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.

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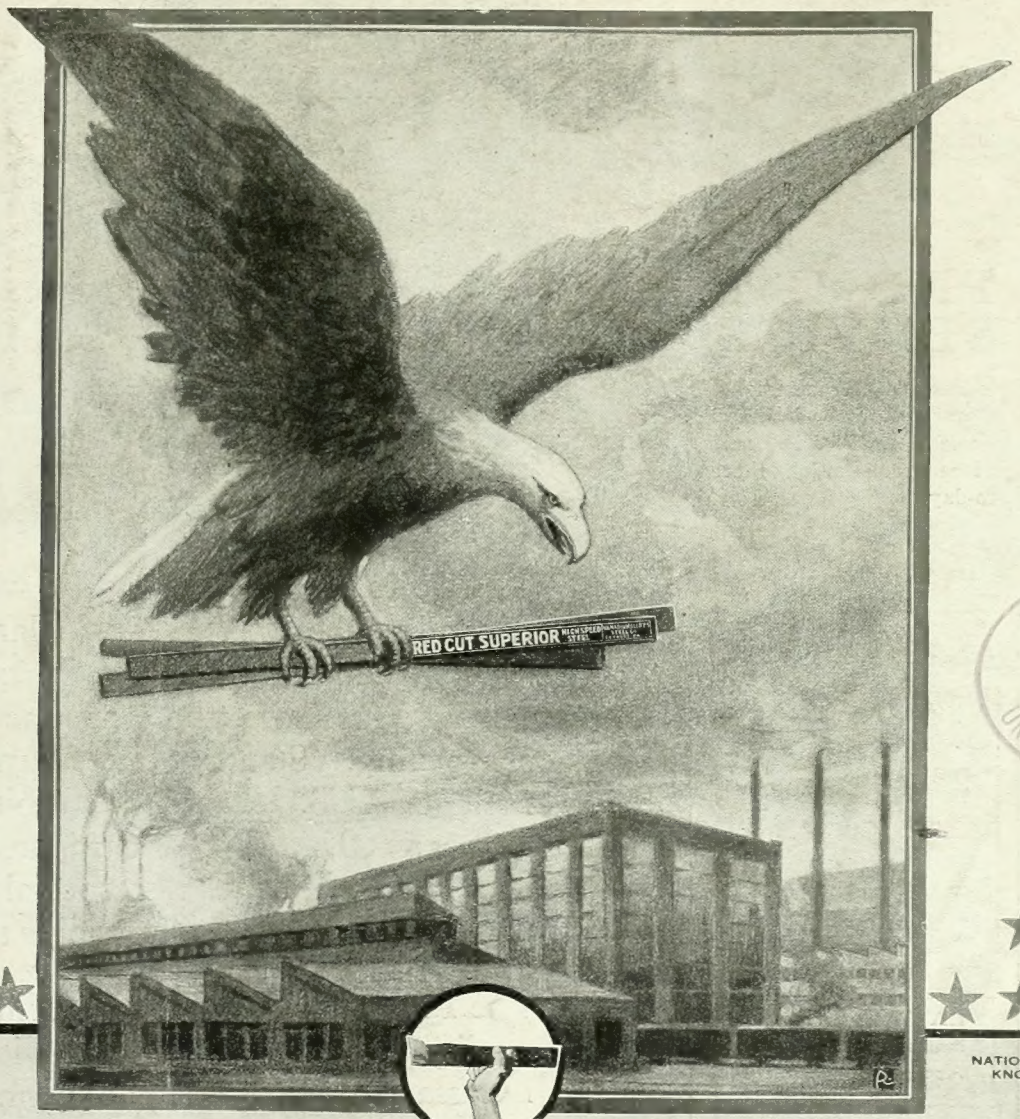

HIGHEST IN QUALITY

NATIONALLY KNOWN

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

BE PATRIOTIC

"Red Cut Superior"

The Nationally Known First Quality

HIGH SPEED STEEL

Will enable you greatly to increase your output

"IT'S THE BEST FOR ALL MACHINE WORK"

VANADIUM-ALLOYS STEEL CO.

PITTSBURGH, PA. Works at LATROBE, PA.

CARRIED IN STOCK AT THESE WAREHOUSES:

E. T. WARD'S SONS, 44 FARNSWORTH ST., BOSTON, MASS.
GEO. NASH CO., 304 HUDSON ST., NEW YORK, N. Y.
FIELD & CO., INC., 721 ARCH ST., PHILADELPHIA, PA.
VANADIUM-ALLOYS STEEL CO., PITTSBURGH, PA., AND LATROBE, PA.
GEO. NASH CO., 646 WASHINGTON BLV'D., CHICAGO, ILL.

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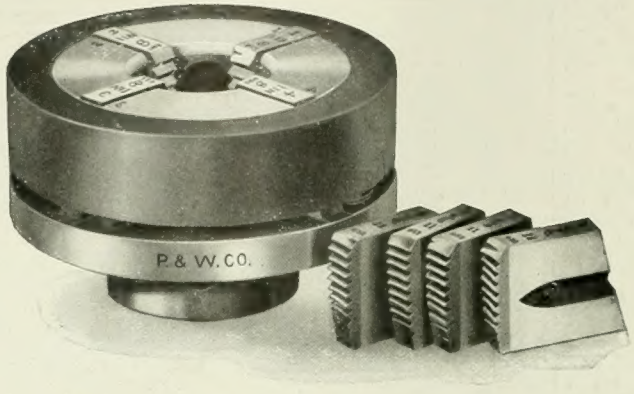
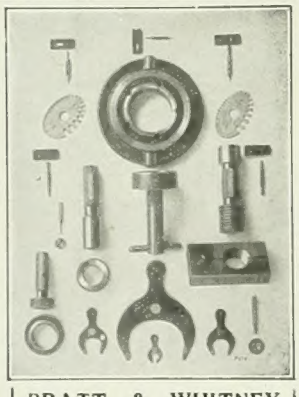
SMALL TOOLS



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
Standards and Gauges
Accuracy Unequalled

P. & W. Die-Stock Dies

These dies are practically solid when in use and can be adjusted 1-32 in. larger or smaller. The chasers can be quickly removed for the purpose of renewal or sharpening. Standard sizes furnished include U. S. Standard, Whitworth Standard, S. A. E. Standard and "V" form, all right hand; also special right-hand Briggs Standard taper pipe thread.

The Pratt & Whitney policy of highest quality materials, together with the necessary refinement and accuracy, is maintained.

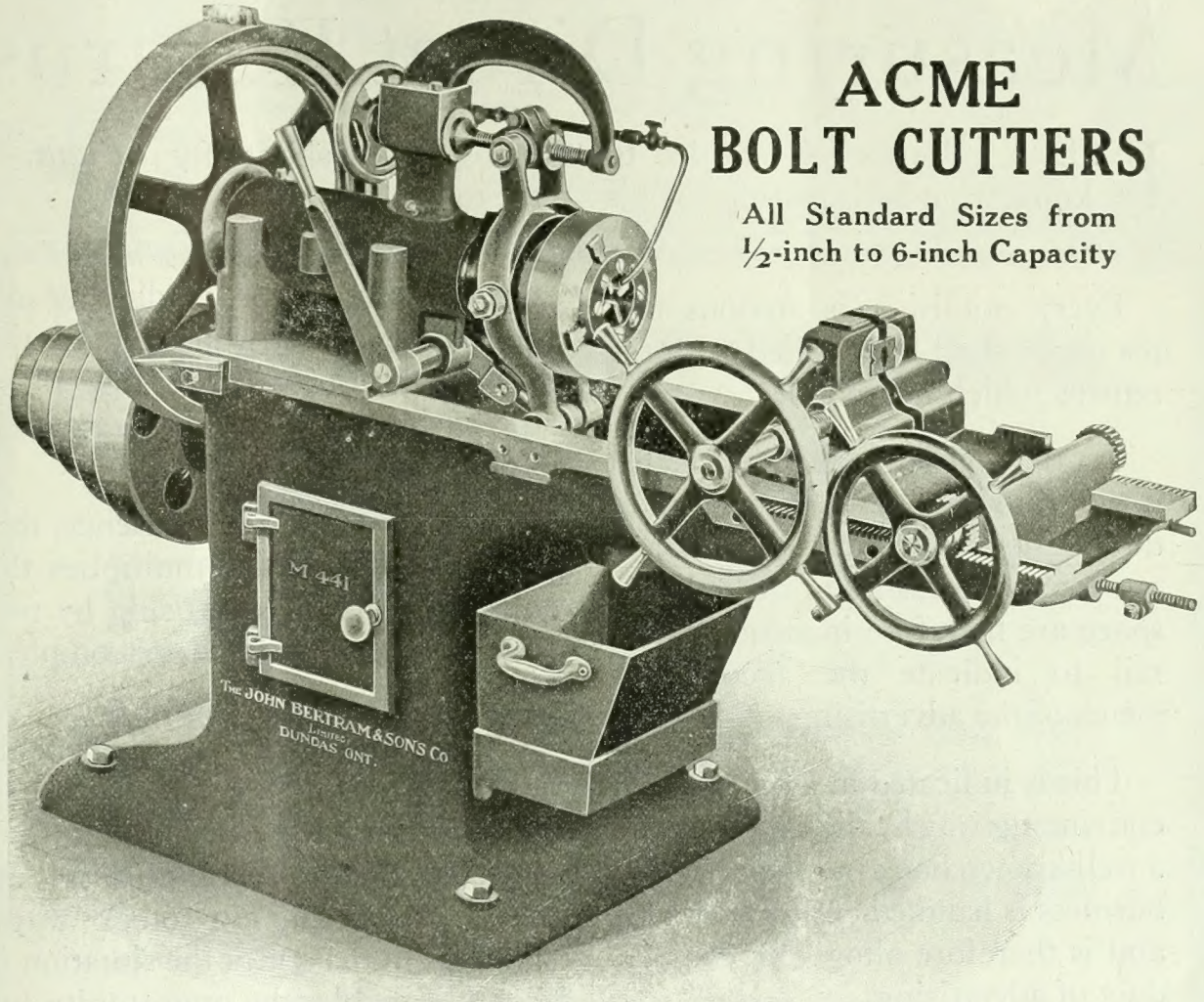
PRATT & WHITNEY CO.

of Canada, Limited

Works: DUNDAS, ONTARIO

MONTREAL	TORONTO	WINNIPEG	VANCOUVER
723 Drummond Bldg.	1002 C.P.R. Bldg.	1205 McArthur Bldg.	B.C. Equipment Co.

BERTRAM MACHINE TOOLS



ACME BOLT CUTTERS

All Standard Sizes from ½-inch to 6-inch Capacity

Supplied with Leadscrew Attachment for Stay Bolts or other work requiring special Accuracy of Pitch.

WRITE US FOR FULL DETAILS ON ANY MACHINE OR MACHINES IN WHICH YOU ARE INTERESTED

The John Bertram & Sons Company Limited

DUNDAS, ONTARIO, CANADA

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

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

The Publisher's Page

TORONTO October 11, 1917

Measuring Direct Returns

EVERY advertiser is entitled to know what he is getting for his money.

Every publisher is anxious that his paper shall be credited with the returns which it produces.

Yet the fact of the business is that it is next to impossible to trace all of the results of advertising. Direct returns as a measure of the value of space are therefore inadequate, and fail to indicate the accomplishments of the advertising.

This is indicated in a particularly convincing way by the experience of a well-known book publisher, whose business is handled entirely by mail, and is therefore altogether the product of advertising.

All ads published are keyed; direct advertising is likewise watched carefully, with special key numbers, so as to enable the publisher to note the percentage of returns from each piece of advertising sent out.

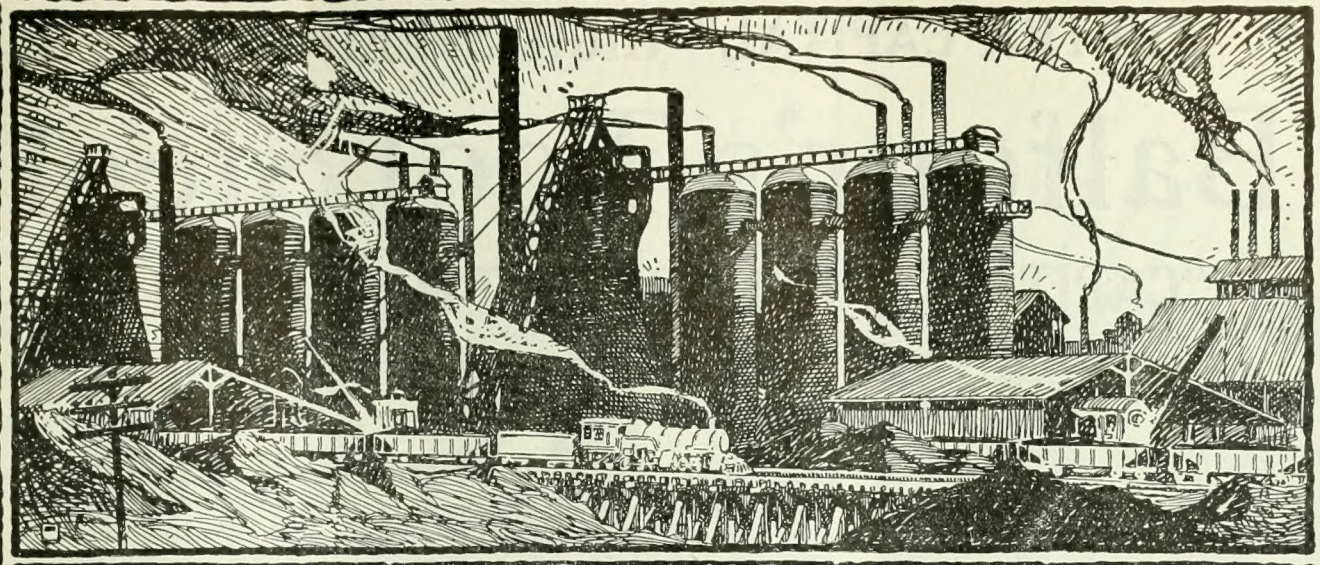
In spite of all this, however, the business which can be definitely attributed to specific forms of advertising is only about fifty per cent. of the total.

In other words, at least half of the business cannot be credited at all, and yet without any question it is the result of advertising, because all of the business of the house is secured in this way.

As a result of his experience, this book publisher now multiplies the direct results of advertising by two in order to get a line on the complete results.

Most advertisers in other fields would probably be able to use a larger multiple, especially if they have salesmen and are following up their advertising in other ways, because in that event the situation is complicated by the opportunity for personal solicitation to interpose and take up the work where it was left off by the printed advertisement.

Consequently, when an advertiser says he didn't get results, an analysis of his business would probably demonstrate that results were secured, but were not credited to specific media.—*Class.*



LITTLE WORDS WITH BIG MEANING

Quality

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

Service

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

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

THE

STEEL COMPANY

OF

CANADA

LIMITED

MONTREAL HAMILTON

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

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

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

"ULTRA CAPITAL" HIGH SPEED STEEL

Balfour's Tool Steel

"CAPITAL" HIGH SPEED TWIST DRILLS

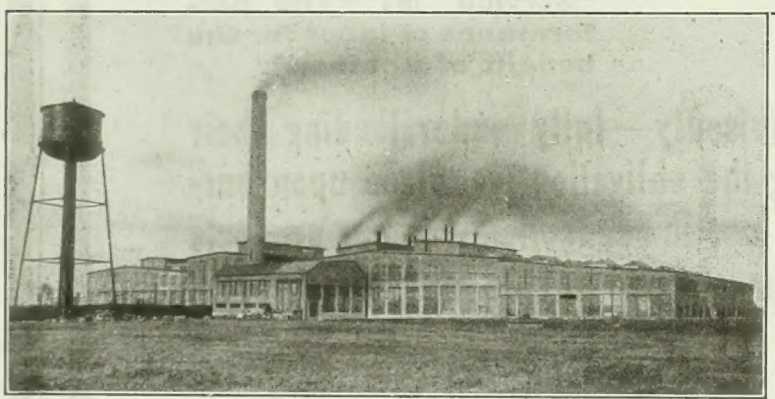
MANUFACTURED BY

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

The Eagle & Globe Steel Company, Limited

Head Office and Warehouse, Canada and U.S. — 128 Craig Street West, Montreal
Ontario Office and Warehouse — 36 Colborne Street, Toronto
Winnipeg Stock — Dominion Equipment & Supply Co. Limited
Vancouver Stock — Frank Darling & Co.

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



Works: LONGUEUIL, QUE.

CANADIAN MANUFACTURERS
are you using Steel
MADE IN CANADA?

We are manufacturing at our works at LONGUEUIL, QUE.
SPECIAL HIGH SPEED AND CARBON TOOL STEELS, MISCELLANEOUS SHOP TOOLS, GAUGES, Etc.

ARMSTRONG WHITWORTH of CANADA
LIMITED
HEAD OFFICE: 298-300 St. James St., Montreal
Branches: 27 King William Street, HAMILTON
Dominion Bank Bldg., TORONTO
McArthur Bldg., WINNIPEG, MAN.

Coal
Coke
Iron Ore

Pig Iron

Victoria FOUNDRY & MALLEABLE

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

M.A. HANNA & CO.
Sales Agents, CLEVELAND
Canadian Office:
703 C.P.R. Bldg., Toronto

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

WM. ATKINS & CO., LTD.

TRADE MARK "WACO"

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

QUITE remarkable economies have been effected in turning, planing and shaper work on all kinds of steel, cast iron, bronze and other materials by the new alloy

STELLITE

But we are now able to recommend it for Milling Cutters and Form Tools of all kinds.

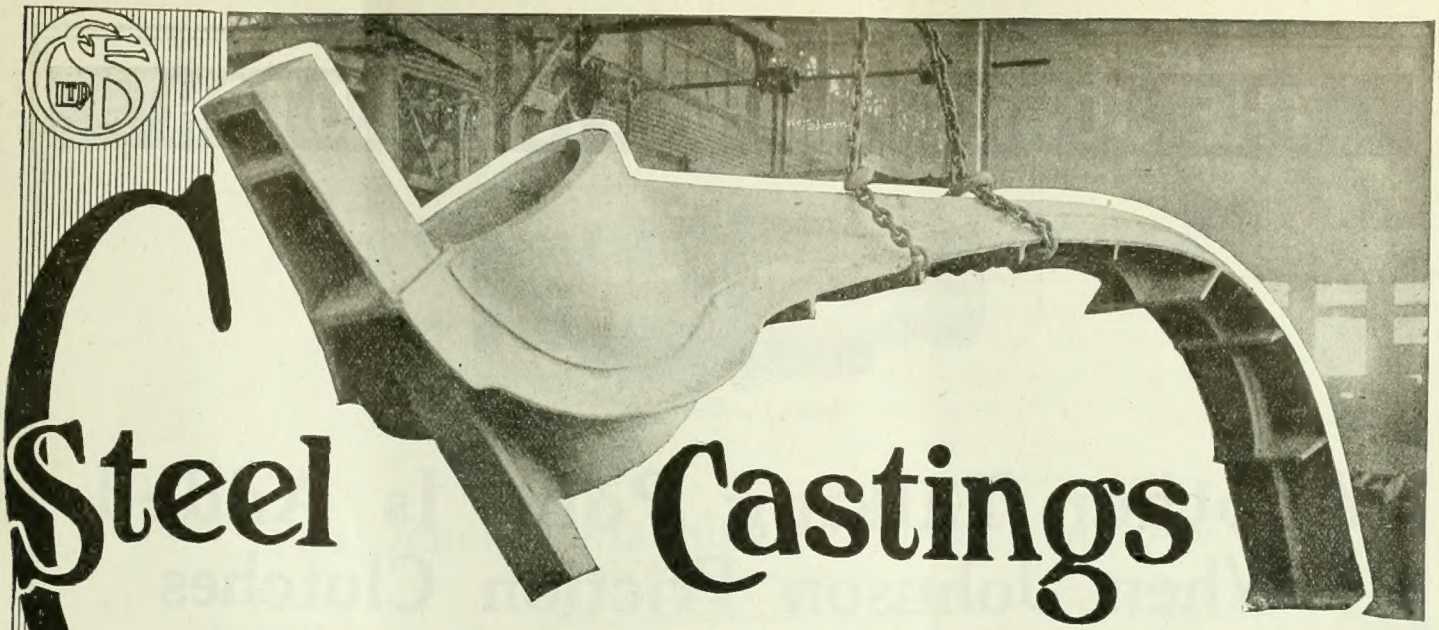
Information and quotations supplied by our Service Department on application.

Deloro Smelting & Refining Co. Ltd.

Head Office & Works—Deloro, Ont.

TORONTO
200 King St. W.

MONTREAL
315 Craig St. W.



Steel Castings

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

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

CANADIAN STEEL FOUNDRIES, LIMITED

Montreal, P.Q. Welland, Ont.

We guarantee shipment within 24 hours of receipt of order

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

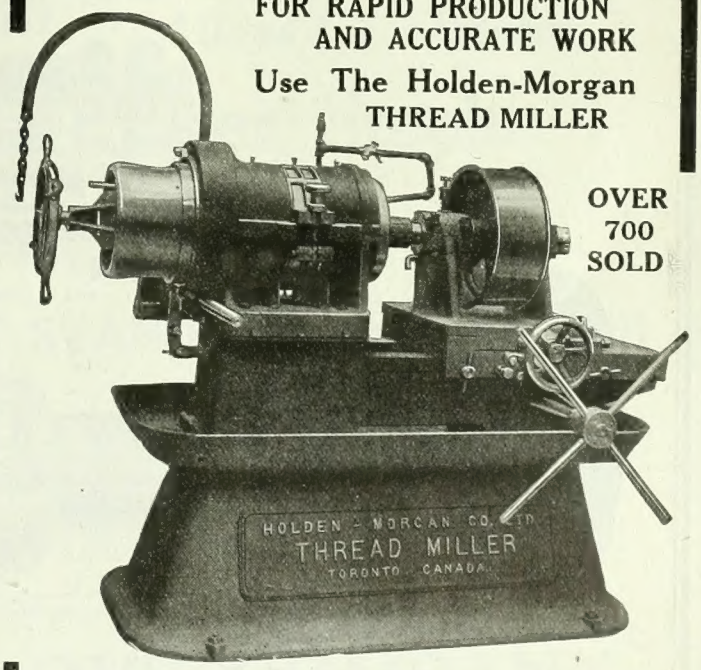
SISCO

Made in Sweden from selected Dannemora Ore

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

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

FOR RAPID PRODUCTION AND ACCURATE WORK
Use The Holden-Morgan THREAD MILLER

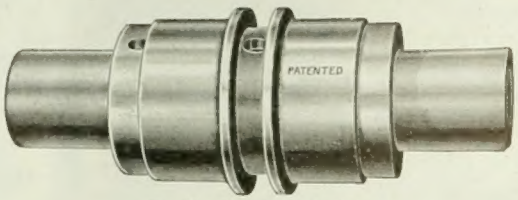


OVER 700 SOLD

Prompt Delivery
On Nose or Base Machines, also Internal or External Fuse Machines—with air-chucks.

The A. R. WILLIAMS MACHINERY COMPANY
LIMITED
64 FRONT ST. W. TORONTO

THE JOHNSON FRICTION CLUTCH



Double Clutch—Exterior.

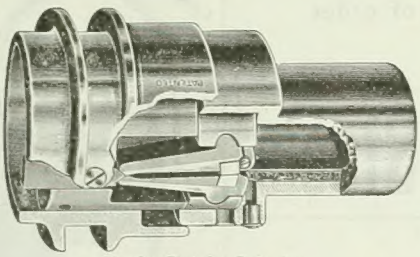
Another Talking Point Is Added When Johnson Friction Clutches Are Added To Your Machines

Many of the machine tools that are noted for their ease of manipulation have gained this mechanical perfection by using JOHNSON FRICTION CLUTCHES.

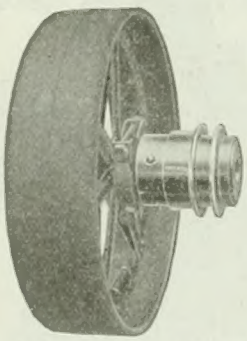
When JOHNSON FRICTION CLUTCHES are mentioned where details of working mechanism are given, you gain the favor of mechanical men and give them the proof that your machines **are** mechanically perfect.

We'll gladly give you a list of the prominent machine tool builders who are incorporating our clutches in their latest machines.

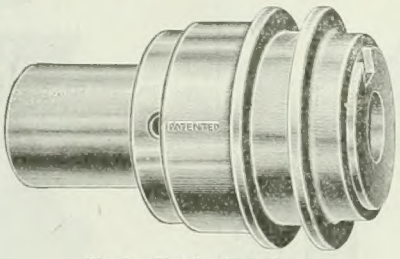
Write for Our Booklet, "Clutches as Applied in Machine Building," and Yellow Data Sheets.



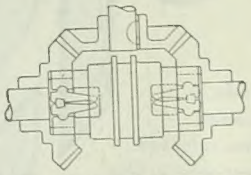
Single Clutch—Interior



Pulley mounted on Clutch Hub



Single Clutch—Exterior



Double Clutch in Nest of Gears

CANADA—Williams & Wilson, 320 St. James Street, Montreal; The Canadian Fairbanks-Morse Co., Ltd., Toronto.
ENGLAND—The Efandem Co., 159 Gt. Portland St., London, W., Sole Agents for British Isles.
AUSTRALIA—Edwin Wood, Pty., Hardware Chambers, 231 Elizabeth Street, Melbourne, Victoria.

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

We will Fill Your Requirements *Send Us Your Inquiries*

Air Compressor Evidence

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

Write us and explain your requirements.

The Jenckes Machine Company, Limited

WORKS: Sherbrooke, Que.

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

WORKS: St. Catharines, Ont.

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

High-Speed and Other Steels of Quality

IT INSURES TOOLS THAT STAND UP ON THE JOB

Largest Producers in the World of URANIUM

WRITE US FOR PARTICULARS

STANDARD ALLOYS COMPANY

Forbes and Meyran Aves. -:- Pittsburgh, Pa.

SaBeN ExTrA
HIGH SPEED STEEL

The most Economical and Efficient Steel for Machining Shells

"Extra" Die Steel another good one

Manufactured by
SANDERSON BROTHERS & NEWBOULD, Limited
SHEFFIELD, ENGLAND

H. A. DRURY COMPANY LIMITED
MONTREAL TORONTO NEW YORK

High-Speed STEEL

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

WOLFRAM

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

VULCAN CRUCIBLE STEEL COMPANY
ESTABLISHED 1900
Aliquippa - Pa., U.S.A.

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

Electrite

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

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

LATROBE ELECTRIC STEEL CO.
LATROBE, PA.

High Speed Steel

Uranium

The

Fairley Davidson Steel Co., Inc.

SPECIALISTS

	Brand Name:
Hot Working Steels	"Xtof" and "Precision"
High Strength Steels	"Hehtemnd"
High Speed Steel	RUSHITOFF No. 6
Tool and Die Steels	"Fondwot" and "Giant"
Magnet Steels	Tungsten or Chrome
Non-Changeable Die Steel	Nugget "B" oil hardening

CHROME VANADIUM, oil hardening or case hardening

CHROME NICKEL, oil hardening or case hardening

Steam Hammer Forgings to Sketch

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

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

Canadian Agents:

The Canadian Utilities Steel & Engineering, Limited

149 Craig Street West, Montreal, Canada

We carry a complete stock at our Montreal Warehouse

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.

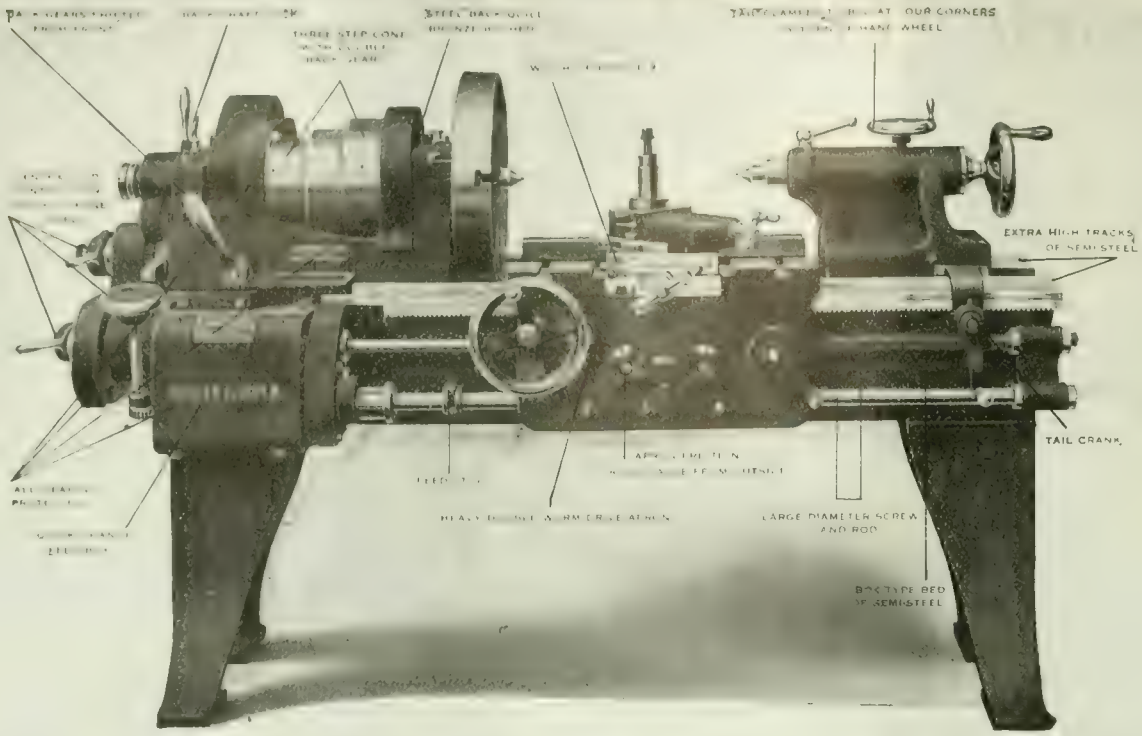
Western Sales Office:
Room 14 Windsor Hotel
MONTREAL

Steel Ingots
by the
HARMET
Liquid Process

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

16" HEAVY DUTY ENGINE LATHE

NOTE THE GOOD FEATURES EMBODIED IN THIS MACHINE



WHITCOMB-BLAISDELL MACHINE TOOL CO.

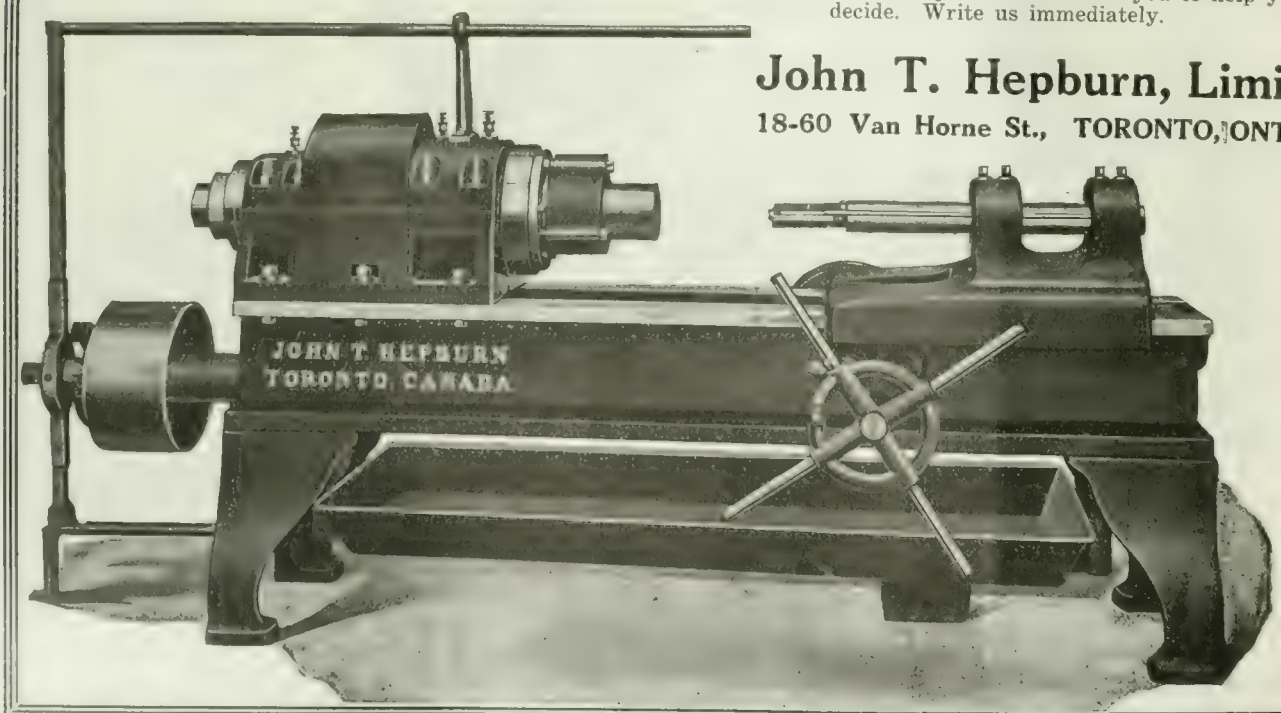
ENGINE LATHES WORCESTER, MASS. METAL PLANERS

Renew Your Old Lathe

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

John T. Hepburn, Limited

18-60 Van Horne St., TORONTO, ONTARIO



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

Roelofson 6-in. Banding Machine

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

Look over the following outstanding features of its construction:

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

Chucking with spring collet chuck insures accurate and speedy checking.

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

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

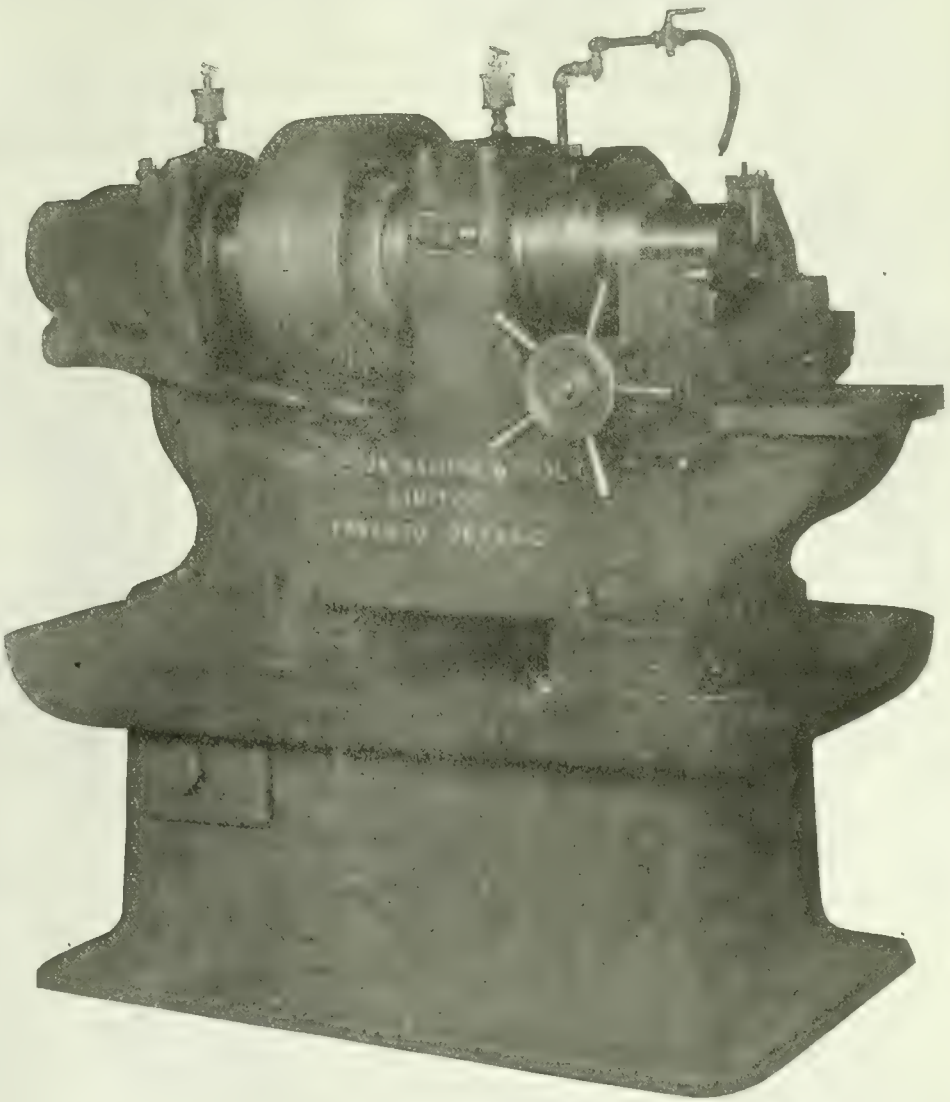
Roelofson Machine & Tool Co., Ltd.

Head Office 1501 Royal Bank Building, Toronto, Canada
Works and Warehouse: Galt, Ont., Canada

Immediate Delivery

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

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



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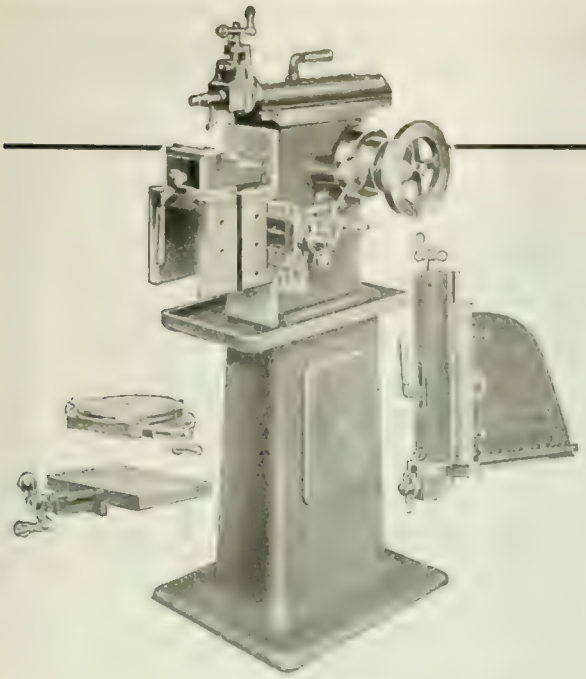


Patented June 23, 1914

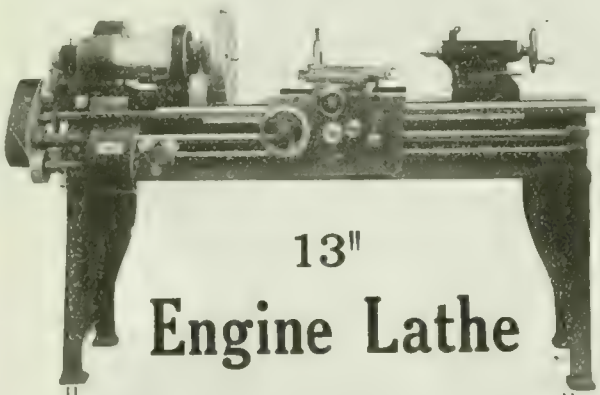
The Complete Machine

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

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

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

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



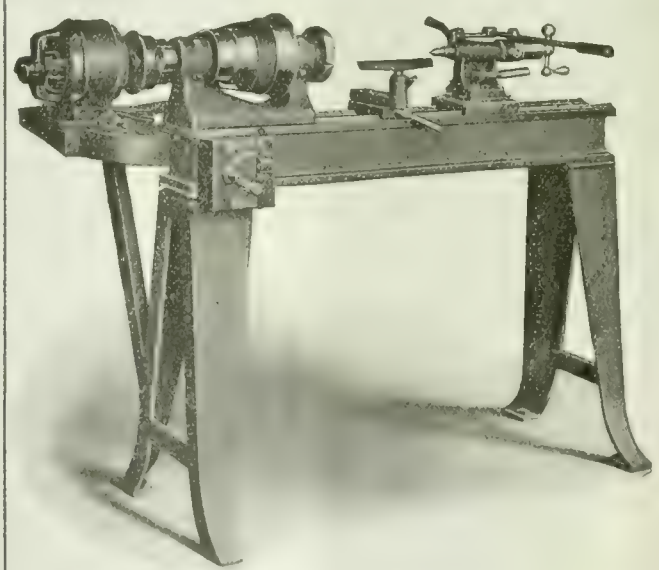
13" Engine Lathe

Such features as solid, full-webbed headstock, 50 point carbon crucible steel spindle, rigidly clamped tailstock and an unwavering principle to maintain a standard of machine that is proportionate throughout and conforms to the requirements of "Filsmith Quality."

These features have put this lathe in the foreground, where its daily performances keep it.

Inquire of us. It is a pleasure to help you.

The Philip Smith Mfg. Co.
SIDNEY OHIO U.S.A.



Built For *Service*

This BLOUNT Motor-driven Lathe is well adapted to all speed lathe uses. It is of late design, and has a number of features in which you will be interested. Provided with constant-speed motor. Lathe spindle made of hollow, high-carbon steel, ground to size and bored for Morse taper. Runs in self-oiling bronze bearings.

J. G. Blount Co., Everett, Mass., U.S.A.

TEXTILE BELTING and PACKINGS

HIGH SPEED TWIST DRILLS

J.R BAXTER & COMPANY LIMITED. MONTREAL.

and GENERAL MACHINERY SUPPLIES

Two Cuts at One Time

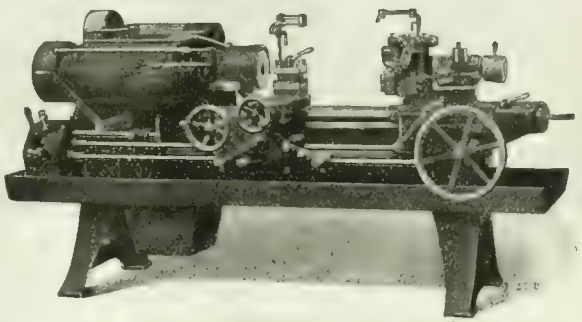
The ability to face, undercut or neck with the square turret while boring or turning with the hollow-hexagon turret contributes largely to the time-saving and economical output of the

Universal Hollow-Hexagon Turret Lathes

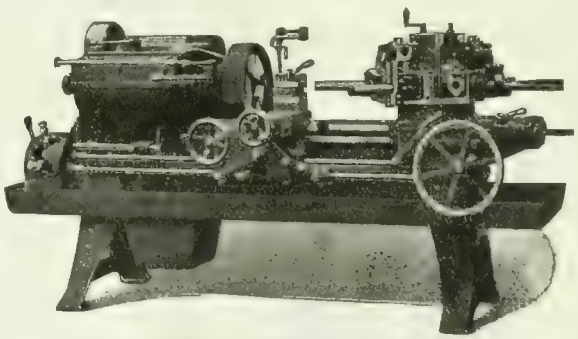
Separate feed shafts, each with ten individual feeds, operate the carriage and turret saddle independently, and provide the exact feed required for each.

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

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



No. 2-A—With "Bar Equipment."

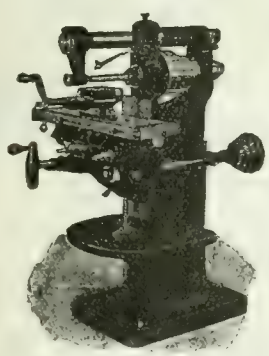


No. 2-A—With "Chucking Equipment."

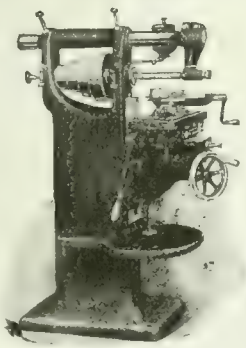
THE WARNER & SWASEY CO., Cleveland, Ohio, U.S.A.

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

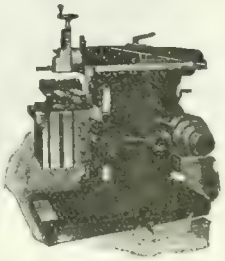
Increased Production Means Increased Profits



Large Millers for large work —STEPTOE MILLERS for small work.



Large Planers for large work —STEPTOE SHAPERS for small work.



Will result in increased production: less money invested in machinery, and increased profits.

THE JOHN STEPTOE COMPANY

CUMMINSVILLE, CINCINNATI, OHIO, U.S.A.

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

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

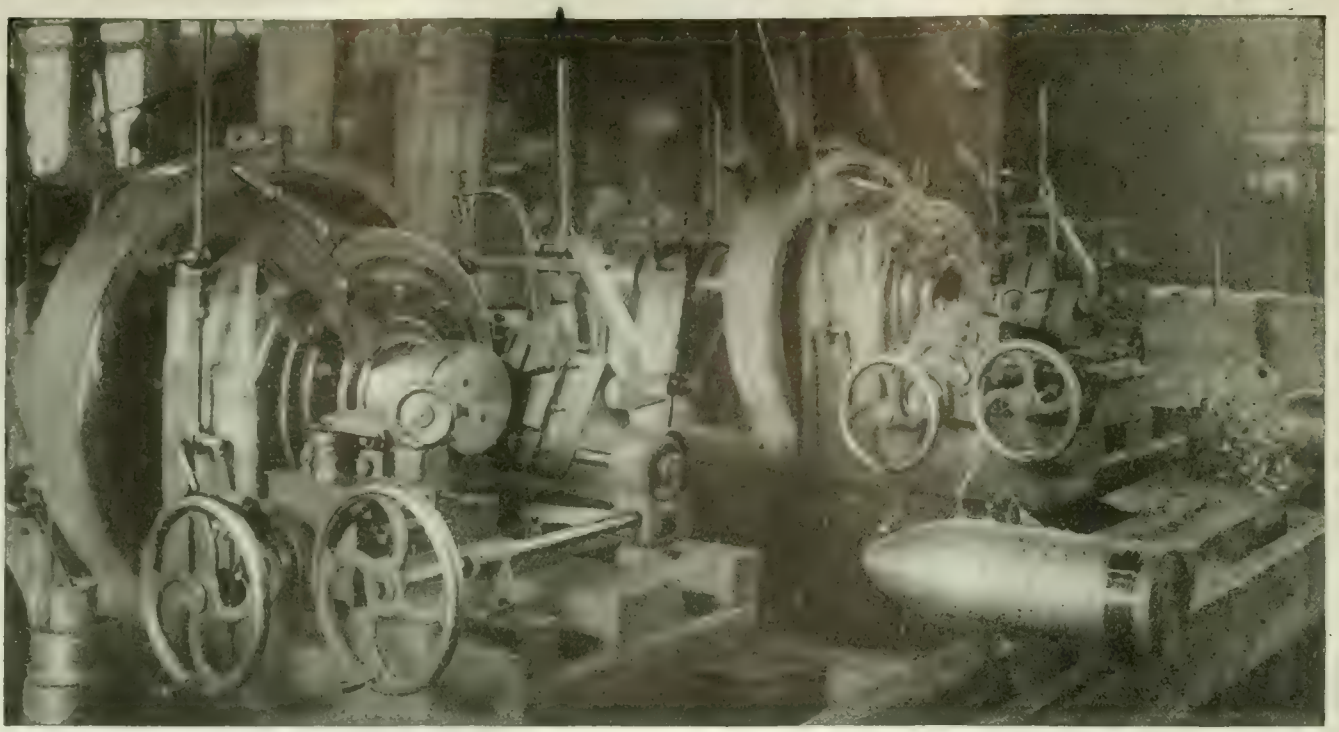
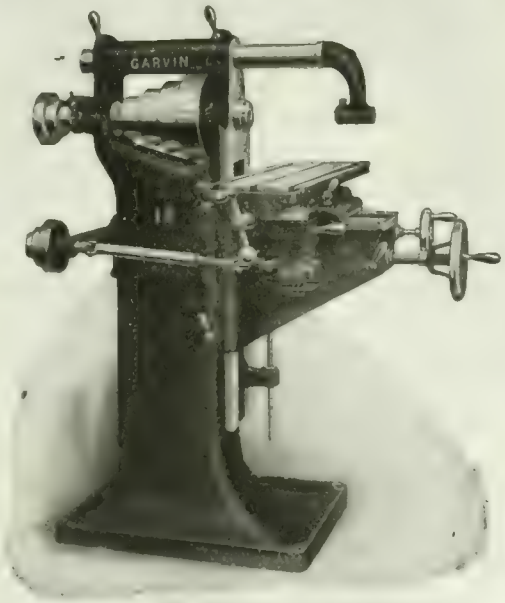


Photo shows two of our Band Turning Machines in one of the largest shell shops in Canada.

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

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

GARVIN



No. 12 Plain Milling Machine—Use Code Abrade

NO. 12 PLAIN MILLING MACHINE

FOR ALL LIGHT MANUFACTURING

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

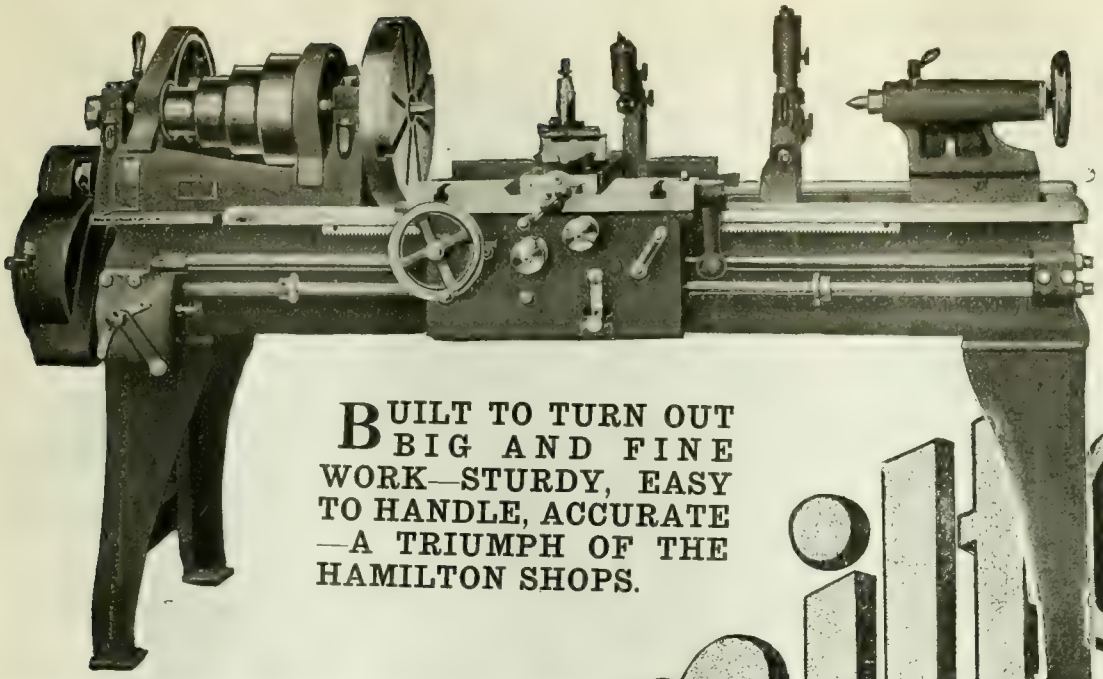
IMMEDIATE DELIVERIES

Send for Complete Catalog

Manufactured by

THE GARVIN MACHINE COMPANY

Spring and Varick Streets (*Visitors Welcome*) 50 Years New York City



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

Hamilton

"The Distinguished Service Lathe"

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

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

Rapid Production HAMILTON Machine Tools

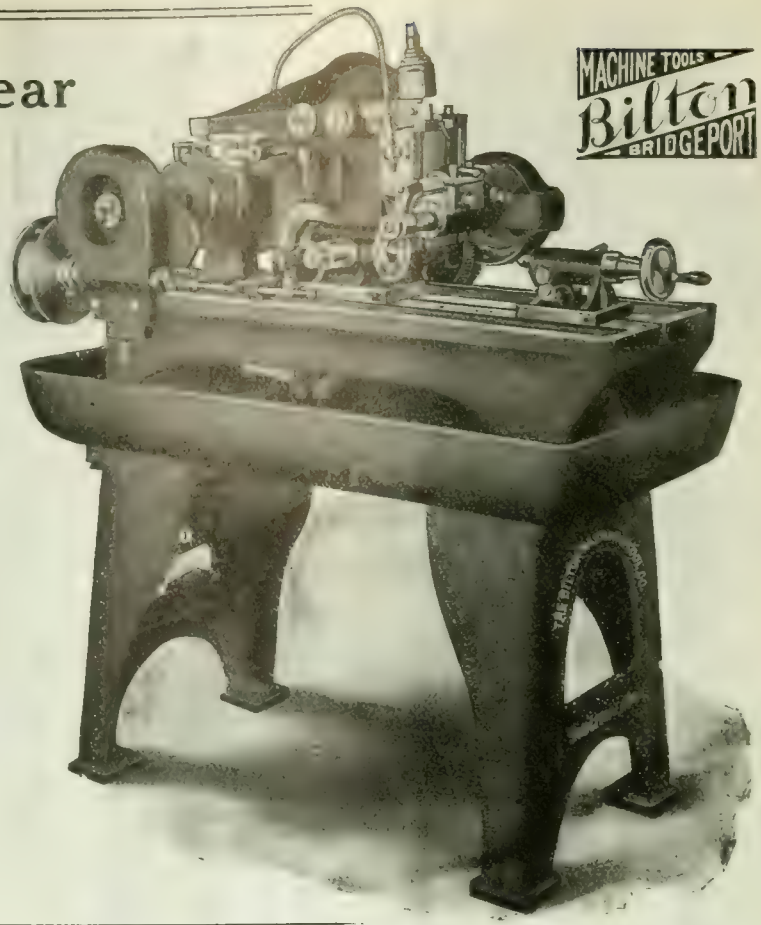
FOR 25 YEARS MAKERS OF FINE MACHINE TOOLS

The Hamilton Machine Tool Co.

HAMILTON, OHIO

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

Bilton Automatic Gear Millers—Spur or Bevel Gears



CAPACITY

No. 1 - 11 Pitch
No. 2 - 10 Pitch
No. 3 - - 8 Pitch

The Bilton Machine Tool Company

Succeeding The Standard Mfg. Company

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

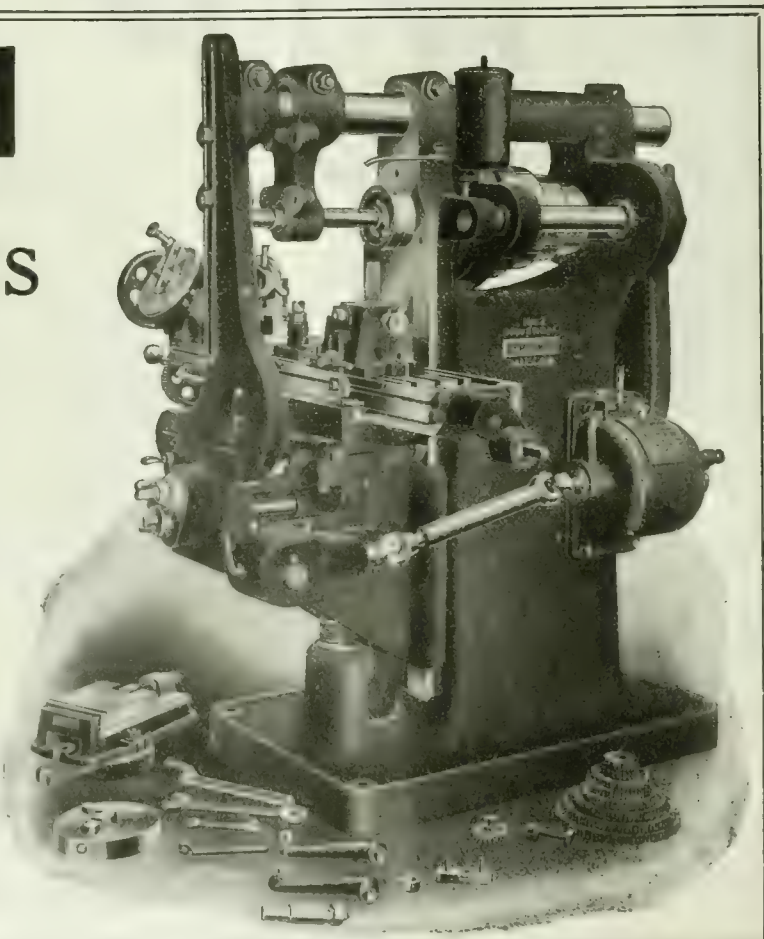
Also Manufacturers of —
Plain Horizontal Millers
Automatic Millers
Plain and Ball Bearing
Bench and Column Drills
Milling Cutters
Riveting Machines

Catalog 30 on request

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

KEMPSMITH

UNIVERSAL MILLING MACHINES



Are built in three standard sizes. They embody every worth-while feature to be found on a tool room Milling Machine. We call especial attention to the Dividing Head which is part of the regular equipment of every Universal Miller.

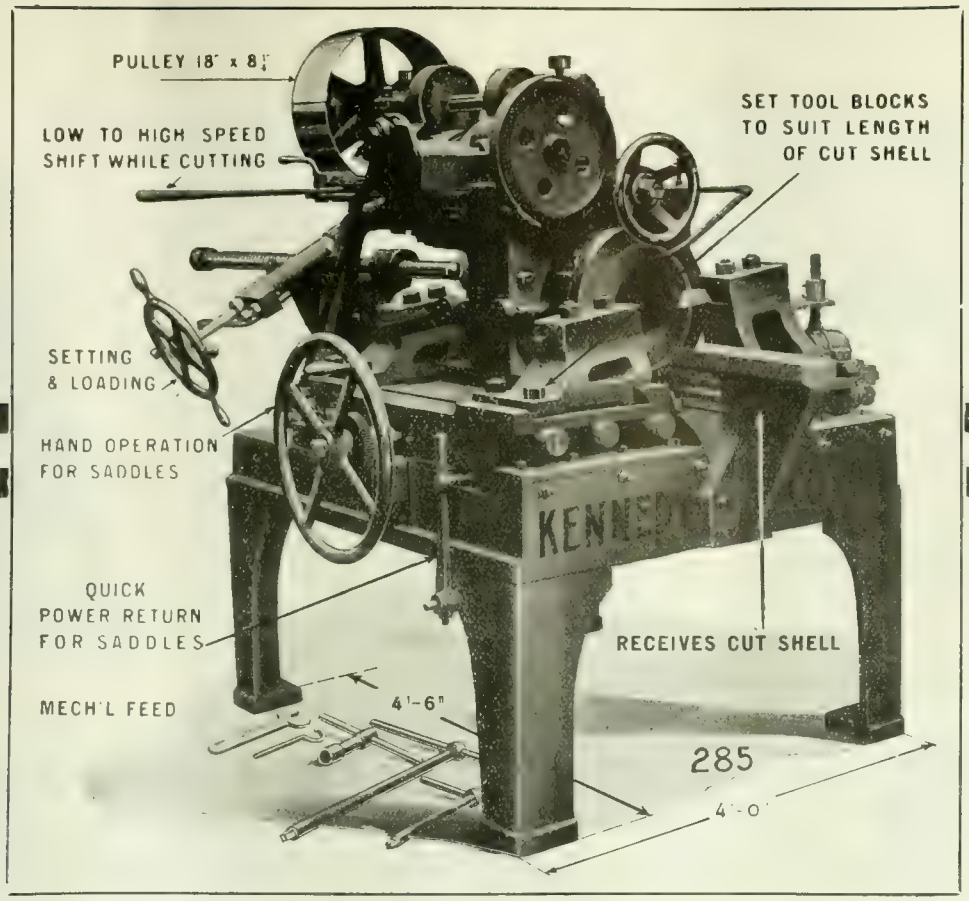
The Kempsmith Dividing Head is compact and rigid, unusually convenient in operation and so constructed as to maintain its accuracy under heavy service.

We publish a thirty-two page book elaborately illustrating and describing this Dividing Head. A copy will be sent free on request. Just ask for "Dividing Head Book."

Kempsmith Manufacturing Co.

MILWAUKEE, WIS., U.S.A.

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



6-inch Shell Cutting-off Machine

Cuts both ends at once

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

A Girl can operate it.

New quick power return for saddles

DELIVERIES REASONABLE

Wm. Kennedy & Sons, Limited

Owen Sound, Ontario

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

HAVE you examined the patented Ball Joint Connection on the smaller Consolidated Presses? This ball joint is instantly adjustable for wear, all lost motion can be eliminated by loosening the locking screws and adjusting the ball cap downward—no machining or filing required.

There is another important feature in considering this connection. The ball cap and adjustable split bushings can be removed from the connection screw without removing the screw from the connection or disassembling any other parts.

That is economy that cannot be overlooked.

Consolidated Press Company

HASTINGS *LARGEST EXCLUSIVE MANUFACTURERS OF POWER PRESSES IN U.S.A.* MICHIGAN

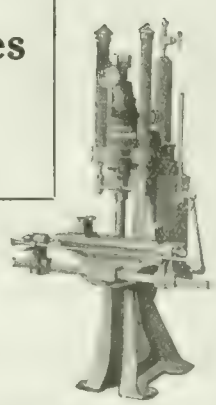
Canadian Representatives: A. R. WILLIAMS MACHINERY CO., Limited, Toronto, St. John, Winnipeg, Vancouver

ELMES

Combination Hydro-Pneumatic Forcing, Broaching and Straightening Press

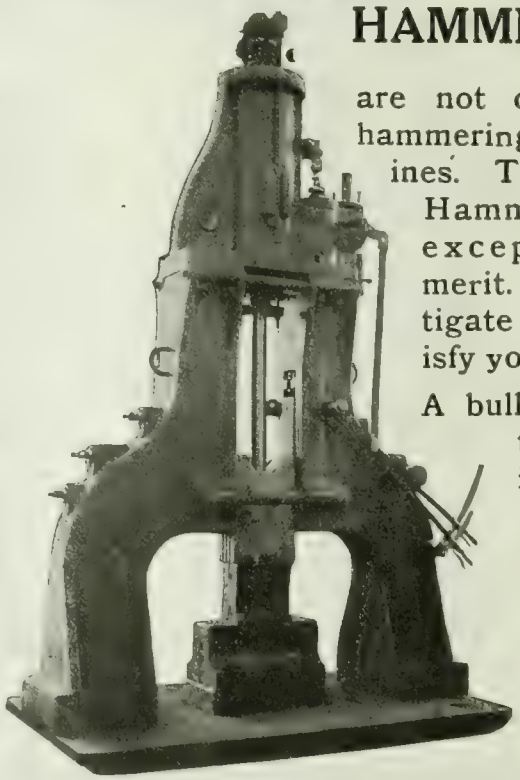
with or without auxiliary tables, can be used for a variety of purposes. Built in sizes to suit your needs.

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



Get our catalog describing our complete line

"ERIE" STEAM FORGING HAMMERS



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

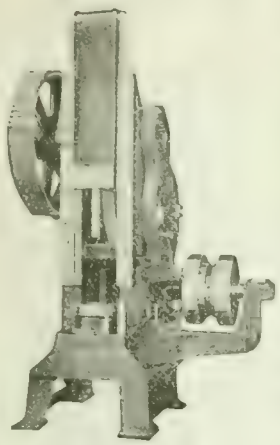
A bulletin for the asking.

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

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

THE "TOLEDO"

Rack and Pinion Reducing Presses



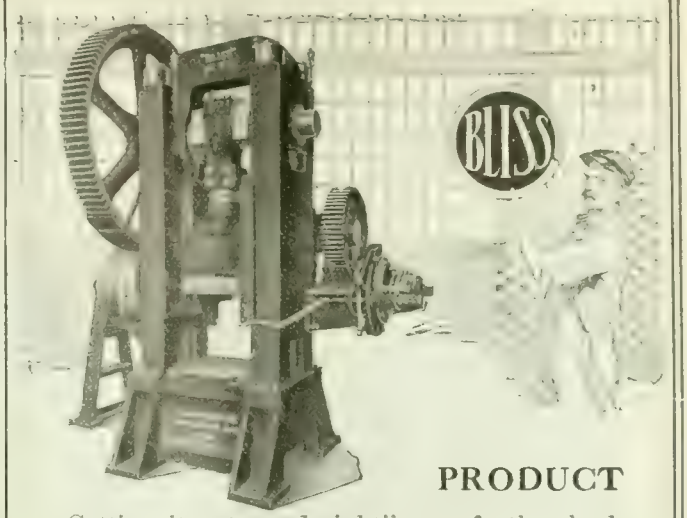
Particularly recommended for the manufacture of brass cartridge cases, soda water fountain tubes, gasoline stove and lamp burner tubes, etc.

The slide is operated in a manner to give a uniform speed to the punch during entire drawing operation; admits of easy adjustment for various heights of work and provides for a quick return.

We build presses weighing pounds or tons—for delicate requirements or heavy needs.

The Toledo Machine & Tool Co.

Toledo, Ohio, U.S.A.



PRODUCT

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

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

E. W. BLISS CO.

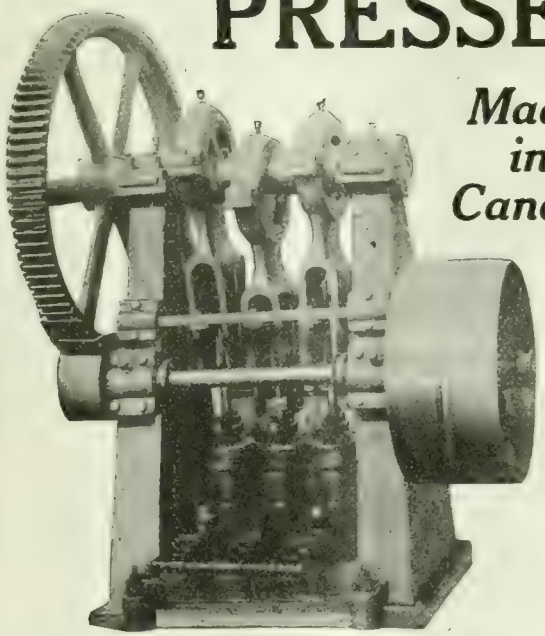
Brooklyn, N.Y., U.S.A.

1857 1917

CHICAGO OFFICE People's Gas. Bldg.
DETROIT OFFICE Dime Bank Bldg.
CLEVELAND OFFICE - Union Bank Bldg.
LONDON, S. E., ENGLAND Pocock St., Blackfriars Road
PARIS, FRANCE 100 Blvd. Victor-Hugo St. Ouen

PRESSES

Made in Canada



Hydraulic Presses, Pumps and Accumulators for all purposes

WRITE FOR PRICES AND DELIVERIES

WILLIAM R. PERRIN, Limited

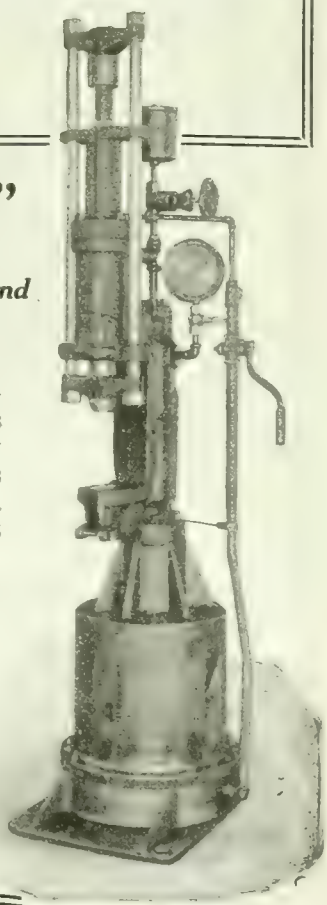
TORONTO, CANADA

Triple Purpose

"METALWOOD" COMBINATION

Forcing, Broaching and Straightening Press.

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



Metalwood Mfg. Co.

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

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

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

Oxy-Acetylene Welding and Cutting

Operator reclaiming broken machine parts by the Prest-O-Lite Process.

Conservation *vs.* Waste

Hundreds of thousands of dollars' worth of valuable castings, machine parts and tools are being reclaimed from the scrap heap by this process. Not only is oxy-acetylene welding of great value as a manufacturing process, but it effects big savings in repair work of all kinds—broken metal parts and castings quickly and inexpensively reclaimed for useful service—in factories, large and small, and in railroad shops, mines and thousands of repair shops.

Many savings and advantages are possible in your shop or factory. Investigation may show a real need for welding.

Prest-O-Lite PROCESS

employs both gases (acetylene and oxygen) in portable cylinders. Prest-O-Lite Dissolved Acetylene (ready-made carbide gas) is backed by Prest-O-Lite Service, which insures prompt exchange of full cylinders for empty ones. Provides dry, purified gas, insuring better welds, quicker work and lower operating cost.

Apparatus consists of an equal pressure blow pipe, automatic regulators and gauges, and all necessary equipment. Adaptable for oxy-acetylene cutting by the addition of special cutting blow pipe.

Thorough instructions are furnished free to every user of Prest-O-Lite Dissolved Acetylene. Any average workman who understands metals can learn the welding process quickly and easily.

We will gladly send illustrated literature and interesting data showing actual instances of savings made by others. It may suggest valuable ideas to you. Write for it. Address Department C-107.

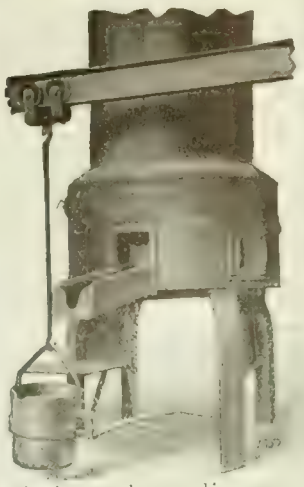
THE PREST-O-LITE COMPANY INC.

CANADIAN GENERAL OFFICES:
913-14 C.P.R. Building TORONTO

Direct Factory Branches: Toronto, Ont; Montreal, Que.; Merritton, Ont.; Winnipeg, Man.

Canadian Plants: Toronto, Ont.; Merritton, Ont.; Winnipeg, Man.; Shawinigan Falls, Que.

World's Largest Makers of Dissolved Acetylene



Overhead Trolley Systems

are invaluable in light work foundries for delivering molten metal, collecting and delivering castings, and distributing flasks and supplies, etc.

Any point in foundry or shop is easily reached, even remote corners. Extensions readily made. Save labor, time and floor space.

Send for Catalog No. 111.

Complete Foundry Equipments
Cranes of all kinds

WHITING
FOUNDRY EQUIPMENT CO.
HARVEY-ILL. U.S.A.
CHICAGO SUBURB.

PRACTICALITY

AFTER fifteen years' study of the Miner's and Lumberman's wants, we know just what is and what is not required in tools for them.

Practicality has been the keynote of our organization. Experience has aided us in eliminating all unnecessary parts and in perfecting the design of our tools.

The use of best material and finest workmanship enable us to manufacture tools that are unexcelled.

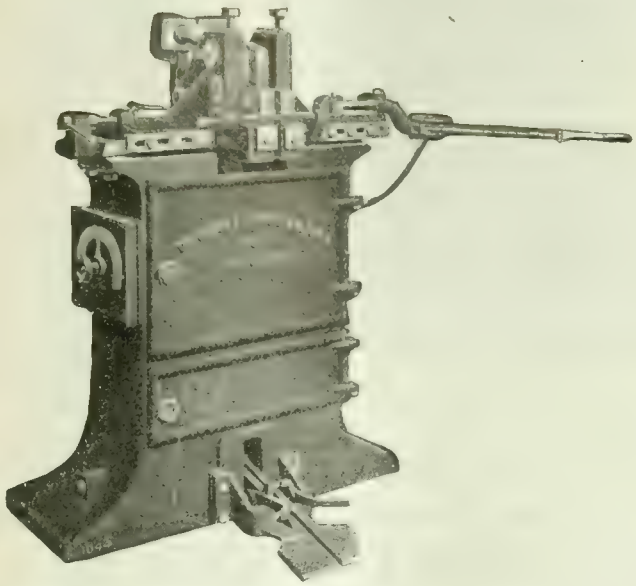
We make a complete line.

Write us for prices.

J. W. CUMMING & SON, LTD.
NEW GLASGOW, - - CANADA

Wood or Steel, let Cummings make it.

Thomson Process
Electric Welding

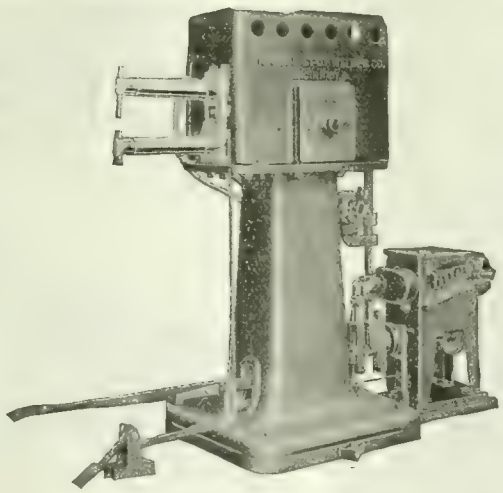


Adopt a "Thomson" For Your Work

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

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

Write for Bulletin B-4.



Rivets Abolished—Time Saved

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

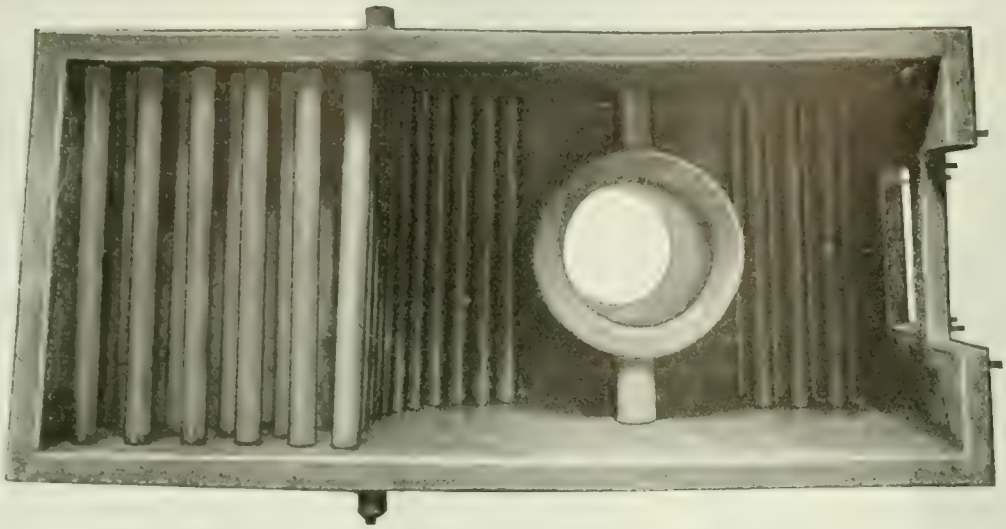
Write for Bulletin S-4

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

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

Thomson Process
Electric Welding

The POSSIBILITIES of OXY-ACETYLENE WELDING



Bottom inside view of Boiler entirely constructed by Oxy-Acetylene Process.

are every day becoming more generally known, and profitable use made of them.

The Boiler illustrated (which is to be used for Steam Heating a building) was constructed entirely by the Oxy-Acetylene Process. All the Plates were cut to size by the Oxy-Acetylene Cutting Torch, and every joint WELDED by the Oxy-Acetylene Blowpipe. Tested hydraulically under high pressure, it was found to be perfect in every respect.

There are hundreds of ways in which you can use an Oxy-Acetylene Outfit to similar advantage, why not do so?

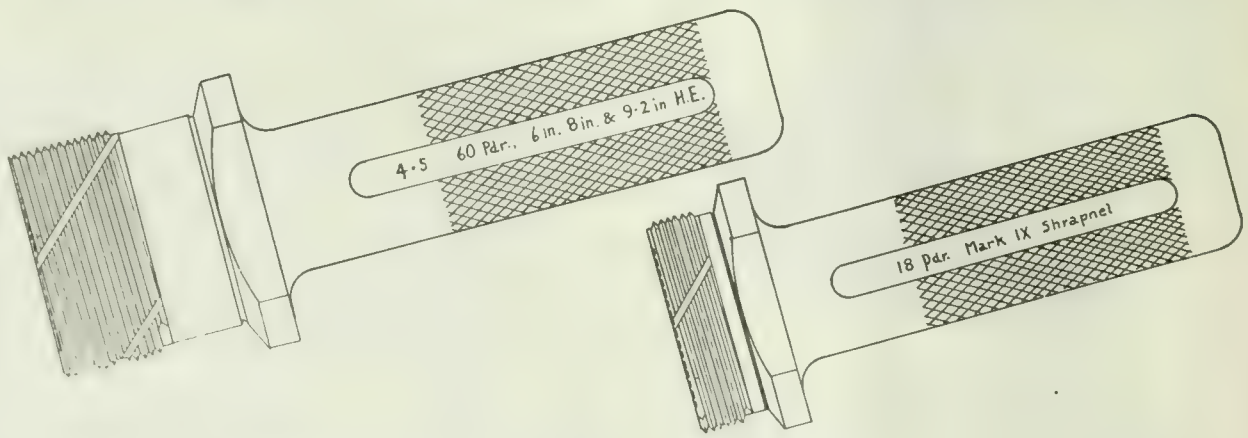
In any Plant where there is running machinery, an Oxy-Acetylene Outfit is the most profitable installation you can make. It obviates Machinery "tie-ups." Saves the cost of replacement by reclaiming broken parts, etc., Saving Time, Money and Material from the day it is installed.

Why not investigate to-day?—particulars sent without obligation.

L'AIR LIQUIDE SOCIETY

Canadian Factories: MONTREAL TORONTO WINNIPEG HALIFAX, Factory under construction.

FUSE HOLE GAUGES

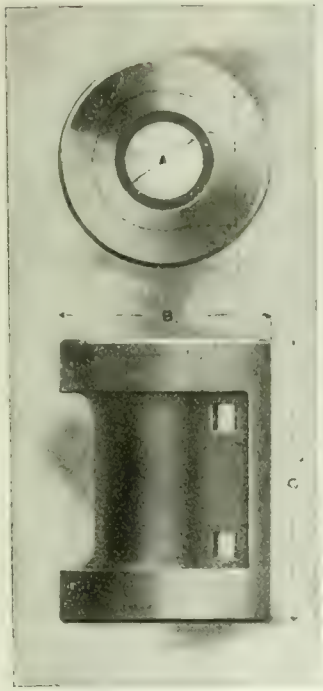


Manufacturing and inspection fuse hole gauges for all size shells. A surplus stock enables us to ship immediately.

Windsor Machine & Tool Works

Windsor, Ontario

Mining Machinery Parts



Two-key Tappet

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

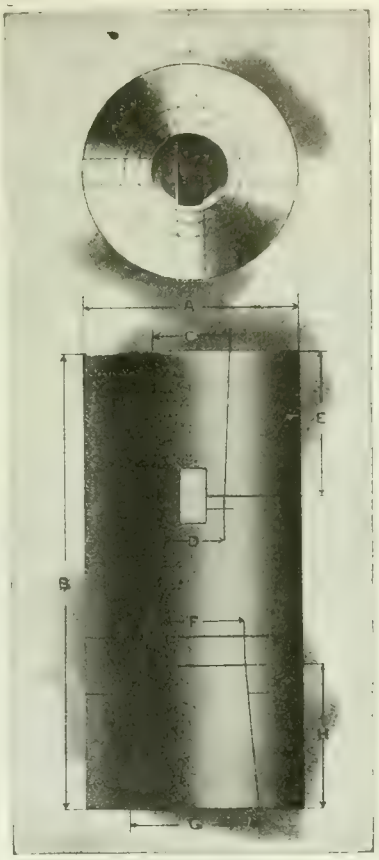
Also Manufacturers of Lining Plates for Ball and Tube Mills Concaves and Heads for Gyratory Crushers.

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.

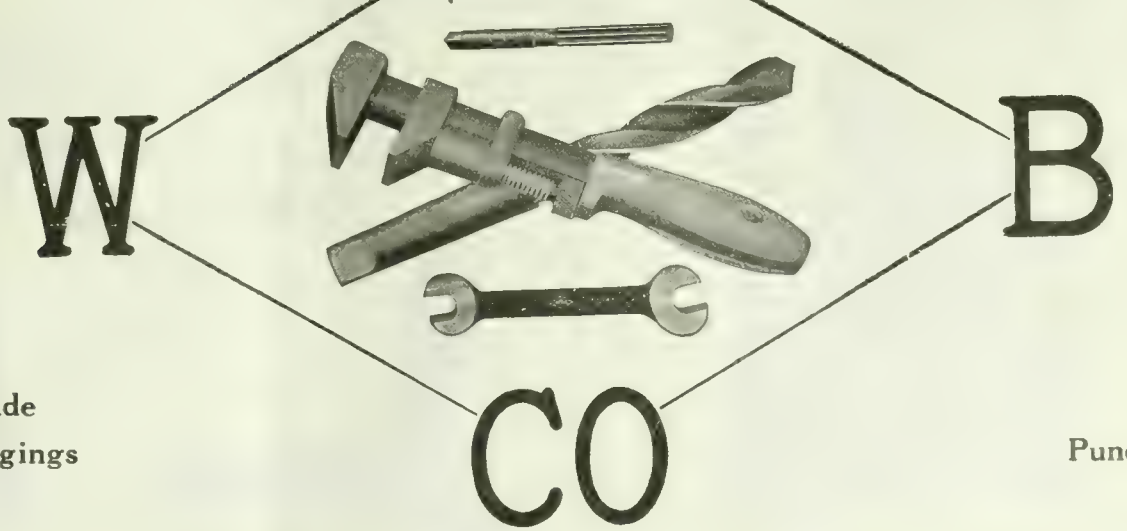


Stamp Head

WHITMAN & BARNES

Twist Drills
and
Reamers

Screw and Drop
Forged Wrenches
Hammers



Special
High Grade
Drop Forgings

Cotters
Chisels
Punches, Etc.

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.

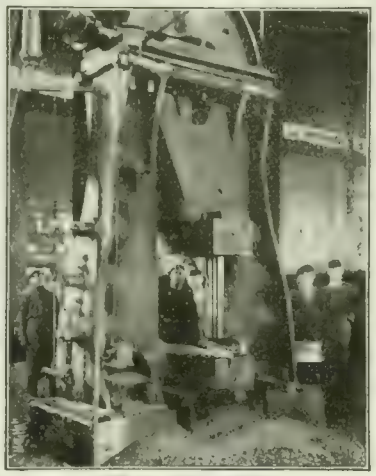
THE WHITMAN & BARNES MFG. CO.

ESTABLISHED 1854

CANADIAN OFFICE AND FACTORY ∴ ∴ ST. CATHARINES, ONTARIO

Witness
a
Drop-Forge
Shop
in action

And
you acquire
a new idea
of
endurance



1 500 LB. DROP HAMMER
WHAT DROP FORGINGS ENDURE THERE EXPLAINS WHY SUPERIOR DROP FORGINGS ENDURE EVERYWHERE

J. H. WILLIAMS & CO.
THE WRENCH PEOPLE
45 RICHARDS STREET BROOKLYN, N.Y. CITY

Watch a Capable Mechanic Test a File

See him pass his thumb over the teeth.

By instinct, he knows, at once, whether a file will do its work.

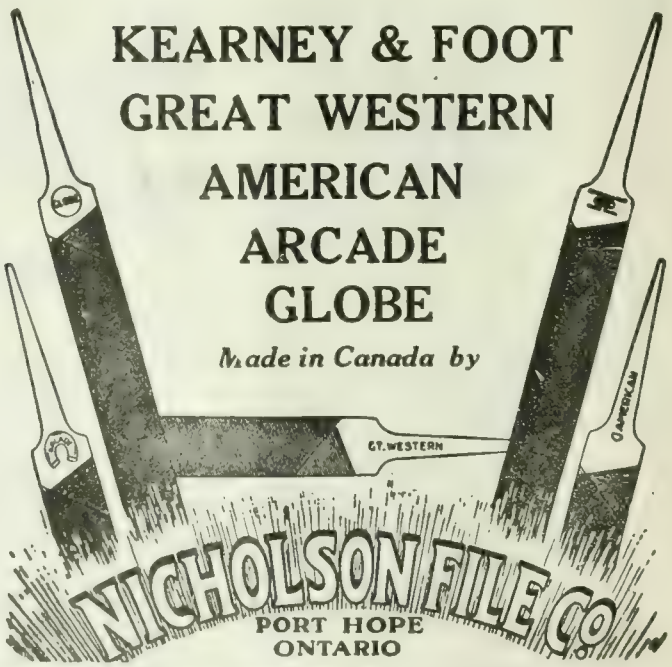
He senses, at once, the quality of the steel—its balance—and the sharp-edged teeth.

He makes no mistakes in buying—and his choice every time will be for "Famous Five" Files.

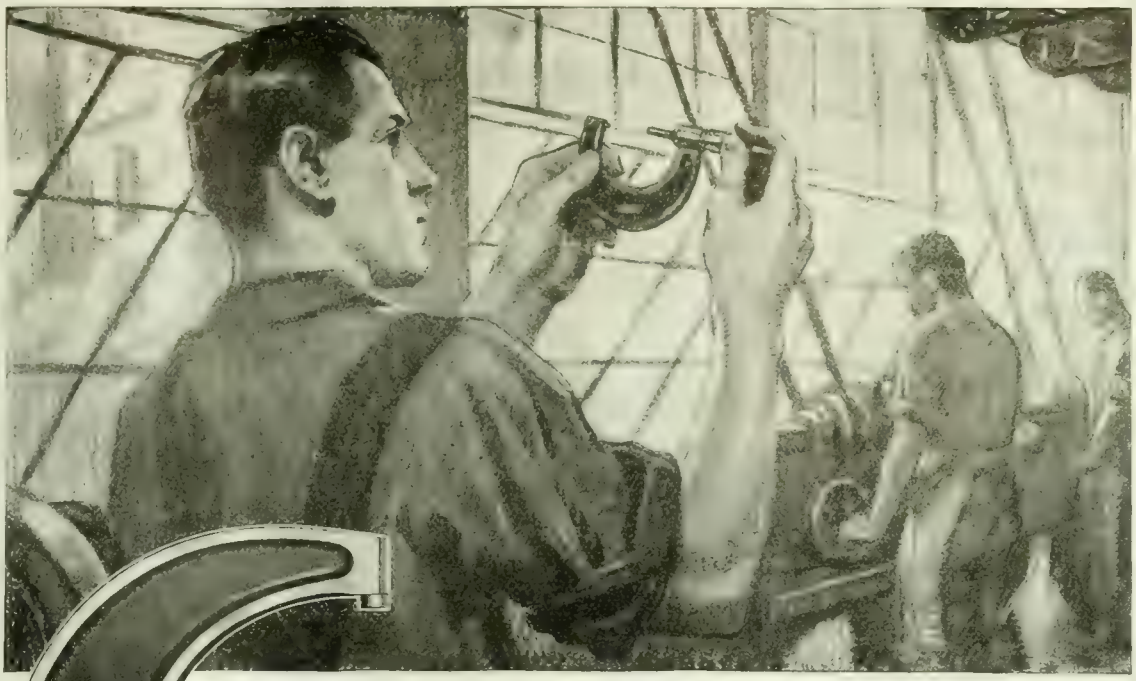
Be influenced by *his* judgment and specify "Famous Five" Files when ordering.

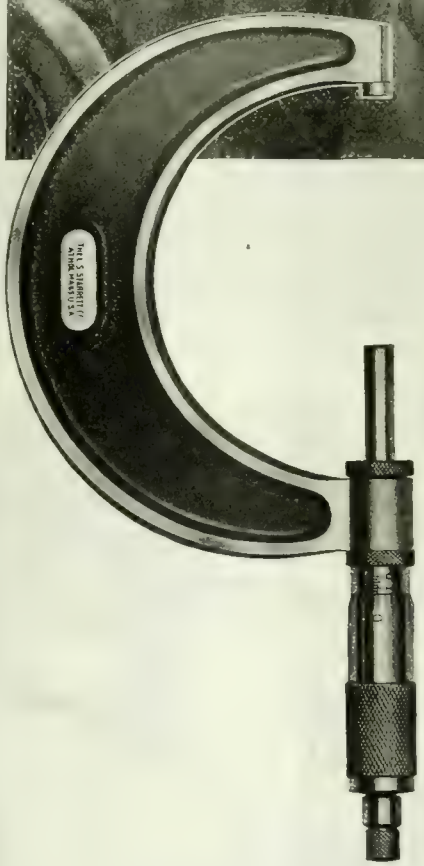
They are:

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE
Made in Canada by



NICHOLSON FILE CO.
PORT HOPE
ONTARIO





Accurate

Are your precision tools your best friends or your worst enemies? If you are never sure of the reading or if they wear easily and rapidly, you have to guess, and guessing produces seconds and makes thin pay envelopes.

If you use

Starrett Tools

TRADE MARK
REG. U.S. PAT. OFF.

you can be *sure* all the time. If a Starrett Micrometer reads .808 you know that the piece is exactly that diameter or thickness.

You can place the same confidence in all the other Starrett Tools from Vernier Height Gages and Caliper Squares to Test Indicators. All of the 2100 styles and sizes of this complete line are recognized for their enduring accuracy. They help to put speed in your work and bonuses in your pocket.

Ask for Catalog No. 213.

The L. S. Starrett Company

THE WORLD'S GREATEST TOOL MAKERS

ATHOL, MASS.

NEW YORK LONDON CHICAGO

42-731

For Polishing Stove Tops

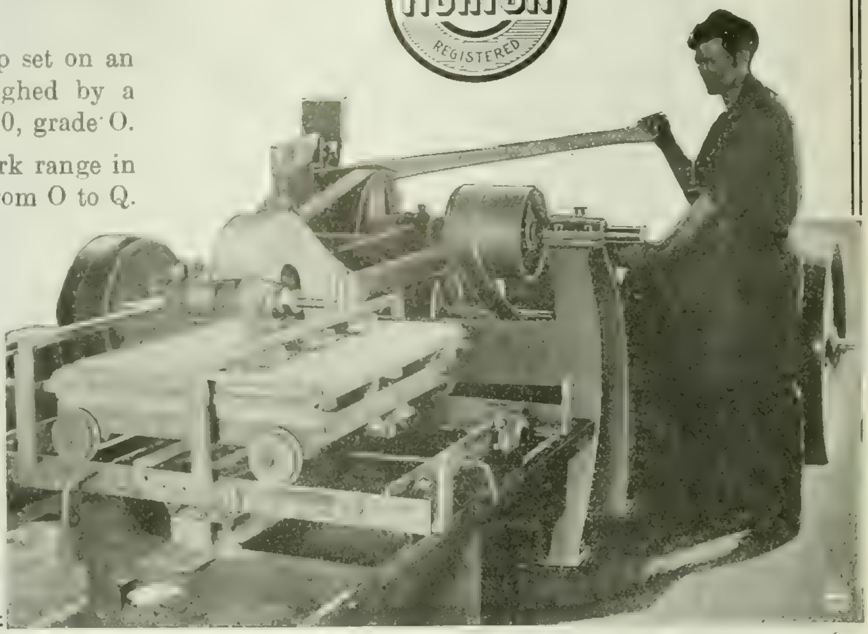
The polishing of stove tops on automatic machines is an interesting operation, and one where the quality of the work done depends largely upon the selection of the grinding wheels and abrasives.

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

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

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

TRADE MARK NORTON REGISTERED



Norton Company

Worcester, Mass.

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

ELECTRIC FURNACE PLANTS

Niagara Falls, N.Y. Chippawa, Ont., Canada

MAKE NAILS! NOT NOISE!

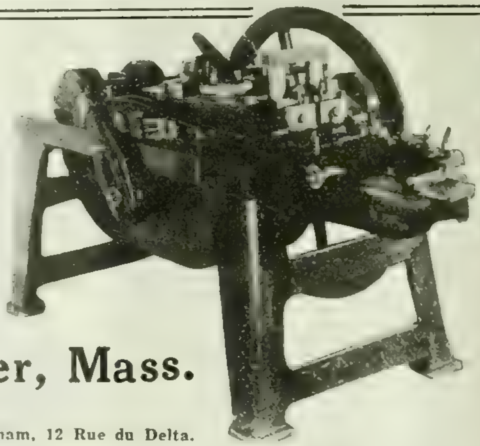
We offer the trade new types of

WIRE NAIL MACHINES

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

Smoothly running machines, with balanced mechanical motions and no rotating cams. Built in 5 sizes, handling wire from No. 17 to ⅜" diam.

PRACTICALLY NOISELESS IN OPERATION



Sleeper & Hartley, Inc., Worcester, Mass.

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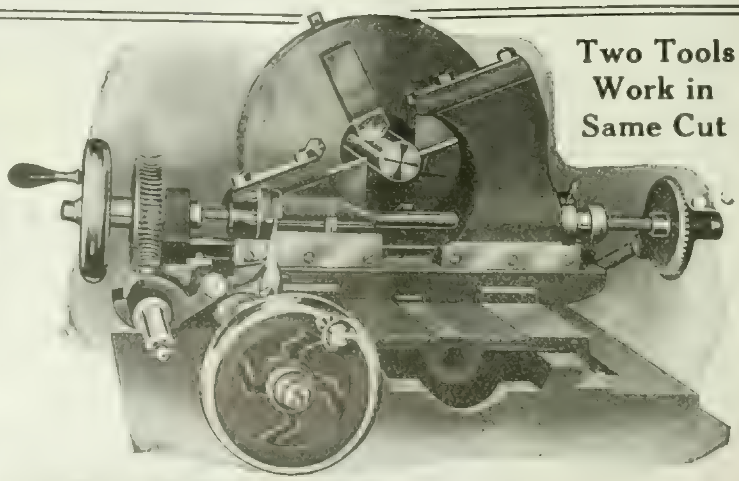

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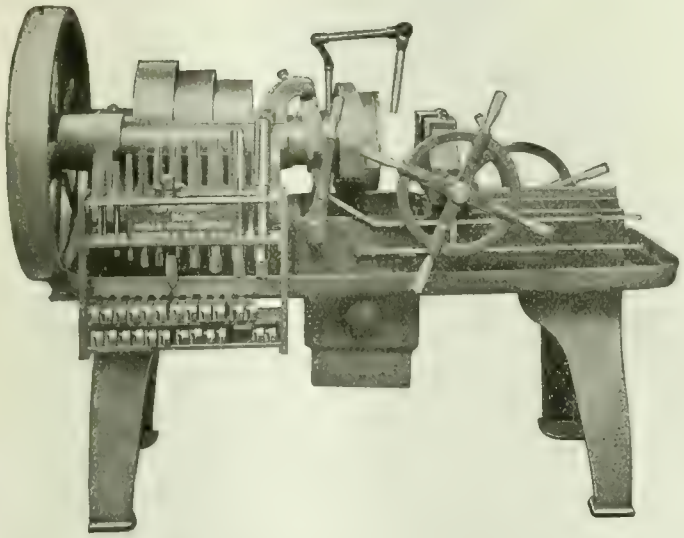

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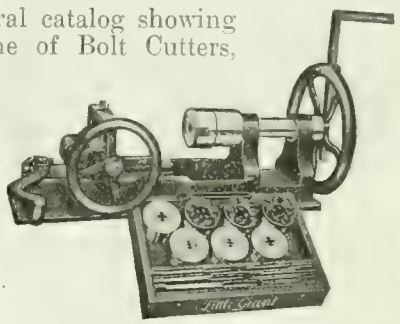

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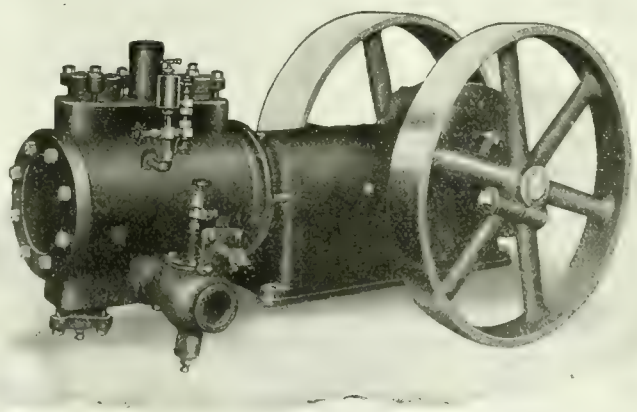

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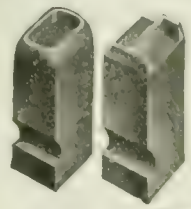

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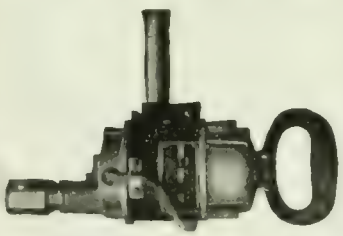

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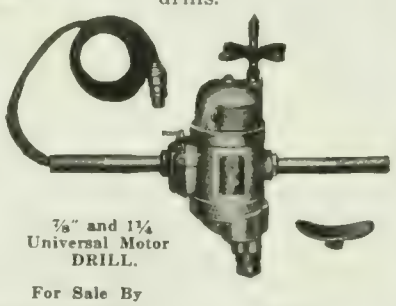

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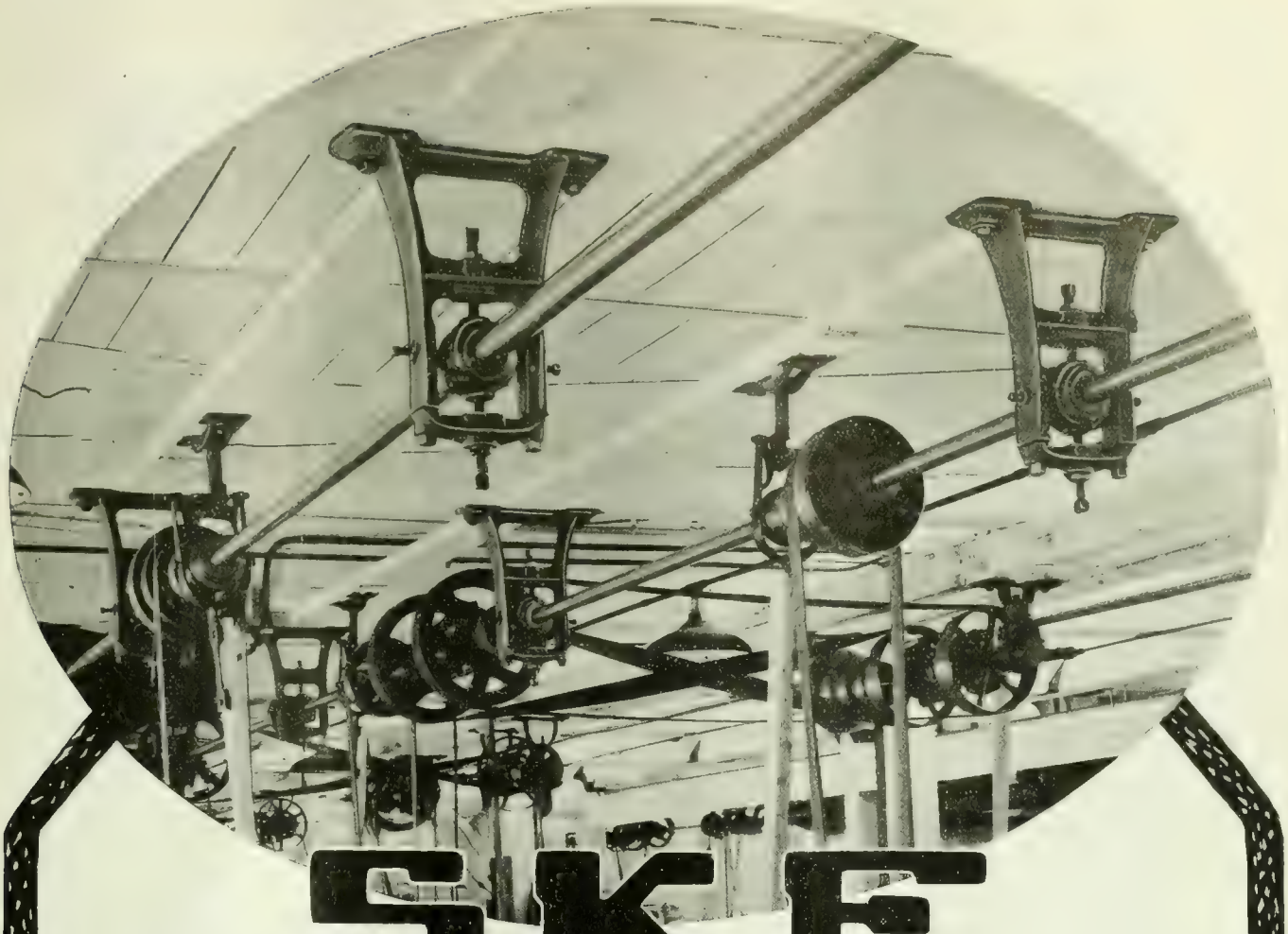

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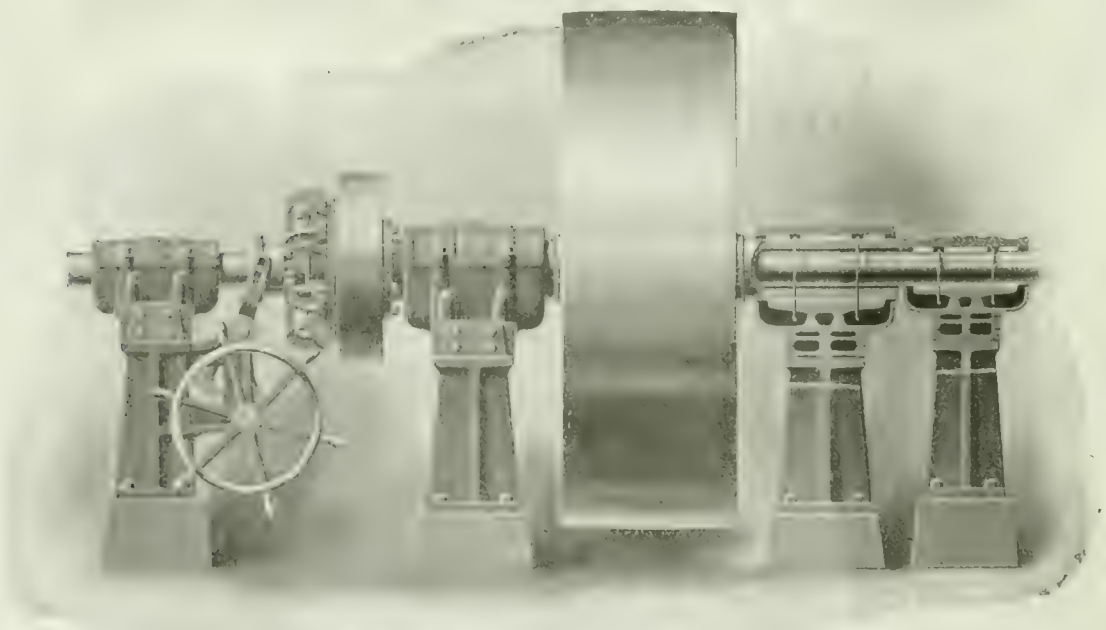


Special and General Applications of Autogenous Welding

Staff Article

It is now a generally recognized fact, that, given suitable apparatus and proper care in operation, there are few limits, except extreme volume of metal, to the successful commercial use of the oxyacetylene welding process. Not alone in repairs, but in regular manufacturing operations the welding department is assured of permanent prominence.

OXY-ACETYLENE cutting and welding is rapidly being recognized as a very important and essential branch of modern engineering practice; not alone in affecting repairs, but also in connection with the initial production of many lines of manufactured articles. At the commencement of the present century the practical application of this art was almost, if not entirely, nil; its use being chiefly confined to experimental work in certain scientific laboratories. While in many respects the progress that has been accomplished in the autogenous method of welding has been very remarkable, it is doubtful if its practical growth has advanced in relative proportion to its usefulness and adaptability. One of the chief reasons for its comparatively slow development has been the skepticism of many mechanical men as to its serviceability under severe test. It is true that many of those who, in the past, have shown reluctance to accept the possibilities of this new method, may have been influenced by the unsatisfactory work of inexperienced operators, where the weld has been made without the necessary technical knowledge that is absolutely essential for the achievement of sound and reliable welding.

Faulty or defective welding can be traced more often to the inexperience of the operator, or the careless manipulation of the blow pipe, than to any other cause. It must not be thought, however, that faulty welding is always directly due to the inability of the operator in the actual making of the weld; for while the fusing and uniting of the metal is the essential factor in this class of work, there are other equally important features that require careful attention in order that the desired objective may be attained. The preparation of the work requires more than ordinary consideration, particularly where the prices are of such a character that the heating of the adjoining metal will create internal stresses and distortion; the result in such cases invariably being a recurrence of the break, either while cooling or after the piece has been placed in service. The second failure may occur at the weld, or if this has been well done, at the weakest point adjoining. Under the conditions just cited, where the uneven expansion and contraction is one of the problems to contend with, it is only by experience that operators are able to successfully overcome any difficulties that are likely to arise. It is unquestionably true that the application of heat will cause metal to expand; therefore it is this condition, and the calculations made by the welder for these contingencies, that assures the success or failure of the job. Where the expansion does not develop stresses in the work it is seldom that preheating is resorted to, but where the work consists of different shapes and thicknesses, such as pulleys, gears, small cylinders, etc., the practice of preheating the work is generally adopted. This process allows the entire piece, or that portion adjacent to the weld, to assume a condition of expansion that permits of uniform contraction of the metal after the weld has been completed, thus eliminating the strains that might otherwise develop.

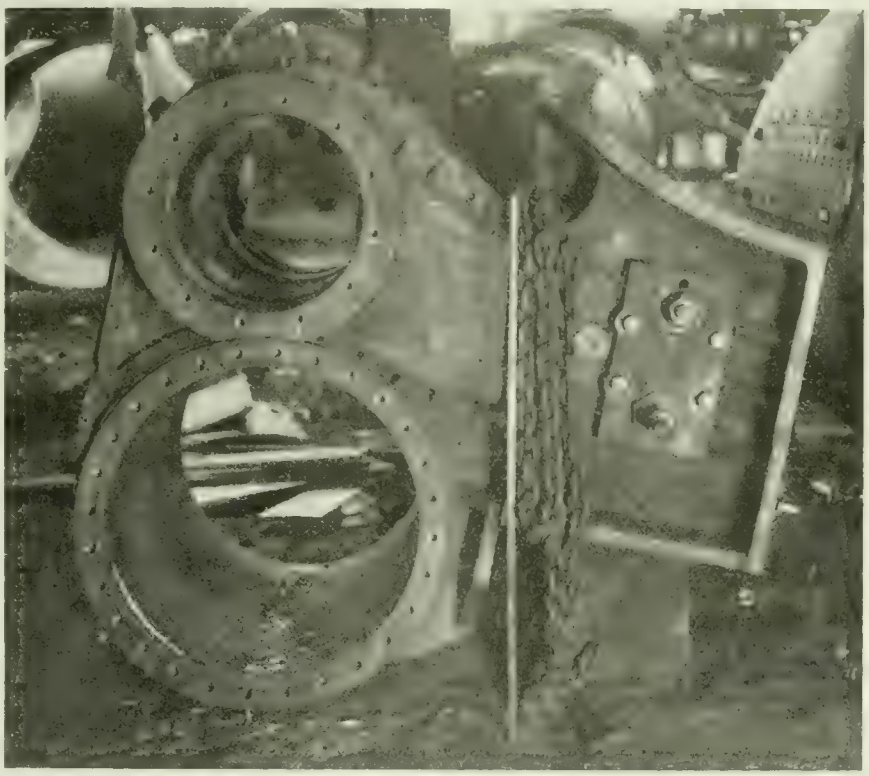


FIG. 2. LOCOMOTIVE CYLINDER CASTING WITH DEFECTIVE BORE REPAIRED BY AUTOGENOUS WELDING.

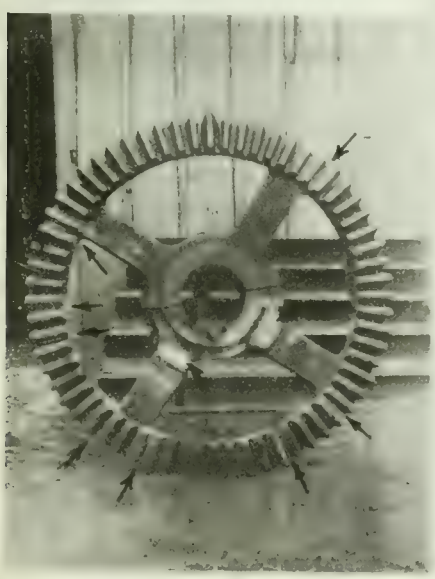


FIG. 1. BEVEL GEAR 85 IN. DIA. REPAIRED AFTER BEING BROKEN IN NINE SEPARATE PIECES.

The best method of heating and the proper distribution of the heat can only be determined from previous experience, as the various jobs must be considered according to their own special requirements. Not only is it necessary to preheat certain work to avoid subsequent failure through unequal contraction, but it is very often also advisable from an economic standpoint, as the assimilation of heat in the material assists in the fusing of the metal immediately adjoining the crack being welded, and to a large degree prevents the possibility of cold shuts; this objectionable feature often occurring, particularly when the blow pipe is in the hands of an inexperienced operator. It is, however, interesting to note that the mechanical world at large is giving more favorable consideration to this branch of engineering than has ever been accorded it in the past, realizing that its field of usefulness is increasing very rapidly, and is becoming a contend-

ing factor in many ways. While the field of autogenous welding, as a manufacturing feature of the metal industry, is showing interesting developments, it is in the repairing of machinery and other mechanical equipment that its application has been most pronounced. Frequent opportunities have arisen during the past three years which have greatly emphasized the importance of this industry and the inestimable value that its general adoption would eventually be to many industrial activities. Conditions that have characterized the metal working trade during the period of war developments, where the outstanding feature has been the inability to obtain machinery or material—except on very extended delivery—have necessitated manufacturers adopting methods that would not have been considered in normal times. Delay of this nature has often resulted in the overhauling of the scrap pile in an effort to utilize discarded parts and assemble them in such a way as to become a very useful part of the plant equipment. In this connection it is safe to say that the oxy-acetylene process of welding has been an essential factor in converting scrap into useful machine tool attachments. Not only has this practice been the means of reducing the size of the scrap pile, but it has also been of material assistance in the saving and putting back into prompt service machinery that would otherwise have remained idle for long periods while broken parts were being replaced.

Repairs to Large Gear

To illustrate the importance that this method of reclamation bears to general industrial work, we give here a number of practical examples that have recently been successfully accomplished in the plant of the St. Lawrence Welding Company of Montreal. Fig. 1 illustrates a large cast iron gear, 85 in. dia., used on a heavy mixing machine. For some apparently unknown reason the machine became jammed, with the result that the gear was broken into nine parts, as indicated by the ten cracks marked by the arrows. The breakage of this gear not only meant the stopping of this particular machine, but left the greater portion of the plant in a state of practical shut-down while the machine was out of commission. To replace this gear with a new one meant a delay of many weeks, as few foundries were in a position to undertake the work. It was, therefore, decided to reclaim the gear by welding the broken sections. The "scrap" was taken to the welding plant and the broken parts prepared by roughly beveling the edges to an approximate angle of 45 degrees, thus making an included angle of about 90 degrees when the parts were placed together; the cracks on the rim being prepared from the back so as to avoid the accumulation of added metal between the teeth. About five hours was spent in preparing the various parts, and after setting up on a suitable support to maintain the sections in proper alignment, a charcoal fire was built around the wheel and allowed to heat for five hours, when welding was commenced. The cracks in the rim were welded first and the two arms afterwards, as this method assured more uniform contraction when cooling. The total cross sectional area united was approximately 80 sq. in., and the work was completed in nearly 14 hours. After being placed in position, a little chipping was necessary at some of the welded parts in the rim, but the time that the machine was out of service, due to repairs, was only a little over 30 hours. The cost of this job was $120, and when compared with an approximate cost of $150 for a new gear,, may not appear a remarkable saving, but when the delay that would have been entailed in getting a new gear was taken into consideration, the cost of the repairs was insignificant. Since repairs were made this gear has been in operation for nearly three years.

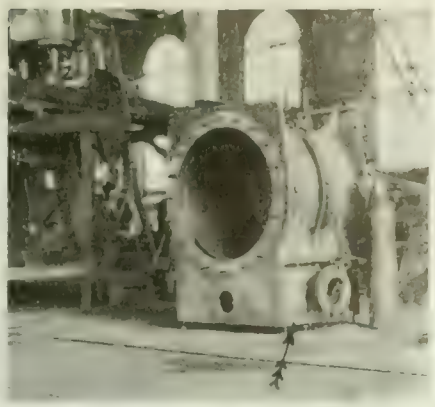


FIG. 3. LARGE MARINE ENGINE CYLINDER REPAIRED BY WELDING.

Locomotive Cylinder Repaired

Fig. 2 shows a large locomotive cylinder that was cracked near the end of the bore by the contraction of the metal during the casting of the cylinder. This defect was not apparent until considerable machining had been accomplished, and when discovered it was decided to have the broken part welded with the blow pipe. The crack, which extended for a length of about 28 in., was gouged out to form a channel for the metal that was added by means of a feed rod of cast iron. The portion surrounding the break was subjected to a preheating process for nearly five hours to bring the metal up to a dull red heat when the welding operation was commenced; the time for making the weld, including the time required to prepare the crack, occupied a period of about four hours. Owing to the position of the weld it was obvious that further machining was necessary to obtain an accurate finish on the bore. It is the work of this nature that emphasizes the importance of autogenous weld-

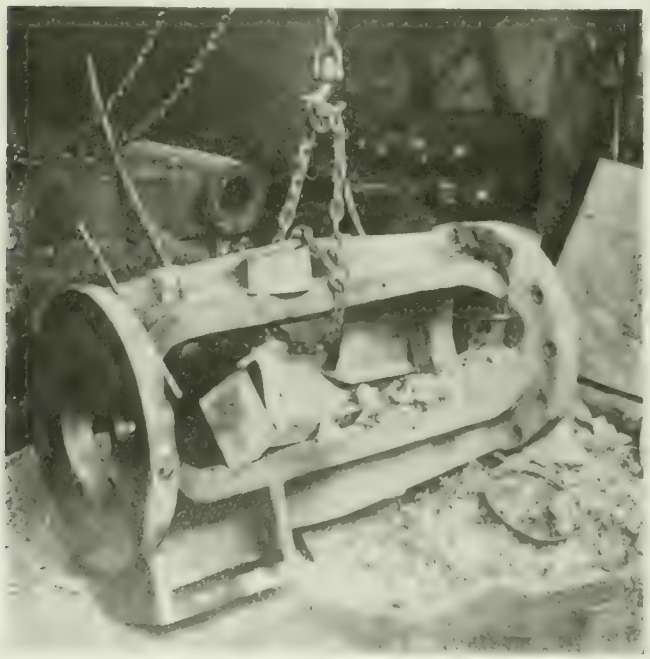


FIG. 4. CROSS-HEAD SLIDE OF HYDRAULIC PUMP WHICH WAS CRACKED THROUGH AT ONE END.

FIG. 5. SLIDE SHOWN IN FIG. 4, COMPLETELY REPAIRED. NOTE DAMAGED CYLINDER ABOVE WAITING REPAIR.

ing in reclaiming costly parts of machinery, and its value can possibly be better understood when it is known that the cost of repairing this particular cylinder was only $20, as compared against the cost of a new cylinder, which would be in the neighborhood of $250.

Break From a Defective Chain

The danger of handling large pieces of machinery by means of the crane is clearly illustrated in the cut shown in Fig. 3, which shows a large 30 x 30 in. low pressure marine engine cylinder that was dropped from its hanging support by the failure of a defective chain that allowed the heavy casting to collapse, with the result that the portion indicated by the arrow, having an approximate length of 14 in. and containing three studs, was broken out. This cylin der, with a weight of nearly four tons, had been practically finished and represented an approximate cost, including the machining, of about $900. To scrap this, therefore, meant no small loss, and in order to save it, the piece was welded in, the corner being heated by means of a charcoal fire, raising the adjacent metal to a red heat. The time required to repair this job, including the preparation of the parts, the preheating, and the actual welding, was just about 24 hours, at a total cost of $150. This being a portable job, the charge included the shipping of the welding outfit to and from the plant in addition to the actual cost of welding.

Reclaiming a Crosshead Slide

With the probable exception of the automobile industry, it is doubtful if any line of manufacturing activity has been systematized to such a standard of efficiency as that of the making of shells, as practised during the past few years. Owing to the routine method of performing the various operations it was essential—especially where no auxiliary equipment was installed—that every machine be kept in good working condition throughout the entire 24 hours of the day, as the tying up of any of the equipment invariably resulted in disorganizing the regular movement of the product through the shop, with subsequent loss of time and curtailment of output. In the forging plant the main source of power in the hydraulic pumps that supply power to the accumulator for the operation of the presses, the stoppage of which for any length of time meant a shortage of forgings upon which the various machine shops were dependent. In a Montreal plant a short time ago, through a loose nut on the piston rod, the cross head slide of the high pressure hydraulic pump was broken. The cost of a new slide, approximating $350, was a matter of small moment under the circumstances, but the date of delivery, about six months, was out of the question entirely. It was, therefore, imperative that the piece be immediately repaired and it was decided to do this by the oxy-acetylene process. Upon delivery at the welding shop, the piece was at once prepared by cutting away the metal at either side of the cracks, which extended entirely through the metal where the slide joins the flange, as shown is Fig. 4, which is a view of the weld partly completed, the charcoal preheating fire at the time being partly scattered. The metal at the welded portion was about four inches thick and the approximate length, both sides, was 27 in., making a cross sectional area of nearly 110 sq. in. Before starting work with the blow pipe, the broken end of the casting was raised to a dull red heat by the charcoal fire, this taking about five hours. For work of this character, requiring continuous operation for long periods, it is the practice to use two welders to relieve each other. The welding of this crosshead slide was completed in about ten hours, and the time the pump was out of service, owing to the repairs, was 36 hours, at a cost of $110. Fig. 5 shows the casting finished, the Corliss engine cylinder above awaiting treatment for pieces broken out of the end.

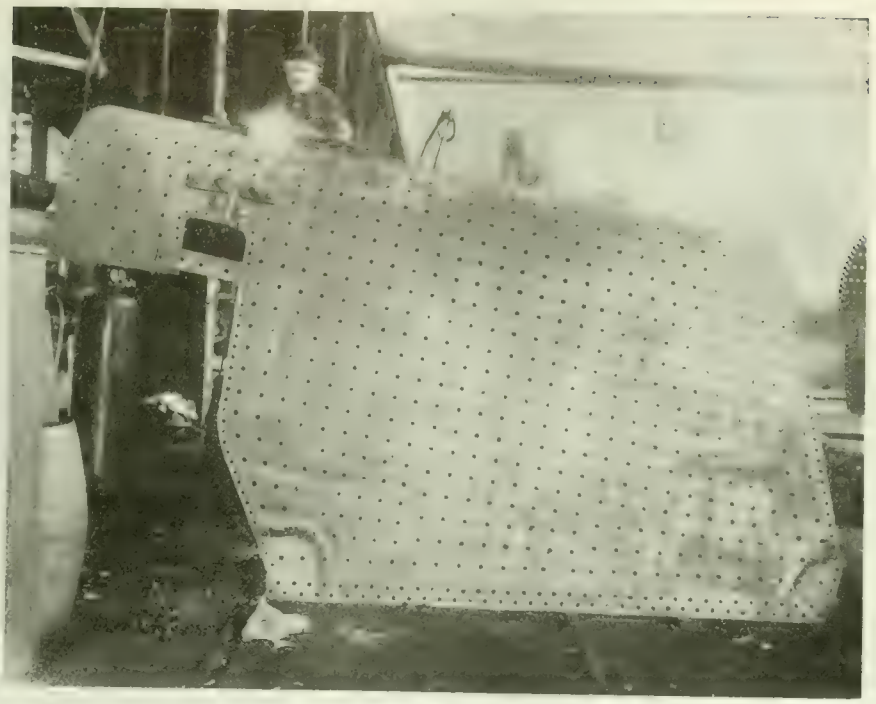


FIG. 7. PIECING UP A FIRE BOX BY AUTOGENOUS WELDING. A REGULAR OPERATION IN LOCOMOTIVE BOILER BUILDING.

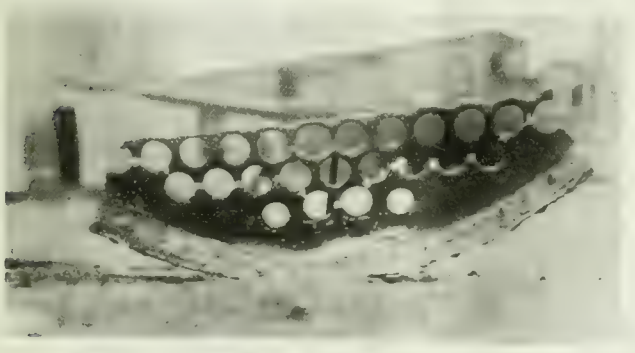


FIG. 6. DEFECTIVE TUBE SHEET CUT FROM PLACE IN LOCOMOTIVE BOILER.

Repairs to Locomotive Tube Sheet

A good illustration of what can be accomplished by the oxy-acetylene process of cutting and welding is shown in Fig. 6. This is a section of a tube sheet that was removed from a locomotive boiler by cutting out with the blow pipe. When this head had been made, it appears that an imperceptible flaw had been formed at the bend of the flange, which in a very short time developed into a serious crack. In an effort to save the sheet the crack was welded with the blow pipe as shown; soon afterwards, however, additional trouble arose, not only at the flange, but also at quite a number of the bridges between the holes in the tube sheet. It was

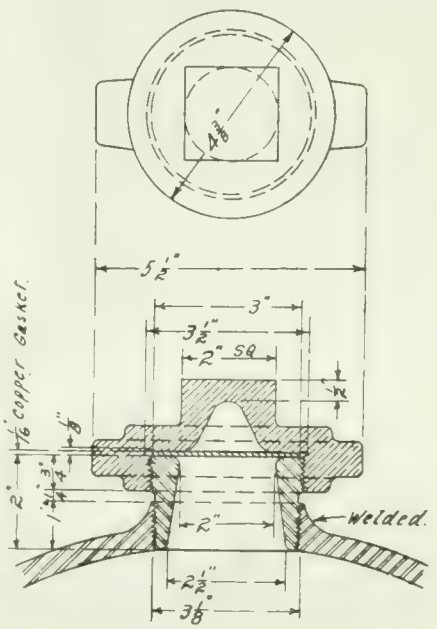


FIG. 9. SECTION OF PLUG SHOWN IN FIG. 8.

FIG. 9. IMPROVED WASHOUT PLUG FOR LOCOMOTIVE BOILERS. IT IS WELDED INTO POSITION.

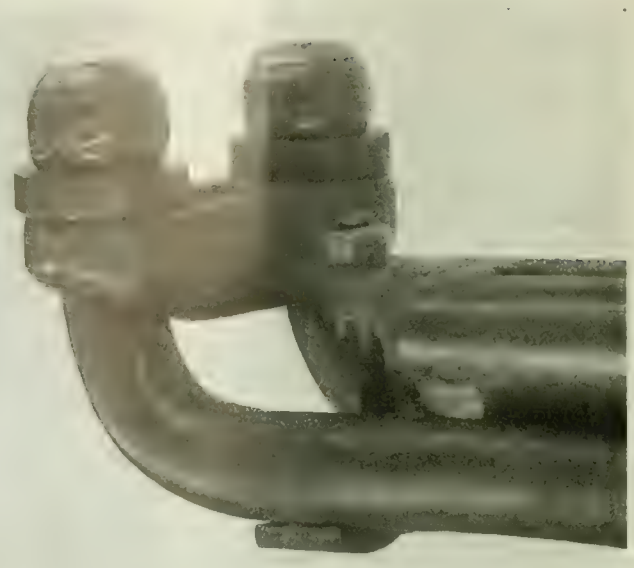


FIG. 10. SHORT BENDS IN SUPER-HEATER PIPES MADE BY OXY-ACETYLENE BLOWPIPE.

then decided to cut out the affected portion of the sheet, and also that section of the boiler shell adjoining. The diameter of the shell was 5 ft. 2 in. and the thickness of the tube sheet ⅜ in. The approximate length of the cut section was 5½ ft. and the piece was cut out in about half an hour; the new piece, exclusive of its preparation, was welded in position in a little over five hours by one welder and a helper. This job consumed 250 cubic feet of oxygen and a similar volume of acetylene, and was completed at a total cost of $70 portable job; only entailing a boiler shut down of about 48 hours, due to welding repairs. This tube sheet, after a period of three years, is still in good condition.

Boiler Construction

In the manufacture of boilers of every description the blow pipe is rapidly acquiring a permanent place. In Fig. 7 is illustrated a regular welding job on the section of the shell on one of the large Mallette articulated type of locomotive boiler. After the edges are beveled, which takes about fifteen hours, the extension is secured in position by suitable clamps, with the desired allowance of separation for expansion of the metal. The total length of the joint in this particular instance was 9 ft. 4 in., and the welding was accomplished in about 10 hours. Work of this character is performed at an approximate cost of $1.15 per ft. of length.

Special Washout Plugs

An interesting detail in the construction of boilers to which the blow pipe has been adapted, is the welding in of special wash-out plugs, as shown in Figs. 8 and 9. This particular design of plug eliminates the objectionable feature, so pronounced in the old type, of destroying the threads in the hole when using the muck bars for cleaning. The sectional view of the plug shows the method of applying the plug and also the reinforced section of added metal. The outer thread on the bush is cut large and finished to size after the bush has been welded in position. Between the cap and the bush a copper gasket is used to insure a tight joint. These improved plugs are applied to a boiler at a total cost of $10.

In the manufacture of superheaters and in refrigeration, short bends are often desired, and for this class of work the blow pipe is particularly adapted, as shown in Fig. 10.

WOMEN IN FOUNDRY WORK

"DILUTION" in engineering works of all kinds is generally recognized as a means of getting over the difficulties of the actual present times in engineering industries; and whilst it is essential as a means of overcoming the demands for larger output, there is little doubt that there are limits to the employment of women on work which has hitherto been done by men. In the general foundry, for example, there would not appear to be much room for female labor, outside the core-making department, as owing to the heaviness of the work and the weights to be lifted, strength considerations would prove a severe handicap. In specialized work of a light character, however, women might be very well employed, and after preliminary training they should turn out quite as much work and be paid as high wages as the men.

Certain rules are as necessary in the foundry as they are in the engineering shops. Of course, suitable dress must be worn whilst at work; such things as high-heeled boots, floppy "munition" outfits, stiff corsets, and such like, would have to be thrown aside for the working period, and practical men's dress used, as freedom of movement is essential in the whole of the work, while at the same time skirts and loose garments are not conducive to safety. But as these commonsense methods have been accepted by women and girls in munition factories generally, there should be no hindrance in this direction. It is more important to observe that female labor should be closely confined to moulding and core-making; the melting and handling of metal, and the pouring and dealing with the metals in the moulds being done by men and boys, this part of the work not being at all suitable for women. When molten metal has to be dealt with, chances cannot be taken with any degree of safety, and whilst a splash will only cause a man to give a hearty swear, with a woman the chances are that the ladle or crucible would be dropped, and on a damp floor this would be disastrous, and probably the ambulance would be often wanted.

Much of the art work which used to be imported could be produced by women up to the pouring stage, and particularly that done by the **cire perdu** process; but heavy work would be beyond their strength, if nothing more. Women are doing good work in machine shops at the present time, but what appears to be lost sight of is that the bulk of the women are on repetition work of what may be called the "one job" type, and really that they are not doing the run of work which has to be taken by the male operatives.

THE EFFECT OF SPELLERIZING ON THE LIFE OF STEEL TUBE

THE beneficial results on the longevity of steel tube manufactured by the spellerizing process are pointed out in an article in the "Compressed Air Magazine," the process having been devised to overcome the tendency of corrosion in the smaller sizes of steel piping in which the greatest corrosion in service occurs on account of the thinness of the metal.

Large sizes, being made from heavier plates of more uniform quality are not so seriously affected by corrosion.

The process consists in subjecting the metal bloom to the action of rolls having regularly shaped projections on their working surfaces, then subjecting the bloom while still hot to the action of smooth faced rolls and repeating the operation, the surface of the metal thus being worked so as to produce a uniformly dense texture better adapted to resist corrosion, especially in the most objectionable form of pitting. The process is quite analogous to the kneading of dough and operates upon the metal all through instead of merely on the surface. The aim is to make the metal uniform and without the spots of varying texture from which pitting results.

Uniform Results

As the process is entirely mechanical and does not in any way depend upon the skill of a workman, uniform treatment and results are assured. The process is applicable to the smaller sizes of pipe, say up to 4 inch.

Pipe has been made by this process for ten years in increasing amounts. The official records of the American Iron and Steel Institute show that during this period the percentage used of steel pipes has increased from 74.3 to 87.9 per cent.

Appended are some special experiences as to the use of this process and its effect upon steel pipe in actual service.

H. J. Macintire, Professor of Mechanical Engineering, Washington University, says in Power:

"In the case of ordinary steel pipe, mill scale is always present, and this likewise is electro-negative to the iron. If this scale is evenly distributed, as in Spellerized steel, the self-corrosion on its account will be slight; but if it is segregated, then local electrolysis and pitting of the material will result."

Morgan M. Smith, in the October, 1913, issue of *Ice*, states with reference to the merits of the Spellerizing process:

"Steel pipe, which has been treated in such a manner as to eliminate or at least distribute evenly the mill scale may be joined with wrought iron or cast iron safely as a rule. The same stock without the treatment for mill scale will show a decided tendency to corrode when joined with wrought iron or cast iron. The so-called Spellerized steel fulfills this condition with respect to the scale."

R. B. Duncan, associated with the United Gas Improvement Company of Philadelphia, Pa., in a paper "Installation and Maintenance of Service," read before the Ninth Annual Meeting of the American Gas Institute, 1914, states:

"The steel industry has been developing a new process which, after several years' time, has given many encouraging results. By this process the steel is treated mechanically and does not in any way depend upon skilled labor, beyond keeping up the machinery involved, hence uniform treatment is assured.

"This new process is a method of treating metal which consists in subjecting the heated bloom to the action of rolls having regularly shaped projections on their working surfaces, then subjecting the bloom, while still hot to the action of smooth faced rolls and repeating the action whereby the surface of the metal is worked so as to produce a uniform dense texture better adapted to resist corrosion, especially in the form of pitting."

The Gas Record, (issue of September 23, 1914, page 222) in commenting on Mr. Duncan's paper in regard to the Spellerizing process, says:

"The consensus of opinion is that modern steel pipe, particularly if Spellerized, is as durable as wrought iron, and is, besides, cheaper, stronger and more ductile and more uniform in composition."

Pipe steel made in 1906 by this roll-knobbling process tested against pipe steel made in 1897 resulted not onl yin a somewhat greater loss of weight by corrosion of the latter, but a decidedly deeper pitting of the 1897 steel in six months than occurred in the 1906 steel in thirteen months. In comparison with wrought iron it was found that the two materials lost practically the same weight by corrosion yet the steel had the advantage of uniform corrosion since the "wrought iron skelp pitted in seven months much deeper than the steel did in thirteen months." (Prof. H. M. Howe, Am. So. for Testing Materials, 1908).

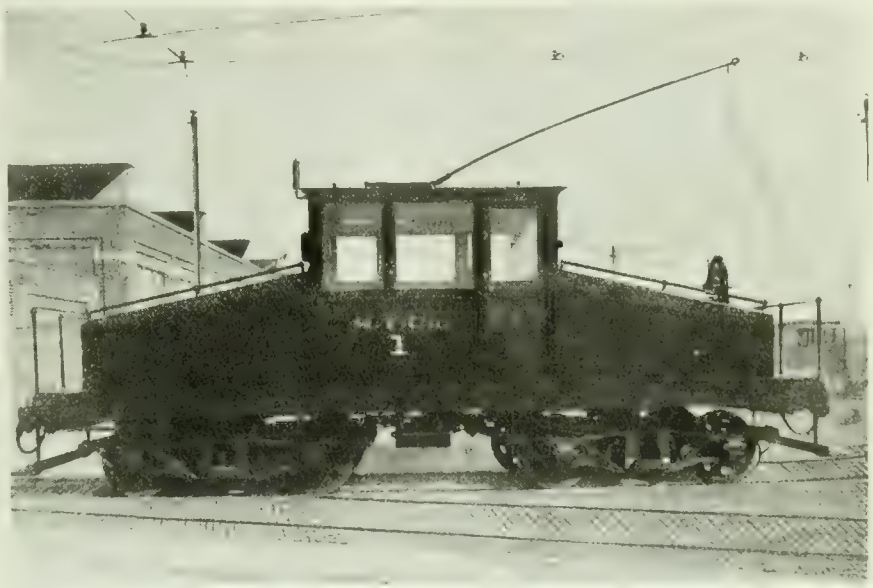
A. Sang, in a thorough resume of the question, entitled "The Corrosion of Iron and Steel" (McGraw Hill Book Co., New York, 1910), says:

"The carefully acquired experience of the largest manufacturers of tubes in the world, which induced them recently to abandon the manufacture of wrought iron pipe, teaches that the use of steel in place of iron, at least in the United States, for the special purpose of tubing is to be preferred; the tendency of steel to pit is somewhat less than that of iron and it welds at the joint fully as well."

"There is very little, if any, difference between the corrosion on the wrought iron and the corrosion on the steel pipe. If anything, the wrought iron is pitted a little deeper, i.e., the pitting on the steel pipe is probably more general all over the surface, but the pitting on the wrought iron pipe is deeper in spots that are affected." (Proc. American Gas Institute, Vol. III, 1908, page 274).

"While the corrosion was about the same, there was a pitting in the iron that we did not find in the steel, and the steel was corroded more uniformly. From the tests made I know that the steel pipe is better for such conditions." (Supt. of one of the largest bituminous coal operations in the Pittsburgh district).

It is believed sufficient has been mentioned to show that the tendency of the Spellerizing process is to render the surface of pipe uniform and reduce the tendency to corrosion—especially in the form of pitting.



ELECTRIC LOCOMOTIVE BUILT BY MONTREAL TRAMWAYS CO. FOR STREET RAILWAY WORK. IT WEIGHS 85,000 LBS., AND HAULS 25 LOADED FREIGHT CARS.

NEW ELECTRIC LOCOMOTIVE

THE accompanying cut illustrates a type of electric locomotive recently built by the Montreal Tramways Company, for operation on various sections of their system where heavy haulage is often necessary. The total weight is approximately 85,000 lbs., and the drawbar pull is upwards of 25 loaded freight cars. A feature of the locomotive is the method of obtaining the desired weight; the steel framing of the platform, consisting of I beams and channels, has an area of about 246 square feet and a depth or thickness of 12 inches, the intervening space being filled with solid concrete, giving a weight in the frame alone of nearly 35,000 lbs.

Tractive power is obtained by four 200 horse-power motors, two of which are installed on each truck. The electric equipment is located in one of the apartments adjoining the central operating cab, while the other contains the air pumps and other pneumatic appliances. The sand is forced to the rails by means of small injectors operated by compressed air. Every facility has been provided for the convenience of the engineer or operator. The general dimensions are as follows: Over-all length at drawbar connections, 31 ft. 8 in.; length of car body, 29 ft.; size of cabin, 9 ft. long by 7 ft. 4 in. wide, with a height from the floor of 7 ft. 7 in. The wheel base is 21 ft. 6 in., the centres of the trucks being 15 ft. apart.

ELECTRIC FURNACE DEVELOPMENT

THE number of electric furnaces in Sheffield now built, or building, is about forty, with every probability of a further increase. Turnings, borings, etc., are being converted into steel for shells, rifle barrels, light armor plates, and aircraft. Until the introduction of the electric furnace, there was no type that could melt more than a somewhat limited proportion of turnings per heat. It was necessary to use a large percentage of new raw materials, such as pig-iron bar-iron, etc., along with the scrap. Now, not only is it possible to have a whole heat of turnings, but to have "boils" of ten and even fifteen tons, by the electric process, whereas prior to the war few electric furnaces were of more than 2½ tons capacity. Now these larger furnaces can make sound steel direct from turnings, and at less cost than by the crucible process. The introduction of this type of furnace is, perhaps, one of the most outstanding features of war-time developments in Sheffield's chief industry.

Greaves and Etchells have assisted largely in this recent development and have recently perfected a special furnace of small capacity for the production of high-speed and other tool steels, besides their larger furnace for the melting of turnings. They claim that electric steels made by their process have the following advantages over other steels: (1) Regularity of composition, (2) lowering of sulphur and phosphorous contents, (3) absence of gases, (4) higher yield of sound ingots, and (5) positive control of all furnace operations. They also claim that their furnace, used in connection with a basic open-hearth furnace, permits the production of steels higher in quality than acid steel at a lower cost price than the latter.

THE PREVENTION OF MINERS' PHTHISIS

FOR collecting and counting the fine particles of mine dust, which play such an important part in the causation of miners' phthisis, Mr. Kotze, the African Government mining engineer, has devised a mechanical collector, to which the name "Konimeter" has been given. This has been tested with satisfactory results, and has been submitted to the Phthisis Committee of the Transvaal Chamber of Mines, with the object of dedicating it for the free use of the mines of the Union. The Konimeter in its present form comprises an aluminum casting about 5 in. long, in which is mounted the barrel of a small air suction pump. The suction end of the barrel communicates with a shallow chamber formed on the side of the casting. This chamber has one open side, which in use is closed air-tight by means of a glass microscope slide, which is removably held in place by a spring. Communication between the chamber and the external atmosphere is made by a small nozzle positioned at right angles and close to the glass plate. The air pump piston is fitted with a leather cup packing so directed as to cause the air to be drawn into the barrel when the piston is raised. The end of the barrel is so shaped as to eliminate dead space when the piston is fully depressed. Upon releasing the trigger the piston is forced up by the spring until it comes in contact with a stop, so that a definite volume of air is collected at each suction stroke. Before being placed in position, the glass slide is coated with a sticky substance, usually vaseline. Upon the piston making a suction stroke it tends to exhaust the air from the slide chamber. The external air accordingly flows through the nozzle, and, impinging as a jet on the sticky surface of the slide, deposits its contained dust on such surface. The strength of the spring and the size of the nozzle are such that the jet of air impinges on the slides at the rate of 40 metres per second. After removal of the slide the dust particles in the spot are counted with the aid of a microscope provided with an eye-piece micrometer, consisting of a piece of glass ruled into squares to facilitate counting. The number so obtained compared with the known volume of air passed into the pump, gives the number of particles per unit volume of the air tested. One glass slide can be utilized for taking a considerable number of samples, as the spots of dust are small. After the samples are taken, the slide is transferred to a specially designed dust-proof carrier for safe transport to the surface. If necessary, however, the slide can be immediately examined underground by means of a portable hand microscope.

BALL BEARINGS

By C. T.

EVERY specialist whose work and effort lies in more or less narrow grooves is apt to consider that his particular specialty is of universal application. The fallacy of the position is easily realized, and much harm has been done to many good devices by irrational recommendation. The case of ball bearings is a case in point. These are decidedly not applicable in a universal sense, and their limitations are obvious to most engineers. It is impossible to utilize ball bearings in connecting rod ends; ball thrust has been tried for a steamer's thrust block, but has not met with general acceptance. It is doubtful if a ship's tunnel would prove a suitable field. The average practical man would hesitate a long time before prescribing ball bearings for a dusty atmosphere or where adverse conditions as to moisture or fumes exist.

The average ball bearing salesman is an enthusiast, the average engineer a cautious, skeptical person, and to overcome the prejudices of the latter it will need more than a mere statement or anti-frictional proof on the part of the former. The average engineer prefers stable and reliable conditions, or even something which gives limited and recurrent trouble to any alternative whose failure means a total and expensive breakdown. Ball bearings in general are not suitable for shock stress, or for heavy-running load, though for great loads under thrust conditions, such as occur in crane hooks they are admirable. In this last case, however, all the load is carried by the balls, and consequently the stress is evenly distributed.

The success of the ball bearing depends on nearly absolute refinements, sphericity of ball and perfectly hardened and polished races. Quite a small speck of grit can play the mischief, and once there is the slightest abrasion total failure is very speedy. Moreover, the specialist-made article may be wrongly applied in service, and so, through no default of the maker, be unsatisfactory. In no other manufacturing industry is the same perfection of product needed.

As a consequence, in certain locations and for certain purposes where speed and low co-efficient of friction are of the highest importance, ball bearings are the only solution. For universal consumption as a panacea for all bearing ills they have their limitations, and by reason of cost and unsuitability will never become general or replace babbit or gun-metal in a universal sense. In these days, when concurrent efforts to produce machinery producing complicated functions and to simplify mechanism as far as possible, are so greatly intensified, it is necessary to keep in mind both the uses and limitations of those triumphs of skill, the ball bearings. Also to remember that even yet much remains to be said as regards their design and manufacture, as recent discussions before the professional societies have shown.

FOR the production of tungsten by a method protected by an English patent, I. C. Butterfield of London, Eng., and A. Ashworth, Bury, Eng., employ scheelite (calcium tungstate) which they grind to a fine powder, briquette with 12 to 13 per cent. charcoal, then heat in a graphite crucible for four or five hours at a temperature of 1,100 to 1,200 deg. C. The mass when cold is crushed, screened and concentrated on a shaking table to gather the metallic tungsten which is then treated with dilute hydrochloric acid to remove lime, after which it is washed and is ready for sale to the steel maker.

Angle and Lead Testing Machine for Thread Gauges

Editorial Correspondence

In the manufacture of taps, hobs and male thread gauges, the question of correct lead and correct angle of the thread has been found to be more important even than the correct diameter, and very few gauges made for checking the angle of the thread are sufficiently accurate and reliable for accurately checking both angle and lead. The machine described herewith was developed for the latter purpose and possesses features of very timely interest.

IN these days of interchangeable manufacturing, where gauges are playing so important a part, the thread gauge is the most difficult to make accurately and also to measure accurately. Large numbers of mechanics who have attempted to make thread gauges, have given the proposition up as a bad job for several reasons. One was the obtaining of machinery accurate enough to do the work, and another reason is that facilities for measuring thread gauges were not in common use or for sale, and still another is the lack of men skilled in their manufacture, due to the fact that most thread gauge makers take the first chance they get to find an easier way to make a living.

The reason for this was that the making of thread gauges was confined to a very few factories who had made a special duty of the matter, and who had been fairly successful in their manufacture, on account of their familiarity with the proposition and the lack of familiarity with the proposition on the part of many of their customers, who simply took what was given to them, and believed that the gauges must be right because of the standing of the name of the firm which supplied them.

During the last two years, however, there has been considerable education among users of thread gauges. The engineering societies, the large munition concerns and the large manufacturing concerns, realize that the question of screws, taps and tapped holes in work are one of their most difficult problems.

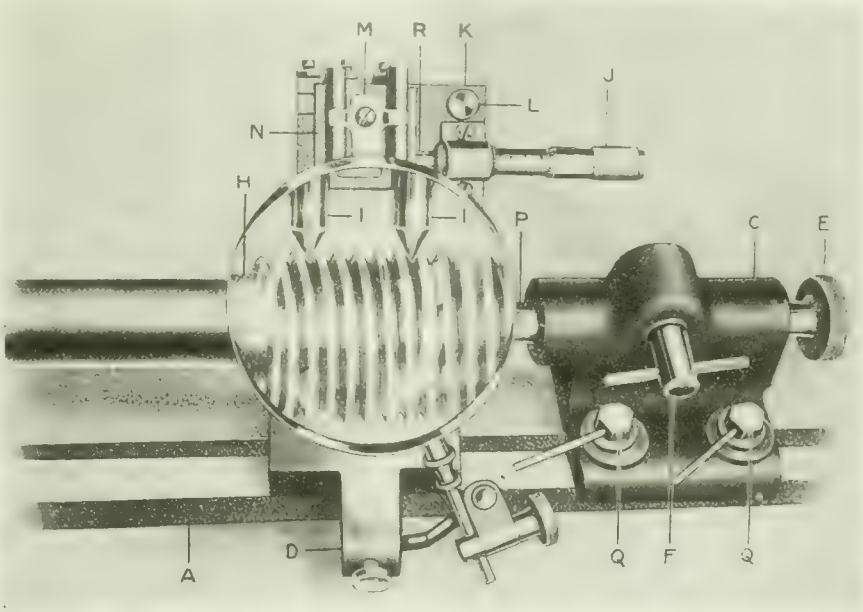


FIG. 2. VIEW THROUGH MAGNIFYING GLASS SHOWING POINT OF ANGLE TEST PIECES FITTING INTO ANGLE OF THREADS ON GAUGE.

In the manfacture of taps, hobs for hobbing dies, male thread gauges and hobs for female thread gauges, the question of correct lead and correct angle of the thread has been found to be more important even than the correct diameter measurement, and while a number of gauges of different types have been offered for checking the angle of the thread, there are hardly any of them, if any, sufficiently accurate and reliable for the accurate checking of angle and lead.

Multiplying gauges, even when most carefully made, are very prone to inaccuracy due to wear, rust, oil, dirt or other foreign substances which, although infinitesimal in themselves, due to the multiplying feature of the gauge, would cause a marked error in the reading. Then again multiplying gauges are delicate and a light pressure will throw them out of adjustment.

Problem and Solution

The problem, therefore, is to design a thread gauge testing device or "measuring machine" for the angle and the lead, which is rigid and substantial, thoroughly accurate and upon which a very small degree of error may be easily ascertained.

In testing the truth of a flat surface, a knife edge straight-edge is used, as the smallest amount of error, even less than .0001 in. will readily show light between the surface tested and the knife edge. This principle seems to be the most simple and reliable principle to be used in testing lead and angularity. Two curving surfaces coming together on a line of contact, will show light through any inequality as readily as a knife-edge gauge on a flat surface; yes, it will even show more light under such circumstances, and the thread lead and angle measuring machine described below, is based on this principle; that is, of see-

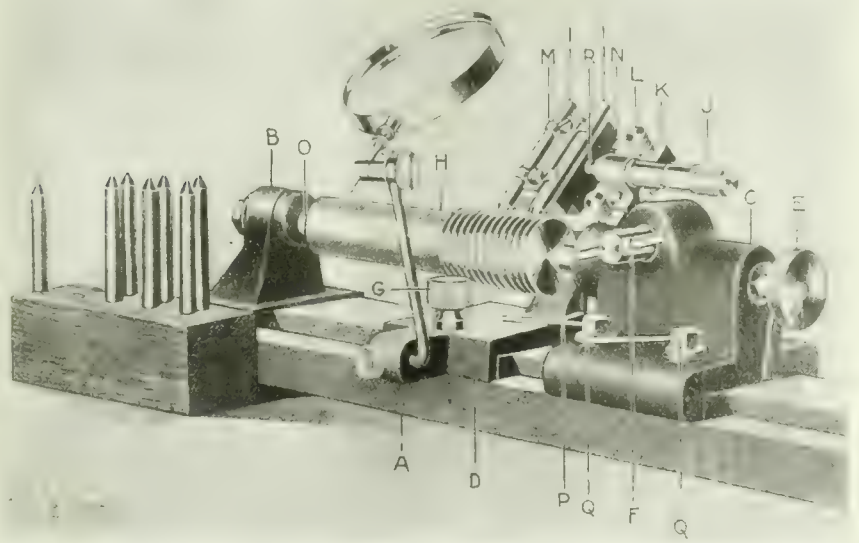


FIG. 1. GENERAL VIEW OF THREAD-LEAD AND ANGLE TESTING MACHINE WITH GAUGE IN POSITION FOR INSPECTION.

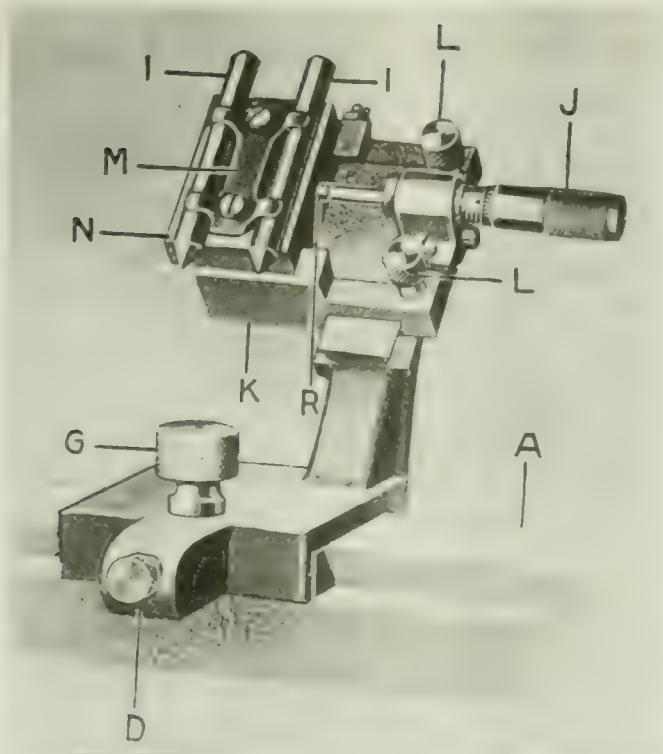


FIG. 3. SLIDE WHICH CARRIES THE ANGLE TEST PIECES AND MICROMETER ADJUSTMENTS FOR MEASURING THE THREADS.

ing light between two curved surfaces, if they do not coincide. The machine was developed and built by the H. E. Harris Engineering Co., Bridgeport, Conn., for their own use, and has also been supplied to the Bureau of Standards.

An error of .0001 in. can be detected by a person with ordinary eyesight, and with the aid of a magnifying glass, .00005 in. can easily be seen where such error exists.

Referring to Fig. 1, which is a general view of the thread, lead and angle measuring machine, the solid and substantial construction will be noted. The machine consists primarily of A, which is a heavy cast bed, stationary head; B, which carries a fixed centre O, and is permanently fixed for casting A; C, which is a sliding tailblock, which can be clamped positively to the bed A, by means of the two clamping screws QQ, and which carries a spring centre P, which can be withdrawn by the knob E. or clamped in position by the screw F.

The gauge H is put between centres by putting one centre of the gauge upon the centre O, bringing up the tailstock C, clamping by screws Q, and allowing the centre P to go in the opposite centre of the gauge, by means of a spring inside of C, clamping into position with F.

So far the means described are simply to hold the gauge true between centres and in correct alignment with the measuring devices, which are carried on the slide D. The slide D is shown in a separate view in Fig. 3. It is carefully fitted to the bed A and is clamped into the position required by the thumb screw G.

It consists primarily of a compound slide which is carefully and accurately made, so as to be in correct alignment with the axial line through the centres O and P, of the measuring machine, all planes and surfaces being either accurately perpendicular or accurately parellal to this axis.

The lower member of the compound slide K is adjustable in toward, and out from, the line of the centres through O-P, and may be clamped in such position as is suitable to suit the diameter of the thread gauge to be measured, by the clamp screws LL. This carries a micrometer head J, which operates against a hardened stud R in the upper member of N of the compound slide. This upper member N has lateral movement along through O-P, the movement of which can be measured by the micrometer head J. or by the use of distance gauges or Swedish blocks, between the point of the micrometer clamped stationary, and the point R on the upper member N.

The upper member N carries two angle test pieces II. These are held by the spring clip M, which permits adjustment by finger pressure in towards and out from the gauge or thread to be measured. The centre distances between the V's and the angle test pieces I are just one inch apart, giving a basis for checking error of lead in gauges which are to English measurement, and which are over one inch long. On metric threads less than one inch long, the micrometer or else proper distance gauges such as Swedish gauge blocks, as before explained, are used between the point of the micrometer and the stud R o nthe slide.

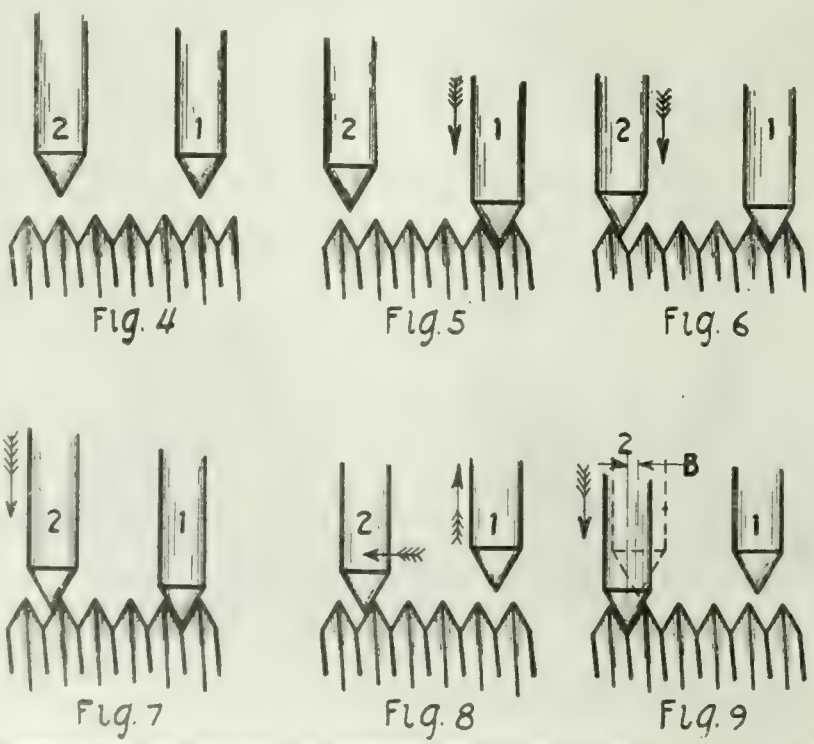
Referring to Fig. 2, and looking through the large magnifying glass, the point of these angle test pieces are shown as fitting in to the angle of the threads on the gauge H, which is in position.

Method of Checking the Lead of the Distance Between Threads.

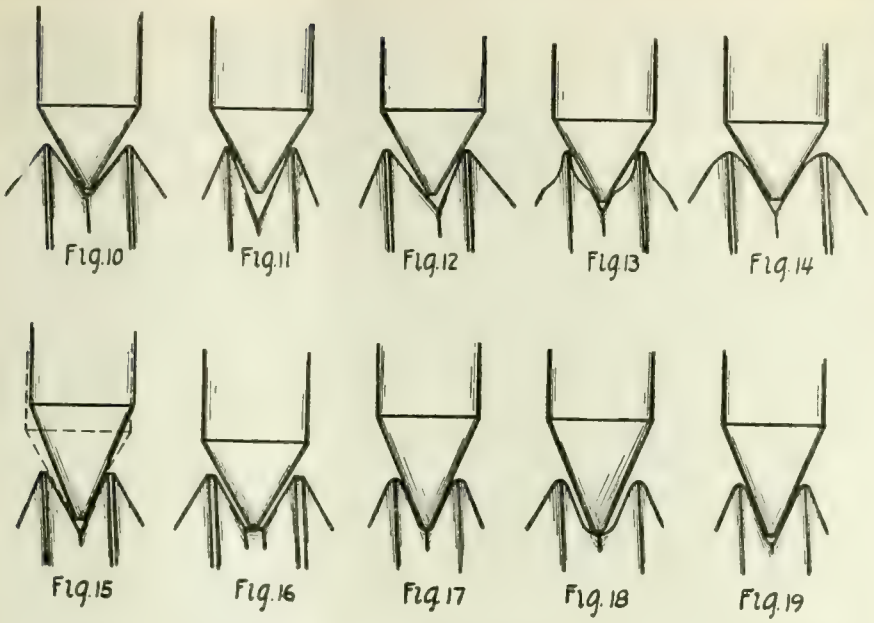
In Fig. 4 a representation is shown of the thread gauge as placed in the machine with the two points 1 and 2 in position ready to check the lead. The first operation is to turn the thread gauge on the centres in the machine until the thread will allow test point 1 to be moved into it as shown in Fig. 5, shutting out light on both sides of the cone point. This is done merely by rotating the gauge by hand in between the centres of the machine and gives a very fine adjustment.

After the point 1 has been pressed down lightly in the direction of the arrow to assist the thread as shown in Fig. 5, point 2 is then brought down in the same direction, till it touches the thread as shown in Fig. 6 and Fig. 7. If the lead on the thread gauge is short, the effect will be shown as in Fig. 6, which has been exaggerated to illustrate the point clearly. If the lead on the thread gauge is long, the effect will be as shown in Fig. 7.

The problem now is, to determine the



ILLUSTRATING THE METHOD OF CHECKING THE LEAD OR THE DISTANCE BETWEEN THREADS ON THE GAUGE UNDER INSPECTION.



ILLUSTRATING THE METHODS USED IN CHECKING THE ANGLE OF THE THREAD WITH THE ANGLE TEST GAUGES, WHILE IN POSITION IN THE MACHINE.

amount that the lead on the thread gauge is long or short. The micrometer with the point R on the point N being set at zero, point 1 is drawn back from the thread as shown in Fig. 8, in the direction of the arrow. This permits moving point 2 in either direction.

Assuming that the lead on the gauge is long as in Fig. 7, by means of the micrometer screw point 2 is moved in the direction of the arrow as in Fig. 8; when it is opposite the thread, it is moved down in the direction of the arrow as in Fig. 9. The amount which it has moved over as indicated by B in Fig. 9, is the extent which the lead of the gauge is long in one inch.

If the lead was found to be short it merely means reversing the operation. The amount B could be measured either by the micrometer direct or with a Swedish block between the micrometer point, and the point R. If the thread on the thread gauge is not more than 1 in. long, only one of the measuring points are used, and in this case point 1 or 2, whichever is used, is moved over the entire number of threads over which the lead is to be checked. The distance moved, measured either by the micrometer or Swedish block, and then compared with the nominal or correct distance, and the difference from the correct figure, being the error in lead for that number of threads.

Method of Checking the Angle of the Threads

The line drawings Figs. 10 to 19 inclusive, show the methods used in checking the angle of the thread with the angle test gauges, while in position in the machine. The views simply show the end of the angle test gauge, and the contour of the thread in the gauge where it is being checked. Fig. 10 shows a standard test angle gauge fitted into a thread which is off angle, having an angle too large. After testing it with the standard plug, a plug with a greater angle is fitted, as is shown by the dotted line, and in this way the amount of angular error can be ascertained.

Fig. 11 shows a gauge where the angle in the thread is too small. Fig. 12 shows where the angle of thread leans to one side. Fig. 13 shows a thread having hollow spots in its wall. These errors show up very prominently by the amount of light which passes through between the angle test gauge and the thread. Fig. 14 shows a thread which is rounded over near the top. This is often caused by excessive lapping with the old style lead lap. Fig. 15 shows how a thread, as shown in Fig. 12, can be checked to ascertain the amount of angular error, by different angle test pieces against each side of the thread walls.

The angle test gauge shown by the full line is checking one side of the wall of the thread, while the angle test gauge shown by the dotted line checks the angle on the other side. Assuming that the standard angle is 60 deg. and the test bar shown in full size is 58½ deg., and the test gauge, as shown in dotted lines, is 61½ deg., it would show that the thread was "tipped" or leaned over ¾ deg., while the included angle of the thread might be or might not be standard.

Fig. 16 shows where the angle test gauge discloses the bottom of the thread that is rounded, and the root diameter is too large. Fig. 17 shows a Whitworth form of thread which checks correctly on the angle and at the bottom. Fig. 18 shows the test of a Whitworth thread gauge which is too shallow—that is, it has too large a radius at the bottom of the thread. Fig. 19 shows a Whitworth thread being checked with a correct angle test gauge which is cut too deep, or has too small a radius at the bottom or root diameter.

The foregoing illustrations, Figs. 10 to 19, are merely intended to show in a somewhat exaggerated degree a few of the diversified defects of the angle which this angle and lead testing machine will check.

REPLACING GASOLINE WITH COAL GAS

THE use of coal gas in place of gasoline has received notable impulse in Britain recently, due to the scarcity and expense of gasoline for commercial purposes. In order to obtain definite information, the British Commercial Gas Association carried out extensive experiments which formed the basis of a report by F. W. Goodenough, which has just been published.

It is pointed out that there is no essential difference between a gas engine and a petrol engine. To convert a gas engine for use with petrol, the principal alteration needed is the addition of a carburetor, while the adaptation of gas to a petrol engine simply renders the carburetor superfluous. Petrol possesses the immense advantage of containing a large amount of energy in a small space. Coal gas, on the other hand, being for practical purposes a "perfect gas," not a vapor, conduces to clean pistons and cylinders, absence of troubles due to injector stoppages, and the complete elimination of starting difficulties in cold weather. For equal energy, however, it is very much more bulky than petrol, and herein lies the only real difficulty in connection with its use as a substitute. The gas supplies in different parts of the country not being standardized either in quality or in price, the gas obtained at some places will give a better mileage than that obtained at others; the gas equivalent, however, is unlikely ever to be higher than 300 cubic feet per gallon of petrol, but may be as low as, and even lower than, 250 cubic feet.

Flexible Gas Containers

The method of storing the gas in a flexible, balloon-like holder under a very slight pressure, probably only a few tenths of an inch head (water-gauge) above atmosphere, has several obvious advantages. The holder can be easily and cheaply replenished with gas from any ordinary supply and behaves as its own constant-pressure governor, thus obviating the need for auxiliary governing accessories; it is cheap to install and adds little or no weight to the vehicle, and there is no need for gas-compressing machinery. The practical disadvantages are the fragile nature of the holder and its bulky dimensions, which seem to unfit it for hard work in towns; nevertheless, owing to its simplicity and low cost, the system warrants careful consideration as a war measure.

From the practical engineering point of view, however, the report declares the use of gas compressed into steel cylinders to be far better, though this method must be for the future, owing to the present state of the iron market. At one time there was a considerable weight of opinion in favor of compression to 120 atmospheres (1,800 pounds per square inch), but to this there are several objections, such as the high cost of compression, the care and supervision required in dealing with cylinders stressed to this degree, the liability of the metal to more rapid "fatigue" owing to continual vibration, and the depreciation of

the gas by subjection to such a high pressure. Experiments with gas stored at this extreme pressure were found to be impossible owing to the lack of the necessary material and apparatus, but experiments were made on the lines along which ultimate success will probably lie, if gas is at all practicable on a large scale, namely, the use of moderate pressures up to 20 or 25 atmospheres (300 to 375 pounds per square inch.)

There was no opportunity of determining, under present conditions, the effect on the calorific value due to compression to 20 atmospheres, but from observations made seven years ago it was found that the loss due to compression to 300 pounds per square inch was from 3 to 4 per cent., so that if due allowance be made for the difference in constitution of the gas at the present day the effect of compression would be less than 3 per cent. and probably virtually negligible. Compression to only 20 atmospheres would cause the gas to deposit 95 per cent. of its normal water contents, and, as in practice it would have very little opportunity of taking up water on its release from the storage cylinders, it would be used in a virtually dry state. The avoidance in this way of dilution by water vapor would compensate for the loss of calorific value due to deposition of hydrocarbons at 20 to 25 atmospheres' compression.

Result of Experiments

As to the nature of the hydrocarbons thrown down by compression, naphthalene will be precipitated, but observations go to show that there is always a sufficiency of liquid bodies to prevent it from assuming the solid form. These liquid bodies, however, have a tendency to polymerize, and therefore it appears desirable that containers for high-pressure gas should be fitted with drain cocks, and perhaps provision should be made for the occasional use of small hand-operated spraying device to facilitate the outflow of viscid deposits.

While there would certainly be a larger deposit of hydrocarbons at extreme pressure like 120 atmospheres, there would at the same time be greater difficulty in cleaning out the containers. It would probably be necessary to expel the deposited matter by means of heating, which would mean the dismantling of the cylinders—an expensive job. The periodical heating would also in time adversely affect the strength of the cylinders and this seems a weighty reason in addition to those already enumerated against the adoption of pressure higher than 25 atmospheres. Another point is that with 120 atmospheres the reservoirs would be smaller and the deposits greater than at 25 atmospheres, so that the volumetric capacity of the reservoirs would suffer serious diminution unless they were frequently cleaned.

Operating Weights

Figures given for several steel reservoirs show that the weights for 1,000 cubic feet of free gas vary from 1,455 pounds to 1,900 pounds for pressures of 20 to 25 atmospheres, down to 1,080 pounds for 120 atmospheres. The report states that there is reason to believe that after the war the question of weight will be found less formidable than at present, and that the weights quoted for reservoirs will be capable of reduction by 50 per cent. or more, owing to the production of steel of greater tensile strength. The use of gas at 120 atmospheres would mean a tangible economy in weight, but the fact remains that the cylinders work at a low factor of safety, which in turn necessitates a degree of supervision that scarcely seems practicable with reservoirs used for the storage of gas for motor traction. High-pressure cylinders are also more expensive per 1,000 cubic feet of free gas than those intended for more moderate pressure, but this increased cost would soon be repaid by the higher carrying capacity of the vehicle, due to the smaller dead-weight.

STANDARD LOCOMOTIVES FOR BRITISH RAILWAYS

By Mark Meredith.

PRIOR to the war there were only occasional suggestions for the standardization of locomotives in the United Kingdom, notwithstanding the fact that standardization of practice within the limits of most of the leading railways has been generally recognized for many years, whilst standard locomotive designs are already accepted in regard to Indian railways. Indeed, it was often contended that each home railway was justifiably a law unto itself, and that careful selection of type, dimensions and constructional features was a necessary corollary to the provision of locomotive equipment truly adapted to the conditions and traffic requirements of the railway concerned. It is true that the history of British locomotive engineering includes several instances when a particular engineer has virtually taken with him from one railway to another the chief features which he had found desirable, and his designs in his new sphere have been quite as satisfactory as those he left behind him. In this connection the names of Patrick and James Stirling, T. W. Worsdell and Dugald Drummond may be mentioned, and there are several living locomotive engineers who might also be cited. But war conditions have introduced so many new factors that it is becoming generally realized that there is ground for arguing in favor of locomotive designs being standardized, and that whatever real justification there has been for individuality of practice in the past, is due, less to the actual necessities of the situation now, than to the magnitude of the operations of most of the leading railways now. Thus, if locomotives were required only in relatively small numbers, it could not be contended that several individual designs were justified; but with hundreds of engines in use on every large railway, there is no occasion, under normal conditions, for inter-railway standardization, providing that there is effective standardization within the limits of the railways concerned. It was, therefore, good practice for each locomotive engineer to adopt designs which seemed suitable for the particular characteristics of the traffic involved. Now it is generally recognized that the case for individuality of practice cannot be supported, as far as the contention that because one design is best for certain traffic on a particular railway no other design, taken from another system, can be equally suitable, apart, of course, from the consideration of local and dimensional limitations, suitability for specified qualities of fuel available, and similar legitimate factors which must be taken into account.

Changes in War Operation

During the war period, however, it has become quite a usual thing for a locomotive of one railway to work regularly over another, far beyond the possibilities of pre-war running powers and working arrangements. Moreover in order to supply locomotive of types suitable for military railways in France and elsewhere, some lines have supplied classes not so suitable to work as part of the locomotive stock of other railways to enable them to send more of their own engines overseas, than they could otherwise spare. There has also been the loan of engines from various railways in need of additional motive power for emergency periods. Furthermore, it is now quite a usual thing for engines of all classes to be employed for traffic other than for which they were designed. For instance, considerable numbers of 4-6-0 express engines are now used systematically for goods traffic of a heavy kind, and even the 4-4-0 and similar express passenger class do a lot of good working.

The case of individuality of design has, therefore, to be considerably modified in view of recent experience, and with the policy of mutual assistance it is found that for all except certain special traffics the designs are suitable for the general traffic of almost any railway, except in regard to questions of repair and maintenance, which requires supplies of spare parts and the like from the owning to the using company. There is, in fact, in view of the urgent need for new material which must follow the conclusion of the war, a very good case for the construction of suitable locomotives on a wider scale than the needs of any one railway may require, and this must pave the way for standarization of locomotive designs in due course.

IT IS said that the present scarcity of manganese and manganese ore in Germany has been met by the utilization of blastfurnace slag accumulations of the past. These slags are smelted in electric furnaces, the alloy produced at one plant analysing about 60 per cent. manganese, 20 per cent. silicon, and 2 per cent. carbon. The phosphorus is, of course, very low, as all that was in the ore originally went into the metal on the first smelting.

EDITORIAL CORRESPONDENCE

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

REGARDING A DEGREE FOR ENGINEERS

IN your issue of Sept. 27, page 71, "Engineering Standard Lower," it is stated, "War conditions have caused a larger demand for men with education in engineering, and it is evident that after the war there will be a call for more such men. It is desirable, therefore, under these circumstances to take measures to hasten the preparation of men for engineering work and to encourage young men to enter upon engineering courses. The deficiency will be made up the first year by devoting a large amount of time to mathematics, so that the total requirements for a degree will remain exactly the same."

What are the total requirements for a degree?

How can a degree be obtained?

Theoretical training, coupled with actual workshop practice, should no doubt be the basis of education in engineering; both are of equal importance, but how often do we find the latter neglected?

Do you not think that some encouragement should be given to the studious, hard-working mechanic to enable him to obtain a degree in engineering? Take this case of, say, Mr. A., who has had 16 years' workshop experience. During this time he has taken courses in mathematics and mechanical drawing, subscribed to one or two engineering papers, as circumstances permitted; has two complete libraries of engineering books, besides a number of works on special engineering subjects, which he has studied hard and diligently, yet never had an opportunity of attending a university and obtaining a degree, though he is considered an authority on certain branches of engineering by those who are acquainted with him.

This is just one case; but I have met several, men who are well informed and educated in engineering, yet no degree.

What, then are the total requirements for a degree?

Is there any way such persons can obtain a degree in this country? If not, I feel sure if one our universities or some representative examining board held examinations from time to time, and awarded degrees, it would be a surprise to find the amount of latent talent we have in this country.

Perhaps some of our readers will give their opinions on this subject.

A MECHANIC.

Walkerville, Ont.

MOTIVE POWER FOR SMALL USERS

By C. T.

THE question of the best motive power for small users, as determined by the use of steam, gas or electricity, is one that can only be answered by a full knowledge of the circumstances existing in each particular case. In a case which was considered recently, where duplicate power was absolutely necessary, where the user had two engines and two boilers, one of each being always at rest, but ready to be started at a moment's emergency, the question was raised, when one of the engines had worn out, whether another engine should be installed or whether gas or electricity should be requisitioned as the motive power. It was ultimately decided that in this particular case another steam engine should be purchased on account of the large capital outlay that would be involved in converting to electricity, gas being quite out of the question. Later, a consulting engineer, who had been asked for an opinion on this problem, recommended that, as additional plant was put in, each machine should have its own motor, and in the case of replacements the same course should be adopted, and when replacement had reached a certain point the older machine should be scrapped and a dynamo put in as a stand-by in case of failure of the electric supply. The advice proved correct, and it shows the advantage of power users going to the expense of getting expert opinion before deciding on the course to be adopted. It is difficult to lay down a hard-and-fast rule for application in every case, but it is possible for steam plant to be scrapped long before it is worn out, and the resulting saving has been so small that it has meant a capital loss.

SOME SCREW MACHINE POINTERS

I HAVE read with considerable interest the above article by Mr. D. A. Hampson in Sept. 20 issue. In fact, I am always interested in articles of that nature, and being a mechanic myself, I have some ideas of my own on the subject. Mr. Hampson does not say whether the article applies to hand screw or automatics, but I presume he refers to the latter. He says, make sure that the cut-off tool is not narrower at the front than further back. An operator that has no more knowledge of grinding tools than that should not be allowed to grind his tools. He further states that stopping the machine while the tools are engaged is disastrous to drills, etc. Surely he must be referring to automatics, for no operator, much less a helper, would be guilty of such gross carelessness. He states further it is better to use a centering tool, as the cut-off tool does not have to be set on the centre. Suppose a drill pushes back, what happens then? I consider there is only one place for a cut-off and that is on the centre, and you don't have to worry about the tit on the end. I have used on the most accurate of work drills as small as ¼ in., with no centering tool preceding it, with the best of success, lots of times having no room for it in the turret. He states that floating drill holders should be used whenever possible. Here I might say I have been fifteen years in screw machine work and failed to have seen the use of one. As to the misalignment of machines, I think Mr. Hampson would have better success by aligning his machines or using a drill holder that would throw his drill off centre to meet the misalignment. Mr. Hampson refers to setting the feed fingers too tight. This is one of the first instructions in care of a screw machine that should be taught an operator before he is allowed to operate any machine. In cases where the stock varies in size, I have used compression collars, same as used on Cleveland automatics with good success.

ALBERT E. WILLIAMS.

Brantford, Ont.

DOES A PISTON STOP AT REVERSAL?

By W. F. Schaphorst, M.E.

R. W. MILLER'S query in your issue of Oct. 4, inspires me to write my convictions pertaining to this question which has been the cause of much "argufication" from time to time.

Yes, a piston stops at reversal. That is, at each end of the stroke of the piston its velocity is zero, and when the velocity of a thing is zero we generally conclude that the thing has "stopped." Mr. Miller states that to stop means to produce a "state of rest." I do not like to use the word "rest" in connection with a piston, because it often signifies sleep, repose, death, and such other items that have comparatively long duration. A piston doesn't rest, therefore, because the period of reversal is infinitesimal. I cannot state "how long" a piston stops, in answer to Mr. Miller's query, nor can anybody else. All I know is that as the piston approaches the end of its stroke, its velocity decreases gradually, and when the end of the stroke is reached, the velocity is zero. At the beginning of the return stroke, then, the velocity is zero from whence it accelerates again to a maximum.

Motion, you know, is only relative anyway. That point has been threshed out very carefully in text books on kinematics, physics, etc. I am pretty sure that all authorities agree that a piston stops at reversal. If it didn't stop, how could it ever start moving in an opposite direction, and all in the same straight line? In a flywheel the particles in the rim constantly change in velocity, but not in speed. Quoting Prof. Goodman: "The velocity of a body may be changed

by altering the speed with which it is moving, or by altering the direction in which it is moving. It does not follow that if the speed of a body be uniform, the velocity will be also. The idea of velocity embodies direction of motion, that of speed does not."

We can, therefore, conclude that there is a considerable difference in definitions of words that we commonly regard as synonyms, and in that event "rest" may mean a period of anything from a second to a day, or thereabouts.

As for the argument, "If the piston stopped even for an infinitesimally small fraction of a second, would not the flywheel to which it is connected stop also?" the piston is no more connected to the flywheel than is the base of the engine. There are several pins connecting the piston with the flywheel, whereas there is but one pin between the base and flywheel. Surely the base is at actual "rest" all of the time.

There are several other instances in which we have "stopping and moving" motion as in the automobile or wagon or carriage tire. A given point in the periphery of the tire moves with variable speed from zero to twice the velocity of the car. When the point is in contact with the road it does not move at all. It stops. Its velocity is zero. As for the duration of the stop—nobody can answer that any more accurately than can Mr. Miller's question be answered.

This takes me to a pet idea of mine pertaining to the question, "Does light stop at reversal?" That's a question that isn't so easily answered, because light, you know, travels at a velocity that is fairly uniform through the air, through a vacuum through glass through water, etc. Now, when light strikes a mirror perpendicularly and is reversed in direction, does it stop? There is no deceleration or acceleration. The writer knows of no reason why there should be a change in velocity, because light has no mass or weight, and therefore concludes that there is no changed velocity. In that case, therefore, the inference must be reached that there is no stopping for there can be no zero velocity when the thing or phenomena or whatever it is is in constant motion.

In comparison the piston problem is easy. There is no question but that the piston stops. The best way in which to oil a piston rod is to oil it at the end of its stroke—when it isn't moving. An automobile tire, you see, catches the mud in a muddy road when its velocity is zero and flings it off soon when high centrifugal force develops. The same is true when you or I run through mud. Mud clings to our shoes when they are in contact and aren't moving at all, but is often thrown off again before the same shoe again strikes or touches the

These analogies may seem crude, but in [illegible] that such objects as pistons, automobile wheels, shoes, etc., all stop at one time [illegible]

As for the last paragraph: "To controvert the theory that the flywheel stops, we find in the definition quoted that the point executing the harmonic motion must move with uniform velocity. How can the flywheel stop twice in one revolution, and yet have any point in its circumference move with uniform velocity?—the motion of the piston is just as continuous as the flywheel." This is answered by the quotation above from Prof. Goodman's splendid work, "Mechanics Applied to Engineering." The velocity of a point in a flywheel rim "in a given direction" becomes zero once each revolution. The speed of the flywheel, aside from the fluctuations due to variable load, is constant.

TECHNICAL EDUCATION IN FRANCE

THAT France, as well as other leaders of civilization is devoting increased consideration to technical education is evidenced by a lecture delivered recently by M. Leon Guillet, the eminent French scientist, before the Society of Civil Engineers of France. At a time like the present, when the relation of education to industrial supremacy is being subjected to continuous investigation, Professor Guillet's conclusions are of particular interest. Briefly outlined these are:

(A) As regards the preparations for the highest-grade schools: (1) The study of the classics is useful. Hence those who have studied them should enjoy some advantages. (2) The teaching of experimental sciences is to be modified. (3) The special classes for mathematics, the present bugbear of so many candidates, might be abolished; the teaching of mathematics should form part of the syllabus of study during a preparatory year. (4) Admission of the highest-grade schools should be by examination, including elementary mathematics. (5) The age limit of pupils should be reduced considerably, a matter of great importance. (6) After a preparatory year at the school, a rigorous weeding out (up to 50 per cent. if necessary) of the candidates who do not give any promise for the future. (7) The syllabus of study during the preparatory year should be so arranged that students who fail may enter institutions of the rank of universities, or other paths of studies.

In connection with (3) M. Guillet quoted a passage from a statement once made by M. Haton de la Goupillere, the famous ex-professor of mathematics at the School of Mines and at the Sorbonne, that he had cut down the time spent on teaching the differential and integral calculus to ten lessons, into which he had carefully condensed all that his pupils required, in his opinion, to help them through the rest of their studies. As regards (5) it should be explained that French engineers now enter upon their professional career between the ages of 25 and 27, while everywhere else their colleagues enter the shop at the age of 22 to 24, because the young Frenchman has to serve two or three years in the army, while the young German engineer only serves one year, and probably is often exempt altogether.

(B) As regards the Technical School itself, M. Guillet's recommendations are: (1)Maintenance of strict discipline. (2) A slight relaxing of examinations. (3) Individual efforts and initiative should be encouraged by all possible means. (4) Professors should only be chosen from among men in actual practice in the branch of the industry they are teaching. (5) The teaching should be encyclopaedic, comprising everything that must be known by a certain category of engineers. (6) Less teaching of theory, and in its place more of generalization in the study of industrial sciences. (7) More practical work carried on by the pupils individually instead of pupils watching in groups someone else. (8) More "documents" in the shape of a brief written outline of the lessons to guide pupils in their studies; plans of modern workshops workshop and test room fittings; "economic" documents, such as computation of cost of production, list of selling prices, statistics (output, consumption, exports of principal countries), customs, tariffs, etc.; test-sheets, specifications. (9) Absolute necessity of pupils working as improvers, of visits to works and journeys for educational purposes. (10) Establishment, if possible, of centres of specialized education by the Universities. (11) The very interesting employment of the cinematograph in the teaching of the higher branches of technical science. (12) The real need of higher-grade teaching centres for "old boys."

Although some of these proposals may appear to be of a revolutionary character, Professor Guillet has already adopted them in his own claasses. As regards cinematograph films for teaching, the only objection to them is their great cost, but the author has been able to make arrangements with the Gaumont firm satisfactory to both parties to the agreement. Some of the views selected were:—(1) The charging of a blast furnace in the old-fashioned and the modern way. (2) The manufacture of zinc from the ore through all its stages to the refined metal in crucibles. (3) Modern methods of testing metal by tension and shock.

ERRATUM

ON page 128 of our issue, August 2, in a paper by E. Jones on "Recent Developments in Air Pump Design," it was stated that the quantity of injection water used by the Hick-Brequet Ejectair was 94 gal. per min., which should have read 367 gal. per min. The author tenders his regrets to Hick Hargreaves, Ltd., Soho Works, Bolton, and La Maison Brequet, Paris, for this regrettable error.

STAINLESS cutlery seems to have come to stay. The claim of the makers that the steel was proof against the corrosive influences of air, water and acids contained in foodstuffs, has been amply proved by two years' use. The only drawback to this kind of cutlery is the tendency to wear blunt, whereas ordinary knives are kept sharp by the repeated application to the cleaning board.

PIONEER DAYS IN THE FOUNDRY

By John Woodside.

I WAS a pioneer, not of my own choosing, but because I was born so; for I was born in the middle year of last century in a pioneer log-house, between the fast developing booze centre, Ballyduff, and the later and better known Railway Station, Bethany. Many of my earliest days were spent on the old Hill-of-Bones farm, where the grinning "think tanks" of aboriginal inhabitants were still dug up in startling numbers. Those landmarks in Durham County show the place of my birth.

Ere I came to years of full memory the pioneer spirit had carried us away up to the lands of the newly opened up "Indian Peninsula," where we settled in the solid "bush," near the namesake of famous Irish Tara, though the "halls" that interested the early settlers here most were the "hauls" of suckers from the shallow Big Sauble river, upon a crossing and small water power of which the village was built. Here my earliest recollections were of crashing maple, beech, and elm, of flaming piles and smoke-filled skies. The maple yielded us about all the sweets we needed; the beech and butternut was our nut supply; while the "beaver meadows" on every creek yielded an abundant supply of such fruits as wild grapes, red plums, and choke cherries, for the possession of which we had sometimes to contend with the black bear. These garden spots also afforded some grazing on coarse grasses for the pioneer cattle, though they generally had to eke out their winter supplies with basswood and elm browse. We had only to scratch the surface amongst those big stumps to make it produce such crops of potatoes as the old pioneers sigh for in vain now.

Youthful Occupations

My first, well remembered toy was a small axe, armed with which I went forth to mimic warfare with the surrounding forest, sometimes to the detriment of the ornamental trees left near home by the pioneer father; and I never lost my love for this great pioneer weapon, the axe.

Canada could fittingly have chosen her shapely axe as a national emblem in place of the more ungainly wood cutter, the beaver; for her sons certainly excelled in the use of this implement, as they now are excelling in the use of weapons of war. We boys were the fire spreaders in season, and had to be closely watched out of season, and many a fortune in hard woods we sent up in smoke.

I passed on to hoe, to hand spike, to harrow and plough, to scythe and cradle, and before I finally left the rural life I had, for at least a couple of harvests, bound after the wonderful new harvester, handled by two men—one to drive and the other to rake off the grain in bunches, to the sweating men to a side of the square, who deftly twisted the straw bands and passed them around the sheaves.

This was in the earlier 60's, while the U. S. was torn with war, and occasional "skeddadlers" came across to our harvest fields, and we youths, with fine disdain for a soldier afraid, used to chant to them, from a distance , the latest ditty: "Bull's Run, Bull's Run, Bull's Run and Candy; Yankee doodle, doodle, do, and Yankee doodle dandy." We had no more sympathy with a slacker in those days than we have to-day.

Looking for a Job

I was 16 years of age before I ever saw a foundry, or dreamed of my future fate. Then I went into Owen Sound to try for a place. I happened to arrive at the shop just as they had finished the cast, and viewed with some dismay the steaming chaos. The old boss, who met me as I came out, asked me how I liked the looks of that place, and I promptly asked him for a chance in the cooler-looking region of the machine shop. No chance; so as I had decided to change from the muddy ruts of the country road to the enticing sidewalks of town, I accepted the inevitable, and tackled the sand heap, and received a pretty thorough course in foundry practice, in green sand, including cupola work, for an apprentice had to go the rounds in those small shops, at the rate of $30, $40, $50, and $60 per year, with board and lodging.

So pioneering was in my blood; and when, after some years at the trade, I received an offer to go out to Tara and put in a small foundry plant, along with their agricultural works, I cheerfully accepted the offer, though the monetary inducements were not heavy—$1.25 per day during construction work, and then the dazzling raise to $1.50 when moulding commenced; so I had an inducement to hurry the instalment. It looks small nowadays, but the highest city wages then were $1.75 to $2 per day, and living was cheap. We had no bikes, nor autos to sigh for. I did scrape up enough, after a while, to buy a big horn in the local brass band, and found it a most interesting diversion.

Preparing the New Shop

As soon as sleighing was good, I proceeded to the most convenient sand pit of moulding sand and helped load and deliver to the new shop, some 15 miles distant, a dozen loads of "the best local." This was dumped down against the wall of the shop—the outside wall—exposed to the variable winter weather of that districts: snow, rain and frost alternating.

We occupied the ground floor of a two-storey shop building, the upper floor being sometimes used as a work room and store room. This had its disadvantages, when we got going below, and the heat opened some cracks in the floor, through which dust, sawdust, and other things sifted down, but we knew that we sent back a fair equivalent in gases, smoke and foundry or beam dust.

The cupola equipment, ladles, etc., had been brought from Owen Sound; it was the old-fashioned style—a square base plate laid on a brick box foundation, only open in front; four columns encircled the shell, and supported the top plate, also square, upon which the local bricklayer erected a stack up through the roof to a safe height, the charging door, of course, being in it. Fire brick and clay had been provided; so I went to work and lined up the cupola, springing a small arch over the tapping pole, placing two tuyeres in regulation position, and altogether making a job which called forth the commendation of the local brick artist, who looked it over and remarked "some job."

We had installed a heater, with a flat top, or baking cores on, and around this I piled as much of the new sand as I could conveniently chop out; and it promptly went into mud, necessitating a drying and burning on plates to fit it for work. This, with a couple of loads of old sand from the town shops, sufficed for a start. The soil was a solid clay, and pretty well frozen before I started to work. It looked neat when I got floors levelled along each side, and a marsh up the middle; but as we heated up and it got thoroughly thawed out, it went into various shapes. I put as much dry sand on top as I could spare, to keep the clay from sticking to my feet, and made a start at moulding.

Some plow patterns and flasks had been purchased in town; some new boxes were built to suit smaller work, amongst which was the main article manufactured in the new works—fanning mills. Now a set of fanning mill castings consists of some 16 pieces, exclusive of the gears; and as we had no knowledge of snap flasks or match boards, we had gone on picking those patterns out one at a time with a pair of tweezers reversed. We had attained to a set gate for them, however, which hastened somewhat the work. But for one man to do some core work for the plows and make up a heat of a couple of plow beams for weight—plow points were, of course, a snap to fill up with—along with this other nest of stuff, and cultivators, turnip seeders, scufflers, etc., and then do his own melting, was likely to become monotonous.

We had always ground our own facings, in town, out of anthracite, charcoal, and sea coal; another 'prentice job; so we secured enough to start on, though the half-barrel of inflammable charcoal dust which I kept stored under the little core bench, in a corner beside the cupola, was blamed, much later on, for catching a spark and eventually setting fire to the bench, shelves and core boxes against the brick wall, and eating its way through the floor above and also the roof, when it was fortunately discovered and extinguished.

The First Heat

The millwright of the shop had put up a home-made fan, not warranted to be noiseless; so in the merry springtime we had all ready for the momentous event in the history of the village, and a goodly crowd assembled to see the first iron run, and incidentally to discover how we induced it to run; but they were doomed to disappointment that day, for though our new fan went off with a fair volume of sound, no pressure resulted; no spark blew from the tapping hole; no sound at the tuyeres; the fan builder had evidently copied the big open fan of the fanning mill, and no pressure was gained, so after nearly an hour of fruitless effort we gave

it up, dropped the bottom and announced for next evening.

They ripped the thing apart, cut out a snail shell spiral, and put it up with a light sheet iron band for a cover. Again I had all ready, the new fan started with a more business-like tone, sparks flew, the tuyere pipes thrilled to the pressure, and soon a trickle of molten iron appeared. The crowd, again assembled, were becoming absorbed in the spectacle of the fizzing fireworks, when with a rending crash the fan above gave way; the spectators mostly hastened from the scene, nor stood upon the order of their going. When we rushed upstairs, we found that something had got loose; one of the riveted fan blades, we presumed, and had made rags of the sheet iron cover, though forunately without injuring the arms or sides of the fan. So it was another drop; this sorting over so much mixed material from under the cupola was trying, but we hoped it would not ever be thus.

Next day everything was ready again, but the crowd was not so large, and they betrayed an air of uneasiness; but this time all went well, the molten iron flowed, it was controlled, and ran into the moulds almost like water, and those who had persevered got their money's worth. The only jar was when the top plate, having been cast in a solid ring, upon getting very hot on the inner side, burst with a bang, which shook the stack a little, but did no further damage. To close the show, I dropped the bottom, with even a greater show than before of hot stuff, and finished my reputation, for the report was around the village next morning that the bottom had again fallen out of the furnace.

CONCERNING BELTS

EXPERIENCE has shown that a long belt, other things being equal, will transmit more power and last longer than a short one. It is easy to remember that a belt one inch wide, travelling 800 feet per minute, and with suitable tension, will transmit one horse-power. If the same belt travels 1600 feet per minute, or if the 800 feet belt is 2 inches wide, both will transmit two horse-power, and so, for every extra inch of width, or an additional speed of 800 feet per minute, an extra horse-power will be procured. If a belt is laced too tightly there will be no fault in its driving, but the journals of the shafts that carry the pulleys will have too much to do, and will soon wear out. If a belt is laced too much on the slack side-slipping will take place, and extensive friction on large cast pulleys has been known to generate sufficient heat to crack the pulleys, even to cause them to burst and fly about and kill. A horizontal belt of considerable length and laced only just tight enough is an ideal drive. Between this ideal drive to the worst, i.e., a vertical drive with a short belt, there are many gradations, but so long as one always visualises the ideal and the worst, care will always be taken when arranging drives to approach the former and ignore the latter.

FIREPROOFING BY PAINT

By O. C.

IN a sense, all painting is fireproofing; or, more properly speaking, it is fire-retarding. There are some paints made specially for fireproofing purposes, though the number of such paints is small. Most fireproofing consists in the application of some chemical solution to the raw wood that will prevent combustion; and over this paint may be applied, or, as happens in many cases, varnish or wood finish of some sort. There are many chemicals that are useful in this connection, and some are very cheap and simple. Alum is one, lime is another.

A certain master painter uses the following formula with much success: Place some fresh lump lime in a barrel, and sprinkle water over it until it crumbles into dust. Then sift it through a fine sieve, and to every 6 qt. add 1 qt. of salt and 1 gal. of water; then place on a fire and boil, skimming it occasionally. To each 5 gal. of this liquid add 1 lb. of pulverized alum, ½ lb. of pulverized copperas, and while stirring the mixture add 12 oz. potash, also 4 lb. fine clean sand. If color is desired, any pigment may be added that will not be affected by lime; any of the earth colors will do. This paint or liquid must be applied with a fibre brush, for it would injure bristles. By adding the proper coloring the effect on a wooden roof will be quite as fine as slates. It also stops leaks in the roof, if made thicker for that purpose; prevents the growth of moss by keeping the water from saturating the wood, and—the principal object—makes it impossible for the shingles to burn. This coating is also very durable.

A different but very good fireproof paint may be made as follows: Mix together one measure of clean fine sand, two measures of sifted wood ashes and three measures of powdered lime. Mix, or better still, grind in a hand mill, with raw linseed oil, or boiled oil as preferred, the latter requiring no driers, while the former does. Apply the first coat thin, let it become hard-dry; then apply the second coat, made stouter than the first coat. This paint will do for any buildings liable to be burnt, and at the same time makes a good weather-proof paint.

Oxide of iron paint, mixed with linseed oil, makes a serviceable fire-retarding paint, because its surface is quite hard and non-inflammable so far as sparks are concerned. The paint may be further improved by the addition of fine sand. A spark may fall on such a paint and burn itself out without doing any damage.

IT IS stated that the firm of Franz Schilling & Sohn, bell founders to the Court, at Apolda, Hanover, have melted down some 70,000 church bells during the war, the metal of which has been used for military purposes. The famous Kaiserglocke from the Cologne cathedral, cast from cannon taken from the French during the Franco-German war of 1870-71, will, it is further said, also be removed for the same purpose. Lightning conductors, rumor also states, are being also pulled down from the churches, and their metal used for army requirements.

AN alloy of 2 per cent. palladium with silver is said to form a good substitute for platinum in contact and spark devices. The alloy which gives the greatest resistance to spark erosion is 60 per cent. palladium and 40 per cent. silver. Palladium raises the melting point and lowers the thermal conductivity.

THE St. Charles deposit of iron ore in Quebec is one of titaniferous magnetite, occurring in large segregation masses. The quantity available is estimated from 1,000,000 to 5,000,000 tons. A sample was found to contain 50.53 per cent. of iron, 10.55 per cent. of titanium, with 0.02 per cent. sulphur and 0.03 per cent. phosphorus. By magnetic concentration the iron can be raised to 77 per cent.

IN the past nitric acid carboys have been closed by a loose-fitting stopper surrounded by clay or plaster of Paris, all held in place by burlap or similar material. This, says the Chemical Trades Journal, has proved very unsatisfactory, and many cases of leakage, with consequent destruction of property and injury to persons, have resulted, and it is believed that the majority of the fires in nitric acid shipments have their basic cause in defective closure. Experiments to determine practicable methods for the improvement of these conditions have been made by prominent manufacturers of acids, and when recently the situation became especially acute on account of the large increase in acid shipments, the Bureau of Explosives, with full support of the Manufacturing Chemists' Association, decided to require the use of a positive form of closure, consisting of a stopper with gasket held in place by some form of wire fastening. This is now being adopted voluntarily by the nitric acid interests, and will be recommended as a requirement of the regulations in the near future.

THE United States Government Bureau of Standards has issued a statement with regard to liquid fuel in which it states that the definition of gasoline will have to be based on the percentage that distils over between specified temperatures, when the distillation is carried out under specified conditions. This distillation test, speaking in non-technical terms, is a measure of the freedom with which the gasoline will vaporize. The gasoline must not vaporize too freely for two reasons—one that it would not be safe, and secondly, its loss in storage by evaporation would be too great. Hence, the specification may have to contain limitations of the percentage distilling over below a certain temperature, coupled, perhaps, with a proviso that certain percentages shall distil over below other fixed temperatures, in order that requisite amounts of low-boiling constituents shall be present to ensure easy starting of an engine. The specification must also contain a provision that all must distil over below a certain maximum temperature in order to exclude from the gasoline the heavier petroleum distillates such as kerosene.

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 A FEED CLUTCH SHOE

By F. Scriber.

IT often happens that it is more economical to manufacture certain machine parts by grouping together than by handling them as they would appear when finished, and an example of this is shown in the accompanying illustration, Fig. 1, which is a feed clutch shoe, finished as shown by the full lines, while for convenience in manufacture two parts are made together, as shown by the dotted lines. These clutch shoes are made from bronze castings, and are finished as follows:—The 1⅝ in. hole, the sides, the bosses at 2 9/16 in. dimension, and the ⅜ in. holes.

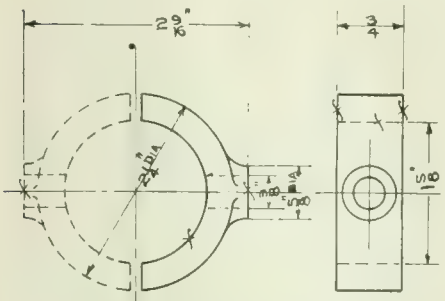


FIG. 1. FEED CLUTCH SHOE.

The first operation on these parts, which is shown by Fig. 2, consists of boring the 1⅝ in. hole and also drilling and reaming the small holes. To accomplish this, a jig is used, of which the body A is cast iron, the clutch shoes being located in the jig by three screws and a screw bushing. Two of these screws B are not moved after having once been set correctly, while the third screw C is used for clamping the work securely in place. Before clamping the work tight, but with the binding screw holding the work lightly, the screw bushing D is brought into position, thus locating the bosses in the right place for drilling. The screw C is now tightened securely, and we can then drill and ream the holes in the usual manner, using the bushings shown to guide the drills.

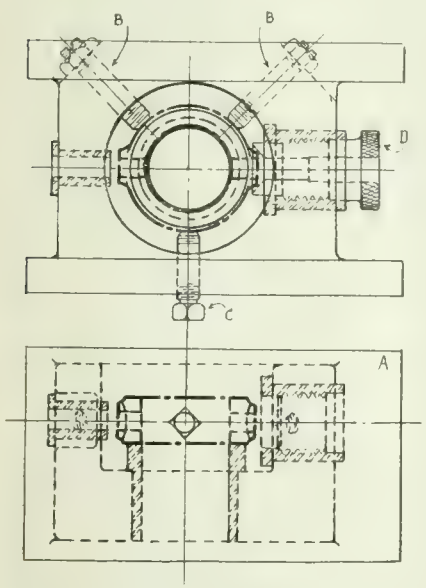


FIG. 2. DRILL JIG USED FOR FIRST OPERATION.

The next operation, "spot facing the bosses," is accomplished as shown in Fig. 3, by simply slipping each piece over an arbor A, held in an angle plate B, when, by using the stop on the drill press and a piloted facing tool, the operation is accomplished without clamping the work in any manner.

For machining the sides of the clutch shoes, which is the next operation, a milling machine is used, this, in connection with the fixture Fig. 4, quickly accomplishing the desired result. In this fixture the work is slipped over the various studs A, and is clamped by means of finger clamps B in the holes, which leaves the upper surface clean, so a milling cut can be taken across. After one side has been milled on all parts, the opposite side is milled in the same manner.

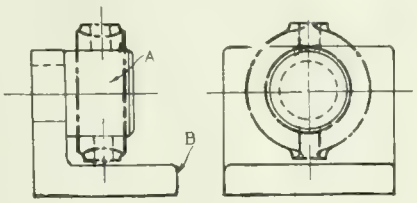


FIG. 3. SPOT FACING FIXTURE.

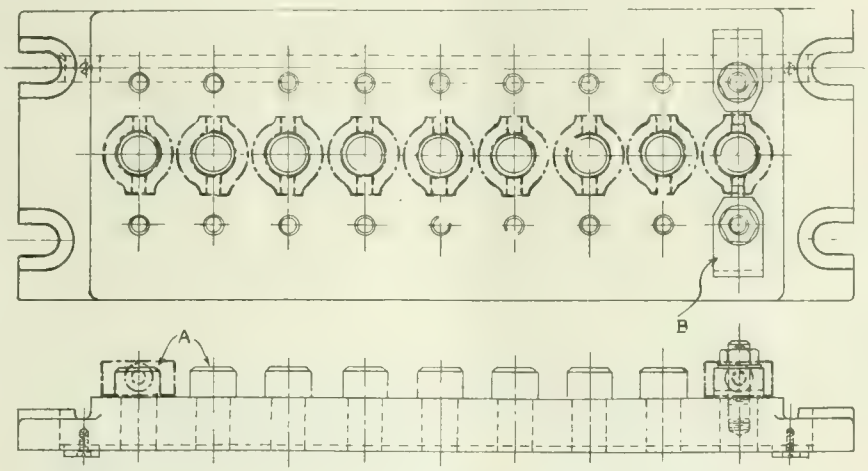


FIG. 4. FIXTURE FOR MILLING SIDES OF FEED CLUTCH SHOES.

Having now completed the milling, all that remains to be done is to cut the parts in two, and this is done by using a saw and the arbor shown in Fig. 5 on a milling machine. In using this arbor a gang of the clutch parts are slipped over it, while through the holes in the bosses pins A are placed. These pins locate the work radially while being free to slide in the elongated slots for clamping purposes, which is done by the nut B.

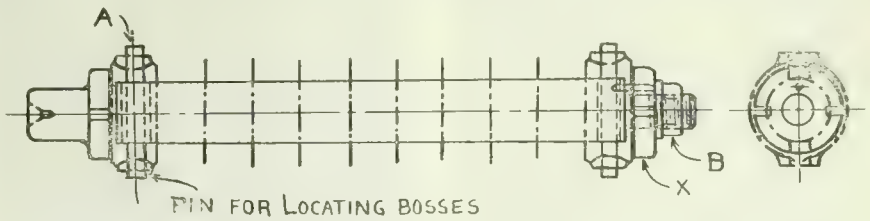


FIG. 5. ARBOR ON WHICH A BATCH OF FEED CLUTCH SHOES ARE SPLIT.

The arbor is used between centres of the milling machine, and after one side of a gang of clutch shoes has been split, the arbor is indexed half-way and the other side finished.

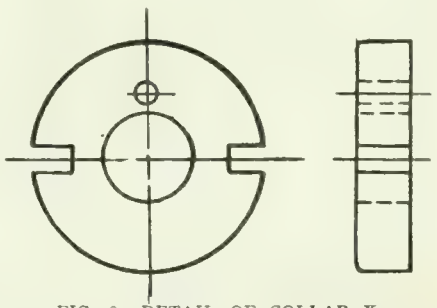


FIG. 6. DETAIL OF COLLAR X.

STRAIGHTENING SHAFTS

THE straightening of shafts in the lathe is, like many another job, when one knows how to do it, quite a simple one. A knowledge of what is required, and a fair modicum of patience are desiderata and indispensable. Given a shaft, say 2½ in. in diameter, straight from the drawing mills, such a shaft being all that may be desired as regards size and soundness, but with a slight bend, and perhaps two, in its length, such bends precluding its use as a shaft, and fit to run in ordinary journals or in ball bearings. The first thing to do is to chuck one end, run the other in the steady and centre that end with a large centre drill. Then the other end, previously held in the chuck is held in the steady rest and faced and centred. The shaft is then provided with a pair of suitable half clips—it must not be gripped in the chuck—or a suitable driver and the lathe started. Bends in the shaft may be easily discerned, and a rough judgment made as to the size of the "job."

Preliminary Inspection

Notice having been taken as to the extent of the bends, it is as well then to let the centre of the shaft run freely in a steady. The acquisition and use of the steady at this stage, and in the centre of the length of the shaft is simply for the purpose of eliminating an accession of spring which would accrue, as a result of out of balance, were the lathe to be run at a considerable speed. It is quite possible, however, that the worst of the bend may be situated just about in the middle of the shaft. If such be the case, another and more suitable position must be found, i.e., if there be one. If there is no part of the shaft found to run, even approximately true, or in other words, sufficiently true to run in the steady, then it is a case of running the lathe slowly round, so that there is no "swing" as the shaft is rotated, and to choose a part to set true first. When such is done, the steady should be applied and attention given to the straightening of the parts on each side of the steady. It should be observed, however, that there is no royal road to the art of straightening shafts any more than there is to the art of flattening a circular saw, or a large steel plate. An expert at either is able to do with a few blows more than a novice can do in an hour, if at all.

Theory of Drawing

As with circular saw or steel plate flattening a "drawing" of the shorter parts is the essential, and the man who knows how to do this well may become an expert on the straightening of shafts. But we may hear the novice exclaim when his patience has been exhausted towards the removal of recalcitrant bends, "when I get this bend out another comes in." Just so, and this will be the case generally, until by judicious drawing the bends become reduced in extent, and the shaft becomes approximately, or, as it is sometimes called, commercially straight. It may be said that the method of drawing—with the aid of copper pad—flogging hammer and steel lever,—the old-fashioned way—is far more preferable, and a more direct remedy for bent shafts than any crowbar; and for this reason: If the shaft has become bent in transit, or by any other means, the convex side had become long by stretching—and common sense will support the idea that to bring the shaft back to an approximate normal, the concave side should be equally stretched. That may be accomplished with the orthodox accessories, copper pad, flogging hammer and steel bar—as a lever—and by no means excluding a good heavy laborer for the bar, a useful man for the hammer and a skilful man to hold the copper pad and direct operations. Such a man, where many shafts are required to be dealt with, is worth high pay, though difficult to discover.

A FACE MILLING CUTTER

By A. L. Loy.

THE cut shows a face milling cutter which was designed for heavy work, milling off the sides of gasoline engine beds. The steel body was threaded to screw on

FACE MILLING CUTTER WHICH IS SUITED FOR HEAVY CUTS.

the nose of the spindle, being beveled at a 45 degree angle where the teeth were inserted. The cuttters were of ⅝ in. round high-speed steel, and were about 2 in. in length projecting from the body of the cutter about ¾ in. The face of these pins was milled off flat to provide the cutting surface, this extending to within one-eight inch of the bottom end, thus allowing this to fit the reamed hole in the body. Three eighth inch holes were drilled at an angle to the cutting face of the pins, and into these holes were driven holding pins which had been milled off at the same angle, so that, when these were driven in, the cutting face of the pins would be parallel with the axis of the spindle. The pins were cut to bottom in their respective holes, and when much worn, balls could be placed beneath them to bring them out the necessary amount. This type of cutter will stand up under the heaviest cuts, and is to be recommended especially in the larger sizes.

PATTERN-MAKING NOTES

By J. W. Broadbent

THERE are many varnishes on the market strongly recommended for finishing patterns, and the lower the price of the varnish the stronger the recommendation, but there is nothing "just as good" as shellac cut with pure grain-alcohol and mixed right in the shop, for manufacturers delight to add foreign materials which cause the moulder to turn grey and find the biggest sledge in the shop to coax the pattern out of the sand.

Varnish

How often we hear the remark made, either by a pattern-maker, or a man in the shop who comes around to dab a little shellac on a cut. "What is that stuff made out of "

Lac is the name applied to the substance in its first form, a resinous incrustation formed on the twigs and young branches of various species of trees by an insect resembling the cochineal fly, whose home is in different parts of India. The insects in large numbers fasten themselves on the young shoots and there they live, eat and die getting their nutriment from the sap of the plant, depositing the resinous substance on the branches and over their bodies, forming in appearance a cocoon.

The twigs are gathered by the natives in June and November and are known as "stick lac," and are taken to the factories where the resin is crushed and washed in hot water to free it from the coloring matter from which dyes are made. It is then known as "seed lac" and after being melted and strained through thick canvas, it is spread in thin layers or rolled between iron rollers to produce the flaky substance known as shellac which is so useful in our industries.

Shellac varies in color from dark amber to almost pure black and can be bleached white by extracting the resin; white shellac varnish does not dry so quickly or produce so hard a surface as orange shellac which color is generally used in pattern making.

Shellac varnish should be prepared in a glass or glazed earthenware vessel and never kept in a metal can, as the oxidation of the metal discolors the varnish; it is well to keep the container air tight as much as possible as the alcohol evaporates very rapidly.

Purpose of Varnish

The idea of applying shellac to a pattern is to fill up the pores of the wood thus producing a hard, smooth surface able to protect the wood from the moisture in the sand and make it easier to withdraw the pattern from the mould. It is a common error to assume that shellac when applied to wood will dry in ten minutes time and is then ready for the next coat. To produce a good hard surface several hours should be allowed between each coat and each coat rubbed down with fine sandpaper before the next is applied.

It is absolutely necessary to have a pattern smooth and flat before the varn-

ish is spread, for putting numerous coats of shellac on a rough coarse job only makes the roughness more apparent.

Coloring matter is added to varnish, the general practice being to varnish patterns so as to distinguish the core prints from the main body of the pattern. Black, the most common color used is produced by adding lampblack, red by adding Chinese vermilion and blue by adding Prussian blue. It is necessary to have this coloring matter perfectly dry and the best results are obtained by mixing to a smooth paste with a little varnish and then adding varnish to this mixture until the desired consistency is produced.

Desirability of Color

From observation the writer has come to the conclusion that if all small patterns were finished in the original color of the orange shellac, they would receive better treatment in the moulding shop, besides leaving the construction of the pattern more visible when alterations or repairs have to be made.

Shellac and plaster of paris or shellac and powdered chalk mixed into a thick paste form an excellent filling for nail holes and holes made by the moulders vent wire; it dries quickly and after being worked into the holes and cracks, what projects is easily sandpapered off, then after a coat of varnish is applied a good hard surface is the result.

Glue

A good quality of glue should be used in the pattern-shop, "good" glue when allowed to soak in cold water will swell up without dissolving and when again dried should resume its original properties. It should be free from specks or grit and of a light brownish yellow transparent appearance, breaking with a glassy fracture.

There is no hard and fast rule as to the proportions of water and glue to be used, this is sometimes determined by the class of work to be glued; thicker glue being required when gluing the end grain of wood. The best method of mixing is to soak the hard glue in cold water over night and then cooking this in an aluminum vessel surrounded by water, either heated by steam, gas, or electricity. The electric glue heaters now on the market are admirable for the purpose, keeping the glue at a uniform temperature. The outside kettle should never be allowed to get dry as burned glue is practically useless.

Strength of Glued Joint

The strength of a glued joint depends, not on the amount of glue used, but upon the quality and the perfect fitting of the joints and surfaces, for it is easily seen that when the surfaces are pressed into close contact there only remains a very thin film of glue and such an amount as has entered the pores of the wood. A good joint, glued under the best of conditions, will withstand a pull of 700 lbs. per sq. in. Nothing should ever be put on the joints to prevent the glue from soaking into the pores of the wood.

When gluing the end grain of wood, or where the grain runs diagonally in such a way as to present the end pores of the wood for the gluing surface, this end wood should be first "sized" that is: it should receive an application of thin glue and after being allowed to dry and scraped lightly with a sharp tool, the joint may be glued in the ordinary manner.

Wherever possible, glued joints should be nailed or secured with screws that is if they can be placed in such position that they will not present themselves to any cutting tools used in turning or shaping the pattern.

CLEARANCE GRINDING ON MILLING CUTTERS

THE angle of clearance of a cutter is measured with a bevel protractor from a line at right angles to the radial as in Fig. 1, A representing the angle of clearance. At B is shown the land of the tooth, and this is generally the deciding factor as to whether to use a disk or a cup wheel. Usually a disk wheel is used

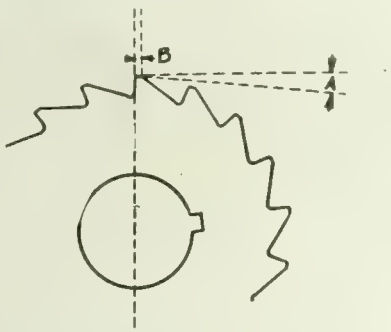


FIG. 1.

on narrow lands and a cup wheel on wide lands.

The angle of clearance on milling cutters under 3 in. in diameter is from 6 to 7°, and from 4° to 5° for those 3 in. and over, but the angle naturally depends on the material to be machined.

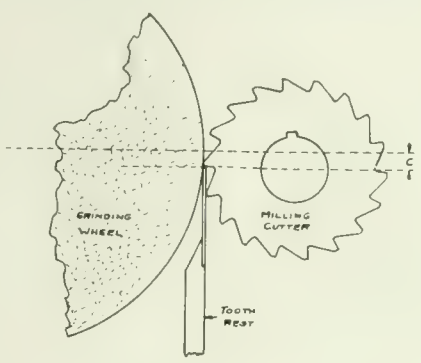


FIG. 2.

Fig. 2 represents a milling cutter and a disk wheel. The method of procedure in obtaining the angle of clearance is this: Set centre of wheel spindle and work centres in the same horizontal plane. Then fasten tooth rest to the table of machine and adjust the tooth rest to the same height as the work centres, using the height gauge. The distance to raise the wheel head (see Fig. 2) may be calculated by the following rule, using the constant .0088 in.; clearance angle times the diameter of grinding wheel times .0088 in.

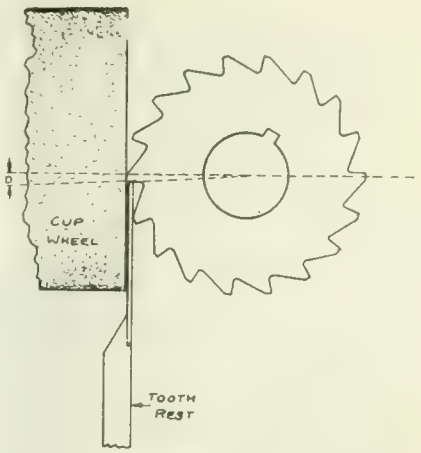


FIG. 3

Example: To find elevation of wheel centre for 5° clearance angle, diameter of grinding wheel, 6 in.

Solution: 5 x 6 in. x .0088 in. = .264 in. Answer.

Therefore, the wheel head should be raised .264 in. to get the proper clearance angle, using the graduated hand wheel.

In sharpening the periphery teeth of a milling cutter with a cup wheel the diameter of the cutter is used in place of the wheel diameter as above, and the rule then reads as follows: Clearance angle times the diameter of cutter times .0088 in.

In Fig. 3 we have a 3 in. diameter cutter with a desired clearance angle of 4°.

Example: To find the distance to locate the tooth rest below the centre of cutter to give a clearance angle of 4°.

Solution: 4° x 3 in. x .0088 in. = .106 in. Answer.

To get the setting proceed as follows: Fasten the tooth rest to the wheel head, and set the tooth rest with a surface gauge to the same height as the centre of the cutter. Then lower the wheel head (Fig. 3) the calculated distance.—Robert J. Spence in "Grits and Grinds."

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

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THE PRE-EMINENCE OF THE TOOLMAKER'S CRAFT

PERHAPS no phase of munitions activity has afforded such convincing evidence of the importance of the machinist's art as the production of gauges. Statements by responsible parties, both in official government positions and otherwise, have been frequently made on this subject, more especially in recent months, when the question arose as to whether the United States should proceed with the production of its own types of munitions or adapt its requirements to those of the Allies which were being supplied in immense volume by American firms.

Those of our readers who have been in touch with these activities across the line know that the decision to adopt certain Allied types of ordnance, small arms and ammunition was based principally, if not solely, on the question of the supply of gauges. To generate new standards and duplicate them on the scale necessary to ensure the mammoth production aimed at, meant a delay, the results of which would be much more costly for the United States in particular, and much more serious for the Allies in general, than the slight loss of prestige involved in the abandonment pro tem. of a few United States standards.

Such action, while being convincing evidence of the single-purpose manner in which the latest recruit is getting down to business, has also directed more than passing interest to the whole question of gauges, and has stimulated interest in the methods of producing them and the degree of accuracy obtainable.

While it may be said of some modern commercial achievements that the supply creates the demand, the reverse is the case with the subject under consideration. The demand has undoubtedly created the supply, the demand in most cases being such that no denial of its requirements was possible, let alone allowable. "Do or die" has been the unseen slogan invisibly engraved on many a war contract, and it is to the everlasting credit, not to say glory, of the machine shop industry that conditions are as they are now. And the keystone of the whole fabric has been the craft, skill, perseverance and painstaking effort of that inner group of workers known as toolmakers.

Modern high-grade machine tools such as tool room lathes, grinding machines and millers formerly sufficed, with the addition of certain hand operations, to produce the greater variety of gauges in commercial use, and when refined methods of checking and measuring were employed, the results were both creditable and suited for the purposes in view. The extreme accuracy required in certain classes of munitions gauges, particularly thread gauges, brought about a state bordering on bewilderment, temporary of course, but of sufficient intensity to arouse all the resource and ingenuity of master craftsmen.

Ordinary cylindrical, taper and profile work called for nothing more than intense care and application of known methods and devices, both for making and measuring, but the work involved in producing thread gauges of the required accuracy seems to have resulted in perfection of measurement without a correspondingly high degree in the articles themselves; which is not to say that thread gauges of very high accuracy cannot be produced in quantity, but that the latest methods of checking can detect errors which it seems almost impossible to wholly eliminate, and which previously were not possible of detection by ordinary means.

The question of accurate thread production and measurement possesses an abstract interest for the skilled machinist which is as intense as it is perennial. The wire system of measuring pitch diameter was welcomed and adopted with a true appreciation of its value until scientific investigation resulted in its shortcomings in certain features being made evident—it afforded no evidence regarding the exact contour of the thread, the angle of lead, or accuracy of pitch. Scientific apparatus which indicates minute variations in all of these important points has become available through recent efforts, and many of the hitherto cherished methods of lapping, etc., are now known to produce results far short of perfection. It would seem, therefore, that the next step in advance is due to be taken by the producer,—detective apparatus is now in the lead, the onus of pulling up level in the contest lies in the direction of improved productive methods. When they attain an even level, the toolmaker's craft will be held still higher in the esteem of all connected with machine shops and manufacturing activities in general.

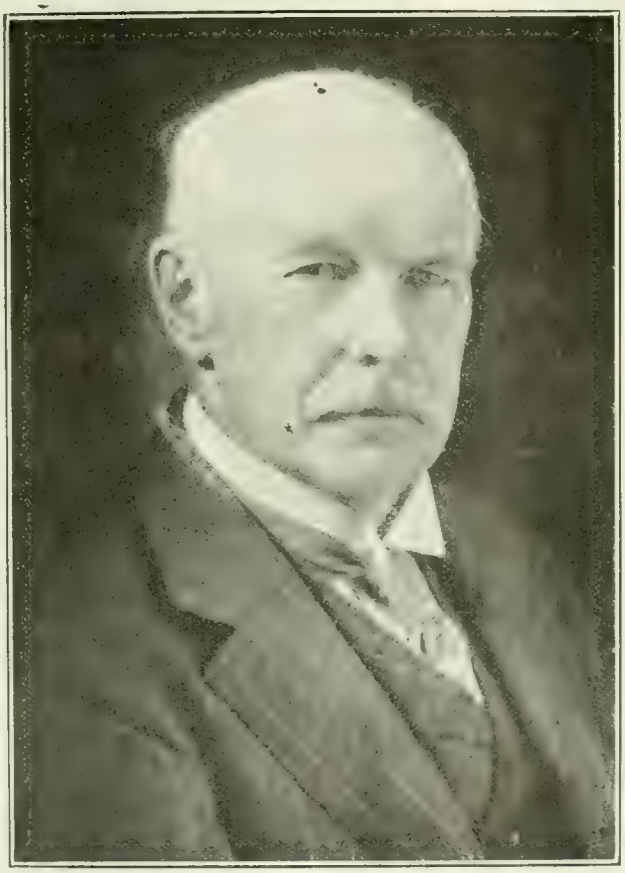
IRON AND STEEL SITUATION

ALTHOUGH the embargo has precipitated a crisis in the iron and steel industry, events have been leading up to the climax for some months. Conditions in the trade have, for some time past, been causing considerable anxiety, but it is only quite recently that the real significance of these developments has come to be realized. Shortage of steel and high prices have been hampering manufacturers' operations increasingly of late, but the embargo has brought the situation to a climax. The situation is serious, more especially to those manufacturers not engaged upon war work, it being assumed that licenses will be issued on steel for war purposes only. No important developments are expected until the committee of manufacturers appointed to investigate the situation has necessary data upon which to base its report to be submitted to the Minister of Trade and Commerce.

In the meantime the market remains in a very unsettled condition and business is almost at a standstill. Consumers are placed in an unfortunate position, not knowing how they stand in regard to obtaining material or what price they may have to pay. This applies of course only to imported steel, but as this class of material forms a considerable proportion of the requirements of Canadian manufacturers, it is an important factor in the situation. While consumers are naturally anxious in regard to the outcome of the pending negotiations with Washington, it is fair to presume that their position will be viewed in a sympathetic manner and suggestions given the consideration that their importance merits. Owing, however, to the exigencies of the situation it appears doubtful whether relief can be obtained to the full extent desired, otherwise the purpose of the embargo would be defeated.

INDUSTRIAL NOTABILITIES

PHELPS JOHNSON, president, Dominion Bridge Co., Ltd., and president, St. Lawrence Bridge Co., Ltd., Montreal, Que., was born in Warwick, Orange County, N.Y., Oct. 23, 1849, son of W. H. and Eliza (Phelps) Johnson, and was educated at public schools of Springfield, Mass., and Goldthwait's Private School, Longmeadow, Mass.



PHELPS JOHNSON.

Mr. Johnson has been with the Dominion Bridge Co. since 1882 and became president of same on the death of the late James Ross, 1912. He also became president of the St. Lawrence Bridge Co. in 1910, when it was reorganized.

He is past president, Canadian Society of Civil Engineers, and is a member of the following clubs: St. James; Engineers; Mount Royal; Royal St. Lawrence Yacht. Mr. Johnson is unmarried and is Conservative in politics.

Mr. Johnson's residence address is Windsor Hotel, Montreal, Que.

Photo, Courtesy British & Colonial Press.

SELECTED MARKET QUOTATIONS

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

PIG IRON.

Grey Forge, Pittsburgh	$40 50
Lake Superior, charcoal, Chicago	58 00
Standard low phos., Philadelphia	87 00
Bessemer, Pittsburgh	[illegible]
Basic, Valley furnace	33 00
Manufacturers' [illegible]	
Hamilton	[illegible]
Victoria	[illegible]

FINISHED IRON AND STEEL.

Per lb. to Large Buyers.	Cents
Iron bars, base, Toronto	5 25
Steel bars, base, Toronto	5 50
Steel bars, 2 in. to 4 in. base	6 00
Steel bars, 4 in. and larger base	7 00
Iron bars, base, Montreal	6 25
Steel bars, base, Montreal	5 50
Reinforcing bars, base	5 25
Steel hoops	7 50
Refined iron	5 50
Norway iron	11 00
Tire steel	5 50
Spring steel	7 00
Band steel, No. 10 gauge	7 50
Chequered floor plate, 3-16 in.	15 20
Chequered floor plate, ¼ in.	15 00
Staybolt iron	8 50
Bessemer rails, heavy at mill	38 00
Steel bars, Pittsburgh	4 00
Tank plates, Pittsburgh	4 00
Structural shapes, Pittsburgh	4 00
Steel hoops, Pittsburgh	5 75
F.O.B., Toronto Warehouse	
Steel bars	5 50
Small shapes	5 75
F.O.B. Chicago Warehouse	
Steel bars	5 00
Structural shapes	5 00
Plates	8 00

FREIGHT RATES.

Pittsburgh to Following Points

	Per 100 lbs C.L.	L.C.L.
Montreal	23 1	31 5
St. John, N.B.	35 1	45 5
Halifax	35 1	45 5
Toronto	18 9	22 1
Guelph	18 9	22 1
London	18 9	22 1
Windsor	18 9	22 1
Winnipeg	64 9	85 1

METALS.

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

Prices per 100 lbs.

PLATES.

	Montreal	Toronto
Plates, ¼ to ½	$13 00	$13 00
Heads	13 30	13 30
Tank plates, 3-16 in.	13 65	13 25

WROUGHT PIPE.

Effective July 5, 1917.

Size.	Black Standard Buttweld. Per 100 feet	Galvanized Standard Buttweld. Per 100 feet
⅛ in.	$ 5 00	$ 6 50
¼ and ⅜ in.	5 12	7 16
½ in.	6 46	8 03
¾ in.	8 17	10 29
1 in.	12 07	15 22
1¼ in.	16 22	20 59
1½ in.	19 77	24 61
2 in.	26 [illegible]	33 12
2½ in.	42 12	52 94
3 in.	55 08	69 23
3½ in.	69 92	86 94
4 in.	82 84	103 00

Size.	Standard Lapweld. Black	Galvanized
2 in.	29 25	5 71
2½ in.	43 88	54 11
3 in.	57 38	70 76
3½ in.	71 76	89 79
4 in.	87 02	106 28
4½ in.	96 52	121 29
5 in.	112 50	141 34
6 in.	145 90	183 36
7 in.	190 40	238 00
8 L in.	200 00	250 00
8 in.	230 40	288 00
9 in.	276 00	345 00
10 L in.	256 00	320 00
10 in.	329 60	412 00

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES.

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

OLD MATERIAL.

Dealers' Buying Prices.

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

BOLTS, NUTS AND SCREWS.

	Per Cent.
Carriage bolts, ⅜" and less.	10
Carriage bolts 7-16 and up	net
Coach and lag screws	25
Stove bolts	55
Plate washers ... List plus	10
Machine bolts, 7-16 and over	net
Machine bolts, ⅜ and less	10
Blank bolts	net
Bolt ends	net
Elevator bolts	50 and 5
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil hd., steel	10
Machine screws, fl. and rd. hd., brass	add 20
Machine screws, o. and fil. hd., brass	add 25
Nuts, square blank	add $1 50
Nuts, square, tapped	add 1 75
Nuts, hex. blank	add 1 75
Nuts, hex. tapped	add 2 00
Copper rivets and burrs, list plus	30
Burrs only list plus	50
Iron rivets and burrs	17½
B.B. rivets, base ¾-in. and larger	$7 60
Structural rivets, as above	7 50
Wood screws, flat, bright	72½
Wood screws, F. H.	67½
Wood screws, flat, brass	37½
Wood screws, O. & R.	32½
Wood screws, flat, bronze	20½
Wood screws, O. & R. bronze	25

MILLED PRODUCTS.

	Per cent
Set screws	35
Sq. & Hex. Head Cap Screws	30
Rd. & Fil. Head Cap Screws	10
Flat & Bat. Hd. Cap Screws plus	10
Fin. & Semi-fin. nuts up to 1 in.	35
Fin. and semi-fin. nuts, over 1 in., up to 1½ in.	30
Fin. and semi-fin. nuts, over 1½ in., up to 2 in.	10
Studs	20
Taper pins	40
Coupling bolts, plus	10
Planer head bolts, with nut fillet, list plus	10
Planer head bolts, with fillet, list plus 10 and	10
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws...list plus	20
Collar screws ....list plus 30,	10
Thumb screws	20
Thumb nuts	65
Patch bolts add 40,	10
Cold pressed nuts to 1½ in. add $4 50	
Cold pressed nuts over 1½ in. add $7.00	

BILLETS.

	Per gross ton
Bessemer billets	$ 60 00
Open-hearth billets	60 00
O.H. sheet bars	70 00
Forging billets	90 00
Wire rods	85 00

F.o.b. Pittsburgh.

NAILS AND SPIKES.

Wire nails	5 50	5 45
Cut nails	5 70	5 80
Miscellaneous wire nails	..	60%
Spikes, ⅝ in. and larger	....	7 50
Spikes, ¼ and 5-16 in.	.....	8 00

MISCELLANEOUS.

Solder, strictly	0 36
Solder, guaranteed	0 38½
Babbitt metals	18 to 70
Soldering coppers, lb.	0 53
Lead wool, per lb.	0 16
Putty, 100-lb. drum	4 75
White lead, pure, cwt.	18 00
Red dry lead, 100-lb. kegs, per cwt.	15 45
Glue English	0 38
Tarred slaters' paper, roll	0 93
Gasoline, per gal., bulk	0 31½
Benzine, per gal., bulk	0 30½
Pure turpentine, single bbls., gal.	0 69
Linseed oil, raw, single bbls.	1 49
Linseed oil, boiled, single bbls.	1 52
Plaster of Paris, per bbl.	2 50
Sandpaper, B. & A. ..list plus	20
Emery Cloth ....list plus	33 1-3
Borax, cyrstal	15
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 03
Rosin "G," per lb.	0 03½
Borax crystal and granular	0 15
Wood alcohol, per gallon	2 15
Whiting, plain, per 100 lbs.	2 20

ROPE AND PACKINGS

Plumbers' oakum, per lb.	.09
Packing, square braided	.34
Packing, No. 1 Italian	.40
Packing, No. 2 Italian	.32
Pure Manila rope	.39
British Manila Rope	.33
New Zealand Hemp	.33
Transmission rope, Manila	.45
Drilling cables, Manila	.41
Cotton Rope, ¼-in. and up	.47

POLISHED DRILL ROD.

Discount off list, Montreal and Toronto 25%

CARBON DRILLS AND REAMERS.

	Per Cent.
S.S. drills, wire sizes up to 52	40
S.S. drills, wire sizes, No. 53 to 80	25
Standard drills to 1½ in.	40
Standard drills, over 1½ in.	15
3-fluted drills, plus	10
Jobbers' and letter sizes	40
Bit stock	40
Ratchet drills	15
S.S. drills for wood	46
Wood boring brace drills	25
Electricians' bits	30
Sockets	40
Sleeves	40
Taper pin reamers	20
Drills and countersinks list plus	30
Bridge reamers	45
Centre reamers	10
Chucking reamers	10
Hand reamers	15

COLD ROLLED SHAFTING.

At mill ..... list plus 40%
At warehouse ..... list plus 50%

Discounts off new list. Warehouse price at Montreal and Toronto.

IRON PIPE FITTINGS.

Canadian malleable, A, add 7½%; B and C, 10%; cast iron, 35%; standard bushings, 25%; headers, 60; flanged unions, 40; malleable bushings, 25 and 7½; nipples, 55; malleable lipped unions, 50.

SHEETS.

	Montreal	Toronto
Sheets, black, No. 28	$11 00	$11 00
Sheets, black, No. 10	12 00	12 00
Canada plates, dull, 52 sheets	12 00	12 00
Canada plates, all bright	12 50	12 50
Apollo brand, 10¾ oz. galvanized	12 25	12 09
Queen's Head, 28 B.W.G	11 75	10 75
Fleur-de-Lis, 28 B.W.G.	11 75	10 75
Gorbal's Best, No. 28	12 00	10 25
Colborne Crown, No. 28	11 25	10 00
Premier, No. 28 U.S.	13 75	11 70
Premier, 10¾ oz.	13 85	12 00
Zinc sheets	20 00	20 00

PROOF COIL CHAIN.

B	
¼ in.	$12 00
5-16 in.	11 50
⅜ in.	11 15
7-16 in.	10 90
½ in.	10 70
9-16 in.	10 70
⅝ in.	10 50
¾ in.	10 40
@ in.	10 25
1 inch	10 10
Extra for B.B. Chain	1 20
Extra for B.B.B. Chain	1 80

ELECTRIC WELD COIL CHAIN B.B.

⅛ in.	$15 50
3-16 in.	11 70
¼ in	8 40
5-16 in.	7 40
⅜ in.	6 35
7-16 in.	6 35
½ in.	6 35
⅝ in.	6 35
¾ in.	6 35

Prices per 100 lbs.

FILES AND RASPS.

	Per Cent.
Great Western, American	50
Kearney & Foot, Arcade	50
J. Barton Smith, Eagle	50
McClelland, Globe	50
Whitman & Barnes	50
Black Diamond	40
Delta Files	37½
Nicholson	40
P.H. and Imperial	50
Globe	50
Vulcan	50
Disston	50

COAL AND COKE.

Solvay Foundry Coke	$
Connelsville Foundry Coke	
Steam Lump Coal	
Best Slack	

Net ton f.o.b. Toronto

BOILER TUBES.

Size.	Seamless	Lap-welded
1 in.	$36 00	$ ....
1¼ in.	40 00	....
1½ in.	43 00	36 00
1¾ in.	43 00	36 00
2 in.	50 00	36 00
2¼ in.	53 00	38 00
2½ in.	55 00	42 00
3 in.	64 00	50 00
3¼ in.	...	58 00
3½ in.	77 00	60 00
4 in.	90 00	75 00

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS.

Castor oil, per lb.	40
Royalite, per gal., bulk	16
Palacine	19
Machine oil, per gal.	26½
Black oil, per gal.	15
Cylinder oil, Capital	45½
Cylinder oil, Acme	36½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	2 50
Union thread cutting oil, antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil	12½

BELTING—NO. 1 OAK TANNED.

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

TAPES.

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

WASTE.

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

COLORED.

Lion	14½
Standard	13
No. 1	13
Popular	11¾
Keen	10½

WOOL PACKING.

Arrow	25
Axle	20
Anvil	15
Anchor	11

WASHED WIPERS.

Select White	12
Mixed colored	10
Dark colored	09

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard	40%
Best grades	20%

ANODES.

Nickel	50 to .54
Cobalt	1.75 to 2 00
Copper	.44 to .46
Tin	.49 to .56
Zinc	.23 to .25

Prices Per Lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	55 00	53 00
Copper wire, list plus 10.		
Plain sheets, 14 oz., 14x28 in., 14x60 in.	55 00	53 50
Copper sheet, tinned, 14x60, 14 oz.	60 00	54 25
Copper sheet, planished, 14x60 base.	64 00	60 00
Braziers', in sheets, 6x4 base	55 00	52 00

BRASS.

Brass rods, base ½ in to 1 in rd.	0 55
Brass sheets, 8 in. wide, 20 oz.	0 60
Brass tubing, seamless	0 57
Copper tubing, seamless	0 58

PLATING SUPPLIES.

Polishing wheels, felt.	3 00
Polishing wheels, bullneck	1 75
Emery in kegs, American	06
Pumice, ground	05
Emery glue	15 to 20
Tripoli composition	04 to 06
Crocus composition	07 to 08
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 35

Prices Per Lb.

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$18 00	$18 00
Sheets, 3½ lbs. sq. ft.	18 00	18 00
Sheets, 4 to 6 lbs. sq. ft.	17 50	17 50

Cut sheets, ½c per lb. extra.

Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ 15
Acid, hydrochloric	05
Acid, hydrofluoric	.14½
Acid, nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	08
Ammonium carbonate	15
Ammonium chloride	.11
Ammonium hydrosulphuret	40
Ammonium sulphate	07
Arsenic, white	.12
Copper, carbonate, anhy.	.35
Copper, sulphate	.17
Cobalt sulphate	.70
Iron perchloride	20
Lead acetate	.16
Nickel ammonium sulphate	.12
Nickel carbonate	.35
Nickel sulphate	.15
Potassium carbonate	.75
Potassium sulphide (substitute)	.20
Silver chloride (per oz.)	65
Silver nitrate (per oz.)	.55
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.41
Sodium hydrate	.04
Sodium hyposulphite, per 100 lbs.	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.60
Zinc sulphate	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Condition and Tendency

THE industrial situation continues unsettled owing to the embargo on steel from the States, but it is hoped that some relief will be obtained when representations have been made to the Priority Board at Washington. It is absolutely essential that steel for shipbuilding and other war purposes be allowed to enter Canada, but while such materials may be licensed, it is extremely improbable that steel will be permitted to enter for purely domestic purposes. The situation is acute and the shortage of steel cannot help but restrict manufacturing operations. There have been no further developments in regard to prices and the market is holding firm in the meantime. Indications point to the embargo tending to keep prices up in Canada in spite of the reductions in the States. The outlook is so obscure, however, that it is difficult to say what will be the outcome of the prevailing unsettled conditions. The appointment of a Controller of Steel and Iron should help materially in clearing up the situation. The non-ferrous metal markets are dull and prices unchanged. The embargo on copper has resulted in a scarcity of this metal and prices are firm locally. Scrap prices are also unchanged and the market is stagnant. Consumers continue to stay out of the market until the situation is more settled. Prices of machine shop supplies are holding firm with an upward tendency on some lines.

MONTREAL, QUE., Oct. 6, 1917.—While increased impetus has been given to the shell industry through the renewal of orders for six inch shells, which will ensure a fair degree of activity in this connection, the munitions end of the country's business is declining. To offset this however, the ship building enterprise has materially assisted in putting off the time that will eventually come when the labor situation will be a serious problem. At present the surplus of labor that has been released from the shell plants has been absorbed by ship building activity and work that is directly associated with this industry. It is encouraging to note that many Canadian firms are actively interesting themselves in acquiring the manufacturing rights of certain lines of ship machinery that in former years had been largely imported from the States and other countries. At present the interests of the Canadian manufacturers are centered on the developments that are taking place in the States, as conditions arising out of the recent regulations may eventually create a very serious situation in this country, unless some arrangement is made to relieve what promises to develop into a very acute and grave condition, the importance of which may not be fully realized by the average layman.

Pig Iron

In view of the developments that are rapidly changing the situation in the States, the market in pig iron is in a very unsettled condition. Following the announcement last week of the fixing of the price for pig iron at the Pittsburgh source, other centers have been affected, and it is expected that the near future will see a general adjustment of prices to comply with the Government regulations. The approximate in the price of pig iron has been nearly $20 per ton. With the market in such an unsettled state, it is very difficult to say just what effect the change will have, but so far nothing has transpired to indicate that immediate relief will be achieved. The Canadian situation is if anything increasingly [illegible], as the difficulty in obtaining certain ma-

terials has become more pronounced. Canadian producers of pig iron are still out of the market.

Steel

The characteristic that features the entire steel and metal market is that of practical stagnation, and this condition is likely to continue so long as price fixing is being considered. The agreements that have already been announced have made little effect upon the situation and business is almost suspended awaiting further developments. With orders being withheld there is undoubtedly a considerable volume of buying that must eventually be placed as soon as the market becomes more settled, but for the present the trade appears to favor a policy of watchful waiting. The existing condition of partial disorganization was to be expected following the unprecendented action of the American Government in the regulation of prices on the scale that has been adopted, but it is anticipated that as soon as the final arrangements have been made the situation will resume a more normal condition; this is apparently emphasized by the fact that upwards of 80 per cent. of the concessions adopted in the fixing of prices, were made by the producers themselves. The market is however, more or less of a technical nature, and will to a large extent remain so until the complete fixing of prices has been accomplished covering all lines under consideration. Producers are indisposed to sell and business at the new prices is practically nil. One possible result of present developments is the improved situation that will prevail at the termination of hostilities. Producers will probably be in a position where their obligations will be such that the readjustment of trade will be more easily and speedily accomplished. The American price changes that have gone into force during the past week have been confined to additional fixed or agreed prices on other commodities; the New York and Philadelphia price for No. 2 Foundry has been fixed at $33.75 per ton, this being a reduction on the previous open market quotations of $20 per ton. Corresponding reductions have also been made at Boston and Buffalo. The purchase of supplies is still regulated by the necessity of having a license to show that the material required is to be used for war purposes only, and it is almost impossible to obtain steel for domestic purposes. The Canadian situation is as acute as ever and with the exception of war requirements there is developing a virtual famine in plates and other materials that are now being largely used for Government needs. Dealers here have added $20 per ton to their previous quotation on plates, and are reserving their small supplies for special requirements only; local prices are now 13c for ¼ to ½ inch plates, 13½c for heads, and 13.65 for 3/16 inch tank plates. The market is almost stagnant in all lines.

Metals

One effect of recent developments throughout the general metal situation has been to cause the consumers to carry lower stocks than they have been accustomed to during the past, not being anxious to overload themselves in face of the uncertainties of existing nervous position owing to the delayed action of the Government in relation to the further regulation of prices. Copper is not active as producers are reluctant to sell. Tin has strengthened after a brief spell of weakness. Spelter is quiet and easier. Lead is less active with a lower tendency. Antimony and aluminum are both quiet and easier.

Copper.—Following the fixing of a price for the sale of copper, the American Government has appointed a committee to assist in the distribution of the metal. It is not yet known just what are the functions of this body, but they will co-operate with the producers in seeing that all demands are filled to meet the needs of the situation. While in some respects the price that has been set for the sale of copper will prevail on the open market, it has been reported that high premiums have been offered and accepted for second hand metal. The situation at present is one of uncertainty as the producers are evidently waiting a reply from the Government in connection with their requirements before meeting the demands of the trade. Under these conditions metal is accumulating at the refineries. Local prices are unchanged at 31 and 30c per lb.

Tin.—This metal is not directly affected by the regulations that are being put into force but is nevertheless influenced by the action of the Government, and when the situation becomes more settled it is anticipated that the British authorities will to some extent reciprocate, with the result that tin may also come under the regulations that are now under consideration. The present demand for tin has shown a little increase and a better tone has developed, but the quotation of 60¾c on the New York market shows a decline of ¾c over that quoted last week. The market here is unchanged and dealers continue to quote last week's price of 63c per lb.

Spelter.—The quiet demnd for spelter during the past few weeks has resulted in the accumulation of stocks, which under present conditions tends to increase the weakness of the market. Producers are still ignorant as to the Government requirements, which continues to keep the market in a very unsettled condition. A slight decline has been announced in the New York quotation, but dealers here are still quoting last week's price of 10½c on a quiet and featureless market.

Lead.—The market appears to have attained a more normal condition than it has experienced in many months. The demand at present is comparatively light and does not correspond to the quantity being produced. These conditions are resulting in the accumulation of stocks that will eventually materialize in a still weaker market, unless increased buying follows the developments that are taking place in Government circles. As a shortage of lead becomes less apparent the consumers are not so anxious to load up with much surplus material, which tends to make the outlook more encouraging. New York continues to quote 8c as the base price, although sales are reported to have been made at slightly lower figures. The situation locally is unchanged with dealers quoting 11c per lb.

Antimony.—Increased supplies and lighter demand has developed a weaker market and prices have a downward tendency; New York quotations having declined ⅜c to 15¼c per lb. Local conditions and prices are unchanged at 18c per lb.

Aluminum.—The market has become a little easier in face of the lighter demand. Prices here however, are unchanged at 63 to 68c per lb.

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.

Machine Tools and Supplies

Activity throughout the machine tool industry is more of a general but quiet character, although small increases have been noted in the demand for shell machinery, particularly for the six inch sizes. Business is not brisk but the volume is sufficient to maintain interest. The embargo on steel and iron has affected the manufacturing operations as it is becoming increasingly difficult to obtain delivery on steel etc., even when it is known that the same is to be used for war requirements. However it is hoped that as the situation becomes clearer, the Government will turn their attention to the relieving of the acute conditions that dominate manufacturing activities. In view of the abnormal requirements in the States on account of the heavy program for munitions and supplies, the machine tool industry across the line is exceptionally active, and in some instances representatives from the States have opened negotiations with Canadian firms for the purchase of some or all of their shell equipment that has become more or less a burden since the falling off of shell con-

tracts. The demand for all classes of supplies continues to be encouraging although the business in this direction has shown a proportionate decline with that of the munition industry. Owing however, to the difficulty of obtaining raw materials and the high cost, the market in supplies continues very firm.

Scrap

Still uncertain as to the attitude of the American Government in connection with their policy of fixing prices for old materials, the scrap market remains in a very unsettled condition. Trading is light, dealers and consumers arranging only for their immediate requirements. The prices that have been set for the sale of steel and iron products, as well as certain metals, has had no material effect upon the quotations on old materials, and dealers and consumers of scrap are anxiously awaiting the action of the adjusting committee on which to base their future trading. Despite the fact that the price of copper has been set at 23¼c, the New York quotation for old copper is practically on a par with that of virgin metal. The market here is much the same as in New York, being unsettled, with dealers holding firm at prices quoted last week.

TORONTO, ONT., Oct. 9.—The chaotic condition prevailing in the iron and steel industry is causing considerable anxiety in manufacturing circles, and seems destined to restrict production of many products required for the carrying on of manufacturing operations. The effect of the embargo will be widespread, as the shortage of iron and steel will make it very difficult for some consumers to continue operations, except in a limited way. While certain industries, such as those engaged upon war work, will perhaps not be affected to any great extent, there are others which will be seriously hampered. The whole question is so complicated, as many industries are closely connected, that an adjustment satisfactory to all seems almost an impossibility. Those manufacturers to whom relief cannot be extended will be obliged to accept conditions with good grace in view of the necessity of providing for war requirements first.

Steel

The outlook in the trade in regard to the embargo continues obscure, and will remain so until the question has received further consideration by the authorities at Washington. What is likely to develop is difficult to say, but it is not easy to be optimistic concerning the outcome of the negotiations. The embargo was put on for the specific purpose of conserving the steel output for war poses. As the U. S. Government requirements for this purpose are increasing all the time, the supplies available for domestic requirements are that much less. Canadian consumers will naturally be affected to the same extent as those in the States, if not more so; it is, therefore, difficult to see how the situation can be materially improved. Steel will be allowed to come in under license for shipbuilding, railways and farm implements, which covers a fairly extensive field, but there are still many other industries not engaged in war work which will unfortunately suffer. This latter contingency could hardly have been avoided, embargo or no embargo, for there has been for sometime a shortage of steel which promises to become more acute in view of the heavy demands for war purposes. Although much has been written about the serious situation created by the embargo, which in the main is true, it must not be forgotten that for some time past deliveries have been very backward and supplies difficult to obtain. The embargo has served rather to bring the situation to a climax than to add greatly to its difficulties. It has, however, brought the trade to a more thorough realization of existing conditions, and in this respect may be a blessing in disguise, for a united effort is now being made to obtain relief.

There has been no further development in regard to prices, which continue on the same basis as last week. What is likely to materialize in this regard is problematical, as the situation is so confusing. On account of conditions prevailing in the market, business is practically at a standstill. The state of the market here reflects conditions across the line, where the steel industry continues unsettled pending the completion of the Government regulation of prices. Until this matter is finally disposed of the present unsettlement seems destined to be prolonged. Canadian mills are hardly likely to take any action, even if they propose doing so, until the situation in the States becomes more settled.

CANADIAN GOVERNMENT PURCHASING COMMISSION

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

Pig Iron

Business is practically at a standstill, owing to the unsettled situation created by the embargo and price regulation. Consumers are showing a disposition to await developments as the outlook is so uncertain. There is every reason to expect continued quiet conditions in the market as most consumers are covered for 1917 and the output of practically all furnaces has been sold up to Jan. 1st. An announcement is expected shortly at Washington giving definite prices on all grades of pig iron. Local prices are unchanged in the meantime but are nominal.

Scrap

The market is practically stagnant due to the unsettled conditions created by the embargo and price regulation. Prices on all scrap metals are unchanged and are more or less nominal as it is difficult to quote prices when so little metal is changing hands. While the market has a weak tendency just now, it appears likely that owing to the shortage of good scrap, prices may become firmer. No developments of importance however, may be expected until the market is more settled.

Machine Tools

The list of products upon which an embargo has been placed includes boring mills, 42 in. and larger; lathes, 30 in. swing and larger, and planers over 36 in. wide. It is likely that exception will be made in the case of tools required for railway shops and shipyards, although this has not been stated definitely. In any event, it should encourage the building of these tools in Canada to a greater extent than formerly. Business has been rather quiet this week, although the renewed activity in the munitions industry is creating a demand for special tools for 6-in. shells.

Supplies

The demand for machine shop supplies is fairly active and prices continue firm, with an upward tendency on some lines. One firm of dealers report a scarcity of emery wheels and carborundum wheels, and have accordingly instructed their representatives to discontinue quotations. In lieu thereof they are placing an artificial abrasive wheel before the trade, which they are quoting at 45 per cent. off list. Recent costs of asbestos sheeting to importers from the United States have necessitated a material advance in prices locally. Where formerly the range of prices was from $9 to $12 per 100 pounds, the new range is from $12 to $15, representing an advance of 25 per cent. This material is scarce and very hard to obtain. A shipment came into the local market recently and the first cost to importers established a new record for this material. Other building materials held steady in price during the week.

Metals

The metal markets continue dull and featureless, while prices are unchanged on the basis of last week's quotations. The copper market holds firm, due more to the embargo than for any other reason, although the decline in production may have something to do with it. Tin is unchanged with light demand, while lead is holding steady. Spelter aluminum and antimony are dull and unchanged.

Copper.—Although the price of copper has been fixed at 23½c New York, there is practically no business being done at this figure, except by the U. S. Government. Supplies of copper available for private consumers are very scarce, and the serious decline in production caused by the strikes has aggravated the situation. The local market is holding firm on account of the embargo, the price regulation not having as yet affected this market. Lake and electrolytic copper is quoted at 32c and castings at 31c per pound.

Tin.—The market is steady and a little

firmer, although prices are unchanged. The London market has advanced. Tin is quoted nominally at 63c per pound.

Spelter.—The market is quiet and easier in New York owing to the lack of buying interest. Locally there is no change in the situation and spelter is being quoted at 10½c per pound.

Lead.—There is a fair demand for lead and the market is holding steady at unchanged quotations. Price, 11c per pound.

Antimony.—The market is dull, with no inquiry, but prices are steady at 19c per pound.

Aluminum.—The market continues dull and demand light. Consumers are well supplied for the time being, and have retired from the market. Local price, 62c per pound.

NEW YORK, Oct. 6.—The machinery industry is on the crest of a wave of prosperity. Never before have such large orders for machine tools been placed in a single month as during September, and buying this month bids fair to be of equal magnitude. In the last two weeks machinery orders placed are valued at $18,000,000. The War and Navy Departments and manufacturers having large Government contracts for various kinds of war munitions, are the main factors in the buying at present. The largest recent orders have been placed by the General Electric Co. for equipping the Erie, Pa., plant. These contracts have amounted to about $2,500,000. The same company has also ordered tools to be installed at the Schenectady, N.Y., and at the West Lynn, Mass., works. All of these plants are working on Government orders. The American International Corporation has the distinction of placing the largest single contract for hoisting machinery ever given to a single manufacturing concern, valued at $2,400,000. The equipment purchased is for the Government shop-assembling plant on Hogg Island. The derricks included in this order were bought from the American Hoist & Derrick Co. of St. Paul, Minn. The American Corporation is also closing contracts for $218,000 worth of pumps and air compressors, and is still negotiating for machine shop power plant equipment.

Adopt Electric Furnaces

The United States Government is about to emulate the example of British Government in making guns from heavy castings of special steel, and to that end has placed contracts for seven additional electrical furnaces costing $50,000 each. These furnaces, of the Herault type, will be manufactured by the American Bridge Co. Three of the furnaces will be installed at the Watertown Arsenal and one at the ordnance plant at Washington. The castings will be mainly for the manufacture of short howitzers. Heretofore practically all of the guns manufactured in this country have been made from steel forgings. The other three furnaces will be installed at the Government plant now building at Charleston, W.V. The steel produced will be used in the manufacture of high explosive projectiles. The United States Navy Department is now taking bids on 61 machine tools for the Boston Navy Yard. The Navy Department has also awarded contracts for additional magazine warehouses at Lake Denmark, New Jersey. The Crucible Steel Co. of America, which is also understood to have adopted electrical steel castings in the manufacture of ordnance and which has been a heavy buyer of machinery to execute Government contracts, has again come into the market for a large number of machines required for manufacturing shells for the Government. It is understood that the work will be done at the Harrison, New Jersey plant. Several other manufacturers, having received Government orders for gun mounts, gun carriages and primers, have been buying machine tools actively. Several large shipbuilding concerns, including the Fore River Shipbuilding Corporation, the Merchant Shipbuilding Corporation and the Chester Shipbuilding Co., have placed contracts for between $3,000,000 and $4,000,000 worth of machine tools, cranes, hydraulic and other machinery required to equip the plants now building to take care of the Government contracts for cargo boats and war craft recently placed. The Fore River Shipbuilding Corporation will build 75 of the 150 destroyers for the United States Navy for which contracts are placed.

Aircraft Manufacture

Several manufacturers who have recently received orders for building Liberty airplane engines amounting to about $10,000,000, are now actively in the market for machine tools calling for the expenditure of nearly $1,000,000. At Detroit, the Lincoln Motor Co. is spending $5,000,000 for plant and equipment to manufacture aircraft engines. It is understood that manufacturers in the Detroit district now hold Government contracts for motor cars, trucks, airplane engines and other war munitions aggregating $250,000,000. The American Car & Foundry, Detroit plant, has just received another large contract for artillery wagons, and the Government is now taking bids on 40,000,000 rounds of ammunition.

PITTSBURGH, Oct. 6.—There is not much light on the iron and steel market situation as yet, even though it is practically a fortnight since the announcement was made that prices are to be controlled and held at the same level for all classes of buyers, the Government, its Allies, and the general public. It is freely admitted that the agreement between the Government and the producers was rather unexpected by the latter. The majority opinion had been, apparently, that no agreement could be reached, at least without further delay. Very nearly all the producers have since expressed themselves as very well satisfied with the agreement.

The schedule of fixed prices has not been enlarged since the first announcement, detailed in last report, which fixed Lake Superior iron ore on the 1917 season basis, set pig iron at the general level indicated by $33 at valley furnaces for No. 2 foundry, basic and malleable, and set bars at 2.90c, shapes at 3.00c and plates at 3.25c. The steel manufacturers assert that the Government's statement that the bar, shape and plate prices were to be "Pittsburgh or Chicago" is an error, that the Pittsburgh basis is to obtain as formerly, and that Chicago prices will be Pittsburgh prices plus the freight of 18.9 cents per 100 lbs.

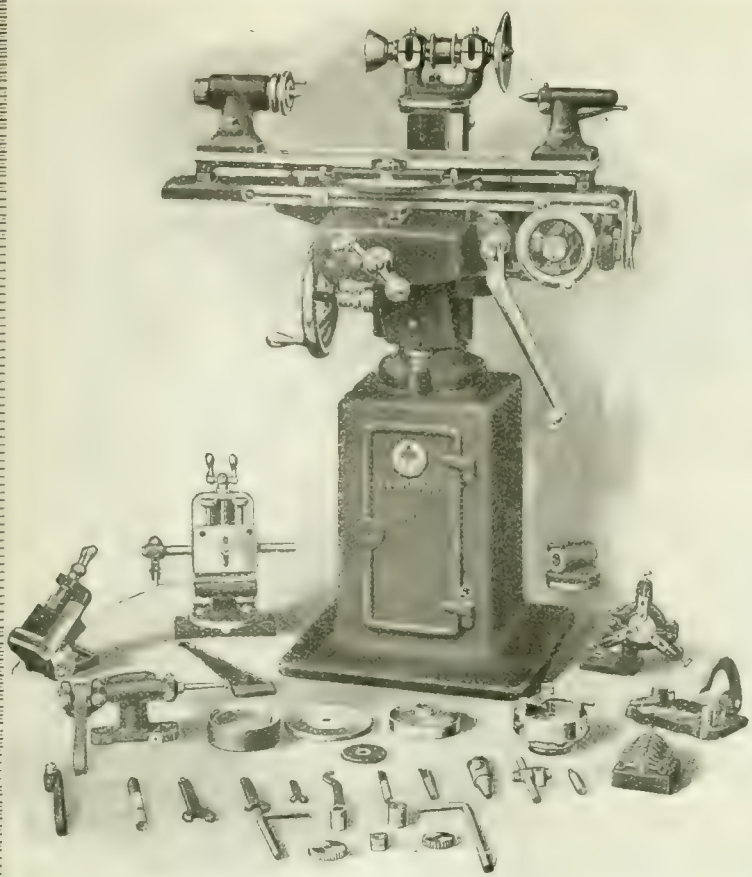
The various other prices are to be fixed by the manufacturers submitting tentative prices to the War Industries Board, which will make all announcements. It is understood that prices on a number of commodities have already been submitted, and a fresh batch of prices is expected to be announced at Washington next week.

No Offerings

There is practically no material being offered at the new prices. Fixing prices at a reduced level has naturally not increased the offerings, but is certain to decrease them, for the whole trend of the market now will be to reduce the volume of obligations on mill books. The control of the Priority Board, it appears, is going to be quite rigid and complete. The Board will fix the sequence in which all orders on books are to be filled, hence delivery is going to depend very much less upon when the order was placed than upon the use to which the purchaser is going to put the material. Some buyers would like to place orders for small tonnages for early deliveries, but, of course, such are not offered, and the average buyer has no incentive to buy at this time, as in the circumstances he has no assurance of delivery, nor is he moved by fear that if he delays prices will be higher. It seems to be the common opinion that if prices as now being fixed are altered in the future, the revision will be downward rather than upward.

Wire Products Easier

Apart from the matter of price fixing, wire products are easier. There have been three classes of contracts of late—those on the basis of $3.20 for nails, confined to the American Steel & Wire Company, and those at $3.50 and $4 in the case of independents. For a while the shipments of independents were rather largely on the $4 basis, but now these contracts seem to be rather dormant and shipments are being made against $3.50 contracts. There are even rumors of independents going back to the $3.20 basis. It is the common view that $3.20 will be the fixed basis, but, of course, if wire could not be bought on that basis, buyers would specify on $3.50 or $4 contracts. The sheet market has continued to weaken, although only slightly. There is really not much demand, and perhaps there would be more shading if the mills saw a prospect of securing a reasonable volume of tonnage by that means. Buyers are holding off, and perhaps when sheet prices are fixed there will be found to be considerable demand, on account of requirements banking up. Whatever the basis fixed, it will certainly be much below 8.00c for 28-gauge black, and even now there are few, if any, mills quoting as low as that. It is believed that several of the mills have shipping orders for only a very few weeks ahead of them, though others are well filled. The Am-



A Cutter Grinder that

IS ALSO { a Cylindrical Grinder / a Surface Grinder / an Internal Grinder

That's the Le BLOND Universal Tool and Cutter Grinder. It is a complete tool-room machine: sharpens all sorts of cutters, including large face mills and saws.

The AUTOMATIC TABLE FEED enables you to do cylindrical, internal and surface grinding with the greatest facility.

SPECIFICATIONS:

Swings	8" dia. x 17	between centres	
Table working surface		29" x 5¼"	
Automatic longitudinal feed			16"
Vertical feed	7¾"	Grinds cutters to	.18 dia.
Cross Feed	6¼"	Grinds saws to	.36 dia.

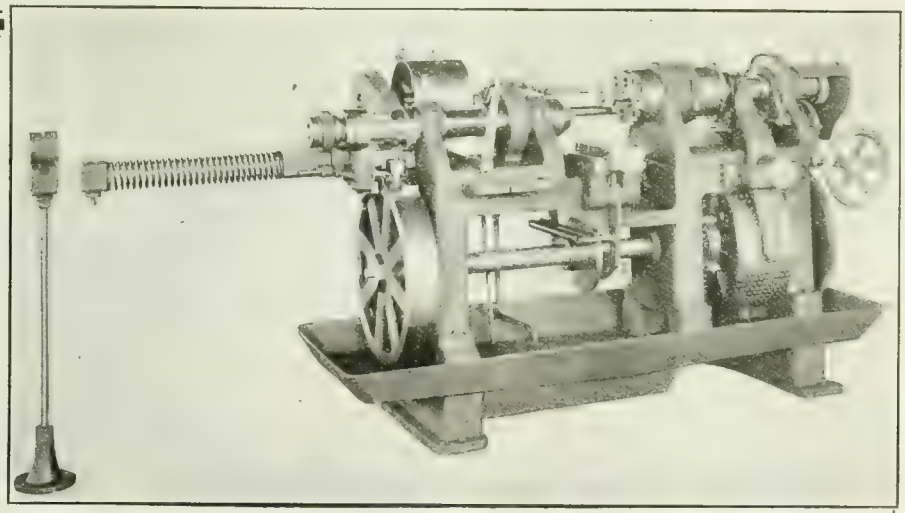
IN STOCK TORONTO *Send for catalog describing this machine.*

The A. R. Williams Machy. Co.
Limited
64 Front St., W. Toronto

The Chicago Automatic Screw Machine

TEN YEARS OF EXTENSIVE MANUFACTURE OF ONE PRODUCT — AUTOMATICS — STAND BEHIND EVERY MACHINE.

No complicated mechanism or a system of cams that are difficult to determine and arrange on this machine.



The rigidity of the machine has not been sacrificed for the flexible features which are embodied in the Chicago Automatic. Alignment is correct and there are no parts where excessive wear takes place—therefore, accurate production is assured during the long life of the machine.

Spindle speeds suitable to different sizes and kinds of stock within the capacity of the machine are obtained by changing two gears on the spindle head.

In less than six weeks we can place Chicagos in your plant ready for production.

They must satisfy you before we consider them sold. Write us about all the features now.

THE JOHN MACNAB MACHINERY COMPANY
NEW YORK CITY, U.S.A.
European Representatives: John Macnab, Hyde, England

erican Sheet & Tin Plate Company will hardly finish filling its second half contracts before the end of January.

Production Unsatisfactory

There is no improvement in production, which has been in the neighborhood of 10 per cent. under capacity for months past. In pig iron the rate is below the rate of last year, while in steel the rate is slightly greater, but both blast furnace and steel works capacity has been materially increased in the past year, so that capacity operations would show a much larger tonnage. Production of pig iron in September was at the lowest rate since last February. Production since January 1 has been at the rate of 38,750,000 tons a year, while the actual production last year was 39,434,797 tons. The restriction in output is due almost entirely to shortage of coke, and there is an interesting discussion whether the fixing of the coke price at $6, when the market had been $10 to $15 for months past, will result in larger production. The 10 per cent. wage advance, which came about under the leadership of the Steel Corporation, became effective October 1, and applies to the coke region as well, but a wage advance does not necessarily increase the supply of men or their assiduity in keeping at work.

Ore Shipments Sufficient

Lake Superior iron ore shipments in September showed a slight decrease from those of the preceding September, the three preceding months having shown gains. Present prospects are for a total movement out of the Lake Superior region of 64,000,000 tons for the year, or a decrease of more than 2,000,000 tons from last year. There will be no shortage of ore, however, at the furnaces tributary to the region. There might have been a shortage if production of pig iron had not been restricted by shortage of coke. There will probably be no surplus for the eastern producers to draw upon, when their supplies of imported ore are restricted and are very expensive.

Market Prospects

There is no likelihood of a really active market in pig iron or steel products for some time to come, even after the full schedule of prices has been developed. Consumption is certainly slowing down in many directions; while apart from that delivery, prospects are so uncertain, on account of the priority to be given to certain classes of orders, that the trade is likely to trend towards a hand-to-mouth basis for doing business. As to prospects for consumption, there is the startling fact that the regular railroads did not order a single freight car in either August or September. There were some orders placed, though not in large volume, by private shippers or industrial railways, by foreign buyers, and by the Government. The car shops are still working, but their orders would have been practically completed months ago if their output had not been restricted by slow deliveries of steel.

COAL PRODUCTION IN CANADA

REPORTS from the principal coal mine operators in the Dominion for the six months ending June 30, last shows a total coal production of 6,154,420 short tons. Nova Scotia led all other provinces with a total of 3,058,216 tons. Alberta was second with 1,763,506 tons and British Columbia third with 1,100,100 tons. Exports averaged around 130,000 tons per month, and were considerably lower than for the same period a year ago. Total production for 1916 was 14,483,395 tons. Bituminous imports for the first six months of the year were 6,392,378, compared with 5,848,289 for the same period a year ago. Anthracite imports up to June 30, 2,231,857, and for the corresponding period last year 2,097,151.

Tokyo, Japan, Sept. 17, 1917.
To the Manager of the Canadian Machinery and Manufacturing News,
143-153 *University Ave., Toronto, Canada.*

Gentlemen,—We beg to introduce ourselves to you as one of the leading machinery importers in Tokyo, who have been in the business for the past 15 *years, devoting themselves exclusively to the line of machine tools.*

Now that the United States of America, from whom we have been buying solely in the past, has recently declared an embargo on machine tools, we are now under the necessity of finding other sources elsewhere.

Although your machine tools have not yet been much used in this country, the present check will be a fair chance to give an opportunity to your manufacturers to cultivate this field for their products.

Under the circumstances as hitherto stated, we shall feel much obliged if you will kindly bring them to the notice of your manufacturers and interested parties so as they may approach us directly by means of letters and catalogues.

Thanking you in anticipation,
Yours truly,
ROKUROKU SHOTEN,

Total coke production in Canada for six months was 580,997. Imports were 490,830, and exports 8,905. Production of coke includes only the coke made in bee-hive or by-product ovens and does not include coke made by gas companies in retorts.

STEEL PRODUCTION FOR WAR PURPOSES

THE steel industry in the United States in the last nine months has operated at an average rate of about 3,600,000 tons of steel ingots per month, which would give an annual output of 43,200,000 tons of ingots, permitting the production of approximately 32,400,000 tons of rolled products. The United States Government is calling upon the steel mills now for about 5,400,000 tons of various products for war purposes, and this tonnage, doubtless, will be increased by a million tons in the near future. Of the total annual output of the rolling mills, therefore, the United States Government is taking 16.6 per cent., and this probably will be increased to 20 per cent. within a few months. If it be assumed that the Government will pay an average price of 3 cents per pound for this material, the total expenditure will be $416,880,000 for this 5,400,000 gross tons, or $500,256,000 for the 6,480,000 tons to be bought.

The Allied Governments to-day are taking 2,600,000 tons of steel from the United States mills, and this will be increased to 3,600,000 tons in the near future, equivalent to about 11 per cent. of mill output. Together, the United States and Allied Governments, therefore, will take about 30 per cent. of the total rollings of the steel mills, and there is a possibility that 40 per cent. may be needed when all of the indirect demands for war munitions have been satisfied.

Of the 20.000.000 tons of unfilled orders on the books of the steel companies, it is understood that only a few million tons represent war orders, so that in the aggregate mill capacity is pre-empted for almost a year. This does not mean that all products are fully sold for this period. In some lines mill capacity is sold for six to eight months, while capacity to produce other products has been taken up for from twelve to fourteen months.

S. S. REGINOLITE TRIAL TRIP

THE fourth oil tank steamer, the Reginolite, which Collingwood Shipbuilding Co. has on contract for the Imperial Oil Co. of Sarnia, was given a trial trip, on Sept. 30. The day was stormy, but the steamer came up to the mark in every detail, and especially in the matter of speed, the contract in this being exceeded by one and a half knots per hour.

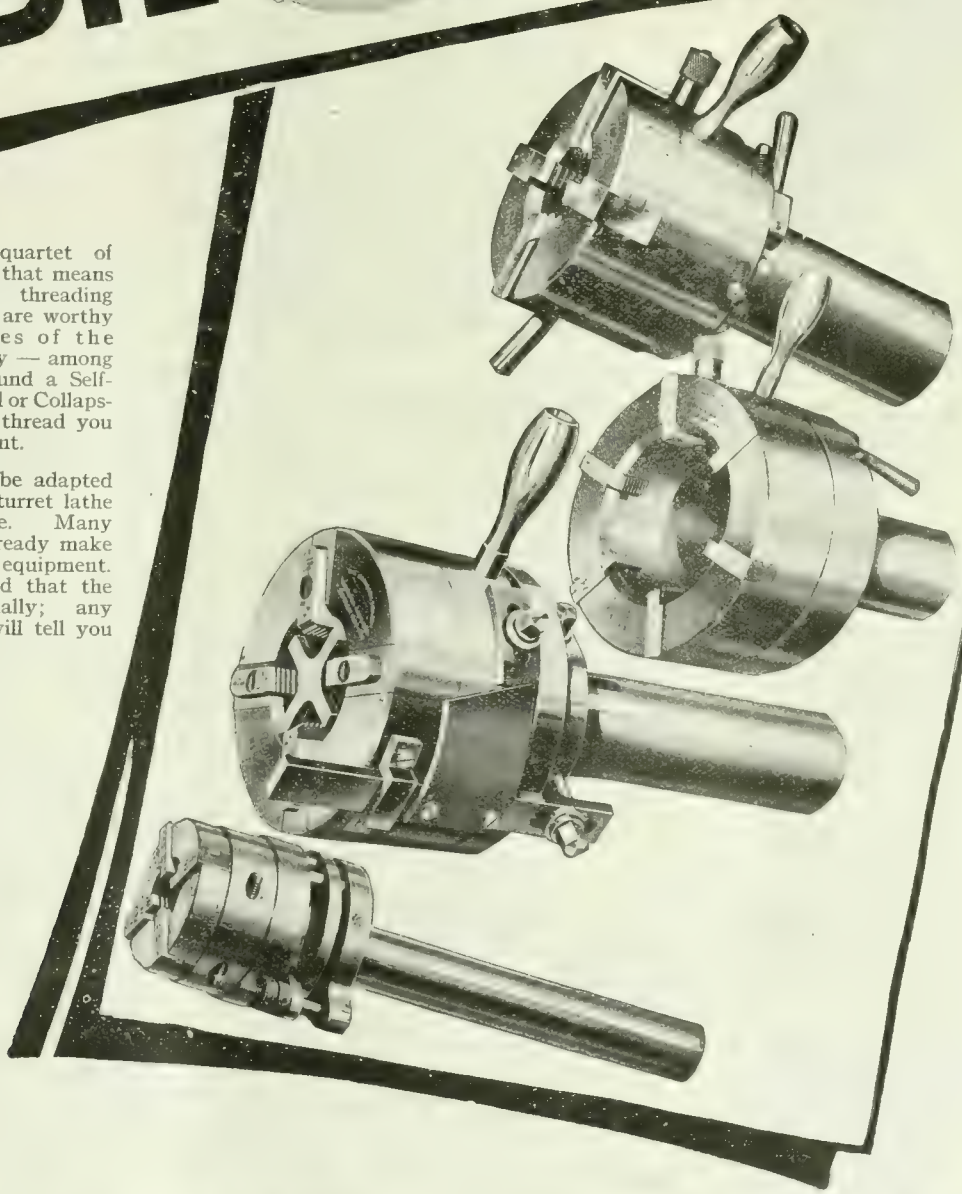
This vessel is intended for ocean service exclusively and is of the following dimensions: Length, 250 ft.; breadth, 43 ft. 9 in.; depth, 25 ft. moulded. The vessel is divided into five cargo tanks, and with a longitudinal counterline bulkhead running the full length, making ten oil tanks in all. A fuel oil bunker is fitted immediately in front of the boiler-room and a bulkhead separates this from the main cargo tanks.

The main propelling machinery consists of one set of triple-expansion engines having cylinders 18, 30 and 50 inches by 36 inch stroke, steam being supplied by two single-ended Scotch boilers 13 ft. 6 in. diameter by 11 ft. long, steam pressure 180 lbs., working under natural draft.

The oil pumping arrangement is of the most elaborate kind of design, the object being to handle the cargo in the most expeditious manner.

The fifth steamer of this type for the same company may be launched this week.

GEOMETRIC DIE-HEADS



HERE'S a quartet of die heads that means death to threading trouble. They are worthy representatives of the Geometric family — among which can be found a Self-Opening Die Head or Collapsing Tap for any thread you could possibly want.

These tools can be adapted to any make of turret lathe or screw machine. Many manufacturers already make them standard equipment. We are convinced that the rest will, eventually; any Geometric user will tell you why.

THE GEOMETRIC TOOL COMPANY

NEW HAVEN CONNECTICUT

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

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

INDUSTRIAL AND CONSTRUCTION NEWS

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

ELECTRICAL

St. Thomas, Ont.—Several farmers residing in the neighborhood of Dutton have petitioned the Dunwich Council to have the hydro-electric extended to their premises. The Council will make a requisition upon the Hydro-Electric Commission to install the power.

ENGINEERING

Winnipeg, Man.—The Canada Metal

Montreal, Que.—The Simonds Canada Saw Co. will make additions to its plant and instal new equipment to cost $5,000.

Hamilton, Ont.—The Toronto, Hamilton and Buffalo Ry., will build a machine shop here.

Perth, Ont.—H. K. Wampole & Co., are building a soap factory and are in the market for power plant equipment.

Hamilton, Ont.—The Canada Screw Co., are building an extension to their factory. W. H. Yates has the general contract.

Campbellville, Ont.—The cars of machinery have arrived here for oil drilling operations to be carried on here. Oil leases have been secured on a large block of land.

Toronto, Ont.—A building permit has been issued to the Willys-Overland Co., for the construction of a one-storey brick addition to machine shop on Weston road, to cost $3,500.

Toronto, Ont.—The Imperial Government has placed a large contract with the Willys-Overland Co., Weston road, for the manufacture of airplane motors. The necessary plant is now being installed, and the work will give employment to a large number of additional hands.

Toronto, Ont.—The request of the Toronto Harbor Commission for permission to sell a site of four acres of land in the Ashbridge's Marsh industrial district to the Imperial Oil Co., has been rejected by the City Council. Leave, however, was granted the company to erect a large tank for the storage of gasoline and to lay conduits under certain streets, so that it might supply oil to the Consumers' Gas Co. Whether this will be done is an open question, as the management of the company has repeatedly declared that it will not make large expenditures on land of which it cannot obtain the freehold.

Penticton, B.C.—Announcement was made recently of a railway, mining and power development programme involving the early expenditure of over $6,000,000, in the Southern Okanagan and Similkameen Valleys. The Kettle Valley Railway Co. will build a branch from Penticton to Copper Mountain through 14 miles of mountainous country at an expenditure of approximately $1,000,000. This is to provide ore freight facilities for the Canada Copper Co., which is entering upon a two and a half million dollar programme at Copper Mountain. A large concentrator is to be built as soon as the property is on a producing basis, and a smelter probably will be erected later. The Kootenay Power Co. will expend $2,500,000 in building a high tension power line from Greenwood, west as far as Copper Mountain, and will extend a line to Penticton for industrial purposes.

CONTRACTS

Stirling, Ont.—Quinlan and Robertson, Ltd., Crookston, received word from the Provincial Department of Highways that their tender for the construction of a permanent road on St. Lawrence Street, Madoc, has been accepted.

GENERAL

Melfort, Sask.—The Saskatchewan Co-operative Creameries will build a cold storage plant.

Weston Ont.—A new firm contemplate establishing a factory here for making rubber tires. The company is appealing for a fixed assessment on a prospective site.

St. Thomas, Ont.—The planing mill of D. L. Shafer of St. Thomas was badly damaged by fire on Oct. 3. The fire started in the drying kiln and before the flames were extinguished the stock and building were damaged to the extent of $7,000, partly covered by insurance.

INCORPORATIONS

W. Harris & Co. has been incorporated at Toronto with a capital of $500,000 to manufacture fertilizers, glue, casings, etc., at Toronto. The incorporators are: J. B. Harris, F. K. Harris and J. H. Harris, all of Toronto.

Standard Foundry & Supply Co. has been incorporated at Toronto to carry on a general foundry business at St. Thomas, Ont., with a capital of $40,000. The provisional directors are Fred S. Ferguson and Tom P. Charlton, the former being the general manager.

Central Iron Works, Ltd., has been incorporated at Ottawa to carry on business as ironfounders, steel melters and manufacture metal goods of all kinds at Toronto, with a capital of $100,000. The incorporators are: A. J. Thomson, W. S. Morlock, and R. H. Parmenter, all of Toronto.

BUILDING

Winnipeg, Man.—The Canada Metal Co. of Toronto, propose enlarging their office building here to take care of large increase in business contemplated after the war.

MUNICIPAL

Alvinston, Ont.—Town Council contemplates the installation of an electric lighting system.

Aylmer, Ont.—The Town Council will purchase electrical transmission equipment, motor-driven pumps, etc.

Rosthern, Sask.—The Town Council will install a power plant. The Perry Electric Co. of Edmonton have the contract.

St. Mary's Ont.—The Town Council are building an addition to the civic power plant and are in the market for a motor driven pump.

Victoria, B.C.—The City Council are selling off a large quantity of plant, machinery, fire equipment and corporation supplies of various kinds.

Chapleau Township, Ont.—The Township Council will build an addition to its pumping station and instal an electrically-operated pumping unit to cost $6,000.

Prince Rupert, B.C.—The preliminary readings of a bylaw to raise $10,000 for the extension of the water mains at Seal Cove took place at the council meeting recently.

Winnipeg, Man. — City Engineer Brereton has been instructed by the Board of Control to advertise for sale a quantity of machinery for which the city has no further use.

Toronto, Ont.—On the new Ottawa-Prescott highway, where operations are expected to start next spring, and which is to cost the municipalities something like $160,000, the work is to be under the direction of the Provincial Government Department of Highways.

Brandon, Man.—The sale has been completed of the properties of the Brandon Electric Light Co. and the Brandon Gas & Power Co., to the Canada Gas & Electric Corporation, a company composed of financial interests in the City of Cleveland. G. A. Paterson, who for the last twenty-five years has been managing director of the Brandon Electric Light Co., has been appointed general manager of the new corporation's properties in Brandon.

Montreal, Que.—At the Board of Control meeting a letter was read from T. M. Kirkwood, of the Three Rivers Shipyards, Ltd., asking if the city would be willing to guarantee a bond issue of $500,000 for the erection of a shipbuild-

ing yard in Montreal. The Board decided to send the proposal to the law department and to the City Council for report.

WOODWORKING

Langley, B.C.—Fire on Sept. 30, completely destroyed the saw mill and shingle mill of W. E. Laking. The loss is partly covered by insurance.

PERSONAL

Norman A. Hill, an American efficiency expert and engineer has been appointed general manager of Carriage Factories, Ltd., Montreal.

H. A. Harrington, of Toronto, secretary of the Retail Merchants' Association of Canada, has been appointed Assistant Ontario Fuel Controller.

Charles C. Ballantyne head of the Sherwin-Williams Paint Co., Montreal and a prominent business man of that city has been appointed Minister of Public Works in the Dominion Government.

M. Clifton Dawson, formerly district superintendent of the Pullman Co., Toronto, died in Toronto on Sept. 29. Mr. Dawson had been in the service of the company for the past thirty-years.

M. J. McCormick, for some time manager of the machine tool department of the Canadian Fairbanks-Morse Co., Montreal, Can., has resigned to accept a position with the McCormick Machinery Co., Montreal.

A. C. Boyce, M.P. for West Algoma, Ont., has been appointed to the Board of Railway Commissioners. Mr. Boyce was born at Wakefield, Yorkshire, England, in 1867. He graduated from Osgoode Hall, Toronto, with honors and a bronze medals in 1890, and has practised law in Sault Ste. Marie since 1903.

Dr. Otto Julius Klotz, LL.D., F.R.A., has been appointed chief astronomer for the Dominion Observatory. Dr. Klotz entered the service of the Dominion Government in 1879, and since 1908 has been assistant chief astronomer. He was born in Preston, Ont., and educated at the Galt Grammar School and Toronto University.

John Dennis has been appointed inspector of stationary and hoisting engineers under the supervision of the Stationary Engineers Board, Department of Public Works for the Province of Ontario. Mr. Dennis who has been serving in the R.N.C.V.R. for the past year was also a member of the C.E.F. until transferred. He served in the British Navy for nine years in the capacity of engine room artificer.

F. Borysewicz has been appointed assistant general manager for Canada, of the Liquid Air Society, with headquarters in Montreal. Before coming to Canada, Mr. Borysewicz was connected with the work of the Society of Japan, having taken a similar position there some years ago, previous to which he had been asso-

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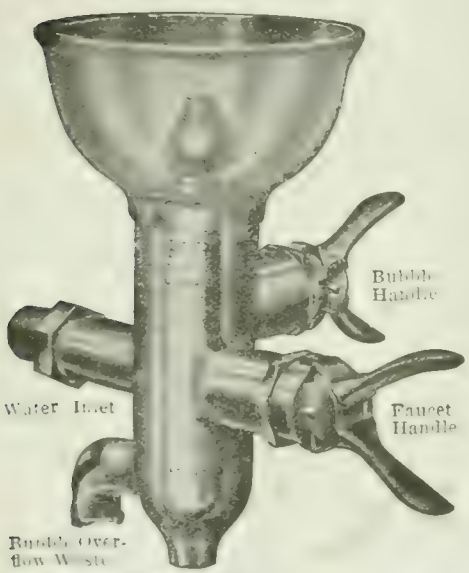

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ciated with the head office in Paris, France. In the absence of Mr. Jordan, who is now in France, Mr. Borysewicz is acting general manager.

TRADE GOSSIP

The London Rolling Mills Co. has increased its capital stock to $500,000.

Hopewell Hill, N.B.—The copper mine at Midway, owned by Henry A. Copp & Sons, has been optioned to J. D. Hubbard, of Chicago, the price mentioned in the option being $750,000. It is said the ore has a heavy percentage of high-grade copper and the veins run to great length.

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

Tungsten Demand Active.—The demand for tungsten continues active and the market in New York is firm at unchanged prices. Wolframite is quoted as to quality at $23 to $25 and Scheelite at $26 per unit for the highest grade on the basis of 60 per cent. metal or 30c per unit additional up to 65 per cent.

Welding & Supplies Co. — A new company has recently been formed in Montreal, under the name of Welding and Supplies Co., to carry on a general oxy-acetylene welding business, and a plant has been located at 1227 Ontario Street East. C. Roger, formerly Canadian manager of the "L'Air Liquide Society," is manager of the company.

Launching At Kingston.—The launching of the first of two Fishery Protection Vessels was successfully accomplished at the Kingston Shipbuilding Co's. yards at Kingston, Ont., on Sept. 27. The christening ceremony was performed by Mrs. H. C. Walsh, manager of the company. The vessel will be known as the Loos. Length between perpendiculars is 130 feet; breadth, moulded, 25 feet; depth, moulded, 14 feet 3 in. The sister ship, which will be known as the Thiepval, will be launched in a few weeks. Both are being built to Lloyds' specifications for ocean service.

Embargo on Machine Tools.—The Exports Administrative Board, Washington, D.C., has issued a further list of commodities, the export of which is practically prohibited. The list includes the following: Oil well casing, boring mills, vertical, 42 inches and larger; engine lathes, with 30-inch swing and larger; planers, metal working, 36 inches wide and larger. Export licenses may be granted for the above articles when destined for actual war purposes, or when they will directly contribute thereto. Individual licenses will be required for shipment to Canada and Newfoundland.

Fishing Protection Vessels Launched. —Two vessels for the Fishery Protection Service were launched at Collingwood on Oct. 1, having been built by the Collingwood Shipbuilding Co. to the order of the Naval Service Department, of which Capt. J. W. Norcross is the director of ship construction. The vessels have the following dimensions: Length, b.p., 125 feet; length over all, 135 feet; breadth, 23 feet 6 in.; depth, 13 feet 6 in. Triple-expansion engines, 12½, 21½ and 35 in. by 24-inch stroke, steam being supplied by one boiler 13 feet 6 in. diameter by 10 feet 6 in. long, working at 180 lbs. pressure. Accommodation is provided for a crew of 17 men.

The National Potash Corporation, Ltd., with E. L. Wettlaufer, of Wettlaufer Brothers, Toronto, as president, has been incorporated to manufacture and produce potash in Canada from feldspar in the vicinity of Muskoka Lakes, where it is found in large quantities. The company has acquired the plant of the Gravenhurst Crushed Granite Co., Ltd., of Gravenhurst, Ont. The officers of the National Potash Corporation, when it is fully in operation, confidently anticipate that they will be able to sell potash at about $10 per ton less than Germany's average price in normal times, as they will produce it for less than the Transatlantic freight from Germany.

L. G. Vincent and **C. G. Morris**, both of whom were formerly connected with the Hyde Engineering, have opened up an office at 248 St. James Street, Montreal, and under the name of Vincent & Morris, will carry on a consulting and commercial engineering business. Mr. Vincent has a wide and varied experience in the sale and manufacture of gas and oil engines, also in marine engines and auxiliary machinery. Previous to his connection with the Hyde Engineering Co., Mr. Morris was for nearly five years general foreman of the Allis-Chalmers Co., of Rockfield, Quebec. They will specialize in marine and general consulting and commercial engineering.

Big Sum Spent on Ontario Roads.—That Ontario in the past ten years has spent something like $28,000,000 on rural highways, of which less than one-quarter remains as a bonded debt, is the information given by the annual report of the Department of Public Highways, just issued. To-day there are only six counties in Ontario that are without county road systems and two of these are committed to the early adoption of road building schemes. The report, which this year is prepared chiefly as an explanation of the county roads system, for the use of the counties just coming in, reviews last year's road construction and outlines the machinery of organization required.

Canadian Steel Corporation Dock Contract.—The Great Lakes Dredging Co. of Canada, with headquarters at Port Arthur, Ont., have been awarded the contract for the construction of wharves, slips, and dredging in connection with the steel plant to be erected for the Canadian Steel Corporation, Ojibway, Ont. This contract involves the expenditure of millions of dollars.

The Canadian Steel Corporation have acquired some twenty-five hundred acres of land at Ojibway, with a frontage on the Detroit River. The slips to be built are some twenty-one hundred feet. All

this work is to be rushed, as the Canadian Steel Corporation wish to start manufacturing as soon as possible.

The Sanford Riley Stoker Co., of Worcester, Mass., has had such an increased volume of business in the Riley underfeed stoker, that it has arranged for additional manufacturing facilities in Detroit, Mich., at the plant of the Murphy Iron Works. There will be no change in the management or policy of the Murphy Iron Works. They will continue the manufacture of the Murphy automatic furnace, increasing their manufacturing facilities as required for the production of Riley stokers. R. Sanford Riley, of Worcester, Mass., has been elected president of the Murphy Iron Works. The B. F. Sturtevant Co., of Hyde Park, Mass., will continue to manufacture and act as selling agents for the Sanford Riley Stoker Co.

Industrial Secrets Are Being Discovered.—Closely-guarded secrets of German manufacture are giving way to research. J. E. Ray, Canadian Trade Commisisoner in Birmingham, England, in an official report received at Ottawa, tells of some of the work done in this direction by the British Advisory Council for Scientific and Industrial Research. Prof. Jackson, Mr. Ray writes, has been investigating the composition of certain optical glasses. He has succeeded in defining the composition of the batch of mixtures necessary for the production of several glasses hitherto manufactured exclusively in Jena. In these is included the famous fluor-glass

Coal Figures on Lakes.—There have been received at the head of the lakes up to date 370,000 tons of anthracite coal this year, as compared with 386,000 ton of the same coal unloaded here during the whole season of navigation in 1916. With almost two months and a half of the navigation season yet to come, this figure looked extremely favorable. The most serious aspect of the hard coal situation, however, is the high price of bituminous coal, which sells at Fort William now at nine dollars per ton, as compared with $5.50 and less in other years. Of the 370,000 tons received this year not more than 100,000 tons remain in store at Fort William and Port Arthur, the balance having already been shipped to western points.

Hudson Bay Terminals Progress.—Work at Port Nelson, on the Hudson Bay terminals, has closed for the season, and Foreman George H. Roy, of Ottawa, and a party of seventy men arrived at Halifax on October 3 on the Dominion Government steamer Sheba. Mr. Roy brings photographs showing the progress of the work during the past season. The great iron bridge extends over the sand beach and low-tide waters for a distance of half a mile, and at its extremity an island is being built up upon which the grain elevators will be erected. Work has commenced on the docks at the island. During the summer there have been no supplies coming in on account of the shortage of tonnage and labor, so it is quite certain that there cannot be much progress made next summer.

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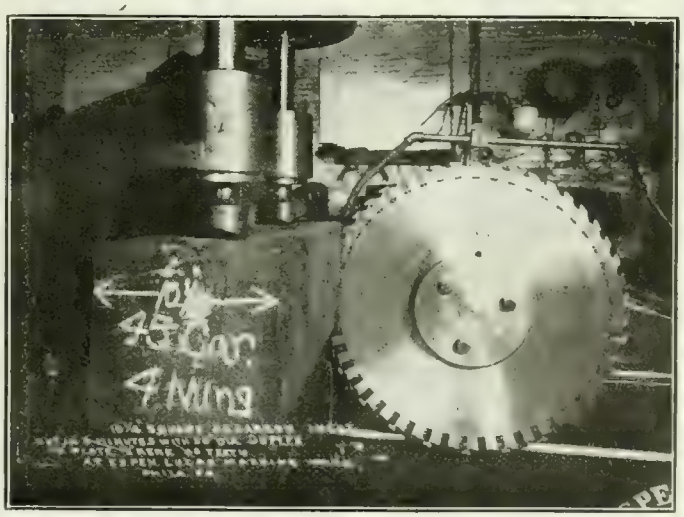

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SECOND-HAND 26" NEWTON TYPE COLD saw cutting-off machine arranged for motor belt drive and complete, with or without motor. Price $300.00. cars Sherbrooke. MacKinnon, Holmes & Co., Limited, Sherbrooke, Quebec. c30m

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

FOR SALE 1 NEW 25 H.P. HOR. TUBULAR boiler, 1 second-hand 12 H.P. hor. tubular boiler, tested to 150 lbs.; 1 second-hand 50 H.P. loc. boiler; 1 second-hand Leonard 12 x 12 high speed engine; 1 second-hand 500-lb. belt-driven Beaudry power hammer, only in use two months; in perfect condition. Canadian Engineering & Mfg. Co., 128 Bleury St., Montreal, Que. c9m

HYDRAULIC EQUIPMENT FOR SALE—THE equipment listed below is in first-class shape having only been used about three months. Blue prints and specifications and foundations drawings will be furnished. 2 14 x 12 x 5" Fairbanks-Morse duplex steam driven high pressure pumps at 80 gals. per minute capacity each against 600 lbs. pressure, steam pressure 150 lbs. 1—Weighted Accumulator good for 1000 lbs. per sq. inch, 16" diameter, plunger 11 ft. stroke with squeezing water cushion and wooden outside bumper blocks. The tank for the weighing material surrounding the cylinder is 10' 7" in diameter and 11' 0" high. 1—Return Suction Tank for above pumps and accumulator. Height, 9' 0", diameter 8' 0". Capacity, 2700 Imperial gallons. This equipment can be shipped immediately and is open for inspection at the company's plant. Prices on application. The Canadian Copper Company, Copper Cliff, Ont. c8m

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

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1—18 x 12 Rahn-Larmon Engine Lathe, new.

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16" x 8' McDougall, B.G., comp. rest (2).
16" x 8' Porter, B.G., comp. rest.
18" x 8' C.M.C., D.B.G., comp. rest.
20" x 8' Fifield, B.G., plain rest.
21" x 8' Bawden, heavy duty (3).
24" x 11' Pond, B.G., comp. rest.
25" x 16' Niles, B.G., turret tool post.
30" x 10' Ames, B.G., plain rest.

DRILLS

14" Excelsior, sliding head, lever feed (6).
16" Barr, sliding head, lever feed.
20" Silver, back geared, power feed (3).
20" Barnes, 3-spindle, lever feed.
22" Barnes, back geared, power feed
24" Kerkhoff, back geared, power feed.
26" Prentice, back geared, power feed.
40" Bickford, back geared.
46" Allfree, back geared, power feed.
No. 10a Baush, 16-spindle.
D-1 Colburn, back geared, heavy duty.

GRINDERS

No. 1 La Salle, plain and surface.
No. 1 Cincinnati, universal (2).
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.
24" Barnes, wet tool.
26" Gardner, disk.

IRON PLANERS

20" x 20" x 5' Bertram.
24" x 24" x 6½' Bertram.
25" x 25" x 12' Lodge & Davis.
36" x 36" x 10' Sellers, 4 heads.
40" x 40" x 12' New Haven, power feed

MILLING MACHINES

Bertram, plain.
Brown & Sharpe, power feed, plain.
Monarch, vertical.
Van Norman, bench.
No. 2 Ford-Smith, plain.
No. 4 Fox, universal.

SHAPERS

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

MISCELLANEOUS

6" and 12" Racine Hack Saws.
4" and 6' Robertson Hack Saws.
4½" Martin cutting-off machine.
12" Hall Pipe Machine.
4" Oster Hand Power Pipe Machine.
No. 2 Mitts & Merril Keyseater.
No. 2 Grant Rotary Riveting Hammer.
Nos. 1 and 3½ Greenerd Arbor Presses.
No. 4 GA. Brown & Boggs punching press.
No. 200 Brown & Boggs Inclinable Power.
No. 2 Bliss Foot-power Press.
No. 3 West Tire Setter Banding Press.
Bertram Single-end Punch and Shear.
No. 3 Dundas Double-end Punch and Shear.
7' Geared Bending Rolls.
1500-lb. Toledo Drop Hammer.
450-lb. Williams Drop Hammer.

H. W. PETRIE, LTD.

FRONT STREET WEST, TORONTO

RIVERSIDE Machinery List

We Own Every Tool Offered

ENGINE LATHES

[illegible] Hamilton Standard Engine Lathe [illegible]
[illegible] Putnam Standard Engine Lathe.
[illegible]
[illegible] New Springfield Engine Lathes.
[illegible] Jones & Lamson [illegible] Engine Lathe.
[illegible] New Standard Engine Lathe.
1—16 x [illegible] Engine Lathe.
[illegible] Reed Stud Lathes.
[illegible] Engine Lathe.
[illegible] Engine Lathe.
1—14 x [illegible] Engine Lathe.
[illegible] Engine Lathe.
[illegible] Van Wyck Engine Lathes.

TURRET AND SCREW MACHINES.

[illegible] Potter & Johnston Automatic Lathe.
[illegible] x 24 Jones & Lamson Flat Turret Lathe, S G H.
[illegible] x 24 Jones & Lamson Flat Turret Lathe, cone head.
1—No. 4 F. G. H. Foster Hand Screw Machine.
[illegible] Hand Screw Machine.
[illegible] Hand Screw Machine.
[illegible] Turret Lathes.
[illegible] Hand Screw Machines.
[illegible] Cleveland Automatic Screw Machines, [illegible] feed.

MILLING MACHINES AND GRINDERS.

[illegible] Plain Milling Machine.
[illegible] Plain Milling Machine.
1—No. 13½ Garvin Plain Milling Machine.
[illegible] Brown & Sharpe Plain Milling Machine.
[illegible] Plain Milling Machine.
[illegible] Pratt & Whitney Lincoln Type Milling Machines.
[illegible] Drilling Machines.
[illegible] Hand Milling Machines.
1—Garvin Hand Miller.
[illegible] Bench Mills.
1—No. 2½ Bath Universal Grinder.
1—No. 2 W. & M. Surface Grinder.
[illegible] W. & M. Surface Grinder.
1—Miami Valley Universal Cutter Grinder.

DRILL PRESSES.

[illegible] Plain Radial Drill, [illegible] type.
[illegible] Baker H. D. Drill.
5—20" Buffalo Plain Drill Presses.
[illegible] Henry & Wright High Speed Drill.
4—6-spindle Fox High Speed Drills.
[illegible] Fox High Speed Drills.
1—16-spindle Natco Drill.
[illegible] High Speed Bench Drills.

SHAPERS AND PLANERS.

[illegible] Lodge & Davis Geared Shaper.
1—18" Hendey Geared Shaper.
[illegible] New Springfield B.G. Crank Shapers.
[illegible] Planer, S H.
[illegible] Hendey Planer S H.

PRESSES AND HAMMERS

1—Waterbury Farrel O.B.I. Press, geared.
1—No. 10 Perkins Drawing Press.
[illegible] Presses.
[illegible] B. & S. [illegible] Hammer.
[illegible] P. & W. [illegible] Hammer.
1—25-lb. Fairbanks Belt Hammer.
[illegible] Bradley Helve Hammer.

AIR COMPRESSORS

[illegible] Steam Pump Co. Steam Driven Air Compressor.
[illegible] Steam Air Compressor.
[illegible] Belt-driven Air Compressor.
[illegible] Air Compressor.
[illegible] Belt-driven Air Compressor.
1—8 x 8 Union Steam Pump Co. Belt-driven Air Compressor.

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

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

RIVERSIDE MACHINERY DEPOT

17-29 St. Aubin Avenue
DETROIT, MICH.

Some Absolutely New Others Quite Like New

None too far gone to necessitate Re-building

USED PLANERS

24" x 24" x 6' American, 1 hd.
30" x 30" x 6' Pond, 1 hd.
36 x 36 x 8 Whitcomb, 1 hd.
36 x 36' x 10 Flather, 2 hds.
36 x 36' x 12 Niles, 1 hd.

PLANER TYPE MILLING MACHINES

24" x 24" x 8 Bement-Miles Hor. Spdl.
24 x 24 x 12 Bement Miles Hor. Spdl.
46" x 26" x 11' Becker-Brainard.
Hor. Spdl. Arranged for Motor Drive.

GREAT BIG TURRET LATHE

40" Swing, weighing about 22,000 lb. Built by American Turret Lathe Co. Hollow spdl. 13¾" hole, capacity for handling work 6' 9" between chuck and turret fitted up with main turret carrying five tools and supplementary turret with four tools, all the automatic feeds, in A-1 condition, having seen but little service.

USED ENGINE LATHES

48" swing, 20' bed, Putnam.
36" swing, 20' bed, Putnam.
24" swing, 15' bed, Bement.
20" swing, 14' bed, Hamilton.
18" swing, 10' bed, Porter.
18" swing, 8' bed, Le Blond.
18" swing, 6' bed, Seneca Falls. Quick change, Taper Draw-in attachment.
16" swing, 6' bed, Le Blond.

USED RADIAL DRILLS

3½' arm, Bement-Miles.
3' arm, Dreses.
2½' arm, Dreses-Simplex (2).

HORIZONTAL CYLINDER BORING MACHINE

No. 2 Barrett, 5" Boring Bar, Continuous Feed. Travel 48" in either direction, having capacity for boring and facing both ends of the cylinder at the same time. Bed is 12' 6" long, widened part 60" x 52". Will bore, counterbore and face off both ends of 10" x 18" cylinder in one hour.

MULTIPLE SPINDLE DRILLS

18 Spindle Speed Box Baush.
8 Spindle with C-shaft Baush.

BIG SLOTTING AND KEYSEATING MACHINE

30" Stroke Baker Bros. Combination Draw-stroke, Slotter and Keyseater, with actual stroke of 33". Table 36" diam. with 12" tool. Automatic feeds in all directions. Can be used for keyseating wheel centers up to 72" diam. Bar carrying cutting tool can be any shape or size up to and including 4½" diam. This machine is adapted to do a great variety of work for slotting in forgings or castings having a great amount of metal to remove or any long deep holes where the regular slotter cannot reach.

MISCELLANEOUS TOOLS

30" swing, Brown & Sharpe Turret Head Boring Mill.
2 x 24 Jones & Lamson Flat Turret.
20" swing, Potter & Johnston Automatic Turret Lathe.
21" swing, Gisholt Gap Style 30" in gap.
12" stroke Travelling Head Shaper, "Sellers."
20" and 24" Crank Shapers, backgeared, Gould & Eberhardt.
14" stroke Slotting Machine, Putnam.
36" Gear Shaper, "Fellows."
No. 2 Baker Keyseater, capacity 2" wide, 18' long.
6" Espen & Lucas Cold Saw.
10" Double End Cutting-off and Centering Machine, Bement-Miles.
20" Lincoln Type Milling Machine. Boring bar 4½" diam., 8' 6" long, with sliding head and inserted screw for feeding.

HAMMERS

Steam—2500-lb. Single Frame Bement-Miles, Cylinder 12" x 50".
Drop—900-lb., Belt Lifter, Williams-White.

NEW LATHES

McCabe Heavy Duty Latest Pattern 3-Step Cone, Double Back Gears, Quick Change Gear Mechanism. Absolutely new, nothing better built in point of workmanship, power, and convenience in handling and installed with that understanding.
16" swing to 26" swing.
6' to 18' Beds or any other lengths if desired.
26-48" x 12', 16' and 22' Beds "McCabe" Double Spindle, Triple-geared.
All these Lathes are in stock right now.

NEW SHAPERS

12" to 32" Stroke, Plain and Back-geared, Crank, with "Speed Box." LATEST PATTERN.

NEW RADIAL DRILLS

2½', 3½' and 4' Arms, with Speed Box, Single Pulley Drive and Tapping attachment.

J. J. McCABE

149 Broadway - New York

Slightly Used Machinery For Immediate Delivery

1—No. 27 Double Floor Grinder—Canadian Hart Wheel Make, equipped with two 12" wheels and two spindles 33" long. Shaft bearings 24" long.
1—Heavy Blount Double Floor Grinder, 45" spindle, two 8" wheels.
1—Heavy Petrie Floor Grinder. No rest or countershaft. Shaft 36" long, two 9" wheels.
1—Stouffville Floor Grinder. No rest or countershaft. Shaft 32", two 8" wheels.
1—Large Polishing Stand (new) 4' shaft, bearings 1¼" x 6.
1—Brown & Boggs Lever Splitting Shear.
1—Hanson & Van Winkle Polishing Stand (no c/s)
1—Hanson & Van Winkle Polishing Stand. Shaft 5', bearings 2¼" x 12".
1—No. 7 Jarecki Pipe Machine, 1¼".
2—Heavy Grinders, Bearings 2¼" x 12"—cross adjustment slide, one 12" wheel.
1—8-Wheel Robinson Detroit Grinder.
1—Anvil, 154-lb.
1—Revolving Electric Plating Machine.
1—Platers Electric Dynamo, 600 Amperes.
1—Tumbling Barrel, 18" x 4.
1—No. 23 Brown & Boggs Hand Punch and Shear.
1—Fairbanks Scale, 5-ton.
1—Hand Former, Toggle Type.
1—40 H.P. Westinghouse, 550-volt, 60-cycle, 3-phase, 850 R.P.M.
3—Westinghouse Transformers, 30KW., 3,200-550-volt.
1—2⅛" Dreses Turret Lathe, power feed, oil pan, spring chuck No. 37220.
2—No. 6 Warner & Swasey Turret Lathes, power feed, oil pan, spring chucks.
1—No. 3 Garvin Turret, oil pan, spring chuck, 2⅛" hole.
1—No. 22—1¾" Garvin Monitor Lathe, oil pan, spring chuck.
1—1¼" Davis & Egan Lathe, oil pan, spring chuck.
1—2" Pratt & Whitney Turret Lathe, spring chuck.
1—32½ Garvin Turret Lathe, spring chuck.
1—12½ Garvin Turret Lathe, spring chuck.
1—Style "F" Single Spindle, heavy duty, Baker Drill.
1—Four Spindle Rockford Drill Press, 20" box column, back-geared, automatic feed, automatic stop, with pump connection.
1—Garrison Press, 26,000-lb.
2—Heavy Thread Chasing Attachments.
1—No. 3 Cincinnati Universal Miller with Dividing Heads.
1—No. 2 Cincinnati Universal Miller with Dividing Heads.
1—No. 2 West Tire Setter Band Press.
1—No. 3 West Tire Setter Band Press.
1—Cincinnati Bickford 24" Drill.
1—Cincinnati Upright 24" Drill with tapping attachment.
2—No. 25 Foote-Burt Drills with belt guards.
2—D2. Colburn Drills with belt guards.
1—Niles-Bement-Pond 50" Drill Press.
1—No. 400 Brown & Boggs 42" Geared Gap Shear.
2—No. 21 Crosby Presses.
1—300-lb. Bliss Board Lift Hammer.
1—100-lb. Bliss Board Lift Hammer.
1—Barnes 24" Geared Drill

Write For Particulars.

Garlock-Walker Machinery Company, Limited

32 FRONT STREET WEST, TORONTO, ONT.

"EVERYTHING IN MACHINERY"

IMMEDIATE DELIVERY

DRILLING MACHINES.

Leland H.S. B.B., bench type.
No. 1½ Knight Driller and Miller.
30" Lodge & Davis, S.H., B.G., P.F.
20" W. F. & J. Barnes, 4-spindle.
No. 11 P. & W. Multiple, 10 spindles.
3' W. E. Gang Plain Radial.
4' Mueller Plain Radial.
Pawling & Harnischfeger Horizontal Driller.

GEAR CUTTERS.

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

GRINDERS.

Yankee Drill.
No. 184 Wells Cutter and Reamer.
No. 2 Woods Universal Cutter and Tool.
No. 1 Brown & Sharpe Universal.
No. 2 Brown & Sharpe Surface.
14" x 20" B. & S., plain.
No. 21 Landis, plain.
Garvin Hole Grinder.
Gisholt Tool Grinder.
No. 1 Gardner Disc.
No. 5 Diamond Water Tool.
No. 6A Diamond Universal Disc.
No. 16 Gardner Disc Grinder.
No. 24 Gardner Disc Grinder.

LATHES.

13" x 5' P. & W., C.R. taper.
14" x 6' Fairbanks, C.R., taper.
16" x 6' Prentice, C.R.
18" x 8' L. & S., pat. head, C.R., taper.
18" x 10' Fitchburg, C.R.
18" x 12' Barker, C.R.
20" x 14' Blaisdell, C.R.
21" x 12' New Haven, C.R.
24" x 13' New Haven, C.R.
31" x 26' Bradford.
36" x 20' American, T.B.G.
38" x 16' Fifield.
36" x 20' Houston, Stanwood & Gamble, selective geared head, single pulley drive, taper attachment (new).
36" x 28' Houston, Stanwood & Gamble, selective geared head, single pulley drive, taper attachment (new).

PLANERS.

24" x 24" x 4' Gray, one head.
24" x 24" x 6' American.
26" x 26" x 8' Pease, one head.
30" x 30" x 8' Woodward & Powell, one head.
30" x 30" x 8' Cincinnati, two heads.
36" x 36" x 14' Sellers, one head.
40" x 38" x 14' Putnam, one head.
50" x 50" x 18' New Haven, two heads, two extension heads.
72" x 48" x 14' Gray, two heads, one side head.

SCREW MACHINES.

1" B. & S., plain.
No. 1 Foster, plain A.C. and W.F.
Belt Lacing Machine.
16" P. & W., plain.
No. 2 Costello, plain head.
No. 2 P. & W., friction head.
No. 4 Pearson, geared head.
No. 3 Bardons & Oliver, plain head.
⅞" Cleveland, Automatic.

TURRET LATHES.

No. 22 Garvin.
16" Lodge & Shipley.
25' Niles.
2" x 24" Jones & Lamson.
2" x 26" P. & W., power feed to turret slide and cut-off.
3" x 36" Jones & Lamson, chucking equipment.
3" x 36" Jones & Lamson, bar equipment.
21" Gisholt, with taper.
2—24" Gisholt Turret Lathes, taper attachment.

PUNCHES AND SHEARS.

No. 3 American Can.
No. 3 Bauroth, O.B.I.
No. 74½ Bliss, S.S., Geared.
No. 3A Lennox Double-end Punch and Shear.

MISCELLANEOUS.

24" Bullard Vertical Turret Lathe, 1 swivel head and one side head.
No. 2 Cochrane-Bly Die Filer.
50-lb. Bradley Strap Hammer.
¾" Acme Forging Machine.
52" Niles Car Wheel Boring Mill.
6" x 14" P. & W. Thread Miller.
No. 1 American Air Tempering Furnace.
Belt Lacing Machine,.
3-ton Yale Duplex Hoist.

STOCKER-RUMELY-WACHS COMPANY

117-121 No. JEFFERSON STREET CHICAGO, ILLINOIS

New York's Greatest Stock

(Partial List)

SHAPERS

NEW 24" HOLLINGWORTH IMPROVED TRIPLE GEARED CRANK SHAPERS.

PLANERS

60" x 60" x 28' Betts Planer, two heads.
5? x 46" x 1? Lincoln four heads.
48" x 48" x 12' Niles, two heads.
32" x 3?" x 10' Pond
30" x 30" x 8' Pease two heads.
Two—28" x 28" x 7' New Haven.
26" x 26" x 8' Niles.
26" x 26" x 6' Hendey.

LATHES

60" Fifield. 9' centers, face plate drive.
60" x 20' New Haven, face plate drive.
48" x 16' Niles Tire or Car Wheel, double head type, face plate drive, triple geared.
36" x 20' New Haven, compound rest, power cross feed, 14' 6" between centers.
36" x 16' Bradford, compound rest, power cross feed.
36" x 14' Putnam, heavy duty, triple geared, face plate drive.
42" x 19' Putnam, heavy duty, triple geared, face plate drive, raising blocks to swing 54".
30" x 28' Fifield, compound rest, power cross feed.
30" x 16' Fifield, raising blocks to swing 38", compound rest, power cross feed.
28" x 17' New Haven, raising blocks to swing 30", hollow spindle, full swing rest, compound rest, power cross feed.
24" x 24' Fitchburg, raising blocks to swing 30", compound rest, power cross feed, 19' between centers.

BENDING ROLLS

No. 1 Hilles & Jones Straightening Rolls, 5' 2" between housings.
Ship Plate Bending Rolls, 9' 2" between housings.
Ship Plate Bending Rolls, 5' 10" between housings.
Niles double geared Bending Rolls, drop end housing, 40½" between housings.

GEAR CUTTERS

Four 48" Newton Automatic Spur Gear.
40" Flather Automatic Spur Gear.
36" Brown & Sharpe Automatic Hob and Spur Gear.
24" Brown & Sharpe Automatic Spiral Gear.
24" Gould & Eberhardt Spur and Bevel Gear.
24" Whiton Automatic Spur and Bevel Gear.
24" Brainard Automatic Spur.
Two No. 12 Brown & Sharpe Automatic Spur and Bevel.
19" x 5" Less Grant Automatic Spur and Spiral.

New York Machinery Exchange, Inc.

50 Church Street . ˙ . New York City

Eastern Machinery & Equipment Co., Inc.

319 COMMERCIAL TRUST BUILDING, PHILADELPHIA, PA.

NEW TOOLS FOR IMMEDIATE DELIVERY.

[illegible] Grinders.
[illegible] Tool Grinder.
[illegible] Boring Lathes.
[illegible] Grinders.
[illegible] Engine [illegible]

USED MACHINERY ENGINE LATHES.

[illegible] Gear head [illegible]
[illegible]
[illegible] American

TURRET LATHES.

[illegible] & Johnson [illegible] Automatic [illegible] Machines.
[illegible] Jones & Lamson Flat [illegible]
[illegible] Jones & Lamson Flat [illegible] equipment. Full set Turret Tools.
[illegible] Gisholt [illegible] Collet chuck. [illegible] spindle threading [illegible]
[illegible] Putnam, Heavy Duty Lathe.
[illegible] Lodge & Shipley Turret. [illegible]
[illegible] Gisholt [illegible] step Cone 6¼ H.S.

BORING MILLS.

1—Binsse Horizontal Boring Mill, 3" bar.
[illegible] swing Bement-Miles Tire Turning Mills, two swivel heads [illegible]
1—Cylinder Boring Mill, capacity of [illegible] diam. to [illegible] diam. 1?' long. Tool equipment included, good as new.
1 [illegible] Boring Mill [illegible] heads.

MILLING MACHINES.

[illegible] Plain Miller [illegible]
1 [illegible] & Smith Open Side Slab Miller, with two vertical spindles.
1—No. 1½ Universal Milling Machine.

GEAR CUTTERS.

1—24" Fellows Gear Shaper.
2—?" Fellows Gear Shapers.

SCREW CUTTING MACHINES.

1—No. 55 National Acme, 4 spindle, good as new.
1—No. 54 National Acme, 4 spindle, good as new.
2—2¾" Cleveland Automatic Machines, Model A.
1—1¼" Cleveland Automatic Machine, Model A.
1—⅞" Cleveland Automatic Machine, Model A.

SLOTTERS AND SHAPERS.

1—12" Bement Slotter.
1—20" Gould & Eberhardt Shaper, B.G., vise., C.S.
1—16" Steptoe Shaper.
1—48" x 12' Pedrick & Ayer Open Side Planer, shaper type.

GRINDERS.

8—12" x 36" Bridgeport.
1—1½" Full Universal Landis Machine.
1—No. 13 Brown & Sharpe Universal and Tool Grinder, full equipment.
No. 1½ Universal Cutter and Reamer Grinder.
1—28" Bridgeport Face Grinder, with magnetic chuck.
5—Fisher Profile Grinders for Cutters.
5—No. 6 Std. Universal Tool and Cutter Grinders.

DRILL PRESSES.

1—24" Bickford Upright, back gear, sliding head, lever and wheel feed drill.
2—No. 1-D Colburn High Duty Drills.
2—No. 3-D Colburn High Duty Drills, tapping attachment.
1—4' Prentice Radial Drill, tapping attachment.
1—2' 6" Fosdick Radial Drill, tapping attachment.

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

STOP—MAYBE IT'S HERE

BORING MACHINES—Vertical

1—30" Flather, one turret head
1—36" B & S, one turret head, Dec. Delivery
1—38" Bausch, two heads
1—38" Niles, two swivel heads
1—42" Metcalf, one swivel head
2—NEW 48" [illegible] 1 swivel [illegible] delivery.
1—[illegible] Niles, two swivel heads [illegible]
4—NEW [illegible] Colburn [illegible] delivery.
1—84" Bickford.
1—96" Vertical Cylinder
1—NEW 8' Bickford
1—Niles, 10'-16' extension, two heads

BORING MACHINES—Horizontal

2—NEW [illegible] immediate delivery
1—Lucas 2¾" bar
1—24" Cleveland, 2½" bar, takes [illegible] compound table.
1—No. 1 Barrett Cylinder Borer, [illegible]" bar type.
1—Betts Knee Type, 3" bar.
1—No. 2 Barrett Cylinder, [illegible]" bar

BULLDOZERS

1—No. 8 Ajax, motor driven
1—No. 9 Williams & White Belt Drive
1—No. 12 Ajax, single pulley drive.
1—No. 23 Williams & White, belt drive
1—No. 29 U Williams & White, arranged for motor drive.

CRANES

1—Case 5-ton, 47' span.
1—10-ton Morris, 35' span, [illegible]
1—50-ton Niles, 61' span.

CUTTING OFF MACHINES

1—NEW 4½" Davis.
5—Davis 4½"
10—4½" Williams.
1—NEW 6" Davis.

DRILLING MACHINES—Radial

6—NEW 3' Mueller, speed box drive, Dec. del.
2—NEW 3' American, sensitive tapping attachment
1—NEW 3½' Western Drill, 86" circle.
1—4' Mueller Plain, speed box drive
1—4½' Bickford, plain.
1—NEW 5' Western, plain, with motor.
1—NEW 5' Niles Universal, with motor
1—5' Dreses, full universal, gear box drive.
1—5' Fosdick, plain.
1—NEW 5' Mueller, speed box drive, Dec. del.
1—6' Dreses, plain.
1—NEW 6' Fosdick, plain, latest type
1—NEW 6' Triumph Motor Drive, Oct. delivery

DRILLING MACHINES—Heavy Duty

2—NEW No. 2 Colburn
3—No. 14 Colburn, 24" swing, [illegible] in solid steel.
4—No. 310 Baker Single Pulley Drive, late type

DRILLING MACHINES—Sliding Head

2—NEW 24" Barnes Drills and T[illegible]
7—NEW 24" Barnes Drills.

DRILLING MACHINES—Multiple Spindle

1—No. 5 Fox, 12-spindle, capacity 1".
1—Baush, 12-spindle, capacity 1¼", 30" circle, motor drive
1—14-spindle Baush, capacity 1" holes, 36" circles.

DRILLING MACHINES—Sensitive

2—NEW 1[illegible]" Allen High Speed [illegible]
1—NEW No. P-4 Allen, one spindle.
1—NEW No. P-2-S Allen, [illegible]
2—NEW No. B-1 Allen, [illegible]
1—NEW No. B-2 Allen, two spindle, [illegible]
2—NEW No. B-3 Allen, three spindle, [illegible] tapping attachment
2—NEW No. B-4 Allen, four spindle, [illegible]

GEAR CUTTING MACHINES

1—NEW No. 3 Bickett Gear Rack Planer, delivery [illegible] days
1—No. 3 Brown & Sharpe Auto. Gear Cutter spur
1—NEW 6" Standard Gear Cutter, spur.
1—15" Gleason Bevel Gear Planer
1—16" Bilgram Bevel Gear Generator
1—[illegible] x 8" G. & E. [illegible]
1—[illegible]" Becker-Brainard
1—24" Fellows Gear Shaper
1—NEW Fellows Shell [illegible]
2—[illegible]" Fellows Gear Shapers

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

5—NEW No. 190 Wells
4—No. 1 Cincinnati.
1—NEW No. 1 Wood [illegible]
1—NEW Wilmarth & Morman Style B K
1—NEW Walker, No. 1 Outfit B
3—NEW No. [illegible]
1—NEW Walker, No. 2 Outfit K [illegible] 26")

2—NEW No. 2 Oesterlein Universal.
1—NEW LeBlond
1—NEW Gisholt Universal

GRINDERS—Cylindrical—Plain

1—NEW No. 12 B. & S., 8" x 36", Oct. del.
1—NEW 8" x 18" Modern, self-contained
3—NEW 8" x 30" Modern, self-contained.
2—NEW 12" x 24" Modern, self-contained.
1—NEW 12" x 36" Modern, self-contained.
1—12" x 42" Landis, self-contained
3—NEW 12" x 48" Modern, self-contained.
1—NEW 12" x [illegible]" Modern, self-contained
1—NEW 16" x 36" Norton, Oct. delivery
1—14" x 50" Norton.
1—NEW 10 x 72 Norton, plain.

GRINDERS—Cylindrical—Universal.

2—NEW No. 2 Bath, 9" x 20".
1—NEW No. 2 Walker, 9" x 26"
1—NEW No. 2½ (10" x 36") Bath
1—NEW Thompson, 10" x 36.
1—No. 3 1[illegible]" x 4[illegible]" Brown & Sharpe
1—12" x 42" Landis
2—NEW No. 3 Modern, 13" x 48", Oct. del.
1—No. 4 Cincinnati, capacity 12 x 72"

GRINDERS—Internal

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

GRINDERS—Cylinder

1—No. 60 Heald, single pulley drive

GRINDERS—Profile

1—NEW Cleveland
5—Fisher Profile Grinders.

GRINDERS—Surface

1—NEW No. 1 Wilmarth & Morman
2—NEW No. 1½ Walker's complete
2—NEW No. 2 American with Walker No. [illegible] plain flat mag. chucks.
4—NEW No. 2 Reid (same as B. & S.)
1—NEW No. 2 Brown & Sharpe.

HAMMERS—Board-Lift, Drop.

1—No. 4 Standard Machinery Co., 400 lb.
1—E. W. Bliss, 800 lb.

HAMMERS—Steam Forging

Morgan & Williams, 600 to 800 lbs., 21" gap
1—3,000 lbs. Morgan Double Frame
2—3,500 lbs. Chambersburg Steam Drop Hammer.
2—6,000 lbs. Chambersburg Steam Drop Hammer.
1—7,000-lb. Morgan Special Double Stand.

KEYSEATERS

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

LATHES—Manufacturing, Not Screw Cutting

2—NEW No. 3 Hurlbut-Rogers' Bench Lathe
3—16" x 8' Fairbanks-Morse, heavy duty.
70—NEW Simplex, 16" x 8'.
14—Reed-Prentice Shell Lathes for 4" or 18 lbs. American shells.
22—18" x 8' Battle Creek, heavy duty.
1—30" x 10' Hendman, high duty

LATHES—Engine

1—NEW 11" x 5' Bradford, quick change.
14—NEW 12" x 5' Rockford
3—NEW 16" x 6' Cleveland Tool Room Lathes.
4—NEW 16" x 8' Bradford, quick change
1—NEW 17" x 8' National, quick change gears
12—17" x 8' LeBlond, pan bed, quick change gears
1—18" x 10' Hendey, quick-change gear, 14" chuck.
1—NEW 20" x 10' Bradford, quick change.
1—NEW 20" x 12' Bradford, quick change.
1—NEW 20" x 10' Cleveland Geared Head
19—NEW 21" x 10' Porter, S.B.G.
1—2[illegible]" x 1[illegible]' Putnam, oil pan and pump
1—NEW 24" x 10' Bradford, quick change.
5—NEW 24" x 12' Bradford, quick change
1—NEW 24" x 14' Bradford, quick change
3—24" x 14' American, quick change
1—24" x 22' Ballard, triple geared, taper attachment.
1—NEW 26" x 48" x 12' McCabe, Double Spindle.
1—New [illegible]" x 48" x [illegible]' McCabe, Double Spindle
1—29" x 18' 6" Schumacher & Boye.
1—NEW 30" x 14' American Double Back Geared Quick-Change
1—NEW [illegible]" x 1[illegible]' Pittsburg Pattern
1—33" x 12' 6" Rahn-Mayer-Carpenter, taper attachment.
2—NEW 36" x 24' Putnam, triple geared
1—48" x [illegible]' Schumacher & Boye, triple geared, quick change
1—50" x 12' American Gear Head, quick-change
1—52" x 30' Putnam
1—NEW 66" x 46' Putnam, triple geared, face plate drive, 5-step cone, 6½" belt; October delivery.
1—71" x 20' Fifield, triple-geared.

LATHES—Turret

1—NEW 13" Gisholt, G-13.
5—NEW 21" Gisholt, H-21.
2—NEW 24" Gisholt, 1-24.
5—2 x 24" Jones & Lamson
1—NEW 18" Libby.
3—24" Libby, universal facing head, 3-jaw chuck.
18—6-A Potter & Johnson.

MILLING MACHINES—Knee Type—Universal

1—NEW No. 1 Kempsmith.
1—No. 2 Kempsmith, vertical attach.
1—No. 2 Kempsmith, 13" dividing head.
1—NEW No. 2 Rockford High Power
1—NEW No. 2 Hendey.
1—No. 2 LeBlond
1—NEW No. 3 Hendey.
1—NEW No. 3 Kempsmith
3—NEW No. 3-H LeBlond

MILLING MACHINES—Knee Type—Plain

9—NEW No. 0 Rockford.
1—NEW No. 1 Kempsmith
2—NEW No. 1½ American back gear
1—NEW No. 1 Rockford, high power.
2—NEW No. 2 Rockford
1—No. 3 LeBlond
1—NEW No. 3 Kempsmith.
1—NEW No. 4 LeBlond.
1—No. 4 Brown & Sharpe

MILLING MACHINES—Hand.

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

MILLING MACHINES—Vertical

1—NEW Bickett, No. 0
1—No. 3 Brown & Sharpe.
2—NEW No. 4-B Becker.
2—No. 4 Becker.

MILLING MACHINES—Planer Type

1—No. 2 Beaman & Smith Vertical Spindle, open side.
1—Ingersoll Slab, 16" x 48" cap
1—NEW 17" x 5' Eynon, planer type.
1—Bement-Niles, heavy duty planer type, 20" x 24" x 12'.
1—[illegible] x [illegible]' Ingersoll No. [illegible] single spindle with motor.

MILLING MACHINES—Lincoln Type.

3—NEW No. 1 American.

PLANERS

24" x 24" x 8' Cincinnati, one head, used three months
1—30" x 30" x 8' Ohio Machine Tool Co., 2 heads.
1—36" x 36" x 10' American, two heads.
1—42" x 42" x 11' Niles, four heads
1—NEW 48" x 48" x 10' Cincinnati, two heads.
1—48" x 12' Pedrick, open side, one head.
1—52" x 56" x 1[illegible]' Pond, 2 heads on rail
1—62" x 52" x 16' Betts, 2 heads, right angle drive.
1—[illegible] x [illegible]' L. W. Pond, 2 heads.
1—[illegible] x [illegible]' G[illegible], 4 heads
1—72" x 72" x 20' McKechrim & Bertram, 4 heads.
1—36' Niles Plate Planer, extra heavy, almost new, arranged for motor drive.

SCREW MACHINES—Hand

4—NEW No. 2 Foster, geared friction head.
1—NEW No. 4 Foster, geared friction head, power feed to turret slide.
1—NEW No. 5 Foster, all geared, power feed to turret slide.
1—NEW No. 5 Foster, all geared head, power feed to turret, power cross feed.
1—NEW No. [illegible] Foster, geared friction head, power feed to turret, power cross feed.
5—NEW No. 7 Foster, geared friction head, power feed to turret, power cross feed.
2—NEW No. 10 Foster, geared friction head, power feed to turret, power cross feed.
2—NEW 2¾" Dreses, F.G.B., power feed.

SCREW MACHINES—Automatic

2—NEW ⅝" Cleveland, Model A.
1—NEW ¾" Gridley Mult. Spindle, belt driven.
2—NEW 1¼" Gridley Mult. Spindle, belt driven.
1—NEW 1[illegible]" Gridley Mult. Spindle, belt driven
1—NEW 2¼" Gridley Mult. Spindle, belt driven.
1—NEW 3[illegible]" Gridley Single Spindle, belt driven
2—No. 63 National Acme.
1—No. 55 National Acme.
1—No. [illegible]5 National Acme

SHAPERS

1—NEW 16" Springfield
1—[illegible]" Motor Driven Rockford
1—NEW Barker 24"
2—NEW 24" Milwaukee.
1—[illegible]" Smith & Mills Back Geared
1—[illegible]" Smith & Mills Triple Geared
2—32" Morton Draw Cut.

SLOTTERS

1—NEW [illegible]
1—16" Sellers Slotter, rebuilt.

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

2—LeBlond Heavy Duty 19" x 8' Engine Lathes.
1—Fay Scott Engine Lathe, 24" x 8', with extra turret.
1—LeBlond Engine Lathe, 17" x 6'.
1—14" x 7' Niles Engine Lathe.
1—16" x 8' Butler Engine Lathe.
1—Boring Lathe for 9.2 or 12" shells.
1—Turning Lathe for 9.2 or 12" shells.
2—No. 50 Foster Turret Lathes, 16" swing.
4—John Hall & Sons No. 4 Cutting-off Machines.
1—Wilmarth & Morman Wet Tool and Twist Drill Grinder.
1—Banfield Plug Milling Machine.
2—Otis-Fensom Bench Thread Millers.
1—Cincinnati Universal Milling Machine No. 3 cone drive.
1—Surface Grinder.
1—Gardner Grinder, No. 4, complete with discs.
1—Gould Triplex Hydraulic Pump, Fig. 997, single acting, 1¼" x 6".
1—Holden-Morgan Marking Machine.
2—Northern Electric Co.'s Electric Soldering Irons.
1—1/15 H.P. General Electric Motor.
1—Brown-Boggs Nosing Press, No. 320.
1—Hisey Wolff Grinder, Portable Electric.
1—Dumore Grinder, Portable Electric.
8—Mech. Engr. Co. Fuel Oil Burners.
4—Mech. Engr. Co. Fuel Oil Burning Furnaces, 24" x 36".
1—Gilbert & Barker Fuel Oil Burning Furnace, 24" x 36", C-15.
6—Gilbert & Barker Fuel Oil Burners, 2".
2—Gilbert & Barker Positive Pressure Blowers, 3".
2—Canadian Buffalo Forge Co. Blowers, No. 6, 30".
1—Portable Blacksmith's Forge.
1—Circular Banding Press, suitable for 18-pdr. shells.
4—Shore Instrument Co.'s Scleroscopes.
3—Resin Pots, Simplex Electric Co.'s make.
3—Chapman Double Ball-bearing Trucks.
2—Oil Quenching Tanks, 8' long x 3' 4" wide x 2' 6" deep water jackets.
1—Bury Air Compressor, 6 x 8.
2—Brown Instrument Co.'s Pyrometers.
1—Thwing Pyrometer.
3—Fairbanks 25-lb. Scales.
1—International Time Clock for 200 men, with racks for tickets.
1—Voltmeter, Western Electric Instrument Co.'s make, 0-300, model 155

Private sale of small tools, rotary pumps, vises, pulleys, belting and shafting, etc., etc., to be held on Oct. 6th, at Midland, Ont.

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ACCURACY IN CUTTING makes SILENT POWER

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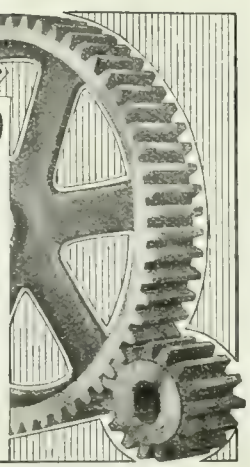

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The Right Heat

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 counter-balanced door clears the opening to full height, admitting the heaviest charge. Fire brick chamber lining, door lining and floor tile are of best quality.

And in every G. & B. furnace you get the benefit of 52 years of experience and study with gaseous and liquid fuels. Our line includes more than one hundred types of furnaces.

At present we are making prompt delivery on many types. Stock list 21 describes them all.

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Manufacturing Company
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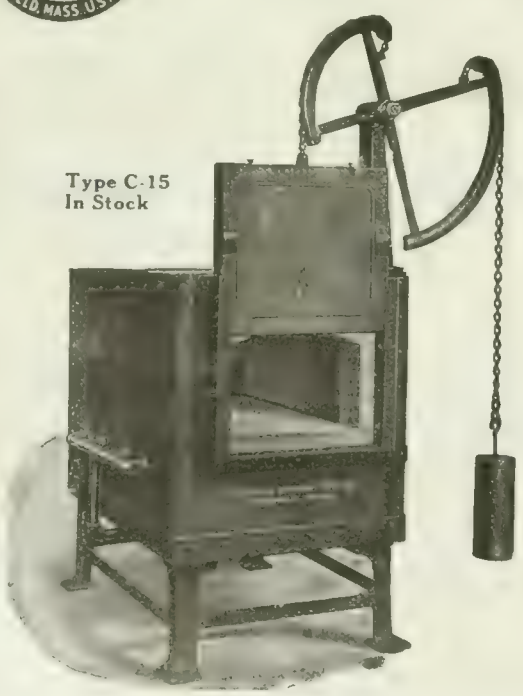
227 Davenport Rd., Toronto, Ont.

GILBERT & BARKER MFG. CO. G&B SPRINGFIELD, MASS. U.S.A. EST. 1865



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Indicating Recording Controlling

Their construction, their never failing accuracy, is due to the careful application of our many years experience in producing *only* the most perfect instruments for the work they must perform. No detail is to small to receive complete consideration. Results obtained from the service they give under the most adverse conditions, continually guide us in the perfection of our product.

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you install, nothing will be lacking in the service you receive. *The experience* of many users back us up in the claim.

We have carefully prepared information which will help you select the thermometer best suited to your needs. When you incur no obligation, why not request this *now?*

Taylor Instrument Companies
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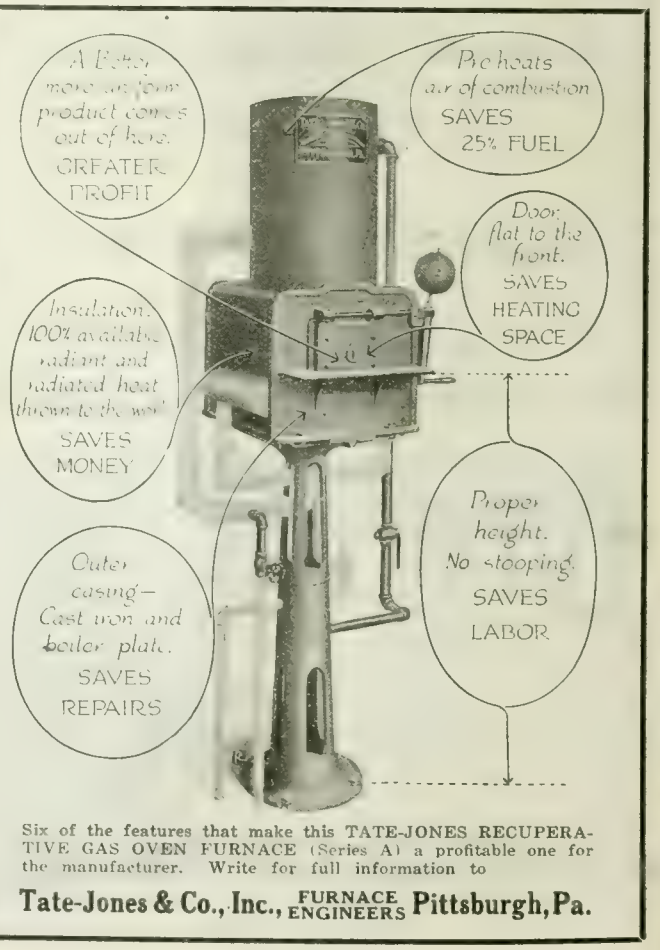

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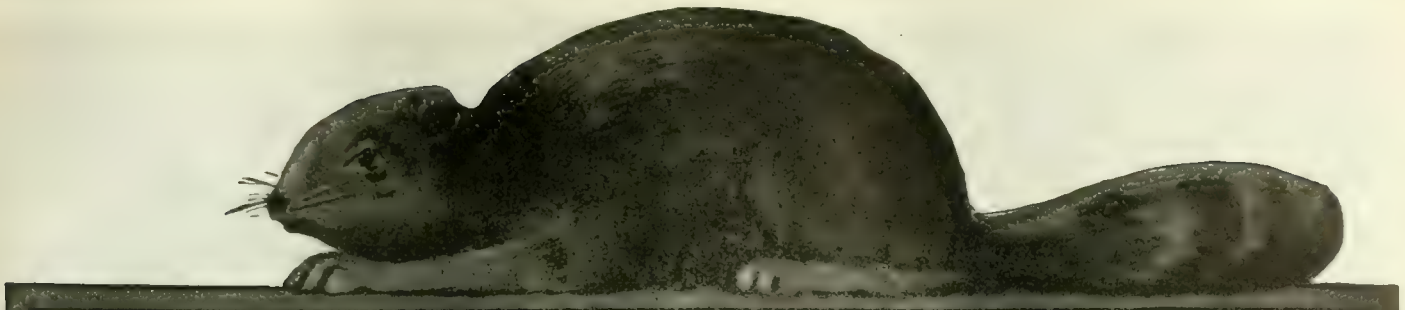

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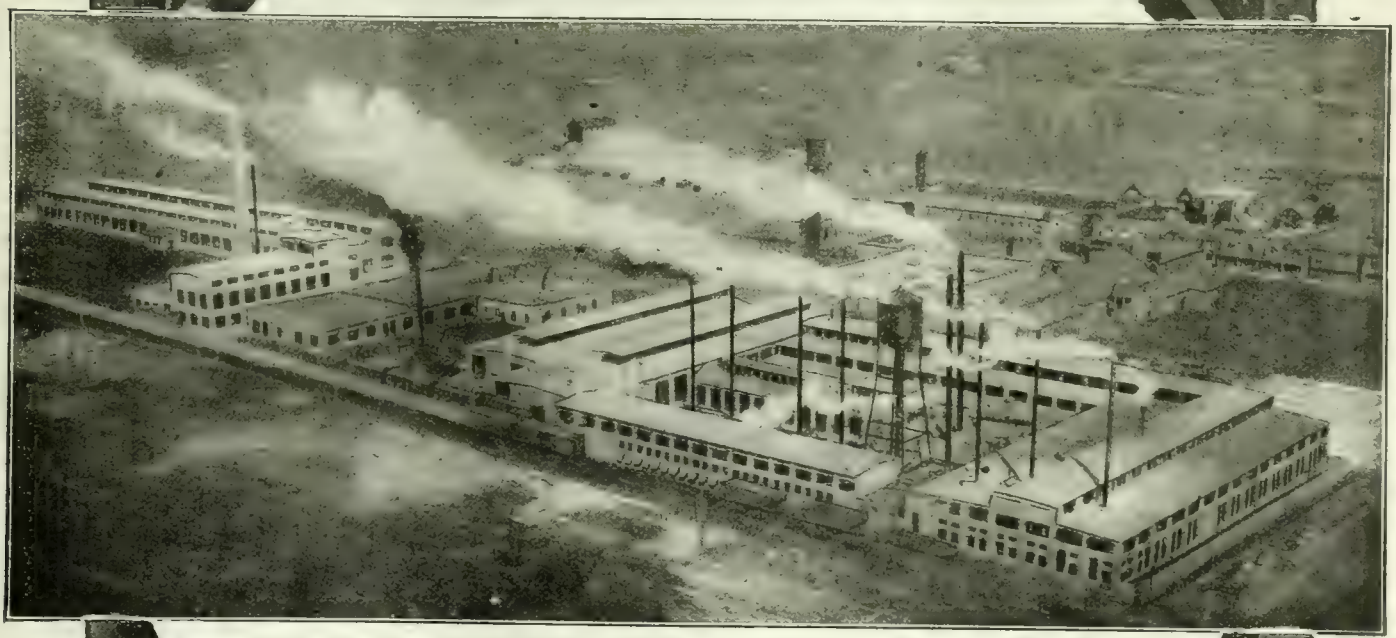

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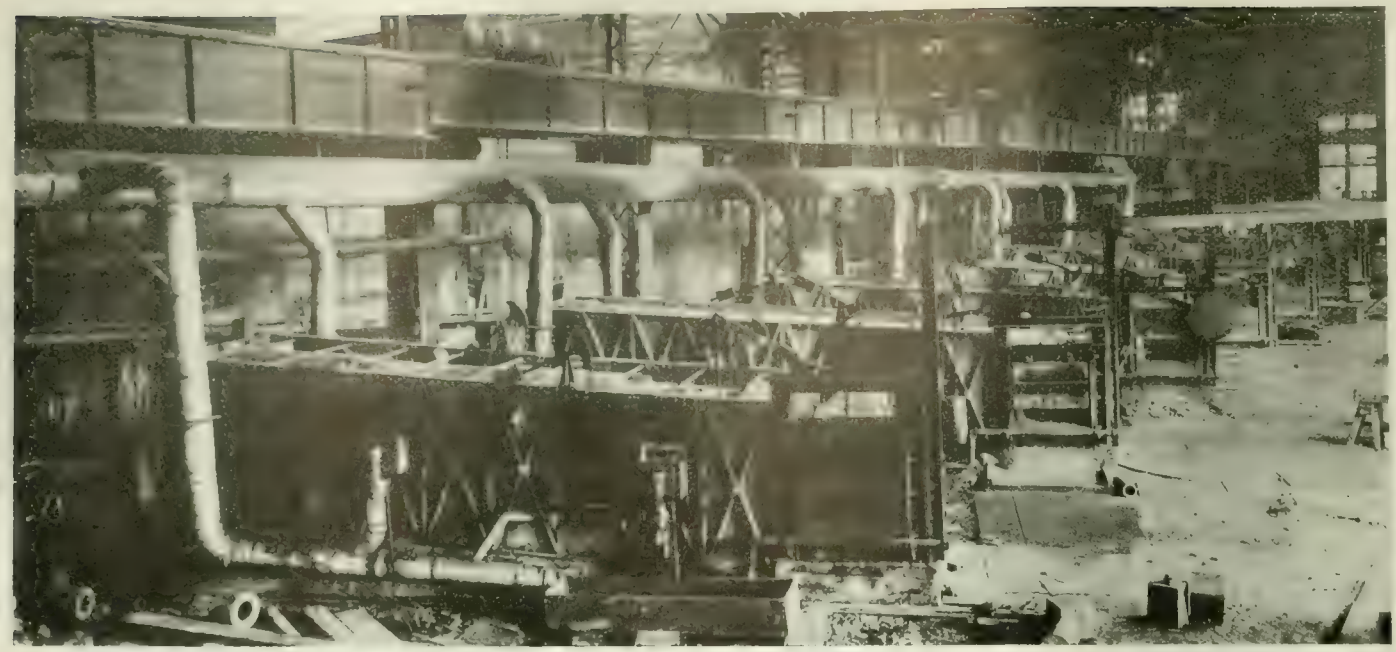

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Installed in the Plant of Canadian Steel Foundries, Limited, Pointe St. Charles, Montreal.

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

Supposing you save only 1/16 on each cut, 200 lbs. of material are saved on 100 cuts of 12 in. round. Your savings may be several times 1/16.

Have you ever stopped to consider the waste of material in wide cuts, especially at the present high cost, will pay for a PEERLESS in a remarkably short time.

This is only one of the reasons for so many repeated orders and large concerns having standardized the PEERLESS. The many other reasons can only be fully appreciated after comparative test.

Write for a list of users, some of these machines may be working in your vicinity. A careful investigation always arouses enthusiasm.

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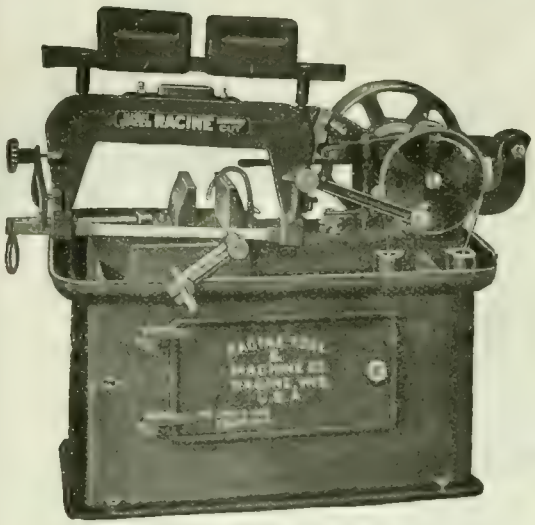

To protect users of Racine High-Speed Metal-Cutting Machines, we carry a large stock of the famous Racine H.S. Tungsten Blades.

A patented device of this Racine High Speed Metal Cutting Machine automatically lifts the blade clear of the work on every return stroke.

In this feature alone the Racine increases both output and endurance of the blade 500 per cent.

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Write us to-day.

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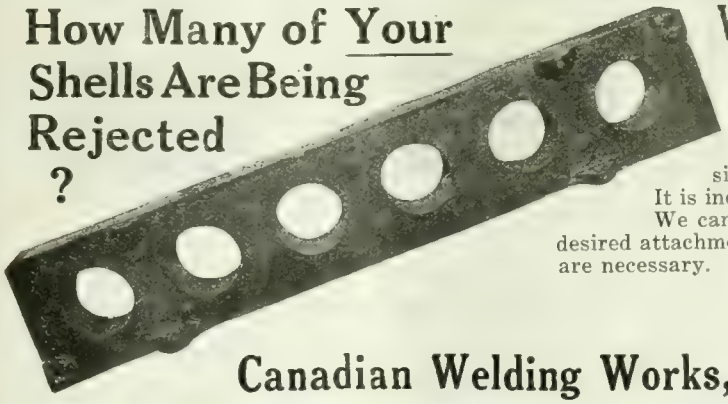
How Many of Your Shells Are Being Rejected ?



Water Jacket for Nosing Furnace

This STEEL jacket holds a large amount of water, which keeps the body of shell cold, and permits of proper heating of the nose for nosing operations. Being made of steel, it stands contraction and expansion—not possible with cast iron.

It is indestructible and fool-proof. Made for all sizes of shells. We can make this jacket to any special dimensions, with any desired attachments. No patterns are required—specifications all that are necessary.

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"CRAWFORD SECTIONAL" OVENS

Heated with our Enclosed Flame Gas Burners, or Electricity

FOR BAKING JAPANS AND OTHER FINISHES ON METAL.

Ovens carried in stock and built to meet requirements of manufacturers.

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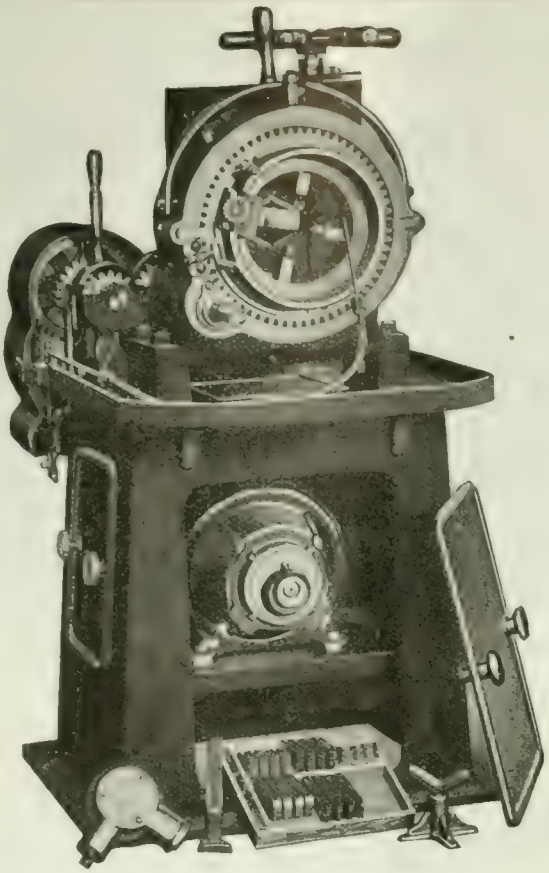

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1. One man can do the work of six against the old stock and die method of cutting.
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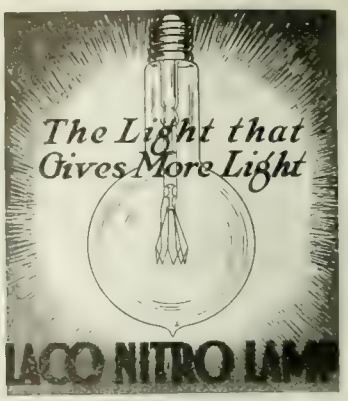
These are convincing arguments for the construction and utility of this machine. Thread cutting can be performed fast, clean and true. Equipped with self-centering vise.

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



AS THE SUN GOES DOWN

THE CHANCES OF ACCIDENT, ERROR AND INACCURACY INCREASE.

The shorter daylight hours of the fall and winter add to this period of hazard.

Keep your factory and shop bright, cheerful and agreeable by using—

LACO NITRO LAMP "THE LIGHT THAT GIVES MORE LIGHT"

It gives the equivalent of twenty-four hours of soft, bright sunlight, thus maintaining labor efficiency, reducing accident, error and spoilage hazard, and helps to prevent decreased production at nightfall.

Laco Nitro Lamps will surprise you in many ways. Less current used. Greater and better light for given power than any other type lamp. Longer utility and the nearest approach to real sunlight. **Inquire from your nearest dealer.**

CANADIAN LACO-PHILIPS CO., Limited
Stocks available at Montreal, Toronto, Winnipeg, Vancouver

IF self-interest be the mainspring of a man's actions, then you should act at once, because the "Clipper" Belt Lacer saves money for you.

Each time a belt breaks from 1 to 150 men and machines are idle.

"Clipper" lacings have been made in 45 seconds. The maximum time required is only three minutes. How long are **your** men and machines idle when a belt breaks?

Clipper Belt Lacer Company
976 Front Avenue Grand Rapids, Mich.

CHAPMAN

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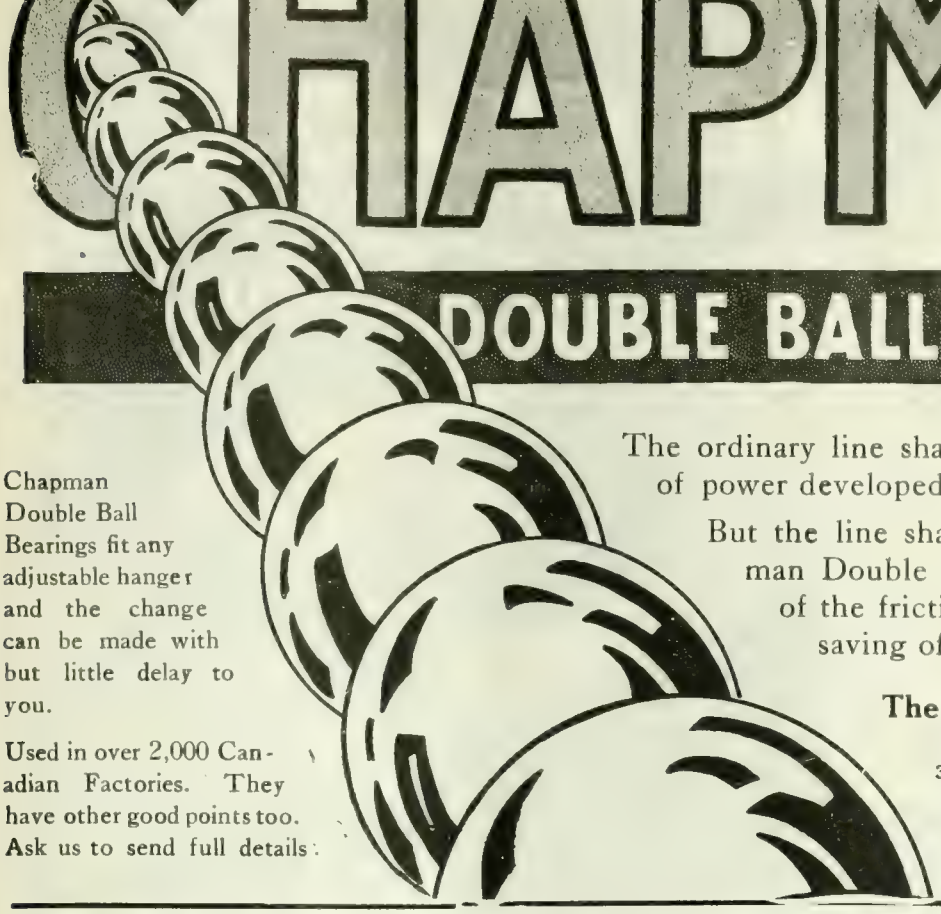

Chapman Double Ball Bearings fit any adjustable hanger and the change can be made with but little delay to you.

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

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

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

The Chapman Double Ball Bearing Company of Canada, Ltd.
339-351 Sorauren Ave., TORONTO, Canada

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

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The coupling of expert work with unexcelled equipment enables us to produce on a large scale Brass Castings of any size or alloy.

Our prices, too, are most reasonable; for our large purchases direct from the smelters command their every price favor.

For better Brass Castings at a money saving, send your orders to us. We promise that our work will please you.

The St. Lawrence Welding Company, Ltd., Montreal, P.Q.

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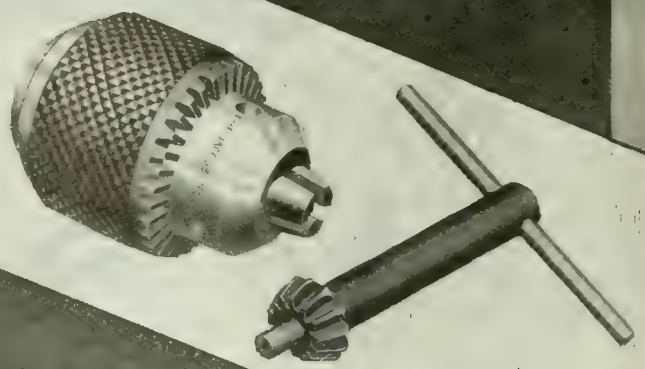
Hamilton Montreal TORONTO Winnipeg Vancouver

Jacobs
IMPROVED
Drill Chuck

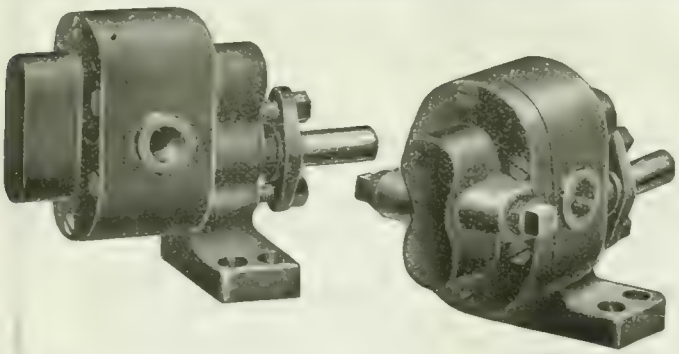


A Winner
By Sheer Merit

Jacobs Improved Drill Chucks are recognized as the STANDARD the world over. Once tried—always used.

Try them and see for yourself.

MADE BY
The Jacobs Manufacturing Co.
Hartford, Conn., U.S.A.

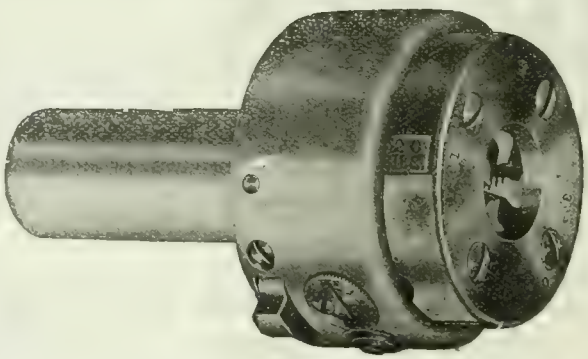


Circulating Pumps

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.



This Point Is Valuable

The chasers are set and held in place by a cam. That cam once adjusted, locks: there is no stopping or changing in size. This H. & G. Automatic Self-Opening Die Head has a quick release that not only issues the cutting of the thread to a given point every time, but permits cutting right up to a shoulder when required. Our booklet will tell you more. Write for it.

Eastern Machine Screw Corp.
New Haven, Conn., U.S.A.

Little Journeys of the "Flint Shot Man"

CHAPTER XX

Sand Blasting Hardened, Forged Steel Camshafts for Automobiles and Airships Is an Interesting Operation

A big "Rotary" sign on the wall of Mr. F. C. Whitney, the Secretary and General Manager of the Michigan Motor Specialties Company, at Muskegon, welcomed the Flint Shot Man, himself a Rotarian.

And the whole beautiful plant seemed vibrant with the sort of snap that marks the true Rotarian.

They make nothing but camshafts and only high-class ones at that, their best customers being high-grade automobile manufacturers and motor builders, especially those building motors for aeroplanes.

These companies deliver to them the rough forgings, which are carbonized and case hardened—the surface being so hard that no file will touch it.

Then comes the sand blasting, to replace the old costly and unsatisfactory method of pickling.

A special Mott equipment, designed for the purpose, with the assistance of Mr. F. L. Flanders, the general superintendent, delivers a blast of Flint Shot at 45 lbs. pressure.

Said Mr. Flanders: "It is vital that every particle of scale be removed from every smallest area of these shafts, for scale is a form of carborundum, the most cutting of all abrasives, and the slightest particle becoming loose in the crank case plays havoc with the bearing surfaces. The U. S. Government inspectors of Motor Truck and Aeroplane Shafts are extremely particular, and after trying all kinds of abrasives, your Flint Shot is the only one that wholly satisfies them."

This company hardens, sand blasts and machines 500 camshafts a day in its big, busy plant.

If you, dear reader, are permitted to supply Uncle Sam with any castings, forgings or other things metallic requiring exceptional cleanness of finish, remember the experience of this "Rotary" shop in Muskegon.

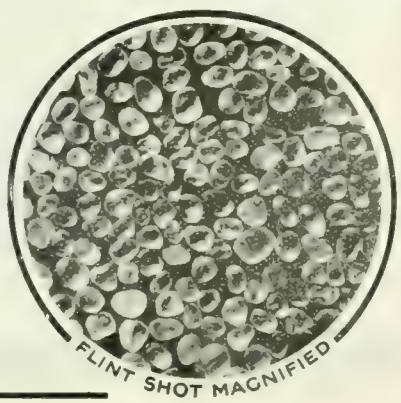
Ask for our Book of "Little Journeys" and let us send you an envelope sample of FLINT SHOT.

FLINT SHOT
TRADE MARK - REGISTERED

United States Silica Company

Sole Producers of Flint Shot

430 Peoples Gas Bldg. Chicago



We will give you an estimate from your blueprints.

ONE minute to tap a 4.5 mark VII shell. Five minutes to tap a 9.2 shell. Compare this speed with your rate. 800 to 1,000 9.2 shells tapped with one set of chasers, so along with speed you can add endurance. Uniformity is another feature. When a chaser wears down it can easily be adjusted to compensate for wear. A solid tap loses its accuracy with first grinding. Adjustments are convenient and quick-acting.

We can give you excellent service. We also maintain a special chaser service for our clients. Get in touch with us immediately.

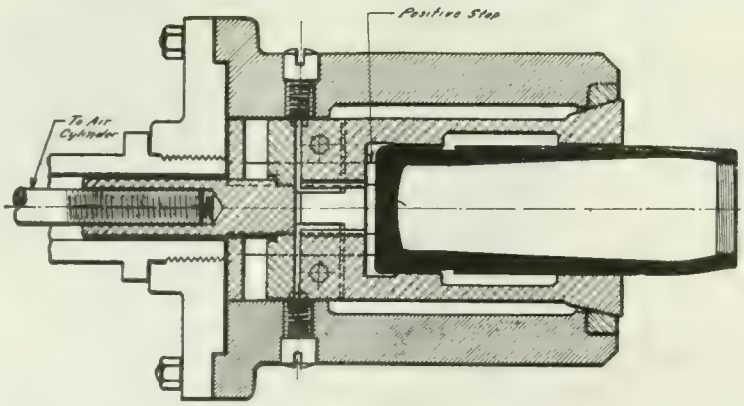
The Coats Machine Tool Co., Ltd., Caxton House, Westminster, London, S.W., England.

Fenwick Freres & Co., 16 Rue Fenelon, Paris, France.

Murchey

Machine & Tool Co.

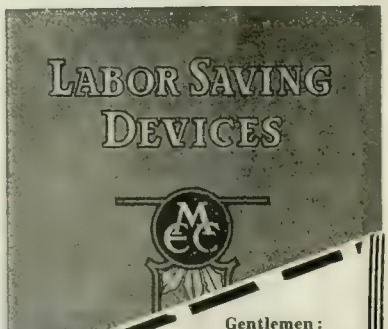
75 Porter Street, Detroit, Mich.



Consider Just This One Feature of M.E.C. Air-operated Hinged Collets

They save from 50 per cent. to 90 per cent. of the time usually required to do the same work by an ordinary chuck. While they **possess many** other points of superiority, the above feature alone is one that should appeal to users of chucks.

May we send full particulars? Just fill in coupon.



Manufacturers Equipment Co.

175-179 N. JEFFERSON ST. CHICAGO, U. S. A.

Canadian Agents:
J. R. Stone Tool and Supply Co., Goebel Bldg., Detroit, Mich.

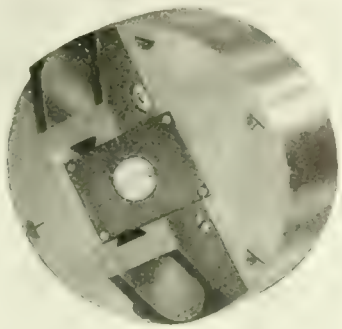
Gentlemen:
Please send me copy of your catalog entitled "Labor Saving Devices," according to your advertisement in Canadian Machinery.

Name .....
Address .....
Position .....
With .....

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

Air Operated Three-Jaw Universal Chuck

Hannifin Air Chucks



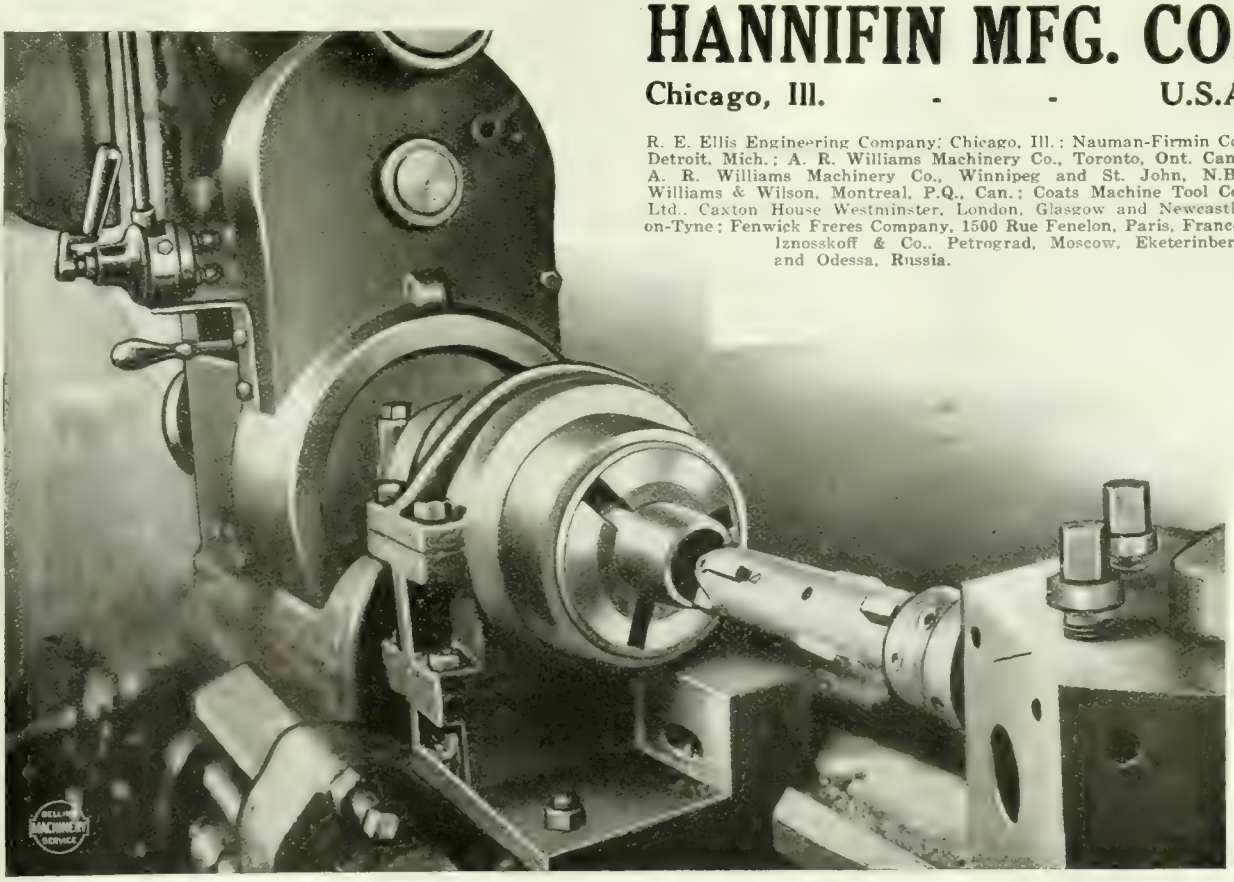
Air Operated Two-Jaw Universal Chuck

Increase Your Output 20 to 100 Per Cent.

This is a big claim, but it's nevertheless within the range of possibility in your plant. Other plants have increased their production 20 to 100 per cent.—you can do likewise. At the Worthington Pump and Machinery Corporation's Hazelton, Pa., plant, Hannifin Air Chucks are in sole possession of the field. They won this distinction through superior merit.

Cut below shows a 3" Russian shell *Hannifin chucked* for inside operation.

For quick handling and rigid slip grip work the "Hannifin" is the chuck for the job. Works on and under 75 pounds pressure.



HANNIFIN MFG. CO.

Chicago, Ill. - - U.S.A

R. E. Ellis Engineering Company; Chicago, Ill.; Nauman-Firmin Co., Detroit, Mich.; A. R. Williams Machinery Co., Toronto, Ont. Can.; A. R. Williams Machinery Co., Winnipeg and St. John, N.B.; Williams & Wilson, Montreal, P.Q., Can.; Coats Machine Tool Co., Ltd., Caxton House Westminster, London, Glasgow and Newcastle-on-Tyne; Fenwick Freres Company, 1500 Rue Fenelon, Paris, France; Iznosskoff & Co., Petrograd, Moscow, Eketerinberg, and Odessa, Russia.

OVER 50,000 COPIES PER MONTH

Canadians

should be thankful that our Country has a Canadian Magazine fit to take its place in the company of the big American magazines — a magazine equalling in interest and literary merit the big magazines produced in a Country of 100,000,000, where it is possible to obtain $1,000 to $5,000 a page per issue or more for advertising space.

THE making of MACLEAN'S MAGAZINE month by month, year after year, has been hard labor. One difficulty was to get the right sort of matter—Canadian in origin and theme. A few years ago our country possessed few writers and artists of trained and high ability. To-day, thanks very largely to MACLEAN'S MAGAZINE, we have men and women writers and artists producing first-class work; they developed when they found a medium demanding a grade of work equalling the best contributors to American magazines. Also, the Canadian writers and artists who were finding a market for their wares in the United States turned to MACLEAN'S when this magazine showed itself to be a sufficient and creditable vehicle for their work.

The future has a good crop of A1 Canadian writers and artists in store, whose work will appear in MACLEAN'S; but consider these names of Canadian men and women who have already "arrived," and whose work appears in MACLEAN'S MAGAZINE:—

Sir Gilbert Parker,	E. Phillips Oppenheim,
Arthur Stringer,	Peter McArthur,
Arthur E. McFarlane,	L. B. Yates,
Stephen Leacock,	Geo. Eustace Pearson,
Robert W. Service,	W. A. Craick,
Alan Sullivan,	H. F. Gadsby,
Agnes C. Laut,	C. W. Jefferys,
L. M. Montgomery,	J. W. Beatty,
"Janey Canuck,"	Arthur William Brown,
A. C. Allenson,	Lou Skuce.

These are some of the names of Canadian men and women writers and artists who are doing work of the highest class, acceptable to the hardest-to-get-into publications of the United States. Ten years ago such a Canadian galaxy had no existence.

BESIDES these professional writers and artists — men and women who depend on their pen and pencil and brush for their livelihood — is a big host of others who write only when successfully urged to do so—because they have something to say that is worth saying. These are usually men in a big way of business, or professional men at the top of the ladder, or men and women doing unusual work of a most important sort—often obscurely because they are not self-trumpeters of their achievements or labors. For example, such men and women as:—

THE LATE SIR MORTIMER CLARK
JOHN BAYNE MACLEAN
ERMAN J. RIDGWAY
LORD NORTHCLIFFE
JOSEPH MARTIN, M.P.
BILLY SUNDAY

All these have contributed under their own name or a nom de plume to MACLEAN'S MAGAZINE in the last 12 or 15 months, recognizing that this magazine can give their messages to the whole nation, and to a class of persons whom they wish to reach.

NOBODY who knows MACLEAN'S would ever call it a story magazine, but rather a national magazine—almost a news magazine. Stories there are in every issue—enough of them to satisfy the right and natural desire for romance, adventure, achievement, business, love and intrigue. But the greater part of the contents of every issue of MACLEAN'S MAGAZINE may be called **NEWS**—NEWS of men and their work and triumphs; news of the nation's work and workers; news of discoveries; news of movements; news of politics; news of the builders and building of Canada. MACLEAN'S, as Canada's National Magazine, prepared for thinking and intelligent men and women, must be an informative and interpretive magazine, must mirror national opinion, record national affairs and developments, and be the **VOICE** of prophets, statesmen and leaders. MACLEAN'S is a magazine of to-day—a newspaper of a sort, dealing with big news passed over by daily newspapers whose function is the recording of the day's news—passing news; and who leave the fuller statement—the summed-up presentation of things they can but touch on—to MACLEAN'S MAGAZINE.

A Magazine *of* Power

News features of MACLEAN'S MAGAZINE greatly liked by its 50,000 readers are

The Business Outlook—article.
The Investment Situation—article
The Review of Reviews Department.
The Nation's Business.
Women and their work.

These are regular department features appearing in every issue of MACLEAN'S. They are of the nature of surveys or digests, and perform a service welcomed and praised by all readers who aim to keep themselves broadly informed concerning what's doing in Canada and what's being thought and said and done the wide world over.

REVIEW of Reviews is the outstanding feature of MACLEAN'S, in that it gives the best articles, in condensed form, from the best magazines of the world. A staff of trained people read and study the contents of all magazines and select for each issue of MACLEAN'S twenty or more articles which mirror the world's progress and present the changing aspects of world opinion.

IN rounding out this presentation of Canada's National Magazine a brief reference may be made to one large and discriminating and important class of contributors to it—advertisers. Literally hundreds of them employ MACLEAN'S for their advertising, to reach the influential classes represented by MACLEAN'S list of subscribers, and because they get national publicity economically. These makers and producers of goods of national consumption appreciate the fact that a select circulation of 50,000 gives them, among the most important families of Canada, strong local publicity as well as broad national publicity, and that retail distributors are both canvassed and assisted by their national advertising in MACLEAN'S MAGAZINE. They recognize that $1,000—$3,000 invested in space in MACLEAN'S MAGAZINE to buy 365-day national influence is dirt cheap publicity.

THIS is but condensed presentation of MACLEAN'S MAGAZINE. Very much more can be said about its editorial policy and character, about its making, about its quest for and development of new contributors, about the policy that keeps canvassing methods and advertising columns clean, about the hearty approval of subscribers of MACLEAN'S MAGAZINE, about the significance of 50,000 circulation, about the wisdom of doing a "little advertising in a few magazines" as an initial step in national advertising plans; about the advertising of MACLEAN'S MAGAZINE in all the MacLean Publishing Company's list of business and technical newspapers, about the influence of MACLEAN'S MAGAZINE on distributors.

But time and space forbid here and now a continuation of the MACLEAN story.
What is enough to be impressed is—

MACLEAN'S MAGAZINE

Canada's National Magazine

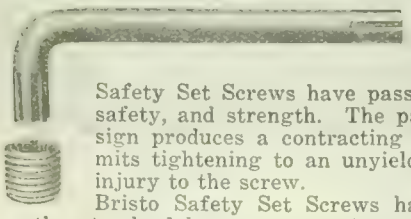
143 University Ave., Toronto

Union Trust Bldg., WINNIPEG Boston New York Chicago London, Eng. Southam Bldg., MONTREAL

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

HINTS TO BUYERS

BUILDERS OF MACHINERY WHAT SET SCREWS DO YOU USE?



TRADE MARK
BRISTO

Safety Set Screws have passed every test for safety, and strength. The patented fluted design produces a contracting effect which permits tightening to an unyielding grip without injury to the screw.

Bristo Safety Set Screws have been adopted as the standard by many prominent machine builders. Ask for free samples and Bulletin I-809.

THE BRISTOL CO., Waterbury, Conn.
U. S. A.

SKINNER DRILL CHUCKS

New Model

THE LARGEST ASSORTMENT
Made By Any Manufacturer

The "New Model" is especially adapted to rapid, sensitive drilling. It is quick, light, strong and easily operated.

The price is surprisingly low. Ask about our complete line on [illegible]

THE SKINNER CHUCK CO.
Main Office and Factory
NEW BRITAIN, CONN.
New York Office—[illegible]
London Office—[illegible]
San Francisco Office—[illegible]

We guard your purchases and tell you if you are getting what you are supposed to get.

Once you have formed the habit of consulting us for expert advice you wonder how you got along without our service.

CANADIAN INSPECTION AND TESTING LABORATORIES, LIMITED

Head Office and Main Laboratories—MONTREAL

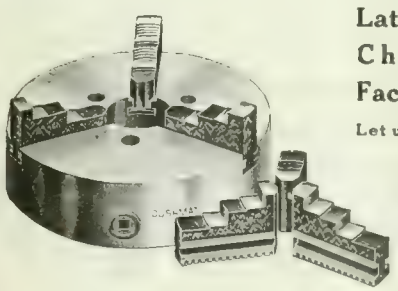
Branch Offices and Laboratories:
TORONTO, WINNIPEG, EDMONTON, VANCOUVER, NEW GLASGOW

STEEL CASTINGS

We are well equipped to make all kinds of steel castings, 100 lbs. to 50,000 lbs.

Dominion Steel Foundry Co.
Hamilton LIMITED Ontario

Cushman Chucks

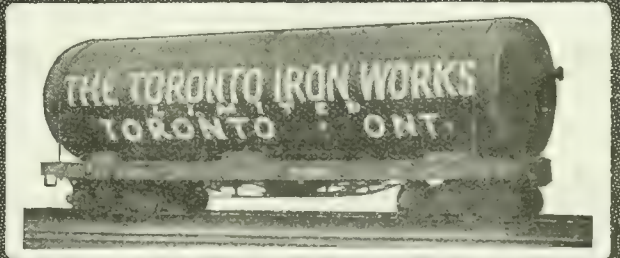


Lathe Chucks, Drill Chucks, Portable Face Plate Jaws.

Let us send you our catalog.

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

RIVETED STEEL TANKS FOR EVERY PURPOSE



OIL STORAGE - GASOLINE TANKS - AIR RECEIVERS
PNEUMATIC WATER SUPPLY TANKS - SMOKE STACKS
BOILER BREECHING - RIVETED STEEL PIPE - BINS & HOPPERS

Northern Crane Works

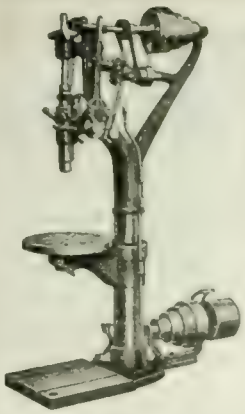
LIMITED
WALKERVILLE
ONTARIO

Electric Cranes
Hand Cranes
Foundry Equipment

NORTHERN CRANES

CRANES
MADE IN CANADA

Electric Hoists
Air Hoists
Cupolas
Ladles



20" Swing Drills in four distinct styles. Plain lever feed, lever and wheel feed, power feed and automatic stop, and with back gearing. Made singly or in 2, 3 or 4 spindle gangs. Write us for complete information and Catalogue No. 62; also for particulars on our new 25" Drilling Machine.

The Silver Mfg. Company

Box 290 Salem, Ohio

SILVER

Zenith Coal & Steel Products Limited

COAL COKE HACK SAW BLADES

CARBON STEEL MACHINERY STEEL

HIGH SPEED STEEL

Royal Bank Bldg., Toronto; McGill Bldg., Montreal, Que.

Every Tooth Cuts on Every *Quality* Saw

They cut straighter. They last longer.

NAPIER SAW WORKS, Inc., Springfield, Mass., U. S. A.

NORTON JACKS

FOR ALL KINDS OF HEAVY LIFTING

Send for complete catalogue showing 50 styles 10 to 100 tons capacity.

Made only by

A. O. NORTON, LIMITED

Coaticook, Prov. Quebec - - Canada

Greenfield

Trade Mark Reg. U. S. Pat. Office

A universal grinder. A grinder with all attachments. A grinder that will handle all kinds of tool-sharpening as well as cylindrical, internal and surface grinding. An all-around machine for your tool-room.

Catalog No. 6.

Greenfield Machine Co.

Greenfield, Mass., U.S.A.

Adjustable and Rustproof

WILLSON SAFETY GOGGLES

Can be worn over other glasses

FOR MUNITION WORKERS Send for details.

T. A. Willson & Co., Inc. Canadian Office, 23 Scott St., Toronto

Oxy-Acetylene Welding and Cutting Apparatus

OXY-ACETYLENE WELDING DAVIS APPARATUS DAVIS-BOURNONVILLE CO. NY.

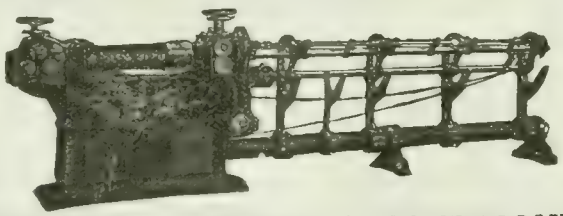
Carter Welding Co., General Dealers **Toronto**

For Davis-Bournonville Oxy-Acetylene Apparatus

General Office and Factory, Jersey City, N.J.

Canadian Factory, Niagara Falls, Ont.

Sales Offices: New York, Boston, Philadelphia, Pittsburgh, Cleveland, Cincinnati, Chicago, Detroit, St. Louis, San Francisco, Seattle.



THE WIRE IS PERFECTLY STRAIGHT

and cut to accurate lengths when it comes from our AUTOMATIC WIRE STRAIGHTENING AND CUTTING MACHINE, whether it's ¾" diameter or only .020" wire, hard or soft wire, highly polished or rough stock.

May we send you catalogue C?

The F. B. SHUSTER COMPANY, New Haven, Conn.

Formerly John Adt & Son. Established 1866.

Also makers of Riveting Machines, Sprue Cutters, Cotter Pin Machines, etc.

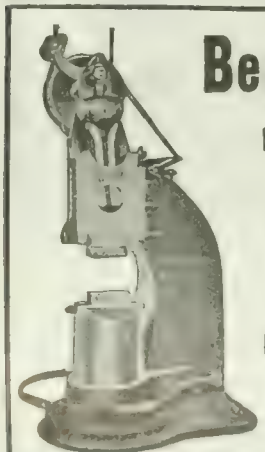
GEAR

GEARS AND GEAR CUTTING SPROCKETS AND CHAINS

In stock and to order any size from one-quarter inch to six-foot in diameter, any material. Estimates and gear advice cheerfully furnished.

Grant Gear Works, Inc., 151 Pearl St. Boston, Mass.

G. B. GRANT U.S.A.



Beaudry Hammers

FOR GENERAL FORGING

Save Fuel, Time and Labor. Cut Forging Costs in two.

BELT OR MOTOR DRIVEN

BEAUDRY & COMPANY, Inc.

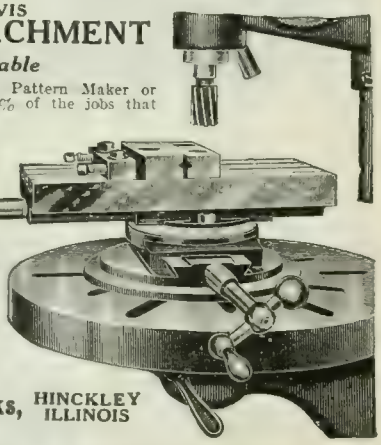
141 Milk Street, Boston, Mass.

Alfred Herbert, Ltd., Coventry, England, London, Paris, Calcutta, Yokohama.

THE DAVIS MILLING ATTACHMENT

and Compound Table

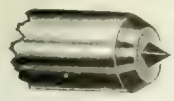
For the Die Maker, Repair Shop, Pattern Maker or Garage; will perform more than 90% of the jobs that come up.



For any Drill Press 14" to 42" swing. Big Economy — Big Convenience — Small Price. It relieves your large millers, comes in handy spotting castings, milling ends of bosses, and many other odd jobs. Cuts all kinds of keyseats perfectly; mills deep grooves, slots and cams. We also make cylinder reamers for reboring Ford car, and a reliable air compressor—all at special factory prices. Write for circulars to-day.

Hinckley Machine Works, HINCKLEY ILLINOIS

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



"End View"

For Truing Grinding Wheels

Francis Diamond Hand and Grinder Tools always give entire satisfaction. The diamonds in these tools are of the hardest and best quality and set very securely. Length of Hand Tool shown here 11½ in. over all. Rosewood handle. Let us send you an assortment for selection.

Francis & Co.

Hartford · · · Conn.

"THISTLE" BRAND RUBBER BELTING

"Maintenance of Quality"

is our motto, and our experience in the manufacture of belting since the year 1856 should be invaluable to you. Let us tell you all about this friction faced belting. The price will appeal to you.

Write to-day.

J. C. McLAREN BELTING CO., LTD.

TORONTO, MONTREAL, WINNIPEG

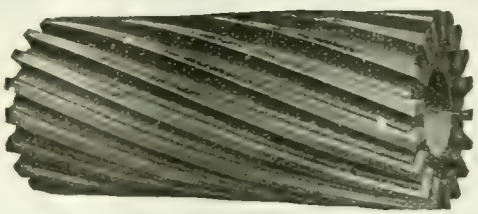
Adjustoglas

TRADE MARK REGISTERED

Resistal reinforced lenses cost more, but are worth more and protect more.

THE STRONG, KENNARD & NUTT CO.
511 Schofield Bldg. Cleveland, Ohio

Taylor-Newbold Milling Cutters



Inserted Helical Blades of High-Speed Steel, with Constant Rake Angle, Insures Higher Speeds and Heavier Cuts.

May We Send Bulletin R-P?

THE TABOR MANUFACTURING COMPANY

PHILADELPHIA, PA., U.S.A.

PRESSES—ALL TYPES

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

Baird Machine Co., Bridgeport, Conn. U.S.A.

HIMOFF MACHINE CO.,

40-50 Mills St., Astoria, N.Y.

Makers of

Lathes, Turret Lathes, and Gear Hobbers

PRECISION TOOLS AND EQUIPMENT

Johansson Standard and Shop Gages
Universal Angle Plates
McCroskey Reamers Higley Cold Metal Saws
Magnetic Chucks
Bench Lathes Surface Grinders

Send us your inquiries. Let us quote.

H. E. STREETER

523 New Birks Building, Montreal, P.Q.

Gardner Disc Grinder

Gardner Disc Grinders are made in all sizes, types and combinations. We can successfully meet any disc grinding problem in existence. Largest builders of Disc Granding machinery in the world.

Gardner Machine Co.

The Disc Grinding Authorities

Beloit, Wis. U.S.A.

Canadian Agents: Can. Fairbanks-Morse Co.
Toronto — Montreal

Toronto Testing Laboratory

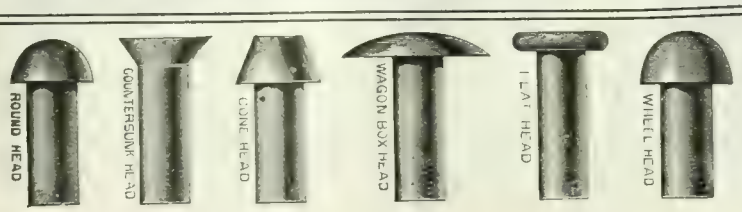
LIMITED

METALLURGISTS—CHEMISTS—FUEL ENGINEERS

160 Bay St., Toronto.

Tests of Metals, Fuels, Oils, Water, Etc.

SPECIAL ATTENTION TO ALL SHELL MATERIALS



WE MANUFACTURE RIVETS of every description, ½ inch. dia. and smaller

PARMENTER & BULLOCH CO., LTD.

GANANOQUE, ONT.

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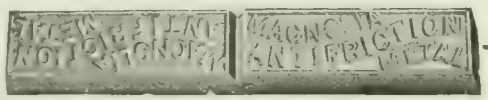

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Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
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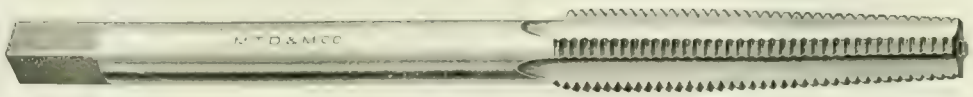

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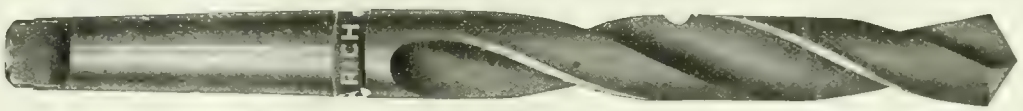

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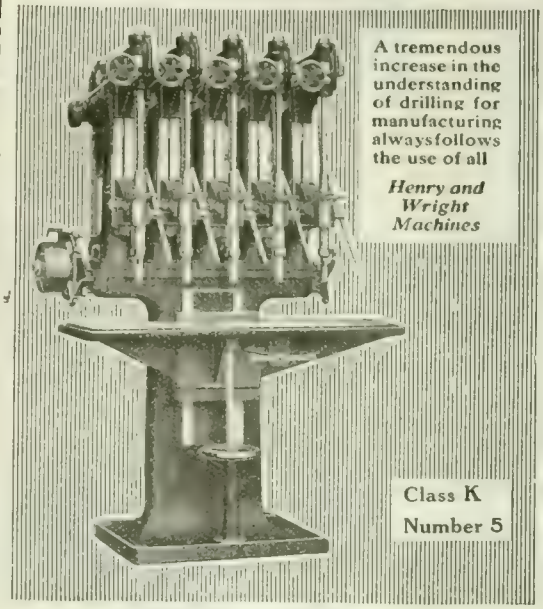

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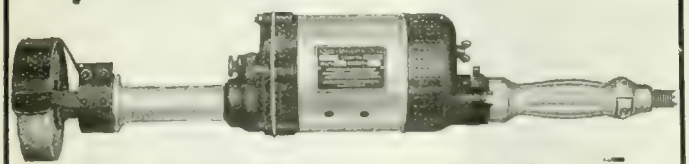

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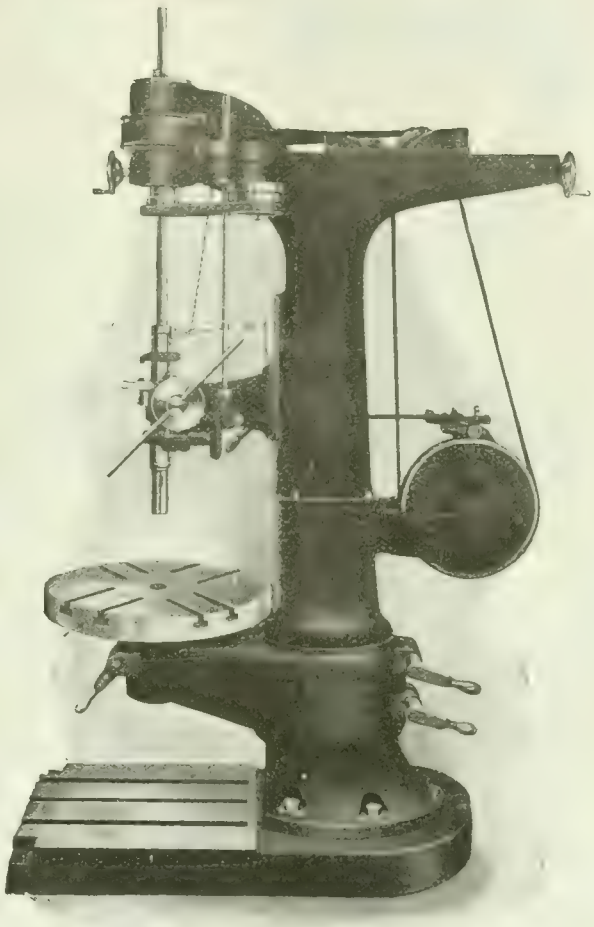

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Gardner, Robt., & Son, Montreal.
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Philadelphia Gear Works, Philadelphia, Pa.
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A. R. Williams Machy. Co., Toronto.

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Willson & Co., Inc., T. A., Reading, Pa.

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GLOVES, STEEL GRIP, SAND BLAST
Hickory Steel Grip Glove Co., Chicago, Ill.

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Wilmarth & Morman, Grand Rapids, Mich.

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Ford-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
New Britain Machine Co., New Britain, Conn.
Petrie, Ltd., H. W., Toronto, Ont.
Stow Mfg. Co., Binghamton, N.Y.
United States Electrical Tool Co., Cincinnati, O.

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LeBlond Mach. Tool Co., R. K., Cincinnati, O.
Norton Grinding Co., Worcester, Mass.
Pratt & Whitney Co., Dundas, Ont.
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Foss & Hill Machy. Co., Montreal.
Greenfield Machine Co., Greenfield, Mass.
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Independent Pneumatic Tool Co., Chicago, Ill.

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Cincinnati Electrical Tool Co., Cincinnati, Ohio.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
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Greenfield Machine Co., Greenfield, Mass.
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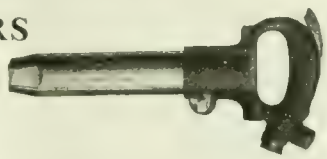

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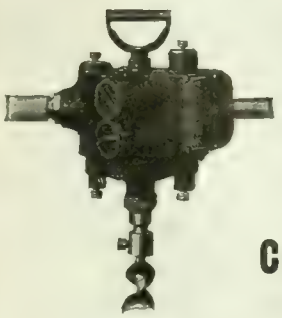

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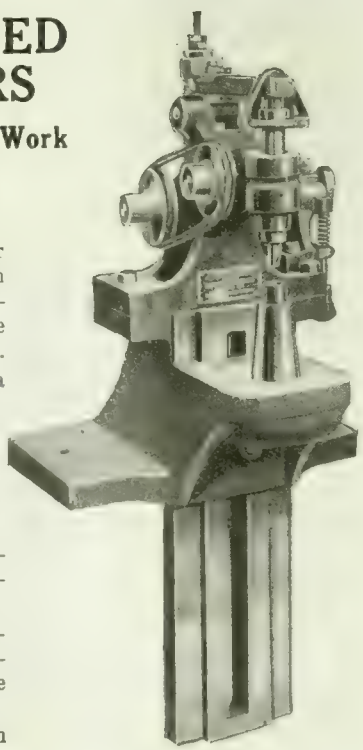

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Noble & Westbrook Mfg. Co., Hartford, Conn.
Perrin, Wm. R., Toronto.

MEASURING MACHINES
Pratt & Whitney Co., Dundas, Ont.

MEASURING TAPES AND RULES
James Chesterman & Co., Ltd., Sheffield, Eng.

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Can. Inspection & Testing Lab., Montreal, Que.
Toronto Testing Laboratory, Ltd., Toronto.

METALS
Can. B. K. Morton, Toronto, Montreal.
Dom. Iron & Wrecking Co., Ltd., Montreal, Que.
Standard Machy. & Supplies, Ltd., Montreal, Que.

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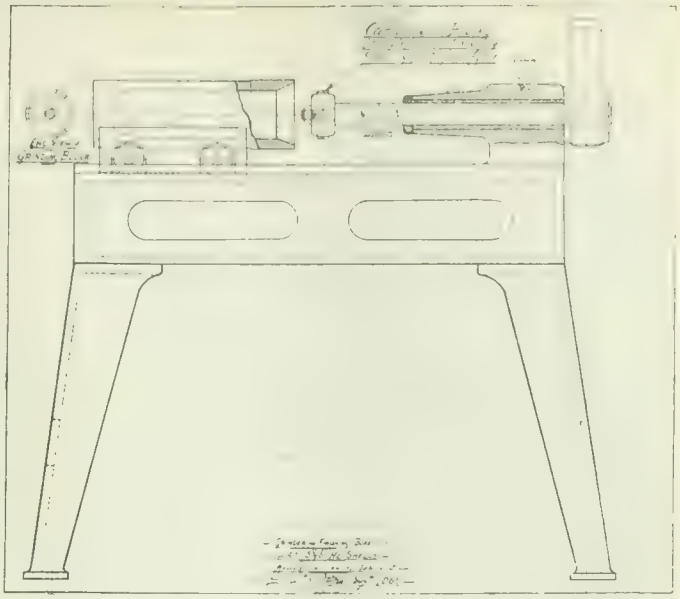
Special Purpose Shell Tools

For use in our own factory we have designed a series of special

SHELL GRINDING MACHINES
SHELL CLEANING MACHINES
UNDERCUTTING MACHINES
FINISH TAPPING MACHINES
INSIDE PROFILING MACHINES

These are all adapted for either 4.5", 5" or 6" High Explosive Shells.

They will do the work for which they were designed rapidly, accurately and economically.



Special Grinder for finishing inside of 4.5" or 5" or 6" H.E. Shells.

They have proven so satisfactory in operation in our own shops that several other shell manufacturers have learned of them in some way and have ordered them for their own use.
So we have decided to offer them for general sale, and at a prices *less than half* the cost of ordinary tools for the same work.

Write us for particulars and photographs.

MARSH & HENTHORN LIMITED, Belleville, Ont.

Stow Shell Grinders Increase Production

Suspended Pedestal Mounted on Truck

Any Size Any Current

Immediate Shipment

Stow Manufacturing Co.

Binghamton, New York, U.S.A.

Oldest Portable Tool Manufacturers in America

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Cincinnati Milling Machine Co., Cincinnati
Cleveland Milling Mach. Co., Cleveland, Ohio.
Ford-Smith Mach. Co., Hamilton, Ont.
Fox Machine Co., Jackson, Mich.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Mach. Co., Torrington, Conn.
Hinckley Machine Works, Hinckley, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Taft-Peirce Mfg. Co., Woonsocket, R.I.

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Hardinge Bros., Inc., Chicago, Ill.
United States Mach. Tool Co., Cincinnati, Ohio.
Pratt & Whitney Co., Dundas, Ont.
Whitney Mfg. Co., Hartford, Conn.

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Cleveland Milling Machine Co., Cleveland, Ohio.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Gooley & Edlund, Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co., New York.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.
Riverside Machinery Depot, Detroit, Mich.
Steptoe, The John Co., Cincinnati, Ohio.
United States Mach. Tool Co., Cincinnati, Ohio.
Whitney Mfg. Co., Hartford, Conn.
A. R. Williams Machy. Co., Toronto.

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Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Machine Co., Torrington.
Kempsmith Mfg. Co., Milwaukee, Wis.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co., New York.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.
Steptoe, The John Co., Cincinnati, Ohio.
A. R. Williams Machy. Co., Toronto.

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Can. Fairbanks-Morse Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.
Riverside Machinery Depot, Detroit, Mich.

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Aikenhead Hardware Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence.
Ford-Smith Mach. Co., Hamilton, Ont.
Geometric Tool Co., New Haven, Conn
Kempsmith Mfg. Co., Milwaukee, Wis.
Tabor Mfg. Co., Philadelphia, Pa.

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Can. Fairbanks-Morse Co., Montreal.
Cummings & Son, J. W., New Glasgow, Canada.
Jenckes Mach. Co., Sherbrooke, Que.
MacKinnon, Holmes Co., Sherbrooke.
Marsh & Henthorn, Belleville, Ont.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.

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Can. Fairbanks-Morse Co., Montreal.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Jenckes Mach. Co., Sherbrooke, Que.
Petrie, Ltd., H. W., Toronto, Ont.
A. R. Williams Machy. Co., Toronto.

MITTENS
Hickory Steel-Grip Glove Co., Chicago, Ill.

MORTISING MACHINES
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
New Britain Mach. Co., New Britain, Conn.

MOTORS, ELECTRIC
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
A. R. Williams Machy. Co., Toronto.

MOTORS, PNEUMATIC
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.

MULTIPLE INDEX CENTRES
Garvin Machine Co., New York.

NAIL MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.

NAME PLATES, BRONZE, ETCHED AND STAMPED
Matthews, Jas. H., & Co., Pittsburgh, Pa.
Pritchard-Andrews Co., Ottawa, Can.

NIPPLE HOLDERS
Curtis & Curtis Co., Bridgeport, Conn.

NIPPLE THREADING MACHINES
John H. Hall & Sons, Ltd., Brantford, Ont.
Landis Machine Co., Waynesboro, Pa.

NITROGEN
Carter Welding Co., Toronto, Ont.
L'Air Liquide Society, Montreal, Toronto.

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Canadian B. K. Morton, Toronto, Montreal.
Galt Machine Screw Co., Galt, Ont.
National-Acme Co., Cleveland, Ohio.
Wilkinson & Kempatrs, Hamilton, Ont.

NUT BURRING MACHINES
National Machy. Co., Tiffin, O.

NUT MACHINES (HOT)
National Machy. Co., Tiffin, O.

NUT FACING AND BOLT SHAVING MACHINES
Garvin Machine Co., New York.
National Machy. Co., Tiffin, O.
Victor Tool Co., Waynesboro, Pa.

NUT TAPPERS
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
Hall, J. H., & Son, Brantford, Ont.
A. B. Jardine & Co., Hespeler.
Landis Machine Co., Waynesboro, Pa.
National Machy. Co., Tiffin, O.

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Elm Cutting Oil Co., Toronto, Ont.

OIL SEPARATORS
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.
Smart-Turner Machine Co., The, Hamilton.

OIL STONES
Aikenhead Hardware Co., Toronto, Ont.
Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.

OIL STORAGE SYSTEMS
Bowser & Co., Inc., S. F., Toronto, Ont.

OSCILLATING VALVE GRINDERS (PNEUMATIC)
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Brantford Oven & Rack Co., Brantford, Ont.
Oven Equipment & Mfg. Co., New Haven, Conn.
Whiting Foundry Equipment Co., Harvey, Ill.

OVEN TRUCKS, STEEL
Brantford Oven & Rack Co., Brantford, Ont.
MacKinnon, Holmes & Co., Sherbrooke, Que.
Oven Equipment & Mfg. Co., New Haven, Conn.
Whiting Foundry Equipment Co., Harvey, Ill.

OVENS FOR DRYING, TEMPER AND UNDER TRUCKS
Brantford Oven & Rack Co., Brantford, Ont.
Oven Equipment & Mfg. Co., New Haven, Conn.

OXY-ACETYLENE WELDING AND CUTTING
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Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
St. Lawrence Welding Co., Montreal, Que.

OXY-ACETYLENE WELDING AND CUTTING PLANT
Carter Welding Co., Toronto, Ont.
L'Air Liquide Society, Montreal, Toronto.
Prest-O-Lite Co., Inc., Toronto, Ont.

OXYGEN (SEE ACETYLENE)
L'Air Liquide Society, Montreal, Que.

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Cleveland Wire Spring Co., Cleveland.
New Britain Mach. Co., New Britain, Conn.

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William R. Perrin, Ltd., Toronto.
Petrie, Ltd., H. W., Toronto, Ont.

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MacKinnon, Holmes & Co., Sherbrooke, Que.
Sturtevant Co., B. F., Galt, Ont.

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Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.

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Butterfield & Co., Rock Island, Que.
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Curtis & Curtis Co., Bridgeport, Conn.
Foss & Hill Machy. Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
John H. Hall & Sons, Brantford.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Petrie, Ltd., H. W., Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont.
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A. R. Williams Machy. Co., Toronto.

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Curtis & Curtis Co., Bridgeport, Conn.
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Wells Bros. Co. of Canada, Galt, Ont.

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Armstrong Bros. Tool Co., Chicago.

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Can. Fairbanks-Morse Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ohio.
Morton Mfg. Co., Muskegon Heights, Mich.
Niles-Bement-Pond Co., New York.
Petrie, Ltd., H. W., Toronto, Ont.
Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.

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Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ohio.
Niles-Bement-Pond Co., New York.
Petrie, Ltd., H. W., Toronto, Ont.
Riverside Machinery Depot, Detroit, Mich.
Steptoe, The John Co., Cincinnati, Ohio.
A. R. Williams Machy. Co., Toronto.

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Sheldons, Ltd., Galt, Ont.
Niles-Bement-Pond Co., New York.

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Aikenhead Hardware Co., Toronto.
Canadian Billings & Spencer, Ltd., Welland.
Peck, Stow & Wilcox Co., Southington, Conn.

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Atlas Press Co., Kalamazoo, Mich.
Hannifin Mfg. Co., Chicago, Ill.
Metalwood Mfg. Co., Detroit, Mich.

PRESSES, BROACHING, FORGING AND FLANGING
Atlas Press Co., Kalamazoo, Mich.
E. W. Bliss Co., Brooklyn, N.Y.
Ferracute Machine Co., Bridgeton, N.J.
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, CAM, TOGGLE, EYELET
Baird Machine Co., Bridgeport, Conn.
Bliss Co., E. W., Brooklyn, N.Y.
Consolidated Press Co., Hastings, Mich.
Toledo Machine & Tool Co., Toledo.

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Atlas Press Co., Kalamazoo, Mich.
Bliss Co., E. W., Brooklyn, N.Y.
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Ferracute Machine Co., Bridgeton, N.J.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Metalwood Mfg. Co., Detroit, Mich.
William R. Perrin, Ltd., Toronto.
Petrie, Ltd., H. W., Toronto, Ont.
West Tire Setter Co., Rochester, N.Y.

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Can. Fairbanks-Morse Co., Montreal.
Erie Foundry Co., Erie, Pa.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Petrie, Ltd., H. W., Toronto, Ont.
Toledo Machine & Tool Co., Toledo.

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Charles F. Elmes Eng. Works, Chicago.
Metalwood Mfg. Co., Detroit, Mich.
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Standard Machy. & Supplies, Ltd., Montreal, Que.
Petrie, Ltd., H. W., Toronto, Ont.
Toledo Machine & Tool Co., Toledo.
West Tire Setter Co., Rochester, N.Y.
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Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Consolidated Press Co., Hastings, Mich.
Charles F. Elmes Eng. Works, Chicago.
Ferracute Machine Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
William R. Perrin, Ltd., Toronto.
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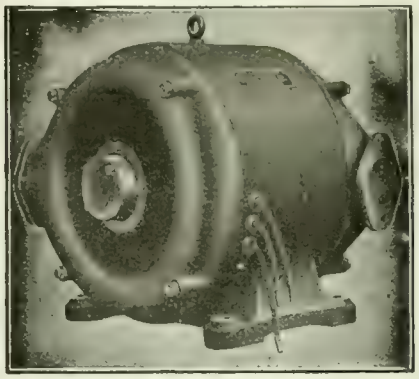

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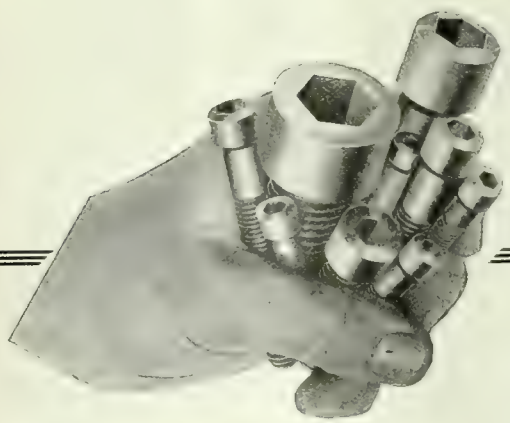
FOR VERY DIRTY PLACES



Safety and Strength

The value of this socket head cap screw is readily observed. The point that remains to be settled is the strength. The socket shown does not lessen the strength of the screw, the hexagon shape remedies any weakness. A surer and stronger grip is obtained by this method. It will add a decided safety factor to your machine, also better appearance.

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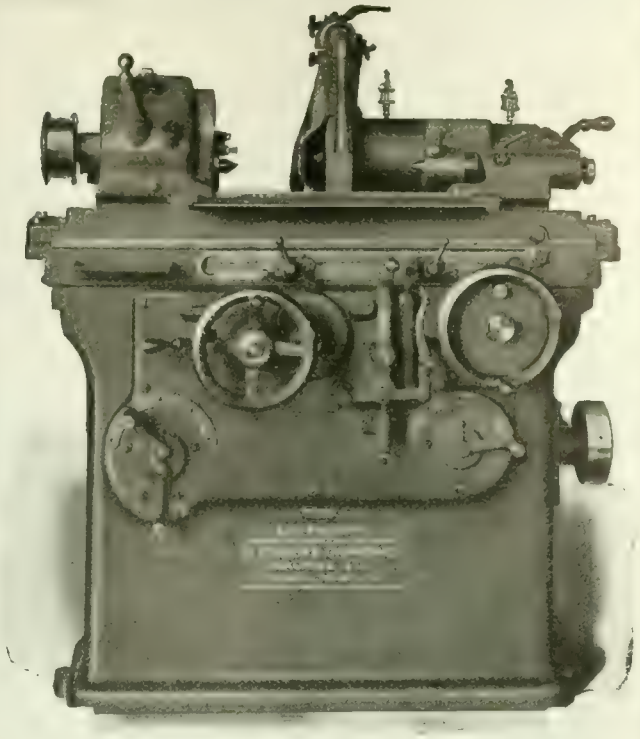
Hartford, Conn., U.S.A.



MODEL "A"

Fitchburg Grinders

Model "A" illustrated here is a machine whose chief feature is its capacity for size, variety and quality of work. Its speed will give you greater production; its size, convenience, increased production, strength and saving in floor space will effect such a saving as to make it preferable over all other machines of similar character.

It is specially adapted for grinding straight or taper shafts.

An inquiry would speedily get you valuable information and data.

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Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
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The Smart-Turner Mach. Co., Hamilton.
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Bernard Industrial Co., A., Fortierville, Que.
Petrie, Ltd., H. W., Toronto, Ont.
Positive Clutch & Pulley Works, Ltd., Toronto.

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Cincinnati Pulley Machy. Co., Cincinnati, Ohio.
Wells Bros. of Canada, Galt, Ont.

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Smart-Turner Mach. Co., Hamilton.

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Can. Blower & Forge Co., Kitchener, Ont.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.
Smart-Turner Mach. Co., Hamilton.
Sturtevant Co., B. F., Galt, Ont.

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Trahern Pump Co., Rockford, Ill.

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Charles F. Elmes Eng. Works, Chicago.
William R. Perrin, Ltd., Toronto.
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Charles F. Elmes Eng. Works, Chicago.
William R. Perrin, Ltd., Toronto.
Petrie, Ltd., H. W., Toronto, Ont.
Smart-Turner Mach. Co., Hamilton.
A. R. Williams Machy. Co., Toronto.

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Blake Pump & Condenser Co., Fitchburg, Mass.
Charles F. Elmes Eng. Works, Chicago.
Metalwood Mfg. Co., Detroit, Mich.
Smart-Turner Mach. Co., Hamilton.
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Bellevue Industrial Furnace Co., Detroit, Mich.
Bowser & Co., Inc., S. F., Toronto, Ont.
Roper, C. F., Co., Hopedale, Mass.
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Graton & Knight Mfg. Co., Worcester, Mass.

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Trahern Pump Co., Rockford, Ill.

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Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Blower & Forge Co., Kitchener, Ont.
Ferracute Mach. Co., Bridgeton, N.J.
Can. Fairbanks-Morse Co., Montreal.
Gardner, Robt., & Son, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Mulliner-Enlund Tool Co., Syracuse, N.Y.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.
Toledo Machine & Tool Co., Toledo, O.

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John Bertram & Sons Co., Dundas.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Consolidated Press Co., Hastings, Mich.
Ferracute Mach. Co., Bridgeton, N.J.
Niles-Bement-Pond Co., New York.

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John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Niles-Bement-Pond Co., New York.
W. A. Whitney Mfg. Co., Rockford, Ill.

PURIFYING AND SOFTENING APPARATUS
Scaife & Sons Co., Wm. B., Pittsburgh, Pa.

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Can. Hoskins, Ltd., Walkerville, Ont.
Holz, Herman A., 1 Madison Ave., New York.
Shore Instrument & Mfg. Co., New York City.
H. E. Streeter, New Birks Bldg., Montreal, Que.
Taylor Instrument Co., Rochester, N.Y.
Thwing Instrument Co., Philadelphia, Pa.

QUARTERING MACHINES
John Bertram & Sons Co., Dundas.
Niles-Bement-Pond Co., New York.

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RAIL BENDERS
Niles-Bement-Pond Co., New York.

RAILROAD TOOLS
Can. Fairbanks-Morse Co., Montreal.
Cumming & Son, J. W., New Glasgow, Canada.
Niles-Bement-Pond Co., New York.

RAILS, STEEL
Cumming & Son, J. W., New Glasgow, Canada.

RATCHETS
Keystone Mfg. Co., Buffalo, N.Y.

RAW HIDE PINIONS (SEE GEARS)

REAMER FLUTING MACHINES
Garvin Machine Co., New York.

REAMERS, ADJUUSTABLE
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Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Osborn (Canada), Ltd., Sam'l, Montreal, Que.
Pratt & Whitney Co., Dundas, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
H. E. Streeter, New Birks Bldg., Montreal, Que.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

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Can. Fairbanks-Morse Co., Montreal.
Clark Equipment Co., Buchanan, Mich.
Cleveland Twist Drill Co., Cleveland.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
McKenna Brothers, Pittsburgh, Pa.
Osborn (Canada), Ltd., Sam'l, Montreal, Que.
Pratt & Whitney Co., Dundas, Ont.

REAMERS, PIPE, CYLINDER AND LOCOMOTIVE
Butterfield & Co., Rock Island, Que.
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Morse Twist Drill & Mch. Co., New Bedford, Mass.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.

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Can. Fairbanks-Morse Co., Montreal.
Clark Equipment Co., Buchanan, Mich.
Cleveland Twist Drill Co., Cleveland.
Illinois Tool Works, Chicago, Ill.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.

REAMING MACHINES, PNEUMATIC
Cleveland Pneumatic Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.

RECORDING INSTRUMENTS
Bristol Co., Waterbury, Conn.
Taylor Instrument Co., Rochester, N.Y.

REGULATORS, PRESSURE, TEMPERATURE
Can. Fairbanks-Morse Co., Montreal
Taylor Instrument Co., Rochester, N.Y.

RESPIRATORS
Strong, Kennard & Nutt Co., Cleveland, Ohio.

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Can. Blower & Forge Co., Kitchener, Ont.
Grant Mfg. & Machine Co., Bridgeport, Conn.
National Machinery Co., Tiffin, O.

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Parmenter & Bulloch Co., Gananoque.
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIVETS, IRON, COPPER AND BRASS
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Parmenter & Bulloch Co., Gananoque.
Steel Co. of Canada, Ltd., Hamilton, Ot.

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Can. Ingersoll-Rand Co., Montreal
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York
Petrie, Ltd., H. W., Toronto, Ont.

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Grant Mfg. & Machine Co., Bridgeport, Conn.
High-Speed Hammer Co., Rochester, N.Y.
F. B. Shuster Co., New Haven, Conn.

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John Bertram & Sons Co., Dundas
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York
Toledo Machine & Tool Co., Toledo, O.

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The Jenckes Mach. Co., Ltd., Sherbrooke, Que.

RUBBER MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland

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Brown & Sharpe Mfg. Co., Providence
James Chesterman & Co., Ltd., Sheffield, Eng.
L. S. Starrett Co., Athol, Mass.

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Strong, Kennard & Nutt Co., Cleveland, Ohio.

SAFETY APPLIANCE GOGGLES
T. A. Wilson, Reading, Pa.

SAND BLASTS
Curtis Pneumatic Machinery Co., St. Louis, Mo.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.

SANDING MACHINES
Canada Machinery Corp., Galt, Ont.

SAW MILL MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Gardner, Robt., & Son, Montreal
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Petrie, Ltd., H. W., Toronto, Ont.
A. R. Williams Machy. Co., Toronto

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Hunter Saw & Machine Co., Pittsburg, Pa.
Napier Saw Works, Springfield, Mass.
Tabor Mfg. Co., Philadelphia, Pa.

SAWS, HACK (SEE HACK SAWS)

SAWS, INSERTED TOOTH
Hunter Saw & Mach. Co., Pittsburgh, Pa.
Napier Saw Works, Springfield, Mass.
Tabor Mfg. Co., Philadelphia, Pa.

SAWS, BAND AND COPING
Napier Saw Works, Springfield, Mass.

SCLEROSCOPES
Shore Instrument & Mfg. Co., New York City
H. E. Streeter, New Birks Bldg., Montreal, Que.

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Johnson Mach. Co., Carlyle, Manchester, Conn.

SCREW MACHINE PRODUCTS
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Eastern Mach. Screw Corp., New Haven, Conn.

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Can. Fairbanks-Morse Co., Montreal.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Garvin Machine Co., New York
Himoff Mach. Co., Inc., Astoria, L.I., New York.
A. B. Jardine & Co., Hespeler
New Britain Machine Co., New Britain, Conn.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.
Rivett Lathe & Grinder Co., Brighton, Mass.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto

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Riverside Machinery Depot, Detroit, Mich.

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Can. B. K. Morton, Toronto, Montreal
Galt Machine Screw Co., Galt, Ont.
National-Acme Co., Cleveland, Ohio
Steel Co. of Canada, Ltd., Hamilton, Ont.
Wilkinson & Kompass, Hamilton, Ont.

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Morse Twist Drill & Mch. Co., New Bedford, Mass
Wells Bros. Co. of Canada, Galt, Ont.
Wilkinson & Kompass, Hamilton, Ont.

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Pratt & Whitney Co., Dundas, Ont.

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Hill, Clarke & Co., Chicago, Ill.
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New York Machinery Exchange, New York
Petrie, Ltd., H. W., Toronto, Ont.
Riverside Machinery Depot, Detroit, Mich.
Strelinger Co., Chas. A., Detroit, Mich.
Stocker-Rumely-Wachs, Chicago, Ill.

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Aikenhead Hardware Co., Toronto, Ont.
Allen Mfg. Co., Hartford, Conn.
Wilkinson & Kompass, Hamilton, Ont.

SHANKS, STRAIGHT AND TAPER
Jacobs Mfg. Co., Hartford, Conn.

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John Bertram & Sons Co., Dundas
Can. Fairbanks-Morse Co., Montreal
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal
Gardner, Robt., & Son, Montreal
Hendey Machine Co., Torrington, Conn.
Hamilton Mach. Tool Co., Hamilton, Ohio
Petrie, Ltd., H. W., Toronto, Ont.
Rhodes Mfg. Co., Hartford, Conn.
Steptoe Co., John, Cincinnati, Ohio

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Can. Bond Hanger & Coup. Co., Alexandria, Ont
Can. Fairbanks-Morse Co., Montreal
Can. Drawn Steel Co., Hamilton, Ont.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Niles-Bement-Pond Co., New York
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.
Strelinger Co., Chas. A., Detroit, Mich.
A. R. Williams Machy. Co., Toronto
Wilkinson & Kompass, Hamilton, Ont.

SHAFTS, FLEXIBLE
Stow Mfg. Co., Binghampton, N.Y.

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Garvin Machine Co., New York.
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D. McKenzie Machinery Co., Guelph, Ont.
Mulliner & Enlund Tool Co., Syracuse, N.Y.
Prest-O-Lite Co., Inc., Toronto, Ont.
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Riverside Machinery Depot, Detroit, Mich.
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Sleeper & Hartley, Inc., Worcester, Mass.

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Morse Chain Co., Ithaca, N.Y.
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Perrin, Wm. R., Toronto.

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Canada Wire & Iron Goods Co., Hamilton, Ont.

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Dom. Forge & Stamping Co., Walkerville, Ont.
Homer & Wilson, Hamilton, Ont.

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Ferracute Mach. Co., Bridgton, N.J.
Noble & Westbrook Mfg. Co., Hartford, Conn.

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Colonial Steel Co., Pittsburgh, Pa.
H. A. Drury Co., Ltd., Montreal.
Eagle & Globe Steel Co., Montreal, Que.
Fairley Davidson Steel Co., New York, N.Y.
Hawkridge Bros. Co., Boston, Mass.
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St. Lawrence Welding Co., Montreal, Que.
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Murchey Machine & Tool Co., Detroit.
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Morse Twist Drill & Mch. Co., New Bedford, Mass.
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Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Geometric Tool Co., New Haven.
Landis Machine Co., Waynesboro, Pa.
National-Acme Co., Cleveland, Ohio.
National Machy. Co., Tiffin, Ohio.
Petrie, Ltd., H. W., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co. of Canada, Galt, Ont.

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Pratt & Whitney Co., Dundas, Ont.
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Armstrong Bros. Tool Co., Chicago.
Can. B. K. Morton, Toronto, Montreal.
Deloro Smelting & Refining Co., Toronto, Ont.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

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TOOL ROOM PARTITIONS
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Can. B. K. Morton, Toronto, Montreal.
Colonial Steel Co., Pittsburgh, Pa.
Deloro Smelting & Refining Co., Toronto, Ont.
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Eagle & Globe Steel Co., Montreal, Que.

Hawkridge Bros. Co., Boston, Mass.
Latrobe Electric Steel Co., Latrobe, Pa.
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H. W. Petrie, Ltd., Toronto, Ont.
Sleeper & Hartley, Inc., Worcester, Mass.
Swedish Steel & Importing Co., Montreal, Que.
Vanadium-Alloys Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

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A. R. Williams Machinery Co., Toronto.
United States Elec. Tool Co., Cincinnati, O.

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Can. Ingersoll-Rand Co., Sherbrooke, Que.
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Curtis Pneumatic Machinery Co., St. Louis, Mo.
Garlock-Walker Machinery Co., Toronto, Ont.
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Armstrong Bros. Tool Co., Chicago.

TOOLS, SCREW MACHINE
Foster Machine Tool Co., Elkhart, Ind.

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Can. Fairbanks-Morse Co., Montreal.
Can. Drawn Steel Co., Hamilton, Ont.
Hamilton Gear & Machine Co., Toronto.
Morse Chain Co., Ithaca, N.Y.
Petrie, Ltd., H. W., Toronto, Ont.
The Smart-Turner Machine Co., Hamilton.

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Northern Crane Works, Walkerville.
Tallman Brass & Metal Co., Hamilton.

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Wright Mfg. Co., Lisbon, Ohio.

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Canada Machinery Corp., Galt, Ont.
Chapman Double Ball Bearing Co., Toronto.
Whiting Foundry Equipment Co., Harvey, Ill

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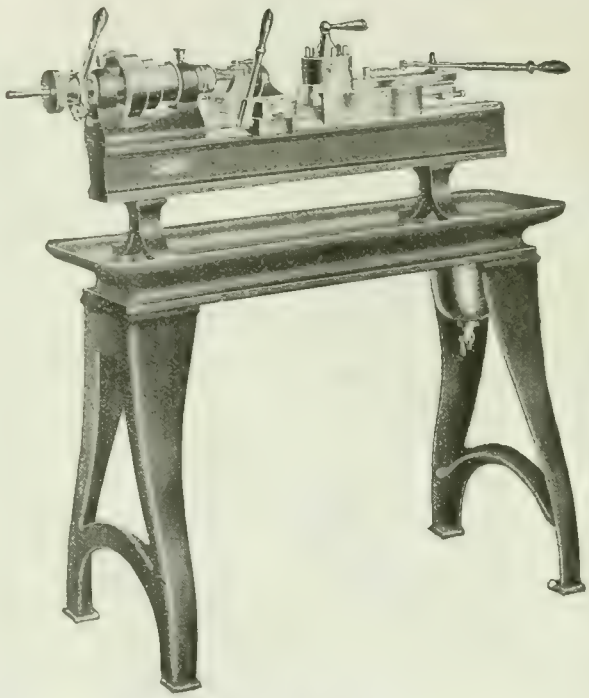

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A weekly newspaper devoted to the machinery and manufacturing interests.

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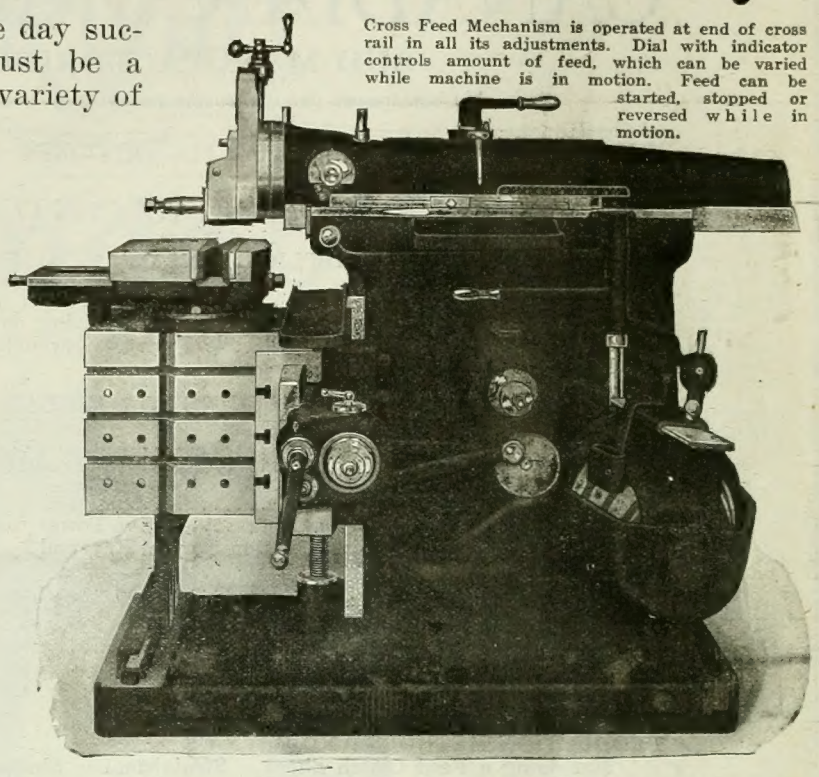

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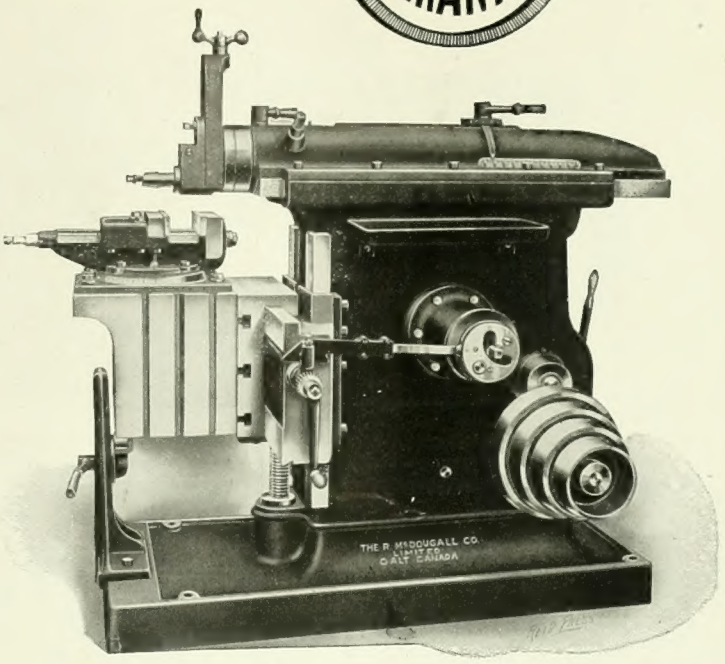

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1—No. 4 Foster screw machine

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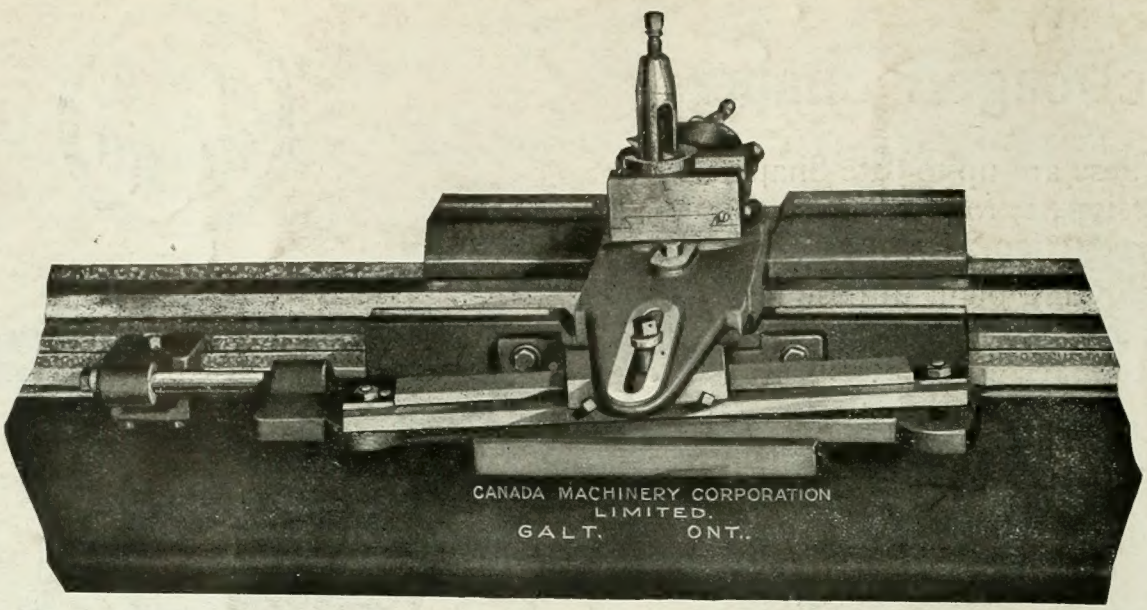

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