

(No Model.)

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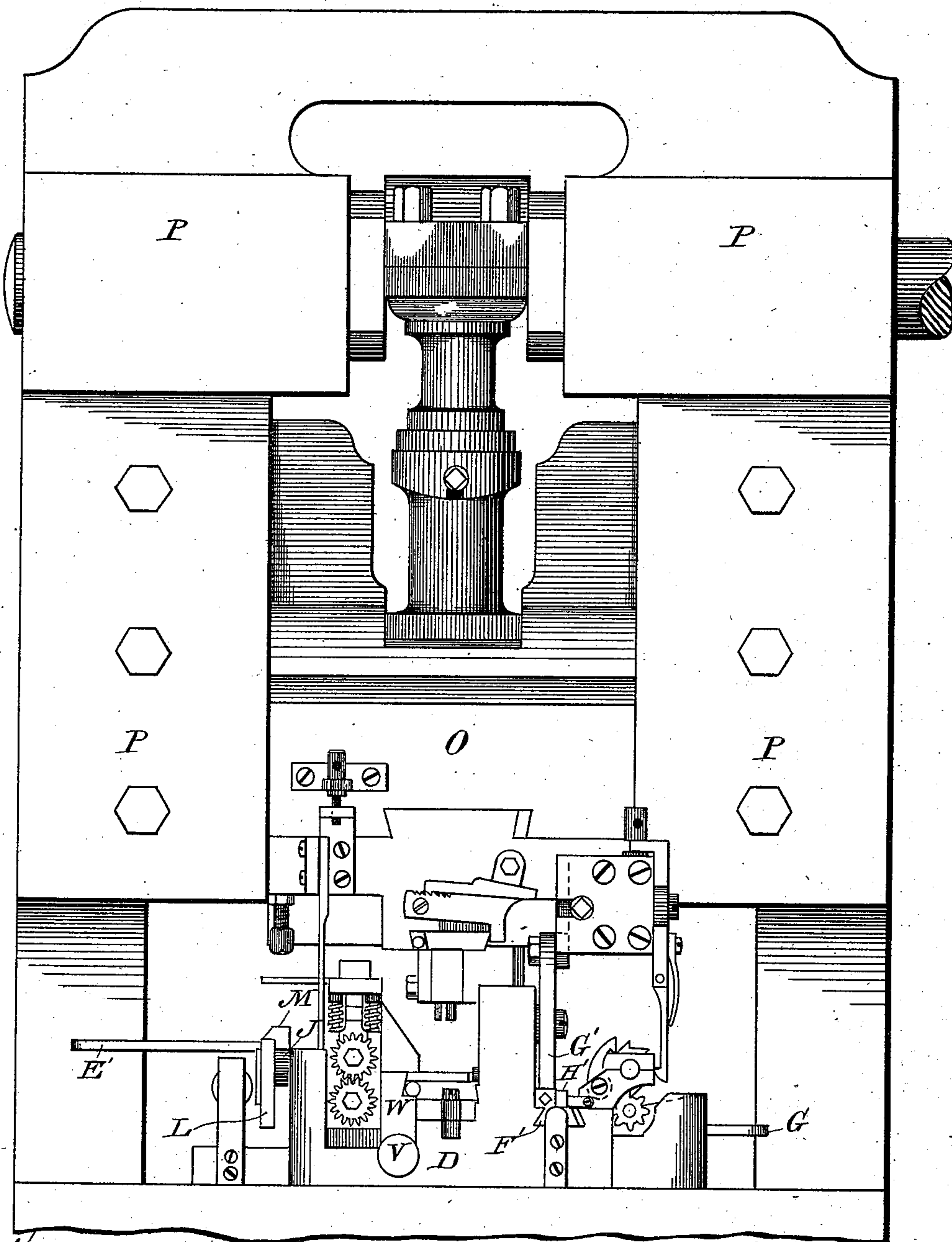
F. EGGE.

MANUFACTURE OF SHEET METAL CHAINS.

No. 376,737.

Patented Jan. 24, 1888.

Fig 1



Witnesses
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J. H. McLean

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attys

(No Model.)

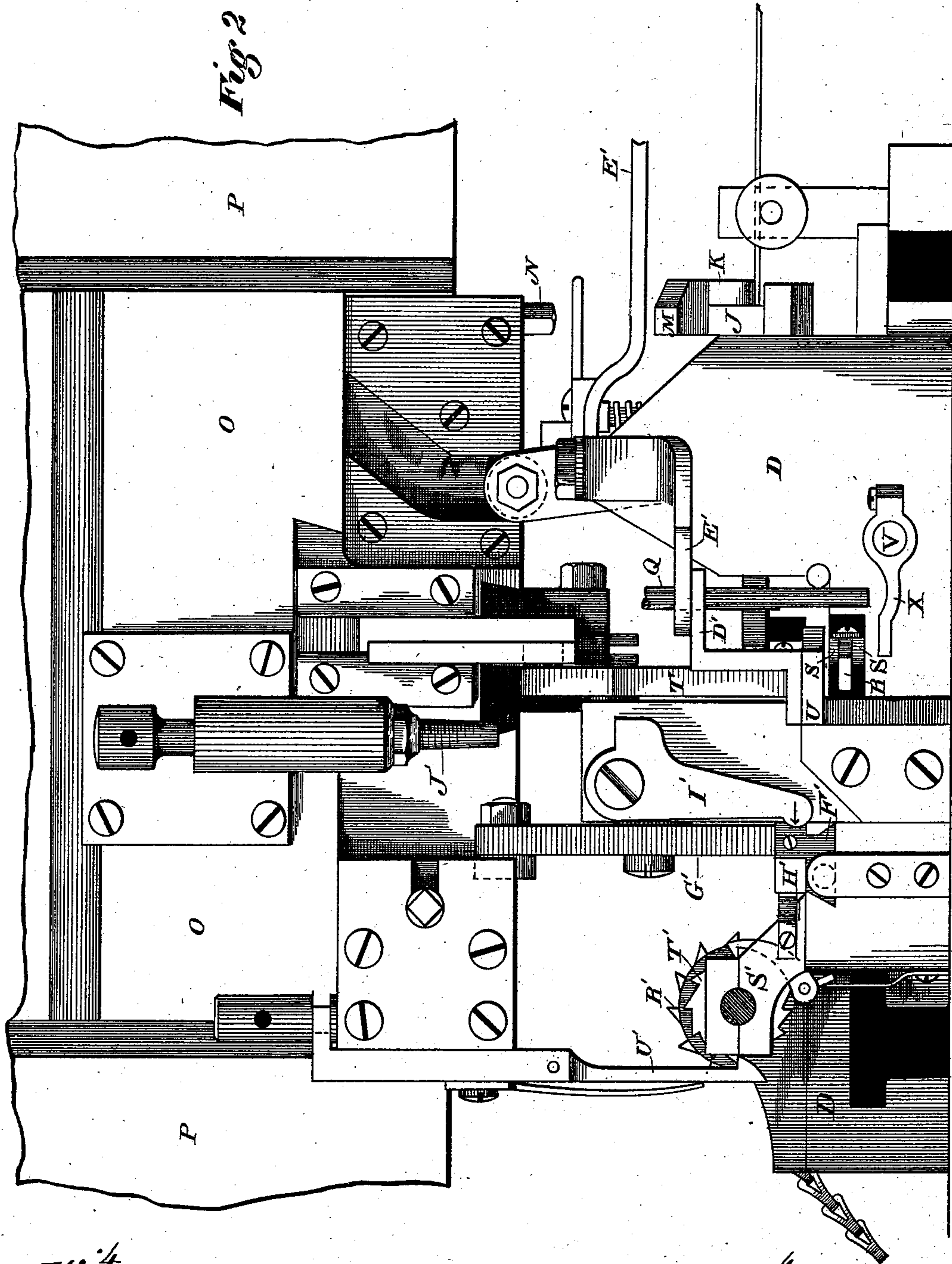
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(No Model.)

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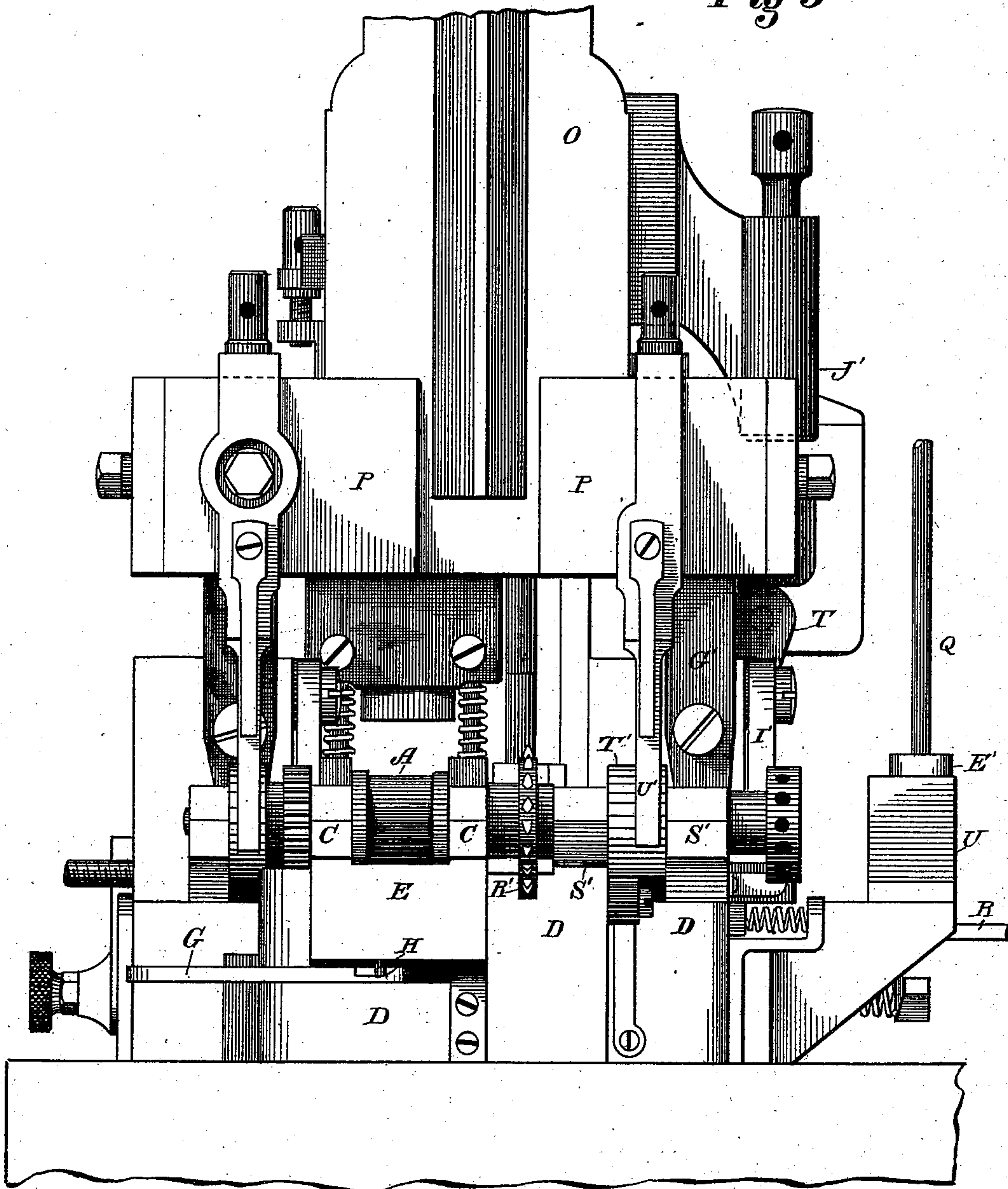
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Fig 3



Witnesses

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(No Model.)

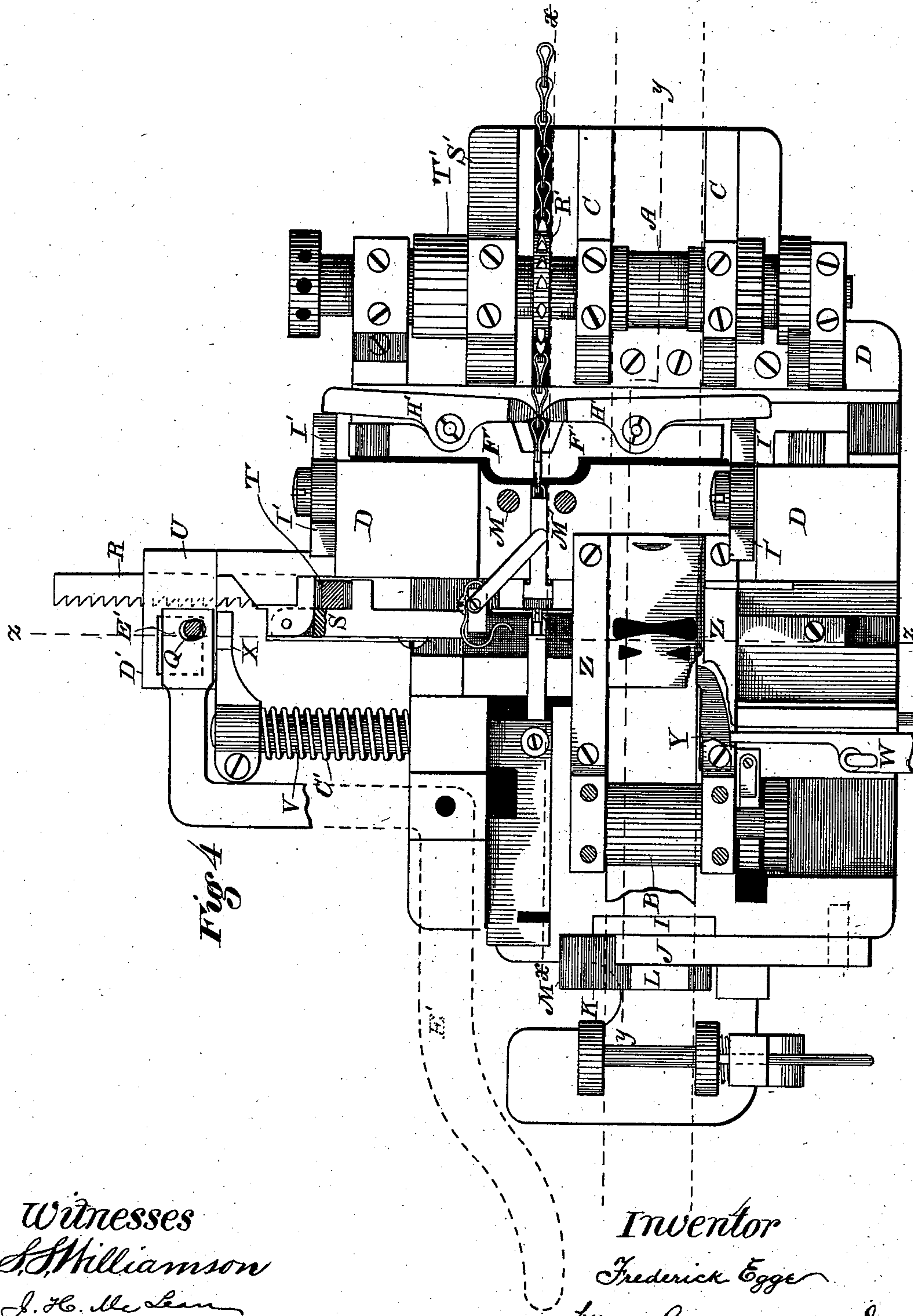
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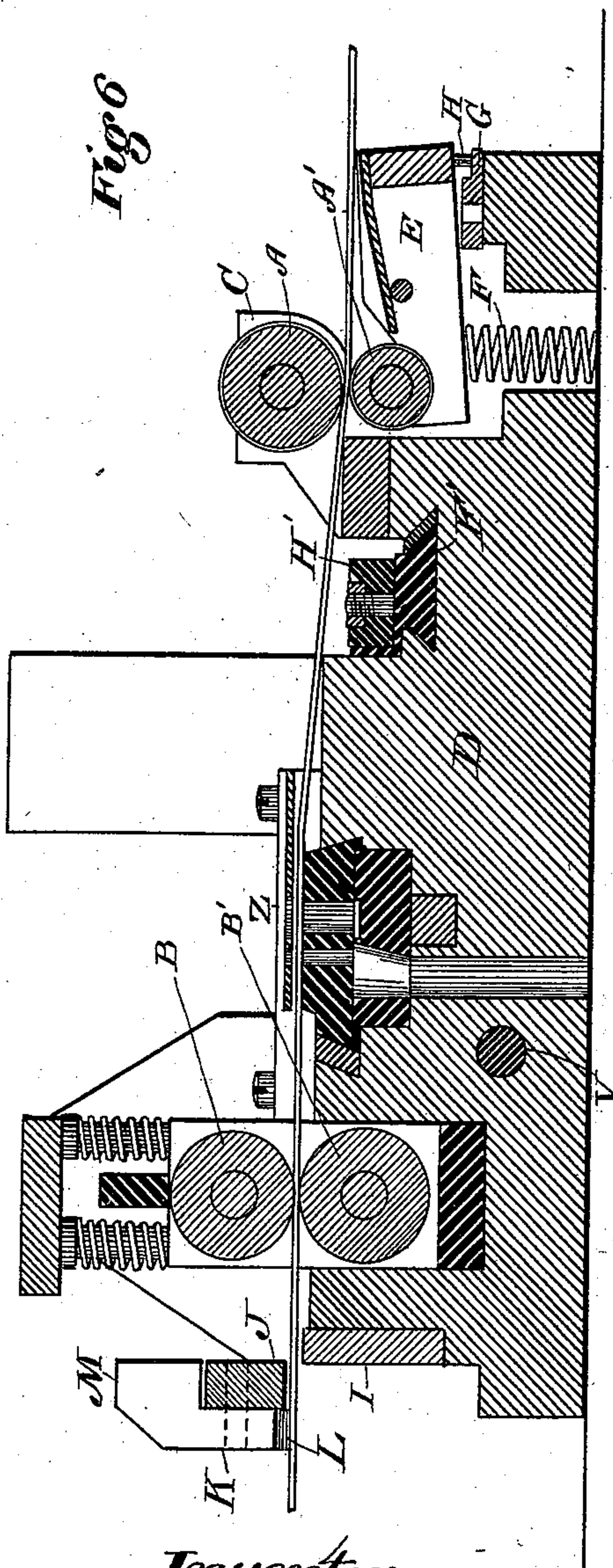
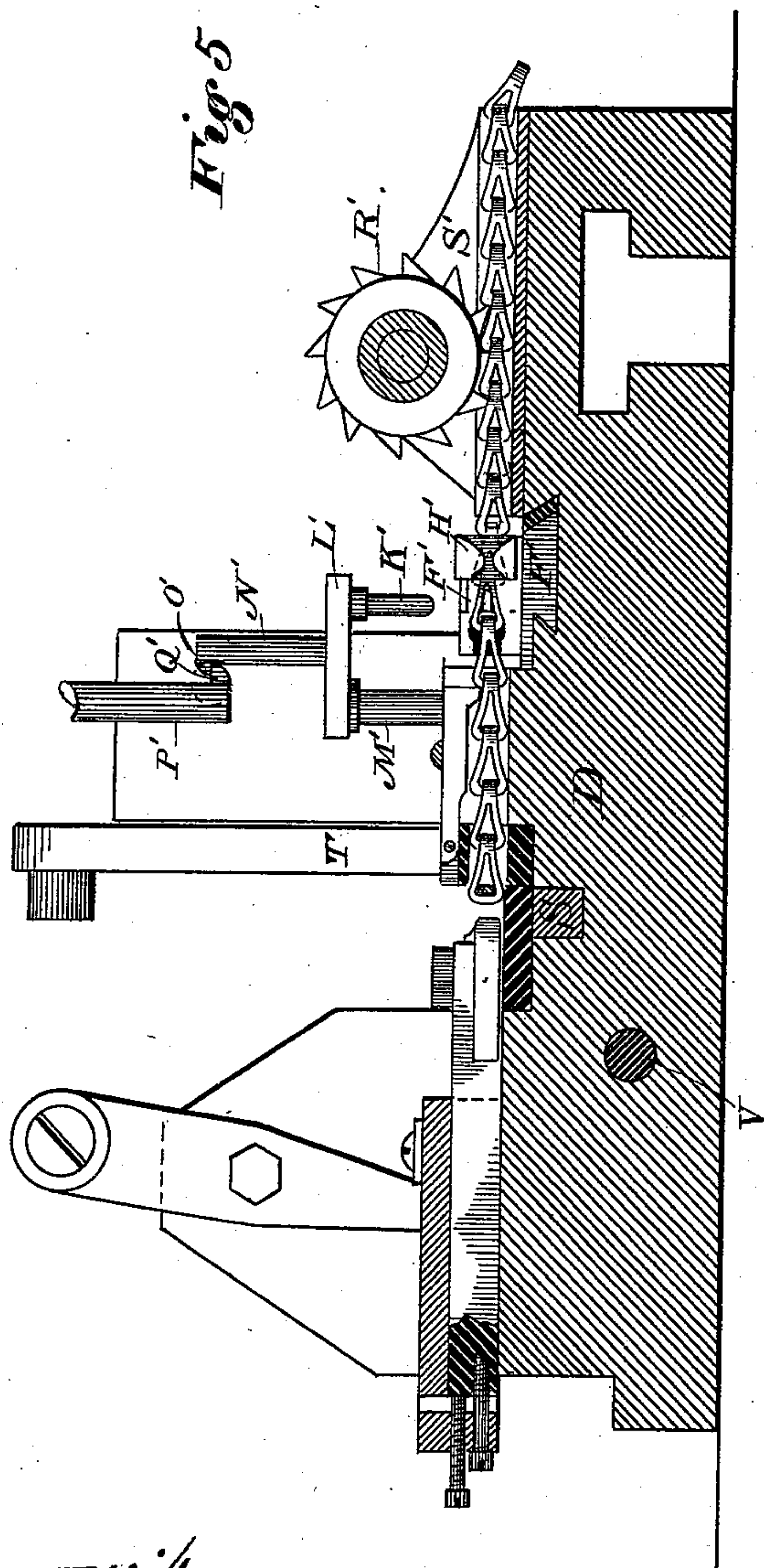
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7 Sheets—Sheet 6.

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Fig 7

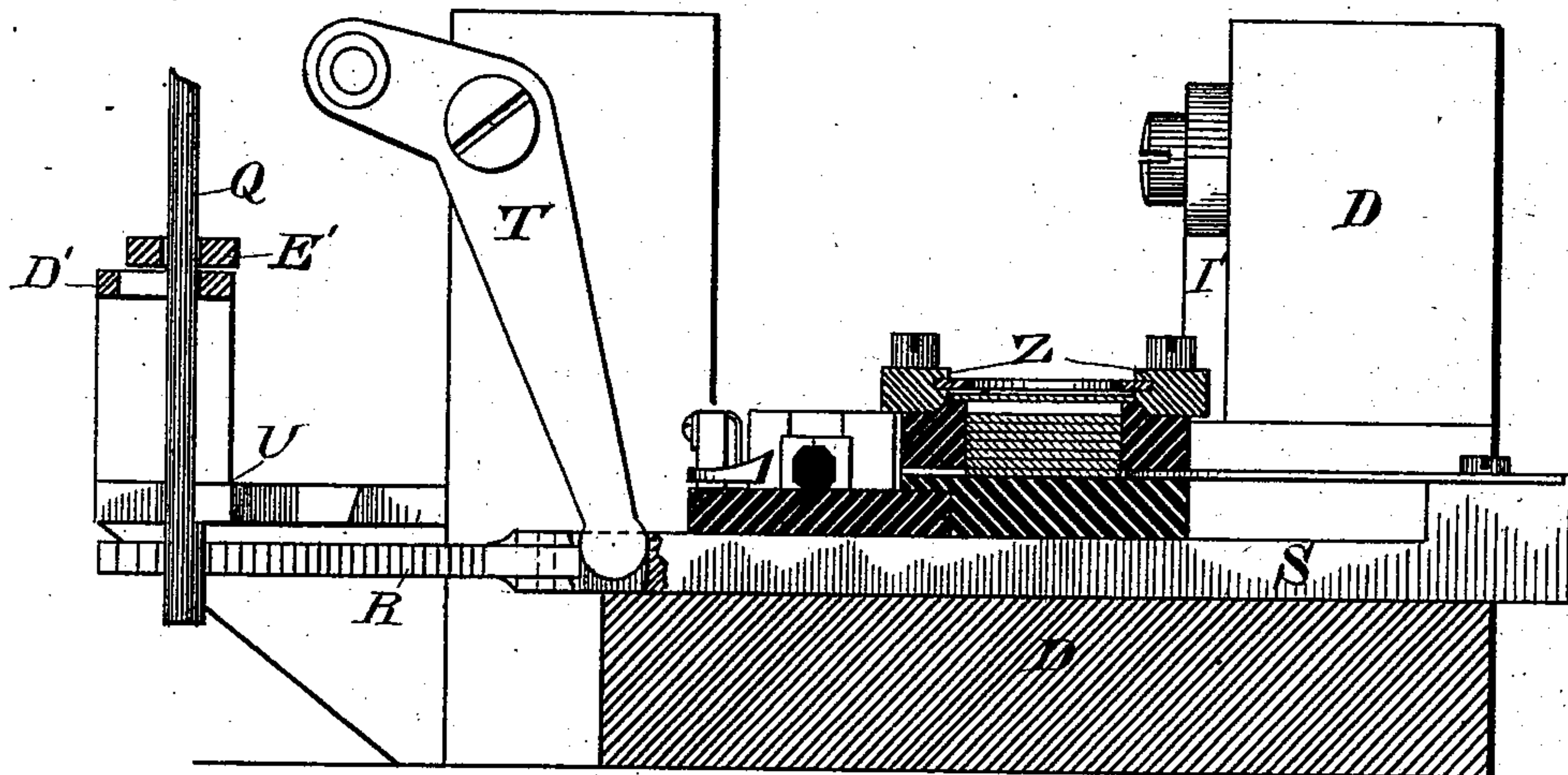
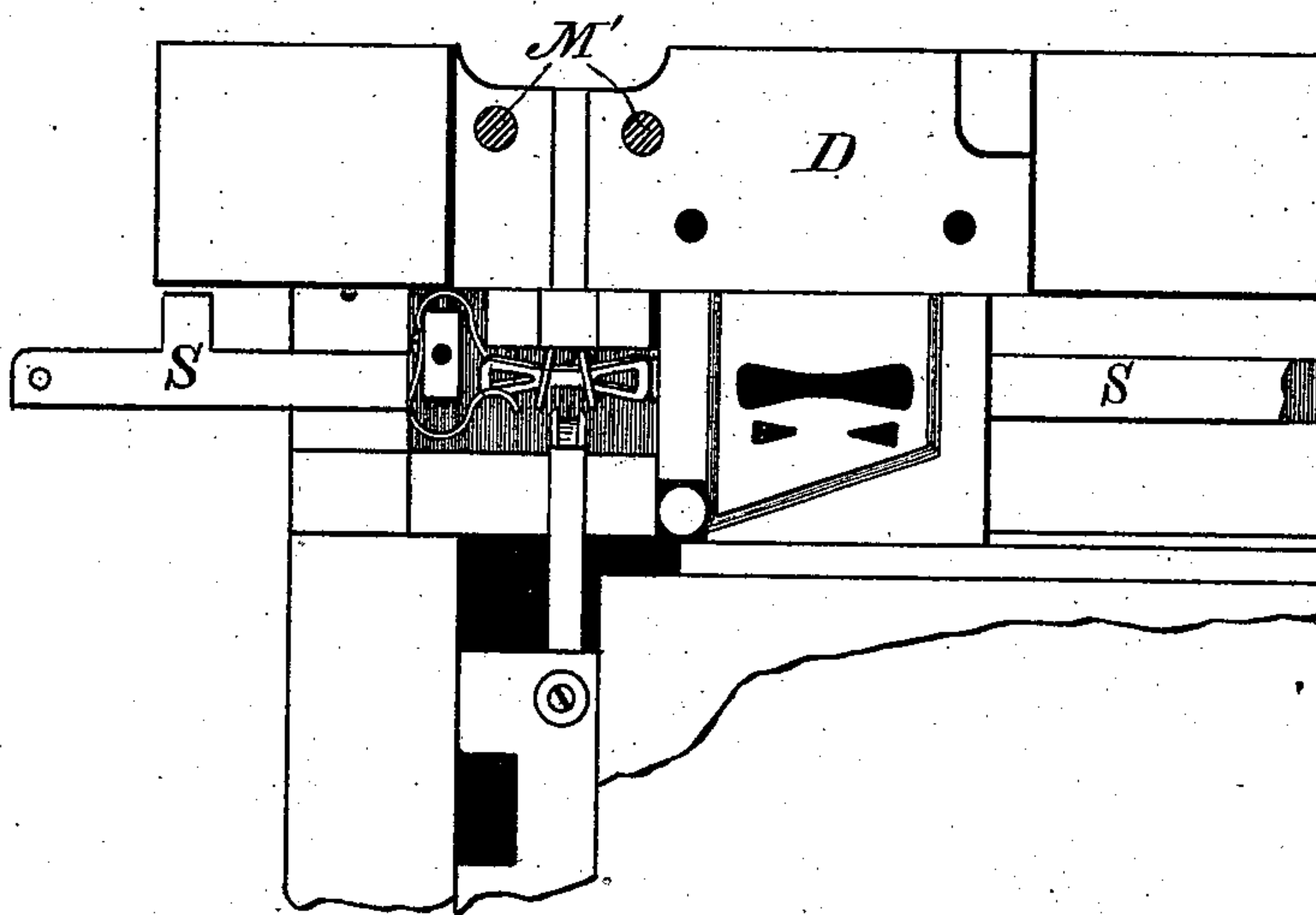


Fig 8



Witnesses
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(No Model.)

7 Sheets—Sheet 7.

F. EGGE.

MANUFACTURE OF SHEET METAL CHAINS.

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Fig 9

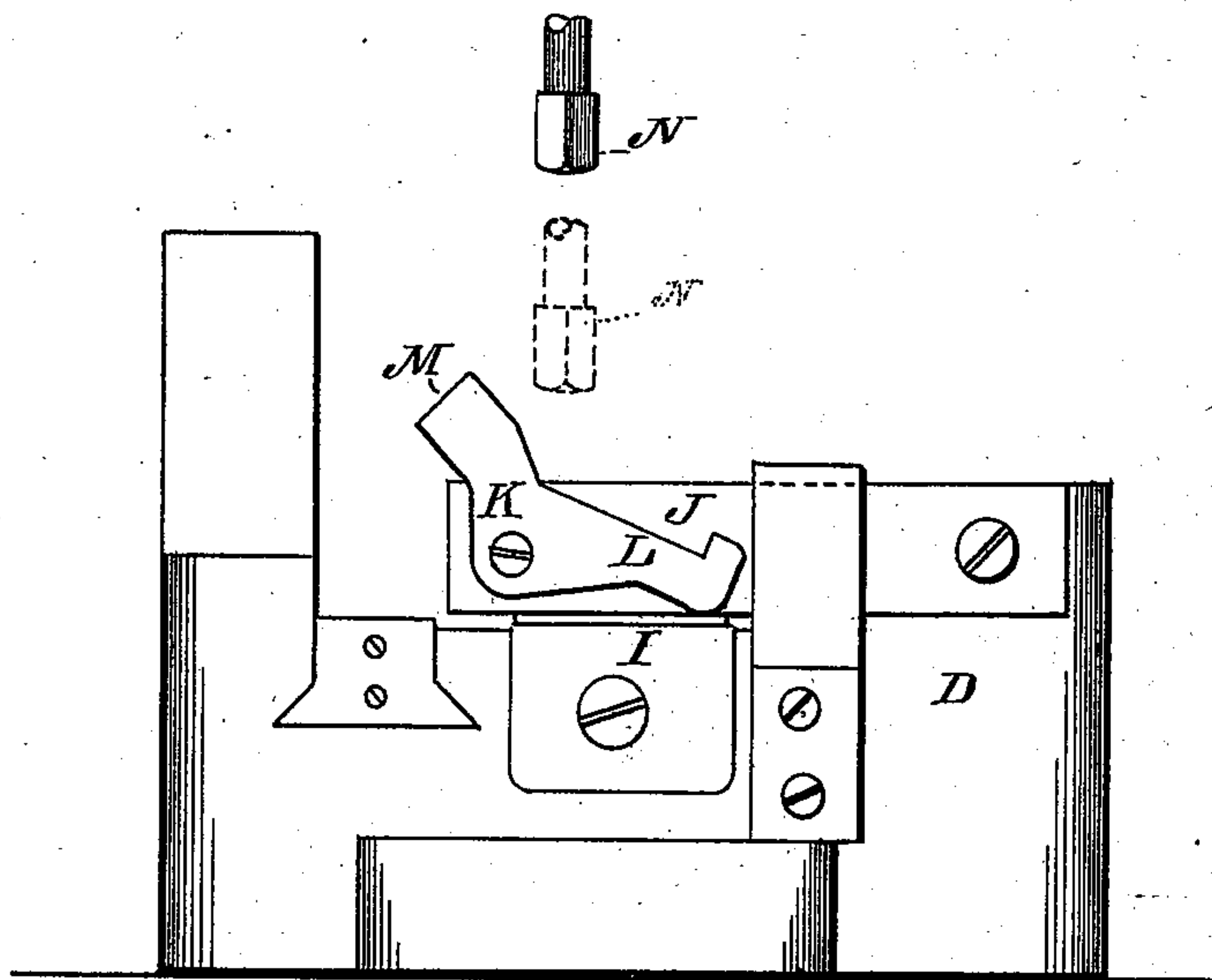
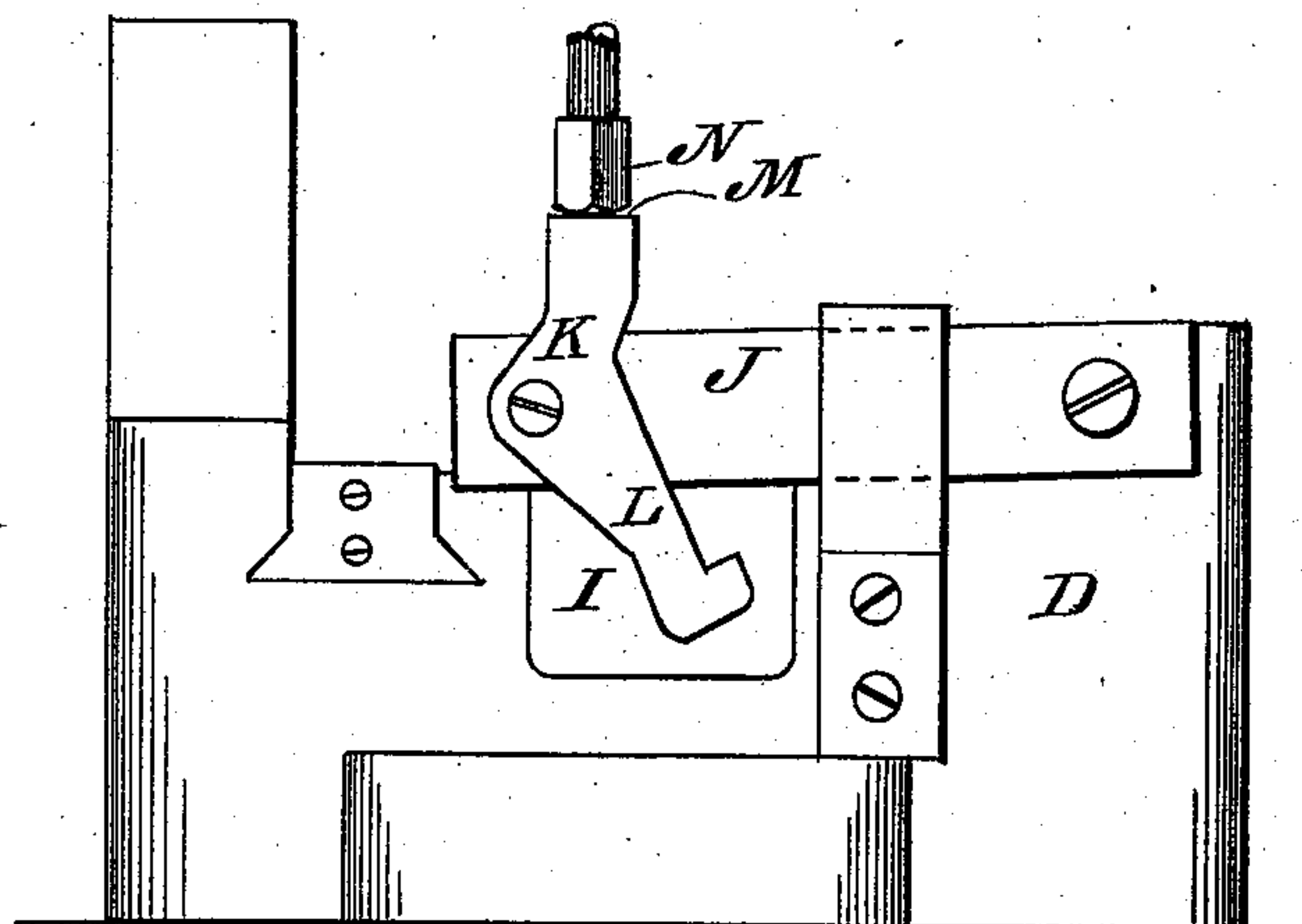


Fig 10



Witnesses

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UNITED STATES PATENT OFFICE.

FREDERICK EGGE, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO THE
SMITH & EGGE MANUFACTURING COMPANY, OF SAME PLACE.

MANUFACTURE OF SHEET-METAL CHAINS.

SPECIFICATION forming part of Letters Patent No. 376,737, dated January 24, 1888.

Application filed June 7, 1887. Serial No. 240,499. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK EGGE, a citizen of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Manufacture of Sheet-Metal Chains; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to the manufacture of chain from sheet or plate metal links, and has for its object to improve on the construction shown and described in the Letters Patent of the United States, No. 202,528, issued to me the 16th day of April, 1878, whereby a great saving of scrap is effected and the machine rendered capable of blanking and interlocking the links with continuity when separate and successive strips of metal are introduced and fed through the machine, while at the same time the link bending and manipulating devices are rendered more durable and effective.

With these ends in view my present improvement consists in the employment of certain automatic mechanism for shearing the last end of the stock, so that the succeeding strip may be fed immediately against the former strip without stopping the machine.

Furthermore, my invention consists in the various changes in the details of the construction and operation of some of the parts shown and described in my aforesaid patent, all of which will be apparent from the following specification, and from the drawings, in which—

Figure 1 is a front elevation; Fig. 2, a rear elevation, the frame of the press being broken away; Fig. 3, a side elevation with the frame of the press removed; Fig. 4, a plan view; Fig. 5, a section at the line *xx* of Fig. 4; Fig. 6, a section at the line *yy* of Fig. 4; Fig. 7, a section at the line *zz* of Fig. 4; Fig. 8, a detail plan of the die and the folding mechanism; Fig. 9, a detail end view showing the shear mechanism and dog in their proper relative position to the striker, so that the latter will clear the dog; and Fig. 10 a similar view show-

ing the head of the dog in a vertical position with the striker in abutment therewith.

It is not deemed necessary to enter into any detailed description of the parts or the fundamental principles of the machine to which my invention relates, excepting only those to which my present invention especially appertains, and I will therefore confine the following description accordingly.

In order that a skilled person may understand this invention and the particular application and bearing which it has with reference to the construction exhibited in my patent aforesaid, I have thought best to describe my present improvement under several heads, in accordance with the different steps and the mechanism necessary to the accomplishment of the ends aimed at.

The first step necessary in the manufacture of chains by means of the machine described and organized in my aforesaid patent is the feeding of the stock from which the links are blanked. By reference to said patent it will be seen that the feed-rolls are on one side of the machine only, and that the stock is introduced, primarily, between the rolls and fed forward through the machine. Now, while there is nothing radically wrong with this feed, and although it accomplishes the purpose for which it is intended, still there is one particular in which the feeding of the stock may be effected to a greater advantage.

It will be readily understood that with a feed in the rear of the blanking mechanism there is necessarily quite a waste of stock, which is about equal to the distance between the feed and the blanking mechanism, since after the last end of the stock has passed beyond the grasp of the feed-rolls the feed ceases, and there remains as waste a piece of stock from two to three inches in length, according to the size of the machine and the disposition of the rolls and blanking mechanism. In my present improvement I have obviated this waste and established a continuity of the feeding of the stock and blanking of the links, as follows: I provide a pair of feed-rolls, *A A'*, beyond the blanking mechanism, precisely similar in operation to the rolls *B B'*, which latter are shown and described in my

said patent. The upper roll, A, is journaled in fixed bearings in the standards C, which extend upward from the bed-plate D, and the lower roll, A', is journaled in a block, E, which is capable of a limited vertical movement. A coil-spring, F, between the block E and the bed D serves to keep the block in its normal position and bring the rolls A A' into operation, while an ordinary cam-lever, G, pivoted to the bed and adapted to act against a pin, H, projecting downward from the block, is used to force the inner end of the latter downward against the resiliency of the spring F, and thereby throw the rolls A A' apart, so that they will have no effect, all of which will be readily understood by reference to Figs. 2, 3, and 6. When the extreme end of the stock has been fed beyond the rolls B B', all that part of the stock which could not be blanked, owing to the stopping of the feed, has been thrown into the scrap, as hereinbefore set forth; but with my present improvement as soon as the rolls B B' have ceased to feed the material the rolls A A', which have been out of operation hitherto, are thrown into their normal position, thereby gripping the scrap and pulling the same along until all the stock has passed beneath the blanking mechanism, the latter being continually in operation in the meantime.

To insure the continuous blanking and interlooping of the links—or, in other words, in order that the last link blanked from the preceding strip may be so near the extreme edge of the latter that the next action of the cutting-punch will blank a link entirely out of the stock of the succeeding strip—I provide mechanism which shall automatically determine the length of stock at the last end of the strip necessary to enable the punch to cut the blanks continuously from successive strips without stopping the machine, which mechanism is as follows:

To the bed-plate D, in the immediate rear of the rolls B B', is secured a shear-block, I, and pivoted to the bed-plate, immediately above this block and in such manner as to have a swinging movement across the edge of the same, is a shear-bar, J.

K is a dog pivoted to the side of the bar J, near the free end thereof, and having a tail, L, adapted to be held in an elevated position by the strip of stock from which the chain is blanked, as will be presently more fully set forth.

The head M of this dog projects across the top of the bar J, so that when the tail is allowed to drop said head will thereby be carried to a vertical position and in abutment with the bar, whereby any force exerted downwardly against said head will cause the bar to be depressed.

N is a striker projecting down from the plunger O, which latter is adapted to reciprocate vertically within a frame, P, as is shown and described in my patent aforesaid, and as is common in every ordinary press. This striker

in its descent will strike against the head M when the latter is in its vertical position, and thereby force the shear-bar J downward; but when said head is at an angle to a perpendicular the striker will completely clear the dog, all of which will be apparent by reference to Figs. 2, 4, 6, 9, and 10. As before stated, the tail L of the dog is held in an elevated position by the stock itself, and therefore when the extreme rear end of the latter has been fed beyond this tail the dog will swing so as to bring the head thereof in a vertical position, this of course being brought about directly by the dropping of the tail. Now when the striker N descends it will force the bar J downward, and thereby shear the stock, provided that the latter does not happen to be of the exact length required, which is well nigh impossible.

It will be readily seen that as the striker is secured to the plunger the shearing is synchronous with the blanking, and takes place, therefore, immediately after one of the intermittent feeding impulses. Accordingly, if the feeding impulse which carries the last end of the stock from under the tail L of the dog also carries the said end to a point in the same vertical plane with the cutting-edge of the shear-block I and no farther, then the bar J, when depressed, will not shear the stock, since the latter is of the desired length, and this is determined by the distance between the blanking mechanism and the outside or cutting edge of the shear-block. Therefore, in respect to the feeding, the operation of the machine in accordance with my present improvement is as follows: The rolls B B' feed the strip of stock through the machine. When the stock allows the tail of the dog to drop, the shearing takes place and the said rolls continue to feed the stock until the latter has passed without their grasp. The rolls A A' are thrown into operative engagement with the scrap just before the feed-rolls B B' lose their grip on the stock, so that it will be readily understood that the feed is continuous, and therefore a succeeding strip of stock may be butted against the rear edge of the strip already in the machine after the automatic stop mechanism hereinafter explained has caused the operative parts of the machine to remain at rest.

The stop mechanism is precisely like that shown and described in my patent before mentioned, with the exception of the means which operates said mechanism automatically.

Q is the shouldered rod; R, the toothed spring tripping arm or latch pivoted at its rear end to the slide or carrier bar S; T, the vibrating lever, and U the bent arm, underneath which the rod R hooks, all of the same construction, and operating to stop the machine should any obstacle—such as an imperfect link or dirt or any other foreign clogging matter interfere with the free forward movement of the slide or carrier—by disconnecting the clutch mechanism from the driving-shaft in precisely the same manner as that set forth in my said patent. In my present improve-

ment I have gone a step farther in regard to this stop mechanism, since I am now enabled to automatically stop the machine immediately prior to the last blanking from a strip of stock; or, in other words, when the rear end of one strip has been fed to the point where, if the forward edge of the second strip were butted against said rear end, the blanking-punch would cut the link from the first strip and at the same time punch out the link-eyes from the second strip at the proper distance from the forward edge thereof. I provide a rod, V, which extends through the bed-plate, so as to have a free lengthwise sliding movement therein. To the front extremity of this rod is secured a block, W, which slides in bearings within the bed in a direction parallel to that of the rod V. At the rear end of the said rod is fastened a toe, X, and between said toe and the rear of the bed is a coil-spring, C', around the rod.

Y is a stop pivoted at one end within one of the die-caps Z in such manner that it is in the same horizontal plane with the strip of stock as the latter lies on the die plate, while the other end extends up to that point where the rear edge of the strip should remain immediately prior to the blanking of the last link therefrom. Against this stop the sliding block W abuts on account of the force of the spring C' exerted against the toe X, and therefore if there is nothing behind the stop the spring-actuated block W will throw said stop backward; but the stock itself, being in the same horizontal plane with this stop, will afford an obstacle to any such forced movement of the latter. When the strip of stock is fed along by the rolls A A' so that the rear end thereof passes beyond the stop Y, the latter will be thrown rearward behind the said end by the block W, and the toe X will be simultaneously driven against the shouldered rod Q, thereby forcing the latter from its engagement with the arm U, and disconnecting the driving-shaft from the motive power, as hereinbefore set forth, and as described in my patent aforesaid. Thus it will be seen that when the strip has been fed to the proper extent preparatory to the introduction of a second strip the machine comes automatically to a dead stop.

The manner of putting a succeeding strip in proper position is exceeding simple, it being necessary only to separate the rolls B B', and, placing the strip between them, to bring the forward end thereof into abutment with the rear edge of the preceding strip, when said rolls are thrown into operative position and the several parts are in proper relative position for the performance of their further functions. I provide the arm U with a yoke, D', through which the rod Q projects, in order that the latter may not become displaced, and to this rod is loosely connected a lever, E', by means of which the operator may throw the rod into engagement with the arm U. To start the machine, the rod Q is forced down-

ward either by hand or by any suitable means—such as a treadle—until the clutch mechanism operated by this rod has connected the driving-shaft with the motive power. The lever E' is now operated to throw the shouldered part of the rod underneath the arm U, and the rod is thereby locked in this position and the machine ready for use. The lever E' is bent and extended around to the front of the machine, as shown in dotted lines at Fig. 4, merely for the accommodation of the operator, since the latter is thereby enabled to stop or start the machine instantly without going around to the rear of the latter.

The next step in my improvement has reference to the compressing and shaping of the partially-bent links, and the following description has especial reference thereto.

In my patent before mentioned the partially-bent links were pressed together by means of a compressor-bar, L, operating in connection with a supporting block or anvil, L', while the upsetting of the links, by compressing or slightly crushing them endwise to finish them and destroy the tendency of the links to separate or spring apart at their ends, was accomplished by a swinging arm or lever, N, having a curved nose or bill-hook, N', at its end, which is shaped to fit snugly around the head or loop of the link. I have ascertained that it is desirable to form the closed ends of the links around some kind of an anvil or mandrel, and also that the resistance offered to the nose of a single bill-hook is not only very great, but unequal in different places.

In my present improvement I provide two compressor-bars, F', both of which are caused to slide in ways in the bed-plate D by means of vertical vibrating levers G', which latter are operated by the plunger O in the same manner precisely as that shown and described of the movable compressor-block in said patent. Instead of a single end compressor-lever, I now use two of such levers, H', which are pivoted one on each of the bars F'. The inner ends of these levers are bill-hooked, and adapted to snugly encompass the head of the link. Tappets I' are pivoted to the bed at the front and rear thereof, respectively, and are adapted by a swinging movement in the direction indicated by the arrow in Fig. 2 to strike the levers H'.

J' are strikers, one only being shown, which are secured to the plunger at opposite sides thereof and in the same vertical plane with the tappets. As the plunger descends, the strikers will come in contact with the tappets and cause them to swing in the direction indicated by the arrow, as set forth. The operation of the compressor-levers by the tappets immediately follows the effective action of the compressor-bars F'. In order to insure the regular and symmetrical formation of the loop or closed end of the bent link, I provide an anvil-pin, K', conformed in cross-section to the general shape of the loop and depending from a gravity-frame, L'. This frame has two guide-rods,

M', which reciprocate in proper bearings in the bed, so as to establish a steady movement to said frame. Only one of these guide-rods appears in the drawings, (see Fig. 5,) the other
 5 being in the immediate rear thereof. Projecting upward from the frame L' is a pin, N', having at its upper end a shoulder, O', and depending from the plunger O is a lifting-rod, P', having at its lower end a shoulder, Q', which
 10 extends underneath the shoulder O'. When the plunger descends, the pin K' will drop by gravity within the loop end of one of the partially-bent links, and on the upward stroke of the plunger the said pin will be lifted out of
 15 the said loop.

In order that the several movements described of the compressor-bars, compressor-levers, and anvil-pin may be more fully understood and their object made clear, I will now
 20 proceed to describe their functions with relation to each other, and more particularly with reference to the effect which they have on the formation of the link. As the plunger descends, the anvil-pin will enter the loop end of
 25 the link and the compressor-bars will be forced against the sides of the link, thereby compressing the latter together and giving the proper shape to the inner part of the loop around the anvil-pin. The compressor-levers H', having
 30 been carried inward toward each other by the action of the bars F', are in proper position to exercise their function, and accordingly the tappets I' are now thrown against the levers H' by the strikers J', as hereinbefore set forth,
 35 thereby forcing said levers firmly against the stock at the end of the loop and causing the latter to assume the proper rounding shape. At the upward stroke of the plunger the tappets swing back to their normal position, the
 40 compressor bars and levers are withdrawn, the anvil-pin is raised out of the loop, and the link thus completed is fed forward, and the succeeding partially-completed link is brought into the position necessary for the repetition
 45 of the operations just described.

The final step in this improvement relates to the feeding, or, perhaps, more properly, the pulling, of the completed chain through the machine. In my aforesaid patent this was ac-
 50 complished by means of an intermittently-revolving sprocket-wheel whose teeth entered the triangular-shaped eyes in the side of the links; but it is apparent that the force exerted by said teeth is not properly applied, since
 55 the strain comes on the stock at one side only of the loop, and accordingly it is possible that the links might thereby lose their symmetrical shape and the chain thus formed withstand a less tensile strain than the metal would war-
 60 rant. I provide a sprocket-wheel, R', precisely like the one shown and described in said patent, but mounted on a shaft journaled in bearings C S', which project upward from the bed-plate D, so that it will be seen that the
 65 line of movement of said sprocket is in a vertical and not in a horizontal plane.

T' is the ratchet-wheel rigidly secured on the

said shaft, and U' the pawl projecting downwardly from the plunger and adapted to engage with the ratchet-wheel and thereby op-
 70 erate the sprocket, as will be evident by reference to Fig. 3. The teeth of the sprocket enter between the sides of the links within the loop and exert a force directly against the
 75 compressed ends of the links, and in a direction coincident with the horizontal axis of the chain, so that it will be understood that the action of said sprocket constitutes a perfect test of the tensile strength of the chain, said
 80 test being of course measured by the resistance offered to the operation of the sprocket.

I claim as of my own invention--

1. In a chain-manufacturing machine, the combination, with the strip-feeding rolls at the rear of the blanking mechanism, of similar
 85 rolls located beyond said mechanism, whereby all the stock is fed through the machine, substantially as set forth.

2. As an improvement in the art of making chain from sheet metal by machinery, the com-
 90 bination, with the feeding devices, of mechanism adapted to automatically shear the strip of stock to a predetermined length, substantially as set forth.

3. The combination, with the feeding-rolls
 95 in the rear of the blanking mechanism, of similar rolls journaled beyond the said mechanism and adapted to grasp the strip of stock after it has left the back rolls, whereby a continuity of feed throughout the entire length
 100 of the strip is obtained, substantially as set forth.

4. As an improvement in the art of manufacturing chain by machinery from sheet
 105 metal, the combination, with the primary feeding devices, of shearing mechanism supported out of operation by the stock itself and adapted to operate when the latter has been carried from beneath it, substantially as set forth and specified.

5. The combination, with the rear feeding-rolls, of a shear-block secured to the bed-plate, a pivoted bar adapted to shear across the edge
 110 of said block, a dog pivoted to the outside of said bar and adapted to be held in an elevated position by the stock itself during the feeding of the latter, and a striker depending from the plunger and operating to abut against the
 115 head of the dog when the latter has swung to a vertical position, whereby the bar is driven against the stock to shear the same, substantially as shown and set forth.

6. In combination with the shear-bar and the feeding device, the dog pivotally attached to
 120 said bar and adapted to automatically regulate the operation of the latter through the medium of the strip of stock itself, substantially as set forth.

7. As an improvement in the art of manufacturing chain from sheet metal by machinery,
 130 the combination, with the means for connecting and disconnecting the driving-shaft with the motive power, of mechanism whose effective operation is dependent on the feeding of

the strip of stock for automatically stopping the machine, substantially as set forth.

8. As an improvement in the art of manufacturing chain from sheet metal by machinery, the mechanism for automatically stopping the machine preparatory to the blanking of the last link from the stock, the same consisting of means, as a stop, withheld from operation by the edge of the strip of stock, in combination with the mechanism for disconnecting the driving-shaft from the motive power, substantially as set forth.

9. The combination, with the shear-block secured to the bed-plate at a predetermined distance from the blanking mechanism, of the bar pivoted to the bed and adapted to shear across the cutting-edge of said block, a dog pivoted to said bar and adapted to effect the operation of the latter when the rear edge of the stock has been carried beyond said dog, and the striker depending from the plunger and adapted to depress the bar through the medium of the interposed dog, substantially as and for the purpose set forth.

10. In combination with the means for connecting and disconnecting the driving-shaft from the motive power, the spring-actuated mechanism controlled by the strip of stock fed through the machine and adapted when unrestrained by said strip to drive against said means and thereby automatically stop the machine, substantially as set forth.

11. The combination, with the rod extending loosely through the bed and having attached to its rear end a toe and at its front end a block arranged to slide in ways in the bed, of a coil-spring around said rod between said toe and bed, a stop against which said block impinges, pivoted to the bed in the same horizontal plane with the strip of stock from which the links are blanked, and the mechanism which disconnects the motive power from the driving-shaft, substantially as described.

12. The combination, with the driving-shaft, the motive power, and a throw-off lever adapted to disconnect said shaft and power, of a spring-actuated tripper one end of which is in close proximity to said throw-off, the other end being withheld against the resiliency of the spring by contact with the strip of stock, said tripper adapted when released by the stock to operate the throw-off lever and thereby stop the machine, substantially as set forth.

13. As an improvement in the art of manufacturing sheet-metal chain by machinery, the combination, with the feeding devices and mechanism for shearing the rear edge of the stock at a predetermined distance from the blanking mechanism, of means controlled by said stock for stopping the machine immedi-

ately prior to the blanking of the last link at the end of the strip, substantially as set forth.

14. In combination with the compressor-bars adapted to be reciprocated in ways within the bed-plate, the compressor-levers pivoted to said bars and bill-hooked at their inner extremities, and means for forcing said levers against the loop end of the link, substantially as shown and described.

15. The bill-hooked compressor-levers carried by the compressor-bars, in combination with the tappets and the strikers depending from the plunger, substantially as set forth.

16. The bill-hooked compressor-levers pivoted to the compressor-bars and adapted when in operative position to meet on opposite sides of the loop end of the link, in combination with the anvil-pin projected within the loop, substantially as and for the purpose described.

17. The combination, with the compressor-bars, of the anvil-pin projected within the loop end of the chain, as and for the purpose set forth.

18. As an improved means for pulling or feeding chain made by machinery, a sprocket-wheel mounted on a shaft journaled in bearings projecting from the bed-plate, the teeth of said wheel adapted to enter between the sides of the link within the loop end thereof and against the end of the preceding link, whereby all the strain is exerted in a line coincident with the horizontal axis of the chain, substantially as set forth.

19. In the art of manufacturing sheet-metal chain by machinery, the method herein described of blanking consecutive links from independent and separate strips of stock, the same consisting in shearing the rear end of the preceding strip at a predetermined distance from the blanking mechanism, feeding the strip so sheared, and butting the forward edge of the succeeding strip against the rear edge of the aforesaid strip immediately prior to the blanking of the last link from the latter, whereby at the next operation of the blanking mechanism the last link will be cut from the first strip and the eyes of the next link will be punched out from the succeeding strip at the proper distance from the forward edge thereof, substantially as and for the purpose specified.

In testimony whereof I affix my signature in presence of two witnesses.

FREDERICK EGGE.

Witnesses:

S. H. HUBBARD,
S. S. WILLIAMSON.