



PREFACE

The names have changed through the years, but the town of Hastings still calls it “The Bliss.”

“The Bliss” played a supporting role in developing the U.S. manufacturing might of the 20th century as a leader in metal forming equipment and mass production of metal parts—from cans to automobile components and munitions.

In this book, we have collected a rich history of photos and articles demonstrating our company’s tradition of advancing technology and innovative equipment designs for the munitions industry.

“The Bliss” story is documented from cannonballs in the War of 1812, to the Bliss-Leavitt Torpedo that served both World Wars, to the manufacturing machinery for small, medium and large caliber ammunition—

much of which is still in operation in ammo manufacturing facilities today.

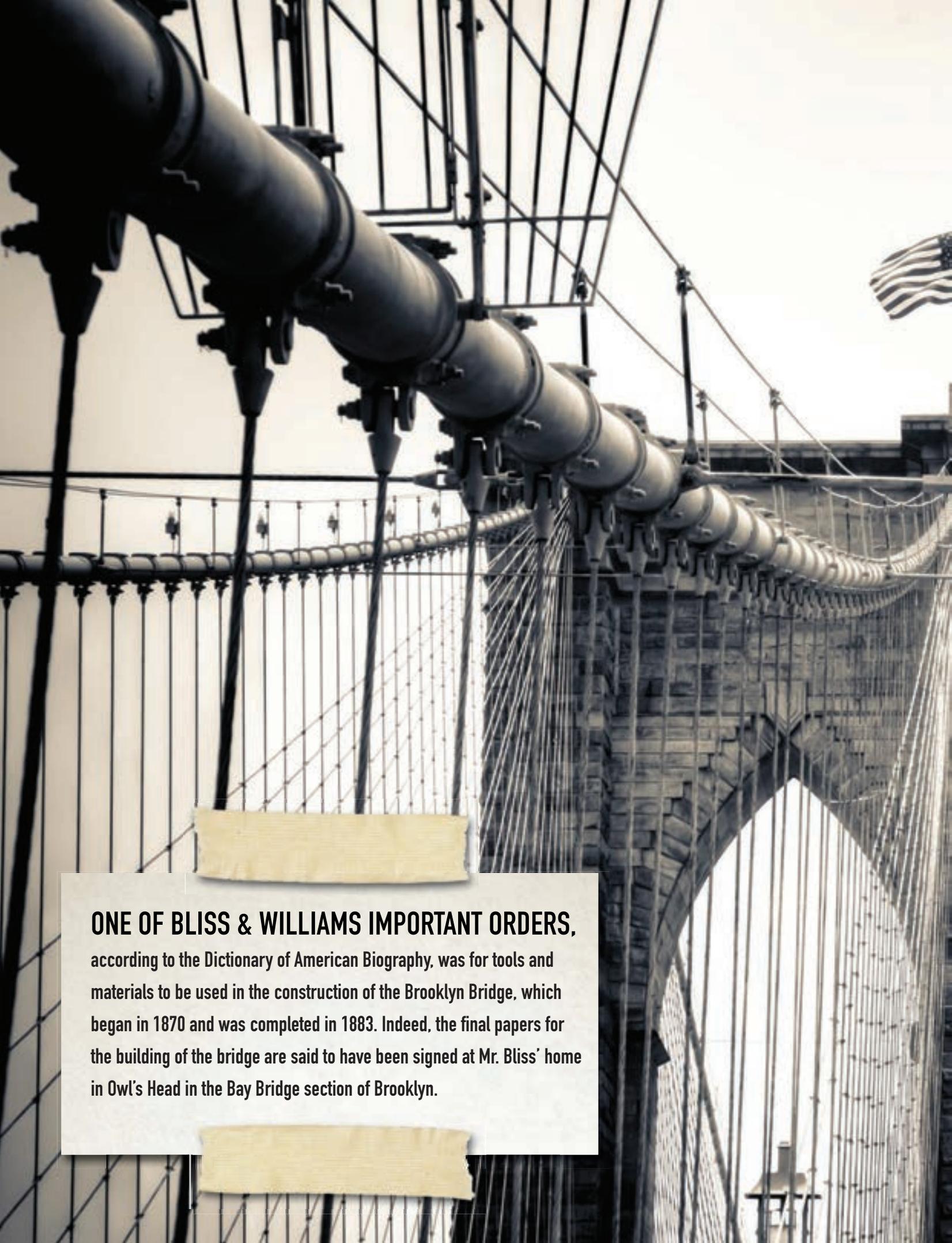
How did the business evolve? According to the July 10, 1920 Magazine of Wall Street, the E.W. Bliss Company was originally employed in the manufacture of presses, dies and the Bills-Leavitt Torpedo (the first steam turbine-driven torpedo was designed in 1904 and remained in extensive use through WWII). The latter branch of the business was expanded during WWI into the manufacture of shrapnel, shells, projectiles and ordnance devices. Even before WWI, the E.W. Bliss Company of Brooklyn, N.Y. had an extensive export business, which positioned it well for the supply of these products.

Today, Bliss Munitions holds extensive intellectual property in the form of millions of original press drawings that support machines operating in many of today’s factories. Built on a tradition of can-do attitude and applied technology, Bliss Munitions supports the ongoing performance of “The Bliss” equipment in press shops and munitions factories, in addition to other brands including the well-known reliable brands of Clearing and Niagara.

We hope you enjoy reading this book as much as we enjoyed finding and selecting the contents herein. In addition, we hope this makes you aware that selecting Bliss Munitions as your partner for equipment services for ammunition manufacture brings you a tradition of knowledge, innovation and pride to the work at hand.

War of 1812 cannonballs from Bliss Mack-Hemp Division





ONE OF BLISS & WILLIAMS IMPORTANT ORDERS,

according to the Dictionary of American Biography, was for tools and materials to be used in the construction of the Brooklyn Bridge, which began in 1870 and was completed in 1883. Indeed, the final papers for the building of the bridge are said to have been signed at Mr. Bliss' home in Owl's Head in the Bay Bridge section of Brooklyn.





Construction of the Main Works in Brooklyn, NY

Bliss Munitions has been revised, restructured, and restored over the past 150 years. Throughout the company's history, there has always been a tradition of innovation and excellence that began with the founder of the E.W. Bliss Company.



Eliphalet Williams Bliss was born in Cooperstown, New York in 1836 to Dr. John S. Bliss and Mrs. Ruby Ann Williams Bliss. At the age of four, E.W. was left an orphan. A neighbor and friend of his parents, Mr. & Mrs. Metcalf took him to live with them in Fly Creek, NY. By sixteen years of

age, Bliss was an apprentice at Metcalf & Livingstone. At the age of 21, Bliss became employed as a journeyman mechanic by the New York Central and Hudson River Railroad. In 1857, he built his first presses on contract for the Oliver Snow & Co. of West Meriden, Connecticut. He later went to work as a machinist for the Charles Parker Gun Company, where his progress was so rapid that before he was 23 years old, he was in charge of their shops.

In 1861, E.W. Bliss answered President Lincoln's call for volunteers and he distinguished himself during the Civil War. After his discharge from the Army, he attracted the attention of Andrew Campbell, inventor of the Campbell County Printing Press. E.W. Bliss joined Mr. Campbell at the Campbell Printing Press Company's plant in 1865.

In that same year, Eliphalet Williams Bliss married Anna Elizabeth Metcalf, daughter of the man to whom he was apprenticed in Cooperstown. Mr. Bliss often remarked that every step he took forward was because his wife gave him a push. It was really Mrs. Bliss who founded the E.W. Bliss Company, for it was she who insisted that her husband leave the services of his employer and go into business for himself. It is also interesting to note that while the business was in its infancy, Mr. Bliss looked after the shop and Mrs. Bliss took care of the accounts as the first bookkeeper of what was to become the E.W. Bliss Company.

Bliss also helped found the U.S. Projectile Company in 1893, which specialized in arms-making. In 1899, Mr. Bliss merged the company into the E.W. Bliss Company.

Bliss first built the Whitehead-type torpedo in America for the Spanish-American War. At its conclusion, Frank M. Leavitt, who in 1893 was in charge of installing equipment and starting the U.S. Projectile Plant, began development of a torpedo along different lines from the Whitehead type. After many years of development, the famous Bliss-Leavitt Torpedo, with a range of 12,500 feet, was perfected.

It became the standard of the United States Government during the First World War. Fifteen-thousand men were employed at one Bliss plant producing them and other munitions for the United States Government and Great Britain. The torpedo consisted of 3,000 separate parts, all requiring close tolerances. Machine tool cutting or turning operations on the torpedo tail cone was typical of many such operations requiring extreme care on the part of a capable Bliss craftsman. A tiny gyro mechanism with bearings lapped in with diamond was the brain for the torpedo's steering device.

In order to accommodate wartime demands, Bliss changed its production focus to creating Bliss-Leavitt torpedoes, depth bombs, mines, mine-sweepers, shells and equipment for manufacturing large and small caliber cartridges.

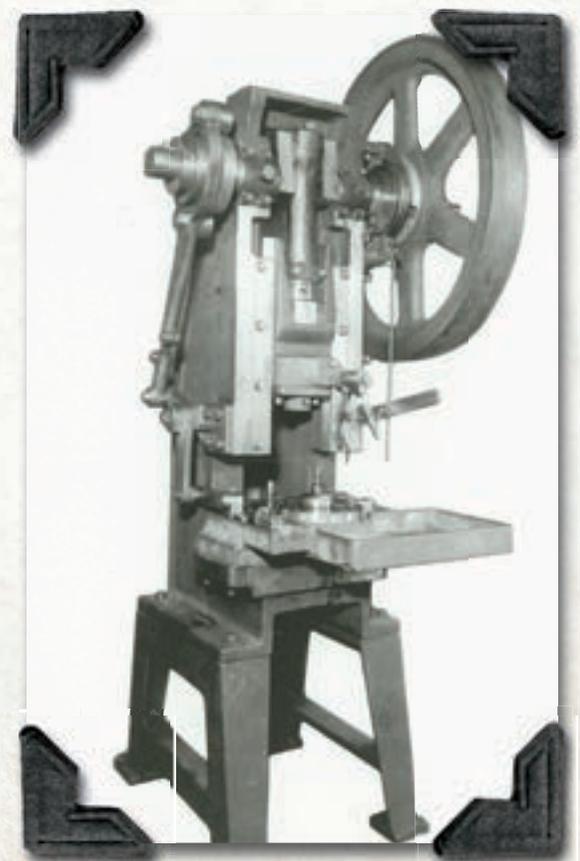
The First World War placed heavy demands on the E.W. Bliss Company. Large extensions were built onto the Brooklyn plant, covering a ground area of 15 acres and bringing the total floor area to approximately 18 acres. In order to accommodate wartime demands, Bliss changed its production focus to creating Bliss-Leavitt torpedoes, depth bombs, mines, mine-sweepers, shells and equipment for manufacturing large and small caliber cartridges.

As production was shifting in the United States, the Paris plant was undergoing even greater challenges. August of 1914 saw the shops and offices of E.W. Bliss in Paris emptied, for there were no exemption of men from military service. The importance of private machine shops for ammunition work was ignored until September of 1914, after the Franco-British victory at the Battle of the Marne.

Though in the midst of the First World War, the E.W. Bliss Company was not without progress. In 1916, Bliss acquired the W.H. Hibbard Manufacturing Company of Brooklyn, NY, specifically known for their production on the inclinable press. After WWI in 1919, E.W. Bliss acquired the Consolidated Press Company in Hastings Michigan, which to this day is the only remaining Bliss plant.



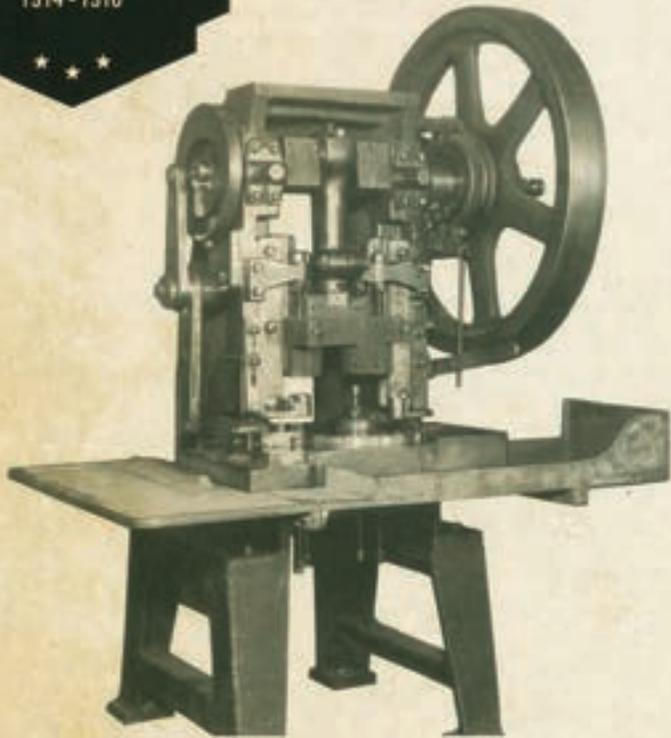
1908 Primer Cupping Press



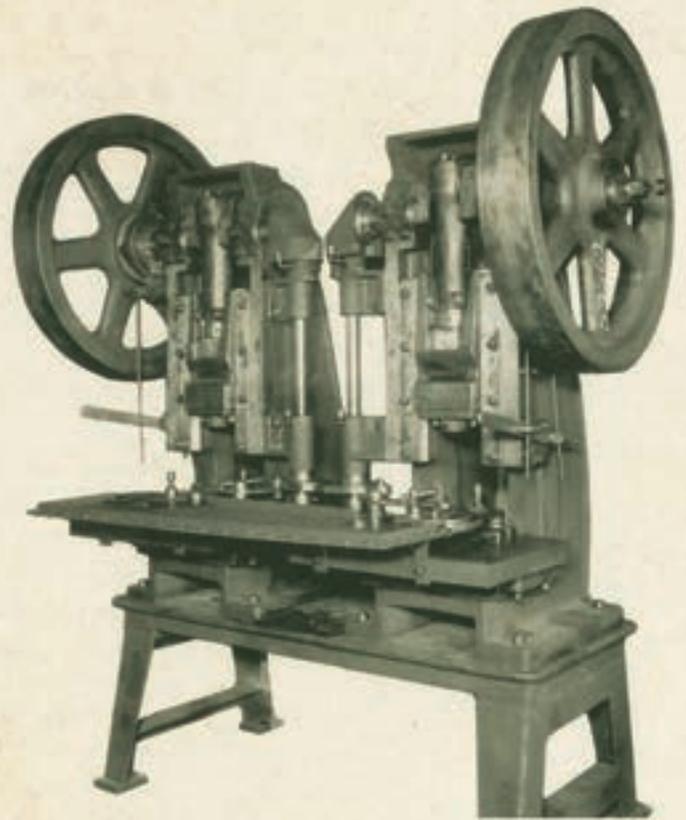
1916 Draw Press

WWI

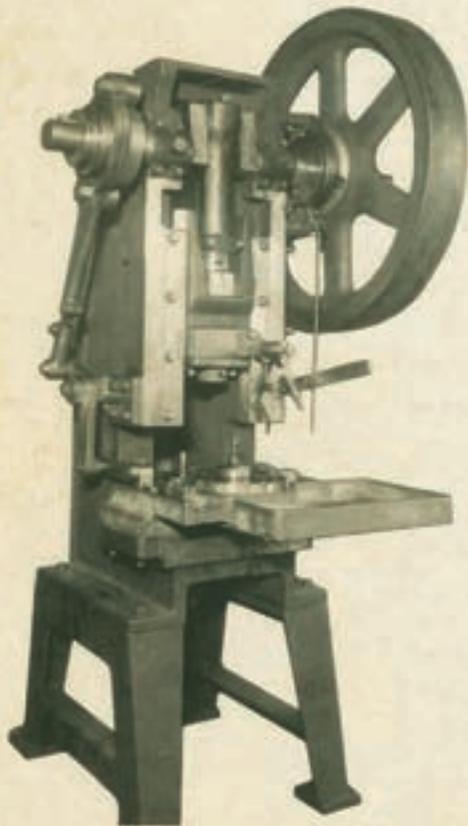
1914 - 1918



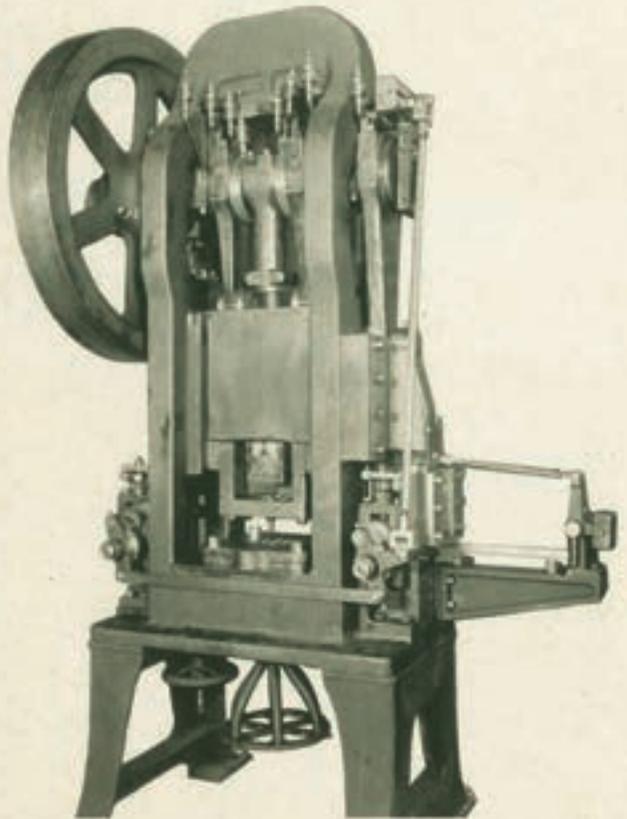
1918 Press



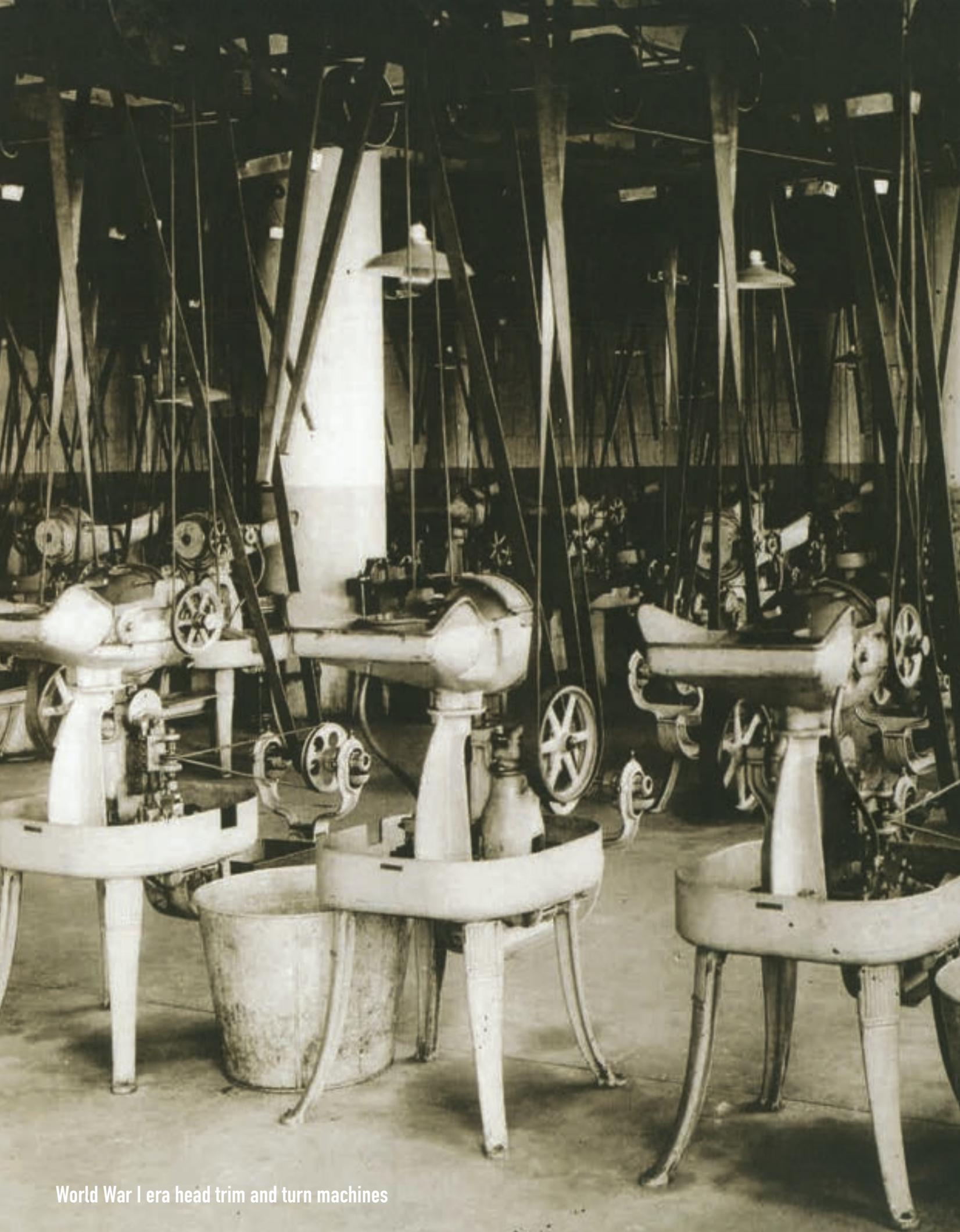
1918 Tandem Draw Press



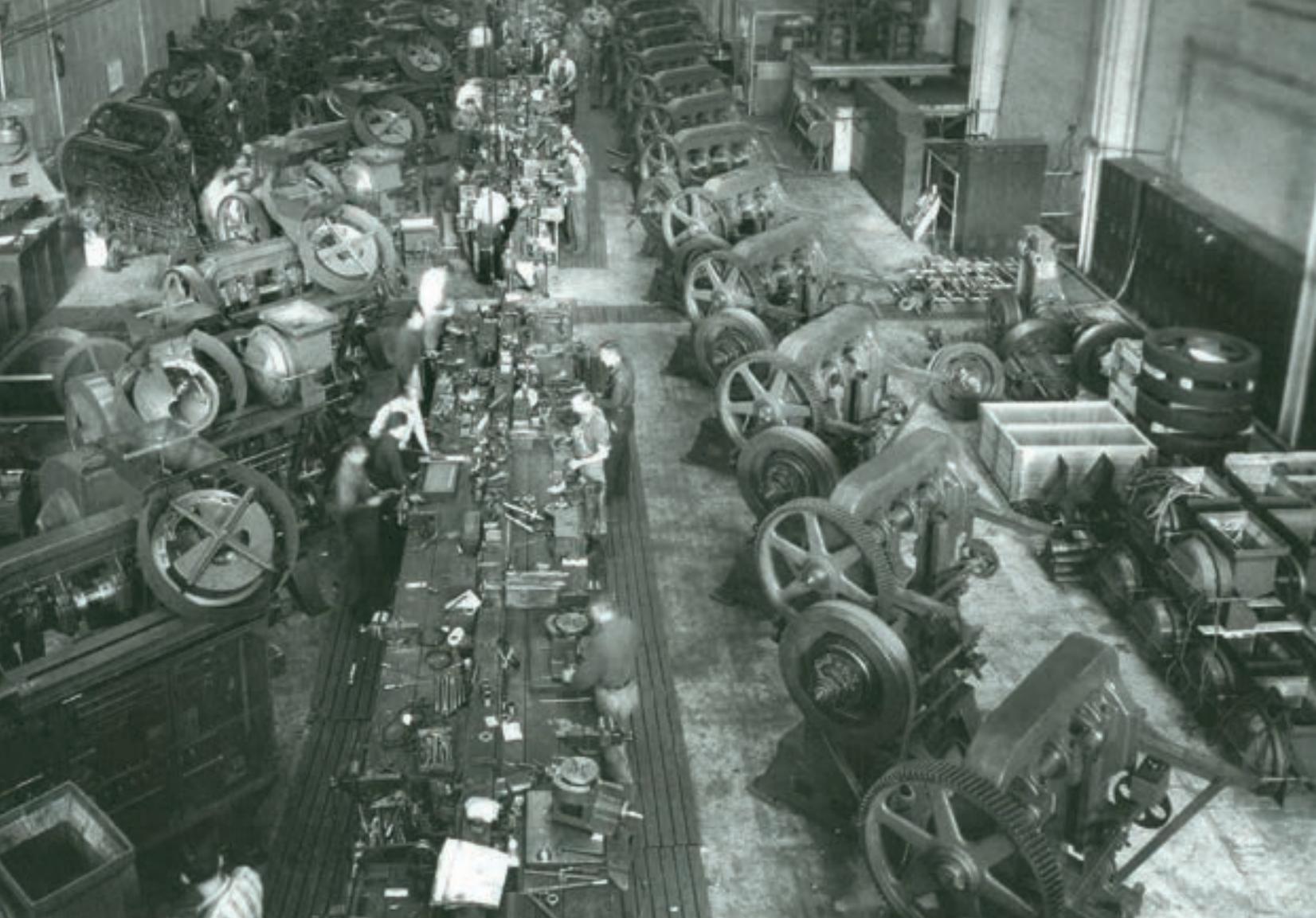
1918 Draw Press



1918 Cupping Press



World War I era head trim and turn machines



WORLD WAR II

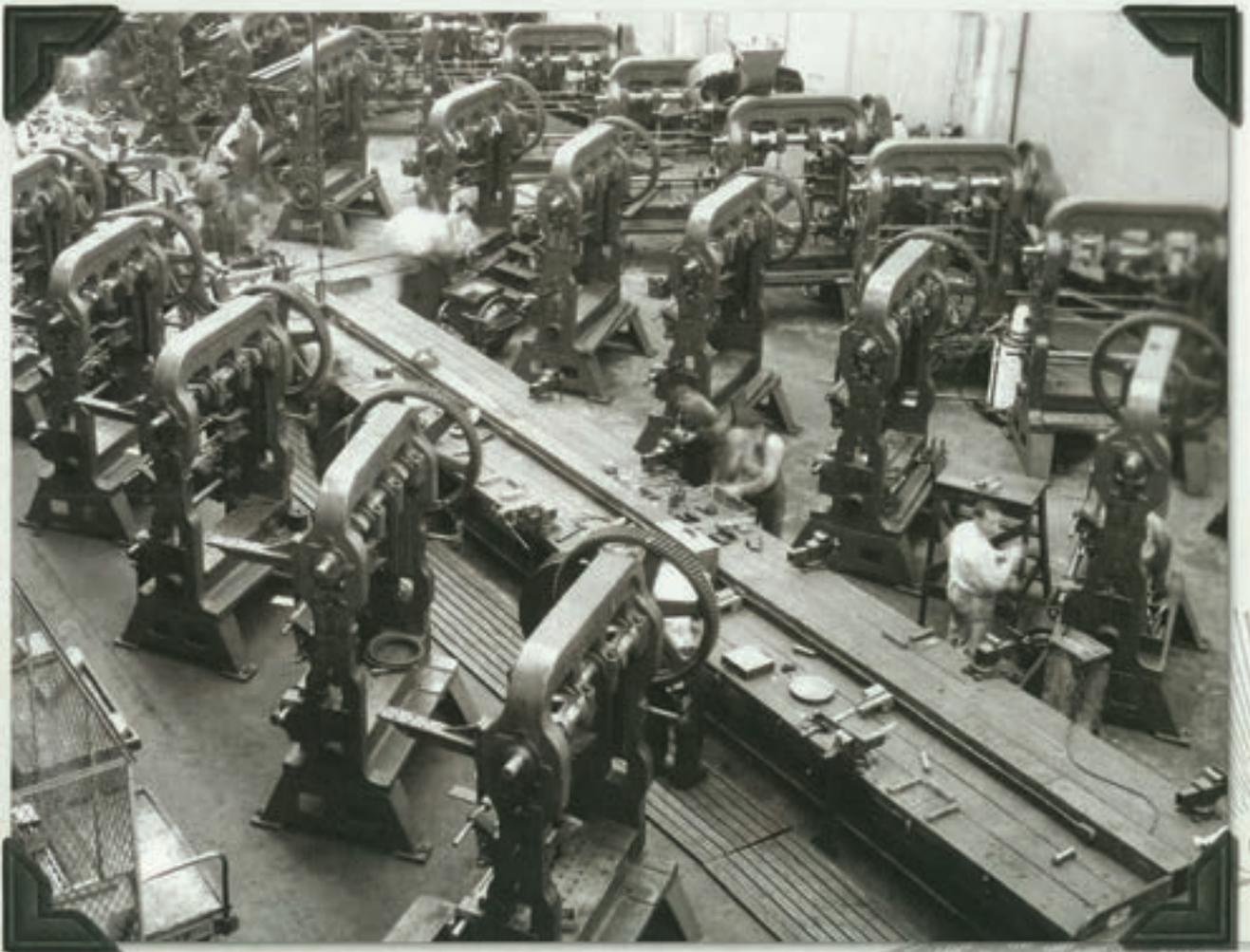
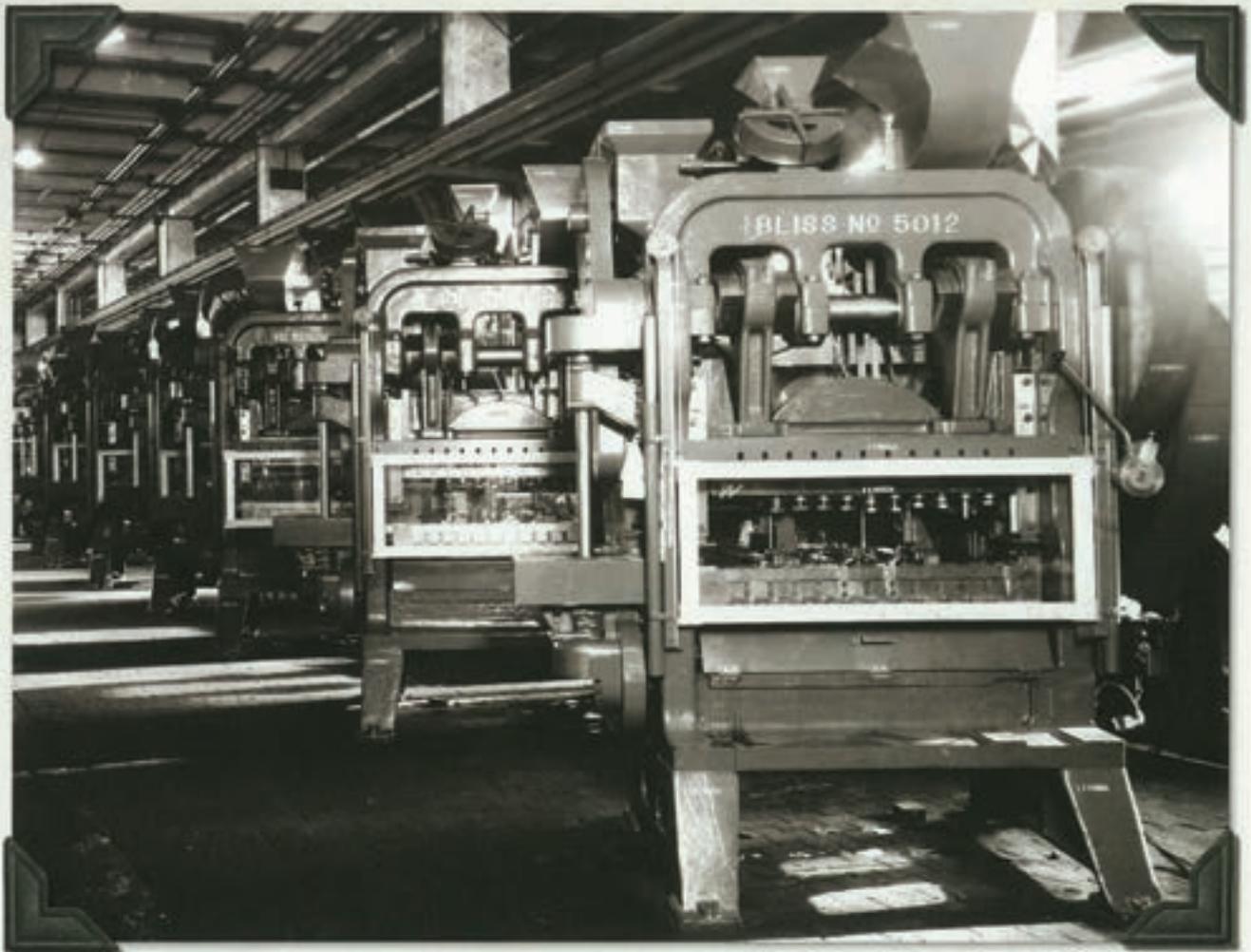
Bliss supplies several hundred large mechanical and hydraulic redraw presses to U.S. arsenals for shell work

During World War II the E.W. Bliss Company, utilizing the complete facilities of six U.S. manufacturing divisions, completed production of torpedoes, 6" shells, turbines, radar equipment, jet propulsion units, and hundreds of automatic presses for 30, 45 and 50 caliber small arms.

The Paris branch of the company was allowed to keep a sufficient staff to produce presses, but just as production was getting organized the German Blitz began. The fall of France resulted in the commandeering of the plant by German authorities, but under a well-organized sabotage system, no complete machines were ever captured.

The company also stretched itself across other borders, founding the E.W. Bliss Company of Canada, Ltd. As the Corporation expanded, the E.W. Bliss Company at home and abroad continued to focus on wartime production.

By the end of WWII, the Bliss works in England was again devoting itself to the design and manufacturing of a complete line of mechanical and hydraulic presses, automatic feeds and machinery for the making of cans and containers.



Cartridge Cases For 25-Pounder Shells

CARTRIDGE cases for 25-pounder shells are being produced on a high-quantity basis by a shop in Quebec which achieved distinction by equipping a complete plant for this purpose with machines, furnaces, tools, dies, and gages, and attaining full-production operation within five months from the day the shop was invited to tender a bid. This plant is now producing over 40,000 cartridge cases per week for 25-pounder shells.

As a manner of general information, it is interesting to know that the shells and the cartridge cases for 25-pounder artillery are loaded separately in the guns. This practice is in marked contrast to the method of loading the famous 75-millimeter guns used by the French American forces in the first World War, and the 18-pounders, which were the standard British field guns up to three years ago. For this older artillery, the ammunition was "fixed." The cartridge case held a definite charge of explosive and was crimped to the end of the shell so that the shell and the cartridge case were loaded as one piece into the gun. The advantage of using separate ammunition is that the charge can be varied.

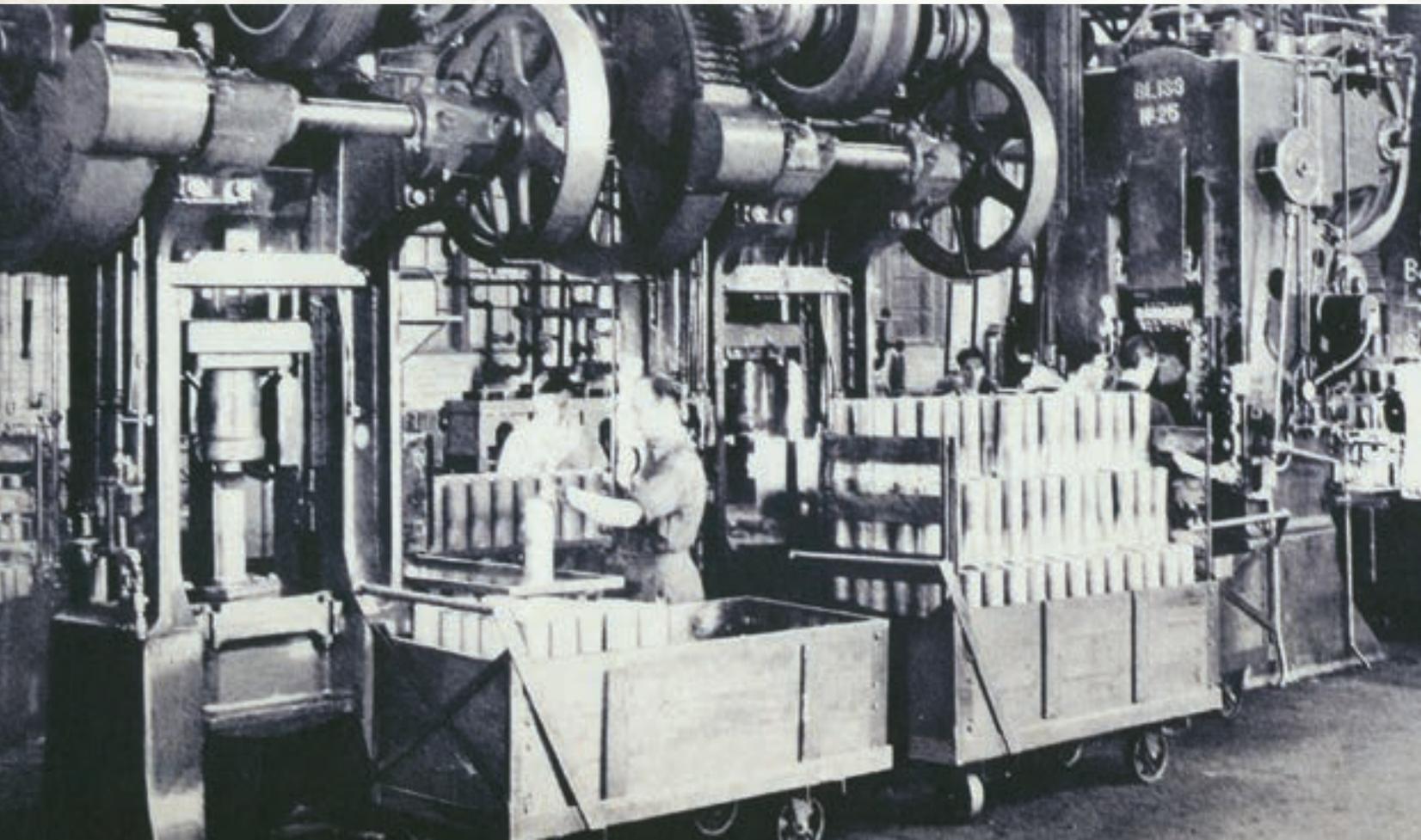
The 25-pounder cartridge cases are produced from disks of brass 6.290 inches in diameter by 0.525 inch thick. The brass from which the disks are produced is rolled in the mill

to the thickness mentioned annealed in the strip and blanked on presses.

The first of these operations consists of drawing the disks to a cup of shape on a Bliss press of 200 tons capacity. The cup is approximately $3 \frac{15}{16}$ inches inside diameter, $4 \frac{3}{4}$ inches outside diameter, and $2 \frac{3}{8}$ inches deep. Following the cupping operation, the cases are annealed to soften the material for the next draw, after which they are pickled to remove scale and dirt. This annealing process, which will be described later, follows each drawing operation, and pickling follows each annealing.

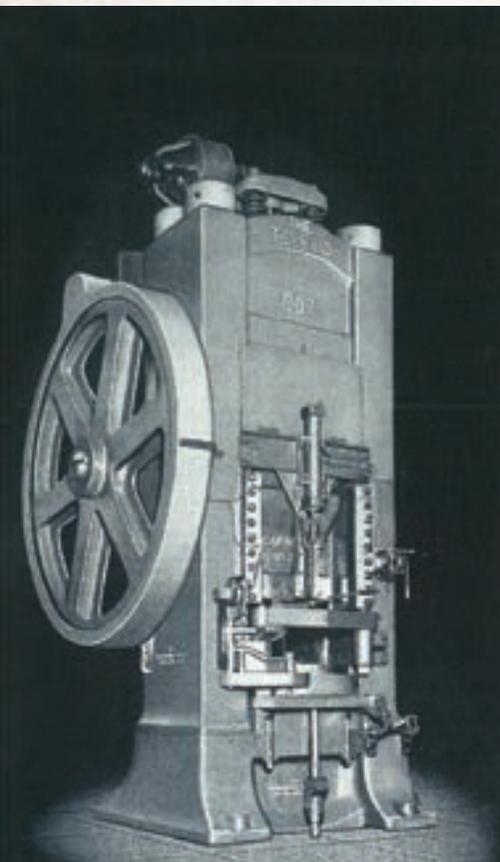
The press employed for cupping the disks is also used for the first draw, it being the practice to run a considerable number of pieces through one of these operations and then change the punch and die for performing the other operation.

In the second draw operation, a man at the front of the press dips the cupped pieces into soluble oil to ensure adequate lubrication of the punch, die and work during the operation. He then lays the dipped cup on a long narrow tray leading to the die-block. A second man at the front of the press inserts the cup into the die between strokes of the press, which operates continuously.





Bliss Cupping Press



Bliss Toledo

The punch pushes the cup completely through the die, the cup rolling through an opening in the back of the die-block to a third man who stacks the cases into a truck to be transferred to the annealing furnace.

Each cartridge case is stripped from the punch on the up stroke by a finger at the inner end of a horizontal spring-actuated plunger. The end of this finger rides against the side of the cartridge case from the bottom to the upper end during the operation and then jumps over the case as it is forced past the finger, thus preventing the case from moving up with the punch on the return stroke. The finger is rounded on top, so that it is readily pushed back by each descending cartridge case, but is flat on the bottom side, and thus cannot be pushed on the up stroke. With the exception of the die insert and punch, the same equipment is employed for the cupping operation.

At the end of the first draw, the cartridge case is approximately $3 \frac{3}{4}$ inches inside diameter, $4 \frac{7}{16}$ inches outside diameter and 3 inches long. After annealing and pickling, the cartridge case is drawn to the approximate dimensions. After again annealing and pickling, the cartridge case goes to a Bliss press of 600 tons capacity for flattening and indenting the base end, as indicated by the cartridge case seen lying on the left-hand side of the die fixture. This fixture is of the two-station type, the work being loaded into a die at the front of the press and then indexed through 180 degrees to locate it under the press ram. Unloading and working of two cartridge cases is, of course, performed simultaneously. Each cartridge case is formed on the bottom end in the operation.

The center of each die is fitted with a plug of the approximately the same diameter as the inside of the cartridge case, which is made with a depression at the upper end in which the indent is formed by the descending punch. The external cylindrical surface of the cartridge case registers against the die sleeve. These indenting die holders are equipped with springs that raise them from the fixture when the ram of the press rises, thus reducing friction in the indexing of the die-holder, which is performed by hand.

The cartridge cases go next to the third drawing operation, which is performed on a 100-ton hydraulic press built in Canada. In this operation, the cases are drawn to the approximate dimensions. Then, after annealing and pickling, the cartridge cases are put through a fourth drawing operation performed on a hydraulic press of 100 tons capacity. A hydraulic press of 50 tons capacity is used for the fifth and sixth drawing operations.

The dies employed in the fourth, fifth and sixth drawing operations are made with a circular depression or well in the top, in which a supply of soluble oil is maintained, so as to completely cover the punch on its up stroke and thus provide adequate lubricant for the working stroke. The cartridge case is dipped in soluble oil before being placed in the die, as in the case of all drawing operations performed in this shop. This practice is of utmost importance in drawing the cartridge cases successfully to their final length and thin wall section. As in the drawing operations previously described, the cartridge cases fall through the die bolsters and are loaded by a man at the back of the press into trucks. Stripping devices on the dies prevent the cases from rising with the punch.

In all the hydraulic presses, there is a rapid approach of the punch to the cartridge case after the fourth, fifth and sixth draws, respectively. A number of the other operations however, occur between the fourth, fifth and sixth draws.

After the fourth drawing operation, the cartridge cases are trimmed to length in machines of the construction, which were designed and built by a Quebec firm. Each case is slipped over an arbor attached to the headstock spindle, and the excess stock at the open end is cut off by feeding a circular cutter at the front of the cross-slide against the revolving case. This cutter is about 4 inches in diameter, and is ground at an angle of 45 degrees to a knife-edge. The slide is fed against a stop, which permits the tool to cut through the brass wall of the cartridge case, but prevents it from cutting the hardened steel ring provided on the arbor in line with the tool. The tool is mounted on Timken roller bearings to enable it to revolve freely with the work. Adjustments are provided to regulate the thrust on these bearings. When the excess stock has been severed from the cartridge case, the cross-slide is fed forward, bringing a hardened roller at the back into firm contact with the trimmed end of the cartridge case and rolling down the small raised edge produced in this operation and there are no burrs. The roller is about 4 inches in diameter by 1/2 inch wide and is also mounted on Timken roller bearings. The wall of the cartridge case is about 3/32 inch thick where it is trimmed off.

Before this method of trimming was adopted, the engineers responsible for its development were told that the method would not prove practical; but experience has proved that each machine of this type in the plant can be operated to trim 360 cartridge cases per hour by a man having only a limited amount of training.

The cartridge cases are passed from the trimming operation to a Bliss press of 1200 tons capacity. After a cartridge case is loaded in one of the two dies, the die fixture is automatically indexed by a mechanism at the rear of the press to bring the cartridge case into position beneath one of the punches. Then the press ram is operated to bring down the punch that is over the work and die for flattening the base of the cartridge case. When the press ram rises again, the operator moves a lever at the right on the front of the machine, causing the punch holder to slide sidewise and thus bring the second punch into position above the work. The operator then causes the press ram to descend a second time for further indenting and forming the base end of the cartridge

case, both on the outside and the inside. Both punches are made with a short projection on the lower end which registers in the indent previously made.

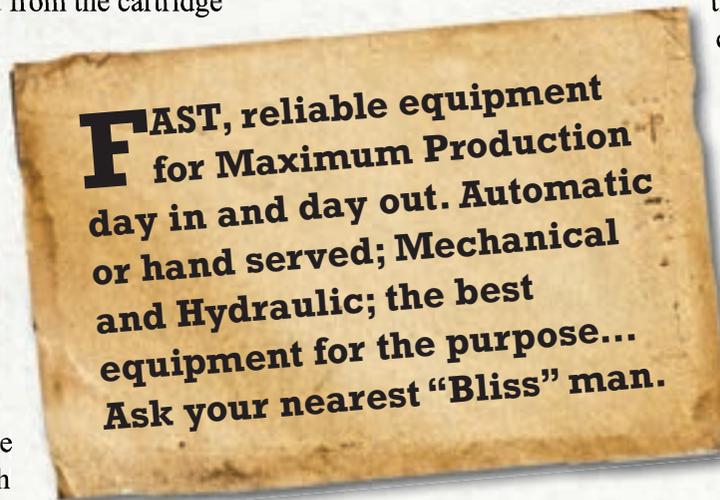
As in the first indenting operation, each die is made with a plug in the center that has a depression in the upper end to suit the previous indent in the cartridge cases, and the outside wall of the cartridge case contacts with the die sleeve. The die indexing mechanism is air-controlled. It is electrically interlocked with the ram operating mechanism, so that the ram cannot be operated unless the dies and punches are in their proper positions.

The cartridge cases then go to the fifth and sixth drawing operations, being, of course, annealed and pickled after the fifth draw. Following the sixth draw, the cartridge cases are trimmed a second time on and a 1/8-inch hole is drilled in the center of the base end. The cartridge cases are now transferred to the Bliss 1200-ton press for heading the closed end. This is a rather severe operation and requires just about the full capacity of the press.

The press is equipped with an indexing fixture for the two dies which is indexed mechanically, as in the case of the second indenting operation. Only one punch is used in this instance, although a handle may be seen at the right extending to the front of the press, for indexing two punches. On this press, as well as on those employed for the first and second indenting operations a mechanical knock-out raises

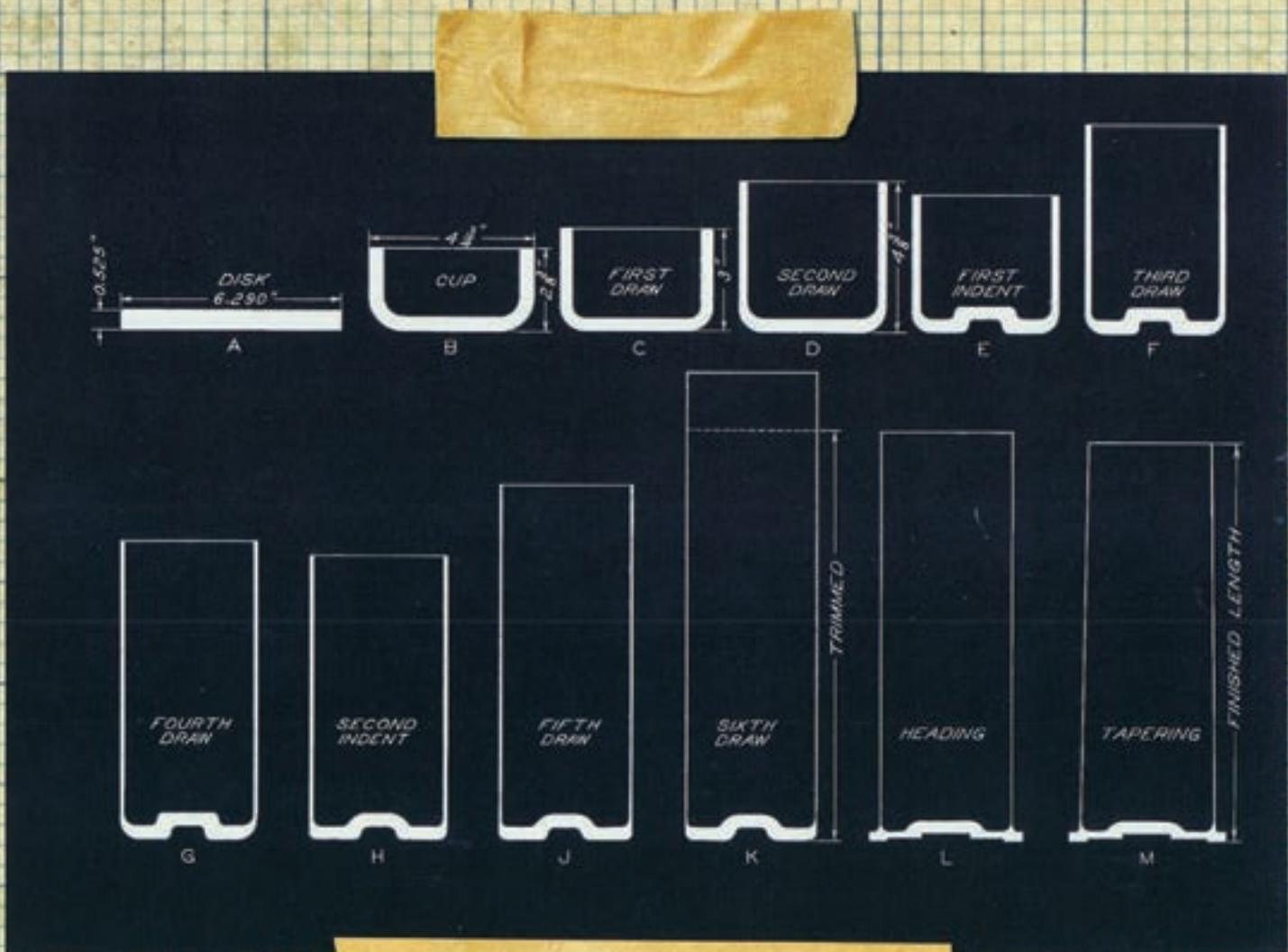
the cartridge cases out of the dies. The work automatically lifted from the deep dies on the heading press, however, by an air-operated pick-up at the front of the press. This device lowers two fingers on a ram that slip under the flanged head of the cartridge case and pull it upward with the return stroke of the air piston. Each cartridge case is taken from this pick-up device and loaded on the truck. Two men stand at the front of both the indenting presses and the heading press, one man being kept busy loading cartridge cases in the dies and the other removing cases as they are indexed to the front of the press.

All of the press operations described had to be so planned and the punches and dies so designed as to ensure proper distribution of the drawn metal in the cartridge cases. When the cases reach the heading operation, the brass at the closed end must be thicker than that of the original disk from which the case was produced. The small hole drilled prior to heading serves as a vent to allow air to escape from the inside of the cartridge case to permit the proper flow of metal, an important factor in obtaining even metal





Successive steps in producing a 25-pounder cartridge case



Approximate changes diagrams

distribution in this operation. The tolerance on the body diameter of the cartridge case underneath the head after the heading operation is plus or minus 0.005 inch.

The annealing operations that follow the various draws are conducted in pusher type furnaces of Holcroft design, built in Ontario, the cartridge cases being loaded on sheet-steel trays for this operation. The furnaces are about 25 feet long inside and are arranged for handling two rows of trays side by side, which shows the discharge end of one of the furnaces. A higher temperature is maintained at the charging end of these annealing furnaces than at the discharge end, where an annealing temperature of about 1200 degrees F is maintained. Depending upon the draw to which the cartridge cases have been subjected, the cartridge cases stay in the furnaces for forty-eight, sixty or seventy-two minutes, it being possible to change the cycle of furnace operation through a variable electric timing device. The furnaces are oil-fired, and each furnace is equipped with a duplicate set of pumps to ensure a supply of oil in the event of a pump breakdown.

At the discharge end of the furnaces, the trays of the work are slid on a roller-equipped table attached to an overhead air hoist and immediately lowered a distance of about three feet by the hoist into a water quenching tank. When the cartridge cases are raised from the quench, they are transferred to a pickling tank containing a dilute solution sulphuric acid for loosening all scale. The cartridge cases are then rinsed in water, brushed, and returned to the press department. Annealing is of great importance in cartridge case production because successful drawing cannot be performed if the brass is either too hard or too soft.

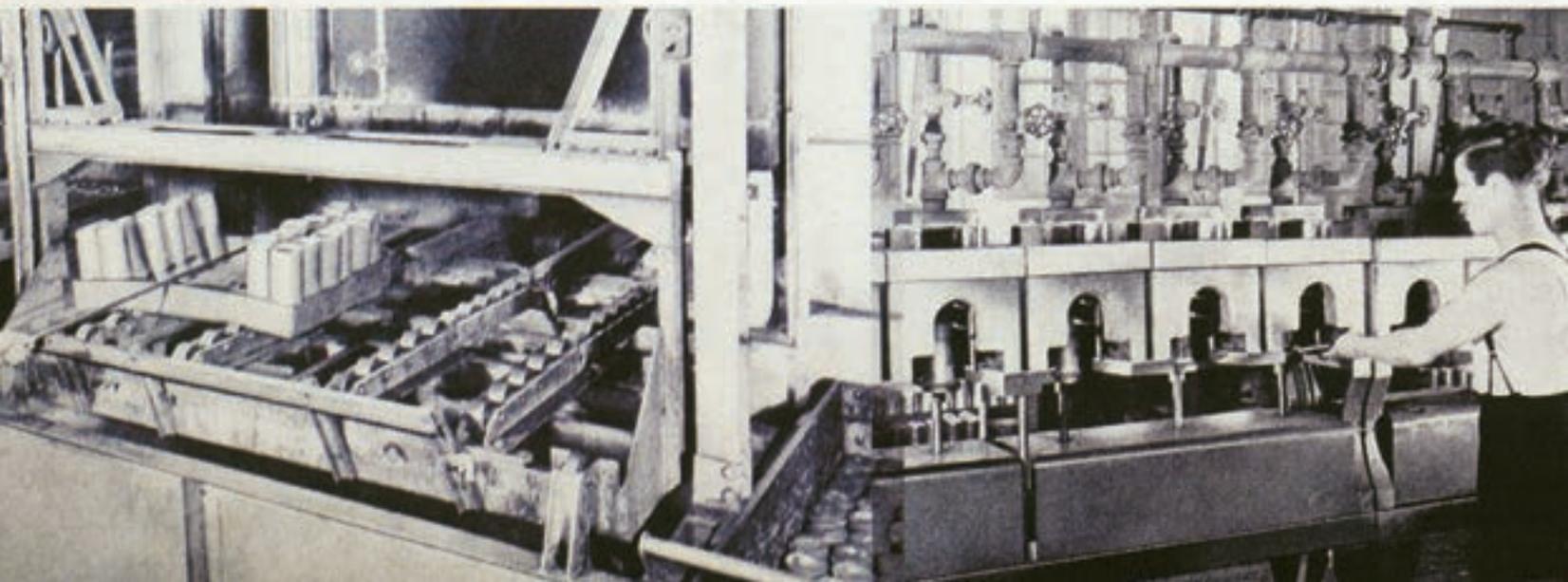
Immediately after the heading operation, the cartridge cases are annealed at the mouth end preparatory to tapering the mouth. This annealing is performed with the special equipment which consists of nine slowly revolving tables with twelve staggered jets of gas flames located above and around each table. The cartridge cases are loaded on these tables and permitted to revolve until they reach a suitable

temperature, as judged by their color. They are heated to this temperature for a distance of about 4 inches from the mouth end. The revolving tables are adjustable for height, as the extent of the heated area must be closely controlled, so as to ensure graduated hardness readings from the mouth of the finished cartridge case to the base end. This mouth annealing furnace was designed and built by a Quebec firm.

Next, the mouth is tapered by the use of two Toledo presses of 50 tons capacity. The cartridge case is positioned on a circular plate beneath the press ram, the ram being fitted with a plug that enters the cartridge case, and also with a tapered die ring that slides down along the outside of the case and gradually squeezes it inward to form the required taper. Each cartridge case is tapered for one-half its length by the first press and then immediately tapered to its full length by the second press. The cartridge cases are ejected from the die by the plug on the ram when the ram rises after each operation. Upon the completion of the foregoing operations, the cartridge case at the mouth end is almost a feather edge.

In addition to the press equipment referred to, there is an auxiliary Bliss press of 1200 tons capacity which is fitted with two indexing punches for performing either the first indenting or the heading operation in the event that either of the presses normally used for those operations should fall behind production schedules. Both punches are always in place on this auxiliary press ready for use, but the die inserts must be changed to suit the operation that is to be performed.

After the mouth tapering operation, the cartridge cases go to a battery of horizontal turret lathes of the Bullard design. These machines are provided with a turret to the right side of the headstock, as on conventional machines of this type, but in addition, they have a tool-slide at the left-hand side of the headstock. The cartridge case is slipped on an arbor that extends through the chuck. This arbor also serves as a stop against the inside of the base end of the cartridge case to locate it endwise, and as a knock-out for pushing the



cartridge case from the arbor when the operation has been completed. The three chuck jaws which grip the outside of the cartridge case are lever-operated.

In operation, the cartridge case is pushed into position on the arbor by advancing a drill on the turret against the headed end of the case. When the cartridge case has been gripped by the chuck jaws, this drill is advanced further to bore the indent to a diameter of approximately 1 inch. The operator then applies tools at the front of the cross-slide to face the head of the cartridge case and form the circumference of the head.

Next, the mouth end of the cartridge case is trimmed by a tool mounted on the slide at the left-hand side of the head-stock, after which the recess hole in the base end is reamed by a tool on the turret. Then the hole in the back of the recess is tapped with Whitworth threads by a collapsible tap on the turret. The threaded hole is about $\frac{1}{2}$ inch long. Finally, the recess is chamfered at its outer and inner ends by tools on a slide mounted on the front of the turret. This slide is operated by a handle to feed the tools radically after they have been fed into position with respect to the work longitudinally.

The holder of the facing tool is so designed that the tool can be relieved at the end of its cut by the operator swiveling a small knob. The forming tool is made of Carboly.

A tolerance of only 0.004 inch is allowed between the high and low limits on the pitch diameter of the threads, and they must also be true with the primer hole within close limits. To ensure this accuracy, a hand tapping operation is performed immediately after the turret lathe operation, the cartridge case being slipped vertically into a bench fixture for the tapping. A bushing plate with a ground boss that fits the recess in front of the tapped hole in the cartridge case is positioned on the head of the cartridge case to guide the tap. The thread is then sized with the cartridge case held on a machine of simple design. In this case, a bushing plate is fitted on the base end of the case and into the primer seat to guide the tap accurately with respect to the primer seat.

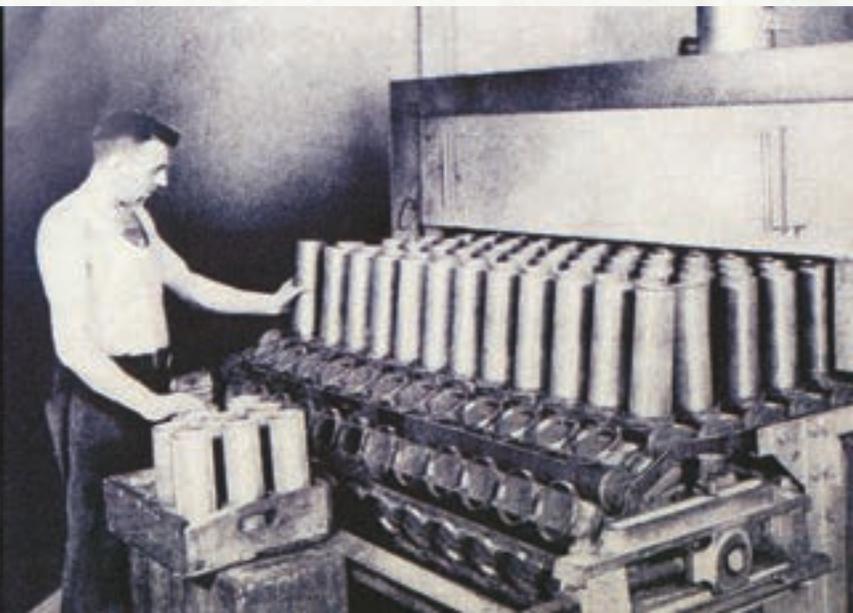
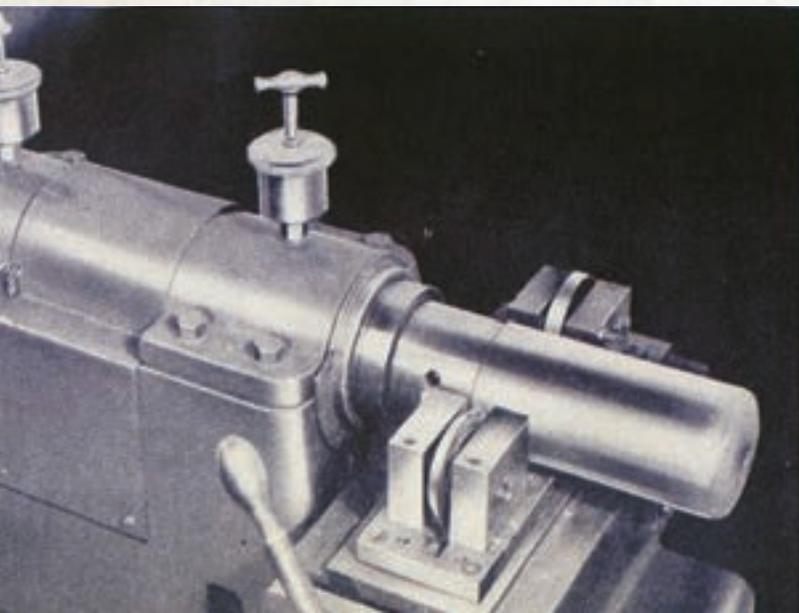
Information pertaining to the size of the cartridge case, the shop in which it is made, etc., is then marked on the base end of the cartridge cases by the Noble & Westbrook machines. For this operation, the cartridge case is slipped on an arbor that can be tilted forward, as seen at the left, to permit loading the work within the limited space available beneath the stamping head. The arbor and work are then swung into an upright position, as seen in the view of the machine at the right, after which the operator pulls down a lever, causing the marking stamp to be rolled crosswise over the end of the cartridge case.

After being marked, the cartridge cases are placed in small boxes and rolled on a gravity conveyor through a wall into an adjoining room where the cases are placed on racks and dipped into a caustic bath for removing all grease. The cartridge cases are then loaded on the conveyor of the electrically heated furnace. In this furnace, the cartridge cases are subjected to a low temperature anneal, the furnace being operated at about 500 degrees F. The cartridge cases are placed upright in rows of twelve within narrow rings that are welded to the flat conveyor bars. It takes seventy-five minutes for the cases to pass through the furnace to the discharging end.

After the cartridge cases leave the furnace, they are pickled in a light solution of sulphuric acid and washed in water. They are then buffed with sand and sawdust to obtain a high polish and to dry the inside and outside surfaces thoroughly.

The final step in the production of the cartridge cases is complete visual and dimensional checking, first by shop inspectors and then by a corps of inspectors employed by the British Government. In this inspection, a Vickers Pyramid hardness tester is used on representative lots of the cartridge cases, it being the practice to take readings across the head of the cases then along one side at points $\frac{1}{2}$, 1, $1\frac{1}{2}$, 3, 4, and 6 inches from the base and at the mouth.

Production in the shop whose methods have been described is 35 percent greater than the maximum believed obtainable when the press and machine set-ups were originally planned. ★



A black and white photograph of a large, heavy-duty industrial machine, likely a press. The word "BLISS" is prominently displayed in large, raised, serif letters across the top of the machine's frame. Below the name, various mechanical components, including rollers and adjustment screws, are visible. The machine appears to be made of dark, possibly cast iron or steel, with a weathered and industrial appearance.

BLISS

The following section contains
photographs of presses included in

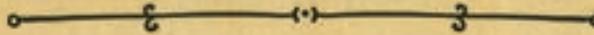
**THE CATALOG OF BLISS CARTRIDGE
MACHINERY SHOWING THE MODELS
SUPPLIED TO THE U.S. AND BRITISH
ARSENALS DURING WORLD WAR II**

which was produced by the E.W. Bliss
Company in 1939.

NO. 3015



WWII PRODUCTION 1940-1944



THREE CRANK CUPPING PRESSES

4-1/2	.30 jacket; .45 case or jacket	252
6	.30 case; .50 jacket	126
6F	.45 case.....	21
7	.50 and .60 cases; 20mm case.....	11

DUPLEX FIRST DRAW PRESSES

58	.30 and .45 jackets	158
72	.30 and .45 cases; .50 jacket	401
73-1/2	.50 case	155

REDRAW PRESSES

58	.30 and .45 jackets.....	995
62	.30 and .45 cases; .50 jacket.....	133
304	.30 case; .50 jacket	1248
305	.50 case.....	428
85-1/2	.60 case; 20mm case.....	61

HEADERS

4	.30 and .45 cases.....	1002
6	.50 case; 20mm case.....	311
7	.60 case.....	2

TAPERING PRESSES

162	.30 Springfield & carbine; .45 pistol	595
163	.303 British	132
164	.50 case.....	312
165	.50 Vickers; .50 Madsen; 20mm.....	53
166	.60 case	1

BULLET ASSEMBLIES

62A	.45 ball; .30 incendiary.....	182
3015	.303 British.....	49
5012	.50 ball; A.P., tracer, incendiary.....	587

MISCELLANEOUS

34	Flash hole piercing press	68
35	Flash hole piercing press	13
18	52 Tracer charging presses.....	119
30	Head turner and mouth trimmer.....	311
80	Head turner and mouth trimmer.....	156
2	Cupping press for 20mm primer.....	2
80	Mouth annealers for 20mm case.....	79

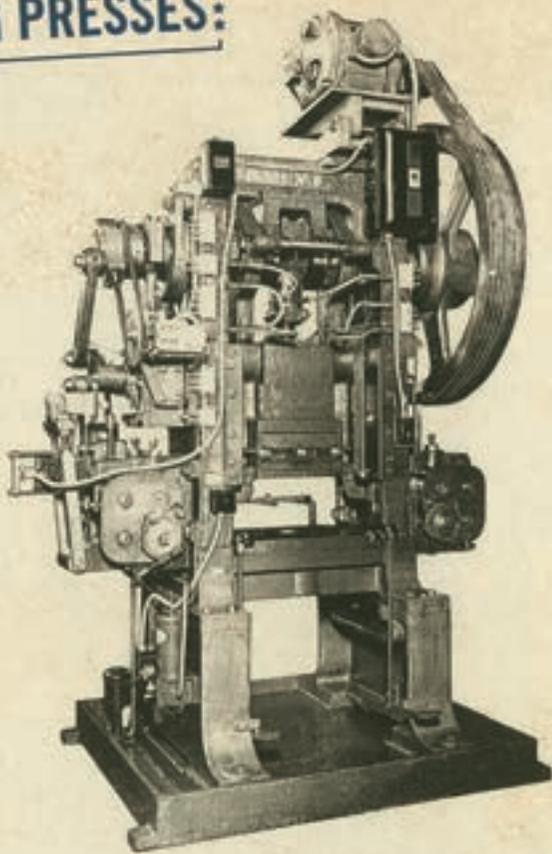


WWII Thousands of torpedoes produced by Bliss

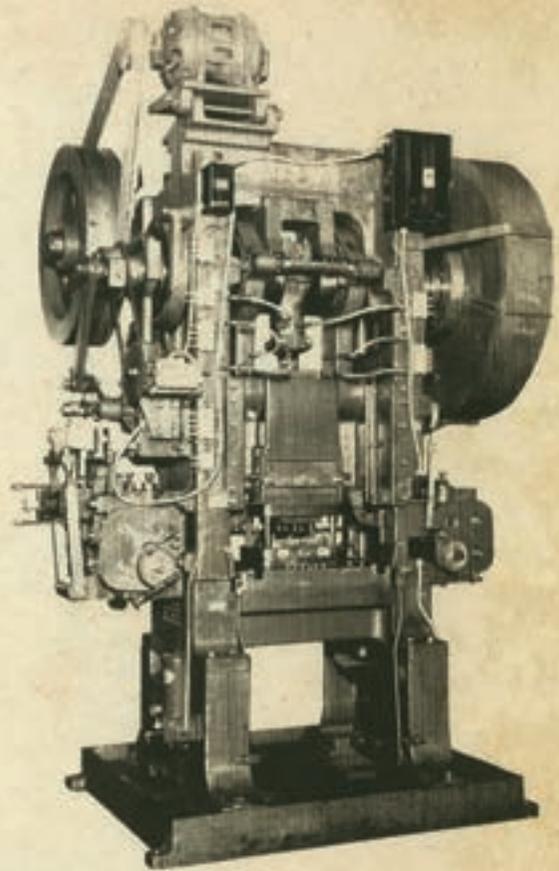


Presses in production at Bliss during the Second World War

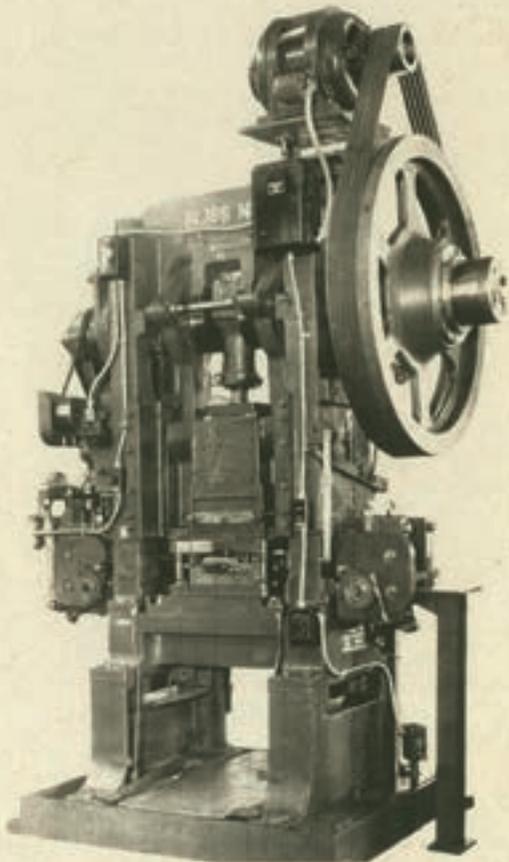
CUPPING PRESSES:



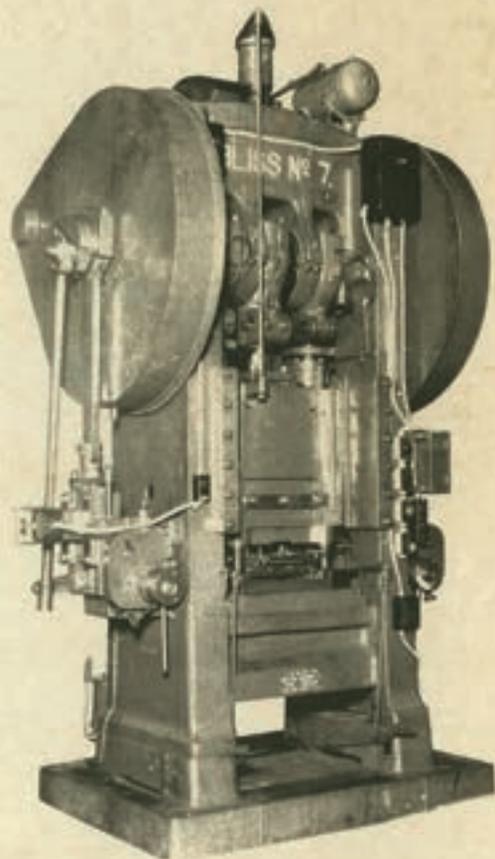
| No. 4-1/2 Cupping Press |



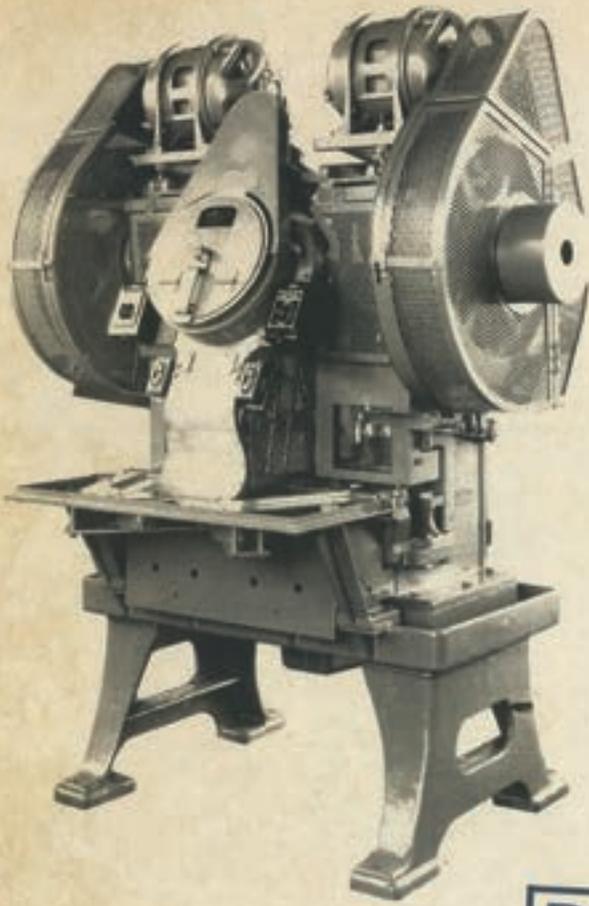
| No. 6 Cupping Press |



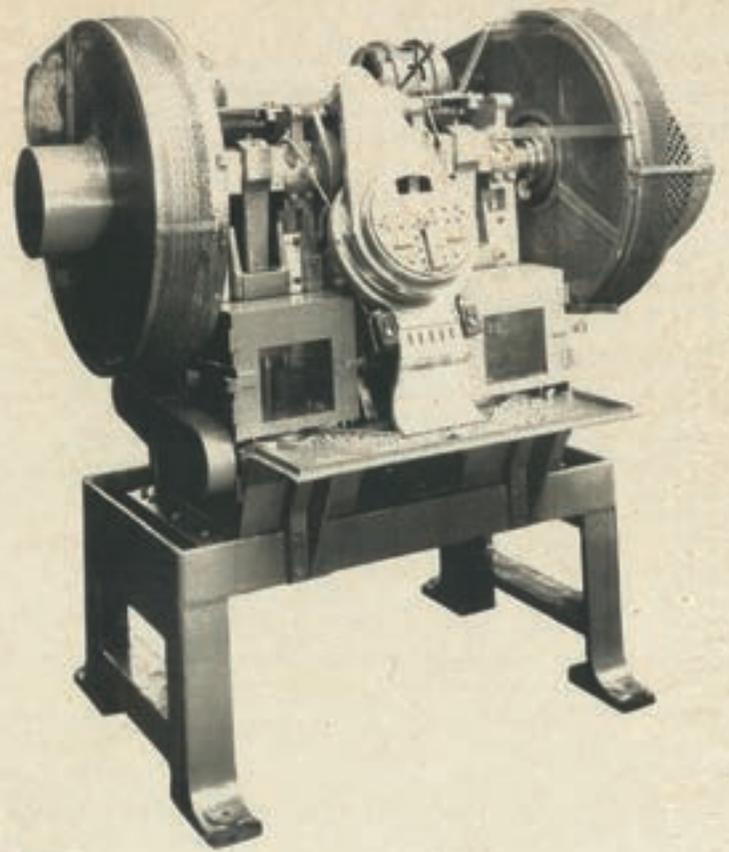
| No. 6-F Cupping Press |



| No. 7 Cupping Press |

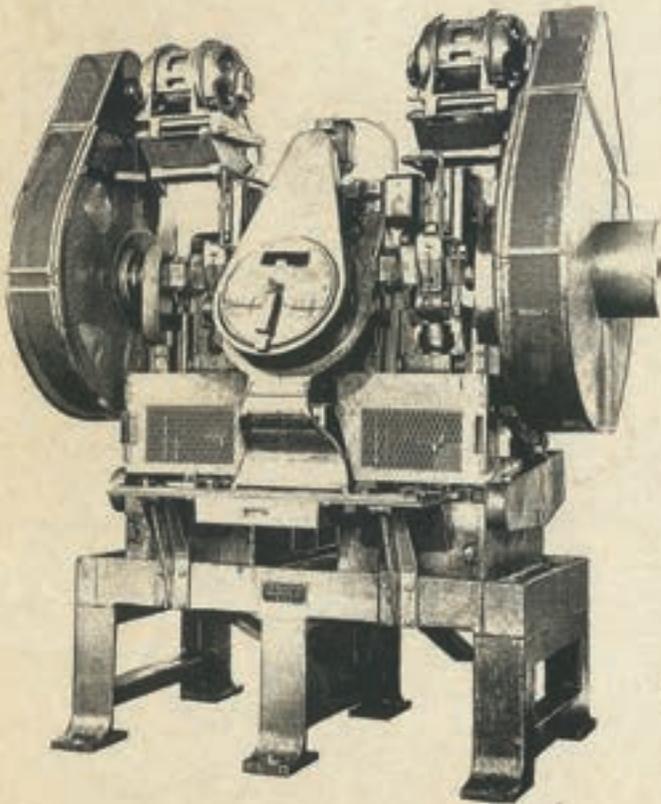


—| No. 58 First Draw Duplex Press |—

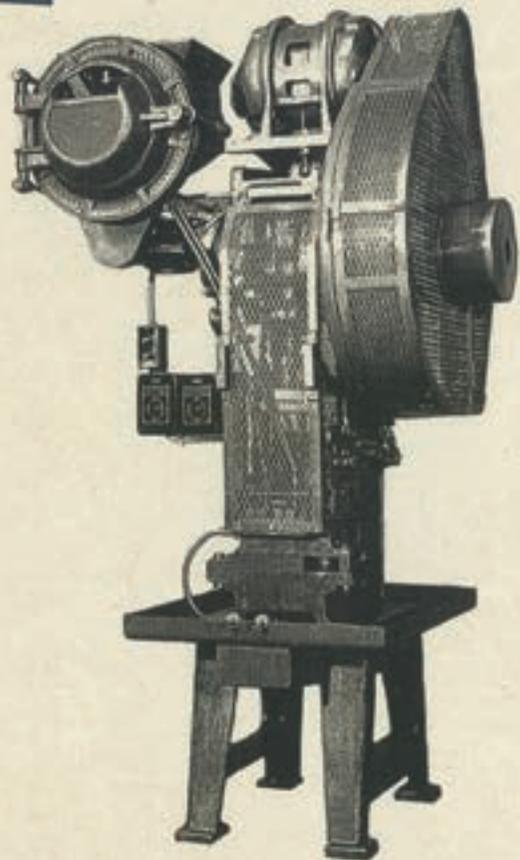


—| No. 62 Duplex First Draw Press |—

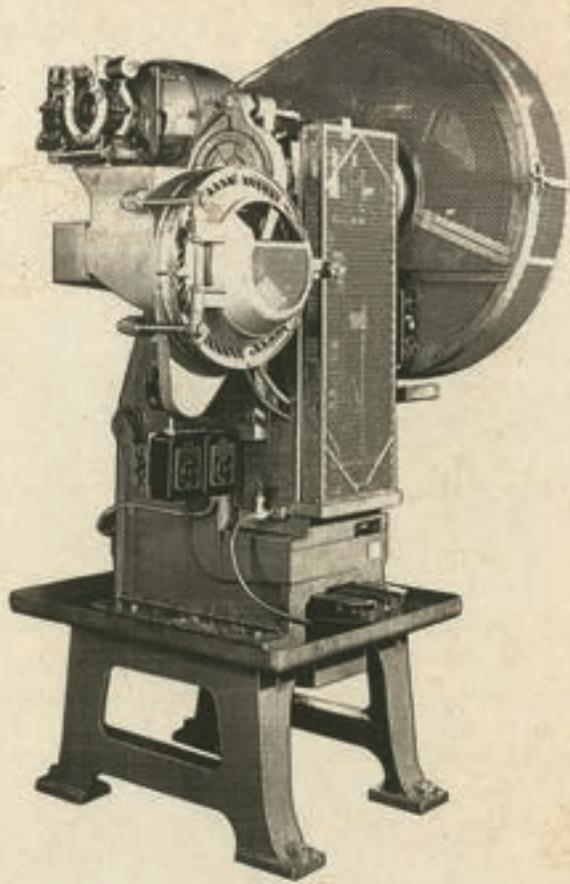
DUPLEX
FIRST DRAW PRESSES



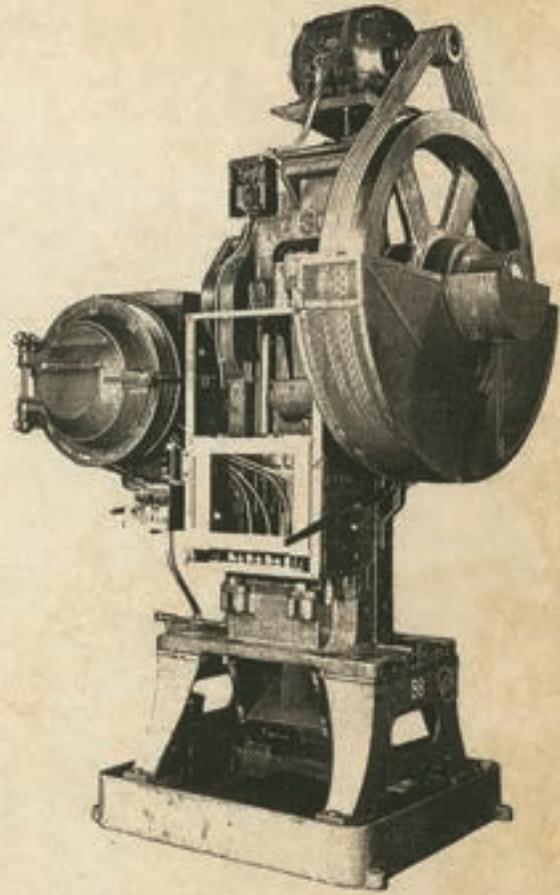
—| No. 73-1/2 Duplex First Draw Press |—



—| No. 58 Redraw Press |—

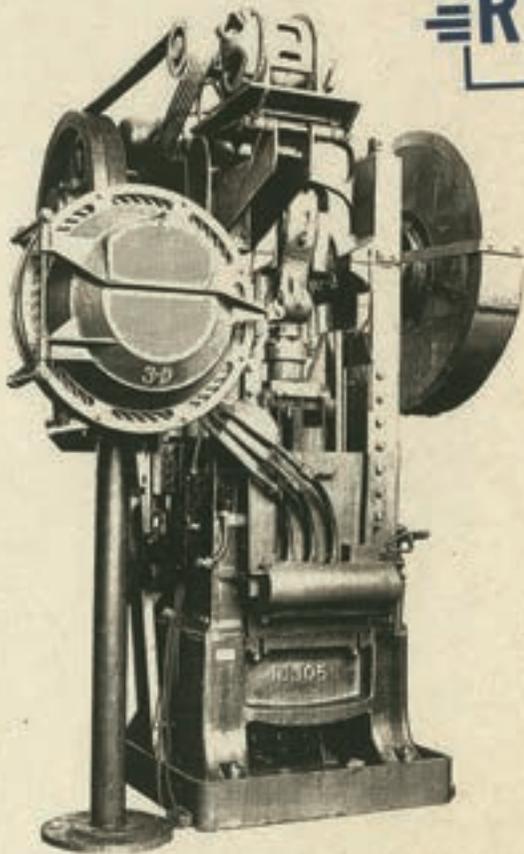


No. 62 Redraw Press

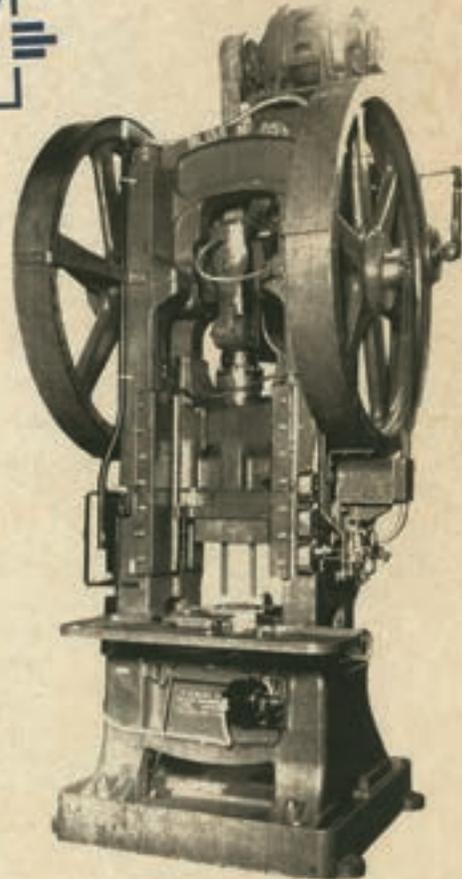


No. 304 Redraw Press

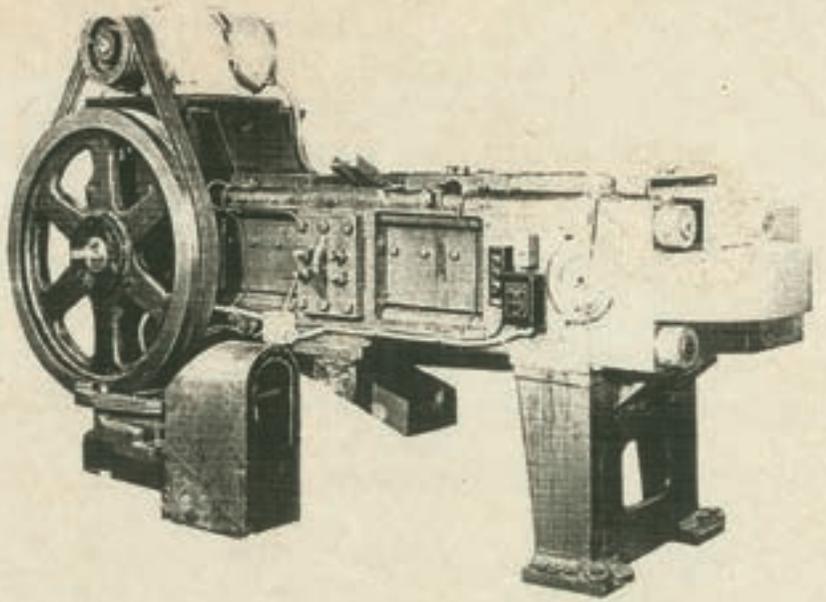
REDRAW
PRESSES



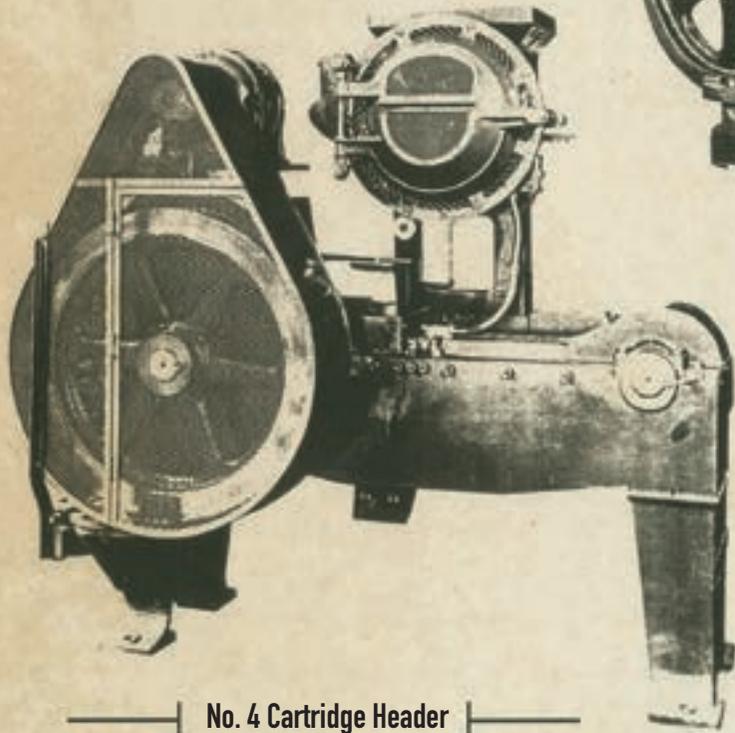
No. 305 Redraw Press



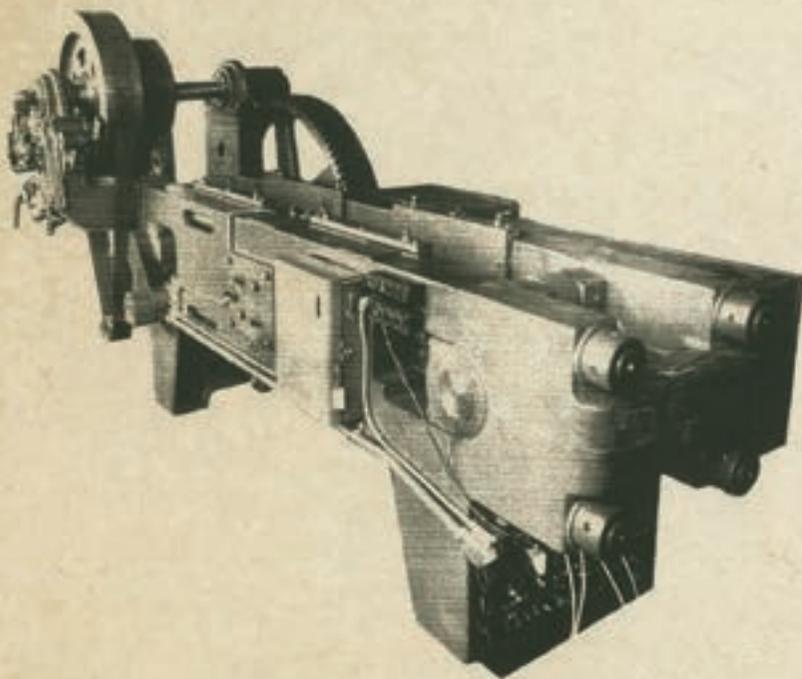
No. 85-1/2 Redraw Press



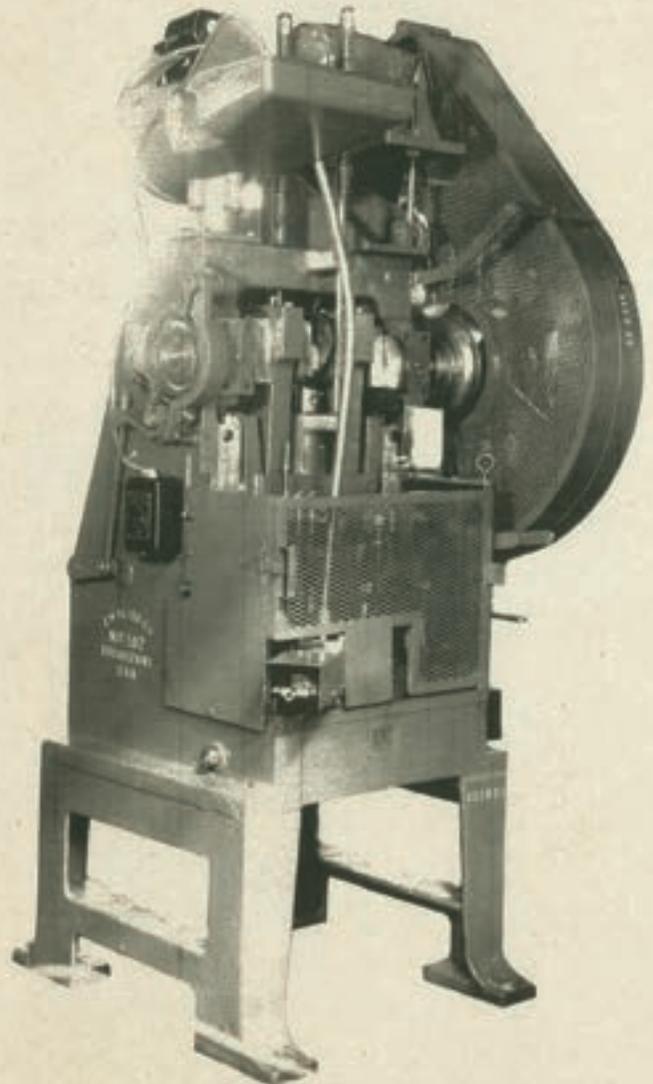
No. 6 Cartridge Header



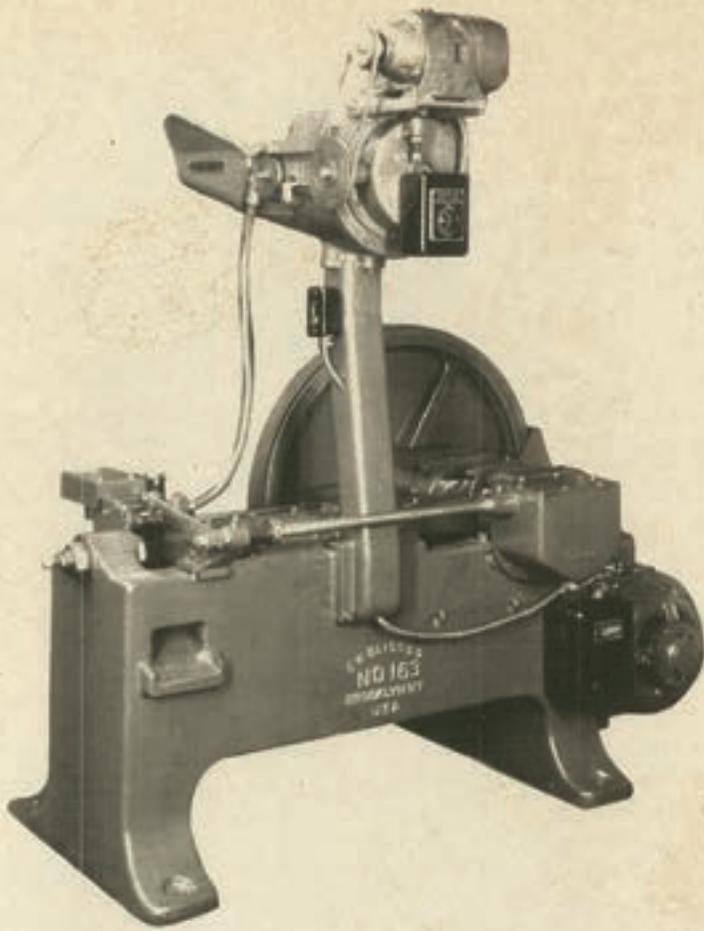
No. 4 Cartridge Header



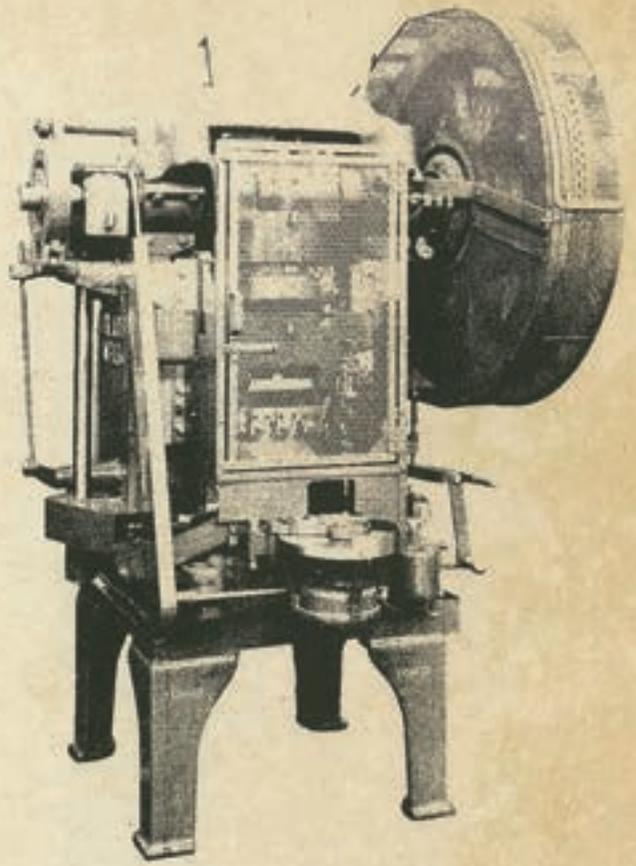
No. 7 Cartridge Header



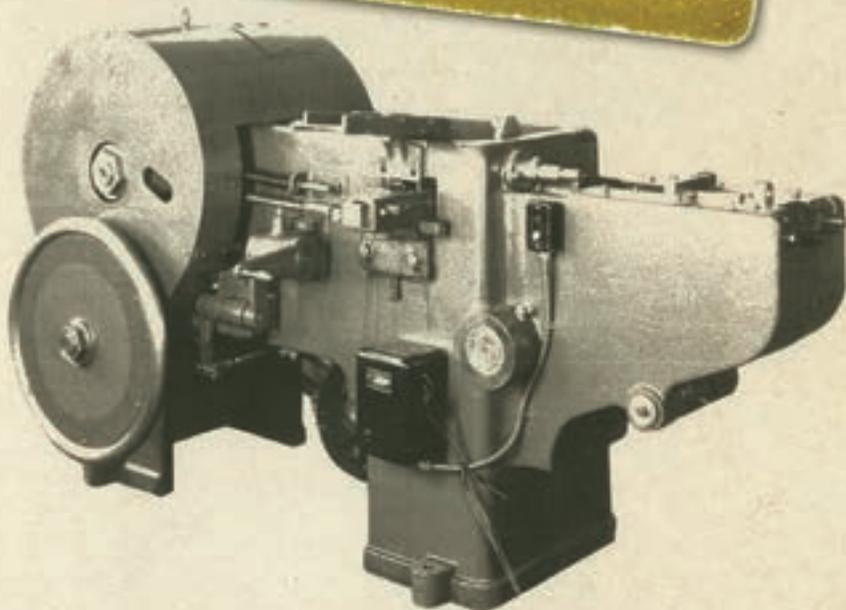
No. 162 Cartridge Tapering Press



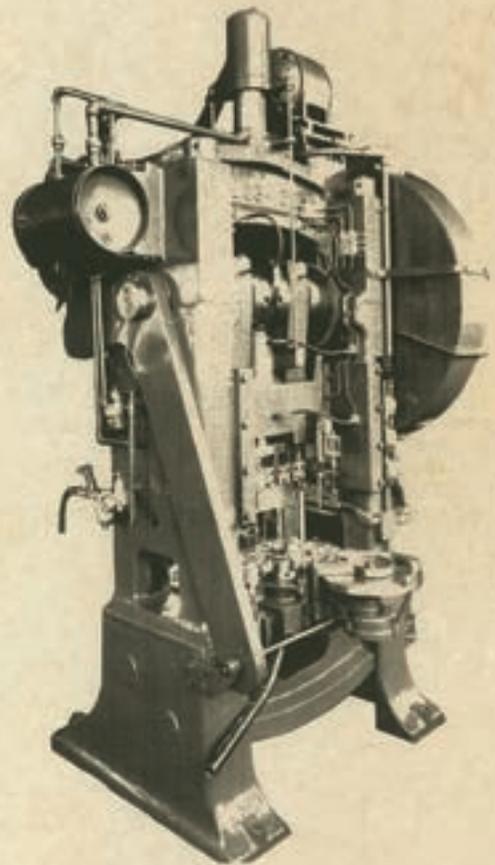
No. 163 Horizontal Tapering Press



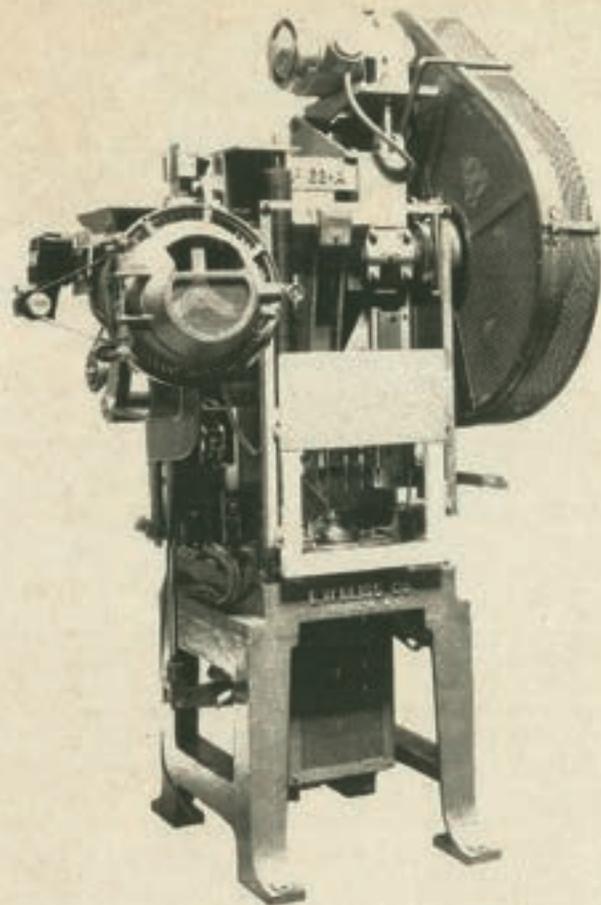
No. 164 Cartridge Tapering Press



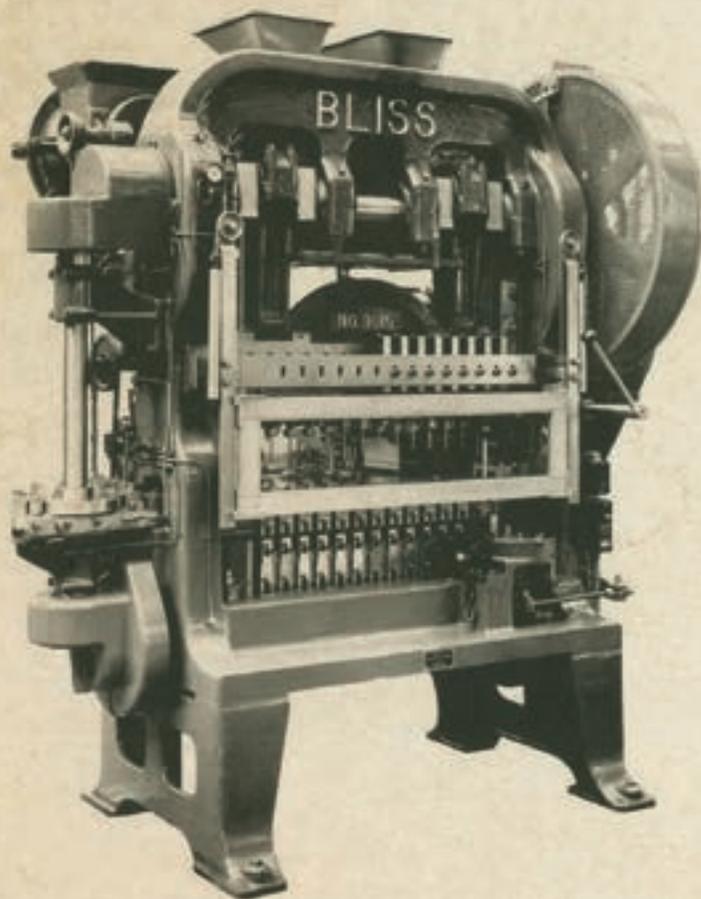
No. 165 Horizontal Tapering Press



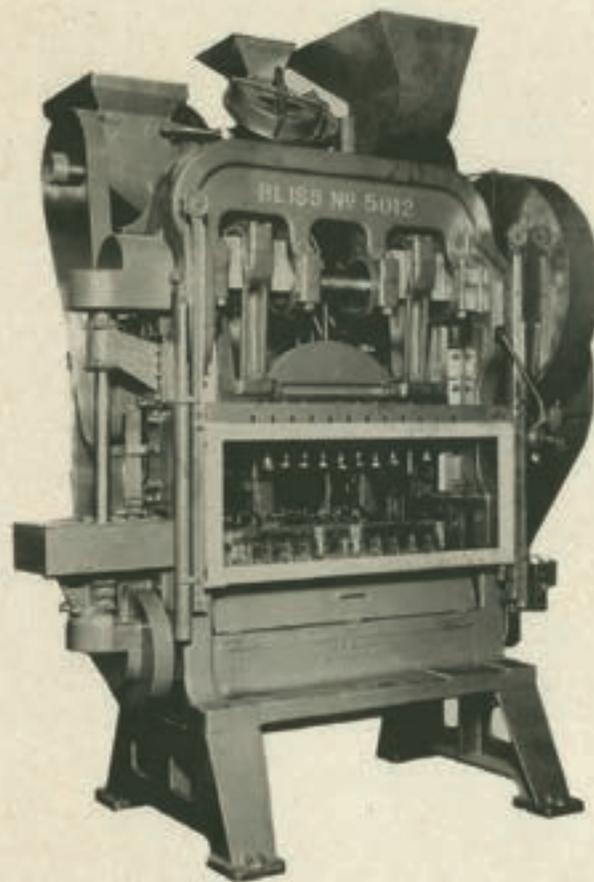
No. 166 Cartridge Tapering Press



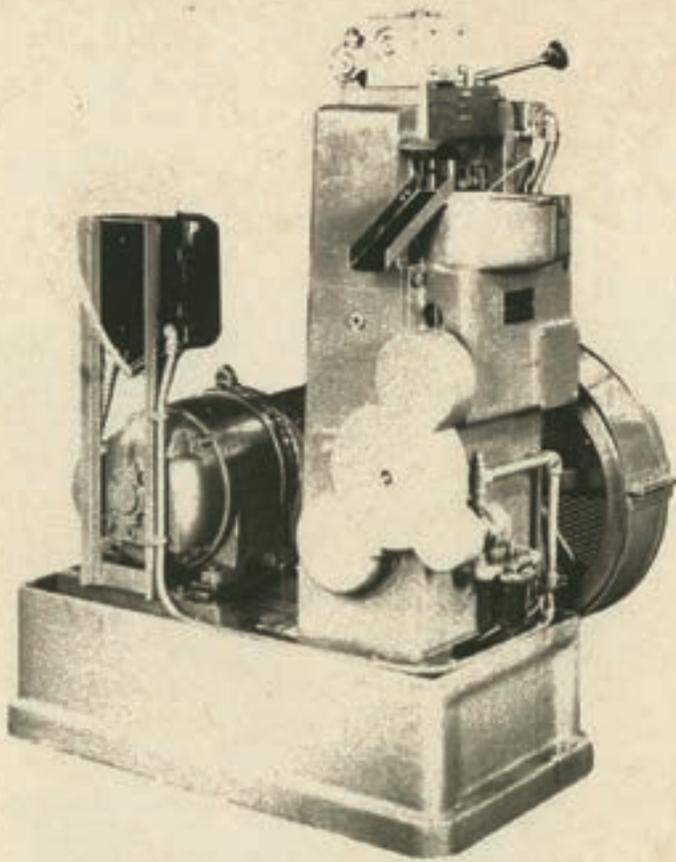
— | No. 62-A Bullet Assembler | —



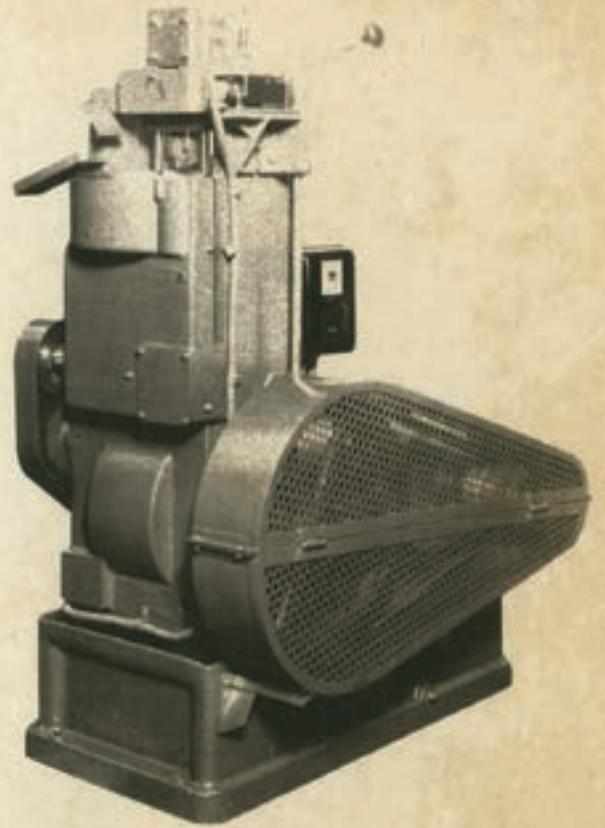
— | No. 3015 Bullet Assembler | —



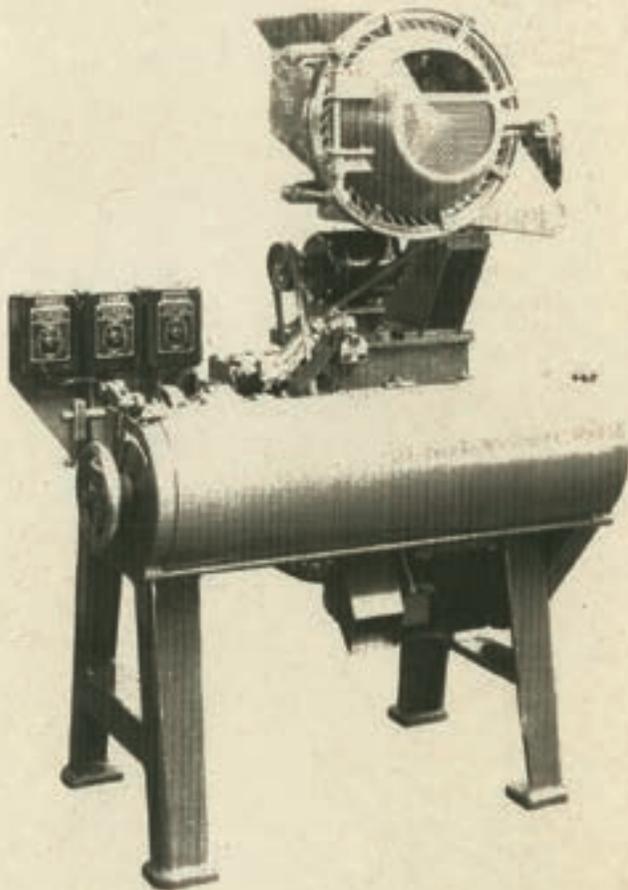
— | No. 5012 Bullet Assembler | —



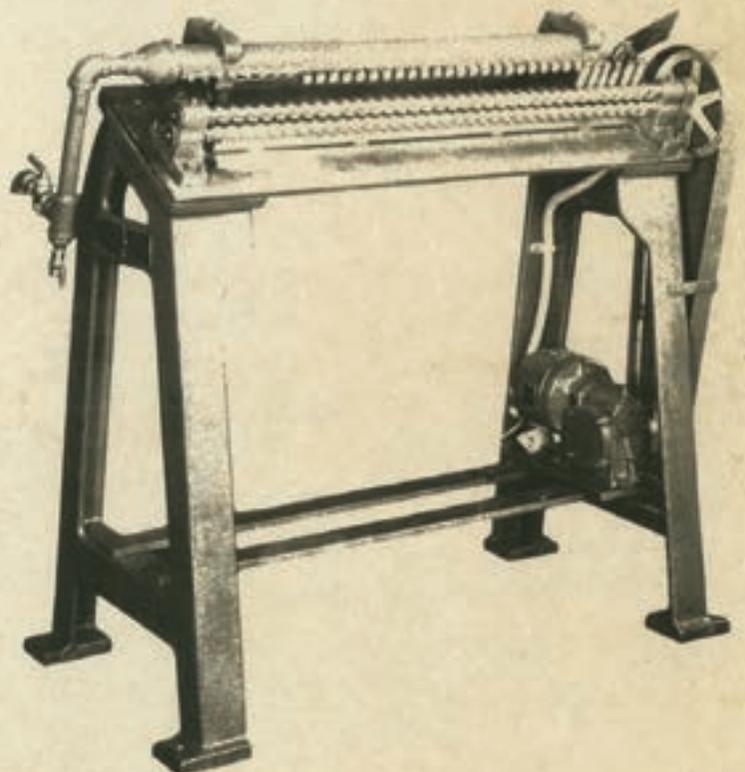
No. 34 Piercing Press



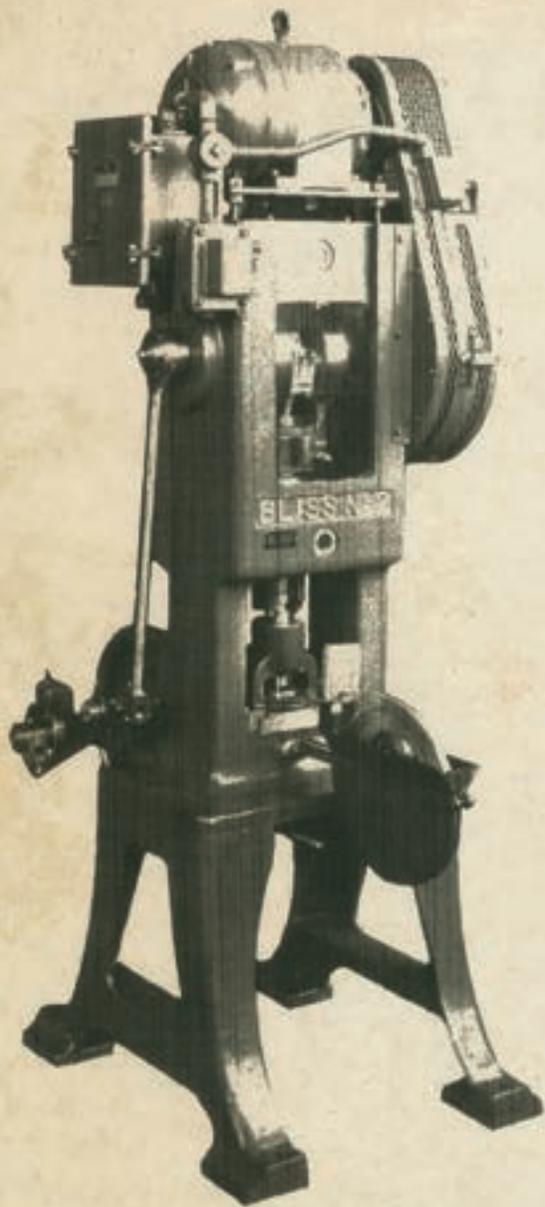
No. 35 Piercing Press



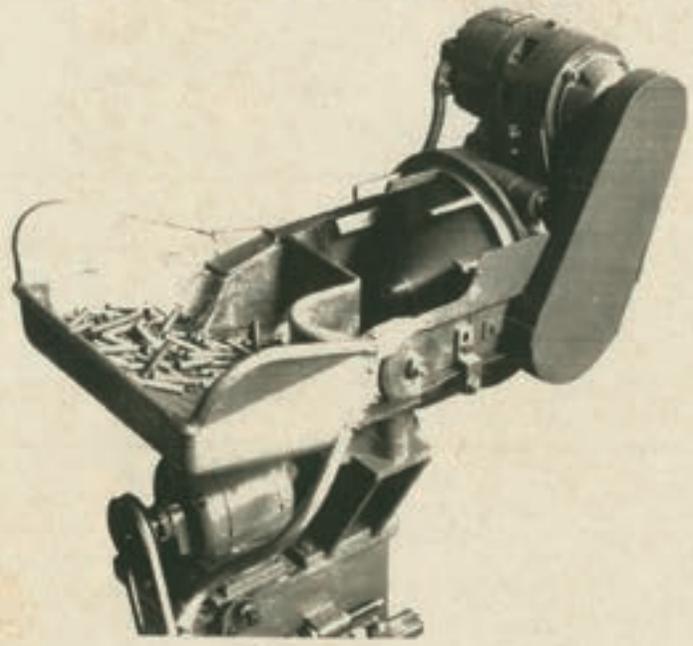
No. 30 Head Turner and Mouth Trimmer



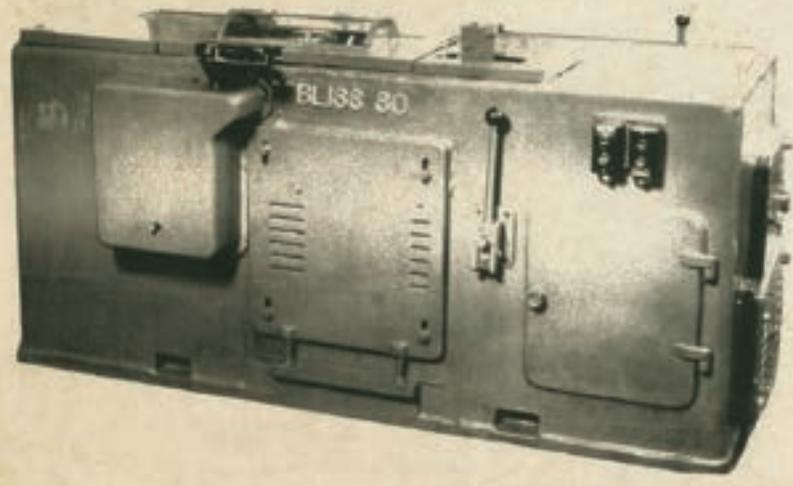
No. 80 Annealing Machine



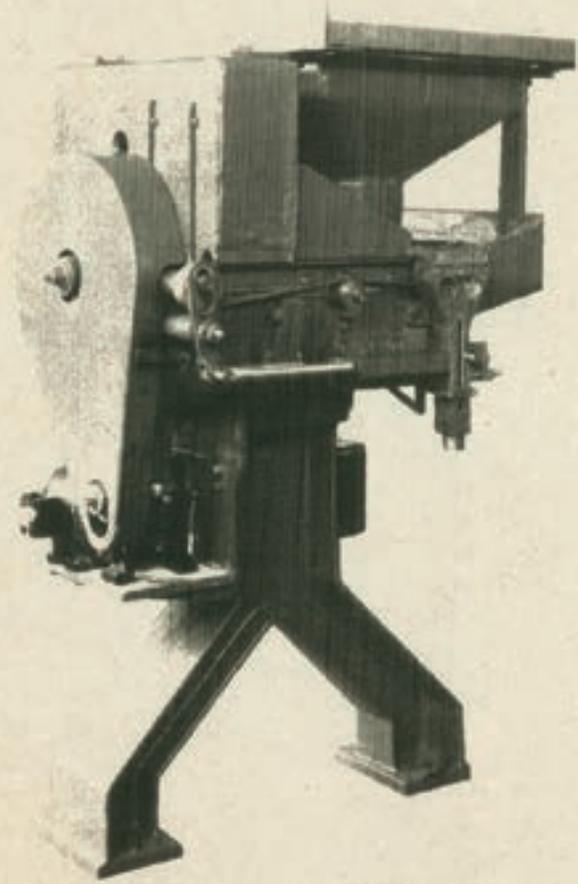
— | No. 2 Cupping Press | —



— | Twelve Inch Paddle Hopper | —



— | No. 80 Head Turner and Mouth Trimmer | —

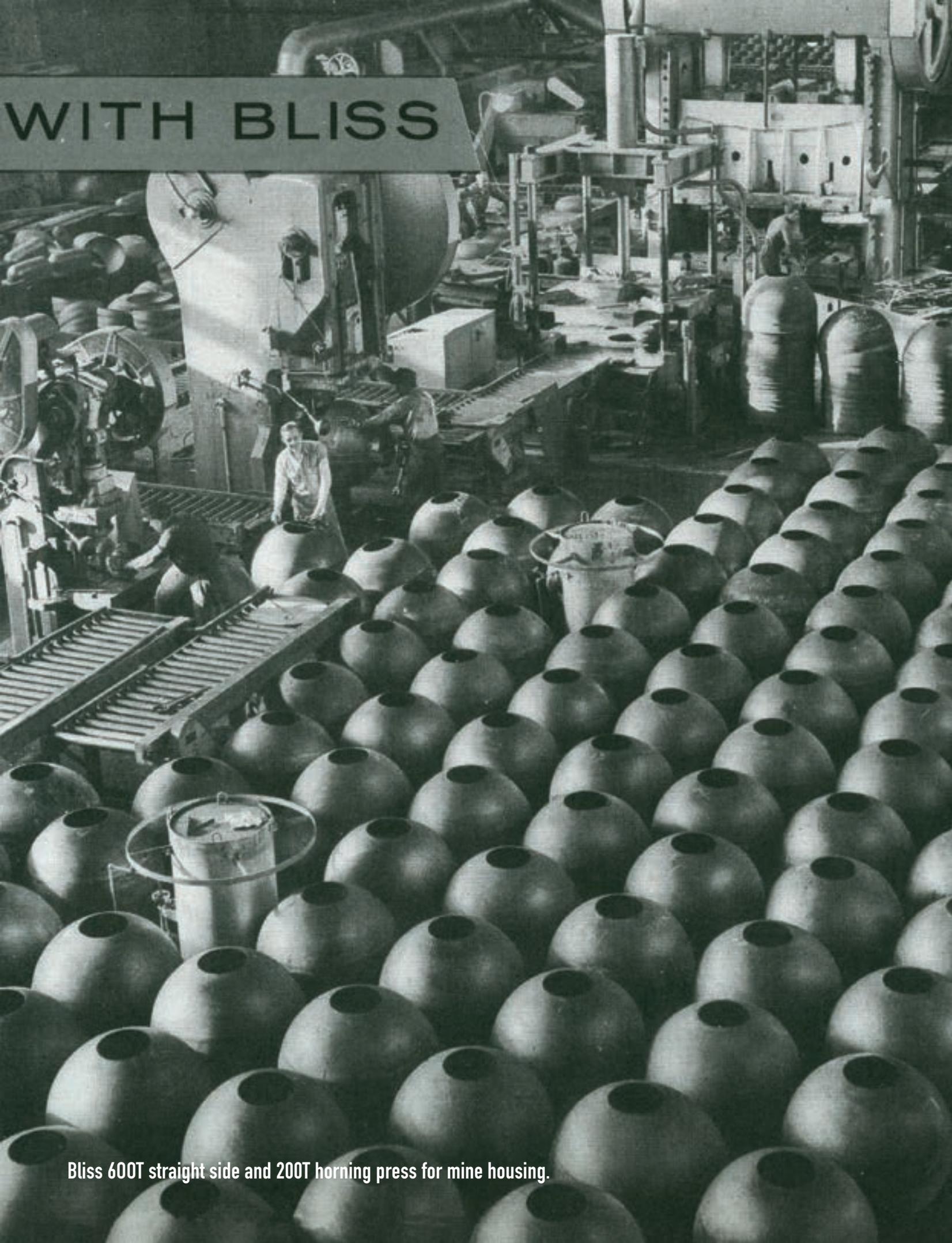


— | Eighteen Inch Paddle Hopper | —

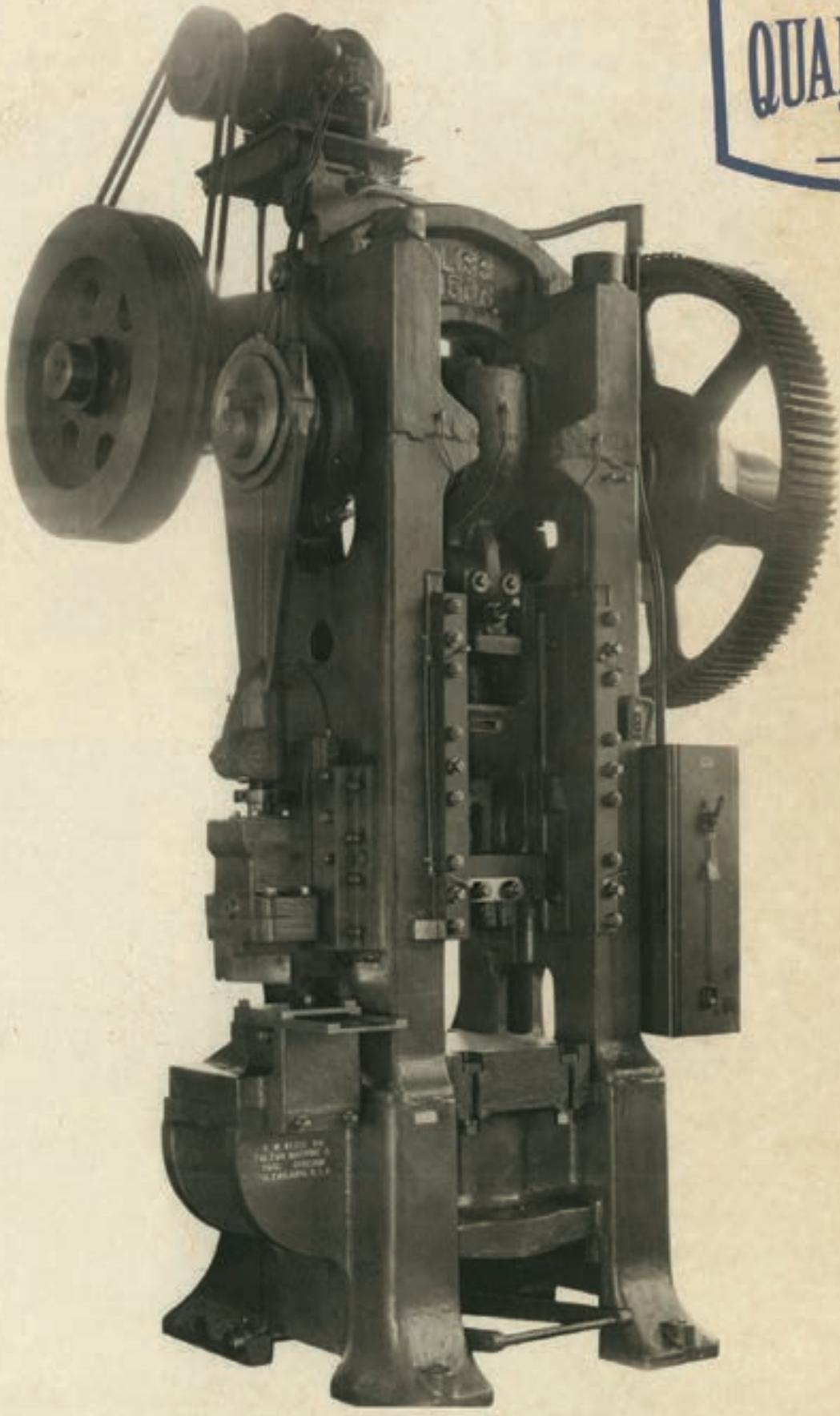


Cartridge cases coming off the line in 1940. Soon after, while the men were in military service, women ran the machines.

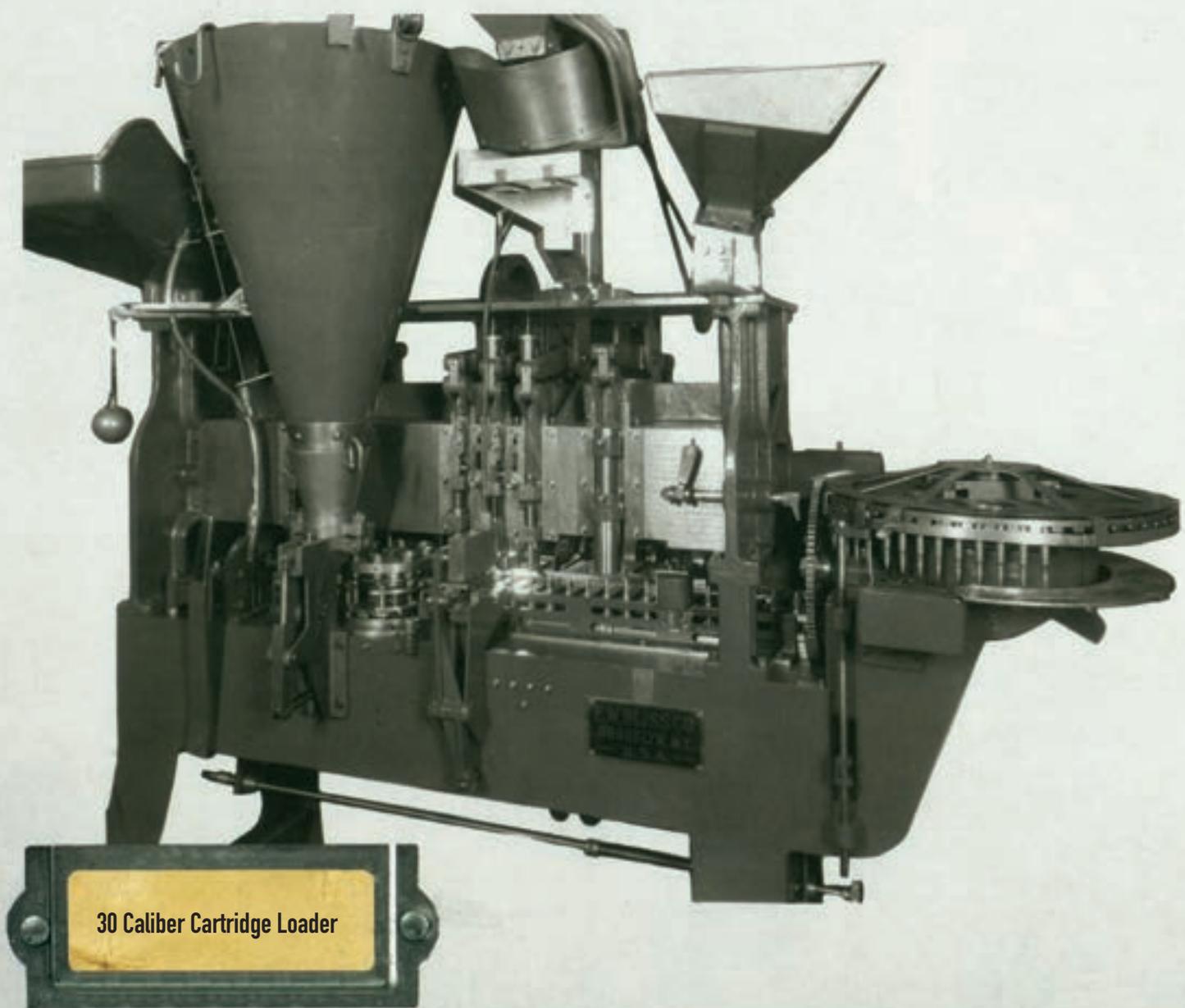
WITH BLISS



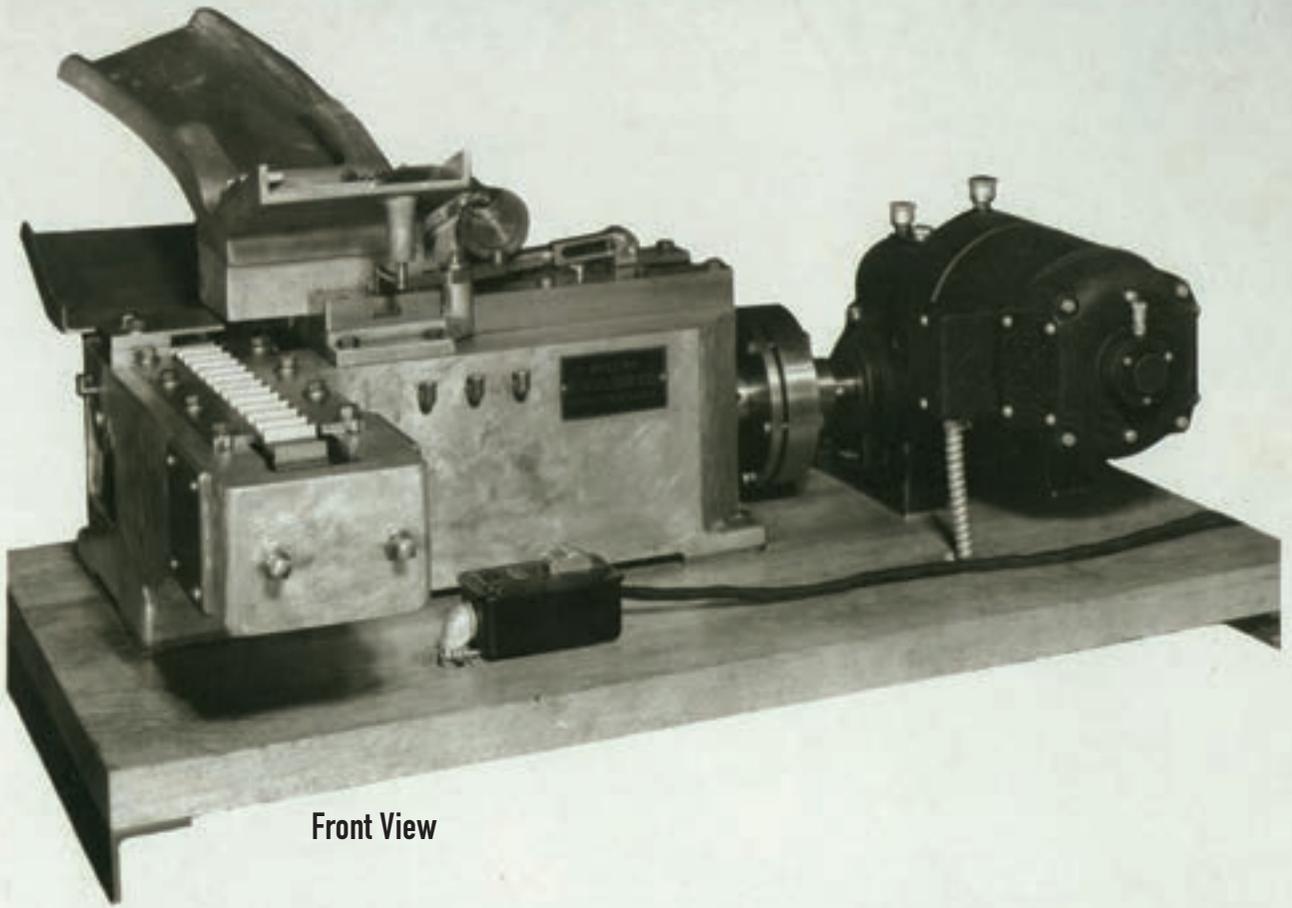
Bliss 600T straight side and 200T horning press for mine housing.



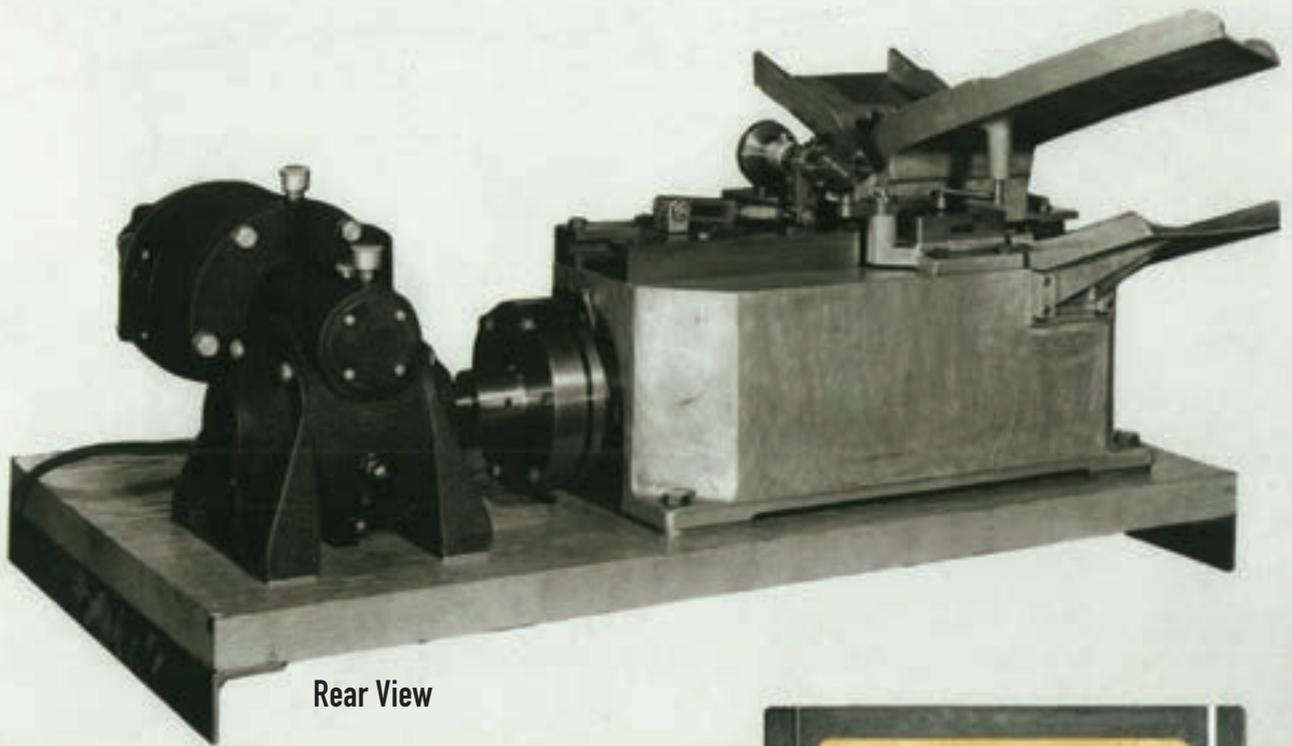
— | Bliss #506 60 Caliber Case Blank | —



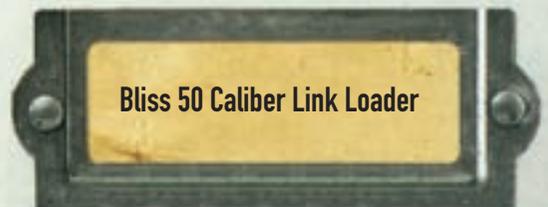
30 Caliber Cartridge Loader



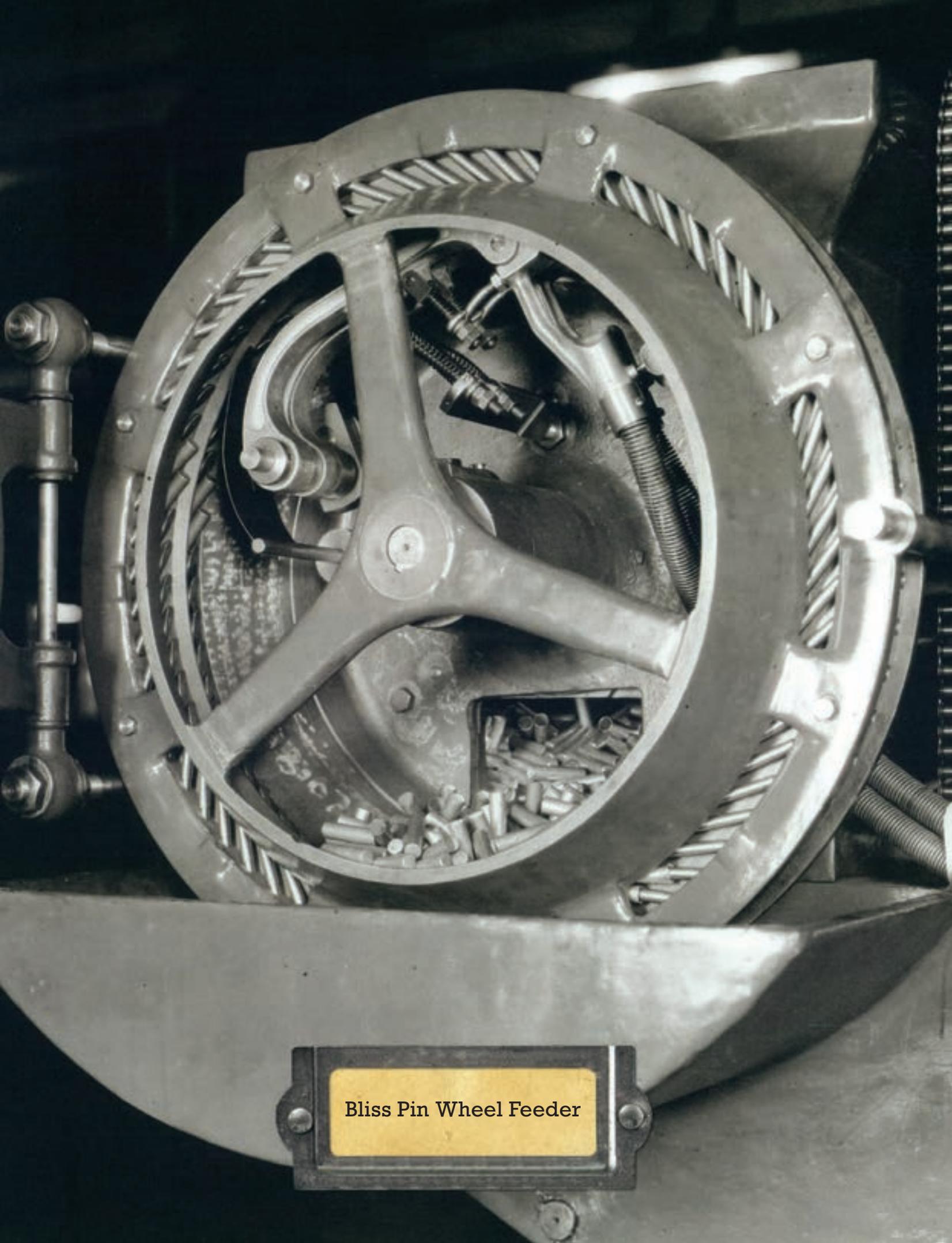
Front View



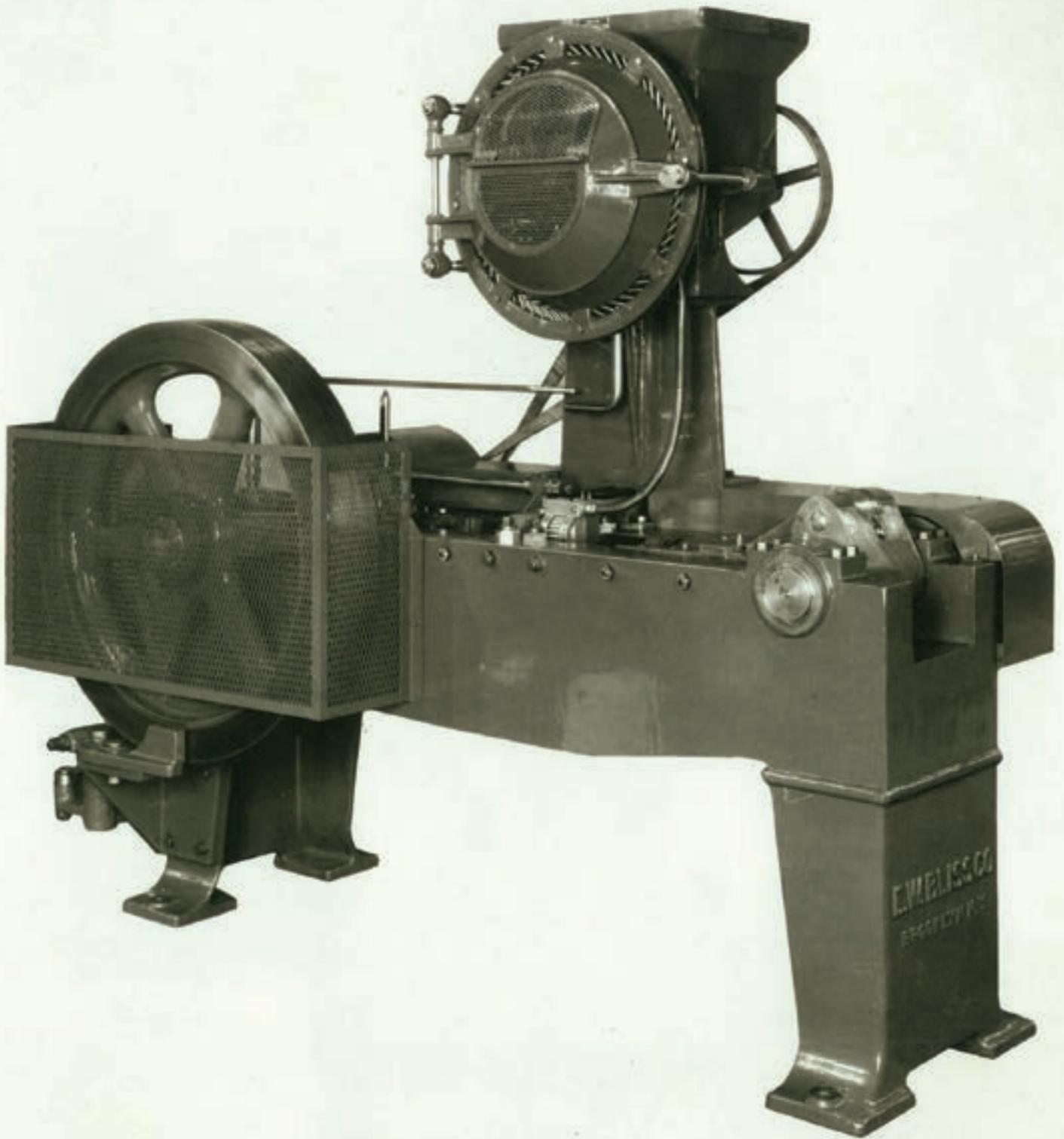
Rear View



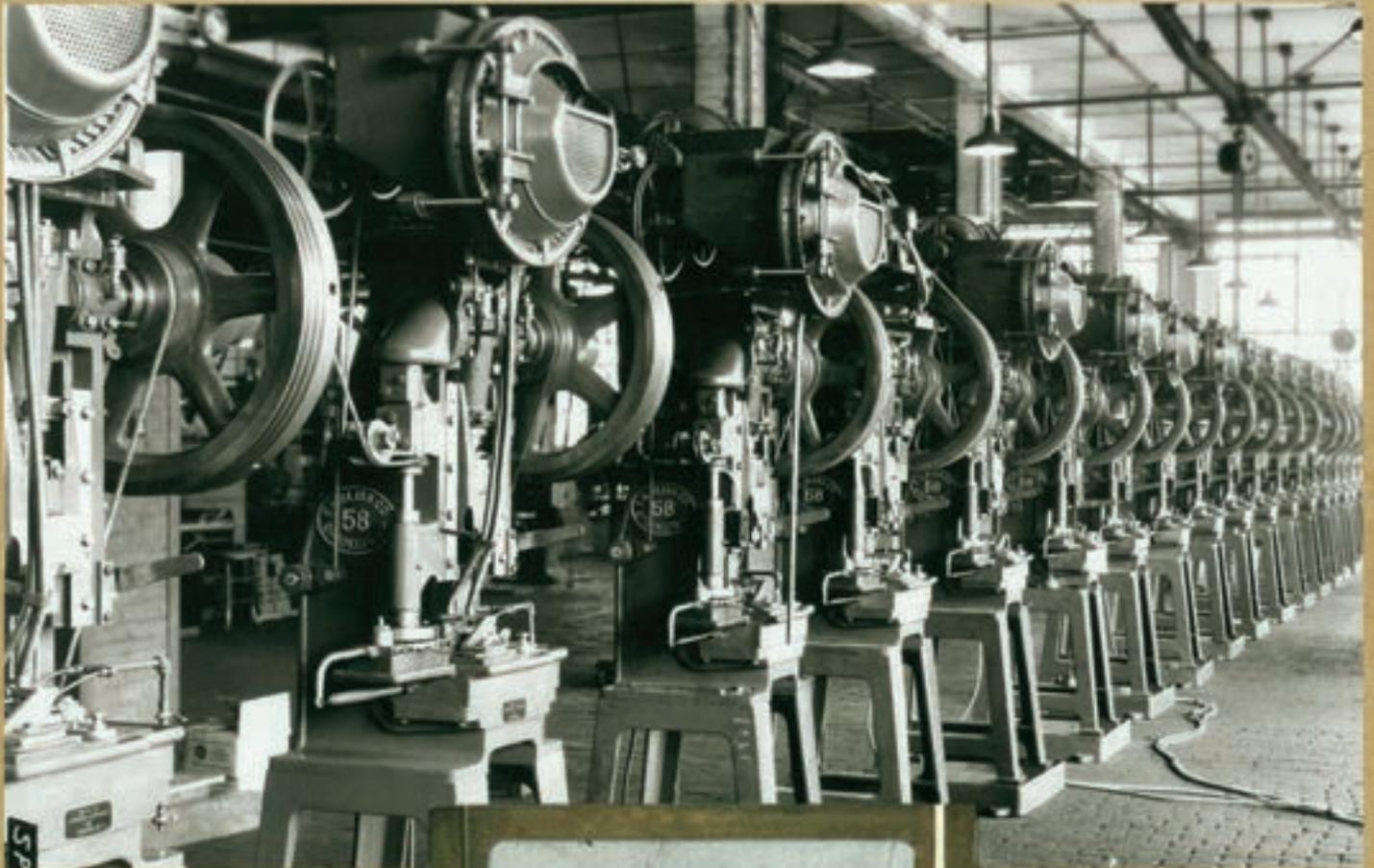
Bliss 50 Caliber Link Loader



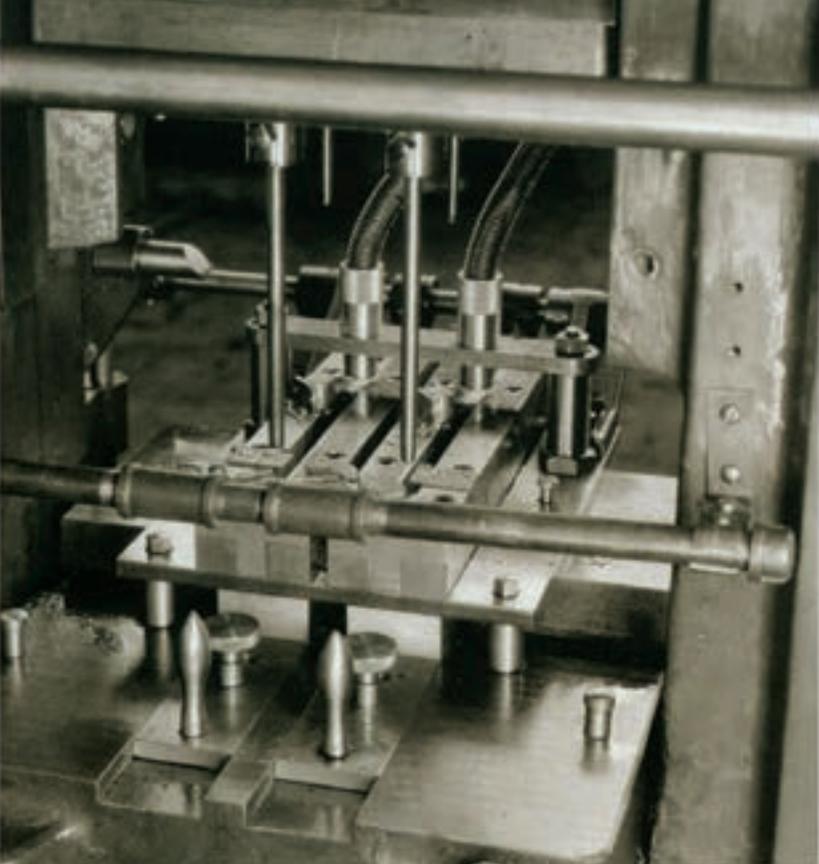
Bliss Pin Wheel Feeder



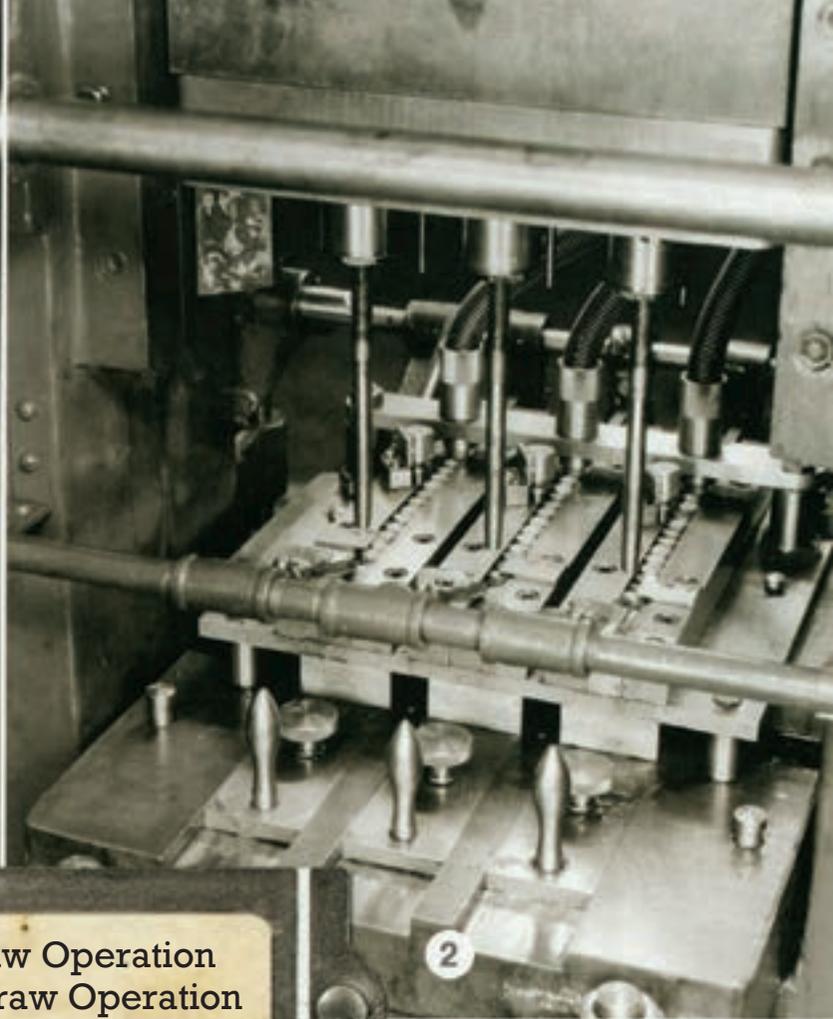
Bliss #30
30 Caliber Header



Bliss #58
First Draw Press

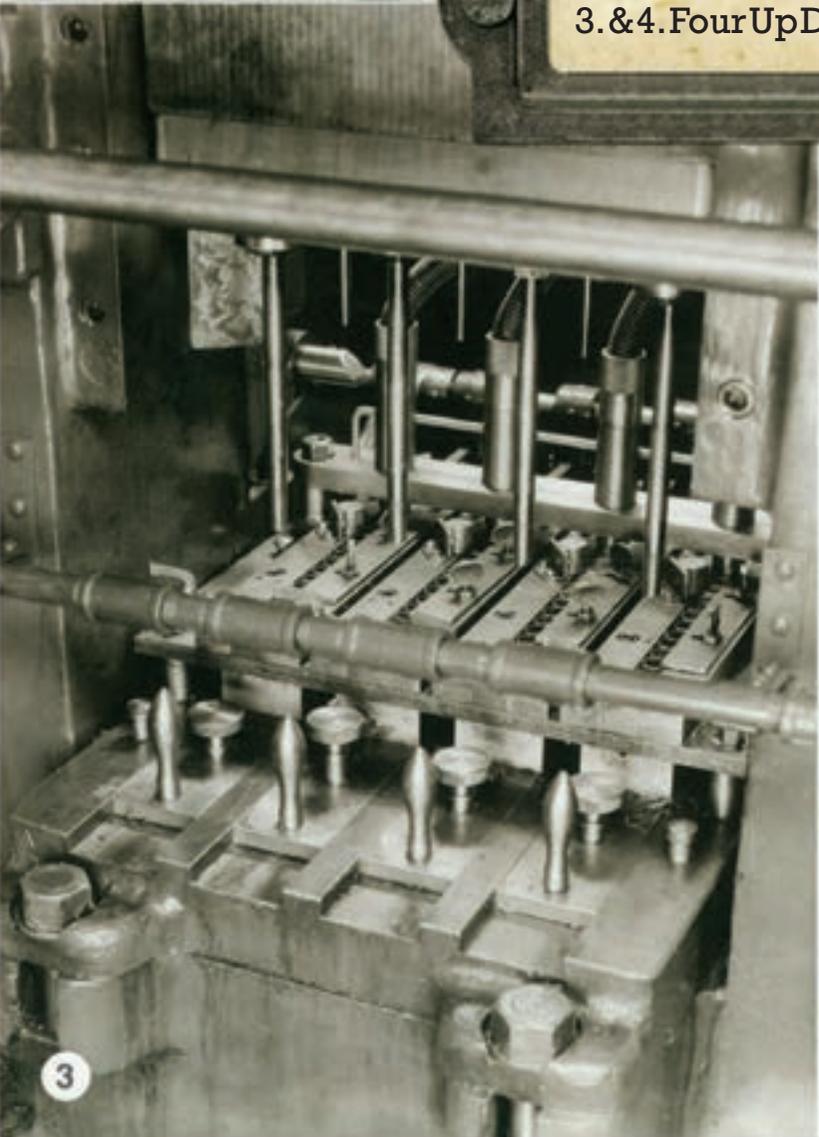


1

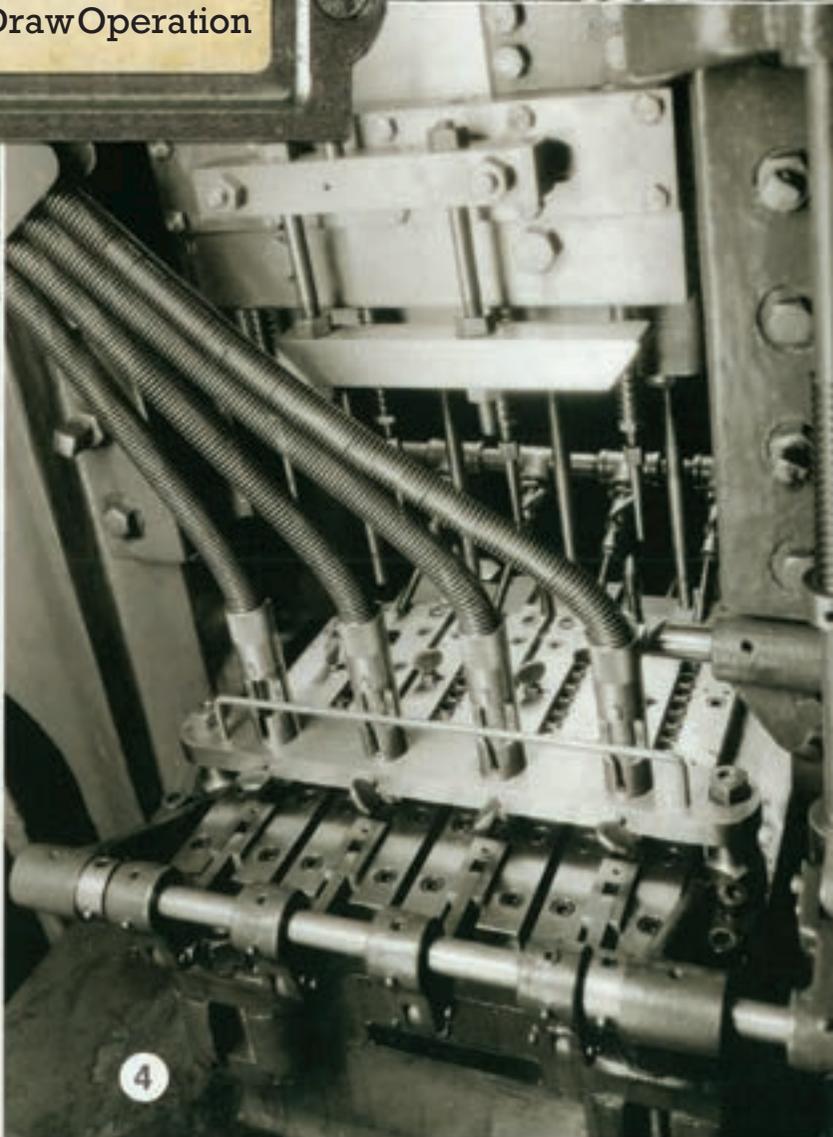


2

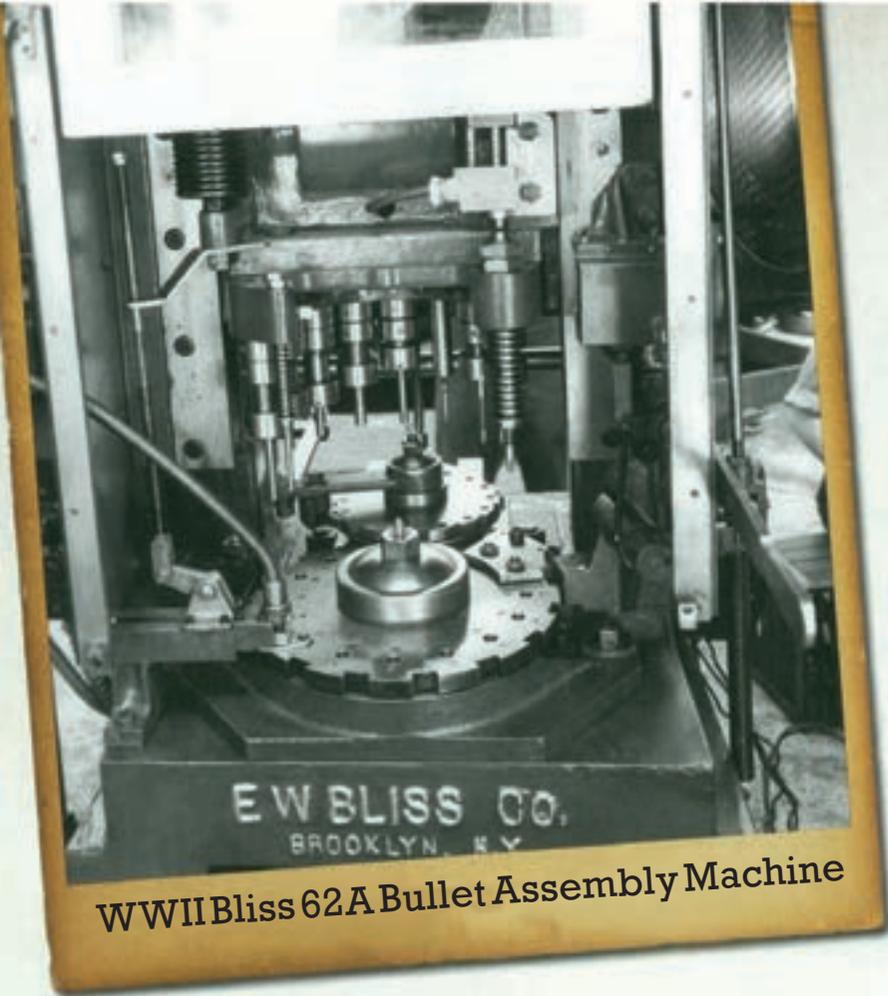
1. Two Up Draw Operation
2. Three Up Draw Operation
3.&4. Four Up Draw Operation



3



4



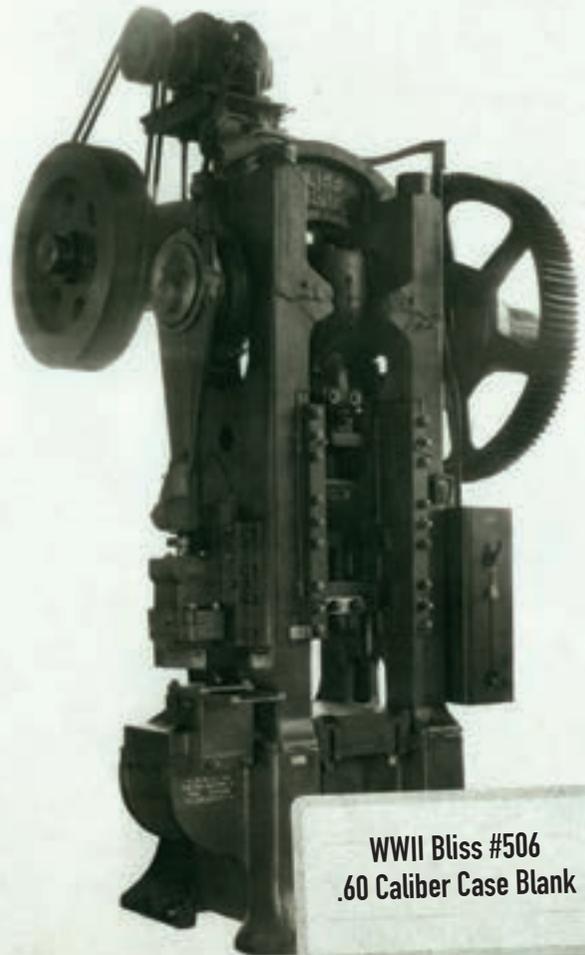
WWII Bliss 62A Bullet Assembly Machine



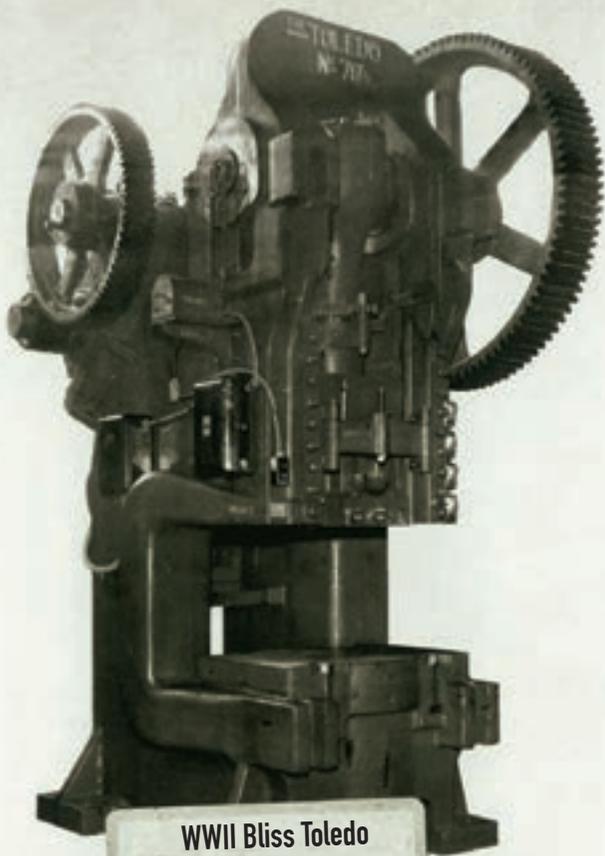
WWII Bliss #73 1/2 Draw Press



WWII Bliss #305 1/2 Medium Caliber Draw Press



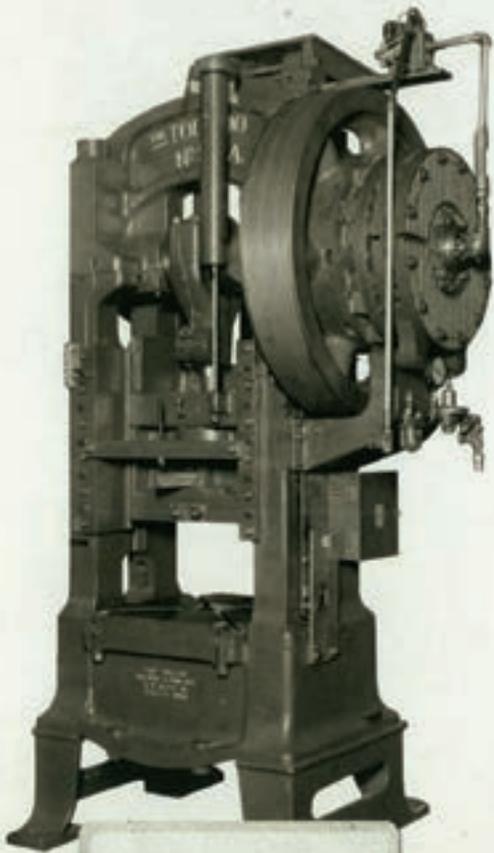
WWII Bliss #506 .60 Caliber Case Blank



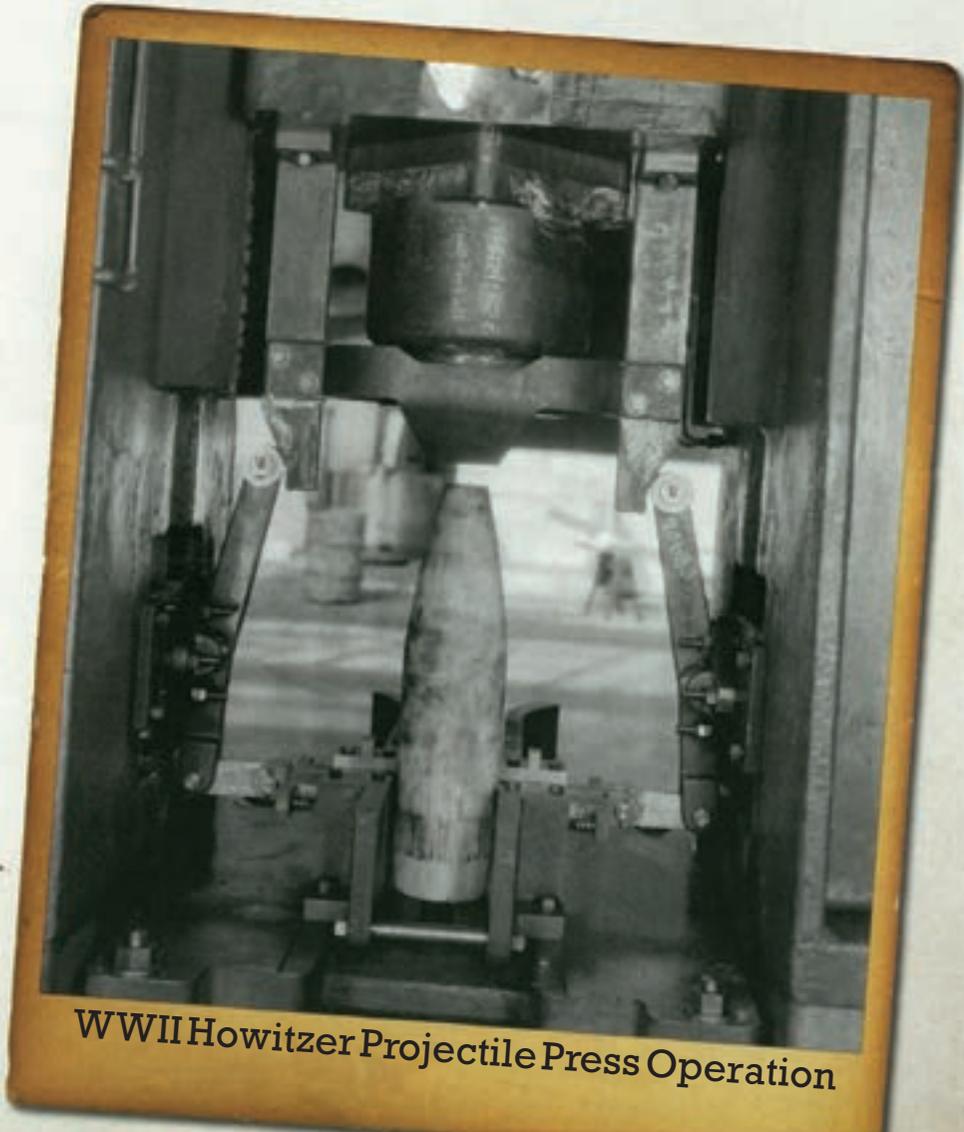
WWII Bliss Toledo
#79 1/2 Gap Frame Large
Caliber Draw Press



WWII Toledo # 667A
Large Caliber
Draw Press



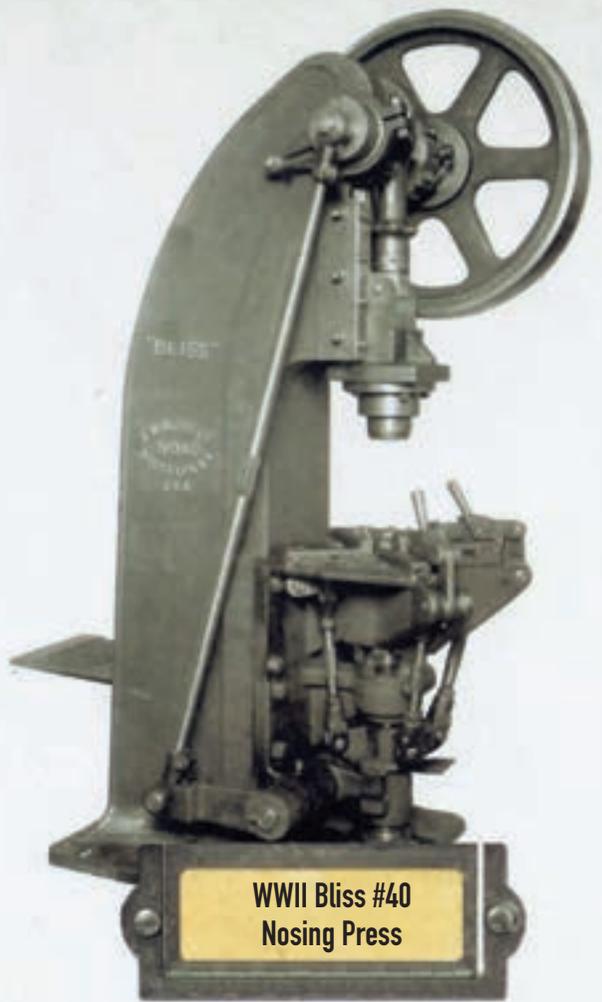
WWII Bliss Medium
Caliber Draw Press



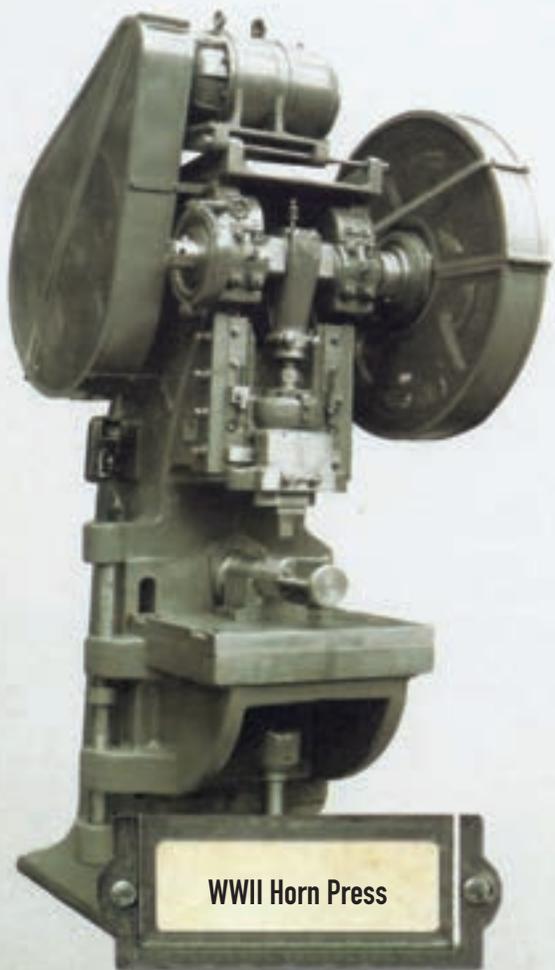
WWII Howitzer Projectile Press Operation



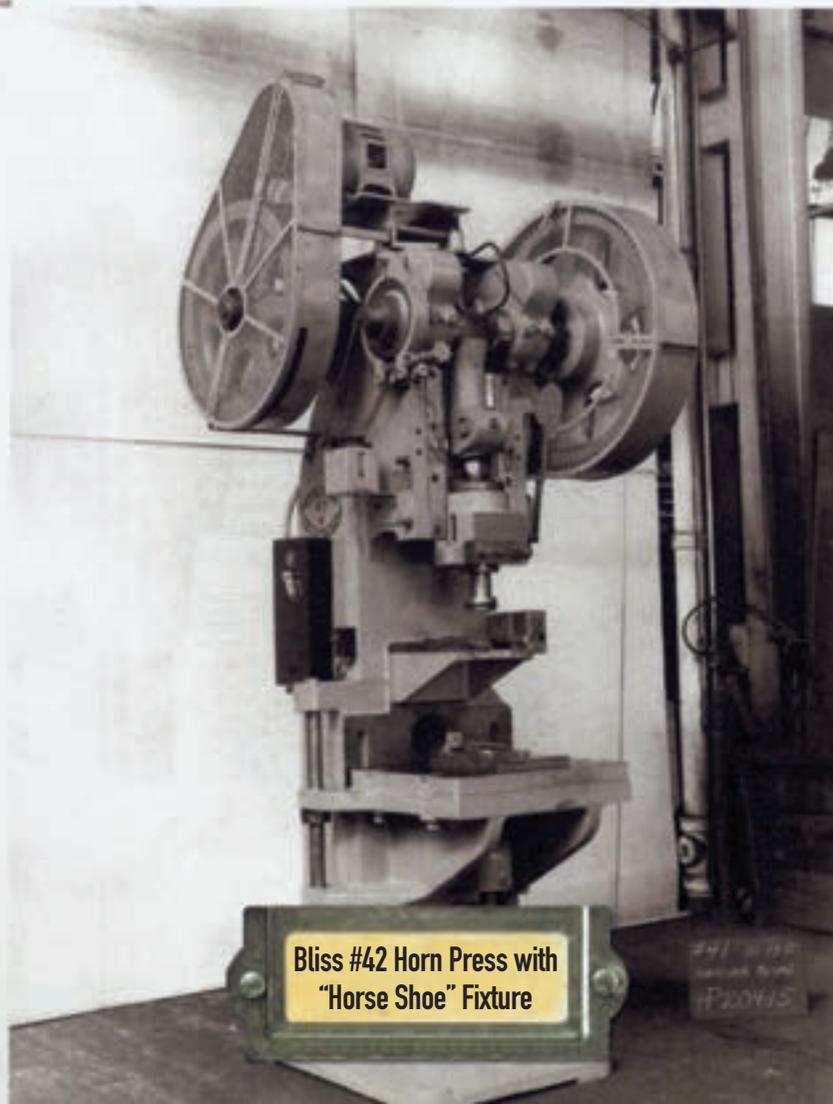
WWII Bliss #39B
Horn Press



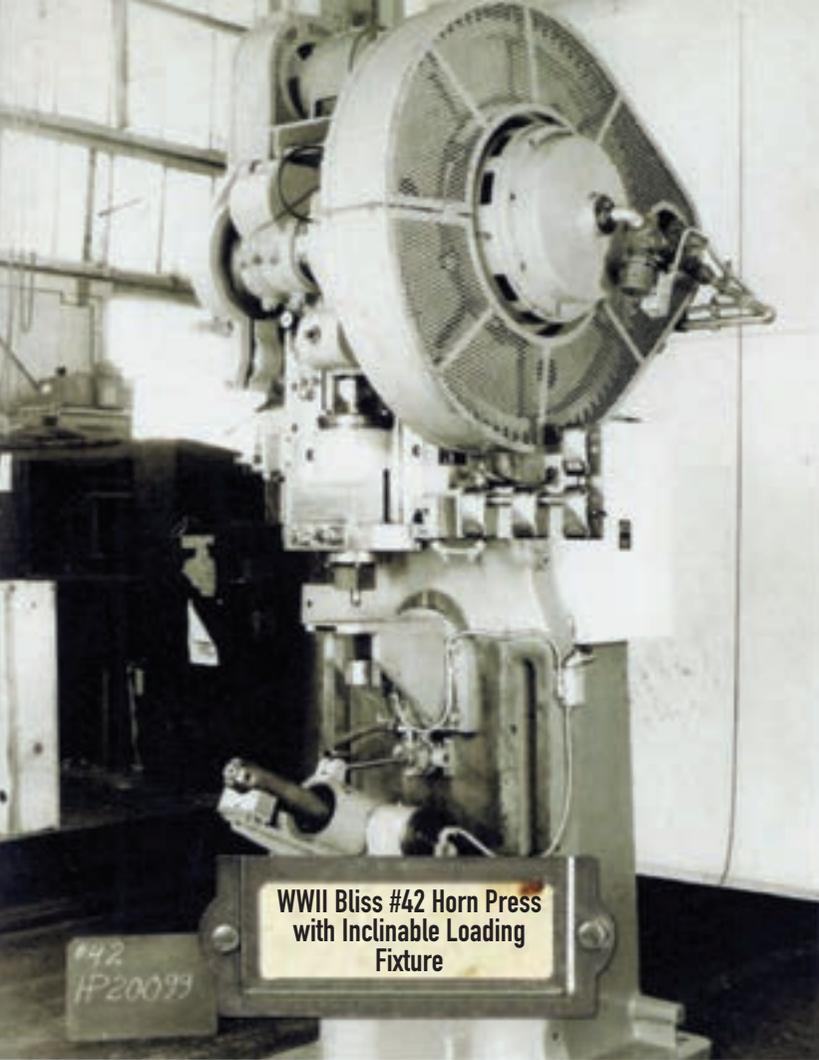
WWII Bliss #40
Nosing Press



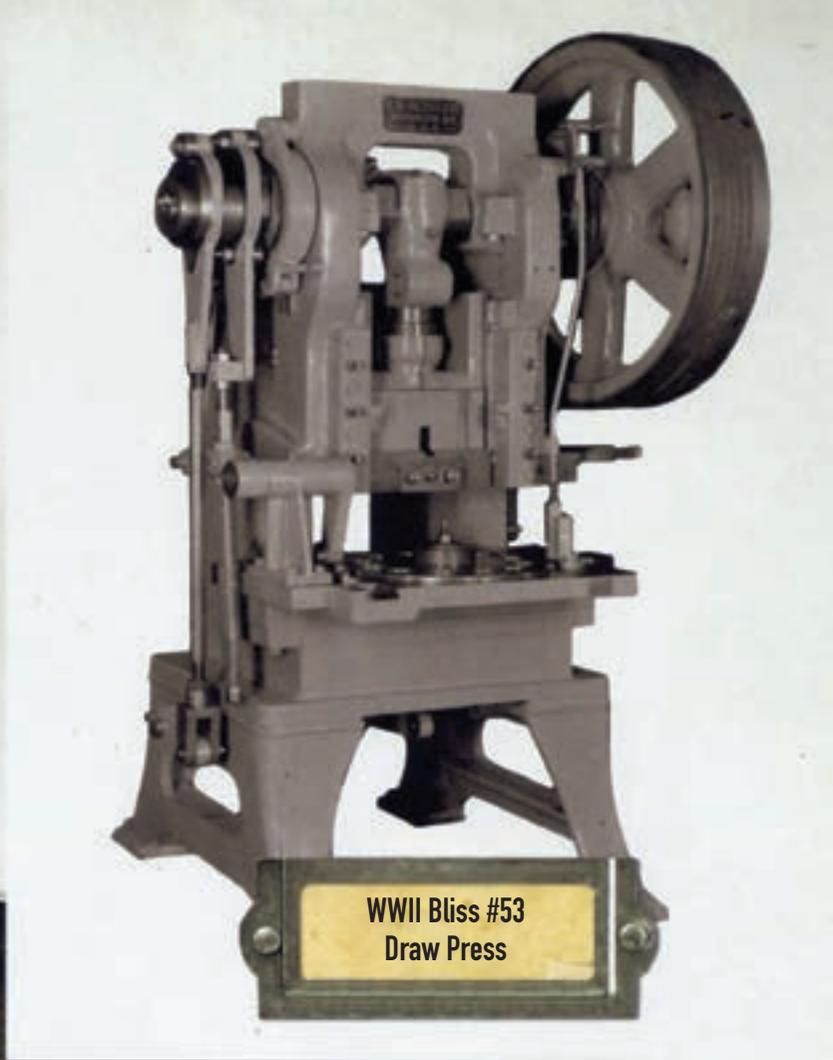
WWII Horn Press



Bliss #42 Horn Press with
"Horse Shoe" Fixture



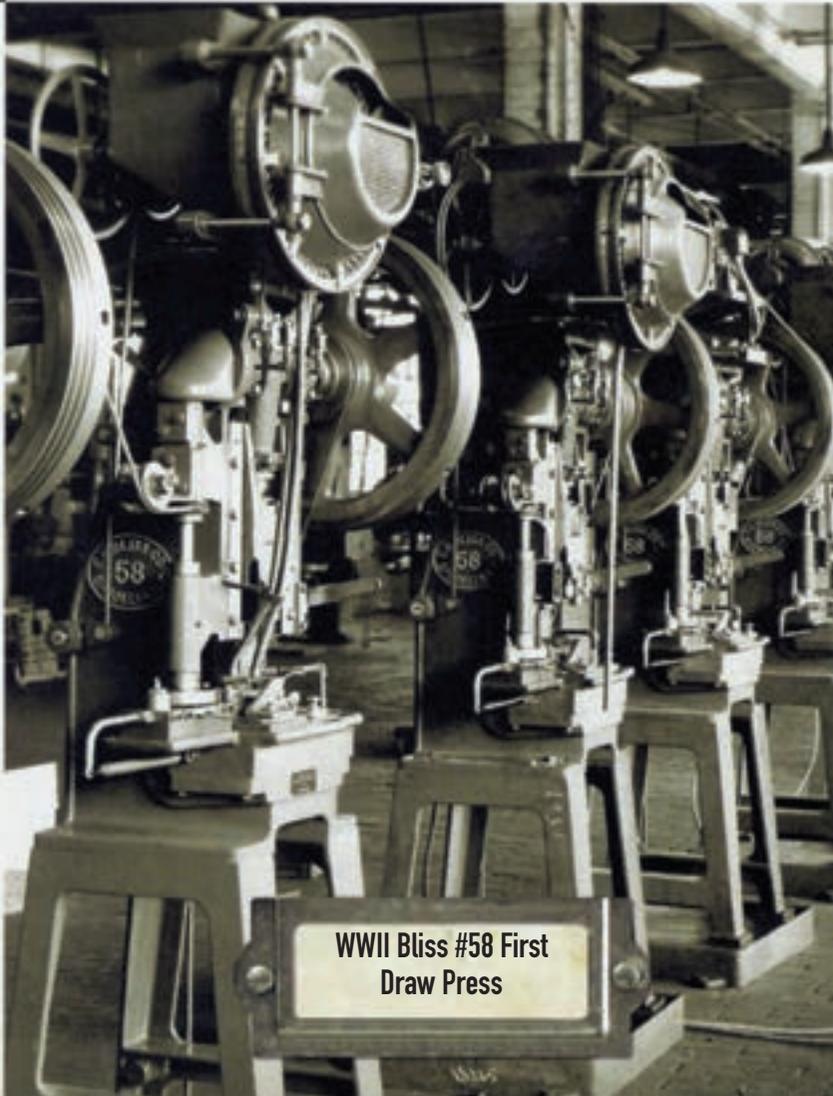
WWII Bliss #42 Horn Press
with Inclinaible Loading
Fixture



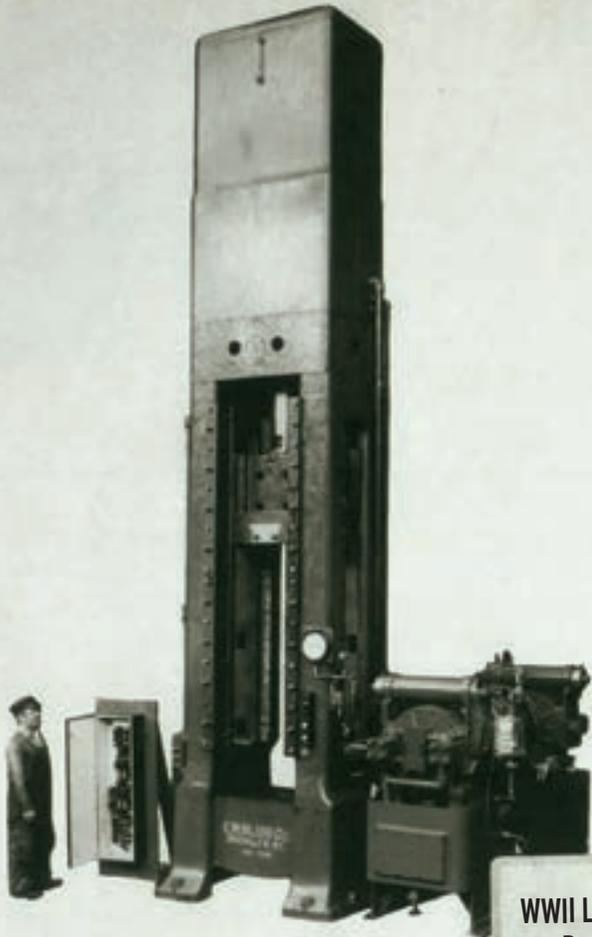
WWII Bliss #53
Draw Press



WWII Bliss #62A .45 Caliber
Ball Bullet Assembly
Machine



WWII Bliss #58 First
Draw Press



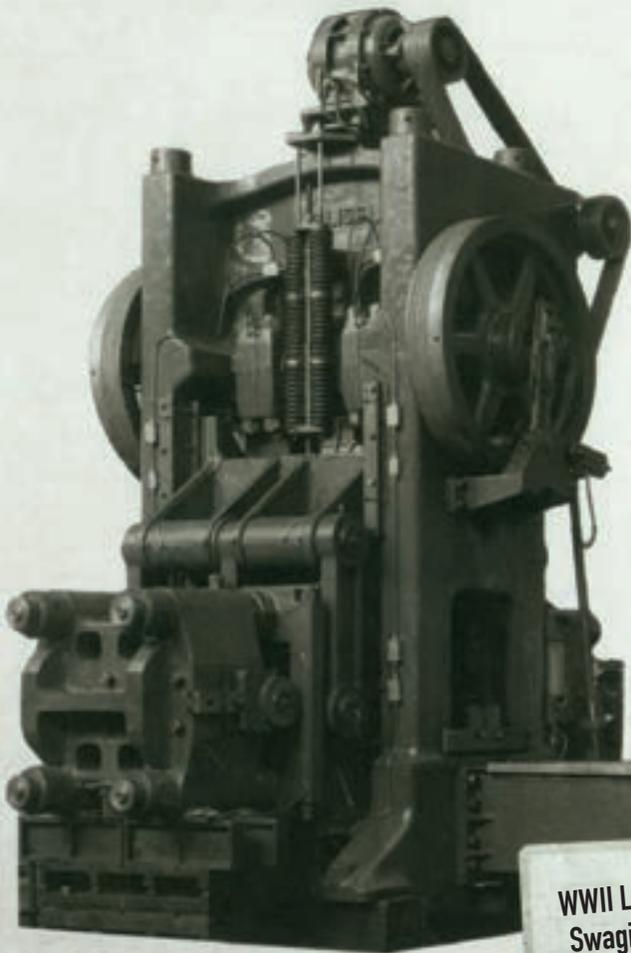
WWII Large Caliber Draw Press



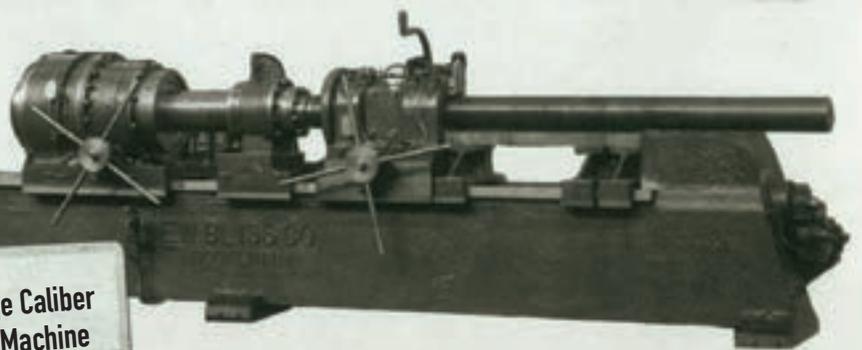
WWII Large Caliber Draw Press

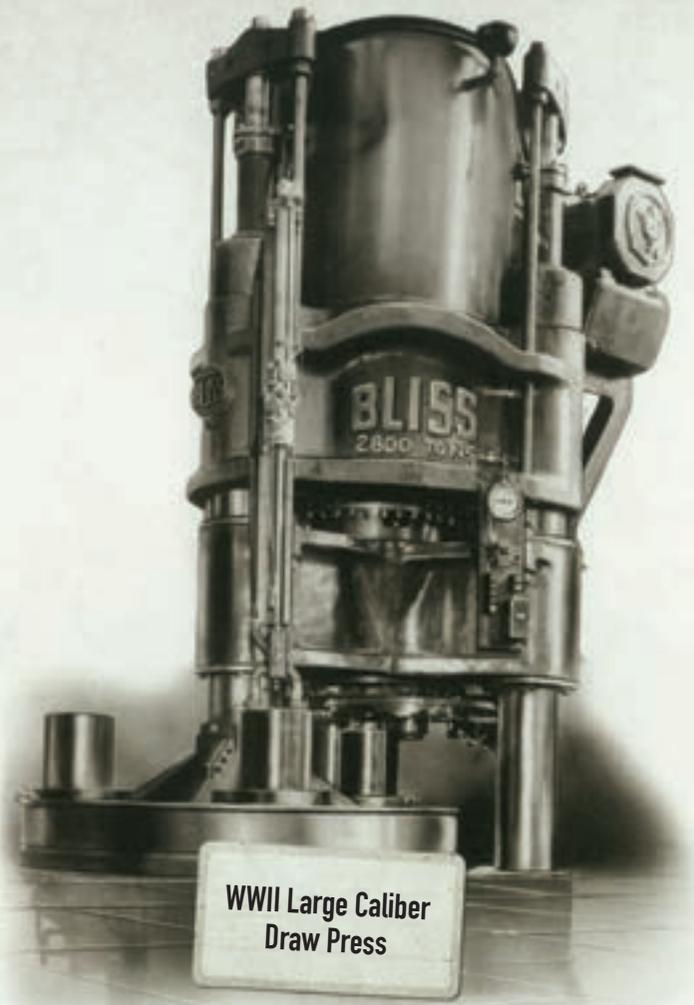


WWII Munitions Machine Assembly



WWII Large Caliber Swaging Machine

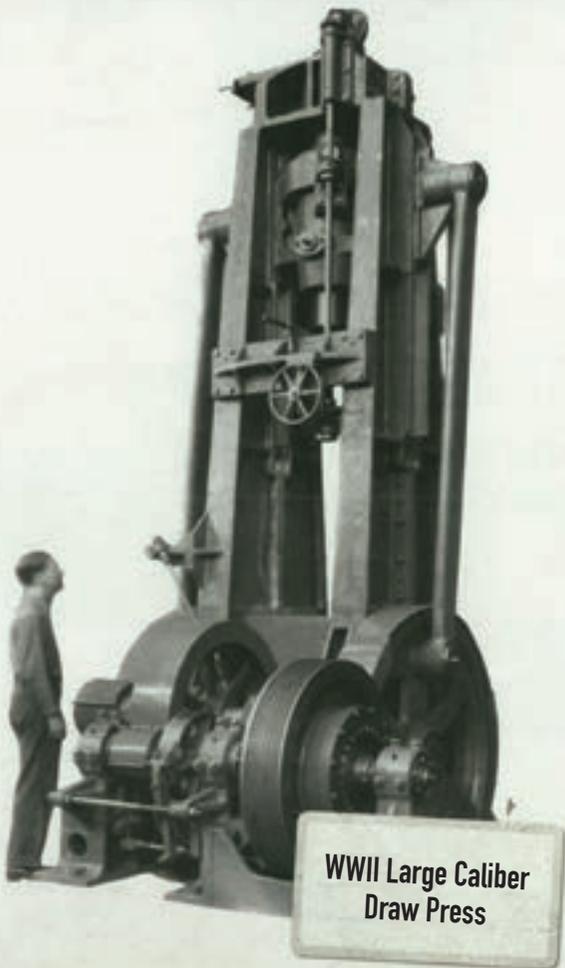




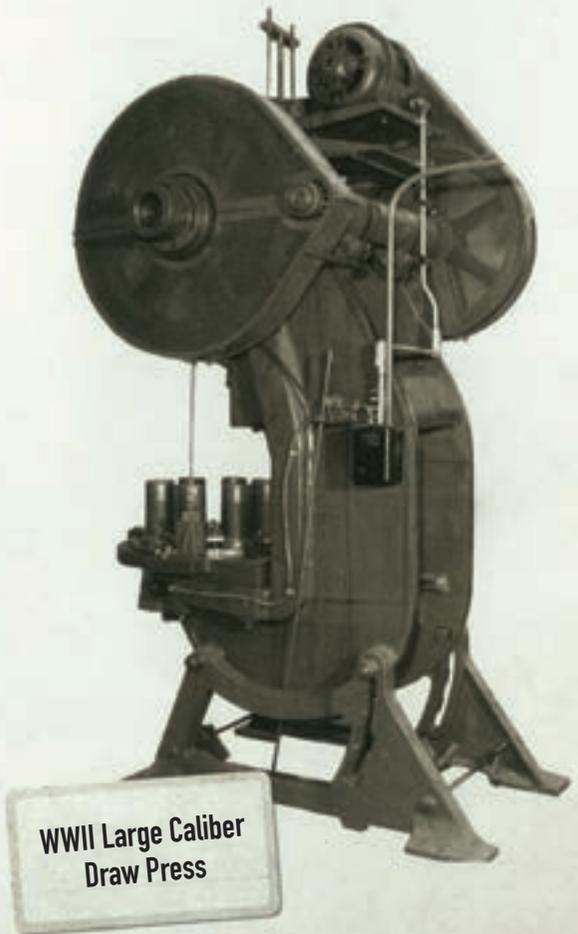
WWII Large Caliber
Draw Press



WWII Large Caliber
Draw Press



WWII Large Caliber
Draw Press



WWII Large Caliber
Draw Press

NIAGARA



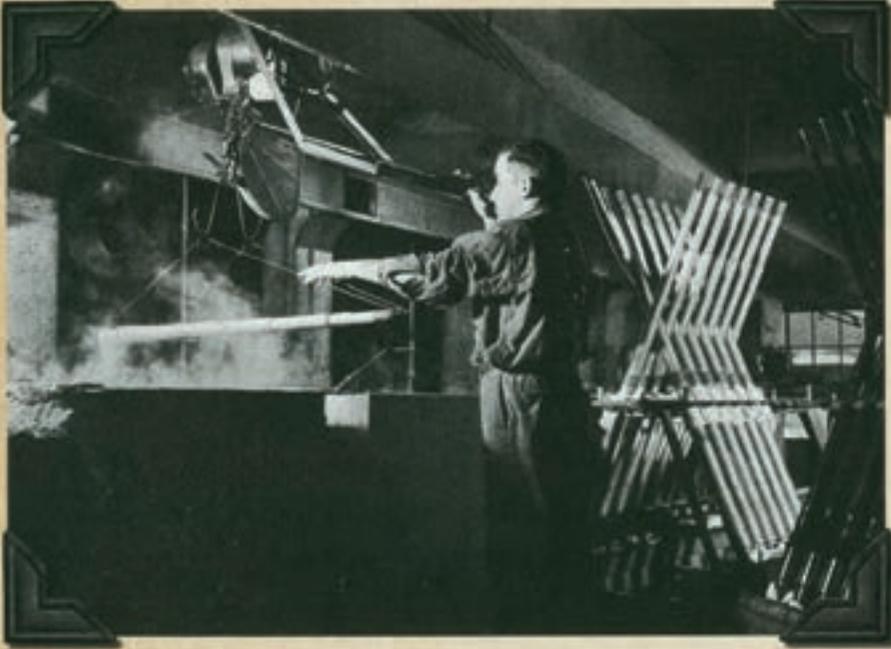
DURING WWII, NIAGARA WAS A MAJOR SUPPLIER OF METAL FORMING EQUIPMENT TO AIRCRAFT BUILDERS AND TO THE ARMY AND NAVY AIR SERVICES.





KOREAN WAR

1950 - 1953



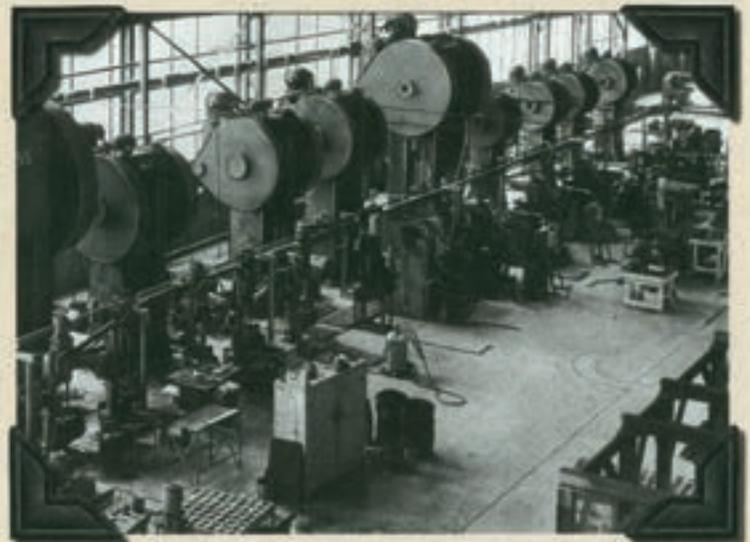
1950s high-speed 20mm aircraft machine guns produced in quantity at Bliss Canton plant



A Summer 1953 Knuckle Joint Press for 105 mm cartridge cases for howitzers



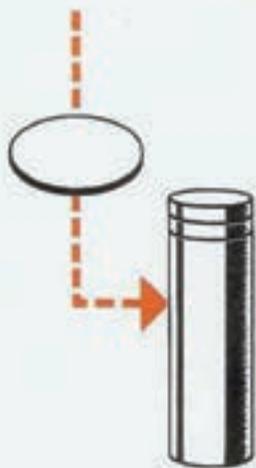
Winter 1954 Bliss Presses, for 90 mm cartridge cases



Extrusion Presses on a Defense Assignment

BLISS trends

IN PRESSES, ROLLING MILLS, SPECIAL MACHINERY



WORLD'S LARGEST KNUCKLE-JOINT PRESS is saving dollars and speeding production in the manufacture of steel cartridge cases at Regal Ware, Inc., Kewaskum, Wisconsin. Press stands 34 feet high, weighs 305 tons, has capacity of 4,000 tons. Shows here is worker manually inserting steel blanks on indexing table. Later blanks are cupped and preheated in simultaneous operation. (Pages 6-7.)



LARGEST KNUCKLE-JOINT PRESS SPEEDS STEEL CARTRIDGE CASE PRODUCTION

VIETNAM
WAR

1950-1975

BLISS

trends

A QUARTERLY PUBLICATION OF E. W. BLISS COMPANY, CANTON, OHIO • SUMMER ISSUE 1956 • NUMBER 4

TOP SECRET

production details
on turbo jet and rocket
launching platforms
revealed for the
first time. See pages
four and five.

4

BLISS trends

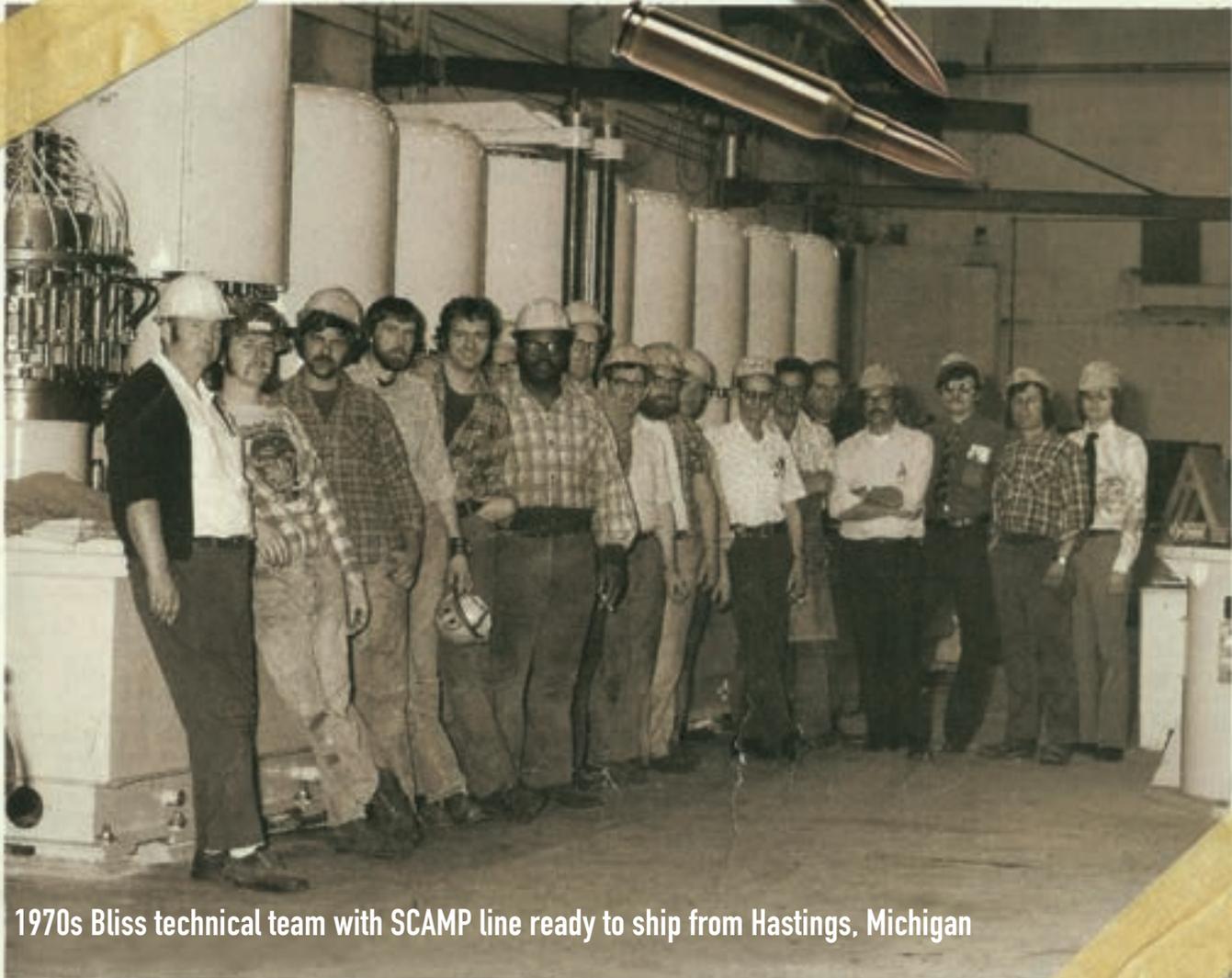
A QUARTERLY PUBLICATION OF E. W. BLISS COMPANY, CANTON, OHIO • SPRING ISSUE 1955 • NUMBER



Boeing's B-52
...7000 ton "squeeze"
gives her wings
a lift

VIETNAM
WAR

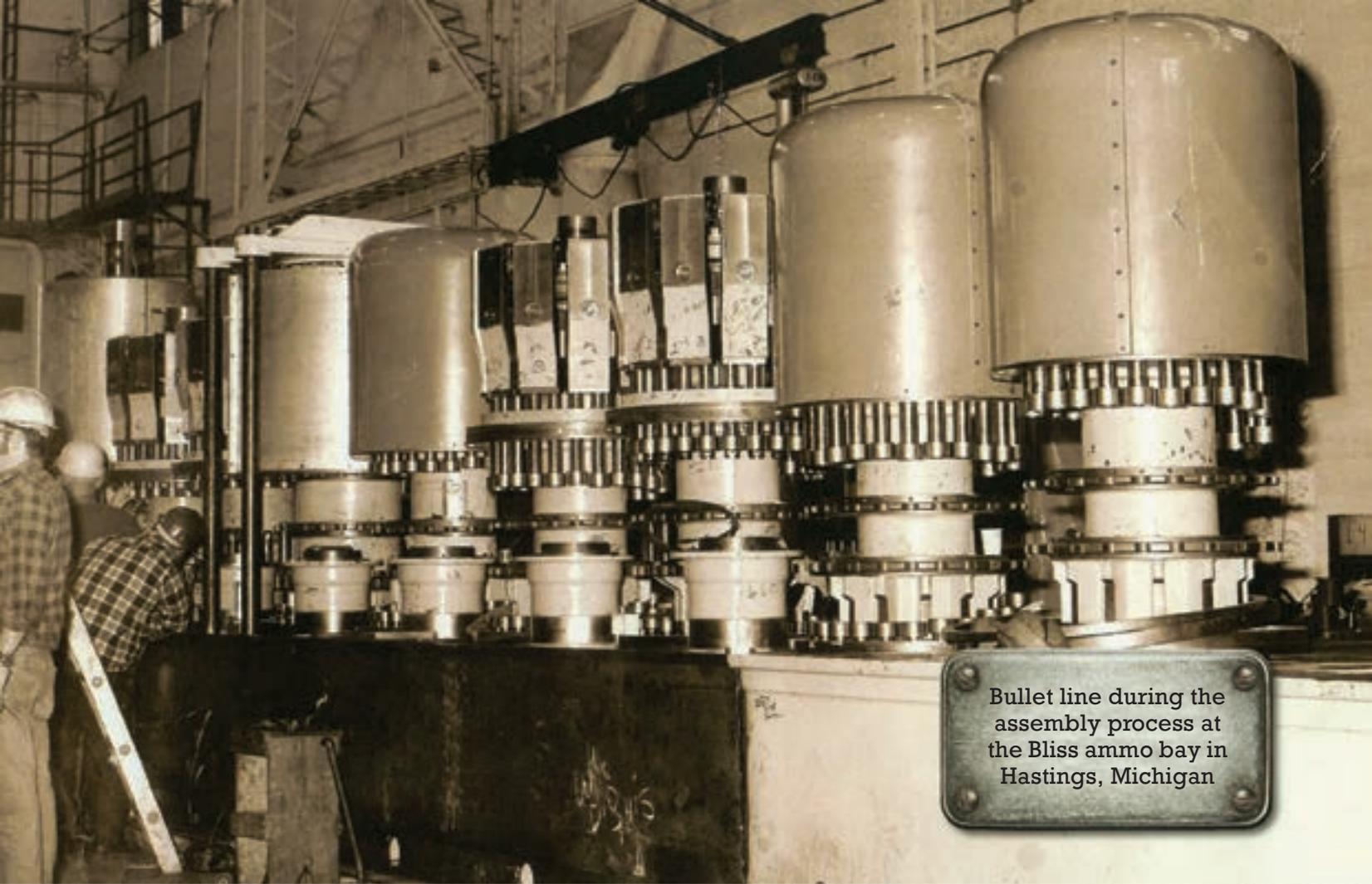
1950 - 1975



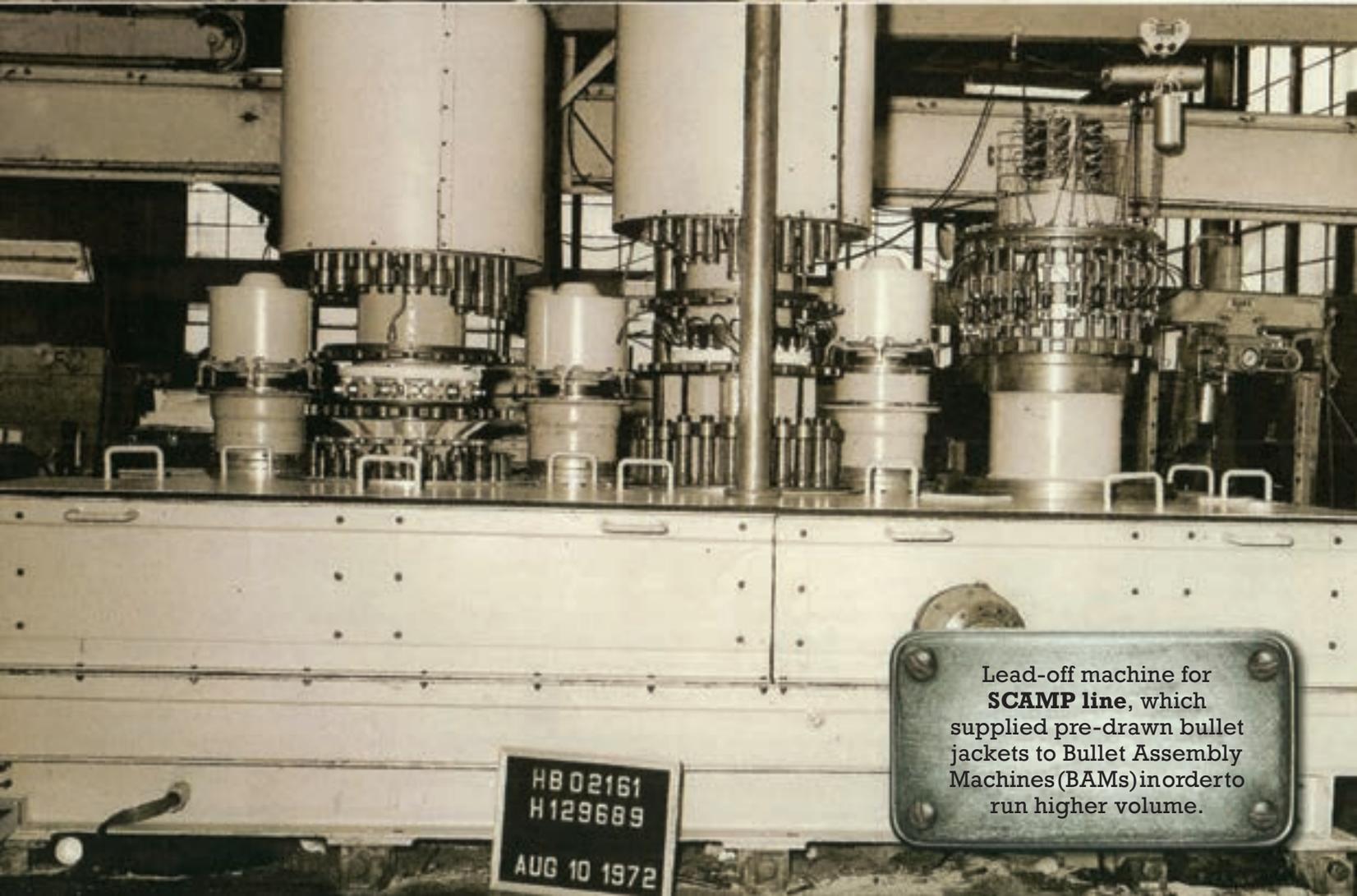
1970s Bliss technical team with SCAMP line ready to ship from Hastings, Michigan

In the 1970's, Bliss built the SCAMP lines which are still the fastest producing ammunition machines in operation today.

SCAMP is the acronym for Small Caliber Ammunition Modernization Program, and Bliss engineers developed this series of integrated machines that produce 1200 rounds per minute. The part is fed through a bullet line, a case line, a loading line, a priming line, and an inspection line.



Bullet line during the assembly process at the Bliss ammo bay in Hastings, Michigan

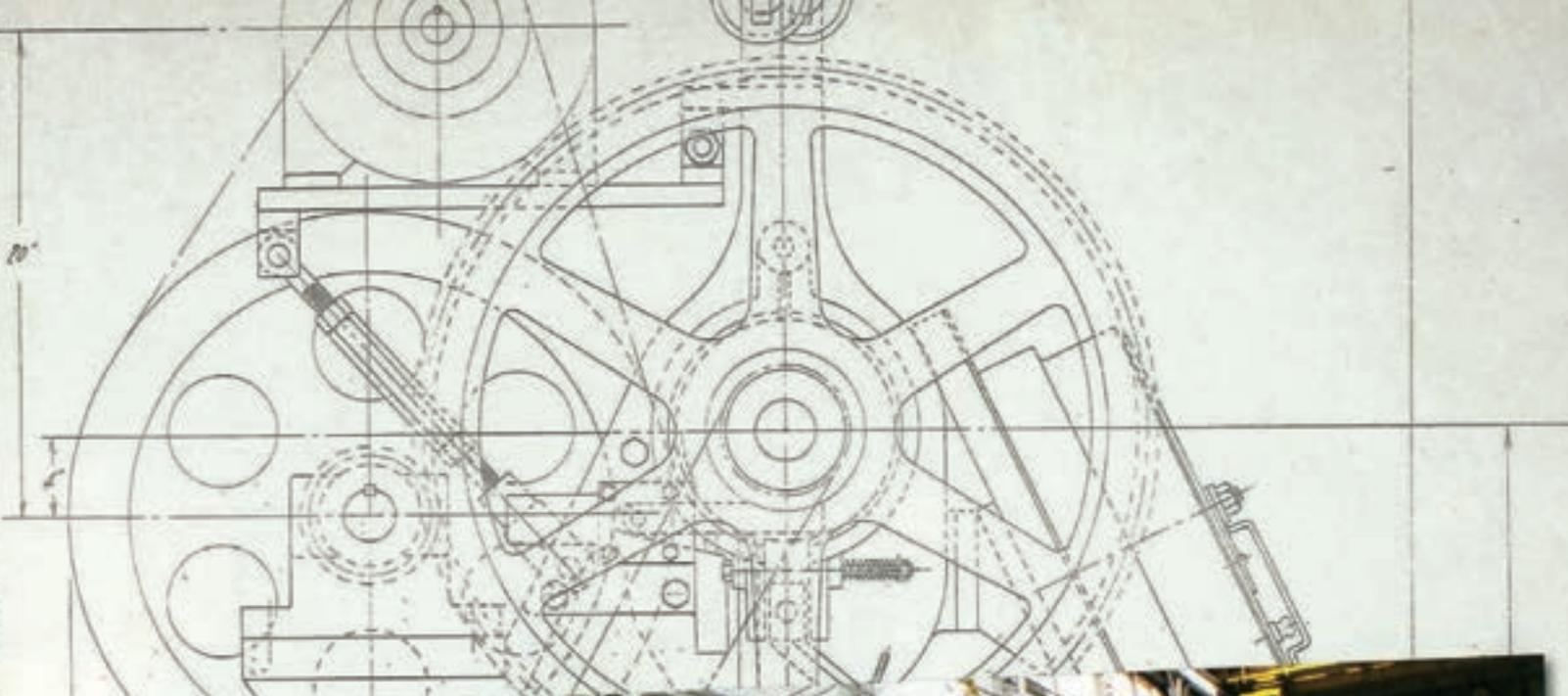


Lead-off machine for **SCAMP** line, which supplied pre-drawn bullet jackets to Bullet Assembly Machines (BAMs) in order to run higher volume.

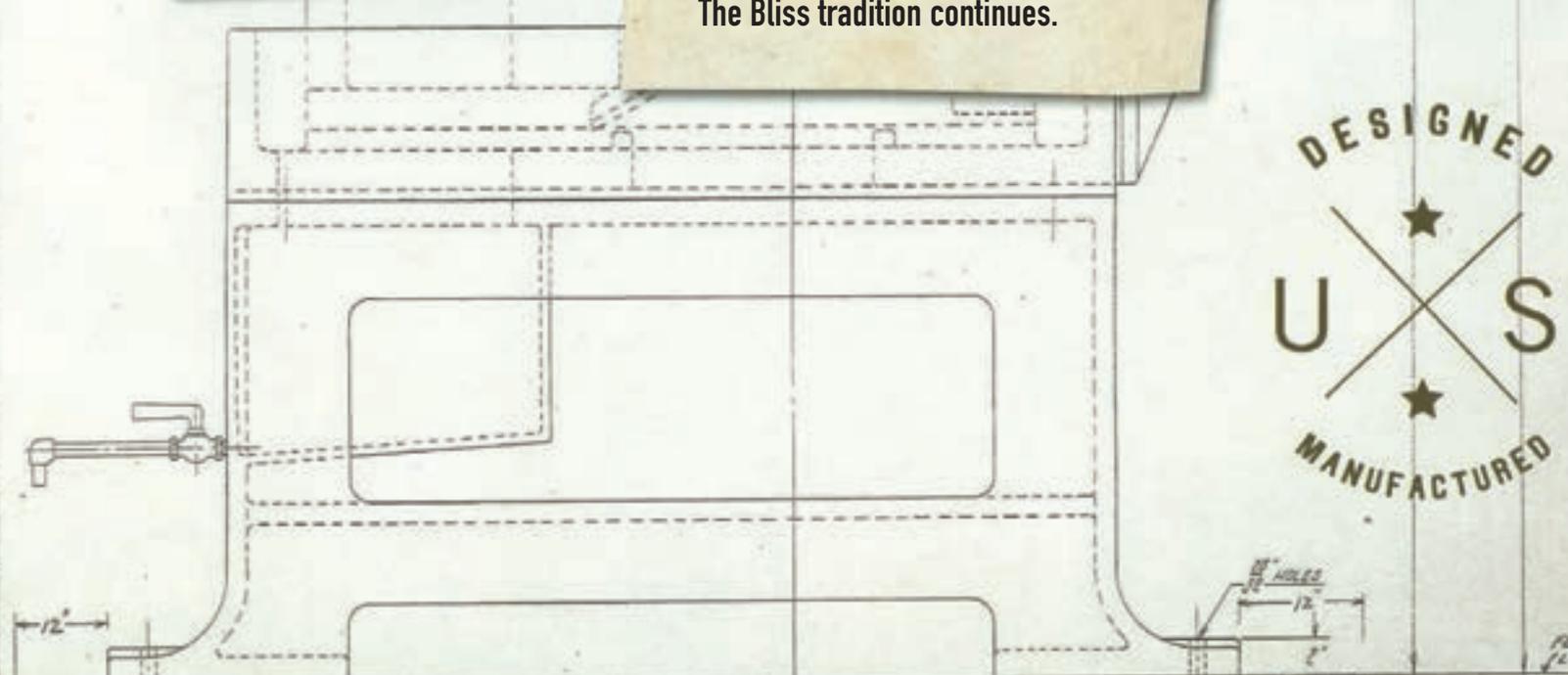
HB 02161
H 129689
AUG 10 1972



Bullet Assembly Machine (BAM) after rebuild with insulated sound enclosure and Allen Bradley PLC control.



Rebuilt. Renewed. Retrofitted. New.
The Bliss tradition continues.



FLOOR
LINE

(1) (10-3)

