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PROCESS AND APPARATUS FOR WIRE DRAWING

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Fig. 2.

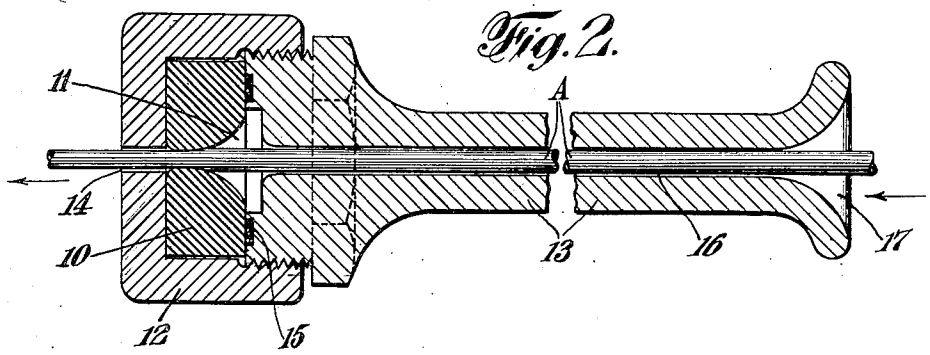
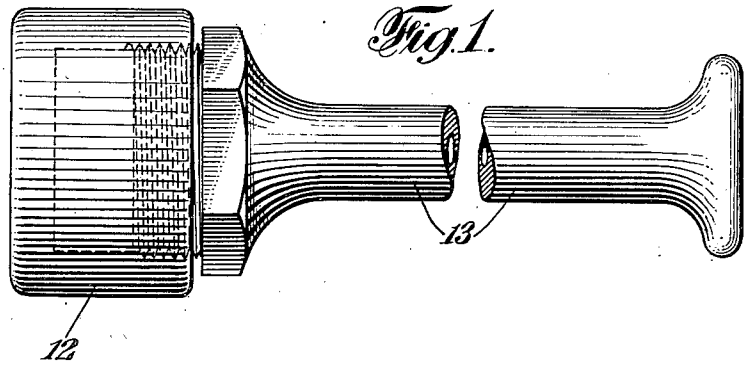


Fig. 1.



INVENTOR
Aaron Simons
BY
Dean Fairbanks Hirsch & Foster
ATTORNEYS

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PROCESS AND APPARATUS FOR WIRE DRAWING

Aaron Simons, New York, N. Y.

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4 Claims. (Cl. 205—29)

This invention relates to the drawing of wire by means of dies; and more particularly to the use of a hardened metal die with an aperture through which the wire is drawn to reduce its diameter.

The main objects of my invention are to permit of an increase in the velocity of travel of the wire; to reduce the amount of power required for drawing the wire, and to increase the length of life of the die.

As an important feature of my invention I provide an oil chamber at the inlet side of the die, and I utilize the movement of the wire itself to said oil chamber for delivering oil to the chamber, and for maintaining such oil under the desired comparatively high pressure.

In carrying out my invention I support the die in a suitable casing or holder which cooperates with the die to form an oil chamber, and which also provides a comparatively long passage through which the wire passes on its way to the die. This passage is made of such internal diameter that it leaves a very slight clearance around the wire through which the oil may pass to the die. The wire is delivered through an oiling device before entering this passage, and the clearance between the wall of the passage and the wire is such that the wire in moving through the passage at high speed carries along a film of oil and builds up oil pressure in the oil chamber. The oil film in the passage, together with this clearance, prevents any material wear of the wall of the passage, so that the die holder may be used for a long period of time, and with a plurality of dies, the latter being employed in succession as they become worn. The oil chamber serves a further function in that it provides a receptacle into which particles of metal may be deposited instead of being forced through the die with the wire.

In the accompanying drawing I have illustrated a device embodying my invention and adapted for use in carrying out my improved process.

In the drawing:

Fig. 1 is a side elevation, a portion being broken away, and

Fig. 2 is a central longitudinal section.

In the apparatus illustrated I provide a die 10 which may be of any suitable character for use in wire drawing, but which is preferably a metal block having a central aperture therethrough of the diameter to which it is desired to draw the die. This metal block may be of hardened steel, or may be of other material appropriate for the purpose. It preferably has a conical chamber 11 at one side for guiding the wire to the portion of the aperture of smallest diameter.

This die is supported in a casing which is illustrated as being formed of two sections 12 and 13. The section 12 is in the form of a cup adapted to receive the die 10, and has an aperture 14 in registry with the aperture of the die. This cup-shaped member 12 is internally threaded at one end to receive the end portion of the other casing member 13. Preferably a gasket 15 is set in the end of the member 13, or engages with said end, so that upon screwing the two sections together a liquid-tight joint is formed between the outer surface of the die and the inner end of the member 13. This member 13 is of tubular form with a passage 16 therethrough in alignment with the aperture of the die, and of slightly greater diameter than that of the wire A which is to be drawn. The inner end of the member 13 preferably has a cavity or recess cooperating with the conical recess in the die so as to somewhat increase the capacity of the oil chamber 11. At its outer end the member 16 may be flared to provide a conical inlet 17 for guiding the wire and preventing it from bending sharply across the edge.

In the use of my improved device the wire A is passed through some suitable form of oiling device which causes a coating or film of oil to be deposited on or retained by the wire. As the wire enters the passage 16 at comparatively high velocity, the oil film will be carried along by the wire and the clearance is not sufficient to permit any return flow of oil. This clearance may be a few thousandths of an inch. The member 13 may be of any desired length, but obviously the greater the clearance between the wire and the wall of the passage, the greater should be the length of the member 13. The result of the high speed travel of the oil coated wire through the passage 16 is to build up an oil pressure in the chamber 11, and to force the oil against the surfaces of the wire and the die at the point where they come together, and to cause a slight amount of oil to travel through the die with the wire, so as to lubricate the die, reduce the friction, and increase the length of life of the die. This lubricating action also permits the wire to be pulled through at high velocity, and with the expenditure of less power. Any particles of metal which may be carried along on the wire may fall to the lower side of the chamber 11, instead of being pulled through the die, and thus a better character of surface on the wire is produced, and with less liability of breaking the wire. As the

aperture of the die becomes worn to a larger diameter, the casing parts may be readily separated, and a new die inserted.

It will be obvious that the casing sections may be mounted in any suitable form of apparatus and that the wire may pass through a series of these apparatus and their corresponding dies in succession. The wire may be reoiled between each successive apparatus, if desired.

As the main purpose of the long, substantially parallel, juxtaposed surfaces of the wire and the wall of the passage, is to develop pressure in the oil chamber and prevent outflow of the oil, it is evident that a lining for the passage may be provided if desired. For instance, the passage may be lined with a very thin layer of felt which will rub on the wire and which is not of such thickness as will permit return flow of oil in a direction opposite to that in which the wire is moved.

The smaller the clearance between the surface of the wire and the wall of the cylindrical passage, the shorter need such passage be in order to develop any given pressure. The longer the passage for any given clearance, the greater will be the pressure. In practice, the theoretical minimum clearance cannot ordinarily be obtained due to surface irregularities in the wire and slight variations in the diameter thereof. By providing a clearance which will barely avoid rubbing contact with commercial wire having such irregularities, it has been found in practice that a satisfactory pressure may be built up if the passage is of a length at least three times the diameter of the wire.

Although in the construction illustrated the gasket 15 is between the die member 10 and the guide member 13, such gasket may be mounted at the opposite end of the die member and between said guide member and the end wall of the cup section 12. By mounting the gasket at this end of the die member, the oil may pass into such space as there may be around the periphery of the die member, and thus act to resist the radially outward stress exerted on the die member by the action of the wire in passing through the latter.

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

1. A wire drawing apparatus including a pair of detachable casing sections adapted to receive a wire drawing die therebetween, one of said sections having a long cylindrical passage in alignment with the aperture of the die, and of slightly greater diameter than that of the wire to be drawn.

2. A wire drawing apparatus including a cup shaped casing member adapted to receive a die, and a second casing member adapted to cooperate with the first mentioned member to clamp the die in position and to form an oil chamber with said die, said second mentioned member having a gasket for preventing escape of oil between the member and the die, and having an elongated cylindrical passage leading to said chamber and of slightly greater diameter than the wire to be drawn.

3. The process of wire drawing, which consists in drawing an oil coated wire through a long cylindrical passage of very slightly greater diameter than said wire, and then directly through a die, whereby oil carried into said passage with said wire and prevented from passing through said die is prevented from flowing along said passage counter to said wire and an oil pressure is built up at the entrance to the die.

4. A wire drawing apparatus including a pair of detachable casing sections adapted to receive a wire drawing die therebetween, one of said sections having a long cylindrical passage in alignment with the aperture of the die, and of slightly greater diameter than that of the wire to be drawn, and a flared portion at the outer end of said passage for guiding the wire into said passage.

AARON SIMONS.