

No. 624,229.

Patented May 2, 1899.

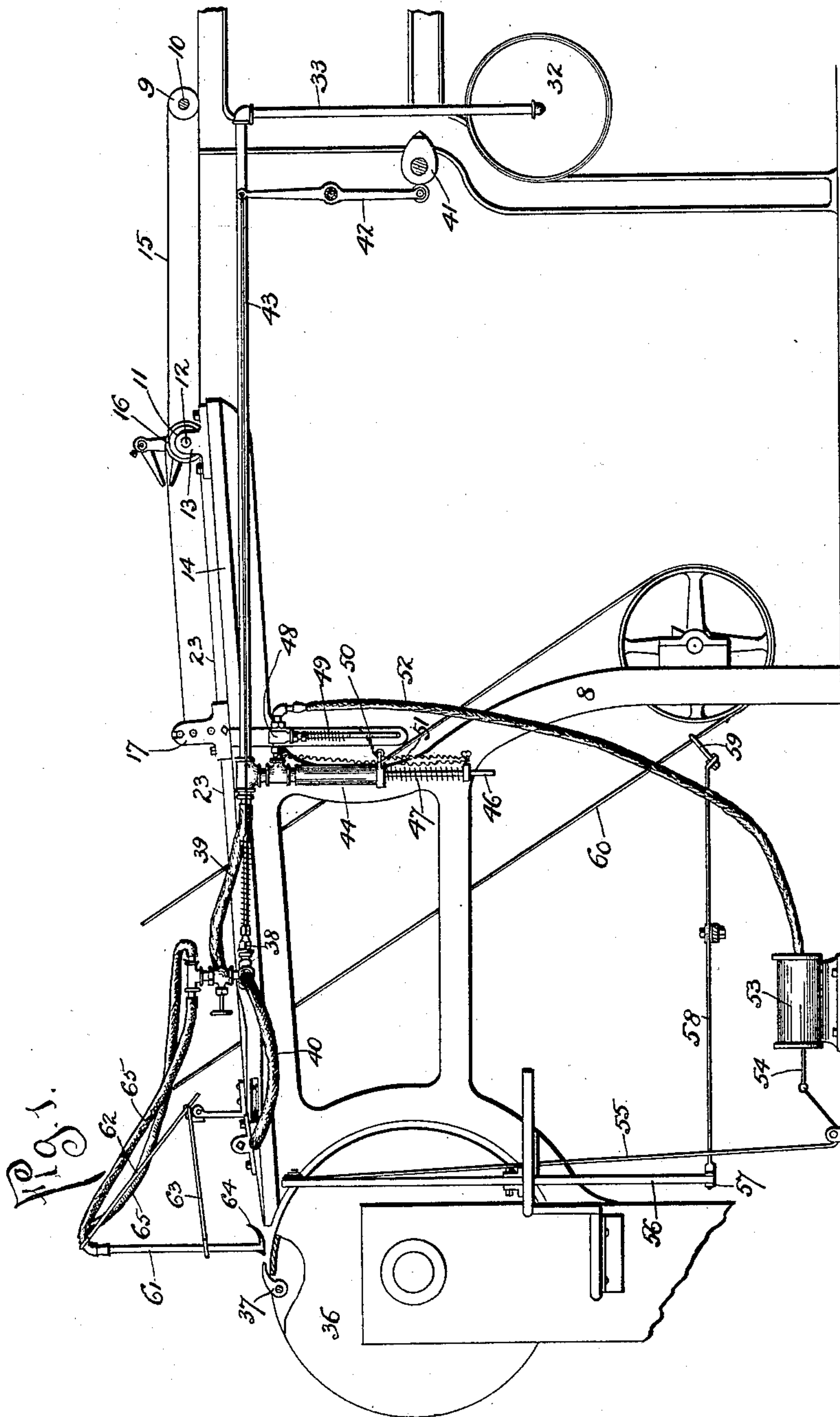
G. F. LEIGER.

AUTOMATIC SHEET FEEDING MACHINE.

(Application filed Apr. 15, 1898.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses  
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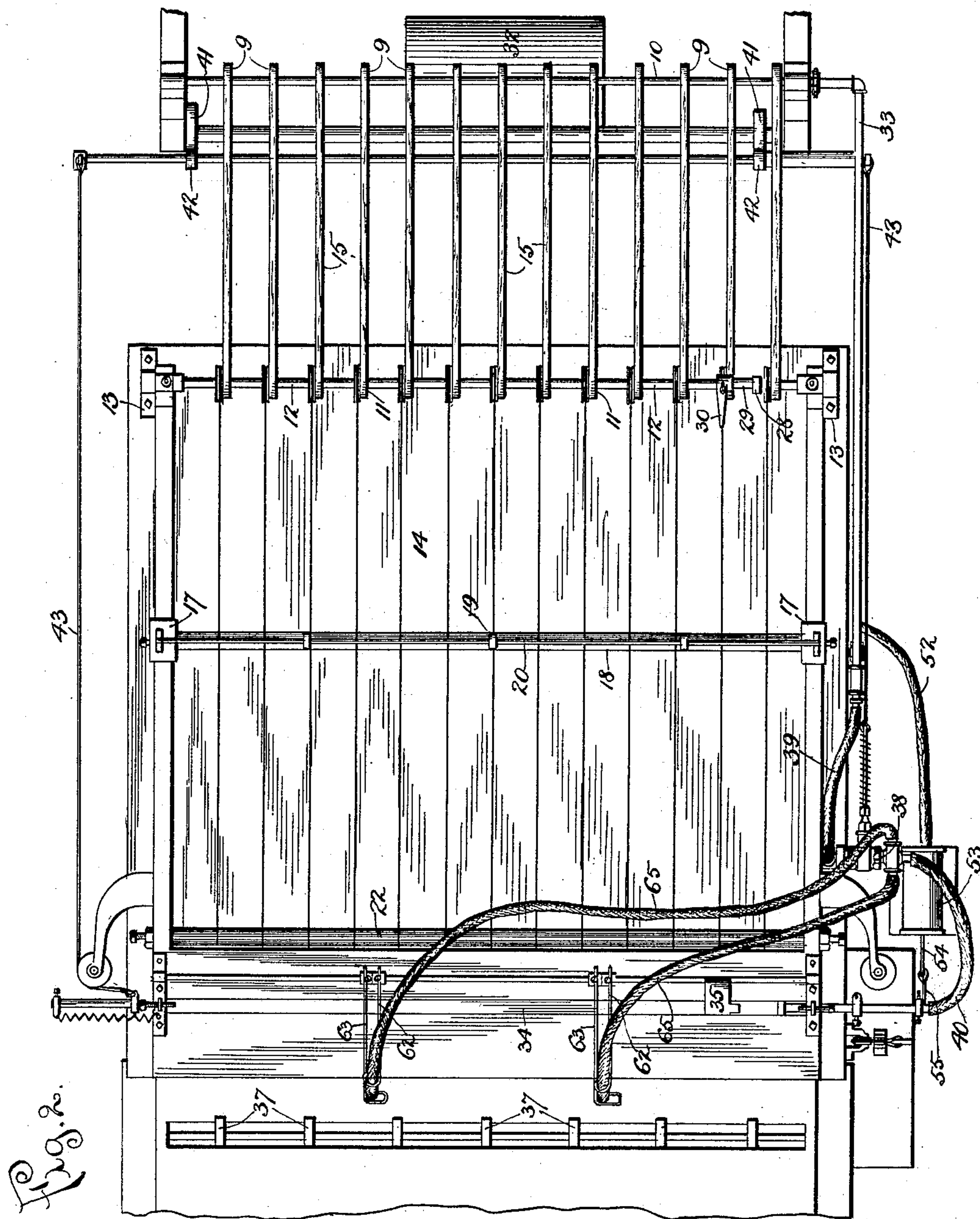
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4 Sheets—Sheet 2.



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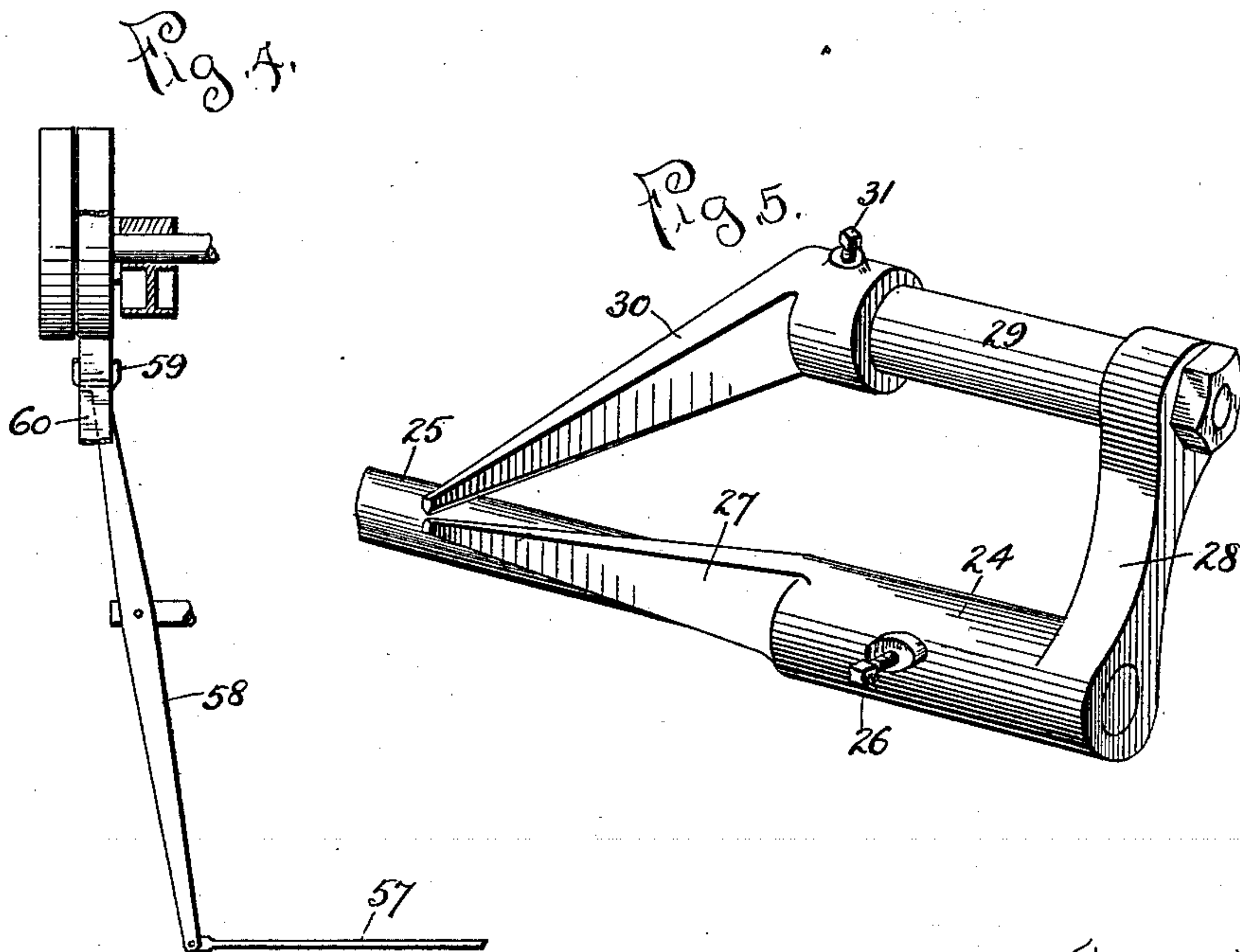
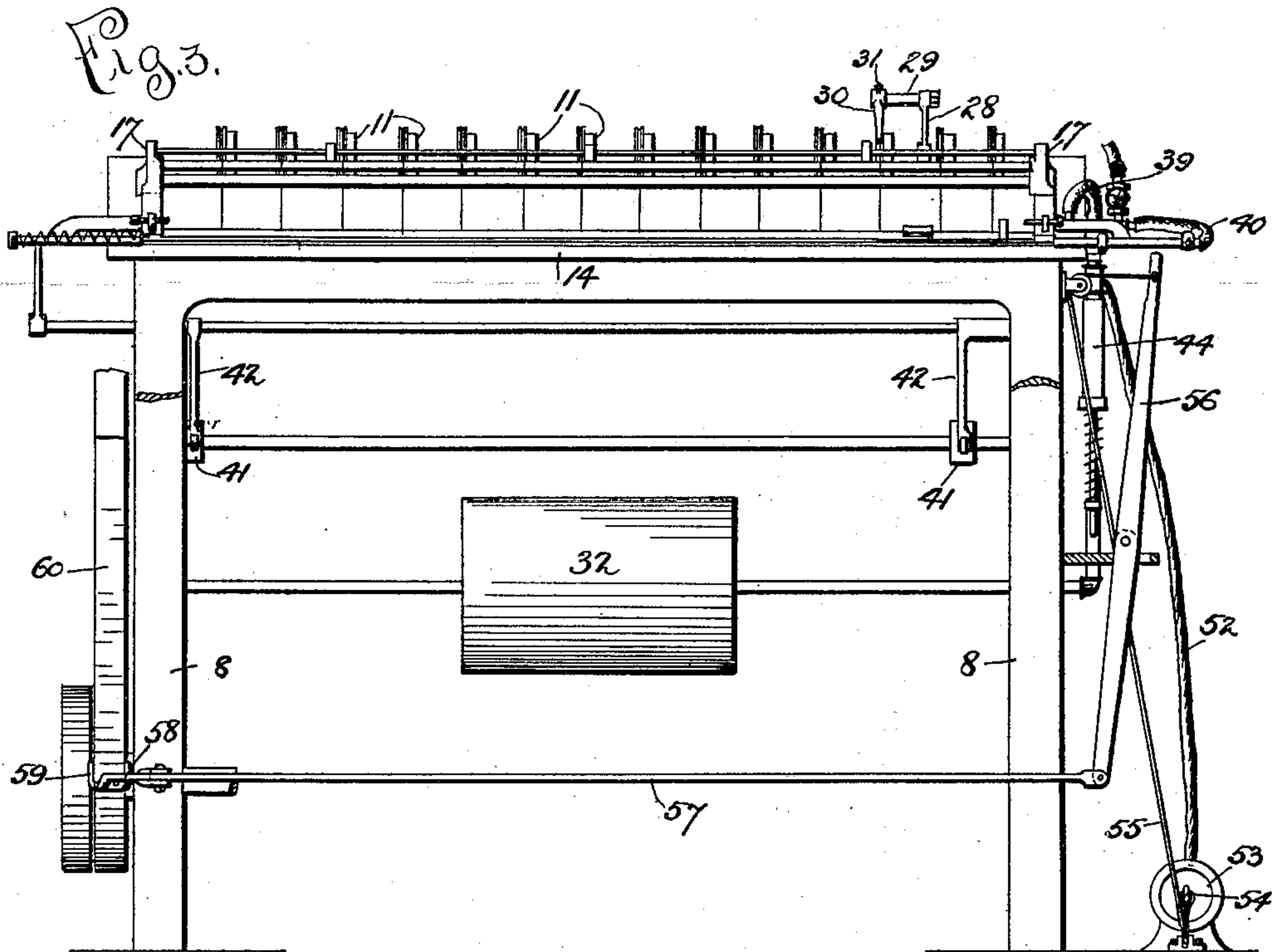
G. F. LEIGER.

AUTOMATIC SHEET FEEDING MACHINE.

(Application filed Apr. 15, 1898.)

(No Model.)

4 Sheets—Sheet 3.



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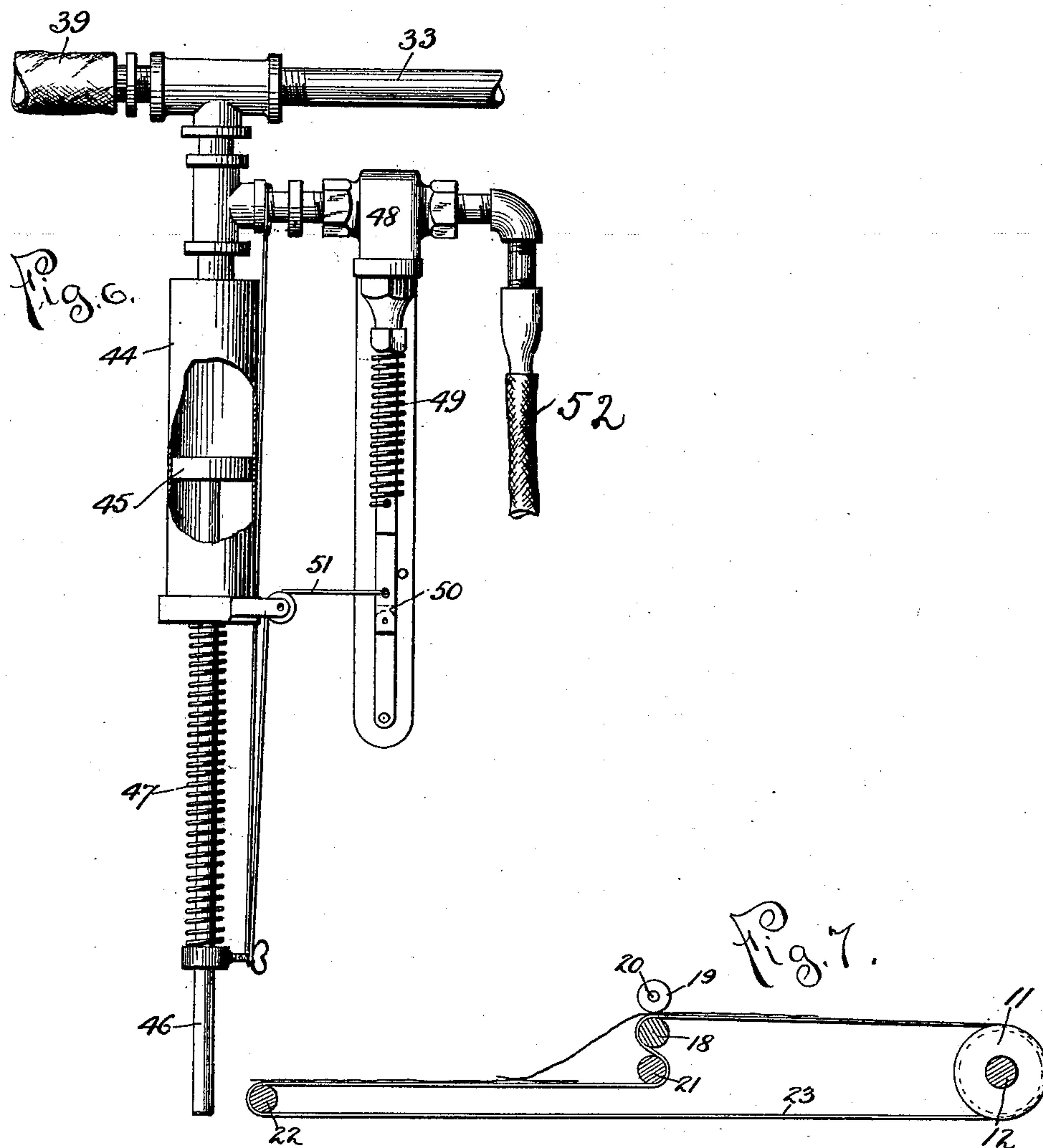
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AUTOMATIC SHEET FEEDING MACHINE.

(Application filed Apr. 15, 1898.)

(No Model.)

4 Sheets—Sheet 4.



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# UNITED STATES PATENT OFFICE.

GEORGE F. LEIGER, OF CHICAGO, ILLINOIS, ASSIGNOR TO LEWIS BENEDICT,  
OF SAME PLACE.

## AUTOMATIC SHEET-FEEDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 624,229, dated May 2, 1899.

Application filed April 15, 1898. Serial No. 677,765. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE F. LEIGER, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Sheet-Feeding Machines, of which the following is a specification.

This invention relates to improvements in machines for feeding sheets of paper to printing-presses or folders, and particularly to improvements upon devices shown and described in previous Letters Patent in the United States to me, Nos. 588,452 and 557,279.

One of its objects is to provide means by which the feeding of only one sheet at a time to the press or folder may be insured by preventing the passage of more than one sheet into the registering device and gripper-cylinder hereinafter described.

Another object of the invention is to provide means for automatically stopping the machine in case the forward edge of the paper is not in perfect alinement and in position to be seized by the grippers of the gripper-cylinder.

I accomplish these objects by mechanism shown in the accompanying drawings and hereinafter fully described.

That which I believe to be new will be set forth in the claims.

Referring to the drawings, Figure 1 is a side elevation. Fig. 2 is a top or plan view. Fig. 3 is an end view seen from in front with the cylinder of the printing-machine removed and with a portion of the framework cut away to show the belt-shifting. Fig. 4 is a detail in the top or plan view of belt-shifting lever with the rod which operates the same cut away. Fig. 5 is an enlarged detail, being an isometrical view of the arms by which the passage of more than one sheet into the feeding mechanism is prevented. Fig. 6 is an enlarged detail, being a view of the cylinder and piston by which the cylinder of the belt-shifting mechanism is connected with the vacuum-chamber. Fig. 7 is an enlarged detail of the feeding-tapes.

In the drawings, 8 indicates the framework of the machine for feeding forward sheets of paper.

9 indicates pulleys for carrying tapes, mounted upon a shaft 10, which is journaled in the frame 8 in the usual way. The pulleys 9 are driven in a suitable manner by driving power of the machine.

11 indicates pulleys mounted upon a shaft 12, which is journaled upon suitable journals 13, mounted upon the rear end of a table 14.

15 indicates tapes which are carried by the pulleys 9 and 11.

16 indicates pulleys which are mounted upon the shaft 12.

17 indicates standards which are mounted upon the table 14.

18 indicates a feed-roll which is journaled in the standards 17.

19 indicates feed-pulleys which are mounted upon a shaft 20, which is journaled in the standards 17.

21 indicates a roller journaled in the standards 17 below the feed-roller 18.

22 indicates a roller mounted in suitable journals near the forward end of the table 14.

23 indicates string-tapes which are carried upon pulleys 11, feed-roll 18, and rollers 21 and 22, the string-tapes 23 passing around roller 11, passing over feed-roll 18, thence around and under feed-roller 18, thence over and behind roller 21, and around roller 22. The relative positions of rollers 11, feed-roll 18, feed-pulleys 19, rollers 21 and 22, and the arrangement of string-tapes 23 are best shown in Fig. 7.

24 indicates a sleeve which is mounted upon a suitable shaft 25, which is carried by the framework 8. Sleeve 24 is provided with a set-screw 26, by means of which it can be adjustably mounted upon the rod 25. The sleeve 24 carries an arm 27, which when the sleeve is mounted in position projects forward and slightly upward and can be adjusted by the set-screw 26 so that its forward end lies very nearly on a level with the top of the string-tapes 23, as is best shown in Fig. 1. The sleeve 24 is provided with a second arm 28, which carries at its outer end a rod 29.

30 indicates an arm which is adjustably mounted, by means of the set-screw 31, upon the arm 29. When the arm 30 is in position, it projects forward and downward, with its forward end close to the forward end of the arm 27, as is best shown in Figs. 1 and 5.



The arms 27 and 30 are beveled to form knife-edges upon their opposing surfaces and inclined toward one another, as is shown in Fig. 5. In the operation of the machine the arms 27 and 30 will be so adjusted that the space between the beveled or knife edges at their forward ends is just sufficient to allow a single sheet of paper to pass freely between them. This distance will of course be varied according to the thickness of the paper which is being fed to the machine. By this construction it will be seen that a sheet of paper of such thickness as to just pass freely between the opposing beveled edges at their forward points will pass through without hindrance and that the knife-edges opposing one another at a point only will cut or crease through any slight irregularities in the thickness of the paper or any slight roughness upon the surface thereof and will still allow the paper to freely pass between them. If, however, two sheets of paper should be fed, they cannot both pass through the jaws and will be held thereby and prevented from passing down into the machine.

The devices heretofore and hereinafter described are especially designed to be used in connection with the pneumatic sheet-feeding devices shown and described in previous Letters Patent of the United States to me, Nos. 557,279 and 588,451, but may of course be used with any suitable sheet-feeding mechanism. When the sheets are fed in in any appropriate manner successively upon the tapes 15, they are carried forward by them and delivered upon the string-tapes 23 and pass between the forward end of the arms 27 and 30, which are preferably located, as is best seen in Fig. 3, to one side of the middle of the machine. The arms being adjusted as above described, as long as only one sheet at a time passes between them, will permit the free passage of the sheet forward upon the string-tapes 23, passing between the feed-roll 18 and feed-pulleys 19. The sheet is carried forward to and laid upon the lower portion of the string-tapes 23, as is best shown in Fig. 11, where it is stopped by and during the action of the registering devices hereinafter described. The string-tapes bringing so little surface to bear upon the paper easily slip beneath it while the second or succeeding sheet is being delivered forward upon the top of the sheet which is resting during the operation of the registering devices, as is shown in Fig. 7. In case, however, by any improper action of the feeding mechanism by which the sheets are fed to the tapes 15 more than one sheet should be carried forward the two thicknesses of sheets cannot pass between the forward ends of the arms 27 and 30 and will be held at that point, the result being that when the sheet ahead has been seized by the sheet-registering devices hereinafter described and delivered to the gripper-cylinder, also hereinafter referred to, no further paper will be fed forward into the registering devices,

which at their next operation, no sheet being present, will by the operation of the devices hereinafter described shift the belt and stop the machine.

32 indicates a vacuum-chamber in which a vacuum is produced by any appropriate means and which communicates by a pipe 33 with the registering and automatic stopping devices hereinafter described.

34 (see Fig. 2) indicates a tube mounted on the framework 8 and capable of being given a reciprocating movement longitudinal of the tube and transversely of the machine.

35 indicates a guide mounted upon and carried by the tube 34. The tube 34 is provided with suitable openings in order that when a vacuum is produced in such tube by the operation of the valves connecting the same with the vacuum-chamber 32 a sheet of paper lying over said tube is engaged thereby and by means of the guide 35 and the reciprocating movement of the tube is brought into proper registry to be delivered to the gripper-cylinder 36, provided with grippers 37. 38 indicates the valve controlling the connection of said tube with the vacuum-chamber 32, being connected with the tube 32 by a flexible pipe 39 and with the tube 34 by a flexible pipe 40. The valve 38 is operated by cam 41, lever 42, and connecting-rod 43. The operation of the said registering-tube 34, guide 35, and of the valve and mechanism controlling the same are fully described in Letters Patent to me of the United States, No. 588,451, granted August 17, 1897, and it is therefore unnecessary to describe them fully here, as the operation of these parts forms no part of my present invention. It is sufficient to say that as the sheet passes down over the tapes 23 and is brought over the tube 34 in the proper position to be seized by the grippers 37 the tube 34 is moved to the left, so as to engage the edge of the sheet in the guide 35. Thereupon by the operation of the valve-controlling mechanism the valve 38 is opened, bringing said tube 34 into connection with the vacuum-chamber 32, causing a vacuum in tube 34, which draws the sheet down upon the tube 34. The tube 34 is thereupon moved to the right in its reciprocal movement described in said last-named Letters Patent, the vacuum-chamber is shut off by the operation of the valve 38, and the sheet, relieved from the engagement of the tube 34, is again carried forward by the tapes 23 into the grippers 37 in proper registry for delivery.

44 indicates a cylinder carried by the tube 33 and having open communication therewith. 45 indicates a piston moving air-tight in the cylinder 44 and having piston-rod 46, the cylinder being open at the lower end below said piston, so as to permit free access of air below the piston. 47 indicates a spring carried by the piston-rod 46 and operating, when allowed to freely exert its force, to draw the piston 45 down toward the lower end of the cylinder 44. Unless air, however, is ad-



mitted into the cylinder 44 above the piston, as hereinafter described, the free communication of said cylinder with the vacuum-chamber 32 causes the pressure of the air below the piston to overcome the pressure of the spring 47 and to force the piston upward in the cylinder. 48 indicates a valve communicating with the cylinder between it and its opening into the vacuum-chamber 32 and normally closed by means of a spring 49. 50 indicates a toggle-lever connecting with the valve-stem of said valve 48. 51 indicates a cord connecting at one end with the toggle-lever 50 and connecting with the piston-rod 46, all of which is best shown in Fig. 6. 52 indicates a pipe connecting said valve 48 with a cylinder 53. Cylinder 53 carries a piston (not shown for reasons hereinafter stated) and piston-rod 54, which is connected by cord 55 with a lever 56, which is pivotally mounted upon the frame 8, as is best shown in Fig. 3. The lever 56 is connected by connecting-rod 57 with a lever 58, which is pivotally mounted upon frame 8 and carries on its other end a belt-shifter 59, which engages with the belt 60. The structure and operation of the cylinder 44 and its accompanying piston, of the valve 48 and its connection with the cylinder 44, of the cylinder 53 and the piston and piston-rod carried thereby, and of its connection with the belt-shifting mechanism are fully described in Letters Patent to me, No. 588,452, and it is not necessary to more fully describe the same. It is sufficient to say that the operation of these devices is such that in case for any reason a sheet fails to come over the registering-tube 34 in proper position to be seized thereby and brought into proper register the air will be admitted into one or more of the openings of said registering-tube 34, as described in last-named Letters Patent, causing the admission of air in the cylinder 44 above the piston 45, which is then forced downward by the operation of the spring 47 opening the valve 48. This causes a communication between the vacuum-chamber 32 and the cylinder 53, and the air-pressure forces in the piston contained therein, with the piston-rod 54, and by the operation of the levers and belt-shifter shifts the belt from the driving to the idler pulley and stops the machine.

61 indicates tubes which are mounted so as to swing freely laterally on supports 62, which are carried upon the framework 8, as is best shown in Figs. 1 and 2. 63 indicates guides which control the swinging of the tubes 61 in such a way as limits their lateral movement to conform with the lateral movement of the registering-tube 34. The tubes 61 are provided at the lower ends with shoes 64, which are extended rearward and are slightly turned upward to guide the forward edge of the sheet of paper beneath them. The tubes 61 when in position hang, as is shown in Fig. 1, above the gripper-cylinder 36 and close to the grippers 37 when said grippers come into operative position. The tubes 61 are connected by flexi-

ble tubes 65 with the valve 38, above described, in such a way that when the valve is opened the tubes 61 are put in communication with the vacuum-chamber 32. The operation of these tubes is as follows: The adjustments of the mechanism operating the registering-tube 34 are such that the said tube 34 does not engage with the sheet of paper delivered above it until the forward edge of the paper is brought below the tubes 61 and also in position to be seized by the grippers 37 when they come into engaging position. When the sheet of paper is in this position, the valve 38 is opened by the mechanism above described, which causes the sheet of paper, as above described, to be engaged by the registering-tube 34. At the same time, being controlled by the same valve, the swinging tubes 61 are also opened to the vacuum-chamber 32, causing at the same instant a vacuum in the said tubes 61, which causes them to engage with the forward edge of the sheet of paper. The tubes 61 being allowed to swing laterally, as above described, are swung to one side while in engagement with the sheet as the sheet is carried to the right of Fig. 2 by the reciprocating movement of the registry-tube 34. The same movement of the mechanism which as soon as the sheet is in proper lateral register causes the closing of the valve 38 and the freeing of the sheet from the registering-tube 34, closing the connection between the tubes 61 and the vacuum-chamber, also frees the sheet from the tubes 61. The position of the tubes 61, as above stated, is such that when the sheet is released from engagement therewith its forward edge is accurately in position to be engaged by the grippers 37. In case through any cause the forward edge of the paper is not properly brought in position to be engaged by both of the said tubes 61 when the valve 38 is opened, there being no paper below one or both of the tubes 61, air will be admitted to one or both of the said tubes. Inasmuch as said tubes are connected with flexible tube 39, opening into cylinder 44, above described, the effect of this will be the same as when air is admitted into any one of the openings in the registering-tube 34. In other words, the vacuum above the piston 45 in the cylinder 44 will be destroyed or modified, the piston will be drawn downward by the spring 47, and by the operation of the devices above described the belt will be shifted and the machine at once stopped. It will be seen that by the above-described operation of the swinging tubes 61 and their connections with the several valves the proper delivery of the sheets to the grippers 37 with the forward edge of said sheets in a proper alinement to be seized by said grippers is caused, or in case the sheet is not so delivered the machine is stopped.

That which I claim as my invention, and desire to secure by Letters Patent, is—

1. In a pneumatic sheet-registering mechanism, the combination with a vacuum-chamber, a swinging pneumatic tube adapted to



engage the lead edge of a sheet of paper, a valve connecting said swinging pneumatic tube with said vacuum-chamber, and mechanism for automatically opening and closing said valve, of a machine-stopping device, and pneumatically-operating mechanism connected with said swinging tube and with said machine-stopping device, and adapted to operate said machine-stopping device if the said swinging tube is open to permit access of air thereto when the connection with the vacuum-chamber between said tube and the vacuum-chamber is open, substantially as described.

2. In a pneumatic sheet-registering mechanism, the combination with a vacuum-chamber, a swinging pneumatic tube adapted to engage the lead edge of the sheet of paper, a valve connecting said swinging tube with said vacuum-chamber, and mechanism for automatically opening and closing said valve, of a belt-shifter and pneumatically-operating mechanism connected with said swinging tube and with said belt-shifter, and adapted to operate said belt-shifter if the said swinging tube is open to permit access of air thereto when the connection with the vacuum-chamber between said tube and the vacuum-chamber is open, substantially as described.

3. In a sheet-feeding machine, the combination of pneumatic sheet-registering mechanism, swinging pneumatic tubes adapted to engage the lead edge of a sheet of paper, a valve connecting said swinging pneumatic tubes with said vacuum-chamber, and mechanism for automatically opening and closing said valve, of a machine-stopping device, and pneumatically-operating mechanism connected with said swinging tubes and with said machine-stopping device, and adapted to operate said machine-stopping device if either of said swinging tubes is open to permit access of air thereto when the connection be-

tween said tubes and said vacuum-chamber is open, substantially as described.

4. In a sheet-feeding machine, the combination with sheet-forwarding devices, of a pair of relatively adjustable jaws provided with knife-edges upon their opposing surfaces, arranged in the path of the sheets and adapted to be adjusted to permit the passage of only one sheet between them, substantially as described.

5. In a sheet-feeding machine, the combination with sheet-forwarding tapes, of a pair of relatively adjustable converging jaws provided with knife-edges upon their opposing surfaces, arranged in the path of the sheets and adapted to be adjusted to permit the passage of only one sheet of paper between them and to stop the sheets in case two or more sheets are carried by said forwarding-tapes, substantially as described.

6. In a sheet-feeding machine, the combination with sheet-forwarding devices of a shaft carried by the framework, a sleeve adjustably mounted on said shaft, an arm carried by said sleeve and extending upward and outward therefrom and having an upper knife-edge, an arm 28 carried by said sleeve, a rod secured at one end in said arm, and an arm 30 adjustably mounted on said rod and extending downward and outward therefrom and having a lower knife-edge, the knife-edges of the arms 27 and 30 opposing each other and the outer ends of said arms being normally arranged at such distance apart as to permit but a single sheet of paper to pass freely between them, substantially as described.

GEORGE F. LEIGER.

Witnesses:

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