

(No Model.)

3 Sheets—Sheet 1.

J. T. HAWKINS.

SHEET DELIVERY MECHANISM FOR PRINTING MACHINES.

No. 389,650.

Patented Sept. 18, 1888.

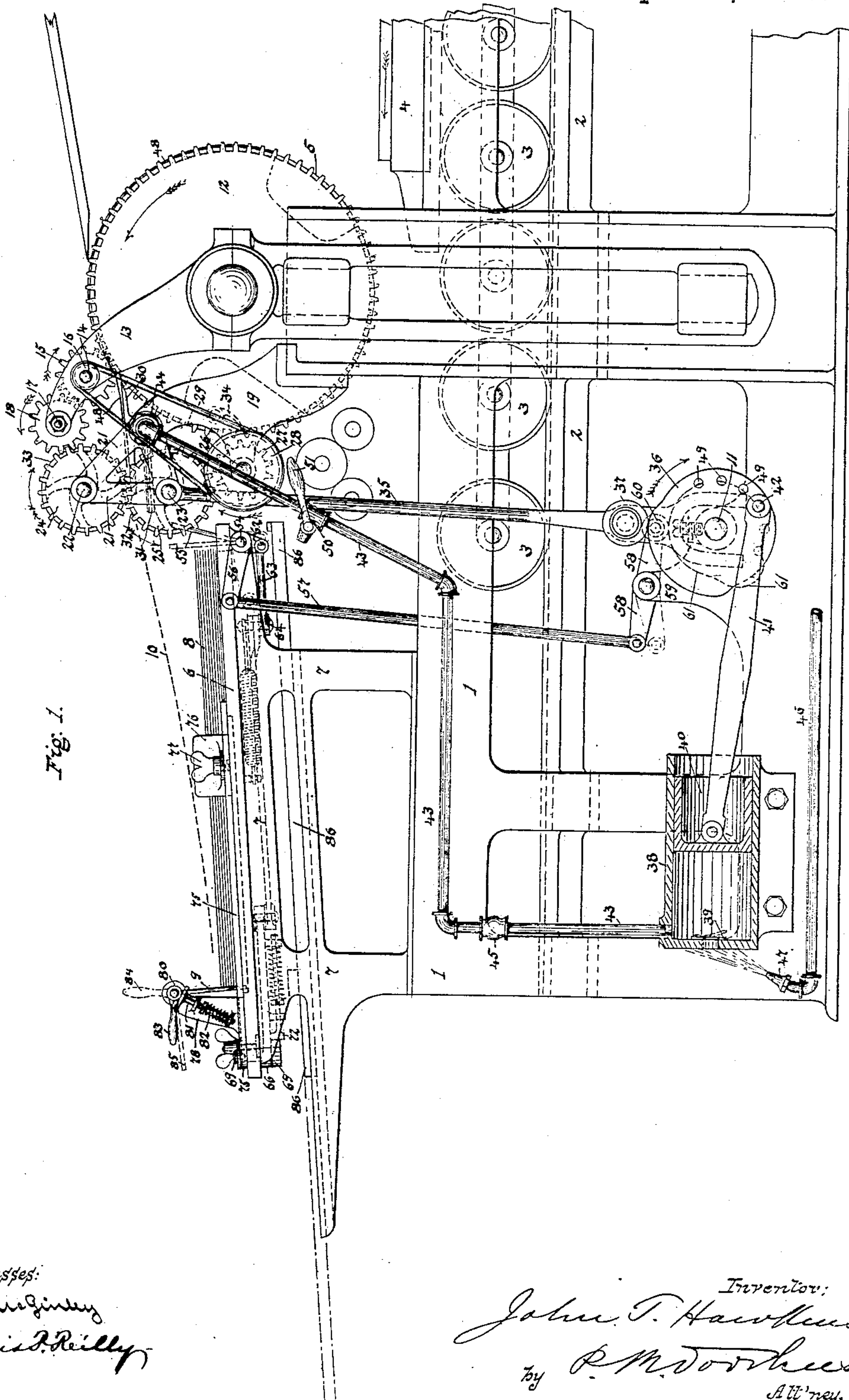


Fig. 1.

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Francis P. Reilly

Inventor:

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by R. M. Dorrance

Att'y.

(No. Model.)

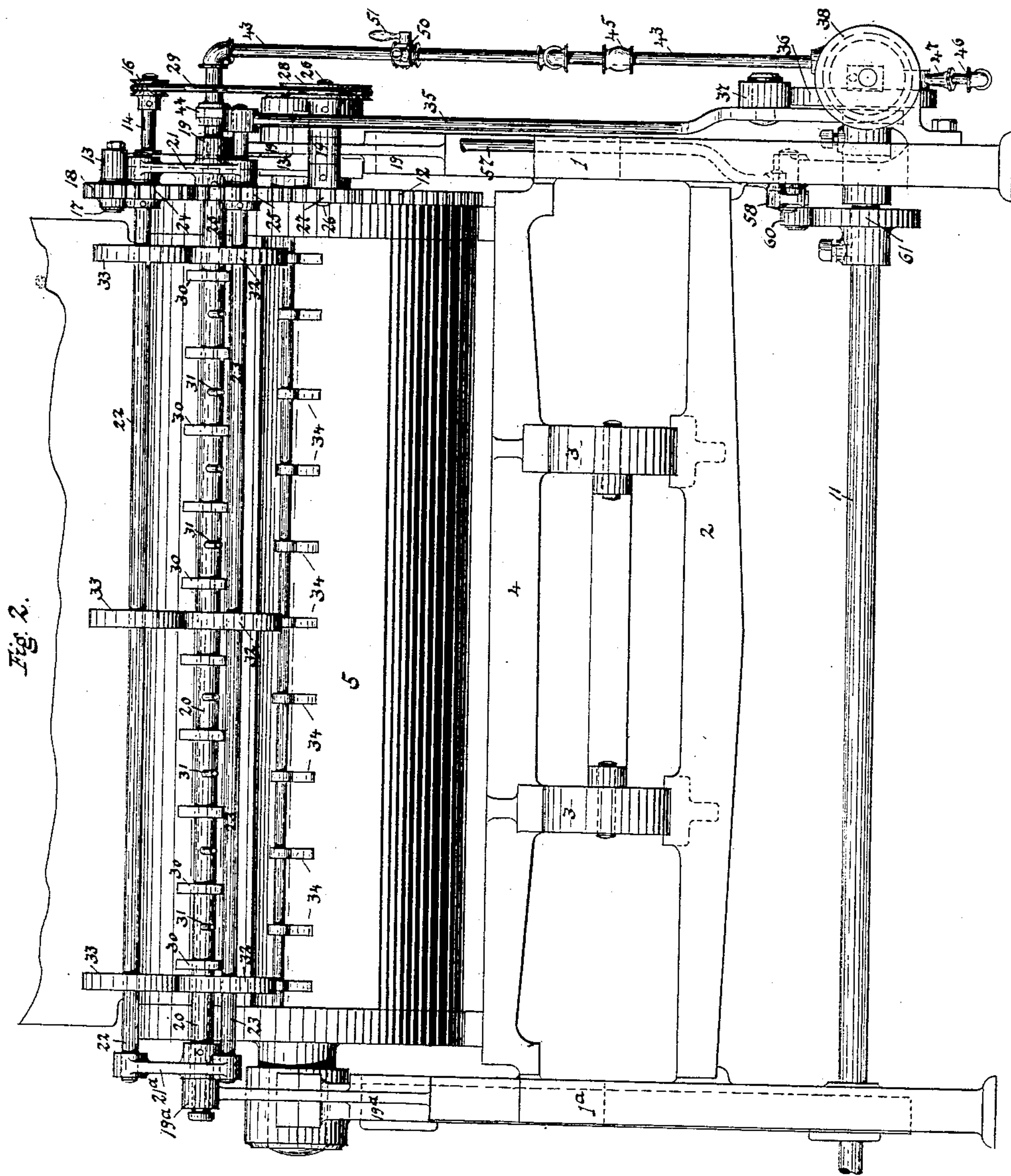
3 Sheets—Sheet 2.

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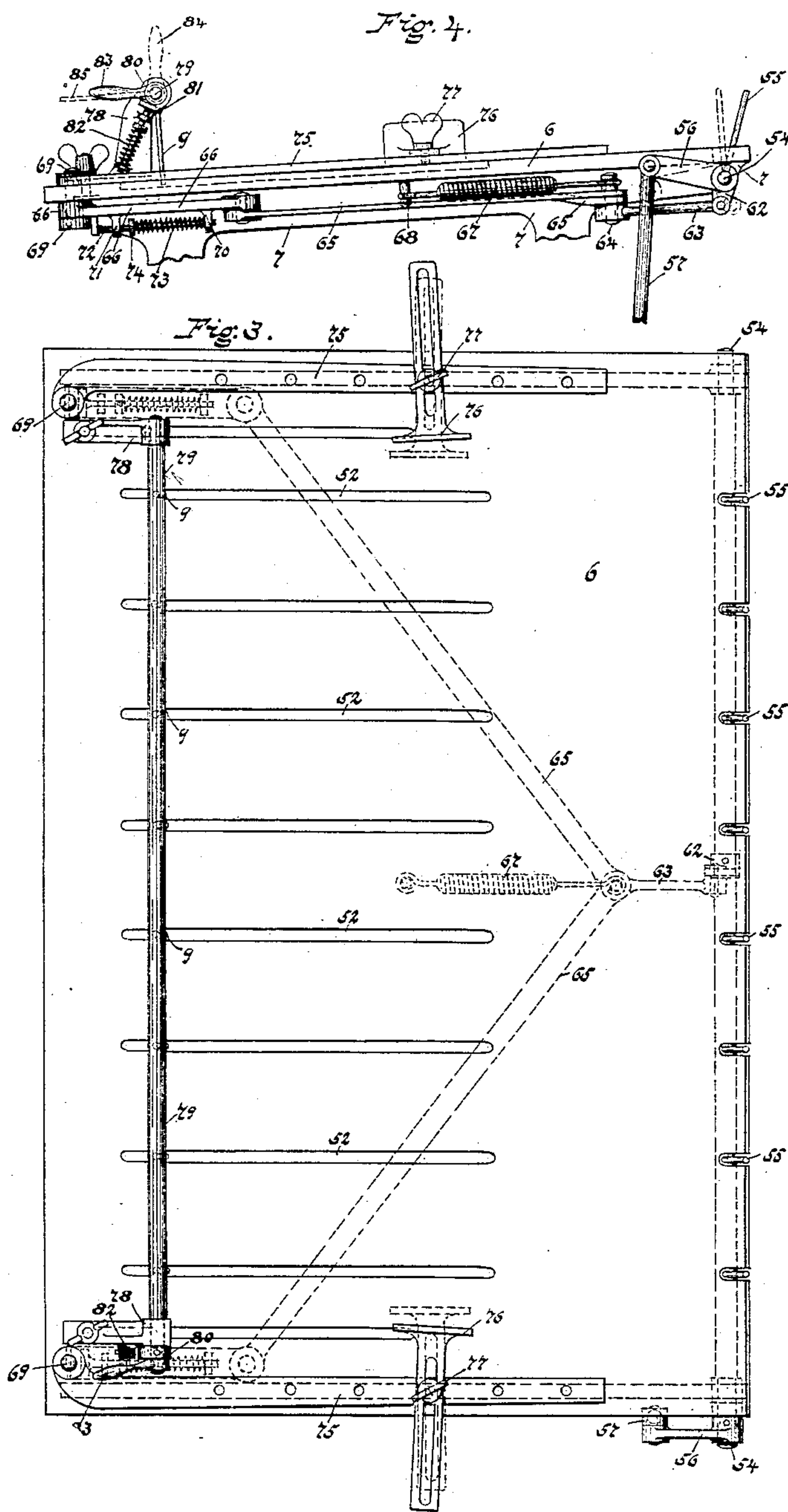
3 Sheets—Sheet 3.

J. T. HAWKINS.

SHEET DELIVERY MECHANISM FOR PRINTING MACHINES.

No. 389,650.

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# UNITED STATES PATENT OFFICE.

JOHN T. HAWKINS, OF TAUNTON, MASSACHUSETTS.

## SHEET-DELIVERY MECHANISM FOR PRINTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 389,650, dated September 18, 1888.

Application filed March 3, 1887. Serial No. 229,524. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN T. HAWKINS, of Taunton, in the county of Bristol and State of Massachusetts, have invented certain new and  
5 useful Improvements in Sheet-Delivery Mechanisms for Printing-Machines, which invention is fully set forth and illustrated in the following specification and accompanying drawings.

The object of this invention is to provide a  
10 sheet-delivery which shall place the sheets, after printing, in an even pile upon a receiving-board with the last printed side uppermost, to do this in a manner that shall avoid contact of the printed portions of the said last  
15 printed side with any part of the mechanism after leaving the form, to have the receiving-board so placed that the sheets may be readily observed by the feeder as they are deposited, to control and arrest the motion of the sheet  
20 through the air after leaving the surface of the impression cylinder by the tail or following edge, to disperse the static electricity from the sheets when electrified and to provide means of automatically evening up the pile of sheets  
25 on the board, and to permit of the printed sheets being removed from the receiving-board with facility at the end or either side of the receiving-board without stopping the machine.

In most of the devices of recent origin for  
30 delivering the sheet from the top of the impression-cylinder of a printing-press making more than one revolution to an impression the sheets are taken from said cylinder and carried along to the place of deposit by their  
35 leading edges, which renders it difficult to control the following parts of the sheet when these operations are performed at any considerable speed. It is therefore desirable to bring  
40 a sheet moving with considerable velocity through the air, to a state of rest before allowing it to drop at its final place of deposit by resistance offered to its following instead of its leading edge, under which circumstances the momentum of the sheet tends to straighten  
45 it out, where, if arrested or retarded by its leading edge, the tendency is to double it up or cause it to be deposited irregularly by the following parts overtaking the leading edge.

Some varieties of paper, particularly in the  
50 winter season, are or become in the printer's hands, more or less highly charged with static electricity, which causes them to adhere to

parts of the delivery mechanism, and to thus obstruct proper delivery. It has been found in practice that such electrical obstruction  
55 can best be overcome by causing a moist current of air to impinge upon the sheets at the proper time.

For the accomplishment of the ends above mentioned, my invention consists of a series  
60 of stripper-fingers for receiving the sheet from the impression cylinder and a series of driving or delivery wheels or pulleys, of which the upper ones run only on unprinted margins of the sheets, so driven that while the  
65 sheet is passing from the impression-cylinder said upper pulleys run at the same surface velocity as the impression-cylinder, and thereafter are retarded so as to reduce the velocity  
70 of the sheet until it finally passes out from between them, held and controlled at this slow velocity by its following edge.

To support the sheet from contact with the previous sheets deposited while passing out from the delivery-wheels, jets of air are caused  
75 to be projected under the advancing sheet, and to disperse any electricity which may exist on the surfaces of the sheets so passing out provision is made for dampening the air forming these jets.  
80

In the accompanying drawings, Figure 1 is a side elevation, and Fig. 2 an end elevation, of so much of a two-revolution cylinder printing-press as is essential to the illustration of the invention. Fig. 3 is a view in plan, and  
85 Fig. 4 a side elevation, of the receiving-board and its attachments.

In Fig. 2 the receiving-board, with its supports, is omitted in order to more clearly show the remaining parts.  
90

In said drawings the several parts are indicated by numbers as follows:

1 and 1<sup>a</sup> are the main frames of the machine.

2 is a member constituting the bed roller-ways; 3, the bed-rollers; 4, the type-bed; 5,  
95 the impression-cylinder; 6, the receiving-board, supported on suitable framing, 7.

8 is a pile of paper already deposited on the board 6.

The numbers 9 indicate sheet stops, herein-  
100 after more fully described, so constructed as to be adjusted in position to suit different lengths of sheets to be printed.

The dotted line 10 shows a sheet just passed



out of the delivery-pulleys and settling down upon the previous pile of sheets.

11 is a shaft extending across the press and journaled in both frames, driven by any suitable means, so as to make one revolution to each complete evolution of the machine, or in this case one revolution to each two revolutions of the impression-cylinder 5. Secured to cylinder 5 is a gear-wheel, 12, whose pitch-line corresponds to the printing surface of the cylinder. Forming a projection upward from the upper half of the cylinder journal-box is a bracket, 13, in which is journaled a short shaft, 14, carrying on its inner end a spur-pinion, 15, and on its outer end a belt-pulley, 16. The pinion 15 engages the cylinder-gear 12. Running freely on a stud, 17, secured in the extremity of bracket 13, is an intermediate or idler pinion, 18, meshing with the pinion 15.

In a bracket, 19, secured to frame 1, is journaled a hollow shaft, 20, extending across the press and journaled in another bracket, 19<sup>a</sup>, corresponding to 19. Secured at one of its angles to shaft 20 is a triangular bracket, 21. In the other two angles of bracket 21 are journaled the shafts 22 and 23, these shafts being journaled at their other ends in a triangular bracket, 21<sup>a</sup>, similar to 21, also secured to shaft 20. Upon shaft 22 is secured a spur-gear, 24, and upon shaft 23 a similar spur-gear, 25, engaging each other. Journaled in bracket 19 is a short shaft, 26, to whose inner end is secured a spur-pinion, 27, and on its outer end a belt-pulley, 28. Running upon the pulleys 16 and 28 is the belt 29. Secured to shaft 20 are stripper-fingers 30, and at intervals between them short tubes or perforations 31 are inserted in shaft 20, communicating with its hollow interior. Secured to shaft 23 are a series of pulleys, 32, and to shaft 22 two or more pulleys, 33, whose surfaces are to be placed to engage corresponding pulleys 32.

34 are the grippers of cylinder 5. Cylinder 5 is also supplied with sheet-lifter fingers in a well-known way, not necessary to be shown, and omitted to prevent complication of the drawings, these being for the purpose of elevating the head of the sheet to enter upon the stripper-fingers at the time of the opening of the grippers 34.

The mechanism for operating the grippers 34 is not shown, as it is not essential to this invention, such operation being performed in many well-known ways.

Shaft 23 is also journaled at its end in the upper end of a cam-rod, 35, whose lower end is bifurcated to embrace the hub of a cam, 36, which is secured to shaft 11. The cam-rod 35 carries a roller, 37, engaging the working-edge of cam 36. The cam 36 is so formed and set on the shaft 11 as to oscillate the shaft 20 with its brackets 21, shafts 22 and 23, and pulleys 32 and 33, blast-tubes 31, and stripper-fingers 30, so that the gear 24 may for that part of the time during which the sheet is passing between pulleys 32 and 33, and any portions of it remain upon the cylinder 5, engage gear 18, and

thus the pulleys 32 and 33 be driven at a surface velocity uniform with that of the surface of cylinder 5. During said passage of that part of the sheet remaining on the stripper-fingers 30 after its tail edge has left the cylinder 5, through or between the pulleys 32 33, the gear 25 will also be caused to engage the gear 27 and elevate the receiving-points of the stripper-fingers away from the cylinder 5 to permit of the passage of the succeeding sheet down to the form to be printed. The pulleys 16 and 28 are so proportioned as to give a velocity to shafts 23 and 24 as much slower as may be desired when the gear-wheel 25 engages 27 than when the gear 24 engages 18, thus retarding the progress of the sheet during the passage of its following end through and between pulleys 32 and 33.

Secured to frame 1 is a single-acting air-pump, 38, with a valve, 39, in the bottom opening upward. To the plunger 40 of this pump is articulated a connecting-rod, 41, which is articulated at the other end to a crank-pin, 42, inserted in the face of the cam 36. A pipe, 43, leading from the bottom of the air-pump 38, is connected at its upper end through a union, 44, with the hollow shaft 20, so as to permit said shaft to oscillate, as described, without disturbing said pipe; or the pump 38 and hollow shaft 20 may be connected in part by a flexible tube, as may be most convenient. A check-valve, 45, is placed in the pipe 43 to insure the entrance of air into the pump 38 through the valve 39. A pipe, 46, conveys steam or water from any convenient source of supply and ends in a jet-nozzle, 47, from which a slight escape of steam or a spray of water may be permitted whenever it may be necessary to moisten the air projected from the tubes 31, the steam or water so escaping from nozzle 47 entering through the valve 39 upon the outward stroke of the plunger 40. The end of the hollow shaft 20, which is journaled in the bracket 19<sup>a</sup>, is of course plugged to prevent escape of air therefrom.

48 is a sheet in process of delivery.

49 are holes in cam 36 for placing the crank-pin in different relations to the rise of the cam 36.

50 is an escape-valve, operated by the handle 51, by which the force of the air-blast may be regulated by the feeder.

52 are grooves in the receiving-board, to permit of the ends of the sheet-stops 9 passing below its surface, so that the first sheets delivered shall not pass under them.

In the brackets 7 is journaled a rock-shaft, 54. Inserted in or secured to rock-shaft 54 at intervals are evener-fingers 55, moving in corresponding slots in the receiving-board 6. On one end of rock-shaft 54 is secured a lever, 56, to which is articulated, at one end, a rod, 57. At its lower end rod 57 is articulated to a lever, 58, which is fulcrumed at or near its center in a bracket, 59, secured to or forming a part of frame 1. The free end of lever 58 carries a roller, 60, which engages the face of



a cam, 61, secured to shaft 11 inside of frame 1. At about the center of shaft 54 is secured a short lever, 62. Articulated at one end to lever 62 is a short rod, 63. Articulated to a common pivot, 64, is the other end of the short rod 63, and one end of each of two connecting-rods, 65. The other ends of connecting-rods 65 are each articulated to the free ends of a lever, 66. Articulated also to the common pivot 64, at one end, is a helical tension-spring, 67, which at the other end is secured to a stud, 68, secured in the under side of the receiving-board 6. The levers 66 are each journaled at their fulcrumed ends upon a stud, 69, having one side of the head flattened. Sliding in lugs 70 and 71, projecting from levers 66, are spring-rods 72, carrying at one end T-heads, engaging the flattened parts of the heads of studs 69. Helical springs 73 and a collar, 74, serve to press the T-heads of the rods 72 against the flattened sides of studs 69. The studs 69 are journaled in the receiving-board 6, and secured to the upper face of the receiving-board 6 are levers 75. Adjustably secured by thumb-screws 77 to levers 75 are slotted sheet eveners or guides 76, which may be secured to levers 75 in different positions in one direction, and adjusted by the slots in their shanks in the other direction to accommodate them to the different sizes of sheets. Adjustably secured to the upper face of the receiving-board 6 are two brackets, 78, in which is journaled a rock-shaft, 79. Inserted in rock-shaft 79, or secured to it at intervals, are the sheet-stops 9. At one end of shaft 79 is secured a collar, 80, flattened on one side similar to the heads of studs 69. A T-headed spring-rod, 81, and spring 82, similar to 72 and 73, serve to hold the sheet-stops 9 in a position at right angles to the face of the board 6 by the T-head engaging the flattened side of the collar 80. Outside of collar 80 a handle, 83, is secured to shaft 79, by means of which the sheet-stops 9 may be thrown up out of the way, as shown in dotted lines 84 and 85, Figs. 1 and 4, whenever it may be desired to remove a pile of sheets from the board toward the end of the press. Whenever it may be more convenient to remove the sheets at the side of the machine, either of the levers 75, with its sheet-guides 76, may be turned out of the way horizontally, similarly to the sheet-stops 9, as permitted by the concentric parts of the heads of the studs 69 compressing the spring 73. Either lever may be quickly returned to its place, which will always be determined by the flattened part of the heads of studs 69. The auxiliary receiving-board 86 may be slid in under the receiving-board 6 when not in use, as shown in full lines, Fig. 1, and drawn out, as shown in dotted lines of the same figure to receive temporarily a pile of paper drawn off the receiving-board 6.

The operation of the invention is as follows:  
In the drawings the positions of the parts are such that a sheet, 48, has just passed upon the stripper-fingers 30 and is about to enter be-

tween the pulleys 32 and 33, the remainder of the sheet lying in contact with the cylinder 5. In this position the cam 36, through intervening mechanism already described, has just caused gear 24 to engage gear 18, and the pulleys 32 and 33 are therefore driven at the same surface velocity as that of the impression-cylinder or moving sheet. At this time the cam 61 is in such position that the roller 60 is upon its lower concentric part, and through the mechanism already described the evener-fingers 55 are inclined toward the impression-cylinder and the side guides drawn outward to receive the sheet, all as shown in full lines, Figs. 1, 3, and 4. During the passage of the sheet from this position the crank-pin 42, being properly placed, causes the plunger 40 to compress the air in the chamber 38, and projects jets of air from the tubes or orifices 31, these jets passing under the sheet being delivered over the pile of sheets 8. Continuing the motion of the parts in the direction indicated by the arrows until the tail of the sheet has reached the stripper-fingers 30, the cam 36 will have reached a position to allow the roller 37 to drop upon its lower concentric surface, the gear 24 will leave engagement with gear 18, gear 25 will become engaged with gear 27, and the receiving-points of the stripper-fingers 30 be removed from proximity with the cylinder 5, so as to allow for the clear passage of the succeeding sheet to be printed. This action slows down the velocity of the sheet as held between the pulleys 32 and 33, and at this period the plunger 40 will have reached the bottom of the chamber or pump 38, and the air-jets from the tubes or orifices 31 will cease, the sheet from this point settling down upon the pile 8, while its following end slowly passes out from between the pulleys 32 and 33, its progress being finally arrested by the stops 9. The cam 61 is so timed upon its shaft that during the last settling down of the sheet upon the pile 8 the evener-fingers 55 and side sheet guides, 76, will be brought by the rise of the cam, through the mechanism already described, momentarily into the position shown in dotted lines, Figs. 1, 3, and 4, inclosing the sheets on all four sides and bringing them to lie on the board in an even pile. It will be understood that for very short sheets or stiff paper the air-jets may not be necessary, in which case the air-pump may be disconnected.

I do not confine myself to the exact mechanism described for actuating the pulleys 32 and 33 at different velocities, as this may be done by the substitution of friction-gearing, in place of the toothed gearing shown, and in other different ways—as, for instance, pulley 28 might be driven by a belt from a pulley secured to shaft 11 to get the slower motion—and this entire mechanism may be varied to suit the particular form of press to which it may be applied. Nor do I confine myself to the construction shown for actuating the pump 38, as this may be done in a great variety of ways as best suited to the particular style of



printing-press to which this invention may be applied. Nor do I confine myself to the exact mechanism shown for operating the eveners-fingers 55 and side guides, 76, as the proper motions may be given them in a number of ways, as may be best suited to the particular form of machine to which this invention may be applied.

Having thus fully described my said improvements as of my invention, I claim—

1. A sheet-delivery for a cylinder printing-machine, consisting of a series of stripper-fingers, as 30, a series of pairs of sheet-driving pulleys, as 32 and 33, and means for imparting variable velocity to said sheet-driving pulleys, consisting of connecting and disconnecting gearing, as 12, 15, 18, 22, 23, and 24, belt-pulleys 16 and 28, and belt 29, suitably mounted in stationary brackets, as 19 and 19<sup>a</sup>, and oscillating brackets, as 21 and 21<sup>a</sup>, automatically oscillated by suitable connection to a moving part of the machine, in combination with an impression-cylinder, as 5, and its gripper and sheet-lifting mechanism, and a receiving-board, as 6, and sheet-stops, as 9, whereby each sheet is delivered upon said stripper fingers, conveyed by and projected from between said driving pulleys for a portion of its whole length at the surface velocity of said impression-cylinder, and for a short final portion of its travel is retarded in velocity, while it is controlled by its following end confined between said driving-pulleys until released by them to settle upon said receiving-board as finally arrested by said sheet-stops, substantially as set forth.

2. In a cylinder printing-machine, in combination with an impression-cylinder, as 5, its gripper and sheet-lifting mechanism, a suitable receiving-board, as 6, and sheet-stops, as 9, a sheet-delivery consisting of a series of stripper-fingers, as 30, a hollow shaft, as 20, carrying tubes or perforations, as 31, from which jets of air may be projected under the advancing sheet, a series of pairs of sheet-driving pulleys, as 32 and 33, and means, substantially as described, for imparting variable motion to said sheet-driving pulleys, whereby each sheet to be delivered is first received upon the said stripper-fingers, conveyed by and projected from between said sheet-driving pulleys for a portion of its length at the surface velocity of the said impression-cylinder, the portion so projected supported by said air-jets, a last short portion of its travel retarded in velocity while it is controlled by its following end held by said driving-pulleys until released to settle upon said receiving-board, where, finally arrested by said sheet stops, each sheet is delivered last-printed side up in a pile upon said receiving-board without contact of its printed matter with any part of the mechanism, substantially as set forth.

3. In a sheet-delivery of a cylinder printing-machine, in combination with an impression-cylinder, as 5, its gripper and sheet-lifting

mechanism, a receiving-board, as 6, sheet-stops, as 9, and a series of stripper-fingers, as 30, a series of pairs of sheet-driving pulleys or wheels, as 32 and 33, driven variably by suitable mechanism, as described, a hollow shaft, as 20, carrying tubes or perforations, as 31, from which jets of air may be projected under the advancing sheet, and an air-pump, as 38, connected to said hollow shaft by a suitable pipe, as 43, and actuated so as to project air-jets from said tubes or perforations at the proper time to support the sheet from contact with the sheets previously delivered while passing out from between said sheet-driving pulleys, and thereafter ceasing to allow a sheet to settle upon the said receiving-board or upon the pile of previously-delivered sheets, whereby the sheets are delivered in a pile upon said receiving-board with their last-printed sides uppermost without contact of their printed matter with any part of the mechanism, substantially as set forth.

4. In the sheet-delivery of a cylinder printing-machine, in combination with an impression-cylinder, as 5, its gripper and sheet-lifting mechanism, a receiving-board, as 6, and sheet-stops, as 9, a series of stripper-fingers, as 30, a series of pairs of sheet-driving pulleys, as 32 and 33, driven variably by suitable mechanism, as described, a hollow shaft, as 20, carrying tubes or perforations, as 31, from which jets of air may be projected under the advancing sheet, an air-pump, as 38, connected to said hollow shaft by a suitable pipe, as 43, and actuated so as to project air-jets from said tubes or perforations at the proper times to support the sheet from contact with the sheets previously delivered while passing out from between said sheet-driving pulleys, and thereafter ceasing to allow a sheet to settle upon the said receiving-board or upon the pile of previously-delivered sheets, and a steam-jet or water-spray for supplying moisture to the chamber of said air-pump, whereby the sheets are delivered in a pile on the said receiving-board with their last-printed sides uppermost without contact of their printed matter with any part of the mechanism, and any static electricity resident in the paper dispersed by the moisture supplied to said air-jets, substantially as set forth.

5. In the sheet-delivery for a printing-machine, in combination with an impression-cylinder, as 5, its gripper and sheet-lifting mechanism, its receiving board, as 6, and sheet-stops, as 9, a series of stripper-fingers, as 30, a series of pairs of sheet-driving pulleys, as 32 and 33, a vibrating eveners finger or fingers, as 55, a pair of vibrating side guides, as 76, and mechanism, substantially as described, for operating said driving-pulleys, eveners-fingers and side guides, whereby the sheets are received from said impression-cylinder upon said stripper-fingers, driven to and projected upon said receiving-board by said driving-pulleys, and brought into an even pile upon said board by said eveners-fingers and said



guides with their last-printed sides uppermost and without contact of their printed matter with any part of the mechanism, substantially as set forth.

5 6. In the sheet-delivery for a cylinder printing-machine, in combination with an impression-cylinder, as 5, its gripper and sheet-lifting mechanism, its receiving-board, as 6, and sheet-stops, as 9, a series of stripper-fingers, as 30, a  
10 series of pairs of sheet-driving pulleys, as 32 and 33, a vibrating evener finger or fingers, as 55, a pair of vibrating side guides, as 76, mechanism, substantially as described, for operating said driving-pulleys, evener-fingers and  
15 side guides, and a series of air-jets, as 31, whereby the sheets are received from said impression-cylinder by said stripper-fingers, driven to and projected upon said receiving-board by said driving-pulleys, and brought into  
20 an even pile upon said receiving-board by said evener-fingers and side guides with the last-printed sides of said sheets uppermost and without contact of their printed matter with any part of the mechanism, substantially as  
25 set forth.

7. In a sheet-evener for a printing-machine, side guides, as 76, adjustably attached to vibrating levers, as 75, secured to fulcrum-studs, as 69, having heads flattened on one side, T-

headed spring-rods, as 72, sliding in lugs projecting from levers, as 66, journaled on said fulcrum-studs, and springs, as 73, pressing said T-headed rods against the heads of said fulcrum-studs, whereby said guides and the levers to which they are attached may be quickly  
35 thrown out of the way to permit of the removal of the sheets from said receiving-board and quickly returned to their proper positions, substantially as set forth.

8. In combination with a receiving-board of a printing-machine, an adjustable sheet-stop consisting of a rock-shaft, as 79, suitably journaled in brackets, as 78, a sheet-stop or series of stop-fingers, as 9, a collar or head, as 80, on one end of said rock-shaft, flattened on  
45 one side, a sliding T-headed spring-rod, as 81, a spring, as 82, and a suitable handle, as 84, secured to said rock-shaft, whereby the said sheet stop or stops 9 may be rotated out of the way for the removal of the sheets from said  
50 receiving-board and returned quickly to its or their original position or positions, substantially as set forth.

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