June 13, 1961 F. J. KENT ET AL 2,988,211

MANDREL LUBRICATING DEVICE

Filed May 26, 1958 2 Sheets-Sheet 1

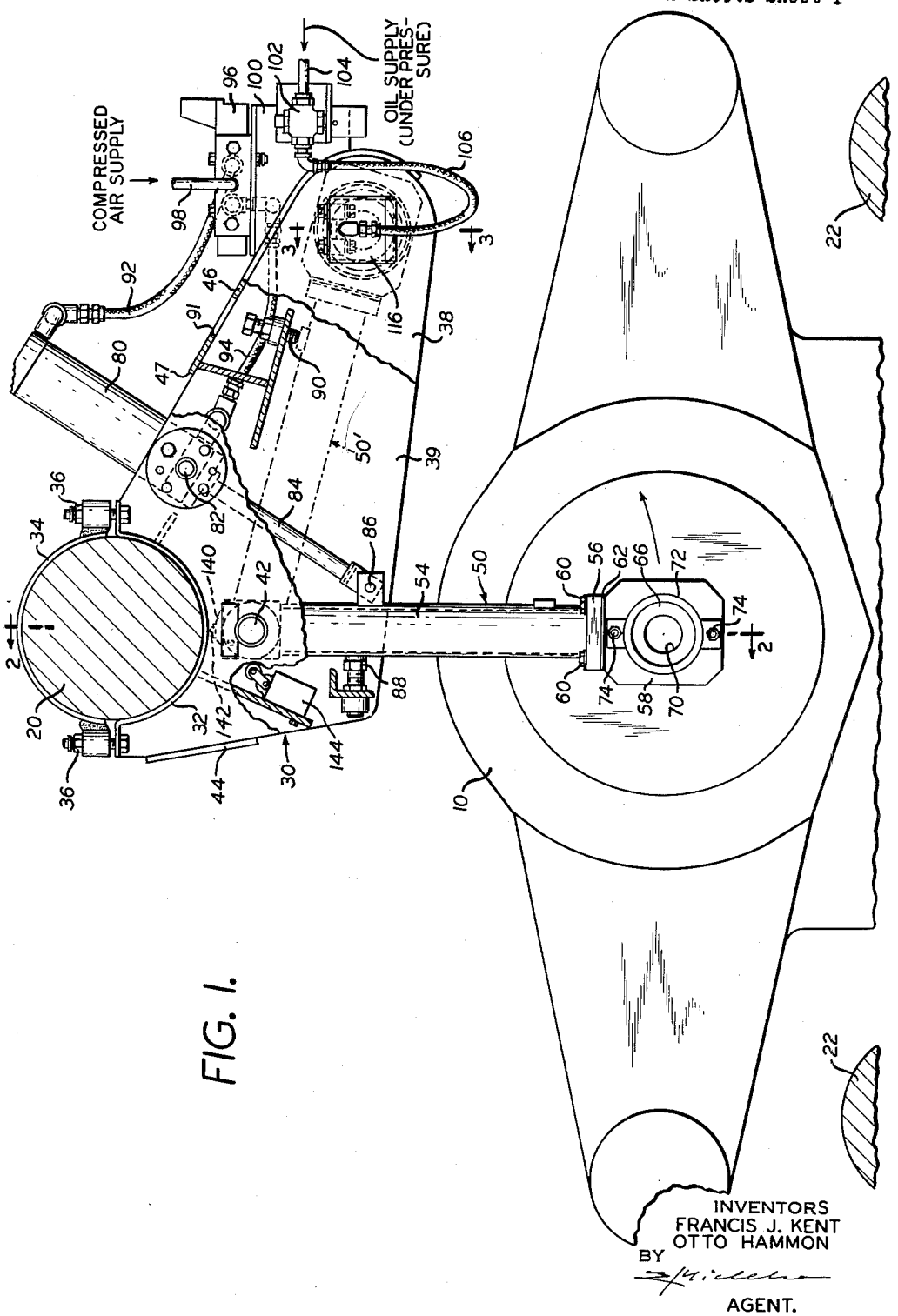


FIG. 1.

INVENTORS
FRANCIS J. KENT
OTTO HAMMON
BY
AGENT.

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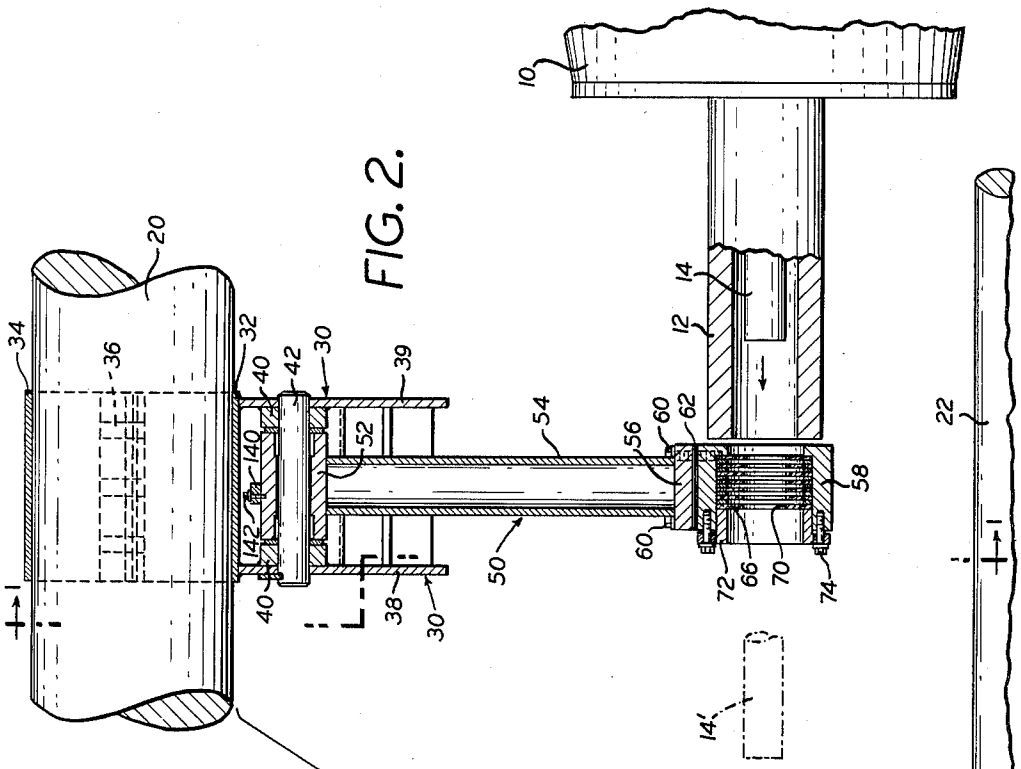


FIG. 2.

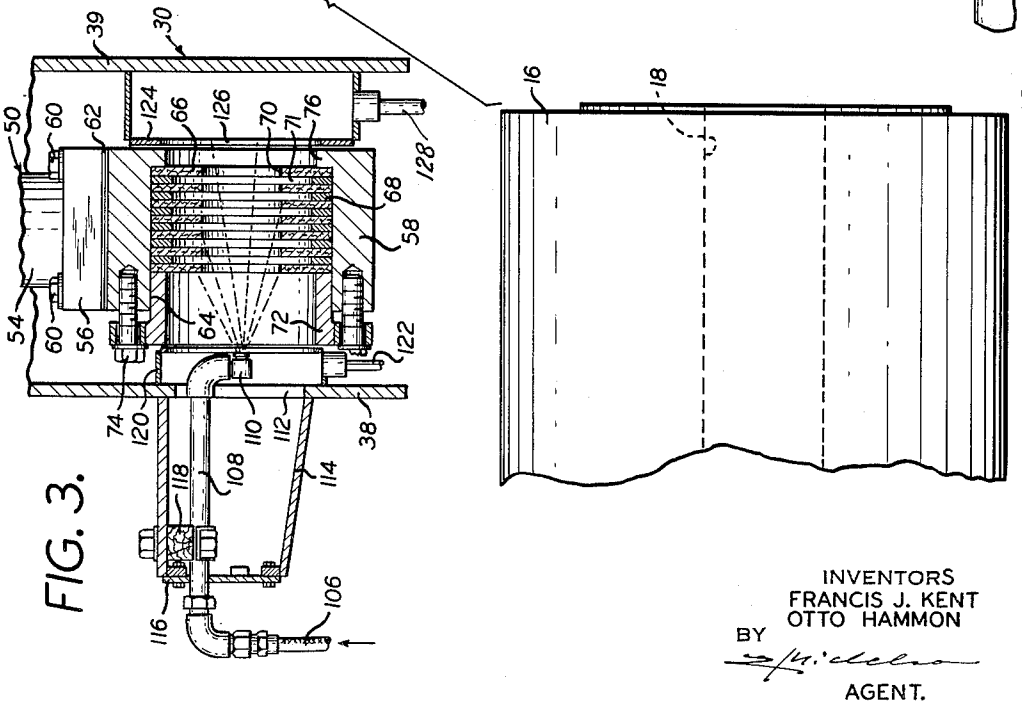


FIG. 3.

INVENTORS
FRANCIS J. KENT
OTTO HAMMON
BY
AGENT.

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MANDREL LUBRICATING DEVICE

Francis J. Kent, Forest Hills, N.Y., and Otto Hammon, Scotch Plains, N.J., assignors to Baldwin-Lima-Hamilton Corporation, a corporation of Pennsylvania

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4 Claims. (Cl. 207—1)

This invention relates to a mandrel lubricating device for a metal working machine or press, and more particularly to a device for lubricating a reciprocable mandrel for the hot extrusion of metal tubes.

When extruding tubes over a mandrel, a hollow billet may be used and the mandrel advanced into the opening of the billet until it extends into the extrusion die to form an annular opening therewith for extrusion of the tube. Alternatively, the starting material may be a solid billet, and the mandrel may be advanced to pierce the billet and then positioned to cooperate with the die whereupon the extrusion takes place so that piercing and extrusion are performed in a continuous operation. In either case, it is necessary to lubricate the mandrel to avoid excessive wear, in particular when handling metals such as brass, copper, and the like which are extruded at relatively high temperatures. Likewise, it is necessary to lubricate the mandrel of presses which are not equipped for extrusion but serve only for piercing. In conventional presses, the lubrication of mandrels has been effected manually by means of a brush or the like, due to the lack of a satisfactory lubricating mechanism. However, such manual handling does not ensure uniform lubrication and frequently causes delays.

It is the principal object of this invention to provide a device which will result in thorough lubrication of a mandrel of a metal press over the entire working area of the mandrel.

It is also an object of the invention to provide a device which will permit thorough lubrication of a mandrel of a metal working press within a short time.

It is another object of the invention to provide a mandrel lubricating device which is of relatively simple design and can easily be mounted on a metal press such as a metal tube extrusion press.

Various other objects, features and advantages of the invention will become apparent as the description proceeds.

In the drawings which illustrate an embodiment of the invention by way of example,

FIG. 1 is an elevational view of a lubricating device according to the invention, partly in section and taken generally in the direction of the arrows 1—1 of FIG. 2;

FIG. 2 is a sectional view taken along line 2—2 of FIG. 1; and

FIG. 3 is an enlarged sectional view taken along line 3—3 of FIG. 1, but showing the lubricating device in full lines in its rest position.

Referring to the drawings, the invention is illustrated as applied to a conventional horizontal metal tube extrusion press having a movable crosshead 10, a hollow extrusion stem or plunger 12 attached to the crosshead 10, and a mandrel 14 movable within the hollow stem 12. The crosshead 10 and stem 12, as well as the mandrel 14, are reciprocable towards and away from a container 16 which has a bore 18 for receiving preheated metal to be extruded. An upper tie rod 20 and two lower tie rods 22 connect the container end of the press to the opposite end in a well known manner.

According to the invention, a mandrel lubricating device is provided comprising a stationary support in the form of a housing or frame generally indicated at 30 which includes a lower clamp portion 32 and an upper clamp portion 34 for attachment to the upper

tie rod 20, the clamp portions being connected by bolts and nuts at 36. The housing 30, which to some extent may be of welded construction, has side walls 38, 39 extending downwardly from clamp portion 32 and is provided with internal bearing blocks 40 to accommodate a pivot 42. The side walls 38, 39 are connected by strips 44, 46, the housing being open laterally where the strips terminate as indicated at 47, for example.

Mounted on the pivot 42 is a holder or arm generally indicated at 50 which is arranged for swinging movement transversely of the press and comprises a head 52 cooperating with the pivot 42, a tubular portion 54 secured by welding or otherwise to head 52 at one of its ends and to a closure member 56 at its other end, a casing 58 fastened by screws 60 to member 56, and shims 62 positioned between member 56 and casing 58 for adjustability. The casing 58 has a horizontally extending bore 64 (FIG. 3) accommodating a plurality of disks or washers 66 which are mounted adjacent to each other, but spacer rings 68 may be provided therebetween at a predetermined distance from aligned central openings 70 of the disks so that cavities 71 are formed. The disks 66 consist of a material adapted to carry or absorb a lubricant. Fibrous material of the felt type may be used in certain cases while asbestos may be selected for operation at highest temperatures. A gland 72 is secured to the casing 58 by means of screws 74 and serves to hold the assembly of disks 66 and spacer rings 68 tightly against a shoulder 76 of casing 58.

A cylinder and piston unit 80 is pivotally mounted on housing 30 at 82 intermediate the side walls 38, 39 and extends upwardly through opening 47 of the housing. Piston rod 84 of unit 80 is pivotally attached to the swingable holder or arm 50 at 86 to move the holder between its initial replenishing or rest position indicated in chain lines at 50' in FIG. 1 and in full lines in FIG. 3, and an operative position shown in full lines in FIGS. 1 and 2. Adjustable stops 88, 90 on housing 30 determine the two positions of holder 50. Stop 88 is accessible for adjustment through the open side of housing 30 below strip 44, and stop 90 may be adjusted through an opening 91 in strip 46. The unit 80 is preferably operated by pneumatic pressure and connected by flexible hoses 92, 94 to a conventional four-way valve 96 which in turn is connected at 98 to a source of compressed air and has an exhaust port (not shown). A bracket 100 on housing 30 serves to support valve 96.

Bracket 100 further carries a conventional, solenoid operated two-way valve 102 which is connected through tube 104 to a source of lubricant such as oil under pressure, and through flexible hose 106 and tube 108 (FIG. 3) to a spraying nozzle 110. An opening 112 in side wall 38 is enclosed by a cover 114 having a removable cap 116 thereon. Tube 108 which passes through cap 116 is fastened to cover 114 at 118 and extends into the opening 112, the spraying nozzle 110 being carried by tube 108. To prevent loss of lubricant in the area close to the nozzle, the latter is surrounded by a cylindrical shield 120 which is attached to side wall 38 and has a pipe 122 connected to its bottom portion for return of fluid collected within shield 38 to the lubricating system.

Attached to side wall 39 is a receptacle 124 having a lateral opening 126 therein, a pipe 128 being connected to the bottom portion of the receptacle. It will be clear from the drawing that the nozzle 110, the central openings 70 in disks 66, and the lateral opening 126 of receptacle 124 are aligned with each other when arm 50 is in its rest position.

The device described operates in the following manner. In the initial replenishing or rest position shown in chain lines at 50' in FIG. 1 and in full lines in FIG. 3, a cam 140 which is secured to arm 50 at 142 actuates a limit

switch 144 associated with and attached to housing 30. Switch 144 causes the solenoid operated valve 102 to open so that lubricant is discharged from nozzle 110. Thus, a spray of lubricant is directed against the series of disks 66 and into the central openings 70 thereof, as well as into the cavities 71, so that lubricant particles will adhere to the assembly of disks, while excess lubricant will be received in receptacle 124 and returned to the lubricating system through pipe 128. As indicated previously, fluid dropping down from nozzle 110 or otherwise lost at the nozzle will be returned to the system through pipe 122. Valve 102 will be closed by means such as a conventional timer to stop the discharge of fluid from nozzle 110 at a selected time.

While arm 50 is at the replenishing station, mandrel 14 and stem 12 are advanced into the container 16 to perform the extrusion operation in the case of a hollow billet, or the combined piercing and extrusion operation in the case of a solid billet, and are then withdrawn. When stem 12 and mandrel 14 are again in their initial positions shown in full lines in FIG. 2, valve 96 is adjusted so that the flexible hoses 92 and 94 are connected to the source of compressed air and to exhaust, respectively, which will cause unit 80 to swing holder 50 downwardly to its operative position. If stop 88 has been adjusted properly, the axis of the disks 66 will coincide with the axis of mandrel 14. The crosshead 10 and stem 12 remain in their withdrawn positions, but the mandrel 14 will now be caused to perform a lubricating stroke, that is, to advance through the central openings of disks 66 as indicated in chain lines at 14' in FIG. 2, and to return to its initial position. Thereby, the entire working surface of the mandrel is thoroughly and evenly lubricated through contact with the assembly of disks previously coated with lubricant at the replenishing station, the disk assembly acting as a swab means. Valve 96 is then reversed to connect hose 94 to the source of compressed air while connecting hose 92 to exhaust. This will cause unit 80 to swing arm 50 upwards and the path of the mandrel is thus cleared for the next working cycle of the press. When holder 50 arrives at the replenishing station, limit switch 144 is actuated to spray the disks 66 with lubricant again.

While a preferred embodiment of the invention has been descriebd, it will be understood that various modifications and changes may be made without departing from the scope of the invention as defined in the appended claims.

Having described our invention, what we claim and desire to secure by Letters Patent is:

1. A lubricating device for a metal working machine having a mandrel reciprocable to perform lubricating and working strokes, comprising a holder mounted on said machine for movement between an operative position in the path of travel of said mandrel and a rest position remote from said path, a plurality of concentric perforated disks secured to said holder adjacent to each other, the openings of said perforated disks being aligned to receive said mandrel therein, spray means mounted on said machine remote from said path for applying a lubricant to said disks when said holder is in its rest position, and power operated actuating means for moving said holder and disks to said operative position prior to a lubricating stroke of the mandrel and for returning said holder and disks to said rest position after lubrication of the mandrel to clear said path of the mandrel for the next working stroke thereof.

2. A lubricating device for a metal working machine having a mandrel reciprocable to perform lubricating and working strokes along a predetermined path, comprising means secured to said machine and spaced from said path of the mandrel for spraying a lubricant in a direction substantially parallel to said path, a receptacle spaced from said spraying means and having an opening disposed in the spraying direction for receiving excess lubricant, a holder movably mounted on said machine, lubricant receiving material secured to said holder and having an opening to accommodate said mandrel, said holder and material having an initial position between said spraying means and said receptacle for applying lubricant to said material and an operative position in said path of the mandrel for lubricating said mandrel, and power-operated actuating means for moving said holder and material from said initial position to said operative position prior to a lubricating stroke of the mandrel and for returning said holder and material to said initial position after lubrication of the mandrel.

3. A lubricating device for a reciprocable mandrel of a horizontal metal working machine, comprising a support secured to said machine remote from the path of travel of said mandrel, an arm pivotally mounted at one of its ends on said support for movement transversely of the machine, said arm having a substantially horizontally extending opening therethrough at its other end, a plurality of disks mounted in said opening of the arm and having aligned central openings to accommodate said mandrel therein, spacers between the disks at a predetermined distance from the central openings thereof to form cavities between said disks, a lubricant spraying member secured to said support, power-operated actuating means for moving said arm between a rest position adjacent said spraying member and an operative position in said path of travel of the mandrel, and means for causing said spraying member to apply lubricant to said disks and deposit lubricant particles in said cavities when said arm is in its rest position.

4. A lubricating device for a reciprocable mandrel of a metal working machine, comprising a support secured to said machine remote from the path of travel of said mandrel, an arm pivotally mounted at one of its ends on said support for movement transversely of the machine, lubricant carrying material secured to the other end of said arm and having an opening therethrough to receive said mandrel, a lubricant spraying member associated with said support, power-operated actuating means for moving said pivoted arm between a rest position adjacent said spraying member and an operative position in said path of travel of the mandrel, and means actuated by said arm upon its arrival at said rest position for causing said spraying member to apply lubricant to said material.

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