(No Model.)

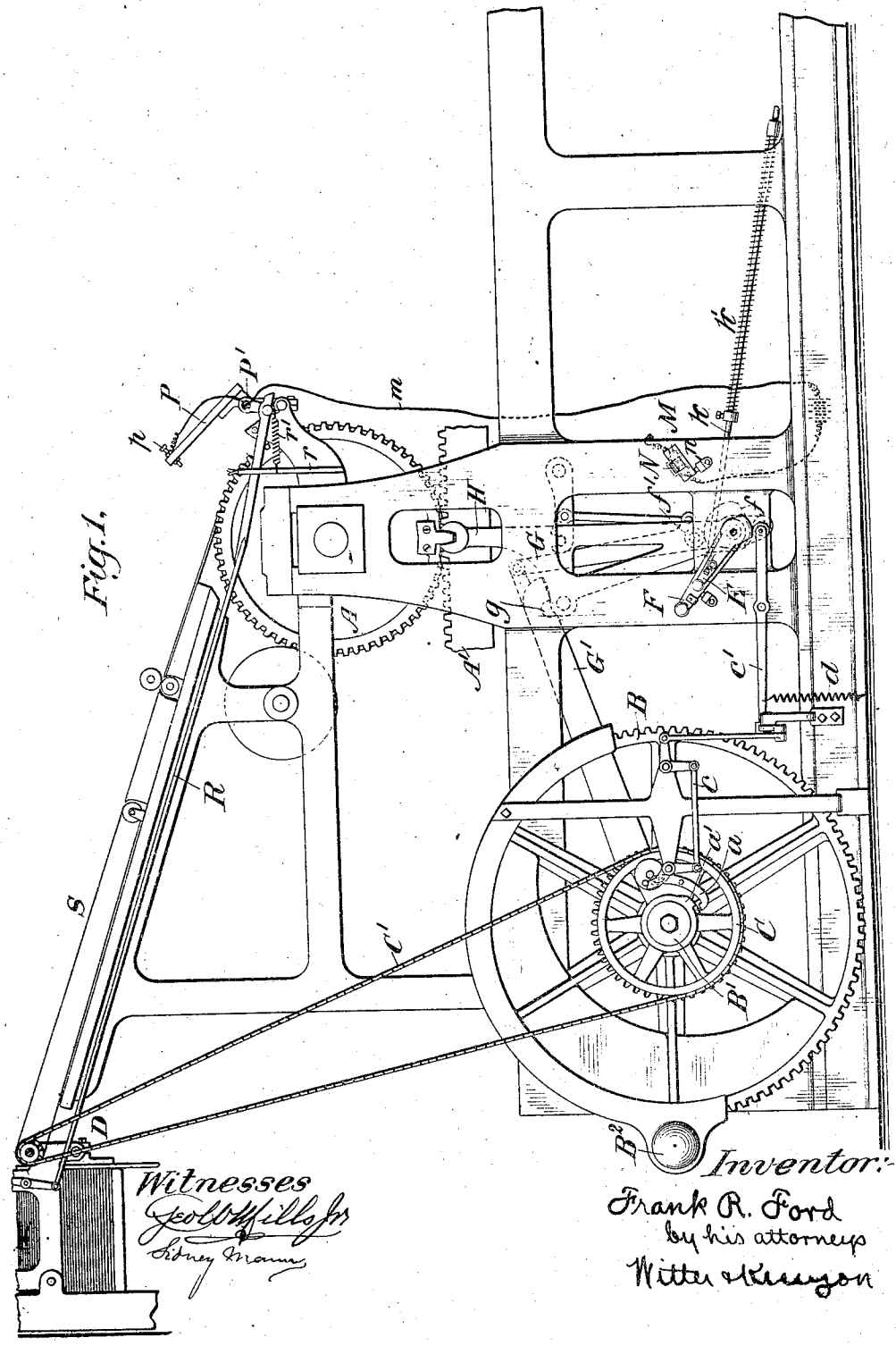
5 Sheets—Sheet 1.

F. R. FORD.

PAPER FEEDING MACHINE.

No. 567,266. Patented Sept. 8, 1896.

Fig. 1.



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Witter & Kingsley

(No Model.) 5 Sheets—Sheet 2.

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PAPER FEEDING MACHINE.

No. 567,266. Patented Sept. 8, 1896.

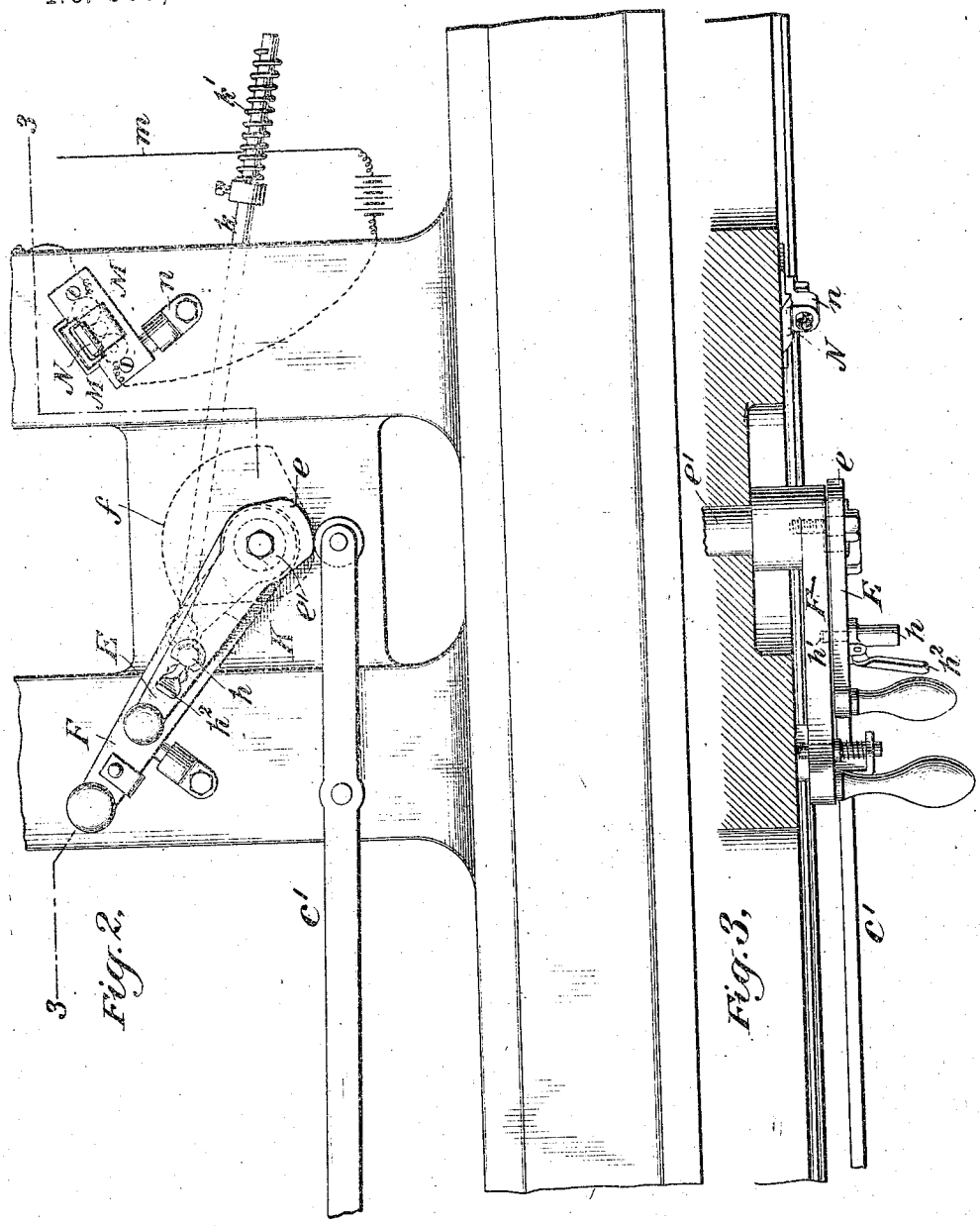

Fig. 2.

Fig. 3.

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(No Model.)

5 Sheets—Sheet 3.

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Fig. 4,

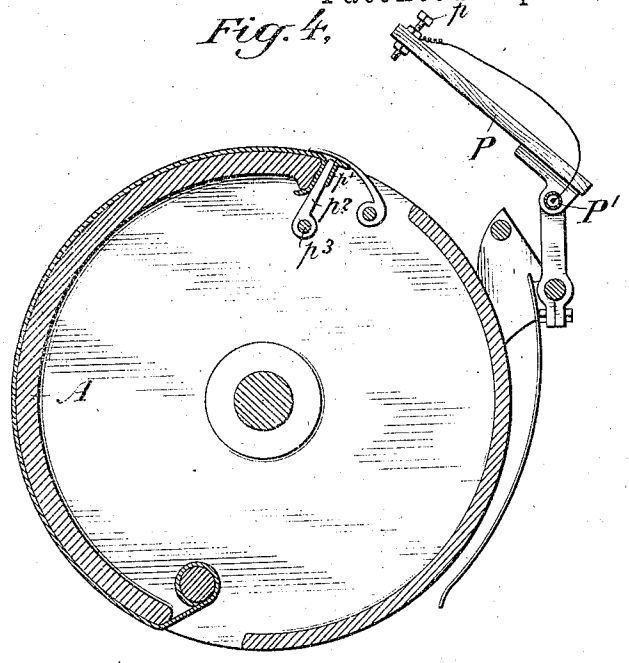
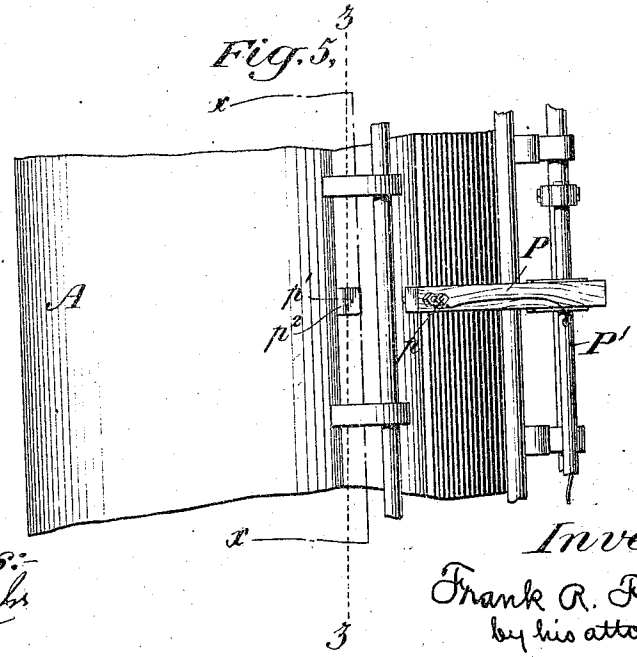


Fig. 5,



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No Model.)

5 Sheets—Sheet 4

F. R. FORD.

PAPER FEEDING MACHINE.

No. 567,266. Patented Sept. 8, 1896.

Fig. 6.

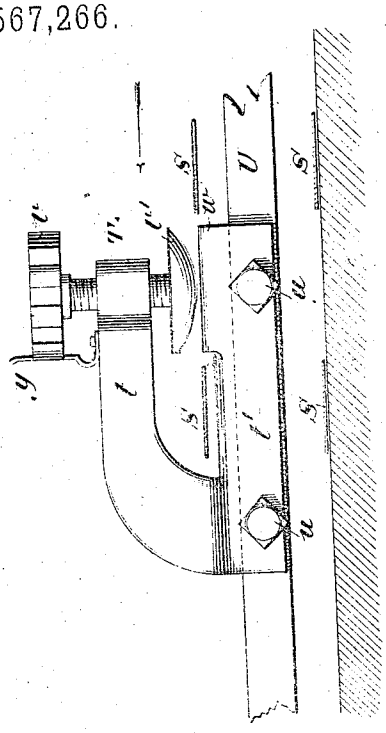


Fig. 7.

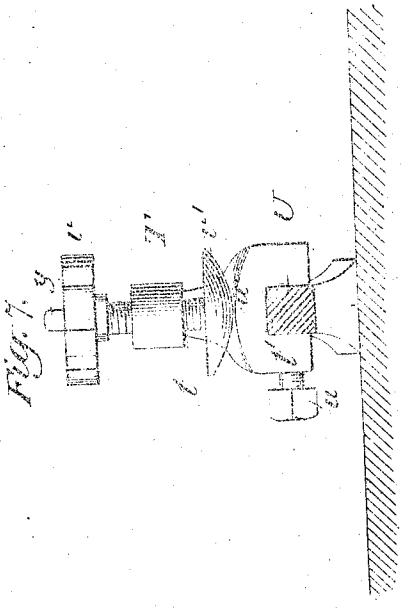
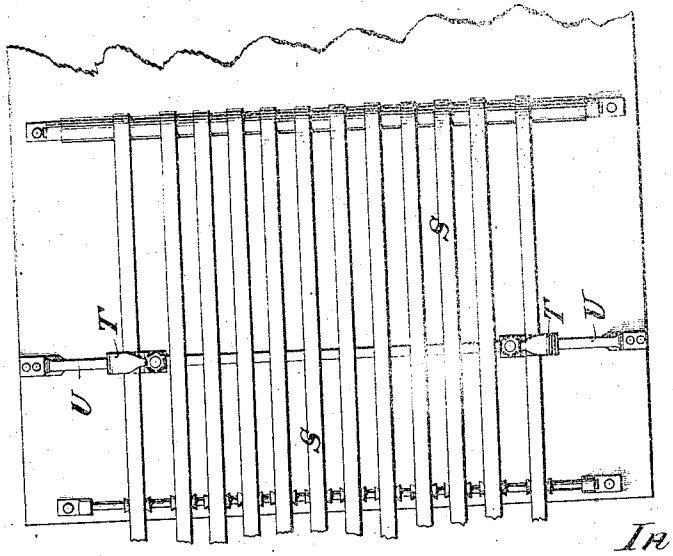


Fig. 8.



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(No Model.) 5 Sheets—Sheet 5.

F. R. FORD.

PAPER FEEDING MACHINE.

No. 567,266. Patented Sept. 8, 1896

Fig. 9.

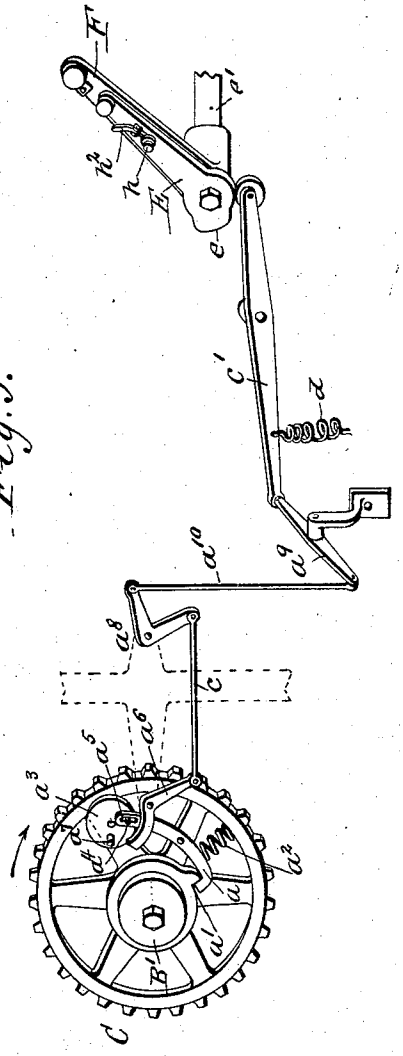
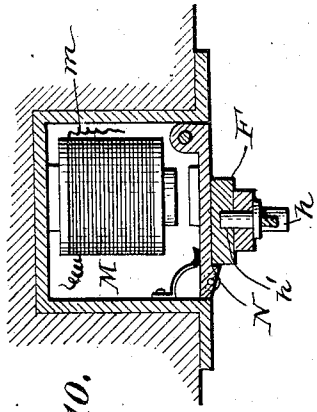


Fig. 10.



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F. R. Ford Inventor.
By Wilhelm Bonner
Attorneys.

UNITED STATES PATENT OFFICE.

FRANK R. FORD, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE ECONOMIC MACHINE COMPANY, OF NEW YORK.

PAPER-FEEDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 567,266, dated September 8, 1896.

Application filed January 7, 1895. Serial No. 534,059. (No model.)

To all whom it may concern:

Be it known that I, FRANK R. FORD, a citizen of the United States, and a resident of the city and county of Philadelphia and State of Pennsylvania, have invented new and useful Improvements in Machines for Feeding Sheets of Paper and for Folding, Printing, or Otherwise Operating Upon the Same, of which the following is a specification.

This invention relates to improvements adapted for use in connection with printing-presses, folding-machines, or other machines for operating upon sheets of paper or similar fabric, and also in connection with automatic feeders for such sheets, whether used alone or in operative connection with said presses or machines.

The objects of these improvements are to control by means of an electric translating device the operation of printing-presses, folding-machines, &c., and also automatic feeders, and to control the electric circuit for this translating device by means of the sheets, whereby when the sheets are properly fed the operations of the feeding and other machines will be continuous, but a sheet improperly fed will operate the electric circuit for the translating device and so discontinue the operation of one or more of the various mechanisms controlled by the translating device. The translating device preferred is an electromagnet operating an armature, but of course other forms may be employed if found desirable.

The invention consists of the various features of construction and their arrangement hereinafter pointed out.

Referring now to the drawings, throughout which like letters designate similar parts, Figure 1 is a side elevation of a well-known type of printing-press known as "stop-cylinder," operatively connected with an automatic feeder, with both of which my improvements are combined. Fig. 2 is a side elevation of a detail, showing the stop-levers for discontinuing the operations of the press and feeder. Fig. 3 is a sectional elevation on the line 3 3 of Fig. 2. Fig. 4 is a sectional elevation of the press-cylinder, showing an arm carried by a rock-shaft on the press provided with a contact adapted to make and break the circuit for the translating device. Fig. 5 is a plan view of the rock-shaft and a portion of the cylinder shown in Fig. 4. Fig. 6 is a side elevation of the gage for controlling the feeding of the sheets from the feeder. Fig. 7 is an elevation of the gage, looking in the direction of the arrow in Fig. 6. Fig. 8 is a plan view of a portion of the feed-table, showing the feeding-tapes and the gages. Fig. 9 is a fragmentary perspective view of the stop mechanism for arresting the movement of the automatic paper-feeder. Fig. 10 is a transverse section of the actuating-levers and the electromagnetic catch for holding the same.

The stop-cylinder press and the automatic feeding mechanism illustrated only in skeleton are herein shown and described merely as types of machines with which my improvements may be advantageously employed, and are not to be understood as limiting the application of the improvements to these particular machines.

A is the cylinder, and A′ is the bed of the press. B is the drive-wheel of the press, made fast on the shaft B′ and actuated by the power-shaft B^2. Loosely carried by the shaft B′ is a sprocket-wheel C, adapted to actuate, by means of a sprocket-chain C′, the automatic feeder D. The sprocket-wheel C is connected with or disconnected from the shaft B′ by any suitable coupling mechanism, the preferred form being constructed as follows:

a is a dog pivoted on the sprocket-wheel and provided at its front end with a hook, which is adapted to engage with a coupling-lug *a*′, formed on a collar which is secured to the shaft B′.

a^2 is a spring whereby the hook of the dog is yieldingly held in engagement with the lug *a*′.

a^3 is a shifting-disk pivoted on the sprocket-wheel and provided with a pin a^4, which engages with a slot a^5 in the rear arm of the dog. Upon turning the shifting-disk in one or the other direction the dog is moved into or out of engagement with the lug *a*′.

a^6 is a trip-lever whereby the shifting-disk is turned for disengaging the dog from the coupling-lug *a*′. This lever is pivoted on the main frame and is adapted to engage with its

upper arm against a pin a^7 on the shifting-disk for turning the latter and disengaging the dog from the coupling-lug. During the normal operation of the paper-feeder the upper arm of the trip-lever is arranged outside of the path of the pin a^7 as the latter rotates with the sprocket-wheel C, so that the dog is permitted to remain in engagement with the coupling-lug.

a^8 is an elbow-lever pivoted on the main frame and having one of its arms connected with the lower arm of a trip-lever by a rod c.

a^9 is a transverse rock-lever pivoted on the main frame and connected with its outer arm to the other arm of the elbow-lever by a rod a^{10}.

c' is a rock-lever pivoted on the main frame and connected at its rear end with the inner arm of the transverse rock-lever a^9.

E represents a hand-crank or rock-arm provided with a cam e and mounted loosely on a transverse shaft e'. This cam engages with a roller on the front arm of the rock-lever. Upon swinging the hand-crank E forwardly, as represented in Fig. 9, the cam depresses the front arm of the rock-lever, and this movement is transmitted by the intermediate mechanism to the trip-lever for holding the same out of the path of the pin a^7 of the shifting-disk. Upon swinging the hand-crank E rearwardly the trip-lever is turned so that its upper arm stands in the path of the pin a^7, whereby the latter upon striking the trip-lever causes the shifting-disk to be turned and the dog to be disengaged from the coupling-lug, whereby the operation of the paper-feeder is arrested regardless of whether or not the press continues its operation. The front arm of the rock-lever c' is caused to follow the cam e by a spring d, secured with its ends to the rear arm of said lever and the main frame.

F represents a hand-crank or rock-arm secured to the shaft e' and provided with a cam f. The cam f is arranged to engage a lug or roller f' on a rod G, pivoted at its upper end to the thrust-bar G', provided with the notch g and operating to oscillate the arm H, which in the well-known way serves to start the cylinder periodically at the proper time. When the crank F is thrown forward from the wheel B, the rod G drops, so that the bar G' engages the arm H; but when the crank is thrown in the opposite direction the cam f lifts the bar H out of engagement and the printing operation is discontinued, although in the style of press shown in the drawings the bed A' continues to reciprocate, as is well known. It is not considered essential to show or describe more fully than has been done the various elements of the printing-press, for they are old and well known in the art.

The crank E carries a spring-bolt h, normally engaging a socket h' in the crank F, but arranged to be disengaged therefrom by a handle h^2, so that these cranks may be operated simultaneously or dissimultaneously, as desired. The shaft e' carries a crank K, to which is connected one end of a suitably-supported thrust-rod k, actuated by a spring k' or other suitable means to throw the shaft e and the cranks K, F, and E backward into the position shown in Figs. 1 and 2. When the crank E, or both the cranks E and F, are thrown forward by hand from the wheel B, the shaft e' is turned and the crank K and rod k are pushed back against the spring k'. The cranks E and F, it will be seen, operate separate stop mechanisms for the feeding and printing mechanisms which they respectively control, and when thrown forward by hand from the wheel B put these feeding and printing mechanisms into operation. The thrust-rod k, by means of the spring k', however, gives these stop mechanisms a normal tendency to discontinue the operations which they control. In order to hold the stop mechanisms against this normal tendency, an electric circuit m is provided, including any suitable translating device, but preferably a magnet M. This magnet operates a latch N, adapted to engage the crank F when thrown forward against the stop n. The circuit m includes a contact p, carried by an oscillating arm P, mounted on a rock-shaft P'. This shaft is actuated by a rod R, connected with the automatic feeding mechanism D, and when the arm P comes down the contact p is adapted to touch the contact-plate p', carried by the cylinder, and thus complete the circuit for the magnet M, the circuit from the plate p' to the magnet being completed through the plate p', the blanket-holder p^2, rod p^3, Fig. 4, head of the cylinder, cylinder-shaft, and frame of the press to the magnet M. When it is desired to disconnect the rock-shaft P' from the feeding mechanism, the rod R may be disengaged and supported upon a standard r. A spring r', connected at one end to the standard and at its other end with the rock-shaft, serves to turn the shaft and lift the arm P out of the way when the rod is so disengaged. S are the feeding-tapes on the feed-table for carrying the sheets of paper or other fabric to the cylinder. They are preferably, as shown, operatively connected with the rest of the feeding mechanism.

Every time a sheet has been delivered to the grippers of the cylinder the rock-arm carrying the contact p moves toward and from the contact p'. If the sheet has been properly presented to the grippers, it covers the contact p' and serves as an insulator to prevent the circuit from being closed during the descent of the contact p upon the contact p', thereby preventing the magnet from becoming energized and releasing the crank-arms E and F. In the event of no sheet being fed to the grippers of the cylinder or of a sheet being improperly presented to the grippers, so as to leave the contact p' uncovered, the contact p in descending upon the contact p' will close the circuit, thereby energizing the magnet M. The instant this takes place the

latter attracts the armature or catch N and withdraws the shoulder of the same from engagement with the crank or rock arm F, thereby releasing the latter, together with the rock-arm E, and permitting the spring k' to swing these arms backward for simultaneously stopping the operation of the feeder and the press.

In the path of the sheets as they are carried down by the feeding-tapes are two gages T, mounted on opposite sides of the feed-table. A convenient way of mounting these gages is to secure them to a bar fixed across the feed-table between the folds of the tapes, and they may be made adjustable on the bar, as shown in Figs. 6, 7, and 8, by means of set-screws u. The gage comprises two arms t t', arranged in substantially U shape, the arm t' being clamped to the bar U by the set-screws u. Through the end of the arm t passes a screw having a notched head v and a spherical foot v', adjustable to and from the anvil w. A spring y, fixed on the arm t, engages one of the notches and locks the screw in any position desired with relation to the anvil w. By these means the gages may be adjusted on the bar U to suit any width of paper, and the jaws of the gages, comprising the foot v' and anvil w, may be adjusted to permit the side edges of paper of any thickness to pass between them, but to stop the sheets if more than one is simultaneously presented. The form of gage shown is preferred, but of course other forms adapted to accomplish the same result might be employed, and one or more than two gages might be employed instead of two.

The operation is as follows: The crank E is thrown forward by hand from the wheel B, the bolt h having been withdrawn, and the feeding mechanism is started. When the sheets are in proper position and the bed A' is making its back stroke, the crank F is thrown forward by hand against the stop n and behind the latch N, the bolt h engaging the crank F and thereby locking the cranks E and F together. The printing mechanism is now started. The cylinder and arm P are so timed that the arm P carries its contact-point p down upon the plate p' just before the grippers seize the sheet of paper. If the sheet has been properly fed, its lower edge (indicated by the broken line, Fig. 5) will lie on top of the plate p', so as to insulate the contacts and prevent the energization of the magnet, so that the operation is continued. If, however, no sheet has been fed, or if a sheet has not been properly fed, as indicated in this second case by the dotted line z z, Fig. 5, there will be nothing to interpose the electrical connection between the contacts, and the magnet will be energized to release the stop mechanism of both the press and feeder, thus preventing the cylinder-blanket from coming in contact with the printing-surface, and also preventing a continuation of the feeding of the sheets and their disarrangement. By timing the movement of the upper contact so that the latter descends and touches the lower contact before the grippers close or grasp an incorrectly-placed sheet the press is instantly stopped by the uncoupling of the clutch, so that the sheet will not be carried partly around the cylinder and wasted by presenting the same out of register to the type-bed. If, as sometimes happens, two sheets are simultaneously fed, they will not be able to pass between the jaws of the gages, and no sheet then reaching the plate p' the contact p will touch the plate and close the circuit m and stop the operation, as before.

It is not the intention to limit this invention to the particular printing mechanism or feeding mechanism or means for operatively connecting them together, for these could be variously modified and various other changes could be readily made without departing from the scope of the invention as set forth in the claims, which are as follows:

Having now described my invention, what I desire to claim is—

1. The combination with the sheet-carrying mechanism, of a lower gage-jaw arranged below the path of the sheets, a gage-foot having a spherical lower side, a screw-stem to the lower end of which said gage-foot is secured and with which it turns, a support for said screw-stem, and a locking device whereby said gage-foot is held against accidental turning, substantially as set forth.

2. The combination with the sheet-carrying mechanism, of a gage-frame composed of an upper and a lower arm, a lower gage-jaw secured to said lower arm and arranged below the path of the sheets, an upper gage-jaw arranged above the lower jaw, an adjusting-screw arranged in the upper arm of the gage-frame and secured to the upper gage-jaw, a notched head secured to said adjusting-screw, and a detent-spring secured to the gage-frame and engaging with said head, substantially as set forth.

3. The combination with a sheet-paper feeder provided with a stop mechanism, and a press provided with a stop mechanism, of a coupling adapted to connect the stop mechanisms of the feeder and the press whereby both stop mechanisms can be operated simultaneously or the stop mechanisms of the feeder and the press can be disconnected, substantially as set forth.

4. The combination with a sheet-paper feeder and a press, of a stop mechanism controlling the feeder and provided with a rock-arm, a stop mechanism controlling the press and provided with a rock-arm, and a coupling whereby said rock-arms can be connected or disconnected, substantially as set forth.

5. The combination with the printing-press frame, the rotary cylinder provided with grippers, and the stop mechanism whereby the press is coupled with or uncoupled from its driving mechanism, of an electromagnetic catch whereby the stop mechanism is held in

position for coupling the press with the driving mechanism, a lower contact connected with said catch, a sheet-carrier whereby the sheets are delivered upon the lower contact and to the grippers, a movable upper contact mounted on said frame and also connected with said catch, and mechanism whereby the upper contact is moved toward the lower contact after each sheet-delivery movement of the carrier and away from the lower contact before the grippers have closed or withdrawn the sheet, whereby an incorrectly-placed sheet is prevented from being carried partly around the cylinder, substantially as set forth.

6. The combination with a paper-feeder provided with a sheet-carrier, of two gage-jaws between which the sheets are fed and which have such a fixed relation to each other that they stop the sheets when more sheets than one are fed at a time, a stop mechanism controlling said feeder, an electromagnetic catch controlling said stop mechanism, and two contacts which form the terminals of the electromagnetic catch and between which the sheets are fed, one of said contacts having a movement toward and from the other contact, substantially as set forth.

7. The combination with a sheet-carrier, a press and a stop mechanism controlling the press, of two gage-jaws between which the sheets are fed and which have such a fixed relation to each other that they stop the sheets when more sheets than one are fed at a time, an electromagnetic catch controlling said stop mechanism, and two contacts which form the terminals of the electromagnetic catch and between which the sheets are fed, one of said contacts having a movement toward and from the other contact, substantially as set forth.

8. The combination with a sheet-paper feeder provided with a stop mechanism and a press provided with a stop mechanism, of a coupling whereby said stop mechanisms can be connected or disconnected, an electromagnetic catch controlling said stop mechanisms, two contacts forming the terminals of the electromagnetic catch and arranged on opposite sides of the path of the sheets, one of said contacts having a movement toward and from the other contact, and two gage-jaws arranged on opposite sides of the path of sheets and having such a fixed relation to each other that they will stop the sheets when more sheets than one are fed at a time, substantially as set forth.

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

FRANK R. FORD.

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