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APPARATUS FOR STRAIGHTENING METALLIC WIRES, RODS, AND TUBES OF CIRCULAR CROSS SECTION.

APPLICATION FILED MAR. 15, 1916.

1,229,981. Patented June 12, 1917.

FIG. 1.

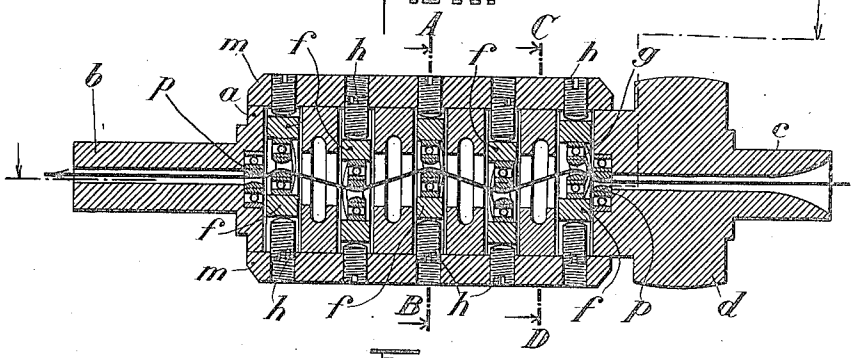


FIG. 2.

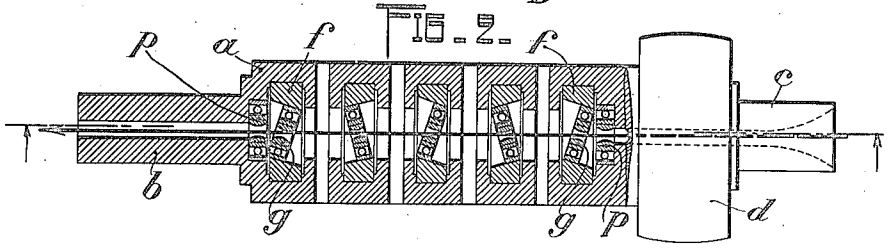


FIG. 3.

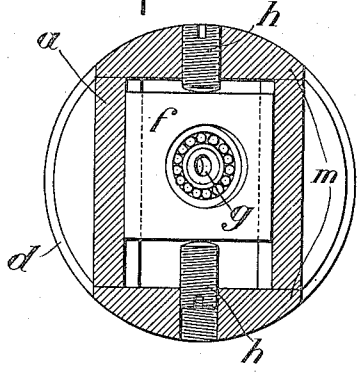


FIG. 4.

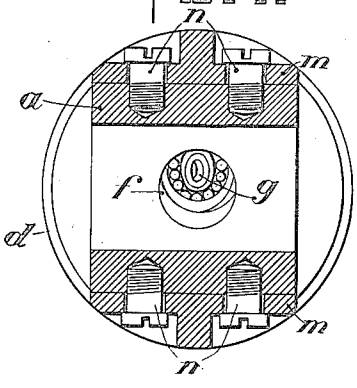
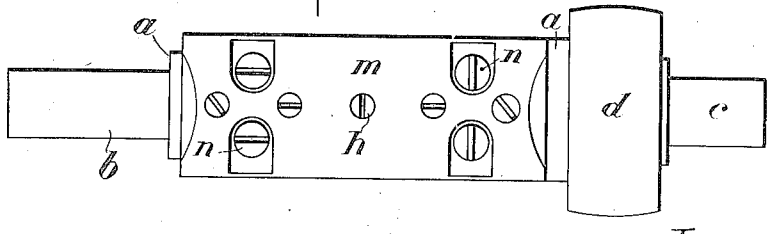


FIG. 5.



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APPARATUS FOR STRAIGHTENING METALLIC WIRES, RODS, AND TUBES OF CIRCULAR CROSS-SECTION.

1,229,981. Specification of Letters Patent. Patented June 12, 1917.

Application filed March 15, 1916. Serial No. 84,430.

To all whom it may concern:

Be it known that I, CARL AUGUST ALBERT LEHMANN, a citizen of the Swiss Republic, and resident of Bienne, Switzerland, engineer, have invented new and useful Improvements in Apparatus for Straightening Metallic Wires, Rods, and Tubes of Circular Cross-Section, of which the following is a full, clear, and exact specification.

The present invention relates to an apparatus for straightening metallic wires, rods and tubes of circular or substantially circular cross section.

The greatest number of the apparatus hitherto employed for straightening metallic wires comprise a series of rotary dies or jaws eccentrically arranged with respect to the axis of rotation which coincides substantially with the direction of the feeding movement of the wire to be worked, said dies producing during their rotation the straightening of the wire drawn between them through the apparatus. These apparatus have many drawbacks, such as twisting actions and corroding effects upon the wire owing to its extremely high friction on the working dies. Also, if the straightening jaws are replaced by rotary rollers, as it has already been proposed, the frictional contact of the wire with these rollers may subsist lengthwise.

According to the invention, the straightening of the work piece (wire, rod, tube) is effected by straightening rings mounted in a rotating carrier, positioned out of the axis of rotation thereof alternately to the one and to the opposite side, arranged to freely turn around their own axes with their inner faces in contact at one place with the work piece and obliquely placed relatively to the axis of rotation of said carrier, in such a manner that, when the carrier is being rotated the rings are caused to freely roll upon the surface of the work piece, producing not only a straightening effect upon the work piece, but also simultaneously an automatic feeding movement thereof along the axis of rotation of said ring carrier.

The most important feature of the invention is the free rolling movement of the straightening rings on the work piece, inasmuch as any appreciable sliding friction on the same is hereby avoided.

Advantageously, the straightening rings are made of hardened steel.

The accompanying drawings represent one embodiment of the improved apparatus, adapted for example for the straightening of wire.

Figure 1 is a longitudinal axial section through the preferred form, having ball-raced straightening rings;

Fig. 2 is also a longitudinal axial section thereof, but at a right angle to that of Fig. 1;

Figs. 3 and 4 are two transverse sections on a larger scale along the lines A—B and C—D of Fig. 1, respectively;

Fig. 5 is a plan view corresponding to Fig. 1.

With regard to Figs. 1 to 5 showing the preferred form of apparatus, *a* indicates a rotating die carrier having two trunnions *b*, *c* for rotatably supporting said die carrier in a frame and a pulley *d* for a driving belt to rotate said die carrier. The latter and its trunnions are bored out to a sufficiently large extent along the axis of rotation of the die carrier so as to allow of free passage of the wire to be straightened. In seatings of the die carrier *a* are inserted several supports *f* with ball-raced straightening rings *g* therein, in such a manner that the rings *g* are positioned out of the axis of rotation of the die carrier alternately to the one and opposite side, as clearly shown in Fig. 1, so that they are arranged eccentrically to the said axis of rotation, the one in Fig. 1 displaced to the top, the other to the bottom part of the die carrier. Set screws *h*, between which the die supports *f* are held, allow of variation of the eccentric position of the straightening rings. The straightening rings *g*, which are also freely rotatable around their own axis in the supports *f*, are obliquely placed in the die carrier *a* relatively to the axis of rotation thereof, as shown in Fig. 2, alternately to the left and to the right hand side. The rings *g* preferably consist of hardened steel. When the die carrier *a* is being rotated, the wire passing through the opening of the straightening rings *g* is not only straightened by the pressure of the rings rolling with their inner face upon the surface of the wire, with which they always make contact at one single place, but also the rings cause, owing to their oblique position, an automatic feeding movement of the wire in its longitudinal direction. The speed of this feeding movement depends on

the magnitude of the inclination angle of the straightening rings to the axis of rotation of the die carrier and on the number of revolutions of the latter. The operation of straightening takes place without any appreciable lengthwise sliding friction on the wire, as the rings are freely rolling upon the wire and produce the automatic advance thereof just in a measure depending upon their revolution.

To save the wire from damages, the opening of the straightening rings g is enlarged and rounded at both ends. Furthermore, the die carrier is provided at the wire inlet and outlet points with two ball-raced guide-rings p serving to prevent there any sliding friction of the wire. These guide-rings are not adjustable; they are centrally arranged; they serve to support the pressure of reaction between the wire and the first and last straightening rings. The inner faces of these guide-rings roll also upon the outer surface of the work piece.

The die carrier a comprises a main body with the seatings for the die supports f and two removable cheeks m, carrying the set screws h and detachably fixed to said main body by means of connecting screws n (Figs. 4 and 5). Instead of the set screws h, there may also be employed a compound system of wedges or the like, which allows of giving the necessary eccentricity to the straightening rings.

In the described apparatus, the straightening rings are placed obliquely in their supports f, the seatings for the latter being directed perpendicularly to the axis of rotation of the die carrier; but the straightening rings may also be perpendicularly arranged in their supports and the latter inserted in obliquely directed seatings of the die carrier.

Obviously, the described apparatus may also be employed when the feeding of the wire constitutes the first or main object and the straightening thereof only a secondary object.

What I claim is:

1. Apparatus for straightening metallic wires, rods and tubes of circular cross section, comprising in combination a rotary die carrier, means for rotating the same, and a series of annular straightening dies mounted in said carrier, positioned out of the axis of rotation thereof alternately to one and the opposite side, obliquely placed relatively to the said axis of rotation and having rings freely rotatable around their axes with their inner faces in contact at one place with the surface of the work piece, in such a manner that, when the die carrier is being rotated, the said rings are caused to freely roll upon the surface of the work piece, producing simultaneously the straightening and automatic feeding movement of the work piece, substantially as described.

2. Apparatus for straightening metallic wires, rods and tubes of circular cross section, comprising in combination a rotary carrier, means for rotating the same, supports engaged in said carrier, straightening rings mounted in said supports, and means for holding said supports in such a position that their straightening rings are placed out of the axis of rotation of said carrier alternately to the one and the opposite side, said rings being ball-raced in their support to freely rotate around their axes with their inner faces in contact at one place with the surface of the work piece and being further obliquely placed to the axis of rotation of the said carrier, for the purpose of straightening and simultaneous automatic feeding of the work piece through the action of the freely rolling rings, substantially as described.

3. Apparatus for straightening metallic wires, rods and tubes of circular cross section, comprising in combination a rotary carrier, means for rotating the same, supports engaged in said carrier, straightening rings mounted in said supports, and means for holding said supports in such a position that their straightening rings are placed out of the axis of rotation of said carrier alternately to the one and the opposite side, said rings being ball-raced in their support to freely rotate around their axes with their inner faces in contact at one place with the surface of the work piece, and being further obliquely placed on the axis of rotation of said carrier alternately to the left-hand and right-hand side, for the purpose of straightening and simultaneous automatic feeding of the work piece through the action of the freely rolling rings, substantially as described.

In witness whereof I have hereunto signed my name this Feb. 15th, 1916, in the presence of two subscribing witnesses.

CARL AUGUST ALBERT LEHMANN.

Witnesses:

AMAND RITTER,

AMAND BRAUN.