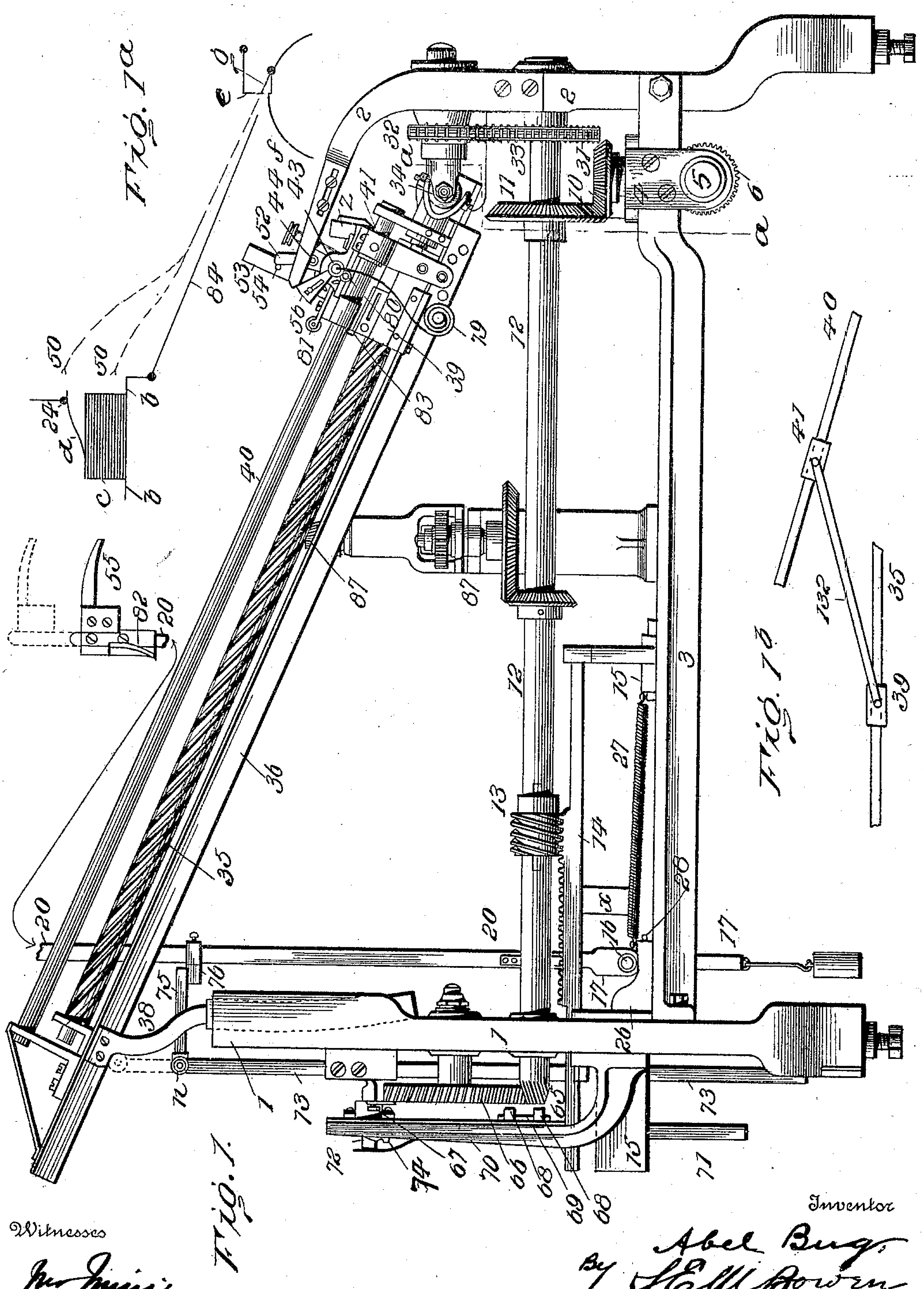
No. 640,991. Patented Jan. 9, 1900.

A. BUG.

SHEET FEEDING MACHINE.

(Application filed Dec. 30, 1897.)

(No Model.) 11 Sheets—Sheet 1.



Witnesses

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A. H. Mahler

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Attorney

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 640,991. Patented Jan. 9, 1900.

A. BUG.

SHEET FEEDING MACHINE.

(Application filed Dec. 30, 1897.)

(No Model.)

11 Sheets—Sheet 2.

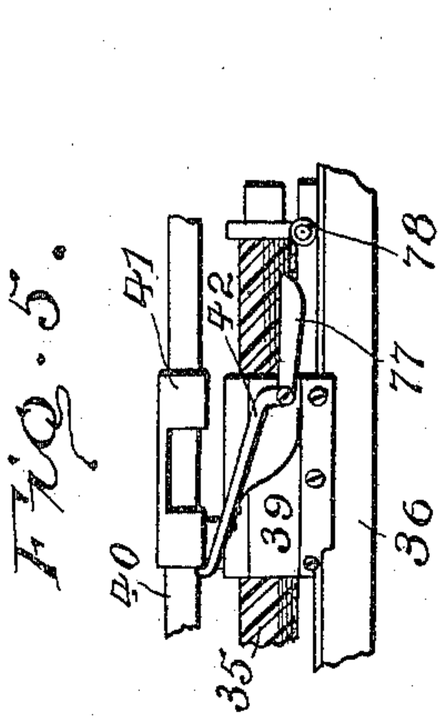

Fig. 5.

Fig. 1.

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No. 640,991. Patented Jan. 9, 1900.

A. BUG.

SHEET FEEDING MACHINE.

(Application filed Dec. 30, 1897.)

(No Model.) 11 Sheets—Sheet 3.

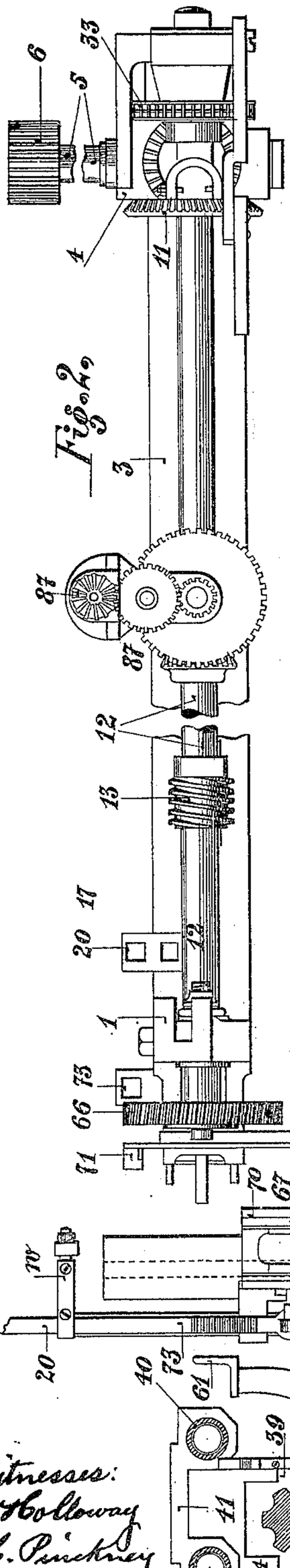

Fig. 2.

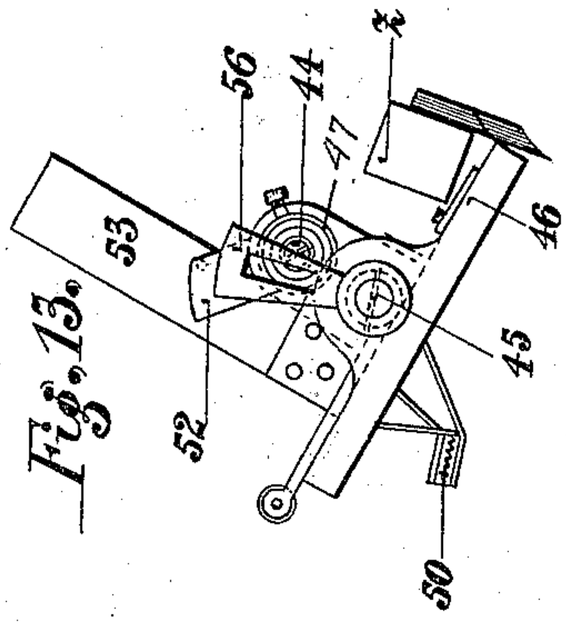

Fig. 13.

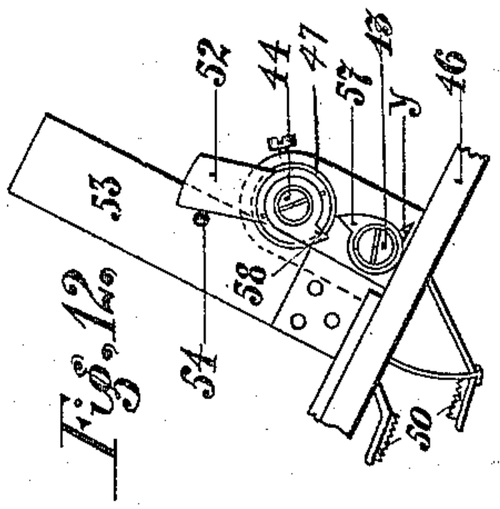

Fig. 12.

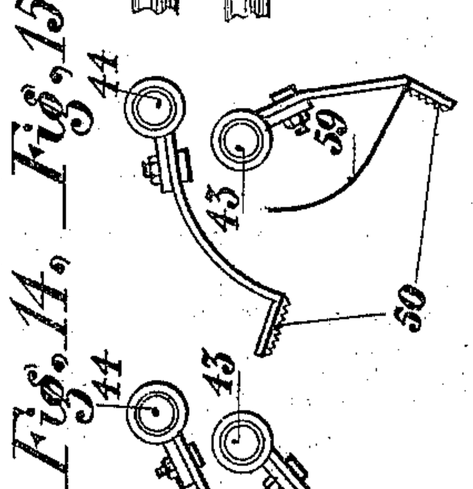

Fig. 15.

Fig. 14.

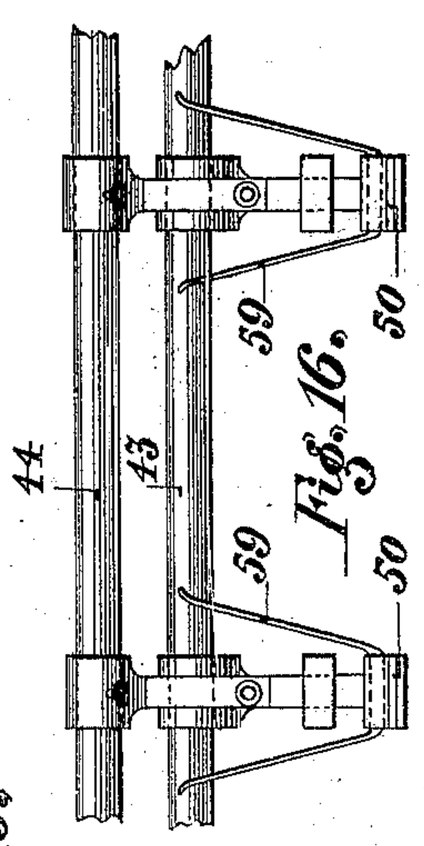

Fig. 16.

Fig. 1.

Fig. 3.

Fig. 4.

Fig. 6.

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SHEET FEEDING MACHINE.

(Application filed Dec. 30, 1897.)

(No Model.)

11 Sheets—Sheet 4.

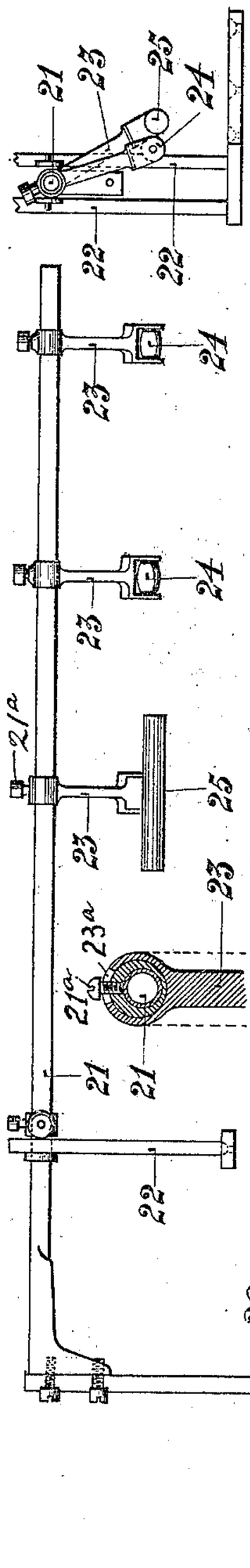


Fig. 9a.

Fig. 11.

Fig. 9.

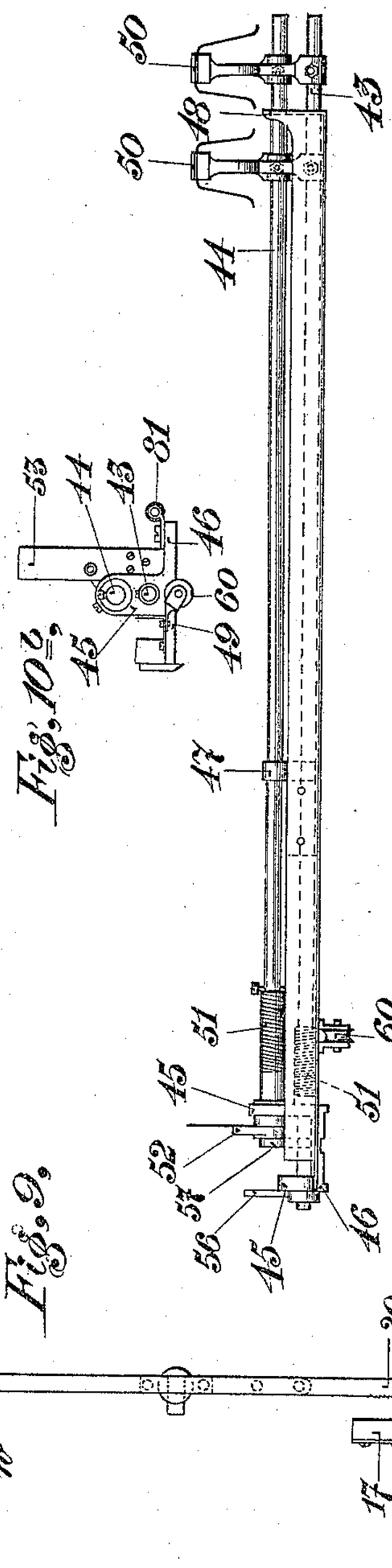


Fig. 10.

Fig. 10a.

Fig. 10b.

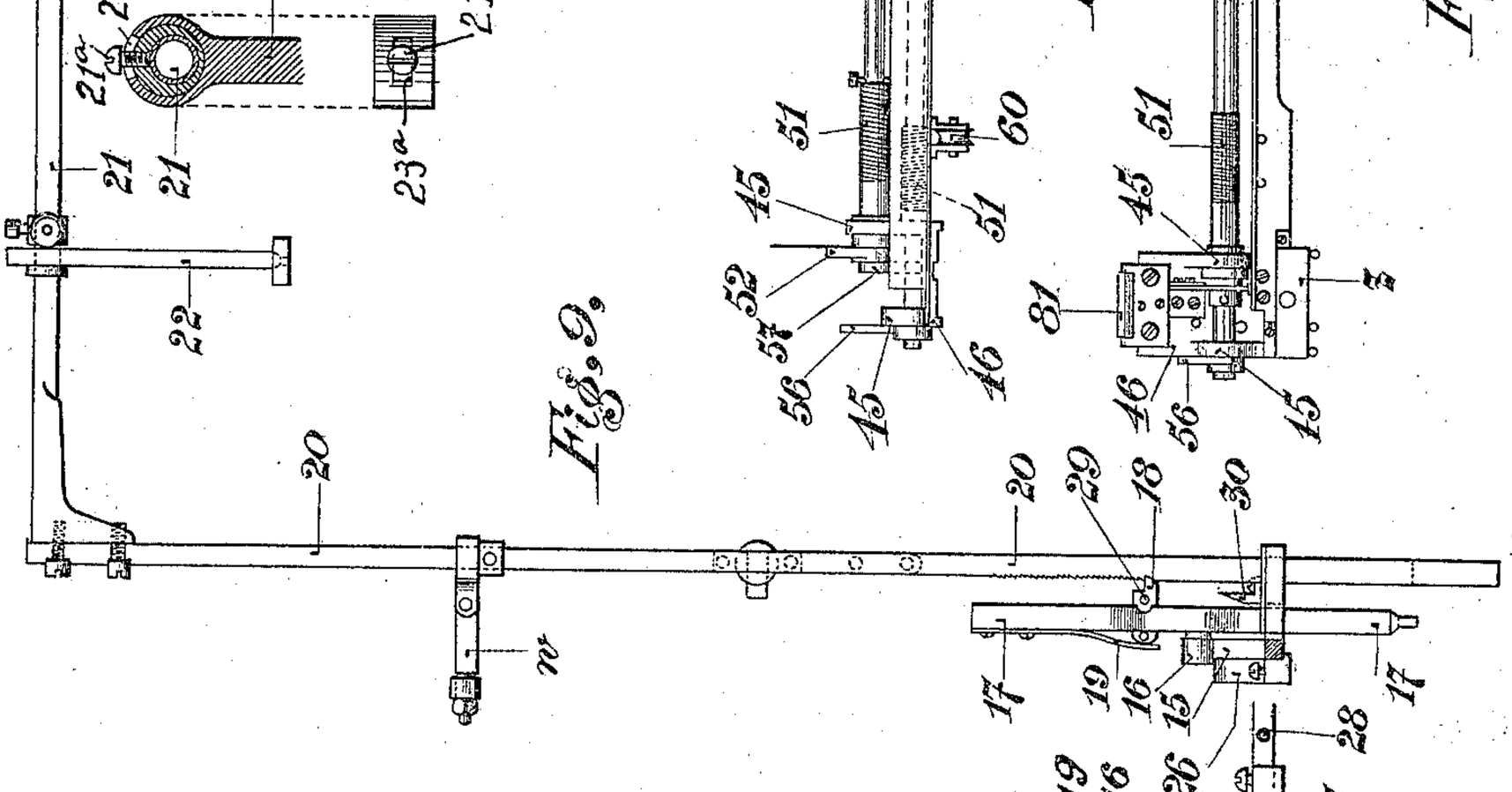
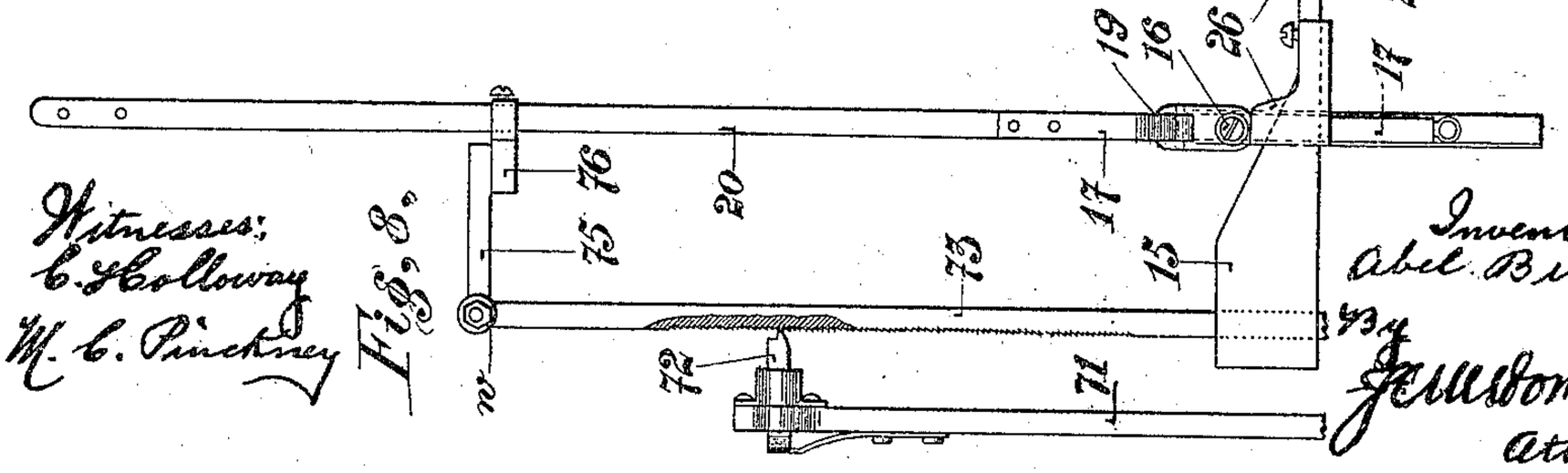


Fig. 8.



Witnesses:
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No. 640,991. Patented Jan. 9, 1900.

A. BUG.

SHEET FEEDING MACHINE.

(Application filed Dec. 30, 1897.)

(No Model.) 11 Sheets—Sheet 5.

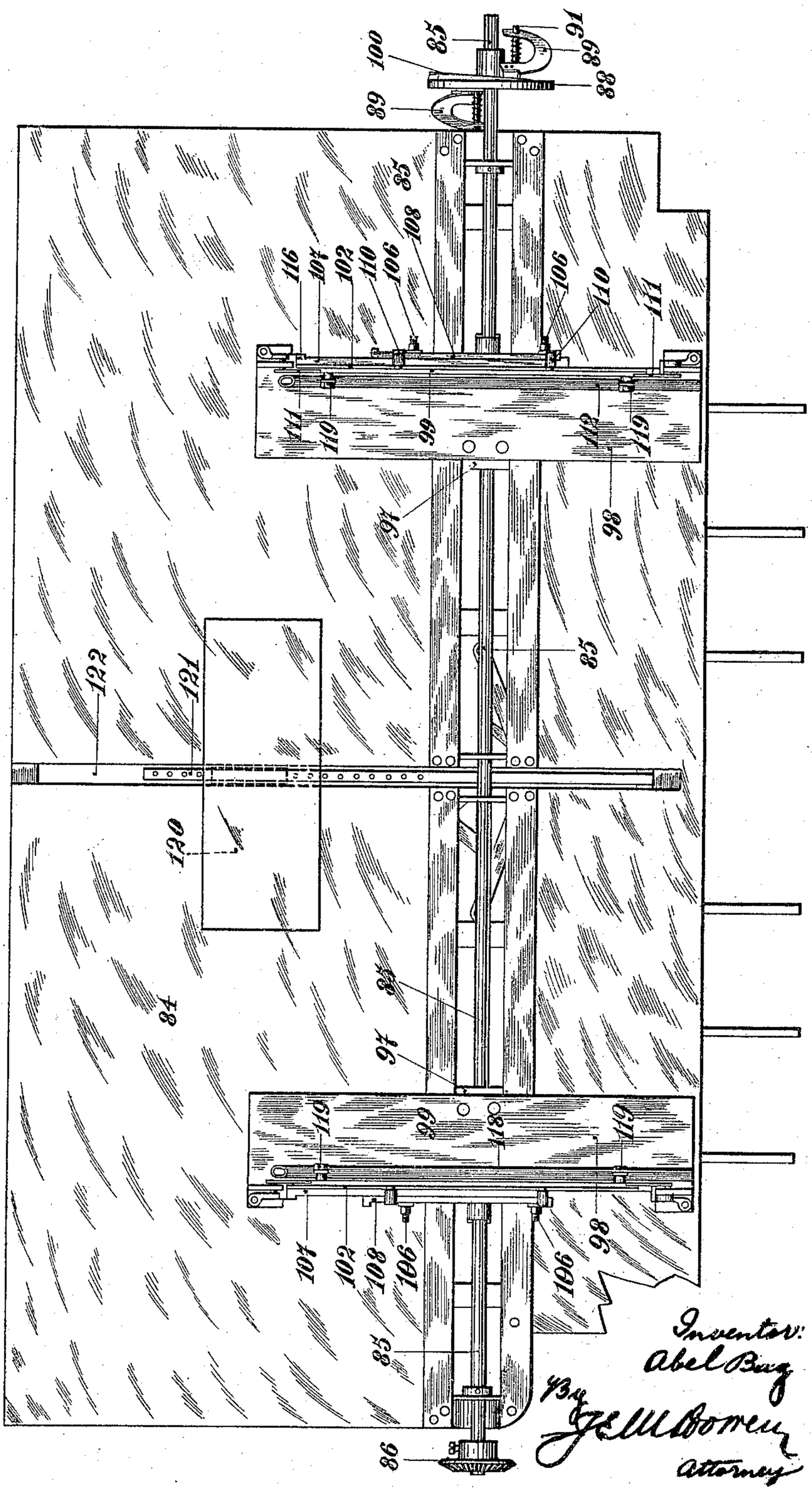

Fig. 14.

Witnesses:
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SHEET FEEDING MACHINE.

(Application filed Dec. 30, 1897.)

(No Model.) 11 Sheets—Sheet 6.

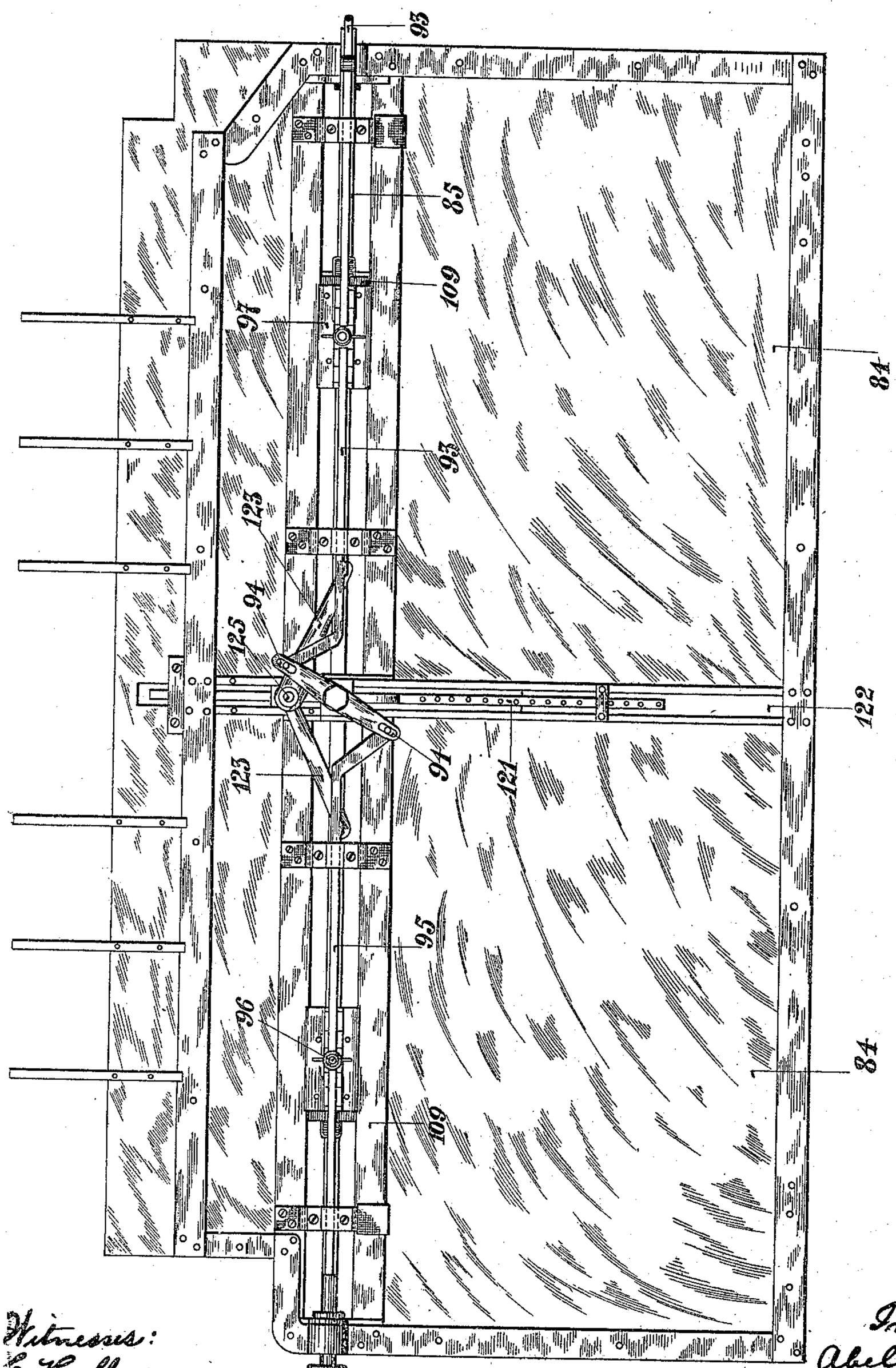

Fig. 18.

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Patented Jan. 9, 1900.

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SHEET FEEDING MACHINE.

(Application filed Dec. 30, 1897.)

(No Model.)

11 Sheets—Sheet 7.

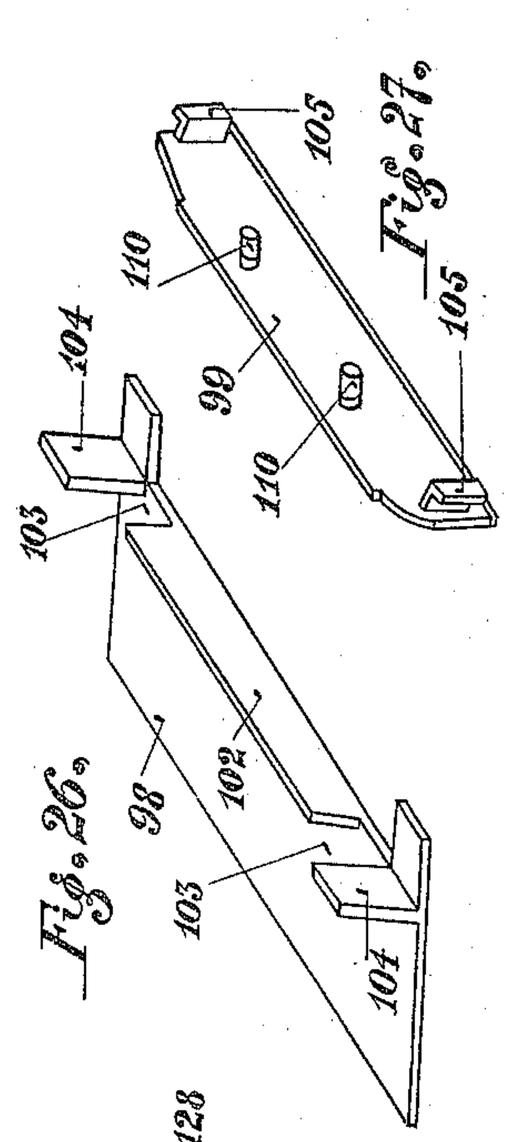

Fig. 26.

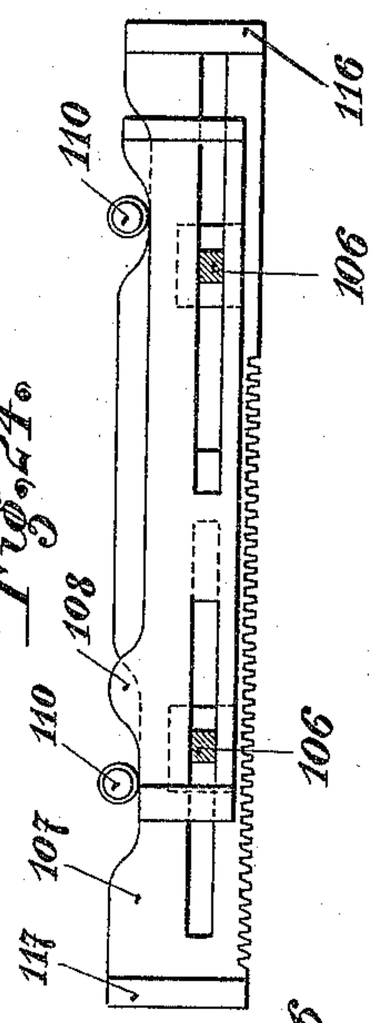

Fig. 24.

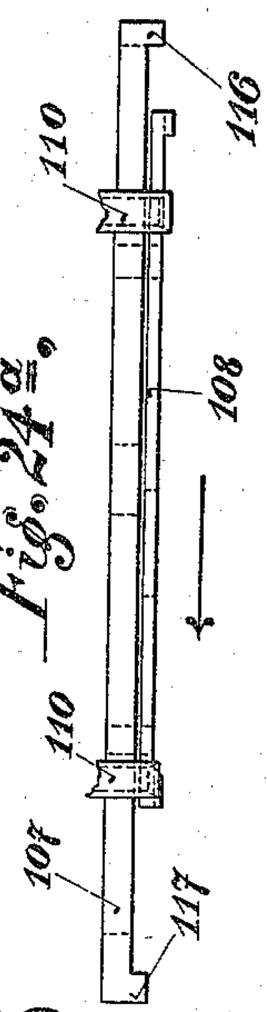

Fig. 24½.

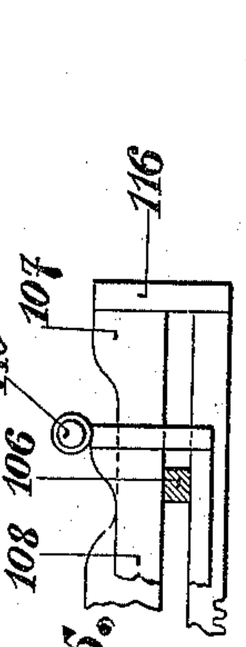

Fig. 25.

Fig. 23.

Fig. 22.

Fig. 21.

Fig. 28.

Fig. 20.

Fig. 19.

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No. 640,991. Patented Jan. 9, 1900.

A. BUG.

SHEET FEEDING MACHINE.

(Application filed Dec. 30, 1897.)

(No Model.) 11 Sheets—Sheet 8.

Fig. 29.

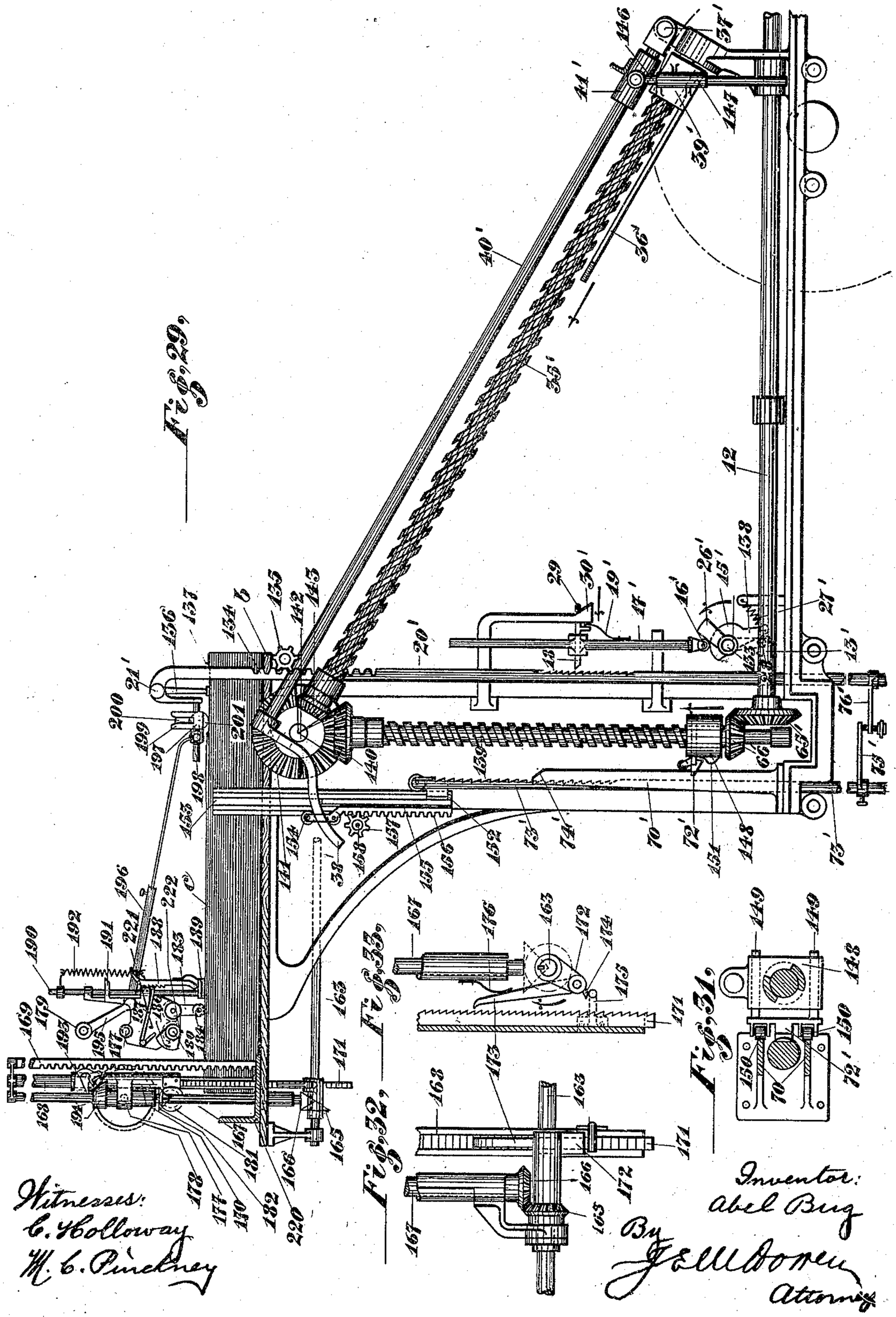

Fig. 30.

Fig. 32.

Fig. 31.

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Patented Jan. 9, 1900.

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SHEET FEEDING MACHINE.

(Application filed Dec. 30, 1897.)

(No Model.)

11 Sheets—Sheet 9.

Fig. 34.

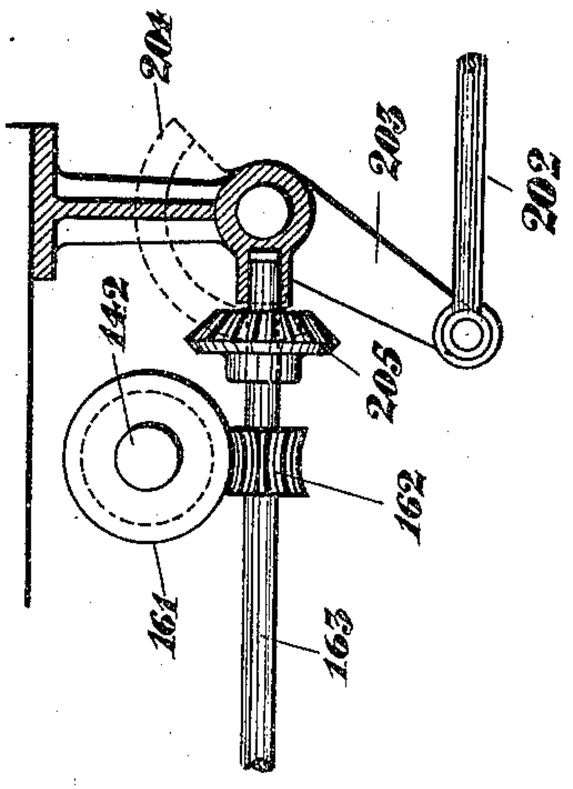
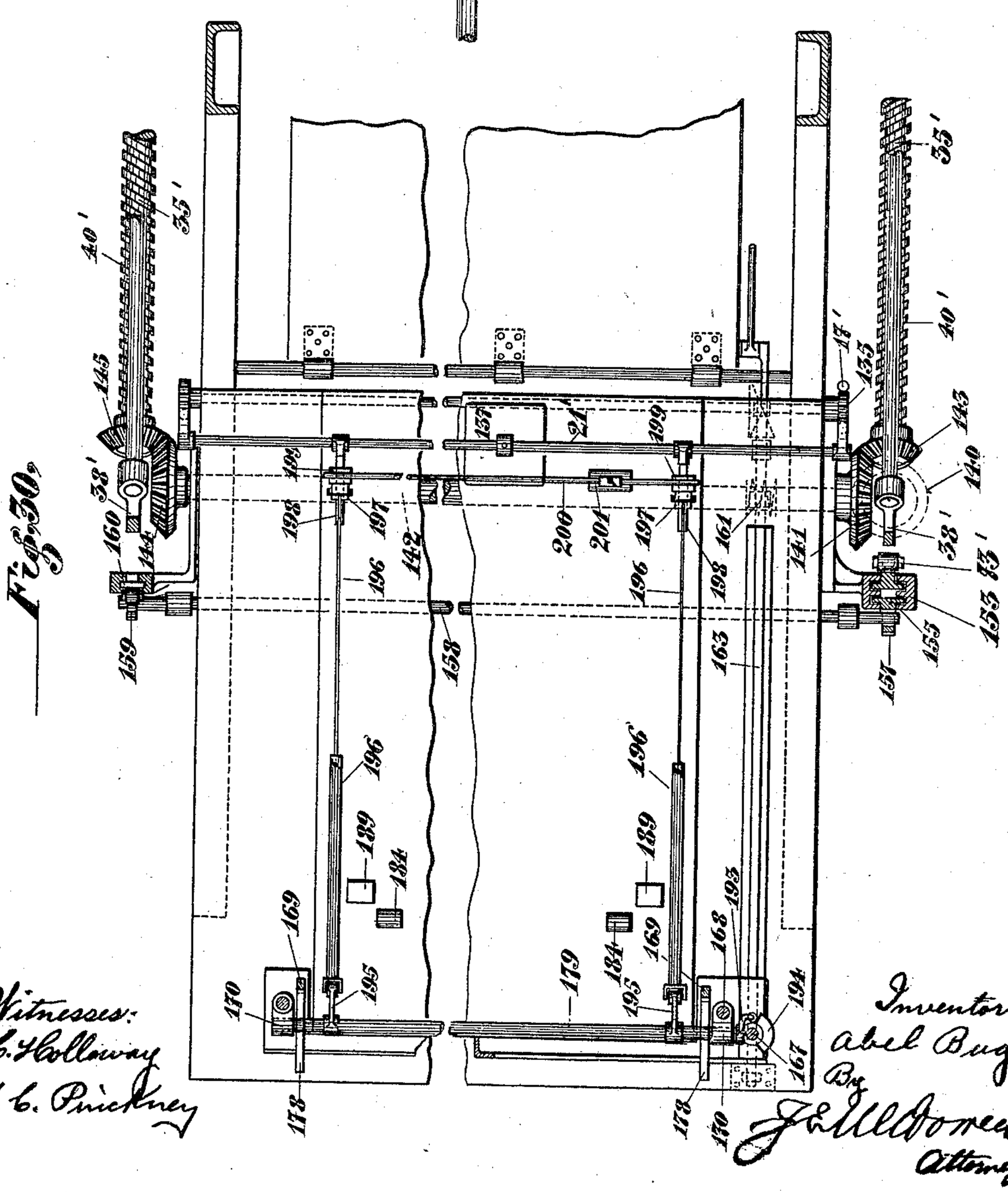


Fig. 30.



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No. 640,991. Patented Jan. 9, 1900.

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SHEET FEEDING MACHINE.

(Application filed Dec. 30, 1897.)

(No Model.) 11 Sheets—Sheet 10.

fig. 34a.

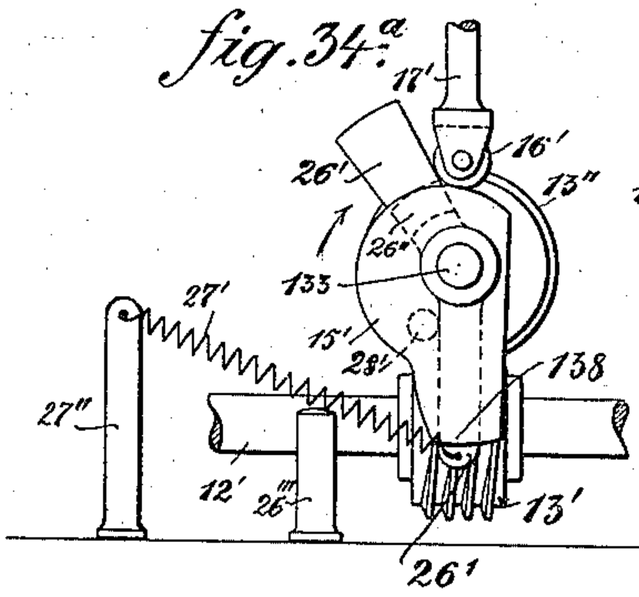


fig. 34b.

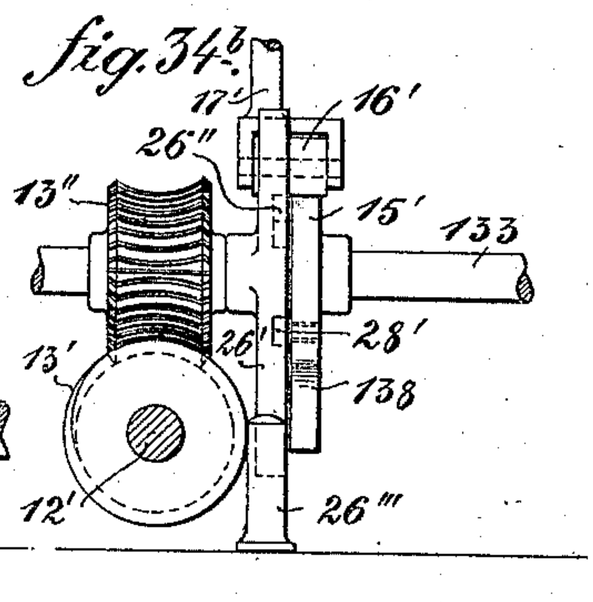


fig. 34c.

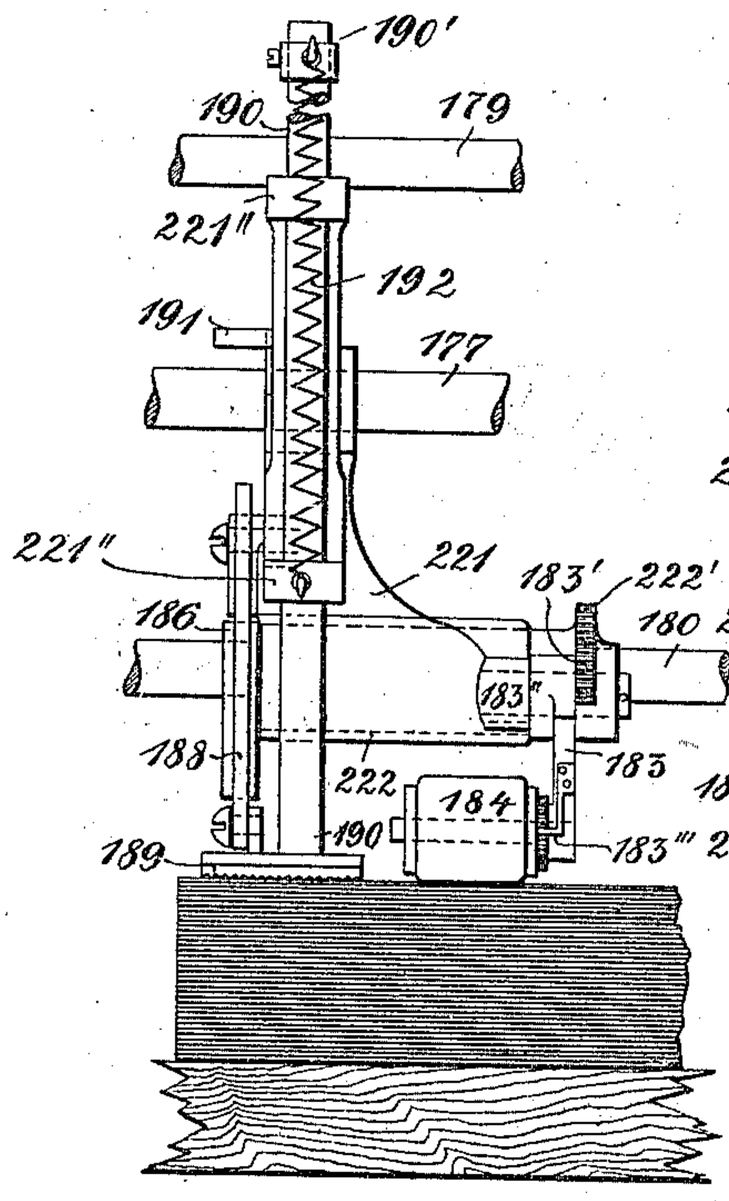
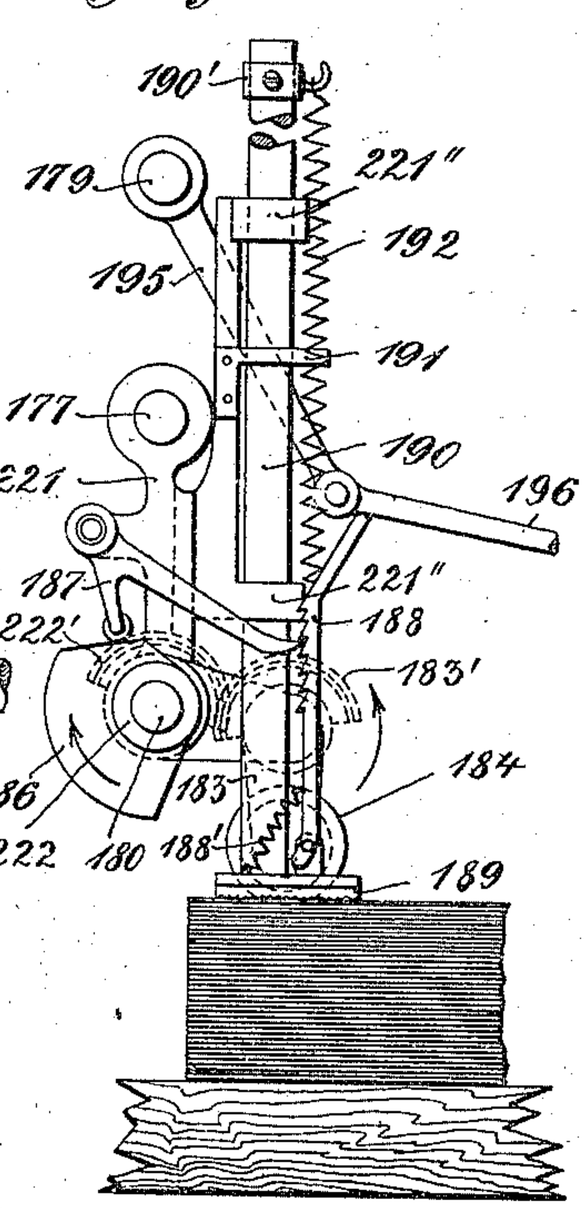


fig. 34d.



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No. 640,991. Patented Jan. 9, 1900.

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SHEET FEEDING MACHINE.

(Application filed Dec. 30, 1897.)

(No Model.) 11 Sheets—Sheet 11.

Fig. 35.

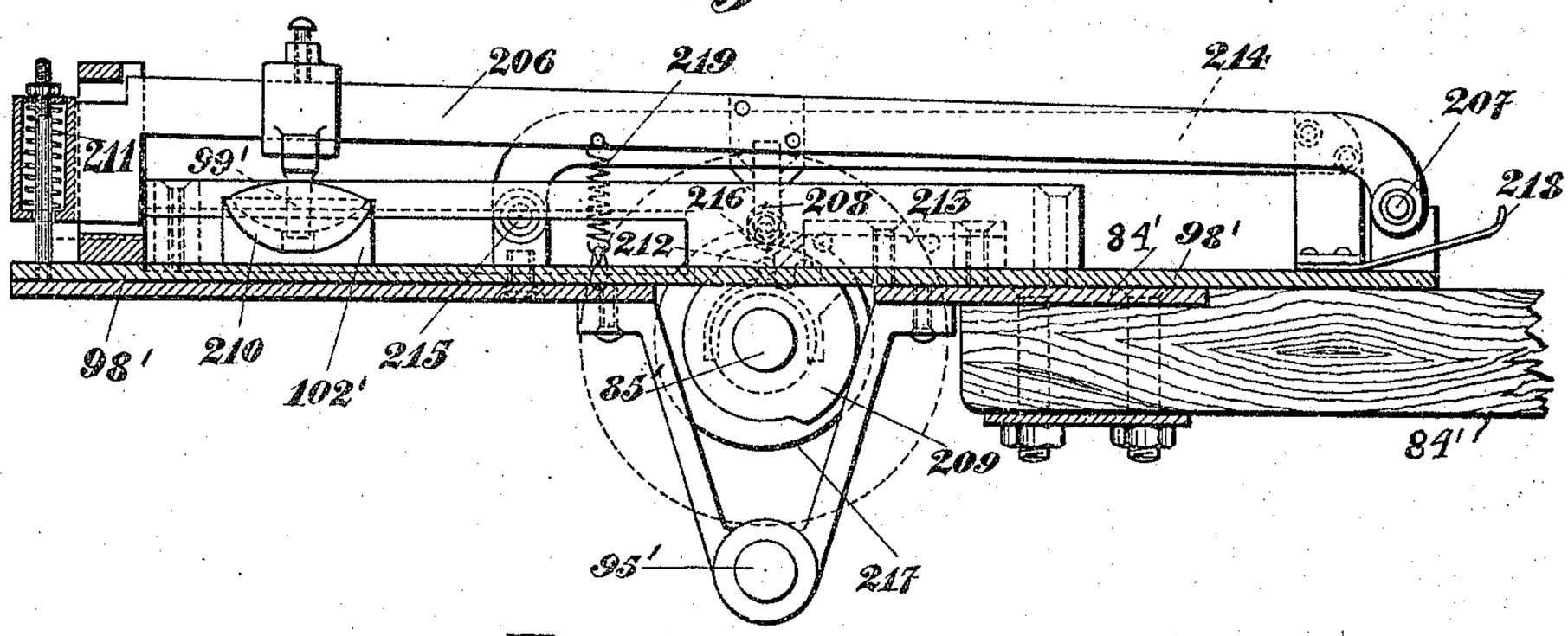

Fig. 36.

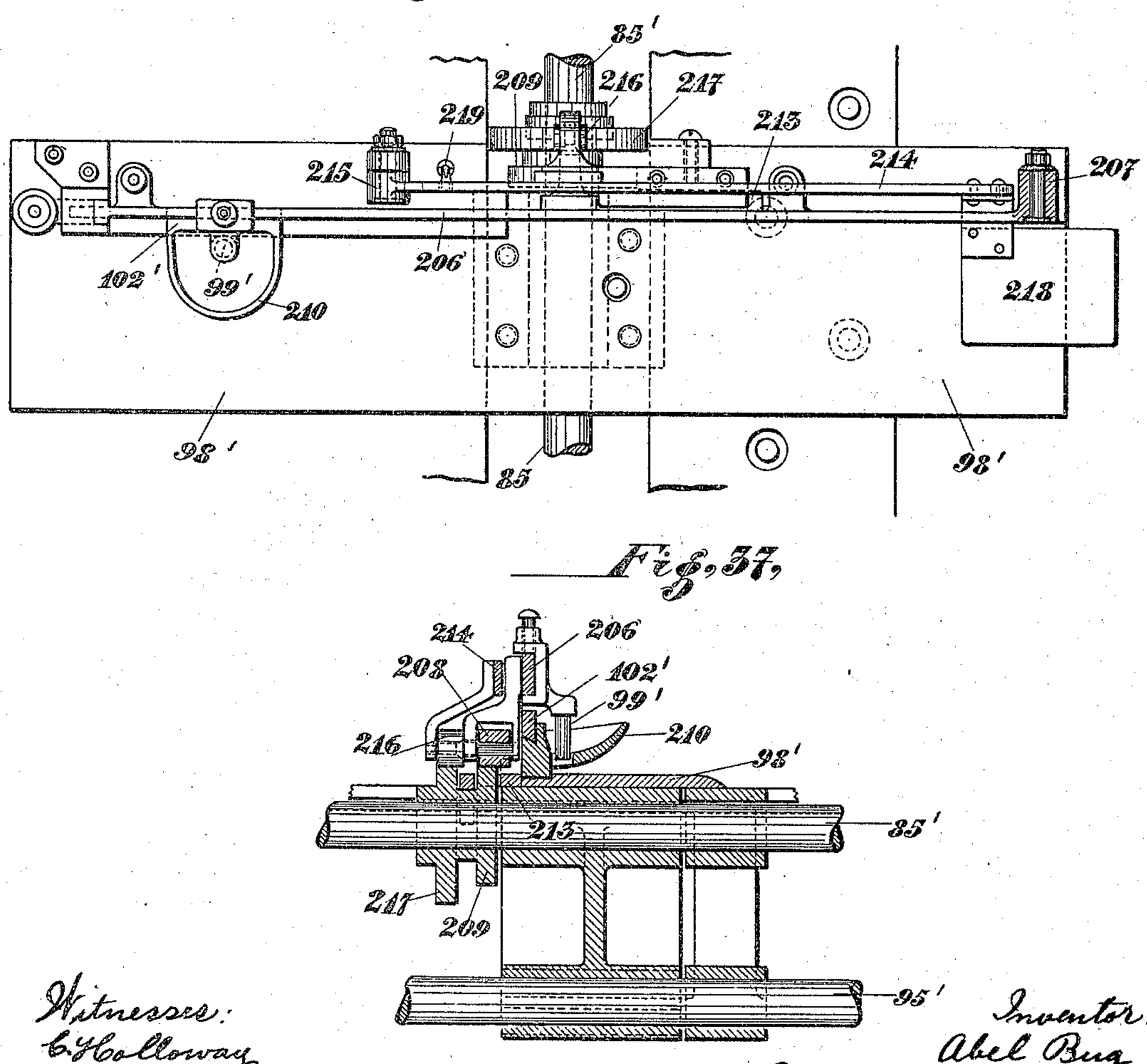

Fig. 37.

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UNITED STATES PATENT OFFICE.

ABEL BUG, OF BERLIN, GERMANY.

SHEET-FEEDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 640,991, dated January 9, 1900.

Application filed December 30, 1897. Serial No. 664,681. (No model.)

To all whom it may concern:

Be it known that I, ABEL BUG, a subject of the Emperor of Russia, residing in Berlin, Germany, have invented certain new and useful Improvements in Automatic Sheet Suppliers and Adjusters for Printing, Paper-Folding, and Similar Machines, of which the following is a specification.

This invention relates to an apparatus which is designed to supply automatically sheets of paper from a pile to a printing, paper-folding, or similar machine. The apparatus belongs to that class of apparatuses in which the sheets of a pile are seized one by one by means of gripping devices, then carried forward, then dropped upon an adjusting-table, and finally adjusted upon the said table before the grippers of the printing-cylinder, the folding-knives, or the like act upon the sheet thus supplied and adjusted.

The invention consists, substantially, in the construction and arrangement illustrated in the accompanying drawings, and more particularly pointed out in the claims.

Figure 1 is a side view of the apparatus. Fig. 1^a is a diagram illustrating the action of the apparatus. Fig. 1^b shows a modified arrangement of the means moving the gripping devices. Fig. 1^c is a view similar to Fig. 1, but showing the parts in the position which they occupy in Fig. 1^a. Fig. 2 is a plan view of Fig. 1, the upper parts of the latter figure being not shown. Fig. 3 is an end view of the apparatus looking to the left-hand side of Fig. 1. Fig. 4 is a cross-section of the spindle moving the gripping devices, of the guide-rods for the grippers, and of adjacent parts. Fig. 5 is a side view of the nut of the spindle and of the slide carrying the grippers, this view being opposite to that shown in Fig. 1. Fig. 6 is an end view of the gearing transmitting the motion of the main shaft to the devices of the adjusting-table. Fig. 7 is a vertical section taken in the direction of the broken line *a a* of Fig. 1 looking from the said line to the right-hand side. Figs. 8 and 9 are respectively side and front views of the devices which lift the uppermost sheet before it is gripped. Fig. 9^a is an end view of the upper parts of Fig. 9 looking from the right-hand side to the left. Figs. 10, 10^a, and 10^b show, respectively, a front view, a plan view, and an end view of the rods carrying the grippers. Fig. 11 is a section and a plan view, of the arm 23 shown in Fig. 9 and carrying the cylinder 25. Figs. 12 and 13 show the slide carrying the gripper-rods and the appertaining devices, the latter being represented in two different positions. Figs. 14 and 15 show, respectively, the grippers closed and opened. Fig. 16 is a plan view of the grippers and of parts carrying the same. Fig. 17 is a plan view of the adjusting-table with its devices. Fig. 18 is an under view of the said table. Fig. 19 is an end view of the said table looking at Fig. 17 from the right-hand side to the left. Fig. 20 is a front view of the parts shown at the right-hand side of Fig. 17. Fig. 21 is a section of the devices adjusting the sheet sidewise. Figs. 22 and 23 are respectively side view and longitudinal section of parts of the device which adjust the sheet upon the adjusting-table in a forward direction. Figs. 24, 24^a, and 25 are respectively side view, plan view, and side view of the parts which move the ledge serving to clamp the sheet of paper. Figs. 26 and 27 are respectively perspective views of the angle-piece displacing the sheet of paper sidewise and of the clamping-ledge sliding upon the vertical leg of the said angle-piece. Fig. 28 is a plan view and a side view of a device serving the purpose to exert pressure upon the clamping-ledge. Fig. 29 is a view similar to Fig. 1, but showing modifications. Fig. 30 is a plan view of Fig. 29. Figs. 31, 32, 33, 34, 34^a, 34^b, 34^c, and 34^d show details, hereinafter referred to more particularly. Figs. 35, 36, and 37 show modified arrangements of the parts adjusting the sheet of paper sidewise.

Referring now to Fig. 1^a, *c* is the pile of paper resting upon a horizontal table *b*. The uppermost sheet of paper *d* is shown lifted by means of sticky rolls 24. This lifted sheet is seized by grippers 50, which do not go downward rectilinear, as heretofore, but move downward in the direction of the upper dotted curve, thus conveying the sheet close to the adjusting-table 84 toward the front stops *e* of the printing-cylinder *f*, whereupon the grippers are opened and let drop the sheet upon the adjusting-table. The dropped sheet is then adjusted, as hereinafter described, before the grippers *g* of the printing-cylinder

seize the said sheet and take it with them. The curved path of the grippers 50 becomes gradually flatter as the height of the pile of paper decreases, so that the said path presents, finally, the form of the under dotted line.

Referring now to Figs. 1 to 28, the construction and action of the apparatus shown are as follows:

1 and 2 (see Fig. 1) are two upright end posts, being secured to one cheek of the frame of the printing-machine and connected near their lower ends by a horizontal beam 3. Near the fore end of this beam (see Figs. 1, 2, and 7) a strap 4 is fixed, in the depending legs of which the driving-shaft 5 is mounted. The said shaft carries a spur-wheel 6, engaging the upper rack of the base-plate of the printing-machine. The shaft 5 transmits its motion by the bevel-wheels 7 and 8 (shown in Fig. 7) to a short vertical shaft 9, mounted in the strap 4 and in the beam 3, and the motion of the said shaft 9 is transmitted by means of the bevel-wheels 10 and 11 to the main shaft 12, being parallel to the beam 3 and mounted in the standards 1 and 2, as shown in Fig. 1. On the main shaft 12, near its left end, a worm 13 is fixed, which engages the rack 14. According to the sense of the rotation of the shaft 12 the said rack is moved forward or backward, taking along with it a wedge 15, which is connected with the said rack 14 by a vertical stay x and can be moved upon the beam 3. As the rack 14 is moved forward the inclined face of the wedge 15 slides under a roll 16, projecting sidewise from a vertical bar 17, being movable up and down. (See also in Fig. 9 the lower part of the left-hand side.) Therefore the bar 17 is raised until the upper horizontal surface of the wedge 15 arrives under the roll 16. In a cross-hole of the bar 17 a sliding pawl 18 is placed, which by means of a spring 19 is pushed into the toothing of a second bar 20, so that this bar 20 partakes of the upward movement of the bar 17. At the upper end of the bar 20, at right angles thereto, a cross-bar 21 is fixed, which extends along the fore edge of the table carrying the pile of paper, and is guided between the legs of a fork 22, secured to the said table. (See Fig. 9^a.) From the cross-bar 21 depend three arms 23, of which both the arms shown at the right-hand side of Fig. 9 bear in their forked ends each a roll 24, lined with a sticky mass, whereas the third arm 23 carries a fluted cylinder 25, of caoutchouc, and is movable a little around the cross-bar 21, the said movement being limited by the pin 21^a and the slot 23^a. (See Fig. 11.) All these arms 23 are inclined toward the back—*i. e.*, toward the pile of paper, as shown in Fig. 9^a—the arm 23, carrying the cylinder 25, being a little more inclined and somewhat longer than the other arms 23. Before both the bars 17 and 20, together with the rod 21, have been raised the sticky rolls 24 and the cylinder 25 rested upon the uppermost sheet of the pile of paper. Therefore the sticky rolls in going upward lifted up the uppermost sheet. This sheet is now seized by grippers, as hereinafter described, which bring it over the adjusting-table of the printing-cylinder and then release it. While the grippers with the seized sheet are removed from the pile of paper, the rod 21, together with the bars 20 and 17, descend, since now the main shaft 12, Fig. 1, rotates in the opposite sense, and the wedge 15 goes back under the roll 16. On the outside of the wedge 15 a second wedge 26, which also engages roll 16, is arranged. This second wedge can be shifted in a slot of the beam 3 and is connected with the fore end of the wedge 15 by a coil-spring 27. As the wedge 15 goes forward the said spring 27 is expanded and the wedge 26 is advanced; but the advancing of the wedge 26 takes place only when the roll 16, by the inclined face of the wedge 15, is raised above the upper face of the wedge 26. The wedge 26 is advanced till it arrives in the position shown in Fig. 8, where its movement is limited by the slot in the beam 3. During the first part of the backward movement of the wedge 15 the wedge 26 remains in the position shown in Fig. 8 and upholds the roll 16, so that the bars 17 and 20 cannot fall down farther. The said bars remain in this position till the rear end of the seized sheet of paper has left the upper table. The instant the stud 28, projecting sidewise from the outside of the wedge 15, strikes against the wedge 26 the latter is also moved backward, and then the bars 17 and 20 fall down from the wedge 26. In falling down a cross-pin 29 of the sliding pawl 18 of the bar 17 (see Fig. 9) strikes against a nose 30, whereby the sliding pawl is disengaged from the toothing of the bar 20. Therefore the bar 20 can drop until the sticky rolls 24 and the caoutchouc or rubber cylinder 25 rest upon the pile of paper. During this descent of the bar 20 the rubber cylinder 25 pushes the uppermost sheet of paper a little backward in order to loosen it from the sheet below it, thus preventing later on several sheets from being lifted up simultaneously. The bar 20 falls down at last independently of the bar 17, and consequently the sticky rolls descend more and more as the height of the pile of paper decreases. Therefore the sliding pawl 18 of the bar 17 during its upward stroke engages another tooth of the bar 20 when some sheets have been taken away. The sheet being lifted up by the sticky rolls is carried toward the front stops of the pressing-cylinder in the following manner:

On the fore end of the main shaft 12 (see Fig. 1) a sprocket-wheel 31 is fixed, which is connected with a higher-placed sprocket-wheel 32 by a pitch-chain 33. The shaft of the sprocket-wheel 32 is coupled by a universal joint 34 with the fore end of a screw-spindle 35, ascending backward in an inclined direction. The said spindle 35 is journaled

in bearings of a rail 36, through a cross-hole of the fore end of which a bolt 37 passes, (see Fig. 7,) which is connected with an arm of the standard 2. Thus the said rail is pivoted to the said arm. From the back end of the rail 36 depends a bracket 38, which rests with a shoulder upon the standard 1 and the lower flat part of which engages a groove in the said standard. By reason of this arrangement the rail 36, together with the spindle 35, can be raised at the rear. The said spindle has a nut 39, the under even face of which lies on the rail 36, so that the said nut can be moved only rectilinear when the spindle is rotated. Above the spindle two parallel guide-rods 40 are arranged, (see Figs. 4 and 1,) which extend in the direction of the spindle and the ends of which are fixed in brackets of the rail 36. On these rods 40 a slide 41 is placed, which carries the grippers. When the nut 39 is moved toward the pile of paper, then the slide 41 is taken with it by a spring-pressed hook 42 (see Fig. 5) being fixed upon that side of the nut 39 which is turned to the adjusting-table. At right angles to the guide-rods 40 two rods 43 and 44 extend from the slide 41 above the adjusting-table. (See Figs. 1 and 10.) These rods, of which the rod 43 is situated below the rod 44, are carried at their left ends (see Figs. 10, 10[a], and 10[b]) in projecting eyes 45 of a plate 46, fixed upon the slide, and are further supported in eyes 47 and 48 of a long bracket 49, extending parallel to the rods 43 and 44 and being fixed upon the plate 46. The said rods are provided with grippers 50, the upper jaws of which are connected adjustably to the upper rod 44, while the lower jaws are connected adjustably to the lower rod 43. (See also Figs. 14, 15, and 16.) Upon each guide-rod a coil-spring 51 (see Fig. 10) is placed, acting in such a manner that the said rods are turned in opposite directions, thus closing the jaws of the grippers. In order to remove the upper jaws from the lower ones—*i. e.*, to open the grippers—the upper rod 44 is provided with an arm 52. (See Figs. 12 and 13.) When the rod 44 is turned by the hand of the workman against the action of its coil-spring 51 (see Fig. 10) till the arm 52 occupies the position shown in Fig. 12, then a plate-spring 53, projecting from the slide-plate 46 and being provided with a stud 54, moves outward and brings its stud behind the arm 53. Now the nut 39, together with the opened grippers, moves backward and upward. (See Fig. 1.) As soon as the grippers arrive at the pile of paper the fore edge of the lifted sheet enters between the jaws of the grippers, and then by a stop 55 of the lifting-bar 20 the plate-spring 53 is pushed inwardly, so that its stud 54 releases the arm 52, whereupon the upper jaws snap down against the lower ones and clamp the sheet of paper *d*, as shown in Fig. 1[c]. The spindle 35 is now rotated in the opposite sense. Hence the nut 39 goes forward and downward and conveys the seized sheet of paper toward the front stops of the printing-cylinder. In doing so the grippers, together with their guide, are lowered, so that the sheet is brought as near as possible over the adjusting-table, as explained above with reference to Fig. 1[a]. The said lowering and the previous raising of the grippers are effected in the following manner:

The left end of the main shaft 12 is provided with a worm 65. (See Fig. 1.) The said worm engages a worm-wheel 66, from the back of which a small roll 67 projects. (See also Fig. 3.) The said wheel makes one full revolution in one sense during the upward travel of the grippers and an opposite revotion during the downward travel of the grippers. When the wheel 66 has made half a revolution during the upward travel of the grippers, then in the further rotation of the wheel 66 the roll 67 of the latter enters (in Fig. 3 from the left-hand side to the right-hand side) between two horizontal rails 68, being rounded off at one end (see Fig. 3, left-hand side) and being fixed to a slide 69, which is movable up and down in a suitable guide of an arm 70 of the standard 1. Hence the said slide is raised by the roll 67 as the wheel 66 rotates in the corresponding sense. To the slide 69 a vertical bar 71 is connected, which partakes of the movement of the said slide. The stroke of the slide and its bar is ever the same. In the upper end of the bar 71 a sliding pawl 72 is placed, (see Fig. 8,) and this pawl engages the toothing of a vertical bar 73, being movable up and down and being raised when the bar 71 is raised. The lowest position of the bar 73 depends upon the lowest position of the bar 20, as hereinafter explained. When the bar 73 is raised, as indicated in Fig. 1 in dotted lines, then it strikes with an arm *w* (see Fig. 3) against the rail 36, carrying the spindle 35, and raises the back end of the said rail, as shown in Fig. 1[c]. At the same time the bar 20, carrying the lifting-rod 21, is raised, and consequently the uppermost sheet of paper is lifted from the pile of paper. By the said raising of the back end of the spindle 35 the grippers arrive in front of the fore edge of the lifted sheet when they terminate their upward travel, whereupon the lifted sheet is seized by the grippers and conveyed toward the front stops of the printing-cylinder. During the downward travel of the grippers the lifting-bar 20 and the bars 73 and 71 descend. The lifting-bar descends soon after the grippers have seized the sheet of paper, and independently of this descent the gripper-guide is lowered at the same time at the rear end by its own weight or by an auxiliary load till the shoulder of the bracket 38 rests upon the standard 1. The gripper-guide is then parallel to the inclined adjusting-table. Thus the air-space between the sheet of paper and the adjusting-table is diminished to such a degree that as soon as the sheet is released from the grippers it pushes off quickly the flat layer of air

below it, whereby a rapid working is insured, and notwithstanding the sheets supplied are prevented from bulging, crumpling, and rolling up, as is the case in the old apparatus, where the sheets had to push off a great wedge-like layer of air. When the bar 71, which causes the raising of the gripper-guide, is near the end of its downward motion, then a nose 74, placed on the arm 70 of the standard 1, (see Fig. 1,) pushes the sliding pawl 72 back, so that the bar 73 is released from the said pawl. The said bar 73 was caught somewhat sooner, as its second arm 72, fixed to its upper end, struck against the adjustable arm 76 of the lifting-bar 20. As above described, the lifting-bar descends the more the less the height of the pile of paper becomes, so that the bar 73 falls down correspondingly farther. Hence the bar 73 is removed more and more from the rear of the rail 36, carrying the spindle 35, so that (see Fig. 8) the sliding pawl 72 of the bar 71, when the latter goes upward, engages by little and little with other teeth of the bar 73. Thus the rear end of the spindle 35 is raised less and less, so that the curve of the path of the grippers becomes gradually flatter, as will be seen from Fig. 1[a]. Consequently the length of the path which the grippers shall have to make becomes gradually shorter, and for that reason the grippers cannot be allowed to follow the whole travel of the spindle-nut 39. To this end the following arrangement is made:

As above explained with reference to Fig. 5, the slide 41, carrying the grippers, follows the upward travel of the spindle-nut 39 by means of a spring-pressed hook 42 being connected with the said nut. When the spindle-nut 39 is near the end of its upward travel, then an arm 77 of the hook 42 slides upon a roll 78 of the rail 36 and releases the hook 42 from the slide 41. Now the spindle-nut goes farther upward, whereas the released slide is pushed farther by a spiral spring 79, (see Fig. 1,) which is fixed to the lower part of the spindle-nut 39 and the free end of which presses against a pin 80 of the slide 41, the said movement being limited by a stop-plate 82, (see Fig. 1[c],) fixed to the lifting-bar 20, and against which a little roller 81 of the slide 41 strikes. In its downward and forward movement the spindle-nut 39 takes with it the gripper-slide 41 by means of a hook 83, fixed to the outside of the said nut. (See Fig. 1.) A short time before the end of this downward travel an arm 56, fixed to the lower gripper-rod 43, strikes against a projection of the standard 2. Thus the lower gripper-rod, which till now remained in its position by its stud *y* lying against the plate 46, (see Fig. 12,) is turned against the action of its coil-spring, and consequently the lower jaws are removed from the upper ones. During this motion of the lower gripper-rod a tooth 57 (see Fig. 12) fixed to the said rod takes with it a tooth 58 of the upper gripper-rod, so that both the jaws of the grippers come into the position shown in Fig. 15 and let drop upon the adjusting-table the sheet which they had conveyed along with them. In order to prevent the sheet sliding forward upon the inclined adjusting-table to rise upon the lower gripper-jaws, each lower jaw is provided with a wire fork 59. (See Fig. 16.) By the rotation of the upper gripper-rod 44, effected by the teeth 57 58, the arm 52 of the said rod is moved forward till the spring-stud 54 snaps behind the arm 52. In order to prevent the gripper-rods to oscillate while they travel together with the slide upward or downward, a roll 60, supported by the bracket 49, (see Fig. 10,) runs upon a guide-rail 61, (see Fig. 4,) extending parallel to the guide-rods 40 of the slide 41 and being connected with the rail 36, carrying the spindle 35, by curved arms 62. Moreover, an arm 63 depending from the outside of the slide 41 carries two rolls 64, which take the rail 36 between them.

Instead of reaching only to the middle of the adjusting-table the gripper-rods may extend entirely across the said table and be carried also at the other side of the table.

It may be mentioned that the gripper-slide is provided with a grease-box *z*, (see Figs. 1, 10[a], and 13,) having three wick-tubes, which supply oil to the gripper-guides 40 and to the spindle 35. Further, it may be remarked that it is not necessary to arrange the spindle 35, moving the grippers, below the gripper-guides, for the said spindle may be mounted in a horizontal position along one side of the table supporting the pile of paper and may be connected with the gripper-slide by a rod 132, as shown in Fig. 1[b]. In this case the spindle is moved by sprocket-wheels, which are arranged at the left end of the main shaft 12 in lieu of being at the right end, as shown in Fig. 1. If it should be deemed necessary to arrange a gripper-guide at each side of the machine, then two spindles are to be mounted, each at one side, and the sheet conveyed till the front stop of the printing-cylinder is released from the grippers, as above explained, after the arm 56 of the lower gripper-guide 43 has stricken against the projection of the standard 2. (See Fig. 1.) The released sheet falls now upon the adjusting-table. (See Figs. 17, 18, and 19.) The said table is provided with the devices which adjust the dropped sheet and are constructed as follows:

Across the table 84 a shaft 85 extends, upon the left end of which (see Fig. 17) a bevel-wheel 86 is mounted, the latter being rotated by the gear 87 from the main shaft 12, as shown in Figs. 1, 2, and 6. Upon the other end of the shaft 85 (see Fig. 17) a disk 88 is mounted, which carries on each face a wing 89. The free end of each wing is acted upon by a coil-spring 90 (see Fig. 20) being put upon a guide-bolt 91, which is fixed to the said disk, the said spring tending to press the wing against the head of the said bolt. When the shaft 85 rotates in the direction of the arrow shown in Fig. 19, then the outer wing 89

(see Fig. 20) works against the roll 92 of a bar 93, (see Fig. 18, right-hand side,) the said bar extending below the shaft 85. Thus this bar is moved inward. It is connected with one arm of a double-armed lever 94, mounted rotatably in the middle of the table, and the other arm of which is connected with another bar 95, equal to the bar 93. According to this arrangement the bar 95 is drawn inward when the bar 93 is pushed inward. To each of these bars a forked piece 96 is fixed adjustably, (see Fig. 21,) and each of the said pieces is connected with a sleeve 97, being put upon the shaft 85 and carrying an angle-piece 98. (See Fig. 17.) Between these angle-pieces the sheet to be adjusted is brought in the following manner: On the middle part of the table 84, above the said angle-pieces 98, a plate 120 is provided, which is shown in full lines in Fig. 17. This plate is connected adjustably with a bar 121, which, being arranged in a slot 122 in the table 84, is movable to and fro and receives its motion from the bars 93 95, situated below the shaft 85, by two rods 123, which are connected at one end with the bars 93 95 and at the other end with a sleeve 124, (see Figs. 22 and 23,) containing a sliding bolt 125. This bolt is provided with a cross-pin 126, which projects through slots of the sleeve 124 and is pressed against an upper collar 128 of the said sleeve 124 by a coil-spring 127, surrounding the said sleeve. The upper end of the bolt 125 is in contact sidewise with a depending projection 129 of the bar 121, so that the latter is pushed in the direction of the arrow when the rods 123 are moved toward one another, as is the case when the bars 93 95 go inward. During this motion of the bar 121 a fixed inclined plane 130 (see Fig. 22) acts upon the cross-pin 126 of the bolt 125 and causes the latter to descend till it is no more in contact with the projection 129 of the bar 121. The bar 121, together with its plate 120, is then stopped, the sheet of paper previously dropped upon the said plate being now in contact with the front stops of the printing-cylinder and between the angle-pieces 98. The sheet of paper lying upon the plate 120 is only held by the friction existing between the sheet and the plate. Hence the sheet is free to move in all directions, so that it adjusts itself exactly to the front stops of the printing-cylinder during the forward movement of the plate. As the outer wing 89 of the disk 88 pushes the bars 93 95 still inward (see Fig. 17) the angle-pieces 98 go farther against one another till the distance between the vertical legs of the angle-pieces 98 is a little smaller than the width of the sheet. Therefore the sheet is somewhat curved—*i. e.*, bulged—and thus its side edges are brought close to the vertical legs of the angle-pieces 98. The degree of the bulging of the sheet is so little that if the side edges of the sheet are not exactly at right angles to its front edge, as is always the case, only one point of one and only one point of the other side edge will be brought in contact with the vertical leg of the adjacent angle-piece, whereby a removal of the fore edge of the sheet from the front stops is prevented. Now the side edges of the sheet of paper are clamped against the horizontal legs of the angle-pieces by ledges 99, (see Fig. 21,) the under side of which is lined with rubber, and which are movably mounted to the inside of the vertical legs of the angle-pieces. An inclined plane 100, formed on the outside of the disk 88, (see Figs. 17, 19, and 20,) acts then against the roll 92 of the bar 93 and causes both the bars 93 95 to move a little outward. Consequently the angle-pieces 98 are removed from one another a little distance, so that the sheet clamped in is stretched. During the further rotation of the disk 88 the angle-pieces 98 remain stationary, whereas the clamping-ledges arise and release the sheet of paper, which during the inverse rotation of the shaft 85, now effected, is seized and drawn away by the grippers of the printing-cylinder. During the inverse rotation of the shaft 85 the inner wing 89 of the disk 88 acts against a second roll 101 of the bar 93, (see Fig. 20,) so that the bars 93 and 95 are pushed outward, thus removing the angle-pieces from one another in order to allow the next sheet of paper to come between them. During the last part of the outward movement of the angle-pieces and the straddling of the rods 123 (see Fig. 18) a projection 131 of the collar 128 of the sleeve 124 (see Fig. 22) moves the bar 121, together with its plate 120, in the initial positions.

As above mentioned, the clamping-ledges must be raised and lowered at the proper times. These movements are effected as follows: The vertical leg 102 of the angle-piece 98 (see Fig. 26) has two recesses 103, so that at each end of the said leg a flap 104 is formed. On these flaps the clamping-ledge 99, being in contact with the inside of the leg 102, (see Fig. 21,) is guided by means of its angular lugs 105. (Shown in Fig. 27.) From the middle part of the leg 102 two bolts 106 project outwardly, (see Figs. 17 and 21,) upon the square part of which two vertical plates 107 and 108 are put, the upper edges of which are indulated, as shown in Figs. 24, 24ª, and 25. The said plates 107 and 108 are provided at the places where the bolts pass through them with longitudinal slots in order to allow the plates to be displaced in their longitudinal direction. The lower edge of the plate 107 is toothed, and in this toothing a spur-wheel 109 engages, (see Fig. 21,) partaking of the rotation of the shaft 85, as well as of the motion of the angle-pieces 98. When the angle-pieces 98 are moved toward one another, then the rotating wheel 109 displaces the plate 107 into the position shown in Fig. 24. In doing so both the rolls 110, projecting sidewise from the clamping-ledge 99, (see Figs. 17, 21, and 27,) descend into the bottoms of the waves of the plates 107 and 108,

(see Fig. 24,) whereby the clamping-ledges 99 are lowered. This lowering is assisted by two pressing-fingers 111, (see Figs. 17 and 19,) working upon the upper corners of the clamping-ledge. One of these pressing-fingers is shown in Fig. 28. It has its fulcrum 112 in one of the flaps 104 of the leg 102, (see Fig. 26,) and its outer arm 113 is acted upon by a coil-spring 114 being put on a bolt 115, which is screwed into an outer flap of the horizontal leg of the angle-piece 98. (See Fig. 26.) The pressure of the pressing-fingers is regulated by turning a nut screwed upon the upper end of the bolt 115, so that one clamping-ledge exerts more pressure upon the sheet of paper than the other ledge. When the angle-pieces 98 after having been moved inward are moved a little from one another in order to stretch the sheet, then the angle-piece, the clamping-ledge of which clamps the sheet faster or stronger, takes the sheet with it, thus bringing the middle of the sheet exactly in accordance with the middle of the printing-cylinder. When the other side of the same sheet of paper is to be printed upon, then the pressing-fingers are to be regulated inversely, so that the other clamping-ledge exerts more pressure than the first one. Hence the same edge of the sheet is pressed faster, whereby the said middles are brought again in accordance with one another. The clamping-ledges having been lowered by the inward motion of the angle-pieces 98 and having then stretched the clamped sheet during the first part of the outward motion of the angle-pieces 98, the further rotation of the shaft 85 effects that the toothed plate 107 is displaced in the direction of the arrow shown in Fig. 24ª, taking with it by its hook 116 the plate 108. In doing so the tops of the waves of the plate 108 (see Fig. 25) are brought under the rolls 110 of the clamping-ledge 99, thus raising the latter. This ledge 99 remains in the raised position, when the plate 107 is displaced in the opposite sense, as the other hook 117 of the toothed plate 107 takes with it the supporting-plate 108 only then, when the tops of the waves of the toothed plate are arrived under the rolls 110 of the clamping-ledge.

In order to convey the side edges of the sheet exactly under the raised clamping-ledges 99 when the plate 120 is moved forward and the angle-pieces 98 are moved toward one another, from each clamping-ledge 99 at its side turned to the middle of the table a tube 118 is suspended in such a manner that it is a little movable in a vertical plane. The rear (in Fig. 17 the upper) end of the tubes 118 is bent upward in order to facilitate the sliding in of the sheet of paper.

Referring now to Figs. 29 to 37, in the modified construction shown the main shaft 12′ (see Fig. 29) receives its motion from a roller of the inking apparatus. On the shaft 12′ is mounted a worm 13′, (see Figs. 34ª and 34ᵇ,) engaging a worm-wheel 13″, which is mounted upon the cross-shaft 133. This shaft is provided with an eccentric 15′ and a movable angle-lever 26′. With the eccentric 15′ the roll 16′ of the vertical bar 17′ is in contact. When the eccentric 15′ rotates in the direction of the arrow, then the bar 17′ is raised. In doing so (see Fig. 29) the arm 29′ of the sliding pawl 18′ of the said bar slides along the inclined plane 30′ of a rigid arm in an upward direction, and the said pawl being acted upon by the spring 19′ engages the toothing of the bar 20′, whereupon this bar is raised too. In the upper part of the bar 20′ a second toothing 134 is formed, into which a spur-wheel 135 engages. The wheel 135 is fixed upon a cross-shaft extending below the table *b′* and having on its other end a wheel equal to the wheel 135. The said second wheel engages another bar 20′, mounted at the other side of the table. The upper ends of both the bars 20′ are connected to a cross-rod 21′, from the middle part of which a rigid arm 136 depends, terminating in a foot-plate 137. This foot-plate rests upon the pile of paper *c′* as long as the bars 20′ remain in the position shown in Fig. 29. The bars 17′ 20′ 21′ are raised by the eccentric 15′ till the roll 16′ of the bar 17′ is upon the end face of the nose 138 of the eccentric 15′. (See also Figs. 34ª and 34ᵇ.) Then the angle-lever 26′ is partly rotated by the action of a spring 27′ (one end of which is connected with the lower arm of the lever 26′ and the other end with a stationary pillar 27″) till the lower arm of the said lever strikes against a stop 26″. Then the upper arm of the lever 26′ is arrived at under the corresponding large roll 16′, so that the bar 20′ cannot fall down when the eccentric 15′ is rotated backward and its nose 138 is removed from the roll 16′. During this time the uppermost sheet of the pile *c′* is pushed forward below the raised foot-plate 137, seized by the grippers, and carried toward the front stops of the printing-cylinder. As soon as the sheet has left the table *b′* a pin 28′ of the nose 138 of the eccentric 15′ (which pin 28′ cannot act upon the upper arm of the lever 26′, as the said upper arm has a suitable recess 26‴) strikes against the lower arm of the angle-lever 26′, thus removing the upper arm of the said angle-lever from the roll 16′, whereupon the bars 20′ and 17′ fall down. The bar 17′ descends till its roll 16′ comes into contact with the eccentric 15′. (See Fig. 29.) Then the sliding pawl 18′ is drawn back by the inclined plane 30′. Hence the bar 20′ descends farther till the foot-plate 137 rests upon the pile of paper *c′*. In this construction two spindles 35′, moving the grippers, are arranged one at each side of the apparatus, as shown in Fig. 30. Both the spindles are mounted in the frame of the machine, so that they can only be rotated. Movement is imparted to them by the bevel-wheel 65′, fixed to the left end of the main shaft 12′, as shown in Fig. 29. The wheel 65′ engages the bevel-wheel 66′ of a vertical spindle 139, the upper bevel-wheel 140 of which rotates the bevel-

wheel 141 of a cross-shaft 142, extending below the table *b'* toward the opposite side of the apparatus. A bevel-wheel 143, fixed to the upper end of the spindle 35', (being visible in Fig. 29,) engages also the bevel-wheel 141, whereas, as shown in Fig. 30, the other spindle 35' receives its motion from the bevel-wheel 144, being mounted on the other end of the cross-shaft 142 and engaging the bevel-wheel 145 of the said other spindle 35'. Above each spindle 35' a guide-rod 40' for the grippers is arranged. The fore end of each guide-rod 40' is pivoted at 37', as shown in Fig. 29, right-hand side, and the slide 41' of the said guide-rod is connected with the spindle-nut 39' by a rod 146 being hinged sidewise to the said slide and sliding in a sleeve 147 of the spindle-nut 39' in order to allow the transmission of the motion of the nut to the slide when the guide-rod 40' oscillates around its pivot 37'. The guide-rods 40', together with the grippers carried by them, are raised and lowered in the following manner: The vertical spindle 139 displaces by its rotation a nut 148, being provided with a sliding pawl 72'. This pawl slides on one side, with two pins 149 in horizontal holes of the nut 148 and bears on the other side with two rolls 150 against two upright guide-rails 70', as shown in Figs. 31 and 29. The upper ends of these rails are sloped at 74', so that when the rolls 150 run upon the sloped parts 74' the sliding pawl 72' is pushed by a spring 151 into the toothing of a bar 73', to the upper end of which, at the left-hand side in Fig. 29, a sliding block 152 is fixed, which engages a grooved vertical guide 153. In the farther ascent of the nut 148 the bar 73' is raised too, and after having passed a certain distance the said bar 73' strikes against a rear arm 38' of the gripper guide-rod 40', which is visible in Fig. 29. The said arm 38' passes rearward between two rolls 154, mounted on a slide 155, which engages another groove of the guide 153. The slide 155 is provided with a toothing 156, in which a spur-wheel 157 engages. The latter is fixed to a cross-shaft 158, extending below the table *b'* and having at its opposite end an equal spur-wheel 159, (see Fig. 30,) which moves a slide 160 equal to the slide 155 and acting upon the arm 38' of the opposite guide-rod 40'. When the guide-rods 40', together with the grippers, are raised, then the grippers seize the uppermost sheet of paper and convey it downward and forward. In this downward travel, which is effected by the inverse rotation of the main shaft 12',-the nut 148 descends upon the vertical spindle 139, so that the bar 73', the arms 38', and the guide-rods 40' go down by their own weight. As soon as the guide-rods 40' come into the position shown in Fig. 29 the arms 38' are arrested by a projection of the guide 153, while the bar 73' descends still farther. Now the rolls 150 of the sliding pawl 72' run again upon the sloped parts 74' of the rails 70', thus being pressed sidewise to the right-hand side, so that the sliding pawl 72' is disengaged from the toothing of the bar 73' and the latter is released, falling down till its lower arm 75' is upheld by the lower arm 76' of the bar 20'. Hence the amount of the free descent of the bar 73' varies with the position of the bar 20', which in its turn depends upon and varies with the height of the pile of paper *c'*. When the bars 20', together with their connecting-rod 21' and the foot-plate 137, arise, then the uppermost sheet is pushed forward below the raised plate 137 in the following manner: On the shaft 142, imparting motion to the spindles 35', a worm 161 is mounted, (see Fig. 34,) engaging a worm-wheel 162 of a horizontal shaft 163, extending along one side of the table *b'*, as shown in Fig. 30. The shaft 163 transmits its motion at the left-hand side in Figs. 29 and 32 by means of bevel-wheels 165 166 to a vertical shaft 167, behind which, somewhat sidewise, (forward,) a rigid guide-rod 168 and a rigid rack 169 are arranged. Upon the shaft 167 and the rod 168 slides a double sleeve 170, from which, before the rod 168, a rack 171 depends, reaching still below the shaft 163. Upon the horizontal shaft 163 being grooved lengthwise a sleeve is mounted, having a feather engaging the groove of the said shaft and carrying the bevel-wheel 165. The fore end of the said sleeve is provided with a fork 172, as shown in Figs. 32 and 33. In the free ends of the legs of the said fork a pawl 173 is pivoted, which in the position shown in Fig. 33 reposes with a lower nose 174 on a rigid projection 175. All the parts 165 to 175 are connected with the rear angle-piece 220, being adjustable according to the size of the sheets of paper to be printed upon and being fixed in the desired position by means of suitable screws. When the shaft 163 rotates in the direction of the arrow shown in Fig. 33, then the nose 174 of the pawl 173 is removed from the projection 175 and the pawl is pushed by means of a spring 176 into the rack 171, so that in the further rotation of the shaft 163 the rack 171 is raised, taking with it the double sleeve 170. In this sleeve one end of a shaft 177 (see Fig. 29) is mounted, extending at the rear of the table *b'* across the same. The opposite end of the said shaft is mounted at the other side of the table in another double sleeve 170, (see Fig. 30,) guided in the same manner as the first sleeve 170. To the shaft 177 two spur-wheels 178 are fixed, one of which engages the rack 169 and the other an equal rack at the opposite side of the table. During the upward motion of the sleeve 170 (shown in Fig. 29) the spur-wheels 178, engaging the rigid racks 169, are rotated, thus raising also the sleeve 170 at the opposite side of the table. In order to make the drawings more easily intelligible, the part which in Fig. 29 is concealed by the sleeve 170 is illustrated apart at the right-hand side of the rack 169. The said part is also shown in a greater scale in Figs. 34^c and 34^d, Fig. 34^c being a front view and Fig.

34[d] a side view. Above and below the shaft 177 two other shafts 179 and 180 are arranged, being also mounted in the said sleeves 170. The shaft 180 is rocked by the bevel-wheels 181 and 182. (Shown in Fig. 29 at the left-hand side.) The wheel 182 is mounted in the sleeve 170 and engages with a feather a longitudinal groove of the vertical shaft 167. Hence during the rocking motion of the shaft 167 the horizontal shaft 180 is also rocked in spite of its up-and-down motion with the double sleeve 170. Both the shafts 177 and 180 pass near each end through a block 221, (see Figs. 34[c] and 34[d],) being adjustable upon the said shafts according to the size of the pile of paper and carrying a sleeve 222, which surrounds the shaft 180 and engages, with a feather, a longitudinal groove of the said shaft, so that the said sleeve partakes of the rocking motion of the shaft 180. On the sleeve 222, at one end, a toothed segment 222′ is fixed, (shown in dotted lines in Fig. 34[d],) engaging the toothed segment 183′ of a lever 183, which is fulcrumed at 183″ (see Fig. 34[c]) in the block 221 and terminates in a sticky roll 184. Thus by the oscillation by the shaft 180 in one sense the sticky rolls 184 at both sides of the table *b*′ are swung forward and lift up the rear end of the uppermost sheet of paper. In the forward springing motion of the levers 183 the rolls 184 cannot turn on their axis, as they are hindered by a lateral pawl 183‴. During this oscillation of the shaft 180 a cam 186, fixed to the other end of the sleeve 222, acts upon a roll of the shorter arm of an angle-lever 187, having its fulcrum in the block 221 and engaging with its longer arm the toothing of a pawl 188, which is hinged to a foot 189 resting upon the uppermost sheet of the pile, and being fixed to a vertical bar 190, which is guided in lugs 221″ of the block 221. Thus the angle-lever 187 raises the pawl 188, together with the foot 189 and its bar 190, till the pawl strikes against a stop 191 of the block 221 and against the action of its spring 188′ is released from the angle-lever 187. Then the foot 189 falls down, touching the sheet, which is lifted by the sticky rolls, and stripping off a second sheet, if such a one should have been lifted too. The free descent of the foot 189 is aided by a spring 192, one end of which is connected with a collar 190′, adjustably fixed to the upper end of the bar 190, while the other end is connected to the lower lug 221″ of the block 221. Now the sheet being lifted up at the rear is pushed forward in the following manner: The shaft 179, mounted in the double sleeves 170 and situated above the shaft 177, carries on its end, which is visible in Fig. 29 at the left-hand side and also in Fig. 30, a curved arm 193, terminating in a roll which bears upon a conical cam 194, being rotatably mounted in the sleeve 170 and rocked by the vertical shaft 167. By the action of the cam 194 upon the roll of the arm 193 the shaft 179 is rocked, carrying two adjustable arms 195, each of which is connected by an adjustable rod 196 with a slide 197. Each of these slides is put upon a rod 198, and both the rods 198 are adjustably connected with the cross-bar 21′, carrying the foot-plate 137. At the fore end each slide 197 is provided on its top with a fork 199, and between both these forks a flat bar 200 is placed edgewise, carrying two adjustable rolls 201, resting upon the uppermost sheet of the pile of paper. The bar 200 has within the forks 199, toward their bottoms, so much play that during the first part of the ascent of the cross-bar 21′ the said bar 200 is not yet raised. Hence its rolls 201 remain in contact with the uppermost sheet of paper. At this time, the foot-plate 137 being a little raised, the slides 197 and the bar 200, together with its rolls 201, are pushed forward, and the said rolls take with it the uppermost sheet, so that the fore edge of the latter projects from the pile. Then in the further ascent of the cross-bar 21′ the forks 199 lift up the roll-bar 200, while the grippers seize the displaced sheet and convey it downward. As soon as the seized sheet leaves the upper table *b*′ all the rolls acting upon the top of the pile of paper return in its initial positions. The sheet conveyed forward is then, as above explained, released and falls upon the adjusting-table, the modified construction of which (shown in the Figs. 35, 36, and 37) will now be described. On one end of the shaft 85′, extending across the table 84′, a spur-wheel (not shown) is mounted, with which a rack engages, forming one piece with the rod 202. (Shown in Fig. 34.) This rod is jointed with the lever 203, the bevel-wheel segment 204 of which gears with the bevel-wheel 205, mounted on the shaft 163, moving the rear sheet-lifting device. (See Fig. 29.) The other end of the shaft 85′ carries a disk similar to the disk 88 (shown in Fig. 17) at the right-hand side and which acts upon bars similar to the bars 93 95 (shown in Fig. 18) and situated below the shaft 85′. In Figs. 35 and 37 only the bar 95′ is visible. In lieu of the clamping-ledge 99 in Fig. 21 a pin 99′ is provided, being adjustably fixed to a lever 206, having its fulcrum 207 in the angle-piece 98′ and resting with a roll 208 upon a cam 209, which partakes of the rotation of the shaft 85′ and of the displacement of the angle-piece 98′. When the cam 209 in its rotation has reached the position shown in Fig. 35, then the roll 208 rests upon that part of the cam 209 the diameter of which is the greatest, the lever 206, together with its clamping-pin 99′, being then lifted. The said pin is guided in a hole of a shell or cup like projection 210 of the vertical leg 102′ of the angle-piece 98′. The said shell turning its convex side downward serves the purpose to lead the side edges of the sheet of paper exactly below the lifted clamping-pins. The free end of the lever 206 is acted upon by a coil-spring 211, pressing downward the said lever, together with its pin, when that part of the cam 209 the diameter

of which is the smallest, is arrived at under the roll 208. Then the sheet of paper is clamped by both the pins 99′. The springs acting upon the lever 206 are adjusted in the same manner as above described with reference to Fig. 28 for the pressing-fingers 111—that is to say, so that the clamping-pin acts with more force than the other. In order to hold each clamping-pin in the lifted position as long as it is required, a crank-pin 212, projecting sidewise from the cam 209, pushes at the proper time a sliding bolt 213 under the raised roll 208. In the opposite rotation of the shaft 85′ the said sliding bolt is pushed back by the crank-pin 212, so that the roll 208 can again follow the circumference of the cam. At the outer side of each lever 206 another lever 214 is arranged, having its fulcrum at 215 and resting with a roll 216 upon the circumference of another cam 217, which also partakes of the rotation of the shaft 85′ and of the displacement of the angle-piece 98′. The two cams 209 and 217 are in one piece, and a fork connected to the angle-piece 98′ goes between the cams. Each or both the levers 214 is acted upon by a spring 219, one end of which is connected to the lever 214 near its fulcrum 215 and the other end to the angle-piece 98′, the said spring tending to pull down the said lever. To the free end of each lever 214 a plate 218 is fixed, which in the position shown in Figs. 35 and 36 is pressed by the action of the spring 219 upon the sheet of paper released by the grippers, so that the said sheet is prevented from sliding farther forward, immediately after which the levers 214, together with their plates 218, are swung upward by the cam 217 and release the sheet of paper, which is now carried forward by the plate 120 (see Fig. 17) to the front stops of the printing-cylinder, then bulged out a little by the vertical legs 102′ of the angle-pieces 98′, then clamped by the pins 99′, then stretched in the same manner as above described, and finally released before the grippers of the printing-cylinder seize the said sheet and take it with them.

I claim as new and desire to secure by Letters Patent—

1. In an apparatus for supplying sheets of paper to printing, paper-folding and similar machines the combination of grippers drawing away from a pile of paper the sheets one by one, a guide, upon which the grippers are moved to and fro, means for moving the grippers upon their guide, means for lowering the gripper-guide at its rear end during the forward travel of the grippers, and an adjusting-table, which does not partake of the movement of the gripper-guide, substantially as described.

2. In an apparatus for supplying sheets of paper to printing, paper-folding and similar machines the combination of grippers 50, a gripper-guide 40 being at its fore end pivoted, a spindle 35 moving the grippers, a bar 73 raising the gripper-guide at the rear and a bar 20, the position of which depends upon the height of the pile of paper and which limits the downward motion of the bar 73, substantially as described.

3. In an apparatus for supplying sheets of paper to printing, paper-folding and similar machines the combination of grippers 50, a gripper-guide 40 being at its fore end pivoted, a spindle 35 moving the grippers, a bar 73 raising the gripper-guide at the rear, means for raising the bar 73 always the same amount, and a bar 20 the position of which depends upon the height of the pile of paper and which limits the downward motion of the bar 73, substantially as described.

4. In an apparatus for supplying sheets of paper to printing, paper-folding and similar machines the combination of grippers drawing away from a pile of paper the sheets one by one, a guide, upon which the grippers are moved to and fro, means for moving the grippers upon their guide, means for disengaging the grippers near the end of their upward travel from the said moving means, a bar 20, the position of which depends upon the height of the pile of paper, means for pushing the grippers after the said disengagement against a stop 82 of the said bar 20, and means for lowering the gripper-guide at its rear during the forward travel of the grippers, substantially as described.

5. In an apparatus for supplying sheets of paper to printing, paper-folding and similar machines the combination of grippers drawing away from a pile of paper the sheets one by one, a guide upon which the grippers are moved to and fro, means for moving the grippers upon their guide, means for lowering the gripper-guide at its rear during the forward travel of the grippers, and a bar 20 which is upheld by a stop 26 during the lowering of the gripper-guide, substantially as described.

6. In an apparatus for supplying sheets of paper to printing, paper-folding and similar machines the combination of grippers 50, a guide upon which the grippers are moved to and fro, means for moving the grippers upon their guide, means for lowering the gripper-guide at its rear during the forward travel of the grippers, means striking against a stop at the end of the forward travel of the grippers and opening the lower gripper-jaws, and means for opening the upper gripper-jaws, substantially as described.

7. In an apparatus for supplying sheets of paper to printing, paper-folding and similar machines, the combination of a bar 21, the position of which depends upon the height of the pile of paper, means for raising said bar, grippers, a gripper-guide, means for moving the uppermost sheet into reach of the grippers, said grippers being adapted to seize said sheet, and means for lowering the gripper-guide during forward travel of the grippers, substantially as described.

8. In an apparatus for supplying and adjusting sheets of paper in printing, paper-folding and similar machines the combination

of grippers drawing away from a pile of paper the sheets one by one, a guide upon which the grippers are moved to and fro, means for moving the grippers upon their guide, means for lowering the gripper-guide at the rear during the forward travel of the grippers, means for releasing the seized sheet from the grippers, an adjusting-table receiving the released sheet, a plate 120 being movable upon the adjusting-table, and means for moving the said plate carrying the sheet brought upon it to the front stops, substantially as described.

9. In an apparatus for supplying and adjusting sheets of paper in printing, paper-folding and similar machines the combination of grippers drawing away from a pile of paper the sheets one by one, a guide, upon which the grippers are moved to and fro, means for moving the grippers upon their guide, means for lowering the gripper-guide at the rear during the forward travel of the grippers, means for releasing the seized sheet from the grippers, an adjusting-table receiving the released sheet, a plate 120 being movable upon the said table, means for moving the said plate carrying the sheet brought upon it to the front stops, and means for adjusting the sheet sidewise, substantially as described.

10. In an apparatus for supplying and adjusting sheets in printing, paper-folding and similar machines the combination of grippers drawing away from a pile of paper the sheets one by one, a guide, upon which the grippers move to and fro, means for moving the grippers upon their guide, means for lowering the gripper-guide at the rear during the forward motion of the grippers, means for releasing the seized sheet from the grippers, an adjusting-table receiving the released sheet, a plate 120 being movable upon the said table, means for moving the said plate together with the sheet brought upon it toward front stops, means for adjusting the sheet sidewise and means for clamping the sheets, the pressure of which is variable, substantially as described.

11. In an apparatus for supplying and adjusting sheets of paper in printing, paper-folding and similar machines the combination of grippers drawing away from a pile of paper the sheets one by one, a guide, upon which the grippers are moved to and fro, means for moving the grippers upon their guide, means for lowering the gripper-guide at the rear during the forward travel of the grippers, means for releasing the seized sheet from the grippers, an adjusting-table receiving the released sheet, means for stopping the said sheet upon the adjusting-table, a plate 120 being movable upon the said table, means for moving the said plate together with the sheet brought upon it toward front stops, and means for adjusting the sheet sidewise, substantially as described.

12. In an apparatus for supplying and adjusting sheets of paper in printing, paper-folding and similar machines the combination of a bar 21, the position of which depends upon the height of the pile of paper, means for raising the said bar, means for lifting up the uppermost sheet at the rear, means for pushing forward the lifted sheet, grippers seizing the displaced sheet, means for lowering the gripper-guide during the forward movement of the grippers, means for releasing the seized sheet from the grippers, an adjusting-table receiving the released sheet, a plate 120 being movable upon the said table, means for moving the said plate together with the sheet brought upon it toward front stops and means for adjusting the said sheet sidewise; substantially as described.

13. In an apparatus for adjusting sheets of paper in printing, paper-folding and similar machines the combination of an adjusting-table, a plate 120 being movable upon the said table, means for moving the said plate together with the sheet brought upon it toward front stops, means for moving the said sheet sidewise so as to bulge it, devices for clamping the side edges of the sheet against the moving means working sidewise, means for stretching the clamped sheet and means for releasing the said clamping devices, substantially as described.

14. In an apparatus for adjusting sheets of paper in printing, paper-folding and similar machines the combination of an adjusting-table, a plate 120 being movable upon the said table, means for moving the said plate together with the sheet brought upon it, means for moving the said sheet sidewise so as to bulge it, means for clamping the side edges of the sheet against the moving means working sidewise, means for regulating the pressure of the clamping devices, means for stretching the clamped sheet and means for releasing the clamping devices, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ABEL BUG.

Witnesses:
WLADIMIR ZIOTECKI,
AUGUST MÜHLE.