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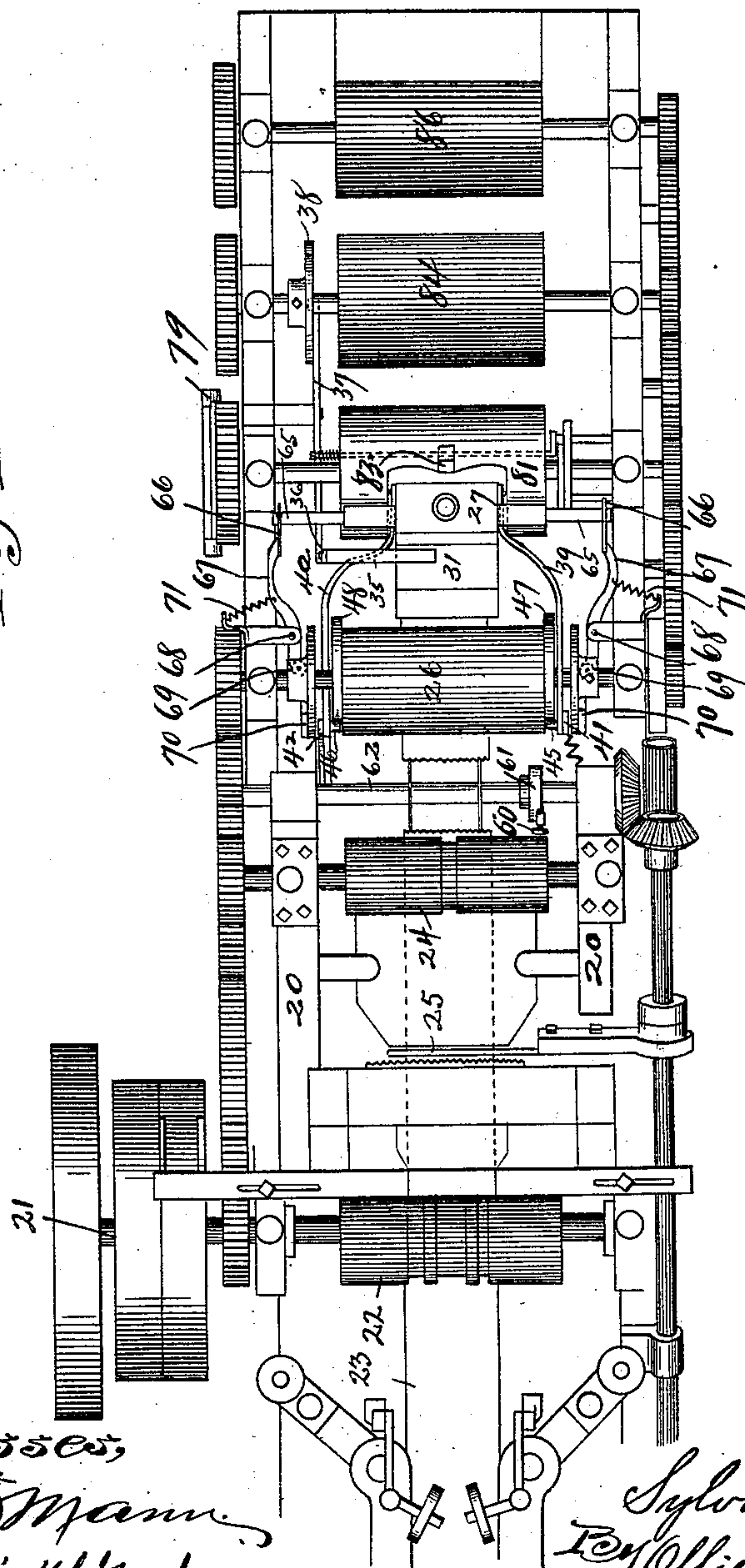
7 Sheets—Sheet 1.

S. T. MURCHIE.
PAPER BAG MACHINE.

No. 540,556.

Patented June 4, 1895.

Fig. 1.



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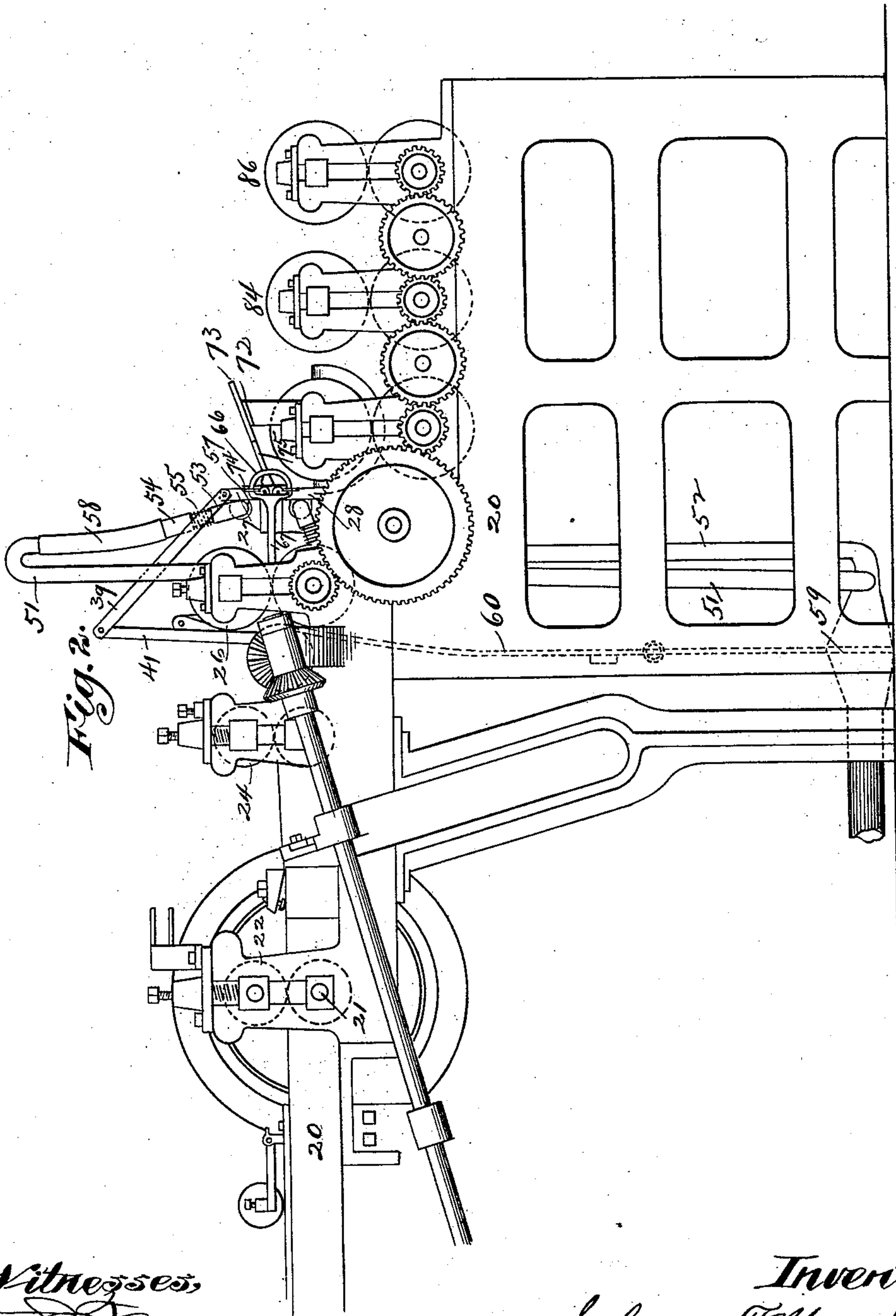
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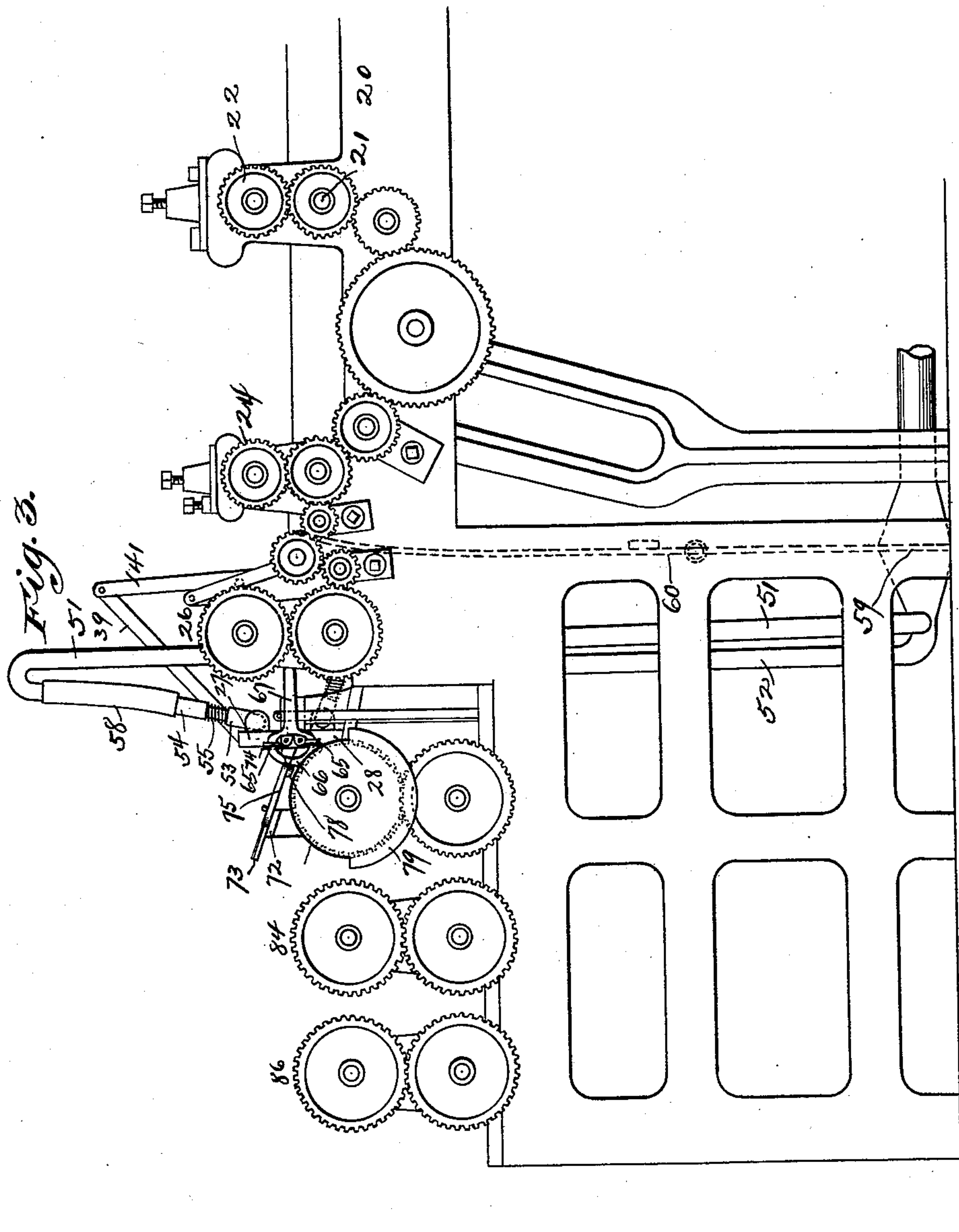
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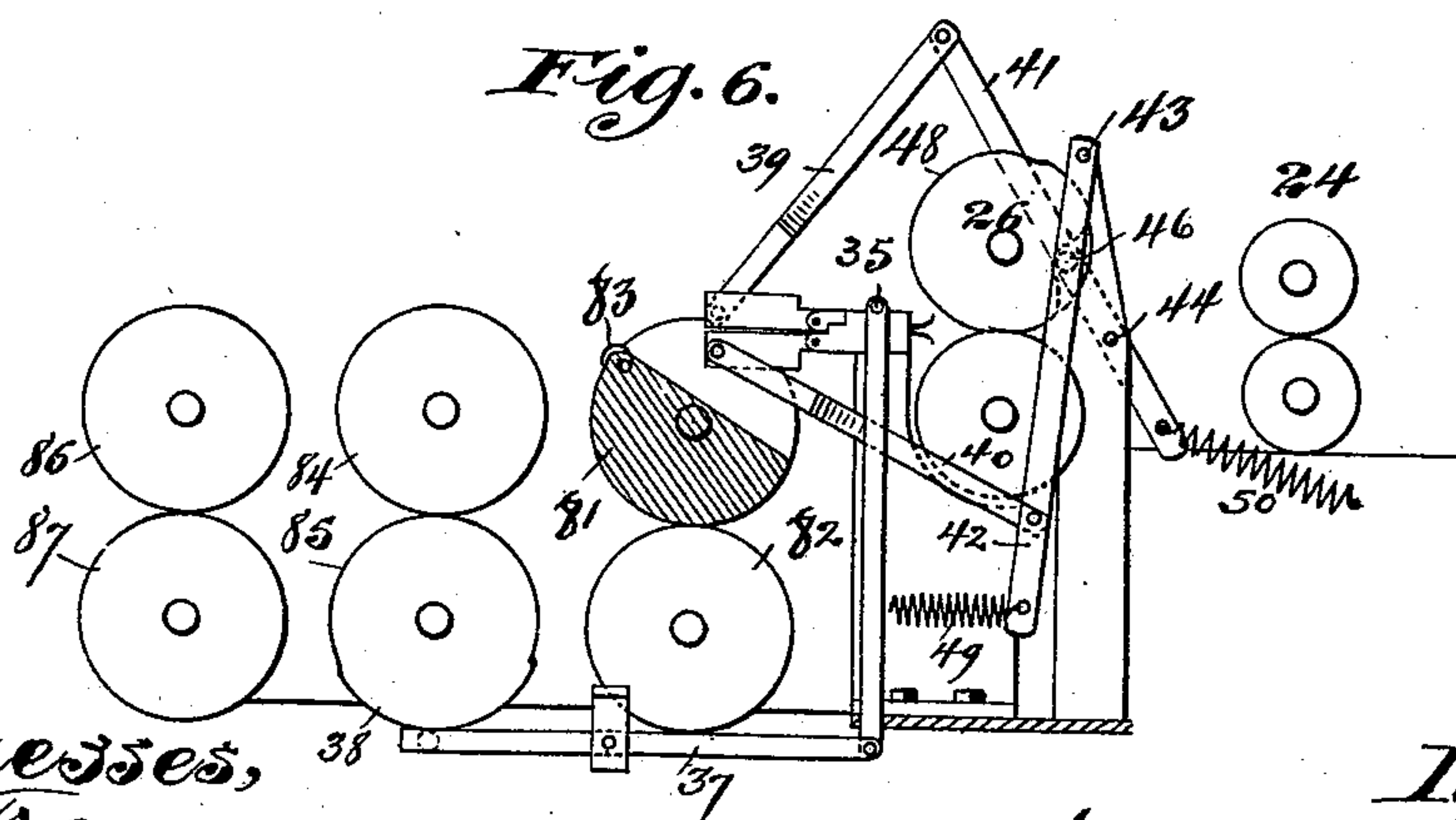
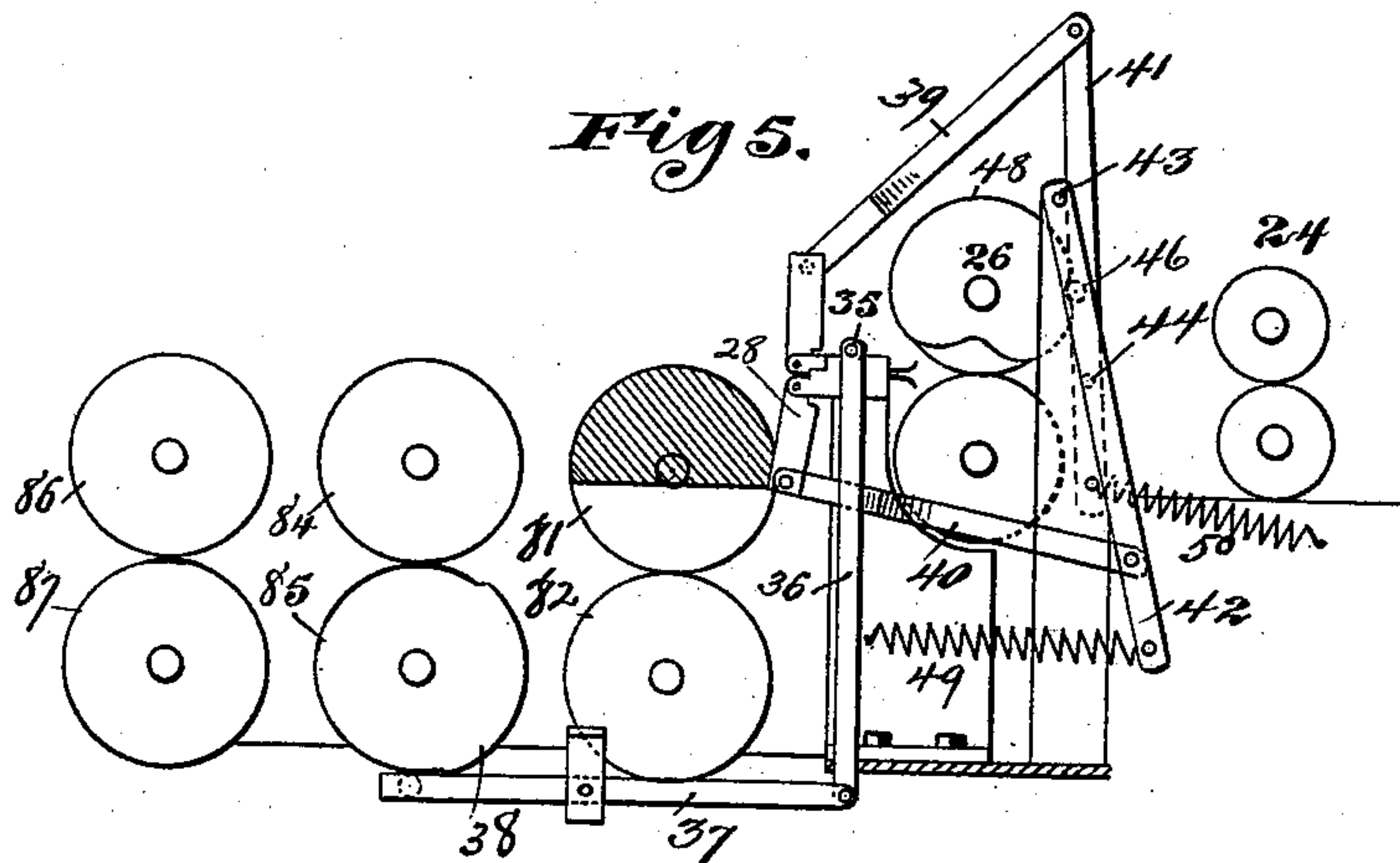
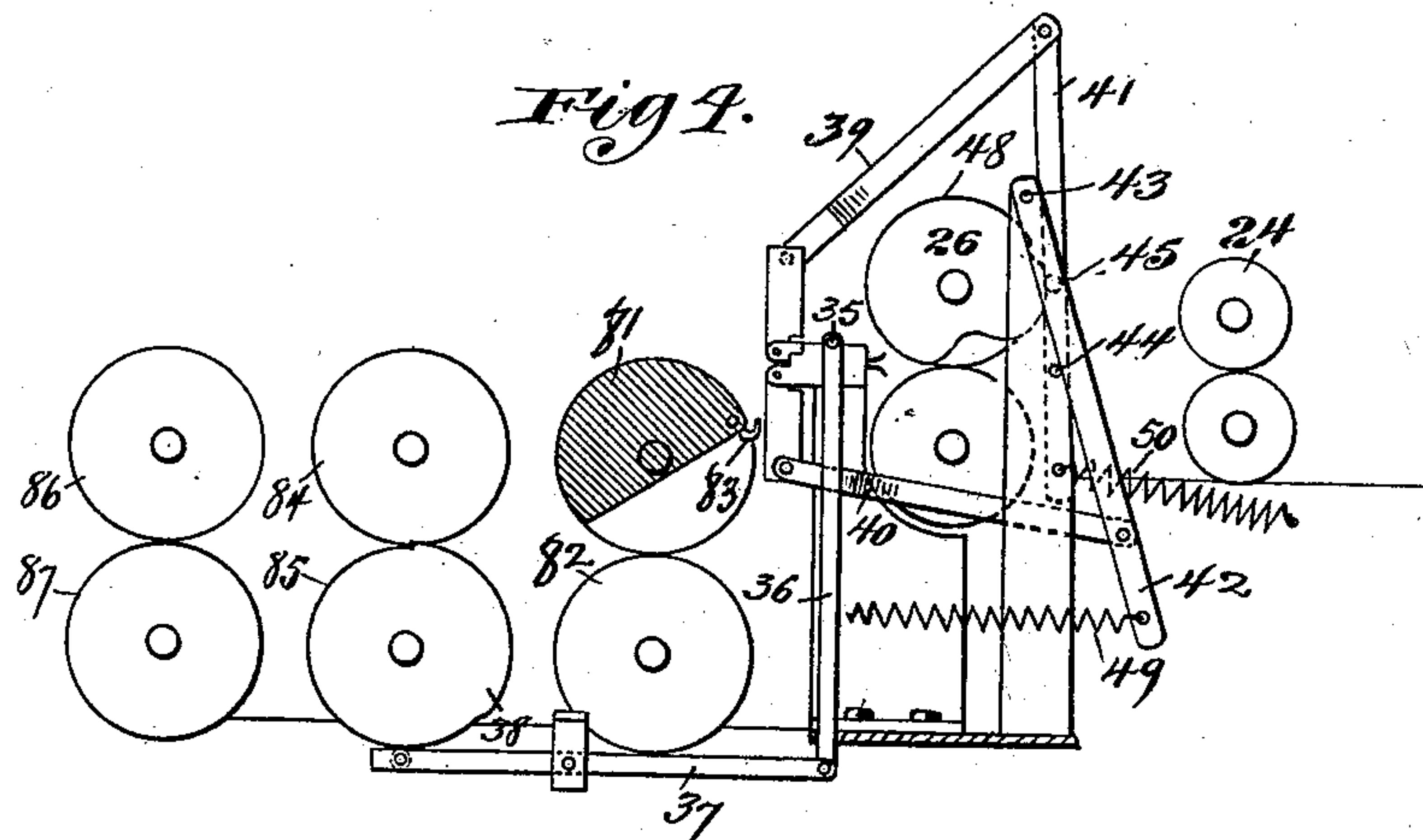
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Fig. 7.

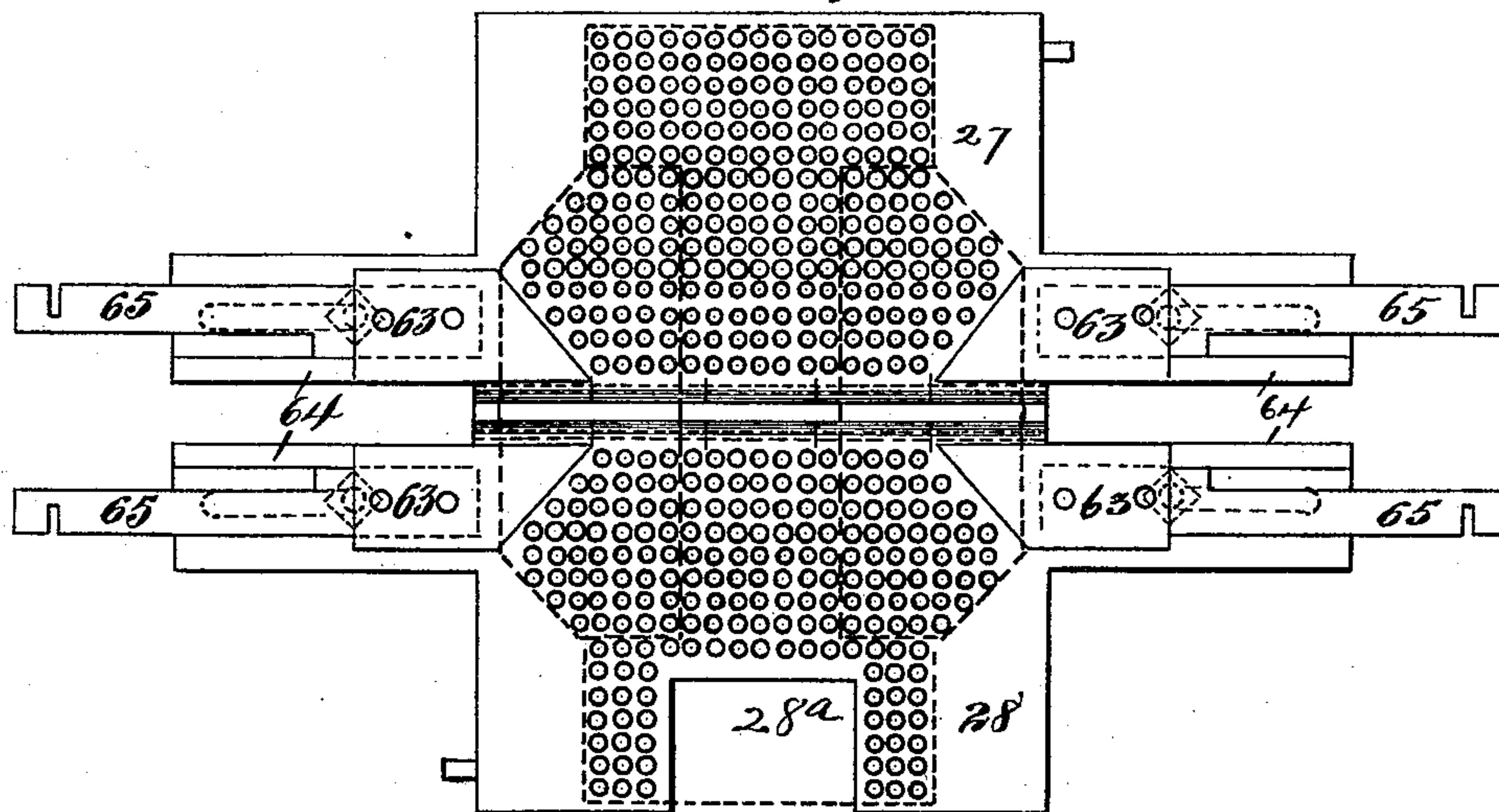


Fig. 8.

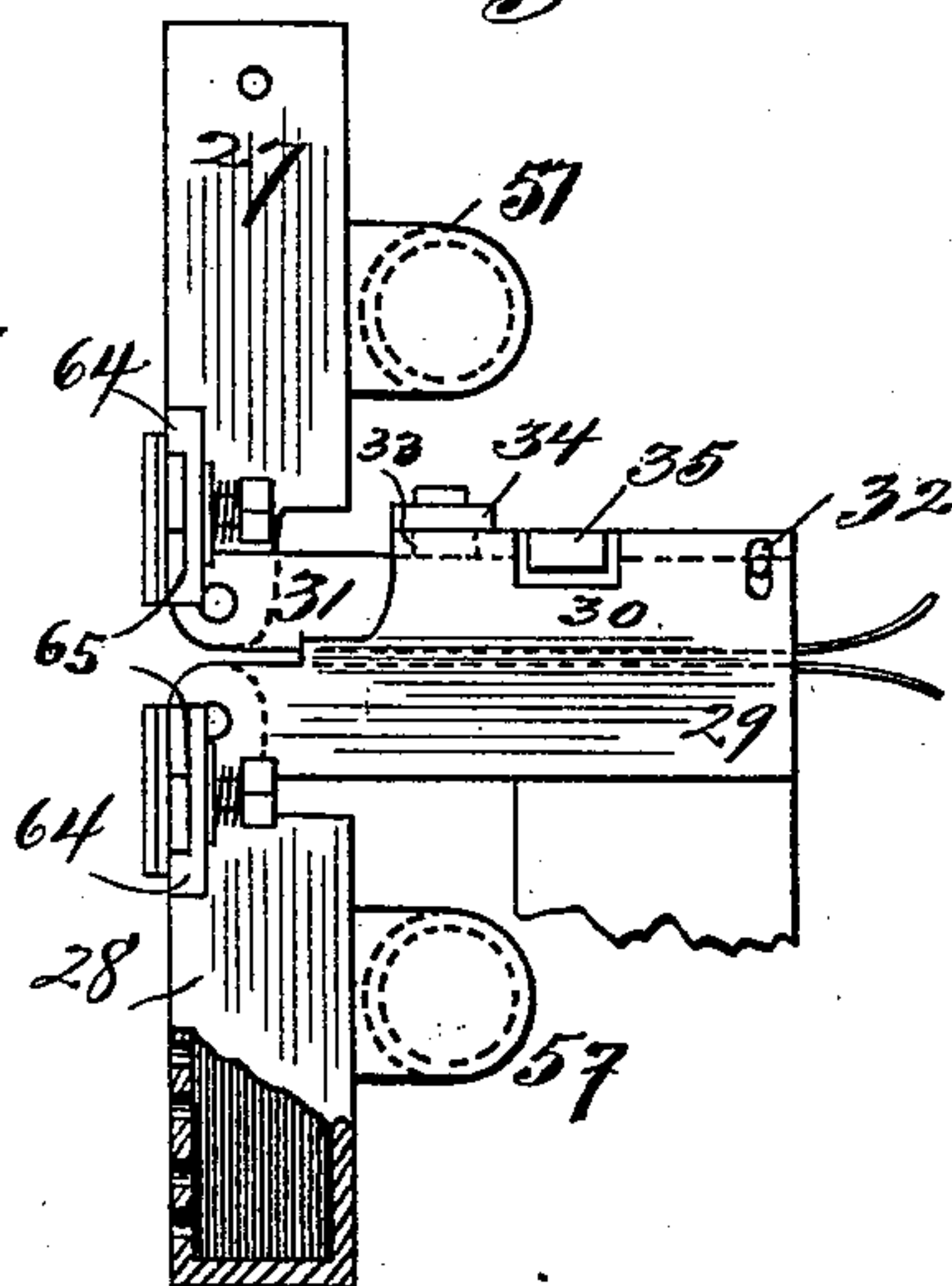
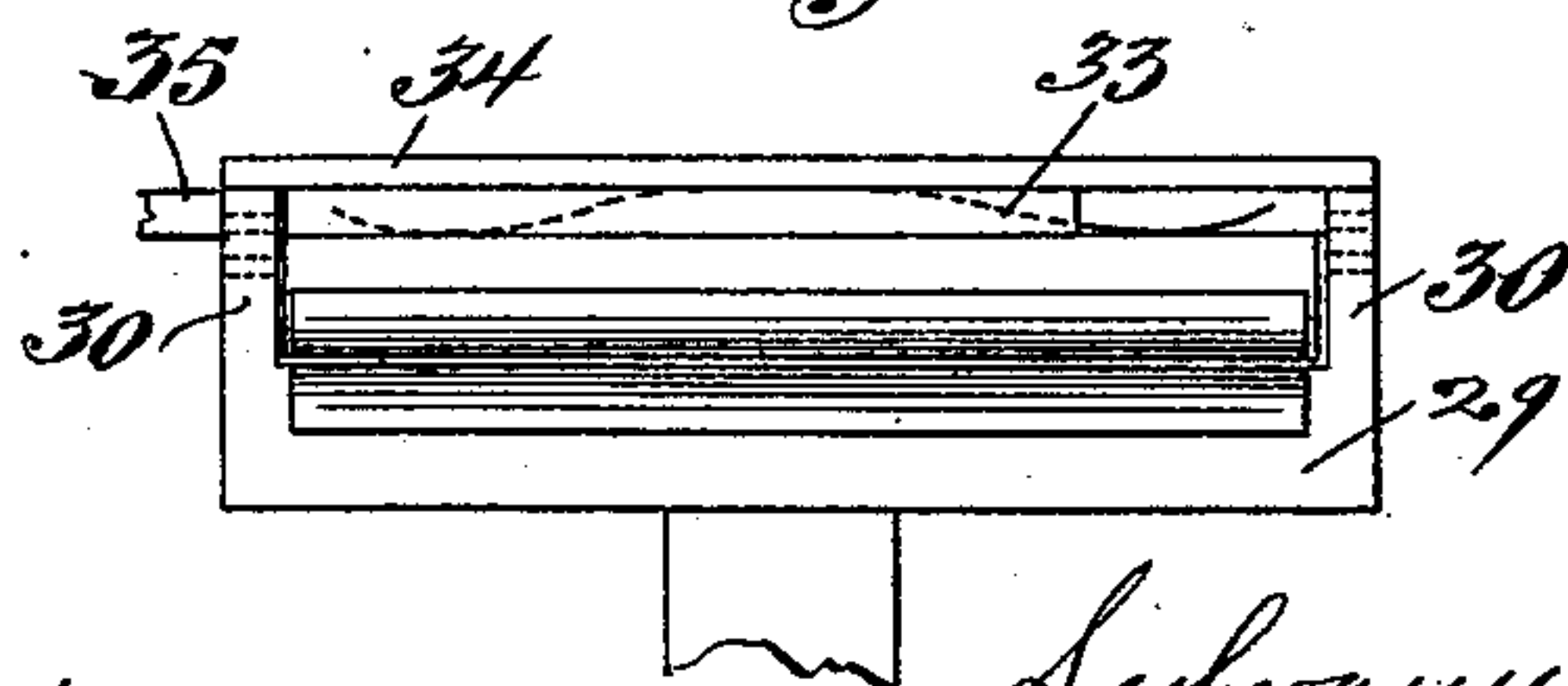


Fig. 9.



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Fig. 10.

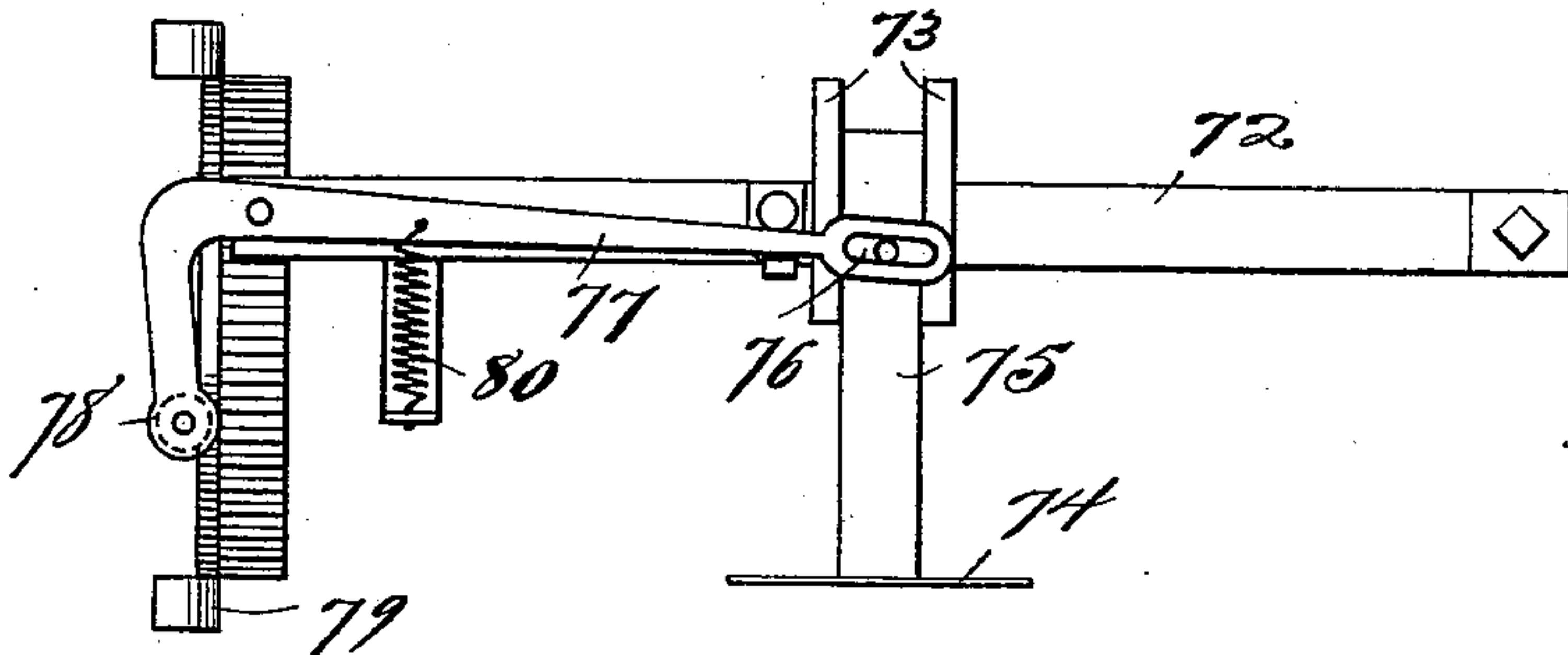


Fig. 11.

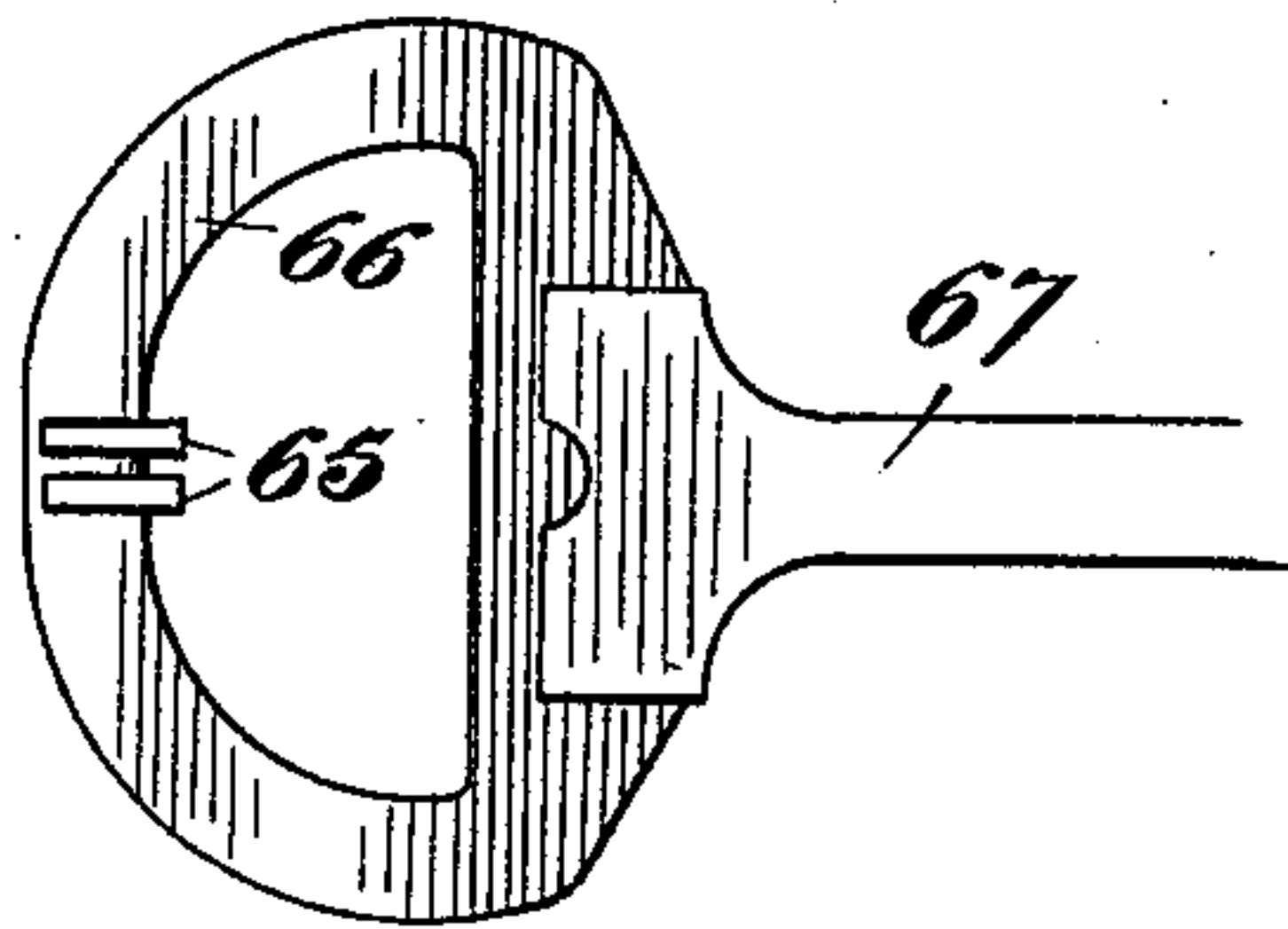
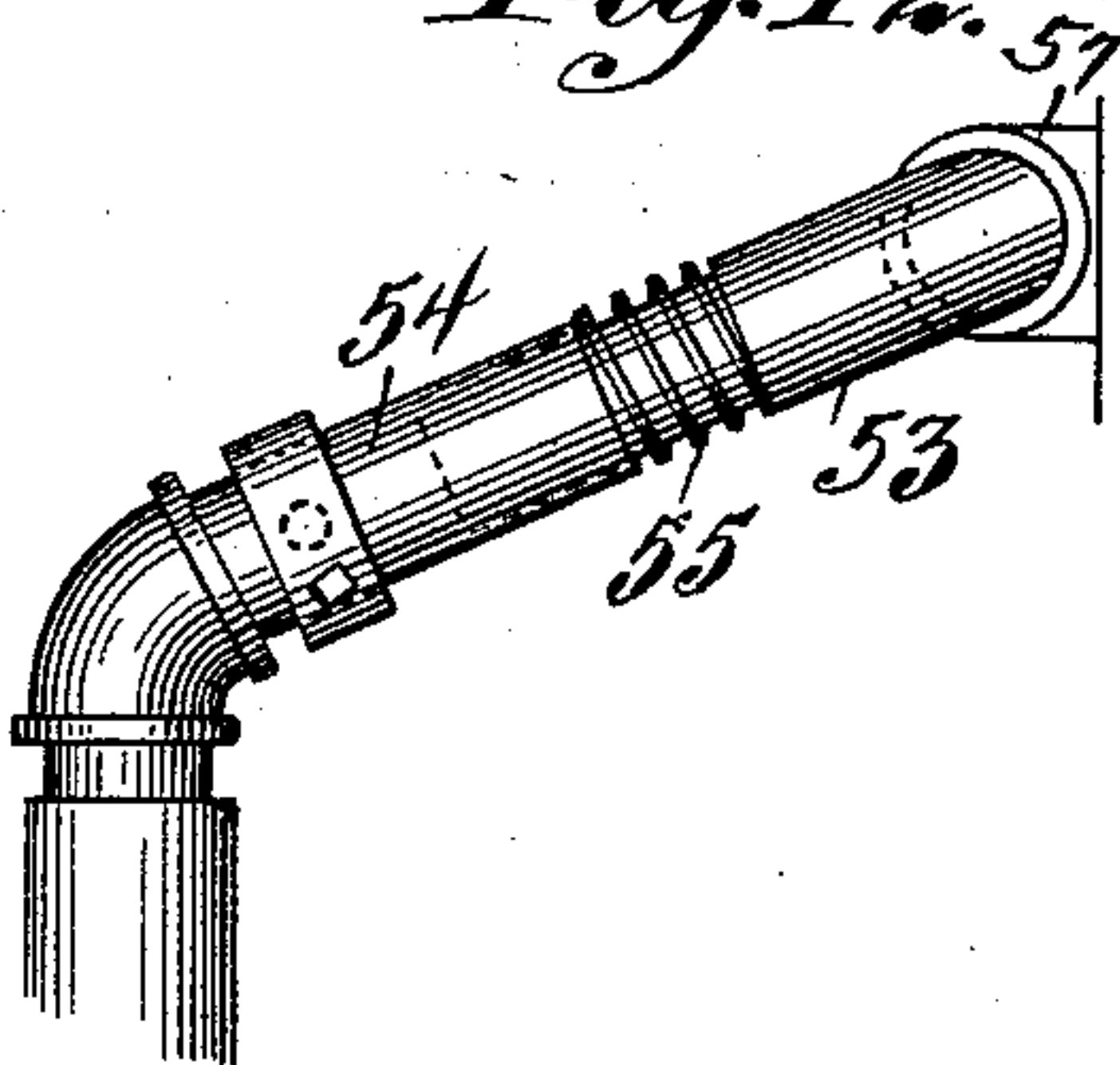


Fig. 12.



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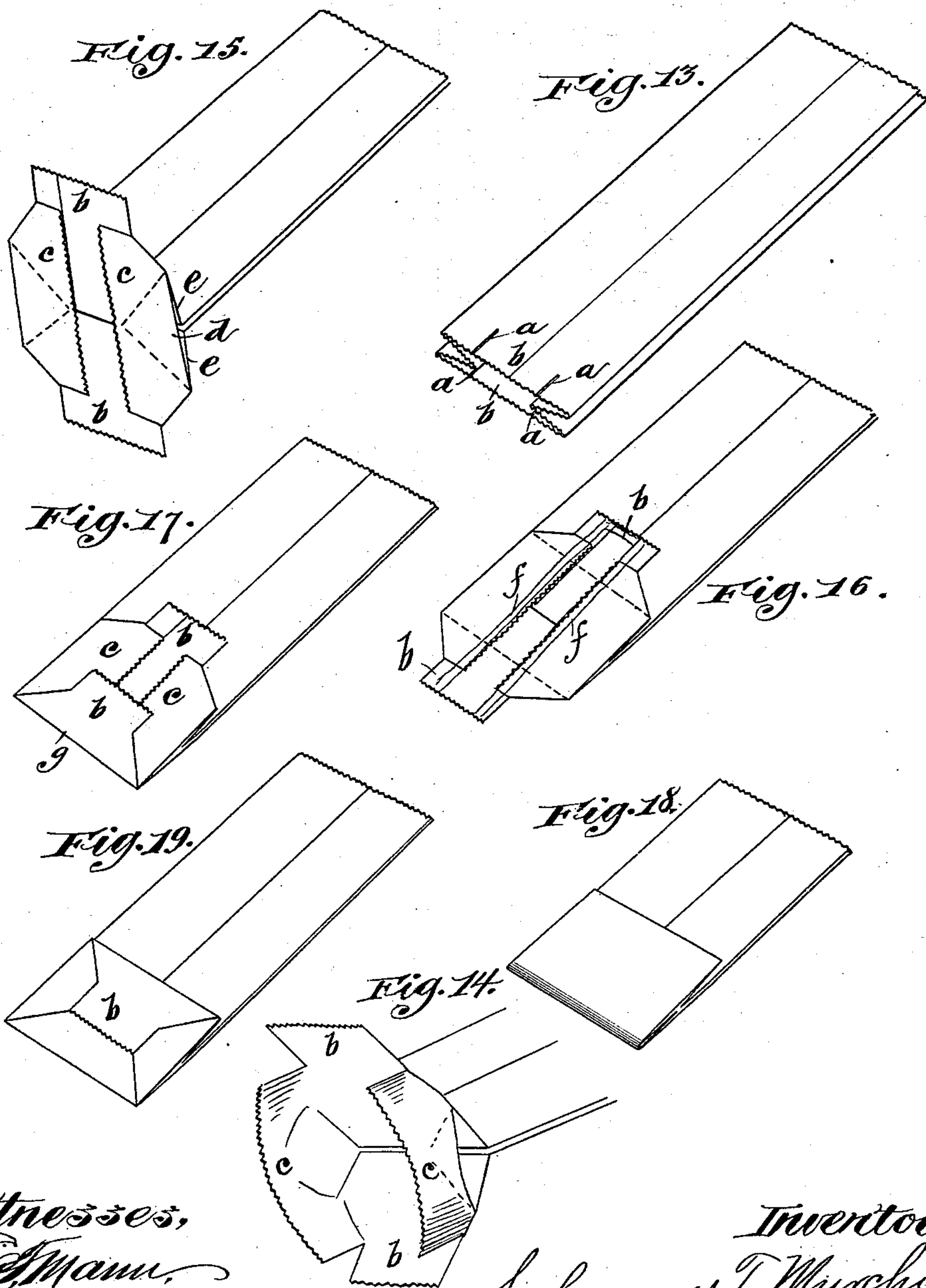
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UNITED STATES PATENT OFFICE.

SYLVANUS T. MURCHIE, OF BATAVIA, ILLINOIS, ASSIGNOR TO THE WESTERN PAPER BAG COMPANY, OF SAME PLACE.

PAPER-BAG MACHINE.

SPECIFICATION forming part of Letters Patent No. 540,556, dated June 4, 1895.

Application filed February 5, 1895. Serial No. 537,329. (No model.)

To all whom it may concern:

Be it known that I, SYLVANUS T. MURCHIE, of Batavia, in the county of Kane and State of Illinois, have invented certain new and useful Improvements in Paper-Bag Machines, of which the following is a specification.

This invention relates to paper bag machines and more particularly to a machine for making what are designated as self-opening satchel bottom square bags from flat tubes having bellows side folds.

My invention relates more particularly to a paper bag machine in which are employed suction formers for opening the leading end of the tube by a single movement, whereby the side folds of the satchel bottom are produced, in combination with means for firmly clamping the body of the blank while the end is being thus opened and the side folds made, and in the employment of means whereby the end of the bag blank is firmly held until it is caught by the nipper roll or other mechanism for carrying the bags away. Thus, in producing bags upon my improved machine the air is exhausted from the suction boxes and the latter in opening separate the sides of the blank by a very rapid movement which causes the sides of the blank to be folded over, and during this opening movement transversely moving blades having pointed ends are thrust into the bellows fold over one ply of the blank, and as the formers approach the limit of their opening movement the side folds are completed, the line of fold being defined or made straight by drawing the sides tightly over the pointed ends of these blades. These transversely moving blades do not tuck in the sides of the blank at all, but when thrust in to their full extent serve as formers over which the paper is drawn in making the side folds, thus making a sharp, clearly defined fold; and when the air is cut off these blades hold the end of the bag firmly against the former until by a slight forward movement of the lower former the blank is delivered into the grasp of the nipper roll by which it is carried away.

The suction boxes are hinged in planes, respectively, above and below and parallel to the path of the moving blank. Each box is constructed integrally—that is, having no hinged sections and having no movement ex-

cept a rocking or hinged movement upon a fixed axis. The devices which take away the bag consist of a pair of rolls, one of which is a nipper roll and has a portion of its body cut away so as to permit the suction formers to rock upon their axes, the parts being so timed that during the movement of the suction boxes the mutilated side of the roll is presented toward them. I have also devised a movable platen for flattening the end folds against the formers. I have also provided means whereby the blanks travel at a greater rate of speed during a part of their movement, thereby permitting the web of paper to move continuously while the severed blank by its accelerated movement gains sufficient time to compensate for the time lost in the operations upon the blank.

In the accompanying drawings, Figure 1 is a plan view (parts omitted) of that end of the machine on which the suction-formers and pasting devices are mounted. Figs. 2 and 3 are side elevations of the same parts, but taken from opposite sides. Figs. 4, 5, and 6 are elevations, partly in section, showing three positions of the formers, with a corresponding position of the mutilated roll in relation thereto. Figs. 7, 8, and 9 are detail views of the suction-former, Fig. 7 being a front elevation showing the formers open, with the folding blades moved in over the face of the formers; Fig. 8, a side elevation with parts broken away, and Fig. 9 a rear elevation with the suction-formers closed. Fig. 10 is a plan view showing the movable platen and the means for supporting and moving the same. Fig. 11 is a detail view showing the means for connecting the transversely-moving blades or formers on one side of the machine. Fig. 12 is a detail view of a section of one of the exhaust-pipes. Figs. 13 to 19, inclusive, show various stages in the formation of the bag.

I have not shown the means for forming the tube and producing the bellows folds in the sides thereof, as these means are well known and many of the parts which I have shown are of ordinary construction and will need no particular or specific description.

The frame work of these paper bag machines is usually divided transversely, and I have shown that portion or member of the

frame work which supports the feed rolls and the pasting and folding devices which operate upon the bag blanks, together with one pair of feed rolls for the tube and the striker arm by which the tube is severed into bag lengths.

In the drawings, 20 represents a supporting frame work whereon is journaled the main driving shaft 21, carrying one of a pair of feed rolls 22 which receive the tube 23 from the bellows fold former.

24 represents a pair of feed rolls and between said rolls and the feed rolls 22 the tube is severed into bag lengths by the revolving striker arm 25. The feed rolls 24 deliver the blanks to a second pair of feed rolls 26.

The pair of feed rolls 26, it will be observed, are much larger in diameter than the rolls 24, and in consequence the bag blanks when engaged by the rolls 26 are fed forward at much greater speed, being separated from each other as clearly seen in Fig. 1. The feed rolls 26 deliver the bag blanks to the suction formers or suction boxes, which are most clearly shown in Figs. 7 and 8.

The suction formers are marked, respectively, 27 and 28. They are hollow rectangular box-like structures having their faces perforated in defined lines approximating closely to the form of the end of the bag blank during one stage of the operation. These suction boxes are hinged upon horizontal axes parallel to and above and below respectively the path of the bag blanks. The former 28 is hinged to a stationary block 29 having raised sides 30. The former 27 is hinged to a vertically reciprocating block 31 fitted to move vertically between the raised sides 30 of the block 29 and having a slot and pin connection therewith, as shown at 32.

The block 31 is normally held down upon the block 29 by means of the spring 33, having its bearing on the cross bar 34. An arm 35 is secured with the block 31 and projects outwardly being connected by link 36 with a pivoted lever 37, the latter being adapted to be intermittently vibrated or rocked upon its pivot by means of a cam disk 38, mounted on one of the revolving shafts, presently to be described.

By the means above described the blocks 29 and 31 are adapted to constitute a clamping device whereby one end of the bag blank may be clamped and held while its opposite end is being opened by the suction formers and otherwise operated upon. Means are provided for moving said suction formers on their hinges so as to open the bag blank, said means comprising links 39, 40, connected to the pivoted levers 41, 42, respectively, the pivots of said levers being marked 43, 44, respectively, and said levers carrying anti-friction rollers or other suitable bearings 45, 46, adapted to travel upon cams 47, 48, said cams being in the form of disks secured upon the shaft carrying the upper roller of the pair 26. Springs 49, 50 normally tend to cause the rollers carried by the pivoted levers to contact

with the cams and the cam 38 is so timed that as the bag blank is fed forward by the rollers 26, the block 31 is raised thus bodily lifting the upper former 27 and permitting the bag blank to enter between the formers while they stand in the position shown in Fig. 6. As soon as the bag blank has entered between the suction formers it is clamped by the downward movement of the block 31 and thereupon the cams 47, 48, rock the levers 41, 42, and through the links 39, 40, cause the suction formers 27, 28 to separate. The interiors of said suction formers or suction boxes are exhausted of contained air through the pipes 51, 52, said suction pipes communicating with some suitable air exhausting apparatus as shown at the bottom of Fig. 2. In order to permit said pipes to flex and follow the movements of the formers, I have provided them with telescoping sections 53, 54, having interposed between them the coiled spring 55. The section 53 has a swiveling connection with a hollow stud 57 on the suction box. Of course a rubber hose or other tube flexible throughout might be employed, but I have found that owing to the continuous flexing of the rubber it soon becomes broken. I therefore employ metallic pipes for the main portions, using only a flexible section as seen at 58, Fig. 2, and then by means of these telescoping sections and the spring the movement of the former is provided for, the section 53 having a sliding movement to compensate for the circular movement of the former during operation. A cut-off must be provided in said exhaust pipes or at some other suitable point in the air exhausting apparatus. In the drawings I have shown a straight slide valve or cut-off plate 59 carried by a pivoted lever 60 operated by a cam 61 on an intermediate shaft 62. The movement of this valve is so timed with reference to the movements of the former that the exhaust will be cut-off after the completion of the opening movement of the formers.

The blank as it is fed into the former is shown in Fig. 10, and at the completion of the opening movement of the formers said blank must be reduced to the condition shown in Fig. 11—that is to say, the leading end of the bag must be opened by the separation of its top and bottom plies, and the bellows sides of the bag must be broken down and folded over said plies, their edges being parallel and slightly separated and adapted to be secured together by the folding of the flaps of the top and bottom plies over said side folds.

The chief difficulty heretofore encountered in the manufacture of these self-opening satchel bottom square bags by the aid of suction formers has been to successfully fold in the side flaps, and so far as I am aware no practical, successful machine has been made prior to my invention for doing this work. It is one of the features of my invention and of my machine to provide for producing these side folds simultaneous with the opening of

the leading end of the bag blanks by the movement of the formers and holding such side folds securely against the formers until the partially completed bag can be seized by the off bearing rolls. To accomplish this I hinge the suction boxes respectively above and below the line of travel of the bag, and open them quickly by a single continuous, positive movement. By this means the side folds are produced without mechanically breaking down the paper or forcing any mechanical devices against the paper to define the folds. It is necessary however to clamp the end of the bag blank securely against the face of the former so as to hold it in position after the action of the exhaust has ceased and before it is seized by the nipper roll. It is also desirable to provide a former over which the paper may be folded, and which will accentuate or define the line of fold. The mechanism which I have provided to this end comprises transversely moving blades or formers, preferably constructed in the form of flat plates arranged in pairs and parallel to the axis of the suction boxes, and having their forward ends pointed to adapt them to enter the bellows fold of the blank simultaneous with the opening movement of the boxes and to advance as the boxes separate but without actual contact with the paper. These blades hold the ends of the blank against the suction boxes while the side flaps are drawn over the entering points of the blades by the adhesion of the flaps of the upper and lower plies of the bag blank to the suction formers during their separation. These formers are best shown in Figs. 7 and 8, and consist of the flat blades 63 which are adapted to slide in suitable ways formed in the extensions 64 of the boxes 27, 28, respectively. These blades, as shown have a slot and pin connection with the formers, but this may be varied as desired. The forward ends of the blades are pointed, the points being arranged adjacent and parallel to the axis of the suction boxes. They have stems 65, the stems being connected in pairs by the curved plate 66 (Fig. 12), carried by the levers 67 pivoted on the brackets 68 and provided with rollers 69 which carry cams 70 mounted on the shaft of the upper roller of the pair 26. The cams which operate the blades and the boxes being on the same shaft their simultaneous movement is insured. A spring 71 normally tends to hold said blades back or at the outer limit of their movement, while the cam imparts a vibrating movement to the lever, thus thrusting the blades inwardly, the inception of their inward movement being contemporaneous with the opening movement of the formers. The cam may be constructed so as to move the blades in both directions and the spring 71 omitted.

In order to press the folds of the side flaps after they have been formed by the opening of the suction boxes, I employ a movable platen having a reciprocation to and from the faces of the boxes when separated. The

relative position of this movable platen with reference to the other parts of the machine is shown in Fig. 2, and a detail plan view of the platen and its operating mechanism is given in Fig. 10. Referring to the latter figure 72 represents a metal bar having slide ways 73 thereon. 74 represents the platen which is in the form of a flat plate carried upon the end of a stem 75, sliding in ways 73. The stem has a pin 76 which enters a slot in a pivoted lever 77, the latter being provided with a roller 78 which is engaged by a revolving cam 79 mounted, in the present instance, upon the gear wheel on the shaft of the mutilated roll. A spring 80 normally tends to thrust the platen toward the suction boxes and a segmental cam rocks the lever on its pivot thus retracting the platen.

In order to remove the blank from the formers, I employ a pair of rolls, the members whereof are marked 81, 82. The roller 81 is a nipper roll while the roller 82 forms the bed roll of the pair. The nipper roll is mutilated, a greater portion of its body being removed as clearly shown in Figs. 4, 5, and 6. The purpose of this mutilation or cutting away of the roll is to enable the suction formers to move in the arc of a circle which intersects the circular path of said roll. If the roll 81 were placed beyond the path of the formers during their opening and closing movements, it would be beyond the position where the nipper carried thereby could grasp the end of the completed bag and hence a reciprocating movement of the suction formers would be necessary after the completion of their forming action. As this reciprocation of the formers entails a loss of time, I have avoided it, making the formers non-movable or stationary with reference to the path of the blank and give them a slight vertical movement upon their hinges during the formation of the bag. The nipper is indicated at 83 and is of usual construction, but located in this instance along the edge or margin of the mutilated roll. The movement of these rolls is so timed that during the folding and unfolding movements of the formers the mutilated or cut away portion of the roll is presented next to said formers and the nipper is presented opposite the recess 28^a in the lower margin of the former 28. In order to present the lower flap of the bag blank to the grasp of the nipper the cam 48 may be provided with a recessed portion in which the roller 46 enters, thus allowing the former 28 to rock slightly on its pivot, as seen in Fig. 5, by which means the nipper is enabled to grasp the lower flap of the blank, but this movement is not necessary. By the continued revolution of the mutilated roll the blank is withdrawn from the grasp of the formers and is passed through the paste rolls 84, 85 and thence to the folding rolls 86, 87.

In order to render the description of the operation of forming the bag intelligible, reference is made to Figs. 13 to 19 inclusive.

Fig. 13 shows the blank in the form of a flat tube, the leading end of the blank having four slits *a*, the portions between said slits constituting top and bottom flaps *b* which are acted upon by those portions of the suction formers nearest their outer or free margins. The leading end of the blank being passed between the hinged boxes, the flaps *b* are drawn apart by the separation of the formers adhering thereto by reason of the air being exhausted from the boxes. The movement of the former boxes on their hinges is rapid and the condition of the bag during this movement is shown in Fig. 14. It will be seen that the side flaps *c* are drawn into the position shown in Fig. 15 by the separation of the flaps *b*, thus defining the fold line *d*. During the folding of the flap *c* the blades enter into the triangular space between the flaps *c* and the folds *e*, the interior boundaries of this space being shown by the dotted lines in Fig. 15. The folds *e* are, therefore, held tightly against the faces of the formers and the folds thus produced on the dotted lines by the breaking of the paper, due to the inward fold of the flap *c*. The folds which are indicated by the dotted lines of Fig. 15 are accentuated by the paper being pressed down over the points of the formers, but it will be understood that the movement of the blades is so timed that they do not, or at least, should not contact with the paper at the bottom of such fold.

After the bag has been brought to the condition shown in Fig. 15, the platen strikes the flaps *c*, thus flattening them down. Then the lower former is rocked forward slightly, bringing the lower flap *b* into the grasp of the nipper roll, and the blank passes off between the nipper roll and its bed roll to the paste rolls, and the line of paste *f* is applied, as shown in Fig. 16.

After the paste is applied the end flap is folded down upon the body, as shown in Fig. 17, and then the blind fold *g* is made which lays the other flap *b* over upon the flaps *c*, as shown in Fig. 18. The bag is thus completed and is delivered from the machine in the condition shown in Fig. 19.

I have shown and described my improvements as co-acting mechanisms, but obviously some of said devices may be employed in machines having co-acting mechanisms of other construction than are described, and it will also be understood that all of the devices which I have shown are not necessarily employed in the described relation to each other, as for example, while I prefer in all cases to employ the movable platen its use may be dispensed with, and while the transversely moving blades or formers are employed in connection with suction boxes which have axial movement only, such blades might be employed in conjunction with reciprocating suction formers, and therefore the claims hereinafter made are not restricted or limited in their broader scope to the combination of

the blades with such axially moving suction boxes.

I claim—

1. In a paper bag machine, suction boxes each constructed in a single section and hinged in planes parallel to the path of movement of the bag blank and on opposite sides thereof, their axes being fixed or non-movable, and means for moving said boxes upon their axes, substantially as described.

2. In a machine for making paper bags, the combination of the following instrumentalities, namely, suction formers, means for feeding the forward ends of flat tubular blanks between said formers and for clamping the opposite ends of said blanks, means for moving the formers on their axes by a single continuous movement, whereby the leading ends of the blanks are opened, means for holding the folds in the forming end of the bag against the faces of the formers and means for removing the partially completed bag, substantially as described.

3. In a paper bag machine, the combination with suction boxes hinged on fixed axes parallel to the path of the bag blank, means for moving said boxes upon their hinges to open the end of the blank, and transversely moving blades or formers adapted to hold the end of the blank against the face of the formers, substantially as described.

4. In a paper bag machine, the combination with hinged suction boxes, of two pairs of transversely moving blades, and a yoke connecting the outer ends of said blades in pairs and means for reciprocating said blades to cause them to move over the faces of the suction boxes, substantially as described.

5. In a paper bag machine, the combination with suction boxes hinged and movable upon fixed axes parallel to the path of the blank, of transversely moving blades adapted to enter the sides of the bellows fold of the blank, means for moving the suction boxes on their axes, and means for simultaneously moving the blades, substantially as described.

6. In a paper bag machine, the combination with the suction boxes each constructed from a single section hinged in planes parallel to but on opposite sides of the plane of movement of the bag blank, means for exhausting the interior of said boxes, and means for separating said boxes by a single continuous movement whereby the leading end of the blank is opened and the sides thereof folded in, means for clamping the folds against the faces of the suction boxes, means for clamping the blank while the boxes are being opened and means for taking away the partially completed bag, said several means being actuated in due order and relation, substantially as described.

7. In a paper bag machine, the combination with suction boxes hinged on axes parallel to each other and constructed in a single section, means for moving said boxes on their axes into a plane at right angles to the plane of movement of the bag blank whereby to open

the leading end of the blank and form the side folds therein, means for holding the folds against the face of the formers, and a reciprocating platen for flattening the folds, substantially as described.

8. In a paper bag machine, the combination with hinged suction boxes adapted to open the leading end of a bag blank, of means for withdrawing the blank from the boxes comprising a pair of rolls, one of which has its body mutilated or cut away, and a nipper for seizing the blanks substantially as described.

9. In a paper bag machine, the combination with hinged suction boxes adapted to open the leading end of a bag blank, of means for withdrawing the blank from the boxes comprising a pair of rolls, one of which has its body mutilated or cut away, and a nipper arranged at the margin of such mutilated portion, substantially as described.

10. In a paper bag machine, the combination with hinged suction boxes and cam actuated means of moving them on their hinges, of transversely moving blades and a cam for actuating said blades, the actuating cams for the boxes and the blades having a common axis whereby the simultaneous movement

of said parts is insured, substantially as described.

11. In a paper bag machine, having suction boxes for opening the leading end of the blank, of exhaust pipes for said boxes, said exhaust pipes having telescoping sections and a swivel connection with the boxes, substantially as described.

12. In a paper bag machine a hinged suction box and an exhaust pipe connected therewith, said pipe having a swivel connection with the box, telescoping sections and a spring having a bearing upon said sections respectively, substantially as described.

13. In a paper bag machine, the combination with means for forming and severing a tube into bag lengths, of suction boxes for opening the leading end of the blank and feed rolls for the tube and for the bag lengths, the latter being adapted to move the bag lengths at a greater rate of speed than the tube is moved, substantially as and for the purpose described.

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