(Model.) 4 Sheets—Sheet 1.

H. D. & D. W. SWIFT.

PRINTING MACHINE.

No. 303,550. Patented Aug. 12, 1884.

Fig. 1.

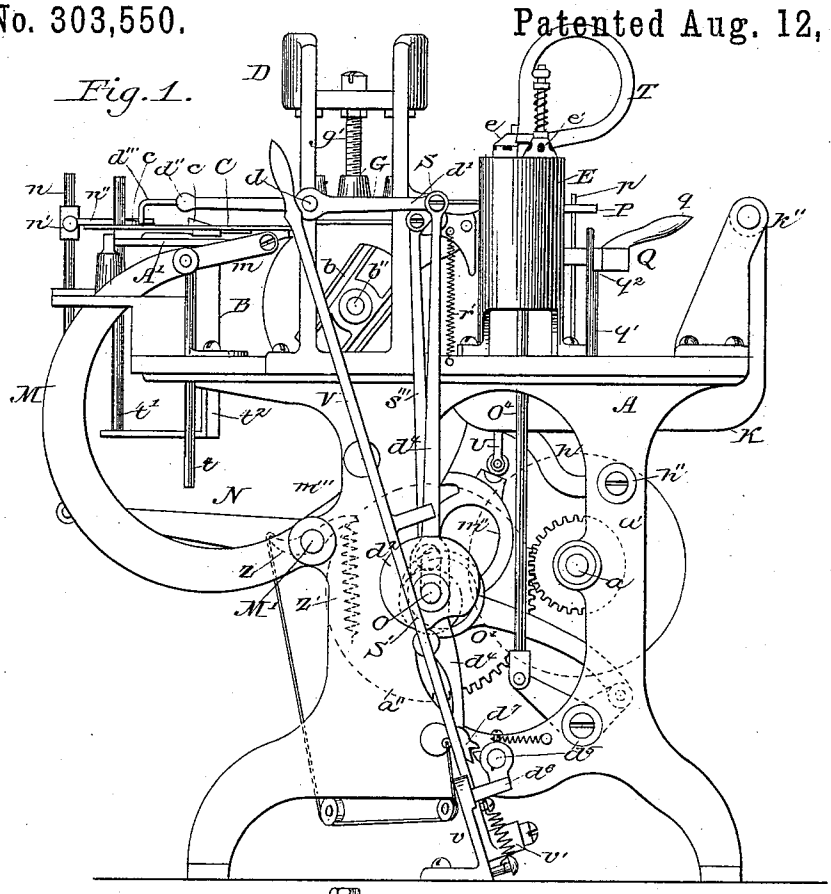
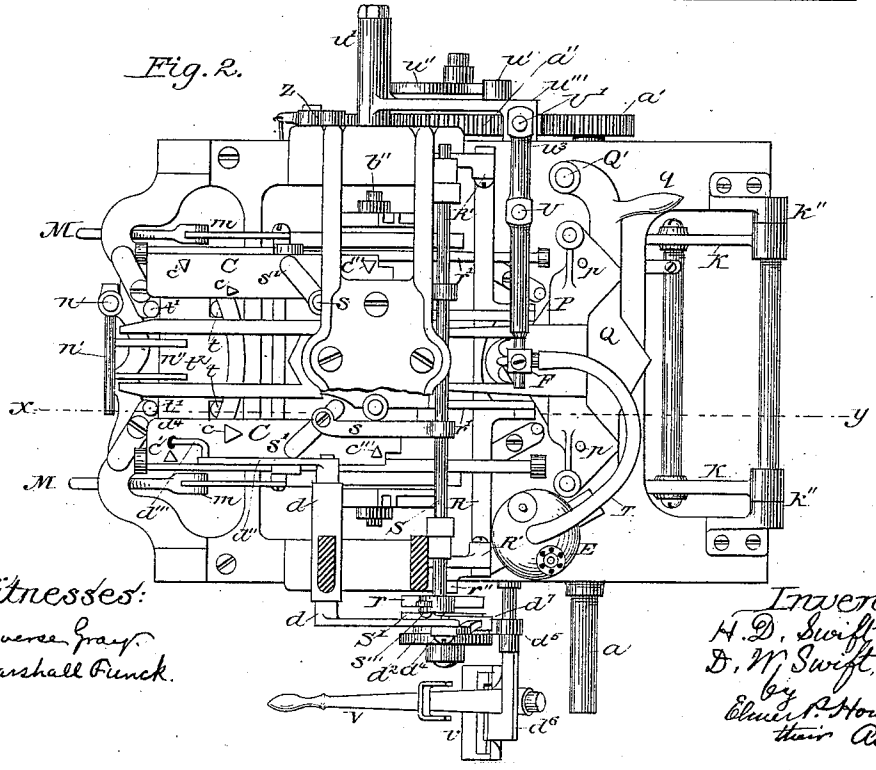


Fig. 2.



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(Model.) 4 Sheets—Sheet 2.

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PRINTING MACHINE.

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Fig. 3.

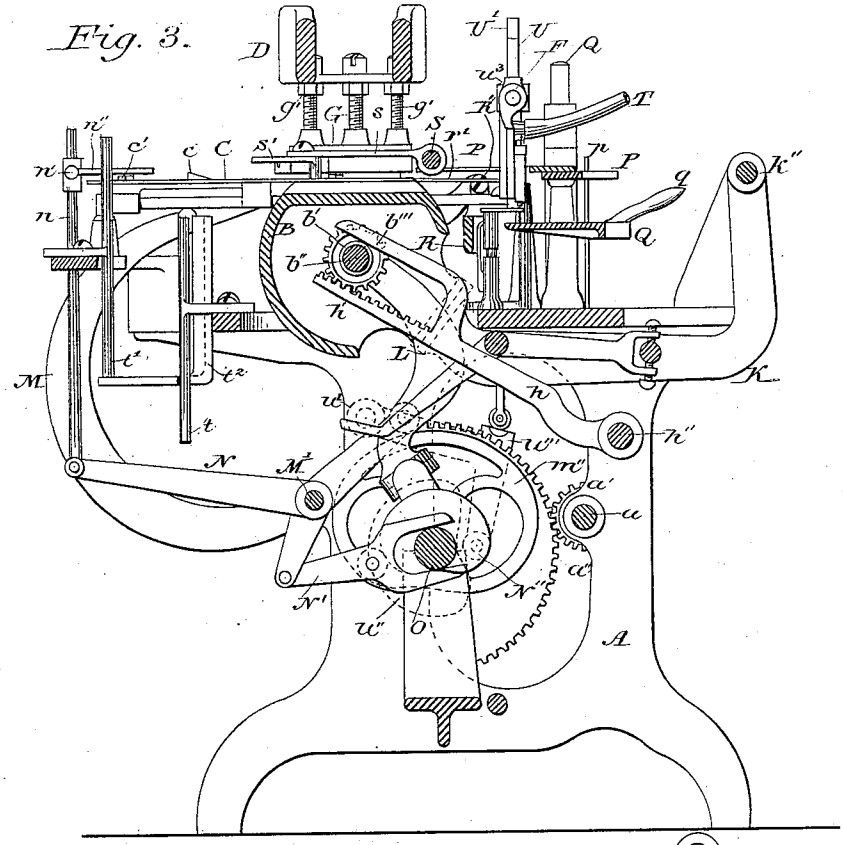


Fig. 4.

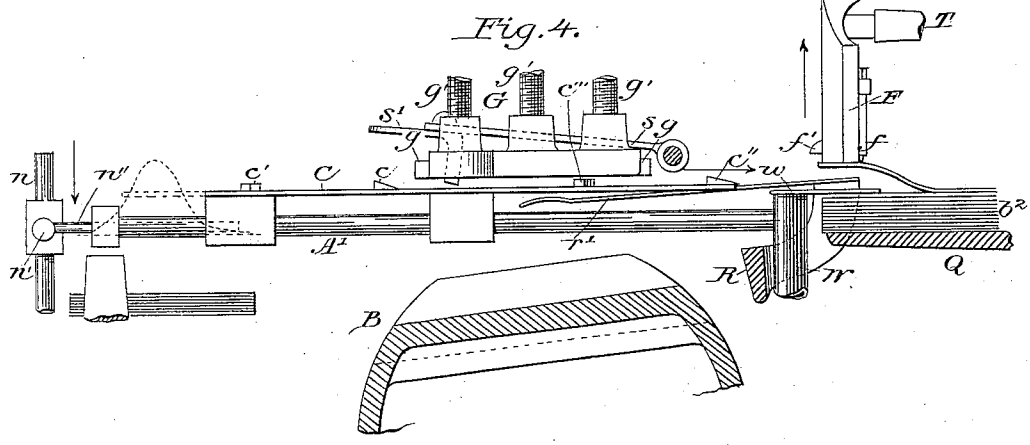
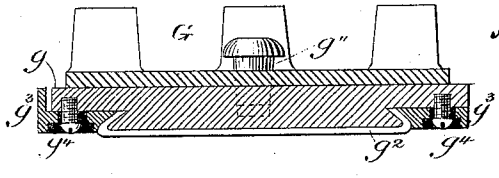


Fig. 5.



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H. D. & D. W. SWIFT.

PRINTING MACHINE.

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Fig. 6.

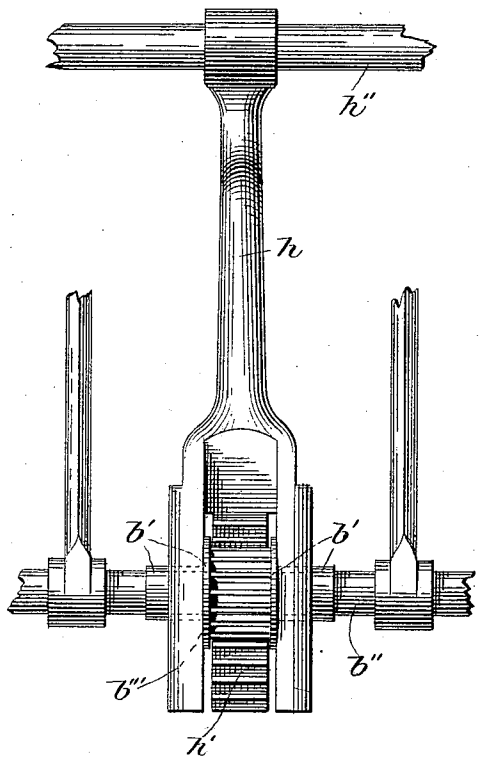
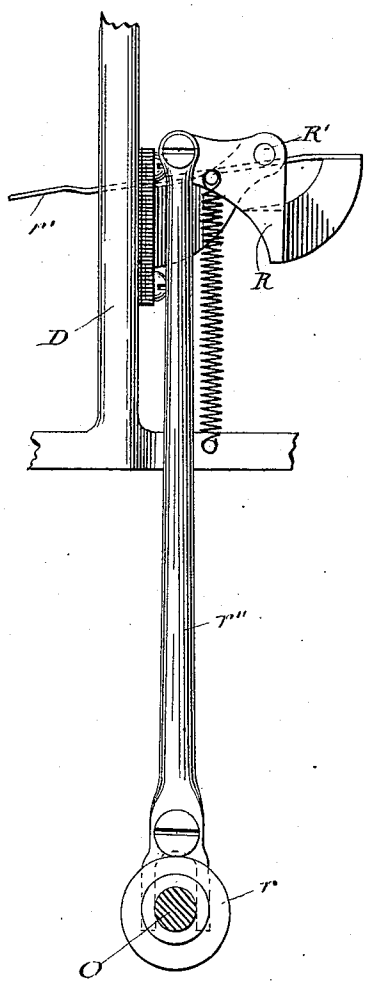


Fig. 7.



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(Model.)

4 Sheets—Sheet 4.

H. D. & D. W. SWIFT.

PRINTING MACHINE.

No. 303,550. Patented Aug. 12, 1884.

Fig. 8.

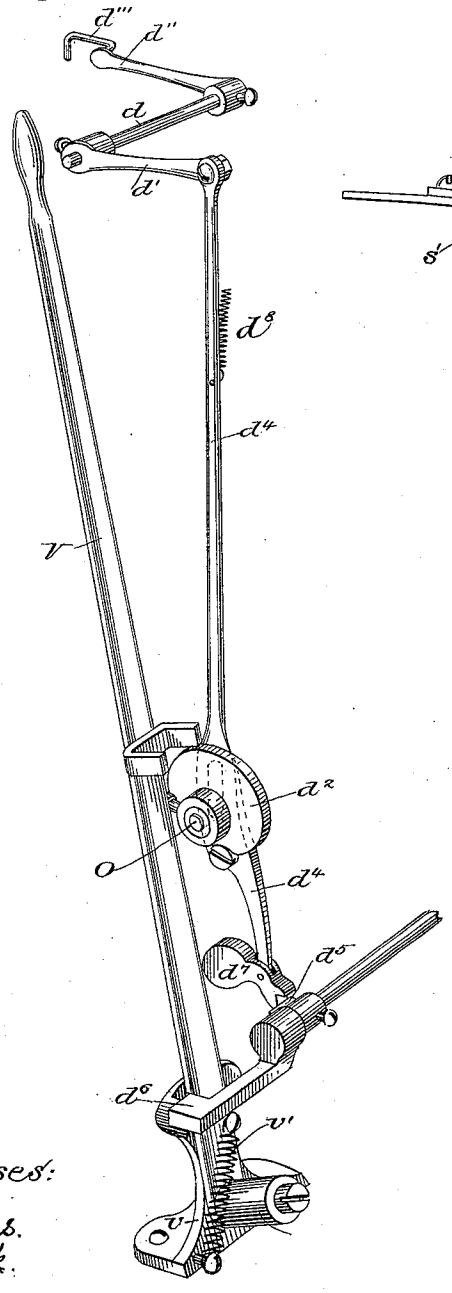
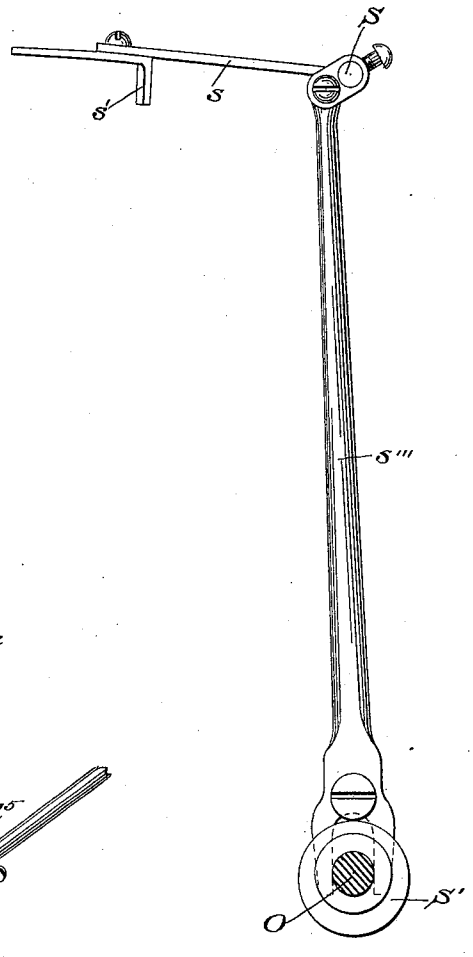


Fig. 9.



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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.

PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 303,550, dated August 12, 1884.

Application filed July 10, 1880. (Model.)

To all whom it may concern:

Be it known that we, HENRY D. SWIFT and D. WHEELER SWIFT, of the city and county of Worcester, and State of Massachusetts, have invented a certain new and useful Improvement in Printing-Machines, which improvement is fully set forth in the following specification and the accompanying drawings, in which—

Figure 1 represents a side elevation of our improved machine; Fig. 2, a plan of the same; Fig. 3, a vertical section on the line *x y*, Fig. 2; Fig. 4, a side elevation in detail of the lifting mechanism, carriage, paper-stops, grippers, bed-plate which supports the type or form, slide-plate upon which impression is taken, and fingers which draw the printed sheets into the receiver. Fig. 5 is a sectional view of the slide-plate and the clamps which hold the tympan-sheet. Fig. 6 is a plan of the shaft on which the inking-cylinder is supported, showing the rack, pinion, and guard-flanges, by which an oscillatory motion is imparted to the cylinder. Fig. 7 is an elevation of the grippers and the shaft, cam, and rocking-frame by which they are moved. Fig. 8 is a perspective view of the stop-finger and mechanism connecting it with the belt-shifting device. Fig. 9 is an elevation of the stops, which determine the position of a sheet under the type, and the rock-shaft connection and cam by which they are raised and lowered.

Similar letters of reference indicate like parts.

In the drawings, A represents the table of the machine. It is supported upon a frame of suitable form to sustain and carry the various parts of the machine.

B is the inking-cylinder, upon which the ink is spread, and from which it is carried by rollers (not shown, but which are to be attached to swinging arms *b*) over the type or form. The cylinder B is attached to arms K, pivoted on a shaft which is fast in supports *k''*, and is also secured to a shaft, *b''*, running axially through it. A rising-and-falling motion is imparted to it by connections L and cranks on the crank-shaft O, motion being communicated from the driving-shaft to the latter by gears *a''* and *a'*. The shaft O is supported in boxes on the frame, and there are also under-bearings to prevent it from springing. An arm, *h*, pivoted at one end on a shaft, *h''*, supported on the frame, carries at its other end a rack, *h'*, which meshes with a pinion, *b'''*, fast on the shaft *b''*, in vertical projections from the arm *h*. On either side of the rack *h'* are slots parallel to the rack, in which play the collars *b'*, which are also loosely fitted on shaft *b''*, on either side of the pinion. The collars *b'* have each a flange, which intervenes between the projection on the rack-arm and the pinion, and serves to hold them in position in shaft *b''*. They also guide the rack properly to the pinion, and prevent wearing away of the shaft *b''*.

D is a support cast with the frame, overhanging the inking-cylinder B, from which, by screw-studs *g'*, is suspended a plate, G. A slide, *g*, fits into dovetailed grooves in the plate G, and is held in position by a taper pin, *g''*, which passes through the plate G and into a hole in the slide. To the under side of this slide, on a raised face, the tympan-sheet *g²*, which receives the impression on the type, is attached. The ends of this face are rounded off, and a recess is formed at the back of each end, against which clamps *g³*, adjusted by screws, *g⁴*, hold the ends of the tympan-sheet. The screws *g⁴* pass through slots in the clamps *g³*, so that the clamps may be drawn toward each other, and thereby draw the sheet tightly over the face of the slide.

Q is a support, substantially like that described in Patent No. 185,798, on which the sheets to be printed are placed.

F is one form of a pneumatic lifter, from which the air is exhausted by pump E, and which, with or without a presser *f* and a friction separator *w*, raises sheets one at a time from the pile on the table Q, and deposits them upon the paper-carriage C. The construction and operation of this sheet-feeding device is fully set forth in another application for Letters Patent made by us.

A rocking-frame, R, is suspended parallel to shaft O, in bearings R', from arms projecting from the frame D on the side toward the

lifter. By means of a cam, r, on shaft, O, a lever-arm, r'', and a spring, r^2, acting to hold the lever-arm r''' in contact with the cam, the rocking-frame R is vibrated at each revolution of the press. At right angles from the rocking-frame R extend two grippers, r', Fig. 5, made preferably of thin metal, and placed at a distance apart a little less than the width of the impression-slide. As the rocking-frame is vibrated, these grippers alternately press against the face of the slide and move down and away from it.

Above and parallel to the rocking-frame R is a rock-shaft, S, supported in bearings on the frame D, to which a vibrating motion is imparted by a cam, S', on shaft O and lever s''', and on which are secured two arms, s, which project each side of the impression-slide. The outer ends of these arms are furnished with stops, s' s', adjustable by means of screws. By the motion of the rock-shaft S and its connections, the stops s' are alternately caused to descend below the face of the impression-slide and rise above it.

C is a paper-carriage of rectangular shape, supported beneath the impression-slide and over the type form or slides. To its framework are attached plates arranged to support the sheet to be printed, and also hooks c'' and stops c''', between which rests the sheet that is being moved, so that it is presented in proper position to the printing mechanism, and also the hooks c, and stops c', between which the sheet subsequently rests, so that it may be presented squarely over the receiver. Connections m, on either side of the carriage, are attached to arms M, which project from a rock-shaft, M'. One of the levers M has an arm which rests upon a cam, m'', as shown in Fig. 2, and is held in contact therewith by a spiral spring. By means of these connections the cam m'' imparts a horizontal reciprocating motion to the paper-carriage.

At the end of the machine, opposite the lifter, are four uprights, adjustably secured to the table, two of which, t, are below the path of the paper-carriage, and two, t', are at the limit of and project above its path. A receiver, t^2, is suspended from the table, which forms a casing behind the uprights t, and beneath all of them.

Horizontal fly-fingers n'', arranged parallel to the sides of the paper-carrage, yet near enough to each other to pass vertically between the longitudinal strips on the carriage, project from a bar, n', which is secured at right angles to a vertical bar, n. The bar n is fitted loosely in a vertical bearing in the frame, and at its lower extremity is pivoted to one end of a rocker-arm, n, to the other end of which is pivoted a bifurcated connection, N', which straddles the shaft O. A cam, N'', on shaft O bears against a roll on the side of the connection, and thereby a vertically-reciprocating motion is imparted to the fly-fingers n'' over the receiver.

Power is intended to be applied to the machine by a belt from the motor, running upon tight and loose pulleys on the driving-shaft a, as indicated by the dotted line, Fig. 1.

For the purpose of starting and stopping the machine, a shipper, V, is provided, pivoted on a stand, v, secured to the floor on which the machine rests, and having fingers projecting midway its height, one on each side of the belt. Stops on the stand v limit the arc of vibration of the shipper. When the shipper is toward the frame of the machine, the belt will be shipped from the loose to the tight pulley and the machine will be in operation. A spring, v', attached to the shipper and to the stand v, will ship the belt back to the loose pulley if the shipper is free to move; but when the machine is in operation—that is, when the shipper is swung toward the frame—a block, d^6, on a horizontal rock-shaft swings in behind the shipper and, for the time, locks it. On this rock-shaft is also secured a dog, d^5, with which engages a weighted foot, d^7, pivoted to the lower end of a bar, d^4. The upper end of d^4 is pivoted to an arm, d', on one end of a rock-shaft, d, supported in a bearing in the top frame. A cam, d^2, on shaft O, bears against a projection from the bar d_4, and causes it to descend as the shaft O revolves. A spring, d^8, attached to bar d^4 at one end and to the frame at the other, causes it to rise. There is a slot in the bar d^4, directly behind the cam d^2, through which the shaft O passes, which guides the bar vertically. On the end of the rock-shaft d, toward the interior of the machine, is attached an arm, d'', nearly parallel to and above the carriage C, when the latter is over the receiver. The extremity of arm d'' is bent down and terminates in a finger, d''', which, as the arm d'' vibrates vertically, enters and is withdrawn from a hole, d^{IV}, in the paper-carriage, during the time the latter is at rest over the receiver, unless there be a blank in proper position on the carriage, as hereinafter described.

A pawl, z, pivoted on the shaft N is held in contact with the gear a'' by a spring, z', and prevents any backward motion of the mechanism when the machine is suddenly stopped.

The operation of our improvements is as follows: A pile of blanks having been placed on the table Q, the machine is set in operation by moving the shipper V toward the frame, where it is held by the block d^6. As the crank-shaft O revolves, the lifter F descends upon the pile of blanks and raises the corner of the top blank of the pile, the paper-carriage is brought under the partially-raised blank, and completes its separation from the pile. Afterward it is laid on the carriage between the hooks c and the stops c', as fully described in our said other application for Letters Patent. The reverse movement of the paper-carriage then takes place, and simultaneously therewith the arms s descend and carry with them the stops s' on either side of the carriage. The movement of the carriage continues until the blank thereon comes in contact with the stops

s', at which time the blank is directly under the tympan-sheet. The stops s', by the aid of screws, are adjustable, in order that the blank may be stopped at any given point and may be placed in proper position to receive the impression of the type. During this operation the cylinder B has been swung down, and the type-form thereon has been inked by the rollers. It now rises, and the type-form is pressed against the blank, which rests against the tympan-sheet g^2 in the adjustable slide g. As the cylinder moves a determined distance at each vibration, the vertical adjustment necessary to secure the desired degree of pressure upon the paper is roughly obtained by the screw-studs g'. The slide g may be then removed and paper put under or taken out from beneath the tympan-sheet, and the latter stretched taut by the clamps g^3 and screws g^4. Immediately the impression is made, the grippers r' are raised by the cam r and connections, and the blank is firmly held against the tympan-slide, whereby, as the cylinder B descends, contact with the blank is instantaneously broken, and the latter is held up, so that the paper-carriage, as it returns for another blank from the lifter, will pass beneath it. When the carriage is at the limit of its motion toward the lifting mechanism, the grippers r' are caused to descend and the blank is let fall on the carriage, where it is received between the hooks c'' and the stops c''', and is carried by the carriage over the receiver and under the fly-fingers n''. While the carriage is momentarily at rest over the receiver, the fly-fingers n'' are caused to suddenly descend by the action of the cam N'' and connections, and the blank is pushed between the bars of the carriage down into the receiver. We have thus described the course of a single blank through the machine. These operations go on substantially simultaneously—that is, while one blank is being carried into the receiver another is being printed, and a third is being raised from the pile. The stops s' and grippers, &c., when once adjusted for a given-shaped blank, need no further attention from the operator. If, owing to a defect in the paper or by any other chance, a blank gets out of position on the carriage and threatens to clog the machine, the belt is automatically shipped and the machine is stopped. This is accomplished by means of the finger d''' and its connections.

The hole d^{IV} in the paper-carriage, into which the finger d''' may penetrate, is placed at a point where it will be covered by the end of one of the flaps of the envelope-blank, as the latter rests in proper position on the carriage; but if the blank be for any reason moved, even but slightly, this hole will be uncovered. As long as the hole is kept covered by a blank just before the latter is pushed into the receiver, the finger d''' will descend and rest upon the blank, but will go no further, as the resistance of the paper is great enough to overcome the feeble tension of the spring attached to the bar d^4. The bar d^4 in that case is not raised sufficiently to bring the weighted foot d^7 into position to act upon the dog d^5; but if the blank leaves the hole exposed, the finger d''' descends to its lowest point, and the bar d^4 rises sufficiently high to bring the toe of the foot d^7 over the dog d^5. As the bar d^4 descends, being impelled by cam d^2, the shaft will be rocked and the block d^6 removed from behind the shipper. The shipper is then drawn over by the action of the spring v' and the machine stopped, thereby preventing damage to the blank.

We claim—

1. The combination of the flanged collars b' with the rack h', shaft b'', and pinion b''', the rack being provided with two projecting-arms extending on each side of the pinion and resting upon the flanged collars, substantially as and for the purpose described.

2. In combination with an impression-plate and the reciprocating carriage C, the adjustable rising and falling stops s', substantially as and for the purpose described.

3. In combination with the impression-plate and reciprocating carriage C, the vibrating grippers r', extending under and rising into contact with the under face of the impression-plate, to hold the sheet against the same and out of contact with the carriage and type after an impression and during the return movement of the carriage.

4. The combination of a frame on which a sheet, during its progress through the machine, rests, furnished with an opening which is covered by the sheet when in proper position thereon, of a reciprocating finger, which, at one extremity of its path, enters the opening in the frame, thereby stopping the machine, or rests upon the sheet, if the sheet is in proper position on the frame, and which, at the other extremity of its path, is at a distance from the frame sufficient to allow the sheet to be moved beneath it, substantially as and for the purpose set forth.

5. The finger d''', rock-shaft d, with arms d' and d'', slotted bar d^4, cam d^2, spring d^8, weighted foot d^7, and a rock-shaft provided with toe d^5 and block d^6, in combination with a belt-shipper and spring v', substantially as and for the purpose described.

6. In a printing-press, in combination with a horizontally-reciprocating carriage, on which the sheet, after being printed, rests, the vertically-reciprocating fly-fingers n'', substantially as and for the purpose described.

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