(No Model.)

J. M. BLAISDELL.

PAPER FEEDING MACHINE.

No. 604,892. Patented May 31, 1898.

Fig. 1.

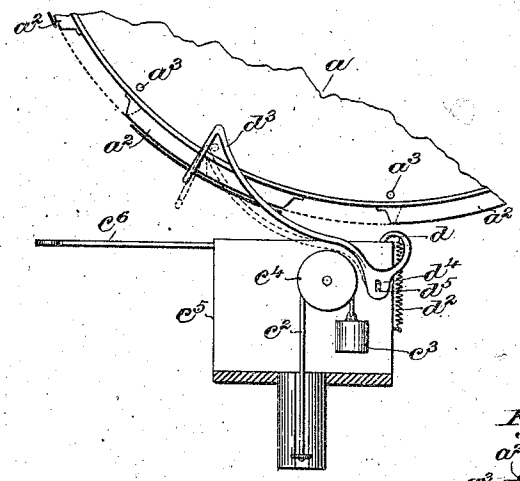


Fig. 2.

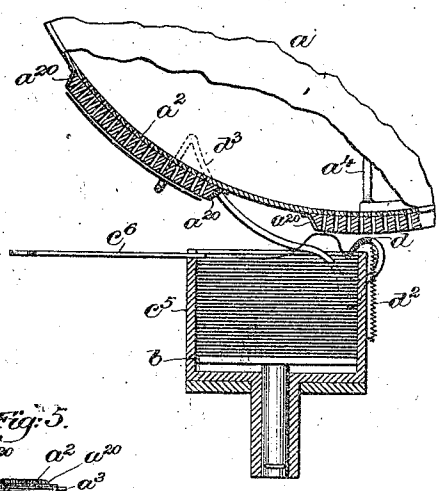


Fig. 3.

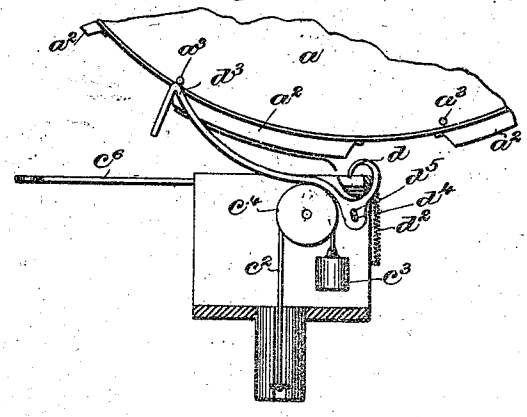


Fig. 5.

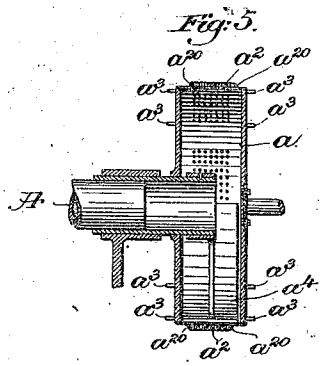
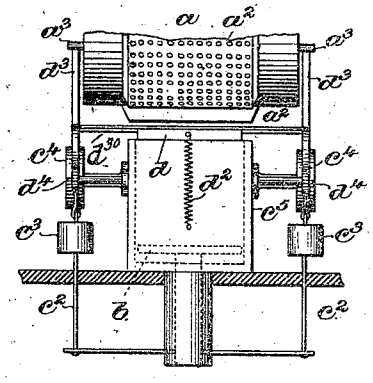


Fig. 4.



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UNITED STATES PATENT OFFICE.

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PAPER-FEEDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 604,892, dated May 31, 1898.

Application filed September 3, 1897. Serial No. 650,493. (No model.)

To all whom it may concern:

Be it known that I, JAMES M. BLAISDELL, a citizen of the United States, residing in Winthrop, county of Suffolk, and State of Massachusetts, have invented an Improvement in Devices for Feeding Sheets of Paper, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The present invention relates to an apparatus for feeding sheets of paper from a stack or pile when it is desired to transfer the sheets one by one from the pile to a position where they are to be operated upon by other instrumentalities—as, for example, in case of sheets of paper which are to be fed to a printing-press or labels which are to be applied to packages.

In accordance with the invention the sheets are fed from a pile and the top sheet is caused to be acted upon by atmospheric pressure to force the same into contact with a suitable surface and separate it from the sheet lying next below, the action of the atmospheric pressure being progressive—that is to say, acting on succeeding portions of the sheet, a portion of which is retained stationary with relation to the pile, between which and the surface against which the sheet is forced a relative change of position is produced. This relative change of position produces a corresponding change of position of the sheet with relation to the surface against which it is forced, so that the sheet, instead of being bodily "sucked up," so to speak, is progressively acted upon, a portion only being forced against the surface when the surface first arrives at its operative position, the remainder being gradually drawn into contact with the surface in the change of position thereof relative to that of the surface of the sheet.

The apparatus embodying the invention comprises a support for the pile of sheets and a "sheet-picker," as it may be called, the said sheet-picker consisting of a chamber, from which the air is partially exhausted and which has an inlet in the wall thereof, through which the air tends to enter, so that a sheet adjacent to the said wall near the inlet will be acted upon by atmospheric pressure and drawn into contact with the said wall over the inlet. The apparatus is further provided with means for effecting a change of position of said sheet-picker with relation to the sheet-support, whereby one of said parts is caused to move past the other, so that that portion of the sheet which first becomes adjacent to the inlet will be first acted upon by the atmospheric pressure and the remainder thereof progressively subjected to pressure in the relative change of position aforesaid. As herein shown, the sheet-picker comprises a rotatable drum or cylinder having one or more inlets arranged along the periphery thereof, so that in the rotation of the drum each inlet will pass the sheets, which are supported in a pile, the top of which is adjacent to the periphery of the drum.

The apparatus embodying the invention is further provided with means whereby the sheets are retained stationary with relation to the support when they are first acted upon by the atmospheric pressure, so that the drum or sheet-picker while attracting the sheet will move along the surface of the same, whereby the sheet is, as it were, smoothed into contact with the surface of the drum until substantially wholly separated from the remainder of the pile and wholly picked up ready to be transferred.

The device is also shown as provided with means whereby that portion of the sheet which has been engaged to hold the sheet stationary during the progressive action above described is subsequently disengaged or released, the release of the sheet taking place after the main portion of the sheet has been drawn over the inlet, as above described.

After the sheet has been picked up and separated from the rest, as above described, it is obvious that any suitable devices may be employed for removing the same from the chamber at the desired position—such, for example, as a pair of nippers on the platen or cylinder of a printing-press, toward which the sheets are commonly pushed by hand—or if the chamber be stationary and the support movable the sheet may be merely dropped by otherwise closing the inlet or letting air into the chamber.

Figure 1 is a side elevation of a sufficient

portion of the feeding device to illustrate the invention. Fig. 2 is a sectional view of the same. Fig. 3 is a side elevation showing the parts in a different position from that shown in Fig. 1. Fig. 4 is a rear elevation or view of the machine as looked at from the right of Fig. 3; and Fig. 5 is a vertical section, on a small scale, of the chamber.

The sheet-picking device a is shown as comprising a closed traveling chamber having one or more inlets a^2, which are shown as sets of perforations in one of its walls, the said chamber being herein shown as a rotatable cylinder from which the air is continually exhausted or drawn out, as through an outlet-tube A. Each of the openings a^2 is shown as consisting of a number of small perforations covering a space substantially the same in area and shape as that of the sheet of paper which is to be picked up, so that when the paper lies in contact therewith it will close the openings and be held snugly against the outer wall of the chamber by atmospheric pressure.

The sheets of paper which are to be operated upon are piled up, so that the top of the pile is adjacent to the surface of the movable chamber or sheet-picking device, which will hereinafter be referred to as the "carrier," so as to be picked up by suction as the openings a^2 travel by. The carrier a is herein shown as provided with a series of such inlets, which may be of any desired number, so that a number of sheets can be carried forward at the same time.

To maintain the top of the pile always at substantially the same level, as the sheets are picked off, the pile of sheets is supported upon a movable shelf or support b, provided with means whereby it constantly tends to move toward the surface of the carrier, so that as each sheet is picked off the next sheet, which is then at the top of the pile, is moved to substantially the position originally occupied by the sheet which has been picked off. As herein shown, the said support b is connected, as by a cord c^2, to a weight c^3, the said cord passing over a pulley c^4, so that the downward tendency of the weight produces a corresponding upward tendency of the support or movement thereof toward the surface of the carrier.

To determine the position of the pile, the machine is provided with a retaining device or presser-foot d, which is adapted to engage the top sheet when it is in the proper position and keep the shelf from rising until the said top sheet is picked off and the next sheet is engaged by the retaining device.

To insure the separation of the top sheet from those underneath it, the retaining device d is arranged to engage the edge of the sheet which is first reached by the inlet a^2, or, in other words, the rear edge of the sheet, the construction and operation being shown to the best advantage in Fig. 2. It will be seen, therefore, that as the inlet reaches the pile of sheets the atmospheric pressure under the top sheet will tend to lift the body thereof away from the point where it is held by the retaining device, as shown, and in thus acting upon the sheet, instead of lifting the sheet bodily, will lift only the rear portion thereof, so that the front end will be drawn horizontally along the surface of the next sheet, the operation being such that the effect of adhesion between the adjacent sheets will be overcome, so that there is no tendency to pick up more than one sheet at a time. As the carrier travels forward, moreover, the body of the sheet will be gradually sucked up against the wall thereof over the inlet, while the rear end of the sheet is held by the retaining device, so that the sheet is gradually drawn or spread along the surface of the carrier without any possibility of displacement, each successive sheet taking the same position relative to the carrier with great accuracy. This spreading and smoothing process will obviously continue as long as the sheet is held stationary with relation to the support, or, in other words, as long as the retaining device will operate to withstand the tendency of the carrier to drag away the sheet. It is desirable, however, to cause the retaining device to actually release the sheet at a predetermined time in the operation, and for this purpose the portion d of said device which engages the sheet, is adapted to be lifted after the main portion of the sheet has reached the desired position with relation to the carrier, and, as herein shown, the said retaining device is normally held in position by means of a spring d^2 and provided with a projection d^3, which is adapted to be operated upon by the coöperating projection a^3 upon the carrier, the said projection a^3 being arranged, as best shown in Fig. 3, to lift the retaining device just at the time when the front edge of the sheet has been drawn into contact with the front portion of the inlet to the carrier. It will be seen, therefore, from the foregoing description that the sheet is drawn and smoothed out upon the surface of the carrier and maintained in position during this operation by the retaining device until the whole sheet, with the exception of a small portion or flap at the rear thereof, is in contact with the carrier, after which the retaining device is lifted, allowing the said small portion or flap to be drawn up against the inlet a^2, so that the whole sheet is then held in place by pressure and carried forward.

In order that the presser-foot or retaining device may be lifted wholly out of contact with the top of the pile to release the top sheet, as above described, and to prevent the next sheet from being frictionally engaged by the under surface of the top sheet as it is drawn out, the device is provided with means for arresting the upward movement of the support at this time, and, as herein shown, the projection d^3 from the said retaining device d is arranged to extend over the periph-

ery of the pulley c^4, the said pulley being arranged to constitute the fulcrum for the said projection, which is first forced into contact with the periphery of said pulley and operates as a brake to arrest the movement thereof and then rocks upon said periphery to lift the retaining device d against the stress of the spring d^2. The retaining device d or, more strictly speaking, the arms d^3, which are connected with said retaining device, (there being two of such arms, one at each side of the carrier,) are secured to the outside of a box or casing c^5, which is adapted to contain the sheets supported upon the shelf b, and the pivot-support d^4 consists of a pin on the outside of the said box, coöperating with an elongated slot d^5, there being such a slot in each of the arms d^3 and a pin at each side of the box. This form of support affords the lost motion necessary for the rocking of the said arms on the pulleys to arrest the upward movement of the shelf and to release the top sheet, it being obvious that as soon as the projection a^3 has passed beyond the end of the arm d^3 the stress of the spring d^2 will draw the retaining device d downward until the top of the slot d^5 rests upon the pin d^4, which then constitutes a fulcrum on which the arm is rocked to lift it out of contact with the pulley and release the support c, so that the sheet which is then at the top takes the place of that which has been previously pulled off. The said arms d^3 are herein shown as formed integral with each other, being curved upward to form inclined surfaces for engagement with the pins a^3, and thence downward and across the face of the cylinder, the downward extension being sufficiently long to have the part which extends across the cylinder clear the surface of the same. The rear ends of said arms above the slot d^5 are connected together by means of a cross-piece d^{30}, to which is directly connected the retaining device d.

To prevent the pressure from being lowered by leaving the inlets free to take in air prior to the time when they reach the sheets, the carrier a may be provided with a damper or shutter a^4, which, as shown in Fig. 2, consists of a stationary cover or shutter, which lies along the inner wall of the chamber a, the said shutter terminating at a point adjacent to the feeding device, so that the air is not free to enter until an inlet reaches the pile of sheets, one of which sheets is then immediately sucked up and caused to close the inlet as fast as it advances in the manner above described. The same shutter may be continued rearward along the inner wall of the chamber to a point where it is desired to remove the sheet from the carrier, so that it will then constitute a cut-off to immediately relieve the external pressure and allow the sheet to be easily removed.

The inlets a^2 are preferably arranged as shown, so that the surface of the carrier where the said inlets occur projects beyond the main surface thereof, it being obvious that if desired the edge of the sheet may be allowed to project somewhat beyond the raised surface, so that it can be easily removed by a pair of nippers, for example. The surface of the carrier at the inlets, as herein shown, is covered with a piece of yielding material, such as rubber, having perforations corresponding to those in the wall of the carriage itself, and the said pieces of rubber are held in position by means of flanges a^{20}, which are inclined, as shown, so that the piece of rubber can be compressed into the space between said flanges, where it will be held by its own elasticity.

As shown in Fig. 4, there are two pulleys c^4, cords c^2, weights c^3, &c., one at each side of the box c^5, the operation of the parts at each side of the box being the same, so that in the foregoing description these parts have been referred to in the singular instead of the plural to render the description more clear. The box c^5 is preferably the same in horizontal sectional shape and size as that of the sheets to be operated upon and may be provided with a cover c^6, adapted to slide into place, and when the device is in operation the said cover is preferably arranged, as shown, to overlie the free edge of the sheets, so as to keep the pile substantially flat.

In another application, filed April 8, 1897, Serial No. 631,206, I have shown and described a machine for applying labels to cans, bottles, and the like, in which the feed device forming the subject of the present invention is utilized as an element. It is obvious, however, that any means desired may be used for picking the sheets from the carrier, and in some instances even it might be of value to employ the carrier as a conveyer to simply pick up the sheets one by one and convey them to another place, where they may be dropped by simply closing the openings, so that the external pressure is relieved.

It is not intended to limit the invention to the specific construction herein shown and described, since modifications may obviously be made without departing from the invention.

I claim—

1. An apparatus for feeding sheets of paper from a pile of such sheets, comprising a sheet-picker into contact with which the top sheet is adapted to be forced by atmospheric pressure, and means for producing a change of position of said sheet-picker relative to the part of said top sheet which is acted upon by such pressure, while such action is going on, to thereby progressively pick up said sheet and separate it from the sheet below, substantially as described.

2. The combination with a sheet-picker into contact with which a sheet is adapted to be forced by atmospheric pressure; of a support for a pile of sheets; a retaining device to hold a portion of the top sheet stationary with relation to the support; means for producing a change of position of said sheet-

picker relative to said support and to that part of the top sheet which is being acted upon by such pressure whereby said sheet-picker and said top sheet are caused to travel one past the other to progressively subject the sheet to atmospheric pressure; and means for subsequently releasing the portion acted upon by the said retaining device, substantially as described.

3. In a sheet-feeding device, the combination with an exhausted chamber having an inlet in a wall thereof, of a support for the sheets, means for producing a relative movement of said chamber and said support whereby the sheets are brought to a position to be acted upon by atmospheric pressure at the chamber-inlet, a retaining device for the sheets adapted to engage and hold one portion of the sheet while another portion thereof is drawn into contact with the wall of the chamber, means for pressing said support toward said retaining device, and means for releasing the sheet from said retaining device after that portion of the sheet which is not held by said device has been drawn into contact with the wall of the chamber, and for simultaneously preventing the movement of the support toward the retaining device, substantially as described.

4. In a sheet-feeding device, the combination with an exhausted chamber having an inlet in a wall thereof; of a support for a pile of sheets arranged to support the pile so that the top sheet thereof is adjacent to but wholly out of contact with the wall of said chamber where the said inlet is situated; a retaining device to hold a portion only of the top sheet stationary with relation to the said support, the remainder of the sheet being free to move into contact with the wall of the chamber at the inlet aforesaid; and means for producing a movement of one of said parts past the other whereby the exhaust-chamber and that part of the sheet drawn into contact therewith have a movement one past the other, so that the sheet is progressively acted upon by pressure at the inlet and that portion of the sheet not held by the retaining device progressively picked up into contact with the chamber over the inlet thereto, substantially as described.

5. In a sheet-feeding device, the combination with a traveling carrier comprising a rotatable drum from which the air is partially exhausted, said drum being provided with one or more inlets, of a sheet-support adjacent to said drum, means for rotating said drum to cause the inlets to travel past said support, means for moving said support toward the wall of the drum, a retaining device for the sheets on said support to retain a portion of the top sheet while another portion thereof is being drawn into contact with the wall of the drum, a stop or projection connected with said drum and adapted in the movement thereof to engage the said retaining device and cause it to release the top sheet, and means whereby the movement of said retaining device to release the top sheet prevents the movement of the support toward the wall of the carrier, substantially as described.

6. In a sheet-feeding device the combination with the traveling carrier comprising a rotatable drum from which the air is exhausted, said drum being provided with one or more inlets, of a sheet-support adjacent to said drum, a stationary shutter for the inlet, said shutter terminating at a point adjacent to the sheet-support, a retaining device for holding a portion only of the sheet stationary with relation to the said support, the remainder of the sheet being free to move into contact with the drum at the inlet, means for rotating said drum to cause the inlets to travel past the surface of the sheet which is drawn into contact therewith, but prevented by said retaining device from being carried along thereby; and means for subsequently operating the retaining device to release the sheet, substantially as described.

7. In a sheet-feeding device, the combination with an exhausted chamber having an inlet in the wall thereof, of a support for a pile of sheets arranged to support the pile so that the top sheet thereof is adjacent to the wall of said chamber where the said inlet is situated, a retaining device to hold a portion only of the top sheet stationary with relation to said support, the remainder of said sheet being free to move into contact with the wall of said chamber at the inlet, means for producing a movement of one of said parts past the other whereby the exhaust-chamber and that part of the sheet which is drawn into contact therewith have a movement one past the other so that the sheet is progressively picked up by atmospheric pressure at the inlet; and means for closing the said inlet up to the time the said inlet is in position to cause the pressure thereat to act upon the sheet, substantially as described.

8. In a sheet-feeding device, the combination with an exhausted chamber provided with an inlet in the wall thereof, of a support for the sheets adapted to be moved toward the wall of said chamber by means of a weight and pulley, a presser-foot provided with a spring whereby it is normally pressed down upon the surface of a sheet on the support, said presser-foot having a loose pivotal connection with said support, an arm or projection from said presser-foot adjacent to said pulley, means for producing a relative movement of the chamber and the sheet-support, and a tripping projection adapted to engage said arm and move the same into engagement with the pulley, whereby said arm is rocked on the pulley as a fulcrum, to lift the presser-foot and at the same time to prevent rotation of the pulley and check the movement of the support which would otherwise result, substantially as described.

9. In a sheet-feeding device, the support *c*,

weight c^3 and pulley c^4, and the presser-foot d having an elongated slot d^5 adapted to engage projections or pins to support said presser-foot, the spring d^2 whereby said presser-foot is normally pressed toward said support, and the arm d^3 overlying said pulley, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES M. BLAISDELL.

Witnesses:
H. J. LIVERMORE,
MARY E. MARONEY.