(Model.) 3 Sheets—Sheet 1

H. D. & D. W. SWIFT.

MACHINERY FOR FEEDING SHEETS OF PAPER.

No. 386,440. Patented July 17, 1888.

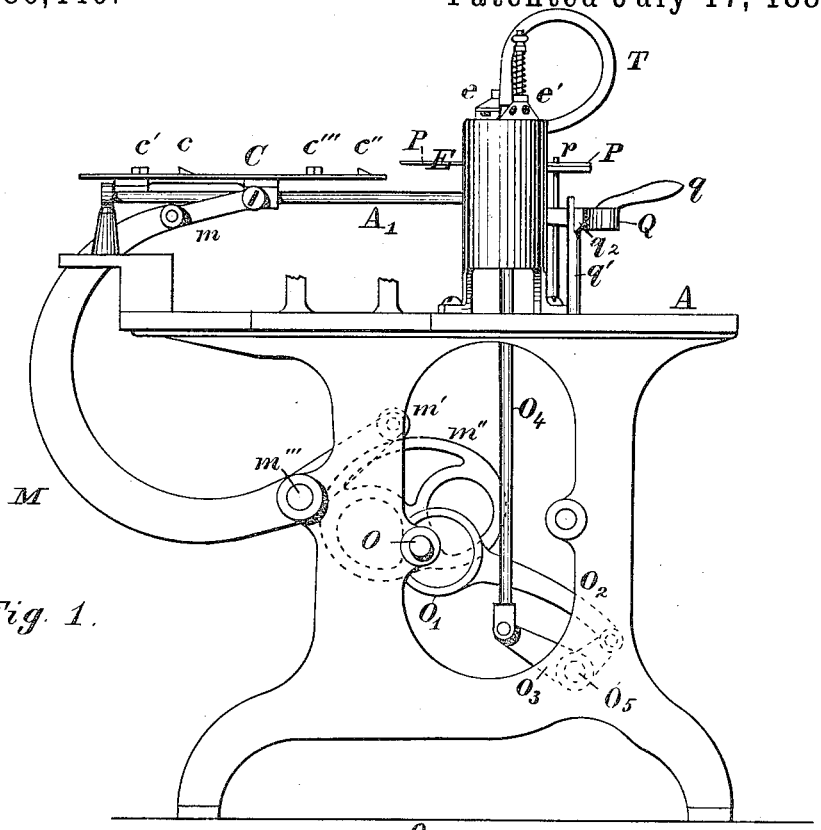


Fig. 1.

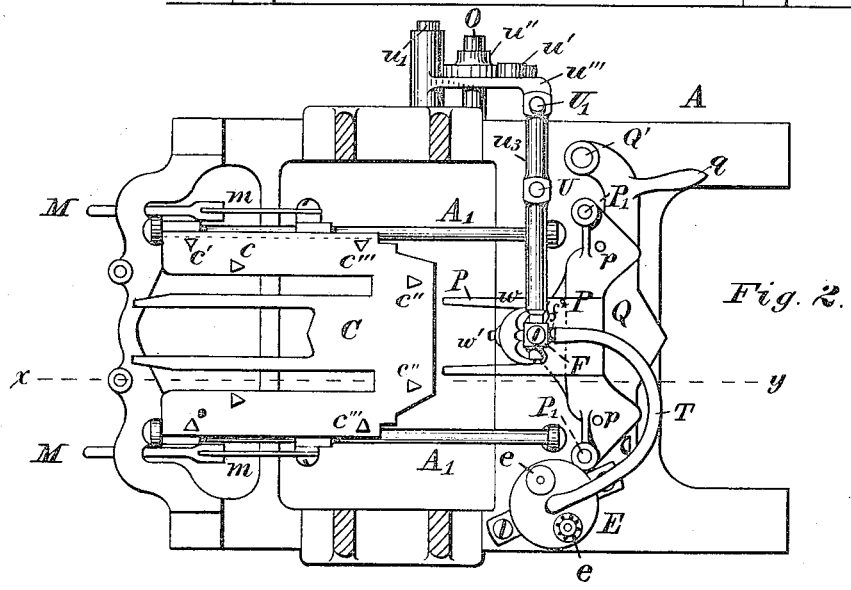


Fig. 2.

WITNESSES;

Edward H. Hill.

Edward F. Tolman.

INVENTORS;

Henry D. Swift.

D. Wheeler Swift.

(Model.) 3 Sheets—Sheet 2.

H. D. & D. W. SWIFT.

MACHINERY FOR FEEDING SHEETS OF PAPER.

No. 386,440. Patented July 17, 1888.

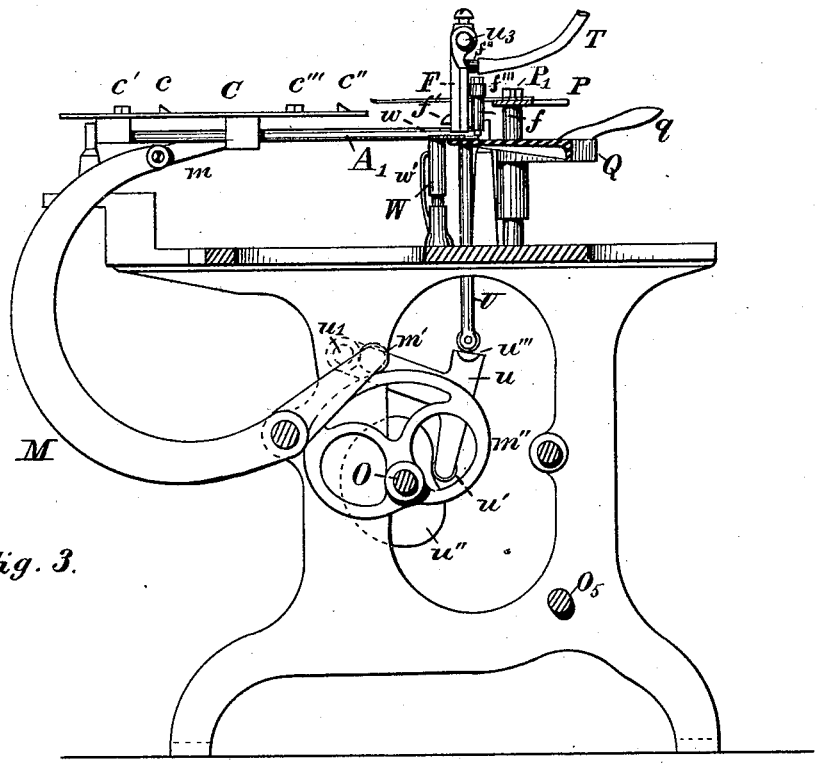


Fig. 3.

Fig. 4.

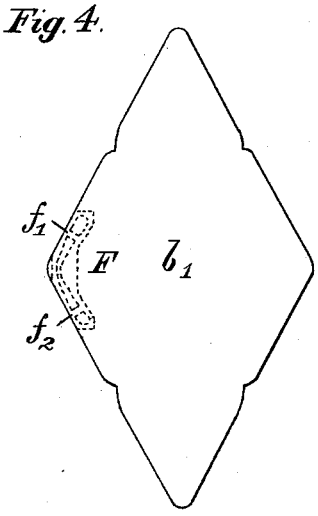
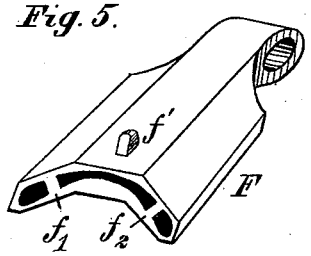


Fig. 5.



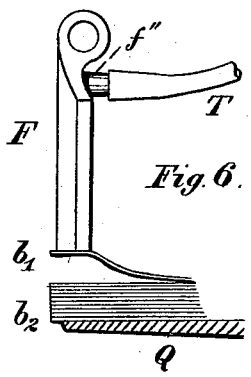
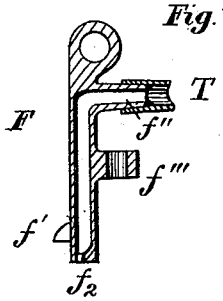


Fig. 6.

Fig. 7.



WITNESSES;
Edward K. Hill.
Edward F. Tolman.

INVENTORS;
Henry D. Swift.
D. Wheeler Swift.

(Model.) 3 Sheets—Sheet 3.

H. D. & D. W. SWIFT.

MACHINERY FOR FEEDING SHEETS OF PAPER.

No. 386,440. Patented July 17, 1888.

Fig. 8.

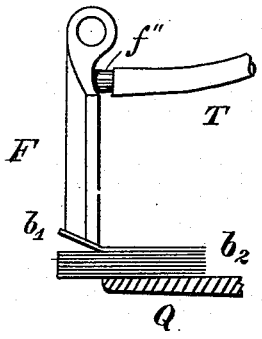


Fig. 9.

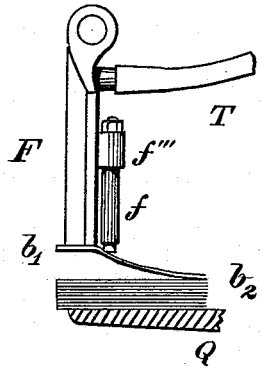


Fig. 10.

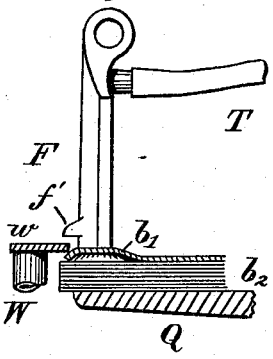


Fig. 11.

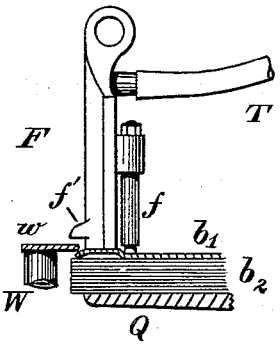


Fig. 13.

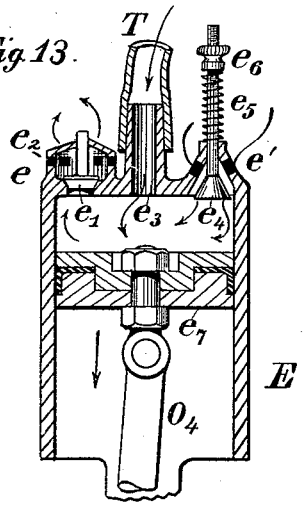
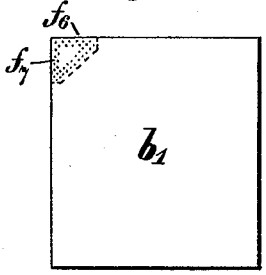


Fig. 12.



WITNESSES;
Edward K. Hill.
Edward F. Tolman.

INVENTORS
Henry D. Swift.
D. Wheeler Swift.

UNITED STATES PATENT OFFICE.

HENRY D. SWIFT AND D. WHEELER SWIFT, OF WORCESTER, MASSACHUSETTS, ASSIGNORS, BY MESNE ASSIGNMENTS, TO THE WHITCOMB ENVELOPE COMPANY, OF SAME PLACE.

MACHINERY FOR FEEDING SHEETS OF PAPER.

SPECIFICATION forming part of Letters Patent No. 386,440, dated July 17, 1888.

Application filed July 10, 1880. Serial No. 13,292. (Model.)

To all whom it may concern:

Be it known that we, HENRY D. SWIFT and D. WHEELER SWIFT, both of the city and county of Worcester and State of Massachusetts, have invented certain Improvements in Machinery for Feeding Sheets of Paper, of which the following is a specification.

This invention is applicable to printing-presses and envelope-folding machines, and wherever sheets of paper or other thin flexible material are to be taken one by one from a pile and delivered to other mechanism.

The object of our invention is to provide certain improvements in mechanism for feeding sheets of paper; and to this end our invention consists in the feeding mechanism and in the construction, arrangement, and combination of the parts thereof, as hereinafter specified.

In the drawings, Figure 1 is a side elevation of a machine with our improvement attached, for printing envelope-blanks. Fig. 2 is a plan of the same. Fig. 3 is a vertical section in the line *x y*, Fig. 2. Fig. 4 represents an envelope-blank, on which the dotted lines indicate the place of contact of the lifter-tube; Fig. 5, a view of the under surface of a lifter tube, as adapted to feed envelope-blanks; Fig. 6, a side elevation of the same lifter and a pile of blanks, showing a blank partially raised from the pile; Fig. 7, a vertical section of the same, showing the course of the air-passage through it; Fig. 8, a side elevation of a lifter, the bottom of which is beveled off, and a pile of blanks; Fig. 9, a side elevation of the lifter shown in Fig. 6, with a presser attached thereto, which bears upon the upper sheet after the lifter rises from the pile; Fig. 10, a side elevation of the same lifter, with a separator patented by us December 26, 1876, acting therewith; Fig. 11, a side elevation of the same lifter, with both the presser and separator acting therewith. Fig. 12 represents a rectangular sheet of paper, on which the dotted lines in the corner indicate the place of contact of the lifter-tube; Fig. 13, a cross-section of the pump used to exhaust the air from the lifter-tube.

A represents the frame-work of the machine, which is constructed in any suitable manner to receive the various working parts.

In bearings attached to the frame is placed the main shaft O, to which motion may be communicated in any convenient manner.

Q is a feed-table similar to the one described in our former patent, No. 185,798, on which rest the blanks or sheets to be fed. It may be turned by the handle *q* about a stud, Q', and also raised or lowered thereon, always, however, remaining parallel to the table A. After the blanks have been placed upon it by the operator, it is swung into the position shown in the drawings, and is prevented from downward or lateral motion by the projection q^2, which rests in a notch in a vertical support, *q'*.

On the shaft O, outside of the frame, is secured a cam, *u''*. A lever, *u*, having its fulcrum on a stud, has an arm projecting downwardly and terminating in a friction-roller, *u'*, which bears on the periphery of the cam *u''*, and also a horizontal arm, *u'''*, extending toward the interior of the machine. A rod, U, rests on the horizontal arm *u'''*, and extends through a vertical guide-bearing affixed to the table of the machine. A bar, u^3, is secured to the upper end of rod U, and is held parallel to the table Q. A guide-pin, U', projecting upward from the table of the machine, passes loosely through a hole in a boss on the outer end of bar u^3. On the end of bar u^3, toward the interior of the machine, is suspended at right angles thereto a hollow metal block, F, hereinafter called the "lifter" or "lifter tube." The sectional view, Fig. 7, shows the location and the form of the passage through it. A flexible tube, T, attached to a nipple, *f''*, on the lifter F, connects it with the exhausting-tube e^3 of an air-pump. By means of the lever *u*, having friction-roller *u'*, rod U, and cam *u''*, a vertical reciprocating motion is communicated to the bar u^3 and lifter. The bottom of the lifter is directly over the inner corner of the table Q when the latter is in position. The guide-pin U' serves to insure motion of the lifter vertically over the table Q.

The lifter has a lip, *f'*, which on the descent of the lifter comes in contact with a separator, W, similar to that shown in our said patent No.

185,798, except that the one herein described has three points resting over the pile of blanks, while that in our former patent has but one. The lip f' is placed at such a distance from the bottom of the lifter that when the lifter rests on the top sheet of a pile of blanks the lip f' shall set the separator so that its horizontally-projecting point or points shall be just above and over the top of the pile, but shall not rest upon it. The separator, when thus set, is held in place by a spring, w', or other friction device on a stud projecting from the table of the machine. On the other side of the lifter F—that is, on the side over the center of the pile of blanks—is a boss, f''', supporting a vertical bearing in which plays a rod, f, hereinafter called a "presser," which projects a short distance below the bottom of the lifter. When the lifter descends upon the pile of blanks, the presser is raised, but immediately the lifter rises the presser tends to fall to its lowest position, being impelled by its weight or by a spring, and thereby a blank which is raised by the lifter is bent sharply just behind the point of contact of the lifter, as is shown in Fig 9.

P is a plate supported on pillars P' parallel to the feed-table Q and of substantially the same outline, except that the part which would be over the corner of the sheet, by which the sheet is to be lifted, is cut away to allow the free motion of the lifter.

An air-pump, E, is attached to the frame at a convenient distance from the lifter, the piston of which, e^7, is reciprocated by a connection-rod, O^4, and a bell-crank, O^3, having its fulcrum on a stud, O^5, and an eccentric, O', on the shaft O. The exhausting-tube e^3, through which air is drawn from the lifter, is in the center of the pump-head. On either side of it are the valves e' e^4. The former opens outward, is held to its seat by gravity, and allows the escape of air on the upward stroke of the piston. The latter opens inward, and is held to its seat by a spring, e^5, on the valve-stem, the tension of which is regulated by a thumb-nut, e^6.

C is a reciprocating frame or carriage, which receives the blank from the lifter and carries it to the printing mechanism. Motion is imparted to it from the shaft O by means of cam m'', arms M, and connecting-rods m. A spiral spring holds the lever M in contact with cam m'' and insures its return movement. The carriage has bearings at its four corners, which rest on ways parallel to the table of the machine. Metal strips are attached to it, on which the blank that is being carried rests, and from which project hooks c'' and stops c''', between which the blank is held in proper position to be presented to the printing mechanism.

The operation of these devices is as follows: A pile of blanks having been laid on the feed-table Q beneath the lifter, power is applied to the machine. The lifter F descends upon the pile of blanks, preferably over the corner of one of the flaps of the top sheet, as shown by the line of contact in Figs. 4 and 12. Simultaneously with the descent of the lifter the piston of the air-pump E is drawn down, and the air in the lifter, the air-pump, and connecting tube is so rarefied that as the lifter approaches contact with the pile the top blank is forced upward by the air which enters beneath it. When contact is established, it is maintained by the excess of atmospheric pressure on the under side of the sheet. The lifter is then raised and draws the corner of the sheet with it until the sheet strikes the plate P and contact with the lifter is broken, when the carriage C, having been brought beneath the sheet, (thereby raising it entirely off the pile,) it rests on the carriage between the stops c''' and hooks c''. During this time the piston of the air-pump has completed its down-stroke and has started on the upstroke. The previously-rarefied air in the lifter is now condensed to the tension of the atmosphere, and consequently the sheet raised, if it is not removed from the lifter by the plate P, is released by the lifter. The carriage then makes its return movement and carries the blank with it beneath the printing mechanism. The lifter again descends and the operation is repeated for each successive sheet in the pile. The tension of the spring upon the valve e^4 of the air-pump is adjusted by the thumb-nut e^6, so that if the rarefaction is greater than is desired the pressure of the air outside overcomes the force of the spring and an amount enters the pump sufficient to maintain the vacuum at nearly a constant point. By this means a vacuum sufficient to cause the paper to be raised and held upon the lifter is secured, and all danger of tearing or bursting the paper is obviated.

For use on certain kinds of paper the form of the lifter-tube may be modified and other devices used in combination with it. For this purpose the bottom of the lifter may be slightly beveled off, in which case the lifter, instead of resting squarely on the pile of blanks, touches it only toward the center of the upper sheet, and the current of air rushing in to the lifter bends up the outer corner of the upper sheet, and thereby separates it from the one beneath it. The operation of this form of lifter is represented in Fig. 8.

We claim—

1. In a paper-feeding machine, a lifter-tube from which the air is exhausted and which is moved to and from a pile of sheets, in combination with a presser which bears upon the upper sheet as it is raised off the pile, as and for the purpose shown and described.

2. In a paper-feeding machine, the combination of a lifter-tube from which the air is exhausted and which is moved to and from a pile of sheets, with an automatically-adjusted separator, W, and a presser, f, whereby the upper sheet as it is raised from the pile is bent

concavely to the sheet beneath it in the vicinity of the place of contact of the separating devices.

3. In a paper-feeding machine, in combination with a suitable support for a pile of blanks, the pneumatic lifter moved to and from the pile of blanks over one corner thereof and adapted to engage and lift or turn up only one corner of the top sheet of the pile, and the reciprocating blank-receiving carriage moving transversely to the line of motion of the lifter and passing between the sheet or blank whose corner is lifted and the next sheet, so as to complete the separation of the former sheet or blank from the pile, substantially as and for the purpose shown.

4. In a paper-feeding machine, in combination with a pneumatic lifter to lift one corner of a blank from a pile, the reciprocating carrier for completing the separation of the partially-raised blank, provided with the hooks c'' c'', made inclined on their forward sides with reference to the movement of the carrier toward the pile of blanks, and with the stops c''' c''', for engaging the blank when on the carrier, substantially as and for the purpose described.

5. In a paper-feeding machine, a pneumatic lifter-tube moved to and from the corner of a pile of blanks and adapted to raise only one corner of the blank on top of the pile, in combination with the reciprocating carriage for conveying a blank from the pile, adapted to move in under the raised corner of the top blank and complete the separation of such blank from the pile, and having the hooks c'' c'' inclined on their forward sides, and the stops c''' c''', substantially as and for the purpose specified.

HENRY D. SWIFT.
D. WHEELER SWIFT.

Witnesses:
L. M. LOVELL,
F. L. MESSINGER.