(No Model.) 6 Sheets—Sheet 1.

E. L. HOWE.

MACHINE FOR MAKING AND ATTACHING BUCKLE ROLLERS.

No. 366,585. Patented July 12, 1887.

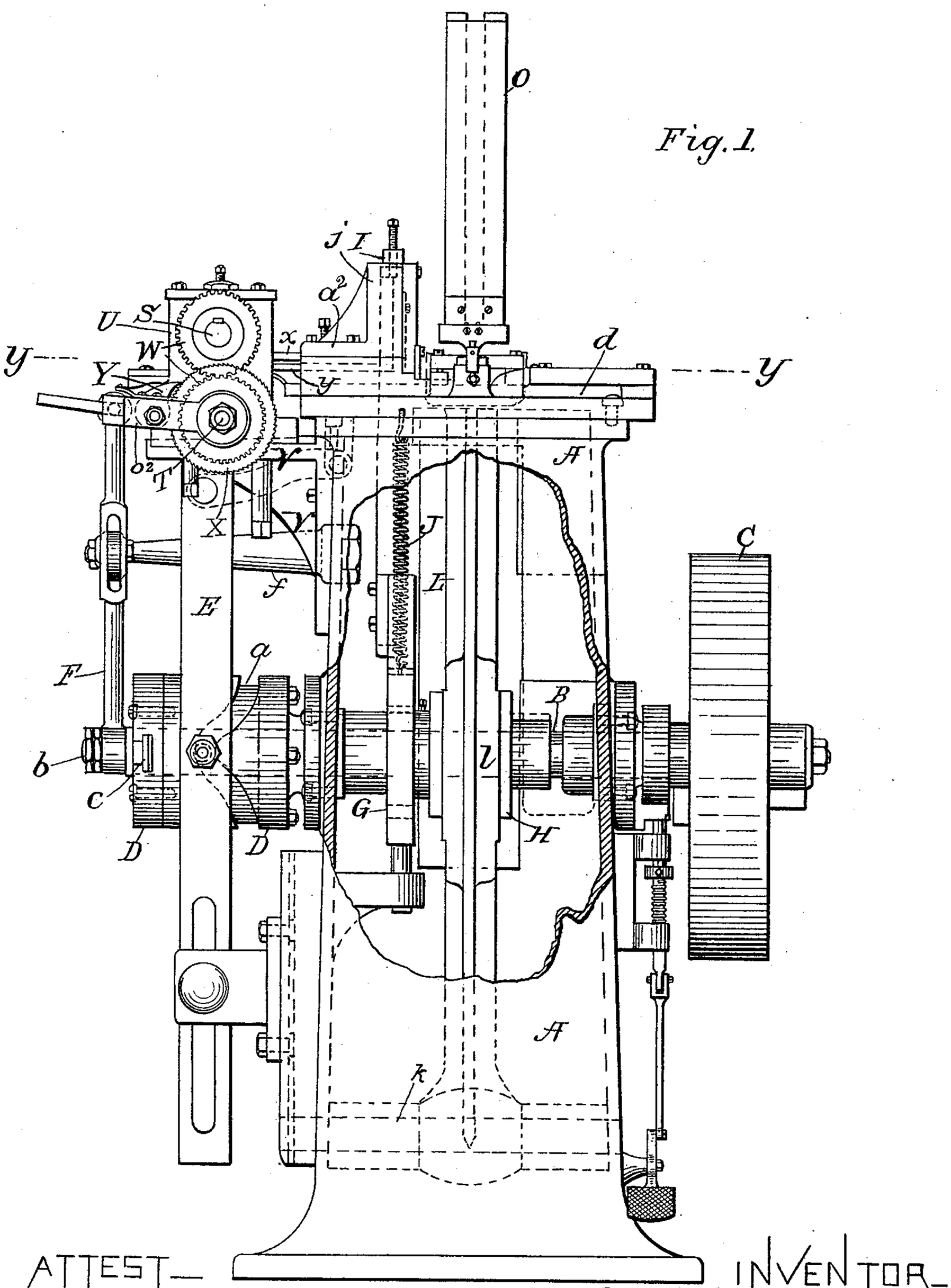

Fig. 1.

ATTEST—
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INVENTOR—
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By his atty
L. J. N. McIntire

N. PETERS. Photo-Lithographer, Washington, D. C.

(No Model.) 6 Sheets—Sheet 2.

E. L. HOWE.

MACHINE FOR MAKING AND ATTACHING BUCKLE ROLLERS.

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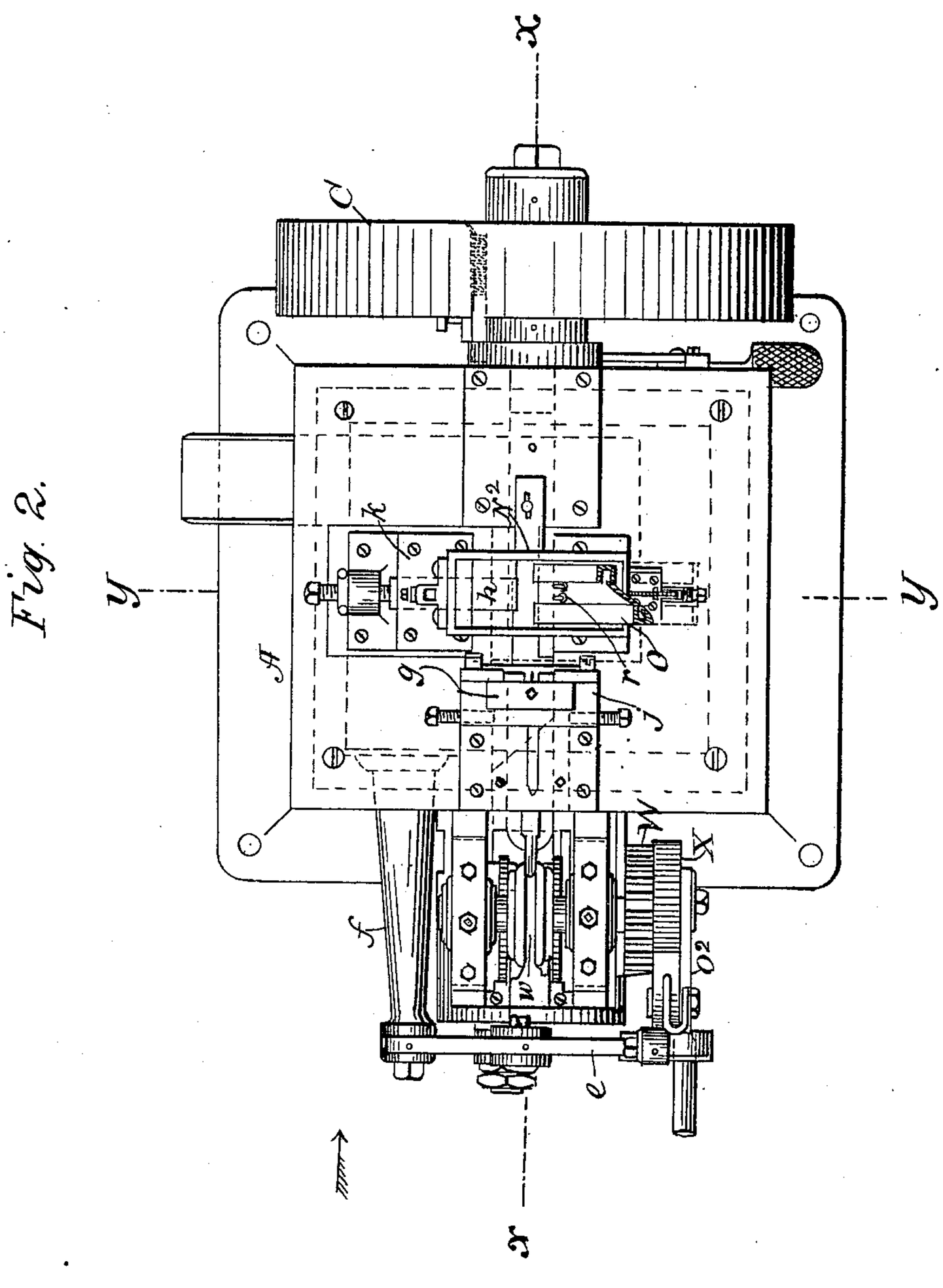

Fig. 2.

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(No Model.) 6 Sheets—Sheet 3.

E. L. HOWE.

MACHINE FOR MAKING AND ATTACHING BUCKLE ROLLERS.

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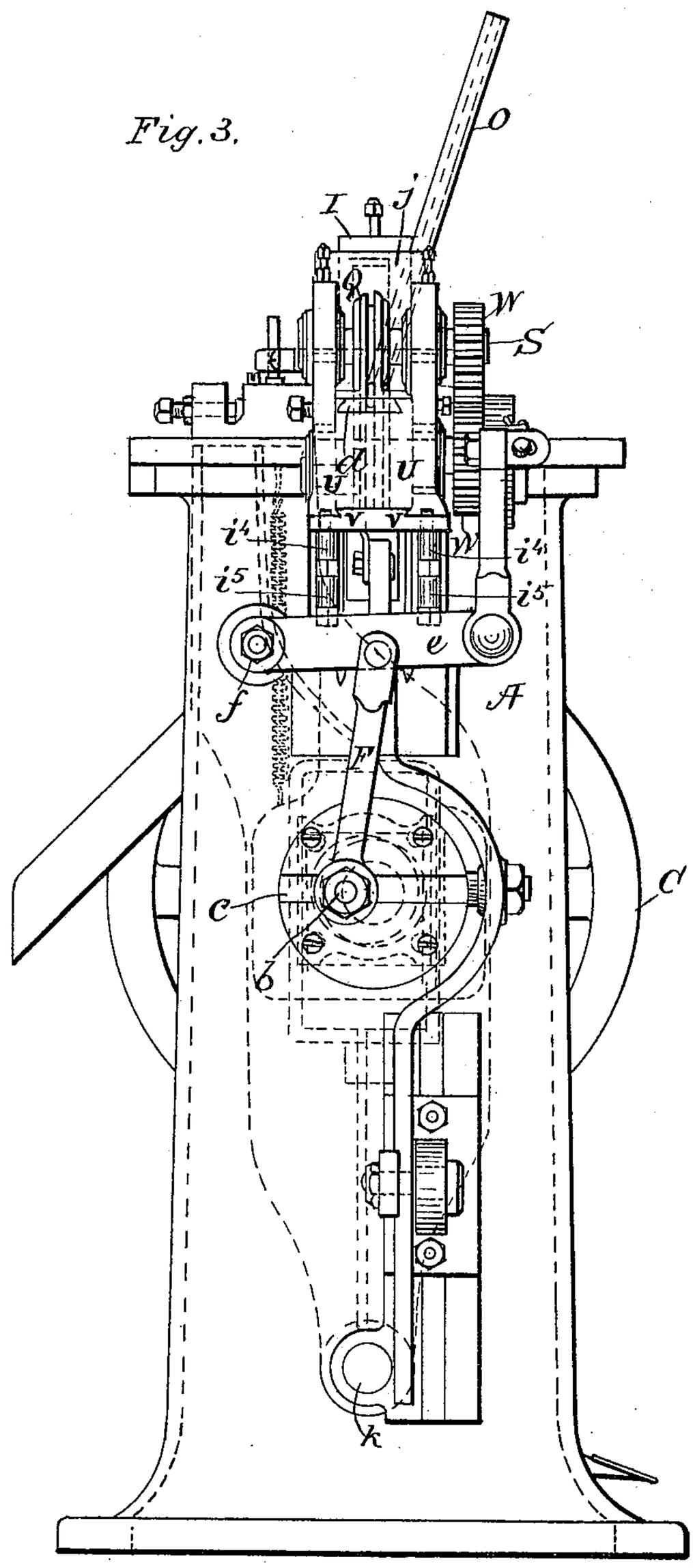
Fig. 3.



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(No Model.) 6 Sheets—Sheet 4.

E. L. HOWE.

MACHINE FOR MAKING AND ATTACHING BUCKLE ROLLERS.

No. 366,585. Patented July 12, 1887.

Fig. 4.

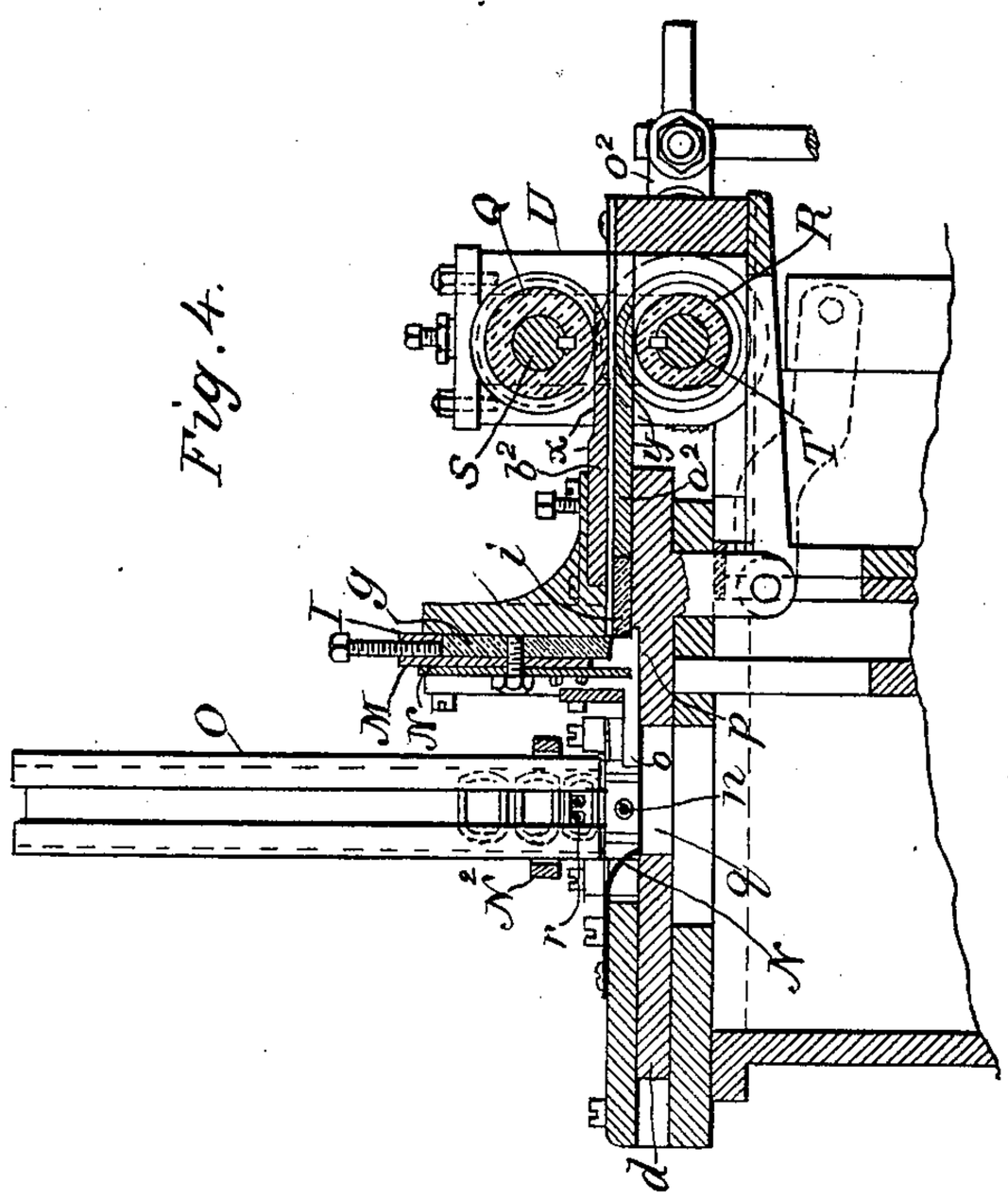
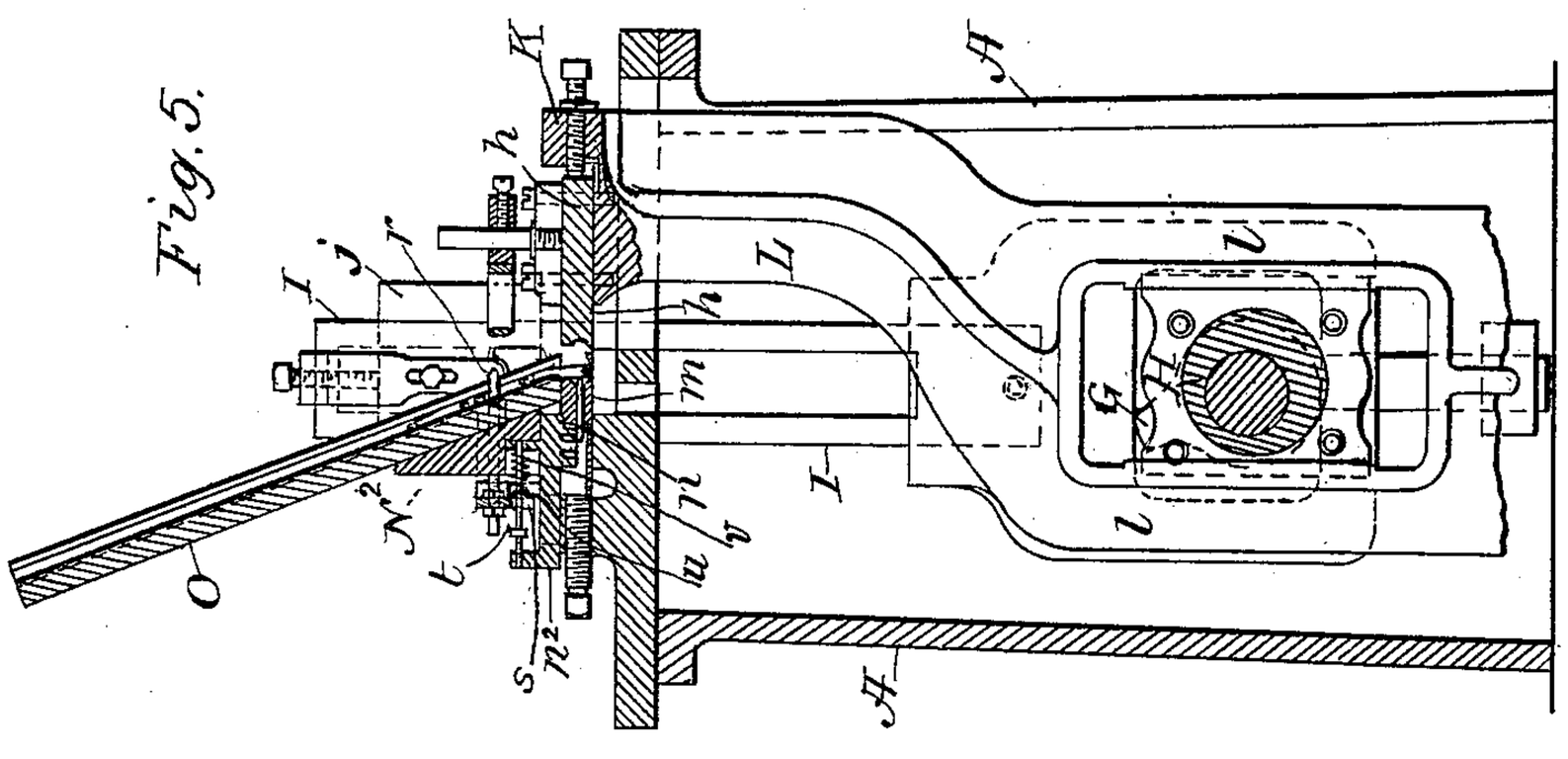


Fig. 5.



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(No Model.) 6 Sheets—Sheet 5.

E. L. HOWE.

MACHINE FOR MAKING AND ATTACHING BUCKLE ROLLERS.

No. 366,585. Patented July 12, 1887.

Fig. 6.

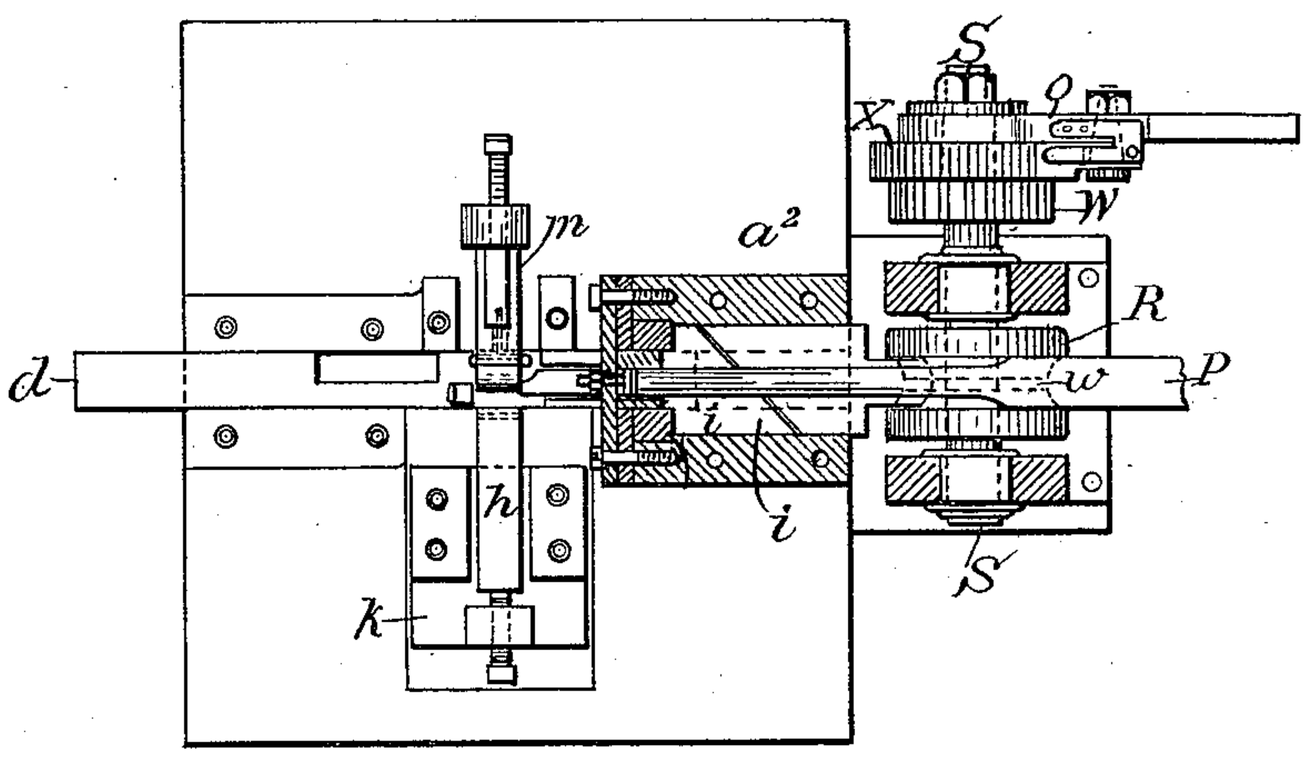


Fig. 7.

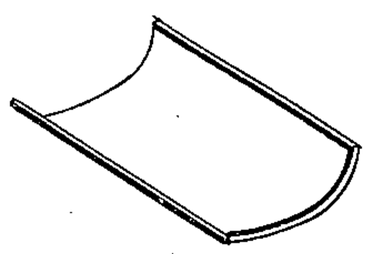
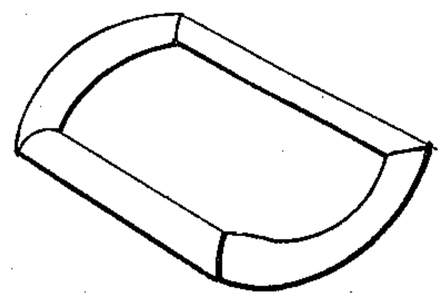


Fig. 8.



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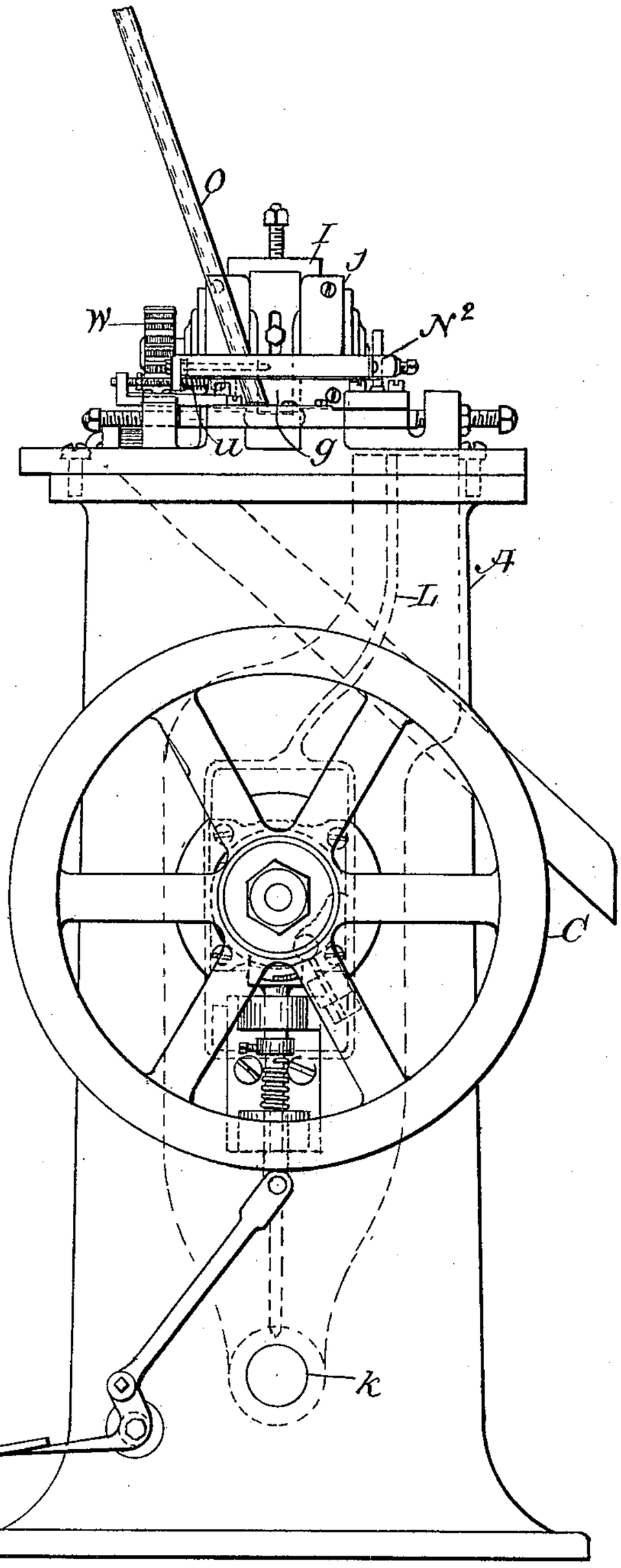
(No Model.) 6 Sheets—Sheet 6.

E. L. HOWE.

MACHINE FOR MAKING AND ATTACHING BUCKLE ROLLERS.

No. 366,585. Patented July 12, 1887.

Fig. 9.



ATTEST:
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UNITED STATES PATENT OFFICE.

EUGENE L. HOWE, OF CLEVELAND, OHIO.

MACHINE FOR MAKING AND ATTACHING BUCKLE-ROLLERS.

SPECIFICATION forming part of Letters Patent No. 366,585, dated July 12, 1887.

Application filed March 1, 1887. Serial No. 229,276. (No model.)

To all whom it may concern:

Be it known that I, EUGENE L. HOWE, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented a Machine for Putting the Rollers on Buckles; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

My invention has for its object to provide for use an automatic machine which, upon being merely supplied with a strip of sheet metal from which to make the rollers and a quantity of the buckle-frames to be rollered, will rapidly and perfectly make the sheet-metal roller-tubes and apply them to the buckle-frames, the latter, with the properly-applied sheet-metal rollers, being rapidly discharged from the machine in a finished condition.

Previous to my invention it has been customary to employ for the purposes of making such sheet-metal tubular rollers and applying them properly to the buckle-frames at least two separate machines, one for cutting out and slightly upsetting the sheet-metal blanks designed to compose the rollers and the other for forming the blanks separately into tubular devices encircling one of the bars of each of the buckle-frames, the organization and operation of the machine for bending the sheet-metal blanks into tubes round about the buckle-frame bars having been such that it was necessary to have the buckle-frames applied separately and successively to the machine by hand, and in like manner removed therefrom after each operation of placing a roller on a buckle-frame.

I propose to effect both the making of the roller-blanks and the formation of said blanks into rollers on the buckle-frames by a single machine, which shall not only be perfectly automatic in its operations, and shall merely require to be fed with strips of sheet metal for the manufacture of the rollers and supplied with a quantity of buckle-frames, but which shall also be capable of turning out the rollered buckle-frames faster than they can be made by the methods and machinery heretofore used and without the employment of any skilled hand labor; and to this purpose my invention consists in the novel organization of machine and in the combinations of devices therein comprised, that will be found described and shown in this application, and that will be particularly pointed out and most clearly defined in the claims of this specification.

To enable those skilled in the art to which my invention relates to make and use a machine according thereto, I will now proceed to more fully explain the nature of my said invention and the best mode now known to me of carrying the same into effect, referring by letter to the accompanying drawings, which form part of this specification, and in which I have shown my invention carried out in that form of machine which is the best now known to me, and in which I have so far successfully practiced my invention with satisfactory results.

In the drawings, Figure 1 is a front elevation of a machine such as I now have in practical operation embracing my invention. Fig. 2 is a top view of the same. Fig. 3 is a side elevation taken from the point of view indicated by the arrow at Fig. 2. Fig. 4 is a partial vertical longitudinal section at the line *x x* of Fig. 2, designed to show more particularly the arrangement and to illustrate the operations of certain of the working parts of the machine. Fig. 5 is a partial vertical cross-section at the line *y y* of Fig. 2. Fig. 6 is a partial horizontal section at the line *y y* of Fig. 1. Fig. 7 is a perspective view of one of the sheet-metal roller-blanks made in the machine and by it subsequently applied to one of the buckle frames supplied to the machine. Fig. 8 is a perspective view of one of the rollered buckle-frames turned out by the machine. Fig. 9 is a view showing the side opposite to that seen at Fig. 3.

At Fig. 1 I have shown a portion of the hollow pedestal-like metallic frame of the machine as broken away for the purpose merely of giving a sight in said view at some of the mechanism located within said hollow main frame, and in the several figures I have used the same letter of reference to indicate always the same part of the machine.

A is the main frame of the machine, within and on which are mounted all the working

parts, and which, by preference, I have made of cast-iron, hollow, and in the pedestal-like shape or design shown. Passing through this hollow frame from side to side, as shown, and provided with suitable bearing-boxes therein, is the main shaft B, which at one end is provided with a drive-pulley, C, through the medium of which the necessary motive power to run the machine is applied from a suitable drive-belt. On the opposite end of said shaft B is secured a combined cam and crank-head, D, in the periphery of which is a groove, *a*, that during the rotation of D actuates, through the medium of a rocking arm, E, the blank carrier or slide *d*, and in the outer end or head of which is a diametrically-arranged slot or recess, *c*, within which is secured (at any desired point of adjustment longitudinally therein) a wrist-pin, *b*, to which is coupled the lower end of a pitman, F, the upper end of which is connected to a vibratory arm or bar, *e*, that is fulcrumed at one end to a post, *f*, projecting rigidly from the main frame A, and that carries at its other end the means for intermittingly driving the mechanism for feeding in the sheet-metal blank-strip, all as will be presently explained. On that portion of the said drive-shaft B that is located within the hollow main frame A are secured, at the proper distances apart, two cams, (marked, respectively, G and H,) the former of which operates to drive the male (and only movable) member *g* of the blank-cutting dies, and the latter of which drives the movable member *h* of the pair of bending or roller-forming dies.

The movable blank-cutting die *g* is mounted securely (but removably) within the upper part of a head-stock or vertically-moving carriage, I, the lower portion or depending leg of which is yoked around the periphery of the aforesaid cam G, as shown, and by the rotative action of said cam the said carriage and its attached cutter *g* are caused to descend at the right times and to the proper extent to effect the cutting off of the sheet-metal blanks from which to make the rollers, the said cutter-carriage being guided within stationary ways *j*, and being lifted (after each depression by said cam) by a strong spiral or other spring, J, which returns the cutter *g* to its uppermost (normal) position rapidly in order that it may quickly get out of the pathway of the incoming sheet-metal strip from which the roller-blanks are successively cut in as rapid succession as practicable in the machine shown.

i is the lower and stationary cutter, with which the cutter *g* co-operates, and it is securely (but removably) fastened within a seat formed in the top plate of the main frame.

The cam H actuates the movable member *h* of the bending-dies through the medium of the following-named devices; Said die *h* is mounted in a head-stock or holder, K, with which the upper end of the rocking arm L is either formed or provided, and the lower end of said arm is pivoted to a fixed fulcrum, *k*, near the bottom of the main frame, as illustrated, while the frame or yoke-like portion *l* of said arm embraces the periphery of the cam H, and thus enables the latter to vibrate said arm upon its fulcrum *k* and give the proper throw to the die in the upper end of said arm at the right time.

For the purpose of varying the length of stroke of the upper end of arm L to suit the requisite action of dies *h* for operating on different-sized blanks, the pivotal pin *k* may be raised or lowered relatively to the cam H, and in adjusting the machine for such variations in the diametrical measurement of the rollers to be formed the stationary bending-die *m*, or the counterpart of *h*, will of course be changed also. This stationary bending-die *m* is secured in place so as to have its operative end come in just the proper relationship to the blank feeder or carrier *d*, and to the lower end of the feed-chute of the machine, as will be presently more fully explained, and it is perforated longitudinally and about centrally with a hole for the reception of the needle *n*, (see Fig. 5,) which operates in a manner and for a purpose to be hereinafter described.

The blank-conveying slide *d* is composed of a metallic bar substantially rectangular in cross-section, and it is formed, as shown, with a depression, *o*, in its top surface, having a vertical shoulder at *p*, and with a hole through it at *q*, through which the rollered or finished buckle-frame may be discharged. Said slide *d* reciprocates beneath and with its top surface in close proximity to the under side of the stationary cutting-die *i*, and to the under side of an adjustable stop finger or device, N, which serves to determine the point to which the roller-blank can be fed by the slide *d*, (see Fig. 4,) and to thus insure the placement of the blanks in exactly the right place endwise relatively to that bar of the buckle-frame around which the blank is to be bent and to the bending-dies *h* and *m*, that are to form the roller.

N^2 is a rectangular frame which is yoked around or embraces the lower part of the inclined feeder-chute O, and that is secured at one end to the head K, so as to move therewith. From that end of the frame N^2 which is opposite to its point of attachment to head K project inwardly two retaining fingers or needles, *r*, which serve to periodically support the column of buckle-frames in the feeder-chute O, (in a manner to be presently explained,) and at the same end of said frame N^2 is a projection, *s*, that engages with a stop or lug, *t*, on the rear end of the needle-bar n^2, to pull the operative end or point of said needle wholly within the perforated die *m*, (for a purpose to be presently stated,) and that also comes into contact with the device *u*, which compresses the spiral spring *v*, that actuates the needle *n* for the purpose of insuring the extrication from the stationary roller-forming

die *m* of the rollered end of the finished buckle-frame.

The feed-chute O is simply an inclined guide-way, made preferably in about the form shown, of sufficient height to contain a supply-column of buckle-frames placed therein, (by hand or otherwise,) and of such construction that, while the column of frames placed therein can slide right down through said chute, they cannot overlap each other therein. The lower end of this chute is located a short distance above the plane in which lie the bending-dies *h* and *m*, and the column of frames in the feeder above the lowermost and finished frame, which has to be discharged by gravity, is always supported by the fingers *r*.

The mechanism or means for intermittingly feeding in the strip or ribbon of sheet metal P consists of two die-rolls, Q and R, which also perform the office of rolling the strip into the proper form for the blanks to be subsequently cut from it. The strip or ribbon P is rolled by the wheels Q R into such form that when subsequently cut crosswise into short pieces or blanks each piece will be of the shape illustrated at Fig. 7.

As will be clearly seen, the periphery of the upper wheel or roll, Q, is convex in cross-sectional profile, while that of the lower roll, R, is concave, and each roll has turned or cut in its face a deep central groove, *w*. These rolls are fast on the short shafts or spindles S and T, that are mounted to turn in suitable journal-boxes in the stand U, and said stand, as clearly shown in the drawings, is mounted upon and engages with the dovetailing way or portion of the horizontal part of a bracket, V, (that is securely bolted, as shown, to the main frame or pedestal A of the machine,) in such manner as to slide on said bracket when not held stationary by the securing bolts or screws i^4 and i^5. These securing-bolts, as shown, have their upper threaded ends tapped into the base of the adjustable stand U and their body portions passed through slots in the top of the bracket V, after a fashion well known, so that on loosening the four screws the stand U may be adjusted within the limits permitted by the length of the slots to any desired position, when by turning home the screws i^4 and i^5 the heads of the latter will come to bearings against the under surface of the top part of the bracket V, thereby securely clamping and holding rigidly in place the adjustable stand U. The purpose and effect of this adjustability of the stand U, which carries the spindles S and T of the feeding and bending rolls Q and R, will be hereinafter fully explained. The shafts or spindles S and T are geared together, as clearly shown, by means of spur-pinions W.

On the front end of the upper spindle, S, is keyed a ratchet-wheel, X, with which engages a spring pawl device, Y, mounted on the vibratory end of the arm or bar e^2, hereinbefore referred to as carrying "the means for intermittingly driving the mechanism for feeding in the sheet-metal blank-strip."

Within the centrally-located peripheral grooves, *w*, of the die-rolls Q and R lie (so as not to interfere with the free rotation of the rolls) the upper and lower guide rods or bars, *x* and *y*, which serve to hold and properly guide the leading end of any freshly-fed-in blank-strip, and prevent the same from either overlapping or getting beneath the tail end of the preceding blank-strip. These guide-rods *x* and *y* project, respectively, from the lower channeled-out metallic block a^2, on which the rolled blank-strip rests and travels after it leaves the die-rolls, and the cap-plate b^2, which is formed with a rib on its lower surface to fit into and hold down the rolled blank, and which cap-plate is securely bolted down on top of the block a^2.

The space between the adjacent surfaces of the guide-rods *x* and *y* is just sufficient to permit the placement and movement between said surfaces of the sheet-metal blank strip or ribbon P, so that these rigid devices perform the important office of enforcing the perfect abutment of the leading end of a freshly-supplied ribbon against the tail end of the preceding strip, in order that the leading end of every blank-strip shall start in just right, and that neither the cutters nor the feeding mechanism shall be subjected to undue strain, nor unnecessary trouble be made by surplus or waste pieces being cut from the leading ends of the ribbons.

The lower stationary cutter, *i*, has its upper surface channeled out similarly to the top of the block a^2, and the adjacent edges or walls of the said cutter and the said block lie in parallel lines oblique to the line of travel of the rolled blank-strip. The object of this obliquity of the adjacent edges of these pieces is this, that even after the space or opening between said edges of said parts shall have become very considerable by repeated sharpening of the cutting-edge of the piece *i*, (which of course has to be always set up to a given relationship with the moving cutter *g*,) there will be no liability of the leading end of the blank-strip catching against the rear edge of the piece *i*.

The general operation of the machine may be thus explained: The feed chute O having been filled with buckle-frames, (and the supply-column kept up during the running of the machine,) and the blank-strip P having been fed into the bite of the die-rolls and feeders Q and R, and the necessary power having been applied to drive the pulley C, the continuous rotation of the main shaft B causes the rolls Q R, through the action of the operative parts hereinbefore described as connecting the crank-head D and its wrist-pin *b* with the mechanism for turning the shaft of the upper die-roll, to feed the blank-strip intermittingly to the blank-cutting dies *g* and *i*, and to at the same

time give to the strip P the shape which the blanks are to have. Each time that the leading end of the strip P shall have been fed past the cutting-dies the proper distance for the production of a blank of the predetermined length the descent of the cutter *g*, effected by the means hereinbefore described, severs from the strip a blank, and the leading end of the piece thus cut off is forced downward to an extent equal to the downward thrust or stroke of the cutter *h* by means of a push-plate, M, which is secured to the body of the upper die, *g*, some distance from the plane in which its cutting-edge travels up and down. The purpose of this push-plate M is to prevent any lagging or upward reactive movement of the leading end of the blank during the cutting operation, and to insure the deposition of the blank in proper shape upon the blank-conveying slide *d*, onto which the severed stock falls. The blank thus cut falls onto the depressed or recessed portion *o* of the slide *d*, (the latter having just been forced back in its final guideways to the proper position,) and the latter, starting immediately afterward on its blank-feeding stroke or movement, (actuated by the vibrating arm E, that is driven by the groove-cam at D, as hereinbefore explained,) carries the blank along until its leading end comes against the stop-finger N, when the slide *d* comes to rest, the blank resting thereon and confined endwise between said stop-finger M and the shoulder *p* of the slide. The blank having now arrived at the proper position, the column of buckle-frames in the chute O is released from the hold-up fingers *r* and descends by gravity until the base of the column—*i. e.*, the lower bar of the bottom frame—rests upon the upper concave surface of the roller-blank, the upturned edges of which blank are now to be acted upon by the bending-dies, and one of which edges has been placed in close proximity to the operative surface of the stationary one, *m*, of said dies.

With the blank and buckle-frame and the parts of the machine just above referred to all in the positions just explained, the moving bending-die *h* now comes up against one of the upturned edges of the blank, (said die being actuated by the means hereinbefore explained,) and the latter is squeezed between the faces of the dies *h* and *m* until the blank shall have been bent into a cylinder embracing the bar of the buckle-frame and conforming to that formed by the adjoining semi-cylindrical die-surfaces. The transformation thus of the dish-shaped blank into a cylinder around the lowermost bar of the bottom frame of the column is, however, effected by the dies *h* and *m*, with the assistance of the needle *n* of the die *m*, which needle projects from the working-face of the die *m* far enough to hold down (or to prevent the rising of) the upturned edge of the blank that is adjacent to said die, while the die *h* bends upwardly and over (to meet said edge) the other edge of the blank, the point of said needle being automatically withdrawn just as the edges of the bent-up blank are about to come to a perfect meeting under the action of the dies *h* and *m*. While these dies are completing the roller thus formed out of the blank and around the bar of the frame that rested on said blank, the blank-feeding slide *d* moves again in the direction to procure another blank, and just as its cut-away portion or the hole *q* therein gets immediately under the finished roller the latter is released from the grip of the bending-dies by the back movement of die *h*, and the finished roller, together with the buckle-frame to which it has been applied, drops through the opening at *q* and falls into a suitable receptacle, (or into a trough leading to such receptacle.) At the same time that the finished or rollered frame thus makes its exit from the machine the rest of the supply-column, of course, also descends by gravity. Before the lowermost one of the rest can have gotten quite to the lower end of the feed-chute the retaining-fingers *r* will have been passed through the central opening of the lowermost buckle-frame, (by the back movement of the die-head K, to which the frame N^2 is secured,) and the further descent of the supply-column arrested by the upper bar of the lowermost frame catching onto said detaining-fingers *r*. At the time of the releasement of the finished roller from the grip of the bending-dies any liability of the finished article to stick or hang in the concave face of the die *m* is effectually overcome and the forcible exit of the finished roller from said die-surface effected by the forward end of the needle *n*, which is suddenly thrust against the finished roller as said needle is forced back to its original position by the backward stroke of the die-holder K and the frame N^2 fastened thereto.

The movements of the needle *n* are effected as follows: As the frame N^2 moves forward its lug *s* comes into contact with the adjustable stop *t* of the needle device in time to positively withdraw the point of the needle from over the edge of the blank, being bent up just as the edges of the bent blank are about to come to a perfect meeting or contact in the completion of the roller. As the frame N^2 then immediately reverses its motion, the actuating-spring *v* of the needle device operates to throw the needle back again into its former position, ready to act as a hold-down device on the next blank to be brought up by the slide *d*; but as the action of this spring might not be either quick enough, when operating normally, to force out the finished roller and buckle-frame in case of any sticking in the face of die *m* the lug *s* of the frame N^2 comes quickly against the movable abutment *u* of said spring, and by suddenly compressing the spring increases the force and rapidity of its initial action.

It will be understood that to make the blanks longer or shorter, for the purpose of producing

longer or shorter buckle-rollers, the feed must be varied by changing the throw of the crank-pin *b*, so as to give more or less motion to the actuating-pawl of the ratchet-wheel X, and hence more or less movement to the feeding and shaping rolls Q R, and that in varying the length of blank the stop-finger N must be adjusted accordingly and the throw of the slide *d* varied (by adjusting the fulcral point of the arm E) so as to bring and place the blank (of a different length) centrally endwise with the bending-dies and the buckle-frame to be rollered.

The feed-chute O may have its guideways set to match frames of different widths, or the chute proper may be removable and different-sized chutes applied for different-sized buckle-frames. In this way, by the means shown and described, one machine may be adjusted to roller several sizes of buckle-frames with rollers of different lengths, and also of somewhat different diameters.

If deemed expedient, a material variation in the diameters of the rollers that may be made on one machine may be effected by having more than one size of shaping-rollers Q R, and substitute parts for the guides between which the rolled blank-strip is passed, and changeable male cutting-off dies.

The object of having the stand in which the roller-dies Q R are mounted made adjustable is that these rolls may be always set at the proper distance from the cutting-dies, according to the length of the blanks to be made, for it is quite important to have the distance between a plane passing through the axes of these rolls and the plane in which the blank-strip is cut divisible without any remainder by the measure of length of the blank to be made—that is to say, if the blanks are to be cut one inch long, the distance between the points above mentioned must be a greater or less number of inches. If the blanks are to be an inch and a quarter long, the said distance must be such that it can be exactly divisible into parts of equal length, each one of which will measure an inch and a quarter. The necessity, or, rather, the great advantage, of such relationship between the rolls and the cutters is that there will never be any piece cut from the leading end of the ribbon or blank-strip that will be insufficient in length to form a roller, and that will consequently have to be disposed of or gotten out of the way while the machine is running.

If the ribbons or blank-strip be cut from a sheet of metal which shall first have been cut to the exact length to make a given number of blanks of a certain size, then there will be no waste pieces or imperfect blanks cut, even from the tail ends of the ribbons fed into the machine.

Of course many of the details of construction of the machine shown and described may be varied more or less without changing its principle of construction and mode of operation, and it will be understood that some of the novel features of my machine may be used separately or in a machine different from mine as to other features with more or less of the advantages due to my invention.

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

1. In combination with a pair of rolls, Q R, adapted to simultaneously feed along a strip of sheet metal and to bend the latter widthwise, a mechanism for cutting the said strip crosswise into roller-blanks, all substantially as hereinbefore set forth.

2. The combination, with dies or cutters for severing a strip of metal crosswise and a pair of rolls for feeding the strip to the cutting device with an intermittent motion, of means for adjusting the feed-rolls relatively to the cutting device, substantially as and for the purpose hereinbefore explained.

3. In combination with means for feeding in the blank-strip P and means for cutting up said strip into roller-blanks, a mechanism for bending the blank up into a roller around the bar of the buckle-frame and a blank-conveying slide or carrier, *d*, adapted to successively receive the blanks as they are made and deliver them to the bending mechanism, all substantially as set forth.

4. The combination, with a mechanism for receiving and bending into cylindrical form a previously-made roller-blank, and adapted to permit the automatic discharge therefrom of the finished roller and the buckle-frame to which it has been applied, of a feeder mechanism for automatically supplying buckle-frames successively to the said roller-blank receiving and bending mechanism, substantially as hereinbefore set forth.

5. In a machine for making sheet-metal blanks for forming the rollers on buckle-frames, the combination of a mechanism for feeding in and bending lengthwise the blank-strip, means for cutting up the bent strip into blanks equal in length to the length of the rollers to be made, a carrier device for feeding the cut-off blanks to the locality at which they are to be formed into cylinders around the buckle-frame bars, and a feeder mechanism for supplying the buckle-frames one at a time to the roller-forming device, all substantially as hereinbefore set forth.

6. In combination with a pair of rollers adapted to successively feed strips of sheet metal supplied to them and a cutting mechanism for cutting up the said strips crosswise, guide bars *x* and *y*, the whole arranged to operate in substantially the manner specified, for the purpose set forth.

7. In a machine for forming roller-blanks from blank-strips fed in and for bending said blanks into shape on the buckle-frames supplied to said machine, the combination, with the blank-cutting mechanism, of adjustable feed-rolls, a blank carrier or slide, *d*, the throw of which may be varied, a blank-bending

mechanism, and an adjustable stop-finger, M, the whole arranged to operate substantially as set forth.

8. The combination, with the bending-dies, the device *d* for supporting the blank and the buckle-frame deposited thereon, as specified, and the mechanism for automatically supplying the buckle-frames, as set forth, of the needle-bar *n*, and the means described for actuating said needle in both directions, for the purposes specified.

In witness whereof I have hereunto set my hand this 18th day of November, 1886.

E. L. HOWE.

In presence of—
ISAAC GOLDSMITH,
HENRY GOLDSMITH.