

No. 624,227.

Patented May 2, 1899.

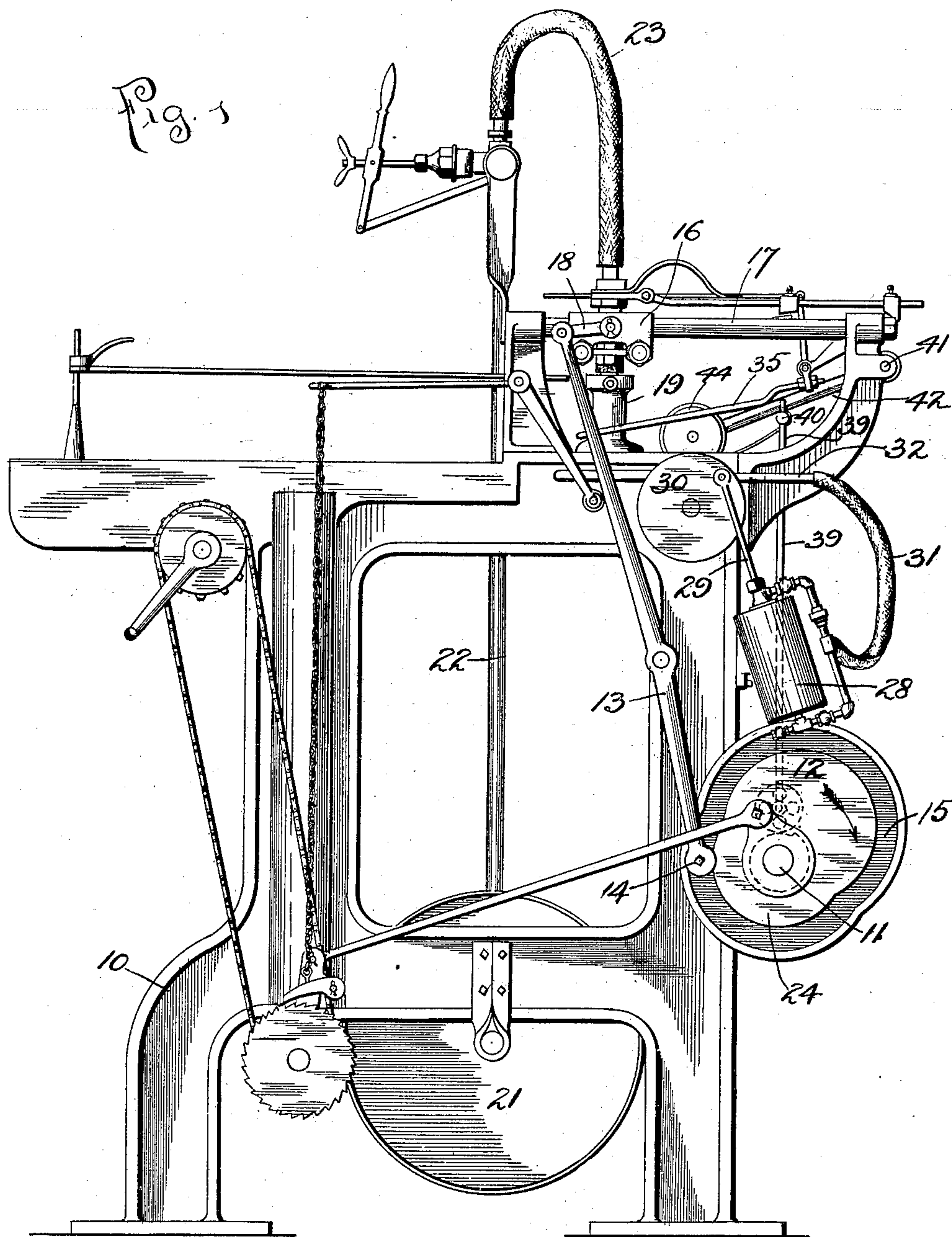
G. F. LEIGER.

PNEUMATIC SHEET SEPARATING AND FEEDING MACHINE.

(Application filed Nov. 22, 1897.)

(No Model.)

5 Sheets—Sheet 1.



Witnesses:  
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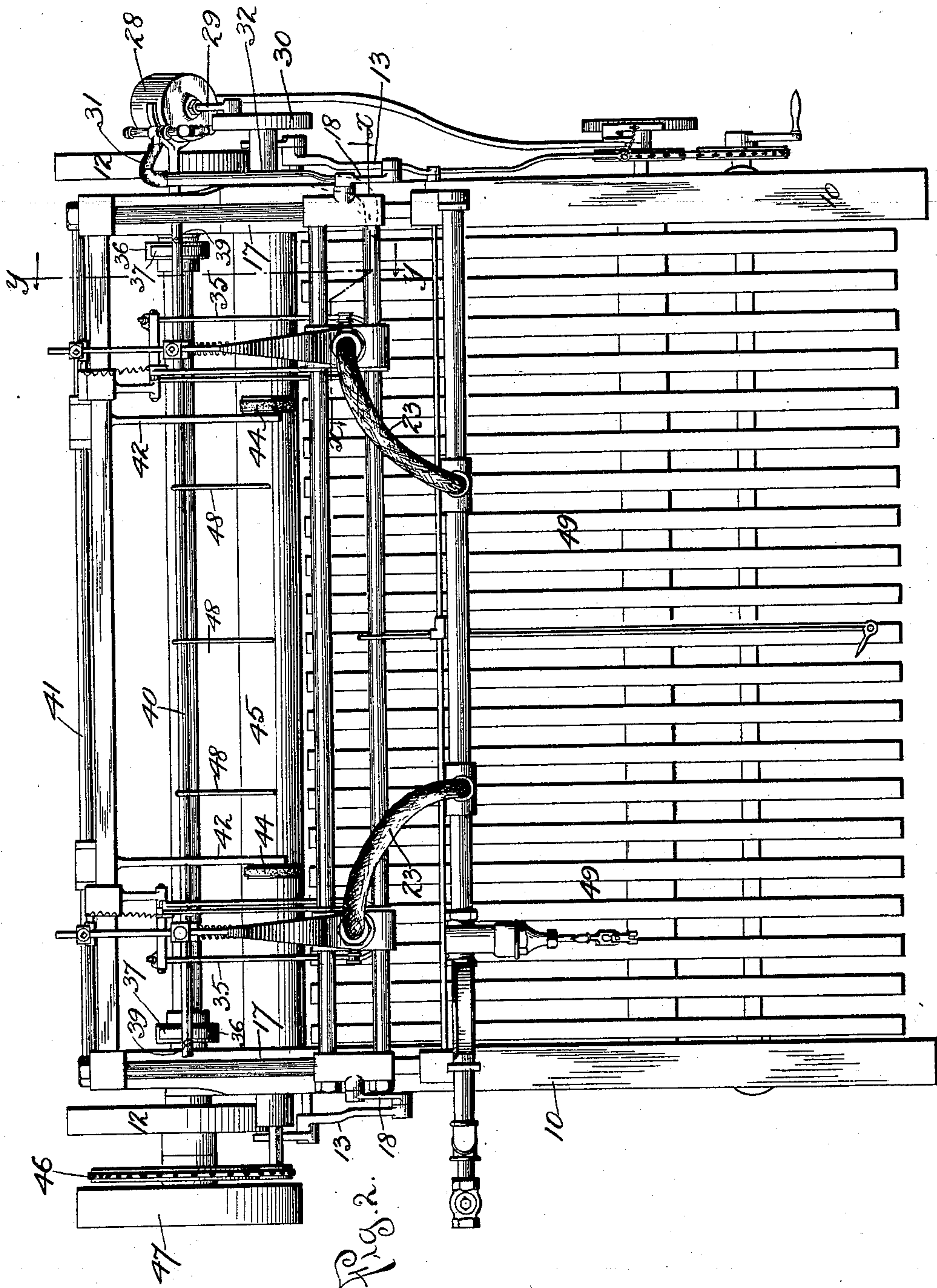
G. F. LEIGER.

PNEUMATIC SHEET SEPARATING AND FEEDING MACHINE.

(Application filed Nov. 22, 1897.)

5 Sheets—Sheet 2.

(No Model.)



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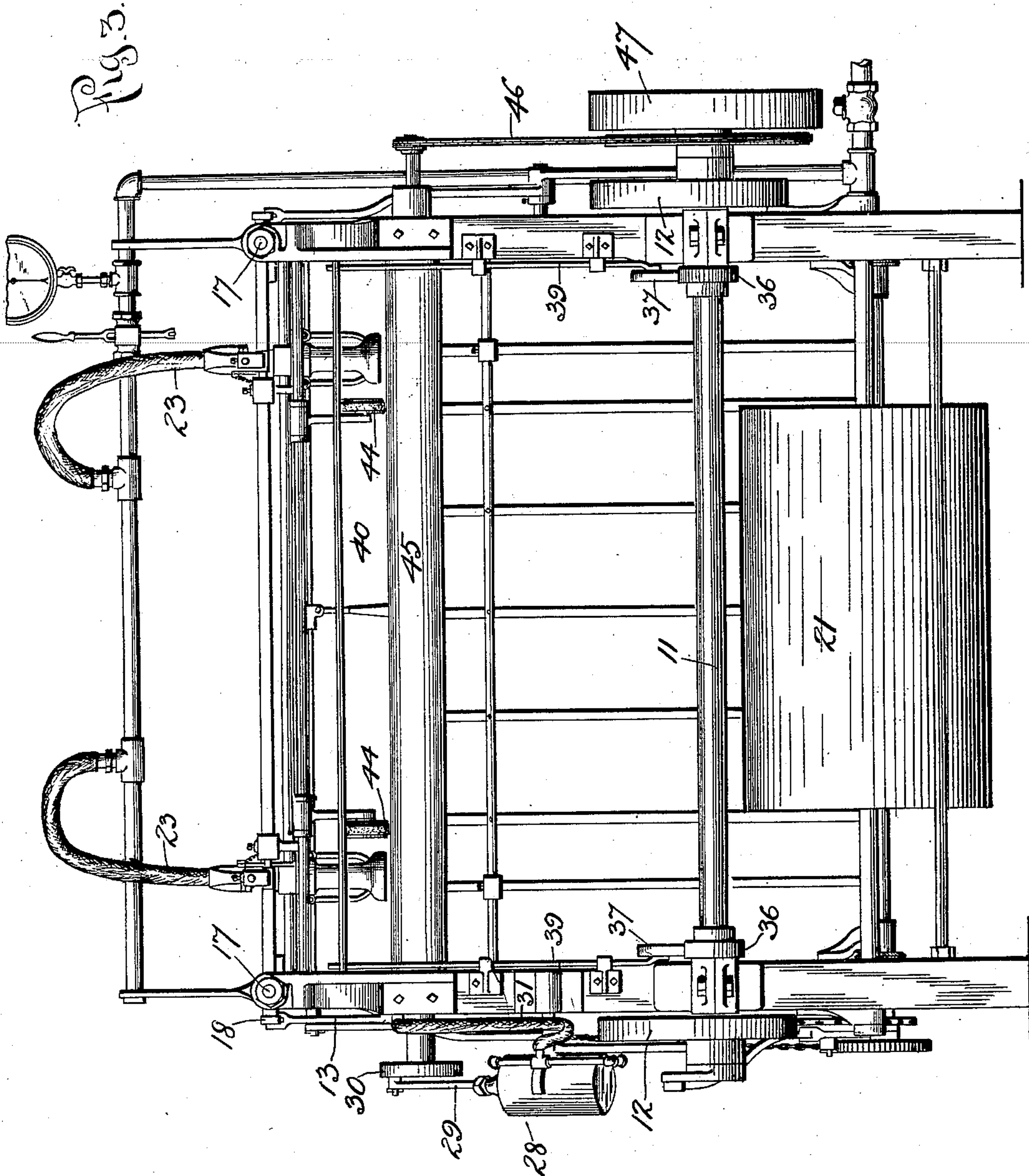
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(Application filed Nov. 22, 1897.)

(No Model.)

5 Sheets—Sheet 3.



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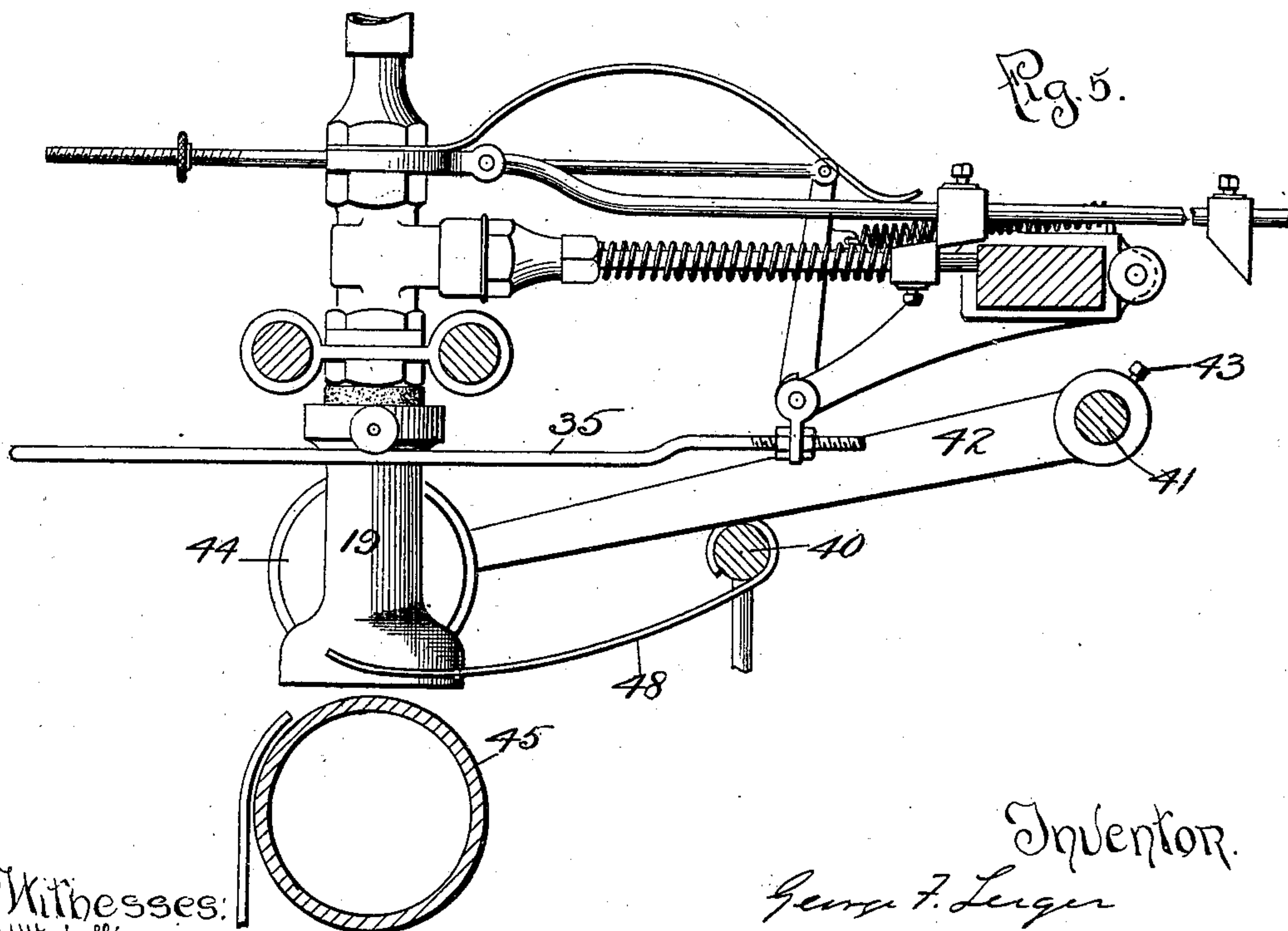
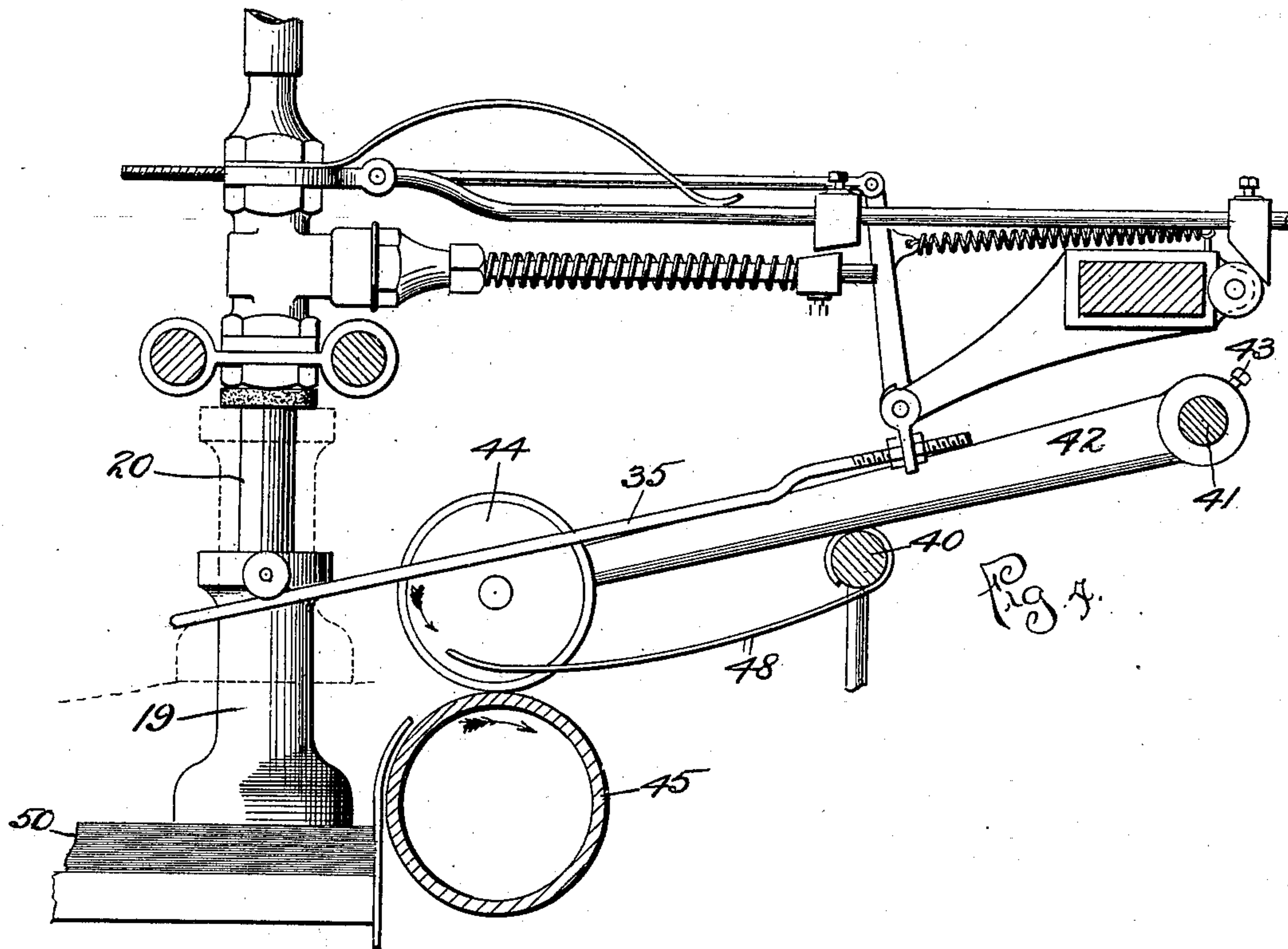
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PNEUMATIC SHEET SEPARATING AND FEEDING MACHINE.

(Application filed Nov. 22, 1897.)

(No Model.)

5 Sheets—Sheet 4.



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No. 624,227.

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(Application filed Nov. 22, 1897.)

(No Model.)

5 Sheets—Sheet 5.

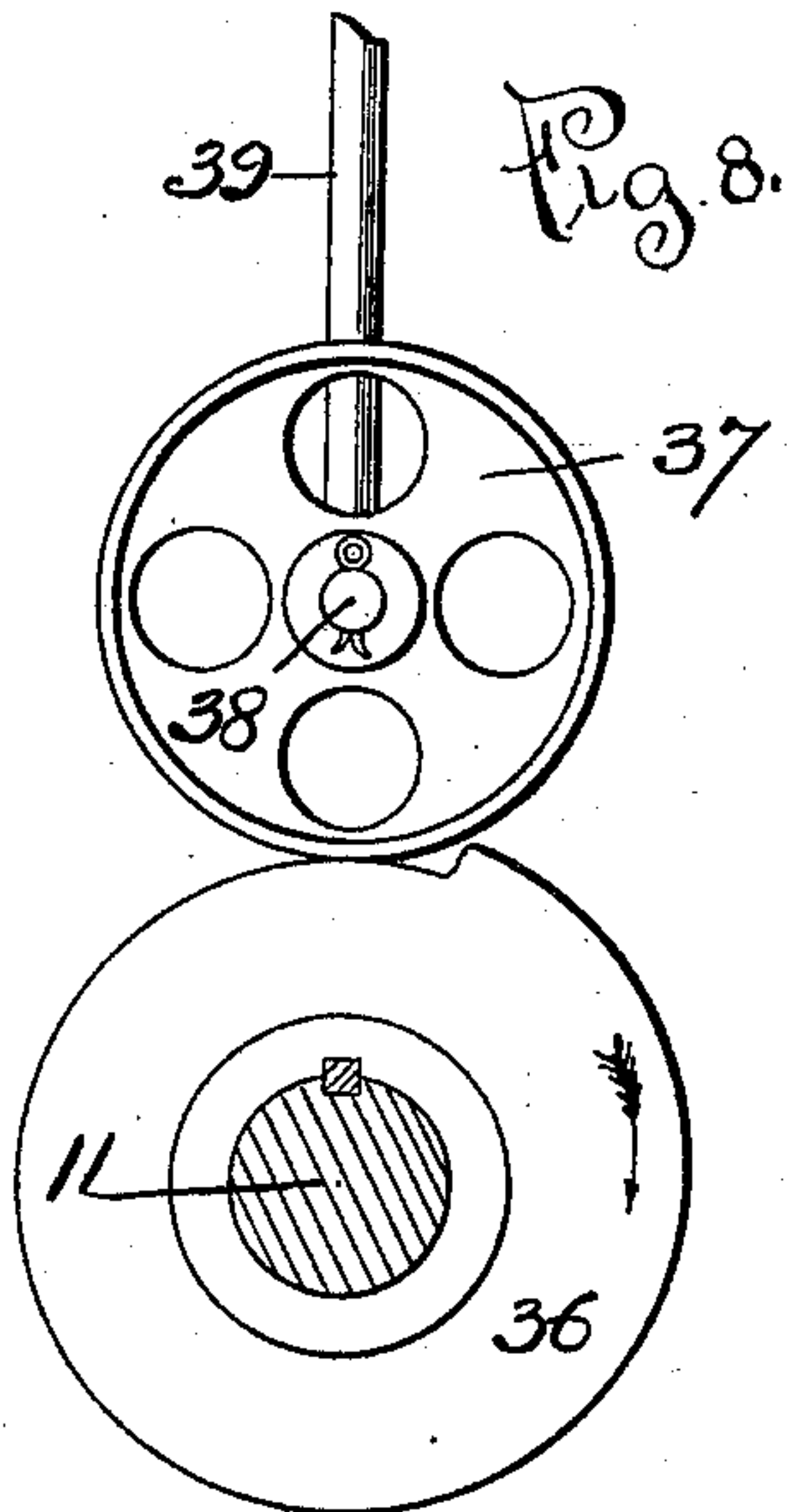


Fig. 6.

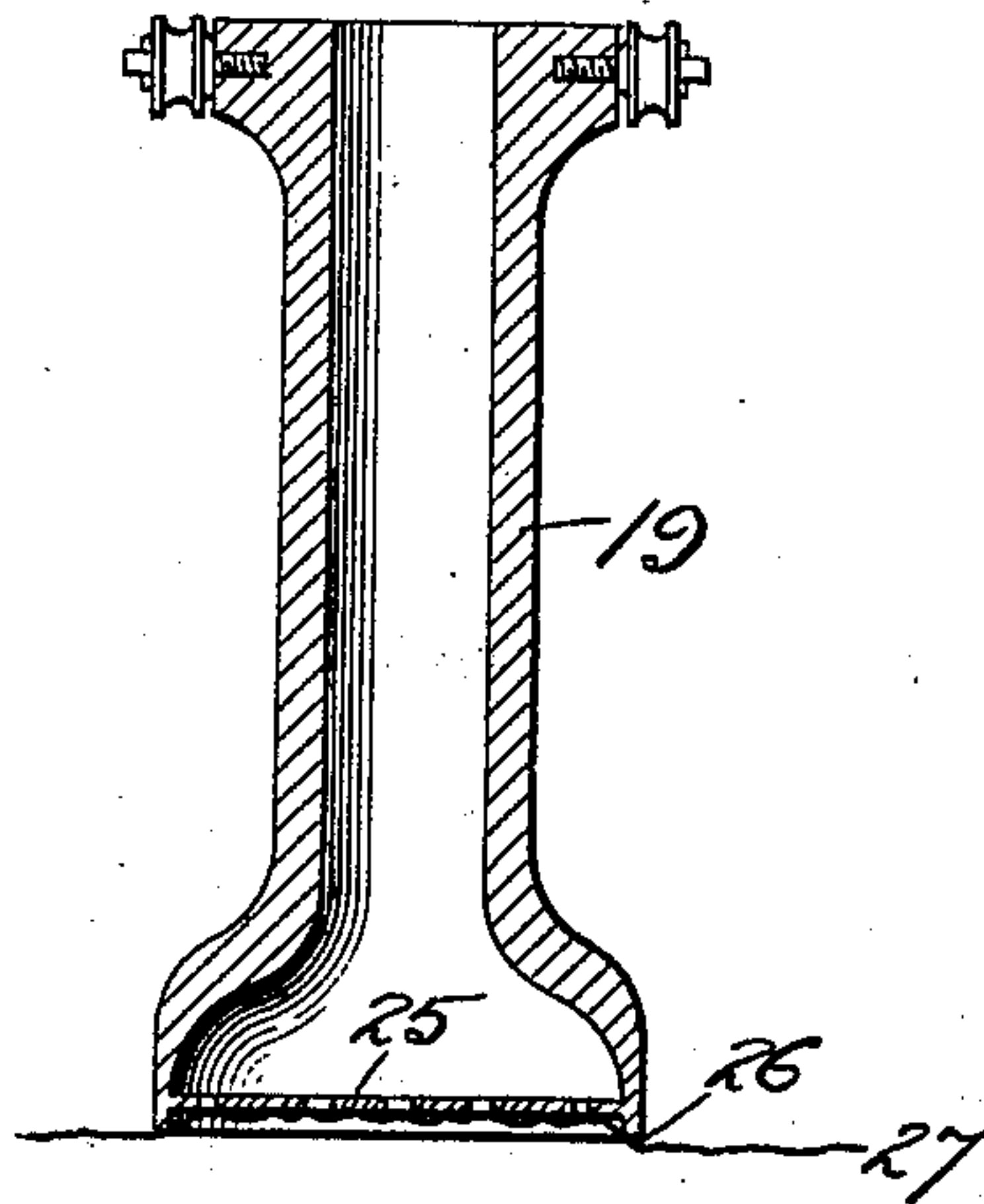


Fig. 9.

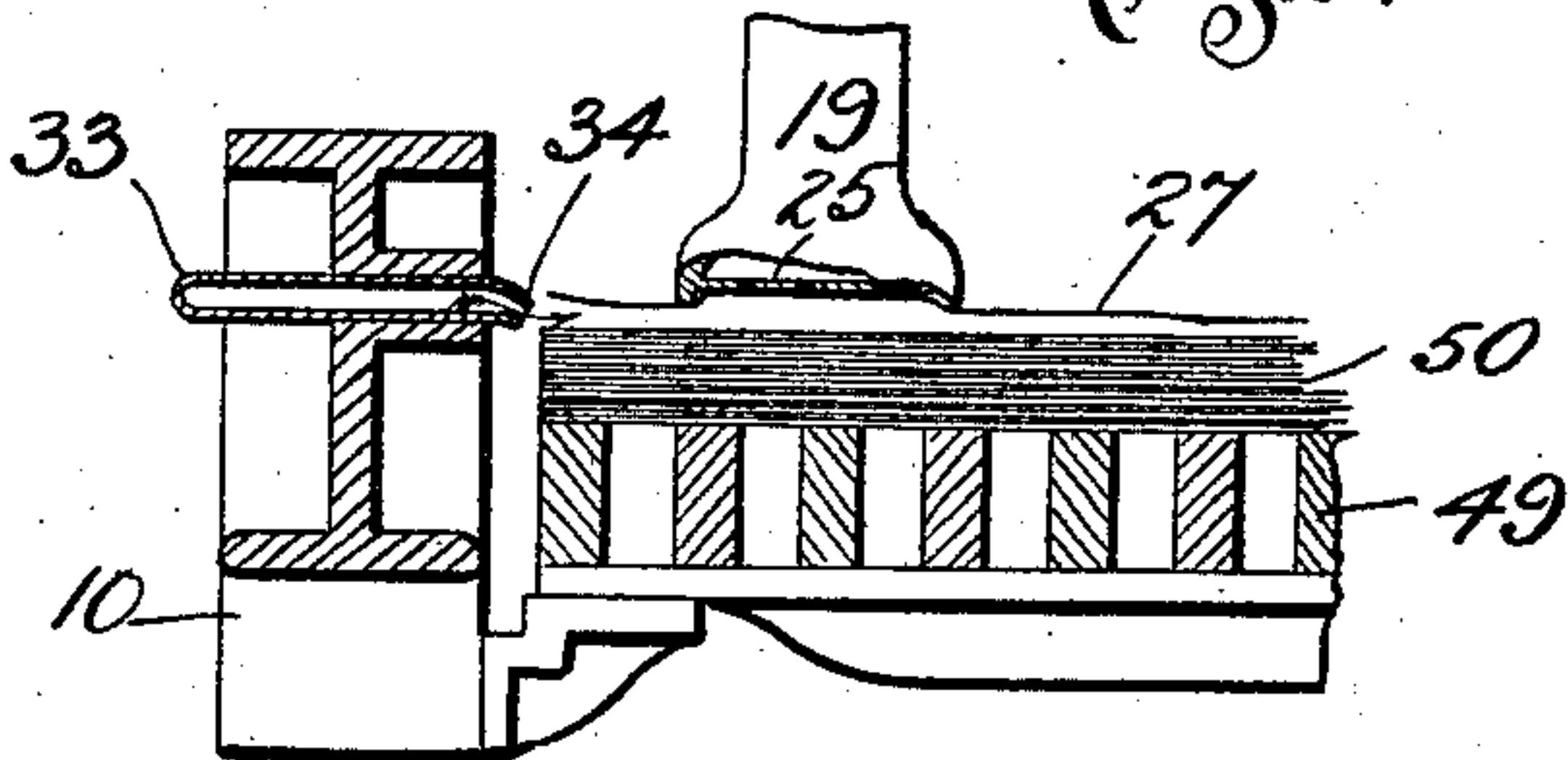
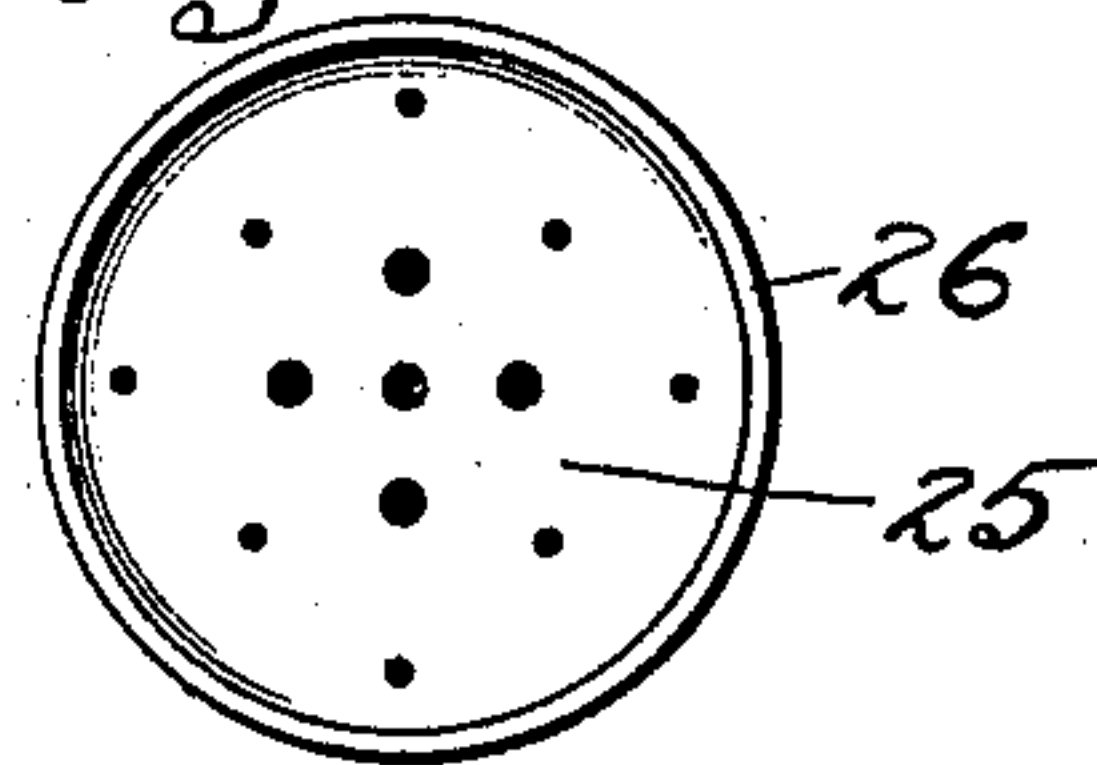


Fig. 7.



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# UNITED STATES PATENT OFFICE.

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

## PNEUMATIC SHEET SEPARATING AND FEEDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 624,227, dated May 2, 1899.

Application filed November 22, 1897. Serial No. 659,417. (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 Pneumatic Sheet Separating and Feeding Machines, of which the following is a specification.

My invention relates to improvements in pneumatic sheet separating and feeding machines, and particularly to improvements in the class of machines and upon the devices shown and described in Letters Patent to me, No. 557,279, dated March 31, 1896, and No. 588,451, dated August 17, 1897. Heretofore in this class of machines in order to insure the picking up of a single sheet of paper from the pile by the pneumatic pickers, which engage the front end of the sheet and feed it to tapes or rollers, by which the sheets are fed forward singly into the printing, folding, or other machine, it has been necessary in practice to devise mechanism for lifting the rear end of a single sheet from the pile, and thus coöperate with the pickers, which feed the sheet forward and insure the delivery of a single sheet at a time. Such devices for engaging the rear end of the sheet are shown in said Letters Patent to me.

One of the objects of my present invention is to provide a new and improved pneumatic picker of such a construction that without any such devices for engaging and lifting the rear end of the sheet the lifting and feeding forward of a single sheet of paper by means of the pneumatic pickers are insured.

Another object of my invention is to provide mechanism by which the movements of the pickers are so arranged and timed as to still further insure the feeding forward of a single sheet, as hereinafter described.

My invention has for a further object certain improvements in details of construction, as hereinafter described.

Referring to the drawings, Figure 1 is a side elevation. Fig. 2 is a top or plan view. Fig. 3 is a rear end elevation. Fig. 4 is an enlarged detail, partly in section, showing the feed-rolls and the telescopic pneumatic picker engaging the lead end of the top sheet and showing in dotted lines the picker raised and

lifting the sheet with it. Fig. 5 is an enlarged detail, partly in section, showing the feed-rolls separated from each other and showing the picker lifted and in its extreme forward position. Fig. 6 is an enlarged detail, being a vertical section of the telescopic picker and showing the sheet of paper "crimped" against its bearing-surface, as hereinafter described. Fig. 7 is an enlarged detail, being a plan view of the bottom of the picker. Fig. 8 is an enlarged detail showing the cam and bearing wheel, by means of which the feed-rolls are momentarily separated. Fig. 9 is an enlarged detail, partly in cross-section, showing the picker with the sheet crimped against its pneumatic bearing-surface and in the act of beginning its upward movement and showing also the air-blast tube for blowing air under the sheet as it is raised, being a section on line *x x* of Fig. 2.

10 indicates the framework of the machine.

11 indicates a shaft upon which is keyed a cam 12.

13 indicates a lever pivoted to the side of the frame 10 and bearing upon its lower end a roller 14, which engages with the cam-groove 15 of the cam 12.

16 indicates a carriage which is mounted upon guides 17 and reciprocates thereon.

18 indicates a connecting-rod which is pivotally connected with the carriage 16 and with the upper arm of the lever 13.

19 indicates a pneumatic telescopic picker which is slidingly mounted upon the air-tube 20 of the carriage 16. The mounting of the pickers 19 upon the tube 20, the mounting of the carriage 16 upon the guides 17, and the valves which automatically control the air, so as to cause a vacuum in the telescopic pneumatic pickers at the proper times, are all of the same construction as shown in said Letters Patent to me, No. 588,451, and need no further description here.

21 indicates a vacuum-chamber. 22 23 indicate the connections between said vacuum-chamber and the pneumatic pickers, which operate in the same manner as those described in my said two Letters Patent and need no description here.

The carriage 16, carrying the pickers 19, is reciprocated by means of the cam 12 bearing



upon the cam-roller 14 of the lever 13. It will be noted that a portion 24 of the surface of said cam 12 is a perfect circle, having for its center the center of the shaft 11. It therefore follows that while the cam-roller 14 is traveling around that portion of the cam 12 which is a circle during the rotation of said cam the lower end of the lever is not moved, and therefore the forward movement of the carriage does not begin until the roller 14 passes away from the circular portion of said cam. The cam is so mounted upon the shaft and its movements so timed that the roller 14 begins to bear upon the circular portion of said cam when the pickers are at the extreme backward limit of their motion and have dropped upon the lead end of the top sheet of the pile. As in my said prior patents, as soon as the pickers at the extreme rearward limit of their motion have dropped upon the forward end of the pile of sheets, the air, by the operation of the valves described in said patents, is exhausted from the pickers by the opening of the connection (as described in said patents) with the vacuum-chamber 21.

Referring to Figs. 6 and 7, 25 indicates the bottom or bearing surface of the telescopic pneumatic picker 19, which is perforated with a number of openings, as shown in said figures, and which is raised a little above the periphery 26 of the lower end of said pneumatic picker. As soon as the vacuum is caused within the telescopic pneumatic picker 19 the sheet 27 is lifted by the pressure of the air against said raised bottom 25, and the lower periphery 26 bearing upon the sheet 27 the sheet is necessarily crimped up against the bottom, which causes a slight sliding of the under side of the sheet upon the sheet below it. This slight movement, due to the crimping of the sheet, is such that only the top sheet is crimped and thus moved slightly upon the sheet below it, which insures a slight opening between the top sheet and the one immediately under it, through which the air enters and by its pressure holds the top sheet only against the raised bearing-surface 25.

28 indicates an air-pump of any approved construction driven by the piston-rod 29, pivotally connected with a wheel 30, which is driven by the main driving-wheel of the machine in any appropriate manner. 31 indicates a flexible tube connected with said air-pump 28 and with a tube 32, which opens into blowers 33, mounted in the frame of the machine and having their openings 34 located near the forward end of the pile of sheets and just above the top of the pile of sheets 50. As soon as the pneumatic picker 19 engages the lead end of the top sheet and a vacuum is caused therein it at once, by the pressure of the air below it, rises and lifts the sheet. The movement of the air-pump 28 is so timed that as soon as the picker 19 is fairly lifted, as above described, a blast of air is blown, as indicated in Fig. 9, underneath the top sheet, and being directed toward the rear of

the pile, as shown in said Fig. 9, the blast tends to free the entire under surface of the top sheet from the sheet immediately below it. The raising of the picker is also insured by the operation of positively-acting guides 35, which bear upon said picker. As these guides are identical in their construction and operation with those shown in said Letters Patent No. 588,451, it is unnecessary to describe them here. As said above, the operation of the cam 12 is so timed that its circular portion 24 begins to bear upon the cam-roller 14 as soon as the picker 19 at the extreme rearward limit of its motion has dropped upon and engaged with the lead end of the top sheet. As the cam continues its rotation the circular portion of said cam continues to bear upon the roller 14 during an appropriate portion of the rotation of said cam. The picker 19 is therefore not carried forward as long as the cam-roller 14 bears upon said circular portion 24 of the cam 12, and as the picker 19 begins to rise as soon as the vacuum is formed it is held with the lifted sheet at its extreme rearward limit of motion for a short period of time, giving the air-blast, above described, time to operate and free the sheet from the sheets below it before the pickers mounted upon the carriage 16, as above described, move forward to feed the sheet into the press. The exact proportion which the circular surface 24 should bear to the entire cam-surface will vary with different machines and different qualities of work done, but I have found that about the proportions represented in Fig. 1 are efficient for general work. These proportions may, however, be varied, the essence of the operation lying in the fact that the picker is held suspended at the extreme rearward limit of its motion for a short space of time before the feeding of the sheet forward is begun in order to give the air-blast time to efficiently operate, as above described. As the cam 12 rotates in the direction indicated by the arrow in Fig. 1, the roller 14 leaves the circular portion 24 and enters upon the cam portion of the cam, and the carriage 16 is moved forward, carrying the pickers 19, with the sheet held thereto by the air-pressure, as above described, until the lead end of the sheet is carried between the feed-rolls hereinafter described. At this moment by the operation of the valves, (which as I have said above is the same as that described in my prior patent, No. 588,451,) the air is allowed to enter the pneumatic pickers, the vacuum shut off, and the sheet falls freed from the pickers. At the same moment by the operation of the cam the carriage carrying the pickers is moved backward to its first position and the operation repeated.

36 indicates cams keyed to the shaft 11.

37 indicates pulleys journaled upon pins 38, secured to the lower ends of upright rods 39, which are slidingly mounted in the frame 10.

40 indicates a cross-bar secured to the upper ends of the rods 39.



41 indicates a rock-shaft journaled in the frame 10.

42 indicates arms adjustably secured to the rock-shaft 41 by means of set-screws 43.

5 44 indicates friction-pulleys which are journaled upon the inner or rear ends of the arms 42.

45 indicates a drawing or feeding roller which is journaled in the frame 10 and is driven by a sprocket-chain 46 from a driving-pulley 47.

48 indicates guides which are secured to the cross-bar 40 and project backward over the drawing or feeding roller 45 and have their rear ends turned upward to act as guides for the lead end of the sheet, as is best shown in Figs. 4 and 5.

It will be seen that the friction-pulleys 44 normally rest by their own weight upon the feed-rollers 45 and, rotating therewith by frictional contact in the direction indicated by the arrows in Figs. 4 and 5, feed forward the sheet of paper that is fed between them.

As the cams 36 rotate in the direction indicated by the arrow, they operate by bearing upon the pulleys 37 to lift said pulleys, and with them the rods 39 and the cross-bar 40, which, bearing upon the under side of the arms 42, raises the friction-pulleys 44 away from the feed-roller 45. The cams 36 are so arranged and timed that the friction-pulleys 44 are lifted away from the feed-roller 45 just as the pickers 19 thrust the lead end of the sheet between them, the guides 48 assisting in guiding the sheet in proper position. As soon as the lead end of the sheet is between the friction-pulleys 44 and the feed-roller 45 and is released from the pickers 19, as above described, the operation of the cams 36 is such as to at once allow the pulleys 37 to drop back into their normal position, causing the friction-pulleys 44 to assume their normal position, and by their frictional contact urge forward the sheet between the friction-pulleys 44 and the feed-roller 45. The friction-pulleys 44 and feed-roller 45, moving the sheet forward, deliver it upon tapes or to any other desirable mechanism, which, varying with the purpose for which the sheets are delivered, it is not necessary to show.

It will be noted that the sheets to be delivered are piled upon a table 49, which is of the same general character as that described in said Letters Patent No. 557,279. The pile of sheets 50, resting upon the table 49, is best shown in Figs. 4 and 9; but as the structure

and operation of the table are in general of the well-known type described by me in said Letters Patent it is unnecessary to describe it in detail here.

In this specification I have used the words "forward," "backward," "front," and "rear." The word "forward" wherever it occurs is to be understood as meaning the direction toward the right of Fig. 1; "rearward" or "backward," the direction toward the left of Fig. 1; "front," the direction toward the right of Fig. 1; "rear," the direction toward the left of Fig. 1.

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

1. In a pneumatic sheet-feeding machine, the combination with a reciprocating carriage, a pneumatic picker mounted upon said carriage, and means for automatically controlling the air-pressure in said picker, of mechanism adapted to reciprocate said carriage and to temporarily hold said carriage stationary at its rearward position before moving it forward, substantially as described.

2. In a pneumatic sheet-feeding machine, the combination with a reciprocating carriage, an extensible pneumatic picker mounted on said carriage and adapted to engage with the surface of a sheet of paper, means for automatically controlling the air-pressure in said picker, and means for automatically raising said picker as soon as it engages with the sheet, of mechanism adapted to reciprocate said carriage and to temporarily hold it stationary at its rearward position before moving it forward, substantially as described.

3. In a pneumatic sheet-feeding machine, the combination with a reciprocating carriage, an extensible pneumatic picker mounted on said carriage and adapted to engage with the surface of a sheet of paper, means for automatically controlling the air-pressure in said picker, and means for automatically raising said picker as soon as it engages with the sheet, of mechanism adapted to reciprocate said carriage and to temporarily hold it stationary at its rearward position before moving it forward, and means for blowing a blast of air under the sheet while said carriage is held in its rearward position, substantially as described.

GEORGE F. LEIGER.

Witnesses:

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