(No Model.) 3 Sheets—Sheet 1.

E. W. VAUGHAN.

MACHINE FOR SWAGING WIRE.

No. 542,213. Patented July 2, 1895.

Fig. 1.

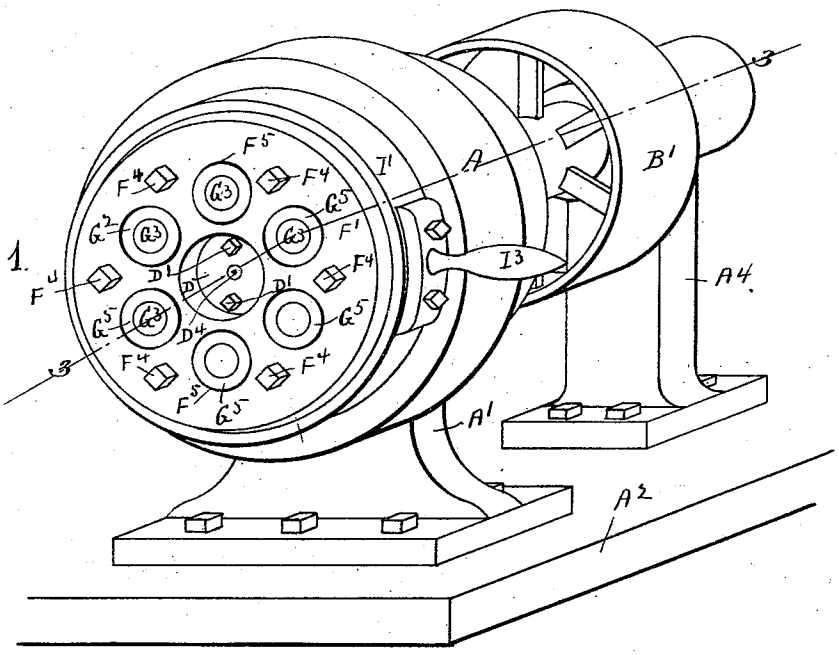
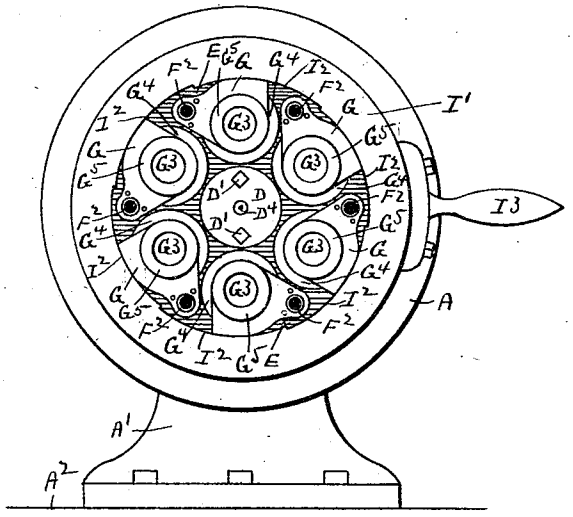


Fig. 2.



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(No Model.)

3 Sheets—Sheet 2.

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MACHINE FOR SWAGING WIRE.

No. 542,213. Patented July 2, 1895.

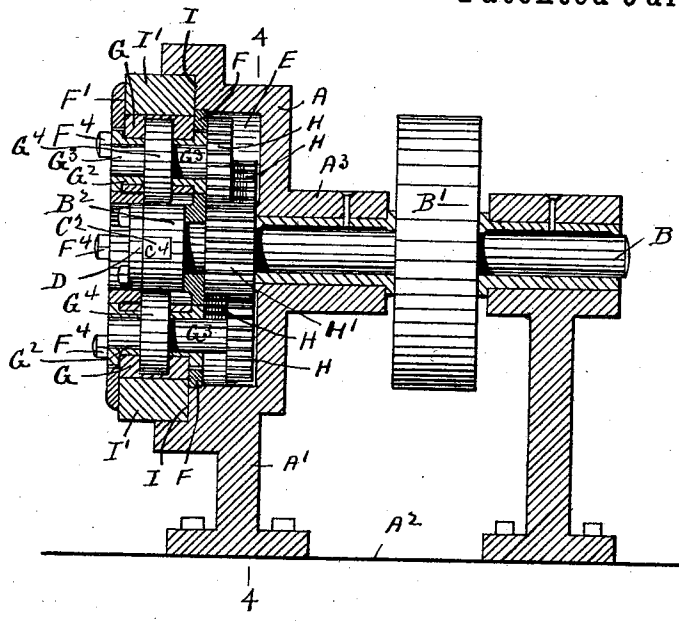

Fig. 3.

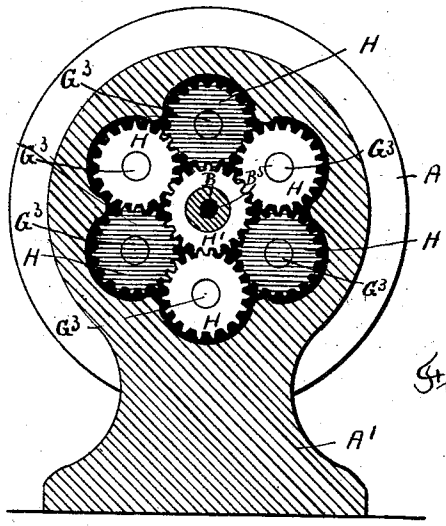

Fig. 4

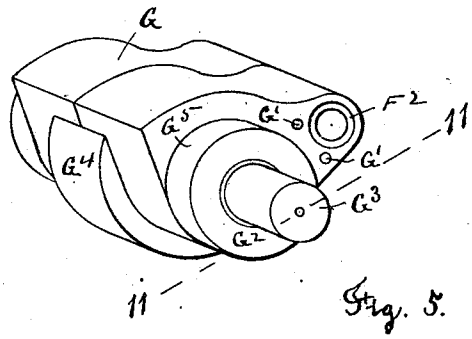

Fig. 5.

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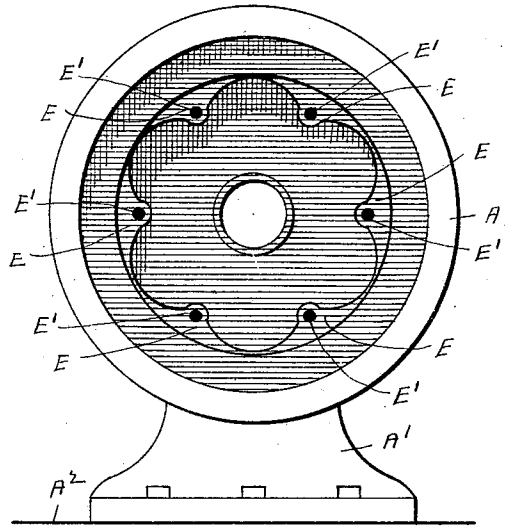
MACHINE FOR SWAGING WIRE.

No. 542,213. Patented July 2, 1895.

Fig. 6.



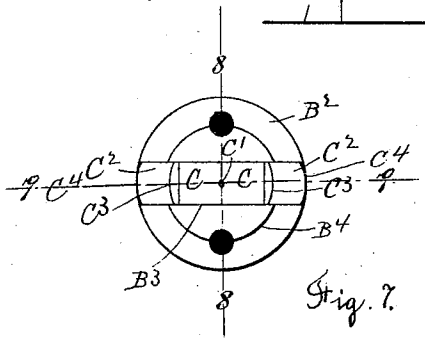


Fig. 7.

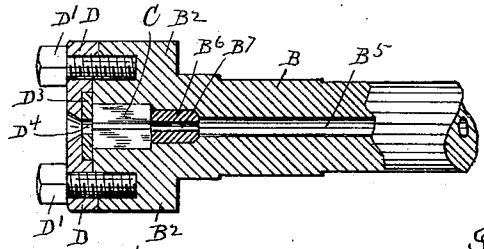


Fig. 8.

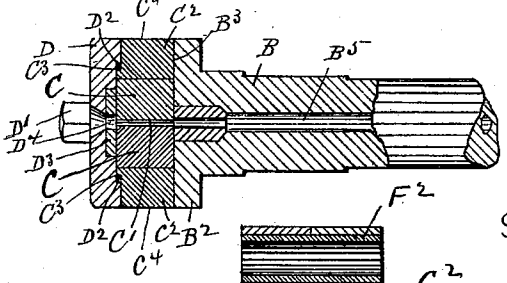


Fig. 9.

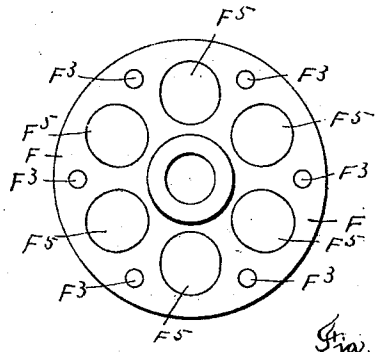


Fig. 10.

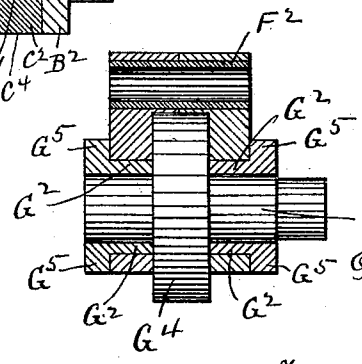


Fig. 11.

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UNITED STATES PATENT OFFICE.

EDWIN W. VAUGHAN, OF WORCESTER, MASSACHUSETTS.

MACHINE FOR SWAGING WIRE.

SPECIFICATION forming part of Letters Patent No. 542,213, dated July 2, 1895.

Application filed May 14, 1894. Serial No. 511,269. (No model.)

To all whom it may concern:

Be it known that I, EDWIN W. VAUGHAN, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in a Machine for Swaging Wire, of which the following is a specification, reference being had to the accompanying drawings, forming a part of the same, in which—

Figure 1 represents a perspective view of a wire-swaging machine embodying my invention. Fig. 2 is an end view of the machine with the front plate removed in order to disclose the swaging-rolls. Fig. 3 is a central vertical sectional view of the machine on line 3 3, Fig. 1. Fig. 4 is a vertical sectional view on line 4 4, Fig. 3. Fig. 5 is a perspective view of one of the pivoted hangers and swaging-roll journaled therein. Fig. 6 is an end view of the shell or case with the operating parts of the mechanism removed therefrom. Fig. 7 is an end view of the revolving die-block with the die-retaining plate removed in order to show the wire-swaging dies and beaters held in a diametrical slot in the revolving die-block. Fig. 8 represents a central longitudinal sectional view of the revolving die-block on line 8 8, Fig. 7. Fig. 9 is a central longitudinal sectional view of the revolving die-block on line 9 9, Fig. 7. Fig. 10 represents the circular plate held within the inclosing-shell of the machine and provided with a series of holes to receive the bushings which form the bearings for the swaging-rolls, and Fig. 11 represents a sectional view of the hanger on line 1 1, Fig. 5.

Similar letters refer to similar parts in the different figures.

The object of my present invention is to provide a wire-swaging machine adapted to either swage a piece of wire at its end, as in the operation of pointing the wire in the manufacture of needles, or to reduce its size, as in the manufacture of the spokes of bicycle-wheels, or for other purposes.

The swaging-machine embodying my invention and illustrated in the accompanying drawings is similar in its general features and its mode of operation to the wire-swaging machines now in use, but it embodies certain features of construction and operation which I deem to be novel, as hereinafter described, and pointed out in the annexed claims.

Referring to the accompanying drawings, A represents a cylindrical shell supported upon a stand A′, having a flanged base, which is bolted to a base-plate A^2. The shell A is provided with a hub A^3, inclosing a journal-bearing for the driving-shaft B, which is journaled at its outer end in a bearing supported by the stand A^4. The driving-shaft B carries a belt-pulley B′, by which rotary motion is imparted to the shaft B, and the inner end of the shaft B is enlarged, forming the cylindrical die-block B^2, which is provided with a diametrical slot B^5 in its end to receive the dies C C. The dies C C are recessed in their opposing faces, so that when they are brought together an opening C′ will be formed corresponding to the desired shape of the wire when swaged. Outside the dies C C, and within the slot B^3, are placed the hardened-steel blocks C^2 C^2, termed "beaters," the dies C C and beaters C^2 C^2 filling the slot B^3, but lying loosely therein, so as to be capable of a radial movement within the slot, and held in place by the die-retaining plate D, which is attached to the die-block by bolts D′ D′.

The end of the die-block is provided with a concentric shoulder B^4, and the die-retaining plate D is provided with a concentric shoulder D^2, fitting the the shoulder B^4, in order to hold the die-retaining plate concentrically with the die-block, and the die-retaining plate is also recessed in the center to receive a hardened-steel plate D^3, to provide a hardened surface to bear against the sides of the dies C C. The sides of the beaters C^2 C^2 are also provided with shoulders C^3, with the diametrical distance between the shoulders C^3 C^3 less than the diameter of the concentric shoulder B^4, in order to allow the beaters to move radially outward until their shoulders C^3 are brought in contact with the concentric shoulder D^2 on the die-retaining plate, thereby limiting the outward movement of the beaters. The die-retaining plate D is provided with a central hole D^4, slightly flaring at its outer end and having its axis coincident with the axis of the revolving shaft B, and the shaft B is provided with a central hole B^5, in order to

allow a piece of wire to pass through the die-retaining plate D, between the dies C C and through the hole B^5 in the shaft B.

The hole B^5 is made larger than the wire to be inserted, and its diameter is contracted immediately behind the dies C C by a hardened-steel bushing B^6, having a central hole B^7 slightly larger than the wire and serving to hold the wire concentrically with the revolving shaft B.

The shell A is provided with the internally-projecting lugs E, having screw-threaded bolt-holes E′, and against the face of the lugs E, I place the circular plate F, shown in Fig. 10 and in sectional view in Fig. 3, and in front of the plate F is a plate F′, separated from the plate F by the sleeves F^2, shown in sectional view in Fig. 11.

The plates F and F′ are provided with bolt-holes F^3, corresponding with the screw-threaded holes E′ in the lugs E, and the plates F and F′ are held in place by the bolts F^4, which pass through the holes F^3 in the plates F′ and F and through the sleeves F^2 and are screwed into the holes E′ in the lugs E.

Journaled on the sleeves F^2, which are arranged concentrically around the axis of the shaft B, are the hangers G, made in two halves and united by dowel-pins G′. The hangers G are provided with bushings G^2 G^2, in which are journaled the spindles G^3, carrying the rolls G^4. The bushings G^2 G^2 project beyond the hangers, as at G^5 G^5, the ends G^5 entering holes F^5 in the plates F and F′.

The holes F^5 are slightly elongated in order to permit a movement of the bushings within the holes and allow a slight angular movement of the hangers G around the axes of the sleeves F^2.

The spindles G^3 are extended rearwardly in order to receive gears H, which engage a gear H′ on the driving-shaft B, causing the rolls G^4 to be rotated by the rotation of the shaft B, with their peripheries traveling in the same direction as the periphery of the die-block B^2.

Between the edge of the plate F′ and a shoulder I, formed in the shell A and flush with the surface of the plate F, is placed a cam-ring I′, provided on its inner side with the eccentric cam-surfaces I^2, which bear against the outer surface of the hangers G, so that by the depression of the handle I^3 the cam-ring I′ will be rocked and the hangers G moved in toward the die-block B^2, while if the the cam-ring be rocked by the elevation of the handle I^3 the cam surfaces I^2 will allow the hangers G to move out and carry the rolls G^4 away from the die-block B^2.

The operation of the machine is as follows: The shaft B is rapidly rotated through the belt-pulley B′, causing the beaters C^2 C^2 and dies C C to be moved radially outward in the diametrical slot B^3 of the die-block by means of their centrifugal force until the shoulders C^3 on the beaters C^2 come in contact with the concentric shoulder D^2 on the die-retaining plate D. The centrifugal motion of the beaters C^2 C^2 and dies C C causes the opening C′ to be enlarged by the separation of the dies, so as to allow the wire to be swaged to be inserted between the dies through the hole D^4 in the die-retaining plate D. The centrifugal movement of the beaters C^2 C^2 in the die-block B^2 will carry their faces C^4 outside the periphery of the revolving die-block B^2, so that if the handle I^3 be depressed to rock the cam-ring I′ and crowd the hangers G inward the face C^4 of the beaters will be successively brought into contact with the periphery of the rolls G^4, causing the beaters C^2 C^2 and dies C C to be driven in toward the wire inserted between the dies. As the beaters C^2 C^2 pass the spaces between the rolls G^4, the centrifugal movement of the dies and beaters will again take place, separating the dies C C, which are again forced together by the contact of the next roll, causing a blow to be struck upon the wire as the beaters pass the rolls G^4 upon opposite sides of the die-block B^2. When it is desired to release the wire from the swaging action of the dies, the handle I^3 is raised, rocking the cam-ring I′ and allowing the hangers G to move radially outward, carrying the rolls G^4 out of the path of the beaters C^2 C^2. The outward radial movement of the hangers G is effected, as soon as the hangers are released by the cam-ring I′, by the crowding action of the gear H′ on the driving-shaft B against the gears H on the roll-spindles G^3. When the beaters C^2 C^2 are brought into contact with the swaging-rolls G^4, the periphery of the rolls travel in the same direction and at the same speed as the surface of the beater in contact with the rolls, so that the contact between the face of the beater and the periphery of the roll becomes a rolling contact instead of a sliding contact, and as the rolls G^4 are rotated positively by the rotation of the shaft B through the intermediate gearing H and H′, the portion of the periphery of the rolls coming in contact with the faces of the beaters can always be predetermined. For example, if the gears H contain the same number of teeth as the driving-gear H′, then the face of the beater will be brought into contact with the same portion of the periphery of the roll at each revolution and upon diametrically-opposite sides of the roll; but if the gears H be provided with one tooth more than the driving-gear H′, then the portion of the periphery of the roll coming in contact with the faces of the beaters will be continually varied, the faces of the beaters being brought into contact with a new portion of the periphery of the rolls at each revolution of the die-block B^2. The positive rotation of the rolls is an advantage, not only because it secures a rolling contact between the rolls and the faces of the beaters, but enables me to determine what portion of the roll shall be brought into contact with the beaters.

The employment of the rocking cam-ring, provided with a handle adapting it to be controlled by the operator, not only allows

the rolls G^4 to be brought into engagement with the beaters C^2 or thrown out of their paths, but it also allows the action of the blow to be varied by varying the amount of compression produced by the dies. For example, the cam-ring can be so set that the contact of the rolls G^4 will produce but a slight radial motion of the swaging-dies, or the cam-ring can be adjusted so as to cause the swaging-dies to be moved toward the center of the die-block until the dies are brought into contact.

I do not claim, broadly, the employment of a ring provided with cam surfaces and capable of an axial movement by which the compressor-rolls are carried radially toward the die block; neither do I claim, broadly, journaling the compressor-rolls in a series of hangers which are pivoted or hinged so as to be capable of a swinging motion. I journal the compressing-rolls G^4 in hangers which are pivoted to a fixed framework, and I hang them in such a position relatively to the die-block that a line connecting the axis of the roll and the axis of the hanger shall form an angle with a radial line extending from the axis of the die-block through the axis of the roll held in the hanger; and I provide the hanger with a bearing-surface in contact with the cam-surface of the ring at or near the free end of the hanger, so the axial movement of the ring will cause its cam-surfaces to act upon the pivoted hangers to rock them around their axes. The surface of the hanger which bears against the cam-surface of the ring is opposite the axis of the roll, causing the force of the blow, which is imparted by the beater when it strikes the roll, to be received directly by the cam-ring and its supporting framework instead of by the pivotal connection of the hanger with the fixed framework.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a machine for swaging wire, the combination with a revolving die-block, dies and beaters carried by said die-block and capable of a radial motion thereon, a series of hangers pivoted at one end concentrically around said die-block, rolls journaled in the free ends of said hangers, said hangers being hung at an angle with radial lines passing through the axes of said rolls and means applied to the free ends of said hangers to rock the same and carry said rolls toward said die-block, substantially as described.

2. In a machine for swaging wire, the combination with a revolving die-block, dies and beaters carried by said die-block and capable of a radial movement therein, of a series of hangers pivoted at one end concentrically around said die-block and at an angle with radial lines passing through said hangers, rolls carried by said hangers, a ring inclosing said hangers and provided with cam surfaces arranged to bear against the free ends of said hangers and radially opposite the axes of said rolls, substantially as described.

3. In a machine for swaging wire, the combination with a fixed frame-work of a revolving die-block carrying a pair of dies and a pair of beaters capable of a radial movement in said block, as described, a series of hangers pivoted to said frame-work and concentrically around said die-block, rolls journaled in said hangers and a ring provided with cam surfaces arranged to bear against the free ends of said hangers and rock them on their pivots and carry the rolls toward said die-block, substantially as described.

4. In a machine for swaging wire, the combination with a revolving die block provided with a diametrical slot, dies held in said slot, beaters resting against said dies and extending to the periphery of said block, said dies and said beaters being capable of a radial motion in said slot, of a series of rolls carried upon rotating spindles, gears attached to said spindles and a driving gear engaging the gears on said spindles, whereby said rolls are positively rotated with their peripheries moving in the same direction as the movement of said beaters, substantially as described.

5. In a machine for swaging wire, the combination of a revolving shaft, a die block carried by said shaft, dies carried in said die block, beaters resting against said dies, hangers pivoted around said die block, spindles journaled in said hangers, rolls carried by said spindles, gears attached to said spindles, a driving gear on said shaft engaging the gears on said spindles and means by which said hangers are crowded toward said die block, substantially as described.

6. In a machine for swaging wire, the combination of a shaft B, a die block carried by said shaft, dies and beaters carried by said die block, rolls arranged concentrically around said die block, said rolls having a positive rotary motion through connected gearing, whereby the periphery of said rolls is moved in the same direction as said beaters, substantially as described.

7. In a machine for swaging wire, the combination of a shell A, plates F and F′, bolts F^4 passing through said plates and held by said shell, die-block B^2, dies C, C and beaters C^2, C^2 carried in said die-block, hangers G pivoted on said bolts F^4 concentrically around said die-block, rolls G^4 journaled in said pivoted hangers and a ring I′ having cam surfaces I^2 bearing against the free ends of said hangers, substantially as described.

8. In a machine for swaging wire, the combination of a revolving hollow shaft B carrying a die block B^2 provided with a diametrical slot B^3, dies C, C held in said slot, a die retaining plate D attached to said die-block and provided with a central recess opposite said dies and a hardened steel plate D^3 held in said recess and bearing against said dies, substantially as described.

9. In a machine for swaging wire, the combination of a shell A, plates F and F′, sleeves F^2 by which said plates are separated, bolts F^4 passing through said sleeves into said shell, hangers G pivoted on said sleeves, spindles G^3 journaled in said hangers, rolls G^4 attached to said spindles, die-block B^2, dies C, C, beaters C^2, C^2 held in said die-block and a ring inclosing said hangers and arranged to bear against the free ends of said hangers, by which said hangers are held from rocking on their axes as said beaters are brought into contact with said rolls, substantially as described.

Dated this 9th day of May, 1894.

EDWIN W. VAUGHAN.

Witnesses:
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