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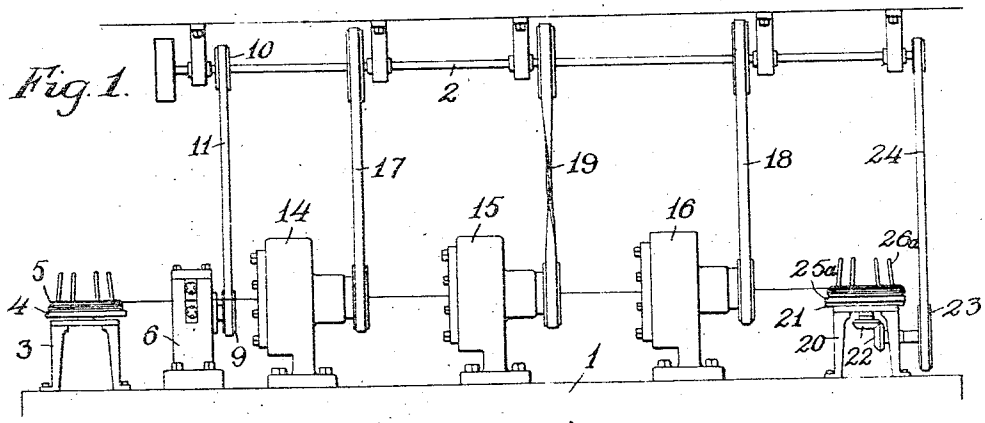
MACHINE FOR REDUCING WIRE

APPLICATION FILED MAY 8, 1909.

1,137,920.

Patented May 4, 1915.

Fig. 1.



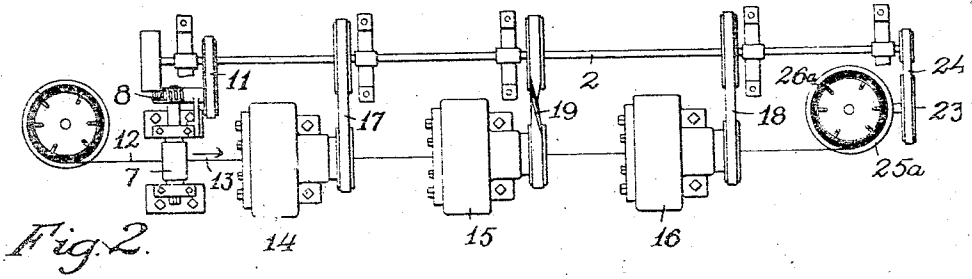


Fig. 2.

Fig. 3

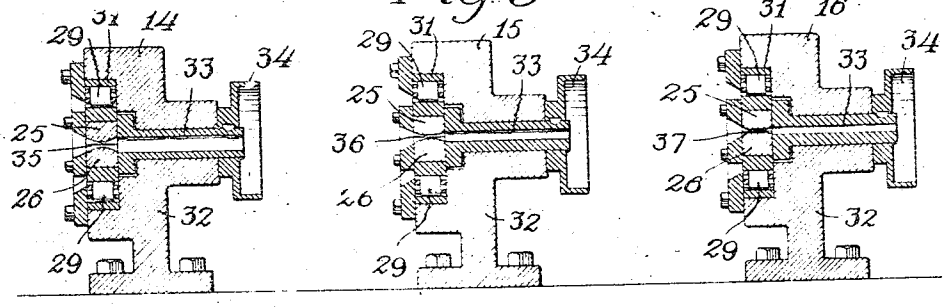
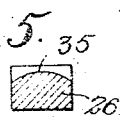


Fig. 5.



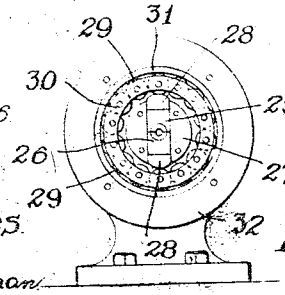
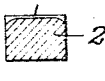


Fig. 4.

Fig. 6.



Fig. 7.



Witnesses.

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MACHINE FOR REDUCING WIRE.

1,137,920.

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To all whom it may concern:

Be it known that I, FRANK H. SLEEPER, a citizen of the Dominion of Canada, residing at Worcester, in the county of Worcester and Commonwealth of Massachusetts, have invented a new and useful Improvement in Machines for Reducing Wire, of which the following is a specification, accompanied by drawings, forming a part of the same, in which—

Figure 1 represents a side elevation of a machine for reducing wire embodying my invention. Fig. 2 is a plan view of the same. Fig. 3 is a vertical central sectional view of the three rotating swaging heads. Fig. 4 is an end view of one of the swaging heads, and Figs. 5, 6 and 7 represent detached views of dies taken in order from the several swaging heads 14, 15 and 16, and showing the variation in the face of the dies.

Similar reference letters and figures refer to similar parts in the different views.

The object of my invention is to provide means for the continuous reduction of wire by a swaging process, which obviates some of the disadvantages now attending the reduction of wire by drawing it successively through dies, and my invention consists in the construction and arrangement of parts as hereinafter described and pointed out in the annexed claims.

Referring to Figs. 1 and 2 of the drawings, 1 denotes a table or bench upon which the operative parts of the mechanism are mounted, 2 a countershaft from which they are driven, and 3 a supporting stand upon which is mounted a reel 4 permitted to turn freely, and carrying a coil of wire 5 whose diameter is to be reduced.

6 is a stand carrying a pair of feed rolls 7, driven through a worm and worm gear 8 and pulley 9 from a pulley 10 on the countershaft through a belt connection 11. The rotation of the feed rolls 7 imparts a forward movement to a wire rod 12 in the direction of the arrow 13.

Supported upon the table 1 and concentrically with the line of feed of the wire rod 12 are a multiplicity of swaging heads, in the present instance three in number, 14, 15 and 16. The swaging heads 14 and 16 are driven by the open belts 17 and 18 from the countershaft 2, and the swaging head 15 is driven by a cross belt 19 from the countershaft, so that successive ones of the three heads revolve in opposite directions. By rotating each pair of dies in the opposite direction from the preceding pair, any spiral ridges on the surface of the wire which may be formed by one pair of dies will be obliterated by the succeeding pair. Mounted upon a stand 20 behind the last swaging head 16 is a rotating disk 21, driven through beveled gears 22 and a pulley 23 from the countershaft 2 through a belt connection 24. Loosely supported upon the rotating disk 21 is a base 25^a of a reel 26^a, which is rotated by the frictional contact between the rotating disk 21 and the reel base 25^a. As the reduced wire is delivered from the swaging head 16, it is taken up by the revolving reel 26^a as long as the strain upon the wire is less than the friction between the base of the reel and the revolving disk 21. When this friction becomes less than the strain upon the wire, the disk 21 revolves while the reel stands still.

Each of the swaging heads is provided with reducing dies, in the present instance two in number, 25 and 26, carried in diametrical ways in a rotating head 27. The dies 25 and 26 are backed by die blocks 28 which, as the head rotates, are carried into contact with a series of rolls 29 journaled in a circular frame 30, with the outer periphery of the rolls bearing against a steel bushing 31 which is held in a stationary stand 32. The rotating heads are carried by hollow shafts 33 journaled in the stands 32 and provided with belt pulleys 34. The faces of the respective pairs of dies in each of the swaging heads 14, 15 and 16 vary in form, as shown in sectional view in Figs. 3, 5, 6 and 7.

The dies in the first swaging head 14 are provided with curved faces 35, which contact at their central sections with the wire rod through a limited area. The dies 25 and 26 of the second swaging head 15 are provided at their central sections with a flattened space 36, adapted to contact with a greater length of the rod than the dies in the first swaging head, while the dies in the last swaging head 16 are flattened throughout a greater extent of their central sections, as shown at 37, so as to contact with a greater length of wire than the dies in the swaging head 15.

In Figs. 5, 6 and 7 I have shown one of the dies from each of the heads 14, 15 and 16 respectively detached, and showing the elongation of the contacting surface with the wire by each successive pair of dies, the

center of the curved face 35 showing the amount of contact of the first pair of dies with the rod as it passes between them. The flattened surface 36 in Fig. 6 shows the increased contacting surface of the second pair of dies, and the flattened surface 37 in Fig. 7 shows a still greater contacting surface between the dies of the third head and the wire.

The increase in the contacting surfaces of the successive pairs of dies is for the purpose of compensating for the increased longitudinal movement of the wire as it passes through each of the swaging heads, due to the elongation of the wire. As the wire increases in length with each reduction in diameter, and as the feeding of the wire to the first set of compressing dies is uniform, it follows, the speed of each reduced section will be increased, it being equal to the initial speed of the wire plus its elongation due to compression. If the contacting surfaces of the successive pairs of dies were of the same length, each elongated section of wire would pass between each pair of dies more rapidly. In order that the wire should contact with each successive pair of dies for the same period of time, I increase the length of each succeeding pair of dies to correspond with the amount of each elongation. The successive pairs of dies are, therefore, proportioned relatively to the increased feed movement of the wire, in order that the swaged wire as it leaves the dies may present a perfectly smooth cylindrical surface without the formation of spiral ridges or marks, which would be liable to occur provided the successive compressions caused by the dies did not overlap each other. The amount of reduction also made by each successive pair of dies is proportioned inversely to the increased speed of the wire as it is forced through the dies.

The amount of reduction effected by each of the swaging mechanisms 15 and 16 is, therefore, less than that produced by the swaging mechanism 14, and the compression produced by the swaging mechanism 16 is less than that produced by the swaging mechanism 15. The reduction in the amount of compression made by each successive pair of dies is for the purpose of equalizing the work thrown upon each of the swaging mechanisms. The increased length of the contacting surfaces of successive pairs of dies requires, in order that the work upon each pair should be equalized, that the amount of reduction of the wire going through the dies with the longer contacting surfaces should be reduced, and this is accomplished by reducing the amount of compression inversely to the elongation of the wire. For example, if the wire is elongated to twice its original length by the swaging head 14, the feed movement of the wire into the swaging mechanism 15 will be twice as fast as that into the swaging mechanism 14, and the amount of compression effected by the dies in the swaging mechanism 15 is consequently arranged to be half that caused by the dies in the swaging mechanism 14, and so on throughout the series of swaging mechanisms.

I claim,

1. In a machine for the continuous reduction of a wire, the combination of a series of rotating swaging mechanisms in axial alinement, each comprising a rotating head, radially movable dies carried by said head, means for intermittently forcing said dies against the wire, a pair of feed rolls for the uniform feeding of the wire to the first of said swaging heads, and frictionally rotated means for taking up the wire as it is delivered from the last of said swaging mechanisms.

2. In a machine for the continuous reduction of a wire, the combination of a series of rotating swaging heads, each having intermittently actuated dies for compressing the wire and arranged in axial alinement, means for feeding the wire at a uniform speed to the first of said swaging heads, with the remaining swaging heads arranged to receive the wire direct from the next preceding swaging head, and a frictionally rotated take-up mechanism for receiving the wire from the last of said swaging heads.

3. In a machine for the continuous reduction of a wire, comprising a series of rotating swaging mechanisms of the class described, means for feeding the wire at a continuous uniform speed to the first of said swaging mechanisms, and means for rotating each of said swaging mechanisms in the opposite direction from the preceding swaging mechanism.

4. In a machine for the continuous reduction of a wire, a series of rotating swaging mechanisms of the class described placed in axial alinement, with each succeeding swaging mechanism, arranged to receive the wire direct from the next preceding swaging mechanism, means for feeding the wire at a continuous uniform speed to the first swaging mechanism, and means for rotating said swaging mechanisms.

Dated this sixth day of May 1909.

FRANK H. SLEEPER.

Witnesses:

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