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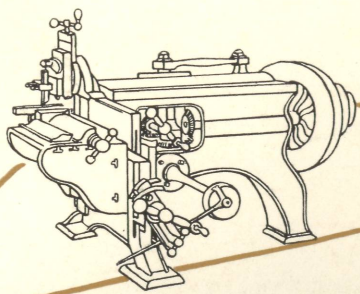
Years

1861

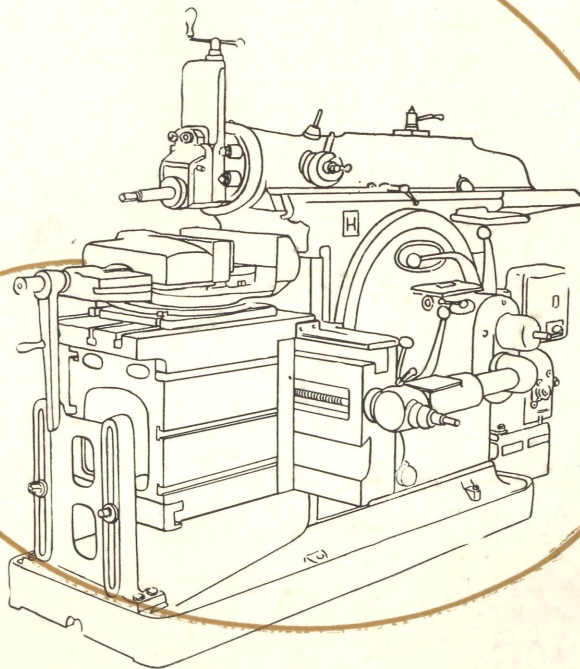
1936

With

Canadian Industry



*A History of Bertram
Machine Tools in Canada
from 1861 to 1936*



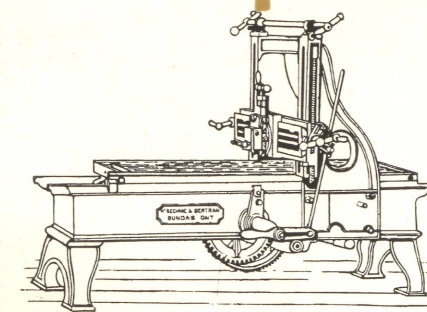


Foreword

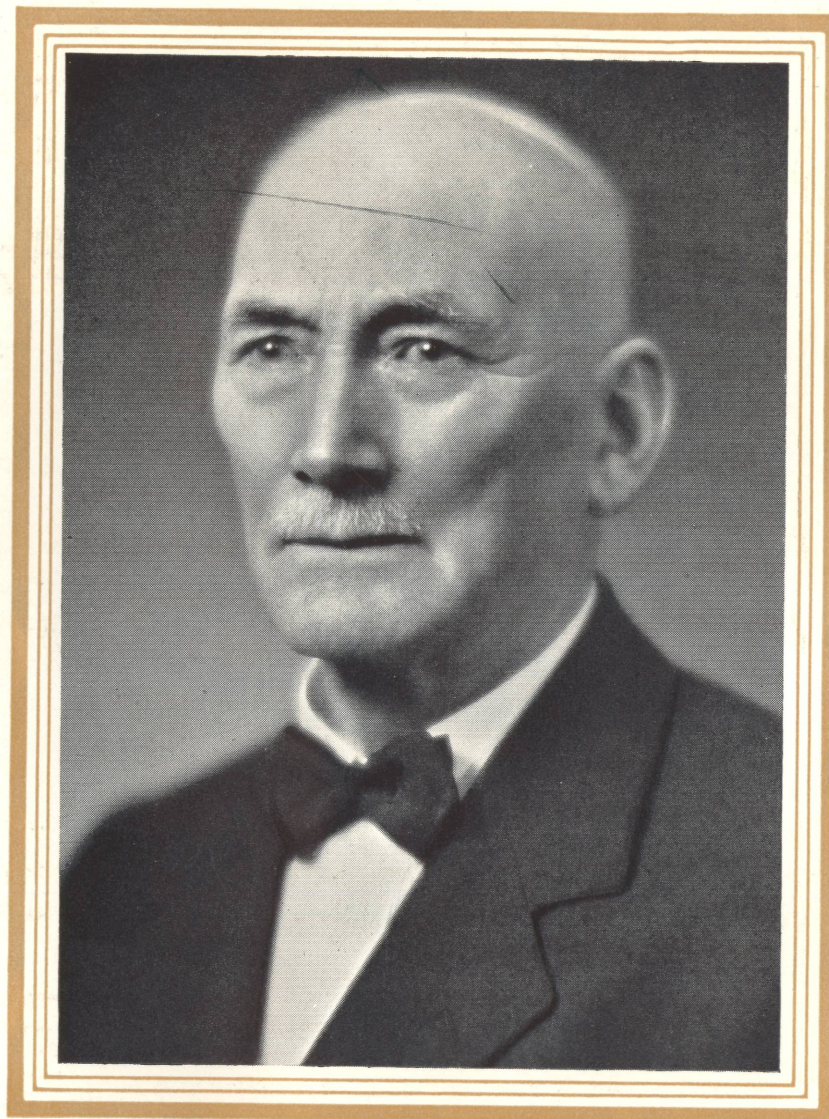
WITHOUT machine tools our modern industrial era would perish. In our homes, on our travels and in our cities we see on every side the products made possible by modern machinery. Yet to the average man in the street the machine tool industry is an unopened book. There is probably no industry comparable in importance which is so little heralded: and this perhaps is as it should be because machine tools are the background of industry.

Since the steam era, and more recently in the electrical transition, machine tools have developed from the crude boring machines which produced a steam engine cylinder one sixteenth of an inch out of round to machines which split the thousandth part of an inch. During the development of Canada's industrial life it has been our privilege to furnish machine tools and machinery to an ever widening metal working community.

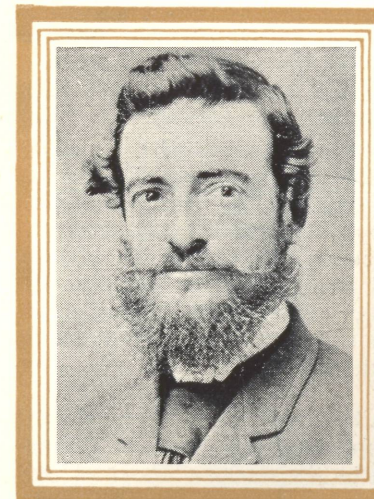
On this occasion of our Seventy-Fifth Anniversary we present in the following pages a short history of our activities. In publishing this booklet we are indebted to our old friends "Canadian Machinery" through whose courtesy the following story is reprinted. Fifty years hence the modern machine tools of today will look as outmoded as many of their forerunners now appear. This is progress. In that future evolution — as in the past — man's servant, the tool, will play its part.



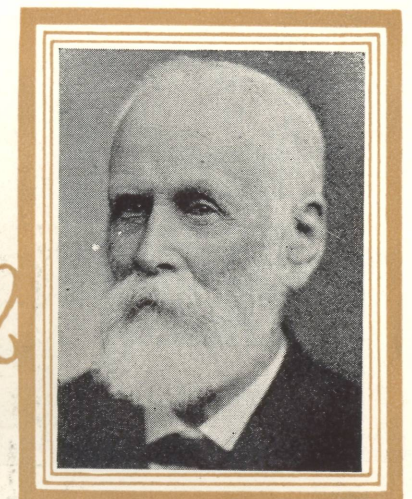
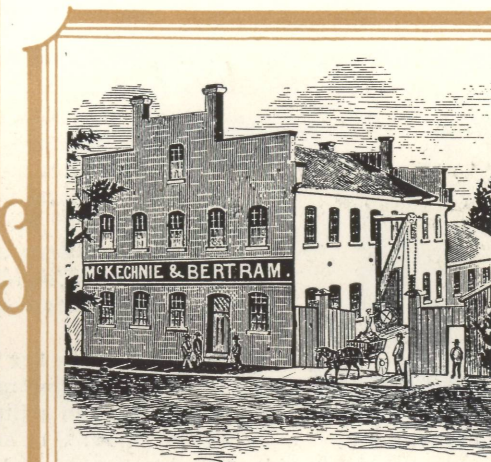
THE JOHN BERTRAM & SONS COMPANY, LIMITED
DUNDAS - ONTARIO



HENRY BERTRAM
President



ROBERT McKECHNIE



JOHN BERTRAM

Bertrams Celebrate Seventy-Fifth Anniversary This Year

by
B. G. NEWTON

Third Generation of Bertrams Now Directing Business Established 1861—A Pioneer in Canadian Manufacturing, This Company Has Made a Vast Contribution to the Building of Canadian Industry

THIS year a great Canadian company celebrates its 75th anniversary—a company which is known wherever machine tools are bought and sold and used—a company which has contributed to the building up of other industries not only in Canada, but in many other countries—a company which helped our great railways to build their rolling stock and keep it rolling, which gave our steel mills and construction companies the tools for fabricating bridges, buildings and ships—a company which, in peace, helped to develop a nation that, in war, was able to give the Motherland the help she needed, supplying not only machine tools for munitions-making, but munitions in great quantities as well. The founding and development of The John Bertram & Sons Co., Ltd., Dundas, Ont., is a fascinating story.

John Bertram, born in Eddleston, Peeblesshire, left Scotland with Elizabeth, his wife, in June, 1852, sailing from Glasgow, and arriving in Montreal in July—the month when the city suffered the greatest fire in its history, over 1,200 houses being burned, with a property loss of over £500,000.

Henry Bertram, son of John the founder of the business, possesses not only a wonderful memory packed with interesting recollections that reach far back into the years, but he treasures many historical documents, photographs, newspapers and records of many kinds. Of these, none perhaps is more cherished than the ticket which gave his father and mother passage on the good ship Clutha.

The ticket calls for "intermediate" passage (somewhat better than steerage it would seem), and the fare for the two was clearly stated to be £8.

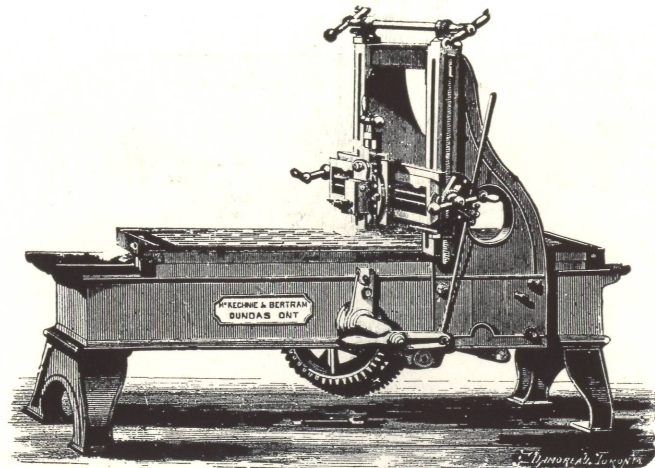
"In addition to any provisions which the passengers may, themselves, bring," the ticket states, "the following quantities at least of water and provisions will be supplied to each passenger by the master of the ship as required by law, and also fires and suitable places for cooking, per week—2½ lb. of bread or biscuit not inferior in quality to navy biscuit; 1 lb. wheaten flour, 15 lb. oatmeal; 2 lb. rice; ¾ lb. sugar; 2 oz. tea."

So pleased were the passengers that, at the end of the voyage, they presented the master of the ship, Captain Bruce, with a silver snuffbox and a suitable testimonial.

A Great Student

ALTHOUGH John Bertram received but an ordinary lower school education, by constant reading and study, he not only became one of the foremost mechanical engineers and manufacturers of his time, but as a hobby he studied astronomy and even constructed a miniature of a reflecting telescope. He was a great student of geology and was among the first to become interested in electricity.

He must have been a prodigious worker, with a great capacity for doing the things which his really great mind conceived. He possessed a remarkable memory and was able to retain the great fund of information he gathered



Forerunner of the present planer, a model made by McKechnie & Bertram.

from books. He was a student of the Bible and was a constant reader of it. He would read aloud from the sacred word and other books in the evenings as his family gathered round him. He knew sacred history. Religion was taken seriously by the Bertram family. There was no whistling on the Sabbath, and the family pew was always full.

Henry Bertram recalls an incident which happened during the Fenian Raid. He picked up a newspaper one Sunday and was reading an account of it when his mother snatched the paper from his hand and placed a Bible in its place. A far cry from those days to the Sunday newspapers with their sixteen pages of comics and stories of bloody adventure.

Each New Achievement a Challenge

JOHN BERTRAM was never satisfied but would seek to improve each new machine which was brought out, ever striving for perfection. Someone has said that an institution is but the lengthened shadow of the man at its head. In this case it is the lengthened shadow of its founder because the traits of character, which made John

Bertram what he was, have been handed down to the third generation. One cannot do business with the Bertram Company without feeling that the spirit of John Bertram is a living influence to this day. He lived until 1906, being in his 77th year when he passed to his reward.

With the father's death, the direction of the business passed to the sons; Alex., later to become Brigadier-General Sir Alexander Bertram, Henry and Jim. The late Sir Alex. Bertram succeeded to the presidency with Henry, secretary-treasurer and general manager. Jim (James B.) who had served his time in the drawing office, at this time had charge of the pattern shop, eventually becoming superintendent of both foundry and pattern shop. But, we are getting ahead too fast with our story.

BECAUSE of the fire in Montreal, there was no place to stay, so John Bertram decided to journey to Toronto. In due course, and sailing on the steamer "Passport" and by way of the canal he arrived at Toronto. Here his guardian angel in the guise of a chance acquaintance, asked him who he was and where he was from. "Are you an engineer?" he was asked, and with the experience of his apprenticeship years with his uncle, Thomas Aimers, Galashiels, in Peebleshire fresh in his memory, he said he was.

"Then you go to Dundas, and to Gartshore's Foundry, and see Mr. Gill" he was advised. He did, and got the job.

The far-reaching effect of war manifested itself even in those days, for the Crimean War, and later the American Civil War resulted in business stagnation in Canada, and John Bertram, in common with many other Canadian workmen, lost his job. He gave up engineering and for a time took to farming in Kent County, only to return to Gartshore's when business picked up again.

In Dundas, at this time, was another Scotsman—Robert McKechnie—who was born in Glasgow in 1835. He came to Canada and to Dundas in 1843. Here he learned the trade of pattern maker at Gartshore's, eventually starting in business for himself with a small pattern and machine shop. In 1860 he formed a partnership, for a time, with Wm. McDonald. The original shop was on Park Street. When this was burned in 1861 a small shop was built on Hatt Street—at the present location of the Bertram works.

In 1863 Mr. McKechnie formed a partnership with John Bertram. McKechnie & Bertram established the Canada Tool Works—a business which, in later years as John Bertram & Sons Co., was destined to become so well known.

Part of the original ticket issued to John Bertram and his wife Elizabeth when they came to Canada from Scotland on the ship "Clutha" in 1852. The amount paid for the passage was £8 for the two and the amount of provisions which were to be given each passenger are clearly stated.

to Sail from Glasgow for Dundas, Ontario on the Clutha day of Sept 1852.

NAMES.	Ages.	Sex.	Rank or Status.
John Bertram	23	M	Adult
Elizabeth Bertram	21	F	Adult

WE the undersigned the Parties herein named shall be provided with a STEAMSHIP PASSAGE to the Port of Dundas in the Ship Clutha with not less than Ten Cubic Feet for Luggage for each Statute Adult and shall be victualled during the Voyage and the time of detention at any place before its termination, according to the subjoined Scale, for the Sum of £ 8 including Government Dues before Embarkation, and Head Money, if any, at the Place of Landing, and every other charge: and we hereby acknowledge to have received the Sum of £ 8 in Advance Payment.

In addition to any Provisions which the Passengers may themselves bring the following Quantities, at least, of Water and Provisions, will be supplied to each Passenger by the Master of the Ship, as required by law, and also Fires and Suitable Places for Cooking—

For each Passenger—

- 3 Quarts Water daily.
- 1 lb. of bread or Biscuits, not inferior in quality to Navy Biscuit.
- 1 lb. of Wheat Flour.
- 5 lbs. of Oatmeal.
- 2 lbs. of Rice.
- 1 lb. Sugar.
- 2 oz. of Tea.

(N.B.—If Mess Utensils and Bedding are to be provided by the Ship, the stipulation must be inserted here.)

Deposits, £ To be Paid before going on Board.

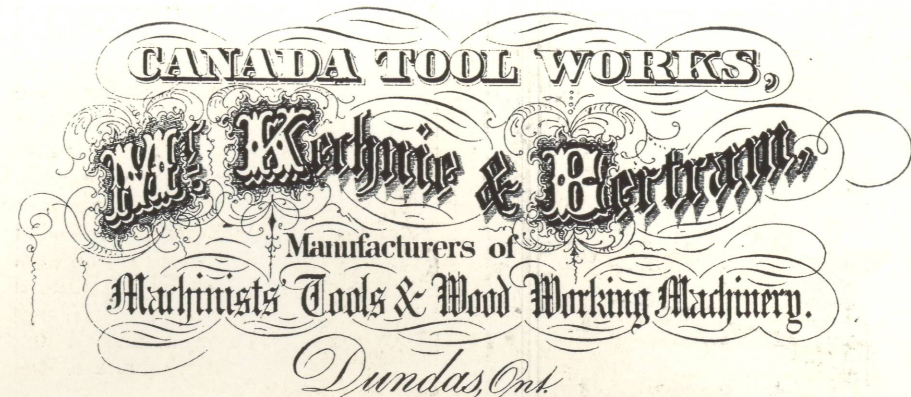
Balance, £

Total, £

Signature, John Bertram On behalf of Owners.

W.B.—This Contract Ticket is exempt from Stamp Duty.

The original letterhead of Canada Tool Works founded by Robert McKechnie and John Bertram in 1861.



A Public Spirited Citizen

THE McKechnie & Bertram union continued until 1886, when Mr. McKechnie retired to private life. He died on October 16, 1909, full of years and with a fine record of public service. Both he and John Bertram believed in taking their share in government, and in all movements for the betterment of their day and generation. Mr. McKechnie, it was stated in his obituary, "was a leading figure in political circles; he was vice-president of the Dominion Board of Trade and for three years president of the Canadian Manufacturers' Association. He was member of the Dundas School Board and president of the Mechanics Institute. He was reeve for seven years and mayor for five. He assisted in 1878 in the inauguration of the National Policy. He ran for Parliament on two occasions."

He was the father of twelve children, the obituary states, which concludes with these words—words which, somehow, seem to apply to the business which he founded "In his business career he has always borne a high reputation for integrity and straightforwardness, his word being as good as his bond."

The Little Acorn

IN THE Bertram archives is the first inventory of the business of McKechnie and Bertram. It shows the value of McKechnie's shares at \$1,018.49. The shop was valued at \$250. (The value of the shops of the Bertram Company today is, we should say, well over ten thousand times the original figure.) Tools \$935.50; raw material \$124.50; finished work on hand \$625. These were the important items, the total value being \$3,202.46.

Industry in those early times, just as it does today, followed the progress and development of the country. Timber was plentiful and wood was the universal raw material. Bridges then were of wood and so were ships and railroad cars. Steel was not thought of as a substitute for wood in a thousand uses. Woodworking machinery was more in demand than metal-working tools, and the McKechnie shops were engaged in the manufacture principally of planers, molding machines and shapers for wood. When John Bertram joined McKechnie they commenced the manufacture of iron tools.

The McKechnie boys and three of the Bertram sons—Henry, Alex. and Jim—were all apprenticed in their fathers' shops, serving five years. A fourth son, Thomas Bertram, studied medicine and has practised in Dundas since his graduation. The first year they received nothing but experience by way of remuneration. The second year, \$2.50 per week, the third year they paid for their board. Both Bertram and McKechnie boarded the boys who worked in the shop. The journal records show such items as "December 31—by 28 weeks' board of Dave Ross—\$70." Money was not exchanged. Business was transacted on a

credit system. The thing somehow always managed to balance.

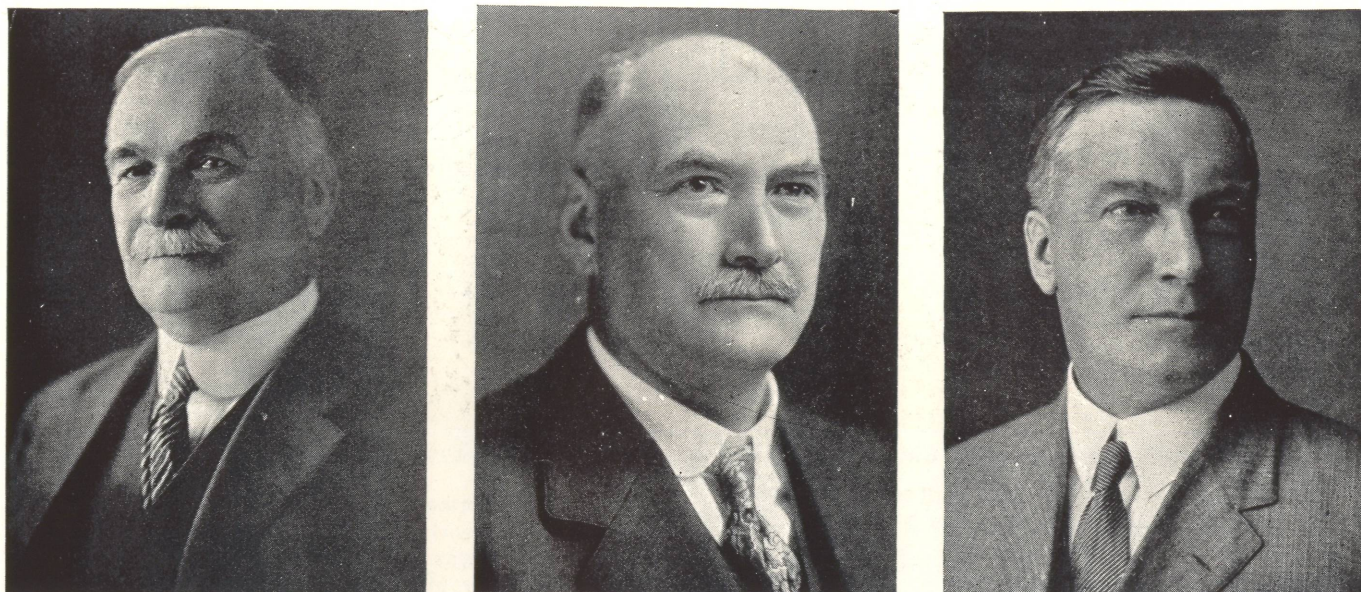
John Bertram had six children—one of them a girl, and a boy who died early in life. Like his partner, McKechnie, John Bertram was a public-spirited citizen and took an active interest in municipal government, acting as mayor for several terms, as well as member of the council.

Canadian Industry Gets Off to a Real Start

THE adoption of the National Policy by the government of Sir John MacDonald in 1879 gave Canadian industry its start in life—a momentum which has increased with the years. It bonused the production of pig iron and gave birth, at the same time, to literally score upon score of shops and factories. Steam railroads became as numerous as bus lines today, and the ancient Bertram correspondence and order files reveal the names of Canadian railroads that are strange indeed to the ear of the present generation. Following is a list of forty-eight railroads to the machine shops of which McKechnie and Bertram supplied tools:



A game of chess in the early days of the foundation of the John Bertram & Sons Co., showing, standing: John Bertram and sitting, left to right, Robert McKechnie, Thomas Wilson and John Wilson.



SONS OF JOHN BERTRAM, ONE OF THE FOUNDERS OF THE COMPANY
Left to right: The late Brig.-Gen. Sir Alexander Bertram, Henry Bertram, James B. Bertram.

Great Western Ry.
Intercolonial Ry.
Grand Trunk Ry.
Port Whitby & Port Perry Ry.
(Changed to Whitby & Port Perry & Lindsay Ry.)
Northern Railway Co.
Lake Erie & Detroit River Ry.
Toronto, Hamilton & Buffalo Ry.
Port Dover & Lake Huron Ry.
Canadian Central Ry. (Brockville).
Cobourg, Peterborough & Mar-
mosa Ry. & Mining Co.
Canada Southern Ry.
Ontario & Quebec Ry.
Buffalo & Goderich Ry.
Welland Ry., St. Catharines.
Erie & Ontario Ry.
Victoria Railway (Lindsay and
Halliburton).
Cumberland Ry. & Coal Co.
(Springhill, N.S.)
Windsor, Annapolis & Kentville
Ry.
Port Hope & Peterborough Ry.

Ottawa, Arnprior & Parry Sound
Ry.
Esquimalt & Nanaimo Ry.
Calgary & Edmonton Ry.
Quebec & Lake St. John Ry.
Northern & Western Ry., (Chat-
ham, N.B.)
Quebec Central Ry.
Hamilton & North Western Ry.
Canada Atlantic Ry. (Ottawa,
Arnprior & Parry Sound Ry.).
Quebec, Montmorency & Char-
levoix Ry.
Algoma Central Ry.
Algoma Eastern Ry.
Credit Valley Ry.
South Eastern Ry.
Port Hope, Lindsay & Bobcay-
geon Ry.
Northern Pacific & Manitoba Ry.
Alberta Ry. & Coal Co.
Temiscouata Ry. & Coal Co.
Erie & Huron Ry.
Kingston & Pembroke Ry.
Midland Ry. (Port Hope).
Manitoba & North West Ry.

United County Ry. (St. Hyacin-
the).
Toronto, Grey & Bruce Ry.
Brockville & Ottawa Ry.
Quebec District Ry.

Ontario, Simcoe & Huron Ry.
Canadian Pacific Ry.
Quebec, Montreal, Ottawa &
Occidental Ry.

The Great Western Railway had its own rolling mill in Hamilton, in which presumably it made some of the materials at least for its rolling stock. This, in time, lost its identity in the now great organization, The Steel Co. of Canada.

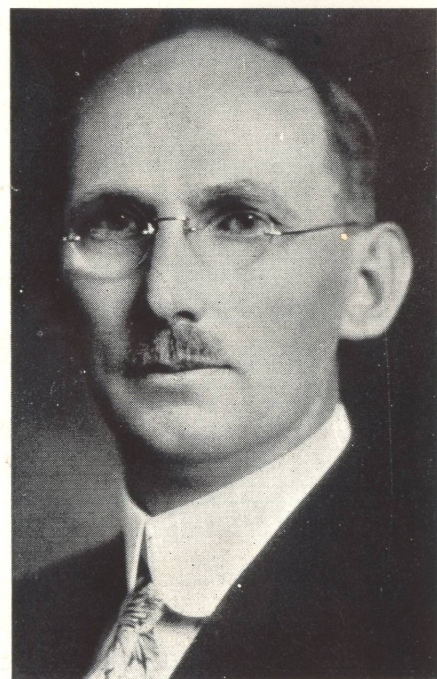
Pioneers in Canadian Industry

THERE are many echoes of those pioneer days in Canadian industry—sounds of water wheels which, made in the primitive shops of the times, were nevertheless the best of their kind and furnished power sufficient for the needs of the day. They furnished power for the machines which, in time, fashioned the less picturesque but more efficient steam engines which took their places—engines which, in turn, were to drive newer tools on which newer engineers fashioned newer prime movers.

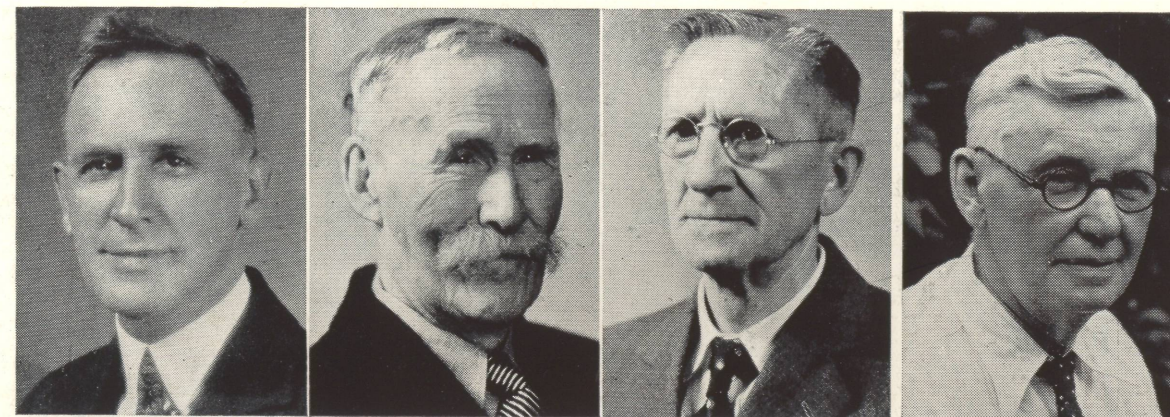
There is, for instance, a letter from Jacob Beck of Baden (Ontario) acknowledging receipt of an order from McKechie and Bertram for a steam engine, and agreeing to take a lathe as part payment. Jacob Beck was the father of Sir Adam Beck, the father of Ontario Hydro development. Adam Beck was a mechanic in his father's shop. Who knows what dreams he had as he helped to build his father's engines—dreams of a new day when, by a miracle of engineering the great water power resources would be harnessed. Did he then have his dreams of a great experiment in public ownership—of Niagara supplying invisible power to every city and farm within a radius of 200 miles, we wonder?

Echoes, too, of forges where the crude, but to that generation wonderful, farm implements were fashioned. With the progress and development of the country there arose a steadily increasing demand for machinery for the farm, with iron entering more and more into their construction. Here again we find shops, wherever there was water power, and a considerable farming community. The advent of the railroad enlarged the market for the farm implement manufacturer even as it carried settlers to new farm homes.

Among the earliest makers of farm machinery were two men who were destined to join hands in building up an industry that is known in every civilized country where



H. GRAHAM BERTRAM
Vice-president and general manager of the company today.



H. W. SIMPSON
Purchasing agent.

GEORDIE TURNBULL
Who started work Dec. 25,
1865.

H. WEBB
In charge of time and
cost dept.

E. TOLTON
Chief inspector.

land is cultivated. We refer to A. L. Harris of Beamsville and H. A. Massey, Newcastle, Ont., president of Massey Manufacturing Co., who, when they merged their interests, carried on the business known as the Massey-Harris Co. In the Bertram files is a letter on the quaint stationery of the times from the office of "A. Harris and Son," and another signed by C. A. Massey, vice-president of the Massey Manufacturing Company, the one dated 1869 and the other 1871.

There is a letter from the Central Iron Works, Toronto, dated 1873. It states that the writer is engaged in the manufacture of patent steam hoisting machines and hand hoists. The letter is signed by John Fensom, founder of a business known today wherever elevators are used—The Otis Fensom Company.

Typewriters Unknown

TYPEWRITERS were not known in those far off but pleasant days. Presidents and vice-presidents wrote their letters in longhand—some, when their hands were greasy, would dictate what they had to say to a bookkeeper or perhaps a handyman. Many of the letters treasured by the Bertram Company carry not only the signatures but the handwriting, from beginning to end, of the big men of the time. John Penman of Paris, for instance, says in 1879, "I wish to put in a first class lathe to do our small repairs at the mill."

Another letter, on common ruled paper, dated 1868, is signed by William Hamilton, founder of the William Hamilton Co. of Peterborough. Another letter on plain paper, dated 1872, at St. Catharines, is signed by Yale & Company, later to become Yale & Towne Company of hoist and lock fame.

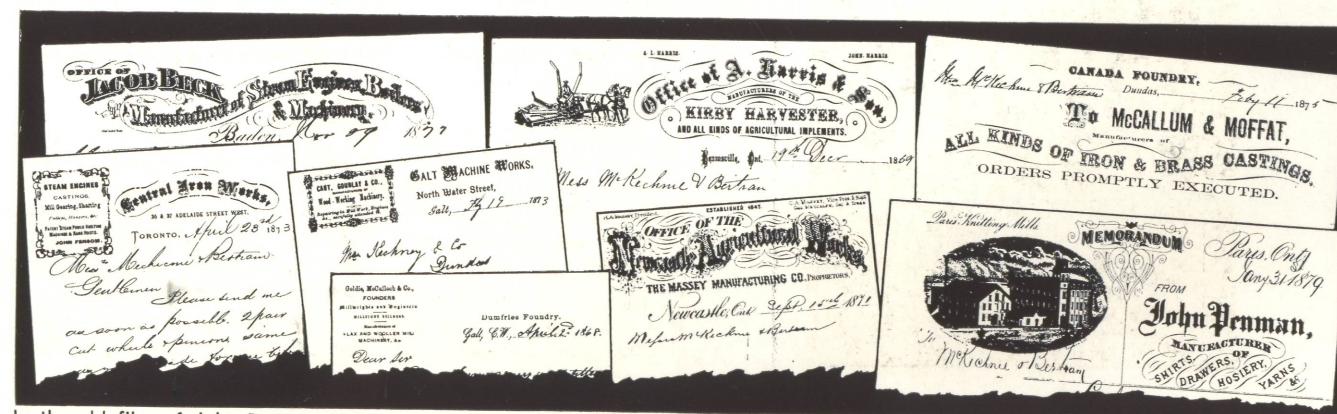
And so, we might go on and on listening to these echoes of bygone days when men of vision, skill and resourcefulness labored to lay the foundation for our industrial structure. Some day, from the material possessed by the Bertram Company, and what other sources may be available, we hope to be able to tell an interesting story of the industrial pioneers of Canada. Meanwhile, we turn reluctantly from files which are so eloquent of the past, and continue the Bertram story.

As we leave the correspondence files may we just mention a bill dated 1865 from George Brown, publisher of The Globe, 26-28 King Street East, for an advertisement for turners—6 times—10 lines—\$1.50; and a letter on the stationery of the Daily and Weekly Telegraph, Bay Street, one door south of King. In small type is a name—the proprietor presumably—J. Ross Robertson, later to become the founder of the Toronto Telegram and well known for his philanthropy.

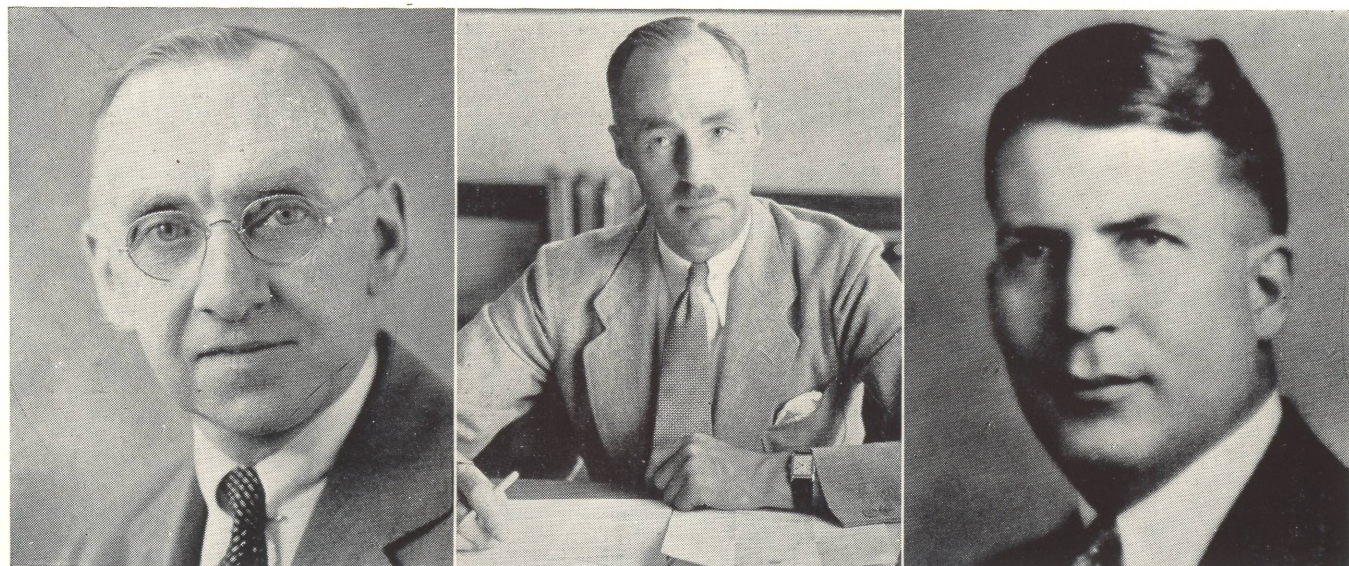
Any time you feel that a cheque stamp tax is something of comparatively recent origin, just remember that there is nothing really new in taxation. Six-cent cheque stamps on financial paper was a quaint government custom back in 1869! Rye whisky sold by the family grocer cost \$1.20 a gallon. There are no toll charges on our great Welland Canal today, but when ships plied the Dundas Canal they were subject to toll charges. This monopoly was in the hands of W. P. Innes, later to become connected with Canadian Cannery.

Great Men Were They

MANY of the engineers who were contemporaries of Henry Bertram have gone on, and there are but a few of that fine fraternity who assisted at the birth of



In the old files of John Bertram & Sons Co., many letters such as these can be found. Above are shown letters from such men as Jacob Beck, father of Sir Adam Beck, A. Harris & Son and The Massey Manufacturing Co. who later joined forces to form the Massey-Harris Co., Goldie-McCulloch & Co., Galt, John Penman of Paris, etc.



HARRY PASCOE
Manager of Winnipeg office.

A. E. R. TURNER
Sales manager.

W. W. BINKLEY
Manager, Walkerville office.

Canada and watched it grow up as a great industrial power. We pay humble tribute to them. Perhaps in years to come the stage through which we are passing today may be considered one of transition. It may be that we have passed from something primitive to something which, in the light of future progress, will be considered advanced but still relatively crude. Be that as it may, there is a romance and drama about our pioneer days which will be forever lacking in the future.

The men of bygone times had both brawn and brains. They needed courage as well as vision. They carried on with none of the methods of rapid communication that we have today when it is no more difficult to speak by telephone to a customer in Montreal or Vancouver than it is to talk to a man in the shop. There were no fast and frequent trains, and certainly no automobiles.

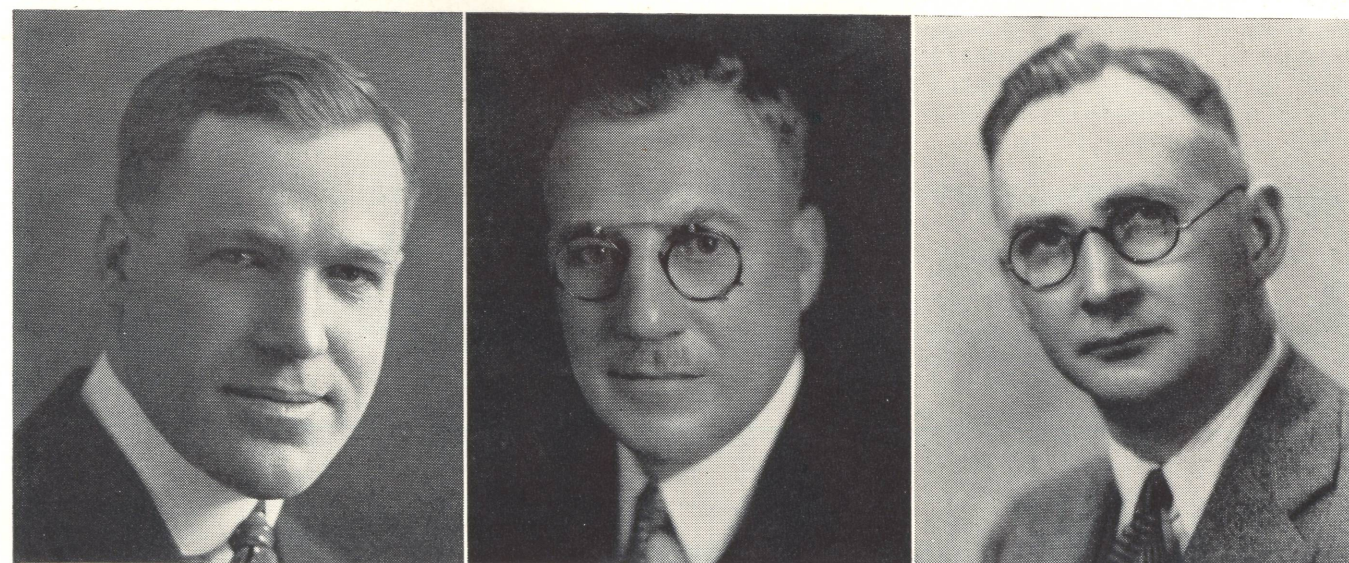
An Echo From "Rebellion" Days

There was little money circulated in the days when Henry Bertram was a young man. Goods and services were the chief medium of exchange. Promissory notes were exchanged, and in time they would be redeemed by

paying in goods or labor or professional services. Mr. Bertram can recall when private individuals were authorized to issue coins of their own and remembers a man named John Leslie of Dundas who minted one-cent pieces, some of which are still extant. Leslie conducted general stores in a number of towns.

It is told for a fact that this same Leslie was obliged to play confidential host to William Lyon Mackenzie one night when the leader of the ill-fated rebellion was on his way to Niagara. He managed to palm him off on a man named Barney Collins who kept him all night. Collins being a rabid Tory, no one ever suspected him. Possibly he was in debt to Leslie, and was able to discharge his indebtedness in this way. Henry Bertram has a wealth of memories of such industrial pioneers as John Abel, L. D. Sawyer, Alex. Harris, of Cockshutt, Waterous, Hamilton, Goldie, Inglis, McCulloch, Hobson, Noxon, Leonard, Nichols, Maxwell, McGregor, Gourlay, Grant, Gurney, Moffat, Beck and a host of other departed giants.

As we have said, progress, change and development in engineering are influenced by the changing currents of the times. Perhaps no other factor was responsible for



JOHN FERGUSON
Manager, Toronto office.

ALFRED MARTIN
Manager, Montreal office.

ANDREW A. BERTRAM
Montreal office.



Group photograph of employees with 25 years or more service with the company. The names, with the year they started in brackets are as follows:—

Back row, left to right: J. W. Smith (1906), E. Housden (1903), A. Carpenter (1910), W. Fry (1898), J. Duckworth (1897), S. Rawnsley (1909), L. Hood (1905), M. Boyd (1912), A. Sanders (1912), D. Layden (1910), F. Brown (1903), F. Mundell (1910), W. Brant (1899), A. Brown (1910), A. Lamb (1912), D. Mitson (1903), P. McManamy (1911), J. Ross (1891), C. A. Fisher (1898).

2nd row standing, left to right: H. M. Webb (1907), H. W. Angold (1895), J. T. Ross (1901), J. Lane (1912), A. A. Smith (1906), W. Stonehill, Sr. (1906), H. Rusby (1900), F. Turnbull (1894), T. Long (1912), F. Builder (1885), W. Stott (1912), J. T. Rae (1910), F. Bennett (1898), R. McFarlane (1909), G. Quackenbush (1902), G. Carruthers (1898), E. Vanderlip (1910), C. Thomson (1906), A. Kennedy (1907), A. Taylor (1906), J. Wichman (1910), W. Laing (1904), W. Davidson (1903).

3rd row sitting, left to right: D. Towns (1889), C. Symonds (1911), W. J. Hendry (1880), G. Chandler (1905), A. Chatland (1903), J. B. Bertram (1886), H. Bertram (1871), H. G. Bertram (1903), H. W. Simpson (1903), G. Turnbull (1865), F. Stoneman (1911), C. Swain (1912), A. Walker (1903), G. Stutt (1907), G. McKowan (1909), E. Tolton (1897).

Front row, left to right: J. S. Clark (1902), J. S. Gordon (1912), N. T. Finlayson (1905), A. E. R. Turner (1911), T. Fechnay (1903), J. Carmichael (1907), A. McIntosh (1901), J. Martin (1898), J. O. McDonald (1912), G. Wilson (1910), A. C. Clark (1900), J. Thomson (1904), W. Derry (1898).

the rapid expansion of the Bertram business as the pushing westward of the Canadian Pacific Railway over fifty years ago. Construction work on such a large scale resulted in a demand for tools of maintenance as well as engineering equipment for car and locomotive shops and for divisional shops of the railroad itself.

As rolling stock became heavier, stronger rails and bridges were required. As rails and bridges were able to bear heavier loads the weight of cars and locomotives was increased. New tools were developed by the Bertram Co. as the need arose and gradually the woodworking tools were dropped. In those days machines were sold on long terms and woodworking shops, with little or no fire protection and insurance, offered poor risks for the manufacturers who had supplied the equipment on the deferred payment plan.

The introduction of iron working tools was a welcome innovation, not only because of the better risk as far as shops were concerned, but because of the growing demand as well. Henry Bertram has very definite recollections of personal contacts with all the leading railway men of the time when railroading seemed to possess more picturesqueness and glamour than it does today.

John Bertram made the tools on which S. J. Hungerford, president of the Canadian National Railway, worked during his apprenticeship years in the shops at Farnham, Que. Sir William Van Horne was the only railway man with whom Henry Bertram had no personal contacts—all the rest he knew or knows from coast to coast.

Canada Strikes Oil

ANOTHER development which gave a great boost to the manufacture of iron tools was the discovery and rapid exploitation of the Petrolia oil fields back in 1866. There grew up a big demand for drilling machinery, of course, but in its train steam hammers, lathes, shapers, planers and pipe machinery. At that busy time there came to the Bertram shop a lad named Turnbull—Geordy Turnbull. He commenced work on Christmas night, 1865 as

engineer in charge of the six horsepower engine which was capable of supplying ample power for the shops' needs in those days.

That was 70 years ago, last December. Geordy Turnbull is still with the company, proudly holding down the job of tool keeper—a link with the past. He is more than a valued employee—he is a Bertram tradition, and we should not be at all surprised a quarter of a century hence, if we are permitted to inspect the Bertram shops in 1961, to see Geordy Turnbull in his accustomed place.

Join Hands With Niles and Pratt & Whitney

IN 1905 the Bertram Co. formed an alliance with the Niles Bement Pond Co. and the Pratt & Whitney Co. This connection was mutually helpful, since it gave the Bertram Co. the benefit of the engineering developments, patents, patterns, blueprints, designs and engineering research of an organization operating in a much larger market. It gave the Niles Bement Pond and the Pratt & Whitney Co. an outlet for their products in a growing market under more favorable Empire conditions (made in Canada) than would otherwise have been possible. Shortly afterward the shops and foundry were enlarged to sufficient capacity to meet all requirements until the great war transformed this and many other peace-time shops into munitions factories.

The Second Generation of Bertrams Assume Direction

UPON the death of John Bertram, April 4, 1906, his eldest son, Alexander, later to become Brigadier-General Sir Alexander Bertram, assumed the presidency of the company with his brother, Henry, secretary-treasurer, in active management of the works. Both, as we have said, were trained as machinists and engineers in their father's shops. Alexander possessed a fine and very likeable personality. He had countless friends. He soon interested himself in sales, and spent much of his time in Montreal, where a great deal of the Bertram business originated. He would superintend the installation of equipment and often lend a hand, especially in the earlier days.

Alexander Bertram

ALEXANDER BERTRAM was best known for the tremendous contribution he made in organizing the manufacture of munitions in Canada. It was for the part he played that he received his knighthood. Colonel David Carnegie in his book, "The History of Munitions Supply in Canada 1914-1918" (himself a member of the Munitions Board), pays a fine tribute to the chairman of the original Shell Committee—General Sir Alexander Bertram—in the following words:

"It was while passing through Winnipeg on August 4, 1914, that he heard war was declared by Great Britain, against Germany, and wired immediately to the Minister of Militia volunteering his services for the front and also the services of his company for the manufacture of war munitions.

"General Bertram's proposal to go overseas was no empty offer. Although he was trained in the works of his father as a mechanical engineer and had become one of Canada's industrial leaders, he was also a soldier of no mean order. From bugler in the 13th regiment, Hamilton, he rose to the command of the 77th Wentworth Regiment, and subsequently to the command of the 3rd Infantry Brigade, West Ontario. In 1909 he commanded the Bisley team with great distinction and received the Colonial Auxiliary Forces Officer's decoration.

"It was there in the offices of the president of John Bertram and Sons that the policy of the Shell Committee (called into being by the late General Sir Sam Hughes) was formulated and established," Colonel Carnegie continues.

"Under his wise chairmanship the work grew rapidly. He threw himself into all the problems which confronted the committee, and fathered with energy and skill their solution. Whether the problems related to basic steel, inspection, raw materials, shortage, explosives, cartridge cases, copper bands or fuses, all were the same to him; they had to be solved. He won the affection of his colleagues and staff, whose energies were devoted to the work which he directed so thoroughly."

Henry Bertram

GENERAL BERTRAM carried a tremendous load during the war. No man worked harder and few as hard. His was a great responsibility. The allied cause depended

to no small extent upon the Shell Committee. Bertram experience and Bertram facilities were placed freely at the disposal of the Minister of Militia. But upon Henry Bertram fell the task of putting the Bertram shops and staff on a war-time basis. Methods of shell manufacture had to be quickly developed, special equipment had to be designed, and the shop itself used to turn out shells.

The mad rush that followed is today but a memory, but many in the Bertram organization vividly recall the stirring incidents of those hectic days. The strain could not fail to leave its mark upon the men who carried the load. Henry Bertram, although surrounded by able engineers and business executives, was naturally the pivotal man about whom all activities revolved. His was the responsibility of making important decisions every hour of the day for four long years. The shops were enlarged and a new office building had to be constructed. An infinite variety of new tools had to be designed for a hundred new uses. The death of a much loved son, Aimers, who was killed overseas, did not make the burden lighter.

For years Henry Bertram worked without a holiday. In the period immediately following the war the Niles Bement Pond Co. expressed a desire to be relieved of their interests in the Dundas shops. The Bertram Co. purchased their stock and complete control of the business passed again to the Bertram family. To Henry Bertram fell the task of piloting the ship during this period of reorganization and the troubled waters of the post war slump in machine tools. The business had to be put back on a peacetime basis—in itself a gigantic task.

By this time H. Graham Bertram, Henry's eldest son, was well groomed to take over some of the duties of management, and at last the time seemed to have arrived for a long-deferred visit to South America, Australia and New Zealand, where many of the company's tools were in use, particularly in the railroad shops. It seemed that a long-cherished ambition was about to be realized, and Henry Bertram left in high spirits on his first vacation. Unfortunately, on this trip he suffered a severe break-down, and when, after spending some months at Rotorua, the famous health resort in New Zealand, he returned to Dundas, it was to wisely surrender the responsibilities of the company management to his eldest son.

Henry Bertram has but one hobby—that of growing flowers. To it he turned for health and strength, and it



GROUP PHOTOGRAPH OF PLANT SUPERINTENDENT AND FOREMEN

Sitting, left to right: F. Builder, tool room foreman; J. T. Rae, foreman of planing dept.; H. W. Angold, plant superintendent; O. E. Sweet, erecting foreman; J. Clark, foreman drilling and boring dept.
Standing, left to right: W. Stott, blacksmith foreman; A. A. Smith, foreman electrician; F. Dobson, foreman, lathe dept.; M. Scrimger, chief inspector; D. Devoy, chief storekeeper; P. Kearns, foundry foreman.

did not fail him. Today, in his eighty-first year, he is hale and hearty, up bright and early every morning, out among his beloved friends—his flowers. He possesses what is probably the finest rose garden in Canada. Certainly in the quality of his blooms he is without a rival. For many years he carried off the honors in practically all classes at the Annual Rose Show in Toronto. Second only to his roses is as fine a collection of peonies as will be found anywhere.

His garden and grounds, rich with rare specimens of flower, shrub, plant and tree, is a thing of beauty. It is the mecca of hundreds of visitors—old friends who love both the man and his flowers. The grounds overlook the valley and the town of Dundas, the shops in evidence but, seeming to know their place, they do not intrude on as fine a piece of landscape as the eye could dwell upon—certainly the eye of the man who lives at Glenholme where his father lived, and who must have loved the same picture.

Third Generation Takes Over

H. GRAHAM BERTRAM, the active head of the Bertram business today, is a conspicuous figure wherever men are wont to gather. He stands six feet four, broad of shoulder and big of limb, well built physically to carry the responsibilities of office. He graduated with honors from Queen's as a B.Sc. in 1910, serving his apprenticeship in the family works as part of his engineering education. He was employed for a time in the shops of the C.P.R., Winnipeg and by the Mexico Northwestern Railway, gaining experience that was to be of practical value in later years. He also spent some time in Central America on steel construction work. He returned to his father's business in 1913.

Like his father, Graham takes a keen interest in the affairs of the Canadian Manufacturers' Association, and has worked on various committees for several years. He is a member of the Executive Council and the Tariff Committee. He married Miss Mabel Richardson, daughter of the late Senator Harry Richardson of Kingston, in 1921. A member of Ancaster, Kingston and Dundas Golf Clubs, he believes in the ancient Scottish game whether he spends much time at it or not.

In recent years, while industry has been digesting the glut of machine tools which the depression threw on the market, the Bertram Company have widened their manu-

facturing activities, and while improving their machine tool line and keeping it in step with developments in design, they have branched out extensively in the building of mine hoists, air compressors, rock crushers, paper winders and rolling mill machinery.

The shops are admirably equipped with both machines and men to handle work requiring unusual precision and accuracy, and the bigger the job the better.

The Pratt & Whitney shops, in addition to turning out the regular line of P. & W. small tools—twist drills, taps, dies, milling cutters, reamers, etc., are engaged in making fine dies, jigs, gauges, etc.

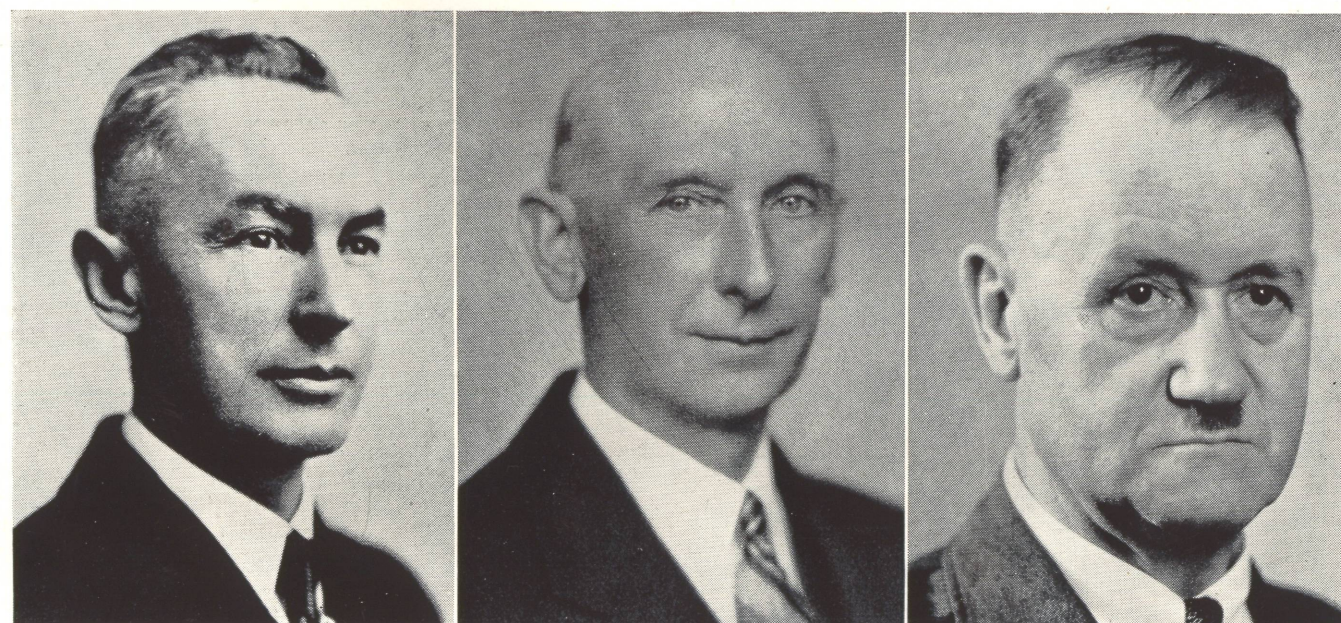
A FEW years after the alliance with Niles Bement Pond and Pratt & Whitney, the shops of the Bertram Company were greatly enlarged. An adequate system for storing patterns and drawings was considered necessary. Up to that time much of the detail was carried in the retentive minds of the foremen and the shop executives, but the time came when changes were so rapid and so radical that only a modern system could handle them.

For several years castings were brought over from the Gurney Foundry in Hamilton, and many trips Alex. Bertram made over the hilly five-mile road with horse and wagon. The introduction of heavier machinery and the steady and highly specialized business of the company made it advisable to operate their own foundry. Pig iron in the early days was imported from the Old Country, later Rogers Brown & Co., in Buffalo, supplied their requirements, but as soon as pig iron of the required quality was produced in this country Canadian pig was used.

A new foundry building was erected. This was described in detail in the September, 1906, issue of Canadian Machinery. It was 210 ft. by 109 ft., divided into three bays. It was equipped with two cupolas, and had a gallery which served as a charging floor and a store room for sand and castings.

The foundry then built, since modernized in the matter of equipment, still serves the needs of the company.

The original shop of the Canada Tool Co. was burned in 1867. It was 24 x 40 feet. A new building was erected 40 x 60 feet. "In 1868 a two-story brick building was added and then extended in the front," says an article in Canadian Machinery, November, 1907. "Then a molding shop



N. T. FINLAYSON
Works manager.

H. W. ANGOLD
Plant superintendent.

A. W. PARKES
Chief engineer.

was added in the rear, and finally the triangle was closed by the erection of a two-story brick structure, leaving in the centre an area of 80 x 100 ft.

"Building operations were continued in 1899, when this company erected a steel structure, converting the hollow area enclosed by the original buildings into an erecting shop, equipped with both a 10- and 15-ton travelling crane and a railroad track communicating with all the other departments. This structure is one story with a clear height of 28 feet overhead, and is roofed with heavy glass and corrugated iron. The progress of the works is shown in the number of men employed. Six years ago 150 were given employment, and there are now 425 enrolled."

The floor space at that time, 1899, was 67,000 square feet, including 12,000 square feet in the gallery.

The original unit of the present works still stands. The other, and more modern buildings, as might be expected, adopt a patronizing attitude toward it, but mindful of other days when it was the pride and joy of the owner, and mindful, too, that it is the mother of those that followed, and which now smile indulgently upon it, it remains aloof—a part and yet apart—brooding over what has gone before.

The Sales Department

BRANCH sales offices are maintained in Montreal, Toronto, Walkerville and Winnipeg, while export sales are handled by the Niles Company.

A. E. R. (Arthur) Turner, sales manager in Dundas, had a thorough grounding in the practical end of the business, having served his time in the Bertram shops. His apprenticeship term was interrupted by the war. He enlisted as a private and won his captain's commission on active service. Following the war he completed his apprenticeship, when he went to the head office of the Niles Bement Pond Co., New York, in 1921. He also spent a year at the Pratt & Whitney Works in Hartford, after which he was appointed manager of the Cleveland Office of the Niles Bement Pond Co.

He rejoined the Bertram Company in 1927 and was appointed manager of the Montreal office when James Young became vice-president. Mr. Turner was appointed sales manager in 1931.

It was during Mr. Young's tenure of office as sales manager that the Bertram and Pratt & Whitney line was supplemented by carefully selected American agencies. This change in policy gave the sales force an opportunity to offer a more complete machine tool service.

Canadian representation for the following lines was arranged:

Cincinnati Milling Machine Co., Cincinnati, Ohio. Manufacturers of milling machines of all types. Known the world over for the quality of their tools and their advanced designs.

Cincinnati Grinders, Inc., Cincinnati, Ohio. Manufacturers of grinding machines that are as good as Cincinnati milling machines.

Jones & Lamson Machine Co., Springfield, Vt. Makers of the well-known "J. & L." turret lathes, Hartness comparators, Fay automatics and die heads.

Acme Machinery Co., Cleveland, Ohio. Manufacturers of nut and bolt machinery and forging machinery.

Abrasive Machine Tool Co., East Providence, R.I. Makers of precision grinding machines.

Branch Offices

The Montreal office is in charge of Alfred (Fred) Martin, who joined the Bertram Company in 1912. He served his apprenticeship in the shops of the Alfred Herbert Co., Coventry, England.

Associated with Mr. Martin is Andrew Bertram, brother of Graham, and Henry Bertram's youngest son. He served his apprenticeship where his father served his. He was educated at Ridley College.

John Ferguson, in charge of sales in Toronto office, has thirty years with the Bertram Co. to his credit, having started his apprenticeship in 1906. For some years he was in charge of cost and time departments. He spent some times in the Montreal office, and with the Niles Bement Pond Co. prior to opening the Toronto office. It is interesting to know that Mr. Ferguson's father served his apprenticeship with Mrs. John Bertram's brother in Alloa, Scotland.

H. Pascoe, manager, Winnipeg office, served his apprenticeship in the C.P.R. shops in Winnipeg, and joined the Bertram Company in 1923.

W. Binkley, manager, Walkerville office, graduated from the Pratt & Whitney office in Dundas.

The Bertram Co., when they purchased the Canadian interests of the Niles Bement Pond and Pratt & Whitney Companies, made arrangements whereby they continued to have the benefit of new designs, and to take advantage of development work.

The Bertram Company act as agents for such few Niles Bement Pond and Pratt & Whitney lines as are not actually manufactured in the Dundas shops.



Although Henry Bertram is still a familiar figure in the offices of John Bertram & Sons Co., he spends a good deal of time with his garden of which he is justly proud. He is seen in his peony garden in the centre view, while on the extreme left is shown his home, "Glenholme," Dundas, and on the right a corner of his rose garden.

BUILDING BERTRAM TOOLS TODAY

by James Breakey

Just As a Story of the Growth and Expansion of the Bertram Company Reflects and Records the Development of Industrial Canada Over a Period of 75 Years, So Will a Picture of Present-Day Canadian Industry Be Seen Reflected in a Description of the Bertram Plant and Products of Today

NO CLEARER picture of the development of the Dominion of Canada during the last 75 years could be obtained than a concise story of the development of the John Bertram & Sons Co., Dundas, Ont. Seventy-five years ago, John Bertram and Robert McKechnie founded a small plant, Canada Tool Works, in Dundas, and through the intervening years has grown the large plant which exists today, manufacturing equipment for the Canadian field. In those early days, production machines were unnecessary and unheard of, while the great mining development had yet to come. Nor had the pulp and paper industry developed to anywhere near the importance it occupies in the industrial life of Canada today.

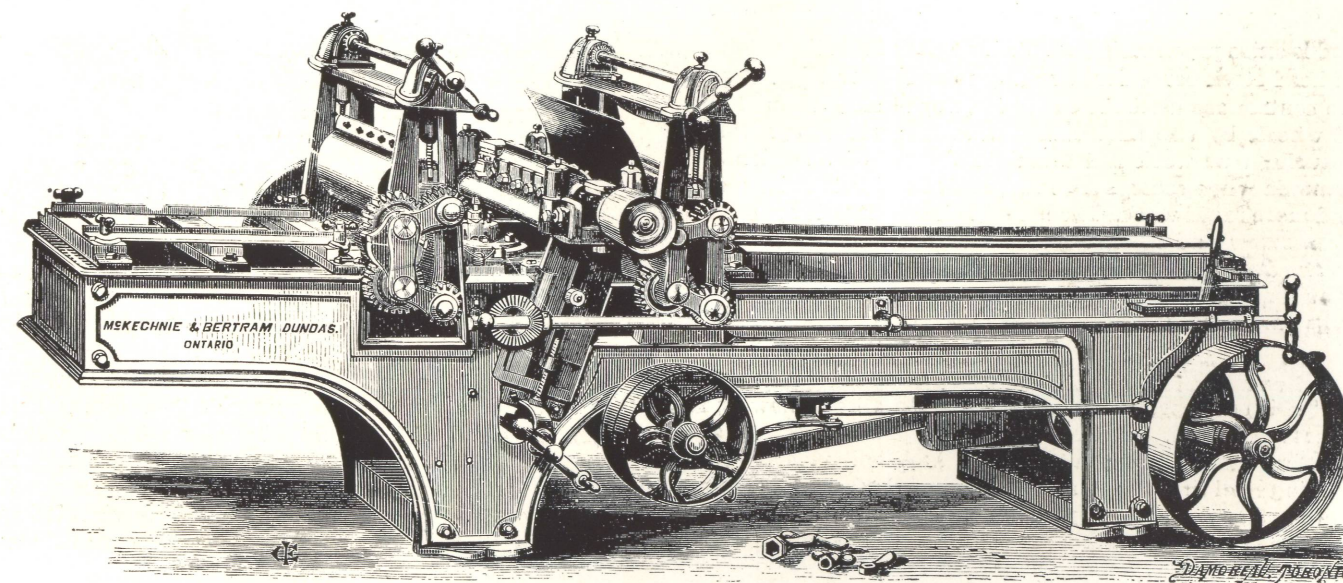
In the early years, when the Bertram Company was founded, lumber was plentiful, and in consequence, wood was the universal raw material. There were at that time one or two railways, but it was not until 1879 that the adoption of the national policy by the government gave Canadian industry a start in life. With the beginning of this era, steam railroads became dotted all over Canada and steam power was also used for the few industries which then existed. In later years, by the introduction of electricity and consequent development of hydro-electric plants throughout the Dominion, cheap electrical power was available for all industries. Throughout the development of the industrial eras, however, the John Bertram plant has manufactured an ever-increasing line of equipment for the many industries and railroads.

In the early years of its foundation, there was a demand for steam engines for the lumber mills, and to meet this

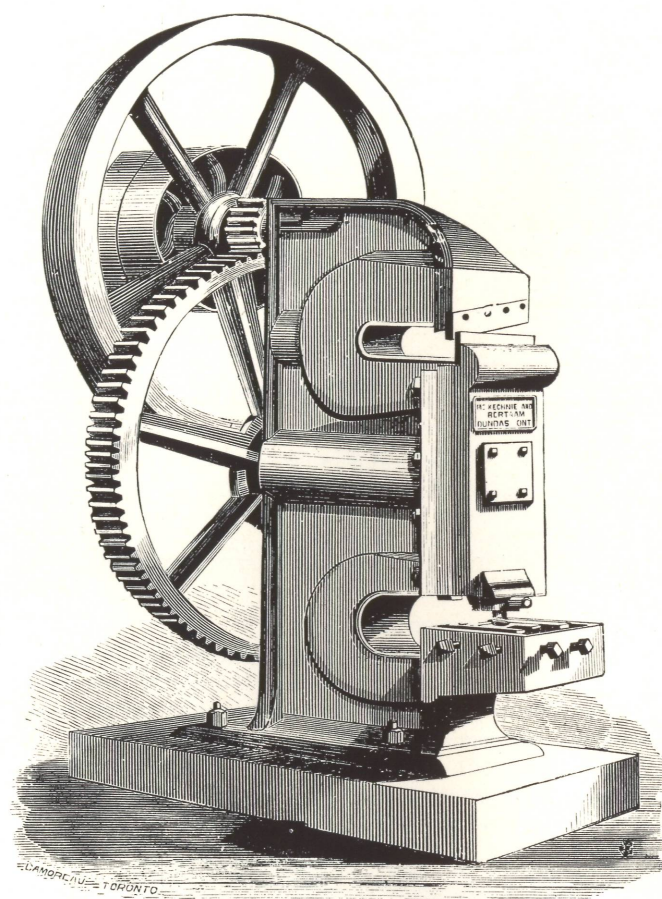
demand for steam engines, machine tools were required which would assist in the making and maintaining of this equipment. In addition, it was realized that woodworking machines were a necessity for the woodworking plants, with the result that some of the first machines manufactured by this company were woodworking machines, such as planing and matching machines, surface planers, molding machines, upright shapers, car mortisers, scroll saws and band saws.

Not only were machine tools required for the making and maintenance of steam engines for the lumber mills, but the railway era had already commenced, the first railway from La Prairie to St. Johns, Quebec, having been opened about 1850 and the number rapidly increasing. There was, in consequence, a demand for metal working machine tools and a fairly complete line was manufactured in the early years of the Bertram Company. These included more or less standard machine tools, such as planers, shapers, drills, milling machines, lathes of various descriptions, bolt cutters, punchers and shears, slotting machines, plate bending rolls, steam hammers, radial drills, and special machine tools for the locomotive industry such as car wheel lathes, car wheel borers, and a multiple spindle drill had also been developed by 1888, and a description was included in the catalogue issued that year.

In this same catalogue a comprehensive list of the manufacturers served in that period is given, it being stated that the firm was completely equipped to supply "car builders, locomotive builders, implement manufacturers, bridge work, and planing factories."



A product of McKechnie & Bertram, an early model wood planer.



Made when the Bertram Co. went under the name of Canada Tool Works. An early model punching and shearing machine.

THE machine tools manufactured in those days were vastly different from those of today and while, in some cases, the design of the present day machine bears a resemblance to the early models, in other cases the design has been totally changed. A description of some of the early types is contained in the "John Bertram & Sons Co. Ltd., illustrated Catalogue of Machinists' Tools and Wood-working Machinery, 1888."

48-inch Wheel Turning Lathe

"This lathe is specially adapted for turning wheel tires, and is extra powerfully geared. Two pinions on the outside of head-stock serve for changing to double or triple gear. No centres are used. The axle is gripped close to the hub of wheels by two universal chucks with steel dogs, thus ensuring true work and complete absence of vibration so common when centres are used, and allowing heavier feed and more rapid work. The movable head-stock is operated by a screw and reversing belt for quick removal of the work. Fast and loose pulleys on countershaft, 24 x 6, and should make 130 revolutions per minute. One set gripping dogs furnished. Weight, 26,000 lb.

79-inch Locomotive Wheel Lathe

"This cut represents our new Wheel Lathe of new and approved design. The head-stocks are powerfully geared, the first motion being cut giving a high belt velocity for turning steel tires. They are so arranged that one face plate can be changed to fast speed for boring. The head-stocks and rest-saddles are gibbed to the top surface of the bed, and can be moved to admit 8 feet 6 inches between face plates. The lathe swings 79 inches in diameter. The two compound slide-rests are fitted on cross-saddles, which

allow them to be quickly set to any position within the range of the lathe. They are operated by ratchet feeds worked from overhead rockshaft. This lathe has great solidity while turning any diameter as the pressure of the cut always falls within the bed. The cone pulley is of large diameter, wide face, and has four grades of speed. Countershaft, fast and loose pulleys 24 in. diameter and 7 in. face, making 140 revolutions per minute. Weight 34,000 lb."

Still more interesting perhaps are two descriptions of machines described in "the McKechnie & Bertram's Illustrated Catalogue of Machinists' Tools and Wood-Working Machinery" of 1876, or fifteen years after the foundation of the firm.

Iron Shaping Machine 18 Inches by 10 Inches

"This machine is particularly adapted to the planing of small surfaces, while having a capacity to plane surfaces 18 inches by 10 inches. The smallest work usually done in the vice can be turned out rapidly.

"The tool holder has a quadrant operated by hand, and by which concave surfaces can be worked out to the smallest diameter.

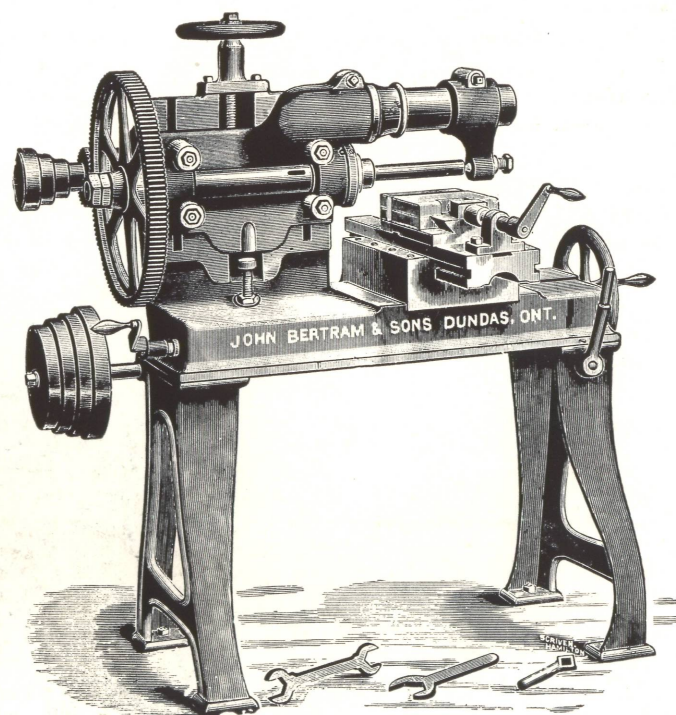
"This machine has Whitworth's quick return motion, all the working parts of which are steel (tempered), only one wheel and pinion being used in imparting motion to the ram. The stroke can be reduced from 10 inches down to zero. The cross-slide is raised and lowered by screws on each side.

"The table can be removed from the block, in which is a steel mandrill for circular work, which has the advantage of raising and lowering with the cross-slide to work any diameter.

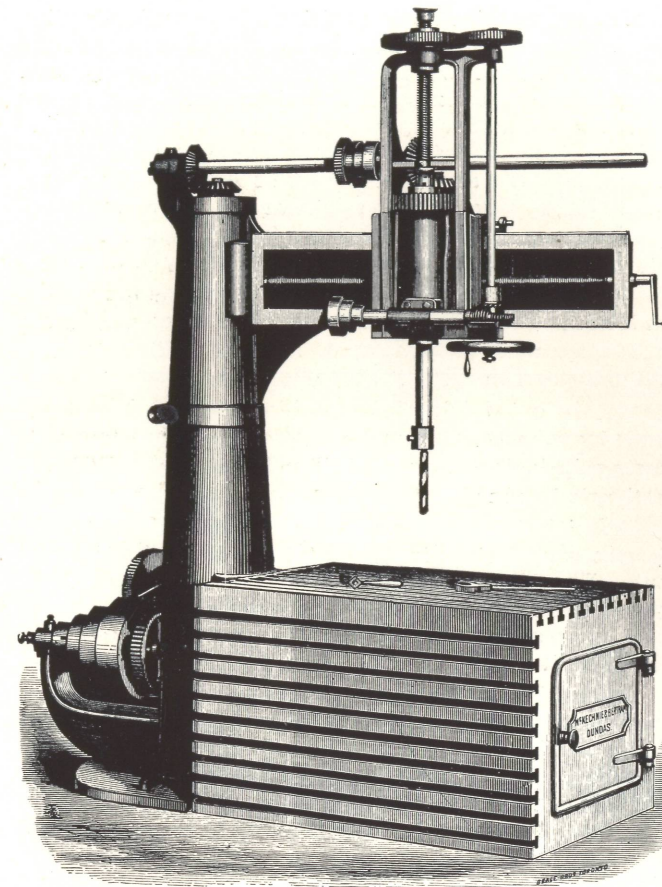
"The screws, shafts, feed rod, crank pins, bolts, nuts and pawls are of steel. The frame is heavy and the ram of extra length with large bearing surface.

"There is furnished with this shaper a suitable vise, countershaft and hangers, wrenches, etc.

"Tight and loose pulleys on countershaft 15 inches diameter and 3½ inch face. Revolutions per minute 130. Weight of machine 2,800 lb.



One of the early models of milling machines made by John Bertram & Sons.



An early model radial drill made by McKechnie & Bertram in Dundas.

No. 4 Lathe

"This lathe the smallest we manufacture, is largely used by agricultural implement and machine makers. It is the same style as our No. 3 lathe. It swings 16 or 20 inches over the bed as required by customers.

"The spindle is of cast-steel. It has wide cones and gear for its size. The carriage has long bearing on the bed, and is gibbed down; the lathe when ordered can be made with an elevating tool rest which is operated by a screw on the back.

"The rod feed is the same style as our No. 3 lathe, worm gear steel and wrought iron. The pinion working into the rack is cut of brass, and large diameter producing an equal and true feed.

"Countershaft, steady and follow rests, 15 changes of screw gear and 3 changes of feed gear. Countershaft pul-

leys 10 inches diameter and 2½ belts, revolutions per minute 150. Weight 1,700 lb."

Development of Machine Tools

GRADUALLY the manufacture of woodworking tools was discontinued and the efforts of the company were directed solely toward the manufacture of metal working machines. The manufacture of machines for the industries specified in the catalogue were gradually improved and the lines increased. The introduction of electricity necessitated stationary steam engines being replaced by the cheaper electric power and a demand was created for machine tools which could be successfully used in the manufacture of the large generators, motors, etc. for the production and use of electricity.

Two of the largest machine tools manufactured for the purpose of producing large equipment for the hydro-electric power plants of the Dominion consisted of a 36-ft. boring mill built for Canadian Westinghouse Co. in 1924. At about the same time an extension boring mill was built for Canadian General Electric Co. and installed in their Peterborough plant, this having a capacity of 36-40 ft. and the total weight being 758,286 lb.

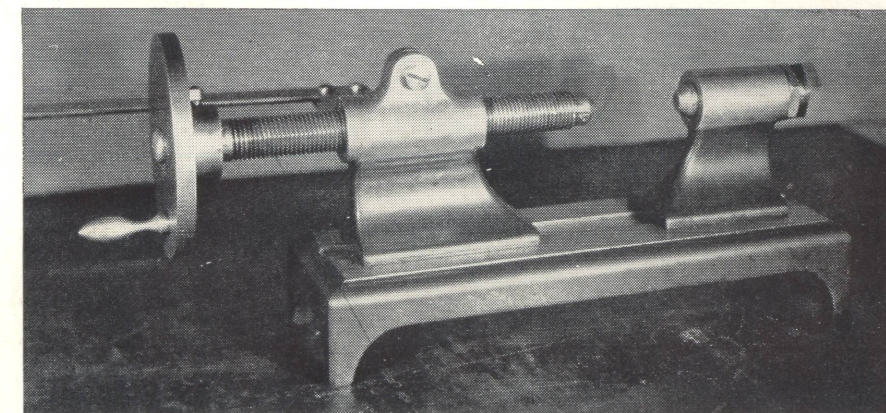
In 1930 a large shearing machine, which at that time was the largest machine of its type ever made in Canada was completed in the Bertram shops. This machine was capable of shearing five 2-in. round bars simultaneously. The machine weighed 92,200 lb. when completed and had an eccentric shaft 11¼ in. diameter, the stroke of the machine being 5 in. The speed was 25 strokes per minute driven by a 40 h.p. motor revolving at a speed of 750 r.p.m., the flywheel which weighed 6,000 lb. being 78 in. in diameter.

Two years later, 1932, a Hooven Owens Rentschler "Hamilton" power press was built for the manufacturers of refrigerator bodies, this press being 96 in. between the housings and having a 10-in. stroke. It was equipped with a 6-in. ram adjustment and a ram pressure of 290 tons. The drive was by a 35 h.p. motor and ram adjustment was made by a 5 h.p. motor. This power press was fitted with an air cushion drawing attachment to aid in pressing and drawing sheet metal.

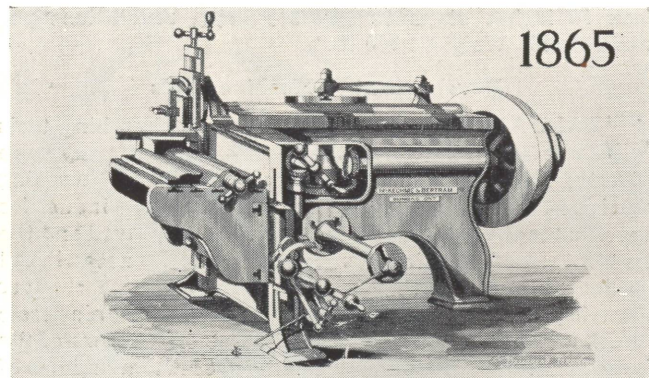
A recent development has been the "Timesaver" line of machines. The "Timesaver" lathe is an example of this line of machine tools, developed by the company and made in a range of three sizes. 28 in., 32 in. and 36 in. The motor is fastened to the rear of the bed, the drive being through V type belts and multiple disc clutch. This provides a powerful drive with a flexible control from the head or apron.

Agencies Taken on in 1924

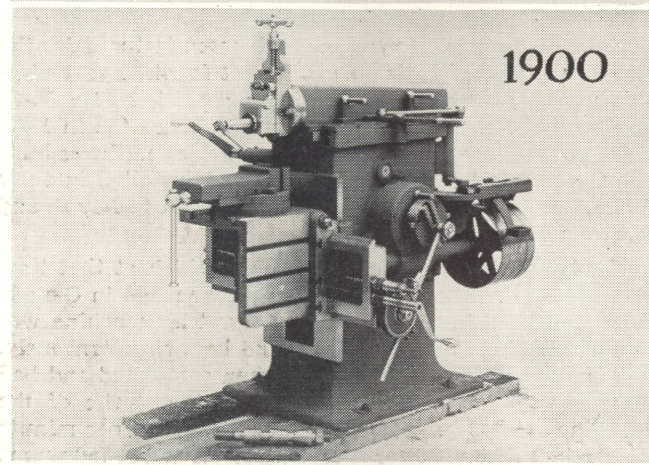
TAKING into consideration the size of the Canadian field, compared with that of the American field, it would not be feasible to manufacture in Canada some lines of



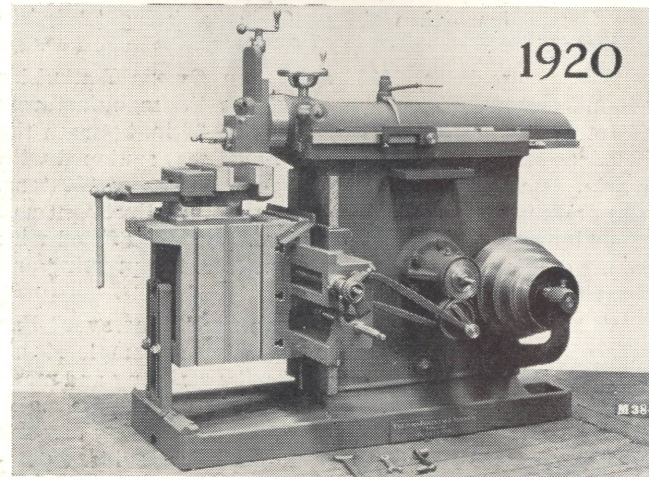
The first micrometer gauge to be made and used by the Bertram Co.



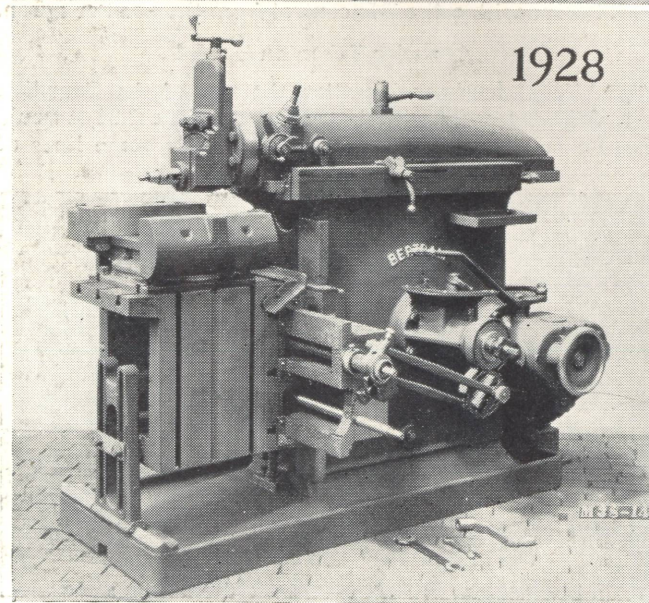
1865



1900



1920



1928

production machine tools requiring a large outlay for jigs, etc. All the salesmen of the Bertram Company are fully trained men and it was felt that they could advantageously sell products of a number of American machines not made by the Bertram Company, and so have a complete service to offer to their various prospects. Various agencies were acquired in the after-war period of 1924-25. It was not until 1934, however, that a start was made to manufacture the larger custom built grinders of the Cincinnati Grinding & Milling Machines Inc. in the Bertram plant.

The building of a Cincinnati-Bertram piston rod grinder in 1934 marked a new development in Canadian industry. This machine is a 16 in. by 35 in. plain self-grinder but the table is cast with a gap to accommodate the piston head. The net weight of the machine is 22,000 lb. and was built by John Bertram and Sons Co. in co-operation with their principals, Cincinnati Milling Machines and Cincinnati Grinders Inc.

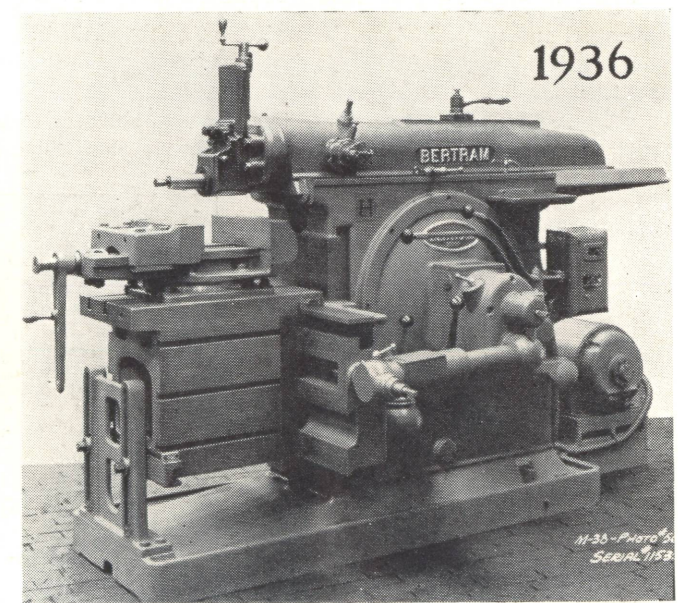
A satisfactory arrangement was made by the two firms for the manufacture in Canada of this type of equipment only. Where production machines are manufactured expensive jigs and fixtures are required and it would not be economical to produce such equipment for the comparatively limited Canadian market.

During the last few years, other equipment of a custom-built type has been manufactured in the Bertram plant to serve the Canadian field and the British Empire export market. Notable equipment which has been manufactured for this purpose includes mine hoists and paper winders. The John Bertram Company manufactures the Cameron Machine Co.'s winders, Nordberg hoists for mines, and Sutton Engineering straightening machines; and the products of the Sullivan Machinery Co. which include mining equipment, air compressors, rock drills, small hoists, portable compressors, etc.

World's Largest Paper Winder

WHAT was claimed to be in 1934 the world's largest paper winder was built for shipment to England by this company. This winder was built for the Cameron Machine Co. of Canada Ltd., a subsidiary of the Cameron

The top view shows an early shaper built by McKechie & Bertram, the 18" model built at the beginning of the twentieth century, weighing only 2,000 lb. The 24" model of 1920 weighed 4,375 lb., the 26" model of 1928 5,200 lb., and the 26" timesaver model of 1936 weighs 6,700 lb.

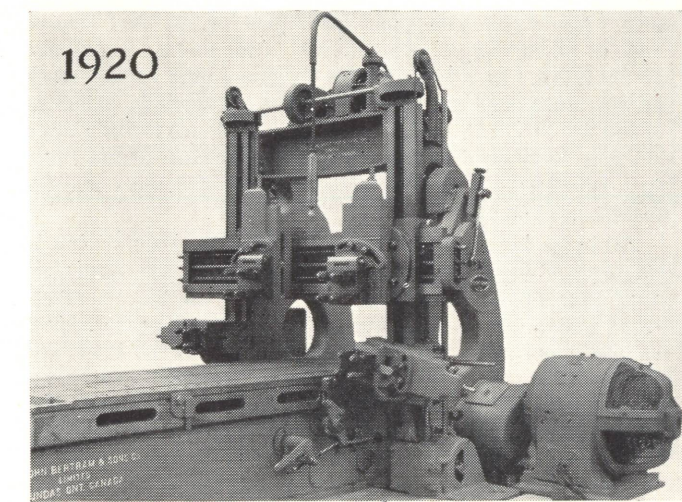


1936

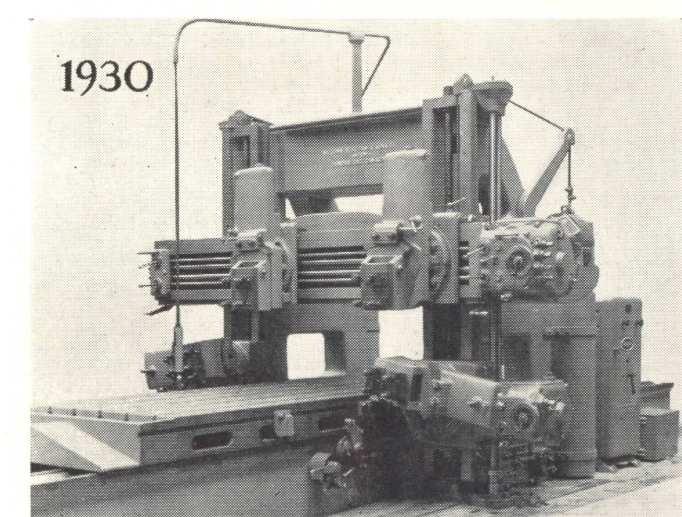
Machine Co. of Brooklyn, New York. Paper and chiefly newsprint, is made in exceptionally wide widths at the rate of about 1,000 linear feet per minute. It is first wound in a winder to trim the edges, rewind, and afterwards placed in a winder to trim the edges, rewind, and slit it into commercial rolls of any desired width, at the rate of 3,000 linear feet per minute. It is for this rewinding and slitting operation that the winder was made. The weight of the machine is approximately 80,000 lb. while the finished rolls of paper rewound on it weigh approximately 10,000 lb. Preferential tariff rates with the Mother Country, following the Imperial Conference in Ottawa, permitted the building of this and similar equipment in Canada.

Mine hoists are now being made for this most important industry of Canada, the latest unit to be manufactured having been designed by the engineers of the Nordberg Co. and completely built of Canadian materials by the Bertram Co. This was a man hoist for the Creighton Mines of the International Nickel Co. for use in transporting the miners from the surface to the workings below and vice versa. It is capable of lifting and lowering about 60 men in each cage at a speed of 1,500 ft. per minute. It is of the double drum type and is designed to operate at a depth of 4,200 ft. Each drum is 14 ft. in diameter and 96 in. face,

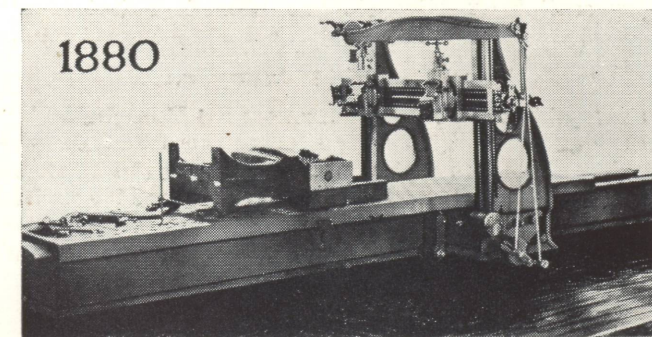
Fifty years development of the planer showing a 72" x 72" x 20 ft. planer weighing 50,000 lb. in 1880, an 84" x 84" x 20 ft. model of 1899 weighing 100,695 lb., and a 36" x 36" x 14 ft. planer of 1906 weighing 23,000 lb. The 48" x 48" x 12 ft. planer of 1911 weighed 40,000 lb., while a planer of the same capacity built in 1920 weighed 51,000 lb. and the 60" x 60" x 18 ft. planer of 1930 weighed 117,500 lb.



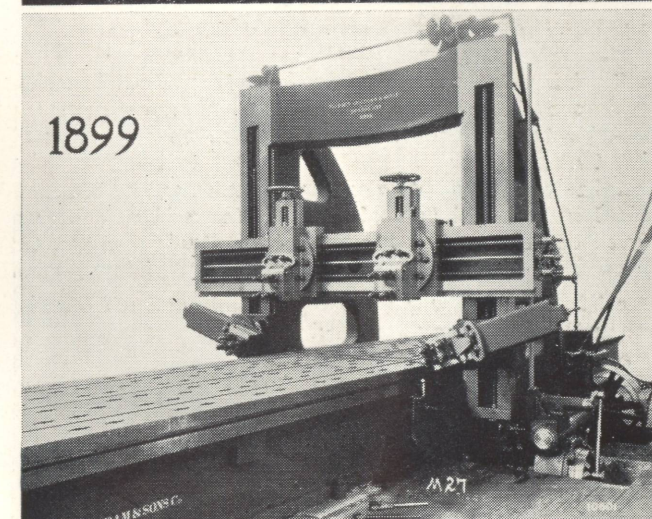
1920



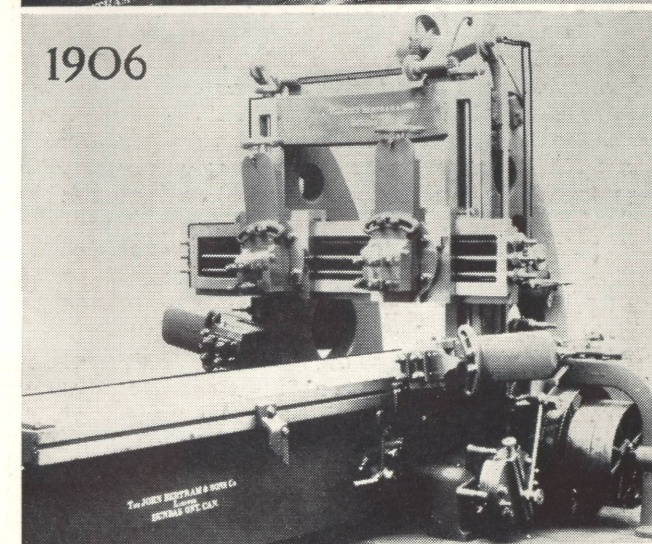
1930



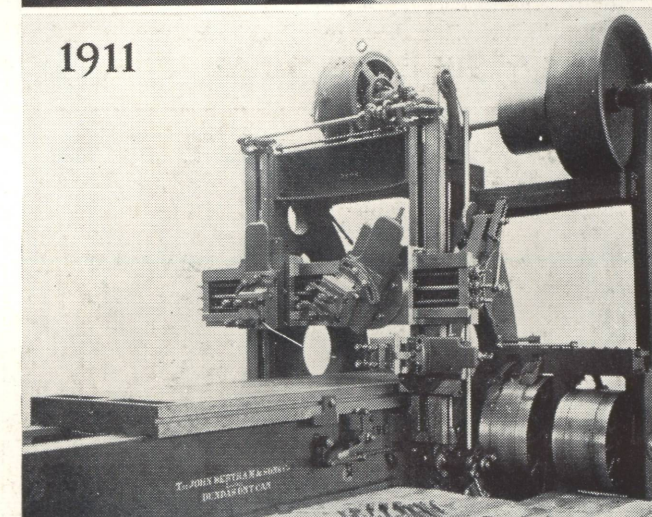
1880



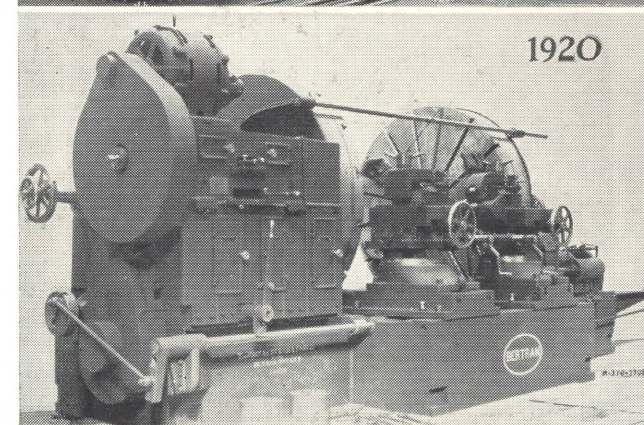
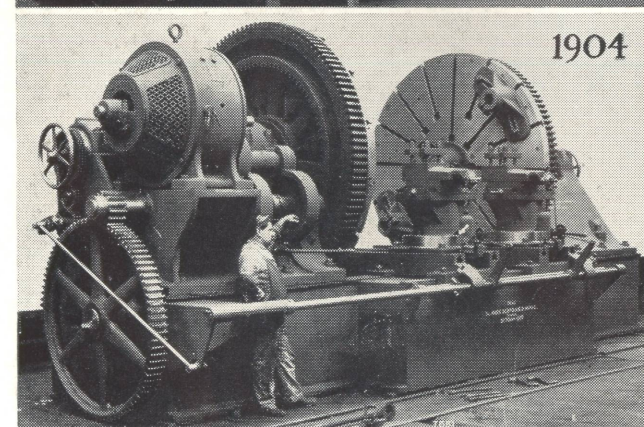
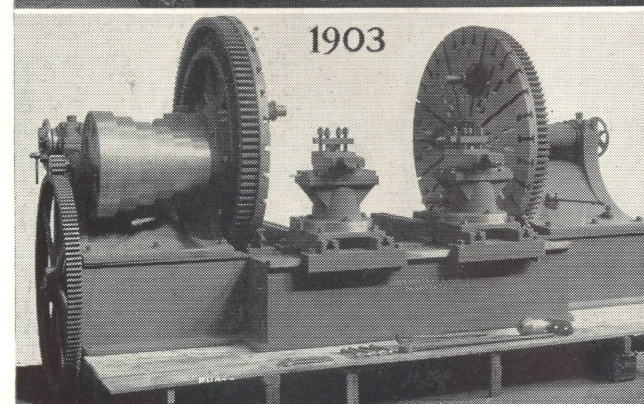
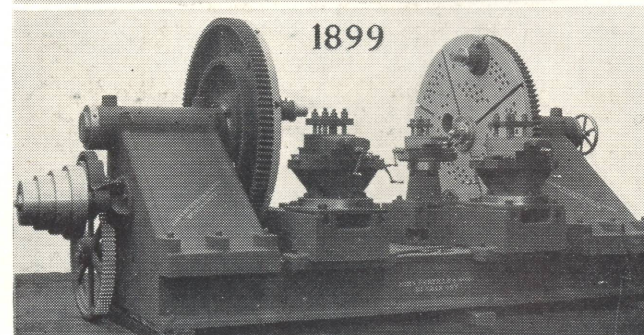
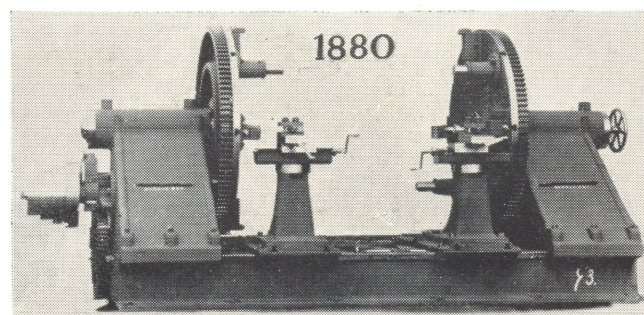
1899



1906



1911



the wire cable being 1 3/4 in. in diameter and the weight of the cable of each drum 22,900 lb. The weight of the cage is 13,060 lb. and the load 12,940 lb. These are but a few of the developments made by the John Bertram and Sons Co. in their modern plant at Dundas.

Present Plant Covers Large Area

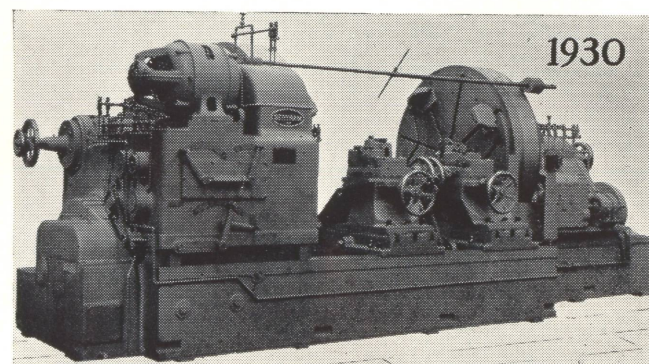
THE plant built after the fire of 1867 destroyed the original shops still stands today and is being utilized for the manufacture of miscellaneous small units on the ground floor, while the upper floor is used for a jig storage and tool room. The total area of the plant today occupies 216,997 sq. ft. which does not include the area of the Pratt and Whitney Co. of Canada, a division of the Bertram Co. which occupies an additional 54,000 sq. ft.

Adjacent to the original plant, the three central erection bays are located, two of these being served with an electric overhead crane, while the third and main bay is equipped with two electric overhead cranes. In this main bay, 278 ft. long by 54 ft. wide, the heavy machine tools are located and include a 10-16 ft. boring mill, a 12 ft. by 10 ft. by 47 ft. planer, a 6 ft. by 6 ft. by 36 ft. planer and a 7 ft. by 6 ft. by 18 ft. planer, and a 6 in. bar floor borer. In the next bay, the small horizontal boring, drilling machines and the small planers are installed. This was the end of the plant until the war period when extensions were necessary for the manufacture of shells of which a considerable quantity were made. This necessitated extra space and four additional bays and storeroom were added.

Gear cutting, boring mills and engine lathe departments are now located in these bays for the manufacture of parts required for the various lines manufactured by this company. The storeroom occupies 17,980 sq. ft. and houses finished parts and stock machines. One section is utilized for shipping. In addition, the forgings and rolled stock are also delivered to and stored in this building. Also included in this additional space is the blacksmith's shop which is fully equipped for the manufacture of odd forging jobs which are required both for maintenance and for manufacturing purposes.

All large forgings are bought from firms specializing in this type of work, but some small forgings are manufactured on the premises and tools are made and heat-treated. Gears which are manufactured on the Maag gear shapers are also heat-treated in this department or at the Pratt and Whitney plant. In a separate building occupying 46,000 sq. ft. the patterns for the foundry are made and stored. The pattern shop itself is equipped with the most up-to-date woodworking machines including band saws, planers,

The development of driving wheel lathes showing the 79" model of 1880, weighing 34,000 lb. The 75" model of 1899 weighed 42,300 lb., while the 80" model of 1903 weighed 68,000 lb. A 100" model was brought out in 1904, weighing 104,460 lb., while the 90" models of 1920 and 1930 weighed 117,300 lb. and 167,000 lb. respectively.



crosscut saws, jointers, and wood lathes, etc. All patterns are made in this department and are stored in the pattern storage, there being a complete record so that any pattern can be obtained on short notice.

Foundry Equipped For Large Castings

THE foundry itself is 213 ft. long by 119 ft. wide and consists of three bays, one of which accommodates two cupolas of 48 in. and 70 in. diameter respectively. These cupolas are served by a spacious charging platform which extends the whole length of the bay in which they are located, at the far end of which, a sand mixing and conveying system is installed. The platform also extends beyond the foundry into the yard and sand, firebrick, and other materials are transferred from the cars to this platform by means of an electric crane, and bins are arranged along the platform to receive them.

The centre and remaining bays are devoted to heavy and medium molding respectively, electric cranes being in each bay, two with a combined capacity of 50 tons taking care of the heaviest work, others of smaller capacities being placed in the medium castings bay and on the core making floor. A large number of castings of a large size such as bedplates and bases for heavy machine tools are manufactured in this plant, and consequently most of the work consists of floor molding. The foundry itself occupies a space of 25,347 sq. ft.

The foundry is also equipped with both a small and a large core oven the latter being loaded with large cores mounted on a truck. Automatic tampers and sand-slingers are used extensively to assist in the molding operation.

It is interesting to note that a cornerstone on the foundry indicates that it was erected in 1905 while the office building is more modern being erected in 1917. Communication between the office and the various parts of the plant is maintained by means of a Lamson pneumatic mail chute. This passes under the roadway from the office to the main plant while a second chute runs to the office of Pratt and Whitney Co. There is a central exchange in the office and a tube also leads up to the time office.

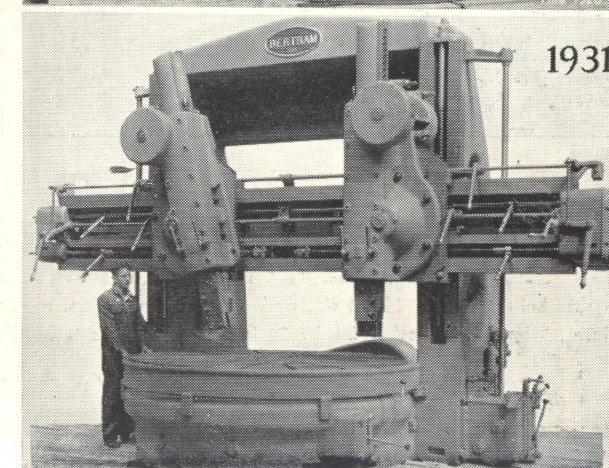
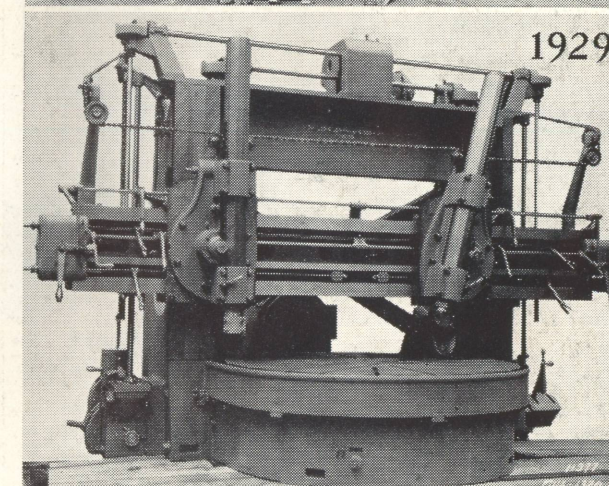
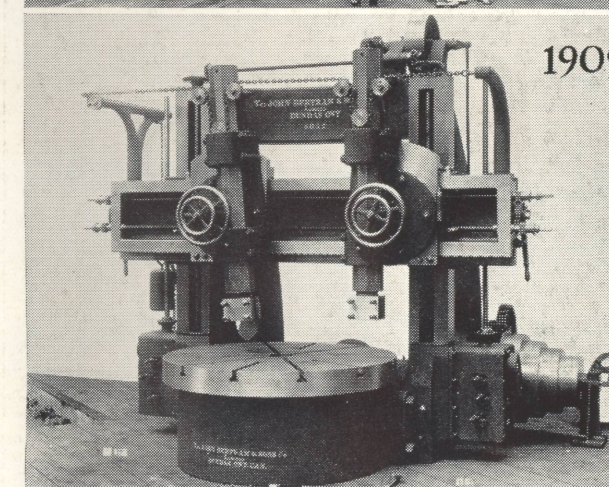
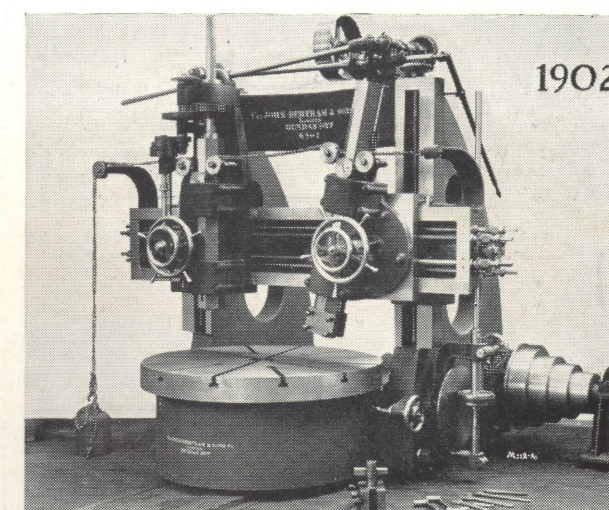
In a small building attached to the foundry a power plant is located, this being used for the production of D.C. power by means of electric generators and the air compressor unit for the supply of compressed air to the whole plant is also located in this building.

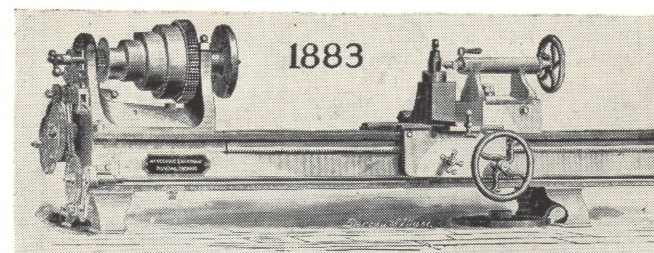
The plant is at present building an end-driven wheel lathe for the Southern Railway Company, England, while several export orders of fairly recent date include two car wheel lathes for the Argentine State Railways, a combination axle turning lathe for the New Zealand government and a 26 in. shaper for the South African Railway and Harbor Commission.

Control of Work

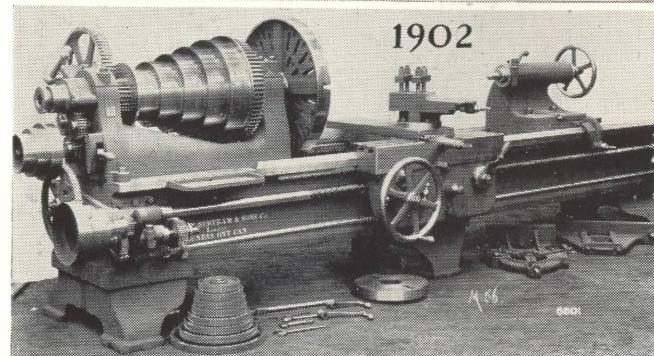
THE control of all work passing through the shop is from the production department. Every part is given a route slip, attached to the particular part, and the sequence of operations is worked out by the production department. Different colored route slips are used according to the job. For ordinary work going through the shop, white cards are used. Where the particular job is a repair part, etc., a blue card is used instead. A red card indicates a rush order, while various other colors are used for work that is being done for other companies. For in-

The development of vertical boring and turning mills showing the 60" model weighing 23,000 lb. in 1902, and 72" model weighing 28,145 lb. of 1909. The 100" standard boring mill developed in 1929 weighing 64,600 lb. and driven by a 20 h.p. motor, while the 100" heavy duty boring mill of 1931 weighed 95,000 lb. and was driven by a 40 h.p. motor.

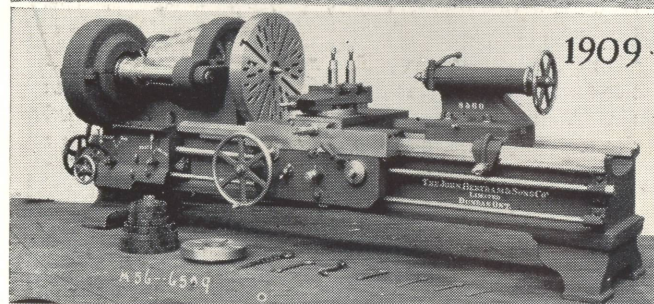




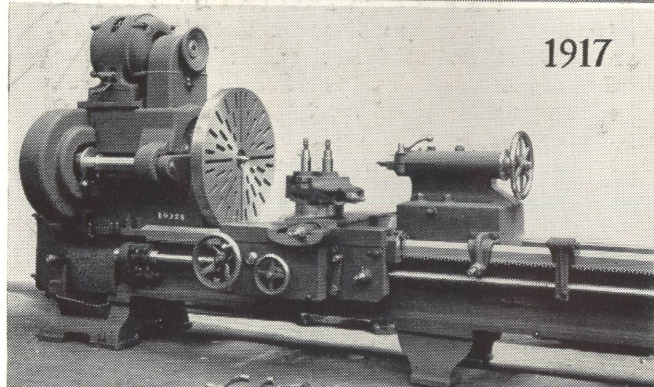
1883



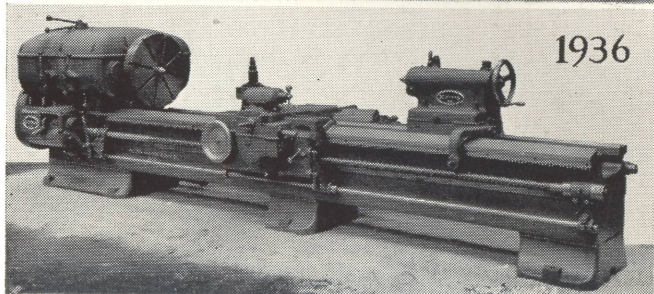
1902



1909



1917



1936

Many changes in design of engine lathes are noted in the last 53 years. The 36 in. lathe built in 1883 weighed 7,500 lb., while the 30 in. x 14 ft. and 30 in. x 12 ft. models built in 1902 and 1909 respectively weighed 10,830 lb. and 11,750 lb. In 1917 a 36 in. x 17 ft. engine lathe was built weighing 14,080 lb., and driven by a 10 h.p. motor. The latest "Time-saver" lathe of 1936, 28 in. x 17 ft., weighs 17,300 lb. and is driven by a 20 h.p. motor.

stance, yellow is used for a product of the Sullivan Machinery Co., whose products are made in the plant.

In addition, a time-card is made out by the production department for each operation and sent to the shop office where it is filed. When the workman is commencing to machine a part, the time card is stamped and when returned after the completion of the operation is again stamped and sent back to the production department. The incentive system is used whereby a certain amount of time is allowed for each particular job, the men being given a bonus if the work is performed in less time. The time allowed for each operation is based on time study work carried out in the shop.

Certain parts such as head stocks, tail stocks, saddles and aprons of lathes, are kept in stock and applied to the different lengths of bed required by the customer. The heavy machinery, however, has to be custom-built and consequently it is difficult to keep any parts in stock.

The engineering department is responsible for ordering patterns from the pattern storage to the foundry. A follow-up man from the production department ensures that all parts are passing through the shop smoothly.

Inspection also plays a large part in this plant, all parts being inspected at the machine as far as possible and checked at the inspection bench after final machining.

In the engineering department, a list of material is always kept on file covering every part of every machine built for the last 28 years. This means that if the serial number of any machine is supplied by a customer, then the drawing of that part can be secured and a replacement supplied at comparatively short notice.

Life Insurance and Sick Fund Maintained

LIFE insurance is provided for the men in the plant, this varying from \$500 to \$1,000, the men paying a fixed rate and the company making up the difference. There is also a sick benefit fund operated by the employees themselves, who pay a weekly donation if the fund is low. If it is considered that the fund is financially sound, then no further contributions are made until required.

The employees also have a pastime club which is located in the old office building. It is also run by the employees themselves, the space, lighting and heating being provided by the company. It is equipped with billiard tables, gramophone, magazines, etc., and dances and smokers are held at intervals.

A most valuable department in this plant is the photographic department. Every machine or one of a group is photographed and, in addition, many outside installation views are photographed and kept on record. Due to the large range of machines manufactured, it would not be practicable to have printed circulars of every machine, and photographs are largely used as an aid to selling. In this way it is possible to show the latest machines of any particular type. Incidentally the most of the photographs in this and the preceding article were taken by the plant photographer, H. Bond, who has been with the company since 1911.

Small Tools and Dies Made in P. & W. Plant

NOT only are machine tools of vital importance to practically every industry in Canada either for production purposes or in the maintenance and repair department, but small tools are also required in their operation. In many industries of the present time, jigs and dies are required for production operations. This is more or less of a recent development in Canada, such methods being unknown when the John Bertram and Sons Company was first founded 75 years ago. However, this company has

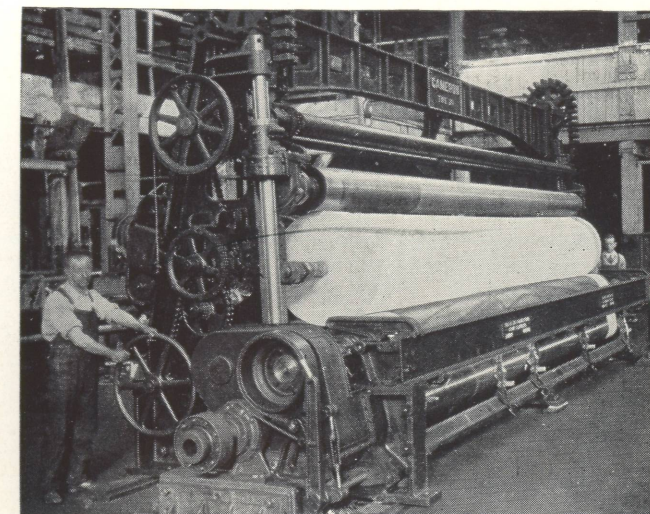
continually developed to meet the demands of an ever-growing country, and with the demand created for jigs and fixtures for production work, they immediately commenced to manufacture same. This part of the business is carried on in the plant of Pratt and Whitney Company of Canada, owned and operated as a separate division of John Bertram and Sons and located adjacent to the main plant in Dundas, Ont.

The total floor space occupied by Pratt & Whitney Co. of Canada is 54,000 sq. ft., and consists of three floors and a basement. The layout is such that raw material arrives at the basement level and proceeds upward through the plant until it finally reaches the heat-treating department located on the top floor. For this reason, the stock is kept in the basement in steel files there being a considerable quantity since a different type of steel is required for every particular job which is manufactured.

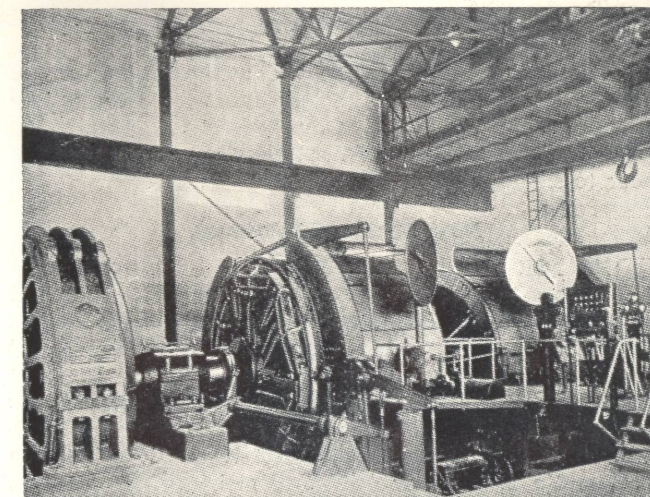
In the basement the cutting-off machines are located, these consisting of a band saw and three circular saws. In addition there is a battery of about 10 automatics for the cutting of steel to be used in production jobs such as the manufacture of taps, reamers, etc. These automatics are also used for screw threading bolts, etc., for use in the various jigs and fixtures made in this plant.

From this department the material proceeds to the second floor where the majority of the material has to be turned, and, in consequence, a large battery of lathes has been installed. These are used for making reamers, taps, etc. Tap-making machines are of two different types, those used for small taps threading the tap first and the fluting being accomplished later. In the large sized taps the flutes are first formed and the threads machined by a hobbing operation. In this same department, a row of benches is used for the manufacture of jigs, dies and gauges, a jig-boring machine being installed for the manufacture of this equipment.

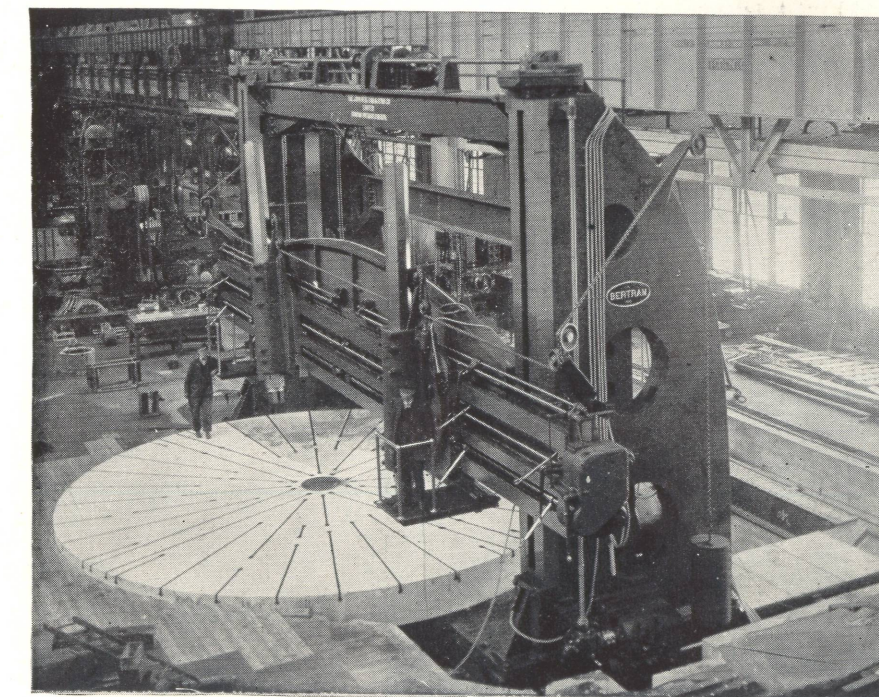
A large portion of the equipment manufactured in this plant has to be heat-treated and for this purpose it proceeds to the third floor. On this floor both the heat-treating department and the inspection department are located, and in most cases the various jobs proceed through the inspection department three times before finally going to



Cameron winders are now made by the Bertram Co., the above unit having been made for export to England.

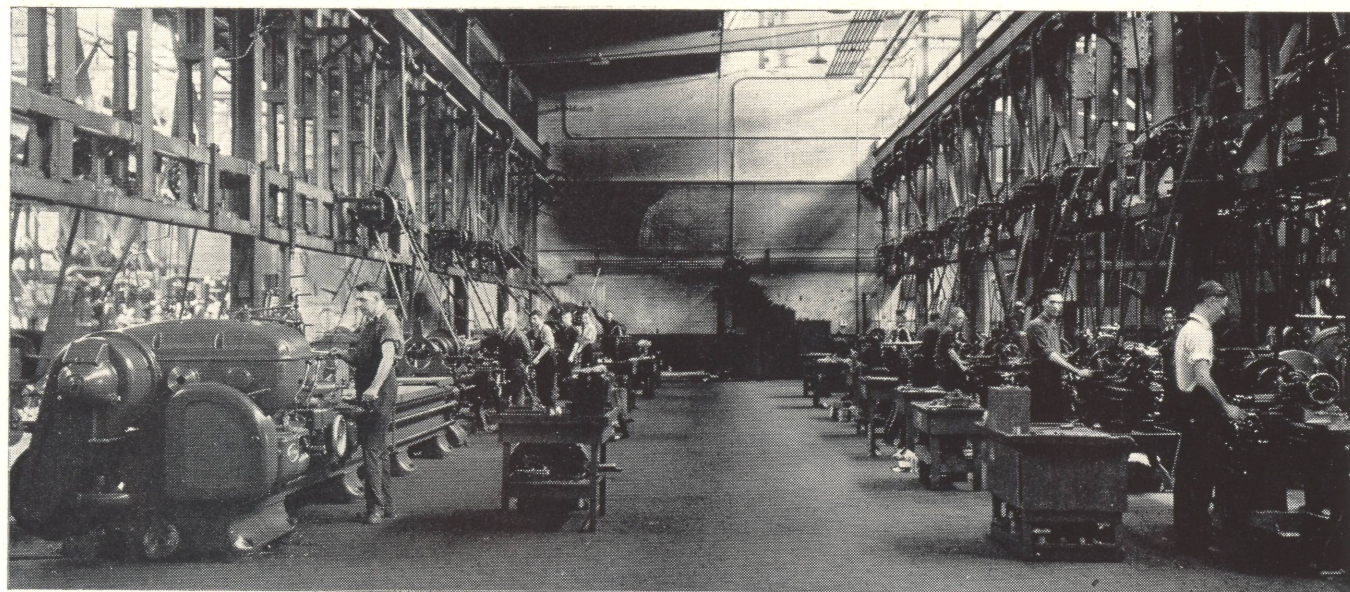


Among the lines of equipment manufactured by the Bertram Co. is Nordberg mine hoists. A hoist made by John Bertram & Sons Co. is shown above.



Large 36-40 extension boring mill, built for Canadian General Electric Co., and installed in their Peterborough works in about 1924.

A complete photographic department is operated by the company, in charge of Horace Bond. Group photographs, shop interiors and pictures of machine tools used in illustrating this story are by Mr. Bond. Photographing machines in course of assembly and when finished, blue printing, printing photos for the sales department, etc., keep this department busy. Occasionally, by way of diversion, color photography is used to preserve some unusually fine specimen from the garden of Glenholme.



View in the engine lathe department showing on the left, a "Time-saver" lathe, recently installed.

the shipping department. They are inspected after the machine operation before the heat-treatment and are then inspected after the heat-treating operation. A third inspection is made after the final grinding and machining prior to shipment.

Heat-treating Department

THE heat-treating department is fully equipped with various types of furnaces according to the treatment required for the different types of steel. For high-speed steel two electric furnaces are used, the steel being quenched in oil after the heat-treatment. These furnaces are equipped with a full automatic control of the Leeds & Northrup "Micromax" type. In addition there is a batch of about six lead pots for the heat-treatment of carbon steel and a Leeds & Northrup electric "Homo" furnace for drawing. A record is kept of every heat-treatment.

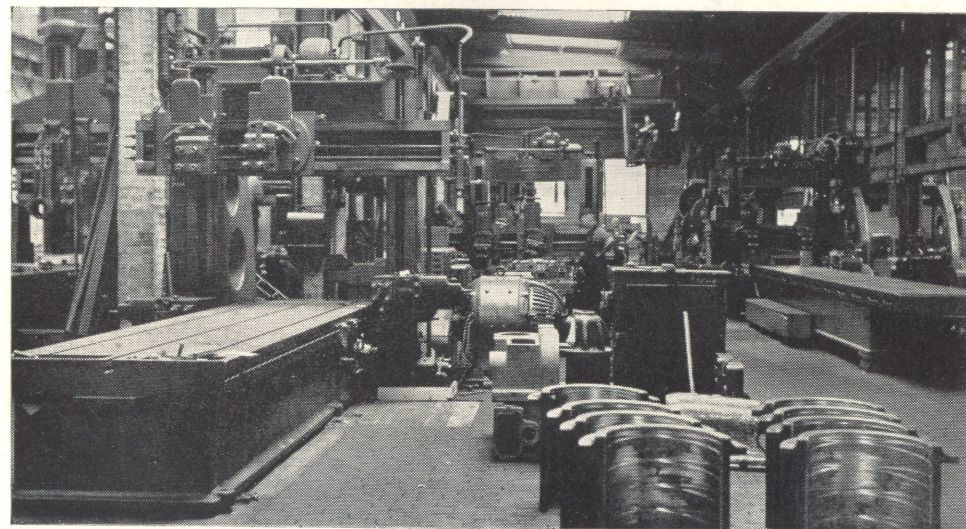
Not only are the small tools such as taps, dies, reamers, milling cutters, etc., heat-treated in this department, but also the products of the Bertram plant such as gears, clutches, etc., as well. With a fully equipped heat-treating department located in the plant of Pratt & Whitney Division it would only be a useless expense to install a second heat-treating department in the main plant.

In the inspection department adjacent to the heat-

treating department, various instruments are used for checking on the production from the heat-treating department. For hardness the Rockwell method is used and a full set of Pratt & Whitney "Hoke" precision gauge blocks is used for checking on various sizes.

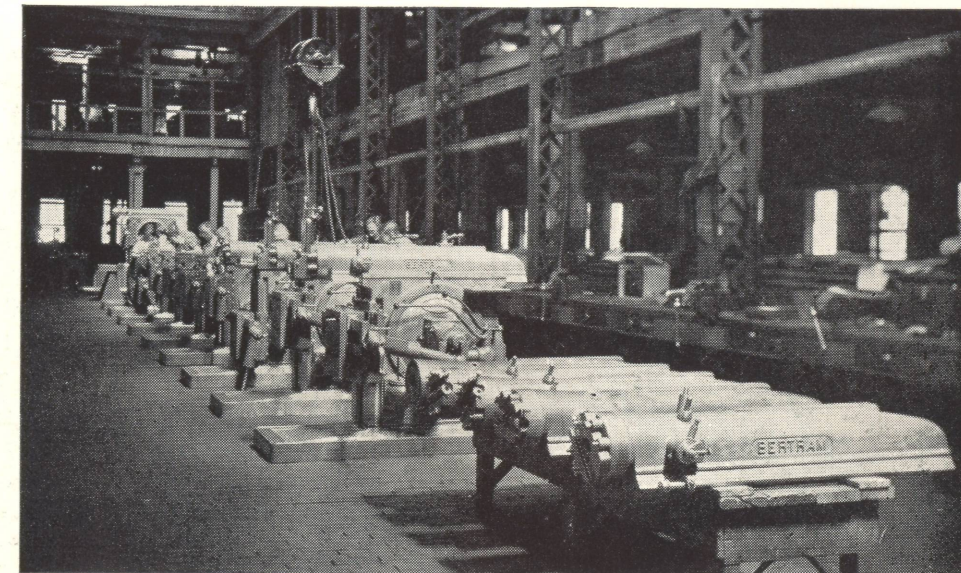
Finish Machining

FROM the heat-treatment department, the small tools proceed to the grinding department, which is located on the same floor, and here the finish machining is performed. The flutes are ground by hand on small disc grinders, while for the surface of such tools as circular saws, a battery of horizontal grinders is used. There are four different kinds of these machines according to the part being ground. For screw slotting cutters the part is held on a horizontal magnetic clutch and the horizontal grinding wheel moves from the centre outward. The table is tilted slightly, so giving a slight clearance to the cutter so that it can cut through the metal easily without binding. In this case the work revolves. On a second type, the part, held by a magnetic clutch, is given a reciprocating motion on a table, the grinding wheel being mounted vertically. In a third type the part is held in a similar manner, but a grinding wheel revolving horizontally is used. In the fourth type of machine the set-up is similar



Planing department which includes a 12 ft. x 10 ft. x 47 ft. planer, a 6 ft. x 6 ft. x 36 ft. planer and a 7 ft. x 6 ft. x 18 ft. model.

The small erecting bay showing 26 in. "Time-saver" shapers in process of erection.



to the first, that is, the part is placed on a magnetic clutch and caused to revolve, but a vertical grinding wheel performs the grinding operation.

On a high-speed machine internal boring of the cutter is performed. From this department the various parts are taken to the final inspection and are then taken to the shipping department located on the ground floor. Here the various parts are wrapped up and placed in storage for use as the occasion demands.

Some very interesting dies have also been manufactured in this plant and have been reported in Canadian Machinery at various dates. Such dies as lamination dies for the formation of lamination for small motors, and dies for the manufacture of radio chassis are quite frequent jobs in the plant.

In this, of course, heat-treating also plays an important part and the inspection is equally if not more severe than in the case of the manufacture of small tools.

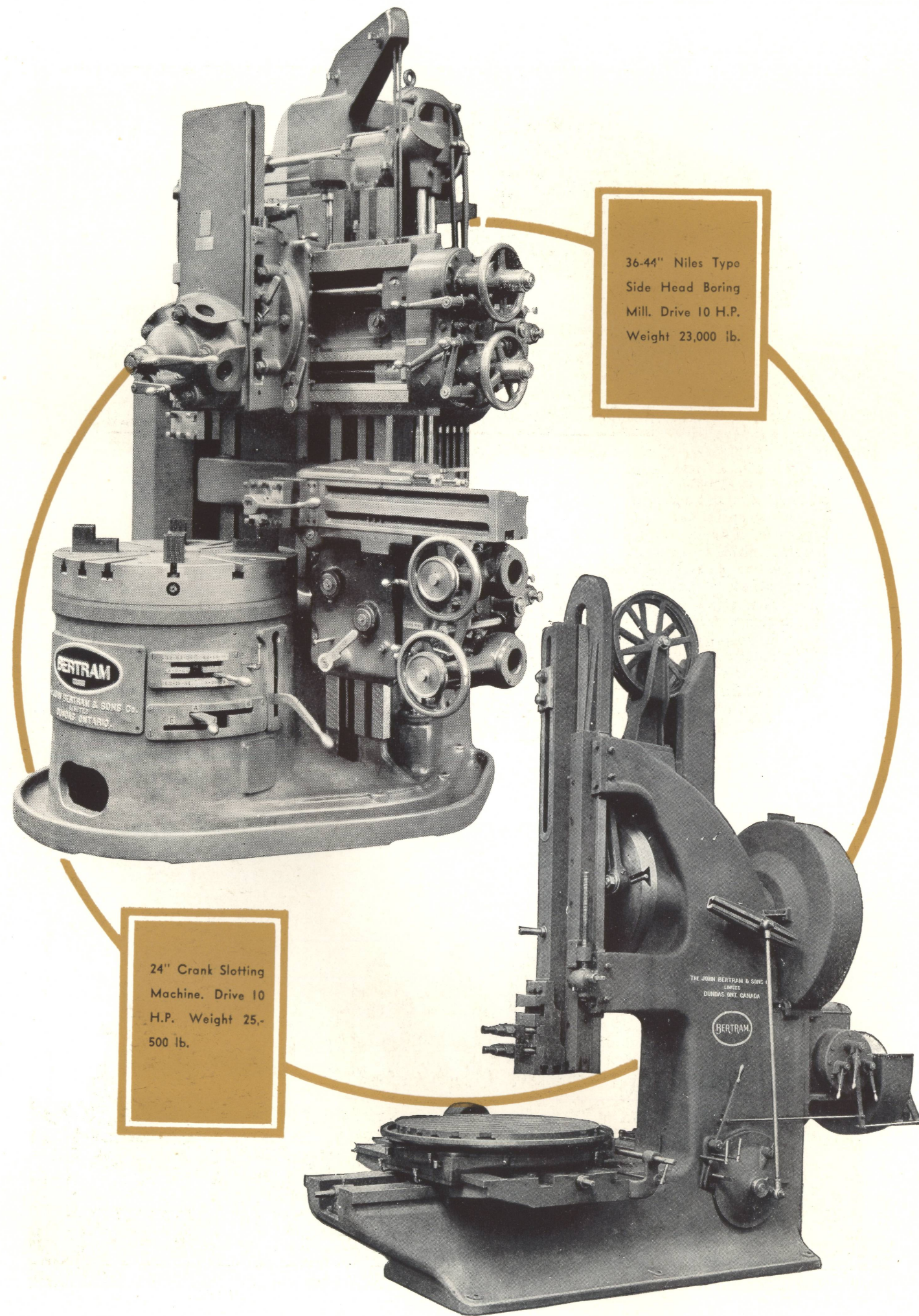
In a smaller building adjacent to the main Pratt & Whitney plant the chemical laboratory is located and a close analysis made of the various steels used for the manufacture of the different products. It is interesting to note that in this original building of the Pratt & Whitney Co. of Canada Limited, a cornerstone bears witness to the fact that the plant was in existence for 25 years before John Bertram and Robert McKechnie commenced operations in Dundas. This cornerstone bears the date 1836 and consequently celebrates its century of service this year.

This plant is also connected to the main plant by means of the Lamson pneumatic mail chute in order to speed up the delivery of orders and instructions from the main office.

The total number of employees in the two plants numbers approximately 300.

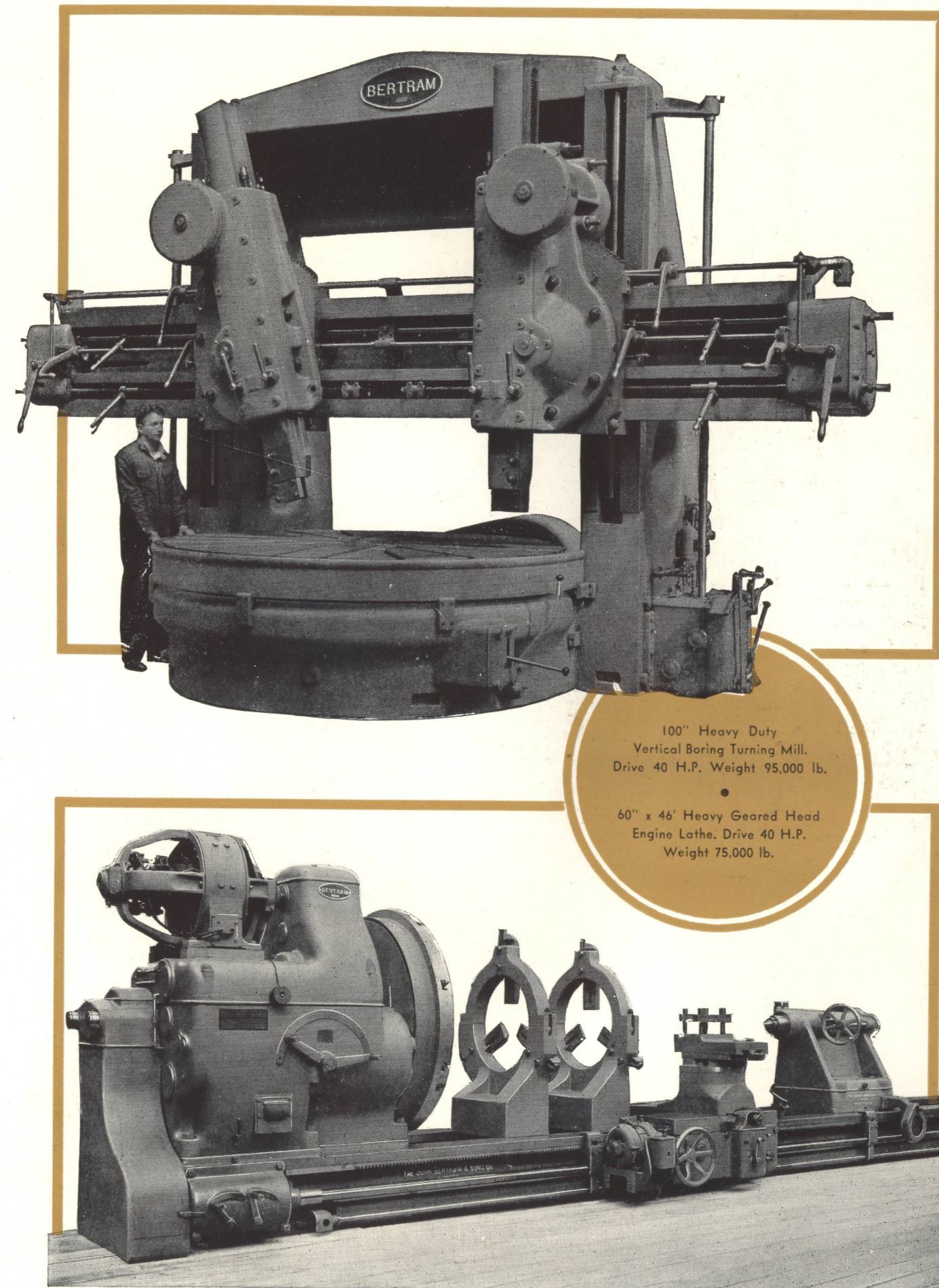


The horizontal boring and drilling department, showing on the right, the lay-off table.



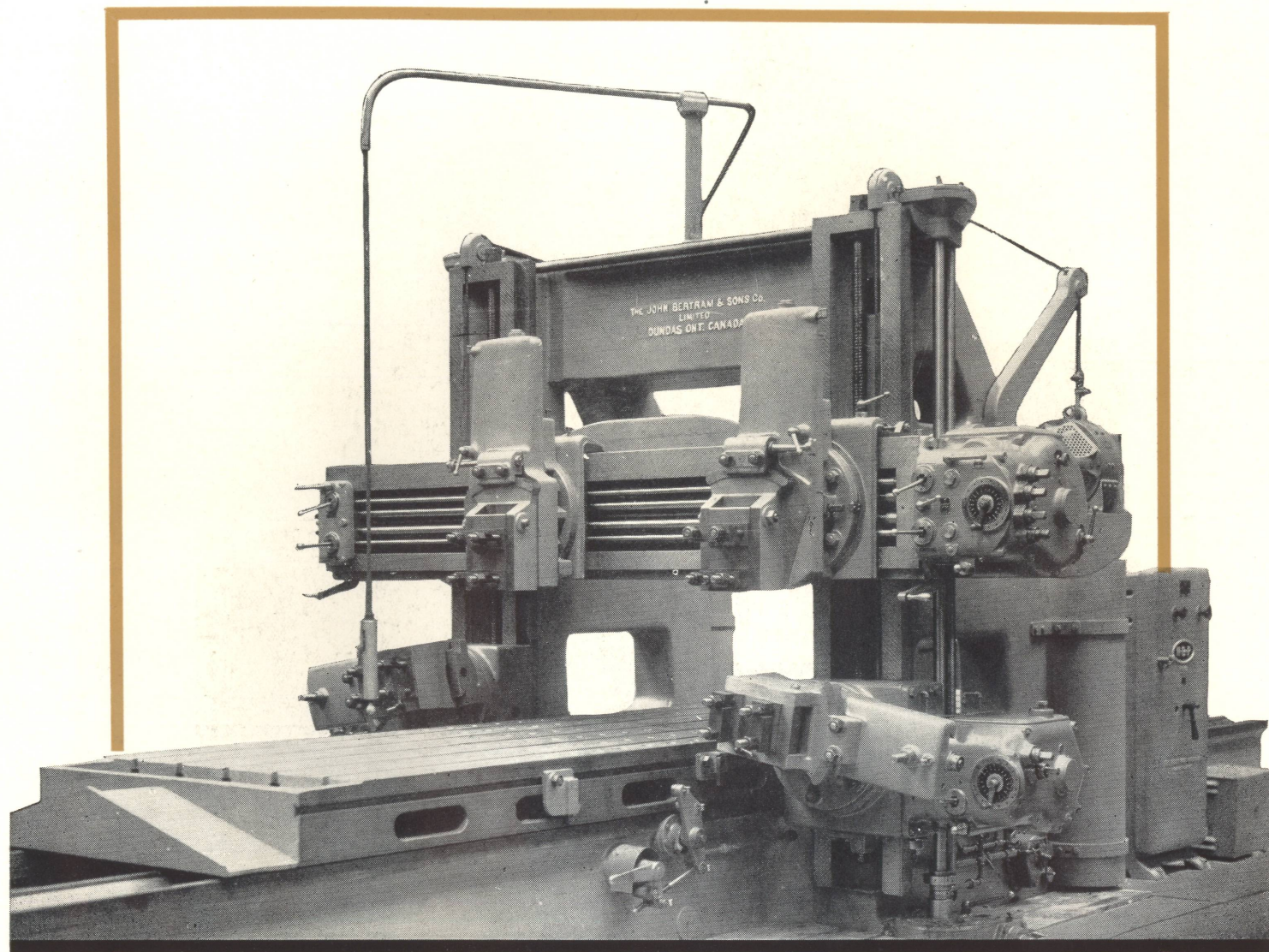
36-44" Niles Type
Side Head Boring
Mill. Drive 10 H.P.
Weight 23,000 lb.

24" Crank Slotting
Machine. Drive 10
H.P. Weight 25,
500 lb.



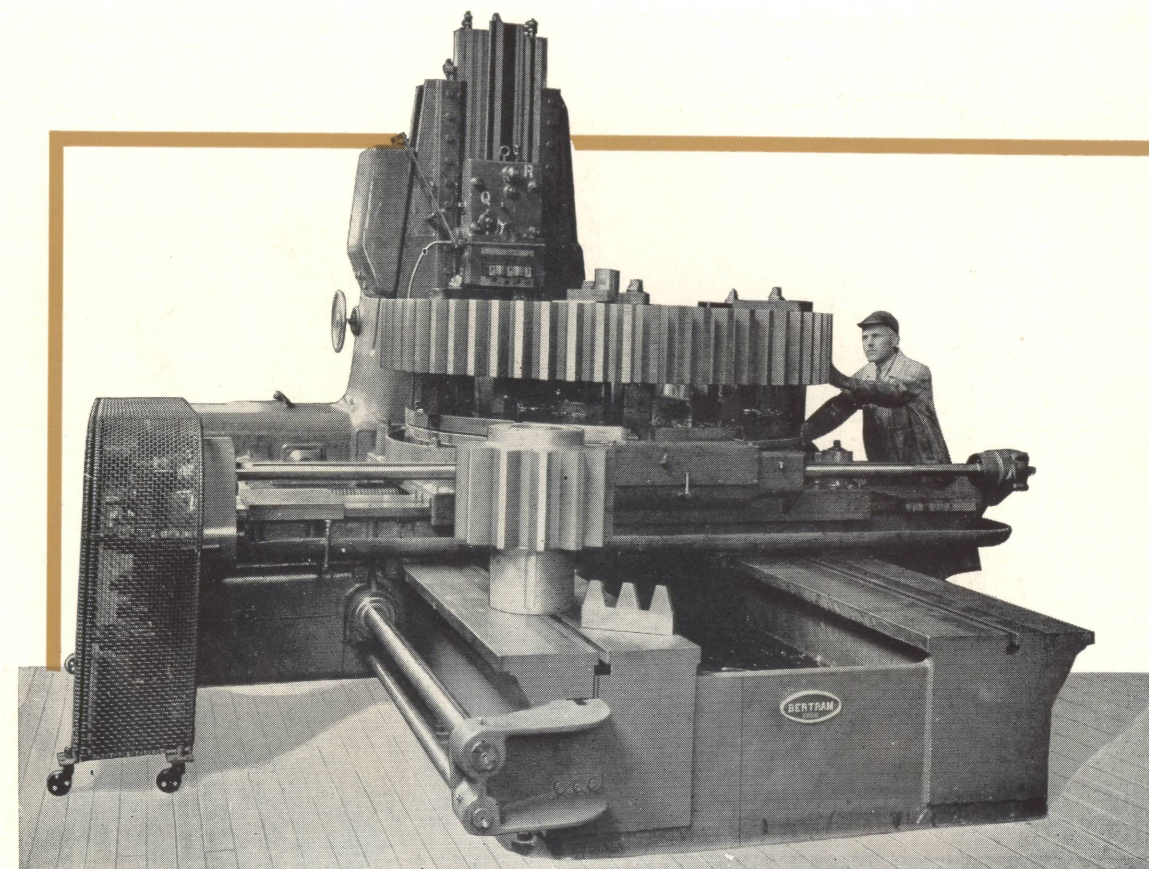
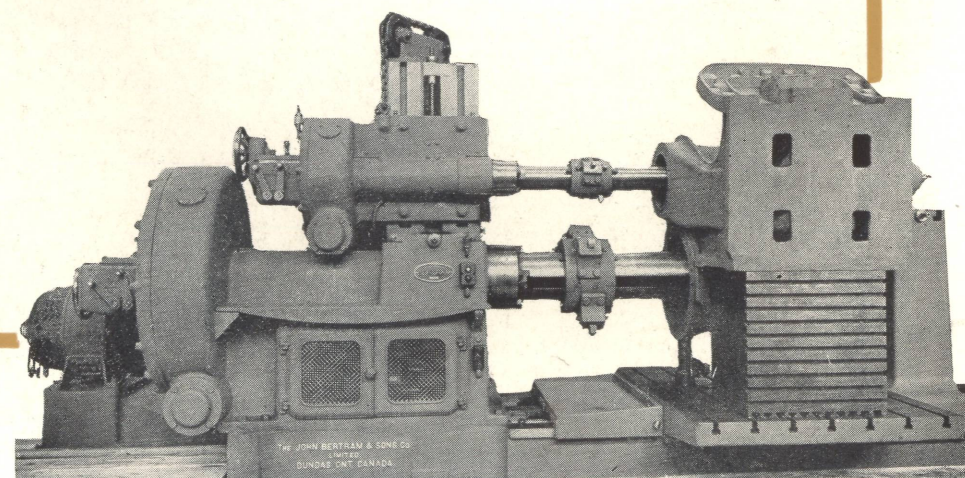
100" Heavy Duty
Vertical Boring Turning Mill.
Drive 40 H.P. Weight 95,000 lb.

60" x 46" Heavy Geared Head
Engine Lathe. Drive 40 H.P.
Weight 75,000 lb.



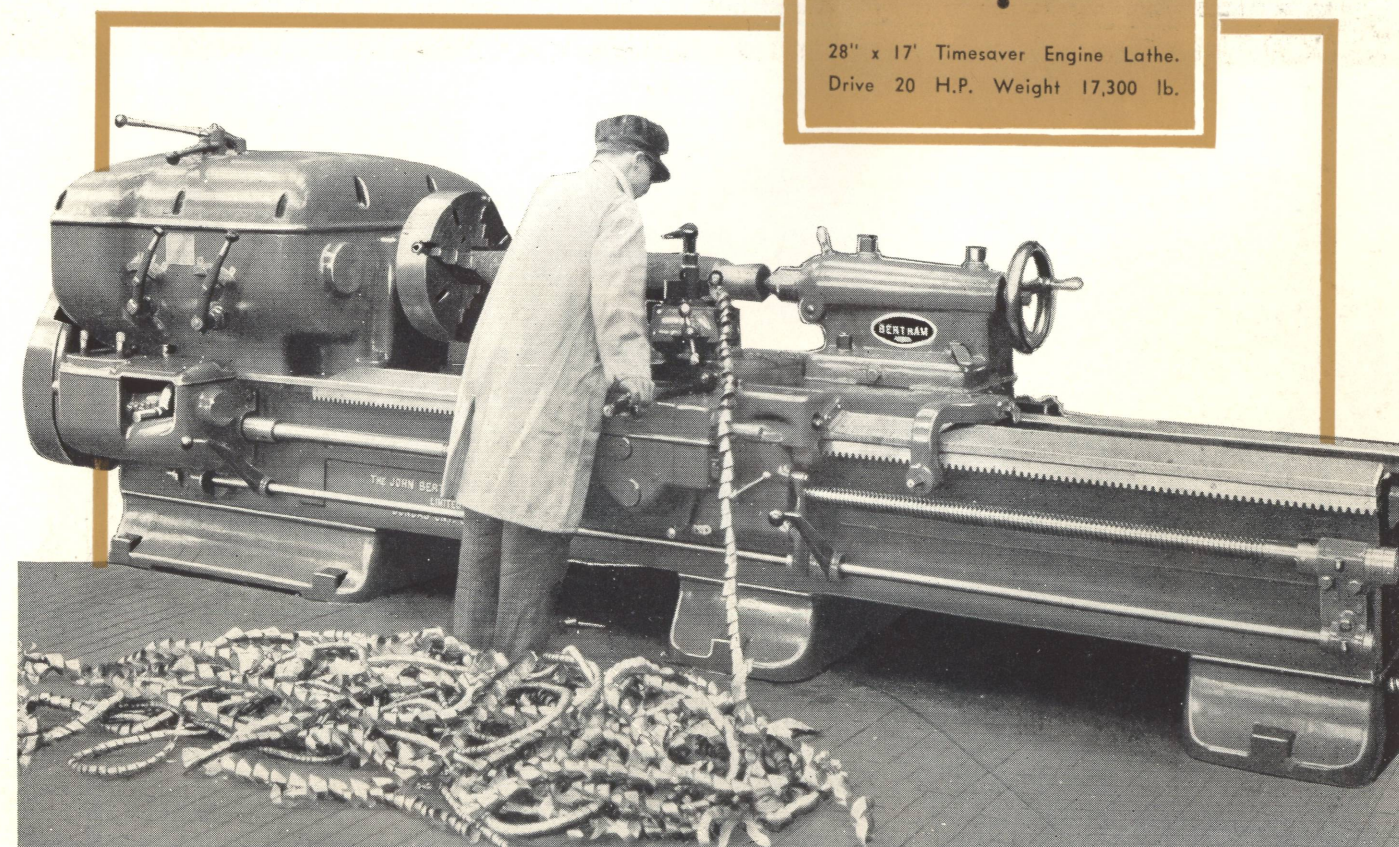
60" x 60" x 18'
Timesaver Planer. Drive
50 H.P. Weight 117,500 lb.

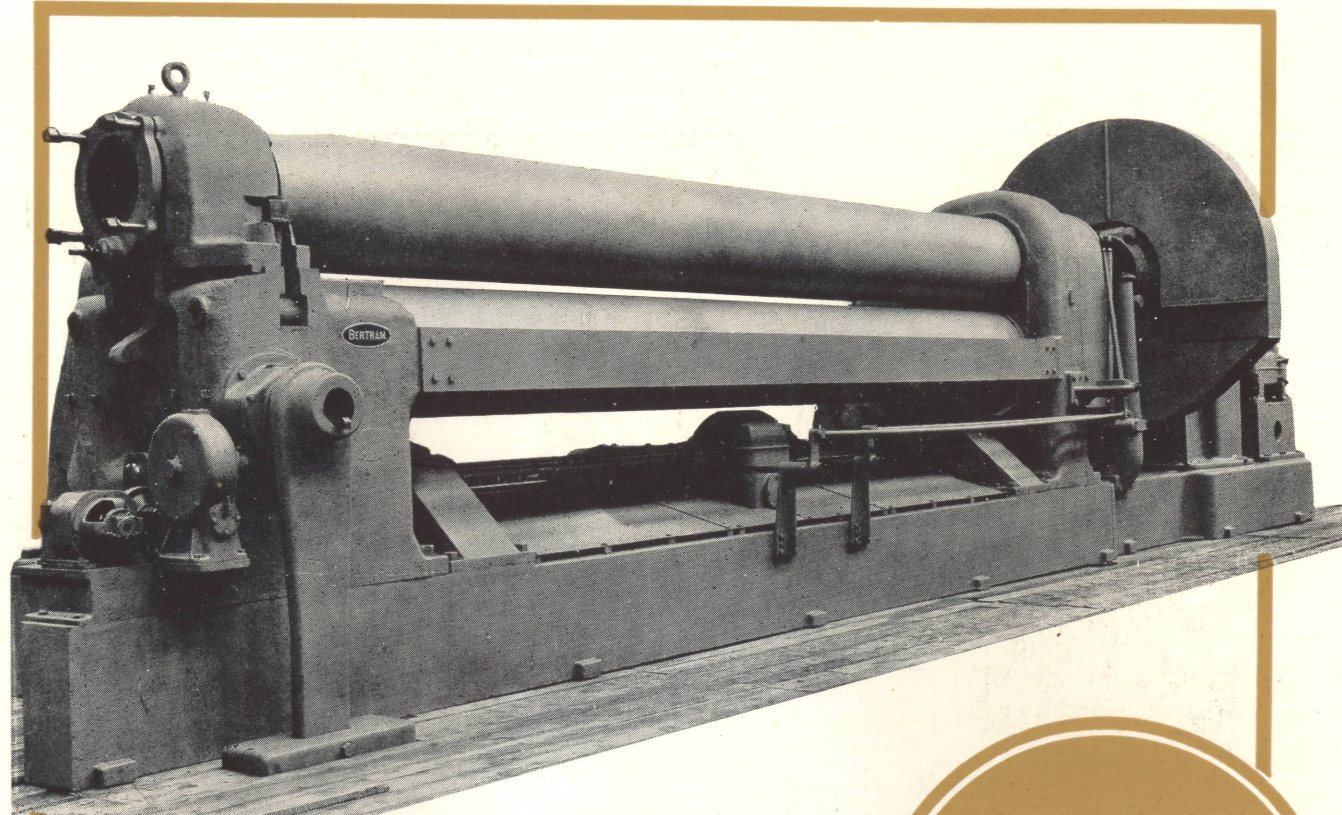
2 bar Locomotive Cylinder
Boring Machine. Drive 25
and 15 H.P. Weight
47,700 lb.



18' Maag Gear Generating Machine.
Drive 25 H.P. Weight 125,000 lb.

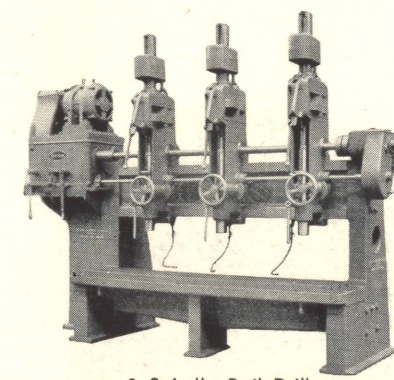
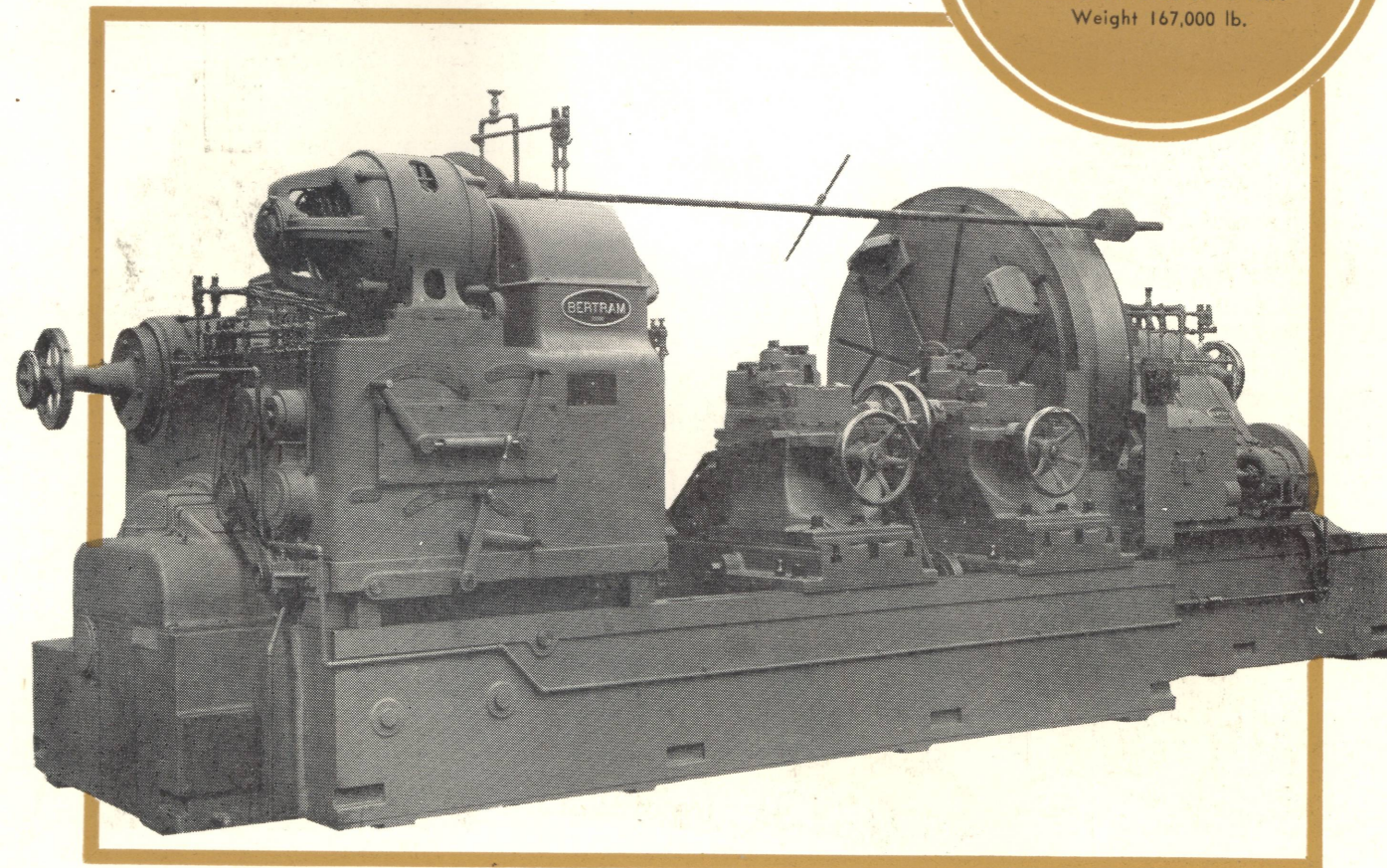
28" x 17' Timesaver Engine Lathe.
Drive 20 H.P. Weight 17,300 lb.



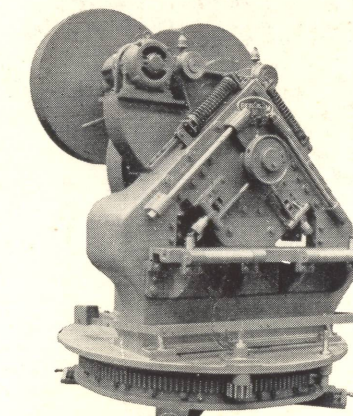


Pinching Type Bending Rolls. Capacity 1 1/4" x 18' Nickel Steel Plate. Drive 75 and 35 H.P. Weight 289,000 lb.

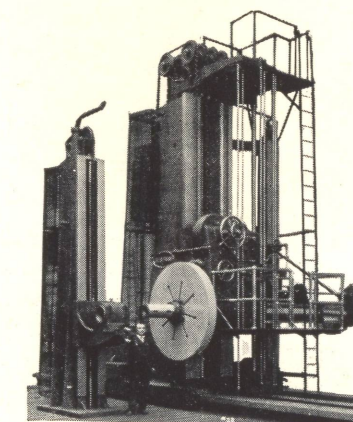
90" Extra Heavy Driving Wheel Lathe. Drive 50 or 75 H.P. Weight 167,000 lb.



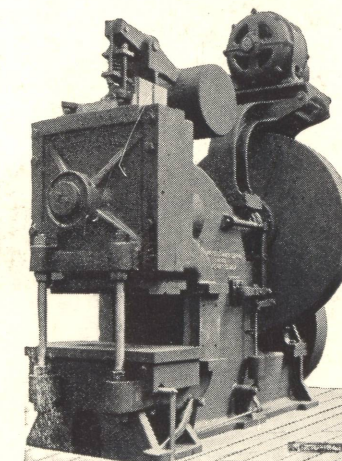
3 Spindle Rail Drill



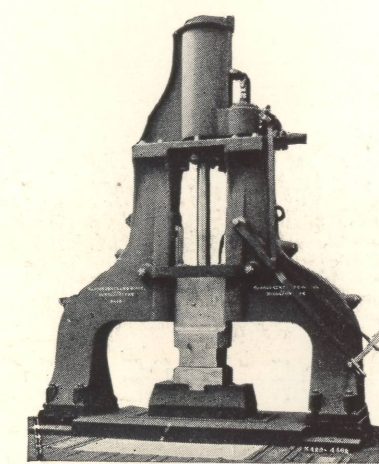
Angle Shear



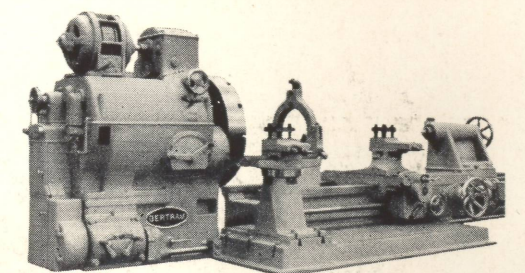
10" Bar Horizontal Boring Drilling and Milling Machine



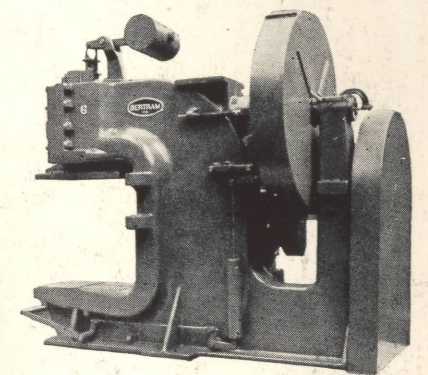
Tie Plate Punch



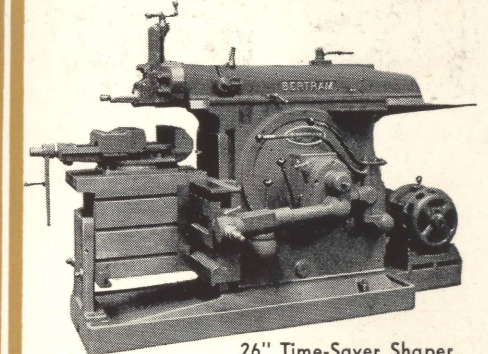
6,000 lb. Double Frame Steam Hammer



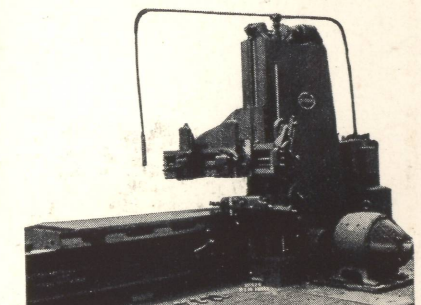
Extension Bed Lathe



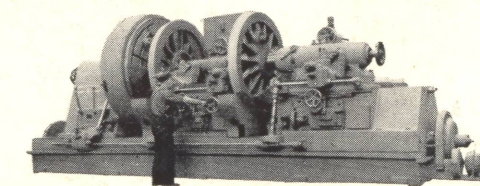
Beam Punch



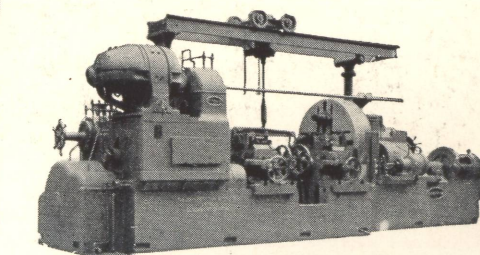
26" Time-Saver Shaper



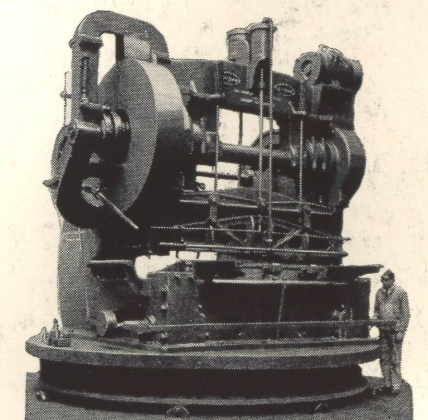
Openside Planer



Locomotive Axle Journal Turning and Grinding Machine



No. 4 Car Wheel Lathe



Gate Shear

In the confines of this booklet it is not practicable to illustrate all the various types of machine tools made by the company, who specialize in General Purpose, Railway and Structural Shop Equipment.

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