(No Model.) 2 Sheets—Sheet 1.

J. ATKINS.

WIRE STRAIGHTENING AND TWISTING MACHINE.

No. 603,868. Patented May 10, 1898.

Fig. 1.

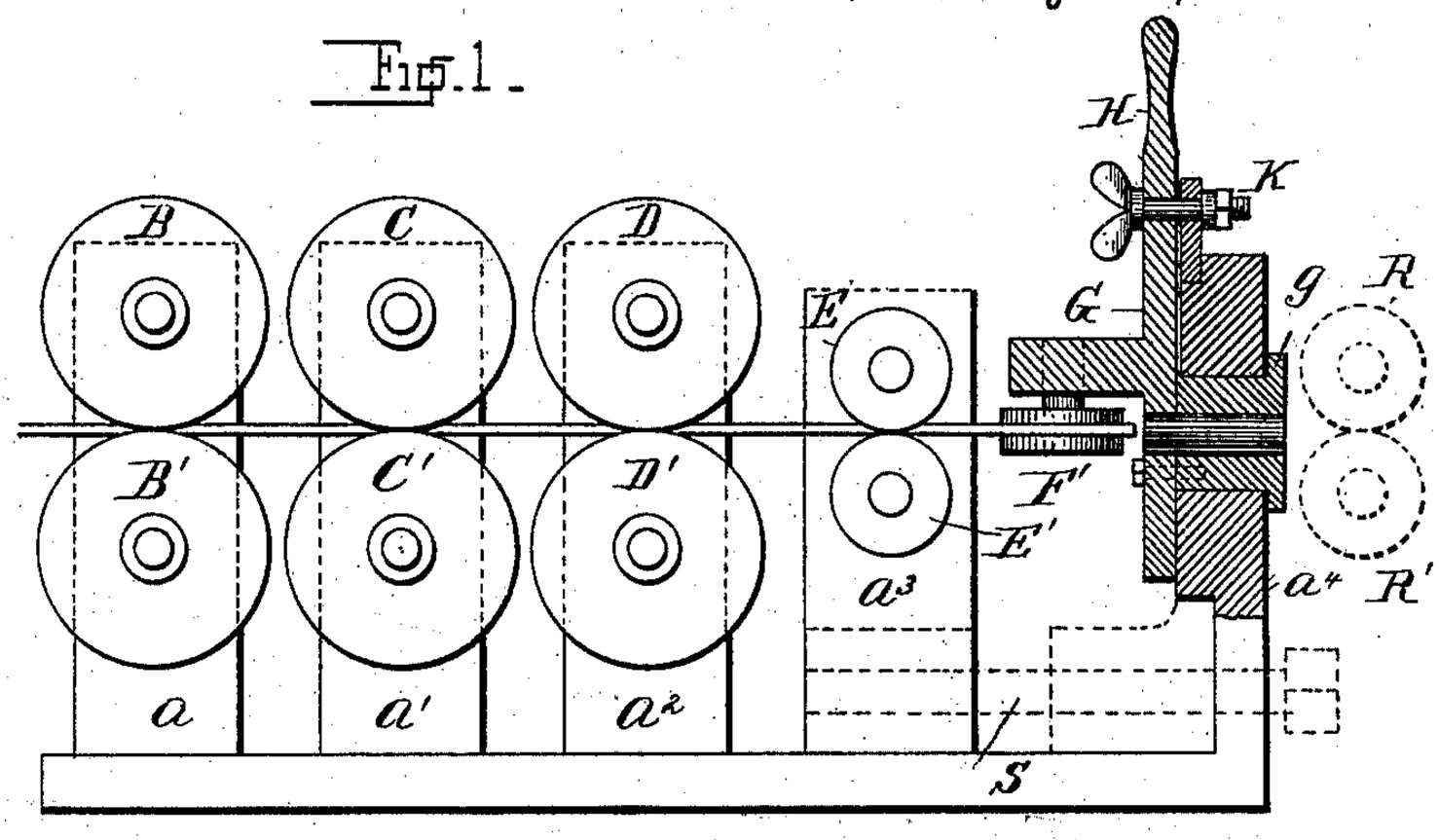


Fig. 2.

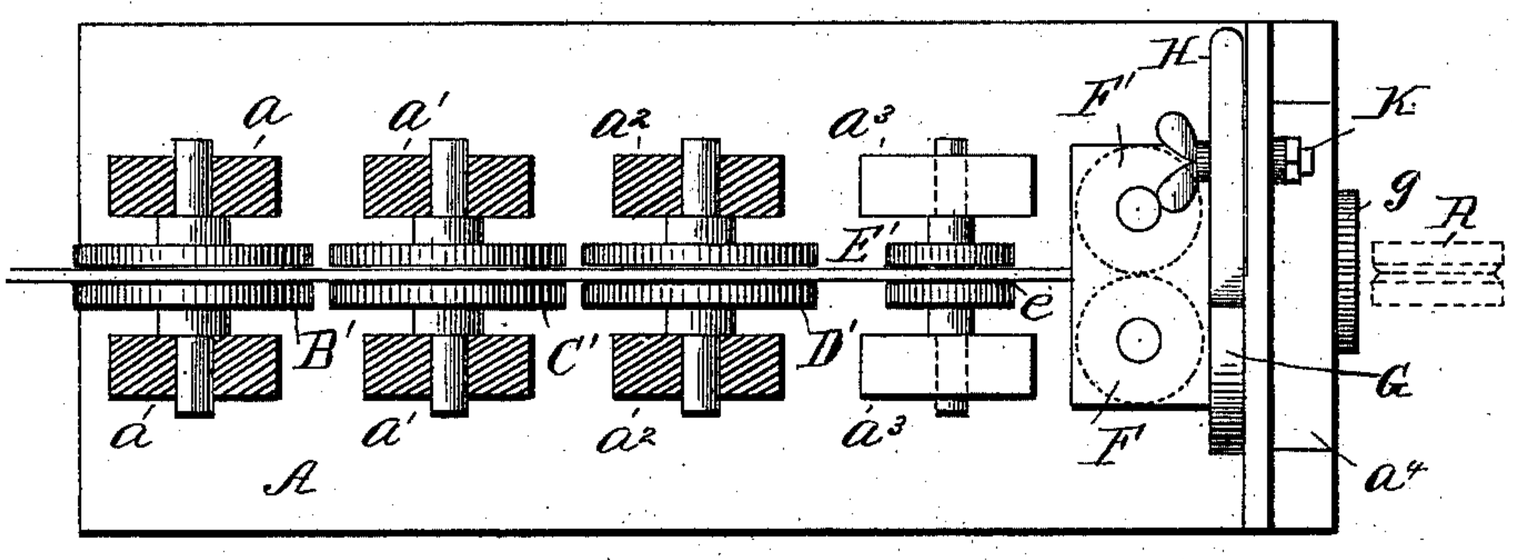


Fig. 3.

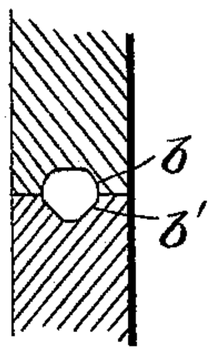


Fig. 4.

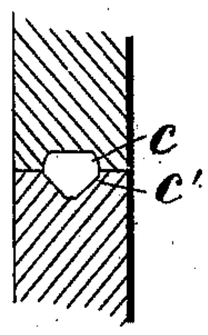


Fig. 5.

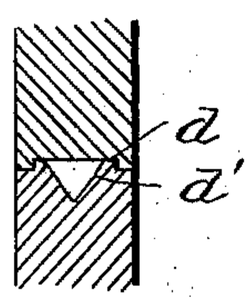
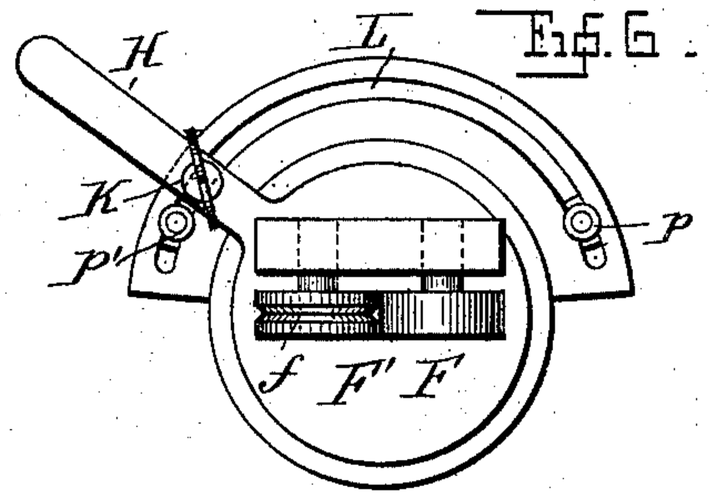


Fig. 6.



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WIRE STRAIGHTENING AND TWISTING MACHINE.

No. 603,868. Patented May 10, 1898.

Fig. 7.

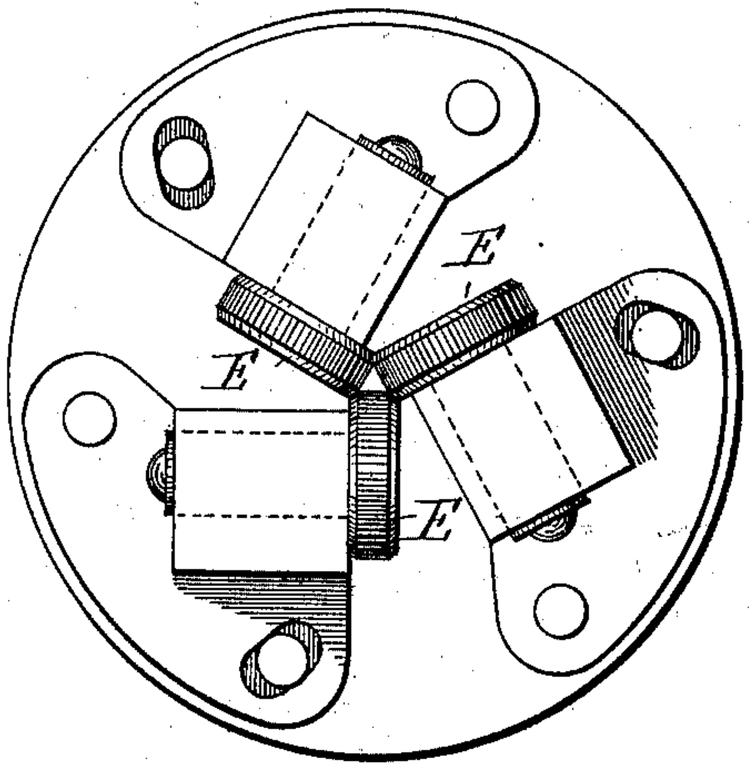


Fig. 8.

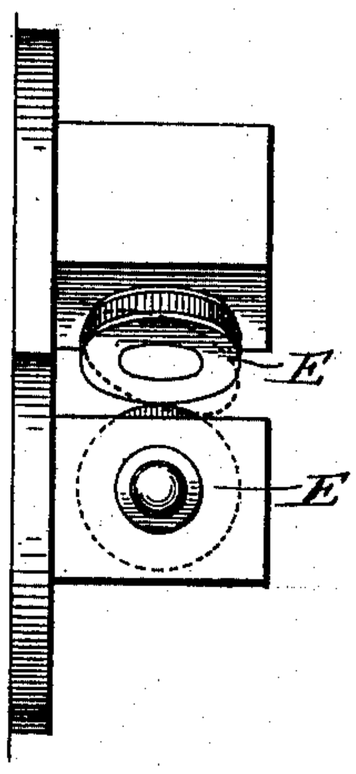


Fig. 9.

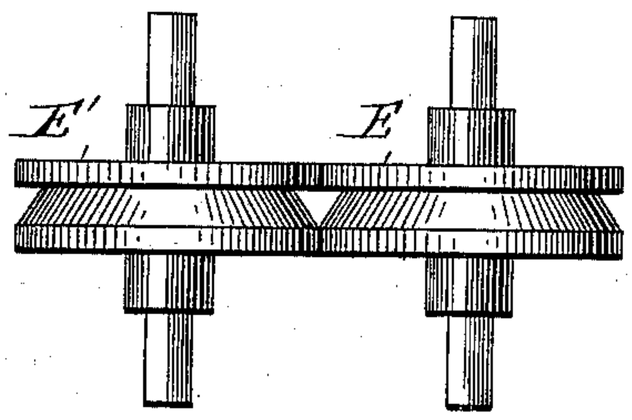
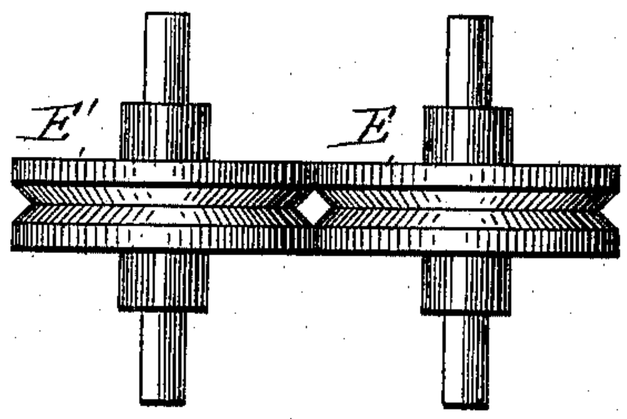


Fig. 10.



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UNITED STATES PATENT OFFICE.

JAMES ATKINS, OF MONTCLAIR, NEW JERSEY.

WIRE STRAIGHTENING AND TWISTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 603,868, dated May 10, 1898.

Application filed November 30, 1897. Serial No. 660,187. (No model.)

To all whom it may concern:

Be it known that I, JAMES ATKINS, a citizen of the United States, residing at Montclair, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Wire Forming, Straightening, and Twisting Machines, of which the following is a specification.

This invention relates to improvements in machines for forming, straightening, and twisting wire, more especially wire of angular or polygonal cross-section—such, for example, as may be used in making twisted wire nails. Such wire has been formed by drawing through dies or rolls, and has been twisted by forcing or drawing it through fixed dies which are screw-shaped, so as to twist the wire as it passes through. Owing to the excessive friction of such drawing and twisting operations they have necessarily been rather slow and therefore somewhat expensive.

My invention provides means for forming the prismatic wire from round wire by a rolling action and for twisting the wire also by a rolling action, and the same means may also be employed to straighten the wire. For this purpose the round wire is passed through a series of pairs of rolls whose peripheries are grooved or are otherwise formed and arranged so as to successively act on the wire to change it from a round to a prismatic shape. From these rolls it passes to the twisting-rolls, which may consist of two pairs of rolls whose peripheries are grooved to conform to the prismatic wire, the said two pairs of rolls being angularly displaced with reference to one another, so that as the wire passes from one pair to the other it is twisted in conformity to the grooves in said rolls. One or more extra pairs of rolls may be added at the end to act as straighteners; but inasmuch as three pairs of rolls fitting a wire and in line with one another will in general operate to straighten same the two pairs of twisting-rolls, together with the last forming-roll, may in some cases suffice also for straightening. Instead of the pair of grooved rolls sets of rolls arranged and formed in any suitable manner to conform to the prismatic wire may be used.

In the accompanying drawings, which form a part of this specification, Figure 1 is a longitudinal vertical section of my machine for forming, straightening, and twisting wire. Fig. 2 is a top view, partly in section, of same. Figs. 3, 4, and 5 are detail sectional views of the successive forming-rolls. Fig. 6 is an end view of the twisting apparatus. Figs. 7 to 10 show modifications.

The various parts of the machine may be mounted on a suitable frame A by means of suitable brackets or standards. The forming-rolls, of which I have shown three pairs, B B′, C C′, and D D′, are journaled in brackets at $a\,a'\,a^2$ and are arranged in line with one another, so as to take the wire (indicated at x) successively. These rolls are formed with grooves $b\,b'$, $c\,c'$, and $d\,d'$, which may, as shown in Figs. 3, 4, and 5, be adapted to roll the wire gradually and successively from a round to a triangular form. The grooves $b\,b'$ in first set of rolls B B′ form when placed together nearly a circular section, but present three equidistant flat portions, which will but slightly act on the wire in three equidistant portions. The next set of rolls C C′ are so grooved as to somewhat further act on these same parts of the wire, and the last set of rolls completely flattens the wire in these three sides, so as to form same into a triangular shape. From these forming-rolls the wire passes to the twisting apparatus. As here shown, this consists of two pairs or sets of rolls E E′ and F F′, the former mounted in bearings in a bracket a^3 of the frame and the latter mounted in bearings on an angularly displaceable and adjustable support G, which has a hollow hub or stud g journaled in a bracket a^4 of the frame. The peripheries of rolls E E′ and F F′ are so formed as to conform to the wire. For example, if a triangular wire is being operated upon one roll E and F of each pair has a triangular groove e and f, the other roll of each pair being flat, as shown in Fig. 6. The two pairs of rolls E E′ and F F′ are so arranged that the centers of the apertures formed between them are exactly in line with the center of aperture between the rolls D D′, so that the wire can be fed directly from the forming-rolls through the twisting-rolls. The first set of rolls E E′ of the twisting apparatus may have its groove placed so as to conform angularly to the groove in the last set of forming-rolls; but the

pair of rolls F F′ can have the angular direction of its groove or aperture varied by turning the support G thereof on its hub *g*. To effect this angular adjustment of the support G, any suitable means may be adopted. I have indicated for this purpose a handle H on said support and a locking device to hold the support in any desired angular position, consisting of a screw-clamp K, working in a slot L in a plate attached to the frame, said screw-clamp when screwed up clamping the support G to the plate in obvious manner. Stops *p p′* may also be provided to limit the motion of the said support G, these stops engaging, for example, with the screw-clamp device K.

In starting the machine in operation the support G may first be brought to a position, as by throwing it over against the stop *p*, wherein the aperture of rolls F F′ is in angular coincidence with that of rolls E E′, and said support G is then turned through an angle sufficient to produce the required twist, the stop *p′* being placed to stop it at the required point, when the support is clamped in place and the machine started. The clamping of the support serves to hold and fix the set of rolls F F′ in such relative position with regard to rolls E E′ that the wire-receiving spaces between the respective sets of rolls occupy different angular positions in the two sets, so that as the wire passes from set E E′ to set F F′ it is twisted in a constant and uniform manner. The operation may then proceed continuously, the rolls B B′, C C′, and D D′ successively forming the round wire to a triangular shape and the rolls E E′ F F′ twisting it. The motion of the rolls aforesaid may be continuous—as, for example, would be preferable in the case of making wire for use in extended lengths; but in case the machine is to be used as an adjunct to a nail-making machine the motion thereof may, if desired, be intermittent.

It is apparent that the amount of twist given to the wire depends not only on the angular displacement of the two pairs of rolls E E′ and F F′, but also on the linear distance between these rolls, so that, given a certain angular displacement of these pairs of rolls, the twisting effect of same may be varied within certain limits by adjustment of said linear distance. This may be effected in any suitable manner, as by means of a screw connection S between the brackets supporting said two pairs of rolls, as indicated in dotted lines in Fig. 1, one of said brackets—for example, the bracket a^3—being movable lengthwise of the machine.

The shape of the grooves in the rolls E E′ and F F′ may be varied, Fig. 9 showing a form wherein each roll has a groove conforming to one-half of a triangular wire and Fig. 10 a form in which each roll has a groove conforming to one-half of a square wire; or, as shown in Figs. 7 and 8, these rolls may have flat peripheries and the rolls themselves be angularly disposed, so that these flat peripheries correspond to the three sides of a triangle or other angular figure. In this case there must of course be as many rolls as the figure has sides. For example, there will be three rolls disposed at angles of one hundred and twenty degrees, so that their flat peripheries meeting at the edges form an equilateral triangle. These rolls may, moreover, be arranged with their axes in a plane at right angles to the wire, or said rolls may be somewhat tilted up, so that their peripheries correspond with the angular planes of the flat faces of the wire. It is also apparent that the shape of the grooves in the forming-rolls B B′ C C′ D D′ may be similarly varied and that the sets of rolls may be formed as shown in Figs. 7, 8, 9, and 10.

The last set of forming-rolls D D′, together with the two sets of twisting-rolls, may serve to straighten the wire sufficiently, or one or more additional pairs of rolls, as shown in dotted lines at R R′, may be provided, the same being mounted in any suitable manner, so as to serve at once to straighten the wire and to aid in twisting it.

In some cases the set of twisting-rolls E E′ could be omitted, especially when the additional set of rolls R R′ is used. In case neither set E E′ nor set R R′ is used the rolls F F′ could coöperate with the last set of forming-rolls D D′ to effect the twisting, the rolls E E′ serving the function of holding the wire to enable twisting thereof.

By "prismatic" wire I mean, broadly speaking, any wire of angular or polygonal cross-section, such as triangular, square, or flat wire.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. A machine for twisting prismatic wire comprising two sets of rolls having their peripheries formed and arranged to present between them spaces which conform to the shape of the wire, and means for supporting and fixing said rolls so that said spaces have different angular positions in the two sets of rolls, so that as the wire passes from one set of rolls to the other it is twisted in conformity to said spaces.

2. A wire-twisting machine comprising two sets of rolls conforming to the wire and arranged in line with one another so that the wire can pass through them in succession, means for varying the angular relation of one of said two sets of rolls, to the other, and means for clamping and fixing the two sets of rolls in definite angular relation.

3. A twisting-machine for prismatic wire comprising two sets of rolls, conforming to the wire and adapted to pass it successively between them, a fixed support for one of said sets of rolls, and a support for the other set of rolls which is angularly adjustable around the line of motion of the wire as a center,

and means for fixing said support in any desired angular position.

4. A straightening and twisting machine, for prismatic wire, comprising three sets of rolls arranged in line so as to pass the wire successively between them and so straighten it, the peripheries of said rolls being formed and arranged to conform to the shape of the wire in different angular positions of same in the successive rolls and means for holding the said sets of rolls in such relative positions.

5. A straightening and twisting machine for prismatic wire comprising three sets of rolls arranged in line so as to pass the wire successively between them and so straighten it, the peripheries of each set of rolls conforming to the wire, and means for holding two of the sets in such angular relation that the peripheries of said sets conform to the wire in a different angular position of the wire so that the wire is twisted in passing from one to the other.

6. A machine for forming, straightening and twisting prismatic wires consisting of a series of forming-rolls having their peripheries formed to sucessively act on a round wire to change it to prismatic form, and two or more sets of twisting-rolls, one at least of which has its peripheries formed to conform to the prismatic wire in a different angular position to that which is given it by the forming-rolls, so as to twist the wire, such sets of rolls being arranged in line, so as to straighten the wire and means for holding the said sets of rolls in such relative positions.

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