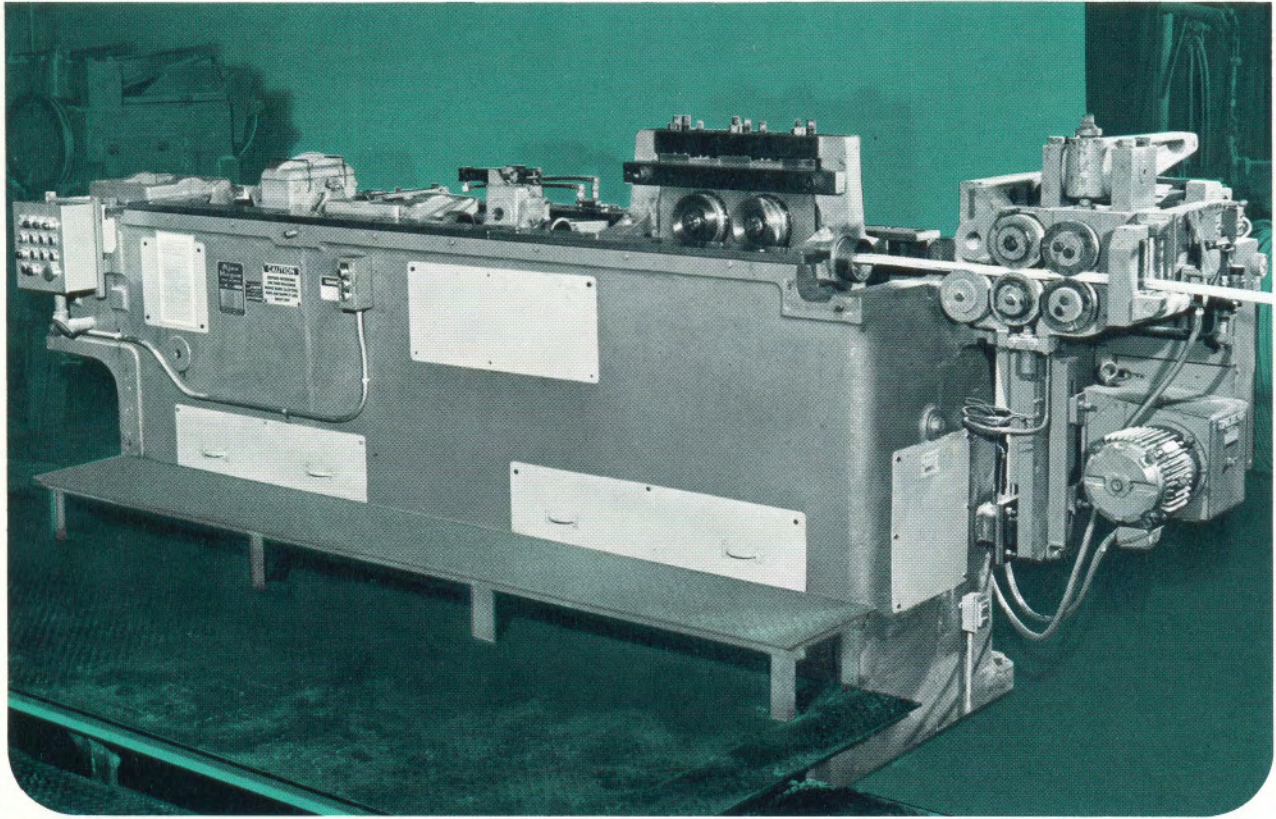


Bulletin No. 111-D

Ajax HOGUE



WIRE DRAWERS for Cold Heading

Ajax-Hogue

Straight Line Drawing

Exact Wire Tolerances

Lower Material Costs

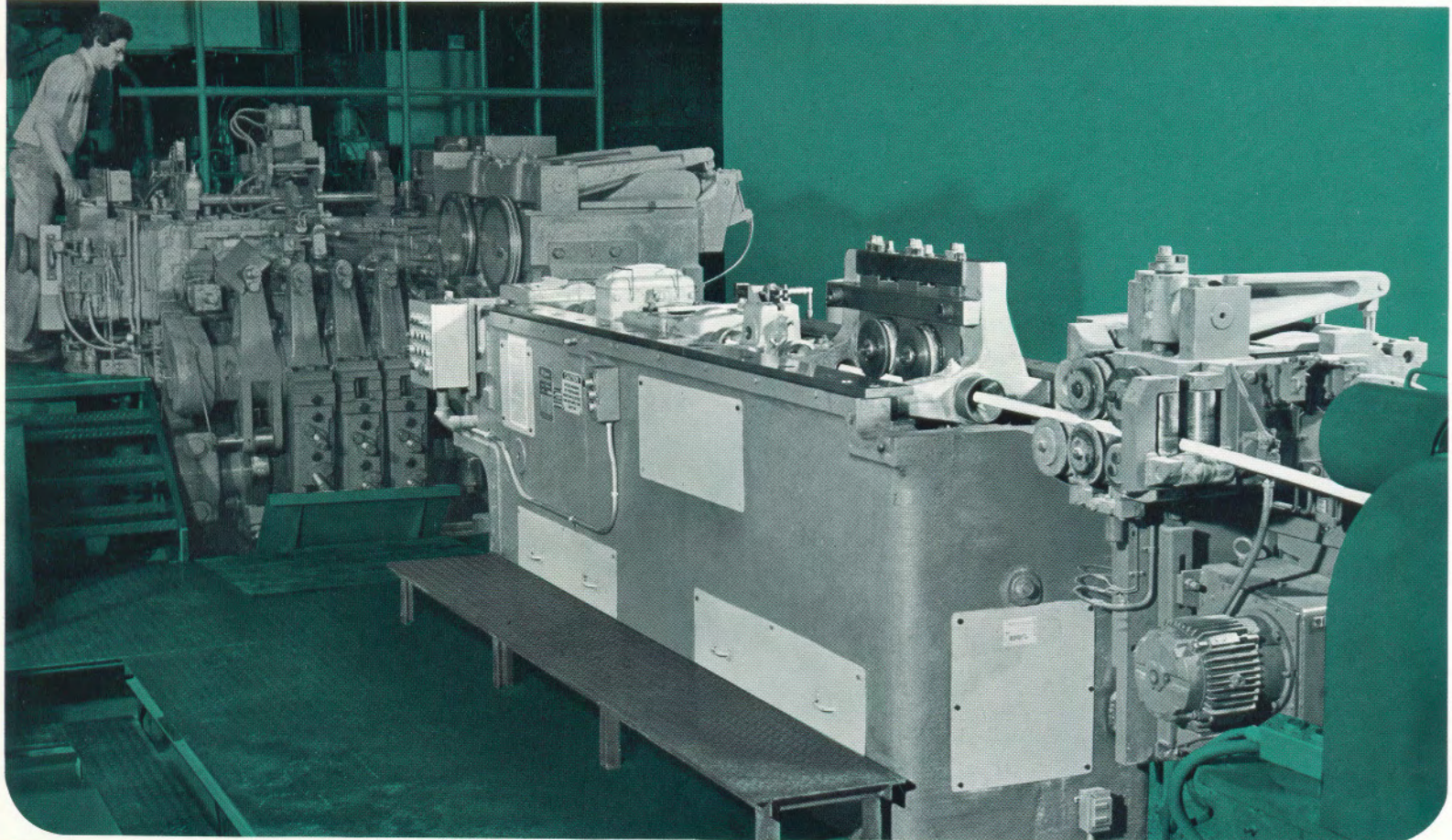
Longer Die Life

Improved Finished Product

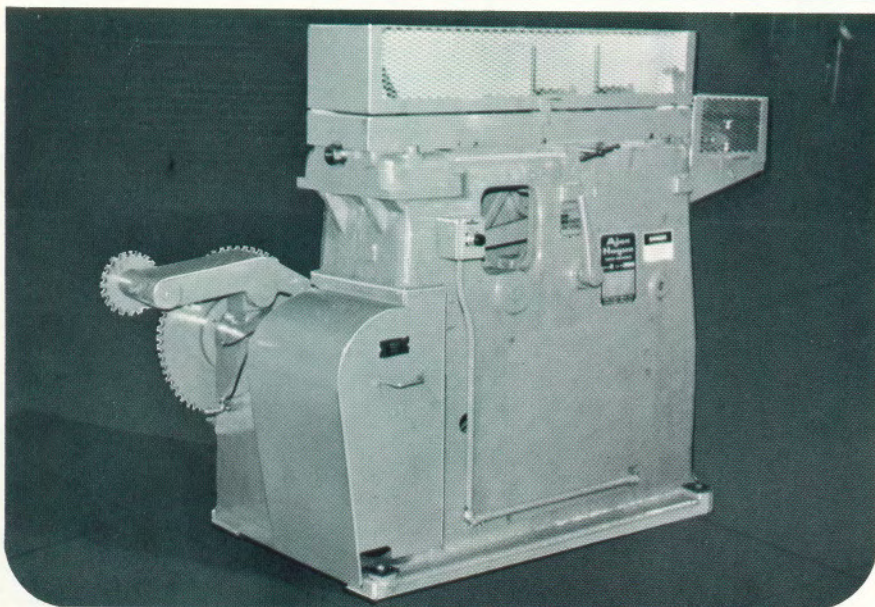
What is an Ajax-Hogue Wire Drawer?

The Ajax-Hogue Wire Drawer is a machine that is used in conjunction with cold forming equipment. It draws and coats hot rolled, pickled and lamed or phosphate coated rod as the rod feeds into the heading machine. With suitable mechanical provisions, Ajax-Hogue Straight Line Wire Drawers will operate with any make of cold-heading machine. They are built in nine sizes for handling all rod diameters from the smallest, Number 0 size, up to the largest, Number 8 size, handling up to and including 2" diameter wire. The cold drawn stock produced in this manner not only exceeds that commercially available as to accuracy, but possesses numerous other desirable properties for operators of cold-heading machinery such as straightness, clean coating and no age hardness.

WIRE DRAWERS for Cold Heading



No. 7 Ajax-Hogue
Wire Drawer
attached to a
1" boltmaker.
(Top guards
removed)



Standard No. 2
Ajax-Hogue
Wire Drawer.

Ajax HOGUE

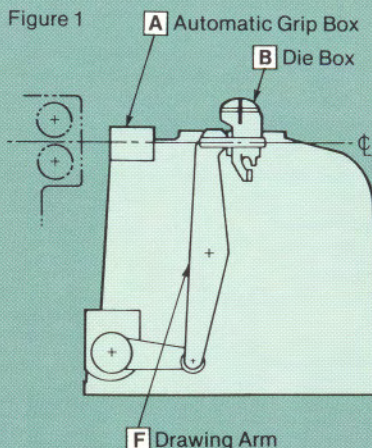
WIRE DRAWERS

for use with
Cold Headers

Standard Accessories

- Breaker Bolts are furnished on all Ajax-Hogue Wire Drawers that have a two-piece drawing arm.
- Sprockets, Roller Chain and Chain Guard are included for connecting the driving mechanism to the Boltmaker or Parts Former crankshaft.
- All drawers size 4 and larger have electric controls for all grip functions.
- All openings in the Wire Drawer are guarded. Safety switches are interlocked to appropriate hinged doors.
- All Ajax-Hogue Wire Drawers feature a fully automatic lubrication system.
- A Feed Assist Air Cylinder is sometimes furnished on longstroke wire drawers. These cylinders assist the header feed rolls by pushing the die box and straightener rolls during the feed cycle.
- A sample set of tooling is included with the Wire Drawer but does not include the drawing die.
- One gallon bucket of Murphy's X-32 drawing compound is furnished separately.

Figure 1



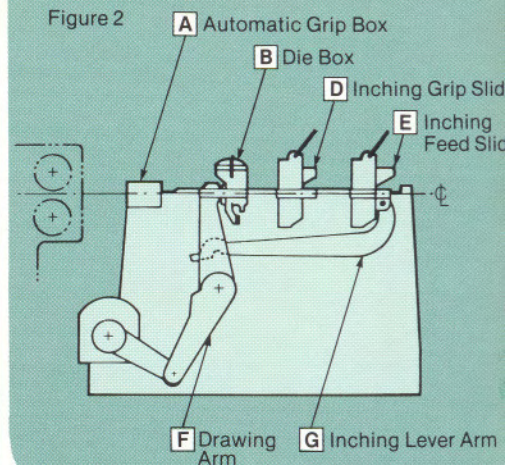
Type 1 / Basic Drawer without Inching

SIZES 0, 1, 2, 3 and 4

Basic Operation of the Type 1 AJAX-Hogue Wire Drawer as illustrated by Figure 1 shows an Automatic Grip Box (A) which grips the wire, a Die Box (B) which contains the wire drawing die and lubricant, and Drawing Arm (F) which pushes the die box back over the rod. In order to start a new coil, the end of the coil must be prepointed or swaged to slightly less than die size so that it is possible to feed the rod end by hand through the drawing die and through the automatic grip box. The header is then jogged and the die box advanced manually until the lead end of the coil reaches the header feed rolls. (This is done to keep swage length to a minimum.) The feed rolls of the header then pull the wire and die box combination forward. As the header continues to run, the Automatic Grip Box (A) holds the wire stationary while the die is pushed back over the rod by the Drawing Arm (F).

In most cases the AJAX-Hogue Wire Drawer is driven by a sprocket and chain drive from the crankshaft of the header to an adjustable eccentric. The adjustable eccentric controls the stroke of the drawing arm which is set to draw slightly more wire than is required by the header to insure sufficient stock for the cutoff blank.

Figure 2

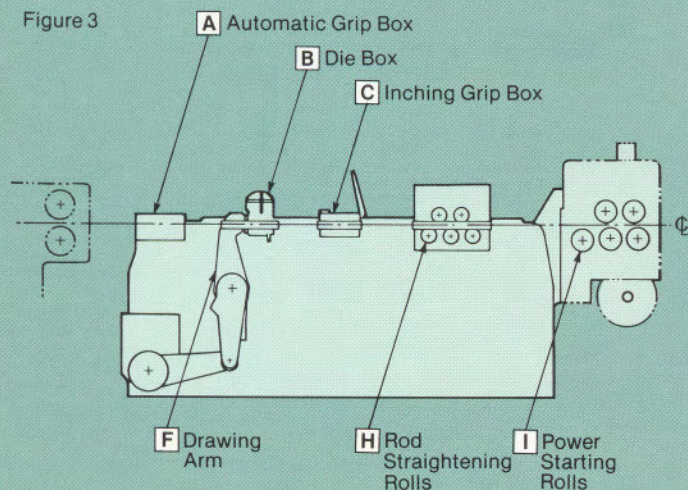


Type 2 / Basic Drawer with Inching Fingers

SIZES 1, 2 and 3

Figure 2 shows the basic drawer with the addition of an inching mechanism. When an inching mechanism is used the starting end of a new coil does not have to be swaged or pre-pointed, nor are welded coils required. This method is normally used in the smaller wire drawers and features the use of inching feed and grip slides with inching fingers. The rod end is pushed by hand into the drawer until it is gripped by the Inching Grip Slide (D). The Inching Feed Slide (E) is operated by the Inching Lever Arm (G) from the Drawing Arm (F) which advances the rod in predetermined length feeds. The Inching Grip Slide (D) is positioned as close as possible to the die box to prevent "buckling" of the rod as it is inched through the die. The fingers in the inching grip slide prevent the rod from backing up as the die is pushed over the rod by the header operator jogging the machine. The inching feed slide advances the rod and die box while the drawing arm is returning for several strokes until the extruded end has passed through the Grip Blocks (A). At this time the Inching Grip Slide (D) can be disengaged and the inching process continued until the wire passes through the feed rolls mounted at the front of the header. The header feed rolls are engaged and the Inching Feed Slide (E) is disengaged. The wire drawer is now set for continuous production. Note: Rod diameters below $\frac{3}{8}$ " or area reductions beyond 18% cannot be inched with this mechanism.

Figure 3

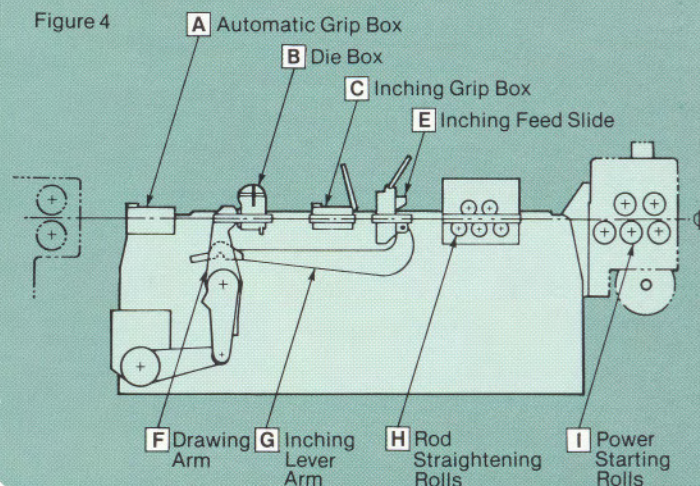


Type 3/ Larger Drawers with Inching

SIZES 4, 5, 6, 7 and 8

Figure 3 illustrates the basic drawer with rod straightening rolls(s) and Power Starting Rolls (I) from the header mounted on the pad of the wire drawer. This style of wire drawer is used mainly to draw the larger rod sizes and features the use of an Inching Grip Box (C) with inching wedge grip blocks along with the rod straightening rolls and power starting rolls from the header. In this operation the Power Starting Rolls (I) are used to feed the rod end through the Rod Straightening Rolls (H) and through the Inching Grip Box (C) to the Die Box (B) where push pointing is accomplished by means of jogging the machine and use of the power starting rolls. The wire is inched until the end passes through the Automatic Grip Box (A) at which point the Inching Grip Box (C) is released. With grip transferred to the Automatic Grip Box (A) buckling is no longer a problem and longer strokes can be used in advancing the end through to the header feed rolls. The power starting rolls can now be disengaged and the unit is set for normal drawing.

Figure 4



Type 4/ Larger Drawers with Inching Feed

SIZES 4, 5, 6, 7 and 8

Type 4 is the same as Type 3 with the addition of an Inching Feed Slide (E) and an Inching Lever Arm (G) shown in Figure 4. The function of the Inching Feed Slide (E) is the same as the Type 2 drawer.

The advantage of the Type 4 drawer over the Type 3 is that it eliminates the possibility that the operator will feed up too much stock and cause a buckle when inching because the inching feed slide determines the feed increment.

Optional Equipment at extra cost

INCHING FEED ROLLS:

Ajax-Hogue Wire Drawers can also be furnished with our own Ajax Power Inching Feed Rolls. These rolls operate intermittently with the drawer in feeding the rod through the inching grip box and are timed to facilitate push pointing. They are normally employed when drawing rod above $\frac{3}{4}$ " diameter.

ROD STRAIGHTENING ROLLS:

For rod larger than $\frac{1}{2}$ " diameter, No. 3 Ajax-Hogue Wire Drawers may be equipped with inching wedge grip blocks and rod straightener rolls. These straightener rolls are designed to straighten the rod to allow it to pass through the inching wedge grip blocks without binding. They are standard equipment on No. 4 Wire Drawers and larger.

SOUND ENCLOSURE:

Ajax-Hogue Wire Drawers that are attached to Headers with sound enclosures can be similarly equipped so that the combined machines will attain the desired Db "A" rating.

OPTIONAL LUBRICATION SYSTEM:

A Trabon or similar progressive type lubrication system can be supplied in place of the standard oil-injector type system.

LIGHTING INSIDE GUARD:

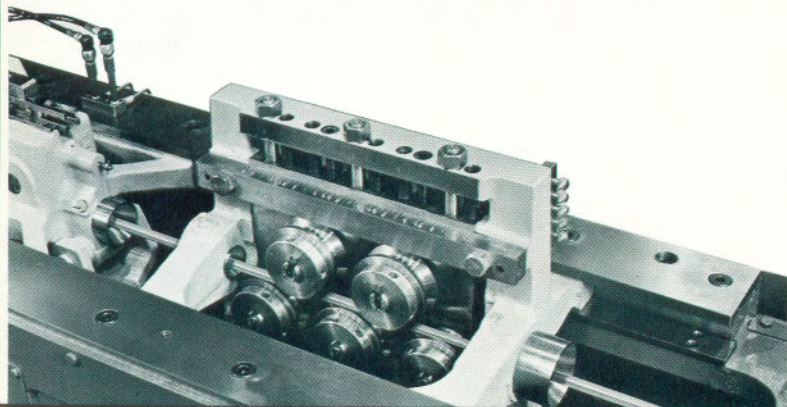
A light can be added inside the top safety guard as an aid when starting a new coil.

TOOLING:

Additional tooling can be ordered to supplement the set that comes with the drawer. It is advisable to tool the drawer with the largest size that you intend to run to minimize the amount of extra tooling that will have to be purchased.

DRAW DIES:

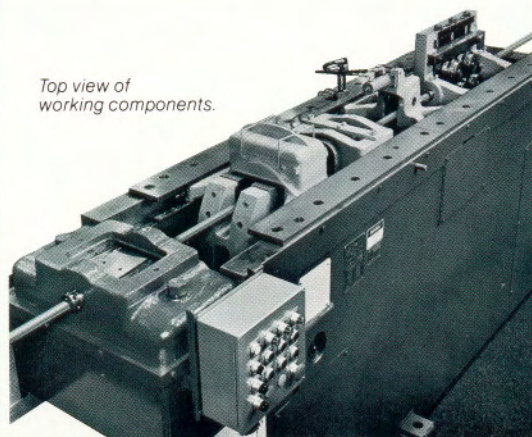
Tungsten carbide drawing dies do not come with the standard set of tools but can be purchased from Ajax or directly from several manufacturers.



Ajax HOGUE

WIRE DRAWERS

Advantages in Use



Top view of
working components.



Adjustable
eccentric for
drawing arm stroke.

1/ Wire Enters Header Straight

Wire drawn through the Ajax-Hogue Wire Drawer is not coiled after drawing; it enters the header straight, without requiring an intermediate roll straightener.

2/ No Additional Labor or Handling

Coiled rod is brought directly to the heading department, and started through the Ajax-Hogue Wire Drawer and into the header almost as easily as wire is started directly into the header – hence no additional labor is required. Also, storage of cold-drawn material is eliminated.

3/ Reduces Cost of Material

The Ajax-Hogue Wire Drawer makes it possible to produce highest quality cold headed products from hot-rolled rod instead of cold-drawn wire – saving the differential in price between the two materials. In many cases this difference alone is enough to justify purchasing an Ajax-Hogue Wire Drawer.

4/ Uniformly Accurate Size on Successive Coils

Since successive coils are drawn through the same die, there is no variation in diameter from coil to coil as with commercial wire. The drawing dies of tungsten carbide remain true to size for many tons of products.

5/ In-House Control of Wire Size

Because you are drawing at the header, the wire size can be varied slightly by changing or altering the drawing die and you are not stuck with huge quantities of pre-drawn material.

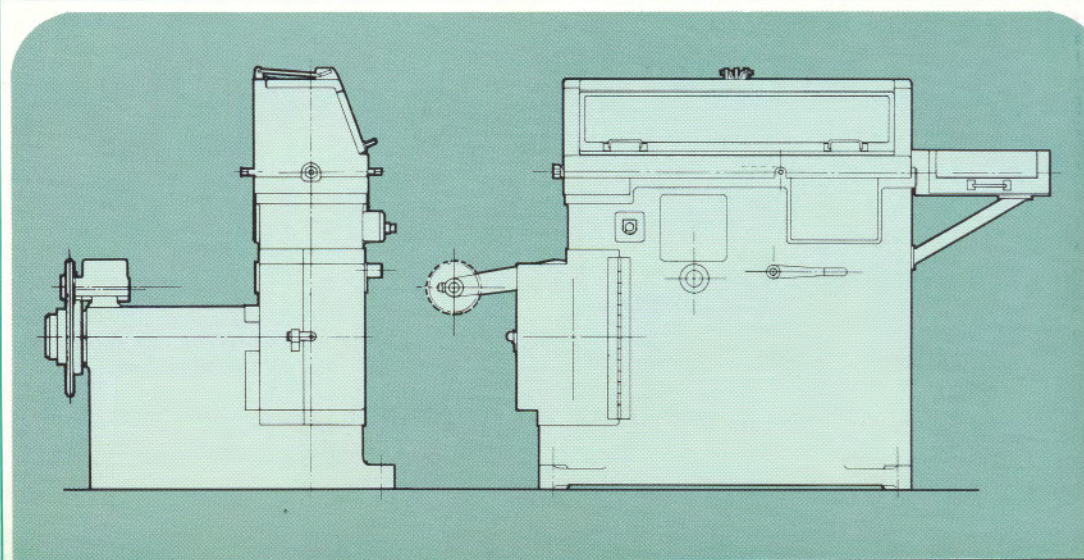
6/ Perfect, Clean Coating

As wire drawn by the Ajax-Hogue machine enters the header immediately after drawing, it is warm, clean and perfectly coated with no chance to pick up scratches or scuffs from foreign matter, or to deteriorate in transit or in storage. Furthermore, by varying the lubricating compound, the coating can be adjusted to suit the job.

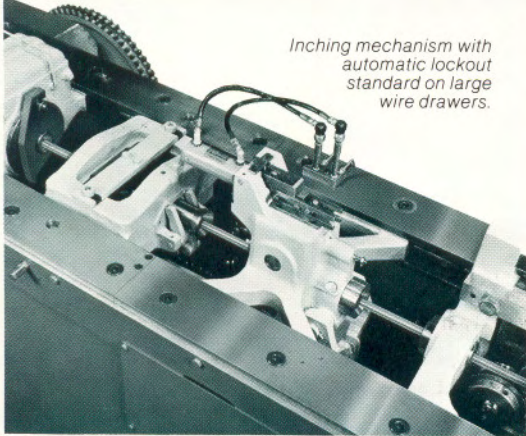
Capacities

Wire Drawer Sizes	Usual Alloy Bolt Steels	Low Carbon Steel— Normal Drafting	Standard Die Slide Bore for Drawing Die
No. 0	1/4"	9/32"	2" dia.
No. 1	3/8"	7/16"	2" dia.
No. 2	1/2"	9/16"	3" dia.
No. 3	5/8"	11/16"	3" dia.
No. 4	3/4"	13/16"	4" dia.
No. 5	1"	1 1/16"	4" dia.
No. 6	1 1/4"	1 5/16"	6" dia.
No. 7	1 1/2"	1 9/16"	6" dia.
No. 8	2"	2 1/8"	7" dia.

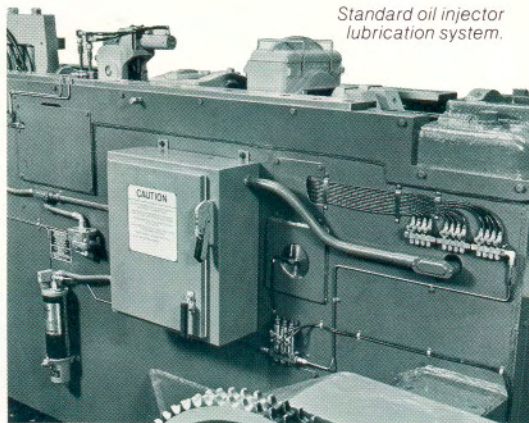
No. 2 Ajax-Hogue Wire Drawer



Inching mechanism with automatic lockout standard on large wire drawers.



Standard oil injector lubrication system.



7/ Heads Easier

Heading immediately after cold-drawing, while the wire has its lowest yield point, results in much easier heading and lower pressures in the heading dies. There is also less tendency for split or cracked heads.

8/ Increases Die Life

The easier heading, the clean coating and the uniformity in size and straightness of Hogue-drawn wire, all contribute to greatly increase the life of heading dies – amounting to as much as 3 times the life or more on some difficult, close-tolerance products.

9/ No Additional Power Required

The Ajax-Hogue Wire Drawer normally operates through a sprocket and chain from the header. It does not increase header motor peak demand, and requires only a little more power than necessary for operating the header. Usually the existing header motor is sufficient.

10/ Improves Product Quality

The foregoing factors all combine to produce sharply filled out heads and corners. This feature is particularly desirable in the cold heading of hex nuts and parts former products. Ajax-Hogue Wire Drawers substantially improve the quality of all cold-headed products.

11/ Synchronized Operation

The Ajax-Hogue Wire Drawer is mechanically driven by the header and operates as part of it. After initial timing at installation, no further adjustment is necessary.

IN SHORT, AJAX GIVES YOU...

Clean, straight, accurate blanks, reduced material costs, less handling and reduced inventory.

Plus increased die life and over-all improved product quality.

TENSILE STRENGTH TESTS*

"One of the most puzzling things in this problem is presented by the phenomenon known as 'age-hardening.' Most people know that if a freshly drawn wire tests low in tensile, it can be held over for a few days or weeks and then will test higher. This aging goes on in all cold drawn materials. I have before me records of tests made by Dr. Brown of Glasgow University. A typical record is that made by a soft basic steel drawn 42% on one draft. The tensile tests run as follows:

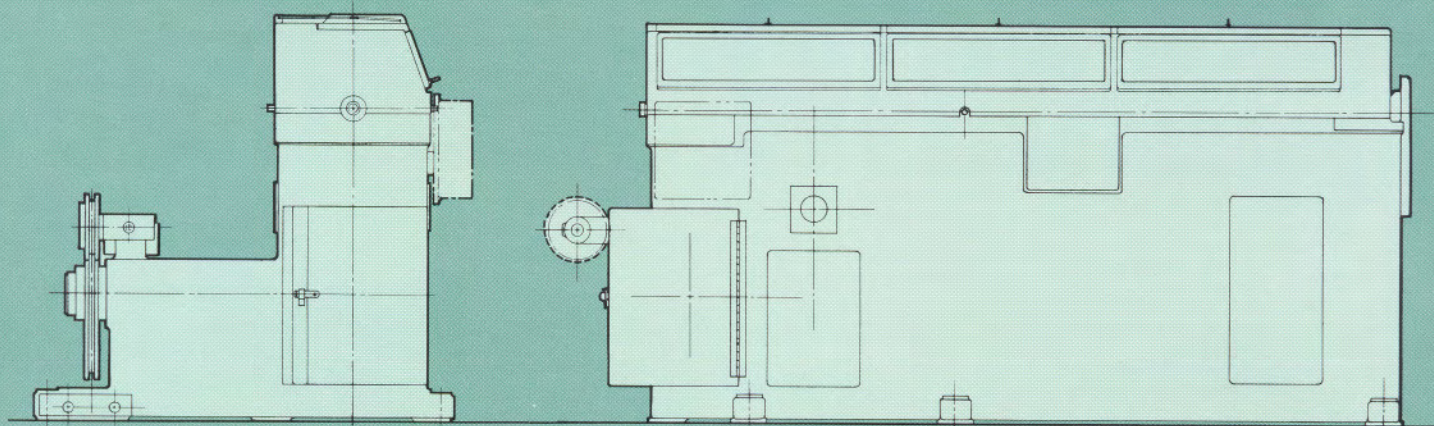
	Lbs. per sq. inch
1 hour after drawing	84,500
1 day after drawing	87,000
7 days after drawing	92,000
26 days after drawing	92,200
188 days after drawing	96,000

Summary of Test	
In first 24 hours	wire gained 2,500
In next 7 days	wire gained 5,000
In last 162 days	wire gained 3,800
TOTAL GAIN 11,300	

It is definitely established that wire has a considerably lower yield point immediately after drawing. Actual experience in cold-heading Hogue-drawn wire only a few seconds after drawing, indicates that it heads more easily and the metal flows more freely, filling out the impressions better and resulting in considerably longer die life.

* Extract from article by Kenneth B. Lewis appearing in an issue of "Wire and Wire Products."

No. 5 Ajax-Hogue Wire Drawer



Useful Information and Trouble Shooting

HOT-ROLLED ROD SPECIFICATIONS

All rod should be pickled and limed, or phoscoated. Phoscoated rod should have little or no lube on it. Mechanically descaled rod can be used, but without a coating it must be drawn in oil. A medium weight of lime is generally most satisfactory. Limed rod must be kept dry because damp lime tends to pack in the throat of the drawing die and exclude the drawing compound.

HEAT TREATMENT OF ROD

Mild carbon steel rod (.20 per cent carbon or less) does not require normalizing. Higher carbon steel rod should be normalized before drawing. Spheroidizing or annealing of alloy steel rod is necessary only when required by the analysis or type of work produced.

ROD TOLERANCE AND SIZE

Mill tolerance on hot-rolled rod is $\pm \frac{1}{64}$ " for diameter, and .025" for out of round. Hot-rolled "bars in coils" may be purchased in $\frac{1}{8}$ " diameter and larger, and should carry a mill tolerance of $\pm .007$ " on diameter. Minimum size hot-rolled rod obtainable commercially is $\frac{1}{32}$ " and is available in diameters varying in increments of $\frac{1}{64}$ ", so that the minimum diameter of wire that is normally drawn from rod in one pass on the Ajax-Hogue Wire Drawer is .180 diameter.

In cold drawing wire for bolt fabrication, the amount of reduction in general practice should only be enough to assure a

uniformly round, accurately sized, clean wire, with a good coating. This reduction generally runs from .015" to .045". Rod size is usually .030" larger than the wire size to the nearest $\frac{1}{64}$ ".

Coils of hot rolled material are available in diameters up to 1 $\frac{1}{2}$ ". Check with your supplier.

SWAGING OR POINTING COIL ENDS

Rod $\frac{1}{8}$ " and larger generally does not require swaging in order to be started into the Ajax-Hogue Wire Drawer. To start a new coil of rod under $\frac{1}{8}$ " in our No. 1 Drawer and larger with inching, the end must be swaged or pointed to the wire diameter plus .010" for a length of 14" to 18". For the No. 0 Drawer or larger Drawer without inching, each coil of rod must be swaged below the wire size in order to start it through the drawing die, or the rod ends can be welded together for continuous drawing.

WEIGHT OF ROD COILS

To reduce the frequency of starting new coils, rod is generally ordered in coils with weight over 600#. Present mill practice can produce coils over 4000#.

MEASUREMENTS REQUIRED

As Ajax-Hogue Wire Drawers are custom built to suit the cold-heading machines to which they are to be attached, it is necessary for us to have certain specific dimensions before proceeding with the execution of an order.

FOUNDATION

The Ajax-Hogue Wire Drawer although connected by chain or link, is independent from the header and should, wherever possible, be mounted on a substantial concrete foundation with hold-down bolts of recommended diameter, grouted securely in the foundation. Leaded-in bolts are not satisfactory, and lag screws, expansion bolts, etc., will not hold the Drawer down firmly. If installed on anything other than the ground floor, the Drawer should be rigidly secured to the main floor beams. If it is necessary to mount the header on vibrator pads, a rigid sub-base for both header and Drawer must be provided and the complete unit mounted on pads. Rigid alignment of header and Drawer is required for chain drive and timing considerations.

DRAWING DIE LUBRICANTS

A sample bucket of Murphy's X32 Compound is shipped with each Ajax-Hogue Wire Drawer. We have found, after considerable trial and experimentation, that Murphy's gives the best results in most cases. Drawing compounds usually consist of a mixture of aluminum stearate or calcium stearate and slaked lime, or aluminum palmitate, slaked lime and calcium carbonate – and are available from many lubricant companies. Additions of other lubricants may be made in special cases. Powdered amber soap or molydisulphide are sometimes used.

Tensile Tests on $\frac{3}{8}$ " – 24 x 1 $\frac{5}{8}$ " SAE Cap Screws

Rod diameter in inches – Nominal	25/64	13/32	7/16
Actual	.388	.409	.435
Drawn Size – inches	.364	.364	.364
Draft in inches	.024	.045	.071
Percent reduction in area	12%	20.9%	30%
Tensile of Rod – lbs. per sq. inch	76,000	73,900	76,600
24 hours after working			
Tensile of drawn wire p.s.i.	91,500	98,000	107,800
Tensile of finished screws p.s.i.	107,900	111,400	117,900
48 hours after working			
Tensile of drawn wire p.s.i.	92,000	98,700	109,300
Tensile of finished screws p.s.i.	109,500	112,500	120,300
240 hours after working			
Tensile of drawn wire p.s.i.	97,900	104,600	111,500
Tensile of finished screws p.s.i.	116,100	118,400	125,100

☐ Material – .14-.20 Carbon Hot Rolled, Unnormalized, Pickled and Limed Rod drawn on Ajax-Hogue Wire Drawer

☐ All physical and chemical determinations performed by The Frank Crobaugh Co., Division of Herron Testing Labs, Inc., Cleveland, Ohio.