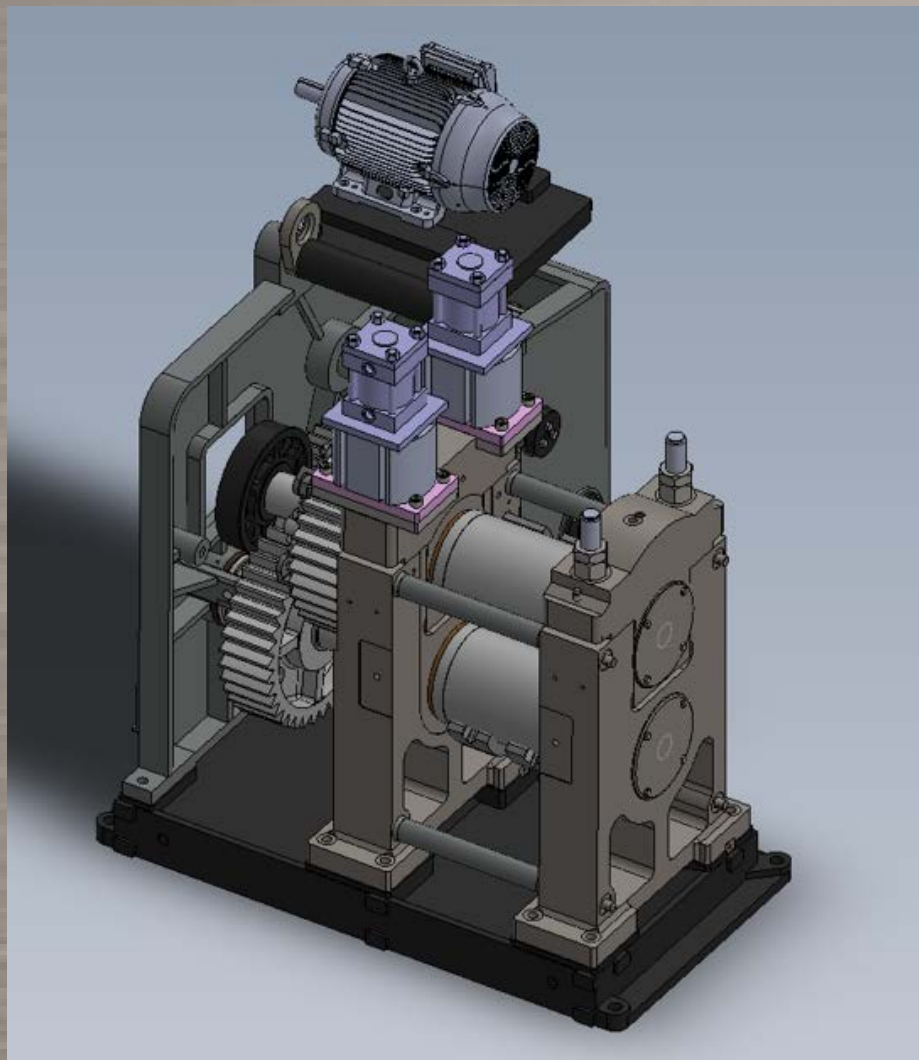




Ajax Wide Adjustment Forging Rolls



Ajax

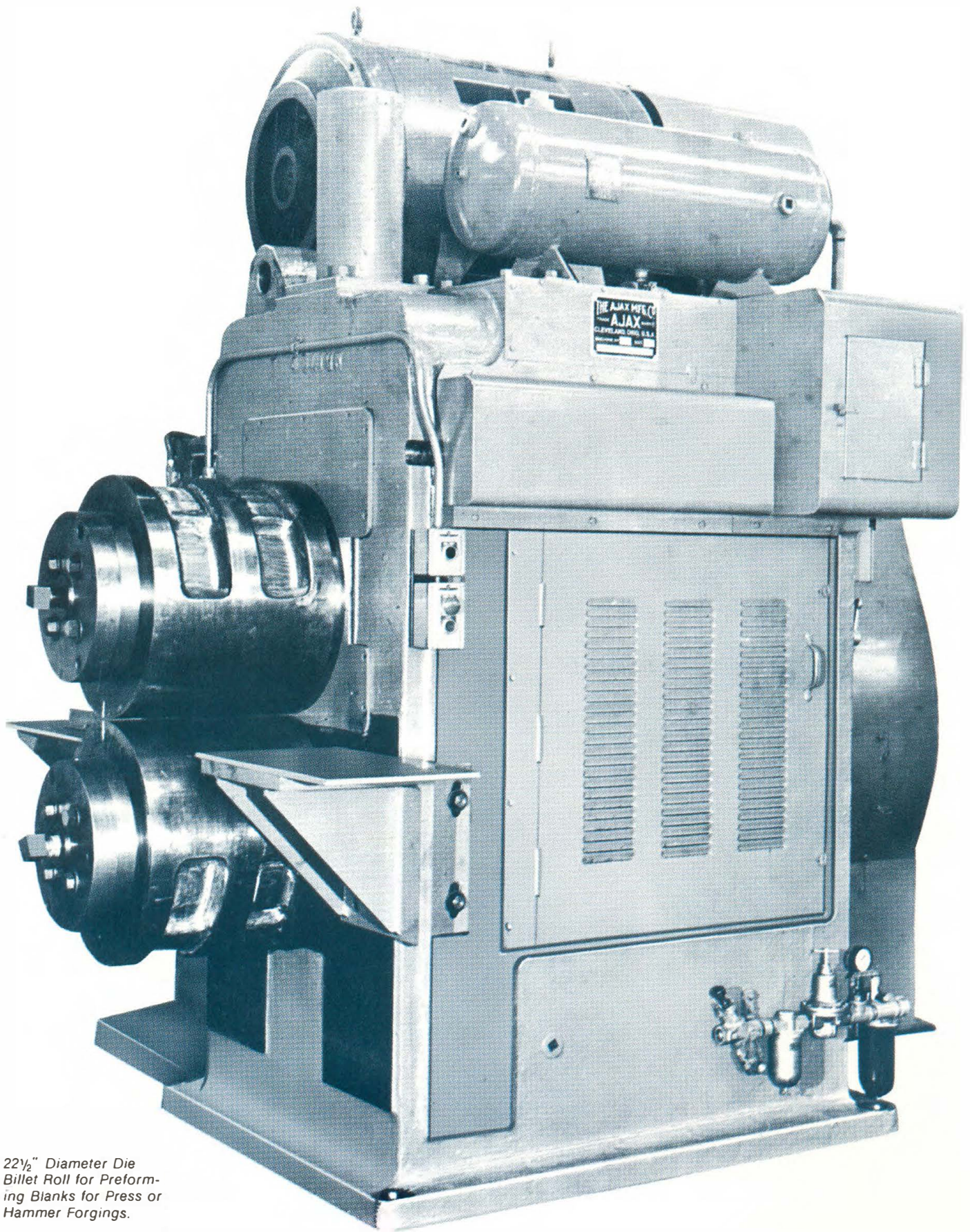
FORGING ROLLS

Ajax Forging Rolls are designed and constructed with the same engineering excellence that has made Ajax a world-wide leader in forging machinery.

These "Wide Adjustment" Forging Rolls employ uncomplicated, highly refined and rugged designs to maximize user productivity in roll forging parts and forging preforming.

This bulletin describes many of the standard design features and options that make this equipment an "Industry Standard" for operating convenience and performance.





22½" Diameter Die Billet Roll for Preforming Blanks for Press or Hammer Forgings.

WHAT ROLL FORGING CAN DO



In roll forging, two curved dies rotating in opposite directions "squeeze" the stock as it is pulled through the rolls much like cloth through a wringer. The forging stock deforms under the force exerted by the rigid dies and machine frame to make a part, whose shape is determined by the shape and contour of the dies.

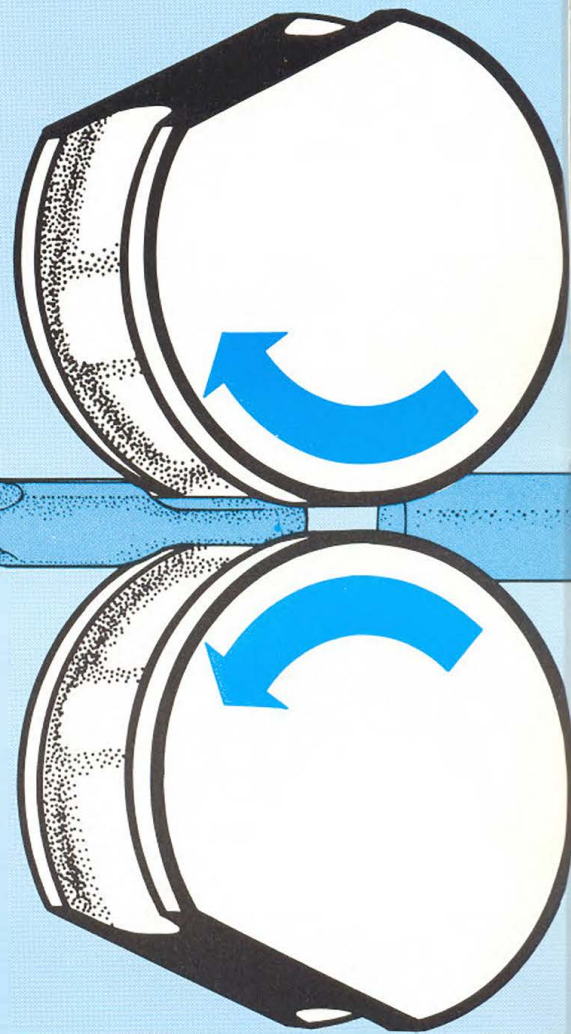
Since there is essentially only rolling contact between the forging and the dies, roll forging is an efficient method of producing large reductions in a cross sectional area at minimal loads.

When used to produce preforms for conventional press or hammer forging, roll forging can provide several advantages which become especially important with the high cost of energy and materials.

AJAX FORGING ROLLS CAN . . .

1. Increase die life, decrease machine loading and energy consumption by minimizing material deformation in subsequent forging operation.
2. Help to produce more uniform quality products.
3. Reduce rejects and save material.
4. Increase productivity.

In addition, roll forging does not require skilled operators or great manual effort. The operator merely grasps one end of the heated stock with tongs, and inserts it between the rolls at the "open" position. Die rotation rolls the stock toward the operator who repeats the operation for a specified number of passes.



Ajax WIDE ADJUSTMENT FORGING ROLLS

Ajax Forging Rolls, with combination roll shafts, air clutch and brake, are designed to optimize all the advantages of the roll forging process for the production of straight, tapered or irregular forgings. Ajax "Wide Adjustment" Forging Rolls embody refinement and innovation in design which has been occurring since Ajax introduced the forging roll in 1898.

The proven design features a patented gearing arrangement which increases roll adjustment capability to six times that of earlier designs. The "Wide Adjustment" feature permits numerous die redressings to decrease production costs. It also permits the use of deep impression dies, which when combined with the Ajax Air Clutch and Brake for stop-motion operation, makes it easy to handle stock with accurate registry for successive, severe breakdown passes.

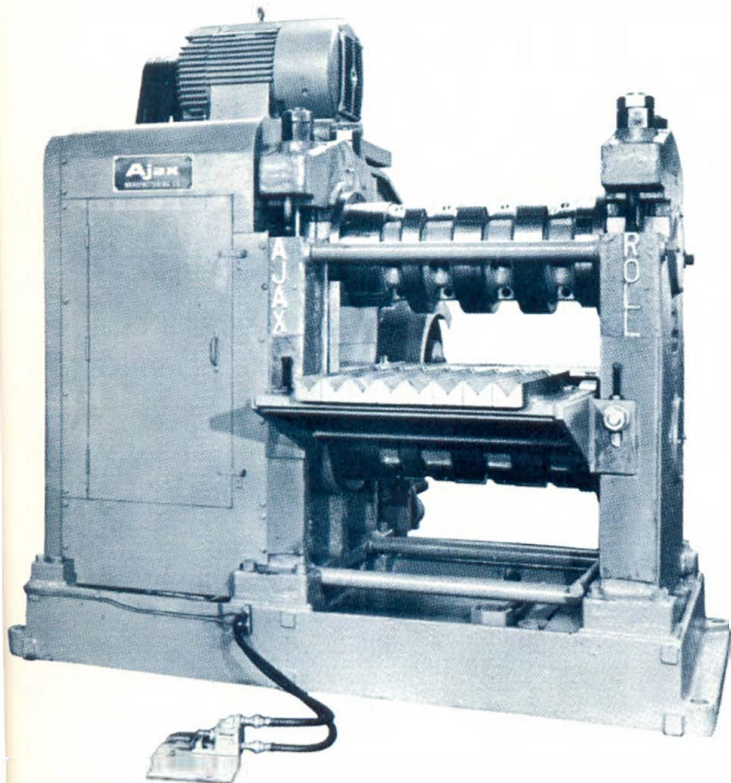
Built in ten standard sizes, these "Wide Adjustment" Forging Rolls can produce forgings ranging from tapered

automotive spring leaves, pointed coil spring ends and rear axle drive shafts, to long tapered blanks used on fork lift trucks and irregular shaped blanks from which I beam front axles can be forged.

Ajax Forging Roll versatility is increased because of self-contained construction which facilitates moving the smaller sized rolls to forging presses, hammers, or other forging equipment.

Pages 12 and 13 illustrate some of the many forgings that have been produced on Ajax Rolls with the speed, accuracy and economy the industry has come to expect from all Ajax equipment.

So that your Ajax Forging Roll will be designed best for the production of your work, we suggest that blueprints, samples or sketches be submitted to our Engineering Department for recommendations based on stock size, length of reduced stock and finished forging accuracy.



THE TWO TYPES OF ROLLS

For maximum production versatility, Ajax offers two types of forging rolls: the DOUBLE HOUSING ROLL and the OVERHANGING ROLL. Each of these machines is suited to a particular type of roll forging.

The double housing roll is best suited to produce shorter pieces requiring large deformation, while the overhanging roll can best produce very long forgings.

THE DOUBLE HOUSING ROLL

Roll dies in the double housing roll are mounted between massive steel housings. Great width and rigidity permit the use of wide dies with multiple impressions for forgings requiring large deformation or for producing several different forgings. Top roll housings are cast steel, tongue-guided in the main housings, and are vertically adjustable to compensate for die dressing. Provisions are made for taking up roll shaft end play to prevent axial die mismatch.

Two types of roll dies, the flat backed segmental and the semi-cylindrical, can be used on the double housing roll.

FLAT BACKED SEGMENTAL DIES,

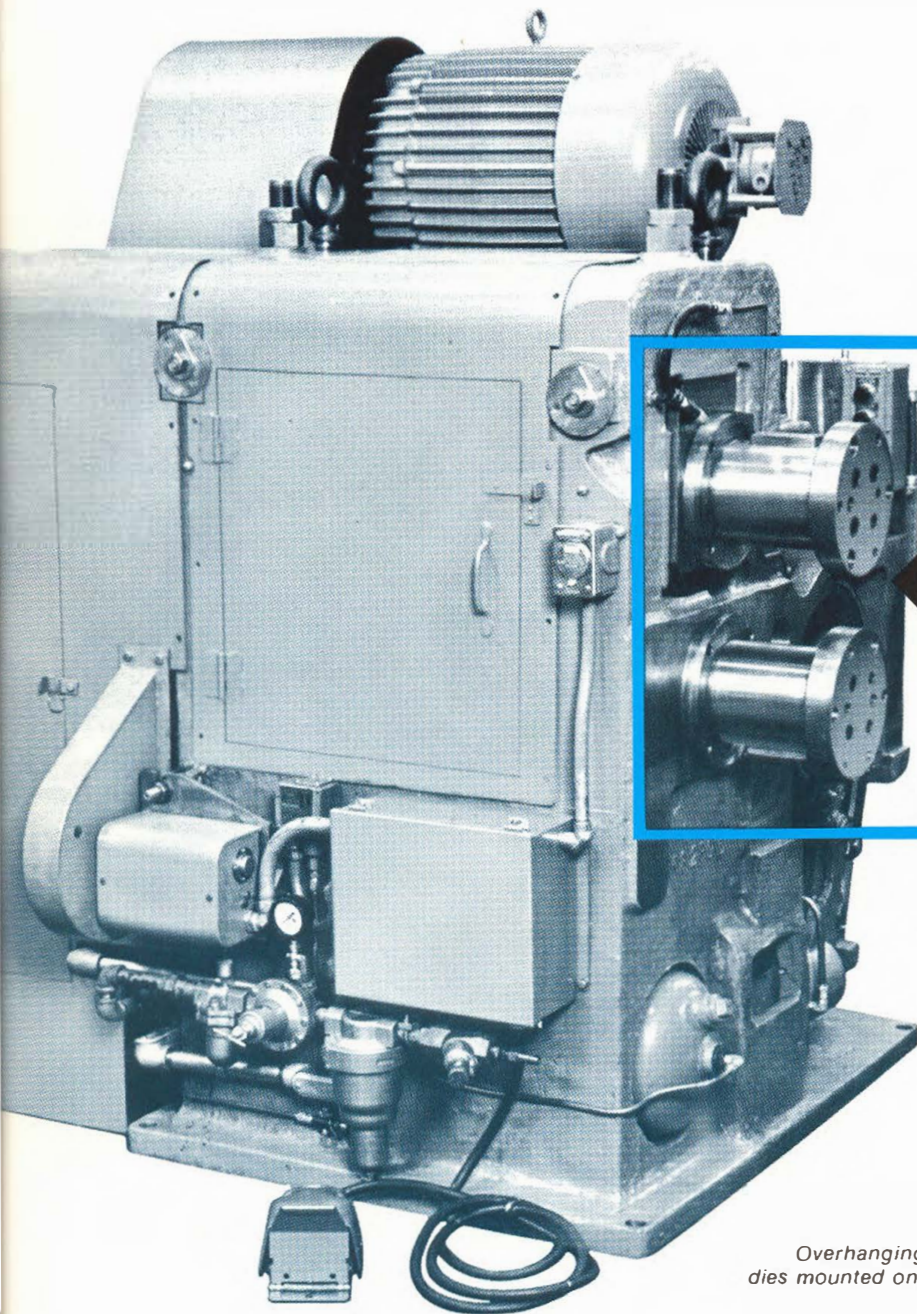


used for rolling short lengths, are the most economical roll forging dies. These light weight dies are bolted and keyed to the roll shafts and can be easily changed and set. Segmental dies are inexpensive because a minimum amount of material is used and grooves can be machined on both dies simultaneously. After machining, heat treating may follow for hardening, and the back surfaces ground to correct for warpage.

SEMI-CYLINDRICAL DIES,



for medium length work, are available on all forging roll sizes. Like the flat backed segmental dies, semi-cylindrical dies are bolted to the roll shafts between the housings and can be easily changed. The two halves can be machined simultaneously. For additional economy, when the work is not too long, both ends of the impressions can be mouthed out to make the dies reversible. Cast steel dies of the same alloy used in rolling mill service, have been used with great success.

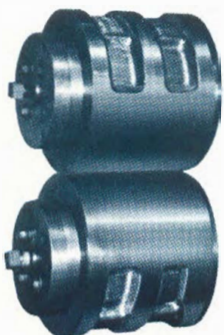


THE OVERHANGING ROLL

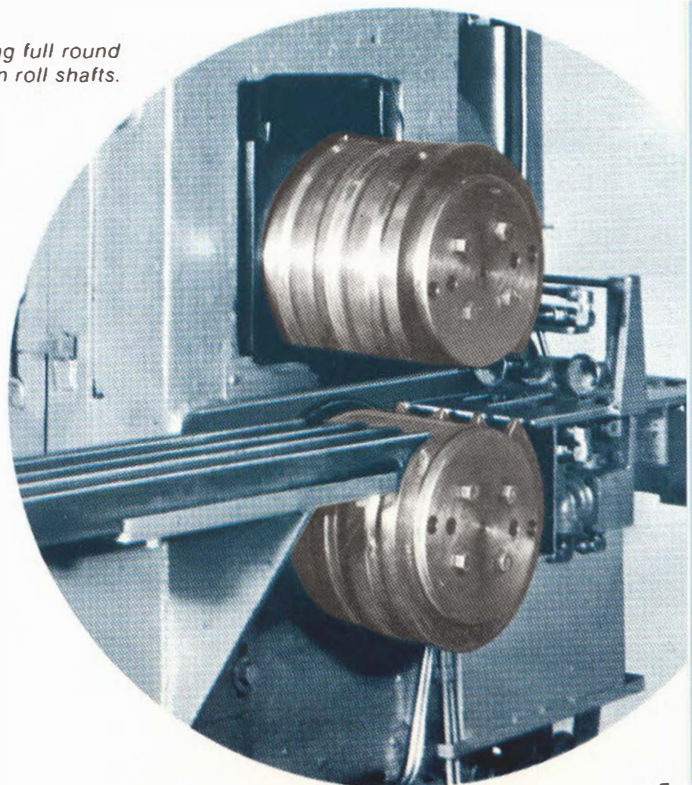
Roll dies on the overhanging roll are outboard-mounted. All the design features described under the Double Housing Roll apply, including the exclusive Ajax "Wide Adjustment" feature. These rolls have massive roll shafts, and bearings mounted far apart for superior rigidity. For special high deformation parts or wide dies, a removable outboard bearing support is available. Roll shaft extensions for using full round dies on Double Housing machines are available only on machines equipped with Air Brake and Clutch.

Overhanging full round dies mounted on roll shafts.

FULL ROUND DIES



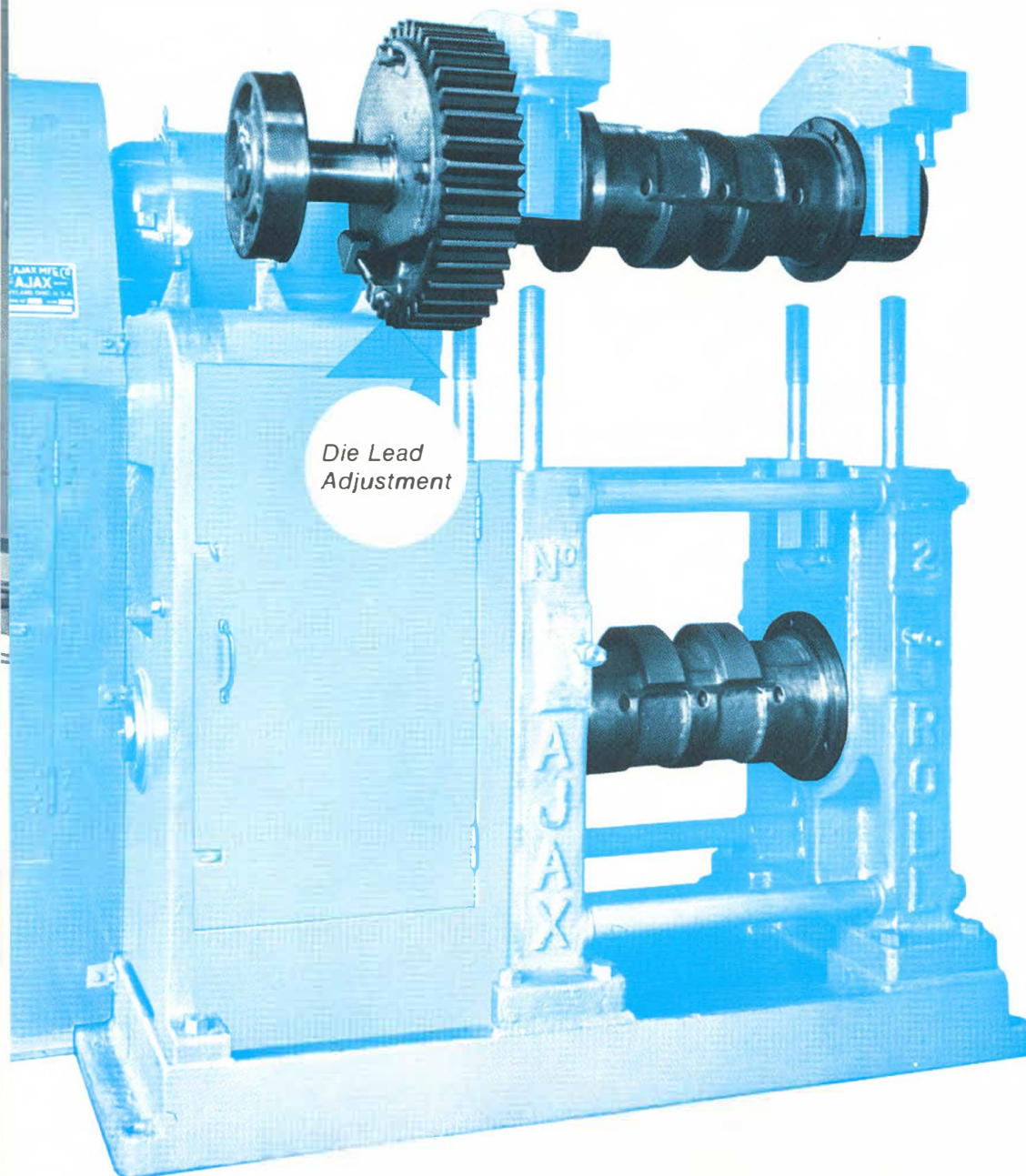
are especially suited for long work, and are mounted on the overhanging ends of the roll shafts. Made most economically as rings, a cutaway section large enough to permit stock feeding must be provided. Because they are supported on one end only, width and therefore the number of grooves, must be limited. Full round dies have the advantage of easy changing.



Ajax

OPERATIONAL FEATURES

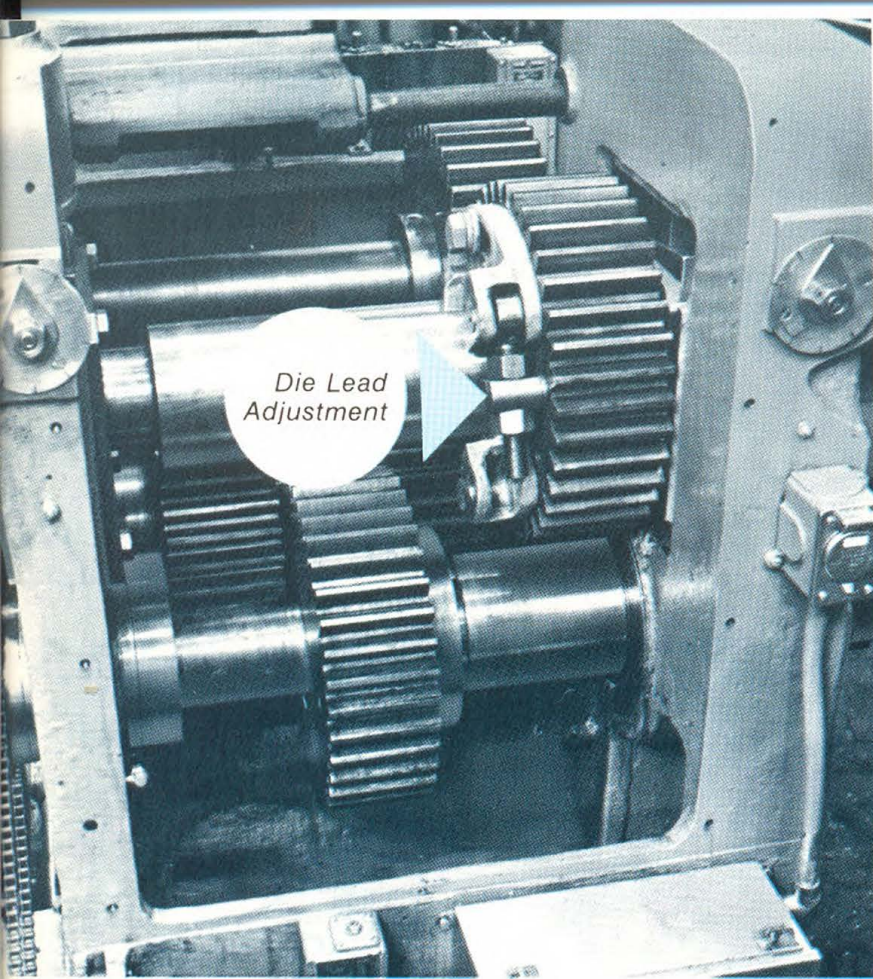
These design features, common to all Ajax Forging Rolls, add to their operating ease and efficiency.



*Die Lead
Adjustment*

DIE LEAD ADJUSTMENT

A die lead adjustment is provided on the upper roll shaft to compensate for die mismatch. Intricate, shouldered impressions can easily be brought into perfect match by the rotational adjustment provided.

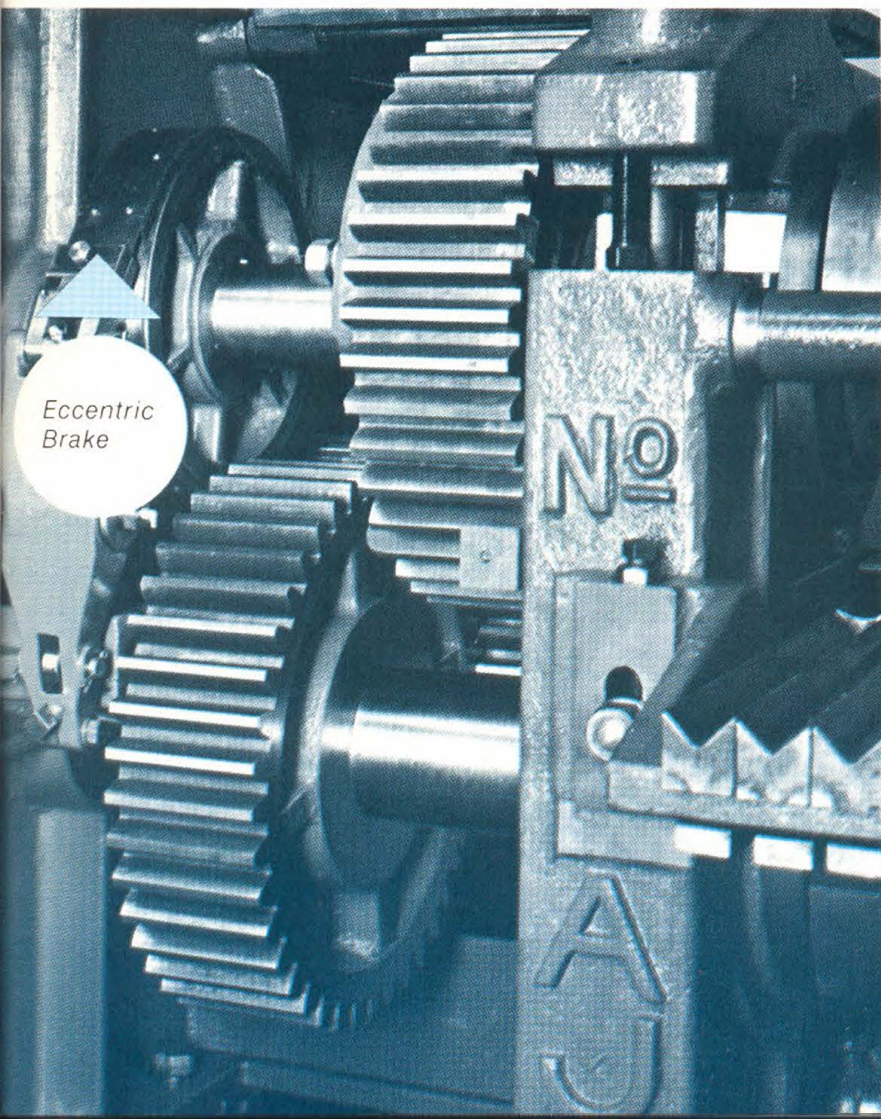


“WIDE ADJUSTMENT” BETWEEN ROLLS

In the patented Ajax Wide Adjustment Gearing System, the top roll shaft gear is adjusted tangentially to the gear which drives it, so that gear mesh deviates a minimum amount throughout the entire roll adjustment. For example, as much as four inches of adjustment can be made on the No. 2 roll, with minimum increase of backlash. The result is enough adjustment for many die redressings with all three types of dies.

The increased number of die redressings permitted by this wide range of adjustment results in improved economy for all depth dies. With the “Wide Adjustment” capability, roll forging is economical for types of work where die costs were once prohibitive.

In the rugged drive mechanism, roll gears overlap and are staggered allowing use of maximum diameter gears which are designed to clear the bottom roll shaft at the lowest adjustment point. For smooth operation, heavy pitch gears are used, and the small required tooth clearance which might be detrimental on exacting work, is taken up with an eccentric brake on the top roll shaft. This brake is automatically set at the part of the cycle where the weight of the top die tends to cause the top roll shaft to “run ahead” then is released for the rest of the cycle. The eccentric brake is not required with full round dies.



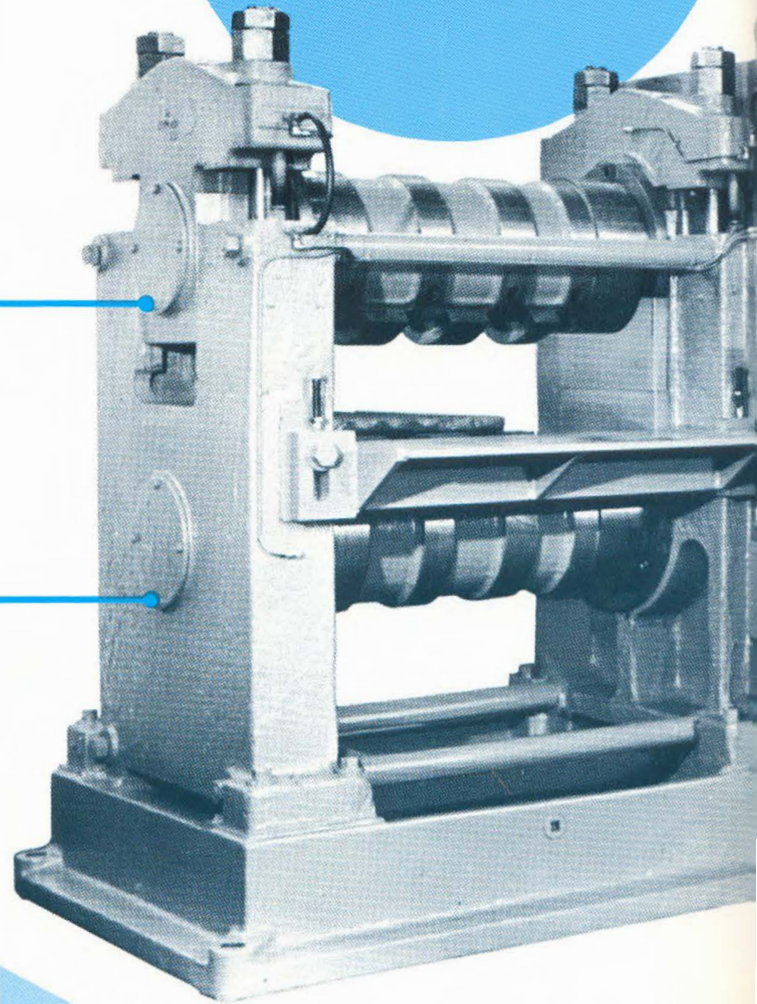
Ajax

GENERAL CONSTRUCTION FEATURES

ALLOY BRONZE BEARINGS, PRESSURE LUBRICATED

Bearings in Ajax Forging Rolls are specially designed for rugged service. Bearings on all shafts are bronze alloy, particularly suitable for rolling mill service. The main roll neck bearings are provided with a labyrinth guard to keep out all scale and cooling water, if used. Very conservatively rated flywheel bearings are smooth running anti-friction roller bearings.

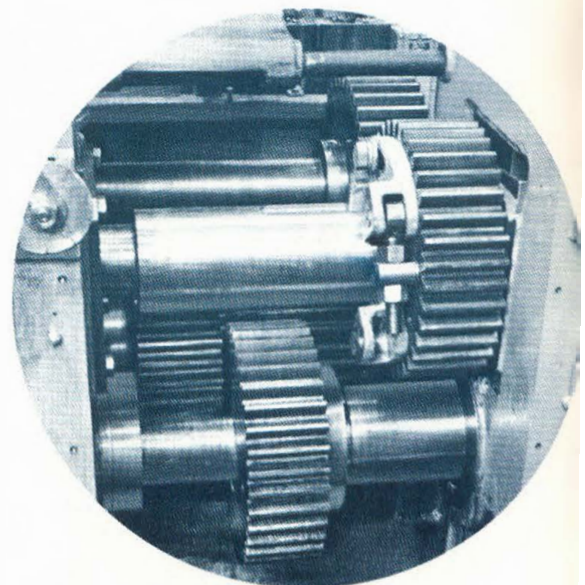
All Ajax rolls are equipped with an automatic pressure lubrication system for all but the roller bearings.



RUGGED STEEL GEARING, COMPLETELY HOUSED

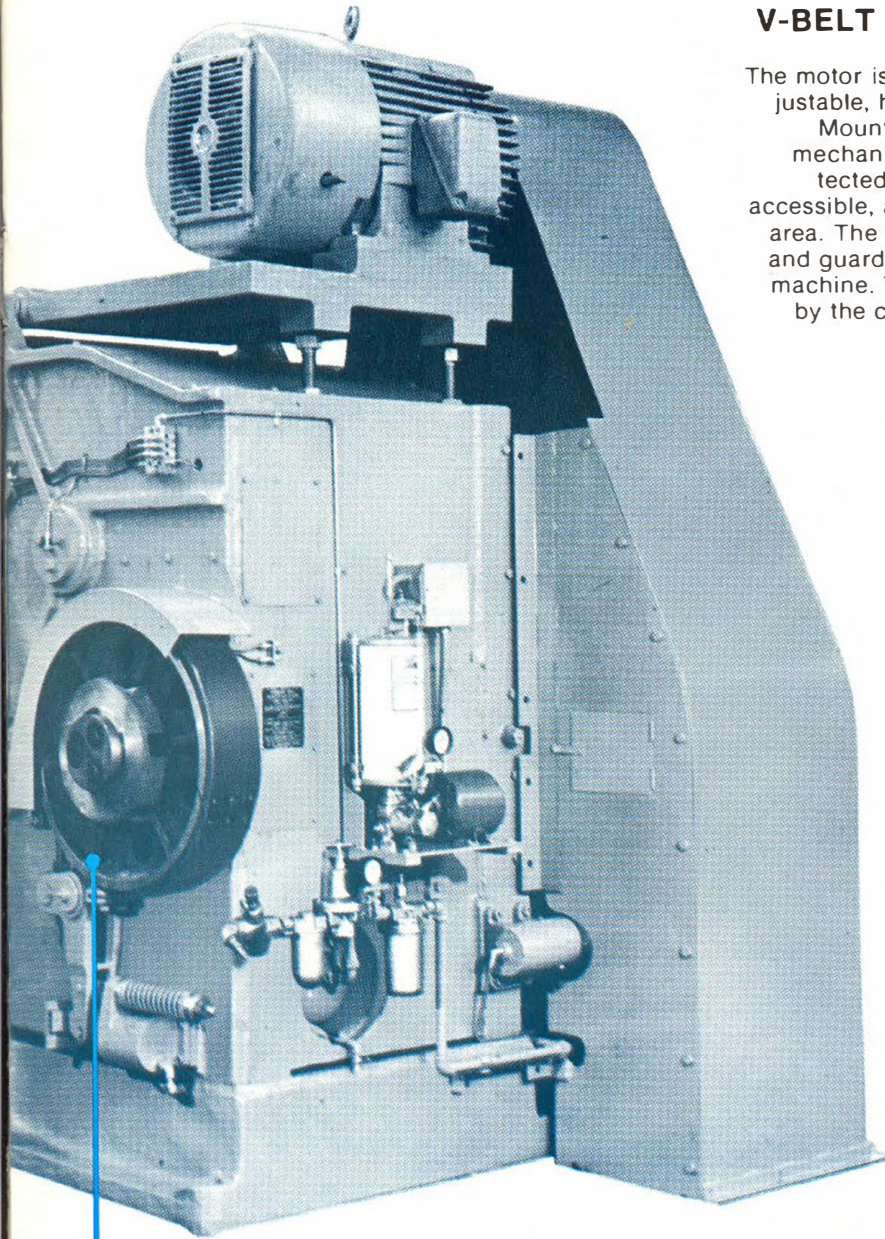
All machine gearing is high strength steel with machine cut teeth. Overlapping gears with very large teeth drive the roll dies, contributing to lower tooth load and longer gear life.

The gearing mechanism is housed in a heavy casting and is covered with sheet steel guards to protect the gears from abrasive scale and dirt. This housing also protects personnel, but is designed for maximum accessibility to all internal adjustments.



SHORT CENTER V-BELT MOTOR DRIVE.

The motor is supported on an adjustable, hinged motor bracket. Mounted above the gearing mechanism, the motor is protected from scale, is readily accessible, and occupies no floor area. The motor sheave, V-belts and guard are supplied with the machine. The motor is supplied by the customer, or furnished by Ajax at extra cost.



BRAKE AND AIR CLUTCH FOR STOP-MOTION OPERATION

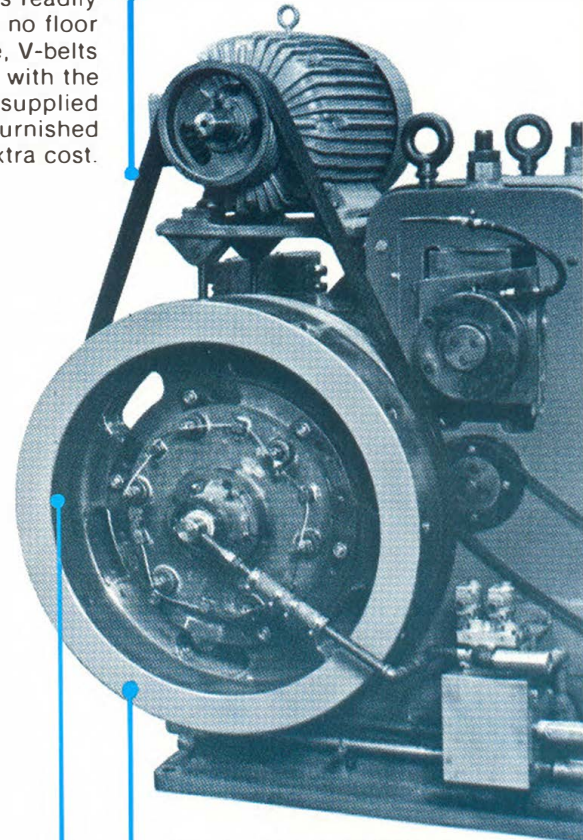
The proven Ajax Air Clutch and co-acting Brake, used on Ajax Forging Machines and Presses, is an available option on all Forging Roll sizes, and is standard equipment on all rolls with extensions for overhung dies. The air clutch and brake gives the operator complete control over machine operation, easing the handling of heavy work and making it possible to align stock into perfect register in multiple deep or intricate die impressions. This option also increases the variety of pieces that can be rolled.

The Air Clutch is a multiple disc, friction type clutch. The pneumatically

operated clutch requires compressed air (60 to 100 psi) in small volumes. The stopping brake is a band type, air-released and spring-set, and is mounted on an extension of the high speed shaft.

On stop motion rolls, an electric foot switch is normally used to start a rolling cycle. The foot switch in sequence releases the brake, then engages the clutch.

At a predetermined point in the cycle, a rotary cam switch mechanism releases the clutch then sets the brake, effectively stopping the roll in preparation for the next rolling operation.



SAFETY FRICTION-SLIP FLYWHEEL

The flywheel on continuous running rolls has the mass to supply abundant energy for long, large reduction rolling. On rolls not equipped with Air Clutch and Brake for stop-motion, the flywheel is clamped between friction discs at its hub to prevent damage from misplaced stock. The torque at which the flywheel will slip is adjustable by means of clamping studs which control the pressure between flywheel clamping discs. Clamping stud diameter, reduced below the thread root diameter to provide elasticity without distorting the threads, is typical of attention to engineering detail in Ajax equipment. Flywheel friction slip arrangement is not used on machines equipped with an air clutch since the clutch provides the same protection.

OPTIONAL EQUIPMENT AT EXTRA COST

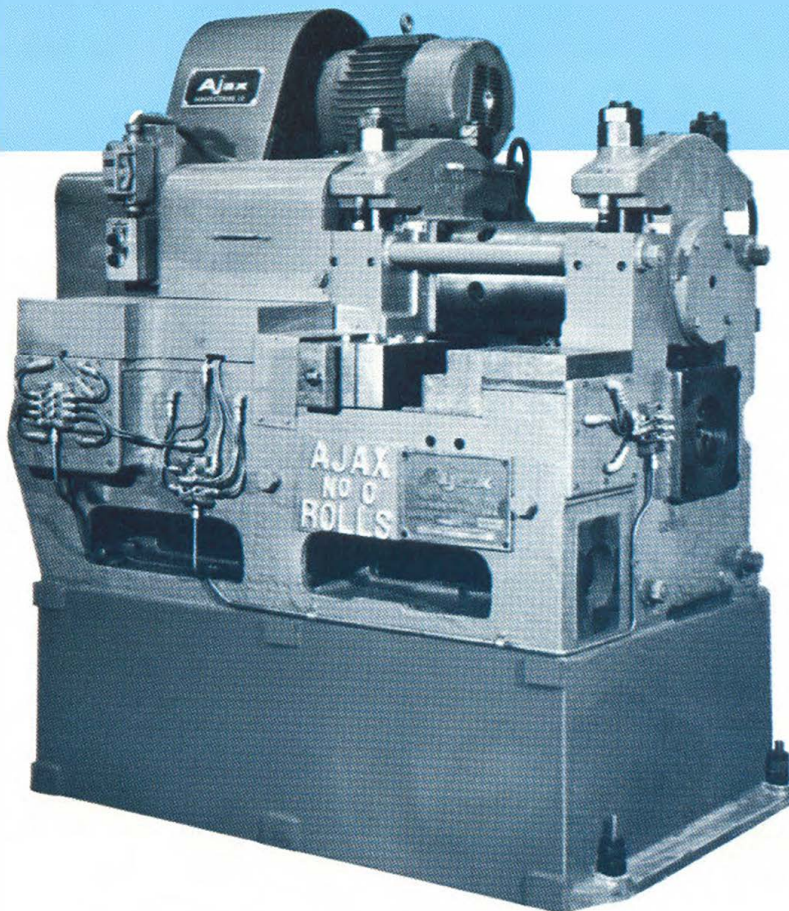
This optional equipment is designed to maximize the capabilities of your Ajax Forging Rolls.

HORIZONTAL FRONT PRESS

When a forging requires side-squeezing after roll passes, as in pointing coil springs and tapering chisel blades, a front press located close to the rolls for rapid production, can be provided. The squeezing dies can be set to various locations in order to distribute wear to other areas of the roll dies. The cross slide carries the moving die at the center and has widely spaced bearings which are well protected from scale. The slide is actuated by an eccentric on the lower roll shaft, and no miter gears are used. A safety pitman with breaker bolt in tension is used to prevent accidental damage.

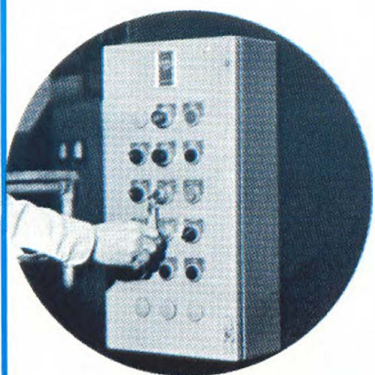
GUIDES AND GAUGES

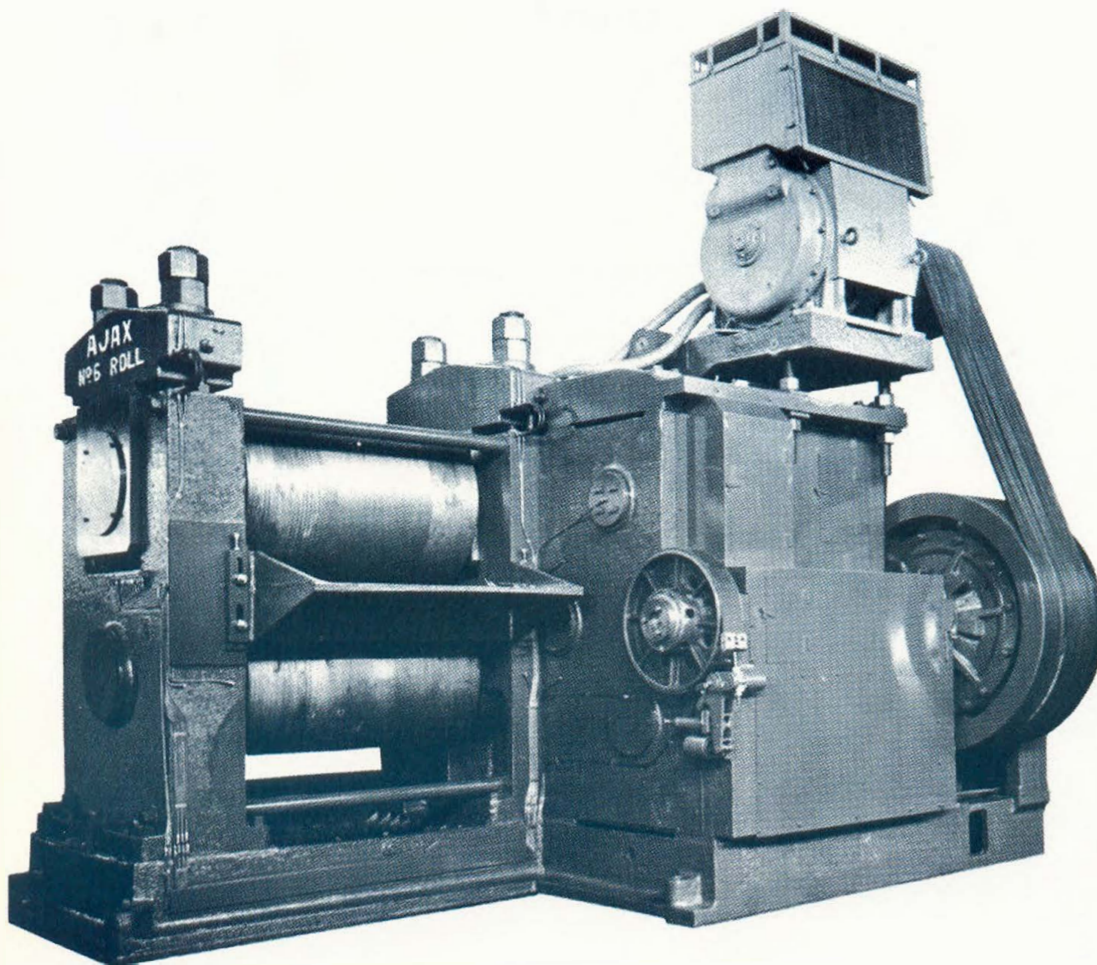
Front and rear guides and gauges maintain perfect stock alignment in the die grooves to insure accuracy. Front guide tables are available for handling long work.



MOTOR AND CONTROLS

Motors, controls, and other electrical equipment are specified by The Ajax Manufacturing Company and are available as optional equipment.

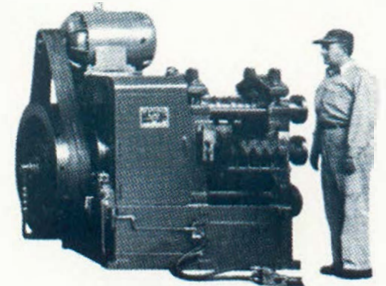




**NO. 6 AJAX
FORGING ROLL
at 100 tons**

**NO. 1 AJAX
FORGING ROLL
at 10 tons**

*Illustrates wide size
range of Ajax Forging
rolls.*



PRINCIPAL DIMENSIONS

ROLL SIZES	No. 0 BLANK FORMING ROLLS	No. 0 ROLLS	No. 1 ROLLS	No. 2 ROLLS	No. 3 ROLLS	No. 5 ROLLS	Special Billet Roll	Special Billet Roll
Width of roll dies								
Half Round		14"	20"	25"	30"	45"		
Flat Back		14"	20"	25"	30"			
Overhung	7"	6"	7"				12 or 18"	18"
Max. Roll Die Dia.								
Half Round		12½"	16¾"	20¾"	28"	38"		
Flat Back		12½"	16¾"	20¾"	28"			
Overhung	13"	12½"	16¾"				20"	22½"
Max. Usable Die Periphery						220° Die		
Half Round		19"	25"	31"	41"	71"		
Flat Back		11"	14"	18"	24"			
Overhung	31"	30"	41"	50"	68"		46"	53"
Min. Roll Die Dia.								
Half Round		10½"	14¼"	16¾"	23½"	33"		
Flat Back		10½"	14¼"	16¾"	23½"			
Overhung	11"	10½"	14¼"					
Min. Usable Die Periphery								
Half Round		16"	21"	24¾"	34"	63"		
Flat Back		9½"	12½"	16"				
Overhung	26"	25"	36"	41"				
H.P. of Motor								
870 to 1150 RPM	20	5 to 20	10 to 30	20 to 40	40 to 75	150	75	100
Floor Space — L. to R.	5'3"	5'8"	6'6"	8'0"	10'0"	15'0"	10'	10'1"
F. to B.	4'11"	4'2"	6'0"	7'0"	8'6"	12'0"	8'4"	8'9"
Approx. Weight Lbs.								
Without Air Clutch	with clutch 11,000	8,500	17,000	26,000	43,500	with clutch 135,000	with clutch 55,000	with clutch 57,000

Overhung Cylindrical Dies can be used on No. 0 to No. 3 Rolls only when equipped with Air Clutch and Brake.



I Beam Front Axle

Twist Drill Blank



Universal Joint Cross



Leaf Spring



*Tapered End
of Fork for
Lift Truck*



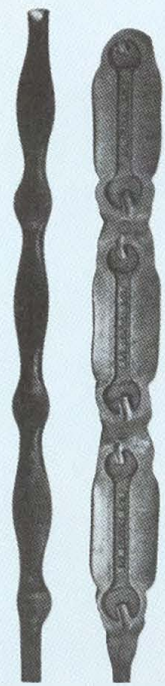
Sector Shaft Arm



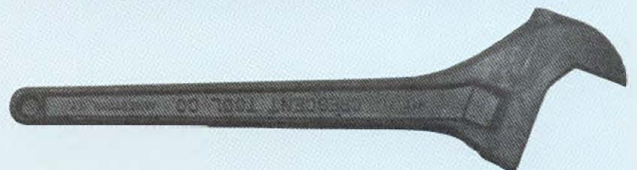
Connecting Rod



Rocker Arms



*Open
End
Wrenches*



Crescent Wrench

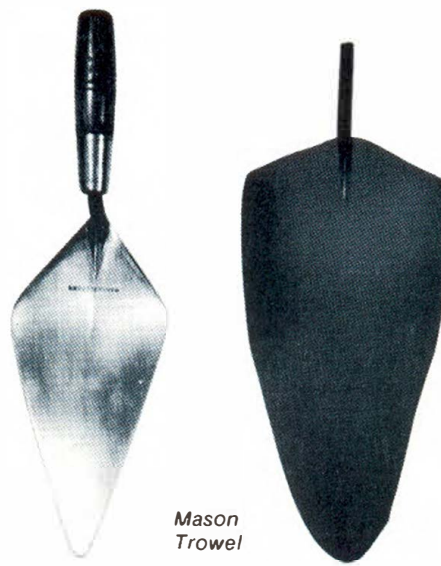
Ajax

FORGING ROLL PRODUCTS

Ajax "Wide Adjustment" Forging Rolls are being used to produce a wide variety of reduced straight and tapered forgings. These are high productivity machines which can produce parts with great uniformity, and with surface finish and accuracy comparable to the highest grade hot rolled bars. For maximum accuracy, the operator can use square guides on tongs to make accurate 90° turns between passes.

Forging roll applications are not limited to operation with other forging equipment. Many Ajax Forging Rolls are being used to produce finished forgings. Due to its unique ability to provide large reductions fast, compared to fullering in a hammer, rolls are frequently used in conjunction with Ajax "Air Clutch" Forging Machines and Presses.

These are examples of how Ajax Forging Rolls have contributed to high productivity in the production of many different forged parts.



Mason
Trowel



Automotive
Spring



File



Knife Blade Blank



Wood Chisel

Typical Preformed Blank



Clay Spade



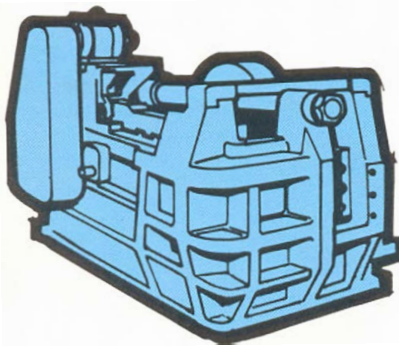
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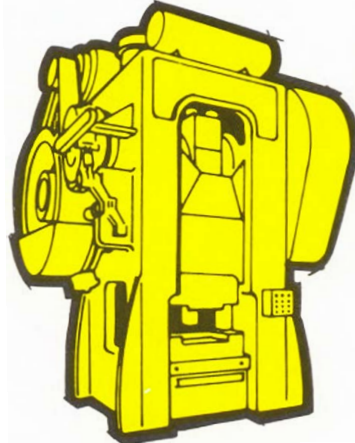
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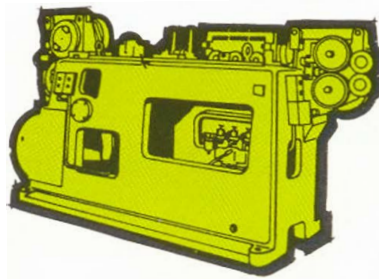
FORGING
MACHINES



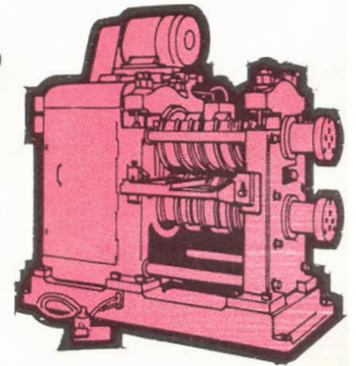
FORGING
PRESSES



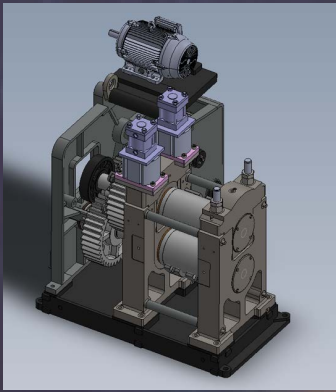
WIRE DRAWING &
CUT-OFF EQUIPMENT



FORGING
ROLLS



FORGING ROLL S



WIRE DRAWING & CUT-OFF EQUIPMENT



FORGING MACHINES



FORGING AUTOMATION

FORGING PRESSES



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