Dec. 17, 1935. C. D. JOHNSON 2,024,768

WIRE DRAWING APPARATUS

Filed Sept. 8, 1934

Fig.1.

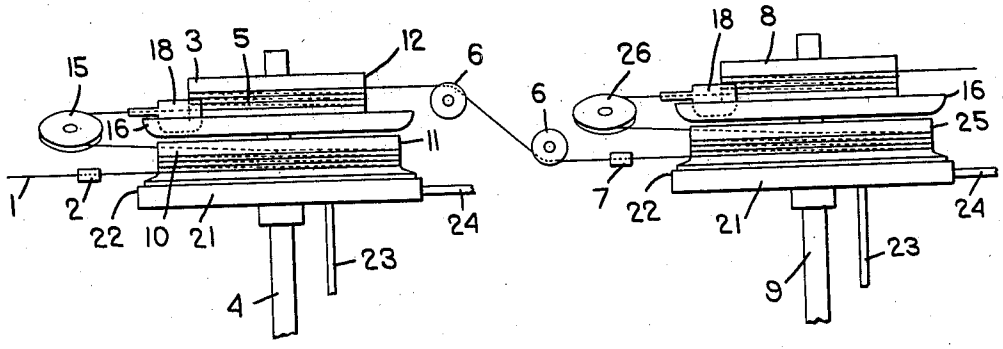


Fig.2.

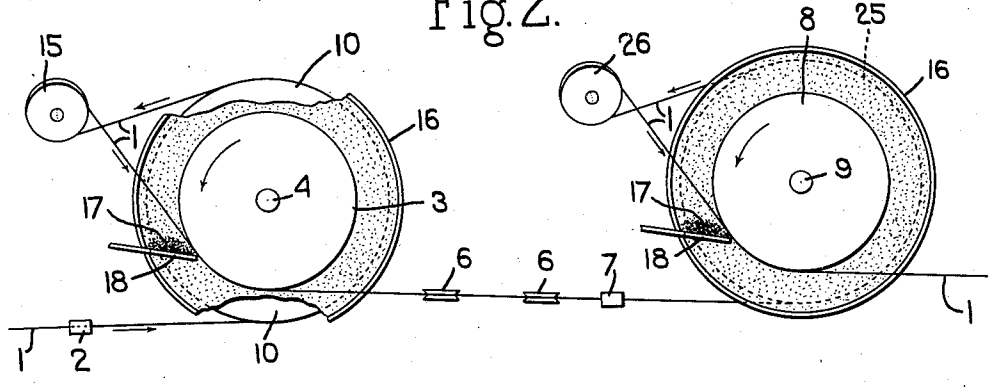
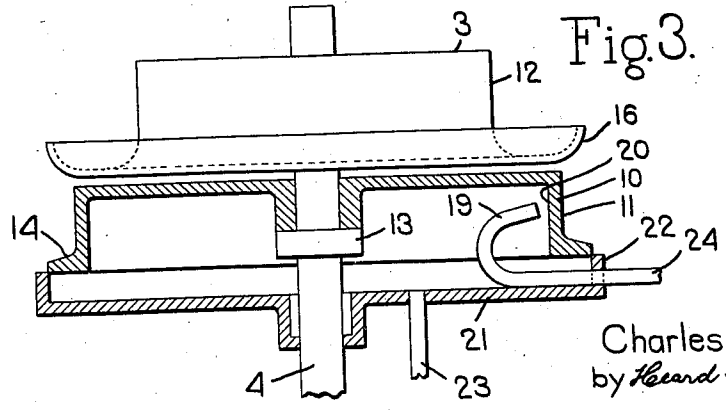


Fig.3.



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WIRE-DRAWING APPARATUS

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7 Claims. (Cl. 205—14)

This invention relates to wire-drawing apparatus and particularly to means for cooling the wire after it has been drawn through the drawing die.

The operation of drawing wire through the drawing die results in heating the wire and in drawing some kinds of wire better results are obtained if the heat which is developed in the wire as it is drawn through the drawing die is removed promptly when the wire leaves the die, because if the wire retains the heat for any length of time after passing through the drawing die the wire will acquire different characteristics from those which it would have if it were cooled promptly, and in making some kinds of wire it is desirable to give the wire the characteristics resulting from a prompt cooling of the wire after leaving the die.

In a continuous wire-drawing machine where the wire passes through a series of dies successively it frequently happens that the heat generated in the wire by passing through any one die is not entirely removed before the wire reaches the next die so that the wire receives an accumulated heating effect which is more or less detrimental in the drawing of certain kinds of wire.

My present invention has for its object to provide means for subjecting the wire to a cooling action as soon as it leaves the drawing die and before it is wound on the drawing drum. This is provided for by employing a wire-cooling drum which preferably is in the form of an idler, and which is situated between the drawing die and the drawing drum and around which the wire passes several times in its travel from the drawing die to the drawing drum. The wire-cooling drum is constructed to give a cooling effect to the wire wound thereon so that the wire is cooled before it is wound on the drawing drum.

When my invention is applied to a continuous wire-drawing machine I propose to employ a wire-cooling drum between each drawing die and the drawing drum which operates to draw the wire through said die so that the wire will be cooled as soon as it passes through each die. This construction prevents any accumulated heating effect in the wire as it passes through successive dies.

In order to give an understanding of the invention I have illustrated in the drawing a selected embodiment thereof which will now be described after which the novel features will be pointed out in the appended claims.

Fig. 1 is a more or less diagrammatic view showing a portion of a continuous wire-drawing apparatus embodying my invention, the drawing drums and wire-cooling drums being shown in side elevation;

Fig. 2 is a top plan view of Fig. 1;

Fig. 3 is an enlarged view of one of the drawing drums and the corresponding wire-cooling drum, the latter being shown in section.

In the drawing 1 indicates the wire being drawn, 2 indicates a drawing die through which the wire is drawn, and 3 indicates a drawing drum which is fast on the positively-driven shaft 4 and which functions to draw the wire 1 through the die block 2, it being understood that the wire is wound around the drawing drum 3 a plurality of times as shown at 5.

The wire-drawing apparatus shown in Figs. 1 and 2 is a continuous wire-drawing apparatus, the wire being led from the drum 3 over suitable direction pulleys 6 to a second drawing die 7 through which it passes and from said second drawing die the wire is wound on a second drawing drum 8 which is shown as fast on a positively-driven shaft 9.

As the wire passes through each drawing die a certain amount of heat is generated therein, and as stated above, the present invention has for its object to provide novel means for cooling the wire after its leaves each drawing die but before it is wound on the corresponding drawing drum. For this purpose I propose to employ a cooling drum 10 which is loosely mounted on the shaft of the drawing drum and around which the wire is passed several times before it reaches the drawing drum.

The wire-cooling drum 10 corresponding to the drawing drum 3 is shown as having a cylindrical wire-receiving surface 11 which is preferably of considerably larger diameter than the wire-receiving surface 12 of the drawing drum 3. This cooling drum 10 is shown as supported on a collar 13 fast on the shaft 4 and the wire-receiving surface 11 of the wire-cooling drum 10 is so situated with reference to the die 2 that the wire which is delivered from the die will engage the wire-receiving surface 11 at the point where it merges into the flange 14. The wire 1 is wound around the wire-receiving surface 11 of the wire-cooling drum 10 several times and then extends around a direction pulley 15 from which it is delivered to the wire-receiving surface 12 of the drawing drum 3.

The drawing drum 3 may be of any suitable or usual type, that herein shown being similar to that illustrated in my Patent No. 1,948,664, February 27, 1934, in that said drum is provided with

a lubricant-receiving flange 16 adapted to receive a dry lubricant 17 which is applied to the wire 1 as it is wound on the drum and to the wire-receiving surface 12 thereof by means of a stationary plow or deflector 18. As the drum rotates the dry lubricant 17 piles up in front of the plow or deflector at substantially the point where the wire is received by the drum and is thus delivered to the wire and the drum.

Suitable means are provided for keeping the wire-receiving surface 11 of the wire-cooling drum cool thereby providing for the desirable cooling of the wire. While various ways of cooling the cooling drum may be employed I have herein shown a construction in which the cooling drum is hollow and is provided with an inner face 20 against which a jet of water or other cooling medium may be delivered through the jet pipe 19.

The cooling drum is open at its lower side and situated below the cooling drum is a stationary pan 21 through which the shaft 4 extends and which is provided with an annular rim 22 and with a drain pipe 23. The jet 19 is connected to a supply pipe 24 and as the cooling drum 10 rotates the jet of water or other cooling medium is delivered against the interior surface 20 of said drum progressively thereby maintaining the drum cool. Since the wire 1 is wound about the cooling drum 10 for a plurality of turns and since the cooling drum is kept cool by the construction herein disclosed, the result is that the heat developed in the wire by its passage through the drawing die 2 will be removed from the wire by its contact with the cooling drum and that when the wire is delivered to the drawing drum 3 or at least before the wire leaves the drawing drum 3 it will be brought to a normal temperature.

In the case of a wire-drawing apparatus having a single drawing die and, therefore, capable of giving the wire only one reduction in size, the drawing drum may be constructed so that it constitutes a receiving or storage drum for the wire as it accumulates on the drawing drum. In the case of a continuous wire-drawing apparatus, however, a plurality of drawing drums and dies are employed arranged in series as shown, there being a wire-cooling drum situated between each drawing die and the corresponding drawing drum as shown in the drawing.

The wire-cooling drum situated between the second drawing die 7 and the corresponding drawing drum 8 is indicated at 25, and it is constructed in the same way as the wire-cooling drum 10 and is provided with similar means for cooling it.

The wire which is delivered from the drawing die 7 passes several times around the wire-cooling drum 25, which it will be understood, is loosely mounted on the shaft 9, and from the cooling drum 25 the wire passes around a direction pulley 26 and thence to the wire-receiving surface of the drawing drum 8 and thence through another drawing die and around another wire-cooling drum and thence to another drawing drum and so on.

It will be observed that in this construction the wire passes around the cooling drum as soon as it leaves the drawing die and before it is wound on the drawing drum so that the cooling of the wire occurs between the drawing die and the corresponding drawing drum.

While I have illustrated one way in which the wire may be cooled between the drawing die and the drawing drum yet I do not wish to be limited to the constructional features shown as other constructions for accomplishing this end may be employed without departing from the invention.

I claim:

1. A wire-drawing apparatus having a drawing die, a drawing drum for drawing wire through said die, and a wire-cooling drum situated between the drawing die and the drawing drum and about which the wire passes as it travels from the die to the drum.

2. A wire-drawing apparatus having a drawing die, a drawing drum for drawing wire through said die, and a freely-rotatable wire-cooling drum situated between the drawing die and the drawing drum and about which the wire passes as it travels from the die to the drawing drum, said wire-cooling drum being given its rotative movement by the traveling movement of the wire.

3. A wire-drawing apparatus having a drawing die, a drawing drum for drawing wire through said die, a hollow wire-cooling drum situated between the drawing die and the drawing drum and about which the wire passes as it travels from the die to the drawing drum, and means for cooling the wire-receiving portion of the cooling drum from the inside thereof whereby the wire is cooled before it is wound on the drawing drum by contact with the cooled surface of the cooling drum as distinguished from being cooled by the direct application of a cooling medium to the wire.

4. A wire-drawing apparatus comprising a plurality of drawing dies, a drawing drum for each die and a wire-cooling drum situated between each die and the corresponding drawing drum and about which the wire passes several times in travelling from the die to the drum.

5. A wire-drawing apparatus comprising a plurality of drawing dies, a drawing drum for each die and a wire-cooling drum situated between each die and the corresponding drawing drum and about which the wire passes several times in travelling from the die to the drum, and means for cooling the wire-receiving surface of each cooling drum.

6. A wire-drawing apparatus comprising a drawing die, a drawing drum for drawing wire through the die, means for applying a dry lubricant to the wire before it passes through the drawing die and a dry, movable wire-cooling surface situated between the drawing die and the drawing drum and with which the wire has contact and by which it is cooled after it leaves the die but before it is wound on the drawing drum, said surface being movable with the wire as it travels from the die to the drum.

7. A wire-drawing apparatus comprising a drawing die, a drawing drum for drawing wire through said die, means to apply a dry lubricant to the wire before it passes through the drawing die, a movable wire-cooling member having a wire-cooling surface with which the wire contacts after it leaves the drawing die but before it is wound on the drawing drum and means to apply a cooling medium to said wire-cooling member for cooling the wire-cooling surface thereof without subjecting the wire contacting with said surface to the direct action of said cooling medium.

CHAS. D. JOHNSON.