

Feb. 7, 1933.

J. R. LONGWELL

1,896,674

WIRE DRAWING APPARATUS

Filed Jan. 31, 1931

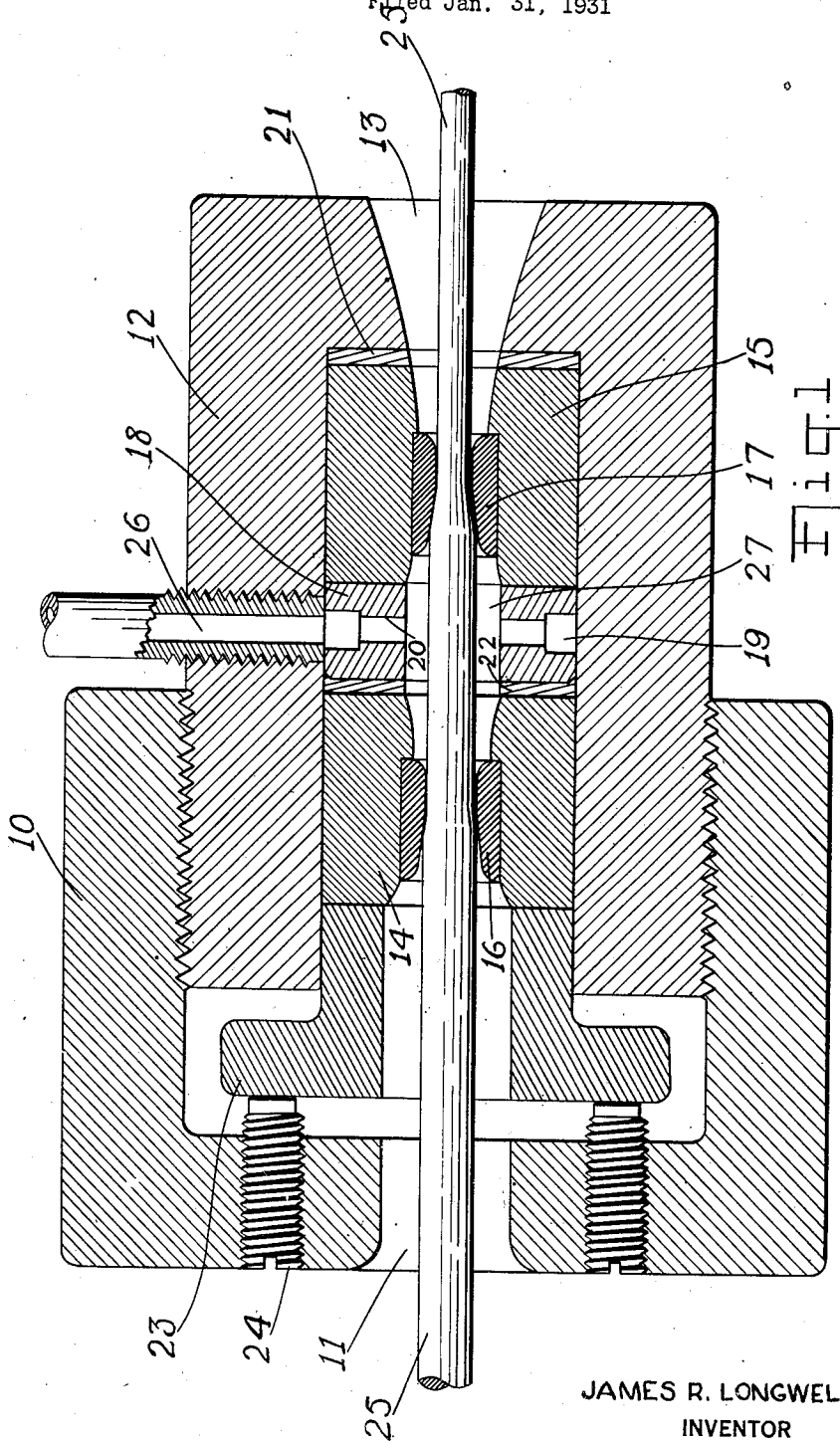


Fig. 1

JAMES R. LONGWELL
INVENTOR

BY
Watson, Bristol, Johnson & Leavenworth.
ATTORNEY

UNITED STATES PATENT OFFICE

JAMES R. LONGWELL, OF CLEVELAND, OHIO, ASSIGNOR TO CARBOLOY COMPANY, INC.,
OF DETROIT, MICHIGAN, A CORPORATION OF NEW YORK

WIRE DRAWING APPARATUS

Application filed January 31, 1931. Serial No. 512,541.

This invention relates to wire drawing apparatus, and more particularly to means for lubricating such a device.

A general object of the invention is to provide a wire drawing apparatus of improved design which is sturdy, rugged, has a long life, and which is adapted to perform its functions in a satisfactory manner, and with a minimum expenditure of effort.

Another object of the invention is to provide a method of drawing wire wherein a lubricant is forced between the drawn wire and the drawing die.

Yet another object of the invention is to provide wire drawing apparatus wherein lubrication between the wire drawn and the drawing die is assured, even when heavy drafts are taken.

To this end, a more particular object is to provide means for forcing lubricant between a die and the material being drawn during the drawing process, under sufficient pressure to urge the lubricant between the die and the work despite the lubricant-expelling pressure developed therebetween.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the several steps and the relation and order of one or more of such steps with respect to each of the others, and the apparatus embodying features of construction, combinations of elements and arrangement of parts which are adapted to effect such steps, all as exemplified in the following detailed disclosure, and the scope of the application of which will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawing, in which:

The figure is a longitudinal sectional view through a wire drawing apparatus embodying the features of the invention.

While for convenience of description the terms "wire" and "wire drawing" are frequently used in this specification and the appended claims, it is to be understood that the

present invention is not confined to the production of wire in any limited sense attributable to that word, but contemplates broadly any drawing process wherein material is passed through a drawing or shaping die, as for example, processes for forming wire, rod, tubes, ornamental beading, and the like. It is therefore intended in the present specification and claims that the expressions "wire" and "wire drawing" shall be generically construed in the manner indicated, wherever the context permits.

Referring more particularly to the drawing, there is shown a preferred embodiment of the invention comprising a fixed die holder cap 10, having in one end wall thereof an orifice 11, and having threaded into the opposite end thereof a die holder body 12 in the form of a cylindrical thimble having an orifice 13 through the end wall thereof. Snugly fitted within the hollow central portion of die holder body 12 are a reducing or sealing die 14 and a drawing die 15, disposed in tandem relation, and having central drawing openings therein defined by nibs 16 and 17 respectively, which may be of any suitable hard, wear-resisting material. Disposed between dies 14 and 15 is a die spacer 18, which is generally ring shaped, and which has around the outer periphery thereof an annular channel 19 from which extend inwardly a plurality of radially disposed bores 20. A centrally perforate gasket 21 is positioned between the drawing die 15 and die holder body 12, and a similar gasket 22 is positioned between the reducing and sealing die 14 and the die spacer.

This assembly is firmly held in position in the die holder body by means of a hollow clamping gland 23 which fits within the hollow central portion of body 12, and seats against one end of die 14. Gland 23 is pressingly engaged by a plurality of threaded bolts 24, which are screwed through the end wall of cap 10. The orifices 11 and 13, the die nib openings, and the hollow central portions of gland 23, spacer 18 and gaskets 21 and 22 are all in registry and provide a continuous passage through which a wire

25 of the material which it is desired to draw may be passed.

A lubricant inlet 26 extends through the die holder body 12 and communications with channel 19.

In operation, while wire 25 is drawn through nibs 16 and 17, lubricant is forced under pressure through inlet 26, whence it flows around channel 19 through the bores 20 and into a space 27 defined by the two dies and the die spacer. Die nib 16 is of relatively light draft, and preferably may be designed to make a relatively small reduction of the diameter of wire 25. A primary function of die nib 16 is to form a seal in order substantially to prevent the expulsion of lubricant out through the inlet opening of chamber 27. Another function of this reducing and sealing die is to reduce any slight irregularities in cross-section or size of the entering wire 25. Die nib 17 may be of comparatively heavy draft, in order to effect a substantial reduction in the size of the wire 25 in a single operation.

With the herein described arrangement of parts, lateral bursting strains which are exerted on dies 14 and 15 and spacer 18 in an outward radial direction are cared for by their snugly confining thimble 12, and to some extent by the die holder cap 10. Lengthwise spreading forces exerted on the two dies are taken up by cap 10, thimble 12, gland 23 and bolts 24, the last two elements being under compression.

It has been found that in practice heretofore followed wherein lubricant has been simply applied to the wire entering the die, the tremendous pressures developed between the wire and the die tend to crush or expel any film of lubricant positioned therebetween. This results in dry metal-to-metal contact with consequent increased friction and heating, and necessitates the expenditure of an undue amount of work to effect a given reduction in the diameter of the wire.

By the present invention the lubricant in chamber 27 is maintained under sufficient pressure to counteract the tendency of the wire and the die to expel the lubricant film therebetween. High lubricant pressures ranging up to 30,000 pounds per square inch are contemplated, the precise pressure utilized being dependent upon the draft of the die, the material drawn, rate of drawing, etc. The lubricant maintained under such heavy pressures is in effect forced outwardly through the nib 17, along with the drawn wire 25, and thus the maintenance of a film of lubricant between the wire and the die is assured even when a heavy draft is taken, in a manner that was not heretofore possible.

It will be seen that by my invention there have been provided a method of and means for properly maintaining a lubricating film

between the wire and the die during the drawing process.

Since certain changes in carrying out the above process and in the constructions set forth, which embody the invention may be made without departing from its scope, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Having described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. Wire drawing apparatus, comprising, in combination, a pair of drawing dies in tandem arrangement, having registered orifices through which material may be drawn, a spacer between said dies having an opening in registry with said orifices, means laterally embracing and alining said dies and said spacer and confining them against outward lateral bursting strains, and means for introducing and maintaining a lubricant in the space defined by said spacer opening and said dies under sufficient pressure substantially to maintain a film of lubricant between said dies and the material drawn there-through during a drawing operation.

2. Apparatus of the class described, comprising, in combination, a pair of perforate drawing dies in tandem arrangement, a spacer located therebetween having an opening in communication with the openings in said dies, a hollow die holder telescoped over said dies and said spacer and confining them against lateral bursting strains, means for clamping said dies and spacer within said holder, so that the space defined by said spacer opening and said die openings constitutes a pressure chamber adapted to be closed by material drawn through said dies, and means for introducing and maintaining a lubricant in said chamber under sufficient pressure to force a film of lubricant between said dies and the material drawn therethrough, during a drawing operation.

3. Apparatus of the class described, comprising, in combination, a pair of perforate drawing dies in tandem arrangement, a spacer located therebetween having a hollow central portion communicating with the openings in said dies and having a peripheral channel and a passage between such channel and its hollow central portion, a hollow die holder telescoped over said dies and spacer, and confining them against lateral bursting strains, means for holding said dies and spacer within said die holder, said die holder being provided with a lubricant conduit in

registry with said channel, whereby lubricant may be forced between said dies and the material drawn therethrough under sufficient pressure to overcome the lubricant expelling pressure developed between the same during a drawing operation.

4. Apparatus of the class described, comprising, in combination, a pair of perforate drawing dies in tandem arrangement, a spacer located therebetween having a hollow central portion communicating with the openings in said dies, a hollow die holder telescoped over said dies and spacer and confining them against lateral bursting strains, an abutment on said die holder for arresting movement of one of said dies in one direction, a fixed die holder cap telescoped over and fixed to said die holder, thrust means maintained under compression between said cap and the other of said dies fixedly to hold said dies and spacer in position, and means for introducing and maintaining a lubricant under pressure in the space defined by said hollow spacer portion and said die openings during a drawing operation.

5. Apparatus of the class described, comprising, in combination, a die holder in the form of a hollow thimble having an orifice through its closed end wall and having external threads adjacent its open end, a pair of perforate drawing dies, a spacer located therebetween having a hollow central portion communicating with the openings in said dies, said dies and spacer being telescoped in the hollow portion of said die holder with the adjacent die arrested from movement in one direction by the end wall thereof, a die holder cap in the form of a hollow thimble having an orifice through its closed end wall and having internal threads adjacent its open end, the threaded portions of said cap and die holder being screwed together, a hollow thrust gland bearing on the die located nearest the open end of said die holder, pressure screws threaded through the end wall of said die holder cap and bearing on said gland, said die holder and said spacer being provided with registering conduits affording a lubricant passage to the space defined by the hollow central spacer portion and said die openings, whereby lubricant may be introduced and maintained in said space, during a drawing operation, under sufficient pressure substantially to maintain a lubricant film between the die openings and material drawn therethrough.

6. Apparatus of the class described, comprising, in combination, a drawing die, a sealing element, said die and element having registered openings through which material may be drawn, a hollow die holder containing said die and element within the hollow thereof to hold them in alinement and confine them against outward lateral bursting strains, and means for introducing a lu-

bricant between the material contacting portions of said sealing element and die and maintaining it under sufficient pressure to ensure presence of a lubricant film, between said die and the material drawn therethrough, during a drawing operation.

In testimony whereof I affix my signature.

JAMES R. LONGWELL.

75

80

85

90

95

100

105

110

115

120

125

130