

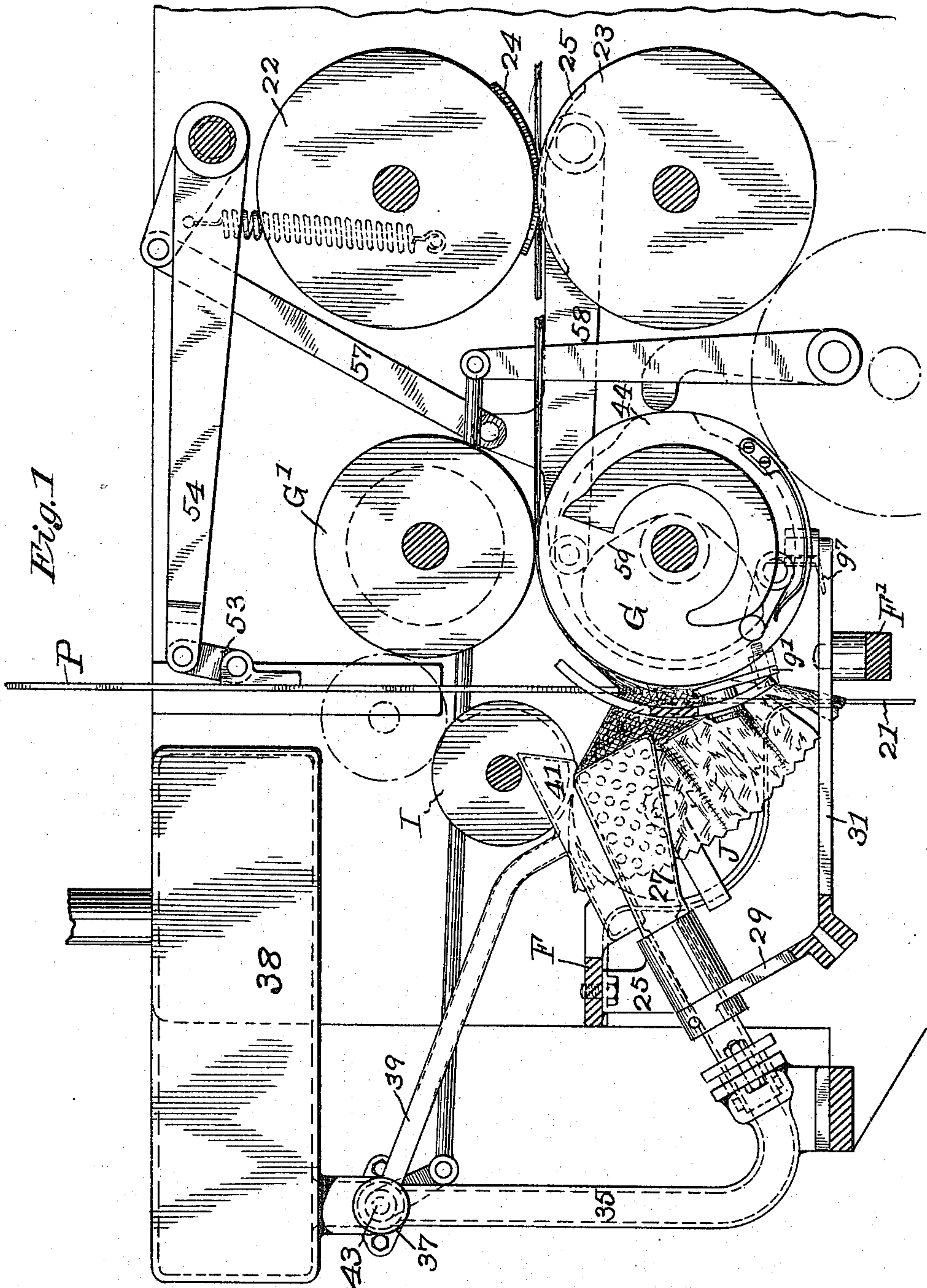
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4 Sheets—Sheet 1.

W. A. LORENZ & E. E. CLAUSSEN.
PAPER BAG MACHINE.

No. 573,277.

Patented Dec. 15, 1896.



Witnesses:
Jennie Nellis
C. S. Howe

Inventors:
William A. Lorenz
Edward E. Claussen
By their Attorney *W. H. Honiss.*

(No Model.)

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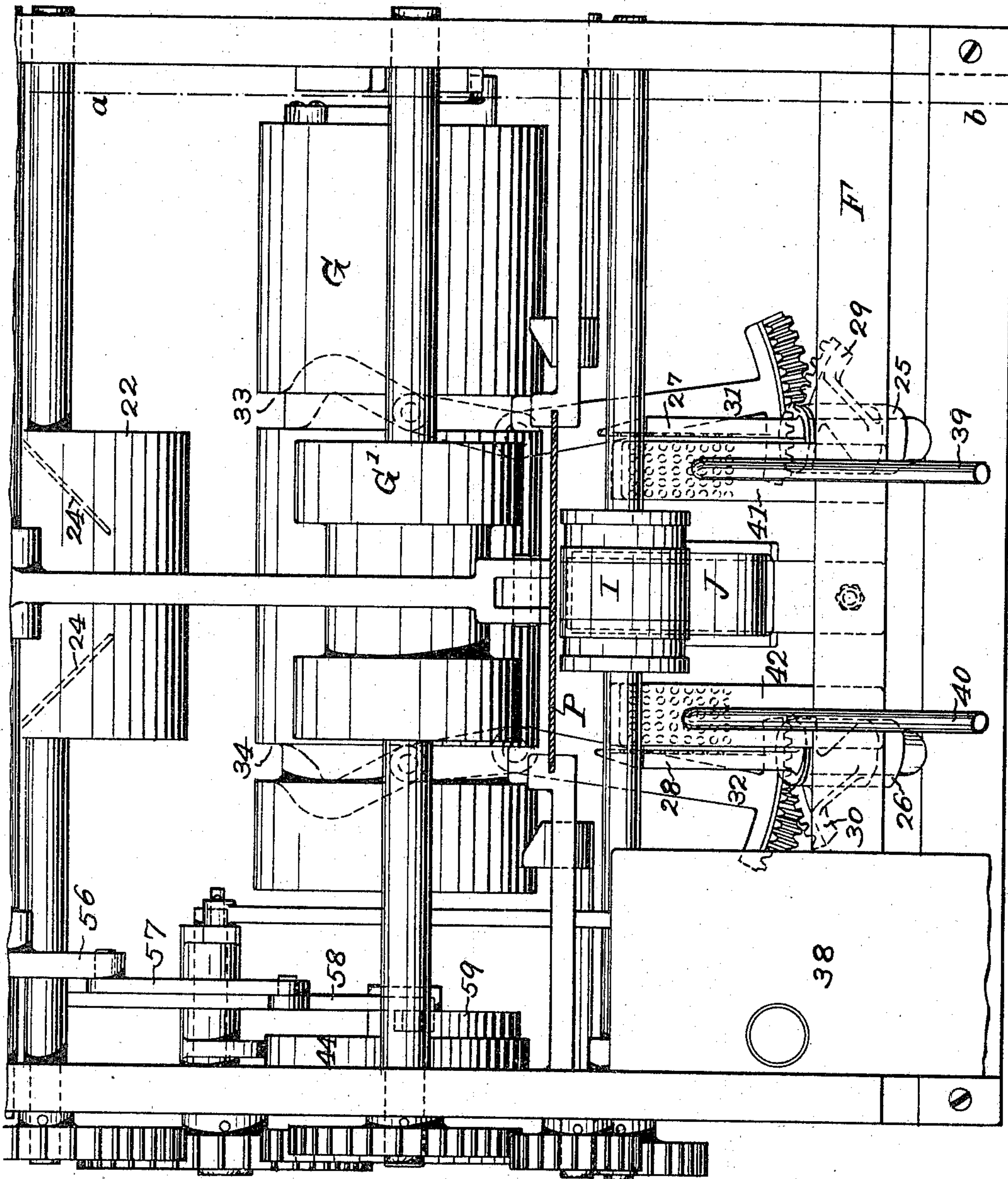


Fig. 2.

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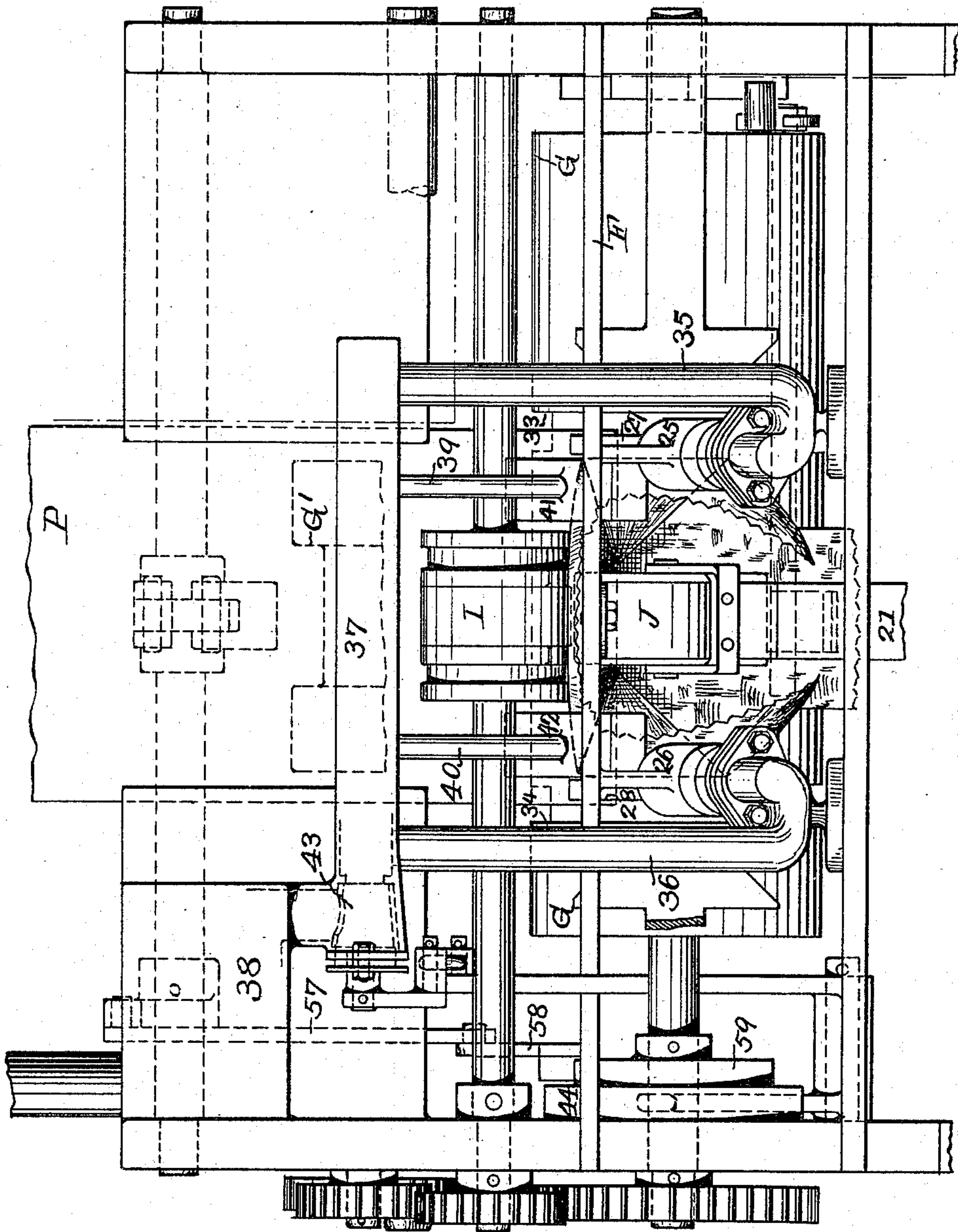
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Fig. 3



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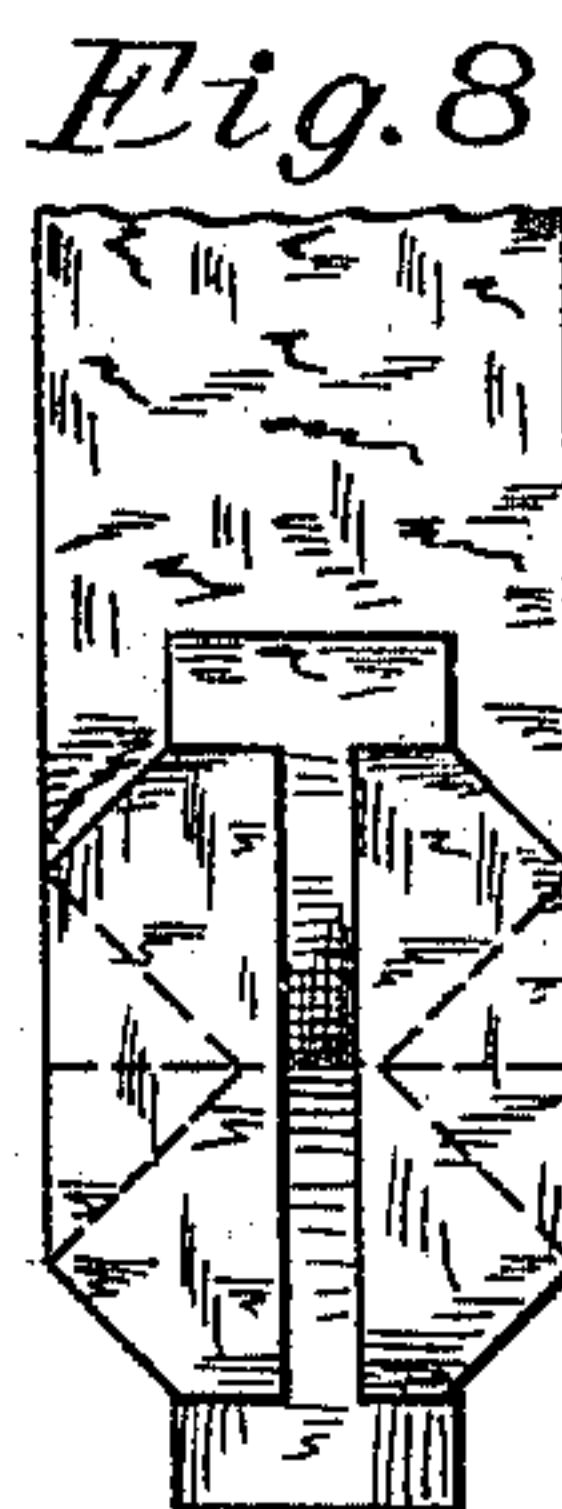
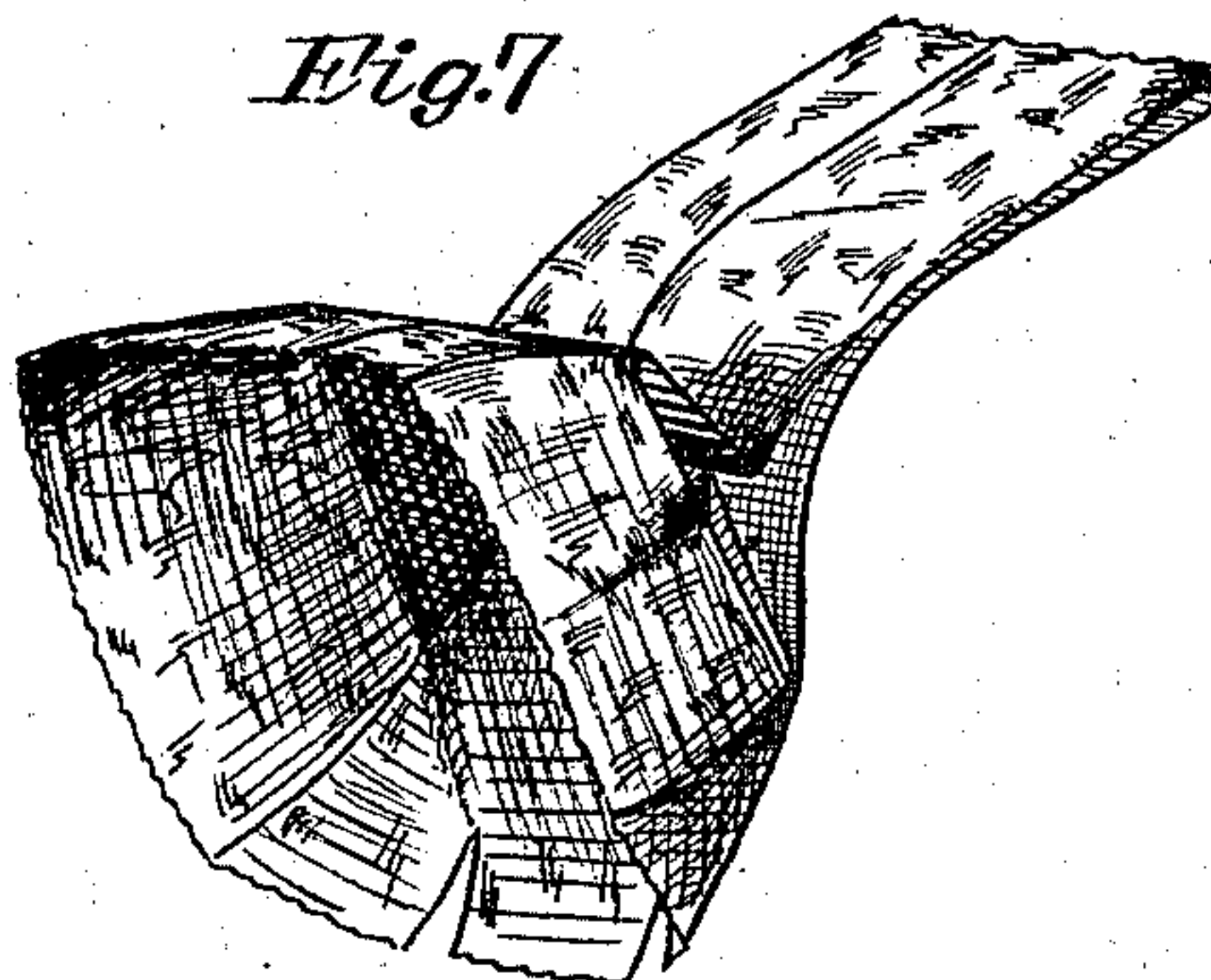
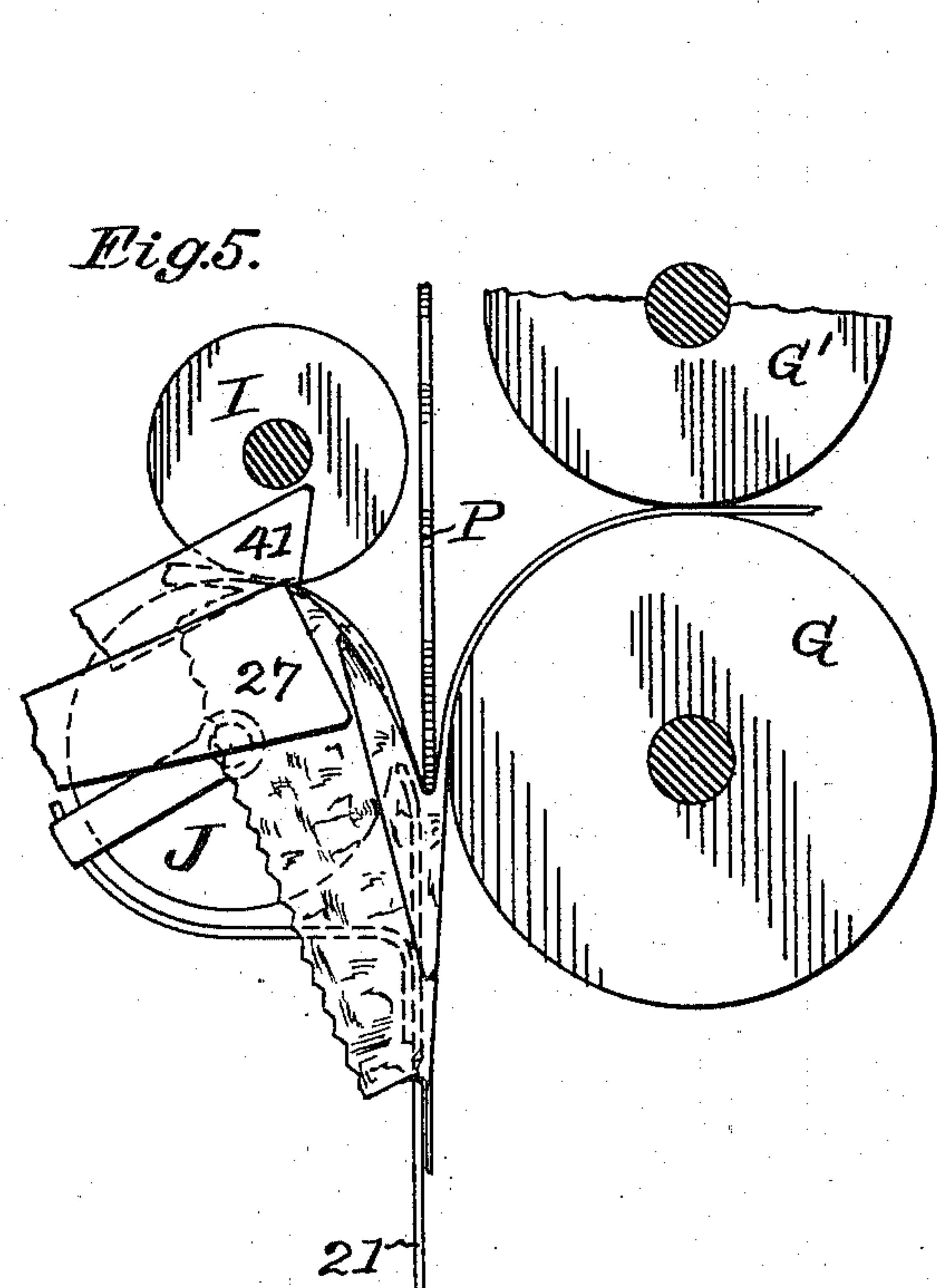
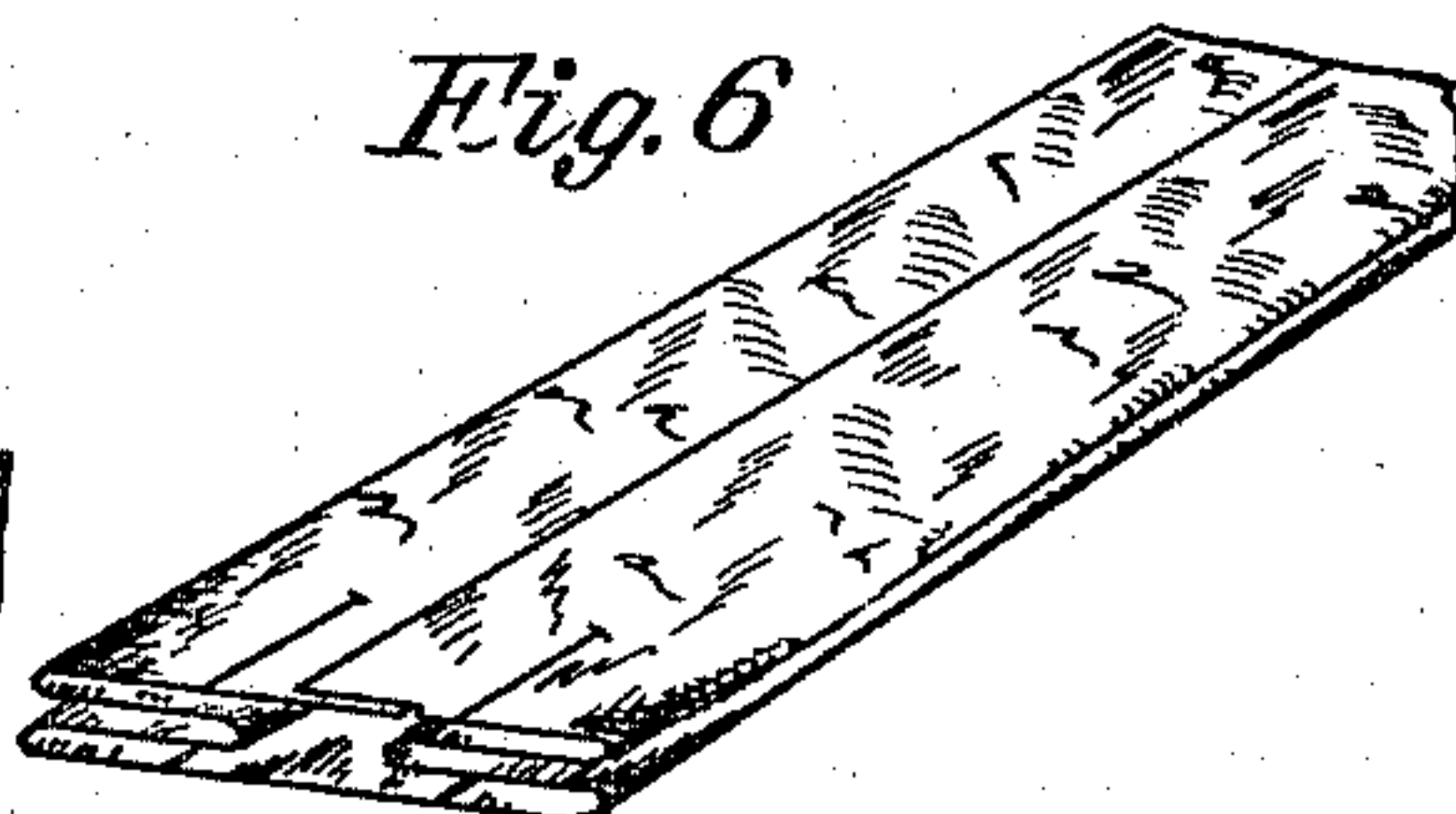
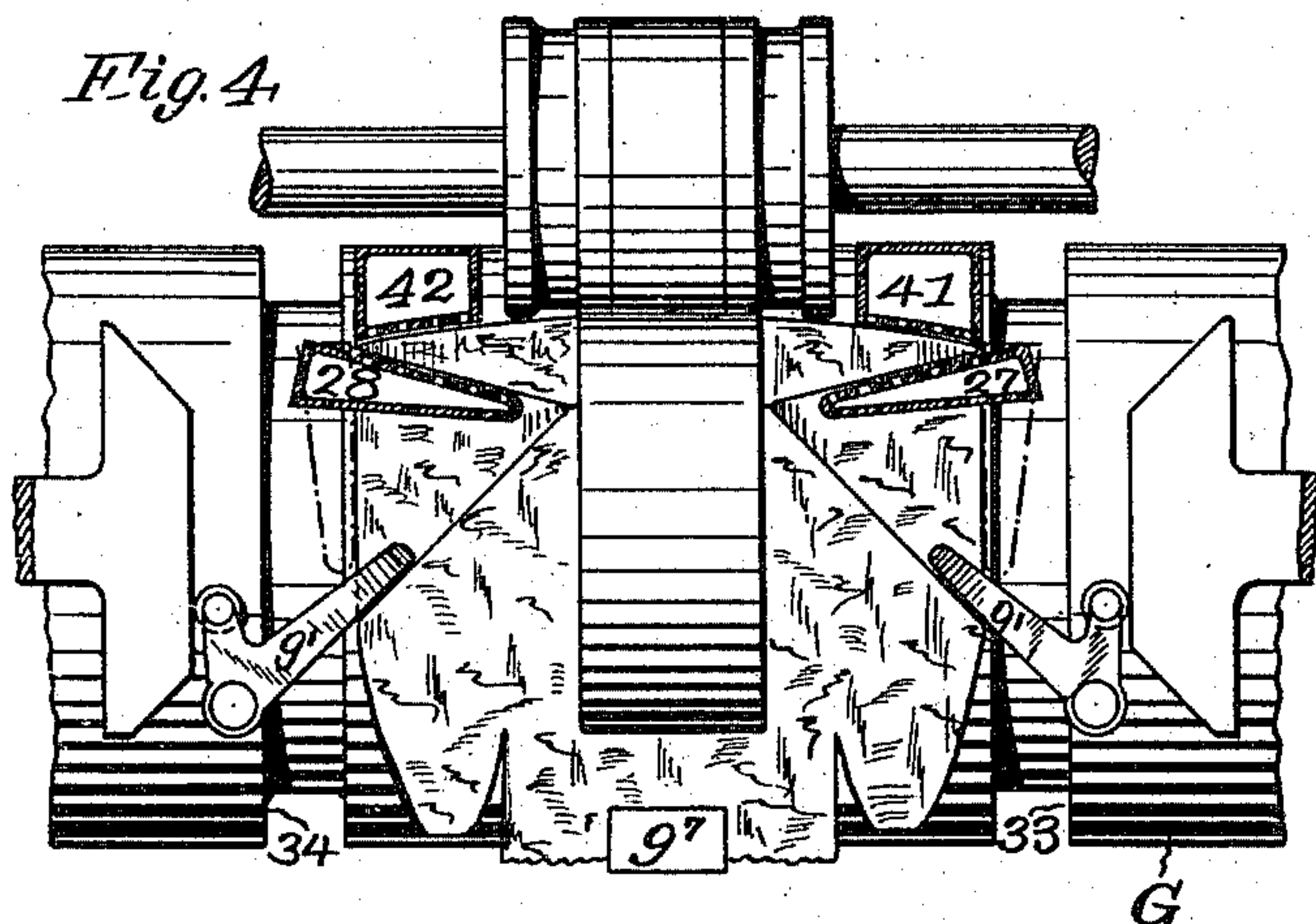
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UNITED STATES PATENT OFFICE.

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PAPER-BAG MACHINE.

SPECIFICATION forming part of Letters Patent No. 573,277, dated December 15, 1896.

Application filed April 20, 1896. Serial No. 588,285. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM A. LORENZ and EDWARD E. CLAUSSEN, citizens of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Paper-Bag Machines, of which the following is a full, clear, and exact specification.

10 This invention relates to means for making diamond-folded bag-blanks from tucked-paper tubes, one of the most difficult steps in the manufacture of square-bottomed paper bags.

15 Although the means which form the subject of this invention may be employed in connection with various types of paper-bag machines, it is herein shown in its application to but one of the leading types of machines for that purpose, namely, the machine which is embodied in Letters Patent of the United States, No. 417,346, of December 17, 1889.

25 Enough of the mechanism of the above-mentioned patent is shown in the drawings to enable the connection of our present invention therewith to be understood, and those parts of the machine of that patent which are herein shown without substantial modification are indicated by the same letters or characters by which they are indicated in that patent.

30 Figure 1 of the drawings is a side view, partly in section, taken on the line *a b* of Fig. 2 of the machine of our present invention, showing in connection therewith a blank in position and partially folded. Fig. 2 is a plan view of the machine with the blank omitted. Fig. 3 is a view of the blank and of the mechanism, looking from the left-hand side of Fig. 1. Fig. 4 is a view of the blank and of the mechanism which immediately engages it, looking directly into the open mouth of the blank and showing the suction fingers and boxes in section, the position of these suction devices being that occupied by them when the upper plies of the blank are pushed through between them. Fig. 5 is a side view of the blank and of its engaging mechanism represented in a position subsequent to that occupied by them in Fig. 1. Fig. 6 is an iso-

metric view of the blank of a tucked-paper-tube blank, such as is well known in this art. Fig. 7 is a view of the blank after it has been opened out by the devices of this invention to substantially the extent shown in Fig. 1. Fig. 8 is a plan view of a blank after the diamond folding has been completed ready for the pasting and bottom-folding operations.

The tucked-paper-tube blanks may be made and fed to this mechanism in any one of the several well-known ways, and the diamond-folded blanks, after being completed by this mechanism to the form shown in Fig. 8, may be passed on to any one of several well-known devices for pasting and cross-folding the end flaps, thus completing the bag in its commercial form.

The feeding-rolls *G* and *G'* are revolubly mounted in suitable bearings and are adapted to feed forward between them the blank to be operated upon, that blank having preferably been passed between the creasing-rolls 22 and 23, having creasing-blades 24 so disposed thereon as to crease or break down the paper at the lines upon which they are subsequently to be folded.

The feed-roll *G* is provided with grippers *g'* *g'* and *g'*, by means of which the lower plies of the blank are held to the roll *G* in substantially the same way and are released therefrom at substantially the same times as in the Patent No. 417,346 above referred to.

The rolls *I* and *J* are mounted in substantially the same position and serve to engage and release the upper single ply of the blank at its center in substantially the same way as in the above-mentioned patent, excepting that in this case the roll *I* is made narrower to allow of the presence on either side thereof of the suction-boxes. To the supports of the roller *J* is also attached the distender 21, which serves to hold down the leading lower ply of the blank and the trailing end of the diamond as it passes from the suction folding devices and the roll *J*.

The tucker-plate *P* is fitted to slide vertically in the frame of the machine and is operated in suitable time by means of a cam and its connections, similar to those of our United States Patent No. 534,512 of February 19, 1895.

Upon the cross-brace F of the frame of the machine are attached the brackets 25 and 26, which form bearings for the suction-fingers 27 and 28, respectively. At the left of the bearings of these fingers, as seen in Fig. 1, they have fixed upon them the sector-gears 29 and 30, respectively. The sector-gears are connected by means of the sector bevel-gears 31 and 32, respectively, pivoted on the cross-brace F' of the frames, with the peripheral cam-grooves 33 and 34, formed in the roll G, by means of which an oscillatory motion is imparted to the suction-fingers 27 and 28, sufficient to cause them to oscillate from the full-line position shown in Fig. 4 to the dot-and-dash position of the same figure. These suction-fingers are provided with an internal air-chamber having perforations leading therefrom through those walls which are to engage the blank, as shown in Fig. 4. An exhaust-passage for the air extends from these chambers in the fingers through their respective bearings and communicates with the air-tubes 35 and 36 by means of glands. (Best shown in Figs. 1 and 3.) The air-tubes 35 and 36 connect by means of a supply-tube 37 with a vacuum box or reservoir 38, from which the air is continuously exhausted by means of any suitable apparatus.

From the supply-tube 37 extend the air-tubes 39 and 40, which terminate in the suction-boxes 41 and 42, located on either side of the roll I. These suction-boxes are hollow and have perforations through their lower walls at the portions thereof which are to engage with the bag-blank. The lower perforated walls are flat, excepting at their outer ends, where they each terminate in a downwardly-projecting hook or nose, which is adapted to break the upper ply of the blank along the line at which it is to be folded to form the bottom corner of that side of the bag. The time and extent of the opening of communication between the vacuum-box 38 and the suction-fingers 27 and 28 and the suction-boxes 41 and 42 are regulated by means of the valve 43, which is adapted to oscillate in the end of the supply-tube 37, so as to open and close the passage leading from the vacuum-box 38 to the supply-tube. The oscillations of the valve 43 are controlled by means of its connection with a cam 44, carried on the shaft along with the feeding-roll G. The construction and arrangement of the connection between the cam 44 and the valve 43 is clearly shown in Figs. 1, 2, and 3.

The suction-fingers 27 and 28 operate to engage the upper members of the inwardly-tucked sides of the tube in advance of that portion of these intucked sides which subsequently form the well-known triangular folds, and their function is to draw out the end portion of the tube from its tucked-in position (shown in Fig. 4) to its extended or rectangular position, (shown in Fig. 7,) the blank meanwhile being held by the grippers *g'* and by the tucker-plate P, so that the action of the

suction-fingers in thus drawing out the intucked sides of the tube shall not extend along the blank beyond the lines on each side of the bag which form the lower boundary of the triangular side folds, these lines agreeing also with the position of the plane of the prospective bottom of the bag.

The function of the suction-boxes 41 and 42 is to engage with those portions of the upper ply of the tube which lie at the sides of the roll I and to support that ply while the bottom end of the blank is being distended by the operation of the suction-fingers in drawing out the tucked-in portions of the adjacent sides. The operation of these suction-boxes is confined to the same zone as that of the suction-fingers 27 and 28; that is, it extends from the bottom end of the tube only so far as the line of the prospective bottom of the bag. Thus it will be seen that these suction fingers and boxes operate to open the leading end of the blank into a box-like form and that they come in contact with only those portions of the blank which are subsequently folded into the bottom.

The operation of this machine as a whole is as follows: The tubular blanks are made and fed to and between the rolls 22 and 23 and the feeding-rolls G and G' by any of the well-known methods. As the leading end of the tube reaches the meeting-line of the feeding-rolls its lower ply is seized by means of the gripper *g'*, and as the blank proceeds the grippers *g'* pass into the side tucks and engage the lower ply of the blank at the location of the subsequent corners of the bag-bottoms. The upper ply of the blank, being left free, passes between the rolls I and J and between the suction-fingers 27 and 28 and the boxes 41 and 42. As soon as a suitable length has thus fed forward the tucker-plate P is brought in contact with the upper ply of the blank at the location of the primary transverse fold and pushes that portion of the blank downward at the same speed at which it is advanced by the feeding-rolls. That portion therefore of the blank which is engaged between the rolls I and J and by the suction devices is temporarily retained in the position shown in Fig. 1, during which time the suction-fingers 27 and 28 perform their function thereon, converting the leading end of the tucked tube from the condition shown in Fig. 4 to that shown in Fig. 7, the air-valve 43 being meanwhile opened by means of its cam 44, so as to allow the suction to operate upon the blank through the suction-fingers 27 and 28 and the suction-boxes 41 and 42. As soon as the blank is opened to the condition shown in Fig. 7 the air-valve is closed, and the blank is carried down, as shown in Fig. 5, by the rolls G G' and by the tucker-plate P. From the position of the blank shown in Fig. 5 it is seized by supplementary devices, which draw it away from the herein-described mechanism, the tube being flattened meanwhile into the diamond shape

shown in Fig. 8, as it is drawn past the roller J and the distender-rod 21.

The suction-boxes 41 and 42 are preferably made, as shown in Figs. 1 and 5, with angles in their lower walls adapted to form the untucked wall of the tube at a line substantially coincident with that upon which that ply of the blank is subsequently folded as one of the bottom closing flaps thereof. These suction-boxes thus serve to define that line and to support that portion of the tube which lies toward the end from that line in a position substantially parallel with the longitudinal center of that portion of the blank, in order that the intucked sides may be free to fold upon the desired lines and in order to hold those portions of the ply engaged by them in their respective relations to the resultant rectangular box. The means hitherto employed in making these folds in this form of bag have operated upon those portions of the tube which are located above the intended plane of the bag-bottom. Those portions of the tube which lie below that plane, and which in this invention are engaged by the folding mechanism, have almost invariably been left entirely free to take whatever form they might under the influences of the means brought to bear on the other portions of the tube. The result has been that these bottom portions of the tube, the formation of which is so important to the perfection of the folds and of the bag, being thus uncontrolled have been more or less distorted when they were subsequently folded and flattened down. By the means herein shown we are enabled to definitely control and shape this part of the tube.

It is not an essential feature of the invention that the suction fingers and boxes shall be confined in their operations to the particular side or sides of the blank with which they are shown to engage in the drawings. In other and modified organizations of their cooperating mechanism to which the devices of this invention are applicable it may be permissible, and indeed preferable, to have them engage the opposite members of the tucked-in sides of the blank, or a pair of the suction-fingers may be employed on each side, thus engaging all four members of the two tucked sides of the blank and operating to draw them out with perhaps a greater degree of positiveness.

We claim as our invention—

1. In combination with means for supporting a tucked-paper tube, a suction-finger adapted to engage a tucked side of the tube between the folds thereof, and adapted to unfold that side into a plane wall, substantially as described.

2. In combination with means for supporting a blank of tucked-paper tubing, a pair of oppositely-disposed suction-fingers adapted to engage the blank between the members of the tucked sides thereof, and adapted to open them into substantially rectangular form, as specified.

3. In combination with means for supporting a blank of tucked-paper tubing, a pair of oppositely-disposed oscillating suction-fingers arranged with their axes substantially parallel with the longitudinal position of the part of the blank to be folded, and adapted to vibrate thereon, for the purpose specified.

4. In combination with means for supporting and feeding a paper tube, a pair of oppositely-disposed oscillating suction-fingers, having a cross-section of substantially a closed-V form, with openings through one of the walls thereof, and with means for exhausting the air from the interior thereof, substantially as described.

5. In combination with a traveling folding bed adapted to support a blank of tucked-papertubing, and with a tucker-plate adapted to travel with and define the primary transverse fold thereof, a pair of oppositely-disposed oscillating suction-formers adapted to engage those portions of the intucked sides of the blank which are to form the bag-bottom, with means substantially as described for oscillating the fingers and exhausting the air therefrom in suitable time and relation to the tucker-plate, substantially as described.

6. Means for converting the end of a tucked-paper tube into a box-like form, consisting of suction-boxes adapted to engage with and support the end of the upper ply of the tube, and of a pair of oppositely-disposed oscillating suction-fingers adapted to engage the tucked sides of the blank, and adapted to open those sides into rectangular relation with the outer plies, substantially as described.

7. In a machine of the class specified, in combination with means for supporting a blank of tucked-papertubing, means adapted to engage with and open into a box-like form those portions of the plies thereof which are to form the bottom of the bag, consisting of suction-boxes adapted to engage the edges of an untucked side wall of the tube, and with a pair of oppositely-disposed suction-fingers located adjacent thereto and adapted to square out the tucked sides of the blank, substantially as described.

8. In combination with feeding-rolls, the roll J, adapted to open the leading end of the blank, and with a tucker-plate adapted to form the primary transverse fold thereof, means for opening into rectangular form those portions of the tube which are to form the bottom plies of the bag, consisting of suction-boxes adapted to support and form one of the untucked side walls of the tube, and a pair of oscillating suction-fingers adapted to engage with and unfold the tucked portion thereof, substantially as described.

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