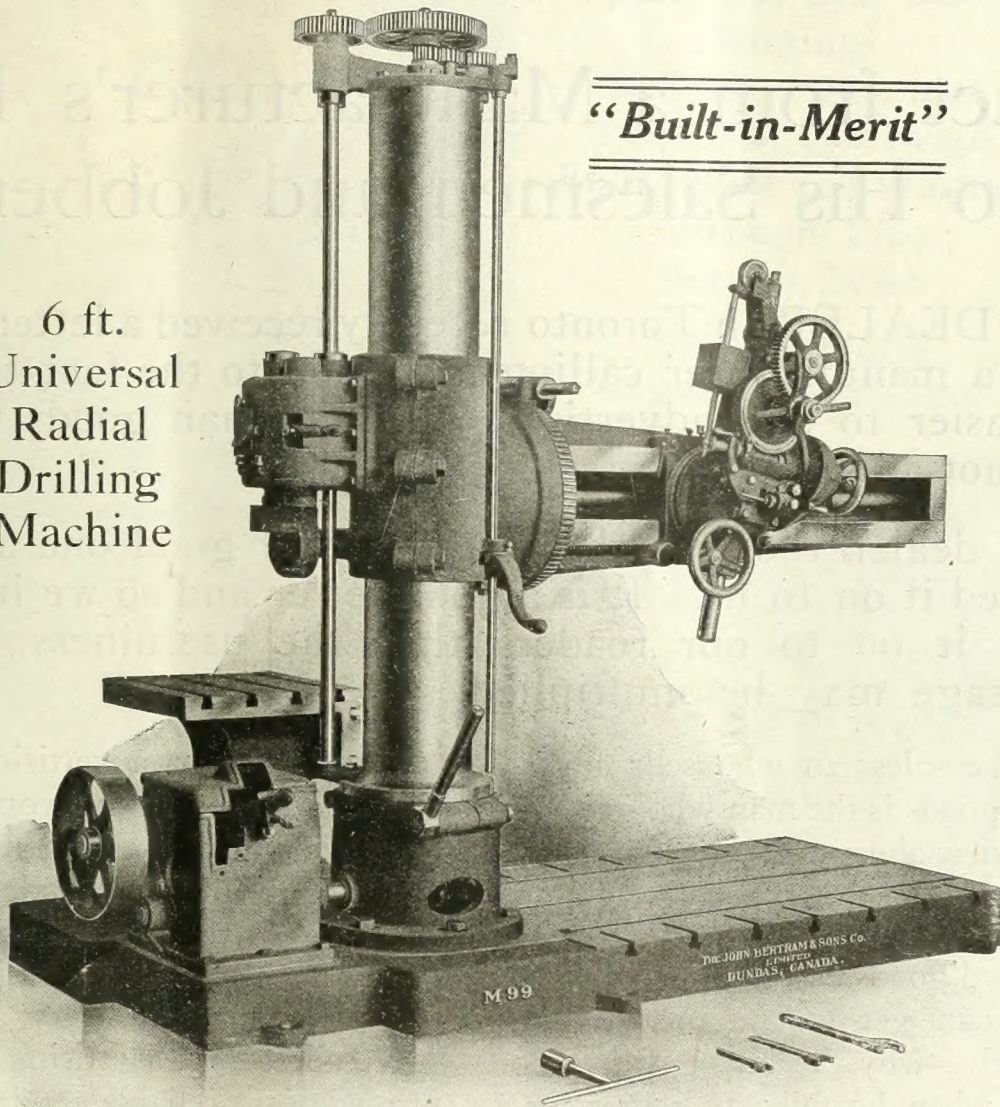




BERTRAM MACHINE TOOLS

"Built-in-Merit"

6 ft.
Universal
Radial
Drilling
Machine



DROP US A LINE FOR PHOTOGRAPHS AND FULL DETAILS
on any machine or machines in which you are interested

The John Bertram & Sons Company Limited

Dundas, Ontario, Canada

MONTREAL
723 Drummond Bldg.

TORONTO
1002 C.P.R. Bldg.

VANCOUVER
609 Bank of Ottawa Bldg.

WINNIPEG
1205 McArthur Bldg.



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

SKF

Swedish Steel Self Aligning
BALL BEARINGS

SKF

MADE IN SWEDEN

Better Motors

Motors are often put in out-of-the-way places where no attention is paid them till they give trouble. Then it is usually too late. A bushing worn out, a scored shaft, perhaps a rotor stripped is the result.

Is it worth while? Does it pay to buy a motor with old-style bushings? Not if you have really investigated S K F Ball Bearings.

S K F Ball Bearings are housed oil-tight and protected from dust. They absolutely prevent wear, dropping and stripping of the rotor, leakage of oil and burnouts. Our bulletin, Better Electric Motors, will give you the facts.

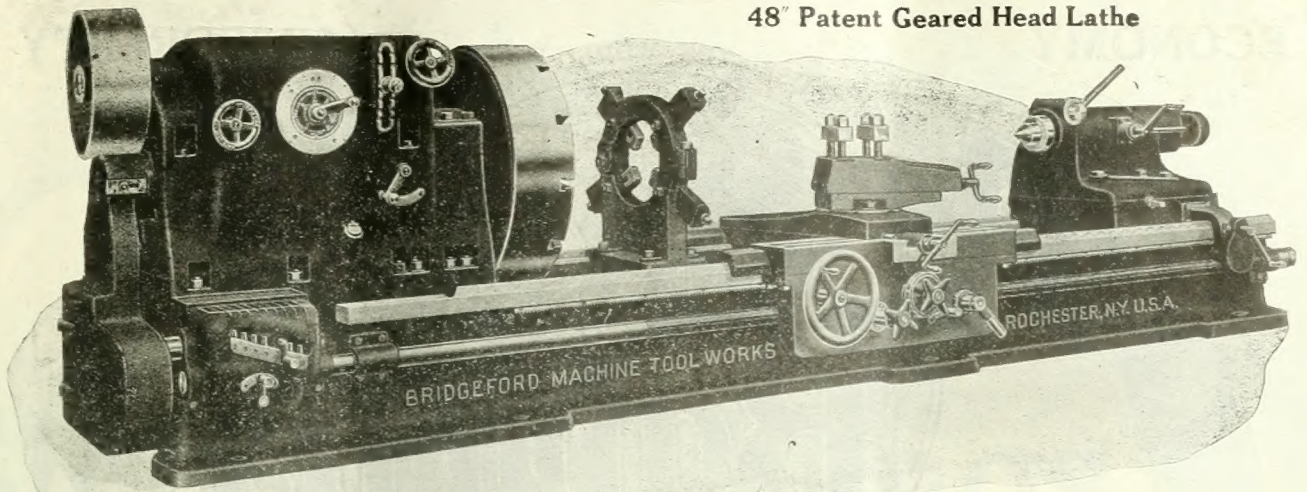
CANADIAN SKF CO.

LIMITED

TORONTO

CANADA

BREVETES G.D.G.



48" Patent Geared Head Lathe

The Bridgeford for Big Work

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

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

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

**Coal
Coke
Iron Ore**



Pig Iron

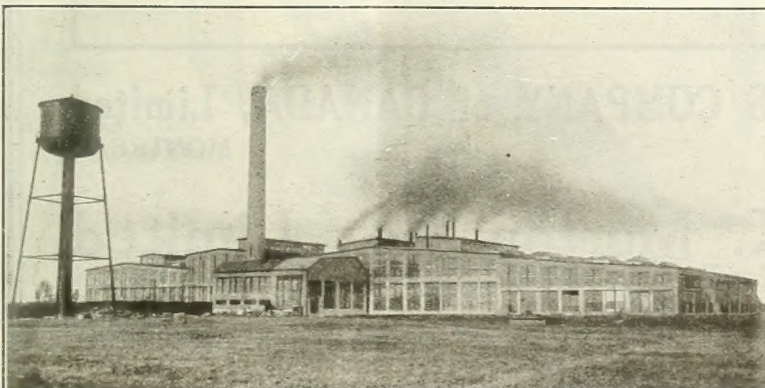
“Victoria”

M.A. HANNA & Co.

Foundry and Malleable
made by The Canadian
Furnace Co.,
Port Colborne, Ontario
Canada

Sales Agents:
Cleveland

Canadian Office:
**783 C.P.R. Bldg.
Toronto**



Works: LONGUEUIL, QUE.

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

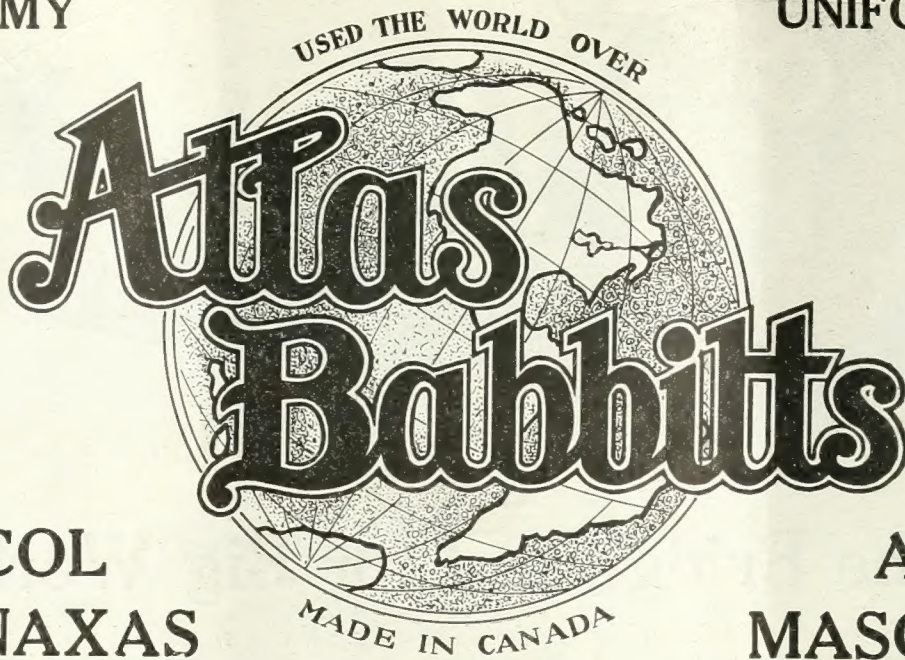
HEAD OFFICE: 298-300 St. James St., Montreal

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

All Products "MADE IN CANADA"

ECONOMY

UNIFORMITY



AMACOL

ATLAS

TENAXAS

MASCOT

TIN TOUGHENED



W. E. W. BABBITT

HAVE A WORLD-WIDE REPUTATION FOR UNIFORMITY

ATLAS Alloys are scientific products—the result of much patient research and long years of experience. They are manufactured under the most modern scientific conditions, thereby eliminating any element of chance in their composition and ensuring a standard maintenance of quality and uniformity.

ATLAS Brands are not alloys that *sometimes* give satisfaction. They are alloys that can be implicitly relied upon *always*. They are alloys with our *prestige* and *reputation* always behind them.

DO not let prejudice stand between *you* and *profit*. You can obtain the *maximum efficiency* from your plant at a *minimum of cost* by using ATLAS BABBITTS.

THERE IS AN ATLAS BRAND TO MEET ANY NEED

NO SHOCK TOO SEVERE

NO WEIGHT TOO HEAVY

NO SPEED TOO GREAT

ATLAS METAL and ALLOYS COMPANY of CANADA, Limited
MONTREAL

Sales Agents:

The Canadian B. K. Morton Co., Limited

MONTREAL

TORONTO

49 Common Street

86 Richmond Street East



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

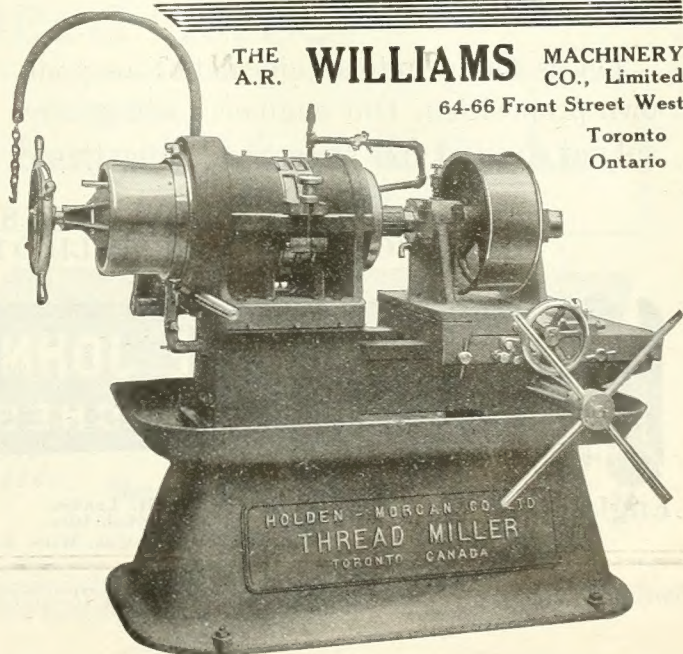
Made in Sweden from selected Dannemora Ore

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.

The Life of a Thread Miller

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



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

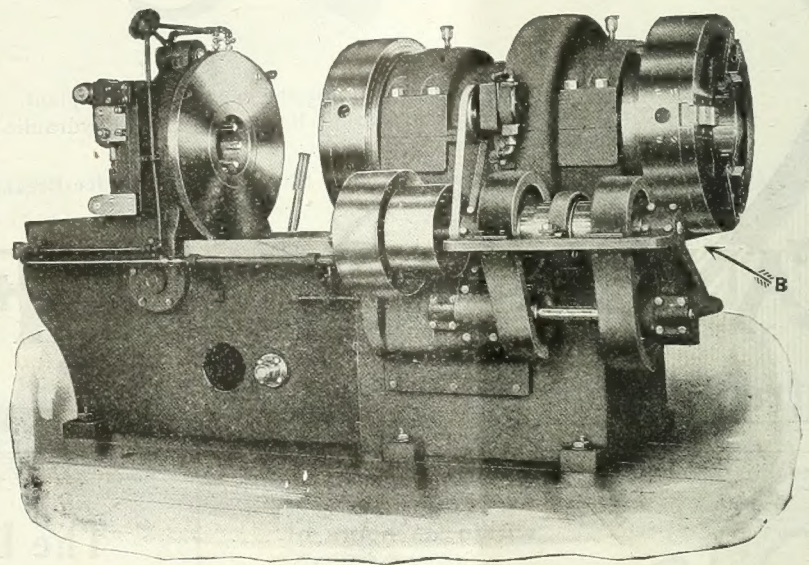
The arrow marks the point where the Johnson Double Clutch is incorporated in the construction of Apex Pipe Threading Machines made by the Merrell Mfg. Co., Toledo, Ohio.

Johnson Double Friction Clutches are well adapted for use on feed and speed changes on all types of machine tools.

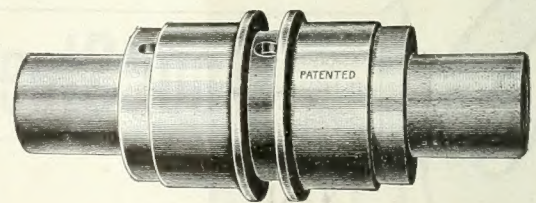
Many of the machines in your shop owe their mechanical efficiency to the perfection of Johnson Friction Clutches.

Let us get down to specific details on your own proposition. Our engineers will gladly submit a report free of cost and obligation.

Send for our **YELLOW DATA SHEETS** and latest free Booklet, "CLUTCHES AS APPLIED IN MACHINE BUILDING."



Courtesy of the Merrell Mfg. Company, Toledo, Ohio.



Double Clutch—Exterior

THE CARLYLE JOHNSON MACHINE CO.

MANCHESTER, CONN.

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

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

AUSTRALIA—Geo. Wills & Co., Brisbane, Queensland.

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

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.

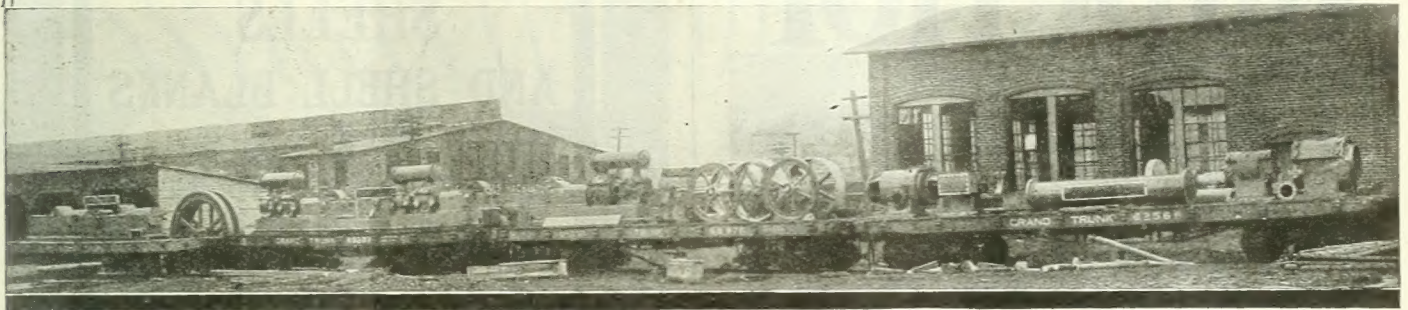
Write us and explain your requirements.

The Jenckes Machine Company, Limited

WORKS:
Sherbrooke, Que.

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

WORKS:
St. Catharines, Ont.



DOUBLE M U S H E T

High Speed Steel

Carbon Steel

Gauge Steel

Alloy Steels

SOLE MAKERS

Samuel Osborn & Co. Ltd.
SHEFFIELD



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

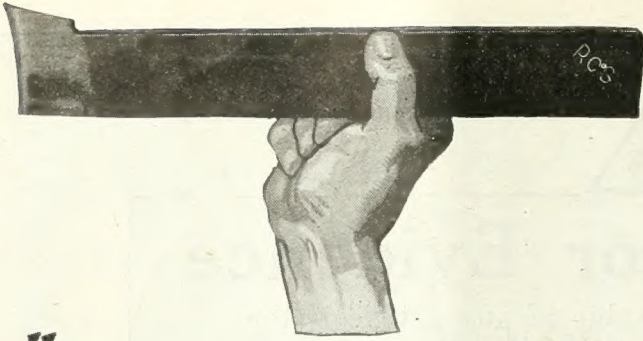


Sam'l Osborn (Canada)
Limited

Head Office and Works: Montreal, P.Q.

Branch Office: Toronto, Ontario

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



"Red Cut Superior"

HIGH SPEED STEEL

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

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

Send for folder

VANADIUM - ALLOYS STEEL COMPANY

Pittsburgh, Pa.

Works at Latrobe, Pa.

STEEL

FOR
SHRAPNEL
SHELLS
AND SHELL BLANKS

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

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

Nova Scotia Steel and Coal Company Limited

Head Office: NEW GLASGOW, N.S.

Western Sales Office:

Room 14, Windsor Hotel, MONTREAL

ESTABLISHED 1870

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

TRADE MARK



Reliance Steel Works
SHEFFIELD, ENG.

TRADE MARK



TRADE MARK

of the Famous

“WACO”

Brand

High Speed Steel and Twist Drills

“DOUBLE WACO” Quality

Specially Adapted for all kinds of
AMMUNITION WORK

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

For particulars apply to our
Sole Representatives for Canada

GEO. A. MARSHALL & CO.

70 Lombard Street Toronto, Ontario





**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



**A
Keen
Cutter**

**WOLFRAM
Is Both**

**Strong
in the
Neck**

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

STELLITE

**IS NOT STEEL, SO DO NOT
∴ USE IT LIKE STEEL ∴**

DIRECTIONS FOR GRINDING "STELLITE" TOOLS

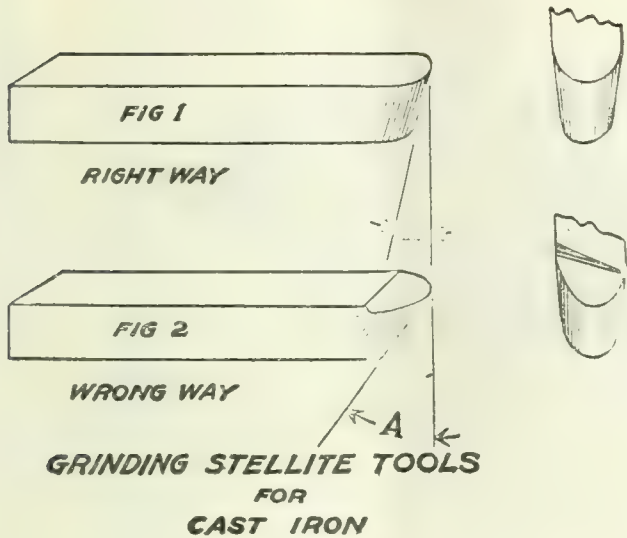


Figure 1 shows the right way to grind a Stellite tool for machining Cast Iron. Give the tool a full Round Nose, and be sure the angle (A) is just sufficient to allow the tool to clear the work. This angle should never be more than six degrees.

Whenever possible, operate the tool without top slope as shown in Figure 2, since the centre of the Stellite bar is not as hard as the outer surface.

Figure 2 shows the improper way to grind the tool. Angle A is entirely too great, and will cause the tool to crumble. This tool should have a full round nose, and the top slope as shown will reduce the cutting qualities of the tool.

Stellite tools cannot be burnt while grinding, because they have no temper. They always remain hard.

Always use No. 3 grade Stellite for turning Cast Iron.

Figure 1 shows the right way to grind Stellite tools for grinding steel. Angle A should be just sufficient to allow the tool to clear the work, and should never be more than six degrees. In turning steel it is necessary to give the tool some top slope to get the proper cutting action between tool and chip. It will be found that due to the high rate of speed at which the Stellite tools operate it requires less top slope than is generally given other tools. A top slope angle of 5 degrees is sufficient.

Figure 2 shows wrong way to grind for turning steel, as Angle A is too great and the shape of the cutting nose is too pointed. The top slope, as shown in figure 2, is too great.

Always use No. 2 grade Stellite for turning 20 to 100 point Carbon Steel.

In Figure 1 the Stellite tool is being ground on the periphery of the grinding wheel, with results as shown in Figure 3. This method is wrong, because a concave clearance is given the tool, as shown, which robs the cutting edge of its maximum support, causing crumbling and failure.

In Figure 2 the Stellite tool is being ground correctly, using the side of grinding wheel. This method gives maximum support to the cutting edge as shown in Figure 4.

Tools ground, as shown in Figure 3, will always give trouble, and are responsible for most failures with Stellite tools.

Never give Stellite tools any more clearance than absolutely necessary.

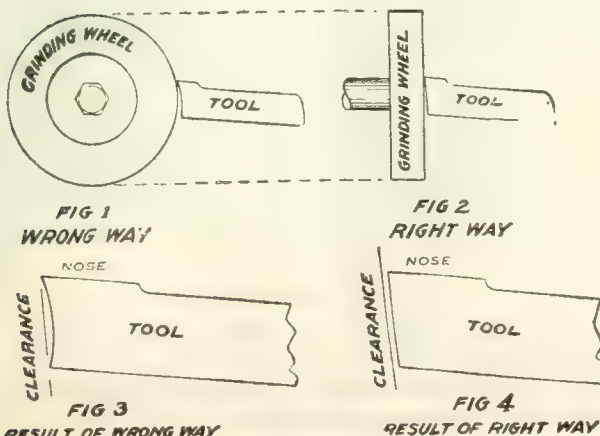
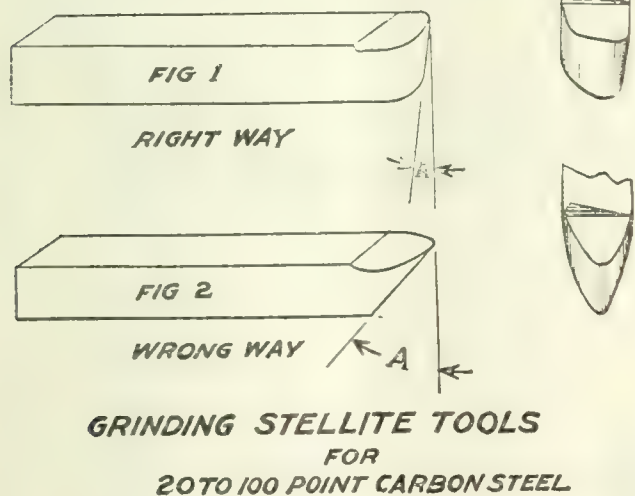
Always remove the wire edge with a carborundum or oilstone.

Stellite cuts 25% to 300% faster than the best tool steel.

CANADIAN MANUFACTURERS

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

Branch Warehouses - TORONTO and MONTREAL

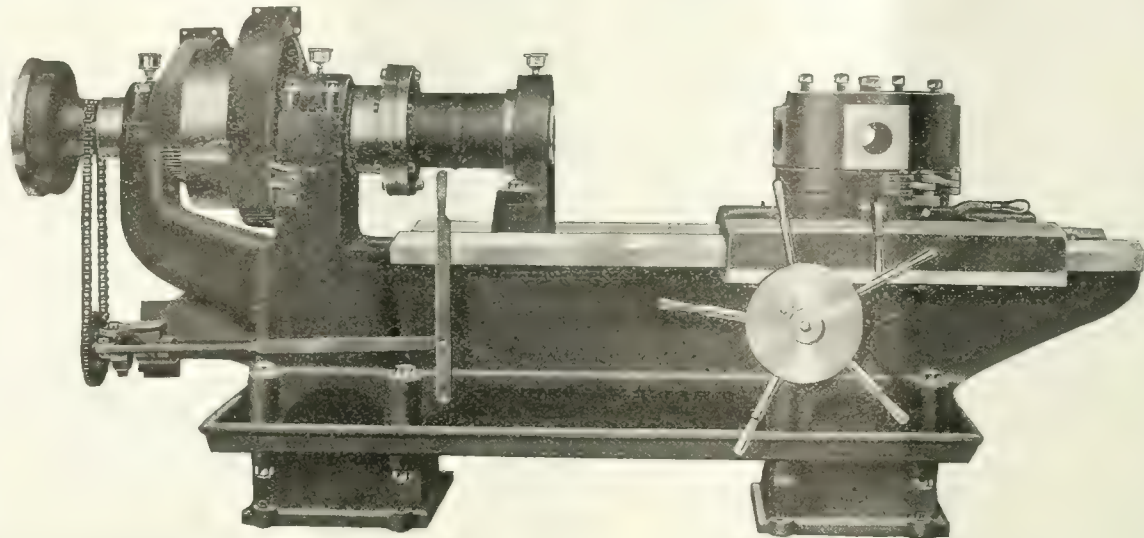


If any advertisement interests you, tear it out now and place with letters to be answered.

IN STOCK—FOR IMMEDIATE SHIPMENT

SUBJECT TO PRIOR SALE

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



MADE IN CANADA

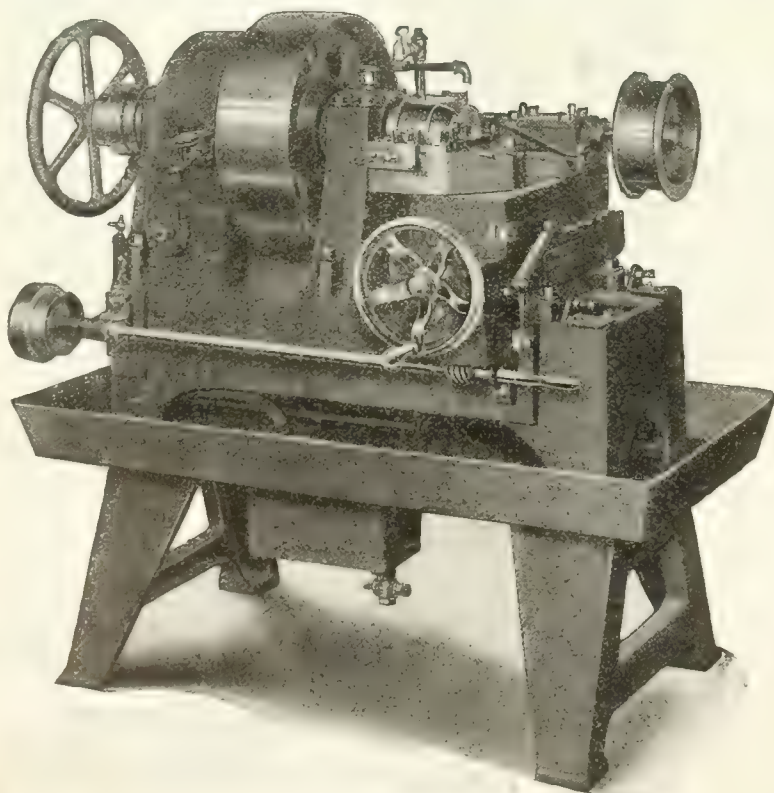
SPECIFICATIONS ON REQUEST

HYDE ENGINEERING WORKS

CONSULTING AND MANUFACTURING ENGINEERS

P.O. Box 1185

27 William Street, MONTREAL, P.Q.



For Turning, Facing and Milling the thread on Gas
Check Plugs for 6-inch High Explosive Shells.

THE BANFIELD PLUG MILLER

Patented in Canada and United States

THIS machine is especially designed for finishing base plugs, turning the outside diameter, finishing the face with any camber desired, and milling the thread, all in one chucking, the complete plug being finished in six minutes by unskilled labor.

The machine is equipped with quick draw-in collet. Drive pulley 18" x 6", with bronze bush having cut jaw clutch for turning and facing. Worm gear 100 to 1 ratio, with cut jaw clutch for milling, driven by 10" x 1½" flanged pulley. The milling cutter is driven by an 8" x 2½" flanged pulley. Tool post carriage is equipped with power feed (two speeds) having automatic stop. Power feed pump with relief valve driven from worm shaft (all drives direct from main line shaft). Rigidly built, simple and economical to operate.

Weight 1,800 lbs.

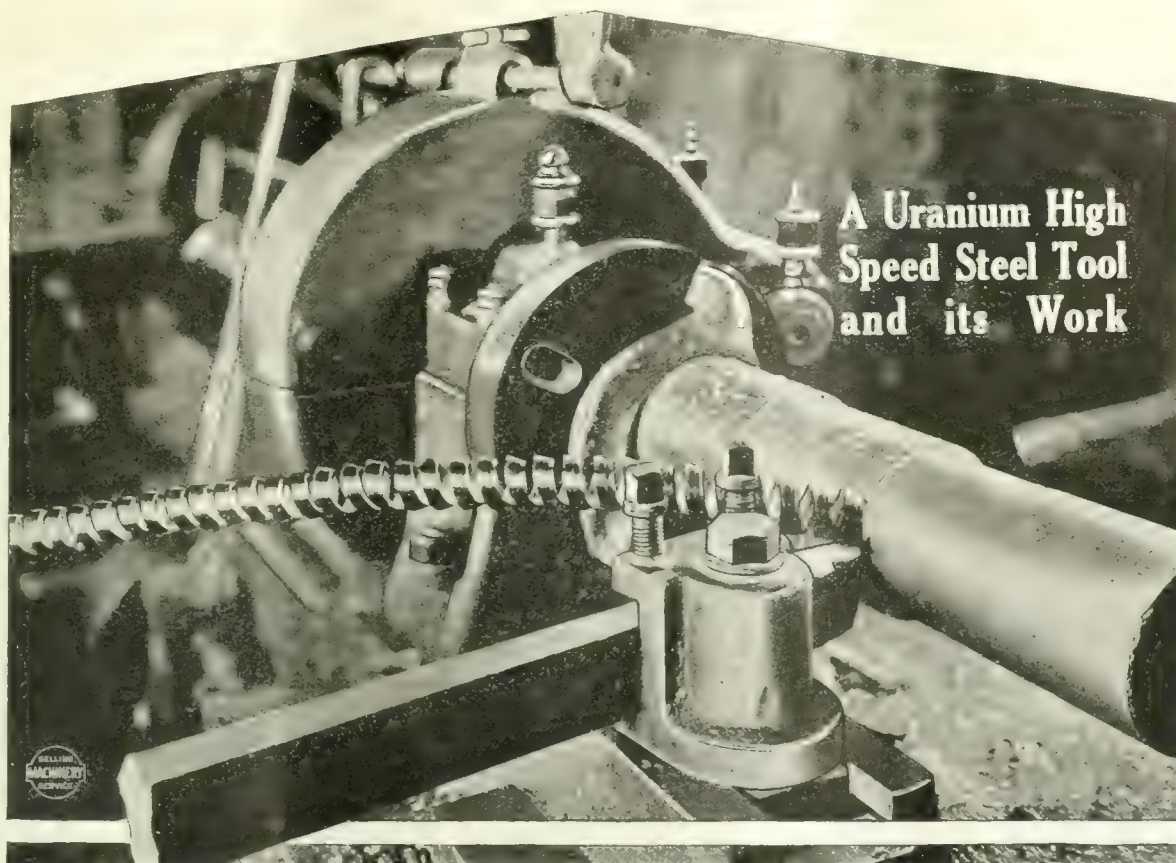
For 18 pdr., 4.5 and 60 pdr. High Explosive Shells. Can furnish machines of same type, but somewhat lighter in construction. Particulars on request. These machines are tooled up for finishing plain machined or bevelled plugs, if desired.

Write for prices and deliveries.

Prompt Shipment

BUILT EXCLUSIVELY BY

Edwin J. Banfield
STAIR BUILDING, TORONTO, ONT.



FOR BETTER TURNING TOOLS SPECIFY

URANIUM HIGH SPEED STEEL

ITS use in high-speed turning tools means longer service between grinds, the ability to stand heavier cuts and coarser feeds and greater "all around" economy. The photograph shows a Uranium Steel Tool, one inch by two inches, turning a heat-treated steel shell forging 4.5" diameter, taking a quarter-inch cut at a feed of $7/32$ " per revolution. The chip coming off is so tough it can hardly be bent with the hands.

If you want better service from high-speed steel tools, regardless of the work they do, specify Uranium High-Speed Steel. Improvement will date from the first job they finish.

Consult your steel man or write us.

STANDARD ALLOYS COMPANY

Forbes and Meyran Avenues, Pittsburgh, Pa.

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

CO CO TURNING STEEL

TOOL HOLDER BITS

"THE BIT WITH THE GROOVE"



What CoCo is Doing on Other Jobs

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

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

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

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

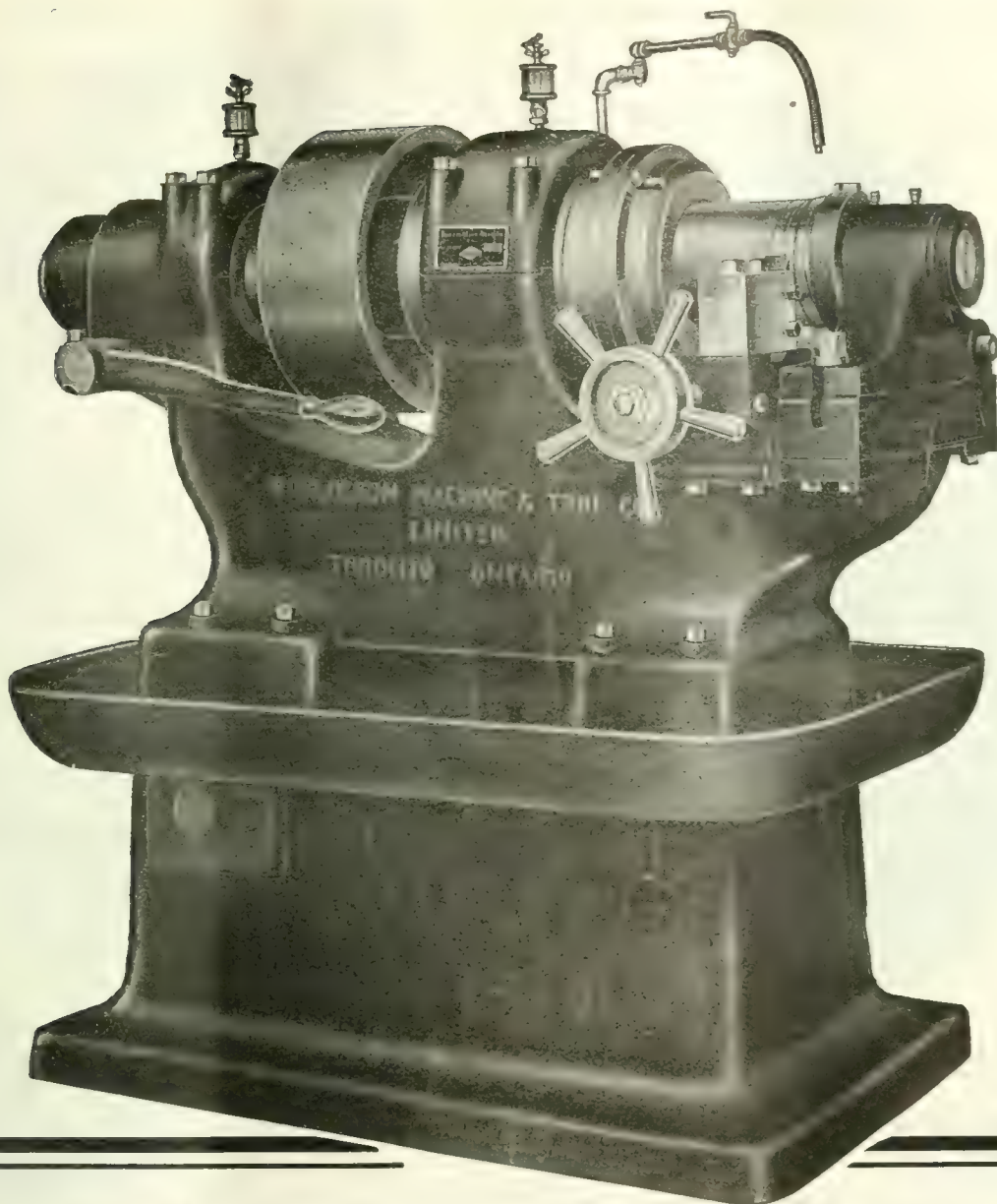
CAN YOU BEAT IT?

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

COLONIAL STEEL COMPANY

PITTSBURGH BOSTON DETROIT NEW YORK PHILADELPHIA ST. LOUIS CHICAGO

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



Just Now—

we have two 4.5 machines ready for immediate delivery

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

A glance over some of the features will interest you.

Integral (en bloc) construction assures

perfect rigidity, permanent accuracy and desirable compactness.

Chucking with spring collet chuck insures accurate and speedy chucking.

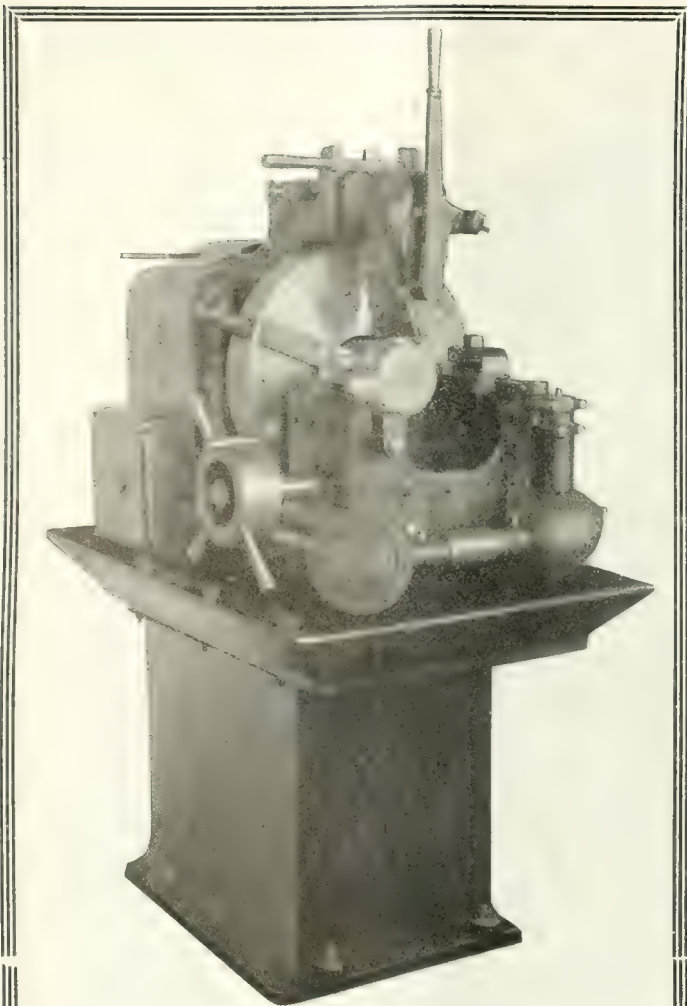
Graduated feed dial, two cutting tools, and ample belt power insure output of accurate work in least possible time.

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

ROELOFSON MACHINE & TOOL COMPANY, LIMITED

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

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



Another Victoria Product that has made a place for itself

A 4.5 grooving, waving
and undercutting
machine.

Rugged, compact, simple
and efficient. No
cams used.

Victoria Foundry Co.
Limited
OTTAWA - - - ONT.



Rivet Speed

One every second is a speed which this Grant Rivet machine will keep up indefinitely, in any degree of tightness or looseness desired. Each rivet is finished with perfectly shaped head, polished and with no hammer marks showing.

We claim this is the only machine manufactured that will accomplish this feat. Our claims are unchallenged. By writing for our catalogues you may obtain full information regarding the ability of this machine.

We are rivet machine specialists. Get in touch with us.

The Grant Mfg. & Machine Co.
Holland Ave., Bridgeport, Conn., U.S.A.

HIGH SPEED HAMMERS

For High Speed Work

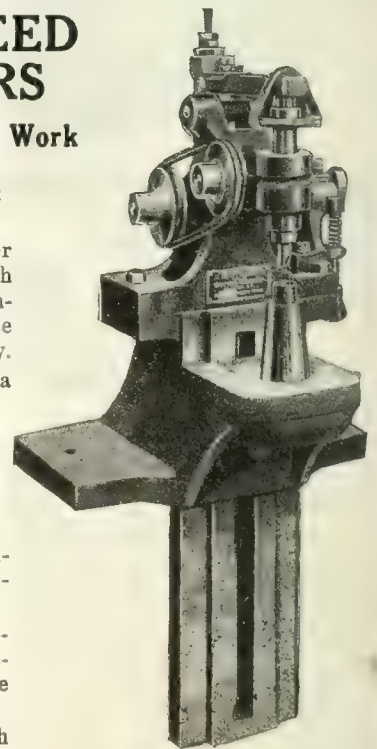
FEATURES:

Our Bench Hammer can be adjusted high or low, and spells another economy in space and handy utility.

With it you have a guaranteed saving of from 15% to 20% on any class of work. The life of the machine is practically indefinite as phosphor bronze bushings are used throughout.

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

Send for our High Speed Hammer Book.

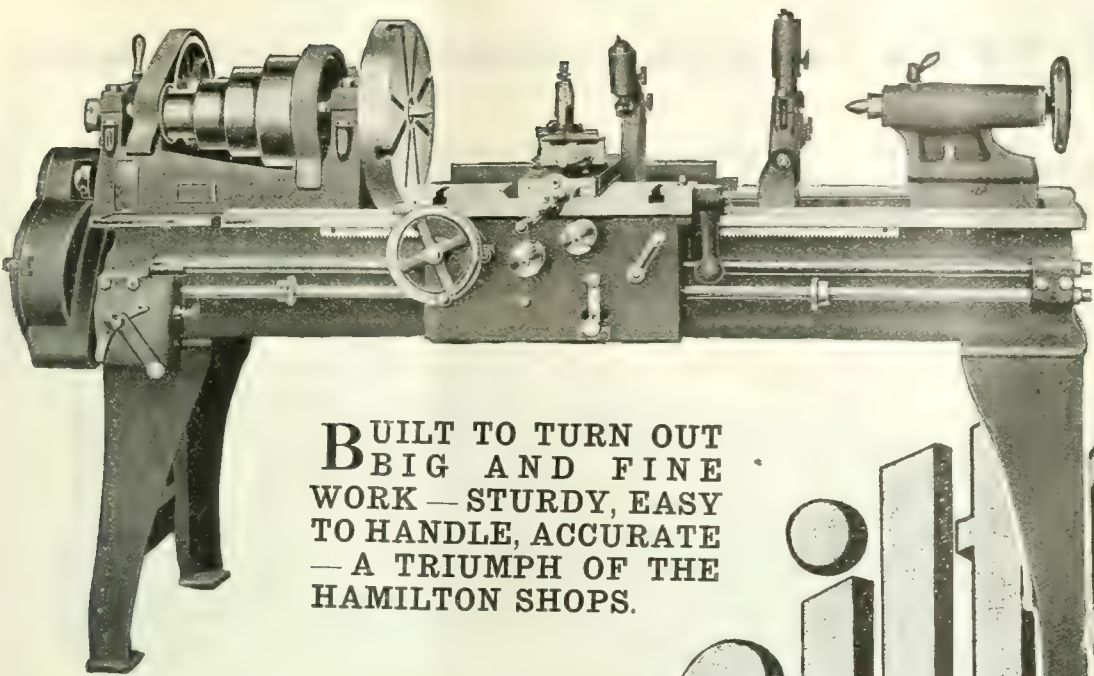


THE HIGH SPEED HAMMER CO.

Rochester, N.Y.

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

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



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.



The Hamilton Machine Tool Co.
 HAMILTON, OHIO

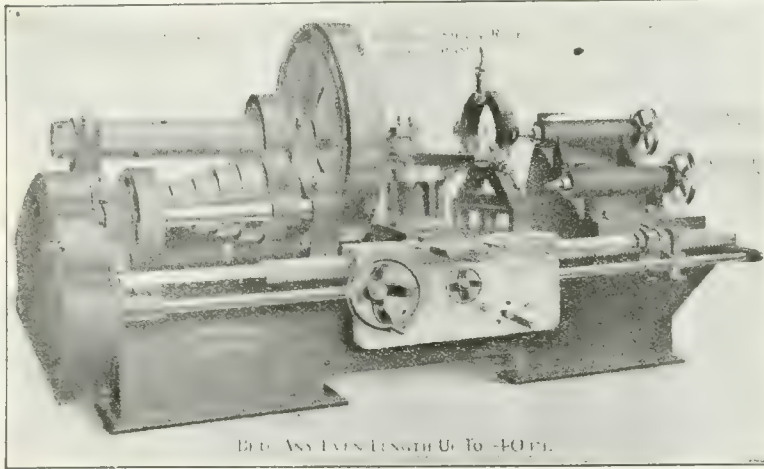
Sole Agents for Ontario: H. W. Petrie, Limited, Toronto, Ontario

FOR 25 YEARS MAKERS
 OF FINE MACHINE TOOLS

Do More! — —put on more steam

is the industrial slogan of to-day

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



Bed Any Even Length Up To 40 Ft.

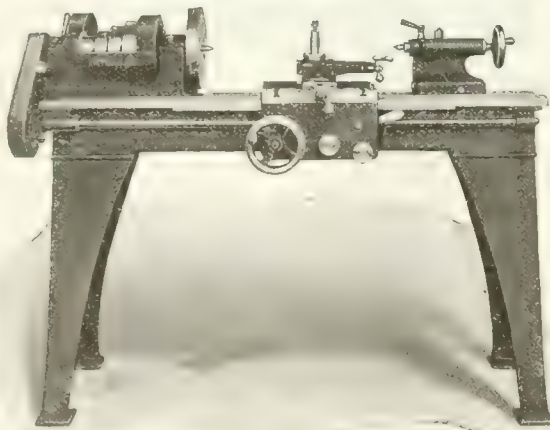
McCABE'S "2-in-1" Double-Spindle Lathe—26-48 inch Swing
As a 48 inch Triple-Gear Lathe.

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

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

Immediate Shipment 12-ft. beds—from stock.

J. J. McCABE
149 Broadway,
NEW YORK



LATHES

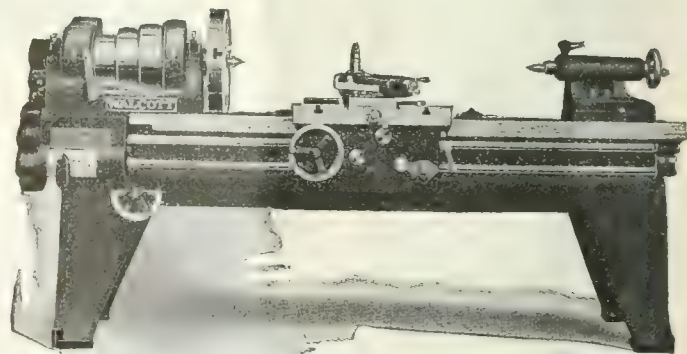
12", 16", 18" and 21" swing

Strictly modern in design, rigidity
and accuracy guaranteed.

Himoff Machine Company

45 Mills Street

Astoria, City of New York, N.Y.



THE WALCOTT LATHE

is backed by lathe-building experience
extending over 35 years

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

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

WALCOTT LATHE COMPANY

Successors to

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

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

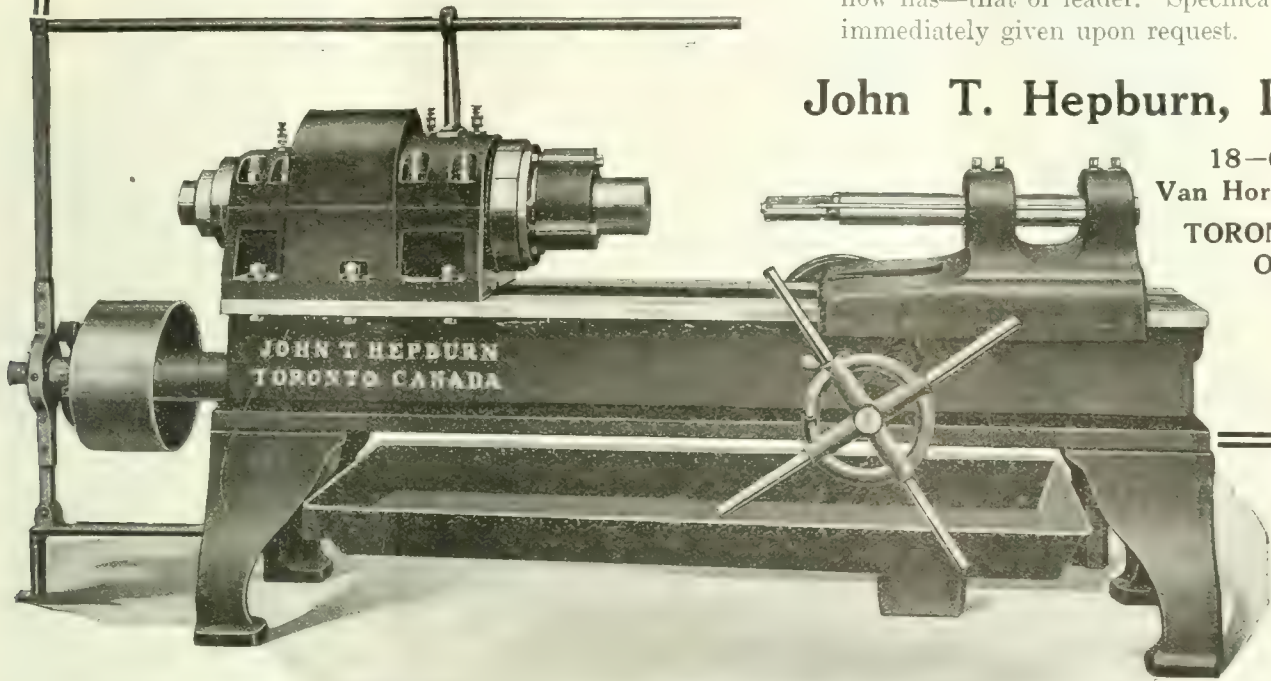
Goes Through Work Without a Hitch

BORING UP TO 6 INCHES

Distinctive and thorough this machine has built up a reputation for speed and quality that has gained it the prestige it now has—that of leader. Specification immediately given upon request.

John T. Hepburn, Ltd.

18-60
Van Horne St
TORONTO
Ontario



WHITCOMB-BLAISDELL

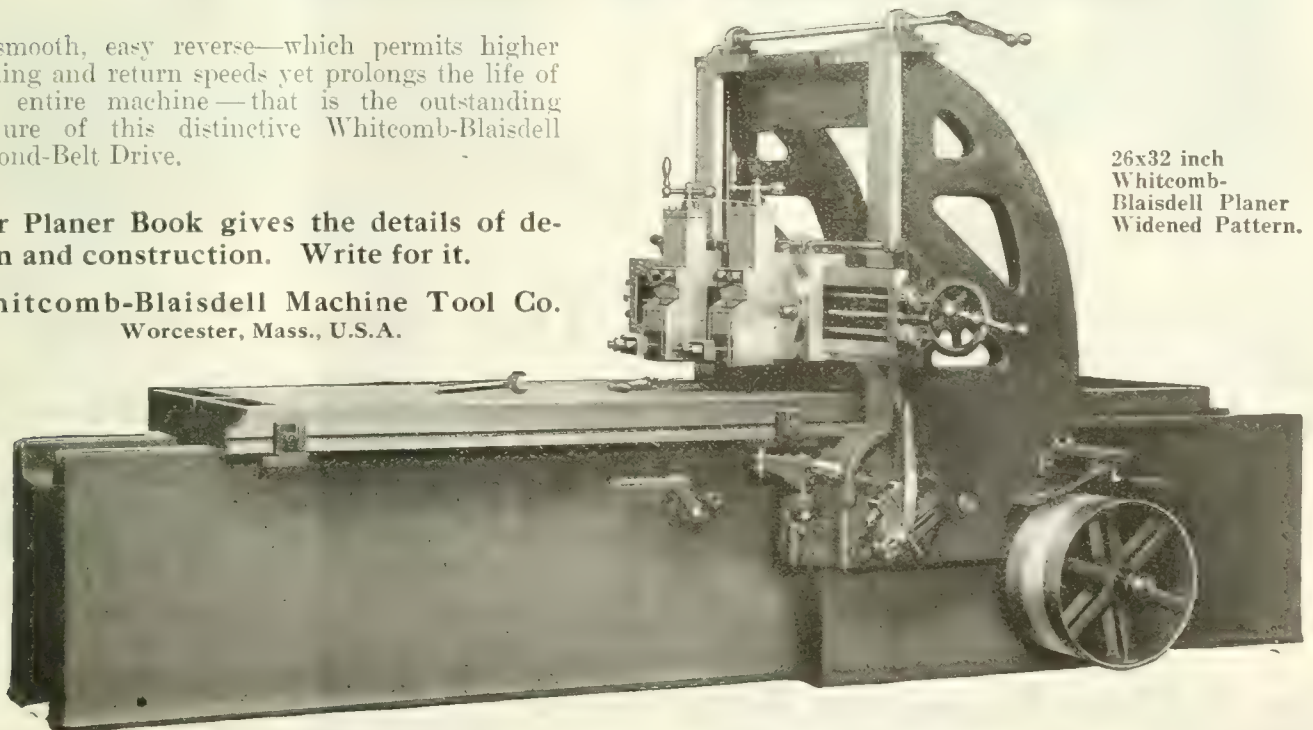
The Planer With the Second-Belt Drive

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

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

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

26x32 inch
Whitcomb-
Blaisdell Planer
Widened Pattern.



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



THE Crank Shafts of all Consolidated Presses are made from .50 to .60 carbon steel hydraulic forgings, accurately machined and ground to size. The body bearings are carefully scraped to fit, thus insuring a perfect bearing.

The Crank Pins are larger in diameter than the main bearings. This has always been a Consolidated feature. Crank cheeks are liberal and guarantee strength and rigidity in the shaft; this, together with the enlarged crank pin, materially resist torsion when the press is in operation.

You cannot ignore these features.

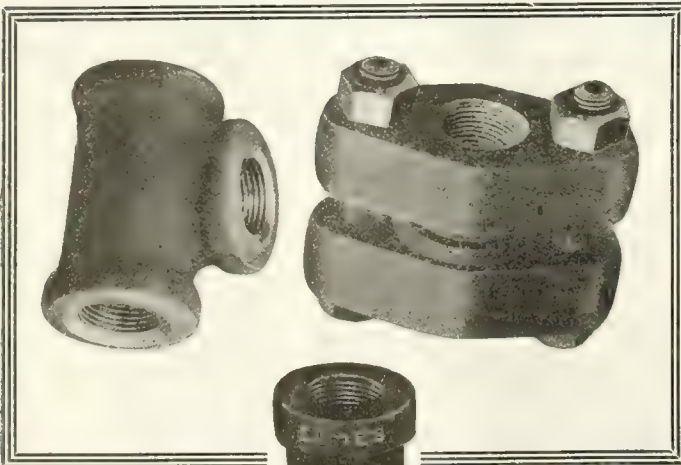
Consolidated Press Company

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



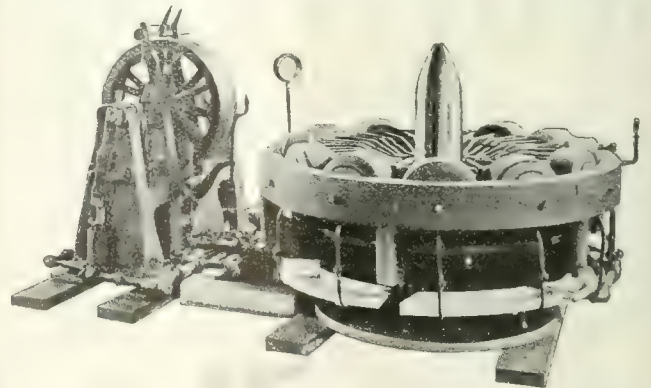
ELMES'
Forged Steel

High-Pressure
Fittings

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

Write us for full information, prices, etc.

Chas. F. Elmes Engineering Works
217 N. Morgan St. CHICAGO, U. S. A.



The New "West"
Banding Press

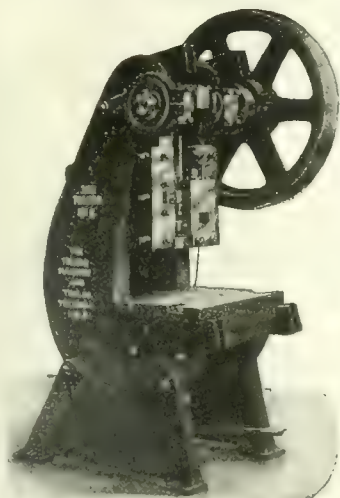
For 9.2" and 8" shells

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

NO ACCUMULATOR REQUIRED.

The West Tire Setter Co.
255 Mill Street, Rochester, N.Y.

The "TOLEDO"



The "Toledo" No. 6 for cutting, drawing and forming steel wheel hubs, stove trimmings, and a general line of large and small stampings.

Open-Back Inclinable Presses embrace in their construction every modern feature of practical utility.

Heavy, rigid frames; large diameter shafts hammer forged from special steel; extra long and wide slides; positive inclining attachment; connections and slide adjusting screw high carbon steel forgings.

Over 20 sizes for an extensive line of work.

The Toledo Machine & Tool Co.
TOLEDO, OHIO

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

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



Inclinable Power Presses

reduce the maintenance cost of both machine and tools.

BUILT IN EIGHTEEN SIZES.

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

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

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

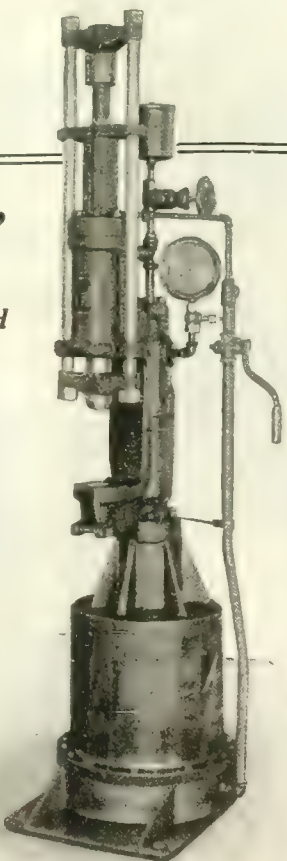
Triple Purpose "METALWOOD" COMBINATION

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.

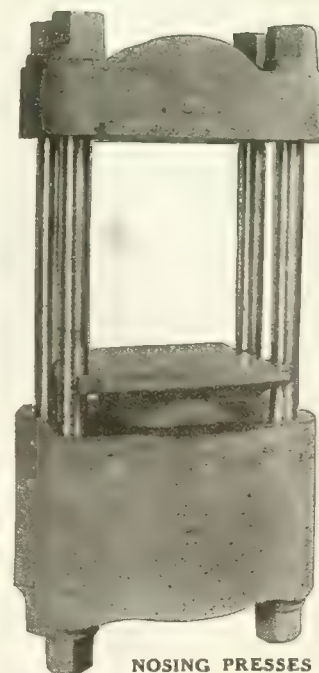


PRESSES

Pumps and Accumulators

FOR ALL PURPOSES

Made in Canada



NOSING PRESSES

WILLIAM R. PERRIN, Limited
TORONTO

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

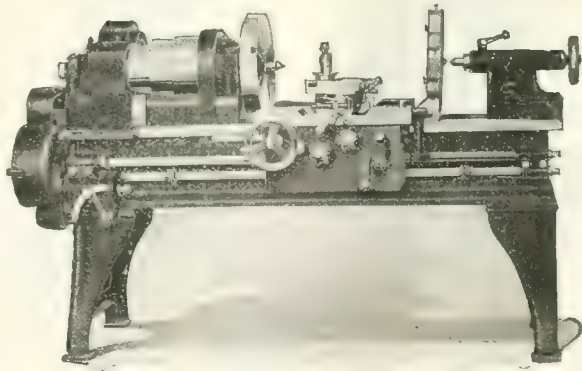


GARLOCK-WALKER MACHINERY CO. LIMITED

32 FRONT ST. WEST,

TORONTO

TELEPHONE MAIN 5346



ENGINE LATHES for delivery from Toronto Stock

18" x 8' Giddings & Lewis Standard Engine Lathes.
Three Step Cone.
Double Back Gears.
Quick Change Feed.
Quick Change Gear Box if desired.

Dimensions:

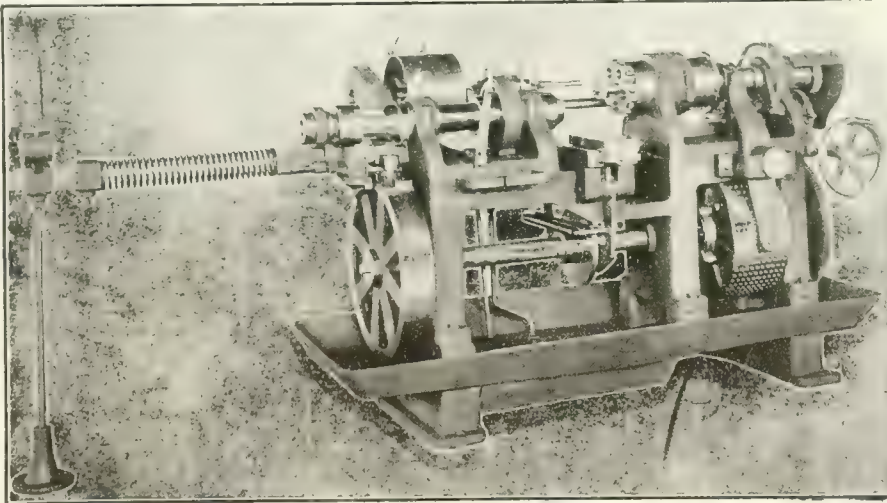
Swing over bed 18 $\frac{3}{4}$.
4' 5" between centers.
Hole through spindle 1 $\frac{1}{2}$ ".

These are strongly built, accurate machines. Will give equal satisfaction in tool-room or shop.

The following extras can be furnished if desired: Taper, Relieving or Draw-in attachment, Waving attachment, Hexagon turret on carriage, Pan pump and piping.

Write for full specifications and prices.

METAL and WOODWORKING MACHINERY of all Kinds



A NEW DEPARTURE IN TURRET INDEXING

By an indexing device—selective in type—one or more idle holes—holes not carrying tools—can be skipped in indexing without pause or loss of time—a feature that makes for increased production.

Chicago Automatics stand up under the strain of day and night service and economically turn out any screw machine product in minimum time. They are the result of 10 years' extensive screw machine manufacture. Drop a card now for details and specifications.

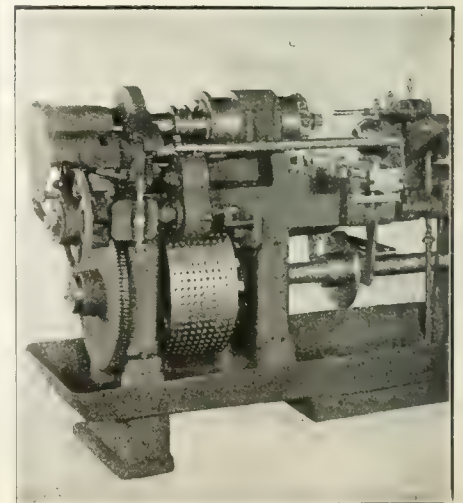
The John MacNab Machinery Co.
90 West Street New York
European Representative—JOHN MACNAB, Hyde, England

Quick Delivery

In less than six weeks from the time your order reaches us we can place

Chicago Automatic Screw Machines

in your plant ready for operation.



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

Bilton Automatic Gear Millers—Spur or Bevel Gears

CAPACITY

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

The Bilton Machine Tool Company

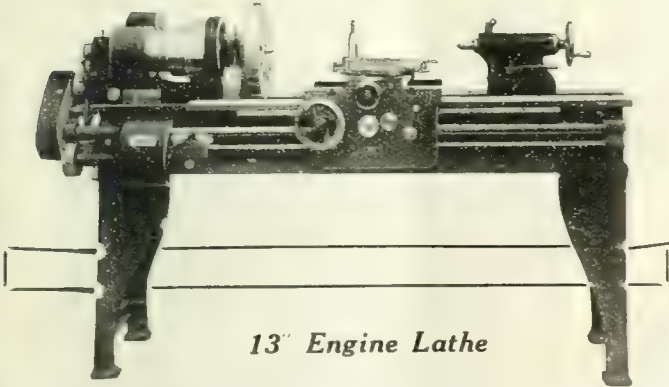
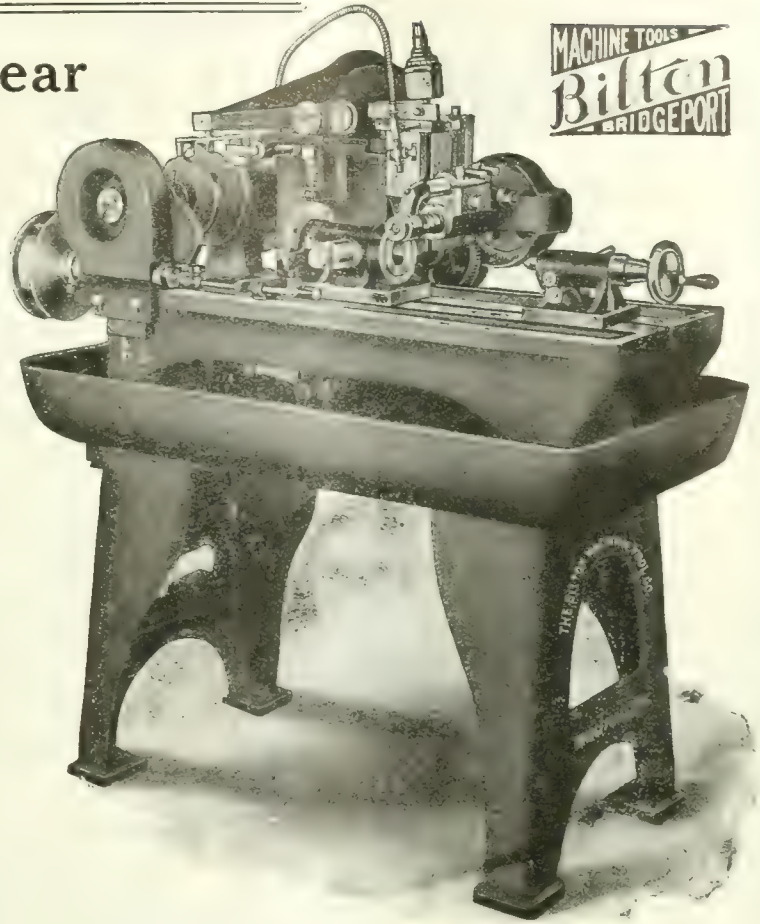
Succeeding The Standard Mfg. Company
 Housatonic Ave., Bridgeport,
 Conn., U.S.A.

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

Catalog 30 on request.

Foreign Agents:

- Alfred Herbert, Limited
- M. Mett Engineering Company
- Chas. Churchill Company, Limited



13" Engine Lathe

"Filsmith" Quality

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

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

For Rapid Production and Accurate Work

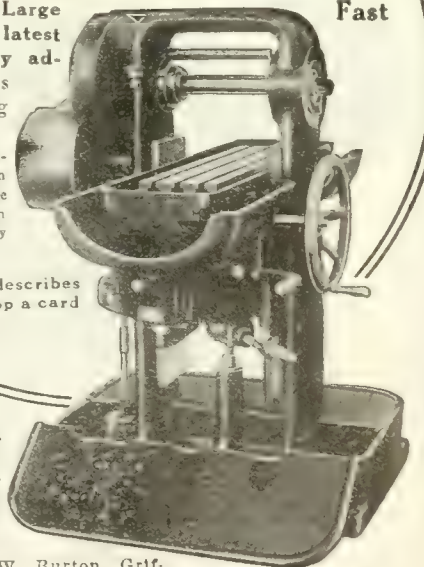
USE THE "BRIGGS"

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

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

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

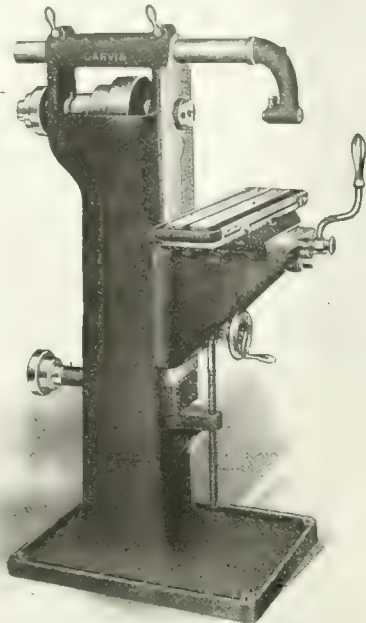
Our booklet describes fully. Drop a card for it.



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

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

GARVIN No. 11 Plain Milling Machine



No. 11 Plain Milling Machine.
Use Code.....Abode.

Adapted to the lightest kinds of small milling and light manufacturing and suitable for jewelers, makers of electrical goods, brass workers' sewing machine manufacturers and others.

The Features of the Machine Are:

- Telescope Arm.
- Hardened and ground Tool-steel Bearing for arbor in arm.
- Spindle Bearing Taper, with adjustment.
- Power Feed driven by vertical worm shaft inside of column, which drives a worm gear clutched to the pinion shaft in the knee.
- Feed Works located and protected inside of column.
- Quick and sensitive movement of Table by Adjustable Lever and Rack Pinion.
- Micrometer adjustments of Knee and Saddle.
- Oil Pan around table.
- Elevating Screw does not pass through the floor.

Power Feed of Table	12½ in.
In and Out Adjustment	4½ in.
Vertical Adjustment	10 in.
Net Weight, Skidded	600 lbs.

For Further Information {ASK YOUR DEALER
or WRITE US DIRECT

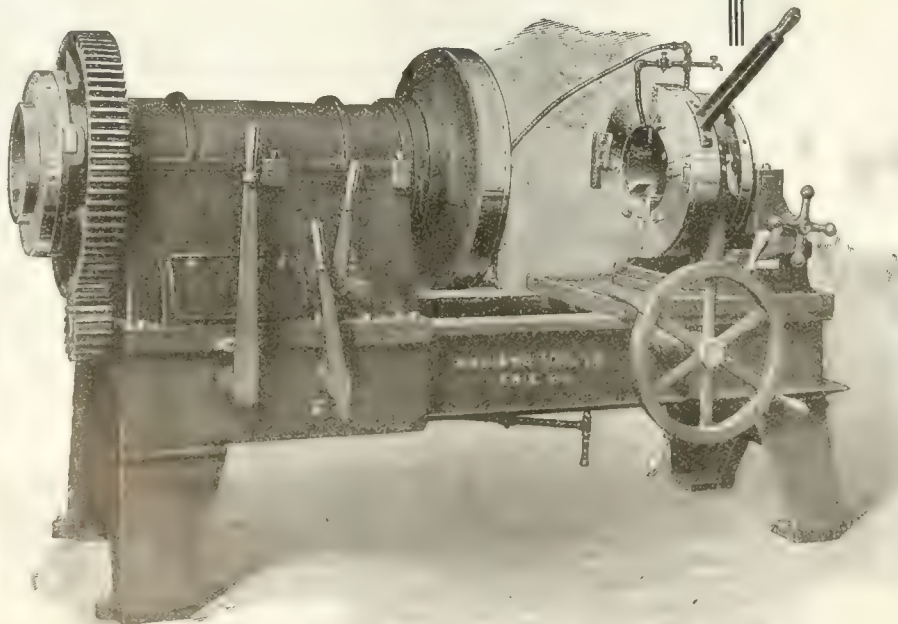
IMMEDIATE DELIVERIES

Send for Complete Catalog

MANUFACTURED BY

THE GARVIN MACHINE COMPANY
Spring and Varick Streets (Visitors Welcome) 50 Years New York City

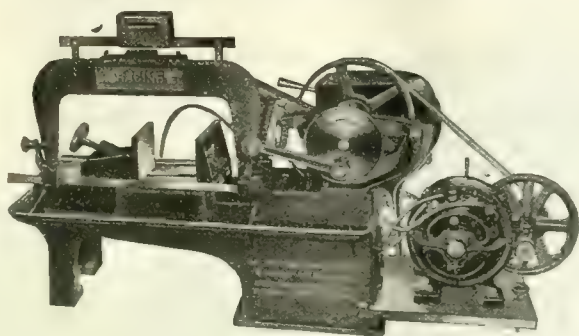
Williams Gives You Quality "Insurance"



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

Williams Tool Co.
Erie, Penn. U.S.A.

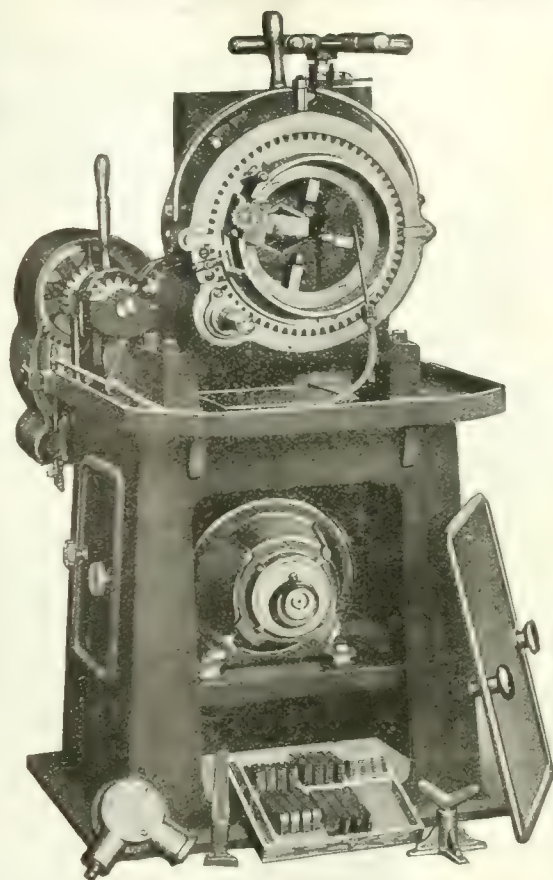
Can. Agents:
The A. R. Williams Machinery Co.,
Ltd., Toronto, Canada



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

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

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



“Forbes Facts”

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

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

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



The Reason For So Many Repeat Orders

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

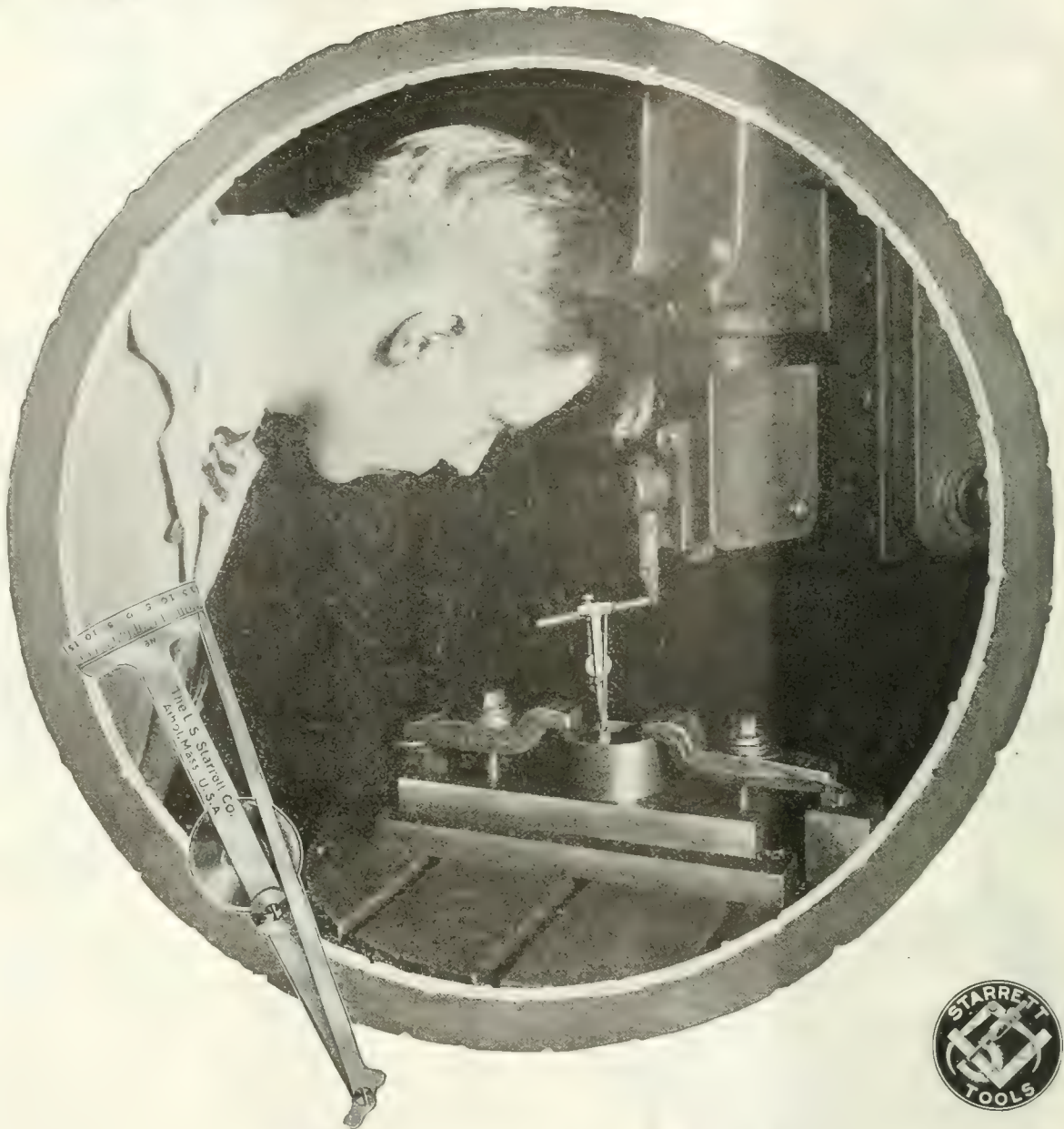
A third order just came in from one of the largest concerns in the United States, and is it not a fact after a firm has standardized on a certain make of tool that some real results must be produced in order to effect a change?

One of our customers writes: "It takes us only 115th of the time to cut our stock on the PEERLESS that it did on our other machine."

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

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

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



Starrett Tools

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

Reduce Mistakes to a Minimum

One slight error in laying out a job or measuring the progress on it may ruin the stock and render futile the labor spent upon it.

Good men using Starrett Tools reduce mistakes to a minimum. These tools are the standard for accuracy all over the world. The line of these fine measuring instruments in-

cludes: rules, squares, levels, calipers, dividers, micrometers, vernier height gages, depth gages, test indicators and hack saws.

Write for free catalog No. 213 describing the whole 2100 styles and sizes of these tools.

The L. S. Starrett Co., Athol, Mass.
World's Greatest Toolmakers



42-71

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

SMOOTH AS GLASS

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

WITH THE
Dominion Universal Grinder

ADD TO THIS

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

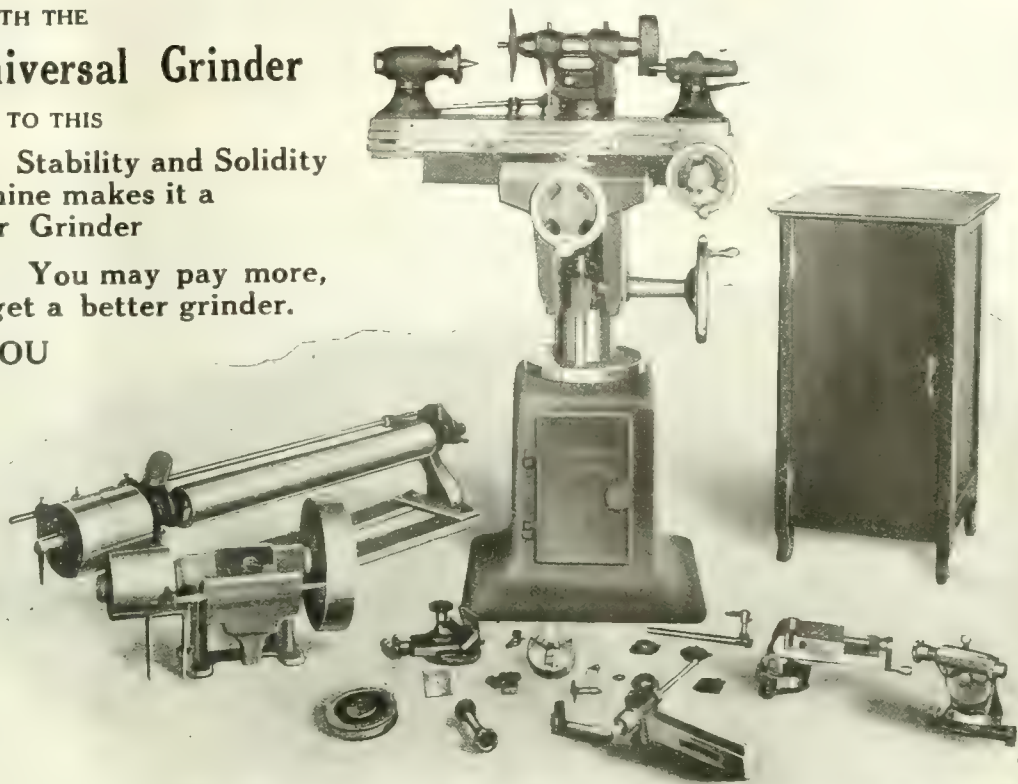
Try One and See. You may pay more,
but you cannot get a better grinder.

LET US TELL YOU

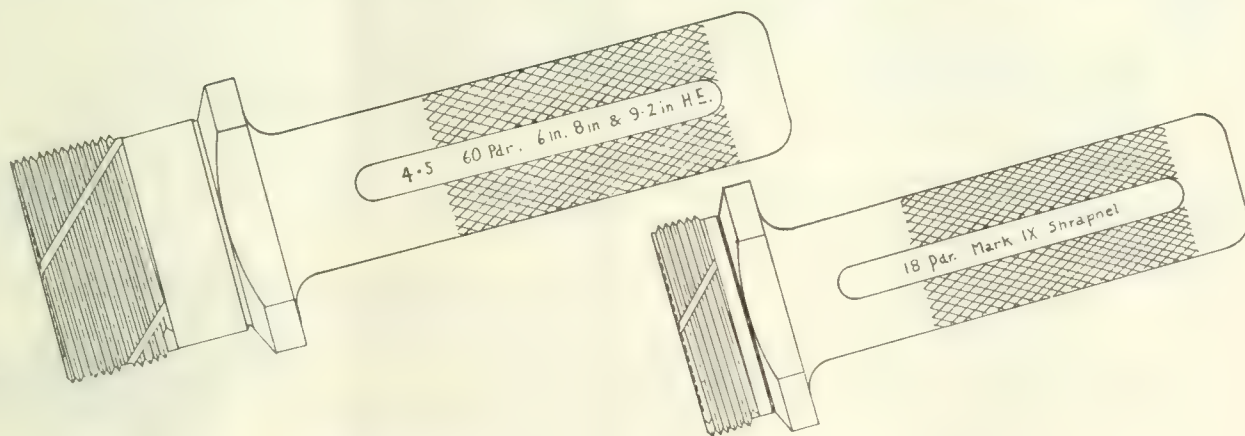
MORE
ABOUT IT

**Dominion
Machinery
Company**

110 Church St.
Toronto, Ont.
Canada



FUSE HOLE GAUGES

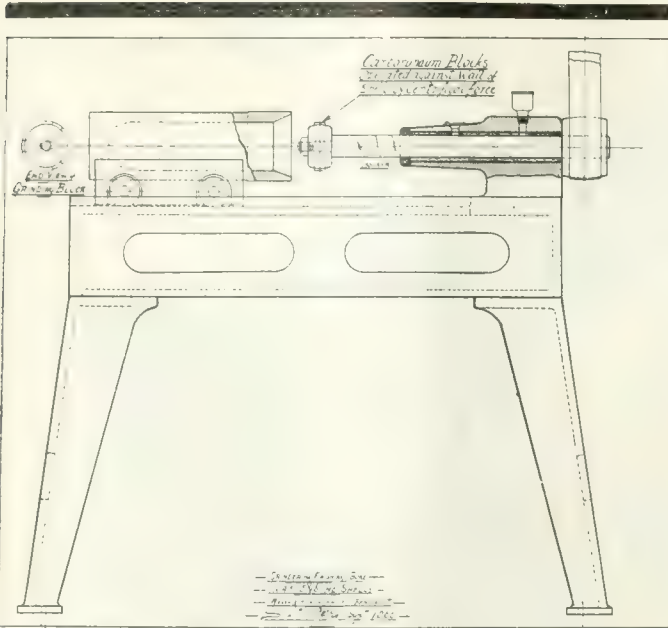


Manufacturing and inspection fuse hole
gauges for all size shells. A surplus
stock enables us to ship immediately.

Windsor Machine & Tool Works

Windsor, Ontario

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



Smooth Bores

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

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

Write us for our proposition.

**Marsh & Henthorn
Limited**

BELLEVILLE, ONTARIO

Stow Shell Grinders Increase Production



**Suspended
Pedestal
Mounted
on Truck**

**Any Size
Any Current**

**Immediate
Shipment**

Stow Manufacturing Co.

Binghamton, New York, U.S.A.

Oldest Portable Tool Manufacturers in America

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

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

Standard No. 6 Universal Grinding Machine

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

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

Simmons Machine Co., Inc.

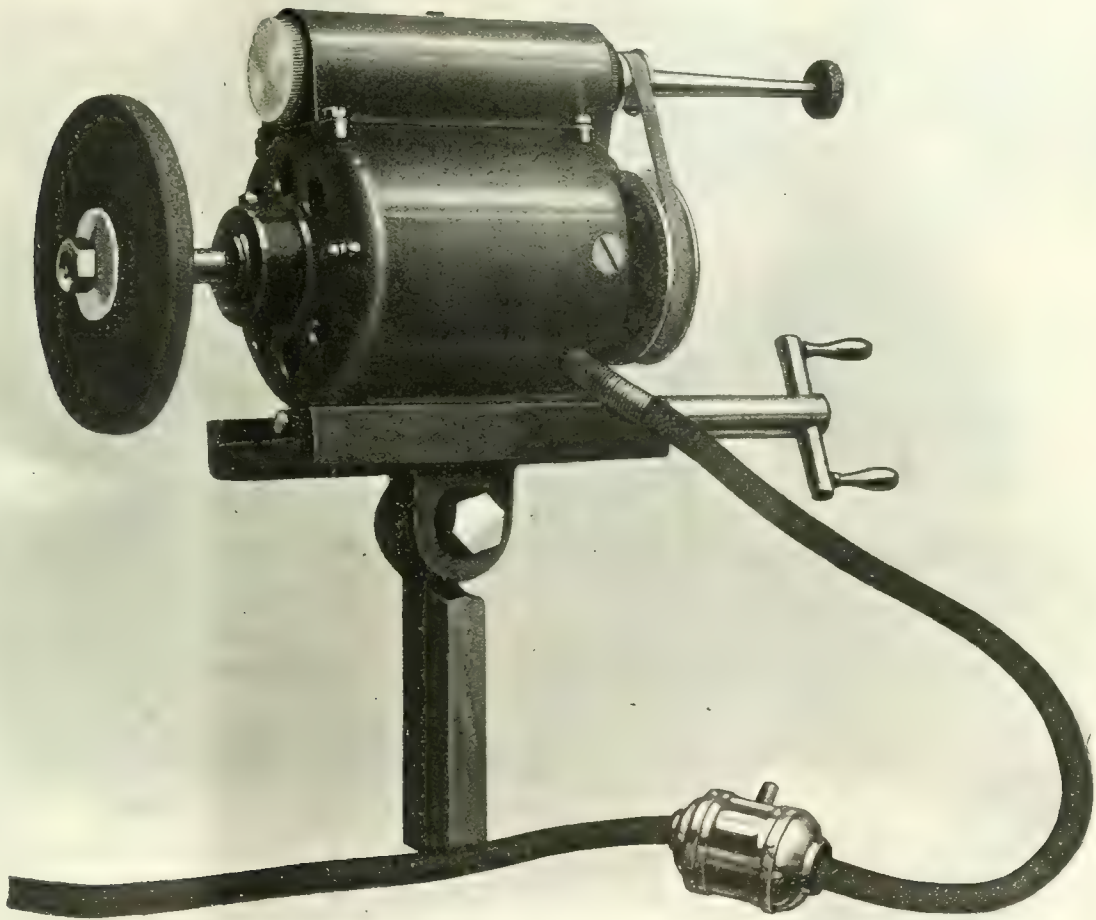
1001 Singer Bldg., New York City
981 Broadway, Albany, N.Y.



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



PORTABLE ELECTRIC GRINDER—30,000 R.P.M.



Cut the Cost of Your Grinding Operations

The mere mention of 30,000 revolutions per minute to a man who knows grinders is a volume of information. It means speed in production—and in case of the ARO, it means perfect accuracy, too.

To do quick, accurate work, speed is absolutely necessary. If you are not giving your wheels the correct surface speed, they will break down, making it impossible to maintain accuracy. The ARO, with 10,000 R.P.M. on the motor spindle and 30,000 R.P.M. on the internal attachment, gives you a cutting speed that allows the wheels to clear themselves, and enables the operator to maintain size.

An examination of the ARO proves why it does more work and better work than the ordinary grinder— it is better built. Motor and internal spindle are equipped with S.K.F. Ball Bearings. No complicated parts to get out of order. No end thrust, no side play. Armature, internal spindle,

pulleys and large emery wheels are dynamically balanced. This eliminates all vibration and assures you of perfect work, free from chatter marks. The ARO is easily carried from job to job—weighs only 17 pounds. All parts interchangeable.

The ARO Grinder is the most efficient Portable Grinder on the market. Wherever grinding is done, it will materially reduce costs. With the ARO you can do all kinds of grinding — longitudinal, cylindrical, internal grinding and other hard-to-get-at jobs.

Sold on an absolute make-good basis. How can you afford to be without it?

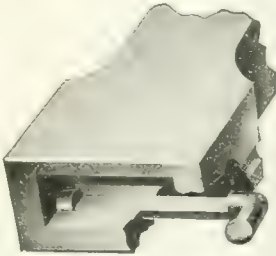
R. E. T. PRINGLE, Limited

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

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

If You Change Markings Often, Use CHAMPION HOLDERS

(Patented)



*Steel Lettering
Die and Stamp
Catalogue
on request.*

MATTHEWS' Improved Champion Steel Holders and Interchangeable Grooved Type were developed to simplify, and to economize the cost of interchangeable marking. Holders are made with spring attachment, which, combined with grooved type, keeps letters or figures securely in place, and insures accurate, straight line marking.

Three styles of holders, and three types of letters and figures.

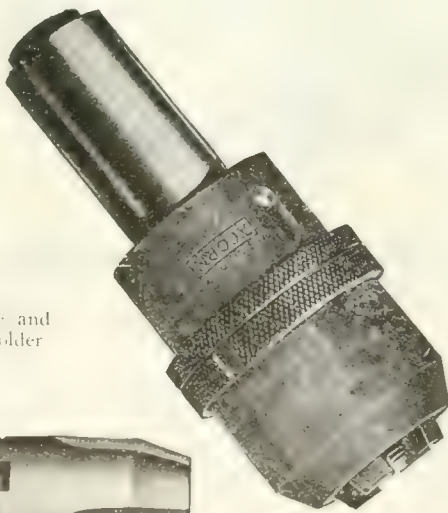
Matthews' marking devices are the best that skill, 67 years' experience and modern equipment can produce. Matthews' deliveries are prompt and Matthews' prices are right. Any device you may require from a small rubber stamp to a steel stamp for marking shells. Send Matthews a trial order.

Jas. H. Matthews & Company, Forbes Field, Pittsburgh, Pa., U.S.A.
67 YEARS IN BUSINESS

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

Let the ACORN DIE Cut Your Threads

Die and
Holder



THE DIE

The adjustment is mechanically perfect—simply turn the cap and all the prongs of the die converge equally—a great advantage over the spring die.

The Acorn Die Holder is smaller in diameter than any other die holder of equal cutting size.

The float permits the die to follow its own lead.

The die projects slightly beyond the adjusting cap, making it admirably adapted for shoulder work—and the chips are thrown ahead of the work, so the die does not clog.

Will you try the Acorn Die on your own work—under your own conditions?

WELLS BROTHERS COMPANY OF CANADA, Limited

GALT - ONTARIO

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



QUALITY FILES

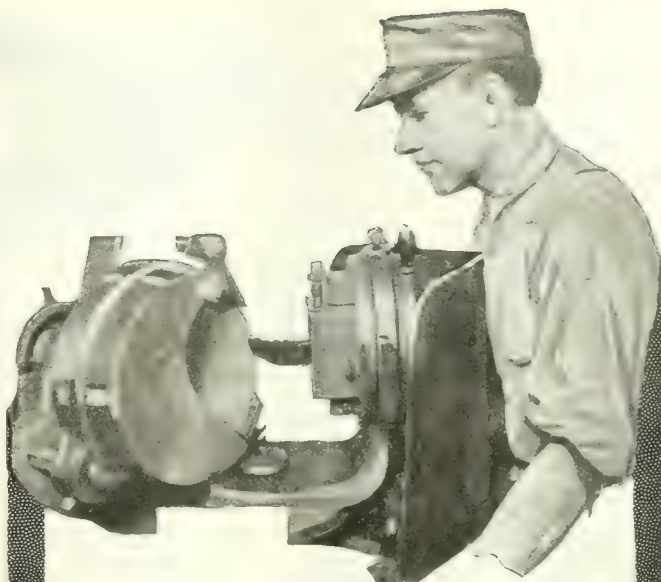
By virtue of their QUALITY, P. H. Files are forging ahead.

Hard as a diamond and straight as a string, they are right because they are "Made for Craftsmen—by Craftsmen."

Port Hope File Mfg. Co., Limited

Port Hope, Ont.

"Ask your jobber"



Alundum for High Speed Steel Tools

The grinding of high speed steel tools requires the use of a wide variety of wheels, each one the correct wheel for its purpose.

For offhand grinding the wheels range in grade from M to P and in grain from 20 to 80, according to the size of the wheel. The abrasive is exclusively Alundum and the process both Vitrified and Silicate. For automatic machines, similar to that pictured above, the wheels usually supplied are listed below.

Gisholt	20 M and N	Vitrified Alundum
Sellers No. 1	20-24 L and M	Vitrified Alundum
	20-24 L and M	Silicate Alundum
Sellers No. 2	36 L	Vitrified Alundum
	30 and 36 M	Silicate Alundum
Taylor	24-0	Silicate Alundum



NORTON COMPANY
WORCESTER, MASS.

ELECTRIC FURNACE PLANTS:
NIAGARA FALLS, N.Y. CHIPPAWA, ONT.
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.

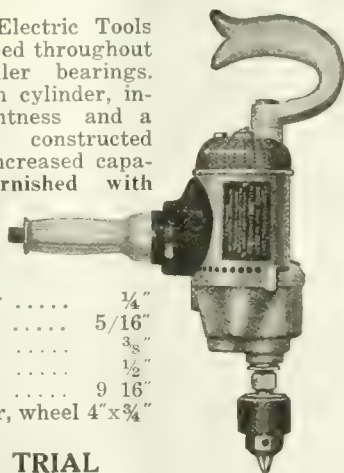
S57 a



UNIVERSAL Electric Drills

Licensed Under Burke Universal Motor Patent

The only Portable Electric Tools made that are equipped throughout with ball and roller bearings. Made with aluminum cylinder, insuring extreme lightness and a powerful specially constructed motor resulting in increased capacity. Can be furnished with Universal, Alternating or Direct current motor 110 or 220 volts.



000 Drilling Capacity	.....	1/4"
00 " "	.....	5/16"
0 " "	.....	3/8"
01 " "	.....	1/2"
1 " "	.....	9 16"

No. 6 Electric Grinder, wheel 4"x3/4"

SHIPPED ON TRIAL

Independent Pneumatic Tool Company

Office: 334 St. James Street, MONTREAL, QUE.

Toronto: 32 Front St. W; Winnipeg: 123 Bannatyne Ave., E;
Vancouver: 1142 Hemer Street

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



Repeat Orders—The Acid Test

Repeat orders are the acid test of a product. No man buys a second time unless he has found a satisfactory product.

In September, 1915, the Colt's Patent Fire Arms Manufacturing Company bought 50 SKF Ball Bearing Hangers—as a trial installation. After a year's trial they bought 400 additional SKF Hangers.

But this is not all. In January, 1917, they bought 200, and in May, 1917, about 500 SKF Hangers, making a total of over 1,000 SKF Hangers.

This is satisfaction—SKF satisfaction—and repeat orders are the proof. Our Hanger Catalog No. 78 will give you further proof. Send for it.

CANADIAN SKF CO., LIMITED
TORONTO, CANADA

Sole Canadian Agents SKF Transmission Bearings

The Canadian Fairbanks-Morse Co., Limited

St. John
Windsor

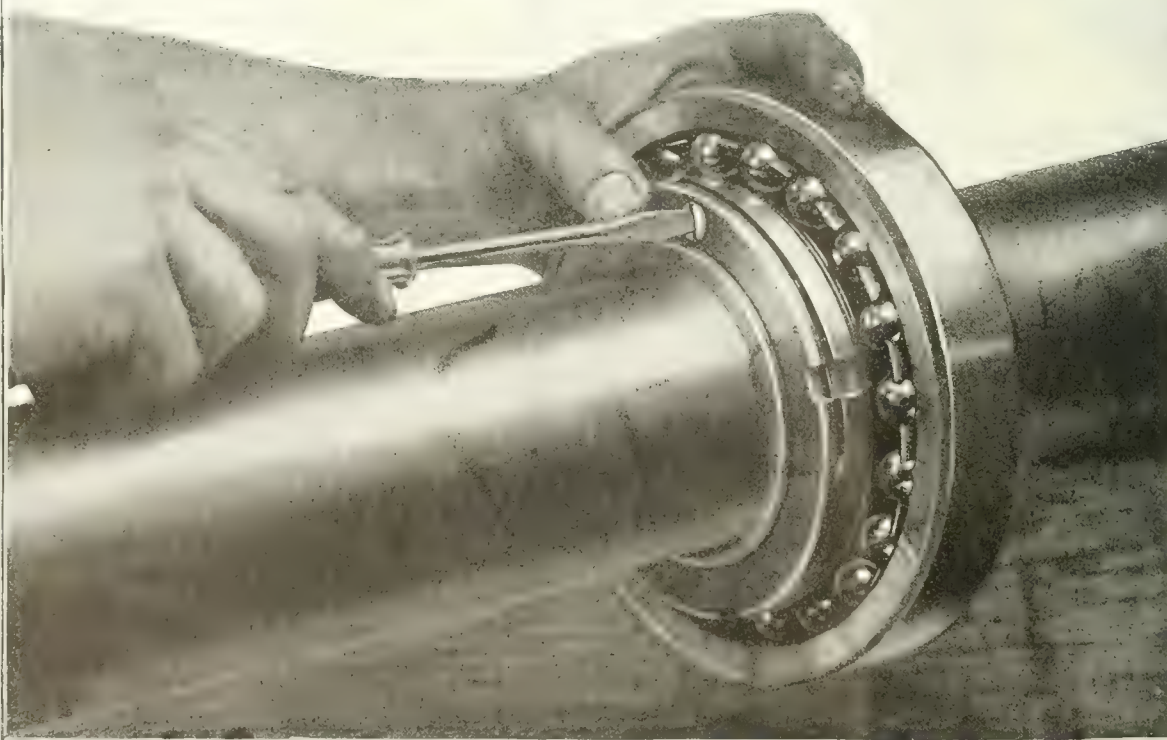
Quebec
Winnipeg

Montreal
Saskatoon

Ottawa
Calgary

Toronto
Vancouver

Hamilton
Victoria



Problems Entering Into Aeroplane Engine Design--I*

By Charles E. Lucke

The aeronautical engine is emerging from the stage of invention to the stage of design, and this paper suggests steps to be taken towards the satisfactory solution of the problem. It resolves the engine into a light, high-tensioned steel structure, consisting of seamless tubing and forged or welded steel parts, possibly formed in drop forge dies. To this steel stress structure are added certain members, such as the piston, exhaust valve and guide, designed primarily for heat-flow conditions and not for stresses; and certain closing members, such as the parts for the intake and exhaust, which can be very properly cast in aluminum; and the oil crank case closure, which can be made of any material desired and readily available.

THE problem of the aeroplane engine appeals strongly to every engineer because it is a problem of the lightest power plant. The lightest weight in engine proper per horse-power is to be secured first by obtaining maximum mean effective pressure at maximum speed; in other words, the product of mean effective pressure and speed must be a maximum. At the same time the weight of metal per cylinder, or per cubic inch of cylinder displacement per working stroke must be a minimum—and with both of these factors the engine must be reliable in operation. So far, this reliability factor has been weakest, though lightness has been secured in engines good for short periods of running.

Metal and Fuel Weights

Not only must the metal weight of engine per horse-power be a minimum, but in addition the fuel weight to be carried must also be a minimum because, as can be readily seen, the fuel weight necessary for flights of any length predominates over the engine weight. For example, taking a half pound of fuel and oil per hour per horse-power as a fair value, it is readily seen how quickly that will catch up on engine weight when the latter is 4 or 5 lbs. per horse-power.

In undertaking an analysis of the aeroplane-engine problem from the records, the only conclusion that can be drawn is along the line of type. Data are almost entirely lacking. On the question of general engine types, attention might be called to a few points:—

The air-cooled motor has entirely failed in comparison with the water-cooled motor—the reasons are perfectly sound and secure. The 2-cycle engine has given way to the 4-cycle type. Fixed cylinders have prevailed over rotating cylinders. Odd cylinder arrangements of queer, freaky forms have all been relegated to the scrap heap in favor of a few modern arrangements. The standard cylinder arrangements of to-day, which are the survivors of what may be called the inventive period, or at least the first inventive period, are the six and eight cylinders in line and the eight, twelve and sixteen V's.

Standardization and Perfecting of Certain Types

It really appears, therefore, that the one valuable result of all our experience has been the selection of a few typical arrangements which we are now compelled

to study, as minutely as circumstances permit, for the purpose of standardizing and mechanically perfecting these particular types as standard machines which will run as reliably as our stationary engines and which can be manufactured as economically. Taking up each of the factors of aeroplane-engine design that seems important, in as specific a way as seems proper, the first one I wish to consider is the value of efficiency and relation of efficiency to minimum weight.

Plotting hours of running as abscissae against weight of engine with fuel and oil, as ordinates, for the air-cooled and the water-cooled types of motor, respectively, so that the intercept on the vertical axis represents the weight of engine metal alone, and the ordinates away from the axis represent the weight of metal plus fuel and oil, one finds that the two curves cross at some period of running beyond which, therefore, the water-cooled heavier engine, because of its lower fuel consumption, becomes lighter in comparison. The metal weight of the water-cooled motor is about one and one-half times that of the air-cooled motor, and the slope of the combined-weight line of the latter compared with that of the former is as two is to one—that is to say, the consumption of the air-cooled motor is approximately twice that of the water-cooled motor. These facts are responsible for the crossing of the lines.

Efficiency Relative to Fuel Weight

Of the conditions for efficiency which bear upon this question of fuel weight, and which have led to the selection of the water-cooled motor as a type, the first is the compression. The higher the compression the higher the efficiency, and there is no limit until preignition occurs. Statements will be found in textbooks to the effect that there is a limit, but they are the results of mistakes in interpretation, and are erroneous. The amount of compression possible is limited, however, by the metal temperature and by the temperature of the mixture as admitted. Naturally, the warmer the mixture during suction, the sooner it reaches ignition temperature by compression. Therefore, suction heating is a limit. Again, the interior metal temperature, if it is high (as it is always), may cause trouble by the contact with the mixture during compression, and some portion of the mixture may be brought to its ignition temperature by

hot-wall contact long before the main mass is brought to this ignition temperature by compression alone. It requires only one such hot spot to wreck a well-laid plan.

The Explosive Mixture

The next factor in efficiency is the mixture quality, and in this there are the following controlling elements: first, mixture proportions. Any excess fuel means direct waste, but it also means carbonization and fouling. Excess air quickly makes the mixture practically non-burnable. Therefore, mixture proportions must be accurately controlled—more accurately than is possible with any existing carburetor. Carburetors are not yet satisfactory, and as soon as satisfactory carburetors are secured from the standpoint of proportionality of the mixture, we may expect to see a further reduction in fuel consumption and more reliable operation.

Dryness of mixture is a matter of co-ordinate importance with mixture proportions. When mixtures are wet, that is, not completely vaporized, the air and fuel cannot be uniformly distributed to the various cylinders by the manifold system. One cylinder will get a different charge from another, as can be easily proved by pressure gauges. There are rarely two cylinders alike as to maximum pressures on a multi-cylinder engine using wet mixtures. Drying of the mixture will cure that fault, and also cure the carbonization that comes from the vaporization of the liquid in the presence of the burning gas when it has been admitted to the cylinder in a liquid state.

The third factor of the mixture question is homogeneity. However accurately the mixture may be adjusted as to fuel and air ratio, however carefully the mixture may be distributed, cylinder to cylinder, the fact remains that, in order to produce economical results, the charge in any one cylinder must be uniform in every cubic inch of it. It is not sufficient that the right amount of air be in the cylinder even if the fuel is vaporized, when the latter is all in one corner.

Flame Propagation and Piston Speed

Following mixture quality, the next factor in efficiency is rate of flame propagation with reference to piston speed. It can be shown that the explosion line of the indicator card following compression must be maintained vertical for maximum efficiency. Now, the rate of propagation is the one factor that tends to hold it vertical. If the propagation rate

*Abstract of A.S.M.E. Spring Meeting Paper.

is high enough for a given piston speed, so that the explosion line is vertical, the efficiency will be high. But should the piston speed exceed a certain value, then the explosion line will begin to lean toward the expansion line, until by and by it becomes horizontal and merges into the expansion line, with a consequent large loss of work area and low efficiency or high fuel consumption. Therefore, there is for every given mixture a limiting piston speed that cannot be exceeded without destroying efficiency, and we are now approaching that speed in aeroplane engines.

M. E. P. and Speed

The next related factors are mean effective pressure and speed. These are the prime factors for the output of a cylinder. If the mean effective pressure were constant, then the horse-power with reference to the speed would follow a straight line. The mean effective pressure is not constant as the speed varies, however. Therefore, plotting horse-power against speed gives a curve having the general form of concave downward and consisting of several separate portions, each worthy of study. There is usually a straight portion over a given speed range, during which the mean effective pressure is constant. For lower speeds the mean effective pressure is lower, and for higher speeds the mean effective pressure is again lower. From the point where, with increasing speed, the straight line becomes a concave-downward curve, the mean effective pressure is decreasing as speed increases, until at the point where the tangent to the curve becomes horizontal, the rate of increase of speed is exactly equal to the rate of decrease of mean effective pressure. At a little higher speed mean effective pressure decreases faster than speed increases, and finally the curve drops down toward zero power.

So much for the facts. An analytical engineer cannot be content with those facts, however, but finds it necessary, if he is to apply a cure, to go behind the facts to ascertain the reasons. The first step in doing that is to determine the volumetric efficiency of the engine by measuring the air and fuel and comparing total volume of mixture taken in with the piston displacement. If the volumetric efficiency be plotted against the speed much light is thrown on the situation. In the first place, the volumetric efficiency falls off in the region of very low speed, where the mean effective pressure is low; it is constant over the region of constant mean effective pressure, where the horse-power-speed line is straight, and then at some high speed it again decreases. It is clear, therefore, that curvature of the horse-power-speed line is due to a corresponding variation of volumetric efficiency. It may be found, however, that at some high speed the horse-power-speed line falls before the volumetric efficiency. This calls attention to the fact that the falling-off of mean effective pressure at high speeds may not be due primarily to volumetric efficiency but to other causes, and recognition of this starts a search for those causes.

The first of these causes is too slow a combustion, or too high a piston speed. That is to be corrected by adding an additional ignition source, or by moving the spark plug from a side wall to a centre point. Igniting at more than one point or at a more central point will cure this defect, and again cause the dropping points of both horse-power-speed and volumetric efficiency-speed curves to lie on the same speed line. Again, it will be found that a change in the valve setting changes this mean-effective-pressure at both ends, but every change in the valve setting also changes the mean effective pressure, and the volumetric efficiency is itself the direct measure of whether or not one has the best valve setting.

Now, it is curious that most people have played with cams and adjusted them back and forward by guesses, and have never bothered about the air meter, which is the only positive means of arriving at best cam forms and valve timing for sustained mean effective pressure at high speeds. Many more analyses along the above lines could be given, but enough has been said to call attention to this most important means of studying the problem of maximum power at high speed, not only revealing what is the matter but pointing out clearly the direction in which to correct the fault.

So much for efficiency and mean effective pressure, or efficiency and horse-power per cubic foot of cylinder. Those two factors bear directly on the fuel weight to be carried and the output per cubic foot of cylinder. What will be the weight of that cubic foot of cylinder? This has to be judged both by qualitative and quantitative analysis. It is impossible to give any quantitative analysis without long mathematical treatment, so I will undertake only the qualitative analysis.

Unit Metal Weight of Multi-Cylinder Engine

The first point in qualitatively analyzing unit metal weight of the multi-cylinder engine is to recognize that the engine can be divided laterally by planes into sections of one cylinder each. The end sections are the same as each other, but are different from the intermediate sections. Therefore, to study qualitatively the relative weights of two typical constructions, the mind must be concentrated upon these sections, each one of which includes a cylinder, a piece of frame, a piece of shaft and the other parts that go with the section.

From this point of view, consider multiplication of cylinders in line vs. radially or circumferentially. It will appear that the weight of the cylinder, piston and connecting rod is just the same no matter how the cylinders are arranged, but the frame weight and shaft weight are reduced by any multiplication. It is clear also that, other things being equal, the lighter arrangement is circumferential rather than longitudinal multiplication. Going back to the history of the situation, we find every conceivable combination has been tried, but these have finally crystallized to not more than two kinds, giving the V-type en-

gine and the engine with cylinders in line.

Considering the effect of cylinder diameter upon unit metal weight, it will appear that from the unit-weight standpoint the cylinder diameter should be as large as possible, because the wall thickness of a cylinder is always greater than necessary for the stress for other structural reasons. A 1/16 in. cylinder of steel will not be stressed over, say, 10,000 lbs. per sq. in. The cylinder could be made much thinner than this and still have a good working stress if there were not other structural objections to it. This being the case, the larger the cylinder for a cubic foot of displacement the less the unit metal weight in the wall and the only limit to large diameter is good running.

Considering the stroke, as this is increased, the metal in the cylinder piles up endwise, or axially, too fast with reference to volume, and therefore for minimum unit metal weight the shorter the stroke the better. In proportion, we are using, normally, shorter strokes in aeronautical motors than in automobile engines for that reason. Again, as affecting the metal weight, we have the connecting-rod length. Clearly, the shorter the connecting rod the shorter the frame, and therefore the more metal saved. The only objection to the shorter connecting rod is an excessive angularity, which introduces stresses requiring metal thickening in other places.

Number of Cylinders

The number of cylinders should be as large as possible up to the point where the weight of the connecting parts has to be increased. A 2-cylinder engine has less than twice the weight per cubic foot of displacements than a single cylinder for the reason that the number of end supports from the shaft, etc., is not increased. Similarly, a 3-cylinder has less than three times, a 4-cylinder less than four times, and so on; and the weight per cubic foot of displacement gets less and less until a certain number of cylinders—somewhere about six—is reached where the shaft diameter and the weight of the frame must be increased so as to retain the necessary stiffness, whereupon the saving in weight by multiplication is neutralized. This appears to be about the limit of saving by line multiplication.

The metal weight per cubic foot of cylinder displacement has to be taken up along the lines indicated, extending the study to the form vs. weight of each individual member. It will appear, as one examines the forms of these individual members, that one form is clearly susceptible of less weight than another—even with the same working stresses or with equal factors of safety.



Aluminum Alloy for Machining.—A suitable mixture for small castings upon which a thread has to be cut, or machine work has to be done, is obtained from 82 per cent. aluminum, 15 per cent. zinc, and 3 per cent. copper. This alloy cuts freely and does not clog the tool.

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

ADJUSTABLE BORING BAR

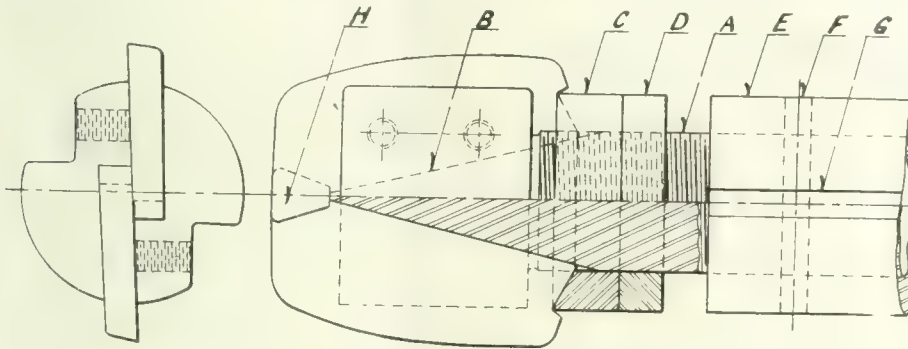
By J. H. R.

MAINTEINING the size of base boring cutters as used on the high explosive shell, has been and still is one of the problems of the munitions shop. With the ordinary solid, one-size cutter, it is necessary to carry quite a

munitions industry, it is not surprising to see such a variety of mechanical appliances in use, for the accomplishment of the different operations; the successful achievement of which has been attained through many channels, hewn out according to the wide range of experience and varied resources of the many men and plants involved. Maximum produc-

is the lever D, the movement of which controls the feed of the cutting tool, by the action of the pinion E in the rack F; the latter being secured to the side of the cross slide G. One end of this slide is provided with a suitable lug H, to support the cutting tool I. Passing through the housing B, and concentric with the lathe spindle, is the short shaft J adjustable to correct position by means of the screw K. The outer end of this short shaft carries the revolving head L that supports the mouth end of the shell while the groove is being cut.

As an additional support for the shell, a special steady head has been devised. The plate M is firmly bolted to the front of the carriage as shown at N, and a hole is bored in the upper portion, central with the lathe spindle, to receive the bush O, which in turn is lined with a bronze bush shown at P. The springs Q, between the fixed plate M and the flange of the bush O, permit of the steady rest accommodating itself to any slight variation in the shell diameter. The cutting point of the tool I is always in relatively the same position to the revolving head L, and it is therefore obvious that the groove will be cut in a uniform location on each shell, irrespective of the latter's position when held in the chuck. The tension spring R is used to withdraw the tool from the work after cutting; one end being secured to the fixed stud S, and the other to the pin T, secured to the movable tool slide G.



ADJUSTABLE BORING BAR.

stock to meet all possibility of wear and breakage. With the boring bar here shown, designed and constructed by John McDougall Caledonian Iron Works, the life of the cutters has been increased indefinitely, one of these bars having been in use for several months with the original cutters. The sketch illustrates quite clearly the construction of the device. The bar A, 1 1/2 inches in diameter, has a large end in which the cutter slots are milled at an angle with the axis as shown at B. The front nut C is bevelled on the side adjoining the cutters so as to assist in retaining the latter in position; these adjusting nuts C and D when locked together take the end thrust of the cutters, which are additionally secured by means of the two grub screws shown. On the back portion of the bar the sleeve E is placed, this sleeve fitting the hole in the turret. The sleeve is locked to the bar by the pin F, and along the top of the sleeve a small copper tube is inserted to carry the lubricant to the forward end of the bar when same is working in the shell. To provide for sufficient adjustment, and still retain metal enough for end cutting, the cutters are made with lips that overlap each other, as shown at H. These boring bars have been in continual operation and are giving every satisfaction.

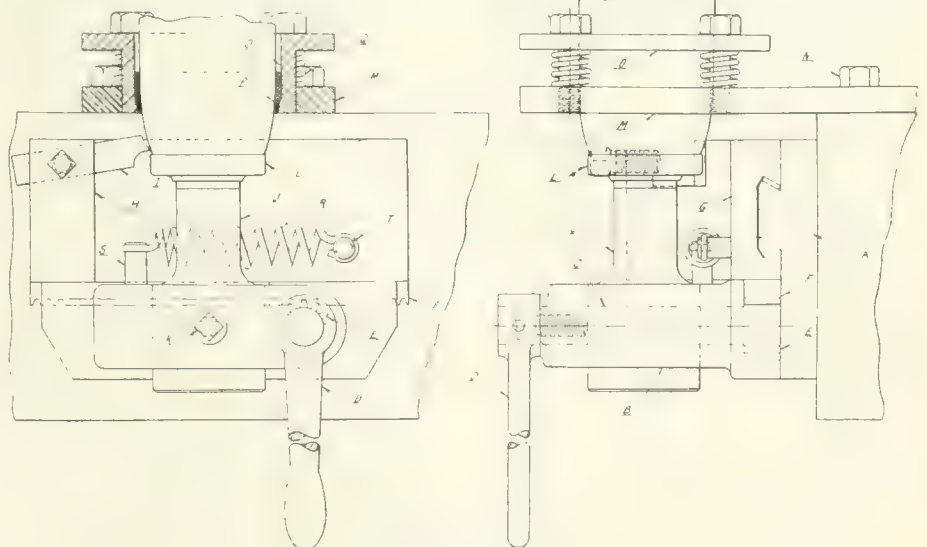
tion depends largely upon speed and accuracy, and it has been with this object in mind that the great number of machine attachments have been designed and constructed.

The accompanying cut illustrating a general arrangement of a lathe fixture for turning the crimping groove in Mark IX. shrapnel, was designed and is used by the Nova Scotia Steel & Coal Co. The entire attachment might be classed as a unit in itself, as it comprises a steady head, tail support for shell, and cross slide for cutting tool; all secured to and moved in conjunction with the carriage. Secured to the carriage in a fixed position, is the base of the cross slide A, up-

INTERIOR PROFILING TOOL

By R. Hamilton.

THE smoothing and sizing of the interior of the shell nose, following the



LATHE FIXTURE FOR CRIMPING GROOVE.

FIXTURE FOR TURNING CRIMPING GROOVE

By S. B.

INGENIOUS methods have undoubtedly been an outstanding feature in the machining of the various types and sizes of shells, and it is very interesting and instructive to study a few that have been developed for the purpose. In view of the sudden and widespread growth of the

on the side of which is the upright housing B that carries the operating shaft C. To the top end of this vertical shaft

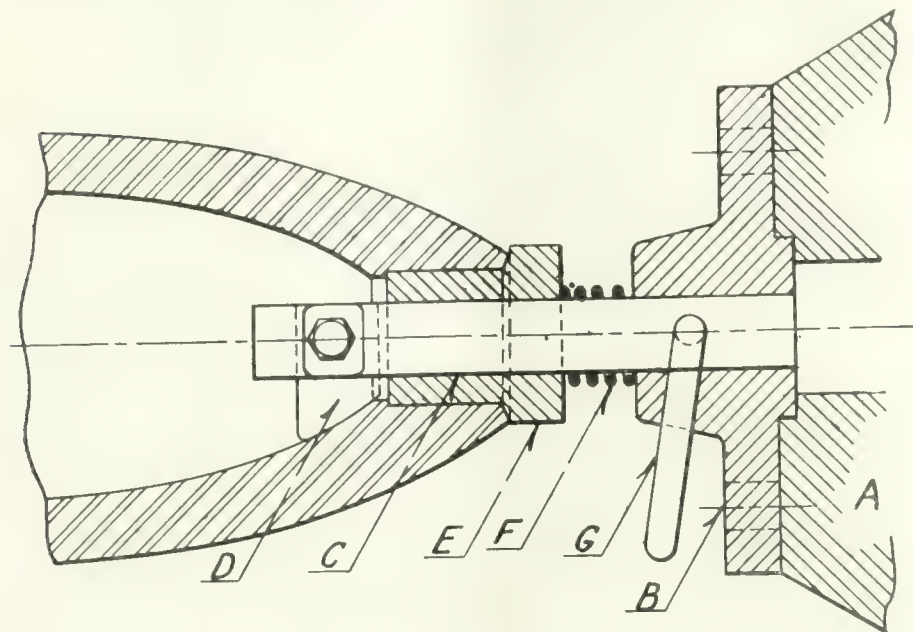
hot closing process, has brought into play many unique tooling devices for the machining of this particular portion. Ow-

ing to the small opening at the nose it is somewhat difficult to sufficiently support the tool while the irregularities are

able time is wasted and much inconvenience caused by these omissions. Only certain kinds of tools are usually to be

taken off and examined. Collars should always be stamped with the figures on the circumferential face, not on the side. See Fig. 4.

It is readily seen from this short review what variety of tools unmarked or improperly so, there are, and how important it is that steps be taken to give these matters attention.



INTERIOR PROFILING TOOL.

being removed. The sketch shows a special boring attachment developed by the Canadian Buffalo Forge Co., and used on the ordinary turret. The bar holder B is bolted to the face of the turret A, and supports the rear end of the boring bar C, through a slot in the inner end of which the forming tool D is secured. The bush E is a close sliding fit on the bar and also in the hole of the shell previously bored to the proper size. The spring F is for the purpose of pressing the bush forward so as to steady the bar while the tool is cutting. Owing to the absence of lateral movement of the turret, it is necessary to insert the bar into the shell nose and then bring the turret forward to engage with the shank of the bar, the locking pin G being placed in when the holes are in line. Although the bar in this instance is comparatively light, the stead bush E provides a rigid support while the cutting tool is operating.

found marked, these including counter-bores, reamers, drills and similar specialties.

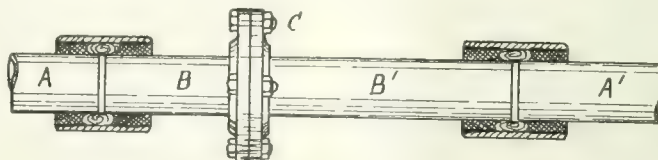
There is hardly any class of tools in

EMERGENCY REPAIR ON WATER PIPE

By John Port

A CAST iron water pipe, 4 in. in diameter, carrying water at 80 pounds pressure, cracked, and a section five feet long had to be cut out. There was no cast iron pipe on the job, but a couple of short pieces of 4 in. wrought iron pipe, a 4 in. flange coupling, and two 6 in. pipe couplings were routed out. The two short pieces, of pipe were connected with the flanges C. the couplings were slipped on and back over the ends of the cast pipe ends A.A'. Then the 6 in. couplings were drawn back over the pieces B.B', after they had been put in place.

Oakum packing was driven into the couplings, as shown by the section, and lead joints run and caulked in the usual way. There is nothing extraordinary in this repair, but it just shows that there is generally some way to overcome a difficulty. In this case lack of cast iron



EMERGENCY REPAIR ON WATER PIPE

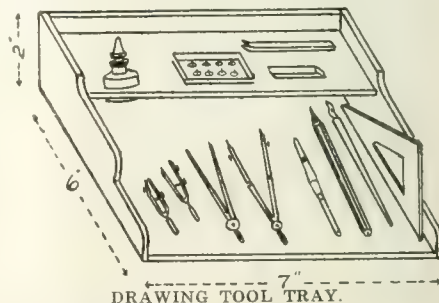
a machine shop that are constantly handled or used but require or should have their sizes or number visibly and properly stamped or cast on them. The advantages to be derived from this are so many that it is surprising that they have been overlooked so long. Take for instance driving shaft pulleys. How much measuring and calipering is done to find out their diameters; gears also, involving the hunting or counting the number of teeth; all of which is time unnecessarily wasted. The sizes and numbers of these should be cast on the arms in raised figures as shown in Figs. 1 and 2.

pipe and sleeves did not prevent the man in charge making a proper and permanent repair.

A DRAWING TOOL TRAY

By A. M. Y.

THE accompanying sketch shows a very handy tray for holding drawing instruments. Draftsmen are well aware of the inconvenience of having tools spread out on a drawing board. It is usually necessary to pick up each one when taking up a drawing or when cleaning off the board; by this arrangement the tools can



DRAWING TOOL TRAY.

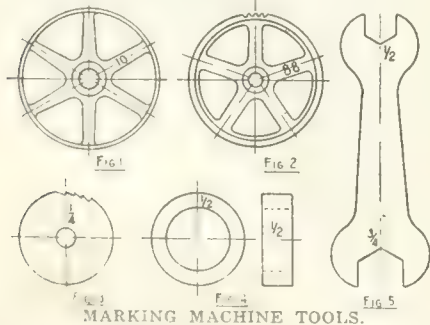
Another case is that of wrenches, it is always necessary to try several of these before one of the right size is found. The opening in a wrench should be marked as in Fig. 5. Metal saws for slotting screws generally have to be sorted out and tried in a thickness gauge before the right size for a certain diameter of screw is found. The size for which they may be used should be stamped on as shown in Fig. 3. Collars that are used in milling machine arbors suggest themselves as instances in which figures are improperly placed, because they cannot be seen when fastened on the arbor, especially between two cutters. A great many times the wrong collar is put on, or the need of making sure of this is often necessary, and they have to be

always be kept together and carried about from one board to another. The tray is made of white wood, shellaced over. The ink bottle fits into a hole in the shelf to prevent it from being upset

MARKING MACHINE TOOLS

By E. Bailey.

IT is a peculiar oversight in the machine tool industry that more tools do not have



MARKING MACHINE TOOLS.

their size and number stamped or cast on them. This branch of work is neglected to such an extent that consider-

and spilled. The shelf can also be used for holding thumb tacks, erasers, and others small accessories. A tray of the dimensions given, takes up very little room and is easily moved about.



HANDY RULE FOR FINDING CONTENT OF CYLINDRICAL TANKS

By C. T.

THE following table is useful in arriving at the contents of cylindrical tanks placed horizontally, i.e., with the two circular ends standing vertically. The diameter referred to is one passing vertically through the centre of the circular end. The table can be used for finding how much has been run off (up to one half) if the percentage of the diameter be counted from the top of the diameter. If the measurement along the diameter be made from its bottom end, the quantity remaining in the tank, (up to one half) can be at once found.

ing the top 49 per cent. viz., 0.4873, 51 per cent., of the diameter is found to represent 0.5127 of the capacity, 52 per cent. is 1—0.4745 or 0.5255 of the capacity, 53 per cent. 1—0.4618 or 0.5382 and so on.

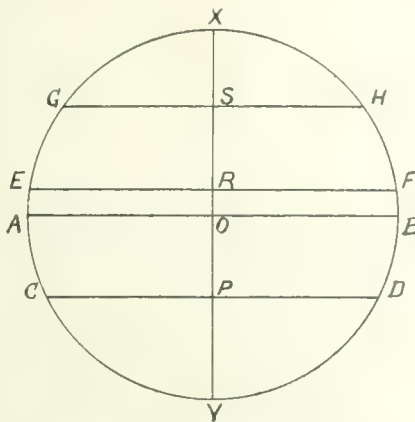


DIAGRAM OF CYLINDRICAL TANK CAPACITIES.

Referring to the diagram which represents one of the circular ends standing vertically, if the surface of the liquid is at AB, then the tank is half full, OY being 50 per cent. of the diameter XY. If it stands at CD the tank contains 0.2523 of its capacity, PY being 30 per cent. of the diameter XY. When more than half full, proceeding as already shown, at EF the tank is 1—0.5382 full as XR is 47 per cent. of the diameters, and at GH it is 1—0.1424 or 0.8576 full, as XS is 20 per cent. of the diameter XY.



White Castings for Motor-car Work.—A mixture which has given satisfaction for motor-car fittings and which can be polished the same as nickel-plated work, is as follows: Copper, 50 lbs.; zinc, 35 lbs.; nickel, 15 lbs.; aluminum, 2 oz. The copper may be increased to 55 lbs., when the resulting castings are required to be very hard and white.

HORIZONTAL AND CYLINDRICAL TANKS CAPACITY IN PER CENT. OF DIAMETER.

1% of diameter is 0.0017 of capacity.

2%	0.0048
3%	0.0087
4%	0.0134
5%	0.0187
6%	0.0245
7%	0.0308
8%	0.0375
9%	0.0446
10%	0.0520
11%	0.0598
12%	0.0679
13%	0.0764
14%	0.0851
15%	0.0941
16%	0.1033
17%	0.1127
18%	0.1224
19%	0.1323
20%	0.1424
21%	0.1527
22%	0.1631
23%	0.1737
24%	0.1845
25%	0.1955
26%	0.2066
27%	0.2178
28%	0.2292
29%	0.2407
30%	0.2523
31%	0.2640
32%	0.2758
33%	0.2878
34%	0.2998
35%	0.3119
36%	0.3241
37%	0.3363
38%	0.3487
39%	0.3611
40%	0.3735
41%	0.3860
42%	0.3986
43%	0.4112
44%	0.4238
45%	0.4364
46%	0.4491
47%	0.4618
48%	0.4745
49%	0.4873
50%	0.5000

The value for intermediate percentages may be obtained by interpolation without any serious error.

The table given only extends as far as half the diameter but can readily be extended the whole way by any reader who wishes to use it. For example assuming that it is being used for estimating the liquid actually in tank, and the percentage of the diameter thus counted starts from the bottom, then 51 per cent. from the bottom is 49 per cent. from the top, subtracting from unity the fraction of the capacity represent-

EMERGENCY MEASURING METHODS

By T. Sim.

OFTEN when a man should have a measuring rule with him on some job, he discovers that he has laid it down somewhere and forgotten to take it up again, or perhaps it has fallen out of his pocket. Usually he will "curse" or "bless" his luck, and return to the workshop for a "rule." There are a number of ways for taking measurements with things that are always with us, and other things usually with us. These measurement things will give us approximate measurements only, unless we use considerable care, but if a little trouble is taken to memorize the tips here given, they will often come in handy.

The Dominion \$1 and \$2 bill is 7 1/16 in. long. An American or Canadian "quarter" is very close to 1 in. in diameter.

Look at Fig. 1. The upper joint of the average female thumb is usually very close to one inch. In the average male it is about 1 1/8 to 1 1/2 in. The old hand outstretched measure, as shown in Fig. 2, will come close to 8 1/4 in. in the male. Fig. 3 shows the forearm measure—from the point of the elbow to the tip of the middle finger will be about 20 inches in the adult male and 16 inches in a female. No doubt most readers have seen the store ladies stringing yards of lace or other material, by stretching the material from the chin to the tip of their outstretched hand.

It is a good idea to ascertain the length you take while walking. If you have a knowledge of this, it is an easy matter to figure any distance required by counting your steps. Many men can pace or step off any distance, taking three feet to the step, and come out at the end very nearly correct. A little practice will enable any man to do this with a fair degree of success.

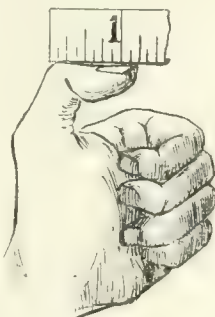


FIG. 1

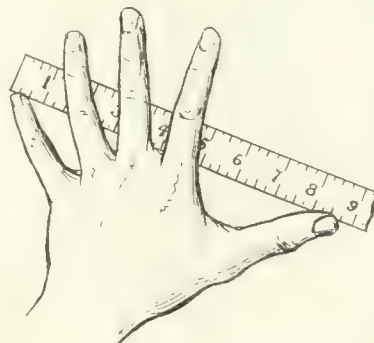


FIG. 2

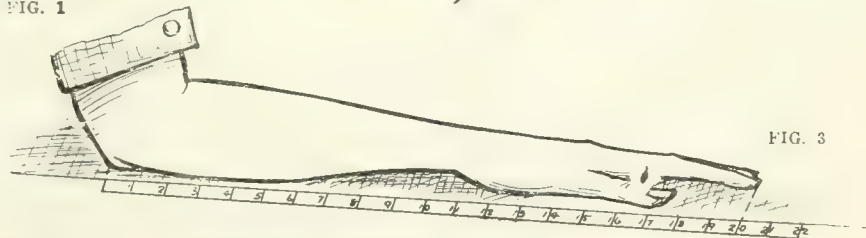


FIG. 3

PLAYING HOSE STREAMS ON CHARGED ELECTRIC WIRES

FROM the earliest days of the adaptation of electricity to commercial purposes there has been, says *The Travelers Standard*, a more or less hazy notion that turning a stream of water on a live wire is a highly dangerous proceeding. Only a few years ago the statement was frequently made in the newspapers that firemen were hampered in their efforts to control a fire because of their fear of directing a stream of water on a high-tension circuit. Such a notice appearing in a paper to-day would reflect on the efficiency and standing of the particular fire department referred to. A study of the question has been made, with the result that every modern fire department has the necessary equipment to protect the firemen from shock. This equipment is in the form of rubber gloves and boots, insulated handles on the nozzles, a marline covering over all hose connections, or other equally effective insulating devices.

Probably the most authentic information on this subject may be had from the records of the fire departments in the principal cities in the United States. These fail to show that any fatal or even serious injury has been caused by directing a hose stream against a high-tension circuit, although a number of departments report that slight shocks have been felt by hosemen. This excellent record is accounted for in part by the fact that overhead circuits are seldom found having pressures above 30,000 volts, within the territory of the fire departments.

Hazard Determination Tests

The Pennsylvania Railroad Co. carried out a series of tests to determine the hazard involved in directing a stream of water on to a high-tension line. Three circuits were available for the purpose—one direct-current circuit of 525 volts pressure, one alternating-current circuit of 2,300 volts, and one of 4,600 volts pressure. Solid streams of fresh water from 5/8-inch and 1-inch nozzles were played on these circuits from various distances, and the difference in potential between the nozzle and the ground was measured by a voltmeter. The summarized results of these tests are shown in Tables 1 and 2. From these tables it is evident that a person standing ten feet away from circuits of the above-

Table 2.—Results of Demonstration at Altoona.

Size of Nozzle % in.	Voltage on Wire 525 (D.C.)	Distance from Nozzle to wire (Feet)	Volts between nozzle and ground
		3	Slight indications of static electricity to the hand
1 in.	2300 (A.C.)	8	Slight indications of static electricity to the hand
1 in.	4600 (A.C.)	10	Slight indications of static electricity to the hand

that playing a solid stream from a hand chemical extinguisher on a high-potential circuit is an extremely dangerous proceeding. The difference in potential between the nozzle of a chemical extinguisher and the ground is approximately seventy-five per cent. of the difference between the line itself and the ground, provided the nozzle is held nine or ten inches from the circuit. Assuming a circuit of 3,000 volts and a nozzle ten inches away, the person holding the extinguisher would be subject to a shock from a potential of approximately 2,000 volts. It seems, then, that the stream from a chemical extinguisher does not offer the same resistance to an electrical current; or in other words, it is a better conductor than fresh water.

With nozzles of larger diameters and circuits of higher potentials the resistivity of the water largely determines the hazard to the men directing the stream. This fact was brought out by a series of tests made at Ohio State University, in which use was made of potentials ranging from 5,000 to 30,000 volts. Nozzles 1½ inches and 1¼ inches in diameter were used, these being the two sizes generally employed by fire departments.

Increased Water Pressure Increases Resistance

One of the important points determined by these tests is the fact that an increase of water pressure increases the resistance, because it tends to cause the stream to break up at a shorter distance from the nozzle than when a lower pressure is employed. As the solid stream breaks up into separate drops the resistance rises suddenly, thus preventing the flow of electric current in dangerous potentials. It was found that with a 1½-

20 feet. This shows that for safety when playing streams on circuits above 5,000 volts, the hosemen, using 1½-inch or 1¼-inch nozzles, should stand at least 20 or 25 feet respectively from the wires; and, in addition, at these distances all modern insulating precautions should be observed.

Overhead high-tension circuits within the fire department limits or near buildings are carried on poles 25 to 40 feet high, so that there is little danger that the firemen while standing on the ground will receive shocks through the streams of water directed on the circuits. Modern fire-fighting apparatus, however, includes metal ladders and extension towers, and it is quite possible for firemen working from either a ladder or a tower, to unintentionally bring the nozzle close enough to a high-tension circuit to receive a serious or fatal shock.

INCREASE IN CANADIAN CUSTOMS CUSTOMS returns for the month of May show an increase of sixty per cent. in the total trade of Canada over the corresponding month last year. The total trade for May amounted to \$256,653,615, and for May, 1916, was \$164,350,950. For the two months of the fiscal year which have elapsed the total trade of Canada was \$408,606,873 compared with \$269,590,815 for the same period last year.

The customs revenue for May was \$17,082,823, an increase of \$4,000,000 over May of last year. The value of Canadian imports during May was \$107,596,379, of which \$56,479,482 were dutiable goods and \$51,116,897 were free goods. The increase in imports for the month amounted to \$38,000,000. For the first two months of the fiscal year the total imports amounted to \$194,404,188 and for the first two months of the last fiscal year \$119,845,642.

Exports for May totalled \$149,057,236 and for the same month last year \$94,653,138. For the two months the total exports were valued at \$214,202,685 and for the corresponding months last year \$149,745,173. All classes of exports show considerable increases, but this was most marked in agricultural products, animals and their produce and manufactures. The value of animals and their produce exported in May was \$11,376,808 and in May, 1916, was \$6,287,620; agricultural products, \$71,793,023 compared with \$47,433,750; manufactures, \$52,949,623 compared with \$27,734,477.

Table 1.—Voltage to Ground from a Five-eighths-inch Nozzle

Voltage on wire.	Distance from nozzle to wire.	Volts between nozzle and ground.
525 (D.C.)	7 ft. 5 in.	20
525 "	4 ft. 9 in.	38
525 "	3 ft. 7½ in.	60
525 "	2 ft. 2 in.	70
525 "	0 ft. 7½ in.	210
2050 (A.C.)	6 ft. 6½ in.	Static
2050 "	3 ft. 5½ in.	Static
4100 "	6 ft. 6½ in.	Static
4000 "	3 ft. 5½ in.	Static

mentioned potentials runs no great risk of dangerous shock.

An important point brought out in connection with these tests is the fact

inch nozzle the solid stream began to break up after travelling 15 to 17 feet, according to the water pressure, and with a 1½-inch nozzle after it had travelled

Intensive Output, Overhead Charges, and Selling Price

By F. T. Clapham, M.I. Mech. E.

It may be said that a proper appreciation of what the three-part title of this article involves is essential to the wise and therefore most likely successful management of any business enterprise. Whether in detail or in combination, thoroughly practical treatment is accorded the subject, on which account, if for no other reason, employer and employee alike may profit by a perusal of the data given to the extent of greater co-operative effort.

IN bringing this subject forward I should like to commence by pointing out the fact that the illustrations which I shall give are not an elaborate hypothesis, but have actually come under my notice during sixteen years' experience as a works manager. I must also appeal for open minds. In the past there has been much mistrust and more unbelief in the actions and words of both employer and employed, and if any of it remains, my time in writing this paper is pure waste. We all know what production by labor means, and the selling price of a finished article, but do we know what difficult things establishment charges are? I think not. If there is a subject less understood than any other by both employer and employee, this is it.

Establishment Charges Defined

First, what are establishment charges? The title covers a number of expenses which must be met in any business that is carried on, and includes rent of premises, ground rent of land on which a leasehold works may be built, rates, taxes, advertising, travellers' expenses and commission, salaries of staff—such as manager, foremen, draughtsmen, clerks, storekeeper, time-keeper, and watchman—postage, telephones, and telegrams, all kinds of stationery, lighting, provision of steam, gas power or electricity, repairs, fire insurance, patent fees, depreciation of buildings and machinery, legal expenses, cartage, provision of loose tools, belting, tools for machines, and a host of small items, all of which go to swell the total.

All these things are necessary; all must be bought, and therefore all must be paid for. It is not possible to charge any given job or contract with any definite proportion of this total otherwise than by adding a percentage. For instance, suppose a firm has an order for 10,000 castings, all machined to a given pattern. They may find it advisable to buy a turret lathe and give \$2,500 for it. It would not be sound policy to charge this lathe to the cost of the contract, because the lathe would be in the shop, and well able to do other work when the contract was completed. If it was intended to be charged to the job, it would mean an addition of 25 cents each to the castings in the estimate, and the result would be, there would be no necessity to buy the lathe.

Departmental Charges Vary

Again, establishment charges vary in

proportion in each part of the works. In the machine shop it will be found that the average works out at 13 men to 12 machines. In the foundry it is 1 machine to 20 men. Now, it must be perfectly clear that the establishment charges of the foundry cannot be anything like as high as they are in the machine shop. Other shops run on much the same lines. In the machine shop the charges even vary with some of the machines. Let us consider a few instances. Here is a very large planing machine. It occupies, with its travelling table, 20 square yards of shop room. It can be driven one way with two horse-power, but the necessity of all planing machines is, they must be driven both ways, and therefore must be reversed continuously. This reversing action uses up more horse-power than the actual cut of the tool—hence the machine must be provided with eight horse-power. Taking horse-power at 2 cents per hour, we find the power cost alone of this machine is 16 cents.

Now we will take a 4ft. arm radial drill. This can be easily driven with .75, or three-quarters, of one horse-power, therefore its cost is 1¼ cents per hour, or ten times less than the planing machine, and it occupies one-sixth of the floor space.

Again, we have a wet, traversing, high precision grinder. For its actual size and weight it has cost more than any other machine in the shop. It requires three horse-power to drive it, and costs more than any other tool for upkeep. It must have a good supply of corundum and carborundum wheels of many sizes and sections to do its many duties. All these wheels must be kept in first-class order, by means of a diamond, for truing up. The life of this tool for high precision work, under the best conditions, does not exceed five years, if kept regularly at work. All three tools are a necessary part of a modern machine shop, and their running cost in each case is different; therefore, in some modern works the establishment charge is fixed for each machine per hour.

Now, it must be clear that when the machine is standing this establishment charge is not earned. The absent operative, if charged with this loss, might reply, "If the machine is standing, it is not using the power." This is only partly true. The power is provided, the tool-room, engine attendants, and other items which make up the whole of the establishment charges are running just the same. This brings up another point.

In a slack time, when possibly half the machines are standing, the establishment charges are very much higher, because the machines at work must earn the charges of those standing. There is one foreman for 30 or 60 machines, the same tool-room, and so on through the whole of the staff.

I know a firm whose establishment charges in the machine shop are 225 per cent. of the labor. They have a most elaborate tool-room, shop inspector, and viewers, an up-to-date prime costing department, and are engaged on the very best class of high precision work. A fairly general average of machine shop charges will be 150 per cent. of the labor, and this is the figure I shall use in my illustrations.

Foundry Establishment Charges

Shortage of orders also make the charges very high in an ironfoundry. There is the cupola man and his mate. They can melt eight tons per day, or one ton, as necessity arises, but in wages alone it costs eight times as much to melt the one ton as it does to melt each of the eight tons. Again, most foundries have the main bay served by an electric or belt-driven overhead crane. This can serve thirty moulders, or five, as the case may be. Assume the crane driver to have \$7.00 per week, and serve thirty moulders, this works out at say 25 cents per man per week; but if work is so scarce that only five moulders are on the floor, the cost instantly rises to \$1.50 per man per week. Figure this out, and apply it to a large works short of orders in all their departments, and then pity the works manager, who must find means to earn the establishment charges, or work at a loss. I think it is made clear that these charges must and do vary considerably on different machines, and in different departments, but their sum total over a whole works does not vary; indeed, one to two per cent. can be safely reckoned as the margin of fluctuation.

Relation of Labor

I trust this explanation of what establishment charges, or running costs, are, is clear. Let us now consider the relationship of labor, not only to these charges, but to the prime cost of the article produced. An estimate may be said to contain briefly three main items:—(1)—Material, (2)—Wages, (3)—Establishment charges. There are other small items, but for our purpose here they are negligible. The sum total of these three items is called the prime cost.

*From a paper read before the Exeter, England, Chamber of Commerce.

Some time ago I took a contract for 20,000 bars, cut to a given length, faced at each end, and rough turned all over. The material was supplied by the customer, and the turning consisted in reducing the diameter by $\frac{3}{16}$ in. This meant a cut $\frac{3}{16}$ in. deep, and I hoped to get it off in one cut. I put a very heavy lathe on the job, with a 3 in. belt to drive it, and a fairly good machinist. From start to stop he took 45 minutes, and said the lathe jibbed at the job. I told him to try another. He did so, but with no better result. I got the foreman to try, and told him to put in a new tool, ground at 88 deg., so as to get good support under the cutting edge. He did one bar in 42 minutes. I then suggested that we should run the lathe in single gear and bring the bar down to size in two cuts instead of one. This reduced the time to 40 minutes, but that was eight times too long for me. I put the matter before my directors, and told them I must have a new strong lathe that could do the job better. I was fortunate to get one from stock immediately, with a 4 in. belt drive, and put it to work. Before we consider the work of the new lathe, I must give you the cost on the old lathe:—

Machinist, three-quarters of an hour at 16 cents=12c
 Establishment charges, 150 per cent.=18c

Prime cost=30c

I had another machinist on the new lathe, and in a few days he turned out 36 a day, against 10 on the old lathe; but he was not doing anything like what the machine was capable of, and I told him so. At the end of a week I said, "Tom, I want 80 bars off this lathe to-morrow; it is capable of 120. and unless you can give me 80, you and I must part. The price is 2 cents each, and I do not care how many more you do, the price is the same." The next day he did 79, and in four days worked up to 129. I will take his average at 108, which is 12 per hour. How did the cost work out? Taking three-quarters of an hour, which is the time it took the other man to do one bar, we get:—

Nine in three-quarters of an hour at 2 cents each=18c
 Establishment charges, 150 per cent.=28c

46c

Total 46c ÷ by 9 = 5c each prime cost.

Look at these startling figures. Labor has increased its earnings by no less than 50 per cent., from 12 to 18 cents, but the prime cost has actually been decreased by 600 per cent., from 30 to 5 cents. Could there be a better illustration of intensive production cheapening the cost and benefiting labor at the same time?

What right had the turner to offer 36 bars for a day's work by means of restricted production? Did he benefit? Is it not a fact that by his very act he tripled the prime cost? If so, for what purpose? These are the things which have embittered the employer in the

past. In the present days and in the days to come these dishonest tricks must find no place in sane, well-meaning trades unionism. There ought to be some court whereby such an offender could be heavily fined. A court set up by the trades unions, and presided over by them, for their own protection and self-respect. There is, however, another side to the picture, and in common fairness I must give it. I have known cases where an employer has set up an arbitrary standard of piecework. He has said, "No man will be allowed to earn more than time and a quarter; if he does, his price will be reduced." This is wrong from every point of view in my judgment.

Modern Tools a Necessity

Let me demonstrate the perversity of some employers. I had an extraordinary experience over the machining of some iron tank plates. The tool on which these plates were machined was an old planer, too slow for words, neither use nor ornament, and I told my directors that if the operator worked for nothing we were still unable to compete with other firms. I described the machine I wanted, and said if my words were not true concerning its value over the old planing machine, I would pay for it, and, further, I would leave them to judge the matter. The machine was bought, and after a while delivered and fixed.

Such an expression of opinion over an old machine, which had long been in their service, and was therefore almost a part of the fixtures, was unpardonable, and I was asked to prove that, with a man working for nothing, the machine could not compete with the new tool. The results worked out as follows:— The plates were 5ft. square, and had flanges 3in. deep. The old planing machine did three in a day of nine hours. The new machine did fourteen in the same time, but being a much simpler tool to handle it was operated by a handy man.

On the Old Machine

Man, nine hours at 16c \$1.44
 Establishment charges, 150 p.c.. 2.16
 \$3.60
 Prime cost \$3.60 ÷ 3 = \$1.20 per plate.

On the New Machine

Man, nine hours at 14c..... \$1.26
 Establishment charges, 150 p.c.. 1.86
 \$3.12
 Prime cost \$3.12 ÷ 14 = 22c per plate.

Going back to the first cost, let us take away the man's wages, and there remains \$2.16 of charges—we cannot run a shop without these $\frac{2.16}{3} = 72c$ per plate, with the man working gratis, against 22c per plate with a man being paid 14c per hour. Here, then, is indisputable proof that labor at its best is useless if not equipped with modern machine tools.

Given modern tools, what a scandal it is that labor should sometimes desire to restrict production, and so discount

the value of the new tools, by claiming that in fixing new piecework prices the rate must be based on the production of the slowest worker in the shop. Piece-work oils the brain. It stimulates the worker to use his ingenuity to get out the greatest possible amount of work done in the least possible time. If the time of the slowest worker is set up as a standard, call it what you will, it is no longer piecework.

If a dozen men are doing exactly the same job, the time of the quickest worker ought to be taken into account in fixing the piecework price. The laggards must be asked to speed up. It is absolutely wrong to ask the quickest worker to slow down to that of the slowest worker, and yet I know that is done. How can a firm meet their competitors when this is the case?

I once had an inquiry from an old friend for 3,000 brass cocks. I consulted our men—for we were not busy—to see what could be done. They declined to make any reduction whatever on their piecework, and asked a price which I knew made the estimate hopeless, and I told them so. I quoted \$4.20 each. A few weeks afterwards I saw my friend, and he said, "You did not want those cocks, then?" I said, "No, not very much; the fact is, they are not quite in our line at present. The machines they ought to be done on are otherwise employed." He said, "That accounts for the high price, then." He showed me a quotation which he had accepted at \$2.34 each. I can assure you that there is nothing more humiliating to a sensitive man than to know he has sent in a prime cost so hopelessly high as to appear really silly, and cover the firm he represents with ridicule. Materials cost about the same anywhere, and as establishment charges are based on the labour, it is labor that is to blame for a high price, assuming, of course, that a suitable machine exists to do the work.

I contend that it is the duty of both employer and employed to get the very utmost out of every machine, and when a new machine is bought piecework prices must be adjusted to the new conditions. What is the good of an employer buying a new machine to do more work, and to do it better, if he has to pay the same labor cost? Yet this attitude is really and seriously taken up. The law of progress is eternal. A firm is either doing better work, and increasing its trade, to the material benefit of its shareholders and employees, or it is steadily slipping back into mediocrity and dissolution. There is no half-way state.

There is another curious instance of the unrealized value of establishment charges which I should like to bring before you. I once obtained a foreign order for \$150,000 worth of work, amongst which was 150 tons of cast iron special pipes. These specials were included in our estimate at \$55 per ton. The foundry was badly equipped in one or two notable things, and, in consequence, was short of work. One of my directors sent out an inquiry for those

specials, and obtained a quotation for them at \$52.50 a ton. He said to me, "I think it advisable to buy these out. In any case, we stand to get a clear profit of \$375, because I can buy the whole lot at \$2.50 a ton cheaper than our estimate." "Exactly," I replied, "but while you are getting \$375 clear profit, you are paying away your own establishment charges." "How do you mean?" "Just this. Our moulders can make these pipes at \$10 a ton. The establishment charges, including melting charges of the cupola and the coke, are \$7.50 per ton. On 150 tons this works out at \$1,125; deduct the \$375 profit you say you can make, there remains a net loss of \$750 in charges." I need hardly add that we made those pipes in the foundry, and although they cost the \$55 a ton of the estimate, we actually earned \$1,125 of charges, which were a great help to the inevitable running costs of the shop.

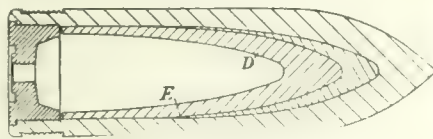
Conclusions Drawn

What do these examples teach us?

- (1)—That intensive production is absolutely necessary to the worker, he wishes higher wages. Why? Because it is proved that wages are included in the selling price of the article produced; consequently, the more articles that are sold the greater the amount of wages paid out, and vice versa.
- (2)—That to intensify production the employer must be ready to supply the worker with the best and most modern machine tools that can be obtained.
- (3)—That intensified production cheapens the cost of the article produced. Therefore labor can materially benefit by being able to buy boots, clothes, and many foodstuffs at a lower price than formerly, assuming, of course, that all trades give a greater output.
- (4)—That out-of-date machinery cannot successfully compete with modern tools, even if the operators work for nothing. Therefore they should be scrapped.
- (5)—That high wages and high production mean low prime costs and low selling prices.
- (6)—That restricted labor means low wages, high prime costs, high selling prices, and restricted markets for the goods in consequence.
- (7)—That establishment charges are not paid for or put on labor. They are based on the cost of labor, but always paid by the consumer. This must be so, because the article is mostly quoted for and sold before labor starts to make it.
- (8)—That until capital and labor fully realize that the one is useless without the other, that their true interests lie close together, that they cannot afford to quarrel, that they have still to agree afterwards, there cannot be any abiding prosperity for either party. What are you going to do about it, if these things are true? Which of you will say they are false?

ARMOUR PIERCING SHELL INVENTION

AN invention in armour-piercing shells, recorded by *The Engineer*, London, England, provides an improved system of manufacture with a view to securing more uniform hardness and strength. It consists in making the shell with an outer envelope and two or more close fitting liners of a contour similar to that of the outer envelope, the total thickness of the envelope and liners corresponding to the standard thickness of metal in ordinary projectiles, each being machined and hardened on its inner and outer surfaces. A recess E may be provided between the inner wall of the outer envelope and the liner D to serve as an air vent when the latter is being forced into position. In this way the inventors say they are able to produce a projectile which is much



ARMOR PIERCING SHELL.

more uniform in hardness and strength than those made according to present methods. Also, in a projectile made according to this invention the force of impact would be taken equally by the head and walls of the outer envelope and liners, and thereby transferred direct to the base of the projectile, and the greatly increased strength given to these vital parts by the more uniform hardening of practically the whole thickness of metal, gives to the projectile a superiority in quality of metal over the armour against which it is fired.

HUGE GRAB-BUCKET DREDGE

THE use of the grab-bucket type of dredge has reached two special developments in American practice. First, great depth of dredging, with short reach of jib to load material into barges alongside; this is for harbor work. Secondly, comparatively shallow dredging, but with immense reach; this is for use in river work, and for building dykes or levees along rivers to afford flood protection.

A huge dredge of this latter type has been built for work on rivers in California. The hull is 140 ft. by 61 ft., built of steel trusses and frames, with steel plating for the sides and a timber bottom and deck. It is 13½ ft. deep on the centre line. At the forward end is an A-frame 68 ft. high, built of timbers 20 in. by 20 in., each 76 ft. long. This is supported by inclined back-legs seated at the stern. Midway between the feet of the A-frame is a heel casting, to which is fitted a timber boom or jib 195 ft. long, 22 in. by 22 in. in section, trussed vertically and laterally. A topping lift or luffing tackle leads from the end of the boom to the top of the A-frame. All machinery is in the hull. The superstructure has the crews' quarters at the deck level, with the officers' cabins above, and over all the enclosed operating house, corresponding to the pilot house of a steamer. The jib carries a clamshell or

two-section bucket of 5 yards capacity.

When at work the boat is held by three vertical timbers or spuds, resting on the river bed. The stern spud is fitted to a slotted casting, attached to a steam cylinder. Steam being admitted to the cylinder, the dredge is pushed forward. The dredge has two tandem cross-compound condensing engines on the ends of the main shaft from which the cable drums are driven by gearing.



DOMINION STEEL CORPORATION

MARK WORKMAN, president of the Dominion Steel Corporation; William McMaster, vice-president; and W. G. Ross, a member of the executive committee, have returned after a two weeks' inspection trip, in which they visited the properties of the company, at Sydney, C.B., Wabana, Newfoundland, and St. John, N.B.

On his arrival in Montreal Mr. Workman stated that they had found the plant at Sydney looking exceptionally well, with all departments working to capacity. He would not discuss the question of earnings, but it is understood from other sources that a new high water mark was reached in May.

Extensive extensions and improvements, which will tend towards the efficiency of the plant are now in progress and good headway is being made along these lines. Mr. Workman would not state how much had already been expended at Sydney, but it is understood to be in the vicinity of \$2,000,000, and the work is not by any means completed yet.

The first battery of sixty coke ovens being installed will be ready during the winter, and the next battery of the same size about a year from now.

Work on the new blast furnace has made rapid progress, and it will be ready for use in two or three months. This furnace will mean an increase in output from thirty-five to forty thousand tons per year, at the minimum. Last year the total output from the Sydney plant was something like 360,000 tons.

The output for the month of June shows little change from previous months of late, and as the plant is working to capacity, and has been for some time, increases cannot be looked for until the additions now under way are completed. The output for June was as follows:

	Tons.
Pig iron	29,375
Ingots	30,647
Blooms	15,980
Shell blooms	11,485
Shell bars	4,868
Rods	10,400
Nails	3,534

As this is the first time output figures have been given out for a number of years, it is not possible to make any comparisons, but they are believed to be well up to the high record, although they show but a small advance from the same month last year. Pig iron output was slightly better than a year ago, while ingots fell off slightly.

Mr. Workman explained that the labor situation was the source of a good deal of uneasiness. La^h

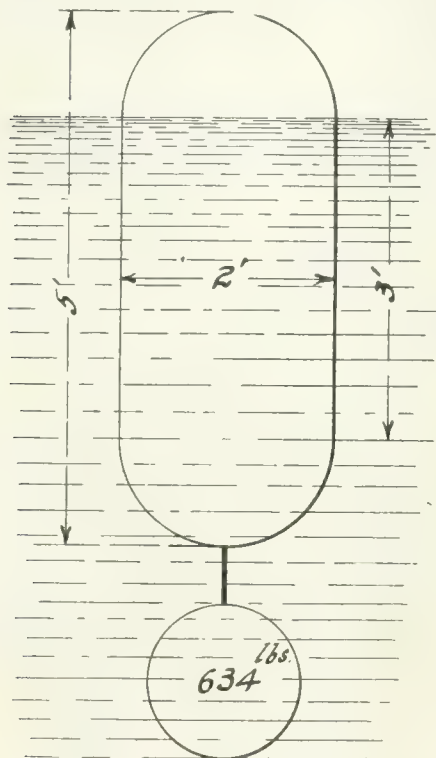
EDITORIAL CORRESPONDENCE

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

PROVIDING VERTICAL FLOTATION OF A STEEL CYLINDER

A STEEL cylinder with spherical ends, made of $\frac{3}{8}$ inch plate, has an overall length of 5 feet, and an appropriate diameter of 24 inches. What weight of solid cast iron would require to be hung on the lower end to maintain the cylinder in a vertical position when placed in water, leaving only the semi-spherical top protruding above the surface?—C. P. M.

The amount of metal used in the construction of the cylinder would equal the metal required for the parallel portion plus that required for the two ends. The



VERTICAL FLOTATION OF A STEEL CYLINDER.

parallel section would have a length of 5 feet minus 2 feet, or 3 feet; and with a diameter of 24 inches and a weight of, say, .283 lb. per cubic inch, the weight of the straight part would be $.283 \times 24 \times 3.1416 \times 36 \times .125$ equals 96 lbs. Combining the two ends, the weight of both would be $.283 \times 24 \times 3.1416 \times .125$ equals 64 lbs. Then the total weight would be 96 plus 64 equals 160 lbs. Placed in water without additional weight, the cylinder would displace an equal weight of water, the volume of which would be 160 divided by .03616 (for fresh water), or 4,397 cu. in. The volume of one of the spherical ends would be $24 \times .5236$, 2 equals 3,619 cubic inches. Subtracting this from the value 4,397 gives 778 cubic inches, which

is the volume of the parallel portion of the cylinder that is submerged; and the depth will equal this divided by the area of the cross section, or

$$\frac{778}{24 \times .7854} \text{ equals 2 inches nearly.}$$

The additional depth to which the cylinder must be submerged (by the application of the weight) will be 36 minus 2 equals 34 inches. This will equal a displacement of $24 \times .7854 \times 34$ equals 15381 cu. in., with a corresponding weight of water of $.03616 \times 15381$ equals 556.2 lbs. This, then, would be the weight of cast iron required to submerge the cylinder to the desired depth; but with the anchor weight below the water, sufficient weight must be added to overcome the buoyancy of the water. This added weight will approximate the weight of displaced water, or about 78 lbs. The weight of the cast iron anchor would then be 556 plus 78 equals 634 lbs. nearly.

HANDY CHART FOR ESTIMATING PULLEYS, FLYWHEELS, ETC.

By "Woodworker."

HERE is a chart that will come in handy in a number of ways wherever circular motion is to be computed or estimated. Knowing any two of the factors shown in columns A or B, the third can be found.

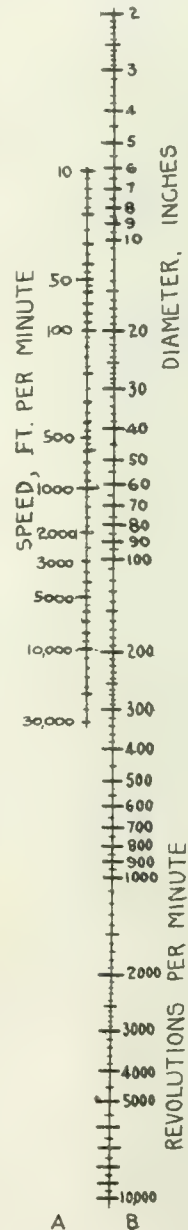
For example, a 20-inch pulley makes 600 revolutions per minute. What is the speed of the pulley periphery in feet per minute? This is a very common problem.

Find the 20 (column B) and the 600 (also in column B), and then locate the point half-way between them. This is done by folding a strip of paper, by means of a pair of dividers, with a ruler, etc. There are many good ways in which to find a mid-point. Directly opposite that mid-point is the answer—very close to 3,200 feet per minute.

This answer is not exact, of course, nor does a slide rule give an absolutely accurate answer, but it is close enough for most practical purposes. The designer is generally most anxious to keep well within the bounds of safety. Well, 3,200 ft. per minute is a safe speed for almost any pulley. In fact, a mile a minute is usually given as the maximum speed for wood pulleys, cast iron pulleys, and others of a brittle nature. Steel pulleys are often allowed to run at 6,000 to 7,000 ft. per minute, and in extreme cases even that speed has been beaten, but nobody should ever attempt a greater speed than a mile a minute without being absolutely sure of himself, his calculations, his design, etc. It has often been pointed out that the energy stored in a flywheel sometimes reaches stupendous proportions and when a flywheel explodes we all know the attendant results.

Again, when it is desired to determine the approximate number of revolutions per minute at which a given pulley will run when the diameter and belt speed are known, the chart is used in this way:

Take the same example as above. Let us assume that the diameter of the pulley is 20 inches and the speed of the



HANDY CHART FOR ESTIMATING PULLEYS, FLYWHEELS, ETC.

belt 3,200 ft. per minute. What will be the r.p.m.?

Find the distance between the 20 (column B) and the 3,200 (column A), and measure that self-same distance downward from the 3,200, and there's the answer in column B=600 r.p.m. This method is just the inverse of the first, of course.

Lastly, if the speed in feet per minute is known and if the r.p.m. are known, the diameter in inches of the required pulley is found by following the same tactics as in the last example. Using 600 and 3,200 as known quantities, the answer will be found to be 20 inches.

In metal turning, also, this chart will be found useful for determining cutting speeds. Knowing the diameter of the stock and the r.p.m., the cutting speed is found as in the first problem cited here. If the diameter is 1 inch, use the 10 on the chart and mentally divide the answer by 10. If the diameter is 1.5 inches, use the 15-inch mark, and again mentally divide the answer by 10. It is thus evident that the range of the chart is virtually unlimited.



THIS WAY SPELLS SUCCESS

By W. G. D.

WHAT makes one man a success and another man a failure? Simply this, perseverance, push, going ahead and doing something, making a start and keeping at it until it is finished. Nothing is ever done by sitting still. No one knows what they can do until they make a start and try. The successful in the business world never knew what they could do till they went at it and accomplished what they did. Neither will you ever know unless you attempt something and keep at it.

Whether you turn out a successful man or a ne'er-do-well is simply a matter of your own choosing. It isn't talent or inspiration or any of these age-worn terms that makes greatness, or does big things, any more than it is good looks or a bushy crop of hair. It is simply just yourself having the push to make the start, and then keeping it up. That is all there is to it.

Begin to-day and make a start. Keep it up, and do each task a little better than the one before it—a little better than the best. Be wrapped up in your work, hold on and do not let go until you have finished it; not until it has finished you, but stand right up to it, and give blow for blow to the last round, or until you are awarded the decision. The man who lays down to a mere nothing, who sees a mountain where there is only a mole-hill, who has to be boosted over every hurdle, is going to be far back in the running when the winners cross the line.

He who rises every time he falls, who never falters when he hits an obstacle, must necessarily forge ahead every time he moves. A few scratches are not defeats. It is in believing that you can do things, that it is in your power to accomplish what you set out to do, that pulls you forward and wins a victory. It does not matter how high you have to climb, or how rough the road is over which you need to travel, these are but minor considerations. If you falter you fail. The real matter is, that you stick to your purpose to the very end.

It is this determination to hang on in spite of discouragements and blockades that accomplishes the things that live forever. This is what makes one man successful and another man a failure—

the thing that takes a block of marble and sculptures a lasting monument; that stretches a piece of canvas and paints a picture that posterity treasures; that writes "ten-commandments" that endure for ages and directs mankind to success—not failure.



HANDY CHART FOR BOILER SHELL COMPUTATIONS

By W. B.

THE accompanying chart will be found useful for determining three different things:

1.—It will give the shell thickness of the boiler, knowing the pressure in pounds per sq. in., and knowing the dia-

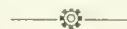
that self-same distance, and the answer will be immediately found in column B as 150 pounds per square inch. This chart is based on 10,000 pounds per square inch as the safe stress to which the metal can be subjected, therefore the answer is the safe working pressure to which the shell can be subjected.

In case it is desired to find the thickness of shell, knowing the other two factors, all that is necessary is to locate the two known points in column B and then find the mid-point. The answer is to be found directly opposite that mid-point in column A.

To find the diameter to which a boiler can be safely made, knowing the shell thickness, and knowing the pressure, the operation is practically the same as in the first example cited. This will be better understood when it is pointed out that the shell thickness would have to be the same for a pressure of 34 pounds and a diameter of 150 or for a pressure of 150 pounds and diameter of 34 inches. Do you get the point? That is why the chart is reversible.

The range of the chart is wide enough to cover nearly every common boiler condition. Its highest pressure is 200 pounds per square inch and the highest shell thickness is one inch.

In case the metal is steel, this chart is especially applicable, allowing a factor of safety of nearly six. In other words, where the breaking strength of the metal is 60,000 pounds per square inch, this chart automatically includes the factor of safety of six. If the metal is cast iron, or something weaker, the chart will not hold without allowance being made, of course.



ELECTRICAL QUERIES AND REPLIES

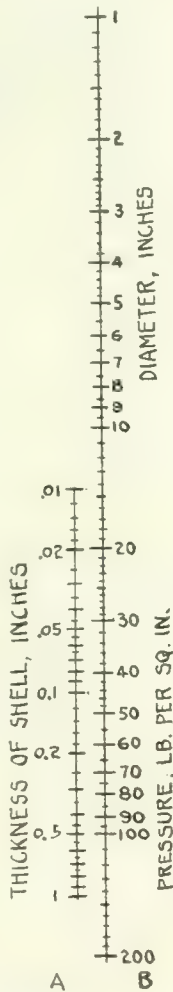
Question.—Define the terms Volt, Ampere, Ohm, Watt, and explain their relationship to electrical horse-power?—M. A. C.

Answer.—The volt is the unit of measurement of force, or strength of electric current, commonly known as electromotive force, or E.M.F. The ampere is the unit of measurement of electric current quantity. The ohm is the unit of resistance to a current passing through a unit length of wire of unit diameter; and the watt the product of one volt and one ampere = volts \times amperes. An electrical horse-power = 746 watts, which is equivalent to that of the steam engine, viz., 33,000 foot pounds.

* * *

Question.—What means are employed to prevent any part of an electrical circuit from becoming overheated?—P. H.

Answer.—A fusible cut-out or fuse which consists of a strip of lead or other readily melted substance is introduced at a convenient point. Then, if from any cause the current becomes greater in intensity than the lead and its connections can comfortably and safely stand, the fuse owing to its resistance becomes overheated and melts, thus breaking connection and preventing overheating of parts in the circuit beyond.



HANDY CHART FOR BOILER SHELL COMPUTATIONS.

meter of the boiler in inches.

2.—It will give the pressure in pounds per square inch when the other two factors mentioned in (1) are known.

3.—It will give the diameter of the boiler in inches when the other two factors also mentioned in (1) are known.

For example, given a boiler made of mild steel, whose internal diameter is 34 inches, and whose shell thickness is .25 inch. What pressure may be safely held within the shell? ?

Find the 34 in column B and measure the distance down to .25 in column A. Then from the .25 measure downward

Safety Standards for Power - Transmission Machinery

By Carl M. Hansen and Rufus W. Hicks

What follows constitutes the tentative draft of a Code of Safety Standards for Power-Transmission Machinery compiled by the authors under the direction and with the consent of the Committee on Health and Safety, National Association of Manufacturers, and presented at this year's spring meeting of The American Society of Mechanical Engineers. An authors' note states that the use of properly designed, constructed, and installed individual motor-driven equipment with electrical power distribution not only eliminates many of the hazards demanding this Code, but also gives an uninterrupted distribution of natural and artificial light, and a greater flexibility and range of speeds than is otherwise possible.

THE specifications describe standard guards for all power-transmission equipment hereinafter mentioned, and apply to all main shafting, jack shafting, drive shafting and countershafting, and their belts and other attachments up to but not including belts actually driving machines.

Class A Guards—If the clearance between the guard and the guarded part is less than five inches, a metal guarding material that will not admit objects larger than one-half inch in diameter, strong enough to withstand loads to which it may be subjected, durable enough to withstand ordinary wear and tear, substantially fabricated and erected, and free from sharp points and edges.

Class B Guards—If the clearance between the guard and the guarded part is five inches or more, a metal guarding material that will not admit objects larger than two inches in diameter, strong enough to withstand loads to which it may be subjected, durable enough to withstand ordinary wear and tear, substantially fabricated and erected, and free from sharp points and edges.

Handrails—If the clearance between the guard and the guarded part is fifteen inches or more (measured horizontally from extreme parts within six feet of floor), a handrail forty-two inches in height with at least one intermediate rail, supported at least every eight feet, substantially fabricated and erected, with no sharp points or edges.

If constructed of pipe, the rails and posts shall be at least equal in strength to 1½-inch standard-weight pipe.

If constructed of structural metal, the rails and posts shall be at least equal in strength to 2x2x¼-inch angles.

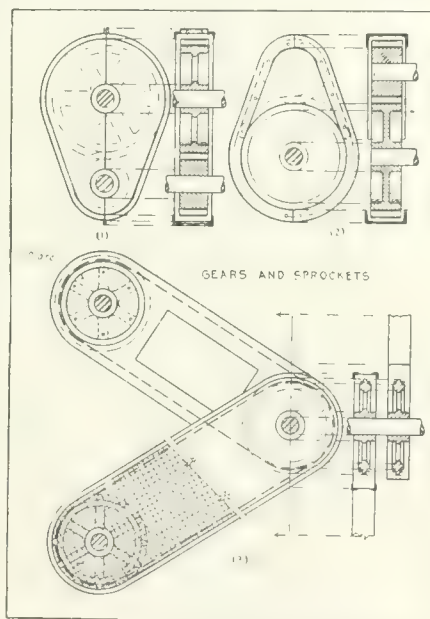
If constructed of wood, the top rail shall be 2x4 inches, and the posts 4x4 inches, all straight-grained lumber dressed on four sides, or other construction of equal strength.

Toe Boards—When power-transmission equipment extends through floors or into pits, Class A and B guards shall extend to the floors, or toe boards six inches in height shall be provided around the floor opening in addition to standard handrails. (See Figs. 6, 7, 11, 14, 30, 31, 34-48.)

Sanitary Bases—Class A and B guards, for power-transmission equipment not extending through floors, shall enclose exposed sides to two inches below the bottom of the lowest moving part when the

clearance between that part and the floor is less than eight inches; or when the clearance between the lowest moving part and the floor is eight inches or more, the guards shall be closed on the bottom, or extended on all sides down to six inches above the floor. (See Figs. 15, 26, 36-40, 42, 43, 49, 54.)

Gears and Sprockets—All power-driven gears and sprockets shall be completely enclosed on exposed sides with standard guards as specified in Class A or B, except in cases where the design and



FIGS. 1 TO 3. GUARDS FOR GEARS AND SPROCKETS.

operation of the parts to be guarded make a complete enclosure clearly impractical, in which case the face of the gears or sprockets shall be covered with a band guard surrounding all exposed teeth, with flanges on both sides extending inward beyond the roots of the teeth, and there shall be a continuous smooth web cast or fitted between the hubs and rims of the gears or sprockets. (See Figs. 1, 2, 3.)

Vertical and Inclined Belts, Ropes, Chains—All vertical and inclined belts, ropes and chains used for transmitting or distributing power (except belts traveling less than 120 feet per minute, or transmitting so little power that accidental contact therewith could cause no accident), shall be provided with standard

guards as specified in Class A or B, six feet high on exposed sides, or on exposed sides and top, or with a standard handrail on exposed sides. (See Figs. 4 to 46, inclusive.)

Horizontal Belts, Ropes, Chains—All horizontal belts, ropes and chains used for transmitting or distributing power (except belts traveling less than 120 feet per minute, or transmitting so little power that accidental contact therewith could cause no accident), shall be guarded as follows:

Low Belts—If the upper part of the belt is lower than six feet above the floor or working platform, it shall be provided with standard guards specified in Class A or B, six feet high on exposed sides, or on exposed sides and top, or with a standard handrail on exposed sides. (See Figs. 47-50.)

Medium Belts—If the upper part of the belt is higher than six feet above the floor or working platform and the lower part of the belt is lower than six feet above the floor or working platform, it shall be provided with standard guards as specified in Class A or B, six feet high on exposed sides, or with a standard handrail on exposed sides. (See Figs. 51-58.)

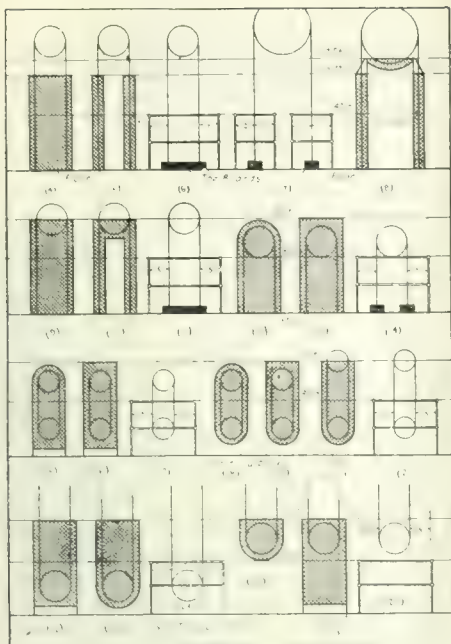
High Belts—If the lower part of the belt is higher than six feet above the floor or working platform and lower than seven feet above the floor, it shall be provided with standard guards as specified in Class A or B, on exposed sides and bottom, or with standard handrail on exposed sides. (See Figs. 59, 60.)

Belts over Driveways—Where a horizontal belt is located over a driveway or passageway, the highest floor of any wagon or truck passing beneath the belt shall be considered a working platform.

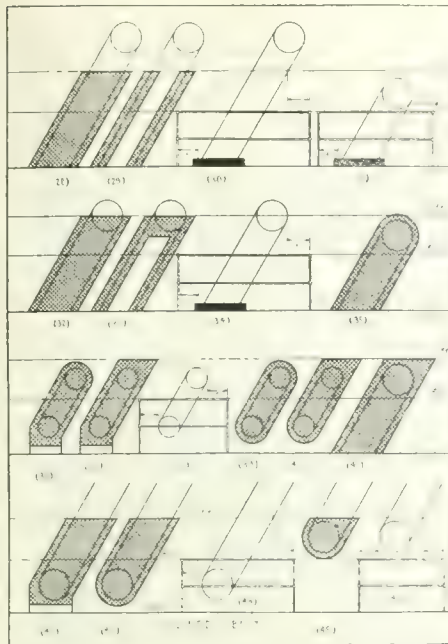
Belt Fasteners—All belts not provided with guards as specified in Class A or B and within seven feet of the floor or working platform shall be free from metal lacings and metal fasteners.

Belt Shifters—Belt shifters shall be provided for all tight- and loose-pulley belts, and shall be so designed and constructed that ordinary vibrations or accidental contact will not alter the set position, and shall have a controlling handle conveniently located. (See Figs. 61-63.)

Pulleys—Pulleys belted from above or from the side in such a way as to allow passage beneath the pulley, and within seven feet of the floor or working platform and not completely enclosed by standard belt guards or handrails, shall



FIGS. 4 TO 27. GUARDS FOR VERTICAL BELTS.



FIGS. 28 TO 46. GUARDS FOR INCLINED BELTS.

be guarded to the top of the pulley or to a height of seven feet above the floor or working platform on exposed sides and beneath by guards as specified in Class A or B, or be enclosed on exposed sides by standard handrails. (See Figs. 64-67.)

Bearing Clearance.—The clearance on shafting between pulleys and bearings or between pulleys and fixed objects shall be not less than thirty-six inches and wider than the belt, or the pulleys shall be guarded on the near side with stationary guards as specified in Class A or B, and all revolving objects in the clearance shall be smooth, cylindrical and concentric with shafting. (See Figs. 68-73.)

Belt Clearance.—The clearance on shafting between pulleys and pulleys, collars, couplings or other revolving attachments shall be wider than the widest belt

used, or the pulleys shall have flanges or guards to prevent the belt from dropping into the clearance. (See Figs. 68-73.)

Abandoned Pulleys.—Pulleys without belts shall be guarded as though belted, or removed from revolving shafts.

Clutches.—Friction clutches, jaw clutches and compression clutches within seven feet of the floor or working platform or within thirty-six inches of a bearing shall have their operating mechanism completely enclosed in stationary guards as specified in Class A or B, or in smooth, concentric revolving guards of solid construction with no projecting parts or attachments.

Couplings.—All couplings within seven feet of the floor or working platform or within thirty-six inches of a bearing shall be guarded as follows:

Rigid Couplings.—Sleeve couplings and flange couplings shall be cylindrical and concentric with the shafting and with no parts or attachments projecting beyond the largest periphery of the coupling or its projecting flanges. (See Figs. 74, 75.)

Flexible Couplings.—Flexible and universal couplings shall be completely enclosed in standard stationary guards as specified in Class A or B, or in smooth concentric revolving guards of solid construction.

Clamp Couplings.—Clamp couplings and makeshift devices of irregular shape or unknown strength are prohibited on power-driven shafting.

Collars.—Assembled collars shall be smooth, cylindrical and concentric with shafting, with no projecting parts or attachments. (See Figs. 76, 77.)

Set Screws.—All set screws in revolving parts not enclosed by standard guards as specified in Class A or B shall be flush with or countersunk below the periphery (See Figs. 76, 77.)

Keys.—All keys or keyways in revolving shafting not enclosed by standard guards as specified in Class A or B shall be made flush with the end and periphery of the shaft or enclosed by smooth, cylindrical concentric guards.

Vertical Shafting.—Vertical shafting with or without collars, couplings, clutches, pulleys, or other attachments shall be enclosed on exposed sides with standard guards as specified in Class A or B to a height of six feet above the floor or working platform, or with a standard handrail. (See Figs. 78, 79.)

Horizontal Shafting.—Horizontal shafting with or without collars, couplings, clutches, pulleys, or other attachments, including dead ends, within seven feet of the floor or working platform, shall be enclosed on all exposed sides with standard guards as specified in Class A or B or with standard handrail, or with freely revolving tubing. (See Figs. 80-82.)

Shafting over Driveways.—Where horizontal shafting is located over driveways or passageways, the highest floor of a wagon or truck passing beneath the shafting shall be considered a working platform.

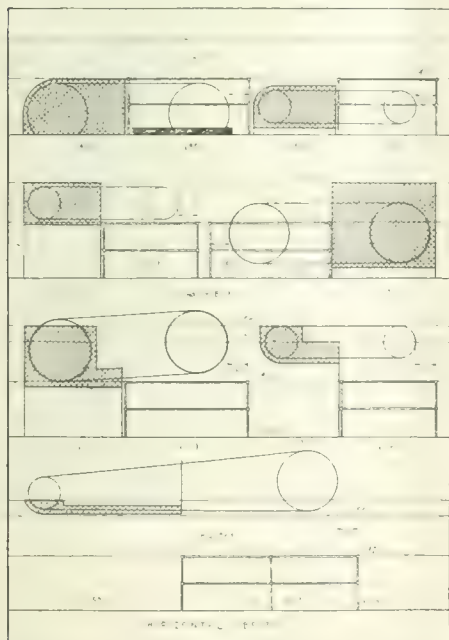
Emergency Stop Stations.—A station or stations shall be provided in each room, section, or department to stop immediately all power-transmission equipment therein. Such station or stations shall be properly marked and easily accessible and provided with means for locking in "stop" position.

Bearings.—Where possible, bearings shall be of a self-oiling type with reservoir capacities for at least 24 hours' running or shall have other methods of oiling which do not bring the oiler in the danger zone, and shall have necessary drip cups and pans securely fastened in position.

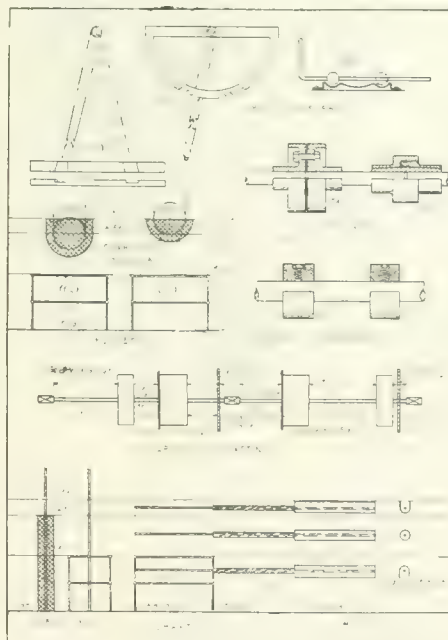
Lubrication.—Oiling which brings the oiler in a danger zone shall be done only by an authorized person, and while the machinery is not in motion.

Oiler's Clothes.—The oiler must not wear loose or flowing clothing.

Oiler's Lock.—The oiler shall be provided with a lock and key or with a key



FIGS. 47 TO 60. GUARDS FOR HORIZONTAL BELTS.



FIGS. 61 TO 82. GUARDS FOR MISCELLANEOUS EQUIPMENT.

to the locks at the emergency stop stations, and with a warning sign to display at the stations when at work on machinery controlled by that station. He shall be required to lock the station in a "stop" position and display the sign before going to work, and unlock and remove the sign when the work is completed and all men have left dangerous places.

Starting Signals—Ample notice should be given by means of an effective alarm or signal in all departments before power-transmission equipment is started.

Inspection—All power-transmission equipment should be carefully inspected at frequent and regular intervals by foremen or authorized inspectors, and defective equipment should be reported for repair and records kept of inspections.

Repairs and Adjustments—Repairs and adjustments to power-transmission equipment or guards therefor shall be made only when the power is cut off from that equipment, and guards shall be replaced in protective before the power is cut on.

Removing Guards—Guards installed in accordance with this Code shall not be removed or rendered ineffective.



GRINDING WHEEL AND GRINDING MACHINE IN AUTOMOBILE MANUFACTURE

TO mention all the parts of an automobile that come in contact with the grinding wheel would be to name almost every essential part, the possible exceptions being the sheet metal fenders, hood over the engine, radiator and the rubber tires; even the glass wind shield, the springs in the cushion, enamelled number plate, the clutch and brake pedals and the button to the Klaxon horn are ground. The following are important parts which depend upon the modern grinding wheel and grinding machine for the accuracy demanded:

Crankshafts, piston pins, piston rings, pistons, cam shafts, eccentric rods, steering knuckles, rear axle housings, worm gears, spline shafts, push rods, valves, bearings, both ball and roller. This list is not by any means complete, however.

The grinding wheel also has what may be called an indirect bearing on the manufacture of automobiles. The metal tools used in lathes, planers, boring mills, milling machines and so forth must be sharpened when they become dull. A great many of these tools are made of alloy steel which can only be satisfactorily shaped by using a grinding wheel. Stellite is a material which is rapidly coming into use. It, too, depends upon the grinding wheel to shape it as desired. When we consider this phase of the subject the importance of the grinding wheel is strongly emphasized and warrants one making the statement that present day production would be only a dream if it were not for artificial abrasives.

Precision Grinding Machine

There is a type of grinding machine known as the precision grinding machine. The word precision is used because machines of this type must be

capable of producing work of great accuracy. The art of precision grinding has advanced very rapidly during the past few years, and the demand of the automobile manufacturer should get credit for producing most of the advance.

It is now possible to grind more than one diameter at one time with one wheel. This is an outgrowth of the use of very wide wheels taking extreme cuts without any traverse of the table or the wheel. A conception of the refinement necessary in the modern grinding machine will become evident by considering the following:

A machine using a very wide wheel, say, 10 in. or 12 in., must have great rigidity as well as be capable of producing refined work. Imagine the forces present when a wheel weighing 150 or 200 pounds revolves on a spindle in plain bearings at 1,000 to 1,200 revolutions per minute. There must be accuracy to keep this spindle in perfect alignment so that the face of the grinding wheel will produce an absolutely straight cylinder, and the weight required in the base of the machine and the wheel slide to absorb all vibration caused by the revolving mass must be ample. Another factor which must be borne in mind is the resistance which is offered when the wheel is brought in contact with the work, as small particles of a very hard material are removed at an extremely rapid rate. It has been calculated that on a wheel 24 in. in diameter and 4 in. wide there are 1,860,171,000 cutting particles coming in contact with the work each minute. The spindle bearings must be so adjusted that the boxes will be quite hot when the machine is in operation; in fact, a temperature of about 140° F. is desirable.

Limits on the work being ground of .0005 in. are very common, those of .00025 quite common, and in some cases requirements are so exacting that less than .00025 in. is demanded. It should also be borne in mind that when the work is reduced .00025 in. the massive slide carrying the wheel spindle and the grinding wheel moves forward only half of this distance; in other words, 0.00125 in. If it were possible to slit a piece of tissue paper into 12 thicknesses, the thickness of one of the resulting pieces would represent the motion of the wheel slide when the grinding wheel removes .00025 in. from the work. Bear in mind that this accuracy must be maintained not only where very small cuts are taken, but also under conditions where the object is to grind off as many cubic inches per minute as possible.

Many more interesting points could be given, but it is hoped the few mentioned above are sufficient to have awakened a sense of appreciation of the modern grinding wheel and grinding machine.

The next time you look at the engine and transmission machinery in your car do so with a certain amount of reverence, and take a few moments from your busy life to reflect that a product of the electric furnace has made all this possible, a product known as—artificial abrasives.—“Grits and Grinds.”

PRECISION GRINDING

A PAPER on the general subject of precision grinding was read by H. H. Asbridge before the Manchester (Great Britain) Association of Engineers. The machine should not be regarded, he said, as a competitor of the lathe or other tool as a remover of metal, but rather as a means of removing metal in which finishing is included. The grinding machine will remove metal more quickly than the cutting tool, as shown by the lathe finishing tool tests of Dempster Smith, whose object was to determine the maximum area of steel shaft that could be finish-machined for a minimum wear of tool. The diameter of shaft was 8 in., traverse per revolution 1/20 in., depth of cut 0.003 in. The tests indicated that the best finishing speed was about 70 ft. per minute, or 7¼ min. to finish turn an 8 in. shaft 1 ft. long. The same work in a grinding machine comparable in size to the lathe on which the shaft was turned, the author said, would require 1½ min. If the sizing operation to a 0.005 in. limit, were included, the total time would not exceed 4 min. per foot of shaft.

Speeds for Cylindrical Grinding

For cylindrical grinding, Mr. Asbridge said the best average surface speed of modern grinding wheels made of artificial abrasives is about 6,000 ft. per minute for external cylindrical grinding, and the useful speed range is from 6,500 ft. to 5,500 ft. per min.; below this speed excessive wheel wear is liable and probable. Grinding machines should be arranged so that the effective life of the wheel falls within this range. The effective life of the wheel is that portion outside the minimum diameter which can be used owing to the limitations of the machine or the method of mounting. He emphasized the necessity of maintaining the speed of the wheel during the cutting operation, no matter what the speed may be. The drive should be sufficiently powerful to prevent slowing down during momentary heavy cutting.

The ideal traverse per revolution of the work is about two-thirds the width of the wheel for external grinding, but it should not, except for finishing, be less than half the width. The speed of the table travel becomes of great importance if a maximum production is to be assured. The main factor governing production on external cylindrical grinding machines is the combination of wide wheels with fast table speeds. The machine which possesses these advantages is the most efficient tool. Work speed has only an indirect effect on the output. With a good wheel it makes little difference to the finish obtained, the author holds, whether the work surface speed be, say, 30 ft. or 60 ft. per minute, except that if the lower speed is persisted in, it limits the table travel, and so in turn limits the output.

Internal Grinding

As regards internal grinding, the idea that the spindle should run at from 30,000 to 50,000 r.p.m. was entirely erroneous. The grinding wheel surface speed for internal grinding has little effect on

production. It has been found that the effective speed range of a good grinding wheel is greater than in any other form of grinding, and ranges from about 1,000 ft. to 4,000 ft. per minute. Much of the most successful grinding is done at a surface speed of from 1,500 ft. to 2,500 ft. Such results have only been made possible by spindle construction of the utmost rigidity. Rigidity is of more importance than actual wheel speed. The later design of internal spindle is so constructed that the spindle bearings never enter the hole being ground. The wheel is carried on an adapter fitted into the main spindle, and held by a draw-bolt. If the work to be ground is of limited range, the adapter portion is formed integral with the main spindle.

For internal grinding, wide wheels and a table traverse up to 9 ft. to 10 ft. per minute are advocated. For surface grinding the best wheel speed is about 4,000 ft. per min.

Grinding is probably the only cutting operation in machine work in which the output cannot be calculated with any approach to accuracy on the usual basis of cutting speed and feed. However, he maintained that grinding times for external cylindrical work could be based by means of the following formula: Diameter of work in inches \times length in feet \times constant = grinding time in minutes for the removal of $1/32$ in. diameter and finishing to commercial limit.

Table of Constants for Determining Grinding		
Diameter of Work.	Size of Wheel	Constant
4" shaft and upward.....	26" x 3"	1.3
3" shaft and upward.....	26" x 3"	1.4
2" shaft and upward.....	26" x 3"	1.8
1 1/2" shaft and upward.....	26" x 3"	2.2
1" shaft and upward.....	26" x 3"	3
3" shaft and upward.....	14" x 2"	2.2
2" shaft and upward.....	14" x 2"	3
1 1/2" shaft and upward.....	14" x 2"	3.7
1" shaft and upward.....	14" x 2"	5
3" shaft and upward.....	12" x 1"	3
2" shaft and upward.....	12" x 1"	3.8
1 1/2" shaft and upward.....	12" x 1"	4.5
1" shaft and upward.....	12" x 1"	6.8

For the removal of $1/64$ in. diameter it was necessary to allow two-thirds of the time obtained. For work below 1 in. diameter the grinding time tended to increase, depending entirely on the rigidity of support afforded, while extra time should be allowed to special limits, such as might be required for drive fits, etc., or for special finished surfaces, such as were necessary for spindles and gauges.

WOMEN WELDERS USE OXY-ACETYLENE APPARATUS

CURRENT developments all tend to show that when the interests of their country demand it, Canadian women will be found willing and able to help in any possible manner. Among the many industrial occupations which have been invaded so successfully by women in Britain is that of blow-pipe operation involving the use of oxy-acetylene apparatus for welding and cutting. It is a peculiar fact that, while the physical effort required in this work is small, every aspirant to the occupation does not always turn out successfully. Skill, concentration of mind, lightness of touch and deftness of hand and eye are necessary factors of success, and that the female temperament contains these qualifications is evidenced by the number of women opera-

tors who have recently acquired a high degree of proficiency in this work.

The rapid development of aeroplane construction in this country opened up much work in the welding and cutting

troller have been concentrated on the task of pushing on the Government standard and other mercantile vessels which are in hand. These efforts are meeting with success, and the output of merchant tonnage is steadily increasing, but it has only been achieved by the most careful arrangements and the combined co-operation of all concerned—the



GROUP OF PUPILS RECEIVING PRACTICAL TRAINING IN CUTTING, WELDING AND BUILDING UP AEROPLANE PARTS.

line which was particularly suited to the employment of women workers. Of comparatively small dimensions, and light weight, and, from their very nature, necessitating the utmost reliability of manufacture, the parts required are now being satisfactorily made by locally trained female operators. For some considerable time now, selected pupils have been receiving instruction in the shops of

Admiralty, the shipyard officials and workers, the iron and steel producers, the marine engine-makers—and these in turn have meant an insistent call for raw and finished materials, which are now, by all accounts, coming forward satisfactorily.

Iron ore is being mined at home and imported from Spain on a larger scale, the ironmasters have lighted additional furnaces, and the output of steel has been steadily increased. All the reports from the iron and steel centres agree that supplies of ship plates and angles, as well as forgings and castings, are now more in keeping with the demand than they were last year. The assembling and allocation of skilled and unskilled labor to the different yards has been no easy task, but it has been accomplished by dint of organization, and to-day there are even women doing useful work in our shipyards. The result is seen in the launching, fitting out, and completion



CANADIAN GIRLS WHO HAVE QUALIFIED AS WOMEN WELDERS IN THE USE OF OXY-ACETYLENE APPARATUS.

the Carter Welding Co., Toronto, and the high percentage of these who make successful operators has been a most pleasing feature of this interesting industrial development.

SHIPBUILDING IN GREAT BRITAIN

ALL THIS year, the efforts of the British shipyards and of the Shipping Con-

of merchant ships, of which the world hears nothing.

"What dirty hands you have, Johnny," said his teacher.

"What would you say if I came to school that way?"

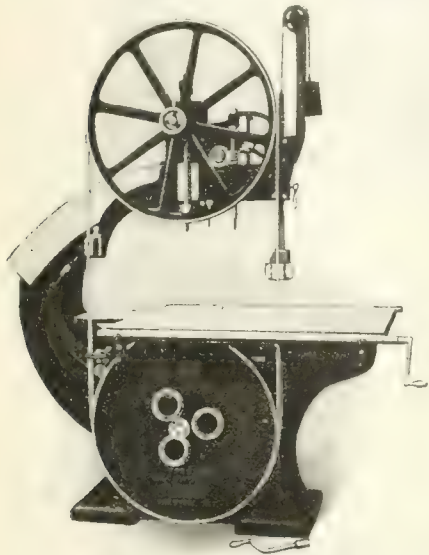
"I wouldn't say nothin'," replied Johnny. "I'd be too polite."

PROGRESS IN NEW EQUIPMENT

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

ADJUSTABLE BEVEL SHIP BAND SAW

THE band saw illustrated in the accompanying engravings is intended for all classes of band sawing where heavy stock has to be sawn bevelling. It is a recent product of the Preston Woodworking Machinery Co., Preston, Ont., and is specially adapted



BEVEL SHIP BAND SAW WITH DISC LOWER WHEEL.

to the use of ship and boat builders, navy yards, carshops, and all work where irregular sawing is done.

The frame is a one-piece casting, corred out in such a manner as to best distribute the material in order to eliminate vibration and ensure steadiness in running.

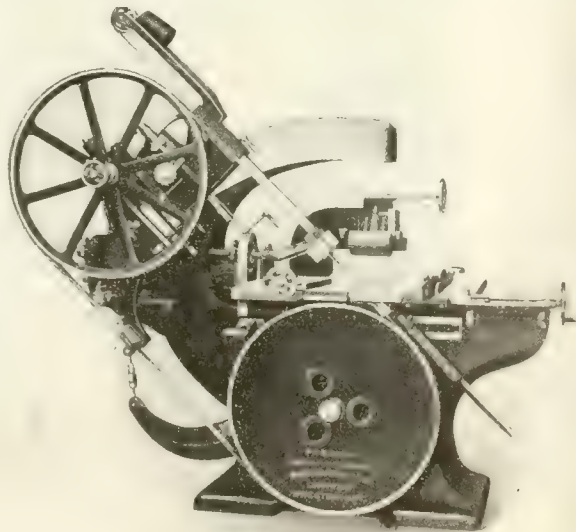
The wheels are 42 in. diameter and 2½ in. face. The bottom wheel is of solid web construction, the top being of arm pattern to make it as light as possible consistent with strength. They are very accurately balanced and covered with the best rubber covering. The top wheel frame can be adjusted to saw from square to any angle up to 45 deg. to the left, and can be adjusted to 10 degs. to the right from perpendicular. This latter is a very important feature. The wheel runs in long self-lubricating bronze bearings and is mounted in such a manner that it can be adjusted by hand wheel while in motion, for regulating the path of the saw to any position on the face of the wheel.

Adjustments can be made while the saw is in motion, by crank connection with worm and worm wheel on front, or by a large handwheel at the back of machine. Both back and front segments are graduated so that the operator can properly adjust the machine from either side. The bottom wheel shaft is very

heavy and runs in long self-lubricating babbitt bearings or optional ball bearings, and is provided with a third bearing outside the tight and loose pulleys.

The table is of iron very heavily ribbed, and is 41 ins. x 43 ins. It is adjustable on main frame by hand-wheel as shown on cut. Adjustable iron plates are fitted into the table to close the opening when the saw is adjusted for different angles. The upper guide is fitted with hardened and ground steel roller back of the saw and with hard maple side guides. The guide bar is of steel 1½ ins. square and carefully counterbalanced. The lower guide with its attachment is automatically adjusted to the correct position to the saw blade at all times and at any angle.

When using the power feed rolls this machine has a capacity up to 4 in. in thickness and 10 in. between the saw blade and the feed works stand. The capacity of the ripping gauge is from ¼ in. to 15 in. in width. A large saving is accomplished when using this machine for preparing cants used in the manufacture of columns, piping or any other class of work that requires building up, as there is practically no waste except the saw kirk. The net weight of this machine is 4,500 lbs. and floor space occupied is 4 ft. 3 in. x 7 ft. 10 in. It is supplied complete with belt shifter, brush for lower wheel, brazing clamp tongs and wrenches and one 2½ in. blade.



BEVEL SHIP BAND SAW ARRANGED FOR ANGULAR CUTTING.

ALL-METAL SWING AND FLEXIBLE PIPE JOINT

SWING and semi-pipe joints, which dispense with the use of packing and are suitable for steam, water, gas and oil, are made by the Rostern Co., People's Gas Building, Chicago. The joints, for which

patents are pending, are made entirely of metal, the special feature being a ball-shaped shoulder revolving on a ring of anti-friction metal. Both types of joints are illustrated, one being designed for straight runs, while the other is intended for connections that are not tapped true.



ALL-METAL SWING AND FLEXIBLE PIPE JOINT.

The standard form of joint consists of a hollow cylinder having a ball-shaped shoulder (a) revolving on an anti-friction metal bearing ring (b). A cast metal spring (c), together with the pressure of the steam or other liquid passing through the joint, is relied upon to hold these two surfaces in close contact, the cylinder being kept in alignment by revolving in a socket (d). All of the parts of the joint are enclosed by the cap and the body. In the case of the oscillating joint, which can be adjusted for various differences of alignment up to 6 degs., the hollow cylinder that carries the ball-shaped shoulder is shortened. If a greater oscillation than 6 degs. is required, a special type of joint is supplied.

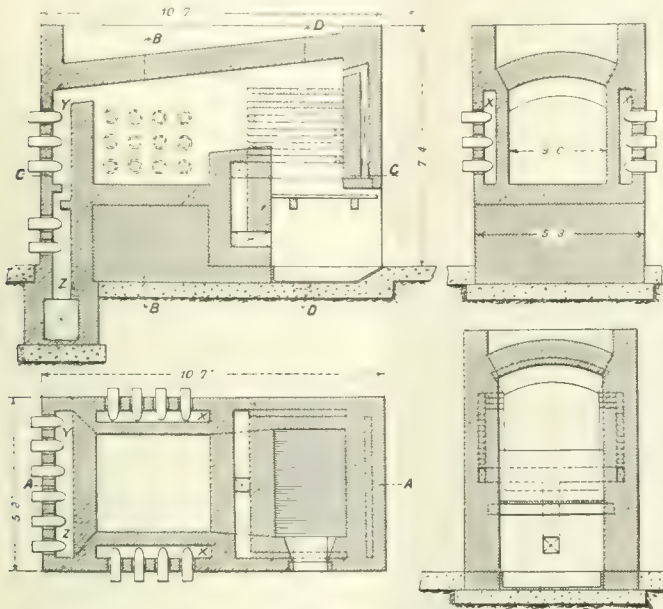
The joints have been found adaptable for connections between the platens of steam vulcanizing and wood bending presses, on laundry, paper and pulp machinery, for flexible pipe lines in mines and quarries, for steam blowers in locomotive roundhouses, for water doors or open-hearth furnaces, etc. In connecting two steam platens it is suggested by the manufacturers that the semi-flexible joints be used on press platens to overcome irregularities in closing, and to care for holes that are tapped out of line. A series of the joints in connection with ordinary pipes and elbows will give a maximum of flexibility.

The Rostern Co. reports tests in which the joints were used with steam at 350 degs. Fah. alternating with water at 64 degs. Fah., the changes being made rapidly and with no unfavorable results. The joints are of bronze in sizes ranging from ¾ to 2 in., with larger sizes in steel, iron and special metals, and also with elbow ends.

Reading makes a full man; writing an exact man; conference a ready man.

COAL FIRED SHELL NOSE FURNACE

THE accompanying illustrations show an improved coal-fired furnace, specially designed for reheating shell noses, in use in several munition factories in England, and built from the designs of S. Ogden, 372 Fairmount-terrace, Thornley-lane, Reddish, Stackport. The special



COAL FIRED SHELL NOSE FURNACE.

feature of the furnace is to obviate any possibility of the flame coming in contact with the metal, as this tends to overheat and crack it. To attain this end, the side walls of the furnace are doubled, with a space between, and the shells at the outside are placed horizontally in apertures in the outer wall, their noses protruding into the intervening space between the two walls marked X on the plan and one of the cross-sections. The inner wall prevents the flames from coming in contact with the noses of the shells, while at the same time the heat penetrating through the inner wall suf-

fices to take the chill off the shell, and anneals the nose without overheating it. When thus gradually heated up, the shells are transferred and placed horizontally in apertures, the nose penetrating into a space between the two back walls, which are marked Y and Z in the longitudinal plan of the furnace, where they come in direct contact with the flames in their passage from the furnace to the uptake or chimney. The temperature here reaches 2,000 degs. Fah. The dimensions of the furnace are given, and practically self-explanatory. It may be added that one such furnace is sufficient to keep two or three presses going constantly. The furnaces, of course, are built to take any size of shell.

B.C. MINERAL PRODUCTION INCREASED 44 P.C.

THE total value of the mineral production of the Province of British Columbia for all years to the end of 1916 was roughly \$558,500,000, says Premier Brewster. The value of the output for 1916 was nearly \$42,300,000, an increase of forty-four per cent. over that of the preceding year. The output from metaliferous mining in 1915 was valued at nearly \$21,000,000, while in 1916 it was more than \$32,000,000, an increase over the first-mentioned year of about \$11,000,000, or fifty-four per cent., while, as compared with the previous record, which was for the year 1912, the increase was seventy-six per cent.

While some of this enormous increase in value is undoubtedly due to the higher market value of most of the metals, yet in each of the metals, except gold there has been a largely increased quantity produced. Of the more important economic metals, lead, the output of which in 1915 was 46,500,000 pounds, was in 1916 nearly 49,000,000 pounds, an increase of 2,500,000 pounds of metal produced. Similarly, the output of copper increased from 57,000,000 pounds to nearly 65,500,000 pounds, an increase of about 8,500,000 pounds, and the quantity of zinc produced increased from about 13,000,000 pounds in 1915 to 37,000,000 pounds in 1916, an increase of 24,000,000 pounds, or nearly 200 per cent.

These facts, represented by figures, indicate that the industries as a whole have been enjoying a profitable and suc-

cessful year, while there is every reason to expect that such will continue during 1917, the first three months of which year have already expired and have given such definite indications that it is safe to predict that the mineral output for 1917 will be greater by \$50,000,000.

The tonnage of ore mined in the Province in 1915 was about 2,700,000 tons, while in 1916 it was about 3,200,000 tons. There was no-doubt but that this great increase in output was stimulated by the high prices of metals due to war conditions, but it is now practically assured that these high prices will continue for the full year 1917. Coal mining is largely dependent upon other mining for a market and the increase in metal mining has had its influence on the coal and coke output, which in 1916 was nearly \$2,000,000 higher than the preceding year, while it seems probable that a similar increase will be made in 1917, bringing the gross value of the products of the collieries up to more than \$11,000,000.

RADIUS GAUGE

A CONVENIENT form of radius gauge has been gotten out by the Moss-Ochs Co., Cleveland, O., which enables the correctness of concave and convex radii to be accurately determined in increments of 1/8 in., from 1/8 in. to 1 in. It consists of eight plates of suitably tempered steel, one end being concave and the other convex. They are hinged as illustrated, so that when closed the larger and stouter sizes protect the more delicate plates from injury. It can be instantly made to any size, and enables the accuracy of surfaces under inspection to be rapidly and reliably determined.

Passing through a military hospital, a distinguished visitor noticed a private in one of the Irish regiments who had been terribly injured.

To the orderly the visitor said: "That's a bad case. What are you going to do with him?"

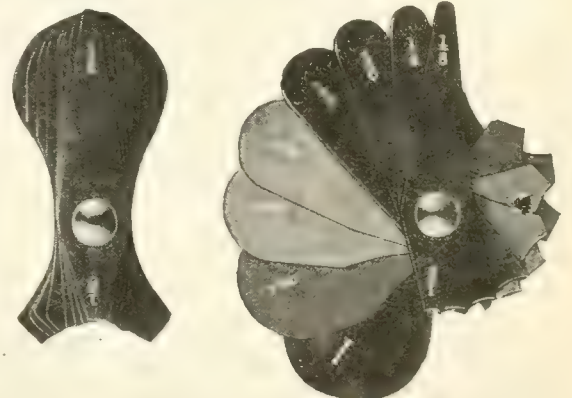
"He's going back, sir," replied the orderly.

"Going back!" said the visitor, in surprised tones.

"Yes," said the orderly. "He thinks he knows who done it."



METHOD OF USING RADIUS GAUGE.



INTERNAL AND EXTERNAL RADIUS GAUGES.

The MacLean Publishing Company

LIMITED

(ESTABLISHED 1888)

JOHN BAYNE MACLEAN - - - - - President
 H. T. HUNTER - - - - - Vice-President
 H. V. TYRRELL - - - - - General Manager
 PUBLISHERS OF

CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper devoted to the machinery and manufacturing interests.

PETER BAIN, M.E., Editor. B. G. NEWTON, Manager.
 Associate Editors
 A. G. WEBSTER J. M. WILSON J. H. RODGERS

Office of Publication, 143-153 University Avenue, Toronto, Ont.

Vol. XVIII.

JULY 12, 1917

No. 2

DEVELOP OUR WHITE COAL

CANADA is facing a very serious problem as regards her fuel supply. In Ontario and other Eastern sections of the Dominion, we are almost entirely dependent upon the United States. Should anything fail in that source, our industrial and domestic life would be seriously menaced.

For the time being the question is largely one of transportation. However, with a shortage in the States and with rising costs of production, there is more than a possibility that our supply may in the future be permanently restricted. Activity should be directed along two lines of inquiry—to investigate the possibilities of our own coal resources; to consider an alternative means for the creation of heat and energy. In the latter connection, hydro-electric power at once comes to mind. Canada has almost unlimited hydro resources. It is largely a case of encouraging the development of potentialities into actualities. How can this best be done? No one can say that there can be too much development for the good of the community.



"SHOP SECRET" MYTH

WHAT are the advantages of the extreme secrecy practised by certain firms relative to methods employed and equipment installed for doing things? While there may be some shops that are virtually in possession of unique methods that prove an essential factor in "putting it over the other fellow," the vast majority of so-called "shop secrets" are very often the greatest stumbling blocks in the path of a firm's progress; not that the particular method or idea is inefficient, but that sometimes the firms are blind to the fact that their competitors may already know of the features that they are so anxious to conceal. Many men are apparently impressed with the thought that they monopolize the source of all good ideas, and that the development of such ideas, together with their practical application, could not have matured in any other mind. How often have you noticed a man's line of thought running along a channel from which it is almost impossible to divert him? If this determination is based

on sound principles, the fault, if you may so call it, is a very good one, but if he has become so obsessed as to be impregnable to others' suggestions, then he may be standing in his own light.

We call to mind an instance some few years ago, where a certain attachment was developed from designs suggested by the superintendent of the plant for the making of certain sheet metal products. Considerable experimenting was subsequently required before the machine could be successfully operated. For some time after it was put in service, it created much interest among the various workmen in the shop, several of whom in course of time were privileged to operate it, each employee becoming more or less familiar with its construction and operation. A curious fact, however, in connection with this particular machine, was that when outside visitors—presumably competitors—were being shown around the shop, instructions were issued beforehand and forwarded to the foreman, so that when the visitors were present, the machine was "idle" and the "shop secret" isolated from view by means of a suitable covering.

One day, some two years after the discovery of the new-born idea, the shrouding process was inadvertently neglected, with the result that a visitor became unconsciously a spy, so to speak. With the "secret" detected, the visitor was asked to comment upon its action, and rather surprised the superintendent by replying, that a similar device had been working in a certain shop in another district for some years, but that several improvements of more recent origin had greatly increased the earlier efficiency. Following several improvements suggested, the inevitable result was better and larger production.

Apart from coincident possibilities, such as above related, the floating character of the human element must make it apparent to all that interchange of ideas and methods must eventually follow the adoption of new and interesting discoveries. Pride in our own achievements should be one of the essential arguments in favor of publicity of ideas. Few, if any of us, are so original that we are entirely self-reliant. If the truth were really known, the birth of many, I was going to say all, of the much vaunted "shop secrets" could be traced to a previous idea or suggestion, verbally expressed or drawn from the text-book of another mind.

Surely then, if we are willing to accept another's suggestion, from which we might build, we should endeavor to reciprocate in so far as we are able. Fear of having our ideas copied should not deter us from bringing them to the notice of another. It is seldom that a device of special design would be copied in its entirety; and even if it were, much of its usefulness would be lost owing to the lack of that experience that can only be acquired by the actual evolution of the idea. Interchange of thoughts and ideas are often the means of converting the ordinary into the exceptional achievement. The mythical nature of the "shop secret" is daily becoming more fully appreciated. Reciprocity is recognized as one of the factors of success. Instead of the isolating spirit of shop secrecy we should cultivate the spirit of Kipling's words:

"They copied all they could follow,
 But they couldn't copy my mind,
 And I left them swearing and stealing,
 A year and a half behind."²²

INDUSTRIAL NOTABILITIES

MARK WORKMAN, president, Dominion Steel Corporation Ltd., Montreal, Que., controlling Dominion Iron & Steel Co.; Dominion Coal Co., etc.; president, Mark Workman Co., Montreal, Que., manufacturers of military clothing, also interested in Jacobs Asbestos Co., Thetford Mines, Que., and the B. Gardner Co., clothing manufacturers, Montreal, Que., was born in Buffalo, N.Y., August 4, 1864, son of Isaac and Sarah (Rosenthal) Workman. He was educated in Public Schools, and came to Montreal with his father in 1876 and associated with him in the clothing business; becoming the real head



MARK WORKMAN

of the business in 1880. The company was incorporated in 1906, and under his able management the business has steadily grown to its present magnitude. For the past eighteen years he has been a contractor for the Dominion and British Government for military clothing.

Mr. Workman is one of the largest shareholders in the Dominion Steel Corporation, having been an active member of the Board of Directors since 1911. He was elected President in January, 1916. He is a very liberal giver to charitable institutions, his yearly benefactions being estimated at \$50,000 to \$60,000. Has given most generously to the Patriotic Fund and to the various regimental funds. He subscribed \$200,000 to the Canadian War Loan.

Mr. Workman married Miss Rachel Lewis, Syracuse, N.Y., February 18, 1886, the family consisting of four daughters and one son.

His residence is 585 Sherbrooke St. W., Montreal.

--Photo, Courtesy British and 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.

FIG IRON.

Grey forge, Pittsburgh.....	\$47 50
Lake Superior, charcoal, Chicago.....	57 00
Standard low phos., Philadelphia.....	\$2 00
Bessemer, Pittsburgh.....	55 95
Basic, Valley furnace.....	50 00
Montreal.....	1 00
Hamilton.....	
Victoria.....	

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
Band steel, No. 10 gauge.....	5 75
Chequered floor plate, 3-16 in.....	12 10
Chequered floor plate, 1/4 in.....	12 00
Staybolt iron.....	8 50
Bessemer rails, heavy, at mill.....	48 00
Steel bars, Pittsburgh.....	4 50
Tank plates, Pittsburgh.....	9 00
Structural shapes, Pittsburgh.....	4 50
Steel hoops, Pittsburgh.....	5 25

F.O.B. Toronto Warehouse	
Steel bars.....	5 50
Small shapes.....	5 75
F.O.B. Chicago Warehouse	
Steel bars.....	5 00
Structural shapes.....	5 00
Plates.....	8 50

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
Hullfax.....	35 1 4 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.....	\$37 00 \$36 00
Electro copper.....	37 00 36 00
Castings, copper.....	36 00 35 00
Tin.....	63 00 66 00
Spelter.....	12 00 12 00
Lead.....	18 75 14 25
Antimony.....	24 00 26 00
Aluminum.....	70 00 68 00

Prices per 100 lbs.

PLATES.

Montreal Toronto	
Plates, 1/2 to 1.....	\$12 00 \$11 00
Heads.....	12 30 11 30
Tank plates, 3-16 in.....	12 65 11 10

WROUGHT PIPE.

Effective July 5, 1917.

Black Galvanized	
Standard Butt-weld.	
Size.	Per 100 feet
1 in.....	\$ 5 00 \$ 6 50
1 1/2 in.....	5 12 7 16
2 in.....	6 16 8 04
3 in.....	8 17 10 29
4 in.....	12 07 15 22
5 in.....	16 33 20 50
6 in.....	19 53 24 61
8 in.....	26 25 33 22
10 in.....	42 12 52 94
12 in.....	57 08 69 28
14 in.....	69 42 86 94
16 in.....	82 84 103 00
Standard Lap-weld.	
2 in.....	29 23 5 71
2 1/2 in.....	43 88 54 11
3 in.....	57 38 70 76

3 1/2 in.....	71 76	89 70
4 in.....	85 02	106 28
4 1/2 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 09
10 L in.....	256 00	320 00
10 in.....	329 60	412 00

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES.

1" and under, 45%.....	
4 1/2" and larger, 40%.....	
4" and under, running thread, 25%.....	
Standard couplings, 4" and under, 35%.....	
4 1/2" and larger, 15%.....	

OLD MATERIAL.

Dealers' Buying Prices.	
	Montreal Toronto
Copper, light.....	\$21 00 \$22 00
Copper, crucible.....	25 00 27 00
Copper, heavy.....	25 00 26 50
Copper wire.....	25 00 26 50
No. 1 machine com-position.....	21 50 22 00
New brass turnings.....	17 00 19 00
No. 1 brass turnings.....	15 00 16 00
Heavy melting steel.....	20 00 17 00
Steel turnings.....	9 00 8 00
Shell turnings.....	12 00 12 00
Boiler plate.....	15 00 10 50
Axles, wrought iron.....	25 00 24 00
Rails.....	19 00 18 00
No. 1 machine cast iron.....	26 00 25 00
Malleable scrap.....	20 00 20 00
Pipe, wrought.....	17 00 9 00
Scrap zinc.....	8 00 9 50
Heavy lead.....	11 50 10 75
Tea lead.....	7 50 7 00
Aluminum.....	35 00 35 00

BOLTS, NUTS AND SCREWS.

Per Cent.	
Coach and lag screws.....	25
Stove bolts.....	55
Plate washers.....	List plus 10
Machine bolts, 7-16 and over.....	net
Machine bolts, 3/8 and less.....	10
Blank bolts.....	net
Bolt ends.....	net
Elevator bolts.....	50 and 5
Machine screws, fl. and rd. hd., steel.....	27 1/2
Machine screws, o. and fl. hd., steel.....	10
Machine screws, fl. and rd. hd., brass.....	add 20
Machine screws, o. and fl. hd., brass.....	add 25
Nuts, square blank.....	add \$1 50
Nuts, square, tapped.....	add 1 75
Nuts, hex. blank.....	add 1 75
Nuts, hex. tapped.....	add 2 00
Copper rivets and burrs, list plus.....	30
Burrs only list plus.....	50
Iron rivets and burrs.....	17 1/2
Boiler rivets, base 3/8 in. and larger.....	\$7 10
Structural rivets, as above.....	7 00
Wood screws, flat, bright.....	72 1/2
Wood screws, O. & R., bright.....	67 1/2
Wood screws, flat, brass.....	37 1/2
Wood screws, O. & R., brass.....	32 1/2
Wood screws, flat, bronze.....	27 1/2
Wood screws, O. & R., bronze.....	25

MILLED PRODUCTS.

Per cent	
Set screws.....	35
Set & Hex. Head Cap Screws.....	30
Rd. & Fil Head Cap Screws.....	10
Flat 3/8 But. Hd. Cap Screws plus.....	10
Fin. & Semi-fin. nuts up to 1 in.....	25
Fin. and semi-fin. nuts, over 1 in. up to 1 1/2 in.....	30
Fin. and semi-fin. nuts, over 1 1/2 in. up to 2 in.....	10
Studs.....	20
Taper pins.....	40
Coupling bolts, plus.....	10
Planer head bolts, without fillet, list plus.....	10
Planer head bolts, with fillet, list plus 10 and.....	10
Planer head bolt nuts, same as finished nuts.....	net
Planer bolt washers.....	net
Hollow set screws.....	list plus 20
Collar screws.....	list plus 30
Thumb screws.....	20
Thumb nuts.....	65
Patch bolts.....	add 40
Cold pressed nuts to 1 1/2 in.....	add \$4 50
Cold pressed nuts over 1 1/2 in.....	add \$7 00

BILLETS.

Per gross ton	
Bessemer billets.....	\$100 00
Open-hearth billets.....	100 00
O.H. sheet bars.....	105 00
Forging billets.....	125 00
Wire rods.....	95 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, 3/4 in. and larger.....	6 50
Spikes, 1/2 and 5-16 in.....	7 00

MISCELLANEOUS.

Solder, strictly.....	0 38
Solder, guaranteed.....	0 41
Babbitt metals.....	16 to 65
Soldering coppers, lb.....	0 53
Benzine, per gal, bulk.....	0 30 1/2
Pure turpentine, single bbls., gal.....	0 62 1/2
Linseed oil, raw, single bbls.....	1 27
Linseed oil, boiled, single bbls.....	1 30
Plaster of Paris, per bbl.....	2 50
Plumbers' oakum, per cwt.....	9 00
Packing, square braided.....	0 34
Packing, No. 1 Italian.....	0 40
Packing, No. 2 Italian.....	0 32
Lead wool, per lb.....	0 15
Pure Manila rope.....	0 37
Transmission rope, Manila.....	0 43
Drilling cables, Manila.....	0 39

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 1 1/2 in.....	40
Standard drills, over 1 1/2 in.....	15
3-fluted drills, plus.....	10
Jobbers' and letter sizes.....	40
Bit stock.....	40
Ratech drills.....	15
S.S. drills for wood.....	40
Wood boring brace drills.....	25
Electricians' bits.....	30
Sockets.....	40

Sleeves.....	40
Taper pin reamers.....	20
Drills and countersinks.....	list plus 30
Bridge reamers.....	45
Centre reamers.....	10
Chucking reamers.....	10
Hand reamers.....	15

COLD ROLLED SHAFTING.

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

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

IRON PIPE FITTINGS.

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

SHEETS.

Montreal Toronto	
Sheets, Black, No. 28.....	\$10 00 \$10 00
Sheets, Black, No. 10.....	11 50 10 50
Canada plates, dull, 52 sheets.....	11 00 11 00
Canada plates, all bright.....	12 50 12 50
Apollo brand, 10 1/2 oz. galvanized.....	12 25 9 75
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, 10 1/2 oz.....	13 85 12 00

PROOF COIL CHAIN.

B	
1/4 in.....	\$12 00
5-16 in.....	11 50
3/8 in.....	11 15
7-16 in.....	10 90
1/2 in.....	10 70
9-16 in.....	10 70
5/8 in.....	10 50
3/4 in.....	10 40
@ in.....	10 25
1 inch.....	10 10
Extra for B.B. Chain.....	1 20
Extra for B.B.B. Chain.....	1 80

ELECTRIC WELD COIL CHAIN B.B.

1/4 in.....	\$15 50
3-16 in.....	11 70
1/2 in.....	8 40
5-16 in.....	7 40
3/8 in.....	6 35
7-16 in.....	6 35
1/2 in.....	6 35
5/8 in.....	6 35
3/4 in.....	6 35

Prices per 100 lbs.

FILES AND RASPS.

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

COAL AND COKE.

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

Net ton f.o.b. Toronto

BOILER TUBES.

Size.	Seamless	Lap-welded
1 in.	\$83 00	
1 1/4 in.	36 00	
1 1/2 in.	38 00	32 00
1 3/4 in.	38 00	32 00
2 in.	45 00	33 00
2 1/4 in.	48 00	35 00
2 1/2 in.	50 00	38 00
3 in.	58 00	45 00
3 1/4 in.		53 00
3 1/2 in.	70 00	55 00
4 in.	82 00	67 00

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS.

Castor oil, per lb.	38
Royalite, per gal., bulk.	16
Palacine	19
Machine oil, per gal.	26 1/2
Black oil, per gal.	13
Cylinder oil, Capital	45 1/2
Cylinder oil, Acme	36 1/2
Standard cutting compound, per lb.	6 15
Lard oil, per gal.	1 50
Union thread cutting oil antiseptic	68
Acme cutting oil, antiseptic	37 1/2
Imperial quenching oil	39 1/2
Petroleum fuel oil	11

BELTING—NO. 1 OAK TANNED.

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

TAPES.

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

WASTE.

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

COLORED.

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

WOOL PACKING.

Arrow	25
Axle	20
Anvil	15
Anchor	11

WASHED WIPERS.

Select White	12
Mixed colored	10
Dark colored	09

This list subject to trade discount for quantity.

RUBBER BELTING.

Standard	40%
Best grades	20%

ANODES.

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

Prices Per Lb.

COPPER SHEETS.

	Montreal	Toronto
Bars, 1/2 to 2 in.	55 00	53 00
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, Cxi base	55 00	52 00

BRASS.

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

PLATING SUPPLIES.

Polishing wheels, felt.	3 00
Polishing wheels, bull-neck	1 75
Emery in kegs, American	06
Pumice, ground	05
Emery glue	15 to 20
Tripoli composition	04 to 06
Crocus composition	07 to 08
Emery composition	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, 3 1/2 lbs. sq. ft.	18 00	18 00
Sheets, 4 to 6 lbs. sq. ft.	17 50	17 50
Cut sheets, 1/2c per lb. extra.		
Cut sheets to size, 1c per lb. extra.		

PLATING CHEMICALS.

Acid, boracic	\$.15
Acid, hydrochloric	.05
Acid, hydrofluoric	.14 1/2
Acid, nitric	.10
Acid, sulphuric	.05
Ammonia, aqua	.08
Ammonium carbonate	.15
Ammonium chloride	.11
Ammonium hydrosulphuret	.40
Ammonium sulphate	.07
Arsenic, white	.12
Copper, carbonate, anhy.	.35
Copper, sulphate	.17
Cobalt sulphate	.70
Iron perchloride	.20
Lead acetate	.16
Nickel ammonium sulphate	.12
Nickel carbonate	.35
Nickel sulphate	.15
Potassium carbonate	.75
Potassium sulphide (substitute)	.20
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.55
Sodium bisulphite	.10
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.41
Sodium hydrate	.04
Sodium hyposulphite, per 100 lbs.	5.00
Sodium phosphate	.14
Tin chloride	.60
Zinc chloride	.60
Zinc sulphate	.09

Prices Per Lb. Unless Otherwise Stated.

The General Market Condition and Tendency

THE situation in the iron and steel trade is becoming more acute and the market is in a very unsettled condition, due largely to the uncertainty as to the American Government requirements, and the prices which have yet to be fixed. Until this question is disposed of, consumers are holding off, not knowing what may develop. In spite of everything, however, prices of steel products continue to advance steadily, and the outcome is looked upon with mixed feelings. - That prices are already too high is the opinion of many in the trade, but there seems to be no means of restricting the upward movement. Wrought pipe has again advanced and higher prices on other products are looked for in the near future. There has been as yet no material improvement in the coal situation, although efforts are being made to increase supplies for the coming winter. There is still a scarcity of coke, and the quality is said to be not up to former standards. The coke situation is causing some uneasiness while, in addition, prices are advancing. There is no change in the domestic pig-iron situation and no prices are obtainable. In the States, pig-iron prices are still advancing which will affect local consumers. Prices of scrap are unchanged from last week and the market continues dull and featureless. Prices of steel and cast iron scrap are firm, but copper and brass are weak. There is a general scarcity of most old materials which is tending to support the market. The non-ferrous metal markets are dull with a weak undertone. Copper has declined, otherwise prices are unchanged. Uncertainty as to the American Government requirements and prices is depressing the market, and consumers are holding off pending developments. Prices of machine tools continue to advance and deliveries are getting more backward. There is a good demand for machine shop supplies at firm prices. Files have advanced, while higher prices on twist drills, lathe chucks and vises are looked for in the near future.

activity. The return of warm weather has resulted in the curtailment of production, and the shortage of coke has made the situation more acute. Shipbuilding and the demand for plates continue to occupy the centre of interest, and the impossibility of meeting the increasing requirements in this direction has resulted in a very strong market, one that is likely to remain for a long period after the war.

Pig Iron

The pig iron market, after a short period of comparative lull, has developed additional strength, and American prices have again advanced. The situation has been somewhat affected by the advent of warm weather, resulting in the falling off of production; this, however, has been counteracted by a slight increase in blast furnace units, which in turn have created an additional demand for raw material, and a pronounced shortage of coke has resulted, being reflected in this week's quotation of \$15.75 for Connelville furnace coke, an advance over last week of \$2.25 per ton. With the exception of the Pittsburgh district, all American pig has been subjected to an advance approximating \$2 per ton; the quotation of composite pig iron is now \$52.96 per ton. The rapid advance of pig may be gathered from the fact that the price a year ago was less than \$20 per ton. No quotations are made on domestic pig, these being practically off the market.

Steel

Domestic consumers are feeling more and more the existing tension, as the present war requirements and the possible increase in this direction make it very difficult to get delivery on material

Montreal, Que., July 9, 1917.—The market has again been featured by a general advance in pig iron, and as this

is the basis of the entire steel industry, it exemplifies the conditions which characterize the situation in all branches of

for general commercial purposes. Demands on Canadian mills are such that the output is insufficient to meet Government needs, while the situation in the States has also become so acute that activity in private enterprise has of necessity fallen off. In addition to the pronounced shortage of steel for domestic use, the abnormal high cost is having a great influencing effect upon general construction, and much needed expansion has been unavoidably deferred. Considerable interest is centred in the possible developments that may place one of Canada's largest iron industries under the control of British or American interests. Shells steel requirements continue heavy, and it is impossible to meet the demands of the shipbuilders for plates. The market in billets and sheet bars remains steady, with prices firm and unchanged. The Pittsburgh quotation on iron bars has been advanced \$5 per ton, the base price being now 5c per lb. The continued placing of American Government orders for sheets, together with the filled up condition of the mills, has again resulted in an advance of approximately \$10 per ton on blue annealed sheets, the Pittsburgh quotation being on a base of 8½c per lb. Galvanized sheets at the same source are quoted at 11c, this being \$20 per ton higher than a week ago. Local dealers have readjusted their sheet prices, the advance being approximately 10 per cent. over those previously quoted. Following the gradual increase in the American plate market, the situation here has become stronger and local prices have been revised; ¼ in. to ½ in. plates are now listed at 12c, heads at 12.30c, and 3/16 in. tank plates at 12.65c per lb. It is reported that sales have been made on certain ship plates as high as 15c per lb. No cessation in the demand for pipe has developed, and prices have become higher on a 7-point advance, the quotation being now 42 per cent. off for steel pipe and 33 per cent. off for wrought iron pipe. Local prices on proof coil chain have again been revised, the advance ranging from \$1.25 on ¼ in. to 85c on 1 in. per 100 pounds; complete price list will be found in the selected market quotations. General conditions here are much the same, the market continuing very active on the advancing prices.

High Speed Steel

The market in high speed steel is well maintained, although a slight falling off has been noted owing to the reduction of large shell output. The uncertainty that prevails as to the permanency of this branch of munitions work causes the situation to retain strength, which, together with the abnormal high cost of all classes of material and labor, maintains prices at a very high level.

Metals

Comparative inactivity has characterized the metal situation of the past week, and prices have consequently declined. American conditions are still unsettled, although action has been taken regarding certain features of trade regulations. The situation is however, very uncertain, and will continue so until the policy of the

Government is definitely known. Copper is slightly weaker, but uncertain. Tin is uncertain, but retains its strength. Spelter is very dull, with little demand. Lead demand is falling off and quotations are declining. Antimony is lower on weak demand. Aluminum is firm, but with a weak undertone.

Copper.—The American market has apparently quieted down after the understanding that the Government would pay a flat price of 25c per lb. The fact that no confirmation is available regarding this has had the tendency to retain much of the uncertainty that was so marked some weeks ago. Leading producers are supplied with large quantities of copper, but are not in the market, and small holders are apparently setting the current prices, recent sales having resulted in a weaker tendency. The New York electrolytic price has declined 1c on the week, the present price being 31½c per lb. On a decline of ¾c castings are quoted at 29¼c per lb. Local dealers report a steady market, but prices asked are ½c lower than last week, the quotations being 37c for lake and electro, and 36c for castings.

Tin.—Despite the disturbing influences of political developments the market in

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.

tin continues very firm. Reports from England are very irregular, and local and American markets are a little unsettled in consequence. New York prices show a firm market, with quotations ¼c higher than last week. Local conditions are unchanged, with dealers asking 63c per lb.

Spelter.—The poor demand and the accumulation of supply has resulted in a very dull and inactive market, and the lack of interest on the part of consumers seems to offer little encouragement for an early revival of former interest. As production is carried on at the present time on practically a cost basis, it is unlikely that prices will decline much lower, and, therefore, New York continues to quote about 9¼c per lb. The conditions here are unchanged, with prices showing a weaker tendency; dealers are asking 12c per lb.

Lead.—A quiet market has created a weaker tone in the general situation, with the independent producers lowering quotations to meet it. Outside prices are nearly on a par with those of the trust, and it is anticipated that the latter will shortly reduce their quotation to conform with the trend of the market. The out-

side price is now 11¼c, with the leading interests asking 11c. On a weaker demand local dealers have declined their quotations to 13¼c, this being ½c lower than last week.

Antimony.—The market has become somewhat irregular, following the placing of orders for the American Government, this having been done quietly; the effect being to upset some of the plans of those dealers not involved in the deal. Supplies being placed on the market have had the effect of a decline of 1¼c on the New York quotation, the nominal price asked being 17c per lb. Local dealers report a weaker market, with prices 1c lower at 24c per lb.

Machine Tools and Supplies

The decline in the production of the heavy shells has materially affected this particular field of machine tool business, but considerable business is still being done in small machinery for light shells and fuses. Interest, however, is being transferred to general tool equipment to handle the increasing business that is characterizing the developments of the shipbuilding industry. Many small plants are actively engaged in the manufacture or repair of various ship machinery and accessories, and inquiries along these lines are very encouraging. The securing of raw materials is still a feature of the situation, the combination of all circumstances making the cost of equipment second only to the getting of it. The demand for supplies is well maintained, with prices firm or advancing.

Scrap

Irregularity is noted in the general market, more particularly in the States, where the situation continues uncertain. Buying is light, both dealers and consumers being reluctant to accumulate heavy supplies under existing conditions. Local conditions are not so erratic, but, apart from the iron and steel scraps, the market has taken on a weak tone. Coppers and brass scraps and also machine compositions have declined locally 1c per pound, 21c being asked for the light copper and 25c for the heavier grades; 17c and 15c for brass clippings and turnings respectively, and 21c for machine compositions. Wrought iron axles have advanced 2c to 25, and machine cast iron 1c to 26c per lb.

Toronto, Ont., July 10.—All indications point to an improvement in the coal situation within the next few months. The fuel controller C. A. Magrath has requested all manufacturers and other large users of coal to state their requirements so that an equitable distribution may be made. The co-operation of the railways in furnishing cars is anticipated. Only by drastic methods can the present serious situation be relieved.

Steel

While prices of iron and steel products continue very firm, the market has become unsettled owing to the uncertainty which prevails in regard to future developments. The rapid advance in prices has reached a somewhat dangerous point and many private consumers

are hesitating, not knowing what may happen in the more or less immediate future. It is generally conceded that the prevailing high prices have been caused to a considerable extent by consumers practically bidding against each other in an effort to obtain material. These interests needed steel and there was apparently no alternative but to pay current prices. The situation has become more complicated since the United States entered the war. It is known that the American Government requires large tonnages of steel in addition to what has already been purchased. The present unsettled situation is due to this fact and also because no contract prices have yet been fixed, except some tentative figures given out some weeks ago. Consumers therefore are waiting to see what prices will be fixed on government requirements and in the meantime are restricting their purchases as far as is conveniently possible. At the same time the high cost of iron and steel is also a deterrent to business and the shortage is having a similar affect. Notwithstanding the prevailing high prices it seems likely that the top has not yet been reached as indications point to an increase in demand at a time when the mills are sold up months ahead. However, when government prices have been fixed, the situation will be clearer; until then it is largely a matter of speculation as to what will happen.

At the moment prices are still climbing and although there are comparatively few changes to announce this week, quite a number of advances are in prospect. There has been another advance in wrought pipe due to the scarcity and high cost of skelp. The new prices represent an advance of two points in all sizes, black and galvanized. On account of the uncertain situation, orders for 2½ in. pipe and larger will only be accepted on a basis of price ruling on day of shipment. Steel washers are also higher, the new discount being list plus 10 per cent. as against net list formerly. Cut nails have advanced, and are now \$5.75 per keg base. The new discount on wire tacks is 60 and 10 per cent. There is no improvement in the steel plate situation. The plate demand particularly for shipbuilding is enormously heavy and will continue to be so for many months. The scarcity of plates, and fear that the supply will be severely restricted by government purchases, have created much uneasiness among consumers. Quotations continue entirely nominal and no formal prices exist for delivery at mill convenience. Prices of iron and steel bars, and shapes are very firm.

The situation in black sheets is getting tighter in the primary market as government requirements are getting heavier. Little business for forward deliveries is being taken by the mills in view of the increasing demand both from the government and from contractors doing government work. Sales of sheets to regular customers are being steadily restricted, and a number of leading mills

are out of the market as sellers. Current prices on black, blue annealed, and galvanized sheets, are firm but unchanged in the meantime.

The steel market in the United States is quieter but prices continue very firm with an upward tendency. The market is however in a very unsettled condition owing to the uncertainty of the government attitude with regard to prices. The possibility of government intervention in the steel market is having an unsettling influence. Private consumers are being held up because of government work.

Pig Iron

The pig iron market in the States continues very firm and prices are still advancing. The general situation is practically unchanged but there is considerable uneasiness in some quarters about the possibility of Government regulation of pig iron prices. The local sit-

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.

uation is unchanged as domestic pig irons are still off the market.

Scrap

There is no appreciable change in the local scrap situation. The market is featureless and prices are unchanged on the basis of last week's quotations. Scrap steels and machinery cast iron are holding firm but there is a decided weakness in coppers and brass. Stocks of scrap are very light which is having a tendency to keep prices from falling.

Machine Tools

Interest at the present time lies principally in the situation across the line, the chief feature being further advances in prices of machine tools. A few manufacturers of turret lathes have announced a 10 per cent. increase. A manufacturer of radial drills has raised his prices 15 per cent. so that higher prices on these tools are likely to become general. Sensitive drill presses have advanced 10 per cent. and grinders 5 per cent. Owing to the increasing demand in the States, deliveries are being extended still further.

Second hand equipment is getting very scarce. The A. R. Williams Machinery Co., have issued a list of their requirements for engineering tools but it is believed that considerable difficulty will be experienced in purchasing the equipment needed.

Supplies

The market for machine shop supplies continues active and there is a general tendency towards higher prices. One manufacturer of lathe chucks recently advanced prices, and other makers will likely follow suit. Higher prices on twist drills and vises are also looked for in the near future. All makers of files have advanced approximately 10 per cent. Higher prices have been recorded on Lufkin rules and tapes.

Metals

Continued dullness characterizes the metal markets this week and prices have a weaker tendency, although copper is the only metal which has declined. The other metals are unchanged at last week's levels. No further developments have materialized in regard to the American Government's purchases of metals and as a result the markets are more or less stagnant pending some definite news as to Government requirements.

Copper.—The market in New York is weak in spite of rumors of impending purchases of copper by the Allies. The recent purchase by the American Government has not affected the market as yet, as no official statement has been made as regards the price. The strike at several copper mines in the U.S. has assumed a serious aspect and production has been in the meantime cut down about one half. Although prices of copper are lower, the shortage of metal in the next few months, owing to the strike, will probably result in an advance. Copper has declined one cent locally, lake and electrolytic being now quoted at 36c and castings at 35c per pound.

Tin.—The market is quiet and unsettled at unchanged prices. There is very little business as importers are not pushing sales and consumers are well stocked. Local price 66c per pound.

Spelter.—The spelter situation is unsatisfactory due to lack of demand from the average consumer. The market is dull and quotations unchanged at 12c per pound.

Lead.—The market is dull and weaker but quotations are in the meantime unchanged although indications point to a decline in prices. More metal is being offered than there seems to be a demand for, thus tending to weaken the market local price 14¼c per pound.

Antimony.—The market is dull and irregular. There are plenty of sellers but few buyers. The revolution in China unless settled soon will strengthen the market.

Aluminum.—The market is easier on freer offerings and practically no demand. Consumers are hesitating pending the American Government's acceptance of 27c for aluminum. Local price unchanged at 68c per pound.

New York, July 7.—The United States Steel Corporation is completing plans for the construction of a large shipbuilding plant in the Hackensack Meadows, on Newark Bay, in the vicinity of New York City. Recently several million dollars were appropriated by the Finance Committee of the Board of Directors for this purpose. At that time details had not been decided upon; even now, official announcement is withheld. It is semi-officially known, however, that the plant will be built speedily and that 12,000 tons of structural steel will be required for the construction of shipways, crane runways, machine and fabricating shops, power houses and other buildings. To equip these various units, it is estimated that \$1,000,000 will be spent. It would not be surprising to find that orders for electric and other cranes and for shop equipment, including turret lathes, drills, boring machines and other tools, already have been placed, as it is expected that steel shipbuilding will begin within four months.

The new plant will be constructed and operated by the American Bridge Co., the fabricating subsidiary of the Steel Corporation. The Bridge Co. for years has been building barges, car floats, and other craft, and in the past year, also has fabricated steel for ocean-going boats, for the Chester Shipbuilding Co. The steel has been fabricated at the Ambridge plant and assembled at the Trenton plant of the Bridge Co. Plans now maturing call for the extension and equipment of existing shops, as well as for the construction of new shops which will require the purchase of more machinery. The Corporation has also appropriated funds for the building of another shipyard in the South by the Tennessee Coal, Iron & Railroad Co. Details concerning this project will probably be announced next week.

Machine tool makers and dealers in the last week have received additional orders from five other shipyards on the Atlantic coast, the Newport News Shipbuilding & Drydock Co. alone having released orders for \$75,000 worth of tools. Agents of three shipbuilding plants on the Pacific coast have also placed orders for cranes and machine tools and are still negotiating.

Manufacturers of airplanes, motors, and engines have closed contracts for between \$500,000 and \$1,000,000 worth of tools. One large company has ordered tools costing several hundred thousand dollars. The latter company, as well as most of the shipbuilders in the market in the past two weeks, are working almost exclusively on Government contracts, and it is expected that the Steel Corporation will build 100 steel cargo boats on an intensified standardized plan for the United States Emergency Fleet Corporation.

Manufacturers of ordnance, mines, bombs and other war munitions, in an effort to push Government contracts, are now in the market with numerous small lists for machine tools. Under these circumstances, it is not surprising that other manufacturers of turret lathes and of radial drills have advanced prices 10 to 15 per cent. Manufacturers of millin-

machines, punching and shearing machinery, of drill presses and of grinding machines also have advanced prices 5 to 10 per cent.

Buying of machinery for export continues active although no large individual orders are being placed. Most of the buying is for machine tools to be shipped to Great Britain, France, and Italy, but orders have also come from South Africa and from India. Before the war, of course, these countries purchased tools in England. Spanish manufacturers have also been in the market, but the United States Government has refused to allow the orders to be executed because of the belief that the machines were designed to assist German interests.

Pittsburgh, Pa., July 7.—The iron and steel trade is rapidly coming to the opinion that there will be some form of price regulation. The amendment added to the Food Bill in the Senate, giving the President power to control prices of iron and steel as well as of foodstuffs, is expected to stay in the bill through the conference with the House, whose bill referred only to food, and the balance of probability is that if the President were given the power he would exercise it. Of course there are many who cannot believe that such a drastic operation would be undertaken, but they are among the slow thinkers. Those who realize both the seriousness of the war situation and the utterly absurd position into which the steel market has worked itself, feel that regulation by this means or that is bound to come.

There is of course the possibility of the steel makers adjusting their market so as to forestall formal action by the Government, but this possibility is relatively remote. The United States Steel Corporation undertook something of the sort, when last April it withdrew almost altogether from the markets. Since then, except in a few instances, it has maintained nominal, or official prices then ruling, and has not sold except to some regular customers and then at its special prices. Those independent mills still in position to sell continued to advance prices, however, and the market as now generally quoted is far above the Steel Corporation levels. The action of the Corporation did not keep the market from advancing and indeed it seems to have had the opposite effect, as the withdrawal of its sales left the demand for the independents.

In case of prices being fixed in the iron and steel industry, it would be absolutely necessary that deliveries on existing contracts be regulated. Contracts higher than the fixed level would of course be revised and as the mills are as a rule sold up fully to the regular trade, with the prospect that deliveries must be held back to give priority to Government orders, the distribution of the tonnage that could be spared from day to day or week to week would require regulation. Details, both as to prices and as to deliveries, would probably be left to the steel manufacturers, after some general rules have been drawn up.

There is no doubt that if regulation is

undertaken at all it will apply to practically everything in the iron and steel industry, that is, it would not be feasible or fair to regulate steel prices and not pig iron prices, or pig iron prices and not coke prices. There are some critics who say that Government regulation is well-nigh impossible, but they lose sight of the fact that the present price structure is a worse mess than anybody could possibly make if he started out with a clean slate. For instance, a year ago Connellsville furnace coke was selling regularly at about one-seventh the price of pig iron, comparing coke per ton at ovens and pig iron per gross ton at valley furnaces. At the present time pig iron is three times the price of a year ago, while just before Independence Day, when there was a particular rush to buy coke to tide over the holiday, there was coke sold at \$16.25, or almost one-third the price of pig iron, although pig iron was selling at three prices.

Possible Price Limits

If price limits are fixed they would naturally be very much lower than the prices now quoted as the market, as these prices are done merely on odd lots for deliveries in the next few months, when the large mills are with scarcely an exception sold up into the new year and only the small mills are in a position to sell. Probably the highest prices that would be considered at all would be the prices at which the bulk of the deliveries are now being made, against old contracts. Such prices would probably be 4c or under for sheets, 3c or under for bars and shapes, and perhaps a somewhat higher price for plates. However, the Federal Trade Commission has been instructed to investigate and report upon costs in the iron and steel industry, and should it find that the costs have greatly increased, the limits might be considerably higher.

There is practically no discussion as to what would be done in the case of export business. For some time past export enquiries have scarcely been considered at all by the mills, and such exports as are made would probably be confined almost entirely to the needs of our Allies in Europe. The limiting of prices would be for two principal objects, first, to make it easier for the Government to arrange for its own requirements and those of the Allies, at perhaps somewhat lower than the general limit prices, and second, to enable consumers of iron and steel to stay in business, for the general good of the country. In this philosophy there is no place provided for the ordinary consumer of steel outside the United States.

Steel Market Very Quiet.

The steel market has continued to grow quieter until now it is almost stagnant. Buying for really forward deliveries practically ceased two months or more ago. Since then the buying, such as has occurred has been for earlier and earlier deliveries, naturally of smaller and smaller volume as there is little steel to be had for early deliveries even at the

(Continued on page 60.)

Smith & Mills SHAPERS

2-14" Plain

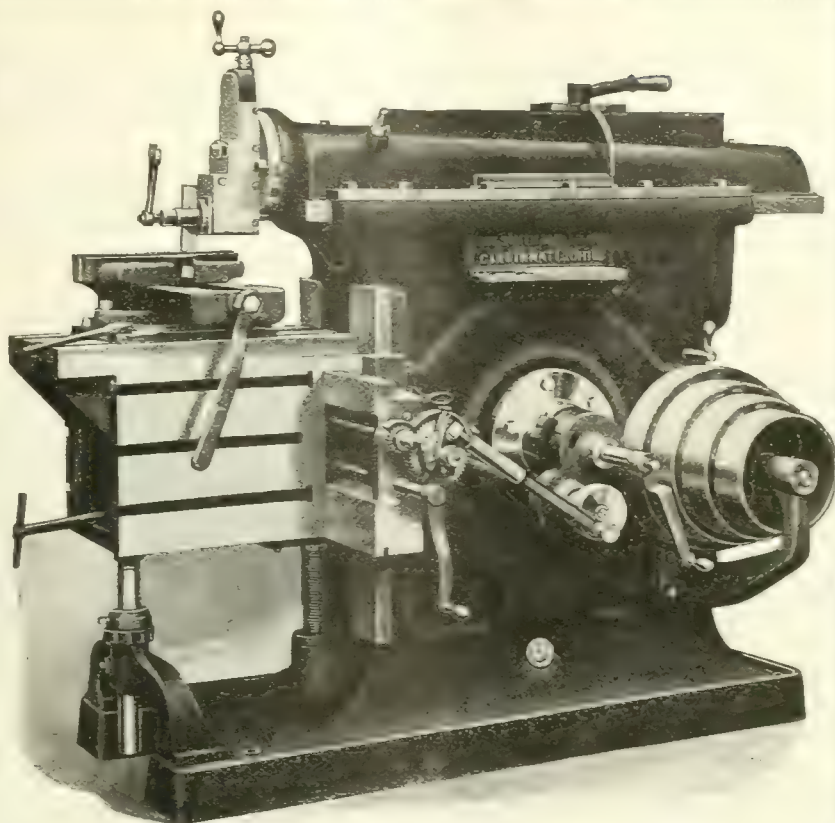
6-16" Back Geared

2-20" Back Geared

IMMEDIATE DELIVERY

WRITE FOR PRICES

The A. R. Williams
Machinery Company,
Limited



ST. JOHN, N.B.
WINNIPEG, VANCOUVER

"If It's Machinery, Write Williams"

64 Front Street West,
TORONTO

Victor Collapsible Taps

ACCURATE, clean-cut threads result from the use of the Victor Collapsible Taps and the quality of work done is absolutely dependable.

Victor Collapsible Taps are constructed with a machine steel body and high speed Steel Chasers. The entire construction is simple and ample adjustment is allowed for wear.

A set screw adjustment from the front end maintains accuracy; automatic trip prevents work from spoiling. Victor Collapsible Taps are extensively used on shell work because of their accuracy and efficiency.

Victor Tool Co.

Waynesboro, Pa.,
U.S.A.



Further
particulars
should interest you.



Every
Thread is
Straight,
Even and
Accurate

The Chasers in an *H & G Automatic, Self-Opening Die Head* are set and held in place by a steel cam. That cam once adjusted, locks; there is no stoppage or changing in size.

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

Simple, Strong and Compact.

Our booklet tells more.

Drop a card for it.

Eastern Machine Screw Corp.
New Haven, Conn.

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

INDUSTRIAL ^A_N^D CONSTRUCTION NEWS

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

ENGINEERING

Chatham, Ont.—The International Harvester Co. of Hamilton, Ont., will build a foundry here.

Kitchener, Ont.—The Canadian Consolidated Rubber Co., propose building an addition to their machine shop.

Hamilton, Ont.—The Hamilton Steel Wheel Co., will build an extension to their plant at a cost of \$25,000.

Toronto, Ont.—The Russell Motor Co. have a permit to erect an addition to their munition factory near King and Dufferin streets at a cost of \$7,500.

Toronto, Ont.—The Booth-Coulter Copper & Brass Co. have been given a permit to build an extension to their factory at 115 Sumach Street, to cost \$6,500.

Toronto, Ont.—The John Inglis Co. have been granted a permit to erect a brick and tile machine shop on Strachan Avenue, south of the G. T. R. tracks, at a cost of \$45,000.

Montreal, Que.—The Imperial Oil Co. is proceeding energetically with the construction of the extension of its refinery in Montreal East. It is announced that the total investment there is now three million dollars.

Shawinigan Falls, Que.—The Canadian Aloxite Co., which will go extensively into the manufacture of carborundum and other abrasives, has started construction of a large plant at Shawinigan Falls. It will be completed some time towards the end of the year. The Shawinigan Water & Power Co., have contracted to supply 20,000 h.p. to the Canadian Aloxite Co., which is a subsidiary of the big Carborundum Co., of Niagara Falls. N.Y.

Sherbrooke, Que.—There was no opposition at the ratepayers' meeting at the City Hall to the by-law authorizing the borrowing of \$150,000 for the construction of a transmission line from Weedon to Sherbrooke and for the erection of a sub-station at Sherbrooke. A few months ago the ratepayers approved of a by-law for the purchase of the Two Miles Falls power plant for \$375,000, but an additional by-law was necessary to provide for the transmission line and sub-station. The authorized expenditure to date is, therefore, \$525,000.

New Westminster, B.C.—It is understood that machine shops in this district will build at least twelve sets of engines, including the main and auxiliary machinery, for the wooden steamers, orders for which have been placed by the Imperial Munitions Board. Under the plan now adopted, no shop will have a contract to build complete sets, but every shop will build such parts, and such quantity as it is properly equipped to

handle. The complete sets will then be assembled at a central establishment to be created by the board. In the meantime, plans, engine drawings, specifications, etc., have been received in the city and distributed to the various machine shops, including the Heaps Engineering Co., the Schaake Machine Shops, Webb & Gifford, and the Westminster Ironworks.

MUNICIPAL

Tilbury, Ont.—The Town Council are considering installing a pumping plant.

Toronto, Ont.—The City Council have passed a by-law authorizing the guaranteeing of a bond issue of \$4,000,000 for harbor improvements.

Hamilton, Ont.—City Engineer Gray has been notified by W. F. Tye of Montreal that the report on the common railway entrance into Hamilton has been completed.

Hamilton, Ont.—City Clerk Kent has received the certificate of approval from the Provincial Board of Health authorizing the installation of additional pumps at the waterworks pumping house. Without this certificate the city could not proceed with the work.

PITTSBURG LETTER

(Continued from page 56.)

extremely high prices bid, say 8c to 9c for blue annealed and black sheets, 10c to 11c for galvanized sheets, 8c to 10c for tank plate, 4.50c for bars and shapes, etc.

Some agricultural implement makers have been sounding the market for bars and other materials for the first half of next year, and this is likely to start something, as they will hardly be quoted at prices that they could possibly consider. The implement makers may go to Washington with the argument that next year's crops will be curtailed if they are not put in position to make implements at prices the farmers would pay.

Pig Iron Quieter

Activity in pig iron has been steadily decreasing, but, unlike the case of finished steel, there is still a regular market for pig iron. There are transactions for deliveries in the first quarter and in the first half of next year, as well as some transactions for prompt shipment and deliveries later this year. The total turnover has decreased to rather small proportions, however. There have been no price advances of the least moment in the past week, and from some viewpoints Southern iron appears to be a shade easier. Whether this reflects the buying pressure having spent its force, or reflects a new attitude on the part of consumers due to the talk of Government price regulation, cannot well be determined.

London, Ont.—The City Council have decided to accept a proposition from the Ajax Rubber Co. and will submit a by-law at a special polling on July 31, to have the people guarantee the bonds of the company to the extent of \$450,000. The company agrees to establish a large plant in this city that will have an annual wage bill exceeding \$250,000. In the event of the passage of the by-law by a majority of the people, work will be undertaken forthwith.

GENERAL

Petrolia, Ont.—The Colonial Knitting Co., contemplate erection of a knitting factory here.

Springfield, Ont.—The Springfield Milk Co., contemplates building an addition to their factory.

Montreal, Que.—L. A. Gosselin, 6 Chenneville St., proposes to erect a factory estimated to cost \$15,000.

Newcastle, N.B.—The New Brunswick Sulphite Fibre Co., of Millerton, will open up the mill shortly.

Hamilton, Ont.—The National Gas Co. has struck a well on the farm of William Pettigrew, Seneca, with a flow of 1,000,000 feet a day.

Brandon, Man.—The Western Canada Flour Mills are planning to double the output of their branch at Brandon, which at present has a capacity of 700 barrels per day. The output of this branch will then be 1,400 barrels per day.

Kingston, Ont.—K. R. McDonald of Kansas City, has secured from R. A. McLelland an option on the elevator and buildings formerly used by the Cereals, Ltd. The elevator and buildings were the site of the now defunct Orange Meat Co. Mr. McDonald proposes to turn the establishment into a plant to mill flour.

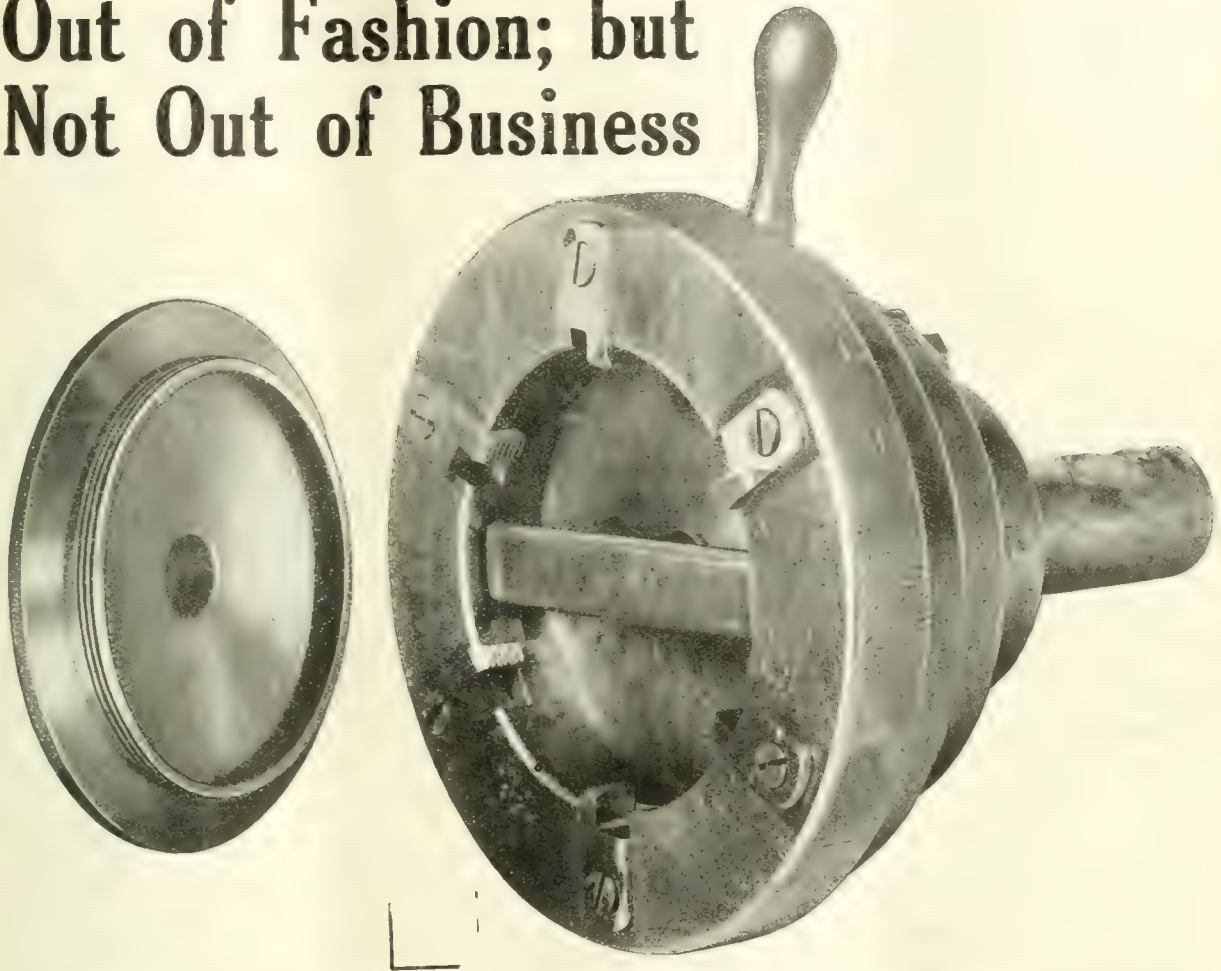
TENDERS

Outremont, Que.—Tenders will be received up to July 18, for the construction of an incinerator. Specifications may be obtained from J. A. Duchastel, city engineer, City Hall.

Lauzon, Que.—Tenders will be received until July for the construction of a transmission pole line between the new and old dry docks at Lauzon, Que. Plans and forms of contract can be seen and specification and forms of tender obtained at the Department of Public Works, Ottawa and at the Post Office, Quebec, Que.

Montreal, South, Que.—Tenders are invited, and will be received up to July 19 for the laying of sanitary sewers, watermains, valves, fire hydrants, etc. Also for an elevated steel tank, one hun-

Out of Fashion; but Not Out of Business



This old "war horse" of a Geometric Die Head has been cutting Screw Threads for a Chicago concern for seventeen years. It was recently sent back to the Geometric Factory for overhauling, and has gone again to Chicago, for possibly seventeen years more of duty.

A Geometric Collapsing Tap, purchased by the same people seventeen years ago, is still cutting the inside threads to match. Can you match that?

Geometric Thread Cutting Tools of to-day can surpass it. What thread cutting method are you using? Learn the Geometric way. It is a path others have trod for the past twenty-five years. Geometric experience has smoothed the path of thread cutting for many. What will you let it do for you?

We could help you—let us.

THE GEOMETRIC TOOL COMPANY

NEW HAVEN, CONNECTICUT, U.S.A.

Canadian Agents: WILLIAMS & WILSON, LIMITED, MONTREAL. THE A. R. WILLIAMS MACHINERY COMPANY, LIMITED,
TORONTO, WINNIPEG AND ST. JOHN, N.B.

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

dred thousand Imperial gallons capacity, and one hundred feet to bottom. Plans can be seen and specification and forms of tender may be had at the office of the engineer, E. Drinkwater, Montreal South.

Winnipeg, Man.—Tenders addressed to the Chairman, Board of Control, will be received up to Friday, July 27th, 1917, for the supply and delivery f.o.b., Winnipeg, of 4,500, more or less, complete high voltage porcelain insulators. Instructions to bidders, specification and form of tender may be obtained at the office of the City Light and Power Department, 54 King Street.

Toronto, Ont.—Tenders, addressed to the Secretary-Treasurer of the Board of Education, will be received until July 13, for hardware, Orde Street School, Manual training benches, Earl Grey School, steel work, Queen Victoria School and other midsummer repair work. Specifications may be seen and all information obtained at the office of the Superintendent of Buildings, Administration Building, 155 College Street.

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

Kingston, Ont.—Tenders will be received until July 16 for the reconstruction of part of the cribwork wharves at the entrance to the Dry Dock, at Kingston, Ont. Plans and forms of contract can be seen and specifications and forms of tender obtained at the Department of Public Works, Ottawa, the offices of the District Engineer, Equity Building, Toronto, Ont., and on application to the postmaster, at Kingston, Ont.
Contracts

INCORPORATIONS

The New Westminster Construction & Tug Co.—Has been incorporated at Victoria, B.C., with a capital of \$30,000. Head office is at New Westminster, B.C.

The Globe Engineering Co., has been incorporated at Ottawa with a capital of \$100,000 to take over as a going concern the Globe Electric Machine Co. of Hamilton, Ont.

Power Development Co., has been incorporated at Ottawa with a capital of \$500,000 to carry on the business of an electric light and power company with head office at Montreal. Incorporators are G. A. Coughlin, F. G. Bush and G. R. Drennan all of Montreal.

The Fox Chain Co. of Canada, Ltd., have been incorporated at Toronto with a capital of \$200,000 to manufacture chains and automobile accessories of all kinds at Hamilton, Ont. The provisional directors are Cecil V. Langs, Ewart G. Binkley and N. Moore all of Hamilton.

Fraser Companies, Ltd., have been incorporated at Ottawa with a capital of \$10,000,000 to acquire and take over as a going concern the business now carried on by Fraser Ltd., and also to manufacture pulp and paper. The head office is at Plaster Rock, N.B.

The Lyman Rubber Mfg. Co. of Canada, Ltd., has been incorporated at Ottawa with a capital of \$10,000 to manufacture rubber goods of all kinds at Montreal. The incorporators are C. G. Derome, Jules Bruneau and Jean Ducharme all of Montreal.

The Ontario Woodworking Co., has been incorporated at Toronto with a capital of \$50,000 to carry on a woodworking business in all its branches at Kitchener, Ont. The provisional directors are David B. Betyner, E. B. Betyner and Owen Hamilton all of Kitchener, Ont.

The Hosmer Stamping & Die Works, Ltd., has been incorporated at Toronto, with a capital of \$10,000 to manufacture metal products of all kinds at Toronto. The provisional directors are William Steward, William G. Winchester and Stephen M. Hosmer all of Toronto.

The Clemens Electrical Corporation of Canada, Ltd., has been incorporated at Ottawa with a capital of \$50,000 to manufacture electrical apparatus and devices of all kinds at Hamilton, Ont. The incorporators are H. N. Kittson, Alex. Wetherell and W. D. Dailey all of Hamilton, Ont.

Canada Emery Wheels Ltd., has been incorporated at Ottawa with a capital of \$50,000 to manufacture abrasive materials into any form and also to manufacture grinding machinery etc., at Hamilton, Ont. The incorporators are Frank Radigan, G. G. Sutherland and Charles Nield all of Hamilton, Ont.

Motor Products Corporation Ltd., has been incorporated at Ottawa with a capital of \$500,000 to manufacture iron, steel, copper and wood products of all kinds at Walkerville, Ont. The incorporators are Y. H. Coburn, A. J. Gordon and John E. Laughlin all of Walkerville, Ont.

The Chelsea Green Iron Works, Ltd., have been incorporated at Toronto with a capital of \$200,000 to manufacture copper, iron, brass goods and machinery of all kinds at Fergus, Ont. The provisional directors are William G. Beatty, Wesley L. Ham and Robert D. Kerr all of Fergus, Ont.

Canadian Sprinkler Equipment Co., has been incorporated at Ottawa with a capital of \$50,000 to manufacture automatic sprinklers, and fire extinguishing apparatus of all kinds. The head office is at Toronto and the incorporators are John G. Leckie, George G. Beckett and John A. Kent all of Toronto.

The Maritime Electric Co., has been incorporated at Ottawa with a capital of \$1,000,000 to manufacture or produce gas for all purposes and to carry on the business of a power company at Fredericton, N.B. The incorporators are John

J. F. Winslow, John J. McCaffrey and Ernest A. McKay all of Fredericton, N.B.

The Electric Steel & Engineering Co., which was recently incorporated at Ottawa with a capital of \$2,000,000 is a merger of three concerns and the head office will be at Welland, Ont. The three companies included in the incorporation are Electric Steel & Metals, Ltd., of Welland, Ont., the Boving Hydraulic Engineering Co. of Lindsay, Ont., and the Wabi Iron Works of New Liskeard, Ont. No announcement as to plans will be made until after a meeting of the directors which is to be held shortly.

TRADE GOSSIP

The Canada Pipe & Steel Co., Toronto has increased its capital stock to the sum of \$600,000.

The Valleyfield Tool Mfg. Co., has changed its name to that of the Canadian Marine Engineering Co. ,

A. B. Jardine & Co., of Hespeler, Ont., makers of woodworking machinery, etc., has been incorporated at Ottawa with a capital of \$300,000.

The National Steel Car Co., of Hamilton, Ont., has received an order for one thousand freight cars for the Canadian Government Railways.

G.T.R. Want More Apprentices.—The Grand Trunk Railway has decided to cut down the period of apprenticeship in their shops from four to three years and to increase the boys' wages.

Brantford, Ont.—The Turbine Equipment Co., Toronto, have been awarded the contract for booster pumps, and the Canadian Westinghouse Co., Hamilton, the contract for motors and electrical equipment for the city.

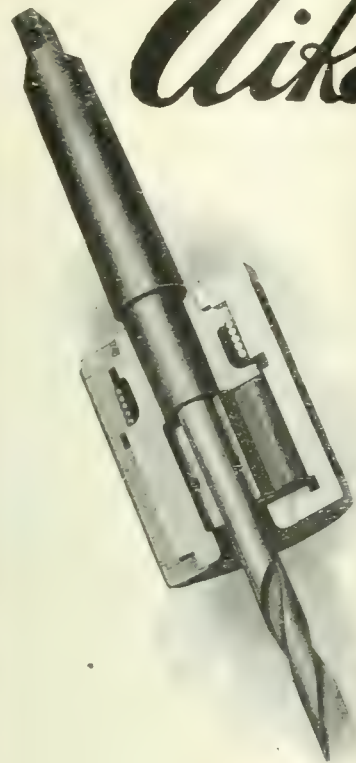
Trenton, Ont.—The Homestead Canning Factory, at Picton, has received further orders from the British Government for pork and beans which, it is stated, will tax the capacity of the factory until the first of October.

Huge Earnings From Steel.—Pittsburg steel statisticians calculate that if prices now quoted on the market were to be obtained on the entire steel output, the steel industry would make \$2,000,000,000 a year greater profit than the rate of earnings during the first quarter of this year.

Port Arthur, Ont.—Earnings of the Port Arthur Shipbuilding Co. are reported as running at an extremely satisfactory rate, with raw material arriving ahead of requirements. Contracts now on the books of the company for delivery prior to the close of navigation, 1918, total approximately \$6,000,000.

Western Coal to Cost More.—Coal prices will be increased from 28 to 35 per cent. as a result of the changed conditions under which the coal mines of Alberta and Southern British Columbia are now being operated, according to a prominent operator. This will approximate seventy-five cents to one dollar per ton at the mines.

Aikenhead's New Chuck



Will stop you losing your drilling profits

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

WAHLSTROM CHUCK

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

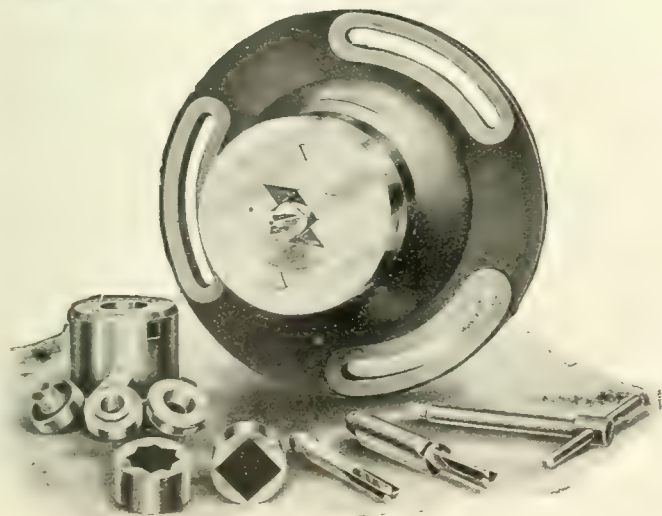
The Wahlstrom comes in two types—one for straight shank tools—the other for Nos. 1, 2 and 3 M.T. shank tools—they are both "Production Increasers," which demands your attention. Write for information now.

AIKENHEAD HARDWARE LIMITED

17, 19, 21 Temperance Street - Toronto, Canada

Aikenhead's

RADBORE HEAD



**Drills Square Holes
Accurate**

Radbore Heads will drill square holes through the material or they will drill square holes to any desired depth with perfectly flat bottoms! Once in your shop the uses that spring up for this head will be remarkable.

MAXIMUM ACCURACY—MINIMUM COST

Aikenhead Hardware Limited

17, 19, 21 TEMPERANCE STREET, TORONTO

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

Enlarged Canadian Trade Intelligence Service

Under the arrangement made by the Minister of Trade and Commerce with Sir Edward Grey in July, 1912, the Department of Trade and Commerce, Ottawa, is able to present the following list of the more important British Consulates whose officers have been instructed by the Foreign Office to answer inquiries from and give information to Canadians who wish to consult them in reference to trade matters.

BRAZIL—Bahia, British Consul. Rio de Janeiro, British Consul General.	NETHERLANDS—Amsterdam, British Consul.
CHILE—Valparaiso, British Consul General.	PANAMA—Colon, British Consul. Panama, British Vice-Consul.
COLOMBIA—Bogota, British Consul General.	PERU—Lima, British Vice-Consul.
ECUADOR—Quito, British Consul General. Guayaquil, British Consul.	PORTUGAL—Lisbon, British Consul.
EGYPT—Alexandria, British Consul General.	RUSSIA—Moscow, British Consul General. Petrograd, British Consul. Vladivostok, British Consul. Odessa, British Consul General.
FRANCE—Havre, British Consul General. Marseilles, British Consul General.	SPAIN—Barcelona, British Consul General. Madrid, British Consul.
INDIA—Calcutta, Director General of Commercial Intelligence.	SWEDEN—Stockholm, British Consul.
ITALY—Genoa, British Consul General. Milan, British Consul.	SWITZERLAND—Geneva, British Consul.
MEXICO—Mexico, British Consul General.	URUGUAY—Monte Video, British Vice-Consul.
	VENEZUELA—Caracas, British Vice-Consul.

Canadian Commercial Intelligence Service

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

CANADIAN TRADE COMMISSIONERS.

ARGENTINE REPUBLIC—R. S. Webb, Acting Canadian Trade Commissioner, Reconquista, No. 46, Buenos Aires. Cable address, Canadian.
AUSTRALIA—D. H. Ross, Stock Exchange Building, Melbourne. Cable address, Canadian.
BRITISH WEST INDIES—E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.
CHINA—J. W. Ross, 13 Nanking Road, Shanghai. Cable address, Canadian.
CUBA—Acting Canadian Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.
FRANCE—Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona.
ITALY—W. Mc. Clarke, c/o H. M. Consul, Milan.
JAPAN—E. F. Crowe, Acting Canadian Trade Commissioner, P. O. Box 109, Yokohama. Cable address, Canadian.
HOLLAND—Ph. Geleerd, Acting Canadian Trade Commissioner, Zuidblaak, 26, Rotterdam. Cable address, Watermill.
RUSSIA—C. F. Just, Canadian Government Commercial Agent, Alexandrinskaia, Ploshch 9, Petrograd. L. D. Wilgress, Canadian Government Commercial Agent, Bukhgalza Ulitsa No. 4, Omsk, Siberia.
NEWEFOUNDLAND—W. W. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.
NEW ZEALAND—W. A. Beddee, Union Buildings, Customs Street, Auckland. Cable address, Canadian.
SOUTH AFRICA—W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.
UNITED KINGDOM—Harrison Watson, Sub-division E.C., 2, 73 Basinghall Street, London, E.C., England. Cable address, Sleighing, London. N. D. Johnston, Sun Building, Clare Street, Bristol. Cable address, Canadian. J. E. Ray, Central House, Birmingham. Cable address, Canadian. J. Forsyth Smith, 31 North John Street, Liverpool. Cable address, Cantracom. F. A. C. Bickerdike, 4 St. Ann's Square, Manchester. Cable address, Cantracom. J. Forsyth Smith, Acting Canadian Trade Commissioner, 87 Union Street, Glasgow, Scotland. Cable address, Cantracom.

CANADIAN COMMERCIAL AGENTS

AUSTRALIA—B. Millin, Royal Exchange Building, Sydney, N.S.W.
BRITISH WEST INDIES—Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian. R. H. Curry, Nassau, Bahamas.
NORWAY AND DENMARK—C. E. Sontum Grubbegd No. 4, Christiania, Norway. Cable address, Sontums.
SPAIN—J. P. Roberts, Hotel Cuatro Naciones, Barcelona.

CANADIAN HIGH COMMISSIONER'S OFFICE

UNITED KINGDOM—W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England. Cable address, Dominion, London.

Toronto Building Permits.—During last month 495 permits for new buildings of the approximate value of \$693,224 were issued by the City Architect's Department, showing an increase in values of \$119,355 compared with June of last year. The total increase in values for the first six months of the present year compared with last is \$641,919.

"The Cillingwood Steamship Co." is the name of an organization which has been formed in Collingwood, Ont., to carry on a steamship service between Collingwood and Sault Ste. Marie, Ont. Capt. G. C. Coles is the president of the new company; M. P. Byenes is vice-president; Harry Storey, secretary; J. F. Zimmerman, treasurer, and Capt. F. G. Moles, manager. The steamer City of Meaford has been secured, and will be put into commission at once.

Freight Embargo.—Possible congestion of traffic at the port of Montreal is responsible for an embargo issued by the G.T.R. on all carload freight for export via this port. Exceptions made affect freight consigned on account of the Imperial Government, and carload freight, when specific steamship space has been secured, and acceptance authorized by officials of the General Foreign Freight Department, either at Montreal or Toronto.

Load Freight Cars to Capacity.—In view of the existing car shortage, traffic officials and operating departments of railways say that the only way to improve present conditions is to secure greater efficiency in the present equipment, terminal trackage and man power. The railways cannot do this alone. They say consignees can help by ordering full carloads instead of the minimum authorized in the tariffs and classifications and consignors can help by loading cars to their full authorized carrying capacity.

L. P. Burns and A. R. Roberts, both of Toronto, have formed a partnership under the name of Burns and Roberts, with offices in the Bank of Hamilton Building, Toronto. Mr. Burns is the head of the Burns Cement-Gun Construction Co., of Toronto, and Mr. Roberts has been acting for some time past as the Canadian representative of the Chapman Valve Mfg. Co. of Indian Orchard, Mass., and of the Cement-Gun Co., Inc., of Allentown, Pa. The new firm will handle contractors' supplies, reinforcing material, valves, factory equipment, etc.

Increased Chilean Copper Output.—Reports from Chile show that the output of the copper mines during 1916 was the largest in the history of that country, the exports of 1916 being 58,000 tons of fine copper in bars, something over 4,000 tons in concentrates, and over 9,000 tons of ores. The United States imports of copper from Chile in 1916 were 77,000,000 pounds of pigs and ingots against 36,000,000 pounds in 1915, and 24,000,000 pounds in 1914, while the copper content of the ore and matte from Chile was 44,500,000 pounds, against 33,435,000 pounds in 1915, and 30,563,000 pounds in 1914.



Here the artist has depicted VICTORY about to welcome and crown the brave legions returning from overseas. Notice that the figure is a companion of Industry which in this case is represented by the maker of munitions.

A limited number of copies, suitable for framing and free from advertising, will be mailed without charge upon request to the makers of **Red Cut Superior** the Nationally Known First Quality High Speed Steel.

Publisher's Note: Owing to a typographical error the word "quick" was substituted for "high" in the above advertisement for the Vanadium-Alloys Steel Co., Pittsburgh, Pa., in our June 28th issue. The mistake was very much regretted and we would ask our readers to kindly accept this correction.

The Canadian B. K. Morton Co. have been granted a license at Toronto to carry on business in the Province of Ontario, providing that their capital does not exceed \$40,000.

Canada's Revenue Goes Up.—The returns to the Department of Finance, Ottawa, for the first three months, ended June 30, of the present fiscal year, show a total revenue of over sixty-three million dollars, as compared with fifty millions for the same period last year. On the other hand, the capital expenditure of the Dominion has declined three millions, chiefly on public works and railways and canals account. The ordinary expenditure, which includes interests upon the war debt and pensions, is practically the same as last year.

H. W. Petrie, Ltd., of Toronto, have re-organized their machinery supplies department which occupies the building 147 Front street, adjoining the Union Station. A larger and more complete stock of supplies is now carried and the company are now in a position to take care of the increase in business. They have taken over several new lines, including the American steel split pulley and also carry a bigger stock of Brown & Sharp cutters and Starrett fine tools. T. H. C. Alison is manager of the supply department. The company contemplate opening a branch at Hamilton.

The Galt Foundry Co., Galt, Ont., have recently closed contracts for a large number of their Galt Sprinkler stokers to the order of many prominent concerns, some of which are included among the following. The T. Eaton Co., 3-stokers at Toronto and 12 at Winnipeg; Dryden Pulp & Paper Co., Dryden, Ont. 12 stokers; Hinde & Dauch Paper Co., Toronto, 8-stokers; Spanish River Pulp & Paper Co., Sturgeon Falls, Ont., 4 stokers; Hamilton Cotton Co. 6 stokers; Dominion Power & Transmission Co., Hamilton, 3 stokers; City of Brandon 2 stokers and Dominion Oilcloth Co., Co., Montreal, 4 stokers.

No Brazilian Rubber For Allies' Enemies.—The Brazilians have shown their interest in the cause of the Allies by compiling a list of firms to whom it is considered inadvisable to ship rubber. Judging from the latest reports this blacklist on the Amazon has been a great success. It came into effect here on March 29, 1916, from which date to March 30, 1917, crude rubber was exported to the amount of 34,424 tons. Of this, 19,631 tons, or 57 per cent., went to Allied and American firms, 12,741 tons, or 37 per cent., to Brazilian or Portuguese firms, and only 2,052 tons, or 6 per cent., to enemy and blacklisted firms.

Victoria, B.C.—The B. C. Metal Trades Association has been furnished with two sets of plans giving the details of the main engines required for the standard wooden steamers to be built by the Imperial Munitions Board. There are eighteen blue prints to a set, and local engine builders are looking them over with a view of putting in tenders. Bids

have already been asked by local representatives of the Munitions Board for fifty winches, and upon the arrival here from the East of Messrs. Chisholm and Russell, representatives of the Imperial Munitions Board, for the purpose of looking into the facilities in British Columbia, it is expected that large orders will be placed in the Province.

Wood Car Passing.—The building of wooden passenger train cars has practically ceased. The *Railway Age Gazette* shows that there were in passenger train service in the United States on January 1, 1909, approximately 629 all steel cars and 673 cars having steel underframes. On January 1, 1917, there were in such service 15,754 all steel cars and 6,136 cars having steel underframes, representing increases of 2,405 per cent. and 812 per cent. respectively. There are now in service 36,169 wooden cars in passenger train service, indicating a retirement of 8,957 wooden cars from service since January 1, 1912, the date of the previous census. Of this number 2,213 were retired during the calendar year 1916. This record includes a total of 61,309 passenger train cars and covers reports from roads representing 235,406 miles of railway in the United States.

Newfoundland Revenue.—The greatest surplus of revenue over expenditures ever obtained by the Colony of Newfoundland is shown in preliminary statements for the fiscal year which ended on June 30. Revenue from all sources was approximately \$5,000,000, nearly \$1,000,000 in excess of expenditures. This is double the surplus of the previous fiscal year. The increase is due to the enhanced value of fishery and other products of the island, the high prices received having enabled the people to import exceptionally large stocks of goods of all kinds on which heavy duties were paid. It is understood the surplus will be applied toward paying the cost of the colony's participation in the war.

Japan's Shipping for American Steel.—It is reported that the Japanese Government is making arrangements with the United States Government whereby Japan will get steel in exchange for ships. The first part of the agreement will be that the United States expedite shipments of steel for Japanese shipyards, and in return Japan will send about 50,000 tons of ships to carry United States troops and war material to Europe. "A further effort will be made by Japanese ship builders to induce Gen. Goethals to order ships for the emergency fleet from Japan. The shipowners say they can complete steel steamers and have them in commission in four months if they get the steel.

Manufacturers Asked to State Coal Needs.—If the steps taken by the newly-appointed fuel controller, C. A. Magrath, to ascertain the requirements of manufacturers, as well as those of Governmental, municipal and other public institutions, for bituminous coal meet with the co-operation of the large consumers, the difficulties of obtaining adequate supplies which were experienced last winter will

be considerably minimized, if not altogether removed. Apprehension as to future supplies has already been expressed in many local quarters, and the information which is now being requested from all industrial concerns will, it is expected, be of considerable value towards relieving the situation, and all manufacturers have been notified through the Canadian Manufacturers' Association to give particulars of their coal consumption during 1916-17 and to estimate what they will require for 1917-18. Once these requirements have been obtained an equitable distribution—it is stated—will be made of the allotment to Canadian industries.

Fuel Controller Organizing Work.—The Dominion Fuel Controller, C. A. Magrath, who has spent the past fortnight in securing all available preliminary data with regard to present and prospective fuel supplies in Canada, announces that one of the leading fuel and transportation experts in the United States has been secured to look after Canadian fuel interests at the United States sources of supply. Efforts are being made to speed up imports of coal, which are now considerably behind the normal, for the district from Montreal to Winnipeg. Mr. Magrath states that he is now in a position to deal with deliveries and complaints, and urges importers of coal who desire to make use of the Fuel Controller's organization to furnish immediate information regarding the quantity of coal contracted for, the quantity received so far, and what must still be contracted for. Mr. Magrath is arranging to get in touch with all the mines, so as to enable him to accelerate deliveries in all cases where there is now delay. He asks that importers communicate their requirements to him promptly at Ottawa.

PERSONAL

W. N. Campbell, who for 22 years was with the Reeves Pully Co., Toronto, has joined the sales staff of H. W. Petrie, Ltd., Toronto, in the transmission department.

John G. Kent has been appointed manager of the Canadian National Exhibition, Toronto in succession to Dr. Orr who has retired on account of failing health.

H. J. Matthews, general manager of the Quebec Street Railway, Heat & Power Co., died on July 3 at the Jeffery Hale Hospital, Quebec, from an operation.

D. J. McQuaig, acting master mechanic at Montreal, has been appointed master mechanic of the Ontario lines of the Grand Trunk system, with headquarters at Toronto.

James M. Sclanders, of Saskatoon, has been appointed industrial commissioner for the Canadian Border Municipalities of Windsor, Walkerville, Ford and Sandwich, Ont., at a salary of \$5,000 per annum.

Charles A. Paquet, president of the General Car & Machinery Works, Montmagny, Que., has resigned from that

position to take over the general management. Mr. Paquet succeeds Robert Patterson, who has asked to be relieved on account of ill-health.

R. R. Gray Chisholm and T. H. Russell, representatives of the British Ministry of Shipping and the Imperial Munitions Board respectively, have arrived at Victoria, B.C., to confer with Mr. Butchart and Capt. J. W. Troup, local representatives of the Munitions Board.

F. C. Gamble, chief engineer of the British Columbia Government Railways, has resigned. Mr. Gamble was born in Toronto in 1848, and went to British Columbia thirty years ago. About four years ago he was appointed to the position which he has now vacated.

D. O. Lesperance has been elected president of the General Car & Machinery Co., Montgomery, Que., in succession to C. A. Paquet, who has been appointed general manager. Mr. Lesperance is also president of the A. Belanger Co., Montreal, and chairman of the Quebec Harbor Commission.

David Spiers one of the most prominent citizens of Galt, Ont., died there last Monday. He was 85 years of age, and he resided in Galt continuously since 1851, when he came to Canada from Scotland. He was at one time owner of the Galt Electric & Gas Light Co., until the advent of the Hydro system.

MARINE

To Remove Plankton Wreck.—The work of salvaging the cargo and machinery of the steamer John Plankinton, which sank in the Canadian channel of the Detroit River several weeks ago in collision with a Grand Trunk car ferry has begun.

Victoria, B.C.—Rapid progress continues on the old Songhees Reserve, where the Foundation Co. and the Cameron-Genoa Mills Shipbuilders are busily engaged in making preparations for laying down keels for the wooden steamers to be built in Victoria to the order of the Imperial Munitions Board.


Toronto, Ont.—Work will be commenced shortly on the construction of two modern vessels, canal size, for the Imperial Munitions Board. The vessels will be built on the new industrial area at Ashbridge's Bay. The contracts for the vessels were awarded to Messrs. John E. Russell, of the Russell Contracting Co., and John J. Manley, manager of the C. S. Boone Co. The steamers will be constructed of British Columbia firm. Modern engines will be installed in addition to all modern machinery for hoisting and handling bulk freight.

MORTON MANUFACTURING CO.
 PORTABLE PLANERS
 DRAW CUT SHAPERS
 SPECIAL DRAW CUT R R SHAPERS
 FINISHED MACHINE KEYS
 STATIONARY & PORTABLE KEY WAY CUTTERS
 SPECIAL LOCOMOTIVE CYLINDER PLANERS
 OFFICE AND WORKS: MUSKOGON HEIGHTS U.S.A.

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

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

"HAWK" D CHROME VANADIUM STEEL



Will Give You Exceptional

Shell Forging Production

WITHOUT AN EQUAL FOR BOTH FIRST AND SECOND OPERATION PUNCHES.

Comes to you heat-treated and ready for use.

It does not stick to the work.

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

It means more shells, per machine per day.

STEEL OF EVERY DESCRIPTION.

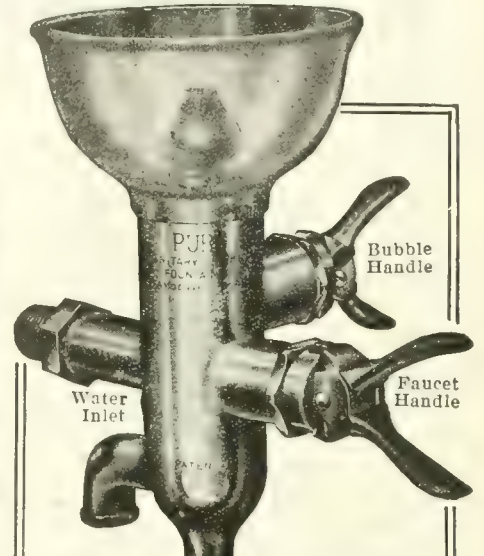
Hawkridge Brothers Company

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

I BELIEVE
*In Safety First and always.
 In providing for the Health of my Fellow Workmen.
 In Light and Air and sanitary Working Conditions.
 In clean, fresh drinking water for everybody.
 In the Safety, Economy and Man-betterment.*

PURO SANITARY DRINKING FOUNTAIN

(MADE IN CANADA)



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

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

When a man comes to work in your factory he puts his health in your keeping. Are you willing to take chances on such a trust?

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

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

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

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

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

Let us tell you just what it will cost you to

"PURO - FY"

YOUR WATER SUPPLY

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

THE IRON WORKS LIMITED
 Successors to
Owen Sound Iron Works
 Owen Sound Ont.
 Engineers
 Boiler-makers
 Founders
 Machinists

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

CLASSIFIED ADVERTISING

Rates (payable in advance): Two cents per word first insertion; one cent per word subsequent insertions. Count five words when box number is required. Each figure counts as one word. Minimum order \$1.00. Display rates on application.

SECTION

FOR SALE

1 24" CONRADSON TURRET LATHE. APPLY
McGregor, McIntyre, Limited, Toronto, Ont.
c3m

FOR SALE—THREE 26" x 12' C.M.C. DOUBLE
back geared quick change gear engine lathes;
never been used. McKinnon Dash Company, St.
Catharines, Ont. c2m

FOR SALE—4 REED PRENTICE ROUGH
Turning Lathes with cut-off attachments in
first-class condition. These will make an ex-
cellent machine for 4.5 shells. The Hayes Wheel
Co. of Canada, Ltd., Chatham, Ont. c5m

FOR SALE—10 PRACTICALLY NEW NO. 7-C
Heavy Duty Racine Hack Saw Machines. Suit-
able for all cutting purposes. For further in-
formation and price address The Peck Rolling
Mills, Limited, Montreal. c3m

ONE BRAND NEW 10 x 36 NORTON PLAIN
grinding machine. This machine on our floor
still crated, never been used. For price and
further particulars address Windsor Machine &
Tool Works, Windsor, Ontario. c5m

FOR SALE 2 36" HARRINGTON DRILLS, 3
No. 14 Colborn Standard Heavy Duty Drills,
1 Cincinnati 32" Drill, back-gear, sliding head,
power and wheel feed. Anxious to dispose of
these tools quickly. Wire or write if interested.
Metal Drawing Co., Ltd., St. Catharines, Ont.
c1m

WE HAVE ON HAND AT OUR WELLAND
Works, for disposal, the following new
machinery: One (1) 18" x 15 ft. Accumulator;
one (1) Aldrich Triplex Hydraulic Pump, 180
gals. capacity; two (2) 350-ton B. and B.
Presses. All offers will be carefully considered.
Canadian Car & Foundry Co., Ltd., Transporta-
tion Building, Montreal.

1—ROBB HORIZONTAL STEAM ENGINE, 10 x
12, 35 h.p. Just overhauled by makers. Price
\$300.00. 1—Heavy Duty Rockford Drill. Suitable
for shells or heavy work. Weight of drill 3,600
lbs. Good as new. Write for specification. 1—
Jones & Lamson 2 x 24 Turret Lathe, 2 1/4" hole in
spindle, 16" swing, cone drive, collet chucks for
bars up to 2" diameter. Or lathe can be fitted with
standard universal chuck. Flat turret 16" dia-
meter. Good condition. Price \$400.00. 1—Warner
& Swasey Turret Lathe. Round turret, diameter
8", hand cross feed for turret. Swing 14". Fairly
good condition. Price \$200.00. 1—Bertram 2-
spindle Thread Miller. Made by makers for
threading 18-pr. shells. Now used for thread-
ing sockets. Good condition. Steel Furnishing
Co., Ltd., New Glasgow, Nova Scotia. c2m

PATENTS

TAKE NOTICE—THAT WE, THE UNDER-
signed attorneys for the patentee, are pre-
pared to supply at a reasonable price any
demand for the water purifying apparatus de-
scribed in Canadian Letters Patent No. 127372,
granted August 16th, 1910, to Lucien Linden,
and assigned to W. J. Stewart. We are also
prepared to receive offers for the purchase of
the patent or for licenses to manufacture under
the same. Ridout & Maybee, 59 Yonge Street,
Toronto, Canada. c2m

BUSINESS CHANCES

SHELL PLANT FOR SALE — COMPLETE
plant—installed since 1914, for the machining
and assembling of 4.5 inch H.E. shells, situated
at Dartmouth, Nova Scotia, on line of Intercol-
onial Railway, with siding running into the
works. Will sell the equipment outright, with
privilege of renting the building in event of the
purchaser engaging in the same business. Starr
Manufacturing Co., Limited, Dartmouth, Nova
Scotia, Canada. c26m

FOR SALE—A MEDIUM-SIZED TWO-STOREY
brick factory situated in the best small city
in Ontario. Buildings in good condition, suitable
for either metal or wood-working; shipping facili-
ties unexcelled. Two trunk lines; direct connec-
tions east, west, north and south. Educational
advantages the very best. Plant will be sold at
a bargain and on easy terms of payment, if
desired. Apply Box 294, Canadian Machinery. c2m

SPECIAL MACHINERY

H. C. THOMAS, GENERAL MACHINE SHOP,
tools, jigs and machine repairs. 301 King
St. W., Toronto. Telephone Adelaide 3836, c1m

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

S. VESSOT & CO., GENERAL MACHINE SHOP
and Grey Iron Foundry. We can undertake
at present time light machining and grey iron
castings, at reasonable prices. Address Joliette,
Que. c1m

FOR SALE

20" Bullard Projectile Lathe
21" Gisholt Turret Lathe
20" x 6" Florence Turret Chucking
Lathe
16" x 7" Oliver Engine Lathe, new
18" x 10" Rahn-Larmon Engine
Lathe, new
18" x 12" Rahn-Larmon Engine
Lathe, new
3 x 36" Jones & Lamson Flat Tur-
ret Lathe, Chucking
3 1/4 x 36" Cincinnati Acme Flat
Turret Lathe, Chucking (4)
Ford-Smith Grinders for 3" shells
(12)
Allis-Chalmers Banding and Wav-
ing Machines (10)
Copper Band Turning Machine
Greenlee Gang Boring Machine
Holden-Morgan Thread Miller

Brownell Machinery Co.
Providence, R. I.

SITUATIONS WANTED

PRACTICAL WORKS MANAGER AND ME-
chanical expert with years of experience in
United States and Canada, a specialist in mun-
ition work, open for engagement. Best of refer-
ences. Apply Box 304, Canadian Machinery. c4m

ELECTRICAL ENGINEER—COLLEGE GRADU-
ate, five years' practical experience; now
employed in large industrial plant, electric-
driven; responsible position desired; money not
sole object; recommendations. Box 305, Canadian
Machinery. c26m

FOREMAN TOOL MAKER OPEN FOR EN-
gagement July 15th. Expert on gauges, jigs,
dies and tool equipment, both for shells, fuses
and interchangeable manufacturing; 15 years'
experience. Apply to J. T. Jamieson, 2647 St.
Urbain St., Montreal, Que. c2m

A PRACTICAL MACHINE SHOP SUPERIN-
tendent of broad experience in Canada and
States will be open for position as superintend-
ent or general foreman, July 15th. All refer-
ences. Address Producer, Box 321, Canadian
Machinery. c3m

SITUATIONS VACANT

THOROUGHLY CAPABLE BRASS FOUNDRY
Foreman to take charge of small foundry do-
ing a general jobbing business and also munition
work. Location Montreal. Address for infor-
mation, "Brass Foreman," P.O. Box 1934, Mon-
treal. c26m

WANTED—TWO EXPERIENCED BORING
lathe hands to take charge on day and night
shifts, of battery of boring lathes for 6" Mark III.
shell. Only men who can get good bores and
high production need apply. Give in the first
instance, experience, wages required and full par-
ticulars, otherwise application will not be con-
sidered. Box 317, Canadian Machinery. c26m

WANTED — ASSISTANT SUPERINTENDENT
for six-inch shell factory. Must be capable
of getting maximum production from an estab-
lished plant and have good mechanical experience.
Duties to consist chiefly in supervising production.
Give full particulars in writing of previous ex-
perience, age, references, and salary required, to
Henry Hope & Sons of Canada, Ltd., Peterboro.
All information will be treated in the strictest
confidence. c5m

TECHNICAL ADVERTISING MAN — LARGE
manufacturing concern near Toronto, building
a general line of heavy machinery, requires a
young man to take care of its advertising; must
be able to prepare machine descriptions from blue
prints and to write clear, concise English; adver-
tising experience desirable, but not necessary;
please state age, nationality, experience and
salary desired, and send samples of your work
with first letter. Box 320, Canadian Machinery. c26m

TORONTO ENGINEERING AGENCY ARE RE-
quested to find six good all round machinists,
non-union men, 45c per hour, for permanent
munitions plant. Men will be paid more according
to ability. For town sixty miles from Toronto.
Also three engine lathe men and good tool-
makers for town sixty miles from Detroit, 45c
per hour. More will be paid according to ability.
Also lathe hands for night shift, city plant.
Employment Agency, 57 Queen W., Toronto.

FOR SALE

Five Newton Coli Saws 22" and 26" blades for either Belt or Motor drive, complete, first-class condition.

The Canada Metal Co.

35 Fraser Ave.

TORONTO ONT.

FOR IMMEDIATE DELIVERY

No. 28—17" x 96" Brown & Sharpe Plain Grinder.

Pratt & Whitney Vertical Surface Grinder, 36" Table.

No. 1½ Bath Universal Grinder, complete tool room equipment.

No. 1½ Landis Universal Grinder, for Internal and External Grinding.

36 ft. Niles Plate Planer.

Lynd-Farquhar Co.

Boston, Massachusetts

Help Wanted

An ad for help in the Classified Advertising Section will bring the right kind of replies.

Try It Out.

Canadian Machinery

Classified Advertising Section

143-153 University Ave., Toronto

H. W. PETRIE of MONTREAL Limited Montreal, Que.

LIST OF NEW AND USED MACHINERY IN STOCK FOR IMMEDIATE SHIPMENT

ENGINE LATHES

- New 13" x 5' Lancaster Sgl. B.G., Gearl Feed.
- New 15" x 6' South Bend, Sgl. B.G., Stan. Change Gears.
- S.H. 15" x 6' South Bend, Sgl. B.G., Stan. Change Gears.
- New 16" x 6' South Bend, Sgl. B.G. Stan. Change Gears.
- New 15" x 7' Oliver Dbl. B.G., Q.C. Gear, Oil Pump and Fan.
- New 15" x 24" x 10' South Bend Gap Sgl. B.G., Stan. Change Gears.
- S.H. 17" x 8' Greaves Klusman Sgl. B.G., Geared Feed.
- New 18" x 8' Greaves Klusman Dbl. B.G., Geared Feed.
- New 18" x 8' Giddings & Lewis Dbl. B.G., Geared Feed.
- New 18" x 8' Stevens Sgl. B.G., Standard Change Gears.
- New 18" x 8' South Bend Sgl. B.G., Stand. Change Gears.
- S.H. 18" x 10' Muller Sgl. B.G., Standard Change Gears.
- New 18" x 10' South Bend Sgl. B.G., Stand. Change Gears.
- S.H. 20" x 10' Flather Sgl. B.G., Standard Change Gears.
- S.H. 36" x 10' Fay & Scott Sgl. B.G., Stand. Change Gears.

HEAVY DUTY MANUFACTURING LATHES

- New 20" x 8' Petrie Heavy Duty Manufacturing Lathes.

TURRET, SPEED AND BRASS LATHES SCREW MACHINES

- New 13" x 7' Putnam Speed Lathe.
- S.H. 15" x 5' 6" Fox Brass Lathe with Chasing Attachment.
- S.H. 30" x 10' Vilter Lathe, Friction B.G., Geared Feed with 18" Hex. Power Feed Turret.
- New No. 0 Foster Plain Head Screw Machine, with wire feed and automatic chuck.

DRILLS

- New 3" Dresses Plain Radial, Gear Box Drive.
- New 20" Excelsior, Back Geared Wheel Lever, Power Feed.
- New 24" Silver, Back Geared Wheel Lever Power Feed.
- New 14" Leland Gifford Single Spindle Sensitive.
- S.H. 14" Avey Spindle Spindle Sensitive.
- S.H. 14" Foote-Burt Four.
- New No. 1 Emco Bench Single.

HACK SAW MACHINES

- New Peerless High Speed.
- New No. 1 Atkins Kwit-Kut.

GRINDING AND BUFFING MACHINES

- New 20" Ford Smith Water Tool Grinder.
- New 18" Ford Smith S.O. General Purpose Pedestal Grinder.
- New 16" Ford Smith S.O. General Purpose Pedestal Grinder.
- New 12" Ford Smith S.O. General Purpose Pedestal Grinder.
- New 12" Ford Smith S.O. Combination Grinder and Buffer.
- New 12" Ford Smith S.O. Buffing Machine.
- New Style B, Point Yankee Twist Drill Grinder.

MISCELLANEOUS

- S.H. No. 22 Garvin Vertical Milling Machine.
- S.H. No. 6 Burke Hand Milling Machine.
- New 1½" National Bolt Cutter with Lead Screw Attachment.
- New No. 1 Grabo Metal Saw Table.
- New D4 Rock River Slitting Shear.
- New No. 1 Chicago Steel Bending Brake.

Telegraph, Phone or Write for Prices and Further Particulars

H. W. PETRIE of MONTREAL LIMITED MONTREAL, QUEBEC

PETRIE'S LIST

Of New and Used Machine Tools Stock for IMMEDIATE DELIVERY

TURRET LATHES AND SCREW MACHINES

- 15" x 5½' American, fox.
- 16" x 6' Pratt & Whitney, turret.
- 18" x 6' Prentice, high speed.
- 22" x 8' Pratt & Whitney.
- 24" x 8' Lodge & Shipley.
- 26" x 8' Fay & Scott, B.G.
- 32" x 18" Lodge & Shipley, pulley.
- No. 2 Warner & Swasey, plain head.
- No. 6 Warner & Swasey, friction head.

ENGINE LATHES

- 14" x 6' Lodge & Shipley.
- 15" x 6' London, back geared.
- 16" x 8' McDougall, back geared.
- 16" x 8½' Cincinnati, D.B.G.
- 17" x 8' Blaisdell, back-geared.
- 18" x 6" New Haven.
- 18" x 10' Putnam, back-geared.
- 20" x 8' Fifield, back geared.
- 21" x 9' back-geared, single purpose (4).
- 22" x 8' Bawden, heavy duty.
- 24" x 11' Pond, back-geared.
- 30" x 10' Ames, back geared.
- 31" x 16' Fifield, back-geared.
- 18" x 32" x 12' C.M.G. gap.
- 20" x 38" x 16' double back gear, gap.
- 24" x 44" x 20' C.M.C., gap.

UPRIGHT DRILLS

- 13" Perfect, 2-spindle.
- 14" Excelsior, sensitive.
- 16" Barr, sliding head.
- 18" Buffalo, post drill.
- 20" Perfect, lever feed.
- 20" Silver, back-geared.
- 22" Barnes, back-geared.
- 24" Kerkhoff, sliding head.
- 40" Bickford, back geared.
- 64" Canedy-Otto, wall radial.
- No. 10a Baush, 16-spindle.
- No. ½ Avey, ball-bearing, bench.

GRINDERS

- No. 1 Wilmarth & Morman.
- No. 1 Cincinnati, universal tool.
- No. 2 Landis.
- No. 2 Sellers, universal.
- No. 3 Modern, universal.
- No. 14 Besly, with shell holder.
- 26" Gardner, disk.

IRON PLANERS

- 20" x 20" x 5' Bertram.
- 24" x 24" x 6½' Bertram.
- 24" x 34" x 8' Cincinnati, 2 heads.
- 25" x 25" x 12' Lodge & Davis.
- 26" x 36" x 10' Sellers, 4 heads.
- 40" x 40" x 12' New Haven, power feed.

MILLING MACHINES

- Nos. 0 and 1 Burke, hand feed.
- Bertram, plain.
- Brown & Sharpe, power feed, plain.
- Fitchburg, geared, plain.
- Monarch, vertical.
- Loudon, universal.

SHAPERS.

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

MISCELLANEOUS

- 6" and 8" Racine Hack Saws.
- 4" and 6" Robertson Hack Saws.
- 6" Kennedy Cutting-off Machine.
- 12" Hall Pipe Machine.
- No. 2 Colburn Keyseater.
- No. 5 Grant Rotary Riveting Hammer.
- Nos. 1 and 3½ Greenerd Arbor Presses.
- No. 2 Bliss Foot-power Press.
- Brown-Boggs Punching Press.
- Bertram Single-end Punch and Shear.
- No. 3 Dundas Double-end Punch and Shear.
- 7' Geared Bending Rolls.
- 1500-lb. Toledo Drop Hammer.
- 450-lb. Williams Drop Hammer.

H. W. PETRIE, LTD.

FRONT STREET WEST, TORONTO

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

RIVERSIDE'S Machinery List

We Own Every Tool Offered

ENGINE LATHES

- 1-8 x 10 Hamilton Standard Engine Lathe, with turret
1-28 x 15 Putnam Standard Engine Lathe
1-22 x 14 Putnam Standard Engine Lathe
1-New 18 x 8 Springfield Engine Lathe.
1-New 16 x 8 Springfield Engine Lathe.
1-New 14 x 6 Springfield Engine Lathe.
1-16 x 8 Davis Engine Lathe, tape attachment.
1-18 x 6 Jones & Lamson Standard Engine Lathe.
1-16 x 8 Porter Standard Engine Lathe.
1-16 x 8 Reel Stud Lathes.
1-11 x 6 Lodge & Shipley Engine Lathe.
1-14 x 6 Springfield Engine Lathe.
1-11 x 6 Proctiss Engine Lathe.
1-14 x 6 Hamilton Engine Lathe.
1-14 x 6 Sebastian Engine Lathe.

TURRET AND S. REW MACHINES

- 1-24 x 36 Jones & Lamson Flat Turret Lathe, S.G.H.
1-24 x 24 Jones & Lamson Flat Turret Lathe, S.G.H.
1-2 x 24 Jones & Lamson Flat Turret Lathe, cone head.
4-No. 4 Foster F.G.H. Hand Screw Machines.
1-No. 3 Foster F.G.H. Hand Screw Machines.
1-No. 5 Pierson F.G.H. Hand Screw Machine.
1-No. 4 Smur & Kamen Hand Screw Machine.

- 4-New 14" Pierce Turret Lathes.
1-New 1 x 8 Pierce Hand Screw Machines.
2-2" Cleveland Automatic Screw Machines, jigger feed.

MILLING MACHINES AND PLANERS.

- 5-No. P2 Knight Milling and Drilling Machines.
3-No. 13 Pratt & Whitney Lincoln Type Milling Machines.
1-No. 1 Cincinnati Plain Milling Machine.
3-Fox Hand Milling Machines.
1-44mm Hand Miller.
1-27 x 27 x 7" Cincinnati Planer.
1-22 x 22 x 5" New Haven Planer.
1-20 x 20 x 3" New Haven Planer.

DRILL PRESSES.

- 1-24" Baker Heavy Duty High Speed Drill.
1-3 spindle 8" Overhang Henry & Wright High Speed Drill.
3-12" Leland & Gifford High Speed Bench Drills.
5-24" Buffalo Plain Drill Presses.
4-6 spindle Fox High Speed Drill Presses.
2-4 spindle Fox High Speed Drill Presses.
1-3" Mueller Plain Radial Drill.
1-6" Mueller Plain Radial Drill.

SHAPERS AND SLOTTERS.

- 1-34" New Barker Crank Shaper.
1-24" Lodge & Davis Geared Shaper.
1-18" Hendley Geared Shaper.
1-16" Hendley Geared Shaper.
1-16" Garvin Shaper.
1-16" Ohio Crank Shaper.
1-16" Smith & Mills B.G. Crank Shaper.
2-16" New Springfield B.G. Crank Shapers.
1-24" Niles Geared Type Slotter.

PRESSES AND HAMMERS.

- 1-Waterbury Farrell Straight-sided Geared Press with double cam knock out.
3-No. 2-W Bliss Wiring Presses.
1-800-lb. B. & S. Roll Board Hammer.
1-800-lb. Pratt & Whitney Roll Board Hammer.
1-500-lb. Seranton Belt Hammer.
1-24-lb. Bradley Helve Hammer.

AIR COMPRESSORS.

- 1-8 x 6 Westinghouse Steam Air Compressor.
1-16 x 18 x 12 Union Steam Pump Co Steam Driven Air Compressor.
1-10 x 10 Ingersoll Sargent Belt-driven Air Compressor.
1-10 x 10 Clayton Belt-driven Air Compressor.
1-9 x 8 Ingersoll Rand Belt-driven Air Compressor.
1-8 x 8 Fairbanks-Morse Electrical driven Air Compressor.
1-8 x 8 Gardner Single Belt-driven Air Compressor.
1-8 x 8 Union Steam Pump Co's Belt Air Compressor.
1-7 1/2 x 6 Chicago Pneumatic Tool Co. Belt-driven Air Compressor.
1-6 x 6 Chicago Pneumatic Tool Co. Belt-driven Air Compressor.

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

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

RIVERSIDE MACHINERY DEPOT

17-29 St. Aubin Avenue
DETROIT, MICH.

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

Second-hand Machinery

FOR SALE BY

The Motch & Merryweather Machinery Company

711 Lakeside Ave., N.W.

Cleveland, Ohio

Branches: DETROIT, CINCINNATI, PITTSBURGH

AUTOMATICS.

- 2" Cleveland.
No. 22 New Britain Chucking.
No. 23 New Britain Chucking.
No. 33 New Britain Chucking.

BROACHING MACHINES.

- No. 1 J. N. Lapointe
No. 2 Lapointe Machine Tool Co.
No. 3 Lapointe Machine Tool Co.

DRILLING MACHINES.

- 15" Barnes.
10" Burke Sensitive.
4-Spindle Allen.
4-Spindle No. 1 1/4 Foote-Burt Rail.
1-Spindle No. 2 Avey.
2-Spindle No. 2 Avey.

GRINDERS.

- 6" x 32" Norton.
10" x 30" Norton.
10" x 50" Norton.
10" x 30" Landis.
No. 1 Cincinnati Cutter.
No. 2 Brown & Sharpe Universal.
No. 2 1/2. Bath Universal.
No. 3 Osterlein.
No. 12 Gardner, duplex disc.
24" Double Wet Tool.
20 x 1 1/2 Single Wet Tool.
No. 200 Heald, ring.

HAMMERS.

- 35-lb. Williams & White, power tire welding.
No. 3 Standard 300-lb. Belt Drop.
1200-lb. Bell, Steam.

KEYSEATERS.

- No. 1 Davis.
No. 2 Mitts & Merrill.
18" x 1 1/2" Norton.

LATHES.

- 14" x 6" Sebastian.
14" x 6" Reed, Extra Heavy Stud.
16" x 6" Lodge & Shipley, Patent Hd.
16" x 8" Walcott.
16" x 8" Reed Stud.
16" x 6" Harrington.
16" x 10" Rahn-Carpenter.

- 18" x 8" Lodge & Shipley, Three-step Cone, D.B.G.
18" x 8" Lodge & Shipley, Pat. Head.
18" x 8" LeBlond.
18" x 8" Bradford.
18" x 8" Walcott, Q.C.
18" x 10" Monarch, Q.C.
18" x 12" Monarch, Q.C.
20" x 8" Walcott, Q.C.
30" x 14" Lodge & Shipley.

MILLING MACHINES.

- No. 2 Osterlein.
No. 7-H Becker, Lincoln Type.
No. 00 Brown & Sharpe.
No. 8 Pratt & Whitney, hand.
No. 10 Pratt & Whitney, hand.

PLANERS.

- 24" x 24" x 5' Blaisdell, one head.
26" x 26" x 6' Pond.
36" x 36" x 10' Sellers, 4 heads.

PIPE MACHINES.

- 12" Curtis & Curtis.

PRESSES.

- No. 2 Consolidated, Plain Inclined.
No. 5 Stiles & Parke Blanking Press.

SAWS.

- 6" Atkins "Kwick-Kut."
7" High Duty Paragon.

SCREW MACHINES.

- 1 1/2" Foster, motor drive.
1 1/2" Warner & Swasey.
4 1/2" Bardons & Oliver.

SLOTTERS.

- 12" Industrial.

TURRET LATHES.

- 2" Jones & Lamson.
14" Warner & Swasey.
16" Bardons & Oliver.
21" Gisholt.
22" Libbey.
24" Gisholt.

MISCELLANEOUS.

- Flywheel Balancing Machine, Rockford.
Oil Separator, Curtis.

The Costliness of Man-time

HOWEVER necessary it may be to employ flesh and blood salesmen to sell your merchandise to farmers, you cannot possibly overtake all your prospects by this method alone. It would bankrupt you.

You must employ the method of influence and persuasion known as Modern Advertising. By this means you can make known what you have to sell to all farmers everywhere, simultaneously.

Suppose you cannot afford to use all the farm papers, and are looking for one hav-

ing national circulation. This one medium is

The FARMER'S MAGAZINE

This should impress you: The Farmer's Magazine is the best produced farm paper in Canada—3-color covers, fine illustrations, good paper, good typography and printing, and most important of all, the best edited. A sample copy will convince you.

If the farmer is your customer, use The Farmer's Magazine.

N.B.—Objectionable advertising not accepted. Both editorial and advertising columns are closely censored to keep them clean and decent.

Published by

The MacLean Publishing Co., Limited
143-153 University Avenue, Toronto, Ontario

GOOD USED EQUIPMENT

ELECTRIC TRAVELING CRANES.

- 50-Ton Niles, 61' 7" span, 350 v. cts., 100' wire
- 10-ton auxiliary hoist
- 15-Ton Browning, 49' 0" span, 20 v. cts., D.C., with 5-ton auxiliary hoist
- 20-Ton Allied Box 49' 0" span, 20 v. cts., D.C., with 5-ton auxiliary hoist
- 20-Ton, hand, 29' 6" span
- 10-Ton, hand, 35' 0" span
- Hand Cranes, 2 to 7 1/2 tons, 11' span to 10'

BRAKE AND PRESSES.

- 13' 6" Garrison Brake or Press, double back geared, capacity 3/4" plate full width, weight about 156,000 lbs.; condition like new.
- No. 11 Perkins (Trimming), 3/4" stroke, 1,500 lbs.
- No. 25 Advance (Punch), 2" stroke, 1,000 lbs.
- No. 65 Toledo (Cam Drawing), E.G., 1,500 lbs.

PUNCHES AND SHEARS.

- Punch, New Duty hand, 15" dia., cap. 1500 lbs.
- Punch and Shear, hand, 10 1/2" dia., cap. 1500 lbs.
- Punch and Shear, 17" throat, cap. 1500 lbs., 3/4" dia.
- P. & S. Cleveland, cap. 1500 lbs., 3/4" dia.
- P. & S. No. 3 H. & J., cap. 13x17", 36" throat.
- P. & S. Condit & McKenna, cap. 6000 lbs., 3/4" dia.
- P. & S. 43" dia., cap. 3x1 1/4", steam engine.
- Shear, Alligator, No. 2 Farrell, cap. 2000 lbs.
- Shear, Angle (double), H. & J. No. 3, cap. 6x6 1/2".
- Shear, Plate (splitting), 18" blade, cap. 3/4".
- Shear, Lemox Rotary Hand, cap. 1500 lbs., 3/4" dia.
- Shear, Lemox Rotary, splitting, cap. 1500 lbs., 3/4" dia.

MISCELLANEOUS.

- Acme Rivet and Upsetter, 1 1/2" cap.
- Bending Roll, 6", drop end, 6 1/2" and 8" rolls.
- Bending and Straightening Mch., 24" dia., 1" jaw.
- Cold Saw, Newton, 4" blade, 1/2" dia.
- Wall Drills, 35' reach, 1 1/2" dia.

First-class second-hand condition.

PROMPT SHIPMENTS

McCoy-Brandt Machinery Co.
Office and Warehouse:
216-218 Penn Ave., Pittsburgh, Pa.

FOR SALE

Equipment used for making 18-pr. Shells.

- 1—Warner & Swasey Turret Lathe, 20" x 24", with attachments.
- 1—Linderman Double Spindle Boring Machine, with attachments for finish boring shrapnel and nose turning H.E.
- 1—Flather & Co. 14" x 5' 0" Lathe, with chuck and countershaft.
- 1—Fosdick 16" x 6' 0" Lathe, with collet chuck and countershaft.
- 1—Braopese 16" x 6' 0" Lathe, collet chuck and taper attachment.
- 1—Goldie & McCulloch Nosing Press with Dies.
- 1—Beatty Accumulator.
- 1—Lees-Bradner Thread Miller, with attachments and countershaft.
- 1—Jones & Lamson Turret Lathe, 20" x 24".
- 1—40-gallon Bowser Tank and Pump; good as new.
- 1—Cell Saw, with variable speed motor, 60 cycle, 220 volt, cuts up to 9" stock, complete with three saws.
- 1—Connection Pyrometer with Rheostat, made by Taylor Instrument Co.
- 1—Thermo Couples, 39" long, bent 12 1/2" from nose.
- 1—Thermo Couples, 39" long, straight.
- 1—One Connection Types Pyrometer, made by Taylor Co.
- 1—Bertram Hand Turning Attachment, for 24" Lathe, Ball-bearing Centre.

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

M. Beatty & Sons, Limited
Welland, Ont.

Machine Tools

IN

Cleveland Stock

BORING MILLS.

- Foote-Burt 2-Spindle Vertical Cylinder Boring Machine, 4" spindles, 10" table feed.
- 36" Bullard 2-Swivel Head Vertical Boring Mill, 3-jaw table chuck, gear feed, cone drive; very good.

DRILLS.

- 20" Prentiss, hand and power feed, sta. hd., upright; very good.
- 24" Aurora, sliding head, power feed, bk. dg.; very good.
- 26" Barnes, sta. hd., bk. gears, power feed; good.
- 36" Bickford Plain Radial Drill, cone drive, swinging table, belt power feed; very good shape.
- 42" Bickford, plain radial, single pulley drive, gear feed, tapping att., square box table, planed base; A1.

GRINDERS.

- Greenfield Tool and Cutter Grinder, complete.
- Landis 10 x 20 Universal Grinder, with all parts; very good.

LATHES.

- 14" x 6' LeBlond, with plain rest and plain feeds; good.
- 14" x 6' LeBlond Regular Engine Lathe, taper att., hollow spindle, screw cutting; complete.
- 24" x 24" Pond Comp. Rest Lathe, arranged for shaft turning, and including double tool holder and rests.
- 32" x 12' Prentiss Comp. Rest Lathe, belt feed, hollow spindle, all change gears and parts; in excellent condition.

PRESSES.

- No. 2C Stiles Plain Punch Press, 12" throat, 1 1/2" stroke, 24" flywheel; excellent condition.
- 76 1/2" Bliss Straight Side Press, single crank, tie rod frame, double geared, friction clutch, 18" stroke, 12" die space, 7" shaft.
- 77 1/2" Bliss Straight Side Press, single crank, tie rod frame, double geared, friction clutch, 10" stroke, 17" die space, 8" shaft.
- 78 1/2" Bliss Straight Side Press, single crank, tie rod frame, double geared, friction clutch, 10" stroke, 24" die space, 10" shaft.
- 165 1/2" Toledo Single Crank Toggle Drawing Press, capacity up to 25" blanks, 19" punch, will draw and lift out up to 9 1/2".

MISCELLANEOUS.

- 75-lb., 7 150-lb. Bradley Upright Strap Hammers, good shape.
- 30" American Wood Band Saw, plain table, 4-step cone drive for 8" belt.
- Peerless High-speed Cut-off Saws, 6"-9"-13" sizes.
- Grant-Lees 18 x 4 Hobbing Machine, for spirals, spurs and worms.
- Bement Miles Heavy Vertical Boring Machine, 7" spindle, capacity for drilling up to 12" or 15", solid steel.

CYRIL J. BATH & CO.

Offices Warehouse
428 Leader-News Bldg. 1031 West Front St.
CLEVELAND, O.

NEW MACHINE TOOLS FOR IMMEDIATE DELIVERY

LATHES.

- 9" x 4' Seneca Falls Bench Lathe, with compound rest and countershaft.
- 14" x 6' Monarch Quick-change Lathes, with opd. rest.
- 17" x 8' Sidney Quick-change Lathe, with 5-step cone and double back gear.
- 20" x 7' Oliver Quick-change Lathe, with 3-step cone, double back gear, pan and pump.
- 24" x 10' Wickes Standard Lathe, with 7-step cone and double back gear.
- 24" x 12' Wickes Standard Lathe, with 7-step cone and turret tool post.

GRINDERS.

- No. 2 Cincinnati 12 x 20 Plain Grinder.
- Six-Fifteen Fitchburg Plain Grinder (Hand Feed).
- Six-Fifteen Fitchburg Grinder (Automatic Feed).
- No. 2 Bath Universal Grinder (10 x 50) "C" equipment.
- No. 2 1/2 Bath Universal Grinder (10 x 36) "C" equipment.
- No. 3 Wilmarth & Morgan Surface Grinder (8 x 24).
- No. 2 Diamond Automatic Surface Grinder (36 x 12 x 12).
- No. 2 Oersterlem Universal Cutter and Tool Grinder.
- No. 3 La Salle Plain Surface Grinder.
- Capitol Internal Grinder.

DRILLS.

- No. 1-S. Garvin B. G. Duplex Horizontal Drill.
- ### MILLERS.
- No. 1 American Lincoln Type Miller.
 - No. 6 Whitney Hand Milling Machine.
 - No. 1 1/2 Valley City B. G. Plain Milling Machine.

POWER PRESSES.

- No. 3 Niagara O-B-I Power Press.
- No. 5 Niagara O-B-I Power Press.
- No. 6 Niagara O-B-I Power Press.
- No. 5 Toledo General O-B-I Power Press.

MISCELLANEOUS.

- 1 1/2" Dresser Friction Head Screw Machine.
- Power Feed to Turret.
- No. 15 Lea-Simplex Cold Metal Saw.
- No. 18 Lea-Simplex Cold Metal Saw.
- 3" Geometric Threading Machine.

THIS IS ONLY PARTIAL LIST SEND US YOUR INQUIRIES
Also Woodworking Machinery, Ship Tools and Supplies.
Address: Machinery Dept.,
Chas. A. Strelinger Co., Detroit, Mich.

C. W. CULLEN MACHINERY CO.

LEADER-NEWS BUILDING CLEVELAND, OHIO

- American 5' Plain Radial Drill, 3" spindle, box table, b.g., tapping attachment, M.D.
- Bickford 4' Plain Radial Drill, cone drive, La Pointe Broaching Machine.
- Toledo No. 204 Spc. Double Crank Press.
- Toledo 400-lb. Board Drop Hammer.
- 2—P. & W. No. 2 Cutting-off Machines.
- Bement Miles & Co. 7 1/2" Spindle, Vertical Drilling and Boring Mill, 68" swing.
- Gardner No. 24 Belt-driven Disc Grinder.
- Bradley 150-lb. Upright Strap, 150-lb. helve, 75-lb. Upright Strap Hammers.
- Detroit Japanning Ovens, 8' 10" x 8' x 152".
- Gisholt 28" Turret Lathe, taper attachment, M.D.
- Pratt & Whitney 48" Gap Lathe.
- Hanna 30-ton Riveter.
- Pangborn Sand Blast, 84" rotary table, M.D.
- 3 800-ton G.E. Hydraulic Double Action Presses.
- 1 Toledo Toggle Press, No. 165 1/2.
- 1 Ferracite Press, Dagg 66.
- Bliss Presses—3 No. 60 1/2, rack and pinion; 1 No. 77 1/2; 1 No. 87 special geared.
- 3—2 1/4 Cleveland Automatics; prac. new.
- 10—3/4" B. & S. Automatics.
- 5—3" x 36" J. & L.
- Allis-Chalmers 150 H.P. Corliss Engine, 12' F.W.
- Bruce MacBeth 150 H.P. Gas Engine; new.
- 2—Rathmann Jones Gas Engines, 125 and 225 H.P.

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

FOR SALE

BORING MACHINE—VERTICAL.

- 1 30" Colburn, 1 turret head.
- 1—New 30" Gisholt, one turret head, Sept. delivery.
- 1—34"-42" New Colburn, one turret head, Aug. delivery.
- 1—34" Rogers, one turret head, Sept. delivery.
- 1—36" N-B-P, one plain and one swivel head.
- 2—36" B. & S., one turret head.
- 12—New 42" Putnam—2 heads, Nov. delivery.
- 1—53" N-B-P, two swivel heads.
- 1 72" Niles, two swivel heads.

BORING MACHINES—HORIZONTAL.

- 1—Lucas, 2 $\frac{1}{4}$ " bar.
- 1—New No. 1 Cleveland, 2 $\frac{1}{2}$ " bar.
- 1—Hoefler Horizontal Driller and Borer with 1 11-16" spindle, vertical adjustment 40", horizontal adjustment 46", size of table 33" x 48".
- 1—New No. 2 Barrett Cylinder, Nov. delivery.

BULLDOZERS.

- 1—New No. 4 Garrison, same specification as No. 4 Williams & White.
- 1 No. 7 Ajax, 20" stroke.
- 1—No. 7 High-speed Ajax, 16" stroke.

COMPRESSORS—AIR.

- 1 8" x 8" Curtis, belt-driven.
- 1—10" x 10" x 10" Single Cylinder Smith-Vaile, steam driven.
- 1—10" x 12" Chicago Pneumatic, belt driven.
- 1—12" x 12" American, belt driven.
- 1—16" x 12" Chicago Pneumatic, Duplex, belt driven.
- 1—10"-16 $\frac{1}{2}$ " x 13" Peerless, cross compound, steam driven.
- 1—22"-13" x 16" Ingersoll-Rand, motor driven.

CUTTING-OFF MACHINES.

- 2—No. 0 Brown & Sharpe.
- 1 2" capacity Warner & Swasey.
- 2—3" Curtis & Curtis.
- 3—4" Curtis & Curtis.

CRANES—ELECTRIC.

- 1—5-ton P. & W., 4-motor, 10' span, 25' lift, 220 v., D.C., with one ton auxiliary hoist.
- 1—8-ton Phoenix, 38' 10" span, 220 v., D.C.

DRILLING MACHINES—RADIAL.

- 1 New 3' Mueller, plain, speed box drive.
- 1 36" Bickford, plain, speed box drive.
- 1 New 3 $\frac{1}{2}$ ' Mueller, cone drive, July delivery.
- 1 New 3 $\frac{1}{2}$ ' Carlton, cone pulley drive.
- 1 New 3 $\frac{1}{2}$ ' Western, July delivery.
- 2—4' Mueller, plain, speed box drive.
- 1—5' Bickford, plain, speed box drive.
- 1—5' American, plain, motor driven.
- 5—5' Special, 2 $\frac{1}{2}$ " spindle, arm does not raise and lower, hand feed.
- 1—New 6' Fosdick, speed box drive, July delivery.

DRILLING MACHINES—HEAVY DUTY.

- 3—No. 14 Colburn, 24" swing, capacity 2" in solid steel.
- 2—No. 26 Foote-Burt, 44" swing, 3 $\frac{1}{2}$ " capacity in solid steel.

DRILLING MACHINES—MULTIPLE SPINDLE.

- 1—30C Baush 12-spindle, capacity 1 $\frac{1}{8}$ " holes, 30" circle.
- 1—Gardam, 12-spindle, capacity $\frac{3}{8}$ " holes, 11" square.
- 1—No. 5 Fox, 12-spindle, rectangular head, 20" x 30", capacity 1" holes, tapping attachment, speed box drive.
- 1—14-spindle Baush, capacity 1" holes, 36" circle.

GEAR CUTTING MACHINES.

- 1—12" G. & E. Gear Hobber.
- 1—12" Gleason Bevel Gear Planer.
- 1 15" Gleason Bevel Gear Planer.
- 1—16" Bilgram Bevel Gear Generator.
- 1—20" Grant-Lees Gear Hobber.
- 1—No. 1 20" Schuchardt & Schutte Gear Hobber.
- 1—22" x 8" Gear Cutter for Spur and Bevel.
- 1—24" Fellows Gear Shaper.
- 1—24" x 8" G. & E. for spur and bevel.
- 1—26" x 10" Cincinnati, spur gears only.

1—No. 3 26" B. & S., spur gears only.

1—New 30" Flather, spur gears only.

3—36" Fellows Gear Shapers.

1—50" x 11" G. & E., spur gears only.

GRINDERS—UNIVERSAL—FOR CUTTERS, DRILLS, REAMERS, ETC.

- 1—New Norton, No. 1.
- 1 New Wilmarth & Morman, style BX.
- 1—No. 1 Cincinnati.
- 1—New Walker No. 2, outfit K (capacity 9" x 26").
- 4—No. 190 Wells.

GRINDING MACHINES—CYLINDRICAL—PLAIN.

- 1—No. 11 (6 x 30") Brown & Sharpe.
- 1—6" x 48" Pratt & Whitney.
- 1—New No. 12 (8" x 26") Brown & Sharpe.
- 1—10" x 50" Norton.
- 1—No. 16 (10" x 72") Brown & Sharpe.
- 6—12" x 24" Modern, self-contained.
- 6—12" x 36" Modern, self-contained, motor driven.
- 6—12" x 48" Modern, self-contained, motor driven.

1—14" x 72" Queen City.

1 16" x 66" Landis, with crank grinding.

1—18" x 96" Brown & Sharpe.

1 New 10" x 36" Landis, immediate.

GRINDING MACHINES—CYLINDRICAL—UNIVERSAL.

- 1—No. 1 Fraser, with surface grinding attachment.
- 1—No. 1 $\frac{1}{2}$ (10" x 30") Landis.
- 1—No. 2 $\frac{1}{2}$ (10" x 36") Bath.
- 1—New No. 2 Bath.
- 1—10" x 42" Modern.
- 1—No. 2 (12" x 30") Brown & Sharpe.
- 10—New No. 2 Morse, cap. 12 x 30", Universal, Dec. delivery.
- 1—No. 3 (12" x 40") Brown & Sharpe.
- 1 12" x 42" Landis.

GRINDING MACHINES—INTERNAL.

- 1—No. 1 $\frac{1}{2}$ Landis.
- 1—No. 70 Heald.
- 1—No. 75 Heald.

GRINDERS—CYLINDER.

- 1—No. 27 Brown & Sharpe.
- 1—No. 60 Heald, single pulley drive.

GRINDERS—DISC.

- 1—No. 14 Besley.
- 1 New No. 17 Gardner (Pattern Makers).
- 1—No. 41 Oliver (Pattern Makers).

GRINDING MACHINES—RING.

- 1—No. 200 Heald.

GRINDING MACHINES—EDGE.

- 1—No. 374 Safety Emery Wheel Co.

GRINDING MACHINES—SURFACE.

- 1—No. 1 Diamond, cap. 12" x 12" x 24", automatic.
- 4—New No. 2 Reid (same as B. & S.).
- 1—22" x 12" x 60" Springfield, planer type, automatic.

GRINDING MACHINES—DUPLEX.

- 1—No. 5 Bath, suitable for grinding cylinders, pistons, piston rings, etc., 16" feed, swivel table, water pump.

GRINDING MACHINES—FACE.

- 1—Diamond Face Grinder, 4' travel, 14" wheels.

HAMMERS—POWER—FORGING.

- 1—40-lb. Bradley Helve.
- 1—150-lb. Bradley Helve, upright.

HAMMERS—BOARD LIFT—DROP.

- 1—200-lb. (no name).
- 1—400-lb. Billings & Spencer.

HAMMERS—STEAM—FORGING.

- 1—400-lb. Toledo.
- 1—400-lb. Zeh & Hahnemann.
- 1—New 600-lb. Bell.
- 1—New 3,000-lb. Bell, September delivery.

KEYSEATERS.

- 1—No. 00 Baker Bros.
- 2—No. 0 Mitts & Merrill.
- 1—No. 2 Mitts & Merrill, motor driven.
- 1 60" stroke Compton Knowles Broacher.

LATHES—ENGINE.

- 1—14" x 6" Bradford, taper attachment.
- 2—16" x 6" LeBlond, pan bed, quick-change gears, taper attachment.

1—16" x 6' LeBlond, quick-change gears.

1—New 17" x 8' National, taper attachment.

1—18" x 8' L. & S., geared head, taper.

9—18" x 8' American, geared head.

3—18" x 9' Chard.

1—New 19" x 8' LeBlond, heavy duty.

1—20" x 16' Greaves-Klusman, taper attachment.

3—22" x 10' Davis.

9—22" x 10' Putnam, oil pan, turrets.

4—24" x 10' Reed.

2 24" x 12' S. & B.

1—24" x 14' Lodge & Shipley, patent head.

4—24" x 14' American, quick-change.

3—New 26" x 12' Boye & Emes.

1—26" x 24' New Haven.

4—New 28" x 12' Boye & Emes.

1—28" x 18' S. & B.

5—New 30" x 14' Boye & Emes.

3—New 32" x 12' Pittsburg pattern.

1—36" x 15' Fifield, 36 x 16".

2—New 36" x 18' Putnam, triple geared.

12—New 36" x 24' Putnam, triple geared.

1—25"-45" x 22' McCabe, double spindle.

1—New 66" x 30' Putnam, Dec. delivery.

1—71" x 20' Fifield, triple geared.

LATHES — MANUFACTURING — NOT SCREW CUTTING.

- 3—No. 1X Reed-Prentice, semi-automatic.
- 2—No. 2X Reed-Prentice, semi-automatic.
- 13—No. 3X Reed-Prentice, semi-automatic.
- 6—No. 11 Amalgamated, for machining and profiling 5" shells.
- 6—14" x 6' Reed Stud and Bolt.
- 3—18" Reed Grooving and Undercutting.
- 70—New Simplex, 16" x 8'.
- 22—18" x 8' Battle Creek, heavy duty.
- 5—20" x 8' Merschon.
- 5—20" x 10' Hindman, high duty.
- 12—21" x 8' LeBlond, quick-change with attachment for grooving and facing both ends of shells with air cylinders and mandrels for 5" shells.
- 18—3 $\frac{1}{2}$ " x 60" Fitchburg, Lo-swing.

MILLING MACHINES—KNEE TYPE—UNIVERSAL.

- 2 New No. 1 Kempsmith.
- 1—No. 1 $\frac{1}{2}$ Garvin.
- 1 No. 1 $\frac{1}{2}$ Hendey-Norton.
- 1—No. 2A Kearney & Trecker, single pulley drive.
- 1 No. 2 Hendey-Norton.
- 3—No. 2 $\frac{1}{2}$ LeBlond, Sept. delivery.
- 2—No. 3H LeBlond, Sept. delivery.
- 1—No. 3 Cincinnati, single pulley drive, high power, vertical attachment.
- 1—New No. 4 LeBlond Heavy Duty, immediate.

MILLING MACHINES—KNEE TYPE—PLAIN.

- 1—No. 14 Garvin.
- 1—No. 21 Garvin.
- 1—No. 0 Pratt & Whitney.
- 3—New No. 1 Rockford.
- 2 New No. 1 Kempsmith.
- 1 New No. 2 Rockford.
- 1—No. 3 LeBlond.
- 1—No. 3 Hendey Norton.

MILLING MACHINES—VERTICAL.

- 3 New Bristol, 10" x 28" table, 21" power feed.
- 1—New No. 4B Becker.
- 2—No. 5 Becker.

MILLING MACHINES—PLANER TYPE.

- 1—No. 1 Beaman & Smith, two vertical spindles, working surface of table 72" x 14".
- 1—No. 1 Beaman & Smith, combined vertical and horizontal, working surface of table 72" x 18".
- 1—Beaman & Smith Slab Miller and Shaft Keyseater, with vertical routing attachment, working surface of table 96" x 17".
- 2—Ingersoll-Rand Slab Millers, working surface of table 60" x 20".
- 2—No. 4 Beaman & Smith, vertical spindle, open side, working surface of table 120" x 24", removable housing on one side.
- 1—Ingersoll Single Spindle, side head, motor driven, table 96" x 30", cutter head 30" in diameter.

W. F. DAVIS MACHINE TOOL COMPANY

CHICAGO, ILL.
32 N. Clinton St.

CINCINNATI, OHIO
1018 Union Central Life Bldg.

CLEVELAND, OHIO
508 Leader News Bldg.

NEW YORK CITY
Singer Bldg.

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

Rebuilt Machines For Sale

PLANERS

- 1-Sellers 30x30x10' with 2 heads
- 5-Sellers 25x25x4'
- 2-Sellers 15x15x8'
- 1-Putnam 24x30x8'
- 1-Putnam 25x35x10'
- 1-Wheeler Heavy 30x30x8' 6"
- 1-Lathe-Morse 24x15x7"
- 1-New Haven 24x15x7"
- 1 Wood Light 30x28x8'
- 1-Putnam 42x40x12' 6"

GRINDERS

- 1-LeBlond Universal Tool and Cutter, power tool, same new.
- 1-Bridgeport Plan, Grind, 14x14
- 1-No. 1 Landis Universal Grind
- 1-No. 3 Landis Universal Grind
- 2-No. 4X Diamond Double End Grinders.
- 1-Erd Smith Plan, Grind.

AUTOMATICS

- 1-1" National Acme Double Belt Type
- 1 1 1/2" National Acme Double Belt Type.
- 1-No. 55 National Acme spindle.
- 1 1/2" National Acme tool spindle.
- 2-No. 54 National Acme tool spindle.
- 3-2" Cleveland.
- 1-2 1/2" Cleveland.
- 2-2 1/2" Gledley Single Spindle Motors.
- 1 3/4" Gledley Single Spindle Motor.

LATHES

- 1-32x12' Draper Lathe, C.R., H.S.
- 1-36x22' Fitchburg Lathe, C.R., P.C.F.

- 1-30x8' Fitchburg, C.R., P.C.F.
- 3-16x8 Putnam, C.R., taper.
- 1-18x8 Porter, C.R., same quick taper.
- 1-18x8 Davis, C.R., pan, pump, taper.
- 1-18x8 Greaves-Klusman, C.R., pan, pump.
- 1-30x8 Perkins Plain Turning, pan, pump.
- 1-14x6 Porter, C.R.
- 1-20x8 LeBlonde, C.R.
- 1-13x5 Seneca Falls, C.R., pan.
- 1-20x8 Perkins Lathes, pan, tool chuck, Fay & Scott turrets.

MISCELLANEOUS

- 1 No. 1 Kemp-Smith Plan, Miller same as new.
- 1-9" Industrial Works Slotter.
- 1 21" Aurora Sliding Head Back Geared Drill.
- 3 Promine 24" Sliding Head Drills.
- 2-Industrial 40" Drills.
- 1-Weston Hydraulic Banding Machine.
- 1-Jonckes Band Turning Lathe, with 3" Universal Chuck.
- 1-30" Aurora Drill.
- 1-Bonan Travelling Head Shaper.
- 1-12" Juengst Crank Shaper.
- 1-12" Putnam Wheel Lathe, table quartering.
- 1-Slater Slab Miller, 24x12x12'.
- 1-No. 21 Lee-Simplex Saw.
- 1-26x10 Cincinnati Gear Cutter.

This is only partial list—Send for full list

Simmons Machine Company, Inc.

NEW YORK, 1001 Singer Bldg., Telephone Cortlandt 6575
ALBANY, N. Y., 985 Broadway, Telephone 4876 Main

New York's Greatest Stock

(Partial List)

PUNCHES AND SHEARS

- 48" SELLERS PUNCH, CAPACITY 6" THROUGH 2" General Engineering Co. Multiple Punch, gap type, punch any length plate, weight about 20,000 lbs. Reade Multiple Punch, 15" throat Hetherington & Berner double geared Beam Punch, 17" throat
- Pels Beam Shear "T-40"
- Alligator Shear, 15" throat, capacity 1" x 6" flats
- Kling Bros. Rotary Splitting Shear, capacity 5/8" plate, any width, weight 13,000 lbs.
- No. 17 Niagara Rotary Shear, circle cutting attachment
- Perkins Model "M" Rotary Shear
- Wm. Sellers double end Punch & Shear, 21" throats, punch 1 1/2" through 1", shear 1" x 6" flats
- Bass double end Punch & Shear, 20" throats, capacity 1 1/4" through 3/4"
- No. 4 Industrial double end Punch and Shear, 20" throats, punch 1" through 1"
- No. 4 Royersford Punch and Shear, 18" throat, punch 1" through 7/8", shear 3" x 8" flats
- McDougall double end Punch and Shear, 15" throat, punch 1" through 3/4"
- Hilles & Jones single end Punch and Shear, punch 3/4" through 5/8", shear 3/8" x 3 1/2" flats
- Coping Machine, 3" stroke, weight 10,000 lbs.

BENDING ROLLS

- Ship Plate, 9'2" between housings
- Niles Plate, 8'6" between housings, drop end housings
- Niles double geared, drop end housing, 40 1/2" between housings

MILLING MACHINES

- No. 4B Brown & Sharpe Plain, single pulley drive
- No. 4 Brown & Sharpe Plain
- No. 4 Cincinnati Plain, heavy duty, single pulley drive
- No. 2 Hendey-Norton Universal
- No. 2 Cincinnati Plain
- No. 2 Cincinnati Universal
- No. 1 1/2 New American Improved Plain
- No. 1 Kemp-Smith Plain
- No. 1 Pratt & Whitney Plain
- No. 3 1/2 Garvin Plain, table 12" x 36"
- Beaman & Smith 2 spindle Vertical, table 24" x 48"

BORING MILLS

- Two 20" Bullard Vertical Turret Lathes
- Three 34" Rogers Vertical, single turret head
- Five 30" Bullard Vertical, single turret head
- Pratt & Whitney Horizontal, 2 1/4" bar
- 48" Niles Car Wheel
- Underwood Automobile Cylinder, 3 5/8" bar

New York Machinery Exchange, Inc.

50 Church Street, New York City

The Crop and Business

In view of the great importance of the crop in relation to the Empire's food supply and Canada's business prosperity, THE FINANCIAL POST will present each week a special article dealing with the developments in a broad way and as they affect the business situation as a whole. This article will be edited by F. M. Chapman, Editor of The Farmer's Magazine, who will have direct and authoritative information on the Western Canadian situation supplied regularly by Miss Cora Hind, a former member of our staff, but now Agricultural Editor of the Manitoba Free Press, a publication whose information for some years has not taken second place even to the current Government statistics. Miss Hind's service will be supplemented by reports from the Provincial Departments of Agriculture from time to time.

THE POST believes that this special on agricultural conditions as presented to the readers of THE POST will prove a very valuable guide to the manufacturers and business men, as well as to the investing public as to the developments of the crop in relation to general business and financial affairs. This is only one of the many news features that THE POST gives its readers every week. It has become so valuable that thousands of them renew year after year.

The Financial Post of Canada

143-153 University Avenue
Toronto, Ontario

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

IMMEDIATE DELIVERY

DRILLING MACHINES

Leland H.S.B.B., Bench type.
No. 1½ Knight Driller and Miller.
14" Rockford Sensitive.
20" Kern, b.g.
No. 25 Foote-Burt 24" Drill (new).
32" Hamilton s.h., b.g., p.f.
12-spindle Multiple P. and W.
No. 30-C Baush, 12-spindle.
20" W. F. & J. Barnes, 4-spindle.

GEAR CUTTERS

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

GRINDERS

Yankee Drill.
Leland Universal, with power feed.
No. 23 B. & S. Gear Cutter.
8" x 30" Modern Plain (new).
14" x 20" B. & S. Plain
Garvin Hole Grinder.
Gisholt Tool Grinder.
No. 5 Diamond Water Tool.
No. 16 Gardner Disc Grinder.
No. 24 Gardner Disc Grinder.

LATHES

No. 3½ Rivett.
No. 3 Cataract.
No. 5 Cataract.

13" x 5' P. & W. c.r. taper.
14" x 6' Davis, p.r.
14" x 6' Fairbanks, c.r. taper.
16" x 6' Prentice, c.r.
16" x 6' Bradford, c.r., q.c.g.
18" x 8' L. & S., pat. head, c.r. taper.
18" x 10' Fitchburg, c.r.
18" x 12' Barker, c.r.
20" x 14' Blaisdell, c.r.
21" x 12' New Haven, c.r.
24" x 13' New Haven, c.r.
32" x 16' Blaisdell, c.r.
36" x 20' American, t.b.g.
3½" x 60" Fitchburg Lo-Swing.

PLANERS.

36" x 36" x 12' Powell, two heads.
36" x 36" x 16' Sellers, one head.
40" x 38" x 14' Putnam, one head.
40" x 40" x 12' New Haven, one head, one side head.

SCREW MACHINES.

1" B. & S., Plain.
16" P. & W., Plain.
No. 2 Foster, Plain Head.
No. 2 Costello, Plain Head.
No. 2 P. & W., Friction Head.
No. 3 Foster, Geared Head.
No. 4 Pearson, Geared Head.
No. 3 Bardons & Oliver, Plain Head.
No. 12½ Garvin, Friction Head.
No. 2-G B. & S. Automatic.
¾" Cleveland Automatic.

TURRET LATHES.

16" Garvin Friction Head, a.c. and w.f.
16" Lodge & Shipley.
25' Niles.
No. 2 Warner & Swasey, Hollow Hexagon.
2" x 24" Jones & Lamson.
3" x 36" Jones & Lamson, chucking equipment.
3" x 36" Jones & Lamson, bar equipment.
21" Gisholt, with taper.
2-24" Gisholt Turret Lathes, taper attach.

PUNCHES AND SHEARS.

No. 2 L. & A. Angle Iron Shears, 5" x 5" x ½" (new).
No. 5 L. & A. Double Punch and Shear, ⅝" in ⅝", 3" x ⅝", 1¼rd (new).
No. 1 L. & A. Multiple Punch (new).
No. 2 L. & A. Multiple Punch (new).
No. 1 L. & A. Horizontal Punch, ½" in 1" (new).

MISCELLANEOUS.

¾" Acme Forging Machine.
52" Niles Car Wheel Boring Mill.
No. 1 Davis Keyseater.
No. 2 M. & M. Keyseater.
No. 3 M. & M. Keyseater.
3" Stover Pipe Machine.
6" x 14" P. & W. Thread Miller.
No. 3A La Point Broacher.
No. 1 American Air Tempering Furnace.
Belt Lacing Machine.
3-Ton Yale Duplex Hoist.
3-Ton Yale Triplex Hoist.

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

We Have for Immediate Delivery the Following Second-hand Machinery in Good Oper- ative Condition

- 1 Landis No. 3 Universal Grinder
12" x 42", complete equipment, less
internal grinding attachment. \$1,500
- 1 Gisholt Turret Lathe, 21", complete
with boring bar equipment and coun-
tershaft \$2,200
- 1 Gisholt Turret Lathe, 21", complete
with boring bar equipment and coun-
tershaft \$1,800

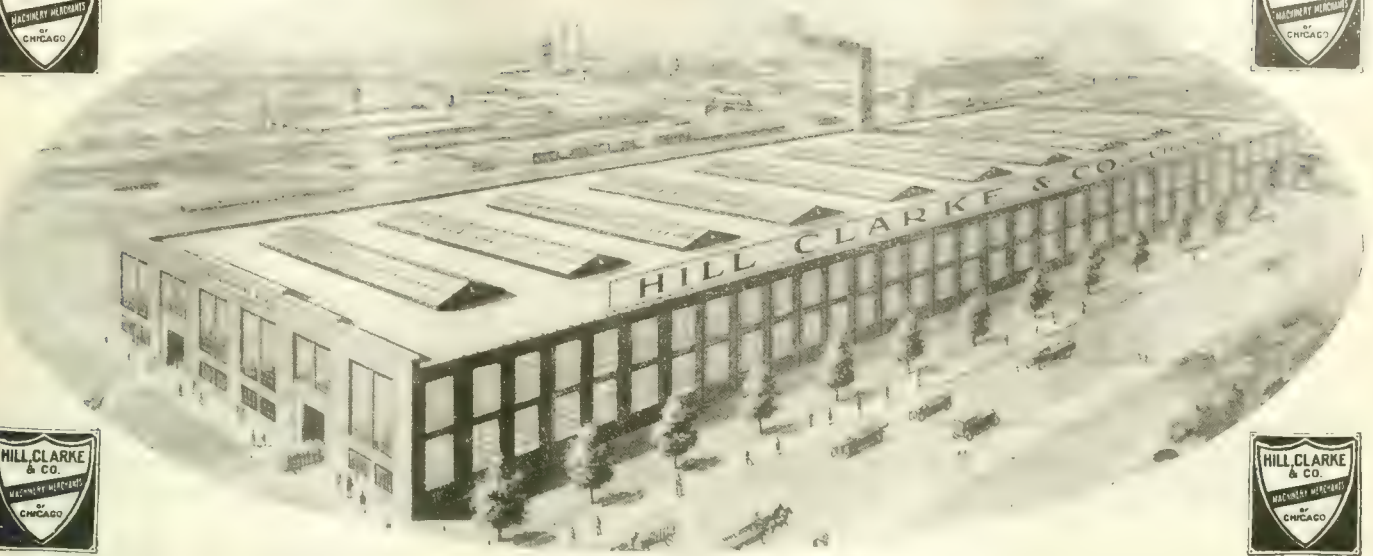
These machines are particularly good
value, and may be seen at our works.

A. B. JARDINE & COMPANY
HESPELER, ONT.

MACHINE TOOLS IN STOCK

- 13" x 7' 6" NEW Carroll-Jamieson.
- 15" x 8' NEW Carroll-Jamieson.
- 12-17" x 8' NEW National, quick change.
- 18" x 10' Rahn Mayer H.S., C.R., T.A.
- 17" x 8' NEW Sidney, D.B.G., quick change.
- 6-19" x 8' NEW Sidney, D.B.G., quick change.
- 20" x 8' Prentice, H.S., C.R., T.A.
- 26"-48" x 14' NEW style, McCabe, double spindle,
heavy pattern, new lathes.
- No. 3 Cincinnati high power Universal Miller.
- 3-No. 1½ NEW American plain Millers.
- No. 1 NEW Hendey Universal Miller.
- No. 0 Steptoe New hand Millers.
- 14" NEW Steptoe Shaper.
- 16" NEW Steptoe B.G. Shaper.
- 15" Bement traveling head Shaper.
- 20" NEW Steptoe B.G. Shaper.
- 24" Flather, B.G. Shaper.
- No. 3 B.&S. Universal Grinder.
- Bath Universal Grinder, 10" x 25".
- 50" x 11" Gould & Eberhardt Gear Cutter.
- 28" NEW Superior sliding head Drill.
- 3-25" NEW Superior sliding head Drills.
- D4 Colburn high duty Drills.
- 3-20" Rockford high duty drills.
- 4' Harrington Radial Drill.

FRANK TOOMEY, INC.
127-131 North Third St., PHILADELPHIA, PA., U.S.A.



OUR REMANUFACTURING PLANT

Has 55,000 square feet of floor space fully covered by traveling cranes. Light as day. 750 machines on the floor. 50 machinists at work.

THIS IS THE OUTSIDE.

COME AND SEE THE INSIDE.

HILL, CLARKE & CO. OF CHICAGO

625 WASHINGTON BLVD., CHICAGO

OUR SPECIALTY

ReMANUFACTURED
 (ORIGINATED BY US) -
MACHINE TOOLS

IN STOCK — IMMEDIATE SHIPMENT

OUR GUARANTEE

YOUR MONEY BACK if you return machine within 30 days from date of shipment, freight prepaid. No excuses necessary.

PLANERS.

- 1—76" x 48" x 18" Woodward & Powell.
- 1—32" x 32" x 10' Gray.
- 1 32" x 32" x 8' Gray.
- 1—30" x 30" x 10' Powell.
- 1—26" x 26" x 7' Gray.
- 1—26" x 26" x 6' American.
- 1—24" x 24" x 6' Cincinnati.
- 2—24" x 24" x 5' Gray.
- 1—24" x 24" x 4' Gray.
- 1—22" x 22" x 6' American.
- 1—22" x 22" x 5' Flather.

SHAPERS.

- 1—48" Morton Draw Cut.
- 1—24" Queen City.
- 1—24" Gould & Eberhardt.
- 2—16" Barker.
- 1—15" Hendey.

MILLING MACHINES.

- 1—No. 3 Hendey.
- 1—No. 5 Schuchardt & Schutte.
- 1 No. 25 Becker-Brinard.
- 1 Hilles & Jones Vertical.
- 1 No. 2 Cincinnati Universal.
- 1 No. 20 Oesterlein Universal.
- 1—No. 1 1/2 Brown & Sharpe Universal.
- 1 60" x 54" x 8' Ingersoll.
- 1 92" x 72" x 15' Beaman & Smith.
- 1—No. 2 B. & S. Combin. Horiz. and Vert.
- 1—No. 15 Garvin Profile Miller.

VERTICAL BORING MILLS.

- 1—84" J. Morton Poole.
- 2—72" Bickford.
- 1—42" Colburn.
- 1—42" Betts Car Wheel Borer.
- 1—36" Bridgeport.
- 1—36" Brown & Sharpe Chucking.
- 2 34" Colburn.
- 1—31" Baush.
- 1—2-spindle Beaman & Smith.

HORIZONTAL BORING MACHINES.

- 1—Binsse, 3" bar.
- 1—Newark, 3" bar.
- 1—Betts, 2 3/8" bar.
- 1 Bement, 2 1/2" bar.
- 1—Beaman & Smith, 2 3/8" bar.
- 1—No. 3 Barnes Double End.
- 1 No. 4 Newton, 2-spindle.
- 1 Beaman & Smith, 2-spindle.

RADIALS.

- 3 5' Niles Semi-Universal.
- 1—4 1/2' Niles Universal.
- 1—3 1/2' Gang.
- 1 3' Prentice.
- 1 3' Mueller.
- 4 2 1/2' Fosdick.
- 2—2 1/2' Mueller.
- 1 2 1/2' Dreses.

TURRET LATHES.

- 1—2" x 26" P. & W.
- 1—2 1/2" x 26" P. & W., Gd. Hd.
- 4—No. 3-A Warner & Swasey.
- 1—22" Libby.
- 52—21" Gisholt.
- 3—2" Gridley Automatic.
- 99 24" Gisholt.
- 1 No. 2 Warner & Swasey.
- 2—2" x 24" J. & L., Cone Head.
- 2—2" x 24" J. & L., Gd. Hd.
- 2—2 1/2" x 26" Greenlee.
- 1—3" x 36" P. & W.

PRESSES.

- 1 No. 5 Consolidated.
- 1 No. 5 Niagara.
- 1—No. 20-U Ryerson.
- 1—No. 30 Perkins.
- 1 No 23 1/2-B Niagara.
- 1—No. 17 Williams & White.

MISCELLANEOUS.

- 1—10" Bement Slotter.
- 1 1 1/2" Morton Keyseater.
- 1 -1 1/2" Baker Keyseater.
- 1 Gleason Gear Planer, 84" bevel, 96" spur.
- 1 36" Fellows Gear Shaper.
- 2—24" Fellows Gear Shapers.
- 2 No. 3 Cincinnati.

GEAR CUTTERS.

- 1 No. 11 B. & S. Plain Grinder.
- 1—10-spindle Foote-Burt Rail Drill.
- 1—Niles 41" x 8' Cylinder Lathe.

SEND FOR GREEN LIST AND PICTURE BOOK
DO IT NOW!

PATENT ATTORNEYS

PATENTS

Fetherstonhaugh & Co.,
 Patent Solicitors, Head Office,
 Royal Bank Bldg., Toronto,
 Ottawa Office, 5 Elgin St.
 Send for our Plain Practical
 Pointers, Copy of National
 Progress, in which our patents
 are advertised, mailed free.

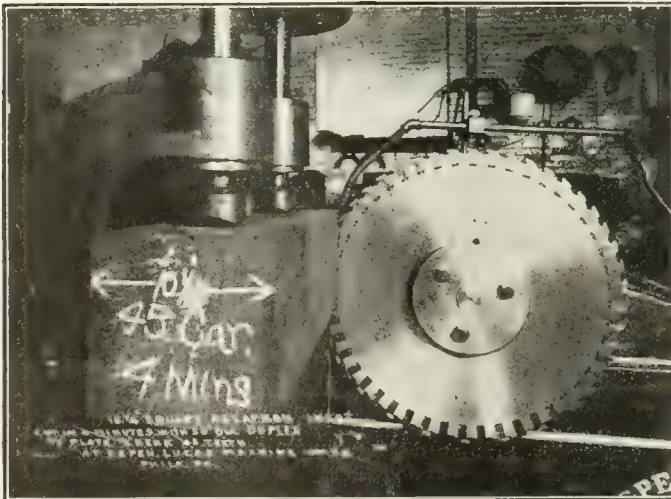
RESEARCH BUREAU
 REPORTS BY EXPERTS ON SCIENTIFIC, TECHNICAL AND INDUSTRIAL DEVELOPMENT.
 SPECIAL RESEARCHES ARRANGED.

PATENTS, TRADE MARKS, ETC.
 HANBURY A. BUDDEN CABLE ADDRESS
 712 DRUMMOND BLDG., MONTREAL "BREVET"

PATENTS PROMPTLY SECURED

In all countries. Ask for our Investor's Adviser, which will be sent free.
MARION & MARION 364 University St.
 Merchants Bank Building, corner
 St. Catherine St., MONTREAL, Phone Up. 6474
 and Washington, D.C., U.S.A.

ON PAGE 68
 You'll find a host
 of Opportunities.
TURN TO IT!



**Circular
 Metal
 Cutting
 Saw
 Blades for
 Any Type
 of
 Machine**

Let us demonstrate what a saving can be made by installing a
HUNTER "DUPLX" Inserted Tooth Blade

Write for information
HUNTER SAW & MACHINE CO., Pittsburgh, Pa., U.S.A.



"Barnes-made" SPRINGS

are the result of over sixty years' experience in spring making, combined with unsurpassed equipment and the workmanship of men who have been with us, ten, twenty and in some cases thirty years.

Write for booklet No. 7-T.

Established 1852.
THE WALLACE BARNES COMPANY
 218 South St., Bristol, Ct., U.S.A.
 Manfrs of "Barnes-made" Products
 Springs, Screw Machine Products, Cold Rolled Steel and Wire

METAL STAMPINGS

We are manufacturers of stamped parts for other manufacturers.

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

We can finish steel stamping in Nickel, Brass or Copper.

Send us a sample order.

W. H. BANFIELD & SONS
 372 Pape Avenue, Toronto, Can.

MAKE NAILS! NOT NOISE!

We offer the trade new types of

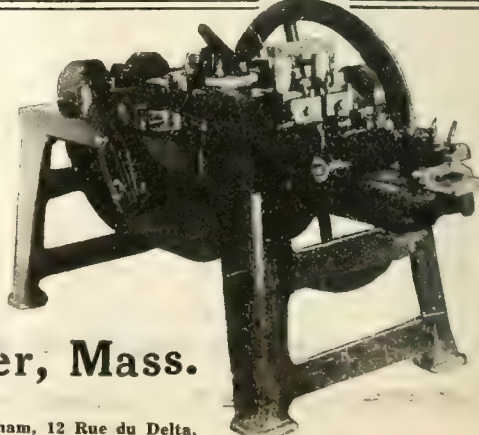
WIRE NAIL MACHINES

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

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

PRACTICALLY NOISELESS IN OPERATION

Sleeper & Hartley, Inc., Worcester, Mass.
 CANADIAN BRANCH, COATICOOK, P.Q.
 London, England, F. A. Perry, 63 Queen Victoria Street, E.C. 4. Paris, France, Edgar Bloxham, 12 Rue du Delta.



The World's Biggest and Best Stock of
USED MACHINE TOOLS

600 Machines to Select from --- Judge by These Samples

PLANERS

54" x 54" x 15' Pond, 2 heads.
 54" x 54" x 15' Sellers, 2 heads.
 40" x 54" x 8' Betts, single head, very heavy type.
 30" x 30" x 6' Sellers, 1 head on cross rail, 1 side head.
 30" x 30" x 10' Pease, single head.
 30" x 30" x 8' Harrington, 2 heads.
 25" x 25" x 6' Sellers, single head.

VERTICAL BORING MILLS

6' Bickford, 2 swivel heads, excellent condition.
 14' Standard, 2 swivel heads.
 Two 36" Bullard, 2 swivel heads, back geared.
 30" Bullard, single turret head.

HORIZONTAL BORING MILLS

Niles, 3½" bar, knee type.
 Beaman & Smith, cylinder, 2 boring and 1 facing spindle, square and circular table.
 (2) Bement, 3" bar, knee type.

MILLING MACHINES

No. 2 Brown & Sharpe Universal, dividing heads, etc.
 No. 2 Putnam Universal, dividing heads, etc.
 Beaman & Smith, open side, planer type, table 24" x 6', 1 vertical spindle.
 Ingersoll, planer type, 36" x 36" x 8', 2 vertical spindles.

MULTIPLE DRILLS

Baush, 12 spindles, 12, 1½" holes, weighs 22,000 lbs., good as new.
 Baush, 10 spindles, 1½" holes, drills rectangular space 36" x 48", weighs 25,000 lbs., good as new.
 Foote-Burt, 2 spindle, adjustable rail, extra heavy, 60" maximum distance center to center of spindles, weighs 12,500 lbs.

RADIAL DRILLS

4' Gang, with tapping attachment.
 3' Gang, with tapping attachment.
 6' Pond.
 6' Dreses.
 5' Prentice.
 4' Prentice, tapping attachment.
 4' Bickford, tapping attachment, direct connected to variable speed motor.
 4' Niles, arranged for motor drive.
 4' Fish.
 42" Bickford, single pulley drive through gear box.

SLOTTERS

36" Bement, geared, weighs 35,000 lbs.
 12" Bement.

LATHES

(4) 27" x 14' Lodge & Shipley, geared head, single pulley drive, quick change gear, etc.
 52" x 16' Gleason, face plate drive.
 84" x 27" Putnam, motor driven.

MULTIPLE PUNCH

Long & Alstatter Multiple Punch, 50 holes in half inch metal, easily converted to Gate Shear, 48" between housings.

HAMMERS

No. 4 Nazel Pneumatic, motor driven.
 500 lb. Bradley Upright.
 (3) 200 lb. Bradley Upright.
 (2) 200 lb. Bradley Upright.
 800 lb. Lane Steam, double frame.

All machines in good working order and condition, inspection our warehouse, immediate delivery.

Write for Stock Lists.

GRAVES MACHINERY EXCHANGE

WAREHOUSE AND R.R. SIDING:

OFFICES:

408 Claremont Ave., JERSEY CITY, N.J.

50 Church Street, NEW YORK, N.Y., Suite 482

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

SPECIAL MACHINERY

Special Machinery, Jigs, Fixtures, Punches and Dies, Small Tools, Screw Machine Products, Gauges, Forgings, Etc.

CONTRACT WORK

Jobbing Machine Shop Owners

will find it to their advantage to mail us a list of their equipment and state what line of work they prefer to undertake.

Address

METAL MANUFACTURERS SERVICE

75 Sun Life Building, Toronto, Ontario

D. C. SWEET, Manager

Consult these firms

If you are too busy, or if your plant is not equipped to handle all parts of your contracts, let these firms help you.

These firms have confidence in their ability to help you, else they wouldn't advertise their services. You'll find the reason for their confidence if you place your problems before them.

Canadian Machinery

Contract Work Section

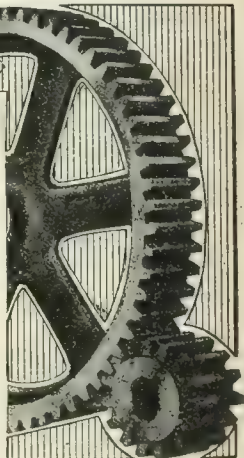
143-153 University Avenue TORONTO

CUT GEARS

Rawhide — Steel — Brass — Cast Iron

Try our W-G Rawhide Silent Gear. Designers and Builders of Special Machinery.

Winnipeg Gear & Engineering Co.
197-199 Princess St., Winnipeg, Man.



Do you want someone to handle your small stamping work?

An advertisement in this section will put you in touch with firms who have the facilities for handling small stampings, small tools, jigs, fixtures, etc. If you need their help, tell them so here.

CANADIAN MACHINERY

Contract Work Section

143 UNIVERSITY AVENUE TORONTO

SPECIAL MACHINERY

Special Machinery, Gears, Jigs, Fixtures, Punches and Dies,
Small Tools, Screw Machine Products, Gauges, Etc.

CONTRACT WORK

GAUGES AND TOOLS

OUR SPECIALTY

How is This?

No. 28 THREAD GAUGE FOR NOSE OF SHELL

ONLY \$35.00

CAN DELIVER FROM STOCK.

THE MONARCH BRASS MFG. COMPANY, LIMITED

71 Browns Ave., Toronto

Homer & Wilson Stamping & Tool Works

WE MAKE THE TOOLS
AND
PRODUCE THE STAMPINGS

Let us quote on your requirements.



1-3-5 Lancaster Street
Hamilton, Ontario



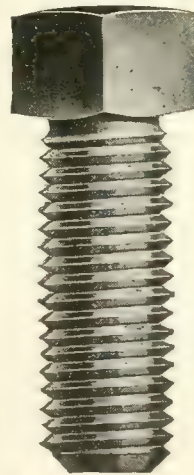
HIGH CARBON STRUCTURAL STEEL TUBING

BUTTED & BRAZED
BENDS & SHAPES

SHEET METAL STAMPINGS

CANADIAN METAL PRODUCTS, Limited,
GUELPH, ONTARIO

ACCURACY



The discriminating buyer is the one we like to meet—the one who insists on accurate product. He will eventually buy "GALT" Cap and Set Screws because they measure up to his standard.

Your rush orders for S. F. Hex. nuts taken prompt care of. Better finished nuts—try a sample.

THE
GALT MACHINE SCREW CO.,
LIMITED

GALT, ONTARIO

Eastern Representatives: The Canadian B. K. Morton Company,
Limited, 49 Common St., Montreal, Que.

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

"Get in line"

WITH THE BIG ARMY OF

HOSKINS PYROMETER USERS

TRADE MARK REGISTERED

AND USE A PYROMETER THAT IS ACCURATE - RELIABLE - DURABLE

They are "MADE IN CANADA"

Approximately 85% of all Pyrometers in Canada
are Hoskins

WRITE FOR BULLETIN No. 3

A Partial List of Users in Canada

Algoma Steel Corporation, Ltd.	Collingwood Shipbuilding Co.	G.T.R. Shops, Stratford	Northern Aluminum Co., Ltd.
Allen Machine & Tool Co., Ltd.	Consumers Gas Co.	Holden-Morgan Co., Ltd.	Nova Scotia Steel & Coal Co., Ltd.
Armstrong-Whitworth Co., Ltd.	Thos. Davidson Mfg. Co., Ltd.	Robert W. Hunt Co., Ltd.	Ottawa Car Mfg. Company
John Bertram & Sons Co., Ltd.	Dominion Arsenal	Ingersoll Machine Co., Ltd.	Thos. Pink & Sons, Ltd.
Horsy Bicks & Sons Co., Ltd.	Dominion Bridge Company, Ltd.	John Inglis Co., Ltd.	Polson Iron Works, Ltd.
Bataavia Mining & Smelting Co.	Dominion Forge & Stamp Co., Ltd.	Inter Engineering Works, Ltd.	Pratt & Whitney Co., Ltd.
Brown-Boggs Co., Ltd.	Dominion General Laboratories	Inter Harvester Co., Ltd.	Jas. Robertson Co., Ltd.
Canadian Airways, Limited	Dowsley Spring & Axle Co., Ltd.	A. B. Jardine Co., Ltd.	Roselofson Mach. & Tool Wks., Ltd.
Canadian Bridge Company, Ltd.	Delora Min. & Reduction Co., Ltd.	Jencks Machine Co., Ltd.	Ross Rifle Co., Ltd.
Canada Cement Co., Ltd.	Dominion Aluminum East Co., Ltd.	C. C. Kavin Co., Ltd.	Royal Mint
Canada Beds, Limited	Dominion Cartridge Co., Ltd.	Kelsey Wheel Co., Ltd.	Russell Motor Car Co., Ltd.
Canadian Cocker Wheeler Co., Ltd.	Dominion Steel Foundry, Ltd.	Leaside Munitions Co., Ltd.	St. Thomas Construction Co., Ltd.
Canadian Buffalo Forge Co., Ltd.	F. X. Drolet, Limited	Lindsay Arsenal	Ernest Scott, Limited
Canadian Electric Prod. Co., Ltd.	Eastern Car Co., Ltd.	London Fib. & Mach. Co., Ltd.	Simonds Can. Saw Co., Ltd.
Canadian Electrode Co., Ltd.	Eastern Steel Co., Ltd.	Loughhead Machine Co., Ltd.	Stan. Chem. Iron & Lumber Co.
Canadian Government Ry.	Electric Steel & Metals, Ltd.	Mantoba Bridge & Iron Wks., Ltd.	St. Lawrence Bridge Company
Can. Ingersoll Rand Co., Ltd.	E. & T. Parbanks, Ltd.	Maritime Nail Co., Ltd.	Stan. Steel Construction Co., Ltd.
Can. Gen. & Electric Co., Ltd.	Essex Stamp Co., Ltd.	T. McAvity & Sons, Ltd.	Sheldons, Limited
Canadian Pacific Ry.	Fittings, Limited	McGlashan-Clarke Co., Ltd.	Steel Co. of Canada, Ltd.
Canada Tool Works, Ltd.	Phoenix Foundry & Mach. Co., Ltd.	Massey-Harris Co., Ltd.	Steel & Radiation, Ltd.
Canadian Vessels, Limited	Pond Motor Co. of Canada, Ltd.	I. Matheson Co., Ltd.	Taylor-Forbes Co., Ltd.
Canadian Wire & Cable Co., Ltd.	Print & Wood Co., Ltd.	Mont. Light, Heat & Power Co.	Tor. Laundry Mach. Co., Ltd.
Canadian Yarn & Towin Co., Ltd.	Gamansque Spring & Axle Co., Ltd.	Montreal Tramways, Ltd.	Warden-King Co., Ltd.
Canada Tool & Specialty Co., Ltd.	Gr. H. McCallough Co., Ltd.	John Morrow Serey & Nut Co., Ltd.	Weldon Mining Co., Ltd.
Canadian Westinghouse Co., Ltd.	Granby Con. Mining & Smelt. Co., Ltd.	H. Mueller Mfg. Co., Ltd.	Welland Vale Mfg. Co., Ltd.
Chapman Dble. Ball Bear. Co., Ltd.	Grant & Thorpe Co., Ltd.	National Mach. & Supply Co.	Williams Mfg. Co., Ltd.
		National Mfg. Co., Ltd.	Wilt Twist Drill Co., Ltd.
		National Steel Car Co., Ltd.	Windsor Mach. & Tool Works, Ltd.

CANADIAN HOSKINS, LIMITED

ELECTRIC, GAS AND OIL FURNACES AND PYROMETERS

G. F. Sheppard, 224 St. James St., Montreal

WALKERVILLE, ONT.

DIVIDEND-PRODUCING FACTS about OXY-ACETYLENE WELDING



Broken Cylinders Before Welding

"A. L. S." Oxy-Acetylene Welding and Cutting Equipment is Backed by "A. L. S." Service

We maintain three factories in Canada and a staff of experts in the process, making Service to you a feature of our business; manufacturing the Purest Oxygen and Dissolved Acetylene, and Equipment of the highest efficiency.

Improved methods mean increased business and bigger profits.

Why not cut the losses? The installation of an Oxy-Acetylene Welding Equipment means but a very small investment compared to the savings in time and money it effects. It is an investment that will bring hundreds per cent. return, and it is good business to keep your plant always running. Is this worth investigation?

You are protected against loss. Not only can Oxy-Acetylene Welding be profitably employed for coping quickly with repairs, "break-downs," "tie-ups"—preventing losses by delay in replacements, but it is universally adopted in many manufacturing processes where a greater efficiency and an improved product are essential.



Same Cylinders After Welding

Many problems in the Metal Industry are being solved by Oxy-Acetylene Process

Write to-day for particulars, without obligation. We can tell you how, and why.

L'AIR LIQUIDE SOCIETY

Pioneers of the Process

Factories the world over
 MONTREAL, Cor. 1st Ave. and Ernest
 TORONTO . . . 26 Boler Street
 WINNIPEG . . . - 1297 Pinc

What Will Drop-Forged Tools Cost In 1918 ?

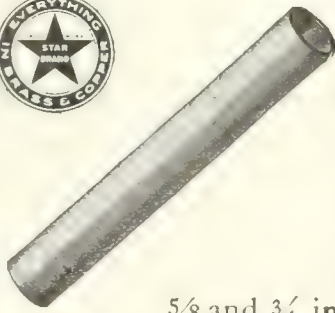
Will you be able to get them at all?
 Will your present stocks carry you over till such time as drop-forging equipment can dispose of the great volume of special work it will shortly be called upon to perform?
 Will it carry you enough longer to permit the steel makers to replenish the drop-forgers' stocks?
 A decreasing supply and an increasing demand with unprecedented shortage of raw material and a growing scarcity of men can hardly be expected to produce low prices for drop-forged products.

Analyze—Answer—Act !

All types of Williams' "AGRIPPA" Tool Holders and many other classes of tools can be shipped promptly from stock if ordered now!

J. H. WILLIAMS & CO., 45 Richard St., Brooklyn, N.Y.

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



IN STOCK READY TO SHIP
"STAR BRAND"
SEAMLESS BRASS
CONDENSER TUBES

TINNED INSIDE AND OUTSIDE

$\frac{5}{8}$ and $\frac{3}{4}$ inch O.D., No. 18 Stubs Gauge—12, 14, 16, 18 and 20 foot lengths

—AND—

"STAR BRAND" BRASS CONDENSER TUBE FERRULES

Standard 14 Thread for $\frac{5}{8}$ and $\frac{3}{4}$ in. Tubes

OUR STOCK ON HAND READY FOR IMMEDIATE SHIPMENT ALSO INCLUDES A FULL LINE OF REGULAR STOCK SIZES AND SHAPES OF THE FOLLOWING

"STAR BRAND" SPECIALTIES

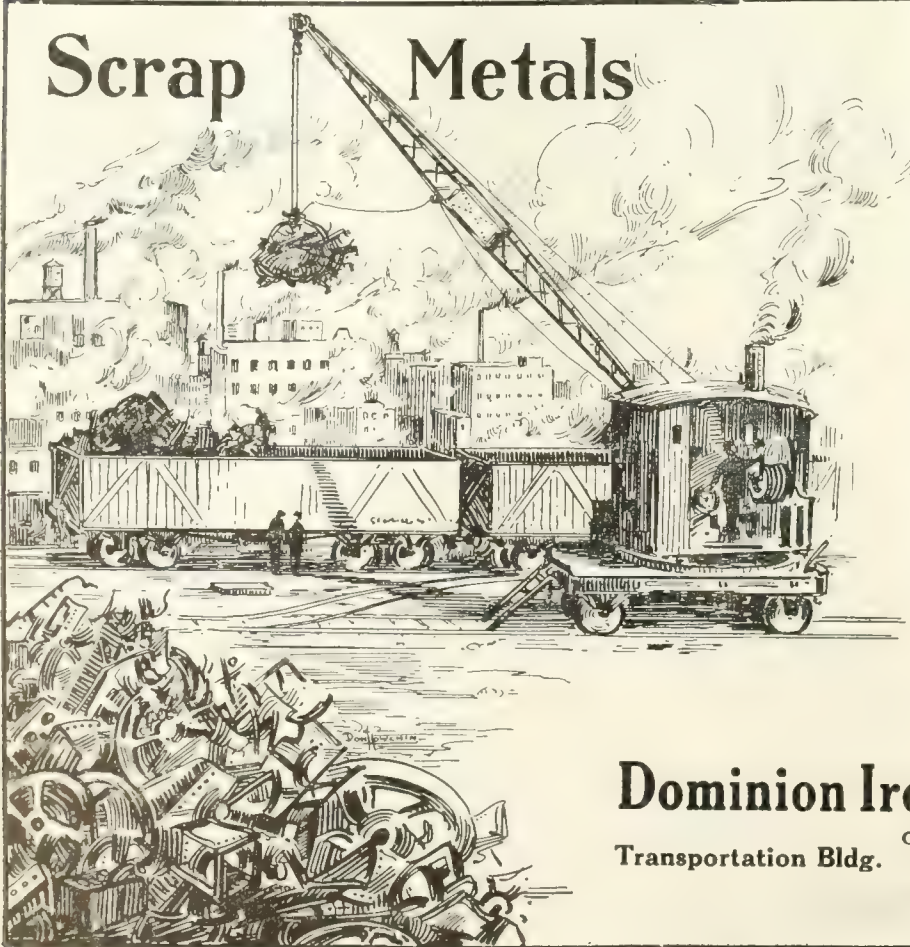
Seamless Brass and Copper Pipe and Tubing, Brass Fittings, Sheet Copper, Copper Bar, Rods and Wire, Copper Nails, Sheet Brass, Brass Rods, Tobin Bronze Rods, Copper Rivets and Burs AND OTHER PRODUCTS IN BRASS, COPPER, PHOSPHOR BRONZE, ARCHITECTURAL BRONZE, ETC., ETC.

U. T. HUNGERFORD BRASS & COPPER CO.

BRANCHES:
 BOSTON
 BALTIMORE
 PHILADELPHIA
 SAN FRANCISCO

HUNGERFORD BUILDING
 Lafayette, White and Franklin Sts.
 NEW YORK, U.S.A.

KINDLY ADDRESS
 INQUIRIES
 FOR ATTENTION OF
 DEPARTMENT D.



Scrap Metals

Scrap Iron, Steel and Metals

No undertaking is too large for us. We are Scrap Metal Specialists, and can co-operate with you in the dismantling of railway equipment, bridges, plants, steamers, mills and will take your rails and machinery.

Shell Makers. We can take care of all your scrap materials, at highest prices.

Give us particulars and we will relieve you of all worry.

Dominion Iron & Wrecking Co.

Transportation Bldg.

General Offices:

LIMITED

Montreal, Quebec

Quebec, Que.

THE BASIS OF A GOOD FILE IS THE STEEL

Unless the steel is such that the tool will stay hard for a reasonable length of time, the file will not give good results—neither will it be economical to use.

The steel from which the "Famous Five" files are cut is a high carbon steel made from our own formulas—which have proven satisfactory after years of practical experience.

This, plus the sharpness and regularity of the teeth, ensures a tool that will stay hard and sharp for a long time. Consequently the "Famous Five" are the most economical Files to buy.

Specify them when ordering.



**KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE**

Made in Canada by

NICHOLSON FILE CO.
PORT HOPE
ONTARIO

The Labor Saver



Showing Truck in Elevated Position

THIS ELEVATING TRUCK greatly reduces cost of producing SHELLS

or any factory product where numerous operations are required.

All material is stacked on the platforms. To move material the truck is backed under the platform; the handle of the truck is then pushed down, keeping the button depressed, which raises the truck bed, and with it the loaded platform, at the same time automatically locking it in its raised position.

When hauled to the desired position the button is pressed and the handle raised, lowering the platform to the floor. The truck is then drawn from underneath and is ready to move another platform.

Raising and lowering of the truck can be operated with one hand—can be raised or lowered at any angle. Specially designed ball-bearings throughout.

We also manufacture Loading Funnels, Ball-Bearing Tightening Nuts, Belt-Driven Loading Vibrators, Bench Vises and PRESSES WITH ATTACHMENTS FOR PRESSING IN BAND—fixtures especially adapted for the manufacture of 18 pr. Shrapnel Shells.

You will profit by getting in touch with us now for prices and full information.

THE CHAPMAN DOUBLE BALL BEARING CO. OF CANADA LIMITED

339-351 Sorauen Ave. - TORONTO, CANADA

TRANSMISSION BALL BEARING CO., INC.

1050 Military Road, Buffalo, N.Y.

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

CUT GEARS



Use Quiet Rawhide Pinions for Motor Drives



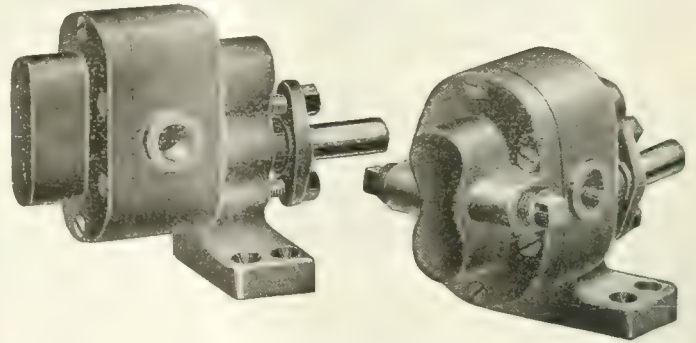
The rough material and a finished pinion.

Our large stock of rawhide pinion material is at your service for quick delivery.

Write us for quotations.

Hamilton Gear & Machine Co.
Van Horne Street, TORONTO

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



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.



Core Ovens

Perfect cores are a big item in cutting foundry costs.

Use Whiting Ovens and obtain uniform heating and regulation. Years of experience are back of our designs.

Send for catalog 121

Complete Foundry Equipments



Cranes of all kinds

The Spiro Never Slips



The Spiro Compression Coupling is locked to the shaft by a graduated grip.

The pull of the bolts on the two halves of the coupling acts on the spiral slotted sleeve until it grips the full surface of the shaft with a never-slip hold.

Every bolt pulls, and at every pull the grip grows.

And last, but not least, the Spiro can be removed as quickly and easily as it can be applied.

The Bond Booklet describes our complete line of Power Transmission Devices.

Canadian Bond Hanger & Coupling Company, Limited

Alexandria

Ontario



ECONOMIC WATER OIL

SHELL MANUFACTURERS use ECONOMIC WATER OIL for METAL CUTTING of every description; it will not gum nor rust, and it SAVES TIME AND LABOR.

WE CAN SAVE YOU 50% in the COST of your CUTTING MIXTURE BECAUSE

ONE GALLON of ECONOMIC WATER OIL will mix readily with 30 to 50 gallons of WATER, making a thick, creamy emulsion, and giving you a cutting mixture which will not only be satisfactory, but will produce very ECONOMIC RESULTS.

One TRIAL ORDER will prove our STATEMENT.

Made in Canada

Canadian Economic Lubricant Co.

LIMITED

1040-1042 Durocher St.

MONTREAL



Did you ever notice somebody starting a conversation in a low voice with the two words "They say"? The moment you hear it you know it is gossip, scandal, and most likely a lie. But when you hear everyone saying that HARRIS HEAVY PRESSURE is the best BABBITT METAL they can use for all general machinery bearings, isn't it about time to believe them?

Send to our nearest factory for a trial box.

Manufactured and guaranteed by

The Canada Metal Company, Limited

Hamilton

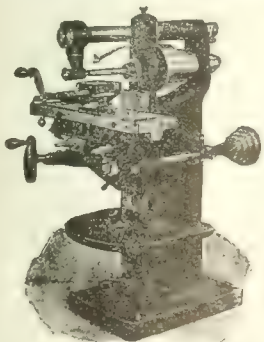
Montreal

TORONTO

Winnipeg

Vancouver

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.



THE JOHN STEPTOE COMPANY
CUMMINSVILLE, CINCINNATI, OHIO, U.S.A.

Will result in increased production; less money invested in machinery, and increased profit.

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

Indispensable Where Rapid Manufacturing Methods Prevail

The M. E. C. Three-Jaw Air-Operated Chuck (steel body) eliminates the troublesome time-losing, hand-operated chuck. Operating on tests of long periods it will show an increase in production of from 25 to 90 per cent. Once chucked, the work stays chucked. Vibration doesn't affect it—it holds tight regardless of cutting strain. Saves energy and time. Most of the work of medium diameter is chucked and released without stopping machine spindle.

Ask for full details. By all means get our interesting catalog on Labor-Saving Devices. Write for it NOW, it's free.

MANUFACTURERS EQUIPMENT COMPANY

171 N. Jefferson Avenue

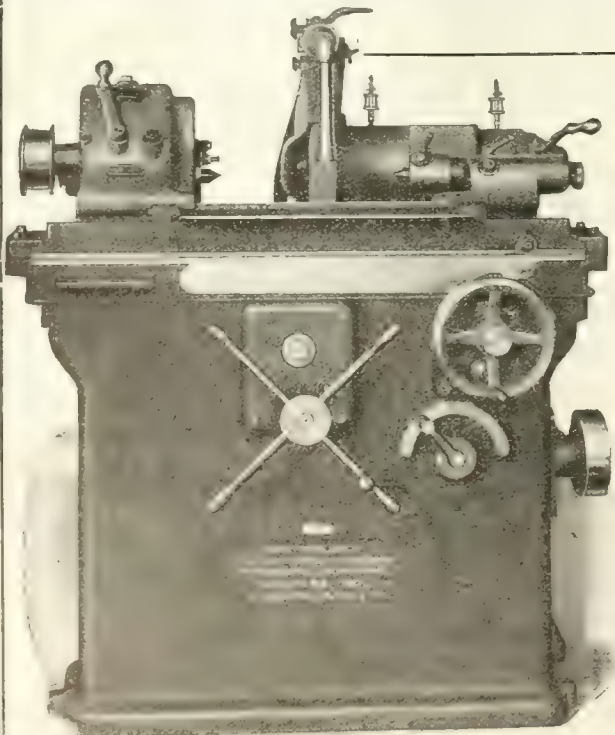
Chicago, U.S.A.

Agents for Central and Eastern States and Canada: J. R. Stone Tool & Supply Co., Goebel Bldg.

Detroit, Mich.

Foreign Agents: C. W. Burton Griffiths & Co., Ludgate, Ludgate Square, London, England.

By All Means Get
Our Interesting
Catalog on Labor
Saving Devices



MODEL "B"

Six x Twenty Grinder *A Fitchburg Model*

Equally as efficient on small work as on that of larger dimensions. Therein lies its value. It is a compact, energetic worker that will do more for its size than any machine of similar wheel dimensions. It is saving in floor space. Its speed will give you greater production. Investigation or trial will impress you. 1300 to 1800 R.P.M. 16 x 3 grinding wheel. 6 x 4 pulleys. 7 horsepower required. Floor space 52 x 66. Send for complete specifications.

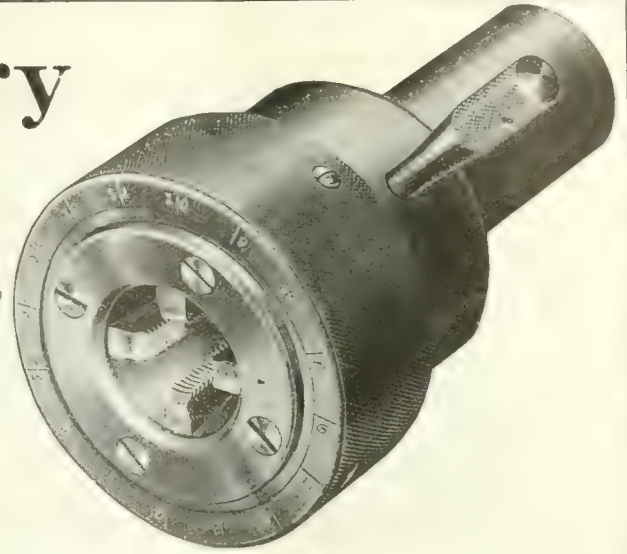
Fitchburg Grinding Machine Co.
FITCHBURG MASS. U.S.A.

Rapid Delivery

*Users of Murchey
Tools Get Chasers
Without Delay*

Lightning deliveries—that is a big advantage of using Murchey Tools. No work held up for chasers. We get your order, fill it, and it's on the way back to you just as quickly as the most rapid means of transportation can bring it to you.

There is no service like the Murchey service, and there are no tools like the Murchey Tools. Send blueprints for estimates.



MURCHEY TAPS are accurate and simple and can be worked with great speed. On 4.5 Mark VII shells Murchey tapping time is just ONE MINUTE.

Murchey Machine & Tool Company
75 PORTER STREET - - - DETROIT, MICHIGAN

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

Jacobs

IMPROVED

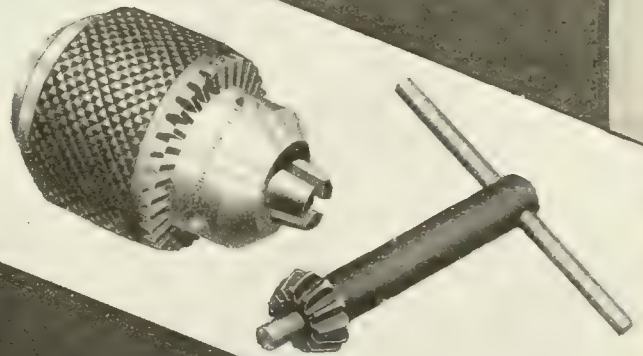
Drill Chuck

**A
Winner
By Sheer Merit**

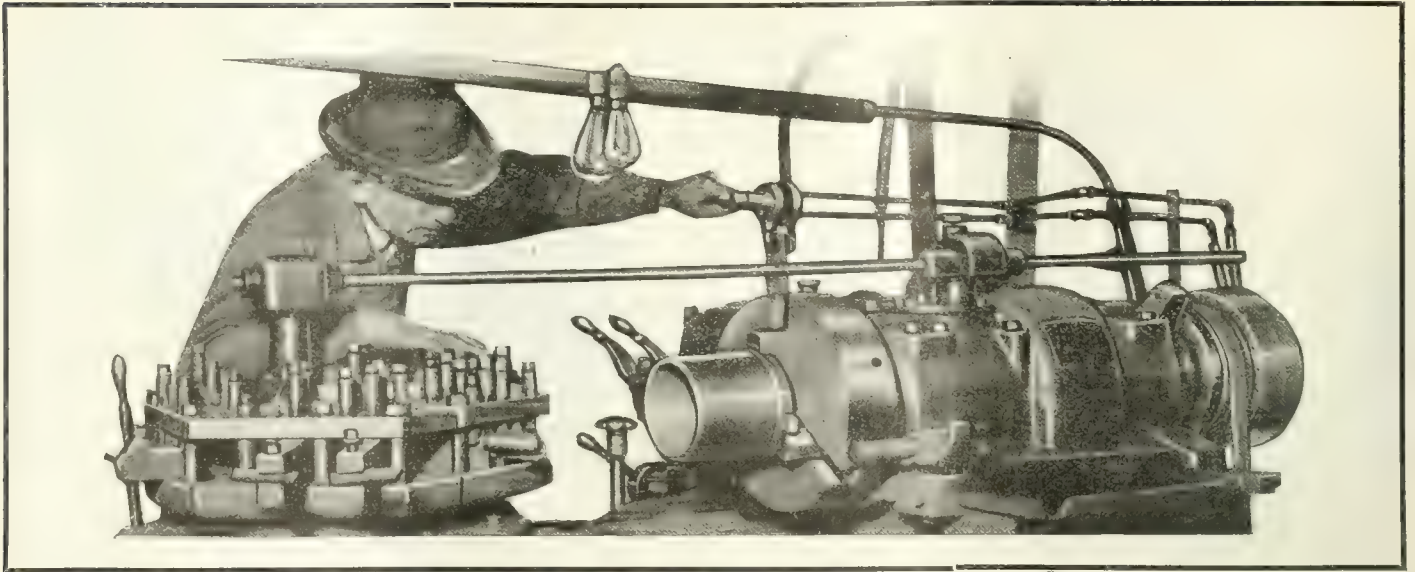
Jacobs Improved Drill Chucks are recognized as the STANDARD the world over. Once tried—always used.

Try them and see for yourself.

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



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



The Woman in the Shop Has Come to Stay

Thrust into the industrial field by unprecedented world conditions, women have more than made good. Lacking masculine brawn, they have by instinct the deft, sure touch and quick perceptions that go to make a highly skilled operator; aided by modern labor-saving devices they equal, and in many cases surpass, the output of the expert workman.

One of the woman machinist's chief helps is the Hannifin Air Chuck, by means of which work is chucked and rigidly gripped by simply turning a lever. Another turn effects the release. The Hannifin Chuck is almost instantaneous in action, holds securely, cannot slip, saves labor, and saves time to the extent of increasing output 20 to 100 per cent.

Every argument is in favor of the Hannifin Air Chuck.

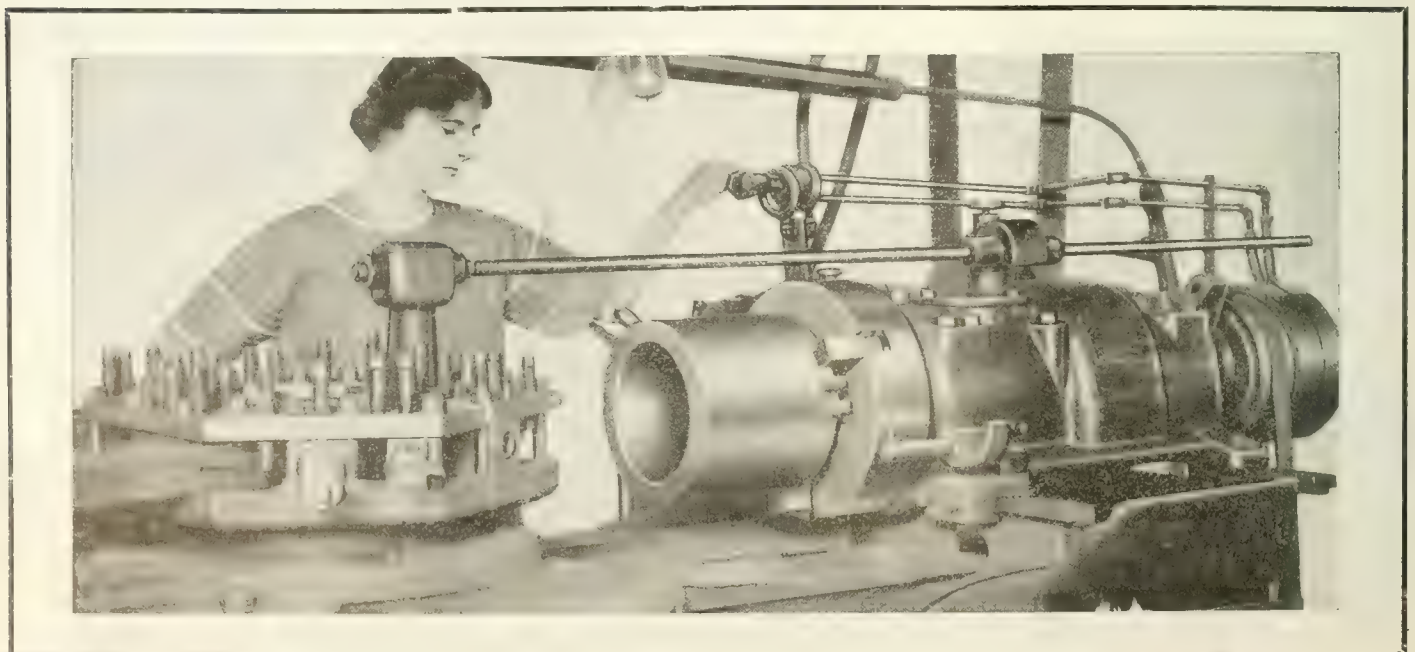
Order one on trial and let it prove its own case.

HANNIFIN Air Chucks

Write for catalogue covering
Air Operated Chucking and
Clamping Equipment.

HANNIFIN MFG. COMPANY, Chicago, U.S.A.

REPRESENTATIVES:—R. E. Ellis Engineering Co., Chicago; Coats Machine Tool Co., New York City; A. R. Williams Machinery Co., Toronto; Williams & Wilson, Montreal; The Canadian Fairbanks-Morse Co., Montreal. EUROPEAN REPRESENTATIVES:—Coats Machine Tool Co., Ltd., London; Fenwick Freres & Co., Paris; Iznoskoff & Co., Petrograd.



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

Every Butterfield Tap comes to you ready for long, hard service.

It is made by expert workmen—from the finest materials obtainable—and thoroughly tested before shipment.

For the tap that is uniformly dependable in service — specify Butterfield.

Butterfield & Co., Inc.
Rock Island :: Quebec

Toronto Office:

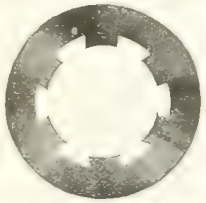
1505 Traders Bank Building : Phone Main 1382

H. A. Harrison, Manager.

Exporting the world's
largest production of
taps & pipe fittings

BUTTERFIELD

HINTS TO BUYERS



Eliminate Danger

Accidents break down the efficiency of your organization, lead to legal troubles, loss of time and money.

TRADE MARK

BRISTO

REG. U. S. PAT. OFFICE

SAFETY SET SCREWS

insure safety. They also protect themselves because of their patented construction. The dove-tailed design of wrench and screw contracts the metal under pressure. The harder you twist the wrench the more the metal of the screw is compressed.

Write for BULLETIN I-809

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



Uncertainty becomes Certainty when you have your material and apparatus tested and inspected by us.

Get the benefit of many years of service.

CANADIAN INSPECTION AND TESTING LABORATORIES, LIMITED

Head Office and Main Laboratories--MONTREAL

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

VIKING

WATERPROOF CEMENT LEATHER BELTS

Will Save You Much Money, Time, Trouble and Worry

"Viking" Belts are just in their element when in wet places and under adverse conditions.

A trial will convince you that they are all-round savers.

Write for particulars.

J. C. McLaren Belting Co., Limited, Canada
MONTREAL TORONTO WINNIPEG

STEEL CASTINGS

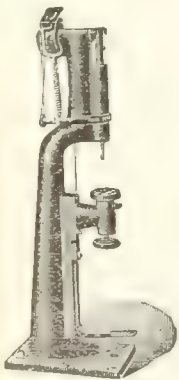
We are well equipped to make all kinds of steel castings, 100 lbs. to 50,000 lbs.

Dominion Steel Foundry Co.

Hamilton

LIMITED

Ontario



IS YOUR RIVETING PROFITABLY DONE?

Our Elastic Rotary Blow Riveting Machine does profitable work, because one machine will do the work of several hand riveters, and do it better.

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

Catalogue C tells more about it.

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

Formerly John Adt & Son. Established 1866.
Also makers of Wire Straighteners and Cutter, Cotter Pin Machines, etc.

RIVETED STEEL TANKS FOR EVERY PURPOSE



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

Northern Crane Works
LIMITED
WALKERVILLE
ONTARIO

Electric Cranes
Hand Cranes
Foundry Equipment



NORTHERN CRANES

CRANES
MADE IN
CANADA

Electric Hoists
Air Hoists
Cupolas
Ladles



Precision Tools and Equipment

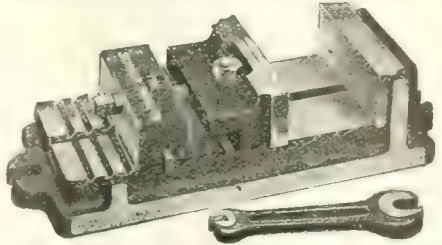
Universal Angle Plates
 Bench Lathes Surface Grinders
 Magnetic Chucks
 Adjustable Reamers
 Scleroscopes Pyroscopes
 Higley Saws

Send us your inquiries. Let us quote.

H. E. STREETER

523 New Birks Building MONTREAL, P.Q.

**SKINNER
 DRILL
 PRESS
 VISE**



A substantial, durable tool which will pay for itself in short order in any machine shop. Four sizes to accommodate a wide range of work. Try one and you'll buy more.

Printed matter promptly mailed on request.

THE SKINNER CHUCK COMPANY

New York Office, London Office San Francisco Office
 94 Reade Street 149 Queen Victoria St. Rialto Bldg.
 Factory and Main Office, New Britain, Conn., U.S.A.

Zenith Coal & Steel Products Limited

COAL COKE HACK SAW BLADES
 CARBON STEEL MACHINERY STEEL
 HIGH SPEED STEEL

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



Trade Mark Reg. U. S. Pat. Office


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

Catalog No. 6.

Greenfield Machine Co.

Greenfield, Mass., U.S.A.

Oxy-Acetylene Welding and Cutting Apparatus



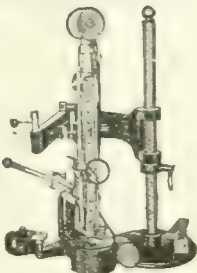
Carter Welding Co., General Toronto
 Dealers
 For Davis-Bournonville Oxy-Acetylene Apparatus
 General Office and Factory, Jersey City, N.J.
 Canadian Factory, Niagara Falls, Ont.
 Sales Offices: New York, Boston, Philadelphia, Pittsburg, Cleveland, Cincinnati, Chicago, Detroit, St. Louis, San Francisco, Seattle.

For Hardness Testing

in shop and laboratory use the **Standard Scleroscope**

Universally adopted, direct reading, inexpensive, and accurate instrument that gives you the hardness of any metal in all parts of the world, thus solving problems of material selection to specification.

BOOKLET FREE.



THE PYROSCOPE THE SCLEROSCOPE (Set)

by optical means is fast becoming the correct thing. The PYROSCOPE has solved the problem. Perfect constancy, inexpensive, in vicinity used. Built to stand rough usage and upon common-sense lines. Used by the Government and best firms.

Shore Instrument & Mfg. Co. 555-7 W. 22nd St. New York
 Agents for Canada: A. R. Williams Machy, Co., Ltd., Toronto, Can.

P U L L E Y S

ALL WOOD—COMBINATION—IRON—STEEL

Every pulley fully guaranteed.
 Write for interesting printed matter.

The Positive Clutch & Pulley Works, Ltd.
 Montreal Factory: Aurora, Ont. Toronto

YOURS IS READY TO MAIL YOUR WHAT?

YOUR CIRCULAR regarding Surface Grinders, New Yankee Drill Grinders, Universal Grinders.

Manufactured by
WILMARTH & MORMAN COMPANY
 1200 Monroe Ave. N.W. Grand Rapids, Mich.
 SEND FOR YOUR CIRCULAR NOW

You want Tool Holders that have made good

ARMSTRONG TOOL HOLDERS

Won The **GRAND PRIZE**

THE HIGHEST POSSIBLE AWARD AT THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION.



THEY ALWAYS MAKE GOOD

Write for Catalog.

Armstrong Bros. Tool Co.
 "The Tool Holder People"
 306 N. Francisco Ave., CHICAGO, U.S.A.

SHAFTING

Cold Drawn, Turned and Polished Steel, Rounds, Squares, Hexagons and Flats, Steel Piston Rods, Pump Rods.

Special facilities for Keyseating up to 6 in. diameter.

THE **Canadian Drawn Steel Co.**
 Limited CANADA
 HAMILTON

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

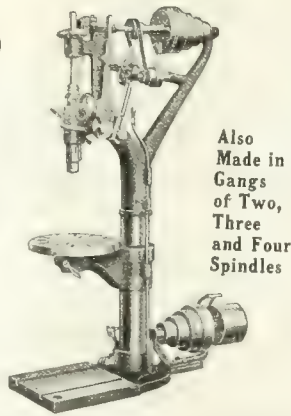
SILVER DRILLS

Increase the Output

Wherever these 20-inch drills have been introduced there has always followed a greater production of work. They are fast and sure. Four styles made. Either round or square base. Also made in gangs of 2, 3 and 4 spindles. Many other features—let us fully explain them.

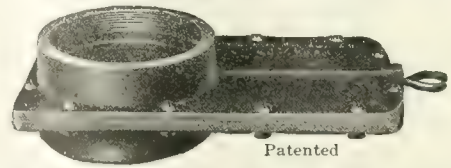
Write to-day. Quick Deliveries.

Silver Manufacturing Co.
290 Broadway, Salem, Ohio



Also Made in Gangs of Two, Three and Four Spindles

NEW AIR-TIGHT BLAST GATE FOR LOW PRESSURE AIR



Patented

Save that air (money) you are now losing through leaky blast gates. Our NEW AIR-TIGHT BLAST GATE stops this loss. Circular 127-B explains its many other advantages, outlining clearly its all-around superiority over the ordinary light, flimsy, cheap, leaky and unreliable blast gates, and the heavy, cumbersome, expensive and slow-acting gate valves and stop cocks. Ask for Circular and list of users.

W. S. ROCKWELL COMPANY
FURNACE ENGINEERS AND CONTRACTORS
50 Church Street Hudson Terminal Building New York

FERALUM
THE ULTIMATE
IN DIAMOND SETTING
IT IS GUARANTEED

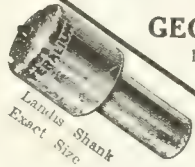
Finest Diamonds and Diamond Tools
THE GENERAL SUPPLY CO.
of Canada, Limited

OTTAWA TORONTO MONTREAL WINNIPEG
356 Sparks St., 125 Adelaide St. W., 408 McGill Bldg., 85 Water St.

Sole Canadian Agents for

GEO. A. JOYCE CO., Ltd.
NEW YORK LONDON

Our Ballas Diamonds Give Excellent Service



NORTON JACKS

FOR ALL KINDS OF HEAVY LIFTING
Send for complete catalogue showing 50 styles 10 to 100 tons capacity.

Made only by

A. O. NORTON, LIMITED
Coaticook, Prov. Quebec Canada

Every Tooth Cuts on Every *Quality* Saw
They cut straighter. They last longer.
NAPIER-SAW WORKS, Inc., Springfield, Mass., U. S. A.



GEARS AND GEAR CUTTING SPROCKETS AND CHAINS

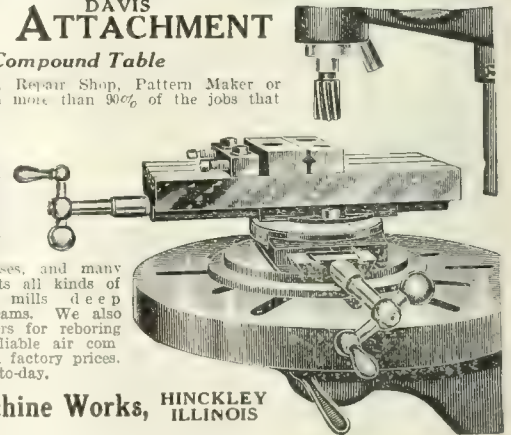
In stock and to order any size from one-quarter inch to six-foot in diameter, any material. Estimates and gear advice cheerfully furnished.

Grant Gear Works, Inc., 151 Pearl St. Boston, Mass. U.S.A.
C. B. GRANT

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 keasets 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

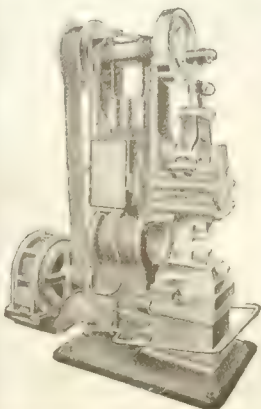


Eye Protectors For All Work

Standard designs for choppers, machinists, grinders, immachinists, etc. Can be worn over other glasses. Full particulars for the asking.

T. A. WILLSON & CO., INC.
23 Scott Street, Toronto, Ontario

9 Hatton Garden, London. Head Bldg., San Francisco. Malters Bldg., Chicago.
Factory and Main Offices: **READING, Pa., U. S. A.**



Fairbanks Hammers

25 to 300 lbs.

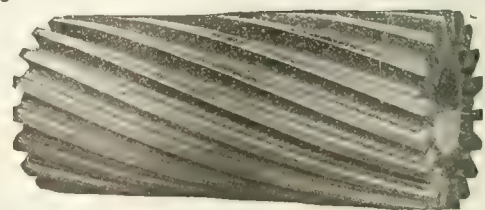
Belt or Motor Drive

These Hammers Embody a Design and Workmanship that are Unsurpassed.

Send for Catalog

UNITED HAMMER CO.
Oliver Bldg. Boston, Mass.

Taylor-Newbold Milling Cutters



The Taylor-Newbold Milling Cutters are absolutely correct in design, workmanship and material. The only inserted blade milling cutters made with constant clearance and rake-angle throughout their length during entire life of cutter. Write for Bulletin R-P and 30-day trial offer.

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

"Frost King" The All-round Babbitt for Mechanics

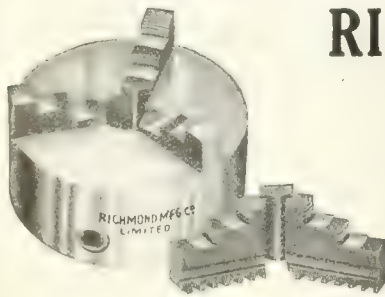
In FROST KING Babbitt you have the embodiment of 40 years' devotion to the perfecting of white metal alloys.

"FROST KING" is the highest achievement in babbitts. It is an all-round babbitt that proves equal to the heavy demands put upon it—taking care of high speed at the same time.

Satisfies the most exacting mechanics. Give it a trial.

HOYT METAL COMPANY

EASTERN AVE. and LEWIS ST., TORONTO, CANADA
 New York, N.Y. London, Eng. St. Louis, Mo.



RICHMOND



CHUCKS

Universal Geared Scroll Type with either one or two sets Jaws.

Richmond Mfg. Co., Ltd.

183-185 George Street

TORONTO, CAN:

WILKINSON & KOMPASS

TORONTO HAMILTON WINNIPEG

IRON AND STEEL

HEAVY HARDWARE

MILL SUPPLIES

AUTOMOBILE ACCESSORIES

WE SHIP PROMPTLY



Grinding Wheel Efficiency

Results both in quantity and quality of the grinding wheel depends upon its surface. A slight coating on the wheel affects both.

No one type of Dresser is best adapted for all wheels. We are specialists in Grinding Wheel Dressers, and can recommend and supply the type of Dresser that is best adapted to your particular needs.

The Canadian Desmond-Stephan Mfg. Co.

Hamilton, Ontario

Alfred Herbert, Ltd., Coventry, Eng.,
 Agent for Great Britain.

METAL WORKING

Call on our Rochester stock for 25" Sliding Drill Presses, 16" Shapers, Power Feed Milling Machines, Screw Machines, Engine Lathes, No. 6 Rivett Internal Grinder.

OGDEN R. ADAMS
 149 ST. PAUL STREET
 ROCHESTER, N.Y.

MACHINERY

The HURLBUT-ROGERS CUTTING-OFF MACHINE

*Cuts Off
 In Half
 The Time*

The Hurlbut-Rogers Cutting-Off and Centering Machine is a big producer because there are TWO TOOLS instead of one, working in the same cut. VERY POWERFUL, RIGID AND ACCURATE.

Pays its cost in savings effected in very few months.

ASK FOR FULL DETAILS.

The Hurlbut Rogers Machinery Co.

So. Sudbury, Mass.

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

Canadian Machinery BUYERS DIRECTORY

If what you want is not listed here write us, and we will tell you where to get it. Let us suggest that you consult also the advertisers' index facing the inside back cover, after having secured advertisers' names from this directory. The information you desire may be found in the advertising pages. This department is maintained for the benefit and convenience of our readers. The insertion of our advertisers' names under proper headings is gladly undertaken, but does not become part of an advertising contract.

ABRASIVE MATERIALS

Aikenhead Hardware Co., Toronto, Ont.
Baxter Co., Ltd., J. R., Montreal, Que.
Canadian Fairbanks-Morse Co., Montreal.
Can. B. K. Morton, Montreal, Que.
Carborundum Co., Niagara Falls, N.Y.
Foss & Hill Machy. Co., Montreal.
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.
Norton Co., Worcester, Mass.
H. W. Petrie, Toronto.
H. W. Petrie, of Montreal, Ltd., Montreal.

ACETYLENE

Carter Welding Co., Toronto, Ont.
Commercial Acetylene Welding Co., Inc., Toronto.
L'Air Liquide Society, Montreal, Toronto.
Prest-O-Lite Co., Inc., Toronto, Ont.

ACETYLENE GENERATORS

Commercial Acetylene Welding Co., Inc., Toronto.
L'Air Liquide Society, Montreal, Toronto.
Prest-O-Lite Co., Inc., Toronto, Ont.

ACCUMULATORS, HYDRAULIC

Canadian Fairbanks-Morse Co., Montreal.
Charles F. Elmes Eng. Works, Chicago.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Smart-Turner Mach. Co., Hamilton, Ont.
William R. Perrin, Ltd., Toronto.

AIR RECEIVERS

Can. Ingersoll-Rand Co., Sherbrooke, Que.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
MacKinnon, Holmes Co., Sherbrooke, Que.

AIR WASHERS

Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

ALUMINUM

Canada Metal Co., Toronto.
Tallman Brass & Metal Co., Hamilton.

ALLOY, STEEL

Can. B. K. Morton, Toronto, Montreal.
Comstedt, Josef F. A., 120 Broadway, New York.
H. A. Drury Co., Ltd., Montreal.
Hawkrige Bros. Co., Boston, Mass.
Michigan Steel Exchange, Inc., Detroit, Mich.
Osborn (Canada), Ltd., Sam'l, Montreal, Que.
Standard Alloys Company, Pittsburgh, Ont.
Vanadium Alloys Steel Co., Pittsburg, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

ARBORS

Canadian Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
H. W. Petrie, Toronto.
H. W. Petrie, Ltd., Montreal.
Pratt & Whitney Co., Dundas, Ont.

AUTOGENOUS WELDING AND CUTTING PLANTS

Carter Welding Co., Toronto, Ont.
L'Air Liquide Society, Montreal, Toronto.
Prest-O-Lite Co., Inc., Toronto, Ont.

AUTOMATIC MACHINERY

Baird Machine Co., Bridgeport, Conn.
Cook, Asa S., Hartford, Conn.
Dominion Machinery Co., Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Gardner, Robt. & Son, Montreal.
McClean & Son, F. W., Niagara Falls, Ont.
Riverside Machinery Depot, Detroit, Mich.
H. W. Petrie, Toronto.
H. W. Petrie, Ltd., Montreal.
Pratt & Whitney Co., Dundas, Ont.
Roelofson Machine & Tool Co., Toronto, Ont.
A. R. Williams Machy. Co., Toronto.

AUTOMATIC WOOD SCREW MACHINES

Cook, Asa S., Hartford, Conn.

BABBITT METAL

Aikenhead Hardware Co., Toronto, Ont.
Baxter Co., Ltd., J. R., Montreal, Que.
Canadian Fairbanks-Morse Co., Montreal.
Canada Metal Co., Ltd., Toronto.
Can. B. K. Morton, Toronto, Montreal.
Foss & Hill Machy. Co., Montreal.
Hoyt Metal Co., Toronto.
Hungerford Brass & Copper Co., U. T., New York.
Jobborn, Geo. A., Hamilton, Ont.
Magnolia Metal Co., Montreal.
H. W. Petrie, Toronto.
Tallman Brass & Metal Co., Hamilton.

BALL BEARINGS

Canadian Fairbanks-Morse Co., Montreal.
Can. S K F Co., Toronto, Ont.
Chapman Double Ball Bearing Company, Toronto.
Lyman Tube & Supply Co., Montreal, Que.
R. E. T. Pringle, Ltd., Toronto, Ont.

BARRELS, STEEL SHOP

Baird Machine Co., Bridgeport, Conn.
Cleveland Wire Spring Co., Cleveland.

BASE FACING MACHINES

Rollins Engine Works, Nashua, N.H.
Victoria Foundry Co., Ottawa, Ont.

BARs, BORING

Charles F. Elmes Eng. Works, Chicago, Ill.
Monarch Brass Mfg. Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Webber Bros. Mach. Co., Toronto, Ont.

BELT LACERS

Clipper Belt Lacer Co., Grand Rapids, Mich.

BELT DRESSING AND CEMENT

Baxter Co., Ltd., J. R., Montreal, Que.

BELT LACING LEATHER

Aikenhead Hardware Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal.
Graton & Knight Mfg. Co., Worcester, Mass.

BELTING, BALATA

Baxter Co., Ltd., J. R., Montreal, Que.
Can. B. K. Morton, Toronto, Montreal.

BELTING, CHAIN

Canadian Fairbanks-Morse Co., Montreal.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
H. W. Petrie, Toronto.
H. W. Petrie, Ltd., Montreal.
Whitney Mfg. Co., Hartford, Conn.

BELTING, CONVEYOR

Goodyear Tire & Rubber Co., Toronto, Ont.

BELTING, LEATHER

Canadian Fairbanks-Morse Co., Montreal.
Can. B. K. Morton, Montreal, Que.
Dominion Machinery Co., Toronto.
Graton & Knight Mfg. Co., Worcester, Mass.
Goodyear Tire & Rubber Co., Toronto, Ont.
McLaren, J. C., Belting Co., Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
H. W. Petrie, Ltd., Montreal.
Standard Machy. & Supplies, Ltd., Montreal, Que.

BELTING, STITCHED COTTON DUCK

Baxter Co., Ltd., J. R., Montreal, Que.
Bennett, W. P., 51 Montford St., Montreal, Que.
Dominion Belting Co., Hamilton, Ont.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

BENCH LEGS, STEEL

New Britain Mach. Co., New Britain, Conn.

BENCH DRAWERS, FRICTIONLESS

New Britain Mach. Co., New Britain, Conn.

BENDING MACHINERY

John Bertram & Sons Co., Dundas.
Bertrams, Limited, Edinburgh, Scotland.
Bliss, E. W. Co., Brooklyn, N.Y.
Brown-Boggs Co., Ltd., Hamilton, Can.
Can. Blower & Forge Co., Kitchener, Canada.
Dominion Machinery Co., Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Charles F. Elmes Eng. Works, Chicago.
Jardine, A. B. & Co., Henseler, Ont.
National Machinery Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Steel Bending Brake Works, Chatham, Ont.
Toledo Machine & Tool Co., Toledo, O.

BILLET MARKERS

Matthews, Jas. H., & Co., Pittsburgh, Pa.

BINS, STEEL

The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
MacKinnon, Holmes Co., Sherbrooke.
Toronto Iron Works, Ltd., Toronto, Ont.

BLASTING MACHINES, SHOT AND STEEL GRIT

Gray Mfg. & Mach. Co., Toronto, Ont.

BLOWERS

Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
H. W. Petrie, Ltd., Montreal.
R. E. T. Pringle, Ltd., Toronto, Ont.
Riverside Machinery Depot, Detroit, Mich.
Sturtevant Co., B. F., Galt, Ont.

BLOW PIPES AND REGULATORS

Carter Welding Co., Toronto, Ont.
L'Air Liquide Society, Montreal, Toronto.
Prest-O-Lite Co., Inc., Toronto, Ont.

BLUE PRINTING MACHINERY

Mulliner-Enlund Tool Co., Syracuse, N.Y.

BOARTZ

Francis & Co., Hartford, Conn.
Geo. A. Joyce Co., Ltd., New York, N.Y.

BOILERS

The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
MacKinnon, Holmes Co., Sherbrooke.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Riverside Machinery Depot, Detroit, Mich.
Wickes Bros., Saginaw, Mich.

BOLT CUTTERS AND NUT TAPERS

Aikenhead Hardware Co., Toronto, Ont.
Canada Machinery Corp., Galt, Ont.
Wells Brothers Co. of Canada, Galt, Ont.

BOLTS

Aikenhead Hardware Co., Toronto, Ont.
Cumming & Son, J. W., New Glasgow, Canada.
Galt Machine Screw Co., Galt, Ont.
London Bolt & Hinge Works, London, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

BOLT AND NUT MACHINERY

John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Gartner, Robt. & Son, Montreal.
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, O.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Riverside Machinery Depot, Detroit, Mich.
A. R. Williams Machinery Co., Toronto.

BOLTS AND NUTS, BRASS, COPPER AND BRONZE

Hungerford Brass & Copper Co., New York, N.Y.

BOLT THREADING MACHINERY

Cook, Asa S., Co., Hartford, Conn.
Victor Tool Co., Waynesboro, Pa.

BORING MACHINES, PNEUMATIC CYLINDER

Cleveland Pneumatic Tool Co. of Canada, Toronto.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Garlock-Walker Machinery Co., Toronto, Ont.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Stow Mfg. Co., Binghamton, N.Y.

BORING MACHINES, UPRIGHT AND HORIZONTAL

John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Dominion Machinery Co., Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
Roelofson Machine & Tool Co., Toronto, Ont.
Riverside Machinery Depot, Detroit, Mich.
Stow Mfg. Co., Binghamton, N.Y.

BORING MACHINES, STOVE AND COAL

Cumming & Son, J. W., New Glasgow, Canada.

BORING AND TURNING MILLS

John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
R. E. T. Pringle, Ltd., Toronto, Ont.

BOXES, STEEL SHOP AND TOTE

Cleveland Wire Spring Co., Cleveland.
New Britain Mach. Co., New Britain, Conn.

BRAKES

Brown, Boggs & Co., Hamilton, Can.
Steel Bending Brake Wks., Ltd., Chatham, Ont.

BRASS AND COPPER BARS, RODS AND SHEETS

Brown's Copper & Brass Rolling Mills, New Toronto.
Hungerford Brass & Copper Co., U. T., New York.

BRASS WORKING MACHINERY

Dominion Machy. Co., Toronto, Ont.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machinery Co., Toronto, Ont.
Warner & Swasey Co., Cleveland.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Prest-O-Lite Co., Inc., Toronto, Ont.
Riverside Machinery Depot, Detroit, Mich.
A. R. Williams Machy. Co., Toronto.

BRIDGES, RAILWAY AND HIGHWAY

The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
MacKinnon, Holmes Co., Sherbrooke, Que.

BRONZE RODS AND SHEETS

Brown's Copper & Brass Rolling Mills, New Toronto.
Hungerford Brass & Copper Co., U. T., New York.

BUBBLERS

Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

BUFFING AND POLISHING MACHY.

Ford-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
New Britain Machine Co., New Britain, Conn.
H. W. Petrie, Ltd., Montreal.
R. E. T. Pringle, Ltd., Toronto, Ont.

BUCKETS, CLAM SHELL, CRAB, DUMP

Northern Crane Works, Ltd., Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

BUCKETS, ELEVATING AND HOISTING

Bannard, Edwin J., Toronto.

BULLDOZERS

John Bertram & Sons Co., Dundas.
E. W. Bliss Co., Brooklyn, N.Y.

Canadian Machinery Corp., Galt, Ont.

BURNERS, OIL AND NATURAL GAS

Bellevue Industrial Furnace Co., Detroit, Mich.
Gray Mfg. & Mach. Co., Toronto, Ont.
Northern Crane Works, Ltd., Walkerville, Ont.
Owen Equipment & Mfg. Co., New Haven, Conn.

BURNING REAMERS

Wells Bros. Co. of Canada, Galt, Ont.

BURRS, IRON AND COPPER

Hungerford Brass & Copper Co., New York, N.Y.
Farmer & Bulloch Co., Ganoquoque.

BUTTERISERS

Wells Bros. Co. of Canada, Galt, Ont.

CANNERS' MACHINERY

Bliss, E. W. Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.

Prest-O-Lite Co., Inc., Toronto, Ont.

CARS, INDUSTRIAL

Corbet Fdry. & Mach. Co., Ltd., Owen Sound, Ont.
Can. Blower & Forge Co., Kitchener, Can.

Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cumming & Son, J. W., New Glasgow, Canada.

The Jencks Mach. Co., Ltd., Sherbrooke, Que.
Marsh & Henthorn, Belleville, Ont.

Sheldons, Limited, Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CAR MOVERS

Dillon Mfg. Co., Oshawa, Ont.

CARTRIDGE MAKING MACHINERY

Blackell, Fred. S., Woodworth Tower, New York.
Prest-O-Lite Co., Inc., Toronto, Ont.

CASTINGS, ALUMINUM, BRASS,**BRONZE, COPPER**

Cumming & Son, J. W., New Glasgow, Canada
Alexander Fleck, Ltd., Ottawa.

Hungerford Brass & Copper Co., New York, N.Y.
The Jencks Mach. Co., Ltd., Sherbrooke, Que.

Tallman Brass & Metal Co., Hamilton.

CASTINGS, GRAY IRON

Bernard Industrial Co., The A., Fortierville, Que.
Brown, Boggs Co., Ltd., Hamilton, Canada.

Can. Steel Foundries, Ltd., Montreal, Que.
Alexander Fleck, Ltd., Ottawa.

Gardner, Robt., & Son, Montreal.
Hull Iron & Steel Foundries, Ltd., Hull, Quebec.

The Jencks Mach. Co., Ltd., Sherbrooke, Que.
Wm. Kennedy & Sons, Ltd., Owen Sound.

Plessisville Foundry Co., Plessisville, Que.
Sheldons, Limited, Galt, Ont.

CASTINGS, STEEL CHROME**AND MANGANESE STEEL**

Can. Steel Foundries, Ltd., Montreal, Que.
Dominion Steel Foundry Co., Ltd., Hamilton, Ont.

Hull Iron & Steel Foundries, Ltd., Hull, Quebec.
Wm. Kennedy & Sons, Ltd., Owen Sound.

CASTINGS, MALLEABLE

Can. Steel Foundries, Ltd., Montreal, Que.
Cumming & Son, J. W., New Glasgow, Canada.

CASTINGS, NICKEL STEEL

Hull Iron & Steel Foundries, Ltd., Hull, Quebec

CEMENT MACHINERY

Canadian Fairbanks-Morse Co., Ltd., Montreal.
Gardner, Robt., & Son, Montreal.

H. W. Petrie, Toronto.

CENTERING MACHINES

Victoria Foundry Co., Ottawa, Ont.

CENTRE REAMERS

Wells Brothers Co. Greenfield, Mass.
John Bertram & Sons Co., Dundas.

Gardner, Robt., & Son, Montreal.
Hurlbut, Rogers Machy. Co., South Sudbury, Mass.

Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.

CHAIN BLOCKS

Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Ltd., Montreal.

Ford Chain Block & Mfg. Co., Philadelphia, Pa.
Foss & Hill Machy. Co., Montreal.

Garlock-Walker Machinery Co., Toronto, Ont.
Lyman Tube & Supply Co., Montreal, Que.

H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

CHEMISTS

Can. Inspection & Testing Lab., Montreal, Que.
The Jencks Mach. Co., Ltd., Sherbrooke, Que.

Toronto Testing Laboratory, Ltd., Toronto.

CHESTS, TOOL

Union Tool Chest Works, Rochester, N.Y.

CHUCKS, AERO, AUTOMATIC

Garvin Machine Co., New York.
Hannifin Mfg. Co., Chicago, Ill.

Hyde Engineering Works, Montreal.

CHUCKS, AIR

Manufacturers Equipment Co., Chicago, Ill.

CHUCKS, COLLET

Hannifin Mfg. Co., Chicago, Ill.

CHUCKS, DRILL, LATHE

AND UNIVERSAL
Aikenhead Hardware Co., Toronto, Ont.

John Bertram & Sons Co., Dundas, Ont.
Can. Blower & Forge Co., Kitchener, Canada.

Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cushman Chuck Co., Hartford, Conn.

Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.

Garlock-Walker Machinery Co., Toronto, Ont.
Hannifin Mfg. Co., Chicago, Ill.

Hardinge Bros., Chicago, Ill.
Jacobs Mfg. Co., Hartford, Conn.

Ker & Goodwin, Brantford.

Manufacturers Equipment Co., Chicago, Ill.
Miller Falls Co., Miller Falls, Mass.

Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.

Richmond Mfg. Co., Toronto, Ont.
H. W. Petrie, Ltd., Montreal.

H. W. Petrie, Toronto.
Sumner Chuck Co., New Britain, Conn.

Thomas Elevator Co., Chicago, Ill.
L. E. Winton Machine Co., New London, Conn.

CHUCKS, DRILL, AUTOMATIC
AND KEYLESS
Aikenhead Hardware Co., Toronto, Ont.

Corbet Fdry. & Mach. Co., Ltd., Owen Sound, Ont.
Can. Blower & Forge Co., Kitchener, Canada.

Whitney Mfg. Co., Hartford, Conn.
Richmond Mfg. Co., Toronto, Ont.

CHUCKS, FRICTION AND TAP
Victor Tool Co., Waynesboro, Pa.

Wells Bros. Co. of Canada, Galt, Ont.

CHUCKS, GEARED SCROLL
Richmond Mfg. Co., Toronto, Ont.

CHUCKS, MAGNETIC
H. E. Strick, 223 New Berks Bldg., Montreal, Que.

CHUCKS, RING WHEEL
Ford-Smith Mach. Co., Hamilton, Ont.

Gardner Machine Co., Beloit, Wis.

CHUCKS, SPLIT
Rivett Lathe & Grinder Co., Brighton, Mass.

CHUCKING MACHINES
Garvin Machine Co., New York.

New Britain Machine Co., New Britain, Conn.
Niles-Bement-Pond Co., New York.

Roeelson Machine & Tool Co., Toronto, Ont.
Warner & Swasey Co., Cleveland, O.

CLUTCHES, FRICTION AND PULLEY
Bernard Industrial Co., A., Fortierville, Que.

Johnson Machine Co., Carlyle, Manchester, Conn.
Positive Clutch & Pulley Works, Ltd., Toronto.

COAL HANDLING MACHINERY
MacKinnon, Holmes & Co., Sherbrooke, Que.

Northern Crane Works, Ltd., Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

COKE AND COAL
Hanna & Co., M. A., Cleveland, O.

Zenith Steel & Coal Products, Montreal, Que.

COLLARS
Can. Bond Hanger & Cplg. Co., Alexandria, Ont.

COLLECTORS, PNEUMATIC
Can. Blower & Forge Co., Kitchener, Ont.

Sheldons, Limited, Galt, Ont.
Sturtevant Co., E. P., Galt, Ont.

COLLETS
Hannifin Mfg. Co., Chicago, Ill.

Hyde Engineering Works, Montreal.
Manufacturers' Equipment Co., Chicago, Ill.

Rivett Lathe & Grinder Co., Boston, Mass.
Stone Tool & Supply Co., J. R., Detroit, Mich.

COMPRESSORS, AIR
Can. Ingersoll-Rand Co., Sherbrooke, Que.

Cleveland Pneumatic Tool Co. of Canada, Toronto.
Curtis Pneumatic Machy. Co., St. Louis, Mo.

Garlock-Walker Machinery Co., Toronto, Ont.
Huckley Machine Co., Huckley, Ill.

The Jencks Mach. Co., Ltd., Sherbrooke, Que.
H. W. Petrie, Ltd., Montreal.

H. W. Petrie, Toronto.
Riverside Machinery Dept., Detroit, Mich.

Smart-Turner Machine Co., Hamilton, Ont.
Taylor Instrument Cos., Rochester, N.Y.

CONDENSER TUBES AND FERRULES, BRASS
Hungerford Brass & Copper Co., New York, N.Y.

CONTROLLERS AND STARTERS, ELECTRIC MOTORS
Dominion Machy. Co., Toronto, Ont.

H. W. Petrie, Toronto.
R. E. T. Pringle, Ltd., Toronto, Ont.

A. R. Williams Machy. Co., Toronto.

CONTROLLING INSTRUMENTS
Taylor Instrument Cos., Rochester, N.Y.

CONVERTERS, STEEL SLIDE-BLOW
Whiting Foundry Equipment Co., Harvey, Ill.

COPING MACHINES
Can. Blower & Forge Co., Kitchener, Ont.

John Bertram & Sons Co., Dundas.
Niles-Bement-Pond Co., New York.

COUNTERBORES AND COUNTERSINKS
Aikenhead Hardware Co., Toronto, Ont.

Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.

Pratt & Whitney Co., Dundas, Ont.

COUNTERSHAFTS
Baird Machine Co., Bridgeport, Conn.

Foster Machine Co., Elkhart, Ind.

COUPLINGS, FRICTION
Bernard Industrial Co., The A., Fortierville, Que.

COUPLINGS, PLAIN AND FLEXIBLE
Can. Bond Hanger & Cplg. Co., Alexandria, Ont.

Cleveland Pneumatic Tool Co. of Canada, Toronto.
Gardner, Robt., & Son, Montreal.

Independent Pneumatic Tool Co., Chicago, Ill.

CRANES, LOCOMOTIVE
Northern Crane Works, Walkerville.

CRANES, GANTRY
Northern Crane Works, Walkerville.

Smart-Turner Machine Co., Hamilton, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANES, GOLIATH AND PNEUMATIC
Northern Crane Works, Walkerville.

Whiting Foundry Equipment Co., Harvey, Ill.

CRANES, TRAVELLING, ELECTRIC AND HAND POWER
Curtis Pneumatic Machy. Co., St. Louis, Mo.

Dominion Bridge Co., Montreal.
Hepburn, John T., Ltd., Toronto, Ont.

Niles-Bement-Pond Co., New York.
Northern Crane Works, Walkerville.

CRANES, PORTABLE
Aikenhead Hardware Co., Toronto, Ont.

Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

CRAMP, LEATHER
Graton & Knight Mfg. Co., Worcester, Mass.

CUPOLAS
Can. Blower & Forge Co., Kitchener, Ont.

Northern Crane Works, Walkerville.
H. W. Petrie, Toronto.

Sheldons, Ltd., Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

CUPOLA BLAST GAUGES & BLOWERS
Sheldons, Ltd., Galt, Ont.

CUTTER GRINDERS AND ATTACHMENTS
Cincinnati Milling Machine Co., Cincinnati.

Garlock-Walker Machinery Co., Toronto, Ont.
Garrin Machine Co., New York.

Monarch Brass Mfg. Co., Toronto, Ont.
Norton Grinding Co., Worcester, Mass.

H. W. Petrie, Ltd., Montreal.

CUTTERS, FLUE
Cleveland Pneumatic Tool Co. of Canada, Toronto.

CUTTERS, PIPE (SEE PIPE CUTTERS)
CUTTERS, MILLING
Canadian Fairbanks-Morse Co., Ltd., Montreal.

Cleveland Milling Mach. Co., Cleveland, Ohio.
Cleveland Twist Drill Co., Cleveland.

Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machinery Co., Montreal.

Garvin Machine Co., New York.
Goddard Tool Co., Chicago, Ill.

Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Mach. Co., New Bedford, Mass.

Osborn (Canada), Ltd., Sam'l, Montreal, Que.
H. W. Petrie, Ltd., Montreal.

H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.

Tabor Mfg. Co., Philadelphia, Pa.
Whitney Mfg. Co., Hartford, Conn.

A. R. Williams Machy. Co., Toronto.

CUTTING COMPOUND AND CUTTING OIL
Can. Economic Lubricant Co., Montreal.

Cataract Refining & Mfg. Co., Toronto.
Racine Tool & Machine Co., Racine, Wis.

CUTTING-OFF MACHINES
Armstrong Bros. Tool Co., Chicago.

John Bertram & Sons Co., Dundas.
Canadian Fairbanks-Morse Co., Ltd., Montreal.

Curtis & Curtis Co., Bridgeport, Conn.
Foss & Hill Machinery Co., Montreal.

Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.

Hurlbut, Rogers Machy. Co., South Sudbury, Mass.
John H. Hall & Sons, Brantford, Ont.

Wm. Kennedy & Sons, Owen Sound, Ont.
Peerless Machine Co., Racine, Wis.

H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

Prest-O-Lite Co., Inc., Toronto, Ont.
Racine Tool & Machine Co., Racine, Wis.

Standard Machy. & Supplies, Ltd., Montreal, Que.
Taylor Mfg. Co., Philadelphia, Pa.

CYLINDERS, AIR
Manufacturers Equip. Co., Chicago, Ill.

CYLINDERS, AUTOMATIC REBORING JIGS AND REAMERS
Hinckley Machine Co., Hinckley, Ill.

CUTTING AND WELDING PLANTS.
Prest-O-Lite Co., Inc., Toronto, Ont.

DAMPER REGULATORS
Canadian Fairbanks-Morse Co., Ltd., Montreal.

DERRICKS
Aikenhead Hardware Co., Toronto, Ont.

Dominion Bridge Co., Montreal.
Winnipeg Gear & Engr. Co., Winnipeg, Man.

DIAMONDS, BLACK AND ROUGH
Geo. A. Joyce Co., Ltd., New York.

DIAMOND TOOLS
Francis & Co., Hartford, Conn.

Geo. A. Joyce Co., Ltd., New York.

DIES, BRASS PRINTING, EMBOSSED AND LETTERING
Matthews, Jas. H., & Co., Pittsburgh, Pa.

DIES AND DIE STOCKS
Aikenhead Hardware Co., Toronto, Ont.

Banfield, W. H., & Son, Toronto.
Butterfield & Co., Rock Island, Que.

Brown, Boggs Co., Hamilton, Ont.
Canadian Fairbanks-Morse Co., Montreal.

Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.

A. B. Jardine & Co., Hespeler, Ont.
Modern Tool Co., Erie, Pa.

Morse Twist Drill & Mach. Co., New Bedford, Mass.
H. W. Petrie, Ltd., Montreal.

H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.

Rickett-Shafer Co., Erie, Pa.
Standard Machy. & Supplies, Ltd., Montreal, Que.

Wells Brothers of Canada, Galt, Ont.

DIES FOR BIT BRACE USE
Wells Brothers of Canada, Galt, Ont.

DIES, NOSING
Marsh & Henthorn, Ltd., Belleville, Ont.

DIES, PIPE-THREADING
Ideal Tool & Mfg. Co., Beaver Falls, Pa.

DIE SINKERS
Cook, Asa S., Co., Hartford, Conn.

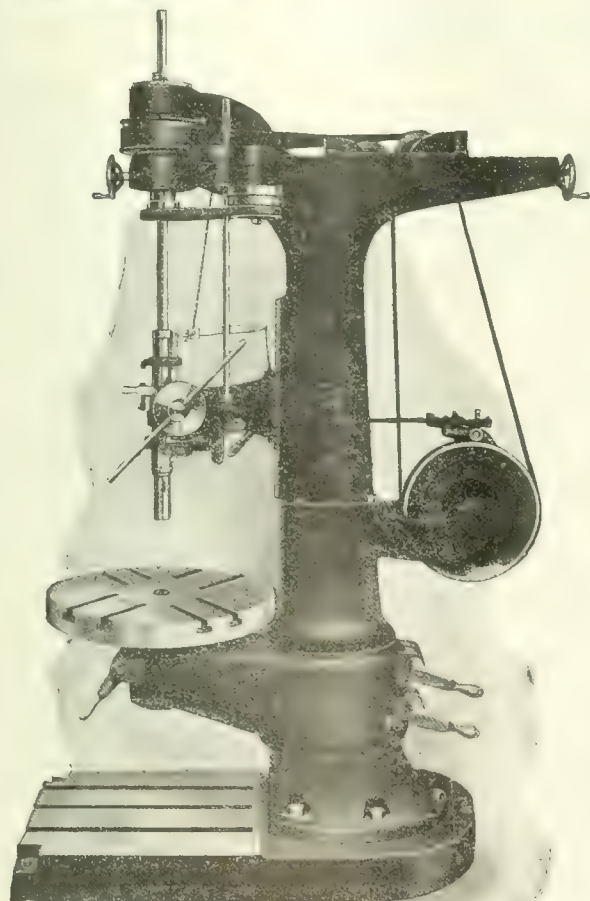
Garvin Machine Co., New York.
H. W. Petrie, Ltd., Montreal.

DIES FOR MACHINES
Aikenhead Hardware Co., Toronto, Ont.

Wells Brothers Co. of Canada, Galt, Ont.



From the
SMALLEST
to the
LARGEST
in Ball Bearing
Sensitive Drilling
Machines



WHATEVER YOUR REQUIREMENTS
as to size, if you want to get the machine most
suitable to your work, get the

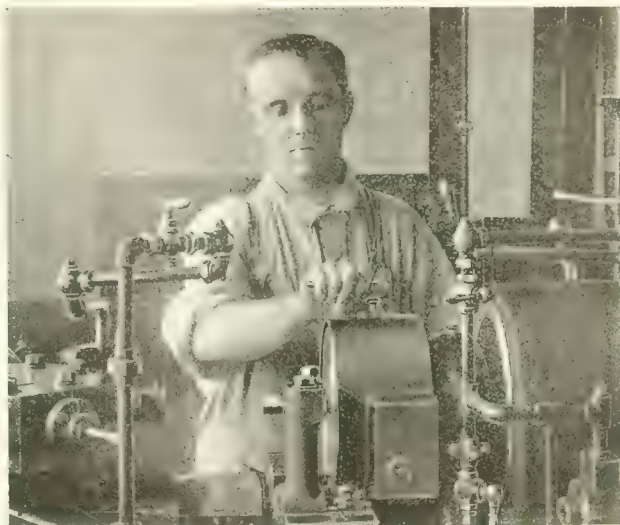
Avey

The widest line in sizes,—the greatest variety in
styles:—higher speeds, together with extreme
simplicity and convenience, enable you to
specialize to best advantage.

GOOD DELIVERIES

WRITE US AT ONCE

THE CINCINNATI PULLEY MACHINERY CO.
CINCINNATI, OHIO, U.S.A.



*A Twist of a Wrench
Adjusts the Chuck
To Any Size*

The slight throw of a handy lever opens chuck
and advances stock; returning the lever to its
original position closes and locks the chuck. The
work is now ready for the tools. This feature of

Brown & Sharpe
Nos. 4 and 6
Wire Feed Screw Machines

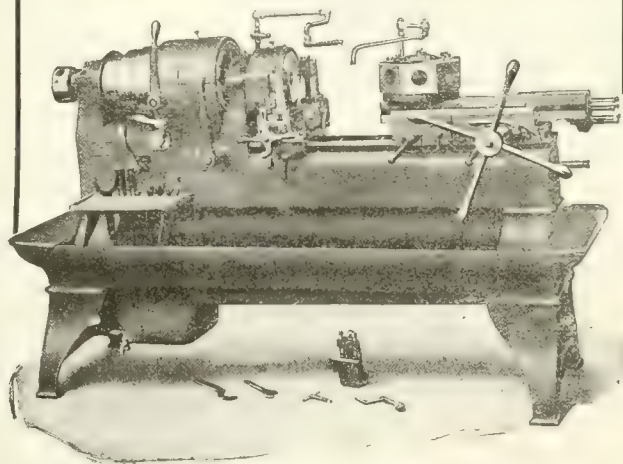
does away entirely with the use of expensive collets. Also
this automatic chuck handles round, square or hexagonal
stock of any size within capacity of machine, and auto-
matically compensates for any ordinary variation in size of
bar. Substantial and durable to stand heavy service, it is
in keeping with the ruggedness of the rest of the machine.

There's no question but what your bar work should be
handled on one of these machines. May we tell you, about
their many other features?

Send for Literature

Brown & Sharpe Mfg., Co.
Providence, R. I., U. S. A.

Canadian Representative:
Canadian Fairbanks-Morse Co., Limited
Toronto, Montreal, Winnipeg, Calgary, Vancouver,
St. John, Saskatoon.



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

DIE SINKING PRESSES, HYDRAULIC

Charles F. Elmes Eng. Works, Chicago.
DIEN, SELF-OPENING
 Eastern Mach. Screw Corp., New Haven, Conn.
 Geometric Tool Co., New Haven.
 Ideal Tool & Mfg. Co., Beaver Falls, Pa.
 Landis Machine Co., Waynesboro, Pa.
 Modern Tool Co., Erie, Pa.
 Murehey Machine & Tool Co., Detroit, Mich.
 Wells Brothers Co. of Canada, Galt, Ont.

DIES FOR SCREW PLATES

Wells Brothers Co. of Canada, Galt, Ont.

DIES, SHEET METAL WORKING

E. W. Bliss Co., Brooklyn, N.Y.
 Brown, Boggs & Co., Hamilton, Canada.
 Worth Engineering Co., Toronto, Ont.

DISCS, LEATHER

Graton & Knight Mfg. Co., Worcester, Mass.

DIES, SCREWS AND THREAD

Landis Machine Co., Waynesboro, Pa.
 Modern Tool Co., Erie, Pa.
 Murehey Machine & Tool Co., Detroit, Mich.
 National-Acme Co., Cleveland, Ohio.
 Wells Brothers Co. of Canada, Galt, Ont.

DRAFT, MECHANICAL

W. H. Banfield & Sons, Toronto.
 Butterfield & Co., Rock Island, Que.
 Can. Blower & Forge Co., Kitchener, Ont.
 A. B. Jardine & Co., Hespeler, Ont.
 Pratt & Whitney Co., Dundas, Ont.
 Sheldons, Ltd., Galt, Ont.

DISCS, LEATHER

Graton & Knight Mfg. Co., Montreal.

DRESSERS, GRINDING AND EMERY WHEEL

Can. Desmond-Stephan Mfg. Co., Hamilton, Ont.
 Ford-Smith Mach. Co., Hamilton, Ont.

DRILL HEADS, ADJUSTABLE,**TWO SPINDLE**

Nelson Blanck Mfg. Co., Detroit, Mich.

DRILL PRESSES

Adams, O. R., 159 St. Paul St., Rochester, N.Y.
 Aurora Tool Works, Aurora, Ind.
 W. F. & John Barnes Co., Rockford.
 Can. Blower & Forge Co., Kitchener, Ont.
 Canada Machinery Corp., Galt, Ont.
 Dominion Machy. Co., Toronto, Ont.
 Foss & Hill Machy. Co., Montreal.
 Garlock-Walker Machinery Co., Toronto, Ont.
 Garvin Machine Co., New York.
 Montreal Machy. & Supplies, Ltd., Montreal, Que.
 Niles-Bement-Pond Co., New York.
 Petrie of Montreal, Ltd., H. W., Montreal, Que.
 H. W. Petrie, Toronto.
 R. E. T. Pringle, Ltd., Toronto, Ont.
 Riverside Machinery Depot, Detroit, Mich.
 Standard Machy. & Supplies, Ltd., Montreal, Que.
 United States Mach. Tool Co., Cincinnati, Ohio.
 A. R. Williams Machinery Co., Toronto.

DRILLING MACHINES, BENCH

Bilton Mach. Tool Co., Bridgeport, Conn.
 Martin Machine Co., Greenfield, Mass.

DRILLING MACHINES, GANG

Barnes, W. F. & John Co., Rockford, Ill.
 Bilton Mach. Tool Co., Bridgeport, Conn.
 Canada Machinery Corp., Galt, Ont.
 Silver Mfg. Co., Salem, Ohio.

DRILLING MACHINES, LOCOMOTIVE AND MULTIPLE SPINDLE

John Bertram & Sons Co., Dundas.
 Bilton Mach. Tool Co., Bridgeport, Conn.
 Can. Blower & Forge Co., Kitchener, Ont.
 Canada Machinery Corp., Galt, Ont.
 Canadian Fairbanks-Morse Co., Montreal.
 Cincinnati Pulley Machy. Co., Cincinnati, Ohio.
 Dominion Machy. Co., Toronto, Ont.
 Foss & Hill Machy. Co., Montreal.
 Fox Machine Co., Jackson, Mich.
 Garlock-Walker Machinery Co., Toronto, Ont.
 Garvin Machine Co., New York.
 A. B. Jardine & Co., Hespeler, Ont.
 National-Acme Co., Cleveland, Ohio.
 Niles-Bement-Pond Co., New York.
 Petrie of Montreal, Ltd., H. W., Montreal, Que.
 H. W. Petrie, Toronto.
 Rockford Drilling Mach. Co., Rockford, Ill.

DRILLING MACHINES,**RADIAL AND TURRET**

John Bertram & Sons Co., Dundas.
 Canadian Fairbanks-Morse Co., Montreal.
 Canada Machinery Corp., Galt, Ont.
 Dominion Machy. Co., Toronto, Ont.
 Garlock-Walker Machinery Co., Toronto, Ont.
 Henry & Wright Mfg. Co., Hartford, Conn.
 Niles-Bement-Pond Co., New York.
 H. W. Petrie, Toronto.

DRILLING MACHINES, SENSITIVE

Aikenhead Hardware Co., Toronto, Ont.
 Bilton Mach. Tool Co., Bridgeport, Conn.
 W. F. & John Barnes Co., Rockford, Ill.
 Canadian Fairbanks-Morse Co., Montreal.
 Canada Machinery Corp., Galt, Ont.
 De Moor Machine Co., Cleveland, Ohio.
 Foss & Hill Machy. Co., Montreal.
 Garlock-Walker Machinery Co., Toronto, Ont.
 Henry & Wright Mfg. Co., Hartford, Conn.
 D. McKenzie Machinery Co., Guelph, Ont.
 Niles-Bement-Pond Co., New York.
 R. E. T. Pringle, Ltd., Toronto, Ont.
 United States Mach. Tool Co., Cincinnati, Ohio.

DRILLING MACHINES, UPRIGHT AND HORIZONTAL

Aurora Tool Works, Aurora, Ind.
 John Bertram & Sons Co., Dundas.
 Can. Blower & Forge Co., Kitchener, Ont.
 Canada Machinery Corp., Galt, Ont.
 Cincinnati Pulley Machy. Co., Cincinnati, Ohio.
 Dominion Machy. Co., Toronto, Ont.
 Garlock-Walker Machinery Co., Toronto, Ont.
 A. B. Jardine & Co., Hespeler, Ont.
 R. McDougall Co., Galt.

Niles-Bement-Pond Co., New York.

Petrie of Montreal, Ltd., H. W., Montreal, Que.

H. W. Petrie, Toronto.

Rockford Drilling Mach. Co., Rockford, Ill.

Silver Mfg. Co., Salem, Ohio.

A. R. Williams Machinery Co., Toronto.

DRILLING POSTS

Aikenhead Hardware Co., Toronto, Ont.
 Keystone Mfg. Co., Buffalo, N.Y.
 Silver Mfg. Co., Salem, Ohio.

DRILLS, BENCH

Aikenhead Hardware Co., Toronto, Ont.
 W. F. & John Barnes Co., Rockford, Ill.
 Can. Blower & Forge Co., Kitchener, Ont.
 Canadian Fairbanks-Morse Co., Montreal.
 Cincinnati Pulley Machy. Co., Cincinnati, Ohio.
 Foss & Hill Machy. Co., Montreal.
 Garlock-Walker Machinery Co., Toronto, Ont.
 Millers Falls Co., Millers Falls, Mass.
 H. W. Petrie, Ltd., Montreal.
 Pratt & Whitney Co., Dundas, Ont.
 R. E. T. Pringle, Ltd., Toronto, Ont.
 United States Electrical Tool Co., Cincinnati.

DRILLS, BLACKSMITH AND BIT STOCK

Aikenhead Hardware Co., Toronto, Ont.
 Can. Blower & Forge Co., Kitchener, Ont.
 Cleveland Twist Drill Co., Cleveland.
 Foss & Hill Machy. Co., Montreal.
 A. B. Jardine & Co., Hespeler, Ont.
 Morse Twist Drill & Machine Co., New Bedford.
 Petrie of Montreal, Ltd., H. W., Montreal, Que.
 H. W. Petrie, Toronto.

DRILLS, CENTRE

Aikenhead Hardware Co., Toronto, Ont.
 Clark Equipment Co., Buchanan, Mich.
 Cleveland Twist Drill Co., Cleveland.
 Morse Twist Drill & Machine Co., New Bedford.

DRILLS, CORNER (PNEUMATIC)

Can. Ingersoll-Rand Co., Sherbrooke, Que.
 Cleveland Pneumatic Tool Co. of Canada, Toronto.
 Garlock-Walker Machinery Co., Toronto, Ont.

DRILLS, ELECTRIC AND PORTABLE

Aikenhead Hardware Co., Toronto, Ont.
 Can. Blower & Forge Co., Kitchener, Ont.
 Cincinnati Electrical Tool Co., Cincinnati, Ohio.
 Dominion Machy. Co., Toronto, Ont.
 Foss & Hill Machy. Co., Montreal.
 Independent Pneumatic Tool Co., Chicago.
 Niles-Bement-Pond Co., New York.
 H. W. Petrie, Ltd., Montreal.
 H. W. Petrie, Toronto.
 Prest-O-Lite Co., Inc., Toronto, Ont.
 R. E. T. Pringle, Ltd., Toronto, Ont.
 Stow Mfg. Co., Binghamton, N.Y.
 United States Electrical Tool Co., Cincinnati.
 A. R. Williams Machinery Co., Toronto.

DRILLS, HIGH SPEED

Aikenhead Hardware Co., Toronto, Ont.
 Atkins & Co., Wm., Sheffield, Eng.
 Cleveland Twist Drill Co., Cleveland.
 Canadian Fairbanks-Morse Co., Montreal.
 Can. B. K. Morton, Toronto, Montreal.
 H. A. Drury Co., Montreal.
 Foss & Hill Machy. Co., Montreal.
 Marshall, Geo. A., 70 Lombard St., Toronto.
 McKenna Brothers, Pittsburgh, Pa.
 Montreal Machy. & Supplies, Ltd., Montreal, Que.
 Morse Twist Drill & Mach. Co., New Bedford, Mass.

Osborn (Canada) Ltd., Sam'l, Montreal, Que.

W. F. & John Barnes Co., Rockford, Ill.

H. W. Petrie, Toronto.

Pratt & Whitney Co., Dundas, Ont.

Standard Machy. & Supplies, Ltd., Montreal, Que.

DRILLS, MULTIPLE SPINDLE

Henry & Wright Mfg. Co., Hartford, Conn.
 Niles-Bement-Pond Co., New York.
 H. W. Petrie, Ltd., Montreal.
 Garlock-Walker Machinery Co., Toronto, Ont.
 Pratt & Whitney Co., Dundas, Ont.

DRILLS, OIL TUBE

Cleveland Twist Drill Co., Cleveland.
 Morse Twist Drill & Mach. Co., New Bedford.

DRILLS, PNEUMATIC

Can. Ingersoll-Rand Co., Sherbrooke, Que.
 Cleveland Pneumatic Tool Co. of Canada, Toronto.
 Independent Pneumatic Tool Co., Chicago, Ill.
 The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
 Niles-Bement-Pond Co., New York.
 R. E. T. Pringle, Ltd., Toronto, Ont.

DRILLS, PNEUMATIC CORNER

Independent Pneumatic Tool Co., Chicago, Ill.

DRILLS, RATCHET AND HAND

Aikenhead Hardware Co., Toronto, Ont.
 Armstrong Bros. Tool Co., Chicago.
 Can. Blower & Forge Co., Kitchener, Ont.
 Canadian Fairbanks-Morse Co., Montreal.
 Cincinnati Electrical Tool Co., Cincinnati, Ohio.
 Cleveland Twist Drill Co., Cleveland.
 Garlock-Walker Machinery Co., Toronto, Ont.
 A. B. Jardine & Co., Hespeler, Ont.
 Millers Falls Co., Millers Falls, Mass.
 Morse Twist Drill & Mach. Co., New Bedford.
 H. W. Petrie, Ltd., Montreal.
 H. W. Petrie, Toronto.
 Pratt & Whitney Co., Dundas, Ont.

DRILLS, ROCK

Can. Ingersoll-Rand Co., Sherbrooke, Que.
 Cleveland Pneumatic Tool Co. of Canada, Toronto.
 Dominion Machy. Co., Toronto.
 Foss & Hill Machy. Co., Montreal.
 The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
 A. R. Williams Machinery Co., Toronto.

DRILLS, TRACK

Cleveland Twist Drill Co., Cleveland.
 Foss & Hill Machy. Co., Montreal.
 Morse Twist Drill & Mach. Co., New Bedford.

DRILLS, TWIST

Atkins & Co., Wm., Sheffield, Eng.
 Aikenhead Hardware Co., Toronto, Ont.
 Armstrong, Whitworth of Canada, Ltd., Montreal.
 Canadian Fairbanks-Morse Co., Montreal.
 Can. B. K. Morton, Toronto, Montreal.
 Clark Equipment Co., Buchanan, Mich.

Cleveland Twist Drill Co., Cleveland.

Morse Twist Drill & Mach. Co., New Bedford.

Osborn (Canada), Ltd., Sam'l, Montreal, Que.

H. W. Petrie, Toronto.

Pratt & Whitney Co., Dundas, Ont.

Whitman & Barnes Mfg. Co., St. Catharines, Ont.

DRINKING FOUNTAINS

Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

DRIVING APPLIANCES

Baird Machine Co., Bridgeport, Conn.
 Sheldons, Ltd., Galt, Ont.
 R. E. T. Pringle, Ltd., Toronto, Ont.

DUMP CARS

Canadian Fairbanks-Morse Co., Montreal.
 The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
 MacKinnon, Holmes & Co., Sherbrooke, Que.

DUST SEPARATORS

Can. Blower & Forge Co., Kitchener, Canada.
 Sheldons, Ltd., Galt, Ont.

DUST ARRESTERS (FOR TUMBLING MILLS)

Northern Crane Works, Walkerville.
 Sheldons, Ltd., Galt, Ont.
 Sturtevant Co., B. F., Galt, Ont.
 Whiting Foundry Equipment Co., Harvey, Ill.

DYNAMOS AND ELECTRICAL SUPPLIES

Canadian Fairbanks-Morse Co., Montreal.
 Dominion Machy. Co., Toronto, Ont.
 Lancashire Dynamo & Motor Co., Ltd., Toronto.
 Montreal Machy. & Supplies, Ltd., Montreal, Que.
 Petrie of Montreal, Ltd., H. W., Montreal, Que.
 H. W. Petrie, Toronto.
 Standard Machy. & Supplies, Ltd., Montreal, Que.
 Pratt & Whitney Co., Dundas, Ont.
 A. R. Williams Machy. Co., Toronto.

ELEVATOR ENCLOSURES

Canada Wire & Iron Goods Co., Hamilton, Ont.

ELEVATORS AND BUCKETS

Curtis Pneumatic Machy. Co., St. Louis, Mo.
 Whiting Foundry Equipment Co., Harvey, Ill.

ELEVATING AND CONVEYING MACHINERY

Banfield, Edwin J., Toronto.
 Can. Matthews Gravity Carrier Co., Toronto, Ont.

EMERY GRINDERS (PNEUMATIC)

Cleveland Pneumatic Tool Co. of Canada, Toronto.
 Stow Mfg. Co., Binghamton, N.Y.

EMERY AND EMERY WHEELS

Foss & Hill Machy. Co., Montreal.
 Garvin Machine Co., New York.
 Canadian Fairbanks-Morse Co., Montreal.
 Ford-Smith Mach. Co., Hamilton, Ont.
 Francis & Co., Hartford, Conn.
 Montreal Machy. & Supplies, Ltd., Montreal, Que.
 Norton Co., Worcester, Mass.
 Petrie of Montreal, Ltd., H. W., Montreal, Que.
 H. W. Petrie, Toronto.
 R. E. T. Pringle, Ltd., Toronto, Ont.
 Standard Machy. & Supplies, Ltd., Montreal, Que.

ENGINES, BALANCED VALVE

The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
 Plessisville Foundry Co., Plessisville, Que.

ENGINES, STEAM, GAS, GASOLINE

Canadian Fairbanks-Morse Co., Montreal.
 Johnson Mach. Co., Carlyle, Manchester, Conn.
 H. W. Petrie, Toronto.
 Riverside Machinery Depot, Detroit, Mich.

ENGINES, HORIZONTAL AND VERTICAL

The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
 Johnson Mach. Co., Carlyle, Manchester, Conn.
 H. W. Petrie, Ltd., Montreal.
 H. W. Petrie, Toronto.
 Sheldons, Ltd., Galt, Ont.
 A. R. Williams Machy. Co., Toronto.

ENGRAVERS

Pritchard-Andrews Co., Ottawa.

ESCUTCHEON PINS

Hungerford Brass & Copper Co., U. T., New York.
 Parmenter & Bulloch Co., Gananque, Ont.

EXHAUST HEADS AND HOODS

Can. Blower & Forge Co., Kitchener, Canada.
 Canadian Fairbanks-Morse Co., Montreal.
 Sheldons, Ltd., Galt, Ont.

EXHAUSTERS

Can. Blower & Forge Co., Kitchener, Canada.
 H. W. Petrie, Toronto.
 Sheldons, Ltd., Galt, Ont.

FANS

Baird Machine Co., Bridgeport, Conn.
 Can. Blower & Forge Co., Kitchener, Canada.
 R. E. T. Pringle, Ltd., Toronto, Ont.
 Sheldons, Ltd., Galt, Ont.
 The Smart-Turner Machine Co., Hamilton.

FAUCETS

Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

FENCE, IRON AND FACTORY

Canada Wire & Iron Goods Co., Hamilton, Ont.

FERRO-TUNGSTEN

Vanadium-Alloys Steel Co., Pittsburgh, Pa.

FILES

Aikenhead Hardware Co., Toronto, Ont.
 Atkins & Co., Wm., Sheffield, Eng.
 Can. B. K. Morton Co., Toronto, Ont.
 Delta File Works, Philadelphia, Pa.
 Marshall, Geo. A., 70 Lombard St., Toronto.
 Nicholson File Co., Port Hope, Ont.
 Osborn (Canada), Ltd., Sam'l, Montreal, Que.
 Port Hope File Mfg. Co., Port Hope, Ont.
 Standard Machy. & Supplies, Ltd., Montreal, Que.

FILING MACHINES

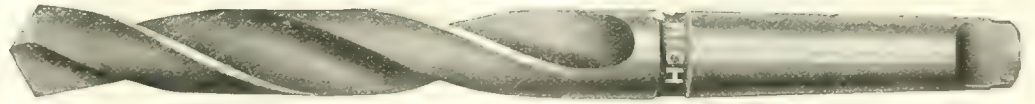
Noble & Westbrook Mfg. Co., Hartford, Conn.

FILTERS, WATER

W. B. Scaife & Sons, Pittsburgh, Pa.

Rich Drills

*f*or maximum speed
and tough propositions



Their value is in their ability to stand up under exceptional speed or extra tough work. The reason for this is that being forged this drill is more durable. Burning or binding is unknown. The result is that clean-cut operation so desirable.



FORGED

We make High-Speed Twist Drills, Reamers, Track Bits, Flat Drills, Bonding Drills, Drill Chucks, Reamer Chucks and Rivet Sets—every Rich tool is of the highest quality and workmanship.

Not Milled

Send for catalog of complete line and prices.

Standard Machinery & Supplies, Limited, Montreal, Que.

260 St. James Street

Western Representatives: Taylor & Arnold, McArthur Building, Winnipeg; R. F. Mather, 1050 Hamilton St., Vancouver

**Cuts Costs
Increases
Production**

— it is a Rockford Machine

This powerful machine is made to drive high-speed drills up to 3" diameter, for drilling and boring tools up to 8" in diameter for boring out cored holes in cast iron.

It has a lateral and vertical adjustment of the head that permits the spindle to operate anywhere on a surface 18" high by 36" wide.

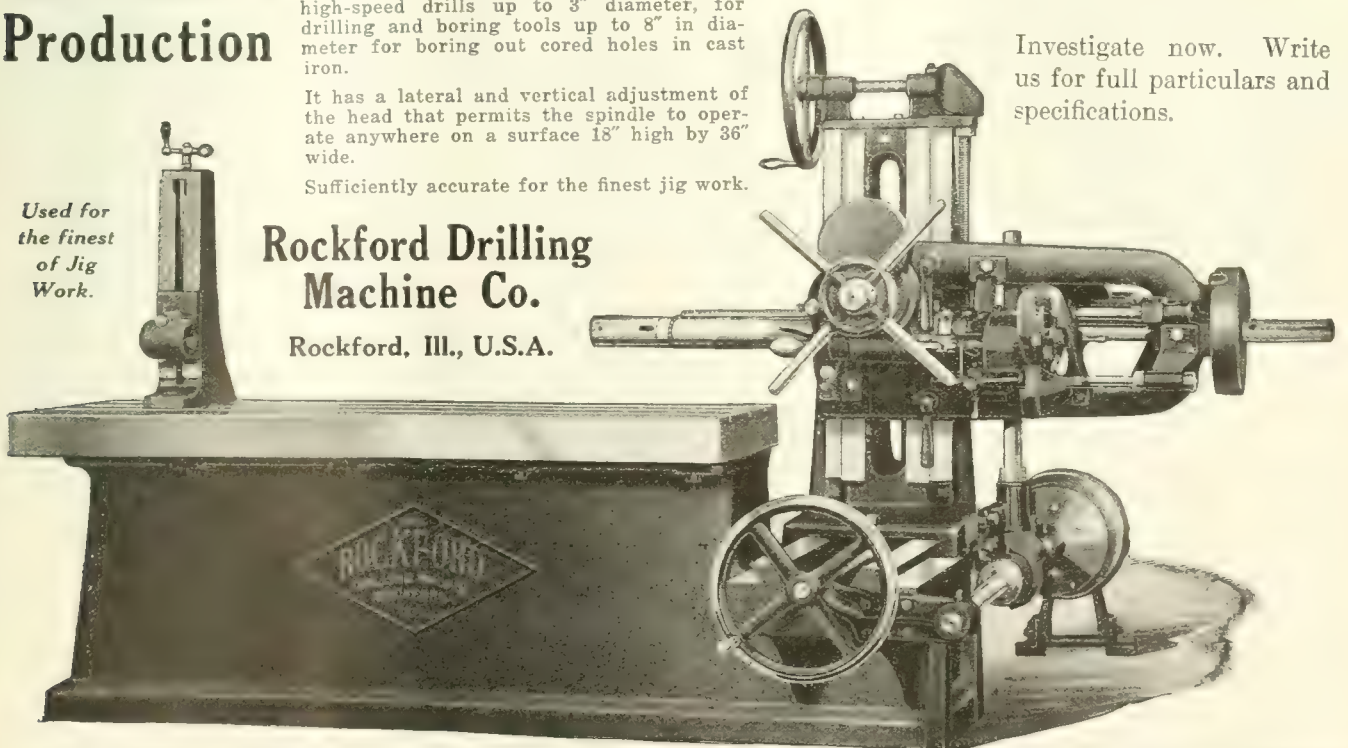
Sufficiently accurate for the finest jig work.

Investigate now. Write us for full particulars and specifications.

*Used for
the finest
of Jig
Work.*

**Rockford Drilling
Machine Co.**

Rockford, Ill., U.S.A.



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

FIRE ESCAPES

Canada Wire & Iron Goods Co., Hamilton, Ont.

FIRE EXTINGUISHERS

Strong, Kitchener & Nott, Kitchener, Ont.

FIRST AID CABINETS

Strong, Kitchener & Nott, Kitchener, Ont.

FISH PLATES

Can. Steel Foundries, Ltd., Montreal, Que.

FIXTURES

Goddard Tool Co., Chicago, Ill.

Monarch Brass Mfg. Co., Toronto, Ont.

Shoem. Aviam & Steam, Inc., New York.

FLEXIBLE SHAFTS

R. E. T. Pringle, Ltd., Toronto, Ont.

Stow Mfg. Co., Binghamton, N.Y.

FLINT SHOT

U.S. Sibley Co., Chicago, Ill.

FORGES, HAND, PORTABLE

Aikenhead Hardware Co., Toronto, Ont.

Can. Blower & Forge Co., Kitchener, Canada.

Sheldons, Ltd., Galt, Ont.

FORGINGS, DROP, AUTOMOBILE

AND LOCOMOTIVE

Bliss, E. W., Co., Brooklyn, N.Y.

Can. Killings & Spencer, Ltd., Welland, Ont.

Cumming & Son, J. W., New Glasgow, Canada.

Dom Forge & Stng Co., Walkerville, Ont.

Steel Co. of Canada Ltd., Hamilton, Ont.

Whitman & Barnes Mfg Co., St. Catharines, Ont.

J. H. Williams & Co., Brooklyn, N.Y.

FORGING HAMMERS, BELT-DRIVEN

Bliss, E. W., Co., Brooklyn, N.Y.

J. H. Williams & Co., Brooklyn, N.Y.

FORGING HAMMERS, STEAM OR AIR

Erie Foundry Co., Erie, Pa.

FORGING MACHINERY

John Bertram & Sons Co., Dundas.

Bliss, E. W., Co., Brooklyn, N.Y.

Brown, Boggs Co., Ltd., Hamilton, Canada.

Erie Foundry Co., Erie, Pa.

Garlock-Walker Machinery Co., Toronto, Ont.

National Machinery Co., Tiffin, Ohio.

Petrie of Montreal, Ltd., H. W., Montreal, Que.

H. W. Petrie, Toronto.

FUEL OIL SYSTEMS

Gilbert & Barker Mfg. Co., Springfield, Mass.

FRICTION LEATHERS

Groton & Knight Mfg. Co., Montreal.

FURNACES, ANNEALING, ETC.

Can. Hoskins, Ltd., Walkerville, Ont.

Gilbert & Barker Mfg. Co., Springfield, Mass.

Mechanical Engineering Co., Montreal.

R. E. T. Pringle, Ltd., Toronto, Ont.

T. J. Jones & Co., Leesdale, Pa.

Waring Foundry Equipment Co., Harvey, Ill.

FURNACES, BLAST

Toronto Iron Works, Ltd., Toronto.

FURNACES, BRASS, MALLEABLE

Waring Foundry Equipment Co., Harvey, Ill.

FURNACES, HEAT TREATING

HARDENING AND TEMPERING

Can. Hoskins, Ltd., Walkerville, Ont.

Gilbert & Barker Mfg. Co., Springfield, Mass.

Tate-Jones & Co., Leesdale, Pa.

FURNACES, FORGING

Can. Hoskins, Ltd., Walkerville, Ont.

Gilbert & Barker Mfg. Co., Springfield, Mass.

FURNACES FOR BAKING, BLUING,

DRYING, ENAMELING, JAPANING

AND LACQUERING

Can. Hoskins, Ltd., Walkerville, Ont.

Oven Equipment & Mfg. Co., New Haven, Conn.

FUSE BOXES, STEEL

Dom Forge & Stng Co., Walkerville, Ont.

FUSE CAP MACHINERY

Noble & Westbrook Mfg. Co., Hartford, Conn.

R. E. T. Pringle, Ltd., Toronto.

GALVANIZING MACHINERY

Erie Foundry Co., Erie, Pa.

GANG PLANER TOOLS

Armstrong Bros. Tool Co., Chicago.

GASKETS, LEATHER, ETC.

Groton & Knight Mfg. Co., Montreal.

GASKETS, COPPER

Hazen & Bess & Copper Co., New York, N.Y.

GAS BLOWERS AND EXHAUSTERS

Can. Blower & Forge Co., Kitchener, Ont.

Sheldons, Limited, Galt.

GAUGES, MERCURY COLUMN, DRAFT

Charles F. Elmer Eng. Works, Chicago.

GAUGES, HYDRAULIC

Form Instrument Co., Rochester, N.Y.

GAUGES, STANDARD

Can. Fairbanks-Morse Co., Montreal.

GEAR TURNING MACHINES, BEND

Bridgeford Mach. Tool Works, Rochester, N.Y.

GEARS, CUT, MORTISE, ANGLE, WORM

Baxter Co., Ltd., J. R., Montreal, Que.

Gardner, Robt., & Son, Montreal.

Grant Gear Works, Boston, Mass.

Hamilton Gear & Machine Co., Toronto.

Hull Iron & Steel Foundries, Ltd., Hull, Que.

The Jencks Mach. Co., Ltd., Sherbrooke, Que.

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

Philadelphia Gear Works, Philadelphia, Pa.

The Smart-Turner Machine Co., Hamilton.

Winnipeg Gear & Engr. Co., Winnipeg, Man.

GEARS, RAWHIDE

Hamilton Gear & Machine Co., Toronto.

Gardner, Robt., & Son, Montreal.

Grant Gear Works, Boston, Mass.

Philadelphia Gear Works, Philadelphia, Pa.

A. R. Williams Machy. Co., Toronto.

Winnipeg Gear & Engr. Co., Winnipeg, Man.

GENERATORS, ELECTRIC

Can. Fairbanks-Morse Co., Montreal.

Dominion Machinery Co., Toronto, Ont.

Lancashire Dynamo & Motor Co., Toronto.

H. W. Petrie, Ltd., Montreal.

H. W. Petrie, Toronto.

Stewart Co., E. F., Galt, Ont.

A. R. Williams Machy. Co., Toronto.

GLASSES, SAFETY

Strong, Kennard & Nutt Co., Cleveland, Ohio.

Willson & Co., Inc., T. A., Reading, Pa.

GRAIN FOR POLISHING

Norton Co., Worcester, Mass.

GRAPHITE

Aikenhead Hardware Co., Toronto, Ont.

Standard Machy. & Supplies, Ltd., Montreal, Que.

GLOVES, LEATHER AND RUBBER

Hickory Steel-Grip Glove Co., Chicago, Ill.

Strong, Kennard & Nutt Co., Cleveland, Ohio.

GLOVES, STEEL GRIP

Hickory Steel-Grip Glove Co., Chicago, Ill.

GLOVES, SAND BLAST

Hickory Steel-Grip Glove Co., Chicago, Ill.

GRAVITY CARRIERS

Can. Matthews Gravity Carrier Co., Toronto, Ont.

GREASES (SEE LUBRICANTS)

GRINDER ATTACHMENTS

Rivett Lathe & Grinder Co., Boston, Mass.

Wilmarth & Morman, Grand Rapids, Mich.

GRINDERS, AUTOMATIC KNIFE

W. H. Barnfield & Son, Toronto.

Canada Machinery Corp., Galt, Ont.

Foss & Hill Machy. Co., Montreal.

Garlock-Walker Machinery Co., Toronto, Ont.

GRINDERS, CENTRE COLUMN, PEDESTAL

AND BENCH

Blak & Johnson Co., Waterbury, Conn.

Can. Bond Hanger & Cplg. Co., Alexandria, Ont.

Canada Machinery Corp., Galt, Ont.

Cleveland Pneumatic Tool Co. of Canada, Toronto.

Dominion Machy. Co., Toronto, Ont.

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 & Machine Co., New Bedford.

New Britain Machine Co., New Britain, Conn.

H. W. Petrie, Ltd., Montreal.

H. W. Petrie, Toronto.

R. E. T. Pringle, Ltd., Toronto, Ont.

Shoem. Aviam & Steam, Inc., New York.

Stow Mfg. Co., Binghamton, N.Y.

United States Electrical Tool Co., Cincinnati, O.

GRINDERS, CUTTER

Brown & Sharpe Mfg. Co., Providence, R.I.

Foss & Hill Machy. Co., Montreal.

Greenfield Machine Co., Greenfield, Mass.

LeBlond Mach. Tool Co., R. K., Cincinnati, O.

Norton Grinding Co., Worcester, Mass.

Pratt & Whitney Co., Dundas, Ont.

Wilmarth & Morman, Grand Rapids, Mich.

GRINDERS, DIE AND CHASER

Landis Machine Co., Waynesboro, Pa.

Modern Tool Co., Erie, Pa.

National-Acme Co., Cleveland, Ohio.

GRINDERS, DISK

Armstrong Bros. Tool Co., Chicago, Ill.

Ford-Smith Mach. Co., Hamilton, Ont.

Gardner Machine Co., Beloit, Wis.

GRINDERS, DRILL

Aikenhead Hardware Co., Toronto, Ont.

Foss & Hill Machy. Co., Montreal.

GEAR BLANKS

Can. Steel Foundries, Ltd., Montreal, Que.

Lyman Tube & Supply Co., Montreal, Que.

GEAR-CUTTING MACHINERY

Bilton Mach. Tool Co., Bridgeport, Conn.

Dominion Machinery Co., Toronto.

Garlock-Walker Machinery Co., Toronto, Ont.

Hamilton Gear & Machine Co., Toronto.

H. W. Petrie, Ltd., Montreal.

H. W. Petrie, Toronto.

The Smart-Turner Machine Co., Hamilton.

D. E. Whiton Machine Co., New London, Conn.

A. R. Williams Machy. Co., Toronto.

Garlock-Walker Machinery Co., Toronto, Ont.

Greenfield Machine Co., Greenfield, Mass.

Independent Pneumatic Tool Co., Chicago.

Norton Co., Worcester, Mass.

Petrie of Montreal, Ltd., H. W., Montreal, Que.

H. W. Petrie, Toronto.

R. E. T. Pringle, Ltd., Toronto, Ont.

United States Electrical Tool Co., Cincinnati.

A. R. Williams Machy. Co., Toronto.

GRINDERS, RADIAL

Rivett Lathe & Grinder Co., Brighton, Mass.

GRINDERS, TOOL AND HOLDER

Armstrong Bros. Tool Co., Chicago.

W. F. & John Barnes Co., Rockford, Ill.

Blake & Johnson Co., Waterbury, Conn.

Blount, J. G., & Co., Everett, Mass.

Brown & Sharpe Mfg. Co., Providence, R.I.

Ford-Smith Machine Co., Hamilton, Ont.

Greenfield Machine Co., Greenfield, Mass.

National-Acme Co., Cleveland, Ohio.

H. W. Petrie, Ltd., Montreal.

Tabor Mfg. Co., Philadelphia, Pa.

Wing & Son, J. E., Hamilton, Ont.

GRINDERS, UNIVERSAL, PLAIN

Fitchburg Grinding Machine Co., Fitchburg, Mass.

Modern Tool Co., Erie, Pa.

Wilmarth & Morman, Grand Rapids, Mich.

GRINDERS, VERTICAL SURFACE

Brown & Sharpe Mfg. Co., Providence, R.I.

Can. Fairbanks-Morse Co., Montreal.

Pratt & Whitney Co., Dundas, Ont.

H. E. Sturtevant, 525 New Brk Bldg., Montreal, Que.

Wilmarth & Morman, Grand Rapids, Mich.

Wing & Son, J. E., Hamilton, Ont.

GRINDING AND POLISHING

MACHINES, PORTABLE, PNEUMATIC

AND SPRING FRAME

Can. Fairbanks-Morse Co., Montreal.

Cincinnati Electrical Tool Co., Cincinnati, Ohio.

Ford-Smith Mach. Co., Hamilton, Ont.

Gardner, Robt., & Son, Montreal.

Garvin Machine Co., New York.

Garlock-Walker Machinery Co., Toronto, Ont.

Greenfield Machine Co., Greenfield, Mass.

Hill & Sons, John H., Brantford.

LeBlond Mach. Tool Co., R. K., Cincinnati.

Niles-Bement-Pond Co., New York.

Petrie of Montreal, Ltd., H. W., Montreal, Que.

H. W. Petrie, Toronto.

Wilmarth & Morman, Grand Rapids, Mich.

Stow Mfg. Co., Binghamton, N.Y.

GRINDING WHEELS

Aikenhead Hardware Co., Toronto, Ont.

Baxter Co., Ltd., J. R., Montreal, Que.

Can. Hart Wheels, Ltd., Hamilton, Ont.

Can. Fairbanks-Morse Co., Montreal.

Can. B. K. Morton, Toronto, Montreal.

Carborundum Co., Niagara Falls.

Dominion Abrasive Wheel Co., New Toronto, Ont.

Ford-Smith Mach. Co., Hamilton, Ont.

Foss & Hill Machy. Co., Montreal.

Francis & Co., Hartford, Conn.

Norton Co., Worcester, Mass.

H. W. Petrie, Toronto.

GUARDS, WINDOW AND MACHINE

Canada Wire & Iron Goods Co., Hamilton, Ont.

Ford-Smith Machine Co., Hamilton, Ont.

New Britain Mach. Co., New Britain, Conn.

HACK SAW BLADES

Aikenhead Hardware Co., Toronto, Ont.

Baxter Co., Ltd., J. R., Montreal, Que.

Diamond Saw & Stamping Works, Buffalo, N.Y.

Ford-Smith Machine Co., Hamilton, Ont.

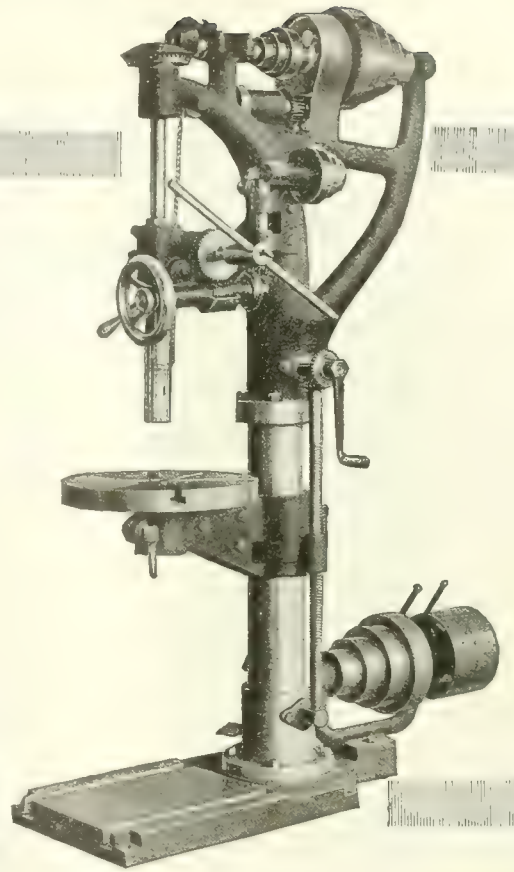
20" Upright Drill

"CANADIAN"

This 20-inch upright power drill is fitted with Power, Lever and Hand Feed, Automatic Stop, Split Bearings and is Double Geared.

Height of Drill	70 in.
Drills to centre of 20" Circle	
Greatest Distance between base and spindle	41½ in.
Greatest Distance between Table and spindle	25½ in.
Travel of Spindle	8½ in.
Diameter of Table	15½ in.
Drills up to	1½ in. dia.
Reamers up to	2 in. dia.

Our catalog 18C-16 describes this drill minutely as well as the complete "Canadian" line. May we send you a copy?



Canadian Blower & Forge Co., Ltd.
KITCHENER, ONT.

Wire Cloth

of every description

We make Machinery Guards of all kinds.
Metal Lockers for Clothes
Steel Shelving for all purposes.

Drop a line for full details.

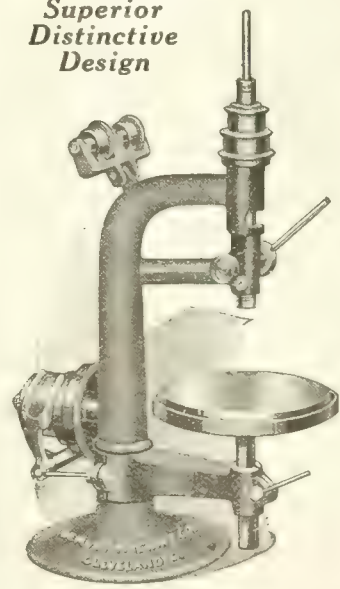
CANADA WIRE & IRON GOODS CO.
HAMILTON, ONTARIO

Eastern Representatives:
H. E. Bull, 184 Mance St.
Montreal, P.Q.

A Good, Hard and Fast Worker

Superior Distinctive Design

The DE MOOY IMPROVED SENSITIVE DRILLS



are built in two sizes; No. 1 has capacity from 0 to 5-16"; No. 2 from 0 to ½"; No. 2 is built in two types, either as Bench or Floor drill.

The machines are built sturdy; compact; convenient; economical and dependable for small accurate drilling.

Write for specifications.

The De Mooy Machine Co.
CLEVELAND, OHIO

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

HAMMERS, MOTOR-DRIVEN

Beatty & Co., Boston, Mass.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

HAMMERS, NAIL MACHINES

United Hammer Co., Boston, Mass.

HAMMERS, STEAM

John Bertram & Sons Co., Dundas, Canada Machinery Corp., Galt, Ont.
Eric Foundry Co., Erie, Pa.
Niles-Bement-Pond Co., New York

HAND LEATHERS OR PADS

Graton & Knight Mfg. Co., Montreal.
Hickox St. Grp. Glee Co., Chicago, Ill.

HANGERS, SHAFT

Baird Machine Co., Bridgeport, Conn.
Can. Bond Hanger & Cplg. Co., Alexandria, Ont.
Can. S K F Co., Toronto, Ont.
Gardner, Robt. & Son, Montreal
Petrie of Montreal, Ltd., H. W., Montreal, Que.
H. W. Petrie, Toronto.
Standard Pressed Steel Co., Philadelphia, Pa.

HARDENING AND TEMPERING

Osborn (Canada), Ltd., Sam'l, Montreal, Que.

HARDNESS TESTING INSTRUMENTS

Shore Instrument & Mfg. Co., New York.

HEATERS AND PURIFIERS

Scaife & Sons Co., Wm. B., Pittsburgh, Pa.

HEATING AND VENTILATING ENGINEERS

Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

HEAT GAUGES, HARDENING AND ANNEALING

Shore Instrument & Mfg. Co., New York.

HIGH SPEED TOOL METAL

Deloro Smelting & Refining Co., Toronto, Ont.

HINGE MACHINERY

Baird Machine Co., Bridgeport, Conn.

HINGES

London Bolt & Hinge Works, London, Ont.

HOBBS

Illinois Tool Works, Chicago, Ill.
Goddard Tool Co., Chicago, Ill.
Osborn (Canada), Ltd., Sam'l, Montreal, Que.

HOISTING AND CONVEYING MACHINERY

Can. Matthews Gravity Carrier Co., Toronto, Ont.
Jenckes Mach. Co., Sherbrooke, Que.
Marsh & Henthorn, Belleville, Ont.
Northern Crane Works, Walkerville, Ont.
Petrie of Montreal, Ltd., H. W., Montreal, Que.
Whiting Foundry Equipment Co., Harvey, Ill.

HOISTS, CHAIN, ELECTRIC AND PNEUMATIC

Can. Ingersoll-Rand Co., Sherbrooke, Que.
Garlock-Walker Machinery Co., Toronto, Ont.
Ford Chain Block & Mfg., Philadelphia, Pa.
Independent Pneumatic Tool Co., Chicago, Ill.
Jenckes Mach. Co., Sherbrooke, Que.
Marsh & Henthorn, Belleville, Ont.
Northern Crane Works, Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

HOISTS, ELECTRIC

The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Kennedy & Sons, Owen Sound, Ont.
Northern Crane Works, Walkerville, Ont.
Winnipeg Gear & Engrg. Co., Winnipeg, Man.
Wright Mfg. Co., Lisbon, Ohio.

HOLDERS, STEEL DIE FOR MARKING

Matthews, Jas. H. & Co., Pittsburgh, Pa.

HOPPERS

The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Toronto Iron Works, Ltd., Toronto, Ont.

HOSE, PNEUMATIC

Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
Goodyear Tire & Rubber Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.
Wells Bros. Co. of Canada, Galt, Ont.

HOLDERS FOR DIES AND DRILLS

HYDRAULIC MACHINERY
Dominion Machinery Co., Toronto.
Charles F. Elmes Eng. Works, Chicago.
Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
William B. Perrin, Ltd., Toronto.
H. W. Petrie, Toronto.
West Tire Setter Co., Rochester, N.Y.

INDICATORS, SPEED

Aikenhead Hardware Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Goodell Pratt, Greenfield, Mass.
L. S. Starnett Co., Athol, Mass.

INDEX CENTRES

Frost C. Dackow, Chicago, Ill.
Garvin Machine Co., New York.

INDICATING INSTRUMENTS

Taylor Instrument Co., Rochester, N.Y.

IRON ORE

Hanna & Co., M. A., Cleveland, O.

JACKS

Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal.
Northern Crane Works, Walkerville.
Norton, A. O., Coaticook, Que.
Petrie, H. W., Toronto.

JACKS, HYDRAULIC

Charles F. Elmes Eng. Works, Chicago.

JACKS, PNEUMATIC

Northern Crane Works, Walkerville.

JACKS, PIT AND TRACK

Can. Fairbanks-Morse Co., Montreal.
Northern Crane Works, Walkerville.

JAWS, FACE PLATE

Cushman Chuck Co., Hartford, Conn.
Skinner Chuck Co., New Britain, Conn.

JIGS, TOOLS, ETC.

Goddard Tool Co., Chicago, Ill.
Homer & Wilson, Hamilton, Ont.
Osborn (Canada), Ltd., Sam'l, Montreal, Que.

Toronto Tool Co., Toronto, Ont.
Shocum, Avram & Shocum, Inc., New York.

KEY SEATERS

Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Morton Mfg. Co., Muskegon Heights, Mich.
National Mach. Tool Co., Cincinnati, Ohio.
A. R. Williams Machy. Co., Toronto.

KEYS, MACHINE

Whitney Mfg. Co., Hartford, Conn.

KILNS

Can. Blower & Forge Co., Kitchener, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Sheldons, Limited, Galt, Ont.

LABELS AND TAGS

Matthews, Jas. H. & Co., Pittsburgh, Pa.

LABORATORIES, INSPECTION AND TESTING (SEE CHEMISTS)**LADLES, FOUNDRY**

Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.
LAG BOLKEM GAMLET POINTESS
National Machy. Co., Tullin, Ohio.

LATHES, BENCH

H. E. Streeter, 33 New Banks Bldg., Montreal, Que.

LATHES, CHUCKING

Acme Machine Tool Co., Cincinnati, Ohio.
Hyde Engineering Works, Montreal.

LATHES CHUCKS (SEE CHUCKS)**LATHES DOGS AND ATTACHMENTS**

Armstrong Bros., Tool Co., Chicago.
Curtis & Curtis Co., Bridgeport, Conn.
Hendey Machine Co., Torrington, Conn.
Rivett Lathe & Grinder Co., Boston, Mass.
J. H. Williams & Co., Brooklyn, N.Y.
Winnipeg Gear & Engrg. Co., Winnipeg, Man.

LATHES, AXLE

Bridgeford Mach. Tool Works, Rochester, N.Y.

LATHES, PRECISION, BENCH

W. F. & John Barnes Co., Rockford.
Blount, J. G., & Co., Everett, Mass.
Can. Fairbanks-Morse Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Harding Bros., Chicago, Ill.
New Britain Mach. Co., New Britain, Conn.
Pratt & Whitney Co., Dundas, Ont.
Rivett Lathe & Grinder Co., Brighton, Mass.
Walcott Lathe Co., Jackson, Mich.

LATHES, BAND TURNING

The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Roelofson Machine & Tool Co., Toronto, Ont.
Warden King Co., Montreal, Que.

LATHES, BRASS

Acme Machine Tool Co., Cincinnati, Ohio.

LATHES, ENGINE

Acme Machine Tool Co., Cincinnati, Ohio.
Adams, O. R., 159 St. Paul St. Rochester, N.Y.
John Bertram & Sons Co., Dundas.
Bridgeford Mach. Tool Works, Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Cincinnati Iron & Steel Co., Cincinnati, Ohio.
Dominion Machinery Co., Toronto.
Foss & Hill Machy Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
Hamilton Mach. Tool Co., Hamilton, Ohio.
Hendey Machine Co., Torrington, Conn.
Himoff Machine Co., New York.
Houston, Stanwood & Gamble Co., Cincinnati, O.
Hyde Engineering Works, Montreal.
McCabe, J. J., New York, N.Y.
R. McDougal Co., Galt.
Niles-Bement-Pond Co., New York.
Oliver Machinery Co., Grand Rapids, Mich.
H. W. Petrie, Toronto.
Rivett Lathe & Grinder Co., Boston, Mass.
Riverside Machinery Depot, Detroit, Mich.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Sebastian Lathe Co., Cincinnati, Ohio.
Walcott Lathe Co., Jackson, Mich.
Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.
Wickes Bros., Saginaw, Mich.
A. R. Williams Machy. Co., Toronto.

LATHES, JOURNAL TRUING

Bridgeford Mach. Tool Works, Rochester, N.Y.
McCabe, J. J., New York, N.Y.

LATHES, PATTERNMAKERS'

J. G. Blount Co., Everett, Mass.
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Jenckes Mach. Co., Sherbrooke, Que.
McCabe, J. J., New York, N.Y.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

LATHES, SINGLE PURPOSE

Bertram, John, & Sons Co., Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal, Que.
Garlock-Walker Machinery Co., Toronto, Ont.
Gray Mfg. & Mach. Co., Toronto, Ont.
Heburn, John T., Ltd., Toronto.
Himoff Machine Co., Inc., New York, N.Y.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
McCabe, J. J., New York, N.Y.
Roelofson Mach. & Tool Co., Toronto, Can.
Walcott Lathe Co., Jackson, Mich.

LATHES, SCREW CUTTING

John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machinery Co., Toronto, Ont.
Heburn, John T., Ltd., Toronto, Ont.
McCabe, J. J., New York, N.Y.
Niles-Bement-Bond Co., New York.
H. W. Petrie, Toronto.
Rivett Lathe & Grinder Co., Boston, Mass.
Riverside Machinery Depot, Detroit, Mich.
Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.

A. R. Williams Machy. Co., Toronto.

LATHES, SPINNING

Bliss, E. W., Co., Brooklyn, N.Y.
McCabe, J. J., New York, N.Y.

LATHES, TURRET AND HAND

Acme Machine Tool Co., Cincinnati, Ohio.
John Bertram & Sons Co., Dundas.
Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Montreal.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Toronto, Ont.
Heburn, John T., Ltd., Toronto, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
R. K. LeBlond Mach. Tool Co., Cincinnati, Ohio.
McCabe, J. J., New York, N.Y.
Mulliner-Enlund Tool Co., Syracuse, N.Y.
National-Acme Co., Cleveland, Ohio.
New Britain Machine Co., New Britain, Conn.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
Rivett Lathe & Grinder Co., Boston, Mass.
Riverside Machinery Depot, Detroit, Mich.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Steinle Turret Mach. Co., Madison, Wis.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.

LEATHER STRAPPING

Graton & Knight Mfg. Co., Worcester, Mass.

LIFTS, PNEUMATIC

Whiting Foundry Equipment Co., Harvey, Ill.

LINK BELTING

Can. Fairbanks-Morse Co., Montreal.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.

LINOLEUM MILL MACHINERY

Bertrams, Ltd., Edinburgh, Scotland.

LIQUID AIR

Carter Woking Co., Toronto, Ont.
L'Air Liquide Society, Montreal, Toronto.
Prest-O-Lite Co., Inc., Toronto, Ont.
Lyman Tube & Supply Co., Montreal, Que.

LOCKERS, STEEL WARDROBE AND STEEL MATERIAL

Canada Wire & Iron Goods Co., Hamilton, Ont.

LUBRICANTS

Can. Economic Lubricant Co., Montreal.
Cataract Refining & Mfg. Co., Toronto.

LUBRICATORS

Roper, C. F., & Co., Hopedale, Mass.
Trahern Pump Co., Rockford, Ill.

MACHINERY DEALERS

Baird Machy. Co., W. J., Detroit, Mich.
Bath & Co., Cyril J., Cleveland, Ohio.
Can. Fairbanks-Morse Co., Montreal.
Dieckow, Fred C., Chicago, Ill.
Dominion Machy. Co., Toronto, Ont.
Garlock-Machinery, Toronto.
Foss & Hill Machy. Co., Montreal.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
R. E. T. Pringle, Ltd., Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto.

MACHINERY, COILING (WIRE AND SPRING)

Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY, FLEXIBLE COILED CASING

Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY, FLEXIBLE METAL TUBE

Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY, FLEXIBLE SHAFT COILING

Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY GUARDS (SEE GUARDS)**MACHINERY REPAIRS**

Prest-O-Lite Co., Inc., Toronto, Ont.
Sumbing Mach. Co., W. H., Toronto, Ont.

MACHINISTS' SCALES, SMALL TOOLS AND SUPPLIES

Can. Fairbanks-Morse Co., Montreal.
Frank H. Scott, Montreal.
J. H. Williams & Co., Brooklyn, N.Y.

MANDRELS

Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Hannifin Mfg. Co., Chicago, Ill.
A. B. Jardine & Co., Hesper, Ont.
Manufacturers Equip. Co., Chicago, Ill.
Monarch Brass Mfg. Co., Toronto, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass.

H. W. Petrie, Ltd., Montreal.

H. W. Petrie, Toronto.

Pratt & Whitney Co., Dundas, Ont.
Stone Tool & Supply Co., J. R., Detroit, Mich.

MARKING DEVICES

Pritchard-Andrews Co. of Canada, Ottawa, Ont.
Matthews, Jas. H., & Co., Pittsburgh, Pa.

MARKING MACHINERY

Brown, Boggs Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Martin Machine Co., Greenfield, Mass.
Noble & Westbrook Mfg. Co., Hartford, Conn.
Perrin, Wm. R., Toronto.

MEASURING TAPES AND RULES

James Chesterman & Co., Ltd., Sheffield, Eng.

METALLURGISTS

Can. Inspection & Testing Lab., Montreal, Que.
Toronto Testing Laboratory, Ltd., Toronto.

METALS

Can. B. K. Merton, Toronto, Montreal.
Dom. Iron & Wrecking Co., Ltd., Montreal, Que.
Standard Machy. & Supplies, Ltd., Montreal, Que.

MILL MACHINERY

Alexander Fleck, Ltd., Ottawa.

MILLING MACHINES, AUTOMATIC

Adams, O. R., 159 St. Paul St. Rochester, N.Y.
Bilton Mach. Tool Co., Bridgeport, Conn.

THE BUHR DRILL HEAD

(Adjustable and Fixed Centres)

A new and original designed multiple head from 2 to 12 spindles.

Easily attached to any press now on the market.

Heads are furnished in plain and ball bearing.

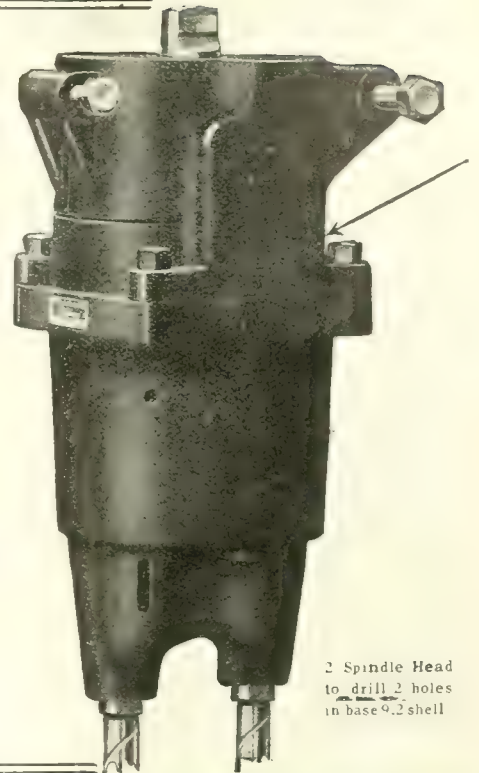
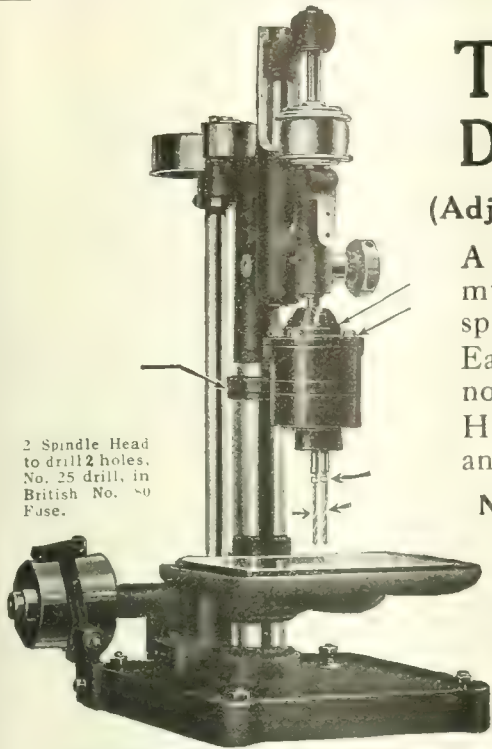
No Running Hot of Bearings

Buhr Ball Bearing Heads need very little care

Write to-day for information.

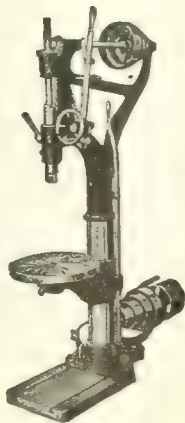
NELSON-BLANCK MFG. CO.

Detroit, Mich.



The

B
A
R
N
E
S



D
R
I
L
L
S



Complete line. 8-inch to 50-inch swing

Gang Drills.—Horizontal Drills.

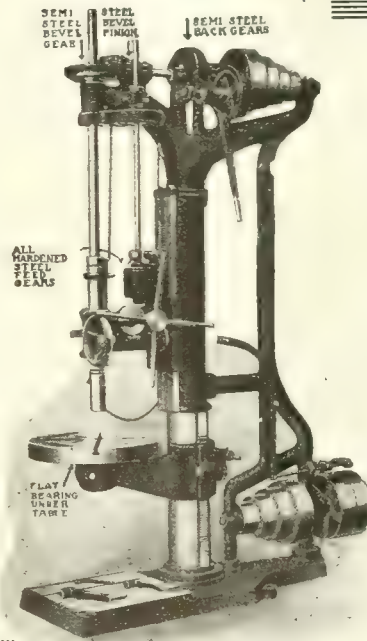
SEND FOR CATALOG.

W. F. & JOHN BARNES CO.

104 Ruby Street - ROCKFORD, ILL.

Canadian Agents—A. R. WILLIAMS MACHINERY CO.
Toronto, Winnipeg, Vancouver, and St. John, N.B.

WILLIAMS & WILSON, Montreal



Lower Your
Production
Cost!

AURORA
Drilling Machine

Strength is the word that distinguishes this machine. Special can be used in boring this Drill up to its present point of efficiency. If you are in the market for drills which must have speed and accuracy consult us. This is an ideal machine for HIGH EXPLOSIVE SHELLS. Inquire—we have the goods.

Stationary head sizes 26", 27",
Sliding head sizes 27", 34"

The Aurora Tool Works
AURORA, INDIANA, U.S.A.



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

PARMENTER & BULLOCH CO., LTD.
GANANOQUE, ONT.

MILLING ATTACHMENTS

John Bertram & Sons Co., Dundas.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati, Ohio.
Cleveland Milling Mach. Co., Cleveland, Ohio.
Ford-Smith Mach. Co., Hamilton, Ont.
Fox Machine Co., Jackson, Mich.
Hendey Mach. Co., Torrington, Conn.
Hineckey Machine Works, Hineckey, Ill.
Kemp Smith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
Pratt & Whitney Co., Dundas, Ont.
Tuff-Piece Mfg. Co., Waukesha, W. Va.

MILLING MACHINES, HAND

United States Mach. Tool Co., Cincinnati, Ohio.
Whitney Mfg. Co., Hartford, Conn.

MILLING MACHINES, HORIZONTAL AND VERTICAL

Brown & Sharpe Mfg. Co., Providence.
John Bertram & Sons Co., Dundas.
Cleveland Milling Machine Co., Cleveland, Ohio.
Garlock-Walker Machinery Co., Toronto, Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Fox Machine Co., Jackson, Mich.
Gooley & Edlund, Cortland, N.Y.
Kemp Smith Mfg. Co., Milwaukee, Wis.
R. E. LeBlond Mach. Tool Co., Cincinnati, Ohio.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Riverside Machinery Depot, Detroit, Mich.
Stephens, The John Co., Cincinnati, Ohio.
United States Mach. Tool Co., Cincinnati, Ohio.
Whitney Mfg. Co., Hartford, Conn.
A. R. Williams Machy. Co., Toronto.

MILLING MACHINES, PLAIN, BENCH AND UNIVERSAL

Bilton Mach. Tool Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati, Ohio.
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., Chicago, Ill.
Hendey Machine Co., Torrington, Conn.
Kemp Smith Mfg. Co., Milwaukee, Wis.
LeBlond Mach. Tool Co., R. E. Cincinnati, Ohio.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Stephens, The John Co., Cincinnati, Ohio.
A. R. Williams Machy. Co., Toronto.

MILLING MACHINES, PROFILE

Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Cook, Asa S., Co., Hartford, Conn.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Riverside Machinery Depot, Detroit, Mich.

MILLING TOOLS

Aikenhead Hardware Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence.
Ford-Smith Mach. Co., Hamilton, Ont.
Geometric Tool Co., New Haven, Conn.
Kemp Smith Mfg. Co., Milwaukee, Wis.
Tabor Mfg. Co., Philadelphia, Pa.

MINE CARS

Can. Fairbanks-Morse Co., Montreal.
Cumming & Son, J. W., New Glasgow, Canada.
Jencks Mach. Co., Sherbrooke, Que.
MacKinnon, Holmes & Co., Sherbrooke, Que.
Marsh & Henthorn, Belleville, Ont.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.

MINING MACHINERY

Can. Fairbanks-Morse Co., Montreal.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Jencks Mach. Co., Sherbrooke, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto.

MITTENS

Hobson 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.
Dominion Machinery Co., Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Lanshire Dynamo & Motor Co., Ltd., Toronto.
H. W. Petrie, Ltd., Montreal.
R. E. T. Pringle, Ltd., Toronto, Ont.
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.

NAILS, COPPER AND YELLOW METAL

Hungerford Brass & Copper Co., New York, N.Y.

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, Quebec.

NUTS, SEMI FINISH AND FINISHED

Can. B. K. Morton, Toronto, Montreal.
Galt Machine Screw Co., Galt, Ont.
National-Acme Co., Cleveland, Ohio.

NUT BURNING MACHINES

National Machy. Co., Tiffin, O.
Petrie of Montreal, Ltd., H. W., Montreal, Que.

NUT MACHINES (MOU)

National Machy. Co., Tiffin, O.
Petrie of Montreal, Ltd., H. W., Montreal, Que.

NUT FACING AND BOLT

SHAVING MACHINES

Garvin Machine Co., New York.
National Machy. Co., Tiffin, O.
Petrie of Montreal, Ltd., H. W., Montreal, Que.
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. Jarline & Co., Hespeler.

Landis Machine Co., Waynesboro, Pa.
National Machy. Co., Tiffin, O.
Petrie of Montreal, Ltd., H. W., Montreal, Que.

OIL GROOVING MACHINES

National Mach. Tool Co., Cincinnati, O.

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.

OSCILLATING VALVE GRINDERS (PNEUMATIC)

Cleveland Pneumatic Tool Co. of Canada, Toronto.

OVENS FOR BAKING, BLUING, DRYING, ENAMELING, JAPANING AND LACQUERING

Brantford Oven & Rack Co., Brantford, Ont.
Oven Equipment & Mfg. Co., New Haven, Conn.
Whiting Foundry Equipment Co., Harvey, Ill.

OVEN TRUCKS, STEEL

Brantford Oven & Rack Co., Brantford, Ont.
MacKinnon, Holmes & Co., Sherbrooke, Que.

Oven Equipment & Mfg. Co., New Haven, Conn.
Whiting Foundry Equipment Co., Harvey, Ill.

OVENS FOR DRYING, TEMPER AND UNDER TRUCKS

Brantford Oven & Rack Co., Brantford, Ont.
Oven Equipment & Mfg. Co., New Haven, Conn.

OXY-ACETYLENE WELDING AND CUTTING

Can. Welding Works, Montreal, Que.
Carter Welding Co., Toronto.

Prest-O-Lite Co., Inc., Toronto, Ont.
Toronto Welding Co., Toronto, Ont.

OXY-ACETYLENE WELDING AND CUTTING PLANTS

Carter Welding Co., Toronto.
L'Air Liquide Society, Montreal, Toronto.

Prest-O-Lite Co., Inc., Toronto, Ont.
OXYGEN (SEE ACETYLENE)

PACKINGS, ASBESTOS

Bennett, W. P., 51 Montford St., Montreal, Que.
Cleveland Wire Spring Co., Cleveland.
New Britain Mach. Co., New Britain, Conn.

PACKINGS, LEATHER, HYDRAULICS, ETC.

Graton & Knight Mfg. Co., Worcester, Mass.
William R. Perrin, Ltd., Toronto.

H. W. Petrie, Toronto.

PAPER MILL MACHINERY

Bertrams, Ltd., Edinburgh, Scotland.
MacKinnon, Holmes & Co., Sherbrooke, Que.

PATTERN SHOP EQUIPMENT

Canada Machinery Corp., Galt, Ont.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Corp., Toronto, Ont.
Oliver Machy. Co., Grand Rapids, Mich.

PATENT SOLICITORS

Budden, Hanbury, A., Montreal.
Fetherstonhaugh & Co., Ottawa.
Marion & Marion, Montreal.
Ridout & Maybee, Toronto.

PATTERNS

Winnipeg Gear & Engr. Co., Winnipeg, Man.

PERFORATED METALS AND ORNAMENTAL IRON GOODS

Jenada Wire & Iron Goods Co., Hamilton.

PIG IRON

Hanna & Co., M. A., Cleveland, O.
Steel Co. of Canada, Ltd., Hamilton, Ont.

PIPE CUTTING AND THREADING MACHINES

Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Curtis & Curtis Co., Bridgeport, Conn.
Dominion Machy. Co., Toronto, Ont.

Foss & Hill Machy. Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.

Garvin Machine Co., New York.
John H. Hall & Sons, Brantford, Ont.

A. R. Jarline & Co., Hespeler.
Landis Machine Co., Waynesboro, Pa.

R. McDowell Co., Galt.
H. W. Petrie, Toronto.

Wells Brothers Co. of Canada, Galt, Ont.
Williams Tool Co., Erie, Pa.

A. R. Williams Machy. Co., Toronto.

PIPE RIVETED STEEL

The Jencks Mach. Co., Ltd., Sherbrooke, Que.

Toronto Iron Works, Ltd., Toronto.

PIPE CUTTERS, ROLLING

Curtis & Curtis Co., Bridgeport, Conn.
John H. Hall & Sons, Ltd., Brantford, Ont.

H. W. Petrie, Ltd., Montreal.

Armstrong Bros. Tool Co., Chicago.

PLANERS, STANDARD AND ROTARY

John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.

Dominion Machinery Co., Toronto.
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.

Oliver Machy. Co., Grand Rapids, Mich.
Petrie of Montreal, Ltd., H. W., Montreal, Que.

H. W. Petrie, Toronto.
Whitecomb Blaisdell Mach. Tool Co., Worcester, Mass.

PLANING AND SHAPING MACHINERY

Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.

Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.

Garvin Machine Co., New York.
Hamilton Machine Tool Co., Hamilton, Ohio.

Niles-Bement-Pond Co., New York.
Petrie of Montreal, Ltd., H. W., Montreal, Que.

H. W. Petrie, Toronto.
Riverside Machinery Depot, Detroit, Mich.

Stephens, The John Co., Cincinnati, Ohio.
A. R. Williams Machy. Co., Toronto.

PLANING MILL EXHAUSTERS

Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

Niles-Bement-Pond Co., New York.

PLIERS

Aikenhead Hardware Co., Toronto, Ont.
Canadian Billings & Spencer, Ltd., Welland.

PLUG MILLERS

Banfield, Edwin J., Toronto.

PRESSES, ARBOR

Atlas Press Co., Kalamazoo, Mich.
Hannifin Mfg. Co., Chicago, Ill.

Metalwood Mfg. Co., Detroit, Mich.

PRESSES, BROACHING, FORGING AND FLANGING

Atlas Press Co., Kalamazoo, Mich.
E. W. Bliss Co., Brooklyn, N.Y.

Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, CAM, TOGGLE, EYELET

Baird Machine Co., Bridgeport, Conn.
Consolidated Press Co., Hastings, Mich.

Toledo Machine & Tool Co., Toledo, O.

PRESSES FOR SHELLS

Atlas Press Co., Kalamazoo, Mich.
Charles F. Elmes Eng. Works, Chicago.

Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.

Garlock-Walker Machinery Co., Toronto, Ont.
Metalwood Mfg. Co., Detroit, Mich.

William R. Perrin, Ltd., Toronto.
Petrie of Montreal, Ltd., H. W., Montreal, Que.

H. W. Petrie, Toronto.
West Tire Setter Co., Rochester, N.Y.

PRESSES, FILTER

Wm. R. Perrin, Ltd., Toronto.

PRESSES, DROP AND FORGING

W. H. Banfield & Son, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.

Brown, Boggs Co., Ltd., Hamilton, Canada.
Charles F. Elmes Eng. Works, Chicago, Ill.

Can. Fairbanks-Morse Co., Montreal.
Erie Foundry Co., Erie, Pa.

Niles-Bement-Pond Co., New York.
Wm. R. Perrin, Ltd., Toronto.

Petrie of Montreal, Ltd., H. W., Montreal, Que.
H. W. Petrie, Toronto.

Toledo Machine & Tool Co., Toledo.

PRESSES, HYDRAULIC

John Bertram & Sons Co., Dundas.
Charles F. Elmes Eng. Works, Chicago, Ill.

Dominion Machinery Co., Toronto, Ont.
Metalwood Mfg. Co., Detroit, Mich.

Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.

Petrie of Montreal, Ltd., H. W., Montreal, Que.
H. W. Petrie, Toronto.

Toledo Machine & Tool Co., Toledo.

West Tire Setter Co., Rochester, N.Y.
A. R. Williams Machy. Co., Toronto.

PRESSES, HYDRAULIC DIE STAMPING

Standard Machy. & Supplies, Ltd., Montreal, Que.

PRESSES, PNEUMATIC

Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, POWER

Baird Machine Co., Bridgeport, Conn.
E. W. Bliss Co., Brooklyn, N.Y.

Brown, Boggs & Co., Hamilton, Can.
Canada Machinery Corp., Galt, Ont.

Can. Fairbanks-Morse Co., Montreal.
Consolidated Press Co., Hastings, Mich.

Charles F. Elmes Eng. Works, Chicago, Ill.
Garlock-Walker Machinery Co., Toronto, Ont.

William R. Perrin, Ltd., Toronto.
Petrie of Montreal, Ltd., H. W., Montreal, Que.

H. W. Petrie, Toronto.
Riverside Machinery Depot, Detroit, Mich.

Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.

PRESSES, BALING

William R. Perrin, Ltd., Toronto.

PRESSES, SPRING FOOT

Brown, Boggs & Co., Hamilton, Can.
Consolidated Press Co., Hastings, Mich.

Toledo Machine & Tool Co., Toledo.



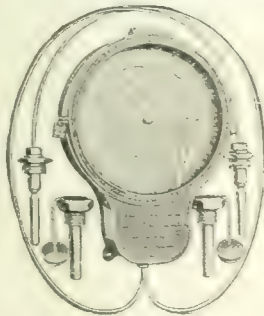
“MECOL”

6" Shell End Nosing
Furnace

*We manufacture furnaces for all
purposes to be used with
any kind of fuel*

The Mechanical Engineering Company, Ltd.
THREE RIVERS, QUE., CANADA

H&M Thermometers



Temperature Difference

of the entering and leaving feed water in heaters or economizers; the outgoing and incoming brine; the condenser intake and discharge; the steam or hot water heating system supply and returns or wherever heat transfer between two mediums is to be measured

is most accurately and conveniently obtained by means of

H&M Tycos

Bi-Record Recording Thermometers

They trace two distinct records of the temperature changes and the time at which they occurred upon a calibrated rotating chart.

Consider the valuable information given by the instant comparison of the readings. Let us send you full details.

We are manufacturers of H&M Type Angle and Straight Stem Thermometers, Automatic Temperature and Pressure Regulators, Mercury Vacuum and Absolute Pressure Gauges, Engraved Stem Thermometers, Hydrometers, Hygrometers, Thermo-Electric and Radiation Pyrometers.



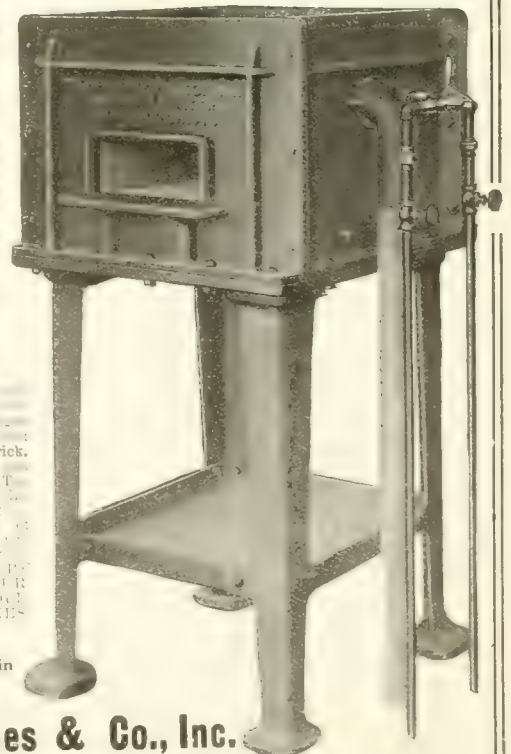
**The H&M Division
Taylor Instrument Companies**

Rochester, N.Y.

201 Royal Bank Bldg., Toronto, Ont., Canada.

Tool Dressing Furnace that Cuts Operating Costs

The advantages of being able to heat three or four pieces at one time and have each piece ready for the operator at the moment he is ready for it, cut down the cost of operation tremendously. Increases the output of a coal or coke furnace, too. This is what the



Tate-Jones

TOOL DRESSING
FURNACE W-LL DO.

It is strongly built of high-grade fire brick. Each piece of work is heated as fast. The flame is evenly distributed over the work by means of baffles and air flow. **TEMPERATURE CAN BE ACCURATELY CONTROLLED AT ALL TIMES.**

Ask for Bulletin
152-C.

Tate-Jones & Co., Inc.

Engineers PITTSBURGH Manufacturers

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

PRESSES, SCREW

Barnes, W. F. & John, Co., Rockford, Ill.
Wm. R. Perrin, Ltd., Toronto.

PRESSES, TRIMMING

Eric Foundry Co., Erie, Pa.
Consolidated Press Co., Hastings, Mich.

PROPELLERS

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

PULLEYS

American Pulley Co., Philadelphia.
Baird Machine Co., Bridgeport, Conn.
Bernard Industrial Co., Fortierville, Que.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Bond Hanger & Cplg. Co., Alexandria, Ont.
Can. Fairbanks-Morse Co., Montreal.
Dominion Machy. Co., Toronto, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Petrie of Montreal, Ltd., H. W., Montreal, Que.
H. W. Petrie, Toronto.
Positive Clutch & Pulley Works, Ltd., Toronto.
Standard Machy. & Supplies, Ltd., Montreal, Que.
The Smart-Turner Mach. Co., Hamilton.

PULLEYS, FRICTION CLUTCH

A. R. Williams Machy. Co., Toronto.
American Pulley Co., Philadelphia, Pa.
Baird Machine Co., Bridgeport, Conn.
Petrie of Montreal, Ltd., H. W., Montreal, Que.
H. W. Petrie, Toronto.
Positive Clutch & Pulley Works, Toronto.
Bernard Industrial Co., A., Fortierville, Que.

PULLEY MACHINERY

Can. Fairbanks-Morse Co., Montreal.
Cincinnati Pulley Machy. Co., Cincinnati, Ohio.
Wells Bros. Co. of Canada, Galt, Ont.

PUMPS, AIR

The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Smart-Turner Mach. Co., Hamilton.

PUMPS, CENTRIFUGAL

Can. Blower & Forge Co., Kitchener, Ont.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.
Smart-Turner Machine Co., Hamilton, Ont.

PUMPS, FUEL OIL

Trahern Pump Co., Rockford, Ill.

PUMPS, HIGH PRESSURE

Blake Pump & Condenser Co., Fitchburg, Mass.
Charles F. Elmes Eng. Works, Chicago.
William R. Perrin, Ltd., Toronto.
Smart-Turner Mach. Co., Hamilton.

PUMPS, ALL KINDS

Blake Pump & Condenser Co., Fitchburg, Mass.
Can. Blower & Forge Co., Kitchener, Ont.
Charles F. Elmes Eng. Works, Chicago.
William R. Perrin, Ltd., Toronto.
H. W. Petrie, Toronto.
The Smart-Turner Mach. Co., Hamilton.
A. R. Williams Machy. Co., Toronto.

PUMPS, HYDRAULIC

Blake Pump & Condenser Co., Fitchburg, Mass.
Charles F. Elmes Eng. Works, Chicago, Ill.
Metalwood Mfg. Co., Detroit, Mich.
Smart-Turner Mach. Co., Hamilton.
Wm. R. Perrin, Ltd., Toronto.

PUMPS, LUBRICANT AND OIL

Belleuve Industrial Furnace Co., Detroit, Mich.
Cincinnati Lubricant Pump Co., Cincinnati, Ohio.
Roper, C. F. Co., Hopedale, Mass.
Trahern Pump Co., Rockford, Ill.

PUMP LEATHERS

Can. B. K. Morton, Toronto, Montreal.
Graton & Knight Mfg. Co., Worcester, Mass.

PUMPS, ROTARY, POWER DRIVEN

Trahern Pump Co., Rockford, Ill.

PUNCHES AND DIES

W. H. Bamfield & Sons, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Roggs Co., Ltd., Hamilton, Canada.
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
Gardner, Robt. & Son, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Mulliner-Edlund Tool Co., Syracuse, N.Y.
Petrie of Montreal, Ltd., H. W., Montreal, Que.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Toledo Machine & Tool Co., Toledo, O.

PUNCHES, POWER

John Bertram & Sons Co., Dundas.
Ellis, E. W., Co., Brooklyn, N.Y.
Brown, Roggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Consolidated Press Co., Hastings, Mich.
Niles-Bement-Pond Co., New York.

PUNCHES, PNEUMATIC

Corbet Fdry. & Mach. Co., Ltd., Owen Sound, Ont.

PUNCHING MACHINES, HORIZONTAL

Bertrams, Ltd., Edinburgh, Scotland.
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Ellis, E. W., Co., Brooklyn, N.Y.
Brown, Roggs Co., Ltd., Hamilton, Canada.
Niles-Bement-Pond Co., New York.
W. A. Whitney Mfg. Co., Rockford, Ill.

PURIFYING AND SOFTENING

APPARATUS
Seafie & Sons Co., Wm. B., Pittsburgh, Pa.

PYROMETERS

Bath & Co., Cyril J., Cleveland, Ohio.
Belleuve Industrial Furnace Co., Detroit, Mich.
Can. Hoskins, Ltd., Walkerville, Ont.
Gibb Instrument Co., Pittsburgh, Pa.
Shore Instrument & Mfg. Co., New York City.
H. E. Stroeter, 523 New Birks Bldg., Montreal, Que.

Taylor Instrument Cos., Rochester, N.Y.
Thwing Instrument Co., Philadelphia, Pa.

QUARTERING MACHINES

John Bertram & Sons Co., Dundas.
Niles-Bement-Pond Co., New York.

RAILING, IRON AND BRASS

(SEE GUARDS)

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.

RAILING, BRASS

Hungerford Brass & Copper Co., New York, N.Y.

RATCHETS

Keystone Mfg. Co., Buffalo, N.Y.

RAW HIDE PINIONS (SEE GEARS)**REAMER FLUTING MACHINES**

Garvin Machine Co., New York.

REAMERS, ADJUSTABLE

Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford
Osborn (Canada), Ltd., Sam'l, Montreal, Que.
Pratt & Whitney Co., Dundas, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
H. E. Stroeter, 523 New Birks Bldg., Montreal, Que.

Whitman & Barnes Mfg. Co., St. Catharines, Ont.

REAMERS, BRIDGE, EXPANDING**AND HIGH SPEED**

Aikenhead Hardware Co., Toronto, Ont.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Illinois Tool Works, Chicago, Ill.
McKenna Brothers, Pittsburgh, Pa.
Osborn (Canada), Ltd., Sam'l, Montreal, Que.
R. E. T. Pringle, Ltd., Toronto, Ont.

REAMERS, PIPE, CYLINDER**AND LOCOMOTIVE**

Morse Twist Drill & Machine Co., New Bedford.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.

REAMERS, STEEL TAPER**AND SELF-FEEDING**

Butterfield & Co., Rock Island, Que.
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 & Machine Co., New Bedford.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.

REAMING MACHINES, PNEUMATIC

Cleveland Pneumatic Tool 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 Cos., Rochester, N.Y.

RESPIRATORS

Strong, Kennard & Nutt Co., Cleveland, Ohio.

RIVET MACHINES

Bilton Mach. Tool Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont.
Cook, Asa B., Co., Hartford, Conn.
Grant Mfg. & Mach. Co., Bridgeport, Conn.
National Machinery Co., Tiffin, O.
H. W. Petrie, Ltd., Montreal.

RIVETS, TUBULAR, BIFURCATED

Hungerford Brass & Copper Co., U. T., New York.
Parmenter & Bulloch Co., Gananoque.
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIVETS, IRON, COPPER AND BRASS

Aikenhead Hardware Co., Toronto, Ont.
Hungerford Brass & Copper Co., U. T., New York.
Parmenter & Bulloch Co., Gananoque.
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIVETERS, PNEUMATIC, HYDRAULIC,**HAMMER, COMPRESSION**

Can. Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Toronto.
R. E. T. Pringle, Ltd., Toronto, Ont.

RIVETING MACHINES, ELASTIC**ROTARY BLOW**

Grant Mfg. & Machine Co., Bridgeport, Conn.
High-Speed Hammer Co., Rochester, N.Y.
Hungerford Brass & Copper Co., U. T., New York.
F. B. Shuster Co., New Haven, Conn.

ROLLS, BENDING AND**STRAIGHTENING**

John Bertram & Sons Co., Dundas.
Brown, Roggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo.

ROLLS, CRUSHING

The Jenckes Mach. Co., Ltd., Sherbrooke, Que.

RUBBER MILL MACHINERY

Bertrams, Ltd., Edinburgh, Scotland.

RYLERS

Brown & Sharpe Mfg. Co., Providence.
James Chesterman & Co., Ltd., Sheffield, Eng.
T. & S. Starratt Co., Athol, Mass.

SAFETY APPLIANCES

Strong, Kennard & Nutt Co., Cleveland, Ohio.

SAND BLASTS

Curtis Pneumatic Machinery Co., St. Louis, Mo.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.

SANDING MACHINES

Canada Machinery Corp., Galt, Ont.
Oliver Machy. Co., Grand Rapids, Mich.

SAW MILL MACHINERY

Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
Gardner, Robt. & Son, Montreal.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto.

SAWS, CIRCULAR METAL

Espen-Lucas Mach. Works, Philadelphia, Pa.
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., Pittsburg, Pa.
Napier Saw Works, Springfield, Mass.
Tabor Mfg. Co., Philadelphia, Pa.

SAW MACHINES

Napier Saw Works, Springfield, Mass.

SAWS, BAND AND COPING

Napier Saw Works, Springfield, Mass.

SCEROSCOPIES

Shore Instrument & Mfg. Co., New York City.
H. E. Stroeter, 523 New Birks Bldg., Montreal, Que.

SCREW MACHINE PARTS

Johnson Mach. Co., Carlyle, Manchester, Conn.

SCREW MACHINE PRODUCTS

Galt Machine Screw Co., Galt, Ont.
Eastern Mach. Screw Corp., New Haven, Conn.

SCREW MACHINES, HAND, AUTOMATIC

Adams, O. R., 159 St. Paul St. Rochester, N.Y.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Garvin Machine Co., New York.
A. B. Jardine & Co., Hespeler.
New Britain Machine Co., New Britain, Conn.
Petrie of Montreal, Ltd., H. W., Montreal, Que.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Rivett Lathie & Grider Co., Brighton, Mass.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy. Co., Toronto.

SCREW MACHINES, AUTOMATIC,**MULTIPLE SPINDLE**

New Britain Machine Co., New Britain, Conn.
Riverside Machinery Depot, Detroit, Mich.

SCREWS

Can. B. K. Morton, Toronto, Montreal.
Galt Machine Screw Co., Galt, Ont.
National-Acme Co., Cleveland, Ohio.
Steel Co. of Canada, Ltd., Hamilton, Ont.

SCREW PLATES

Butterfield & Co., Rock Island, Que.
A. B. Jardine & Co., Hespeler.
Morse Twist Drill & Machine Co., New Bedford.
Wells Bros. Co. of Canada, Galt, Ont.

SCREW SLOTTERS

Cook, Asa S., Co., Hartford, Conn.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.

SECOND-HAND MACHINERY

Rath & Co., Cyril J., Cleveland, Ohio.
Davis Machine Tool Co., W. E., New York.
Dominion Machinery Co., Toronto.
Foss & Hill Machy. Co., Montreal.
Hill, Clarke & Co., Chicago, Ill.
McCabe, J. J., New York, N.Y.
New York Machinery Exchange, New York.
H. W. Petrie, Toronto.
Riverside Machy. Depot, Detroit, Mich.
Strelinger Co., Chas. A., Detroit, Mich.
Stocker-Rumely-Wachs, Chicago, Ill.

SET SCREWS, SAFETY

Aikenhead Hardware Co., Toronto, Ont.
Allen Mfg. Co., Hartford, Conn.

SHANKS, STRAIGHT AND TAPER

Jacobs Mfg. Co., Hartford, Conn.

SHAPERS

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 of Montreal, Ltd., H. W., Montreal, Que.
H. W. Petrie, Toronto.
Rhodes Mfg. Co., Hartford, Conn.
Steptoe Co., John, Cincinnati, Ohio.

SHAFTING

Can. Bond Hanger & Coupling 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.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Strelinger Co., Chas. A., Detroit, Mich.
A. R. Williams Machy. Co., Toronto.

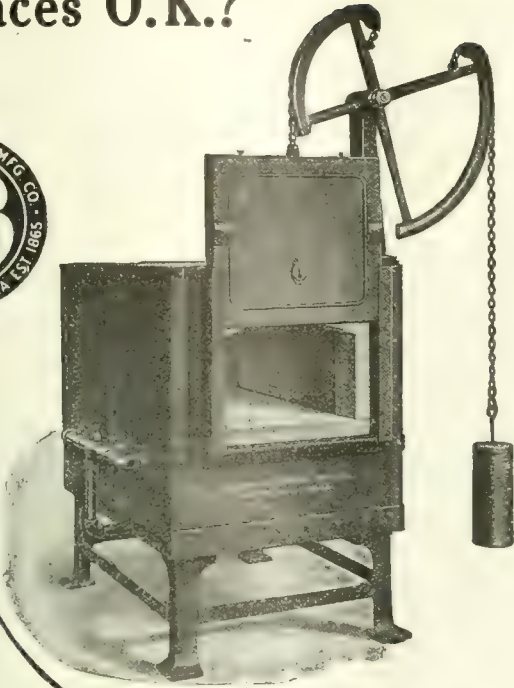
SHARPENING STONES

Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.

SHAVINGS, SEPARATORS

Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

Are Your Furnaces O.K.?



Gilbert & Barker Gas and Oil Furnaces

FOR

Heat Treating, Forging and Annealing Steel for the Manufacture of Ammunition, are sold everywhere. The preference for our furnaces has been built upon our reputation to satisfactorily solve all kinds of heat-treating problems. Our experience of 52 years is certainly worth something to you.

WE HAVE A GOOD STOCK
of many types for prompt deliveries and you should write at once for our stock list 24.

Tell us the class of work you are doing and our engineers will suggest the G.&B. Furnace best suited for you. We have a furnace for every need.

Canadian Agents:
WILLIAMS & WILSON, LIMITED
MONTREAL, QUE.
JAMES DeVON, 227 Davenport Rd.
TORONTO, ONT.

Gilbert & Barker Mfg. Company

WEST SPRINGFIELD, MASS.

High Speed Steel Treated at 1750

by pack hardening in HeTzy

a scientifically compounded and thoroughly tested preparation. Yes, and further, you will find that you

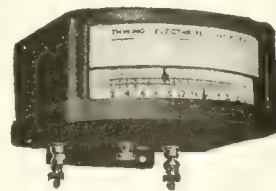
1. keep down H/S steel scrap pile,
2. turn out tools with 30 per cent. more production.
3. eliminate distortion, breaking and pitting.

Prove this at our risk.

Send for 100 lb. container and try it for 30 days. If it doesn't do what we say, return the balance and you owe us nothing.

If still in doubt write for our circular and partial list of 200 representative concerns using HeTzy on all H/S treatment.

Gibb Instrument Co.
5716 Euclid Ave., CLEVELAND, OHIO.



Insuring
Accurate
Temperature
Measurements

THWING

HIGH RESISTANCE MULTIPLE RECORD

PYROMETERS

are instruments of exact precision. Yet they have the rugged durability to withstand hard usage in the toolroom, the steel mill, and similar places.

Thwing Instruments are furnished in either the Indicating or Recording style, giving as many as twelve readings on a single recorder.

Our New Catalog No. 8 covers the entire line.
Send for copy.

Canadian Representative:
Mr. James DeVon, 227 Davenport Road, Toronto

Thwing Instrument Co.
34th Street and Lancaster Ave.,
PHILADELPHIA, PA.

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

SHEARING MACHINES, ANGLE IRON, BAR AND GATE

John Bertram & Sons Co., Dundas.
Bertrams, Ltd., Edinburgh, Scotland.
Canada Machinery Corp., Galt, Ont.
A. B. Jarline & Co., Hespeler.
Montgomery, Smith & Co., Keynsham, Somerset, Eng.

Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo.

SHEARS, POWER

John Bertram & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
National Machy. Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Toledo Machine & Tool Co., Toledo.

SHEET METAL STAMPINGS

Dominion Forge & Stpg. Co., Walkerville, Ont.

SHELL BANDING MACHINES, HYDRAULIC

Chapman Double Ball-Bearing Co., Toronto, Ont.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Metalwood Mfg. Co., Detroit, Mich.
Perrin, Ltd., W. R., Toronto, Ont.
West Tire Setter Co., Rochester, N.Y.

SHELL PAINTING MACHINE

Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

SHELL RIVETERS

Grant Mfg. & Machine Co., Bridgeport, Conn.
High Speed Hammer Co., Rochester, N.Y.

SHELL WASHER

Can. Economic Lubricant Co., Montreal, Que.

SHRAPNEL SHELL MARKER

Brown-Boggs Co., Hamilton, Ont.
Noble & Westbrook Mfg. Co., Hartford, Conn.

SIDE TOOLS

Armstrong Bros. Tool Co., Chicago.
Baxter & Co., Ltd., J. R., Montreal, Que.
Can. B. K. Morton, Toronto, Montreal.

SIGNS, ENAMEL

Strong, Kennard & Nutt Co., Cleveland, Ohio.

SILVER SOLDER

Hungerford Brass & Copper Co., U. T., New York.
Geo. H. Lees & Co., Hamilton, Ont.

SKATE SHARPENERS

Can. Bond Hanger & Cplg. Co., Alexandria, Ont.

SLEDGES

Aikenhead Hardware Co., Toronto, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

SLOTTERS

Garvin Machine Co., New York.
National-Acme Co., Cleveland, Ohio.
Niles-Bement-Pond Co., New York.
Rhodes Mfg. Co., Hartford, Conn.

SMOKESTACKS

The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
MacKinnon, Holmes Co., Sherbrooke, Que.

SOCKETS

Brown & Sharpe Mfg. Co., Providence, Cleveland Twist Drill Co., Cleveland.
Keystone Mfg. Co., Buffalo, N.Y.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.
J. H. Williams & Co., Brooklyn, N.Y.

SOLDERING IRONS

Aikenhead Hardware Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
Brown, Boggs & Co., Hamilton, Can.

SOLDERS

Aikenhead Hardware Co., Toronto, Ont.
Hungerford Brass & Copper Co., U. T., New York.
Tallman Brass & Metal Co., Hamilton.

SPECIAL MACHINERY

Baird Machine Co., Bridgeport, Conn.
Banfield, Edwin J., Toronto.
Banfield, W. H., & Sons, Toronto.
Bertram, John, & Sons Co., Dundas.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.
Can. Fairbanks-Morse Co., Montreal.
Charles F. Elmes Eng. Works, Chicago.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Courtland, N.Y.
Grant Mfg. & Machy. Co., Bridgeport, Conn.
John H. Hall & Sons, Brantford.
Gray Mfg. & Mach. Co., Toronto, Ont.
Himoff Machine Co., New York, N.Y.
Hyde Engineering Works, Montreal, Que.
Jardine, A. B., & Co., Hespeler.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
McClellan & Son, E. W., Niagara Falls, Ont.
National-Acme Co., Cleveland, Ohio.
D. McKenzie Machinery Co., Quelpah, Ont.
Mulliner & Edlund Tool Co., Syracuse, N.Y.
Prest-O-Lite Co., Inc., Toronto, Ont.
Rhodes Mfg. Co., Hartford, Conn.
Riverside Machinery Depot, Detroit, Mich.
Smart-Turner Machine Co., Hamilton, Ont.
T. C. M. Mfg. Co., Harrison, N.J.
Victoria Foundry Co., Ottawa, Ont.
William R. Perrin, Ltd., Toronto.
Winipeg Gear & Engr. Co., Winnipeg, Man.

SPRINGS, MACHINERY

Barnes, W. H., Co., Bristol, Conn.
Can. Steel Foundries, Ltd., Montreal, Que.
Cleveland Wire Spring Co., Cleveland.
Jas. Steele, Ltd., Guelph, Ont.

SPRING COILING AND WINDING MACHINERY

Baird Machine Co., Bridgeport, Conn.
Garvin Machine Co., New York.
Sleeper & Hartley, Inc., Worcester, Mass.

SPRING MAKING MACHINERY (AUTOMATIC)

Garvin Machine Co., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

SPIRAL CONVEYORS

Can. Matthews Gravity Carrier Co., Toronto, Ont.

SPROCKETS, CHAIN

Grant Gear Works, Boston, Mass.
Morse Chain Co., Ithaca, N.Y.
Philadelphia Gear Works, Philadelphia, Pa.

SOLDER

Jobborn, Geo. A., Hamilton, Ont.

SPROCKET WHEELS, CAST

Perrin, Wm. R., Toronto.

STAIRS, IRON

Canada Wire & Iron Goods Co., Hamilton, Ont.

STAMPINGS

Dillon Mfg. Co., Oshawa, Ont.
Dom. Forge & Stpg. Co., Walkerville, Ont.
Homer & Wilson, Hamilton, Ont.

STAMPING MACHINERY

Brown, Boggs & Co., Hamilton, Can.
Canada Machinery Corp., Galt, Ont.
Noble & Westbrook Mfg. Co., Hartford, Conn.
STAMPS, STEEL ALPHABET, FIGURES
Matthews, Jas. H. & Co., Pittsburgh, Pa.
Noble & Westbrook Mfg. Co., Hartford, Conn.
Pritchard-Andrews Co., Ottawa, Can.

STAPLE MACHINES

Sleeper & Hartley, Inc., Worcester, Mass.

STEAM SEPARATORS AND TRAPS

Can. Fairbanks-Morse Co., Montreal.
Can. Morehead Mfg. Co., Woodstock, Ont.
H. W. Petrie, Toronto.

STEEL ALLOY (SEE ALLOY STEEL)**STEEL BENDING BRAKES**

Steel Bending Brake Works, Ltd., Chatham, Ont.

STEEL FOR AXES, PLOWS, SAWS, DRILLS, ETC.

Colonial Steel Co., Pittsburgh, Pa.
STEEL, CARBON, FERRO-TUNGSTEN
Can. B. K. Morton, Toronto, Montreal.
Colonial Steel Co., Pittsburgh, Pa.

STEEL, CARBON, FERRO-TUNGSTEN

Can. B. K. Morton, Toronto, Montreal.
Colonial Steel Co., Pittsburgh, Pa.
Comstedt, Josef F. A., 120 Broadway, N.Y.

STEEL, CARBON, FERRO-TUNGSTEN

Can. B. K. Morton, Toronto, Montreal.
Colonial Steel Co., Pittsburgh, Pa.
Comstedt, Josef F. A., 120 Broadway, N.Y.
Labroe Electric Steel Co., Labroe, Pa.
Michigan Steel Exchange, Inc., Detroit, Mich.
Osborn (Canada), Ltd., Sam'l, Montreal, Que.

Vanadium-Alloys Steel Co., Pittsburgh, Pa.**Vulcan Crucible Steel Co., Aliquippa, Pa.****Zenith Coal & Steel Products, Montreal, Que.****STEEL, COLD ROLLER**

Can. Drawn Steel Co., Hamilton, Ont.
Union Drawn Steel Co., Hamilton, Ont.

STEEL DRUMS

Smart-Turner Machine Co., Hamilton, Ont.

STEEL PRESSURE BLOWERS

Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
Sheldons, Ltd., Galt, Ont.

STEEL, HIGH SPEED

Armstrong Whitworth of Canada, Ltd., Montreal.
Can. Fairbanks-Morse Co., Montreal.
Can. B. K. Morton, Toronto, Montreal.

Colonial Steel Co., Pittsburgh, Pa.**Comstedt, Josef F. A., 120 Broadway, N.Y.****H. A. Drury Co., Ltd., Montreal.****Hawkrige Bros. Co., Boston, Mass.****Labroe Electric Steel Co., Labroe, Pa.****Marshall, Geo. A., 70 Lombard, Toronto.****Michigan Steel Exchange, Inc., Detroit, Mich.****Osborn (Canada), Ltd., Sam'l, Montreal, Que.****H. W. Petrie, Toronto.****Standard Alloys Company, Pittsburgh, Pa.****Vanadium Alloys Steel Co., Pittsburgh, Pa.****Vulcan Crucible Steel Co., Aliquippa, Pa.; represented in Canada by Norton, Callard & Co., Montreal, Que.****Zenith Coal & Steel Products, Montreal, Que.****STEEL VANADIUM**

Comstedt, Josef F. A., 120 Broadway, N.Y.
Drury, H. A., Co., Montreal, Que.
Michigan Steel Exchange, Inc., Detroit, Mich.
Standard Alloys Co., Pittsburgh, Pa.

Vanadium Alloys Steel Co., Pittsburgh, Pa.**Vulcan Crucible Steel Co., Aliquippa, Pa.****STEELLITE, HIGH-SPEED TOOL METAL**

Can. B. K. Morton Co., Montreal, Que.
Deloro Smelting & Refining Co., Toronto, Ont.

STOCK RACKS FOR BARS, PIPING, ETC.

New Britain Machine Co., New Britain, Conn.

STOCKS FOR DIES

Wells Bros. Co. of Canada, Galt, Ont.

STOCKS, PIPE

Butterfield & Co., Rock Island, Que.

STOOLS, STEEL, SHOP

Dennis Wire & Iron Works, London, Canada.
New Britain Mach. Co., New Britain, Conn.

STRAIGHTENING MACHINERY

Baird Machine Co., Bridgeport, Conn.
Bertrams, Ltd., Edinburgh, Scotland

SWITCHES, RAILWAY

Can. Steel Foundries, Ltd., Montreal.

TACK (DOUBLE POINT) MACHINES

Sleeper & Hartley, Inc., Worcester, Mass.

TANKS, GASOLINE AND OIL

Dominion Forge & Stpg. Co., Walkerville, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
MacKinnon, Holmes & Co., Sherbrooke, Que.

TANKS, STEEL, WATER PRESSURE

Can. Welding Works, Montreal, Que.

Jenckes Mach. Co., Sherbrooke, Que.**MacKinnon, Holmes & Co., Sherbrooke, Toronto Iron Works, Ltd., Toronto.****TANK WAGONS**

Jenckes Mach. Co., Sherbrooke, Que.
MacKinnon, Holmes & Co., Sherbrooke, Toronto Iron Works, Ltd., Toronto.

TAPES, MEASURING

James Chesterman & Co., Ltd., Sheffield, Eng.

TAPPING MACHINES (PNEUMATIC)

Cleveland Pneumatic Tool Co. of Canada, Toronto.
Greenfield Tap & Die Corp., Greenfield, Mass.

TAPPING MACHINES AND ATTACHMENTS

John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
Garvin Machine Co., New York.
The Geometric Tool Co., New Haven.
J. H. Hall & Sons, Brantford, Ont.
A. B. Jardine & Co., Hespeler.
Landis Machine Co., Waynesboro, Pa.
Manufacturers Equipment Co., Chicago, Ill.
Modern Tool Co., Erie, Pa.
Murechey Machine & Tool Co., Detroit.
Niles-Bement-Pond Co., New York.
Petrie of Montreal, Ltd., H. W., Montreal, Que.
H. W. Petrie, Toronto.
Rickett Shafer Co., Erie, Pa.
L. S. Starrett Co., Athol, Mass.
Whitney Mfg. Co., Hartford, Conn.

TAPS, ADJUSTABLE

Baxter Co., Ltd., J. R., Montreal, Que.
Geometric Tool Co., New Haven.
Manufacturers Equipment Co., Chicago, Ill.
Murechey Machine & Tool Co., Detroit.
National-Acme Co., Cleveland, Ohio.
Osborn (Canada, Ltd., Sam'l, Montreal, Que.

TAPS, COLLAPSIBLE

Geometric Tool Co., New Haven, Conn.
Manufacturers Equipment Co., Chicago, Ill.
Modern Tool Co., Erie, Pa.
Murechey Machine & Tool Co., Detroit, Mich.
Osborn (Canada, Ltd., Sam'l, Montreal, Que.
Victor Tool Co., Waynesboro, Pa.

TAPS, DIES AND WRENCHES

Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Foss & Hill Machy. Co., Montreal.
Geometric Tool Co., New Haven, Conn.
A. B. Jardine & Co., Hespeler.

Morse Twist Drill & Machine Co., New Bedford.**Murechey Machine & Tool Co., Detroit.****Osborn (Canada, Ltd., Sam'l), Montreal, Que.****Petrie of Montreal, Ltd., H. W., Montreal, Que.****H. W. Petrie, Toronto.****Pratt & Whitney Co., Dundas, Ont.****L. S. Starrett Co., Athol, Mass.****Wells Bros. Co. of Canada, Galt, Ont.****TESTING INSTRUMENTS****METALLURGICAL****Shore Instrument & Mfg. Co., New York City.****THERMOMETERS, ALL KINDS****Taylor Instrument Co., Rochester, N.Y.****Belleuve Industrial Furnace Co., Detroit, Mich.****TESTING LABORATORIES****Can. Inspection & Testing Lab., Montreal, Que.****Toronto Testing Laboratory, Toronto.****THREAD-CUTTING MACHINES****Can. Fairbanks-Morse Co., Montreal.****Curtis & Curcus Co., Bridgeport, Conn.****Garlock-Walker Machinery Co., Toronto, Ont.****Geometric Tool Co., New Haven, Conn.****Landis Machine Co., Waynesboro, Pa.****National-Acme Co., Cleveland, Ohio.****National Machy. Co., Tiffin, Ohio.****H. W. Petrie, Ltd., Toronto, Ont.****Pratt & Whitney Co., Dundas, Ont.****Wells Bros. Co. of Canada, Galt, Ont.****THREADING TOOLS****Rivett Lathe & Grinder Co., Brighton, Mass.****THREAD MILLING MACHINES****Gray Mfg. & Mach. Co., Toronto, Ont.****Taft-Pence Co., New York, N.Y.****T. C. M. Mfg. Co., Harrison, N.J.****TINSMITHS' TOOLS****Brown, Boggs & Co., Hamilton, Can.****Steel Bending Brake Works, Ltd., Chatham, Ont.****Peck, Stow & Wilcox, Cleveland, Ohio.****TIRE SETTING MACHINES, HYDRAULIC****William R. Perrin, Ltd., Toronto.****West Tire Setter Co., Rochester, N.Y.****TOOL CASES****Union Tool Chest Works, Rochester, N.Y.****TOOL HOLDERS****Aikenhead Hardware Co., Toronto, Ont.****Armstrong Bros. Tool Co., Chicago.****Cleveland Twist Drill Co., Cleveland.****Can. B. K. Morton, Toronto, Montreal.****Deloro Smelting & Refining Co., Toronto, Ont.****Modern Tool Co., Erie, Pa.****Pratt & Whitney Co., Dundas, Ont.****J. H. Williams Co., Brooklyn, N.Y.****TOOL POSTS, LATHE****Armstrong Bros. Tool Co., Chicago.****TOOL ROOM PARTITIONS****Canada Wire & Iron Goods Co., Hamilton.****TOOL STEEL****Atkins & Co., Wm., Sheffield, Eng.****Armstrong, Whitworth, Ltd. of Canada, Montreal.****Can. Fairbanks-Morse Co., Montreal.****Can. B. K. Morton, Toronto, Montreal.****Colonial Steel Co., Pittsburgh, Pa.****Deloro Smelting & Refining Co., Toronto, Ont.****H. A. Drury Co., Montreal.****Hawkrige Bros. Co., Boston, Mass.****Labroe Electric Steel Co., Labroe, Pa.****Marshall, Geo. A., 70 Lombard, Toronto.****Michigan Steel Exchange, Inc., Detroit, Mich.****Osborn (Canada), Ltd., Sam'l, Montreal, Que.****H. W. Petrie, Ltd., Toronto, Ont.****Swedish Steel & Importing Co., Montreal, Que.****Vanadium-Alloys Steel Co., Pittsburgh, Pa.****Vulcan Crucible Steel Co., Aliquippa, Pa.****TOOLS, ELECTRIC****Independent Pneumatic Tool Co., Chicago, Ill.****H. W. Petrie, Ltd., Montreal.****R. E. T. Pringle, Ltd., Toronto, Ont.****Stow Mfg. Co., Binghamton, N.Y.****A. R. Williams Machy. Co., Toronto.****United States Elec. Tool Co., Cincinnati, O.****TOOLS, PNEUMATIC****Can. Ingersoll-Rand Co., Sherbrooke, Que.****Cleveland Pneumatic Tool Co. of Canada, Toronto.****Curtis Pneumatic Machinery Co., St. Louis, Mo.****Garlock-Walker Machinery Co., Toronto, Ont.****Independent Pneumatic Tool Co., Chicago, Ill.**

The Oven Equipment & Manufacturing Company

NEW HAVEN, CONN.

"CRAWFORD SECTIONAL" OVENS

Heated with our Enclosed Flame Gas Burners, or Electricity
FOR BAKING JAPANS AND OTHER FINISHES ON METAL.

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

Builders of All-Steel Oven Trucks with Roller Bearings.

Canadian Representatives: The A. R. WILLIAMS MACHINERY COMPANY, Ltd.

ST. JOHN, N.B. TORONTO WINNIPEG VANCOUVER

SHEARS, PNEUMATIC

Toledo Machine & Tool Co., Toledo, Ohio.

SHEARS, SQUARING

Brown, Boggs & Co., Hamilton, Canada.

SHEET METAL WORKING TOOLS

Baird Machine Co., Bridgeport, Conn.
Bliss, E. W., Co., Brooklyn, N. Y.
Brown, Boggs & Co., Hamilton, Can.
Peck, Stow & Wilcox, Cleveland, O.
Steel Bending Works, Ltd., Chatham, Ont.

TOOLS, LATHE, PLANNER, SLOTTER

Armstrong Bros. Tool Co., Chicago.

TOOLS, SCREW MACHINE

Foster Machine Tool Co., Elkhart, Ind.

TORCHES, STEEL

Armstrong, Whitworth of Canada Ltd., Montreal.
Prest-O-Lite Co., Inc., Toronto, Ont.

TRACK SYSTEMS

Dillon Mfg. Co., Oshawa, Ont.
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

TRANSMISSION MACHINERY

American Pulley Co., Philadelphia, Pa.
A. R. Williams Machy Co., Toronto.
Can. Bond Hanger & Cplg. Co., Alexandria, Ont.
Can. Fairbanks-Morse Co., Montreal.
Can. Drawn Steel Co., Hamilton, Ont.
Hamilton Gear & Mach. Co., Toronto.
Lynan Tube & Supply Co., Montreal, Que.
Main Belting Co., Montreal.
Morse Chain Co., Ithaca, N. Y.
H. W. Petrie, Ltd., Toronto, Ont.
The Smart-Turner Machine Co., Hamilton.

TRANSMISSION TOWERS

Curtis Pneumatic Machinery Co., St. Louis, Mo.
Northern Crane Works, Walkerville.
Tallman Brass & Metal Co., Hamilton.

TRUCKS, FACTORY, FREIGHT, ETC

Canada Machinery Corp., Galt, Ont.
Chapman Double Ball Bearing Co., Toronto.
Whiting Foundry Equipment Co., Harvey, Ill.

TRUCKS, LUMBER AND KILN

Sheldons, Ltd., Galt, Ont.
Northern Crane Works, Walkerville.

TUBING, SEAMLESS, BRASS & COPPER

Hungerford Brass & Copper Co., New York, N. Y.
Lynan Tube & Supply Co., Montreal, Que.
Standard Tube & Fence Co., Walkerville, Ont.

TUMBLING BARRELS

Baird Machine Co., Bridgeport, Conn.
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

TUNGSTEN FILAMENT COILING

Machinery

Sleeper & Hartley, Inc., Worcester, Mass.

TURNBUCKLES

Canadian Billings & Spencer, Ltd., Welland.

TURNABLES

Whiting Foundry Equipment Co., Harvey, Ill.

TURRET MACHINES

Brown & Sharpe Mfg. Co., Providence, R. I.
Garlock-Walker Machinery Co., Toronto, Ont.
New Britain Machine Co., New Britain, Conn.
H. W. Petrie, Toronto.
Pratt & Whitney, Hartford, Conn.
Riverside Machinery Depot, Detroit, Mich.
Warner & Swasey, Cleveland, O.
Garvin Machine Co., New York.

TURBINE WATER WHEELS

Jenckes Mach. Co., Sherbrooke, Que.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.

UPSETTING AND BENDING

MACHINERY

John Bertram & Sons Co., Dundas.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Cook, Asa S., Co., Hartford, Conn.
A. B. Jardine & Co., Hesper, Ont.
National Machy. Co., Tiffin, O.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Petrie of Montreal, Ltd., H. W., Montreal, Que.
H. W. Petrie, Ltd., Toronto, Ont.
A. R. Williams Machy. Co., Toronto.

VACUUM PUMPS

Can. Blower & Forge Co., Kitchener, Ont.
Smart-Turner Machine Co., Hamilton, Ont.

VALVE LEATHERS

Can. B. K. Morton, Toronto, Montreal.
Graton & Knight Mfg. Co., Montreal.

VALVE GRINDERS (PNEUMATIC)

Cleveland Pneumatic Tool Co. of Canada, Toronto.

VALVES, FOOT

Smart-Turner Mach. Co., Hamilton.

VALVES, HYDRAULIC

Charles F. Elmes Eng. Works, Chicago, Ill.
Metalwood Mfg. Co., Detroit, Mich.

VALVES, BACK PRESSURE, STEAM

Sheldons, Limited, Galt, Ont.

VENTILATING APPARATUS

Brantford Oven & Rack Co., Brantford, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Limited, Galt.
H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto.

VISES, AIR OPERATED

Hammitt Mfg. Co., Chicago, Ill.

VISE STANDS, PORTABLE

New Britain Mach. Co., New Britain, Conn.

VISES, BENCH

Aikenhead Hardware Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal.
New Britain Machine Co., New Britain, Conn.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

VISES, PIPE

Aikenhead Hardware Co., Toronto, Ont.
Butterfield & Co., Rock Island, Que.
J. H. Williams & Co., Brooklyn, N. Y.

VISES, PLANNER AND SHAPER

Aikenhead Hardware Co., Toronto, Ont.
Skinner Chuck Co., New Britain, Conn.

WASHER MACHINES

National Machy. Co., Tiffin, Ohio.

WASHERS

Barnes, Wallace, Co., Bristol, Conn.
Dillon Mfg. Co., Oshawa, Ont.
Graton & Knight Mfg. Co., Worcester, Mass.
Hungerford Brass & Copper Co., New York, N. Y.
London Bolt & Hinge Works, London, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

WATCHES, TIME STUDY

Siberberg, M. J., Chicago, Ill.

WATER PURIFYING AND SOFTENING

APPARATUS

Wm. B. Seafie & Sons Co., Pittsburgh, Pa.

WATER CINDER MILLS

Whiting Foundry Equipment Co., Harvey, Ill.

WATER JACKETS

Can. Welding Works, Montreal, Que.

WATER TOWERS

The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Toronto Iron Works, Ltd., Toronto.

WATER WHEELS

The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Sleeper & Hartley, Inc., Worcester, Mass.

WAVING AND UNDERCUTTING

MACHINES AND ATTACHMENTS

Gray Mfg. & Mach. Co., Toronto, Ont.

WELDING MASKS

Strong, Kennard & Nutt Co., Cleveland, Ohio.

WELDERS, ELECTRIC, SPOT,

BUTT, ETC.

National Electric Welder Co., Warren, O.
Tabor Mfg. Co., Philadelphia, Pa.
Thomson Electric Welding Co., Lynn, Mass.
Winfield Electric Welder Co., Warren, Ohio.

WELDING, WORK AND SUPPLIES

(Autogenous and Oxy-Acetylene). SEE

OXY-ACETYLENE

WINCHES

John H. Hall & Sons, Brantford.
Kennedy & Son, Wm., Owen Sound, Ont.
Northern Crane Works, Walkerville.

WIRE COILING AND POINTING

MACHINERY

Baird Machine Co., Bridgeport, Conn.
F. B. Shuster Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

WIRE CLOTH AND PERFORATED

METALS

Canada Wire & Iron Goods Co., Hamilton.
Hungerford Brass & Copper Co., U. T., New York.

WIRE FORMING AND

STAMPING MACHINERY

Baird Machine Co., Bridgeport, Conn.
Brown, Boggs Co., Ltd., Hamilton, Canada.
McClellan & Son, F. W., Niagara Falls, Ont.
F. B. Shuster Co., New Haven, Conn.

WIRE NAILS

Parmenter & Bulloch Co., Gananoque.
Steel Co. of Canada, Ltd., Hamilton, Ont.

WIRE NAIL MACHINERY

National Machy. Co., Tiffin, Ohio.
Sleeper & Hartley, Inc., Worcester, Mass.
A. R. Williams Machy. Co., Toronto.

WIRE SOLDER

Hungerford Brass & Copper Co., U. T., New York.

WIRE, STEEL, BRASS, COPPER,

BRONZE

Hungerford Brass & Copper Co., U. T., New York.
Steel Co. of Canada, Ltd., Hamilton, Ont.

WOOD BORING MACHINES

Canada Machinery Corp., Galt, Ont.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto.
Petrie of Montreal, Ltd., H. W., Montreal, Que.
H. W. Petrie, Toronto.

WIRE STRAIGHTENERS AND CUTTERS

Baird Machine Co., Bridgeport, Conn.
Brown, Boggs Co., Ltd., Hamilton, Canada.
F. B. Shuster Co., New Haven, Conn.

WOODWORKING MACHINERY

Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Garlock-Walker Machinery Co., Toronto.
New Britain Machine Co., New Britain, Conn.
Oliver Machy. Co., Grand Rapids, Mich.
H. W. Petrie, Toronto.
Petrie of Montreal, Ltd., H. W., Montreal, Que.
R. E. T. Pringle, Ltd., Toronto, Ont.
Silver Mfg. Co., Salem, O.

WOOD LATHES

A. R. Williams Machy. Co., Toronto

WOOD LATHES

Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Oliver Machy. Co., Grand Rapids, Mich.

WORKS STANDS, PORTABLE

New Britain Mach. Co., New Britain, Conn.

WRENCHES

Armstrong Bros. Tool Co., Chicago, Ill.
Butterfield & Co., Rock Island, Que.
Canadian Billings & Spencer, Ltd., Welland.
Keystone Mfg. Co., Buffalo, N. Y.
Wells Bros. Co. of Canada, Galt, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Williams & Co., J. H., Brooklyn, N. Y.

WRENCHES, AUTOMATIC NARROW

JAW AND MONKEY

Bemis & Call Hdwe. & Tool Co., Springfield, Mass.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

WRENCHES, PIPE, MONKEY, TAP

Aikenhead Hardware Co., Toronto, Ont.
Bemis & Call Hdwe. & Tool Co., Springfield, Mass.
Wells Bros. Co. of Canada, Galt, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

WRENCHES, RATCHET AND BASIN

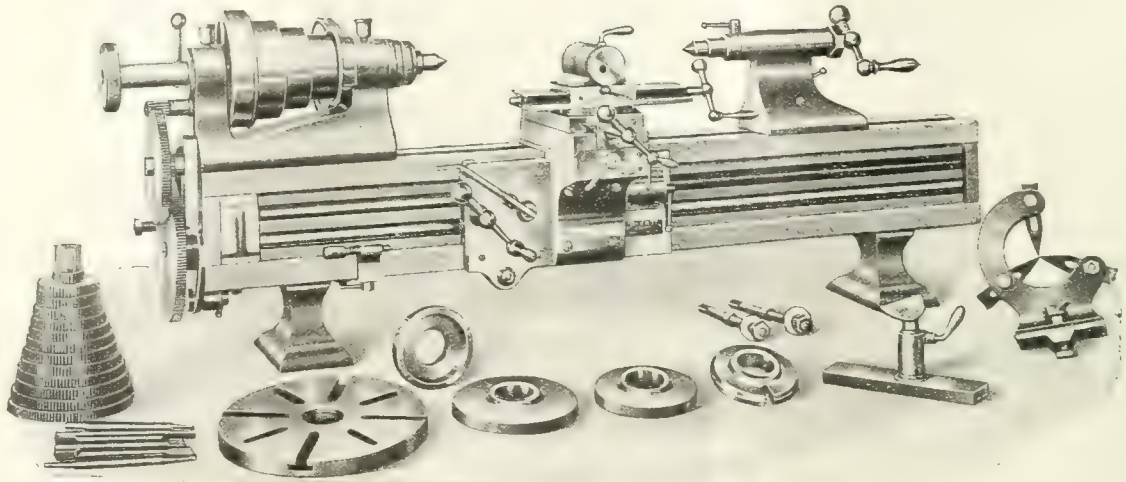
Bemis & Call Hdwe. & Tool Co., Springfield, Mass.
Keystone Mfg. Co., Buffalo, N. Y.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

WIRE STRAIGHTENING AND CUTTING

MACHINERY (AUTOMATIC)

Sleeper & Hartley, Inc., Worcester, Mass.

Here's a Masterpiece in Mechanical Construction



RIVETT PRECISION LATHES

Our 608

Illustration shows type No. 608, Back-Gearred Precision Lathe. A Lathe of exceptional accuracy and highest grade finish, suitable for fine tool room, experimental and model work, and a wide range of light manufacturing. Equipped with compound Slide Rest and thread-cutting equipment. Designed for bench mounting, but may be furnished with combination stand and oil pan or oak cabinet and installed as an independent unit.

There are twelve tests of alignment made by experts on all Rivett Lathes, each test being conducted with minute care to ensure exactness without exception in any case. Then there is a close inspection of the completed machine, and when you buy it you may rest assured of getting a product that has all the Rivett excellence in quality and ability to produce.

Rivett Lathes are models of a model mechanical institution. We are keeping up with the spirit of the age in producing quality tools with profit-making speed.

Write for literature covering our products.

THE RIVETT LATHE & GRINDER CO.

BRIGHTON DISTRICT OF BOSTON

MASS., U.S.A.

Builders of Highest Grade Precision Tools

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

CANADIAN MACHINERY

AND MANUFACTURING NEWS

A weekly newspaper devoted to the machinery and manufacturing interests.

Vol. XVIII.

TORONTO, JULY 12, 1917

No. 2

EDITORIAL CONTENTS

Problems Entering Into Aeroplane Engine Design—I.....	33-34
Productive Methods and Devices	35-37
Adjustable Boring Bar... Fixture for Turning Crimping Groove... Interior Pro-	
filing Tool... Marking Machine Tools... Emergency Repair on Water Pipe... A	
Drawing Room Tray... Handy Rule for Finding Contents of Cylindrical Tanks	
... Emergency Measuring Methods.	
Playing Hose Streams on Charged Electric Wires	38
General	38
Increase in Canadian Customs.	
Intensive Output, Overhead Charges, and Selling Price	39-41
General	41
Armor Piercing Shell Invention... Huge Grab-Bucket Dredge... Dominion Steel	
Corporation.	
Editorial Correspondence	42-43
Providing Vertical Flotation of a Steel Cylinder... Handy Chart for Estimating	
Pulleys, Flywheels, etc.... This Way Spells Success... Handy Chart for Boiler	
Shell Computations.	
Safety Standards for Power Transmission Machinery	44-46
General	46-47
Grinding Wheel and Grinding Machine in Automobile Manufacture... Precision	
Grinding... Women Welders Use Oxy-Acetylene Apparatus... Shipbuilding in	
Great Britain.	
Progress in New Equipment	48-49
Adjustable Bevel Ship Band Saw... Coal Fired Shell Nose Furnace... Radius	
Gauge... All-Metal Swing and Flexible Pipe Joint.	
General	49
B.C. Mineral Output Increased 44 Per Cent.	
Editorial	50
"Shop Secret" Myth... Develop Our White Coal.	
Industrial Notabilities	51
Mark Workman.	
Selected Market Quotations	52-53
The General Market Condition and Tendency	53-56
Montreal Letter... Toronto Letter... New York Letter... Pittsburgh Letter.	
Industrial and Construction News.....	60-67

THE MACLEAN PUBLISHING COMPANY, LIMITED

JOHN BAYNE MACLEAN, Pres. H. T. HUNTER, Vice-pres. H. V. TYRRELL, Gen. Man.

Publishers of Hardware and Metal, The Financial Post, MacLean's Magazine, Farmer's Magazine, Canadian Grocer, Dry Goods Review, Men's Wear Review, Printer and Publisher, Bookseller and Stationer, Canadian Machinery and Manufacturing News, The Power House, The Sanitary Engineer, Canadian Foundryman, Marine Engineering of Canada.

Cable Address: Macpubco, Toronto; Atabek, London, Eng.

ESTABLISHED 1887

CANADIAN MACHINERY AND MANUFACTURING NEWS

PETER BAIN, M.E., Editor. B. G. NEWTON, Manager.
Associate Editors: A. G. WEBSTER, J. M. WILSON, J. H. RODGERS.

CHIEF OFFICES:

CANADA—Montreal, Southam Building, 128 Bleury Street, Telephone 1004; Toronto, 143-153 University Ave., Telephone Main 7324; Winnipeg, 22 Royal Bank Building, Telephone Garry 2313.

GREAT BRITAIN—LONDON, The MacLean Company of Great Britain, Limited, 88 Fleet Street, E.C., E. J. Dodd, Director. Telephone Central 12960. Cable Address: Atabek, London, England.

UNITED STATES—New York, R. R. Huestis, Room 620, 111 Broadway, N.Y., Telephone Rector 8971; Boston, C. L. Morton, Room 733, Old South Building, Telephone Main 1204. A. H. Byrne, 1104-5-6-7 Fort Dearborn Bldg., 105 W. Monroe St., Chicago, Telephone Randolph 3234.

SUBSCRIPTION PRICE—Canada, Great Britain, South Africa and the West Indies, \$3.00 a year; United States, \$3.50 a year; other countries, \$4.00 a year; Single Copies, 15 cents. Invariably in advance.

First in the field—still in the lead

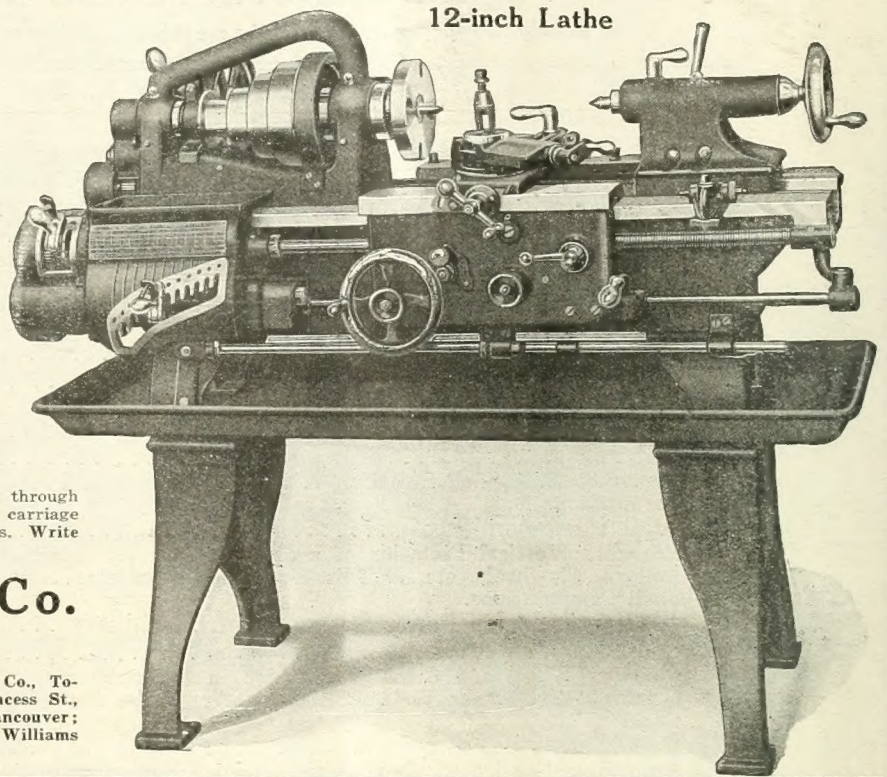
Improved Screw-cutting **HENDEY** Engine Lathe

Mounted quick-change gearing was first made a commercial success on this type of Hendey Lathe. It got away to a good start and still maintains its initial advantages. Used more than any other quick-change lathe manufactured — its top-notch efficiency holds the field.

Thirty-six different threads and feeds are had through mounted change gearing. Automatic stop for carriage works in either direction. Has host of features. Write for full particulars.

Hendey Machine Co. Torrington, Conn., U.S.A.

Canadian Agents: A. R. Williams Machinery Co., Toronto; A. R. Williams Machinery Co., 260 Princess St., Winnipeg; A. R. Williams Machinery Co., Vancouver; A. R. Williams Machinery Co., St. John, N.B.; Williams & Wilson, Montreal.



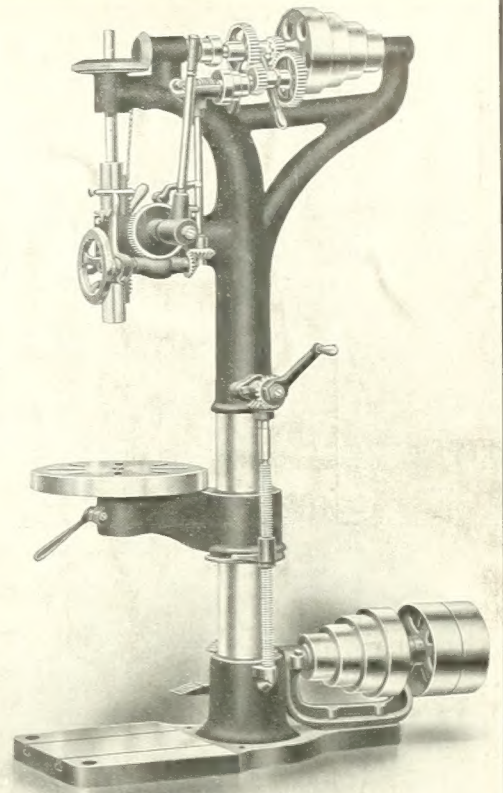
INDEX TO ADVERTISERS

A	Deloro Smelting & Refining Co. 13	Jardine & Co., A. B. 74	Rivett Lathe & Grinder Co. 110
Adams, Ogden R. 94	De Mooy Mach. Co. 101	Jenckes Mach. Co. 9	Rockford Drilling Machine Co. 99
Aikenhead Hardware Co. 63	Dominion Iron & Wrecking Co. 82	Jobbom, Geo. E. 67	Rockville Co., W. S. 92
Armstrong Bros. Tool Co. 91	Dominion Machinery Co. 29, 73	Johnson Mach. Co., Carlyle 8	Rodolfsen Machine & Tool Co. 17
Armstrong, Whitworth of Canada. 5	Dominion Steel Foundry Co. 93	Joyce Co., Geo. A. 92	Roper & Co., C. F. 84
Atkins, Wm., & Co., Ltd. 11	Drury Co., H. A. 12	L	S
Aurora Tool Works 103	E	L'Air Liquide Society 81	Sebastian Lathe Co. 93
B	Eastern Mach. Screw Corp. 86	Landis Machine Co. 93	Shuster Co., F. B. 90
Baird Machine Co. 93	Elmes, Chas. F. 22	Latrobe Electric Steel Co. 12	Silver Mfg. Co. 92
Banfield, E. J. 14	Erie Foundry Co. 78	Lynd-Farquhar Co. 79	Simmons Mach. Co. 30, 73
Banfield, W. H., & Sons 76	F	M	Skinner Chuck Co. 91
Barnes, Wallace, Co. 76	Fetherstonhaugh & Co. 76	MacNab Machy. Co., John 24	Sleeper & Hartley, Inc. 76
Barnes Co., W. F., & John. 1, 3	Fitchburg Grinding & Mach. Co. 59	Magnolia Metal Co. 53	Standard Alloys Co. 15
Bath, Cyril J. 71	Foss & Hill Machy. Co. 93	Manufacturers Equipment Co. 87	Standard Machy. & Supplies, Ltd. 99
Beatty & Son, M. 71	Francis & Co. 93	Marion & Marion 16	Starrett Co., L. S. 28
Bertram, John, & Sons Co., Ltd. 1	G	Marsh & Henthorn, Ltd. 39	Steel Co. of Canada 3
Bilton Mach. Tool Co. 25	Galt Machine Screw Co. 79	Matthews, Jas. H., & Co., Inc. 32	Steploe, John, Co. 85
Bliss Co., E. W. 23	Gardner Machine Co. 83	McCabe, J. J. 29	Smith Mfg. Co., Phillip 25
Brantford Oven & Rack Co. 67	Garlock-Walker Machy. Co. 24	McCoy-Brandt Machy Co. 71	Stocker-Rumley-Wachs Co. 74
Bridgford Mach. & Tool Works. 5	Gardner Machine Co. 93	McDougall Co., H. Inside back cover	Stow Mfg. Co. 30
Bristol Company 91	Geometric Tool Co. 61	McLaren, J. C., Belting Co. 91	Strelinger Co., Chas. A. 71
Brownell Machy. Co. 68	Gibb Instrument Co. 15	Mechanical Engineering Co. 105	Streeter, H. E. 91
Brown & Sharpe Mfg. Co. 97	Gilbert & Barker Mfg. Co. 15	Metal Manufacturers' Service 72	Strong, Kennard & Nutt Co., The. 93
Budden, Harbury A. 76	Gooler & Edmund 25	Metalwood Mfg. Co. 73	Swedish Steel & Importing Co. 97
Butterfield & Co., Inc. 89	Grant Gear Works, Inc. 92	Monarch Brass Mfg. Co. 70	T
C	Grant Mfg. & Machine Co. 18	Morton Mfg. Co. 67	Taber Mfg. Co. 92
Canada Metal Co. 85	Greenfield Machine Co. 91	Motch & Merryweather 70	Tate-Jones & Co., Inc. 105
Canada Machinery Corporation 7	Graves Machy. Exchange 77	Murchey Machine & Tool Co. 87	Taylor Instrument Co. 105
Canada Wire & Iron Goods. 101	H	N	Thosine Instrument Co. 107
Can. Bond Hanger & Coupling Co. 85	Hamilton Gear & Machine Co. 81	Napier Saw Works, Inc. 92	Tolado Mach. & Tool Co. 73
Can. Blower & Forge Co. 1, 4	Hamilton Machine Tool Works. 19	Nelson-Blancq Mfg. Co. 173	Toronto Iron Works 66
Can. B. K. Morton Co. 6	Hanna & Co., M. A. 5	New York Machinery Exchange 73	Toomey, Frank 74
Can. Fairbanks-Morse Co. 24	Hannifin Mfg. Co. 19, 88	Nicholson File 83	U
Can. Desmond-Stephan Mfg. Co. 94	Hawkbridge Bros. 67	Niles-Bement-Pond. Inside front cover	Union Tool Chest Works 93
Can. Drawn Steel Co. 91	Hendey Machine Co. 112	Northern Crane Works 91	United Hammer Co. 92
Can. Economic Lubricant Co. 85	Hepburn, John T. 21	Norton, A. O. 92	V
Can. Hoskins, Ltd. 89	High Speed Hammer Co. 18	Norton Co. 33	Vanadium-Alloys Steel 10, 65
Can. Inspection & Testing Laboratories, Ltd. 90	Hill, Clarke & Co. 75	Nova Scotia Steel & Coal Co. 19	Victor Tool Co. 86
Can. Metal Products 7	Himoff Mach. Co. 20, 93	O	Victoria Foundry Co. 18
Can. Steel Foundries, Ltd. 7	Homer & Wilson Stamp, Tool Wks. 79	Osborn (Canada), Ltd., Sam'l 3	Vulcan Crucible Steel Co. 12
Can. S K F Co., Ltd. 4	Hockley Mach. Works 52	Oven Equipment & Mfg. Co. 1, 9	W
Carlyle, Johnson Mach. Co. 8	Hort Metal Co. 91	P	Walcott Lathe Co. 30
Chapman Double Ball Bearing Co. 83	Hungerford Brass & Copper Co. 82	Parmenter & Bulloch Co. 103	Wells Bros. Co. of Canada 32
Cincinnati Pulley Machy. Co. 97	Hurlbut-Rogers Machinery Co. 94	Peerless Machine Co. 27	West Tire Setter Co. 22
Colonial Steel Co. 16	Hunter Saw & Mach. Co. 76	Perrin, Wm. R. 23	Whitcomb-Blaisdell Mach. Tool Co. 21
Consolidated Press Co. 22	Hyde Engineering Works 14	Petrie of Montreal, H. W. 68	Whiting Foundry Equipment Co. 84
Cullen Machy. Co., C. W. 71	I	Petrie, H. W., Ltd. 69	Wilkinson & Kompass 59
Curtis & Curtis Co. 27	Independent Pneumatic Tool Co. 33	Port Hope File Mfg. Co. 23	Williams & Co., J. H. 7
Cushman Chuck Co. 93	Iron Works, The 67	Positive Clutch & Pulley Works. 91	Williams Tool Co. 81
D	J	Pratt & Whitney. Inside front cover	Wilson & Co., T. A. 92
Davis-Bournoyville Co. 91	Jacobs Mfg. Co. 87	Pringle, R. E. T., Ltd. 31	Wilmarth & Norman Co. 91
Davis Machine Tool Co., W. F. 72	R	Puro Sanitary Drink'g Fountain Co. 67	Windsor Mach. & Tool Works. 29
	Racine Tool & Machine Co. 27	Z	Winnipeg Gear & Engineering Co. 78
	Richmond Mfg. Co. 94	Zenith Coal & Steel Products Co. 51	
	Riverside Machy. Depot 70		

A General Purpose 20-inch Drill Press

This is a very valuable machine for manufacturing, as it is adapted to a large variety of work; and with the Power Feed and Automatic Stop, with proper jigs, they are run in gangs of from 2 to 6 or more, greatly facilitating and reducing the cost of getting out work.

This Drill has features in the manner of changing from lever to wheel feed that are very quick and effective. By a slight turn of the lever a clutch is thrown from lever to wheel feed, and each is independent of the other when in use.



The R. McDougall Co., Ltd.

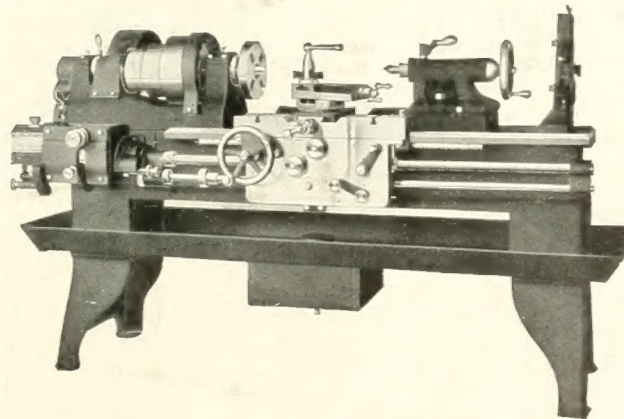
Galt, Ontario, Canada

SALES AGENTS:

**The Canadian Fairbanks-Morse Co.,
Limited**

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

(2)



THE FOSS & HILL MACHINERY COMPANY

AGENTS FOR

Boye & Emmes Machine Tool Company:
Engines, Lathes.
Mueller Machine Tool Company:
Lathes and Radial Drills.
Cincinnati Lathe & Tool Company:
16" and 18" Lathes.
G. A. Gray Company:
Planers.
Racine Tool & Machine Company:
High-Speed Metal Cutting Machines.

Oesterlein Machine Tool Company:
Milling Machines.
Hjorth Lathe & Tool Company:
Precision Lathes.
Murchey Machine Tool Company:
Collapsible Taps.
Eureka Steam Traps.
Tungsten Hack Saw Blades.

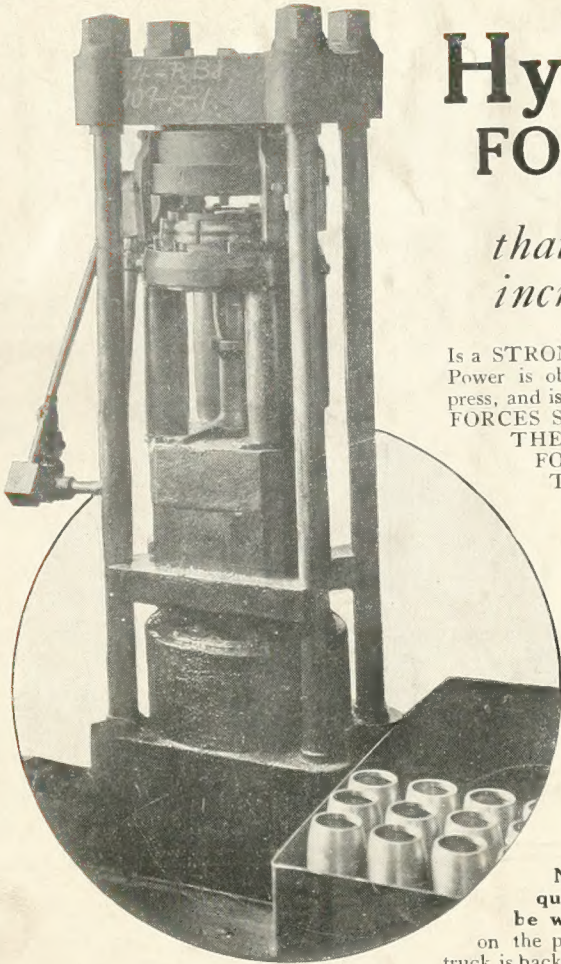
Full line of machinery carried in stock at our showrooms at
305 ST. JAMES STREET, MONTREAL, CANADA

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

Hydraulic Press FOR SHELL BANDING

*that will play an important part in
increasing your output and profit*

Is a STRONG, SIMPLE AND RELIABLE MACHINE AT LOW COST. Power is obtained from continuous running belt-driven pump located near the press, and is applied to the ram underneath the table. TABLE RISES AND FORCES STEEL TAPER WEDGES, EIGHT IN NUMBER, UP INTO THE HOLLOW CASTING AT THE TOP. THE WEDGES CONFORMING TO THE SHAPE OF THE COPPER BAND ARE THUS PRESSED IN EQUALLY AGAINST SAME. PRESSURE IS THEN RELEASED AND THE SHELL READILY TAKEN OUT. Operates by lever shown on left-hand side. Pressure gauge behind. As this machine is a Standard Hydraulic Press it can be used in any other capacity.



What this ELEVATING TRUCK saves in handling costs is surprising

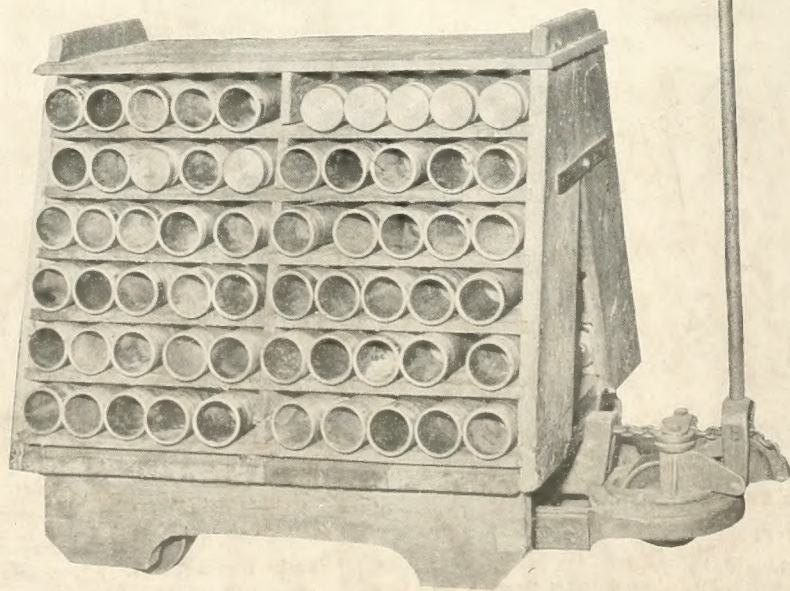
No manufacturer of a product that requires numerous operations can afford to be without this truck. All material is stacked on the platforms. To move material the truck is backed under the platform, the handle of the truck is then pressed down, keeping the

bottom depressed, which raises the truck bed and with it the loaded platform, at the same time automatically locking it in its raised position. When hauled to the desired position the button is pressed and the handle raised, lowering the platform to the floor. The truck is then drawn from underneath and is ready to move another platform.

RAISING AND LOWERING OF THE TRUCK CAN BE OPERATED WITH ONE HAND ONLY — can be raised or lowered at any angle.

Specially designed ball - bearings throughout.

We also manufacture **Loading Funnels, Ball-Bearing Tightening Nuts, Belt - Driven Loading Vibrators, Bench Vises.** We shall be pleased to submit prices and give particulars required.



The Chapman Double Ball Bearing Co. of Canada, Limited
339-351 Sorauren Avenue, Toronto, Canada