

(No Model.)

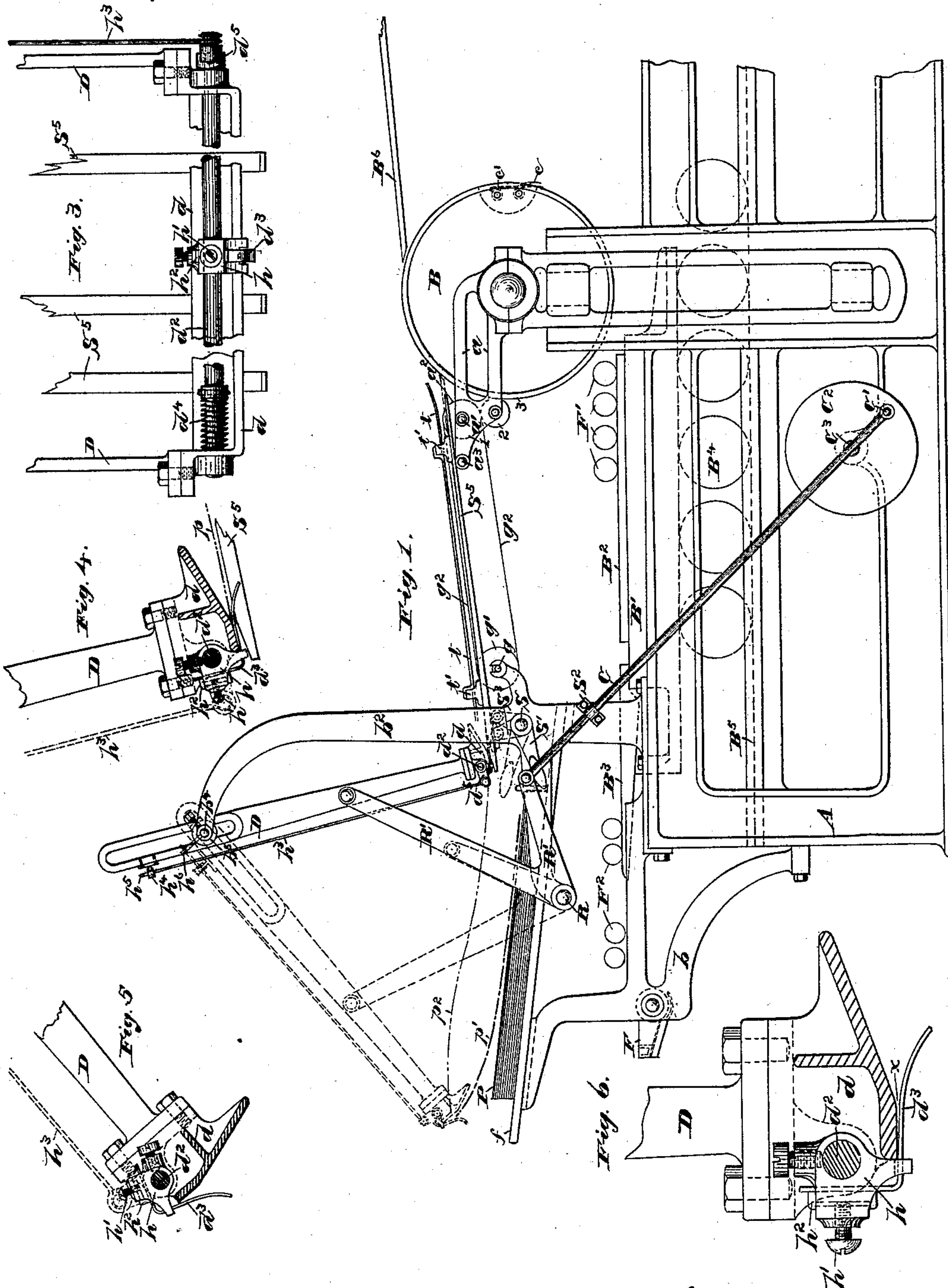
2 Sheets—Sheet 1.

J. T. HAWKINS.

SHEET DELIVERY APPARATUS FOR PRINTING MACHINES.

No. 393,978.

Patented Dec. 4, 1888.



Witnesses:  
Francis P. Leilly,  
John Tully.

Inventor:  
John T. Hawkins,  
by P. H. Voorhes,  
Attorney

(No Model.)

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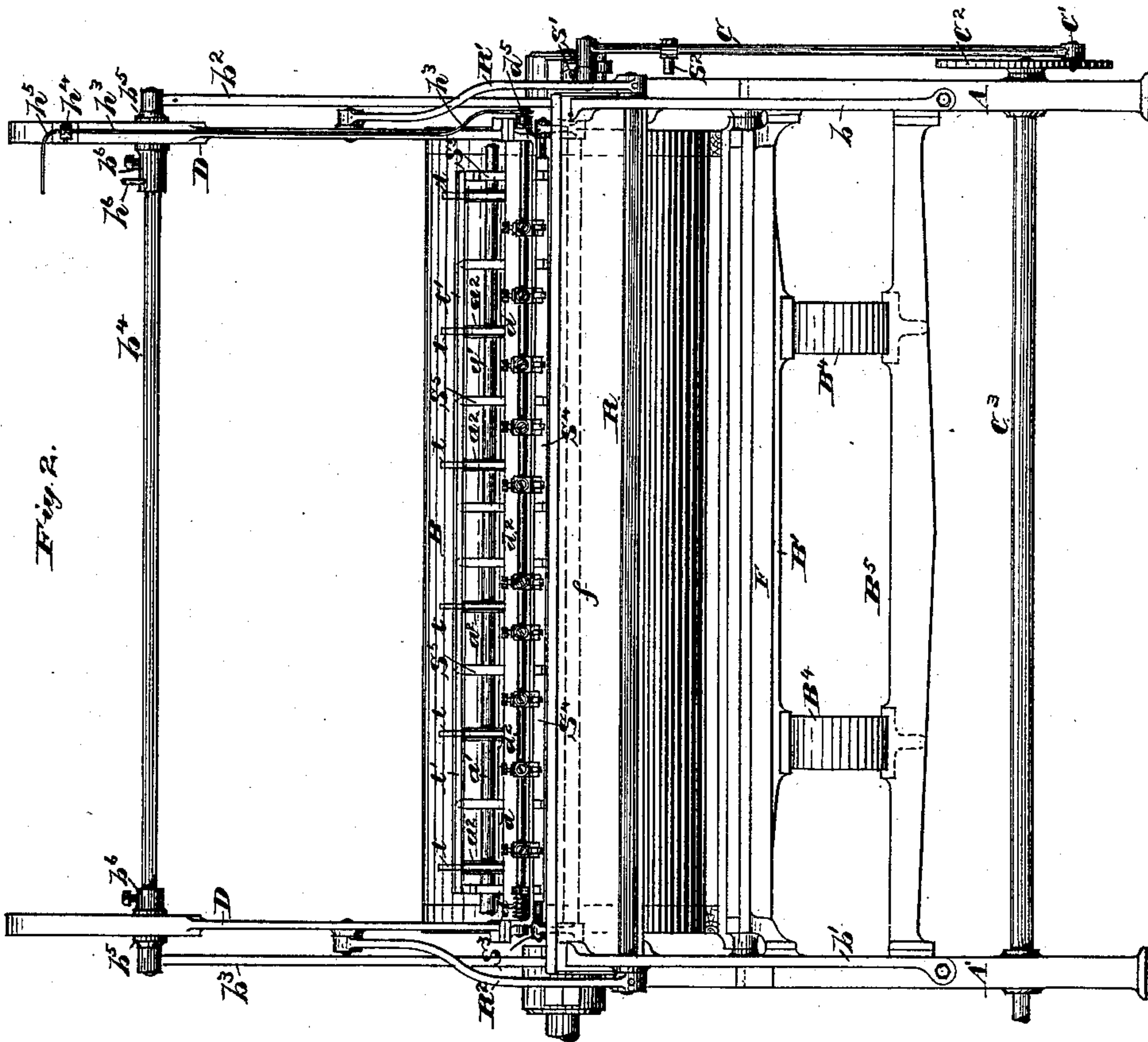
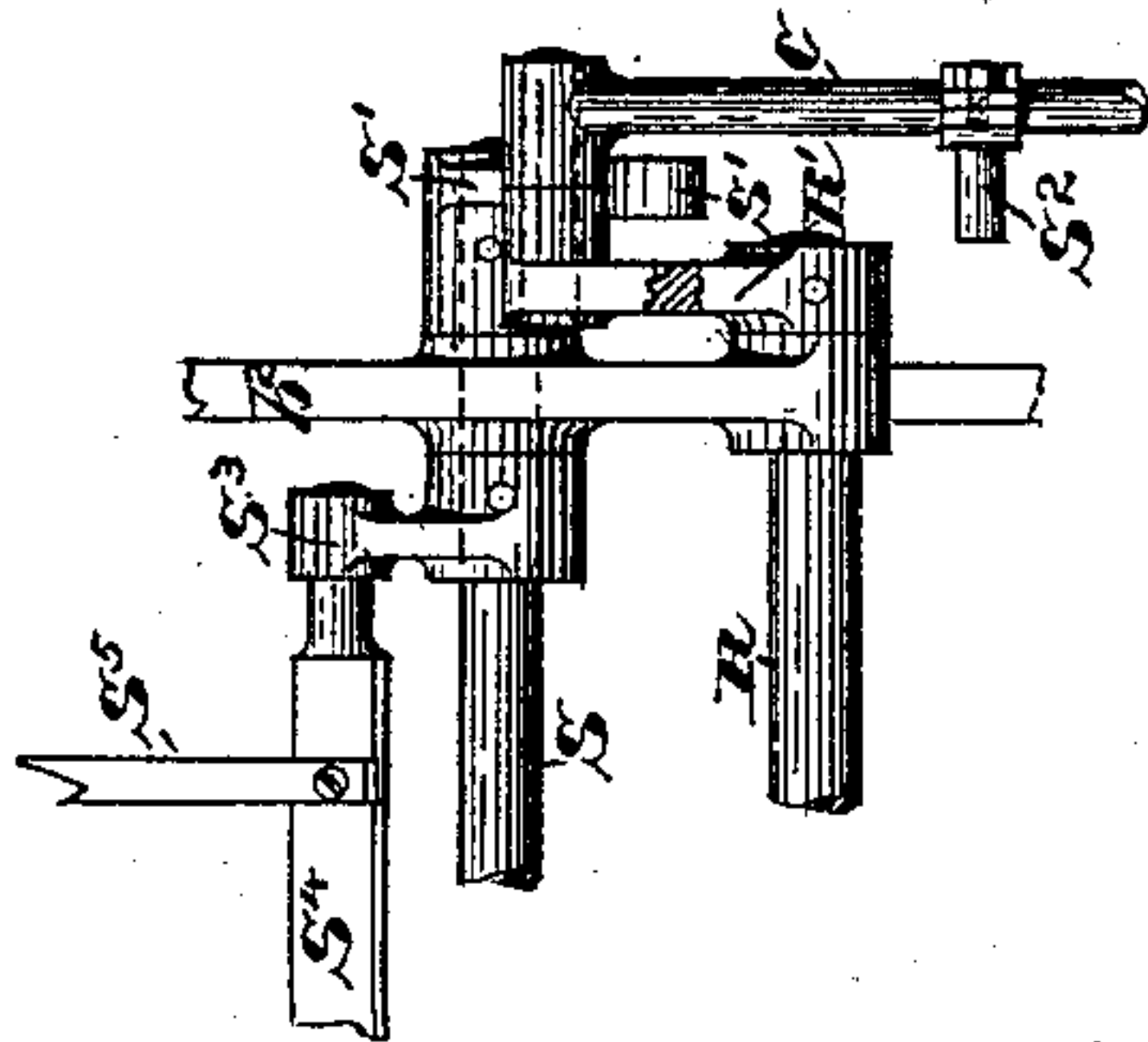


Fig. 2.



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# UNITED STATES PATENT OFFICE.

JOHN T. HAWKINS, OF TAUNTON, MASSACHUSETTS.

## SHEET-DELIVERY APPARATUS FOR PRINTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 393,978, dated December 4, 1888.

Application filed October 2, 1885. Serial No. 178,782. (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 useful Improvements in Sheet-Delivery Apparatus for Printing-Machines, which invention or improvements are fully set forth and illustrated in the following specification and accompanying drawings.

10 The object of this invention is to take the sheet by a minimum gripper-hold while delivering it, last-printed side up, being a modification of my invention of a sheet-delivery apparatus contained in my patent, dated February 9, 1886, No. 335,698.

15 In the last-mentioned patent the design was to receive the sheet upon a series of endless tapes, as stripped from the top and front of the cylinder by a series of stripper-fingers until wholly run on said tapes, at which point the stripper-fingers were elevated to or above the level of the tapes, so that the motion of the sheet might be partially arrested by frictional contact with said stripper-fingers, and the sheet then seized at its head end by a series of traveling grippers, which grippers were automatically held open for its reception and at the proper time automatically closed upon it, said grippers then conveying the sheet to and over a receiving-board, and at the end of their outward stroke automatically opening to release it. The present invention differs from said patent, in that the tapes are kept at all times above the level of the stripper-fingers for the purpose of assisting to force the sheet into the traveling grippers and to assist in its subsequent removal from them, and said grippers are so constructed as not to require any opening mechanism for the purpose of receiving the sheet, but to present an acute angle between the lower and upper jaws of said grippers, into which angle the sheet is driven by its own momentum and the action of the tapes under it, the traveling grippers being opened only to release the sheet, and thereafter immediately closed. A series of sheet-guides is also provided above the tapes to prevent the leading edge of the sheet from being elevated by the action of the air, at high speeds, and in-

suring its leading edge entering the traveling grippers.

The invention consists of the parts and combinations of parts hereinafter described, as set forth in the claims.

55 In the accompanying drawings, Figure 1 is a side elevation of certain parts of a two-revolution cylinder printing-press, to which my invention is shown connected. Fig. 2 is an end elevation of the same. Fig. 3 is an elevation of the traveling gripper-bar, with one gripper in the closed position, as when receiving the sheet. Fig. 4 is a transverse section of Fig. 3. Fig. 5 is also a transverse section of Fig. 3, with the grippers in the open position. Fig. 6 is an enlarged view of the closed gripper, showing more clearly the acute angle formed between the upper and lower jaws for the reception of the sheet. Fig. 7 is an enlarged elevation of the details of the mechanism operating the traveling grippers and the arms which carry them.

In said figures the several parts are indicated by letters, as follows:

75 A A' are the main frames; B, the impression-cylinder; B', the type-bed; B<sup>2</sup>, the form; B<sup>3</sup>, the ink-plate; B<sup>4</sup>, the bed-rollers; B<sup>5</sup>, the bed-roller ways.

F is the ink-fountain.

80 The circles F' indicate the position of the form-rollers, and the circles F<sup>2</sup> that of the angle distributing-rollers. The rollers F' and F<sup>2</sup> are omitted in Fig. 2. Brackets b b' are secured to the frames A A', carrying the fountain F and the outer end of the receiving-board f. Brackets or standards b<sup>2</sup> b<sup>3</sup> are secured at their bases to the frames A A'.

P is the pile of sheets upon the receiving-board. (Not shown in Fig. 2.)

90 Journaled in arms extending from the standards b<sup>2</sup> b<sup>3</sup> is a rock-shaft, R. Secured to rock-shaft R on the right-hand end, Fig. 2, is a bell-crank lever, R', and upon the left-hand end a straight lever, R<sup>2</sup>, the long arm or lever R' being broken away in Fig. 7. In the short arm of the bell-crank R' is articulated the upper end of the connecting-rod C, the lower end of which is connected to a crank-pin, C', secured in the rotating disk C<sup>2</sup>. The disk C<sup>2</sup> is secured to its shaft C<sup>3</sup>, which is caused to 100



rotate by suitable gearing (not shown) once to each impression, or to make one-half the revolutions made by the impression-cylinder B in a given time. The driving-gearing and its connection with the axis of the cylinder B and the shaft C<sup>3</sup> are omitted as unnecessary to the illustration of the invention. The two standards b<sup>2</sup> b<sup>3</sup> are connected at the top by a stay-rod, b<sup>4</sup>. Upon the stay-rod b<sup>4</sup> are secured collars b<sup>5</sup> b<sup>6</sup>. Embracing the stay-rod b<sup>4</sup> by slots in their upper ends, and sliding between the pairs of collars b<sup>5</sup> and b<sup>6</sup>, are two levers, D. At a properly-proportioned point on the levers D, as hereinafter explained, the long arms of levers R' R<sup>2</sup> are articulated.

To the lower ends of the levers D is secured a bar, d, constituting the upper jaw of a series of jaws or gripper-fingers, d<sup>3</sup>. A rock-shaft, d<sup>2</sup>, is journaled in the ends of the bar d, having adjustably secured thereto a series of sockets, h, in which is secured by the set-screws h' and gibs h<sup>2</sup> the gripper-fingers d<sup>3</sup>. The rock-shaft d<sup>2</sup> is operated to close the jaws or grippers d<sup>3</sup> against the jaw or bar d by a spring, d<sup>4</sup>, Figs. 2 and 3.

Secured to the rock-shaft d<sup>2</sup> is a small arm, d<sup>5</sup>, to which is secured at its lower end a connecting-rod, h<sup>3</sup>. The upper end of the connecting-rod h<sup>3</sup> slides in a small bracket, h<sup>4</sup>, secured in the upper end of one of the arms D, and is bent at right angles, as seen at h<sup>5</sup>, Fig. 2. The bent end h<sup>5</sup> of connecting-rod h<sup>3</sup> engages a pin, h<sup>6</sup>, secured in one of the collars b<sup>6</sup>, when at the point of releasing the sheet, thus opening the gripper-fingers d<sup>3</sup>, as shown in dotted lines, Fig. 1, and upon the commencement of the return-stroke of the levers D allowing the gripper-fingers d<sup>3</sup> to again close. In brackets a, extending from the cylinder-bearings, (not shown in Fig. 2,) is journaled a shaft, a', carrying a series of tape-pulleys, a<sup>2</sup>.

On one end of the shaft a' is secured a gear-wheel meshing with an idler-wheel running on a stud secured in one of the arms a, which idler in turn engages a gear-wheel secured to one end of the cylinder. These gears (represented only by the circles 1 2 3) actuate the shaft a' to rotate in the same direction as the cylinder B. In short arms extending from the standards b<sup>2</sup> b<sup>3</sup> is journaled a shaft, g, carrying a second series of tape-pulleys, g'. Upon the two series of tape-pulleys a<sup>2</sup> and g' runs a series of tapes, g<sup>2</sup>. In the standards b<sup>2</sup> b<sup>3</sup> is journaled a rock-shaft, S. Secured to the rock-shaft S, outside of the standard b<sup>2</sup>, is an arm, S', having a cam-shaped projection on its free end. Secured to the connecting-rod C is a projecting stud, S<sup>2</sup>, which engages the free end of lever S' during the last part of the upward motion of the connecting-rod C, the upper end of connecting-rod C, where articulated to the lever R', engaging the free end of the lever S' on its upper side during the last part of the downward motion of the connecting-rod C.

Inside of the standards b<sup>2</sup> b<sup>3</sup> are secured to the rock-shaft S two arms, S<sup>3</sup>. In the free ends of the arms S<sup>3</sup> is journaled a bar, S<sup>4</sup>, Fig. 7. Secured to the bar S<sup>4</sup> is a series of stripper-fingers, S<sup>5</sup>. In the arms a is secured a rod, a<sup>3</sup>, upon which the stripper-fingers S<sup>5</sup> lie and slide, the short sliding motion given to them by the mechanism described being for the purpose of carrying their free ends sufficiently close to the cylinder B to strip the sheet from it, as shown in dotted lines in Fig. 1, and to be far enough away from said cylinder when the sheet is passing down to the form to be printed, as shown in full lines in the same figure. The whole is represented in Fig. 1 in full lines in position when the sheet is to enter the acute angle formed by the bar or jaw d and the jaws or gripper-fingers d<sup>3</sup>, and in dotted lines when the sheet p is being released to fall upon the receiving-board f or upon the pile of sheets P. Figs. 3, 4, and 6 also show the parts in their respective positions when receiving the sheet and Fig. 5 when releasing it. The dotted line p<sup>2</sup>, Fig. 1, represents the path described by a point in the bar d, the relative proportions of the levers R', R<sup>2</sup>, and D, and the points of articulation of the arms R' R<sup>2</sup> with the arms D, and the situations of the centers of vibration being properly made and placed to cause the bar d to pursue approximately a straight line, preferably, however, causing it to be slightly curved convex downward toward the stripper-fingers and convex upward toward the outer end, so as to rise slightly away from the released sheet on the return-stroke and allow the sheet to drop unobstructed.

B<sup>6</sup> is the feed-board; c, the cylinder-grippers, and c' the sheet-lifter fingers. A series of sheet-guides, t, is adjustably attached, so as to slide upon the cross-bars t' of the stripper-fingers S<sup>5</sup> and extend toward and over the impression-cylinder to the point where the cylinder-grippers c open to release the sheet. These guides serve to prevent the leading edge of the sheet from being elevated away from the stripper-fingers S<sup>5</sup> and the tapes g<sup>2</sup> on its passage down them, and thus to insure that the head or leading edge of every sheet shall enter the opening formed between the bar or jaw d and the jaws or fingers d<sup>3</sup>.

The operation of the above-described parts is as follows: With the parts as shown in dotted lines, Fig. 1, the stripper-fingers S<sup>5</sup> have their free ends in close proximity to the cylinder B, and in this position strip the sheet from the cylinder B, the cylinder-grippers c, Fig. 1, being caused to release the sheet at the proper time, and the head of the sheet being lifted to and upon the stripper-fingers S<sup>5</sup> by the usual lifter-fingers, c', and the tapes g<sup>2</sup> carrying the sheet out of contact with the stripper-fingers S<sup>5</sup>. While the sheet is passing down upon the tapes g<sup>2</sup> the levers D are passing to the right, Fig. 1, as actuated by the mechanism already described, so as to



cause the jaw or bar  $d$  and the jaws or gripper-fingers  $d^3$  to close upon it to meet the advancing edge of the sheet at the lower end of the stripper-fingers  $S^5$ , the crank-disk  $C^2$  being properly timed to bring this about. The sheet at this point shoots with considerable force, due to its own momentum and to the action of the tapes  $g^2$ , into the acute angle, as at  $x$ , Fig. 6, between the bar or jaw  $d$  and the jaws or fingers  $d^3$ , so that it is held without any measurable clamping of the sheet between the bar or jaw  $d$  and jaws or fingers  $d^3$ , and might be thus held, if the sheet were printed practically out to its leading edge, without being soiled by pressure between the bar or jaw  $d$  and the jaws or fingers  $d^3$ . Just before the arrival of the bar  $d$  at the extremity of its motion to the right, Fig. 1, the upper end of the connecting-rod  $C$  engages the free end of the lever  $S'$ , and, through the arms  $S^3$ , draws the stripper-fingers  $S^5$  away from the cylinder  $B$  a short distance to allow the next sheet to pass down unobstructed to be printed. By the continuation of the motion of the parts the bar or jaw  $d$ , with its jaws or fingers  $d^3$ , conveys the head of the sheet through the path  $p^2$ . The upper bent end of the rod  $h^3$  engages the pin  $h^6$  during the last part of this motion, opening the fingers or jaws  $d^3$  and releasing the sheet to fall upon the board  $f$  or the pile of paper  $P$ . Upon the arrival of the parts at the position shown in dotted lines, Fig. 1, the pin  $S^2$ , secured to the connecting-rod  $C$ , engages the free end of the lever  $S'$  and brings the stripper-fingers  $S^5$  again into position in close proximity to the cylinder  $B$  to receive the succeeding sheet.

The jaws or fingers  $d^3$ , as shown, are made of metal sufficiently thin to permit of their being more or less elastic, so that the action of the sheet, in forcibly entering the acute angle formed between them and the bar or jaw  $d$ , slightly springs the jaws or fingers  $d^3$  away from the jaw or bar  $d$ ; but this is essential only in certain cases and for certain kinds of paper, and the fingers  $d^3$  may generally be made of such proportions as to be practically rigid, holding the sheet by its being merely wedged into the acute angular space formed between them and the jaw or bar  $d$ . So that I do not confine myself to either method of making the fingers  $d^3$ . Preferably they are made slightly elastic, as best suited to all varieties of paper.

It is quite obvious that the bar  $d$  may be made as a series of upper grippers, as in application, Serial No. 164,556. It is obvious, also, that the jaws or grippers  $d$   $d^3$  may be constructed so that both may be movable to release the sheet, instead of one jaw or series of jaws being fixed, without departing from the principle of this invention. I therefore do not confine myself to the exact construction of these parts shown in the drawings.

I do not herein claim the parallel mechanism for imparting traveling motion to the

sheet-grippers. Such mechanism is claimed in my above-mentioned patent, No. 335,698.

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

1. In the sheet-delivery of a printing-machine, a sheet-conveyer for conveying the sheet by one of its edges, consisting of a series of jaws or grippers, as  $d$  and  $d^3$ , forming with each other an acute-angled opening, as at  $x$ , into which the sheet to be conveyed is forcibly driven by any suitable means and held wedged into said acute-angled opening between said jaws while being conveyed, substantially as and for the purposes set forth.

2. In the sheet-delivery of a printing-machine, a sheet-conveyer for holding and conveying the sheet by one of its edges, consisting of a series of jaws or grippers, as  $d$   $d^3$ , forming between the two, when closed, an acute-angled opening, as  $x$ , into which the sheet to be conveyed is forcibly driven by any suitable means, in combination with means, substantially as described, for automatically opening said jaws or grippers at the proper time to release the sheet, substantially as and for the purposes set forth.

3. In the sheet-delivery of a printing-machine, a sheet-conveyer for holding and conveying the sheet by one of its edges, consisting of a series of jaws or grippers, as  $d$   $d^3$ , forming between the two, when closed, an acute-angled opening, as  $x$ , into which the sheet to be conveyed is forcibly driven by any suitable means, in combination with means, substantially as described, for automatically opening said jaws or grippers at the proper time to release the sheet, and means, substantially as described, for imparting a reciprocating travel to said conveyer, substantially as and for the purposes set forth.

4. In the sheet-delivery of a printing-machine, in combination with a sheet-conveyer consisting of a series of jaws or grippers, as  $d$   $d^3$ , a series of tapes, as  $g^2$ , for conveying the sheet to and assisting in both forcibly driving the sheet into the closed jaws of said conveyer and conveying it away while so held, substantially as and for the purposes set forth.

5. In a sheet-delivery for a cylinder printing-machine, in combination with an impression-cylinder, as  $B$ , a series of stripper-fingers, as  $S^5$ , means, substantially as described, for automatically moving said stripper-fingers to and from said impression-cylinder, a series of jaws or grippers, as  $d$   $d^3$ , a series of tapes, as  $g^2$ , mechanism, substantially as described, for giving to said jaws or grippers a reciprocating travel, and means, substantially as described, to automatically open said jaws or grippers for the release of the sheet only, substantially as and for the purposes set forth.

6. In a sheet-delivery for a cylinder printing-machine, in combination with an impression-cylinder, as  $B$ , a series of stripper-fingers, as  $S^5$ , means, substantially as described, for



automatically moving said stripper-fingers to  
and from said impression-cylinder, a series  
of jaws or grippers, as  $d$   $d^3$ , a series of tapes,  
as  $g^2$ , mechanism, substantially as described,  
5 for giving to said jaws or grippers a recip-  
rocating travel, means, substantially as de-  
scribed, for automatically opening said jaws

or grippers to release the sheet, and a series  
of sheet-guides, as  $t$ , substantially as and for  
the purposes set forth.

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