

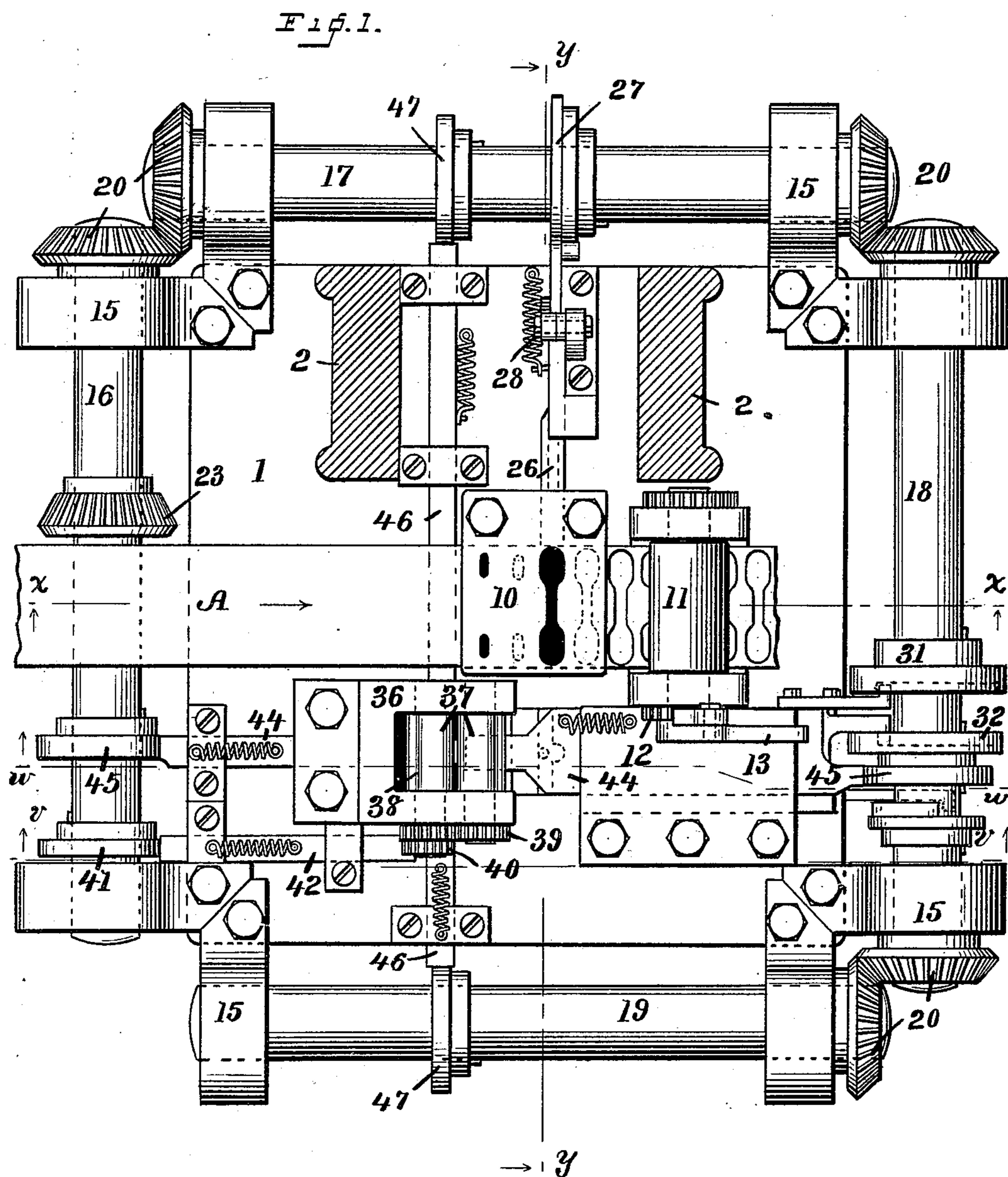
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5 Sheets—Sheet 1.

H. J. AUSTIN & R. T. LEWIS, Jr.  
MACHINE FOR MAKING SHEET METAL CHAINS.

No. 481,776.

Patented Aug. 30, 1892.



WITNESSES

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A. J. Tanner.

INVENTORS

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By their atty O. H. Hubbard,

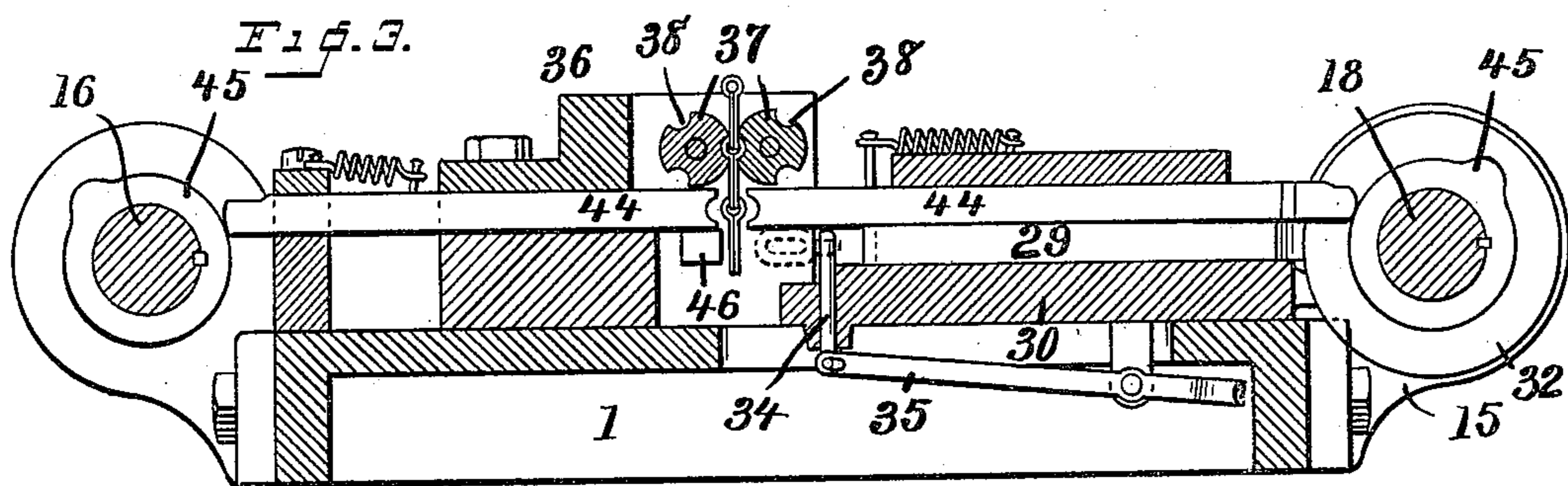
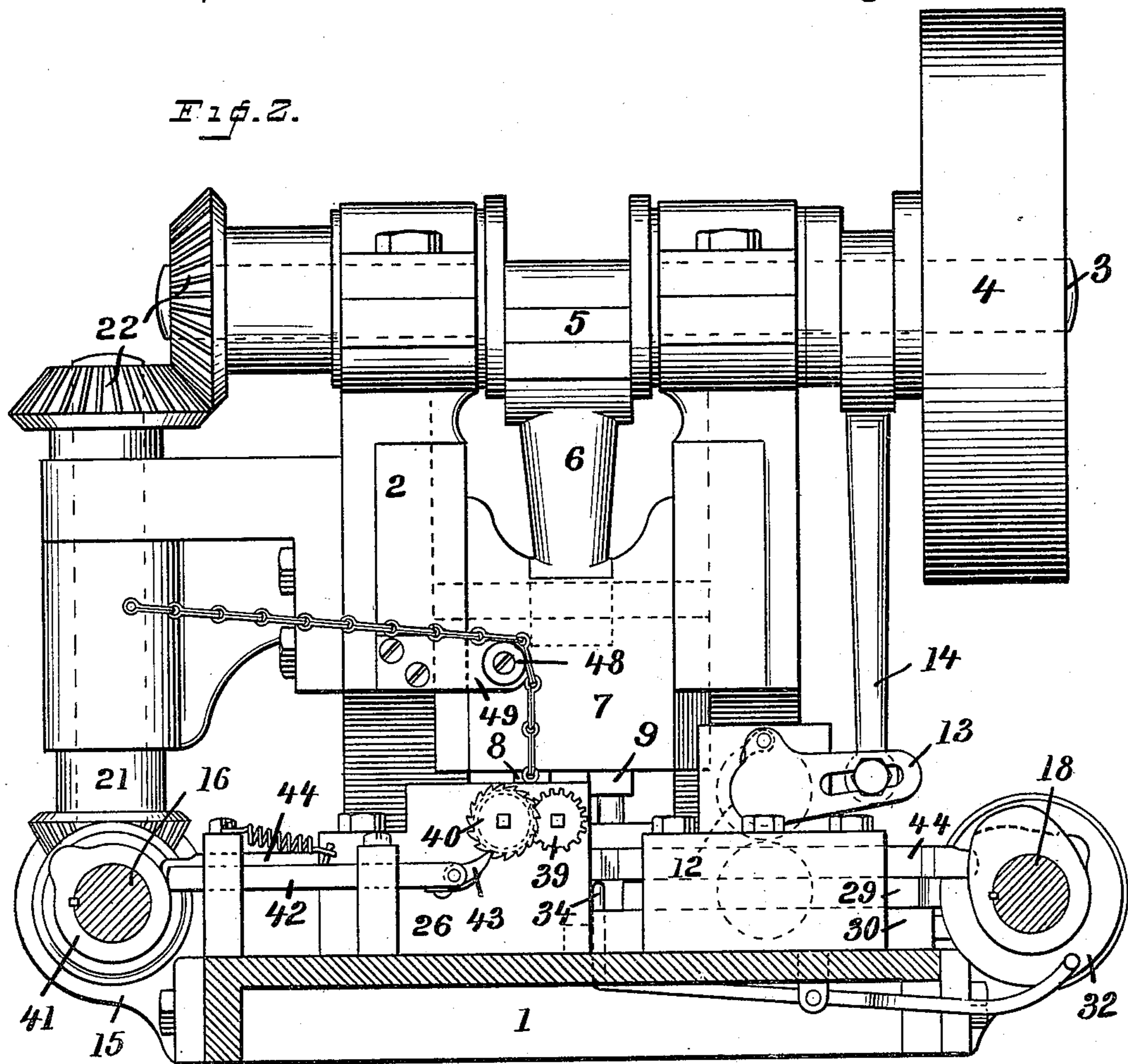
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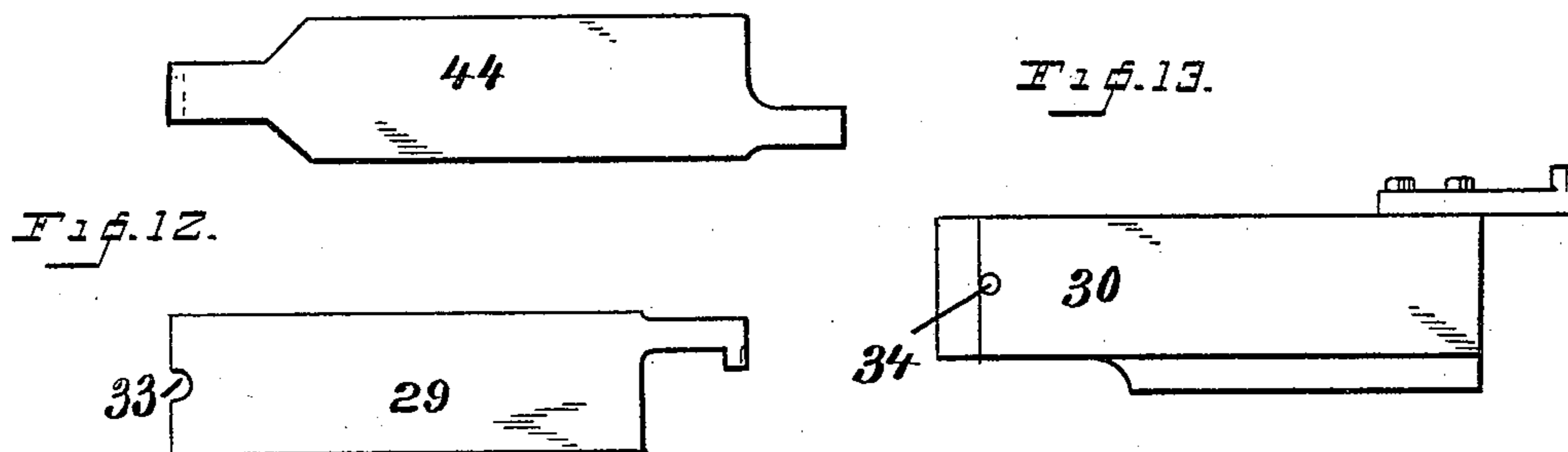
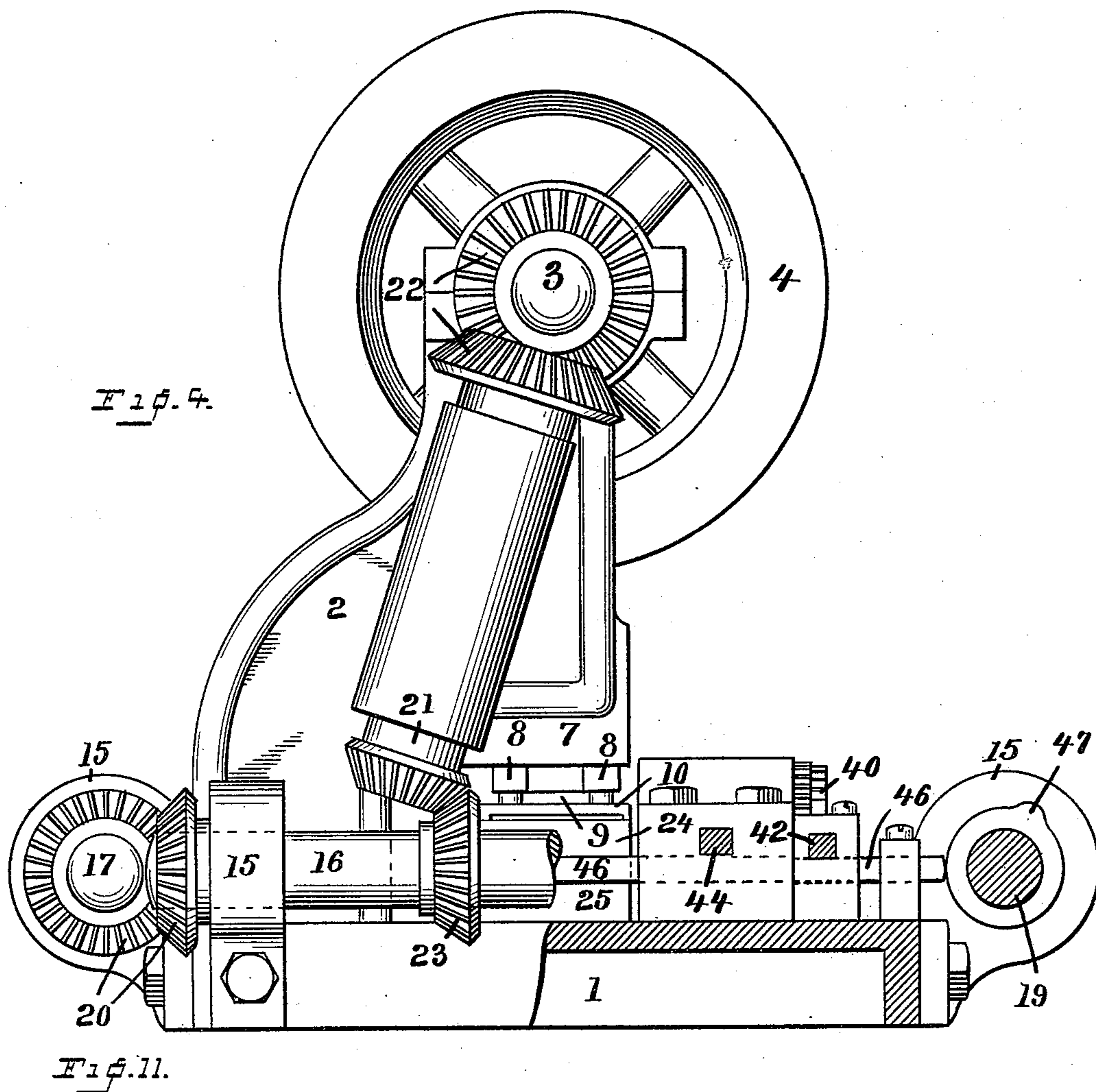
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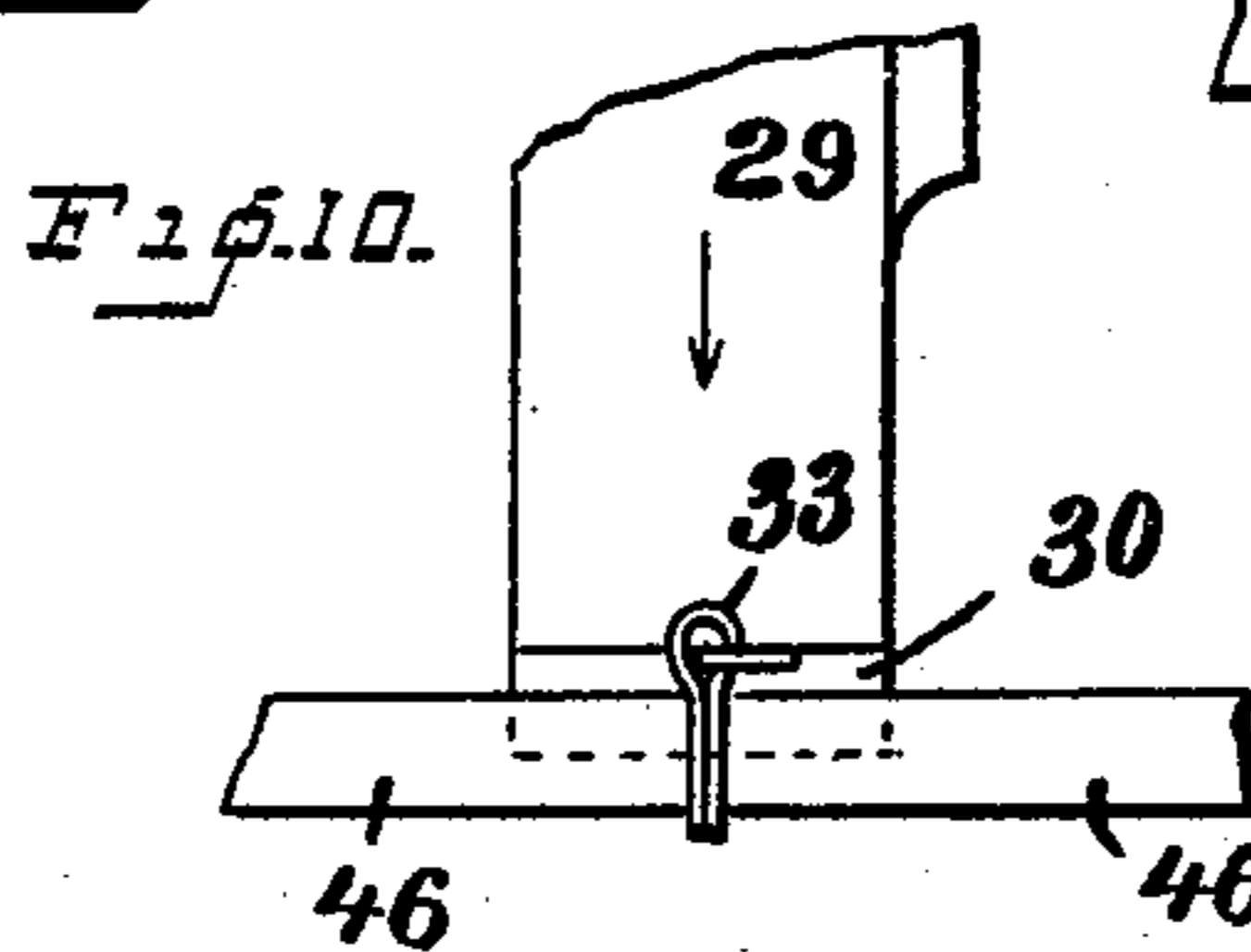
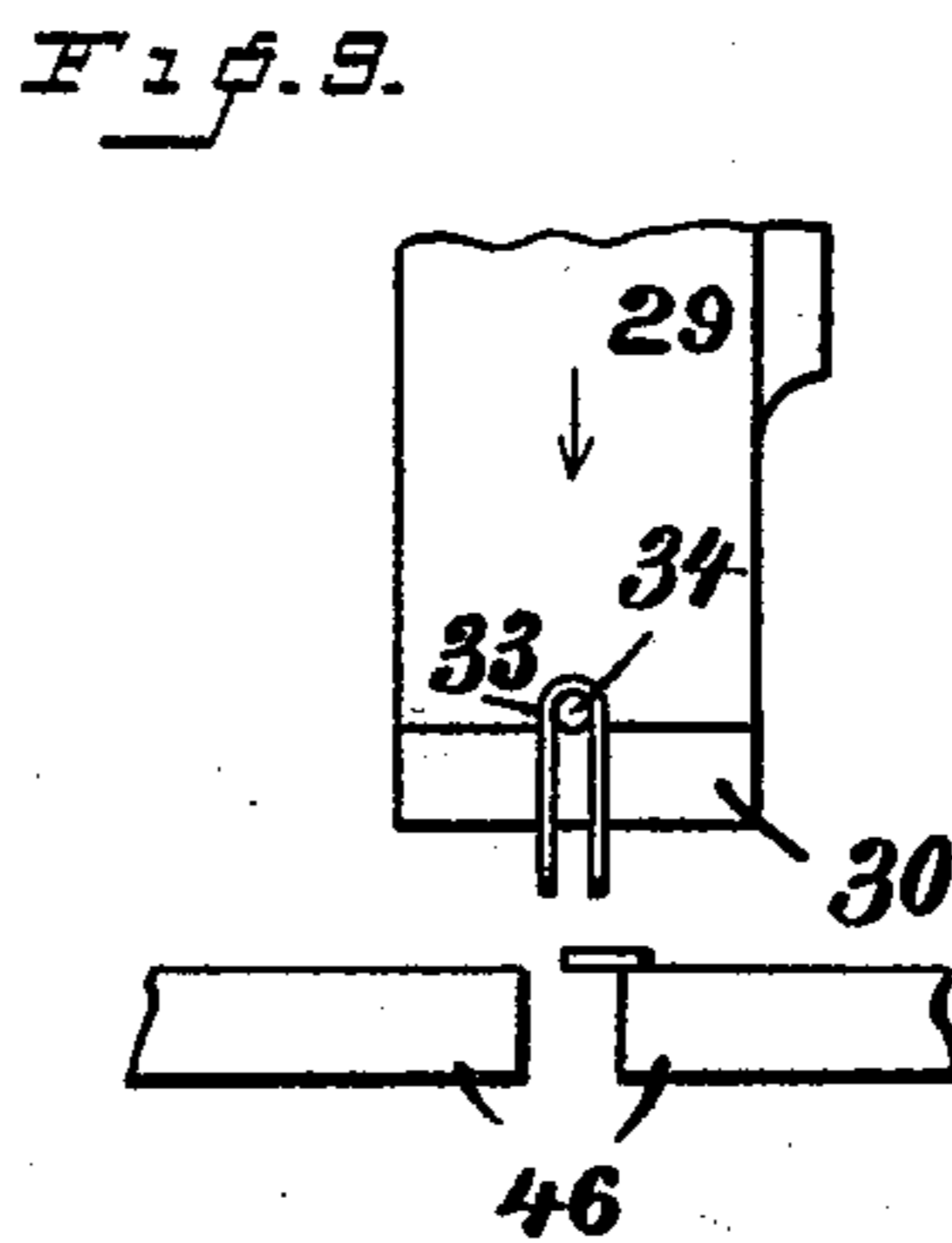
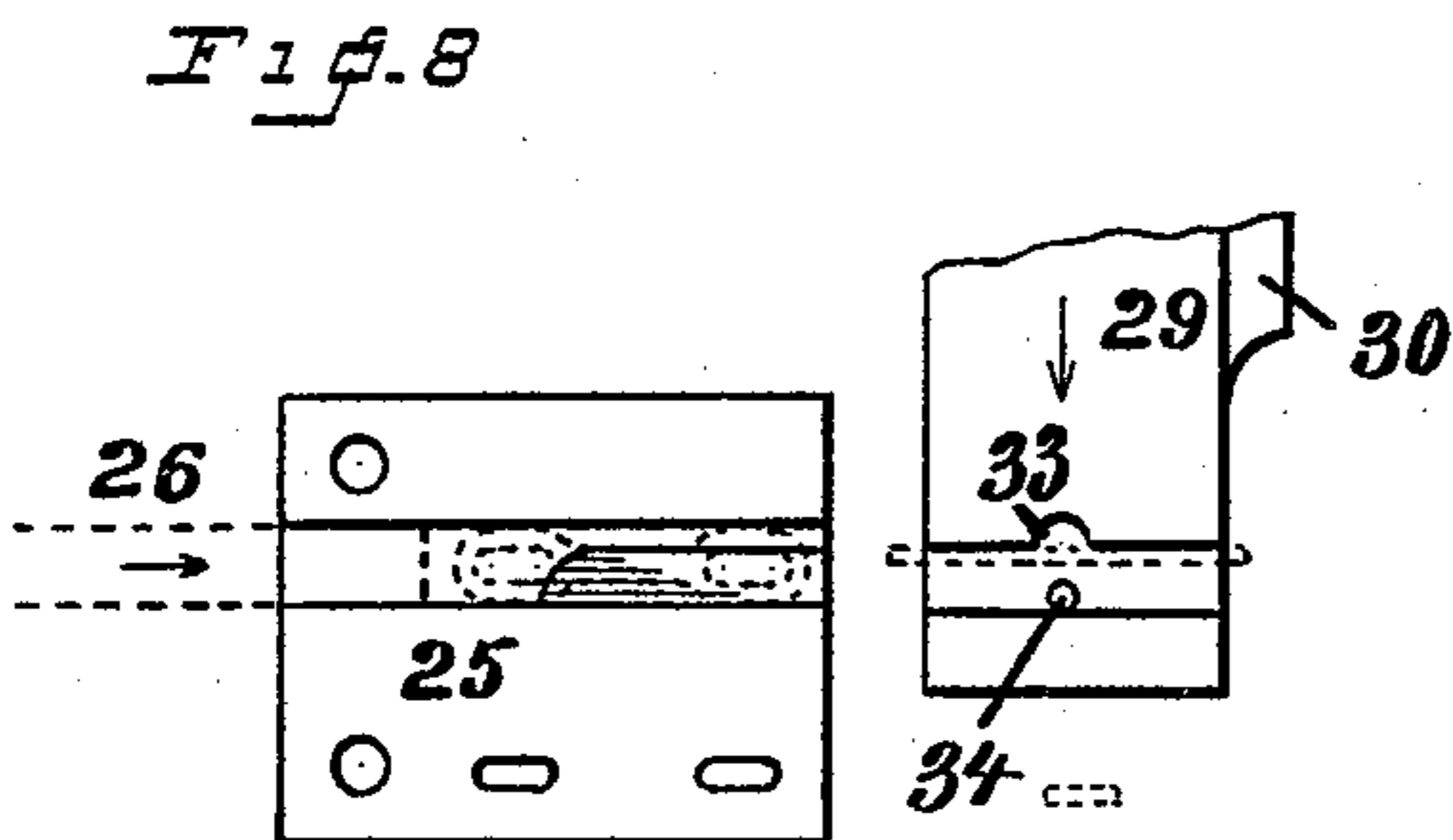
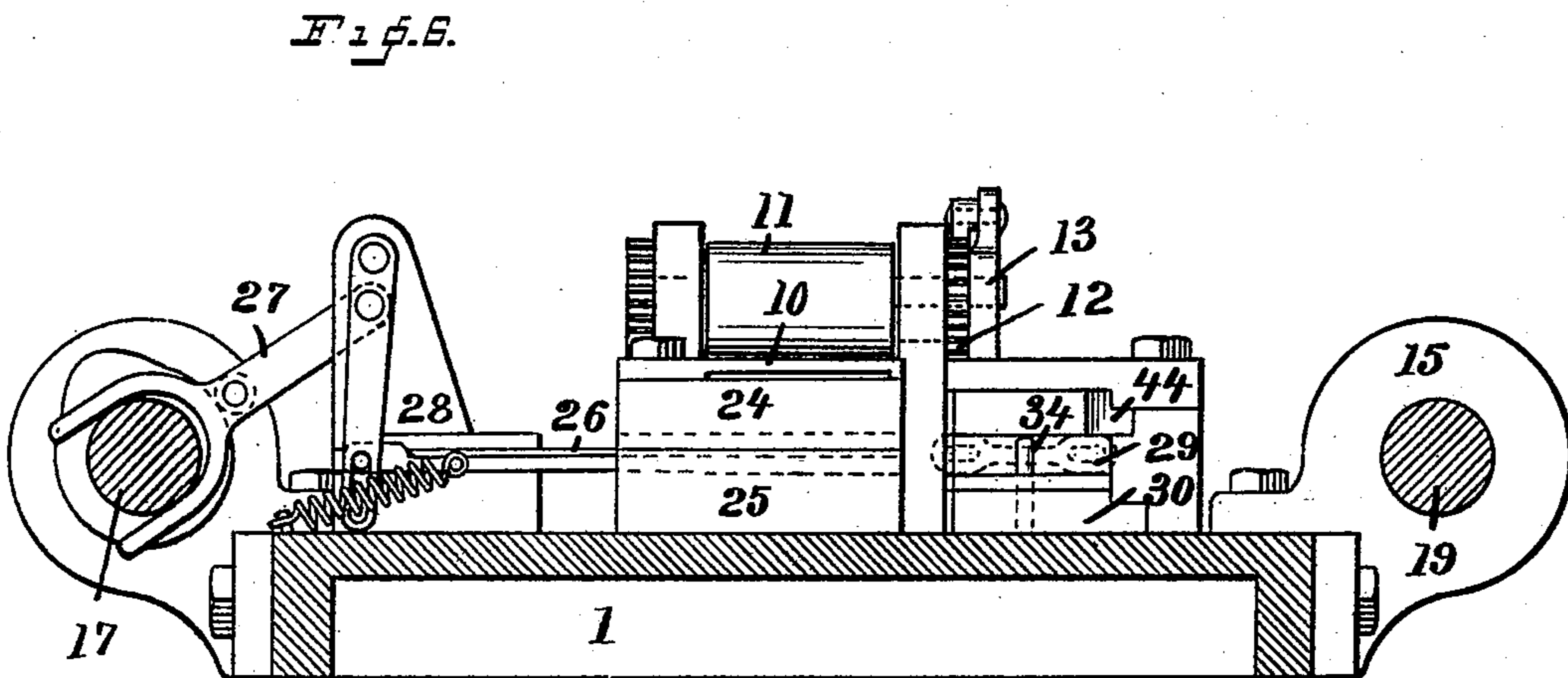
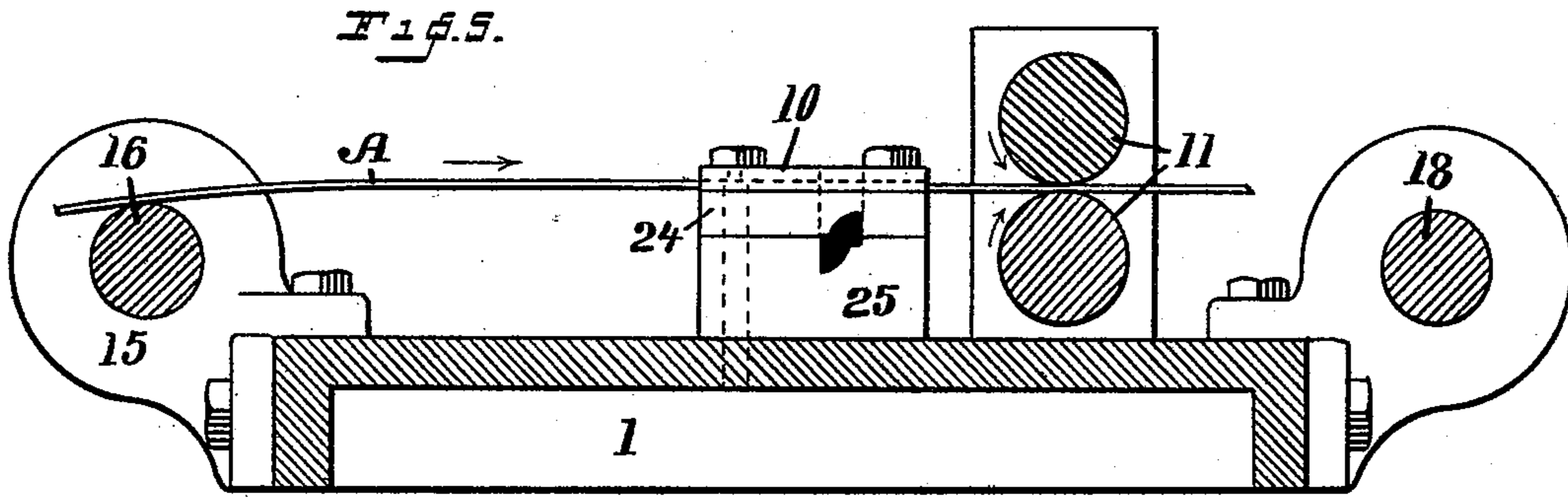
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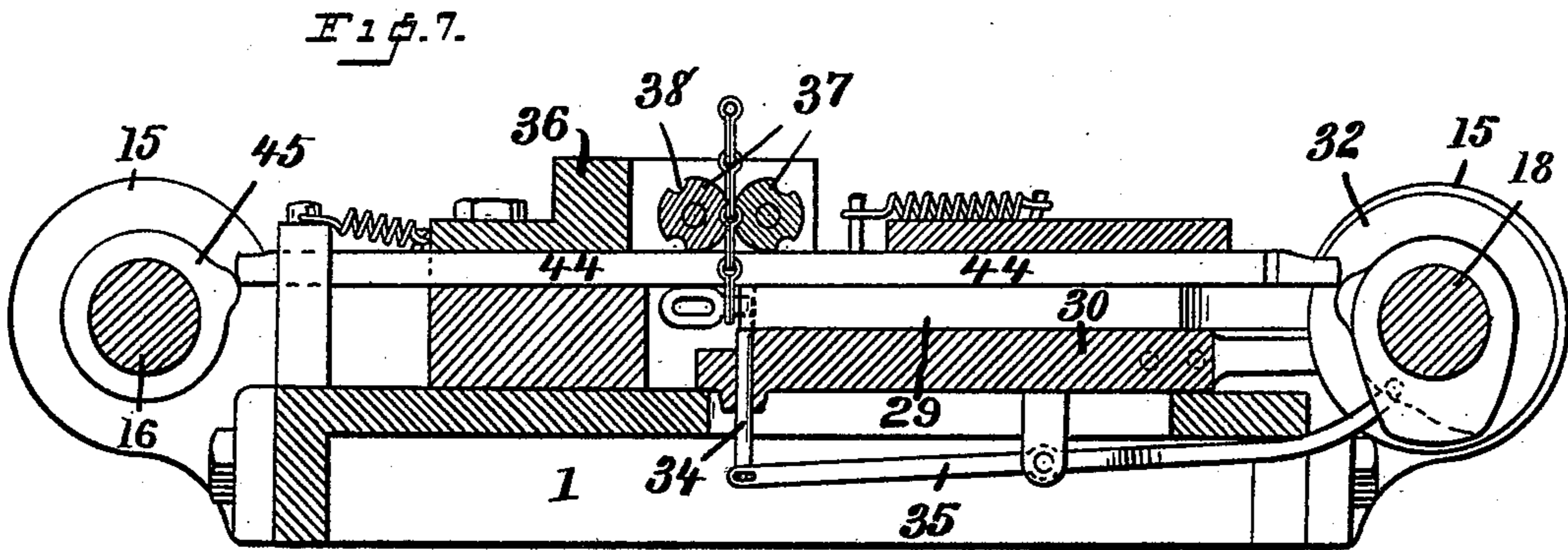


Fig. 14.

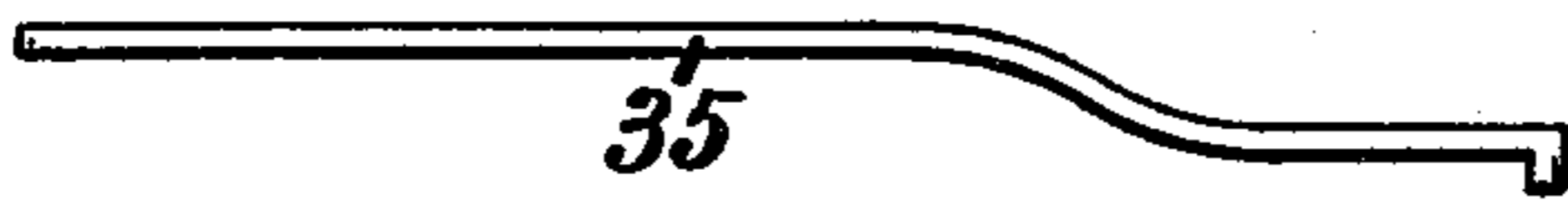


Fig. 15.

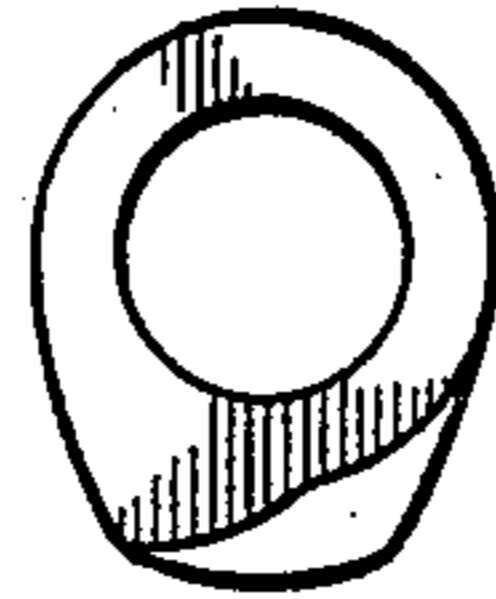
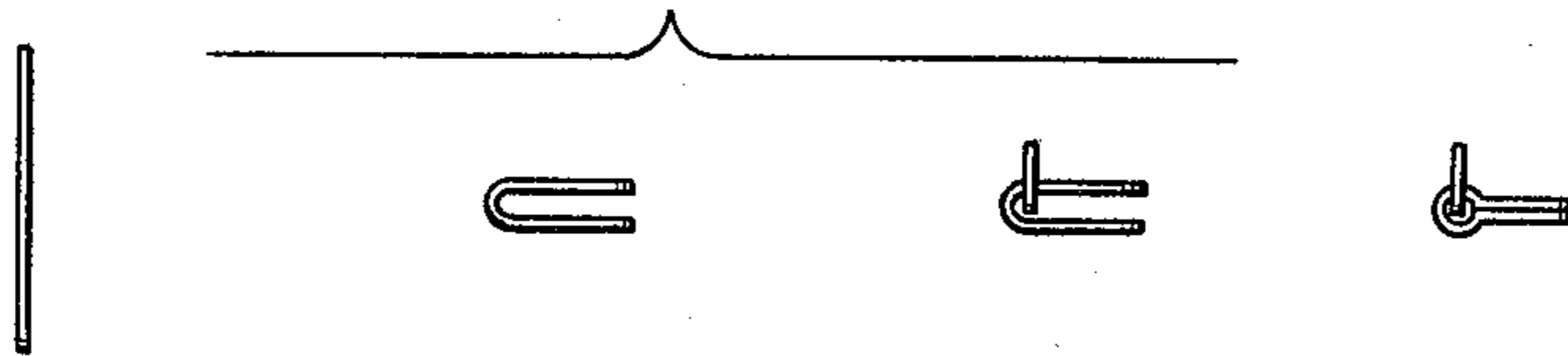


Fig. 16.



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# UNITED STATES PATENT OFFICE.

HENRY J. AUSTIN AND ROBERT T. LEWIS, JR., OF WATERBURY,  
CONNECTICUT.

## MACHINE FOR MAKING SHEET-METAL CHAINS.

SPECIFICATION forming part of Letters Patent No. 481,776, dated August 30, 1892.

Application filed March 2, 1892. Serial No. 423,486. (No model.)

*To all whom it may concern:*

Be it known that we, HENRY J. AUSTIN and ROBERT T. LEWIS, Jr., citizens of the United States, residing at Waterbury, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Machines for Making Sheet-Metal Chains; and we 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.

This invention relates to certain novel and useful improvements in machines for making sheet-metal chain, and has for its objects, first, to provide a machine of this character which shall produce the ordinary bent sheet-metal chain automatically; second, to provide a machine in which the links are first bent to an approximately U shape and then fed forward for purposes of assembling, whereby, as will presently be shown, certain delicate feeding mechanism is done away with; third, to provide for the perfect and compact closing of each link after it has been assembled, and, fourth and generally, to provide a machine which shall be simple in construction and rapid in operation; and with these ends in view our invention consists and resides in the construction and combination of elements hereinafter fully explained, and then recited in the claims.

In order that those skilled in the art to which our invention appertains may fully understand its construction and method of operation, we will describe the same in detail, reference being had to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a plan view with the shaft and press-gate removed. Fig. 2 is a section on the line *vv* of Fig. 1, looking in the direction of the arrow. Fig. 3 is a section on the line *ww* of Fig. 1, looking in the direction of the arrow. Fig. 4 is a side elevation from the left of Fig. 1 with a part of the frame broken away. Fig. 5 is a section at the line *xx* of Fig. 1, looking in the direction of the arrow; Fig. 6, a similar view at the line *yy* of Fig. 1. Fig. 7 is a view similar to Fig. 3, but showing the parts in another position. Fig. 8 is

a detail plan view showing the feed-block and the bending-slides. Fig. 9 is a detail plan view of the bending-slides and closing-dies prior to the feeding movement of the bent link. Fig. 10 is a view similar to Fig. 9, showing the same parts after the link has been fed. Fig. 11 is a plan view of one of the closing-slides. Fig. 12 is a plan view of one of the bending-slides. Fig. 13 is a plan view of the pin-carrying slide. Fig. 14 is a plan view of the pin-operating lever. Fig. 15 is a side elevation of the cam whereby the lever shown at Fig. 14 is operated; Fig. 16, a view showing the successive shapes of the blank at different stages of its manufacture, each being in edge elevation.

The same numerals and letters denote the same parts in each of the figures.

The several small arrows placed upon the parts show the direction of the operative movement.

Referring now more particularly to Figs. 1, 2, and 4, 1 denotes the bed of the machine, which may be supported upon legs or otherwise. Upon this bed is mounted a pair of standards 2, and in the upper parts of these standards is journaled the main shaft 3. This shaft at one end carries a heavy pulley 4, adapted to be driven by a belt, and this is preferably made heavy enough to operate as a fly-wheel. The main shaft 3 is cranked at its center between the standards, as seen at 5, and by this crank is driven through a pitman 6 a cross-head 7, mounted in ways in the standard. This cross-head carries a pair of punches 8 and 9—such as are common in machines of this class—one punch forming the eyes of the link by cutting two openings near the opposite edges of the blank, as seen at Fig. 1, and the other punch at the next stroke cutting the outline of the blank around the eyes. The die with which these punches cooperate is affixed firmly to the bed beneath the press-gate. Its plan view is exactly the same as that of the stripper 10, which appears in Fig. 1. The metal passes between the upper face of the die and the lower face of the stripper, as clearly appears at Fig. 1. Just behind the die is mounted a pair of feed-rolls 11, the upper of which carries a ratchet-wheel 12, actuated by a pawl-carrying lever 13,

(shown at Fig. 2,) and this lever obtains its stroke from the main shaft through a pitman 14. (Shown at Fig. 2.) The connection between the parts 13 and 14 is preferably adjustable, so that the feed may be varied according to the size of the chain to be produced. In bearings 15, secured to the bed, are journaled four shafts 16, 17, 18, and 19, and these shafts serve to operate the various devices whereby the link is treated after it has been blanked from the sheet or strip of metal A by the punches. This system of shafts we preferably connect by means of bevel-gears 20, and their movement is derived from the main shaft through a connecting-shaft 21, whose upper end is geared to said main shaft by gears 22 and whose lower end carries a bevel-gear meshing with and adapted to drive a gear 23, fast on the shaft 16.

The operation of the punch 9, which, as has been heretofore explained, severs the flat link from the strip, carries said link downward through the die, which is shown in end elevation at 24, Fig. 5, and which rests upon the feed-block 25, which appears in Fig. 5 and in plan view at Fig. 8. The recess in this slide and in which the punch deposits the link is of their regular shape, which may be gathered from a comparison of Figs. 5 and 8. When the link is thus deposited, it lies in the position shown in plan view in dotted lines, Fig. 8, and in end elevation in dotted lines at Fig. 5. As soon as it has been deposited and the punch has receded, a feeding-slide 26, operated by a cam 27 on shaft 17 and retracted by a spring 28, moves forward and pushes the link along in the direction indicated by the arrow on Fig. 8. As soon as the link is started forward it falls into the recess in the block, so as to lie therein edgewise, and the further movement of the slide 26 pushes it outward to the position shown in dotted lines at the right hand of Fig. 8, and also in Fig. 7. When in this position, it lies against the face of a slide 29, which in its turn is superposed upon a slide 30, and these two slides are operated by cams 31 and 32 on the shaft 18 in such manner that after the link has arrived at the position at which it is shown the slide 29 moves forward relative to the slide 30, and then the two slides continue their movement together, as will be presently explained. The slide 29 has a curved bending-die 33 formed in its outer end, and through the slide 30 projects upward a pin 34 immediately in front of the die. The first forward movement of the slide 29 carries the link flatwise up against the pin and bends it in the U form shown at Fig. 9. During the balance of its forward movement the slide 30 moves with the slide 29, and the result of this movement is to carry one branch of the U-shaped link through the eyes of the link previously formed, as appears at Fig. 7. The pin 34 is seated through the slide 30 and is borne upon and moved by a lever 35, fulcrumed to the bottom of the slide 20 and having its rear end

operated by a cam on the shaft 18 in such manner as to withdraw the pin 34 downward out of the bent link, as will be presently explained. As soon as the forward feeding movement is completed and the U-shaped link fed through the eyes of the previously-bent link, it is closed by means of a pair of slides 46, which are operated by means of cams 47 upon the shafts 17 and 19, respectively. After operating upon the link these slides are retracted by means of springs. The position of the parts at the time of this closing movement is shown at Fig. 10. By closing the link while its bent end is still around the pin an eye or loop of uniform size is obtained in all the links. When the link has thus been threaded and closed, the feeding movement of the chain takes place, and we will now describe the means whereby this is accomplished. In a bearing 36, secured upon the bed, are journaled a pair of feeding-rolls 37, each having in its periphery a number—say, for instance, three—of longitudinal grooves 38, and these grooves are so spaced as to engage the loops of the links, as will be readily understood from an inspection of Figs. 3 and 7. The rolls 37 are geared together by means of gears 39, Figs. 1 and 2, and upon the shaft of one roll is mounted a ratchet-wheel 40, which is actuated by means of a cam 41 on the shaft 16 through a slide-bar 42, having a pawl 43, which engages the periphery of the ratchet-wheel. The throw of the slide-bar and the spacing of the ratchet-teeth are so arranged as to impart the proper movement to the feeding-rolls at each stroke of the press, and this, as is shown in the drawings, will be one-third of a turn. The feeding movement of the rolls draws the link upward one step to the position in which the lowermost link is shown at Fig. 3, and this brings said link between the faces of a pair of combined grasping-jaws and closing-slides 44, which serve a double purpose. When closed in, they not only assist in the formation of the eye, in this way supplementing the slides 46, but they remain together long enough to hold the link firmly while the next U-shaped link is threaded through it and closed. As soon as this has taken place, the slides recede and the pin is withdrawn downward out of the finished link, which latter, being thus left entirely unsupported, drops downward into line with the length of chain above. The several steps are then repeated in the formation of each link in turn.

We provide a take-up for the finished chain, which preferably consists of a roller 48, hung on a bracket 49 on one of the standards, and after passing over this roller the chain is wound upon reel, which may properly be driven by a light slip belt or cord. This is a common device for this purpose, and we have not thought it necessary to show it in the drawings.

While the operation of the invention has been explained in connection with the descrip-

tion on the several parts, a short recapitulation may be profitable in connection with Fig. 16, which is designed to show diagrammatically the shape of the link at its various stages and its several positions, the mechanism being omitted. The blanking is first completed, leaving the link in the shape of the flat sheet-metal piece with the contracted center and enlarged open ends. This piece is then fed in the direction of its length and is caused by gravity to turn one-quarter of a turn in relation to its original position. Then it is bent into the U shape illustrated at Fig. 9. Then it is fed forward, so that one of its branches passes through the eyes of the last formed and completed link. Then it is closed and then released and by gravity falls a quarter-turn from the horizontal to the vertical position, and at the same time it turns a quarter-turn upon its axis, which latter movement is due to the engagement of its eye with the rounded end of the loop of the preceding link. When in this position it is fed upward, finished by the slides 44, and finally passes between the feeding-rolls.

In this our invention we do not wish to be confined to the precise details of construction nor to the exact instrumentalities which we have shown in the drawings for the purpose of carrying out our invention, since these may be altered and varied and still the same steps in the method of operation be produced.

It will be observed, among other things, that for the turning of the link before bending from its flat to its edgewise position the gravity of the link itself is employed, and this enables us to dispense with any gripping-fingers or other mechanisms for this purpose. As the link is bent to its U form before it is threaded, the curve of each link which subsequently forms the eye or loop, will be precisely the same as that of each other link, regardless of the consistency or texture of the metal, and in this way a uniformity of the finished product is secured which is not obtainable where the flat link is threaded through the preceding link and then bent upon itself without any support, such as is afforded by the pin 34 in our invention. These features are of the highest practical importance for the reasons above stated.

Again, after the U-shaped link has been fed forward and threaded through a preceding link and then closed and released it assumes its proper position by gravity, and we are thus enabled to dispense with any means for turning it. It is intended that the action of the closing-dies shall complete the formation of the eye or loop and at the same time firmly compress the branches of the link together; but by the use of the slides 44 and the feeding-rollers of the shape shown each link receives as it passes through a supplemental pressure, and the greater part of its flat portion is subjected to a rolling action, which corrects any possible defect in the flattening

which may have been left by the closing-dies. These features also have an important bearing upon the excellence and uniformity of the finished product.

We have shown in the organized machine the means for blanking the links from the intermittently-fed strip of sheet metal; but this is not necessary, since it is entirely within the scope of our invention to blank the links in one press and bend and assemble them in a machine similar to that hereinbefore described.

We claim—

1. In a chain-machine, the combination, with suitable blanking mechanism for forming the links, of means, as described, for feeding the blanked link in the direction of its length and for turning the same, an anvil and bending-slide adapted to receive said fed link and to bend the same into U form, means, as described, for projecting said slide and anvil forward to thread the link, a pair of closing-dies for shaping the link, and a feed for the complete chain, substantially as set forth.

2. In a chain-machine, the combination, with suitable means for forming the blank, of means for feeding said blank in the direction of its length and turning the same, a pair of bending-slides having independent and conjoint movement, whereby the link is bent to U form and fed forward and threaded, a pin or anvil for the support of the link during the bending process, and closing devices operated simultaneously on both sides of the link, and means for feeding the same.

3. In a machine of the character described, the combination, with means for forming the link, of the feed-block in which the link is deposited and which is inclined at one end for the turning of the link, a feed-slide operating through the feed-block to project the link in the direction of its length, a pair of bending-slides, whereby the link is first bent and then fed, and closing mechanism, substantially as described, for the subsequent treatment of the link.

4. In a chain-machine, the combination, with suitable blanking mechanism, of a feed-block inclined at one end, as shown, a feed-slide working through said block and adapted to project the link in the direction of its length, a pair of bending-slides, one provided with a bending-die and the other with a pin or anvil, and means for first moving the die forward to effect the bending and both dies forward for the purpose of feeding the link, and a pair of closing-dies and suitable feeding mechanism.

In testimony whereof we affix our signatures in presence of two witnesses.

HENRY J. AUSTIN.  
ROBERT T. LEWIS, JR.

Witnesses:

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M. C. HINCHCLIFFE.