Oct. 30, 1923. 1,472,442

B. D. STEVENS

PRINTING PRESS TRIPPING APPLIANCE

Filed Feb. 26, 1921 2 Sheets-Sheet 1

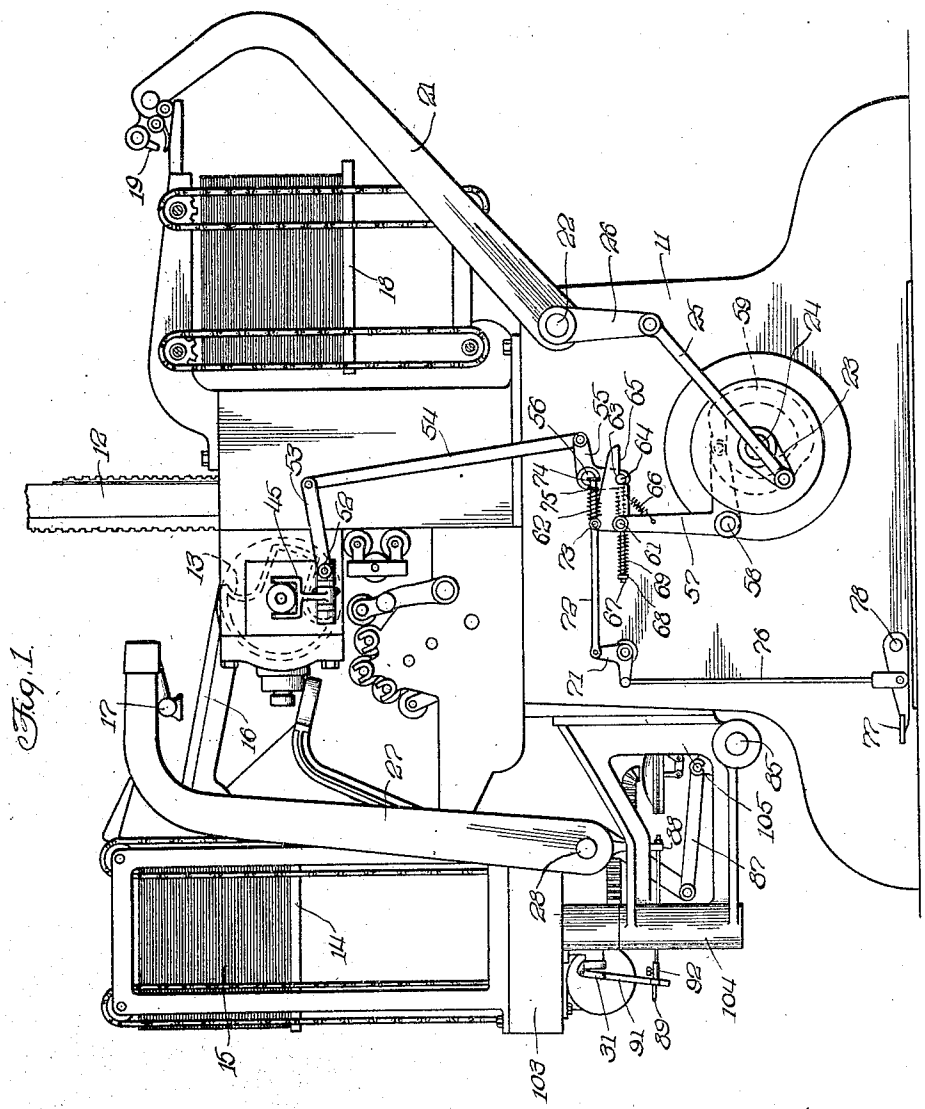


Fig. 1.

Witness:
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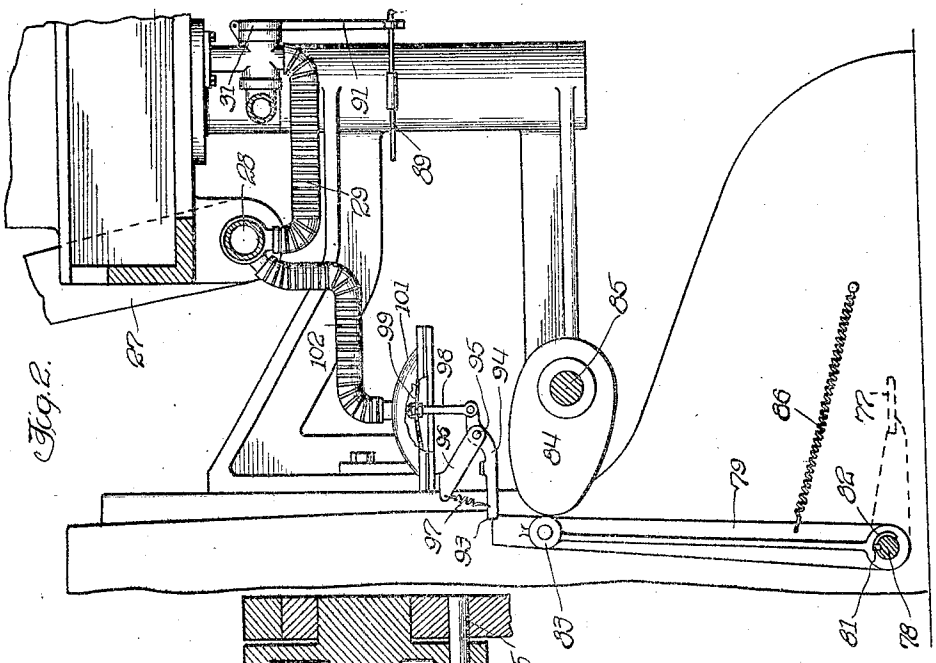


Fig. 2.

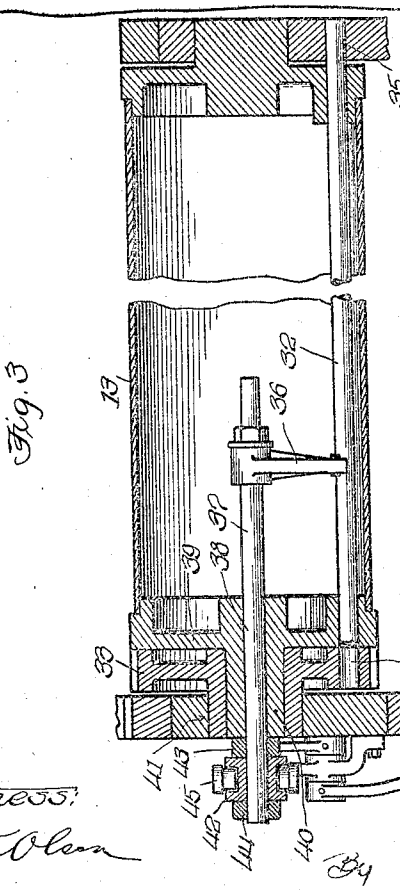


Fig. 3

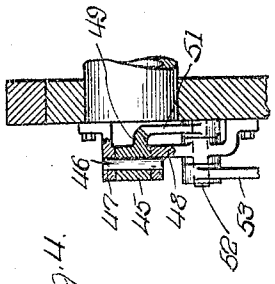


Fig. 4.

Witness:
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Patented Oct. 30, 1923. 1,472,442

UNITED STATES PATENT OFFICE.

BURT D. STEVENS, OF EVANSTON, ILLINOIS, ASSIGNOR TO MIEHLE PRINTING PRESS AND MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

PRINTING-PRESS TRIPPING APPLIANCE.

Application filed February 26, 1921. Serial No. 448,112.

To all whom it may concern:

Be it known that I, BURT D. STEVENS, a citizen of the United States, residing at Evanston, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Printing-Press Tripping Appliances, of which the following is a specification.

Heretofore, it has been customary to provide printing-presses with various types of cylinder tripping mechanisms all depending for their action upon whether or not the oncoming sheet has been properly advanced for the printing impression.

In the preferred embodiment of this invention one or more sheet-feeder suction-shoes pick up the top sheets of a supply pile one after the other and convey them to and deliver or drop them upon a registration feed board operated by suitable means to register the sheet with the usual front and side guides.

Such registration or transfer feed board is apertured or perforated and constantly subjected to a slight suction to hold the sheet thereto to prevent dislodgment, but not so firmly, however, that the sheet after having reached its registered position with the two sets of guides may not shift relatively to the board rather than follow its further movement.

The uniform uninterrupted suction on such feed board is preferably comparatively slight in amount and consequently does not lend itself as a means for controlling the cylinder tripping operation.

Accordingly in the new style of printing-press the tripping mechanism is governed by the air-pressure condition in the suction feeder-shoes which, of course, is dependent in turn on whether or not they have picked up a sheet from the pile and are properly transferring it to the registration-board.

The press tends to trip the cylinder just previous to the delivery of the sheet by such suction-shoes to the registration-board.

If the shoes are properly transporting a sheet, the cylinder will not be tripped, whereas, on the other hand, if the shoes for some reason or other have failed to raise a sheet from the pile and are consequently not conveying or feeding it, tripping of the cylinder will occur so that the printing operation will be omitted, which otherwise would take place had the sheet been present.

In order that those skilled in this art may understand the manner in which the above-stated purpose is effected in a preferred embodiment of the invention, as well as other aims and objects of the latter, a desirable corporation of the invention in physical form has been illustrated in the accompanying drawings forming a part of this specification, and throughout the several views of which like reference characters refer to the same parts.

In these drawings:

Figure 1 is a side elevation of the printing-press;

Figure 2 is a vertical section illustrating the interior mechanism;

Figure 3 is a longitudinal section through the impression-cylinder; and

Figure 4 is a partial plan and partial detailed section of a small portion of the appliance.

Referring to these drawings, it will be observed that the printing-press includes a main-frame 11 equipped with a suitably-guided, vertical, reciprocatory bed 12, the printing-form of which coacts in the ordinary manner with an impression-cylinder 13, these parts being operated by appropriate mechanism in the usual way.

The machine comprises also a board or table 14 for the stack or pile of blank sheets 15 to be printed, an inclined, registration, feed-board 16 adjacent to the impression-cylinder, and to which the sheets are transferred individually in succession from the pile by one or more suction-shoes 17, and a delivery board or platform 18 to which the printed sheets are conveyed in sequence from the cylinder by delivery-grippers 19 on a pair of oscillatory rock-arms 21 mounted on a shaft 22 and actuated in proper timed relation to the operation of the other parts of the mechanism in any approved manner, as for instance by a crank-arm 23 on a drive-shaft 24 connected by a link 25 to an arm 26 on shaft 22.

The apertured or perforated suction-shoes 17 may be of any convenient or desirable design receiving their reduced atmospheric pressure or suction through their hollow supports on the upper ends of one or more hollow bent or curved rock-arms 27 mounted on a hollow rock-shaft 28 connected by a pipe or tube 29 of the usual flexible form to a suction-fan, not shown.

By means of these several hollow members connected together in series, the suction created by the fan is exerted through the suction-shoes enabling them to pick up the top sheets of the pile in succession and transport or convey them to and deliver them on to the registration feed-board from which they pass to the cylinder for printing at the proper moment. To deliver the sheets to or drop them on the feed-board from the suction-shoes, it is necessary to relieve or terminate the suction and this is accomplished by automatically opening a valve 31 connecting pipe 29 to the outer air, whereby when the valve is opened atmospheric pressure prevails in the suction shoes causing the sheet formerly adhered thereto by the suction to drop on the feed-board.

Such registration feed-board, forming no part of the present invention and which is fully disclosed and claimed in a copending patent application, is automatically moved to register the sheet thereon with suitable front and side guides or gauges preliminary to being gripped to the cylinder, and is apertured and subjected to a constant slight suction to maintain the sheet in proper position thereon without danger of unintentional displacement, thus permitting the sliding or shifting of the sheet on the board during the further continued travel of the latter after the sheet has been brought into contact with the guides or gauges.

The tripping of the cylinder to prevent its operation when not supplied with a sheet to be printed is controlled through or by means of the suction-shoes, whereby if a sheet has not been properly carried forward by the shoes from the supply pile to the registration feed board, the cylinder will be tripped and omit its printing revolution.

Such tripping or cylinder controlling mechanism comprises a lock or clutch rod 32 inside of the cylinder slidingly mounted lengthwise in the end walls thereof and adapted to be slid back and forth to unclutch and clutch the cylinder to its aligned or coaxial driving gear 33 apertured at 34 for the accommodation of one end portion of the rod projecting from the end of the cylinder when the parts are clutched together.

When such lock rod is retracted to disconnect the cylinder from its operating gear, its other end is projected into a hole or aperture 35 in the frame of the machine, thereby locking the cylinder against rotation so long as it is unclutched from from its gear.

Such clutch rod is slid back and forth by an arm 36 fast on a shaft or rod 37 slidably mounted at the axis of the cylinder and gear in a bearing 38 in the cylinder end member 39, the latter having a hub 40 revoluble in a bearing in the gear, the latter in turn having a hub or journal rotatable in a bearing 41 of the frame. At its protruding end shaft or rod 37 is equipped with an annularly grooved sleeve 42 between abutments or collars 43 and 44 on the shaft.

The element 37 is adapted to be slid lengthwise by a yoke arm 45 having pins or rollers in the groove of the collar, the lower end of such arm being rockingly mounted on a stationary shaft 46 supported in suitable brackets 47 and 48 fastened to the main frame. The lower portion of arm 45 is equipped with a sector 49, the teeth of which are in mesh with those of another sector 51 fastened to a shaft 52 rockingly mounted in a bearing of bracket 48, the outstanding end of such shaft having an arm 53 fastened thereto with its end connected by a link 54 to one arm of a bell-crank 55 fulcrumed at 56.

A bell-crank 57 fulcrumed at 58 is adapted to be rocked or oscillated by a revoluble cam 59 on shaft 24 in the usual way and has one arm pivoted at 61 to a recessed or notched lock or catch member 62 supplied on its lower edge with a socket or cavity 63 adapted to receive a pin 64 outstanding from the depending arm of bell-crank 55 and thus normally operatively connect together the two bell-cranks, whereby the cam rocks the two simultaneously.

It should be observed that the left-hand wall of the recess or cavity 63 is deeper than its right-hand wall, the latter terminating at the beginning of a flat, horizontal face 65, member 62 being yieldingly pulled down by a coil contractile spring 66 connected thereto and to the element 57.

The pin-equipped arm of bell-crank 55 is supplied with a rod 67 slidingly extended through a bearing 68 on the frame, the rod being surrounded by a coil spring 69, one end bearing against the bell-crank and the other end against the bearing, whereby when freed from the lock 62 the spring tends to rock bell-crank 55 in a direction to unclutch the impression-cylinder from its operating gear, the actual uncoupling of these two elements occurring when the rod 32, during the rotation of the impression-cylinder, comes into register or alignment with recess 35.

So long as the several parts are connected together as shown in Figure 1, the cam 59 regularly and intermittently clutches the impression-cylinder to and unclutches it from the gear by which action the cylinder remains stationary during a portion of the travel of the reciprocatory bed, the cylinder being what may be characterized as a stop cylinder.

If the impression-cylinder is to be tripped, the means about to be described temporarily prevent the locking of the cylinder to its gear so that during a period when it would normally be rotating it is now stationary

and no printing operation is effected because the cylinder, being cut away on one side, does not contact with the traveling form.

Accordingly, the lock member or coupling element 62 is connected to one arm of a suitably-journalled bell-crank 71 by a rod link 72 pivoted to the bell-crank and extended through a pivot pin 73 rockingly mounted on member 62, such rod being equipped on its protruding portion with a collar 74 secured thereto near its end and a coil spring 75 encircling the rod and interposed between the collar and the pivot pin, such spring being somewhat shorter than the distance between these elements so that normally there is practically no strain thereon. The other arm of bell-crank 71 is connected by an upright link 76 to a pedal or treadle 77 fastened to a rock-shaft 78 journalled in the frame.

Inside of the machine frame, shaft 78 is supplied with an upstanding arm 79 loosely secured thereto by means of a key 81 on the shaft fitting in an arcuate slot 82 in the hub of the arm, the latter near its upper end being provided with a roller 83 coacting with a cam 84 on a drive-shaft 85, arm 79 being yieldingly pulled toward the cam by a coil contractile spring 86.

This shaft 85 also operates the sheet-feeder rock-arms 27 through a crank-arm and link connection 87, one of the arms 27 or its shaft 28 having a depending ear or lug 88 carrying a rod 89 extended through a hole in the arm 91 carrying the valve 31, the rod 89 being fitted with collar 92 adapted at the proper moment to strike the arm 91 and open the valve.

At its upper end arm 79 has a shoulder 93 adapted to bear against the end of a lock-lever 94 fulcrumed at 95 in a suitably-supported bracket 96 and supplied with a spring 97 tending to lift or raise the end thereof which coacts with arm 79.

The opposite end of the lock-lever is connected by a member 98 to the center of a rubber diaphragm 99 secured around its border or margin to a shell or casing 101, the interior of which above the diaphragm is connected to the chamber in the hollow shaft 28 by a flexible hose or pipe 102, the lower face of the diaphragm being exposed to the outer air, whereby the upper side of the diaphragm is subject to the same atmospheric pressure or suction conditions as exist in the sheet-transporting shoes 17, whereas the lower or bottom face of the diaphragm is acted upon by the usual or normal atmospheric pressure of approximately fifteen pounds per square inch.

The entire sheet-feeding mechanism, including the pile of blank sheets and their support, the registration feed-board, and the suction feeder are mounted on a frame 103 hinged at 104 to a substantial bracket 105 carried by the main-frame 11, and by disconnecting the link 87 from its associated crank-arm on shaft 85, which can be readily accomplished since that end of the link is in hook form and takes over a pin on the crank-arm, the frame 103 and all its parts may be swung out of the way in a horizontal plane away from the impression-cylinder, the form, the bed, and other parts of the printing-press.

Owing to the flexible suction-connection described, the tripping mechanism, the action of which is controlled by the condition of the suction-feeder as more fully described hereinafter, remains operative in all positions of the swinging frame, but, of course, the operation of the sheet-feeder is interrupted in the open position of the frame by reason of the temporary breaking of the link connection 87 with the shaft 85.

In case it is desired to operate the cylinder and bed, as for instance for hand feeding, when the mechanical feeder is thus swung around into inoperative position, the tripping mechanism, so far as control thereof by the suction sheet-feeder is concerned, may be made inactive by permitting a paper sheet to remain adhered to the suction-shoes, thus preserving the presence of a reduced atmospheric pressure throughout the system.

The operation of the appliance occurs practically as follows.

Owing to the rocking of arms 27 to the left as the parts are viewed in Figure 1, the suction sheet-feeder shoes 17 move over and down on to the sheet supply pile, and, by reason of the reduced pneumatic pressure therein, pick up the topmost sheet from the stock or supply stack or pile, and, during the swinging of the arms to the right, transport or convey the sheet, which adheres to them because of the existing suction, over the transfer or registration feed-board.

As soon as such sheet clings to and covers the holes of the suction-shoes, the air pressures on the two sides of the diaphragm become unbalanced, and such member flexes upwardly causing lever 94 to move to a position to lock arm 79.

At the proper moment the cam 59 causes bell-crank 57 to turn to the right and the cylinder becomes stationary by disconnecting it from its gear and locking it in stop position to the frame.

At the correct instant valve 31 opens causing the dropping of the sheet on to the registration feed-board and the balancing of the air pressures on the two sides of the diaphragm, thus ending its upward bending or arching, resulting in lever 94 unlocking arm 79, but cam 84 prevents the arm from moving sufficiently to perform the cylinder tripping function.

When, thereafter, cam 59 rocks bell-crank 57 to the left, the cylinder will be clutched

to its gear and the printing operation will occur in the normal way with the sheet gripped to the cylinder.

Assuming that the operator desires to trip the cylinder by foot, he presses down on pedal 77, thus rocking bell-crank 71 to the left and shifting rod 72 in the same direction.

With such parts held in this position or relation by the foot of the workman, elements 62 and 55 are not operatively disconnected from one another by the upward turning of member 62 until bell-crank 57 is at or near its limit of travel to the right, because, owing to the shortness of spring 75 and the consequent absence of initial strain on the same, it is not sufficiently compressed to lift the catch member 62 against the action of spring 66 unless the pedal is depressed at the time element 62 is at or near its limit of movement to the right.

Such coaction of the cooperating parts assures that the cylinder will certainly be unclutched from its driving gear and locked to the frame at the proper moment, because the pedal cannot prevent this action.

Assuming that the parts 62 and 55 are thus unlocked through the action of the pedal, when bell-crank 57 rocks to the left to again clutch the cylinder to its gear no such result occurs, because the surface 65 of the lock element 62 slides idly to the left on the pin 64, the parts 64, 55, 54, 53, etc., being maintained in cylinder unclutched position by the action of spring 69.

Thereafter, so long as the pedal is held depressed, the cylinder will remain unclutched from its actuating gear.

As soon after the pedal is released as the pin 64 and socket or recess 63 come into register during the movements of the parts, the two members 62 and 55 will automatically become operatively locked together again.

Assuming that the suction-shoes for some reason or other fail to pick up a sheet from the supply pile, the diaphragm will remain in the lower position which it assumed upon delivery of the preceding sheet from the feeder shoes to the registration feed-board. Therefore, lock-lever 94 is not in a position to engage and hold arm 79 and accordingly as soon as cam 84 will permit it, arm 79 swings in answer to the action of spring 86 turning shaft 78 in the same direction that it would be rocked by depressing the pedal by reason of the engagement of one end wall of slot 82 with the key 81 of the shaft.

This results in tripping the cylinder in substantially the same way as when the pedal is pressed down with the foot.

After the time when the suction-feeder shoes would have normally raised a sheet from the supply pile in the usual way, cam 84 restores arm 79 to its retracted position, and, if the feeder shoes have a sheet properly adhered thereto, the arm will become automatically locked by lever 94 in the normal position as shown in Figure 2 and there will be no tripping of the cylinder, but if the shoes have not properly lifted a sheet, lock-lever 94 will not be in a position to lock arm 79 and the latter as soon as the cam will permit will trip the cylinder.

Such tripping will continue, the arm 79 swinging back and forth with the cam, until a sheet is correctly picked up by the suction shoes whereupon upward flexure of the diaphragm causes lever 94 to lock the arm thus preventing tripping of the cylinder.

The invention herein presented is not necessarily confined to the exact structure illustrated and described in detail and it is to be understood that such mechanism may be modified in a more or less radical degree without departure from the heart and essence of the invention and without the sacrifice of any of its substantial benefits and advantages.

I claim:

1. In a printing-press, the combination of an impression-cylinder, means to rotate said cylinder, a sheet-transporting feeder associated with said cylinder, and means controlled by the condition of the sheet-transporting part of the feeder to trip the cylinder when the feeder fails to properly advance a sheet, substantially as described.

2. In a printing-press, the combination of an impression-cylinder, means to rotate said cylinder, a suction sheet-feeder associated with said cylinder, and means controlled by the suction of the feeder to trip the cylinder when the feeder fails to properly advance a sheet, substantially as described.

3. In a printing-press, the combination of an impression-cylinder, a gear to rotate said cylinder, means to operate said gear, means to clutch said cylinder to and unclutch it from said gear, a suction sheet-feeder associated with said cylinder, means to operate said feeder, and means controlled by the suction of the feeder governing the action of said clutching and unclutching means, whereby the cylinder will be tripped by failure of being normally clutched to said gear when the feeder fails to properly advance a sheet, substantially as described.

4. In a printing-press, the combination of an impression-cylinder, means to rotate said cylinder, a sheet-transporting feeder associated with said cylinder, means controlled by the condition of the sheet-transporting part of the feeder to trip said cylinder if the feeder fails to properly advance a sheet, and means operative after the feeder has delivered a sheet to prevent tripping of the cylinder, substantially as described.

5. In a printing-press, the combination

of an impression-cylinder, means to rotate said cylinder, a suction sheet-feeder associated with said cylinder, means controlled by the air-pressure condition of the feeder to trip said cylinder if the feeder fails to properly advance a sheet, means to release the sheet from the feeder by terminating its suction, and means operative after the normal tripping point to prevent tripping of the cylinder by the release of the suction on the feeder to discharge its sheet, substantially as described.

6. In a printing-press, the combination of a main-frame, an impression-cylinder thereon, means to rotate said cylinder, means on said main-frame to trip said cylinder, a supplemental frame hinged to said main-frame, a sheet-feeder on said supplemental frame associated with said cylinder, and means operative in all positions of said supplemental-frame controlled by the condition of the feeder governing the action of said cylinder tripping means, whereby the cylinder will be tripped if the feeder fails to properly advance the sheet, substantially as described.

7. In a printing-press, the combination of a main-frame, an impression-cylinder thereon, means to rotate said cylinder, means on said main-frame to trip said cylinder, a supplemental-frame hinged to said main-frame, a suction sheet-feeder on said supplemental frame associated with said cylinder, and means operative in all positions of said supplemental-frame and controlled by the air pressure condition in the feeder governing the action of said cylinder-tripping means, whereby when the feeder fails to properly advance a sheet the cylinder will be tripped, substantially as described.

8. In a printing-press, the combination of a rotary impression-cylinder, means to rotate said cylinder, a clutch between said cylinder and rotating means, means to operate said clutch to intermittently rotate the cylinder, and means to break the operative connection between said operating means and the clutch only when the cylinder is unclutched from its rotating means, substantially as described.

9. In a printing-press, the combination of a rotary impression-cylinder, means to rotate said cylinder, a clutch between said cylinder and rotating means, means to operate said clutch to intermittently rotate the cylinder, and manual and automatic means each adapted to break the operative connection between said operating means and the clutch only when the cylinder is unclutched from its rotating means, substantially as described.

10. In a printing-press, the combination of a rotary impression-cylinder, means to rotate said cylinder, a clutch between said cylinder and said rotating means, means to operate said clutch to effect the intermittent rotation of the cylinder, a suction sheet-feeder associated with said cylinder, and means controlled by the air pressure conditions in said feeder arranged to break the operative connection between said operating means and the clutch only when the cylinder is unclutched from its rotating means, substantially as described.

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