

CANADIAN MACHINERY

AND MANUFACTURING NEWS

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

Vol. XVIII—No. 9

Publication Office: Toronto, August 30, 1917

Subscription Price
\$3.00 per Year

BERTRAM

MACHINE TOOLS

For Structural, Bridge and Shipbuilding Plants

Modern in design and built for heavy service, our line embraces a varied equipment of Punches, Shears, Bending and Straightening Rolls, Coping Machines, Rotary and Plate Planers.

The assistance and advice of our engineers are yours for the asking.

The John Bertram & Sons Co.

LIMITED

Dundas, Ontario, Canada

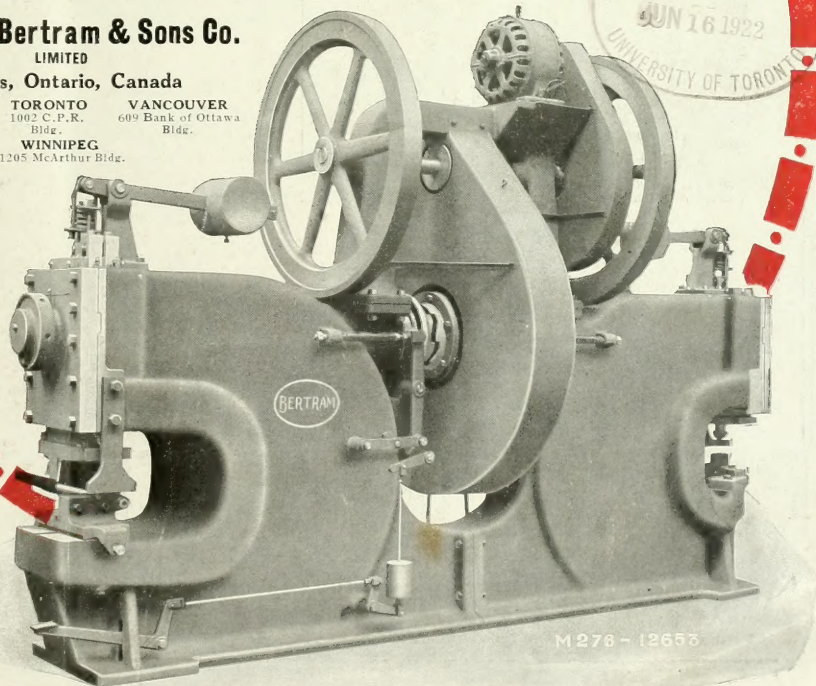
MONTREAL
723 Drummond
Bldg.

TORONTO
100 E. P. R.
Bldg.

VANCOUVER
609 Bank of Ottawa
Bldg.

WINNIPEG
1205 McArthur Bldg.

Double Punch
and Shear.
Capacity—
Shears 6 in. by
1½-in. plate.
Punches 24-in.
hole in 1½-in.
plate.



M276-12653

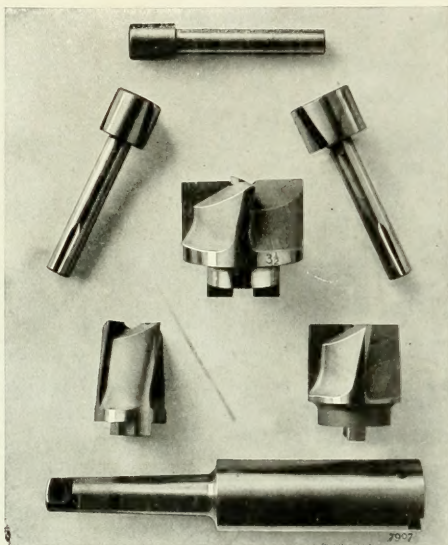


SMALL TOOLS

Equip Your Tool Room With

PRATT & WHITNEY

Interchangeable Cutter Counterbores



and get the right combination at once.

HOLDER, CUTTER and GUIDE

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

HOLDERS

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

GUIDES

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

CUTTERS

Can be furnished of either carbon or high-speed steel.

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

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

PROMPT SERVICE

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

PRATT & WHITNEY CO.

of Canada, Limited

Works: DUNDAS, ONTARIO

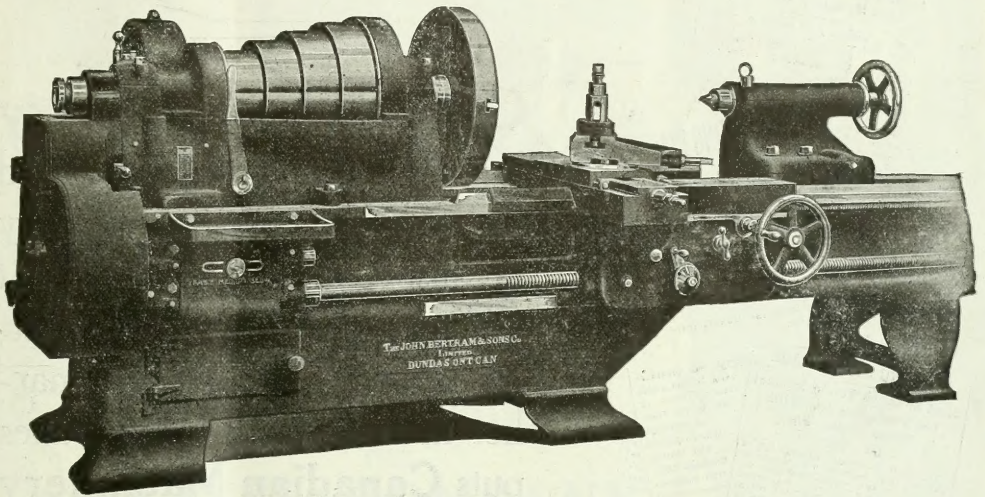
MONTREAL
723 Drummond Bldg.

TORONTO
1002 C.P.R. Bldg.

WINNIPEG
1205 McArthur Bldg.

VANCOUVER
B.C. Equipment Co.

BERTRAM MACHINE TOOLS



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

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

The John Bertram & Sons Co., Limited

Dundas, Ontario, Canada



MONTREAL
723 Drummond Bldg.

TORONTO
1002 C. P. R. Bldg.
WINNIPEG
1205 McArthur Bldg.

VANCOUVER
609 Bank of Ottawa Bldg.



The Publisher's Page

TORONTO

August 30, 1917

A Market Authority

Canadian Machinery is now generally recognized as the leading market authority in this country. The recent addition of regular weekly letters from two of the best market men in the United States puts **Canadian Machinery** market service in a class by itself.

The leading daily newspapers quote **Canadian Machinery**, frequently giving full credit to this journal.

Are you taking full advantage of this service?

STEEL SITUATION
Summary of Iron, Steel, Metal and Machinery Markets
if its summary of the iron steel machinery and manufacturing news, Toronto.

INTERESTING INACTIVITY IN THE STEEL TRADE
Consumers Continue to Hold Off Pending Developments in the Price-Fixing Policy.
in its summary of the machinery and manufacturing news, Toronto.

IRON AND STEEL TRADE
Steel Situation Full of Interest but Trade Inactive, With Prices Easier—Pig Iron Quiet

The steel situation continues full of interest, but considerable inactivity prevails in the trade. Indications of the ultimate trend of prices regarding point to the great having been reached, but no definite assurance can be made on this point at the present time, although the situation is favorable that a cargo will be placed in the United States.

Interest in the steel situation continues full of interest, but considerable inactivity prevails in the trade. Indications of the ultimate trend of prices regarding point to the great having been reached, but no definite assurance can be made on this point at the present time, although the situation is favorable that a cargo will be placed in the United States.

IRON LETTER
Large iron...
NIPIS.

HAS CROSSED THE PEAK.
in its summary of the machinery and manufacturing news, Toronto.

Interest in the steel situation continues full of interest, but considerable inactivity prevails in the trade. Indications of the ultimate trend of prices regarding point to the great having been reached, but no definite assurance can be made on this point at the present time, although the situation is favorable that a cargo will be placed in the United States.

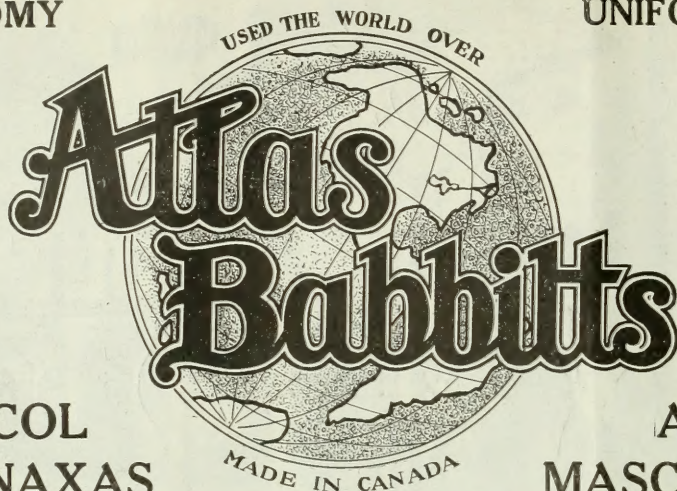
Reproductions of clippings from recent issues of four leading Canadian dailies.



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

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

49 Common Street

Phone M. 3206

TORONTO

86 Richmond Street East

Phones M. 1472-1473

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

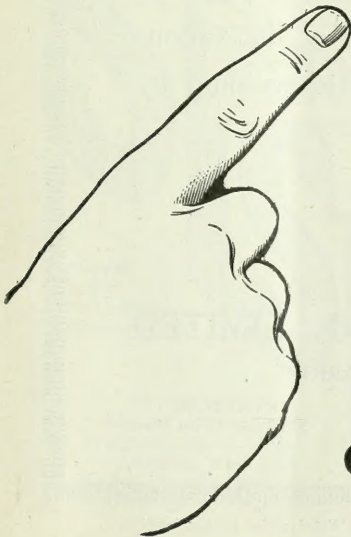
Specially Adapted for all kinds of
MUNITION WORK

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

*For particulars apply to our
Sole Representatives for Canada*

GEO. A. MARSHALL & CO.

70 Lombard Street Toronto, Ontario





STELLITE

Canadian National Exhibition

*“Meet Me at Machinery Hall
Opposite Stellite Booth”*

The greatest annual fall fair in the world has this year an added attraction in a unique display of “Stellite,” under actual working conditions, as well as a display of the various uses to which it can be put, its adaptability to welding by the oxy-acetylene torch and by brazing.

Be sure and look us up

DELORO SMELTING & REFINING CO., LIMITED

Head Office - - - DELORO, ONTARIO

TORONTO
200 King Street West

MONTREAL
315 Craig Street West

Steel Castings



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

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

Castings made true to specifications and patterns.



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

Canadian Steel Foundries Limited

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

We guarantee shipment within 24 hours of receipt of order

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

SISCO

Made in Sweden from selected Dannemora Ore

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

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

The Life of a Thread Miller

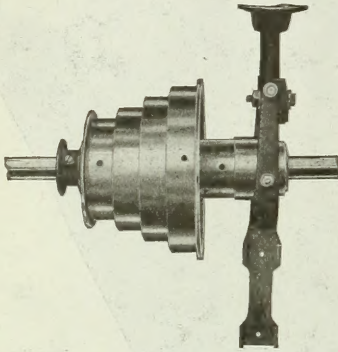
Depends not upon the amount of work it does, but the ease and thoroughness with which the work is done. These Thread Millers are noted for these qualities. Its quality of work is unrivalled. Our Service Department will give you all the particulars. *Write us!*

THE WILLIAMS MACHINERY CO., Limited
64-66 Front Street West
Toronto Ontario

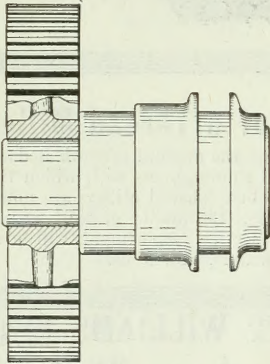
HOLDEN MORGAN CO. LTD.
THREAD MILLER
TORONTO, CANADA

THE JOHNSON FRICTION CLUTCH

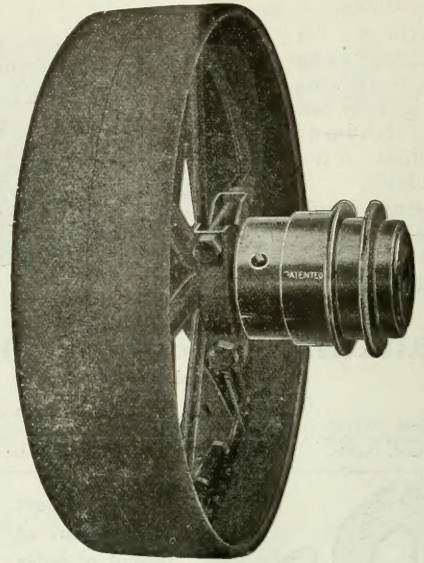
can be used with pulleys of all kinds, gears or sprockets. Look at the illustrations herewith. You have use for a good clutch. Why not try the JOHNSON?



*Cone Mounted upon the Clutch Hub,
for Line Shaft*



Gear Mounted on Clutch Hub



*The JOHNSON FRICTION CLUTCH Mounted
with an American Steel Split Pulley*

The clutch that is used
by the men who know.

Equip your machines
with **JOHNSON FRICTION CLUTCHES.**

Canada: WILLIAMS & WILSON, 320 St. James Street, Montreal.
THE CANADIAN FAIRBANKS-MORSE CO., LTD., Toronto.

England: THE EFANDEM CO., 159 Great Portland St., London, W.,
Sole Agents British Isles.

Australia: EDWIN WOOD, Pty., Hardware Chambers, 231 Elizabeth
Street, Melbourne, Victoria.

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

We will Fill Your Requirements



Send us Your Inquiries

Air Compressor Evidence

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

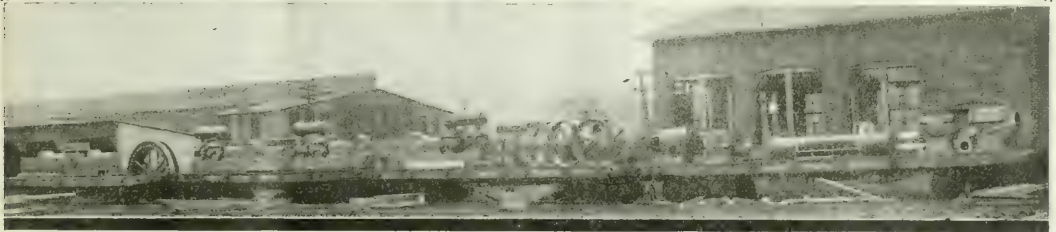
Write us and explain your requirements.

The Jenckes Machine Company, Limited

WORKS:
Sherbrooke, Que.

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

WORKS:
St. Catharines, Ont.



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.

uranium

High Speed Steel



High-Speed STEEL

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

WOLFRAM

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

VULCAN CRUCIBLE STEEL COMPANY

ESTABLISHED 1900

Aliquippa Pa., U.S.A.

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



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

STEEL

FOR SHRAPNEL SHELLS AND SHELL BLANKS

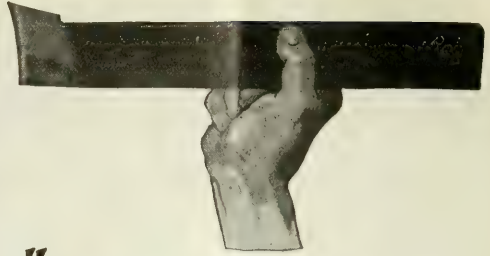
We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

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



"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.



GARLOCK-WALKER MACHINERY CO.

LIMITED

32 FRONT ST. WEST,

TORONTO

TELEPHONE MAIN 5346

You are invited

to attend the showing of a series of educational slides depicting the manufacture of machine tools of quality from the mine to the finished product.

The different processes of manufacture are all shown, the smelting and refining of the ore, the pouring, the casting and the extraordinary care in finishing the parts; the assembling and minute inspection and numerous tests of the complete machine—a vivid story in picture of one of the world's greatest industries.

We are showing these pictures every day during the Exhibition at our booth in the eastern end of Machinery Hall.

You are cordially invited. Meet us there and see this interesting exhibit.

METAL and WOODWORKING MACHINERY of all Kinds

"ULTRA CAPITAL" HIGH SPEED STEEL

Balfour's Tool Steel

"CAPITAL" HIGH SPEED TWIST DRILLS

MANUFACTURED BY

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

The Eagle & Globe Steel Company, Limited

Head Office, Canada and U.S.
Ontario Office and Warehouse
Winnipeg Stock
Vancouver Stock

128 Craig Street West, Montreal
36 Colborne Street, Toronto
Dominion Equipment & Supply Co. Limited
Frank Darling & Co.

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

The
Fairley Davidson Steel Co., Inc.
SPECIALISTS

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

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

CHROME VANADIUM, oil hardening or case hardening

CHROME NICKEL, oil hardening or case hardening

Steam Hammer Forgings to Sketch

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

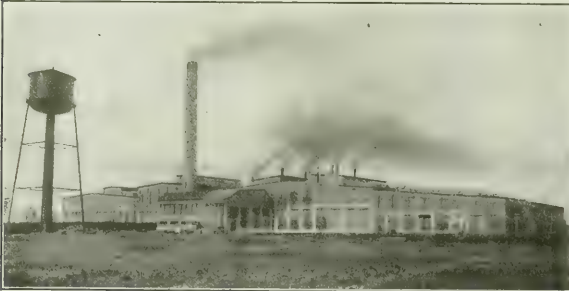
We carry a complete stock at our New York Warehouse, 124 Maiden Lane, New York City

Canadian Agents:

The Canadian Utilities Steel & Engineering, Limited

149 Craig Street West, Montreal, Canada

We carry a complete stock at our Montreal Warehouse



Works: LONGUEUIL, QUE.

CANADIAN MANUFACTURERS
 are you using Steel
MADE IN CANADA?

We are manufacturing at our works at
 LONGUEUIL, QUE.

**SPECIAL HIGH SPEED AND CARBON
 TOOL STEELS, MISCELLANEOUS
 SHOP TOOLS, GAUGES, Etc.**

**ARMSTRONG WHITWORTH of CANADA
 LIMITED**

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

27 King William Street, HAMILTON

Branches: Dominion Bank Bldg., TORONTO
 McArthur Bldg., WINNIPEG, MAN.

**Coal
 Coke
 Iron Ore**

Pig Iron

Victoria

FOUNDRY & MALLEABLE

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

M.A. HANNA & Co.

Sales Agents, CLEVELAND

Canadian Office:

703 C.P.R. Bldg., Toronto



**Chips Turned With a Tool of
URANIUM
High Speed Steel**

You must have good steel in your cutting tool where you have turning operations that are severe; the making of rolls for steel mills, for example. The steel used is a very hard, tough metal, and it is necessary to remove this metal to some depth.

The chips tell the story. There are nearly two pounds of them in the man's hands. The roll is thirty inches diameter and the feed is $13/64$ inch per revolution, while the depth of cut is over an inch. The cutting speed is about 18 feet per minute. A 50 H.P. motor is required to operate the machine.

Uranium Steel is used for this cutting tool. It is the only steel that several concerns have found can stand the pace. Uranium is an element which gives high-speed steel remarkable toughness and life.

Consult your steel man or write us

Standard Alloys Company

Forbes and Meyran Avenues
PITTSBURGH, PA.
U.S.A.

IF YOU WANT THE

BEST
 ASE PLUGS,
 UY
 ANFIELD'S

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

Capacity, 3,000 per day.

Write for prices.

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

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

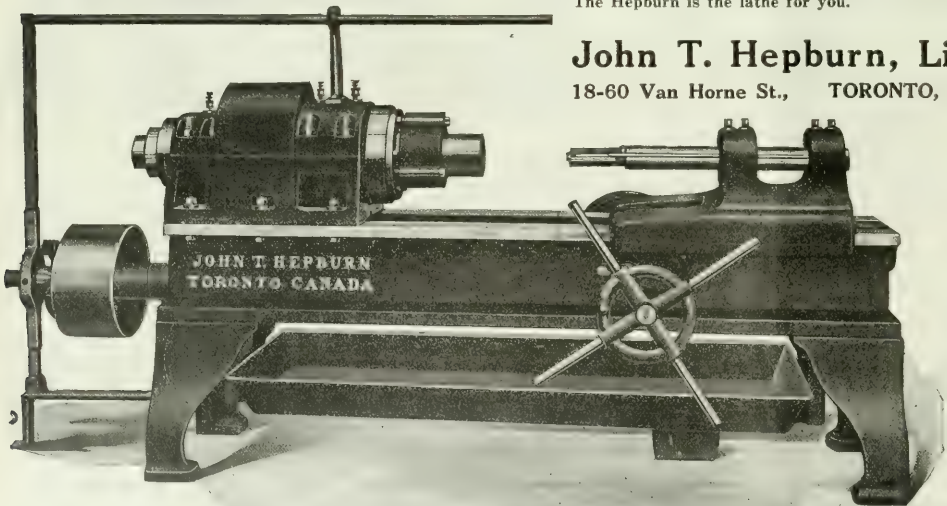
The Lathe that Stands the Test

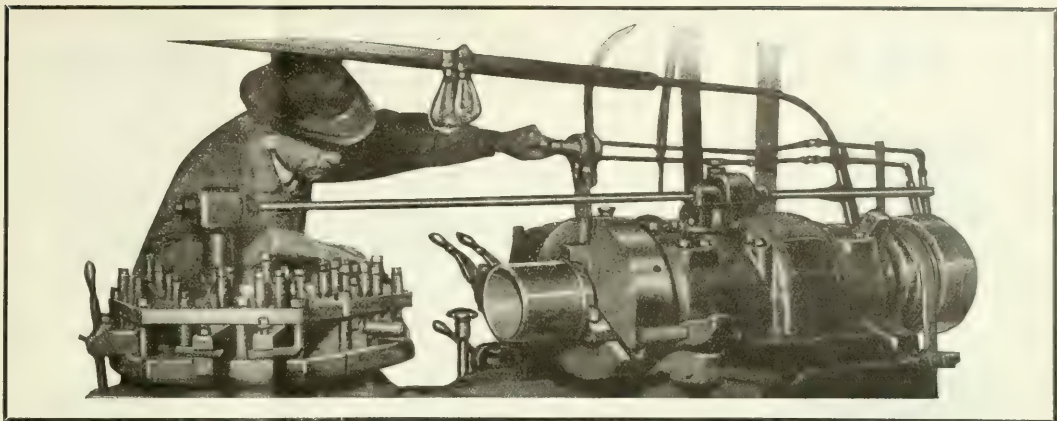
Hepburn

Shell work thoroughly tests the ability of a lathe. The Hepburn Lathe is making a wonderful record in the munition plants of Canada in boring up to 6" shells. It has shown superior speed and superior quality of work and keeps right at it day in and day out. We also rebuild lathes embodying in them all latest improvements.

The Hepburn is the lathe for you.

John T. Hepburn, Limited
 18-60 Van Horne St., TORONTO, ONTARIO





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.

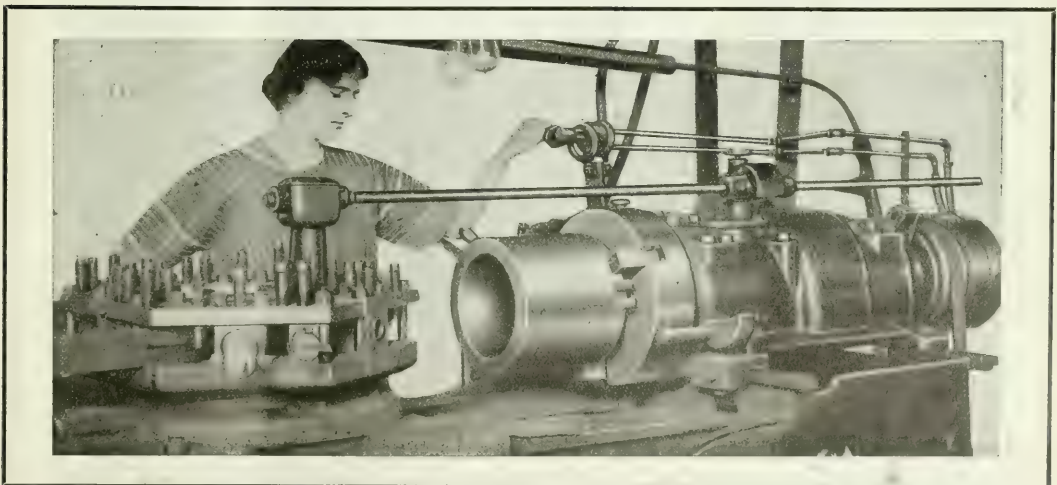
Every argument is in favor of the Hannifin Air Chuck. Order one on trial and let it prove its own case.

HANNIFIN Air Chucks

Write for catalogue covering Air Operated Chucking and Clamping Equipment.

HANNIFIN MFG. COMPANY, Chicago, U.S.A.

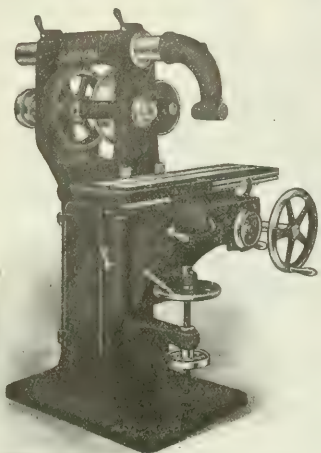
REPRESENTATIVES:—R. E. Ellis Engineering Co., Chicago; Coats Machine Tool Co., New York City; A. R. Williams Machinery Co., Toronto; Williams & Wilson, Montreal; The Canadian Fairbanks-Morse Co., Montreal. EUROPEAN REPRESENTATIVES:—Coats Machine Tool Co., Ltd., London; Fenwick Freres & Co., Paris; Iznoskoff & Co., Petrograd.



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

GARVIN No. 21 Plain Miller

Back Geared



No. 21 B.G. PLAIN MILLING MACHINE
Back Geared
Use Code - Abjeet

For Plain and Gang Milling for general manufacturing, and is used mostly in gangs of 5 or 6 machines to one operator. Spindle runs in adjustable bronze boxes, and is driven by a 3" belt through back gears (3 to 1).

Knee is our improved solid top design, rigid and stiff to resist side pressure of heavy cuts.

DIMENSIONS:

Automatic Feed of Table	18 in.
Adjustment in line with Spindle	6 in.
Vertical adjustment under Spindle	13 in.
Table, inside Oil Pockets	5 x 30 in.
Changes of Speed	6
Changes of Feed	6
Net Weight, Skidded	1,575 lbs.

For Further Information **ASK YOUR DEALER**
or **WRITE US DIRECT**

IMMEDIATE DELIVERIES

Send for Complete Catalog

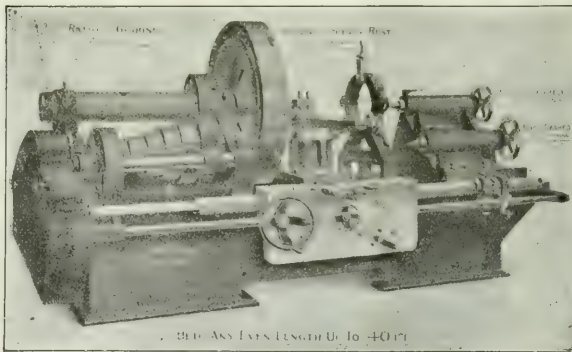
MANUFACTURED BY

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

One Ship-building Plant

wrote to six different Lathe-Builders

and bought McCabe's "2-in-1" Double-spindle Lathe—on a 30-ft. bed—because it was "different" and built especially for such a wide range of work.



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

What other big Lathe can you get, and have full use of your Lathe, whether you have big or small work?
What Lathe Manufacturers except McCabe could make such a low price possible?
No other Lathe builder turns out 48-inch Lathes in such big lots at a time, making the parts all duplicate and interchangeable.
And in addition to the 48-inch Triple-geared Lathe, the 26-inch is the "Lathe plus" feature McCabe offers you—at no extra cost.
DOUBLE service—convenience and capacity—all described in Latest Bulletins.

J. J. McCABE, 149 BROADWAY, NEW YORK

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

Do It Automatically!

With labor so scarce and expensive, can you afford to jog along with the old "one machine to a man" method when one man can do the work of six with Potter & Johnston Automatics?

By practically eliminating the labor problem, P. & J. Automatics reduce production costs amazingly. One attendant can readily operate from two to six machines.

SPECIFICATIONS

Geared head, having three automatic changes of spindle speeds.
Geared feed.

Auxiliary reaming and threading feed.

Cross slide.

Automatic back facer bar through spindle.

16-inch convertible two and three-jaw seroll chuck.

Spindle 5 $\frac{3}{4}$ inches diameter, hole 3 $\frac{1}{2}$ inches diameter.

And production! A study of your problems will result in some surprising information for you. We have shown many firms the way to greater and more accurate production. Let us study your blue-prints.

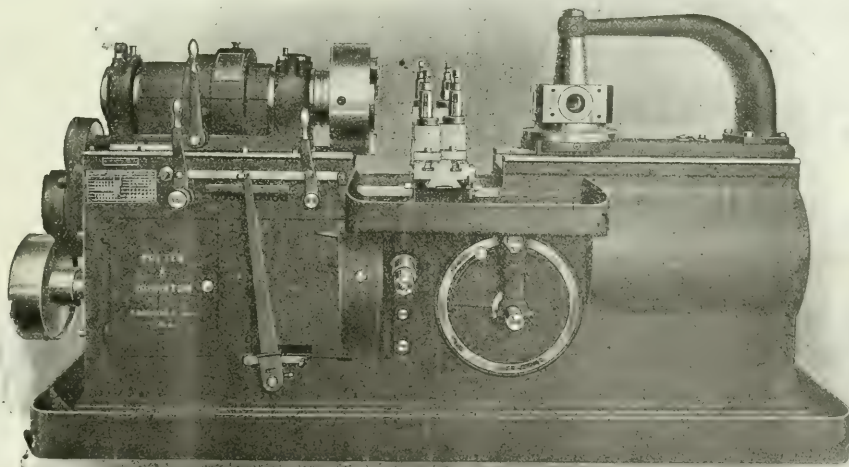
If you machine iron, bronze or steel castings or forgings; if you manufacture gear blanks, bushings, etc., let us tell you how P. & J. automatics will increase your production.

Canadian Offices Potter & Johnston Machine Co., Pawtucket, R.I.

Roelofson Machine & Tool Co., Ltd.

Head Office: 1501 Royal Bank Building, Toronto, Canada

Works and Warehouse: Galt, Ont., Canada



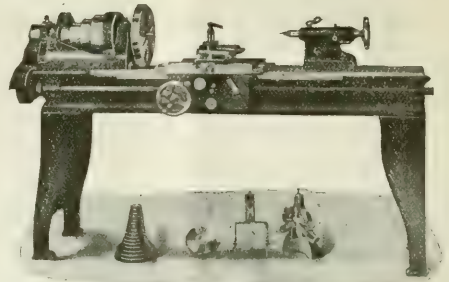
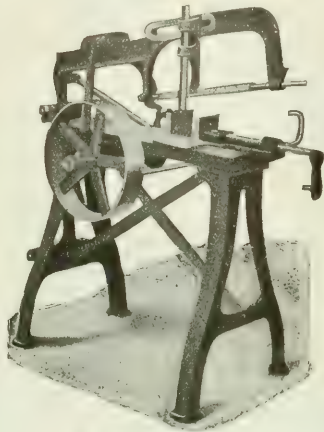
6-A Potter & Johnston Automatic Chucking and Turning Machine

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

The "McKenzie" Engine Lathe The Standard of Accuracy

Made from new patterns, of improved design, and constructed of the very best material by expert workmen. Every part is mechanically perfect and excellently finished. Its accuracy and durability mean a big saving of money to you.

Let us put full details before you. Write!



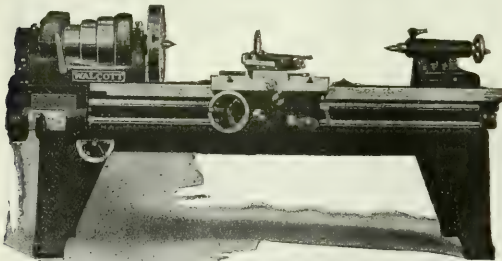
The Improved Power Hack Saw

will cover its cost many times over with the money it saves through long, efficient service.

Saws bars 6 x 6 in., either round or square, and is so constructed as to require no attention after work is put in vise, and stops automatically when piece is cut off.

The improved Saw Guide is a Special Feature—it keeps the saw perfectly in line at all times.

The D. McKenzie Machinery Company
Guelph, Ontario



THE WALCOTT LATHE

is backed by lathe-building experience
extending over 36 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

Decidedly Quality

That is the verdict of our clients.

In construction, operation and results, quality is evident. That is the reason why Filsmith has occupied the foreground in lathedom. In Canada and United States you will find Filsmith quality is based on what it is now doing, not on history. Full webbed headstock, 50-point carbon steel spindle, and rigidly clamped tailstock.

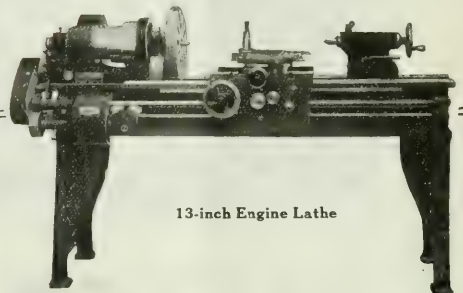
An enquiry will secure you full information.

The Philip Smith Mfg. Co.

Sidney,

Ohio,

U.S.A.



13-inch Engine Lathe

Two Cuts at One Time

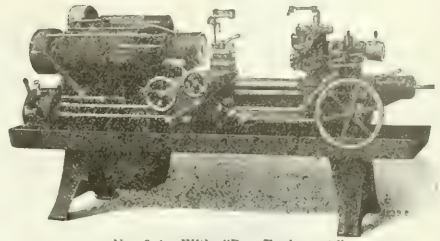
The ability to face, undercut or neck with the square turret while boring or turning with the hollow-hexagon turret contributes largely to the time-saving and economical output of the

Universal Hollow-Hexagon Turret Lathes

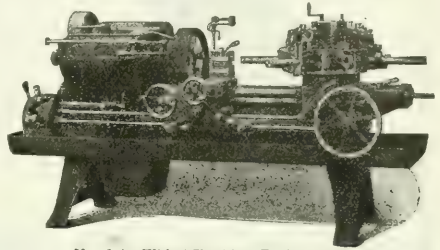
Separate feed shafts, each with ten individual feeds, operate the carriage and turret saddle independently, and provide the exact feed required for each.

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

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



No. 2-A—With "Bar Equipment."



No. 2-A—With "Chucking Equipment."

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

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

To Realize the Full Cutting Power Of High Speed Steel

Whitcomb-Blaisdell

The Planer with the Second-Belt Drive.

That is the specific purpose for which Whitcomb-Blaisdell Planers have been designed.

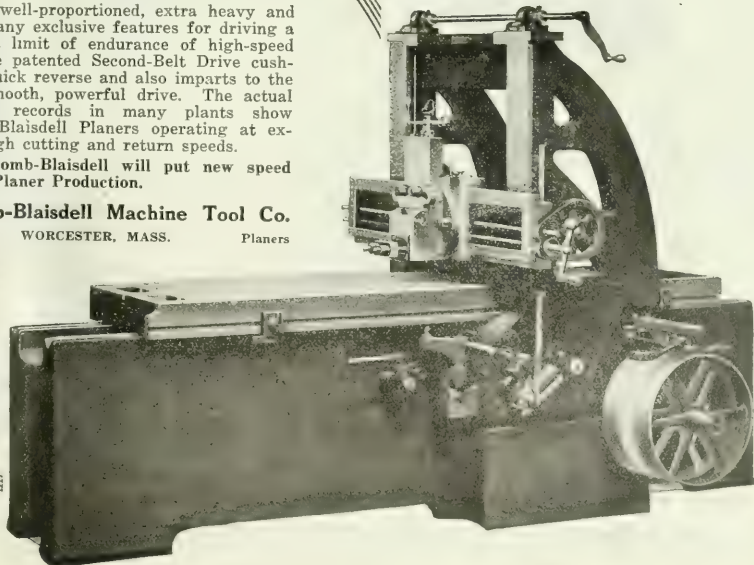
They are well-proportioned, extra heavy and embody many exclusive features for driving a cut at the limit of endurance of high-speed steel. The patented Second-Belt Drive cushions the quick reverse and also imparts to the table a smooth, powerful drive. The actual production records in many plants show Whitcomb-Blaisdell Planers operating at extremely high cutting and return speeds.

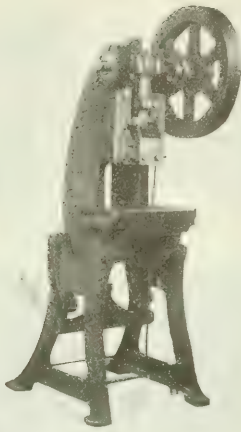
The Whitcomb-Blaisdell will put new speed into your Planer Production.

Whitcomb-Blaisdell Machine Tool Co.

Lathes WORCESTER, MASS. Planers

The Planer Book tells the concrete reasons for Whitcomb-Blaisdell Speed. Write for your copy.





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.

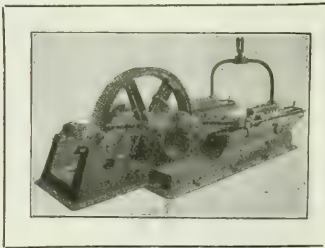
Consolidated Press Company

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

18" Stroke Hydraulic Pump

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

Other designs for all pressures and capacities.

Charles F. Elmes Engineering Works

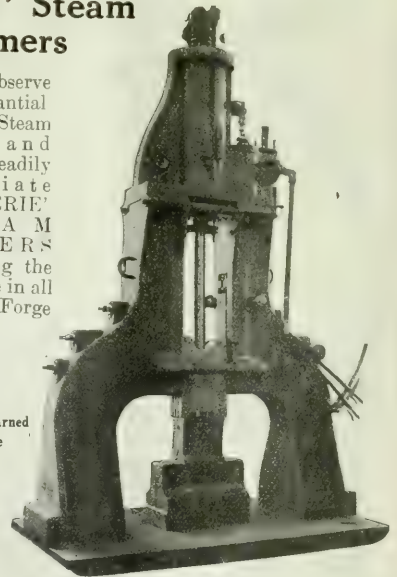
217 No. Morgan Street

CHICAGO, ILL.

"Erie" Steam Hammers

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

They have earned their enviable reputation.



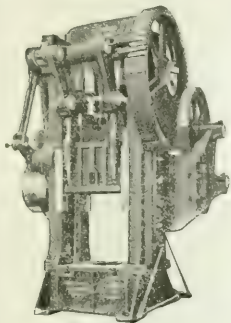
ERIE FOUNDRY COMPANY

ERIE, PA.

U. S. A.

THE "TOLEDO"

Toggle Drawing and Deep Stamping Presses

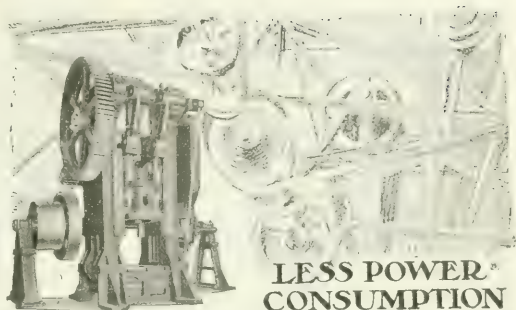


A few of the advantages: Perfect dwell of blank holder during entire drawing operation; the exertion of all the required power; elimination of wasters due to undulation of the blank holder pressure; perfect timing feed consequent effective balancing of entire machine assuring smooth, silent running and safety for operator.

Toggle arms, rocker arms and yokes are made throughout of steel with inserted bronze bushings at each bearing.

Built in all sizes for work from tin cups to road scrapers.

The Toledo Machine & Tool Co.
TOLEDO, OHIO



"Bliss" Patent Toggle Drawing Presses require less power in performing a given operation than many other types of press. Smoothness of action, perfect dwell of the blank-holder and minimum of wearing stresses contribute to this end. Adapted to drawing a large variety of heavy sheet metal work, including many automobile parts.

"BLISS" TOGGLE DRAWING PRESS NO. 15-A.



E. W. BLISS CO.



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

1857

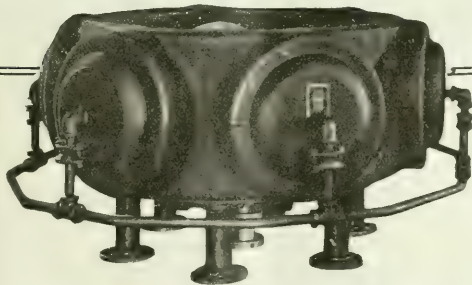
CHICAGO OFFICE
People's Gas. Bldg.
CLEVELAND OFFICE - Union Bank Bldg.

DETROIT OFFICE
Dime Bank Bldg.

1917

LONDON, S. E., ENGLAND
Pocock St., Blackfriars Road

PARIS, FRANCE
100 Blvd. Victor-Hugo St. Ouen



Banding 6" to 12" Shells

Its sturdy construction allows it to stand up under severe service. This is the reason for its higher price. Such extra care, better material and expert workmanship are required that the results warrant the high cost.

It has six 11" semi-steel rams which move 1/2" or more if necessary. All rams returned by levers on plates with heavy Vanadium Steel Springs. Cylinder removable of alloy steel.

Hydraulic inlet to cylinder 1 1/4 pipe. Distributing ring 2". All pipe of Seamless Steel Tubing. All fittings dropped forged steel. All parts under strain, alloy steel castings and forgings.

Six dies of forged chrome nickel steel, hardened and removable, without disturbing any part of press, by loosening two nuts. Can be operated either from accumulator or pump.

Built also in smaller size of same type for banding "pounder" to 6" shells.

Metalwood Manufacturing Co.

Leib and Wight Sts. -:- DETROIT, MICH.

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

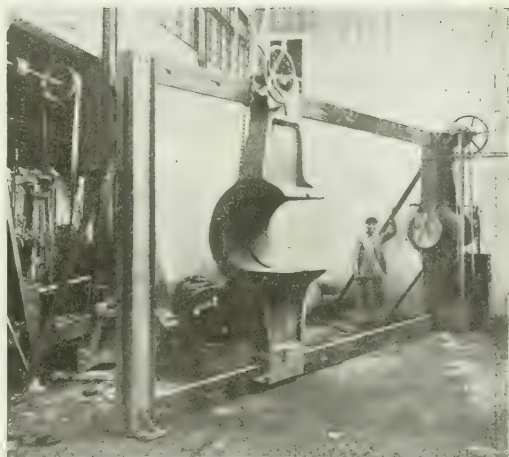


Illustration shows Hydraulic Press for Government Shipbuilding Plant, Sorel, Que.

Hydraulic Presses, Pumps and Accumulators for all Purposes.

Write for Prices and Deliveries.

WM. R. PERRIN, LIMITED

TORONTO, CANADA.

Universal Gear Hobber

The machine which completes our lines to cut all types of small gears except internal, within 10" dia. 8 Pitch.

The Bilton Gear Hobber will cut spur spiral gears, worm gears, also various special shapes of teeth. It can cut a spiral gear on end of a shaft 1 3/8" diam. 24" long.

SPECIFICATIONS

Capacity Gears: 10 Diametral Pitch
10 in. Outside Diameter
10 in. Width of Face

Range of hob feed 50-250 R.P.M.

Range hob feed to each rev. of worm .010 to .125

Drive: 3 Steps Cone Pulley; 2 1/2 in. Belt

Weight 2,100 lbs.

A machine of latest design, introducing new features which increase production without sacrificing accuracy. The hob is cutting continuously; operation of machine entirely automatic.

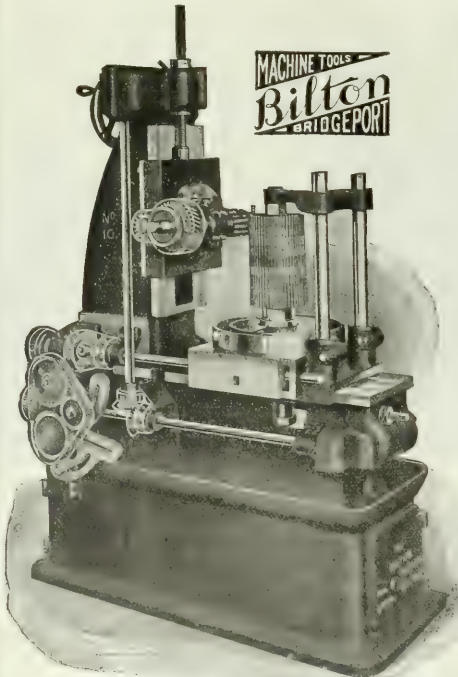
DELIVERY

A few of these machines are now available for October delivery.

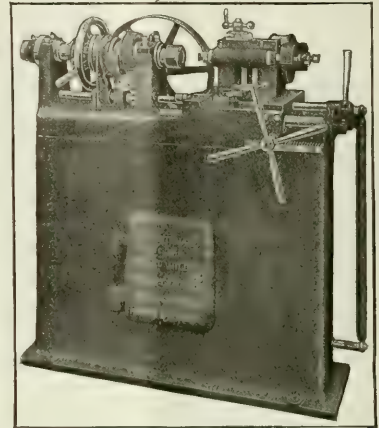
Send for copy of new catalog No. 30, and bulletin describing this machine.

The Bilton Machine Tool Co.
Bridgeport, Conn.

Foreign Agents: Alfred Herbert Ltd., M. Mett Engineering Co., Chas. Churchill & Co.



The Morris Thomson Semi-Automatic Thread Miller



Simplest, fastest and most accurate for Primers, Fuse Bodies, Watch Cases and such pieces. Capacity 3-inch internal or external 10 pitch.

Quick Deliveries.

Hundreds in Use.

T.C.M. Mfg. Co., Harrison, N.J.
U. S. A.

PRACTICALITY

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

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

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

We make a complete line.

Write us for prices.

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

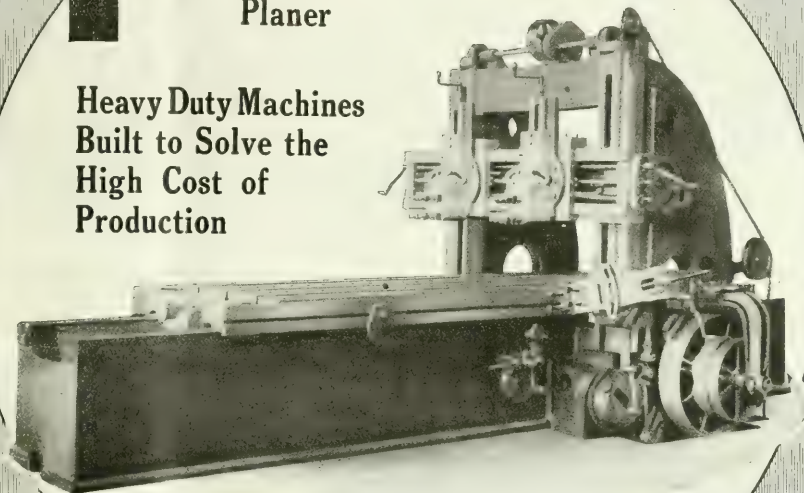
Wood or Steel, let Cummings make it.

HAMILTON

PLANERS

**Hamilton 36" x 36"
Planer**

**Heavy Duty Machines
Built to Solve the
High Cost of
Production**



WEIGHT, RIGIDITY, DIMENSIONS and POWER—these are the combination of assets that give exceptional productive ability to "HAMILTON" PLANERS. The installation of the "HAMILTON" strikes a crushing blow at the High Cost of Production. They do big work fast and accurately. Sizes from 24" x 24" to 54" x 54".

Our bulletin will tell you all about this planer. Give us your address.

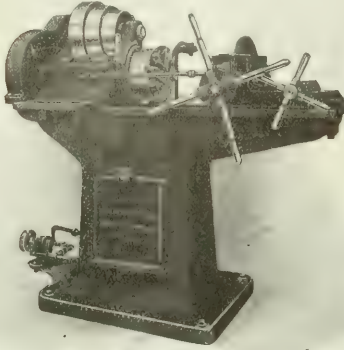
The Hamilton Machine Tool Company, Hamilton, Ohio
H. W. PETRIE, LIMITED, TORONTO, Sole Agents for Ontario.

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

EVERY THREAD A PROFIT MAKER

This is readily possible by using the Landis which insures a high production of clean-cut, well-formed threads at a minimum cost of die maintenance.

These results are due in part to the *Landis Chaser* which embodies the following features:



The line contact between chaser and stock which reduces friction and permits of high cutting speeds.

The rake or cutting angle of the chaser is controllable and may be ground to suit the nature of the material to be threaded.

The length of the chaser is such as to give a life at least twenty times that of other dies.

The chasers never require annealing, hobbing or retempering, but when dull are merely given a slight grinding at the cutting edge and advanced in the holders.

The chasers are interchangeable, which means that one or more of a set can be replaced without renewing the entire die.

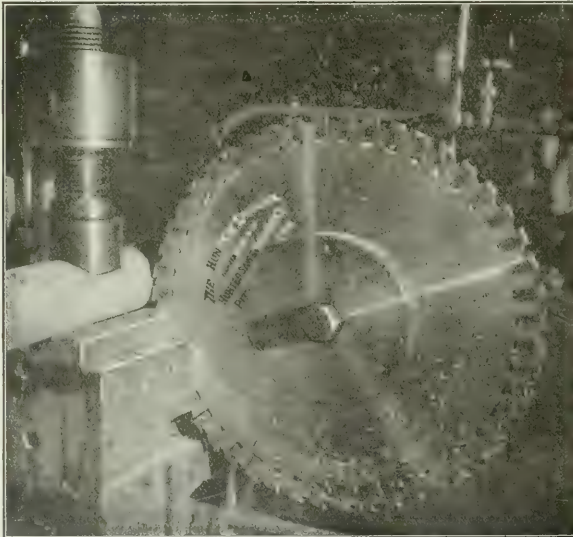
There are still other features which with those above mentioned are absolutely essential to profitable threading.

Write for details.

LANDIS MACHINE COMPANY,

Waynesboro, Pa.

A Hunter "Duplex" on Shrapnel Stock



FAST GOING
on Newton Machine

Through $3\frac{1}{2}$ " round 60
Carbon, 70 Manganese
Shrapnel Stock every

2 MINUTES

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

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

*Let us send full
Particulars.*

HUNTER SAW & MACHINE COMPANY, Pittsburg, Pa.

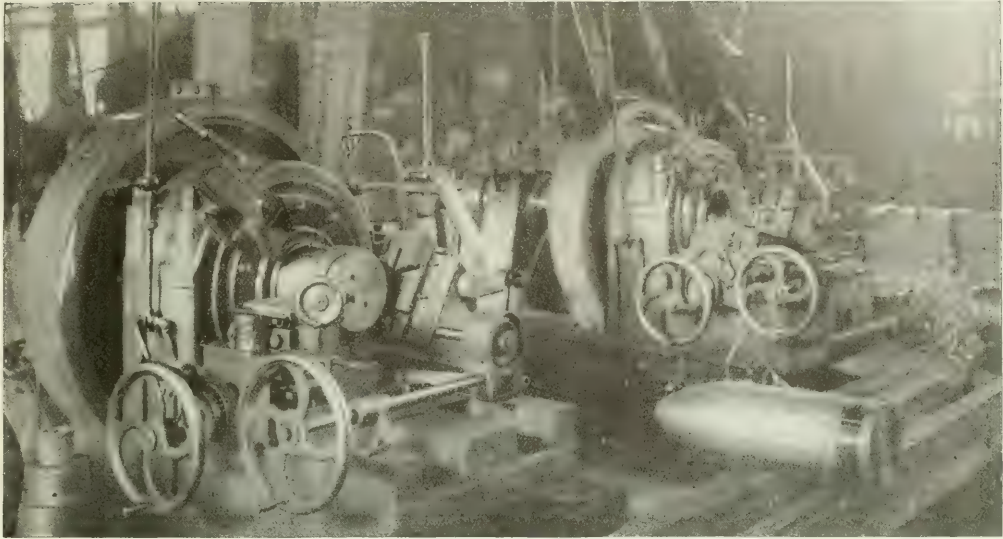


Photo shows two of our Band Turning Machines in one of the largest shell shops in Canada.

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

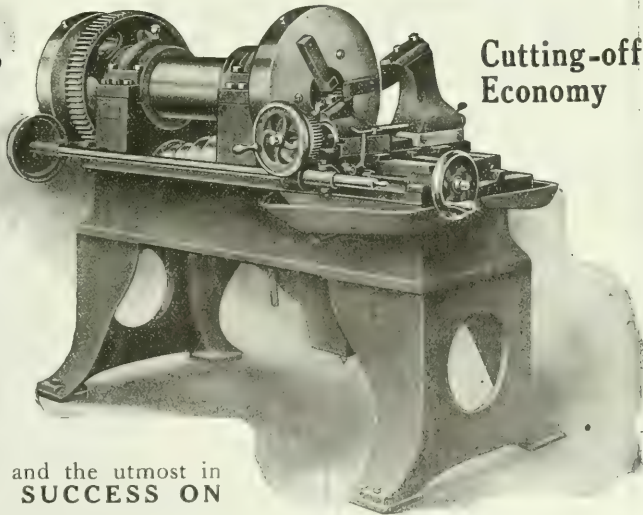
Bennett Ave. **Warden King Limited** Maisonneuve, P.Q.

Two Cuts Simultaneously

One up, the other down. This is what makes the **Hurlbut-Rogers Cutting-Off and Centering Machine** virtually double the output and reduce the cost per piece about one-half.

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

We build them for hard work and the utmost in accuracy—and their **GREAT SUCCESS ON SHELLS** shows it.



Cutting-off
Economy

5-inch Cone-Driven Machine

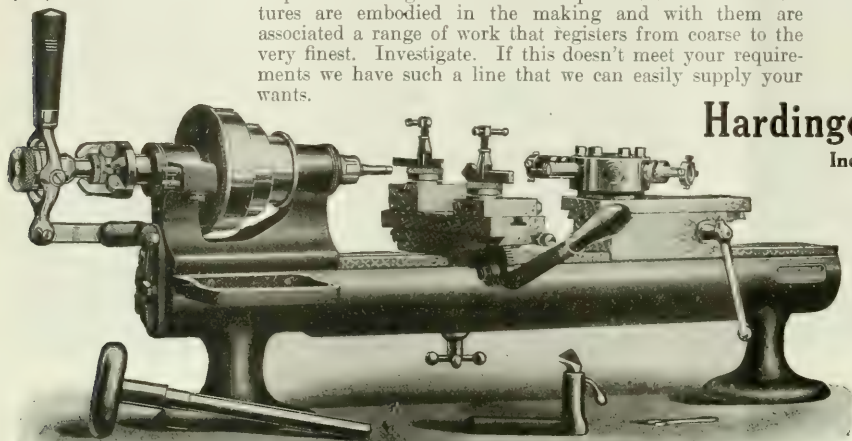
Let us go into details.

HURLBUT-ROGERS MACHINERY CO., South Sudbury, Mass.

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

If it is a Question of Efficiency

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



Hardinge Bros.
Inc.

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

KEMPSMITH

UNIVERSAL MILLING MACHINES

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

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

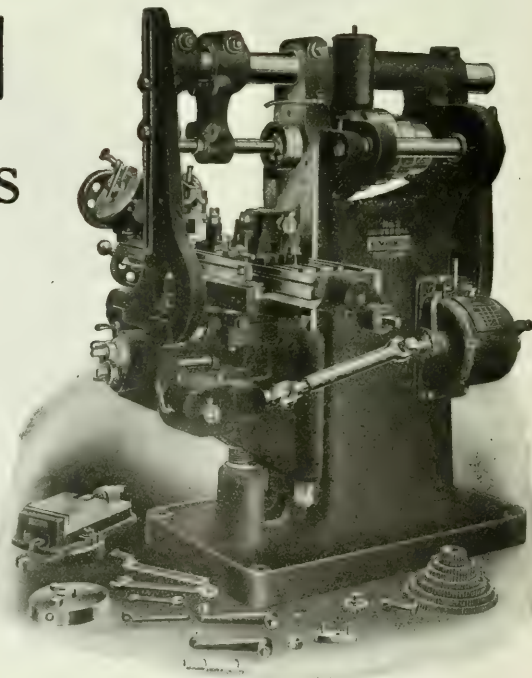
Kempsmith machines are heavy, with weight well distributed and their accuracy is guaranteed within very close limits.

Send for Illustrated Catalogue.

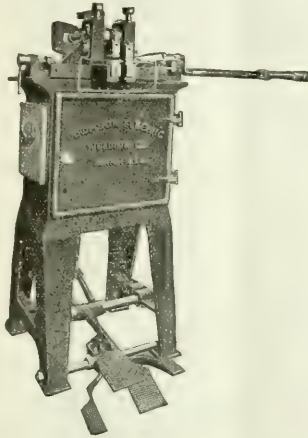
Kempsmith Manufacturing Co.
MILWAUKEE, WIS., U.S.A.

AGENTS:

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



Thomson Process
Electric Welding



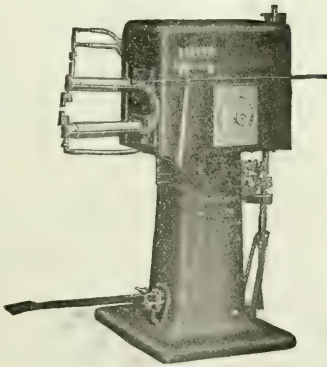
Economy —

In these times, when the entire country is endeavoring to conserve its resources to the greatest extent possible, you can eliminate waste in your welding department by installing a Thomson Butt Welder. The saving in six months will more than pay for the initial cost.

Whether you weld automobile rims, brake rods, angle irons, pipe joints, etc., there is a Thomson Butt Welder for YOUR purpose.

Send for Bulletin B-4.

The Thomson Spot Welder Does It Quickly



It has been proved by actual results that one boy and a "Thomson" can do more and better work than five men and any other method.

It is extremely economical—no rivets to buy, no holes to punch. Think for a moment what that means in dollars and cents. It is just as easy to operate as it is economical—no danger, no smoke, no dirt and very little noise.

We have a model for your work.

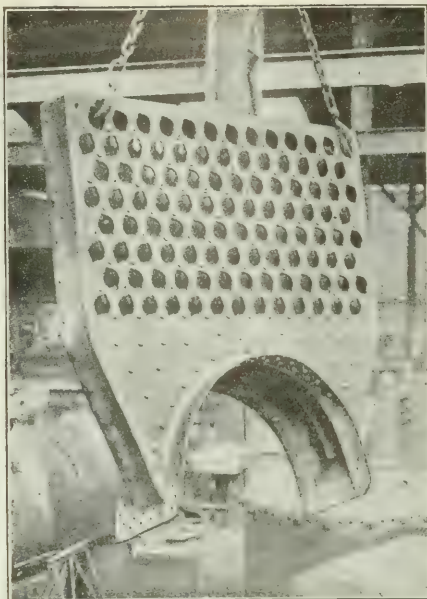
Send for Bulletin S-4.

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

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



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



Part of Water Tube Boiler
Made by Oxy-Acetylene Welding.

The Importance of Oxy-Acetylene Welding

for joining metals, has been overwhelmingly proven. In many cases it is absolutely indispensable, certain classes of work being done that were otherwise impossible. Even though you may not think you have an application for it you would do well to investigate, its possibilities may surprise you.

Are you continuing the old wasteful and inefficient methods?

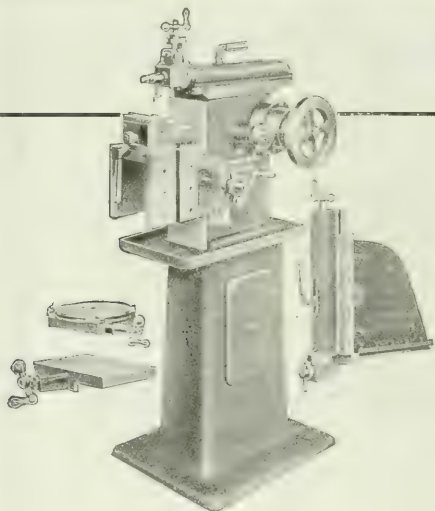
Replacing broken parts instead of welding them,
Piling up scrap instead of using it as good material,
Your machinery idle when it might be earning,
Labor standing idle when it might be producing,
Making leaky joints instead of permanently welding them,
Doing less in more time, than welding does in less time,
And many other disadvantages that inefficiency means.

IF SO,—

Will you have us tell you what Oxy-Acetylene Welding and Cutting is doing for others? We are the Pioneers of the Process and are in the best position to serve you: manufacturing in Canada, Oxygen and Dissolved Acetylene, Apparatus and Supplies requisite for the Process. Write to-day, your interest will be appreciated.

L'AIR LIQUIDE SOCIETY

Canadian Factories: Montreal, Winnipeg, Toronto
Halifax: Factory under construction



Patented June 23, 1914

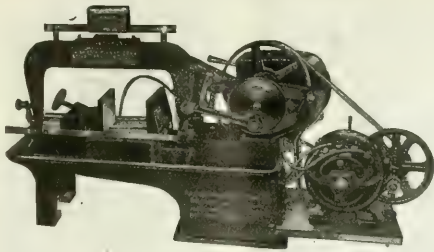
The Complete Machine

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

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

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

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



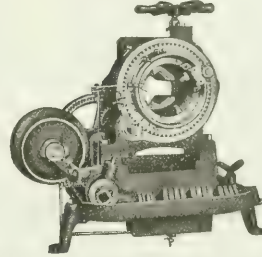
Your Cutting

How do you do it? Are your methods giving satisfaction? Are you getting the maximum production? With a Racine to compare results with you will get a better idea of the results you should be getting or could get. Metal cutting has been our study. It is the purpose for which our machines are built. We stand ready to co-operate with you in your cutting problems. Write us for information.

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

No Leaky Joints

when the Forbes does the threading



FORBES Pipe Cutter and Threader is the machine you take right to job and save carrying heavy pipe to and fro. Powerful and compact. Saves labor of 2 and 6 men over old stock and die method.

The Forbes is the only machine equipped with receding gears carrying the dies on to the pipe; and also with shell adjustable, to compensate for wear. And instead of turning the heavy length of pipe in the dies, as is usual, it turns the comparatively light dies around the pipe.

The Curtis & Curtis Co.
Garden Street, Bridgeport, Conn.

DOUBLE SAVINGS

in cutting on PEERLESS HIGH SPEED METAL SAWS:
they save both Time and Material.

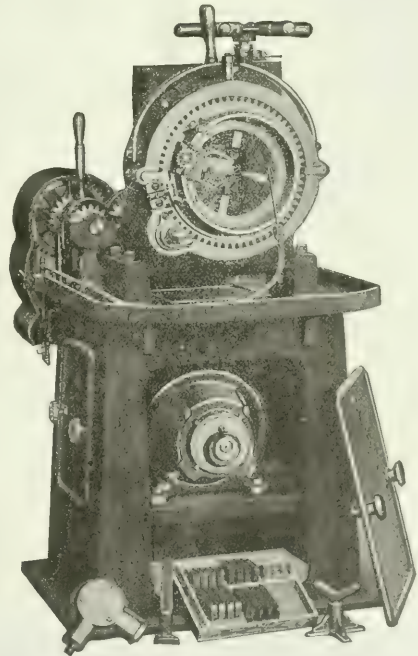
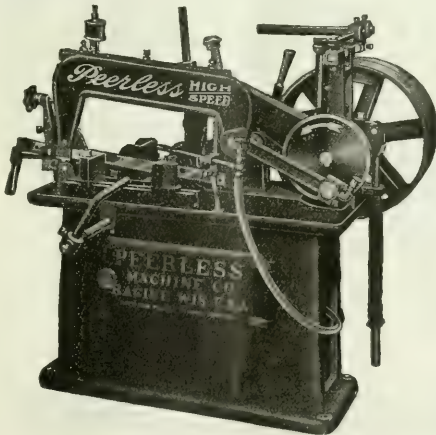
Supposing you save only 1/16 on each cut, 200 lbs. of material are saved on 100 cuts of 12 in. round. Your savings may be several times 1/16.

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

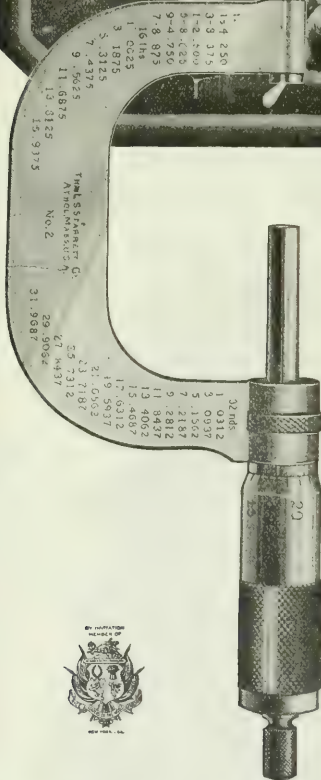
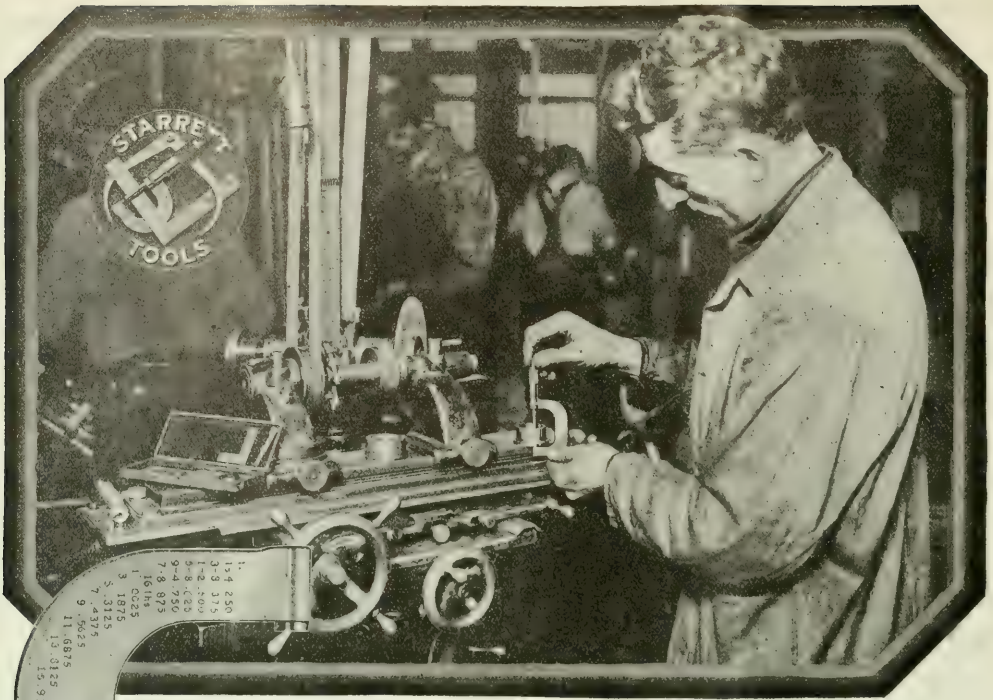
This is only one of the reasons for so many repeated orders and large concerns having standardized the PEERLESS. The many other reasons can only be fully appreciated after comparative test.

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

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.



Where Quality Comes First

Where quality must be made certain, you use tools of known accuracy. You are also very careful to use the tools especially adapted to the work in hand.

It makes little difference what sort of work it is, if accuracy is the first thing, you can be sure of it with

Starrett Tools

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

There are 2100 styles and sizes of these fine tools. One or more of them matches every demand for the fine work needed in a well-made product.

There are micrometers, vernier height and depth gages, vernier calipers, caliper squares, rules, levels, surface indicators and many other instruments of precision.

Catalog No. 213 on request.

The L. S. Starrett Company

THE WORLD'S GREATEST TOOL MAKERS

Athol, Massachusetts

42-703



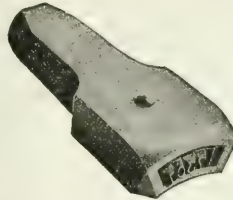


PROVE YOUR PRIDE IN YOUR PRODUCT

Mark it, and mark it clearly. You can do it with a Matthews die or stamp. We make them for marking all products. Our letters and figures are hand cut from the best tool steel.

Matthews stamps are extensively used for marking shells. Many Canadian munition plants have complete Matthews equipment, including holders, type, separate stamps, inspectors' hammers, etc.

Catalog gives complete description of our extensive line, send for a copy



Special "Champion" holder with type chamber curved radially for marking base of shells.



Special "Champion" holders with type chamber curved on face for marking sides of shells.

JAS. H. MATTHEWS & COMPANY

ESTABLISHED 1850

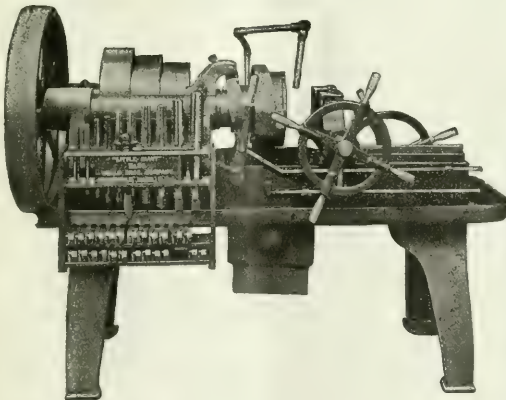
PITTSBURGH

Pa.

Distributors for Canada The Canadian Fairbanks-Morse Company
Montreal, Toronto, Quebec, Ottawa, St. John, N. B.; Winnipeg, Calgary, Saskatoon
Vancouver, Victoria.

Threading Machines

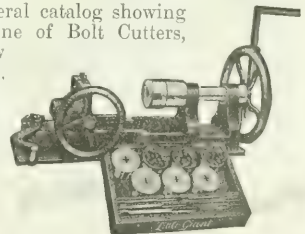
Little Giant



threading machines are free from time-consuming complications. Any shop employee can set them up in a few minutes. They are very easily operated. Any length of thread can be cut with the power machines, as they are fitted with hollow spindles.

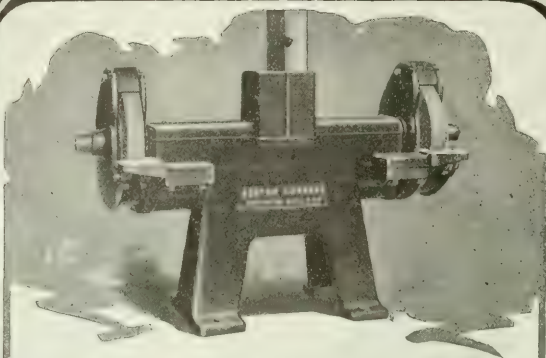
The Little Giant line includes a complete range from the power machines with Automatic Opening Die Heads to the small bench machines with Solid Die Heads.


Send for general catalog showing our complete line of Bolt Cutters, Taps, Dies, Screw Plates, Gages, Reamers, etc.



Wells Brothers Co. of Canada, Limited GALT, .: ONTARIO

Sales Agents: THE CANADIAN FAIRBANKS-MORSE COMPANY, LIMITED.
Montreal Toronto Vancouver Winnipeg, St. John, Calgary.





NOTE the sturdy construction of this NORTON grinding wheel stand—the large spindle bearings—the strong protection hoods—the exhaust connections for carrying away the dust and chips—the strong “roomy” work rests—the abundance of foot space—all of which enable the operator to handle heavy work economically and without extra strain.

Note also the absence of sharp corners and projecting parts, and recesses where dust might lodge.

Let us send you our Bulletin on Grinding Wheel Stands and Protection Hoods.

NORTON COMPANY
WORCESTER, MASS.

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

May We Repeat

THAT

P
H

TRADE MARK

QUALITY FILES

are the only files made in Canada using BEST CRUCIBLE CAST STEEL exclusively in their manufacture. What does that mean to the user?

IT MEANS a keener cutting edge to the teeth, and longer life to the file. IT MEANS the stock has that “pep” in it so beloved of metal workers. IT MEANS that after a long and honorable career on the bench, there is still fine steel in the file which warrants the user in having it re-cut and put on the job again on less “fussy” work.

THAT IS TRUE ECONOMY.

Port Hope File Mfg. Co., Limited

Port Hope, Ont.

“Ask your jobber”

U. S. Electric Drills and Grinders

Save Time, Labor and Money



3 SIZES

3-16 in., W.G.T., 6 lbs.
 3/4 in., W.G.T., 9 lbs.
 3/8 in., W.G.T., 12 lbs.

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

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

They can be attached to any lamp socket.

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



3/4" and 1 1/4" Universal Motor DRILL.

For Sale By

The Canadian Fairbanks-Morse Co., Limited

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

THE UNITED STATES ELECTRICAL TOOL CO.
CINCINNATI, OHIO

SKF

BALL BEARING HANGERS

MORE than three thousand satisfied users of SKF Hangers representing almost every line of industrial activity prove the fitness of these self-aligning ball bearing hangers to adequately solve your line shafting problem.

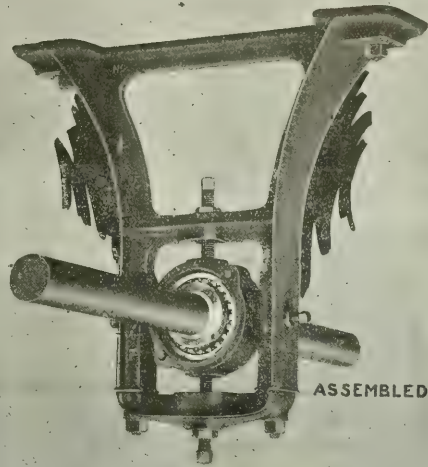
Installations of over 1,000 hangers in a single plant bear evidence of power-saving advantages.

Canadian SKF Co., Limited
TORONTO, ONTARIO

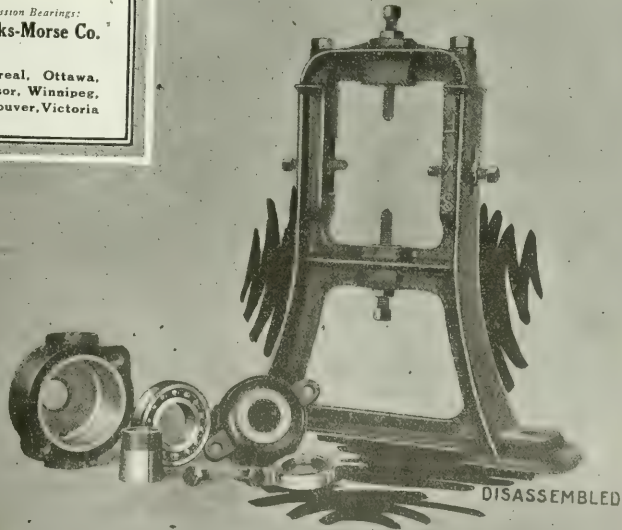
Sales Agents for SKF Transmission Bearings:

The Canadian Fairbanks-Morse Co. Limited

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



ASSEMBLED



DISASSEMBLED

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



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



Manufacturing Plant Equipment

Fairbanks Scales	Port. Elec. Drills
Electric Cranes	Portable Electric
Jib Cranes	Grinders
Hand Cranes	Wire Brushes
Yale Chain Blocks	Motors
Telfer Systems	Shafting and
Switches	Hangers
Wheelbarrows	Pulleys
Hand Trucks	Belting
Electric Trucks	Blowers
Buckets	Gates
Shovels	Pipe and Fittings
Hammers	Valves
Sledges	Ovens
Chisels	Air Compressors
Grinding Machines	Air Tanks
Grinding Wheels	Power Shears

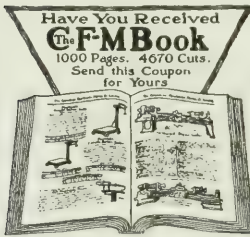
7 - Foundry

Here, as in every other department of manufacturing, the Fairbanks-Morse line includes many items of necessity.

We have listed at the left, a number of items which every foundryman will recognize as essential to his equipment.

We carry the largest stock in Canada of this material, and are prepared to make as prompt shipment as the present market conditions will permit.

Let us quote on your requirements.



The Canadian Fairbanks-Morse Co., Limited

Canada's Departmental House for Mechanical Goods

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



The Expanding Arbor as a Factor of Production

Staff Article

Quantity production on an efficiency basis is dependent upon the facilities provided for the handling of the product, so that the minimum amount of time is consumed between actual machining operation. Special effort has been centered upon the design and construction of operating appliances for the rapid and economical manufacture of all classes of shells, and some observations of driving appliances form the basis of the accompanying article.

SUITABLE equipment is undoubtedly the chief factor in the production of any manufactured article on a repetition basis. Unprovided with such essentials maximum efficiency is impossible of attainment. In so far as the actual machining operations on a certain piece of work is concerned, the end desired is a question of secondary importance, the principal feature being to minimize the unproductive period that is necessarily incidental to the achievement of any purpose. It was due largely to the design, construction and adoption of special fixtures and attachments upon existing machinery that provided a foundation for the special machine, the effectiveness of which has been amply demonstrated during the past three years. In many respects, however, the life of the special machine will terminate

and experience has been the means of developing and improving on the methods adopted at the inception of the industry. While many of these devices, even at the height of perfection, may find a place only for specific purposes, the principles, while not entirely new, may be economically adapted for general purpose equipment.

Plain Cone Drive

Probably the most common driver used for roughing off the outer surface of the smaller shells, particularly during the experimental stages of munitions manufacture, was the ordinary cone shaped type of solid driver with inserted serrated teeth. Many of these are still in operation, but unless they are properly made and handled, they are a source of inconvenience and annoy-

until the cutting pressure is relieved. In the case of the serrated cone, any tendency to slip results in a certain amount of metal being reamed from the mouth of the bore, causing the work to advance slightly, which partly removes the pressure of the cut from the tool, but has the objectionable feature of loosening the work from the tail centre. If, however, the work does not advance, the cutting tool will still be forced into the work in such a manner that, should the driver suddenly resume its duties, there is the probability that the tool will be destroyed under the additional cut. It is, therefore, advisable to so adjust the driver and the depth of cut that slippage will be reduced to a minimum.

Plain Collet Arbor

The drive that has been most extensively used has been the expanding arbor, and the engineering initiative of the country has been reflected in the wide range of design in the arbors that are now in general use. One of the simplest forms of expanding arbors is that illustrated in Fig. 1, where the collet is integral with the body of the arbor. In this particular one the chucking portion is made to fit the nose of the shell after it has been closed and bored. The shank A is turned to fit the taper in the nose of the spindle, and the collet D is expanded by the bolt B, which in turn is operated by the draw rod C that passes through the hollow spindle and controlled by a suitable hand wheel or air operated cylinder attached to the rear.

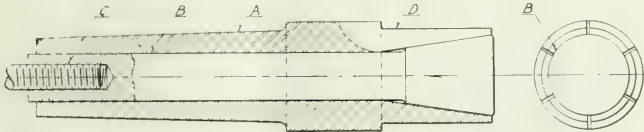


FIG. 1. PLAIN COLLET ARBOR.

with that of the shell industry, but it is not going too far to predict that many of the primary devices, and their subsequent developments, will find and fill useful roles in the ordinary department of engineering practice.

Driving Appliances.

The detail in shell making that has contributed largely to the rapid and effective handling during machining operations, has been the facilities provided for holding and driving the shells for both interior and exterior machining. The advantages to be derived by the removal of the outside metal with one or a series of continuous cuts made it almost imperative that the shell be driven from the rough and afterwards the finished bore. Owing to the greater difficulty of interior machining, the general practice on rough foregoings was to use the bore as a base from which to commence operations; the significance of this being further pronounced by the eccentricity of wall thickness due to faulty forging. Under these conditions the uneven cut is taken by the turning tools, which are always in a better position to withstand the variation in stress caused by the irregular forging. Irrespective of the condition of the forging, however, it is necessary that the driving medium be capable of performing its functions under the heaviest of cuts,

ance. Slippage, under heavy or irregular cuts, causes the teeth of the driver to chew away the mouth of the shell bore, thus destroying the effective drive and forcing the work away from the tail centre; the latter occurrence requiring the operator to give constant attention to this troublesome detail. Another feature in connection with slippage of work under a heavy cut is that of the tool ac-

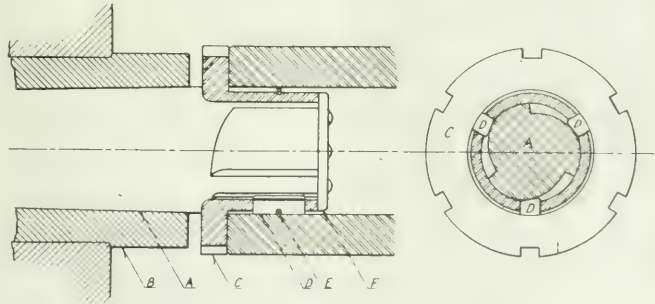


FIG. 2. PLAIN TYPE OF TRIPLEX CAM ARBOR.

tion. When the force applied by the depth of cut is greater than the driving power of the arbor, the work will invariably slip; that is, the lathe spindle and work arbor will continue to revolve while the work will remain stationary

The repair upkeep on the arbor shown in Fig. 1 was, however, a factor that worked to its disadvantage, for the constant and heavy service required of it for shell making. It was this feature that was the primary cause of developing

an expanding arbor where the various operating parts could be replaced at little loss of time or expense, and also facilitate the handling of the shells.

Cam Operated Arbor

The arbor shown in Fig. 2 is semi-automatic in its action, inasmuch as any tendency to slip causes the jaws to take a firmer hold upon the work. The operation of this arbor is dependent upon the central triplex cam and the corresponding jaws. Like the one previously described this is constructed upon the shank that fits the spindle nose. The hardened steel blocks D are fitted in slots cut in the cylindrical section of the cage C, the flange of which is provided with six notches for operating, this being done with a hook spanner. The blocks are kept in contact with the cams by the action of a single coil spring E, placed in a groove cut in the centre of the block and also in the cage; the whole being retained in position by the plate F. It might be well to draw attention to the fact that the inner surface of the jaws should not conform to the arc of the cam upon which they move, owing to the radial movement of the jaws and the eccentric movement of the cam.

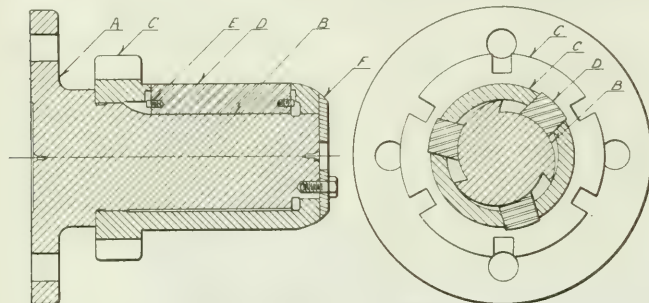


FIG. 3. CAM WITH PLAIN SLIDE BLOCKS.

The bearing surface of the jaws should be reduced so as to bring the thrust as near the centre of the jaw as possible and thus avoid the tendency of the jaws to tilt to one side under the pressure.

The arbor illustrated in Fig. 3 is similar in its action to that shown in Fig. 2, but the central cam is milled upon a piece which has a flange, bolted to the face plate of the lathe, and instead of the jaws being held to their seat by means of a central spring, they are collapsed by two springs that fit over the small pins E, fitted in either end of each jaw.

Arbor With Swivel Block

The expanding arbor shown in Fig. 4 has several points of similarity to the others just described and in addition has a feature that almost eliminates any tendency of side thrust upon the three jaws during the movement of the cam. This attachment is fitted to a lathe having a solid spindle, the cam spindle being screwed to a small chuck that is likewise screwed to the nose of the lathe spindle. When assembled, the cage containing the three jaws is free to move,

but without lateral play. The feature of this particular design is the semi-circular block placed beneath each jaw which allows of a rocking motion during

for the rollers, one firm adopted the design shown in Fig. 6, the sectional view being that drawn through two of the slots in a three slot cage. It was found

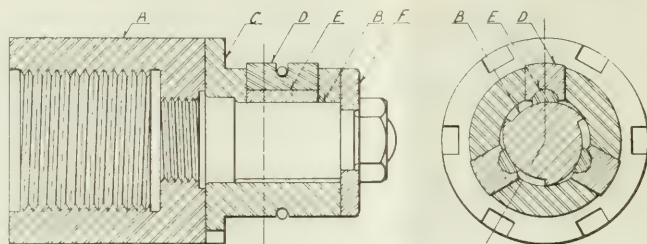


FIG. 4. ROCKING BLOCKS UNDER JAWS.

the cam action. This permits of a wider bearing surface on the cam and added stability to the entire device.

Arbor With Cams and Rollers

A design that greatly reduces the friction of the operating parts and also the effort required to release the chuck after the work has been performed, is that illustrated in Fig. 5, where the sliding blocks are replaced by rollers.

that much time and labor was saved by leaving the round ends in the slots and turning the rollers as shown at B. This rounding of the corners also assisted in the hardening of the rollers and avoided the chipping of the corners when in operation.

Where the expansion of the arbor was controlled by means of a hand wheel located at the rear of the lathe spindle, it was often found that the semi-revolving cam device had the disadvantage of irregular control owing to the torsion of the operating rod due to its length, which, in the case of the smaller sizes of shells, or arbors operating on the closed nose was often a feature of considerable annoyance to the operators. A design that overcomes this objection to some extent is illustrated in the sketch Fig. 7. The spindle in this case carries on its forward end the usual face plate, to which is fitted the flange cage C, slotted in the usual manner to receive the three jaws D. The radial movement of these blocks is derived by the axial movement of the rod E that passes through the hollow spindle and is operated by the hand wheel at the rear; this wheel may be of any suitable design, the one shown being a hub fitted with four short handles. In some of the elementary applications of this particular design it was necessary to release the grip of the jaws by hammering the rear end of the draw rod, after the hand wheel had been backed off. In the ap-

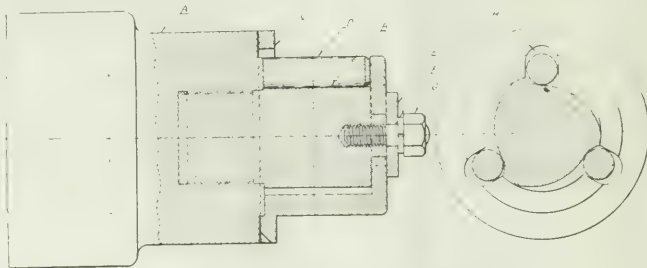


FIG. 5. SLIDE BLOCKS REPLACED BY ROLLERS.

which it is being used. The stud G is kept locked in position by the reaction of the spring washer F. To eliminate the necessity of squaring out the slots

pliance here shown, the hand wheel is fitted with an inner collar that revolves in a space provided on the rear support so that when the wheel is backed off,

the centre rod is pushed forward and allows the jaws, D, to collapse under action of the spring. By placing a solid ring over the jaws in place of the small spring, and using the bush in the nose

keyed to the forward end of the operating rod. The jaws are kept in contact with the inner bevel by the ordinary ring spring, but have a frictional action on the shell bore due to their movement

sketch here illustrated, the cage that carries the sliding blocks E and F, is integral with the portion that fits into the nose of the spindle, and is further secured by being keyed into position.

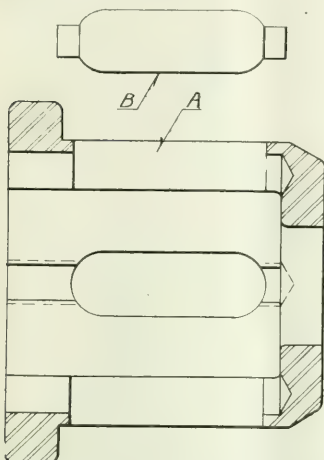


FIG. 6. ROLLERS WITH SPHERICAL ENDS.

of the arbor, the blocks can be turned or reground while in position.

Arbor Operated by Knock Pawl

An arbor that embodies many of the features described in the foregoing, and yet has several additional ones, is illustrated in Fig. 8. The operation of this is also controlled from the rear of the spindle, but a special design of hand

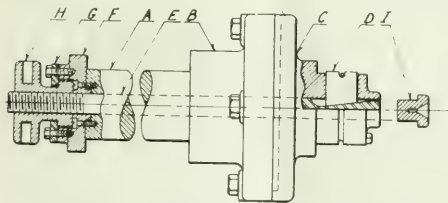


FIG. 7. EXPANDING BLOCKS WITH DRAW-ROD.

wheel is used for tightening and releasing the forward mechanism. The wheel here shown is a development of the notched flange and the spanner wrench, as it was discovered that it was much better to leave the "wrench" always in position than to be continually lifting and laying down the same. The steel hub B is keyed to the end of the operating rod A, and is provided with two notches as shown in the centre section. The hand wheel C is bored out a free fit for the collar B, and through the webs of the centre portion two pins F are placed, these pins supporting two pawls E, located in the central cored portion of the hand wheel, the pawls being forced against the outer surface of the hub by the springs G. Several knocks in either direction are sufficient to tighten or release the jaws of the arbor, which are operated by means of a short cone on the block K; this block being

about the axis. This is caused by the parts being relatively connected to the central block K, the lateral movement of which is controlled by the threaded portion at the inner end. This style of chuck is not satisfactory for use, on the shells when cutting the waving ribs in the copper band groove, as any shippage would alter the track of the tool and possibly destroys the waves.

Double Expanding Arbor

Where the shells are held entirely upon the arbor, such as for boring and threading of the nose, it was necessary to provide increased support for the shell; this being done by extending the length of arbor and using two separate sets of jaws, located at either end of the parallel portion. Some of these, during the experimental stages of shell making, were designed with a cam action, but owing to the excessive torsion, they did not give the best of satisfaction, and this style of double arbor is generally constructed along the lines of the sliding block principle, similar to that shown in Fig. 9; the accepted method in nearly every case being to

In order to obtain satisfactory operation, it is advisable to operate the two sets of jaws by separate sliding blocks B and C, the former being secured to the tube G for operating the rear set, and the latter secured to the central rod H for controlling the movement of the forward set. Where the arbor is operated by hand, it is necessary to have the rod and the tube secured to different rear supports, and in the case of an air operated fixture, the tube is secured to the cylinder and the central rod to the piston. The plug D is inserted in the nose of the arbor to protect the sliding blocks from the dirt and cuttings.

BRITISH CONTROL RARE METAL DEPOSITS IN QUEENSLAND

RECENT advices from Australia are to the effect that practically all the big wolfram and molybdenite properties in North Queensland have been sold to the Thermo Electric Ore Reduction Corporation Ltd., whose registered offices are in London and works at Luton. By means of the latest machinery and appliances the new owners propose to work the mines to their utmost capacity. Four 250-h.p. Diesel oil engines and a complete electrical installation will form part of the new equipment, while the

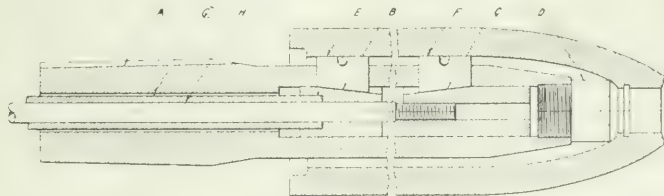


FIG. 9. EXPANDING ARBOR WITH DOUBLE CAM ARRANGEMENT.

design such arbors with three equi-distant jaws, as it is next to impossible to obtain a central control with any other than a three point bearing. In the

present 10 head of stamps will be increased to 40 head. By these means the annual output is to be multiplied several times. The company are also ne-

gotiating for the purchase of the Mount Carbine Wolfram Mines, which, with proper appliances, are estimated to yield 500 tons yearly, or half as much as the properties already acquired. The mines bought by the British company are expected to give 1,000 tons of wolfram per annum instead of 200 tons, as at present, with a corresponding increase of molybdenite and bismuth. During the war all of these rare ores and metals obtained in Australia are sold under agreement to the Imperial authorities.

Wolfram and scheelite are the principal ores of tungsten, and the metal tungsten is chiefly used in the manufacture of high-grade steel, such as is required for lathes and for inner tubes of big guns. It imparts to the steel great density, toughness, and hardness. Molybdenum, the metal derived from the ore molybdenite, is also used for hardening steel as well as for other purposes. All these steel hardening materials have commanded exceptionally high prices since the outbreak of war. As much as £2,000 per ton has been paid by Germany for molybdenite, so it is said, but the British Government fixed the price delivered in London at £525. For wolfram up to £1,000 per ton has been paid in the United States, but the price is now about £200.

SCHEME TO CONTROL FACTORIES AFTER WAR IS AUSTRALIAN PLAN

THE Australian Commonwealth Government is engaged in drawing up a schem for controlling national industries after the war along the lines of Socialism. It is intended as a first contribution to spend \$50,000,000 in the establishment of certain factories under the joint control of private and Government supervision.

A national industrial department is to be created, which shall be in close contact with the Commonwealth Bank, and a specially selected group of "experts," upon whose advice the operations of the department will very largely depend. This department will have very wide powers with respect to the investigation, creation and maintenance of new or expended industries. If a proposition is made to the Government, the experts of the Government would advise as to capitalization, tariff, aid required and the best technical methods of organization. The industry established, they would report from, time to time upon its progress. Assisted industries would be required to provide for the presence of a Government representative upon the board of directors and to agree to a limitation of profits.

The shareholders' proportion of the profits would not be permitted in any given year to exceed 7 per cent. on the capital. If the profits went beyond this, the success would go into the Government revenue funds or be used to finance a reduction of the commodity to the public. If the promoters of the new industries agreed to the scheme of control and profit limitation, they would obtain advances from the Government to 75 per

cent. of the capitalization value, at 5 per cent. interest for the loan moneys. If the industry's operations resulted in a loss after a reasonable and fair trial, and the loss was found to be due to inadequate tariff protection, the industrial department would advise the Government at once to raise the duties. If the industry was really vital to the nation's safety and well-being, the loss would fall on the Government until such times as the new higher duties had enabled the industry profitably to secure complete home market.

It is thought that the first experiments in this direction will be made as follows: \$5,000,000 in the development of the wool industry, \$2,500,000 each in the chemical and tin-plate industries, \$500,000 in glass works, and \$5,000,000 in special iron and steel process works.

BRITISH FIRM BUILDS MAGNETOS

THE dependence of Britain on foreign manufacturers for the supply of magnetos is now definitely a thing of the past. Several firms have been producing this apparatus for some time and the latest addition to their ranks is the British Lighting & Ignition Co., Ltd., formed by Vickers, Ltd., to produce articles of the very highest grade. The name chosen for the new magnetos is "B.L.I.C." from the initials of the Co. Hundreds of magnetos are at present being produced weekly to meet the needs of the authorities, and all possible preparations are being made to meet the large demand expected after the war. The address of the new company is 204 Tottenham Court-road, London, W.C.

BRITAIN COMMANDERS IRON ORE

AN order issued by the British Minister of Munitions went into effect July 24, under which he takes possession of all iron ore mines in the counties of Cumberland and Lancaster, all mines and quarries to which the regulation applies passing into the possession of the Minister of Munitions. The owner, agent, and manager of every such mine or quarry, and every officer thereof, and, where the owner of the mine is a company, every director of the company must comply with the directions of the Minister of Munitions as to the management and use of the mine or quarry, and if he fails to do so will be guilty of a summary offence against the Defence of the Realm Regulations.

CONCRETE SHIP SHOWS LONG SERVICE

THE first reinforced vessel was in the form of a small boat built in 1849 by a Frenchman named Lambot, at Miravel, and the boat is still in service after a practical test of 68 years. Toward the end of last century the possibilities of reinforced concrete for all kinds of structural work began to be more widely recognized and the material was applied

to the construction of vessels of various classes in different parts of the world.

One of the first examples was a floating chalet supported by a reinforced concrete pontoon, measuring 67 feet long by 21 feet wide, built in Rome in 1897. Other barges, lighters and pontoons followed in fairly rapid succession, a Roman firm being most enterprising in the new branch of the work. By the end of 1912, they had constructed at least 20 vessels of the lighter class and over 60 pontoons for floating bridges. In Germany reinforced concrete vessels of the motor launch and barge types have been constructed. In North and South America, a good many barges and pontoons have been made in reinforced concrete during the last ten years. Typical examples are furnished by a barge in Ontario, 81 feet long by 24 feet beam by 7 feet deep; a fleet of lighters, 100 feet long by 30 feet beam, built at San Francisco for the coasting trade; several lighters and pontoons on the Panama Canal; and some scows 112 feet long by 28 feet beam built at Fairfield.

From the examples cited it is evident that reinforced concrete has earned a definite claim to be regarded as a real shipbuilding material, particularly for vessels of moderate size. The material possesses obvious advantages for the building of many useful types of craft. Apart from ships, barges and pontoons, there are other types of floating structures in which reinforced concrete can be employed with advantage. The most interesting example of the caisson class is furnished by the "Batterie des Maures," a torpedo testing station which at present forms a kind of artificial island in the Mediterranean. The structure was built partly in a dry dock, and completed at moorings outside the dock. The battery was then towed by a couple of steam tugs for a distance of some 30 miles through the sea and sunk upon a prepared bed in deep water. When in readiness for its voyage across the sea, the battery had a displacement of 2,600 tons and drew 26 feet of water.

While of less striking character than this structure, reinforced concrete caissons for pier and jetty construction are of practical interest.

It is frequently contended that saline substances in solution damage the concrete. Authorities state, however, that while badly made concrete has suffered deterioration in a few cases, there is ample evidence of the fact that correctly proportioned and carefully prepared concrete is not injured by prolonged immersion in sea water.

THE first artesian well to be bored in Europe, of which data are available, is the tube well at Grenelle in France, which was sunk by the French Government between 1834 and 1841 in the hope of obtaining a sufficient supply of water for Paris. The depth is 179 ft., at which level a prolific supply of water was reached, giving an overflow at the surface of 600 gallons per minute. In Upper Silesia there is a bore-hole 6,572 ft. deep.

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

AUTOMATIC ARBOR FOR SHELL NOSE DRILLING

By W. D. Powell.

THE accompanying sketch shows two interesting applications of an automatic self-centring arbor for accurately locating shell forgings and similar work in a vertical position so as to insure that nose operations will concentrate with the main bore within a high degree of accuracy.

The main part of sketch shows the

er end pressing against a collar as shown. The upward movement is limited to that point where the cone comes in contact with the lower spindle bearing.

Duplex Arrangement

Two arbors are fitted to the one table, so that unloading and loading proceeds simultaneously with the work. The table is located in the two positions by a tapered locking pin situated below, and operated by a foot lever, which is also arranged to lift the revolving table clear

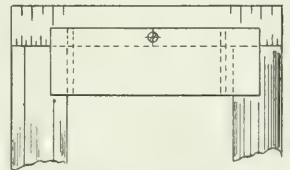
interior of the nose near the point. This bushing is pressed in place as shown. arbor column, and is pressed on a shouldered diameter of the spindle. Drill bushing E is pressed in place as shown. The other details of the arbor are identical with that already described.

The second arbor is also revolvably mounted in a vertical drill press, which takes a light boring cut out of the nose hole after the main bore has been finished, and thus makes the two bores truly concentric, so that the shell may be supported by the internal surfaces at either end in order to turn the outside true with the bore.

STOCK CENTER-GAUGE

By E. Bailey

IN the enclosed sketch is shown an interesting gauge for finding the center of stock to be center punched previous to its being centered. It consists of a piece of square stock beveled vee-shaped on each end, 30 deg., and 45 deg., respectively. A narrow slot is milled along its length into which can be placed a steel scale. The method for using it, is to place the gauge against the stock, then the scale is moved so that its outer end coincides with the edge of the stock. It is then fastened with the headless screw. A line is then scratched in the direction of A, A, along the edge of the scale across the stock. A short scratch as B, is next made just half way or half the diameter of the stock measured on the scale. The exact center being



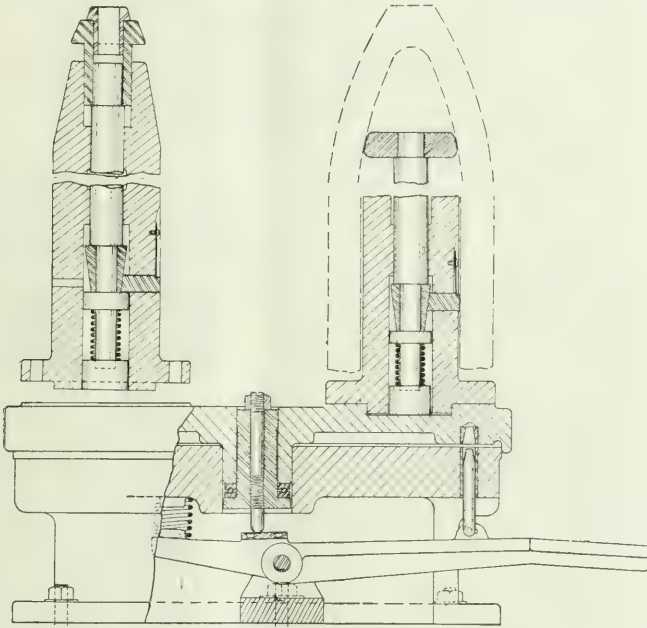
STOCK CENTER GAUGE.

where line B meets line A. The gauge is serviceable both for round, square, and hexagon stock.

A WIRE HANGER RACK

By A. M. Y.

WIRE that is used for making springs and rivets, etc., usually comes wound in coils of various diameters. Bessemer spring wire coils being considerably larger of course than music wire. It is the usual practice to store these coils either on top of one another, or stand them endwise one against the other near a wall. In this manner they are hard



AUTOMATIC SHELL DRILLING ARBORS SHOWING ARRANGEMENT ON REVOLVING TABLE.

device as used on the revolving table of a drilling machine in which the nose of the rough forging was drilled and faced. The arbor column is of cast iron, recessed and bolted in place. The arbor spindle is of machine steel, fitted with a hardened steel disc on its upper end, and of such a diameter that it makes contact with the inner surface of the nose about midway down the tapered portion. The lower end carried a hardened tapered cone, which contacts with three hardened steel dogs, and as the arbor descends under the weight of the forging the dogs expand equally and locate the main body of the forging centrally from the inside. Small plate springs return the dogs, as the arbor spindle rises when the work is lifted off, this movement of the spindle being caused by a heavy coil spring at its low-

er end pressing against a collar as shown. In order to do this, the foot lever is provided with a flat cam plate at its fulcrum end, which operates against a ball pointed stud carried in the bushing which supports the ball thrust bearing. The stud extends up to the top of the bushing so that adjustment can be made to allow of the locking pin being drawn down clear of the table before the latter is lifted clear off the base.

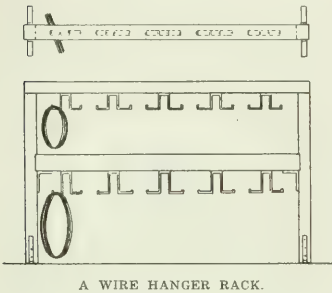
The locking of the pin is insured by providing a compression spring on the other side of the lever fulcrum from the pedal.

Truing Application

The small sketch to the left shows the same arbor with a special drill bushing in the end. In this case the locating disc is replaced by a hardened bushing with a formed flange to fit the finished

to get at, besides, the ends become entangled with other coils and considerable difficulty is experienced in trying to separate them.

In the accompanying sketch is shown a wire hanger rack which is a very neat and convenient arrangement for hanging wire separately on books, whereby the coils are kept free from each other and are easily accessible when wanted. The rack is made from two by four lumber about 10 feet long, and 5 feet high. The lower rail is supported on the end by a forged bracket, and also four brackets support and hold the two up-



A WIRE HANGER RACK.

rights to the floor. The top rail is used for holding coils of small diameters, and the lower rail for larger diameters. The rack occupies very little space. The coils when placed on the hooks are turned slightly inward as shown in the top view of the sketch.

PRACTICAL GRINDING HINTS

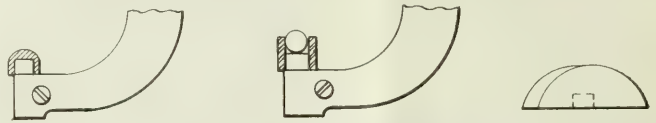
By J. Davies.

IN repetition cylindrical grinding, that is grinding plain round pieces, first rough out the work within 2/1000 of an inch of size with a coarse wheel, taking light cuts with a quick feed. Let the pieces cool down and then put back and finish with a fine soft wheel, still maintaining a rapid feed. A small wheel must not be expected to do the same amount of work as a large wheel in the same time; finer feeds and slower table speeds must be employed for smaller wheels. The faster the emery wheel runs the less it wears; a glazed or a filled wheel can often be remedied by slowing down the speed and thus causing it to wear away more rapidly.

Avoid heating the work as much as possible, don't have your centers too tight, and be sure there is no looseness or end motion, but at the same time leave the job free to revolve. All grinding wheels heat more or less and it is uneven distribution of heat that causes the trouble. Water is only used on grinding wheels for its cooling qualities; therefore to distribute the heat quickly, employ coarse feeds and light cuts; above all you must have a free cutting wheel for satisfactory grinding. Driving belts should be treated with neat's-foot oil and kept soft and pliable.

Grinding a Gear Cutter By Hand
In many small shops there is no universal grinder, or if there is one it may be occupied with another job, hence it

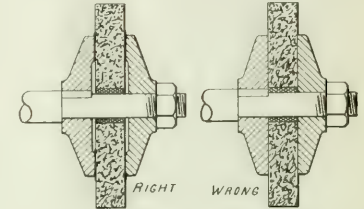
til they will pass in the same manner.
Care in Wheel Mounting
Keep a record of your jobs and the kind of wheel that give the best satis-



METHODS OF ADAPTING MICROMETER ANVIL TO MEASUREMENT OF CUTTER TEETH.

becomes necessary to grind gear cutters by hand. While it is no easy matter to grind a gear cutter correctly by this method, in the hands of a competent mechanic a satisfactory job can often be obtained and much time saved. The main thing to keep in mind is to have the tops of the teeth all an equal distance from the center of the cutter. This can be done by measuring the distance from the edge of the hole to the top of the teeth with a micrometer; this however, has its disadvantages owing to the fact that, the anvil of the micrometer touches the hole at two points. This may be overcome by boring a piece of round stock to fit the anvil, and rounding the piece at the end where it comes in contact with the inside of the hole, or cutting a piece off the end of a round bar and attaching to anvil block as shown in sketch; or by boring a piece of stock to fit the anvil and drop in a small steel ball such as is used in common ball bearings.

A simple and efficient hand grinding device is made and operated as follows: Take a piece of round plate, or a slab cut off the end of a round ball, a little larger than the cutters to be ground; cut or grind a notch in it to allow the emery wheel to reach the face of the cutter, put a stud in the center to suit the hole in the cutter and clamp an index finger on the side of the plate near the edge; a glance at sketch will show how it works. A is the plate, B is the cutter, C the pin upon which it is mounted and D the index finger held to the plate by a small screw. To operate, place the cutter upon stud C and grind one tooth in the usual way, selecting the



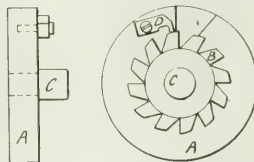
THE RIGHT AND WRONG OF WHEEL MOUNTING.

should be used between the flanges and the wheel; these distribute the pressure evenly when tightened up and overcome any slight imperfections in the wheel or flanges. The hole in the wheel bushing should be large enough to permit the wheel to slide on the spindle freely, to ensure a good fit against the inside flanges. Clamping nut should be tightened only enough to hold wheel firmly. Flanges should always be relieved.

The sketch shows the wrong and the right method of mounting emery wheels. When the inside of the flanges are not relieved and the nut is tightened on the spindle, it causes the flanges to become slightly convex and instead of the pressure being distributed evenly over the entire bearing surface of the flanges, it is greatest near the hole, causing a dangerous condition. The inner flange should not be loose on the spindle but should be shrunk, pressed or keyed on. Sound wheels before mounting to detect any possible defect or injury. Don't start to work with a new wheel until you know that it runs true; to grind cylindrical work true, the face of the wheel must be true. Always true up with a diamond if one is available.

Minor Troubles

Speed is an important factor; speed up the spindle as the diameter of the



SIMPLE AND EFFICIENT HAND GRINDING DEVICE.

tooth that is worn most or requires the most grinding; adjust the index finger D so that it will just touch the ground tooth as it passes. Clamp the index finger in position, then continue to grind the face of all the rest of the teeth un-

wheel is decreased. To increase the speed of a grinding wheel gives the effect of a softer wheel. Wheels are run in actual practice at from four thousand to six thousand feet per minute.

Transferring worm wheels from one machine to another helps to maintain the speed, as in most shops the grinder has one speed only. Don't use the wrong wheel on the job because you are too lazy to change it and humor yourself that you are saving time. Make the feed as nearly the width of the wheel as practicable. There are three grinding troubles—the operator, the wheel and the machine, but the greatest of these is the operator. An unbalanced grinding wheel often causes chatter marks in the work. White lead makes a good lubricant for work centres. If you want the best results true the wheel between the roughing and finishing operations. It is false economy to use a hand wheel because it doesn't wear out so fast. Sometimes the glazing of a wheel can be remedied by simply reversing the wheel, so that the work will come against the opposite side of the cutting grains.

To examine the condition of a ground hole don't look through; let the light shine into it and look down at the hole as near right angle as possible. The use of the lubricating compound improves the cutting and prolongs the life of the wheel. A modern grinding wheel used on an up-to-date machine by a skilled operator is just as surely a milling cutter as if it were made of steel. Its cutting edges consist of millions of sharp cutting teeth, and each tooth as it comes in contact with the work cuts off a chip in the same manner as the tooth of a milling cutter. The chips are very small but when they are cut off at the rate of some millions per minute they soon begin to amount to something.

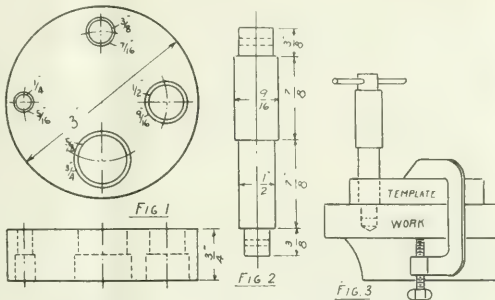
TEMPLATE AND PLUGS FOR TAPPING HOLES.

By J. WRIGHT.

WHEN tapping out holes in a vise or otherwise than with a tapping fixture, it is necessary to use a plug and template over the work in order to guide the tap straight. The template used for this purpose is generally made from a long piece of square stock, having several holes drilled in a line for the different taps used. The plugs are made in various lengths, the end being made tap-size to fit the work, and the shoulder end full-size.

A more compact arrangement, eliminating the need of a long template and several plugs for each size tap, is shown

in the accompanying sketch. In Fig. 1, is seen a round disk in which are full-size holes drilled on each side, half the thickness of the template; these range



TEMPLATE AND PLUG FOR TAPPING HOLES.

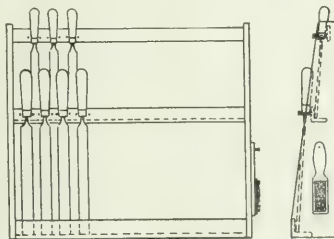
from 1/4 in. up to 3/4 in. dia. The full-size 1/4 in. and 5/16 in. holes are together, as are 3/8 in. and 7/16 in., etc. The template takes up less room than the kind generally used. The plug, Fig. 2, is turned so that both ends can be used for two size taps; in this case the shoulder ends are 1/2 in. and 9/16 in. respectively. Where eight plugs formerly were used, only four are required of this type.

A small hole is drilled in each end of the plug for inserting a piece of 1/16 in. stubs' steel wire, to be used for a handle to draw out the plug with, as seen in Fig. 3.

A VERTICAL FILE RACK

By G. Elliot.

IT is seldom one sees files arranged in any proper order on a workman's bench. This is because that there is no way that they may be kept so, for the reason that they require considerable room, and it is necessary to stack them together in order to save space. When they are arranged lengthwise with ends resting on the back partition of the work-bench, they become knocked down by jarring such as hammering work in a vise, etc. In the enclosed sketch is shown a file rack that can be easily constructed of light wood, in which the files are placed vertically and rested on the cross-piece as shown. The larger



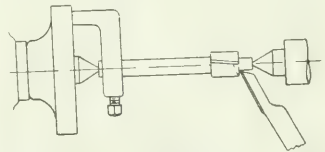
CONVENIENT FILE RACK FOR BENCH.

files are placed below and the smaller files above. Nails are driven in the cross-pieces for the handles to fit into and to prevent the files falling sideways.

BACKING OFF COUNTERBORES

By J. E. C.

AN accurate and quick method for backing off for the clearance on a counterbore is shown in the enclosed illustration. The usual method in doing this is to file the flutes in a vise, which is generally guess-work, as it is not possible to file them alike. As shown, the counterbore is placed on centres in a lathe. The lathe is then geared up to cut 1/16 in. or 1/8 in. pitch, or whatever clearance is desired. The edge of the flutes are first squared off, then the gears thrown in. The side tool as shown is set on an angle against the back edge of the flute; then, taking hold the belt with the hand, the spindle is turned sufficient to remove a chip from the back of the flute. This is repeated till the necessary stock is removed to the extreme cutting edge. The tool moves inward at each operation, cutting the edge off evenly around the guide. Each flute edge is cut separately. By this method the clearance on several counter-



BACKING OFF COUNTERBORE INTO LATHE.

bores can be backed off in the time formerly required in filing one in a vise.

THE SCREW MACHINE FEED

By D. A. Hampson.

"JUST how does that feed work?" That is the invariable question asked by new men when they go to work on an automatic screw machine and by persons watching the operation of the machine. The drawings show the construction of the parts and their relation.

The operation may be explained in brief as follows:—The bar of stock is controlled in its movements by a feed tube, at the inner end of which is screwed a feed finger or shell which grips the bar tight enough to move it under any ordinary circumstances, but not so tight that it will fail to slip if the bar is held in a more vise-like grip, and the feed tube pulled along. This tighter grip is furnished by the chuck, of collet type. When the chuck is opened the feed tube is given a forward movement, and the bar goes with it because there is no resistance beyond the friction of the bar. After the chuck is closed and the tools have begun their work, the feed tube is drawn back and the finger simply slides along to a position further back on the bar ready for the next feeding.

Fig. 1 shows a section of the spindle of an automatic with the above parts in place. The collet is operated by a tube that surrounds the feed tube; both of these tubes have grooved collars at their outer ends and movement is imparted through forks working in the grooves. The collet is forced into the hardened nose piece which, being tapered, causes it to close when moved forward (in one type of chuck, the collet itself is sta-

tionary and the movement of a surrounding piece causes it to close). Cams on drums or arms mounted on the cam shaft engage the forks that work in the grooved collars and impart movement to the tubes.

The two tubes are a regular part of the machine; the collets and feed fingers are equipment, and have to be purchased or made. On larger machines, one collet and one feed finger, or shell, is made to answer for several sizes of stock by the

it against the weight of the tube. The feed finger should be spring tempered with a hard end.

The nominal size of the machine is the size bar that will go through the feed tube and finger. No part of the feed tube should be a tight fit in the collet closing tube or the feed will not work or it will feed short. It will be noticed that the feed finger is partly within the collet; by making it this way, a minimum of stock is wasted. A short piece—about 1½ in.—

subject to commutator troubles which, in spite of many ingenious devices, such as the radial commutator, are not easily overcome; so that a 5,000 kilowatt set in a single machine appears to be the limit for safe and efficient operation with a direct coupled turbo-generator.

If a larger power from one set is required, resort must be made to one of two alternatives. The first is to use a turbo-alternator, running at 3,000 or 3,600 revolutions per minute, in conjunction with a rotary converter. This forms a combination which, in certain cases, has distinct advantages.

Advantages of Turbo-Alternator

This combination is particularly suitable when direct-current power must be supplied to several points some distant apart, when the transmission losses and cost of mains can be kept to a minimum by generating at a moderate or high voltage, and transforming down at the sub-station where the rotaries are installed. In many instances direct current is essential for a part of the system only, while the remainder can be served more efficiently by an alternating supply, a case for which the rotary converter plant is peculiarly suitable. With such a mixed system of distribution the rotary has the further advantage that it can be inverted, taking direct current from sets with which it works in parallel, or from a battery, and supplying alternating current into the mains, thus helping out the alternating current sets in case of a breakdown. A further advantage arises if there is a linking up of several generating stations, because small direct current stations will receive alternating current from the trunk mains and convert it into direct current by means of a rotary, thus having their main-turbo-alternator sets as a stand-by; whereas, in the case of either the direct connected or geared direct-current generator, it will be necessary to use rotaries.

The other alternative is to use double helical turbine gearing to reduce the speed of the turbine to that most suitable for an engine type direct-current generator; the speed of the former is usually between 3,000 and 4,000 revolutions per minute for units of moderate size. The turbo-alternator rotary plant does not suffer from the limitation in desirable size which applies to direct coupling, and also, to a lesser degree, to the use of mechanical reducing gears.

THE first submarine boat of which history makes any record was built by a Dutchman, named van Driebel, in 1640. The boat was built in England with money said to have been advanced by King James I. According to reports the vessel had a unique ballasting system. There was a number of goatskin bags placed under the deck between two large planks. These bags, when filled with water, caused the vessel to sink. To cause it to rise again the bags were pressed together again with a windlass arrangement, forcing the water out, and thus giving the boat reserve buoyancy.

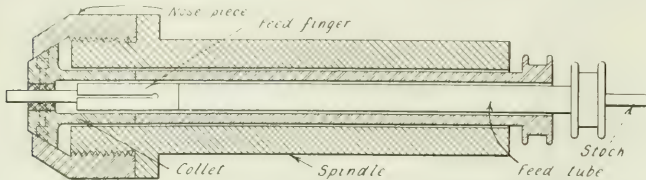


FIG. 1. SECTION OF SPINDLE SHOWING COLLET AND TUBE.

insertion of jaws which reduce the bore at the working point; aside from this, each size and shape of bar requires a collet and feed finger—always the pair together.

If these parts are to be made in the shop, they should be carefully made and hardened. A crooked hole in either piece will result in trouble in feeding the stock. Poorly tempered parts will be an endless source of trouble and delay. After turning in the lathe, both collet and feed finger have to be split as shown in the drawing. The collet should be sawed to make a three-pronged or four-pronged end and the finger the same, though the latter will work just as well if it is divided by a single saw cut as shown.

The same size hole is put in both collet and shell, but the hardening is so done that their final size differs. The feed finger is sprung together and wired so while being hardened, the idea being to so give that spring tension on the jaws that grips the stock. The collet, on the contrary, is wedged apart and wired so, and is then hardened, leaving the working hole so much oversize that the bar of stock passes very freely through it. The outside tapered part of the collet and the inside that works on the bar should be almost glass hard—the rest a spring temper. The working surface of the nose

cannot be fed up, and is always wasted.

Mention has been made of the hardened nose piece. Because it and the collet are hard and smooth, they are "slippery" and the collet opens readily. Anything that interferes with this condition is detrimental to free action—a little rust formed over Sunday has been the cause of the chuck not opening properly, and much time was spent in going over a machine in otherwise perfect shape until this was discovered as the only trouble.

TURBINE SPEEDS AND APPLICATIONS

By T. J.

IN the earlier stages of its development the steam turbine was considered in many quarters to hold great possibilities, not so much from high expectations of thermal efficiency, as by reason of an assumption that it must prove an ideal prime mover for coupling to electric generators in power stations and propeller shafts in steamships. But mechanical arrangements seldom work out in practice along the line of the ideally simple and direct; and the speed of the large turbine units now in use has proved to be too high to permit of the satisfactory direct coupling of turbines either to propeller shafts or to generators.

Turbine speeds can, of course, be reduced by increasing the size of the motor, but only at the price of greater weight, higher initial cost and reduced efficiency; and consequently the present trend in both electrical and marine engineering is all in the direction of introducing some form of reduction gear between the turbine and the propeller shaft or generator.

The difficulty confronting the marine engineer is that the most efficient speed for a screw propeller is only about a quarter or a fifth of the most efficient speed of a steam turbine, and if he decides upon reduction gear his choice is between helical gearing, electric reduction drive and hydraulic reduction drive. The power station engineer is up against the fact that a direct-current generator running at 2,500 or 3,000 rev. per min. is

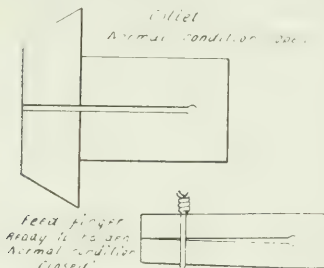


FIG. 2. NORMAL CONDITIONS OF COLLET AND FEED FINGER.

piece must also be very hard. Properly hardened and smooth these two pieces slide with practically no friction and the spring of the collet is sufficient to open

FOUNDRY PRACTICE AND EQUIPMENT

Practical Articles for Canadian Foundrymen and Pattern Makers, and News of Foundrymen's and Allied Associations. Contributions Invited.

REFLECTIONS FROM THE FETTLING SHOP OF A STEEL FOUNDRY*

By John Watson.**

IT is important at the outset to note that I am speaking from the standpoint of a jobbing steel foundry using open-hearth acid steel, for although first principles remain the same in jobbing as in repetition shops, cause and effect vary. For instance, we all recognize that one of the factors in foundry efficiency is a regular daily cast of a certain tonnage of castings. In a repetition shop this is a comparatively easy matter, as charges can be made up easily and small melting units are usually employed. In a jobbing shop the run of work may involve a variety of test specifications with their corresponding variety of analyses, and often it is a matter of great difficulty to assemble a daily cast to take the output of the large furnaces working in a jobbing foundry using acid open-hearth steel. This is a point on which close collaboration between the selling and manufacturing sides can greatly help the foundry efficiency.

Fettling Shop in Cinderella Role

The fettling shop in the Cinderella to its more favored sister, the moulding shop, and its open face is the mirror that reflects all the blemishes of that sister's vaunted superiority. I once heard a fettler say that if it wasn't for fettlers half the moulders would be out of a job. He did not mean the ordinary dresser, but the super-dresser, who, in Sheffield, is paid 18 cents per hour, plus extras, and is known by the euphonious name of the "knocker-up." This particular gentleman, coupled with the electric welder, is a standing monument to the inefficiency of the moulding shop.

Most of you will have heard of Euclid's famous axiom, "A straight line is the shortest distance between two points." Now in a steel foundry we have two such points—the order book and the loading bank—and the efficiency of our foundry depends on how near we can approximate to that straight line between these two points; but as we are not crows we have to modify our axiom by the consideration that the shortest distance may be round a corner, and to keep that curve efficient we must always keep before us the factor of continuity of direction—there must be no doubling back over the first track. Just as in our argument a straight line may be a curve, so a curve may be a straight line, and the application of the straight line curve is, in my opinion, the basis of success in manufacturing.

Value of Production Curves

It is surprising that the plotting of

curves, and the correct solution of their meaning, is not more studied by managers than it is. I know of nothing more illuminating. Take, for instance, the curve of daily production plotted out, say, in tons delivered for each day worked; if you plot such a simple curve you will most probably get something like Fig. 1. Here is a curve showing the fluctuation of daily output, and the problem is to find out why the curve looks like a contour of the Himalaya Mountains, and how it can be made a straight line showing an equal daily distribution of output, as shown by the line A.

Suppose we have a fettling shop designed to finish and deliver 55 tons per week, then on an evenly-balanced output we should deliver 10 tons per day for five days, and five tons on Saturday, and our theoretical full efficiency line will be the

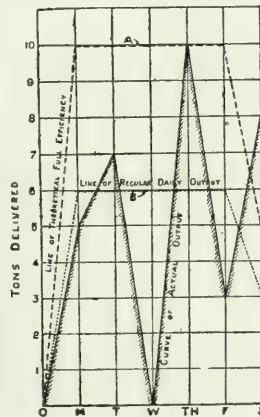


FIG. 1.

line A. Our actual deliveries, however, are:—Monday, 5 tons; Tuesday, 7 tons; Wednesday, 0 tons; Thursday, 10 tons; Friday, 3 tons; Saturday, 8 tons. We get, on plotting, the shaded line or curve of actual output.

The manager's first problem is to reduce this irregular line to the line B showing regular daily output, and his next to make the line B coincide with the line A; that is what is meant by "push and go" in a steel foundry. An excellent education lies before the man who has never tried to solve this problem.

Let us see how in the solution of this simple curve we can utilize another not quite so simple, but vastly more illuminating. Let us try to find out what is happening between two points on our curve, say, during Tuesday's working hours, by plotting down a curve of the human effort expended in that day's production. In other words, we take the

straight line M.T. and diagnose it. You will find great difficulty in plotting this curve, but assuming that we have succeeded, in our dotal work jobbing foundry, it will appear like Fig. 2. Here is plotted down the curve of daily effort expended by a hand fettler scaling an annealed steel casting. We will assume that his maximum effort is at the rate of 8 sq. ft. per hour, then his theoretical line will be the line A. His actual effort, however, only produces the shaded lines shown on each period, and this curve is worth studying.

Factors in the Varying Daily Output

Let us follow it from 6 o'clock and trace its teaching. The straight line A is the theoretical full efficiency. It is a winner's morning, and the worker moves sluggishly; he is cold and most probably

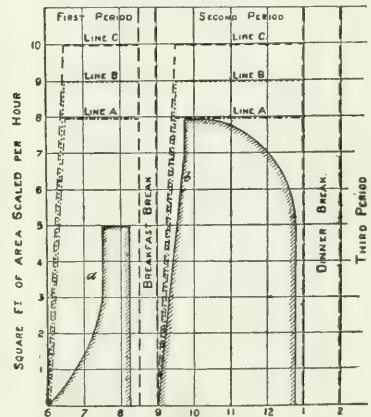


FIG. 2.

hungry, and his effort curve crawls slowly up to the point *a* about 7.30, when a sharp rise takes place in a few minutes. You will find that at this point the foreman has emerged from the warmth of his cabin, and the solace of his morning pipe and paper, and work goes on steadily with a straight curve to, say, 8.15, when the foreman goes back to his warm cabin and our curve drops sharply to the base line as our worker wanders off to warm his tea can. Then the breakfast break intervenes, and now see the change. The man is fed, he is warm with his hot tea and a smoke in front of the furnace, and his efficiency curve rises sharply to its maximum at about 9.45 a.m., and continues for an hour or so while he is feeling the benefit of his meal. His curve then droops, and again sharply drops when he wanders off to look for his dinner basket. The afternoon curve is a reproduction of the after-

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

**Steel Foundry Manager, Cammell, Laird & Co., Sheffield.

breakfast curve, except that it droops earlier and faster as the operator tires. The point *b* where there is a short, sharp rise about 9.45 o'clock, marks the manager's advent in the shop.

It needs no very hard thinking to read the lesson of this curve. The section No. 1 is absolutely inefficient and wants cutting out, so that our 6 o'clock start is damned to commence with. I consider it a relic of barbarism, and is, I believe, at the root of a great deal of bad timekeeping. In the man's most efficient stage covered by sections 2 and 3 of the curve, there is only one break in a period of 7½ hours. This curve then shows that a one-break day, allowing the operator to start warm and well fed and to finish without exhaustion, is the correct system.

If we are to give practical effect to a lot of the loose talk that goes on about educating the operators, then the question of physical exhaustion due to early starting and long hours must be considered. You cannot get good results from a tired body. I have taken it out, and I find the average hours worked apart from overtime are not more than 49 per week, so that you are really working a very badly balanced 48-hour week, and by readjusting the distribution of that time on the one-break system you must, in my opinion, get more efficient working.

It is often remarked that men lose very little time when they are on night shift because they are paid more money. I do not agree with that reason. I believe that it is mostly due to the fact that a man's household have time to prepare a decent hot meal for him and get him away in good time for his night's work. I find that men work on the night shift not from a love of it, but because it enables them to average up their wages which are low on the day shift through the often intolerable conditions of our six o'clock start. The great majority of men who lose time on the day shift are not slackers.

We have seen that efficiency rises when the foreman gets going—we have seen that efficiency rises when the manager gets going—and from this we reflect that the highest efficiency will be obtained by making this working period common to all who have anything to do with the business, i.e., manager, clerks and operators should start at the same time.

Efficiency Curve for Managers and Foremen

Before I pass from this curve I would suggest that it would make a bit of useful education to any foreman or manager to plot out this curve of his own efficiency. If he has the usual amount of self-conceit prevalent in foundries, he will get his curve away up above the theoretical maximum line (as shown by line C in Fig. 2). Of course, as the manager or foreman is supposed to be on top of his job, his theoretical efficiency line will be above the operator's line, as shown by line B. Now, if he is an honest thinker he will quickly recognize that the super-height of his curve is the mea-

sure of his amount of swelled head, and when he examines the same period of time on the production curve he will most likely find a V-shaped depression as we have on the first curve at W—the rut that the moulder is in. This curve of swelled head is one of the contributory causes to the rut. Erode the peak, and the rut will begin to fill up. By efficiency I mean a high rate of production of good quality castings, at a relatively low cost rate, from a body of well-paid, contented operators and staff.

Proper Sequence of Operations

I mentioned that we must always keep before us the factor of continuity of direction. How rarely one finds this in a jobbing steel foundry. There is rarely any idea of a proper sequence of operations. The furnace is often in the wrong place, drying stoves in the wrong place, making it incumbent on the travelling cranes to be continually shifting moulds backwards and forwards. If the furnace is at one end of the shop and the drying stoves at the other, you

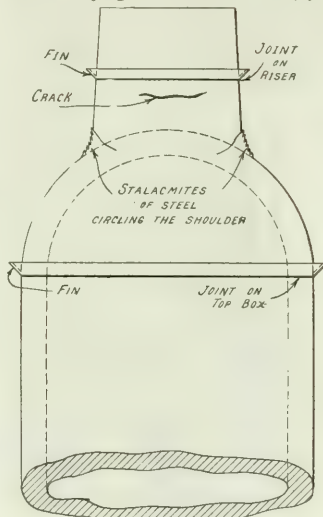


FIG. 3.

close and set the moulds at the stove end, the steel has to travel over the moulding area to the pit, and the moulders for an hour, say, are left craveness. That interferes with output.

Let us look at the sequence of operations in the foundry:—Moulding, core-making, drying, closing, casting, knocking out, sand blasting, riser removal, annealing, fettling, testing, finishing, loading. I have left out pattern-making, for in jobbing-shops most of the patterns are sent in and the pattern-maker's chief business is to keep the moulder right (if he can), in his closing. With the exception of hand moulding, core making and melting, the whole business is purely mechanical, and the speed of production largely depends on the balance of output from each operation, the perfection of the means of transit from one operation to another,

and the efficacy of the machinery for performing each operation.

What a misnomer the term moulding shop often is in the jobbing foundry. How often one finds it a conglomeration of moulding area, box park, knocking-out shop, fettling shop, scrap-heap, and goodness knows what. The moulding shop should be a place to mould in; the dirty work should be done in other shops fitted for the purpose. Then a bit more of the valleys in the first curve will be found filling up.

There is no secret in a steel foundry; there is plenty of delusion, and the whole question of "quantity" resolves itself into an engineering problem of the application of the straight line. It is, however, when we come to consider quality in a steel foundry that we are confronted with the real problem. Quality is that condition in a casting that enables it to pass through all the successive stages from the casting pit to the loading bank with a minimum of trouble and cost and strengthens the salesman's hand by making the buyer (like Oliver Twist), ask for more.

Factors in Quality Output

Quality depends primarily on two factors:—1—The foreman moulder; 2—the molten steel. I put the steel last, because, in my experience, it is the least important of the two. The instructions given to the operating moulder by the foreman, such as the position to place the runner, the right way to mould the job, the position and size of risers, the use or abuse of core irons, and the putting on of brackets in 99 cases out of a 100 determine whether the job will be good or not, and it is in these points that the weak spot in our steel foundries lies. The great majority of foremen moulders are not properly trained.

It is a most melancholy reflection that such a fine body of men should be handicapped by what is a serious defect in our shop training. I mean that education of foremen to think on correct scientific lines, enabling them to rise above the "hit and miss" methods so prevalent in our shops. Employers of labor will have to face this question, and its solution starts with the apprentice moulder. A foreman must come from the operating moulders; he must go through the mill of the apprenticeship drudgery, but employers must insist that mental training proceeds with the manual training, and part of that mental training should, I think, be carried out in the works, so that lads can be taught to appreciate the co-ordination between manual effort and technical training, not as a thing apart from their daily toil, but as a powerful weapon to enable them to make that toil more productive in earning capacity for themselves, and for the man or corporation that employs them.

The excessive use of brackets, core irons and risers are, in my opinion, the distress signals of the foreman moulder. He is too often so obsessed by the fear of what the steel-maker is going to give

him that his mind is incapable of analysing his difficulties correctly. It is always good policy for a manager when the foreman tells him that last night's charge was like "bull muck" to examine the charge sheet, and get busy in the fettling shop. He won't take long to find which casting has worried the foreman. You'll usually find it by the number of brackets on it—a kind of steel hedgehog. Tell a foreman a casting is a "ship casting," and he'll go bracket mad. Tell him it's a furnace door, and you'll get a better casting with no brackets on it at all. I firmly believe that the blaming of the steel-maker for bad or cracked castings is the greatest piece of bluff ever put up in a workshop. For many years now I have never failed to get correct test results from the steel supplied, except where it has been contaminated in the mould or spoiled by mechanical action in the mould. I do not think it reasonable to suggest that 30-ton steel, giving an elongation of 30 per cent. on 2 in. and 180 deg. bend (a steel being made daily in our Sheffield foundries), is a bad steel or a steel responsible for the cracks in castings.

Critical Period of Steel Castings

Foreman moulders do not fully recognise or believe that the critical period of a steel casting is just at the point of change from the liquid to the solid state, not only because the metal is then in a pasty condition, but because the main contraction comes on that moment, and the casting will crack if the mould and cores are not sufficiently friable to allow that sudden movement to be unrestricted. This contraction is so fast that in a job cast vertically you will frequently find that part of the steel near the base of the riser has lagged behind the mass and appears as a row of small stalagmites on the cold casting. I have repeatedly found them 5-16-in. long on the top end of a cylinder whose contracting length was 4 ft.

Fig. 3 illustrates the point. A dome-ended cylinder was cast with the dome end up and the feeding riser placed as shown. The joint of the top box and the riser box are shown. In cases where no fin formed at these joints the stalagmites of steel were much in evidence, but when fin did occur through bad jointing the stalagmites were absent, and the fins were bent almost vertical, and in one case, although the fin on the riser was only $\frac{3}{4}$ in. wide by $\frac{1}{16}$ in. thick, a crack 9 in. long occurred on the riser just below the fin. Examples such as this show the speed of contraction, and the danger of cracking through even a very slight resistance to contraction at the critical point of solidification.

You can always tell whether a foreman grasps this question of contraction by watching if he slackens a job after it is cast. All slackening should be done when the mould and cores are being made and dried, and with the exception of easing round a riser the casting should not be disturbed until it is cold enough to lift, and I want to see fore-

man moulders so trained that, without a thought to the steel, they can produce a sound steel casting by scientific moulding methods.

A great deal has been talked about the excellence of German steel castings. I have examined every German casting I could get hold of, and I have not found one made of better steel than we are daily supplied with in our Sheffield foundries, but I believe I am right in saying their methods of moulding were superior. I have seen a German 12-ton ship casting, and it had been made with only eight brackets on it. I have seen a similar British casting made of better steel with 200 brackets on it, and the German casting was the more saleable article—"it had quality." My experience forces me to the conclusion that method of manufacture in the moulding shop and not the steel is the main factor in securing quality in steel castings.



FOUNDRYMEN'S CONVENTION AND EXHIBITION

THE success of the exhibition of foundry supplies and equipment, machine tools and accessories, to be held in Boston, Mass., during the week of September 24, concurrently with the annual conventions of the American Foundrymen's Association and American Institute of Metals, is already assured, since nearly 150 manufacturers have made reservation of 45,000 square feet of floor space, an amount well in excess of that occupied at Cleveland a year ago. Judging from the convention programme scope as regards subjects to be discussed, it is quite apparent that the development of foundry practice along right lines continues to expand and grow in importance. Program details follow:—

A. F. A. Programme, Monday, Sept. 24
10 a.m.—Registration, Mechanics' Building.

1 p.m.—Opening of Exhibition, Mechanics' Building.

3 p.m.—Joint opening session, American Foundrymen's Association and American Institute of Metals, Paul Revere Hall, Mechanics' Building.

Address of welcome, by Hon. James M. Curley, Mayor of the City of Boston.

Response to the address of welcome, by R. A. Bull, Duquesne Steel Foundry Co., Corcoran, Pa.

Annual address by J. P. Pero, Missouri Malleable Iron Co., East St. Louis, Ill., president, American Foundrymen's Association.

Annual address by James L. Jones, Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa., president American Institute of Metals.

Report of Executive Board of the American Foundrymen's Association.

Report of the Secretary-Treasurer of the American Foundrymen's Association, by A. O. Backert, Cleveland.

"Fire Prevention in Large Industrial Establishments," by C. Johnson, Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa.

Appointment of Nominating Committee and Committee on Resolutions.

Tuesday, Sept. 25, 10 a.m.—Paul Revere Hall

"The Foundry from the Viewpoint of the Sales Engineer," by H. R. Atwater, Osborne Mfg. Co., Cleveland.

"The Relationship of the Engineering Department to the Pattern Shop and Foundry," by F. J. McGrail, Struthers-Wells Co., Warren, Pa.

"How Character Analysis Solves the Men Problem," by William Judson Kirby, Employment Specialist, Cleveland.

Report of A. F. A. Committee Advisory to the U. S. Bureau of Standards, by Richard Moldenke, Chairman, Watchung, N.J.

"Efficiency in the Foundry," by James A. Fitzgerald, Reno, Pa.

"Co-operative Shop Training," by W. B. Hunter, Fitchburg, High School, Fitchburg, Mass.

1.30 p.m.—Boat ride in and about Boston Harbor. Luncheon will be served on board.

Wednesday, Sept. 26, 10 a.m., Paul Revere Hall

"Improving the Relationship Between Employer and Employee," by J. F. Kent, American Cast Iron Pipe Co., Birmingham, Ala.

Report of A. F. A. Committee on Safety, Sanitation and Fire Prevention, by Victor T. Noonan, Chairman, Industrial Commission of Ohio, Columbus, O.

Report of A. F. A. Committee on Foundry costs, by B. D. Fuller, Chairman, Westinghouse Electric and Mfg. Co., Cleveland.

Report of A. F. A. representatives on the Conference Board on Training of Apprentices, by Frank M. Leavitt, Chairman, University of Illinois, Chicago.

"The Labor Situation as Relating to Co-operation Between the Employer and Employee," by G. B. MacLwain, Babson's Statistical Organization, Wellesley, Mass.

"Micro-Metallography for the Foundry," by Robert J. Anderson, Cleveland Metal Products Co., Cleveland.

Report of nominating committee and election of directors.

Malleable Session, 10 a.m., Mechanics' Building

"The Theory of the Modern Waste-Heat Boiler and Possible Application of Such Boilers to the Malleable Melting Furnace," by A. D. Pratt, The Babcock & Wilcox Co., New York.

"Application of Waste-Heat Boilers to the Malleable Melting Furnace," by C. D. Townsend, Danville Malleable Iron Co., Danville, Ill.

"Application of Pulverized Coal to the Air Furnace," by W. R. Bean, Naugatuck Malleable Iron Works, Naugatuck, Conn.

"The Application of Pulverized Coal to Malleable Melting Furnaces," by Joseph Harrington, Advisory Engineer, Chicago.

"How Malleable Iron Has Improved," by Enrique Touceda, Consulting Engineer, Albany, N.Y.

"Troubles Encountered in Machining Malleable Iron: Causes and Remedies," by A. T. Jeffery, Dayton Malleable Iron Co., Dayton, O.

"Comparative Carbon Losses in Malleable Iron Annealing by Muffle and Pot Oven Methods," by Joseph B. Deisher," The T. H. Symington Co., Rochester, N. Y.

"The Effect of Iron Oxide in Moulding Sand," by W. R. Bean, Naugatuck Malleable Iron Works, Naugatuck, Conn.

3 p.m.—Baseball game, Fenway Park, Boston and Cleveland American League Teams.

8.15 p.m.—Theatre party.

Thursday, Sept. 27, 10 a.m., Paul Revere Hall—Gray Iron Session

"Note on Fine Molding Sands," by C. P. Karr, Associated Physicist, U.S. Bureau of Standards, Washington, D.C.

Report of A. F. A. Committee on General Specifications for Gray Iron Castings," by W. P. Putnam, Chairman, Detroit Testing Laboratory, Detroit.

"Briquetting Foundry Borings," by A. L. Stillman, General Briquetting Co., New York.

"Cast Iron Shells in Permanent Molds," by Edgar Allen Custer, Consulting Engineer, Philadelphia, Pa.

"The Seasoning of Gray Iron Castings," by L. M. Sherwin, Brown & Sharpe Mfg. Co., Providence, R.I.

"Factors in the Economical Production of Small Cores in Large Quantities," by R. E. Kennedy, University of Illinois, Urbana, Ill.

"Modern Centrifugal Cupola Blowers," by J. W. Shugg, General Electric Co., Schenectady, N.Y.

"The Effect of High Sulphur in Gray Iron Castings," by T. Mauland, International Harvester Co., Chicago.

Steel Session, 10 a.m., Mechanics' Building

"Molding and Casting Large Slag Pots," by C. J. McMahon, Illinois Steel Co., Chicago.

"A description of a Small Open-Hearth Furnace," by David McLain, McLain's Systems, Milwaukee.

"Small Steel Castings for Ordnance Purposes," by Major C. M. Wesson, Watertown Arsenal, Watertown, Mass.

"A New System of Burning Crude Oil," by W. A. Janssen, Chairman, Davenport, Iowa.

"The Use of Vanadium in Steel Castings," by J. Lloyd Uhler, Union Steel Castings Co., Pittsburgh.

Report of A. F. A. Committee on Steel Foundry Standards, by W. A. Janssen, Chairman, Davenport, Iowa.

12.00 noon—Luncheon for the ladies followed by an automobile trip.

12.30 p.m.—Visit to the West Lynn Plant of the General Electric Co. Luncheon will be served at the works.

7.00 p.m.—Annual banquet, Copley-Plaza Hotel.

Friday, Sept. 28, 10 a.m., Paul Revere Hall

"Solution of Foundry Transportation and Conveying Problems," by Robert E. Newcomb, Deane Works, Worthington Pump and Machinery Co., Holyoke, Mass.

"Sand-Blasting in the Foundry," by H.

L. Wadsworth, Sand Mixing Machine Co., Cleveland.

"Results of Tests in Blending and Mixing Sand by Means of Mullers," by R. F. Harrington, Hunt-Spiller Mfg. Co., Worcester, Mass.

"Factors Contributing to the Economical Use of Grinding Wheels in the Foundry," by Wallace T. Montague, Norton Co., Worcester, Mass.

"Refractory Materials Employed in the Metallurgical Industries," by H. C. Arnold, University of Illinois, Urbana, Ill.

Steel Session 10 a.m., Mechanics' Bldg.
"Electric Furnace Design," by John A. Crowley, John A. Crowley Co., Detroit.

"Recent Developments in the Application of the Electric Furnace to the Melting Problem," by Douglas Walker, Booth-Hall Co., Chicago.

"Comparison of Electric Furnace and Steel Converter for the Manufacture of Small Steel Castings," by C. R. Messenger, Sivyer Steel Casting Co., Milwaukee.

"The Electric Furnace From the Central Station Standpoint," by E. L. Crosby, Detroit Edison Co., Detroit.

"The Electric Furnace in the Iron and Steel Foundry," by Max Trembour, Metallurgical Engineer, Ludlum Steel Co., Watervelt, N.Y.

Plant visitation.

Program American Institute of Metals
Monday, Sept. 24

10 a.m. — Registration, Mechanics' Building.

3 p.m.—Joint opening session American Foundrymen's Association and American Institute of Metals, Paul Revere Hall, Mechanics' Building.

Tuesday, Sept. 25

9.30 a.m.—Hotel Somerset. Melting and Casting Nonferrous Metals.

"Raw Materials Used for Crucibles," by Prof. A. V. Bleininger, Bureau of Standards, Washington, D.C.

"Melting Yellow Brass in New Form of Induction Furnace," by G. H. Clamer, Ajax Metal Co., Philadelphia.

"Casting Bearings in Sand and Metal Molds," by R. R. Clarke, Pennsylvania Lines West of Pittsburgh, Pittsburgh.

"Negative Experiments on Waste Core Sand," by Dr. H. W. Gillett, Bureau of Mines, Ithaca, N.Y.

"The Crucible Situation," by M. McNaughton, Jos. Dixon Crucible Co., Jersey City, N.J.

"The Electric Furnace, and Nonferrous Metals," by Dwight D. Miller, The Society for Electric Development, New York City.

"My Experience with Metal Melting Furnaces," by W. H. Parry, National Meter Co., Brooklyn, N.Y.

"The Briquetting of Nonferrous Light Metal Scrap," by A. L. Stillman, General Briquetting Co., New York City.

1.30 p.m.—Boat ride in and about Boston Harbor. Luncheon will be served on board.

Wednesday, Sept. 26, 9.30 a.m., Hotel Somerset—Uses of Nonferrous Metals for Munitions, Etc.

"The Present Status of Tin Fusible Plug Manufacture and Properties," by Dr. George K. Burgess, Bureau of Standards, Washington, D.C.

"Stellite," by Elwood Haynes, Haynes Stellite Works, Kokomo, Ind.

"The Use of Die Castings in Munitions," by Chas. Pack, Doehler Die Casting Co., Brooklyn, N.Y.

"Shrapnel Bullets," by Harold J. Roast, The Jas. Robertson Co., Ltd., Montreal, P.Q.

"A Few Points on Alloy Patents," by Wm. J. Rich, Patent Office, Washington, D.C.

Address by a representative of the United States Tariff Commission.

"The Use of Bronzes in Railroad Turntables and Movable Bridges," by O. E. Selby, Big Four Railroad, Cincinnati.

"Recent Industrial Uses of Aluminum," by F. G. Shull, Aluminum Co. of America, Boston.

"The Consumption of Copper and Its Varied Uses," by H. D. Hawks, United Metals Selling Co., New York City.

3 p.m.—Baseball game, Fenway Park, Boston and Cleveland American League teams.

8.15 p.m.—Theatre party.

Thursday, Sept. 27, 9.30 a.m., Hotel Somerset—Testing of Nonferrous Metals.

"Comparative Tests on Test Bars and Actual Castings," by W. M. Corse, Titanium Bronze Co., Niagara Falls, N.Y.

"Analysis of Babbitts and Brasses," by E. W. Hagmaier, Buffalo.

"Standard Test Bars of 88-10-2 and 88-8-4, Being the Result of Co-operative Work of Six Foundries; a new series of Tests," by C. P. Karr, Bureau of Standards, Washington, D.C.

"The Expansion of Co-efficients of Alpha and Beta Brass," and "The Corrosion of Manganese Bronze Under Stress," by Dr. Paul D. Merica, Bureau of Standards, Washington, D.C.

"Corrosion of Brasses of the Muntz Metal type," by H. S. Rawdon, Bureau of Standards, Washington, D.C.

Address by Richard C. MacLaurin, President, League to Enforce Peace.

"The School End of the Job in Training Foundrymen," by Dean C. B. Connelley, Carnegie Institute of Technology, Pittsburgh.

"The Flux and Cleaner Question of Brass," by E. D. Frohman, S. Obermayer Co., Pittsburgh.

"Pyrometers—Their Construction and Application," by John P. Goheen, Brown Instrument Co., Philadelphia.

"Electrically-heated Core Ovens," by Dr. C. F. Hirschfeld, Edison Illuminating Co., Detroit.

"Brass Rolling Mill Alloys," by Roy A. Wood, Cheshire, Conn.

12 m.—Luncheon for the ladies, followed by an automobile sight-seeing tour.

12.30 p.m.—Visit to the West Lynn plant of the General Electric Co. Luncheon will be served at the works.

7 p.m.—Annual banquet, Copley-Plaza Hotel.

Friday, Sept. 28, 9.30 a.m., Hotel Somerset—Metallurgy and Metallography

"The Electrolytic Production of Antimony," by Prof. D. J. Demorest, Ohio State University, Columbus.

"The Electrical Properties of Some High Resistance Alloys," by Prof. M. A.

Hunter, Rensselaer Polytechnic Institute, and F. M. Sebast, Troy, N.Y.

"The Amorphous Theory in Metals," by Zay Jeffries, Aluminum Castings Co., Cleveland.

"The Volatility of Zinc and Cadmium," by John Johnston and Edward Schramm, American Zinc, Lead and Smelting Co., St. Louis.

"Surface Tension and Deoxidizing of Metals," by W. J. Knox, Metals Deoxidizing and Refining Co., New York City.

"Antimony—Its Metallurgy and Uses," by K. C. Li, Wah Chang Mining and Smelting Co., Inc., New York City.

"Development and Reabsorption of the Beta Constituent in Alloys Which Are Normally of the Alpha Type," by Prof. C. H. Mathewson, Department of Mining and Metallurgy, Yale University, and Philip Davidson, New Haven, Conn.

"The Swelling of Zinc Base Die Castings," by H. M. Williams, National Cash Register Co., Dayton, O.
Plant visitation.

IS THERE A SUBSTITUTE FOR IRON FOR PERMANENT MOULDS?

IT IS generally acknowledged that the labor costs on sand and other moulds run up the prices of castings to what is often nearly a prohibitive figure, and for this reason iron moulds are used for many things which have to be made in large numbers, and while these iron moulds are good up to a certain point, they still leave much to be desired. For instance, they are not in any way porous, and for this reason gases can only escape at points specially arranged instead of from any part of the casting (by absorption) as in sand moulds. This renders special care in dealing with the metal in very many cases, while in some instances it is not safe to attempt casting in iron moulds. Naturally, iron moulds in suitable cases prove economical, but in such instances as they are unsuitable they are merely a waste. What is wanted is a refractory material which can be made up into porous moulds having a capacity of holding up to 100 or more castings without alteration, and which can be recovered for re-manufacture into moulds. Costs being a very important item, and the total expenditure having to be less than that of sand moulding, probably the matter is one that offers many difficulties, but such that probably could be overcome with patience and practical experimental work. For instance, grained emery or corundum would probably stand the wear incidental to casting; but could they be cemented in such a way as to remain porous, and be capable of being broken down and remain in good condition for making other moulds; and could this be done in a way that could be used in ordinary foundry practice? If this or a similar material could be adapted for the work, and show a saving of, say, 10 per cent. reduction in the cost of actual moulding, there would be from 15 per cent. to 20 per cent. savings to be made in the melting and pouring of the metal, the saving in time in deal-

ing with the moulds after they are made being an important item. There is a good opening for inventiveness in the direction pointed out.—The "Practical Engineer."

PROFITABLE DISPOSAL OF METAL CUTTINGS

By D. Street.

METAL chips, in the shape of borings, turnings and planing scrap, often amount to 10 per cent. of the total production of the machine shops, and it is not altogether an easy matter to dispose of this waste material to advantage. It is apparent that the most economical way to deal with it is to use it in place of other materials in furnace mixing, but here there is a difficulty in charging a furnace with loose chips. The forced draught blows a large proportion away, and a further big percentage is subjected to violent combustion and goes at once into slag as ferric oxide. When loose chips are charged into a furnace it is safe to say that at least one-half of the total weight is wasted and the large amount of viscid slag that is produced seriously interferes with the efficient working of the furnace.

Proposed Methods

Some years ago it was suggested that the metal chips might be packed in wooden or cast metal cases before they were added to the furnace mixture, but, taking everything into consideration, this method is far from economical. Another method which was advocated was that the chips should be exposed in large volume to the atmosphere, so that they might rust into a solid form; but here again the method in practice is expensive. The proposal to feed the chips into the furnace with a low power blast has also been found to work unsatisfactorily. Some engineers have added binding material to the chips and pressed the mixture into bricks, but in almost every case it has been found that the binder disintegrated the moment it was exposed to heat and the briquettes simply broke into free metal dust. There was not only a great loss, due to oxidation under the action of the binder, but the furnace loss had also to be taken into account.

For many years past German engineers have done their utmost to develop the use of low-grade ore and waste metal in their country. They have been the largest users of waste steel plate, and the problem of utilizing metal chipings to the best advantage was tackled some little time ago with almost complete success.

Present Practice

In all German metal workshops the chips are saved and sheltered as far as possible from atmospheric influence. If the shop has not the necessary facilities for dealing with the chips itself, storage of them is made until a sufficient quantity has accumulated to justify despatching them to works which can deal with them efficiently. The method adopted is to load the metal scrap into a press and subject it to a very high pressure. The chips are thus compressed into briquette form without the aid of

any binding material. The blocks can be loaded into the furnaces and practically no loss results through burning or through particles being blown away, and these blocks are used as a substitute for expensive grades of pig iron in the production of high-grade cast metal.

In steel foundries it has been pointed out that these briquettes might serve as a substitute for the low phosphorous white iron that is now in such demand. In fact, they can be economically used in any place where steel scrap is used, whether it be in the foundry or the steel mill, as briquettes of steel or wrought iron are a good charging material.

Chips from hard rolls, projectiles, and the like, may be mixed with grey iron chips, so as to make a uniform charging material. Chips from copper, brass, bronze and white metal have also been pressed into briquettes, and a considerable saving in cost has been effected. This is due to the fact that the cost of pressing the chips is much less than the value of the savings that are effected in other ways, such as in the oxidation of the metal in remelting, the easier methods employed in handling the chips and the less space that is required in which to store them.

BLOW AND GAS-HOLES IN IRON CASTINGS

By L. E.

IT sometimes happens in places where really good iron and coke are used in cupola melting, that holes under the skin of the castings cause trouble, and it may very well happen that the cause cannot be found by analysis of the metal and fuel. At the same time, it usually happens that the furnace man complains that his furnace burns away at points opposite the tuyeres, while the machine-men grumble at the hardness of the metal, the whole thing appears somewhat incomprehensible on account of the good quality of the material used. In reality the fault is caused by the air blast being too high in pressure and too low in volume, there not being sufficient oxygen supplied to melt the iron rapidly by the high rate of combustion of the fuel. So long as the air pressure is enough to enable the whole of the fuel to get its supply of oxygen it is ample, but the quantity of air supplied must also be ample, and in all cases at least $6\frac{1}{2}$ lbs. of air—roughly, $85\frac{1}{2}$ cubic feet of air—is needed for each pound of coke used in the cupola if the best results are to be secured. To get this air the propeller, whether called a fan or blower, must be of sufficient size, there must be as nearly a straight passage for the air from the propeller to cupola, and this passage must be free from angles and sharp bends, and, last of all, the tuyeres must be of sufficient area.

The main air passage from the propeller apparatus should be larger than the exit orifice of the fan or propeller, owing to the friction of the walls considerably reducing its effective area, and the shorter the distance from the propeller to the cupola, the more efficient will be the work done.

EDITORIAL CORRESPONDENCE

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

SWEDISH IRON AND STEEL INDUSTRY

FROM time immemorial mining and the manufacture of iron have been industries of very great importance. The principal reason for this is that Sweden possesses one of the greatest supplies of iron-ore in Europe. According to a valuation of the supplies of iron-ore of the world at present known, which was published at the International Geological Congress of 1910, Germany's supply was reckoned at 3,607 million tons of iron-ore, France 3,300 million tons, and England 1,300 million tons, while the Swedish deposits of iron-ore are calculated at 1,150 million tons. It must also be observed that Swedish iron-ore is unusually rich. According to the above-mentioned extensive international investigation it is calculated that the whole world possesses 1,300 million tons of iron-ore which has 60% or more of iron; of this quantity Sweden owns no less than 1,035 million tons. The Swedish iron-ore supplies are found in two separate districts, one in the midlands, north and west of Lake Malar, and another in the far north of Sweden, a little beyond the Polar circle.

Increased Production

According to figures published by "Swedish Export," the total annual production of iron-ore in Sweden first exceeded one million tons during the period 1891-95 when the average annual output was 1,519,325 tons, rising in 1912 to 6,699,226 tons, the increase being very marked from 1910 on. In the year 1911 the whole world produced 136 million tons of iron ore, Sweden, with 6,150,718 tons occupying seventh position. Since 1871, Sweden and the United States have increased their production of ore almost ten-fold, Great Britain remaining almost stationary in this respect until recently.

The great bulk of the ore is exported, Germany taking by far the greater portion, followed by Britain, Belgium, France, and America in the order named. The chief reason for such exportation is the fact that Sweden lacks a natural supply of fuel.

High Quality Ore

As regards the quality of Swedish iron-ore it has been shown that no other country possesses a similar supply of ore with such a high percentage of iron; besides which the greater part of the ore mined in the midlands is unusually free from phosphor and sulphur, and consequently is an excellent material for the production of steel of the highest quality. Statistics show that the average quality of ore from the midlands contains 0.005—0.020% phosphor and 0.007—0.050% sulphur. During recent

years the Swedish iron manufacture has obtained a further addition of ore free from phosphor and sulphur since the magnetic concentration of low grade ores has become more general, and as a consequence the production of briquettes. The development of the manufacture of concentrates and briquettes is shown by the following figures:

Year	Concentrates,		Briquettes,	
	Tons		Tons	
1906	131,407	78,205		
1907	178,567	88,532		
1908	296,400	193,216		
1909	225,933	143,330		
1910	365,985	247,946		
1911	381,190	255,948		
1912	620,710	288,553		

The total quantity of concentrates, which is manufactured according to the methods invented by Mr. Grondal, a Swedish engineer, has a percentage of iron of 50—70, and the percentage of phosphor only exceptionally exceeds 0.010%, although the raw ore which is refined has in certain cases contained more than 1% of phosphor. With the object of making the concentrates in piece-form and at the same time reducing its percentage of sulphur it is briquetted according to the Grondal method by heating up to 1,200—1,400 degrees C. without the addition of any binding substance, whereby the concentrate is softened by the heat and becomes a coherent mass. The briquettes thus obtained seldom have a percentage of sulphur of more than 0.010%. In 1912 the Swedish iron-ore mines employed 10,500 workmen and the value of the iron-ore produced was 49.6 million Kr.

Manufacture of Iron and Steel

The Swedish iron industry is of very ancient origin. According to the authority already quoted, as early as prehistoric times iron was manufactured in Sweden from hydrated ores, collected at the bottom of the lakes and marshes. The smelting was done by means of holes made in the ground and with the aid of wood as fuel. These holes were lined with slabs of stone. The inhabitants soon learned how to use the rich metals found in the ore, and small iron-works began to appear near the water-courses. Our ancient documents bear witness of a considerable mining industry. In a deed of exchange dated 1288 Stora Kopparberget is already mentioned and a deed of sale concerning certain interests in the Norberg mining fields bears the date 1303. In 1347 Stora Kopparbergs Bergslag obtained their first royal privileges. Several of our steel works still in existence were founded in the sixteenth and seventeenth centuries. An abundant supply of rich and pure ores, wealth of charcoal and more than sufficient water-power soon enabled Sweden to play an important part in

the international iron market, and at the commencement of the eighteenth century Sweden was the country that produced the largest annual supply of pig-iron. At that time, however, several metallurgical inventions were made which very greatly neutralized the aforementioned advantages regarding the natural supplies upon which Sweden based her pre-eminence as an iron-manufacturing country. In the year 1730 cokes replaced charcoal as fuel for blast-furnaces in England, and very soon afterwards manufacturers learned how to eliminate phosphor from highly phosphoric pig-iron by means of puddling. Thus as soon as the discovery of the extraction of iron suitable for ordinary purposes from low quality ores with the aid of coal was made, the extent of the manufacture of iron in England, Germany and France soon exceeded that of Sweden.

Charcoal Versus Coke

The supply of very high quality ores and first class fuel in the form of charcoal has enabled Sweden to maintain her prominent position as the producer of the finest quality of steel in the world. As regards the manufacture of Swedish pig-iron it is, as has already been mentioned, chiefly based upon ores containing a minimum of phosphor, and charcoal as fuel. The supply of ore free from phosphorus can nowadays, especially through the introduction of Grondal's method, be said to be unlimited and the price of pig-iron is determined in the first place by the price of charcoal. Since, however, the waste wood obtained from the forests and saw-mills is becoming more and more used for the manufacture of cellulose, the supply of charcoal is being reduced and consequently its price has risen. The charcoal question is therefore of the greatest importance to the iron industry, and the most energetic efforts are being made to reduce the price of charcoal on the one side and to spare its consumption in the blast furnaces on the other. The coaling of the waste wood in furnaces instead of producing charcoal in heaps may be mentioned as an effort in the former direction. Charcoal heaps produce less coal than furnaces, besides which furnaces enable one to collect the by-products of tar, methylated spirits, wood-vinegar, etc.

On the other hand, as has already been mentioned, efforts are being made to reduce the consumption of charcoal at the iron works. Previous to the year 1900 all steel, even the simplest implements for home use, was produced from charcoal pig-iron whereas nowadays coke is beginning to be used as fuel at iron-works that manufacture steel for the Swedish market only. Thus in the

year 1912, 86,000 tons of coke pig-iron were manufactured.

Electrical Developments

The most important step taken for the reduction of the consumption of charcoal dates, however, from the year 1910 when the electric blast-furnace, invented by three Swedes, Messrs. Lindblad, Stalhane, and Gronwall, was technically worked out at the expense of "Jarnkontoret", (The Institute for the advancement of the Swedish Iron Industry) so that it was then possible to introduce it into several Swedish iron-works. In this furnace only so much charcoal is consumed as is necessary for the reduction of the ore, while all the heat essential for smelting is supplied by electric power. About 1.3 h.p. is used per ton of pig-iron with an electrode consumption of 3 kg.

The consumption of charcoal at Swedish iron-works has, owing to the aforementioned measures, been constant during the last few years, while the manufacture of pig-iron has rapidly increased. The pig-iron, which is of the highest quality guaranteed to contain a maximum percentage of 0.020 phosphorus and 0.010 sulphur, is used as raw material for tool-steel and especially for war-material (armor-plate, guns, etc.). Of the export of 1912 103,348 tons were shipped to England, 41,818 tons to Germany and 20,698 tons to France. Smaller quantities were exported to The United States of America, Italy, and Japan. As charcoal pig-iron of such an excellent quality cannot be produced in any other country, Sweden enjoys a certain monopoly of this special branch of the iron market.

Production of Wrought Iron and Steel

In Sweden, as in other countries, the production of wrought iron has for ages only been carried on in hearths with charcoal as fuel. The metal was prepared according to old German and Belgian principles after a system which is still to be found in Dannemora, where the world-renowned so-called Walloon iron, the purest wrought iron in the world, is manufactured. But at the commencement of the nineteenth century a new kind of blooming was introduced into Sweden from England, called the Lancashire hearth process, which compared with the Walloon process was characterized by a considerable reduction in the consumption of charcoal. These two processes are still used in Sweden for the production of large quantities of wrought iron known for its toughness, malleableness, and, in general, for its unusual low percentage of phosphorus and sulphur. This wrought iron is chiefly sold for export, partly in the form of blooms, and partly in the form of rolled or forged bars. The highest qualities are used in England and Germany as raw material for the production of finest tool-steels.

KEROSENE AS MOTOR FUEL

By C. T.

IT is evident that the day is not far distant when kerosene will be as com-

monly used in engines of motor cars and tractors as gasoline is at present. The search for another substitute than that of some petroleum product has been an utter failure. It began with the high price of gasoline some four years ago, and has been continued ever since. Various suggestions have been made and numerous times it has been reported that a substitute had been found which would furnish cars with a cheap fuel and drive gasoline out of business. It will be remembered that English inventors were sure a few years ago that they could substitute benzol for the American article, but they never carried the demonstration beyond a few cars, because the article was too scarce and too costly. An American inventor drove cars round the race track in Indianapolis for several weeks with a fluid that could be produced at the small cost of a few cents a gallon. It was a failure in the end. Last year a Long Island chemist had a green fluid, which, added to water produced at any pump or creek, promised relief from high-priced gasoline. He drove cars with it, or with something, and even deceived several noted inventors. The green fluid suddenly disappeared from public prints, and the auto owners waited for some other inspired article.

Meanwhile inventors turned their attention to the use of the cheaper kerosene as a substitute. Engines have since then been run on kerosenes with the introduction of small amounts of water in the cylinders. This has been practically demonstrated in a factory in Allegany County, New York, and two years ago a car crossed the Continent with no other motive power than kerosene. A few months ago a car was taken from Warren, Pa., to New York over heavy roads and through bad weather, and with no other fluid than was obtained from the kerosene stores along the route. The facts prove the possibility of the use of the heavier article for autocars and other engines.

It is now recognized that only slight changes are needed in the carburetter to make the use of kerosene as common as that of gasoline. This is also proved by the fact that much of the gasoline now used in the same specific gravity as the lighter grades of kerosene of the past years. The gravity of gasoline has been gradually lowered to meet the demand for more motive power for automobiles, aeroplanes and motor boats, and the engines built at present handle it freely. Necessity has brought this about, and with the awakened interest in the heavier article the demand will be met.

MARINE DIESEL ENGINE PROBLEMS

THAT some departure of a radical nature in type or arrangement of marine diesel engines is necessary if maximum powers are to be profitably increased above the present figures is the opinion of a writer in The Engineer.

Success is one of those human qualities to which it is rarely possible to assign an absolute value, and in engineering progress one might almost say that

there are no such things as failure and success, but only stepping stones. When, therefore, we speak of the relative failure of the marine Diesel engine, it will be understood that the phrase "relative success" would be almost as appropriate. We have to look at the matter from the point of view of how much was expected from the Diesel type in the past; how few, comparatively speaking, of those expectations have been realized, and try and imagine what progress is to be expected in the future.

We can recall the time when the Diesel engine first came to be talked about; when it was anticipated by some that its progress would be so rapid as to leave no room for any other type. And truly, if the overwhelming superiority in fuel economy had not been attended by corresponding disadvantages, there was no reason why these high expectations should not have been realized. It took about a decade for the land type Diesel to get through the period of its infantile troubles, and this type naturally had to be perfected before attention could be turned to the marine type. We do not propose now to enter upon the history of the marine Diesel engine—the various "stepping stones" in the development of the type have been from time to time described and illustrated in our pages—but rapidly casting our mind's eye over the experience gained in the last ten years, we are forced to the conclusion that the progress has been in the direction of perfection of detail and increase of reliability, rather than in any big advance in the sphere of its application.

Two Types Only

Broadly speaking, the marine Diesel is limited to two types—the high speed, which has its main application in submarines, and the low speed, which has been successfully applied to the ocean tramp. Of the former type it would be inadvisable to speak at length, but the limitations of the size of the high-speed Diesel were pointed out in a paper read by Lieut.-Commander Anstey at the Institution of Naval Architects eight years ago, and experience since has confirmed the conclusions arrived at in that paper. Speed of revolution, on which low weight per horsepower mainly depends, cannot be maintained as the size of the cylinder is increased, with the result that bigger powered units must be heavier, or else the increase of power must be obtained by the multiplication of cylinders.

In the type which has been developed for the tramp, weight is not a primary consideration, and here the limiting condition has been the size of cylinder. We have heard of experiments being made with very large cylinders of the order of 1,000 horsepower, but so far the results have been maintained in reserve. We are not handling an ordinary engineering problem when we come to deal with Diesel engine cylinders of, say, 50-inch diameter, which may be exposed to a pressure of anything up to 900 pounds or 1,000 pounds per square inch.

The problem is more one for a gun designer than a marine engineer, and one begins to wonder whether the game is worth the candle. If we arrived at such dimensions, it is fairly obvious that the weight of the installation would probably exceed that of a steam set of equal power. Not that that would be a great consideration if counterbalancing gains could be proved, but experience has shown that the larger the unit the less the balance of advantage of the Diesel engine over steam, and there must be some point at which the credit balance disappears entirely.

Nature of Present Limitations

An argument with some who have not studied the question is that improvements are daily being made, and will still further be made, which will make further progress possible. The answer is, of course, that it is not a question of making improvements; it is that we are up against mechanical principles and laws which cannot be altered. In all questions of engineering progress similar conditions may arise. Take, for example, the question of obtaining a high speed in a vessel of a given size. Imagine that we had got to the point of progress in the design of the hulls represented, say, by an old-type, 30-knot destroyer, but imagine at the same time that our steam machinery was at the stage represented by the compound engine at 90 pounds pressure, and that the lightest form of boiler known was the locomotive type. Imagine such machinery installed in our boat, and we might probably reach 20 knots. We trace our steam machinery through its subsequent development, changing it from time to time in accordance with the improvements, but keeping the boat the same. Through all these changes we will suppose we have had an ideal in view, to obtain, say 33 knots. We arrive eventually at the highest power we can possibly cram into the boat, and we find we can just reach 30 knots, and it has been the last two knots which have taken all the trouble to get. Probably, by making supreme sacrifices in weight, we could even get another knot, but is it worth it? The time has now come when it is necessary to abandon an unpractical though possible solution, and to find a way round it. We have imagined the hull unchanged through all this previous development; now we turn our attention to it and we find that, by lengthening the ship and increasing the displacement, we can practically begin in speed where we left off in the old type. The curve of horsepower and speed which was getting so steep as to be almost vertical at the top has, under the newer conditions, a reasonable slope, and shows us that we can still get an increase of speed with a reasonable addition of horse-power. This question of the relation of speed of vessel and power required to produce it, is a parable of a large number of problems of engineering progress. Development begins on certain lines and proceeds satisfactorily up to a certain point; beyond

that progress becomes increasingly difficult, until at last the advance made is not commensurate with the expenditure of energy required.

The Diesel Situation

Some such situation has now arrived with the marine Diesel engine. Engines up to 250 horsepower per cylinder, and up to eight cylinders on one shaft, are now fairly common. The difficulties increase progressively as we pass the 250-horsepower mark, and at some point—we hesitate to give an exact figure—it will not be worth while to attempt more power per cylinder. The system then breaks down unless a larger number of cylinders is accepted, and shipowners and engineers will be reluctant to accept this solution, the former on account of cost and space, and the latter on account of complication. The problem of complication is one that has to be got round if further advance is to be made. Now, it is well to fix in our minds what we mean by complication. Multiplication of parts does not in itself constitute complication. The steam turbine, for example, has an enormously larger number of parts than a reciprocating engine, considering each blade as a separate part. It is when those parts are dependent upon one another, or form working "pairs" liable to get out of adjustment, that the objection arises to their multiplication. If it were possible to simplify valves and their gears, which are the principal sources of trouble and anxiety, we could go on multiplying small cylinders almost indefinitely to obtain the desired power. In any case, some break from the reciprocating type is necessary if we are to see high speed, or even moderate speed, vessels propelled by internal combustion engines.

PAINTING STEEL CEILINGS

By O. C.

THE manufacturers of steel ceilings prepare the sheets with a gloss as follows: After the sheets are stamped, they are dipped in a thin liquid, composed of a little zinc white and varnish, thinned down with benzine. Not enough zinc white is added to make the finish opaque, though this is hardly material, since the finish is applied by a painter, who would much prefer a different prime coat, one quite dead or flat; a coat of two of this will make a finish. If the steel sheet has not been primed or coated in the factory, it is for the painter to cleanse it of grease and dirt with benzine, or with some alkaline solution. When dry, there should be a coat of raw or boiled oil given, adding a little drier to the raw oil. While the makers of steel ceilings who prime the sheets use a primer with a pigment base, zinc as a rule, it is yet true that the best primer is the simple pure oil, raw or boiled. After priming with the oil, and after it has become dry, any desired paint may be applied; although a gloss paint is given preference, many prefer a soft rather flattish effect.

Galvanized iron should not be painted until it has stood to the weather for a year or so, or before it has been treated

with a liquid to cut the so-called grease or galvanizing. In many instances galvanized work looks well enough without paint, and in such cases it is a waste of time and money to apply paint to it. But when the finish demands the painting of the galvanized work it may be prepared with this formula: Take 2 ozs. each of copper chloride, copper nitrate, and sal ammoniac, all to be dissolved in one gallon of soft water, preferably. Then add 2 ozs. of muriatic acid. Mix in a wooden vessel and apply with a broad bristle brush one coat. When dry, it may be painted.

GRAVITY vs. FORCE-FEED LUBRICATION

By R. Wood.

IN A recent issue of an American engineering journal, a correspondent recommends the old style gravity feed lubricator in preference to the oil pump. The writer presumes he refers to the automatic oil pumps which are stated to be wasteful.

Considerable experience with modern automatic force feed lubricators has shown them the exact opposite of wasteful and in my opinion they possess many points of superiority over the gravity lubricator. Some of these points are as follows:—

It is desired to introduce a quantity of oil prior to starting a unit, all the operator has to do is to give the ratchet wheel a few turns by the handle placed on the wheel for this purpose.

The oil chamber can be filled and refilled while the unit to which it is attached is in operation and while the pump itself is in operation. If a small piece of sediment finds its way into the oil passage it can be forced out by giving the ratchet wheel a few quick turns.

When the unit is started the pump starts feeding. When the unit stops the oil flow stops; there are no valves to open or close, no water to be drawn from the oil chamber.

The pump can be set to feed one drop a second or one drop a minute, that is, any speed of flow desired by the operator, and to regulate this flow all that is required is a turn or two on a regulating screw. This screw is the only thing the operator has to move. It requires about the same amount of work to install an automatic oil pump as it does to connect up a gravity automatic lubricator.

A messenger from the stores which held a Government contract hailed a vessel in dock at Liverpool.

"What do you want?" growled the surly mate.

"Got some vegetables for the ship," was the reply.

"All right. You needn't come aboard. Throw them up one at a time," said the mate, as he stood ready to receive the vegetables.

"Ahoj there, look out!" shouted the lad as he threw a small dried pea towards the mate. "I've got a hundred-weight of these!"

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

UNIVERSAL MILLING MACHINE
THE accompanying illustration shows a universal milling machine which is a recent addition to the line of milling machines built by the Ford-Smith Machine Co., Hamilton, Ont.

The capacity of the machine is 25 in. by 8 in. by 17 in. Longitudinal, cross and vertical power feeds are provided, all feeds being direct gear-driven from the back of the machine. Special attention has been given to the convenient arrangement of feed levers within easy reach of the operator.

Circular movement of the table extends through 50 degs. to either side, which enables all operations to be performed as are usually undertaken in milling machines. Every care is exercised during manufacture to insure accuracy in all vital features, while ample rigidity and strength are insured through the adoption of liberal proportions throughout.



MOTOR-DRIVEN WIRE POINTERS

FOR those wire-drawing shops which prefer individual motor drive, the Morgan Construction Company of Worcester, Mass., has arranged to supply its wire-pointing rolls with Westinghouse motors mounted on the frame. This makes the unit very compact, since there is no external apparatus and no overhead connections. It is also easy to start and stop by means of the conveniently located starting-box handle.

The wire-pointer consists simply of a

pair of rolls revolving so as to feed material toward the operator. There are a number of grooves to care for various sizes of wire. The cross-section of these

duction motor of 3 h.p., 1,700 r.p.m. It is made by the Westinghouse Electric & Mfg. Company of East Pittsburgh, Pa.

MOTOR-DRIVEN BULL FRAME

FOR drawing wire of sizes from 7/16 in. to 1 in. diameter, the two-block horizontal spindle bull frame shown in the accompanying illustration is made by the Morgan Construction Company of Worcester, Mass. It will handle square, hexagonal, and round sections, with pull at the die of from 10,000 lbs. to 20,000

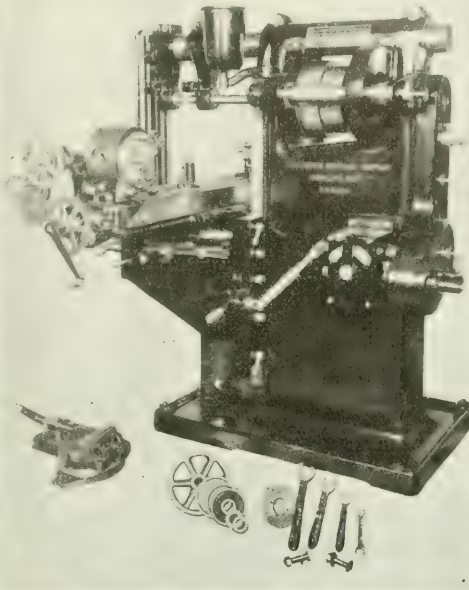
A special feature of this line of machines is a winding block so arranged that, while the pull is always close to the main bearing, the coiled wire moves out to the end of the block in a regular helix without bunching or crowding. In addition to the safety afforded by quick stopping characteristic of individual drive, a friction clutch is contained in each block, which instantly disengages the block from the mechanism. Thus by the movement of the clutch lever, the drawing may be stopped at any time regardless of the strain on the block.

This machine, which is intended for heavy work at high speeds, is equipped with a 150 h.p. type CS induction motor

made by the Westinghouse Electric & Mfg. Company at East Pittsburgh, Pa. Other sizes are driven by motors down to 50 h.p.



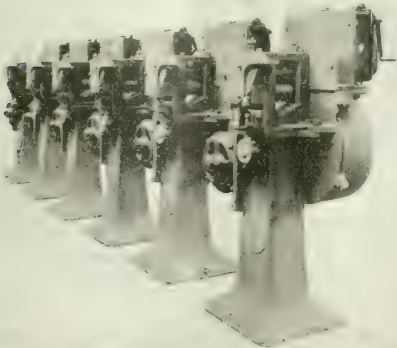
Fundamental principles are the foundation of an engineering education. Surprising what costly structures some men build on flimsy foundations.



25 x 8 x 17 IN. UNIVERSAL MILLING MACHINE.

grooves diminishes around the circumference, so that the end of a wire placed in the open part of a groove is pushed back by the rolls and reduced into a tapering end. This pointed end is then threaded through the die in which the wire is to be drawn down.

The motor illustrated is a type CS in-



MOTOR-DRIVEN POINTERS FOR WIRE-DRAWING SHOPS.



MOTOR-DRIVEN WIRE-DRAWING BULL FRAME.

SHELL HANDLING EQUIPMENT AT A BRITISH NATIONAL FACTORY
 THE text and illustrations refer to a plant for handling heavy shells, the equipment specially featured being supplied to an important national shell

three-phase current supplied at 440 volts, the periodicity being 25 cycles per second. The hoisting and travelling motions are transmitted by ordinary spur gearing, and are fitted with the usual magnetic brakes. For the slewing mo-

verted channel irons and fitted with slings, and designed to carry eleven 12-in. shells.

A gripper for lifting the unformed billets is illustrated in Figs. 5 and 6, whilst another type, intended for lifting heavy shells from the floor and turning them into a vertical position, is represented in Figs. 9 and 10. This consists of two heavy crossheads fitted with levers, which give a very powerful grip on the shell. The gripping parts are pivoted on the ends of the levers, thus allowing the shell to swing into the vertical position. The grips are lined with ferodo, to reduce the liability to slip.

An apparatus designed to lift from the floor four finished shells is illustrated in Figs. 7 and 8. The prongs are shaped to pass between an adjoining pair of shells, each of which is thus supported by two prongs. For lifting the billets after forging, the apparatus illustrated in Figs. 11 and 12 is employed. Its method of use is obvious. A similar system is used for handling shells at other stages of manufacture, as shown in Figs. 13 and 14. The tongs illustrated in Figs. 15 and 16 are suitable for lifting short shells up to 8 in. in diameter, whilst for larger shells the double tongs represented in Figs. 17 and 18 are employed.—*Engineering.*

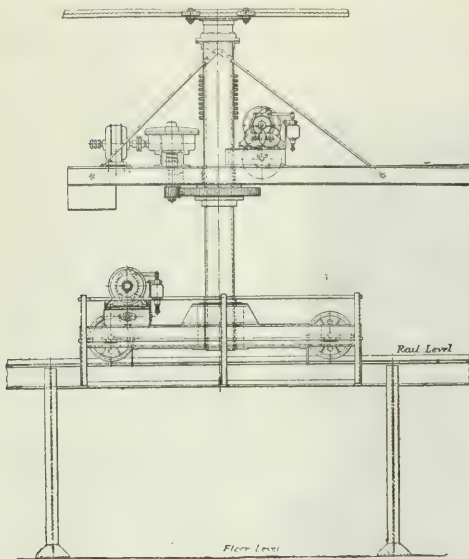


FIG. 1.

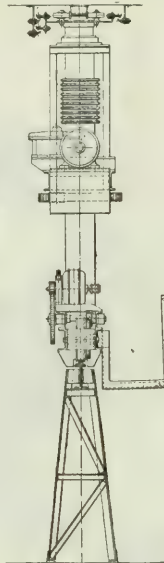


FIG. 2.

factory by Messrs. Babcock & Wilcox, London, E.C. The machine shop, to which the figures refer, consists of two bays, each about 50 ft. wide and 400 ft. long. In each bay there are two rows of machines and two sets of gantries, carrying the travelling cranes by which the shells and billets are lifted and transported. These cranes are of the so-called single-rail type, the whole of the weight being, as shown in Fig. 1 and 2, transmitted to a single rail riveted to the I-beam which forms the top bar of the gantry. Tipping over is prevented by two pairs of rollers at the top of the crane post which abut against one side or the other of a rolled joist secured to the roof of the shop. The whole arrangement is clearly shown in Fig. 2. The top of the gantry is about 7 ft. above floor-level, and the space underneath is utilized for storing shells and blanks. Each crane has a jib of 10 ft. 6 in. radius, which is sufficient to extend to the centre of each line of machines served, and the cranes pass between the driving shafting and pulleys. The maximum load they are designed to lift is 1,680 pounds.

As will be seen from Fig. 1 and 2, the cranes are electrically driven, separate and independent motors being provided for the three operations of lifting, slewing and travelling. The controls are arranged so as to be operated from the attendant's platform shown to the right in Fig. 2. The motors are of the slipping type, designed to operate with

tion, worm reduction gearing is used, the worm running in an oil bath and a slipping clutch fitted to take up any shock due to sudden starting or stopping.

In view of the special character of the

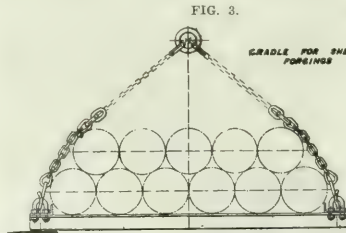


FIG. 3.



FIG. 4.

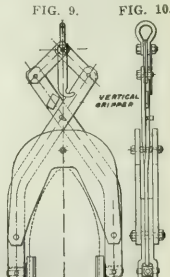


FIG. 9.

FIG. 10.

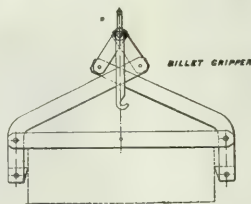


FIG. 5.



FIG. 6.

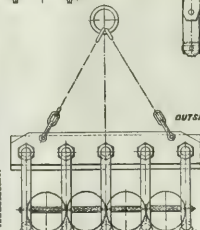


FIG. 7.

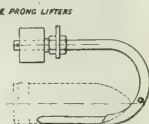


FIG. 8.

materials to be handled, various lifting tackle mechanisms have been designed and installed. In Fig. 3 and 4, there is illustrated a cradle built up of in-

branch of industry, but are more striking in metallurgy and engineering. Scientific processes are now in constant use in place of empirical methods which

hitherto were held in honor. The smallest factory now owns a testing machine, generally a Brinell machine. No steel bar is now taken for the manufacture of a piece of some importance without

and Hoskin pyrometers. Representatives, Messrs. Freeman and Cunningham.

Canadian Ice Machine Co., Toronto.—Full line of refrigerating machinery and supplies. Representatives, C. H. Bower, C. E. Allison, C. M. Kirby, H. Diemler.
Carter Welding Co., Toronto.—Complete exhibit

FIG. 11.

FIG. 12.

FIG. 13.

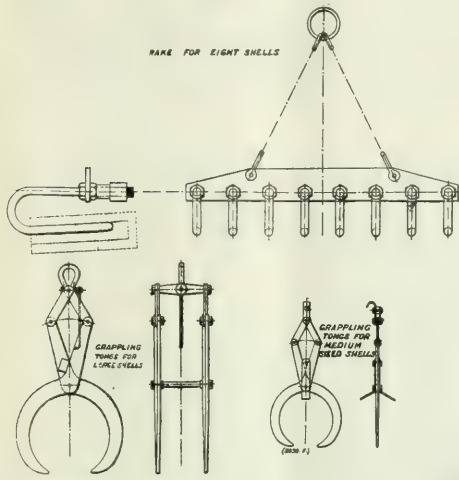


FIG. 15.

FIG. 16.

FIG. 17.

FIG. 18.

FIG. 14.

being submitted first to a Brinell test. The same applies to the heat treatment of steel, and every operative who has charge of quenching and annealing now carries out the work with the aid of an optical or a thermo-electrical pyrometer.

of Davis-Bournville oxy-acetylene welding and cutting apparatus and machines, emergency outfits and supplies. Demonstrations of equipment in use. Representatives, H. W. Carter, P. Sorley, C. Steadman.

Chapman Double Ball Bearing Co., Toronto.—Transmission equipment, ball bearings and transfer trucks. Representatives, W. J. Murray, W. C. J. Hockin.

Cleveland Pneumatic Tool Co., Toronto.—In addition to display of Cleveland apparatus, hammers, drills, grinders, riveters, couplings, etc., show pneumatically operated wood-boring machinery for shippyard use. Representatives, C. D. Garner, H. F. Olrich, K. R. Friedley, Geo. W. Hall.

Eastman Baler Co., Hamilton.—Waste paper baling machine. Representatives, H. Robinson, Melville Moore.

Geo. W. Cole Co., Toronto.—Steam specialties, including Cole boiler feeders, heaters, etc. Representative, Geo. W. Cole.

Cowan & Co., Galt, Ont.—Selected types of modern wood-working machinery. Representatives, W. Cowan, S. F. Barrows, W. C. Clark.

Canadian Automatic Wrench Co., Toronto.—Pipe wrenches, etc.

Consumers' Gas Co., Toronto.—Display of gas-fired furnaces and industrial equipment of all kinds.

Canadian S K F Co., Ltd.—Ball bearing transmission equipment, with demonstration line shaft in operation, showing self-aligning features of product. Representatives, Gordon Janes, Toronto, and A. G. Norris, transmission expert from Hartford, U.S.A., factory.

Dominion Belting Co., Hamilton, Ont.—Display of stitched cotton duck belting, Maple Leaf brand, for power transmission and conveyor equipment. Belt dressing and accessories. Representative, J. S. Foster.

Dodge Mfg. Co., Toronto.—Dodge wood pulleys, shaftings, bearings, hangers, and other transmission equipment. Representatives, T. F. Gary, J. F. Haas.

Elliot Wood Worker, Toronto.—Elliot combination woodworker, floor sander, scroll saw and shaper. Representatives, W. A. Elliot, Frank Elliot.

Deloro Smelting and Refining Co., Toronto.—Exhibit Stellite cutting tools and Champion tool holders, expanding mandrils, vices and shop equipment. Representatives, H. Southworth, W. Kitts and J. Z. Welis, of Western Tool & Mfg. Co., Springfield.

Foster, W. L., Toronto.—Carbonic system of oxy-acetylene lighting. Representatives, A. E. Haich, M. V. O'Neill.

Garlock-Walker Machinery Co., Toronto.—Special lantern slide display of machine tool manufacture: 18 in. by 8 ft. Garlock-Walker lathe, Herburn single bar shell boring lathe, Leisy-Patron screw machine, Racine hack saw. For pneumatic tools, and Falls feeding attachment for

buff planers. Machinery in operation. Representatives, W. Garlock, Jr., A. E. Walker.

Gravage Mfg. Co., Toronto.—Boiler cleaner, cutting compounds, belt dressings and engine room supplies. Representatives, W. J. Sanderson, John Morris.

Goodyear Tire & Rubber Co., Toronto.—Heavy duty belting for power transmission and conveyor purposes, extra service air hose, packing and similar supplies. Representatives, W. H. C. Crossby, R. F. Fox.

Hutchinson Woodworking and Contracting Co., Toronto.—Hutchinson woodworker in operation. Representative, A. D. Matthew.

Jones & Moore Electric Co., Toronto.—Electric motors and generators.

McLaren, D. K., Ltd., Montreal.—Leather, balata and canvas belting for transmission and conveyor purposes, woolen and knitting mill supplies. Representative, W. S. Hamilton.

Main Belting Co. of Canada.—Leviathan and Anaconda belting for transmission, conveyor and elevator work. Representatives, S. R. Walsh, B. Vogel.

Morrison, J. L., Toronto.—Bookbinders' and paper machinery. Representatives, D. Brown, W. Duncan, C. Leake.

Positive Clutch & Pulley Works, Aurora, Ont.—Power transmission equipment. Representatives, R. A. Fraser, Norman Beard, W. Crawford.

Pratt & Whitney Co., Toronto.—Display of Canadian-made fine tools, cutters, taps, shell tools and gauges. Representatives, J. Ferguson, J. T. Crowley, H. C. Thomas.

Shell-Bar, Boico Supply, Ltd., Toronto.—Boiler grates, gaskets, packing and engine room supplies. Representative, Mr. Downes.

Small Bros., Smith's Falls, Ont.—Evaporators and supplies for the maple sugar industry. Representative, Len Edmonds.

Phillips, V. O., & Sons.—Measuring pumps, feed crushers.

Toledo Scale Co., Toledo.—Scales.

United Shoe Machinery Co., Toronto.—Shoe machinery in operation.

Williams Machinery Co., A. R., Toronto.—Machine tools and shop equipment are displayed on a wide scale. Stationary and marine gasoline engines are also exhibited, while a special demonstration of Stellite tools is made on LeBlond lathes. Representatives, W. Branscombe, W. Hunter, E. Cronk.

MACHINERY HALL EXHIBITS AT CANADIAN NATIONAL EXHIBITION, 1917.

INDUSTRIAL tendencies are noticeably evident in the character of the exhibits displayed. Established manufacturers and dealers in machine tools are ably represented, while the development of efficiency and scientific equipment, as represented by anti-friction devices, heat treating apparatus, and small tools is well sustained by the displays arranged by the exhibitors in these lines. More detailed descriptions of outstanding exhibits will appear in due course.

L'Air Liquide Society, Toronto.—Exhibit of liquid air, transformer casing of welded sheet steel construction, oxy-acetylene welding apparatus and welded gas containers. Representative, A. M. McDougall.

Boiler Repair & Grate Bar Co., Toronto.—Firebrick linings and furnace equipment. Representatives, C. W. Andrews, A. H. Hetts.

Baines & Peckover, Toronto.—Display of high-speed steel, crucible, vanadium and cold rolled steel. Exhibit of concrete reinforcing material in course of application, and Feralun non-slipping stair treads. Representatives, C. R. Peckover, W. M. David, J. A. Steven, D. J. McSweeney, W. Goodwill, W. Miller.

Canada Machinery Corporation, Galt, Ont.—Comprehensive exhibit of machine tools and wood-working machines: 16-in. tool-room lathe, 18 in. and 32 in. by 12 ft. gapped lathe, 26 in. new type shaper, 42 in. revolving bed, 9 drum sander, No. 611 straight-edging and jointing machine, No. 110 planer and matcher, No. 604 single end tenoning machine, No. 617 variety saw bench, No. 636 double mitre saw. Representatives, D. King, P. D. Burton, W. J. Irving, M. Preston, M. Blain.

Canadian Hoskins Co., Walkerville, Ont.—Special exhibit of Chromel heat-resisting castings; standard lines of electric, gas and oil furnaces.

Mrs. Exe.—Do you mind when your husband brings a friend home to dinner?

Mrs. Wye.—No: what I mind is having a friend bring him home after dinner.

The temperance reformer was justly proud of having converted the biggest drunkard in the little town of P—, and induced him—he was the local grave-digger—to get on the platform and testify. This is how he did it: "My friends," he said, "I never thocht to stand upon this platform with the Provoost on one side of me and Toon Clerk on th' ither side of me. I never thocht to tell ye that for a whole month I havena touched a drop of anything. I've saved enough to buy me a braw oak cofin wi' brass handles and brass nails, an' if I'm a teetotaller for another month, I shall be wantin' it."

A Scotchman born and bred, Sir Henry Oliver, the new Deputy-Chief of the recently reorganized Admiralty, has a rare fund of Scotch stories.

One of the best concerns a certain beadle whose duty it was to show visitors over the remains of an old abbey, "somewhere beyond the Tweed."

On one occasion he had performed this service for a lady who, on leaving him at the churchyard gate, rewarded him only with barren thanks.

Whereupon the canny Scot remarked:

"Weel, my leddy, when ye gang hame, if ye fin' out that ye have lost your purse, ye maun recollect that ye hav'na had it oot here."

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. AUGUST 30, 1917 No. 9

RESTORING THE WORLD'S SHIPPING

IT has been said that we will win the war if we can successfully combat the submarine menace, but the latter, to all appearance, will only be accomplished by concentration on merchant shipbuilding. Without doubt a fair percentage of enemy submarines have been destroyed, trapped and captured, but these when assessed at their proper value are little more than incidentals in the whole big struggle for ultimate supremacy. The weekly report of vessel sinkings indicates only too clearly to which side the mass of the victims belong, and bears witness to the fact that nothing of worth-while effect has been devised, or at least is yet operative, that will deal the death-blow to the undersea boat activity.

Among men who have been watching the shipping situation closely, there is a disposition to believe that we are not keeping pace with Germany's submarine construction and equipment development as we ought, particularly in the arming of our merchantmen. The steadiness or even lowering of the weekly sinking record is not in their estimation the real criterion; rather is it the apparent paucity in number of vessels that successfully resist submarine attack. It is believed that the power of offensive of Germany's U-boats has been materially increased as regards their gun equipment over that of our armed merchantmen; in consequence, not a little concern is evident lest the destruction waged by these pirate craft become immediately or in the early future still more intensified.

There is to-day less disposition to talk of shipbuilding achievement than there was a few months ago, it having been realized in the interval that suiting action to words is less easy than at first sight appears. It is estimated that the Allies began this year with 20,000,000 gross tons of merchant shipping. Britain's losses for the period elapsed are believed to be at the rate of 5,000,000 tons per annum, against which the total of 2,000,000 tons for the last completed year of the world's shipbuilding makes a rather unfavorable comparison, and seems to dispose of the possibility of the immense new construction programmes launched a while ago reaching anything like the figures aimed at.

Britain's best shipbuilding performance in pre-war days was around 2,000,000 tons per annum; nevertheless, Premier Lloyd George has promised that 4,000,000 tons will be produced this year. Again, stupendous figures of

tonnage output are being credited as likely to come from the United States. In the minds of those in close touch with the shipbuilding industry, irrespective of its nationality location, and who are able to gauge with a substantial degree of accuracy the whole situation with its myriad accessory disabilities, the opinion exists that in the coming year a deficit of 5,000,000 tons of shipping will have to be made good, and that its detail participation by the Allies will call for 2,000,000 tons from Great Britain, 1,500,000 tons from the United States, and a like total from France, Italy, and Japan combined. We consider even the foregoing a pretty tall order, and shall look forward expectantly to its fulfillment.

It is a good idea, however, to set a figure of achievement, if same be reasonably and judiciously determined, and be made the absolute minimum. Britain's four million tons for this year is to our mind a particularly rash estimate of her shipyard capacity, aside altogether from its being war-time; yet there is no disposition to believe that, although her achievement for the period is likely to be much under the figure quoted, her safety and that of the world's civilization will be jeopardized.

The transfer of skilled, semi-skilled, and unskilled labor, from munitions making, should both stimulate and accelerate new tonnage output in Canada, besides enabling metal-working plant executives to concentrate their attention more on what gives promise of being an industry both substantial as well as permanent in character. There is reason to believe that plans are being developed for a much enlarged shipbuilding effort in Eastern Canada in the coming months, the relief from shell-making admitting now of greater freedom of action. If we choose, shipbuilding, with its accessory industries, for the next decade in this Dominion may readily surpass in proportions the munitions activity of these past thirty months or more.

MUNITIONS MAKING FURTHER RESTRICTED

CURTAILMENT of Canada's shell industry is being accepted as immediately probable, although it would perhaps be more correct to say that its further enlarged restriction has become quite imminent. Needless to say, the conditions which have operated to bring about this latest development in our metal-working plant activities are in every sense satisfactory, thereby eliminating all opportunity to cavil at the action taken by the Imperial Munitions Board.

That the initiation and development of munitions making in Canada required the display of much administrative tact and foresight, and that each was forthcoming in generous measure, few will be found to dispute; but what of the final passing of the industry? It seems to us that to a still greater degree will the executive ability of our Munitions Board be taxed if our industries generally and our metal-working plants particularly are to be spared a succession of jars and jolts, and their operators be immune from even a moderately extended period of unemployment.

It is worth while noting that the inception of our shell industry was accomplished in the most unspectacular manner, and its subsequent growth to immense proportions was also so realized. Why not let its decline be equally unspectacular, and its final passing out of the least possible moment. Judging by the procedure being adopted by the Imperial Munitions Board, and the efforts of our manufacturers to co-operate with them as regards stopping the gaps created by taking hold of other lines of product, we are constrained to believe that the absolute minimum of business dislocation will ensue as shell-making disappears; in a word, it is more than possible that there will be no dislocation at all.

INDUSTRIAL NOTABILITIES

GEORGE DUNCAN DAVIE, general manager Davie Shipbuilding & Repairing Co., Ltd., Lauzon, Levis, Quebec, was born at Levis, August 19, 1873, son of George Taylor and Mary Elizabeth (Patton) Davie. After being educated at Berthier Grammar School, Eleeb, and Quebec High School, Mr. Davie started in 1890 with Carrier, Laine & Co., shipbuilders and engineers, of Levis, Que., where he learned the business and developed into



GEORGE DUNCAN DAVIE.

mechanical and salvage engineer, ultimately occupying the position of general manager to the Quebec Salvage & Wreckage Co., Ltd. In 1913, Geo. T. Davie & Sons sold their shipbuilding and repairing plant at Lauzon to the Davie Shipbuilding & Repairing Co., Mr. Davie continuing as general manager of that firm, which position he had previously with his own firm. Mr. Davie's ability is indicated by the fact that he was the recipient, in December, 1916, of a gold watch bearing the following inscription: "Presented by the Directors of the Submarine Boat Corporation, U.S.A., as a token of appreciation for the great energy shown by him in the construction of 325 80-foot motor launches for the British Admiralty at Lauzon, Levis, Que., during 1915 and 1916.

A study of shipbuilding methods on the Clyde and also in American yards has enabled Mr. Davie to impart a high degree of efficiency to his plant and practice, he being further a member of the Naval Architects' Institute of Great Britain.

Protestant in religion, Mr. Davie's society affiliations include I.O.O.F. and Royal Arcanum. His residence is Lauzon, Levis, Quebec.

—Photo, courtesy *International Press*.

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.

Great Western, American	Per Cent. 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
P.H. and Imperial	50
Globe	50
Vulcan	50
Disston	50

COAL AND COKE.

Solvay Foundry Coke	\$13 05
Connellville Foundry Coke	14 00
Steam Lump Coal	7 25
Best Slack	6 50

Net ton f.o.b. Toronto

BOILER TUBES.

Size.	Seam-	Lap-
	less	welded
1 in.	\$33 00	37 1/2
1 1/4 in.	36 00	40
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 1/2 in.	53 00	50 00
4 in.	70 00	55 00
4 1/2 in.	82 00	67 00

Prices per 100 feet, Montreal and Toronto.

OILS AND COMPOUNDS.

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

Black oil, per gal.	15
Cylinder oil, Capital	45 1/2
Cylinder oil, Acme	36 1/2
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	2 50
Union thread cutting oil antiseptic	88
Acme cutting oil, antiseptic	37 1/2
Imperial quenching oil	39 1/2
Petroleum fuel oil	12 1/2

BELTING—NO. 1 OAK TANNED.

Extra heavy, single and double	30-50%
standard	40%
Cut leather lacing, No. 1	1 75
Leather in sides	1 60

TAPES.

Chesterman Metallic, 50 ft.	\$2 00
Lufkin Metallic, 608, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Sajid Jun. S. Steel Tape, 50 ft.	3 55
Royal Steel Tape, 50 ft.	2 75
Royal 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	13 1/2
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 PRODUCTS.

Montreal Toronto	
Bars, 1/2 to 2 in.	55 00 53 00
Copper wire, list plus 10.	
Plain sheets, 14 oz.	
1 1/2x3 in., 14x60 in.	55 00 53 50
Copper sheet, tinned.	
14x60, 14 oz.	60 00 54 25
Copper sheet, planished, 14x60 base.	64 00 60 00
Braziers', in sheets, 6x4 base	55 00 52 00

BRASS.

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

PLATING SUPPLIES.

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

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

Prices Per Lb.

LEAD SHEETS.

Sheets, 3 lbs. sq. ft.	\$18 00 \$18 00
Sheets, 3 1/2 lbs. sq. ft.	
ft.	18 00 18 00
Sheets, 4 to 6 lbs. sq. ft.	17 50 17 50
Cut sheets, 1/2 per lb. extra	
Cut sheets to size, 1c per lb. extra.	

PLATING CHEMICALS.

Acid, boracic	15
Acid, hydrofluoric	.05
Acid, hydrochloric	.05
Acid, nitric	.10
Acid, sulphuric	.06
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)	.26
Silver chloride (per oz.)	.65
Silver nitrate (per oz.)	.65
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	.06

Prices Per Lb. Unless Otherwise Stated.

The General Market Condition and Tendency

THE outstanding feature this week is the official announcement that the production of munitions will be considerably reduced. For some time past there has been a steady reduction in output, but now a further restriction is advised. Such a situation was expected and an effort will doubtless be made by the firms affected to readjust their affairs to meet the new conditions. One beneficial result will be to increase the tonnage of steel available for domestic purposes and thereby help to relieve the shortage which has prevailed for some time. On account of the embargo on steel from the United States the situation has become serious, but hopes are entertained that some way out of the difficulty will be found. The matter is at present engaging the attention of the authorities at Ottawa and Washington. Prices of steel products continue stationary, but the market has a weaker tendency and some shading of prices is possible in the near future. A pronounced recession in prices, however, is not likely in the meantime. The pig-iron market continues firm at unchanged prices. Business is quiet as consumers are holding off pending developments in the price-fixing situation. The output of coke continues limited, owing to labor shortage, and prices are still high as a result. The non-ferrous metal markets continue quiet and prices have a weaker tendency, copper and lead having declined. There is no change in the scrap metal market and prices continue stationary with a tendency to weakness. There is no change in the machine tool situation except that deliveries are getting more backward. There have been a number of advances in prices of machine shop supplies.

Montreal, Que., Aug. 27, 1917.—It is now almost a certainty that future operations in the production of

classes of munitions will shortly be curtailed in Canada, if this condition has not already developed. The recent

announcement that the manufacture of the large shells would be discontinued was expected to be followed by a similar action in connection with the smaller sizes, but it was not anticipated that this would materialize so soon. The action has been deemed advisable for two possible reasons, that of Britain being able to cope with the present requirements, and the necessity of Canadian funds to maintain the maximum activity in the new industry of shipbuilding. With the new developments will come a surplus of labor for the time being, at least, this is however, expected to be quickly taken care of by the necessities of shipbuilding.

Pig Iron

Like other markets, that of pig iron is unsettled owing to the uncertainty that dominates the situation due to the delayed announcement of the American authorities in connection with what the future war policy will be, regarding the price regulation and distribution of such materials as are now in urgent demand. It is interesting to note that after a considerable period in a stationary position, the tendency of this market is to lower levels, as indicated in the composite price of pig iron being now \$51.86 per ton, a decline of \$1 per ton on the high price of a few weeks ago. Canadian pig is very scarce and few quotations are available.

Steel

No material change is reported in the

general situation, as much uncertainty is still prevalent in all circles regarding the early future. In addition to the unsettled conditions arising out of the proposed adjustment of prices and the control of production and distribution, the market has been somewhat affected by the recent overtures for peace originating from Rome. No early negotiations are expected but the market is nevertheless influenced by these and other developments. Here in Canada the situation has taken a turn that will no doubt add to the past nervousness of the market, as it is almost certain that the production of munitions will be further curtailed, resulting eventually in placing on the market a number of men who have been employed in this industry. It is more than probable, however, that many of these will be quickly absorbed in other lines of activity, particularly that of shipbuilding and companion industries.

While the present announcement appears to indicate only a partial further reduction in the shell requirements it is at the moment uncertain to what extent this will be increased in the near future. It has been reported that the reason, or one of them, is that additional funds are necessary to finance the construction of the shipping that is and will be required. The production of small forgings has already been discontinued in some sections and this will shortly be followed by a corresponding decline in the manufacture of the finished product. This development in the steel situation will not however have much effect on price conditions as little of the present output can be changed over to other requirements. The bar and small shape market may experience some relief owing to the change, as the mills in Canada may be able to increase production on these lines.

The position in the States is becoming more acute as the demand for steel increases, but the market is still influenced by the uncertainty as to what the attitude of the Government will be in connection with the regulation of prices on the various materials. This adjustment may not be made on a basis of present production costs, as there is a possibility that some change may be made in the wages of labor before a decision is arrived at, as in some respects these are lower than living conditions warrant. The Pittsburgh quotations on billets and wire rods has been subjected to a decline of \$5 per ton, the present prices being \$80 and \$90 respectively. The base price on refined iron rods has been reduced to 4½ cents per lb., a decline on the week of \$10 per ton. In some of the American markets the quotation on iron and steel bars has been advanced approximately 50 cents per ton. All markets are generally unchanged with a steady demand. The Canadian situation is virtually the same with the exception of the shell industry which is undoubtedly declining. One local dealer is figuring on an order for 2000 tons of plates for the Imperial

Munitions Board for the construction of boilers for wooden vessels now under construction and others are contemplated. Local conditions are unchanged with prices comparatively firm.

Metals

The metal market is still affected by the political situation in the States and active buying is practically at a standstill with the exception of what may be required for immediate needs. Investigation is still proceeding into the cost of production but no definite announcement has been made as to the possible prices that will be set for the various commodities. This inaction is having the tendency to create or rather maintain an uncertainty that is reflected in a general dullness throughout the markets. Copper is quieter and also easier. Tin is in less demand and weaker. Spelter is very dull and lower. Lead is firm but with an undertone of weakness. Antimony and aluminum are both comparatively quiet and unchanged.

Copper.—Nothing has as yet developed to relieve the tension of the market and

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.

provide a basis on which the trade can resume normal activity. Many rumors are current as to what the intentions of the American Government are in connection with the setting of prices but nothing definite has been officially announced and the entire situation is one of decided uncertainty. Under these conditions consumers are taking no active interest in the market and buying is only for immediate requirements. Responding to rumors that the regulation price would be lower than previously anticipated, the American market weakened during the week, the decline being 1½ cents on lake, ¾ cent on electro and ½ cent on castings, the quotations being 28 cents, 26½ cents and 26 cents respectively. The London market is easier by £5 per ton. The local situation is featureless with quotations firm at 34 cents for lake and electro, and 33 cents for castings.

Tin.—The tin situation has been more or less affected by delayed cable reports, but the present tendency appears to be towards a weaker market. Buying is close to normal but no special activity is reported or expected until some announcement is made regarding the price that the American Govern-

ment may fix for fixture trading. The latest reports from London indicate an easier situation and New York has declined ¾ cent during the week. The local market is not active but business is steady. Prices however are easier on a decline of ½ cent per lb., the week's quotation being 61½ cents per lb.

Spelter.—The market in this metal is comparatively speaking unchanged, and no immediate prospect of improvement is looked for. The feature of the situation, which has been the influencing factor for several months, has been the total absence of export demand, and it is not thought that any material change will be noted in the situation in the States or Canada until this demand is resumed. Following the continued dullness, the situation in the New York market has developed an easier tone, a decline of ¼ cent placing the nominal quotation at 8¼ cents per lb. Dealers here report a dull market with prices easier, on a decline of ½ cent, quotations are 10½ cents per lb.

Lead.—This market is still influenced by the political situation and the delay in the action of the American Government in fixing and announcing their decision regarding the price regulations that are expected to control future business. Producers are content to await developments before further adjustment of prices as their present output is well taken care of. Under these conditions the New York market is relatively steady with prices quoted at 11 cents per pound. Independents are however, endeavoring to increase the demand and have lowered their prices ¼ cent per lb., the present quotation being 10½ cents per lb. Prices are firm locally but with an undertone of weakness.

Antimony.—No improvement has developed in this market and the absence of any marked demand has created an easier tendency which is reflected in a drop on the New York quotation of ½ cent per lb., the prices this week being 15½ cents per lb. The local market is steady and unchanged at 20 cents per lb.

Aluminum.—The demand continues steady with an undertone of weakness. The situation here is quiet with prices firm at 65 cents per lb.

Machine Tools and Supplies

The situation this week has been the quietest that the market has experienced for some time and with the exception of light inquiry for general equipment the demand is very listless. The possibility that munitions manufacture is nearing the closing stages, or at least is showing a great falling off in general production, makes it very unlikely that much additional equipment will be required for shell making purposes. What little business is passing is generally for such machinery as will be used for ship and accessory construction, and additions to repair plants. The activity in the States continues to be the feature of present situation, as every plant is working to near capacity in

meeting the requirements of the abnormal situation. No appreciable decline is noted in the demand for supplies, but it is anticipated that the near future may see a falling off in this connection. Prices continue to hold firm despite the future prospect.

Scrap

Activity in old metals has been somewhat halted by the United States embargo which has had the tendency to create easier prices but to increase the difficulty of securing material. The New York situation has experienced a set-back owing to recent developments, and the market is weaker in nearly all lines. Iron and steel scraps in the Pittsburgh district are from \$2 to \$5 lower per ton; heavy melting steel and No. 1 wrought iron being featured at the latter figure. The local situation has not yet been seriously affected by the recent developments but dealers are anxiously watching the trend of the market; with the exception of coppers, the market here is well maintained. Old coppers have declined one cent on the week, the local prices being 22 cents for light and 25 cents for crucible and heavy.

Toronto, Ont., August 28.—Although the decline in activity in the munitions industry has been obvious for some weeks the official statement recently issued has brought the matter to a climax. The fact that production has been steadily declining for some time, and that there are still some contracts to complete, will not disorganize conditions in the industry to the same extent as if the stoppage had been more sudden. Some firms have already turned their attention to other classes of work which will help to relieve the situation. Such a situation as now prevails has been anticipated and there has been time to make such preparations to meet the new conditions. It is understood that the Dominion Government is making advances at the rate of \$35,000,000 a month for munitions which will be continued until the end of the year, so the activity has not entirely ceased. An enormous sum of money has been expended in Canada in munitions. To date the Dominion Government has advanced to the Imperial Munitions Board for the purpose of munitions in Canada \$285,000,000. In addition to this the chartered banks of Canada have advanced \$100,000,000. For many months past the Government has been making advances at the rate of \$25,000,000 monthly, and during July and August this has been increased to \$35,000,000. The arrangement will be continued to the end of the year.

While strict economy in the use of coal has been advocated so that there will be less chance of a shortage this winter, there is some hope that prices will be kept within reasonable limits. The United States Government has fixed a price of \$2 a ton on soft coal at the mines, which it is hoped will be reflected in lower prices in Canada. It is understood that prices of anthracite coal have also been fixed.

The coal situation is thus improved and the outlook is brighter.

Steel

No definite progress has been made so far in regard to the adjustment of the embargo on steel from the United States. The matter has been taken up with the authorities at Ottawa, who in turn are negotiating with Washington, and it is hoped that some relief will be obtained. As the matter stands at present, a license has to be obtained from Washington for each shipment, which entails a great deal of trouble and delay, and even then a permit may not be issued. The steel merchants are in a difficult position at present, for when booking an order they never know whether they can obtain the material or not, which often results in disappointment to customers. The decline in the production of shells will likely release

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.

considerable steel for other purposes for domestic use, although no official statement has as yet been made in regard to this matter. It is possible that some shell steel will still be exported, but even if this is the case there is little doubt but that there will be a considerable increase in available tonnage for domestic purposes. The marked increase in business of a general nature during the past year has resulted in a material improvement in demand for steel. Considerable of this demand has not been filled as the steel companies have been too busy on war orders.

With the decline in the munitions orders the mills will be in a better position to look after their domestic business and a much easier situation should result. The Steel Company of Canada have already closed down their bar mill at Hamilton, which had been rolling shrapnel bars, and the Nova Scotia Steel & Coal Co., have discontinued making shrapnel forgings. The increase in tonnage now available will help to relieve the shortage in some steel products such as bars and small shapes rendered more acute by the embargo on steel from the United States. The supply

of plates, sheets and large structural shapes will, however, not be increased and semi-finished material such as billets and wire rods will still be in short supply. There have been no further developments in regard to prices and the market continues stationary. Recent developments in the trade will tend, however, to further weaken prices, although no pronounced recession is likely in the meantime. The situation is intensely interesting and it is difficult to tell what will happen with any degree of certainty. Developments at Washington are being followed closely, no official statement having as yet been issued with regard to prices of steel.

Prices of black sheets are showing a weaker tendency, although no changes have as yet been made from current quotations. The market is dull as consumers are not placing orders to any important extent as they are looking for lower prices. Nearly all the new business in the U.S. is coming from the Government, leaving comparatively little tonnage available for private consumers.

In the United States, Government buying continues to dominate the market. There is very little new demand for finished steel of any kind because of the uncertainty as to what action the authorities will take in regard to steel prices. It is generally expected that another big loss in unfilled tonnages will be shown for August owing to the tendency of consumers to hold off on their orders. An improvement in the market is expected as soon as the Government price-fixing has been settled. Prices continue to show a weak tendency, billets have again declined while steel bars and shapes are a shade lower at Pittsburgh.

Pig Iron

Locally there is no material change in the pig iron situation, although the embargo on American iron is causing considerable inconvenience and is tending to stiffen prices. There is very little domestic foundry iron available except on contracts, as the furnaces are booked up for the remainder of this year. In the States the market is quiet, but increased activity is looked for as soon as the policy of the government with regard to price fixing is determined.

Scrap

The market continues dull and prices generally are weaker in sympathy with the declining tendency of the new metals. There have been no price changes this week, although a decline in copper and brass scrap is anticipated. Cast iron scrap continues firm at unchanged prices, while steel scrap is also holding steady. The reduction in output of munitions means a falling off in supply of shell turnings which will tend to stiffen prices on this material. Consumers continue to keep out of the market in anticipation of lower prices.

Machine Tools

The reduction in munitions orders will not materially affect the machine tool trade, any more than was anticipated, as buying of this class of equipment has for some time been comparatively negli-

gible. There will be considerable second hand equipment thrown on the market, but this was expected and is the natural result of conditions surrounding the industry. Some of this equipment, except special tools will doubtless be utilized for other purposes, but even so there will be no scarcity of second-hand tools for some time to come. Those firms who have turned their attention to other forms of activity will help in the general readjustment and so relieve the labor situation. The principal demand now is for a heavier class of tool and a fair business is being done. The increased activity in the States is making it more difficult to obtain equipment from that country and deliveries are consequently getting more backward.

Supplies

Notwithstanding the fact that prices of iron, steel and metals are weaker, machine shop and mill supplies continue to show an upward tendency. The reason is doubtless due to the fact that there is still a shortage of raw materials and that supplies and small tools, etc., are still being made from high priced materials. The market is unsettled owing to the uncertain situation resulting from the falling off of munitions contracts. There has been during the past few weeks a decline in the volume of business as a result of decreased activity in munition plants. All transmission equipment has advanced in price; the change in discount on wood pulleys was mentioned last week. The Fairbanks Co. have withdrawn all prices on brass and iron valves. Wire rope thimbles have advanced 10 per cent. Higher prices have been made effective on malleable fittings and bushings. New prices that have been issued on plunger leathers, valve leathers and cup plungers provide for an increase of 12½ per cent. No. 1 plunger leathers are now quoted at \$1.45 per doz., No. 2 at \$1.65 per doz., and No. 3 at \$2 per doz. In valve leathers No. 1 is quoted at \$1.45 per doz., No. 2 at \$1.65, and No. 3 at \$2 per doz. Cup plunger leathers, 2½ in., are quoted at \$1.85 per doz.; 3 in., at \$2.35, and 3½ in. at \$2.70 per doz. Solders have declined one cent a pound. Turpentine is up one cent a gallon, while linseed oil is also higher at \$1.49 for raw and \$1.52 for boiled oil.

Metals

The announcement relative to the falling off of munition contracts has created an unsettled feeling in the metal markets and the outlook consequently is somewhat uncertain. The effect of the decline in shell orders will not be serious, however, as general business has for some time been gradually increasing in volume and readjustment taking place more or less gradually. In spite of this it is hardly likely that business will be as active in the future as during the past two years or so, but if it does not go below the level of normal years it is as much as can be expected. Prices have a weak tendency and the outlook in this regard continues unsettled owing to lack of information as to what the American Government intends to do in regard to its

price-fixing policy. Copper and lead have declined, otherwise prices are unchanged.

Copper.—The market is unsettled, and weaker owing to the uncertainty regarding the action of the U.S. Government. Consumers continue to show a lack of interest in the market and buying is in light volume in the meantime. Copper prices continue nominal and are quoted locally one cent lower than last week. Lake and electrolytic are now 34c. and castings 33c. per pound.

Tin.—There is nothing of interest to note in the tin market, which continues dull at unchanged prices. The tin committee at Washington have not yet made any announcement as to progress of plans for adjusting distribution of tin in the U.S. Local price, 64c. per pound.

shown in the market which has weakened although quotations are unchanged at 60c. per pound.

Spelter.—The market is a little firmer owing to some improvement in demand, but prices are unchanged at 11c. per pound.

New York, Aug. 27.—Manufacturers of machinery have received contracts, amounting to several million dollars, from concerns that have been awarded additional orders for war munitions by the United States Government. Additional contracts for machine tools and for cranes calling for the expenditure of \$3,000,000 are pending, most of which will probably be closed before Sept. 1.

The Ordnance Bureau of the War Department, which has been quietly perfecting plans for the rapid building of big guns in the United States outside of the plants of the Bethlehem and Midvale Steel companies, which have long manufactured heavy ordnance, has completed satisfactory arrangements by which large forgings will be made by forging and casting shops at Columbus and Cleveland, Ohio, and at Pittsburgh, Pa., as well as at Tacony, Pa. These forge shops have been installing additional machinery and work on Government contracts will begin early in September. The plan is to have the gun forgings machined at various plants, the selection of which was noted last week. The American Radiator Co., which is now equipping a plant at Bayonne, New Jersey, has been added to the list previously given. The 3, 6 and 9.5-inch guns to be manufactured are designed for equipping the United States army in France. The Bullard Machine Tool Co., which will machine some of these forgings, has just placed a contract for ten 10-ton cranes, and the American Radiator Co. has ordered several hundred thousand dollars worth of shop equipment.

Other manufacturers who have received Government contracts are buying machinery as rapidly as the present condition of the market permits. Walter Scott & Co., of Plainfield, New Jersey, is receiving bids on 200 machines needed to manufacture gun carriages. The Wagner Electric Mfg. Co., St. Louis, and the American Car & Foundry Co., who will manufacture hubs for caisson and gun carriages, are buying shop equipment to execute these orders. The Wagner Co. is also to manufacture \$3,000,000 worth of 8-inch shells and one thousand 4-inch guns for the Government. The Goss Printing Co. of Chicago has bought equipment in that market to manufacture sights for 4-inch guns. Stone & Webster are now buying \$1,500,000 worth of tools through its Boston office, to equip the machine shop at the Rock Island Arsenal. The Poole Engineering & Machine Co., of Baltimore, and the Worcester Mfg. Co., of Worcester, Mass., are to manufacture one pound projectiles for the Navy Department. The Government has also placed orders with the Bausch & Lomb Optical Co. for periscopes and gun-sights, and with the Sperry Gyroscope Co., of Brooklyn, for

AUXILIARY MACHINERY REQUIRED.

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

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

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

Two small circulating pumps.

One large circulating pump.

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

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

One oil fuel pump with complete set of spare parts.

Lead.—The situation in the lead market is unchanged and business is held back by the general feeling of uncertainty in regard to prices. The fact that American Government purchases for the last two months have been at 8c. a pound, while the outside market has ranged around 11c., has a deterring effect. Those consumers who can hold off are doing so, and those who must buy limit their requirements to the barest necessities. Lead has declined locally and is now being quoted at 13c. per pound.

Antimony.—No improvement is noted in the demand for antimony, which has been quiet for some time. The market, however, shows no sign of weakness and quotations are unchanged at 20c. per pound.

Aluminum.—Little interest is being

compasses, searchlights, and airplane apparatus. Both of these companies are now purchasing tools to execute Government contracts.

Increased activity is evident in the airplane industry. The Curtiss Aeroplane & Motor Corporation is buying \$1,000,000 worth of machine tools for its Buffalo plant. This corporation is said to have orders for airplanes from the Government, amounting to \$200,000,000. The Simplex Automobile Co., New Brunswick, New Jersey, a branch of the Wright-Martin Aircraft Corporation, has issued a list for 100 machines, and will probably buy 200 tools to manufacture airplane engines for the Government; the order received calls for the delivery of 50 engines per day.

The Quartermaster-General of the army has purchased a number of machine tools, including belt-driven hammers, forging and bolt machines, to equip motor and tractor repair shops in France. The Government is still buying travelling cranes for railroad shops and locomotive cranes for railroad construction in France through the Pennsylvania Co. and machine tools through the Phoenix Construction Co. French railroads also are buying 50 locomotive cranes. Agents of Australian manufacturing plants are placing orders for power and shop equipment.

Pittsburgh, Aug. 25.—It has been a week of rather interesting developments pertaining to the iron and steel trade, but unfortunately the developments are only interesting rather than conclusive. They do not tend to clarify the prospects of the market. Foremost was the fixing of coal prices by the Government at 50 cents a ton less than had been expected, and thus indicating that the Government has ideas of lower prices in general than had been surmised. Then there were declines of \$5 a ton in billets and \$2 a ton in Bessemer pig iron, maintaining the general declining tendency in raw and intermediate products. Offerings of plates appeared at lower prices and for earlier deliveries than formerly, while otherwise finished steel showed no distinct change. Finally, statistics leaked out indicating that the production of steel ingots in July was 6 per cent. greater than the average output in 1916, yet 11 per cent. under the capacity, as lately increased. The developments served to make the prospect still clearer that there is to be a general decline in the finished steel market, and perhaps a greater decline than had been expected; but there is no light on the question when the readjustment is to occur or how far it is to extend.

The Coal Price

The schedule of coal prices was announced August 22, prices varying in different districts, but except for the higher prices assigned to some far western districts, averaging approximately the Pittsburgh district prices, which are: \$1.75 for slack, \$2 for mine-run, and \$2.25 for screened coal, per net ton at mine. The lowest forecast had been

\$2.50 for mine-run. The coal operators now speak as if they would have been content with a \$2.50 price; but as it is, they have called a general meeting of soft coal operators all over the country, to be held in Pittsburgh August 27, evidently for the purpose of making representations to the Government that the price is too low. They are justified in this by the observation in the price announcement that the prices were tentative.

It is expected that coke prices will be announced shortly, perhaps within a fortnight, and if \$2 stands as the Pittsburgh district coal price, the Connellsville coke price can hardly be over \$4, as with their lower mining costs the Connellsville operators would fare well to be allowed \$3 for the ton and a half of coal required to make a ton of coke, with \$1 for conversion.

Pig Iron and Steel Easier

Resale offerings of Bessemer pig iron, arising chiefly from the export embargo, resulted in sales at not over \$53, valley, when the furnace quotations, although practically nominal, had been \$55. Billets that had been offered freely in the market were marked down \$5 a ton, resulting in small sales of both Bessemer and open-hearth at \$80, the top price last June having been \$95 to \$100. Sheet bars offered at \$85 find no takers, although last June \$105 was paid in several instances.

The blast furnaces have not marked down their quotations, chiefly because it would not help them to do so, as there is no disposition to buy at any price. They no longer advise their customers to purchase, and frankly admit that all the indications are for a decline.

The continued decline in billets and sheet bars is important only as illustrating a general trend in values, for at prices above \$60 to \$70 there have been no purchases except in small lots, by consumers peculiarly situated. The regular consumers receive their steel on long term contracts, the settling price at present being probably in the neighborhood of \$60.

Finished Steel

There are reports of several offerings of plate down to 8.00c, and for earlier deliveries than mills formerly admitted were possible, while until now the plate market has been described strong at 9.00c to 10.00c. Doubtless the offerings arose through the shutting off of exports by the embargo. The common report has been that the embargo on shipbuilding material was established for the purpose of making an arrangement with Japan whereby that country would receive material already ordered in return for sending some ships to engage in the transatlantic trade, but whether designedly or otherwise, the embargo is softening the market.

A curious fact is that while domestic demand for sheets has dropped to almost nothing, buyers being committed to a policy of waiting for lower prices, foreign buyers are bidding as eagerly as ever, and sales have been made for both

Japan and South America at 9.25c, and perhaps even higher. Some of the mills have two months or more of unsold capacity to the end of the year, but they are not reducing quotations.

Government Buying

A fortnight ago the Government distributed orders for 6,000 standard gauge freight cars, and 2,997 narrow gauge cars for its operations in France, and 3,000 standard gauge cars have now been added to the orders, while 5,000 more are under advisement. The interesting statement is made by steel producers that an absolute price has been agreed upon for the steel involved, but no information is vouchsafed as to what the price is, apart from the observation that it is "satisfactory." Prices on steel for the merchant ships are still to be arranged. The mills are less opposed than formerly to the Government's proposal of 2.90c for plates, and 2.50c for shapes and bars.

A careful summary indicates that the Government purchases up to date do not indicate that as much as 15 per cent. of the capacity will be engaged at any time, but when the shipbuilding program is in full operation the total may possibly be a trifle more than 15 per cent., and any large buying of shell would effect a slight further increase. The increase in capacity over the average of last year is more than 15 per cent. Accordingly, the statement may be made that the full steel making capacity will be engaged next year provided domestic consumption is as great as in 1916, that the Government absorbs steel equal to the increase in capacity, and that the purchases of the European Allies are as great as they were in 1916. As to the last named item, there has been practically no buying at all to date, while as to the first, it seems altogether improbable that domestic consumption will not decrease.

FLAX INDUSTRY HAS BEEN REVIVED

Dominion Government officials report a great revival in the industry throughout Canada. Fifty years ago flax was a very important crop on many farms and there were about 100 mills in Ontario turning the plant into articles of commerce.

The new generation of farmers drifted into other lines of production when foreign competition became too keen and when war was declared three years ago there were at best six or seven mills in Ontario. War, however, has put the industry back on its feet in Canada and in addition to a tremendous acreage in the West Ontario farmers have planted 8,000 acres to the crop this year. As a result it is expected that there will be between thirty and forty flax mills in operation in this province next winter.

In order to give both the agricultural and industrial side of the industry every encouragement the Government has established an experimental flax mill at Ottawa, where experts are testing it.

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

Swift Current, Sask.—The Imperial Oil Co., will erect a distributing plant here.

Toronto, Ont.—The Cluff Mfg. Co., are rebuilding their factory on Sterling road.

Toronto, Ont.—The Willys-Overland Co., will build a new machine shop at their factory on Weston Road.

Vancouver, B.C.—The Pacific Metal & Galvanizing Co., Seattle, Wash., proposes to establish a plant at Vancouver, B.C., to cost \$35,000. Henry Gray is secretary.

Toronto, Ont.—Gunns Ltd., will make alterations to their abattoir at West Toronto, at a cost of \$12,000. The John V. Gray Construction Co., of Toronto are the general contractors.

Shawinigan Falls, Que.—The Shawinigan Water & Power Co. is preparing designs for a 5000 ft. clear conductor span for the transmission of electric energy over the St. Lawrence River at Three Rivers, Que., which will supplement the submarine cable transmission line already installed. Each of the steel towers on which the line will rest at the extreme ends of this long span will have a concrete base, set some little distance from the bank of the river. The towers will be 350 ft. high, so as to provide a clearance of 160 ft. in the centre of the span. The three conductors will be placed approximately 50 ft. apart. The transmission line will not be anchored to but merely supported by the towers and anchored to concrete blocks situated some distance to the rear of the towers.

ELECTRICAL

Waterloo, Ont.—Representatives of the Hydro-Electric Commission have been in this district inspecting electric threshing outfits on three farms in Waterloo County. Steps will be taken to develop hydro power more extensively for this purpose.

MUNICIPAL

Kingsville, Ont.—The Town Council contemplated installing a pumping plant.

London, Ont.—The Board of Control will call tenders shortly for sludge pumps for East End sewage disposal works.

Portage la Prairie, Man.—The Town Council contemplates installation of one 100 h.p. boiler with mechanical stoker costing about \$5,000, for electric station.

Winnipeg, Man.—Tenders for rubber boots and rubber hose for the fire department have been opened by the Board

of Control and referred to J. E. Buchanan, Fire Chief, for tabulation and report.

Woodstock, Ont.—The Town Council will install a filtration plant and build an addition to the pumping station. Tenders have been called for the above and also for a boiler and pumping equipment.

Rosthern, Sask.—The Town Council will build an electric light plant and will install oil engines and electrical equipment. Tenders must be in by Sept. 1. Full particulars may be obtained from K. A. Reeder, town clerk.

London, Ont.—The Board of Control decided not to purchase a motor fire engine, as suggested by the Underwriters' Association, owing to the cost (\$8,000) being too high. The city will retain the present fire engine and buy a motor ladder truck.

Winnipeg, Man.—One hundred and fifty tons of reinforcing steel is to be purchased by the city for the big extension being carried out at its electric plant at Point du Bois. On account of the embargo on steel by the United States, the Board of Control, on the recommendation of J. G. Glasco, have decided to call for tenders returnable in one week.

Montreal, Que.—In a report signed by Messrs. H. E. Vautelet and A. St. Laurent, consulting engineers, the Board of Control is advised that the city proceed with the hydraulic development of the aqueduct along the lines suggested by them in Scheme 2 of their original report; they also recommend that the foundation of the power house be built as early as possible to insure the water supply of the city, while it is also suggested that the balance of the work be proceeded with along the lines recommended by them as circumstances will allow.

GENERAL

Hamilton, Ont.—The American Can Co., will build an addition to their factory here to cost \$125,000.

Guelph, Ont.—It is reported that a prominent oil concern have leased an extensive tract of land at Rockwood, near here, and that drilling will be commenced at once.

Montreal, Que.—Damage to the extent of about \$50,000 was done by fire on Aug. 20, in the establishment of H. Gray & Co., cotton waste and wipers, 25 Common street, the top floor being completely burned out.

Woodstock, Ont.—This city is to have a new factory before the winter. Ground has been broken adjoining the textile works and a factory to cost \$40,000 will be erected, and when completed will be

occupied by the Woodstock Cotton Spinning Co.

St. Lambert, Que.—The by-law covering the agreement between the town of St. Lambert and the Dominion Textile Co., providing for the establishment of a large manufacturing plant in that town has become operative without the necessity of a poll of the ratepayers. Under the terms of the agreement the town provides bonds to the amount of \$95,000 which are to become the property of the company on the expiration of ten years if the company has carried out its agreement with the town. The company is also granted exemption from taxation on its works for a period of twenty years. The company is not compelled to begin construction for some time after the end of the war but there is a feeling that it will not wait long before taking some steps.

TENDERS

Hamilton, Ont.—Tenders are being received until September 4 by the engineer, E. R. Gray, for pumping equipment for Beach pumping station. The cost is estimated at \$130,000.

Cobalt, Ont.—Tenders will be received up to Sept. 18, for the supply of material and labor necessary in the installation of a complete telephone system in the Town of Cobalt, and in part of the adjoining Township of Coleman. Further particulars will be furnished by R. L. O'Gorman, Town Clerk.

Sudbury, Ont.—Tenders will be received until noon September 4, for supplying material and constructing a reinforced concrete bridge in the Town of Sudbury. Approximately 470 cubic yards. Plans, specifications and other information may be obtained at the Town Clerk's office, Sudbury. W. J. Ross, Town Clerk.

Oakshella, Sask.—Tenders are required for the supply of material and constructing thirteen miles of bracket line, also placing two circuits on the Government lead on six-pin crossarms. For plans and specifications, apply to James Wiggins, secretary-treasurer, Last Chance Telephone Co., Oakshella, Sask.

Vancouver, B.C.—Tenders will be received by James Stuart, City Purchasing Agent, until September 4, for one automobile combination hose wagon and gasoline pump, with a capacity of not less than 750 gallons per minute at 120 pounds pump pressure. Parties tendering to supply their own specifications, blue prints or photographs.

Hatley Center, Que.—Tenders for the construction of a concrete bridge and making the necessary grade and fills at the Lowery Brook, 1½ miles east of North Hatley, on the Capelton Road,

FOR SALE

The Entire Plant, Power, Equipment and Buildings of
THE NOVA SCOTIA CAR WORKS, Halifax, N.S.

PARTIAL LIST IRON TOOLS

- 1—8 Spindle Bertram Arch Bar Drill.
- 1—26—48" x 20' McCabe Double Spindle Lathe.
- 2—No. 3 Bertram Double Axle Lathes.
- 1—42" Bertram Car Wheel Borer with Hub facing attachment and Crane.
- 1—1" Acme Triple Head Bolt Cutter.
- 1—1½" Acme 6 Spindle Nut Tapper.
- 2—Bertram Punches 30" throat capacity ¾" in ¾".
- 1—Bertram Punch 24" throat capacity 1" in 1".
- 1—Bertram Punch 18" throat capacity 1½" in 1".
- 1—C. M. C. Double End Punch and Shear, 18" throat, capacity 1" in 1" and shear 4" x 1".

- 2—C. M. C. Punches 18" throat capacity 1" in 1".
- 1 each 1", 1½" and 3" Ajax Bolt Headers.
- 1—1½" Acme Bolt Header.
- 1—No. 2 Williams & White Eye Bender.
- 1—3,000 lb. Morgan Double Frame Steam Hammer.
- 2—No. 23, 1 No. 26 and 1 No. 9 Williams & White Bulldozers.
- 40—Canadian Westinghouse Motors, from 3 to 75 H.P. for 3/60/550 V. Service.
- Also Woodworking Machinery and a Steel Building, 300' long by 100' wide.
- 3—10 ton, 47 ft. Span, 3 Motor Electric Travelling Cranes for 3/60/550 V. Service.

For full particulars, prices, write

THE

A. R. WILLIAMS MACHINERY CO., LTD.

64 FRONT ST., West

TORONTO, ONT.



1 Second

One completed, perfectly finished rivet per second. That is the Grant speed. Not for a short time or a long time, but all the time. No hammer marks showing. Any degree of tightness or looseness desired. This great speed should materially reduce your operating cost and increase output.

Our catalogue will reveal a great deal more. Write for it.

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.

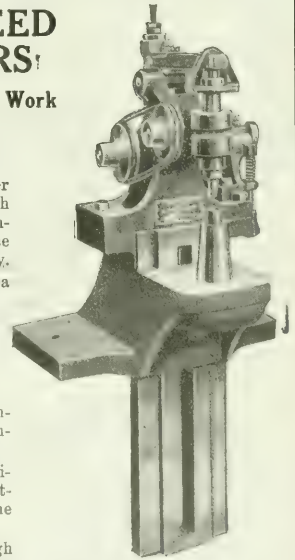
No riveting too intricate for us; no riveting which our machine accomplish.

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.



will be received up to Sept. 4. Plans and specifications of this work may be seen at the office of the W. E. Greer, Secretary-Treasurer, Hatley Center, Que.

PERSONAL

Prof. J. C. McLennan of Toronto University, has been created an officer of the newly instituted Order of the British Empire.

George M. McLeod, one of the best known men in railway circles throughout Eastern Canada, died at St. John, N.B., on Aug. 21 aged 65 years.

Harry S. Burrell, owner and manager of the Burrell Rockdrill industry, Belleville, Ont., died last Sunday, after a brief illness. Deceased was 48 years of age.

E. C. Richardson, who has been connected with the St. Lawrence Welding Co., Montreal, has resigned from his position to join the United States forces for overseas service.

Dr. J. O. Orr, manager of the Canadian National Exhibition since 1903, died on Aug. 21 at his residence, 83 Spadina road, Toronto, of heart trouble. He had been in failing health for a long time.

Geo. A. Kingston, of Toronto, Ont., was elected vice-president of the International Association of Industrial Accident Boards and Commissions at the fourth annual convention held in Boston, Mass., last week.

Percy Wilkins, formerly chief inspector with the St. Lawrence Machinery Co., Montreal, has accepted a position with the St. Lawrence Welding Co., Montreal, and has been appointed secretary-treasurer of the company.

Charles Blair Gordon, Montreal, business man, former vice-president of the Imperial Munitions Board, and now representing the Imperial Munitions Ministry in the United States, has been made Knight Commander of the newly created Order of the British Empire.

Professor K. Birkeland of the University of Christiania, Norway, who died recently at Tokyo, Japan was the originator of the first successful process for the oxidation of atmospheric nitrogen by electric discharges. He was a member of the British Association and vice-president of the Faraday Society.

TRADE GOSSIP

To Promote Trade.—The British Government has appointed a Belgian Trade Committee to investigate the means of promoting trade and commerce between the British Empire and Belgium.

The Damp Bros. Welding Co., 848 Dupont street have established a plant for welding and cutting all kinds of metal by the oxy-acetylene process. This concern will specialize in welding broken parts of machinery and automobiles.

Potash From Waste.—The Curtis Bay Distilling Co., a Baltimore, Md., concern,

is preparing to manufacture potash from waste material, and will utilize one of its recently closed down plants for that purpose. The company has developed a method of turning waste from the distillery into potash.

Rock Island, Que.—The board of directors of the Union Twist Drill Co. of Athol, Mass., were in town recently to visit their plant here. W. Putnam, Manchester, Mass., J. A. McGregor, L. L. Starrett and Simon Mackay of Athol, Mass., W. B. McKinnon, Arlin Ward and J. A. Drury of Boston constitute the board of Directors, and these gentlemen spent the day looking over the plant.

Ottawa, Ont.—Potash has been discovered at Muskoka Lake, Ont., and the Salts and Potash Co. of Canada (of Toronto) have been granted permission on the application of J. Ogle Cars, to divert water from the lake to extract the potash, and also to lease vacant Dominion lands abutting on Muskoka Lake in connection with the recovery and utilization of the potash and other minerals.

Acquire New Plant.—Owing to the increasing volume of business, the St. Lawrence Welding Co., of 138 Inspector Street, Montreal, have acquired a new plant at 39 Olier Street, where they intend to handle all their heavy work, a feature that is now a large portion of their general output. The shop at 138 Inspector Street will be retained to take care of small welding repairs. In addition to the new plant of 100 by 24 feet, a new section, 25 by 40 feet, has been built, to be used as a brass foundry, work in this portion to be commenced in the near future.

U. S. Shipbuilding Programme.—The United States Government's shipbuilding programme calls for a total of 1,270 ships of 7,968,000 tonnage, it was revealed last Friday in estimates the Shipbuilding Board has sent to Secretary of the Treasury McAdoo, on which to base a request for a new billion-dollar appropriation. This is in addition to nearly two million tons of shipping now building in American yards, which has been commandeered by the Emergency Fleet Corporation. A large part of the Government fleet and of the commandeered fleet will have been completed by the end of the fiscal year, June 30, 1918. Building, commandeering and purchase of vessels will total about two billion dollars.

Allies Purchasing Committee in U.S.—A report from Washington, D.C., states that the Allied purchasing committee in the United States is now a fact. The Allies have signed an agreement to make their purchases through the new war industries board. America's loans to the Allies will be protected against huge prices which heretofore, the Allies have been willing to pay with Uncle Sam's money in order to get badly-needed war materials. B. M. Barcus, Robert S. Lovett and R. S. Brookings of the war board will be actively in charge of the Allied purchases. Barcus and Brookings will handle raw material and finished supplies, respectively, while

Lovatt will decide priority questions between the Allies.

Standard Wooden Ship Dimensions.—The wooden standard ship as adopted by the Canadian Government and of which a considerable number have been contracted for in British Columbia yards is dimensioned as follows: Length 250 feet, beam 43 feet 6 inches and depth 25 feet, with a deadweight capacity of 2,800 tons on a 21-foot draft. The vessels are considerably heavier in construction than the United States Shipping Board's standard wooden hull. They will be fitted with box girder keelsons, have a deep tank forward for water ballast and be propelled by triple expansion engines of about 950 horsepower. They will be constructed of Douglas fir and built to Lloyds' requirements for A1 classification.

Embargo on Sulphur by U. S. Government.—A report from Washington, D.C., states that sulphur classified with explosives is included in the list of commodities for which export licenses are required. No shipments will be licensed, officials said to-day, until Canada has presented complete estimates of the requirements of Dominion newsprint makers and of the needs of explosive factories. The impression was given by officials at Washington that while there is every desire that the newspaper industry suffer no embarrassments, war needs will be given first consideration and it was suggested that sulphur may be permitted to go to Canada in limited quantities only even after the issuing of licenses is resumed.

Dominion Government Orders Cars.—Hon. Frank Cochrane announced in the House, that the orders for rolling stock would include six thousand cars, four thousand of which would be required for the Government system. The remaining two thousand would be needed by the C.N.R., the Grand Trunk, and other companies. Coal shippers in the United States were now anxious to have their cars returned immediately, which meant they could not be used in Canada for carrying sand and gravel. The Minister said four thousand of the cars would be supplied by the Canada Car Company, one thousand by the Eastern Car Company, and one thousand by the National Car Company. Deliveries were to be made between October 1 and February 1.

Marine Insurance Increase.—In connection with increase in Washington insurance rates on estimate of ship values at \$1,000 to \$2,000 a ton gained currency in many newspapers. It is difficult to establish a foundation for such high estimates. The highest price paid for a vessel was \$310 a deadweight ton. This vessel had oil-burning equipment and refrigerators, was modern in every respect and delivery was prompt. Average price at present is \$250 a deadweight ton. Before the war a good price would have been about \$65 a deadweight ton. The present market is considered enormous, and intimation that Washington is valuing ships at \$2,000 a ton is regarded as absurd. At least, New York shipping men do not pay such

Daylight Saving with a GEOMETRIC

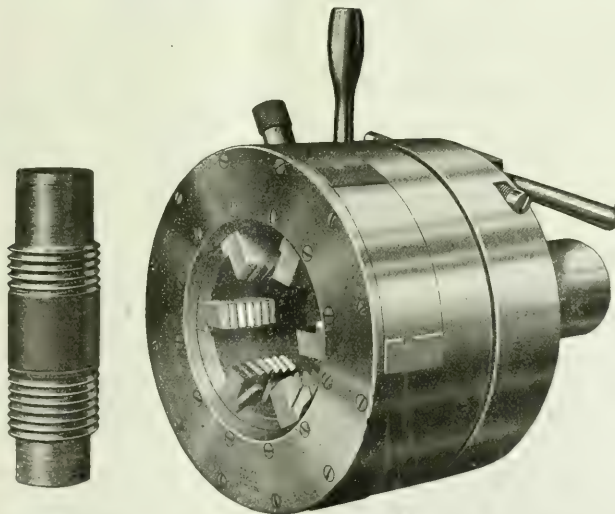
That is what it amounts to. Time is not the only thing saved, either. Geometrics are a saving proposition all around.

This Geometric Collapsing Tap is specially arranged for deep tapping in Projectile Caps.

All classes of thread tapping above $\frac{3}{4}$ -inch diameter are taken care of by Geometric Collapsing Taps.



Twenty-five years of specializing in Screw Thread Cutting Tools has made the name GEOMETRIC stand for all that could be asked in Screw Thread Production.



When it is an outside thread, Geometric Die Heads cut every style from 1-16-inch size up to greatest required diameter.

A U.S. Navy Yard is using this $4\frac{1}{2}$ -inch size Style "D" Geometric Die Head. United States Navy Yards accept no second quality.

Do your Screw Machines and Turret Lathes swing Geometrics?

You have as much right to Geometric benefits as any other manufacturer.

The Geometric Tool Company, New Haven, Conn., U.S.A.

Canadian Agents:

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

Fast Work



There are two kinds of fast work—done by a file. The first is on material (hard or soft) and the points of the file wear off shortly. That is the expensive speed. The other is where the same material is worked upon and the file retains its sharp, clean-cutting features. This is the economic speed. The "Delta" Files are noted for that latter quality.

There is not only the expense of new files to be considered, there is the time it takes a file to do that job in as perfect a manner and as short a time as possible. The cutting edge is retained after all classes of work.

Quality in Construction

Made of crucible steel 3 to 24 inches in length. A sample file will convince you. Write for it. State the work you wish to use it on.

All Leading Jobbers

Delta File Works

Philadelphia, Pa., U.S.A.

CANADIAN AGENTS:

H. S. Howland, Sons & Co., Toronto
 Starke, Seybold, Montreal
 Wm. Stairs, Son & Morrow, Halifax
 Merrick-Anderson Co., Winnipeg

Concrete Ship Built in Norway.—The first Norwegian iron and concrete boat has been launched at the Porsgrund Cement Works, Christiania in the presence of Prime Minister Knudsen. The boat is built entirely on a new system, with the bottom up, from which extraordinary position the launching took place. The underlying sledges glided out with the ship. When the water was reached the hull was detached from the sledges. It gradually sank to a certain point and slowly righted itself. This ship of 200 tons was built in three weeks, but the next will only require about half that time. The frame can be used with each subsequent ship of the same size. It is intended to start wholesale building of iron and concrete boats of from 200 to 500 to 1,000 tons. The last can be completed in six weeks.

Asbestos in Northern Quebec.—What promises to be more or less important discovery of high-grade asbestos has been made in the unsurveyed portion of Quebec, about twenty-five miles north east of Ville Marie, on the shores of Mackenzie Lake. A number of veins which are said to average about four feet in width, have been traced for a considerable distance, and have been found to contain asbestos of a similar grade to that which is being worked at the Slade Forbes property in the Porcupine district. The discovery was made in the latter part of June and efforts are being made by prominent citizens of Ville Marie to induce the Government to build a road into the district which at the present time is reached only by trail from Ville Marie via Lorraineville, from which point it is about eighteen miles to the scene of the discovery. Upwards of a dozen claims have been already staked, on all which it is said the showings on the mineral are very encouraging.

U. S. Company for Greaves-Etchells Furnace.—T. H. Watson & Co., Sheffield, England, who control the patents of the Greaves-Etchells Electric Furnace, announce the formation of an American company to handle the furnace business in the United States and Canada. The new company will be known as the Electric Furnace Construction Co., with head offices in the Finance Building, Philadelphia. The Greaves-Etchells furnace is well known in the Sheffield district, and other parts of England, and over thirty furnaces ranging in size from ¼ ton to 12 ½ tons capacity have been contracted for, including special Government equipments. Frank Hodson, a partner of the T. H. Watson & Co., is now in the United States arranging the details of the new company, and will act as its president. F. J. Ryan, who resigned as Eastern manager of the Snyder Electric Furnace Co. on June 1, will be general manager. The two inventors, Mr. Greaves and Mr. Etchells, will act in associate capacity to the company's technical staff and when necessary will take charge of actual installation.

BUILDING

Toronto, Ont.—The City Architect has issued to the Harris Abattoir Co. a permit for an addition to their cattle pens on St. Clair avenue, near Symes road, \$15,000.

Kingston, Ont.—In the supplementary estimates recently tabled in the House at Ottawa \$150,000 is included for the enlargement of the Educational Block of the Royal Military College, and \$100,000 to complete the new dormitory at the R.M.C., by adding two wings.

New Toronto, Ont.—The town is to have an up-to-date moving picture theatre, which will accommodate 400 people, at a cost of \$20,000, at the corner of Fifth street and Lake Shore road. C. J. Peart is the builder, and it is expected that the theatre will be opened before Christmas.

CONTRACTS

Toronto, Ont.—Wells & Newton of New York, have been awarded the plumbing and heating contract for the new Union Station.

Shawinigan Falls, Que.—Church, Ross & Co. of Montreal, have been awarded the contract for erecting a factory for the Canadian Aloxite Co., F. T. Tone is manager of this concern.

Pointe Claire, Que.—The Town Council have awarded a contract to the Turbine Equipment Co., Toronto, Ont. 2-motor driven De Laval single stage pumps, for the municipal filtration plant.

Weston, Ont.—A special meeting of the Town Council was held last Monday to open tenders for the heating of the Town Hall. There were four tenders, and the contract was awarded to George Keyes, of Weston, at a price of \$1,795.

Oshawa, Ont.—The Turbine Equipment Co., Toronto, have secured a contract from the Town of Oshawa, for 2-De Laval single stage, motor driven centrifugal pumps, for the new filtration plant which is being constructed here.

Toronto, Ont.—A contract for the completion of the carpentry work at the new Park School was awarded by the Board of Education recently to William Williamson, whose tender was for \$19,950. The work is to be completed by Jan. 10.

Dundas, Ont.—The Canadian Engineering & Contracting Co. of Hamilton has been awarded the contract for repairing the waterworks reservoir. The tender was \$2,808, the lowest received. The work will be commenced in two weeks' time.

Brantford, Ont.—The City Council have awarded a contract to the Turbine Equipment Co., Toronto, for 2-De Laval single stage, motor driven pumps, for the booster pumping station. This is the second order within the last three years for De Laval pumps for this city.

Toronto, Ont.—The Board of Education has let the contracts for inter-departmental phones for the Regal Road and Strathcona Schools. The Regal

Road contract goes to the Canadian Electric Company at \$896, and A. Rice, tendering at \$620 was the successful bidder for the Strathcona School contract.

The Turbine Equipment Co., Toronto, have received an order for a 125 h.p. motor driven De Laval 2 stage pump, from the city of Belleville, Ont. This is the fourth De Laval unit purchased by this city.

Quebec, Que.—The C. P. R. has let contracts for additions to the Palais Station at Quebec, which will cost \$50,000. The contractors are the Deakin Construction Co., and E. T. Byers, both of Montreal. It is the intention of the company to increase the terminal trackage very materially; but for immediate betterment the addition mentioned is to be undertaken at once.

John Watson & Son of Montreal, Ltd., Montreal, Que., have recently secured contracts for metal and architectural iron work for the following buildings. The new Toronto Terminal station; C.N.R. station at Montreal; American Can Co.'s factory, Montreal; Power house at Lennoxville, Que.; John Aird's bakery at Montreal; Consumers Cordage Co., Montreal, and the new office building for the greater Montreal Land & Investment Co.

The Turbine Equipment Co., Toronto, have recently secured the following contracts. One motor driven Multistage De Laval pump for operating against 400 feet head, for the mining corporation of Canada, Cobalt, Ont. A similar unit for operating against 450 feet head for the Casey-Cobalt Silver Mining Co., New Liskeard, Ont. Two De Laval steam turbine driven centrifugal pumps for the new Union Station, Toronto.

MARINE.

Kingston, Ont.—The Dominion Government has made an appropriation of \$33,000 for the Kingston dry-dock for renewal of the revetment wall.

North Vancouver, B.C.—The Janet Carruthers, the fifth auxiliary schooner built in this province will leave soon on her maiden voyage to Australia with a cargo of lumber.

Port Arthur, Ont.—Private advices are that the Government has appropriated \$130,000 for dredging at the new Saskatchewan Co-operative and Richardson elevators on the north water-front.

Cobourg, Ont.—It is understood that the Grand Trunk ferry dock here is to be rebuilt and that plans are already on hand for a covered dock to replace the one built here twelve years ago.

Three Rivers, Que.—Contracts for the building of two wooden ships have been given by the British Admiralty to the Three Rivers Shipyard, Ltd., at a cost of \$900,000. It is expected that further contracts will be obtained for the company, and will provide a new industry for this city.

Victoria, B.C.—The Foundation Co. of British Columbia, Ltd., who have contracts from the Imperial Government for

Special Machinery
MADE TO ORDER

Mill Machinery, Engine Work
Grey Iron and Brass Castings

TRY US FOR GENERAL REPAIRS

ALEXANDER FLECK, LIMITED
(Vulcan Iron Works) OTTAWA, ONT.

Hamilton Anti-Friction
BABBITT

A Dependable Metal for
Speed and Pressure.

Geo. E. Jobborn, Hamilton, Ont.

BOLTS

Our large stock of
Machine Bolts,
Rivets and Washers
assures quickly filled
orders and prompt
shipment.
One quality only—
The Best.
Send a trial order.

LONDON BOLT & NUT WORKS
London Ontario

OVENS

Enameling and Varnishing Ovens heated
by Gas, Electricity, Steam or Coal.
Write for Booklet.

Brantford Oven & Rack Co., Ltd.
Brantford, Canada.

MAPLE LEAF
STITCHED COTTON DUCK
BELTING

DOMINION BELTING CO. LTD.
HAMILTON CANADA

Mackinnon,
Holmes & Co.
LIMITED
Sherbrooke,
Quebec

Builders of
Coal Bunkers,
Oil Tanks, Water
Tanks and Receivers

We specialize in Bridges, Buildings, Towers,
Tanks, Penstocks, Roof Trusses, Columns,
Smoke Flues and Stacks, Coal Bins,
Ore Bins, Buckets, Refuse Burners,
Stills, Air Receivers, etc.

Write for Prices

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 - WORKS: MUSKOGON HEIGHTS U.S.A.

Oxy-Acetylene Welding

We can give the best of service
in all kinds of welding repair
jobs. We have successfully re-
paired the most difficult jobs. Our
work is high-class and our prices
moderate.

Send us your work or write us regarding it.

TORONTO WELDING CO.
26 Pearl St., TORONTO

Oil Tempered
Steel Springs

—for every purpose
and the best for each
use.

Special styles of all
kinds to order.

THE CLEVELAND
WIRE SPRING
COMPANY

Cleveland, Ohio
U.S.A.

PATENT ATTORNEYS

RESEARCH BUREAU

REPORTS BY EXPERTS ON SCIENTIFIC, TECHNICAL AND INDUSTRIAL DEVELOPMENT.
SPECIAL RESEARCHES ARRANGED.

PATENTS, TRADE MARKS, ETC.

HANBURY A. BUDDEN CABLE ADDRESS "BREVET"
712 DRUMMOND BLDG., MONTREAL



Fetherstonhaugh & Co.,
Patent Solicitors, Head Office,
Royal Bank Bldg., Toronto,
Ottawa Office, 2 Elgin St.
Send for our Plain Practical
Pointers. Copy of National
Progress, in which our patents
are advertised, mailed free.

PATENTS TRADEMARKS AND DESIGNS

PROCURED IN ALL COUNTRIES

Special Attention given to Patent Litigation

Pamphlet sent free on application.

RIDOUT & MAYBEE 59 Yonge Street
TORONTO, CANADA

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.

five wooden steamers, have completed all their preliminary work in the way of laying down their plant, and of the four keels already in place, one has a number of square frames set up.

Victoria, B.C.—The Whalen Pulp & Paper Co., which is engaged in establishing the largest industrial plant on Vancouver Island at the new town of Port Alice, near the head of the Southeast Arm of Quatsino Sound, will lay down two keels at a time and will keep on building ships until it has enough of them to handle its export trade.

Ottawa, Ont.—In the House on Saturday, a vote of \$600,000 was discussed for two wooden ships of 3,500 tons each, to be built by the firms of Wallace & Harrison of Vancouver, at a cost of \$230,000 each, the vessels to be equipped with Diesel oil engines. The item was allowed to stand over, because the shipbuilding firms had cancelled their tenders, and had offered to go ahead on a cost plus ten per cent. basis.

Vancouver, B.C.—The twin-screw motor vessel Chiralite built by the Taylor Engineering Co., for the International Petroleum Co., for service in Talara, Peru, was launched on Aug. 15. It is the present intention of the owners to have the Chiralite proceed to Peru under her own power, in charge of Captain Jones. The Chiralite was christened by Mrs. M. Rolston daughter of C. M. Rolston local manager of the Imperial Oil Co.

Midland, Ont.—Contracts for the buildings in connection with the McDougall-Smith Shipbuilding Co.'s plant in which Capt. Alex. McDougall, is interested will be let shortly. The size of the buildings are as follows. The carpentry shop will be 50 by 200 feet, two storeys in height. There will be two one-storey workshops, each 32 by 300 feet; a two-storey office building, 65 by 50 feet; a building in which will be rest rooms and other conveniences for the men, and a boiler house and oil house. All the structures will be of frame. It is intended to rush construction and have the plant ready for operation by late fall.

Vancouver, B.C.—The Canadian Fishing Co.'s newest vessel, the Tartoo, ran her trials on Aug. 16. This concern now has three boats, the Nesto, Tasso and the Tartoo, the last-named being the most modern and up-to-date type of seine craft. The Tartoo is 60 feet long, 15 feet beam and 5½ feet draft. A 50-horsepower gas engine gives the vessel a speed of ten miles per hour. The hold has a capacity of 10,000 sockeye salmon or its equivalent, 72,000 pounds. The boat was built by Ferrier & Lucas, costing about \$9,200. The plans for this new vessel were furnished to the Royal Commission on Fisheries, which has suggested them for a standard seine craft.

Victoria, B.C.—With the launching of the Malahat, the fourth schooner to take the water from the Cameron-Genoa Mills Shipyard, Victoria, and the schooner Mabel Stewart from the Wallace Shipyard No. 2, North Vancouver, the

fifth schooner to be launched for the latter concern, only three more vessels of this type remain to be launched by these yards under the present programme, two of which are nearing completion at the plant of the Cameron-Genoa Shipbuilders, Ltd., and the other being well along at the Wallace yard. After completing the fleet of twelve ships, all of which are of the auxiliary schooner class, and half of which were ordered here and half in North Vancouver, both of the yards mentioned will give all of their attention to the building of wooden steamers for the Imperial Munitions Board.

INCORPORATIONS

British Dyes, Ltd., have obtained an Ontario provincial license to carry on business as dyers and manufacturers of dyes and chemicals, with capital not to exceed \$40,000. G. G. Thwaites, of Toronto, is the company's attorney.

The Smith Motor Truck Corporation has obtained an Ontario provincial license to manufacture motor cars and trucks in this province, with a capital not exceeding \$40,000. M. A. Stratton, of Toronto, is the company's attorney.

The Three Rivers Shipyards, Ltd., has been incorporated at Ottawa, with a capital of \$49,000, to build ships of all kinds at Three Rivers, Que. The incorporators are: T. M. Kirkwood, of Toronto, also A. Chouinard and L. Heyman, of Montreal.

Canadian Hession Tillers & Tractors, Ltd., has been incorporated at Ottawa by H. D. Petrie, T. Crompton and F. C. Petrie, all of Hamilton, to manufacture tillers, tractors and farm implements, at Hamilton, Ont., with a capital of \$500,000.

Midland Shipbuilding Co. has been incorporated at Ottawa by Norman L. Playfair, Marcus Smith, and Thomas C. Luke, all of Midland, Ont., to carry on the business of shipbuilders in all its branches at Midland, Ont., with a capital of \$1,000,000.

The Yamachiche Electric Light Co. has been incorporated at Ottawa with a capital of \$100,000, to operate an electric light and power plant at Three Rivers, Que. The incorporators are: J. E. Marier, J. E. Cadotte and E. Cherette, all of Montreal.

Fruit Machinery Co. has been incorporated at Ottawa, with a capital of \$40,000, to carry on the business of machinists and iron founders, and to build special machinery at Belleville, Ont. The incorporators are: R. J. Graham, of Sidney, Ont.; also G. K. Graham and J. Bone, both of Belleville, Ont.

The Graham Development & Contracting Co. is the name of a new company which has just been incorporated with a capitalization of \$100,000, the head office to be situated in Fort William, Ont., the provisional directors being W. A. Dowler, K.C., A. H. Dowler and Edith Brown. This company has been organized for the purpose of conducting a general lumbering, mining, contracting, and prospecting business.

RAILWAYS—BRIDGES

Kincardine, Ont.—The Town Council have decided to call for new tenders for three bridges on Broadway and Durham streets.

Kincardine, Ont. — The Township Council of Kincardine will be put to an expense of about \$14,000 this year for new bridges and culverts, to replace those washed out. It means an assessment of about \$12 extra on every 100-acre farm. The Council will put it in this year's taxes.

BOOK REVIEW

Pulpwood Production.—One of the Canadian industries which has gone on increasing rapidly during war time is the production of pulpwood and the manufacture of pulp. The total quantity of wood manufactured into pulpwood in Canada in 1916 was over a million and three-quarter cords, as compared with one million four hundred thousand cords in 1915. The value of the pulpwood made into pulp in Canada and exported for making pulp abroad was nearly twenty million dollars. Very much more wood is now manufactured into pulp in Canada than is exported in the log form to be manufactured in other countries. A few years ago the reverse was the case. All the essential facts about the pulpwood and pulp industry in Canada in 1916 are shown in a bulletin issued by the Forestry Branch of the Department of the Interior. Copies of the same may be had free upon application for the "Pulpwood Bulletin for 1916" to the Director of Forestry, Ottawa.

CATALOGUES

Electric Travelers.—Catalogue No. 130, issued by the Whiting Foundry Equipment Co., Harvey, Ill., describes the various types of cranes built by this firm, showing the latest improved construction. While this catalogue deals chiefly with electric traveling cranes, a variety of other types are also featured, which includes cranes for every service. Crane trolleys, bridge trucks and other parts of the electric traveller are illustrated and described covering the principal features while details of other types of crane are also dealt with. A large number of excellent half tones show the several types of crane in operation featuring the wide field of application for this company's products. The concluding pages 74 to 79 are devoted to the Whiting line of foundry equipment and railroad specialties. The catalogue contains 81 pages and includes a list of some recent users of Whiting equipment.

WIRE SPRINGS
OF ALL KINDS
Machine Springs, Valve Springs, Automobile Cushion Springs, etc., of a quality that defies competition. Tell us your requirements. Send sample or specification for price.
JAMES STEELE, LIMITED
GUELPH, ONTARIO

BERTRAMS LIMITED
Engineers
Sciences, EDINBURGH
PAPER MILL MACHINERY
and
MACHINE TOOLS FOR IRON WORKERS
Catalogues offered to Purchasers.

WM. MUIR & CO., LIMITED
Manchester, England.
Machine Tool Makers.
Specialties: Patent Puncher Slotting Machines, Milling Machines, Boring Machines.
Agents: Messrs Peacock Bros., 68 Beaver Hall Hill, Montreal.
Send for catalogue.

JOHN STIRK & SONS, Limited
HALIFAX, ENG.
MACHINE TOOLS
Agents—The A. R. Williams Mch. Co., Ltd.
Toronto, Winnipeg, Vancouver, St. John, N.B.



The "Dupont" PATENT Power Hammer

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

Made carefully from carefully selected, high-class materials.

Positively Guaranteed

Seven sizes.

With rams from 35 to 300 lbs.

Write for full details.

THE PLESSISVILLE FOUNDRY
Plessisville, Que.

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

GAUGES
DIES, TOOLS AND REPAIRS
OXY-ACETYLENE WELDING
WORTH ENGINEERING CO.
163 Spadina Ave., Toronto, Ont.
Phone Adel. 3734
B. H. AYLSWORTH A. E. HACKWORTH

Lanco Balata Belting

BELTING FOR BIG SERVICE

Lanco Balata is as nearly stretchless as it is possible to have a good belt and is really waterproof.

Have you our Belting Book? Sent free on request.

Federal Engineering Co., Limited
172 John Street, Toronto

'Barnes-Made' Springs

are unusual in service and wear.

They are the result of sixty years' experience, unsurpassed equipment and highly skilled workmanship.

A trial will convince you that "Barnes-Made" Springs are the best buy.

Established 1857.
THE WALLACE BARNES COMPANY
218 South St., Bristol, Ct., U. S. A.
Mfrs of "Barnes-made" Products
Springs, Screws, Machine Products, Cold Rolled Steel and Wire

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

A PAYING PROPOSITION FOR RAILROADS or manufacturers. Wish to sell our Canadian rights with fixtures. Address Frank Bayless, 311 Fair Street, Springfield, Ohio. c9m

FOR SALE—1 LEES-BRADNER THREAD miller, equipped for threading nose and base of 6" shells. Apply The Hayes Wheel Co., Chatham, Ontario. c9m

SECOND-HAND 26" NEWTON TYPE COLD saw cutting-off machine, arranged for motor belt drive and complete, with or without motor. Price \$860.00, cars. MacKinnon, MacKinnon, Holmes & Co., Limited, Sherbrooke, Quebec. c10m

ONE ARMINGTON & SIMS 10" x 12" HIGH speed engine, belted to one Westinghouse Electric Mfg. Co. direct current generator, 40 K.W., 550 volts, 75 amps.; speed 910 r.p.m.; also 40" 0-10" double leather belting; all in good condition. Armstrong, Whitworth of Canada, Limited, Montreal, Que. c6m

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

FOR SALE—THE TORONTO ELECTRIC COMMISSIONERS have for sale a quantity of second-hand 60-cycle meters and transformers recently in service, also quantity of electrical supplies. List of material and full particulars may be obtained on application to the Purchasing Agent, 15 Wilton Avenue. The quantities are not guaranteed, and all are subject to prior sale. No tender necessarily accepted. Toronto Hydro-Electric System, 226 Yonge St., Toronto. c7m

HYDRAULIC EQUIPMENT FOR SALE—The equipment listed below is in first-class shape having only been used about three months. Blue prints and specifications and foundations drawings will be furnished. 2-14 x 12 x 5" Fairbanks-Morse duplex steam driven high pressure pumps at 80 gals. per minute capacity each against 600 lbs. pressure, steam pressure 150 lbs. 1-Weighted Accumulator good for 1000 lbs. per sq. inch, 16" diameter, plunger 11 ft. stroke with squeezing water cushion and wooden outside bumper blocks. The tank for the weighing material surrounding the cylinder is 10' 7" in diameter and 11' 0" high. 1-Return Suction Tank for above pumps and accumulator. Height, 9' 0", diameter 8' 0". Capacity, 2700 Imperial gallons. This equipment can be shipped immediately and is open for inspection at the company's plant. Prices on application. The Canadian Copper Company, Copper Cliff, Ont. c6m

SPECIAL MACHINERY

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

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

WANTED

WANTED—SECOND-HAND POWER SQUARING shear to cut No. 10 gauge steel up to 24" wide. Must be in good working condition. Packard Electric Company, St. Catharines, Ont. c1m

SITUATIONS WANTED

PRACTICAL WORKS MANAGER AND MECHANICAL expert with years of experience in United States and Canada, a specialist in munition work, open for engagement. Best of references. Apply Box 304, Canadian Machinery. c4m

MACHINE SHOP FOREMAN DESIRES change as shop foreman or master mechanic. Acquainted with scientific management; 26 years' experience. Box 328 Canadian Machinery. c11m

A PRACTICAL MACHINE SHOP SUPERINTENDENT of broad experience in Canada and States wants position as superintendent or general foreman. Large or small shop on ammunition or machinery: A1 references. Address Box 327, Canadian Machinery. c9m

EMPLOYMENT AGENT OR EMPLOYEE—interviewer position. Lady, middle-aged, possessing keen discernment, educated above the average, good correspondent (shorthand writer, typist), desires position as above with large firm of engineers or any factory, to interview employees and referees. Moderate salary desired. Toronto Engineering Agency, 57 Queen W., Toronto.

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

SITUATIONS WANTED

A PRACTICAL MACHINE SHOP SUPERINTENDENT of broad experience in Canada and States will be open for position as superintendent or general foreman, July 15th. A1 references. Address Producer, Box 321, Canadian Machinery. c3m

SITUATIONS VACANT

MECHANICAL DRAFTSMAN WANTED. Experienced on engines or turbines, capable of working out engine details. Apply giving full particulars as to experience, salary required, and enclose references, to Henry Hope & Sons of Canada Limited, Peterborough, Ont. c6m

NIGHT SUPERINTENDENT FOR SHELL machinery plant in Western Canada; knowledge of four point five shell and good all-round experience essential. Write, stating qualifications, salary and references, otherwise application will not be considered. Box 325, Canadian Machinery. c6m

FOREMAN WANTED—FOR SHOP IN CENTRE of Toronto, with up-to-date equipment, employing about thirty men, doing jobbing business and making fine special machinery and tools. When applying state experience and give references, also wages expected. Only first-class men need apply. Box 326, Canadian Machinery. c8m

WANTED—ASSISTANT SUPERINTENDENT for six-inch shell factory. Must be capable of getting maximum production from an established plant and have good mechanical experience. Duties to consist chiefly in supervising production. Give full particulars in writing of previous experience, age, references, and salary required, to Henry Hope & Sons of Canada, Ltd., Peterboro. All information will be treated in the strictest confidence. c6m

PRESS EQUIPMENT FOR SALE

50—No. 18 Bliss Type Inclinable Presses.

6—No. 19 Bliss Type Inclinable Presses, with roll feeds.

1—Double Acting (Michigan) Press.

1—Double Acting (Rhodes England) Press.

1—Brown-Boggs Multiple Power Shears.

A large number of these presses are equipped with Dial Feeds. Have only been used for a few months—good as new. Will be sold at a bargain if purchased at once.

Apply 702 Excelsior Life Building
TORONTO

c10m

FOR SALE

Equipment used for making
18-pr. Shells.

- 1—Warner & Swasey Turret Lathe, 2" x 24", with attachments.
- 1—Linderman Double Spindle Boring Machine, with attachments for finish boring sharp and nose turning H.E.
- 1—Flather & Co. 11" x 5' 0" Lathe, with chuck and countershaft.
- 1—Fosdick 16" x 6' 0" Lathe, with collet chuck and countershaft.
- 1—Braopose 16" x 6' 0" Lathe, collet chuck and taper attachment.
- 1—Gould & McCulloch Nosing Press with Dies.
- 1—Beatty Accumulator.
- 1—Lees-Bradner Thread Miller, with attachments and countershaft.
- 1—Jones & Lamson Turret Lathe, 2" x 24".
- 1—40-gallon Bowser Tank and Pump; good as new.
- 1—Cold Saw, with variable speed motor, 60 cycle, 220 volt, cuts up to 8" stock, complete with three saws.
- 1—4-Connection Pyrometer with Rheostat, made by Taylor Instrument Co.
- 1—Thermo Couples, 39" long, bent 124" from nose.
- 1—Thermo Couples, 39" long, straight.
- 1—One-Connection Tyros 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.

c11m

FOR SALE

- 4—14 x 6 Flather Engine Lathes, C.R., Q.C.G., new.
- 4—14 x 5 Reed Engine Lathes, R. & F.
- 3—18 x 8 Davis Engine Lathes, D.B.G.
- 1 18 x 10 Rahn-Larmon Engine Lathe, new.
- 1—18 x 12 Rahn-Larmon Engine Lathe, new.
- 1—22" x 10' Nicholson & Waterman Engine Lathe.
- 1—No. 13 B. & S. Automatic Gear Cutter.
- 1—30" Newark Automatic Gear Cutter.
- 1—5 x 48 Pratt & Whitney Plain Grinder.
- 1—No. 2 Bath Universal Grinder.
- 1—12 x 60 Modern Plain Grinder, new.
- 2—Lees-Bradner Thread Millers.
- 1—30 x 30 x 8' Powell Planer, new.

Brownell Machinery Co.
Providence, R. I.

NOW!

You've been going to send in that ad for weeks, so why not mail it now for next week's issue?

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., Geared Feed.
- New 15" x 6' South Bend, Sgl. B.G., Stan. Change Gears.
- New 15" x 6' South Bend, Sgl. B.G., Stan. Change Gears.
- New 15" x 7' Oliver Dbl. B.G., Q.C. Gear. Oil Pump and Pan.
- New 16" 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., Stan. Change Gears.
- S.H. 18" x 10' Muller Sgl. B.G., Standard Change Gears.
- New 18" x 10' South Bend Sgl. B.G., Stan. Change Gears.
- S.H. 20" x 10' Flather Sgl. B.G., Standard Change Gears.
- S.H. 20" x 10' Fay & Scott Sgl. B.G., Stan. 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. 20" x 10' Vilter Lathe, Friction B.G., Geared Feed with 18" Hex. Power Feed Turret.

DRILLS

- New 20" Excelsior, Back Geared Wheel Lever, Power Feed.
- New 20" Silver, Back Geared Wheel Lever Power Feed.
- New 14" Leland Gifford Single Spindle Sensitive.
- S.H. 14" Avey Spindle Sensitive.
- S.H. 14" Foote-Burt Four.
- New No. 1 Emco Bench Single.

HACK SAW MACHINES

- New Peerless High Speed.
- New No. 1 Rapid.

GRINDING AND BUFFING MACHINES

- New 30" Ford Smith Water Tool Grinder.
- New 18" Ford Smith S.O. General Purpose Pedestal Grinder.
- New 18" 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.

MISCELLANEOUS

- S.H. No. 23 Garvin Vertical Milling Machine.
- S.H. No. 0 Burke Hand Milling Machine.
- New 12" National Bolt Outter with Lead Screw Attachment.
- New No. 1 G-rubo Metal Saw Table.
- New D4 Reek River Slitting Shear.
- New No. 4 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

- 2" x 24" Stevens, flat type.
- 12" x 42" Foster, plain head.
- 15" x 6 1/2" American, fox.
- 15" x 6' Pratt & Whitney, turret.
- 22" x 8' Pratt & Whitney.
- 24" x 10' Conradson, D.B.G.
- 24" x 8' Lodge & Shipley.
- 26" x 8' Fay & Scott, B.G.
- No. 2 Warner & Swasey, plain head.
- No. 6 Warner & Swasey, friction head.

ENGINE LATHES

- 13" x 6' Filsmith, D.B.G.
- 14" x 6' Lodge & Shipley.
- 15" x 8' Sebastian, back geared.
- 16" x 8' McDougall, back geared.
- 17" x 8' Biaisdel, back geared.
- 18" x 6' New Haven.
- 18" x 10' Putnam, back geared.
- 20" x 8' Fifeid, back geared.
- 21" x 8' Bawden, heavy duty.
- 23" x 11' Pond, back geared.
- 30" x 10' Ames, back geared.
- 31" x 16' Fifeid, back geared.
- 18" x 32" x 12' C.M.G. gap.
- 24" x 40" x 20' Dundas, gap.
- 28" x 50" x 24' Bertram, gap.

DRILLS

- 13" Perfect, 2-spindle.
- 14" Excelsior, sensitive.
- 15" Barr, sliding head.
- 18" Buffalo, post drill.
- 20" Perfect, lever feed.
- 20" Silver, back geared.
- 22" Barnes, back geared.
- 22" Kerkhoff, sliding head.
- 40" Bickford, back geared.
- 64" Canedy-Otto, wall radial.
- No. 10a Bausch, 16-spindle.
- No. 1/2 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 6 1/2' Bertram.
- 25" x 25" x 12' Lodge & Davis.
- 36" x 36" x 10' Sellers, 4 heads.
- 40" x 40" x 12' New Haven, power feed.

MILLING MACHINES

- No. 0 Burke, hand feed.
- Bertram, plain.
- Brown & Sharpe, power feed, plain.
- Fitchburg, geared, plain.
- No. 2 Ford-Smith.
- No. 6 Whitney, hand feed.

SHAPERS.

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

MISCELLANEOUS

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

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

RIVERSIDE Machinery List

We Own Every Tool Offered

- ENGINE LATHES**
- 1-20 x 10 Hamilton Standard Engine Lathe, with turret.
 - 1-20 x 15 Putnam Standard Engine Lathe.
 - 1-20 x 11 Putnam Standard Engine Lathe.
 - 1-20 x 10 Rev. Standard Engine Lathe.
 - 1-22 x 8 Reed Standard Engine Lathe.
 - 3-New 18 x 3 Springfield Engine Lathes.
 - 1-New 18 x 3 Springfield Engine Lathe.
 - 1-New 14 x 6 Springfield Engine Lathe.
 - 1-18 x 6 Jones & Lamson Standard Engine Lathe.
 - 2-16 x 8 Reed Stud Lathes.
 - 1-16 x 8 Porter Standard Engine Lathe.
 - 1-14 x 8 Sebastian Standard Engine Lathe.
 - 1-14 x 6 Springfield Engine Lathe.
 - 1-14 x 6 Prentiss Engine Lathe.
 - 1-14 x 6 Sebastian Engine Lathe.
 - 2-14 x 6 Van Velsk Engine Lathes.
 - 1-No. 3 Hartlage Bench Lathe.

- TURRET AND SCREW MACHINES**
- 1-26" Gisholt Turret Lathe.
 - 2-No. 6-A Potter & Johnson Automatic Lathes.
 - 1-24 x 24 Jones & Lamson Flat Turret Lathe, S.G.H.
 - 1-2 x 24 Jones & Lamson Flat Turret Lathe, one head.
 - 3-No. 4 Foster F.G.H. Hand Screw Machines.
 - 1-No. 4 Smur & Kameron Hand Screw Machine.
 - 1-No. 6 Pierson F.G.H. Hand Screw Machine.
 - 4-New 14" Power Turret Lathes.
 - 2-New 1 x 8 Pierce Hand Screw Machines.
 - 2-New Cleveland Automatic Screw Machines, Jigger feed.

- MILLING MACHINES AND GRINDERS**
- 1-No. 2 Hendey Plain Milling Machine.
 - 3-New No. 1 1/2 American Plain Milling Machines.
 - 1-No. 23 1/2 Garvin Plain Milling Machine.
 - 1-No. 0 Brown & Sharpe Plain Milling Machine.
 - 1-No. 1 Cincinnati Plain Milling Machine.
 - 2-No. 13 Pratt & Whitney Lincoln Type Milling Machines.
 - 5-No. 14 Knight Milling & Drilling Machines.
 - 3-Fox Hand Milling Machines.
 - 1-Garvin Hand Miller.
 - 4-No. 0 Burke Bench Millers (new).
 - 1-No. 25 Ball Turret Lathe.
 - 1-No. 2 Wilmarth & Morman Surface Grinder.
 - 1-No. 3 Wilmarth & Morman Surface Grinder.
 - 1-Mina Valley Bench Surface Grinder.
 - 1-No. 170 Wells Cutter Grinder.

- DRILL PRESSES**
- 1-3' Mueller Plain Radial Drill.
 - 1-6' Mueller Plain Radial Drill, old type.
 - 1-27' Baker H.D. Drill.
 - 6-30" Buffalo Plain Drill Presses.
 - 1-3 spindle 8" overhang Henry & Wright High Speed Drill.
 - 4-4 spindle Fox High Speed Drill Presses.
 - 2-4 spindle Fox High Speed Drill Presses.
 - 1-16 spindle Nafco Drill.
 - 3-17" Leland & Gifford High Speed Bench Drills.

- SHAPERS AND PLANERS**
- 1-24" Ohio H.D. R.G. Crank Shaper.
 - 1-24" Lytle & Davis Geared Shaper.
 - 1-18" Howker Geared Shaper.
 - 2-16" New Springfield P.G. Crank Shapers.
 - 1-27 x 27 x 8' Cincinnati Planer, S.H.
 - 1-16 x 16 x 5' Hendey Planer, S.H.

- PRESSERS AND HAMMERS**
- 1-Watson-Perrill O.R.I. Press, geared.
 - 1-No. 10 Perkins Drawing Press.
 - 5-No. 2AV Bliss Wiring Presses.
 - 1-800 lbs. B. & S. Roll Board Hammer.
 - 1-800 lbs. P. & V. Roll Board Hammer.
 - 1-500 lb. Seranton Belt Hammer.
 - 1-25 lb. Pradley Helve Hammer.

- AIR COMPRESSORS**
- 1-8 x 8 x 17 1/2 Union Steam Pump Co. steam driven air compressor.
 - 1-8 x 6 Westinghouse Steam Air Compressor.
 - 1-10 x 10 Clayton 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. Belt Driven Air Compressor.
 - 1-7 1/2 x 6 Chicago Pneumatic Tool Co. Belt Driven Air Compressor.

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

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

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

Eastern Machinery & Equipment Co., Inc.

319 COMMERCIAL TRUST BUILDING

- NEW TOOLS FOR IMMEDIATE DELIVERY**
- 4-12" x 36" Bridgeport Grinders.
 - 1-24" x 24" Wm. Sellers Tool Grinder.
 - 3-18" x 9" Turning and Boring Lathes.
 - 3-26 x 11' Am. Pat. Eng. Lathe.
 - 3-Double head Sullivan Grinders.
 - 1-20" x 12" Pittsburgh Engine Lathe.
 - 1-24" Ohio Shaper.

- USED MACHINERY**
- AMERICAN LATHES**
- 8-30" x 10' American Gear head A-1.
 - 5-24" x 8' American Lathe & Shaper, geared head, q.c.p.
 - 1-30" x 10' Bullard.
 - 1-24" x 6' Bullard.
 - 3-24" x 14' American.

- TURRET LATHES**
- 3-24 x 30 Jones & Lamson Flat Turret.
 - 2-24" x 21" Jones & Lamson Flat Turret, bar equipment. Full set. Turret Tools.
 - 9-20" Gisholt 12" Collet chuck 6 1/2" hole in spindle threading lathe.
 - 3-30" Putnam heavy duty lathe.
 - 1-14" x 6' Lodge & Shipley Turret. Backgeared.
 - 5-24" Gisholt 2 STEP CO.

- BORING MILLS**
- 6-60" swing Bement-Miles 7 1/2" Turning Mills, two swivel heads-15 1/2" under rail.
 - 1-37" Baush Boring Mill, 2 heads, good as new.
 - 1-Cylinder boring mill, capacity of 2 1/2" diam, to 3/4" diam, 40" long.
 - (Tool equipment included, good as new.)
 - 1-42" Bullard Boring 3 1/2" (2) heads.

- PLANERS**
- 1-48" x 12' Pedrick open side.
 - 1-30" x 36" Pedrick, open side.
 - 1-26 x 36 x 10 Ohio, 2 heads.

- MILLING MACHINES.**
- 1 No. 3 LeBlond Plain Miller, table 13 1/2 x 38 1/2.

- 1-No. 2 Kempsmith, table 10" x 46".
- 1-24" x 8' Beaman & Smith Open Side Slab Miller, with two vertical spindles.
- 1-No. 42 Universal Milling Machine.
- 1-GEAR CUTTERS
- 1-24" Follows Gear Shaper.
- 2-36" Follows Gear Shapers.
- 1-SCREW CUTTING MACHINES
- 1-Cleveland automatic.
- 1-No. 38 National Acme 4 spindle, good as new.
- 1-No. 34 National Acme 4 spindle, good as new.
- 1-5" SLOTTERS AND SHAPERS
- 1-Bumont Slatter.
- 1" Bumont Slatter.
- 1-Wharton Shorter.
- 2-36" Good & Escherich SHAPERS, B.G. Vise, C.S.
- 1-16" Steptoe Shaper.

- GRINDERS.**
- 8-12" x 36" Bridgeport.
 - 1-17" Full Universal Lathis Machine.
 - 1 No. 13 Brown & Sharpe Universal and Tool Grinder. Full equipment.
 - No. 15 Universal Outlet and Reamer Grinder.
 - 2-23" Bridgeport Face Grinder, with magnetic chuck.
 - 1-Esker Trefle Grindas for Cutters.
 - 1-No. 28 Brown & Sharpe Plain Grinder, 17" x 36".
 - 3-24 x 6 Std. Universal Tool & Cutter Grinders.
 - 1-16" Dresser friction clutch back gear.
 - 2-18" American Monitor back gear carriage and control.
 - 2-34" L. E. Hall Turret Monitors, back gear.
 - 1-DRILL PRESSES
 - 1-24" Bickford Upright back gear sliding head lever and wheel feed drill.
 - 1-4" Bickford Radial, with Tapping attachment, motor drive, with motor.

GOOD USED EQUIPMENT

- ELECTRIC TRAVELING CRANES.**
- 20-Ton, 5 1/2' span, three motor, 110 volts, D.C.
 - 4-Ton Bulleye crane, 800 lbs. volts, D.C.
 - 1-Ton, 40' span, 80' lift, three motor.
 - 5-Ton, 17' 0" span, three motor, 220 V., D.C. (Gate Motors, 1 and 1 1/2 H.P., 220 V., D.C.)
 - 10-Ton hand crane, 55' 0" span.
 - 30-Ton hand crane, 29' 0" span.
 - 1-Ton hand cranes, 22' span.

- PUNCHES AND SHEARS.**
- Lever Shear (double), cap. 2" sq.
 - 3/8" throat (single), cap. 3/8"x3/8" (belt).
 - 3/8" throat (single), cap. 1 1/4" (belt).
 - 4/8" throat (single), cap. 3/4"x1 1/2" (steam).
 - 1/2" throat (single), cap. 1 1/2"x1 1/2" (belt).
 - 5/8" throat (single), cap. 3/4"x3/4" (belt).
 - 1 1/2" throat (single), cap. 3/4"x3/4" (hand).
 - 10" throat (double), cap. 1 1/2"x1 1/2" (belt).
 - Squaring Shear, 50" cap., 14 gauge.
 - Angle Shear (double), cap. 60x3/4" (belt).
 - Plate Shear (Univ.), 18" blade, cap. 3/4".
 - Roller shearing, 30" throat, cap. 1/2".
 - 1-Ton hand, 3" throat, cap. 1/2".
 - 1-Ton hand, 3" throat, cap. 1/2", spring steel.
 - Guilbrine, Perkins, No. 6, cap. 2 1/2" sq.

- MISCELLANEOUS.**
- Vene Bolt and Upsetter, 1 1/2" cap.
 - Puller, No. 12 Ajax, 2 1/2" stroke.
 - Bending Roll, 60" end, 6 1/2 and 8" rolls.
 - Lathe, 24" x 10' American, latest.
 - Grinder, No. 10 B. & S. Plain.
 - Grinder, No. 13, B. & S. Universal and Tool.
 - Rotary Planer, 36", Cleveland No. 2.
 - Saw, cold, 26" blade, 48" travel.
 - Press (trimming) No. 11 Perkins, 16,500 lbs.
 - Rolling Mill, 1 stand, 2 high 20" hot. housings.
 - First-class condition-quick shipments.

McCoy-Brandt Machinery Co.
Office and Warehouse:
216-218 Penn Ave., Pittsburgh, Pa.

C. W. CULLEN MACHINERY CO. LEADER-NEWS BUILDING CLEVELAND, OHIO

- Bickford 4 1/2" Plain Radial Drill, one drive.
- No. 3 Lapointe Broaching Machine, new.
- 2-P. & W. No. 2 Cutting-off Machines.
- Bement Miles & Co. 7 1/2" Vertical Spindle Crank Drilling and Boring Mill, 68" swing.
- Detroit Japanning Ovens, 8' 10" x 8' x 152".
- Pratt & Whitney 48" Gap Lathe.
- Hanna 30-ton Riveter, 12" reach.
- Fangborn Sand Blast, 90" rotary table, M.D.
- 3 800-ton Gen. El. Hydraulic Double Action Presses.
- 3-2 1/2" Cleveland Automatics; prac. new.
- 10-3" B. & S. Automatics.
- 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.
- 80" Niles Vert. Boring and Turning Mill, 2 heads, slotting attachment.
- Ingersoll-Rand Air Comp., 342 cu. ft., steam driven, inter-cooler, complete.
- Bertech Straightening Rolls, 7" x 84"-3" vert. adj. M.D.
- Kelly Springfield 10-ton Road Roller, rebuilt.
- Vulcan 1 cu. yd. Steam Shovel, traction; weight 35 tons; new flues.
- 62-ton Baldwin Consolidation Locomotive.
- Ajax No. 1 Taper Forging Rolls, 50 strokes.
- One No. 5 S-3 Cold Langelier Swadner.
- 3-No. 7 H.S.-6 Langelier Swadner.
- 1-Bolt and Rivet Header, hand feed, 5 1/2" x 3 1/2" rivets.
- Bolt and Rivet Header, hand feed, 3/4" x 4" rivets.
- 70-C Bucyrus Steam Shovel, St. G.
- R. Is. Locomotive, 45 tons, St. G.



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

CANADIAN MACHINERY
Classified Advertising Section
143-153 University Ave., Toronto

List of Machinery in Stock for Sale

FOR 60-PDR. SHELLS

- 2—N. 150 Brown & Boggs, Dial Feed, Without Dial Feed.
- 2—N. 150 Brown & Boggs, with Dial Feed.
- 2—No. 1 Toledo, with Dial Feed.
- 1—N. 61 V. & O. Presses with Roll Feed.
- 1—No. 18 Perkins Press, Plain.
- 2—No. 217 McDonald Double Acting Can Press with Magnet Stack Lifter and Auto. Feed.
- 1—No. 25B Niagara Tool Works Co. Slitting Machine.
- 1—Hobden & Mosan Thread Mill; 1 1/2 base and.
- 1—Hobden Duplex Thread Mill; 1 1/2 base and.
- 1—Barnam Capot; Band Lathe.
- 1—Barnam Band Press with Pump.
- 1—Barnam Ring Twister (home made).
- 1—Roll Riveter (home made).
- 1—6" Shell Vise (home made).
- 1—5" Marking Head (home made).
- 1—5" Hand Tapping Vise (home made).
- 1—Wagoner Special Rough Turners and Cutting off Lathe.
- 1—Jenckes Band Turner.

MISCELLANEOUS

- 4—Errington Collapsible Taps, 2".
- Chasers for above.
- 1—1 1/2" Automatic Hartford Screw Machine; in first-class condition.
- 1—Noble & Westbrooke Marking Machine, only used to mark 200,000 gauges; good as new.
- 1—P. & W. 5/8" Screw Machine.

FOR 6" SHELLS

- 2—50-lb. Beachy Champion Hammers.
- 4—Sets 5" Shell Nosing Dies for above.
- 2—1 1/2" Villesco Varnish Scrapers; 1 quart size.
- Transformer set for above.
- 1—No. 3 West Banding Press for 6" shell.
- 1—Greenough Turf, 2 1/2".
- 1—"M.L.", 2 1/2" x 12", Double Back Gearing.

All the above are in good condition and only ran six months.

McKinnon Dash Company
St. Catharines, Ont.

c11m

Don't Keep It--Sell It!

- If you have a
- lathe
 - drill
 - milling machine
 - planer
 - chain block
 - chuck
 - motor
 - crane
 - stock of belting
 - engine
 - compressor

or any other machine shop equipment for which you really have no further use, why not turn it into *cash*?

Someone may be looking for just the machine you may want to sell. Let us bring you together.

A "classified" ad. in CANADIAN MACHINERY, costing a few cents per issue, has done wonders for others. Why not try it?

Turn to the "Classified" section in this issue and see what is being offered and what is wanted at present.

CANADIAN MACHINERY

Classified Advertising Section

143-153 University Avenue TORONTO, ONT.

STEEL BUILDING CRANES

STEEL Building or Coal Shed, 108 ft. by 298 ft., maximum height 40 ft., containing approximately 450 tons of structural steel.

Two Brown Patent Bridge Tramways, hoisting and conveying apparatuses consisting of a bridge tramway with tracks permitting a movement of 300 ft., distance between movable piers 180 ft., with end cantilevers 92 ft. and 36 ft. Each bridge has in its house, Brown Patent Hoisting Engine with the most modern operating mechanism, together with all necessary fittings and connections for complete operation, together with six Brown Patent Automatic Self-Dumping Coal Tubs of 42 cu. ft. capacity; two single rope buckets of 48 cu. ft. capacity; four skips of 2 ton capacity; and also automatic clam shell bucket. Both these outfits are practically in new condition.

New York Machinery Exchange, Inc.

50 Church Street . . . New York City

IMMEDIATE DELIVERY

DRILLING MACHINES

Leland H.S., E.B., bench type.
 No. 1½ Knight Drill and Miller.
 14" Rockford Sensitive.
 22" W. F. & J. Barnes, s.h., b.g., p.f.
 32" Hamilton, s.h., b.g., p.f.
 32" W. F. & J. Barnes, s.h., b.g., p.f.
 20" W. F. & J. Barnes, 4 spindle.
 3" W. E. Gang Plain Radial.
 3½" W. E. Gang Plain Radial.
 Pawling & Harnischfeger Horizontal Driller.

GEAR CUTTERS

Reynolds Hobber.
 No. 11 B. & S. automatic.
 30" x 9" G. & E. auto. for spur and bevel.
 24" x 7" G. & E. for spur.
 No. 3-28" B. & S. for spur.
 36" Walcott for spur.

GRINDERS

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

13" x 5' P. & W., c.r., taper.
 14" x 6' Fairbanks, c.r., taper.
 18" x 6' Prentice, c.r.
 18" x 8' L. & S. pat. head, c.r., taper.
 18" x 10' Fitchburg, c.r.
 18" x 12' Barker, c.r.
 20" x 14' Blaisdell, c.r.
 21" x 12' New Haven, c.r.
 24" x 18' New Haven, c.r.
 36" x 20' American, t.b.g.
 36" x 22' New Haven, t.b.g.
 3½" x 60" Fitchburg Lo-Swing.

PLANERS

24" x 24" x 4' Gray, one head.
 24" x 24" x 8' Cincinnati, one head.
 30" x 30" x 8' Woodward & Powell, one head.
 30" x 30" x 8' Cincinnati, two heads.
 36" x 36" x 14' Sclera, one head.
 40" x 38" x 14' Putnam, one head.
 50" x 50" x 18' New Haven, two heads, two extension heads.

SCREW MACHINES

1" B. & S. Plain.
 16" P. & W. Plain.
 No. 2 Costello, plain head.
 No. 2 P. & W. friction head.
 No. 4 Pearson, geared head.
 No. 3 Bardons & Oliver, plain head.
 7½" Cleveland, automatic.

TURRET LATHES

16" Lodge & Shipley.
 25" Niles.
 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 attachment.

PUNCHES AND SHEARS

No. 3 Bauroth, O.B.I.
 No. 5 Bauroth Geared, O.B.I.
 No. 6 N. American Can.
 No. 2 L. & A. Angle Iron Shears, 5"x5"x½" (new).
 No. 5 L. & A. Double Punch & Shear, 5"x5"x½" (new).
 No. 1 L. & A. Multiple Punch (new).
 No. 2 L. & A. Multiple Punch (new).
 No. 1 L. & A. Horizontal Punch, ½" in 1" (new).

MISCELLANEOUS

No. 2 Kempnath Universal Miller.
 50-lb. Bradley Strap Hammer.
 ¾" Acme Forging Machine.
 52" Niles car wheel boring mill.
 3" Stover Pipe Machine.
 6" x 14" P. & W. Thread Miller.
 No. 1 American Air Tempering Furnace.
 Belt Lacing Machine.
 3-ton Yale Duplex Hoist.

Stocker-Rumely-Wachs Company, 117-121 N. Jefferson St., CHICAGO, ILL.

Let the Boss Know It!

If you are a reader of Canadian Machinery, I go tell your employer about it some convenient time! You couldn't tell the up-to-date manufacturer anything that would please him more. He would know that you are abreast of the times; that you are ambitious and interested in your work; that you are acquainted with methods and machinery which make for greater efficiency. He will say softly to himself: "Here is a live wire,—I'll just keep my eye on that chap."

If you are not a regular reader it will pay you to become one right away—quick.

Subscription price—\$3.00 per year. 52 issues.

LOOK—HERE THEY ARE

BORING AND TURNING MACHINES—VERTICAL.

- 1-3rd Bullard, 1 turret head.
- 1-3rd Flather, one turret head.
- 1-3rd Farnish, 2 turret heads.
- 2-3rd Brown & Sharpe, one turret head; Dec delivery.
- 1-4th Niles, two turret heads, motor drive.
- 1-10th Gisholt, 2 heads.
- 1-7th Niles, two turret heads.
- 1-10th Niles, two turret heads, slotting attachment.
- 1-8th Sellers, one head.
- 1-9th Vertical Collins.
- 1-10th S. Rickford, December delivery.
- 10th Niles, 2 heads; December delivery.

- 1-New 10 x 36th Landis; immediate.
- 1-New 10th x 36th Norton, Sept. delivery.
- 1-New 10th x 60th Norton, Sept. delivery.
- 1-16th x 60th Landis.
- 1-New 10th x 72 Norton, Plain.
- 30-12th x 34th Modern, self-contained.
- 1-12th x 28th Landis, rebuilt.
- 6-12th x 36th Modern, self-contained, motor or belt driven.
- 4-12th x 42th Landis, self-contained.
- 1-30th x 18th Modern, self-contained, motor driven.
- 1-16th x 66th Landis, with crank grinding.
- 1-18th x 96th Brown & Sharpe.

GRINDING MACHINES—CYLINDRICAL—UNIVERSAL.

- 1-Brown & Sharpe No. 15, 8" x 34".
- 1-New No. 2 Bath, 9" x 30".
- 1-No. 2 New Walker, 9" x 36".
- 1-No. 1 1/2 (10" x 30") Landis.
- 1-New No. 2 1/2 (10" x 36") Bath.
- 1-10th x 42" Modern.
- 9-New No. 2 Morse, cap. 12" x 30". Universal, Nov. delivery.

BORING MACHINES—HORIZONTAL.

- 1-Lucas, 2 1/2" bar.
- 1-No. 1 Barrett Cylinder Borer, 3 1/2" bar type.
- 1-Newburgh 4" bar, 8 1/2" swing, 72" feed.
- 1-No. 2 20th Barrett, 2 facing heads.
- 1-Betts Table Type, 4" bar, 8" spindle to bearing.

BULLDOZERS.

- 1-New No. 4 Garrison (same as No. 4 Williams-White).
- 1-1-7th High-speed Ajax, 16" stroke.
- 1-No. 9 Williams & White, belt drive.
- 1-No. 23 Williams & White, belt drive.
- 1-No. 38 Williams & White, belt drive.

COMPRESSORS—AIR.

- 1-Ingersoll-Sargeant Duplex, 8 x 1 1/4 x 8".
- 1-Cincinnati Cross Compound, two-stage, 790 cu. ft.
- 1-10th x 12th Chicago Pneumatic, belt-driven.
- 1-10th x 16th x 10th Single Cylinder Smith-Vale, steam driven.
- 1-12th x 12th x 16th Ingersoll-Rand, motor driven.

CRANES.

- 2-10-ton Electric, 47' span.
- 1-50-ton Nile, 61' span.
- 1-Locomotive, 35' boom, standard gaged, steam driven.

CUTTING-OFF MACHINES.

- 2-No. 60 Brown & Sharpe.
- 1-2nd capacity Warner & Swasey.
- 4-34th Hall.
- 10-44th Williams.
- 3-4th Curtis & Curtis.

DRILLING MACHINES—RADIAL.

- 2-New 2nd American, cone drive.
- 1-3rd Rickford, semi-universal table.
- 1-3rd Rickford, gear drive.
- 3-New 3rd Americans, sensitive tapping attach.
- 1-New 3rd Mueller, plain speed, box drive.
- 1-New 3 1/2nd Western Drill, 8 1/2" circle.
- 2-4th Mueller, plain, speed box drive.
- 1-5th semi-universal American.
- 1-6th American full Universal.
- 1-6th Baush Plain, cone drive.
- New 6th Triumph, motor drive; September delivery.

DRILLING MACHINES—HEAVY DUTY.

- 2-New No. 2 Colburn.
- 3-No. 14 Colburn, 24" swing, capacity 2" in solid steel.
- 2-14th Colburn, plain table.
- 1-No. 33B Baker, single pulley drive, late type.

DRILLING MACHINES—MULTIPLE SPINDLE.

- 4-New Leland-Gifford, sensitive, four spindle.
- 1-No. 200 Baush, 12 spindle, capacity 1 1/2" holes, 30" circle.
- 1-14-spindle Baush, capacity 1" holes, 36" circle.

GEAR-CUTTING MACHINES.

- 1-No. 1 Whitton.
- 1-No. 3 Bickett Gear Rack Planer, delivery 60 days.
- 1-No. 3 Brown & Sharpe Auto. Gear Cutter, Spur.
- 1-New 5th Standard Gear Cutter, Spur.
- 1-12th Gleason Bevel Gear Planer.
- 1-16th Gleason Bevel Gear Planer.
- 1-16th Blugram Bevel Gear Generator.
- 1-30th Grant-Lee Gear Hobber.
- 1-No. 1 30th Scheuchart & Schutte Gear Hobber.
- 1-23rd x 4 G. & E. Spur and Bevel Cutter.
- 9-4th Fellows Gear Shapers.
- 1-24th x 8" G. & E. for Spur and Bevel.
- 1-24th Becker Brainard.
- 1-New No. 10 Whitton, Bevel 30", Spur 34".
- 5-30th Fellows Gear Shapers.

GRINDERS—INTERNAL FOR CUTTERS, DRILLS, REAMERS, ETC.

- 1-No. 1 Cincinnati.
- 1-New Norton No. 1.
- 1-New Walker No. 1, outfit B.
- 1-New Walker No. 2, outfit K (capacity 10" x 36").
- 1-New Wilmarth & Morman, style B.K.
- 1-No. 190 Wells.
- 1-Gisholt No. 5, 12".

GRINDING MACHINES—CYLINDRICAL—PLAIN.

- 1-New No. 12 Brown & Sharpe, 8" x 36", Sept. delivery.

- 1-21st x 11th Lodge & Shipley, patent head.
- 1-24th x 34th Perkins, single back geared, raising blocks to 40", 18" chuck.
- 1-24th x 41st x 25th Pitman, double spindle.
- 1-26th x 31st New Haven.
- 4-27th x 14th Patent Head Lodge & Shipley, double back geared.
- 1-28th x 18th New Haven, single back geared.
- 1-28th x 18th Schumacher & Boye.
- 3-New 30th x 12th Pittsburg pattern.
- 8-New 34th x 23rd Pitman, triple geared.
- 1-38 x 19th Stepto, single back gear.
- 1-12 x 30th Fifeled, triple gear.

LATHES—TURRET.

- 1-27th x 27th Jones & Lamson, geared sliding head.
- 5-2 x 24 Jones & Lamson.
- 16-5th Potter & Johnson.
- 1-New 21st Gisholt.

MILLING MACHINES—KNEE TYPE—UNIVERSAL.

- 1-No. 2 Kempsmith, 15", dividing head.
- 1-No. 2 Kempsmith, vertical attachment.
- 1-New Kempsmith.
- 1-No. 2 Kempsmith, back geared.
- 1-No. 2 Cincinnati.
- 2-No. 3 Cincinnati, late model; almost new.
- 1-New No. 3 Kempsmith.
- 1-New No. 3 Becker, August delivery.
- 1-New No. 4 LeBlond, heavy duty; immediate.
- 1-No. 4 Cincinnati, with vertical attachment.

MILLING MACHINES—KNEE TYPE—PLAIN.

- 1-No. 0 Pratt & Whitney.
- 1-New No. 1 Brown & Sharpe.
- 2-New No. 1 Kempsmith.
- 2-New No. 1 1/2 American, back gear.
- 1-New No. 3 Rockford.
- 2-New No. 3 Kempsmith.
- 1-No. 3 LeBlond.
- 1-No. 3 Cincinnati.
- 1-No. 4 Garvin.

MILLING MACHINES—VERTICAL.

- 1-New Bickett, No. 0.
- 4-New No. 4B Becker.
- 2-New No. 5 Becker.
- 1-New No. 6 Becker.

MILLING MACHINES—PLANNER TYPE.

- 1-No. 2 Beaman & Smith, vertical spindle, open side.
- 2-Ingersoll Slab Millers, working surface of table 50" x 20".
- 1-No. 4 Beaman & Smith, vertical spindle, open side, working surface of table 120" x 34", removable housing on one side.

PLANERS.

- 1-34" x 24" x 6' Gray, one head on cross rail.
- 2-4" x 30" x 8' Cincinnati, one head; used three months.

- 1-76" x 26" x 8' Gray, one head on cross rail.
- 1-30" x 30" x 8' Gale Planer, one head.
- 1-30" x 30" x 12' Cincinnati, two heads.
- 1-36" x 30" x 12' New Haven, one head.
- New 36" x 30" x 12' Bickett, one head; January del.; additional heads if desired.
- 1-New 38" x 30" x 12' Woodward & Powell, two heads on cross rail, one side head; Oct. delivery.
- 1-36" x 36" x 12' Gray, two heads.
- 1-38" x 36" x 14' Sellers, four heads.
- 4-40" x 40" x 11th Niles, four heads.
- 1-Gray, 42", widened to 56" x 42" x 16, two heads.
- New 48" x 42" x 16' Bickett, one head; January delivery; additional heads if desired.
- 1-48" x 48" x 16' Sellers, one rail head, two side heads.
- 1-60" x 14th Powell, one head.
- 1-60" x 52" x 16' Betts, two heads, right angle drive.
- 1-60" x 48" x 16' Woodward-Powell, 2 heads.
- 1-60" x 48" x 16' Graves, two heads.
- 1-60" x 60" x 18th Niles, two heads.
- 1-32nd 4 Niles Plate Planer.

SCREW MACHINES—AUTOMATIC.

- 5 N. 51 National Acme.
- 1-No. 515 National Acme.
- 2-No. 52 National Acme.
- 2-No. 53 National Acme.

SHAPERS.

- 1-New 16th Springfield.
- 1-16th Motor-driven Rockford.
- 2-New 24th Milwaukee.
- 1-New Barker, 24".
- 1-20th Walcott, gear drive.

SLOTTERS.

- 1-18th Betts, adjustable stroke.
- 2-12th Bennett Gear.
- 1-5th Bond Gears.

W. F. DAVIS MACHINE TOOL COMPANY

CHICAGO, ILL. CINCINNATI, OHIO CLEVELAND, OHIO NEW YORK CITY

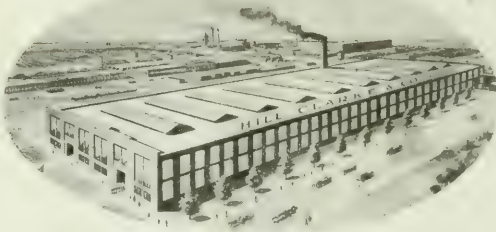
549 Washington Blvd. 1018 Union Central Life Bldg. 508 Leader News Bldg. Singer Bldg.

WRITE OR WIRE OUR NEAREST OFFICE FOR QUOTATIONS
THIS IS ONLY A PARTIAL LIST OF AVAILABLE MACHINES

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

ReMANUFACTURED —(ORIGINATED BY US)— MACHINE TOOLS

We Want Your Business Now and We Want It After the War
A RE-MANUFACTURED MACHINE WILL MAKE OUR RELATIONS PERMANENT
300 Machines—Latest Models. Over 300 Others But Slightly Older



The Only Re-MANUFACTURING Plant in the World.

OUR GUARANTEE

Your money back if you return a machine within 30 days from date of shipment, freight prepaid.

NO EXCUSES NECESSARY.

ENGINE LATHES—Latest Models

- 24—22" x 8' Hamilton, D.B.G., C.R., semi-Q.C.
- 5—22" x 8' Hamilton, D.B.G., turret tool post.
- 4—22" x 8' Davenport, D.B.G., tur. tool post.
- 7—22" x 10' Hamilton, D.B.G., C.R., semi-Q.C.G.
- 2—22" x 10' Hamilton, D.B.G., turret tool post, semi-Q.C.G.
- 20—22" x 10' Davis, D.B.G., C.R., Q.C.G.
- 8—24" x 10' Lodge & Shipley, D.B.G., C.R., Q.C.G.
- 8—24" x 10' Lodge & Shipley, selective gd. hd., C.R., Q.C.G.
- 11—26" x 10' American, D.B.G., C.R., and carriage turret, Q.C.G.
- 2 26" x 10' American, D.B.G., carriage turret.
- 19—26" x 12' Putnam, carriage turret, semi-Q.C.
- 9—26" x 12' Putnam, C.R., semi-Q.C.
- 2—26" x 12' Wickes, D.B.G., C.R., semi-Q.C.G.
- 10 28" x 10' Niles, Bement, Pond, C.B.G., Q.C.G.

- 4—28" x 14' Lodge & Shipley, select gd. hd., motor drive, C.R., turret and taper.
- 3—30" x 16' Lodge & Shipley, D.B.G., C.R., turret and taper.
- 10—40" x 18' Pittsburgh, triple geared, Q.C.G.

TURRET MACHINES—Latest Models

- 25—21" Gisholts, 3½" hole, 2-step, 5" belt.
- 20 21" Gisholts, 3½" hole, motor arrangement.
- 13—24" Gisholts, 4¼" hole, 3-step, 4" belt.
- 38—24" Gisholts, 6" hole, 2-step, 6" belt.
- 41—24" Gisholts, 6" hole, motor arrangement.
- 2—2¼" x 26" Greenlee Flat Turrets.
- 2—2¼" x 26" Pratt & Whitney Gd. Hd. turrets.
- 4—3-A Warner & Swasey (bar machines).

RADIAL DRILLS

- 4 2½" Fostick.
- 2—2¼" Mueller.
- 1—2¼" Dreses.
- 1-3' Prentice

- 1—3' Mueller.
- 1—3¼' Gang.
- 1—4' Niles Full Univ.
- 3—5' Niles Semi-Univ.

DRILLING MACHINES

- 1—24' Baker High Duty.
- 1—2-spindle Foote-Burt.
- 4—2-spindle Baker Vert. Cyl. Bor. Meh., adj. spindle.
- 1—4-spindle Foote-Burt Rail Drill.
- 1—10-spindle Foote-Burt Rail Drill.
- 1—12-spindle Moline Rail Drill.

SHAPERS

- 1—15" Hendey Friction Shaper.
- 1—16" Perkins Friction Shaper.
- 2—16" Barker Plain Crank.
- 1—24" Gould & Eberhardt Back Geared Crank.
- 1—24" Queen City Back Geared Crank.
- 1—48" Morton Draw Cut.

HILL, CLARKE & CO. OF CHICAGO

625 WASHINGTON BLVD., CHICAGO, ILL.

**"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.

**Hawkrige Brothers
Company**

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

Quality is Highest—Not the Price

Dickow's Guaranteed 10-inch Universal Index Coaters
You save from \$50 to \$125 on first cost, and many times that because of their simple construction and great ease of operation. They embody the maximum of accuracy, simplicity and durability.

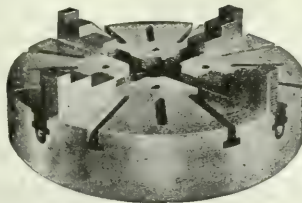


Get the Original—Beware of Imitators
Sold by all dealers. Write to-day for particulars
Fred. C. Dickow, 35 So. Desplains St., Chicago, Ill., U.S.A.

We Know

you are anxious to buy
Canadian Made
goods.

The Imperial



Chuck

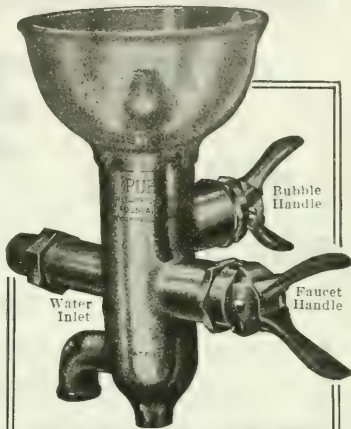
is manufactured by
Ker & Goodwin
Brantford, Canada

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, abso-
lutely.

When a man comes to work in your factory
he puts his health in your keeping.

Are you willing to take chances on such a
trust?
Impure drinking conditions are responsible for
more tragedies than any machine ever built.

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

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

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

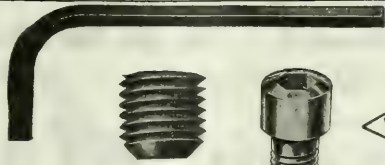
The only Sanitary Drinking Fountain that is
safe, sanitary, simple, automatic in control and
easily attached.

Let us tell you just what it will cost you to

"PURO - FY"

YOUR WATER SUPPLY

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



Safety Set Screws
Tap Extensions



Socket Head
Cap Screws



Safety Set Screws
Socket Wrenches

MANUFACTURED BY

135 Sheldon Street

The Allen Manufacturing Co.

Hartford, Conn.

SPECIAL MACHINERY

Special Machinery, Gears, Jigs, Fixtures, Punches and Dies,
Small Tools, Screw Machine Products, Gauges, Etc.

CONTRACT WORK

GEARS

HAMILTON

GEAR & MACHINE CO.

Cor. Concord
& Van Horne



TORONTO

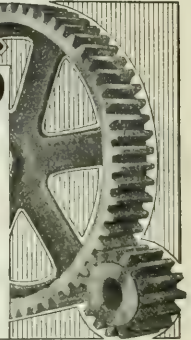
Bevel Gears cut theoretically and practically
correct on Gear Shaper

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.



**You're Busy NOW
But How About
After the
War?**

Right now is the time to prepare for peace-time.
If you have, or will have facilities for the manu-
facture of Special Machinery, Gears, Jigs, Punches, Gauges,
Small Tools, etc., get your name before the buyers of these
products *now*. Connections made now through this section will aid you
in keeping things going after the war.

Write for further particulars.

Canadian Machinery,

Contract Work Section,

143 University Ave., Toronto

CUT GEARS

Theoretically Correct

PROMPT SERVICE

**ROBERT GARDNER & SON
LIMITED**

52 NAZARETH ST., MONTREAL, P. Q.

RAWHIDE

OR METAL

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

SPECIAL MACHINERY
 Special Machinery, Jigs, Fixtures, Punches and Dies, Small
 Tools, Screw Machine Products, Gauges, Forgings, Etc.
CONTRACT WORK



Brass, Phosphor Bronze,
 Copper and Aluminum
CASTINGS

We have the largest Jobbing
 Brass Foundry in Canada.
 Can make prompt delivery.

Tallman's reputation is in the goods.

Tallman Brass & Metal Co.
HAMILTON, ONT.

CANADA



SPECIAL TOOLS

Gauges Taps Jigs

AUTOMATIC MACHINERY
 FOR MUNITIONS

4.5 Mark VII Shell
 Milling Machines

TORONTO TOOL CO.
 TORONTO, ONT.

516 Richmond St. West Phone A. 1181

We Make GAUGES and TOOLS

All Work Executed Promptly and Guaranteed

THE MONARCH BRASS MFG.
 COMPANY, LIMITED

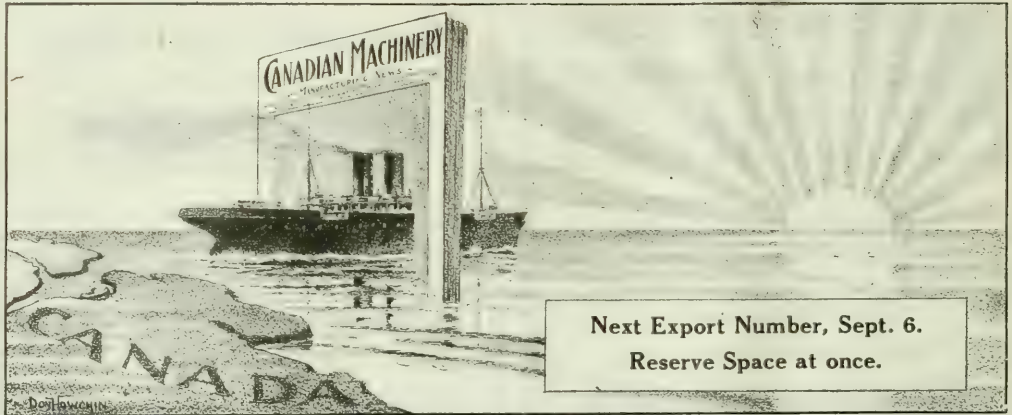
71 BROWNS AVE. - - TORONTO, ONT.

**TEXTILE BELTING
and PACKINGS**

**HIGH TWIST SPEED
DRILLS**

**J.R. BAXTER
& COMPANY LIMITED,
MONTREAL.**

and GENERAL MACHINERY SUPPLIES



**Next Export Number, Sept. 6.
Reserve Space at once.**

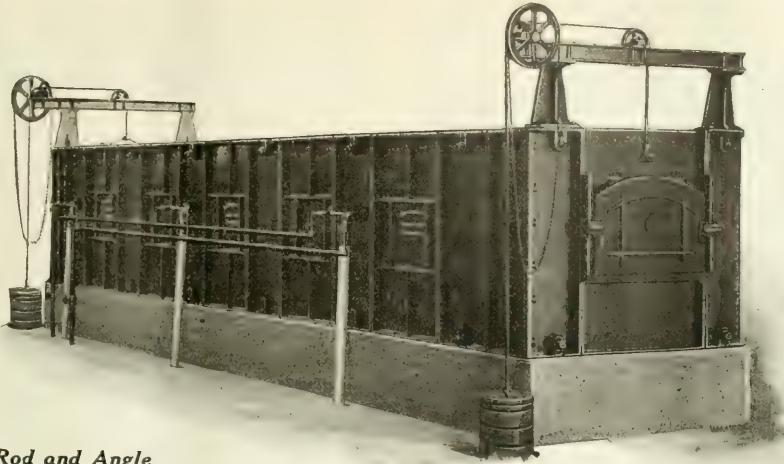
**SHEET
METAL
STAMPINGS**

**Dominion Forge
& Stamping Co., Limited**
WALKERVILLE ONTARIO

**DROP
FORGINGS**

Our facilities
and equipment enable us to
give you a top-notch quality at a very
reasonable price.

AUTOMOBILE FENDERS, HOODS AND GASOLINE TANKS



*Rod and Angle
Heating Furnace*

Rapid Heats—Uniform Temperatures

WITH THIS

TATE-JONES

Rod and Angle Heating Furnace

“Rapid heats” means a saving in time—but not at the expense of the work.
“Uniform temperatures” means a uniform finished product.

In these days, where every minute and every ounce of material must be utilized to the fullest, the two facts mentioned above prove of vital importance.

Some of the Other Features of this Tate-Jones Furnace

This furnace can be fired with either oil or gas and can be operated on high or low pressure system. A very economical and convenient burner is our combination oil and gas burner which permits the use of either fuel at the will of the operator. This is especially valuable in districts where the fuel supply is likely to be delayed or discontinued from any cause, or where fluctuations in price of either fuel have to be considered.

Different temperatures in the heating chamber can be produced at the same time. Where a long furnace is used on short work, the short section needed can be used instead of firing up the whole length. This is especially valuable when heating angles for bending, etc.

The burners fire on both sides of the furnace and are placed in staggered positions. Baffles distribute the heat uniformly over the arch and radiate it uniformly on to the hearth.

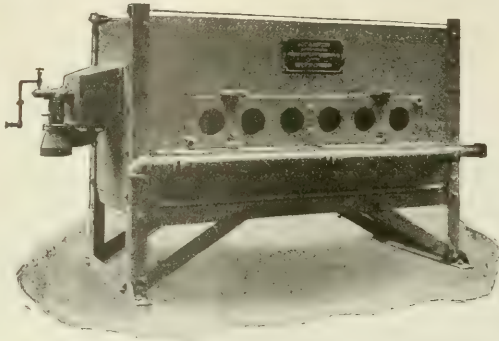
By arrangement of vents and flues, a considerable portion of the heat is recovered and utilized in heating the hearth from below.

If the work your plant is engaged in consists of any of the following or similar operations, it will prove decidedly to your advantage to write for Bulletin—giving further particulars.

For heating angles, bending and forming work in shipyards and structural shops. Also for heating rods for continuous bolt, rivet and spike machinery.

We make furnaces of all types and kinds for the heat treatment of metals.
In making requests for information, mention the particular work so that the proper literature can be sent.

TATE-JONES & CO., INC. FURNACE ENGINEERS **PITTSBURGH, PA.**



“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

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



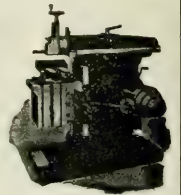
CUT YOUR SHOP COSTS

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

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

That same principle applied to your small planer work will cut the cost of planer work.

A Steptoe Shaper will do the work faster because it can be handled quicker.



The John Steptoe Company, CUMMINSVILLE, CINCINNATI, OHIO, U.S.A.

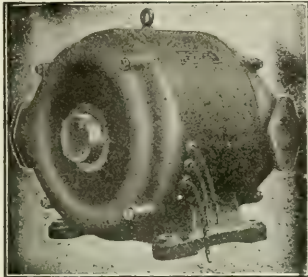
Canadian Representatives: Garlock-Walker Machinery Co., Toronto, Ont.

The Lancashire Dynamo & Motor Company, of Canada, Limited

107-109 Duke Street, TORONTO

ELECTRICAL MACHINERY for all Purposes.

ELLIOTT BROS. INSTRUMENTS
RECORDING GAUGES



PIPE VENTILATED A.C. MOTOR
FOR VERY DIRTY PLACES



TYPE E-4

Two G. & B. Furnaces

from a stock of over 100 types and sizes — a furnace for every purpose. And at present we are making immediate deliveries on nearly all types.

With a Gilbert & Barker furnace you are assured of efficient and economical heat-treating, annealing, hardening, etc. Our half century of experience with liquid and gaseous fuels for heat treatment of metals makes us confident of our ability to solve your heat-treating problems. Put them up to us.

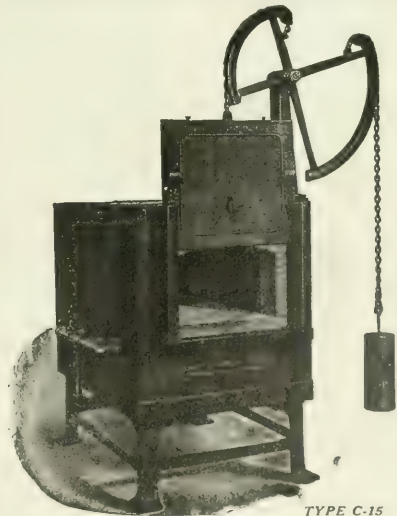
Catalog 24 describes the complete line.

Gilbert & Barker Mfg. Co.


West Springfield, Mass.

Canadian Agents:


WILLIAMS & WILSON, LIMITED, MONTREAL, QUE.
JAMES DEVON, 227 Davenport Rd., TORONTO, ONT.



TYPE C-15



The Accurate Recording Thermometer



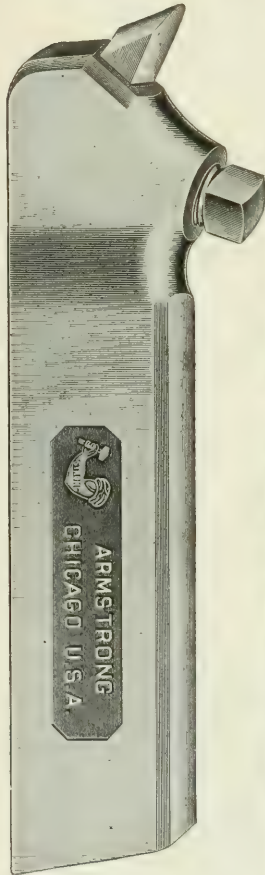
The H&M Division
Taylor Instrument Companies
Rochester, N.Y.
100 ROYAL BANK BLDG. TORONTO, CANADA

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

The Only Grand Prize for TOOL HOLDERS

Awarded separately and independent of other
lines exhibited at the
PANAMA-PACIFIC EXPOSITION
WAS WON BY

ARMSTRONG TOOL HOLDERS



HIGHEST AWARD

at 4 World's Expositions

Paris - - - 1900
St. Louis - - 1905
Liege - - - 1904
San Francisco 1915

THEY ALWAYS
MAKE GOOD



They Are Saving Millions of
Dollars in High Speed Steel

CATALOG FREE

Armstrong Bros. Tool Co.

"The Tool Holder People"

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



The Panama-Pacific MEDAL OF HONOR was also won by
ARMSTRONG Drop Forged Wrenches, Ratchets,
Clamps, Lathe Dogs, Etc.

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.

And that's why it pays Dealers to sell them.

Specify them when ordering.



Mining Machinery Parts

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

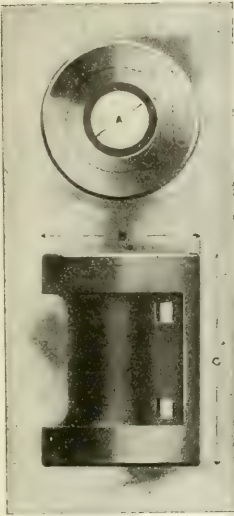
Also Manufacturers of Lining Plates for Ball and Tube Mills Concaves and Heads for Gyrary Crushers.

Machine Moulded Gears

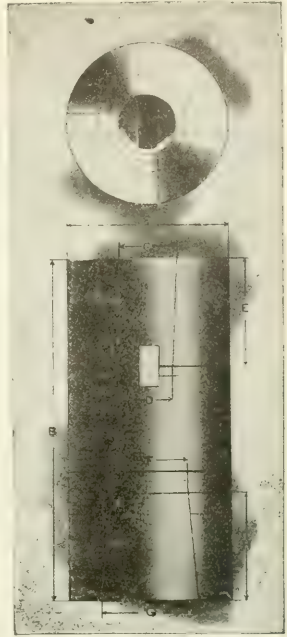
Any size up to 18 feet in diameter. No patterns needed.

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

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



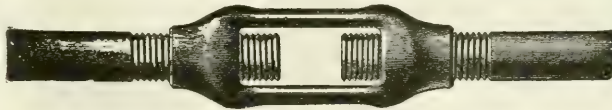
Two-key Tappet



Stamp Head



Pliers, Structural Wrenches, Track Wrenches, Machine Wrenches, Eye Bolts, Lathe Dogs, Journal Box Wedges, Etc.



All Kinds Of Special Drop Forgings

Send Models or Blue Prints for Estimates

WRITE FOR CATALOG

Canadian Billings & Spencer, Limited, Welland, Ontario

BENCH



'TANGENT'

Can. Pat. COMBINED No. 167666
PORTABLE AND BENCH

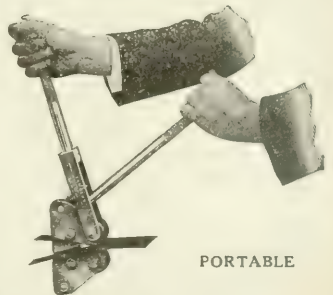
HAND SHEARING TOOL.
FOR FLAT SHEETS.

Is Self-Feeding. Gives beautifully clean cuts. Fast, easy cutting
Capacity: 3-32 in. Steel. 1-8 in. Softer Metals.

WRITE FOR DESCRIPTIVE PAMPHLET.

Montgomery, Smith & Co., Limited
Patentees and Manufacturers

Tangent Works, Keynsham, Som., Eng.
Applications for selling agencies or rights to manufacture under license will be considered.



PORTABLE

Measuring Tapes, Steel Rules, Straight Edges, Surveyors' Band Chains, Engineers' Tools

MANUFACTURED BY

JAMES CHESTERMAN & CO., Limited

SHEFFIELD, ENGLAND

Chesterman tools are the highest standard of accuracy in the British Empire, and the quality of steel and substantial build guarantee a maximum of service and economy.



Steel Depth Gauge



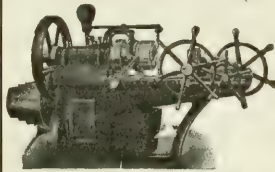
Steel Pocket Vernier Gauge

Canadian Representative:

**F. H. SCOTT, 404 Coristine Building,
MONTREAL, CANADA**

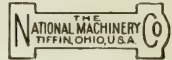


Wind-up Measures, Steel, Linen and Metallic, With Improved Patent Flush Handle.



BOLT, NUT, FORGING AND WIRE NAIL MACHINERY

"National" Bolt Cutters, "Wedge Grip" Bolt and Rivet Headers, Forging Machines, Nut Machines, Roll Threaders and Wire Nail Machines are used by leading Railroads and Industrials.



CANADIAN AGENT:
H. W. PETRIE, Ltd.
TORONTO, ONT.
MONTREAL, QUE.
VANCOUVER, B. C.

SMOOTH-ON

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

Iron Cements

Positively stop all leaks of steam, water, fire or oil in iron or steel. Unequaled for smoothing over rough and defective castings.

Smooth-On Cements are easy to apply, harden quickly and make permanent repairs.

Every Engineer should have a copy of our new instruction book.

Smooth-On Iron Cements are sold by supply houses.

Smooth-On Mfg. Co.

JERSEY CITY, N. J. U.S.A.

**Send for New
No. 16 Illustrated Instruction Book**



Convenience

This wrench will conveniently get at that nut "just around the corner" or in other inconvenient places where a straight handled wrench would be awkward. Easily operated and handled by one hand. We can give you service and good prices.

BEMIS & CALL

Hardware & Tool Company
Springfield Mass., U.S.A.

THE "W & B" LINE OF SCREW WRENCHES MADE IN CANADA

The only Pipe Wrenches made EXCLUSIVELY IN CANADA



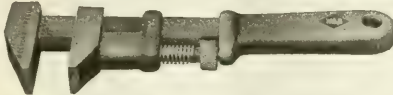
"W & B" Wood Handle Grips, Length open 6 to 14 inches.



"W & B" STEEL Handle Grips, Length open 10 to 48 inches.

"W & B" SCREW WRENCHES MADE IN CANADA

"Railroad Special" Wrenches



This is the strongest and best HEAVY DUTY Wrench made. Head and Bar Drop Forged in one piece from selected steel. Extra heavy jaws thoroughly case-hardened. Indestructible iron handle. FITTED WITH "W. & B." EASY ACTING SCREW

Adopt this established line as your standard CANADIAN MADE WRENCHES.

Complete information and catalog No. 90 on request.

Machinists' Knife Handle Wrenches



This is the best wrench of its type on the market. With the exception of the difference in the handle it is practically the same as the "Railroad Special" Wrench. FITTED WITH "W. & B." EASY ACTING SCREW.

Regular Wrenches



Head and Bar Drop Forged in one piece. FITTED WITH "W. & B." EASY ACTING SCREW and thoroughly seasoned handle.

The Whitman & Barnes Manufacturing Company
ST. CATHARINES, ONTARIO
ESTABLISHED 64 YEARS



**Convenience
Quality**

Keystone tools bear the stamp of quality that makes them to be desired because they are made in the most convenient shapes and give the maximum in service and economy.

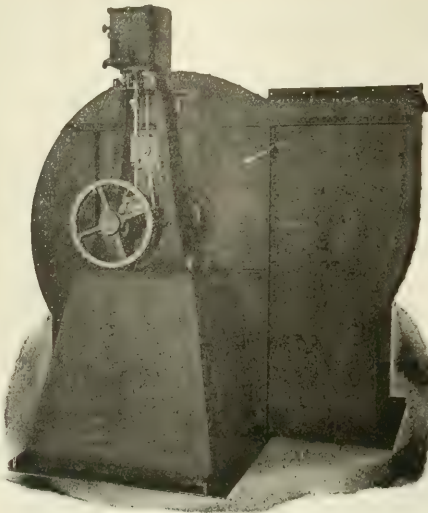
Our ratchets and adjustable wrench illustrated here are samples of our line. The Keystone brand are carried by the best houses. Inquire of your dealer.

The Keystone Mfg. Co.

BUFFALO

N.Y.

U.S.A.



HEATING and VENTILATING

"Keith" Fans will be found more economical and have a greater efficiency where conditions are unusually severe, because they possess advantages over other Fans used for the same purpose.

The "Keith" Fan is the one that will give you continued and unqualified satisfaction.

Our New Catalogue No. 55 has just come from the Press. Tell us where to address it and you will receive one by first mail.

SHELDONS LIMITED, Galt, Ont., Canada

Toronto (Canada) Office: 609 Kent Building.

Messrs. Ross & Greig, 412 St. James St., Montreal, Que.
Messrs. Walkers, Ltd., 259-261 Stanley St., Winnipeg, Man.

AGENTS:

Messrs. Gorman, Clancy & Grindley, Ltd., Calgary and Edmonton, Alta.
Messrs. Robert Hamilton Co., Ltd., Bank of Ottawa Bldg., Vancouver, B.C.



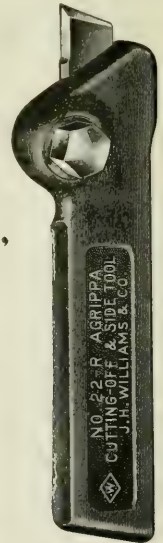
The Threaded Tool, with lockable spring head, will do roughing, finishing and threading at one setting in the tool post.

Williams' "AGRIPPA" Tool Holders

"THE HOLDERS THAT HOLD"

save the most time and need the least shifting.

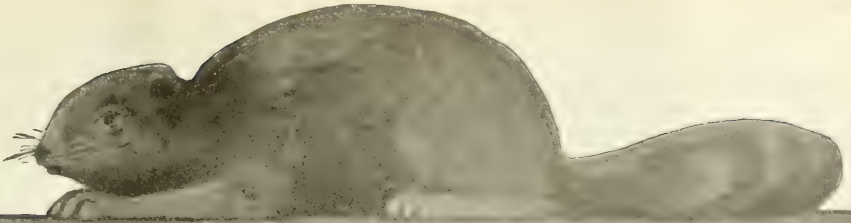
We will ship them promptly if your dealer can't supply you from stock.



A tool that performs both cutting-off and side work by the mere substitution of suitable cutters tells its own story of economy.



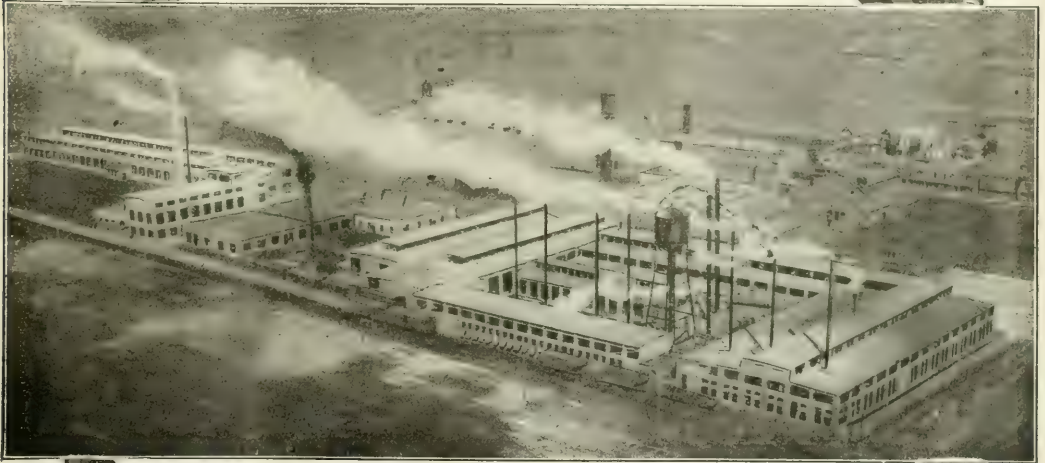
45 RICHARDS STREET BROOKLYN, N.Y. CITY



BROWN'S

BEAVER BRAND METALS

BRASS, BRONZE,
CANADA SILVER and GILDING METAL
In Sheets, Rolls, Plates and Rods



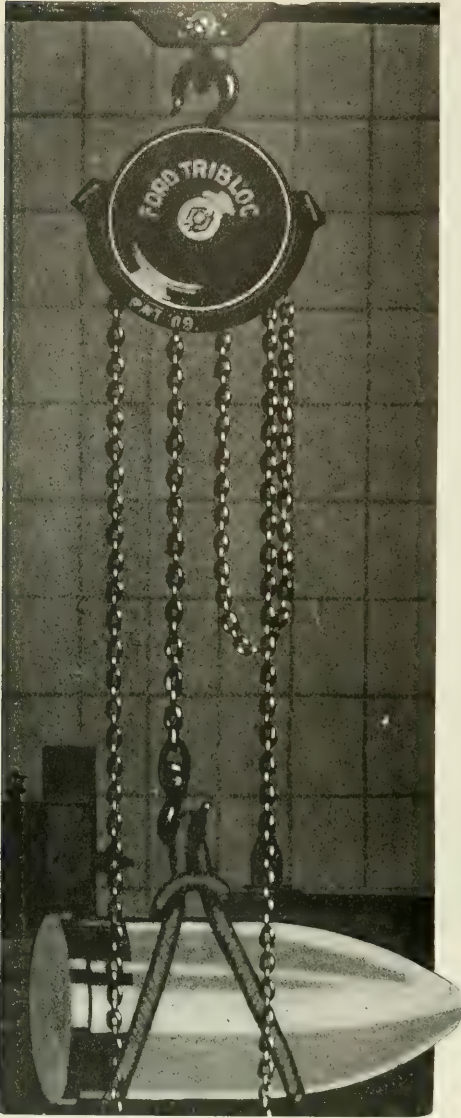
**Brown's Copper & Brass Rolling
Mills, Limited**

General Offices and Works:
New Toronto, Ontario, Canada



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

FORD TRIBLOC



High Calibre Chain Hoist

For manufacturers of practically anything from munitions to ploughshares Ford Tribloc Chain Hoists are unsurpassed for lifting service.

Reason 1—Steel working parts. Reason 2—Planetary type spur gearing for greater efficiency. Reason 3—Factor of safety of $3\frac{1}{2}$ to 1. Reason 4—Loop Hand Chain Guide that prevents "gagging." Five additional reasons in the five-year guarantee.

Ask for Catalog.

FORD CHAIN BLOCK & MFG. CO.
139-41 OXFORD STREET, 2092-D PHILADELPHIA, PA.

Mystic Cutting Compound

INCREASES production because it keeps tools in proper condition and enables them to work at their maximum efficiency.

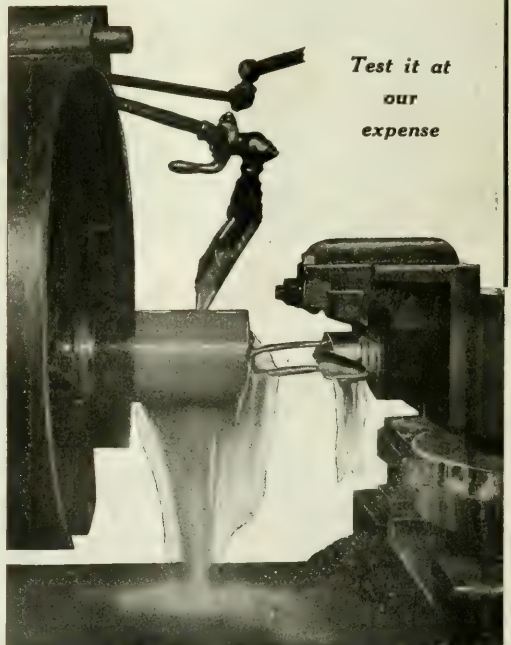
It is far more efficient than any oil. The ideal lubricant for shell work.

Let us demonstrate its merits in your plant, free of cost, in order to show what a really remarkable cutting compound it is.

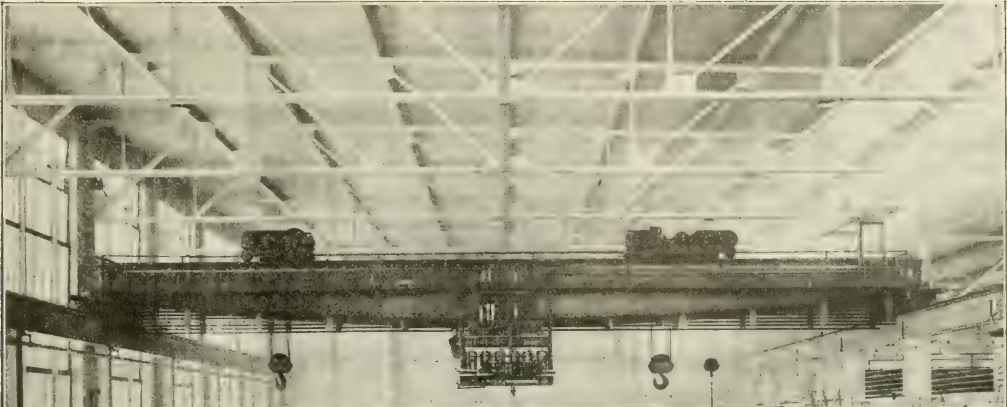
Cataract Refining Co. Limited

Toronto

Ontario



*Test it at
our
expense*



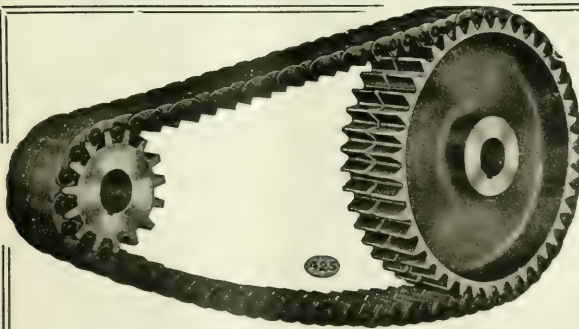
Our Type "R" Crane

is giving satisfaction in all kinds of service. The double trolley 50-ton crane shown here is in the locomotive



shop of General Electric Co., Erie, Pa. Other large crane users are buying the type "R" Write for Catalog 130

COMPLETE FOUNDRY EQUIPMENT



RENOLD CHAINS

The proven efficient form of Power Transmission.

PATENT SILENT

Equally suitable for main shaft or machine drives. Save space and power, increase output and ensure durability. Chain and Parts Carried in Stock.

Sole Canadian Agents

Jones & Glassco. (Reg'd)

Branch Office: ENGINEERS St. Nicholas Bldg.
TORONTO, ONT. MONTREAL, P.Q.

Scandinavia Belts



Can be used anywhere that leather can be used.

Scandinavia Belting is a solid woven cotton belt, made of long fibre cotton. It is impregnated to give further solidity, and the impregnation also acts as a moisture resistant. For direct drives where atmospheric conditions remain approximately the same, this belt is probably the best on the market today.

It stands up well on shifters.

W. P. BENNETT

51 Montfort Street, Montreal, P.Q.

Beltings

Packings

Asbestos



FOR ELECTRIC RAILWAYS

LONDON & LAKE ERIE RAILWAY.

The Magnolia Metal Company.
Gentlemen:—

London, Ont., Oct. 6th, 1916.

It affords me much pleasure to testify to the merits of your product.

Have used it continually for four years, and, as stated to your Mr. Peck, found it most satisfactory, both as to quality and service.

We have not in the period named had a single hot journal or bearing, and as our cars run at times over 40 miles per hour, we think this is a record.

One thing is certain, if the man who uses the metal does his work properly, no fear may be entertained that it will fail.

I have no hesitation in giving you this testimonial, which is deserved.

Yours truly,

W. N. WARBURTON,
General Manager.

PRACTICAL ENGINEER POCKET BOOK:

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

Address Montreal Office.

SOLD BY LEADING DEALERS EVERYWHERE OR BY

MAGNOLIA METAL CO.

OFFICE AND FACTORY:

225 St. Ambrose 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

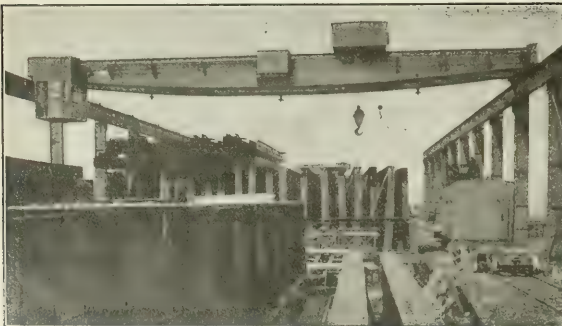
Hamilton

Montreal

TORONTO

Winnipeg

Vancouver



Electric Travelling Cranes

(Direct or Alternating Current)

Steam and Electric Derricks

(Stationary or Travelling)

Up-to-date design. Built for fast, continuous service.

ACCESSIBILITY—DURABILITY.

Dominion Bridge Company, Limited

MONTREAL

The "Rocker-Joint"
Depends Upon Its Construction,
not Upon Lubricant,
for Its Life and Efficiency

Power Transmission

What does she know about it? Not a thing! But she knows that he knows, and that's the point. He is a long-time user of silent chains and what he says about them counts.

This is what he says: "There is *only one Silent Chain* with a properly designed joint, and that is the MORSE. The "ROCKER JOINT," the exclusive, patented feature of the MORSE, eliminates all power losses because it permits *no destructive sliding friction*, as do all other joints. There is only the simple movement of the rocking chair."

Usable Positive Efficient

MORSE CHAIN CO. Ithaca, N.Y.

Largest Manufacturers of Silent Chains in the World

MORSE
Silent Chains



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

CHAPMAN

DOUBLE BALL BEARINGS

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

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

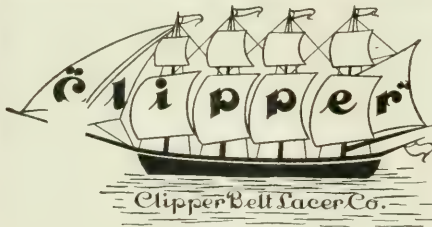
The ordinary line shafting consumes from 15 to 60 % of power developed—

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

The Chapman Double Ball Bearing Company of Canada, Ltd.

339-351 Spadina Ave., TORONTO, Canada

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

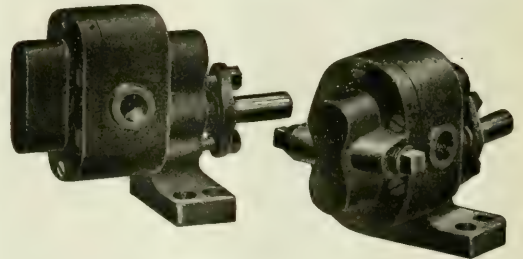


If you would use a stop watch while one of your belt lacing crews were at work you would find that you were paying expert men for a half hour job when any machine operator can lace a belt in **THREE** minutes with the

CLIPPER BELT LACER

CLIPPER BELT LACER COMPANY

976 Front Ave., N.W. Grand Rapids, Mich.



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.

Every Machine Right at Hand

Another Pexto innovation! This time it's a handy, revolving standard that swings every machine into the right position at a moment's notice. A time-saver, a labor-saver and a space-saver, all in one.

Holdall Revolving Machine Standard

The illustrations on this page will tell you this interesting and practical story—the first one shows the standard with the machines. The revolving turret will carry four machines on strong, adjustable machine holders. It swings quickly to any position and easily locks with a handy lever. Can you imagine an easier way of handling successive sheet metal operations? Then, too, look at the six additional machine holders and you'll appreciate how this handy Pexto Standard will save valuable bench space and still keep your equipment within easy reach.

A new book which illustrates this practical device will be sent on request.

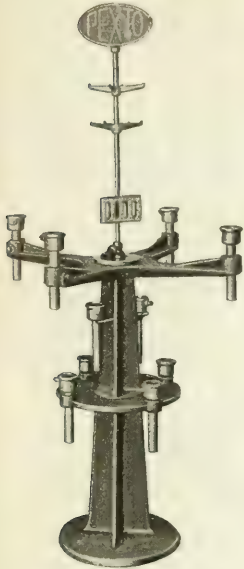
The Peck, Stow & Wilcox Co.

Mfrs. Mechanics' Hand Tools, Tinsmiths' and Sheet Metal Workers' Tools and Machines, Builders' and General Hardware.

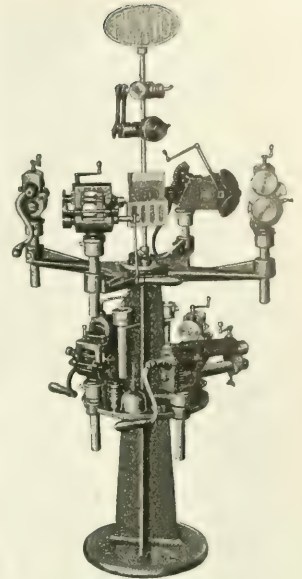
Address correspondence to 205 W. Center Street

SOUTHINGTON, CONN.

CLEVELAND, O.

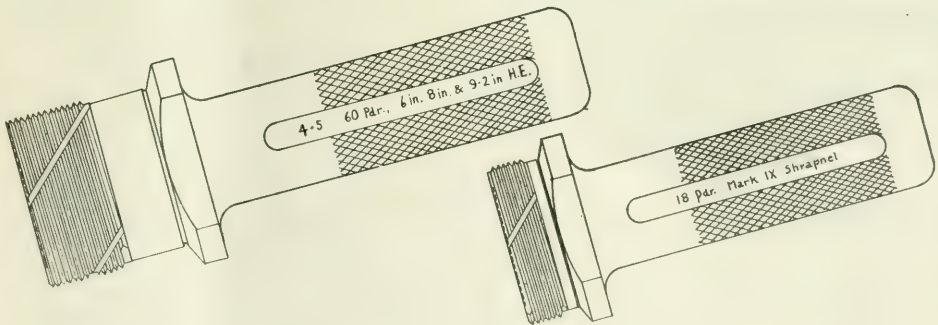


Holdall Revolving Machine Standard, No. 969 (Without Machines).



Holdall Revolving Machine Standard, No. 969 (With Machines).

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

Jacobs

IMPROVED

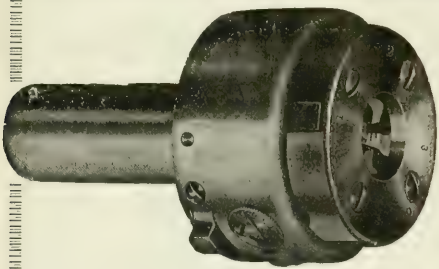
Drill Chuck

**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.

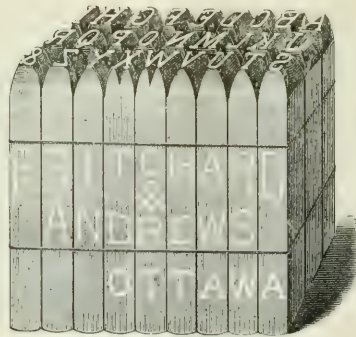
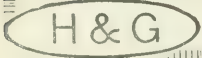



Thread Accuracy

Are you satisfied with your threads? Are they all you desire? Do you wish to get better results? That last question interests us vitally. Our Self-Opening Automatic Die Head will chase your troubles. Its quick release feature not only insures the cutting of the thread to a given point every time, but permits cutting right to the shoulder where required. Our booklet will tell you about other features.

Eastern Machine Screw Corp.

NEW HAVEN, CONN., U.S.A.



STEEL STAMPS

FOR MARKING SHELLS, ETC.

We will Give You Satisfaction on All Work of this Kind

SEND FOR PRICES

Pritchard-Andrews Co., of Ottawa

General Engravers and Die Sinkers

264 SPARKS ST.

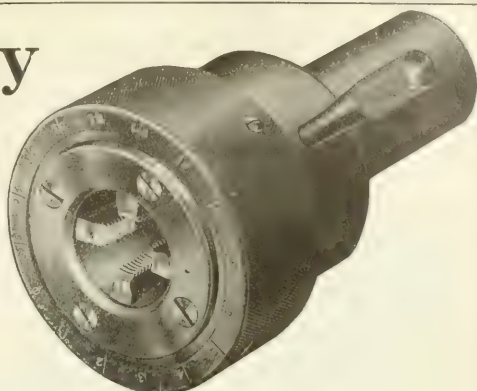
OTTAWA, CANADA

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.

It's Mighty Good Business Management To Install M. E. C. Air Cylinders

Because of their money-saving service. They improve and increase your output and decrease your operating costs. They are lighter than others, yet are more durable and compact.

Style "D" shown above is double acting; operates in either direction.

The pistons are packed with high-grade twist lubricated packing supported by a tapered, adjustable piston ring. In the application of power to chucks, the M.E.C. Air Cylinder will be found ideal. End thrust in air supply connection has been eliminated and a minimum number of parts assured, because of careful design. It is as near leak-proof as is possible to make an air cylinder.

Manufacturers Equipment Co.

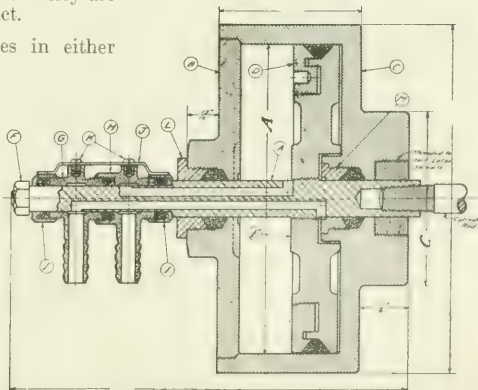
171 North Jefferson St., Chicago, Ill., U.S.A.

Agents for Canada

J. R. STONE TOOL & SUPPLY COMPANY

Goebel Building, Detroit, Mich.

Ask for literature about M.E.C. air-operated two and three-jaw chucks, air-operated hinge collets, expanding mandrels and collapsible taps.



MacLean's Magazine

for September

Northcliffe

THE Big Feature is Lord Northcliffe's article—Federation after the War. This brilliant and mighty publisher and world-figure deals with the question of a federation of Great Britain and the United States, and of Canada's relation to such a federation.

It is a big thing for MacLean's to get this special and exclusive article from Lord Northcliffe, and the inference is: This great journalist and man of affairs deemed MacLean's worthy of his writings.

Lord Northcliffe is only 54 years old. In the years ahead he and his powerful papers, the *London Times* and *London Daily Mail*, will play a big part in the shaping of the Imperial State.

MacLean

COLONEL JOHN BAYNE MACLEAN is a notable contributor, writing of the causes of the war, and of the post-war reconstruction as it relates to Canada.

Colonel MacLean discusses the steps that should be taken to win the war, and deals with the financial measures that Canada must consider for the after-the-war period.

Colonel MacLean is pre-eminently well-informed, and his long and intimate connection with International and Domestic financial affairs makes what he writes challenging and illuminating.

Harold McGrath's Great Story of Adventure and Mystery

This world-famous fiction-writer contributes a complete novelette—"The Rubies of Perak."

Other notable contributors are Stephen Leacock, Miss Laut, W. W. Jacobs, Allenson, Moorhouse, and J. P. Ronald, who tells of a smuggling enterprise by an American who temporarily fooled the Customs Department when he imported the plant for a new factory in a Canadian City.

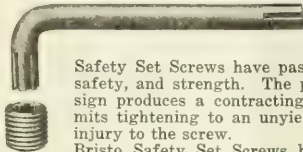
"The Gun Brand," by Hendryx, a great story of the Canadian Northwest, is a feature of the September *MacLean's*.

Three features liked by business men are the "Review of Reviews" Department, where the best things in the current magazines of the world are condensed; the "Business Outlook" article, and the Department, "Information for Investors."

Now on Sale Everywhere—Fifteen Cents

HINTS TO BUYERS

BUILDERS OF MACHINERY WHAT SET SCREWS DO YOU USE?



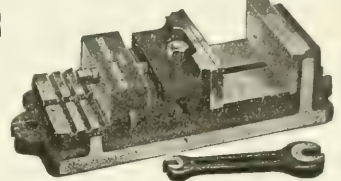
TRADE MARK
BRISTO
REG. U.S. PAT. OFF.

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

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

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

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.

THOUSANDS of Dollars are saved every year by our clients, because we have experts who are trained to make exhaustive tests of all the material you are purchasing, whether raw material or finished products.

CANADIAN INSPECTION AND TESTING LABORATORIES, LIMITED

Head Office and Main Laboratories—MONTREAL

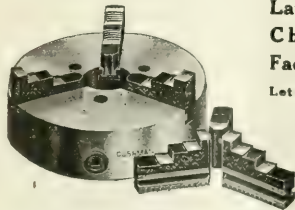
Branch Offices and Laboratories:
TORONTO, WINNIPEG, EDMONTON, VANCOUVER,
NEW GLASGOW.

STEEL CASTINGS

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

Dominion Steel Foundry Co.
LIMITED
Hamilton Ontario

Cushman Chucks



Lathe Chucks, Drill Chucks, Portable Face Plate Jaws.

Let us send you our catalog.

The Cushman Chuck Co.

Hartford, Conn.,
U.S.A.

RIVETED STEEL TANKS FOR EVERY PURPOSE



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

Northern Crane Works
LIMITED
WALKERVILLE
ONTARIO

Electric Cranes
Hand Cranes
Foundry Equipment



NORTHERN CRANES

CRANES
MADE IN
CANADA

Electric Hoists
Air Hoists
Cupolas
Ladles



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



Silver Drills

The demand for maximum output is as great as ever. The Silver single or gang drills will take care of your drilling regardless of the speed you desire. They are built for speed. The quality of work is maintained. Our booklet will give you valuable information and data. Write for it now.

Silver Manufacturing Co.
290 Broadway, Salem, Ohio

Zenith Coal & Steel Products Limited

COAL COKE HACK SAW BLADES
CARBON STEEL MACHINERY STEEL
HIGH SPEED STEEL


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

Every Tooth Cuts on Every *Quality*

They cut straighter. They last longer.

SAW

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



NORTON JACKS

FOR ALL KINDS OF HEAVY LIFTING

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

Made only by
A. O. NORTON, LIMITED
Coaticook, Prov. Quebec Canada

Greenfield

Trade Mark Reg. U. S. Pat. Office

A Universal Grinder with a Complete set of attachments for handling all kinds of tool sharpening, cylindrical, internal and surface grinding. **STURDY, DEPENDABLE, ACCURATE, RAPID.** Catalog No. 6 on request.

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



Eye Protectors For All Work


Standard designs for choppers, machinists, grinders, fitters, etc. Can be worn over other glasses. Full particulars for the asking.

T. A. WILLSON & CO., INC.
23 Scott Street, Toronto, Ontario

Head Bldg., San Francisco.
Mallers Bldg., Chicago.

9 Hatton Garden, London.
Factory and Main Offices: READING, Pa., 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, Pittsburgh, Cleveland, Cincinnati, Chicago, Detroit, St. Louis, San Francisco, Seattle.



THE WIRE IS PERFECTLY STRAIGHT

and cut to accurate lengths when it comes from our **AUTOMATIC WIRE STRAIGHTENING AND CUTTING MACHINE**, whether it's 3/4" diameter or only .020" wire, hard or soft wire, highly polished or rough stock.

May we send you catalogue C?

The F. B. SHUSTER COMPANY, New Haven, Conn.
Formerly John Adt & Son. Established 1866.

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



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.
G. B. CRANT



Beaudry Hammers

FOR GENERAL FORGING

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

BELT OR MOTOR DRIVEN

BEAUDRY & COMPANY, Inc.
141 Milk Street, Boston, Mass.
Alfred Herbert, Ltd., Coventry, England, London, Paris, Calcutta, Yokohama.

UNION DRAWN STEEL CO. LTD.



Manufacturers of
Bright Finished Steel Shafting and Shapes.

Large stock of all sizes.

HAMILTON, ONTARIO

Send for Price List

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



"End View"

For Truing Grinding Wheels

Francis Diamond Hand and Grinder Tools always give entire satisfaction. The diamonds in these tools are of the hardest and best quality and set very securely. Length of Hand Tool shown here 11 1/2 in. over all. Rosewood handle. Let us send you an assortment for selection.

Francis & Co.
Hartford Conn.




RICHMOND

CHUCKS

Universal Geared Scroll Type with either one or two sets Jaws.

Richmond Mfg. Co., Ltd.
183-185 George Street TORONTO, CAN.



Adjustoglas
TRADE MARK REGISTERED

Goggles are gladly worn, you don't have to make men wear them.

THE STRONG, KENNARD & NUTT COMPANY
2042 E. 9th Street Cleveland, Ohio

"THISTLE" BRAND RUBBER BELTING

"Maintenance of Quality"

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

Write to-day.

J. C. McLAREN BELTING CO., LTD.
TORONTO, MONTREAL, WINNIPEG



PRESSES — ALL TYPES

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

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



Taylor-Newbold Milling Cutters



Fast Cutting
Powerful

Inserted Helical Blades of High-Speed Steel

Will outlive and out-cut any other on the market. 4-in. Diameter for General Use.

Send for Bulletin R-P, and 30-day trial offer.

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

PRECISION TOOLS AND EQUIPMENT

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

Send us your inquiries. Let us quote.

H. E. STREETER
523 New Birks Building, Montreal, P.Q.



The Whiton **AUTOMATIC Gear Cutting Machine**

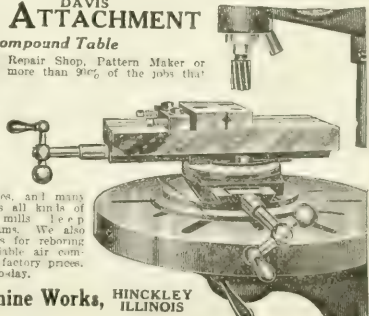
Do you want Catalog?

The D. E. Whiton Machine Co.
NEW LONDON, - CONN.

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 boxes, and many other odd jobs. Cuts all kinds of keyseats perfectly; mills deep grooves, slots and cams. We also make cylinder reamers for reboring Ford car, and a reliable air compressor—all at special factory prices. Write for circulars to-day.



Hinckley Machine Works, HINCKLEY ILLINOIS

"Frost King" The Flawless Babbitt

Perfection is not reached in a day. It has taken 40 years' hard study and experiment to bring "Frost King" to its present perfect state.

"Frost King" is a flawless babbitt, pleasing to the most exacting and critical mechanics, for the way in which it takes care of high speed under heavy demands.

When you want the perfect, all-round babbitt, use "Frost King." It will lessen your babbitt expenses. Try it and be convinced.



HOYT METAL COMPANY

EASTERN AVE. and LEWIS ST., TORONTO, CANADA
New York, N.Y. London, Eng. St. Louis, Mo.

HIMOFF MACHINE CO.,

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

Makers of

Lathes, Turret Lathes, and Gear Hobbers



Engine Lathes from 37" to 60" swing; Plain Turning Lathes, 27" and 37" swing; Axle and Journal Truing Lathes and Bevel Gear Turning Lathes. Write for Catalogue.

BRIDGEFORD MACHINE TOOL WORKS
161 Winton Road Rochester, N.Y.

PULLEYS

ALL WOOD—COMBINATION—IRON—STEEL

Every pulley fully guaranteed.

Write for interesting printed matter.

The Positive Clutch & Pulley Works, Ltd.
Montreal Factory: Aurora, Ont. Toronto

Toronto Testing Laboratory

METALLURGISTS—CHEMISTS—FUEL ENGINEERS
160 Bay St., Toronto.

Tests of Metals, Fuels, Oils, Water, Etc.
SPECIAL ATTENTION TO ALL SHELL MATERIALS



TAKE ALL THE GRIND OUT OF GRINDING
WITH

WILMARTH & MORMAN GRINDERS

CATALOGUE ON REQUEST

WILMARTH & MORMAN COMPANY, 1200 Monroe Avenue, N. W.
GRAND RAPIDS, MICH., U. S. A.

Manufacturers of Drill Grinders, Surface Grinders, Universal Grinders

WILKINSON & KOMPASS

TORONTO HAMILTON WINNIPEG

IRON AND STEEL

HEAVY HARDWARE

MILL SUPPLIES

AUTOMOBILE ACCESSORIES

WE SHIP PROMPTLY

Long Distance is Calling!

Telegrams and Long Distance Telephone Messages are not uncommon among the replies to ads in our Classified Advertising Section.



WE MANUFACTURE RIVETS of every description, 1/8 inch. dia. and smaller

PARMENTER & BULLOCH CO., LTD.

GANANOQUE, ONT.

Canadian Machinery Advertisers Directory

If what you want is not 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 Jencks Mach. Co., Ltd., Sherbrooke, Que.
MacKinnon, Holmes Co., Sherbrooke, Que.

AIR WASHERS

Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.
Sturtevant Co., B. F., Galt, Ont.

ALUMINUM

Canada Metal Co., Toronto
Tallman Brass & Metal Co., Hamilton

ALLOY STEEL

Can. B. K. Morton, Toronto, Montreal
H. A. Drury Co., Ltd., Montreal.
Hawkrige Bros. Co., Boston, Mass.
Osborn (Canada), Ltd., Sarnia, Montreal, Que.
Standard Alloy Company, Pittsburgh, Pa.
Vanadium Alloy Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Aliquippa, Pa.

ARBORS

Canadian Fairbanks-Morse Co., Montreal
Cleveland Twist Drill Co., Cleveland, Ohio
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., Bridgeton, Conn.
Dominion Machinery Co., Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
McClellan & 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, Can.
A. R. Williams Machy. Co., Toronto

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.
Hot Metal Co., Toronto
Jobbong, 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. E. F. Co., Toronto, Ont.
Chapman Double Ball Bearing Company, Toronto

BARRELS, STEEL SHOP

Baird Machine Co., Bridgeton, Conn.
Cleveland Wire Spring Co., Cleveland

BASE FACING MACHINES

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

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
Federal Engineering Co., Toronto, Ont.

BELTING, CHAIN

Canadian Fairbanks-Morse Co., Montreal
Jones & Glasco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
H. W. Petrie, Toronto, Ont.
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, Toronto, Montreal
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., St. Montford St., Montreal, Que.
Dominion Belting Co., Hamilton, Ont.
H. W. Petrie, Ltd., Montreal
H. W. Petrie, Ltd., Montreal

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-Boogs Co., Ltd., Hamilton, Can.
Can. Blower & Forge Co., Kitchener, Canada
Dominion Machinery Co., Toronto
Ferracue Mach. Co., Bridgeton, N.J.
Garlock-Walker Machinery Co., Toronto, Ont.
Charles F. Elmes Eng. Works, Chicago
Jawline, A. B., & Co., Hesperus, Ont.
National Machinery Co., Tiffin, Ohio
Niles-Bement-Pond Co., New York
H. W. Petrie, Toronto
H. W. Petrie, Ltd., Montreal
Steel Bending Brake Works, Chatham, Ont.
Toledo Machine & Tool Co., Toledo, Ohio.

BILET MARKERS

Mathews, Jas. H., & Co., Pittsburgh, Pa.

BINS, STEEL

The Jencks 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.
Sprentzen, J. L., Toronto, 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

Mullner-Enlund Tool Co., Strassau, N.Y.

BOARTZ

Frank & Co., Hartford, Conn.
Geo. A. Isaac Co., Ltd., New York, N.Y.

BOILERS

The Jencks Mach. Co., Ltd., Sherbrooke, Que.
MacKinnon, Holmes Co., Sherbrooke
H. W. Petrie, Ltd., Montreal
H. W. Petrie, Toronto

BOLT CUTTERS AND NUT TAPERS

Aikenhead Hardware Co., Toronto, Ont.
Canada Machinery Corp., Galt, Ont.

Landis Machine Co., Waynesboro, Pa.
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.
Gardner, Robt., & Son, Montreal
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, Ohio.
H. W. Petrie, Toronto
H. W. Petrie, Toronto
Riverside Machinery Depot, Detroit, Mich.
A. R. Williams Machinery Co., Toronto

BOLT THREADING MACHINERY

Landis Machine Co., Waynesboro, Pa.
Victor Tool Co., Waynesboro, Pa.

BORING MACHINES, PNEUMATIC CYLINDER

Cleveland Pneumatic Tool Co. of Canada, Toronto
Canadian Fairbanks-Morse Co., Montreal
Can. Ingersoll-Rand Co., Toronto
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.
Hill, Clarke & Co., Chicago, Ill.
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, Boogs & Co., Hamilton, Can

BRASS AND COPPER BARS, RODS AND SHEETS

Brown's Copper & Brass Rolling Mills, New Toronto

BRASS WORKING MACHINERY

Dominion Machy. Co., Toronto, Ont.
Foster Machine Co., New York
Garlock-Walker Machinery Co., Toronto, Ont.
Warner & Sweeney 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 Jencks Mach. Co., Ltd., Sherbrooke, Que.
MacKinnon, Holmes Co., Sherbrooke

BRONZE RODS AND SHEETS

Brown's Copper & Brass Rolling Mills, New Toronto

BUBBLERS

Pure Sanitary Dk's Fountain Co., Haverhill, Mass.

BUFFING AND POLISHING MACHINERY

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**
Banfield, Emma J., Toronto.
- BULLDOZERS**
John Bertram & Sons Co., Dundas.
E. W. Bliss Co., Brooklyn, N.Y.
Canada Machinery Corp., 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**
Parmenter & Bulloch Co., Gananoque.
- CANNERS' MACHINERY**
Bliss, E. W. Co., Brooklyn, N.Y.
Farracut Mach. Co., Bridgeton, N.J.
Brown, Boggs & Co., Hamilton, Can.
Prest-O-Lite Co., Inc., Toronto, Ont.
- CARS, INDUSTRIAL**
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.
- CARTIDGE MAKING MACHINERY**
Blackall, Fred. S., Woolworth 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.
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, Que.
- 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**
John Bertram & Sons Co., Dundas.
Gardner, Robt. & Son, 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.
- CHUCKS, AIR**
Hannifin Mfg. Co., Chicago, Ill.
Manufacturers Equipment Co., Chicago, Ill.
- CHUCKS, COLL. DRILL**
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 Churn 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.
Key & Goodwin, Brantford.
Manufacturers Equipment Co., Chicago, Ill.
Millers Falls Co., Millers 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.
Skinner Chuck Co., New Britain, Conn.
Thomas Elevator Co., Chicago, Ill.
D. E. Whiton Machine Co., New London, Conn.
- CHUCKS, DRILL, AUTOMATIC**
- AND KEYLESS**
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Canada.
Whitney Mfg. Co., Hartford, Conn.
Richmond, 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. Steveson, 221 New Birks Bldg., Montreal.
- 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.
Rooftop Machine & Tool Co., Toronto, Ont.
Warren & Swartz Co., Cleveland, O.
- CLOCKS, WATCHMAN, PORTABLE**
Hardinge Bros., Inc., Chicago, Ill.
- CLUTCHES, FRICTION AND PULLEY**
Bernard Industrial Co., The A., Fortierville, Que.
Johnson Machine Co., Carlyle, Manchester, Conn.
Positive Clutch & Pulley Works, Ltd., Toronto.
- COAL HANDLING MACHINERY**
Wm. MacKinnon, Holmc & Co., Sherbrooke, Que.
Northern Crane Works, Ltd., Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.
- COILING MACHINERY, WIRE**
Bleeker & Hartley, Inc., Worcester, Mass.
- COKE AND COAL**
Hanna & Co., M. A., Cleveland, O.
- Zenith Steel & Coal Products, Montreal, Que.**
- COLLARS**
Can. Bond Hanger & Cmpg. Co., Alexandria, Ont.
- COLLECTORS, PNEUMATIC**
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Limited, Galt, Ont.
Sturtevant Co., B. F., Galt, Ont.
- COLLETS**
Becker Milling Machine Co., Boston, Mass.
Hannifin Mfg. Co., Chicago, Ill.
Hardinge Bros., Inc., Chicago, Ill.
Manufacturers Equipment Co., Chicago, Ill.
Rivett Lathe & Grinder Co., Boston, Mass.
Stone Tool & Supply Co., J. R., Detroit, Mich.
- COMPRESSORS, AIR**
H. E. Ingersoll, Ltd., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Garlock-Walker Machinery Co., Toronto, Ont.
Hickley Machine Co., Hinchelley, Ill.
The Jencks Mach. Co., Ltd., Sherbrooke, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Riverside Machinery Depot, Detroit, Mich.
Smart-Turner Machine Co., Hamilton, Ont.
Taylor Instrument Co., Rochester, N.Y.
- CONTROLLERS AND STARTERS, ELECTRIC MOTORS**
Dominion Machy. Co., Toronto, Ont.
H. W. Petrie, Toronto.
R. E. Tring, Ltd., Toronto, Ont.
A. R. Williams Machy. Co., Toronto.
- CONTROLLING INSTRUMENTS**
Taylor Instrument Co., 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.
Clark Equipment Co., Buchanan, Mich.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill Machine Co., New Bedford.
Pratt & Whitney Co., Lunda, Ont.
- COUNTERSHAFTS**
Baird Machine Co., Bridgeport, Conn.
Foster Machine Ltd., Elkhart, Ind.
Stow Mfg. Co., Ringhamton, N.Y.
- COUPLINGS, FRICTION**
Bernard Industrial Co., The A., Fortierville, Que.
- COUPLINGS, FLAT, AND FLEXIBLE**
Can. Bond Hanger & Cmpg. 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.
Heppner, John T., Ltd., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Northern Crane Works, Walkerville.
- CRANES, PORTABLE**
Aikenhead Hardware Co., Toronto, Ont.
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.
- CRIMPS, LEATHER**
Graton & Knight Mfg. Co., Worcester, Mass.
- CUPOLAS**
Can. Blower & Forge Co., Kitchener, Ont.
Northern Crane Works, Walkerville.
H. W. Petrie, Ltd., Montreal.
Sheldons, Ltd., Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.
- CUPOLA BLAST GAUGES & BLOWERS**
Sheldons, Ltd., Galt, Ont.
- CUTTER GRINDERS AND ATTACHMENTS**
Cincinnati Milling Machine Co., Cincinnati.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Monarch Brass Mfg. Co., Toronto, Ont.
Norton Grinding & Worcester, Mass.
H. W. Petrie, Ltd., Montreal.
- CUTTERS, FLUE**
Cleveland Pneumatic Tool Co. of Canada, Toronto
- CUTTERS, PIPE (SEE PIPE CUTTERS)**
- CUTTERS, MILLING**
Becker Milling Machine Co., Boston, Mass.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cleveland Milling Mach. Co., Cleveland, Ohio.
Cleveland Twist Drill Co., Cleveland, Ohio.
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machinery Co., Montreal.
Garvin Machine Co., New York.
Goddard Tool Co., Chicago, Ill.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Osborn (Canada), Ltd., Sam'l, Montreal, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Tabor Mfg. Co., Philadelphia, Pa.
Whitney Mfg. Co., Hartford, Conn.
- CUTTING COMPOUND AND CUTTING OIL**
Catacar Redding Mfg. Co., Toronto.
Elm Cutting Oil Co., Toronto.
Racine Tool & Machine Co., Racine, Wis.
- CUTTING-OFF MACHINES**
Armstrong Bros. Tool Co., Chicago.
John Bertram & Sons Co., Dundas.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Curtis & Curtis Co., Bridgeport, Conn.
Foss & Hill Machinery Co., Montreal.
Galt & Walker Machinery Co., Toronto, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Herburt, Rogers Machy. Co., South Sudbury, Mass.
John H. Hall & Sons, Brantford, Ont.
Wm. Kennedy & Sons, Owen Sound, Ont.
Perlees Machine Co., Racine, Wis.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
- CYLINDERS, AIR**
Latic O-Lite Mfg. Co., Toronto, Ont.
Racine Tool & Machine Co., Racine, Wis.
Standard Mch. & Supplies, Ltd., Montreal, Que.
Tabor Mfg. Co., Philadelphia, Pa.
- CYLINDERS, AIR**
Manufacturers Equipment Co., Chicago, Ill.
- CYLINDERS, AUTOMATIC REBORING JIGS AND REAMERS**
Hinchelley Machine Co., Hinchelley, 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**
Franca & Co., Hartford, Conn.
Geo. A. Joyce Co., Ltd., New York.
Wheel Trusing Tool Co., Windsor, Ont.
- DIES, BRASS PRINTING, EMBOSING**
- AND LETTERING**
Matthews, Jas. H. & Co., Pittsburgh, Pa.
- DIES AND DIE STOCKS**
Aikenhead Hardware Co., Toronto, Ont.
Banfield, Emma J., Toronto.
Butterfield & Co., Rock Island, Que.
Brown, Boggs Co., Hamilton, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Foss & Hill Machinery Co., Montreal.
Gardner, Robt. & Son, Montreal.
A. E. Jarline & Co., Hesperia, Ont.
Landis Machine Co., Wrentham, Pa.
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-Safer Co., Erie, Pa.
Standard Machy. & Supplies, Ltd., Montreal.
Wells Brothers of Canada, Galt, Ont.
- DIES FOR BIT BRACE USE**
Wells Bros. Co. of Canada, Galt, Ont.
- DIES, NOSING**
Marsh & Henthorn, Ltd., Belleville, Ont.
- DIES, PIPE THREADING**
Landis Machine Co., Waynesboro, Pa.
- DIE SINKERS**
Becker Milling Machine Co., Boston, Mass.
Garvin Machine Co., New York.
H. W. Petrie, Ltd., Montreal.
- DIES FOR MACHINES**
Aikenhead Hardware Co., Toronto, Ont.
Landis Machine Co., Waynesboro, Pa.
Wells Brothers Co. of Canada, Galt, Ont.

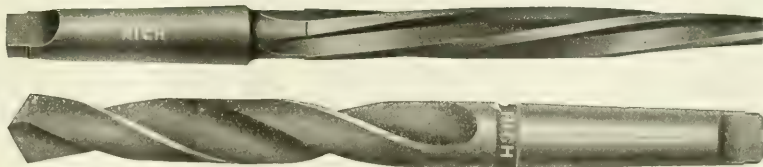
HOW MANY HOLES MUST YOU DRILL TO MAKE A PROFIT?



TO BE SURE THAT YOUR DRILLS WILL LAST LONG ENOUGH TO MAKE THEIR USE PROFITABLE BUY

“MORSE” DRILLS AND GET RESULTS

MORSE TWIST DRILL & MACHINE CO.
NEW BEDFORD MASS., U.S.A.



Manufactured by the Rich Tool Company

Rich Drills and Reamers are *Forged*

Forging the tools is a method that affects them in at least two ways—strength and life. You can understand that when a drill is milled the fine grain of the tool is cut and in some cases lost sight of entirely. The forging and hot twisting makes the drill retain its grain and consequently its strength, thus lengthening its life. As in drills and

reams, so is the quality in all “Rich” tools.

We can supply you with equipment of any kind desired, also supplies. We make a specialty of fitting plants out completely. Let us get in touch with you.

Standard Machinery & Supplies Ltd.

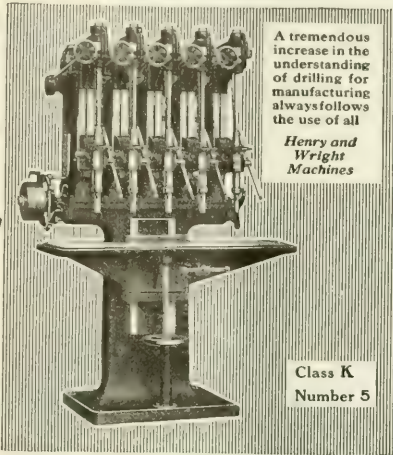
260 St. James St.

Montreal, Que.

TAYLOR & ARNOLD
McArthur Bldg., Winnipeg

R. F. MATHER
1050 Hamilton St., Vancouver

HENRY & WRIGHT Drilling Machines



A tremendous increase in the understanding of drilling for manufacturing always follows the use of all

Henry and Wright Machines

Class K
Number 5

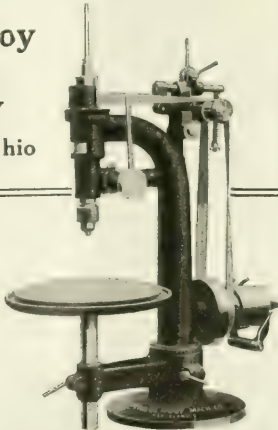
The Henry & Wright Mfg. Co.
Hartford, Conn.

No Vibration at 12,000 R.P.M.

Floor or Bench type. This great speed can be maintained for drilling up to 3/16". 1/2" may be drilled at slower speeds. The no friction, no vibration features are effected through the oil-ball-bearing construction, and automatic belt stretch absorber. Built in 1, 2, 3, 4 and 6-spindle floor types. It not only increases the speed, but minimizes breakage of drills, because the hole is drilled out, not pushed through. An inquiry would secure you bulletins and full information.

The DeMooy Machine Company

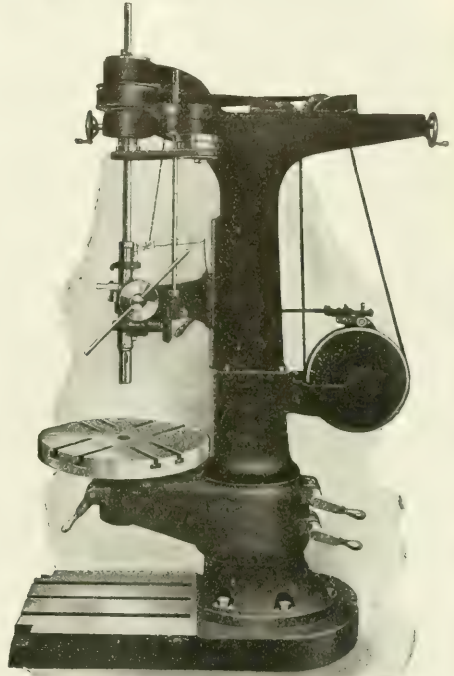
Cleveland - Ohio



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



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

Avel

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

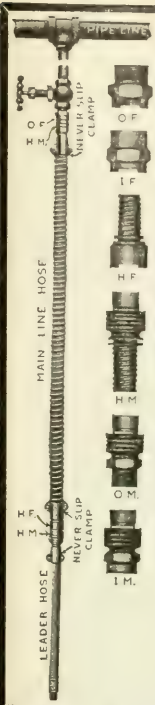
WRITE US AT ONCE

THE CINCINNATI PULLEY MACHINERY CO.
CINCINNATI, OHIO, U.S.A.

CLEVELAND HOSE SPECIALTIES

Bowes Automatic Air Hose Couplings
Over 1,000,000 in general use

The Cleveland Never Slip Hose Clamp
Made in same sizes as Bowes Couplings



STYLE O.F. is an Outside Thread Female Pipe End. Made in sizes $\frac{3}{8}$ -inch to $1\frac{1}{2}$ -inch.

STYLE I.F. is an inside Thread Female Pipe End. Made in sizes $\frac{3}{8}$ -in. to $1\frac{1}{2}$ -in.

STYLE H.F. is a Female Hose End with spiral shank to insert into the hose and has groove for the Never Slip Hose Clamp. Made in sizes $\frac{1}{4}$ -in. to $1\frac{1}{2}$ -in.

STYLE H.M. is a Male Hose End with spiral shank to insert into the hose and has groove for the Never Slip Hose Clamp. Made in sizes $\frac{1}{4}$ -in. to $1\frac{1}{2}$ -in.

STYLE O.M. is an Outside Thread Male Pipe End. Made in sizes $\frac{3}{8}$ -in. to $1\frac{1}{2}$ -in.

STYLE I.M. is an Inside Thread Male Pipe End. Made in sizes $\frac{3}{8}$ -in. to $1\frac{1}{2}$ -in.

The Male and Female Ends of Bowes Couplings interchange in sizes, $\frac{1}{4}$ -in. to $\frac{3}{4}$ -in. Sizes 1-in. and $1\frac{1}{4}$ -in. interchange. The $1\frac{1}{2}$ -in. ends interchange only with themselves.

BOWES COUPLINGS

Are instantly connected or disconnected. They are absolutely air-tight under all pressures. They quickly pay for themselves by stopping costly leaks. They interchange in sizes most commonly used. They have no loose parts to be mislaid or lost. They are made of brass and will not rust. The U-shaped Gasket interchanges in couplings $\frac{1}{4}$ -in. to $\frac{3}{4}$ -in.

The adjoining cut of Never Slip Hose Clamp shows the "Flanges" which engage the groove provided in all hose ends of Bowes Couplings. The "Model Hose Line" illustrated shows correct styles of couplings to use and proper way to attach the clamps.



CLEVELAND GROOVED HOSE NIPPLE



Grooved Nipples when attached to hose with the wire clamp cannot "blow-out," as one-half of the Wire Clamp lies in Nipple Groove, and the

other half on the hose, uniting nipple and hose permanently. "Blow-outs" are expensive, as one to five men are idle while new connection is being made; time wasted, ten to thirty minutes. Can you afford it?

WIRE CLAMP TOOL

To apply Wire Clamps to Grooved Hose Nipples you need the Wire Clamp Tool illustrated, a small hand-operated tool at moderate cost which we carry in stock for immediate delivery. In Stock: Riveting and Chipping Hammers, Four-piston Air Drills, Corner Drills, Emery Grinders, Sand Rammers, Holder Ons, Etc.



ANNEALED WIRE NO.14

WRITE FOR BULLETIN NO. 29.

IMPORTANT:—The Small Leaks in your "AIR LINE" mean serious loss in DOLLARS. Have you any idea of the amount of "Air" wasted in small leaks at your connections? Air Leakage through 1-16 in. opening equals 5.32 cu. ft. per minute at 80 lbs. It will pay you to install Bowes Couplings and stop costly leaks.

Write for Catalog No. 12, which illustrates our complete line of Air Tools.

Address all inquiries to

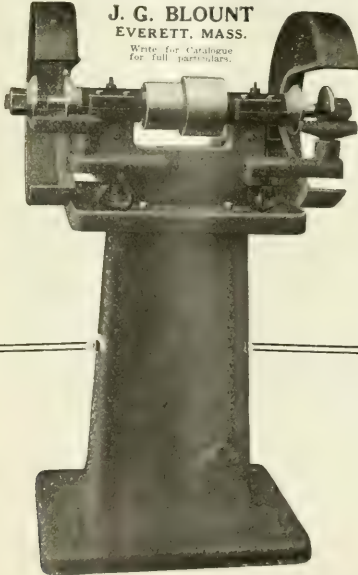
CLEVELAND PNEUMATIC TOOL CO. OF CANADA LTD., 84 Chestnut St., TORONTO
A. R. WILLIAMS MACHINERY CO., TORONTO. WILLIAMS AND WILSON, MONTREAL

Greater and Better Production

One way is to install two machines. Another way is to install a Blount Grinder. Cut shows a machine for 16"x21 1/2"x14" wheels. Self-oiled, line-reamed, babbitted bearings. Milled caps to lock on to boxes. High grade steel spindle interchangeable.

J. G. BLOUNT
EVERETT, MASS.

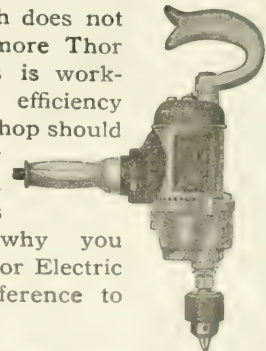
Write for Catalogue for full particulars.



UNIVERSAL Electric Drills

Licensed Under Burke Universal Motor Patent

No shop which does not use one or more Thor Electric Drills is working to full efficiency which every shop should do during these critical times. Let us demonstrate why you should use Thor Electric Tools in preference to other makes.



Independent Pneumatic Tool Company

Office: 334 St. James Street, MONTREAL, QUE.
Toronto: 32 Front St. W.; Winnipeg: 123 Bannatyne Ave., E.;
Vancouver: 1142 Homer Street

HAMMERS, MOTOR-DRIVEN
Boswell & Co., Boston, Mass.

HAMMERS, NAIL MACHINE
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.
Hickory Steel-Grine Co., Chicago, Ill.

HANGERS, SHAFI
Bard Machine Co., Bridgeport, Conn.
Can. Bond Hanger & Cpk. Co., Alexandria, Ont.
Can. S. K. F. Co., Toronto, Ont.
Garbar, Roll., & Son, Montreal.
Petrie of Montreal, Ltd., H. W., Montreal, Que.
H. W. Petrie, Toronto.
Standard Pressed Steel Co., Philadelphia, Pa.

HARDENING AND TEMPERING
Holz, Herman & 1 Madison Ave., New York.
Osborn (Canada), Ltd., Sam'l, Montreal, Que.

HARDNESS TESTING INSTRUMENTS
Shore Instrument & Mfg. Co., New York.

HEATERS
Scott & Sons Co., Wm. B., Pittsburgh, Pa.
Sturtevant Co., B. F., Galt, Ont.

HEATING AND VENTILATING ENGINEERS
Can. Blower & Forge Co., Kitchener, Ont.
Sheltons, Ltd., Galt, Ont.

HEAT GAUGES, HARDENING AND ANNEALING
Holz, Herman & 1 Madison Ave., New York.
Shore Instrument & Mfg. Co., New York.

HIGH SPEED TOOL METAL
Davis Sanding & Refining Co., Toronto, Ont.

HINGE MACHINERY
Baird Machine Co., Bridgeport, Conn.

HINGES
London Bolt & Hinge Works, London, Ont.

HOBS
Hilmes Tool Works, Chicago, Ill.
Osborn (Canada), Ltd., Sam'l, Montreal, Que.

HOISTING AND CONVEYING MACHINERY
Can. Matthews Gravity Carrier Co., Toronto, Ont.
Joncks 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 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.
Joncks Mach. Co., Sherbrooke, Que.
Marsh & Henthorn, Belleville, Ont.
Northern Crane Works, Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.
Bright Mfg. Co., Lisbon, Mo.

HOISTS, ELECTRIC
The Jencks Mach. Co., Ltd., Sherbrooke, Que.
Kennedy & Sons, Owen Sound, Ont.
Northern Crane Works, Walkerville, Ont.
Winnipeg Gear & Engng. Co., Winnipeg, Man.

HOLDERS, STEEL DIE FOR MARKING
Matthews, Jas. H., & Co., Pittsburg, Pa.

HOPPERS
Jencks 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.
Metalwork Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
William R. Perin, Ltd., Toronto.
H. W. Petrie, Toronto.
West Tire Setter Co., Rochester, N.Y.

INDICATORS, SPEED
Harrison & Sons Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
L. S. Starrett Co., Athol, Mass.

INDEX CENTRES
Fred C. Dickor, 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, Ont.
Norton, A. O., Coonrook, Que.
Petrie, H. W., Toronto.

JACKS, HYDRAULIC
Charles F. Elmes Eng. Works, Chicago.

JACKS, PNEUMATIC
Northern Crane Works, Walkerville, Ont.

JACKS, PIT AND TRACK
Can. Fairbanks-Morse Co., Montreal.
Northern Crane Works, Walkerville, Ont.

JAWS, FACE PLATE
Cushman Chuck Co., Hartford, Conn.
Skinner Chuck Co., New Britain, Conn.

JIGS, TOOLS, ETC.
Homer & Wilson, Hamilton, Ont.
Osborn (Canada), Ltd., Sam'l, Montreal, Que.
Toronto Tool Co., Toronto, Ont.

KEY SEATERS
Garlock-Walker Machinery Co., Toronto, Ont.
Savin Machine Co., New York.
Morton Mfg. Co., Muskegon Heights, Mich.
A. R. Williams Machy. Co., Toronto.

KEYS, MACHINE
Whitney Mfg. Co., Hartford, Conn.

KILNS
Can. Blower & Forge Co., Kitchener, Ont.
The Jencks Mach. Co., Ltd., Sherbrooke, Que.
Sheltons, Limited, Galt, Ont.

LABELS AND TAGS
Matthews, Jas. H. & Co., Pittsburg, Pa.

LABORATORIES, INSPECTION AND TESTING (SEE CHEMISTS)

LADLES, FOUNDRY
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

LAG SCREW GIMLET POINTERS
National Machy. Co., Tiffin, Ohio.

LATHES, BENCH
H. E. Stretcher, New Birks Bldg., Montreal, Que.

LATHES, CHUCKING
Acme Machine Tool Co., Cincinnati, Ohio.

LATHE CHUCKS (SEE CHUCKS)

LATHE DOGS AND ATTACHMENTS
Armstrong Bros. Tool Co., Chicago.
Curtis & Curtis Co., Bridgeport, Conn.
Hendy Machine Co., Torrington, Conn.
Rivett Lathe & Grinder Co., Boston, Mass.
J. H. Williams & Co., Brooklyn, N.Y.
Winnipeg Gear & Engng. 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., Toronto, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Harding Bros., Chicago, Ill.
Hobson Mach. & Tool Co., New Britain, Conn.
Pratt & Whitney Co., Dundas, Ont.
Rivett Lathe & Grinder Co., Boston, Mass.
Walcott Lathe Co., Jackson, Mich.

LATHES, BAND TURNING
The Jencks Mach. Co., Ltd., Sherbrooke, Que.
Robson Machine & Tool Co., Toronto, Ont.
Warden King Co., Montreal, Que.

LATHES, BRASS
Acme Machine Tool Co., Cincinnati, Ohio.
Harding Bros., Inc., Chicago, Ill.

LATHES, ENGINE
Acme Machine Tool Co., Cincinnati, Ohio.
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 Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
Hamilton Mach. Tool Co., Hamilton, Ohio.
Hill, Clarke & Co., Chicago, Ill.
Himoff Mach. Co., Inc., Astoria, La., New York.
McCabe, J. J., New York, N.Y.
R. McDougall Co., Galt.
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.
Sebastian Lathe Co., Cincinnati, Ohio.
Walcott Lathe Co., Jackson, Mich.
Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.
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 Machinery Co., Toronto, Ont.
The Jencks Mach. Co., Ltd., Sherbrooke, Que.
McCabe, J. J., New York, N.Y.
H. W. Petrie, Ltd., Montreal.

LATHES, SINGLE PURPOSE
Bertram, John, & Sons Co., Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Gray Mfg. & Mach. Co., Toronto, Ont.
Hepburn, John T., Ltd., Toronto.
Himoff Mach. Co., Inc., Astoria, La., New York.
The Jencks Mach. Co., Ltd., Sherbrooke, Que.
McCabe, J. J., New York, N.Y.
Reelinson Mach. Co., Toronto, Can.
Walcott Lathe Co., Jackson, Mich.

LATHES, SCREW CUTTING
Bertram, John, & Sons Co., Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Dominion Machinery Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machinery Co., Toronto, Ont.
Harding Bros., Inc., Chicago, Ill.
Hepburn, John T., Ltd., Toronto.
McCabe, J. J., New York, N.Y.
Niles-Bement-Pond 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.
Perraulte Mach. Co., Bridgeton, N.J.
McCabe, J. J., New York, N.Y.

LATHES, TURRET AND HAND
Acme Machine Tool Co., Cincinnati, Ohio.
John Bertram & Sons Co., Dundas.
Brown, J. G., & Co., Everett, Mass.
Blount & Sharp, Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Foss & Hill Machy. Co., Toronto, Ont.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machinery Co., Toronto, Ont.
Harding Bros., Inc., Chicago, Ill.
Hepburn, John T., Ltd., Toronto, Ont.
Hill, Clarke & Co., Chicago, Ill.
Himoff Mach. Co., Inc., Astoria, La., New York.
The Jencks 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.
Wamer & Sranachy 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.
James & Glasco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.

LINOLEUM MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

LIQUID AIR
Carter Welding Co., Toronto, Ont.
L'Air Liquide Society, Montreal, Toronto.
Pre-O-Lite Co., Inc., Toronto, Ont.

LOCKERS, STEEL WARDROBE AND STEEL MATERIAL
Amshala Wire & Iron Goods Co., Hamilton, Ont.

LUBRICANTS
Catastrat Refining & Mfg. Co., Toronto.

LUBRICATORS
Roper, C. F., & Co., Hopedale, Mass.
Trahern Pump Co., Rockford, Ill.

MACHINERY DEALERS
Baird Machine Co., Bridgeport, Conn.
Can. Fairbanks-Morse Co., Montreal.
Dickow, Fred C., Chicago, Ill.
Dominion Machy. Co., Toronto, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal.
H. W. Petrie, Toronto.
H. W. Petrie, Toronto.
R. E. T. Pringle, Ltd., Toronto, Ont.
Standard Machy & Supplies, Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto.

MACHINERY GUARDS (SEE GUARDS)

MACHINERY REPAIRS
Pre-O-Lite Co., Inc., Toronto, Ont.
Sumbing Mach. Co., N. H., Toronto, Ont.

MACHINISTS' SCALLES, 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.
Hamflin Mfg. Co., Chicago, Ill.
A. B. Jardine & Co., Toronto, 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., Pittsburg, Pa.

MARKING MACHINERY
Brown, Boggs Co., Hamilton, Ont.
Foss & Hill Machy. Co., Montreal.
Martin Machine Co., Greenfield, Mass.
Noble & Westbrook Mfg. Co., Hartford, Conn.
Perin, Wm. R., Toronto.

MEASURING TAPES AND RULES
James Chiersden & Co., Ltd., Sheffield, Eng.

METALLURGISTS
Can. Inspection & Testing Lab., Montreal, Que.
Toronto Testing Laboratory, Ltd., Toronto.

METALS
Can. B. K. Morton, Toronto, Montreal.
Doan Iron & Wrecking Co., Ltd., Montreal, Que.
Standard Machy & Supplies, Ltd., Montreal, Que.

METERS, OIL WATER
Bovser & Co., Inc., S. F., Toronto, Ont.

MILL MACHINERY
Alexander Fleck, Ltd., Ottawa.

MILLING MACHINES, AUTOMATIC
Bilton Mach. Tool Co., Bridgeport, Conn.



Gardner Grinders

GRINDING BASE
OF 18-pr. SHELL

This No. 14 Double Disc Grinder is used for accurately sizing the bases of these shells after heat treating. The shell is held in a suitable fixture, which allows it to be revolved slowly between the discs which grind the diameter to within 3.28 and 3.29 inches.

The quality and finish of the work is perfect, and steady production can be maintained at an average rate of 5 per minute.

The discs are faced with abrasive at the outer part only, where the work is done.

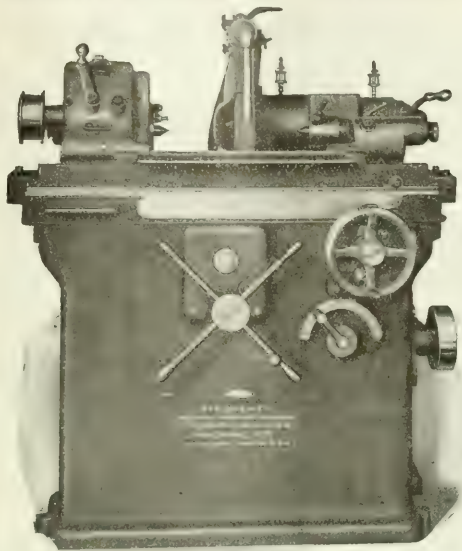
All that is best in material and workmanship goes into Gardner Grinders. They last long, do the work as it should be done, and do it economically.

Drop a card for full particulars.

The Gardner Machine Company, Beloit, Wis., U.S.A.

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

FITCHBURG 6" x 20" MANUFACTURING GRINDER



NO doubt if you were to tabulate the parts being ground in your factory, you would find a large percentage being ground on machines of very much larger capacity than the FITCHBURG 6" x 20" and possibly for no other reason than that the smaller machines do not have the required power, rigidity, and the present-day grinding capacity.

The FITCHBURG 6" x 20" is designed and constructed to meet the grinding problems put up to machines of very much larger capacity.

Model "A" power feed No. grinding wheel speeds (3) 1300-1550-1800 R.P.M.

Weight of machine about 4100 lbs.

Floor space 52" x 66".

Fitchburg Grinding Machine Co.
76 Winter Street Fitchburg, Mass.

"LITTLE DAVID"

Has Many Uses

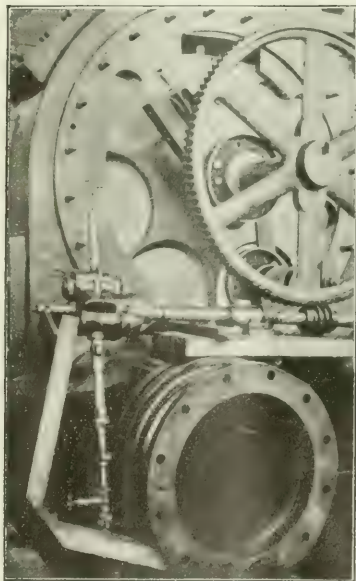
Here are some of them:
Driving Screw Spikes,
Tightening Bolts,
Tapping, Grinding, etc.

Do any of them interest you?
There are others. Our Bulletin 8507 shows many of them, and may suggest some method of applying "Little David" Pneumatic Drills to your work for other than their regular service of drilling, reaming, tapping, etc., or as powerful, "all-round" air motors, capable of *saving time and reducing costs* in ways you had not suspected.

Use the coupon. It will pay you.

CANADIAN INGERSOLL-RAND CO.

Commercial Union Building, Montreal LIMITED
SYDNEY TORONTO COBALT TIMMINS WINNIPEG NELSON VANCOUVER
WORKS: SHERBROOKE, QUE.



"Little David" Drill driving boring bar. Reboring 38" dia. Air Cylinder at mining plant in Northern Ontario.

Canadian Ingersoll-Rand Co., Limited,
Montreal.

Gentlemen:

Please send, without obligation on our part, Bulletin 8507

Name

Address

Province Date

Business C.M.

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

PRESSES, BALING
William R. Perrin, Ltd., Toronto.

PRESSES, SPRING FOOT
Brown, Boggs & Co., Hamilton, Ont.
Consolidated Press Co., Hastings, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, SCREW
Barnes, W. F. & John, Co., Rockford, Ill.
Ferracute Mach. Co., Bridgeton, N.J.
William R. Perrin, Ltd., Toronto.

PRESSES, TRIMMING
Consolidated Press Co., Hastings, Mich.
Erie Foundry Co., Erie, Pa.
Ferracute Mach. Co., Bridgeton, N.J.

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 & Cpg. Co., Alexandria, Ont.
Can. Fairbanks-Morse Co., Montreal.
Dominion Mach. 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.

PULVEYERS
Positive Church & Pulley Works, Ltd., Toronto.
Stanley Machine Works, Ltd., Montreal, Que.
The Smart-Turner Mach. Co., Hamilton.

A. R. Williams Machy. Co., Toronto.

PULLEYS, FR. END CLUTCH
American Pulley Co., Philadelphia.
Baird Machine Co., Bridgeport, Conn.
Petrie of Montreal, Ltd., H. W., Montreal, Que.
H. W. Petrie, Toronto.

PULVEYERS
Positive Church & Pulley Works, Ltd., Toronto.
Bernard Industrial Co., A., Fortierville, Que.

PULLEY MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Cincinnati Pulley Machy. Co., Cincinnati, Ohio.
Wells Bros. of Canada, Galt, Ont.

PUMPS, AIR
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Smart-Turner Mach. Co., Hamilton.

PUMPS, CENTRIFUGAL
Boswer & Co., Inc., S. F., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Sheldens, Ltd., Ont.
Smart-Turner Mach. Co., Hamilton.
Sturtevant Co., B. F., Galt, Ont.

PUMPS, FUEL OIL
Boswer & Co., Inc., S. F., Toronto, Ont.
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.
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.
Metalwood Mfg. Co., Detroit, Mich.
Smart Turner Mach. Co., Hamilton.
William R. Perrin, Ltd., Toronto.

PUMPS, LUBRICANT OIL
Bellevue Industrial Furnace Co., Detroit, Mich.
Boswer & Co., Inc., S. F., Toronto, Ont.
Roper, C. F., Co., Hopedale, Mass.
Trahern Pump Co., Rockford, Ill.

PUMP LEATHERS
Can. B. Morton, Toronto, Montreal.
Gaston & Knight Mfg. Co., Worcester, Mass.

PUMPS, ROTARY, POWER DRIVEN
Boswer & Co., Inc., S. F., Toronto, Ont.
Trahern Pump Co., Rockford, Ill.

PUNCHES AND DIES
W. H. Bartlett & Sons, Toronto.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Blower & Forge Co., Kitchener, Ont.
Ferracute Mach. Co., Bridgeton, N.J.
Can. Fairbanks-Morse Co., Montreal.
Gardner, Robt., & Son, Montreal.
H. W. Petrie, Toronto.
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.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Consolidated Press Co., Hastings, Mich.
Ferracute Mach. Co., Bridgeton, N.J.
Niles-Bement-Pond Co., New York.

PUNCHING MACHINES, HORIZONTAL
Bertrams, Ltd., Edinburgh, Scotland.
John Bertram & Sons Co., Dundas.
Canada Machinery Corp., Galt, Ont.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Niles-Bement-Pond Co., New York.
W. A. Whitney Mfg. Co., Rockford, Ill.

PURIFYING AND SOFTENING
APPARATUS
Scaff & Son, Co., Wm. B., Pittsburgh, Pa.

PYROMETERS
Bellevue Industrial Furnace Co., Detroit, Mich.
Can. Hoekins, Ltd., Waverille, Ont.
Holz, Herman A., 1 Madison Ave., New York.

Shore Instrument & Mfg. Co., New York City.
H. E. Streeter, New Birks Bldg., Montreal, Que.
Taylor Instrument Co., Rochester, N.Y.
Thwing Instrument Co., Philadelphia, Pa.

QUARTERING MACHINES
John Bertram & Sons Co., Dundas.
Niles-Bement-Pond Co., New York.

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.

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 & Mch. Co., New Bedford, Mass.
Osborn (Canada) Ltd., Saml., Montreal, Que.
Pratt & Whitney Co., Dundas, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
H. E. Streeter, New Birks Bldg., Montreal, Que.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

REAMERS, BRIDGE, EXPANDING AND HIGH SPEED
Aikenhead Hardware Co., Toronto.
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.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
McKenna Brothers, Pittsburgh, Pa.
Osborn (Canada) Ltd., Saml., Montreal, Que.
Pratt & Whitney Co., Dundas, Ont.
R. E. T. Pringle, Ltd., Toronto, Ont.

REAMERS, PIPE, CYLINDER AND LOCOMOTIVE
Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
H. W. Petrie, Toronto.
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. Jantine & Co., Hesperia, Ont.
Fox & Mfg. Co., New Bedford, Mass.
H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.

REAMING MACHINES, PNEUMATIC
Cleveland Pneumatic Tool Co., Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.

RECORDING INSTRUMENTS
Bristol Co., Waterbury, Conn.
Taylor Instrument Co., Rochester, N.Y.

REGULATORS, PRESSURE, TEMPERATURE
Can. Fairbanks-Morse Co., Montreal.
Taylor Instrument Co., Rochester, N.Y.

RESPIRATORS
Strong, Kennard & Nutt Co., Cleveland, Ohio.

RIVET MACHINES
Bilton Mfg. Tool Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont.
Grant Mfg. & Machine Co., Bridgeport, Conn.
National Machinery Co., Tiffin, O.
H. W. Petrie, Ltd., Montreal.

RIVETS, TUBULAR, BIFURCATED
Parmenter & Bulloch Co., Gananoque, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIVETS, IRON COPPER AND BRASS
Aikenhead Hardware Co., Toronto, Ont.
Parmenter & Bulloch Co., Gananoque, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

RIVETERS, PNEUMATIC, HYDRAULIC, HAMMER, COMPRESSOR
Can. Ingersoll-Rand Co., Montreal.
Cleveland Pneumatic Tool Co., Toronto, Canada.
Garlock-Walker Machinery Co., 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.
F. B. Shuster Co., New Haven, Conn.

ROLLS, BENDING AND STRAIGHTENING
John Bertram & Sons Co., Dundas.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo, O.

ROLLS, CRUSHING
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.

RUBBER MILL MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.

RULES
Brown & Sharpe Mfg. Co., Providence.
James Chesterman & Co., Ltd., Sheffield, Eng.
L. S. Starrett Co., Athol, Mass.

SAFETY APPLIANCES
Strong, Kennard & Nutt Co., Cleveland, Ohio.

SAFETY APPLIANCE GOGGLES
T. A. Wilson, Reading, Pa.

SAND BLASTS
United Pneumatic Machinery Co., St. Louis, Mo.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.

SANDING MACHINES
Canada Machinery Corp., Galt, Ont.

SAW MILL MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Dominion Machy. Co., Toronto, Ont.
Gardner, Robt., & Son, Montreal.
Carlin Pneumatic Mfg. Co., St. Louis, Mo.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
A. R. Williams Machy. Co., Toronto

SAWS, CIRCULAR METAL
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.

SAWS, BAND AND COPING
Napier Saw Works, Springfield, Mass.

SCLEROSCOPES
Shore Instrument & Mfg. Co., New York City.
H. E. Streeter, New Birks Bldg., Montreal, Que.

SCREW MACHINE PATS.
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
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Fosco Industries, Elkhat, Ind.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Garvin Machine Co., New York.
Himoff Mach. Co., Astoria, 1st, New York.
A. B. Jantine & Co., Hesperia.
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 Lathes & Machine 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.
B. Jantine & Co., Hesperia.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Wells Bros. Co. of Canada, Galt, Ont.

SCREW SLOTTERS
Garvin Machine Co., New York
Pratt & Whitney Co., Dundas, Ont.

SECOND-HAND MACHINERY
Davis Machine Tool Co., W. F., New York
Dominion Machinery Co., Montreal
Foss & Hill Machy. Co., Montreal
Hill, Clarke & Co., Chicago, Ill.
Widette, J. J., New York City.
New York Machinery Exchange, New York
H. W. Petrie, Toronto.
Riverside Machinery Depot, Detroit, Mich.
Kitchener Co., Chas. A., Detroit, Mich.
Steinbock-Rumely-Wachs, Chicago, Ill.

SET SCREWS, SAFETY
Aikenhead Hardware Co., Toronto, Ont.
Allen Mfg. Co., Hartford, Conn.

SHANKS, STRAIGHT AND TAPER
Jacob 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.
Hendy Machine Works, Toronto, 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 & Coup. Co., Alexandria, Ont.
Can. Fairbanks-Morse Co., Montreal
Can. Drawn Steel Co., Hamilton, Ont.
Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
The Jenckes Mach. Co., Ltd., Sherbrooke, Que.
Niles-Bement-Pond Co., New York
H. W. Petrie, Toronto
Pratt & Whitney Co., Dundas, Ont.
Streisinger Co., Chas. A., Detroit, Mich.
A. R. Williams Machy. Co., Toronto

SHARPENING STONES
Carborundum Co., Niagara Falls, N.Y.
Norton Co., Worcester, Mass.

SHAVINGS, SEPARATOR
Can. Blower & Forge Co., Kitchener, Ont.
Sheldens, Ltd., Galt, Ont.

SHARING MACHINES, ANGLE IRON, BAR AND GATE
John Bertram & Sons Co., Dundas

Stow Shell Grinders Increase Production



**Suspended
Pedestal
Mounted
on Truck**

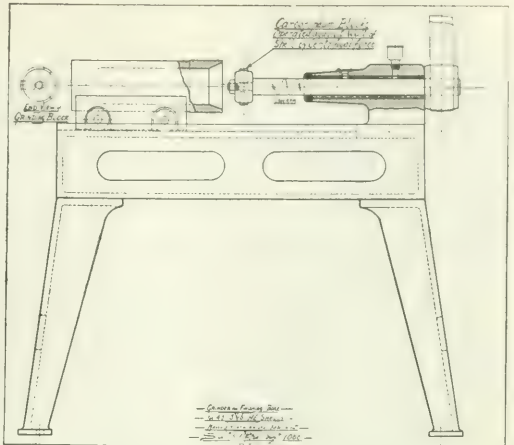
**Any Size
Any Current**

**Immediate
Shipment**

Stow Manufacturing Co.

Binghamton, New York, U.S.A.

Oldest Portable Tool Manufacturers in America



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

**WE BUILD
THEM BY
HUNDREDS**

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

**only
\$75
Complete**

The Blake & Johnson Co., Waterbury, Conn.

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

Bertrams, Ltd., Edinburgh, Scotland
 Canada Machinery Corp., Galt, Ont.
 A. B. Jardine & Co., Hespeler, Ont.
 Montgomerie, Smith & Co., Kingston, Somerset,
 Eng.
 No. 10, Berners Hall Co., New York
 Tool Machine & Tool Co., Toledo

SHEARS, POWER
 John Bertram & Sons Co., Dundas
 Bliss, E. W. Co., Brooklyn, N.Y.
 Brown, Boggs & Co., Hamilton, Canada
 Can. Blower & Forge Co., Kitchener, Ont.
 Canada Machinery Corp., Galt, Ont.
 Ferracuta Machine Co., Bridgeport, N.J.
 National Machy. Co., Tiffin, Ohio
 Niles-Bennet-Pond Co., New York
 H. W. Petrie, Ltd., Montreal
 H. W. Petrie, Ltd., Toledo
 Toledo Machine & Tool Co., Toledo

SHEARS, PNEUMATIC
 Toledo Machine & Tool Co., Toledo, Ohio.

SHEARS, SQUARING
 Brown, Boggs & Co., Hamilton, Canada

SHEET METAL WORKING TOOLS
 Ford Machine Co., Bridgeport, Conn.
 Bliss, E. W. Co., Brooklyn, N.Y.
 Brown, Boggs & Co., Hamilton, Canada
 Peck, Stow & Wilcox, Cleveland, O.
 Steel Bending Machine Works, Ltd., Chatham, Ont.

SHEET METAL STAMPINGS
 Dominion Forge & Stg. Co., Walkerville, Ont.

SHELL BANDING MACHINES, HYDRAULIC
 Chapman Double Ball-Bearing Co., Toronto, Ont.
 Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
 The Jencks Mach. Co., Ltd., Sherbrooke, Que.
 Metalwood Mfg. Co., Detroit, Mich.
 Ferrin, Ltd., W. Toronto, Ont.
 West Tire Setter Co., Rochester, N.Y.

SHELL PAINTING MACHINES
 Can. Blower & Forge Co., Kitchener, Ont.
 Sheldon, Ltd., Galt, Ont.

SHELL RIVETERS
 Giant Mfg. & Machine Co., Bridgeport, Conn.
 High Speed Hammer Co., Rochester, N.Y.
SIRAPNEL SHELL MARKER
 Brown, Boggs & Co., Hamilton, Canada
 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
 Geo. H. Lees & Co., Hamilton, Ont.

SKATE SHARPER
 Can. Bond Hanger & Cplg. Co., Alexandria, Ont.

SLEDGES
 Alkenhead Hardware Co., Toronto, Ont.
 Whitman & Barnes Mfg. Co., St. Catharines, Ont.

SLOTTERS
 Garvin Machine Co., New York.
 National-Acme Co., Cleveland, Ohio.
 Niles-Bennet-Pond Co., New York.
 Rhodes Mfg. Co., Hartford, Conn.

SMOKETAGS
 The Jencks Mach. Co., Ltd., Sherbrooke, Que.
 MacKinnon, Holmes Co., Sherbrooke, Que.

SOCKETS
 Brown & Sharpe Mfg. Co., Providence.
 Park Equipment Co., Washburn, Mich.
 Cleveland Twist Drill Co., Cleveland.
 Keystone Mfg. Co., Buffalo, N.Y.
 Chicago Tool Co., Erie, Pa.
 M. E. DeWitt & Co., New Bedford, Mass.
 J. H. Williams & Co., Brooklyn, N.Y.

SOCKET HEAD CAP SCREWS
 Allen Mfg. Co., Hartford, Conn.

SOLDERING IRONS
 Alkenhead Hardware Co., Toronto, Ont.
 Prest-O-Lite Co., Inc., Toronto, Ont.
 Brown, Boggs & Co., Hamilton, Canada

SOLDERS
 Alkenhead Hardware Co., Toronto, Ont.
 Tallman Brass & Metal Co., Hamilton.

SPECIAL MACHINERY
 Babel Machine Co., Bridgeport, Conn.
 Banfield, Edwin J., Toronto.
 Bavel, H. W. H., Toronto.
 Brittan John & Sons Co., Dundas
 Bliss, E. W. Co., Brooklyn, N.Y.
 Brown, Boggs & Co., Hamilton, Canada
 Can. Fairbanks-Morse Co., Montreal.
 Charles F. Elmes Eng. Works, Chicago.
 Ferracuta Machine Co., Bridgeport, N.J.
 Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
 Garvin Machine Co., New York.
 Gouley & Edlin, Inc., Grand, N.Y.
 Grant Mfg. & Machy. Co., Bridgeport, Conn.
 John H. Hall & Sons, Brantford.
 Gray Mfg. & Machy. Co., Toronto.
 Himeoff Mach. Co., Inc., Astoria, L.I., New York.
 Hyde Engineering Works, Montreal, Que.
 A. B. Jardine & Co., Hespeler, Ont.
 The Jencks Mach. Co., Ltd., Sherbrooke, Que.
 MacKinnon & Smith, W. Niagara Falls, Ont.
 National-Acme Co., Cleveland, Ohio.
 D. McKenzie Machinery Co., Guelph, Ont.
 Mulliner & Blundell Tool Co., Syracuse, N.Y.
 Prest-O-Lite Co., Inc., Toronto, Ont.
 Rhodes Mfg. Co., Hartford, Conn.
 Riverside Machinery Depot, Detroit, Mich.
 Sleeper & Hartley, Inc., Worcester, Mass.
 Smart-Turner Machine Co., Hamilton, Ont.
 T. J. M. McMillan, N.J.
 Victoria Foundry Co., Ottawa, Ont.
 William H. Ferrin, Ltd., Toronto.
 Winnipeg Gear & Engr. Co., Winnipeg, Man.

SPRINGS, MACHINERY
 Barnes, Wallace Co., Bristol, Conn.
 Can. Steel Foundry, Ltd., Montreal, Que.
 Cleveland Wire Spring Co., Cleveland.
 J. S. Smith, Ltd., Guelph, Ont.

SPRING COILING AND WINDING MACHINERY
 Baird Machine Co., Bridgeport, Conn.
 Gavett Machine Co., New York.
 Sleeper & Hartley, Inc., Worcester, Mass.

SPRING MAKING MACHINERY (AUTOMATIC)
 Baird Machine Co., Bridgeport, Conn.
 Sleeper & Hartley, Inc., Worcester, Mass.

SPIRAL CONVEYORS
 Can. Matthews Gravity Carrier Co., Toronto, Ont.

SPROCKETS, CHAIN
 Grant Gear Works, Boston, Mass.
 Morse Chain Co., Ithaca, N.Y.
 Philadelphia Gear Works, Philadelphia, Pa.

SOLDER
 Johnson, Geo. A., Hamilton, Ont.

SPOCKET WHEELS, CAST
 Ferrin, Wm. R., Toronto.

STAIRS, IRON
 Canada Wire & Iron Goods Co., Hamilton, Ont.

STAMPINGS
 Dillon Mfg. Co., Oshawa, Ont.
 Penn. Forge & Stamping Co., Walkerville, Ont.
 Homer & Wilson, Hamilton, Ont.

STAMPING MACHINERY
 Brown, Boggs & Co., Hamilton, Canada
 Machinery Corp., Galt, Ont.
 Ferracuta Mach. Co., Bridgeport, N.J.
 Noble & Westbrook Mfg. Co., Hartford, Conn.

STAMPS, STEEL ALPHABET FIGURES
 Matthews, Jas. H. & Co., Hartford, Conn.
 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.
 Sheldon, Ltd., Galt, Ont.
 The Smart-Turner Machine Co., Hamilton.
 Stafford Co., E. F., Galt, Ont.

STEEL ALLOY (SEE ALLOY STEEL)
STEEL BENDING BRAKES
 Steel Bending Brake Works, Ltd., Chatham, Ont.

STEEL FOR AXES, PLOWS, SAWS, DRILLS, ETC.
 Colonial Steel Co., Pittsburgh, Pa.
STEEL CARBON, FERRO-TUNGSTEN
 Can. B. K. Morton, Toronto, Montreal.
 Can. Steel Foundry, Ltd., Montreal, Que.
 Erie River Steel Co., Ltd., Montreal, Que.
 Osborn (Canada), Ltd., Sam'l, Montreal, Que.
 Vanadium-Alloy Steel Co., Pittsburgh, Pa.
 Vulcan Crucible Steel Co., Aliquippa, Pa.
 Zenith Coal & Steel Products, Montreal, Que.

STEEL, COLD ROLLED
 Can. Iron Steel Co., Hamilton, Ont.
 Essex Dutch 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.
 Sheldon, Ltd., Galt, Ont.
 Sturtevant Co., E. F., Galt, Ont.

STEEL, HIGH SPEED
 Armstrong Whitworth of Canada, Ltd., Montreal.
 Can. Fairbanks-Morse Co., Montreal.
 Can. B. K. Morton, Toronto, Montreal.
 Century Steel Co. of America, New York.
 Colonial Steel Co., Pittsburgh, Pa.
 Osborn (Canada), Ltd., Sam'l, Montreal, Que.
 H. A. Drury Co., Ltd., Montreal.
 Eagle & Globe Steel Co., Montreal, Que.
 Fairley Davidson Steel Co., New York, N.Y.
 Hawkley, Ross Co., Boston, Mass.
 Latrobe Electric Steel Co., Latrobe, Pa.
 MacKinnon & Smith, W. Niagara Falls, Ont.
 Osborn (Canada), Ltd., Sam'l, Montreal, Que.
 H. W. Petrie, Toronto.
 Standard Alloy Company, Pittsburgh, Pa.
 Vanadium-Alloy Steel Co., Pittsburgh, Pa.
 Vulcan Crucible Steel Co., Aliquippa, Pa.; represented in Canada by Norton, Tallard & Co., Montreal, Que.

STEELS, HIGH STRENGTH, HOT-WORKING, DIE, MAGNET
 Fairley Davidson Steel Co., New York, N.Y.

STEEL, VANADIUM
 Drury, H. A., Co., Montreal, Que.
 Standard Alloys Co., Pittsburgh, Pa.
 Vanadium-Alloy Steel Co., Pittsburgh, Pa.
 Vulcan Crucible Steel Co., Aliquippa, Pa.

STELLITE, HIGH-SPEED TOOL METAL
 Deloro Smelting & Refining Co., Toronto, Ont.

STOCK RACKS FOR BARS, PIPING, ETC.
 Can. British Machine Co., New Britain, Conn.

STOCKS FOR DIES
 Wells Bros. Co. of Canada, Galt, Ont.

STOCKS, PIPE
 Butterfield & Co., Rock Island, Que.
 Wells Bros. Co. of Canada, Galt, Ont.

STOOLS, STEEL, SHOP
 Can. British Machine Co., New Britain, Conn.

STRAIGHTENING MACHINERY
 Baird Machine Co., Bridgeport, Conn.
 Bertrams, Ltd., Edinburgh, Scotland.

SWITCHES, RAILWAY
 Can. Steel Foundry, Ltd., Montreal.

TACK (DOUBLE POINT) MACHINES
 Sleeper & Hartley, Inc., Worcester, Mass.

TANKS, GASOLINE AND OIL
 Bowser & Co., Inc., S. F., Toronto, Ont.

Dominion Forge & Stamping Co., Walkerville.
 The Jencks Mach. Co., Ltd., Sherbrooke, Que.
 MacKinnon, Holmes Co., Sherbrooke, Que.

TANKS, STEEL, WATER PRESSURE
 Bowser & Co., Inc., S. F., Toronto, Ont.
 Can. Welding Works, Montreal, Que.
 Jencks Machine Co., Sherbrooke, Que.
 MacKinnon, Holmes Co., Sherbrooke.
 Toronto Iron Works, Ltd., Toronto.

TANK WAGONS
 Jencks Mach. Co., Sherbrooke, Que.
 MacKinnon, Holmes Co., Sherbrooke.
 Toronto Iron Works, Ltd., Toronto.

TAPES, MEASURING
 James Chesterman & Co., Ltd., Sheffield, Eng.

TAPPING MACHINES (PNEUMATIC)
 Cleveland Machine Tool Co., Ltd., Toronto.

TAPPING MACHINES AND ATTACHMENTS
 Bertram, John, & Sons Co., Dundas.
 Canada Machinery Corp., Galt, Ont.
 Gartin Machine Co., New York.
 The Geometric Tool Co., New Haven.
 J. H. Hall & Sons, Brantford, Ont.
 A. B. Jardine & Co., Hespeler, Ont.
 Landis Machine Co., Waynesboro, Pa.
 Manufacturers Equipment Co., Chicago, Ill.
 Modern Tool Co., New York.
 Murchey Machine & Tool Co., Detroit.
 Niles-Bennet-Pond Co., New York.
 Petrie of Montreal, Ltd., H. W., Montreal, Que.
 H. W. Petrie, Toronto.
 Rickert-Shafer Co., Erie, Pa.
 E. S. Starrett Co., Athol, Mass.
 Whitney Mfg. Co., Hartford, Conn.

TAPS, ADJUSTABLE
 Baxter Co., Ltd., J. E., Montreal, Que.
 Geometric Tool Co., New Haven.
 Manufacturers Equipment Co., Chicago, Ill.
 Murchey Machine & Tool Co., Detroit.
 National-Acme Co., Cleveland, Ohio.
 Osborn (Canada), Ltd., Sam'l, Montreal, Que.

TAPS, COLLAPSIBLE
 Geometric Tool Co., New Haven.
 Manufacturers Equipment Co., Chicago, Ill.
 Modern Tool Co., Erie, Pa.
 Murchey Machine & Tool Co., Detroit.
 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, Que.
 Cleveland Twist Drill Co., Cleveland.
 Foss & Hill Machy. Co., Montreal.
 Geometric Tool Co., New Haven.
 A. B. Jardine & Co., Hespeler, Ont.
 Landis Machine Co., Waynesboro, Pa.
 Morse Twist Drill & Mach. Co., New Bedford, Mass.
 Murchey 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.
 E. S. Starrett Co., Athol, Mass.
 Wells Bros. Co. of Canada, Galt, Ont.

TAP EXTENSIONS
 Allen Mfg. Co., Hartford, Conn.

TESTING INSTRUMENTS
METALLURGICAL
 Shore Instrument & Mfg. Co., New York City.

THERMOMETERS, ALL KINDS
 Taylor Instrument Co., Rochester, N.Y.
 Bellows Instrument Co., Detroit, Mich.

TESTING LABORATORIES
 Can. Inspection & Testing Lab., Montreal, Que.
 Toronto Testing Laboratory, Toronto.

THREAD-CUTTING MACHINES
 Can. Fairbanks-Morse Co., Montreal.
 Curtis & Curtis Co., Bridgeport, Conn.
 Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
 Geometric Tool Co., New Haven.
 Landis Machine Co., Waynesboro, Pa.
 National-Acme Co., Cleveland, Ohio.
 National Machine Tool, Ltd., Chicago.
 H. W. Petrie, Toronto.
 Pratt & Whitney Co., Dundas, Ont.
 Wells Bros. Co. of Canada, Galt, Ont.

THREADING TOOLS
 Landis Machine Co., Waynesboro, Pa.
 Ruytt Lab. & Grind Co., Brighton, Mass.

THREAD MILLING MACHINES
 Gray Mfg. & Machy. Co., Montreal, Ont.
 Ted-Herz Co., New York, N.Y.
 T. C. M. Mfg. Co., Harrison, N.J.

TINSMITHS' TOOLS
 Brown, Boggs & Co., Hamilton, Can.
 Peck, Stow & Wilcox, Cleveland, Ohio.

TIRE SETTING MACHINES, HYDRAULIC
 William R. Ferrin, Ltd., Toronto.
 West Tire Setter Co., Rochester, N.Y.

TOOL CASES
 Union Tool Chest Works, Rochester, N.Y.

TOOL HOLDERS
 Alkenhead Hardware Co., Toronto, Ont.
 Cleveland Twist Drill Co., Cleveland.
 Armstrong Bros. Tool Co., Chicago.
 Can. B. K. Morton, Toronto, Montreal.
 Deloro Smelting & Refining Co., Toronto, Ont.
 Modern Tool Co., Erie, Pa.
 Pratt & Whitney Co., Dundas, Ont.
 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.
 Eagle & Globe Steel Co., Montreal, Que.

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.

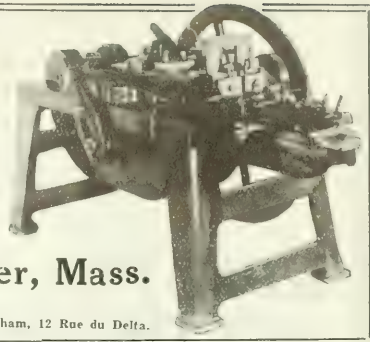
Smoothly running machines, with balanced mechanical motions and no rotating cams. Built in 5 sizes, handling wire from No. 17 to 3/8" diam.

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.



Hawthorne Bros. Co., Boston, Mass.
Lafayette Electric Steel Co., Latrobe, Pa.
Marshall & Co., G. A. T. Co., Ont.
Osborn (Canada), Ltd., Sam'l, Montreal, Que.
H. W. Petrie, Ltd., Toronto, Ont.
Sleeper & Hartley, Inc., Worcester, Mass.
Swedish Steel & Importing Co., Montreal, Que.
Tandium-Alloy Steel Co., Pittsburgh, Pa.
Vulcan Crucible Steel Co., Alliquippa, Pa.

TOOLS, ELECTRIC
Independent Pneumatic Tool Co., Chicago, Ill.
H. W. Petrie, Ltd., Montreal.
R. E. T. Fringer & Co., Toronto, Ont.
Stow Mfg. Co., Binghamton, N.Y.
A. R. Williams Machinery Co., Toronto.
United States Elec. Tool Co., Cincinnati, O.

TOOLS, PNEUMATIC
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Curtis Pneumatic Machinery Co., St. Louis, Mo.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

TOOLS, LATHE, 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 Machinery Co., Toronto.
Can. Bond Hanger & Cgls. Co., Alexandria, Ont.
Can. Fairbanks-Morse Co., Montreal.
Can. Drawn Steel Co., Hamilton, Ont.
Hamilton Gear & Machine Co., Toronto.
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.

TROLLEYS
Wright Mfg. Co., Lisbon, Ohio.

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
Standard Tube & Fence Co., Woodstock, Ont.

TUBING COILERS, FLEXIBLE METAL
Sleeper & Hartley, Inc., Worcester, Mass.

TURBINE 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.

TURNTABLES
Whiting Foundry Equipment Co., Harvey, Ill.

TURRET MACHINES
Brewer & Sharpe Mfg. Co., Providence.
Garlock-Walker Machinery Co., Toronto, Ont.
New Britain Machine Co., New Britain, Conn.
H. W. Petrie, Ltd., Toronto, Ont.
Pratt & Whitney, Hartford, Conn.
Riverside Machine Depot, Detroit, Mich.
Warner & Swasey, Cleveland, O.
Garvin Machine Co., New York.

TURBINE WATER WHEELS
Jencks Mach. Co., Sherbrooke, Que.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.

UPSETTING AND BENDING MACHINERY
John Bertram & Sons Co., Dundas.

Brown, Boggs Co., Ltd., Hamilton, Canada.
E. B. Jarvie & Co., Hespeler, Ont.
National Machy. Co., Tiffin, O.
Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.
Jencks Mach. Co., 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. E. Morton, Toronto, Montreal.
Graton & Knight Mfg. Co., Montreal.

VALVE GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co. of Canada, Toronto.

VALVES, FOOT
Smart-Turner Machine Co., Hamilton, Ont.

VALVES, HYDRAULIC
Charles F. Elmes Eng. Works, Chicago, Ill.
Metalswood 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, Ont.
H. W. Petrie, Toronto.
Sturtevant Co., B. F., Galt, Ont.
A. R. Williams Machy. Co., Toronto.

VICES, AIR OPERATED
Hamfitt Mfg. Co., Chicago, Ill.

VICE STANDS, PORTABLE
New Britain Machine Co., New Britain, Conn.

VICES, BENCH
Aikenhead Hardware Co., Toronto, Ont.
Becker Milling Machine Co., Boston, Mass.
Foss & Hill Machy. Co., Montreal.
New Britain Machine Co., New Britain, Conn.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.

VICES, PIPE
Aikenhead Hardware Co., Toronto, Ont.
Ruttorfield & Co., Rock Island, Ill.
Wells Bros. Co. of Canada, Galt, Ont.
J. H. Williams & Co., Brooklyn, N.Y.

VICES, 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.
Loun B&I & Hinge Works, London, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

WATER PURIFYING AND SOFTENING APPARATUS
Wm. B. Seafie & Sons Co., Pittsburgh, Pa.

WATER CINDER MILLS
Whiting Foundry Equipment Co., Harvey, Ill.

WATER JACKETS
Can. Weibing Works, Montreal, Que.

WATER TOWERS
The Jencks Mach. Co., Ltd., Sherbrooke, Que.
Toronto Iron Works, Ltd., Toronto.

WATER WHEELS
The Jencks 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.
E. B. Shuster Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

WIRE CLOTH AND PERFORATED METALS
Canada Wire & Iron Goods Co., Hamilton.

WIRE FORMING AND STAMPING MACHINERY
Baird Machine Co., Bridgeport, Conn.
Brown, Boggs Co., Ltd., Hamilton, Canada.
McClellan & Son, F. W., Niagara Falls, Ont.
E. 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 STEEL, BRASS, COPPER, BRONZE
Steel Co. of Canada, Ltd., Hamilton, Ont.

WIRE RAILS
Sleeper & Hartley, Inc., Worcester, Mass.

WOOD BORING MACHINES
Canada Machinery Corp., Galt, Ont.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
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.
E. B. Shuster Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

WOODWORKING MACHINERY
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Garlock-Walker Machinery Co., Toronto, Ont.
New Britain Machine Co., New Britain, Conn.
H. W. Petrie, Toronto.
Petrie of Montreal, Ltd., H. W., Montreal, Que.
R. E. T. Fringer & Co., Toronto, Ont.
Silver Mfg. Co., Salem, Ohio.
A. R. Williams Machy. Co., Toronto.

WOOD LATHES
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Oliver Machy. Co., Grand Rapids, Mich.

WORKS STANDS, PORTABLE
New Britain Mach. Co., New Britain, Conn.

WRENCHES
Armstrong, B. E., Tool Co., Chicago, Ill.
E. B. Shuster & Co., Grand Rapids, Mich.
Canadian Billings & Spencer, Ltd., Welland.
Rosenberg Mfg. Co., Buffalo, N.Y.
Niles-Bement-Pond Co., New York.
Wardman & Barnes Mfg. Co., St. Catharines, Ont.

WRENCHES, AUTOMOBILE NARROW JAW AND MONKEY
Barnes & Barnes Mfg. Co., St. Catharines, Ont.

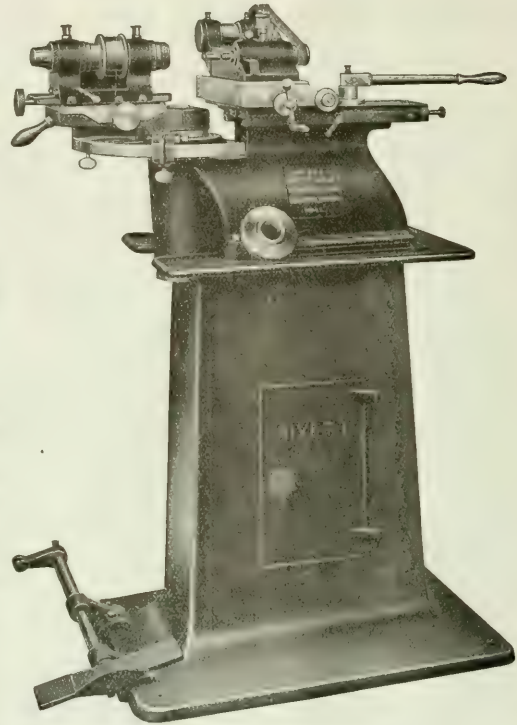
WRENCHES, PIPE, MONKEY, TAP
Aikenhead Hardware Co., Toronto, Ont.
Remis & Call Hdwe. & Tool Co., Springfield, Mass.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

WRENCHES, RATCHET AND BASIN
Remis & Call Hdwe. & Tool Co., Springfield, Mass.
Keystone Mfg. Co., Buffalo, N.Y.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.

WRENCHES, SOCKET
Allen Mfg. Co., Hartford, Conn.

RIVETT
Quality

**RIVETT
ACCURACY
PLUS
INCREASED
PRODUCTION**



Here is a machine that lives up to the high standard of accuracy that has been set by other Rivett machines. It is made like all other Rivett machines with quality the most important consideration. But in designing the No. 205 Radial Grinder, speed of production was not lost sight of in the effort to secure quality. We have secured accuracy with speed, perhaps the most difficult combination to secure in a machine tool.

For the grinding of ball bearings and similar radial operations this machine is without a peer when it comes to speed on small sizes.

When you want a radial that will turn out the work rapidly and at the same time accurately, you can do no better than to buy a No. 205 Rivett. Our catalog will interest you.

RIVETT LATHE & GRINDER CO.

BRIGHTON DISTRICT OF BOSTON, MASS.

CANADIAN MACHINERY

AND MANUFACTURING NEWS

A weekly newspaper devoted to the machinery and manufacturing interests.

Vol. XVIII.

TORONTO, AUGUST 30, 1917

No. 9

EDITORIAL CONTENTS

THE EXPANDING ARBOR AS A FACTOR OF PRODUCTION.....	225-227
GENERAL	227-228
Britain Controls Rare Metal Deposits in Queensland.... Scheme to Control Factories After War is Australian Plan.... Britain Commandeers Iron Ore.... Concrete Ship Shows Long Service.	
PRODUCTION METHODS AND DEVICES.....	229-232
Automatic Arbor for Shell Nose Drilling.... Stock Centre Gauge... A Wire Hanger Rack.... Practical Grinding Hints.... Template and Plugs for Tapping Holes.... A Vertical File Rack.... Backing Off Counterbores.... The Screw Machine Feed.	
GENERAL	232
Turbine Speeds and Applications.	
FOUNDRY PRACTICE AND EQUIPMENT.....	233-235
Reflections From the Fettleing Shop of a Steel Foundry.	
FOUNDRYMEN'S CONVENTION AND EXHIBITION	235-237
GENERAL	237
Is There a Substitute for Iron for Permanent Moulds?... Profitable Disposal of Metal Cuttings.... Blow and Gas-holes in Iron Castings.	
EDITORIAL CORRESPONDENCE	238-240
Swedish Iron and Steel Industry.... Kerosene as Motor Fuel... Marine Diesel Engine Problems.... Painting Steel Ceilings.... Gravity Versus Force-feed Lubrication.	
PROGRESS IN NEW EQUIPMENT	241-243
Universal Milling Machine.... Motor-Driven Wire Pointers.... Motor-Driven Bull Frame.... Shell Handling Equipment at a British National Factory.... Machinery Hall Exhibits at Canadian National Exhibition.	
EDITORIAL	244
Restoring the World's Shipping.... Munitions Making Further Restricted.	
INDUSTRIAL NOTABILITIES	245
George Duncan Davie.	
SELECTED MARKET QUOTATIONS	246-247
THE GENERAL MARKET CONDITION AND TENDENCY	247
Summary.... Montreal Letter.... Toronto Letter.... New York Letter... Pittsburgh Letter.... Flax Industry Has Been Revived.	
INDUSTRIAL AND CONSTRUCTION NEWS.....	252

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.

PUBLISHED 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, 1207 Union Trust Building, Telephone Main 3449.

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 738, Old South Building, Telephone Main 1204. A. H. Byrne, 1104-5-6-7 Fort Dearborn Building, 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.

McDougall Shapers

These are up-to-date Shapers, designed for modern shop production.

They are plain in design, yet embody all essential features necessary for efficient work.

Every adjustment is convenient for the operator and fine for the most accurate work.

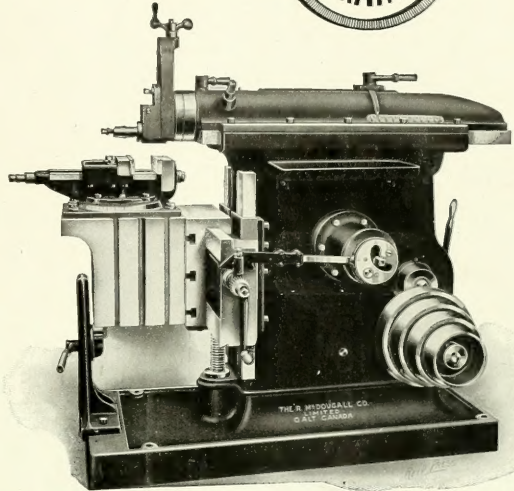
Let us have your inquiry.

**The R. McDougall Company
Limited**

Manufacturers

GALT, ONTARIO, CANADA

The Canadian Fairbanks-Morse Company, Limited
Sales Agents



Machine Tools In Stock

LATHES.

- 1—6" Dalton Bench Lathe with draw-in attachment.
- 1—12" Perfect.
- 1—13" Champion.
- 1—14 x 6 Mulliner Tool-room Lathe with pan, taper attachment and draw-in attachment.
- 1—17 x 10 Sidney.
- 1—18 x 8 Mueller.
- 1—19 x 10 Sidney.
- 1—19 x 12 Sidney with taper attachment.
- 2—24 x 12 Boye & Emmes.
- 2—26 x 12 Boye & Emmes.
- 3—30 x 14 Boye & Emmes.
- 4—21 x 8 Le Blond Heavy Duty Turning Lathes.
- 6—21 x 8 Le Blond Turret Lathes.
- 4—18 x 8 Battle Creek Heavy Duty.
- 1—24 x 24 New Haven Standard Type.
- 1—36 x 12 Conradson.

MISCELLANEOUS.

- 1—700-lb. Bell Steam Hammer.
- 1—Franklin Portable Crane.
- 1—American Gas Furnace with blower.
- 1—No. 180 Brown & Boggs Power Press.
- 1—No. 200 Brown & Boggs Power Press.

SHAPERS.

- 1—16" Ohio Heavy Duty
- 1—20" Ohio Standard Type.
- 1—20" Ohio Heavy Duty.
- 1—20" Smith & Mills.
- 1—20" Queen City.

MILLING MACHINES.

- 1—No. 2 Kempsmith Universal.
- 1—No. 3 Kempsmith Universal.
- 2—No. 25 Ohio Universal.
- 1—No. 2 Ford Smith Plain.
- 1—No. 1 Standard Hand.
- 2—12" Garvin Dividing Heads.

GRINDERS.

- 1—No. 2 Ohio Universal.
- 1—No. 3 Ohio Universal.
- 1—No. 1 Fraser Universal.
- 1—Style B Yankee Twist Drill Grinder.
- 1—Garvin Surface Grinder.
- 1—No. 12 Ford Smith Wet Tool Grinder.
- 3—8" Grind Stands.
- 8—12" Grind Stands.
- 2—18" Grind Stands.

The Foss & Hill Machinery Company

305 ST. JAMES ST., MONTREAL, QUE.

C.M.C.

All Geared Lathe

C.M.C.

16"
18"
20"
24"
26"
32"

IN this head we offer the maximum number of speeds with the minimum number of gears. It is arranged for direct connection to constant speed motor or direct pulley drive. It is the simplest and most flexible of any geared head on the market. Built with the usual strength and accuracy of all C. M. C. tools.

Bulletin No. 1107 illustrates in detail this up-to-date, all-geared head, and will gladly be sent on request.

CANADA MACHINERY CORPORATION
LIMITED

Works at GALT and HESPELER

Toronto Showrooms at Brock Avenue Subway

