J. G. HARDIE.

SHEET FEEDING MACHINE.

APPLICATION FILED JAN. 21, 1919.

1,412,404.

Patented Apr. 11, 1922.

2 SHEETS—SHEET 1.

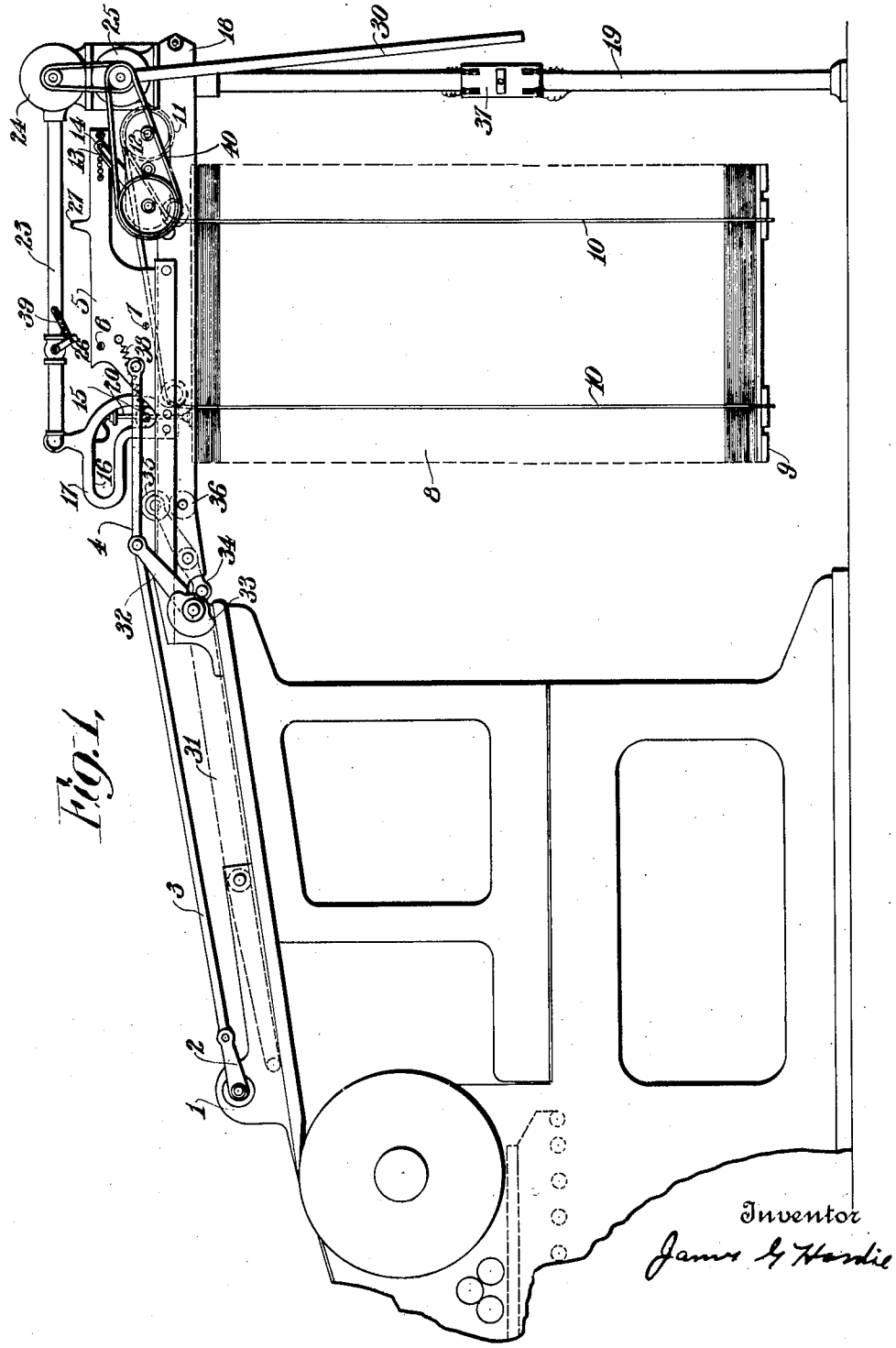


Fig. 1.

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2 SHEETS—SHEET 2.

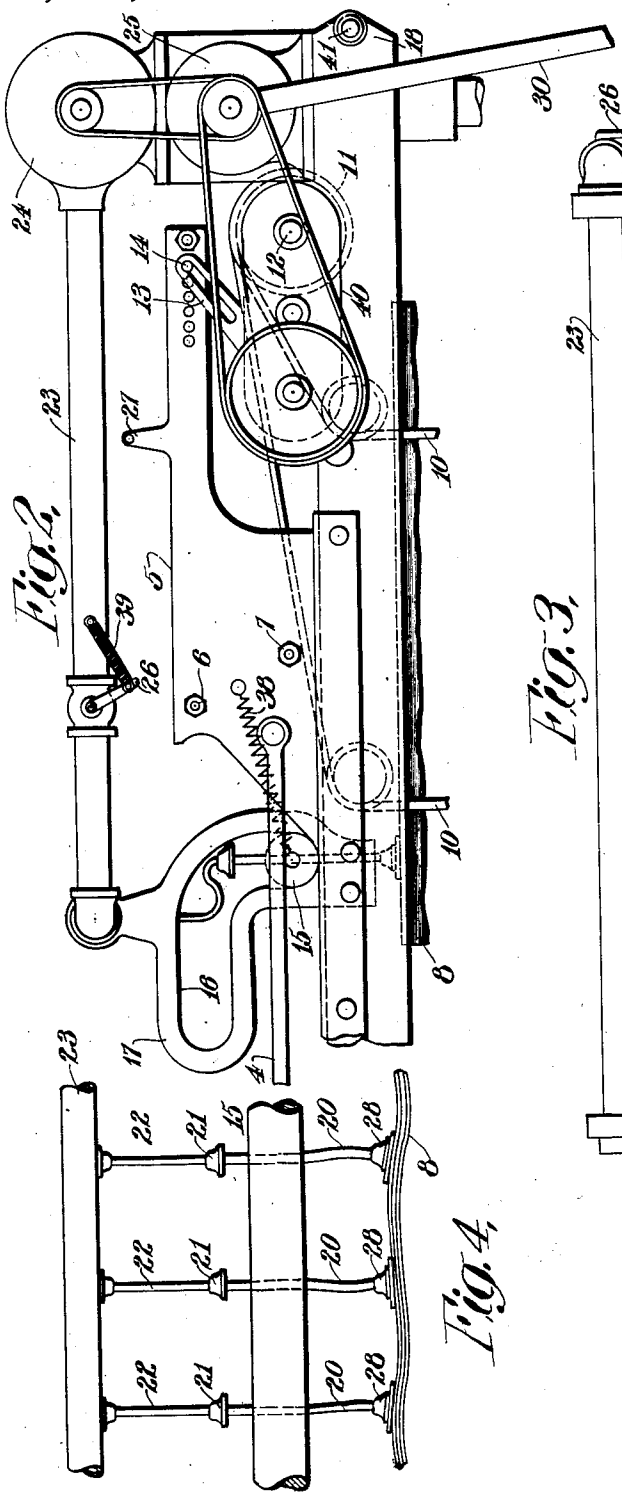


Fig. 2.

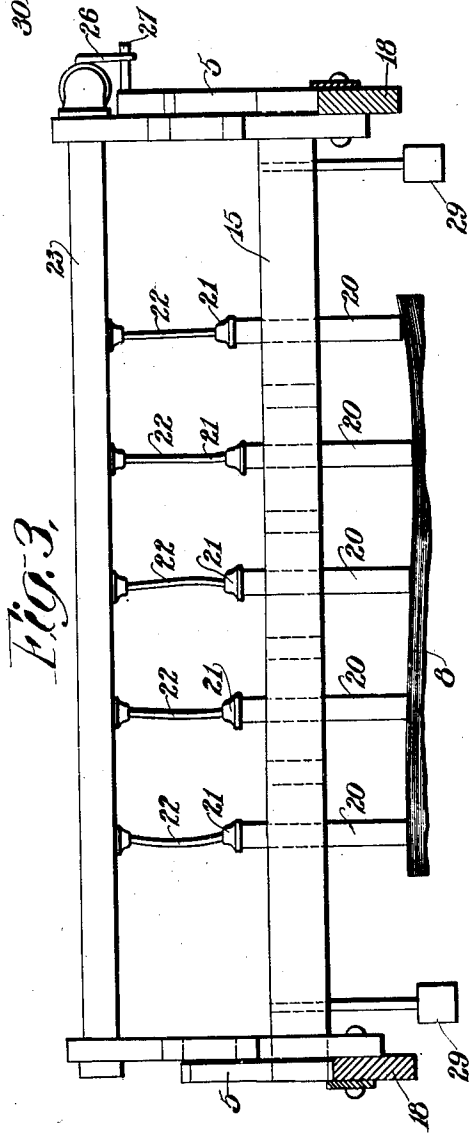


Fig. 3.

Fig. 4.

Inventor

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UNITED STATES PATENT OFFICE.

JAMES G. HARDIE, OF CANTON, NEW YORK.

SHEET-FEEDING MACHINE.

1,412,404. Specification of Letters Patent. Patented Apr. 11, 1922.

Application filed January 21, 1919. Serial No. 272,225.

To all whom it may concern:

Be it known that I, JAMES G. HARDIE, a citizen of the United States of America, and a resident of Canton, county of St. Lawrence, and State of New York, have invented certain new and useful Improvements in Sheet-Feeding Machines, of which the following is a specification.

The present invention relates to improvements in a sheet-feeding mechanism for printing presses and the like, in which a single sheet is fed off a stack and carried forward to the cylinder, and relates in particular to the suction feed type of feeding machines whereby the top sheet is lifted by suction and carried forward to be operated upon by means to advance it to the press cylinder.

My present invention relates to improved features of construction particularly as follows: Means to pick up the top sheet from a stack having an uneven surface, and to carry forward the sheet to means adapted to advance the sheet.

In order that my invention may be fully understood, I will first describe the same with reference to the accompanying drawings and afterwards more particularly point out the novelty of each feature.

In the accompanying drawings similar figures refer to similar parts.

Figure 1 is the side elevation of what is termed the feeder side, showing the rear of a printing press and including the impression cylinder, from which the power is understood to be received. A side view of the elevator is shown with a stack of paper therein, also a side view of the mechanism that carries the sheet from the feeder to the printing press. Figure 2 is an enlarged elevation of the means for picking up the top sheet and moving it forward, the means for elevating the stack of paper, for keeping the top of the stack at a uniform height, and for creating suction to lift the sheet. Figure 3 is a front view of the mechanism consisting of suction tubes which engage with the stack of sheets and the means for lifting said tubes and advancing them. Figure 4 is a modified form of the suction tubes.

Description in detail.

Figure 1 is the side registering mechanism, reference is here made to my Patent No. 1,144,937, issued June 29, 1915, in which is fully illustrated and described the mechanism forming a part of this specification, in which the power is supplied by the press cylinder and through the device referred to and from thence through the arm 2 and the link 3 to the link 4 which is pivoted to the reciprocating frame 5. The frame consists of side pieces, one on either side of the feeder held together by the tie rods 6 and 7. 8 is the stack of sheets, 9 is the platform upon which the stack is piled. 10 are the cables which support the stack of paper and are wound upon the sheeves 11, that are rigid upon the shaft 12. Shaft 12 is in geared connection with the rocking arm 13 through a pawl and ratchet, not shown. The rocking arm 13 is in operative connection with the sliding frame 5, by a pin 14 that may be inserted in anyone of a series of holes in said sliding frame. The front end of the sliding frame 5 is shaped to engage the shaft 15 and during the first part of the movement the shaft is elevated vertically and then carried forward horizontally in the slot 16 of the member 17 which is rigid upon the main frame. 18 is a side piece of the main frame, the front end of which rests upon the printing press, and the rear end is supported upon the leg 19. Loosely mounted in the shaft 15, Figure 3, are the vertical tubes 20 which rest upon the stack of sheets and are adapted to adjust themselves to the uneven top surface of a stack of paper. Each tube has a flanged head 21 which engages the shaft 15 when it is raised, and thus the shaft 15 lifts the tubes to an even level. 22 is a flexible tube connecting the tube 20 with the main suction pipe 23, through which the suction is created by the blower 24, which is operated by the electric motor 25. 26 is a shut off valve in the pipe 23 and is operated by the stop pin 27 in the sliding frame 5. Figure 4 is a front view of a modification of Figure 3, in which the vertical tubes 20 are flexible, and have a flanged foot 28. 29 are counter weights to prevent the shaft 15 from oscillating as it is elevated. 30 is a shifting lever for the clutch, not shown, which makes the elevating mechanism operative or inoperative. 31 is the means for conveying the sheet to the cylinder. 32 is an arm which oscillates the cam 33. 34 engages the cam

33 and reciprocates the roll 35, which intermittently engages the power rotated roll 36.

Manner of operation.

The power is applied as shown in my Patent No. 1,144,937 and is transmitted through the arm 2 and links 3 and 4, to the reciprocating frame 5. The frame is so shaped that in its forward movement it will raise the shaft 15 vertically and then move it forward horizontally, and as the frame recedes, the spring 38 will return the shaft 15 to its original position. As the frame 5 reciprocates, the stop pin 27 will contact the valve arm 26 and will close the valve, and as the frame returns the spring will open the valve. As the frame 5 moves forward it will rock the lever 13 through engagement of pin 14 in the slot of 13. Rock-arm 13 is pivotedly mounted upon the first arbor of a train of gears journaled in the gear case 40, and is operatively connected with the train of gears by a pawl and ratchet not shown which will have the effect to rotate the train as the frame 5 moves forward to wind the cables 10 on the sheeve 11 rigid upon the arbor 12, that is in operative connection with the train of gears. The whole mechanism is so timed that the frame 5 will make a to and fro movement to each sheet printed. 8 is the stack of sheets piled upon the platform 9 and beneath this platform are bars attached to the cables. 25 is an electric motor mounted upon the frame work and is in belted connection with a blower 24 which creates a suction through the pipe 23. 15 is a shaft loosely mounted in the member 17 which is rigidly attached to the frame 18. In this shaft 15 are slidably mounted the vertical tubes 20 adapted to rest upon the stack of sheets. The tubes 20 are connected with pipe 23 by flexible tubes 22. 21 is a flanged head adapted to contact the shaft 15, so that when said shaft is elevated it will admit of the tubes 20 hanging loosely and bring them to the same level. The suction created in the pipe 23 will have the effect to operate through the members 20 and 22 to lift the top sheet vertically and then pull it forward over the power rotated roll 36, at which time the member 27 will contact the valve arm 26 shut off the suction and release the sheet from the tubes 20. The cam 33 is so shaped and timed that it will raise the drop roll 35 to admit the sheet to be brought between the roll 35 and the roll 36. The roll 35 will then be lowered holding the sheet tightly causing it to be advanced. From its advanced position the sheet will be carried forward to the cylinder guides and registered by mechanism shown and described in my Patent No. 1,144,937.

Figure 4 is a modification of Figure 3 in that the vertical tubes 20 are shown of a flexible nature in order to bend and adapt themselves to the foot pieces 28 which tip to meet the surface of an uneven stack of sheets. If desired, the flexible foot pieces 28 could be fitted upon the plunger tubes 20 in Figure 3.

Figure 3, 29 is a counter weight adapted to keep the shaft 15 from oscillating when it is carrying the sheet forward; various means could be used to accomplish this end so I do not confine myself to this particular form.

The side frames 18 are fastened rigidly at their front ends to the press, and the rear ends are held together by the tie rod 41.

37 is a two way switch for reversing the electric motor 25.

If desired, the mechanism illustrated and described in my Patent No. 1,112,791 could be incorporated in place of the rocking arm 13, in which case the worm and worm gear shown in my Patent 1,283,506 would be incorporated and thus eliminate the pawl and ratchet.

There are various means and devices now in use for the purpose of separating the top sheet from the second sheet and at the same time to hold the second sheet while the top sheet is being conveyed forward, and as any one of these various devices are adaptable for the use in this machine I have not shown means for that purpose.

It will be observed that a very important feature of this invention is to provide means to advance the top sheet from a stack that may be quite uneven on the top surface, and while I have shown two forms of suction tubes I do not confine myself even to those two forms but wish to broadly cover suction tubes that are capable of adjusting themselves to an uneven surface. These could be attached to a main member in various ways and be of various designs but would embody the same idea herein described.

It might be desirable to cause the shaft 15 to have only a vertical movement and combine with it a member that would reciprocate and take hold of the sheet, so I do not confine myself to the particular movement shown of the shaft 15.

I have shown and described a reciprocating frame as a means to elevate the shaft 15, but various other devices now in use could be adapted to perform this same work, so I do not confine myself to the use of a reciprocating frame, but wish to use whatever means that are practicable.

Having thus described my invention, what I claim is,

1. In a sheet feeding machine, the combination of a suction pipe and means to create a suction, power operated means to let on and stop the suction, flexible suction conduits operatively attached to said suction pipe with their loose end adapted to

rest upon a stack of sheets, a foot attached to the loose end of said conduits, a stop mounted upon each of said conduits, a power reciprocated member adapted to engage said stop.

2. In a sheet feeding machine, the combination of a main stationary suction pipe, and means to create a suction, power operated means to let on and stop the suction, flexible suction conduits operatively attached to said suction pipe with their loose end adapted to rest upon a stack of sheets, a foot attached to the loose end of said conduits, a stop mounted upon each of said conduits, a power reciprocated member adapted to engage said stop.

3. In a sheet feeding machine, the combination of a suction pipe and means to create a suction, power operated means to let on and stop the suction, a power reciprocated member in operative connection with suitable suction conduits, a stop on said conduits in operative connection with said reciprocating member, the loose end of said conduits adapted to rest upon a stack of sheets, a flexible conduit in operative connection with said stop and the main suction pipe.

4. In a sheet feeding machine, the combination of a main suction pipe and means to create a suction, power operated means to let on and stop the suction, flexible suction conduits operatively attached to said suction pipe with their loose end adapted to rest upon a stack of sheets, a foot attached to the loose end of said conduits, a stop mounted upon each of said conduits, a power reciprocated member adapted to engage said stops.

5. In a sheet feeding machine, the combination of a main suction pipe and means to create a suction, means to let on and stop the suction, flexible suction conduits operatively attached to said suction pipe with their loose end adapted to rest upon a stack of sheets, a foot attached to the loose end of said conduits a stop mounted upon each of said conduits, a reciprocating member adapted to engage said stops, a power reciprocated frame adapted to raise said member vertically and then move it horizontally.

JAMES G. HARDIE.

Witnesses:
JOHN F. ELLINGER,
L. A. MILLER.