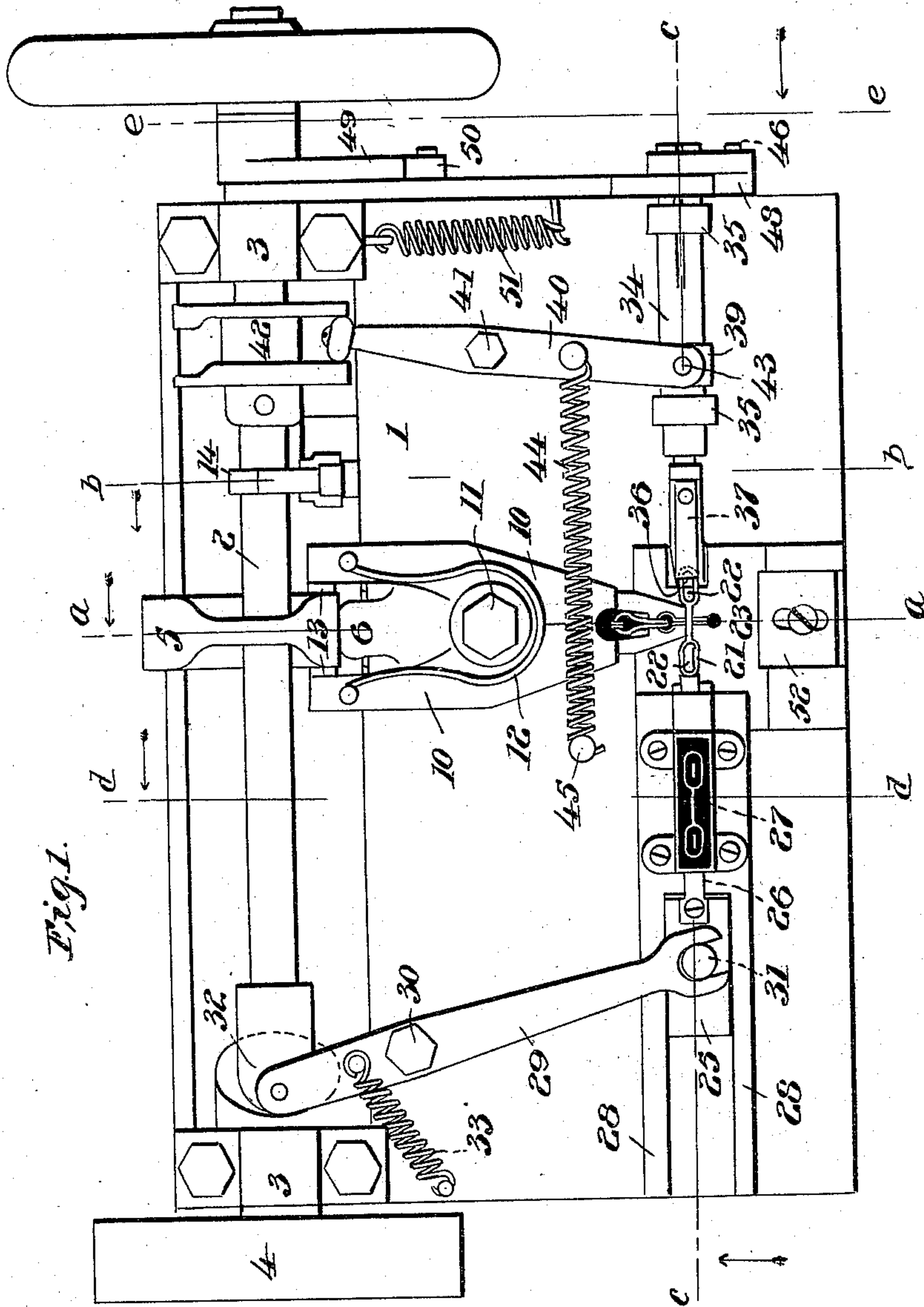


5 Sheets—Sheet 1.

MACHINE FOR AUTOMATICALLY MANUFACTURING SHEET METAL CHAIN.

Patented Dec. 3, 1895.



INVENTOR

F. EGGE.

J. H. Smith Jr.

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(No Model.)

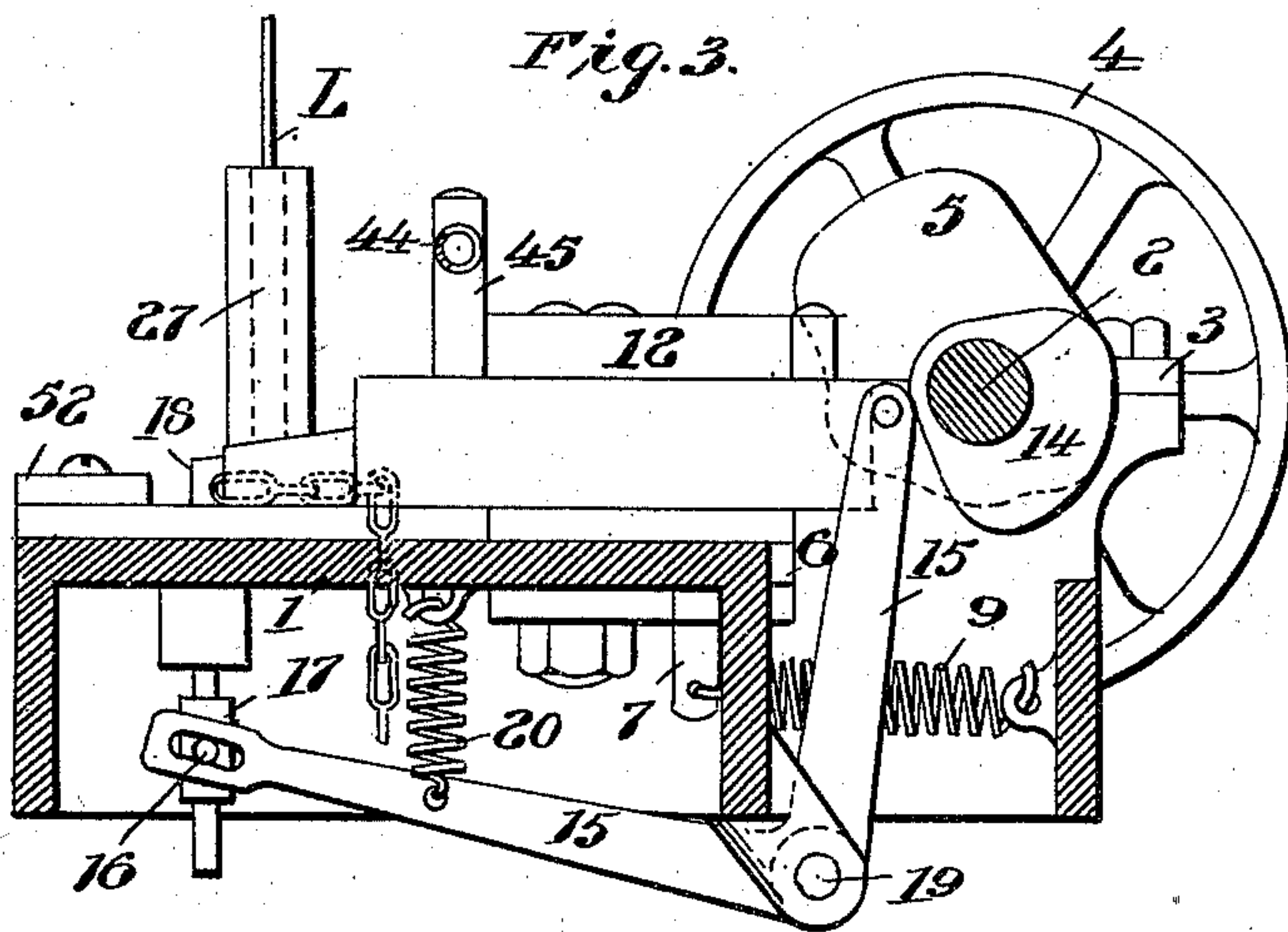
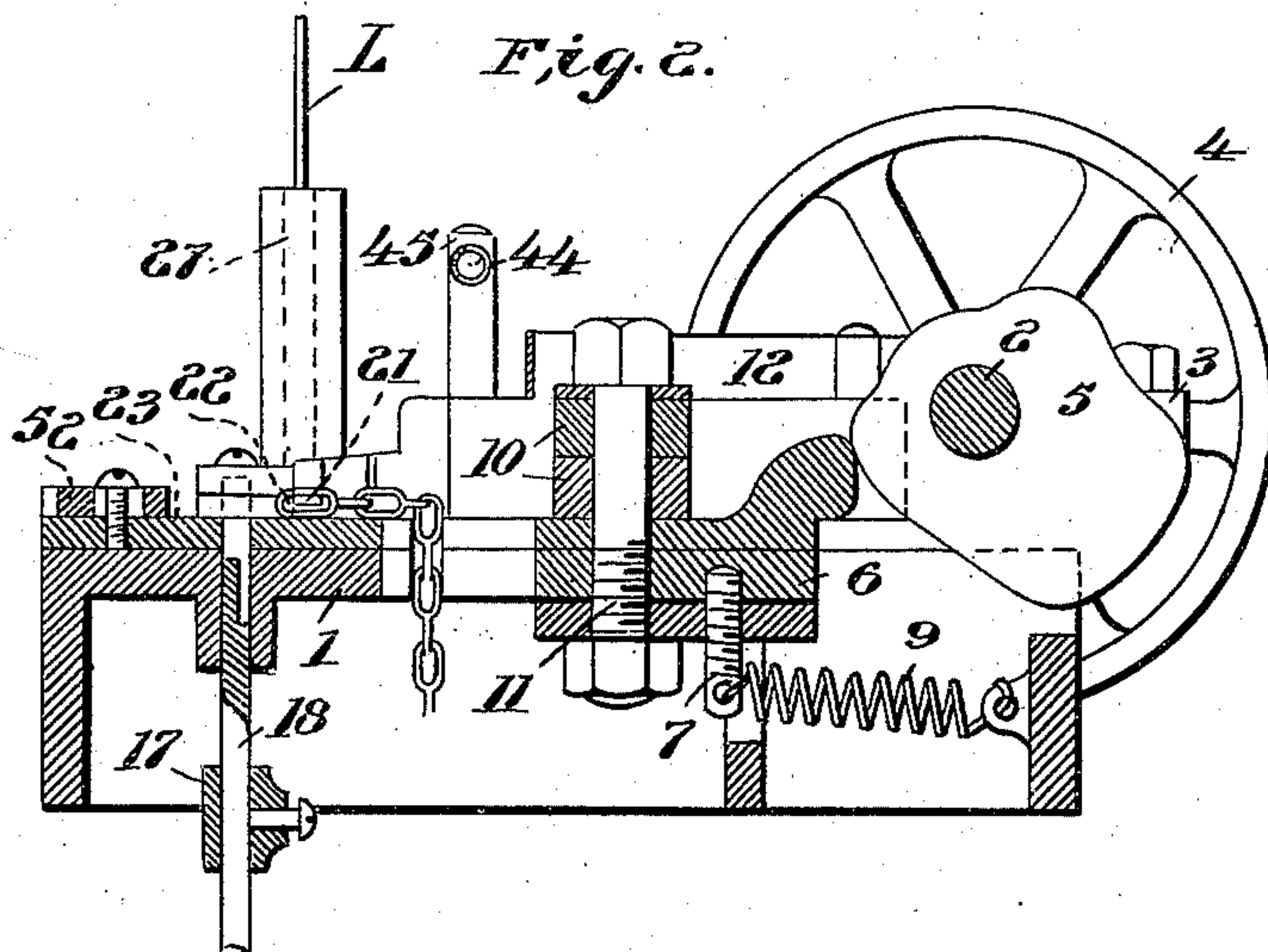
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F. EGGE.

MACHINE FOR AUTOMATICALLY MANUFACTURING SHEET METAL CHAIN.

No. 550,605.

Patented Dec. 3, 1895.



WITNESSES:

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(No Model.)

5 Sheets—Sheet 3.

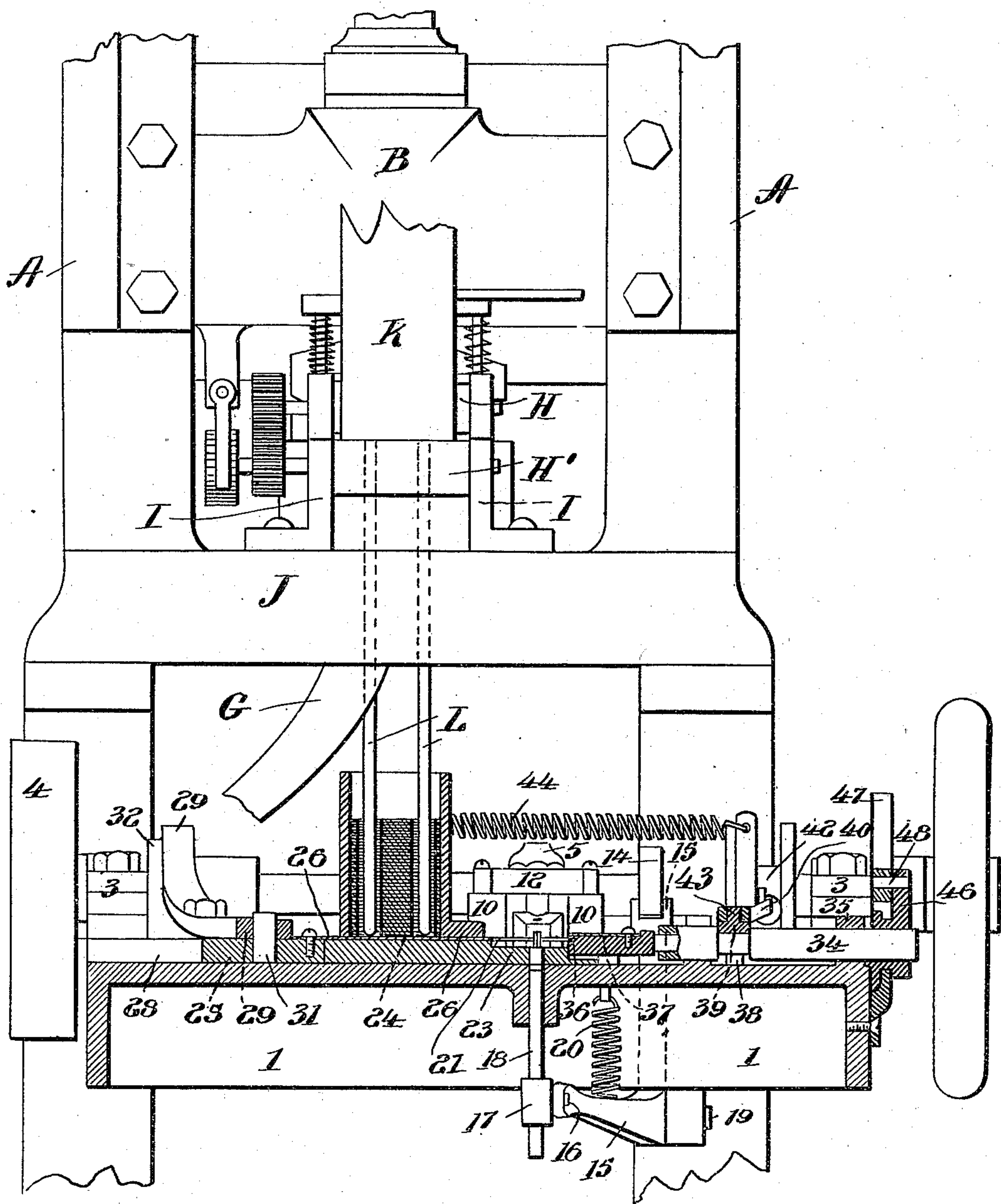
F. EGGE.

MACHINE FOR AUTOMATICALLY MANUFACTURING SHEET METAL CHAIN.

No. 550,605.

Patented Dec. 3, 1895.

Fig. 4.



WITNESSES:

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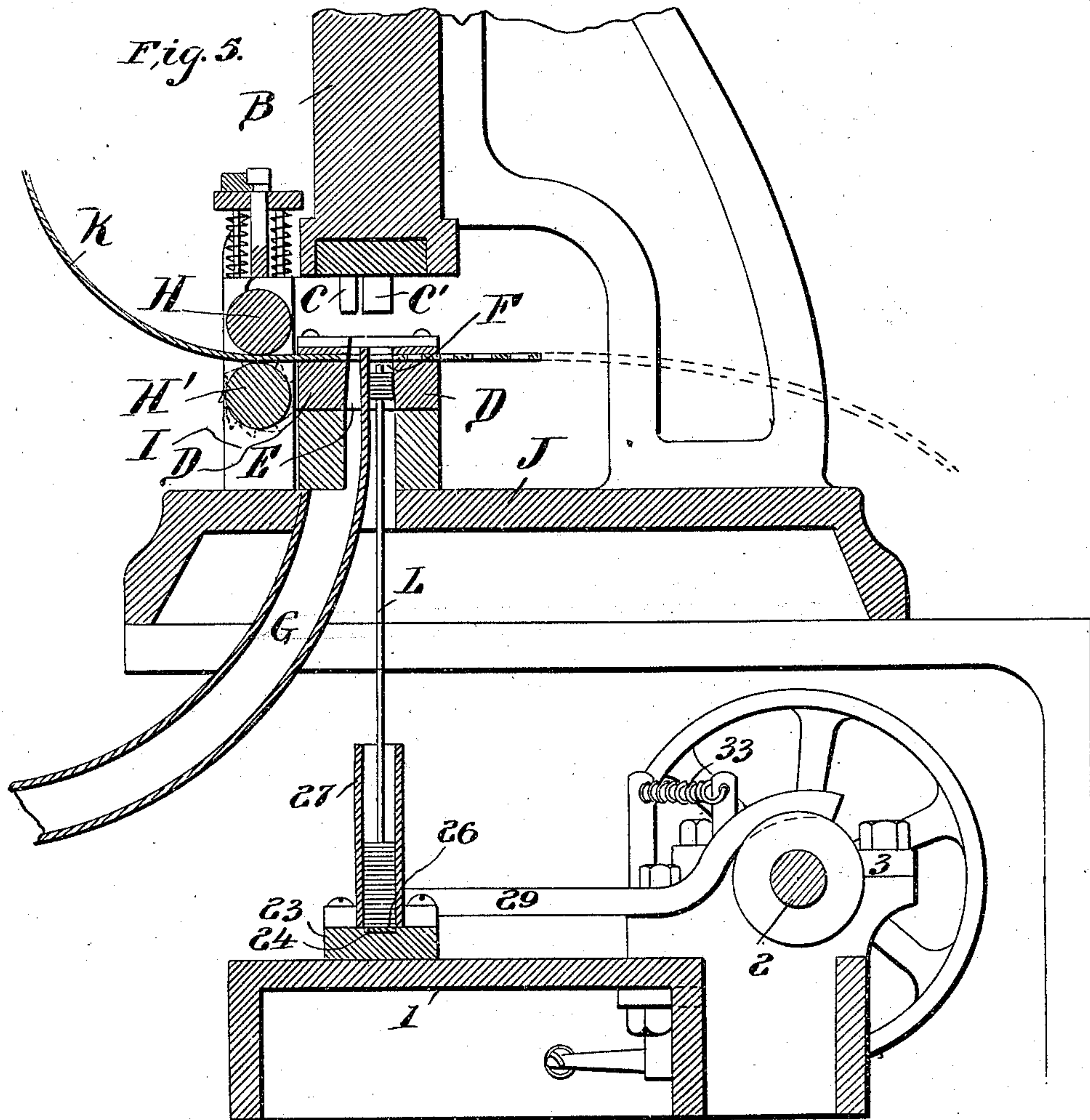
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(No Model.)

5 Sheets—Sheet 4.

F. EGGE.
MACHINE FOR AUTOMATICALLY MANUFACTURING SHEET METAL CHAIN
No. 550,605.
Patented Dec. 3, 1895.



WITNESSES:

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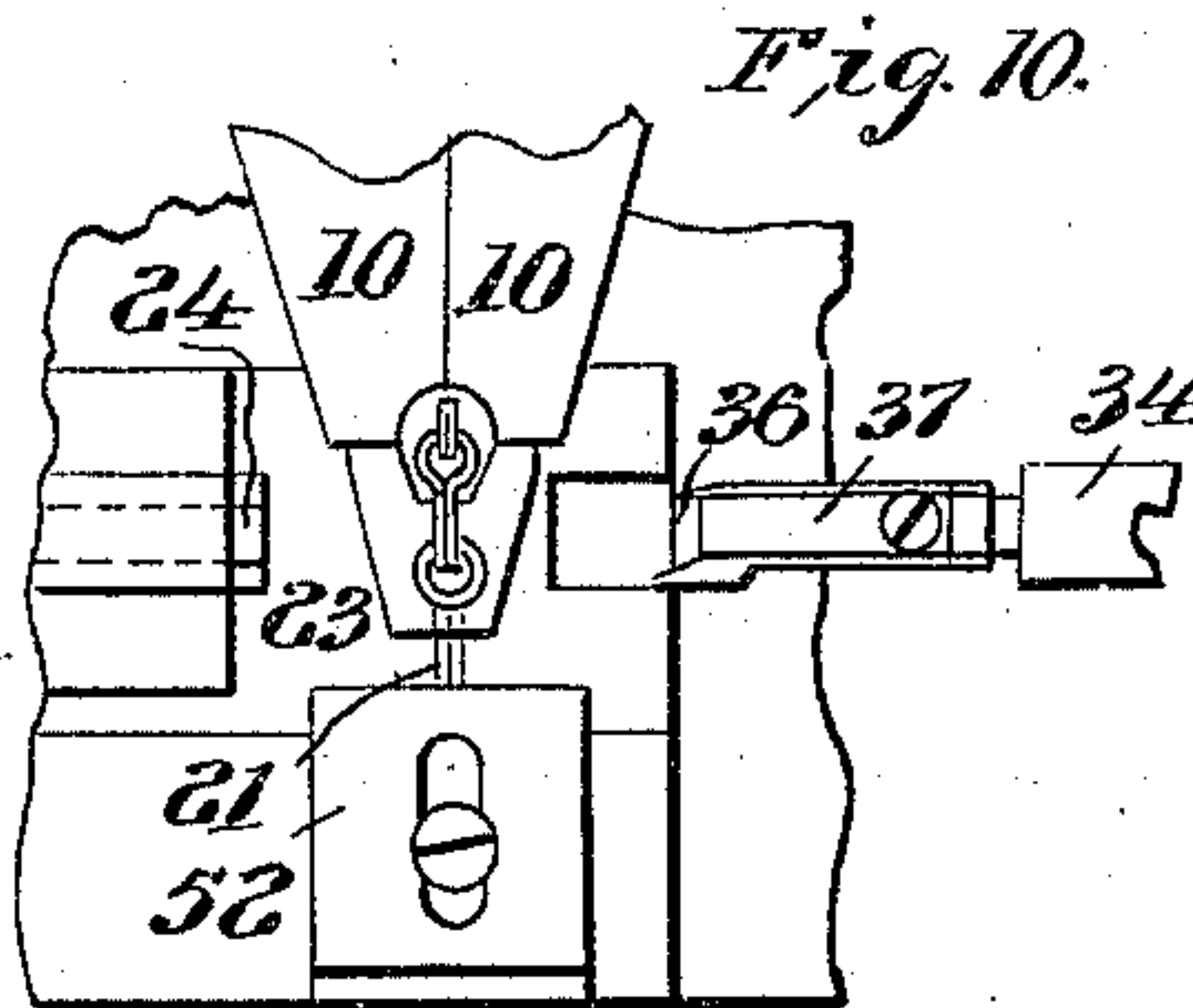
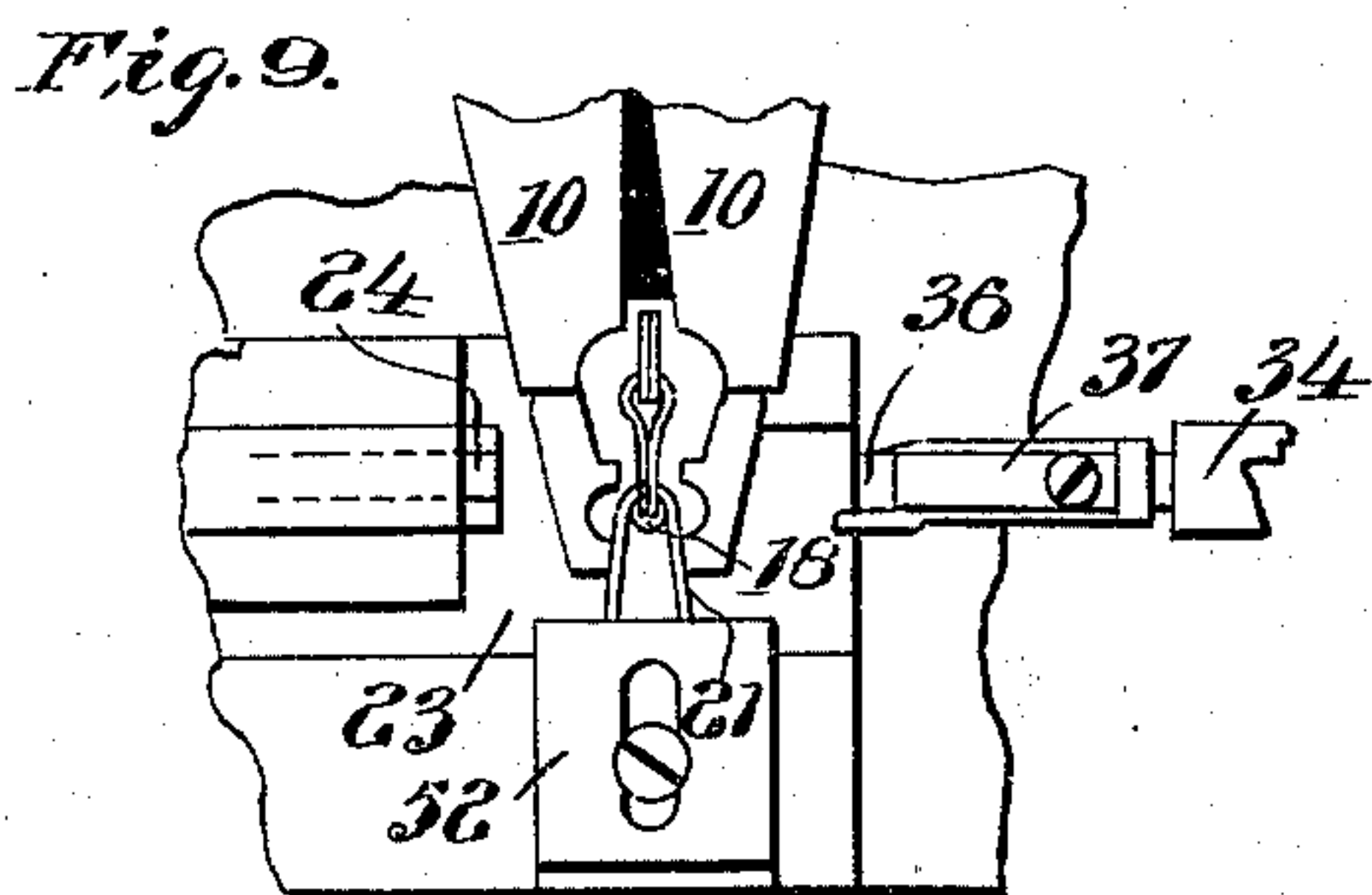
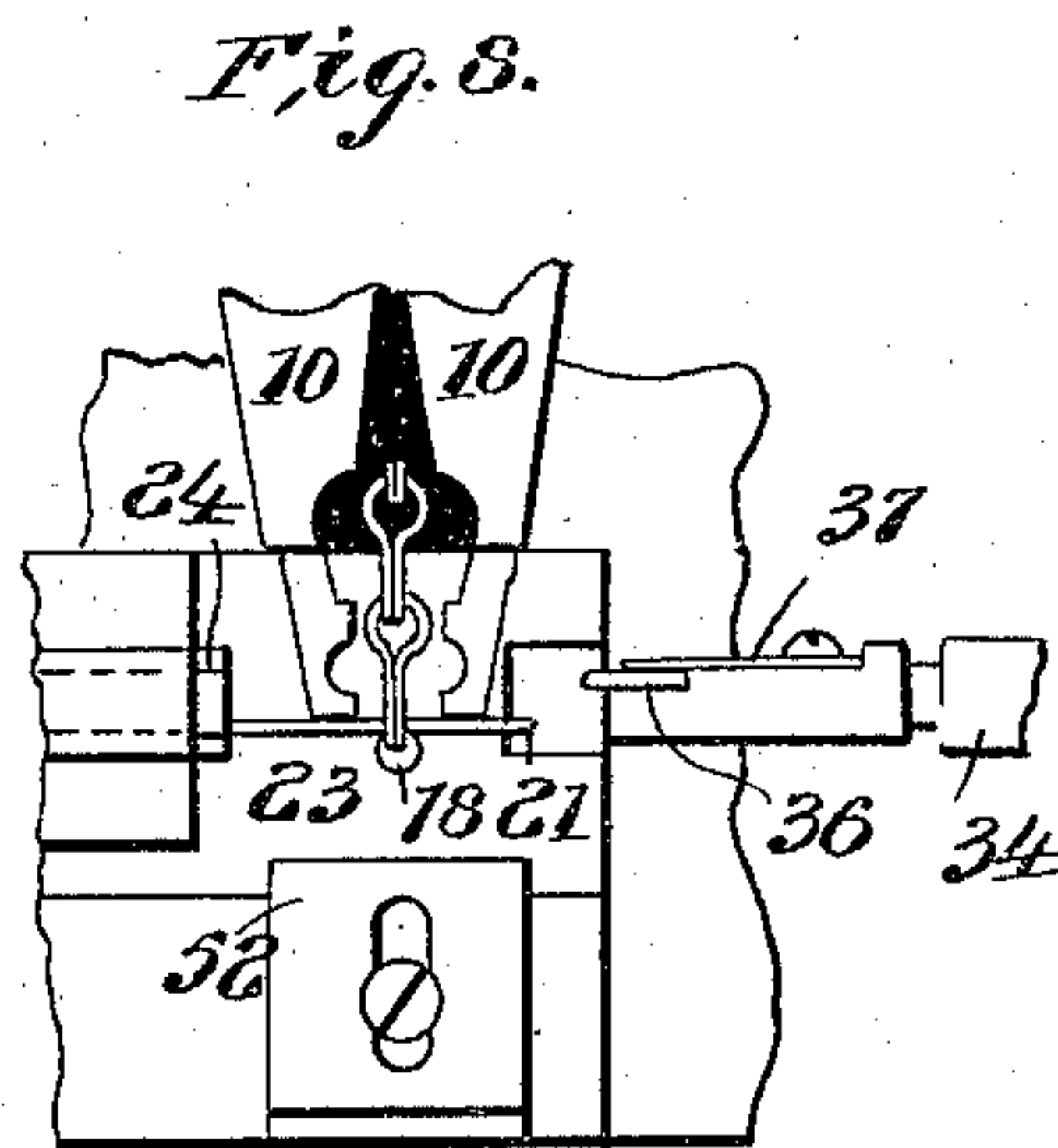
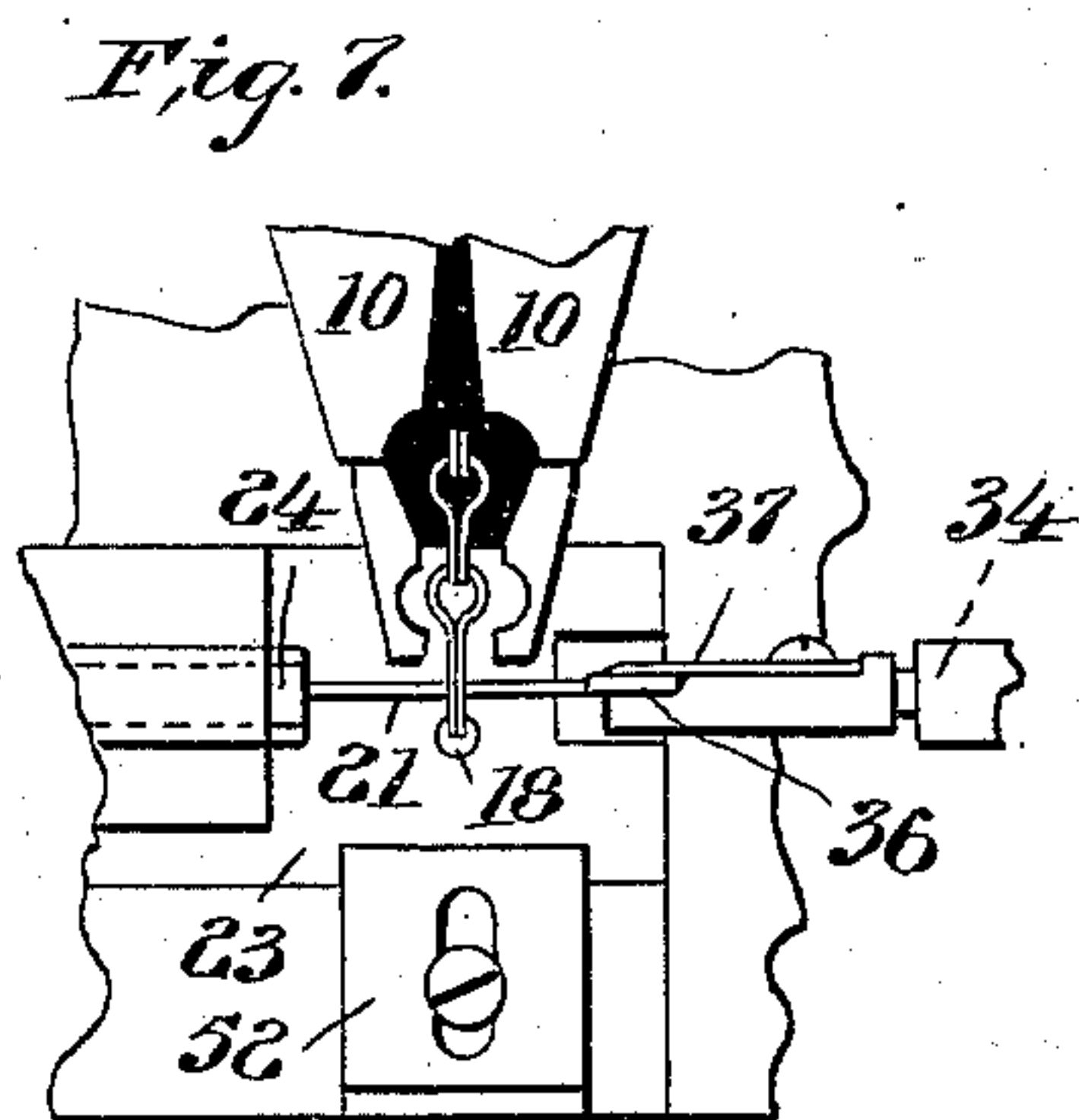
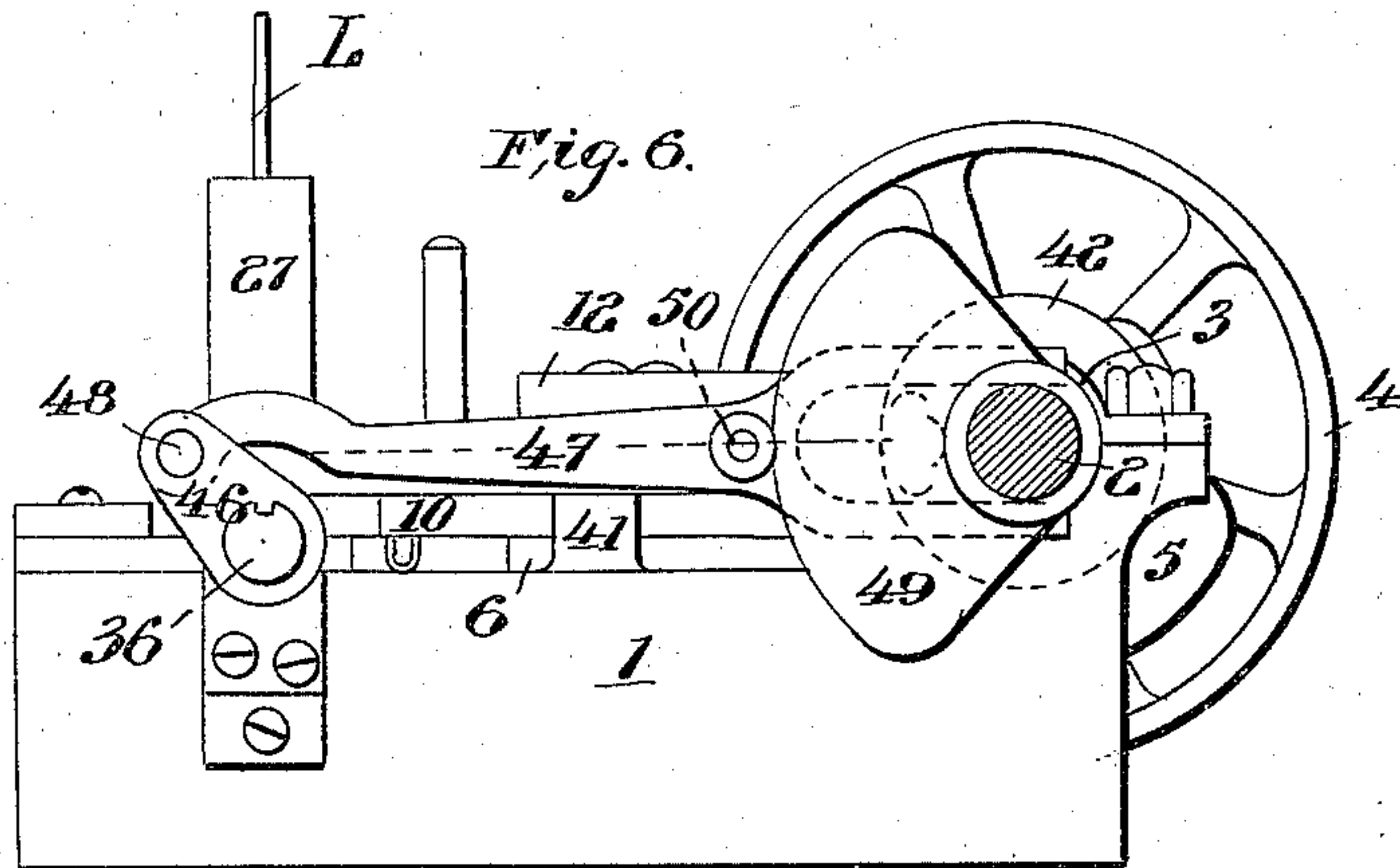
J. M. Smith

ATTORNEY

(No Model.)

5 Sheets—Sheet 5.

F. EGGE.
MACHINE FOR AUTOMATICALLY MANUFACTURING SHEET METAL CHAIN.
No. 550,605. Patented Dec. 3, 1895.



WITNESSES:

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INVENTOR

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UNITED STATES PATENT OFFICE.

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

MACHINE FOR AUTOMATICALLY MANUFACTURING SHEET-METAL CHAIN.

SPECIFICATION forming part of Letters Patent No. 550,605, dated December 3, 1895.

Application filed October 27, 1893. Serial No. 489,259. (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 Machines for Automatically Manufacturing Sheet-Metal Chain; 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 certain new and useful improvements in machines for manufacturing sheet-metal chain, and has for its object to produce such chain automatically with great rapidity and at a minimum cost.

In the accompanying drawings, which form a part of this application, Figure 1 is a plan of my machine. Figs. 2, 3, 4, 5, and 6 are sections, respectively, at the lines *a*, *b*, *c*, *d*, and *e* on Fig. 1; and Figs. 7, 8, 9, and 10 are detail broken plan views illustrating the successive operations of the devices for bending and shaping the blanks into the form of completed links.

Similar letters and numbers of reference denote like parts in the several figures of the drawings.

1 is the bed of the machine, having at the rear a shaft 2, journaled in boxes 3, on which shaft is mounted the power-pulley 4.

5 is a compound cam mounted on the shaft 2.

6 is a carriage supported on the bed and capable of a free to-and-fro sliding movement in a way 8.

7 is a pin which depends from the carriage, and 9 is a coil-spring whose ends are secured to said pin and bed, respectively, whereby the rear of the carriage is normally retracted against the face of the cam 5, as shown at Fig. 2.

10 are the clamping and forming jaws, pivoted by a pin 11 on the carriage, so as to be carried thereby and capable of being opened and closed.

12 is a spring secured to the jaws in such manner as to keep the forward ends thereof normally distended.

13 are studs which extend inwardly from

the heel ends of the jaws against the opposite sides of the cam 5, the spring 12 also serving to keep these ends against the cam.

14 is a cam on the shaft 2, and 15 is a bell-crank, one end whereof bears against said cam, while the other end is loosely connected at 16 to a collar 17, which latter is secured around a pin 18, which has a free vertical play through the bed. The bell-crank is pivoted at 19 to the bed, and a spring 20, whose ends are secured to the bed and the forward leg of the bell-crank, keeps the rear end of the latter normally against the cam 14. As the cam revolves, the bell-crank will be rocked on its pivotal point, thereby alternately projecting the pin 18 above the level of the bed and then withdrawing it below such level. Supposing, therefore, a blank 21 to be in a position athwart the front ends of the jaws 10, and the pin 18 to be projected above the bed, as shown in detail at Figs. 3 and 8, the action of the cams 5 14 will cause the jaws to advance, thereby bending the blank into U shape around the pin, as shown in Figs. 9 and 10. The jaws will then close around the bent link, thus shaping the link around the pin, as shown at Fig. 10. The pin will then be withdrawn, and the jaws carrying the finished link will be retracted to normal position. The jaws are interiorly shaped to conform to a finished link, and when the latter is held by the jaws the ends of such link will project beyond the jaws, and such ends being provided with eyes 22 it will be readily seen that a succeeding blank may be threaded through said eyes preparatory to being bent and formed after the manner of the first-mentioned link.

I will now describe the means whereby the blanks are fed successively and interlooped with the previously bent and formed links.

23 is a block secured on the bed and having a guideway 24, within which the blanks are deposited one by one.

25 is a block properly guided and capable of a to-and-fro movement. This block carries a push-finger 26, which fits closely within the way 24. As the finger is thrown inward it will force a blank out of the way 24 through the eyes of a previously bent and formed

link, the latter being held by the jaws, as previously set forth.

A is an ordinary power-press mounted directly over the various mechanisms which form the chain.

B is the gate of the press, and C C' are the punches which blank out the links.

D is the die having openings E F, which correspond to the punches C C'.

The punch C cuts the eyes in the links, and a chute G, communicating with the opening E, leads the punchings into any convenient receptacle. The punch C' cuts out the link from the strip of metal after the eyes have been punched out.

H H' are ordinary feed-rolls journaled in uprights I on the bed J of the press, and between these rolls the strip K of metal is fed beneath the punches.

Mounted directly over the way 24 is a well 27. L are guide-wires, which are loose within said well and extend upward into the opening F. These wires are perfectly loose and are sustained in vertical position by the blanks themselves.

Referring to Figs. 4 and 5, it will be seen that the opening F is slightly contracted at the top and gradually widens at the bottom, the object of which construction is to cause a few of the blanks to be retained in said opening by friction against the walls thereof. The blanks in the well and the opening F are the sole means whereby the wires L are sustained in position, and as fast as a fresh blank is deposited around the wires from the dies the bottom blank in the opening F will be forced from said opening, so as to be no longer retained by friction, and will drop down in the well. These wires rest at their lower ends against the bottom of the way 24, and said ends are rounded for the purpose presently explained.

When the finger 26 is projected, it will strike against the blank which is in the way 24, and said blank, as it is pushed forward, will elevate the wires L, owing to the rounded lower extremities of the latter, so that said wires will not obstruct the free passage of the blank to the bending devices. When the finger 26 is retracted, the wires will drop down to normal position and a succeeding blank will fall from the well into the way 24 in position to be forced out and delivered to the bending devices by the next forward movement of the push-finger.

The block 25 is guided in ways 28, and a lever 29, pivoted to the bed at 30, is loosely connected at 31 to said block; the rear end of said lever being held in normal contact with the side of a cam 32, carried by the shaft 2, by means of a coil-spring 33, whose ends are secured, respectively, to said lever and the bed.

From the foregoing it will readily be understood that the combined action of the cam 32 and spring 33 will cause the lever 29 to be

swung to and fro when the shaft 2 is revolved, whereby the finger 26 is reciprocated to thread successive blanks through the eyes of links that have been previously bent and shaped.

After a blank has been threaded through the eyes of a previously bent and shaped link, it becomes necessary to turn said blank from a horizontal position, so that it will lie with its flat side athwart the ends of the jaws in position for bending. This may be accomplished in various ways, either by active or passive instrumentalities; but I prefer to effect the same by positive means, and I have therefore shown and will now describe such means.

34 is a rock-shaft journaled in bearings 35, rising from the bed, and having at its inner end a notch 36. This notch is formed by securing an overhanging plate 37 to the shaft 34, although such notch might be cut in the shaft itself.

38 is a countersunk annular recess in the shaft 34, and 39 is a shoe fitting therein.

40 is a lever pivoted at 41 to the bed, the heel end of said lever being within the groove of a cam 42, while the front end of such lever is loosely connected at 43 to the shoe 39. A coil-spring 44, secured to a post 45, rising from the bed, and to the lever 40, preserves the normal or inwardly-projected position of the front end of the lever, while the cam by its action throws said end backward against the resiliency of said spring. Thus it will be seen that the shaft 34 is projected and retracted by the combined action of the cam 42 and spring 44. Splined on the shaft 34, so as to have a free sliding movement thereon, is a crank 46.

47 is a connecting-arm, whose rear end is guided around the shaft 2, so as to have a free forward-and-backward movement, and whose front end is pivoted to the crank 46 at 48.

49 is a cam carried by the shaft 2 and having an effective bearing against a roll 50, carried by the arm 47, the office of said cam being to throw said arm forward.

51 is a coil-spring, whose ends are secured to the arm 47 and to the bed, and by means of which said arm is retracted. It will thus be clear that the spring 51 and cam 49 will cause the shaft 34 to be rocked back and forth for the purpose presently explained.

When a blank is forced by the push-finger through the eyes of a previously-bent link, said blank will enter and abut within the notch 36 in the rock-shaft 34. The action of the spring 51 will rock said shaft, thereby bringing the blank into a vertical position preparatory to bending. The action of the cam 42 will retract said shaft, and the action of the cam 49 will cause said shaft to be rocked into normal position.

The hereinbefore-described bending of the blank occurs just after the retraction of the shaft 34, while the action of the spring 44 and the cam 49 to bring said shaft into nor-

mal position occurs after the jaws 10 have been operated to bend and shape the link.

5 An adjustable stop 52 on the bed may be employed, against which the ends of the bent link are abutted by the action of the jaws in order to insure the proper alignment of such ends.

The operation of my improvement, organized as hereinbefore described, is as follows:

10 A blank is fed forward by the push-finger through the eyes of a previously-bent link within the notch in the rock-shaft. The latter is rocked to bring the blank in a vertical plane athwart the ends of the jaws. The rock-
15 shaft is retracted, and the jaws in distended position are forced against the blank, thereby bending and inclosing the latter around the bending-pin, which has been previously projected above the bed. The jaws are now
20 closed against the blank thereby shaping the latter around said pin. The latter is then withdrawn, the jaws are retracted with the link clamped thereby, the shaft is projected and rocked to normal position, a succeeding
25 link is fed by the push-finger through the eyes of the link last bent and shaped, the contour of the cam 5 being such that the jaws are then distended at their front ends by the action of the spring 12, and the above-de-
30 scribed operations are repeated to form succeeding links.

As fast as the chain is made in completed form it drops through the slot 8 into any suitable receptacle, the weight of the chain being
35 sufficient to drag the completed links from the jaws, so that no clogging can occur.

It will be readily understood that the rounding of the lower extremities of the wires L insures the ready delivery of the lowest blank
40 by the push-finger to the chain-forming instrumentalities, since the impact of the blank will cause these wires to be lifted out of the way, while said wires will drop and again rest upon the feedway after the blank has
45 been delivered and the push-finger returned to its normal position. The metal from which the blanks are cut varies somewhat in thickness, so that some blanks may be a trifle thicker than others, but not too thick to in-
50 terfere with the operation of the chain-forming devices; also, a burr is sometimes formed at the bottom edges of the blanks, and this, for all practical purposes, is the same as if the blanks were of unequal thickness. It is
55 true that a thick blank, or a blank having a burr, may seriously interfere with the feeding and proper delivery of such blank to the chain-forming devices, in that such blank may obstruct the free movement of the push-
60 finger, but in my present improvement the upward yielding of the wires L permits of the feeding and delivery of all blanks, whether they have burrs or whether they are unusually thick, and, therefore, it is not necessary
65 to provide any special means for surmounting difficulties caused by such blanks.

It will be seen that I have entirely separated the devices for feeding the strip of metal and for cutting and blanking out the links
70 from the mechanisms which form the blanks into the completed chain, the advantage of this construction being that there can be no accident to such mechanisms due to any im-
75 perfections in the operations of said devices; also, should the dies or strip-feeding devices become inoperative for any reason the blanks may be readily placed by hand over the wires
L at the top thereof and the operation of forming the chain continued without any ces-
80 sation. The disassociation of these two sets of mechanisms renders it possible to run the chain-forming instrumentalities at a very high rate of speed, since no attention need be paid to any particular harmony in the timing
85 of the two sets of mechanisms, it being merely essential that the power-press should run at a speed fast enough to properly supply the blanks to the chain-forming devices. This
90 is a great advantage in machines for automatically making sheet-metal chain, and the gist of my invention rests in the broad idea
of providing the vertically-movable guide-
wires intermediate of the blanking and link-
forming devices, said wires having their lower
95 ends rounded and resting upon the feedway, whereby a supply of blanks is continuously and automatically delivered from the blank-
ing instrumentalities to the mechanism for forming the chain.

I do not wish to be confined to any particu-
100 lar means which I have shown as comprising the devices for feeding the metal strip and for cutting out the blanks, and for forming said blanks into completed chain, since such
105 devices are in the main very common and may be varied without affecting my invention, which latter pertains solely to the proper delivery of the blanks and not to the means employed for cutting them out or for form-
110 ing them into chain-links.

I claim—

1. In a machine for automatically making sheet metal chain, the combination of the feed way and a reciprocatory push finger op-
115 erating throughout said feed way, with the separate wires having their lower extremities rounded and resting upon said feed way around which wires the link blanks are threaded through their eyes so as to rest upon
120 the feed way in a column one above the other, said wires being perfectly free and capable of a vertical play, whereby when the push finger is projected against the lowermost
blank resting upon the feed way said wires will rise upwardly to permit the passage of
125 said blank and finger and will drop back to normal position and rest upon said feed way after said finger has been retracted, substantially as set forth.

2. In a machine for automatically making
130 sheet metal chain, the combination of the die block and mechanism for cutting out the link

blanks and depositing them within said block, the chain forming instrumentalities operating independent of the mechanism for cutting out the blanks, a well for the reception
5 of said blanks prior to their delivery to the chain forming devices, a feed way immediately beneath said well and into which the blanks from said well successively drop, guide wires whose lower extremities are
10 rounded and extend through the eyes of the blanks in said well and rest against the bottom of said feed way and whose upper ends

extend through the eyes of the blanks within the die block, and means—as a push finger—for driving said blanks successively out 15 through said feed way to the chain forming devices, substantially as set forth.

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

FREDERICK EGGE.

Witnesses:

R. H. BRODERICK,
E. D. HINMAN.