

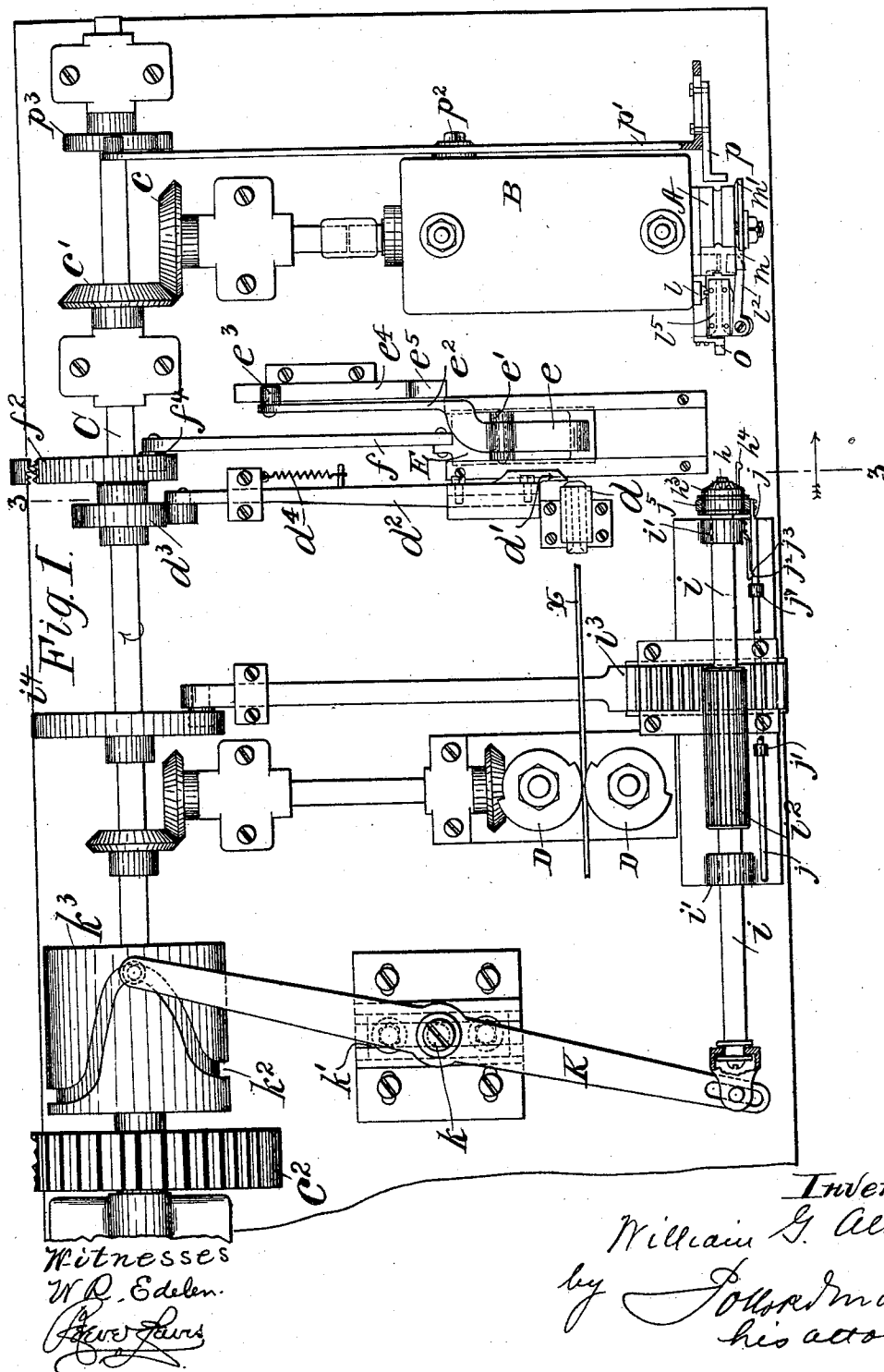
(No Model.)

4 Sheets—Sheet 1.

W. G. ALLEN.
MACHINE FOR ROLLING WIRE.

No. 585,169.

Patented June 29, 1897.



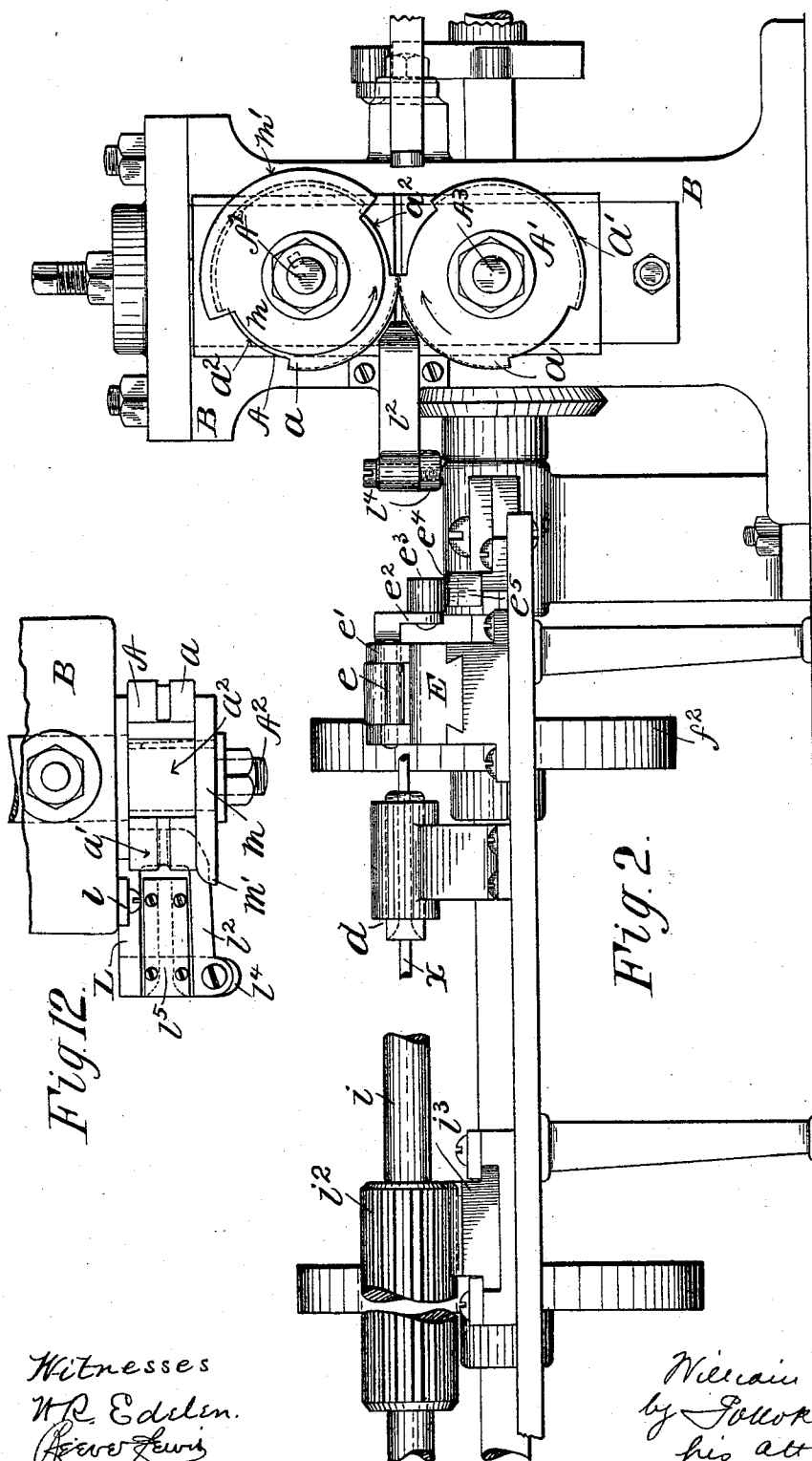
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Witnesses
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Geo. Lewis

Inventor.
W. G. Allen
by Follock Maurs,
his attorneys.

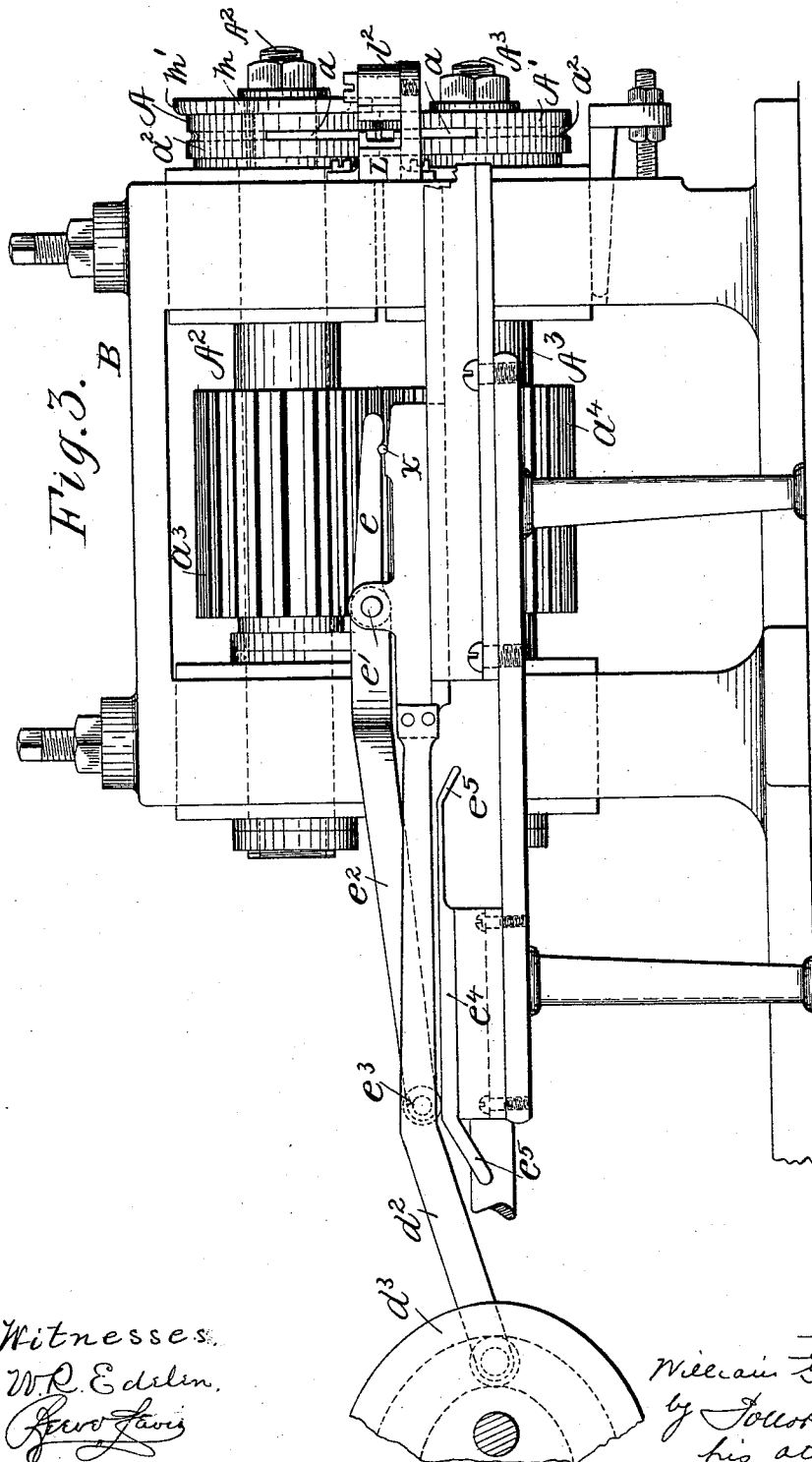
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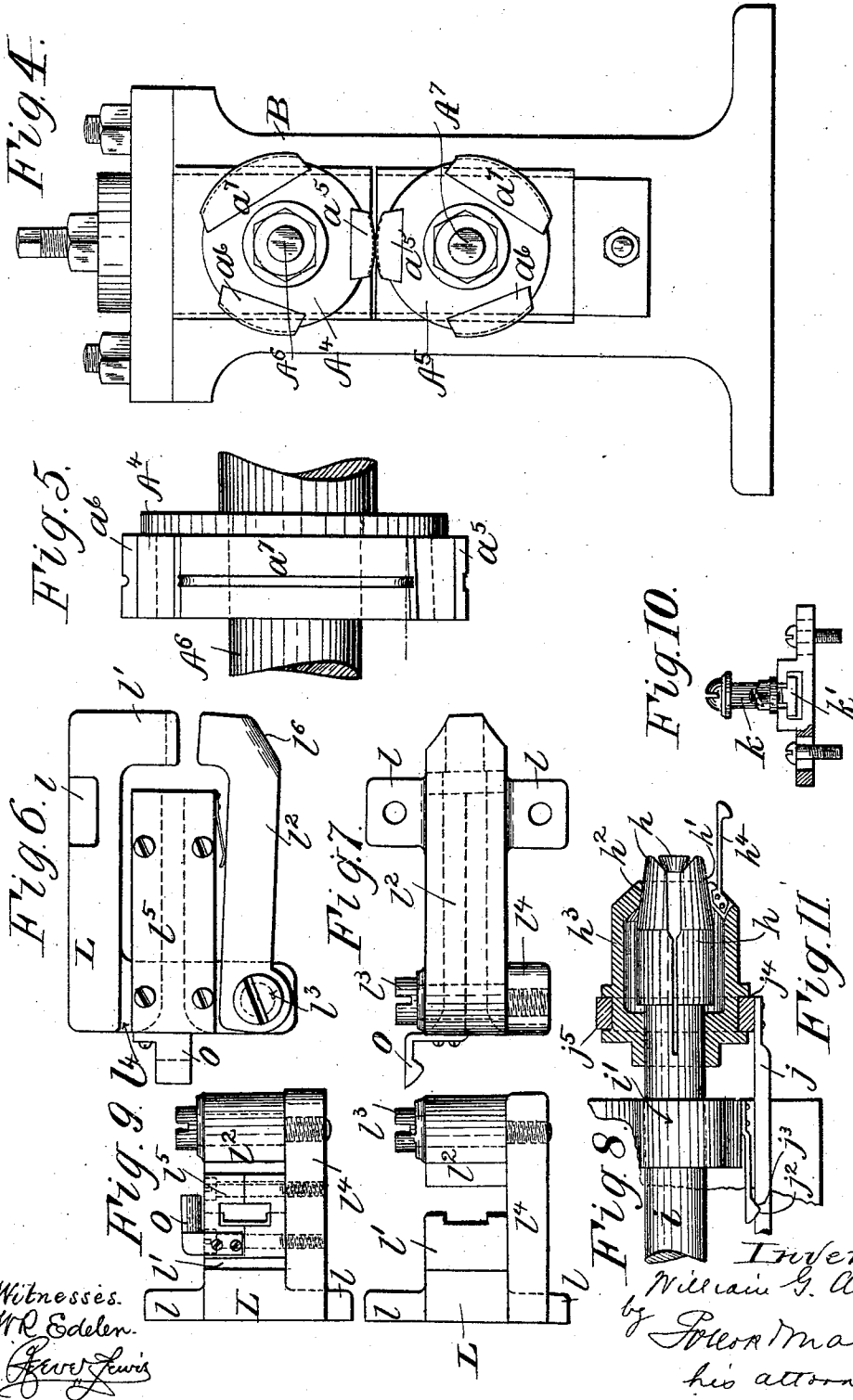
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UNITED STATES PATENT OFFICE.

WILLIAM G. ALLEN, OF HARTFORD, CONNECTICUT.

MACHINE FOR ROLLING WIRE.

SPECIFICATION forming part of Letters Patent No. 585,169, dated June 29, 1897.

Application filed July 30, 1896. Serial No. 601,031. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM G. ALLEN, of Hartford, Connecticut, have invented a new and useful Improvement in Machines for Rolling Wire, which improvement is fully set forth in the following specification.

This invention relates to means for reducing wire by rolling, and is particularly designed for use in operating upon wire-stock in the manufacture of blanks which are of reduced diameter for a portion of their length only—such, for example, as blanks for wire spokes or for button-hooks.

The machine herein described is useful in the manufacture of a great variety of articles, as will be apparent to skilled metal-workers.

In acting upon a wire to reduce a portion of its length only it is not expedient to act upon it with rolls having a circular pass, for the reason that the metal is thereby injured and the blank greatly weakened at the point where the rolls begin to act. For this reason it is advantageous to act first upon the stock by means of rolls which flatten it, producing an oblong or oval cross-section, and then by another pair of rolls having a circular pass, which further reduce the stock and at the same time restore the circular cross-section.

The object of the present invention is to accomplish the entire operation by means of a single pair of rolls. To this end the rolls are made of a circumference sufficiently great to afford the required length for two or more sets of acting surfaces—that is to say, for a portion of their periphery the rolls will have shallow and broad grooves adapted to flatten the stock, and for another portion semicircular grooves; or if more than two operations on the stock are required there may be three or a greater number of reducing-surfaces for acting successively upon the stock. Coöperating with the rolls so constructed are feeding devices whose function it is to deliver the stock to the rolls for the first operation, withdraw it after such operation, and again advance as often as the stock is to be acted upon. The feeding devices are so constructed as to turn the stock on its axis, so as to present the proper surfaces for the action of the rolls. The latter are cut away between con-

tiguous acting surfaces to admit the end of the wire initially and to permit its withdrawal between two successive operations. At the last operation the stock is released by the feeding devices and is carried entirely through the rolls.

The feeding devices and their actuating mechanism may be constructed in various ways. In the machine hereinafter described as embodying the principle of the invention the stock is held at one end by a chuck or set of gripping-jaws carried on the end of an arbor. Suitable mechanism is provided for reciprocating this arbor to advance the wire to the rolls and to withdraw it preparatory to another advance and other mechanism for turning the arbor on its axis before the second advance. In the operation of first flattening the wire and then restoring it to a circular cross-section it must be given a quarter-turn between the two operations, so as to present the narrow edges to the action of the rolls. To prevent the pressure of the rolls from turning the wire sidewise, a guide is provided adjacent to the rolls, and which keeps the wire from twisting. This device can manifestly be used with any pair of rolls adapted to roll down a flattened wire to a circular or other cross-section.

With the mechanism as thus far described it is preferred to provide means for cutting off blanks of proper length from a wire and for delivering these blanks to the chuck or gripper, so that the machine can operate continuously upon a wire of any length.

In the accompanying drawings, forming part of this specification, Figure 1 is a plan view of a machine embodying the improvements constituting the present invention. Fig. 2 is a side elevation thereof, parts of the mechanism being broken away and omitted. Fig. 3 is an end elevation, looking to the right from line 3 3, Fig. 1. Fig. 4 is an end view of a pair of reducing-rolls and their supports having three acting surfaces. Fig. 5 is an enlarged edge view of one of the rolls shown in Fig. 4. Figs. 6, 7, 8, and 9 are respectively a top plan view, front elevation, an end view with some of the parts omitted, and an end view complete of the device for preventing the turning of the flattened wire as it is

fed to the rolls. Fig. 10 is a detail of the pivot for the lever which oscillates the chuck for feeding the stock to the rolls. Fig. 11 is a detail view, partly in section and partly in elevation, of the chuck for holding the wire as it is fed to the rolls; and Fig. 12 is a plan view of the rolls and adjacent parts, showing the movable pressure-jaw in a closed position.

Referring to the drawings, A represents the upper roll, and A' the lower roll, each having acting surfaces $a a'$, between which the peripheral surfaces of the rolls are cut away, forming depressions a^2 . The acting surfaces $a a'$ of the rolls have shallow broad peripheral grooves therein acting on the wire to flatten and elongate it, while the acting surfaces $a' a'$, which are longer than the acting surfaces $a a$ to compensate for the elongation effected by the latter, have semicircular peripheral grooves which act upon the edges of the flattened wire to restore the circular cross-section.

Rolls A and A' are mounted on the ends of shafts A^2 and A^3 , respectively, supported in bearings in framework B, the lower shaft A^3 being rotated by the bevel-gear c on the end thereof, meshing with a corresponding gear c' on the main shaft C, driven from any suitable source of power through gear c^2 . Shaft A^3 transmits motion to shaft A^2 through pinions a^4 and a^3 , carried thereby, respectively.

D D are a pair of feed-rolls for intermittently feeding the wire-stock to a cutter, which latter consists of a bushing d and a shearing-blade d' , carried by a sliding rod d^2 , reciprocated in one direction by a cam-wheel d^3 on shaft C and in the reverse direction by a spring d^4 . As the wire-stock is advanced by the feed-rolls it is passed through bushing d to a position to be engaged by a movable gripping-jaw e on a sliding carriage E. Jaw e is pivoted at e' and has a rearwardly-extending arm e^2 , carrying a roller e^3 , adapted to run along a track e^4 , said track having inclined surfaces $e^5 e^5$ at each end thereof to close and open the jaw at the proper times. Carriage E is given its forward and backward movements by a pitman f , connected at one end to the carriage and carrying at its other end a roller f^4 , engaging in a cam-groove in the side of a wheel f^2 on shaft C. After a suitable length of stock has been severed by the cutter and is in position to be gripped by jaw e the carriage E is advanced, as above explained, such forward movement causing roller e^3 to run up incline e^5 at the rear end of the track, thereby closing jaw e tightly against the stock. At the instant the limit of the forward movement of the carriage E is reached the roller e^3 runs down the incline e^5 at the front end of the track, thereby releasing the grip of jaw e upon the stock. The blank remaining momentarily in this position is gripped at one end by a chuck, whereby it is fed to the reducing-rolls. The mechanism for operating this chuck will next be described.

The chuck proper consists of two or more jaws $h h$ (three being shown on the drawings)

on the extremity of arbor i , said jaws having conical surfaces h' at one end, which bear against the edge h^2 of a sleeve h^3 , arranged about said jaws. Sleeve h^3 fits closely about the shaft to the rear of the jaws, so as to slide freely thereon, and is also connected by means of an annular groove j^4 and collar j^5 to the end of a rod j , sliding in lugs or ears j' on the framework and having a notch j^2 therein, adapted to be engaged by a spring j^3 , as will be presently explained. In a suitable recess in the edge h^2 of the sleeve h^3 is secured a spring-catch h^4 , which, when the sleeve is turned to the proper position, is adapted to engage under a stationary tooth o , located in front of the rolls, the effect being, when the reverse movement of arbor i begins, to slide the sleeve forwardly over the jaws h , releasing the jaws, which spring open and release the stock, the latter passing on through the rolls. The continued reverse movement disengages the spring-catch h^4 from the tooth o .

Arbor i is movable longitudinally in bearings i' and carries a wide gear i^2 thereon engaged by a rack i^3 , operated from a cam-wheel i^4 to rotate the shaft and chuck at the proper time to turn the flattened blank to present its narrow edges to the acting surfaces $a' a'$, having the semicircular grooves therein. The longitudinal movements of arbor i for advancing the stock to the acting surfaces $a a$, then withdrawing it by a reverse movement while depressions a^2 of the rolls pass over the wire, during which interval the wire is turned a quarter of a rotation, and again advancing the flattened stock to the acting surfaces $a' a'$, are effected by a lever K, pivoted at k to an adjustable slide k' , said lever carrying at one end a roller engaging a peripheral cam-groove k^2 in a drum k^3 on shaft C. At its other end lever K is connected to the extremity of arbor i in such way as to permit the same to freely rotate, as clearly shown in Fig. 1.

The devices for guiding the wire-stock to the rolls and for preventing the rolls from turning and twisting the stock as it is passed between the rolls in its flattened condition will now be explained.

L is a bracket secured to the framework B by ears $l l$ in front of rolls A A'. An arm l' of the bracket serves as the stationary jaw of a pressure device of which the movable jaw l^2 is pivoted at l^3 to another arm l^4 of the bracket. l^5 is a stationary bushing secured to the arm l^4 of the bracket and through which the stock is fed. It being only necessary that the pressure device should act upon the blank after it has been flattened and during the time that it is being acted upon by the surfaces $a' a'$ to close jaw l^2 against the stock at the proper time, I employ a disk m , keyed on shaft A^2 outside of the roll A, said disk being cut away for a portion of its periphery, or, in other words, having an extended portion m' , corresponding to the acting surfaces a' , adapted to bear at its inner edge upon a beveled surface l^6 of jaw l^2 , (see

Fig. 12,) thereby pressing the latter tightly against the blank as it slides between the jaws to the rolls.

In order to prevent the stock from being advanced too far through the rolls before it is acted upon by the flattening-grooves, or, in other words, to regulate the extent of the end portion of the stock which is unacted upon, a movable stop is provided at the exit side of the rolls. This stop consists of an angular piece p , adjustably secured to an angular extension on a lever p' , pivoted at p^2 to the framework B and adapted to be raised and lowered from the line of the grooves at the proper times by a cam-wheel p^3 on the shaft C, bearing against a roller on the rear end of lever p' .

The operation of the machine is as follows: The continuous wire x is fed forward intermittently by the feed-rolls D D through the bushing d to a position to be gripped by the jaw e , at which instant cam-wheel d^3 actuates the blade d' to sever a proper length of stock. Immediately after this has been effected cam-wheel f^3 advances the carriage E, which movement causes the jaw e to close tightly against the stock, as already explained. When the carriage reaches the limit of its forward movement, the stock is released, and at the same instant the chuck is advanced with its jaws open, this movement being effected by a longitudinal movement of the arbor i through the lever K and cam-groove k^2 in drum k^3 . During this forward movement of the jaws h the sleeve h^3 is held stationary by spring j^3 engaging notch j^2 in rod j , and the conical surfaces of the jaws engaging against the edge h^2 of the sleeve closes the jaws tightly about the end of the stock. Further movement of the arbor i carries the sleeve forward with the jaws, disengaging spring j^3 from the notch j^2 and sliding the rod in lugs j' . The stock is now advanced through bushing b^5 and between the rolls, (depressions a^2 of the latter being at this instant opposite each other and no pressure being applied by the jaw l^2 .) If the stock has been gripped at the proper point, its position will not be affected by the stop p , which is at this period of the operation in the line of feed; but if too short a grip has been taken upon the stock by the chuck, due to slight irregularities in the operation of the machine, the free end of the stock will come in contact with the stop to force the stock farther into the grip of the chuck. At the instant the end of the stock projects through the rolls for a proper distance the flattened grooves come into action against opposite sides thereof and flatten it for a portion of its length. The stock being released from the bite of the rolls by reason of the depressions a^2 (following the flattening-grooves) coming opposite each other, cam k^2 operates to reverse the movement of the arbor i , drawing it back for another feed. During this reverse movement cam-wheel i^4 actuates rack i^3 to rotate gear i^2 , thus turning the arbor i , and

with it the stock, one-quarter of a rotation, bringing the stock to an edgewise position. The parts are now advanced again by the operation of cam-groove k^2 , the jaw l^2 being brought into action to prevent the stock from turning, as already explained, and the grooves of semicircular cross-section acting upon the stock to restore its circular cross-section. When the chuck reaches the limit of this second forward movement, spring-catch h^4 engages tooth o , (having been brought into line therewith by the rotation of the arbor i), so that at the beginning of the reverse movement of the chuck sleeve h is momentarily held stationary, the jaws sliding therein and being released so as to spring open and release the stock, which is carried on through the rolls. Arbor i and with it the sleeve h (through frictional contact with the jaws) are now further rotated by cam i^4 , rack i^3 , and gear i^2 to return the spring-catch h^4 to its original position. During the time these operations are being performed another length of stock is severed by the cutter and brought forward by the carriage to be grasped by the chuck, and the movements, as above described, are repeated, thus making the operation of the machine continuous.

In Figs. 4 and 5 rolls A^4 and A^5 are shown as having three pairs of acting surfaces a^5 , a^6 , and a^7 , the surfaces a^5 having flat grooves therein and the surfaces a^6 and a^7 having semicircular grooves therein, those in surface a^7 being of less diameter than those of surfaces a^6 , whereby the stock upon being flattened is more gradually restored to a circular cross-section by the action of the two sets of grooves than where one set only is used for this purpose.

Of course it will be understood that in machines wherein rolls having three (or more) sets of acting surfaces are employed certain changes in the operation of the feeding devices are necessary whereby the blank is advanced to the rolls for the action of the first set of acting surfaces, then withdrawn after such operation, advanced to the rolls for the action of the second set of acting surfaces, withdrawn after such operation, and finally advanced to the rolls for the action of the third set of acting surfaces. Such modifications, however, will be readily made by any skilled mechanic from the explanations given in this specification.

Of course it will be understood that the movements of the several parts and mechanisms must be properly timed and regulated, so as to properly coact with reference to each other, and that parts of the mechanism shown and described are capable of use separately from and in other machines than that of this application; also, that modifications may be made without departing from the nature and principle of the invention.

As already stated and as will be readily seen, the size of the rolls may be varied and a larger number of independent grooves or

acting surfaces arranged thereon, as may be most advantageous for the particular purpose. When, therefore, mention is made in the claims of two grooves or acting surfaces, it is to be understood that such claims are not limited to that precise number, two being simply the minimum.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a machine for rolling wire-stock, a pair of reducing-rolls having two sets of grooves or acting surfaces in the same line, for acting successively upon the stock, the peripheries of the rolls being cut away between contiguous sets of grooves, in combination with feed mechanism for advancing the stock to the rolls, then withdrawing it, and advancing it for another pass, substantially as described.

2. In a machine for rolling wire-stock, a pair of reducing-rolls having two sets of grooves in the same line, for acting successively upon the stock, the peripheries of the rolls being cut away between contiguous sets of grooves, in combination with feed mechanism for advancing the stock to the rolls, then withdrawing it, then turning the stock and advancing it for another pass, substantially as described.

3. In a machine for rolling wire-stock, a pair of reducing-rolls having a set of flat shallow grooves therein, for flattening the wire-stock, and a set of grooves of semicircular cross-section, in line with said flat grooves, for restoring the circular cross-section of the stock, the peripheries of the rolls being cut away between contiguous sets of grooves, in combination with feed mechanism for advancing the stock to the rolls for the action of the shallow flat grooves, then withdrawing the stock and turning it a quarter of a rotation, and again advancing it to the rolls for the action of the grooves of semicircular cross-section, substantially as described.

4. In a rolling-machine, the combination with the rolls for acting upon the stock, of a device constructed and arranged to act upon said stock to prevent it from twisting under the action of the rolls, and means for automatically throwing said device into operation during a portion of the rotation of the rolls, substantially as described.

5. In a rolling-machine, the combination

with the rolls for acting upon the stock, of a device contiguous to said rolls constructed and arranged to press upon or grip the stock to prevent it from twisting, and means on one of the rolls for throwing said device into operation during a portion of the rotation thereof, substantially as described.

6. In a rolling-machine, the combination with the rolls for acting upon the stock having two sets of grooves therein, one set for flattening the stock and the other set for restoring its circular cross-section, the peripheries of the rolls being cut away between contiguous sets of grooves, a device constructed and arranged to press upon or grip the stock as it is fed to the rolls, and means rotating with one of the rolls and actuating the gripping device while the rolls are acting on the flattened stock, substantially as described.

7. In a rolling-machine, the combination with the rolls having acting and non-acting peripheral surfaces, of a device constructed and arranged to grip the stock as it passes through the rolls to prevent twisting, and a disk located at the end of and rotating with one of the rolls and having a peripheral tension corresponding with the acting-surface of the roll for actuating the gripping device, substantially as described.

8. In a rolling-machine, the combination with the rolls and a single feeding device successively presenting the stock to said rolls, of a carriage for successively delivering the stock in proper lengths to the feeding device, and means on the carriage for gripping and releasing the stock at the proper times, substantially as described.

9. In a rolling-machine, for reducing the diameter of the stock for a portion of its length only, the combination with the rolls having segmental peripheral acting-surfaces, the rolls being cut away between the ends of said surfaces, of a movable stop at the exit side of the rolls and means for moving said stop into and out of the path of the stock at the proper times, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WILLIAM G. ALLEN.

Witnesses:

CHAS. FLINT,
ERNEST C. DAY.