Main Belting Co., Montreal.  
Morse Chain Co., Ithaca, N.Y.  
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F. Reddaway & Co., Montreal.  
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Northern Crane Works, Walkerville, Ont.  
Tallman Brass & Metal Co., Hamilton.**Traveling Cranes.**Northern Crane Works, Walkerville, Ont.  
Smart-Turner Machine Co., Hamilton, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.**Trolley Hoists, Electric.**Northern Crane Works, Walkerville, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.**Trucks, Lumber and Kiln.**Sheldons, Ltd., Galt, Ont.  
Northern Crane Works, Walkerville, Ont.**Trucks, Factory, Freight, Etc.**Chambers, Ltd., Toronto.  
Chapman Double Ball Bearing Co., Toronto.  
Whiting Foundry Equipment Co., Harvey, Ill.**Tube Expanders (Rollers).**A. B. Jardine & Co., Hespeler, Ont.  
Watson-Stillman Co., Aldene, N.J.**Tumbling Barrels.**Baird Machine Co., Bridgeport, Conn.  
Northern Crane Works, Walkerville, Ont.  
Whiting Foundry Equipment Co., Harvey, Ill.**Turbines, Steam.**

Southwark Foundry &amp; Machine Co., Philadelphia, Pa.

**Turnbuckles.**Canadian Billings & Spencer, Ltd., Welland.  
Can. H. W. Johns-Manville Co., Ltd., Toronto.**Turret Machines.**Brown & Sharpe Mfg. Co., Providence, R.I.  
Fay & Scott, Dexter, Me.  
Girard Machine & Tool Co., Philadelphia, Pa.  
Hill, Clarke & Co. of Chicago, Chicago, Ill.  
Mott & Merryweather Machy. Co., Cleveland, O.  
New Britain Machine Co., New Britain, Conn.  
Pratt & Whitney, Hartford, Conn.  
Turner Machine Co., Ltd., Danbury, Conn.  
Warner & Swasey, Cleveland, O.**Turbines, Steam, Water.**

Plessisville Foundry, Plessisville, Que.

**Upsetting and Bending Machinery.**A. R. Williams Machy. Co., Toronto.  
John Bertram & Sons Co., Dundas, Ont.  
Brown, Boggs Co., Ltd., Hamilton, Canada.  
A. B. Jardine & Co., Hespeler, Ont.  
National Machy. Co., Tiffin, O.  
Niles-Bement-Pond Co., New York.  
Watson-Stillman Co., Aldene, N.J.**Vacuum Pumps.**Buffalo Forge Co., Buffalo, N.Y.  
Mesta Machine Co., Pittsburgh.  
Smart-Turner Machine Co., Hamilton, Ont.**Valve Grinders (Pneumatic).**

Cleveland Pneumatic Tool Co. of Canada, Toronto.

**Valves, Hydraulic.**Can. Boomer & Boschert Press Co., Montreal.  
Charles F. Elmes Eng. Works, Chicago, Ill.  
Mesta Machine Co., Pittsburgh, Pa.  
Watson-Stillman Co., Aldene, N.J.  
R. D. Wood & Co., Philadelphia, Pa.**Valve Leathers.**

Graton &amp; Knight Mfg. Co., Montreal.

**Valves, Back Pressure, Steam.**Mesta Machine Co., Pittsburgh, Pa.  
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Hawkrige Bros. Co., Boston, Mass.**Ventilating Apparatus.**Can. Sirocco Co., Ltd., Windsor, Ont.  
Sheldons, Limited, Galt.  
A. R. Williams Machy. Co., Toronto.**Vises, Bench.**Emmert Mfg. Co., Waynesboro, Pa.  
Hollands Mfg. Co., Erie, Pa.  
National Mach. & Sup. Co., Hamilton.  
New Britain Machine Co., New Britain, Conn.**Vises, Pipe.**Armstrong Mfg. Company, Bridgeport, Conn.  
Bigmall & Keeler Mach. Works, Edwardsville, Ill.  
Butterfield & Co., Rock Island, Que.  
Emmert Mfg. Co., Waynesboro, Pa.  
National Mach. & Sup. Co., Hamilton.  
J. H. Williams Co., Brooklyn, N.Y.**Vises, Planer and Shaper.**Girard Machine & Tool Co., Philadelphia, Pa.  
National Mach. & Sup. Co., Hamilton.  
Skinner Chuck Co., New Britain, C.**Vises, Milling Machine.**

National Mach. &amp; Sup. Co., Hamilton.

**Vises, Woodworking.**

Emmert Mfg. Co., Waynesboro, Pa.

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London Bolt & Hinge Works, London, Ont.  
Wallace, Barnes Co., Bristol, Conn.**Washer Machines.**

National Machy. Co., Tiffin, Ohio.

**Waterproof Coating, Cement, Fabric.**

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**Watchman's Clocks.**Lintz-Porter Co., Toronto.  
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Toronto Iron Works, Ltd., Toronto.

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Lever Bros., Toronto.  
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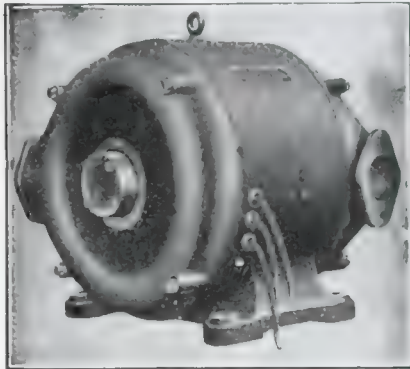
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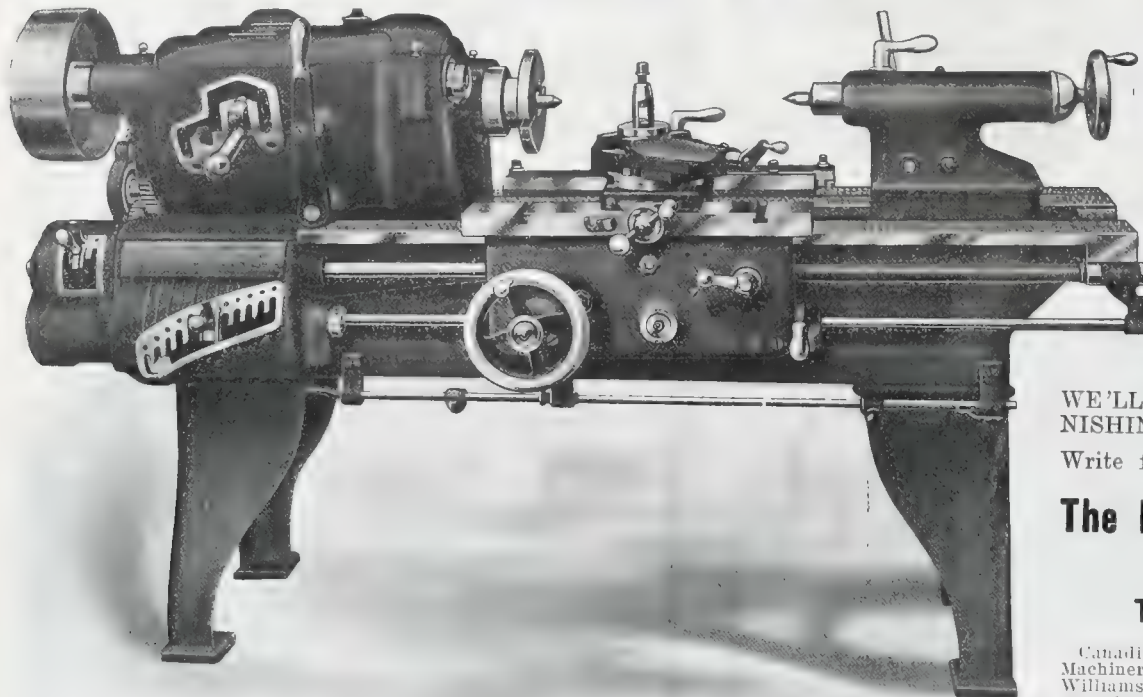
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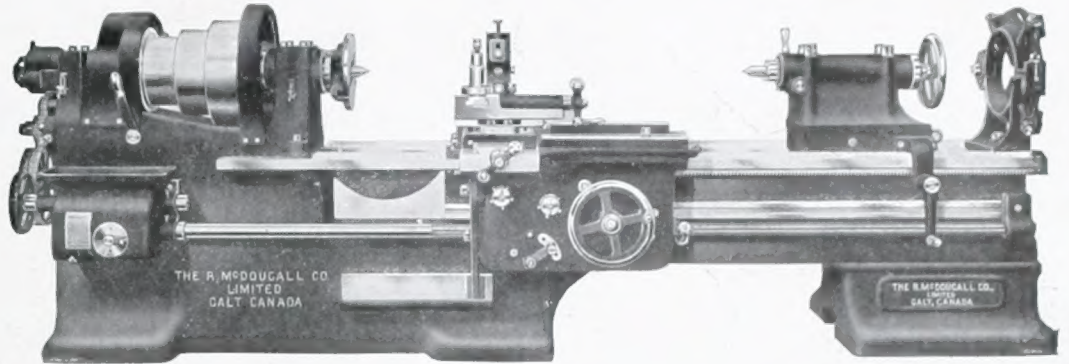
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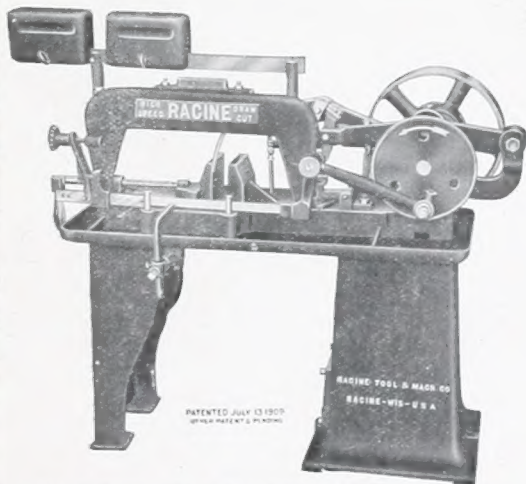
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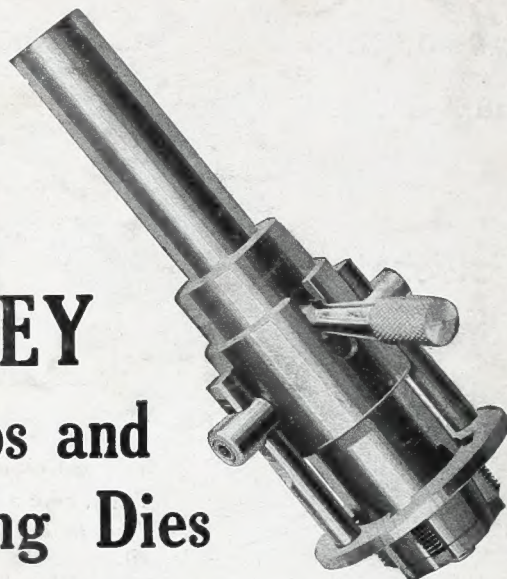
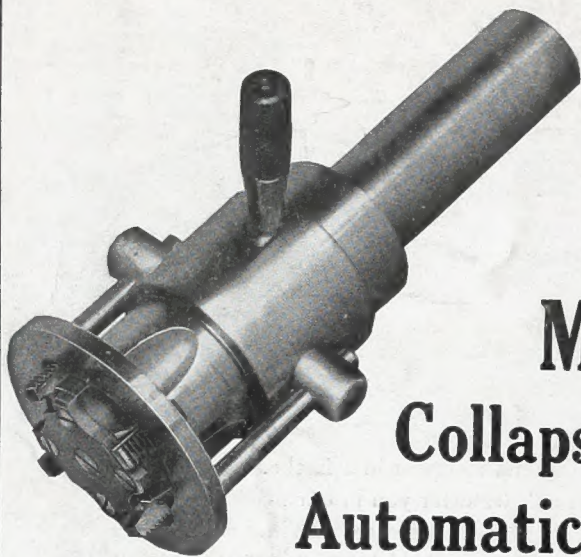
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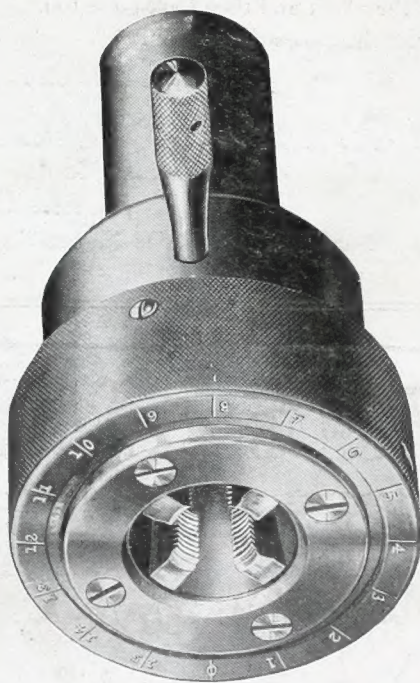
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