

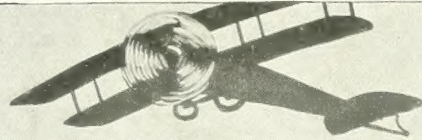
CANADIAN MACHINERY

AND MANUFACTURING NEWS

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

Vol. XVIII—No. 25 Publication Office: Toronto, December 20, 1917

Subscription Price \$3.00 per Year



ONE Shot—
properly placed, may decide the engagement.
One or several Machine Tools constantly lagging behind the others will play havoc with production. Trained men are none too plentiful—can you afford to waste their time grinding, treating, or otherwise trying to make good tools from inferior steel? The history of

"Red Cut Superior"

The Nationally Known First Quality

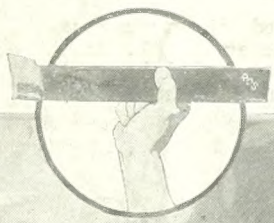
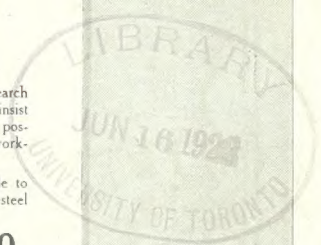
HIGH SPEED STEEL

is allied with the history of men whose lives have been devoted to research and specializing in the manufacture of high grade steels. These men insist that each bar of *Red Cut Superior* must contain the purest materials possible for money and brains to produce—and in addition to careful workmanship, every bar must undergo a rigid searching inspection.

We guarantee our customers that so far as it is humanly possible to make it so *Red Cut Superior* is the highest in quality since high speed steel was first introduced.

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

CARRIED IN STOCK AT THESE WAREHOUSES:
E. J. HARRIS ST. LEO WASH DC FIELD & CO INC VANADIUM ALLOYS STEEL CO. GEO WASH CO
** FARMINGTON ST 204 HUDSON ST 721 ARCH ST PITTSBURGH PA AND *** WASHINGTON BLVD
BOSTON MASS NEW YORK N Y PHILADELPHIA PA LATROBE PA CHICAGO ILL

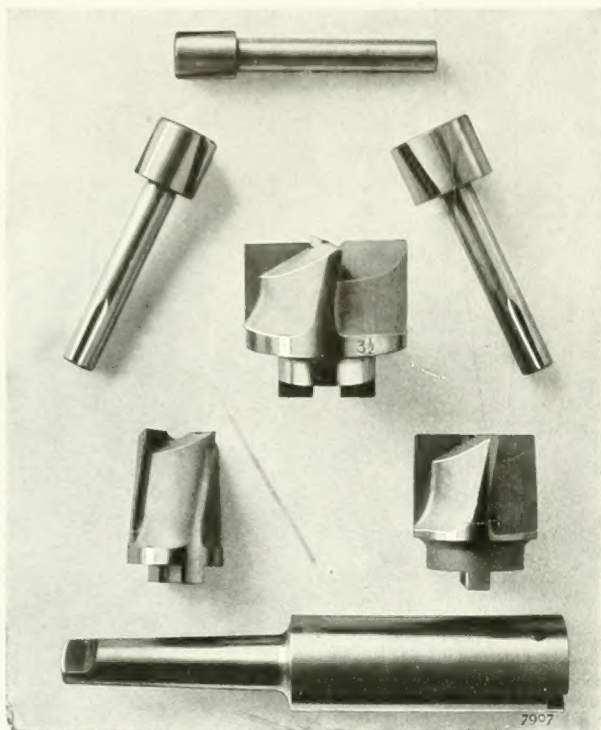


SMALL TOOLS

Equip Your Tool Room With

PRATT & WHITNEY

Interchangeable Cutter Counterbores



and get the right combination at once.

HOLDER, CUTTER and GUIDE

With this combination you can immediately make the right combination for every counterboring job.

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.

Holder, Cutters and Guides are furnished in a wide range of sizes.

PROMPT SERVICE

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

PRATT & WHITNEY CO.

of Canada, Limited

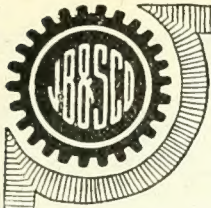
Works: DUNDAS, ONTARIO

MONTREAL
723 Drummond Bldg.

TORONTO
1002 C.P.R. Bldg.

WINNIPEG
1205 McArthur Bldg.

VANCOUVER
B.C. Equipment Co.



BERTRAM MACHINE TOOLS

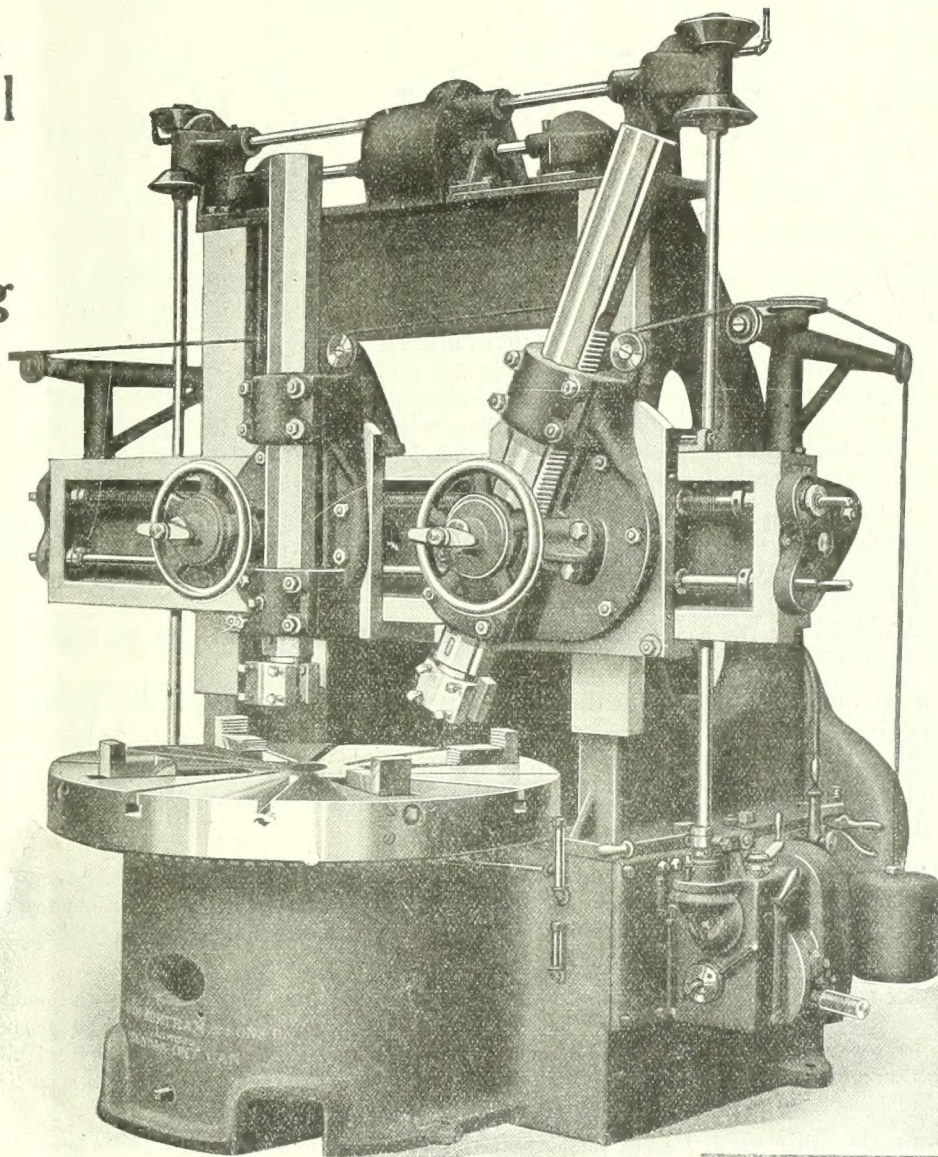
**42-inch
Vertical
Boring
and
Turning
Mill**

***Niles
Type***

Motor
Driven
Through
Speed Box

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

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



NOTE PHOTO 10572

The John Bertram & Sons Company Limited

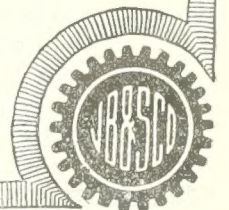
DUNDAS, ONTARIO, CANADA

MONTREAL
723 Drummond Bldg.

TORONTO
1002 C.P.R. Bldg.

VANCOUVER
609 Bank of Ottawa Bldg.

WINNIPEG
1205 McArthur Bldg.



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

The Publisher's Page

TORONTO

December 20, 1917

A true word well spoken

WE received a day or two ago a blotter-calendar—from one of our advertising friends. It is of fine quality, the printing good and the color pleasing. It is the message which the blotter conveys, however, which makes it unusual and interesting. Here it is:

American business men do not realize the value which trade journals and technical magazines might be to them in increasing their efficiency and in giving them a broad and comprehensive view of their business. Our foreign competitors read almost every article published upon their business with great care and thoroughness. Our trade journals and technical papers are the best in the world and they should be encouraged and supported by our business men.

"These papers are preaching the gospel of sound business on practical lines and are helpful, not only to business, but to the country as a whole. If the suggestions made by them in the past had been followed by our business men it would not be necessary at this time to point out some of the fundamental weaknesses in American business."

Adapted from the book, "Awakening of Business," by Edward N. Hurley, Chairman of the Federal Shipping Board.

The following excerpt from the letter which accompanied the blotter in question is equally interesting explaining as it does the reason why the advertiser spends his good money on expensive advertising to "boost" as he says the technical journal. The letter was written by the general sales manager and his name and the name of the concern he represents, though withheld here, will be supplied upon request.

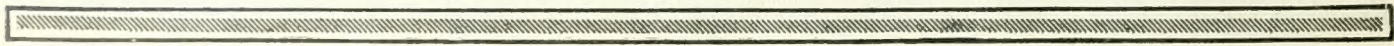
Several people have asked me why I am "boosting the game" of the trade papers. They find it difficult to understand just how I expect to sell our product by getting people to read the technical journals; and many of them think me a fool for spending hundreds of dollars of my company's money to distribute these blotters. * * * *

My position in this matter is taken because of a very firm conviction that the people who read the trade papers are much better business men and hence easier to sell a good product to, than the men who do not read the trade papers. I have studied this question for several years and do not think that I ever found a man consistently reading the trade papers who was not a "live wire" and the sort of fellow I like to do business with.

On the other hand, I have found that the men who do not read the trade journals are unprogressive, addicted to haggling over trivial points and, on the whole, very hard to do business with. The people who read the business papers know what's what, and, in selling them, it is not necessary to spend hours of valuable time in the discussion of elementary points.

My attitude in this matter is possibly an unusual one but I am firmly convinced that it is the right attitude. Furthermore, I believe that if my ideas on this subject were brought to the attention of the people selling goods in the marine field many of them would see the matter in a new light and would actively co-operate with you in getting your publication into the hands of, even more, the men to whom they wish to sell.

The trade papers are doing a wonderful work; and every good business man should boost them all he can all the time.





Quality

Service

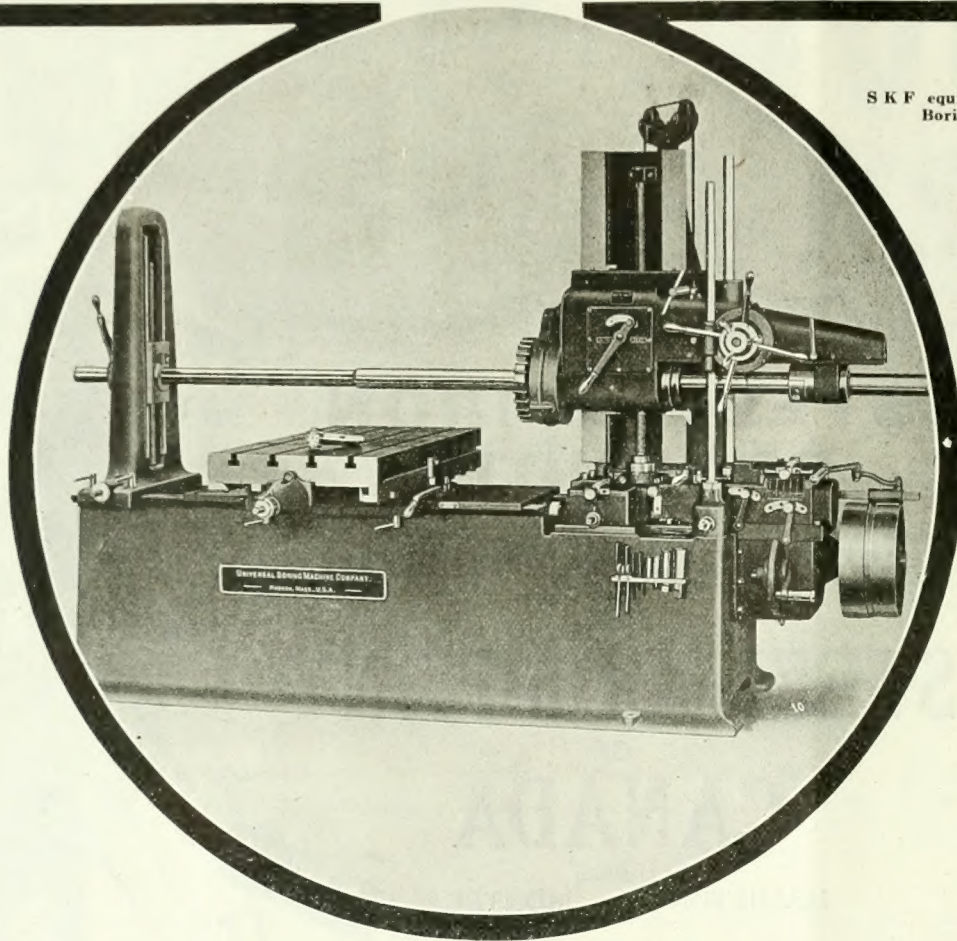
**STEEL & IRON
PRODUCTS**
OF
Every Description
THE
STEEL COMPANY
OF
CANADA

LIMITED
HAMILTON - MONTREAL

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

SKF

BALL BEARINGS



SKF equipped "Universal"
Boring Machine

No. 2 of a Series of SKF Equipped Boring Machines

ENDURANCE

The bearings used in boring machines must be wearproof. That is why the best makers use SKF.

Made of the finest steel, to most exacting standards, SKF are not only accurate, they are lastingly accurate. The parts they carry are held with exactness; there is no shake, no looseness, no play.

If you are looking for enduring accuracy, consult our Engineering Service Department. Through their long experience they can recommend an SKF that will give you perfect satisfaction.

Canadian SKF Company, Limited
TORONTO, ONT., CANADA

STELLITE



The Top of the Tree for Doubled Production and
A MERRY CHRISTMAS

Deloro Smelting and Refining Company Limited

TORONTO
200 King St., W.

MONTREAL
315 Craig St. W.

The
Fairley Davidson Steel Co., Inc.
SPECIALISTS

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

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

CHROME VANADIUM, oil hardening or case hardening

CHROME NICKEL, oil hardening or case hardening

Steam Hammer Forgings to Sketch

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

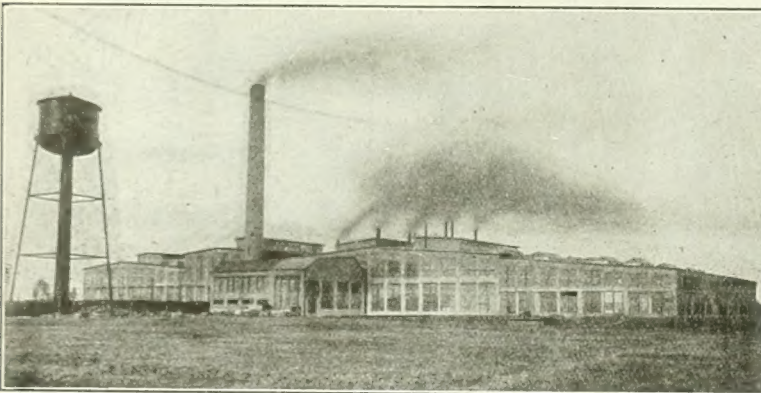
We carry a complete stock at our New York Warehouse, 124 Maiden Lane, New York City

Canadian Agents:

THE FACTORY SUPPLY AND STEEL COMPANY

149 Craig Street West, Montreal, Canada

We carry a complete stock at our Montreal Warehouse



Works: LONGUEUIL, QUE.

**Armstrong, Whitworth
 of Canada Limited**

Standard Sizes of

HIGH SPEED STEEL

Carried in Stock

CARBON AND ALLOY STEELS

Shop Tools, Gauges, etc.

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

Dominion Bank Bldg., TORONTO

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

**Coal
 Coke
 Iron Ore**

Pig Iron

Victoria FOUNDRY & MALLEABLE

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

M.A. HANNA & Co.

Sales Agents, CLEVELAND

Canadian Office:

703 C.P.R. Bldg., Toronto

MALLEABLE CASTINGS

Capacity

Two Thousand Five Hundred Tons per Month

*Our Prices, Quality and Delivery
are Right*

Send Us Your Inquiries.

THE PRATT & LETCHWORTH COMPANY, Limited

P.O. BOX 1630, MONTREAL

Works: BRANTFORD, ONTARIO

**Air Chucks for 6" Shells
in Stock**

**General Machine Work
of All Kinds**

Gear Cutting, Etc.

**Hyde Engineering
Works**

27 William St., Montreal

P.O. Box 1185

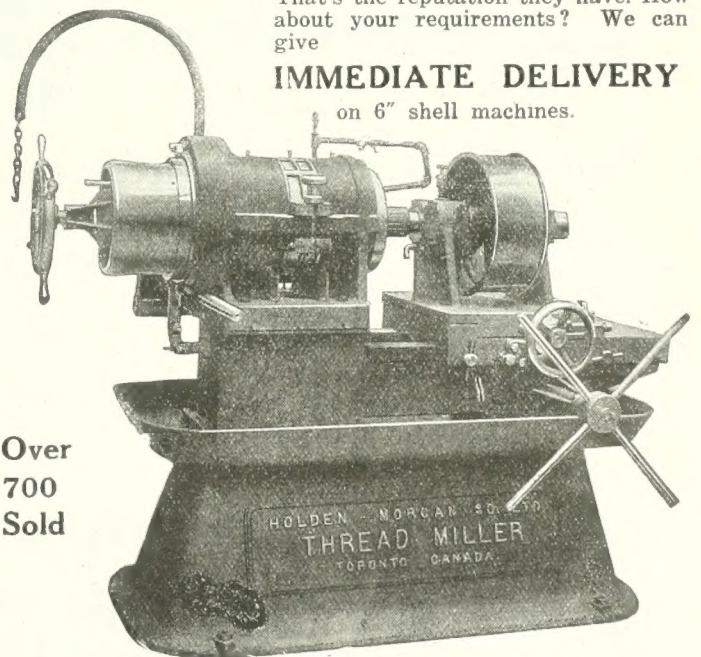
Telephones: M. 1899 & M. 2527

70 Holden-Morgans in One Plant

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

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

IMMEDIATE DELIVERY
on 6" shell machines.

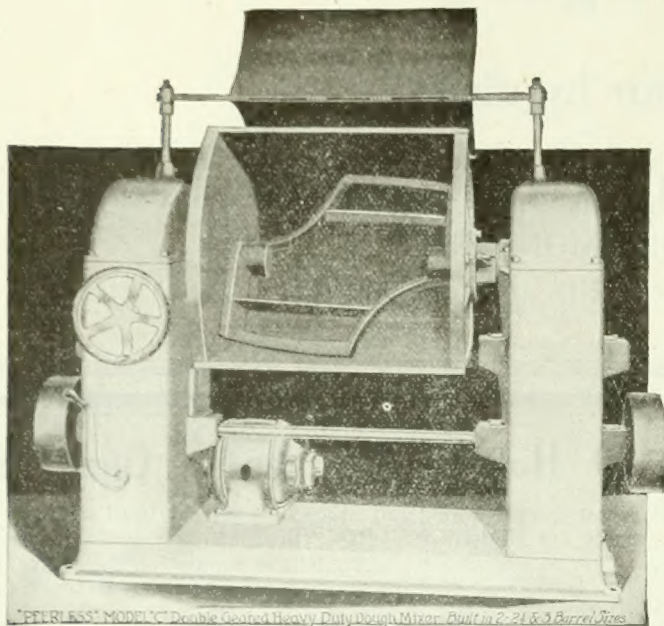


Over
700
Sold

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

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

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



PEERLESS MODEL C Double Geared Heavy Duty Dough Mixer. Built in 2-24 & 3 Barrel Sizes.

Courtesy The Peerless Bread Machine Co., Sidney, Ohio.

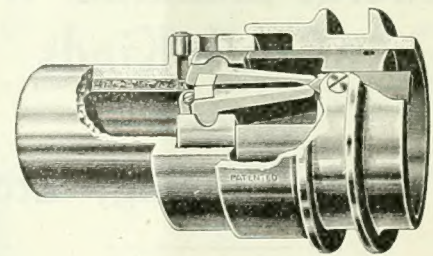
Mixing Dough

is the vocation of this machine and the mixer is controlled by JOHNSON FRICTION CLUTCHES installed on the horizontal shaft and two Johnson clutches are used, one in each of the vertical columns. You know how Mother mixed her bread. You know how careful she was not to overknead it. The same is true with automatic mixers. The mixer must knead the bread to a certain consistency and then the Machine is stopped through the use of JOHNSON FRICTION CLUTCHES.

This installation is but another instance of Johnson Friction Clutch Satisfaction.

For Your Own Machines—

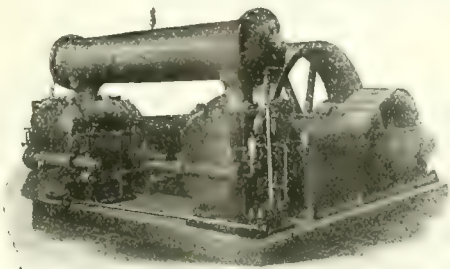
Have you thought of incorporating clutches? You know that people are known by the company they keep. So are all other things. Have you noticed the machines the JOHNSON FRICTION CLUTCHES are associated with? Let us introduce you to clutch satisfaction, THE JOHNSON FRICTION CLUTCH, so your machines may become acquainted. Write us about your requirements to-day.



Single Clutch Interior.

THE CARLYLE JOHNSON MACHINE CO.
MANCHESTER, CONN.

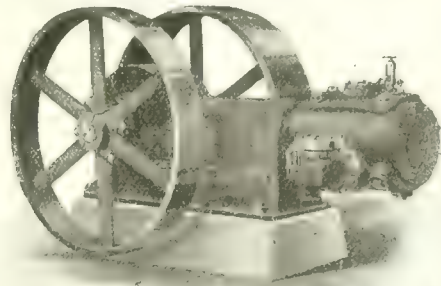
Canada: Williams & Wilson, Ltd., 320 St. James St., Montreal; Can. Fairbanks-Morse Co., Ltd., Toronto.
England: The Efandem Co., 159 Gt. Portland St., London, W., Sole Agents British Isles.
Australia: Edwin Wood, Pty., Hardware Chambers, 231 Elizabeth St., Melbourne, Victoria.



**JENCKES CLASS DB-2
AIR COMPRESSOR**

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

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



**JENCKES CLASS CB-1
AIR COMPRESSOR**

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

Jenckes Machine

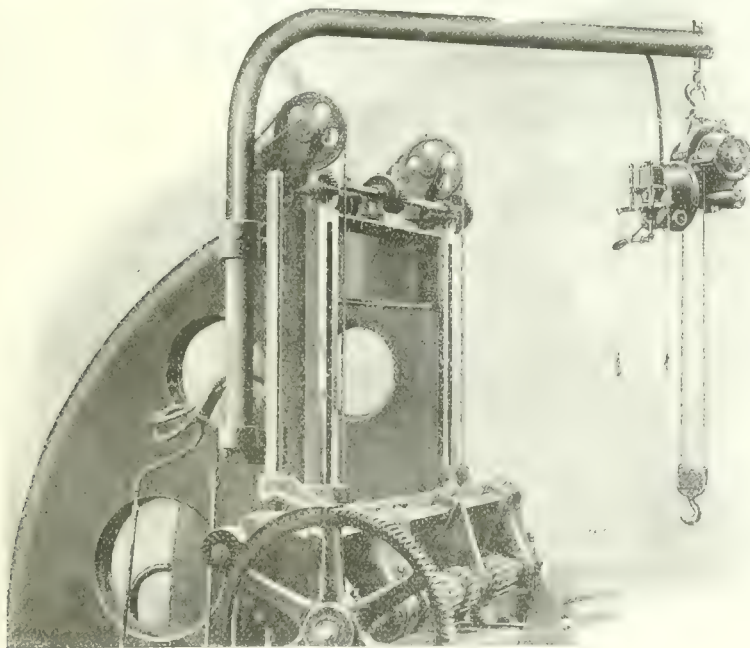
Works: ST. CATHARINES, ONT.
Works: SHERBROOKE, QUE.

The



Company, Limited

Sales Offices: 710 C.P.R. Bldg., Toronto, 908
I. T. Bank Bldg., Montreal; West Chester Ave.,
St. Catharines; Cobalt, Ont.



**WHY DO WE USE
"IMPERIAL"
MOTOR HOISTS?**

Because they are
Very Compact
Moderate in Weight
Perfectly Controlled
Simple and Durable

Because they have -
Most Efficient Gearing
Most Thorough Lubrication
Reliable Automatic Stop
Ball-bearing Hook Block

And they have still other good features.

Write for Bulletin 8006-It
tells the whole story.

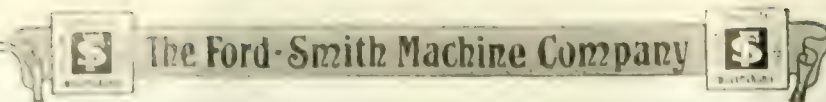
Canadian Ingersoll-Rand Company, Limited

General Offices: 260 St. James St., Montreal, Que.

Branches: Sydney, Sherbrooke, Montreal, Toronto, Cobalt, Timmins, Winnipeg, Nelson, Vancouver



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



The Ford-Smith Machine Company

Adv't. No. 10

MILLER SERIES

Conclusion

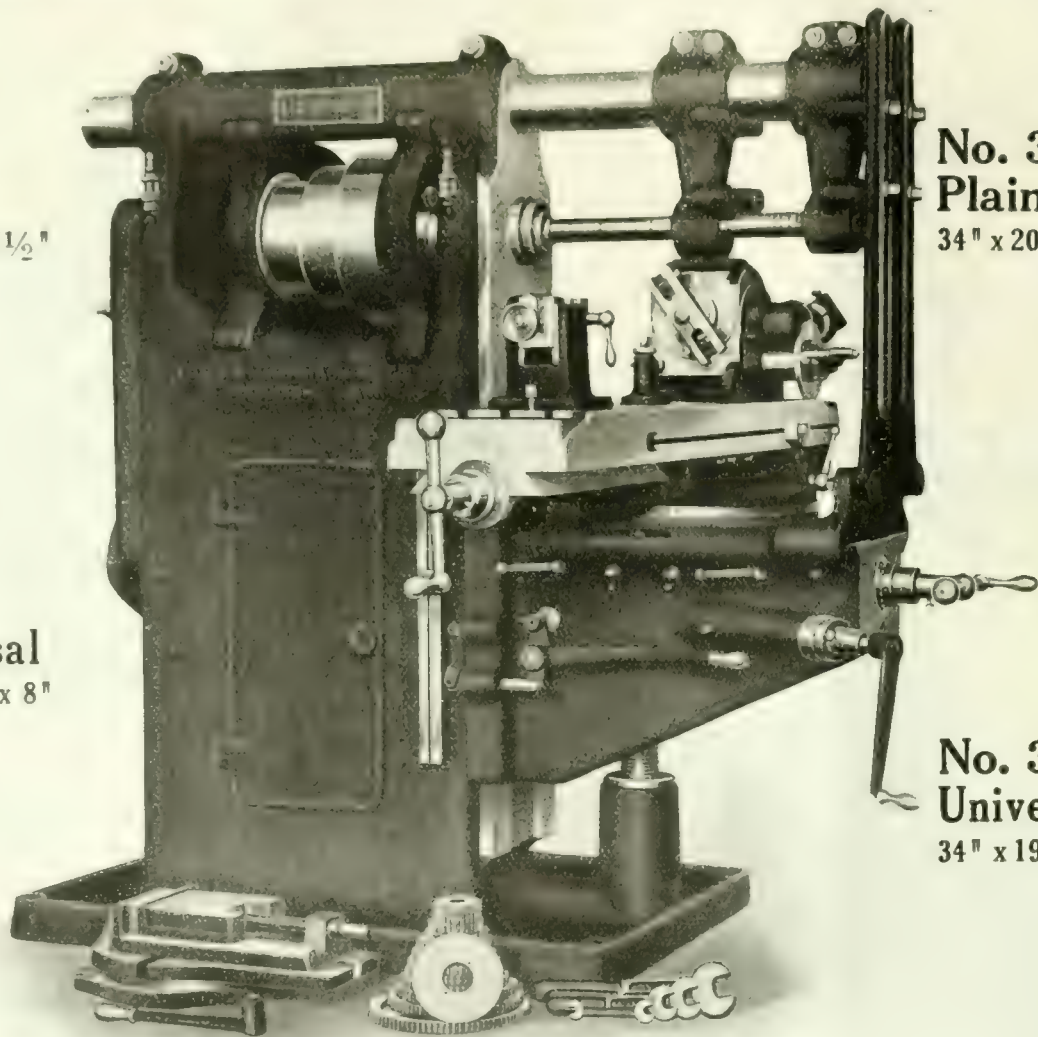
We have come to the close of our series. Have they been successful in bringing before you the various reasons why a Ford-Smith Miller should be a part of your equipment. We sincerely hope our efforts have been a success—in any case—let's hear from you. We aim to state only facts.

**No. 2
Plain**
27" x 19" x 7½"

**No. 3
Plain**
34" x 20" x 10"

**No. 2
Universal**
25" x 18" x 8"

**No. 3
Universal**
34" x 19" x 20"



Just remember we build Four Sizes as shown above. One of the sizes may be the machine you require. If so, we want your order. If you let us have your first—we know we will get all your future business—so drop us a line.

The Ford-Smith Machine Company, Limited
HAMILTON ONTARIO CANADA

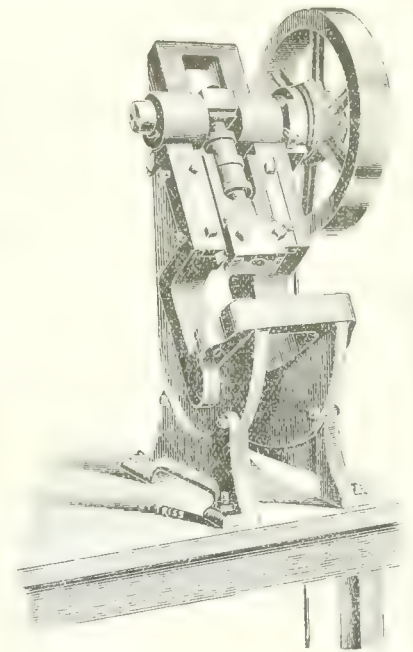
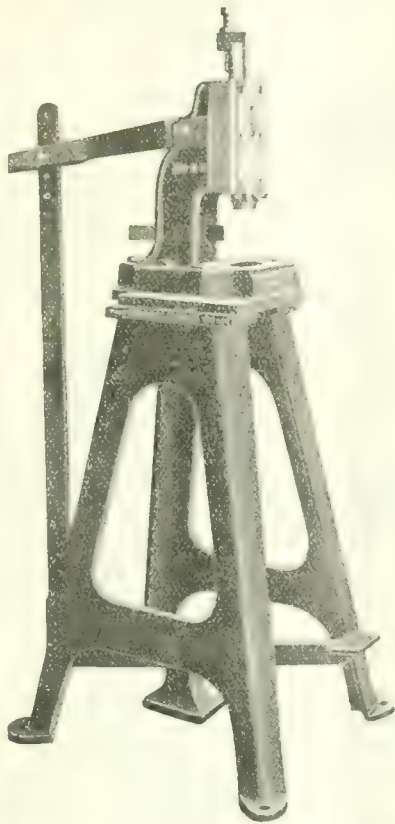
If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.

WHY A "B. B.?"

Experience has proved
that

B.B. PRESSES

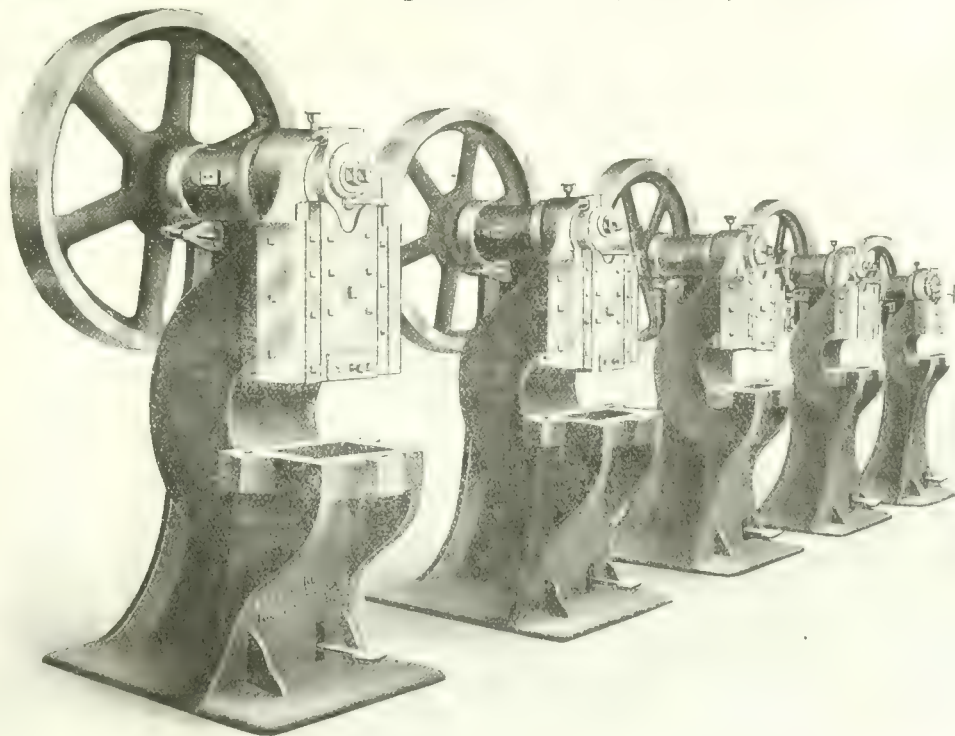
qualify for
Economy
Durability
Speed



The Brown, Boggs Co.,

LIMITED

HAMILTON, ONT., CANADA



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

URANIUM

HIGH SPEED STEEL

Fewer Trips to the Grinder

The man who leaves his machine every few minutes to grind his tool is an expensive employee. Something is wrong. Nine times out of ten it is the high speed steel he is using.

By adding Uranium to high speed steel we have produced a

cutting steel that is tough, that is strong, that will hold its cutting edge after ordinary tools have crumpled or burnt.

Cut down those expensive trips to the grinder by putting Uranium to work for you.

STANDARD ALLOYS COMPANY

FORBES AND MEYRAN AVES.

PITTSBURGH, PENNA.



High-Speed STEEL

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

WOLFRAM

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

VULCAN CRUCIBLE STEEL COMPANY

ESTABLISHED 1900

Aliquippa - Pa., U.S.A.

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



Electrite

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

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

LATROBE ELECTRIC STEEL CO.

LATROBE, PA.

High Speed Steel

uranium

DOUBLE MUSHET

High Speed Steel

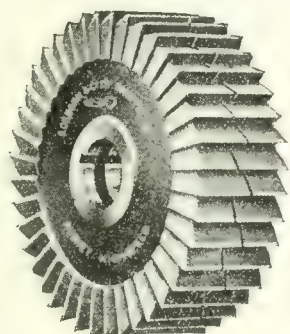
Carbon Steel

Gauge Steel

Alloy Steels

SOLE MAKERS

Samuel Osborn & Co. Ltd.
SHEFFIELD



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

Sam'l Osborn (Canada)
Limited

Head Office and Works: Montreal, P.Q.

Branch Office: Toronto, Ontario

STEEL for Shrapnel Shells and Shell Blanks

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

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

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

Head Office:

New Glasgow, N.S.

Western Sales Office:

Room 14 Windsor Hotel
MONTREAL



Steel Ingots

by the

HARMET

Liquid Process

TRADE MARK

of the Famous

“WACO”

BRAND

HIGH SPEED STEEL

AND

TWIST DRILLS

“DOUBLE WACO” Quality

Specially Adapted for Munition Work

“TURTLE” BRAND

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

ESTABLISHED 1870

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

TRADE MARK



Reliance Steel Works
SHEFFIELD, ENG.

TRADE MARK



For particulars apply to our
Sole Representatives for Canada

GEO. A. MARSHALL & CO.

70 Lombard Street Toronto, Ontario

Roelofson 6-in. Banding Machine

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

Look over the following outstanding features of its construction:

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

Chucking with spring collet chuck insures accurate and speedy chucking.

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

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

Roelofson Machine & Tool Co., Ltd.

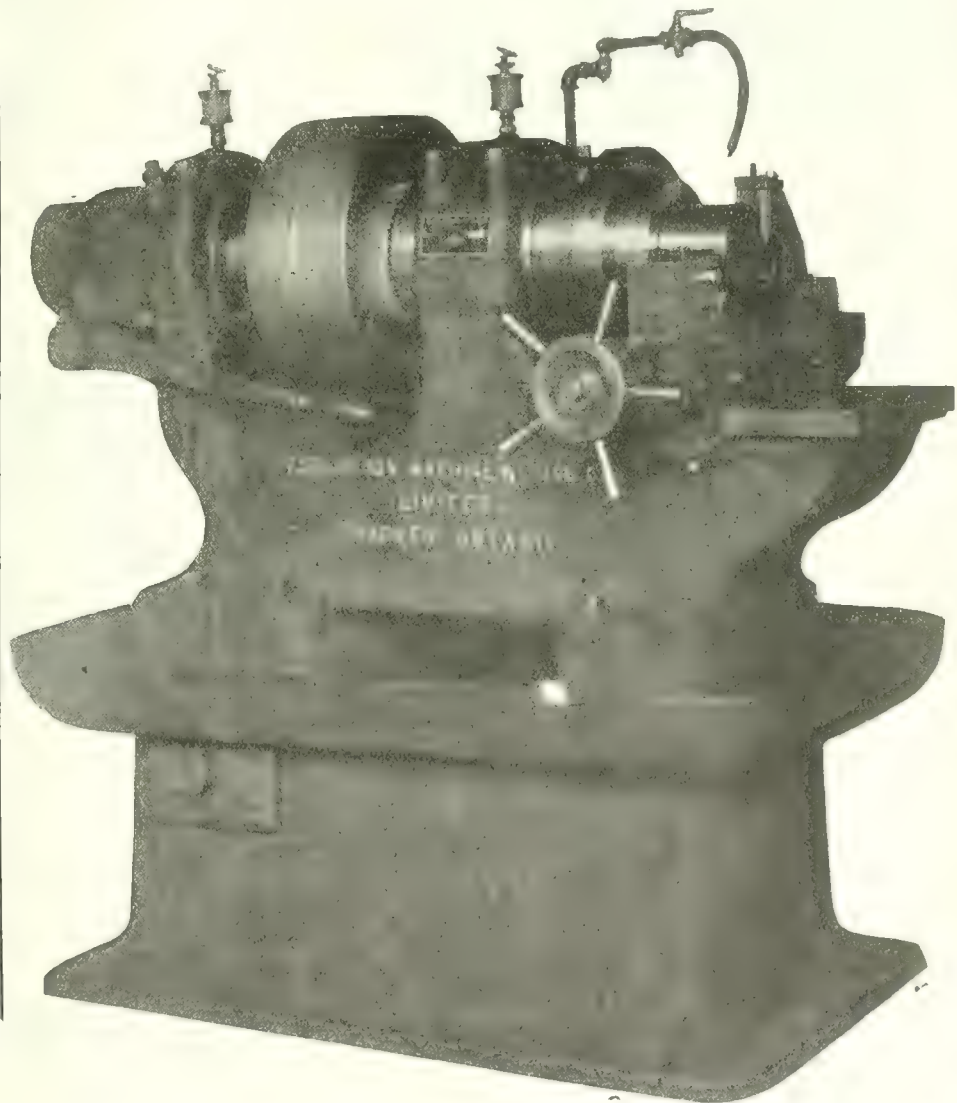
Head Office: 1501 Royal Bank Building, Toronto, Canada

Works and Warehouse: Galt, Ont., Canada

Immediate Delivery

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

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



GRINDING SEED WHEAT

WOULD YOU DO IT?

To grind seed wheat would be to deprive the future. It would rob men of fighting strength and those at home of bread.

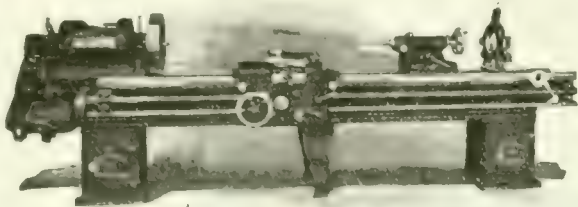
To run and run in the purchase of a machine that is to be depended upon to produce fighting and farming tools—specially and accurately—is like grinding seed wheat—it deprives the future of materials that men will need badly.

A suggestion before you buy tools, carefully examine the merits of the high-quality "Army for Service" line which are sold in Canada by

The Geo. F. Foss Machinery & Supply Co.
MONTREAL, QUEBEC.

AND

H. W. Petrie, Ltd.
TORONTO, ONTARIO



TRADE  MARK

The Sidney Tool Company
SIDNEY, OHIO, U.S.A.

WRITE FOR BULLETIN 30



LANDIS

DIAMOND



NORTON

All sizes, finest quality, awaiting your command, stones

“THAT SUIT”

either unmounted or mounted in our improved
(any style) CAST STEEL MOUNTING;

GUARANTEED TO BRING RESULTS.

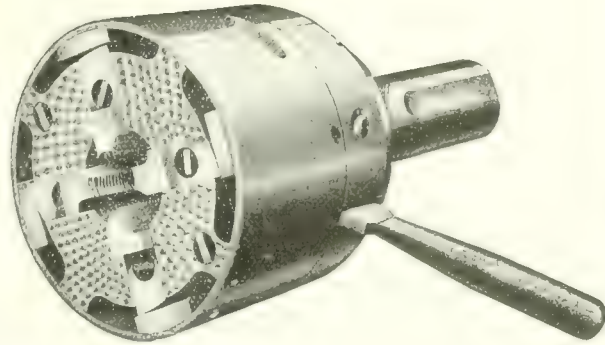
“MADE IN CANADA”

WHEEL TRUING TOOL CO.

88 WEST PITT STREET

WINDSOR, ONTARIO

NAMCO Self-Opening DIES



Accuracy and Durability are predominant in NAMCO Dies. Their construction has insured the productive results that they are constantly giving.

NOTE—

- Solid one-piece head
- Simplicity of working parts
- Support of chasers directly back of cutting edges
- Thorough cleansing and lubrication, due to open construction.

NAMCO Dies are made in both revolving and non revolving types for use on any kind of screw machines, turret lathes and special threading machine.

For internal threading we build the NAMCO Collapsing Tap for which there is "NO HOLE TOO DEEP."

Catalogs on each.

There's a NAMCO Die for practically every threading requirement.
Send for catalog or submit blueprints for quotations.

The National Acme Company

NEW ENGLAND PLANT WINDSOR, VERMONT Cleveland, Ohio CANADIAN PLANT MONTREAL, QUE.

Branch Offices: New York, Boston, Chicago, Detroit, Atlanta, San Francisco. With Foreign Representatives.

Makers of Gridley Single and Multiple Spindle Automatics at Windsor, Vermont, and Acme Automatics, Threading Dies, and Screw Machine Products at Cleveland, Ohio.

IF YOU WANT THE

BEST BASE PLUGS, BUY BANFIELD'S

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

Capacity, 3,000 per day.

Write for prices.

EDWIN J. BANFIELD

STAIR BLDG. ∴ TORONTO, ONT.

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

One of the
 Steels of the Century
Centurion High-Speed

Made from the **BEST** Materials
 Iron, Tungsten, Chrome, Vanadium

Melted by the **BEST** Process
 The Crucible Furnace Method

Handled by the **BEST** Workmen
 Melters, Forgemen, Annealers, Metallurgists

CONSEQUENTLY
 Will do the **BEST** Work

Quality

Delivery

Service

We have a catalog waiting for you. Write for it.

THE CENTURY STEEL CO. OF AMERICA

MANUFACTURERS OF HIGH-GRADE CRUCIBLE STEELS

General Office and Works:

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Sales Offices:

120 BROADWAY,
 NEW YORK

INGOTS

Brass, Bronze and Composition
Any Alloy According to Your Formula



ALSO

INGOT-COPPER

99.9% PURE

For High-Grade Castings

Wire or Write for Prices

We are Purchasers of Copper Bearing Material

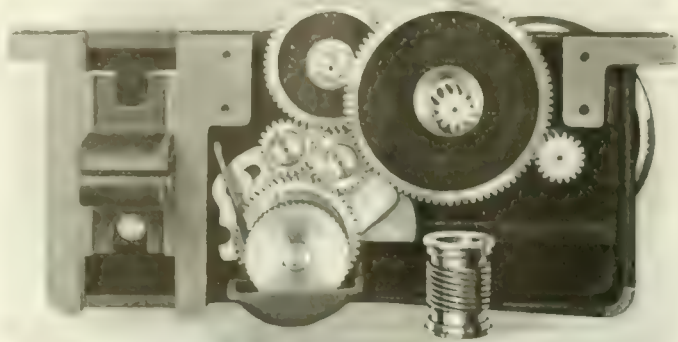
**BROWN'S COPPER & BRASS ROLLING
MILLS, LIMITED**

NEW TORONTO,

Near Toronto

CANADA

EVER STUDY A CISCO APRON?



Note the compactness
See the rigidity
Count the few parts
Observe the simplicity
Mark the fool-proof points

A CISCO APRON

Like all other parts of CISCO Lathes, is built for
Simplicity in operation
Power and pull
Economy and efficiency

THE LATHE WITH THE PULL | *CISCO* | *Has No Equal*
THE LATHE OF SIMPLIFIED ACCURACY | *14"-16"-18"-24"*

Sold in Canada by
The A. R. Williams Machinery Co., Ltd.

Made in Cincinnati, U.S.A., by
The Cincinnati Iron & Steel Co.

We guarantee shipment
within 24 hours of
receipt of order

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

SISCO

Made in
Sweden
from selected
Dannemora Ore

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

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

Sterling Engine Works

Successors to the
DOTY ENGINE WORKS

Expert Engineers, Machinists
and Boiler Makers

Gasoline Engines, Steam Engines and
Boilers, new and second-hand. Castings in
iron or brass. Forgings. Machine and
Boiler repairs. Cold Rolled Shaftings.

CUT GEARS

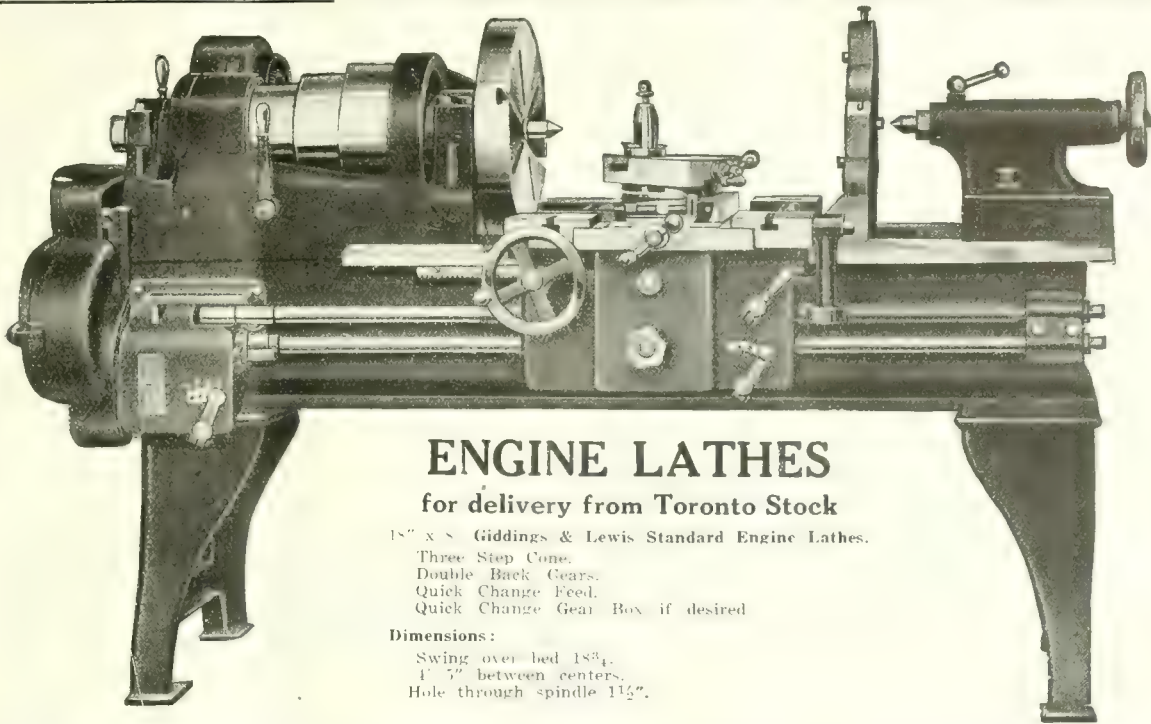
We have the only automatic Gear-Cutting
Machine in Western Canada. We special-
ize in this work. Also in Marine and Hoist-
ing Engines, Contractors' Equipment,
Dredge Work, Dippers, etc.

Estimates gladly given
on big or small orders.

Works and Office: Foot of Water Street

Phone: Main 9543

WINNIPEG, MANITOBA



ENGINE LATHES

for delivery from Toronto Stock

18" x 8 Giddings & Lewis Standard Engine Lathes.

- Three Step Cone.
- Double Back Gears.
- Quick Change Feed.
- Quick Change Gear Box if desired

Dimensions:

- Swing over bed 18 3/4".
- 1' 7" between centers.
- Hole through spindle 1 1/4".

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

Write for full specifications and prices.

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

HEPBURN

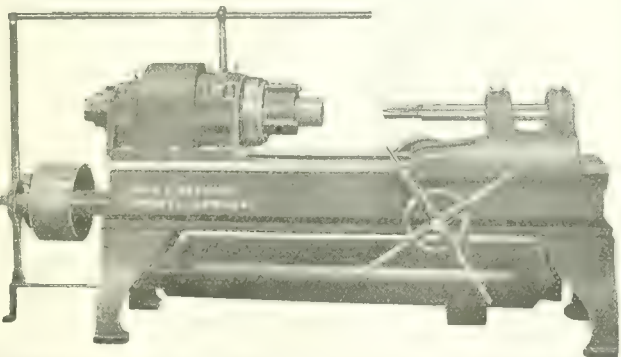
Lathe For Shell Work

Put into your shop this Hepburn Single Bar Boring Lathe, because it has been proven to have no equal on shell work. We will send the proof—or find it yourself in many of the larger shell plants of Canada. Your old lathe rebuilt to embody latest improvements. Write for the facts about our service.

JOHN T. HEPBURN, LIMITED

18-60 Van Horne Street

Toronto, Ontario



WHITING

AIR HOISTS

Most convenient for the many quick, short lifts about the average shop.

Valve stem does not pass through air chamber and therefore no packings are required.

Automatic cut-off guards against waste of air.

All details the result of many years' study in manufacturing and operating cranes and hoists of all kinds.

Send for catalog 119

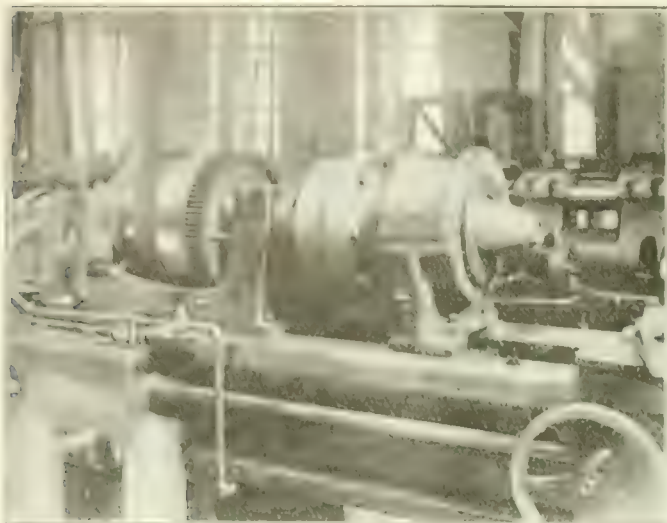
Complete Foundry Equipment. Cranes of all Types.



1719



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A Big Efficiency Unit in Your Shell Plant

A. J. LAVOIE'S LOW PRESSURE Compressed Air Chuck

This chuck can be applied to any make of lathe, without alteration to the machine, and will increase production from 25% to 75%. It grips and releases the shell while in motion—no need to stop your machine.

It is a single unit combination attached to the face plate of lathes, supported by an additional heavy duty bearing, thus making a heavy duty lathe out of a light machine. A small lever operates the chuck. Will operate with a pressure of 60 lbs. per sq. in.

MANUFACTURED BY

The Montreal General Tool Co.
673-5 Notre Dame Street, Maisonneuve, Montreal, P.Q.

Also manufacturers of shell tools, and special machine attachments of all kinds made to order.

The chuck is built on the duplicate part system. It is simple, effective and fool-proof.

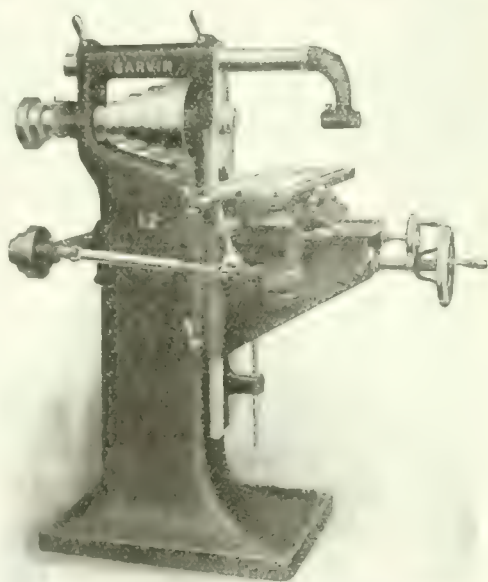
It grips the shell in a predetermined position. The jaws will not slip on the shell. It has shell interior and exterior adjustable stops.

A trial on one of your lathes will convince you that this is THE chuck for shell work.

GARVIN

NO. 12 PLAIN MILLING MACHINE

FOR ALL LIGHT MANUFACTURING



No. 12 Plain Milling Machine—Use Code Abrade

This machine is built especially strong and substantial for a tool of its capacity, and has many valuable features worthy of special mention. The slide is fitted with a quick pitch screw, giving one inch per turn. This combines the rapidity of a rack feed with the steadiness of the screw feed. The table has an oil pan all around it, with finished edges—automatic feed, trip and reverse—adjustable nut on the feed screw to take wear—the Feed Screw is hardened.

Adjustments.....18 x 6 x 15 in.

For Further Information ASK YOUR DEALER OR WRITE US DIRECT

IMMEDIATE DELIVERIES

Send for Complete Catalog

Manufactured by

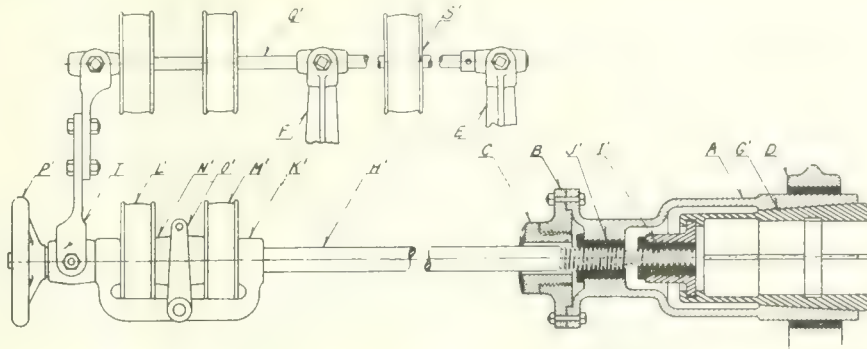
THE GARVIN MACHINE COMPANY

Spring and Varick Streets

(Visitors Welcome)

50 Years New York City

If your product is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.



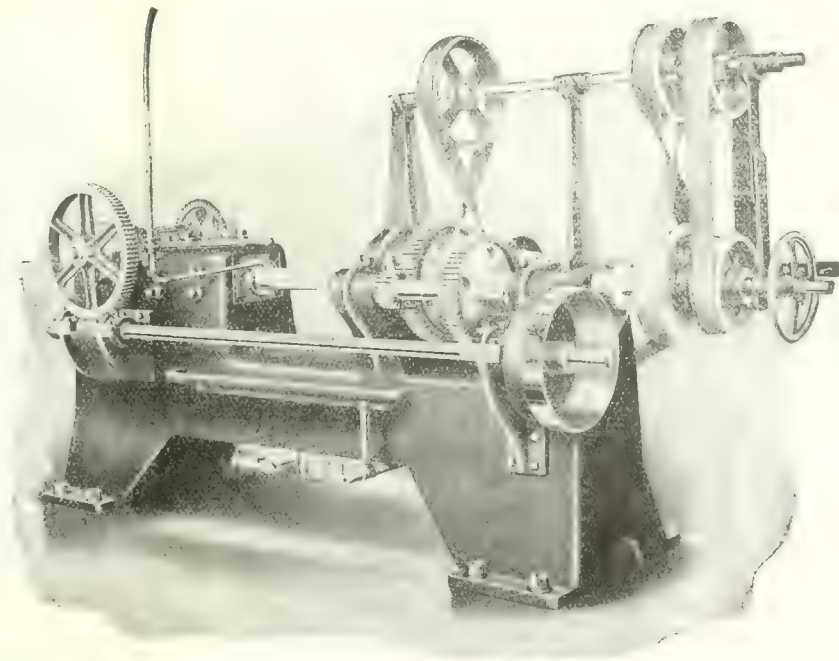
6" Boring = 75 Rough 100 Finish

10 HOUR DAY

A close study of the above chuck will reveal strength that enables this machine to give this production *all the time* in 10 hours. The illustration below shows the wonderful sturdiness of the machine. Inquire of us. The prices are exceptional. Made in Canada.

The Plessisville Foundry

PLESSISVILLE, QUEBEC



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&

BARNES

Twist Drills
and
Reamers

Screw and Drop
Forged Wrenches
Hammers

W

B

Special
High Grade
Drop Forgings

Cotters
Chisels
Punches, Etc.

CO

Users recognize "W & B" Tool Quality, backed by 64 Years' Uninterrupted Experience. If your Jobbers and Dealers cannot supply, write us and we will see that you are supplied. Send for Catalog No. 90.

THE WHITMAN & BARNES MFG. CO.

ESTABLISHED 1854

CANADIAN OFFICE AND FACTORY

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ST. CATHARINES, ONTARIO

Mining Machinery Parts



Two-key Tappet

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

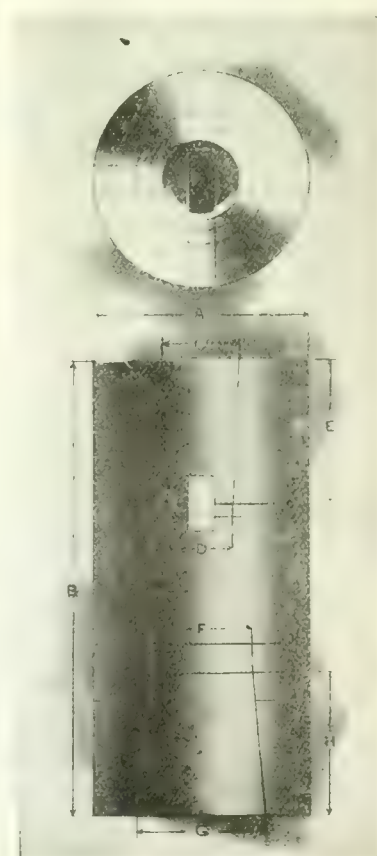
Also Manufacturers of Lining
Plates for Ball and Tube Mills
Concaves and Heads for Gyra-
tory Crushers.

Machine Moulded Gears

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

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

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



Stamp Head

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“Almost Rickert-Shafer Tapping Speed”

WHAT an admission to come from a competitor's salesman! And still, all honor to the man who thus qualified his claim.

The truth is: Every Rickert-Shafer Tapper is solemnly pledged to work with unerring accuracy on toughest jobs for longer than any other tapper built.

Rickert-Shafer Tappers are built in Bench, Vertical and Horizontal Types for tapping of all kinds—3-16 to 2 1/2 inch.

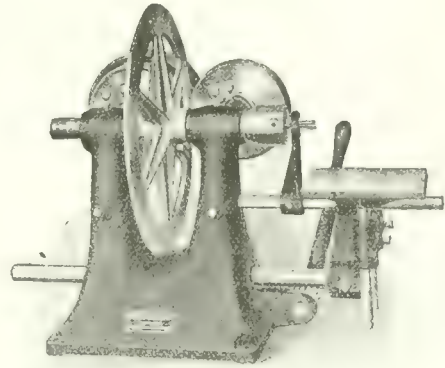
Let us send you particulars and the names of users.

RICKERT-SHAFER COMPANY

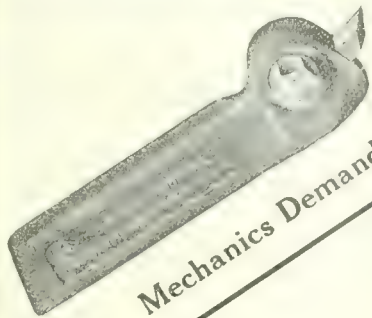
ERIE, PA., U. S. A.

This is Our Address—How Can We Serve You?

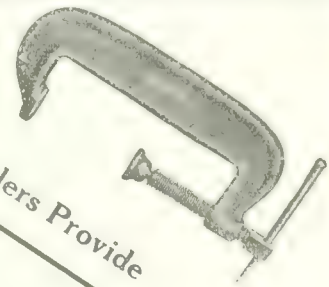
ALFRED HERBERT, Foreign Agent.
COVENTRY, ENGLAND



Bench Tapper



Mechanics Demand



Dealers Provide

Turn Where You Will
The World Employs

WILLIAMS'

GRAND  PRIZE

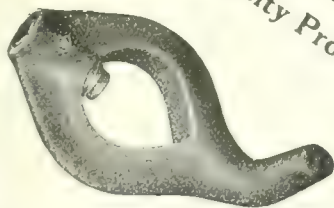
Drop Forged Tools

J. H. WILLIAMS & CO.



THE WRENCH PEOPLE

45 RICHARDS STREET, BROOKLYN, N. Y. CITY



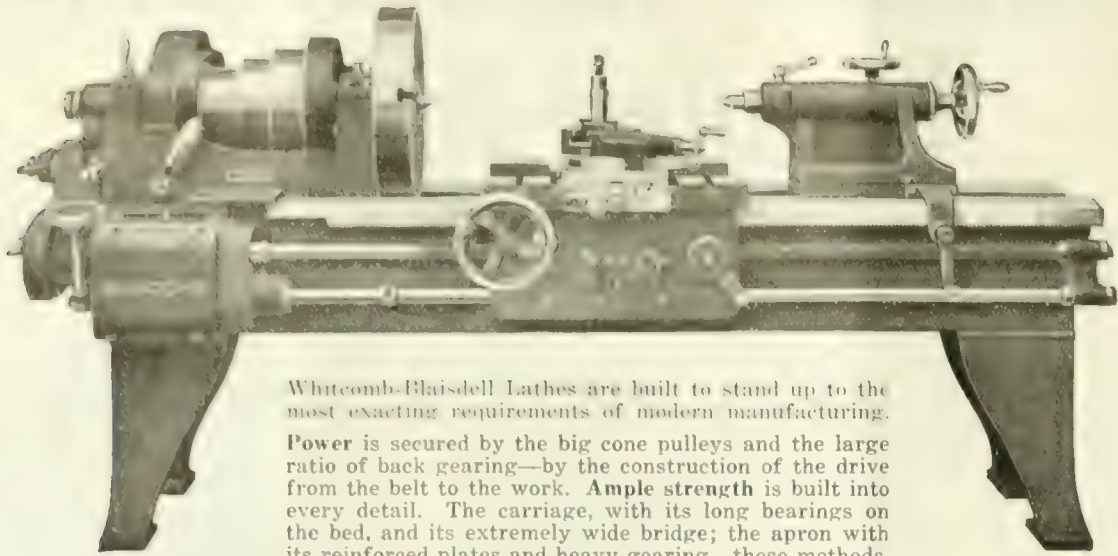
Publicity Promotes



Makers Guarantee

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With Strength and Pulling Power

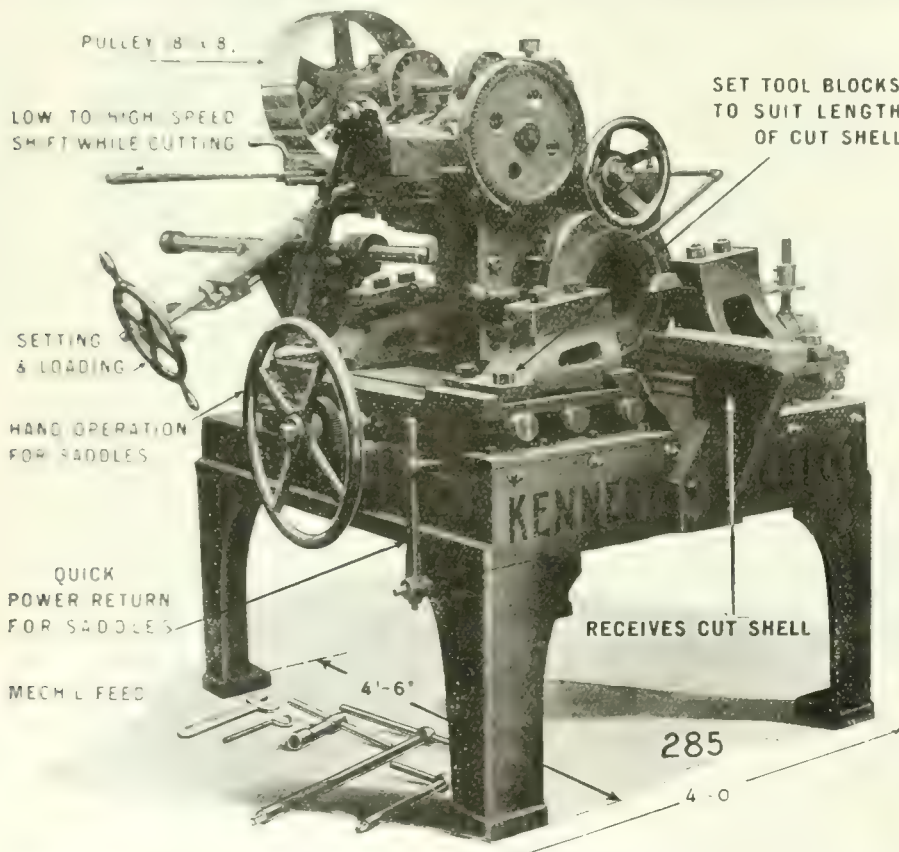


Whitcomb-Blaisdell Lathes are built to stand up to the most exacting requirements of modern manufacturing.

Power is secured by the big cone pulleys and the large ratio of back gearing—by the construction of the drive from the belt to the work. Ample strength is built into every detail. The carriage, with its long bearings on the bed, and its extremely wide bridge; the apron with its reinforced plates and heavy gearing—these methods, consistently followed throughout the design, build a powerful, durable machine tool.

Write for Catalog giving full details.

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



PULLEY 8 x 8.

LOW TO HIGH SPEED
SHIFT WHILE CUTTING

SET TOOL BLOCKS
TO SUIT LENGTH
OF CUT SHELL

SETTING
& LOADING

HAND OPERATION
FOR SADDLES

QUICK
POWER RETURN
FOR SADDLES

MECH'L FEED

RECEIVES CUT SHELL

4'-6"

285

4'-0"

CUTTING-OFF MACHINES

Cuts both ends at once

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

Forgings load in one end and dis-
charge out the other when cut

A Girl can operate it

**6-4.5" Machines in
Stock**

The
Wm. Kennedy & Sons,
Limited
Owen Sound

KEMPSMITH

UNIVERSAL MILLING MACHINES

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

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

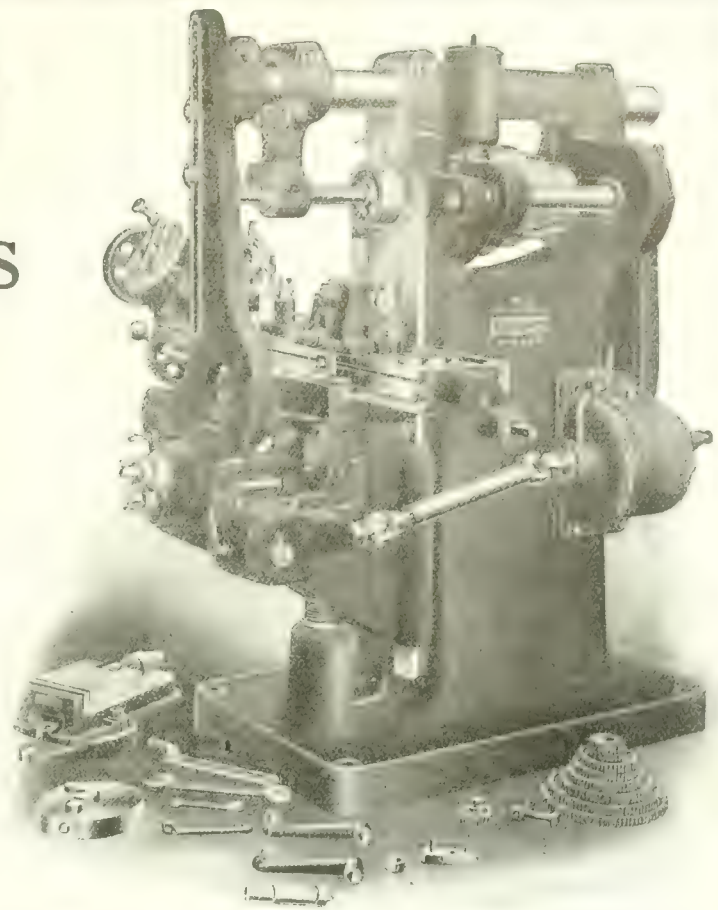
Kemp Smith machines are heavy, with weight well distributed and their accuracy is guaranteed within very close limits.

Send for Illustrated Catalogue.

Kemp Smith Manufacturing Co.
MILWAUKEE, WIS., U.S.A.

AGENTS:

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



Bilton Automatic Gear Millers—Spur or Bevel Gears

CAPACITY

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

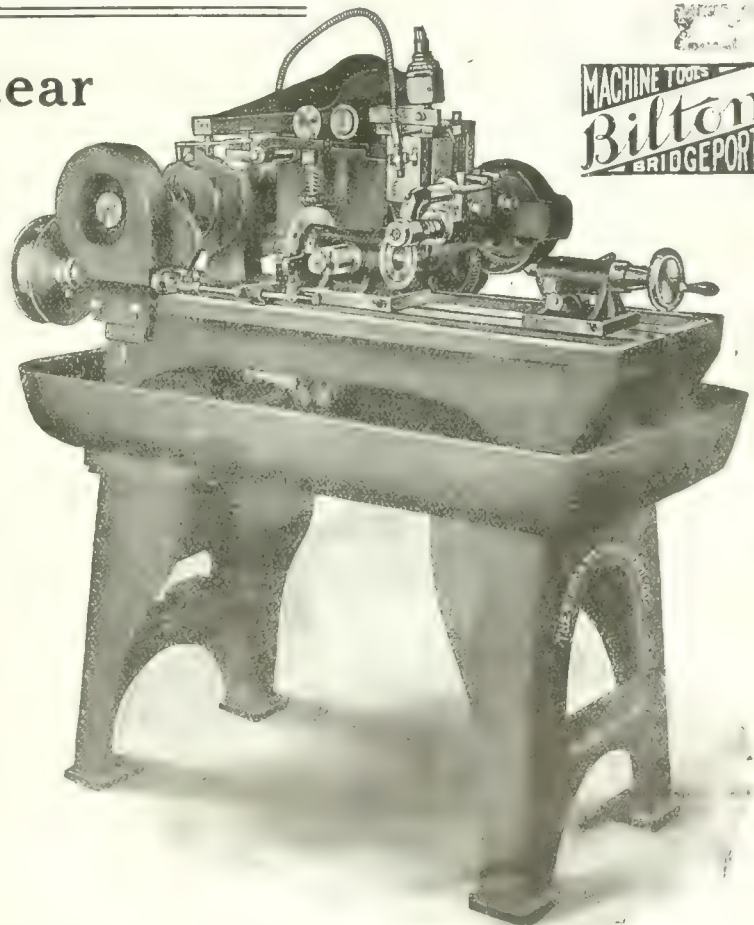
The Bilton Machine Tool Company

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

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

Catalog 30 on request

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



Her Sure Touch



Her deep-rooted desire to do thoroughly whatever work is expected of her makes

WOMAN

ideally fitted for operating the Grant

Silent Riveter

Instead of nerve-racking, hammer-like blows, with this Grant Rotary Rivet Spinning Machine there is absolute quiet. Noiseless twin rolls, revolving independently of each other, roll heads on the rivets under pressure. One rivet every second, and never a bent shank, whether rivets are soft brass or hard steel. Heads finished perfectly smooth, show no mark of the riveting tool.

Thousands of articles now being riveted on Grant Noiseless Riveters. Write.

GRANT

Mfg. and Machine Co.
BRIDGEPORT, CONN., U.S.A.

HIGH SPEED HAMMERS

For High Speed Work

FEATURES:

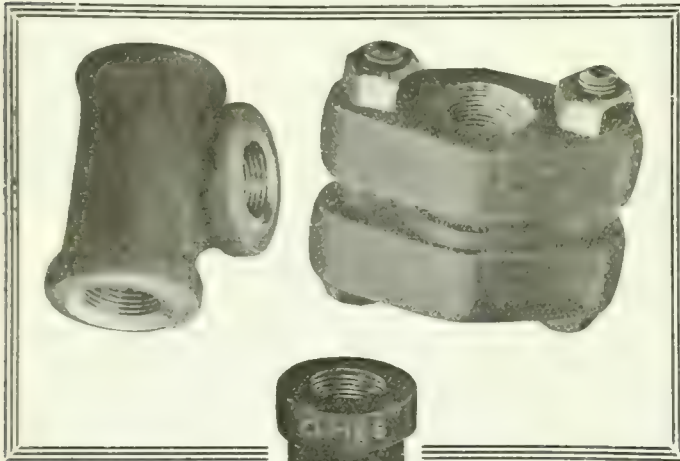
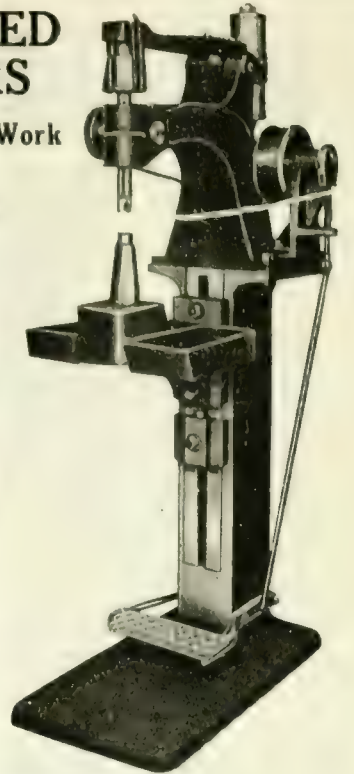
Economy in floor space, elimination of weight and a guaranteed saving of from 15% to 20% on any class of work. The life of the machine is practically indefinite as phosphor bronze bushings are used throughout.

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

Send for our High Speed Hammer Book.

THE HIGH SPEED HAMMER CO.
Rochester, N.Y.

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



ELMES' Forged Steel

High-Pressure Fittings

They are made after a thorough study of the requirements of these fittings. Our manufacturing knowledge of the machines these fittings are for has given us an intimate knowledge of the strength required.

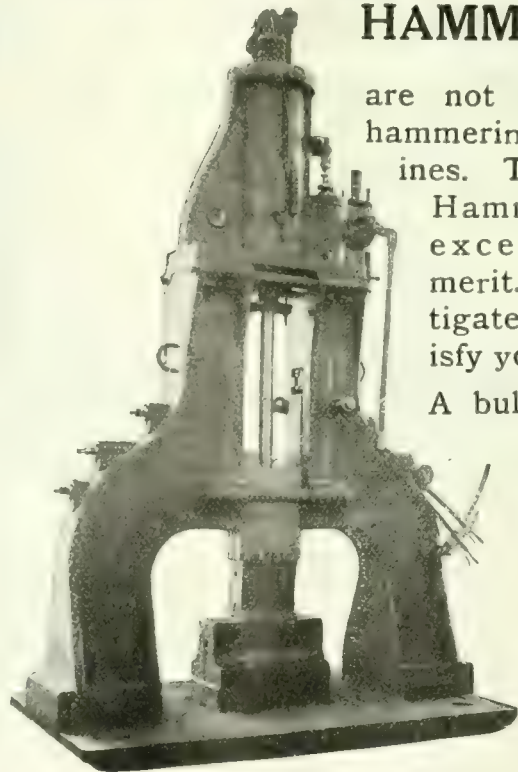
Write us for full information, prices, etc.

Charles F. Elmes Engineering Works
217 N. Morgan St. - Chicago, U.S.A.

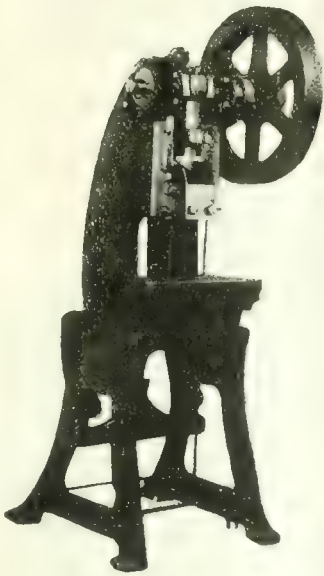
"ERIE" STEAM FORGING HAMMERS

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

A bulletin for the asking.



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



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

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

This is a feature you cannot conscientiously overlook.

Consolidated Press Company

HASTINGS

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

MICHIGAN

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



Reg. U. S. Pat. Office.

TEST PRESSES

For Applying Internal Pressure
Physical Test to Shells

BANDING PRESSES

For Pressing in Copper Rotat-
ing Bands on Shells.

Metalwood Manufacturing Co.

Detroit, Michigan

Designers and Builders of High Speed Hydraulic and
Special Machinery for all Purposes

Complete Hydraulic Installations

Canadian Fairbanks-Morse Co., Ltd., Sales Representatives for
Canada

R. E. Ellis Engineering Co., 621 Washington Blvd., Chicago, Ill.,
Sales Representatives. For Great Britain and Continent, address
Gaston E. Marbaix, Coronation House, 4 Lloyds Ave., London,
E.C., England.

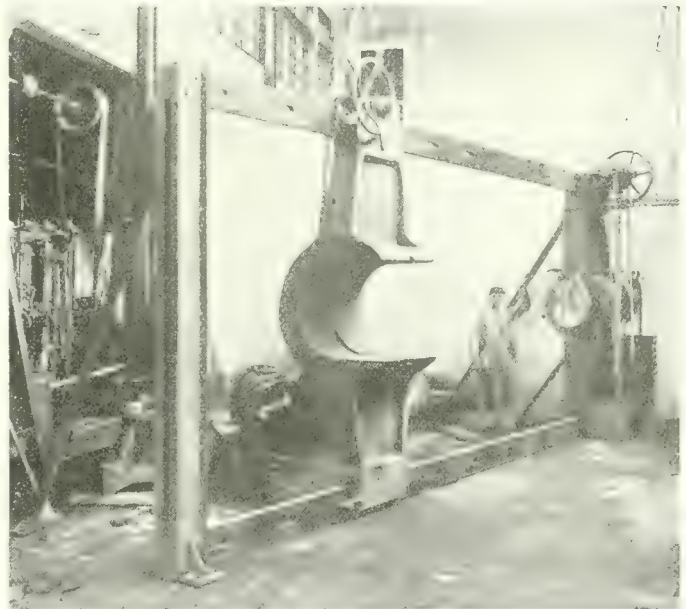


Illustration shows Hydraulic Press for Government
Shipbuilding Plant, Sorel, Que.

Hydraulic Presses, Pumps and Accumulators for all Purposes.

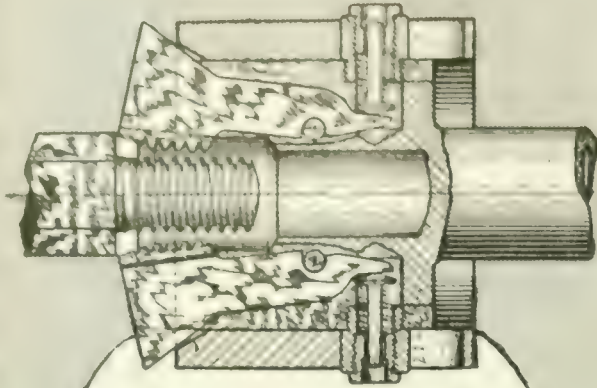
Write for Prices and Deliveries.

WM. R. PERRIN, LIMITED

TORONTO, CANADA.

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

Wells Self-Opening Die Advantages



QUALITY OF THREADS

The quality of threads cut by the W. S. O. D. is due to construction of the die head.

Chasers are held to the work by a solid steel shell which bears on all four lands directly back of the cutting teeth. (See diagram above). This shell also releases and closes the chasers, moving backward or forward in doing so.

The chasers fit in slots in a solid steel body. This prevents any tendency of the lands to tip, etc.

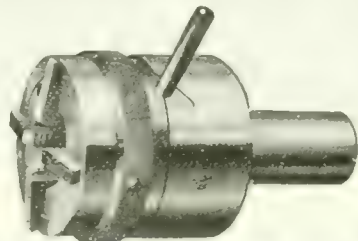
BIG PRODUCTION

The saving in time taken to back off, the free, easy cutting of the lands, the absence of trouble with the die head, all make for big, gratifying production.

LOWER COSTS

Saving in time, increased production, etc., mean lower costs, and consequently recommend this die for your use.

The W. S. O. D. is made in three models, one of which is particularly adapted to your special requirement. Tell us what your work is and we will recommend the right head for the job. Ask for literature and catalog.



Wells Self-Opening Die
Model B

Wells Bros. Co. of Canada, Ltd.
Galt, Ontario

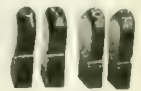
Sales Agents: The Canadian Fairbanks-Morse Company, Limited
Montreal, Toronto, Vancouver, Winnipeg, St. John, Calgary

The Proper Marking Tools

for Heat, Test and
Inspection Marking
of Shells



Special Champion
Holders concave on
face for marking
sides of shells.



Special Holder
shown, with the type
chamber curved
radially for marking
the base of shells.
Small illustration
shows style of type
used in these hold-
ers.

For Full Particulars
Write Now
For This Book



Est. 1850

**Jas. H. Matthews
& Co.**

MARKING DEVICES
Forbes Field
Pittsburgh, Pa.

The CANADIAN FAIRBANKS-MORSE CO., Ltd.,

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

DISTRIBUTORS FOR CANADA

"Over the Top"



Right down in the front trenches of metal working, in the no-man's land of production, the

Starrett Hack Saw

is doing its bit. The sharp, hardened tungsten steel teeth cut their way through rod or sheet, steel or copper as a machine gun cuts its way through opposing infantry.

While the excellence of Starrett blades has long been an accepted fact, never before have they been accorded the confidence they enjoy to-day. The rush and bustle attendant upon forced production have created a demand for a hack saw blade that will "stand up"—cut quicker and last longer.

Because we have made careful and thorough tests we are able to tell you just which numbered blade is best suited for each class of work. The result of these important tests, together with the unexcelled quality of Starrett Hack Saws, have placed our blades in the first rank of industrial preparation.

What blade to use is indicated on page 208 of our Catalog No. 213. Send for your copy.

The L. S. Starrett Company
 THE WORLD'S GREATEST TOOL MAKERS
 ATHOL, MASS.



NEW YORK

LONDON

CHICAGO



42-719

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For Grinding and Polishing Automobile Parts

ALUNDUM

Automobile manufacturers use ALUNDUM for polishing and finishing: steering columns, connecting rods, brakes, springs, electric starter parts and similar pieces.

Perhaps you have some operation in your plant that could be done at less cost and in less time by the use of ALUNDUM.

We are able to offer you IMMEDIATE DELIVERIES on polishing grain of any size.



NORTON COMPANY

Worcester, Mass.

Electric Furnace Plants:

Niagara Falls, N.Y. 884 Chippawa, Ont. Can.

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

That Wear-Longer Argument

It is claimed that the length of service of a file is immaterial, that it is the work done quickly which counts.

Our files agree with the cutting argument, but—they go a little further. They cut quickly first, last and all the time, and, like tried friends—

THEY WEAR

They have the teeth and they have the stock. Remember this brand and cut your filing costs.

PXH

TRADE MARK

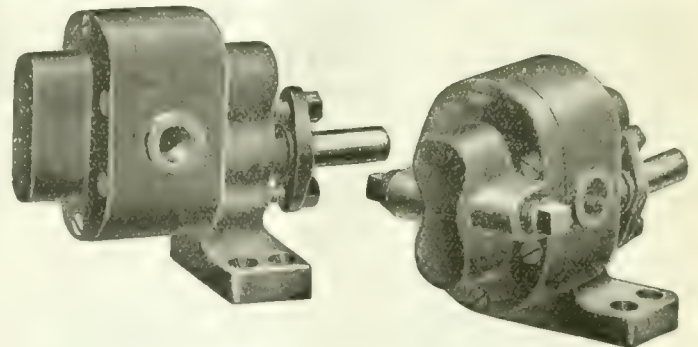
QUALITY FILES

PORT HOPE FILE MFG. CO.,
LIMITED

Port Hope, Ontario

"Ask your jobber"

(C)



Circulating Pumps

Eliminate the separate relief valve and its necessary piping by installing the Roper Circulating Oil Pump. But, you say, why install a new system when the present is good enough? This "good enough" article may appear to be giving satisfaction, *but*, is it giving the best to be obtained. Can you speed up without any fear? With a Roper you need not have any fear of any kind. The oil flows from it in a steady, even stream, and there you can speed up to full capacity and let her go feeling confident.

Inquire. You will get valuable information anyway.

C. F. ROPER & CO.

Hopedale : Mass. : U.S.A.



For Over Eleven Years This
NORTON
 GRINDING MACHINE
 Has Given Excellent Service

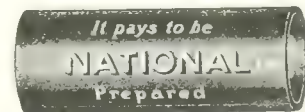
The photograph shows a Norton Grinding Machine that has been used for over eleven years in grinding the tools for making National tube. A piercing plunger is shown on the machine, being ground to size, 1/16 to 1/8 inch metal removed. On this same machine plungers as large as 16 inches diameter and 8 feet long are ground—all in the day's work—and all satisfactorily finished.

Everybody knows National pipe and tubing, and everybody knows its high quality.

You, too, can get excellent results and excellent service from Norton Grinding Machines. Let us send specification sheets.

"The Norton Limit is the Grinding Limit"

Photographed through the Courtesy of the National Tube Co. Maker of Steel Tubing and Similar Products



Norton Grinding Co., Worcester, Mass.

Chicago Store, 11 North Jefferson St.

Canadian Selling Agents: THE CANADIAN FAIRBANKS-MORSE COMPANY, LIMITED
 St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria

If interested, tear out this page and keep with letters to be answered.

Quality Production

Can be secured at the
maximum efficiency by
the use of

FAIRBANKS-MORSE MACHINERY AND SUPPLIES

Many of your departments can be completely equipped with Fairbanks-Morse Machinery. Every department can use some Fairbanks-Morse equipment.

Our catalogue shows a complete line of Scales, Valves and Steam Goods, Pumps, Electrical Motors and Generators, Machine Tools, Transmission Appliances, Machine Shop Supplies.

Let us quote on your requirements.



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



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

Machining the British 6 in. Mark XI. High Explosive Shell

By M. H. Potter

Changes in the completion of the shell industry have followed each other in recent months with kaleidoscopic rapidity, and the resources of manufacturers have on frequent occasions been severely tried in adjusting themselves to changes in type. The design of shell described here with is that upon which many manufacturers are at present concentrating.

INASMUCH as many manufacturers have found this particular shell rather difficult to produce, and have experienced considerable trouble and delay in securing rapid and steady production, this article will no doubt be of timely interest. Special attention is called to the sequence of operations, the working gauges used and the tool equipment involved.

To those who seek the shortest methods and the least number of operations attention is especially called to the method as pursued in this instance. After actual tests by practical experience, the following was found to be the best in the long run. In other words, the easiest way is not always the best, nor is it the shortest. Air-operated mandrels and collet chucks were purchased.

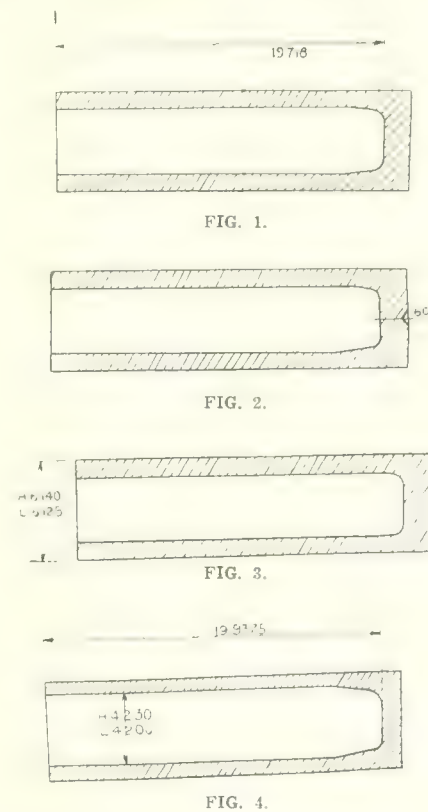
Cut Off Open End

Operation 1, see Fig. 1.—Special machine or engine lathe with two cut-off tools set opposite; tools operated towards the centre by means of a cross-feed screw; the feed screw is operated by worm gears driven from lathe head-stock gear.

Gauges.—Length gauge to extend from the end of bore, having a centre punch to mark shell before this operation.

Centre Closed End

Operation 2, see Fig. 2.—Engine lathe with special fixture; the shell and drill revolve in opposite directions; the fixture consists of a drill spindle mounted in a casting, having a V slide cross-



wise to the shell centres, which allows the operator to place or remove the shell. The drill is ground at 60°, and has no side clearance.

Gauges.—A flat depth gauge is used.

Rough Turn

Operation 3, see Fig. 3.—The cutting tool is stellite welded to a machine steel shank.

Gauges.—A snap gauge for low and high diameters.

Bore

Operation 4, see Fig. 4.—Boring machine with single boring bar, having a taper hole and slot for driving key. The three boring heads are as follows: First, for roughing the straight part of bore; the two cutting tools are 3/4 in. square and expanded to size by means of a taper plug screwed into the end of the boring head. Second, for roughing the taper and bottom of bore; two form cutting tools extending 1 in. on the straight part, held in taper slot in boring head by two machine screws; the holes (for the machine screws) are slightly elongated to permit the tool to be "packed up" to size. Old finishing tools are used in this head. Third, for finishing the bore; same boring head and tools (new) as used for the second cut.

Gauges.—Plug gauges for high and low diameter of bore; plunger gauge for depth of bore.

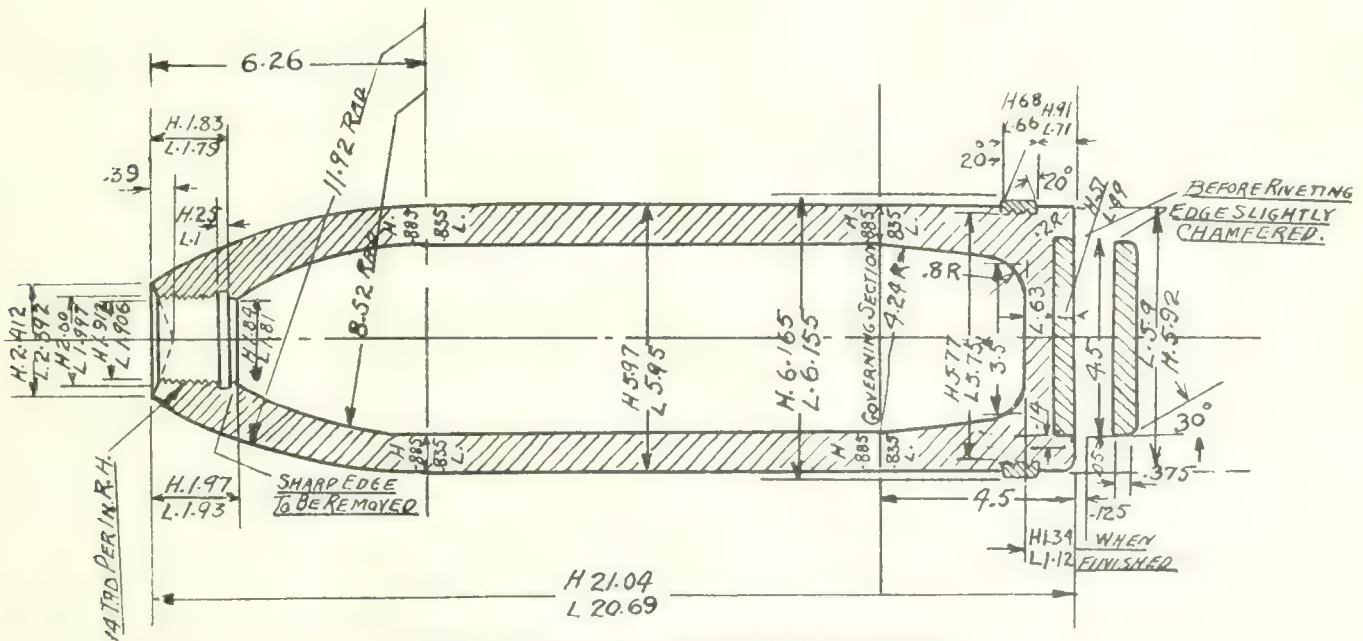
Rough Face Base

Operation 5, see Fig. 5.—Special open-end machine or engine lathe.

Gauges.—Length gauge to extend from bottom of bore to end (outside) of base, having a centre punch.

Re-centre

Operation 6, see Fig. 2.—Same as operation 2.



PRINCIPAL DIMENSIONS OF BRITISH 6-IN. H.E. SHELL.

Re-rough Turn

Operation 7, see Fig. 6.—Engine lathe, with special tool holder; the tools being set so that the cross-feed is not required. Gauges.—Flat gauge for form of chamfer.



FIG. 6.

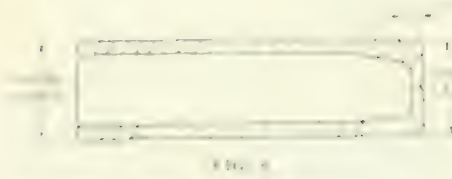


FIG. 7.

Operation 8, see Fig. 7.—Engine lathe with special tool holder; the tools being set so that the cross-feed is not required. Gauges.—Flat gauge for form of chamfer.

Chamfer Open End

Operation 8, see Fig. 7.—Engine lathe with special tool holder; the tools being set so that the cross-feed is not required. Gauges.—Flat gauge for form of chamfer.

Re-rough Face Base

Operation 9, see Fig. 8.—Same as operation 5, a similar gauge being used (distance between end of gauge and centre punch being 1.50).

Nose-in

Operation 10, see Fig. 9.—Hydraulic press and oil furnace; the shell is placed (about 6 in. of the open end in the furnace) and heated to a white heat for a distance of 1½ in. down the open end.

Gauges.—Outside length gauge for over-all length of shell; ball gauge for diameter of hole in nose.

Bore and Ream Fuse Hole

Operation 11, see Fig. 10.—Turret lathe, 1st turret; drill 1 11-16 in. diameter; 2nd turret, facing cutter, having an adjustable rod to extend to base (inside); 3rd, two single-pointed boring tools for double diameter of nose, having two threaded collars to regulate depth of bore; 4th turret, double diameter reamer, with adjusting collars, as used



FIG. 11.

B is the machine steel holder with a round shank to fit in the tool block D. The taper pin clamp E and key F permit of quick handling, as the tool must first be placed in the nose of shell and then clamped in position in the tool block. The shank at B is made as large as possible. The blade C is kept in line with the guide roller A, which keeps the bored contour in line with the bore proper.

on 3rd turret; 5th turret, rose reamer for angle of fuse seat, with pilot pushing in bore of nose.

Gauges.—Plunger gauge for distance

of fuse seat to bottom of nose, and gauge for high and low diameters of fuse seat, similar gauge for high and low diameters of fuse hole proper; length gauge for length of nose to fuse hole.

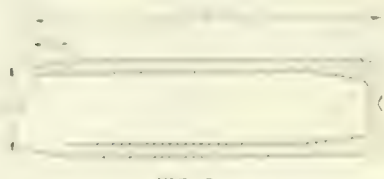


FIG. 7.

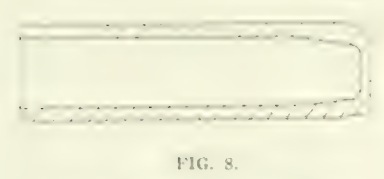


FIG. 8.

Finish Contour Inside Nose
Operation 12.—Engine lathe, with boring fixture (see Fig. 11), with explanatory note.

Gauge.—Length gauge for length of fuse hole.

Finish Turn Body and Nose

Operation 13, see Fig. 12. Engine

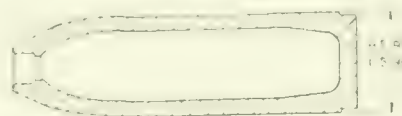


FIG. 12.

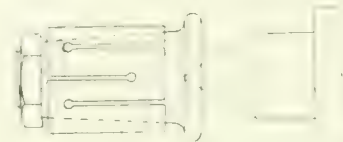


FIG. 13.

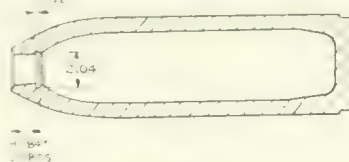


FIG. 14.

lathe with cam profiling attachment; expanding centre in nose end of shell, see Fig. 13.

Gauges.—Snap gauge for high and low diameter of body; ring gauge for high body; ring gauge for low body; two latter used by inspector for checking; form gauge for nose profile.

Recess and Thread Nose

Operation 14, see Fig. 14.—Engine lathe, with special tool post and tools (see Fig. 15 and explanatory note).

Gauges.—Combination (thread) gauge for threads and checking angle of fuse hole; length gauge for distance of recess from fuse hole seat.

Weight

Operation 15.—Special Fairbanks basket scale or regular platform (plat-

form set flush with bench top), see Fig. 16 and explanatory note.

Recess for Base Plate and Form Bead

Operation 16, see Fig. 17.—Open end machine or engine lathe, with special at-

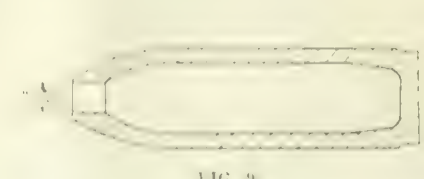


FIG. 9.

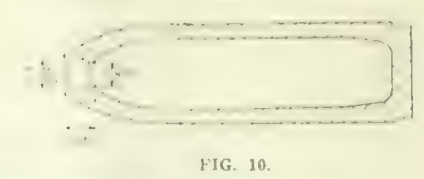


FIG. 10.

tachments; see Fig. 17A and explanatory note.

Gauges.—Plug gauge for diameter of recess; form gauge for bead; flat gauge for high and low depth and flatness of recess.

Check Weight

Operation 17.—See scales as used in operation 15.

Gauges.—Gauge for checking thickness of base.

Groove and Wave

Operation 16, see Fig. 18.—Open end machine or engine lathe with tool block and tools, as shown in Fig. 19.

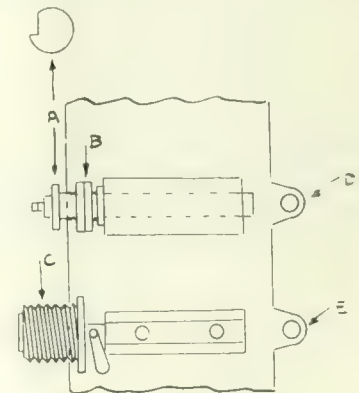


FIG. 15.

A is the circular recessing tool; B the threaded collars which determine the distance of the recess from the fuse hole edge; C is a standard collapsible tap; D and E are the pin stops which lock the tools on centre.

Gauges.—Flat gauge for angle of undercut; flat gauge for width of groove; flat gauge for distance of groove from base; flat gauge for height of ribs; snap

TABLE OF WEIGHT TO BE REMOVED			
UP LIMIT	185.025 to 85.2	85.025 to 85.2	INCHES
85.2	15	85.2	0
85.3	3	85.0	1
85.7	7	85.10	3
85.11	11	85.14	4
85.5	5	86.2	5
86.3	3	86.6	6
DOWN LIMIT	86.7	86.10	7

FIG. 16.

Explanation of table: Should the shell weigh 85 lbs. 12 oz. it is stamped 4, which means that block 4 is used in the following operation (16).

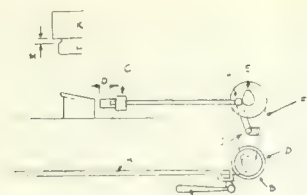


FIG. 17A.

The shaft A is lengthwise of the lathe, and is driven by the headstock gears; at the rear is the worm B. The lever C carries a cam which meshes the worm with the worm wheel. The hand wheel D (when A is not in mesh) allows the operator to bring the cam E into the desired position. The chain F drives the main cam shaft G. The roller on H swings from J and carries the block C. These blocks (Nos. 1, 2, 3, 4, 5, 6, 7) vary in thickness at D in 32nds of an inch (see table, Fig. 16). The cam E has a lift which gives a feed of 100th of an inch to one revolution of the shell. The tools K and L are against each other, the distance M being 1/32 larger than the finished shell, which permits the tool K (recessing) to be brought to the left 1/32 of an inch to take a finishing cut off the side of the recess.

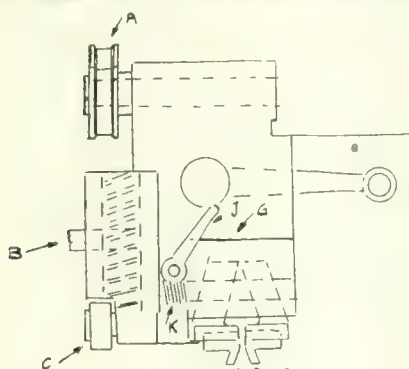


FIG. 19

The turret carries three independent tools A the circular grooving tool; B the flat waving tool, which is operated by a face cam running against the roller C. The coil spring E keeps the tool holder against the cam. The undercutting tools F are mounted in the holders G, which have racks cut in their shanks. The gear H meshes with G, and by means of the handle J (through the worm and worm wheels K) the tools are fed forward.

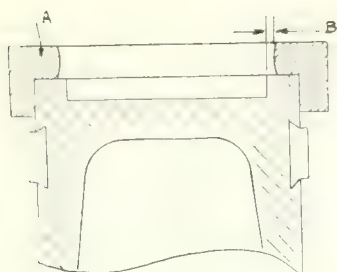


FIG. 20.

The ring A is a slide fit over the base end of the shell, the distance B being equal to one-half the width of the planing chisel.

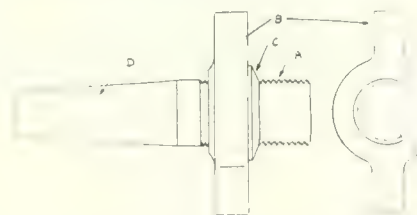


FIG. 21.

The nose of the shell is screwed on the threads A. The threaded lock nut is then driven against the nose (the taper C being 18° to match the taper of the fuse hole angle). The taper shank D fits the lathe spindle.

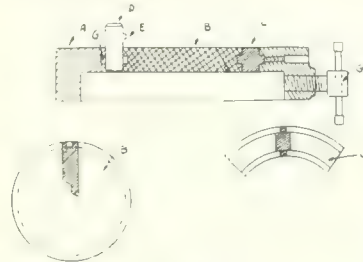


FIG. 22.

The outer ring A is grooved at G; the spacers (2 set opposite) C lock this (A) outer ring to the inner ring B. The stamps (E) prevents the stamps from falling out when the fixture is not in place on the shell. Blank pieces a little shorter in length than the stamps are used to fill in with.

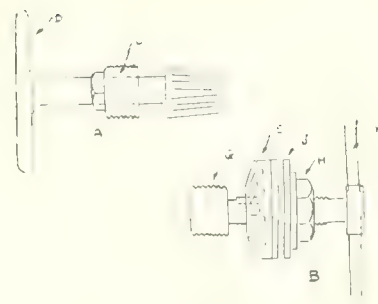


FIG. 23

A is the sizing reamer for the gaine seat diameter. The threaded nut C is screwed into the fuse hole and the reamer operated by means of the handle D. B is the seating (rose) reamer. The reamer proper is keyed to the threaded stem G. The nut H forces the thrust bearing J against the reamer. It is operated by the handle K.

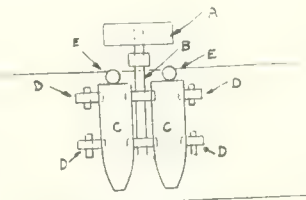


FIG. 24.

The belt-driven pulley A drives the shaft B. The shells are represented by C. The idle rollers D are bracketed to the bench; E are roller stops, which hold the shell in place.

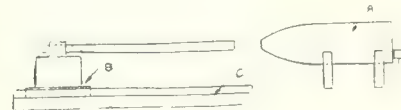


FIG. 25.

The shell A is revolved in rollers, as in Fig. 24. The varnish spray gun is mounted on a base B, which is flanged to slide along the board C, which is also flanged to suit the base of the spray gun.

gauge for high and low diameters of ribs; snap gauge for high and low diameter of groove.

Sand Blast, Wash and Clean

Operation 17.—Special machines used.

Preliminary Shop Inspection

Operation 18.—The following gauges are used after the shells have been col-

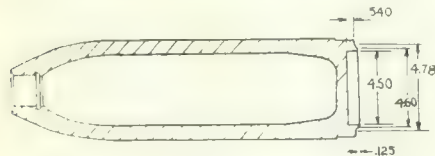


FIG. 17.

lected in series: Ring gauge high diameter of body, 5.97 in.; ring gauge low diameter of body, 5.95 in.; ring gauge high base, 5.92 in.; ring gauge low base, 5.90 in.; snap gauge high and low diameter of driving band groove, 5.77 in. and 5.75 in.; width of driving band recess, .680 in. and .660 in., and distance from base, .910 in. and .710 in.; caliper gauge thickness of wall, .885 in. and .835 in.

Preliminary Government Inspection

Press on Band

Operation 19.—Special banding press.

Fit and Rivet Base Plate

Operation 20.—A pneumatic hand hammer is used; see Fig. 20 for special fixtures.

Gauges.—The usual test for tightness.



FIG. 18.

Finish Face Base

Operation 21.—Open end machine or engine lathe; see Fig. 21 for method of holding shell.

Gauges.—Flat gauge for form of base radius; ring gauge for high base check.

Check Weight

Operation 22.—Scale as used for weighing in operation 15.

Stamp Base

Operation 23.—See Fig. 22 for fixture.

Hand Re-tap and Seat

Operation 24.—The ordinary expanding hand tap; see Fig. 23 for seating and sizing reamers.

Wash and Clean

Operation 25.—Special washing ma-

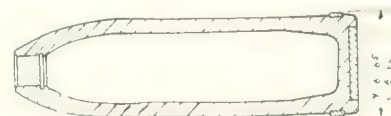


FIG. 26.

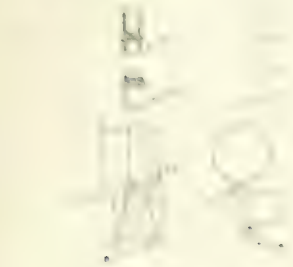
chine; see Fig. 24 for roller fixture for revolving shell to facilitate cleaning.

Varnish and Bake

Operation 26.—Special shell varnishing machine or fixture; see Fig. 25. Gas ovens to accommodate roller trucks, with structural steel racks to hold shell's nose downward; the required heat and length of time required depends upon the varnish used.

Tube Band

operation of the...
 Fig. 7



...
 ...
 ...

Gauges - Show gauge low and high diameter of band; ring gauge high diameter of band; ring gauge low diameter of band; flat gauge for form of band; high and low width of band and high and low distance from base.

Final Inspection

The following gauges are used. Ring gauge for high base; flat form gauge for profile of nose; cylinder gauge for concentricity.

Final Government Inspection

After which the shells are placed in the bond room previous to boxing and shipping.

SUBMARINES TO RAISE SUNKEN SHIPS

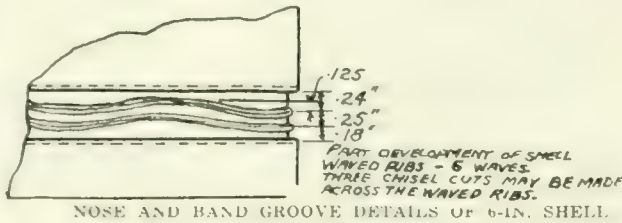
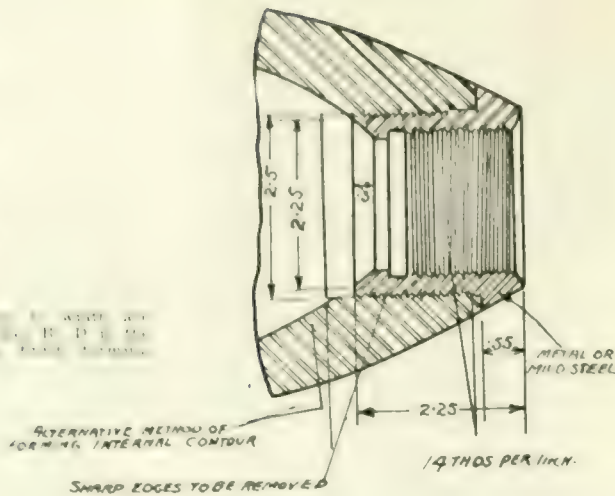
THAT the submarine considered as an engineering creation may be put to practical constructive use in salvaging sunken ships seems likely from the details which have been received regarding an invention by W. D. Sisson, an American engineer. Full particulars of the contrivance are not at present available, but from such as are given the general working scheme may be deduced.

The four accompanying engravings are from photographs taken in the shop where the diving bell was built, and it is uncertain whether it has yet received its initial test in actual working conditions.

The hull is a vanadium steel sphere, 8 ft. in diameter, and consists of two halves with a water-tight joint, by means of which they are bolted together. It is built sufficiently strong to withstand the high pressure which will be encountered when submerged to great depths and is roomy enough for the two operators and the working apparatus.

The object of the invention is to provide a device which will drill hobs in the sides of the sunken ships, thus affording a means of attaching a series of sunken... to the vessel to be lifted. So

ALTERNATIVE HEAD SCALE 1/2 SIZE.



that when the requisite number of pontoons is in position the water in them may be pumped out, and the resulting buoyancy will lift the ship. The drills used are 2 in. in dia. and driven by electric motors inside the shell. The sphere is held tightly against the sides of the vessel on which it is operating by means of a series of electro-magnets attached to the outside of the sphere by spindles passing through holes in the four adjustable saddles, which may be seen in the two engravings. Four 3,000

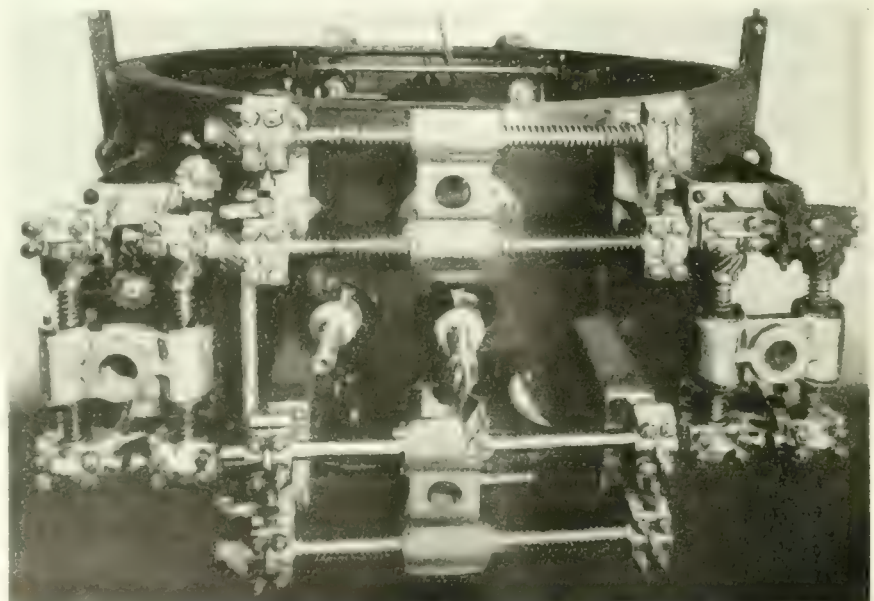
candle power incandescent electric lamps enclosed within a 2 in. glass protector, reinforced with steel net, are attached near the magnets, outside the shell, for throwing light on the work and the operators are enabled to see what they are doing by looking through lenses 4 in. thick in the sphere.

It may be explained that the steel pontoons which will be used are 40 ft. long and 15 ft. dia. and each has a lifting power of 300 tons when exhausted. It is proposed to have the submarine guide the pontoons to their places after drilling the holes, and for the purpose there are four propellers and a rudder so arranged as to propel the globe in a horizontal or vertical direction, as desired, at a speed of two miles per hour. Just how the actual attachment of the pontoons to the ship will be accomplished we are unable to state.

The submarine and equipment weigh 6 tons in the air and are lowered into the water by means of a cable strong enough to support a weight of 56 tons. Through this cable also run the wires for carrying current to the electric machinery and lights as well as the telephone wires. The atmosphere within the sphere is replenished by oxygen from a cylinder capable of supplying sufficient oxygen over a working period of 72 hours. Chemicals are doubtless provided to absorb the carbonic acid gas produced by respiration.

OVERALLS NOT NECESSARY FOR WOMEN WORKERS

CHESTER B. LORD, general superintendent of the Wagner Electric Manufacturing Company, of St. Louis, declared at the recent convention of the American Society of Mechanical Engineers that the women workers in munitions and other plants who consent to wear overalls are of the masculine type and are usually lacking in sex-consciousness. He believed, however, that all women workers in a plant should be made to dress alike and his plant had found out



ARRANGEMENT OF DRILL MAGNETS AND SHIFTING DEVICES.



EXTERIOR MECHANISM OPPOSITE PROPELLERS

by experience that the best clothes for women workers were a dark skirt, an unfadeable blue linen waist of standard design and a uniform apron. He said that all women workers would usually obey such rules about their clothes provided the rule were enforced for everyone. The uniform clothes were optional on Saturdays as many women desired to shop on the half holiday. Woman workers had usually an inherent fear of men and were willing to follow to the letter rules laid down for them.

Mr. Lord said that in employing women successfully in plants many little things had to be taken care of that would contribute to their contentment of mind without which they were not efficient. He said that all the machines in the shops of his company employing women were painted white and special attention had to be given to cheerfulness and cleanliness throughout the work-rooms and conveniences. He also said that in his plant there were on an average of two marriages per month among the employees and they were always very successful chiefly because under the

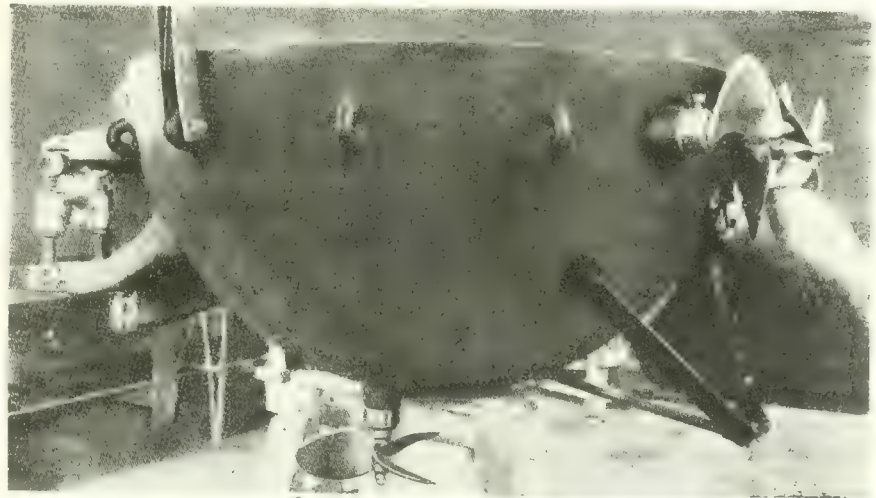
conditions of working, women depended entirely upon their natural advantages to attract the men, and the clothes consciousness and vanity of the woman were eliminated.

LABOR SAVING APPLIANCES IN FERRO-CONCRETE WORK

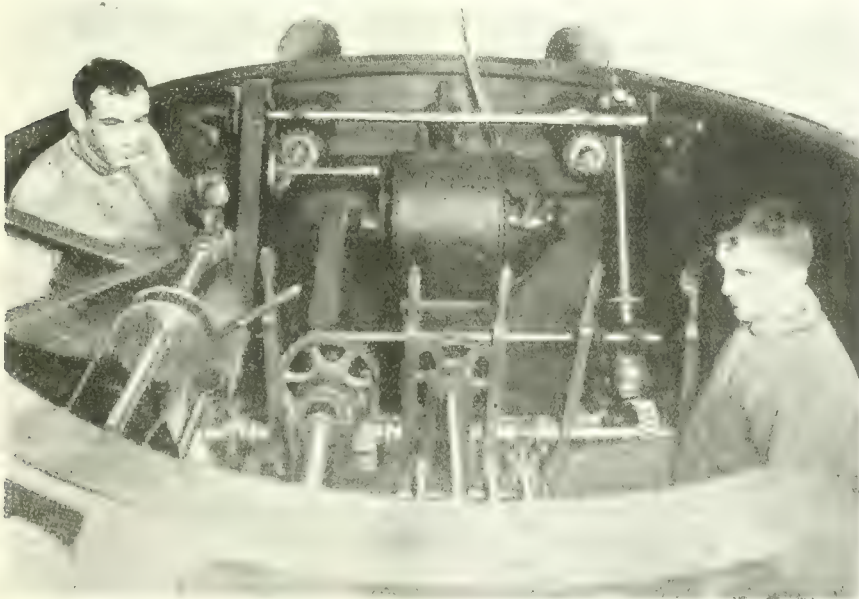
By O. C.

IT has always been the policy of modern engineers to encourage the design of machines for the efficient, rapid and economical performance of work formerly carried out entirely by manual labor. The extended employment of machinery is more than ever necessary to-day in view of the existing labor shortage. Owing to the circumstance that ferro-concrete work is executed on the site without previous preparation of the materials, the suggestion may perhaps be made that this class of work offers little scope for labor saving appliances. That may be so in comparison with steel construction, for which a large amount of preliminary work has to be carried out in the machine shops, the fitting shops, and the erecting yard, but mechanical aids are of much value to the reinforced concrete builder.

Amongst them may be mentioned appliances for handling materials delivered on the site, machinery for crushing, screening and otherwise preparing aggregates in mixing concrete, for hoisting



EXTERIOR VIEW. NOTE PROPELLERS AND RUDDER.



LOOKING INTO THE LOWER HALF, SHOWING LAYOUT OF MACHINERY

and distributing this mixed material expeditiously to the places where it is to be used, for cutting, bending, and otherwise preparing bars and strips, employed as reinforcement, and for various woodworking operations incidental to the construction of moulds, not to mention anything of the elaborate plant required in connection with the execution of large contracts. It is sometimes possible to execute all the necessary work by means of very simple mechanical appliances but as a general rule it will be found advantageous to make a special study of the aids available for the substitution of machinery in the place of hand labor.

AN important activity of the American Society of Mechanical Engineers is its work in co-operation with government bureau chiefs and manufacturers in securing and maintaining uniform standards in gauges used in the production of guns, ammunition, motor trucks, aircraft and other war material, and a public meeting of its gauge committee, held recently, was largely attended by manufacturers and their representatives.

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

MACHINING BLOCKS FROM POT CASTING

By Frank H. Mayoh

AN example of machining thin rectangular blocks in a rather interesting manner is shown by the accompanying illustrations. These blocks have a round hole bored in them, and the dimensions of the same are shown in the lower view of Fig. 1. In the upper view of Fig. 1 a pot casting from which these blocks are made is shown, and it will be noticed in this connection that a round beveled flange is cast at one end. This flange is for gripping purposes while performing the various operations.

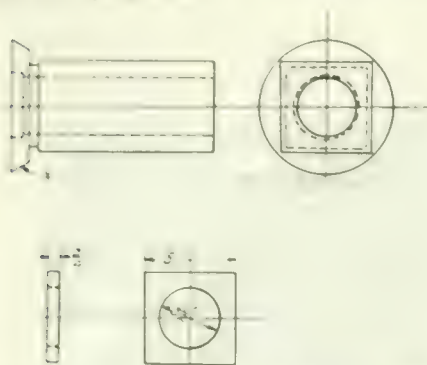


FIG. 1. POT CASTING TO BE MACHINED AND FINISHED BLOCK

In making these square blocks, the operations are performed in the following manner, the first of which is turning the beveled flange. This is accomplished by gripping the pot casting in a four-jawed chuck in the usual manner on a lathe, when by using a broad nose tool the beveled surface X is turned true, this being a necessary preliminary operation, as by so doing we have a satisfactory gripping surface from which the pot casting may be held true while performing the remaining operations. The second operation is performed on a chucking machine, as illustrated by Fig. 2, the method of doing this being obvious, as it merely consists of boring the hole with the cutter A held in a boring

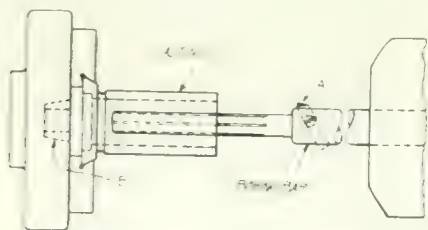


FIG. 2. METHOD OF BORING THE POT CASTING.

bar, the pot casting being gripped by the flange in a three-jawed chuck.

The boring bar at this operation is piloted in a bushing B held in the chuck. Having bored the hole, it is now neces-

sary to machine the four sides of the pot casting and saw it apart. Machining of the sides in this case is performed on a shaper using index centres, and the man-

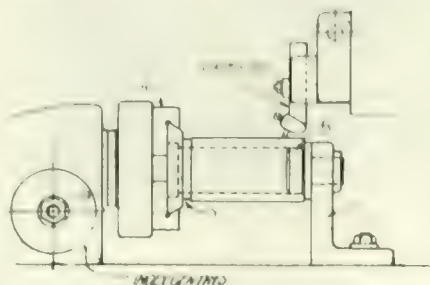


FIG. 3. METHOD OF SHAPING THE POT CASTING SQUARE

ner of performing this is shown by Fig. 3.

For this operation the pot casting is again held in a three-jawed chuck A by the flange, while the other end is supported by means of a plug B in the bored hole; the plug is held in an angle plate C, which in turn is bolted to the platen of the shaper. One side of the pot casting is now machined by feeding the tool across the work in the usual manner, and after one side has been machined the pot casting is indexed quarter-way round and machined in the same manner,

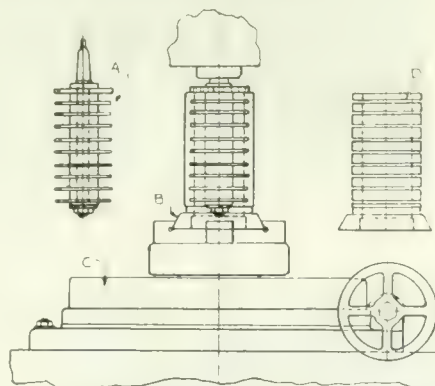


FIG. 4. METHOD OF MILLING OUT BLOCKS.

likewise the two remaining sides are machined, thus completing the rectangular shape of the pot casting. In this connection it is well to notice the recess Y in the pot casting which was provided as tool clearance for shaping into.

The pot castings being now finished, we come to a very interesting operation: that of cutting the pot casting into blocks. Anyone who is familiar with turning square bars in a lathe knows how hard this operation is on the tool and machine when starting to cut, as the tool is only cutting during four intermittent periods of each revolution and, therefore, there is a tendency for the tool to dig in or pound as it takes the cut.

Nevertheless, while the turning of square or irregular-shaped work may be readily accomplished in the lathe by using a rugged tool, this operation becomes increasingly difficult when using a narrow cutting-off tool; therefore, it was decided to perform the cutting-off operation of the blocks on a vertical milling machine, as shown in Fig. 4. For doing this the gang of cutters A was provided; the casting itself was again gripped in the chuck B, which in turn was held on a circular milling attachment C. To cut off the blocks the cross-slide was brought out enough to allow the work to be clear of the cutters while it is being placed in the chuck, following this the cross-slide was fed in until the cutters were through the hole of the pot casting. In this position the cross-slide of the milling machine was clamped, when by causing the rotary attachment to revolve the blocks were sawed apart. A view of the pot casting showing the saw cuts through it is indicated as D, and it will be noticed that the upper cutter on the arbor is a surface mill for facing the end of the casting.

Another point in connection with this gang of cutters is that each cutter is slightly larger than the one below, so that the upper block will be cut off first and each one below in turn will be cut off next.

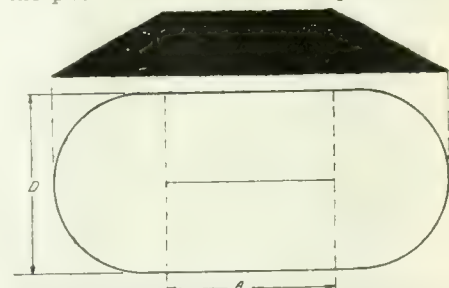
TONS OF COAL IN ELONGATED PILES

By N. G. Near.

WHEN bituminous coal is piled in a conical pile the tonnage in the volume is easily estimated from the formula, $0.00248 D^3$, where D is the diameter of the pile in feet at its base. But coal is often stored in elongated piles, as shown in the accompanying sketch, in which case the tonnage of bituminous coal is computed from the formula:

$$0.00248 D^3 + 0.00474 AD^2 = \text{tons (bituminous)}$$

where A is the length of the "crest" on the pile in feet. The best way to deter-



SKETCH SHOWING METHOD OF CALCULATING COAL PILE CONTENTS.

mine the length of this crest is to subtract D from the total length of the pile at its base.

The sketch shows one of these piles both in elevation and in plan. The plan

shows clearly how the pile can be cut up into three parts. The two curved end portions, when added together, give us a pure and simple cone, whence we have the $0.00248 D^3$ in the formula. The central portion has a triangular section from end to end, and its volume is one-half as great as would be the volume of a rectangular block having the same base and height. The tonnage in this central triangular portion is $0.00474 AD^2$. Adding the two together we, therefore, have $0.00248 D^3 + 0.00474 AD^2$.

Where the coal is anthracite instead of bituminous the formula becomes

$$0.00172 D^3 + 0.0033 AD^2 = \text{tons anthracite.}$$

D and A are both measured in feet.

These formulas are based on the fact that one ton of coal occupies 38 cu. ft. on the average, whether anthracite or bituminous. The natural cone of anthracite is 0.25 as high as it is in diameter at its base. For bituminous coal the value is 0.36.

LOADING TIME FUSES

By G. C. White.

ALTHOUGH there have been many thousands of time fuse component parts made in this country, there are very few who know the essentials of the loading operation and while not strictly of a mechanical nature the process is interesting. Like the manufacture of components, the loading requires great exactitude and attention to detail. It is not the intention of this article to deal with all the operations necessary in loading, but to give a general idea.

Holes to Be Drilled

The real loading is performed on the top and bottom rings by pressing a certain mixture of powder or composition, as it is called, into the routing channel. This composition must have a vent in order that it may burn, for if there were no vent and the burning were confined, an explosion would occur and the slow burning or time effect would

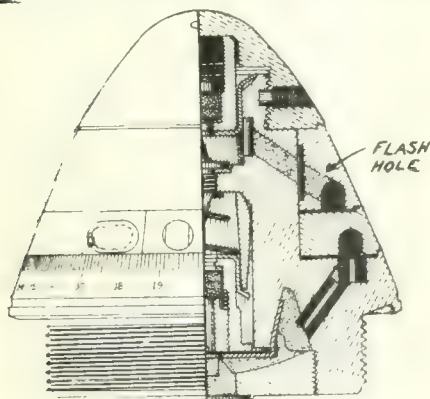


FIG. 1.

be lost. The vents are what the manufacturer of components calls the escape holes and they are elliptical in shape on the British fuse. The escape holes are connected with the composition channels by holes drilled through the escape hole. The extreme end, next to the flash hole

where the flame from the detonator in time pellet comes through into the ring, is drilled with a hole in the powder vent called the vent hole, which enables the powder to commence burning, until such time as the powder pellets, which have been inserted into the hole connecting up the end of composition channel and escape hole and the escape hole itself, can be ignited.

Jigs for Drilling Holes

All work done in drilling these holes and in routing is located by a work hole. The jigs used are shown in Figures 2, 3 and 4, and their operation needs no explanation. The jig for drilling the flash hole in bottom ring is somewhat different from that used for the top ring as it must be drilled and counterbored. The jig proper is made with a wing and after the counterbore is drilled the

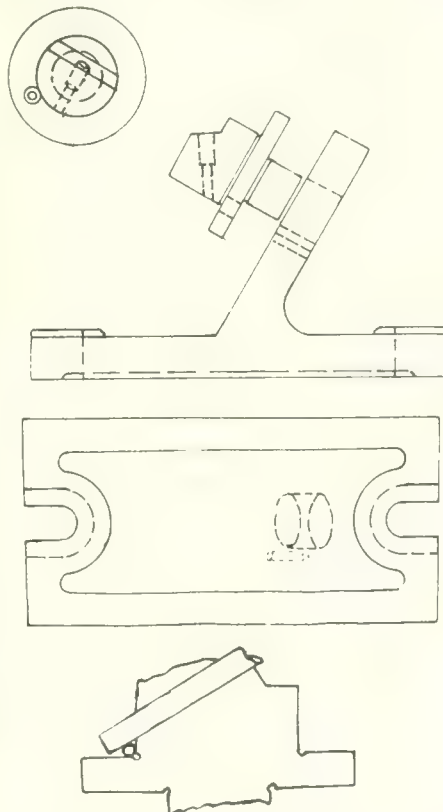


FIG. 2.

wing is thrown out of the way and the jig moved along the guides until it strikes the stop, when the other hole is drilled. A double spindle Avey drill is used. All these operations are done after the fuse composition has been pressed in.

Blending and Loading the Powder

The blending of the powder is a very important part of the loading and in this department nothing is left to chance. The powder used for loading is of two kinds, grain and mealed, but for the purpose of this description it is unnecessary to go into the details of their respective merits. It is sufficient to say that there is very little difference in their efficiency. The powder is divided into two grades, low powder 21.5 to 21.8 seconds and high powder 22.2 to 22.5 seconds. The ideal blend is of course half

and half, but it is sometimes necessary to mix two to one. A trial mixture is made up and sample fuses are tested at rest in an electrical machine which automatically records the length of time consumed. A sample is also tried by spinning a fuse at 2,500 revolutions per

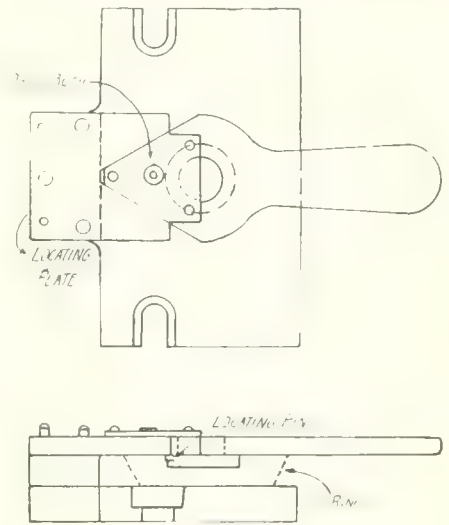


FIG. 3.

minute in a specially designed lathe and the time also recorded. If these tests are satisfactory, a sufficient quantity to load a lot of fuses is made up and a re-test is made. If this is satisfactory the required amount is weighed out and sent in air-tight cases to the loading rooms.

These loading rooms and the powder blending department are conditioned, or in other words kept at a temperature of 70 degrees, and at a constant atmospheric condition, as it is an established fact that barometric conditions affect the time of burning and so exacting are the specifications in regard to the time, that compensations must be made for variations in atmospheric conditions. As a safety first precaution, the loading de-

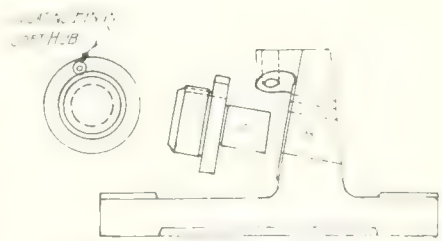
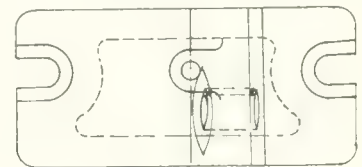


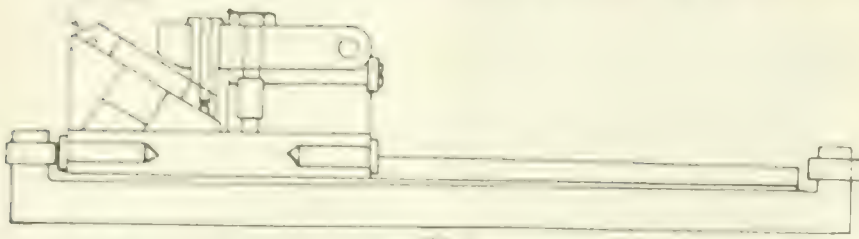
FIG. 4.

partments are divided into small compartments, each capable of turning out about 4,000 rings per day with 13 men. The loading operation consists of weighing out the powder, evenly distributing

... of the ...

The Loading Tool

The loading tool ...



The Loading Tool

... attached support to the bottom and outer diameter of the ring. A circular ... is inserted into the bore with a press fit, the idea being to prevent the ring from distorting under the loading pressure which is applied under a slightly modified Riele or Olsen testing machine. The pressure required is approximately 40,000 and 46,000 pounds for the top and bottom rings respectively, which works out approximately 29 tons per square inch. This pressure does distort the ring and after the centre support has been pressed out the bore will close in, making it necessary to ream the ring, which is the first assembly department operation. These operations may be divided up as per the operation table, from which it will be seen that the top ring, bottom ring and body operations are kept separate.

The rings are now faced off on shaving machines which run about 600 r.p.m., which is not fast enough to ignite the

powder. Surplus brass and composition cut off in the shaving operation is drawn by air through a galvanized iron container to a tank containing water which kills the powder. The rings are piled on

Insert percussion arrangement after having inspected it and inspect to see that all parts of the arrangement are correct in place.

Tighten base plug.

Put in base charge of powder.

Put in filling hole plug.

Shellac base.

Solder on weather cover.

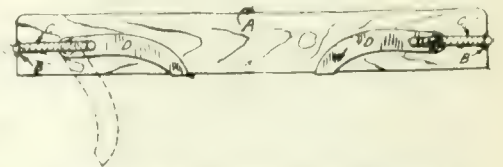
The assembly departments are for convenience divided up into sections, each capable of turning out 6,000 fuses per day of 10 hours. The components are handled separately on long tables until it becomes necessary to assemble, when they are grouped together



CLAMPING BLOCK FOR EMERY CLOTH

By R. Hamilton

WHEN it is required to fasten emery cloth or sand paper to a block of wood the general practice is to fasten the cloth on the wooden strip by means of small tacks; the sketch here shown illustrates a very handy and serviceable device for this purpose and one that can be easily made from a small piece of



CLAMPING BLOCK FOR EMERY CLOTH.

wire and sheet steel stock. The wooden block can be made of any desirable size and by cutting a groove in each end as shown at B will provide an efficient means for clamping the cloth by means of the toggle arrangement of the U-shaped wire and clamping lever D. The dotted line shows the clamp open to allow of inserting the cloth which is placed over the top A and between the end of the block and the wire C. When the cloth is in position the piece D is pressed back against the block so that the center line of the wire C is forced over the center of D, thus locking the toggle and also the cloth in position.



TO deaden the noise from trucks rumbling over a concrete floor, a factory has successfully used a heavy tar paper pasted to the floor by paint. The method of application is as follows: The floor to be protected is first given one coating of grey cement paint. On the following day when the paint is thoroughly dry, a second coat is applied. At the same time one side of a five ply tar paper is painted and when both paper and floor are still wet the paper is carefully laid, wet side down, on the floor and rolled with either a roller or wide tired truck until all signs of air pockets beneath the paper disappear. The surface seems to improve with age and very effectively reduces noise at a low cost to the lowest possible minimum.

trays for convenience in handling and sent to the assembly sections where the holes are drilled as described.

Operations on Top Ring

Rebore.

Drill powder vent.

Drill flash hole.

Lacquer.

Insert escape hole pellet, seal and shellac and put on paper washer, dry and trim edges.

Put on wax.

Put powder pellet in flash hole.

Operations on Bottom Ring

The work on the bottom ring is similar to the above with the addition of the following operations:

Put on felt washer with 100 pounds pressure.

Inspect to see that hole in felt washer coincides with flash hole.

Body operation.

Put on shellac.

Insert powder pellet in flash hole.

Put on felt washer under pressure.

Inspect to see that hole in felt washer coincides with hole in body.

Put rings in place.

Drill securing pin holes.

Take off rings and remove cuttings and burrs with a file.

Reassemble and insert securing pins.

Inspect and insert time arrangement.

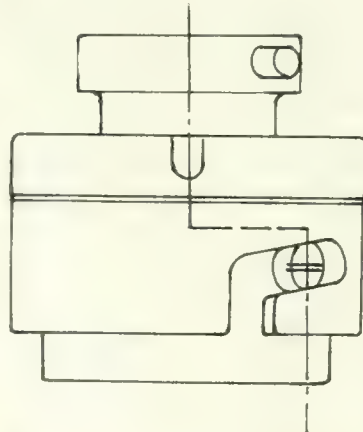
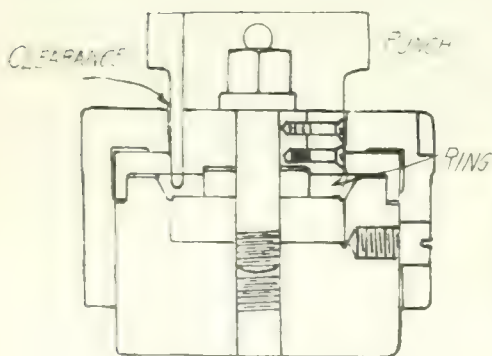
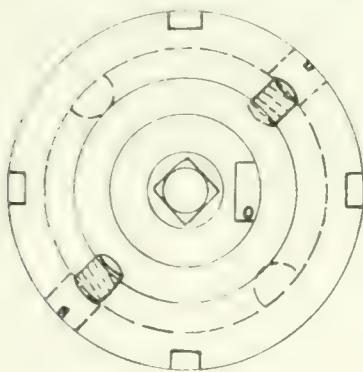
Put on cap.

Tighten cap.

Drill for set screw and insert.

Tighten set screws.

Try tension on bottom ring after being sure felt washers have had time to dry.



Modern Welding and Cutting Processes in Locomotive Works*

By A. F. Dyer

The practical applications of processes which but a few short years ago were looked on in the light of scientific novelties is only confirmatory evidence of the soundness of reasoning and courage of conviction which prompted the different pioneers in each line. The manner in which the two processes have proved to be complementary to each other is additional evidence that there is a field for every advancement in applied science.

AT the present price of material, scarcity of labor and difficulty of obtaining steel and iron, welding and cutting by both the above processes has proved a great boon and an almost indispensable factor in railroad repair shops.

Seven years ago we employed one man as an acetylene welder and owing to failures through his lack of experience the process was nearly condemned, but as we gathered experience both gas and electric welding developed, so that now instead of one man we employ eighteen and have often to work them overtime.

Acetylene Systems

The low pressure acetylene gas system is used and the whole shops are piped for the acetylene; every other repair pit has a drop connection; in roundhouses we use dissolved acetylene in cylinders, which saves the expenses of a generator and piping where the process is only in use occasionally.

There is a great difference in opinion as to the relative merits of high or positive pressure and low pressure gas, the manufacturers of pressure outfits contending that you save oxygen by using their type of generators and claim that you can not get so near to a neutral flame with the low pressure gas as you can with the high; the makers of the low pressure outfits claim that by the use of an injector embodied in the torch or welding head a neutral flame can easily be obtained; we find we can obtain a flame as nearly neutral as can be obtained with the outfit we use, although with pressure gas you can obtain a much larger flame for the same size head than with the low pressure. The principal factor, however, that made us decide on the low pressure outfit was the fact that our main supply pipes are carried overhead throughout the shops, and as nearly all, if not all, oil, steam and water pipes are overhead, we had to consider a very well known motto, viz., "Safety First," for if a man was working overhead and by mistake broke a joint of the gas pipe his torch or candle might cause an explosion, which might wreck the shop. I may say that, though we have been using the acetylene gas for eight years, we have never had an explosion of any sort yet. Our low pressure generator went through a big fire two years ago, and we were enabled to repair it and use it for several weeks till we received our new outfit.

Electric Outfits

There are many kinds of electric weld-

ing outfits on the market, and, of course, each one is claimed to be the best by its respective makers; each has its advantages, and the old prejudice very often exists among operators that the machine they are using and are familiar with is the best, and they will stick to that opinion until they become accustomed to the new machine. A new equipment using alternating currents instead of the direct current is now being put on the market, and only weighs 150 lbs., and gives from 20 to 200 amperes, and is about 50 per cent. cheaper than any D.C. machine on the market.

The electric welding outfit consists of two generators, each operating four welding circuits; the shops are wired, and at convenient places connection boxes are placed and only need a lead and ground wire connected to them and the work on which the welder is engaged.

The outfit used has panel controls, which allows each man to control his amperes independent of the other welders.

The processes have proved themselves fitly to be ranked amongst the greatest time and labor savers, and also we may safely say money-savers, introduced for a long period. For instance, in the not very distant past, a locomotive with a broken frame was due for a period of several days in the shops before they could strip down one side and remove the frame to the smith's shop, weld it, and perhaps have it machined and then replaced; now we drop the pair of wheels which may cover the break, cut out the crack with the cutting torch to the shape of a double V at an angle of 90°, clean off the oxide caused by cutting and weld up with the metal electrode, using soft steel or Swedish iron, a frame 4 in. x 5 in. being cut and welded in under 14 hours, and it can be done in less time by having two operators on the frame at once, but the men do not like facing each other's arcs, as when they are changing their filling rods their eyes get sore.

Frames, when worn by brake gear and stays, are built up and worn holes are plugged and welded instead of reaming them out to a larger size and thereby weakening the frame. In rebuilding and superheating engines the same boilers are seldom used on their original frames, and in very few cases do the various holes in angle irons, furnace bearers, etc., come into alignment with frames or boilers; these holes are welded up and redrilled.

The present price of tool steel demands that none shall be wasted; therefore, we use it down to the last inch by welding it to tire steel. Twist drills, taps and

reamers when broken near the socket end are welded and put into use again; for this purpose we use either the electrode or gas, but in both cases we use vanadium steel filling rods, as we find this gives the best results. Spokes of driving wheels are welded and flat spots on tires have been successfully welded up when it was necessary to do so.

Up to now we have not had much success on cast iron with the iron electrode although with the carbon you can make a fair job, but the gas is unquestionably the best for any of this material. We have successfully welded with the gas, steam shovel engine frames, slides and cylinders by welding in patches of cast iron where worn or broken. When our contract for shells was completed and the lathes that were used for this purpose were being overhauled, it was found that most of the V slide beds were worn down by the tool carriers; these were built up with the gas, which saved machining these beds down in many cases $\frac{3}{8}$ in.

Boiler Work

In regard to boiler work, most of the welding is done with the iron electrode, using a mild steel or Swedish iron as a filler; it is found that the electric process localizes the heat more so than the gas, though it is the writer's humble opinion that the gas makes a closer and neater weld, as all welds made by the electrode are more or less porous unless hammered up. It pays better whenever possible to do so to put quarter or half sides in order to get out of the fire line in preference to putting in a patch, for, as a rule, however well the patch is welded it generally gives out in from twelve to eighteen months' service, and the same applies to cracks, whereas the half or quarter side should last as long as the firebox.

When a nest of small cracks is found round the staybolts the bolts are removed and the holes countersunk and welded up. This method has been found to be very successful. Corner patches are welded in by running the patch into the tube or back sheets, as the case may be, at the same time removing the flanges. If it is decided to do away with a number of tubes, plugs are welded in the holes, first countersinking the holes and having the plugs punched by a countersunk die which gives the proper bevel for welding.

A great deal of trouble was experienced when welding in the superheater flues and tubes when this was first started, but after a little experience much better success was arrived at. Some operators prefer the tubes belled and others

*Read before the Canadian Railway Club, Montreal, Dec. 11, 1917.

**General Foreman, Welding Dept., Grand Trunk Railway, Montreal.

under them to seal, some prefer the water in the boiler and others do not.

The operators I am connected with like the belled methods best and with the water in the boiler. This leaves the tube sheet from heating, especially round the smaller tubes. Tubes are set in with counter ferrules at base 1.32 in. and the flues are belled out 3.16 in. to 1.32 in. and the small tubes 2.16 in. The sheet is roughened all round the tubes and flues, and the oil is then burnt off with the oxy-acetylene flame and tubes and flues welded in with electrode, using 1/8 in. mild steel or Swedish iron; the latter is preferred if caulking is needed.

Output Performance

A sample of an average day's work is as follows for a gang of 12 men:

- 14 rivet holes in smokebox and 4 peg holes in foundation ring.
- 10 tube holes in upper portion of fire-box tube sheet.
- 2 air pipes which were worn through in the tool room:
- 1 ratchet for jack (2 teeth replaced)
- 1 gear spindle built up.
- 1 chuck screw key end built up.
- 1 boring shaft built up from 2 1/2 in. to 2 3/4 in.
- 2 tool holders rebuilt.
- 1 air hammer handle repaired
- 6 teeth in lathe gear built in.
- 1 cone, small end filled up solid.
- 2 1 3/4-in. holes in top rail of frame filled up.
- 4 cracks 18 in. long in right side sheet welded.
- 14 bottom tube holes welded up.
- 2 washout plug holes built up for tapping in round head.
- Cut out frame for welding and started welding same.
- Welded bushes in pony truck stays.
- Cut out 3 sets of boiler tubes.
- Cut out 1 set of superheater flues.
- Build up caulking edge of fire hole.
- Heated corners of tube sheet for closing.
- Welded broken superheater damper bracket.
- Built up reversing lever where worn.
- Built up 2 side rods where worn.
- Cut out 48 flexible staybolts in firebox.
- Welded 2 cracks in throat sheet.

Air Brake Department:

- 1 broken flange of air brake cylinder.
- In addition to this list two men are engaged continuously on cutting around the shops.

For cutting steel and wrought iron the oxy-acetylene process has practically no competitor, it being impossible with the carbon point to cut as fast or as fine and neatly as the gas torch, although for scrapping fireboxes and frames, the carbon point is cheaper if time is no object and labor cheap.

The foregoing examples only enumerate a very small fraction of the uses to which the two methods of welding and cutting are being put to in locomotive repairing and machine shops, and fresh uses are being found for it every day.

Both Processes Valuable

No roundhouse should be without an oxy-acetylene outfit, both for repair work

and as a part of the wrecking outfit; many days are lost by engines being tied up through parts having to be sent to the nearest big shops for repair, which could be repaired on the spot with a welding and cutting outfit. All large roundhouses should have both processes, as they would pay for themselves over and over again.

In concluding, I would state that though there are many different opinions as to which is the best process, no shop is complete unless it has both equipments, although the gas has really the widest range, but, on the other hand, a heavy piece of steel or iron needs no pre-heating with the electrode, but welding can be commenced as soon as your arc is drawn; 95 per cent. of the failures which occur, instead of being laid on the process, should be placed on the shoulders of the operators.

Welding should not be treated as a side line of the machinists' or boiler-makers' business, but should be treated as a trade in itself, as it really is, for it needs the entire concentration of a man's mind, careful study, plenty of practice and a conscientious man to make a welder.

Wherever possible a separate building or suitable space should be provided for bench work, and should be equipped with a suitable furnace for heating and annealing castings, and also have plenty of floor room to allow of charcoal fires being built for preheating cast iron jobs for welding.



A TREATISE ON SHELL VARNISHING

By Chief Examiner

THE question of varnishing a high explosive shell is one the importance of which cannot possibly be too strongly impressed upon the minds of all concerned in its manufacture. Many lives have been wantonly sacrificed, and countless dollars worth of damage has been done, through carelessly and improperly varnished shells.

Why is a shell varnished at all? To give it a nice, pretty appearance? No. It is varnished:—First, to make absolutely certain that the bore is smooth—perfectly smooth; second, to protect the bore from rust; third, to prevent the high explosive from coming in contact with the steel and thereby forming "Picric."

Now comes the question—What is the best varnish to use? The obvious answer is "That which has passed the government analytical test." But it does not follow that "passing the test" is enough. This test is principally to ensure that no lead is in any of the ingredients used in making up the varnish—not even a "trace" of lead. It may pass the test well enough, and yet, may not function properly when applied to the shell. Again, the varnish may be good, but may not be applied in the right manner. Or the shell may not have been properly cleaned before being varnished. These points are all worth

consideration and might be discussed individually.

How to Clean Shells

Let us begin at the beginning and take the question of cleaning first. Some firms wash the shell thoroughly with gasoline or benzoline and then dry it out with rags. This is a method that often causes trouble partly owing to the poor quality of the gasoline of the present day. Some of it is more like kerosene or coal oil than gasoline, and possesses a kind of grease which remains on the steel in a white film after the spirit has evaporated.

Then, again, the rags that are used should not have any lint on them because this is sure to stick to the steel. It is very important to be sure that the compressed air—if such is used for drying out—is quite dry because, if not dry, spots of rust will form on the steel after the varnish has been applied, and has dried or been baked.

Some firms merely blow out the shell and wipe it thoroughly with a succession of rags. This method never brings success. Other firms wash the shell in a solution of soda or soda preparation used at almost boiling point. This is not approved of on account of the soda getting in between the steel and copper band, and thereby forming verdigris. Besides this, it is almost impossible to remove all traces of the soda, and as a natural consequence neither the varnish inside, nor the paint outside, will adhere to the steel.

The best known method, the one which is sure to bring the best results, is the following—it is of course a little more expensive to operate, but when one comes to add so much for every shell that has to be "rectified" for varnish—i.e. revarnished—perhaps the more expensive way is the cheapest after all. Wash the interior with a jet of steam hot solution of one of the cleansers permitted by the government inspector. Then dry it, after washing it in perfectly clean hot water, by using 1st, a mop, 2nd, a dry cloth, 3rd, a clean dry cloth, 4th, chamois skin, 5th, a perfectly clean chamois—then apply the varnish while the shell is warm, and you will get a varnish coat that is absolutely smooth, clean, and free from overlapping.

Applying the Varnish

Some firms prefer the spray or varnish gun, while others like the pouring method best. Splendid success has been attained with each method, but with the pouring there is invariably more trouble caused by the varnish getting into the threads in the nose. This must of course be completely removed, thereby causing more work and discontent—because it certainly is a tedious job.

There is very little air-drying varnish used now-a-days, because the authorities in England do not approve of it. The varnish used, should be copal baking. There are two sorts—clear and dyed. Take my advice and always use the clear stuff. All imperfections and dirt can be at once seen through the clear

varnish, but with the colored stuff imperfections may be and are covered up. It has been known where, in certain cases, this covering up with a second coat of the dyed varnish has been done on purpose, to save the trouble and expense—about 30c—of revarnishing the shell. No examiner, if he would be considered any good at all, will pass any varnish that is in slightest degree faulty, or of which he is not absolutely sure. If he is in the slightest doubt whatever, he should have the shell varnished again, the old varnish being thoroughly removed, whether the firm like it or not. The varnish question is too important to be trifled with.

In the earlier days of shell making, it was permissible to use air-drying varnish. This has, however, been done away with, except in some special cases, because it was found that it cracked and peeled off after the shell had been stored for some time, thereby leaving bare spots of steel exposed to the action of the explosive. It has been found much better, and safer to use copal baking varnish. This, as I said before, should be applied while the shell is warm. The shell is then placed in an oven and baked for from 2 to 2½ hours at a temperature of 300 deg. F.

Baking Hints

When a number of shells are placed in the oven at one time, the shells being cold naturally reduce the temperature of the oven, so that it is very necessary to note exactly how much this is reduced and give the shells the extra time required. The shells should not be left in the oven too long. If this is done the varnish will come out burnt and consequently flake off, which is just as bad as air-drying. The steel also takes on a burnt color and the inspector will turn the shell back to be polished with emery cloth, to enable him to give it a proper visual examination.

Great care and constant watchfulness is therefore required when baking, and a firm is wise to appoint a man to act as inspector for them who not only thoroughly understands the varnish question, but who will give his entire attention to the work.

If a shell is not properly varnished and is sent out to be re-done, every scrap of the old varnish must be removed by blasting, or otherwise, and the old varnish being baked hard is sometimes difficult to remove. Not only this, the time taken in re-doing work that should have been properly done at first means money lost to the firm and owing to the extra time taken in re-baking sometimes a whole shipment is held up for the sake of half a dozen shells.

Sometimes the varnish takes a mottled or piebald appearance. This is mainly due to spots of greasy gasoline, and means that while the spotted portion may be covered the covering is much thinner on the spots than on the remainder. Therefore this would constitute a dangerous varnish to pass.

A great deal of trouble is caused by

the varnish "running"—overlapping. The specifications call for a "smooth continuous coat," therefore if an overlapping or wave develops, the shell has to be re-done. Patching up faulty places in the varnish is not acceptable because these patches bake hard, and cause roughness on the surface.

Another good point to remember, is, never let your varnish thicken up. As it is against the rules to "thin" it out, a firm will be wise if they buy their varnish in one gallon cans, and not by the barrel.

Conclusion

To sum up—The points to watch are perfect cleanliness before varnishing, or the varnish will not adhere. Apply the varnish while the shell is warm. Whether using the "gun" or pouring method, watch for overlapping. Be exact in the baking time. Don't do any "patchwork." When cleaning the threads be careful not to let drops of "Taxite," "Brantine," or other strong varnish remover fall into the shell, because if you do that shell will have to be re-varnished.

When one thinks it all over, one sees how simple the whole thing is, provided of course, that the men, boys, or girls, in the varnish room, are interested in their work. As remarked at the beginning of the article, the varnish question is one the importance of which cannot possibly be too strongly impressed on the minds of all concerned—manufacturers, shop inspectors, yes, and government men too. A chief examiner is held personally responsible on the varnish question and he is a fool if he yields one fraction of an inch in this matter.



WHEELS FOR GRINDING STELLITE

CONSIDERABLE interest has been shown lately in the grinding of stellite. Much depends upon the personal element and grinding conditions. A recent number of *Grits and Grinds* contained some recent experiments conducted in laboratories and in some shops where considerable of this material is being used, which may prove helpful to those who have had stellite grinding as one of their problems. The tests were conducted in order to answer the following questions:

1. Do the different grades of stellite require different grinding wheels on the same operation?

2. What grains, grades and abrasives are most satisfactory for cylindrical grinding, surface grinding, tool and cutter grinding and cut-off grinding?

3. Is there any advantage in wet grinding?

4. Are wheels commonly employed for hardened carbon and high speed steels satisfactory for grinding stellite?

5. Will finer grits be better than those usually employed for steel tools?

The conclusions reached by these laboratory reports and by reports from salesmen of the various territories where stellite is ground successfully are as follows:

1. The No. 38 alundum is by far the

most desirable abrasive for the precision operations and most of the tool grinding. However, regular alundum is satisfactory for the cut-off grinding and may be used for free-hand grinding of heavy tools.

2. Vitrified wheels should be used in preference to silicate or elastic.

3. No. 3 stellite seems to require slightly finer and softer wheels than No. 2 stellite.

4. The advantage of wet grinding, especially on the precision grinding operations, is in more rapid and accurate sizing of the work and slight retardance of glazing. Finish is also somewhat improved. On tool grinding no pronounced improvement in wet grinding, except that it keeps the wheel face cleaner and enables the operator to handle the tools easier.

5. Wheels used for stellite are interchangeable to a certain extent with those used for high speed steel grinding. This applies especially on the precision grinding operations. On the free-hand operations, our laboratory tests call for No. 38 alundum, slightly finer and softer than would be used on steel tools.

6. The general tendency is undoubtedly toward finer grits, while grades follow other conditions which vary greatly in different shops. No. 46 grit is the coarsest size which produce a satisfactory finish in most cases.

7. For cylindrical grinding we suggest 3846-L on No. 2 stellite and 3846-K or 3860-J on No. 3.

8. For surfacing with straight wheels we suggest 3836 and 3846-H on No. 2 stellite and 3846 and 3860-H on No. 3 stellite. For surfacing with cup wheels approximately the same wheels may be used, but outside conditions will undoubtedly call for softer wheels on the cup wheel grinding operations.

9. For tool grinding we suggest 3860-M or N as found satisfactory in our tests. However, outside reports indicate the same deviation from this, namely, 36 and 46-O, also 46-K and 60-J regular alundum.

10. For cut-off grinding, 60-3 or 46 grades 4 and 5 alundum elastic should be used.

These suggestions and recommendations may only serve as a starting point in many instances. Outside conditions and practice are so varied that it is impossible to develop standards readily. Undoubtedly, as stellite comes into more general use, more experience in grinding will be obtained and then more definite statements and conclusions can be drawn.



MANUFACTURING ACTIVITIES IN THE U. S.

THE effect of three years of war upon the manufacturing industries of the United States can now be measured, in some degree at least, by certain official data which renders possible the comparison of conditions in 1917 with those of 1914. An analysis by the National City Bank of New York of figures of export of manufactures compared with those of 1914 indicates a wonderful development

It is interesting to note, however, a large increase in the manufacturing activities of the country in 1917, starting in 1914.

Manufactures exported in the eight months of 1917, for which figures are available, are only three times those exported in the same months of 1914. Personal manufactures, except the non-metallic minerals, in the same months ending with September, 1917, amount to \$279,199,000, against \$90,000,000 in the same months of 1914. Manufactures for the non-manufacturing use are \$27,000,000, against \$6,000,000 in the corresponding months of 1914. Thus the total of manufactures exported in the months of 1917 is \$302,000,000, against \$96,000,000 in the same months of 1914.

Export Figures

While this very large increase occurs, to a considerable extent, in strictly war material, it also applies to a large proportion of the classes of goods produced by our manufacturers. Iron and steel manufactures as a whole, for example, show a total export value in the eight months ending with August, 1917, of \$80,767,000, against \$10,246,000 in the corresponding months of 1914, being thus six times as much in value in 1917 as in 1914. Manufactures of cotton show in the eight months of 1917 total exports \$91,907,000, against \$34,028,000 in the same months of 1914, having thus a little more than trebled in value of exports in the period in question. Cars and carriages, including in this term freight and passenger cars for railways, automobiles, both freight and passenger, aeroplanes, motorcycles, and bicycles, show a total for the eight months of 1917 of \$111,073,000, against \$30,361,000 in 1914, having thus nearly quadrupled in value in the period under consideration. Copper of all sorts exported in the eight months of 1917 was \$349,676,000, against \$89,713,000 in the same months of 1914, having practically trebled in value in the three-year period.

Paper and manufactures thereof exported in the eight months of 1917 amounted to \$26,841,000, against \$13,337,000 in 1914. Tinplate showed a total in 1917 of \$24,211,000, against \$2,950,000 in the same months of 1914. Refined sugar, which has seldom formed an important factor in the export trade, showed for the eight months of 1917 exports amounting to \$48,421,000, against \$2,595,000 in the corresponding months of 1914. The wood and lumber industry is apparently the only one of the great manufacturing industries which has not prospered as a result of the war, the total value of wood and manufactures thereof exported in the eight months of 1917 having been but \$41,832,000, against \$61,279,000 in the same months of 1914.

Import Figures

Evidence of the activities of our manufactures is also shown by an examination of the import figures. The bank's statement shows that the total value of raw material imported for use in manufacturing in the eight months of 1917 is \$886,683,000, against \$436,234,000 in the

same months of 1914, having thus practically doubled in the three-year period. Manufactures for further use in manufacturing imported in the eight months of 1917 amounted to \$346,287,000 in 1917, against \$198,584,000 in the same months of 1914, having also nearly doubled in the three-year period. These two great groups of manufacturing material show for 1917 an aggregate of \$1,051,000,000, against \$635,000,000 in the same months of 1914. Raw cotton imports in the eight months of 1917 amounted in value to \$35,182,000, against \$18,025,000 in the same months of 1914. Fibres in the 1917 period amounted to \$55,462,000, against \$36,291,000 in 1914; hides and skins in 1917 \$166,679,000, against \$86,807,000 in 1914; India rubber and substitutes thereof in 1917 \$170,588,000, against \$50,088,000 in 1914; raw silk in 1917 \$111,787,000, against \$63,407,000 in 1914; pig tin in 1917 \$43,746,000, against \$24,334,000 in 1914; and wool in 1917 \$134,139,000, against \$50,521,000 in the corresponding months of 1914.

While no official census of manufactures in the United States has been taken since the year 1914, the very large increase in production is illustrated not only by the above figures of increased imports of manufacturing material and increased exports of manufactures, but also by the fact that the quantity of pig iron produced in the country in the eight months ending with August, 1917, was 25,660,000 tons, against 16,355,000 tons in the same months of 1914, and that the quantity of cotton used by the factories of the United States has increased approximately 25 per cent. in the same period indicates that the actual quantity of manufactures turned out has enormously increased, while the advance in prices has still further increased the total value of the output as compared with 1914.

A. S. M. E. ELECTS NEW HEAD

MR. CHARLES T. MAIN, of Boston, a consulting engineer, who has served in several public offices for the purpose of advancing the idea of good government, has been elected president of the American Society of Mechanical Engineers, which includes in its membership 8,500 mechanical engineers.

Mr. Main was born in Marblehead, Mass., in 1856, and was educated at the Massachusetts Institute of Technology, from which he graduated in 1876. After extended service in the engineering field he became, in 1907, partner in the consulting firm of Dean and Main, with offices in Boston.

Among the numerous industrial, steam power and water power plants which Mr. Main has designed and successfully completed, might be mentioned the Wood, Worsted and Ayer Mills in Lawrence, Mass., and four hydro-electric developments for the Montana Power Co., aggregating about 280,000 horse-power.

He is a member of the American Society of Civil Engineers and a number of other engineering and technical societies.

B. C. FISHERIES

THE report of the British Columbia Fisheries Department for the year ended March 31 has been issued.

The report shows that the value of the fishery products of British Columbia for the twelve months was \$14,538,320, which represented 40.54 per cent. of the fishery products of the Dominion, which totalled \$35,860,708. The British Columbia production exceeded that of Nova Scotia by \$5,371,469.

Notwithstanding the fact that the fisheries of the province show an increase in value of \$3,023,234 over that of the previous year, the quantity of the leading species of fish caught was notably less. The gain in value is due to an increase in the price received for the catch.

Of the fish marketed, salmon was valued at \$10,726,818; herring, \$1,009,708; halibut, \$1,972,000; cod, \$300,049; oysters and clams, \$98,180. There were twenty-one species marketed.

PULPWOOD REFORESTRY

THAT the greater portion of the cut-over pulpwood lands of Canada will take from 30 to 100 years to reforest themselves instead of about 20 years, as lumbermen have supposed, is the statement made by Dr. C. D. Howe, of the Faculty of Forestry, University of Toronto, to the Commission of Conservation.

Of special significance, in view of a possibility of the diminishing coal resources of the United States soon forcing Canadian railways to use hydro-electric energy for traction purposes, was the address of S. T. Dodd, traction expert of the General Electric Co., Schenectady, N.Y. He fully described the electrified western section of the Chicago, Milwaukee and St. Paul Railway, which covers a distance of 440 miles, and has found electric traction to be considerably cheaper than steam.

ALCOHOL is made from the cheapest starchy materials available, such as potatoes, maize, turnips, molasses. The raw material is mashed with about 5 per cent. of malt, and fermented in the usual way. After distillation in a Coffey still, the spirit is diluted with water, filtered through wood charcoal to remove fusel oil and redistilled through a fractionating column. The products are separated into three grades: first runnings, and first and second quality spirits. The first runnings, containing about 95 per cent. of alcohol with a small quantity of aldehyde, may be used for burning and give rise to no deleterious effects. The first and second qualities, which are 96 to 97 per cent. in strength and contain only traces of aldehyde—the second quality also containing a small quantity of fusel oil—are known as silent spirit, because they afford no evidence of their source. These qualities are used for drinking purposes—liqueurs and factitious brandy and whiskey—and for pharmaceutical preparations.

EDITORIAL CORRESPONDENCE

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

OVAL TURNING

THE article on elliptical lathe work appearing in a recent issue of this journal reminds me of an attachment used some time for turning a few irregular shapes, the dimensions of which were not required to be very accurate, but had to conform to the desired throw

of the lever C, the upper end of which contained a small hardened steel piece D, the point bearing on the surface of the eccentric E. This eccentric, with a throw of $1\frac{1}{2}$ inches, or the difference between the major and minor axis, was keyed to the shaft that turned in the bearings of the fork bracket B. This

was maintained by the action of the small cable I and the weight K, the former passing over the small pulley located on the side of the bracket J. Better results are obtained when the strain is equalized by using a cable on either side of the cross slide.

The action of this device is illustrated

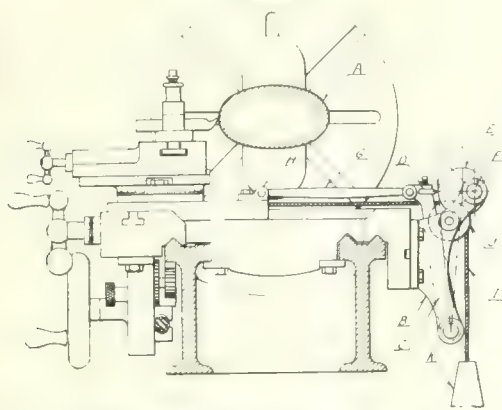


FIG. 1. ARRANGEMENT FOR RECIPROCATING THE CROSS-SLIDE

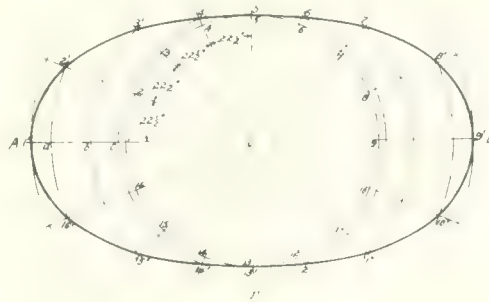


FIG. 2. GRAPHICAL DEVELOPMENT OF OVAL.

of the difference of the minor and major axis. To hold ourselves to the dimensions given in the article of recent date, where the major axis was $7\frac{1}{2}$ inches and the minor axis 4 inches, the oval was developed from the oscillating motion derived from an eccentric, this being transferred to a reciprocating movement of the cross slide by suitable linkage. The arrangement of the device as at-

shaft F was driven by suitable gearing arranged at the rear of the lathe, so that the train could be set up to suit the work required. The fulcrum of lever C was located in a vertical midway position between the two extreme points of travel of the controlling point of the steel block D. Connection was made between the device and the cross slide by means of the rod G, the small bracket H being se-

by the graphical sketch, Fig. 2. It must be understood that to derive an oval or ellipse from an eccentric in this manner it is necessary that the eccentric make two revolutions while the work is making one. To determine the approximate outline of the oval that the attachment will produce draw two circles representing the two diameters of the piece required, in this case $7\frac{1}{4}$ and 4 inches. The centre of motion of the eccentric will be at X. From this point divide the circle into 8 equal parts, each having an angle of 45 deg. The intersection of the radial lines with the eccentric circle will be the points on the circumference in contact with the controlling point for each 45 deg. of movement. From the various intersections, using X as a centre, draw arcs, cutting the horizontal diameter at A, B, C and D, these points representing the lateral travel of the cross slide for each 45 deg. passed through by the generating eccentric; and as the work is revolving at one-half the speed, it will pass through an angle of $22\frac{1}{2}$ deg. in the same period of time. Therefore, transferring these distances to the portion of the line A-B lying between the two circles, and describing arcs cutting the various radii in the points 2 ft., 3 ft., etc., will give the points through which the curve can be developed. Fig. 3 shows the outline that would result if the eccentric were used in the ordinary, where the centre of the connecting rod passes through the circle l-b-d-b. If the connecting rod were of infinite length the developed outline would be more elliptical in shape than here shown.

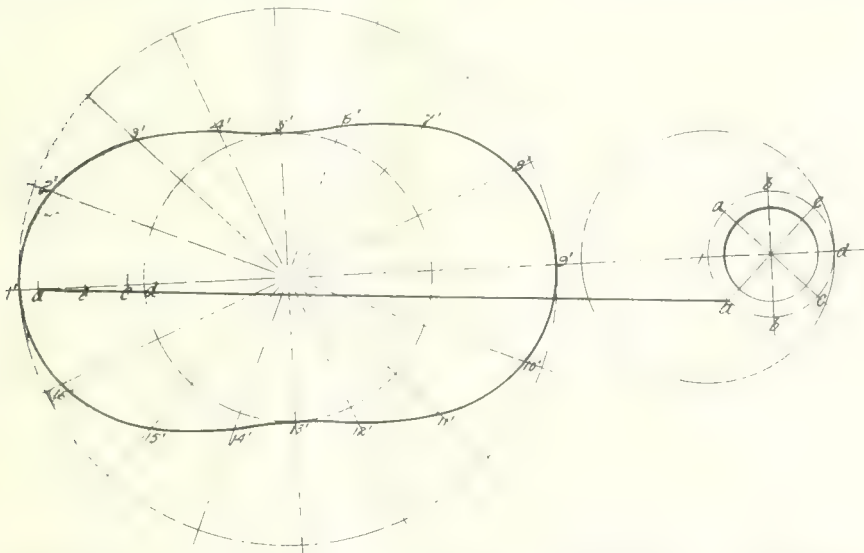


FIG. 3. OUTLINE WHICH WOULD RESULT FROM USE OF ORDINARY ECCENTRIC ROD.

tached to a lathe is shown in Fig. 1, the work A being held in a chuck secured to the face plate of the machine. The bracket B was secured to the back of the carriage and from the lower support car-

cured in a position to suit the size of the work. With the cross feed screw removed, tool adjustment is made by means of the compound rest; contact of the point on the eccentric being main-

MARINE USES OF CONCRETE

By L. E.

BESIDES the use of concrete in the construction of piers, wharves, and other structures, the use of concrete in the construction of ferrocement vessels is becoming more and more common. The use of concrete in the construction of ferrocement vessels is becoming more and more common. The use of concrete in the construction of ferrocement vessels is becoming more and more common.

The actual building process of a ferrocement ship is such that the quality of the material and the workmanship cannot be controlled with the certainty obtaining for steel vessels. The tensile strength of concrete is very limited. Tensile stresses must, therefore, be carried as far as possible by the reinforcing steel. In a floating structure, however, the concrete cannot be altogether guarded from tensile stresses, which are apt to create small cracks. Such cracks may also arise during the setting of the concrete. On shore they are generally considered to be of minor importance, but it is by no means certain that such cracks may not play a different part in a vessel exposed to varying stresses and the effect of penetrating sea water.

THE GYROSCOPIC COMPASS

By C. T.

THE French physicist Foucault was the first to analyse the phenomenon of the gyroscope which underlies its application to the compass. Foucault's efforts, which were made in 1851, resulted in the deduction of two laws: firstly, that a rapidly rotating wheel suspended with freedom to move about all axes will maintain its plane of rotation in space; and secondly, that a gyroscope suspended will tend to process or turn about the vertical axis in an effort to place its plane of rotation coincident with that of the earth. The question of utilising this phenomenon in an instrument which would seek and maintain the true north meridian, regardless of position, speed or course, or oscillating movement of the

...in which it was... (partially obscured)

Early in his work the American inventor Sperry became convinced that the... in devising a suspension which would be frictionless about the vertical axis, allowing the gyroscope to turn with perfect freedom in its effort to seek the meridian. The problem was solved by... element from a strained wire, the top of which is carried in a frame surrounding the gyroscopic element, the frame being oriented by an electric follow-up system in such a way as to cause the frame to follow any tendencies of the gyroscopic element to move about the vertical axis.

Numerous other problems quite as difficult of solution were encountered. Perhaps the most difficult of all was that involved in so suspending the sensitive element that it would be unaffected by the acceleration pressures arising from movements of the vessel on which it was mounted. In developing that point it was necessary to collect a large amount of data relating to the time taken by all classes of vessels to accelerate from one speed to another. From this data, the acceleration pressures were calculated and actually applied to the experimental instrument by means of weights allowed to act for a certain length of time. The Sperry Gyro-Compass as it is in service to-day demonstrates how all these difficult problems have been solved.

A TALE OF A RUN-DOWN SHOP

By H. Middleton.

WHEN Bob Philips undertook the job of rehabilitating the Drew Hat Co. he thought he would have a great deal of hydraulic work to do; in fact, it was because of his experience as a machinist on such work and his ability as an organizer that the second generation of Drews hired him. The elder Drew had founded the business shortly after he came to America, and having always made money in it, had been satisfied to let things go on as they were; but after his death the sons decided on a more up-to-date policy.

The hat business is a big user of presses and steam—hydraulic, steam, lever, and toggle presses. Philips found the hydraulic presses in good shape, also the accumulators, pumps, and piping; they were of English make, and had been in charge of a Yorkshire man, who took pride in them because of that. But the lever and toggle presses being so "simple," had had little or no care, simply because they had been left to the unskilled hands who worked on them.

A saving of over \$500 on the first trip through the press room is rather unusual, but it was made in this instance. The hand-operated presses are all counterweighted, and Philips noticed an unusual form of counterweight, consisting of a box filled with junk. His investigation led to an examination of the junk, which proved to be spelter and lead—and from 150 to 300 lbs. of it on every machine. The substitution of a baser metal scrap for the spelter made a good start. Further savings were made on

the overhead by such simple means as washing the windows and so cutting down the light bill; having the floor swept in the corners and under the presses, netting an unbelievable heap of well chewed tobacco quids, which sold for \$15 for fertilizer; and in having the galled joints of some of the presses that "wouldn't work" loosened up and oiled, thus increasing the capacity of the press room twenty per cent.—which goes to show that there are homely ways of making money without spending it.

FORETHOUGHT AS A SAFETY FACTOR

By S. H. R.

EXPERIENCE is one of man's best educators but it is very often a hard taskmaster. The bulk of the knowledge that most of us have acquired has been doled out by this ever existing and often unrelenting teacher; and it is probably well that it is so, as many of the lessons thus learned are more likely to make a lasting impression upon us than if the same were handed down to us as a hereditary legacy. How many men to-day profit by the experience of their elders? The majority of us are like the child that must touch the fire even after being told that by doing so he will get burnt. Shop accidents are more often caused by thoughtlessness or carelessness on the part of the workmen than from the faulty condition of the plant equipment. The human element is the most perverse factor in the safety problem of shop management. We are prone to criticize the actions of those about us, but too often fail in a proper analysis of our own accomplishments. A frequent cause of injury to machinery is the impulsiveness of the operator, this trait being particularly pronounced in young apprentices and inexperienced mechanics. The first duty of a workman, when placed upon a new machine, is to become familiar with its operating mechanism.

Many machine tools of to-day are equipped with every facility for maximum efficiency, and at the same time relieve the workman of much of the physical and mental effort incidental to the manipulation of equipment of the last decade. This does not mean that it requires a less skilful operator to do effective work on a modern machine, as it is probable that closer attention is now required than ever before, owing to the greater possibility of becoming confused by the various knobs and levers. The semi-automatic nature of present day metal working tools has, however, destroyed much of that reasoning power that in former days was so common in the average workman. Apprentices and older mechanics should endeavor to cultivate the habit of speedy but accurate forethought in the discharge of their duties, as a mental review of possible developments will often prevent injury to a machine or an operator.

To illustrate by an example: Some time ago a young mechanic was boring piston ring castings, which in the rough weighed about 80 lbs. After completing

the work on one of these he placed another one in the chuck without removing the boring tool from the tool-post. In order to center the work—a four jaw chuck being used—one of the jaws was slackened, leaving the casting supported by two others; turning the work through an angle of 180 deg., and with the right hand placed on the upper portion of the ring to steady it, he started to adjust the casting to position. One of the side jaws, however, had apparently been resting on a small lump, so that the downward pressure from the top screw released the work, causing the piece to fall from the chuck, and catching the man unprepared his hand was caught between the tool and the work, resulting in a badly lacerated finger. A little forethought in removing the tool, or supporting the work while setting, would likely have prevented the injury sustained. Accidents occur every day through over impulsive action on the part of workmen, which a moment's forethought would oftentimes prevent.

ELECTRIC DRIVE FOR WARSHIPS

By D. Street.

IT is confidently expected by those who favor electric transmission for ship propulsion that the electrically-driven cruisers and battleships now building for the American Navy will demonstrate conclusively that the electric drive is superior to all others for naval vessels of this class. The features upon which this confidence is mainly founded are the maintenance of a high efficiency at all speeds, and the diminished risk of a vessel being temporarily crippled by a breakdown in the engine room.

No attempt is made to claim for electrical transmission as high an efficiency at full power and speed as can be obtained from the geared drive. In the new battle cruisers the losses from turbine to propeller shaft will be about 7 per cent. at top speed. It is conceded that at full speed a geared drive will show a better figure than this—better, perhaps, by 2 per cent.—but a battleship is only on full speed for a fraction of its time, and the normal cruising speed requires only about one-tenth of full power. It is here that the electric drive is expected to show great advantages. At light loads the efficiency of the geared turbine equipment falls off considerably owing to the reduced thermal efficiency of the main turbines themselves, and to the relatively greater drag of gearing, bearings, reversing turbines, and idle parts of the main turbines.

Even though special cruising turbines are fitted, the efficiency at cruising speed must be low, for such turbines cannot have the efficiency of a single large main turbine, and they add still more to the drag. With the electric drive the transmission efficiency can, on the other hand, be kept equally good at all speeds; the number of motors and turbines used can be adapted to the demand for power, and this gives a very important gain in economy at all speeds below the maximum. At 19 knots only one turbine is

required to drive the ship, and it runs at full speed instead of at half-speed as it would in a geared equipment. Thus the steam efficiency at 19 knots—a desirable cruising speed—is equal to the best attainable at any speed, and as cruising economy gives increased cruising radius without renewal of fuel supplies, high efficiency at this speed is a matter of the greatest importance.

Breakdown Possibilities

In regard to the risks of complete breakdown, it is pointed out that in the geared equipment each shaft has a system of turbines, gears, bearings, thrust-balancing devices, and lubricating systems, all mechanically locked together, and that with high speed machinery any kind of trouble with any of these parts generally necessitates the immediate stoppage of the whole system, whilst if a breakdown has occurred it may be necessary to stop the ship while the wreckage is cleared away and the shaft uncoupled, after which the idle propeller would still act as a very serious drag on a fast vessel. In the electrically-driven ship there is no mechanical connection of the shaft to anything but the rotors of the motors, which cannot be subject to mechanical interference.

The shafts are subject to the same possibilities of bearing or thrust trouble as shafts in other ships, but the presence of the motors does not increase this danger, and the speed being low, it is remote in any case. With this equipment any motor, generator, or turbine, if in any kind of trouble, can be instantly disconnected without stopping the ship and with only a small loss from the highest speed capacity. The versatility of transmission constitutes one of the most important advantages of electric drive in such a ship. With one motor out of eight in trouble only one-eighth of the maximum capacity is lost, and the ship's maximum speed is impaired by only about one knot. If a generator or turbine is in trouble the maximum speed is reduced only about two knots. With two generating units and four motors out, the ship can make 26 knots, and with three generators and four motors out she can make 19 knots. If parts give trouble they are simply cut out and repaired at leisure, or as opportunity affords.

Self-Contained Reverse

A further point made is that the electric drive dispenses with the need for reversing turbines and eliminates complications which they involve. Importance is also attached to the large gains in fuel economy afforded by super-heat, and it is expected that the demonstration of the ability to use safely high degrees of super-heat may constitute one of the most important reasons for adopting the electric drive. In opposition to these claims can only be advanced one, that of greater weight. This can be discounted on the heavy ships, where protection is of vital importance. On the light fast vessels, such as destroyers and scouts, where no protection exists, everything is sacrificed for speed, and for such vessels

the mechanical reduction gear stands pre-eminent to-day.

VELOCITY OF SOUND IN SEAWATER

By T. J.

AS is well known, the aberration to which aerial sound signals are subject makes the transmission of sound through water a much more desirable medium for the exchange of signals, but there is a certain amount of error always found in short distances from the shore when a ship is endeavoring to find her distance by echo. The elasticity of the water is a great determining factor, as the velocity of sound through a medium is equal to the square root of the quotient found by dividing the elasticity of the medium by its density. The elasticity of sea water is 2.02 by 10.10, and its usual density is 1.03; and the computed velocity of sound through the ocean is therefore 1,400 metres, or 4,593 feet per second. Owing to the uncertainty of locating the place from which the sound waves are reflected to form an echo any method of finding distances in navigation by means of submarine echoes is not at all serviceable. In the location of sound signals every effort is made to avoid the formation of echoes on account of the uncertainty which their presence produces in locating the submarine signal.

U. S. ENGINEERS DISCUSS WAR TOPICS

WAR topics predominated at the convention of the American Society of Mechanical Engineers, recently held at the Engineering Societies Building, 29 West 39th Street, New York, the engineers discussing the shipbuilding problem, the aircraft problem, the fuel problem, the agricultural problem, etc.

Methods were considered whereby the problem of fuel conservation will be met either by compelling coal consumers to execute such measures of economy as the authorities prescribe, or else by disseminating correct information regarding the mining and consumption of coal, accompanied by an appeal to the patriotism of the consumers.

Such subjects as expenses and costs, accident prevention, labor turnover expense, and the relation of industrial management to engineering, were discussed. Dr. John A. Brashear, past-president of the society and widely known in connection with the development of the modern telescope, addressed the members and their guests, taking for his subject "The Science of the Beautiful in Commonplace Things."

Honorary membership in the American Society of Mechanical Engineers was conferred upon Major-General George W. Goethals in recognition of his achievements in engineering, and Ex-President Taft gave an address on "The War's Call to Professional Men." These functions, which were held in the impressive auditorium of the engineers' building, were followed by a reception to the new president of the society, Mr. Charles T. Main.

PROGRESS IN NEW EQUIPMENT

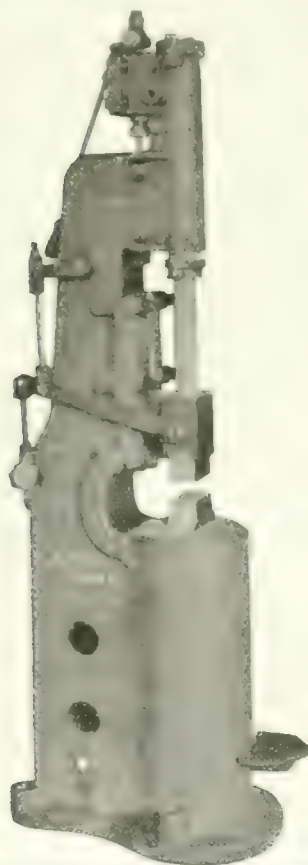
There is Here Provided in Compact Form a Monthly Compendium of Shipbuilding and Marine Engineering Auxiliary Product Achievement

PNEUMATIC LIGHT FORGING HAMMER

EXPANDED equipment in the automatic equipment has enabled H. ...

The weight of the complete hammer is 1,000 lbs. and is expressly suited for handling all sorts of light miscellaneous iron casting, forging, welding, straightening, blacksmithing, etc., ordinarily done by hand, thus avoiding the uneconomical tying up of a large hammer, and providing a hammer readily movable to the work in the yard, shop, mine, quarry or contract work.

The main frame consists of a heavy



PNEUMATIC LIGHT FORGING HAMMER.

anvil portion cast solid, and having a rigid integral box housing supporting the working parts. Cylinder is bored and reamed and has a key across the entire face of frame in addition to four bolts. Ports are large and direct and main valve is quickly accessible through cover plate on valve chest. Main stuffing box gland is of ample length, is

... for easy removal.

... used for the one-piece piston and rod; the ram, head and guide shoe are made of a single open-hearth forging, and have a long taper fit on the rod. Vanadium alloy steel is used for the valve gear pin inside of ram. Liberal wearing surface is provided on the guides which extend down as far as practicable. Dies are of the plain forging type of special tool steel suitably tempered. The upper die is dovetailed and keyed to ram, while lower die is dowelled to anvil.

Operation is controlled by pressure on the foot lever, the speed depending on the air pressure and thickness of stock—from 150 to 200 blows per min. The higher speed automatically occurs on thicker sizes of the hammer's range which is from 1/16 in. to 2 in. inclusive. No adjustment is required in striking and reversing on any thickness within the above capacity, speed and force being controlled directly by amount foot lever is depressed. Hot iron 2 in. square is readily worked.

The hammer occupies a floor space 14 in. by 24 in.; is 66 in. high; dies 2 1/4 in. by 4 1/2 in.; requires 30 cu. ft. free air per min. at 90 lb. pressure per sq. in. for steady operation at full speed.

UNIVERSAL CUTTER AND TOOL GRINDER

A UNIVERSAL cutter and tool grinder of modern design and adapted for a very wide range of tool room work is built by Wilmarth & Mormon Co., Grand Rapids, Mich. Their No. 1 Universal grinder is shown in the accompanying engraving, and has eight speed changes for table travel graduated from 12 in. to 75 in. per min.

The travel and reversing mechanism is contained in a gear box at the left of the saddle and somewhat to the rear. It is a complete unit in itself and is so arranged that it can be attached to the hand feed machines of this type already

in service with very little work. It is driven by the two step cone pulley at the extreme left, four speeds being obtained on each step.



UNIVERSAL CUTTER AND TOOL GRINDER.

The gearing from the box to the table is arranged so that it can be entirely disengaged leaving the table free for operation by the handwheel at the front of the saddle or the lever at the rear without operating any of the power feed mechanism which drives the table.

The front of the table is provided with a tee-slot which carries adjustable dogs for operating the reversing mechanism at the desired points on the work, allowing the operator to shorten or lengthen the stroke as desired.

All of the mechanism is entirely self contained with none of the working parts exposed to grindings or dirt, and all of the gears are run in a bath of oil to insure long wear.

AMPLE STEEL SUPPLIES FOR THE WAR

AMPLE supplies of steel for all the Government's war needs were assured to the War Industries Board by representatives of the largest steel mills in the United States. They proposed, however, a different system of allocating orders to take into consideration idle capacity, the fuel supply and transportation conditions. In line with this suggestion, hereafter placing of orders will

be centralized in the hands of J. L. Replogle, the board's steel expert, and it is believed that deliveries will be expedited. Ways and means of expediting production of the war instruments which are to bring victory in the war occupied the attention of the conference almost exclusively during the two hours the meeting was in progress. Whether the filling of war orders would leave sufficient steel for private industries was declared to be "another question," which none of those present would answer definitely.

CANADIAN RAILWAY CLUB HELPS HALIFAX

THE Canadian Railway Club meeting at Montreal last week decided to forego their annual dinner this year, owing to the general conditions that prevail at the present time. In view of the fact that the war is still at its height and the recent devastation at Halifax, it was thought advisable to postpone the event. By a unanimous vote a grant of \$200 was passed for the relief committee of the stricken city, the money being wired while the club was in session.

DOCTORS ARE REALLY ENGINEERS

COL. W. O. OWENS, in charge of the Motion Picture Department of the American Medical Museum in Washington, under the direction of General Goorgas, declared at the recent convention of the American Society of Mechanical Engineers that he had come to look upon doctors and medical men as biological engineers, inasmuch as their chief business was to keep the human engine in perfect working order. His statement was emphasized by Major Frank D. Gilbreth of the Engineers Officers' Reserve Corps, who described how the soldiers crippled in the war are provided with means for performing useful industrial work and making themselves self-supporting. In the course of the discussion on the crippled workers, illustrations were shown of men putting on their trousers with blacksmiths' tongs, one-armed men driving nails with magnetic hammers quicker than two-armed men could with ordinary hammers. Major Gilbreth urged the universal employment of cripples in work which they could perform and said it would be socially indecent for employers to give a job to a normal person when a cripple could just as well do it. He told how efficient cripples were in industrial plants.

WELDING WORK DISCUSSED BY RAILWAY MEN

AT the last regular meeting of the Canadian Railway Club a paper was read on "Oxy-Acetylene and Electric Welding in Locomotive Work" and the discussion that followed proved to be the most interesting and instructive that the members have so far experienced. The center of the discussion hinged on the advantages and disadvantages of the lap and butt weld as applied to construction and repair of fire-boxes and flue sheets. While no definite conclusion was arrived at considerable data and information

were brought forward that will be of value for future operation of this class of welding.

SOUTHERN CANADA POWER CO. DEVELOPMENTS

THE map accompanying the annual report of Southern Canada Power Co. recently issued shows that the company's operations cover an exceptionally wide range of territory, doubtless the largest east of the Niagara power zone. On the south power is carried across the international boundary into Derby, Vermont. On the west the transmission lines approach as near to Montreal as St. Johns, Iberville, St. Hilaire and Beloeil. On the north Drummondville and adjacent municipalities are tapped, while on the east the principal points of consumption are Sherbrooke, Lennoxville, Richmond and Compton. These distances are approximately 70 to 75 miles east and west, north and south.

It is quietly but gradually developing into an important development, and is extending a network of power wires throughout the south-eastern section of the Province of Quebec, and working up the available hydro-electric propositions in that area.

The report states:

"Considerable progress has been made during the year in the consolidation of the subsidiaries acquired, as referred to in the last report. Since then the company has purchased the municipal plants of the City of Granby and the Town of Bromptonville, and is now engaged in the joining up of its various isolated properties.

"The company at present has under construction about eight-five miles of transmission lines from Sherbrooke to Granby and Cowansville, from Sherbrooke to Bromptonville, and from St. Cyrille to St. Germain through Drummondville, with the necessary sub-stations and distribution systems.

"The power development at Richmond, Drummondville, Foster and Granby are being considerably improved and enlarged and put into shape for the most economical operation, through the transmission lines, with the other plants of the company.

"A great deal of work has been done in connection with the engineering investigation of the company's water powers, and additional riparian and other rights have been acquired, so that practically all such work usually preliminary to such developments is now completed."

A HIGH speed steel alloy recently patented in Great Britain has the following composition: Carbon, 0.5 to 0.8 per cent.; molybdenum, from 6 to 10 per cent.; chromium, from 3 to 6 per cent.; vanadium, 0.15 to 2 per cent.; manganese, 0.2 to 0.4 per cent., and silicon, 0.2 to 0.4 per cent. The amount of vanadium may be lowered and partly replaced by cobalt, of which latter element from 0.5 to 3.5 per cent. may be incorporated.

Screenings

Little Tommy—"Say, papa, what is meant by beastly weather?"

Papa—"When it's raining cats and dogs."—Brooklyn Citizen.

The boy came into the house weeping and his mother was naturally solicitous. "What's the matter, Willie?" she asked. "The boy across the way hit me," he replied.

"Oh, well, I wouldn't cry for that," she returned. "Show that you can be a little man."

"I ain't crying for that," he retorted. "He ran into the house before I could get at him."—Philadelphia Press.

A policeman popped his head inside a crowded car.

"Excuse me, ladies and gentlemen," he said, "but there are two swell thieves in here."

"Dear me!" cried a nervous-looking individual. "I cannot risk my reputation in here."

Up jumped another gentleman with a gold watch chain and white waistcoat.

"I must get out at once," he said. "I have just taken some money out of the bank and I won't chance being robbed."

The policeman nudged the conductor.

"It's all right now, drive on; they've both got out."

The dominie was told by his family doctor that a glass of toddy would do him no harm. "I canna manage it," said the minister, "my housekeeper wad gossip among the church women."

"Oh, keep it in your private cupboard, and when you get your shaving water in the morning, get a little extra supply."

A month later one of the female parishioners who was calling on the housekeeper enquired as to the dominie's health.

"I'm sair afraid the meenister is losing his mind," was the answer.

"My goodness, how is that?" said the visitor.

"Weel, he asks for shaving water five or sax times a day."

A good story is being told concerning Sir Francis Hopwood, the Secretary of the Irish Convention, who has recently been made a peer.

It appears that he was once cross-examining a witness in an agrarian case in Ireland, and the man, describing how a tenant was evicted from his holdings by the bailiffs, remarked that the beam used to break down the door of the cabin was shaped like a battering-ram.

Sir Francis saw an opening—or he thought so, at all events.

"Have you ever seen a battering-ram?" he asked.

"I have," replied the witness stolidly.

"Where?" snapped Sir Francis.

"In London."

"Whereabouts in London?" persisted Sir Francis, with a smile of incredulity.

"In the South Kensington Museum."

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TRAINING BRAINS FOR AFTER-WAR TRADE.

WAR is still with us, and may be for a while. With the echo of the first shot in the war there awoke in progressive business minds the thought of trade after the war. Not "Business as Usual" but "Business far Better than Before" is the slogan to follow. Leaders in business life are busy upon after-the-war problems to-day. Already the key-word to their thoughts is out.

That word is Education. Its effect is found in the decision of the Tootal Broadhurst Lee Co., Manchester, to appropriate \$50,000 a year for five years for research to improve their products, and for education to improve the general efficiency of their employees. "Without improved education, and a closer link between science and industry, our future trade cannot expand as it should," says the Chairman of their Board of Directors. "In this respect we are behind some other countries."

So part time instruction in a works school during working hours is provided for, and employees who show outstanding ability are to be selected for further education. In special cases they may have whole time education and a university course to develop them. The purpose of the appropriation is to produce more specialized expert help for the company. Part of the fund is to be spent in research work by already available experts. The educational policy pursued is to bring out more experts.

The race for trade after the war will be closely contested. The countries best prepared by the education of the industrial and business brains that are to run their commercial concerns will come out winners. Financial as well as industrial training is demanded. Sir Richard Vassar Smith, in a recent address before the Institute of Bankers in London, said that recent developments of inter-

national banking meant a demand for young men with a knowledge of foreign languages, foreign exchange, and the commercial and financial conditions of other countries. Clearly a call for still further specialized education for the men who are to make a winner of trade after the war.



WHAT HATH THE YEAR BROUGHT US?

THE approaching close of the year bids many of us glance backward and in silent retrospect consider whence we have come and whither do we go. Each year has seen the prediction that the war would soon be over, and each year still sees it with us, influencing our thoughts, words and deeds to such an extent that, when it does reach a conclusion, the void left by the disappearance of such a mainspring of industrial activity will be immediately unfathomable.

Military events have influenced activities of the past year very greatly, for instance, the alternate depression and cheerfulness which have marked the fluctuations in munitions manufacture. That such happenings should take place is incidental to the nature of their origin, but that their effect on our private and national disposition should pass unnoticed is not right. It must be constantly kept in mind that the readjustments necessary during the transition period will have a much more acute influence on our individual lives than any temporary depression has had hitherto.

Viewing the turnings and twistings of Fortune's ship, and admitting however unwillingly that results are not what seemed likely to materialize at certain periods, we must take such comfort as we can from the saying that "things are never so bad but what they might be worse." There is a mean level to which all influences gravitate, some upward and some downward. Mankind is not gifted with such powers of intuition that basic principles can be ignored, and of these the law of action and reaction is not the least important.

As a nation, Canadians in Canada have suffered less than any other. That we can expect to see the business through and remain on Easy Street while the rest of the world is struggling in by-ways and vacant lots is absolutely foolish. Knowledge to plan, ability to execute and determination to support our share of the world's burden, willingly as well as uncomplainingly, are the essentials for our future guidance. It is a pleasing feature of the situation that financial interests realize the extent to which they will be strained in the period of readjustment—their ability to withstand it will determine more than anything else its duration and intensity.

The time for preparation is here—preparation for any eventuality, and the tentative evidences during the past year of all that readjustment will imply must receive more than ordinary consideration from those directly concerned with the industrial future of the country. If the year has done nothing else than bring to us all a sterner realization of the present and determination to face the future, it has not been unavailing.

INDUSTRIAL NOTABILITIES

HERBERT MARVEN EWAN, B.Sc., Vice-President, Taylor and Arnold, Ltd., Railway and Marine Supplies, Montreal; Vice-President, Central Engineering Co., Ltd., Montreal; Vice-President of American Flexible Bolt Co. of Canada, Montreal; Director of Canadian Brakeshoe Co., Ltd., Sherbrooke; Director, Boss Nut Co. of Canada, Ltd., Montreal, was born in Montreal, Oct. 19, 1876, son of Alexander and Kate Gourd (Bellhouse) Ewan, both of Scotland.

After receiving his education at Montreal Grammar School and McGill University, he began his career as assistant experimenter in tin plate manufacture, Bridgeport,



HERBERT MARVEN EWAN.

Connecticut, in 1899, leaving this in 1900 to serve a two year's apprenticeship in England with the firm of John H. Andrew and Co., Ltd., Sheffield. He subsequently returned to Montreal to take up sales work in the steel business, and after extended experience in this capacity became sales manager of Canadian Steel Foundries, 1913, and in the following year joined the firm with which he is now associated as Vice-President.

On May 23, 1907, Mr. Ewan married Blanche Gilmour, daughter of Duncan Gilmour, Sheffield, Eng., and has one daughter.

He is a member of numerous clubs, among them the Engineers'; Winter; St. George's Snowshoe; Royal St. Lawrence Yacht; University of Montreal, as well as the Royal Canadian Yacht and University Club of Toronto. His one society affiliation is A. F. and A. M. and he holds a commission as lieutenant in the Victoria Rifles. Tennis, yachting, fishing and skating are his favorite recreations.

Mr. Ewan is Conservative in politics and Protestant in religion and resides in The Linton Apartments, Montreal, Que.

Photo courtesy British and Colonial Press

ELECTRIC WELD COIL CHAIN B.B.	
3-16 in.	11 70
1/4 in.	8 10
5-16 in.	7 10
3/8 in.	6 35
7-16 in.	6 35
1/2 in.	6 35
3/4 in.	6 35
1 in.	6 35

Prices per 100 lbs.

FILES AND RASPS.	
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	50
Black Diamond	50
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	37
Diston	50
Whitman & Barnes	50

COAL AND COKE.

Solvay Foundry Coke	
Connellsville Foundry Coke	
Steam Lump Coal	
Best Slack	
Net ton f.o.b. Toronto.	

BOILER TUBES.

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

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS.

Castor oil, per lb.	50
Royalite, per gal., bulk	16
Palacine	19
Machine oil, per gal.	26 1/2

Black oil, per gal.	15
Cylinder oil, Capital	17 1/2
Cylinder oil, Acme	30 1/2
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	2 50
Union thread cutting oil antiseptic	88
Acme cutting oil, antiseptic	37 1/2
Imperial quenching oil	37 1/2
Petroleum fuel oil	12 1/2

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30 5/8
Standard	10 7/8
Cut leather lacing, No. 1	1 9/5
Leather in sides	1 7/5

TAPES.

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

WASTE.

White. Cents per lb.	
XXX Extra	20
Peerless	20
Grand	19
Superior	19
N. L. C. R.	18
Atlas	18
X Empire	18
Ideal	17
X press	16
Colored.	
Lion	14 1/2
Standard	13
No. 1	13
Popular	11 3/4
Keen	10 1/2

WOOL PACKING.

Arrow	25
Axle	20
Anvil	15
Anchor	11

WASHED WIPERS.

Select White	12
Mixed colored	10
Dark colored	09
This list subject to trade discount for quantity.	

RUBBER BELTING.

Standard	19
Best grade	15

ANODES.

Nickel	.50 to .54
Cobalt	1.75 to 2.00
Copper	.14 to .16
Tin	.49 to .56
Zinc	.23 to .27

Prices Per Lb.

COPPER PRODUCTS.

Montreal Toronto	
Bars, 1/2 to 2 in.	55 00 48 00
Copper wire, list plus 10.	
Plain sheets, 14 oz.	
11x60 in.	55 00 48 00
Copper sheet, tinned.	
11x60, 14 oz.	60 00 54 25
Copper sheet, planished, 16 oz. base.	64 00 49 00
Braziers', in sheets, 6x1 base.	55 00 48 00

BRASS.

Brass rods, base 1/2 in. to 1 in. rod	0 13
Brass sheets, 24 gauge and heavier, base	0 48
Brass tubing, seamless.	0 55
Copper tubing, seamless	0 60

PLATING SUPPLIES.

Polishing wheels, felt.	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	06
Emery glue	15 to 20
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09

Rouge, fine	3 10
Rouge, coarse	3 10

Prices Per Lb.

LEAD SHEETS.

Montreal Toronto	
Sheets, 3 lbs. sq. ft.	\$18 00 \$18 00
Sheet, 4 to 5 lb.	18 00 18 00
sq. ft.	17 50 17 50
Cut sheets, 1/2 per lb. extra.	
Cut sheets to size, 1c per lb. extra.	

PLATING CHEMICALS.

Acid, boracic	15
Acid, hydrochloric	.05
Acid, hydrofluoric	.14
Acid, nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	.12
Copper, carbonate, anhy.	.35
Copper, sulphate	.17
Cobalt, sulphate	.70
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.12
Nickel carbonate	.35
Nickel sulphate	.15
Potassium carbonate	.75
Potassium sulphide (substitute)	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.55
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.41
Sodium hydrate	.04
Sodium hyposulphite, per 100 lbs.	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.60
Zinc sulphate	.09

Prices per lb. unless otherwise stated.

Market Condition and Tendency

Trading Easier With Approach of Christmas—Steel for Private Work Scarce—Washington Price Revisions Awaited—Coke Shortage Continuous.

BUSINESS generally this week has been upset on account of the elections but in other respects there is practically no change in the situation. Trading will likely be quiet for the remainder of the year as the Christmas holidays intervene. Merchants report quiet times in the iron and steel trade owing to the difficulty being experienced in obtaining supplies of steel for ordinary purposes which is restricting manufacturing operations. Consumers not engaged upon war orders are thus in an extremely difficult position, and the demand from such sources has fallen off. It is not very difficult to obtain steel for war work, but a considerable part of this is direct mill business and special arrangements exist for facilitating the procuring of supplies. Prices of steel products continue firm except for lighter gauges of black sheets which are easier; a slight decline in steel plates is expected in the near future. No announcements have been made following an important meeting in Washington to discuss the revision of prices on steel products. It is, however, believed that no change will be made from the prevailing schedule. The shortage of coke continues to restrict the production of pig-iron and the situation in the States is getting more acute. Furnaces in this district are also feeling the effects of the coke shortage. The non-ferrous metal markets are quiet, interest being centered on developments at Washington where an announcement is expected shortly concerning fixed prices on copper, lead and spelter.

MONTREAL, Que., Dec. 17, 1917.—Industrial activity continues unabated, although general business has been somewhat disorganized by the unusual interest being taken in the Federal House elections. The recent heavy snow and cold weather has added another to the difficulties under which manufacturers labor at the present time, as it has been almost impossible under certain conditions to secure delivery on much needed material. The recent calamity at Halifax resulted in the destruction of a large number of cars, a feature that has added to the acute condition of car shortage. Embargoes on exports from the States makes it increasingly difficult for manufacturers to obtain material and supplies from American centers.

Pig Iron

The situation in pig iron is unchanged although producers have been working under difficulties during the past week owing to inability to obtain raw materials, the recent storms and continued cold weather creating a serious factor for the furnaces. The situation, however, has shown a little improvement during the past few days but the shortage of iron is still more or less pronounced. In some quarters expectancy is shown that some revision will be made on the prices now ruling in the States.

Steel

No new developments have taken place

to alter the general tone of business activity. No amount of price revision, and apparently there is no possibility of such a revision, will remove the pressure on the Government contracts and the open market, and the pressure will remain. While there is some possibility that prices may be readjusted in the near future, it is not likely that this will take place until well into the New Year, and even then it is not anticipated that such revisions will materially effect the present condition of the market. Different steps may be taken to relieve the pressure that is felt in certain directions.

The present kind of activity, however, has not been such as to remove the uncertainty that has characterized the situation for several weeks so that all buying is accomplished in a more or less cautious manner. This attitude is more pronounced in those steel products that are not in great demand for Government purposes. In addition to the increasing requirements for war necessities, the weather conditions during the past week or so have greatly hampered the transportation of all classes of materials so that production has suffered in many respects; this at a time when the recent closing of inland navigation has placed additional pressure on the various railroads.

Conditions are becoming so acute that unless consumers are working on Government contracts it is practically impossible to obtain steel and this tendency is daily becoming more pronounced. The freight congestion in the Eastern States has necessitated placing an embargo on all export material other than that specified for war purposes. The open market on billets and sheet bars is now virtually a thing of the past as producers are conserving their entire output for Government requirements. This condition also applies to structural material and domestic users of this class of steel have had to suspend operations until relief is assured. The urgent need for more cars and the stupendous program of shipbuilding is taxing the plate mills to their fullest capacity and this situation is likely to become worse before it is better. The same applies to almost every other line of steel product and Canadian conditions are reflected in those prevailing in the States. It has been reported that some difficulty is being experienced by those of our manufacturers who have secured American shell contracts, in obtaining the required steel from the States owing to the deferred action of the authorities at Washington.

The Canadian situation on the whole is unchanged and is likely to remain so until the turn of the New Year, as the shipping here and the coming holiday season will have the result of disorganizing business to some extent. The heavy work of the past week has somewhat affected transportation facilities and manufacturers here suffered in consequence. Dealers report a very strong market with all price quotations very firm.

Metals

The general situation in the metal

market is unchanged with tin still holding the center of interest. Conditions in the States are still hanging on the penny price fixers on some of the metals, definite action on which is expected at any time. The coming holiday season, however, has interfered with the progress of the work and the New Year may arrive before an announcement is made. Copper is quiet, no early possibility of price revision being apparent. Tin is very strong but the acute condition of the past few weeks is less pronounced. Spelter is active under Government orders but the open market is very quiet. Lead is quiet but firm. Antimony is again weak and aluminum is in less demand.

Copper.—Steps have been taken during the past week towards coming to an understanding as to the price that will govern the sale of copper during the coming year or at least for such a period as may be agreed upon by producers and the Government. The announcement that some of the smaller producers find it very difficult to operate at a profit under the prices now ruling might indicate that any change would be in an upward direction. However, nothing definite has yet been done and it is still problemati-

CANADIAN GOVERNMENT PURCHASING COM- MISSION

The following gentlemen constitute the War Purchasing Commission appointed by the Canadian Government: **Hormidas Laporte, Montreal, chairman; George F. Galt, Winnipeg; William P. Gundy, Toronto. Thomas Hillier is secretary, and the Commission headquarters are at Ottawa.**

cal just what conditions will prevail during the months of the coming year. Readjustments will probably depend upon developments, their nature at the present time being very uncertain. Local activity is light but prices are well maintained, dealers here are quoting 33 cents for lake and electro, and 32 cents for castings.

Tin.—The market in tin continues to be the feature of the metal situation, and although the most recent reports point to a relief of the existing acute conditions, there is still a pronounced shortage of tin both here and in the States. While nothing has been made public as to the progress made by the American Government towards obtaining better shipments of tin from England or other points under the control of the British Government, consumers are beginning to feel the pinch as the available supply of spot tin is becoming noticeably less. Some consumers who were fortunate enough to have covered their requirements have been induced to dispose of small quantities of metal to other users to meet their immediate

needs. Early prospects, however, seem to be towards an easier situation, but this can only be shown by future developments. The latest reports show a practical suspension of business on the New York market, with the latest quotation at the nominal figure of 86 cents per lb. Dealers here report active market with prices very firm, the current quotation being 78 cents per lb.

Spelter.—The general demand for spelter has shown no tendency to increase although the buying by galvanizers for Government sheet contracts has been recently quite heavy, manufacturers not being inclined to take any chance on the market for a lower price, rather showing a tendency to amply cover their requirements at present prices. The attitude of the American Government in connection with the fixing of spelter prices appears to be very uncertain and it is expected that this factor will be left for trade conditions to automatically adjust as the demand becomes more on a par with production. The New York quotation shows a weaker tendency, the quotation of 7½ cents being a decline of ¼ cent on the week. Prices here are unchanged at 10½ cents per lb.

Lead.—The situation in lead has shown no tendency to develop special features and the market is at present unsettled owing to the uncertainty that prevails regarding the contemplated action of the American Government in the setting of price to regulate the sale of metal. While this was expected to have been announced before this it is not likely that definite action will be taken until after the holidays. Reports of pending business of considerable volume have given a stronger tone to the general situation. Lead is quoted at 9½c but with a weaker tendency.

Antimony.—Reaction has followed the recent slight activity in the antimony market and quotations have again declined; New York is quoting 15 cents, a decline of ½ cent over that quoted last week. The local quotation is firm and unchanged at 18 cents per lb.; the demand being fair.

Aluminum.—The market is not active and the demand is light, prices are unchanged but with an easier undertone. Dealers here are asking 60 cents per lb., but the market is weak with a lower undertone.

Machine Tools and Supplies

The machine tool industry is at present regulated by the requirements of the government, particularly in connection with the business in the States, a factor that to a large extent, may be said to prevail also in Canada, as manufacturers here are dependent to a large degree on the American market for their supplies in machine shop equipment. The restrictions that have been placed on the export of machinery from the States have, however, given increased impetus to tool builders here in Canada, as shown in the greater activity in certain lines. While the week has been fairly quiet, the volume of sales has been sufficient to maintain

an interest in the market. Political activity has somewhat disturbed the regular progress of events and it is not anticipated that any great business will be in evidence until the country has become settled and the holiday season is over. It is known that several industrial developments have been suspended until the election returns are announced. A return to normal conditions may follow the holiday season and in anticipation, many dealers are looking optimistically forward to it. Business in small supplies has shown a little falling off and this is accounted for by the disturbed condition of the country at the present time. No weakening tendency has developed in the prices quoted on small supplies and quotations are generally very firm.

Scrap

The market is generally quiet with an unsettled tendency owing to the nervous situation that prevails in the States. It is expected that some action will be taken early in the New Year towards the regulation of prices controlling the sale and distribution of old materials, a factor that will tend to put this market in a more stable relation to that of other markets. The local situation has shown an inclination to weaken on metal scrap but steel and iron scrap is firm with stronger quotations on steel axles and machine shop turnings. Scrap brass has declined one cent during the week; heavy quoted at 15 cents and light brass at 10 cents per lb. Heavy lead is now 5½ cents, a drop of ½ cent per lb. Aluminum is weaker, the quotation of 25 cents representing a decline on the week of 3 cents per lb. Scrap zinc has become a little stronger, an advance of ½ cent raising the price asked to 5½ cents per lb. Steel axles are in good demand and quotations have advanced, although the ruling prices are on the sliding scale; a nominal quotation being \$38 per ton. Machine shop turnings show an advance of 50 cents per ton, the current quotation being \$9 per ton.

Toronto

TORONTO, Ont., Dec. 18.—Interest this week has centred almost entirely in the General Election, with the usual effect on business. Apart from this there have been no developments of importance. The favorable result of the election ensures a continuance of the "Carry-on-with-the-War" policy which will be to the benefit of the industrial situation in Canada.

The shortage of raw materials, particularly of steel, is assuming more serious proportions, and there is no relief in sight. A serious shortage of coal has recently been revealed in some parts of this province, while the natural gas supply has failed in Western Ontario, due to the severe weather prevailing. A number of factories have been practically closed down, causing a dislocation of business.

Steel

The shortage of iron and steel, which has already caused some restriction in manufacturing operations, shows no

signs of improvement, and the outlook is not by any means satisfactory. Little difficulty is being experienced in obtaining steel for war purposes, but for ordinary manufacturing requirements consumers are not able to obtain material in sufficient quantities to satisfy their needs. The result is that business is dull, particularly for merchants.

Comparatively dull conditions will likely prevail for the balance of this year, and probably for the greater part of the first quarter of 1918. This applies to purely domestic business, and not to that section of the trade engaged upon war orders. Special arrangements exist for facilitating the production of war equipment and for obtaining all necessary materials for this purpose, but this is not the case for normal manufacturing activities. War requirements take precedence over all other work, which means that consumers not engaged upon war orders will have to be content to take what they can get. The mills are exceptionally busy now, but war

they would be subject to review after January 1. At last week's meeting the steel men pointed out that reductions in the present rates, which it is understood had been contemplated, would seriously impair the efficiency of the industry. It is considered almost certain that the Government will allow the present schedules to stand.

The unfiled tonnage statements of the U. S. Steel Corporation for November revealed a shrinkage of about 150,000 tons from the previous month, but it was the smallest decrease that has been shown for some time, and as there was no let up in shipments, it is a sign that the current business of steel companies is showing a big increase, with prospects good for an increase in unfiled tonnage for December. At present time the volume of steel business is showing some increase over what it has been at any time previously since price-fixing was first announced, with private consumers good buyers and a number of large Government contracts being placed.

Pig Iron

The shortage of coke continues to cause much anxiety to consumers, and as a result the pig iron situation is growing more serious. Production of pig iron in this district has not yet suffered much from the lack of coke, but will likely do so unless conditions improve materially in the near future. In the United States the shortage of pig iron, in view of the heavy demand, has reached an acute stage, and is steadily growing worse, with little hope of improvement in sight. Instead of meeting the growing demand, the furnaces have been barely able to keep the output from falling behind, the output not being sufficient to meet the consuming requirements of the trade.

Scrap

There is little to be said in regard to conditions in the market for scrap metals. Business is very quiet; in fact, there is hardly enough business passing to form a correct opinion of prices. The principal reason for the dull market is the contemplated price-fixing in the States. On this account consumers are staying out of the market pending a definite settlement of fixed prices.

Machine Tools

This has been a comparatively quiet week in the machine tool business, with no developments of particular importance. The demand is principally for tools for those munitions plants which are preparing to execute new orders for shells. It is becoming increasingly difficult to get equipment from the States, as a license has to be obtained before any machine can be shipped, and also the demand there is so heavy that deliveries now run into several months.

Supplies

Business continues steady, with firm prices ruling. Gasoline and coal oil are very firm, due to the advance in crude oil. Higher prices for coal oil are not unlikely. An advance in Pratt & Cady

MARKET LETTER DEVELOPMENT

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

needs have first call upon their output.

As far as can be judged at present no marked price recessions are likely to be made this year. The lighter gauges of black sheets are easier, having declined again, and a decline in boiler plate is expected shortly. Apart from these two products, there is no indication of an immediate fall in prices on steel products generally. The situation, however, in regard to prices is somewhat uncertain, and may to some extent depend upon developments at Washington. An important meeting was held in that city towards the end of last week, when, it is understood, the question of revising the fixed price schedule was discussed. No announcement has been made in regard to the result of the conference, but it is believed that the present schedule of steel prices will be reaffirmed by the Government.

President Wilson had previously fixed steel prices with the understanding that

...
No. 1587, which...
...
Barnes pipe cutters and Saunders pipe cutters, together with the parts therefor. Where Barnes pipe cutters were formerly quoted at 37½ per cent. off list, they are now quoted at 30 per cent. off list. Parts for Barnes pipe cutters are now quoted at 25 per cent. off list, the former discount being 27½ per cent. Saunders pipe cutters, that were formerly quoted at 47½ per cent. off list, are now quoted at 40 per cent. discount. Parts for Saunders pipe cutters are now quoted at a discount of 10 per cent. off list, the former discount being 22½ per cent. Linseed oil and turpentine have both declined. Linseed oil is now selling at range of \$1.36 to \$1.48 for raw and \$1.39½ to \$1.51 for boiled oil. Turpentine is now quoted at 71c to 74c per gallon.

Metals

Although prices for the most part continue firm and unchanged, the market is unsettled, due to conflicting reports from Washington concerning the situation in regard to prices of copper, lead and spelter. The price of copper was established some time ago, but there is an impression that it will be revised in an upward direction. An announcement regarding fixed prices for lead and spelter is expected any time, but there is no indication as to what the trend will be. The tin situation continues very unsatisfactory owing to the shortage and unusually high prices. The shortage of tin is serious, particularly for manufacturers of tin plate. Business in the local metal trade is steady and fairly active.

Copper.—Considerable uncertainty prevails in regard to the revision of copper prices, which are being considered at Washington. The general feeling seems to be that if any change is made at all it will be upward. It is generally believed that there will be sufficient copper to meet all demands, and the situation in this respect is satisfactory. Copper prices are unchanged, lake and electrolytic being quoted at 32c and castings at 31c per pound.

Tin.—The serious shortage of pig tin, evident for over a month, threatens to cut down the production of tin plate. This shortage has already been responsible for a sharp advance in price, and there is no indication of any improvement in the situation in the meantime. It is understood that the U. S. Government is taking steps to have the British regulations modified in respect to tin, so as to allow of adequate consignments being shipped to the States. Tin quotations locally are nominal and unchanged at 80c per pound.

Spelter.—The market is inclined to be easy pending the expected announcement from Washington, which may fix the

price for white Western and the higher grades. Local price is unchanged at 10½c per pound.

Lead.—The market is unsettled, being influenced by the price-fixing now under consideration at Washington. The impression prevails that if a Government price is established it will probably be below the current market. In the meantime lead is unchanged at 8½c per pound.

Antimony.—The market, which was active some days ago, is now quiet. Quotations are unchanged at 18c per pound.

Aluminum.—The market for aluminum is steady and unchanged at 62c per pound.

Washington

WASHINGTON, D.C., Dec. 15.—Chairman E. N. Hurley, of the United States Shipping Board, this week announced that the Board in co-operation with the Federal Bureau of Standards will undertake the construction of concrete cargo ships. This decision follows an investigation by the Bureau of Standards of a 4,500-ton concrete vessel now under construction at San Francisco. The Shipping Board and the Bureau of Standards will send special representatives to the San Francisco yard at once to gather information regarding the methods of construction. These will be used in later concrete construction by the Government.

Concrete Ship Construction

The Shipping Board has negotiated a provisional contract with Matthew Hale, of Boston, for the construction of twenty concrete ships of 3,500 tons each, by a Boston Company, to be called the Liberty Shipbuilding Corporation. The contract provides for a concrete vessel now under construction by the Boston concern being accepted by the Emergency Fleet Corporation. The Boston interests plan to construct their ships in a Southern yard, to be located either in South Carolina or Georgia. In presenting the proposal to the Shipping Board, Hale stated that the plans of his clients had been approved by marine experts of the Massachusetts Institute of Technology. The Shipping Board is further considering the construction of concrete barges to be used in the coastwise traffic.

Barge and Tug Construction

Chairman Hurley has announced that the Shipping Board has transferred \$3,360,000 of its available funds to the War Department for the construction of twenty-four barges and four tugs to be used on the Mississippi river. These craft are essential, it was stated, in moving lumber and steel to the Gulf shipyards.

Merchant Service Control

Following weeks of discussion regarding control of the personnel of the merchant service, a compromise has been reached whereby the Shipping Board and the Navy Department will exercise joint control. The plan for joint jurisdiction was explained in an announcement, issued by the Shipping Board, as follows:

"The bulk of vessels under the American flag, whether engaged in the trans-Atlantic trade or elsewhere, so long as they retain their character as merchantmen, will continue to be manned by merchant sailors. Troopships and vessels carrying whole cargoes of munitions or supplies for the army and navy, however, for military reasons, will be manned by naval crews."

Acting on this plan the Shipping Board has adopted a comprehensive program for obtaining civilian crews that will be needed on the new fleets of the merchant marine. About 58,000 officers and men will be required for the ships the Board aims to put into commission before the end of 1918.

Explosive Plant Construction

Daniel C. Jackling, of San Francisco, managing director of a group of copper mines, has been designated by Secretary of War Baker to take charge of the building of the Government's explosive plants. Expenditure of more than \$90,000,000 is contemplated in the erection of these plants to supplement the present output of the private munitions manufacturers.

Thomas A. Edison, with four other internationally known scientists, may soon be called upon to rule on the genuineness of what is claimed to be the greatest invention of mankind. The "Garabed" resolution, providing investigation of the purported discovery of Garabed T. K. Giragossian of a virgin natural force has passed the House of Representatives. If the Senate and President Wilson approve it, a committee of five eminent scientists to which the invention will be demonstrated will be appointed.

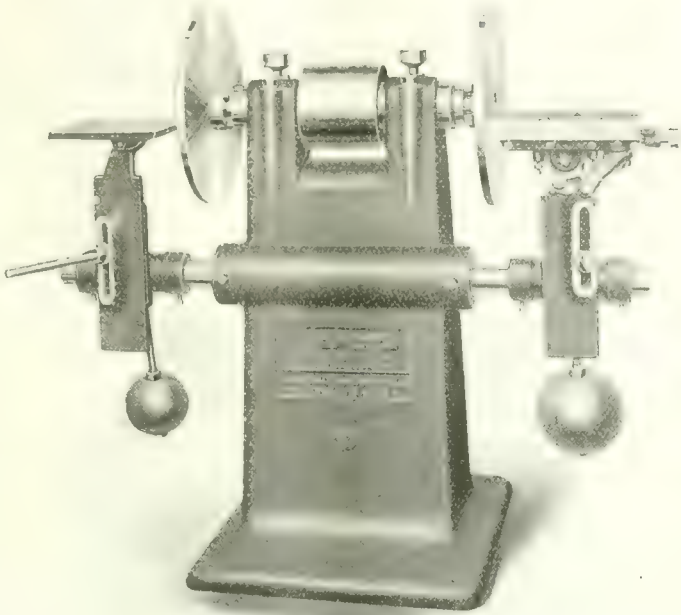
Closing hours of the debate on the resolution produced a strange scene. Opponents of Garabed, after interposing every known parliamentary obstruction, had brought into the House floor an electrical machine which they claimed paralleled the Garabed invention, but it was removed shortly after. Henry Perrigo, Kansas City, Mo., electrician, whose machine figured in the wrangle, stated he will attempt to induce Congress to subject his invention to the same committee of scientists which will pass on the "Garabed." Perrigo claims to be able to produce unlimited electricity from the air without the use of fuel. Garabed's claims are not based on electricity.

Under schedule 2531½, the Bureau of Supplies and Accounts, Navy Department, will open bids on December 28 for furnishing machine tools. On the same day, under schedule 2529½ the Bureau will open bids for furnishing 64 motor generators and 29 dynamo motors to various navy yards.

A quantity of pipe, nuts, rivets, hoes, etc., are required by the Panama Canal Commission, bids for which will be opened December 28, under Circular 1189, which can be obtained from General Purchasing Agent, this city.

The Alaskan Engineering Commission is inviting bids until December 27 for

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We can supply any of the above complete, ready for use, at about half the cost of ordinary tools for the same purpose, or we can furnish you with a complete set of castings ready for you to machine and set up.

We have sold these to many Shell Factories in Canada, and have had many testimonials regarding their good qualities and economy in use.

Marsh & Henthorn, Limited
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to be made a specialty of the factory. The tools can be ordered from the War Industries Board.

American Iron Works and Bridge Co. of York and Detroit, Navy Department, is working for the production of the tools. The company has a large stock of tools and is working for the production of the tools.

New York

NEW YORK, Dec. 15.—The Government has ordered the production of tools for the production of the tools. The company has a large stock of tools and is working for the production of the tools. Freight congestion, railroad strikes, and other difficulties have delayed the production of the tools. The company has a large stock of tools and is working for the production of the tools.

At Bridgeport the Liberty Ordnance Co. is preparing to greatly increase its output of 5-inch naval guns, and the Remington Arms U. M. C. Co. is increasing production of rifles and cartridges. The Colt's Patent Fire Arms Mfg. Co., Hartford, Conn., is rapidly equipping its plant at Meriden, which was recently acquired. Half of the Mayo radiator plant at New Haven, belonging to the Marlin Arms Co., is being converted for the manufacture of rapid fire machine guns, and it is also increasing the output of its Norwich plant. The Sterling Motor Co., Brockton, Mass., is building an addition in order to be in position to execute new contracts for shell and for gun sights, recently received from the Government.

Airplane Plant Organization

Furniture manufacturers of Grand Rapids, Mich., at the behest of the Government have mobilized their plants for the manufacture of airplanes and have organized the Grand Rapids Airplane Co. with a capital stock of \$200,000, through which individual manufacturers will receive their orders from the Government. Automobile plants at Lansing, Mich., are preparing their factories to turn out war munitions. The Reo Motor Co. is making changes in its shop equipment for the manufacture of shrapnel cases. The Lincoln Motor Co., of Detroit, who recently purchased \$2,500,000 worth of machine tools to manufacture Liberty airplane motors, expects to have the new plant, now under construction, ready for operation by the middle of February. Dodge Bros., Detroit, who have been awarded a large contract for recoil gun devices by the Government, expect to have their new plant ready in the spring, and fifty of the tools recently commandeered by the Government in New York have been ordered shipped to Detroit.

Fewer large contracts for machinery were placed in the New York market in the past week, but there is still an active

demand for small lots of tools needed by the steel industry as well as in the interior. The American Can Co., which has an order for four million 75 mm. shell from the Government, is preparing to purchase 100 tools for the equipment of its Edgewater, N.J., plant. This company is also going to increase its plant at Jersey City. The Standard Ordnance Corporation, which is to build 155 mm. gun carriages at Hamilton, Ohio, has made additional purchases of tools in the New York market. The United States Government is still in the market for cranes for installation in the new shops at the Washington Navy Yard and for equipping the Sandy Hook Proving Ground.

Steel Output Will Meet Requirements

At the Washington conference last Monday between the War Industries Board and representatives of the Iron & Steel Institute it is understood that assurance was given by the producers that while the output of steel is being cut down by coke shortage and freight congestion, an ample supply of all products will be available to meet war requirements of the United States Government and its Allies. The question of price revision to be made after the 1st of January was only referred to incidentally, but some consideration was given to prices at the meeting held yesterday.

The Iron & Steel Institute is preparing a pamphlet giving in detail the base and differential prices with tables of "extras" established by agreement between the Government and the manufacturers, which, by request of the War Board, will be issued to the trade as the official guide. It is known that some members of the Federal Trade Commission are in favor of revising prices in the near future, but this sentiment is not accepted by the War Industries Board, and the steel manufacturers and distributors are strongly opposed to any changes until time has been given to test the schedules already adopted.

Pittsburgh

PITTSBURGH, Pa., Dec. 15.—The steel market has turned still quieter in the past week. There is an effort made by some authorities in the trade to ascribe the quieter conditions of the past fortnight to the resuscitation at Washington of the price question. At the same time they profess to feel assured that the Washington authorities are not going to make any serious effort to have prices revised downward, and no one contends that there is any hope of the producers having them revised upwards. It seems more natural to attribute the quietness of trade to the season of the year and the fact that the country is getting still more on a war basis.

Last Monday's conference between the War Industries Board and the iron and steel makers was devoted chiefly to consideration of revised methods for apportioning war steel tonnage and placing the actual orders. Prices, it is said, were mentioned only casually. The programme is that following yesterday's conference

between the Federal Trade Commission and representatives of the steel industry the Commission will submit to the War Industries Board some of the cost data it has been accumulating in the past six months, whereupon the board will call another meeting with the steel industry prior to Jan. 1. As the various set prices were definitely announced to run to that date, it is necessary to take some formal action, if only to pronounce them good for a further period or for an indefinite time.

Operating Difficulties

A cold snap, with zero weather, descended upon the whole central west immediately after last report was written, and in the past week all operations in the iron and steel industry have been materially reduced. There has been a fresh shortage of coal at many steel plants and the shortage of coke at blast furnaces has been accentuated. There have also been difficulties with frozen ore, frozen pipes and other obstacles to full production.

While much is made in trade circles of the decreased production arising from weather and transportation difficulties, it is important to observe that the steel makers have given the Government authorities fresh assurances that all the war steel required will be furnished on time, while on the other hand ordinary buyers do not seem to be incommoded seriously by insufficient deliveries of steel. If they are not receiving as much as they could use under normal conditions, their own operations have likewise been interfered with by much the same influences that have operated in the steel industry.

Production Varies

The rate of production shows wide variations in different lines. Steel is diverted to the finishing departments, whose product is most needed. Sheet bar supplies to tin mills are almost normal, while to sheet mills they are greatly reduced. In the past week the tin mills have operated at between 90 and 95 per cent. of capacity, the sheet mills at only about 50 per cent. Production of shell steel and plates seems to have been well maintained, while production of standard steel pipe and wire has suffered greatly. All the American Steel & Wire Co. plants at Cleveland were down at the beginning of the week, chiefly from lack of coal.

Pig Iron

It continues to be the case that there is practically no pig iron offered in the market for early deliveries. There is no basic or Bessemer at all, and foundry iron can only be bought, if at all, by regular customers of the furnaces. There is, however, some foundry iron business being done for second quarter and second half of next year. The requirements of foundries are much lighter than formerly, but there is correspondingly light production, so many furnaces being operated on basic iron. Quotations when made are always at the set prices, \$33 for basic or No. 2 foundry, \$36.30

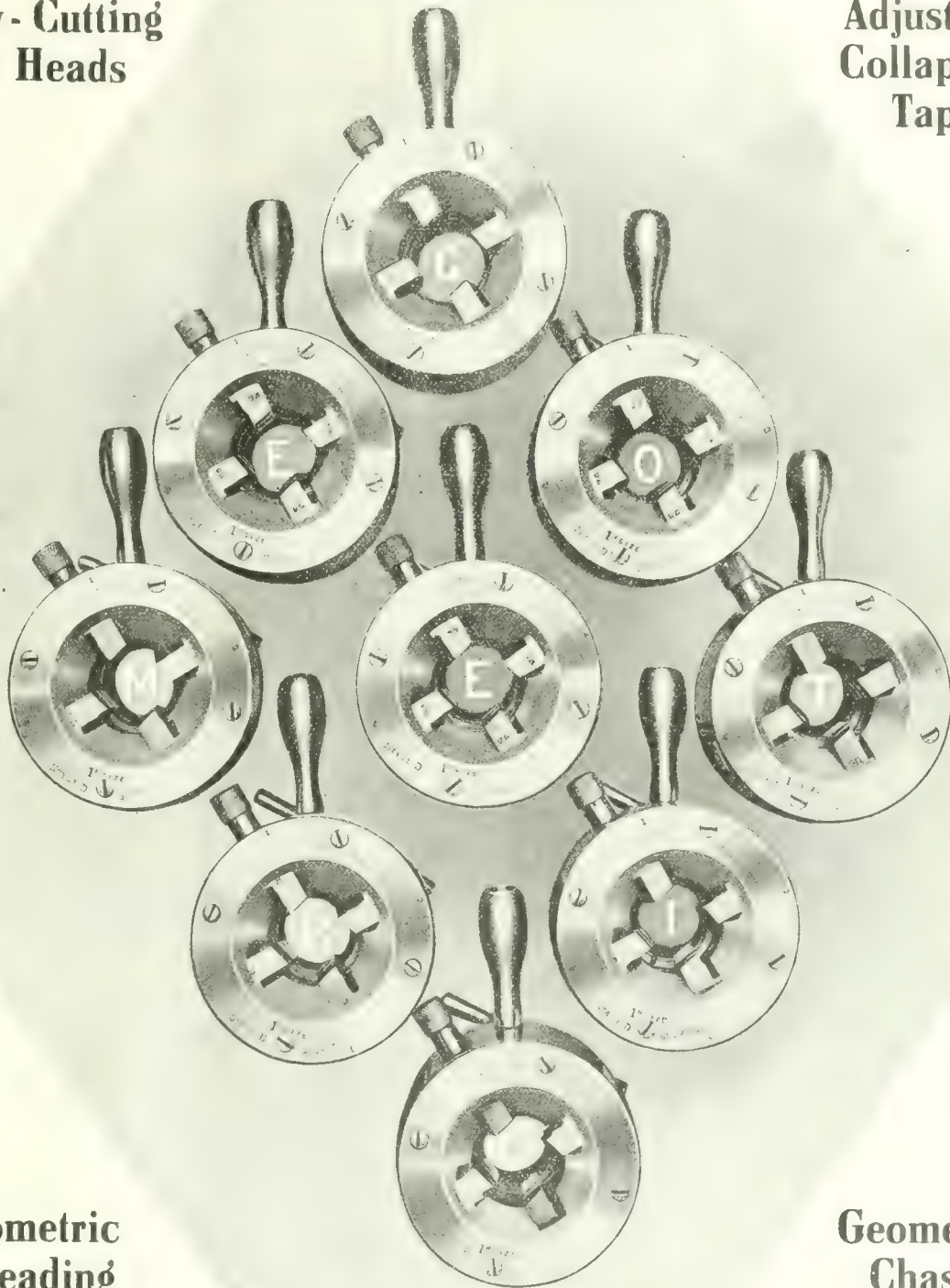
(Continued on page 62.)

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

PITTSBURGH MARKETS

(Continued from page 10)

The December 27, 1917, market for steel was very active.

Discard Steel Offered

Discard steel is being offered in large quantities. This is due to the fact that the production of discard steel, arising from the manufacture of shell steel, has been increased and the mills are offering by any means. Some of the mills will roll the steel to specification, down to 1/2 inch, and the remainder will be of corresponding size:—Billets, \$47.50; small billets, \$51; slabs, \$50; Pittsburgh or Youngstown. No tonnage figures are available as to shell steel, but it is evident that the production has been increased very considerably.

Prospects of Supplies

While the market situation presents the appearance of strength, with deliveries in practically all lines rather difficult to secure, except from old contracts, there is little doubt but that with anything like full production of the basic materials, pig iron and crude steel, there would be fairly plentiful supplies of finished steel in certain forms, those not largely required for prosecuting war. The finished steel industry has only a certain amount of flexibility, the total finishing capacity only slightly exceeding the total capacity for producing raw steel.

With the production of raw steel curtailed, the output can be allotted in accordance with the needs for finished products, the mills making the products most in demand being operated as fully as possible while the mills whose product is not so much needed receive correspondingly less steel. If the produc-

tion of steel were at capacity, instead of in the neighborhood of 85 per cent. of capacity, the steel could be finished only by diverting more of it to the departments now operating at far below their capacity, and such finished products would then be found to be relatively plentiful. The question is whether the blast furnaces and steel-making departments can operate at capacity at any time this winter.

Iron and steel exports in October amounted to 571,893 gross tons, against 489,415 tons in September, and a monthly average of 543,000 tons in the 12 months November, 1916, to October, 1917, inclusive, approximately the twelvemonth period of heaviest exports. While some exports have been embargoed, and the shipping situation is unsatisfactory, it is evident that shipments of war material are going to be so forced as to maintain a good total tonnage of exports right along.

INDUSTRIAL ^A_N^D CONSTRUCTION NEWS

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

ENGINEERING

Valleyfield, Que.—The power house at the Montreal Cottons, Ltd., plant was destroyed by fire on Dec. 13.

Brantford, Ont.—The Steel Company of Canada propose building an addition to their plant here at a cost of \$100,000.

Beamsville, Ont.—Work will commence shortly on the construction of hangars and other buildings for the proposed aviation plant which will be located here.

Toronto, Ont.—A building permit has been issued to The Canadian Aeroplanes, Ltd., for an additional storey to a building on Dupont Street, to cost \$27,000.

Winnipeg, Man.—The Transcona Shell Co., which has been operating the G.T.P. shops at Transcona will it is understood establish a plant for making munitions at Batavia, N.Y.

Toronto, Ont.—The city architect has granted a permit to the Canadian Fairbanks-Morse Co. to erect a one-storey munition shop adjacent to their present plant on Bloor Street. The estimated cost is \$5,000.

Ladysmith, B.C.—The Ladysmith smelter was blown in again on Dec. 3, for at least a few weeks run. It is hoped that before the present supply of ore is exhausted that there will be enough additional supplies in sight to warrant the management continuing the run for an extended time.

Wallaceburg, Ont.—Damage to the extent of \$100,000 was done on Dec. 11 by fire to the Wallaceburg plant of the Dominion Sugar Co. The fire followed an explosion believed caused by an explosion of gas used for heating the boilers in the pulp building. The blaze completely destroyed the building and machinery and 7,000 bags of pulp.

Vancouver, B.C.—A permit has been granted to the Schaafe Engineering Co.

for the first unit of engineering works to be erected shortly. The first unit will comprise a machine shop that will cost \$46,750 for the building alone. The firm will be able to handle almost any class of repair work, as well as build machinery of all kinds.

Sault Ste. Marie, Ont.—The Algoma Steel Corporation will make considerable additions and improvements to its plant, including the installation of 25 by-product coke ovens, with by-product equipment. Construction will be started immediately, and it is expected that the plant will be completed by the middle of 1918. The contract for the installation of the coke ovens has been awarded to the Wilputte Coke Oven Corporation, New York.

Niagara Falls, Ont.—A 13-foot wood-stave pipe line will be laid from the river to Queen Victoria Park down to the development at the foot of the Falls. This pipe line will enable the Ontario Power plant to be developed to its full capacity, and will produce an extra 25,000 horse-power. The new pipe line will provide enough water for additional generators as well, and to utilize it tenders will be let for the installation of additional turbines, with penstock and generator complete. This will give another 20,000 horse-power available ten months from now.

Montreal, Que.—An influential syndicate has been formed to finance and operate a new glass company in a suburb of Montreal called St. Pierre, to be known as the Consumers' Glass Co., and to work in opposition to the Dominion Glass Co., which has several plants throughout the country, including factories at Toronto, Hamilton and Wallaceburg. The new company is taking over the plant of a company formerly called the Premier Glass Co., which previously

had taken over the plant of the Atlas Glass Co., and both of which proved failures.

ELECTRICAL

Kingston, Ont.—On Thursday afternoon engineers Kribs and Johnson of Toronto turned on the Hydro-Electric power from the Trent at the Kingston sub-station, and everything worked satisfactorily.

GENERAL

St. Johns, Que.—A serious fire, supposed to have started in the boiler room of the Excelsior Straw Works, last Thursday destroyed the Excelsior Straw Works, St. Johns Straw Works, Thuote Moving Picture Theatre, and several other buildings. The total loss is about \$125,000, partly covered by insurance.

Toronto, Ont.—The newly-erected manufacturers' building of W. T. Dillon and Company, 183 George Street, was the scene of a fire on Dec. 10, that damaged the building and contents about \$7,000. The chief sufferer was the John Crane Co. Their loss is estimated at about \$5,000, of which about \$1,500 is to machinery. The damage to the building is placed at \$1,500.

MUNICIPAL

Galt, Ont.—A by-law will be submitted to the ratepayers on Jan. 1 to provide money for extensions to the waterworks system to cost \$18,558.

Alliston, Ont.—A by-law will be voted on by the ratepayers on Jan. 7 to authorize an expenditure of \$6,000 for electrifying the municipal pumping plant.

Toronto, Ont.—The Harbor Commissioners have referred to the board's engi-

neer and to Fire Chief Smith the proposal that a fire boat be purchased for protecting the water front and island.

Toronto, Ont.—Fire Chief Smith has recommended the purchase of two motor fire trucks, to cost \$24,000, to protect the district surrounded by Liberty Street, Dufferin Street, Hanna Avenue and the G.T.R. tracks. Works Commissioner Harris reports that new high-pressure mains in the district would cost \$20,000.

Windsor, Ont.—The Water Commissioners have decided to instal at once two motor-driven pumps to obviate danger which threatened to arise as a result of the fuel shortage. It is proposed to use Hydro power to drive the pumps and to keep the present steam installation for auxiliary purposes. However, in order to relieve the load upon the Hydro system in the early evening the steam pumps will be used for an hour or two.

Chatham, Ont. — A serious situation has developed in Western Ontario on account of a shortage in supply of natural gas. The gas pressure failed in Chatham last Saturday, the available supply being hardly sufficient to keep water from freezing in the boilers. There is also very little coal in the city and a number of factories may have to close down. Unless there is a change in the temperature very little relief can be expected.

Hamilton, Ont.—At a special meeting of the Barton Township Council held last Saturday, it was proposed to enact a by-law for the purpose of raising \$55,000 for the purpose of installing a Hydro system in the township. It will require \$22,000 as a first investment to buy out the present system, the rest of the funds to be held for extensions, etc. The question will be placed before the electors of the township when they ballot for the municipal elections.

North Vancouver.—The district of North Vancouver council on Nov. 29 passed a resolution authorizing the clerk to prepare a general loan by-law to provide the sum of \$35,000 for waterworks purposes. The money, which in the event of this by-law passing at the general elections in January, is intended for the establishment of a waterworks system east of Seymour river. The principal need for such a system is to provide a steady and sure supply to the two large industries at Roche Point—the Canadian Robert Dollar Co. and the Vancouver Cedar Mills, Ltd.

CONTRACTS

Hamilton, Ont.—The Board of Control has awarded a contract to the City Brass Co., Hamilton, for the year's supply of brass at \$2,465.

Toronto, Ont.—The Board of Education has awarded the contracts for the Alexandra school annex. The tenders amounted to \$102,081 whereas only \$70,000 was provided for this work in the estimates. The successful tenderers were as follows: Masonry, \$38,500, Witchall & Sons; carpentry, \$22,171,

Frank Armstrong; heating and plumbing, \$21,998, Purdy, Mansell; iron work, \$3,675, Can. Wire & Iron Co.; plastering, \$4,950, Geo. White; painting, \$2,525, Jas. Casey; concrete, \$2,147, Concrete Construction Co.; flooring, \$1,345, Can. Glass, Mantel & Tile Co.; galvanizing, \$1,345; heat regulators, \$1,183, Johnston Temperature Co.; electrical work, \$897, Can. Electric; roofing, \$1,345, J. F. Flowers.

TRADE GOSSIP

New Tonnage Equals Losses.—British tonnage completed in the month of November was within measurable distance of the tonnage losses in that period by enemy attacks, it was announced in the House of Commons on Dec. 11, by Sir Leo Money, Parliamentary private secretary to the Ministry of Munitions.

Contracts Awarded for 4,000 New Ships.—Contracts have been let by the United States Federal Shipping Board for 4,000 ships with net dead-weight carrying capacity of eight million tons. Raymond B. Stevens, vice-chairman of the board, told the members of the Academy of Political Science at the opening of their thirty-seventh annual meeting at New York on Friday that he thought at least six million tons would be available next year.

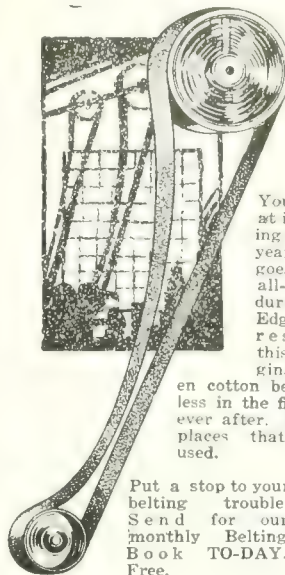
Buy Machinery for China in U. S.—A party of eight Chinese has arrived in New York to arrange for the purchase of a large quantity of machinery for shipment to China. The report has gone out that the purchase was to be of agricultural implements and machinery, but Mr. Ying said this was not so. Mr. Ying emphasized the fact that they had been appointed by the Chinese Government to handle the machinery purchase, and they would have nothing to do with any other matter while in America.

U.S. Steel Output.—Considering all the difficulties against which the steel companies have been obliged to contend, production in November was satisfactory, being slightly larger than in September or in July. The average monthly output of steel since July 1 by the Steel Corporation has been approximately 1,640,000 tons. The production of rolled products in November is indicated to have been a little under 1,200,000 tons, and the average monthly output since July 1 is 1,235,000 tons.

War Expenditure for November.—Canada's war expenditure during the month of November totalled \$18,714,472, making a grand total of war expenditure to November 30 of \$151,969,271. The total net debt on November 30 was \$958,000,700, as compared with \$706,128,082 on November 30, 1916. Revenue for the month on consolidated fund account was \$24,322,946, and expenditure for the month \$12,922,635. Revenue for the eight months period to November 30 was \$170,042,006 and expenditure \$79,566,862.

James Carruthers Gives Aeroplanes.—According to the *Westminster Gazette*, London, James Carruthers, of Montreal,

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ex-President of the Montreal Board of Trade and President of the Canadian Steamship Lines, has offered to the British Government, through Lieutenant Colonel W. Grant Murray, the gift of four battleships for use by the Western Front and the Air Base, as a token of the gift, has expressed its warm appreciation of the generous contribution. Mr. Curzon has already promised three battleships to the Canadian public, and has given a grant of a quarter of a million pounds to Canadian patriotic funds.

Bill to Let Rid of German Control.—The construction of a canal, which gives the British Government control of all shipping to and from the interior, and is intended to destroy what hitherto had been a virtual German monopoly in these metals, was passed on the second reading by the House of Commons, London, England, on Dec. 9. In the course of the debate Andrew Bonar Law, Chancellor of the Exchequer, said he wished to let Germany know that Great Britain will not be pushed around, and that when the time came he should use it. Germany should also remember, he said, that the longer the war lasted, the less any national there would be to go round and the allies would help themselves first.

To Build Training Ship.—The Danish-Canadian Patriotic Fund of Toronto has launched a campaign for a subscription of \$100,000, which is to pay for the building and rigging of a school-ship for the training of young lads in practical seamanship. It is the intention of the organization to build other ships for the same purpose. These will be stationed at such points as St. John, Quebec, Montreal, Winnipeg, Vancouver, etc. The "Denmark," as the first ship will be called, is to be presented to the Canadian Navy League, and will be stationed at Toronto. It will be considered the flagship of the fleet. All money orders and cheques should be made payable to the Danish-Canadian Patriotic Fund and sent to the Wesley Building, Toronto.

Canada Large Buyer of U.S. Tin Plate.—According to the United States Department of Commerce imports of pig tin and palm oil, both essential in the manufacture of tin plate, show an increase for the ten months ended October 31, 1917, over the corresponding period for 1916, while exports of domestic tin plate and terne plates show a falling off. Imports of palm oil amounted to 33,703,671 pounds, against 24,976,235 pounds in 1916, and imports of pig tin were 126,125,792 pounds as compared with 121,048,537 pounds for the first ten months of 1916. Exports of tin plate up to October 31, 1917, totalled 421,137,657 pounds, compared with 433,000,173 pounds in 1916. Argentina and Canada were the largest customers for American tin plate, the former country leading for the first time in this respect.

New Car Ferry Being Built at Levis.—The new ferry now building at the yards of the Davie Shipbuilding and Repairing Co., Levis, Que., will have a

speed of 14 miles an hour and will have a hold capacity of 70,000 cubic feet. It is designed to carry 20 cars, will be 308 feet in length over all and of 52 feet breadth, with a depth of 20 feet 6 inches. The gross tonnage is estimated at 5,000 tons and the net at 3,000 tons. The engines installed will be one four-cylinder triple, 2,200 i.h.p., and the boilers installed will be four of the Scottish marine type, 11½ feet in diameter, 175 pounds working pressure, having 5,500 square feet of heating surface and 143 feet of grate area. The capacity of No. 1 hold will be 40,000 cubic feet, and of No. 2 hold 30,000 feet. The area of the main deck will be 13,000 square feet.

Power Canal Making Progress.—Excellent progress is now being made on the Chippawa Hydro-electric Power Canal and the preliminary work has got well under way. The construction railway which will carry away the material excavated has been completed from the Whirlpool to the power-house, and the rest of the line is being pushed forward. The Hydro engineers were handicapped by shortage of labor, but now about 350 men are employed. At the present time operations are being centred on the erection of a concrete bridge for the Niagara, St. Catharines & Toronto Railway tracks at Stamford, Ont. This is only one of about thirty bridges which will have to be built. The engineers are filling in a great many ravines around the Niagara River with the earth taken out in excavating the canal.

Japan Needs Chemicals.—The ban on cotton and restriction on steel have caused much anxiety throughout Japan, but now chemical importers are at the fore protesting against the shutting off of their supplies of caustic soda, glycerine, and soda ash, all of which are largely obtained from the United States. These three articles are much wanted in Japan. Soda ash is required for glass manufacture, and, to the end of August of this year, was imported to the value of \$1,696,484. Much more than 50 per cent. of this came from the United States. England has now prohibited export of any of these chemicals. Attempts have been made to manufacture soda ash in Japan, but they are still in the experimental stage. Glycerine is produced in Japan by a few concerns, but their combined output is entirely inadequate.

G.T.R.'s Annual Track Inspection Completed.—The annual inspection of track over the Grand Trunk Railway System has just been completed. This inspection has occupied six weeks, and has included a thorough examination of rails, ties, etc., on the 1,145 miles of main line, and on some thousands of miles of branch lines. The inspection party travelled over the system in a specially constructed car fitted with electrically controlled devices for registering the efficiency marks gained by the various sections for excellency of track maintenance. There was the keenest competition between the various sec-

tion gangs, foremen and supervisors for the honors which are given to the section considered to represent the highest standard of maintenance work. These inspection trips serve to increase the enthusiasm of the men engaged in this important branch of railroad work, and enable the officers to give the closest supervision to the maintenance of the track in a high state of efficiency.

PERSONAL

Herbert Johnston has been appointed Canadian sales manager of the Armstrong Whitworth Co. of Canada, Montreal, not city sales manager as was stated in last week's issue.

Captain Arthur C. May, one of the best known vessel masters on the Great Lakes, died at his home in Port Huron, Mich., on Dec. 11, after an illness of five months. He was 58 years old, and resided in Port Huron 28 years.

G. H. Smith, vice-president of the International Petroleum Co., Toronto, has been elected president in succession to Walter C. Teagle, now president of the Standard Oil Co., of New Jersey.

Lt. J. K. L. Ross, of the R.N.C.V.R., has been promoted to the rank of commander for the splendid services he has rendered to the Department of the Naval Service and for his generosity in many other ways.

William Clark Hawkins, managing director of the Dominion Power and Transmission Co., of Hamilton, Ont., has been elected president of the Southern Canada Power Co., of which he was already a director. Mr. Hawkins was born at Orange, N.J., in 1866. He became associated with the D. P. & T. Co. in 1901 and was appointed managing director in 1912.

Lieut. George H. Forster, who, before going overseas was manager of the Linde Canadian Refrigeration Co., Montreal, has been badly gassed in the recent fighting while serving with the British army. Although his condition is serious, there is hope of his recovery. Lieut. Forster joined the 148th McGill Battalion, under the command of Lieut.-Col. Magee, and left in 1916 for England, but later was transferred to the Imperial Forces.

Lieut. Commander J. A. M. Murray, one of the C.P.R. fleet captains, was instantly killed in the explosion at Halifax. Capt. Murray was for about 15 years in the Elder-Dempster West African trade, and also in the West India line. When the C.P.R. took over the Elder-Dempster line, Captain Murray went with the ships and served under the C.P.R. until four years ago, when he became Harbor Master of Quebec. When the war broke out, he was sent by the Canadian Government in the winter to Halifax. Later he was at Sydney, and last summer returned to Halifax, where he was put in the Imperial service. He was in command of the Lake Manitoba for a long time before taking the command of the Empress of Britain.

RAILWAYS & BRIDGES

Port Arthur, Ont.—Fire starting in the basement of the C.N.R. station building on Dec. 12 did material damage to the extent of about \$15,000.

TENDERS

Toronto, Ont.—Tenders are now being called for the building of Child's Restaurant at the corner of Yonge and Dundas Sts., on the site of the old Vendome Hotel, to cost \$100,000. It will be of structural steel, blue stone and granite construction.

BUILDING

Ottawa, Ont.—About a month's time will be required for the restoration of Pier Two, the reception hospital and clearing depot at Halifax, which were badly damaged by the Mont Blanc explosion.

MARINE

Port Colborne, Ont.—Storm warnings have been discontinued here for the season.

Port Colborne, Ont.—The Welland Canal was officially closed for the season, December 15th.

Vancouver, B.C.—Following upon the announcement that John Coughlan & Sons had been awarded contracts by the Imperial Munitions Board for the construction of four steel steamers at an approximate cost of \$7,000,000, comes information that the Coughlan plant will be greatly extended at a cost of approximately \$250,000. At present there are 1,000 men at work on the six steel steamers. It is proposed by the firm to employ at least 2,000 men.

CATALOGUES

Dwight Co. Indicator.—Bulletin "C" illustrating and describing the Dwight Co. indicator made by the Dwight Mfg. Co., Chicago. Copies of the bulletin may be obtained from the Allen General Supplies, Ltd., Toronto, who are the Canadian agents for this instrument.

Atlas Babbitts.—Catalogue issued by the Atlas Metal & Alloys Co. of Canada, Ltd., Montreal. The catalogue describes an extensive line of "Atlas" babbitt metals and other alloys for all kinds of bearings. Details of a friction test of "Atlas" metals and a long list of steamships is given in which "Tenaxas" metal has been employed in the main engine bearings.

Tool Grinding is the title of an interesting booklet just issued by the Norton Company, Worcester, Mass., containing a great deal of useful information on tool room grinding. The booklet explains the correct way to grind cutters of all kinds, reamers, drills, lathes, planer tools, and dies. A number of grinding operations are illustrated to assist the reader in following the text.

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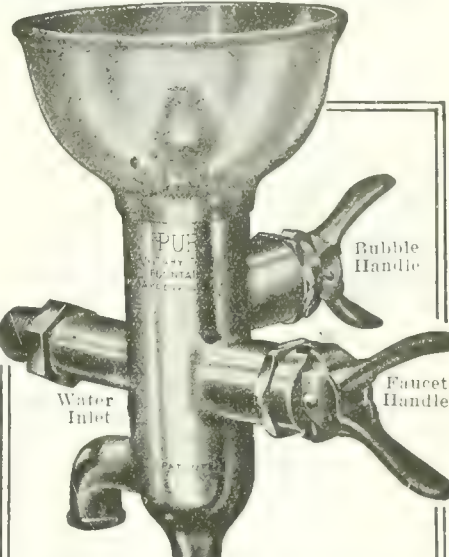
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Brass Castings,
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Pneumatic Tools. Keller Pneumatic Tool Co., Portland, Ore., Wash., has issued three pamphlets dealing with a line of pneumatic and riveting hammers and a sand rammer. In the first two the construction of the hammers is explained in some detail, with illustrations of the various styles that can be supplied and their component parts. In the last bulletin the advantages of pneumatic ramming in foundries and for other work is touched upon with illustrations of the different types available.

Tool Room Specialties. Taft Power Mfg. Co., Woonsocket, R.I., have distributed a catalogue describing a line of tool room specialties, which includes bench plates, boring equipment, gages of all kinds, knees, parallels, sine bars and v blocks. Each specialty is given a single loose leaf with an illustration, brief description and in some cases tables of the various sizes that can be supplied. A feature of the catalogue is its paging according to the style numbers of the various articles covered. Mention is also made of the work which the company is prepared to do in the design and manufacture of special gauges, fixtures or tools.

TENDERS WANTED FOR TELE- GRAPH EQUIPMENT

THE Canadian Trade Commissioner in Cape Town, W. J. Egan, has forwarded to the Department of Trade and Commerce copies of indent No. 151, issued by the Department of Posts and Telegraphs of the Union of South Africa and recently transmitted to the High Commissioner for South Africa in London. Interested manufacturers will note that this indent is not to be executed until after the termination of the war. The requirements represented in the indent include such items as galvanometers, single and double-current keys, circular carbon protectors, wheatstone receivers, relays, sounder screens, wheatstone transmitters, magneto bells, terminal blocks, terminal boxes, pay station telephone apparatus, repeating coils, distributing frames, lightning protectors, protectors with carbons and fuses, jacks, receivers, switches, switchboards, frames, cross-connecting fields, battery boxes, protector strips, test plugs, telephone (magneto wall, central battery wall, central battery table), telephonemeters, telurs, test sets, galvanized iron arms, galvanized bolts, brackets, cement, clamps, clips, connectors, insulators, spindles, cupholders, washers, man-hole covers, milonite nails, cast-iron pipes, copper plates, sheet iron plates, plumbers' metal, iron tapered telegraph poles, screw rings, lightning rods, parallel poles, cable suspension rings, salamac, lead sleeves, paper sleeves, solder resin, tinman's solder, stay rods, pole steps, tape, copper tapes and binders, copper wire, galvanized iron wire, barbed wire, steel suspension wire, vulcanized india-rubber wire, braided indoor wire, bridle wire, flameproof wire, aerial vulcanized india-rubber cable, under-ground telephone cable, armoured tele-

phone cable, silk and cotton telephone cable, switchboard cable, aerial telephone cable. These requirements should be of service in pointing out to Canadian manufacturers the necessity of representation in South Africa or London. This indent may be seen at the Department of Trade and Commerce. (Refer File No. 18760.)

TRADE ENQUIRIES

THE following trade enquiries have been received by the Department of Trade and Commerce, Ottawa. Further particulars may be obtained on application.

1506. Pig-iron, steel plates for shipbuilding, marine oil engines, etc.—A Genoese firm who are contractors to the Royal Italian Government, and to the leading shipyards, engineering companies, and shipowners in Italy, are prepared to open negotiations, for after-the-war trade, with Canadian concerns who manufacture the following: Pig-iron, metals, steel plates and sections for shipbuilding, auxiliary machinery, marine oil engines and other materials used directly or indirectly in the shipbuilding and engineering trades.

1507. Electrical equipment.—An importing house in Genoa, Italy, which is thoroughly conversant with the electrical needs of the Italian market, wishes to correspond immediately with Canadian manufacturers of electric motors, transformers, dynamos, turbines, and electrical cable.

1511. Machinery and metals.—An important firm of merchants and representatives in Italy, with head offices in Genoa, and branches in Milan and Naples, would welcome Canadian agencies in metals and machinery, etc., such as agricultural machinery, pumps, railway supplies, machine tools, wrenches, pliers, diesel and semi-diesel twin motors, 100 to 400 horse-power.

1513. Metals, ferrous and non-ferrous, etc.—An agent in Milan, Italy, would like to open negotiations with Canadian manufacturers of ferrous and non-ferrous metals, and of metal, woodwork, and machine-shop tools.

1514. Lumber.—A. Desio (Milan), Italy, manufacturer of artistic furniture, is anxious to buy Canadian lumber suitable for furniture making. He is also prepared to handle a Canadian lumber agency for after the war.

1515. Wood-pulp.—An import house in Milan, Italy, familiar with the wood-pulp requirements of the Italian market would like to hear from Canadian shippers of same, with a view to representation either now or after the war.

1516. Arsenic.—A Plymouth firm wants to import arsenic 99½ per cent. pure and to contain no impurities, especially sulphur, as it turns black when used in manufacture. Arsenic is generally imported in casks of 3¼ to 4 cwt. (112 pounds to cwt.).

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EXPERIENCED METAL PATTERN MAKER with knowledge of all types of patterns and machinery. Apply to Canadian Machinery, Box 361, Toronto. (c23m)

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WANTED A GOOD HEAVY POWERFUL machine for 4.5 shells. Send description and best price at once. Box 359, Canadian Machinery. (c24m)

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SIX COMPRESSORS FOR SALE VERY cheap. The National Quarry, 81 St. Peter St., Quebec. c22m

FOR SALE NEW ONE TURBO WING blower, twelve-inch; one Mason hydraulic damper regulator, No. 4; one ten-inch air cylinder and two-way valve for air chuck; one No. 3, two No. 3 Acme automatic steam engines, all new Barrens, make bid Reliance Machine Company, Toronto. (c24m)

THREE TONS COLD ROLLED STRIP STEEL, drawing quality 8" wide, .065 thick. Dillon Manufacturing Co., Oshawa. c1m

PUNCHING MACHINE—POWERFUL BELT-driven geared multiple punching machine; capable of punching 30 holes 3/4" dia. at 2 1/2" pitch through 3/4" plate; distance between housings 6' 0"; having two bed plates, one 24' long, fitted with adjustable screw-driven plate carriage for feeding plates to punch, and one 26' long, fitted with plain plate carriage, which is operated by hand-power draw winch; machine has large equipment, including punches and bolsters, for 1/2", 3/4", 1", 1 1/4" and 1 1/2", and one rack of fixed punches and bolsters 11-32" at 1 1/4" pitch; made by Hanna, Donald & Wilson; f.o.b. Glasgow. William C. Wilson & Co., 21 Camden Street, Toronto. c23m

FOR SALE ONE INGERSOLL-RAND AIR Compressor with receiver. Displacement 64 cubic feet per minute. In good shape. \$300.00. Perfection Stove Co., Ltd., Sarnia, Ont.

HOISTING ENGINE—NEW.

ONE 16" x 24" "MEAD-MORRISON" DOUBLE cylinder, single drum, first motion hoisting engine, reversible, drum is 30" diameter and 70" long between flanges; is grooved for wire rope 1" diameter. Rope capacity in single coil 500' 0", but flanges will allow of four or five layers. I. Matheson & Co., Ltd., New Glasgow, N.S. (c24m)

FOR SALE CHEAP 16" SHAPER; 24 x 24 x 6 planer; two heavy duty roughing lathes for 6" shells; 1 Hall No. 6 cut-off machine; 1 2-ton heavy Morris chain block—all guaranteed and in first class condition. Dominion Machinery Co., Toronto. c24m

HOISTING ENGINE — NEW

ONE 16" x 24" "MEAD-MORRISON" double cylinder, single drum, first motion hoisting engine, reversible, drum is 30" diameter and 70" long between flanges; is grooved for wire rope 1" diameter. Rope capacity in single coil 500' 0", but flanges will allow of four or five layers. I. MATHESON & CO., LTD., ENGINEERS NEW GLASGOW, N.S. (c26m)

AGENTS WANTED

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

WANTED—PARTY TO TAKE OVER CANADIAN and European patents of good paying machine. The machine, which costs less than thousand dollars to build, is in daily operation in Pittsburgh steel mill, with a saving of thirty dollars per day. Apply to Box 355, Canadian Machinery. (c25m)

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H. C. THOMAS, GENERAL MACHINE SHOP, tools, jigs and machine repairs. 801 King St. W., Toronto. Telephone Adelaide 3486. tf

MANUFACTURERS—WE CAN UNDERTAKE work to any specification—munition production equipment or otherwise. Write W. H. Sumbling Machinery Co., 7 St. Mary St., Toronto.

LET OUR MACHINE SHOP HANDLE YOUR overflow. We have a well equipped shop and can handle turret lathe, engine lathe, shaper, drill, screw machine work, as well as fitting. We will gladly quote you prices. Webber Bros. Machine Co., Dupont St., Toronto. (c26m)

FOR SALE

- 2 16" x 5' Reed Lathes, elevating rest.
- 1 16" x 6' Reed Engine Lathe, plain rest.
- 1—16" x 6' Reed Engine Lathe, R. and F.
- 1—18" x 8' Davis Engine Lathe, D.B.G.
- 1 18" x 8' Porter Engine Lathe.
- 1 22" x 10' Nicholson & Waterman Engine Lathe.
- 1 No. 3 Brown & Sharpe Automatic Gear Cutter.
- 1 30" old-style Brainerd Automatic Gear Cutter.
- 1 5" x 48" Pratt & Whitney Plain Grinder.
- 1 No. 3 Lees-Bradner Thread Miller.
- 1—15" Jungst Shaper.
- 2—24" x 24" x 6' Powell Standard Planers.
- 2—30" x 30" x 8' Powell Standard Planers.

Brownell Machinery Co.
Providence, R. I.

Automatic Multiple Punch

By D. Bergue & Co., Manchester, Eng.

SPECIFICATIONS:

CAPACITY TO PUNCH.....	18 7/8" holes in 7/8" plate, or 20 3/4" holes in 3/4" plate, or 27 1/2" holes in 3/8" plate.
Each punch is independently adjustable for centers. All punches can be operated together or any individual punch can be instantly thrown out of action.	
EQUIPMENT.....	1 set 18 7/8", and 1 set 27 1/2" punches and dies.
TAKES PLATES.....	26" long by 6' 6" wide.
DISTANCE BETWEEN HOUSINGS.....	7' 0"
STROKE OF RAM.....	3"
DIE SPACE -STROKE UP.....	12"
WIDTH OF FACE OF RAM.....	12"
(to which punches are secured)	
WIDTH OF TABLE.....	18"
(to which dies are clamped)	
TABLES.....	Extend for a distance of 29' 0" in front and at rear of machine measuring from center line of punches, which is ample for 26' plates. Feed is controlled by operator from front of machine.
PLATES ARE FED INTO MACHINE AUTOMATICALLY.....	by means of rollers in tables. Feed is controlled by operator from front of machine.
BELT OR MOTOR DRIVE.....	Motor drive is recommended, motor being directly belted to driving shaft.
Driving pulley.....	10" x 7 1/2"
Fly wheel.....	64" x 6"
Driving shaft is double geared into main shaft.	
Main shaft.....	12" diameter.
WEIGHT.....	About 50,000 lbs. net.

Condition equal to new
IMMEDIATE SHIPMENT

Full details on request

A. R. Williams Machinery Co., Ltd.

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Toronto

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TRAVELING CRANES.

- 20-ton Browning Trolley, 5-ton zux., 56 1/2" ga. (new).
- 20-ton Shaw, 56' 3" span, 110 V.D.C.
- 10-ton Case, 58' 3" span, 220 V.D.C.
- 10-ton Northern, 74' 6" span, 220 V.D.C.
- 15-ton Niles, 55' 6" span, 220 V.D.C.

PUNCHES AND SHEARS.

- Single 48" tht., cap. 3 x 1 1/4"; Providence.
- Single 6" tht., cap. 7/8 x 7/8", Cleveland.
- Single 15" tht., cap. 3/4 x 1 1/2" (hand) new Doty.
- Single, 9" tht., cap. 1 x 1", belted (3).
- Single, 27" tht., cap. 3/4 x 3/4", belted.
- Single, 32" tht., cap. 1 x 1", belted.
- Double 15" tht. cap. 3/4 x 3/4" Fischer.
- Double, Queen City, 12" thts., cap. 5/8" x 5/8".
- Double, No. 3-A Royersford, 18" thts., cap. 1" x 7/8".
- Double, No. 13 Williams-W., cap. 1 3/4 x 1", 20" throats.
- Double 12" blades, bar shear, cap. 2" sq., crucible.

- Univ. Plate Shear, 18" blades, cap. 3/4", Cleveland belted.
- Univ. Plate Shear, 26" blades, cap. 1/2", Lewis belted.
- Guillotine Shear, cap. 2 1/2" sq., belted, Perkins No. 6.
- Guillotine Shear, No. O. H. & J., 6 and 7" blades (2).
- Guillotine Shear, Fisher, 21" blade, cap. 8 x 2".
- Squaring Machine 120", cap. 3/16".

MISCELLANEOUS.

- Bolt Cutter, Acme 2", Class A, single head, dies.
- Boring Mill, 10' Niles, Vertical, 2 heads.
- Forging and Upsetting Machine, 1 1/2" Acme, with dies.
- Forging and Upsetting Machine, 2 1/2" Ajax.
- Hammer, 80-lb. Bradley, Cushion Helve.
- Hammer, 35-lb. Maggowan & Finigan (Perfect), belted.
- Rotary Planer, 36" Cleveland, motor driven.
- Rotary Planer, 60" Cleveland, motor 60 cy., 440 V.
- Pipe Machine, 8" E. C. & B.
- Pipe Machine, No. 11 Jarecki.

GOOD CONDITION. PROMPT SHIPMENT.

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- 7' x 5' Fitchburg, lo-swing.
- 16" x 5 1/2' Pratt & Whitney, D.B.G. (3).
- 16" x 5 1/2' MacGregor, D.B.G. (2)
- 16" x 6' Pratt & Whitney, B.G.
- 18" x 10' Libby (2).
- 20" x 10' Bridgeport, B.G.
- 22" x 8' Pratt & Whitney, B.G.
- 22" x 8' Martin, single purpose (2).
- 22" x 8' Davis, D.B.G.
- 21" x 8' Lodge & Shipley.
- 26" x 8' Fay & Scott, B.G.
- 2" x 24" Stevens Screw Machines.
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- No. 6 Warner & Swasey, friction head.

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- 6" x 30" Dalton, B.G., bench.
- 18" x 6' Filsmith, D.B.G., comp. rest.
- 11" x 6' McKenzie, taper attachment.
- 11" x 6' Lodge & Shipley, taper attachment.
- 15" x 6' Sebastian, B.G., comp. rest (3).
- 15 1/2" x 8' Carrol-Jamieson, D.B.G.
- 16" x 8' Monarch, B.G., compound rest.
- 18" x 10' Putnam, back geared.
- 20" x 8' Fifield, B.G., plain rest.
- 20" x 8' Hercules, heavy duty.
- 21" x 8' Bawden, heavy duty (2).
- 22" x 8' Pond, B.G., plain rest.
- 24" x 11' Pond, B.G., comp. rest.
- 26" x 14' Gleason, D.B.G.
- 31" x 16' Fifield, back geared.

DRILLS

- 12" Reed, 4-spindle.
- 12 1/2" Avey, ball-bearing.
- 14" Excelsior, sliding head, lever feed (5).
- 15" Avey, high-speed, ball-bearing.
- 16" Barr, sliding head, lever feed.
- 20" Barnes, 3-spindle, lever feed (2).
- 20" Baber, tapping attachment.
- 24" Foote-Burt, heavy duty.
- 32" Cincinnati, heavy duty.
- 40" Bickford, back geared.
- 46" Allfree, back geared, power feed.
- 54" Hand-feed Radial.
- D-8 Colburn, heavy duty.

GRINDERS

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

IRON PLANERS

- 20" x 20" x 5' Bertram (2).
- 24" x 24" x 6 1/2' Bertram.
- 36" x 36" x 10' Pond, two heads
- 40" x 40" x 12' New Haven, power feed.
- 72" x 72" x 11' Canada, power feed.

MILLING MACHINES

- Bertram, plain.
- Brown & Sharpe, power feed, plain.
- No. 2 Ford-Smith, plain.
- No. 1 Fox, universal.
- Gray Thread Miller.
- Monarch, vertical.

SHAPERS

- 16" Petrie, back geared (2).
- 16" Canada Mach. Corp., back geared.
- 16" Cincinnati, back geared (3).
- 24" Gould & Eberhardt, back geared.
- 30" Morton, back geared, draw cut.

MISCELLANEOUS

- 4", 6" and 12" Power Hack Saws.
- 4 1/2" Martin Cutting-off Machine.
- No. 2 Grant Rotary Riveting Hammer.
- 3/8" Garvin Vertical Tapping Machine.
- No. 3 1/2" Greenerd Arbor Press.
- No. 180 Brown-Boggs Power Presses (2).
- No. 18 Can. Hanson & Van Winkle Power Press.
- No. 2 West Tire Setter, Hydraulic Banding Press.
- No. 3 Goldie & McCulloch Hydraulic Banding Press.
- Bawden Copper Band Turner for 4.5 Shells.
- 1500-lb. Toledo Drop Hammer.
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RIVERSIDE MACHINERY DEPOT
 29 St. Aubin Ave.,
 DETROIT, MICH.

Complete 18-pr. Shrapnel Plant for Sale

PRINCIPAL ITEMS AS FOLLOWS:

- 1 - 18" x 12" x 10" Worthington Duplex Double Acting Steam Pump
- 1 - 14" x 12" x 10" Worthington Duplex Double Acting Steam Pump
- 1 - 2" x 1" x 1/2" Gardner Feed Pump and Receiver
- 1 - 2" x 2" x 1/2" Smart Turner B.F. Steam Pump
- 1 - 12" and 18" x 12" x 10" Worthington Compound Duplex Double Acting Steam Pump
- 1 - 14" x 12" x 10" Worthington Duplex Double Acting Steam Pump
- 1 - 8" x 10" Ideal High Speed Steam Engine
- 1 - 150 Goldie McCulloch Corliss Engine
- 1 - 1 H.P. International Stationary Gasoline Engine
- 1 - 15 H.P. International Portable Gasoline Engine
- 1 - 35 H.P. Heer Stationary Gasoline Engine
- 2 - 40 H.P. Locomotive Type Boiler
- 1 - 60 H.P. Locomotive Type Boiler
- 1 - 75 H.P. Return Tubular Boiler, full front setting
- 2 - 100 H.P. Return Tubular Boilers, full front setting
- 3 - 150 H.P. Return Tubular Boilers, full front setting
- 1 - 6 1/2" x 8" Napanee D.C., D.D. Hoisting Engine
- 2 - 7 x 10 D.C., S.D. Hoisting Engine
- 2 - 6 x 8 D.C., S.D. Mine Hoists
- 1 - 7 x 10 Bacon Special Cableway Winding Engine
- 1 - 1 H.P. Novo Reversible Gasoline Hoist
- 1 - No. 5 American Gas Forge
- 1 - No. 16 American Gas Furnace
- 1 - 6" Peerless Hack Saw
- 2 - No. 3 Waymoth Variety Lathes
- 1 - Waymoth Pointing Machine
- 1 - Crescent Universal Boring Machine
- 1 - 20 K.W. D.C. Generator, 115 volts
- 1 - 1/2 yard London Concrete Mixer, mounted on truck, with steam engine and boiler, complete with water tank and automatic loading skip
- 1 - 20 H.P., 2-phase, 440-volt, 60-cycle Electric Motor
- 1 - 75 H.P., 3-phase, 2200-volt, 60-cycle Electric Motor
- 2 - Bilton Gear Cutters
- 1 - Gray Sandblast Machine

Jenckes Machine Co., Ltd.
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FOR SALE

- 1 - 20 Thomas Spacing Table complete with indicator carriage, trolley carriage, stands, adjustable roller, racks, etc. Capacity: Plates, 48" long x 48" wide, angles, 8" long x 8" wide. Further particulars on application.
- 1 - 10 H.P. Horizontal Gasoline Engine complete and in running order
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- 1 - Air Compressor driven by Twin Cylinder Fairbanks Gasoline Engine, mounted.
- Complete equipment for machining 4 1/2" HE Shell Nose Plugs. Capacity, 10,000 per day.
- 1 - Powerful Hand Punching Machine.
- 1 - Horizontal Steam Pump.

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- No. 1 - 12" to Turn Lathe, geared head
- No. 2 - 10" Monitor Lathe
- No. 3 - 8" Spinning Lathe
- No. 4 - 6" Spinning Lathe

GRINDERS

- No. 1 - Gardner Grinder
- Gardner Double Disc Grinder
- Corliss Disc Grinder
- Leaf Sharp Shell Grinder
- 10" x 4" Leadin' Grinder
- Primo Leadin' Grinder

SHAPERS AND PLANERS

- No. 1 - 14" Planer
- No. 2 - 12" Planer

PRESSES AND HAMMERS

- No. 1 - 12" Nurex Triple Drawing Press
- No. 2 - 10" Consolidated Straight Sided Press
- No. 3 - 8" Drop Hammer

PIPE THREADING MACHINES

- 1 - 1 1/2" Victor, Belt-driven
- 1 - 1" John H. Hall, Belt Driven
- 1 - 1" Locom Victor Motor Driven S.P. 110 60.
- 1 - 1" 6" Locom Victor Motor Driven S.P. 110 60.

PUMPS

- 1 - 2" x 1 1/2" x 1/2" Gardner Feed Pump and Receiver
- 1 - 2" x 2" x 1/2" Smart Turner B.F. Steam Pump
- 1 - 12" and 18" x 12" x 10" Worthington Compound Duplex Double Acting Steam Pump
- 1 - 14" x 12" x 10" Worthington Duplex Double Acting Steam Pump

STEAM AND GASOLINE ENGINES

- 1 - 8" x 10" Ideal High Speed Steam Engine
- 1 - 150 Goldie McCulloch Corliss Engine
- 1 - 1 H.P. International Stationary Gasoline Engine
- 1 - 15 H.P. International Portable Gasoline Engine
- 1 - 35 H.P. Heer Stationary Gasoline Engine

BOILERS AND HOISTS

- 2 - 40 H.P. Locomotive Type Boiler
- 1 - 60 H.P. Locomotive Type Boiler
- 1 - 75 H.P. Return Tubular Boiler, full front setting
- 2 - 100 H.P. Return Tubular Boilers, full front setting
- 3 - 150 H.P. Return Tubular Boilers, full front setting
- 1 - 6 1/2" x 8" Napanee D.C., D.D. Hoisting Engine
- 2 - 7 x 10 D.C., S.D. Hoisting Engine
- 2 - 6 x 8 D.C., S.D. Mine Hoists
- 1 - 7 x 10 Bacon Special Cableway Winding Engine
- 1 - 1 H.P. Novo Reversible Gasoline Hoist

MISCELLANEOUS

- 1 - No. 5 American Gas Forge
- 1 - No. 16 American Gas Furnace
- 1 - 6" Peerless Hack Saw
- 2 - No. 3 Waymoth Variety Lathes
- 1 - Waymoth Pointing Machine
- 1 - Crescent Universal Boring Machine
- 1 - 20 K.W. D.C. Generator, 115 volts
- 1 - 1/2 yard London Concrete Mixer, mounted on truck, with steam engine and boiler, complete with water tank and automatic loading skip
- 1 - 20 H.P., 2-phase, 440-volt, 60-cycle Electric Motor
- 1 - 75 H.P., 3-phase, 2200-volt, 60-cycle Electric Motor
- 2 - Bilton Gear Cutters
- 1 - Gray Sandblast Machine

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4" Mueller Plain Radial.
Four No. 310 Baker Heavy Duty.
3-spindle Rockford.
4-spindle Rockford.
4-spindle Washburn, with power feed.
1-spindle Allen.
No. 11 Pratt & Whitney, 10 spindles.

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24" x 7" G. & E., spur gears.
No. 3 26" B. & S., spur gears.
30" x 9" G. & E., spur and bevel gears.
36" x 9" G. & E., spur and bevel gears.
36" Walcott, spur gears.
No. 1 Schuchardt & Schutte Gear Hobber.

GRINDERS.

No. 1 Cincinnati Universal Tool and Cutter.
No. 1½ Cincinnati Cutter and Tool.
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Brainard Cutter.

Leland Universal, with power feed.
No. 2 Landis Universal.

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10" x 5' LeBlond, C.R., with chuck.
14" x 6' Hamilton, C.R., chuck.
14" x 6' Rockford, C.R.
15" x 6' Rockford Tool Co., C.R.
15" x 6' Prentice Lathe, C.R.

16" x 6' Bradford, C.R.
18" x 6' Bradford, C.R., taper attachment.
18" x 6' Lodge & Shipley, pat. head, C.R., taper attachment.
20" x 14' Blaisdell, C.R.
21" x 12' New Haven, C.R.
24-27½" x 14' Lodge & Shipley, selective geared head, Q.C.G., 18" chuck fitted.
24-27" x 12' Reed-Prentice, geared head, single pulley drive.
32" x 12' Schumacher & Boye, 28" chuck, fitted.
36" x 18' Schumacher & Boye, T.B.G., Q.C.G.
36" x 20' American, T.B.G.

PLANERS.

24" x 24" x 6' American, one head.
26" x 26" x 8' Pease, one head.
36" x 36" x 8' Powell, 2 heads.
36" x 36" x 14' Sellers, one head.
39" x 39" x 12' New Haven, one head.

SCREW MACHINES.

No. 1 Warner & Swasey, plain head.
No. 2 P. & W., friction head.
No. 3 Pratt & Whitney, B.G., double friction head, A.C. and W.F.
No. 3 Bardons & Oliver, plain head, A.C. and W.F.
No. 4 Pearson, friction head, A.C. and W.F.
No. 5 Foster, geared friction head, A.C., P.F. to turret slide, and P.F. to cross slide.

TURRET LATHES.

No. 2 Foster-Kimball, plain head.
No. 22 Garvin, plain head.
16" Lodge & Davis, back geared.
16" Warner & Swasey, friction head.
2 x 24" J. & L., cone head.
24" Gisholt, 4¼" spindle hole, taper attachment.
No. 3-A Warner & Swasey, bar attachment.

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No. 20 Thiem, O.B.I.
No. 3 Loshbough-Jordan, O.B.I.
No. 3 Loshbough-Jordan, O.B.I.
No. 4 Rockford, O.B.I.
No. 4 American Can., O.B.I.
No. 74½ Bliss, str. side, geared.
Blake & Johnson Embossing.

MISCELLANEOUS.

7'-10' Betts Boring Mill.
No. 2 Garvin Auto. Tapper.
No. 2½ Hendeley Lincoln Type Miller.
No. 24 Oesterlein Universal Miller.
4" Nutter & Barnes Cutting-off Machine.
6 x 48" P. & W. Thread Miller.
No. 3 Cincinnati Vertical Milling Machine.
20 H.P. Nash 2-cylinder Vertical Gas Engine.
6 H.P. Fairbanks-Morse Horizontal Gas Engine.

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These "High Duty" New Lathes will be installed in your shop with understanding there is nothing better built in workmanship — power and convenience in handling.

All-Steel Quick- Change Gear-box	26-in Swing —18-ft. Bed		
	26 " " 16 " "		
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3-step Cone— Double Back- Gears	24 " " 18 " "		
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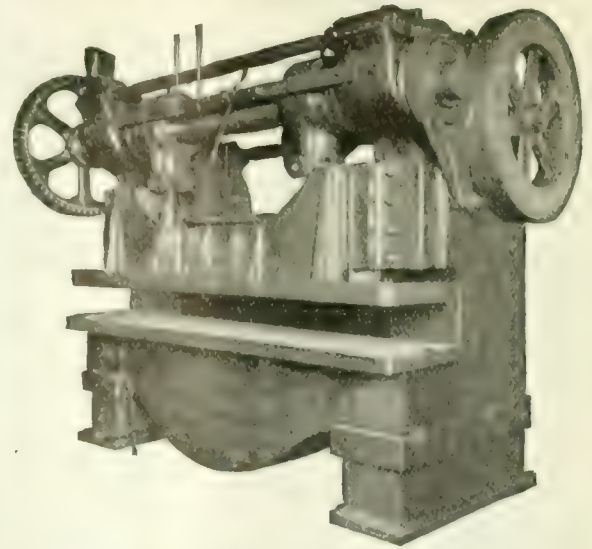
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Large Blanking Press

76" between housings, 8" shaft,
3½" stroke, 8¼" die space.

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Equipment may be bought independent of plant.

Specifications: Modern Building, 100' x 200' on 7½-acre site.
Ideal wharfage and C.P.R. spurs running into plant.

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- 1—18" Barr Double Arm Punch and Shear.
- 1—26" Prentice Drill Press.
- 1—40" Buffalo Blower.
- 1—5" Bellers Radial Drill.
- 1—2-ton Chain Block and Swedge Block.
- 1—48" Espen Lucas Cold Saw, 2 blades.
- 1—72" x 72" x 14" Enterprise Planer, 2 heads and grinder head.
- 3—Air Hoists, 1—4", 2—7".
- 1—2" Acme Bolt Cutter, 3 complete sets of dies.
- 1—12 x 12 Rand Steam-driven Air Compressor, with tank.
- 1—36" x 36" Niles Planer, with two heads.
- 1—45" x 12" Niles Two-head Planer, with extensions.
- 1—54" Putnam Gear Cutter, with cutters.
- 1—Gisholt Tool Grinder.
- 1—32" x 48" Brainard Slab Miller.
- 1—Power Hack Saw.
- 1—1½" Spindle Double-end Grinder.
- 1—48" Morton Draw-cut Shaper.
- 1—1210A Mason Boiler (T.P. 240, W.P. 160).
- 1—Dudley Car Frame and Trucks.
- Several Electric Motors.

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At This Period "Service" is our
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With our well equipped Tool Dept.
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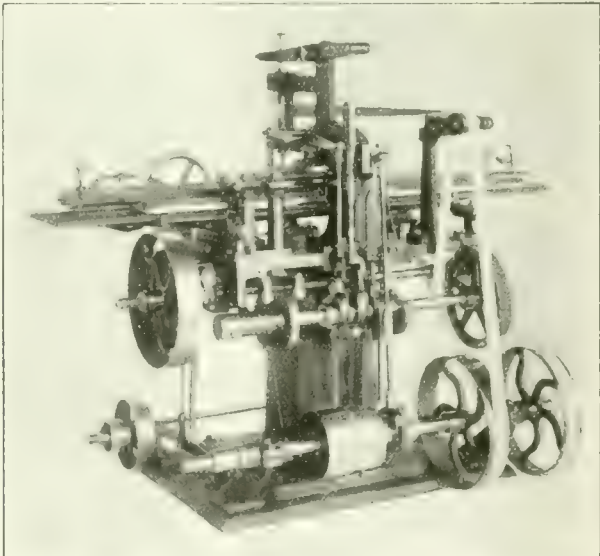
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 bilities in this line.



Balance Rail and Keyframe Boring
 Machine

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AND
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We make Blanking, Perforating, Drawing, Forming and all classes of dies and tools for plain or difficult stamping to suit the production required.

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At a speed of 12,000 R.P.M. or at any one of 4 lower speeds, drills true to most exacting requirements.

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maintains the cutting drill in alignment perfectly true. Note the vertically adjustable quill bracket and the belt adjuster and automatic take-up.

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is of ball-bearing construction throughout. No friction; no vibration — NO BROKEN DRILLS.

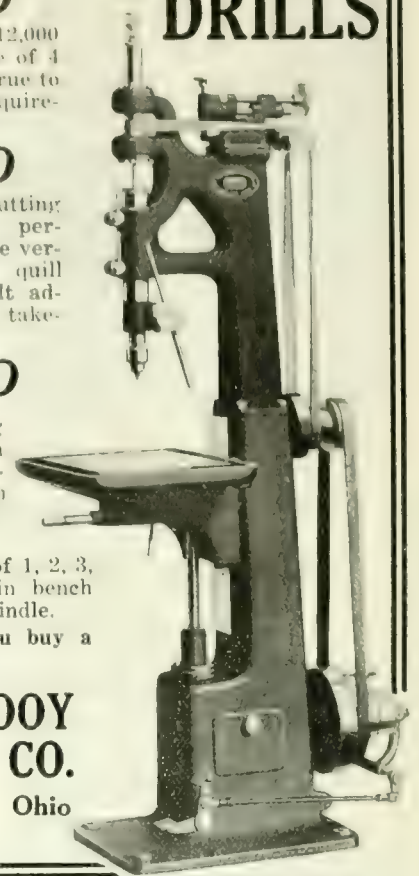
Built in floor types of 1, 2, 3, 4 and 6 spindles; in bench type with single spindle.

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

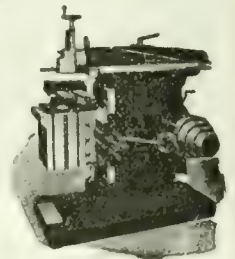
A Steptoe Hand Miller or small power feed can be handled quickly and will cut your production cost. You will have less money invested in your Milling Machines and have more machines to do the work.

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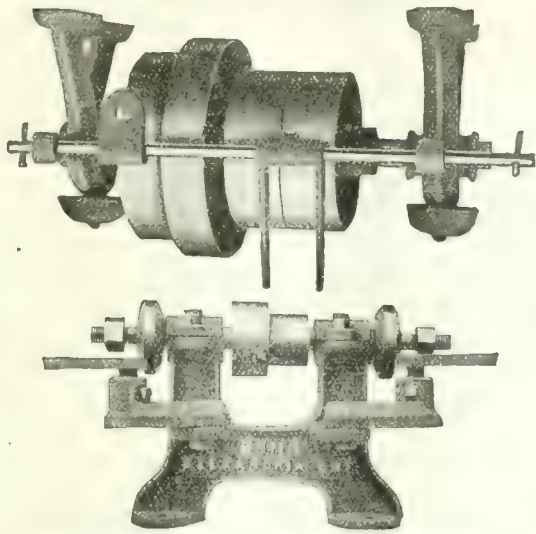
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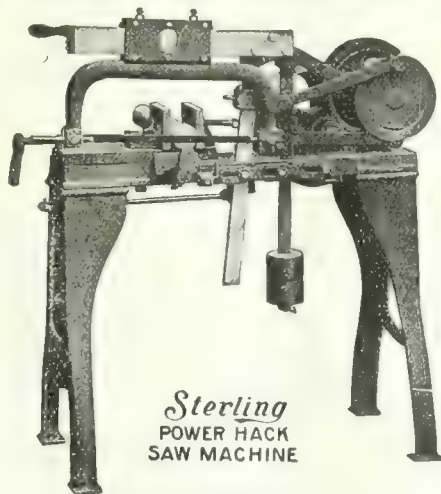


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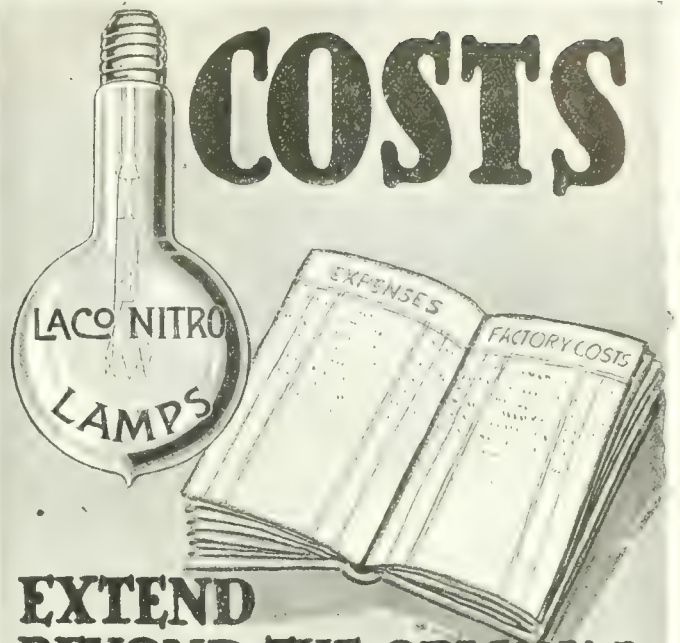
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CHEAP LAMPS DO COST YOU MORE

Look at this chart. Test reports on five different type lamps. Study it over and decide.

NAME OF LAMP	WATTAGE IN ANGLE POWER LAMPED HRS TESTED LAMPS	ACTUAL WATTAGE ANGLE POWER TESTED LAMP	ACTUAL WATTAGE TEST LAMP	COST		1000 HRS LOSS
				1000 LAMP NEEDED	1000 HR COST	
LACO NITRO	100	111.5	104	9	\$23.40	NONE
COMPETING LAMP A	100	78.5	101	13	\$28.83	\$ 9.43
" B	100	87.5	109.5	12	3285	9.45
" C	100	66.9	103	15	3863	15.23
" D	100	63.0	100	16	4000	16.60

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Show an Actual
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THIS SAVING WILL BUY A NEW SET OF LAMPS AT THE END OF THE MINIMUM GUARANTEED PERIOD AND LONGER LIFE IS FREQUENTLY SECURED.

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Their RELIABILITY has made them standard grade tools in the estimation of all mechanics.

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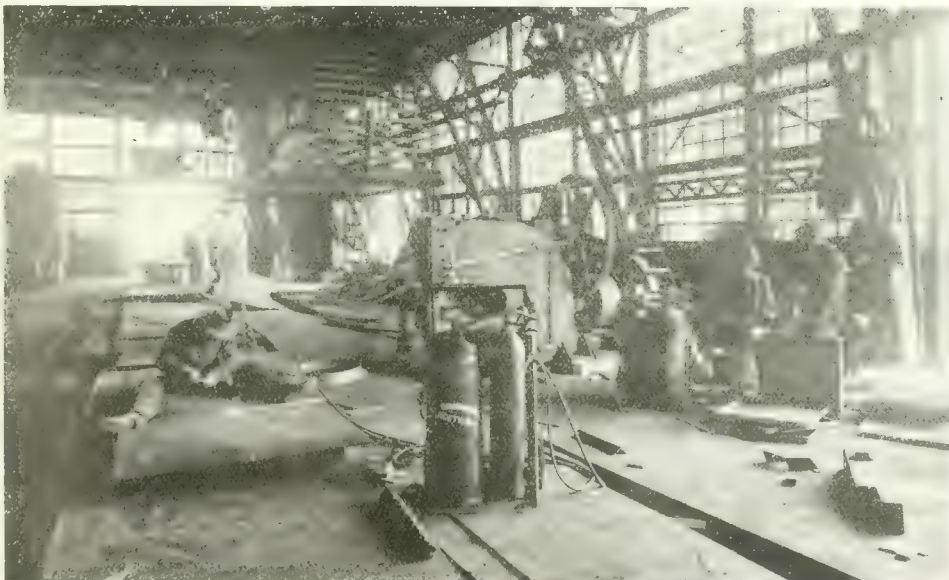


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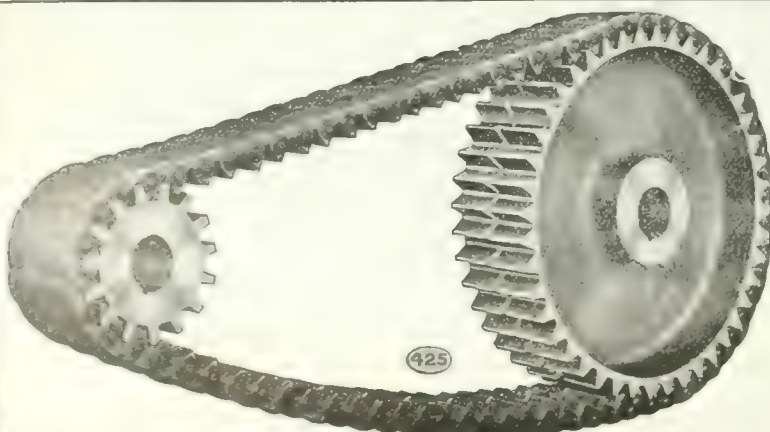


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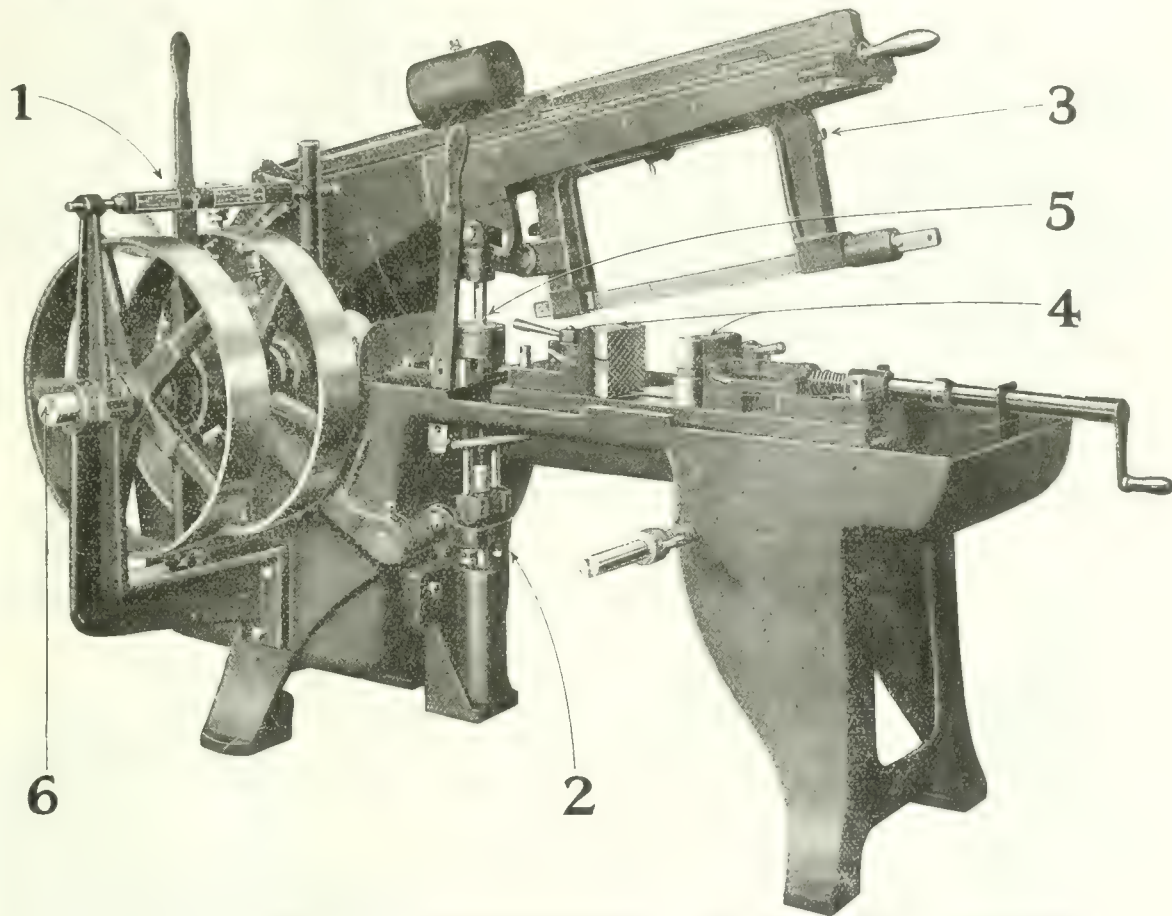
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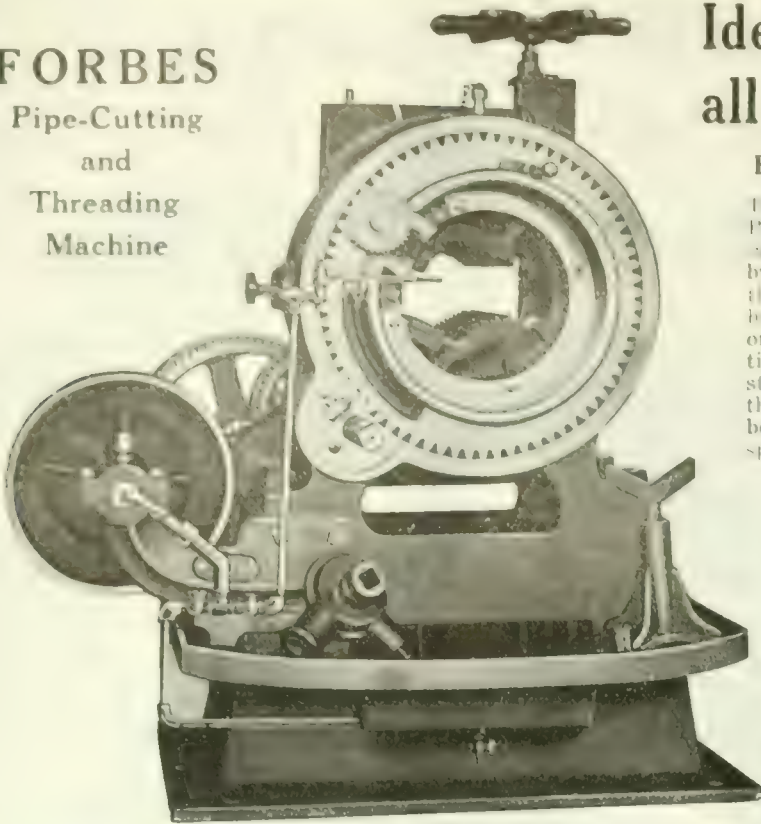
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Pipe-Cutting
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Threading
Machine



**Ideal Machine for
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Especially Fine Work

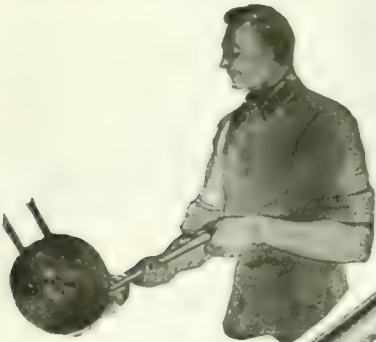
The "Forbes" is the ideal Pipe-Cutting and Threading Machine for any job, but it is especially essential where the work in hand is of a high class order—where the reputation of your firm is at stake. Joints threaded by the Forbes Machines will bear the most critical inspection. They never leak.

It is the only machine on the market with receding gear which carries the die into the pipe. It is also entirely self-maintaining, motor-driven and can be easily carried to its work.



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in Trim---**
**The Diamo-Carbo Emery
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The Diamo-Carbo Dresser is being very generally adopted as a substitute for the expensive diamonds. Diamonds are becoming more scarce and quality is deteriorating. The quality of the Diamo-Carbo is uniform and in most places will do the same work as a diamond. They can be tried at our expense.

The Desmond Huntington No. 2 is the best dresser ever devised for use on large and coarse wheels.

We can make prompt deliveries of any type of Dresser desired.

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**Labor and Pro-
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Wouldn't a proposition interest you that would solve these problems? We have proven to hundreds of others that our New Improved Peerless

High Speed Heavy Duty Metal Cutting Saw will do more work with less labor and save floor space. Instead of using several machines, one Peerless will do the work.

You are losing money in delaying your production and tying up ready cash when building.

Now can you afford to pass up this proposition? You take no chances, we allow you thirty days' free trial before you decide to purchase. No previous records or world-wide reputations are given consideration after this tool is once installed.

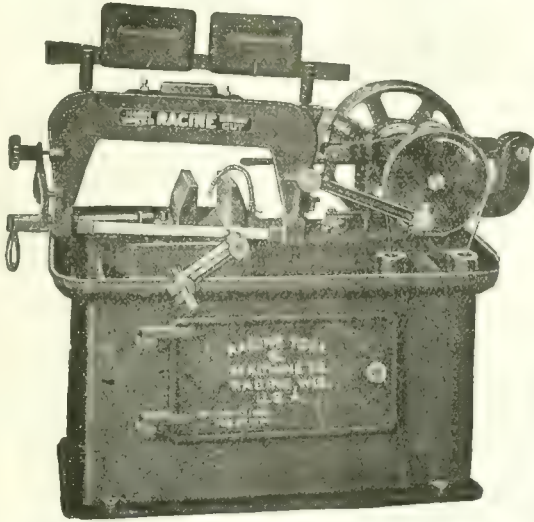
It takes but a moment for any manufacturer to realize the real value of this tool after a comparative trial. Many find them so profitable that they are ordering additional machines by express.

It will surprise you to note the large list of users. May we send you a copy?

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Consulting Engineers on all kinds of welding. Breakdown repairs handled at once, just 'phone us and we will be on the job by next train.

Oxy-Acetylene Welding of heavy cast iron frames, cylinders, gears, water wheels, etc.

Steel, any kind of welding on parts of large or small machines, tanks, digesters, boilers, shafts, brackets, etc.

Can be welded in place when necessary.

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Marine repairs undertaken by our Marine Welding Tug which is equipped with Electric and Oxy-Acetylene Welding Apparatus with Compressed Air Plant complete.

Oxy-Acetylene cutting of any kind of steel construction.

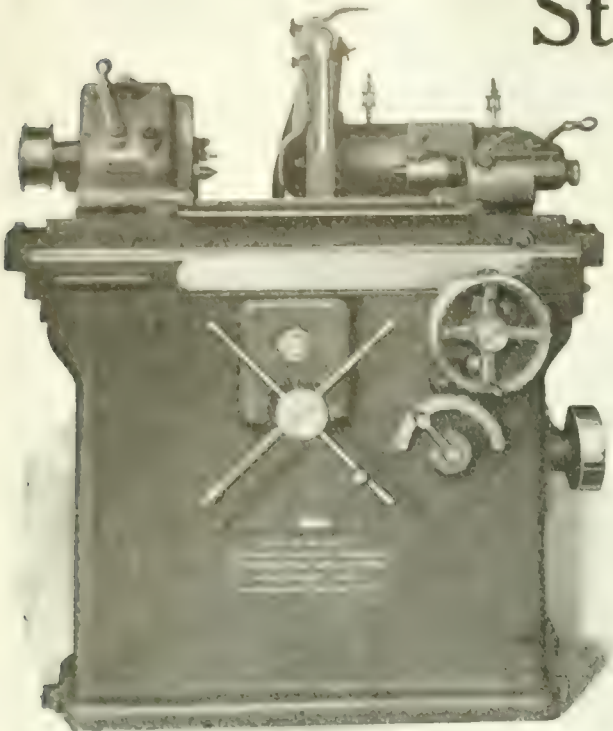
Portable Welding Apparatus of all kinds with trained operators always available to repair your breakdown at once.

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Manufacturers of Steel Tanks, Air Receivers, Welded Tanks, Etc. Electric Welders, Oxy-Acetylene Welders. Boiler Repairs. Lead Burning and Brass Foundry Work.

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The Fitchburg Grinder illustrated weighs about 4,100 pounds and occupies 52" x 66" floor space. In design it is conveniently compact; in build, uncommonly strong. It will save you price cost in the first place and repair cost later on. Occupies much less floor space, and, at the same time, does all the various grinding work with equal if not greater speed than machines of much larger capacity. Write for interesting facts and Catalogue.

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Standardized Production enables us to offer this powerful Waterbury Grinder at such a low price. It grinds rapidly and accurately, all flat surfaces, dies, punches, planer, lathe, and other tools. Has adjustable table and tool rest with large radius of travel. Rigid, 3-point table supports giving great steadiness. A reliable, practical grinding outfit.

The Blake & Johnson Co., Waterbury, Conn.

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**Suspended
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Oldest Portable Tool Manufacturers in America

Dominion Cast Steel Parts

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We have recently increased the capacity of our plant and can guarantee quick delivery on castings weighing anywhere from 100 lbs. to 50,000 lbs.

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In the M.E.C. illustrated catalog. It describes minutely the most dependable labor-saving devices including these deservedly famed

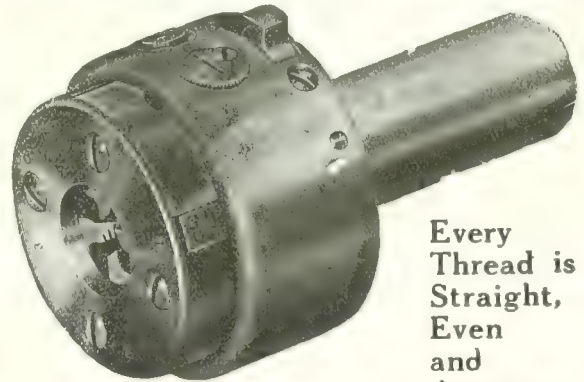
- M** Air Cylinders, Air-Operated
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In your hands it will point the better way to compensate for any shortage of skilled labor with which you may be contending. Write to-day for your copy.

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The quick release not only issues the cutting of the thread to a given point every time, but permits cutting right up to a shoulder when required.

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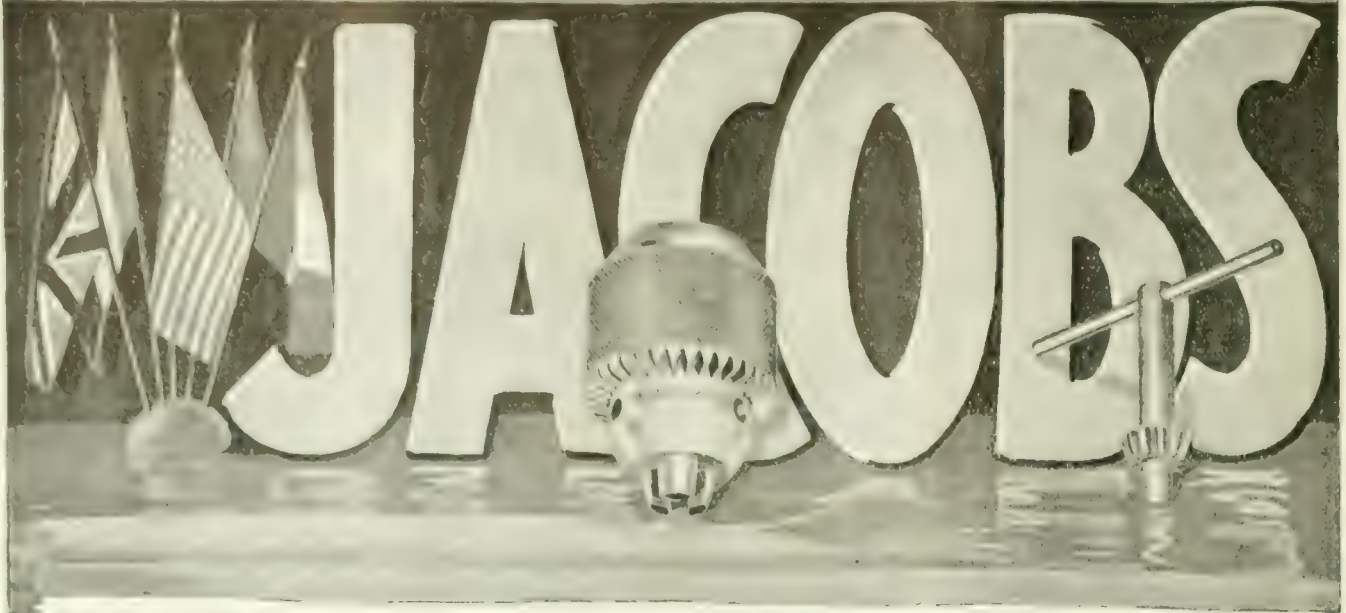
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Eastern Machine Screw Corp.

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If interested, tear out this page and keep with letters to be answered.



The Drill Chuck that's Doing its Bit—and then some!

JACOBS IMPROVED DRILL CHUCKS are among the modern industrial devices that are meeting the war-time demand for quick, efficient and economical service. They keep down expense and increase the output. If you haven't used them, put some to the test.

The Jacobs Manufacturing Company, Hartford, Conn.

Handle 75-M/M Shells Just Once

Two Murchey Taps on your lathe completely finish this shell so that when it comes off the machine there is no more handling or re-sizing to do. Therefore

Murchey Tap Them

By using Murchey Collapsing and Adjustable Taps, you save two minutes or more on every 75-mm. Shell. Figure that in dollars for yourself!

Practically all the large plants of the United States are lining up with Collapsing Taps to thread the nose of this shell. No minute must be knowingly wasted.

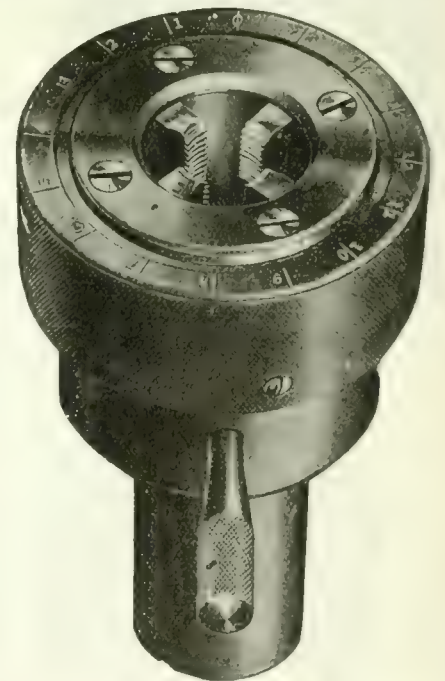
Murchey Chasers are quickly adjusted to compensate for wear, and Murchey Adjustable Taps serve as long as ten solid Taps.

WRITE AT ONCE FOR ALL PARTICULARS.

Murchey Machine & Tool Company

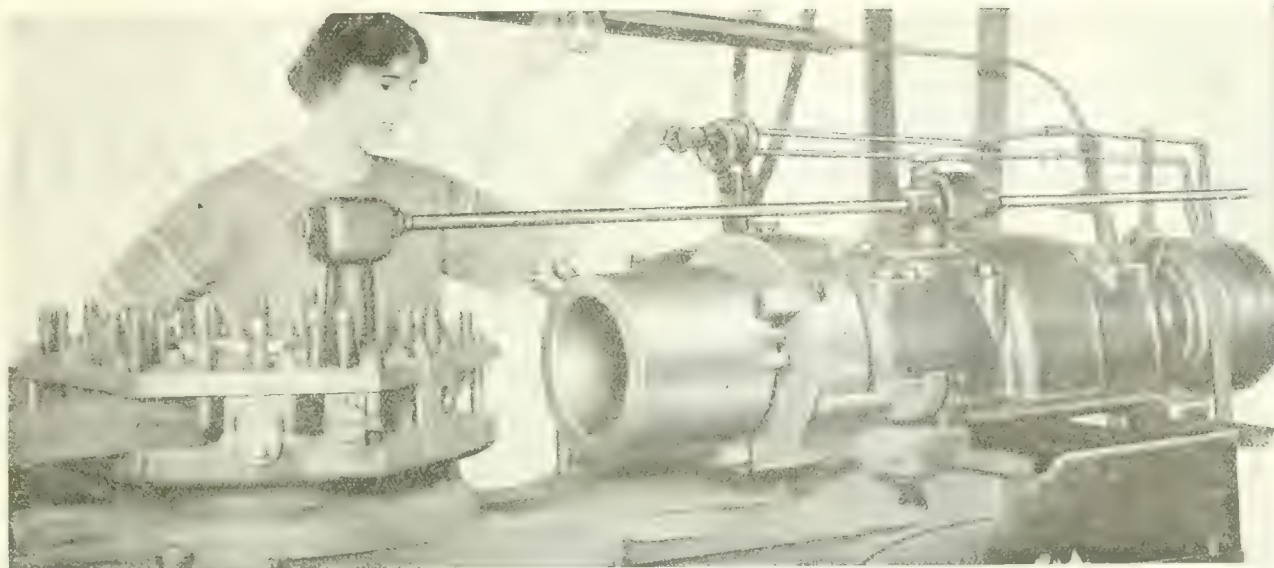
75 Porter Street, Detroit, Mich.

The Coats Machine Tool Company, Ltd., Caxton House, Westminster, London, S. W.,
England, Glasgow, Newcastle-on-Tyne, and Fenwick Freres & Company,
15 Rue Fenelon, Paris, France



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—That is Murchey Service



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So long as there is labor—male or female—capable of simply turning the Hannifin air control lever, Hannifin Air Equipment will enable you to meet the demands of war on a 100 per cent. efficiency basis.

To prove the altogether superior features of Hannifin Air Equipment, *we ship on trial*. And if you find a Hannifin Air Chuck is not all we claim—almost instantaneous in action, rigidly gripping, never slipping—please send it back.

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

MacLean's Magazine

for JANUARY

Chasing the Submarine—by a Canadian

A CANADIAN, whose name is withheld, in the Motor Boat Patrol Service in the North Sea, tells in the January MACLEAN'S the story of the work and life and triumphs of the Service to which he is attached. It is a fine performance by MACLEAN'S to get this story for the Canadian people. Successes of this sort have made MACLEAN'S go far forward in public favor during past months.

If the horrid and terrible submarine warfare and the conquest of this pest of the deep interest you, learn more about submarines and their capturing in the January MACLEAN'S, and pass on to others the news of this unsigned contribution.

Ships—more ships—and yet more ships

THIS is a very strong article which Miss Agnes C. Laut contributes. As usual she is very well informed. Regarding the duration of the war she voices American opinion when she says that it is likely to be long drawn-out. The United States people are buckling down to a stern struggle. At this time we want very much to read what well-informed, virile thinkers and writers have to say about the war, since things are not any too bright in certain directions. Miss Laut has a good deal to say about the shipping programme of the United States, and certainly she gives facts and sets us thinking as few writers do.

"Jim" by Robert W. Service

A POEM by this strong poet—a poem wrought amid the smoke and hell of battle, yet fanciful and tender. One wonders how men can write fanciful verse amid surroundings that seem so adverse to thinking and writing, yet some gifted can detach themselves and let fancy play; or is it that their minds see through the real and horrible—through the immediate environment into inner things? Whatever it may be, we ought to be glad for the verse that men like Service give us, remembering how and where it is produced.

Adam and Arthur William Brown, Brothers

ADAM BROWN is a Canadian short story writer of large promise. His brother, Arthur William, is one of New York's foremost illustrators. Both brothers have joined their gifts to make Hannibal Helps a mighty good feature of the January MACLEAN'S.

A New Serial by Alan Sullivan

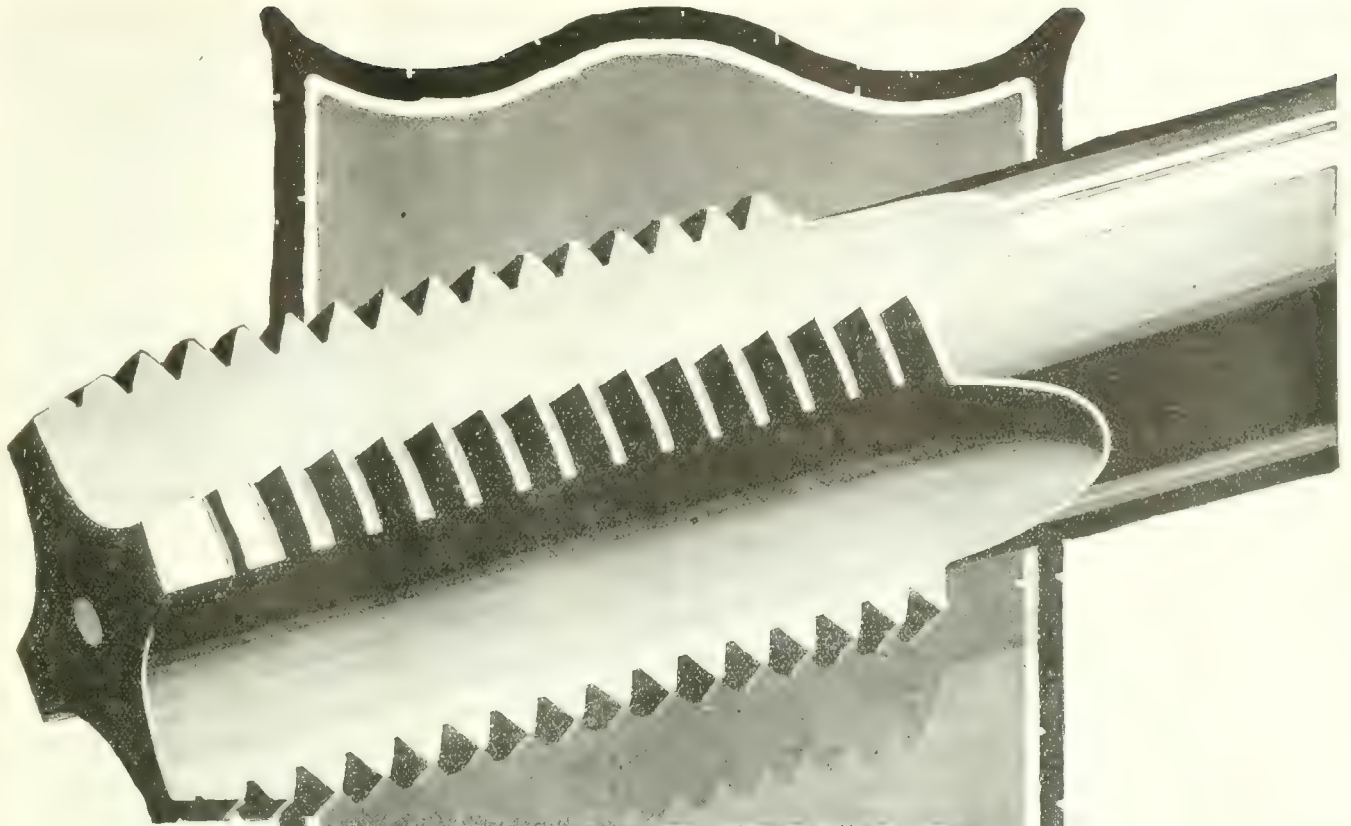
ALAN SULLIVAN'S recent novel, The Inner Door, is being well received. Perhaps we have no better novelist of his type in Canada to-day. He writes

books that show introspection and fine analysis. This serial, The Magic Makers, adds venture and mystery to psychological study, and is a rare good thing. Arthur Heming illustrates the story, which begins in Scotland and is transferred to Canada where the stage is set.

The Regular Departments of MacLean's

REVIEW of Reviews, Women at Work, The Business Outlook—are present in goodly measure. Oppenheim's The Pawns Count, Trench Pictures, and first-class illustrations by artists of note help to make the January MACLEAN'S good value for money.

At All News Stands, 20c.



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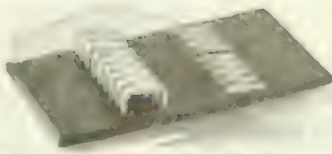
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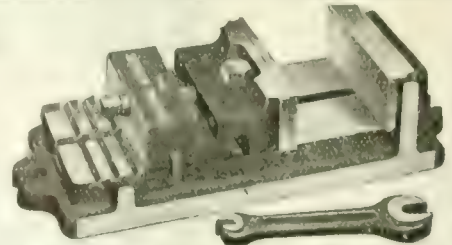
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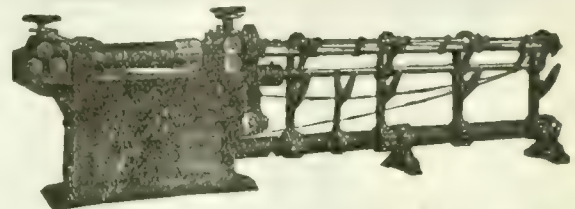
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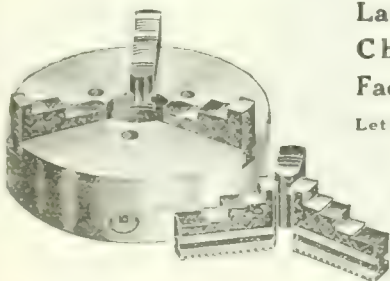
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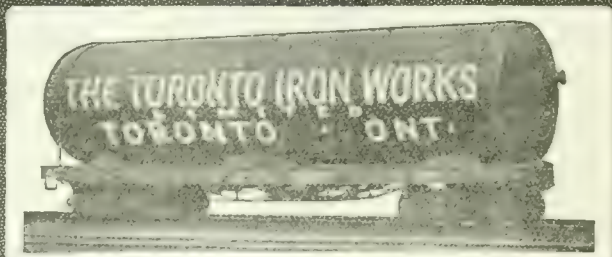
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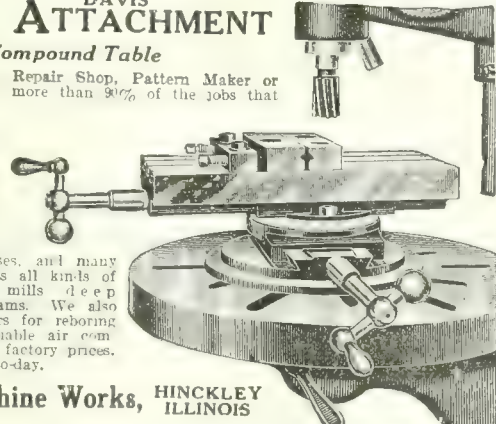
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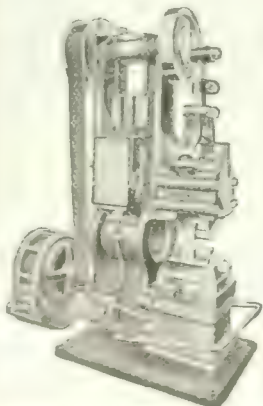
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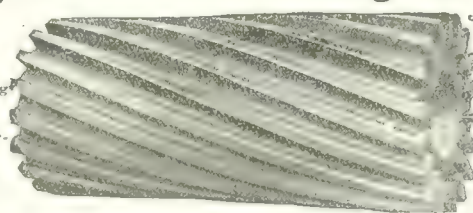
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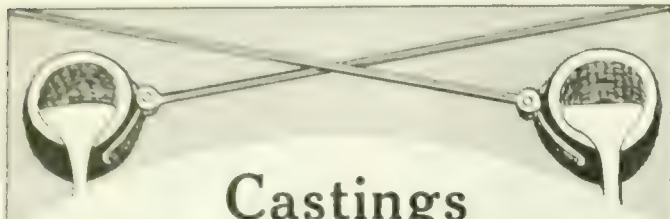
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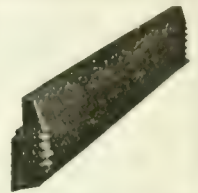
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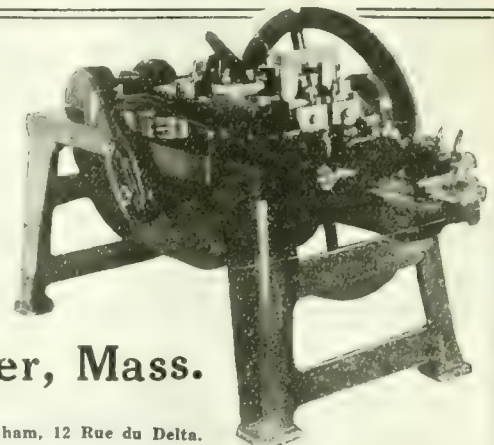
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CRANES, TRAVELLING, ELECTRIC AND HAND POWER

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The Strength Of The Plant

IS THE QUALITY OF ITS PRODUCT. THE TOOLS THAT ENTER INTO THE MAKING OF THAT PRODUCT CONTROL ITS QUALITY.

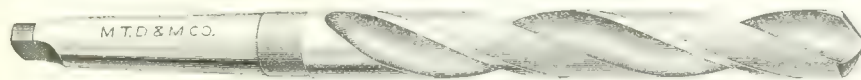
IN CHOOSING THOSE TOOLS TOO GREAT CARE CANNOT BE TAKEN.

FOR DRILLING OPERATIONS USE

"MORSE" DRILLS

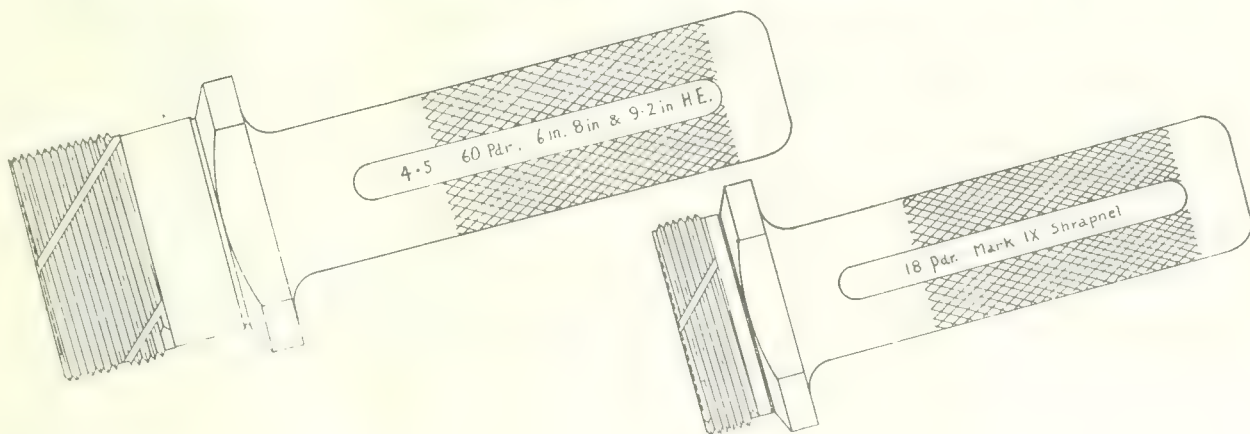
PRODUCERS OF QUALITY AND QUANTITY

CATALOG ON REQUEST



MORSE TWIST DRILL & MACHINE CO.
NEW BEDFORD, MASS., U.S.A.

FUSE HOLE GAUGES



Fuse hole and other gauges for shells. Also dies, fixtures and special machines to your specifications.

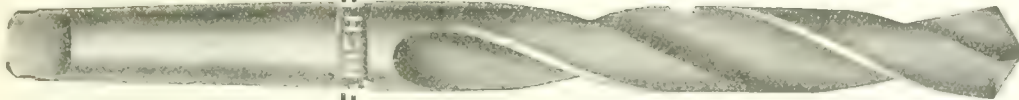
We have a complete organization equipped to give you prompt service.

Windsor Machine & Tool Works

Windsor, Ontario

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

RICH



Made by the
Rich Tool Company

FORGED DRILLS

Not one in one thousand snaps on the toughest drilling jobs, whether or not feed is heavy and speed high.

And Rich Forged Drills never burn nor bind when your drill presses are stepped to maximum speed and the feed crowded because the work is a rush job.

Rich Forged Drills are highest grade high-speed steel—and the fibrous grain is not cut and consequently weakened as in a milled drill.

Other reasons why Rich Forged Drills accomplish more than ordinary drills any user of Rich Forged Drills will explain. The particulars are also given in the Rich catalog. Write for it.

Consult us for shell plant, mill and factory equipment.

STANDARD MACHINERY & SUPPLIES, LTD.
260 ST. JAMES ST. MONTREAL, QUE.

**Lower Your
Drill Bill
Because—**

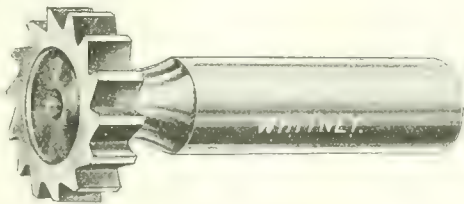
**Not
Milled**

“WHITNEY”

KEY-SEAT CUTTERS

For the Woodruff System of Keying

GET OUR PRICES



Either carbon or high-speed steel.
Material the best obtainable.
Unsurpassed in efficiency and durability.
Centred at both ends.
Unsurpassed in accuracy and finish.
Large quantities carried in stock.

The Whitney Mfg. Co., Hartford Conn.

Chains, Keys and Cutters, Hand Milling Machines

Morehead



SYSTEM

Save 8 to 20% of fuel—and increase the efficiency of your plant. The Morehead System takes condensation from steam lines and returns it to the boilers as pure, HOT feed water. Better service from steam lines—actually increases efficiency



of steam heated machinery. Many users report that steam heated equipment is made to produce 50% greater volume. Ask us to send literature.

CANADIAN MOREHEAD MFG. COMPANY
Dept. “L” WOODSTOCK, ONT

HEAVY WATER

HEAVY METALS

HEAVY ELECTRICAL MACHINES

HEAVY AIR COMPRESSORS

HEAVY PUMPS

HEAVY ROLLERS

HEAVY SHAPING MACHINERY

HEAVY SPINDLES

HEAVY HAND PORTABLE

HOISTING CHAINS AND ACCESSORY

HOISTING DRILL AUTOMOTIVE

HOISTING LUBRICATING

HOISTING MACHINERY

HOISTING PORTABLE

HOISTING HAMMERS BELT DRIVEN

HOISTING HAMMERS STEAM OR AIR

HOISTING MACHINERY

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Hamilton Gear & Machine Co. Hamilton, Ont.

The Standard Machine Co. Hamilton, Ont.

GLAR HOBBING MACHINES

GLAR TURNING MACHINES, BEVEL

GLARS, CUT, MORTISE, ANGLE, WORM

GLAR GRINDING MACHINES

GLAR GRINDING MACHINES

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Brown & Sharpe Mfg. Co., Providence, R.I.

GRINDERS, RADIAL

GRINDERS, UNIVERSAL, PLAIN

GRINDING AND POLISHING MACHINES, PORTABLE, PNEUMATIC AND SPRING FRAME

GRINDING WHEELS

HACK SAW BLADES

HACK SAW FRAMES

HAMMERS, AIR

HAMMERS, MARKING

HOISTING MACHINERY

HOISTING MACHINERY

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HOISTING MACHINERY

**Carry Your Grinder to the Work
Not Your Work to the Grinder**

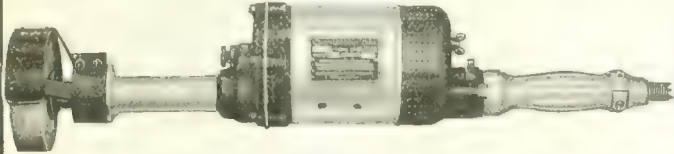
Thor

**Portable Electric
GRINDER**

Equipped with Universal Motor
for Operating on Direct or
Alternating Current

110 TO 250 VOLTS

(Licensed Under Burke Universal Motor Patent.)



No. 6 Grinder-Wheel 4" x 3/4" x 1/2"

ATTACH TO ANY LAMP SOCKET

Thor Portable Electric Grinder is equipped throughout with ball and roller bearings, and has a specially constructed motor, insuring speed, power, ease of operation and increased capacity.

IT RUNS AT 4,500 R.P.M.

**Independent Pneumatic Tool
Company**

Office: 334 St. James Street, MONTREAL, QUE.

Toronto: 32 Front St. W.; Winnipeg: 123 Bannatyne Ave. E.;
Vancouver: 1142 Homer Street

**Let them
know it's there**

In complimenting us upon the results secured from their advertisement in this section, one advertiser said:

"Of course we would not have sold it without letting people know it was here, that is obvious, and thanks are due you for letting the people know it was for sale."

If you have any old or used equipment for sale, let people know it's there. Your message in Canadian Machinery will be placed before the probable buyers of such equipment.

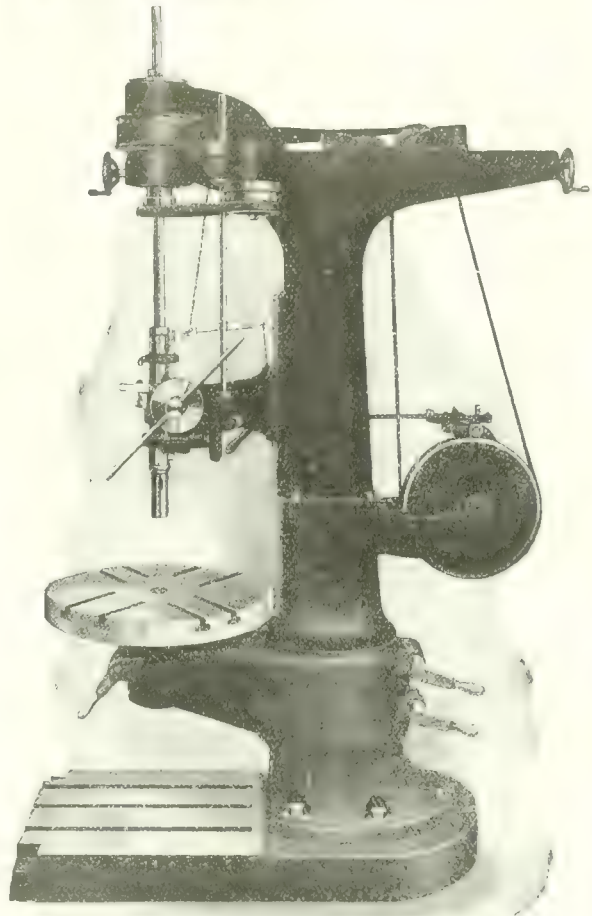
Canadian Machinery

Classified Advertising Section

143 University Ave., TORONTO



From the
SMALLEST
to the
LARGEST
in Ball Bearing
Sensitive Drilling
Machines



WHATEVER YOUR REQUIREMENTS
as to size, if you want to get the machine most
suitable to your work, get the

Aves

The widest line in sizes,—the greatest variety in styles:—higher speeds, together with extreme simplicity and convenience, enable you to specialize to best advantage.

GOOD DELIVERIES

WRITE US AT ONCE

THE CINCINNATI PULLEY MACHINERY CO.
CINCINNATI, OHIO, U.S.A.

HAMMERS, MOTOR-DRIVEN
 Hamilton & Co. Ltd., Toronto, Ont.
HAMMERS, NAUT MACHINE
 Hamilton & Co. Ltd., Toronto, Ont.
HAMMERS, STEAM
 Hamilton & Co. Ltd., Toronto, Ont.
HAND LEATHERS OR PADS
 Hamilton & Co. Ltd., Toronto, Ont.
HANGERS, SHAFT
 Hamilton & Co. Ltd., Toronto, Ont.
HARDENING AND TEMPERING
 Hamilton & Co. Ltd., Toronto, Ont.
HARDNESS TESTING INSTRUMENTS
 Hamilton & Co. Ltd., Toronto, Ont.
HEATERS
 Hamilton & Co. Ltd., Toronto, Ont.
HEATING AND VENTILATING ENGINEERS
 Hamilton & Co. Ltd., Toronto, Ont.
HEAT GAUGES, HARDENING AND ANNEALING
 Hamilton & Co. Ltd., Toronto, Ont.
HIGH SPEED TOOL METAL
 Hamilton & Co. Ltd., Toronto, Ont.
HINGE MACHINERY
 Hamilton & Co. Ltd., Toronto, Ont.
HINGES
 Hamilton & Co. Ltd., Toronto, Ont.
HOBS
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HOISTING AND CONVEYING MACHINERY
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 Hamilton & Co. Ltd., Toronto, Ont.
HOISTS, ELECTRIC
 Hamilton & Co. Ltd., Toronto, Ont.
HOPPERS
 Hamilton & Co. Ltd., Toronto, Ont.
HOSE, PNEUMATIC
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HYDRAULIC MACHINERY
 Hamilton & Co. Ltd., Toronto, Ont.
INDICATORS, SPEED
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INDEX CENTRES
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INDICATING INSTRUMENTS
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INGOT METAL
 Hamilton & Co. Ltd., Toronto, Ont.
IRON ORE
 Hamilton & Co. Ltd., Toronto, Ont.
JACKS
 Hamilton & Co. Ltd., Toronto, Ont.
JACKS, HYDRAULIC
 Hamilton & Co. Ltd., Toronto, Ont.
JACKS, PNEUMATIC
 Hamilton & Co. Ltd., Toronto, Ont.

JACKS, PIT AND TRACK
 Hamilton & Co. Ltd., Toronto, Ont.
JAWS, FACE PLATE
 Hamilton & Co. Ltd., Toronto, Ont.
JIGS, TOOLS, ETC.
 Hamilton & Co. Ltd., Toronto, Ont.
KEY SLATERS
 Hamilton & Co. Ltd., Toronto, Ont.
KEYS, MACHINE
 Hamilton & Co. Ltd., Toronto, Ont.
KILNS
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LABELS AND TAGS
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 Hamilton & Co. Ltd., Toronto, Ont.
LAG SCREW GIMLET POINTERS
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 Hamilton & Co. Ltd., Toronto, Ont.
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LATHES, CHUCKING
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LATHES CHUCKS (SEE CHUCKS)
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LATHES, BAND TURNING
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LOCKERS, STEEL WARDROBE AND STEEL MATERIAL
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MEASURING TAPES AND RULES
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METALLURGISTS
 Hamilton & Co. Ltd., Toronto, Ont.
METERS, METAL TESTING
 Hamilton & Co. Ltd., Toronto, Ont.
METALS
 Hamilton & Co. Ltd., Toronto, Ont.

Tel. Main 6755

Jos. Bickerstaff, Mgr.

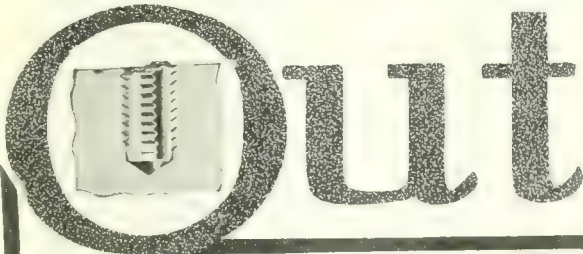
THE ELM CUTTING OIL COMPANY

645 East King Street
TORONTO

You have tried the rest. Now use the best for screw cutting and threading.

Our standard is uniformity at all times and a guarantee of quality with every barrel of oil produced.

PRICES ON APPLICATION



Without Delay **WHY?**

First: Because in our Extractor, we use a steel of different analysis than that in the taps themselves. Second: Because it is not tempered the same, for taps have to be left exceedingly hard in order to maintain their cutting edge and they are therefore brittle. Third: Because the Fingers of our Extractors are further from the axis of the tap than is any solid portion of the tap itself and they thus have a greater leverage in their favor; and Fourth: Because they are shaped to fit the grooves of the tap, using, therefore, the greatest amount of material.

Write for particulars of 60-day trial offer.

THE WALTON COMPANY
HARTFORD, CONN.



The Right Heat

is the only heat to work with if you are going to turn out good work.

An ordinary mechanic can keep a Gilbert & Barker Furnace steady and even, insuring a uniform temperature.

G. & B. are built right—from the ground up. The built-up construction with heavy sheet metal is reinforced with heavy angle iron straps riveted and bolted. The counterbalanced door clears the opening to full height, admitting the heaviest charge. Fire brick chamber lining, door lining and floor tile are of best quality.

And in every G. & B. furnace you get the benefit of 52 years of experience and study with gaseous and liquid fuels. Our line includes more than one hundred types of furnaces.

At present we are making prompt delivery on many types. Stock list 24 describes them all.

Gilbert & Barker
Manufacturing Company

West Springfield, Mass.

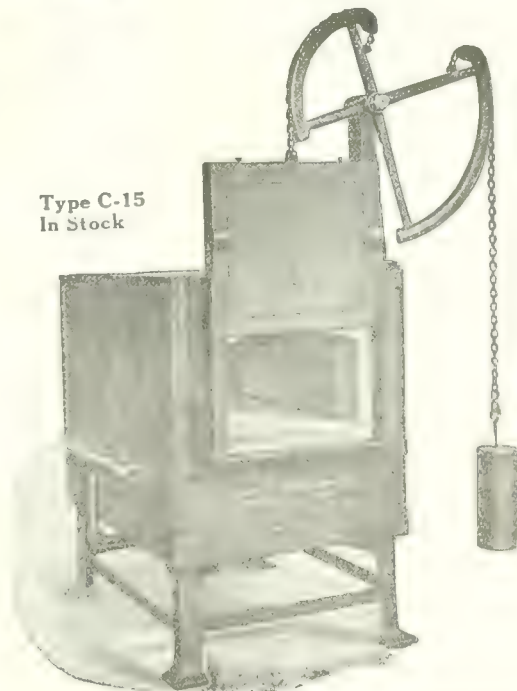
Canadian Agents:

WILLIAMS & WILSON, LIMITED
Montreal, Que.

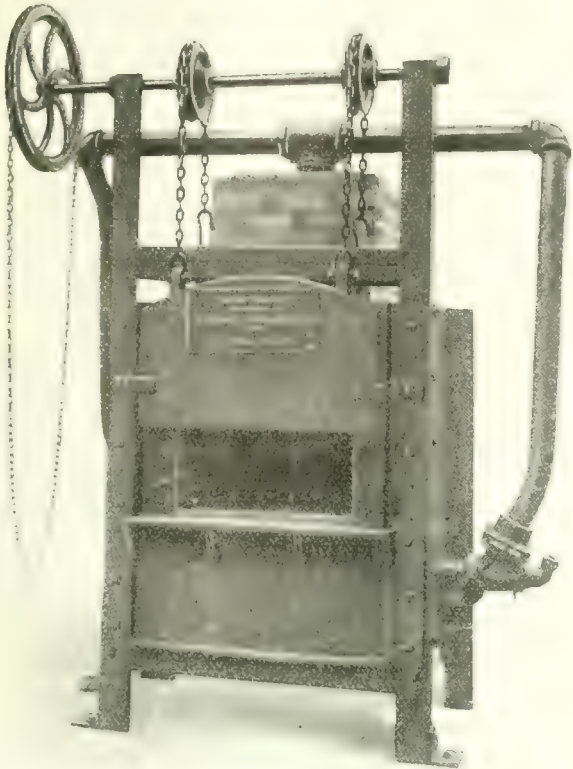
JAMES DEVON
227 Davenport Rd., Toronto, Ont.



Type C-15
In Stock



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

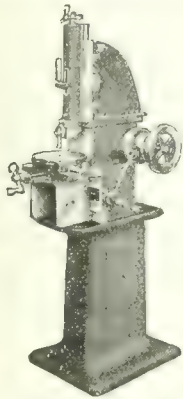


It's a "Mecol"

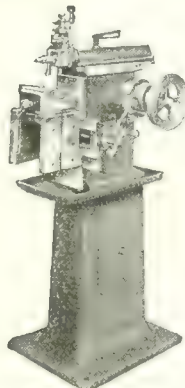
And that word "Mecol" stamps the character of the furnace. The best firms, the largest firms, small concerns with the systems and organization up to highest pitch have installed the "Mecol" products. They realize the value to be obtained from our furnaces.

Illustration shows our Gas Fired, Heat Treating Furnace with preheater. Consult us regarding your needs of this nature.

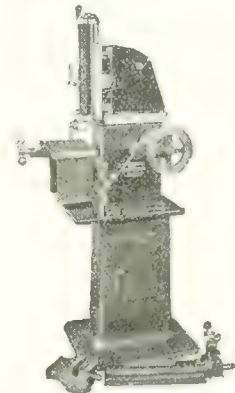
Mechanical Engineering Co., Ltd.
 Three Rivers Que. Canada



3 1/2-inch Slotter



7-inch Shaper



Combination

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

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

The Rhodes Mfg. Company

Owned and Operated by the Jacobs Mfg. Co.

Hartford, Conn., U. S. A.

If interested, tear out this page and keep with letters to be answered.

PRESSES, BALING
PRESSES, PNEUMATIC
PRESSES, SPRING FOOT
PRESSES, SCREW
PRESSES, TREMMING
PRESSES, WORK
PULLEYS
PULLEYS, FRICTION CLUTCH
PULLEY MACHINERY
DRILLING AND TAPPING
PULP MILL MACHINERY
PUMPS, AIR
PUMPS, CENTRIFUGAL
PUMPS, HIGH PRESSURE
PUMPS, ALL KINDS
PUMPS, HYDRAULIC
PUMPS, LUBRICANT OIL
PUMP LEATHERS
PUMPS, ROTARY, POWER DRIVEN
PUNCHES AND DIES
PUNCHES, POWER
PUNCHING MACHINES, HORIZONTAL

Brown Boggs Co. Ltd., Hamilton, Canada
Niles-Bement-Pond Co., New York
W. A. Wheeler Mfg. Co., Rockford, Ill.
PURIFYING AND SOFTENING APPARATUS
Pyrometers
Quartering Machines
Railing, Iron and Brass
Rail Guards
Rail Blenders
Railroad Tools
Rails, Steel
Railchests
Raw Hide Pinions (Self Gears)
Reamer Tapping Machines
Reamers, Adjustable
Reamers, Bridge, Expanding and High Speed
Reamers, Pipe, Cylinder and Locomotive
Reamers, Steel Taper and Self-Feeding
Reaming Machines, Pneumatic
Recording Instruments
Regulators, Pressure, Temperature
Respirators
Rivet Machines
Rivets, Tubular, Bifurcated
Rivets, Iron, Copper and Brass
Riveters, Pneumatic, Hydraulic, Hammer, Compression
Rotary Blow
Roller Chains
Rolls, Bending and Straightening
Rolls, Crushing
Rubber Mill Machinery
Rules

James Chesterman & Co. Ltd., Sheffield, Eng.
L. S. Starrist Co., Athol, Mass.
Safety Appliances
Safety Appliance Goggles
Sand Blasts
Sanding Machines
Saw Mill Machinery
Saws, Circular Metal
Saws, Hack (Saw Hack Saws)
Saws, Inserted Tooth
Saws, Band and Coping
Scleroscopes
Screw Machine Parts
Screw Machine Products
Screw Machines, Hand, Automatic
Screw Machine Spindles
Screws
Screw Plates
Screw Slotters
Second-Hand Machinery
Set Screws, Safety
Shanks, Straight and Taper
Shapers
Shafts, Flexible
Sharpening Stones
Shavings, Separator

CLEVELAND SAND RAMMERS

FOR FLOOR, BENCH, PEIN AND FLASK RAMMING

Cleveland Sand Rammers are made in several sizes and weights, and are adapted for all kinds of Ramming in general foundry service.

The Piston Rods are packed with a resilient packing that conforms to the shape of Rod without retarding its free action, and prevents any dirt from entering piston chamber and working parts—Rammers are fitted with either Round or Flat Rods as required. Cleveland Rammers are light in weight, have high speed and practically no vibration, making them ideal foundry tools.



Sand Rammer in operation.

CLEVELAND CHIPPING HAMMERS



For General Foundry Work. Are furnished in any required size or weight for grey iron or steel castings; they have high speed, and are particularly adapted for fast chipping now required by piece-work operators.



BOWES AIR HOSE COUPLINGS

Over 1,000,000, in General Use

Bowes Couplings are instantly connected or disconnected.



Bowes Couplings are absolutely air tight under all pressures.

Above cut shows the Never-Slip Clamp attached to Bowes Coupling.

In Stock :—RIVETING HAMMERS, DRILLS, REAMING, TAPPING AND FLUE-ROLLING MACHINES CORNER DRILLS, PORTABLE AND BENCH GRINDERS, ETC.

Catalog No. 12 mailed on request.

ADDRESS ALL INQUIRIES TO

CLEVELAND PNEUMATIC TOOL CO. OF CANADA, LIMITED
84 CHESTNUT STREET, TORONTO, ONT.

Agents: A. R. WILLIAMS MACHINERY CO., TORONTO

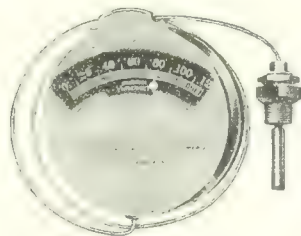
WILLIAMS & WILSON, MONTREAL

Tycos

TEMPERATURE INSTRUMENTS

Indicating Recording Controlling

- Mercurial, Recording and Index Thermometers for all industrial and laboratory applications.
- Electric Contact Thermometers.
- Temperature, Pressure and Time Regulators.
- Mercury Column Vacuum Pressure and U Gauges.
- Base Metal, Rare Metal and Radiation Pyrometers.
- Fery Radiation Pyrometers.
- Hygrometers.
- Hydrometers.
- Mineral Oil Testing Instruments.
- Aneroid Barometers.
- Mercurial Barometers.
- Recording Barometers.
- Pocket Compasses.
- Surveying Compasses.
- Rain Gauges.
- Anemometers.
- Air Meters.
- Thermographs.
- Hand Levels.
- Aviation Barometers.
- Inclinometers.
- Sphygmomanometers
- Fever Thermometers.
- Urinary Glassware.
- Thermometers of all kinds for home and general use.



Tycos INDEX THERMOMETER

This instrument is found in every branch of industry where changes of temperature are under constant observation.

Let our catalogues tell you about Tycos Temperature Instruments. A post card request brings them to you at once.

Taylor Instrument Companies
ROCHESTER, N.Y.

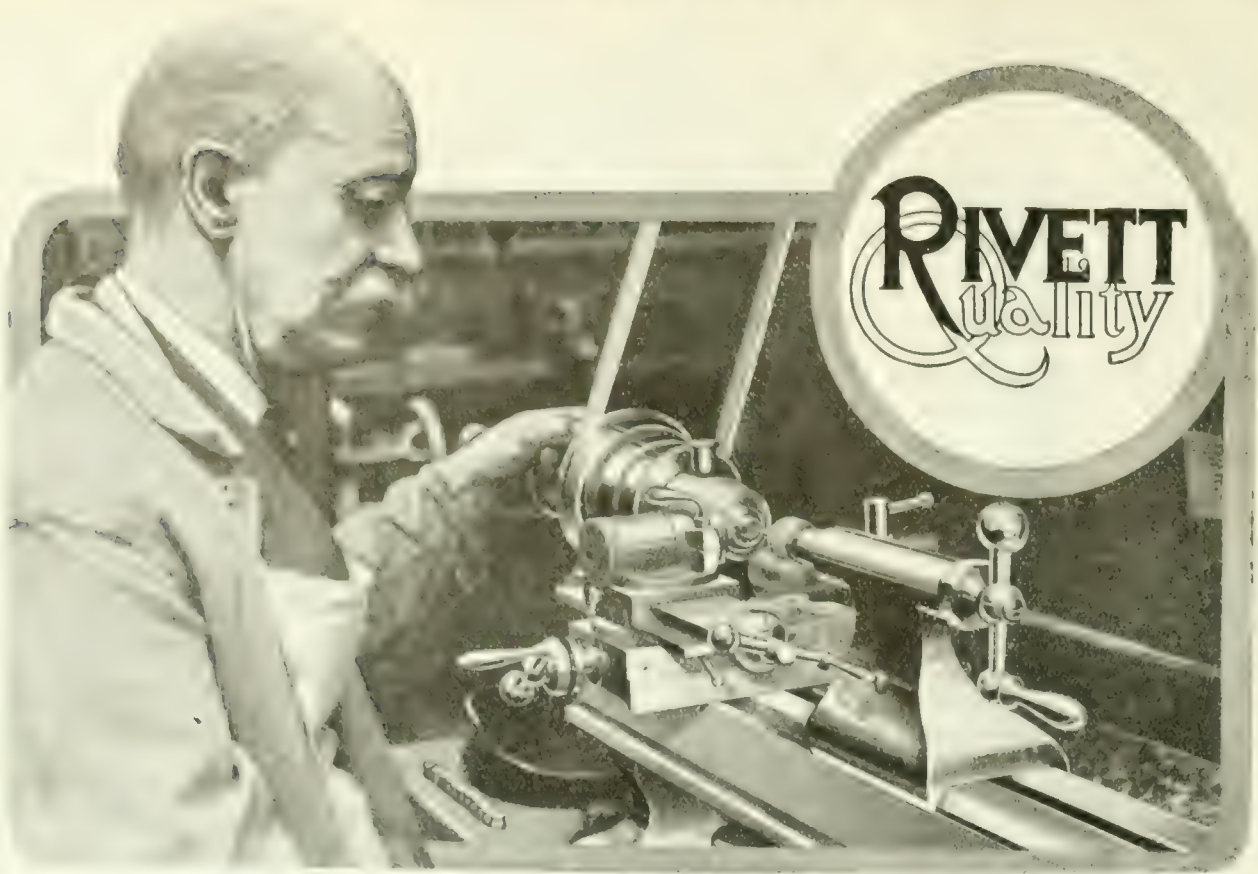
SHEET METAL STAMPINGS

The quality of our production is one grade —
THE BEST. Our facilities and equipment enable us to give a very attractive price and prompt service.

Dominion Forge and Stamping Co., Limited
WALKERVILLE, ONTARIO

DROP FORGINGS

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



RIVETT LATHE & GRINDER CO., Brighton District of Boston, Massachusetts

Never a Slacker—

THE “STRAND”

As near to wear-proof, as near to fool-proof, as forethought, skill and material can make a mechanical device, is the “Strand” Flexible Shaft. Many times faster and better than the unprofitable hand way, it

Cleans Out All Shells

Not the size of a pin point of space on interior wall and base that it doesn't clean. It's the machine shell factories throughout Canada profitably use for cleaning, polishing, light grinding and drilling. Motor driven or arranged for countershaft.

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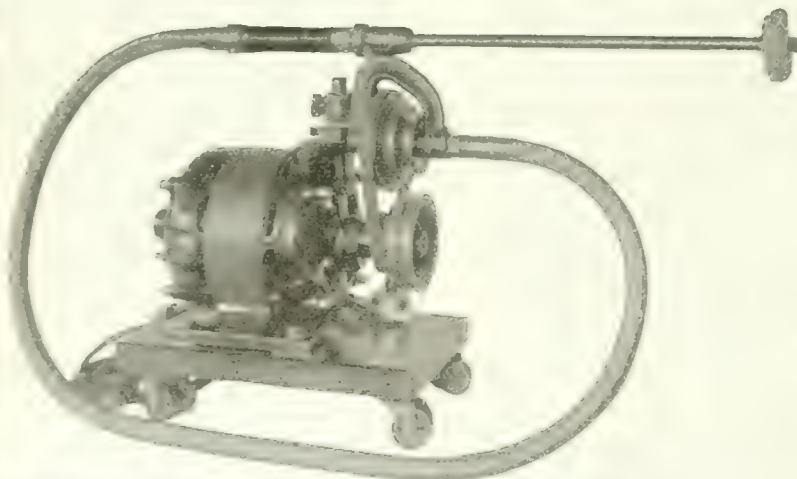
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A weekly newspaper devoted to the machinery and manufacturing interests.

Vol. XVIII.

TORONTO, DECEMBER 20, 1917

No. 25

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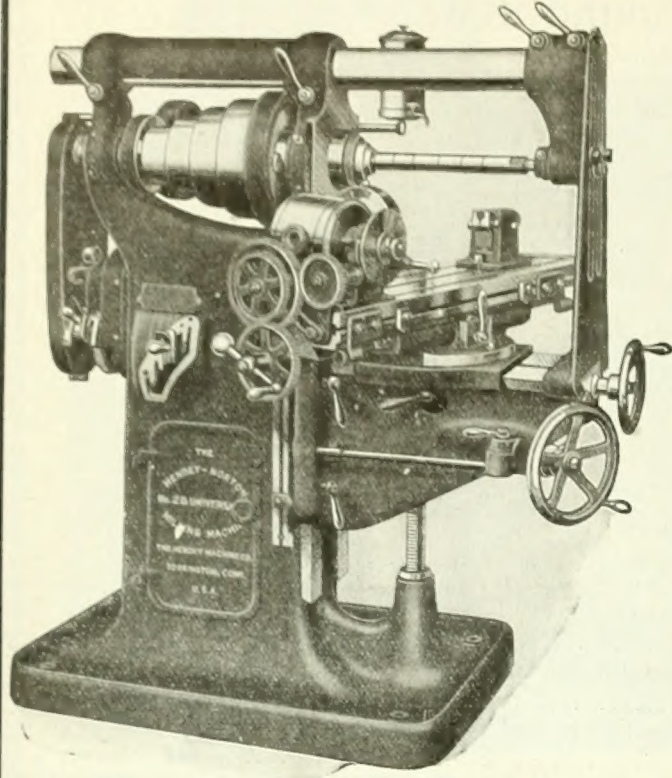
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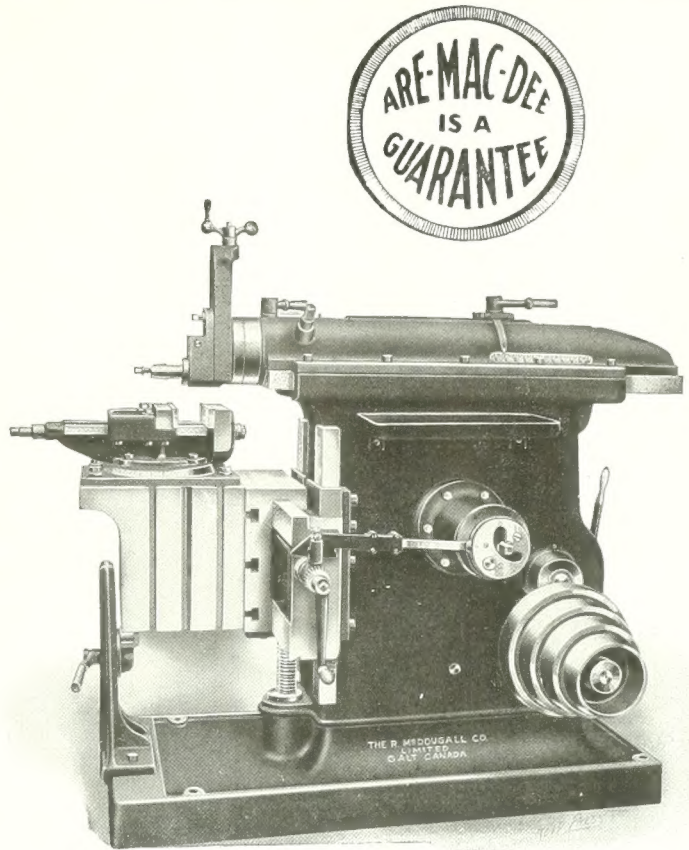
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