Nov. 29, 1938. W. A. WHITTAKER 2,138,201

WIRE DRAWING METHOD AND APPARATUS

Filed Feb. 6, 1937

Fig. 1.

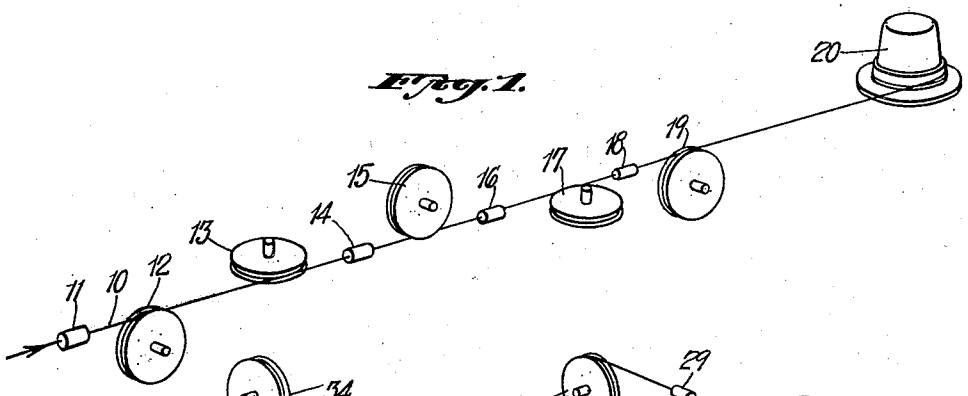


Fig. 2.

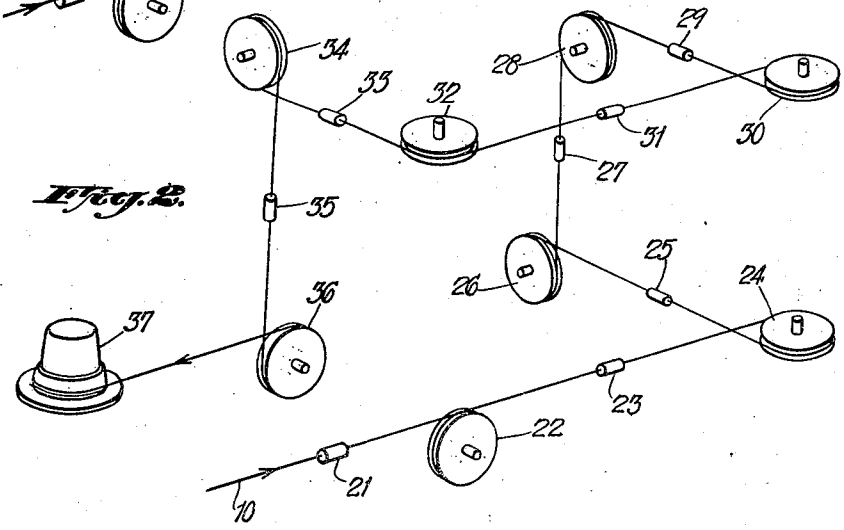
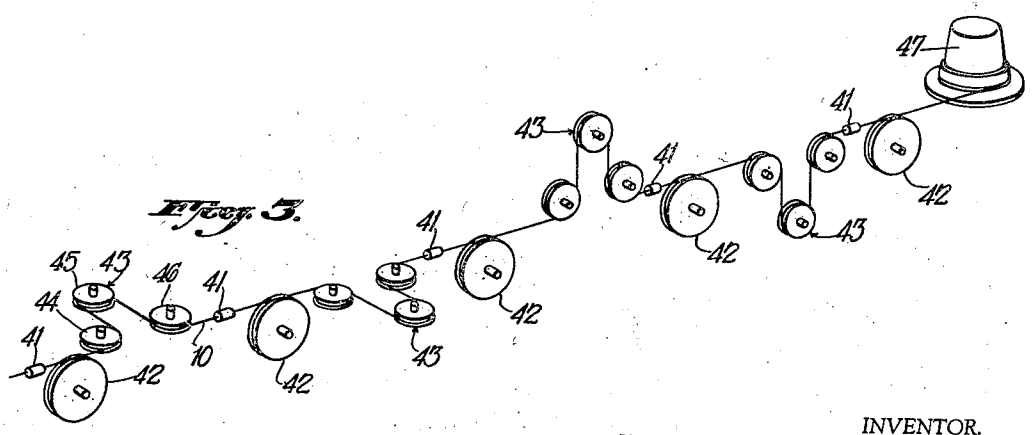


Fig. 3.



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WIRE DRAWING METHOD AND APPARATUS

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7 Claims. (Cl. 205—14)

My invention relates to a method and apparatus for drawing wire, particularly for drawing wire through a succession of dies to decrease its diameter.

Heretofore wire has been drawn through dies by means of driven pulleys arranged successively in such a manner as to bend the wire about one axis of bending or in a single plane. The wire was drawn first through a die and then about a pulley so that the bending of the wire was always in the same plane relative to the axis of the wire. When a wire formed in this manner was bent on a plane other than that in which it was bent during drawing it would not stand as much deformation without breaking as if bent or deformed in the plane in which it was bent or deformed in drawing. Its resistance to fracture was thus less in some planes than in others.

In the method and apparatus of my invention the above mentioned inequalities are eliminated by bending the wire in several planes during the formation or drawing of the wire.

In my invention the planes of rotation of successive pulleys are at successively different angles about the center line of the wire so that the wire in passing successively about these pulleys is bent first in one plane, then in a plane at an angle to the first plane, and so on until the angles of bending are distributed substantially uniformly about the axis of the wire. The pulleys about which the wire turns may either all be driving pulleys serving to pull the wire through the wire drawing dies or, some of them may be idler pulleys serving merely to change the direction or plane of bending between drawing pulleys all of which are in the same plane. The pulleys may all be arranged tangent to a straight line of travel of the wire or, to economize in space, they may be arranged in various formations in which the wire passes back and forth at different angles.

The various features of the invention are illustrated by way of example, in the accompanying drawing, in which

Fig. 1 is a diagrammatic view of a preferred embodiment of the invention.

Fig. 2 is a diagrammatic perspective view of a modified arrangement of the pulleys.

Fig. 3 is a perspective diagram of apparatus embodying combinations of driving and idler pulleys.

In the apparatus of Fig. 1 the wire 10 is drawn through a die 11 by means of a pulley 12 arranged in one plane of rotation as, for example, the vertical, and then through a second pulley 13 positioned in a different plane of rotation as, for example, the horizontal. Then the wire is drawn through another die 14 by means of a pulley 15 arranged in the same plane as the pulley 12, but on the opposite side of the wire so that it is bent diametrically opposite to the bending about the pulley 12. The wire then passes through a die 16 and about a pulley 17 in the same plane as the pulley 13, but on the opposite side of the wire, thence through a final die 18 and about a final pulley 19. From the pulley 19 the wire is wound onto a winding drum 20.

In the apparatus shown in Fig. 2 the wire is drawn first through a die 21, then about a pulley 22 having a vertical plane of rotation. Then it passes successively through a die 23 and about a pulley 24 in a horizontal plane, thence through a die 25 about a pulley 26 in a vertical plane, through a die 27 to a pulley 28 in a vertical plane, thence successively through a die 29 about horizontal pulley 30, through die 31 and about a horizontal pulley 32. Then it passes through a die 33 about a vertical pulley 34, through die 35 and about a vertical pulley 36 to a final winding drum 37. It will be obvious from the above that the wire passes about five vertical pulleys and three horizontal pulleys, this distribution being one of convenience. It is obvious that the pulley 22 could be a horizontal pulley in the same plane as the pulley 24. There being eight pulleys in all, these pulleys may be arranged in the form of a parallelopiped instead of in a straight line, thereby greatly economizing in the space required for the wire drawing apparatus.

In the apparatus shown in Fig. 3, the wire 10 is drawn through a succession of dies 41 by means of a succession of driving pulleys 42 arranged between the successive dies. The driving drums 42 may all be arranged in a single plane as, for example, in a vertical plane. To obtain a flexing of the wire about other planes, groups of idler pulleys 43 are interspersed in the system, the idler pulleys of some groups being arranged in horizontal planes, and those of other groups in vertical planes. Each group of idler pulleys is made up of three individual pulleys 44, 45 and 46. The wire is finally wrapped onto a winding drum 47.

In each of the above embodiments, the wire is alternately bent on a variety of planes. Planes at an angle of 90° have been shown by way of example, but it will be understood that the angularity of these planes may vary with different circumstances and requirements for the wire.

In my invention also, an increased working and, therefore, an increased hardness may be

imparted to the wire, if desired, with an equal distribution of hardness and stress at all angles about the center of the wire.

What I claim is:

1. A method of wire drawing which comprises passing a wire through a succession of drawing dies, and bending said wire successively through turns of not less than 180° in planes positioned symmetrically about the center of said wire at angles of less than 180°.

2. Wire drawing apparatus which comprises a series of successive dies and pulleys between said dies, with their planes of rotation arranged symmetrically about the line of movement of the wire and at angles less than 180°.

3. Wire drawing apparatus which comprises a succession of wire drawing dies and pulleys about which said wire passes between said dies, said pulleys being arranged symmetrically about the line of movement of the wire in planes at successive angles of 90°.

4. The apparatus of claim 3 in which said dies are in alignment, and said pulleys tangent to a straight line passing through said dies.

5. Wire drawing apparatus which comprises a group of pulleys arranged at the corners of a parallelopiped and in different respective planes of the parallelopiped and in which the planes of rotation of said pulleys are different to pass wire around successive pulleys to a different direction of travel, and wire drawing dies through which wire passes from one pulley to another.

6. Wire drawing apparatus which comprises a series of driving pulleys, a series of wire drawing dies, one in advance of each of said pulleys, and idler pulleys between said driving pulleys arranged symmetrically about the line of movement of the wire in planes at an angle less than 180° to the plane of said driving pulleys.

7. The apparatus of claim 6 in which said driving pulleys are all arranged in a common plane.

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