

(Model.)

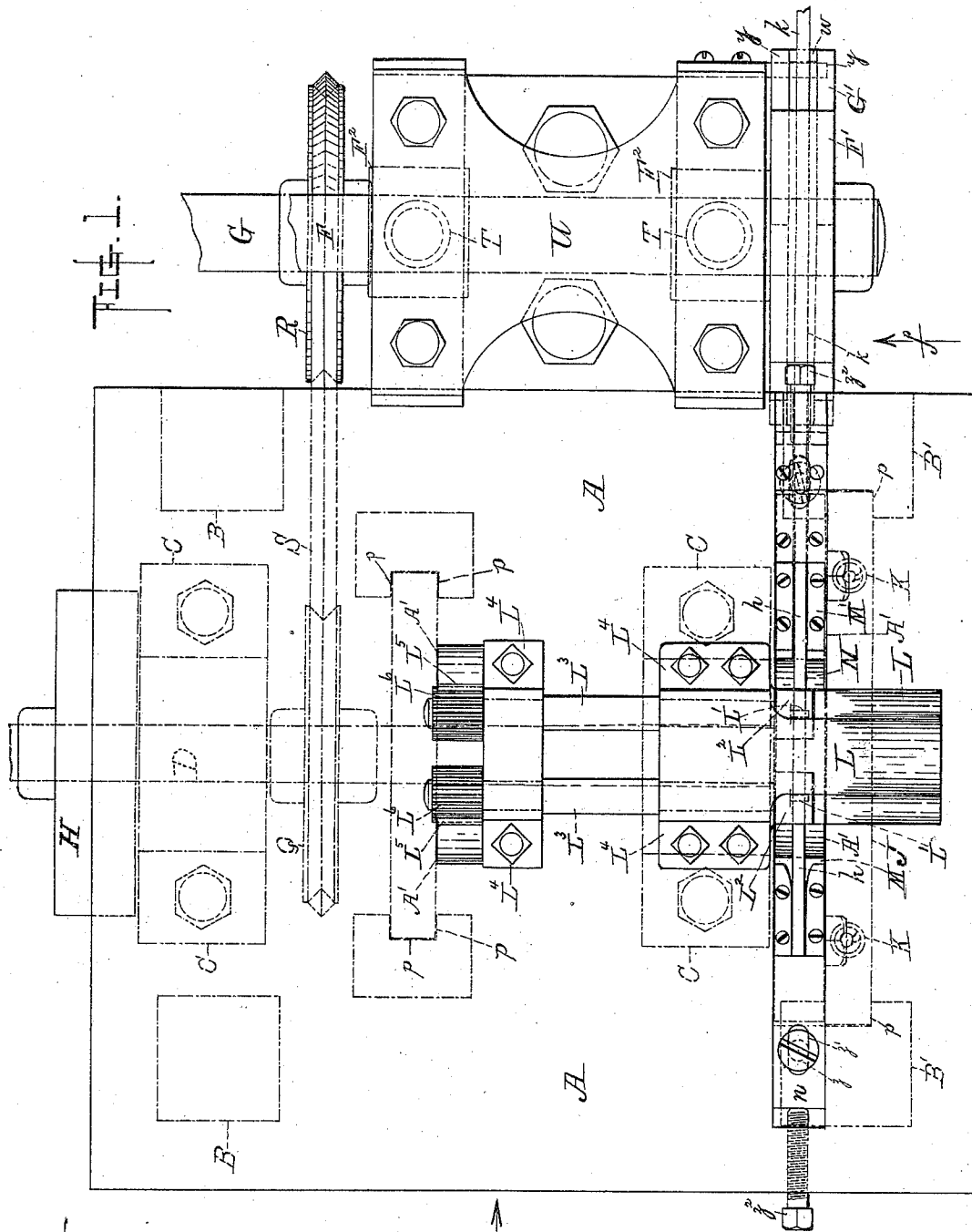
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E. J. WATSON.

MACHINE FOR MAKING EYEGLASS SPRINGS.

No. 311,548.

Patented Feb. 3, 1885.



Witnesses,  
Albert A. Barker.  
Walter B. Nourse.

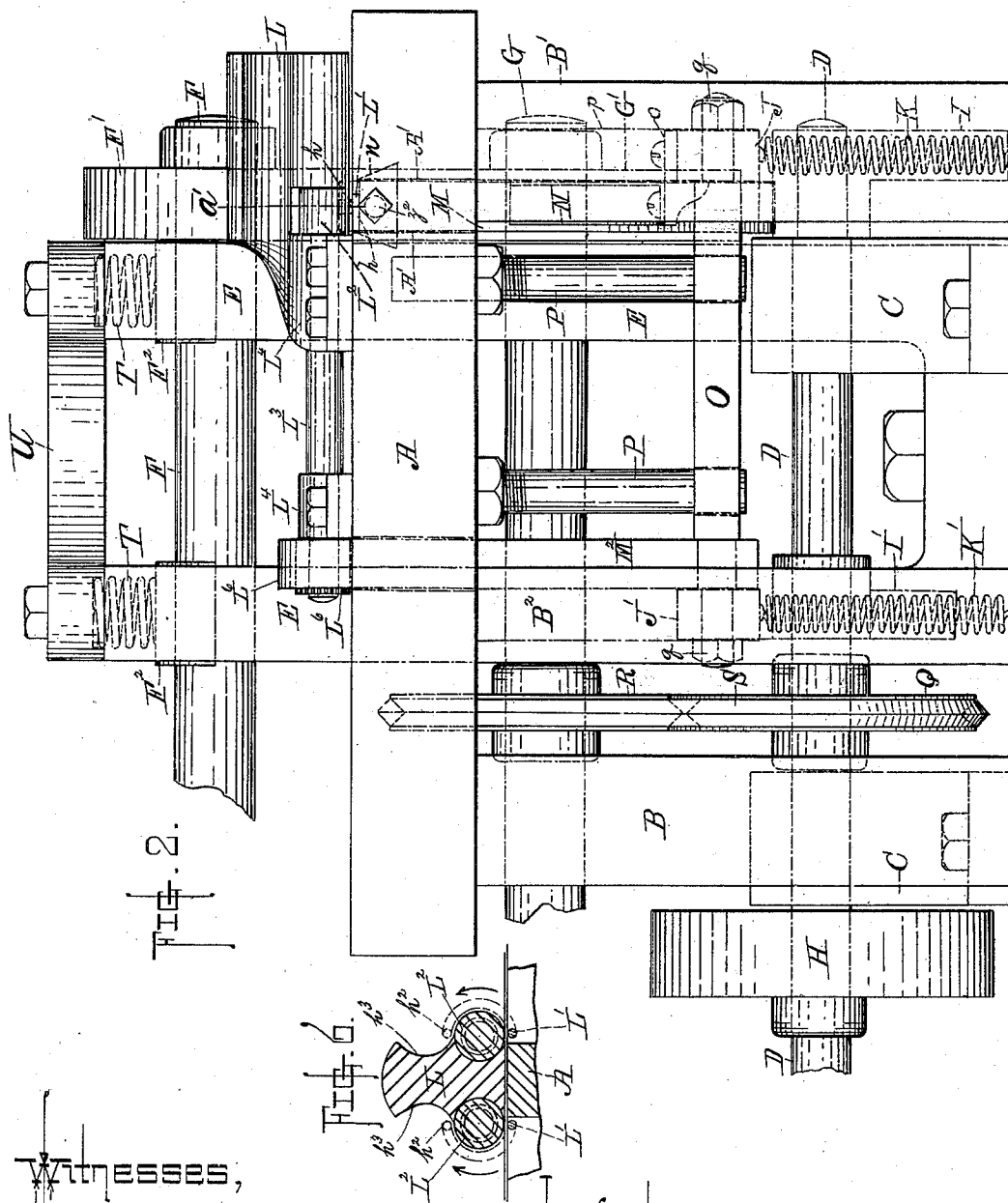
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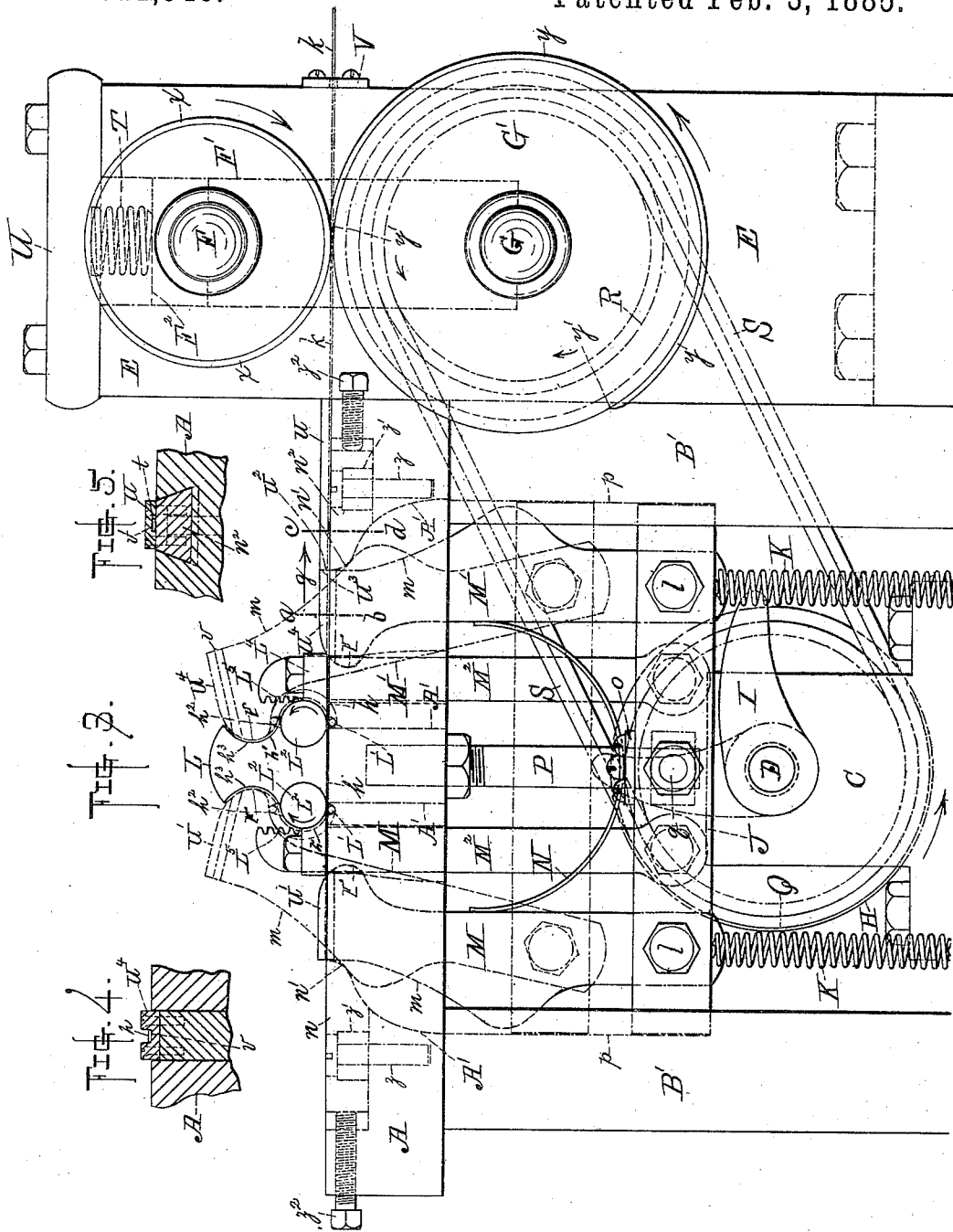
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# UNITED STATES PATENT OFFICE.

EDWIN J. WATSON, OF WORCESTER, MASSACHUSETTS.

## MACHINE FOR MAKING EYEGLASS-SPRINGS.

SPECIFICATION forming part of Letters Patent No. 311,548, dated February 3, 1885.

Application filed July 8, 1881. (Model.)

*To all whom it may concern:*

Be it known that I, EDWIN J. WATSON, of the city and county of Worcester, and Commonwealth of Massachusetts, have invented a new and useful Machine for Manufacturing Eyeglass-Springs by a Continuous and Automatic Operation; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 represents a top or plan view of my aforesaid machine for manufacturing eyeglass-springs. Fig. 2 represents a side view of said machine shown in Fig. 1, looking in the direction indicated by arrow *c*, same figure. Fig. 3 represents a front side view of the machine, looking in the direction indicated by arrow *f*, Fig. 1, showing, as do also Figs. 1 and 2, the metal strip from which the springs are made as having been fed forward into said machine preparatory to its being cut and bent over the former of the machine, as will be hereinafter more fully described. Figs. 4 and 5 represent vertical sections through portions of the machine, taken on lines *a b* and *c d*, respectively, looking in the direction shown by arrow *g*. Fig. 6 represents a vertical section through another part of the machine, taken on line *a'*, which will be hereinafter more fully described.

My invention relates to the manufacture of springs such as are used upon eyeglasses for supporting and holding the same in position upon the bridge of the nose.

It consists in constructing and arranging the several parts of a machine so that a long flat strip of metal (from which the springs are made, which may be coiled upon a spool or reel at a short distance to one side of the machine) may be drawn forward and fed into and through said machine, short sections cut from the end of the strip, and said sections bent around the surface of a former as fast as they are cut off to form and give to the springs their required shape, all by a continuous and automatic operation, which will be hereinafter more fully described.

In the drawings and specification I have shown and described a former having irregular curved surfaces over which the metal is bent to form the springs; but in the model, which by request was subsequently furnished, I have shown, instead of said former, an equivalent device consisting of two stationary pins or

studs fastened in a stationary part and so arranged that the metal may be bent to form the springs in a similar way to that shown in the drawings, the reason for making said change in the model being that I found said device in practice to be the most desirable and convenient for adjustment.

Up to the present time springs for eyeglasses have been made entirely by hand by the use of some simple device which can be operated by means of a hand-lever, or by connecting said hand-lever with a suitable foot-treadle. As will be seen, this is a very slow, and therefore expensive, method, necessitating the employment of a considerable number of hands, which may be dispensed with by the use of one of my machines, one operative being enabled by the employment of said machine to produce the work of several by the aforesaid old method, and the springs thus produced are much more perfectly and satisfactorily made.

To enable those skilled in the art to which my invention belongs to make and use the same, I will proceed to describe it more in detail.

In the drawings, A represents the bed of the machine, and the parts marked B B' B' the legs or standards upon which said bed is supported.

C C are the bearings for the main driving-shaft D, and E E upright standards or housings in which turn the shafts F' G' of feed-rolls F' G'.

Upon shaft D, at the back side of the machine, is secured a driving-pulley, H, which may be connected with any suitable and convenient driving mechanism arranged above or below the machine. To the forward end of said shaft D is secured a cam, I, which forces up a horizontal cross-piece, J, when the shaft is in operation. Said cross-piece J is drawn down when the cam does not bear upon the same by means of spiral springs K K, secured to the under side of the cross-piece and to the floor upon which the machine is supported. Any other suitable device for drawing down said cross-piece may be employed, if desired. A similar cross-piece, J', is also arranged near the center of the machine, which is operated by a similar cam, I', and springs K', arranged and secured in a similar manner to those before described.

Upon the upper side of bed A is secured the former L, over which the sections *h*, cut

from the flat metal strip  $k$ , are bent by means of the swinging cam-arms  $M M'$ , (which are hinged at their lower ends at  $l l$  to cross-piece  $J$ ), and by the fingers  $L' L'$ , which are formed 5 or secured on the heads  $L^2 L^2$  of shafts  $L^3 L^3$ , the latter being partially turned or rocked in their bearings  $L^4 L^4$  by racks  $L^5 L^5$  and pinions  $L^6 L^6$ . Said pinions are secured to the ends of shafts  $L^3 L^3$ , while the racks are 10 formed on the inner upper ends of vertical arms  $M^2 M^2$ , which are hinged to cross-piece  $J'$ , thus being operated up and down by cam  $I'$ , so as to turn shafts  $L^3 L^3$  part way around, as shown by arrows in Figs. 1 and 6, when 15 moved up, and back again when moved down. By the aforesaid operation the pins or turning-fingers  $L' L'$  bend the sections  $h$  of strip  $k$  around the surface of the heads  $L^2 L^2$  up to the points shown by  $h^2 h^2$ , when the bend is then 20 completed by the curved ends  $r r$  of the swinging or rocking arms  $M M'$  being forced up against the curved surfaces  $h^3 h^3$ , as hereinafter described.

Said cam-arms  $M M'$  are provided with cam-surfaces  $m m$  upon their outer sides, which 25 are made to bear upon the rounded ends  $n' n'$  of adjustable parts  $n n^2$  by means of a flat or other spring,  $N$ , which bears against the inner sides of said cam-arms, as represented in Fig. 3 of the drawings. In this instance spring 30  $N$  is made in hoop form, and secured at the center to a detachable piece,  $o$ , which is in turn secured to cross-piece  $J$ .

In order that said cross-piece  $J$  and cross-piece  $J'$  may be made to travel in vertical lines 35 when operated by their cams  $I I'$  and springs  $K K'$ , ways are formed in the legs  $B' B^2$ , as represented by dotted lines  $p$  in Figs. 1, 2, and 3, for them to slide up and down in. A guide-piece,  $O$ , is also secured to the cross-pieces at 40  $q q$ , which is provided with vertical holes through the same, so that it may slide up and down on vertical stationary rods  $P$ , secured in the under side of bed  $A$ . By the upward 45 movement of cross-piece  $J$  it will be seen that the cam-arms  $M M'$ , owing to the shape of their cam-surfaces  $m m$ , will first travel in a vertical line for a short distance, for the purpose hereinafter stated, and then commence to 50 gradually move toward the former  $L$ , and by the time the bending-fingers  $L' L'$  have bent the section  $h$  around the heads  $L^2 L^2$ , as before described, the rounded ends  $r r$  of said cam-arms have reached the proper point to commence bending the ends of the springs. They 55 continue to travel toward the surface of the former  $L$  until they reach the positions represented by dotted lines in Fig. 3 of the drawings, thereby bending the metal strip  $k$  into the shape represented by dotted lines  $h'$ , and 60 finishing the spring, ready to be punched and secured to the rims of the eyeglasses.

The short section  $h$  is in this instance cut from the metal strip  $k$  in the following manner: To the top of adjustable part  $n^2$ , over the 65 line traversed by the metal strip  $k$ , is secured a guide,  $u$ , through which said strip passes as

it is fed forward, said guide when secured in position forming a rectangular-shaped opening,  $t$ , a trifle larger than the strip, as represented in Fig. 5. Similar-shaped guides  $u' u'$  70 are also secured in an inverted position, as represented in Fig. 4, to the top of each of the arms  $M M'$ . The end  $u^2$  of guide  $u$  and the end  $u^3$  of the guide  $u'$  coming next to guide 75  $u$  are made square and sharp, and of hardened steel, thus forming sharp cutting-edges at  $v v'$  on said guides. Therefore when the arms move up in a vertical line, as before stated, the section  $h$  is cut off, preparatory to its being bent over the surface of the former  $L$ , by 80 the cutting-edge  $v$  passing by the stationary cutting-edge  $v'$ , the strip  $k$  being held in position by bearing upon the under side of the guide  $u$ . (Shown in Fig. 5.) 85

Slots are formed in bed  $A$ , as is represented by lines  $A'$ , for the reception of cam-arms  $M M' M^2 M^2$ , which also serve to hold the upper 90 ends of said arms in position laterally when in operation.

Power is imparted from the main driving-shaft  $D$  to turn the feed-rolls  $F' G'$  by securing pulleys  $Q$  and  $R$  upon said shaft  $D$  and shaft  $G$ , and connecting the same by means of an endless belt,  $S$ , fitted over said pulleys. 95 The upper feed-roll,  $F'$ , simply rests upon the lower one, and is turned by the latter, being fitted to turn in loose bearings  $F^2 F^2$ , which slide up and down in suitable ways formed in the standards  $E E$ . It is forced down, so 100 as to produce sufficient pressure upon the metal strip  $k$  to feed the same forward, by means of spiral springs  $T T$ , arranged between the upper sides of said loose bearings and the under side of a cap-piece,  $U$ , secured to the 105 tops of standards  $E E$ .

In order that a strong friction may be produced upon the strip  $k$  by the feed-rolls  $F' G'$  to properly feed it forward when said rolls 110 are in operation, a band of rubber, leather, or similar material,  $w$ , is fitted and secured in a groove formed entirely around the periphery of roll  $G'$ . A similar band,  $x$ , may also be secured over the periphery of the upper feed-roll,  $F'$ , if desired. 115

The rolls  $F' G'$  feed the strip  $k$  forward a sufficient distance to form the spring, when said strip is then stopped while a piece is cut 120 off and bent over the former  $L$ , as before described, by the upper roll,  $F'$ , being raised off of the surface of the strip. This is done in this instance by securing or forming ribs  $y y$  (see Figs. 1 and 3) on the periphery of roll  $G'$  at each side of the band  $w$ , the distance between their ends  $y' y'$  (shown in Fig. 3) being 125 just sufficient to allow the strip to be fed forward the required distance.

If preferred, the feed-rolls may be arranged to alternately turn and stop to feed forward and stop the strip, as before described, or any 130 similar and convenient feeding mechanism employed for the purpose.

The parts  $n n^2$ , against which the cam-arms  $M M'$  bear, are made adjustable by forming

slots  $z' z'$  in the same, so that they may be moved back and forth on their holding-screws  $z z$ . They bear endwise against the ends of adjusting-screws  $z^2 z^2$ , which turn in bed A. By adjusting said parts  $n n^2$  in or out and changing the form of the cam-surfaces  $m m$  of cam-arms  $M M'$  and that of the heads  $L^2 L^2$ , their fingers and former L, any desired shape may be given to the eyeglass-springs made by the machine, the feed-motion being made to conform therewith by lengthening or shortening the ribs or flanges  $y y$  on feed-roll  $G'$ .

In this instance the former L is represented as being recessed or cut out in circular form at each side to receive the heads  $L^2 L^2$ , and the bending-fingers  $L' L'$  formed or secured upon projecting ears or flanges formed upon said heads, the fingers being far enough from the surface of the heads to allow the metal strip to pass between them—i. e., between the fingers and heads—but, if preferred, any other suitable way of arranging and securing the fingers upon turning heads, so that they will bend the sections  $h$  over a suitable former, L, to form the springs  $h'$ , may be employed.

The operation of the machine may be briefly summed up thus: Supposing a long strip,  $k$ , to be coiled upon a suitable spool or reel arranged at a short distance from the machine. The attendant passes its loose end through a guide, V, secured to the side of one of the standards E. He then pushes it through between the rolls and into the machine by hand a sufficient distance to form the first spring. He now starts the machine, when the ribs  $y y$  on the lower feed-roll,  $G'$ , immediately raise the upper feed-roll off of the strip  $k$ , so that it will not be fed farther forward. The edges  $v'$  and  $v$  on the cam-arm  $M'$  and guide  $u$  then cut the strip to form the spring-section  $h$ , when said section is then bent into the shape  $h'$  to form the finished spring by the bending-fingers  $L' L'$  and curved ends  $r r$  of arms  $M M'$ , as before described. During the aforesaid operation the ribs  $y y$  have traveled in contact with the upper roll,  $F'$ , nearly their whole length, and by the time the cam-arms  $M M'$  have been drawn down and the bending-fingers  $L' L'$  turned back into their original positions, ready to form the next spring, the ends of said ribs pass out of action with said roll  $F'$ , thus allowing the latter to drop down and bear upon the strip to feed it forward again, when the operation before described is repeated.

As the springs are finished upon the former L they may be pushed forward off of the former L, and discharged into a proper receptacle by means of any suitable and convenient device.

Having described my aforesaid machine for manufacturing eyeglass-springs, what I claim therein as new and of my invention, and desire to secure by Letters Patent, is—

1. In a machine for making eyeglass-springs from long flat strips of metal by a continuous

and automatic operation, the combination of a suitable rigid former, L, the heads  $L^2 L^2$ , provided with bending-fingers  $L' L'$ , the means for operating said heads and fingers, the rocking cam-levers  $M M'$ , the means for operating said levers, and the means for feeding forward the strips from which the springs are made, and for cutting them into sections of proper length to form said springs preparatory to the bending operation, substantially as shown and described.

2. The combination of the former L with cam-arms  $M M'$ , provided with cam-surfaces  $m m$ , guides  $u' u'$ , and cutter  $v$ , turning-heads  $L^2 L^2$ , provided with bending-fingers  $L' L'$ , guide  $u$ , provided with cutter  $v'$ , bed A, feed-rolls  $F' G'$ , provided with friction-bands  $w w$  and ribs  $y y$ , and guide V, substantially as and for the purposes set forth.

3. The combination of feed-rolls  $F' G'$  with shafts F G, turning in suitable bearings, standards E E, springs T T, cap U, pulleys Q R, shaft D, bearings C C, and pulley H, substantially as and for the purposes set forth.

4. The combination of cam I on shaft D, spiral springs K K, or their equivalents, and cross-piece J, with legs  $B' B'$ , bed A, cam-arms  $M M'$ , provided with guides  $u' u'$ , spring N, adjustable parts  $n n^2$ , guide  $u$ , heads  $L^2 L^2$ , provided with bending-fingers  $L' L'$ , and former L, substantially as and for the purposes set forth.

5. The combination of cam I' on shaft D, spiral springs K' K', or their equivalents, and cross-piece J', with vertical arms  $M^2 M^2$ , provided with racks  $L^5 L^5$ , bed A, pinions  $L^6 L^6$ , rocking shafts  $L^3 L^3$ , bearings  $L^4 L^4$ , heads  $L^2 L^2$ , provided with bending-fingers  $L' L'$ , cam-arms  $M M'$ , and former L, substantially as and for the purposes set forth.

6. The combination of former L with heads  $L^2 L^2$ , provided with bending-fingers  $L' L'$ , substantially as and for the purposes set forth.

7. The combination of former L with cam-arms  $M M'$ , adjustable parts  $n n^2$ , arranged in proper supports, and cross-piece J, substantially as and for the purposes set forth.

8. The combination of cams I I' and springs K with cross-pieces J J', arms or levers  $M M'$ , part O, vertical rods P, and bed A, substantially as and for the purposes set forth.

9. The combination, with cam-arm  $M'$ , provided with guide  $u'$  and cutting-edge  $v$ , and means for operating said cam-arm, of bed A, adjustable part  $n^2$ , and guide  $u$ , provided with cutting-edge  $v'$ , substantially as and for the purposes set forth.

10. The combination of cam-arms  $M M'$  with bed A, and adjustable parts  $n n^2$ , provided with holding-nuts  $z$ , slots  $z'$ , and adjusting-screws  $z^2$ , substantially as and for the purposes set forth.

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Witnesses:

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WALTER B. NOURSE.