Aug. 25, 1964 J. S. CASE 3,145,832

PRESSURE DIE FOR WIRE DRAWING

Filed May 2, 1961

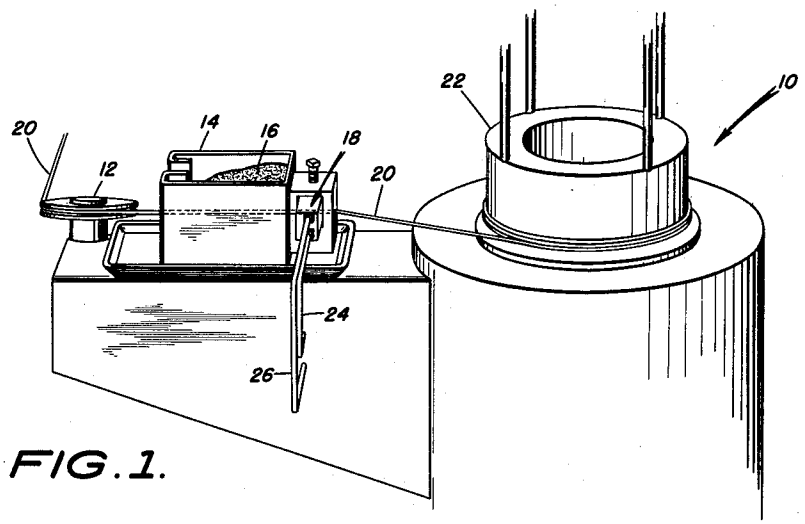


FIG. 1.

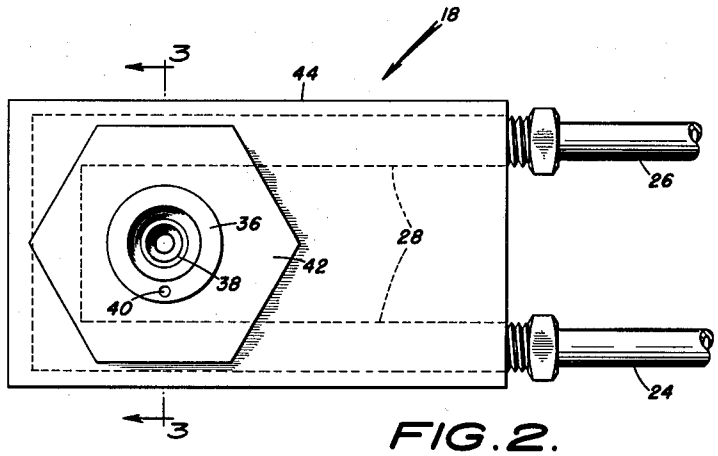


FIG. 2.

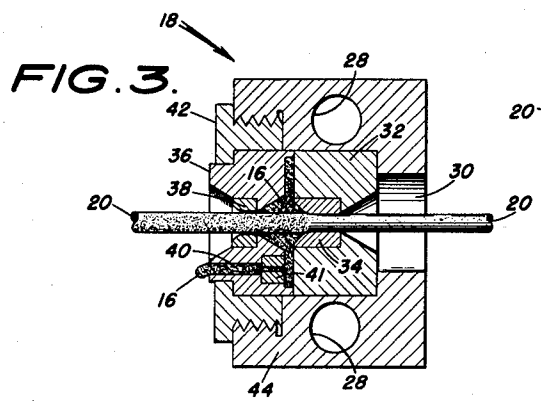


FIG. 3.

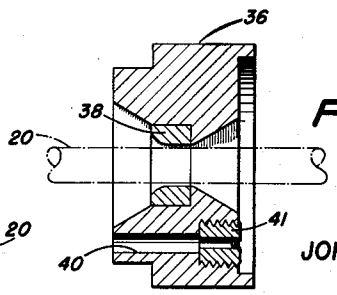


FIG. 4.

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PRESSURE DIE FOR WIRE DRAWING

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The present invention relates to wire drawing dies and more particularly to the lubrication of wire guides and drawing dies.

It is an object of this invention to provide a die assembly having a constant flow of lubricant into the orifice of a wire guide and the concentration of this lubricant under pressure at the entrance of a drawing die.

Another object of this invention is to provide a recirculation of a lubricant through a relief port arranged in a die assembly dimensionally so as to control the pressure of the lubricant presented to a drawing die orifice.

Even another object of this invention is to provide a die assembly for controlling the cooling of a drawing die by the presentation of fresh lubricant to the die orifice as well as a circulation of water through a die holding block.

And another object of this invention is to provide a die assembly for utilizing the feeding of a wire through a drawing die to deliver and maintain the pressure lubrication of the drawing die.

Still a further object of this invention is to provide a helper die preceding a drawing die and to maintain a pressure lubrication chamber therebetween, with means for relief of the pressure lubricant in the chamber.

A further object of this invention is to provide a soap or lubricant reservoir through which a wire must pass adjacent and preceding a water cooled die holder, which reservoir serves to cool the incoming wire as it is coated with a lubricant.

Many other objects and attendant advantages of this invention will become more apparent from the following detailed description and accompanying drawings in which:

FIG. 1 is a perspective view of a wire drawing machine showing the associated parts incorporating features of this invention;

FIG. 2 is a front elevational view of a water cooled die holder;

FIG. 3 is a longitudinal vertical sectional view taken substantially along the line 3—3 of FIG. 2; and

FIG. 4 is an enlarged longitudinal vertical sectional view of a drawing die and a relief port taken on the line 3—3 of FIG. 2.

Referring now to FIG. 1 of the drawing, there is shown a wire **20** which is directed through a pulley **12** for guiding the wire **20** into a lubricant reservoir **14** which is supplied with a lubricant **16**.

The wire **20** is then passed through a water cooled die holder assembly **18** which is supplied with water through a feeder pipe **26** and a discharge pipe **24**. From the die holder assembly **18**, the wire **20** travels to a take-up spool **22** of a wire drawing machine **10**.

Referring now to the details of FIG. 2, the die holder assembly **18** is supplied with water by the feeder pipe **26** and it is discharged therefrom through a discharge pipe **24** which is connected by passage **28**, indicated by dotted lines to the feeder pipe **26**.

A die holder block **44** serves as a seat for a die retainer nut **42**. This die retainer nut **42** serves also to align a helper die holder **36** and a helper die **38** which is positioned in this helper die holder **36**. A pressure relief port bushing **41** and a pressure relief port channel **40** is also positioned in the helper die holder **36**.

The previously mentioned lubricant **16** is indicated as

positioned in the pressure relief port **40** and between the helper die **38** and the drawing die **34** in the wire drawing die body **32** which is seated in a die holder block **44**. A clearance hole or aperture **30** is provided in the body of the die holder block **44** for passage of the wire **20** therethrough after passing through the die **34**. The die holder block **44** also contains the previously mentioned water cooling passage **28**. The wire **20**, shown in FIG. 3, is illustrated in a drawing position.

FIG. 4 shows the wire **20** positioned in the helper die **38** which is located in the helper die holder **36** along with the relief port **40** and relief port bushing **41** which can be threadedly positioned in the die holder **36** by threads thereon. This view is furnished to more clearly show the annular clearance that exists between the wire **20** and the helper die **38**. This clearance is required to permit the moving wire **20** to draw into and through this helper die **38** a constant flow of fresh lubricant, such as calcium stearate or sodium stearate, with suitable additives of various types to improve lubrication and cooling of the wire **20** as it passes through the die holder assembly **18** to be reduced in diameter by the appropriate wire drawing die **34** positioned in the die body **32** of the die holder assembly **18**.

It is to be noted that the aperture in the removably mounted pressure relief port bushing **41** can be varied in diameter as desired by placing a bushing **41** having the appropriate sized aperture in the helper die holder **36**. Depending upon the size of the aperture in the bushing **41**, any desired pressure of lubricant **16** can be built up in the die assembly **18**.

In actual operation, the wire **20** to be reduced in diameter by drawing through the wire drawing die **34** is passed first through the lubricant reservoir **14**, where, due to its rapid forward movement, it pulls the powdered lubricant **16** through the annular clearance between the wire **20** and the helper die **38** into the space between the helper die **38**, the helper die holder **34**, the drawing die body **32**, and the drawing die **34**, where, due to the high pressure that the lubricant is subjected to, it is converted into a plastic lubricant, which is used effectively for lubricating the wire **20** being drawn or reduced in diameter by the wire drawing die **34**. Any excess lubricant **16** is fed back through the aperture in the bushing **41**, and passage **40** back to the lubricant reservoir **14**, where it solidifies and is again passed back through the helper die **38** as previously described.

Although there is shown and described only one preferred embodiment of this invention, it is to be definitely understood that it is not desired to limit the invention thereto, and any change or changes may be made in the structure and arrangement of the several parts, within the spirit of the invention as claimed.

What is claimed is:

1. In a wire drawing apparatus having a helper die and a wire drawing die positioned in axial alignment with said helper die and spaced therefrom to define a pressure chamber for wire drawing lubricant between said dies, a replaceable relief port positioned in said helper die and having its aperture communicating between said pressure chamber and the atmosphere, with the diameter of said aperture being of predetermined size to control the pressure buildup of said wire drawing lubricant in said pressure chamber.

2. In a wire drawing apparatus having a helper die and a wire drawing die positioned in axial alignment with said helper die and spaced therefrom to define a pressure chamber for wire drawing lubricant between said dies, an outlet passage communicating between said pressure chamber and the atmosphere and a relief port removably positioned in said outlet passage, with the aperture of said relief port having a diameter of predetermined size to

control the pressure buildup of said wire drawing lubricant in said pressure chamber.

3. In the wire drawing apparatus as recited in claim 2, wherein said relief port is a bushing having external threads engaging said helper die.

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