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J. T. FERENCI

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METHOD AND MEANS FOR DRAWING WIRES

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Fig. 1.

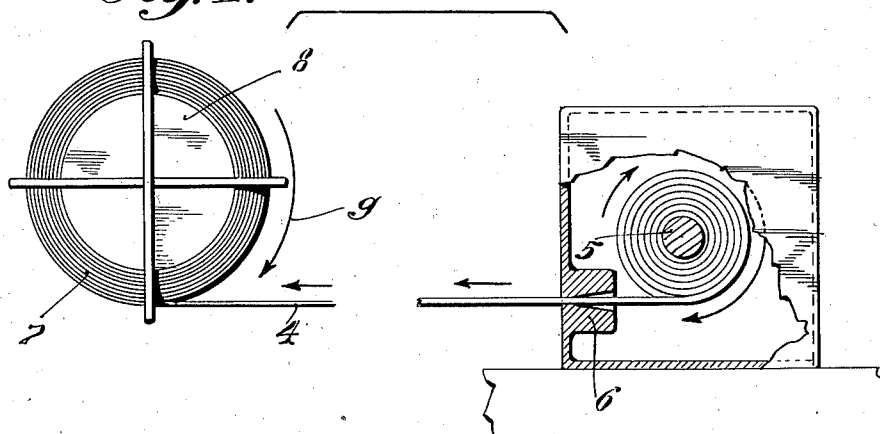


Fig. 3.

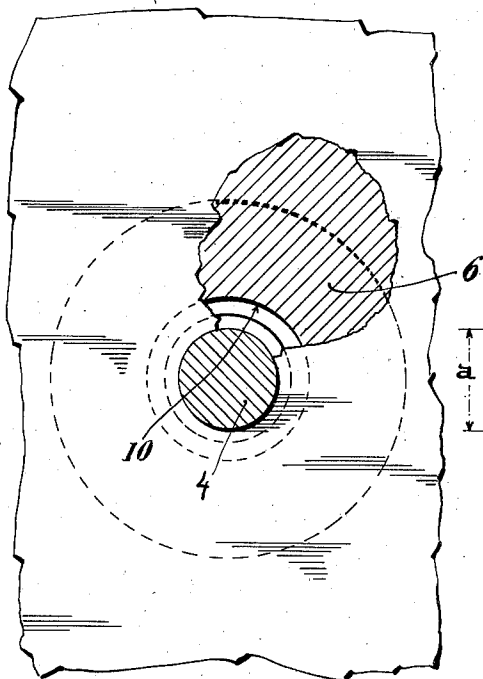
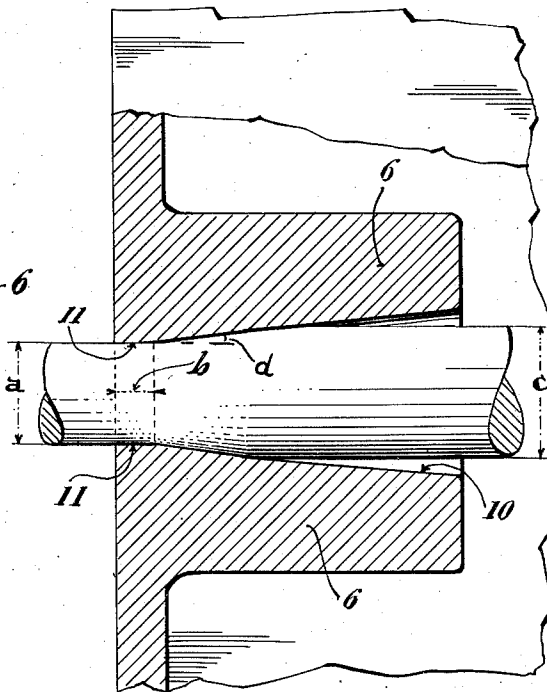


Fig. 2.



INVENTOR.
John T. Ferenci
BY
V. Alexander Scher,
attorney.

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METHOD AND MEANS FOR DRAWING WIRES

John T. Ferenc, Trenton, N. J.

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3 Claims. (Cl. 205-21)

This invention relates to a device for drawing wires and to a method of wire drawing.

Wire is now made into a perfectly shaped body of uniform diameter by being drawn through a drawing device which is situated between two drums. One of these drums pulls the wire and serves as a carrier for the drawn wire, while the other drum carries the original wire. The drawing device situated between the two drums has the form of a die provided with a tapering opening. The walls enclosing this opening engage the wire and shape it as it is being pulled or drawn through the opening.

Obviously the smallest diameter of the tapered opening should be equal to the desired diameter of the wire. Heretofore the amount of the taper, the length of the die and in general, the shape of the opening for the wire were constructed on the basis of prior experience and no attempt was made to vary the shape of the opening depending upon wire conditions. Heretofore a standard 12 degree taper was used for wires ranging in diameter from .005 inch to .092 inch. A 14 degree taper was used for wires having a greater diameter.

The described prior art devices for drawing wire were satisfactory so long as the wire was passed with slow speeds.

At the present time newly constructed machinery makes it necessary or advisable to draw the wire at a rate which is about twenty times as great. Practical experience has shown that the existing dies cannot be used for this high rate of speed. Often the wire which is being drawn becomes over-heated and breaks. In other instances a breakage occurs in the pulling machine, or in the die itself.

The present invention is based on the discovery that wire drawing may be considerably improved if the die used for the drawing is constructed in accordance with a predetermined formula, and if the dies are made different depending upon the size of the wire to be drawn and other characteristics.

Therefore, an object of the present invention is to improve the process of wire drawing and make it possible to draw wires safely and securely at a high rate of speed without the danger that the wire or the drawing mechanism will be damaged.

Another object is the provision of a die which is so constructed that the stress or pressure upon the wire in the course of its formation is equalized and made uniform, thereby facilitating the formation of the wire.

Other objects of the present invention will become apparent in the course of the following specification.

In accomplishing the objects of the present invention, it was found necessary to construct a wire drawing die in such a manner that the angle of its cone and the length of its bearing are determined by the difference between the stock size of the wire and its final drawn size.

The invention will appear more clearly from the following detailed description when taken into connection with the accompanying drawing, showing, by way of example, a preferred embodiment of the inventive idea.

In the drawing:

Figure 1 is a diagram illustrating the drawing of a wire.

Figure 2 is a diagram showing in section a die through which a wire is drawn and which is constructed in accordance with the principles of the present invention.

Figure 3 is a top view of the die shown in Figure 2.

Figure 1 illustrates diagrammatically the drawing of a wire 4'. The wire of stock size is wound upon a rotary drum 5. An outer end of the wire is made thinner than the smallest diameter a of the tapered opening 10, provided in the die 6. Then this outer end of the wire may be inserted through this opening and is attached to a drum 7 which is rotated by a suitable motor 8.

When the motor 8 is actuated the drum 7 will be rotated in the direction of the arrow 9 and will proceed to pull the wire through the die 6. This process is completed when all of the wire 4 is unwound from the drum 5, and is wound upon the drum 7.

In accordance with the present invention, the difference between the stock size and the drawn size of the wire determines the angle of the cone in the die, and the length of the bearing.

If the diameter of the stock size in inches is designated as c and the diameter in inches of the drawn size is designated as a , and if the angle of the cone is designated as d degrees, then the angle of the cone for wires of different sizes should be determined in accordance with the following simple formula:

$$c - a = d^\circ$$

Another important feature of the present invention is the provision of a bearing of uniform diameter equal to the final diameter of the drawn wire. This bearing is obviously located at the exit side of the die, and its width constitutes the

second important factor of the present invention. If the width or length of the bearing is designated as b , then this length in inches should be determined by the following simple formula:

$$c-a=b$$

The following table given solely by way of example gives the angle of the cone and the length of the bearing depending upon predetermined stock and drawn sizes of the wire:

No.	Stock	Drawn size	Angle of cone	Length of bearing
			Degrees	
1.....	0.109	0.092	17	0.017
2.....	.092	.077	15	.015
3.....	.077	.065	12	.012
4.....	.065	.055	10	.010
5.....	.055	.047	8	.008
6.....	.047	.041	6	.006

Practical experience has shown that if the taper depends upon the difference between the stock size and the drawn size in the described manner, the wire would be shaped gradually and slowly without over-heating and without creating a flow of material within the wire which may eventually cause its breakage.

The conical part of the opening commences the shaping of the wire which is finally completed by the cylindrical bearing. This bearing controls the diameter of the drawn wire by holding the outer circumference of the wire after the flow of the material caused by the conical opening. The combined effects of the designated taper and of the bearing of the predetermined length make it possible to increase the speed of movement of the wire to a considerable extent without exposing the wire to the danger of breakage.

Another important advantage of the described construction is that the life of the die is increased to a considerable extent, namely, from about 3,000 lbs. in the past to an average of 10,000 lbs. It is obvious that if the drawing of the wire takes place gradually and without creating any undue strain or high temperature, the die which is usually made of carbon tungsten will have a longer life and will last longer. Furthermore, the die constructed in accordance with the principles of the present invention may be easily polished and repaired.

The combined effect of the taper of the selected size and of the bearing of the selected size is to equalize the pressure and/or stress upon the wire in the course of its formation and thereby diminishing the danger of breakage to a considerable extent.

The described die may be constructed for any size of wire within limits imposed by the materials of which the die and the wire are made.

It is apparent that the invention described above is subject to wide variation and modifications without departing from the scope or intent of the invention. All of these variations and modifications are to be included within the scope of the present invention.

What is claimed is:

1. The method of drawing a wire which comprises pulling a wire of stock size in the direction of its length while gradually increasing pressure upon the wire until the wire reaches the desired drawn size, the value of the angle of the conical portion of the drawing die in degrees being equal numerically to the difference in diameter between the entrance and exit sizes of the stock, and then maintaining uniform pressure upon the wire during a length of its passage which is proportional to the difference between said stock and drawn sizes.

2. The method of drawing a wire which comprises pulling a wire of stock size in the direction of its length while gradually increasing pressure upon the wire until the wire reaches the desired drawn size, the value of the angle of the conical portion of the drawing die in degrees being equal numerically to the difference in diameter between the entrance and exit sizes of the stock, and then maintaining uniform pressure upon the wire during a length of its passage which is also equal to the difference between said stock and drawn sizes.

3. A wire drawing die, comprising a block and an opening formed in said block for the drawing of the wire, said opening comprising a tapered portion and a bearing portion constituting a continuation of said tapered portion, the taper of said tapered portion and the length of said bearing portion being equal to the difference between the stock and drawn sizes of the wire.

JOHN T. FERENCI.