Nov. 7, 1939. G. W. PENNEY 2,179,348

WIRE DRAWING MACHINERY

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Fig. 1.

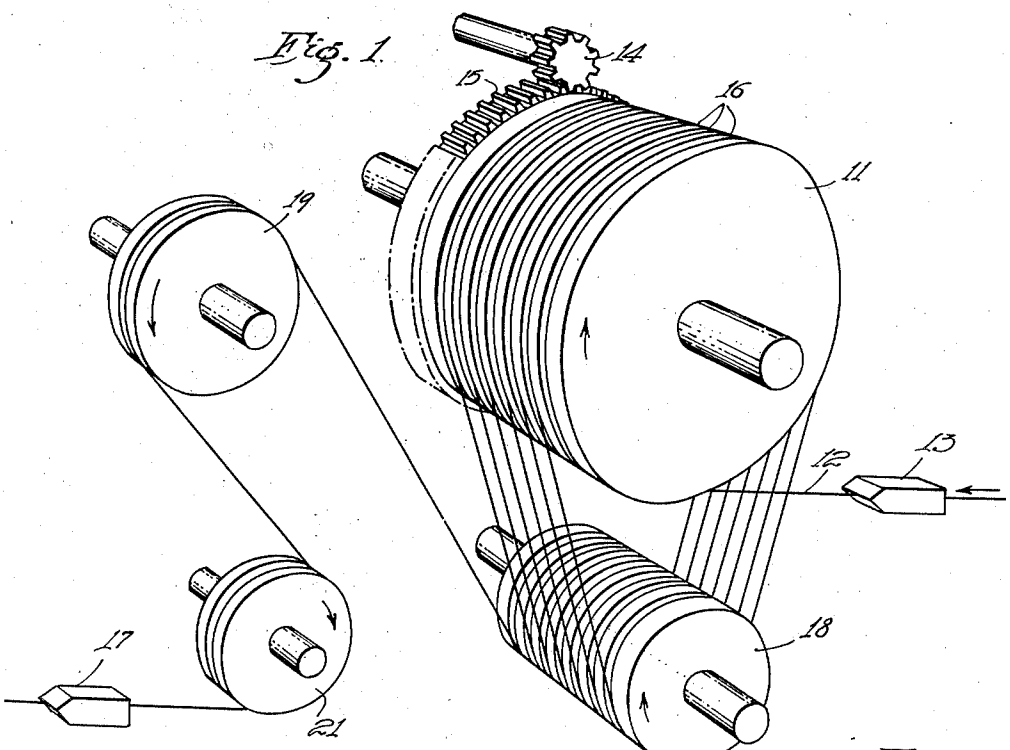
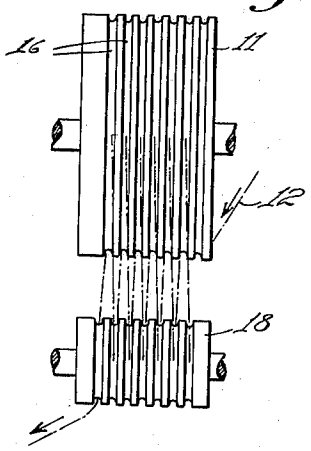


Fig. 2.



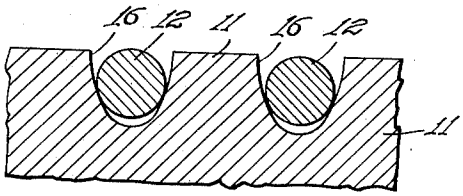


Fig. 3.

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WIRE DRAWING MACHINERY

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7 Claims. (Cl. 205—14)

My invention relates, generally, to wire drawing machinery, and, more particularly, to that part of wire drawing machinery whose function it is to reduce the temperature of the wire as it is passing from one die to the next in a tandem wire drawing mill.

In the process of drawing wire, it is common practice to pull the wire through a die by winding it on a motor driven drum. Where the wire is run continuously through several successive dies to secure several steps of reduction, the wire is pulled through a die by winding it on one end of a drum and is fed to the next succeeding die as it unwinds from the other end of the drum, the wire passing from one end of the drum to the other in a single layer by a sliding movement over the surface of the drum.

In passing through the die the wire becomes very hot and where several successive dies are employed the speed with which the wire can be fed through the dies depends upon the degree of cooling of the wire between dies. Ordinarily the drums upon which the wire is wound are made of cast iron so that they will resist the wear occasioned by the wire sliding along the drum surface as it moves from the winding to the unwinding end of the drum.

The use of cast iron drums limits the cooling of the wire because of the low thermal conductivity of cast iron as compared to copper or such softer metals. However, if these softer metals were used for this purpose, the drums would have to be replaced often because of the rapid wearing away of the drum surface due to the sliding of the wire from the winding to the unwinding end of the drum.

Other disadvantages in the use of drums on which the wire is passed from the winding to the unwinding end by sliding along the drum surface, are that only a single line contact is maintained between the wire and the drum, resulting in poor heat transfer between the wire and drum and, that the adjacent turns of wire on the drum are so close as to produce excessive heat concentration on the drum resulting in poor heat dissipation. In the use of such a drum the number of turns that can be wound on the drum is limited by the number of turns that can be made to slide along the drum surface from the winding to the unwinding end thereof. This limitation in the number of turns on the drum limits the total contact area between the drum and the wire resulting in limited heat dissipation.

The object of my invention is to provide a forwarding drum for wire drawing machines which shall function to obviate the hereinbefore described objectionable features of forwarding drums now in common use.

Another object of the invention is to provide a forwarding drum for tandem wire drawing machines which shall function to provide improved dissipation of heat from the wire as it passes between adjacent drawing blocks.

A further object of the invention is to provide a forwarding drum for tandem wire drawing machines which shall function to provide increased drum surface to thus provide improved reduction of wire temperature as it passes between adjacent drawing blocks.

Another object of the invention is to provide a forwarding drum for a wire drawing machine which shall be constructed of material having a high coefficient of thermal conductivity.

Another object of the invention is to provide the forwarding drum of a wire drawing machine with grooves in which the wire shall travel to obviate wear of the drum occasioned by the sliding of the wire along the surface of the drum.

A further object of the invention is to provide a forwarding drum for wire drawing machines which shall accommodate a sufficient number of turns of wire to provide ample dissipation of heat from the wire as it passes between succeeding drawing dies.

Another object of the invention is to provide improvements in wire drawing machines which shall function to materially increase the speed of operation of such machines.

These and other objects and advantages of the invention will be apparent from the following detailed description taken in connection with the accompanying drawing in which:

Figure 1 is a view in perspective of the preferred embodiment of my invention showing the parts in their cooperative relation,

Fig. 2 is an elevational view of the forwarding drum and transfer drum of Fig. 1, illustrating the relation of the grooves in the two drums to effect transfer of the wire from one groove to the next progressively across the forwarding drum, and

Fig. 3 is a partial cross section view of the forwarding drum of Fig. 1 showing the shaping of the grooves in the drum.

In carrying out my invention, I provide the forwarding drums of a tandem wire drawing machine with a series of spaced endless, circumferential grooves through which the wire travels in passing between successive blocks. Auxiliary

drums, similarly grooved, are mounted adjacent the forwarding drums and function to transfer the wire to succeeeding grooves on the forwarding drums. The drums may be made of copper or other soft metal of high coefficient of thermal conductivity and the grooves may be of V-shaped cross section to provide two lines of contact between the wire and drum.

Referring to Figure 1 of the drawing, a forwarding drum 11 is provided for applying the necessary force to the wire 12 to pull it through the die block 13. The drum 11 may be driven by any suitable power means which may comprise a motor driven pinion 14 and gear 15.

The drum 11 is provided with a series of circumferential grooves 16 in which the wire 12 lies as it passes over the drum. A suitable number of these grooves is provided for permitting the cooling of the wire 12 by transfer of heat from the wire to the drum before the wire passes to the next succeeding die block 17.

A transfer drum 18 is mounted adjacent the drum 11 and has circumferential grooves similar to those in the surface of the drum 11, the planes of the grooves of the transfer drum 18 being slightly offset from the planes of the corresponding grooves of drum 11, as shown in Fig. 2.

By this arrangement the wire 12 enters the first groove of drum 11, passes around the drum in the direction shown by the arrows in Figure 1, leaves the first groove before passing around the drum completely and enters the first groove of transfer drum 18. From the first groove of the transfer drum 18, the wire passes to the second groove of drum 11 thence to the second groove of drum 18 and so on until it finally leaves the last groove of forwarding drum 11, passes through the last groove of transfer drum 18 and is passed over an idler pulley 19 and guide pulley 21 to the next succeeding die 17. The manner in which the transfer of the wire from one groove to another of forwarding drum 11 is accomplished is clearly shown in Fig. 2.

In order to secure a maximum surface contact between the wire 12 and the drum 11 to provide the most efficient heat transfer between the drum and wire, the grooves 16 are made generally V-shaped so that there will be two lines of contact between the drum 11 and the wire. The shape of these grooves is best shown in Fig. 3. In the particular form of the grooves shown, the sides of the grooves are concave or curved so that they will partly conform to the surface curvature of the wire to provide a maximum of contact area.

It is the usual practice in the wire drawing art to provide a cooling means, such as circulating water, for the forwarding drum in order to dissipate the heat transferred from the wire to the drum and it is understood that such cooling means may be provided in the forwarding and transfer drums 11 and 18 of my invention if desired. The forwarding and transfer drums 11 and 18 are preferably made of a metal having a high coefficient of thermal conductivity such as copper so as to secure a maximum rate of heat transfer from the wire.

It will be seen that I have provided a forwarding drum and a cooperating transfer drum which will function to provide efficient cooling of a wire as it is passing from one die block to the next, thus substantially increasing the production rate of a wire drawing machine by permitting the wire to be passed through the machine at a maximum speed.

In compliance with the requirements of the patent statutes, I have shown and described herein a preferred embodiment of my invention. It is understood, however, that the invention is not limited to the precise construction shown and described but is capable of modification by one skilled in the art, the embodiments herein shown being merely illustrative of the principles of my invention.

I claim as my invention:

1. In a tandem wire drawing machine, a rotatable cooling drum over which the wire travels a plurality of times in passing between a pair of adjacent drawing dies, the surface of said drum being provided with a plurality of endless circumferential grooves in successive ones of which the wire lies as it travels over the drum a plurality of times in passing between the pair of dies, and means for transferring the wire from each groove to the next succeeding groove as it travels over the drum.

2. In a tandem wire drawing machine, a rotatable cooling drum over which the wire travels a plurality of times in passing from one die to the next succeeding die, the surface of said drum being provided with endless circumferential grooves in which the wire lies as it travels over the drum, and means for transferring the wire from each groove to the next succeeding groove as it travels over the drum, said transfer means comprising a second grooved drum, the wire being taken from each groove of the first named drum passed through a groove of said transfer drum and fed to the next succeeding groove of said first named drum.

3. In a tandem wire drawing machine, a rotatable cooling drum over which the wire travels a plurality of times in passing from one die to the next succeeding die, the surface of said drum being provided with endless circumferential grooves in which the wire lies as it travels over the drum, a second drum for transferring the wire from each groove to the next succeeding groove as it travels over the first drum, the wire being taken from each groove of the first named drum, passed over the transfer drum and fed to the next succeeding groove of the first drum.

4. In a tandem wire drawing machine, a rotatable cooling drum over which the wire travels a plurality of times in passing from one die to the next succeeding die, the surface of said drum being provided with endless circumferential grooves in which the wire lies as it travels over the drum, and means for transferring the wire from each groove to the next succeeding groove as it travels over the drum, said drum being made of a material having relatively high thermal conductivity.

5. In a wire drawing machine, a rotatable cooling drum having circumferential grooves on its surface in which the wire lies as it travels over the drum, said grooves being substantially V-shaped in cross section, and so dimensioned as to provide line contact between the wire and each side of the grooves.

6. In a wire drawing machine, a rotatable cooling drum made of material having a relatively high coefficient of thermal conductivity and having a series of axially spaced grooves on its surface in which the wire lies as it travels over the drum, said grooves being so shaped as to provide line contact between the wire and each side of the grooves.

7. In a tandem wire drawing machine, a ro-

tatable cooling drum over which the wire travels a plurality of times in passing from one die to the next succeeding die, the surface of said drum being provided with endless circumferential grooves in which the wire lies as it travels over the drum, and means for transferring the wire from each groove to the next succeeding groove as it travels over the drum, said drum being made of a material having relatively high thermal conductivity and said grooves being so shaped as to provide line contact between the wire and each side of the grooves.

GAYLORD W. PENNEY.