

CANADIAN MACHINERY

AND MANUFACTURING NEWS

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

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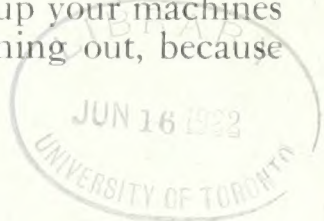
Subscription Price
\$3.00 per Year



Increased protection is the cry of the day. Rich Drills will enable you to speed up your machines without fear of your drills burning out, because they are

FORGED

—Not Milled



In machine shops where all manner of light and heavy drilling is being done, Rich Drills are pre-eminent.

Where work of character is in the making—work that must go out into the world bearing the stamp of Quality—Rich Drills have, in their way, en-

hanced the prestige of the finished article.

Always look for "Rich" on High-Speed Twist Drills, Hammers, Track Bits, Flat Drills, Drills and Reamer Chucks and Rivet Sets.

Send for Catalog.

Standard Machinery & Supplies, Limited

Successors to Montreal Machinery & Supplies, Limited

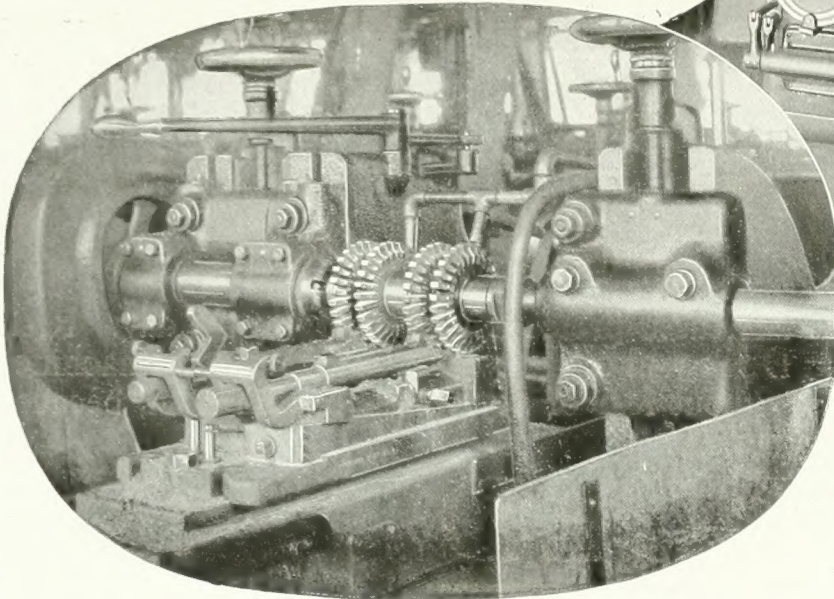
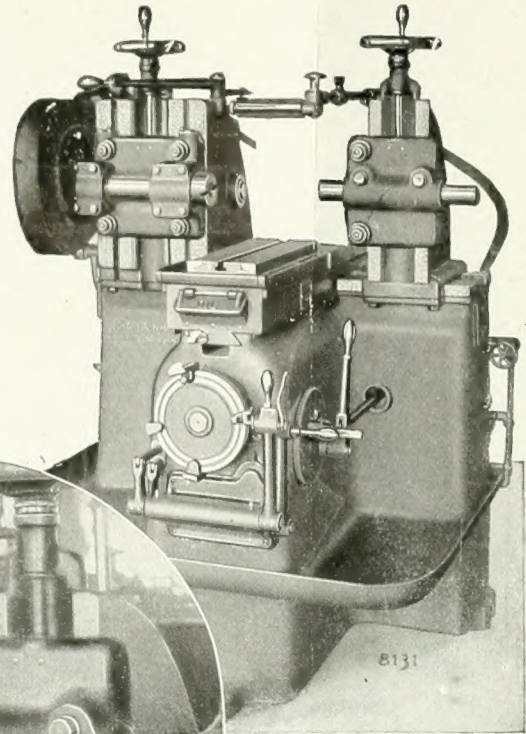
260 St. James Street, MONTREAL



PRATT & WHITNEY

Automatic MILLERS

A high production manufacturing tool of extreme accuracy; automatic in operation and especially adapted to the diversified milling requirements of fire arms production and similar work.



At Work on Military Rifles

Illustration shows straddle milling operation on sides of receivers. Two receivers are handled at one time.

Pratt & Whitney Automatic Millers are built in 5-inch, 8-inch and 12-inch sizes. The table has rapid power traverse in either direction, automatically controlled. The table receding feature operates automatically and permits the work to clear the cutter on the return stroke and, therefore, prevents marring of the finished surface. Automatic features of these machines eliminate usual hand operations. One man can take care of from six to eight machines, depending on the character of the work. Practically all the operator has to do is to supply the machine with work.

Write for Illustrated Circulars.

PRATT & WHITNEY CO.

of Canada, Limited

Works: DUNDAS, ONTARIO

MONTREAL
723 Drummond Bldg.

TORONTO
1002 C.P.R. Bldg.

WINNIPEG
1205 McArthur Bldg.

VANCOUVER
B.C. Equipment Co.



BERTRAM MACHINE TOOLS

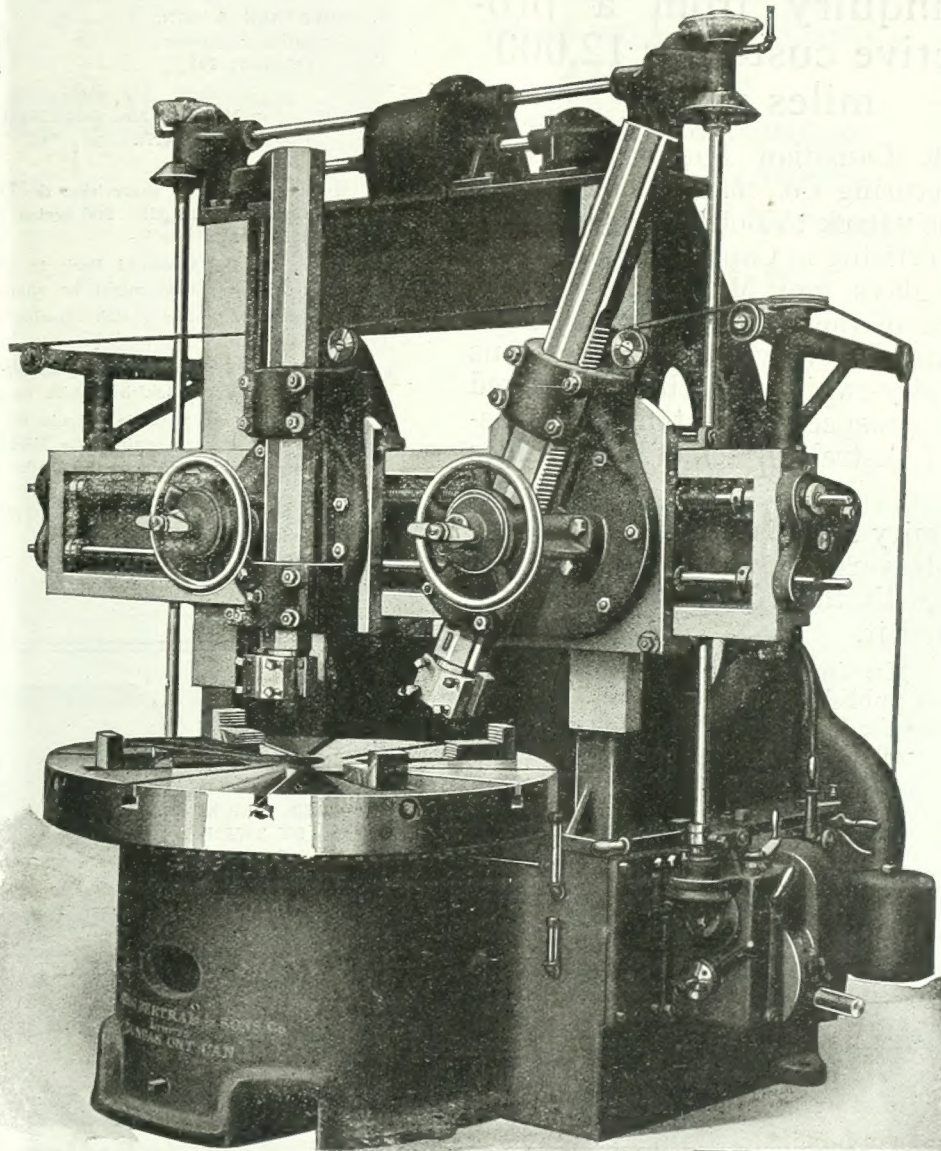
**42-inch
Vertical
Boring
and
Turning
Mill**

*Niles
Type*

Motor-
Driven
Through
Speed Box

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

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



M 111 PHOTO 1057.

The John Bertram & Sons Company Limited

Dundas, Ontario, Canada

MONTREAL
723 Drummond Bldg.

TORONTO
1002 C.P.R. Bldg.

VANCOUVER
609 Bank of Ottawa Bldg.

WINNIPEG
1205 McArthur Bldg.



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

The Publisher's Page

TORONTO

July, 1917

An inquiry from a prospective customer 12,000 miles away

THE Canadian Morehead Manufacturing Co., makers of the famous "Back to Boiler" Steam Trap, are advertising in Canadian Machinery. A few days ago Mr. King, general manager of the Can. Morehead Manufacturing Co., very kindly showed us an inquiry which had been received from a prospective customer in Tasmania (Australia), some 12,000 miles away!

The inquiry itself is interesting and we have pleasure in reproducing it, together with the advertisement which prompted it.

Canadian Machinery was the first Canadian journal to publish export numbers. For well over a year the first issue of each month to the extent of well over 1,000 copies, is mailed abroad to a carefully compiled list of machinery importers.

A supply of each export number is also sent to each Canadian Trade Commissioner and excellent work has been done by these officials in bringing our paper to the attention of interested parties.

We have received many letters from our advertisers testifying to the splendid results they are obtaining. We appreciate their frankness in telling us of results secured because such reports encourage and spur us on to even greater efforts.

There are many difficulties in the way of doing a profitable export business at this time. It must not be forgotten, however, that an export connection is not built up in a day or a year, and the full force of the advertising in our export numbers will be felt months and perhaps years hence.

To the foresighted firms who are reaching out into the future we take off our hats. Some day Canada will have a *real* export business to brag about. You will find that the concerns who are getting the thin end of the wedge in now will be in the front row of exporters then.

Our next Export Number is due to appear August 2nd, forms closing July 26. Why not take advantage of it?

F. ROWNTREE & SON,
Consulting Engineers
Telephone 205

37 Montpelier Road,
Hobart, May 26th, 1917
Tasmania, Australasia

The Canadian Morehead Manufacturing Co.,
Woodstock, Ontario.

Gentlemen:—

We have under our supervision the steam plant of the leading "Temperance Hotel" of this city, and seeing your add. in the February issue of "Canadian Machinery"—

"Morehead Back to Boiler System"

we thought your system might be applied with profit to our plant.

Herewith please find sketch showing relative positions of the various parts in use.

Should you feel disposed to communicate with us at the other extremity of the Grand British Empire we shall esteem it a favor.

Allow us to congratulate Canada on the noble sons she has sent to the "Help of the Lord against the Mighty," and the splendid work they have accomplished; God bless them all.

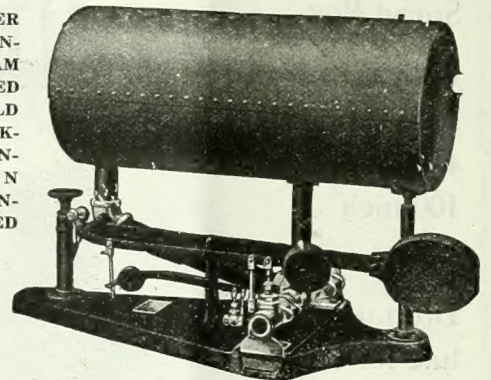
Yours truly,

F. ROWNTREE & SON,

37 Montpelier St.
Hobart
Tasmania, via Australia.

Per Francis Rowntree

THE PIONEER
AND ORIGINAL
IN STEAM
TRAPS. USED
THE WORLD
OVER. BACK-
ED BY TWEN-
TY - SEVEN
YEARS OF UN-
QUALIFIED
SUCCESS.



Morehead
Back to Boiler
SYSTEM

Assures a better
heat and a saving
of fuel, time and
labor.

MOREHEAD TRAPS are being used everywhere on Heating, Drying and Cooking propositions of every kind, from straight pipe work to fan stacks, and under vacuum conditions without regard to the difference in pressures between the apparatus drained and that carried on to the boiler, and without regard to location of the apparatus drained, whether above or below the water line in the boiler.

An attractive proposition for foreign buyers.

Write us direct.

Canadian Morehead Mfg. Co.
Woodstock, Ontario

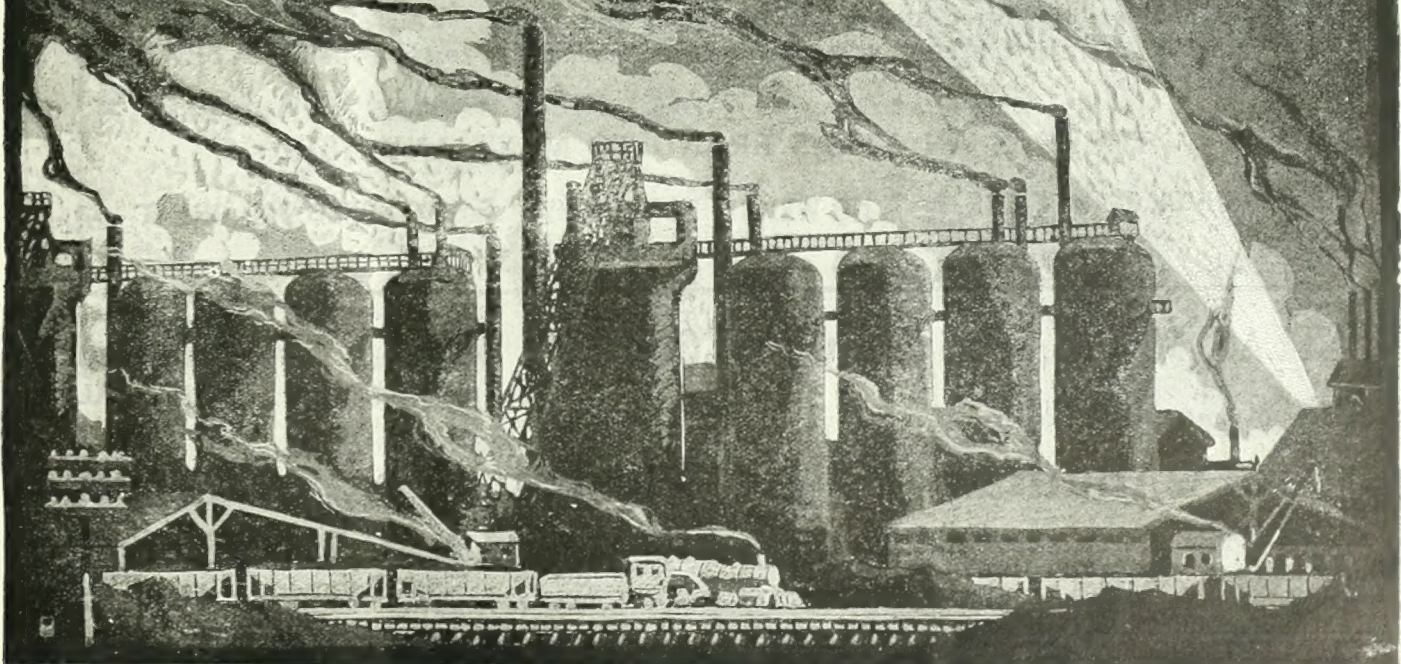
Quality

Service

LIST OF PRODUCTS

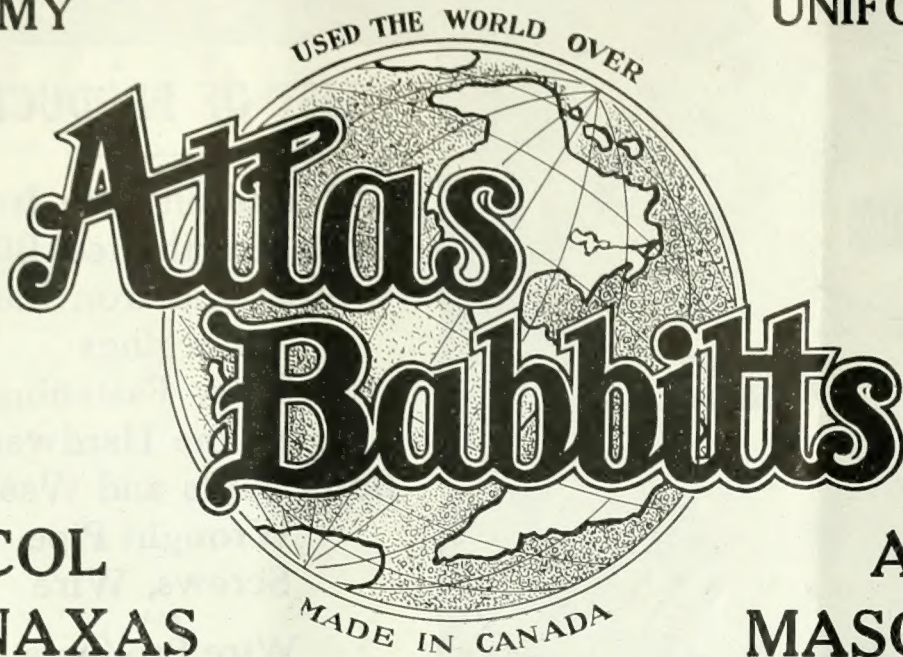
“Hamilton” Pig Iron
Open Hearth Steel Billets
Steel and Iron Bars
Forgings
Railway Fastenings
Pole Line Hardware
Bolts, Nuts and Washers
Wrought Pipe
Screws, Wire
and
Wire Products
of every description

**THE
STEEL COMPANY
OF CANADA
LIMITED
HAMILTON MONTREAL**



ECONOMY

UNIFORMITY

AMACOL
TENAXASATLAS
MASCOTTIN TOUGHENED  W. E. W. BABBITT

HAVE A WORLD-WIDE REPUTATION FOR UNIFORMITY

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

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

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

THERE IS AN ATLAS BRAND TO MEET ANY NEED

NO SHOCK TOO SEVERE

NO WEIGHT TOO HEAVY

NO SPEED TOO GREAT

ATLAS METAL and ALLOYS COMPANY of CANADA, Limited
MONTREAL

Sales Agents:

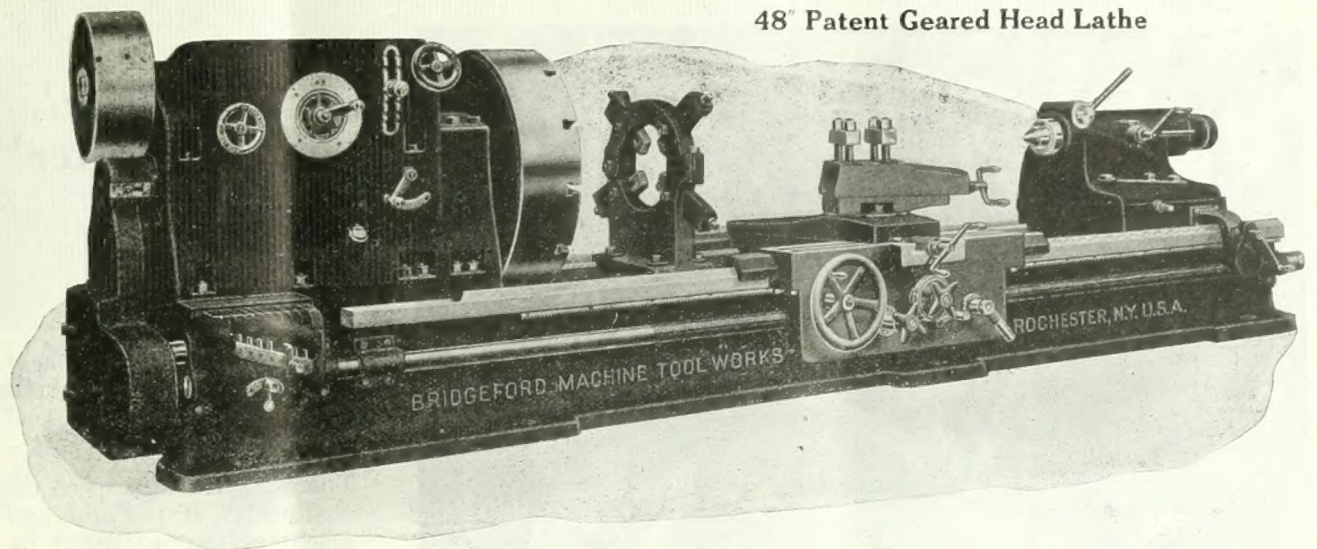
The Canadian B. K. Morton Co., Limited

MONTREAL

TORONTO

49 Common Street

86 Richmond Street East



48" Patent Geared Head Lathe

The Bridgeford for Big Work

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

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

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

Two Cuts at One Time

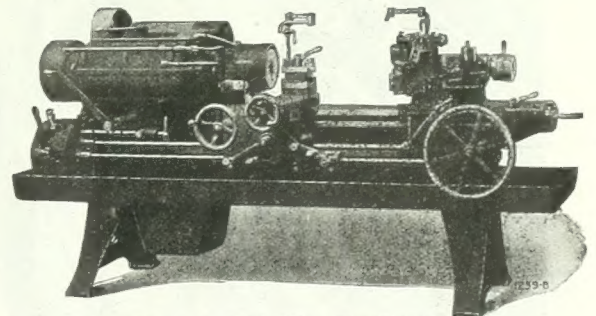
The ability to face, undercut or neck with the square turret while boring or turning with the hollow-hexagon turret contributes largely to the time-saving and economical output of the

Universal Hollow-Hexagon Turret Lathes

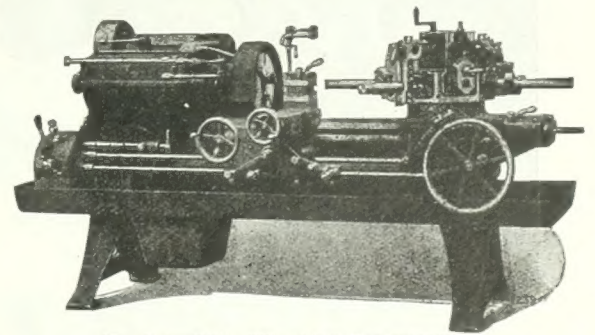
Separate feed shafts, each with ten individual feeds, operate the carriage and turret saddle independently, and provide the exact feed required for each.

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."

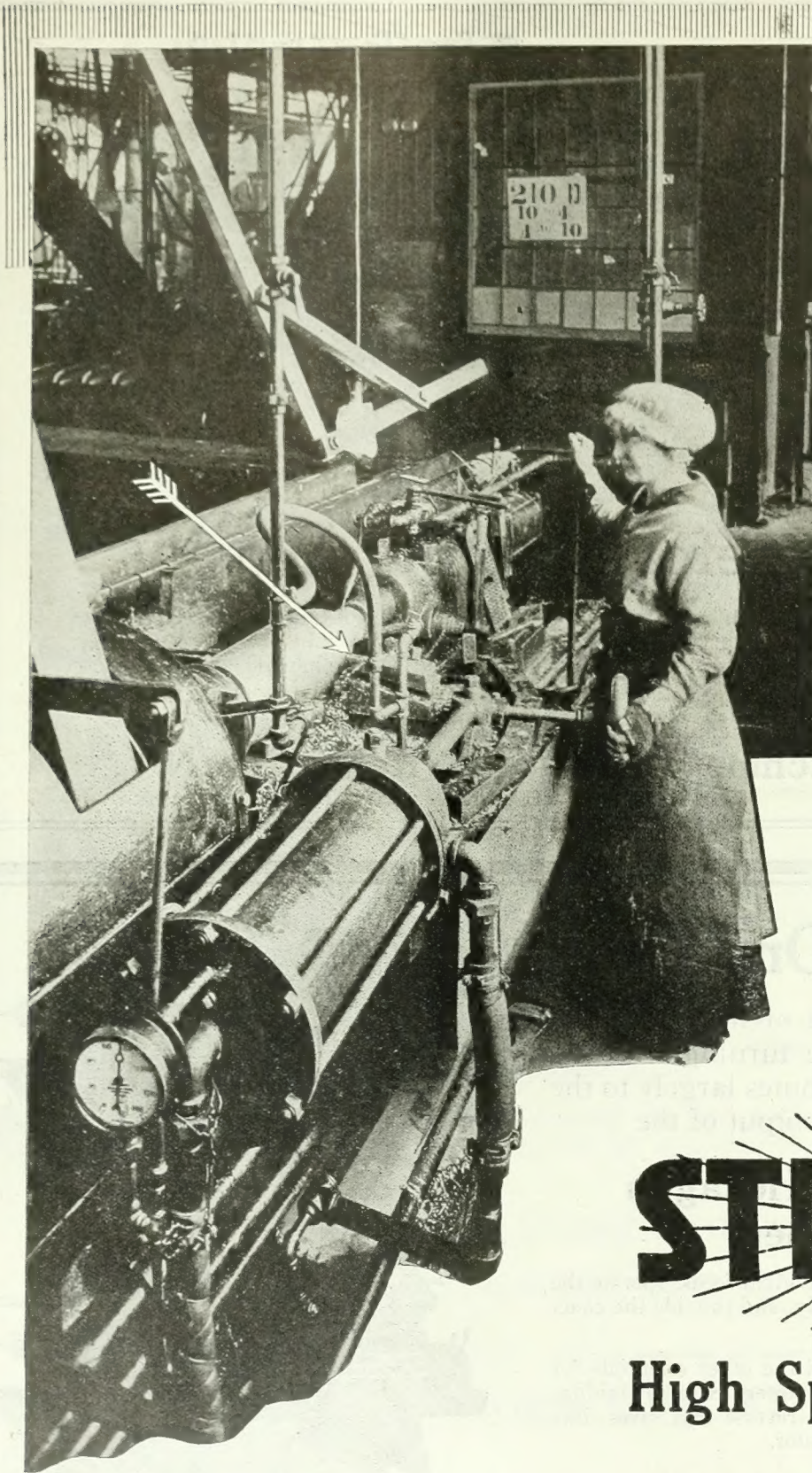


No. 2-A—With "Chucking Equipment."

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

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



**“Not a Steel,
but its Master”**

FINISHING the profile of 8-in. Howitzer shells made from rolled steel forgings.

The cut starts at a speed exceeding 200 ft. per min. and machines the surface 9 in. long in 1 min. 24 sec.

The tool is given a feed of $\frac{1}{8}$ in. per revolution and imparts a highly finished surface to the work.

An output of 55 shells per grinding is maintained easily.

An instance of extreme conditions which Stellite is meeting successfully every day.

Stellite is harder and tougher than steel. Cuts longer and 25 to 300% faster. Requires no forging, and cuts as well when running at red heat as when cold—does not lose its temper. Convince yourself that STELLITE stands behind bigger production and tool economy by giving it a try-out.

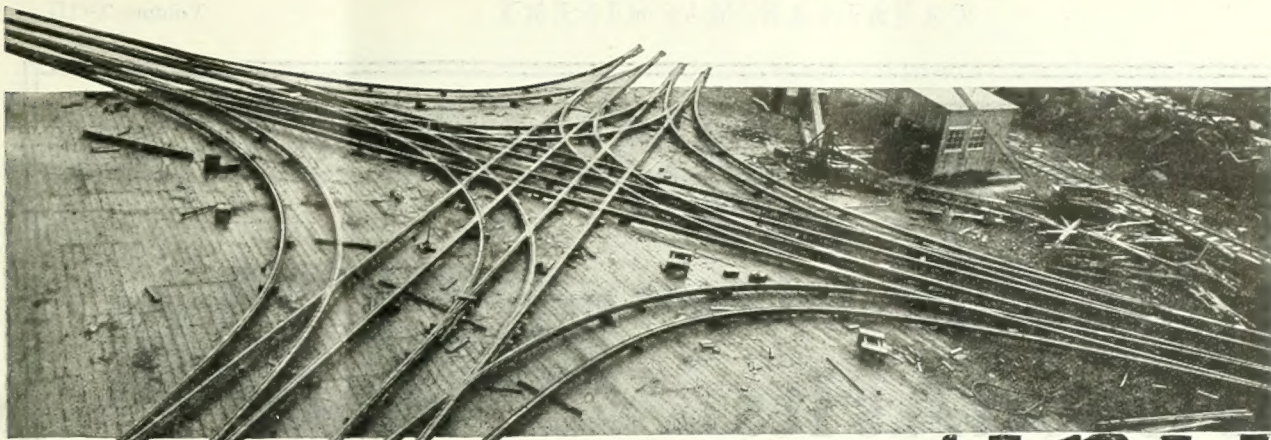
STELLITE

High Speed Tool Metal

Deloro Smelting & Refining Co., Limited Stellite Sales Dept.
DELORO, ONT.

Toronto Branch: 200 King Street West

Montreal Branch: 315 Craig Street West



Solid Manganese Steel Intersection for Montreal Tramways Company.

Steel Castings

For Hydraulic, Mill Gear, Locomotive, Rolling Stock, Marine—in fact we make castings of any size and any kind—Manganese, Vanadium, Titanium, Chrome, Nickel, etc. Dependable products always.

Canadian Steel Foundries, LIMITED
MONTREAL WELLAND

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.

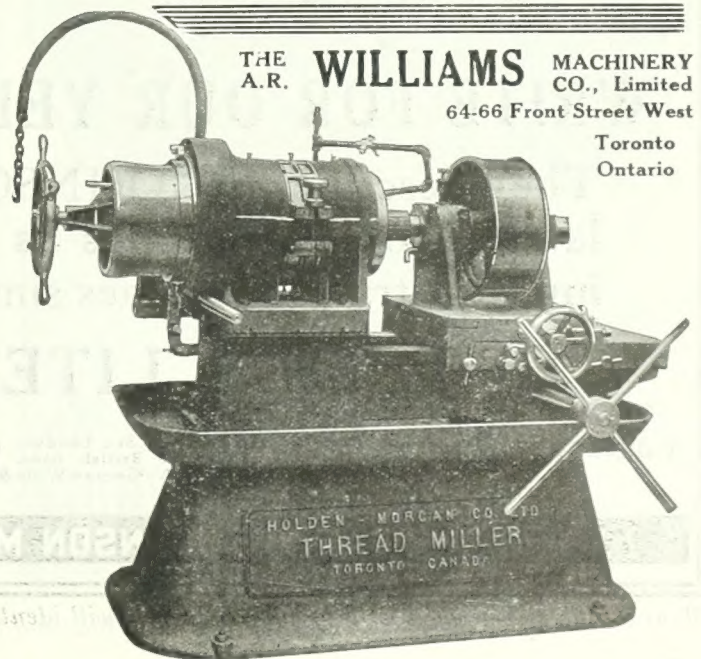
The Life of a Thread Miller

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



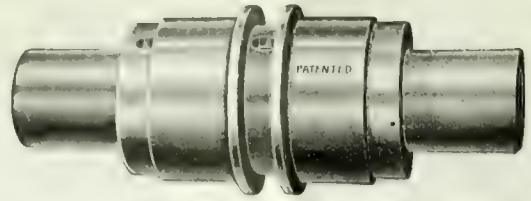
THE JOHNSON FRICTION CLUTCH

“A Machine Is As Good As Its Clutches”

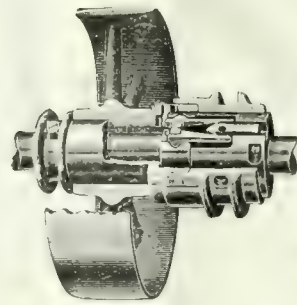
The finest materials and workmanship that enter into the construction of machine tools are dependent upon the clutch for smooth running and mechanical perfection.

Therefore, a machine is as good as its clutches. This fact is so thoroughly appreciated among machine tool designers that Johnson Friction Clutches are specified wherever clutches can be used.

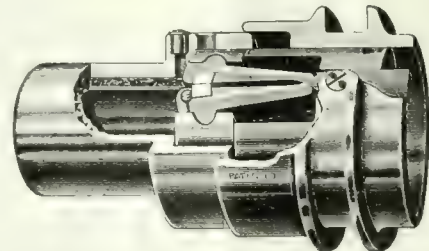
We are always ready to talk over any mechanical problem to which clutches may be applied and help the designer or machine tool builder. If our various types of clutches do not meet your needs, we are prepared to make any modifications which may be necessary.



Double Clutch—Exterior.



Single Clutch with Pulley on Hub.



Section broken away, showing clutch disengaged.

WRITE FOR OUR YELLOW DATA SHEETS

They describe the JOHNSON CLUTCH fully. Our latest booklet, **Clutches as Applied in Machine Building**, illustrates machines similar to yours.

GET THIS LITERATURE NOW.

England—The Efadem Co., 159 Gt. Portland St., London. Canada—Williams & Wilson, Ltd., 320 St. James St., Montreal.
W., England. Sole Agents for the British Isles. Canadian Fairbanks-Morse Co., Limited, Toronto.
AUSTRALIA—George Wills & Co., Brisbane, Queensland.

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



A Keen Cutter

WOLFRAM
Is Both

VULCAN CRUCIBLE STEEL CO.
Aliquippa, Pa. U.S.A.
Represented in Canada by Messrs. Wm. Colford & Company, Que.

Strong in the Neck

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



The Stamp of Approval is "on the Well Advertised Article

So quote all the authorities on this subject.

So far it has been our policy to simply show a photograph and let it go at that—but *Now* we intend covering in a series of *10 Issues*—the chief reasons why a **FORD-SMITH MILLER** should form a part of *your Shop Equipment*.

Follow us up on these Advertisements—We will appreciate it—at the same time—It will pay you—*and be Time Well Spent*.

NO SWEEPING SLOGANS WILL BE USED
Simply plain, understandable language—foolish talk never lasts long anyway

When we get through let us hear from you—*good, candid criticism will be welcomed*.

Our Special Miller Bulletins—and also our General Catalogue describe to fuller extent than we can in these columns *our Complete Line*.

Suppose we send you one, so you can get better acquainted with our Various Lines *including Millers, Grinders and Special Machinery*.

WATCH FOR OUR COMING ADVT. No. 1

These advertisements will appear every second week on page 10.

The Ford-Smith Machine Company, Limited

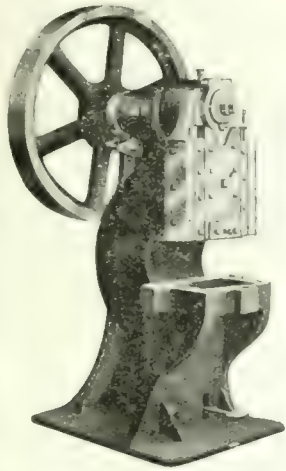
HAMILTON,

ONTARIO

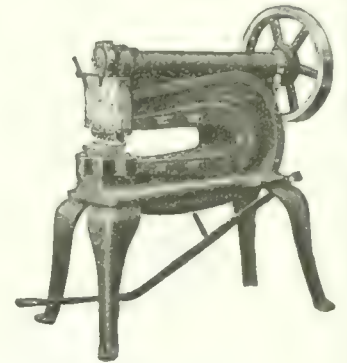
CANADA

Sheet Metal Working Machinery of Any Description

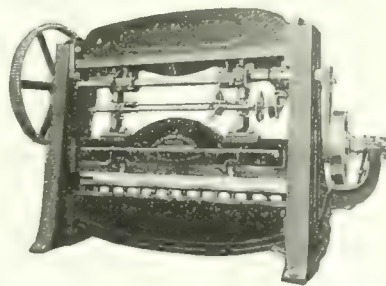
B.B. Presses for
Quality, Efficiency,
Durability, Speed,
Accurate Production.



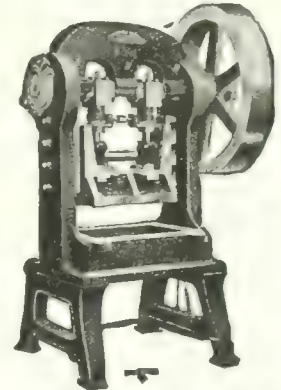
No. 2—G.A. Press



No. 126
Deep Throat Power Punch

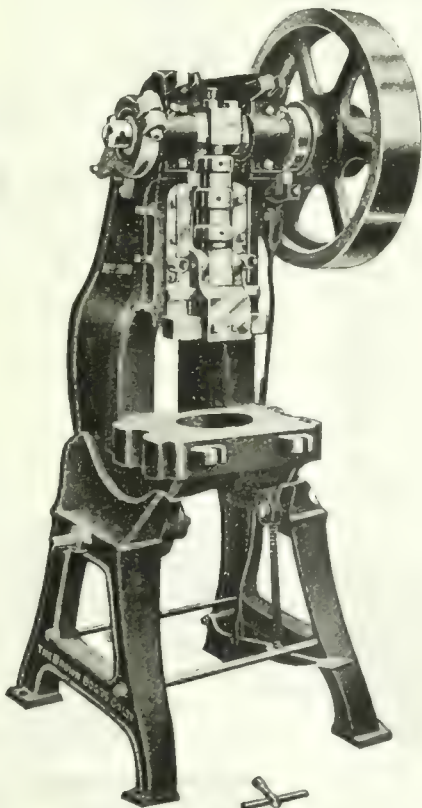


No. 500—Power Brake or Press



No. 20 1/2—Power Press

B.B. Presses embody special features for minimizing maintenance cost of both machines and tools.



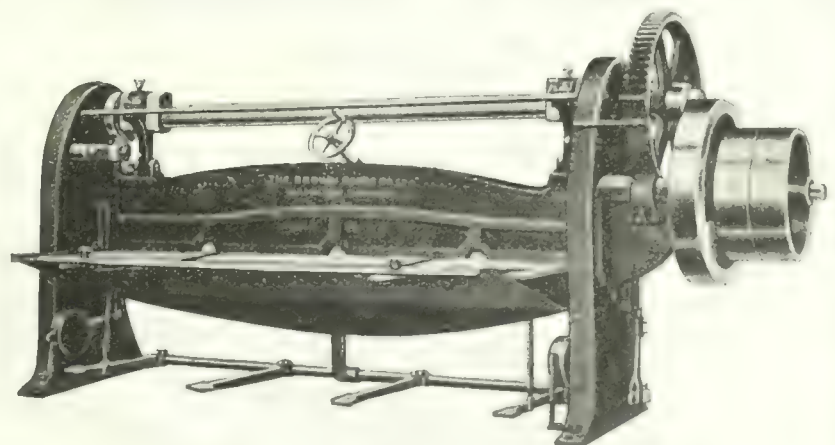
No. 200—Power Press

The Brown, Boggs Company, Limited

HAMILTON ONTARIO

MANUFACTURERS OF

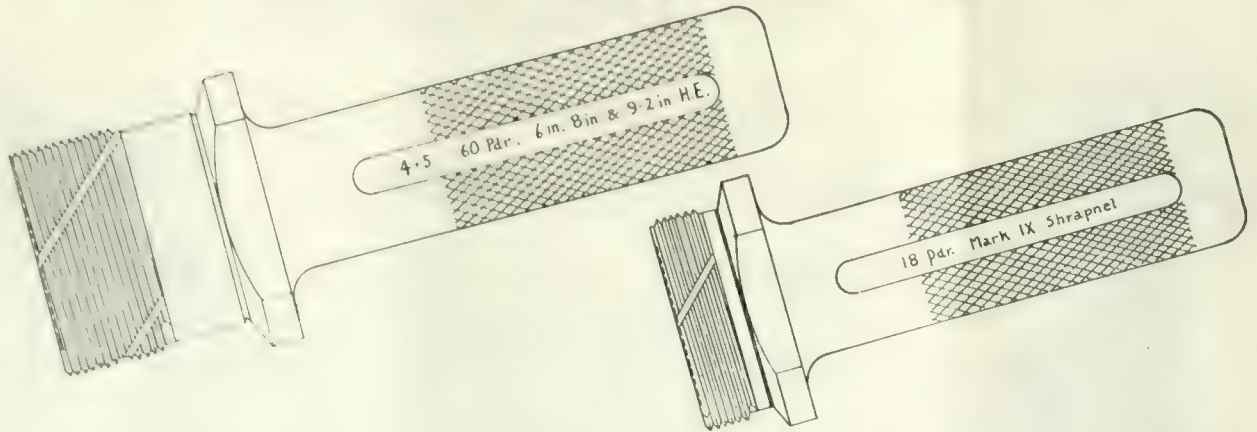
Tinsmiths' Heavy Sheet Metal Working Machinery



No. 960—Overhead Shear

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

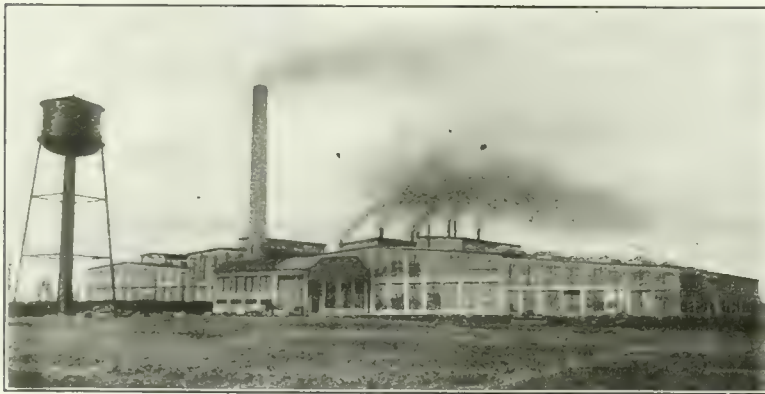
FUSE HOLE GAUGES



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

Windsor Machine & Tool Works

Windsor, Ontario



Works: LONGUEUIL, QUE.

Armstrong Whitworth

of Canada, Limited
MANUFACTURERS OF

HIGH SPEED STEEL

CARBON AND ALLOY STEEL
MISCELLANEOUS SHOP TOOLS

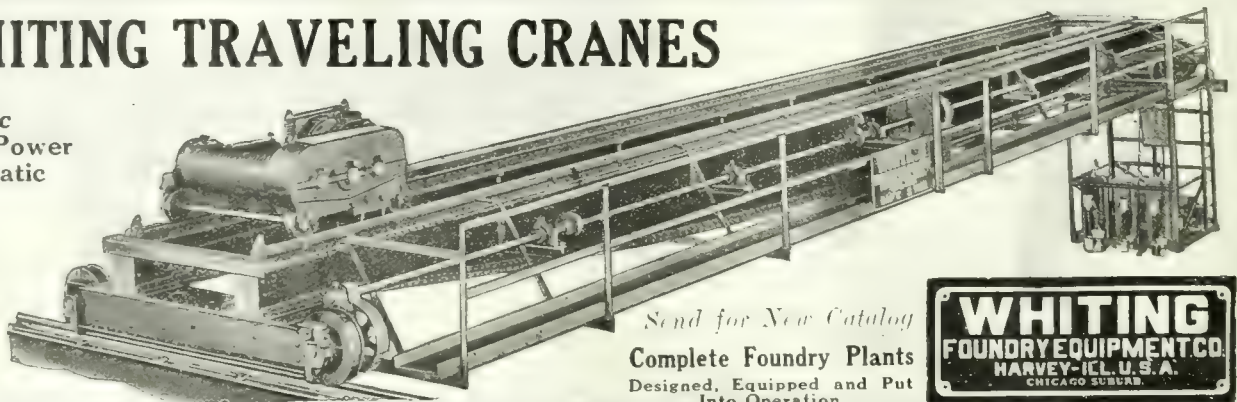
HEAD OFFICE: 298-300 St. James St., Montreal

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

All Products "MADE IN CANADA"

WHITING TRAVELING CRANES

Electric
Hand Power
Pneumatic



Send for New Catalog
Complete Foundry Plants
Designed, Equipped and Put
Into Operation

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

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

ESTABLISHED 1870

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

TRADE MARK



Reliance Steel Works
SHEFFIELD, ENG.

TRADE MARK



TRADE MARK

of the Famous

“WACO”

Brand

High Speed Steel and Twist Drills

“DOUBLE WACO” Quality

Specially Adapted for all kinds of
AMMUNITION WORK

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

*For particulars apply to our
Sole Representatives for Canada*

GEO. A. MARSHALL & CO.

70 Lombard Street Toronto, Ontario

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.

**TEXTILE BELTING
and PACKINGS**

**J.R. BAXTER
& COMPANY LIMITED,
MONTREAL.**

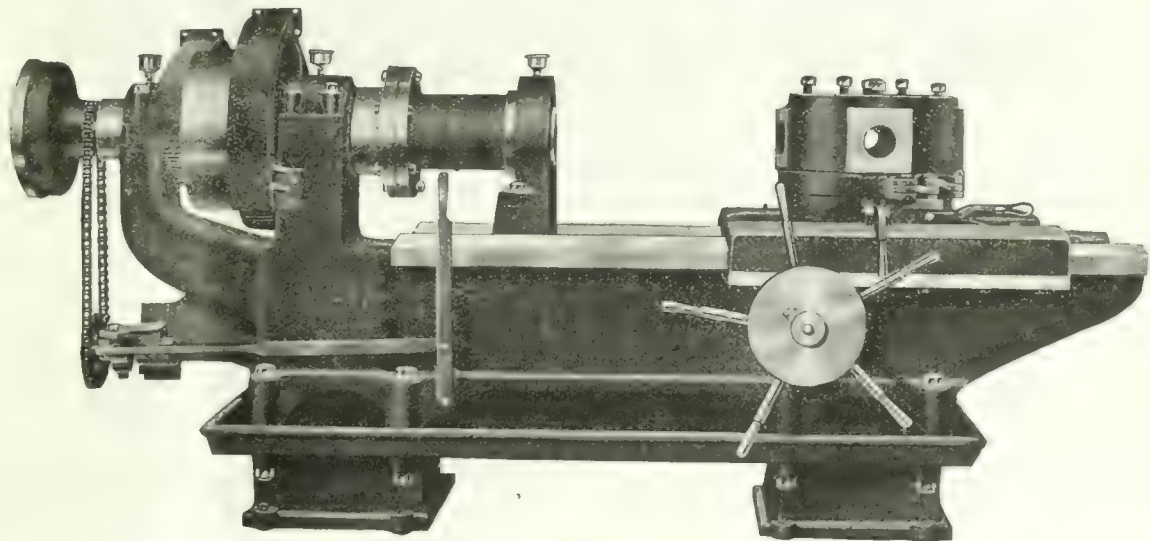
**HIGH TWIST SPEED
DRILLS**

and GENERAL MACHINERY SUPPLIES

IN STOCK—FOR IMMEDIATE SHIPMENT

SUBJECT TO PRIOR SALE

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



MADE IN CANADA

SPECIFICATIONS ON REQUEST

HYDE ENGINEERING WORKS

CONSULTING AND MANUFACTURING ENGINEERS

P.O. Box 1185

27 William Street, MONTREAL, P.Q.

Don't Crowd Your Large Machines

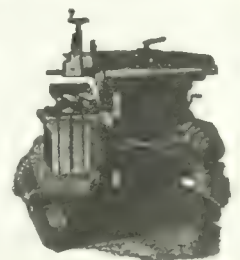
You cannot manufacture small parts economically on a large machine. Steptoe Small Power Feed Millers and Hand Millers are especially adapted for that kind of work, a stiff, heavy tool that can be quickly handled and crowded to the limit. That is the machine to buy for small parts.

If your Planers are crowded take the small jobs and put them on a Steptoe Shaper and you will do them quicker and you will have less money invested in equipment.

STEPTOE SHAPERS "Just a Little Better."

CIRCULAR ON REQUEST.

John Steptoe Co., Cumminsville, Cincinnati, Ohio, U.S.A.



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

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.

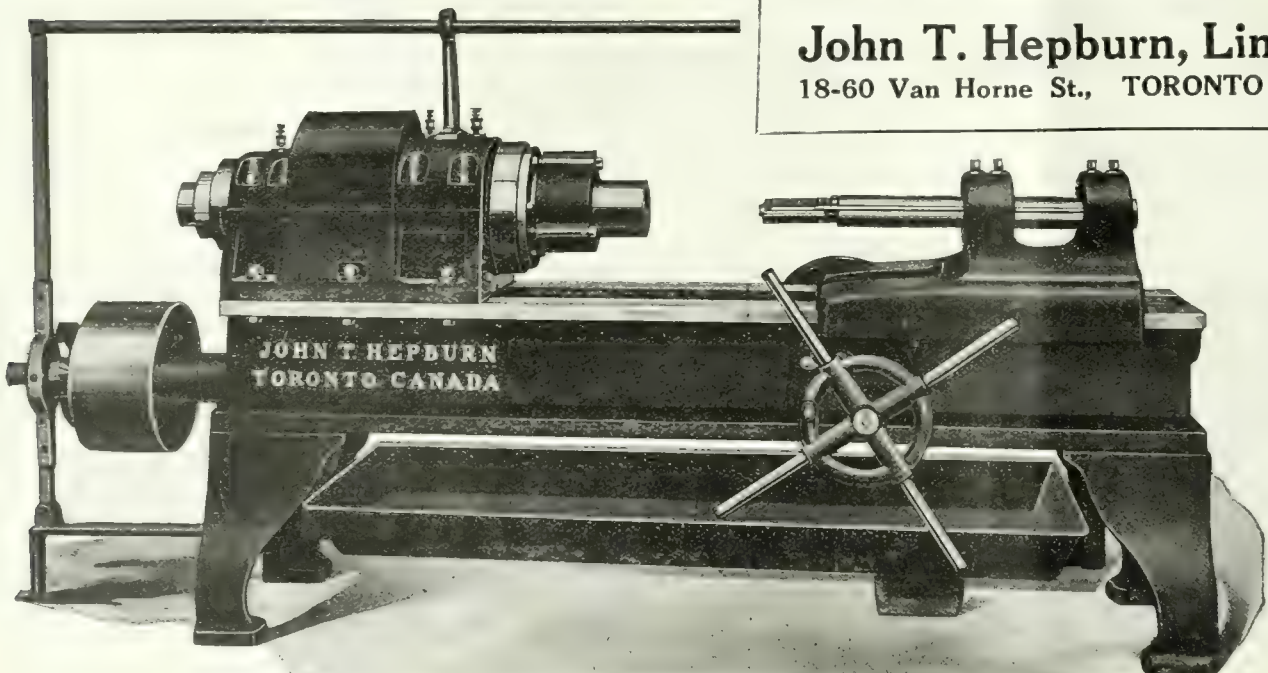
Manufacturer of Plug Milling Machines for above size shells. Prices and deliveries on application.

Boring Up to 6 Inches

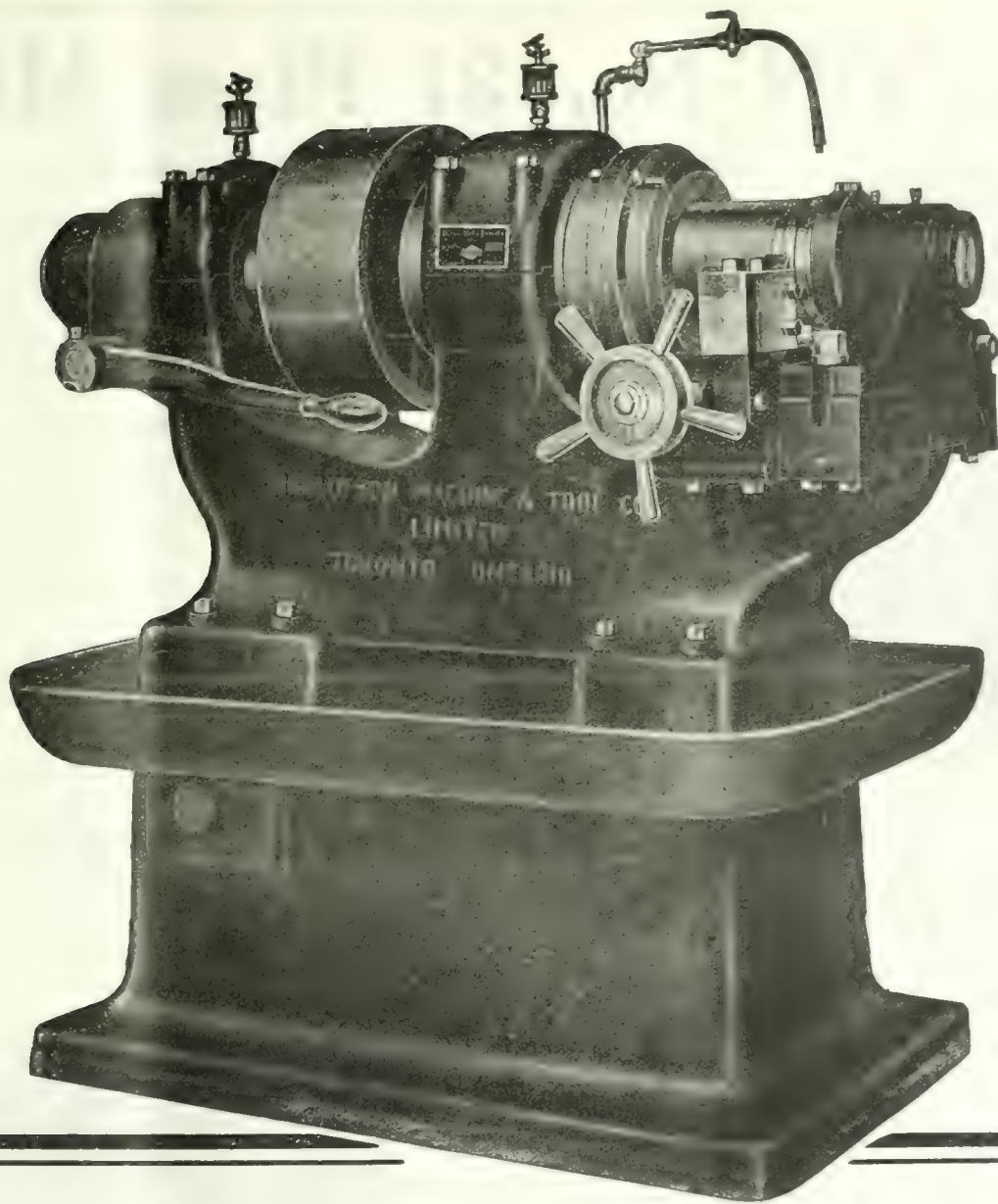
The demand for speed in production was met and exceeded by this Single Bar Boring Lathe which includes sizes up to and including 6". It is a lathe of exceptional strength and in accuracy and quality of production it has proven itself a leader

An inquiry would secure specifications and our immediate co-operation.

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



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



Just Now—

we have two 4.5 machines ready for immediate delivery

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

A glance over some of the features will interest you.

Integral (en bloc) construction assures

perfect rigidity, permanent accuracy and desirable compactness.

Chucking with spring collet chuck insures accurate and speedy chucking.

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

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

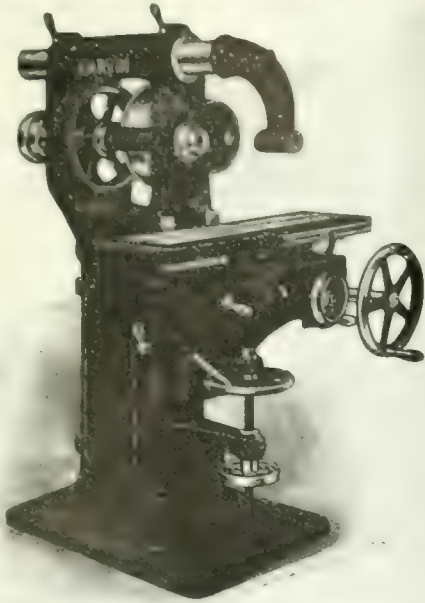
ROELOFSON MACHINE & TOOL COMPANY, LIMITED

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

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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	6 x 30 in.
Changes of Speed	6
Changes of Feed	6
Net Weight, Skidded	1,575 lbs.

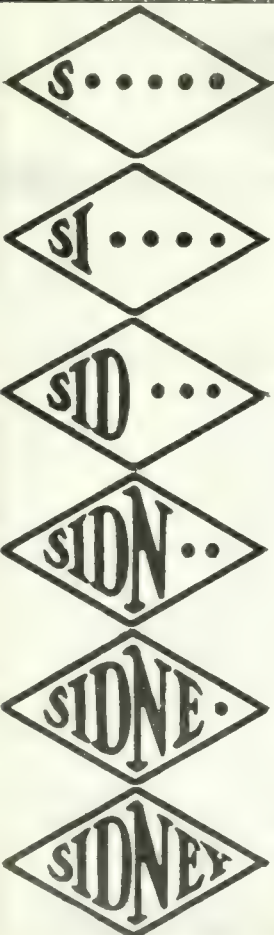
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IMMEDIATE DELIVERIES

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



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"SIDNEY"
when you are in the market for



LATHES

Represented in Canada by:

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 Insuring strength and power.
 Satisfying every Lathe customer.
 Combining accuracy with efficiency.
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CISCO Lathes are built for you.

Built with the greatest care, of best material, and by skilled mechanics. Good now (well worth the money), yet improving daily, therefore the best.

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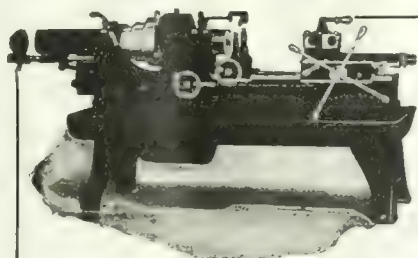
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THE LATHE WITH THE PULL

The A.R. Williams Machinery Co., Ltd. The Cincinnati Iron and Steel Co.

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 OF CISCO LATHES

CINCINNATI, U.S.A.
 MAKERS OF 14", 16", 18", 24" LATHES



Cincinnati Acme 2¼" x 11" Screw Machine

5/8" to 2¼"; 11" to 20" swing, with plain or friction geared head, with or without automatic feed to turret. Does your requirements

come within the range of this machine? If not, get in touch with us, give us data regarding your requirements, we will be glad to co-operate with you.

Our Screw Machines represent the highest efficiency that is to be attained in this class of machinery. They are producers of accurate work, and are the same in light or heavy work where strength is required.

Special tool equipment and estimates in production. This is part of our service. Ask us.

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Cincinnati, Ohio, U.S.A.

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Bilton Automatic Gear Millers—Spur or Bevel Gears

CAPACITY

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

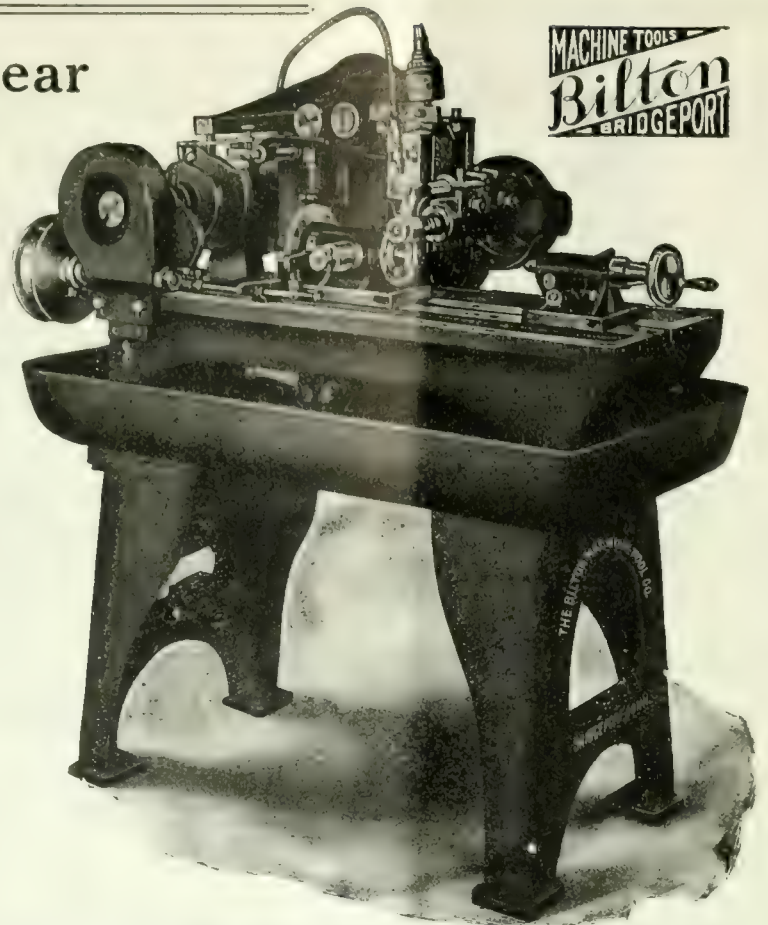
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Succeeding The Standard Mfg. Company
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UNIVERSAL MILLING MACHINES

Are built in three standard sizes. They embody every worth-while feature to be found on a tool room Milling Machine.

We call especial attention to the Dividing Head which is part of the regular equipment of every Universal Miller.

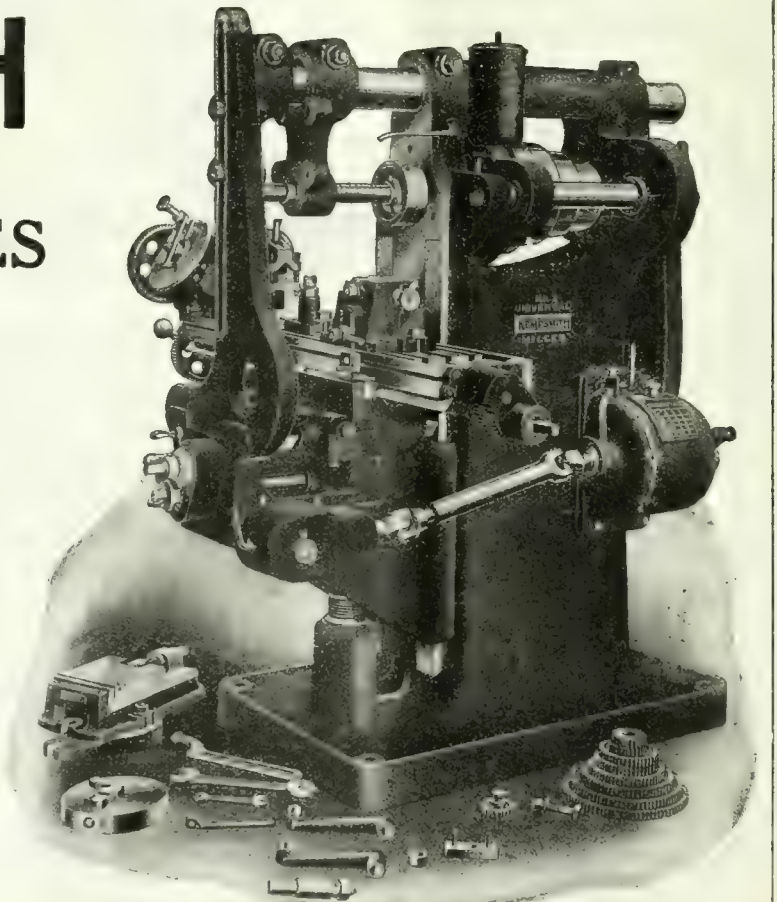
The Kempsmith Dividing Head is compact and rigid, unusually convenient in operation and so constructed as to maintain its accuracy under heavy service.

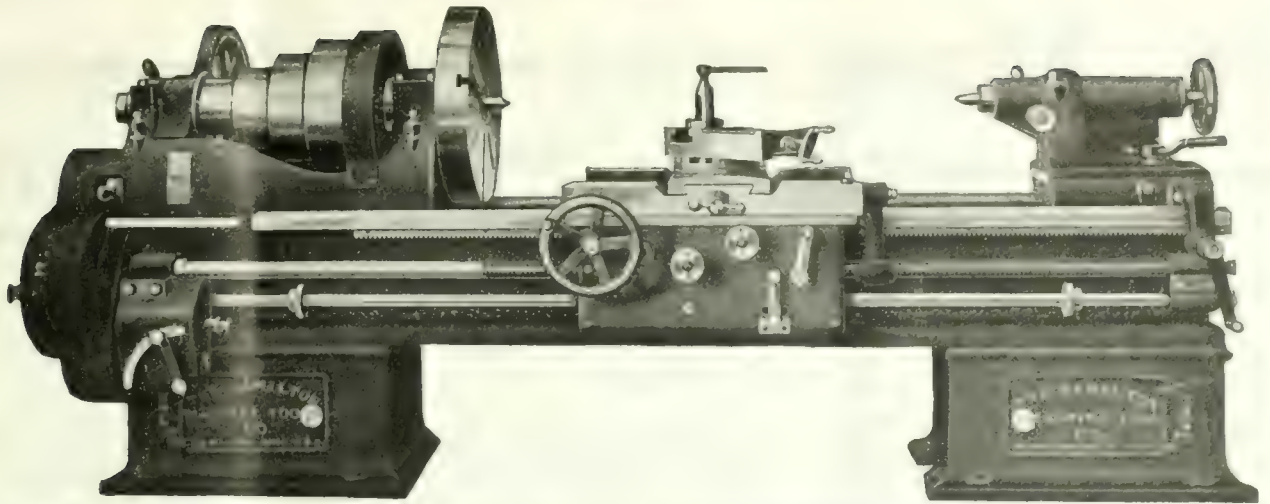
We publish a thirty-two page book elaborately illustrating and describing this Dividing Head. A copy will be sent free on request. Just ask for "Dividing Head Book."

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Hamilton Lathes

Is Your Cost of Production too high?

In the well-managed factory there is no greater loss of time—and therefore of money—than that resulting from the use of old style machinery.

All over the country shops are now running at top speed, and producing more for the dollar than ever before. Why? Because they are installing modern machine tools—tools built to withstand all the strain put upon them by the use of high speed tool steel.

You cannot expect to meet the competition of to-day with the methods of yesterday. To-day your equipment must be of the best, otherwise your costs will go up as your production goes down.

Investigate "HAMILTON" Lathes, put them in your factory—then watch the balance swing the other way. Speed, durability and accuracy are the points that make "HAMILTON" tools indispensable in cutting your cost of production.



For 25 Years Makers of fine Machine Tools

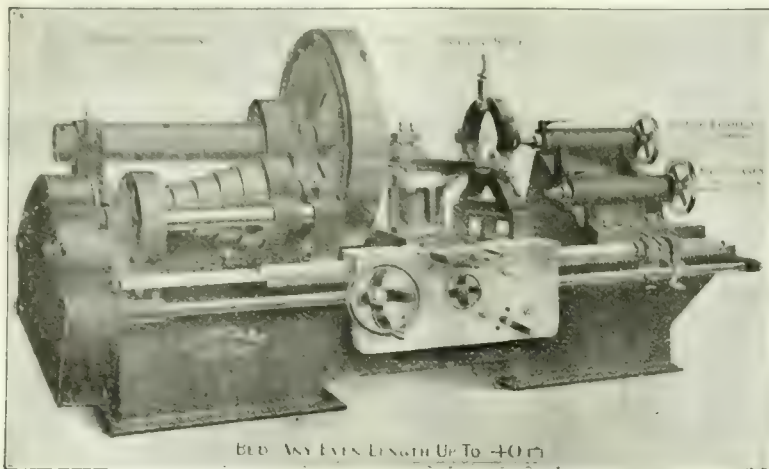
The Hamilton Machine Tool Co.
HAMILTON, OHIO

Sole Agents for Ontario:
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Do More! ——— ———put on more steam

is the industrial slogan of to-day

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



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

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

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

Immediate Shipment 12-ft. beds—from stock.

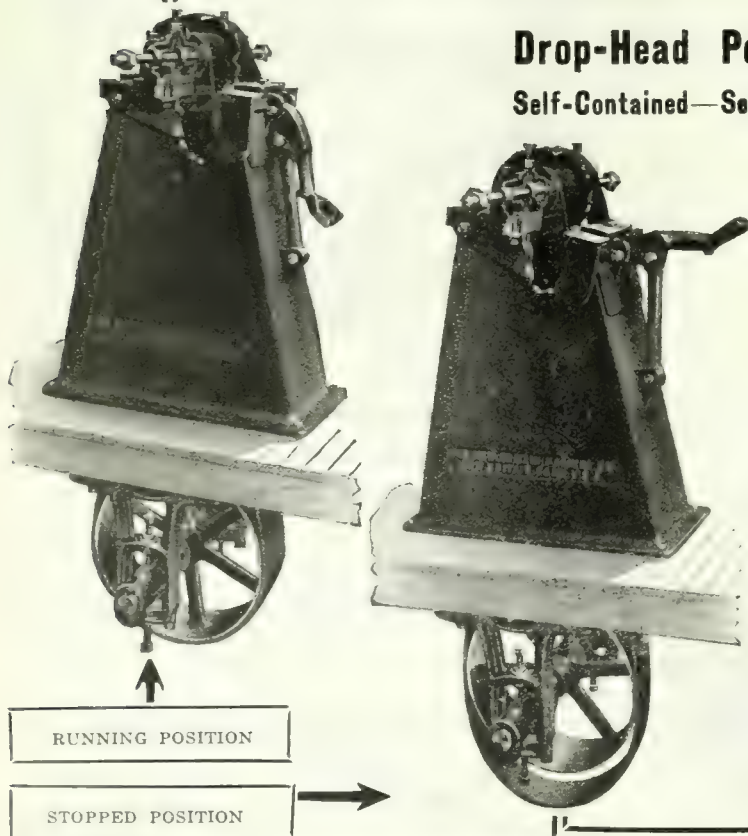
J. J. McCABE

149 Broadway,
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NEW BRITAIN

Drop-Head Polishing Machines

Self-Contained—Self-Oiling—Quick-Stopping



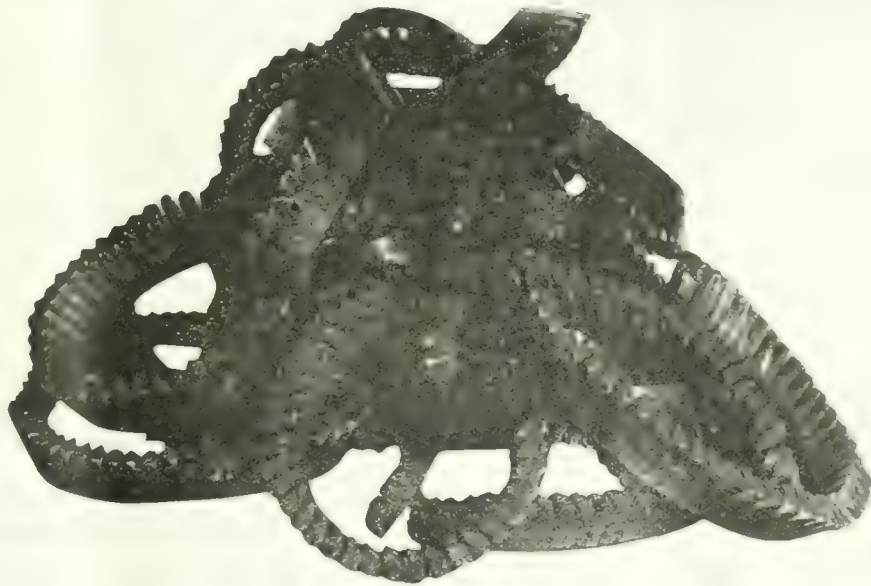
THE adoption of the Drop-Head Type of Polishing Machine for all the big arms factories erected the past year or two is convincing testimony to its superiority. Machine is belted from below, eliminating all countershafts, clutches, and loose pulleys and effecting a marked saving in power. The downward pull of the belt offsets any tendency to vibration and insures a smooth running wheel. Belt is in tension only when running and can be tightened without shortening. The enclosure of the belt excludes those air currents which with exposed belting carry injurious particles of emery to the lungs. Bearings are self-aligning and self-oiling. The Drop-Head Polishing Machine shows a 50% saving in floor space as compared with back-belted machines. For complete description send for Bulletin No. 1103.

"Built Like a Machine Tool"

The New Britain Machine Company
"Shop Furniture Originators"  **New Britain, Conn. U.S.A.**

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

Specimen Cuttings Made with
URANIUM
HIGH SPEED TOOLS



Note Depth of Cut on the Tests Below

Tool	Feed	Speed, Feet Per Minute	Depth of Cut	Material Cut Before Grinding
U-8	1/16 in.	45	5/8 in. to 3/4 in.	Ran 87 in. most of time the nose of tool was on scale.
U-8	1/16 in. to 1/10 in.	38	15/16 in.	Ran 127 in. Time 3 hrs., speed increased to 65 ft. p.m. after tool had gone 105 in.
U-8	1/16 in.	60	1 1/16 in.	Ran 12 in.

See your tool steel man or write us.

Standard Alloys Company

Forbes and Meyran Aves.

PITTSBURGH, PA.

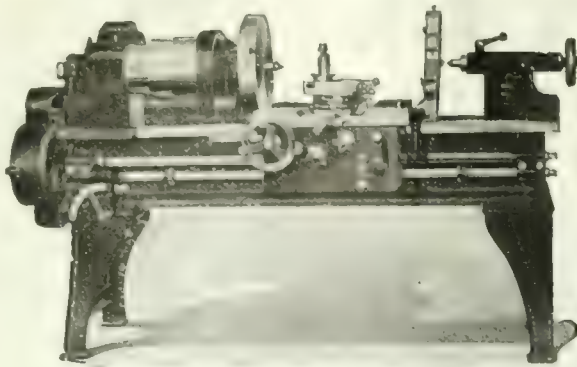


GARLOCK-WALKER MACHINERY CO. LIMITED

32 FRONT ST. WEST,

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TELEPHONE MAIN 5346



ENGINE LATHES

for delivery from Toronto Stock

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

Dimensions:

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

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

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

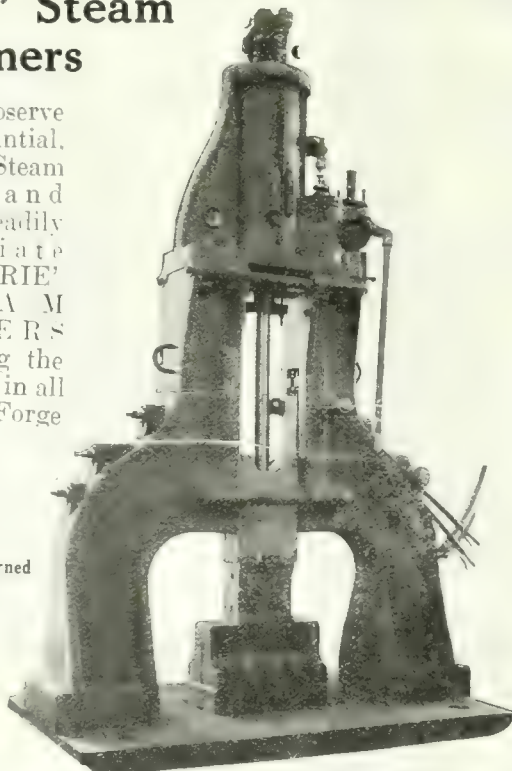
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METAL and WOODWORKING MACHINERY of all Kinds

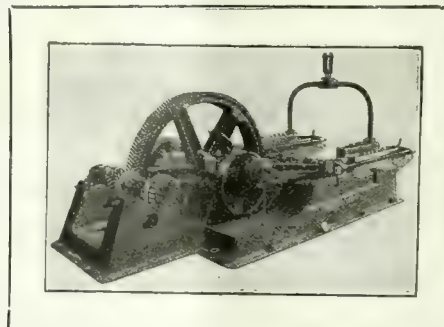
"Erie" Steam Hammers

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
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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

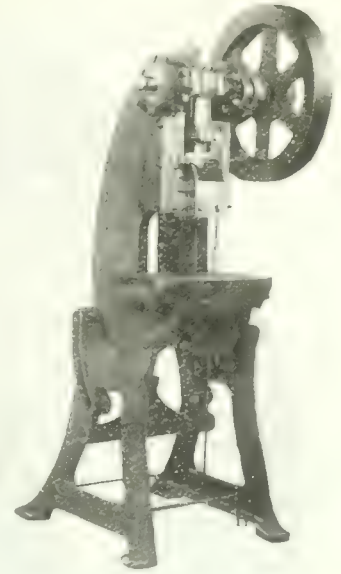
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HAVE you examined the patented Ball Joint Connection on the smaller Consolidated Presses? This ball joint is instantly adjustable for wear, all lost motion can be eliminated by loosening the locking screws and adjusting the ball cap downward—no machining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

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

That is economy that cannot be overlooked.



Consolidated Press Company

HASTINGS

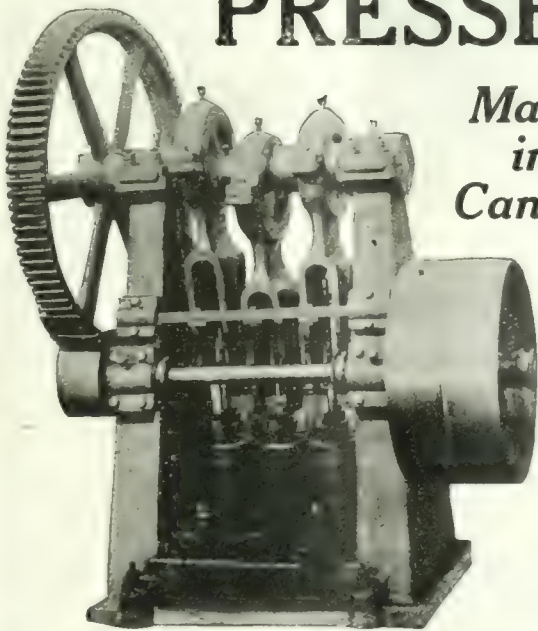
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MICHIGAN

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

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*Made
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Hydraulic Presses, Pumps and Accumulators for all purposes

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WILLIAM R. PERRIN, Limited
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Triple Purpose

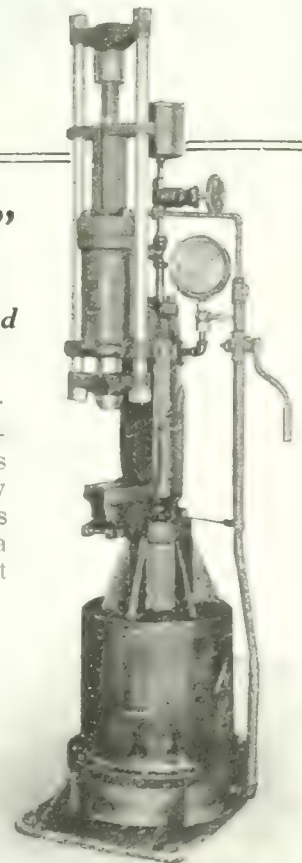
**“METALWOOD”
COMBINATION**

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

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Starrett Tools
 REG. U.S. PAT. OFF.

Reduce Mistakes to a Minimum

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

Good men using Starrett Tools reduce mistakes to a minimum. These tools are the standard for accuracy all over the world. The line of these fine measuring instruments includes: rules, squares, levels, calipers, dividers, micrometers, vernier height gages, depth gages, test indicators and hack saws.

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

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



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



30,000 R.P.M.

A Portable Electric Grinder with such extreme speed as the ARO should appeal strongly to every shop which has grinding to do—it will surely cut down costs.

While the ARO is noted for its marvellous speed, that's not all it has to recommend it. It is absolutely accurate and built for a long life of service. Superior to all other grinders.

Perfectly constructed—Armature, internal spindle pulleys and large emery wheels are dynamically balanced, preventing vibration. There's no end thrust or side play.

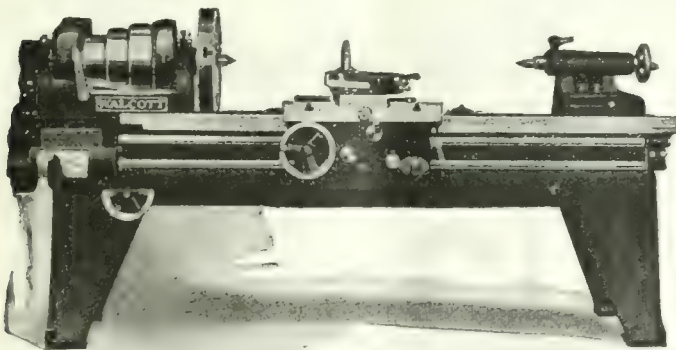
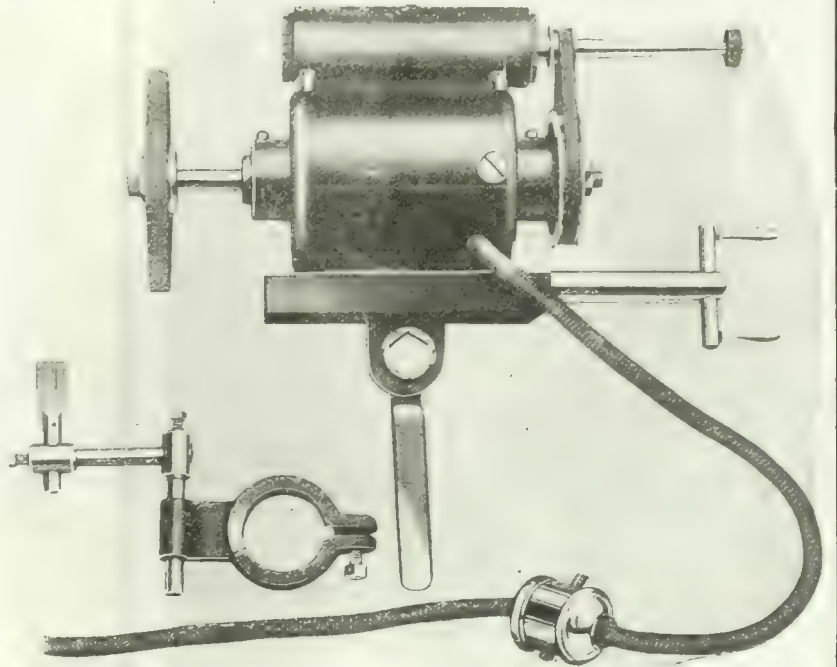
Motor and internal spindle are equipped with S K F and "Norma" Bearings.

Write for full details.

R. E. T. Pringle, Limited
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OFFICES:

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THE WALCOTT LATHE

is backed by lathe-building experience extending over 35 years

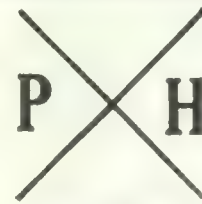
These are features of Walcott Lathes: drop-forged gears in apron; all-steel gears in gear-box; large ways on bed, all gears completely enclosed. Parts are interchangeable. Rigid headstock and tailstock.

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

WALCOTT LATHE COMPANY

Successors to

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



TRADE MARK

Quality Files

Finest Crucible Cast Steel —
Expert Workmanship
File Perfection

File perfection means P.H. Files which cut faster and wear longer than any other brand.

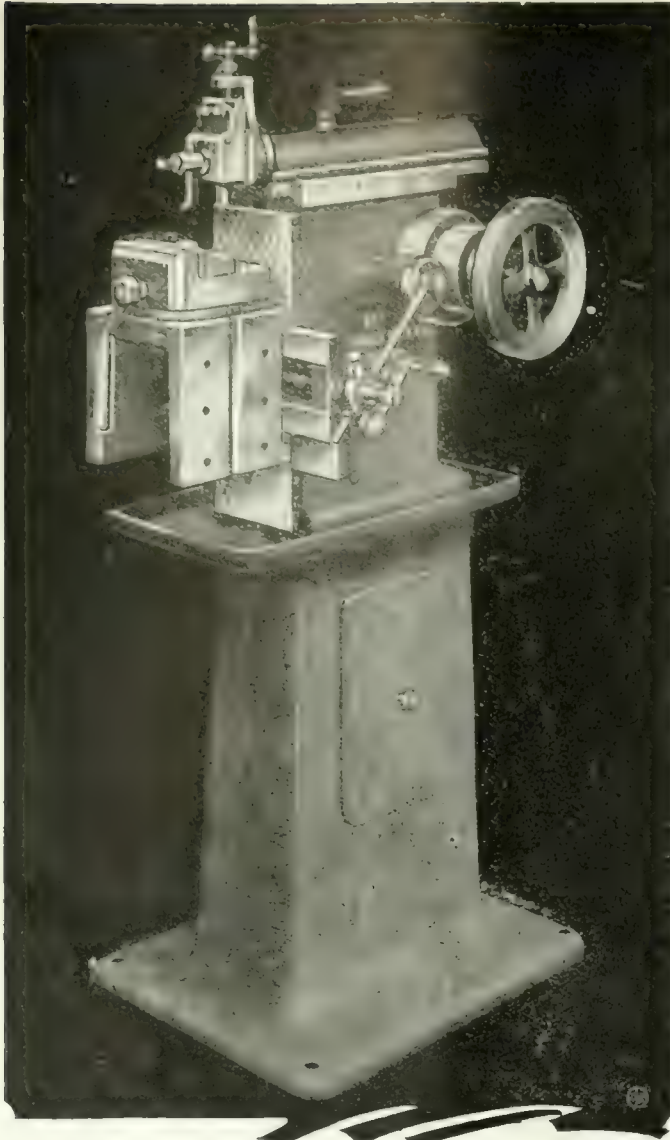
Let us demonstrate this to you.

Port Hope File Mfg. Co., Ltd.

Port Hope, Ont.

Ask Your Jobber

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RHODES

*Vertical and Horizontal Shaper
Gives Maximum Efficiency
at Minimum Cost*

Don't do your shaping and slotting, tool-making, die-making, modeling and other classes of light work on big and expensively-operated machines when all this work can be done more accurately, quicker and cheaper by far, with the RHODES Machine. Being introduced all over the world on their cost-cutting merits.

They will increase your profits. Look into the matter. Write for description of various types—do it now.

The Rhodes Mfg. Co.
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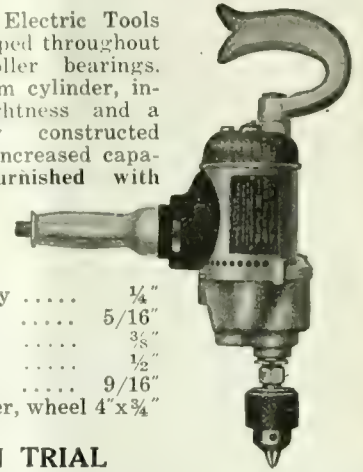
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UNIVERSAL Electric Drills

Licensed Under Burke
Universal Motor Patent

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

000	Drilling Capacity	1/4"
00	"	5/16"
0	"	3/8"
01	"	1/2"
1	"	9/16"
No. 6 Electric Grinder, wheel 4"x3/4"			



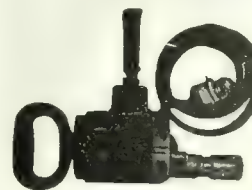
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Independent Pneumatic Tool Company

Office: 334 St. James Street, MONTREAL, QUE.
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U. S. Electric Drills and Grinders

Save Time, Labor and Money



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 SIZES

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

All motors wound for 110 or 220 volts.

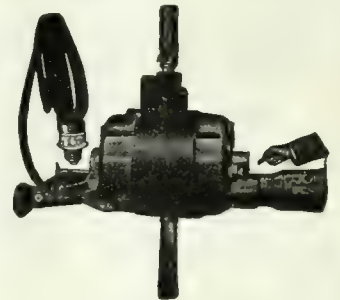
Direct or alternating current.

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

For Sale By

The Canadian Fairbanks-Morse Co., Limited

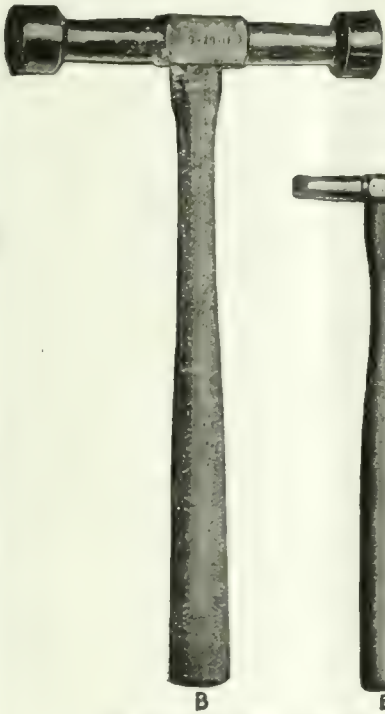
Montreal, St. John, N.B., Toronto, Winnipeg, Calgary, Vancouver



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

THE UNITED STATES ELECTRICAL TOOL CO.
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INSPECTION THE MOST IMPORTANT MANUFACTURING OPERATION REQUIRES PROPER MARKING TOOLS



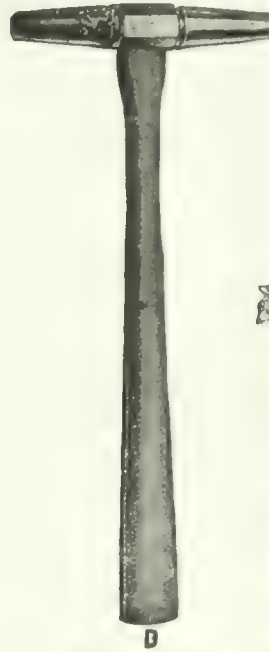
B
For inspection marking of ties, timber, etc.



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For inspection marking to record operations of employees.



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For inspection marking of rails, billets, bars, beams, steel, etc.



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For inspection marking of brass, copper, and metals, etc.



C
For inspection marking of machinery, etc.



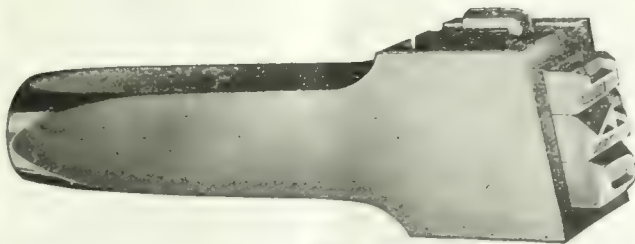
F
For inspection marking of machinery, etc.



No. 5

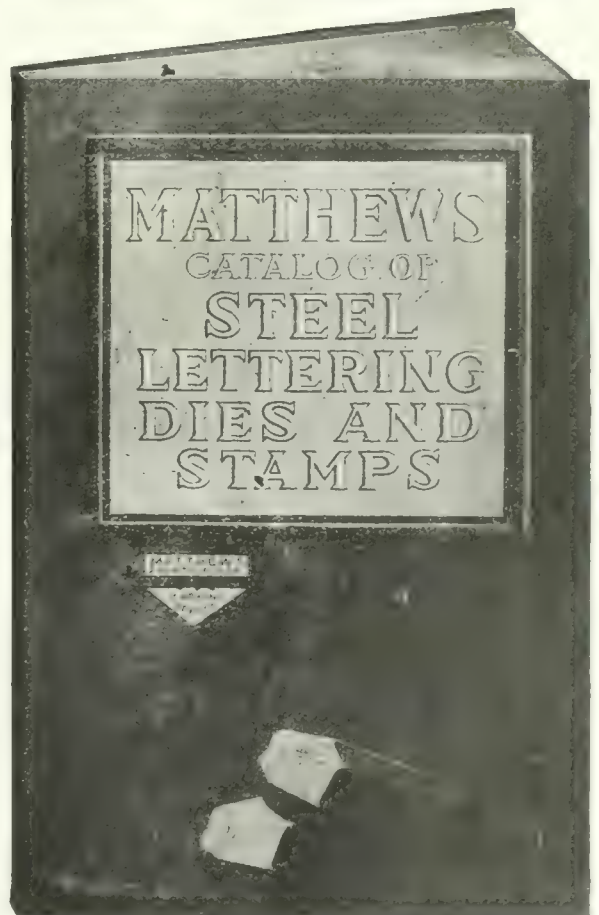


No. 6



No. 1

Three styles of Champion Steel die holders for placing of inspection dates, initials, numbers, etc., on metal products of all kinds.



The Matthews lettering dies and stamps are made of the finest steel and are guaranteed to last.

JAMES H. MATTHEWS & CO.

Established 1850

Marking Devices

FORBES FIELD PITTSBURGH, Pa.

Canadian Distributors: Canadian Fairbanks-Morse Co., Ltd

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Repeat Orders—The Acid Test

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

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

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

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

CANADIAN SKF CO., LIMITED
TORONTO, CANADA

Sole Canadian Agents SKF Transmission Bearings

The Canadian Fairbanks-Morse Co., Limited

St. John
Windsor

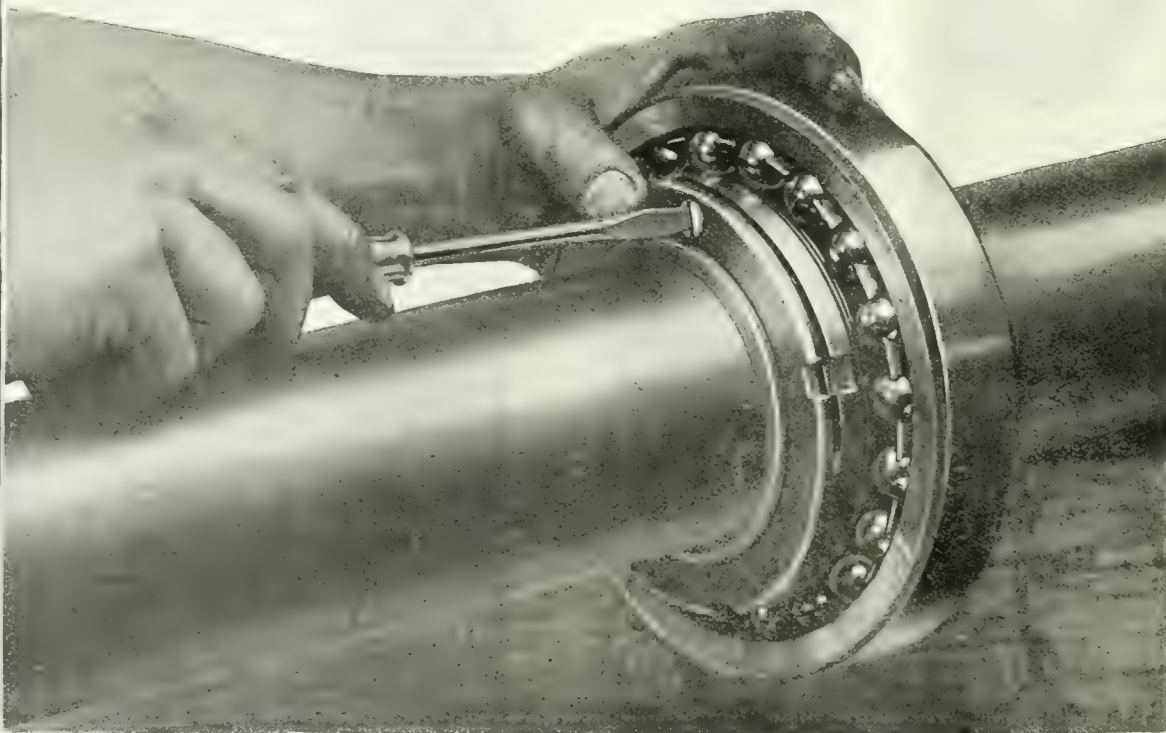
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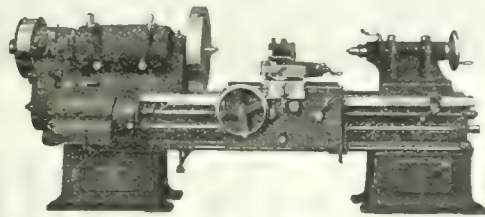
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REED-PRENTICE COMPANY
WORCESTER MASS. U.S.A.



24-IN. "PRENTICE" LATHE

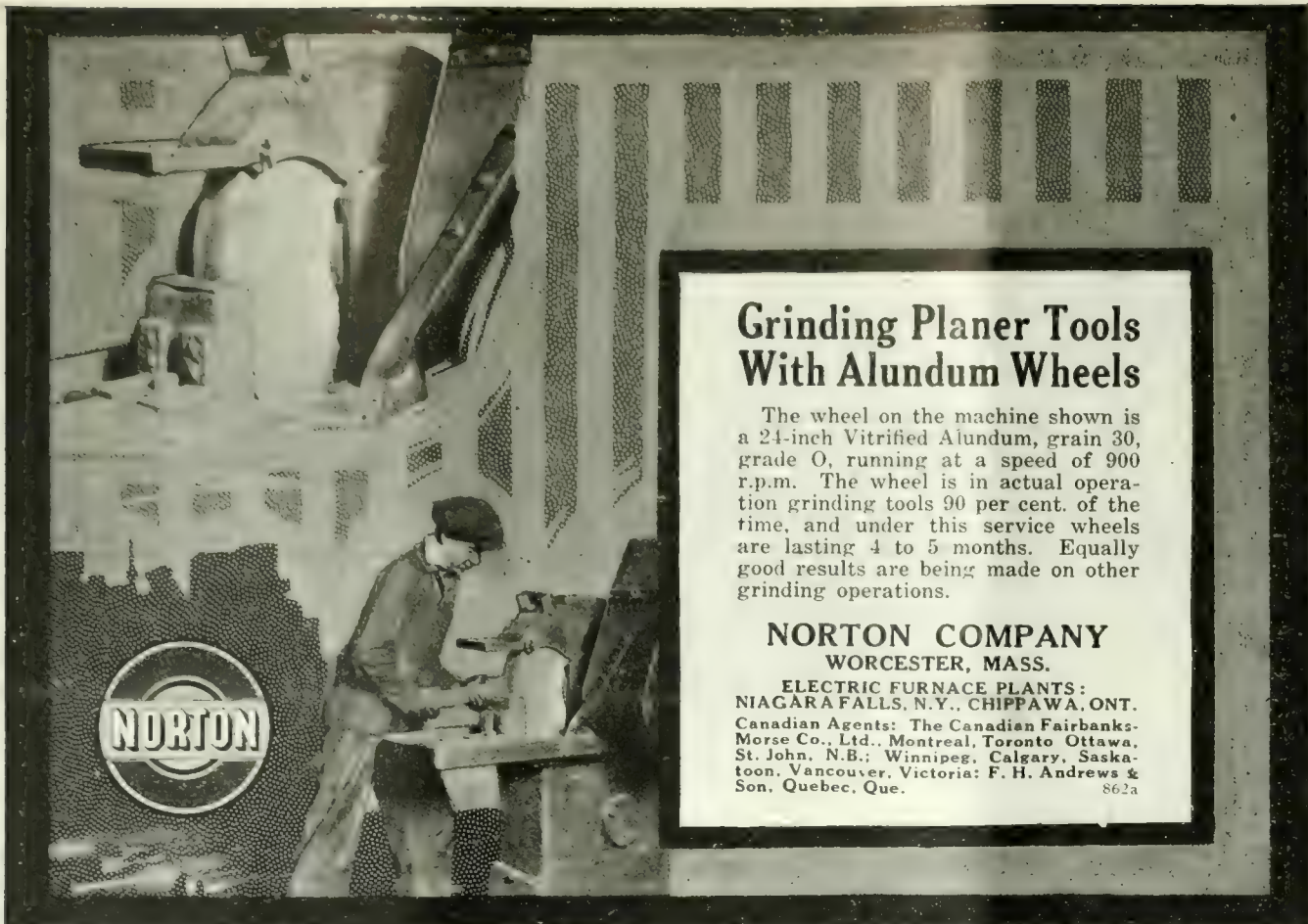
This Geared Head Lathe will do the most work in the least time with the minimum of fatigue to the operator.

Canadian Fairbanks - Morse Co., Limited

JUDGE IT

TEST IT

OUR CATALOGUE WILL FOCUS YOUR ATTENTION



**Grinding Planer Tools
With Alundum Wheels**

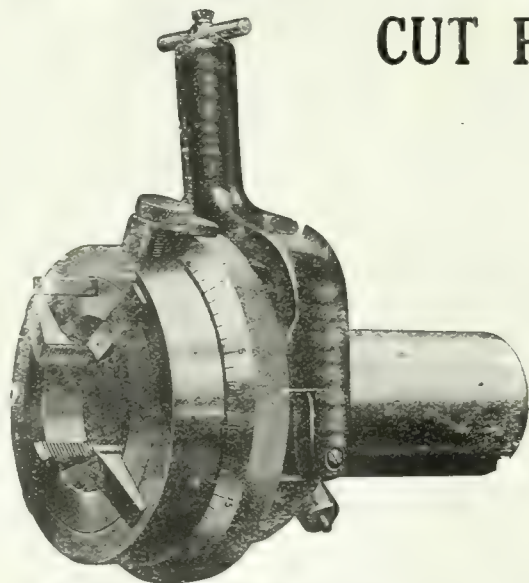
The wheel on the machine shown is a 24-inch Vitrified Alundum, grain 30, grade O, running at a speed of 900 r.p.m. The wheel is in actual operation grinding tools 90 per cent. of the time, and under this service wheels are lasting 4 to 5 months. Equally good results are being made on other grinding operations.

NORTON COMPANY
WORCESTER, MASS.

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

Canadian Agents: The Canadian Fairbanks-Morse Co., Ltd., Montreal, Toronto, Ottawa, St. John, N.B.; Winnipeg, Calgary, Saskatoon, Vancouver, Victoria; F. H. Andrews & Son, Quebec, Que. 862a

WELLS SELF-OPENING DIES CUT PERFECT SCREW THREADS



WELLS SELF-OPENING DIE
has both face and hand trip.

The Wells Self-Opening Die cuts the thread with a fine shearing cut, then opens with a quick, positive snap.

Adaptability

The Wells Self-Opening Die can be used on screw machines, lathes, automatics, drill presses and bolt cutters.

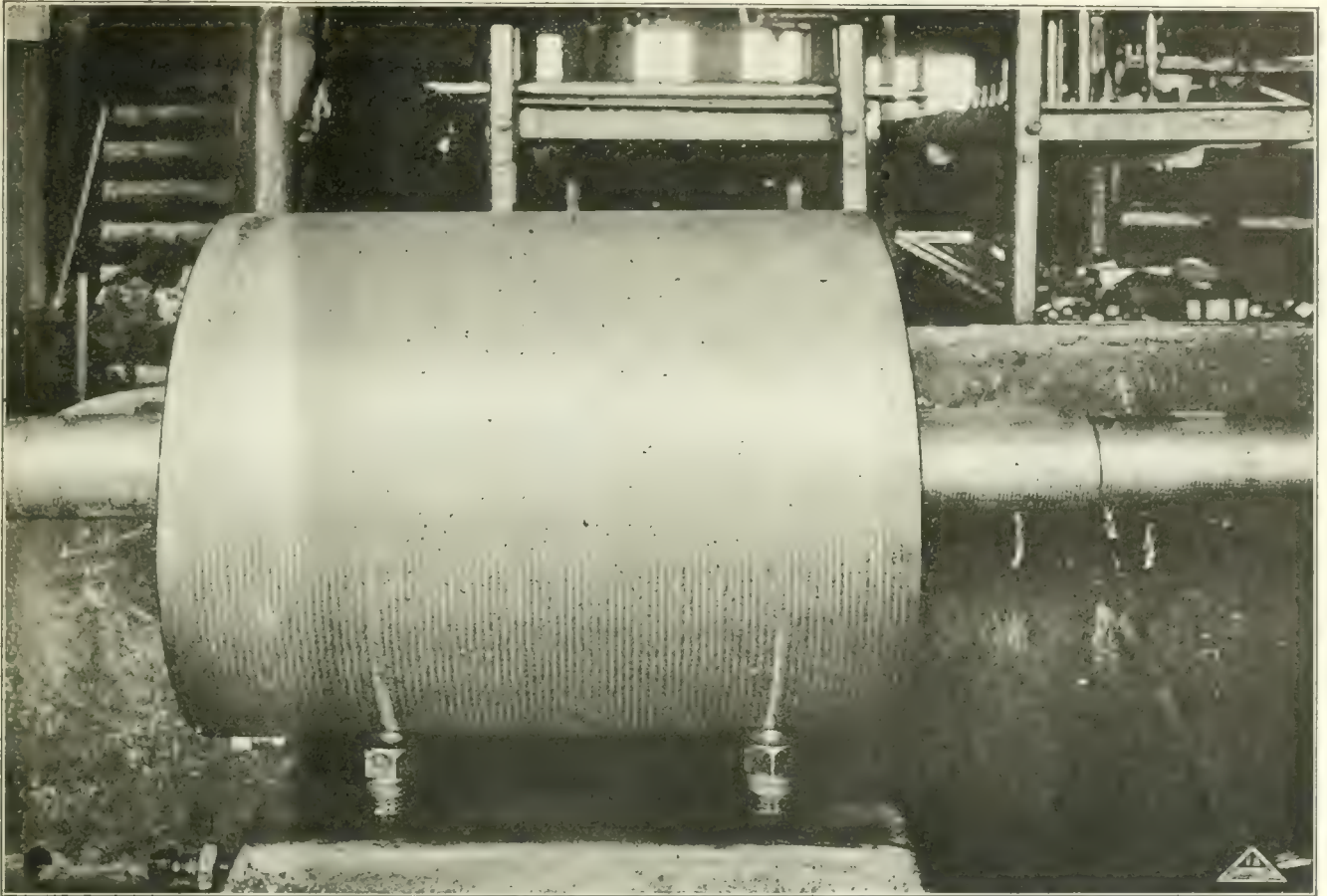
Chaser Principle

The Wells Self-Opening Die embodies an entirely new principle of design. The chasers are about four times as long as the threaded portions and are supported throughout their entire length and width by the solid sides of the slots in the body. They cannot squirm away from the work. Wear is reduced to a minimum throughout. Adjustment is simple, positive and accurate.

A large number of these Dies in stock for Immediate Shipment.

Wells Brothers Company of Canada, Limited
GALT, ONTARIO

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



Grind Wherever and Whenever You Can

The Norton Grinding Machine will cut your costs and production time.

You wouldn't think of performing rough cuts at coarse feeds and high speeds on the ordinary grinding machine. You would do it on the lathe instead. But why do it on a lathe when you can get much better results in the Norton way? The Norton Grinding Machine will do everything but extremely heavy and rough work.

The illustration shows a rough turned roll 2' 9 $\frac{1}{2}$ " over all, with a 12" body and 2 $\frac{3}{4}$ " shaft. In 45 minutes 1.64 of stock was removed from the diameter.

Interesting, isn't it? We have many more such cases to tell you about. May we?

NORTON GRINDING COMPANY
WORCESTER, MASSACHUSETTS, 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

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

Boilers	Feed Water Heaters
Pipe	Separators
Valves	Oil Filters
Fittings	Engine Stops
Scales	Indicators
Coal Conveyors	Packing
Ash Conveyors	Metal Hose
Wheelbarrows	Steam Traps
Shovels	Industrial Track
Gauges	Chain Hoists
Whistles	Tools of all kinds
Safety Valves	Engines
Injectors	Motors
Pumps	Generators
	Storage Batteries

1.—The Power House

The heart of every manufacturing plant is the power house. Here is developed the mechanical or electrical power necessary to carry on the production of goods in each and every department of manufacture.

Here we can supply every single necessary item from cotton waste to the large engines. The list in the margin will give you a slight idea of some of the equipment necessary for power production.

Let us have your inquiries. We carry the largest stock in Canada, and our prices are reasonable.

Canada's Departmental House for Mechanical Goods.

The Canadian Fairbanks-Morse Co., Ltd.

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

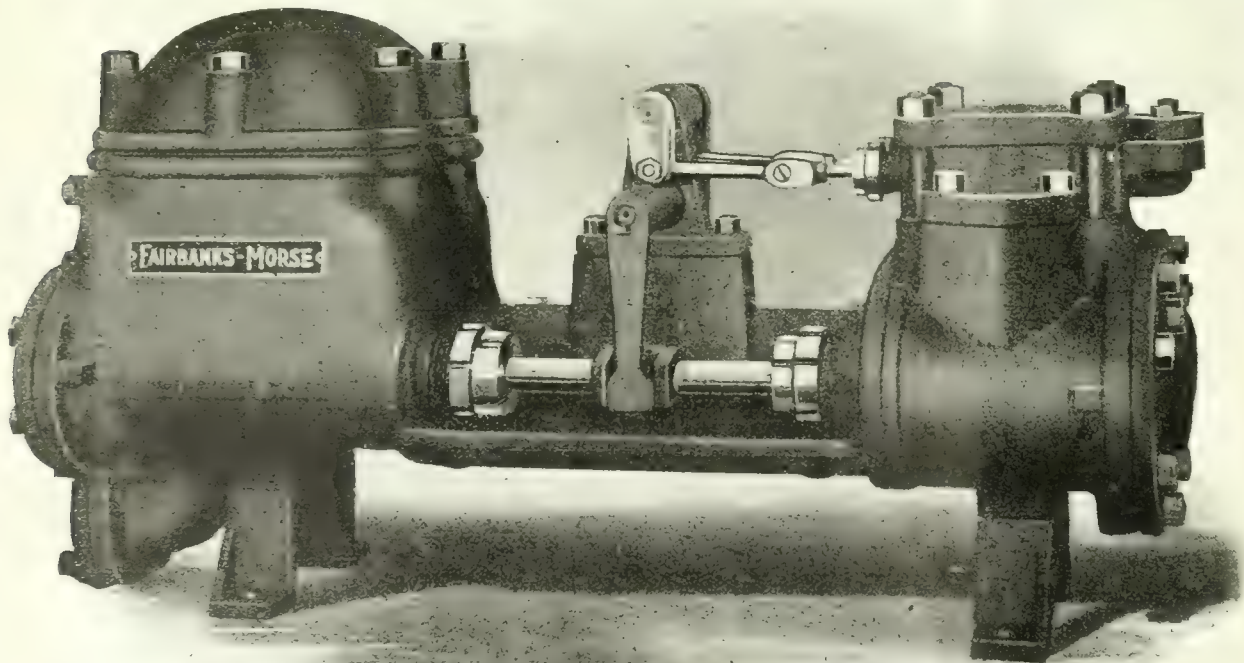
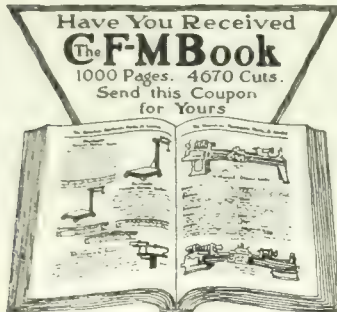




FIG. 1. VIEW OF MAIN BAY SHOWING ASSEMBLY BENCHES AND WORK IN PROGRESS. MACHINE DEPARTMENTS ARE LOCATED IN EACH SIDE BAY.

The Chapman Double Ball Bearing Co. in U.S. Territory

Staff Article

It is a significant fact that the Chapman Double Ball Bearing Co., of Toronto, Ont., have in the past developed and improved and finally exported to the United States a type of ball bearing which originated there, and which according to all expectations should have attained in the hands of its originators a development far exceeding that possible in this country with its limited market, and inherent manufacturing handicaps. As a further indication of what has been accomplished, the accompanying article is ample proof.

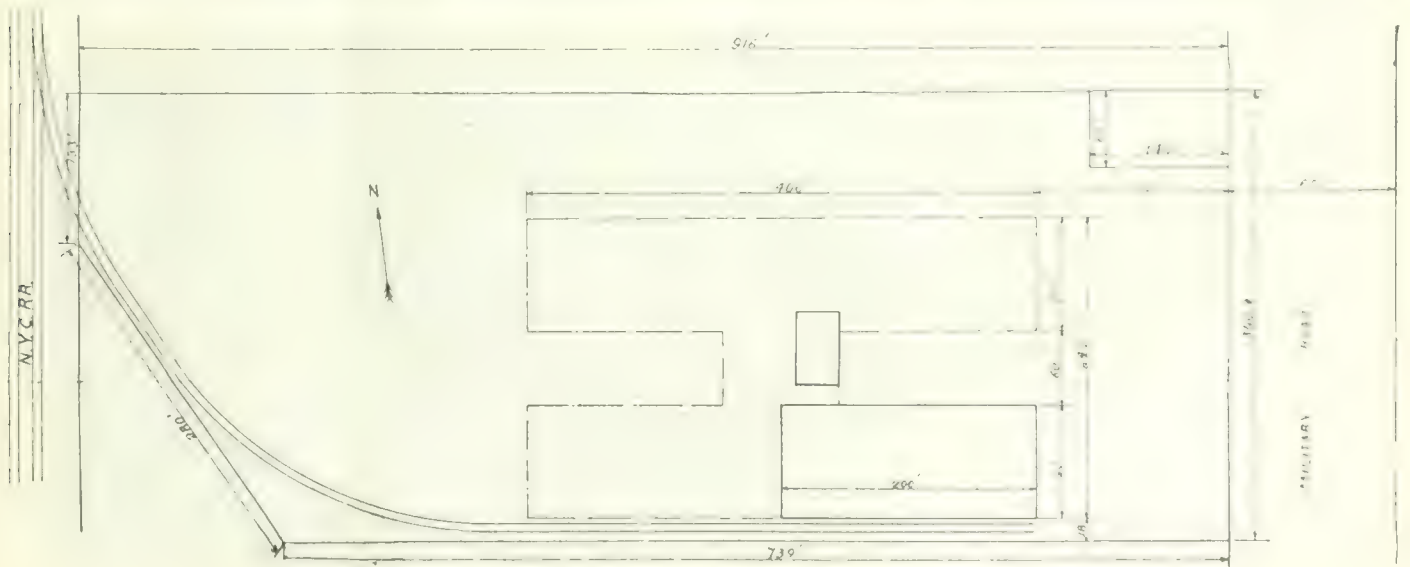
A FEATURE of Canadian industrial development during the past fifteen or twenty years has been the continual and, latterly, rapidly increasing influx of branch houses and factories from United States concerns. Few lines, indeed, have been exempt from the attention of our Southern neighbors, and while the influx has, on a whole, been beneficial to this country, there has occasionally been just a tinge of regret that the movement should be so one-sided. The relative degree of development attained by either country was always such that the initiative in many

branches of industry, by force of circumstances to a great extent, originated in the more densely populated parts of the continent, and it was only in such cases where natural resources and other factors beyond human control had counteracted prevailing influences that Canada was enabled to attain an equal level and perhaps forge slightly ahead in industrial enterprises of various kinds.

A Pioneer Firm

Ball-bearing manufacture, together with several allied industries, has experienced tremendous developments in recent

years; an essential component of the automobile, the production of this engineering accessory, has been compelled to undergo continuous expansion to keep pace with the requirements of car builders, and it would seem, therefore, that this preoccupation had been the opportunity whereby the perseverance of a pioneer Canadian firm has been rewarded with the ability to carry the fight into the enemy's camp, so to speak. It is a significant fact, however, that the past fourteen years have seen the Chapman Double Ball Bearing Co., Ltd., develop, introduce, improve, and finally export to



GROUND PLAN SHOWING LOCATION OF PRESENT SHOPS AND RAILROAD CONNECTION.

the States a type of ball-bearing which originated across the line, and which, according to all ordinary business expectations should have attained, in the hands

an excellent car service existing between the plant location and all residential districts. The future growth of the factory was kept well in mind, and a glance at

ously around the brick filling from the floor to the steel sash.

Department Arrangement

A general view of the interior is shown in title illustration, Fig. 1, from which the principal features of the shop layout can be gathered. The shafting is laid out in two main lines, one to each wing, located close to the main columns so as to give a suitable length of belt drive to the machine countershafts. The lathe department occupies the left foreground, the grinding department the right fore, with assembly benches and material extending across the centre aisle back to the tool crib, which is exactly in the centre of the shop within equal and convenient access from all departments.

The lathe department equipment is quite varied in view of the variety of work involved in producing the different parts, such as cast iron housings, steel sleeves, cone wedges, and numerous items of transmission equipment, such as pillow blocks, loose pulley sleeves, etc. Turret lathes, made by Pratt & Whitney, Acme Mach. Tool Co., Jones & Lamson, and Bardons & Oliver, are installed for this work, and a double spindle Jones & Lamson for certain details which lend themselves to production on this machine. The heavier work is done on a Libby turret lathe, while much miscellaneous and special work is handled to advantage on a Lodge & Shipley lathe with turret carriage, one Bullard and one Colburn boring mill, and a Kelly shaper. Much work of a suitable nature is found to keep a Foster screw machine fully employed, also a National speed lathe.

The amount of drilling required is comparatively slight, and is well taken care of by a couple of medium drill presses by W. F. & J. Barnes and Rockford Machine Tool Co.

Lathe Department

A view of the lathe department is given in Fig. 3, a feature of which is the extensive provision of wire guards. The State regulations in this matter are very rigid, and include such features as arrangement of the machines themselves

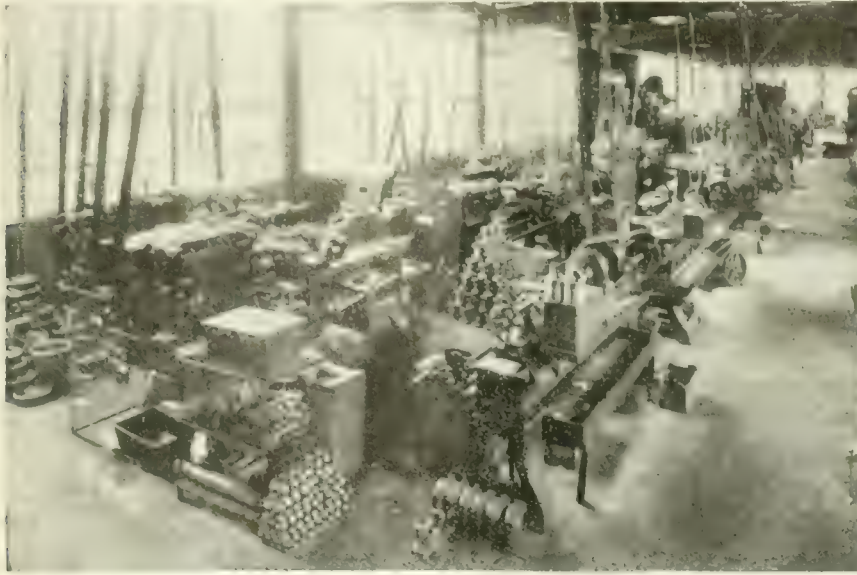


FIG. 3. PART OF LATHE DEPARTMENT SHOWING EXCELLENT LIGHTING, ARRANGEMENT OF MACHINES AND TYPE OF SAFETY GUARDS INSTALLED.

of the originators, a development far exceeding that possible in this country with its limited market, and inherent manufacturing handicaps.

Despite all of these conditions, the enterprise of what might be termed the Canadian branch, has succeeded in creating a demand from U. S. manufacturers which has resulted in the former "branch" house establishing a branch of its own whereby the American markets can be more effectively supplied with the Canadianized product.

Opportunity Offered

Two years ago, when U. S. industries began to enter that period of activity, the end of which is not yet in sight, certain Canadian and American interests incorporated the Transmission Ball Bearing Co., and manufacturing operations were commenced in the City of Buffalo. That the occasion was opportune, has been proven by the rapid and continuous development forced upon the new concern. Producing an article adapted to a wide range of applications, perfected as the result of many years use under all sorts and conditions of service, and supported by an organization which had grown up with the business, the U. S. branch had everything in its favor to insure success from its inception. The necessity for securing enlarged manufacturing facilities quickly became evident, culminating in the erection of an entirely new plant in the Blackrock district, on the immediate outskirts of Buffalo City.

Location and Type of Plant

A site was secured on Military Road, the main thoroughfare between Buffalo and Niagara Falls, having a frontage of 360 ft., with a depth of 916 ft., the rear boundary abutting on the main line of the New York Central R.R. Both labor and material are thus easily obtainable,

the plan view reproduced in line drawing, Fig. 2, shows the ample provision for expansion. Destined to ultimately occupy a space of 240 ft. by 400 ft., the complete plan calls for two main bays, 90 ft. wide, separated for most of their length by a 60 ft. space, which insures ample light and ventilation.

The building, of which the accompanying views are illustrative, is exactly half of what will be later a main bay, being 200 ft. long by 90 ft. wide. It is of the monitor-daylight type, the roof being carried on rolled steel girders and columns, the side columns being surrounded by a light brick filling, which adds to the stability and appearance of the building without an appreciable diminution of lighting area. Hinged panels in the steel sash lights, both inside walls and monitor sides, insure an excellent degree of ventilation; while radiators extend continu-

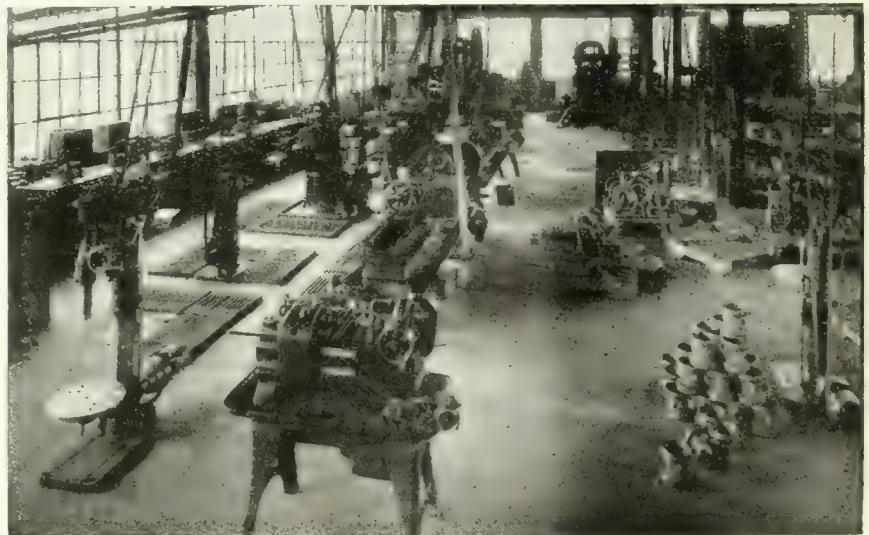


FIG. 4. TOOL ROOM SHOWING SPACIOUS LOCATION OF MACHINES.

independently of such handling systems or manufacturing methods which may be desired by the firm.

Beyond the lathe department is the tool room, which, like all parts of the building, is spacious, orderly and well equipped. The line shaft from the lathe department extends to the tool room with a clutch drive between the motor pulley and the lathe department. This allows the tool room to be run by itself on occasion, and, as it is a much smaller load than the lathe department, it does not add appreciably to the load when the latter department has to run extra time. The equipment illustrated in Fig. 4 is representative of good modern practice, being suited for the production of jigs and fixtures as well as a tooling outfit and upkeep—one 20 in., one 18 in., and one 14 in. American lathes; one No. 2 Kempsmith universal miller; one Cincinnati shaper; one Excelsior sensitive drill; one Universal, one Blount, and one La Salle grinder.

Power Press Department

At the extreme end of the left wing is the press department. This consists of five power presses driven from a shaft running transversely. These are used for stamping and forming the cup and cone ball races, drawing sleeves and housings for power table bearings, and stamping out ball cages or containers. Two large presses are made by the Toledo Mach. & Tool Co., and Niagara Mach. & Tool Works, with one medium and two small machines by the latter maker.

Three phase 25 cycle current at 440 volts is used throughout the factory, the lathes and tool room being operated by a 35 horse-power G. E. induction motor, and the cross shaft in press department by a ceiling type of Crocker-Wheeler motor.

Grinding Department

Returning to the right foreground of Fig. 1, the grinding and polishing of the ball races is here performed. Extreme accuracy is called for in this work which consists of parallel grinding on the outside of the outer race, taper grinding on the inside of the inner race, and radius grinding on the ball tracks of both races.

The first and last are done on three No. 3 modern universal grinders, while the radius work is done on No. 1 Landis radius grinders with automatic swivelling head carrying the work. Preliminary rough grinding or dressing is done on a Gardner double disc grinder, while a high speed polishing spindle is provided for finishing the ball tracks to that degree necessary for long and successful operation.

Suitable space is set aside in this department for an electric spot welding machine which unites the two halves or sides of the ball cages. These are of special design as developed for Chapman bearings, which allows them to be assembled and adjusted complete with balls in position before putting in the housing. The convenience of being thus able to complete the manufacture of the cage without riveting or other work

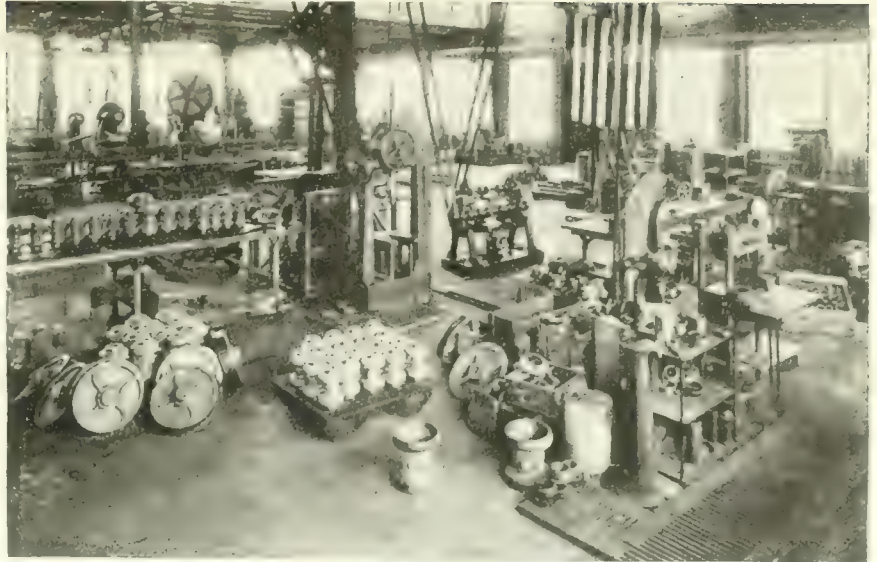


FIG. 5. FINAL TEST DEPARTMENT WHERE BEARINGS ARE ADJUSTED AND RUN UNDER SPECIFIED LOADS, ETC.

after assembling is a feature peculiar to this type of bearing and greatly facilitates replacements and repairs when necessary.

Final Testing

Assembling and testing is an important feature of the work, the satisfactory service of these bearings being due to accurate adjustment of parts followed by severe testing under abnormal running conditions. Hydraulic power is utilized in obtaining a uniform degree of pressure on each individual bearing as its components are put together, a Perrin four column press and a Lucas gear-hydraulic power press. The testing of balls and ball races is accomplished by means of three stands on which various sizes of shafts can be quickly arranged so that a definite controllable load can be put on a number of bearings simultaneously by adjusting a hydraulic jack. A specified length of run and amount of load proportioned to the various sizes of bearings enables their reliability under service to be accurately determined before going into use.

A view of this department is given in

Fig. 5, showing the Lucas press and testing stands in the centre, with numbers of shafting bearings and ball-bearing car wheels in course of assembly.

In the right bay, immediately beside the tool crib is the stock room and shipping department. Here are stored the detail parts used in final assembly as well as raw material and supplies for manufacture and shop operation. A 50 horse-power motor which operates the line shaft to the grinding room is installed in a suitable location here, as is also the transformer equipment, and main switch board.

The manufacture of elevating transfer trucks, into which ball-bearings enter largely, has been an important branch of the firm's activity for some years. The patented design has certain exclusive features which have aided largely in securing a growing demand for it, a fact of special interest being that the apparatus was invented and developed to its present state entirely in Canada, and as such reacts favorably in regard to the friendly rivalry, in trade exportation which is referred to at the beginning of the article.



FIG. 6. ELEVATING TRUCKS ARE BUILT ON A CONSIDERABLE SCALE AS SHOWN HEREWITH.

MONTREAL EAST'S BIG OIL INDUSTRY

THE expedition which has marked the construction of the new industrial centre recently established in Montreal East by the Imperial Oil Company has attracted more than passing attention from those who have been watching the growth of the city as a manufacturing centre. The plan is so extensive and has become so important a factor, not only in the business life of the community, but in the war requirements of the nation, that its completion in a remarkably short time is the subject of many congratulations. The Montreal refinery completes a system of great distributing and refining plants, extending across the country, all controlled by the Imperial Oil Co. It is one of the largest and most important of the five refineries located respectively at Montreal, Vancouver, Regina, Sarnia and Halifax. It represents an investment of over \$3,000,000, and its equipment is as modern as any refinery plant on the continent, with, in addition, unique deep water shipping facilities.

Refinery Site

The site of the refinery occupies some 90 acres in Montreal East, and is bounded on the south by the St. Lawrence River, and traversed by Notre Dame Street East, the tramway to Bout de l'Île, and the Canadian Northern Railway System. Construction of the refinery and asphalt plants began a little over a year ago, and eleven hundred men have been engaged in building operations ever since. Of the block of land occupied, one-quarter is on the south side of Notre Dame, while three-quarters is on the north side of that thoroughfare.

When the Montreal Harbor Commissioners realized the importance of the enterprise which the Imperial Oil Co. had in hand, they began the construction of a wharf 900 feet long and 300 feet wide, with 28 feet depth of water. While the wharf is scarcely completed, tank steamers, carrying upwards of 50,000 barrels of crude oil from Tampico, Mexico, from which port the company's supply of crude oil is obtained, are making regular trips to the Montreal refinery. The round trip occupies thirty days, and the system of oil tanks extending for and aft of the SS. "Luz Blanca," the SS. "Imperoyal," and other tankers engaged in the trade, are of great interest. The pumping and pipe line system is so efficient that an entire cargo can be transferred from the ship's tanks to the reservoirs in thirty hours or less.

Refinery Capacity

It is understood that the annual amount of business of this Montreal refinery will reach a million barrels, and the storage capacity of the company will be large enough to carry over crude oil to last from the close of navigation to the following spring. It is evident that little has been spared to make this plant one of the finest on the continent, and when the last details of construction are completed, a sum well on to three million dollars will have been expended in the town of Montreal East by the company. Of the eleven hundred men em-

ployed since the breaking of the ground a year ago in May last, half of the number have been skilled and half unskilled labor, and A. W. Forman, superintendent of the works, states that when the manufacturing and refining process is well under way the permanent force employed will most likely reach from five to six hundred men.

The housing of all these men is a problem which had to be solved, and the company is encouraging the construction of not less than one hundred houses in the vicinity, which will rent at about twenty dollars per month.

The Asphalt Unit

The asphalt unit of the refinery plant is located between Notre Dame street and the river, and is one of the most interesting features of the undertaking. The several tanks and buildings for the manufacture of this modern commodity are constructed of brick and steel. The plant is practically finished, and the company now in the asphalt market.

The refinery and its subsidiary plants are located on the north side of Notre Dame street, the whole being connected with the different transportation systems of the Harbor Commissioners and Canadian Northern tracks, as well as the Montreal Tramway Co. So the company considers its transportation difficulties have been practically mastered. In a few weeks' time, the whole series of pipe lines, tanks, and all other appliances required for the operations of the refinery will be completed.

THE ELECTRIC TRUCK

IT IS stated that the total value of electric trucks in the United States is approximately \$36,000,000. If the same ratio in proportion to the population were obtained, Canada should possess electric trucks to the value of about \$3,000,000. Information at hand shows that the total investment in electric trucks in the Dominion of Canada very likely does not exceed \$300,000. From the above we can conclude that the field in Canada for the sale of electric trucks is very fertile and offers great possibilities either to the manufacturer or central station that is willing to put forth the proper amount of effort, said the report of the Canadian Electrical Association.

The principal reasons for the rapid success of the electric truck are the low up-keep and reliability. Supplementary reasons are the improvements in charging apparatus, the development of charging stations equipped with proper facilities, together with the increased capacity of storage batteries. In this connection it is interesting to note that the storage battery, as manufactured at present, possesses an average life of double that of a few years ago. The modern electric truck in city and suburban service is capable of going from 40 to 50 miles on one battery charge, a total travel per day that well satisfies the requirements of most commercial transportation. By using a spare battery this mileage may be easily doubled.

Large manufacturers and others requiring extensive trucking or large department stores have proved the immense value of the electric truck. Departmen-

tal stores in larger cities have come to depend nearly exclusively upon their electric delivery system, utilizing electric cars from 1,000 to 2,000 lbs. capacity, for their house to house delivery.

OUR UNDEVELOPED WATER POWERS

WHEN the present survey of Canada's natural resources are completed under the auspices of the Canadian Pacific Railway, it will doubtless contain a great deal of new information relative to the undeveloped waterpower of Manitoba, Saskatchewan and Alberta. Investigations already made by a sub-department of the Ministry of the Interior, it is claimed, establish the fact that in the Saskatchewan River, with its tributaries furnishing the water arteries of a vast expanse of country, and in the Winnipeg River and other streams emptying into Lake Winnipeg, there is hydro-electric energy sufficient to harness 1,172,000 horse-power.

In the upper reaches of these provinces, the Athabasca, Peace and Churchill Rivers, with a number of other large streams, in their long course to the Arctic Ocean and Hudson Bay, afford new sources of energy equivalent to at least 5,500,000 horse-power. Out of this aggregate of over 1,600,000 horse-power, only a little over 100,000 has been employed. Manufacturers, it is expected, after the war, will take on new life at Calgary, within 100 miles of the Selkirk range of mountains. The Bow River, from which 31,000 horse-power has been drawn, has at least 75,000 undeveloped reserve power available for the industries of that city.

S.S. "WAR WASP" LAUNCHED

THE S.S. "War Wasp," the first steel ocean-going steamer built in Nova Scotia was successfully launched at New Glasgow, N.S., 10 days ago by the Nova Scotia Steel and Coal Co. Work on this vessel was started in October of last year, and when launched, was practically ready for sea. The boat has a carrying capacity of about 2,000 tons, a displacement when loaded of 2,870 tons, and a speed of 11 knots. The "War Wasp" has been sold to the British Government and will be taken across by the British representative in a few days. A second vessel, about 25 per cent. larger, is now under construction, and a third vessel will immediately occupy the berth vacated by the "War Wasp." Townspeople of New Glasgow presented Col. Thomas Cantley with an address and silver plate, while the Town Councils of New Glasgow and Trenton also presented the former Scotia president with addresses, adding the hope that the East River of Pictou would become the Clyde of Canada.

Women are now employed in the chemical laboratory of the Algoma Steel Corporation. Two-thirds of the force of routine chemists are girls, who have shown aptitude, accuracy and notable orderliness after a short period of training.

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

INSIDE PROFILING ON SHELLS

AN OBJECTIONAL feature in connection with the inside profiling of the various sizes of shells, is that of the shells running out of true when the operation is being performed. To many this detail seems to be one of minor importance and therefore sufficient attention is not given to prevent

bore of the shell while the cutter is working, thus following the slight irregularities in eccentricity resulting from the hurried setting of the shell in the chuck. As the cutter is ground from time to time, the adjusting screw A can be set back to conform to the changed conditions.

Another interesting profiling arrange-

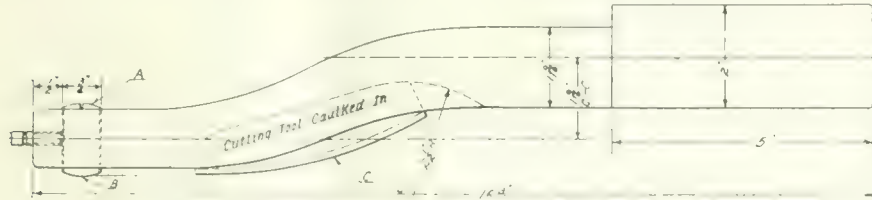


FIG. 1 INSIDE SHELL PROFILING ATTACHMENT.

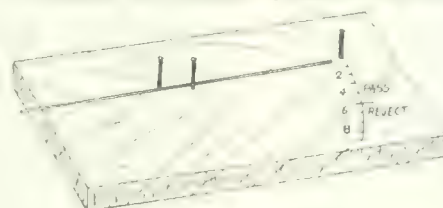
the possibilities of eccentricity at this particular juncture. Another cause of rejections for faulty machining at this point is that arising from making the diameter too great by allowing the tools to undercut. A tool that has materially assisted in the elimination of these errors is shown in the accompanying

ment is here illustrated, the inner profile being generated by means of a cam motion, that is transferred to the cutting tool by the use of bars held in the turret. After the shell has been placed in the chuck, the roughing of the inside contour is accomplished by the tool held in the bar A, its motion being guided by the roller in the bar B on the opposite side of the turret. The finishing is performed by the tool in the bar G, the motion being controlled by the passage of the roller opposite, through the cam H; this cam being bolted to a fixed support secured to the bed of the lathe, back of the saddle. Opposite to the generating cam H is the pressure plate I, which is forced forward by the spring J. The object of this plate is to always retain the rollers against the generating cam H. The undercutting for the fuse thread is accomplished by the small tool in the short bar K, this bar being provided with an adjustable gauge for the desired position and depth of cut. When the shells are being placed in the chuck, the carriage is moved to the extreme forward position, with the short bar I in line with the lathe spindle, the shell position in the chuck being determined by the gauge stop L.

A WIRE TESTER

By D. A. Hampson.

A CERTAIN manufactured article uses a number of straight pieces of spring



A WIRE TESTER.

wire $\frac{1}{8}$ in. in diameter. This wire is bought from various makers, test pieces are selected at random from each lot re-

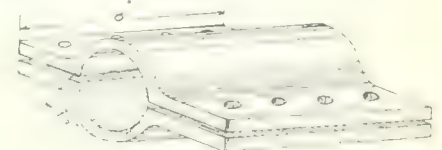
ceived, and samples are submitted in competitive solicitation of orders. Some means of comparing and testing has to be employed and, outside of a fatigue test, which consists of bending the wire back and forth in a machine several hours at a time, the most satisfactory test as well as the simplest to arrange is the test board shown in the drawing.

A polished maple board has two nails driven in it and the straightened wire is laid between them. With the wire extending 6 in. from the last nail, a zero point is made with a third nail. An arc is drawn, graduated, and the face shel-laced. Now, any wire which can be pulled to the No. 5 in. mark and return to zero without acquiring a permanent bend, or "set," will go. If they bend before they reach the 5, the wire or the lot is rejected. Those that remain straight when pulled farthest beyond No. 5 are rated the highest and this grade selected.

REPAIRING BROKEN STREET CAR AXLES

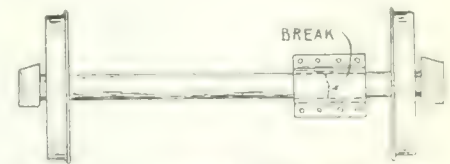
By H. Middleton.

BROKEN axles on street cars are not frequent, but when they do occur they produce a lot of trouble, expense and de-



CLAMP FOR BROKEN CAR AXLE.

lay, particularly if the accident happens where traffic is dense. The way in which one company combats the delay is to use the clamp shown, which is wide enough to reach on each side of the break, and stiffen the axle sufficiently to keep it together while the car is being towed to



BROKEN CAR AXLE WITH CLAMP IN POSITION.

the barns. Half a dozen clamps for each size of axle are made up and a complete set left at as many stations throughout the city. This avoids the delay of sending to distant shops for repairs and materially cuts down the time of blocking the line of cars and vehicular traffic.

IMPROVED C-CLAMP

By H. A. D.

AN inventor has just been granted claims on an improved C-clamp. All who have used the ordinary kind, even the highest priced, have had trouble with

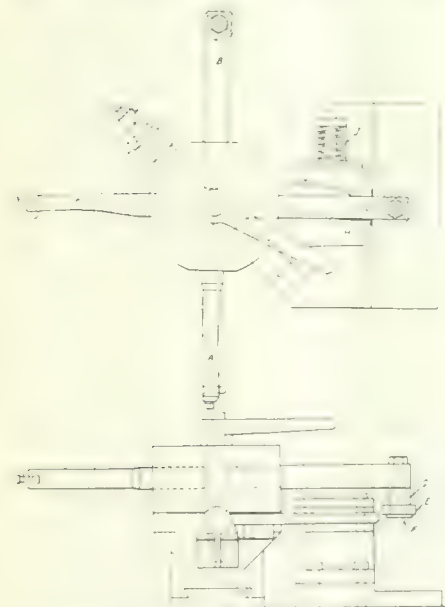
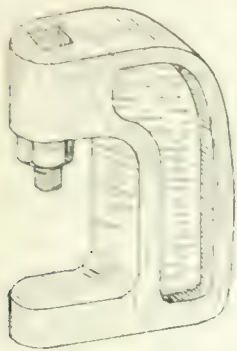


FIG. 2 INSIDE SHELL PROFILING ATTACHMENT

sketch; the design of this bar is such that not only is the danger of undercutting prevented, but extra weight has been given to the bar to provide increased cutting power not available in the lighter bar generally used. After the bar is bent to the desired shape, the slot for the cutter is milled-in, and the cutter inserted and afterwards caulked-in to prevent it from moving in either direction. The bar is made long enough to permit of a screw A being placed through the end; this screw is adjustable so that the point B rides on the parallel

their slipping off sloping or rounded surfaces; this has caused the C-clamp to get a name for unreliability in machine shops and their use in some cases to be forbidden by safety inspectors. The trouble lies in the screw end which (in spite of various swivels) turns as the



C. CLAMP WITH NON-REVOLVING.

screw is turned and just naturally slides away from the work.

This new clamp has a screw which does not turn. The screw is moved longitudinally by turning the nut. The screw head is square and travels in a squared opening—this prevents turning. The screw used is an ordinary set screw and its point end engages the work. It takes hold—bites in—rounded and slanting surfaces with no chance of slipping because it is fed in without turning. It has an easy renewability—ordinary nuts and set screws are found in every shop. This construction puts the wear not on the clamp itself, but on loose pieces—renewable parts.



PLANING A LARGE COMPRESSOR BED

By D. S. Mann

IN machining the large compressor bed shown in the accompanying cuts several interesting problems were encountered, the shop not being equipped to handle such large work. One of these was the planing, there being considerable of this work on the casting, it having been de-

signed especially to be handled on an open-side machine. The main bearings were to be planed out as well as faced off at the ends; the top also required machining for the oil cover. There were also three openings on the one side and two on the other. The bottom was left rough. The casting weighed practically 7,000 pounds and was over eight feet long.

The only planer with which the shop was equipped was a 30 in. x 30 in. unit, and considerable scheming was indulged in before it was finally decided to do the job at home. The photos show quite clearly how it was handled. A heavy ribbed casting was made to bolt to the planer table, being provided with tongues to fit the table slots so that the strain would be relieved from the clamping bolts. This casting extended about 39 ins. over the edge of the table and was machined to the same dimensions as the regular crossrail so that the saddle could be removed from the planer proper and used on the table. The regular feed screw was also used, the planed portion of the casting being the same length as the crossrail. This necessitated the making and machining of but the one casting. All feeling of the tools had to be done by hand, of course. To prevent the table rising from the reaction of the cut, it was loaded with a number of counterweights.

The bed was placed alongside the planer on the floor and levelled up; due to its weight, no clamping was necessary except when planing out the main bearings when it was placed at right angles to the machine. Several settings were, of course, required and it was necessary to line the bed up for each one. As the bed had previously been bored, this was not a difficult task. The outfit gave good satisfaction, and the bed was finished in record time. Of course, it was impossible to take the heaviest cuts at the outer end of the fixture, but this caused little delay. Needless to say, considerable time was saved over what would have been necessary had the casting been finished on the outside.

BRITISH MUNITIONS OUTPUT

DR. CHRISTOPHER ADDISON, Minister of Munitions, speaking in the House of Commons, London, England, recently, on the estimates for his department, gave a striking account of the work of the department since it started a little more than two years ago.

Dr. Addison said that some conception of the magnitude of the production of explosives might be formed from the fact that in March of 1917 the capacity for the production of high explosives was more than four times that of March of 1916, and 28 times that of March of 1915.

The Ministry had recently reached such a state of production with respect to gun munitions that it was able to divert certain national factories to assisting other sections of the munitions programme.

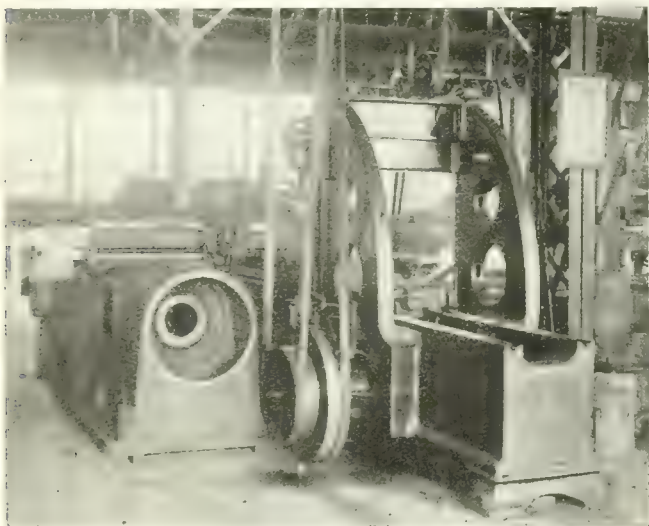
He mentioned the discovery of a component of a new type which possessed great advantages for certain purposes. A large supply of this had been produced in a short time, and was proving of the greatest value in facilitating the advance at the front and in saving life.

Enormous Stock of Shells

The requirements regarding the accumulation of a great reserve of field gun ammunition would be met in good time, and, despite the enormous expenditure in the first nine weeks of the offensive, the stock of shells had only fallen off seven per cent. Field Marshal Haig had enthusiastically reported on the accuracy and fine detonating quality of the ammunition, whether it was used for wire cutting, barrage, or other purposes.

The output of machine guns and rifles was full equal to the demands, while for railway purposes tracks pulled up in England, Australia and Canada, had been utilized. Canada had arranged to pull up 800 miles of track and ship it complete when wanted. More than 2,000 miles of track had already been supplied in complete condition, and nearly 1,000 locomotives, apart from hundreds supplied by the railways.

The supplies of new design tanks were coming forward excellently, and, continued the Minister, "the end of the story is not yet, for the enthusiasm of Colonel



PLANING A LARGE COMPRESSOR BED.



PLANING A LARGE COMPRESSOR BED.

Stern, the inventor of the tanks, and his colleagues knows no limits.

Steel Output Increasing

With respect to steel, the Minister said that the output of steel before the war had for some time been stationary at a little over seven million tons yearly. The output was ten million tons, and he would be disappointed if the country did not reach a twelve million ton output by the end of next year. Within fourteen months the capacity for the manufacture of basic steel had increased by thirty per cent.

The demands for steel were so many that the control had been very close, and despite all the help from Canada and the United States, he would not offer any immediate prospect of relief. Notwithstanding the cost of material and labor, the Government was obtaining steel plates at home, at less than half their cost in the United States, while shell steel cost 30 per cent. less.

Referring to salvage operations at the front, the Minister said it was now possible to reform hundreds of thousands of 18-pounder cartridge cases weekly at a cost of fourpence each, compared with seven shillings for new cases. Regarding trench warfare, he said:

"While we started behind in the race, we are probably now as superior to the Germans in this section of warfare as we are in that of artillery."

Enormous Demands

More than 1,500,000 steel helmets had been supplied in the last six months, and whereas in December the tonnage required for trench warfare material was 7,648 tons, in the last six months it was 17,963 tons. The work of the Ministry had almost doubled within the last twelve months. The aircraft supply alone at the beginning of the year required an additional 10,000 workers, and that which applied to the aircraft applied also to shipbuilding, gunmaking, tanks, agricultural implements and other necessities of war.

The widespread employment of women had been attended, singularly, with little difficulty. From 60 to 80 per cent. of the machine work on shells, fuse and trench warfare supplies was done by women.

Comparing the cost of ammunition during the past year with what the same would have cost the previous year, said Dr. Addison, the saving was £43,000,000.

Dr. Addison said that before the war the production of spelter in Britain was only one-third of the natural requirements, but that he hoped the capacity would be doubled before the end of the year. Part of the plan involved the working of Australian zinc concentrate, which formerly was under German control. Some time ago steps were taken to obtain control of the wolfram ores of the Empire, with a view to regulating the stock of tungsten for production of steel, and if the prices at Sheffield were compared with those in New York it would be found that the country had profited enormously by the enterprise.

Sub Losses Are Small

Arrangements were in hand, the Min-

ister continued, which increased the home production of aluminum by 45 per cent., while a committee of experts was considering development of copper and other mineral resources of the United Kingdom.

At the suggestion of the United States Government, negotiations are now in progress for further consolidation of interests in America and England. The results of these negotiations, if successful, would be of enormous value, not only in enabling the American Government to place its great resources more readily and effectively at the disposal of the Allies, but in promoting economy in purchase. Dr. Addison said these arrangements had been facilitated greatly by the work of the Balfour mission in the United States.

The Munitions Ministry, Dr. Addison continued, had an interest in nearly 1,500,000 tons of shipments monthly. The submarine campaign, bad as it was, did not provide much comfort for the enemy when he knew, for example, that of the shell components shipped from North America, the total since the commencement of unrestricted submarine warfare, had been only 5.9 per cent. of the amount shipped.



LEATHER BELTING NOTES

IN the choice of a belt, the first consideration is that it be made from a good hide. Some indicative opinion may be had by cutting a thin shaving from the samples offered, and tearing them between the fingers. This will enable even the unskilled to form an opinion as to how much of his purchase is leather, and how much simply weight-making material.

Leather belts lose a good deal of their strength and nature unless impregnated with a certain amount of oil. Good quality cod oil is largely used for this purpose. An ordinary belt thus lubricated, develops a stretching propensity, which is, of course, both troublesome and wasteful. The problem, therefore, is to secure the admittedly advantageous features of "lubrication without stretch." The solution is obvious—Stretch the belt fully before application.

The ultimate tensile strength of belting is not generally a factor in power transmission calculations. It may be reckoned at an average of, say, 3,500 pounds per square inch. Variation in ultimate strength is due not only to possible variation in the quality of the material, but to want of its homogeneity as well. The ultimate strength of a laced joint well put together should be taken at from 1,000 to 1,500 pounds per sq. inch, while that of a riveted joint may be taken as equal to one-half of the strength of the solid belt.

Adhesion of Belts

The motion transmitted by a belt is maintained solely by the frictional adhesion of the belt to the pulley rim. Belts do not communicate motion with precision on account of their liability to slip. The adhesive grip of a belt is greater on wooden than on cast iron rims.

A belt will slip just as readily on a pulley four feet in diameter as it will on a pulley two feet in diameter, provided the conditions of the faces of the pulleys, are area of contact, the tension and the number of feet the belt travels per minute, are the same in both cases. Causes of slippage are because belts are overloaded, dirty, clogged, dried up and neglected.

It stands to reason that while slip may be prevented by undue tightening, this is not the right method to make the belt do its full duty. A belt properly filled and of correct dimensions for its work, should break before slipping.

Engineers usually pay little attention to their belting except that which is giving immediate trouble. The ingredients of a leather, cotton, or camel's hair belt, Manila or hemp driving rope, slowly dry out and leave the contact surfaces hard. Unless something is added to replace these natural ingredients the belt or rope cannot be expected to grip the pulley close enough to transmit full load.

Creep of Belt

By creep of Belt is meant its stretching and contracting propensity as it passes over the pulleys, and is due to inherent elasticity and nature of load. The net result is a continuous creep or shifting of the belt around the pulleys in a direction opposite to that in which the belt runs. Belt creep in practice is usually kept within a one per cent. limit, and to make certain of its attainment, the working strain for best material belt body and substantial joint is taken at 49 pounds per inch width single belt, 70 and 100 ditto for double and treble belts respectively.

When a belt runs at a high velocity, centrifugal force produces tension in addition to that existing when the belt is at rest or moving at a low velocity. This diminishes the effective driving force. Double belts are less pliable than single belts and the centrifugal force is greater. Furthermore, the tension is seldom increased proportionately; for these reasons, double belts should not be expected to transmit more than 8-5ths the power of single belts.



Could Spare Father.—Little Denis, out for a walk with mother, noticed a poor, ragged little urchin.

"Yes, dear," said mother. "That poor little boy has no father to give him toys and things, like you have. Wouldn't you like to do something for him? Wouldn't you like to give him your rabbit?"

Denis thought a moment, and then suggested:

"I'd rather give him father!"

A Hedger.—A Coakley teacher was giving a lesson to a class of children and questioning them about the various joints of mutton. The neck, shoulder, leg, and loin had been mentioned. "Now," said the teacher, "there is another joint no one has mentioned. Come, Mary, I know your father is a groom. What does he often put on a horse?"

"A shilling each way, miss," was the unexpected answer.

Problems Entering Into Aeroplane Engine Design--II*

By Charles E. Lucke

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

CYLINDER METAL—CAST IRON

THE first cylinders built were made of cast iron, with head cylinder and jacket cast in one piece, and the valves being arranged in a side pocket—the ordinary T or L-head construction. It is clear that the weight of the valve pocket is detrimental. The first step in any cylinder-weight reduction, then, is to take that pocket away, retaining the cast cylinder (on the assumption that we do not know how to make any other kind) and putting the valve in the head. This results in the valve-in-head construction, which is now practically universal, but which, strange to say, it took six or seven years to realize.

A similar instance of slow realization of facts exists with reference to the cast-iron jacket wall, which has no other function than to hold water. Cast iron for that purpose, especially in an aeroplane engine is wasteful of material, so the next step is to get rid of the cast iron. When one stops to think how it is to be done, a structural difficulty becomes apparent, and therefore one must not too readily condemn the holding on to the cast iron jacket. The difficulty is of course the necessity of providing openings for the intake and outlet from each valve, an igniter plug hole and at least two pipe connections for the jacket, and in an aeronautical engine under heavy stress there is some driving gear which requires fastenings. This naturally tends toward the use of a casting.

Suppose such a casting is used, with inlet and one exhaust valve each with a port leading out, and such valve seating in the head which turns down to form the cylinder; then the casting may be led around the top, forming the enclosure of the head jacket and joining the several outlets and coming down outside the cylinder. The cylinder-head jacket casting ends in the form of a skirt at about the level of the valve deck, and to this end a tube jacket can be added by any one of several possible fastenings. That is the next step: cast iron for the cylinders, head and head jacket in a one-piece casting, but with sheet metal for the jacket over the cylindrical barrel. It is a logical step, but it took several years to reach it just the same.

Proceeding along the same line of weight reduction, the next step is to cut away this cast iron joining the ends of the ports and forming the wall of the head jacket, and substitute sheet metal

welded to the ports by the oxygen welding system. Wherever there are connections to be made for attachment of gears there must be some additional supports welded or brazed on. The cast-iron cylinder is still there, and with cast-iron ports.

Cylinder Metal—Steel

There is a fundamental objection to a cast-iron cylinder for aeronautical work, and it is a perfectly valid one. Cast-iron cylinders do not have to be very thick to be amply strong, so far as the gas-pressure stresses are concerned, but the fact remains that so long as they are cast-iron, no one knows whether they are good cast iron inside or not, and the use of cast iron cut down to $\frac{1}{8}$ inch in thickness incurs taking some chances. Hence attention is turned toward steel.

Drawn steel or forged steel is a reliable material and a logical selection, so designers have sought means of using it; but when one stops to think how to use a drawn-steel tube for a cylinder, and get the necessary attachments on it, one soon recognizes that the matter is not so easy as it looks. That is the reason the adoption of the steel cylinder was so long delayed.

There are now several schemes developed for steel cylinders. The first of these is a steel cylinder of a drawn tube formed without a head, screwed into a separate head carrying the ports and the head jacket cast in one piece. This is rather a satisfactory way of attaching a head, but it involves more than one difficulty. When such a screwed head is set up against the shoulder, it is not at all clear just where it is going to stop; and to secure the proper position one must either scrape the faces or shim them—neither of which is a nice job. A further objection is the considerable weight of the cast iron in a rather complicated casting, and also the inner wall of that cast iron is a stress wall, the stress of which must pass through the thread to the cylinder. There is no objection to using a casting if it is not stressed, but a casting under stress is not satisfactory and is to be retained only in the absence of something better.

Complete elimination of castings has been tried by using all-steel and sheet metal welded together, but this did not prove satisfactory for a very interesting reason. A flat sheet-metal head on which the valves are seated will not remain flat, and a round valve seat will not stay round. Such sheet metal tends to warp out of shape, and with it the valves will

not stay tight. However, the material does not break, which is something worthy of thought.

To eliminate the weld between the steel cylinder and head, another construction was developed. In this, a seamless drawn-steel shell with head just like a cartridge is used, and two holes are arranged in the head to seat the valves. It is evident that this is a structure which is sound against all kinds of stresses. It still has some of the difficulties of warping the seats, causing leakage of the valves; and when a valve leaks the amount of heat developed is tremendous. Once a valve starts to leak, it is only a question of a short time before it will be completely destroyed.

Aluminum Combination Cylinders

The particular construction of cylinder just described is rather difficult to attach to its jacket ports. It is interesting to note one case at least in which a satisfactory attachment has been worked out, and that is the Hispano-Swiss engine, now used on the European war front, and now also being built in this country. In this particular engine the entire outside of the cylinder is threaded, and the cylinders are screwed into an aluminum casting which is double-walled just like the cast-iron block casting of an automobile engine. The thread performs the double purpose of holding the cylinder in place and bringing its head up against the aluminum cast head which carries the ports, and also acting as a thermal bridge between the metal of the cylinder and the metal of the aluminum casting which carries the jacket water. Without the latter there would be poor thermal contact and overheating of the cylinder. While this construction is not entirely satisfactory, it is nevertheless very interesting and suggestive. It immediately calls attention to the fact that a water jacket may be made of an aluminum casting and the ports formed just as easily as in iron, the steel interior carrying the stress due to the interior gas pressures.

It is, however, quite feasible to get rid of the double aluminum wall down along the cylinder barrel into which this steel cylinder is placed and which carries the ports above, by leaving out its interior wall and retaining the outside, or even by stopping the wall just below the head as a skirt to take a short thin tube which may itself be of aluminum, ending at the bottom in a cast stuffing-box ring to act as a joint against the steel cylinder. That, so far as I know, represents the last word in this direction, the steel cy-

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

linder head being bolted up to the aluminum head-port casting at the valve-seat bases, and not just pressed up against it by a remote thread.

One-piece Steel Forged Cylinder

Finally, there is to be noted the one-piece steel-forging construction for cylinder, cylinder-head, ports and ignition holes, surrounded by a sheet-metal welded jacket, a very satisfactory though expensive construction.

These heads are themselves a subject of considerable study. We have first a plain head in which the valve inside diameter is half the cylinder less the width of seat, and half the bridge between the valves. Both valves have stems pointing upward and parallel. The plain cy-

amount of the bulge. The flat bulged head is a very desirable thing for larger volumetric efficiency and higher mean effective pressure, but offers some difficulty in manufacture when one is making a one-piece seamless-drawn steel job, but not a serious difficulty.

Another suggestion for getting the same result is to bulge this head upward in the form of two flats and put the valves on the two inclines. It is perfectly clear that a very large increase in diameter can be secured in this way. The valve stems in this case are not parallel but diverge at any angle and the limit is reached when the angle is 180 degrees, in which case they are horizontal.

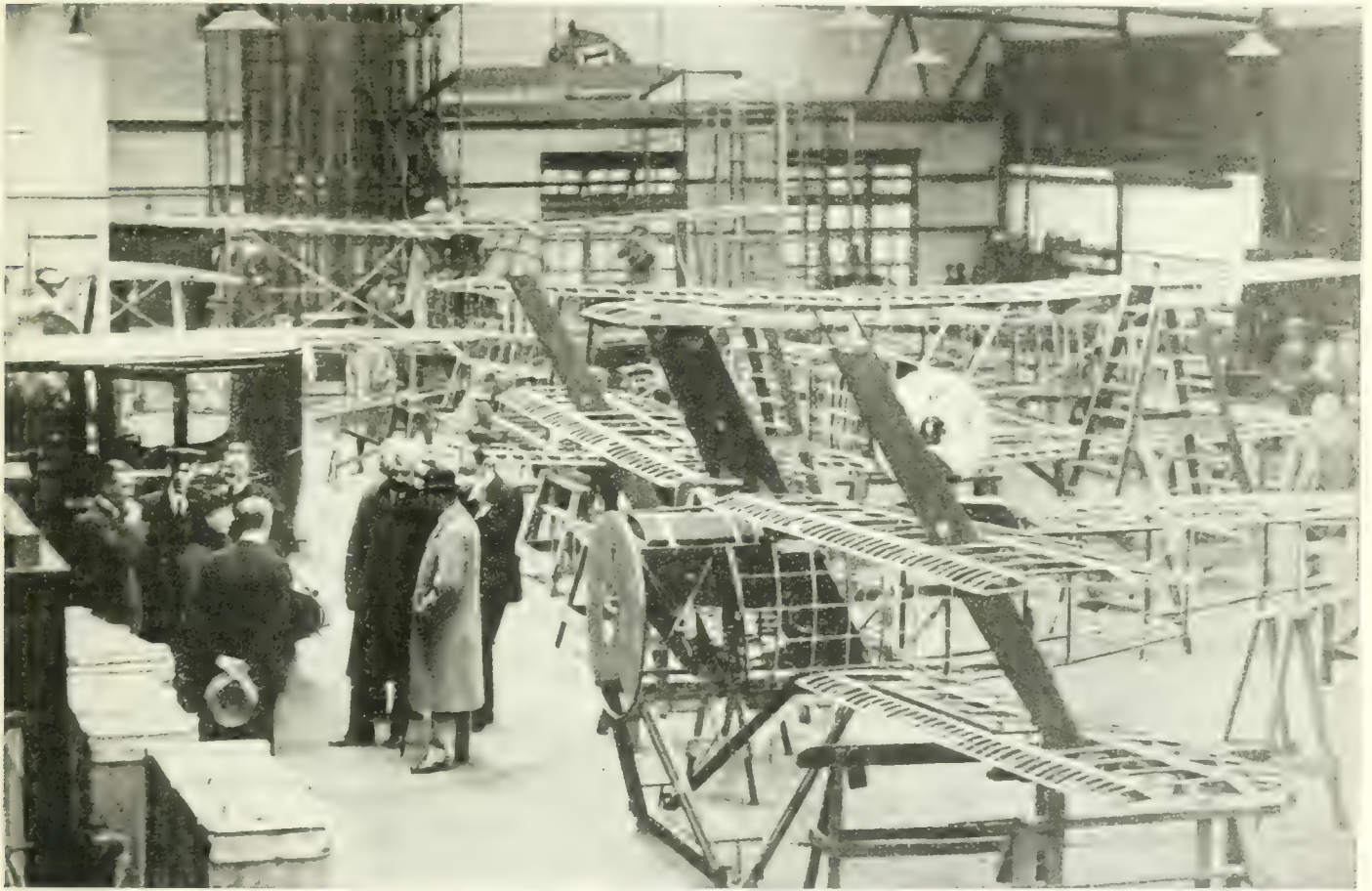
Block Arrangement vs. Separate Units

The question of block arrangement of

These cylinders gave trouble on the outer flanges, the end studs breaking off or pulling out. The trouble was caused by the crank case running hot, expanding, and the aluminum block cylinder casting running cool, because it was water-jacketed, not expanding. The cylinders being bent inward tore the stud ends right out.

Another point: the steel cylinder is naturally flexible, and it belongs—in fact, the entire motor belongs—to that class of structures which should properly be termed flexible, exactly similar to bridge structures.

These flexible motors weave just as the engine of a steamship weaves. To attempt to hold one against springing is to attempt what is practically impossible.



OUR KING AND QUEEN, ACCOMPANIED BY THE MAHARAJAH OF BIKANER, IN THE ASSEMBLY DEPARTMENT OF ONE OF BRITAIN'S NUMEROUS AEROPLANE FACTORIES.

linder, then, which can be made of a plain, seamless-drawn steel cartridge, and which is so desirable structurally, limits valve diameter, and this is a factor against it. Valve diameter is a strong influence in volumetric efficiency and weight of charge, controlling, as it does, flow-resistance conditions. Naturally, designers must get the volumetric efficiency as high as possible by keeping flow resistance as low as possible. Therefore, the tendency is to go towards larger valves than is possible with the previous arrangement.

Block Arrangement vs. Separate Units

One variation in form for this purpose is the flat bulged head where the valve diameter is larger than before by the

cylinders and their jacket vs. separate units deserves some attention. In some cases each cylinder with its jacket and head is entirely separate. In other cases the jackets are cast or welded in a block form, around more than one cylinder—sometimes two and sometimes four, and in some cases six. It is clear that the more cylinders included in the jacket block the less will be the weight of the jacket, because the length of the tangent to two jacket circles is less than a half circumference. But there are objections to the block, and in some cases it may not pay to use it.

In a case in point, a cast-aluminum block jacket was set down over four steel cylinders which were bolted to the frame by their usual flanges and studs.

The cylinders of aeroplane engines should all be perfectly free to go as they will, and not be held on the top in any way. All the block arrangements of cylinders of the sort just described are therefore, objectionable. Steel cylinders have a natural spring and give to them, and if let alone they will serve well; but attempting to secure them may result in serious distortions, or in highly localized excess stresses.

Typical Valve Gears

It was my intention to elaborate on the different arrangements of valves and valve gears, but that would take up too much space, so I will first just draw attention to some typical gears. One of these has a rocker arm overhead, worked

by a push rod from a camshaft in the crank case. In some cases this one push rod works two valves. When the valve stems are in line with the rocker fulcrum placed in the middle, each may be worked alternately. This push-and-pull may be secured by a single cam having a plus and a minus face, or by two opposed plus face cams having a plus face with a fork—the second form being far preferable. That particular form of driving the overhead valve by a rocker from a crankcase camshaft is now regarded as old-fashioned, but here is one case where there is something in favor of the old-fashioned. The new fashion is the overhead camshaft, where one camshaft, running along over a whole line of valve stems, will work them directly, or, being offset a little bit, may work through rockers, all stems being equidistant from the camshaft. When the two valves for one cylinder are on a line at right angles to the shaft, the camshaft may be placed between them, working with double rockers.

The objection to the overhead camshaft is two-fold. In the first place, a camshaft mounted on separate cylinder heads exerts a restraint against their free movement. The variance of that camshaft will necessarily cause a stress, and the camshaft will be bent, and it is only a question of time when something will fail—either by wear or breakage. Again, the cam is very close to the valve stem, and the adjustment of timing is very delicate. It is difficult to adjust a valve directly driven by a cam so that it will be accurately timed, and stay timed, when a difference of 0.01 in. means several degrees.

The location of the camshaft down in the crankcase, with rods coming up to the rocker arms or levers, allows each cylinder to be entirely free, and does not interfere with its turning in any direction whatever. Also it permits the use of longer levers and a far more accurate adjustment of the timing clearances between the cam and the stem on the long reach rod; but such a reach rod should be either a tension rod or should not be used at all. A push rod in a place like that seems to be fundamentally wrong. Here is a case of a long column of thickness of about half one's little finger, which is, in many cases, opening a valve—an exhaust valve—against an internal pressure of 40 lb. per sq. in., and a diameter of 2 in. or more, and, in addition, overcoming all the inertia of the gear and valve at perhaps 2,500 r.p.m. That is not a proper function for a long column, but is a perfectly proper function for a tension rod, or steel wire, and why no one has put a steel wire between the valve stem and camshaft, which will allow the whole structure to go the way it wants to, instead of abandoning the crank case camshaft, is more than I can see. Of course, the block construction is more favorable to the overhead camshaft, but it has not all the advantages.

Valve Types

Coming now to the question of valves, everyone knows that it is of no consequence to lift a poppet valve more than

one-quarter of its diameter. It is also true that the valve will work better, and the volumetric efficiency and mean effective pressure be better, the larger the diameter of the valve and the smaller the lift. That is, the valve should not approach the quarter-diameter lift. That condition conforms to good principles of gaseous flow.

It is also a fact that the timing of the valves on the high speeds in aeroplane engines, when one is desirous of getting the largest possible mean effective pressure, is a matter of basic importance. In no case should an inlet valve close sooner than 20 degrees late, and the amount more than 20 degrees late must still be determined experimentally for each machine, because the porting and manifold is different on each machine and no general formula has yet been found. Likewise the exhaust opening must be 45 degrees plus something ahead; the exhaust closing 5 degrees late plus something, etc. The inlet opening is the only period that does not seem to matter.

Suppose one had a valve lift of 0.4 in.—which would be reasonable for one of these motors—the valve is supposed to lift 0.4 in. and close again in the open period of the valve, which we may assume is 200 degrees in round numbers. If one examines that 0.4 in. lift and 200 degrees of crank angle, one finds that a variation of 0.01 in. in the lift corresponds to 5 degrees of crank-angle timing effect. It is clear, therefore, that with valve lifts of the order we are dealing with, in facing the problem of accurate timing we are running into a question of very great accuracy of dimensions, where a difference of 0.01 in. in any part between the cam and the valve stem means a difference of 5 degrees in time, and that means a loss of 5 per cent. in power.

A valve is normally made of a quite thin disk with a small diameter stem joined by a fillet. It sits in a seat supposedly water-cooled. It is a stress member, and is normally designed for stress. Designers talk about Grashof's formula for flat plates as the basis for its design, but that has nothing to do with the case.

These valves, designed according to this formula, will burn out. If they are designed according to the flat-plate formula they are quite thin, and their stems also—when calculated for compression loads. Consider heat being added to the outside face of that whole disk, and at a rate that is not equalled in any other structure that we have anything to do with. In the case of the exhaust valve there is some heat added on the other side, too, and when the valve opens there is a tremendous increase on the back, as is also true when the valve leaks. But excluding that extra heat, and considering only the heat added on the flat of the disk, the valve can attain a steady state of temperature only when the heat is being disposed of at a rate equal to that at which it is received. Where is the heat going to go? How is it going to get out? It is perfectly evident that the problem of keeping the valve cool is entirely a problem of providing for getting the heat out, because there is no control over what comes in. The heat flow is

radially inward, then axially upward to a stem bearing. After the heat gets up the stem, it turns off through the stem bearing to the water.

When it is remembered that the conductivity of a gas film is ever so much less than the conductivity of the metal through which the heat is flowing, and that the same is true of the water which must ultimately receive it, it is perfectly clear that the amount of area in the stem guide must be very large in proportion to the area of this stem circle carrying the heat up to it, and the ratio of one to the other should be based somewhat on the conductivities, with due regard to gas-oil and water-film thicknesses. Also, the heat received on the disk must pass through the cylinder of metal constituting the stem. Therefore, the stem thickness must bear a logical relation to the disk face, and the thickness of the face should regularly increase toward the centre. If one followed this out, one could easily develop a rational form for valve based not on stresses, but on heat flow.

The ratio of the conducting area to the heating surface becomes the prime variable, and it is perfectly evident that that ratio ought to be the same all through one piece of metal itself, and ought to be increased when the heat must cross a bridge, as at the stem guide where there is a film of oil or dead gas, by an amount representing the ratio of thermal resistances. If one does that, he is carrying through the principle of establishing a regular temperature gradient from the most distant point; and it only requires one or two experiments in that direction to decide what metal to use, and what shape, and how close it ought to fit, in order that any fixed temperature will not be exceeded at the hottest part. So long as it remains below a red heat a valve is all right, but as soon as it attains a red heat it will first oxidize and warp, and then will cause preignition.

This thermal study of a valve has not been undertaken by anyone in the shops. It is one of the things that the scientific men are contributing to this problem, but it is now about to be put to practical use. The same situation exists with respect to the piston, as the following shows:

Piston Types

The ordinary piston, as built for aeronautical motors, has been a failure; and even in the best motors to-day I venture to say that, next to the exhaust valve, the piston is the source of greatest trouble. I put it before the exhaust valve. I think more accidents and trouble can be traced directly to pistons than any other single part of the engine structure, and yet pistons have been entirely neglected from this thermal standpoint. In the first place, the aeronautical man, in starting out to build his aeroplane on the automobile model, had in mind only one thing—to take metal away from every possible place with the idea that the metal was there only for stress purposes and might be taken away as long as the stress did not go above a certain value. What happened? In the first place, the piston was cut off from one

and one-half diameters long to less than one diameter long, which reduced the contact between the piston barrel and the cylinder. Not being satisfied with that, the early designer bored holes in the piston and then cut the head down until it was $\frac{1}{8}$ in. in maximum thickness, and frequently only 1-16 in. across the top. So far as stresses were concerned the piston thus reduced was all right, but it ran hot and soon gave trouble.

Consider the piston from the standpoint of heat dissipation, and something surprising follows the logic of the analysis. The piston is receiving heat all over the top at a very high rate. Where is the heat going? It must go out through the barrel walls and the oil film to the cylinder—that is the only place it can go.

It is perfectly clear that the heat received within a circle drawn concentrically on the head must pass radially outward through a cylindrical surface equal to the circumference of the circle multiplied by the head thickness at that point. The heat received within a larger circle drawn on the head, passing also radially outward, must have a larger head thickness at its circumference. If the temperature is not to get unduly high, then the head thickness must regularly increase from centre outward, so that the metal-conducting area bears a constant ratio to the area of the heat-receiving circle to control the temperature gradient from centre to edge. The principle is the same as is used in designing copper electrical conductors to control the voltage drop. It can be shown by a simple equation that the thickness ought to increase on a straight line.

When the heat gets to the edge, it is clear that it must flow down the piston barrel. Therefore, there ought to be as much metal behind the first ring as the thickness of the head at the inside edge of the barrel. Practically no heat can get through the ring, this being a floating member. Then the barrel thickness can be regularly decreased toward the open end, to control the temperature gradient from end to end. It is also clear that the more surface there is around the barrel, and the better the fit, the easier it is to establish a low-temperature gradient between piston barrel and cylinder wall, providing there is sufficient conducting metal in the piston walls, head and barrel. From considerations of that character, backed up by any number of broken and burnt pistons, it is about time we stopped cutting the metal out of the pistons and began putting in considerably more metal. The additional weight is not going to injure the motor at all, but will permanently have the effect of enabling it to run longer periods of time.

Motor Frames

A qualitative analysis of frames is also worth while. The frame of the aeronautical motor has been regarded as a thing that nobody has to be bothered about. It was a crankcase and, of course, we had lots of crankcases. Automobile crankcases had been made in great numbers and variety, and it seemed a simple thing to create an aeronautical-motor

crankcase from that of an automobile motor.

Now, it is a fundamental fact that if one is going to reduce the metal weight of a structure such as this, to a minimum, every piece of metal should be required to carry a very heavy stress—as heavy a stress as possible, and do it all the time. The basic principle, then, of weight reduction, after the thermal considerations have been disposed of, and the conditions for high mean effective pressure and thermal efficiency properly met, is to make the metal carry real loads. That is not to be accomplished with the ordinary crankcase construction, because the crankcase is a reasonably heavily stressed member, and is subjected to complicated sets of stresses that cannot be opposed with any economy of metal weight by a common casting of box form—which is all that the ordinary crankcase is.

The old-style crankcase, of upper and lower halves, formed a box with holes on top to take the cylinders. The lower half of the box carried webs, which in turn carried the bearings with top caps. If one started off with the idea of designing a structure as little adapted to the stress conditions as possible, this is about what he would get. Consider the fact that the stress due to the gas pressures is always upward, producing tension in the cylinder and its fastening to the frame that is carried out along the flat top of the box as a beam load and down along the upper side walls as tension; then through the parting joint to the lower side walls, and then through the webs as beams from both sides to the main bearing and shaft, where it finally ends. Coming around like that is an excellent example of indirectness of stress transmission and consequent demand for the maximum of metal.

Consider also that the crankcase is stressed in another way, in that it has in the 4-cylinder motor a pair of cranks acting downward between a pair acting upward, so that there is a rotating radial centrifugal load due to both rotating masses and the inertia of the reciprocating parts. This sort of loading puts on the crankcase the duty of a beam, but in which the direction of loading rotates. It would appear that the box structure is rather better for the beam-load condition than it is for this tension condition.

Slowly these ideas have percolated, and the effects are to be seen. The first direct effect is noticed when this bottom web is eliminated, and the bottom crankcase member ceases to be a stressed member, and becomes merely what it ought to be—a cover. The web is introduced in the top half, and the bearing now has bottom bearing caps held by studs in the top web. Now the gas pressure stress can come straight down through the webs. This, however, is not as satisfactory as it might be, because each web is a plate subjected to the same kind of stresses as a truss is. The next suggestion, therefore, is to build it truss-like; and we find top-web castings taking truss forms, cutting out holes in the unstressed section of the web member. That

is an example of appreciation of the nature of the problem. The next step, however, shows rather more intelligence, where there is substituted for the cast web member a high-tension steel long-bolt member running up through a hole in the web. That bolt takes a bearing cap on one end and takes the cylinder flange on the other end. This represents the last word to-day.

It is my belief that the next step should be to eliminate the cast-aluminum webbed box member entirely, and to build the whole thing of direct truss form, using nothing but steel. Furthermore, I do not hesitate to say that it is my belief, founded upon the study of practice and on some analyses, that no member of the aeronautical engine that is subjected to heavy stress should be anything but steel, except when that member is subjected to heat-carrying conditions and must be designed for heat-carrying, rather than stress resistance, in which case it will be found that there is more than enough metal for stress. This leaves only one other class of member, which is the enclosing member, and which can be made of whatever suggests itself.

Now, in the course of this designing, it is necessary to build, test, analyze results and repeat. One can argue, as I have done, at very great length from the standpoint of qualitative analysis; but that sort of analysis, however nicely it leads into certain directions, as shown, does not give the right answer. It requires in addition a quantitative analysis, which can only be obtained experimentally, and which is the final step which we, as engineers, are bound to demand.



CANADIAN BOUNTIES

ACCORDING to the latest report issued by the Department of Trade and Commerce at Ottawa, the following trade bounties were paid out in one year:—

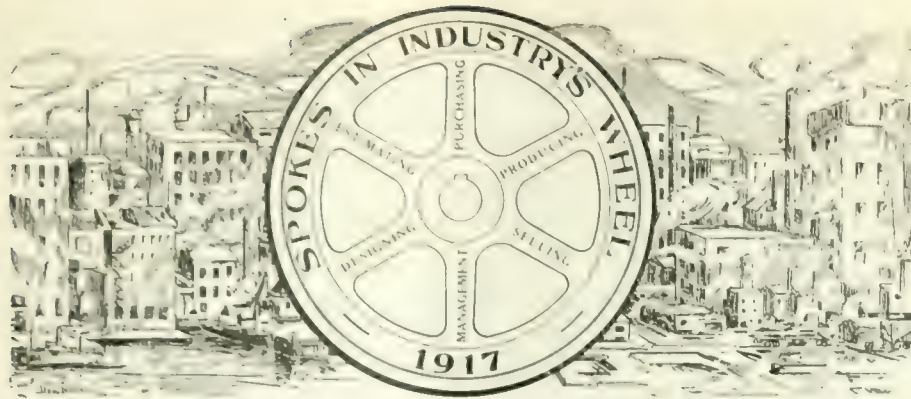
Total bounties paid	\$21,669,965	
Metal	Amt., Tons	Bounty
Pig iron	5,431,547	\$7,097,041
Puddled iron		
bars	42,812	113,671
Steel	4,448,780	6,706,990
Manufactures		
of steel	499,312	2,868,122
Lead (pounds)	1,187,083,350	1,979,164
Manila fibre (pounds)	108,048,641	367,962
Crude petroleum (gallons)	169,134,123	2,537,012



Their Pet Names.—A very tall, thin boy reported to a battalion in Flanders. His colonel was bald and elderly, but adored by his men. After a few days' experience of his new command the sub. approached the officer commanding and asked permission to ventilate a grievance.

"I wish you would use your influence, sir, to restrain my platoon from referring to me as 'Legs,'" he said.

"Sure! my lad, sure!" replied the colonel, solemnly; "if you'll use yours to stop my whole battalion callin' me 'Old Baldy.'"



The constitution of industrial enterprise is largely departmental—"spokes in a wheel." This series of articles has for its object the featuring in a racy, interesting and instructive fashion, the training, experience and achievement of those who to-day are transmitting, effectively, energy in their capacity as "spokes in the wheels" of our metal-working establishments.

WILLIAM A. SWEET

THE development and transmission of electrical power has advanced to such a point, and demands such qualifications in the individual that it may well be said that wires like guns need men behind them. Electrical engineering in its operative features, requires a degree of practical experience equalled only by mechanical engineering, and obtainable only by lapse of time and occurrence of trouble. Just as it is impossible to cross bridges before you come to them, so is it impossible to gauge one's ability to overcome trouble until unwelcome events have presented themselves for solution. While it is not implied that the subject of these remarks has a special leaning toward trouble, it is believed that, because of the closeness with which his personal career and activity are interwoven with the development of his present duties, his biographical details possess more than passing interest for readers of this journal.

The early days of electrical engineering were characterized by a rapidity of development experienced by few other industries and the fact that our "Spoke's" experience with electrical machinery dates from the early "Eighties" is sufficient evidence that he not only knows how to meet trouble when it comes but what is perhaps more important, is capable of maintaining a preventive attitude against the trials and sorrows of the station engineer.

Born in the county of Wentworth, township of Salt Fleet, May 3, 1862, William A. Sweet is a Canadian son of Canadian parents, although four generations back his forefathers were of Holland birth. After receiving the ordinary school education of that period, he commenced work at the age of sixteen, learning the milling trade in the town of Woodburn, Ont., where he was employed at the Woodburn Flour Mills. They were owned by John Edmonds and during the three and a half years he was there, Mr.

Sweet had charge of a beam engine having a cylinder 20 in. dia. by 5 ft. stroke, running at 30 revs. per min. An interesting feature of this plant was the presence of a water tube boiler of which the following description is given: A main horizontal shell about 6 ft. dia., and proportionate length, had a central rectangular flue 48 in. wide by 30 in. high. About 500 tubes were disposed vertically in this flue, connecting the water



W. A. SWEET.

spaces above and below the square flue. This boiler was made by some firm in Hamilton, whose name history recordeth not.

After a short time with Morgan Bros., who owned a flour mill in Hamilton, Mr. Sweet decided to become a real out and out engineer, and with this end in view

he commenced his apprenticeship in 1882 with the firm of Reid & Barr, who were engaged in the building of stationary and portable engines and also boilers. The four years spent there were full of opportunity, particularly as regards the operation of machinery, a fact which was to be of considerable influence in the later activities of our friend.

At this time, Mr. Sweet devoted considerable time to study, taking both the electrical and steam engineering courses of the Scranton School, so that he was amply qualified to take charge of the electrical plant at the Royal Distillery, Hamilton. This equipment included one bi-polar dynamo of 400 light capacity, 2 bi-polar motors and one electric lift. Three boilers of 125 horse-power were installed, and the engines were one 100 horse-power, and one 20 horse-power, the latter being an Armington & Simms, built by the Inglis Co., of Toronto. The electrical machinery was built by Tom Kay, of Hamilton.

Mr. Sweet's connection with the various plants now owned by the Dominion Power & Transmission Co., dates from June 1, 1894, when he took charge of the power plant of the Hamilton, Grimsby and Beamsville Electric Railway, this plant being under his care till the present time. His duties were extended in Sept., 1896, to include the power plant of the Hamilton Radial Electric Railway, this latter plant being in continuous operation as a generating plant until 1901, when it was converted to a transformer and motor-generator station. At this time Mr. Sweet was placed in charge of all stations owned by the Hamilton Cataract Power, Light and Traction Co., these consisting of the old electric light plant on King street, the Street Railway plant at the foot of John street, and the Grimsby Electric plant.

The formation of the Dominion Power and Transmission Co., solidified the various electric projects in the Hamilton district and incidentally increased Mr. Sweet's responsibilities so that in addition to the companies mentioned he has charge of plants belonging to Hamilton & Dundas Street Railway, Dundas Electric Co., Brantford & Hamilton Elec. Ry., Hamilton Terminal Co., and Western Counties Electric Co. The Victoria Ave. sub-station belonging to the old Cataract Co., is the only plant where steam generation is still in use.

Social and political activities of limited degree have characterized Mr. Sweet's past life. Radical in politics and Anglican in religion, he has never been attracted by municipal politics. A Mason and member of the I.O.O.F., he is also a member of the C.A.S.E., being one of the old members of No. 2 Lodge, past president of the C.A.S.E. executive, and a warm friend of that organization.

Hunting is his chief relaxation, and a fall trip has been an annual feature for the last 25 years.

On Jan. 26, 1889, he married Cozens Tryphena, of Hamilton, the union being

blessed with two sons and two daughters, one of each of whom is married; the family residence being 78 Colborne St., Hamilton, Ont.

Outside of his duties, Mr. Sweet has various interests, one of special interest at this time being the Hamilton Molybdenum Alloys Co., of which he is a director. His success in life he attributes to a lot of mighty hard work, not a little of it being study in the wee sma' hours of the morning; in fact, he admits that his wife has occasionally hidden books from him for days at a time. She cannot, however, deprive him of technical papers, which appear regularly, and Mr. Sweet regards these as one of the necessities of life for the modern aspirant to success.

Cool collectedness is particularly necessary for successful electric station operation and both Mr. Sweet's personality and the various plants under his control bear out the truth of this assertion.



RUSSIA PRESENTS VALUABLE MARKETS

A SPECIAL REPORT on trade conditions in Russia has been forwarded to the Department of Trade and Commerce at Ottawa by C. F. Just, Canadian Trade Commissioner, Petrograd, Russia.

Contrary to expectations, on this side of the Atlantic the many plans for the extension of Russo-Canadian trade have not been interfered with to any appreciable extent by the revolution; in fact, according to the latest advices, much new development work will be the outcome of the revolution as soon as order is brought out of chaos.

Mr. Just states that the important programs which have been authorized in connection with Russia railway construction, the development of the road system of the empire, the improvement of internal navigation, land reclamation, colonization and settlement should provide numerous opportunities for Canada's participation in supplying a wide range of machinery and of general supplies which will be called for and for which, at the outset at all events, the administration must depend upon outside sources of supply. These should include many of our Canadian specialties which have been evolved by these same conditions and the same necessities of development as those which confront Russia of to-day. It is pleasant to know that the authorities are prepared to recognize the help which Canada can render their country in this respect, and it would seem that they are willing to give us a preference in such matters within reasonable limits.

The question of finance and the difficulties of exchange as well as of transportation throughout the year have had considerable influence in delaying the placing of orders in Canada for any requirements of a character which were not absolutely necessary for war purposes.

Agricultural Machinery

Among the great and immediate necessities of Russia must be classed a fuller supply of agricultural machinery. The seriousness of the present short supply, due to the reduction of local production and to the interruption of imports, is fully recognized by the Russian authorities, and there is every disposition on the part of the Government, acting in co-operation with the chief zemstvo unions and agricultural credit associations, to meet the situation as far as circumstances will allow. There is room here for a fuller participation of Canadian works. It is true that the contracts for the 1917 campaign allotted to Canada were larger than in former years. They were confined, however, to a single Canadian firm. Contracts for 1918 will be arranged doubtless during the spring of the year. The requirements to be met are bound to be larger than ever, and it rests with our manufacturers to take advantage of the position.

The question of forest exploitation, particularly in northern Russia, was the subject of prolonged and careful investigation by the Russian Government during the year, and the decision was arrived at to encourage by generous commission the development of exports on a greatly increased scale.

The only possible market of Russia open to Canada now is the Russian Far East, with Vladivostok as the chief centre, and a good many inquiries have reached me in this regard. Complaints have come to hand, however, from the importing houses in Vladivostok of the difficulty in getting Canadian firms to agree to the terms of settlement—i.e., cash against documents in Vladivostok, which prove acceptable to shippers in other countries. It is much to be desired that some kind of agreement could be reached that would enable Canadians to obtain a firm foothold in that market.

Getting Business By Correspondence Futile

Judging by the inquiries I am receiving from Canada there is too great a tendency with Canadian firms to rely merely on correspondence for securing business. This course in a general way is quite a futile proceeding. As I have repeatedly pointed out, little progress can be made in this market without a personal understanding of the situation and without creating a selling organization founded on local knowledge. It is absolutely necessary for Canadian firms which are in earnest regarding the Russian market to send over responsible representatives.

I am fully aware that the question of winning the war must be our chief pre-occupation in Canada, and that this will interfere for the present in many instances with such a course. The prolongation of the war makes the resumption by Germany of her old activities an ever remoter possibility, and the way will be rendered easier for entry of new firms and for the formation of new connections. The commercial and financial

circles in Russia, however, are looking with some impatience for fuller proofs of interest on the part of the allied countries in this regard, and the matter is one which we shall do well to provide for.

Pooling Business Advised

Perhaps the best advice I can offer to Canadians is to urge again this practical consideration upon their attention. My firm belief is that the position is to be best met, so far as Canada is concerned, by the grouping of like or correlated industries interested in the Russian market, and of frankly pooling Russia business. Under the conditions that are likely to exist after the war such collective or co-operative effort will be more adapted to success than by the old part of individual effort. Again it is not unreasonable to ask that Canadian firms which are believed to have made unusual profits during the war should set apart a portion of those profits as a fund for investigating possibilities of new markets, including that of Russia, and for forming necessary connections in order to maintain their present enlarged output.

Prior to the war Canada was a terra incognita in Russian commercial and financial circles, but time and circumstances are working a change, and the evidence of Canada's industrial strength and varied production is receiving generous recognition, which only requires to be supported by practical work on the spot in order to secure substantial results. Canada, with her new capacities and new spirit of self-reliance, will find in Russia a rich field for her newly-devoted energies, but manufacturing ability must receive its direction from well-informed commercial enterprise, and both the support of far-sighted and patriotic finance and carefully-matured transportation facilities.



RESTRICT USE OF PLATINUM

NOW that the price of platinum has risen to such a figure that its use by chemists and chemical manufacturers is now practically prohibited, large stores of the metal are in the hands of jewellers who are holding it for making up into rings and other similar articles to sell to people who will pay for it the present inflated price, which is five times that of gold. When sold in small quantities, such as is usually the case, an insignificant amount of platinum will go a long way, it being the third most ductile, as well as malleable, of the metals, but the total of all these small sales reveals the fact that the price of the metal has been forced up to such an extent that its purchase for chemical use, except in these microscopic quantities, is indeed at a minimum.

Platinum is one of the essentials in the manufacture of sulphuric acid by the contact process; in the methods of obtaining nitric acid by the oxidation of ammonia, in the production of explosives and as a catalyst in many other operations.

EDITORIAL CORRESPONDENCE

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

MACHINISTS' INSTRUCTION COURSE—XXIII.

By J. Davies

GRINDING is a term that is used for many different operations, many different kinds of material including all kinds of metal, glass, rubber, wood etc., being ground by emery

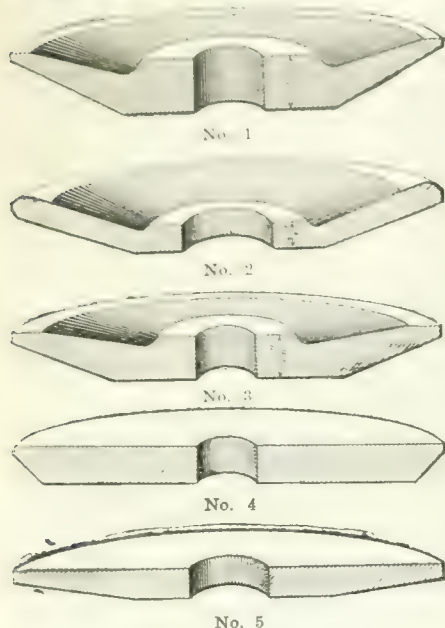


FIG. 85.—TYPES OF EMERY WHEELS IN GENERAL USE.

wheels. It is not our intention to discuss grinding in its many varied phases, but only as it applies to modern machine shop practice. Our old friend the grindstone is rapidly losing its popularity and is conspicuous by its absence in most machine shops. Carpenters and patternmakers, however, regard it with more favor than the machinist. They claim that for grinding tools that have sharp thin cutting edges the grindstone can't be beat, because it does not draw the temper of the steel, and leaves the tool in good cutting condition.

Care of Grindstones

Grindstones are usually run in a trough partly filled with water, as they cut more freely when wet; the water also keeps the work cool and washes away particles of dislodged stone and steel. Grindstones are softer when wet than dry, and for this reason the water should be drained out of the trough every night. If the stone is allowed to remain all night partly submerged in water, next day the wet side will wear away faster than the dry side and there will be great difficulty in keeping the stone true.

Grindstones under favorable conditions rapidly work out of truth and require truing up. This is most often accom-

plished by a steel bar, or an old file, but the most popular tool is a piece of old gas or water pipe, which is supported on a rest and rolled across the face of the stone. Be sure to have the rest close up to the face of the stone or the end of the pipe may slip in between the stone and the rest; also have the pipe long enough to give a good leverage. The modern machinist is a hog for speed so he has practically discarded the grindstone in favor of the emery wheel, and the word emery wheel in shop language includes all kinds of built up wheels of different grades and materials. Emery wheels are made in different grades of hardness, and makers have their own system of grading.

Selecting a Wheel

In selecting a wheel, more depends upon the material that is being ground, and upon the finish required than upon the grade or hardness of the wheel. It does not follow that a fine grain wheel will always produce a fine finish, and a coarse grain wheel rough finish, irrespective of the material being ground and the nature and conditions of the work. Generally speaking the harder the material to be ground the softer and coarser should the wheel be. When grinding steel or chilled iron the harder the steel the softer the wheel, and vice versa. Brass and copper require very soft wheels. When grinding brass, or copper, or any of the soft metals or alloys with a fine hard wheel, you will have trouble with the particles of metal sticking to the wheel.

Emery wheels are practically cutting tools that are bound together to form a circular cutting tool that presents thousands of cutting edges to the work. These thousands of minute particles break away from the wheel more or less readily according to the hardness of the material being ground, so that when grinding hardened steel it is necessary to have a soft wheel so that these numerous cutting edges will be worn or broken away rapidly and new cutting edges presented to the work.

Shape of Wheels

Figs. 85 and 86 show the most common form of wheels in general use. Nos. 1, 2 and 3 are difficult forms for endurance in cutting into sharp corners.



FIG. 87.—DIAMOND DRESSER.

No. 5 is a solid soft free cutting wheel, and is used on fluted reamers and milling cutters, it is made with both sharp and round corners. No. 6 is a cupped

wheel used for face cutter sharpening or face grinding. No. 7 is a plain cylindrical wheel used for general work and surface grinding. No. 8 is a very narrow wheel for cutting-off hardened stock, slotting or similar work; these are made as narrow as 1/16 in. No. 9 is a cone which can be used for wood gouges that

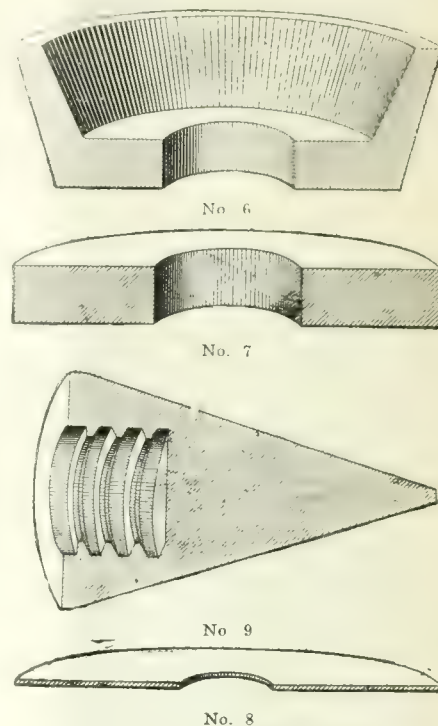


FIG. 86.—TYPES OF EMERY WHEELS IN GENERAL USE.

are ground on the inside of the curve of the blade. Many other shapes are manufactured but these are the principal ones used. These wheels can be altered to other forms as desired.

Truing Emery Wheels

It is essential that the grinding wheel should run quite true and bear evenly against the work over its entire cutting surface. A diamond is undoubtedly the best tool for truing small wheels but unfortunately diamonds are quite expensive and are not very much in evidence in general machine shops being the exception rather than the rule. When they can be obtained, they should be set in the end of a round bar, Fig. 87 which

enables them to be used in any position. Some machines have devices for holding the diamond point to the wheel, but the writer has observed that most grinder

operators prefer to hold the tool by hand, resting it upon some stationary object while the revolving wheel moves back and forth past the tool, or the tool moves past the wheel.

Truing with a diamond is not practicable for rough work, and where large and coarse wheels are used, some other method of dressing the wheel must be



FIG. 88. DIAMOND DRESSER.

resorted to. A dressing tool made of steel or chilled iron disks that are free to revolve on a central spindle is shown in Fig. 88. This tool is pressed against the wheel and as the disks revolve, the teeth strike the wheel and dislodge particles of emery thus making an even surface. A very useful dressing tool is a lump broken out of an old wheel that is coarse and harder than the wheel to be dressed. It should be kept moving around, applying the different edges to the stone.

Chatter and Its Causes

It often happens that the wheel leaves a lot of peculiar wavy lines called chatter marks. These marks may be due to a number of different causes the name given to them suggests the cause, chatter. The grinding wheel spindle may be loose in its bearings and so chatter,—the work itself may be slender and not properly supported, or the wheel may be too hard. Chattering may often be overcome by using a softer or a narrower wheel,—of course the narrower wheel means a slower feed, and speed is sacrificed for a better job.

In grinding cylindrical work where there is a fair amount of metal to remove, it is necessary to flood the work with water to carry away the heat and prevent distortion of the work. Many experiments have been made which prove conclusively that if a round bar is ground in the middle only, and the heat is allowed to generate and spread itself unevenly through the bar it is impossible to grind the bar round. Here is how one operator greatly reduced the heat trouble, he was grinding very thin stock on the surface grinder, and found that the unequal distribution of the heat caused unequal expansion and when his work was finished and cooled off it was unequal in thickness. He therefore turned a groove in the face of his wheel which not only reduced the bearing surface, but also provided an air space which helped materially to keep the work cool.



POWDER MONKEYS

By H. H. Brown.

IN Canada there are four plants manufacturing smokeless powder for use as a

propellant in cannon. Two of these plants manufacture "cordite," which originally is an English powder, having been first made about twenty-five years ago. The name cordite was derived from the shape of the finished powder, which resembles a cord in appearance. It ranges in length from ten to twenty-six inches, depending on the calibre of the gun in which it is

used. Cordite is a mixture of gun-cotton, nitro-glycerine, acetone, and a small per cent. of vaseline. After being mixed into a thick paste, it is pressed through apertures of an hydraulic press and comes out like macaroni, is cut into proper length, dried, and packed ready to be shipped to the loading station, where it is placed in the cartridges. This kind of powder is made at — and —.

The other two plants making smokeless powder are located at — and —. Their product is known as N.C.T. (nitro-cellulose tubular) powder. The finished product is cylindrical in shape, having perforations running lengthwise, therefore the name tubular. Grains vary in size, according to calibre, but the average is about one-half inch in length and one eighth-inch in diameter. Nitro-cellulose powder is nitrated cotton treated with ether and alcohol, pressed into cakes resembling a cheese both in appearance and consistency, then pressed through dies, similar to the cordite apertures, and cut into grains of the proper length by machinery. The capacity of these plants vary, the largest being equal to 50,000 lbs. per day.

At the latter of these two plants about twelve hundred men work day and night turning out finished powder from raw material. The three main constituents of smokeless powder are sulphuric acid, nitric acid and cotton. Sulphur from the State of Alabama is used to make the sulphuric acid, nitrate of soda from South America for the nitric acid, and American cotton for the cellulose. After the cotton has been nitrated with a mixture of nitric and sulphuric acid (four pounds of mixed acid to one pound of cotton), it is beaten into a plup and put through a process of purification, after which it is ready for the "powder line." In this state, nitro-cellulose is also known as "pyro."

Powder Line

The pyro is dehydrated with alcohol by means of hydraulic pressure to take out the moisture that remains in the cotton after it has passed through the hydro-extractors or centrifugal wringers. After treatment with alcohol it is then mixed with ether, which changes the pyro into a colloidal state resembling a mealy dough. While being handled in this form,

the ether rapidly volatilizes, filling the shop with heavy fumes and intoxicating the operators in a manner similar to an alcoholic drink. On account of the silly capers the men on the powder line perform while drunk on ether fumes, they have been given the name "powder monkeys." Some will sing, dance, and play, while others are made melancholy and are wont to sleep. Some perform silly stunts such as untying a fellow workman's shoestring. Sleepiness and nausea often follow an ether drunk. The fumes are generally heavy in the "finishing press" house where the powder is pressed through perforating dies and granulated by cutting machines while still in a plastic form and exuding fumes. Ether fumes are highly inflammable, almost explosive. Often a spark from a cutting machine will cause the entire room to burst into blue flame intensely hot.

After granulation, the powder is dried and ready to be loaded into cartridges. The process of drying takes about nine days.

Canary Birds

Picric acid, which is probably the heaviest explosive used in high explosive shells, gives off a yellow fume which stains the skin, hair and clothing of the workmen with a staying quality that is faster than the fastest dyes. The hair is dyed a greenish yellow which remains so until it grows out and is cut off. These men are called "canary birds" from their bright yellow appearance.

Acid Rats

"Acid Rats" is the name given to the operators in nitric and sulphuric acid. They are not dyed as deep yellow as their cousin, the canary bird, nor do they present as good an appearance on account of their acid-eaten clothes, which are often reduced to mere rags. Woollen cloth withstands acid much better than cotton, consequently nitrators wear thick, cheap woollen garments often made in rich colors and large checks. The Inferno is very applicable to the nitrating room, where the nitrators slowly shuffle to and fro with long iron forks, dressed in red checkered trousers, colored shirts, rubber boots and aprons, and capped off with white handkerchiefs to shield their mouths and noses from the hot pungent fumes that float up from the acid pots over which they stand and stir with long iron forks.

No greater field for the study of human nature could be chosen than a smokeless powder plant. In such a plant in the United States, twenty thousand men at work are to be found, representing from practically every nation and race on earth. In this mass of humanity is found every type from the lowest to those who have scaled the heights of success and known the better things of life. There are representatives from the chosen professions, such as doctors, lawyers, etc., as well as a fine collection of ex-convicts and jail birds working side by side for thirty cents an hour.

The Canadian plants have the same variety of racial representation as do the large plants in the States.

STEEL INDUSTRY DEVELOPMENTS

The War-Created Stimulus given the Steel Industry is Reflected alike in the Nature and Application of New and Improved Equipment being Installed and Developed.

TURBO-BLOWERS FOR BLAST FURNACES—I.*

By R. H. Rice and S. A. Ross.

THE blowing of blast furnaces is a process which, at best, is attended with considerable variation, both in the operation of the furnace, and in the factors which are necessary to the proper working of the plant as a whole. In modern furnace practice every effort is being made to reduce the number of variables and increase the steadiness of operation, and a careful study of these variables and what is being done to decrease or eliminate them will be useful. The variable elements which enter into the operation of a blast furnace are as follows:—

1.—Variations in the composition of the ore, and variations in the size of the particles thereof.

2.—Variations in the composition and in the size of the particles of the limestone.

3.—Variations in the carbon content, strength and size of the coke.

4.—Variations in the quantity of oxygen blown into the furnace, due to variations in barometer, temperature, and humidity of the entering air.

5.—Variations in the pressure and volume of the blast, due to the character of the blowing agent.

Of variables which have no relation to the blast, these are dealt with as follows:—

1.—Variations in the composition of the ore are being dealt with by proper combinations of ore; and variations in the size of the ore are being dealt with by proper means of sizing the ore, including crushing, screening, sintering and roasting.

2.—Analyzing and mixing various compositions of limestone in order to secure a uniform quality.

3.—Careful choice of coke, and proper attention to the uniformity of manufacture.

4.—An attempt to decrease variables in blowing was made by the introduction of the dry blast. The expense of the plant for this method of removing the moisture from air and the operating cost thereof is so great that this method of treating the blast has not made any considerable progress recently.

5.—The introduction of the turbo-blower has provided a means of rendering the blast conditions more uniform. Not only is the blast pressure held steady but also the very steadiness of the blowing permits accurate measurement of the air volumes, and accurate adjustments thereof, and compensation for variations

in barometer, thermometer and humidity; so as to insure a constant rate of flow of oxygen into the furnace, and the accurate adjustment of this rate to the needs of the furnace conditions.

Steadiness and Control of Blast

It is difficult to demonstrate, to those furnace operators who have not had experience with the steadiness and ready controllability of the blast from a centrifugal compressor, what the effect of this steadiness of conditions will have on the furnace; which is in direct contrast to the attitude of those who have had experience with the operation of such units. In no case has there been a failure on the part of the people who have acquired experience with this method of blowing, to appreciate the improvements which result from these conditions.

It is only recently, however, that an accurate means has been provided for correcting the rate of blowing to correspond with the variations in atmospheric conditions. Experience with the use of these corrections is very limited; only one case is known to the writers where some of these corrections have been applied by observation of the atmospheric conditions and an arbitrary correction of the weight beam in accordance with this observation, and in this case (speaking of the Northern Iron Co., Port Henry, N. Y.), the correction has only been made for barometer and temperature, and no attempt has been made to correct for humidity.

It is not to be wondered at that those whose experience is exclusively with ordinary methods of blowing should fail to appreciate the desirability of the steady blast and the accurate measurement of oxygen, for the reason that there are so many variables which necessarily have occupied the attention of our blast furnace operators that it has been almost impossible to differentiate and evaluate the various variables which have to be dealt with. By the recent improvements in the operation of furnaces, which permit the removing of some of the variables by sizing of the ore, and by proper attention to the coke and limestone charges, some of these variables are being removed and the final step would seem to be the removal of all possible variations from the blast itself.

Blast Pulsations Absent

It goes without saying that the blast from a centrifugal compressor will be a steady flow without pulsations. The very nature of the apparatus necessitates this. It also seems evident, and has been proved by actual observation of the blast delivered from a reciprocating machine discharging its air in puffs, each puff corresponding to one stroke of the engine, that the flow of the blast must be more

variable and produce some variations of effect in the furnace. Whatever these variations are, it seems evident that it is desirable to remove them. Experience with centrifugal machines on blast furnaces demonstrates this, and shows that an improved output, a somewhat less quantity of dust, and a general steadying up of conditions has resulted. A part of this improvement is due to the steadiness of the blast, and a part is due to the more accurate control of the rate of blowing.

An interesting experience which shows the importance, and even absolute necessity, of accurate control of the rate of air flow has been had with a blast furnace centrifugal compressor within the last few years. In this case the measuring device which was relied upon to determine the rate at which the blast was being blown was so located that the indications of this measuring device were inaccurate; at some time indicating more blast than was actually flowing and at other times less. The result of this inaccurate measurement of air was an inaccurate adjustment of the machine, causing excessive quantities of dust to be produced and a decreased output from the furnace as compared with the reciprocating engines, which were installed to blow the same furnace in alteration.

After operation in this condition for a considerable period the measuring device was relocated where the connections were more accurate. I am informed that the result of this relocation and consequent more accurate operation of the blower, was to decrease the quantity of dust to normal and increase the output of the furnace. In order to determine the effect of improvement in these parts such instances are of extreme value. They show the importance of the proper regulation of the rate of flow of blast and indicate the possibilities which can be expected when inequalities and irregularities are entirely removed.

Governor Controlled Rate of Blowing

A governor has been devised that is capable of accurately controlling the rate of blowing. This governor is used on blast furnace blowers built by the General Electric Co. It consists of a disc riding on the ingoing air in the centre of a frusto-conical portion of the inlet pipe. Movements of the disc are transmitted direct to the valve gear, and ample power is secured by the use of very moderate dimensions. The angularity of the walls of the conical pipe is determined by the desired accuracy of regulation. No packing is necessary and the device is therefore practically frictionless and wear-proof. Differing rates of flow are secured by moving a weight along a scale beam, which is graduated in cubic feet of free air per minute, and calibrated at

*From a paper read before the Engineers' Society of Western Pennsylvania.

**Of the Engineering and Turbine Research Departments, General Electric Co., Lynn, Mass.

the factory before shipment. A recent improvement of this governor consists of a means of adjusting the index on the sliding weight to compensate so that the weight can readily be reset to take account of variations in atmospheric conditions. The following is a description of this device, which is called a volume corrector.

Description of Volume Corrector

On the scale beams are marked with various numbers of cubic feet per minute. An index marked on the sliding weight is set opposite the number of cubic feet per minute which is desired should be held by the constant volume governor. This index is adjustable and its exact position is secured by the setting of three scales which are carried on the sliding weight. These scales are for barometer, atmospheric temperature, and atmospheric humidity. Proper settings on these three scales are made corresponding to atmospheric conditions, and this automatically sets the index on the sliding weight in such a position that the corresponding volume on the scale beam is corrected for the atmospheric conditions as set.

A phenomenon with which we had to deal in the early days of our experience with centrifugal compressors on blast furnaces was the so-called "surging" which appeared when the machines were operated at considerably less rates of blowing than those for which they were designed, or when excessive pressures were met with, as in case of tightening up of the furnace. The occasional phenomenon which is often called "surging" is only met with when, at normal pressures, the volume being blown through the centrifugal compressor is considerably less than that for which it was designed. In case of high pressures, for instance, with a tight furnace, this phenomenon may be met with, although the volume discharged is about that for which the machine was designed. It consists of an alternate forward and back-flow of air through the compressor, and is the result of the improper functioning of the discharge vanes owing to the variation of blowing conditions from those for which the vanes were designed.

These alternate forward and back flows through the compressor result in a variation of pressure in the discharge mains of sometimes as great as two pounds, and cause some irregularity in the working of the furnace. This phenomenon is not peculiar to any one type of centrifugal compressor, but is met with in all types. For some time after the installation of our first machines this phenomenon was difficult to deal with, particularly as the first machines were designed for much larger quantities than have ever been blown through them. However, in the 10 years of experience which we have had with this apparatus effective means have been devised and applied which render it unnecessary that any such phenomenon should again give difficulty.

"Surge" Elimination

The steps which have been taken to eliminate this surging are: First, the

reasonable proportioning of the machine to the requirements of the furnace; second, provision of a by-pass with an automatic valve which, under conditions which would ordinarily permit surging, leads back into the inlet a small quantity of air. This valve is self-compensating for variations in volume and pressure, and once adjusted needs no attention. The use of this apparatus increases the efficiency of operation in conditions where it is operative, since it maintains the proper air discharge pressure without diminution.

The centrifugal compressor, therefore, properly governed, affords a means of blowing the blast furnace with the steadiest possible conditions of blast and the most uniform rate of inflow of oxygen contents; a means of blowing which can be adjusted to meet any variations which may be necessary in the composition and mechanical conditions of the charge; and one which is automatic in operation when set for any existing condition and quickly reset for any change of condition of furnace or atmosphere, and one which requires comparatively little care and attention on the part of the operating staff.

Another feature, which tends to uniform operations, and permits of more accurate determination of the blowing conditions, is the fact that the turbo-blower is readily manufactured in such sizes that a single blower can be used for blowing a single furnace. In this way each blowing unit is adjustable to meet the exact furnace conditions with certainty, thereby increasing the uniformity of the product and the amount thereof; also decreasing the gas consumption, since the turbo-blower is more efficient in the larger sizes than in the smaller, and also because two units, whether of turbines or of engines, are less efficient than a single unit. This is on account of the fixed losses which exist in every turbine or engine unit and which do not increase in proportion to the size of the unit.

Turbine Efficiency

The efficiency of the turbine need hardly be argued here. It is the cause of its adoption as a prime mover in all our central power stations, and in practically all our industrial plants throughout the country in competition with all other forms of units. Very recent improvements in turbine construction have greatly improved the efficiency of such units, and these units of increased efficiency are now available in cases where steam consumption is an important requirement of blast furnace blowers. The discussion which will follow as to the cost of blowing furnaces will be based upon the use of one of these modern units. Another feature of this type of blowing apparatus is that, considering its efficiency, its first cost and cost of installation, its operating costs are also low.

Operation Costs

Reliable figures have been obtained from existing plants to the actual cost of operation, both for the gas plant and the steam plant. While these figures were not obtained from plants of the same magnitude, or located in exactly

the same places, the conditions are so nearly uniform as to location, and figures for gas engines are obtained from plants which are so much larger than the turbine plants compared with them, that it is felt that the comparison is not unjust; in fact, any advantage which would obtain from the character of the plant appears to be in favor of the gas engine. It is well known that large plants operate with greater economy than smaller ones.

The gas engine figures are not those obtained from any one location, but are the result of comparison of figures of plants in several locations. In every case where choice of data could be made those results most favorable to the gas engine have been chosen. In selecting the gas engine installations best adapted for comparison with the steam turbine plant, the best possible examples of recent gas engine practice have been chosen; plants which are in the hands of most capable operators, installed for the purpose of securing the highest efficiency and containing all the various elements for proper operation for such plants. Furthermore, by reason of the care and supervision which is exercised over these plants it is believed that they are, without unnecessary expenditures, now in the best possible condition for service, and maintained at the highest practical efficiency.

Again, the physical location of these plants is also favorable, since they are placed at such points as give them readily proper supplies of ore, fuel, limestone, water and all the other materials necessary for economical operation, and they are equipped with handling devices for storing and transportation of these materials to the fullest practical extent. They are large plants, involving more than four blast furnaces, but in order to bring the plant unit down to one which would be most practical for consideration in new installations they have been reduced to the equivalent of a four furnace plant.

Plant Size Feature

In making this reduction no allowance has been made for a decrease of operating efficiency which would result in the reduction in size. On the other hand, the turbo-blower plant which has been selected for comparison is one which is used with only two furnaces. In enlarging it to the four-furnace plant no account has been taken of the increased economies which would result from the increase in size. Therefore it will be seen that the turbo-blower suffers in two directions: first, that the gas engine plants selected for comparison are larger than the plant which is taken as the standard unit, and second, the turbine plant, which is selected for comparison is, in turn, smaller. If these facts were taken into account we should expect that the figures would come out more favorable to the turbine than results actually given; but it is not desired, in making this comparison, to leave any doubt as to the conservatism of the result.

Installation First Cost

In considering the installation of a gas

engine equipment for a steel mill of the type under consideration, the first fact which strikes the investigator is the first cost of the installation. It has not been customary in the past to consider the addition to operating cost which results from the charges necessitated by this capital investment. It is, however, of vital importance in considering the desirability of installation of one type of prime mover or another, that all the elements involved be taken into account in the same way that they are taken into account in other cases involving differences of first cost.

It is obvious that the capital invested in such plants must give some return to the investor, and a proper allowance for this return is a just and legitimate charge against operating expense. Furthermore, these investments involve taxes, which also should go against operating expense; and insurance is an item of the same class. Again, and more important than any of these, is the question of obsolescence, by which is meant the amount to be laid by as a sinking fund to retire or amortize the plant at the time when its usefulness becomes extinguished by the improvements in the available apparatus, whether as to efficiency, as to increased reliability, or in other ways; also to provide for the general ageing of the apparatus which takes place no matter how carefully the repairs and renewal of parts are taken care of. That is to say, this obsolescence charge which I am now discussing also includes depreciation.

It is, perhaps, not necessary to go too deeply into the necessity of an obsolescence or depreciation charge, but a familiar instance which is often cited, to show the necessity of the charge, is the case of the horse, investment in which is automatically extinguished by the ageing of the horse no matter how carefully he is taken care of, kept free from sickness, and otherwise preserved so far as possible in good condition. While the depreciation of machinery is often not so rapid or so easily seen as in the case of the horse, the two instances are fairly analogous.

If these fixed charges on the investment are not taken care of by charges against operating expense, they must be handled in some other manner, by charges against the product of the mills, or otherwise; which charges are wrongly allocated and do not show, unless put into operating expenses, the true value of investment in the various types of apparatus.

In most steel plants it has been the custom to consider merely the running charges. The management has been given the plants to operate, and it has been judged by this cost of operation without including the fixed charges due to investment. This had led to an inaccurate view of the desirability of extreme efficiency in the prime mover and does not consider the cost of obtaining this high efficiency. This leads to a use of the most expensive plant, provided such plant gives a larger output from the gas available without regard to the first cost.

OPERATING COSTS ADVANCE 80 PER CENT.

IN the United States there is a very general demand on the part of traction concerns for higher fares, due to the increased operating costs since the outbreak of the war. To show how the high cost of fuel and materials have affected the traction companies, the following compilation of the costs of fuel and materials in 1914, as compared with 1917, and the percentage of increase, is given:

	1914 Price.	1917 Price	P.C. of Increase
Cast iron car wheels, each	\$ 7.00	8.15	15.15
Steel iron car wheels, each	15.00	22.50	50.0
Round steel axle blanks, each	30.15	23.51	11.65
Brill axles	17.12	18.84	9.96
Armature coils, G-57, each	125.00	151.56	21.2
Armature coils, W. H.-510, each	26.00	40.66	51.2
Copper wire, per lb.	30.00	62.50	107.0
Soft steel, per cwt.	.16	.35	118.9
Glass, for car windows, per box	1.65	4.50	172.5
Brake shoes, per ton	4.05	5.07	25.2
Street car controller, each	25.00	45.00	80.0
Trolley bases, each	17.00	21.00	11.1
Rail, per ton	32.40	60.00	85.1
Track bolts, per cwt.	2.25	3.58	59.1
Track spikes, per cwt.	1.85	2.39	29.18
Oak ties, each	.69	.88	27.6
Crushed stone, per cu. yd., delivered	1.25	1.70	41.60
Tongue switches and mates complete, each	290.00	355.00	22.40
Wire nails, per keg	1.88	3.45	78.20
Portland cement, per bbl.	1.30	2.19	68.50
Sand, per cu. yd. delivered	.50	1.25	150.00
Gravel, per cu. yd. dlvd.	.85	1.25	47.10
Structural beams, per cwt.	1.10	4.00	263.60
Coal, per ton, delivered	1.50	4.50-6.50	333.33

In addition to the foregoing, it is pointed out that wages have increased during this interim from 15 to 25 per cent. and that whereas two years ago a mile of trolley wire only meant an investment of \$325, it now requires \$725. Altogether the traction companies must now pay on an average of 80 per cent. more for fuel, materials, etc., than they did heretofore.

WORK OF CANADIAN RAILWAY TROOPS

THE Government at Ottawa has received from General Headquarters in France the following summary of the work of the Canadian railway troops for the month of April:

Broad gauge lines—	
Miles located	44.75
Miles graded	36.25
Miles grade repaired	43.55
Miles track laid	51.50
Miles ballasted	46.45
Miles surfaced	43.67
Average number of miles maintained	60.70
Average number O.R. (ordinary ranks) C.R.T., daily on construction	1,597
Average number O.R., C.R.T., daily on maintenance	686
Casualties from shell fire, officers	none
O. R.	7
Average number of British unskilled labor attached	2,660

In most cases these lines were laid over the remains of old metre-gauge lines, which tended to hinder rather than help the work. Owing to the destruction of the lines by the enemy, it was neces-

sary to do a considerable amount of bridge work.

Narrow gauge lines—	
Miles located	57.58
Miles graded	64.98
Miles grade repaired	28.74
Miles track laid	72.89
Miles ballasted	77.84
Miles surfaced	49.63
Average number of miles maintained	100.06
Average number O.R., C.R.T., daily on construction	2,504
Average number O.R., C.R.T., daily on maintenance	1,258
Casualties from shellfire, officers	3
O.R.	75
Average number of British labor attached	3,276

Weather conditions during the beginning of April were bad. In many cases, building of narrow gauge railways was carried out under shell and machine gun fire, the former necessitating constant patrolling and repairing.

TRADE ENQUIRIES

THE following enquiries relating to Canadian trade have been received by the Department of Trade and Commerce, Ottawa from which further particulars may be obtained.

1023. **Railway sleepers.**—A railway engineer in France wishes to arrange for supplies of railway sleepers in lots from 100,000 to 1,000,000. The sizes of sleepers generally used are:—

2 metres	60 centimetres	long.
0 "	24 "	wide.
0 "	14 "	Thick.

1024. **Machines, tools and materials.**—A French concern which is erecting large works for the manufacture of locomotives and railway materials wishes to secure supplies of machines, tools and materials from Canada.

1025. **Locomotives and railway materials.**—A French railway engineer wishes to get in touch with Canadian manufacturers of locomotives and railway materials.

1028. **Galvanized sheets.**—A hardware firm in British Guiana desires to import from Canada galvanized iron sheets and barbed wire.

1062. **Motor-cars and accessories.**—A manufacturers' agent in Jamaica would like to secure an agency for motor-cars and accessories.

Military Inspecting Officer—"Now, sergeant, what precautions do you take against infected water?"

Sergeant—"Well, sir, first we boil it," Officer—"Good."

Sergeant—"Then we filter it."

Officer—"Excellent!"

Sergeant—"Then we drink beer!"

Assist in the work of preventing accidents for your own sake and for the good of our country at large.

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MERCHANT SHIPBUILDING PUBLICITY

AT the beginning of the present month, the United States authorities at Washington gave official intimation that the lid would be shut down tight on information to the public so far as the development and progress of the national shipbuilding programme was concerned. Apparently, the circumstances necessitating such a drastic measure left no alternative—the activities of German sympathizers being directed against new plant establishments at various centres and with, unfortunately, some considerable degree of success. War vessel construction and movements, and the latter even so far as merchant craft are concerned, are on common-sense as well as strategic grounds closely veiled from the public, but whether due to instinct or education, the lack of this data neither arouses curiosity nor causes irritation. In peace times, little of real naval construction achievement gets beyond a very charmed circle in any country, and even when a type ship and its equipment passes into the fleet reserve and, later, into the discard, the detail does not become publicly available. This, of course, is as it should be, for the possibilities are many that in some feature or features even a discard might provide the stepping stones of advantage to an unfriendly or unscrupulous competitor.

To merchant ship construction the public maintain an altogether different attitude, and while instinct may be wholly absent, it can truthfully be stated that education is largely responsible for the stand taken. In no previous war has merchant shipping figured so prominently, whether the latter be relative to what they have accomplished and continue to accomplish, or to the enormous tonnage losses sustained. Their vocation is rightfully looked upon as a peaceful one, in consequence their construction comes under the same category. On this account, instead of a spirit of curiosity being aroused when secrecy is enjoined and enforced, there is liable to supervene a considerable degree of irritation.

It would appear that Hun "submarines" are operative on land as well as at sea if we judge the situation rightly in the United States, and we might as well admit straightaway, that our views as to combatting them do not lie along the lines of secrecy. Meeting the submarine emergency, as the latter is popularly known, whether it be on sea or land, will be most promptly and effectively accom-

plished by dealing with the devils directly, instead of dodging them as appears to be the meantime tendency both ashore and afloat. We talk of sea power and as individual nations we claim to have land power, to the extent at least of the territory and the people embraced; but have we? Germany is endeavoring to show us that she owns both the land and sea power of the world meantime. Further, she is making a fairly effective display of her ownership. Isn't it just about time we told her and showed her otherwise? Publicity is the most potent known adversary of evil-doing as it is of everything else that cannot measure up to the very moderate standards of human decency, then why not lengthen and strengthen its arm instead of paralyzing it?

Let us show Germany, that not only in the United States but here in Canada, we are openly planning and procuring accomplishment of the means whereby her devilishness is going to be absolutely squelched, and let us make the demonstration so comprehensive, and so public, that she will realize that her game of world-conquest is up, and that the oceans and their highways are free to all, irrespective of nationality, creed or color. In our haste to establish shipyards, munition factories, infantry and aviation camps, let us not forget internment camps for the Hun "submarines" at large in our cities and towns, if our jails are already or are likely to become too full. Both Canada and the United States have thousands of acres lying idle on which to erect domiciles for their enemies, besides the adjacent land might be none the worse for tilling.

Many things call for censorship in times like these, and while it may appear to be politic to have the ban operate as comprehensively as can be determined, a big advertising campaign concerning our merchant shipbuilding effort would undoubtedly shake German confidence to its foundations more quickly than will "sealing the lid" tight.

WATER POWER TO SAVE COAL

CANADA depends upon the United States for a large portion of her coal supply both for domestic and industrial purposes; she is therefore much interested in the coal conditions obtaining there. A recent communication from Secretary F. K. Lane, of the U.S. Dept. of the Interior shows how acute the situation has been made by the entrance of our neighbors into the war. One of the remedies urged, particularly applicable to Canada, is the immediate conservation of fuel by the efficient use of all available water power. Elimination of unnecessary consumption of coal is considered a problem of national interest and of immediate concern.

New power requirements should therefore be met, so far as practicable by utilization of hydro-electric energy; this would also apply to present steam generating energy consuming coal or oil in its production. Thus, all water available at water power plants should be utilized to produce energy up to the capacity of the works and the requirements of the population and industries within transmission distance of the site; every facility should also be given for the efficient development of new sites. In regions where water power can be made available, steam power plants should be operated only to carry loads in excess of those that can be carried by water power plants. The adoption of this course, in many cases, would mean cheaper operation, particularly in view of the rapidly increasing price of coal.

Every additional hydro-electric horse-power used in Canada means the yearly liberation of from 10 to 12 tons of coal for domestic heating or other purposes where hydro-electric energy cannot be so effectively substituted.

SELECTED MARKET QUOTATIONS

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

PIG IRON.

Grey forge, Pittsburgh	\$4 95
Lake Superior charcoal, Chicago	8 00
Standard low phosphorus, Philadelphia	87 00
Bessemer, Pittsburgh	81 95
Basic, Valley Forge	80 00

Hamillon, Victoria
 Mo... ..
 Victoria

FINISHED IRON AND STEEL.

Per lb. to Large Buyers. Cents

Iron bars, base, Toronto	5 25
Steel bars, base, Toronto	5 30
Steel strips, 2 in. to 4 in. base	6 00
Steel bars, 4 in. and larger base	7 00
Iron bars, base, Montreal	5 25
Steel bars, base, Montreal	5 30
Reinforcing bars, base	5 25
Steel hoops	7 50
Refined iron	5 50
Norway iron	11 00
Tire steel	5 50
Spring steel	7 00
Band steel, No. 10 gauge	5 75
Chequered floor plate, 3-16 in.	12 10
Chequered floor plate, 1/4 in.	12 00
Staybolt iron	8 30
Bessemer bars, heavy, at mill	38 00
Steel bars, Pittsburgh	4 50
Tank plates, Pittsburgh	9 00
Structural shapes, Pittsburgh	4 50
Steel hoops, Pittsburgh	5 25

F.O.B. Toronto Warehouse.

Steel bars	5 50
Small shapes	5 75

F.O.B. Chicago Warehouse

Steel bars	5 00
Structural shapes	5 00
Plates	8 50

FREIGHT RATES.

Pittsburgh to Following Points

Per 100 lbs.	Points	
	C.L.	L.C.L.
Montreal	23.1	31.5
St. John, N.B.	35.1	45.5
Halifax	35.1	45.5
Toronto	18.9	22.1
Guelph	18.9	22.1
London	18.9	22.1
Windsor	18.9	22.1
Winnipeg	64.9	85.1

METALS.

Montreal Toronto

Lake copper	\$85 00	\$86 00
Electro copper	35 00	36 00
Castings, copper	34 00	35 00
Tin	62 00	65 00
Spelter	11 00	11 50
Lead	13 75	14 00
Antimony	20 00	24 00
Aluminum	70 00	65 00

Prices per 100 lbs.

PLATES.

Montreal Toronto

Plates, 1/4 to 1/2	\$12 00	\$12 00
Heads	12 30	12 30
Tank plates, 3-16 in.	12 65	12 25

WROUGHT PIPE.

Effective July 5, 1917.

Size.	Black Galvanized	
	Standard	Buttweld.
1 1/2 in.	8 50	8 50
2 in.	5 12	7 16
2 1/2 in.	8 46	8 03
3 in.	8 17	10 29
3 1/2 in.	12 07	15 22
4 in.	16 38	20 59
4 1/2 in.	19 53	24 61
5 in.	26 27	33 12
5 1/2 in.	42 12	52 94
6 in.	55 08	69 23
6 1/2 in.	69 92	86 94
7 in.	82 84	103 00

Standard Lapweld.

2 in.	29 23	5 71
2 1/2 in.	33 88	54 11
3 in.	37 38	70 76
3 1/2 in.	41 76	89 70
4 in.	45 02	106 28
4 1/2 in.	49 52	121 29
5 in.	54 00	141 34
5 1/2 in.	58 90	183 36
6 in.	63 10	238 00
6 1/2 in.	68 00	250 00
7 in.	72 40	288 00
7 1/2 in.	77 00	345 00
8 in.	81 60	320 00
8 1/2 in.	86 40	412 00
9 in.	91 00	320 00
9 1/2 in.	96 00	320 00
10 in.	101 00	320 00

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES.

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

OLD MATERIAL.

Dealers' Buying Prices.

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

BOLTS, NUTS AND SCREWS.

Per Cent.

Carriage bolts, 3/4" and less.	10
Carriage bolts 7-16 and up.	net
Coach and lag screws.	25
Store bolts.	55
Plate washers.	List plus 10
Machine bolts, 7-16 and over.	net
Machine bolts, 3/8" and less.	10
Blank bolts.	net
Bolt ends.	net
Elevator bolts.	50 and 5
Machine screws, fl. and rd. hd., steel	27 1/2
Machine screws, o. and fl. hd., steel	10
Machine screws, fl. and rd. hd., brass.	add 20
Machine screws, o. and fl. hd., brass.	add 25
Nuts, square blank.	add 15 50
Nuts, square, tapped.	add 1 75
Nuts, hex. blank.	add 1 75
Nuts, hex. tapped.	add 2 00
Copper rivets and burrs.	List plus 30
Burrs only list plus.	50
Iron rivets and burrs.	17 1/2
Ro-fer rivets, base 3/4-in. and larger.	87 10
Structural rivets, as above.	7 00
Wood screws, flat, bright.	72 1/2
Wood screws, O. & R., bright.	67 1/2
Wood screws, flat, brass.	37 1/2
Wood screws, O. & R., brass.	32 1/2
Wood screws, flat, bronze.	27 1/2
Wood screws, O. & R., bronze.	25

MILLED PRODUCTS.

	Per cent.	
Set screws	35	
Sq. & Hex. Head Cap Screws	30	
Rd. & Fl. Head Cap Screws	10	
Flat 5/8 But. Hd. Cap Screws plus	10	
Flu. & Semi-flu. nuts up to 1 in.	35	
Flu. and semi-flu nuts, over 1 in., up to 1 1/2 in.	50	
Flu. and semi-flu nuts, over 1 1/2 in., up to 2 in.	10	
Studs	20	
Taper plus	40	
Coupling bolts, plus	10	
Planer head bolts, without fillet, list plus	10	
Planer head bolts, with fillet, list plus 10 and	10	
Planer head bolt nuts, same as finished nuts.	net	
Planer bolt washers	100	
Hollow set screws	List plus 20	
Collar screws	List plus 30, 10	
Thumb screws	20	
Thumb nuts	65	
Patch bolts	add 40, 10	
Cold pressed nuts to 1 1/2 in.	add 4, 50	
Cold pressed nuts over 1 1/2 in.	add 7, 00	

BILLETS.

Per gross ton

Bessemer billets	\$100 00
Open-hearth billets	100 00
O.H sheet bars	105 00
Forging billets	125 00
Wire rods	95 00

F.o.b. Pittsburgh.

NAILS AND SPIKES.

Wire nails	5 50	5 45
Cut nails	5 70	5 80
Miscellaneous wire nails	60%	
Spikes, 3/4 in. and larger	6 50	
Spikes, 1/2 and 5-16 in.	7 00	

MISCELLANEOUS.

Solder, strictly	0 38
Solder, guaranteed	0 41
Babbitt metals	16 to 65
Soldering coppers, lb.	0 53
Lead wool, per lb.	0 15
Putty, 100-lb. drum	4 35
White lead, pure, cwt.	19 00
Red dry lead, 100-lb. kegs, per cwt.	15 45
Glue English	0 38
Tarred slaters' paper, roll	0 95
Gasoline, per gal., bulk	0 31 1/2
Benzine, per gal., bulk	0 30 1/2
Pure turpentine, single bbls., gal.	0 62 1/2
Linseed oil, raw, single bbls.	1 27
Linseed oil, boiled, single bbls.	1 30
Plaster of Paris, per bbl.	2 50
Plumbers' oakum, per cwt.	9 00
Packing, square braided	0 34
Packing, No. 1 Italian	0 32
Packing, No. 2 Italian	0 32
Pure Manila rope	0 37
British Manila Rope	31
New Zealand Hemp	31
Cotton Rope 1/4-in. and up.	47
Transmission rope, Manila	0 43
Drilling cables, Manila	0 39
Sandpaper, B. & A., list plus	20
Emery Cloth	list plus 33 1-3
Borax, crystal	15

POLISHED DRILL ROD.

Discount off list, Montreal and Toronto

25%

CARBON DRILLS AND REAMERS.

Per Cent.

S.S. drills, wire sizes up to 52 40	
S.S. drills, wire sizes, No. 53 to 80	25
Standard drills to 1 1/2 in.	40
Standard drills, over 1 1/2 in.	15
3-fluted drills, plus	10
Jobbers' and letter sizes	40

Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	36
Stockets	40
Sleeves	40
Taper pin reamers	20
Drills and countersinks	list plus 30
Bridge reamers	45
Centre reamers	10
Chucking reamers	10
Hand reamers	15

COLD ROLLED SHAFTING.

At mill list plus 40%
 At warehouse list plus 50%
 Discounts off new list. Warehouse price at Montreal and Toronto.

IRON PIPE FITTINGS.

Canadian malleable, A, add 7 1/2%; B and C, 10%; cast iron, 35%; standard bushings, 50%; headers, 60; flanged unions, 40; malleable bushings, 50; nipples, 55; malleable lipped unions, 50.

SHEETS.

Montreal Toronto

Sheets, black, No. 28	\$11 00	\$11 00
Sheets, black, No. 10	11 50	11 50
Canada plates, dull, 52 sheets	11 00	11 00
Canada plates, all bright	12 50	12 50
Apollo brand, 10 1/4 oz. galvanized	12 25	12 09
Queen's Head, 28 B.W.G.	11 75	10 75
Fleur-de-Lis, 28 B.W.G.	11 75	10 75
Gorbal's Best, No. 28	12 00	10 25
Colborne Crown, No. 28	11 25	10 00
Premier, No. 28 U.S.	13 75	11 70
Premier, 10 3/4 oz.	13 85	12 00
Zinc sheets	20 00	20 00

PROOF COIL CHAIN.

B

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

ELECTRIC WELD COIL CHAIN B.B.

1/2 in.	\$15 50
3-16 in.	11 70
1/4 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

FILES AND RASPS.

Per Cent.

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

COAL AND COKE.

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

Net ton f.o.b. Toronto

BOILER TUBES.			TAPES.		ANODES.		SHEETS, 3½ lbs. sq.	
Size.	Seamless	Lap-welded					ft. 18 00 18 00	
1 in.	333 00		Chesterman Metallic, 50 ft.	\$2 00	Nickel	.50 to .54	Sheets, 4 to 6 lbs. sq. ft. 17 50 17 50	
1½ in.	36 00		Lufkin Metallic, 603, 50 ft.	2 00	Cobalt	1.75 to 2 00	Cut sheets, ½¢ per lb. extra.	
1¾ in.	38 00	32 00	Admiral Steel Tape, 50 ft.	2 75	Copper	.44 to .46	Cut sheets to size, 1¢ per lb. extra.	
2 in.	45 00	33 00	Admiral Steel Tape, 100 ft.	4 45	Tin	.49 to .56		
2½ in.	48 00	35 00	Major Jun. Steel Tape, 50 ft.	3 50	Zinc	.23 to .25		
3 in.	58 00	38 00	Rival Steel Tape, 50 ft.	2 75	Prices Per Lb.			
3½ in.	58 00	45 00	Rival Steel Tape, 100 ft.	4 46	COPPER PRODUCTS.			
4 in.	82 00	67 00	Reliable Jun. Steel Tape, 50 ft.	3 50	Montreal Toronto			
Prices per 100 feet, Montreal and Toronto.			WASTE.		Bars, ½ to 2 in. 55 00 53 00			
OILS AND COMPOUNDS.			White Cents per lb.		Copper wire, list plus 10.			
Castor oil, per lb.	40		XXX Extra	20	Plain sheets, 14 oz., 14x28 in., 14x60 in. 55 00 53 50			
Royalite, per gal., bulk	16		Peerless	20	Copper sheet, tinned, 14x60, 14 oz. 60 00 54 25			
Palatine	19		Grand	19	Copper sheet, planished, 14x60 base, 64 00 60 00			
Machine oil, per gal.	26½		Superior	19	Braziers', in sheets, 6x4 base 55 00 52 00			
Black oil, per gal.	13		X L C R	18	BRASS.			
Cylinder oil, Capital	45½		Atlas	18	Brass rods, base ½ in to 1 in rd. 0 55			
Cylinder oil, Acme	36½		X Empire	18	Brass sheets, 8 in. wide, 20 oz. 0 60			
Standard cutting compound, per lb.	6 15		Ideal	17	Brass tubing, seamless 0 57			
Lard oil, per gal.	2 50		X press	16	Copper tubing, seamless 0 58			
Union thread cutting oil antiseptic	88		COLORED.		PLATING SUPPLIES.			
Acme cutting oil, antiseptic	37½		Lion	14½	Polishing wheels, felt. 3 00			
Imperial quenching oil	39½		Standard	13	Polishing wheels, bull-neck 1 75			
Petroleum fuel oil	11		No. 1	13	Emery in kegs, American 06			
BELTING—NO. 1 OAK TANNED.			Popular	11½	Pumice, ground 05			
Extra heavy, single and double	30-5%		Keen	10½	Emery glue 15 to 20			
Standard	40%		WOOL PACKING.		Tripoli composition 04 to 06			
Cut leather lacing, No. 1	1 50		Arrow	25	Crocus composition 07 to 08			
Leather in sides	1 35		Axle	20	Emery composition 08 to 09			
			Anvil	15	Rouge, silver 35 to 50			
			Anchor	11	Rouge, powder 30 to 35			
			WASHED WIPERS.		Prices Per Lb.			
			Select White	12	LEAD SHEETS.			
			Mixed colored	10	Montreal Toronto			
			Dark colored	09	Sheets, 3 lbs. sq. ft. . . \$18 00 \$18 00			
			This list subject to trade discount for quantity.		Prices Per Lb. Unless Otherwise Stated.			
			RUBBER BELTING.					
			Standard	40%				
			Best grades	20%				

The General Market Condition and Tendency

THERE has been as yet no marked changes in the coal situation, although an improvement is looked for within the next few months. There appears to be some possibility of a decline in the price of soft coal, but not in anthracite. Prices of steel products continue firm, but there have not been so many advances this week. The situation in the steel trade is somewhat uncertain and developments in the United States are being watched closely. A tentative agreement has been made at Washington between the Government and the steel interests, but no definite prices have yet been fixed. The main point of interest is the probable affect of the pending decision on prices of steel to private consumers. In the meantime buying is being restricted to more urgent requirements. The situation in the pig-iron market is very similar to that in the steel market, and consumers are generally waiting developments. Quotations on domestic foundry irons are still withdrawn. There is no improvement in the coke situation, prices are still very high and supplies are coming forward slowly. The scrap metal market continues dull and prices have a lower tendency with the exception of steel and cast iron scrap, which are firm. Prices of old materials are unchanged. Machine shop supplies are moving out in good volume at steadily advancing prices. Higher prices have been issued on some makes of stocks and dies, pipe cutters, die plates, dry batteries, hammer and file handles, screw jacks, etc. The non-ferrous metal markets are quiet and prices lower on tin, spelter, lead, antimony and aluminum. Machine tools continue to advance and deliveries are getting more backward.

Montreal, Que., July 16, 1917.—Still hovering between uncertainty and possibility, the entire industrial situation is in an unsettled condition, due largely to the delayed action of the American Government in their policy of price regulation on materials required for the war

programme. Recent developments have opened the way for relief in the coal situation, both in the States and in Canada, and the early future may have a similar effect in other lines of industry. The uniform price policy contemplated by the United States Government does

not entirely meet with the approval of the producers, as they intimate that this would disorganize business, and have a serious effect upon early future conditions. The Canadian situation is, comparatively speaking, unchanged, but interests here are patiently awaiting American developments as a guide to future conditions.

Pig Iron

Although disturbing conditions still prevail in the American situation owing to the uncertainty of the Government's attitude regarding the regulation of prices, current quotations continue to move to higher levels. The nearer approach to decisive action on the part of the authorities has resulted in a rather unsettled market, with activity on the wane. Canadian conditions are much the same, no quotations being available.

Steel

That the situation in steel is nearing a point where a better understanding will be marked between the producer and the consumer seems very apparent, as American developments seem to indicate that the marketing of steel will be placed on such a basis that much of the trafficking will in future be largely eliminated. The scramble for steel on the part of consumers has undoubtedly been one of the chief causes of the present high levels of steel prices, and if the sale and purchase of material is systematically controlled by the Government it may be the means of placing the market in such a position that much, if not all of the uncertainty, will be done away with. Prices are still in the ascendancy, but there is the belief that with few excep-

tions the apex has been about reached.

Interest is still centred in the needs of the shipbuilding plants, and to fill the heavy demands for plates remains the unsolved question of the present abnormal situation. Forging billets have again been advanced, the current quotation at East Pittsburgh being \$130 per ton, the price being \$5 above that quoted last week. The week's advance on steel bars, New York, has been \$20 per ton, the prevailing price this week being 5.669c per pound. Tank plates are again stronger, with quoted advances in some quarters; others are expected. The market in sheets, in common with that of other commodities, is strong, but unsettled, owing to pending developments. The United States requirements for steel supplies are being contracted for, with the price to be paid arranged at a later date; the prevailing tentative price to be readjusted following certain investigations into the cost of raw materials and production. The entire situation in respect to early future conditions would seem to hinge on the decision of the Government as to whether the cost to the domestic consumer shall be the same as that to the Government. Price lists on cold rolled shafting have been subjected to another readjustment, the discount being now only 5 per cent. off. Other commodities are practically unchanged, with prices very firm. Local conditions are much the same, with quotations steady; delivery has been relieved a little, but considerable difficulty is still experienced in obtaining material.

Metals

The influencing feature in the metal situation is the pending developments in the American Government policy in connection with the regulation of prices for the various war requirements; this condition is resulting in considerable uneasiness concerning the early future of these markets, and much anxiety is expressed by both producers and consumers as to the final attitude of the Government and its ultimate effect upon industrial conditions generally. The market has developed weakness followed by easier prices. Copper is quieter and lower. Tin remains inactive, and has declined slightly. Spelter has a weak undertone, but is at present quiet. Lead is wavering on possible developments. Antimony continues to weaken on poor demand. Aluminum is steady and firm.

Copper.—The statement that the American Government would pay 25c per pound for their copper requirements, pending a later price adjustment based on the actual cost of production, seemed for a time to clear the atmosphere regarding present conditions, but the report that this price may also apply to all consumers, Government and domestic alike, has created a condition that promises some very interesting developments unless further consideration is given to the matter. In the present state of the market, it is not anticipated that the Government will completely tie the hands of the producers in connection with the domestic demand. The effect of the uncertainty existent has been to develop

a weakness that has been reflected in lower prices, the New York quotations having declined 1½c on lake, 2c on electro, and ½c on castings; the prevailing prices this week being 30c, 29½c and 28¾c respectively. On a quiet market local dealers have shaded prices 2c per pound, the current quotations being 35c for lake and electrolytic and 34c for castings.

Tin.—The regulations contemplated by the American Government to control the sale of war materials are not expected to have the same effect on the tin market owing to the fact that the source of supply is in foreign countries; to some extent, however, this metal will no doubt be influenced by the developments that are now pending. The New York market has experienced a fluctuating tendency during the past week, and is at present ½c lower than a week ago, the quotation being 62c per pound. The local market continues firm, but quotations show a decline of ½c on the week, the present price asked being 62½c per pound.

Spelter.—As an inducement for consumers to buy metal, concessions continue to feature the market. Should the regulations that are proposed by the American Government be delayed much longer it is anticipated that the market will become still weaker, as the uncertainty is so influencing the situation that early interest may be hard to revive. The absence of demand has again resulted in a slow market, and prices have consequently declined, the quotation of 8½c showing a decline of ¼c on the week. Locally the price of spelter has declined 1c, the quotation being 11c per pound.

Lead.—Like other metals, lead has become quite stagnant on the United States market, as a result of the delayed action of the Government in connection with the regulation of prices. The possibility that a one price to all policy may be adopted by the authorities is causing considerable uneasiness, as this would undoubtedly mean a price much lower than that prevailing at the present time, the previous price paid for Government requirements being about 8c per pound. The outside quotation on the New York market is now on a par with the leading interests after the week's decline of ½c per pound, the general quotation being now 11c per pound. The local price is well maintained at 13¾c per pound.

Antimony.—This market, while quiet, is not as weak as price quotations would indicate, as these are largely an inducement to draw out buyers, the actual strength of the market being covered by the uncertainty of present conditions. The New York quotation of 16c shows a decline on the week of 1c per pound. The quieter market abroad has been reflected here by a falling off in price quoted, dealers asking 20c, a decline on the week of 4c per pound.

Machine Tools and Supplies

The increased activity in the States has stepped into the breach that was all too evident after the shell industry had attained its maximum in Canada, and at a time when the demand for equipment had fallen off considerably. The machine

tool requirements in the States to-day reflect a similar condition to that prevailing in Canada during the first year of the war, with the possible exception that the producers are not so pressed for delivery owing to the large volume of machinery that is at present available, due to the decline in the manufacture of munitions for the British Government; America having completed her contracts in this connection. Owing to the condition of the general steel and iron market the prices on all kinds of machinery continues very firm or stronger, but early developments make the position very uncertain, as the projected regulation of prices may also affect machine tools. The demand for all classes of supplies is well maintained with quotations taking an upward trend.

Scrap

With few exceptions the market in old materials has become weaker and prices have shown a decline. This is largely due to the nervous state that prevails in the market over the pending American regulations covering transactions in sale and purchase of the various commodities. The eventual control of iron and steel must necessarily cover the scrap market, to avoid a very perplexing situation in speculation enterprise. The American market generally has become weaker, coppers and brass being about ½c lower; with the exception of wrought iron, which is slightly stronger, the situation in scrap iron and steel is considerably easier, Pittsburgh quotations on hydraulic compressed and low phosphorus steel being about 4c lower on the week. The local market is unchanged, with iron scraps showing a weak undertone.

Toronto, Ont., July 17.—The announcement made recently that orders for blankets aggregating one million dollars had been placed among Canadian manufacturers by the American Government for army purposes is an interesting development in Canadian industrial circles, and may be the forerunner of further business.

Although there has been as yet no reduction in prices of soft coal in this district, it is possible that within the next week or so something will be done along this line. At the present time there does not appear to be much hope for lower prices on anthracite coal. The coal situation, although serious, may ultimately be less acute when relief measures have had time to become effective. There appears to be a shortage of coal at the mines, as well as insufficient transportation facilities.

Steel

The situation in the steel market is less tense following the agreement which has been reached between the American Government and the steel interests. It was announced that the entire output of the mills will be made available for the Government's war purposes at a price to be determined on the basis of a cost of production inquiry being conducted by the Federal Trade Commission. It is assumed that when prices are actually fixed that they will be considerably below the

market. It is also predicted that steel prices will decline for the private consumer as well as the Government. What will actually happen in regard to the private consumer is problematical, but in view of the urgent demand for steel and restriction in available supplies for the private consumer it is difficult to see how prices can decline to any great extent. The action of the Government will doubtless have the effect of curbing the upward movement in prices, and thus be a distinct benefit to the trade. While the Canadian steel companies are not directly affected by any action that the American Government may take, domestic consumers are in many cases vitally interested, and are naturally closely watching developments across the line. One thing is certain that there will be no relief in the shortage of steel, so in any event no real relief to the situation is anticipated. Prices of all steel products continue very firm, but there are no important price changes to note in the meantime except plates, which have advanced to \$12.

Prices of sheets continue to advance, No. 28 gauge black being now quoted at \$11 and No. 10, blue annealed, \$11.50. The situation in sheets is getting tighter. There has been a large increase in direct Government orders, and also for making products for the Government. The distribution of sheets from the mills to domestic consumers is getting steadily less as the Government demands increase.

The situation in the steel trade in the United States has not as yet been affected by the Government agreement in regard to fixing prices, but the demand has declined pending further developments. Unfilled tonnages are decreasing principally because of the inability of the mills to accept orders that are offered.

Pig Iron

Prices of domestic foundry irons are still withdrawn, and there is no change in the situation. In the Buffalo market prices are very firm, with an advancing tendency. Developments, however, seem to indicate that prices of pig iron will eventually work to a lower level. Because of this prospect consumers are holding off. Very little tonnage of any grade is procurable from the furnaces in the Buffalo district for 1917 delivery.

Scrap

The market for old materials is dull, with prices generally showing a lower tendency. An exception, however, must be made in cast iron and steel scraps, which are holding firm.

Machine Tools

The chief feature in the machine tool market is the continued high cost of equipment of all kinds, due to the renewed activity in the United States. For the same reason deliveries are getting more backward. Business continues fairly good, the demand being chiefly for general engineering tools.

Supplies

Prices of machine shop supplies are still advancing, due to the high cost of raw materials. Some supplies, which have recently advanced, include Beaver

stocks and dies, Gardner governors, Simplex jacks, file and hammer handles. Dry batteries have advanced approximately 10 per cent. All lines of Butterfield goods have advanced, including stocks and dies, die plates, pipe cutters, pipe taps, etc.

Metals

The dullness which has characterized the metal markets during the past few weeks is even more pronounced this week and prices of all metals have declined, with the exception of copper, which is unchanged. Copper, however, is weaker, and the tendency is for lower prices. Appearances seem to indicate that prices have reached the top, and that adjustments probably to lower levels are likely. Although the American Government has not issued any definite statement regarding prices, reports from Washington indicate that prices on Government purchases of metals will be considerably below the market, and also that prices to

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.

the private consumer will also be lower than obtain at present. On account of the uncertain situation the market is quiet and little activity is to be expected until the outlook clears.

Copper.—Prices continue nominal and easy, while the market is dull and unsettled. The market has been depressed since the price of 25c was fixed on a purchase of copper by the American Government. It is now reported that a still lower price of probably 20c will be in future paid by the Government, and also that the price to private consumers will be at the same rate. This latest development has further upset the market. The strikes have caused a considerable reduction in output of copper, and unless they are settled now, a greater scarcity of metal than at present exists will result. Local quotations are unchanged, lake and electrolytic being quoted at 36c and castings at 35c per pound.

Tin.—The London tin market is weaker and prices lower, but New York has not followed the lead. The market, however, is uncertain, and very little business

is passing at the present time. The position of tin continues to be a strong one, and no marked weakness is anticipated further than a decline of 1c locally. Tin is now quoted at 65c per pound.

Spelter.—The market is weaker and lower, the decline being due to lack of buying support. It is reported that at present prices some producers are losing money, and that some furnaces have been shut down, presumably for repairs. Spelter has declined ½c locally, and is now quoted at 11½c per pound.

Lead.—In keeping with the general position of all the metals, lead is quiet. Apart from requirements for munitions, there is little forward movement, and increasing production is not calculated to strengthen the situation. Lead has declined ½c, and is now quoted at 14c per pound.

Antimony.—Little interest is shown in antimony and lack of demand has resulted in lower prices. Local price is 26c per pound, representing a decline of 2c.

Aluminum.—The market is quiet and demand light. Aluminum has declined 3c, and is now quoted at 65c per pound.

New York, July 16.—Important developments have occurred in the steel industry during the last week, and all branches of manufacture dependent upon iron and steel have been affected. All collateral lines of trade reflect, or will reflect, the agreements, made at the Washington conferences, between Government officials and representatives of the Iron and Steel Institute. The latter were, and are, in a position to speak and to act in full measure for the entire industry. The administration gave assurance of reasonable prices, including a fair profit, to be paid to the steel manufacturers for all commodities by the Army and Navy Departments. The steel companies in turn placed the entire productive capacity of the country, at the disposal of the Government and confidently left the settlement of prices to the Administration, which is now endeavoring to ascertain productive cost of various commodities through the Federal Trade Commission.

Immediately following the happy outcome of the price controversy, came the interesting decision made by the United States Transportation Commission, to renew efforts to distribute orders for the construction of 80,000 steel cars and 2,000 locomotives among American manufacturers. The plan to build railroad equipment by the Government was recently held in abeyance because of a belief that steel would not be available in ample tonnage to build all steel cars; but it is now understood that the mills have given assurance that a full amount of steel will be provided to enable the Commission to carry out its original intention. It is estimated that 800,000 tons of steel will be required to build the cars and 400,000 tons of steel to construct the locomotives, included in the program. Deliveries of the steel probably will be made in monthly installments over a year.

Another and most important development was revealed by the startling announcement made by Major General Goethals, now in supreme command of the Government shipbuilding activities, that the United States Emergency Fleet Corporation will take bids to-day for the construction of two large shipbuilding plants, to be owned and operated by the Government, in which 400 fabricated steel ships of 2,500,000 tons displacement, will be constructed. It is estimated that the building of ship ways will require 12,000 tons of structural steel and that the plants will be ready for the erection of ships inside of four months. The 800,000 tons of steel shapes and plates required in building these cargo ships, will be fabricated by various commercial shops and delivery will be expedited because of this fact.

The latest development is the appropriation of \$640,000,000 by the House of Representatives to build a gigantic air fleet and to train and equip an army of 75,000 aviators. The Government has also distributed numerous additional munition contracts and has given various orders for structural steel to be used in improvements at navy yards and arsenals, and to build storehouses, hangars and for a key bridge over the Potomac river.

All of these activities are reflected in the machine tool industry. Sixteen manufacturers with munition contracts have placed orders for machinery and negotiations continue actively on many more machine tools. Six more shipbuilding concerns also have placed orders for shop equipment and several large manufacturers of motors and engines for airplanes have closed contracts for machinery and buying continues apace.

Builders of machine tools having contracts to supply the United States Navy, either directly or indirectly, are required by the Compensation Board to give facts and figures to justify the high prices now prevailing for their products.

In the export trade for machine tools, the latest important feature is the resale of many tools originally sold to Russia. France and Great Britain have placed additional orders for lathes and drills and have put out new inquiries for portable electric tools.

Pittsburgh, Pa., July 14.—The pig iron and steel markets have become completely stagnant, the cause commonly assigned being the prospect that there will be regulation of prices, either voluntarily on the part of the producers or through direct action by the Government. A contributing cause, however, is undoubtedly the very high level to which prices have risen, a level that the average consumer cannot see his way clear to follow. In the case of pig iron, all descriptions except Southern iron at Birmingham are above \$50 at furnace. If the furnaces have cleaned up their deliveries at \$18, furnace, they have done so only lately. Certainly the average foundryman would have difficulty in ad-

justing the selling prices of his finished products so as to provide for a tripling in the cost of the pig iron. As to the steel works, they of course have high prices and can pay almost any price for pig iron if they need it.

In the case of the finished steel market, really forward buying many weeks ago dwindled to practically insignificant proportions. The forward market practically disappeared, the only market left being the prompt market, for delivery in say from two or six months. Prices in this market have been made by buyers who were exceptionally situated. Either they were making a product that would bring almost any price or they needed some little additional tonnage to average with much lower priced tonnage. Thus the quotable market, which is really a prompt market, has ascended until it averages about double the level at which

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.

the great bulk of the steel shipments are being made, under old contracts.

Price Regulation

This subject takes a new aspect almost every day. To the "food bill" which is having such a tortuous course in the Senate, there was added an amendment giving the President power to regulate iron and steel prices as well as food prices. Within the past week a substitute bill has come to the front, with no price regulation except for food, and the prospect has been that this bill, rather than the other, would be the one that would eventually pass. Now a totally new turn has occurred. The general committee of the American Iron and Steel Institute, the chief body representing the steel makers in connection with sales of steel to the Government, was called to Washington for Wednesday, July 11. After they had been in session one day, the President issued a statement called an "appeal" that manufacturers forego unusual profits at this time, promising all manufacturers a fair profit, so as to maintain prosperity, and enunciating clearly the entirely new doctrine that prices to the Government and to the ordinary consumer be the same, intimating, perhaps, that the Government is as well able to pay as the private consumer, but laying stress upon the fact, which the iron and steel industry has been coming to realize of late, that it is impossible to draw a clear dis-

inction, when we are endeavoring to prosecute the war with our full material resources, where Government purchases end and purely private purchases begin.

On the second day of the conference, after this proclamation had been issued, Secretary of War Baker made a public statement that an agreement had been reached as to Government purchases of steel, the Federal Trade Commission to determine costs, and prices to be fixed so that reasonable profit would be assured, and attention given to the needs of the steel industry for expansion. As the President's "appeal" must have been intended quite largely to refer to iron and steel, the conclusion to be drawn is that prices to all buyers are to be scaled down very greatly from the present fictitious level. In view of the fact, however, that the aspect of affairs has been continually changing this conclusion may have to be modified or dropped entirely within a few days.

Unfilled Tonnage Decreases

The unfilled obligations of the United States Steel Corporation decreased 503,304 tons during June, to 11,383,287 tons, equal to about a nine months' run, provided the orders were equally distributed in the different departments, which is not the case. The decrease in June was equal to about 40 per cent. of the month's shipment, bookings of all descriptions being about 60 per cent. of shipments. These bookings were made up of Government orders and of special transactions with preferred customers, whose continued needs must be taken care of as old obligations are filled.

The Export Embargo

The export embargo proclaimed by the President to become effective July 15, includes in iron and steel commodities, coke, pig iron, billets, plates, and structural shapes. Licenses are to be granted by the Secretary of Commerce. To what extent such licenses will be granted remains to be seen. The object, of course, is primarily to prevent material reaching Germany but there is the further object of conserving supplies for the United States and its Allies. From one view point, Canada might be held to fall between, but there is no use speculating.

Pig Iron

There has been practically no change in pig iron prices for a fortnight, but the market has become stagnant. There is a little buying of odd lots for early deliveries and that is about all. Perhaps sellers would make price concessions if that were likely to result in sales but it is obvious that decline in the market would merely confirm the views of buyers that they had better stay out.



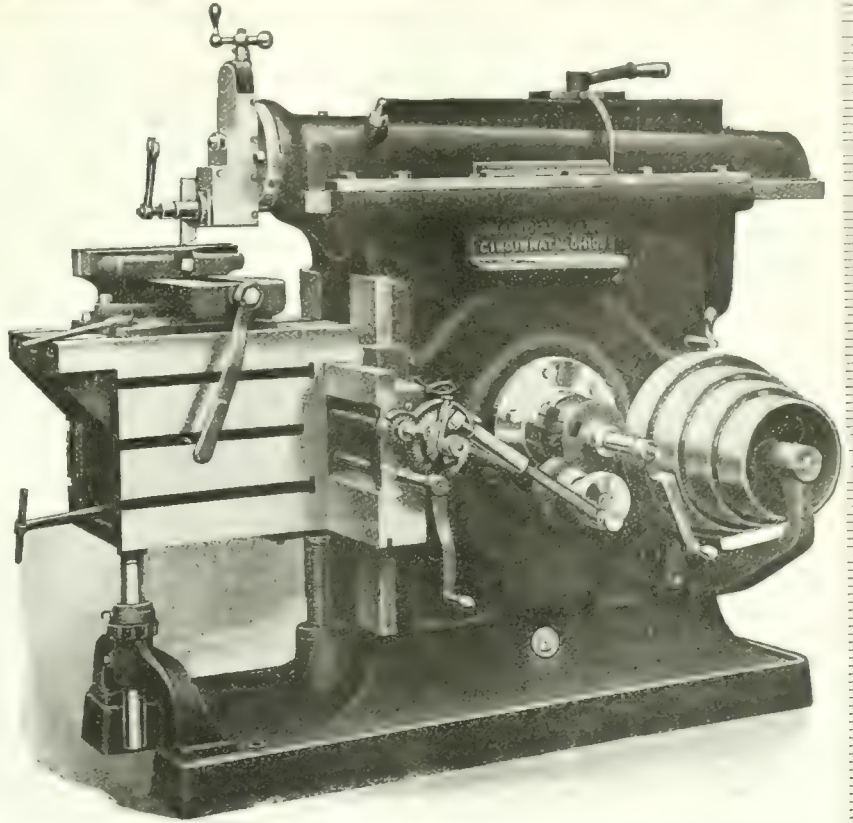
U. S. Steel Corporation Unfilled Tonnage.—The unfilled tonnage of the U. S. Steel Corporation on June 30, 1917, was 11,383,287 tons, a decrease of 503,304 tons, compared with the figures for May 31, according to the monthly report recently issued.

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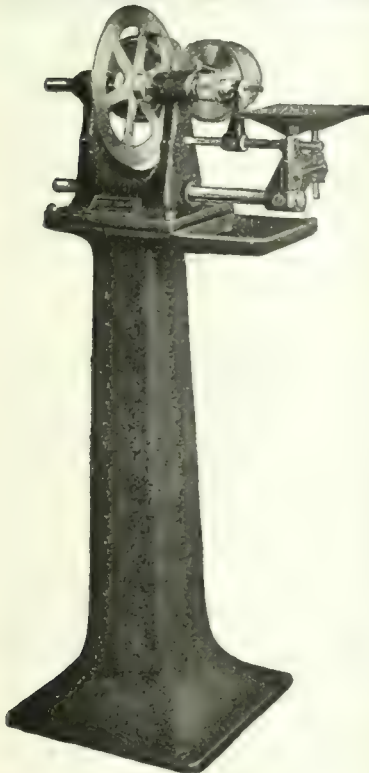
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INDUSTRIAL ^A_N^D CONSTRUCTION NEWS

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

ENGINEERING

Montreal, Que.—Mansions, Ltd. have obtained a permit to build a boiler room at Lincoln Avenue, to cost \$4,000.

Oshawa, Ont.—The directors of the Canada Malleable & Steel Range Co. have decided to dispose of the plant.

Owen Sound, Ont.—Green & Woolrich have begun the construction of a new coal dock for the malleable iron plant. The new structure will be 80 ft. wide by 200 ft. long, and 200 piles will be driven.

Montreal, Que.—A permit has been taken out by the Frederick Thompson Co., electrical engineers, to erect a factory at 7-11 St. Genevieve Street. The building will be 60 x 104 feet, four storeys, and will cost \$30,000.

Montreal, Que.—It is expected that the Montreal Tramways Co.'s new steam plant will be in operation within two weeks. This plant has a capacity of 12,000 k.w.h., or of about 17,000 h.p., developed from steam turbine, and a similar installation will be added next year, making a total of 34,000 h.p.

Hamilton, Ont.—The National Abrasive Co. will begin at once the erection of a factory and office building on Biggar Avenue, at an estimated cost of \$16,700. The contract has been awarded to the Hamilton Bridge Works, and completion is expected before September. The company will manufacture artificial abrasive, principally polishing and grinding materials. The initial investment in the Hamilton plant will be about \$75,000.

Amherst, N.S.—Fire in the International Engineering Works here on July 11, did damage estimated at between \$75,000 and \$100,000. The blaze developed in the pattern storage room and spread rapidly, completely destroying that building. Other buildings were threatened, but were saved. The origin of the outbreak is unknown. The destroyed building and its contents were partially insured.

GENERAL

Kitchener, Ont.—The W. E. Woelfle Shoe Co. are building an addition to their factory.

Montreal, Que.—The Dominion Oil Cloth Co. have got a permit to build a warehouse, 102 x 75, at 1,235 Notre Dame East, to cost \$2,500.

Halifax, N.S.—J. E. Chipchase, the eastern manager for Hinde & Dauch Paper Co., of Canada, Ltd., manufacturers of corrugated and fibre containers, has been in the city for the past week interviewing the box users and gathering the box data, with the view to the further development of this industry in the Maritime Provinces.

Ingersoll, Ont.—The John Morrow Screw & Nut Co. is building an addition to its plant to cost \$30,000.

Fergus, Ont.—John Watson will erect a sawmill to cost \$10,000, to replace the one recently destroyed by fire. New machinery and equipment will be required.

Strathroy, Ont.—Fire, entailing an estimated loss of \$175,000, totally destroyed the three-storey building and its contents of the Strathroy Canning Co. here on July 13. The company is a branch of the Dominion Canning Co., of Hamilton, Ont.

Nobleford, Sask.—A large number of grain elevators are to be erected this summer in the West, according to reports received. The McLaughlin Co. is projecting the erection of one at Nobleford, Sask. It will be the first one built by this concern in the West.

MUNICIPAL

Grandmere, Que.—The Town Council are considering extending the municipal pumping plant.

London, Ont.—Tenders will be called shortly for a motor-driven hose truck for the fire department.

London, Ont.—The Council have decided to purchase a booster pump, on the recommendation of Fire Chief Aitken.

Sarnia, Ont.—A by-law for \$25,000 will shortly be submitted to the people for an incinerator plant. John A. Baird, City Engineer.

Verdun, Que.—The City Council have decided to proceed with the laying down of an underground conduit system, for which there is an authorized loan of \$225,000.

Hamilton, Ont.—The City Council recently made an appropriation of \$2,500 to aid the Engineering Department in the preparation of a report regarding the remodeling of the sewer and sewage disposal system.

Galt, Ont.—It is believed that there is considerable leakage in the water mains, and the Water Commission is considering the advisability of making a test to find the leaks. Dr. Radford, chairman of the commission, suggests buying a pitometer.

St. Catharines, Ont.—The Water and Light Committee have recommended the acceptance of the tender of the Jenckes Machine Co. for castings for the year 1917 at the following prices: Manhole tops, \$20.75 each; gully tops, \$20.70 each; Tomlinson traps, \$10.25 each.

Welland, Ont.—Tenders for street sprinklers have been received as follows:—Somerville & Son, Sawyer Massey sprinkler, flusher and oiler combined, \$600; Studebaker sprinkler, \$450; Austin

sprinkler, \$547; Tiffin sprinkler, \$592. No award has yet been made.

Oshawa, Ont.—A by-law calling for construction of a \$38,000 filtration plant, was carried here on Saturday by a vote of three to one. Work on construction of the plant will be started at once by the John ver Mehr Engineering Co., of Toronto.

Windsor, Ont.—This city will refuse to recognize an estimate of \$40,300 as its share of the apportionment of the cost of the proposed sewer and water improvements submitted in a report by Maurice Knowles, engineer of the Essex Border Utilities Commission. At a recent meeting of the commission, Mayor Tuson declared the city will not sell its waterworks, but is ready to supply water at a reasonable rate.

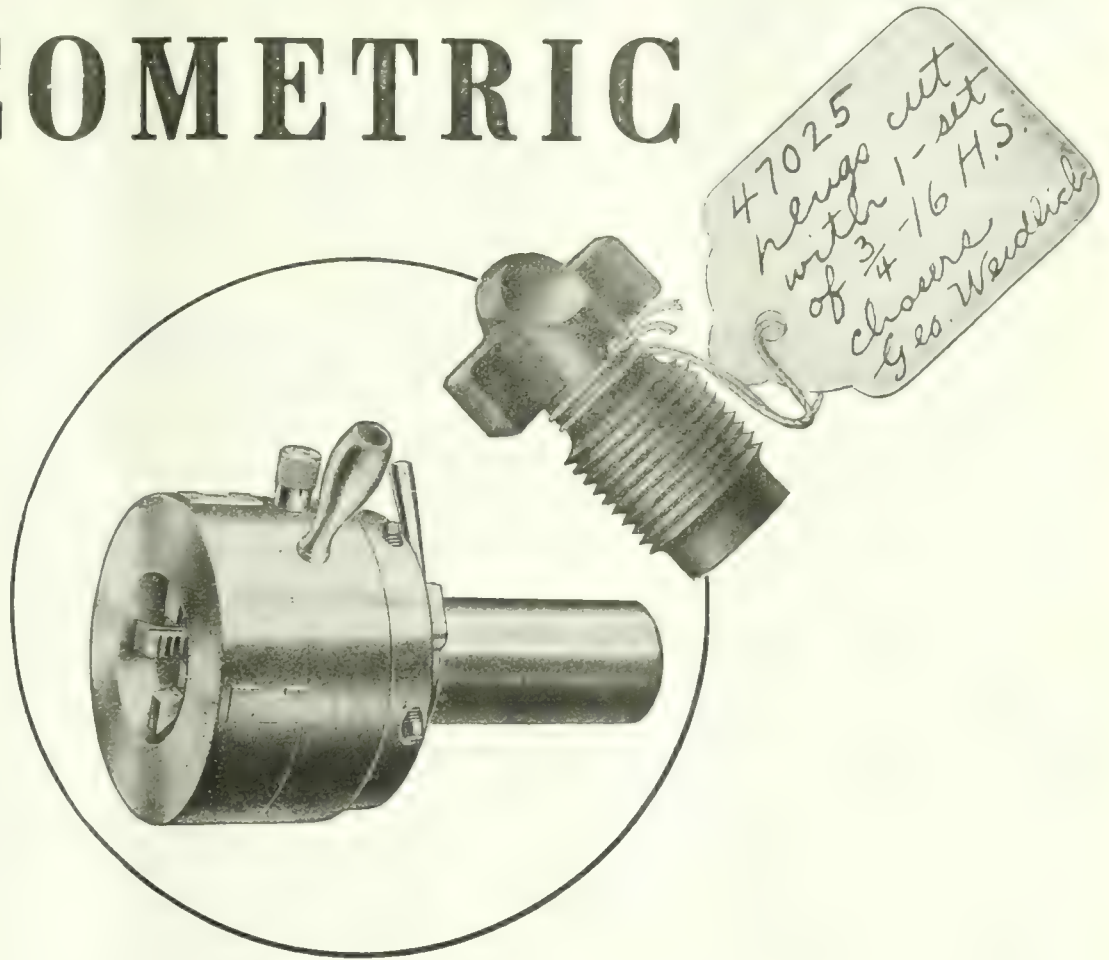
Montreal, Que.—Only one tender—that of the Montreal, Light, Heat & Power Co., was received by the Board of Control for the civic power supply for lighting the streets and for operating the low level pumping station. The company offers to supply primary power for lighting purposes at \$27.50 per h.p., and secondary power for lighting at \$25.50 per h.p. per year. For the pumping station \$26.50 is tendered for primary power and \$24.50 is bid for secondary power.

Weston, Ont.—Plans and data for the reconstruction of the sedimentary basin and the laying of a new intake pipe, have been ordered by the Weston Water, Power & Light Commission, to be ready by July 24, so that tenders may be called for as soon as possible. This action was taken upon a special report submitted by Engineer E. A. James, of Toronto, in which he advised immediate adjustment of the water system, as the present equipment does not meet the growing demands of the town.

Swift Current, Sask.—At the City Council meeting held on July 3, on motion of Ald. West and Carter, the Mayor and Clerk were authorized to sign the contract with Theodore Kipp, of Oshawa, Ont., for the purchase of the Diesel oil engine that is to take the place of the present steam plant at one of the city's power stations. The engine is to cost \$53,000, and the city will receive \$45,000 for the old steam plant. It is expected that delivery will be made within a month of so, or as soon as the necessary money by-laws can be put through.

Swift Current, Sask.—Engineer Calder has recommended the immediate purchase of a 75 h.p., induction motor to be used as an auxiliary. This motor will be a necessary precaution in case of fire and will cost \$1,175. He also recommended the purchase of repair parts for pumps, as well as calling for tenders for piping and specials and for the laying

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Enlarged Canadian Trade Intelligence Service

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

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

Canadian Commercial Intelligence Service

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

CANADIAN TRADE COMMISSIONERS.

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

CANADIAN COMMERCIAL AGENTS

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

CANADIAN HIGH COMMISSIONER'S OFFICE

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

of the concrete foundation for the new Diesel engine. These recommendations were all adopted.

Winnipeg, Man.—Rapid progress is being made with the construction of the big lock-joint aqueduct from Deacon to the Red River. The Lock Joint Pipe Co. acting as subcontractors for the Winnipeg Aqueduct Construction Co., have fully 20 per cent. of the pipe made and ready for laying. The only remaining contract to be let is that for the big syphon under the Red River and piping on to the McPhillips reservoir, but this, together with the projected reservoir on the site of the present Victoria Park, will, it is thought, not be commenced until the winter of 1918-1919.

ELECTRICAL

Beeton, Ont.—The Hydro Commission engineers estimate that it would cost \$15,000 to install a transmission and lighting system in Beeton. A by-law will be submitted to the ratepayers.

Brantford, Ont.—Hydro-Electric service for the suburbs of Brantford Township has been approved, only 36 votes being cast in opposition, out of a total of 193. The by-law, authorizing the issue of debentures by the Township Council to finance the undertaking, received a majority of 158.

New Westminster, B.C.—Permission to run a power line from Third Avenue and Eleventh Street down Third Avenue and across to Poplar Island, to serve the shipbuilding plant of New Westminster Construction and Engineering Co., was granted to the Western Power Co. of Canada, by the City Council.

BUILDINGS

Toronto, Ont.—The Separate School Board have secured a permit to erect a two-storey brick school on the south side of Westminster avenue, at a cost of \$21,500.

Toronto, Ont.—A building permit has been issued to the Dominion Bank for a new building to be erected at the corner of Yonge Street and St. Clair Avenue, to cost \$35,000.

Montreal, Que.—A permit has been taken out by the Merchants' Bank of Canada to build a new bank building at the corner of Harvard and Sherbrooke streets, to cost \$20,000.

Regina, Sask.—In response to the call for tenders for the children's home which is to be built at an approximate cost of \$35,000, ten bids have been received by the architects, Storey & Van Egmond.

Toronto, Ont.—E. D. Norris, 97 Waverley road, has been granted a permit by the City Architect to erect a store and apartment building of concrete block construction at 2102 Queen street east, at an estimated cost of \$25,000.

Toronto, Ont.—On the recommendation of the City Architect and Property Commissioner, it was decided to advise the Council to sanction the cancellation of the contract for the erection of a dormitory building at the Women's Industrial Farm, and that it be completed by the

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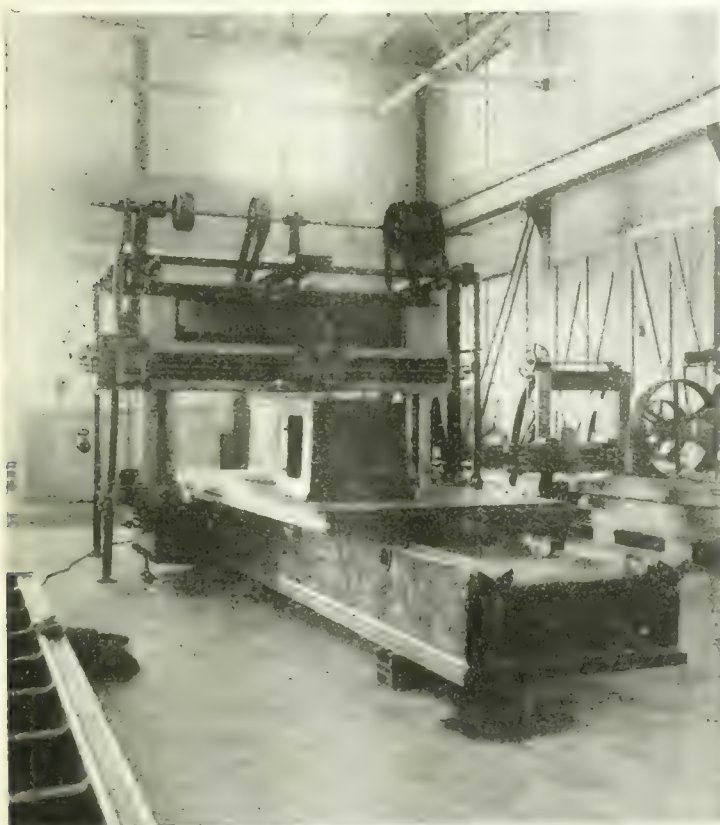
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at the left shows the bed of a large Horizontal Boring Machine being replanned. Every remanufactured machine is disassembled as completely as this machine has been, and the important surfaces and bearings tested with B. & S. precision instruments. If they are inaccurate for any reason, they are replanned, worn or broken parts are replaced where necessary, and the finished machines tested under belt for operation and accuracy.

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- 1 Betts, 27 1/2" bar.
- 1 Bement, 27 1/2" bar.
- 1 Beaman & Smith, 21 1/2" bar.
- 1 No. 4 Newton, 2-spindle.
- 1 Beaman & Smith 2-Spindle Cylinder Borer.

MILLING MACHINES.

- 1 No. 3 Hendey.
- 1 No. 2 Cincinnati Universal.
- 1 No. 20 Oesterlein Universal.
- 1 No. 25 Becker
- 1 No. 5 Schuehardt & Schutte
- 1 No. 0-Y Brown & Sharpe.
- 1 60" x 54" x 8' Ingersoll
- 1 92" x 72" x 15' Beaman & Smith Sab.
- 1 No. 2 Beaman & Smith Horiz. and Vert.
- 1 Hillis & Jones Vertical

PLANERS.

- 1 32" x 32" x 10' Gray.
- 1 32" x 32" x 8' Gray.
- 1 30" x 30" x 10' Powell.
- 1 26" x 26" x 6' American.
- 1 26" x 26" x 7' Gray.
- 1 24" x 24" x 6' Cincinnati.
- 1 24" x 24" x 6' Gray.
- 1-24" x 24" x 5' Gray.
- 1-24" x 24" x 4' Gray.
- 1 23" x 23" x 5' Flather.
- 1-22" x 22" x 6' American.

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- 1- 12" x 18' Draper.
- 1- 10" x 18' Pittsburgh.
- 1-36" x 16' Springfield.
- 1 32" x 14' New Haven.
- 1-31" x 14' Pond.
- 1-31" x 12' Pond.
- 3 30" x 16' Lodge & Shipley.
- 4 28" x 14' Lodge & Shipley.
- 10 28" x 10' Pond.
- 18 26" x 12' Putnam.
- 1 26" x 12' Schumacher & Boye.
- 2 26" x 12' Wickes.
- 13 26" x 10' American.
- 1 26" x 10' Prentice.
- 1 24" x 14' Blaisdell.
- 1 24" x 12' Draper.
- 1 24" x 10' New Haven.
- 16 24" x 10' Lodge & Shipley.
- 1 22" x 16' Flather.
- 1 22" x 10' Schumacher & Boye.
- 1 22" x 10' Reed.
- 20 22" x 10' Davis.
- 8 22" x 8' Hamilton.
- 4 22" x 8' Davenport.
- 1-22" x 8' Lodge & Shipley.

LARGE TURRET LATHES.

- 1 No. 3-A Warner & Swasey.
- 9 24" Gisholt.
- 52-21" Gisholt.

1-22" Libby.

- 1 No. 6 Bardons & Oliver.
- 3-2" Gridley.
- 1-2" x 26" Pratt & Whitney G. H.
- 1-3" x 36" Pratt & Whitney.
- 2 2 1/4" x 26" Greenlee.
- 2-2" x 24" J. & L., Cd. Hd.
- 2-2" x 24" J. & L., Cone Head.

RADIAL DRILLS.

- 3-5' Niles Semi-Universal.
- 1 4 1/2' Niles Full Universal.
- 1 3 1/2' Gang.
- 1-3' Prentice.
- 1-3' Mueller.
- 1 2 1/2' Drees.
- 1-2 1/4' Fosdick.
- 2 2 1/4' Mueller.

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- 3-8" Nutter Barnes Cold Saw.
- 2 72" Rickford Vertical Boring Mills.
- 1-42" Betts Car Wheel Borer.
- 1-84" Doole Vertical Boring Mill.
- 3 No. 750, Bliss Presses.
- 1 No. 231, B. Niagara Tangle Press.
- 1-36" Gleason Spur and Bevel Gear Former.
- 1 1 1/2" Morton Keyseater.
- 1 10" Benant Slatier.
- 2 No. 14 Brown & Sharpe Plain Grinders.
- 1 Gleason Gear Planer, 8 1/2" bevel, 96" spur.
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city. The work should have been finished in December, but the contractors have been unable to obtain labor, and have been delayed by weather conditions.

TRADE GOSSIP

The Canadian Locomotive Works Co., of Kingston, Ont., has been given an order for six switch engines for the Toronto, Hamilton and Buffalo Railway. They are to be delivered some time next March and are to be used in the operation of the T. H. & B., at Bridgeburg.

No Embargo on Coal from U.S.—Fuel Controller Magrath has received a message from Washington stating that the United States authorities had issued instructions to all customs and other border officials to allow all coal shipments to pass freely. This means that there is to be no fuel embargo against Canada. Complete blanket license is granted.

Government Will Advertise in France.—In the Dominion Senate on July 10, a resolution offered by Senator Beaubien, urging the Government to advertise Canadian products in France by means of an exhibition train of sample goods for the purpose of obtaining for Canadian producers a larger share of the French market, especially at the cessation of hostilities, was adopted.

Montreal, Que.—A rich deposit of graphite has been discovered at St. Remi d'Amherst, about 50 miles from here. The results of the tests of the analysts and engineers to whom have been submitted samples of this graphite, have been remarkably favorable. One American milling firm declares that the sample they have analyzed shows a recovery of 47 per cent. graphite of a very high carbon content from the raw material.

New Fibre Containers.—Several canning companies that have used the new containers, which are a sort of fibre-ware which has been thoroughly treated with paraffin, are very pleased with the results. The containers are light in weight, and said to be absolutely sanitary, as they are germ and moisture proof. It is not proved yet whether they will stand long shipments and consequent knocks, but so far everyone seems satisfied.

U. S. Will Build 400 Steel Ships.—An agreement has been reached regarding the proposed shipbuilding programme. The plan as outlined in a communication by General Goethals to Chairman Denman, calls for the immediate construction of two Government shipbuilding plants to produce 400 fabricated steel ships of 2,500,000 tonnage; the commandeering of 1,500,000 tons of shipping now under construction for private account in American yards, and for another big appropriation for building ships.

The Power Plant Equipment Co., Toronto, has recently been reorganized and the scope of the concern's activities considerably extended. The manager, L. O. Smith, is well known to local engineers and has been in business for sometime under the above firm name. J. M. Prentiss who was for a number of years secretary of the Chartered Trust &

Executor Co., has taken charge of the office and Thomas Henry, for many years chief engineer of the Interurban Electric Co., and later connected with the Toronto Electric Light Co., has charge of the electrical department.

Ontario Gold Output Increases.—It is estimated that the output of the Northern Ontario gold camps for the current year will reach \$17,000,000. In 1916 the united output of the gold and silver mines of the province was \$23,500,000, a sum which will be considerably surpassed this year. The gold for the year was valued at \$10,000,000, and the silver at \$13,500,000. In 1915, the figures were lower. In that twelve months the gold value was \$8,501,391, and the silver value, \$11,742,463, or a total of \$20,243,854, the increase in 1916 over 1915 being thus about 16 per cent.

Canadian Railways Increasing Rates.—Canadian railways are increasing their class rates from points in Canada to points in the United States in line with the decision recently given at Washington by the Interstate Commerce Commission, on the application of the American companies for a 15 per cent. advance. There companies have been allowed something in the neighborhood of from 12 to 14 per cent., which will also apply to freight consigned to Canada, and in order to maintain the same relationship Canadian railways have advanced their international rates to the same extent. The new tariff will come into effect between July 16 and Aug. 1.

Increase in Loading Draft.—Increases in loading draft averaging from two to four inches are reported by the Lake Carriers' Association. The upbound draft for Lake St. Clair remains the same, while the downbound draft is increased two inches. There is an increase of four inches in downbound draft in the American and Canadian locks, and an increase in upbound draft at the American lock of one inch. The upbound draft recommended in the American lock is 20 feet 3 in. and in Lake St. Clair 20 feet 4 in. Downbound boats can load not to exceed 20 feet 6 in. for either the American or the Canadian lock.

Glycerine From Sugar.—Discovery in the U.S. Internal Revenue Division laboratory of a process for the manufacturing of glycerine from sugar was announced recently by the Treasury Department, Washington, D.C. Under the secret process evolved the cost of this substance, a heavy factor in the manufacturing of explosives, will be reduced to slightly more than one-fourth of its present cost. Glycerine is at present manufactured almost entirely from fats at a cost of ninety cents a pound, which is six times its cost of production before the war. Extraction of the product from sugar will ensure production, officials estimate, at 25 cents a pound or less.

Steel Co., of Canada Acquire Ore Lands.—The directors of the Steel Company of Canada, at a meeting held in Toronto recently, practically adopted a

new policy which is likely to have an important bearing on the future of the company. In co-operation with American interests, the directors propose to acquire certain ore and coal properties situated in an advantageous location in the eastern States, from which such of its supply as is necessary in the future will be drawn. Hitherto the company has not controlled its supply of raw material, although it has enjoyed the reputation in the steel trade of having the benefit of some exceptional contracts. It is understood that the plans of the company included the construction of a considerable plant for the production of coke. The Steel Company of Canada has been the only large domestic steel corporation without its own ore and coal reserves.

M. A. Hanna & Co., Cleveland, Ohio, have taken over the bulk of the Hill ore properties on the Minnesota ranges. Together with the recent leases to the Jones & Laughlin and Inland steel companies, this transaction practically removes the Hill interests from the ore market. They are said to retain only about 15 per cent. of their original holdings, this ore being largely low-grade. The Hanna company has been ore agent for the Hill interests for some time.

Trade When War Is Over. A despatch from Ottawa states that Sir Frederic Nichols has secured the adoption by the Senate of a resolution declaring it expedient that the Senate "appoint a committee to enquire into and report upon the best method of conserving and increasing our domestic and overseas trade to the end that our present prosperity may not unduly suffer when the stimulus resulting from orders from munitions and other war supplies is removed."

Steel Co's. co-operate with U.S. Government.—Formal announcement was made at Washington by Secretary of War Baker, on July 12 that an agreement has been reached with representatives of the American Steel Industry in conference here, under which the entire product of the industry would be made available for the Government's war purposes at a price to be determined on the basis of a cost of production inquiry being conducted by the Federal Trade Commission. On their side the Government representatives assured the steel men that reasonable profits would be included in the price fixed and that provision also would be made to care for the expansion of the industry to meet new demands. The Government also assured the steel men that its war order would be distributed over the entire iron and steel producing capacity of the country leaving no single producer or group of producers to carry an unfair share of the war burden.

PERSONAL

C. W. Stokes has been appointed assistant general publicity agent for the C.P.R.

Clifford B. Langstroth, supervisor of the heat-treating drop-forge departments of the Ross Rifle Co., Quebec, has

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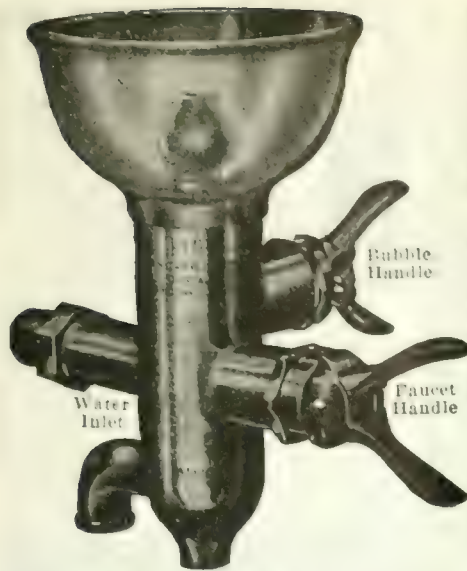
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been appointed metallurgist with the Link-Belt Co., Indianapolis.

J. White, of the ornamental iron department of Canadian Allis-Chalmers, Ltd., has been appointed general superintendent of the Canada Foundry Co.'s Davenport works, in place of J. J. Scollan, who recently resigned.

Frank H. Crockard, the new president and general manager of the Nova Scotia Steel & Coal Co., has arrived at New Glasgow, N.S. He recently attended a meeting of directors and was introduced to the heads of the various departments.

W. J. Amor, of Transcona, Man., has been appointed acting superintendent of the Canadian Government railway shops and yards at Transcona, filling the position made vacant by the death of J. L. Hodgson. Mr. Amor is a well known Transcona man and a former councillor.

H. E. Streeter, manager of the Montreal agency of the Swedish Gage Co., will in future also handle the following lines of percussion tools and equipment:—universal angle plates, bench lathes, surface grinders, magnetic chucks, adjustable reamers, scleroscopes, pyroscopes and Higley saws.

Cadet Claire A. Page, of the Royal Flying Corps, was accidentally killed on July 10, when his machine crashed down on a road near Ypres Junction, near Camp Borden, during an electric storm. Cadet Page belonged to Hamilton, where he was formerly sales manager of the Canadian Hart Wheels, Ltd.

H. P. McCue, general manager of transportation for the Pittsburg Coal Co., and vice-president of the Montour Railroad, has been appointed by the Canadian Government to fill the newly created position of assistant fuel director. In his new position Mr. McCue will be charged with responsibility of hurrying forward supplies of coal to Canada.

R. S. White, who a few months ago resigned his post as Collector of Customs of the Port of Montreal, after twenty-one years' services, was presented with \$21,000 and an illuminated address by importers, manufacturers, merchants, and representatives of railway and steamship companies in Montreal, in appreciation and acknowledgment of his administration of the Customs service and courtesies during his tenure of office.

Geo. F. Sheppard, who has been manager of the Toronto office of the Canadian Hoskins, Ltd., Walkerville, Ont., has been transferred to the Montreal office, 31 Ottawa Bank Building. In addition to handling the business of the Canadian Hoskins, Ltd., he will have the Canadian agency for the Ideal Electric and Manufacturing Co., of Mansfield, Ohio; the Winfield Welding Machine Co., of Warren, Ohio; the Enterprise Electric Co. of Warren, Ohio, and the Claywood Electric Co., of Toronto, Ont.

E. F. Ashley Cooper, well known in Victoria, B.C., shipping circles, and for many years connected with the various steamers plying in the British Columbia coastal service, having served as purser aboard vessels of the C. P. R. and G. T.

R. fleets, is now a lieutenant in the Royal Naval Volunteer Reserve. Mr. Cooper left Victoria last September to join the R.N.V.R. as a sub-lieutenant and the news of his promotion was received in the city recently. He is at present serving on H.M.S. Research.

Lieut. A. S. Bertram, who was reported wounded a few days ago, died of his wounds in a military hospital in London, according to information received on July 11, by his uncle, Brigadier-General Sir Alexander Bertram. Lieut. Bertram was the son of Henry Bertram, of the firm of John Bertram & Sons Co., of Dundas, Ont. He was a graduate of Queen's University, Kingston, in applied science, and after serving his apprenticeship with his father, entered the employ of the Dominion Bridge Co., in Montreal. Early in the war he joined the 58th Westmount Rifles, and later was given a commission in the 5th Pioneer Battalion. He, however, did not go to the front with that unit, being, instead, transferred to an infantry battalion on the firing line. Lieut. Bertram is the second member of the Bertram family to make the supreme sacrifice in the present war, a cousin of his, Capt. J. K. Bertram, who was for a time adjutant of the 20th Battalion, and later one of the officers of Major-General Garnet Hughes' staff, being killed in action. He was in his fourth year medicine at McGill University, prior to enlisting. Three other members of the Bertram family are still on the firing line.

TENDERS

Port Arthur, Ont.—The Canadian General Electric Company have secured the contract for the sub-station and electrical equipment for the plant of the Eastern Terminal Elevator, now being built at Current River, Port Arthur, for Jas. Richardson & Sons.

Lauzon, Que.—Tenders will be received until July 26 for the construction of a transmission pole line between the new and old dry docks at Lauzon, Que. Plans and forms of contract can be seen and specification and forms of tender obtained at the Department of Public Works, Ottawa, and at the post office, Quebec, Que.

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

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

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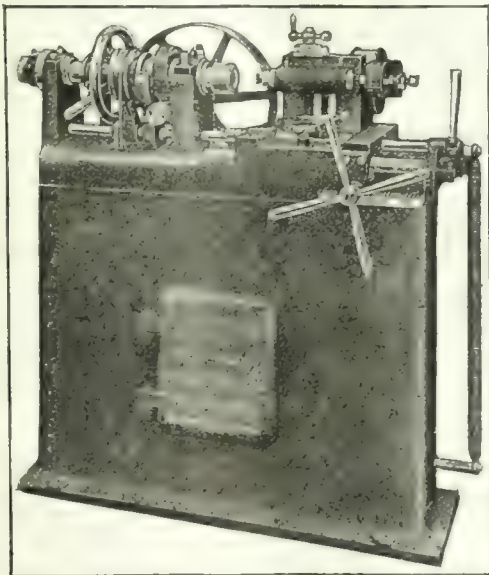
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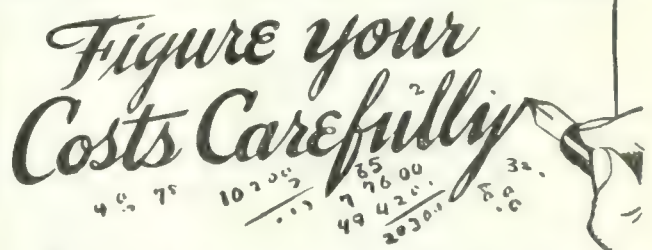
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grinding machine. This machine on our floor
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against 600 lbs. pressure, steam pressure 150 lbs.
1—Weighted Accumulator good for 1000 lbs. per
sq. inch, 16" diameter, plunger 11 ft. stroke with
squeezing 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
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ing shear to cut No. 10 gauge steel up to
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No. 28—17" x 96" Brown &
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Foreman to take charge of small foundry do-
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lathe hands to take charge on day and night
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shell. Only men who can get good bores and
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instance, experience, wages required and full par-
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WANTED—ASSISTANT SUPERINTENDENT
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Duties to consist chiefly in supervising production.
Give full particulars in writing of previous ex-
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New 12" x 5" Lancaster Sgl. B.G., Geared Feed.
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S.H. 12" x 6" South Bend. Sgl. B.G., Stan. Change Gears.
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New 15" x 7" Oliver Dbl. B.G., Q.C. Gear. Old 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.
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New 20" x 8" Petrie Heavy Duty Manufacturing Lathes.

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New 12" x 7" Putnam Speed Lathe.
S.H. 15" x 5" 6" Fox Brass Lathe with Chasing Attachment.
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S.H. 11" Avey Spindle Sensitive.
S.H. 11" Electric Four.
New No. 1 Emco Bench Single.

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New Peerless High Speed.
New No. 1 Atkins K&W Kut.

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New 20" Ford Smith Water Tool Grinder.
New 18" Ford Smith S.O. General Purpose Pedestal Grinder.
New 16" Ford Smith S.O. General Purpose Pedestal Grinder.
New 12" Ford Smith S.O. General Purpose Pedestal Grinder.
New 10" Ford Smith S.O. Combination Grinder and Buffer.
New 10" Ford Smith S.O. Buffing Machine.
New Style B. Paul Yankee Twist Drill Grinder.

MISCELLANEOUS

S.H. No. 22 Garvin Vertical Milling Machine.
S.H. No. 6 Bessemer Hand Milling Machine.
New 24" National Bolt Center with Lead Screw Attachment.
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15" x 5 1/2" American, fox.
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16" x 8 1/2" Cincinnati, D.B.G.
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18" x 6" New Haven.
18" x 10" Putnam, back-geared.
20" x 8" Fifield, back geared.
21" x 9" back-geared, single purpose (4).
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30" x 10" Ames, back geared.
31" x 16" Fifield, back-geared.
18" x 32" x 12" C.M.G. gap.
20" x 38" x 16" double back gear, gap.
24" x 44" x 20" C.M.C., gap.

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13" Perfect, 2-spindle.
14" Excelsior, sensitive.
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64" Canedy-Otto, wall radial.
No. 10a Baush, 16-spindle.
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GRINDERS

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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.

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20" x 20" x 5" Bertram.
24" x 24" x 6 1/2" Bertram.
24" x 34" x 8" Cincinnati, 2 heads.
25" x 25" x 12" Lodge & Davis.
36" x 36" x 10" Sellers, 4 heads.
40" x 40" x 12" New Haven, power feed.

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Bertram, plain.
Brown & Sharpe, power feed, plain.
Fitchburg, geared, plain.
Monarch, vertical.
London, universal.

SHAPERS.

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

MISCELLANEOUS

6" and 8" Racine Hack Saws.
4" and 6" Robertson Hack Saws.
6" Kennedy Cutting-off Machine.
12" Hall Pipe Machine.
No. 2 Colburn Keycenter.
No. 5 Grant Rotary Riveting Hammer.
Nos. 1 and 3 1/2 Greenard Arbor Presses.
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Brown-Boggs Punching Press.
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- 1 N. W. S. A. S. Spring-Loaded Engine Lathe.
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- 1 S. A. J. Hydraulic Sensitive Engine Lathe.
- 1 S. A. J. Hydraulic Sensitive Engine Lathe.
- 1 S. A. J. Hydraulic Sensitive Engine Lathe.
- 1 S. A. J. Hydraulic Sensitive Engine Lathe.
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- 1 S. A. J. Hydraulic Sensitive Flat Turret Lathe.

MILLING MACHINES AND PLANERS

- 5 No. 12 Knight Milling and Drilling Machines.
- 2 No. 13 Pratt & Whitney Lincoln Type Milling Machines.
- 1 No. 1 Cincinnati Plain Milling Machine.
- 5 Fox Hand Milling Machines.
- 1 Garvin Hand Mill.
- 1 Cincinnati Plain Planer.
- 1 New Haven Planer.
- 1 New Haven Planer.

DRILL PRESSES

- 1-21" Baker Heavy Duty High Speed Drill.
- 1-21" spindle 8" overhang Henry & Wright High Speed Drill.
- 3-12" Deland & Gifford High Speed Bench Drills.
- 5-22" Buffalo Plain Drill Presses.
- 4-21" spindle Fox High Speed Drill Presses.
- 4-21" spindle Fox High Speed Drill Presses.
- 1 Mueller Plain Radial Drill.
- 1 Mueller Plain Radial Drill.

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- 1-21" Ledge & Davis Geared Shaper.
- 1-21" Hendey Geared Shaper.
- 1-16" Hendey Geared Shaper.
- 1-21" Garvin Shaper.
- 1-21" Ohio Crank Shaper.
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- 1-800lb. Pratt & Whitney Roll Board Hammer.
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- Punch and Shear, 17" throat, cap. 1 1/2" through 3/4".
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- P. & S. No. 3 H & J, cap. 1 1/2", 30" throat.
- P. & S. Condit & McKenzie, cap. 3 1/2", 80" steel.

MISCELLANEOUS

- P. & S. 18" dia., cap. 3 1/2", steam engine, shear, Alligant, No. 2 Farwell, cap. 1" sq.
- Shear, Angle double, H. & J. No. 2, cap. 2 1/2".
- Shear, Plate splitting, 18" blade, cap. 3/4".
- Shear, Lennox Rotary Bowl, cap. 3/4" plate.
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- 3-2 1/4 Cleveland Automatics; prac. new.
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1—Warner & Swasey Turret Lathe, 2" capacity through automatic chuck. Friction geared head, power feed, oil pan.

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- 1 Wheeler Heavy 20x36 1/2"
- 1 Lath-Morse 24x36 1/2"
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LATHES

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- 1—38x8 Putnam, C.R., taper.
- 1—38x8 Porter, C.R., semi-quick taper.
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- 1—2 1/2" Airy Sling Head Back Geared Drill
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- Pels Beam Shear "T-40"
- Alligator Shear, 15" throat, capacity 1" x 6" flats
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- Bass double end Punch & Shear, 20" throats, capacity 1 1/4" through 3/4"
- No. 4 Industrial double end Punch and Shear, 20" throats, punch 1" through 1"
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- McDougall double end Punch and Shear, 15" throat, punch 1" through 3/4"
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- No. 4 Brown & Sharpe Plain
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- No. 2 Cincinnati Plain
- No. 2 Cincinnati Universal
- No. 1 1/2 New American Improved Plain
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- No. 1 Pratt & Whitney Plain
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No. 2 Costello, Plain Head.
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 - 1 New 30" Gisholt, one turret head, Sept. delivery.
 - 1 34"-42" New Colburn, one turret head, Aug. delivery.
 - 1 34" Rogers, one turret head, Sept. delivery.
 - 1 34" Gisholt, incandive motor.
 - 2—36" N-B-P, one plain and one swivel head.
 - 2 36" B & S., one turret head.
 - 12 New 42" Putnam, 2 heads, New delivery.
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 - 1 72" Niles, two swivel heads.
 - 1 New 8" Bingsford, December delivery.

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 - 10 4 1/2" Williams.
 - 3 4" Curtis & Curtis.

- DRILLING MACHINES—RADIAL.**
- 2 New No. 3 American plain cone drive.
 - 3 New 7" American, sensitive tapping attachment.
 - 7 New 7" Prentice, July delivery.
 - 1 New 7" Mueller plain speed box drive.
 - 1 New 3 1/2" Mueller, cone drive, July delivery.
 - 1 New 3 1/2" Western Drill, 86" shaft.
 - 2 4" Mueller, plain, speed box drive.
 - 1 3" Bickford gear drive.
 - 1 5" Bickford plain, speed box drive.
 - 1 5" American, plain, motor drive.
 - 5 5" spindle, arm does not raise and lower, hand feed.
 - 1 5 1/2" Foster plain cone drive tapping attachment.
 - 1 6" Bausch plain cone driver.

- DRILLING MACHINES—HEAVY DUTY.**
- 3 No. 14 Colburn 2 1/2" wire capacity 2" in solid steel.
 - 2—D-3 Colburn plain table.
 - 2—No. 26 Foote-Burt, 44" swing, 3 1/2" capacity in solid steel.
 - 1 No. 310 Bausch, plain cone drive, late type.

- DRILLING MACHINES—MULTIPLE SPINDLE.**
- 1 No. 50C Burt, 12 spindle capacity, 1 1/2" holes, 20" circle.
 - No. 24 Burt, 12 spindles.
 - 1 Gardiner, 12 spindle capacity, 8" holes, 14" square.
 - 1 11 spindle Bausch, capacity 1 1/2" holes, 9" circle.
 - No. 11, Pratt & Whitney, 8 spindle cap, 19 spindles, 7" cap.

- GEAR CUTTING MACHINES.**
- 1 New 6" Standard gear cutter, steel.
 - 1 12" G. & E. gear router.
 - 1 12" Greenough Bevel Gear Planer.
 - 1 12" Greenough Bevel Gear Planer.
 - 1 16" Ingram Bevel Gear Cutter.
 - 1 20" Grant-Lee Gear Hobber.
 - 1—No. 1 20" Schuchardt & Schutte Gear Hobber.
 - 1 24" Fellows Gear Shaper.
 - 1 22" x 8" G. & E. spur and bevel cutter.
 - 1 24" x 8" G. & E. for spur and bevel.

- 1 26" x 10" Cincinnati, spur gears only.
- 1 New 30" Flather, spur gears only.
- 3 36" Fellows Gear Shapers.
- 1 50" x 11" G. & E., spur gears only.
- 1 No. 3 Brown & Sharpe Auto gear cutter, spur.

- GRINDERS—UNIVERSAL—FOR CUTTERS, DRILLS, REAMERS, ETC.**
- 1 New Norton, No. 1.
 - 1 New Wilmarth & Morman, type BX.
 - 1 No. 1 Cincinnati.
 - 1 New Walker No. 2, outfit K (capacity 9" x 26").
 - 8 No. 190 Wells.

- GRINDING MACHINES—CYLINDRICAL—PLAIN.**
- 1—No. 11 (6 x 30") Brown & Sharpe.
 - 1 6" x 48" Pratt & Whitney.
 - 1 New No. 12 (8" x 26") Brown & Sharpe.
 - 1 10" x 50" Norton.
 - 1 New 10" x 72" Norton, plain.
 - 1 No. 16 (10" x 72") Brown & Sharpe.
 - 20 12" x 24" modern, self-contained.
 - 6 12" x 36" Modern, self-contained, motor or belt driven.
 - 6 12" x 48" Modern, self-contained, motor or belt driven.
 - 1 16" x 66" Landis, with crank grinding.
 - 12 x 32 Landis, rebuilt.
 - 1 18" x 96" Brown & Sharpe.
 - 1 New 10" x 36" Landis, immediate.

- GRINDING MACHINES—CYLINDRICAL—UNIVERSAL.**
- 1—No. 1 Fraser, with surface grinding attachment.
 - 1—No. 1 1/2 (10" x 30") Landis.
 - 1 No. 2 1/2 (10" x 36") Bath.
 - 1—New No. 3 Bath.
 - 1—No. 2 New Walker, 9" x 26".
 - 1 10" x 42" Modern.
 - 1—No. 2 (12" x 30") Brown & Sharpe.
 - 10 New No. 2 Morse, cap. 12 x 30", Universal, Dec. delivery.
 - 1—No. 3 (12" x 40") Brown & Sharpe.
 - 1 12" x 42" Landis.

- GRINDING MACHINES—INTERNAL.**
- 1 No. 1 1/2 Landis.
 - 1 No. 70 Heald.
 - 1 No. 75 Heald.

- GRINDERS—CYLINDER.**
- 1 No. 27 Brown & Sharpe.
 - 1 No. 60 Heald, single-pulley drive.

- GRINDERS—DISC.**
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 - 1 New No. 17 Gardner (Pattern Makers).
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 - 1—No. 210 Heald.

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- GRINDING MACHINES—SURFACE.**
- 1—No. 1 Diamond, cap. 12" x 12" x 24", automatic.
 - 4 New No. 2 Reid (same as B. & S.).
 - 1—22" x 12" x 60" Springfield, planer type, automatic.
 - 1 New No. 1 Wilmarth & Morman.

- GRINDING MACHINES—DUPLIX.**
- 1 No. 5 Bath, suitable for grinding cylinders, pistons, piston rings, etc., 16" feed, raised table, water pump.
- GRINDING MACHINES—FACE.**
- 1—Diamond Face Grinder, 4" travel, 14" wheels.

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 - 1—150-lb. Bradley Helve, upright.
- HAMMERS—BOARD LIFT—DROP.**
- 1—100-lb. Babcock & Spencer.
 - 2,000-lb. Chambersburg.
- HAMMERS—STEAM—FORGING.**
- 1 New 600-lb. Bell.
 - 1 New 2,000-lb. Bell, September delivery.

- KEYSEATERS.**
- 2 No. 0 Mitt & Merrill.
 - 1 No. 2 Mitt & Merrill, motor driven.
 - 1 No. 1110 Champion, Keyseat Reamer.
- LATHES—ENGINE.**
- 6 New 12" x 4" Shepard reverse head.
 - 2 New 12" x 4" Standard reverse head.
 - 1 New 12" x 6" Shepard reverse head.
 - 1 14" x 6" Bradford, taper attachment.
 - 2 16" x 6" LeBlond, par. bed, cone change, cone taper attachment.
 - 1 18" x 8" I. & S., geared head, turret.
 - 1 18" x 9" Chard.
 - 1 18" x 10" Kendry, quick change gear, 14" chuck.

- 1 New 19" x 8" LeBlond, heavy duty.
- 22 20" x 8" Lodge & Shipley, quick change gear.
- 7 New 20" x 8" American Heavy Duty.
- 9 22" x 10" Putnam, oil pan, turret.
- 4—24" x 10" Reed.
- 2—24" x 12" S. & B.
- 1 24" x 14" Lodge & Shipley, patent head.
- 4 24" x 14" American, quick change.
- 3 New 26" x 12" Boye & Emme.
- 1 26" x 24" New Haven.
- 1 New 28" x 12" Boye & Emme.
- 1 28" x 18" S. & B.
- 6 New 30" x 14" Boye & Emme.
- 3—New 32" x 12" Pittsburg pattern.
- 5 New 36" x 24" Putnam, triple geared.
- 1 48" x 19" Stepton single back gear.
- 1 56" x 15" Fitchell, 36 x 16.
- 1 24" x 14" x 22" McCabe, double spindle.
- 1 48" x 27" 9 Bette's triple back gear.
- 1 60" x 27" Bette's triple back gear.
- 1—New 66" x 30" Putnam, Dec. delivery.
- 1 71" x 20" Fitchell, triple geared.

- LATHES — MANUFACTURING — NOT SCREW CUTTING.**
- 13 No. 5X Reed-Prentice, semi-automatic.
 - 13 Reed-Prentice shell lathes for 1" or 1 1/2" American shells.
 - 60 14" x 6" Reed stud and bolt.
 - 1 16" x 8" Fairbanks-Morse, heavy duty.
 - 70 New Simplex, 16" x 8".
 - 14 16" x 8" Simplex single pulley drive.
 - 22 18" x 8" Battle Creek, heavy duty.
 - 5 20" x 8" Merschon.
 - 50—20" x 10" Hindman, high duty.
 - 12 21" x 8" LeBlond, quick-change with attachment for grooving and facing both ends of shells with air cylinders and mandrels for 5" shells.

- MILLING MACHINES—KNEE TYPE—UNIVERSAL.**
- 2 New No. 1 Kempsmith.
 - 1 No. 1 1/2 Hendey-Norton.
 - 1 No. 2 Kempsmith back geared.
 - 1 No. 2 new Cincinnati.
 - 3—No. 2 1/2 LeBlond, Sept. delivery.
 - 2 No. 3H LeBlond, Sept. delivery.
 - 1 No. 3 Cincinnati, single pulley drive, high power, vertical attachment.
 - 1—New No. 4 LeBlond Heavy Duty, immediate.

- LATHES—TURRET.**
- 5 2 x 24 Jones & Lamson.
 - 5 3 x 36 Jones & Lamson.
 - 18—6A Potter & Johnson.
 - 2—21 Gisholt.

- MILLING MACHINES—KNEE TYPE—PLAIN.**
- 1 No. 6 Pratt & Whitney.
 - 3 New No. 1 Rockford.
 - 2 New No. 1 Kempsmith.
 - 1 1/2" American.
 - 1 New No. 2 Rockford.
 - 1 No. 3 LeBlond.
 - 1 No. 1 Cincinnati.
 - 1 No. 1 Garvin.

- MILLING MACHINES—VERTICAL.**
- 1 New No. 4B Becker.
 - 1 No. 2 New Cincinnati.
 - 2 No. 5 Becker.
- MILLING MACHINES—PLANER TYPE.**
- 1 No. 2 Beaman & Smith.
 - 2 Impressed rub miller, working surfaces of table 60" x 20".
 - 1 No. 4 Beaman & Smith, vertical spindle, open side, working surface of table 60" x 24", reversible, housing on one side.

- PLANERS**
- 1 24" x 24" x 6" Gray, one head on cross rail.
 - 1 26" 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 8" Whitcomb, one head.
 - 1 New 36" x 36" x 12" Foxe, high speed, one head.
 - 1 36" x 36" x 12" New Haven, one head.
 - 1 36" x 36" x 12" Saylor, four head.
 - 1 36" x 36" x 12" Saylor, four head.
 - 1 New 48" x 48" x 14" Woodward & Lothrop, one head on cross rail, one side feed, October delivery.
 - 1 48" x 48" x 14" Saylor, four head.
 - 1 40" x 40" x 11" Niles, four head.
 - 1 48" x 48" x 14" Phillips, one head on cross rail, one side head.
 - 1 48" x 48" x 14" Ford, two head.
 - 1 48" x 48" x 14" Saylor, one head on cross rail, one side head.

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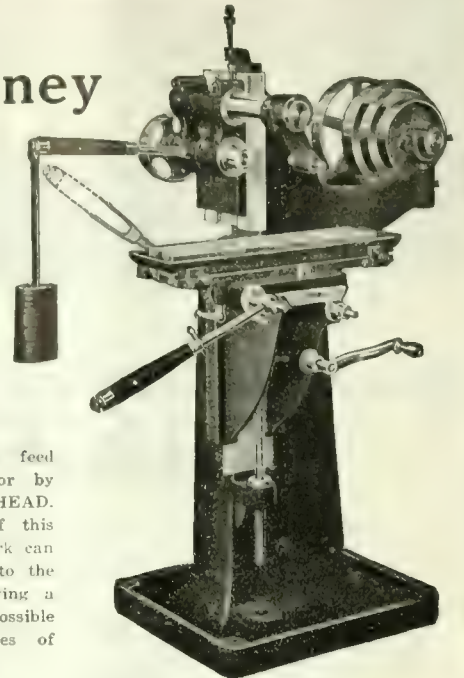
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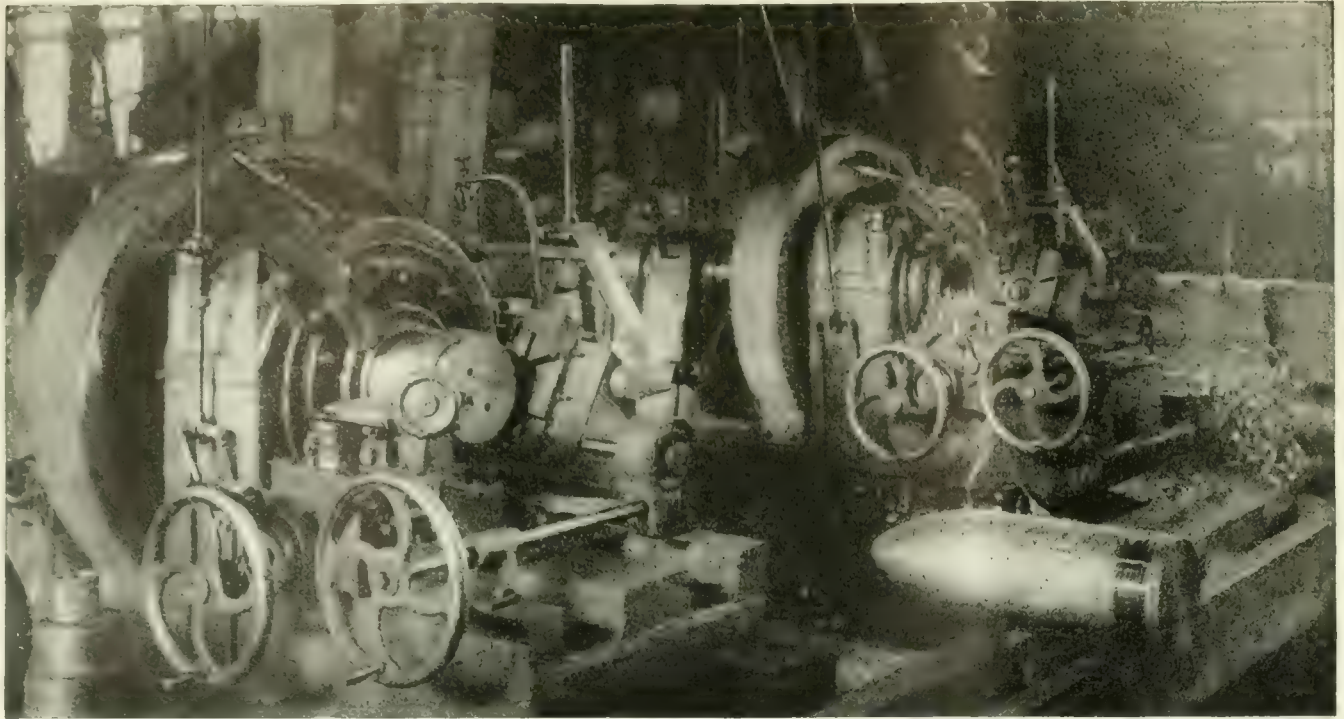


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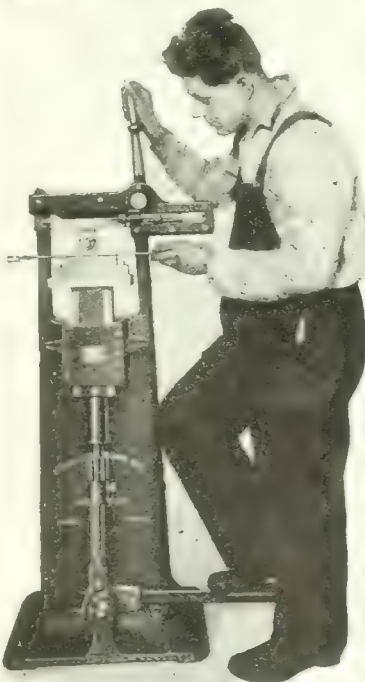
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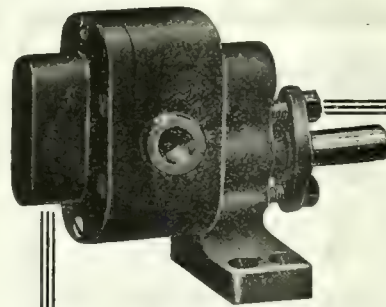
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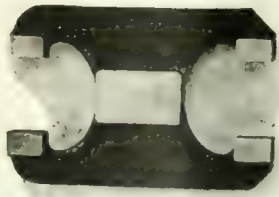
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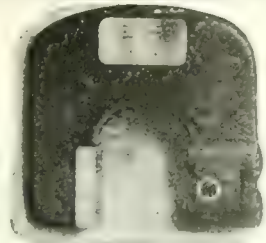
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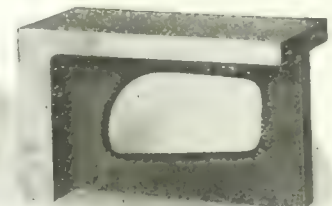
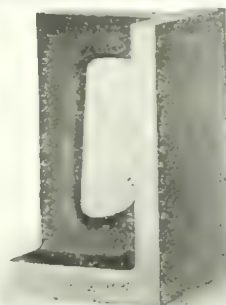
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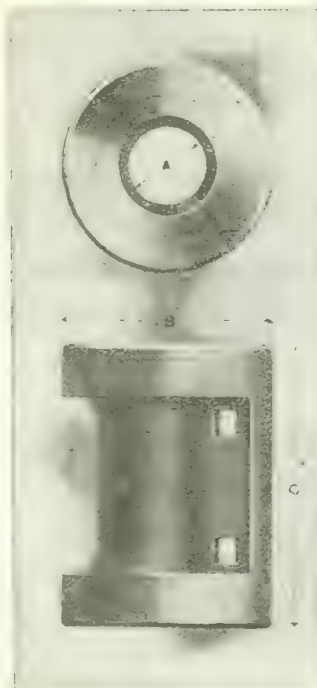
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**Shoes and Dies, Tappets,
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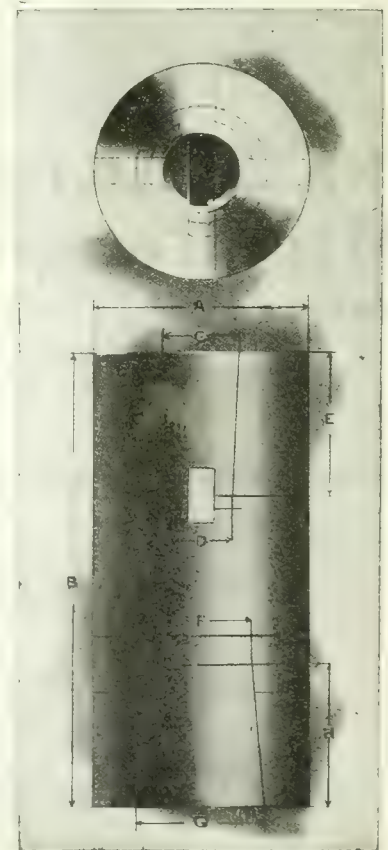
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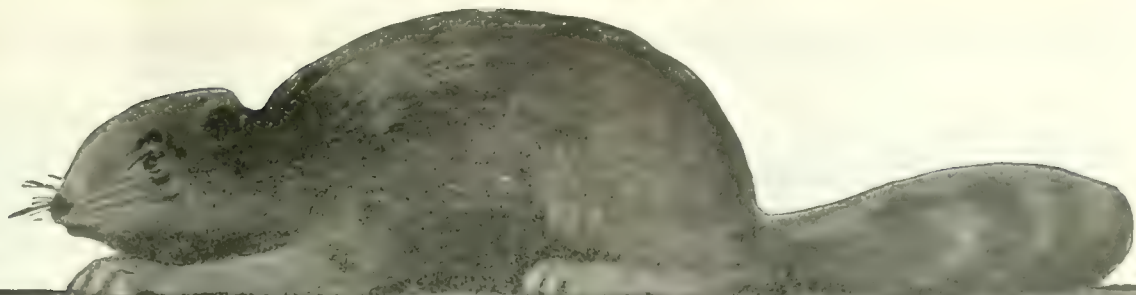
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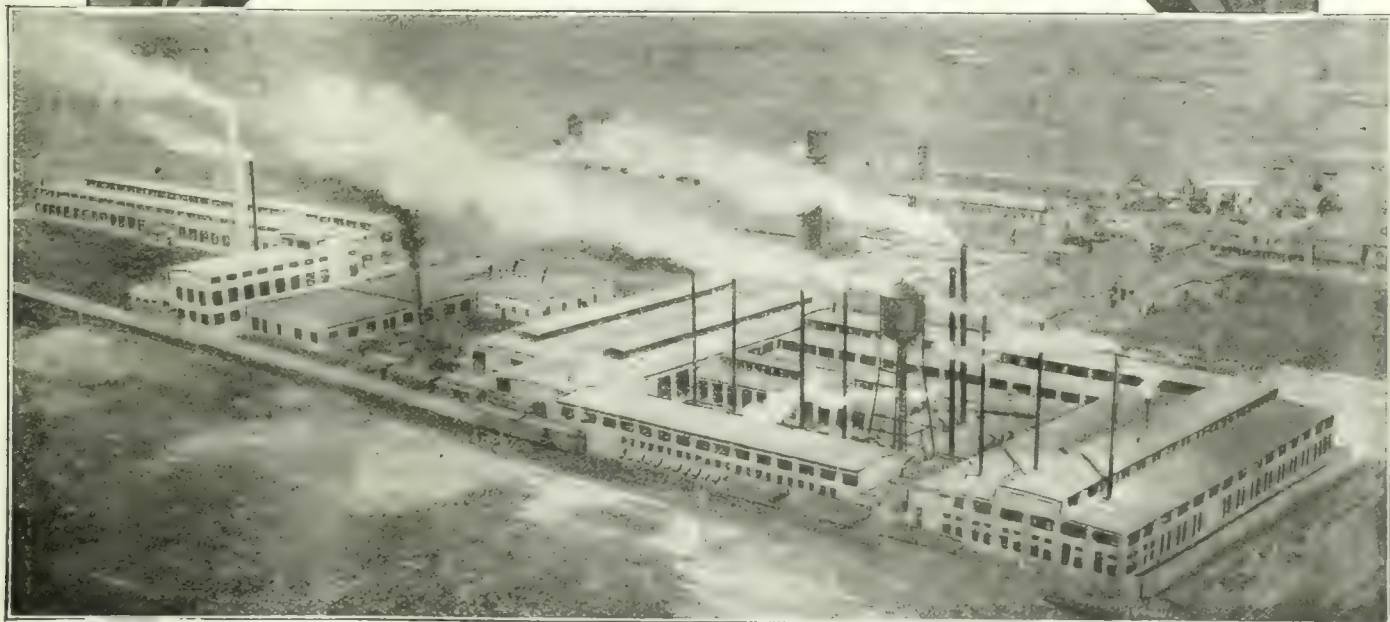
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Prest-O-Lite Process

employs both gases (acetylene and oxygen) in portable cylinders. Prest-O-Lite Dissolved Acetylene (ready-made carbide gas) is backed by Prest-O-Lite Service, which insures prompt exchange of full cylinders for empty ones. Provides dry, purified gas, insuring better welds, quicker work and lower operating cost. Avoids the large initial outlay and heavy depreciation incurred in making crude acetylene in a carbide generator.

Apparatus consists of an equal pressure blow pipe, automatic regulators and gauges, and all necessary equipment.

Adaptable for oxy-acetylene cutting by the addition of special cutting blow pipe.

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

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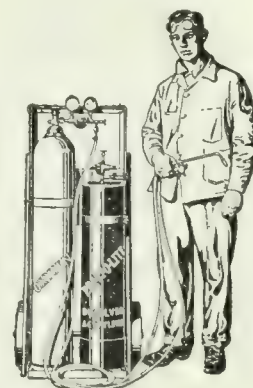
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We maintain three factories in Canada and a staff of experts in the process, making Service to you a feature of our business; manufacturing the Purest Oxygen and Dissolved Acetylene, and Equipment of the highest efficiency.

Improved methods mean increased business and bigger profits.

Why not cut the losses? The installation of an Oxy-Acetylene Welding Equipment means but a very small investment compared to the savings in time and money it effects. It is an investment that will bring hundreds per cent. return, and it is good business to keep your plant always running. Is this worth investigation?

You are protected against loss. Not only can Oxy-Acetylene Welding be profitably employed for coping quickly with repairs, "break-downs," "tie-ups"—preventing losses by delay in replacements, but it is universally adopted in many manufacturing processes where a greater efficiency and an improved product are essential.



Same Cylinders After Welding

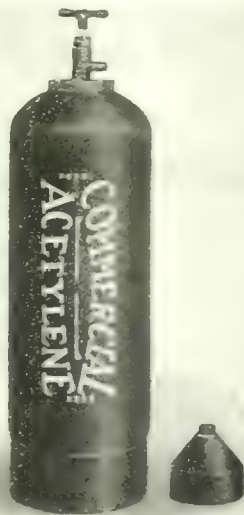
Many problems in the Metal Industry are being solved by Oxy-Acetylene Process

Write to-day for particulars, without obligation. We can tell you how, and why.

L'AIR LIQUIDE SOCIETY

Pioneers of the Process

Factories the world over
 MONTREAL, Cor. 1st Ave. and Ernest
 TORONTO 26 Boler Street
 WINNIPEG 1297 Pine



Quality Quantity

Guaranteed

Write US About Your
 Acetylene Supply

Commercial Acetylene Welding Co., Inc.

ATLANTA, GA.
 AURORA, ILL.
 BOSTON, MASS.
 BOUND BROOK, N.J.
 EAST DEERFIELD, MASS.

103 Bay Street, Toronto

Main Office

80 Broadway, New York

TORONTO, ONT.
 SAN FRANCISCO, CALIF.
 MOBERLY, MO.
 W. BERKELEY, CALIF.

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



MUNITION MAKERS

Need the best power blades they can buy for their metal cutting—need them for economy and speed of production and to save blade cost.

Buy your blades by careful efficiency tests for rapidity of cutting and number of cuts and you will standardize on

MILLERS FALLS STAR HACK SAW BLADES

WE CAN MAKE PROMPT DELIVERY ON ALL SIZES.

Star Blades are made in a different way than any other blade. Patent hardening process makes them harder, faster cutting and more uniform as comparative tests will show.

Your blade cost and your manufacturing cost are less when you buy the Star.

Mechanic's Handbook containing much valuable mechanical information, never before printed, and pocket catalog—free on request.

Millers Falls Company

"Toolmaker to the Master Mechanic"

Millers Falls, Mass.

New York Office: 28 Warren Street



Grinding Wheel Efficiency

Results both in quantity and quality of the grinding wheel depends upon its surface. A slight coating on the wheel affects both.

No one type of Dresser is best adapted for all wheels. We are specialists in Grinding Wheel Dressers, and can recommend and supply the type of Dresser that is best adapted to your particular needs.

The Canadian Desmond-Stephan Mfg. Co.

Hamilton, Ontario

Alfred Herbert, Ltd., Coventry, Eng.,
Agent for Great Britain.

"STERLING"

Hack Saws

Will prove an economical investment and should be used in every machine shop.



If you care to save money, use "Sterling" Blades.

MANUFACTURED BY

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

Speed Up Output

**Decrease Freight Cost
Decrease Labor Cost
Decrease Air Cost and
Dust-Disposal Cost
By Sand-blasting with**

FLINT SHOT
TRADE MARK - REGISTERED

Better Than Sand

Flint Shot is to a bank or ocean sand what a regiment is to a mob—it is an *organized* product of similar units, equal in size, texture, shape, hardness and in their resistance to splitting.

Sand is unorganized, unequal and therefore not uniform in the work done by the granule-impact.

As the foreman of the enameling department of the Chicago Hardware Foundry put it: “Flint Shot has more ‘pep’—takes a better ‘bite’—goes twice as far—makes a cleaner, evener surface.”

Let us send you a bag or two for working test—free of charge, freight prepaid

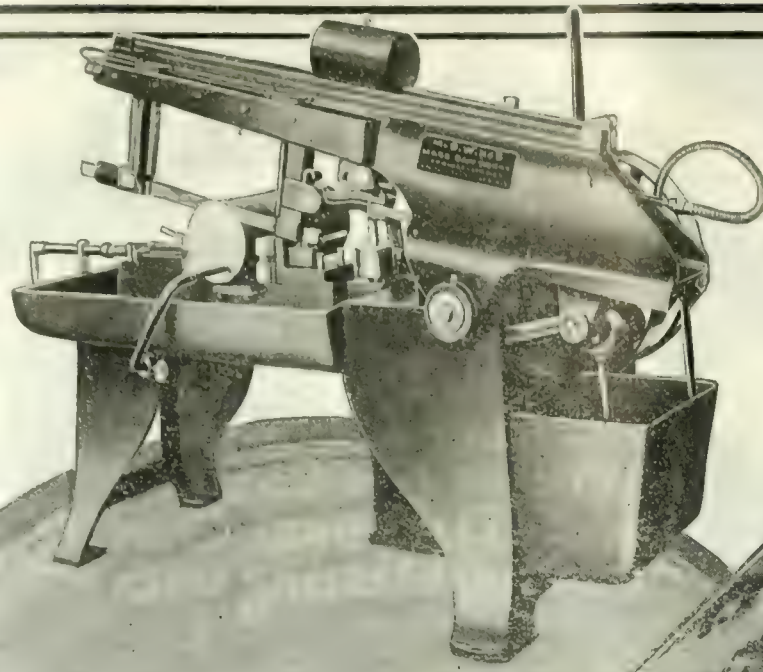
Ask for our Flint Shot Book

U. S. SILICA COMPANY

430 Peoples Gas Building

Chicago, Illinois

Nine
Inches
of
Solid
Steel



V. S. W. No. 5
High Speed Hack Saw Machine

A high grade machine used in doing fine
cutting and working shops for the economical
and cutting of all metals in work shop.

Built heavier and stronger than actually
necessary to stand the modern tendency to
over crowd. It never wears out, and is a natural
and in getting used to it.

We cannot emphasize too strongly its high
grade construction, the simplicity of its devices,
its silence and smoothness in operation, and its
rigidity and strength.

You should have a V. S. W. machine.

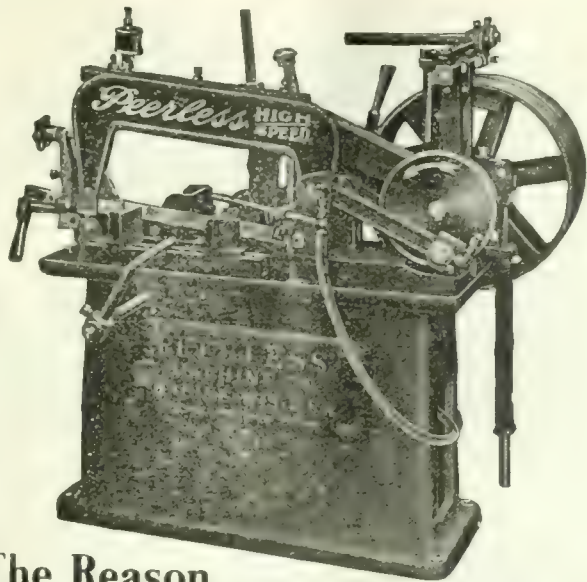
Plus **VICTOR** blades, of course.

Write us for complete description.

VICTOR SAW WORKS LIMITED

HAMILTON,

CANADA



The Reason For So Many Repeat Orders

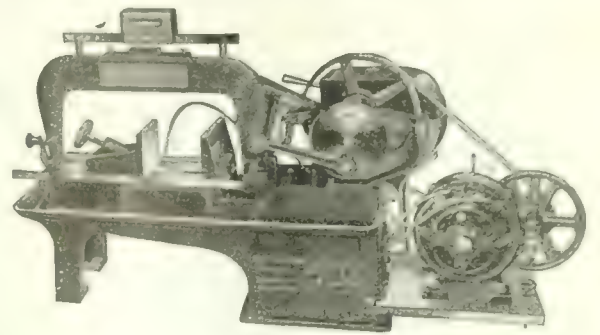
after comparative tests is that no magnifying glass is necessary to distinguish the increased production and the better class of work on the PEERLESS High-Speed Sewing Machine.

A third order just came in from one of the largest concerns in the United States, and is a fact after a firm has standardized on a certain make of tool that some real results must be produced in order to effect a change?

One of our customers writes: "It takes us only 1/15th of the time to cut our stock on the PEERLESS than it did on our other machine."

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

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

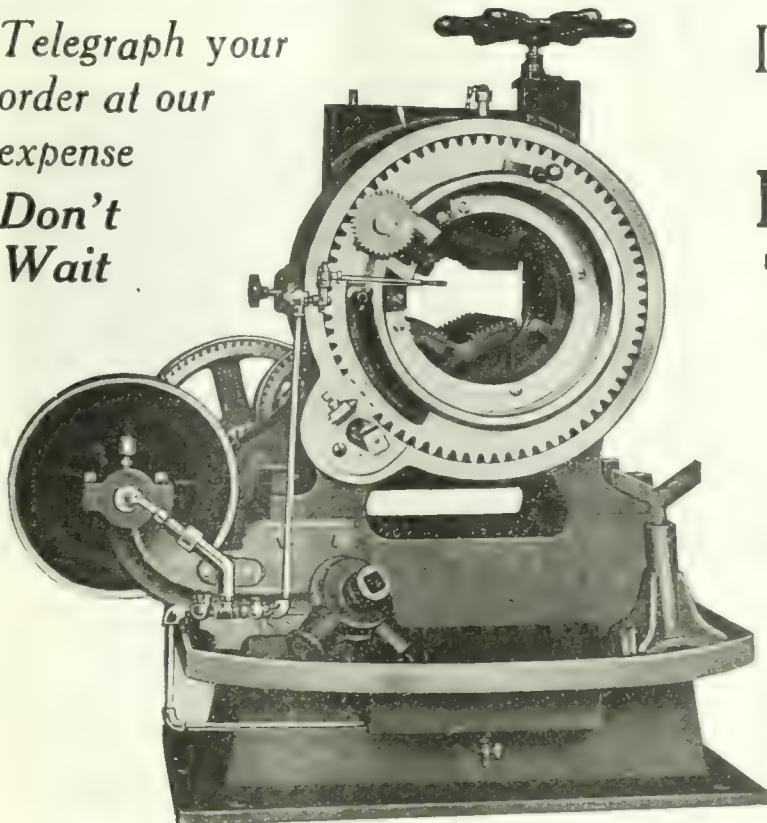


We will send a Racine on a Trial Basis—Why?

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

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

*Telegraph your
order at our
expense
Don't
Wait*



In These WAR Times If you have need of a Pipe Cutting and Threading Machine

You want to know three things and in this order:

Delivery

All sizes up to 15", for either Hand, Belt or Electric drive, kept in stock for immediate shipment. No waiting.

Quality

The original FORBES. Our specialty since 1882. More than 25,000 in use.

Price

Less than any other Standard Machine on the market, and less than half of many. Our system is the reason.

THE CURTIS & CURTIS CO., 115 Garden Street, Bridgeport, Conn.

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

The Right Heat

is the only heat to work with if you are going to turn out good work.

An ordinary mechanic can keep a Gilbert & Barker Furnace steady and even, insuring a uniform temperature. Fuel waste is eliminated and your steel hardening problems are solved because uniformity is the secret of success in hardening steel.

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

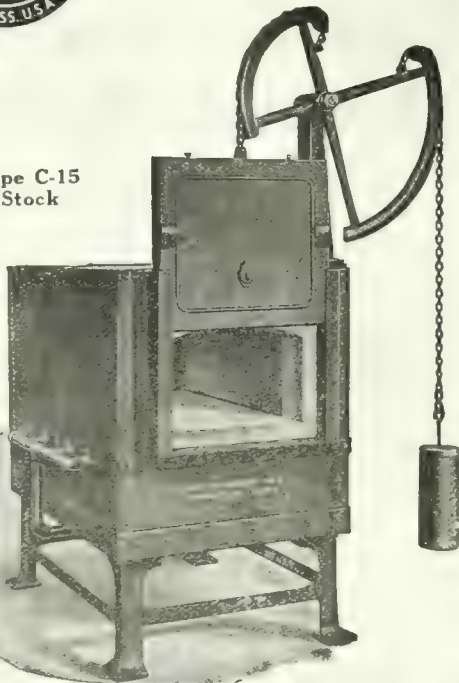
At present we are making prompt delivery on many types. Stock list 24 describes them all.

**Gilbert & Barker
Manufacturing Company**
West Springfield Mass.

Canadian Agents:
WILLIAMS & WILSON, LIMITED
Montreal, Que.
JAMES DEVON.
227 Davenport Rd., Toronto, Ont.



Type C-15
in Stock



Tycos

Temperature Instruments

Indicating
Recording
Controlling

H&M Regulators

Tycos Mercury Operated Recording Thermometers

Glass Engraved Stem Thermometers

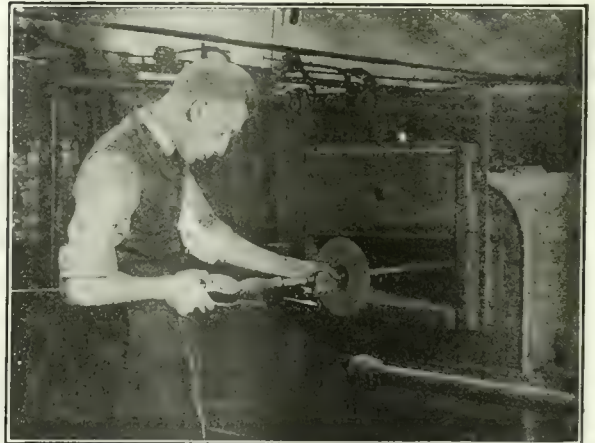
Hygrometers and Hydrometers

Thermo-Electric and Radiation Pyrometers

Correspondence is invited
The H&M Division
Taylor Instrument Companies
ROCHESTER N.Y.

201 Royal Bank Bldg., Toronto, Ont.

"I have paid for myself
in a day."



Feeling the Pulse of Steel

Most Steels Treated

materially above the critical temperature show coarse crystallization and brittleness.

below the critical temperature show a lack of hardness.

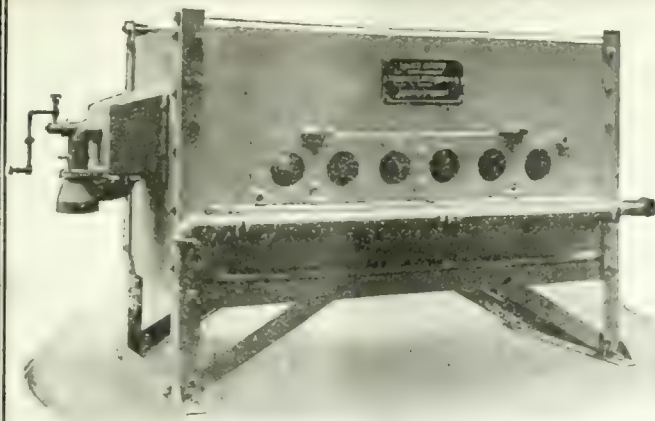
at the critical temperature indicate maximum hardness and strength.

THE "CRIT-POINT"

infallibly indicates whether the steel is or is not up to the critical point.

THIS REVOLUTIONARY METHOD RESULTS
in uniformly perfect product at minimum labor and fuel expense.
PRICE \$85.00

GIBB INSTRUMENT COMPANY
5716 Euclid Avenue Cleveland, Ohio



“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

Even Temperature is What You Want

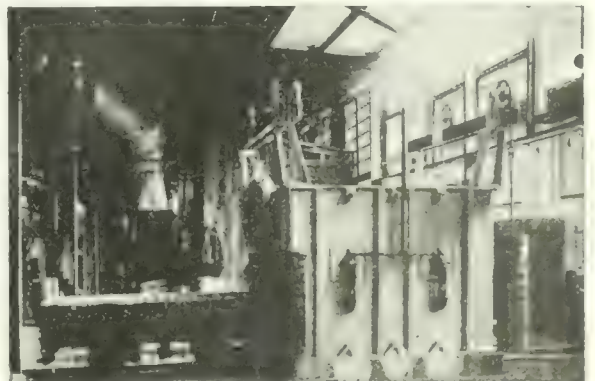
—You get it in a Tate-Jones Annealing
Furnace—That's certain.

In industries where a great deal of annealing, pack-hardening and heat treating of special and alloy steels is done a furnace is required that will handle a big output and still insure an even temperature which can be accurately controlled. Here is a furnace where Evenness of Temperature and Accurate Control are certain.

We will be pleased to explain the many good characteristics of our double and single annealing furnaces, also our other lines of furnaces, if you will send us your address.

Write for Catalog C.

TATE-JONES & COMPANY, Inc.
Furnace Engineers PITTSBURGH, P.A.



No. 3063 Furnace for Oven Annealing - James McKay Co., Pittsburgh, Pa.

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



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

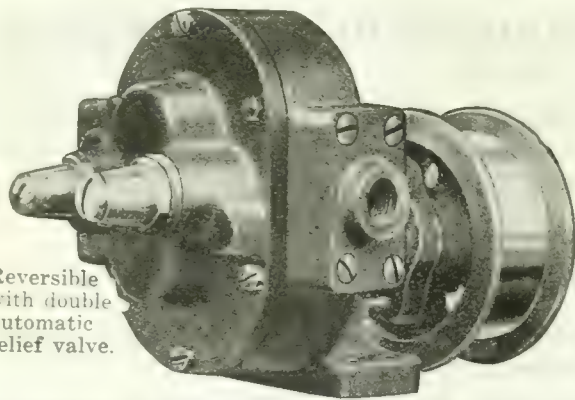
Hamilton Montreal TORONTO Winnipeg Vancouver

Copious - Clean - Coolant

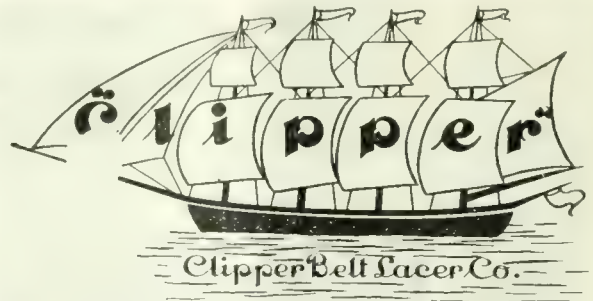
TRAHERN ROTARY GEARED PUMPS do not clog, and if equipped with strainers it is impossible for foreign matter to pass through pump and damage cutting tool. The cost of one such accident would pay for many pumps. Think it over—then write to us.

Trahern Pump Company
ROCKFORD, ILLINOIS

Canadian Agents: A. R. WILLIAMS MACHINERY CO.
Toronto, Ontario



Reversible with double automatic relief valve.

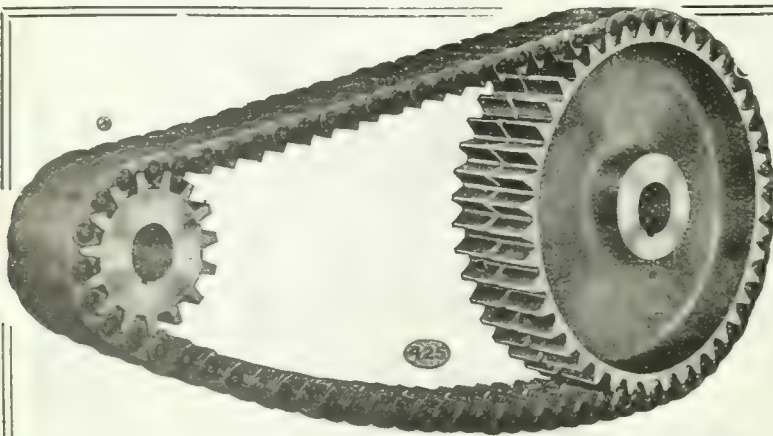


If you would use a stop watch while one of your belt lacing crews were at work you would find that you were paying expert men for a half hour job when any machine operator can lace a belt in **THREE** minutes with the

CLIPPER BELT LACER

CLIPPER BELT LACER COMPANY

976 Front Ave., N.W. Grand Rapids, Mich.



RENOLD *The proven efficient form of Power Transmission.*
CHAINS
PATENT SILENT

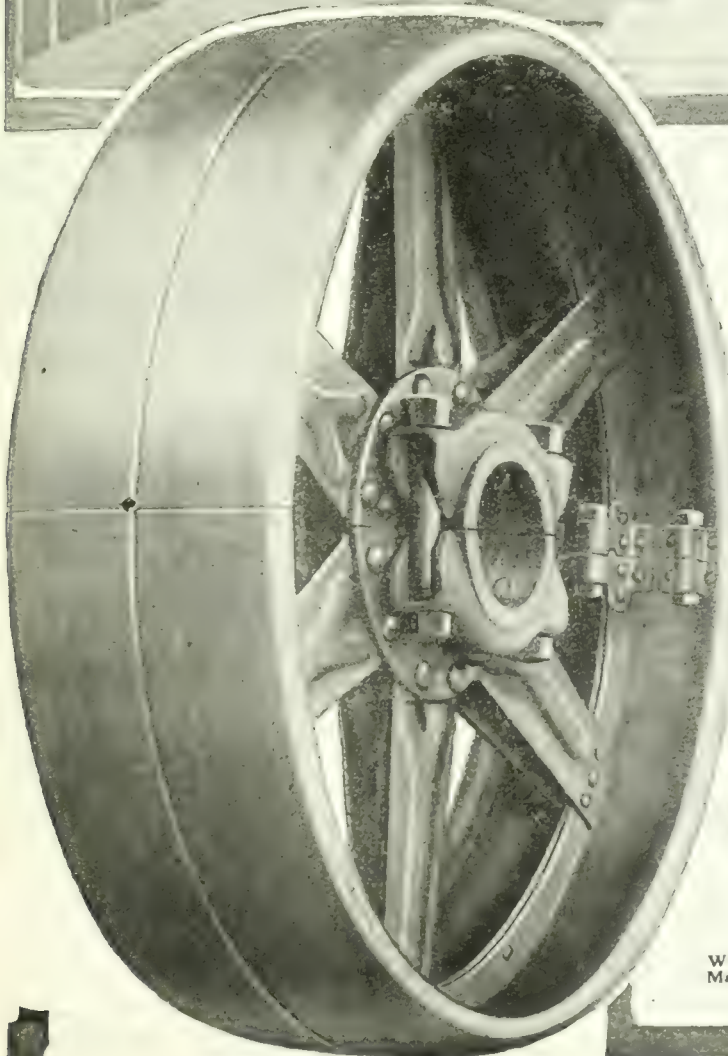
Equally suitable for main shaft or machine drives. Save space and power, increase output and ensure durability.
Chain and Parts Carried in Stock.

Sole Canadian Agents

Jones & Glassco. (Reg'd)

Branch Office: ENGINEERS St. Nicholas Bldg.
TORONTO, ONT. MONTREAL, P.Q.

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



**“We Must Stop
These Pulley Losses”**

Pulley breakdowns — men and machines idle — are all too frequent in some plants.

Belt slip and air resistance eat up power.

Not enough attention is paid to the selection of culleys. Perhaps wood and iron pulleys are still being used. Their first cost may be low, but their last cost is far higher than

**AMERICAN
STEEL SPLIT
PULLEYS**

The flat V-braced arms of “American” Pulleys cut the air and save enormously on power.

Belt slip is reduced to a minimum.

“Americans” are guaranteed to perform double belt duty under all conditions not demanding a special pulley.

They are capable of enduring higher speeds than any other standard metal pulley.

FREE BOOK — “Pulley Efficiency” sent on request. Full of money-saving pulley information.

THE AMERICAN PULLEY CO.
Philadelphia, Pa.

Canadian Distributors:

Williams & Wilson, Ltd., Montreal, Que. A. R. Williams Machinery Co., St. John, N.B.; Toronto, Ont.; Vancouver, B.C.; Winnipeg, Man. H. W. Petrie, Ltd., Toronto, Ont.

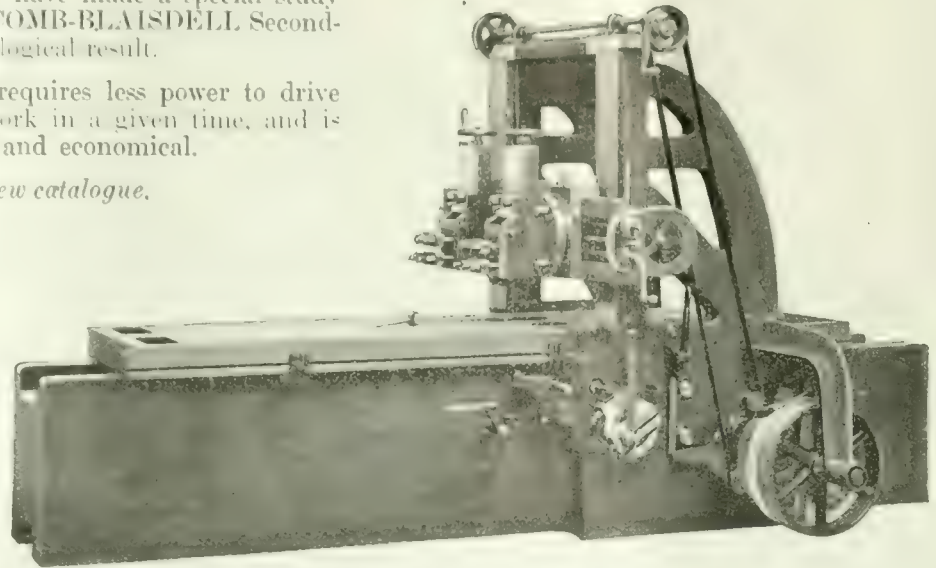
If any advertisement interests you, tear it out now and place with letters to be answered.

WHITCOMB-BLAISDELL Second-Belt Drive Planers

Does power saving, time saving and increased production interest you? We have made a special study of these points and WHITCOMB-BLAISDELL Second-Belt Drive Planers are the logical result.

The second-belt drive requires less power to drive the machine, does more work in a given time, and is noiseless, smooth running and economical.

Write for new catalogue.



30" x 30" x 8"
PLANER

WHITCOMB-BLAISDELL MACHINE TOOL CO.
Worcester, Mass., U. S. A.

WHITMAN

BARNES

Twist Drills
and
Reamers

Screw and Drop
Forged Wrenches
Hammers

W

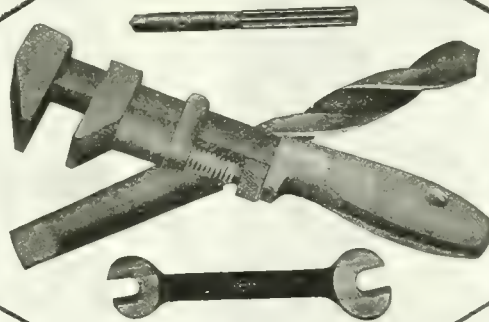
&

B

Special
High Grade
Drop Forgings

Cotters
Chisels
Punches, Etc.

CO



Users recognize "W & B" Tool Quality, backed by 62 Years' Uninterrupted Manufacturing Experience. If your Jobbers and Dealers cannot supply, write us and we will see that you are supplied. Send for Catalog No. 86-H.

THE WHITMAN & BARNES MFG. CO.

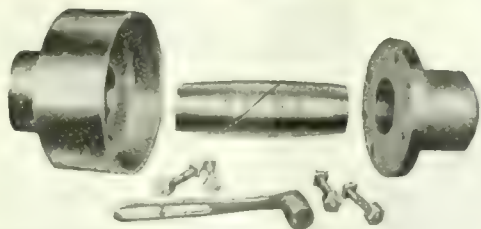
ESTABLISHED 1854

CANADIAN OFFICE AND FACTORY

∴ ∴

ST. CATHARINES, ONTARIO

The Spiro Never Slips



The Spiro Compression Coupling is locked to the shaft by a graduated grip.

The pull of the bolts on the two halves of the coupling acts on the spiral slotted sleeve until it grips the full surface of the shaft with a never-slip hold.

Every bolt pulls, and at every pull the grip grows.

And last, but not least, the Spiro can be removed as quickly and easily as it can be applied.

The Bond Booklet describes our complete line of Power Transmission Devices.

Canadian Bond Hanger & Coupling Company, Limited

Alexandria

Ontario

Economic Boiler Compound

If you have boiler troubles, and wish to clean same at a minimum cost, use **ECONOMIC BOILER COMPOUND**, it will surprise you.

Manufactured by

CANADIAN ECONOMIC LUBRICANT CO., LTD.

MONTREAL

CHAPMAN

DOUBLE BALL BEARINGS

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

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

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

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

The Chapman Double Ball Bearing Company of Canada, Ltd.

339-351 Sorauren Ave., TORONTO, Canada

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

Coal
Coke
Iron Ore

Pig Iron

FOUNDRY & MALLEABLE

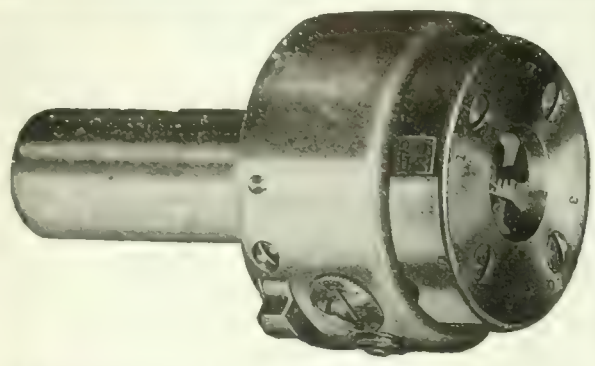
Made by The Canadian Furnace Co.
Port Colborne, Ontario, Canada.

Victoria

M.A. HANNA & CO.

Sales Agents:
CLEVELAND

Canadian Office:
703 C.P.R. Bldg., Toronto

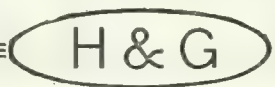


Desirable Threads

Are easily obtainable with an H. & G. Automatic Self-opening Die Head.
The Chasers are set and held in place by a steel cam which, once adjusted, locks. No stopping or changing required to keep to size. There are a good many other features on this Die Head.

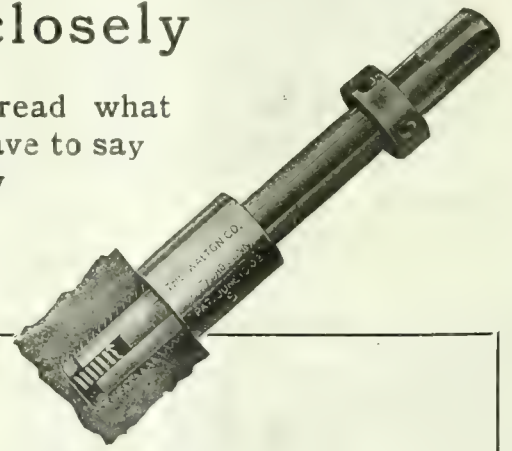
"Write us!—write now."

EASTERN MACHINE SCREW CORP.
NEW HAVEN CONN., U.S.A.



Look at this again —closely

and read what
we have to say
below



WHEN a tap breaks off close or below the surface, you'll find this Walton Tap Extractor will save a great deal of time and trouble. The crucible fingers grasp the flutes of the tap, a twist of the wrench and the piece is out.

Don't you think it would pay to have a few lying around on your benches?

The Walton Company
Hartford, Conn.

How Many of Your Shells Are Being Rejected

?



Water Jacket for Nosing Furnace

This **STEEL** jacket holds a large amount of water, which keeps the body of shell cold, and permits of proper heating of the nose for nosing operations.

Being made of steel, it stands contraction and expansion—not possible with cast iron.

It is indestructible and fool-proof. Made for all sizes of shells.

We can make this jacket to any special dimensions, with any desired attachments. No patterns are required—specifications all that are necessary.

Tested and Guaranteed
IMMEDIATE DELIVERY.

Canadian Welding Works, Ltd., 51 Montfort Street, **Montreal, P.Q.**



Hannifin Air Chucks

Their operation, their simple construction, their efficiency-promoting qualities have impressed the Canadian manufacturers in such a manner that they are becoming an established part of the shop equipment.

After demonstrating its superiority over other chucks the Hannifin Air Chuck has been adopted by a popular line of Canadian lathes.

There is no wear on these chucks. The pressure is uniform and positive. Our catalogue will give such data and specifications as to convince you of the Hannifin superiority.

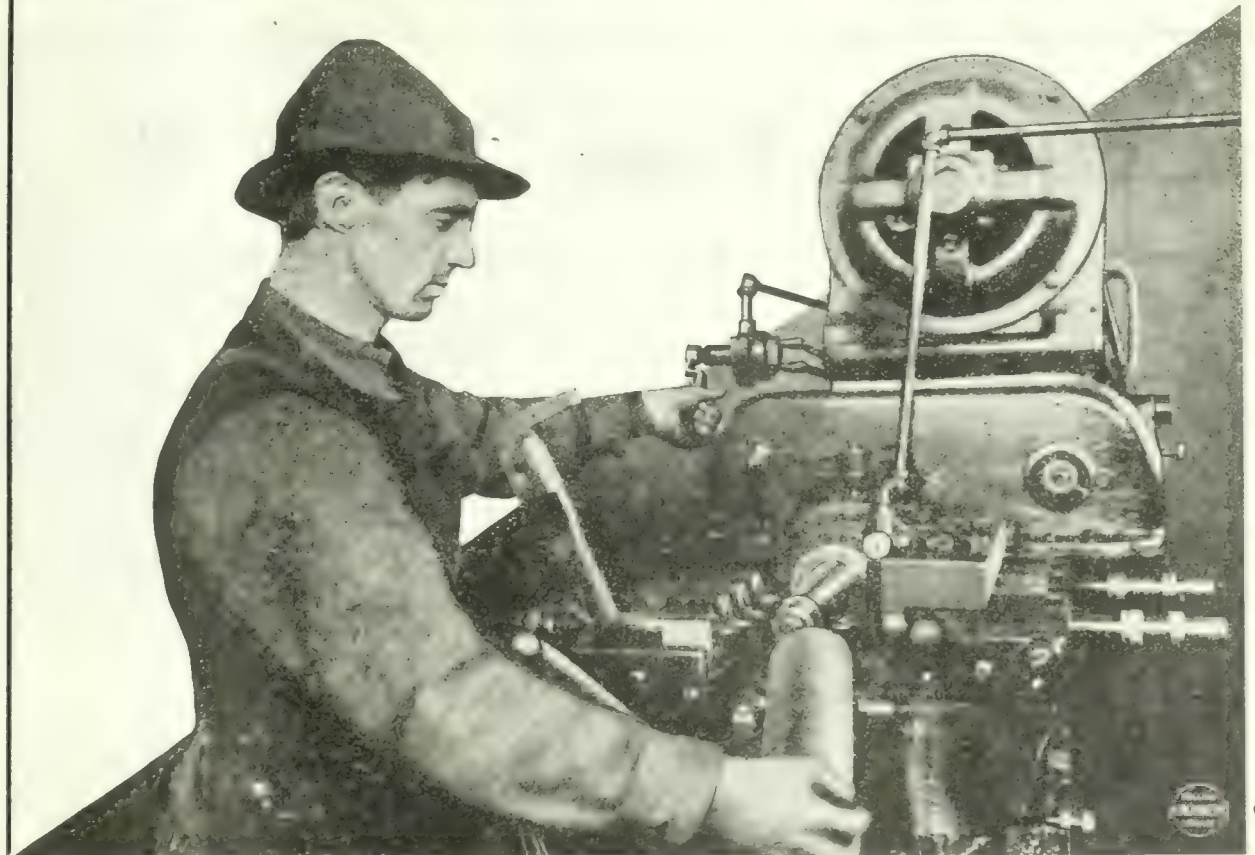
Our Catalogue is at Your Disposal

Hannifin Manufacturing Company

Representatives
 R. E. Ellis Engineering Co.,
 Chicago
 Coats Machine Tool Co.,
 New York City
 A. R. Williams Machinery Co.,
 Toronto
 Williams & Wilson, Montreal

CHICAGO
U.S.A.

Representatives
 The Canadian Fairbanks-Morse Co.,
 Montreal
 European Representatives
 Coats Machine Tool Co., London
 Fenwick, Freres & Co., Paris
 Iznosskoff & Co., Petrograd



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Jacobs

IMPROVED

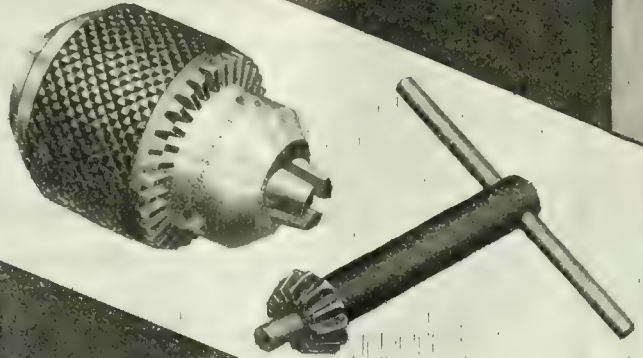
Drill Chuck

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.



Let the Boss Know It!

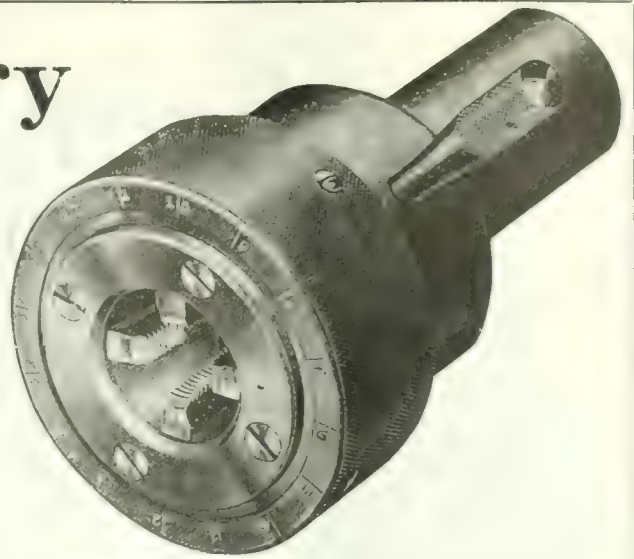
IF you are a reader of Canadian Machinery, go tell your employer about it some convenient time! You couldn't tell the up-to-date manufacturer anything that would please him more. He would know that you are abreast of the times; that you are ambitious and interested in your work; that you are acquainted 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.

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.

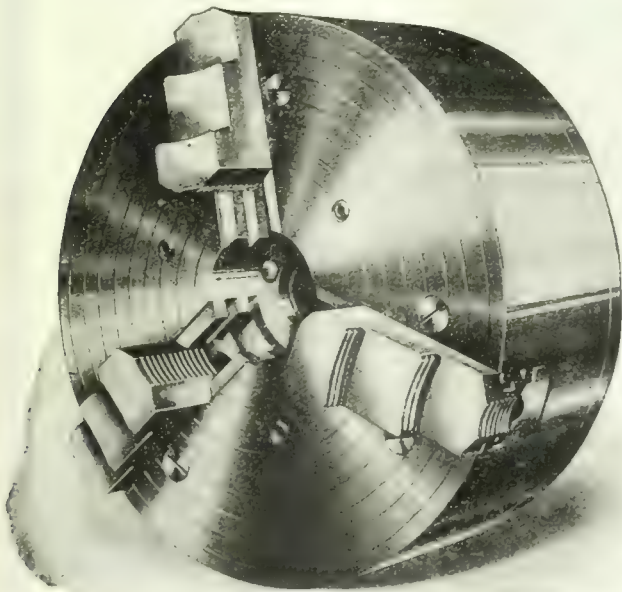
Murchey Machine & Tool Company

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.

Indispensable Where Rapid Manufacturing Methods Prevail



The M. E. C. Three-Jaw Air-Operated Chuck (steel body) eliminates the troublesome time-losing, hand-operated chuck. Operating on tests of long periods it will show an increase in production of from 25 to 90 per cent. Once chucked, the work stays chucked. Vibration doesn't affect it—it holds tight regardless of cutting strain. Saves energy and time. Most of the work of medium diameter is chucked and released without stopping machine spindle.

Ask for full details. By all means get our interesting catalog on Labor-Saving Devices. Write for it NOW, it's free.

MANUFACTURERS EQUIPMENT COMPANY

171 N. Jefferson Avenue

Chicago, U.S.A.

Agents for Central and Eastern States and Canada: J. R. Stone Tool & Supply Co., Goebel Bldg. Detroit, Mich.

Foreign Agents: C. W. Burton Griffiths & Co., Ludgate, Ludgate Square, London, England.

By All Means Get Our Interesting Catalog on Labor Saving Devices

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

MacLean's Magazine

FOR JULY

The Smugglers were Caught

THE true and complete story of a huge smuggling conspiracy which robbed the Canadian and United States Customs Departments of hundreds of thousands of dollars, and which was finally exposed by a Canadian Customs officer, is well told in the July MACLEAN'S. The parties concerned settled by handing over a huge check to the Canadian Government and not a word of the story has ever before been in print. The man who writes the article, J. D. Ronald, was personally concerned in the investigation, and he tells the whole case from first to last, merely changing the names of some of the central figures. This is one of the most striking special features that MACLEAN'S has ever had.

Confederation

the dominant theme of July MACLEAN'S

THE Jubilee of Confederation has led the Editor to make the July MACLEAN'S retrospective and interpretive of Confederation in the character of its main contents—this to meet the certain need and desire of the Canadian people. Note the fine provision of special Confederation article and features:

"THE MEETING OF MACDONALD AND BROWN."

By C. W. Jefferys, a frontispiece painted for MACLEAN'S.

"THE STORY OF CONFEDERATION."

By Thomas Bertram. A colorful narrative of the bringing about of the union of provinces.

"FIFTY YEARS OF BUSINESS EXPANSION."

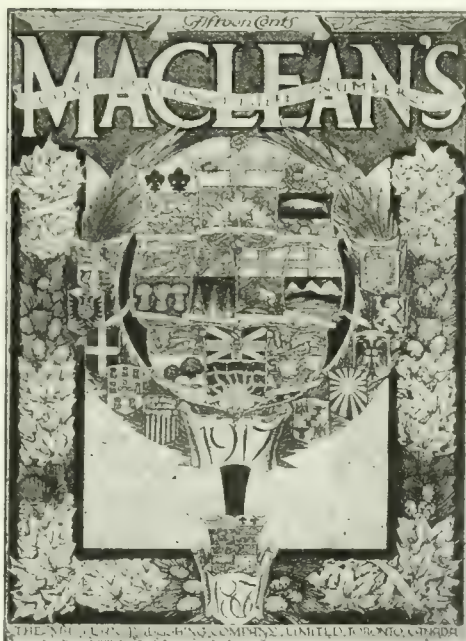
By W. A. Craik, covering all phases of business—banking, insurance, manufacturing, agriculture, transportation, etc.

"THE BUILDING OF THE C.P.R."

By C. H. Mackintosh, former Lieutenant-Governor of the North West Territories, and an ex-editor of the Ottawa Citizen.

"CONFEDERATION AND AFTERWARDS."

By Agnes C. Laut. An article on Confederation and the taking over of the North West Territories from the Hudson Bay Company.



Look for this symbolic cover design in three colors at book stores and news-stands. It is a fine bit of work, and worth preserving.

"SOME CANADIAN CONTRASTS."

By Frank Yeigh. A sketchy article showing some of the most picturesque ways in which Canada has advanced during the last fifteen years.

"THE DRAFT."

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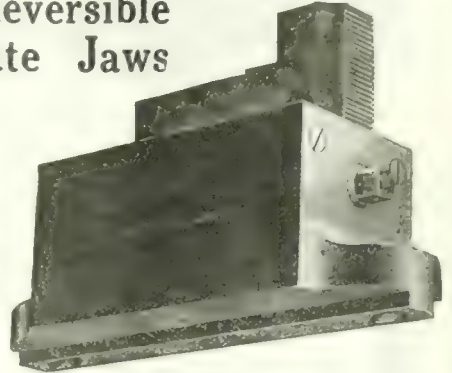
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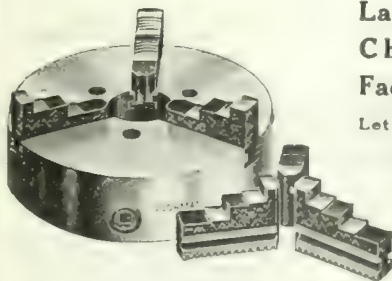
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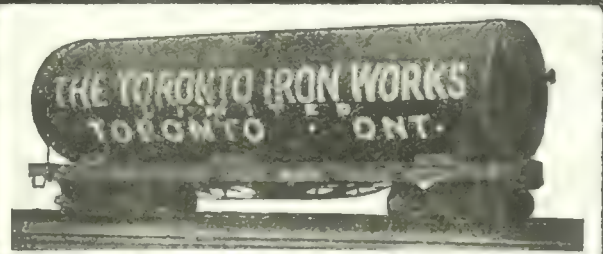
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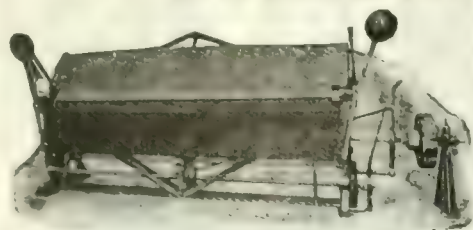
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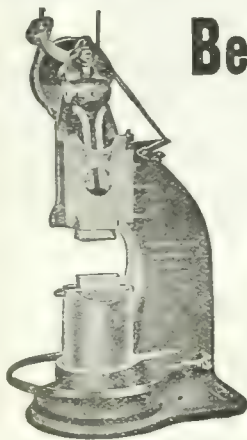
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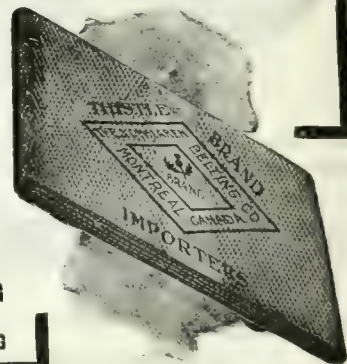
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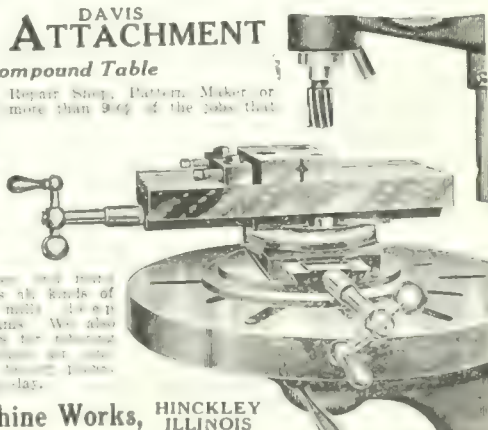
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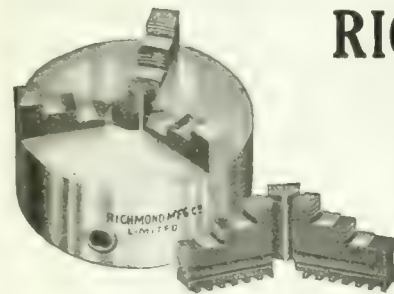
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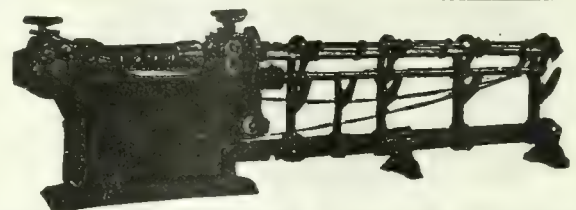
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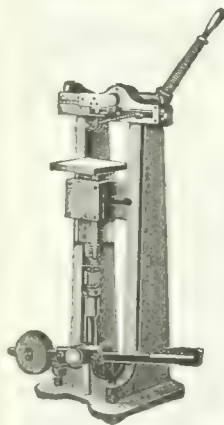
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 MacKinnon, Holmes Co., Sherbrooke, Que.

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 Hungerford Brass & Copper Co., U. T., New York.

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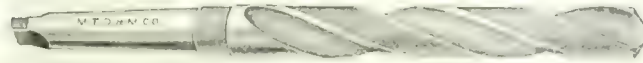
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 Foss & Hill Machy. Co., Montreal.
 Garlock-Walker Machinery Co., Toronto, Ont.
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Whiting Foundry Equipment Co., Harvey, Ill.
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- BULLDOZERS**
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Hungerford Brass & Copper Co., New York, N.Y.
Farrington & Bishopp Co., Galt, Ont.
- BUTTERIFIERS**
Wells Bros. Co., Galt, Ont.
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Brown, Boggs & Co., Hamilton, Ont.
Patterson & Co., Toronto, Ont.
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Cunningham & Son, J. W., New Glasgow, Canada.
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Marsh & Henthorn, Belleville, Ont.
Sheldons, Limited, Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.
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BRONZE, COPPER
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Hungerford Brass & Copper Co., New York, N.Y.
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Tallman Brass & Metal Co., Hamilton.
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Bernard Industrial Co., The A., Fortierville, Que.
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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
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Dominion Steel Foundry Co., Ltd., Hamilton, Ont.
Hull Iron & Steel Foundries, Ltd., Hull, Quebec.
Wm. Kennedy & Sons, Ltd., Owen Sound.
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Can. Steel Foundries, Ltd., Montreal, Que.
Cunningham & Son, J. W., New Glasgow, Canada.
- CASTINGS, NICKEL STEEL**
Hull Iron & Steel Foundries, Ltd., Hull, Quebec.
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Gardner, Robt., & Son, Montreal.
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Victoria Foundry Co., Ottawa, Ont.
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John Bertram & Sons Co., Dundas.
Gardner, Robt., & Son, Montreal.
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Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
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Canadian Fairbanks-Morse Co., Ltd., Montreal.
Ford Chain Block & Mfg. Co., Philadelphia, Pa.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Lyman Tube & Supply Co., Montreal, Que.
H. W. Petrie, Ltd., Montreal.
H. W. Petrie, Toronto.
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Can. Inspection & Testing Lab., Montreal, Que.
The Jencks Mach. Co., Ltd., Sherbrooke, Que.
Toronto Testing Laboratory, Ltd., Toronto.
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Union Tool Chest Works, Rochester, N.Y.
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Garvin Machine Co., New York.
Hannifin Mfg. Co., Chicago, Ill.
Hyde Engineering Works, Montreal.
- CHUCKS, AIR**
Manufacturers' Equipment Co., Chicago, Ill.
- CHUCKS, COLLET**
Hannifin Mfg. Co., Chicago, Ill.
- CHUCKS, DRILL, LATHE**
AND UNIVERSAL
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John Bertram & Sons Co., Dundas, Ont.
Can. Blower & Forge Co., Kitchener, Canada.
Canadian Fairbanks-Morse Co., Ltd., Montreal.
Cushman Chuck Co., Hartford, Conn.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Hannifin Mfg. Co., Chicago, Ill.
Hardinge Bros., Chicago, Ill.
Jacobs Mfg. Co., Hartford, Conn.
Ker & Goodwin, Brantford.
- Manufacturers' Equipment Co., Chicago, Ill.**
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Modern Tool Co., Erie, Pa.
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H. W. Petrie, Toronto.
Skinner Chuck Co., New Britain, Conn.
Thomas Elevator Co., Chicago, Ill.
D. E. Walton Machine Co., New London, Conn.
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AND KEYLESS
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Corbet Fry & Mach. Co., Ltd., Owen Sound, Ont.
Can. Blower & Forge Co., Kitchener, Canada.
Whitney Mfg. Co., Hartford, Conn.
Richmond Mfg. Co., Toronto, Ont.
- CHUCKS, FRICTION AND TAP**
Victor Tool Co., Waynesboro, Pa.
Wells Bros. Co., Galt, Ont.
- CHUCKS, GEARED SCROLL**
Richmond Mfg. Co., Toronto, Ont.
- CHUCKS, MAGNETIC**
H. E. Streeton, 32 New Birks Bldg., Montreal, Que.
- CHUCKS, RING WHEEL**
Ford Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.
- CHUCKS, SPLIT**
Rivett Lathe & Grinder Co., Brighton, Mass.
- CHUCKING MACHINES**
Garvin Machine Co., New York.
New Britain Machine Co., New Britain, Conn.
Niles-Bement-Pond Co., New York.
Rocklofton Machine & Tool Co., Toronto, Ont.
Warner & Swasey Co., Cleveland, O.
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Hawkins Bros. Inc., Chicago, Ill.
- CLUTCHES, FRICTION AND PULLEY**
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Johnson Machine Co., Carlisle, Manchester, Conn.
Posgrave Clutch & Pulley Works, Ltd., Toronto
- COAL HANDLING MACHINERY**
MacKinnon, Holmes & Co., Sherbrooke, Que.
Northern Crane Works, Ltd., Walkerville, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.
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Hanna & Co., M. A., Cleveland, O.
Zenith Steel & Coal Products, Montreal, Que.
- COLLARS**
Can. Bond Hanger & Cplg. Co., Alexandria, Ont.
- COLLECTORS, PNEUMATIC**
Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Limited, Galt, Ont.
Sturtevant Co., B. F., Galt, Ont.
- COLLETS**
Hannifin Mfg. Co., Chicago, Ill.
Hawkeye Bros., Inc., Chicago, Ill.
Hyde Engineering Works, Montreal.
Manufacturers' Equipment Co., Chicago, Ill.
Rivett Lathe & Grinder Co., Boston, Mass.
Stone Tool & Supply Co., J. R., Detroit, Mich.
- COMPRESSORS, AIR**
Can. Ingersoll-Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co., Canada, Toronto.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Garlock-Walker Machinery Co., Toronto, Ont.
Hinckley Machine Co., Hinckley, 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 Cos., Rochester, N.Y.
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John Bertram & Sons Co., Dundas.
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Pratt & Whitney Co., Dundas, Ont.
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Foster Machine Co., Elkhart, Ind.
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- COUPLINGS, PLAIN AND FLEXIBLE**
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Gardner, Robt., & Son, Montreal.
Independent Pneumatic Tool Co., Chicago, Ill.
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- 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
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Dominion Bridge Co., Montreal.
Heppburn, John T., Ltd., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Northern Crane Works, Walkerville.
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Aikenhead Hardware Co., Toronto, Ont.
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.
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Glatton & Knight Mfg. Co., Worcester, Mass.
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Northern Crane Works, Walkerville.
H. W. Petrie, Toronto.
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Sheldons, Ltd., Galt, Ont.
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Garvin Machine Co., New York.
Monarch Brass Mfg. Co., Toronto, Ont.
Norton Grinding Co., Worcester, Mass.
H. W. Petrie, Ltd., Montreal.
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- CUTTERS, MILLING**
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Cleveland Milling Mach. Co., Cleveland, Ohio.
Cleveland Twist Drill Co., Cleveland.
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Foss & Hill Machinery Co., Montreal.
Garvin Machine Co., New York.
Goldard Tool Co., Chicago, Ill.
Hinos Tool Works, Chicago, Ill.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
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H. W. Petrie, Toronto.
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Wm. Kennedy & Sons, Owen Sound, Ont.
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H. W. Petrie, Toronto.
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Modern Tool Co., Erie, Pa.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
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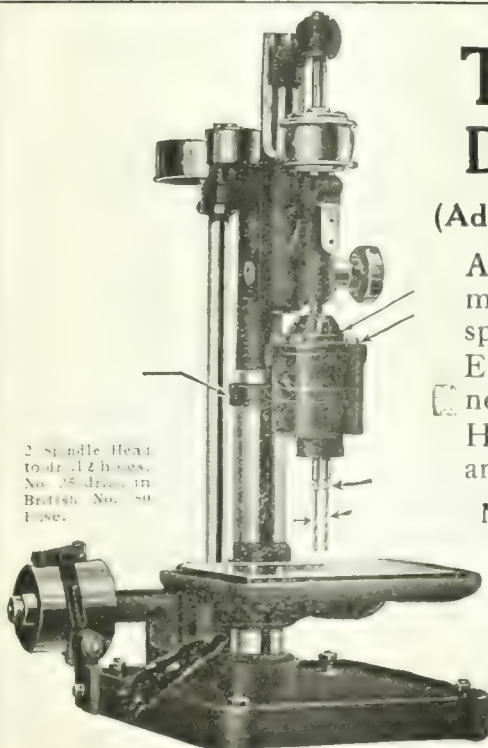
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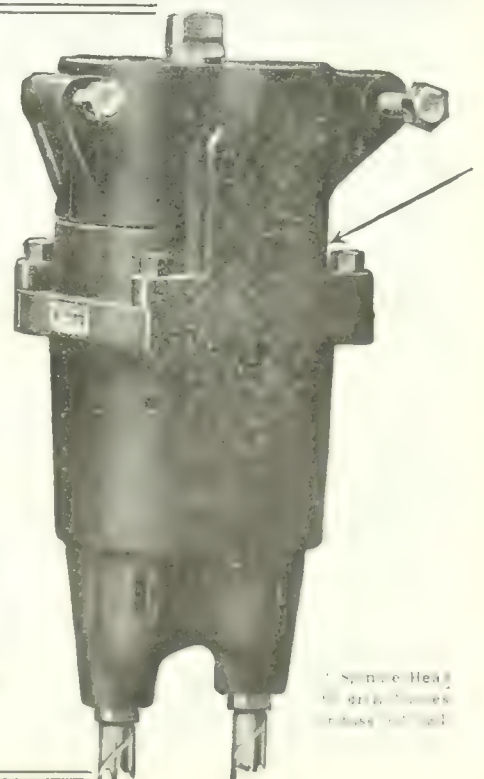
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Foss & Hill Machy. Co., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
Garvin Machine Co., New York.
A. B. Jaczko & Co., Hesperia, Ont.
National-Acme Co., Cleveland, Ohio.
Niles-Bement-Pond Co., New York.
Petrie of Montreal, Ltd., H. W., Montreal, Que.
H. W. Petrie, Toronto.
Rockford Drilling Mach. Co., Rockford, Ill.

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Niles-Bement-Pond Co., New York.
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Canada Machinery Corp., Galt, Ont.
L. M. Machine Co., Cleveland, Ohio.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
D. McKim Machinery Co., Guelph, Ont.
Niles-Bement-Pond Co., New York.
R. E. T. Pringle, Ltd., Toronto, Ont.
United States Mach. Tool Co., Cincinnati, Ohio.

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Aurora Tool Works, Aurora, Ind.
John Bertram & Sons Co., Dundas.
Can. Blower & Forge Co., Kitchener, Ont.
Canada Machinery Corp., Galt, Ont.
Cincinnati Pulley Machy. Co., Cincinnati, Ohio.
Dominion Machy. Co., Toronto, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jaczko & Co., Hesperia, Ont.
R. McDonald Co., Galt.
Niles-Bement-Pond Co., New York.

Petrie of Montreal, Ltd., H. W., Montreal, Que.
H. W. Petrie, Toronto.
Rockford Drilling Mach. Co., Rockford, Ill.
Silver Mfg. Co., Salem, Ohio.
A. R. Williams Machinery Co., Toronto.

DRILLING POSTS

Aikenhead Hardware Co., Toronto, Ont.
Keystone Mfg. Co., Erie, Pa.
Salem Mfg. Co., Salem, Ohio.

DRILLS, BENCH

Aikenhead Hardware Co., Toronto, Ont.
W. F. & J. B. Barnes Co., Rockford, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cincinnati Pulley Machy. Co., Cincinnati, Ohio.
Foss & Hill Machy. Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
H. W. Petrie, Ltd., Montreal.
Pratt & Whitney Co., Dundas, Ont.
R. E. T. Pringle, Ltd., Toronto, Ont.
United States Electrical Tool Co., Cincinnati, Ohio.

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Can. Blower & Forge Co., Kitchener, Ont.
Cleveland Twist Drill Co., Cleveland.
Foss & Hill Machy. Co., Montreal.
A. B. Jaczko & Co., Hesperia, Ont.
Morse Twist Drill & Mach. Co., New Bedford.
Petrie of Montreal, Ltd., H. W., Montreal, Que.
H. W. Petrie, Toronto.

DRILLS, CENTRE

Aikenhead Hardware Co., Toronto, Ont.
Clark Equipment Co., Richmond, Mich.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mach. Co., New Bedford.
DRILLS, CORNER (PNEUMATIC)
Can. Ingersoll Rand Co., Sherbrooke, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.

DRILLS, ELECTRIC AND PORTABLE

Aikenhead Hardware Co., Toronto, Ont.
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Cincinnati Pulley Machy. Co., Cincinnati, Ohio.
Dominion Machy. Co., Toronto, Ont.
Foss & Hill Machy. Co., Montreal.
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York.
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H. W. Petrie, Toronto.
Prest-O-Lite Co., Inc., Toronto, Ont.
R. E. T. Pringle, Ltd., Toronto, Ont.
Stow Mfg. Co., Binghamton, N.Y.
United States Electrical Tool Co., Cincinnati, Ohio.
A. R. Williams Machy. Co., Toronto.

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Aikenhead Hardware Co., Toronto, Ont.
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Can. B. K. Morton, Toronto, Montreal.
H. A. Drury Co., Montreal.
Foss & Hill Machy. Co., Montreal.
Marshall, Geo. A., 70 Lombard St., Toronto.
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H. W. Petrie, Toronto.
Pratt & Whitney Co., Dundas, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.

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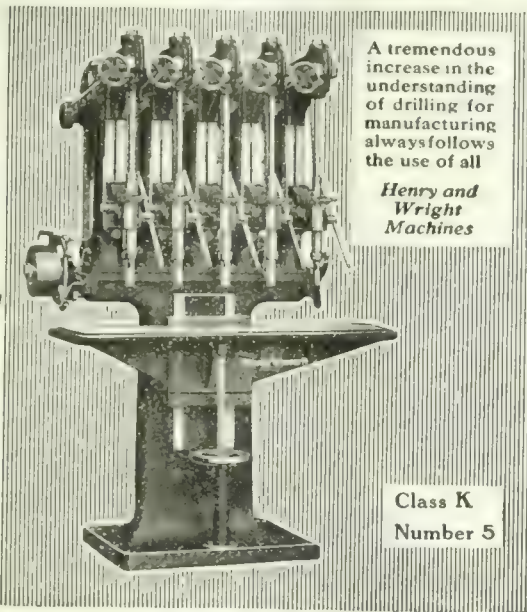
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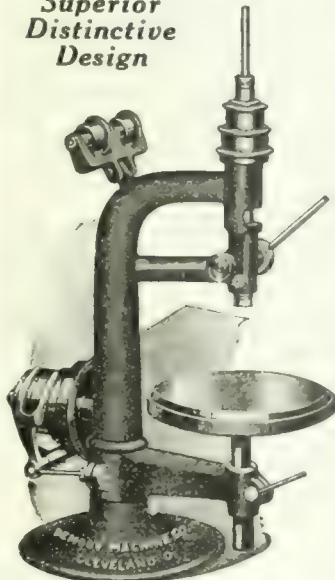
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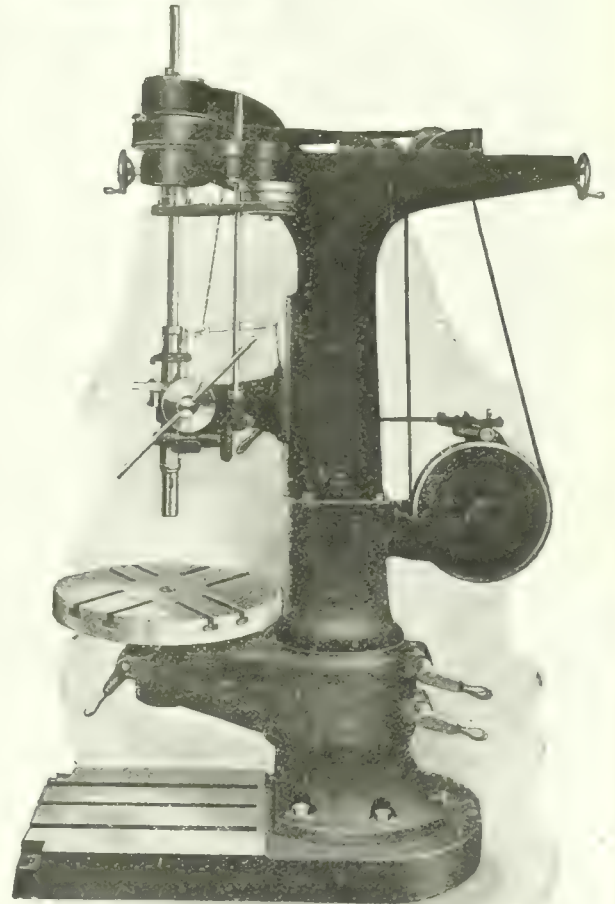
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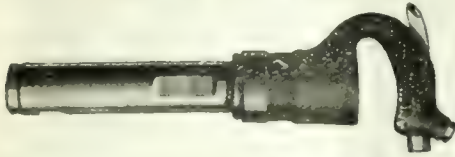
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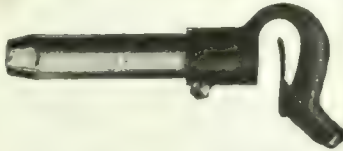
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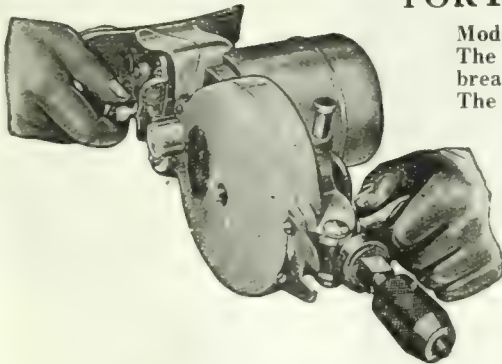
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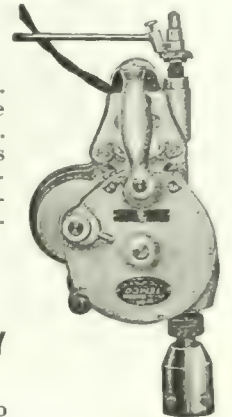


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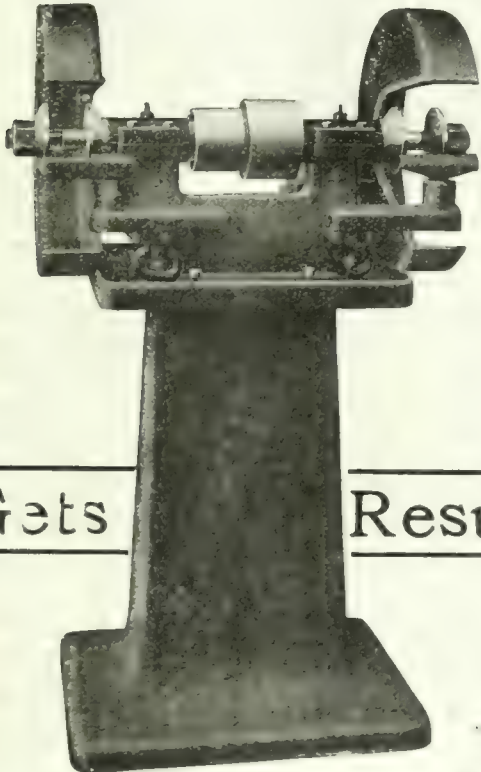


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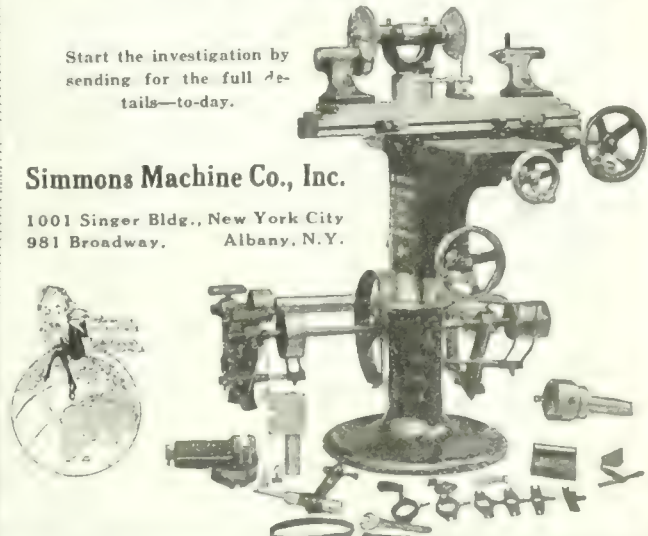
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Napier Saw Works, Springfield, Mass.
Tabor Mfg. Co., Philadelphia, Pa.

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Napier Saw Works, Springfield, Mass.

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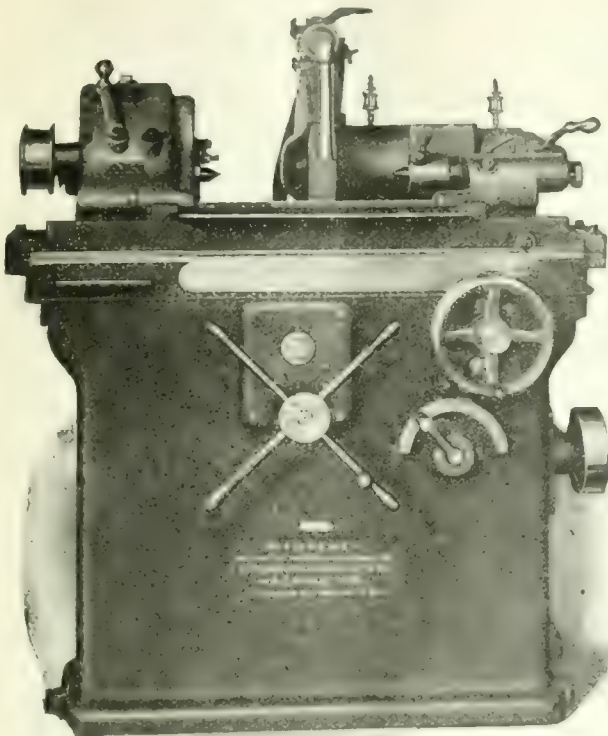
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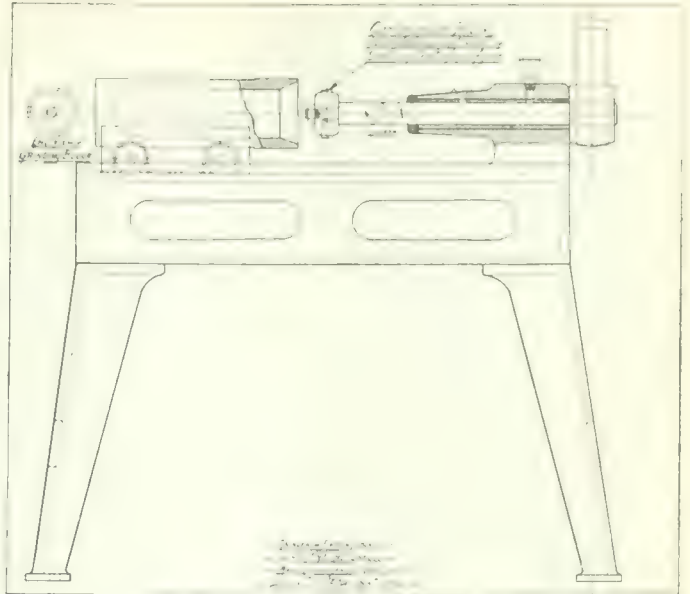
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 Colonial Steel Co., Pittsburgh, Pa.
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 Latrobe Electric Steel Co., Latrobe, Pa.
 Michigan Steel Exchange, Inc., Detroit, Mich.
 Osborn (Canada), Ltd., Sam'l, Montreal, Que.
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 Fairley Davidson Steel Co., New York, N.Y.
 Hawkridge Bros. Co., Boston, Mass.
 Latrobe Electric Steel Co., Latrobe, Pa.
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 Michigan Steel Exchange, Inc., Detroit, Mich.
 Osborn (Canada), Ltd., Sam'l, Montreal, Que.
 H. W. Petrie, Toronto.

Standard Alloys Company, Pittsburgh, Pa.
Vanadium Alloys Steel Co., Pittsburgh Pa
Vulcan Crucible Steel Co., Allquippa Pa
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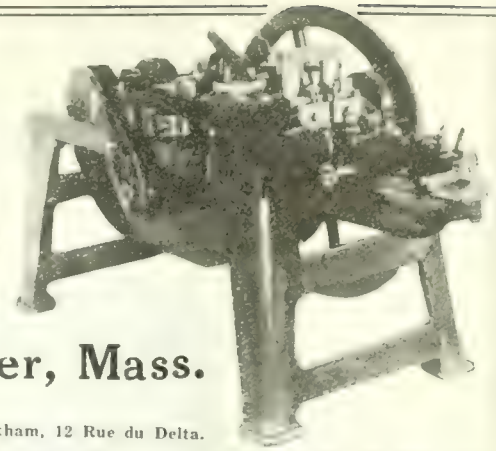
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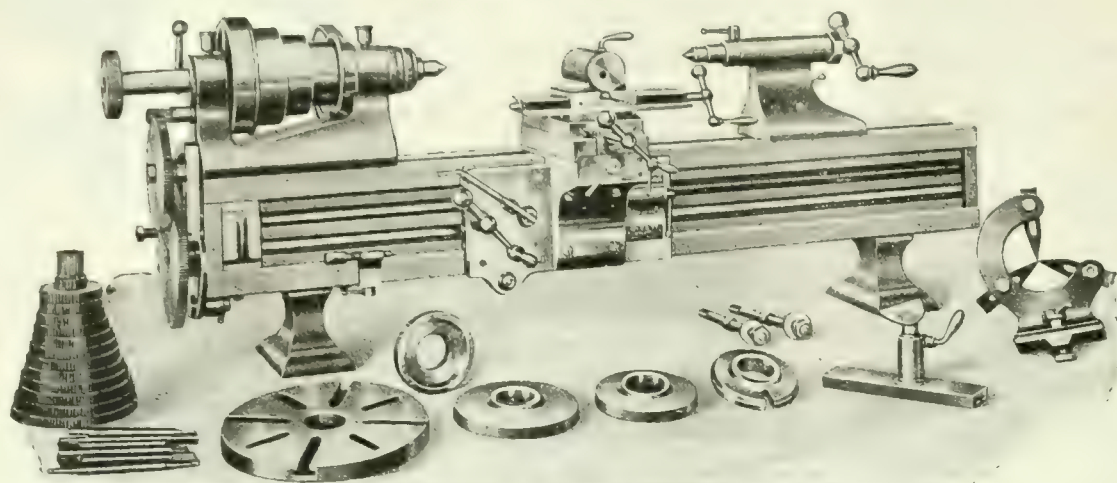
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A weekly newspaper devoted to the machinery and manufacturing interests.

Vol. XVIII.

TORONTO, JULY 19, 1917

No. 3

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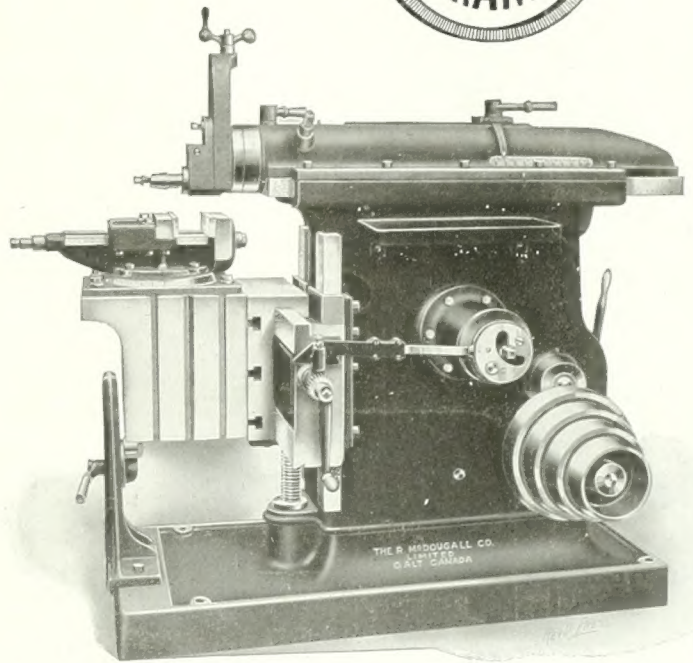
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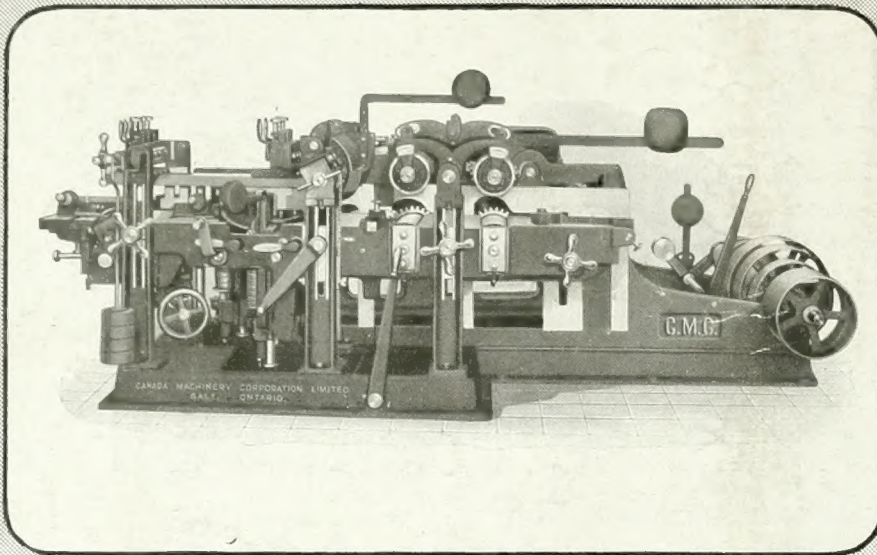
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