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J. J. HIGGINS

MACHINE FOR STRAIGHTENING WIRE

Filed Dec. 14, 1920

FIG. 2.

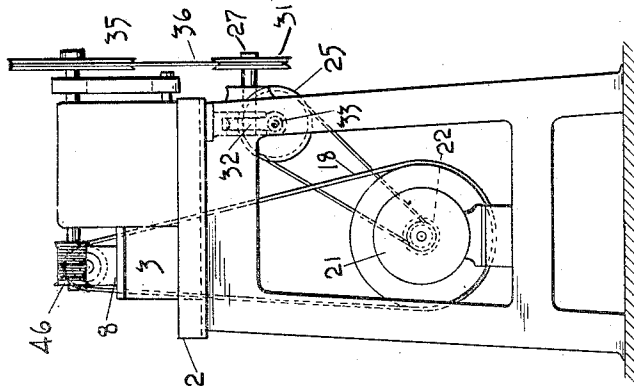


FIG. 1.

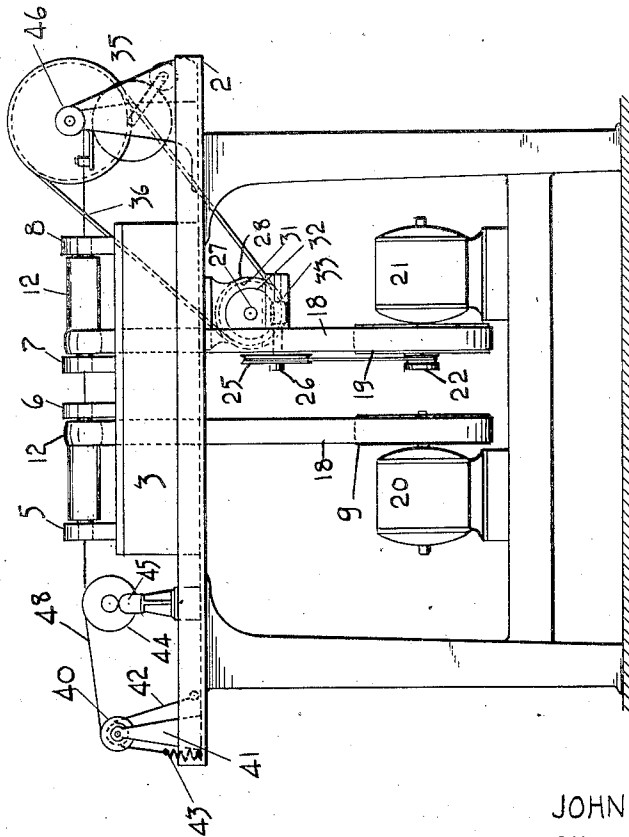
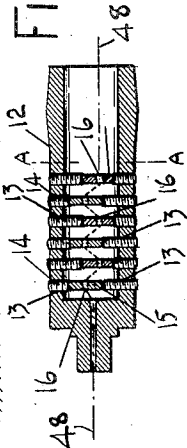


FIG. 4.



FIG. 3.



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MACHINE FOR STRAIGHTENING WIRE.

Application filed December 14, 1920. Serial No. 430,591.

To all whom it may concern:

Be it known that I, JOHN J. HIGGINS, a citizen of the United States, and a resident of East Orange, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Machines for Straightening Wire, of which the following is a specification.

This invention relates to a machine for straightening wire and is especially applicable for use in connection with filament or support wire, such as tungsten, molybdenum or other small-calibre wire.

An object of the invention is to provide a machine for removing the waves or curls from filament or support wire without the necessity of annealing, thereby retaining the tenacity and resiliency inherent in the wire. A further object is to remove such irregularities in a rapid and efficient manner.

The process of manufacturing a filament or support wire requires a drawing operation. Wire, when drawn for this purpose, in some cases, has a wavy sinuous form. The pitch of the undulations vary, depending on the structure of the material of which the wire is composed.

It is well known that the support or anchor wires which carry the filament should be resilient. Wire manufactured for this purpose, although annealed in the first steps of the drawing operation, is, in the last step, cold drawn. This last step imparts an elastic property to the wire.

A certain percent of the wire when taken direct from the drawing dies is not in condition for use in the manufacture of incandescent lamps, and the important step of straightening this wire must be performed before it can be utilized as working material.

The advantage of my invention will be appreciated when it is understood that it provides means for straightening the said cold-drawn wire by a method whereby the advantage of cold drawing is maintained.

The oppositely rotating staggered dies, as embodied in my invention, effect a hammer-like action upon the passing wire which not only acts to straighten the wire but increases its resilient quality, thus promoting

its value as a tension member or anchor for supporting a filament of an incandescent lamp.

I am aware that wire-straightening devices have heretofore been used and that a known example of such devices comprises a holder and a set of fixed dies or guides through which the wire is passed, the holder being rotated as the wire is drawn there-through. This device resulted in giving the wire a helical form and, although it helped toward removing the more pronounced irregularities, it did not accomplish the desired result of producing a straightened wire in the proper condition for lamp-manufacturing purposes.

My invention employs holders and dies or guides somewhat similar to those heretofore used, and, by first passing a wire through a set of rotating guides as above set forth, I obtain wire of helical formation, this being the result of the forces set up in the rotating guides which oppose the tendencies of the wire to remain in the form produced by the drawing dies. I have discovered that, by then passing the helical wire through another set of oppositely rotating guides, I cause another change in the form of the wire; the oppositely rotating guides acting to convert the helical wire back to a straight form. The wire, thus operated upon, is entirely straight and suitable for use in the manufacture of incandescent-lamp filaments and supports therefor.

Referring to the drawings, Fig. 1 is a side elevation of my machine; Fig. 2 is an end elevation of the machine shown in Fig. 1; Fig. 3 is a longitudinal section of a detail showing a set of guides supported in a holder; and Fig. 4 is a transverse section taken on line 4—4 of Fig. 3.

Like numerals indicate like parts throughout the several views. My apparatus includes a table 2 having a base 3 secured thereto; upon the base is mounted a plate provided with bearings 5, 6, 7 and 8 to support tubular holders or casings 12. The holders 12 are provided with oppositely disposed tapped holes 13 (see Fig. 3) to receive screw studs 14 between which guides or dies 15 may be secured. By adjusting the studs, the dies may be moved trans-

versely of the holder to locate the openings 16 in the dies in various positions. As shown in the drawings, the openings 16 are located alternately on opposite sides of the axial line of the holder.

The holders 12 are provided with crowned portions at their ends to receive belts 18 which pass over pulleys 9 and 19 and are driven by means of motors 20 and 21. The shaft of the motor 21 extends through the pulley 19 and is equipped with a supplemental pulley 22 of relatively small diameter, which is connected to a belt sheave 25. The sheave 25 is secured to a shaft 26. Arranged above the shaft 26 and at right angles thereto, is a shaft 27 supported in bearings 28 hung from the underside of the table 2. The shaft 27 is provided with a sheave 31 and worm wheel 32, the worm wheel being so disposed as to mesh with a worm 33 secured on shaft 26.

A winding mechanism of any suitable type may be used to wind the wire. The winding mechanism illustrated in the drawing is designated by the reference character 35 and is connected to the sheave 31 by means of a belt 36.

The motors 20 and 21 are arranged to run in opposite directions and, when in operation, the belts 18 drive the two holders 12 and 12 in a clockwise and in a counter clockwise direction respectively. The motor 21 acts also to drive the winding mechanism, the power being transmitted by means of pulley 22 which drives sheave 25. The sheave 25 is connected to shaft 27 by any speed-reducing mechanism which, in the illustration, consists of the worm 33 and the worm wheel 32, and the belt 36 connects the sheave 31 to the winding mechanism. The said mechanism is thus driven by the main drive motor at any suitable speed, which may be governed by interposed gearing.

The wire 48, to be straightened, is fed from the drum or spool 40 which revolves in bearings in brackets 41. To prevent the spool from gaining momentum, a brake is provided in the form of a strap 42 secured, at one end, to the table and extending over a cylindrical projection on the spool, its opposite end being connected to a spring 43, which is secured to the table 2.

The wire is led from the spool 40 over and around a roller 44, the said roller or counter wheel cooperating with a meter 45 to measure the length of the passing wire. From the roller 44, the wire is passed through the dies in holders 12, and thence to a receiving spool 46 of the winding mechanism.

It will be understood from the foregoing description that the wire passes through sets of dies or guides contained in the holders. The guides or dies are arranged in staggered formation to cause the wire

to take a zig zag course through the holders, the said holders being rotated in opposite directions at a high speed.

It has been found that a certain relation exists between the speed of the wire passing through the dies and the number of rotations of the dies per minute. I find that very good results are obtained in the use of tungsten wire when the said wire is passed through the dies at the rate of nine meters per minute and the guides or dies are rotated at the rate of 6,000 rotations per minute.

My invention, therefore, embodies mechanism for operating upon wire of irregular lineal form to give such wire a predetermined form as that of a helix, then removing or neutralizing the said helical form to obtain a straight wire.

Although a preferred embodiment of the invention has been shown, it is obvious that structural alterations be made without departing from the spirit of my invention. It is, therefore, understood that my invention comprehends all such modifications as fall within the scope of the appended claims.

What is claimed is:

1. A machine for straightening wire comprising rotatable die holders, a plurality of dies positioned in each holder, a source of power, means for connecting said dies with said power for rotation at a given rate of speed, a wire-receiving member connected with said source of power and means interposed between said member and said power for causing a rotation of said member at a different rate of speed than that of said dies.

2. A machine for straightening fine wire comprising two rotatable die holders, a plurality of dies disposed in staggered relation in each of said holders, means for passing wire through said dies, a rotatable member, means for rotating said member, connection between said member and said dies for imparting a rotary movement thereto, a wire-receiving member, connection between said wire-receiving member and said rotary member whereby said wire-receiving member is rotated at a different rate of speed than said dies.

3. A machine for straightening wire comprising a pair of die holders arranged to rotate on a common axial line, a plurality of dies disposed in each of said holders, two pulleys adapted to rotate in opposite directions and associated with respective die holders for rotating the same in opposite directions and means associated with one of said pulleys for effecting a movement of a wire through said dies during the rotation thereof.

4. A machine for straightening wire comprising a pair of die holders arranged to rotate upon a common axial line, two pulleys adapted to be driven in opposite direc-

tions to rotate the respective die holders in opposite directions, motors for driving said pulleys, means for supporting a wire for movement through said dies, a spool for receiving said wire after passing through the dies and means associated with one of said pulleys whereby movement is derived there- from to rotate said spool to wind the wire thereon and effect its passage through said dies. 10

In testimony whereof, I have hereunto subscribed my name this 13th day of December, 1920.

JOHN J. HIGGINS.