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WIRE DRAWING MACHINE

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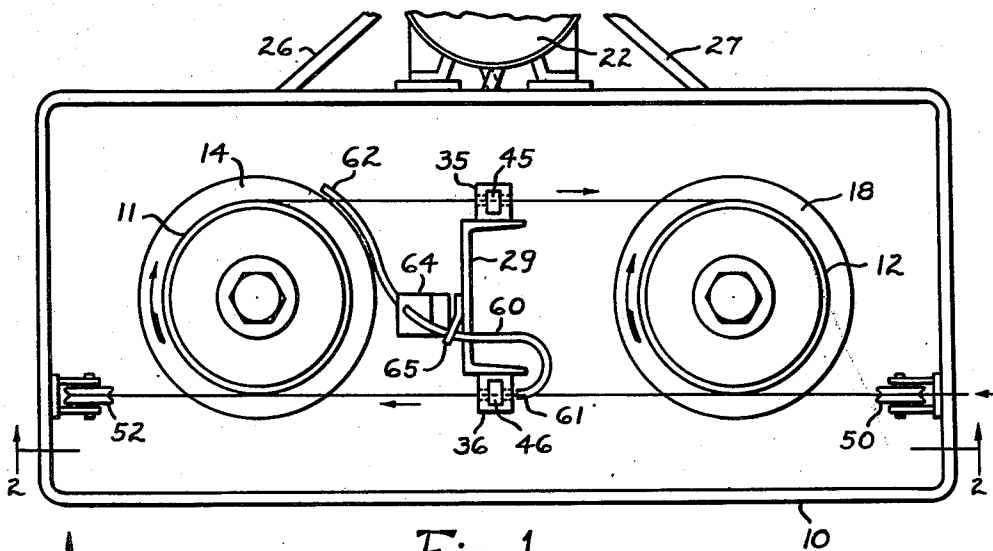


Fig. 1

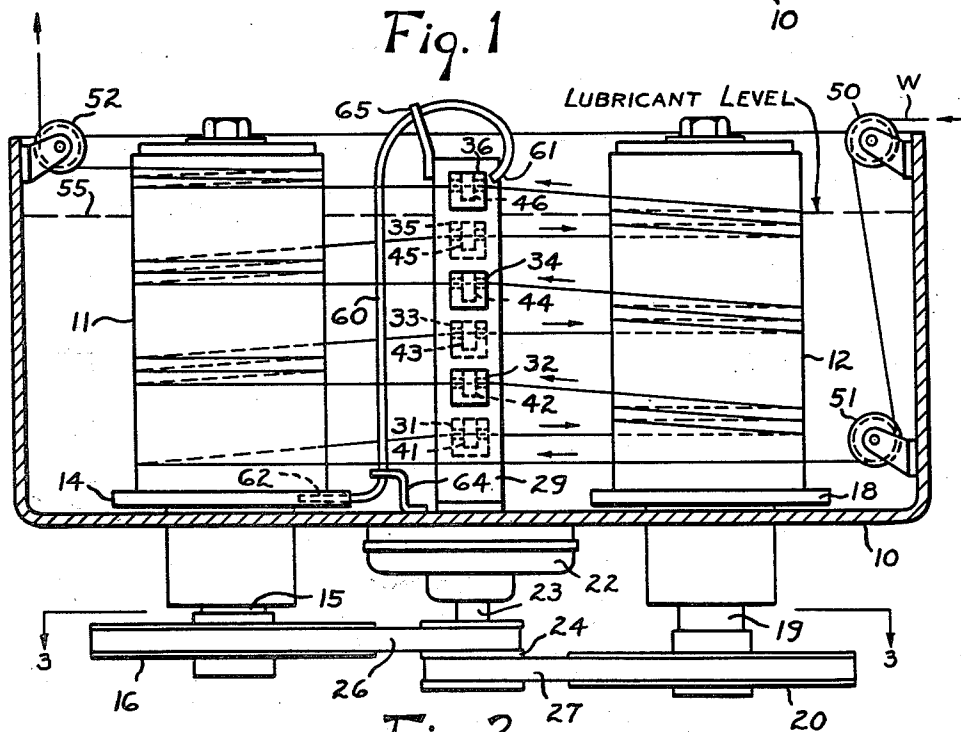


Fig. 2

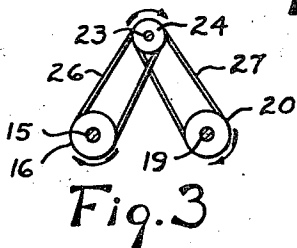


Fig. 3

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WIRE DRAWING MACHINE

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1 Claim. (Cl. 205—13)

This invention relates to wire drawing machines, and more particularly to machines having a series of dies through which the wire is drawn successively by rotating means, such as a drum or drums.

In the manufacture of certain types of wire, for example very fine steel wire, it is the practice to employ dies and rotatable drums which are for the most part submerged in a liquid lubricant. The lubricant is usually a solution or emulsion of some suitable material in water, and it serves both as a coolant and as a lubricant for the wire, dies and drums. It is important that the wire be dry as it leaves the final die and travels to the spooler, for otherwise the coiled wire would rust. It is also important that the wire be lubricated as it enters the final die, in order to minimize wear on this die and to obtain a proper surface finish on the wire. In order to meet these requirements it has heretofore been found necessary to provide various complicated and expensive constructions.

It is accordingly one object of the invention to provide a comparatively simple and inexpensive wire drawing machine having a series of dies and provision for lubricating all of the dies while delivering the finished wire in a dry condition.

It is a further object of the invention to provide a wire drawing machine having a series of dies, all except the final die being submerged in lubricant, and a comparatively simple and inexpensive means for lubricating the final die while the finished wire is delivered in a dry condition.

With these and other objects in view, as will be apparent to those skilled in the art, the invention resides in the combination of parts set forth in the specification and covered by the claim appended hereto.

Referring to the drawings illustrating one embodiment of the invention and in which like reference numerals indicate like parts:

Fig. 1 is a plan view of a wire drawing machine;

Fig. 2 is a view in section taken on the line 2—2 of Fig. 1; and

Fig. 3 is a section taken on the line 3—3 of Fig. 2, at a greatly reduced scale.

The embodiment illustrated comprises a tank 10, of generally rectangular shape in plan, and open at the top. Within this tank there are mounted two horizontally spaced upright drums 11 and 12, each of which is rotatable about a vertical axis. The drum 11 is for the most part cylindrical in shape, with a horizontal flange 14 below the cylindrical portion, a coaxial drive shaft 15 extending through the bottom of the tank 10, and a sheave 16 mounted on the lower end of the shaft. The drum 12 is preferably identical in construction with the drum 11, and includes a horizontal flange 18 below the cylindrical portion of the drum. A coaxial drive shaft 19 for the drum 12 extends through the bottom of the tank 10, and a sheave 20 is mounted on the lower end of this shaft. On the outside of the rear wall of the tank there is mounted an electric motor 22 having a downwardly extending vertical shaft 23 carrying a double-grooved sheave 24. This motor sheave 24 is connected by belts 26 and 27 respectively to the sheaves 16 and 20. With this arrangement the motor 22 may drive both the drums 11 and 12 in clockwise directions, as indicated by the arrows in Fig. 1.

The drums 11 and 12 serve to pull wire through a series of dies and thereby successively reduce the size of the wire. For this purpose an upright post or column

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29 is located between the two drums and rigidly secured at its lower end to the bottom wall of the tank 10. This post is of generally channel-shaped cross section, as shown in Fig. 1. The post 29 serves to support a series of die holders 31, 32, 33, 34, 35 and 36 within which there are mounted dies 41, 42, 43, 44, 45 and 46 respectively. The die 41 is located behind the post 29 near the bottom of the tank, the die 42 is located in front of the post at a slightly higher elevation than the die 41, and the remaining dies are located alternately behind and in front of the post and at successively higher elevations, the final die 46 being at the highest elevation. In order to guide the wire properly through the machine, three rotatable idler sheaves 50, 51 and 52, with their axes horizontal, are mounted within the tank. The sheave 50 is located near the top of the tank at the end adjacent the drum 12, the sheave 51 is located beneath the sheave 50 and near the bottom of the tank, and the sheave 52 is located near the top of the tank at the end adjacent the drum 11. In entering the machine, the wire W will travel over the sheave 50, beneath the sheave 51, past the drum 12, around the drum 11, through the first die 41, and then around the drum 12 in a plurality of turns. The wire will then travel through the second die 42 and around the drum 11 in a plurality of turns, through the third die 43 and around the drum 12 in a plurality of turns, and so on until it has passed through the final die 46. From this die the wire will travel around the upper portion of the drum 11 in a plurality of turns, and then beneath the sheave 52 to a suitable spooler (not shown) or other means for receiving the finished wire.

In order to provide the lubrication and cooling necessary for satisfactory drawing of the wire, the tank 10 is filled with a suitable liquid lubricant to the level indicated by the broken line 55 in Fig. 2. The final die 46, the upper portion of the drum 11, and the sheave 52 are all located above this level 55. Consequently the finished wire will remain dry and out of contact with the lubricant. The dies 41 to 45 inclusive are submerged and hence are thoroughly lubricated. The final die 46 however is not submerged, and the wire approaching this die will not carry sufficient lubricant with it to cool and lubricate the die.

In accordance with the invention, a continuous stream of lubricant is discharged on the inlet side of the final die 46, and the energy for the maintenance of this stream is derived from the whirling current of lubricant produced by the rotation of one of the drums. The preferred construction illustrated comprises a stationary tube or conduit 60 having its upper end portion 61 in position to discharge a stream as desired on the inlet side of the final die 46. The lower end portion 62 of the tube is submerged in the lubricant and lies close to the drum 11 and substantially tangential thereto, with the end of the tube extending in a direction opposite that in which the adjacent portion of the drum travels by reason of its rotation. Thus the tube provides a passage having an inlet opening in position to receive the impact of the current produced by the rotation of the drum. The tube 60 is supported by means of brackets 64 and 65 which are mounted respectively on the bottom wall of the tank 10 and on the upper portion of the post 29.

It will now be apparent that in the operation of the machine the rotation of the drum 11 will cause the adjacent portion of the lubricant to travel around the drum in the same direction as the drum is moving. A portion of this whirling current of lubricant will strike the open lower end of the tube 60, and the velocity head of the lubricant will be sufficient to produce a continuous stream flowing upwardly through the tube and discharging in the desired manner from the end 61 thereof. While the device will operate if the lower end 62 of the tube is properly located adjacent any submerged portion of the drum 11, it is preferably located adjacent the periphery of the flange 14. This takes advantage of the higher velocity of the flange portion of the block, and it gets the tube out of the way of the wire and lessens the chances of entanglement thereof during the threading of the machine. It is obviously immaterial whether the lower end 62 of the tube be located adjacent the flange 14 or adjacent the flange 18, as either of the drums will pro-

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duce the necessary velocity head in the lubricant. It will be understood that the spooler or other take-up mechanism will maintain a slight tension in the finished wire leaving the drum 11, this tension being sufficient to produce the capstan effect required to prevent this drum from slipping within the convolutions of finished wire on the upper portion of the drum. Hence the speed of the drum 11 will establish the speed at which the wire leaves the machine. Before the wire reaches the final die, it of course will have a larger cross section and therefore will be traveling at a slower speed. Hence, except for the convolutions of finished wire, both drums will slip forwardly continuously with respect to the surrounding portions of wire, the amount of such slip becoming less as the wire approaches the final die, and the friction at each group of convolutions being sufficient to pull the wire through the previous die.

The invention provides a simple and inexpensive machine in which all the dies are efficiently lubricated and yet perfectly dry finished wire will be produced.

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

A wire drawing machine comprising a tank having a body of liquid lubricant therein, a series of dies sub-

merged in the lubricant, a final die located above the level of the lubricant, two upright drums rotatable within the lubricant for pulling the wire successively through the submerged dies, one of the drums extending above the level of the lubricant to provide a dry portion about which the wire is wrapped to pull it through the final die, and stationary means forming a passage with an upper outlet opening in position to discharge a continuous stream of lubricant on the inlet side of the final die, the passage having a lower inlet opening submerged in the lubricant and in position to receive the impact of the whirling current of lubricant produced by the rotation of one of the drums.

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