

No. 854,040.

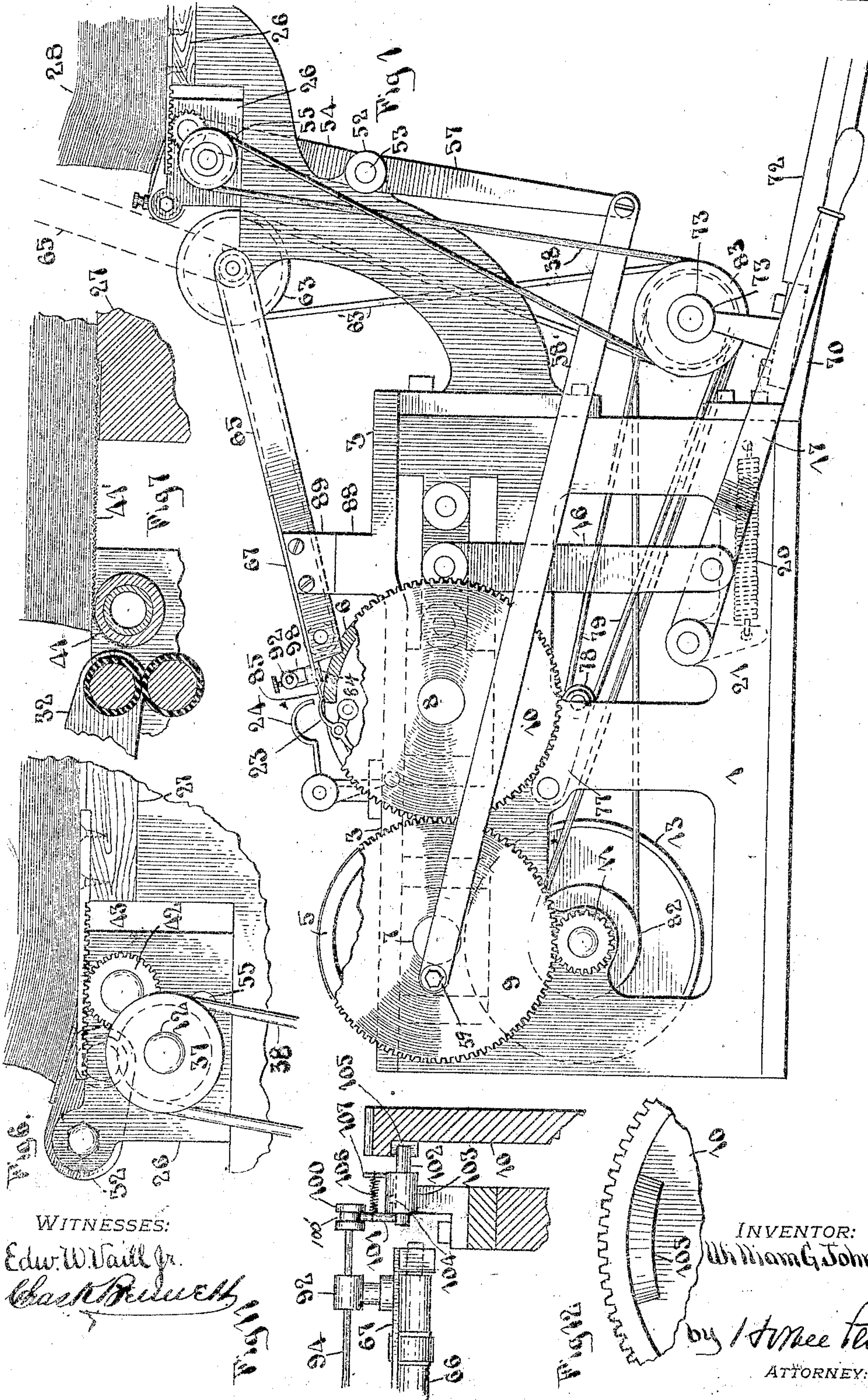
PATENTED MAY 21, 1907.

W. G. JOHNSTON.

MECHANISM FOR FEEDING SHEET MATERIAL.

APPLICATION FILED JUNE 8, 1903.

3 SHEETS—SHEET 1.



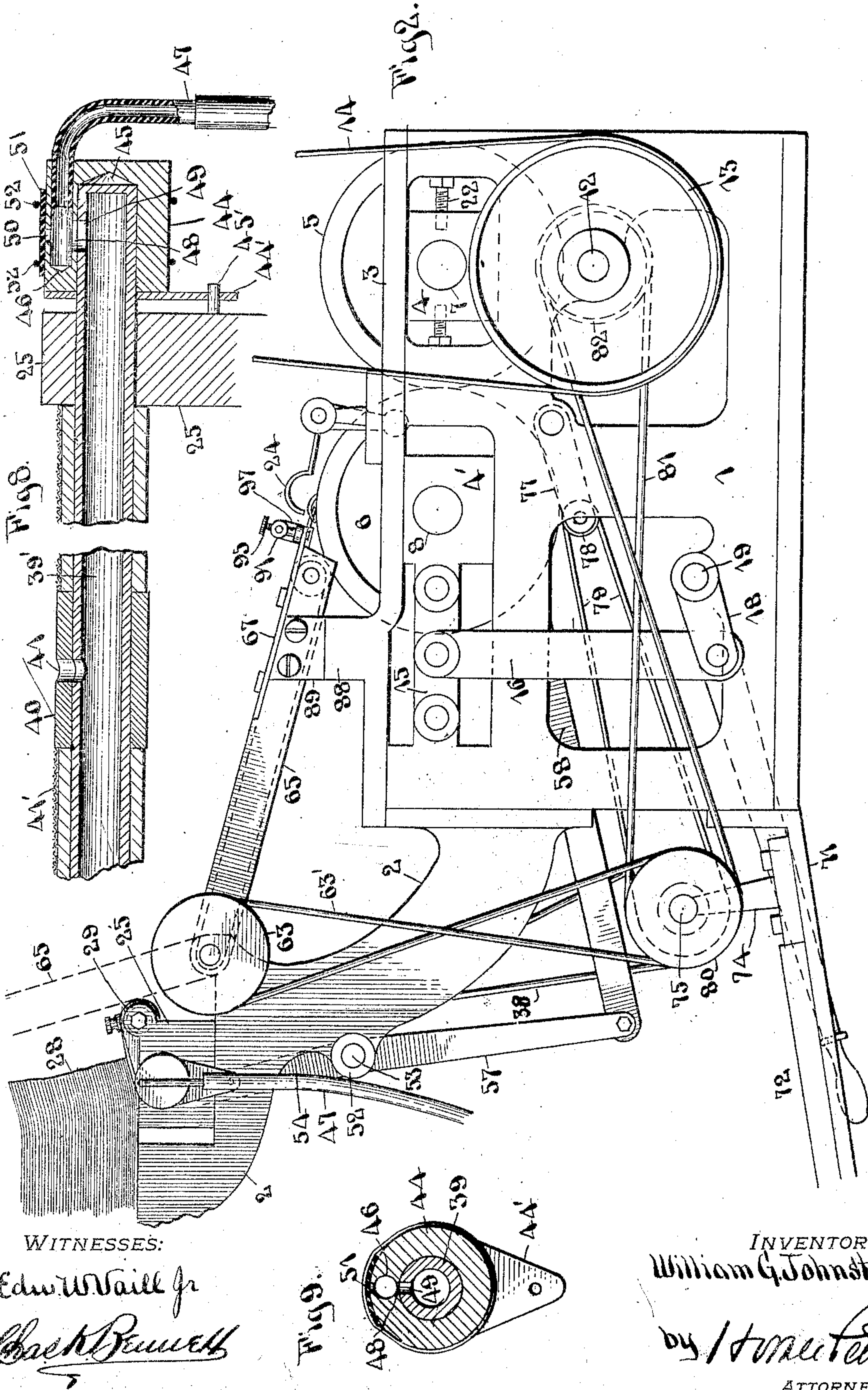
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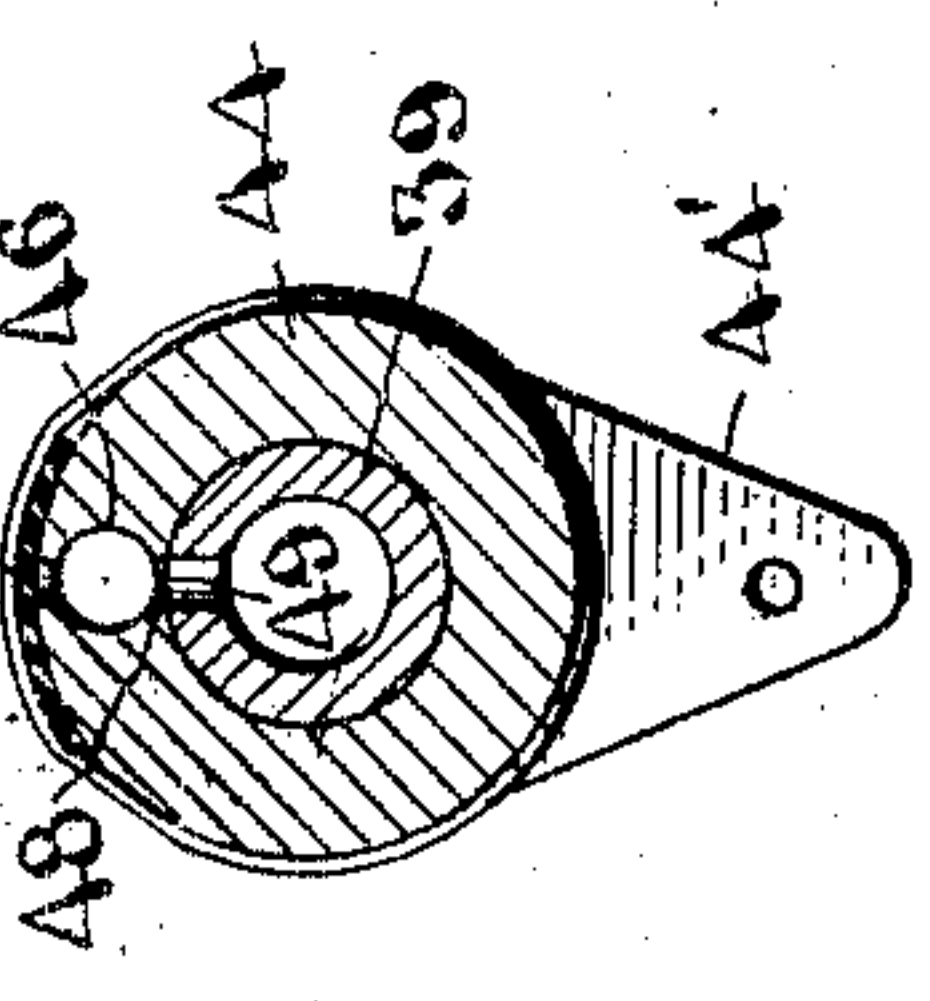
3 SHEETS—SHEET 2.



WITNESSES:

Edw. W. Vaile Jr.
Chas. R. Bennett

Fig. 9.



INVENTOR:
William G. Johnston.
By *Wm. G. Johnston*
ATTORNEY:

No. 854,040.

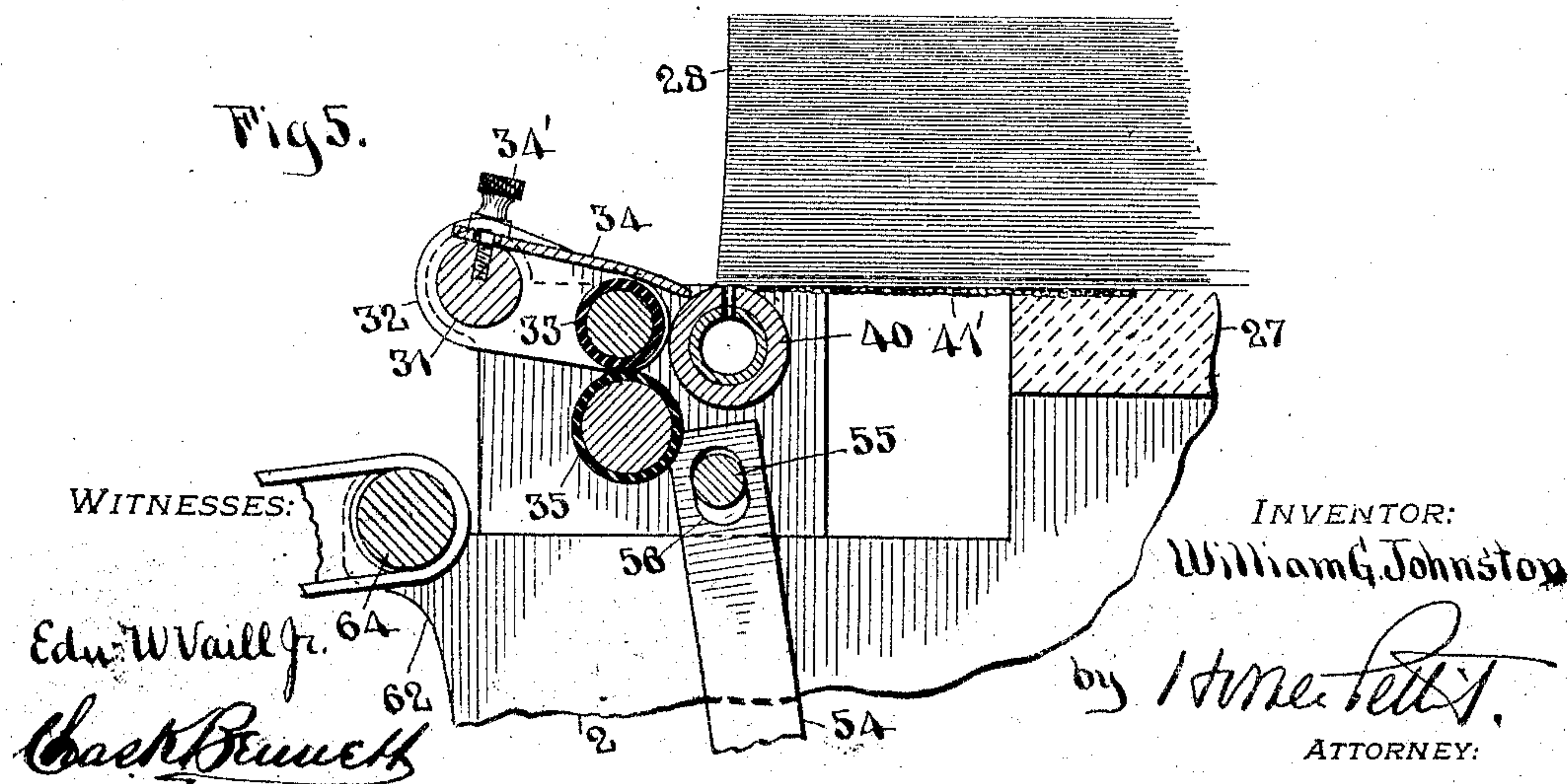
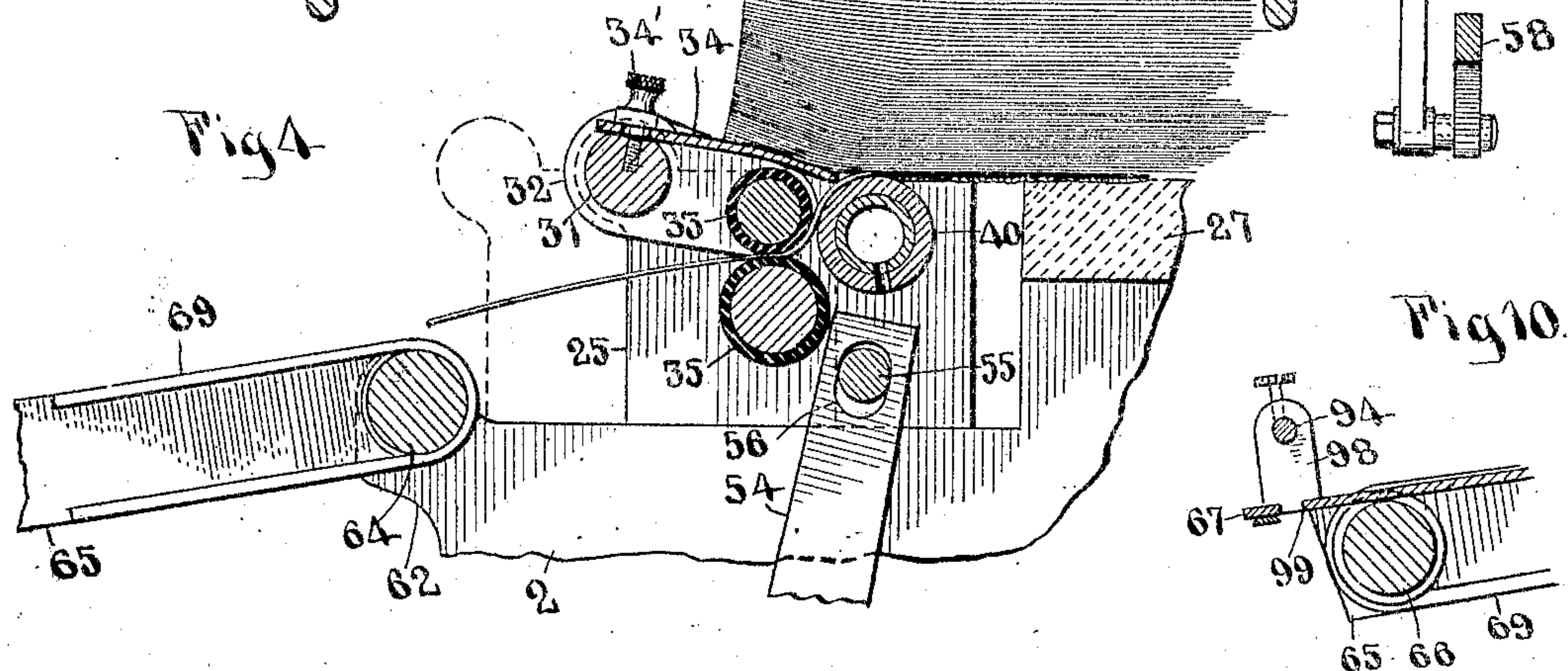
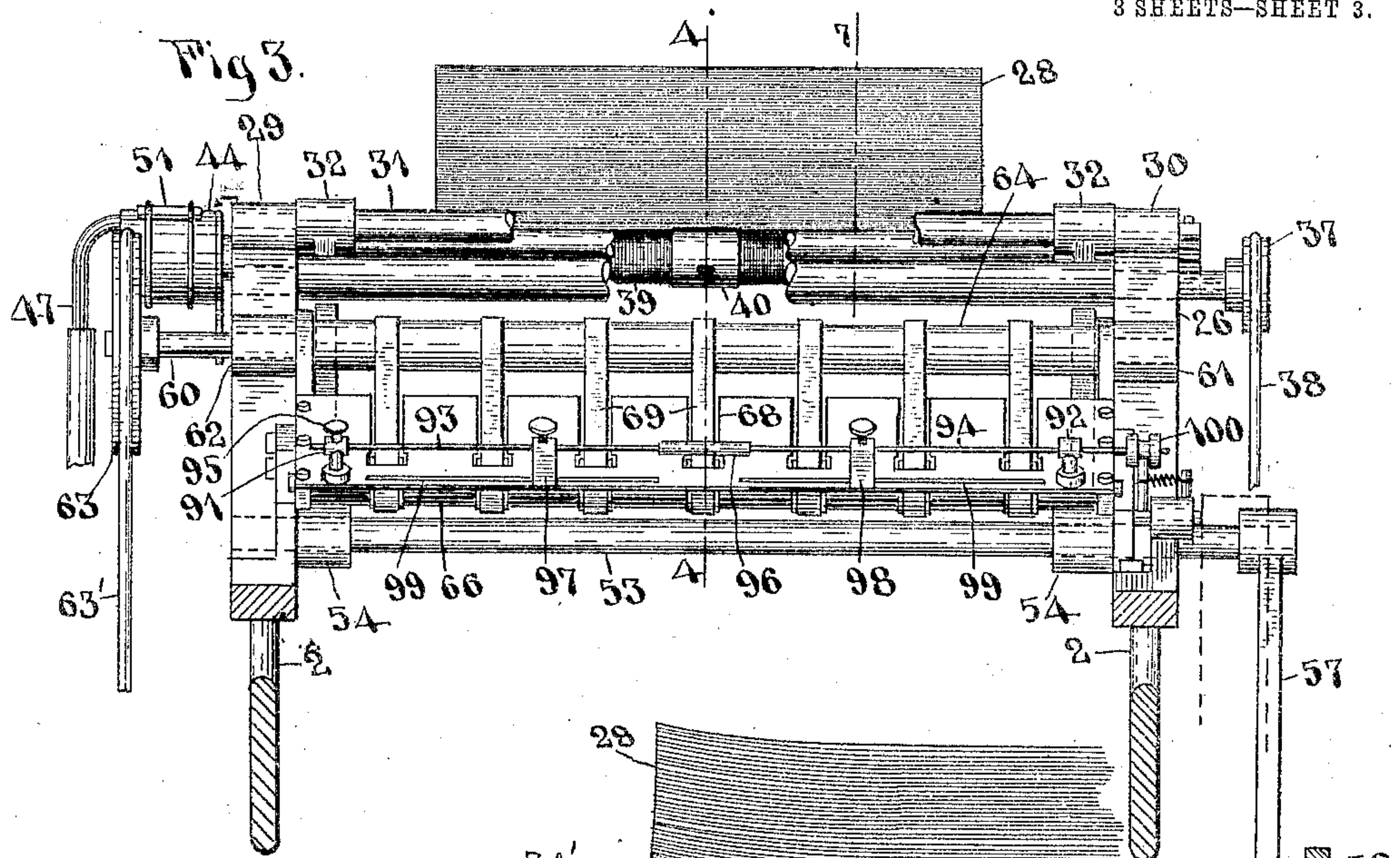
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APPLICATION FILED JUNE 8, 1903.

3 SHEETS—SHEET 3.



UNITED STATES PATENT OFFICE.

WILLIAM G. JOHNSTON, OF WOODBURY, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE AMERICAN PAPER GOODS COMPANY, OF KENSINGTON, CONNECTICUT, A CORPORATION OF NEW JERSEY.

MECHANISM FOR FEEDING SHEET MATERIAL.

No. 854,040.

Specification of Letters Patent.

Patented May 21, 1907.

Application filed June 8, 1903. Serial No. 160,530.

To all whom it may concern:

Be it known that I, WILLIAM G. JOHNSTON, a citizen of the United States, and a resident of Woodbury, State of New Jersey, have invented certain new and useful Improvements in Mechanism for Feeding Sheet Material, of which the following is a specification.

My invention relates to feed-mechanism having a wide range of adaptability in connection with machines of various kinds in which sheet-material may be operated on to produce goods of different character, and while shown employed with a printing-press is limited to no specific use.

Primarily, the object of my invention is the provision of improved feed-mechanism for advancing a sheet to a machine which will operate thereon.

Other objects of the invention are the provision of improvements in various elements of said feed-mechanism including a rotary-picker working on the suction principle, and operating to detach a sheet from a pile, a reciprocatory support for said picker, and continuously-driven mechanism of any suitable character for advancing the sheet to the machine with which the feed-mechanism may be employed.

Other objects of the invention will be set forth in the following description:

In the accompanying drawings, Figure 1 is a side elevation of one of the many kinds of machines, (for instance a cylinder printing-press), having my improvements applied thereto; Fig. 2 a side elevation of the opposite side of the same machine; Fig. 3 a front elevation of the improved feed-mechanism; Fig. 4 a sectional view taken substantially upon the line 4—4, Fig. 3; Fig. 5 a sectional view taken upon the same line, but showing the parts in different positions; Fig. 6 a side elevation of the reciprocating portion of the feeding-mechanism, showing the means for oscillating the picker; Fig. 7 a sectional view taken substantially upon the line 7—7 of Fig. 3; Fig. 8 a longitudinal sectional view of the picker and its controlling valve; Fig. 9 a transverse section of the controlling valve, shown in Fig. 8; Fig. 10 an elevation of the end of the feeding-bands and the supports for the rectifying device; Fig. 11 an elevation, partly in section, showing the details of the

mechanism for operating the rectifying-device; and Fig. 12 an elevation of the cam for operating the rectifying-device.

Like numerals designate similar parts throughout the several views.

In the drawings the numeral 1 indicates plates forming the frame at opposite sides of the machine, said frame carrying at one end the supports 2, on which the feeding mechanism and the table 27 for carrying the pile of sheets to be printed are mounted. Upon the tops of the side frames 1 longitudinal bars 3 are provided for retaining the cylinder bearings, 4, 4' in position, and also for supporting other parts of the mechanism. A printing cylinder 5 is journaled in one set of bearings 4, while the paper-carrying cylinder 6 is retained in the other set of said bearings 4'. Upon the outer ends of the shafts or studs, which form the journals 7 and 8, for the cylinders 5 and 6, respectively, are secured intermeshing gears 9 and 10, the gear 9, of which, is adapted to mesh with a small gear 11, carried upon the driving shaft 12, which driving-shaft also carries a pulley 13, driven by a belt 14. The bearings 4' for the cylinder 6 are slidably mounted in the frame plate 1, and are adapted to be reciprocated by means of toggles 15. These toggles are operated by the links 16, which are connected to the lever 17 and to the crank arm 18, respectively, carried by the transverse shaft 19, and said links are normally held in raised position by means of a spring 20, which at one end is fastened to the machine frame 1, and at its other extremity is attached to an arm 21 carried by the shaft 19.

To regulate the pressure of the printing-plate upon the paper the bearings of the printing-cylinder are made adjustable by means of screws 22. Usual cam-operated gripping-fingers 23 are carried by cylinder 6, and oscillating guide-fingers 24, which are cam-operated, are located above said cylinder 6.

On horizontal portions of the supports or brackets 2, slidable bearing-blocks 25 and 26 are reciprocable, the upper portions of these blocks being substantially on a line with the upper surface of the table 27, upon which the pile of paper 28 to be printed is placed.

Secured within projections 29 and 30 at the upper inner corners of the bearing-blocks 25 and 26 are the ends of a horizontal rod 31, and adjacent to said ends and within the projections are mounted for arcuate movement the arms or links 32, each having at its free end a bearing for the rubber-covered roll 33. A plate 34 is adjustably attached to the rod 31 at its central portion by a thumb screw 34', and is inclined downward so that its lower edge will pass beneath the lowest sheet of the pile of paper when the reciprocatory blocks 25 and 26 are moved toward said pile. Beneath the roll 33, a second rubber-covered roll 35 is provided, which also has bearings in the blocks 25 and 26, and one of the journals 35' of which extends through the block 26, and is adapted to carry a grooved pulley 37 adjacent to its end, which is driven by a belt 38, to which power is communicated by means hereinafter to be described. At the rear of the roll 33 is a tubular shaft 39, which also has bearings at each end in the slidable blocks 25 and 26. On this shaft rigid therewith and constituting an enlargement of its central portion is a sleeve 40 constituting a picker for detaching the lower-most sheet from the pile, said sleeve being provided with a port 41, which communicates through an opening 39' with the bore 39' of said shaft. At each side of the sleeve 40 the shaft 39 is provided with other sleeves A and A' rigid therewith and slightly less in diameter than said sleeve 40. These sleeves constitute enlargements of the shaft 39, and while shown separate therefrom and rigid therewith may be made integral with said shaft if desired. To the peripheries of said sleeves A and A' one end of a flexible apron 41' is attached, the other end of said apron being secured to the table 27, as indicated in Fig. 7, and said apron is divided at its central portion to permit it to wind about the sleeves A, A' without interfering with the picker 40 of the shaft 39. Upon an extension of the shaft 39, which is journaled in the block 26, is fixed a small gear or pinion 42, which is adapted to mesh with a rack 43, which is fixed to the table 27. It will therefore be seen that as the blocks 25 and 26 reciprocate, the shaft 39 carrying picker 40 will be oscillated through the action of the gear 42, and the fixed rack 43. At the opposite end of the tubular shaft 39 is attached an automatic valve 44, which is shown most clearly in Figs. 8 and 9. This valve 44 consists of a cylindrical block having an axial chamber 45 within which the end of the shaft 39 is adapted to pass, said cylindrical block 44 being also provided with a smaller longitudinal chamber 46, within which fits one end of a suction-tube 47.

Any suitable exhausting device may be connected with the suction-tube 47 for creating a suction or vacuum and may be located at any convenient part of the machine

or at another place. A port 48 connects the chamber 45 with the chamber 46, and there is also a similar port 49 in the shaft 39 which communicates with the opening 48 when said shaft is in the requisite position to cause the said openings to register. There is also a small port 50 which connects the chamber 46 with the exterior of the block 44 and said port is covered with a flexible flap or valve 51, which is held in position in any suitable manner, as by elastic bands 52. The opening 50, with the flap 51, forms a relief valve, which allows air to enter the hollow shaft 39, should the suction therein become too great for efficient operation. A projection 44' is attached to one end of the block 44, and is adapted to engage with a pin 45' attached to the block 25, as shown in Fig. 8. By these means, the valve 44 is held in a fixed position, while the end of the shaft is adapted to oscillate within the chamber 45 to open and close communication between the chamber 46 and the interior of the shaft 39, as the ports 48 and 49 are brought into and out of the register.

Upon the rear portion of the brackets 2, journal boxes 52 are provided, which carry a horizontal shaft 53, and on this shaft 53 are fixed two upwardly-extending arms 54, which engage a bar or rod 55 connecting the blocks 25 and 26. Slots 56 are provided in the upper ends of the arms 54 to permit slight play of the arms with relation to said rod. A downwardly-extending arm 57 is also fixed to the shaft 53, and is connected at its lower end to a link 58, which is articulated to a wrist-pin 59 carried by the gear 9, in virtue of which it will be seen that as said gear 9 rotates the link 58 will be reciprocated and will in turn oscillate the arm 57, shaft 53, and the arms 54, thereby imparting reciprocatory movements to the blocks 25 and 26 and the rolls 33, 35, and 40 journaled therein with relation to the pile of sheets 28.

A shaft 60 journaled in the projections 61, 62 of the brackets 2 carries at one end a grooved pulley 63, and the central portion of said shaft constitutes a grooved roll 64. Adjacent the projections 61 and 62 of the brackets 2, and upon the shaft 60, are pivoted the side-bars 65, within the lower or inner ends of which is journaled a second grooved roll 66. A plate 67 also connects the lower ends of these side-bars, and said plate has slots 68 therein, into which pass the conveying bands 69, which are carried in the grooves of the rolls 64 and 66.

Attached to the plate 67 are supports 91 and 92, said supports having openings through which pass two sections 93 and 94 of a horizontal rod, the section 93 being adapted to be held firmly in a support 91 by a thumb-screw 95, while the section 94 passes slidably through the support 92. A sleeve 96 connects the adjacent inner ends of the sections

93 and 94 of the horizontal rod, said sleeve being fixed to the section 93, but slidably retaining the end of the section 94. Upon the sections 93 and 94 of the horizontal rod, are adjustably mounted guides or stops 97 and 98, said stops having projections which extend into a slot or slots 99 in the plate 67. At its outer end the section 94 is provided with a head 100, grooved at 100' to receive a vertical pin 101, said pin being carried by a horizontal rod 102, supported in a fixed bearing 103 of the frame. Said rod 102 is adapted to slide in said bearing 103, but is prevented from turning therein by a key-and-slot connection 104. Upon the gear 10 is cast or otherwise secured a cam-shaped projection 105, which is adapted to engage the outer end of the rod 102 and force the same inward at each rotation of said gear 10. A spring 106 is attached to the pin 101 at one end, while the other end of said spring is connected to a pin 107 fixed to the bearing 103, said spring serving to retract the rod-section 94 and to keep the rod 102 in position to engage the cam-projection 105, (see Fig. 11).

To the lower portion of the plates 1 of the frame are attached inclined bars 70 and 71, which carry on their upper sides a receiving table 72, and also the supports of two journal-bearings 73 and 74, a shaft 75 being journaled in these bearings, and provided at its central portion with a grooved roll 76. Beneath the cylinder 6, and pivoted upon the frame-plates 1, are supports 77, which carry at their lower end a grooved roll 78, within the grooves of which, and the grooves of the roll 76, are placed the traveling conveying-bands 79. Upon one end of the shaft 75 is provided a grooved pulley 80, which is connected by means of the cross-belt 81 with the grooved pulley 82 fixed on the main shaft 12. On the opposite end of the shaft 75 it carries another grooved pulley 83, which is connected by belt 38 with the grooved pulley 37 before described. Projections 88 rise from the bars 3, and are adapted to cooperate with the corresponding lugs or blocks 89, which are attached to the side-bars 65, to thus afford a support for the lower ends of the conveying bands 69 and the roll 66, in proper position in relation to the cylinder 6.

The plate 67 is of such a length as to project slightly over the lower ends of the bars 65, and said projecting portion is provided with a dove-tail part 84, which carries adjustable fingers 85, which come very close to the surface of the paper-carrying cylinder 6, and which engage the ends of the guide-fingers 24, when the latter are lowered toward the cylinder 6. These parts are usually provided for controlling the paper in cylinder printing-presses, and therefore do not require further explanation.

In the operation of my invention a pile of

paper or other sheets to be printed is placed upon the table 27 in such position that one edge of the pile will be located substantially over the axis of the tubular shaft 39, when the blocks 25 and 26 are at their extreme outward limit of motion, as shown in Fig. 5, thus permitting the port 41 to come directly beneath the end of the lower sheet of the pile by reason of the fact that the gear 42 of the shaft 39 is adjusted with relation to the rack 43 to bring said port into such position. Suction produced in the shaft 39 is then made effective by means of the valve-block 44, the openings 48 and 49 registering with each other when the picker 40 is in the position, shown in said Fig. 5. This suction causes the lowest sheet of the pile to adhere to the surface of the picker 40, and as the shaft 39 and said picker rotates in a contra-clockwise, (see Fig. 5) direction said sheet is drawn forward and downward, while at the same time the blocks 25 and 26 begin to move inward. When the lower sheet has been drawn downward so that its edge comes approximately opposite the line of contact of the rolls 33 and 35 the suction within the shaft 39 ceases, because the ports 48 and 49 of said shaft and valve-block no longer register, thus releasing the sheet and permitting the same to pass between said rubber-covered rolls 33 and 35. Should the suction become greater than is necessary to draw the lower sheet of the pile downward, air will leak in beneath the flap 51 and thus relieve the same. These rubber-covered rolls are continuously driven by the belt 38, and they grip the sheet and because of the higher speed at which they are run, rapidly project said sheet forward from beneath the pile and place it upon the conveying bands 69. While this has been taking place the blocks 24 and 25 have been moving toward the rear and the plate 34 has passed over the edge of the sheet of paper which is being withdrawn. Before the opening 41 of the shaft 39 has again come to a position adjacent to the pile of sheets by its oscillation due to a forward movement of the blocks 25 and 26, the sheet which was first withdrawn has left the rolls 33 and 35 and continues on its course toward the printing cylinder. After leaving the rolls 33 and 35, the sheet is dropped on the conveying-bands 69 and is carried downward until its forward end abuts against the stops 24, which are then in contact with the fingers 85, and immediately after the sheet has assumed this position the stop 98 is given a slight inward movement and pushes the sheet up to the adjustable stop 97, thus perfectly alining the sheet with the form upon the printing-cylinder, so as to have the printing matter accurately placed upon the surface of the sheet. Immediately after the sheet has been alined or rectified, the gripping-fingers 23 pass over the edge of the

sheet, while at the same time the stops 24 are raised out of the path of the sheet, and as the cylinder 6 rotates the sheet is brought into contact with the printing-cylinder 5 and the impression made. Thereafter the printed sheet continues its downward movement, and when its forward end is above the conveying-bands 79, the gripping-fingers 23 are caused to release their hold in the usual manner, which allows the sheet to drop on said bands 79 and to be conveyed to the receiving table 72.

Should it be desired for any reason to stop the impressions being made by the printing-cylinder, the lever 17 may be raised, and by means of the toggles 15 and the connecting parts, the cylinder 6 will be moved slightly away from the cylinder 5.

It will be noticed by the construction above described, that many advantages and functions are attained, which have heretofore not been embodied in automatic printing-presses. By having the frame and rolls for supporting the conveying-bands 69, pivoted so as to be movable about the shaft 60, said frames may be raised to the position shown in dotted lines in Fig. 1, thus permitting the cylinder 6 to be entirely unobstructed, and therefore the same can be "made ready" before the press is started in the printing operation, without displacing or disconnecting any parts of the machine. This operation of "making ready" consists in applying thin pieces of paper to the surface of the cylinder 6, at such points as are too low to give the requisite amount of pressure to make a clear and distinct impression, and it is therefore required that access to the surface of the cylinder may be easily obtained and entirely unobstructed.

A further advantage of the construction set forth is that all parts are simplified and made more accessible, while at the same time the capacity of the machine in the number of sheets per hour printed is greatly increased.

By providing the guiding or rectifying-blocks 97 and 98, the sheet is positively and accurately located in position to receive the impression immediately before it is placed upon the pressure cylinder 6.

I do not wish to be limited to the details of forms and arrangements of parts herein set forth, for changes may be made in the use of equivalents and in other ways, without departing from the spirit or scope of my invention.

While a suction-picker is shown for detaching and feeding the sheets from the bottom of the pile, the invention is not limited thereto, and by slight modifications the mechanism may be arranged to feed from the top of the pile; nor is the invention limited to the precise arrangement of operating mechanism shown, and described, for various modifications may be made that will be with-

in the purview thereof. So too, the form of the picker may be varied, and the mechanism may be arranged in vertical, horizontal or other desired positions without departure from the invention.

Having thus described my invention what I claim is:

1. In sheet-feeding mechanism, a suction roll, means for reciprocating said suction-roll, means for oscillating said roll upon its axis and an axially fixed valve-casing carried by said roll and having a passage adapted to register with an opening in said suction-roll, when the latter is in one position for controlling the suction of said roll.

2. In sheet-feeding mechanism, slidable blocks or bearings, a suction-roll journaled in said bearings, means for reciprocating said bearings, and a valve-casing carried by said roll and fixed to one of said blocks for intermittently controlling the suction of said roll.

3. In sheet-feeding mechanism, a suction-roll carried in reciprocating bearings, means for oscillating said roll, means for reciprocating said bearings, a valve-casing mounted upon said suction-roll, means for preventing said casing from oscillating, a secondary chamber or opening in said valve-casing, said valve-casing and said suction-roll having openings, which are adapted to register with each other, to connect said secondary chamber with the interior of said suction-roll, and means for producing suction in said secondary chamber.

4. In sheet-feeding mechanism, an oscillating, hollow suction-roll therefor, a valve casing carried by said roll, means for preventing said casing from turning upon its axis, a secondary chamber in said valve-casing, said chamber and hollow roll having openings communicating with each other when the roll is in a predetermined position, and means for producing suction in said chamber.

5. In sheet-feeding mechanism, reciprocating bearing-blocks, an oscillating suction-roll carried by said bearing-blocks, rotating feed rolls also carried by said bearing-blocks, means for oscillating said suction-roll, means for reciprocating said bearing-blocks, and means for continuously rotating said feed-rolls.

6. In sheet-feeding mechanism, reciprocating bearing-blocks, a suction-roll carried thereby, means for oscillating said suction-roll, a valve carried by said suction-roll for intermittently and automatically controlling the suction therein, feed-rolls carried by said bearing-blocks, means for rotating said feed-rolls, means for delivering the sheets to be printed from said feed-rolls to the printing-mechanism.

7. In sheet-feeding mechanism, bearing-blocks, means for reciprocating said bearing-blocks, an oscillating suction-roll carried by

said bearing-blocks, means for oscillating said suction-roll, feed rolls also carried by said bearing-blocks, a pulley carried by one of said feed-rolls and a driving-belt cooperating with said pulley.

8. In sheet-feeding mechanism, an automatic valve, comprising a casing having a main chamber, a secondary chamber therein having an opening communicating with said first-named chamber, and an opening communicating with the exterior of the casing, a flexible flap over said last-named opening, and means for preventing said valve-casing from rotating.

9. The combination, with a sheet support for a pile of sheets, of a picker for detaching one of the sheets from the pile, a reciprocatory device carrying said picker, means for actuating said picker on said device to cause it to seize and deliver a sheet, and means carried by said device for advancing a sheet delivered by said picker.

10. The combination, with a table for receiving a pile of sheets, of a picker having a port, a shaft having a bore, and a port registering with the port of the picker, means for applying suction to the shaft, means for reciprocating the shaft, means for rotating the shaft, and feed-mechanism to which the sheet is delivered by said picker.

11. The combination, with a table for receiving a pile of sheets, of a sliding support, means for reciprocating said support, feed-rolls carried by the support, means for continuously-driving said feed-rolls, and a picker for detaching a sheet from a pile and delivering it to said feed-rolls.

12. The combination, with a table for receiving a pile of sheets, of a movable support, means for actuating said support, feed-rolls carried by the support, means for continuously rotating the feed-rolls, a pneumatic-picker for detaching a sheet from the pile and delivering it to the feed-rolls, and means for actuating said pneumatic picker.

13. The combination, with slides, and with means for simultaneously reciprocating said slides, of feed-rolls movable with the slides, means for continuously rotating the feed-rolls, a table for receiving a pile of sheets, and means carried by the slides for detaching a sheet from the pile and delivering it to said continuously-rotating feed-rolls.

14. The combination, with a stationary table for a pile of sheets, of a pneumatic picker for seizing a sheet from the pile, reciprocatory support for said picker, means for rotating the picker, a separator on said support and cooperating with the picker, and feed-rolls for advancing the sheet delivered by the picker.

15. The combination, with a sheet-support of a rotary picker, a reciprocatory device for supporting said picker, a separator movable in synchronism with the picker-

supporting device, and feed-mechanism carried by said reciprocating device, and to which the sheet is delivered by the picker.

16. The combination, with a support, for a pile of sheets, of a picker, a reciprocatory support for said picker, means for actuating the picker in an arcuate path as it is reciprocated, a separator cooperating with said picker to remove a sheet from the pile, and feed-devices carried by said reciprocatory support for receiving the sheet delivered by the picker.

17. The combination, with a table for receiving a pile of sheets, of a sliding support, means for reciprocating said support, feed-rolls carried by the support, gearing for continuously-driving said feed-rolls, and a picker for detaching the sheet from the pile and delivering it to said feed-rolls.

18. The combination, with a sliding support, of feed-rolls carried by said support, a table for receiving a pile of sheets, a pneumatic picker also carried by said support, and a separator cooperating with the picker to detach a sheet from the pile.

19. The combination, with a table for supporting a pile of sheets, of a shaft, a picker carried by said shaft, a gear on the shaft, means for reciprocating the shaft, a rack with which the gear on the shaft engages, and a separator carried by the shaft-reciprocating means, and cooperating with the picker.

20. The combination, with a table for supporting a pile of sheets, of a tubular shaft having a port, a pneumatic picker rigid with the shaft, and having a port, means for reciprocating the shaft, rack-and-gear mechanism for actuating said shaft, a separator movable in synchronism with said shaft, and cooperating with the picker, and feed-mechanism to which the sheet is delivered.

21. The combination, with a tubular shaft having a port, of a pneumatic-picker rigid with the shaft, a separator, means for simultaneously actuating the shaft and separator, and feed-mechanism cooperating with the picker.

22. The combination, with a table for receiving a pile of sheets, of a picker, a sliding support for said picker, means for rotating the picker, a driving shaft, gearing actuated by said shaft, feed-rolls actuated by the gearing, and means actuated by the driving-shaft for operating the sliding support.

23. The combination, with a table for the reception of material, of a support, feed-rolls carried by said support, a picker carried by the support, means for continuously rotating the feed-rolls, means for reciprocating the support, and means for independently operating said picker to cause it to remove material from the table, and deliver it to the feed-rolls.

24. The combination, with a table for re-

ceiving a pile of sheets, of a suction picker reciprocable beneath said pile, and serving to detach the lower sheet therefrom, means for actuating said picker, feed-rolls, means for continuously rotating said feed-rolls, a separator cooperating with the picker, and means for adjusting said separator.

25. The combination, with a table upon which a pile of sheets is placed, of a pair of slides, means for simultaneously reciprocating said slides, feed-devices carried by said slides, a picker also carried by the slides, a separator movable in synchronism with the slides, and means for actuating the picker to cause it to detach a sheet from the pile and deliver said sheet to the feed-devices.

26. The combination, with a table for the reception of a pile of sheets, of suction and feed-devices for detaching and feeding a sheet from the pile, means for simultaneously reciprocating said devices, means for actuating said devices in proper timing with relation to each other, and a separator movable in synchronism with said devices.

27. The combination, with a table for supporting a pile of sheets, of slides mounted on ways of the frame, a shaft journaled in said slides, a picker carried by the shaft, a pinion on the shaft, a rack with which said pinion engages, means for simultaneously reciprocating the slides, feed-rolls carried by the slides, and means for continuously rotating said feed-rolls.

28. The combination with a sheet-support,

of a rotary device for taking the sheet from the support, means for actuating said device, a reciprocatory-support and continuously-driven mechanism carried by said reciprocatory-support for seizing and advancing the sheet delivered by said device.

29. The combination, with a stationary support for a pile of sheets, of a movable device for detaching the bottom sheet of the pile, a reciprocatory-support for said device, and feed-rolls carried by the reciprocatory-support for seizing the sheet delivered by said device.

30. The combination, with a support for a pile of sheets, of a picker for detaching a sheet from the pile, a reciprocatory support for the picker, means for rotating the picker, and continuously-driven rolls carried by the reciprocatory support for seizing the sheet delivered by said picker.

31. The combination, with a support for a pile of sheets, of a device for seizing one of the sheets of said pile, a reciprocatory support for said device, a separator cooperating with said device, and feed-mechanism carried by said reciprocatory support, and to which the sheet is delivered by said device.

In witness whereof I have hereunto set my hand this 11th day of May, A. D., 1903.

WILLIAM G. JOHNSTON.

Witnesses:

JOHN F. GRADY,
EDW. W. VAILL, Jr.