Jan. 8, 1924. 1,480,132

J. WHITE ET AL

PRINTING PRESS AND METHOD OF OPERATING THE SAME

Original Filed Jan. 9, 1920 3 Sheets-Sheet 1

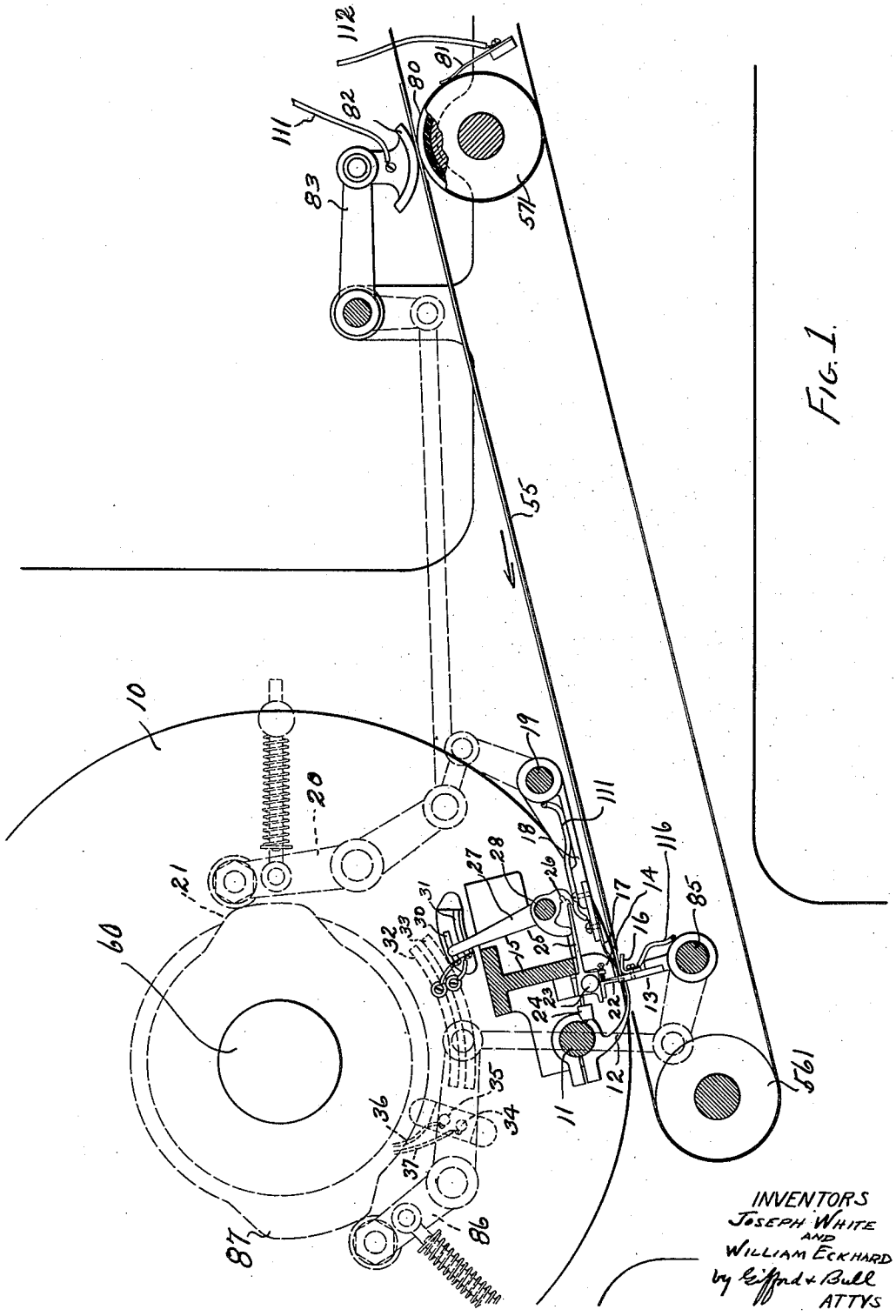


FIG. 1.

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PRINTING PRESS AND METHOD OF OPERATING THE SAME

Original Filed Jan. 9, 1920 3 Sheets-Sheet 2

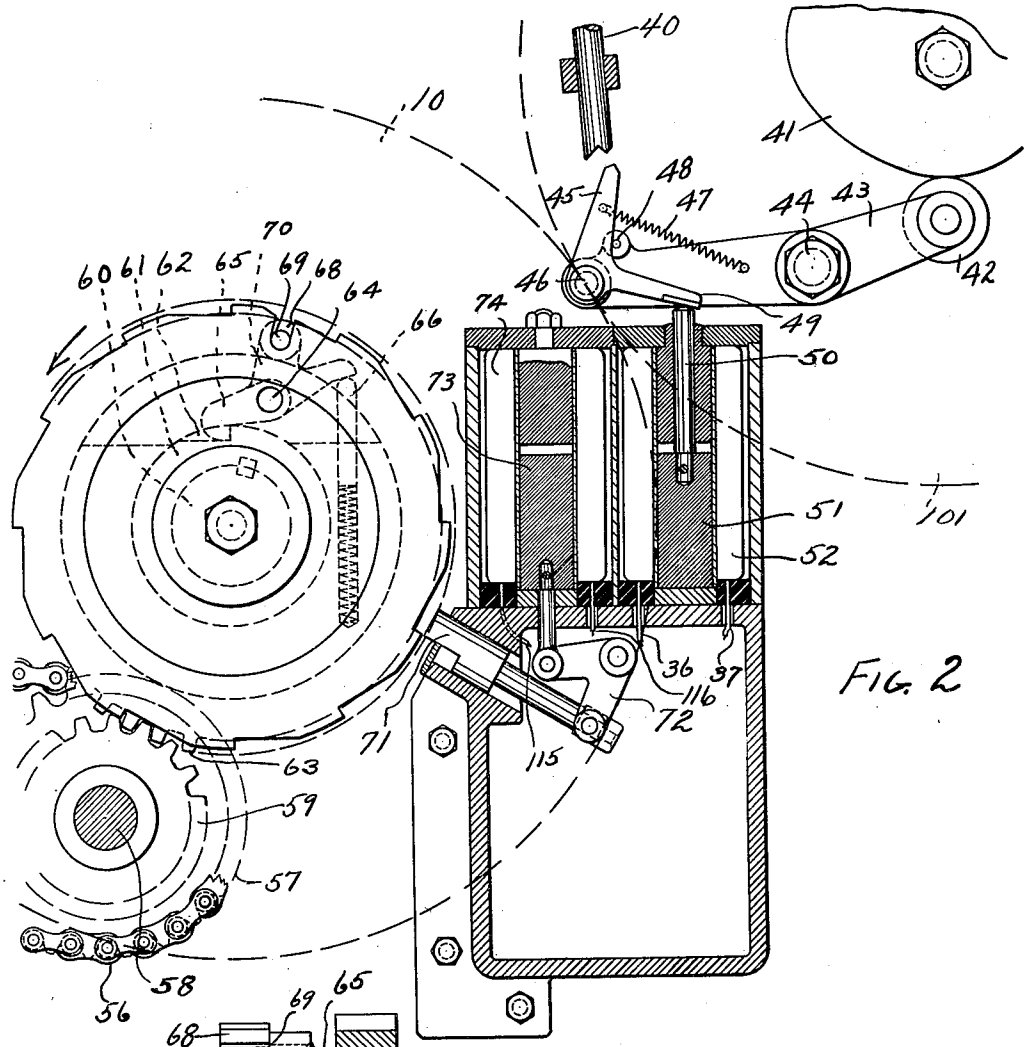


FIG. 2

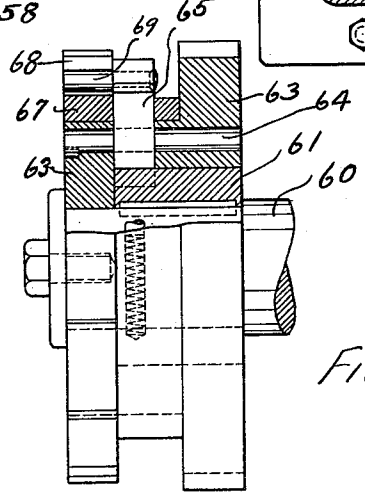


FIG. 3.

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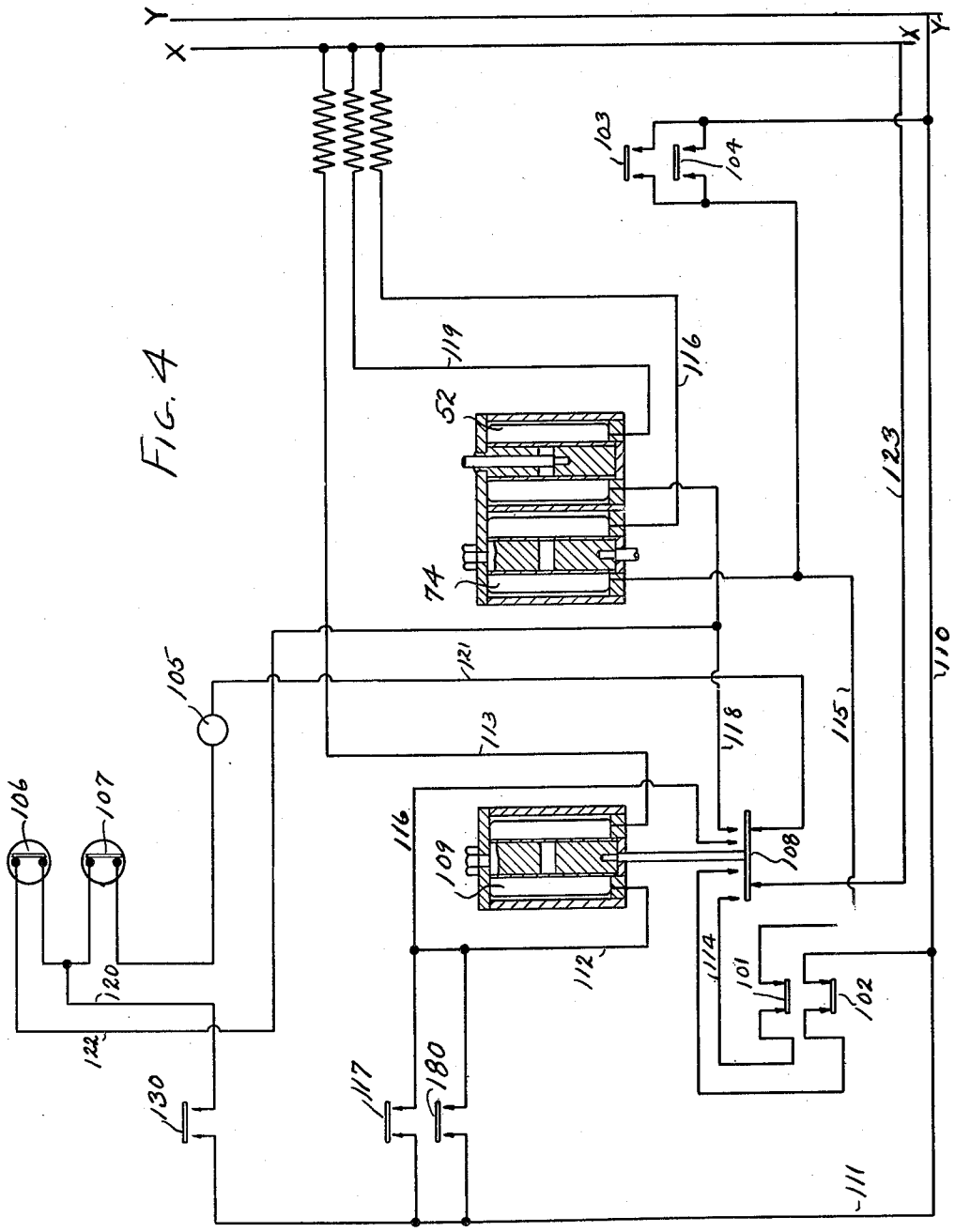
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PRINTING PRESS AND METHOD OF OPERATING THE SAME

Original Filed Jan. 9, 1920 3 Sheets-Sheet 3

FIG. 4



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Patented Jan. 8, 1924. 1,480,132

UNITED STATES PATENT OFFICE.

JOSEPH WHITE, OF MIDDLESEX, AND WILLIAM ECKHARD, OF PLAINFIELD, NEW JERSEY, ASSIGNORS TO HALL PRINTING PRESS COMPANY, OF DUNELLEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PRINTING PRESS AND METHOD OF OPERATING THE SAME.

Application filed January 9, 1920, Serial No. 350,339. Renewed March 21, 1923.

To all whom it may concern:

Be it known that we, JOSEPH WHITE, a citizen of the United States, residing at Middlesex, in the county of Union and State of New Jersey, and WILLIAM ECKHARD, a citizen of the United States, residing at Plainfield, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Printing Presses and Methods of Operating the Same, of which the following is a specification.

Our invention relates to methods and apparatus used in printing whereby the character of the register which the printer desires to obtain, will determine the operation of the press and the automatic sheet feeder, if the press has one, and also methods and apparatus by which the printer operating the press or a supervisor, may have knowledge of the conditions of operation of the press without stopping the same or inspecting its product.

Heretofore it has been customary in printing presses provided with automatic sheet feeders and a trip for the printing couple, to provide register detectors which will contact with a sheet being presented to the press, and which will trip the press and suspend or stop the further operation of the automatic feeder when such a sheet is not properly presented to the gages or, in other words, in such a position that it would be printed out of register. Such an arrangement, however, does not provide for the fact that in some classes of work it is not necessary to suspend the operation of the automatic feeder (which necessarily decreases the output of the press) unless the sheet is very considerably out of register. In other words, it may be that the automatic feeder is delivering to the press gages a sheet which is very closely in registered position, but which nevertheless is sufficiently out of such position to operate the sheet detector, particularly if such detector is set to operate when the out of register position is extremely small, as it must necessarily be constructed to form a fine quality of printing. In such case the failure of even an occasional sheet to reach exact register position will stop the operation of the feeder and consequently cut down the output of the press unnecessarily. Furthermore, in a fine register job it is desirable that the pressman have knowledge of the registration of the successive sheets without being obliged to examine each one. It is well understood in the printing art that even with the best of appliances, occasionally a sheet will be printed slightly out of register. Sometimes this is so occasional that the printer knows that he cannot probably reset his apparatus so as to take care of such occasional sheets. On the other hand, if the number of out-of-register sheets is considerable, then the printer knows that adjustment of some sort is required, or that some of his adjustments have gotten out of position in the operation of the machine, and it will therefore be necessary for him to stop the machine to correct the difficulty. It is another object of our invention to provide a method and apparatus by which the printer will be advised at all times of the registering conditions of the machine so that he can stop the press to adjust the parts or not, in accordance with the character of the work which he is doing.

Another object of our invention is to provide an automatic stop for the automatic sheet feeder which stop will be located preferably at the press, and also an automatic press trip, both of which preferably will be controlled by electric circuits in the manner to be more fully described hereinafter. With these and other objects in view, our invention consists of the methods and of certain novel features of construction, combination and arrangement of parts as will be more fully described and pointed out in the appended claims.

In the drawings, Figure 1 is a side sectional elevation of a portion of a well-known type of press to which our present invention has been applied; Fig. 2 is an enlarged elevation of a portion of our operating mechanism with one of the members in section; Fig. 3 is a side elevation of a portion of Fig. 2 and Fig. 4 is a diagram of our preferred form of electric circuits which we use in carrying out our invention.

The corresponding parts are referred to both in the specification and in the drawings by similar reference characters.

For purpose of illustration we have shown our invention as applied to the type of press illustrated in the prior patent to Joseph

White, No. 1,178,563, patented April 11, 1916, to which the fine detector mechanism disclosed in the application of Joseph White, No. 330,023, filed October 11, 1919 has been applied, together with a coarse detector mechanism for the front gages, which is of a well-known type old in the art, and a coarse side gage detector which is also of a type old in the art.

In the drawings, 10 is a sheet-carrying cylinder which may be a feed cylinder or an impression cylinder, as is well understood, which has a gripper shaft 11 with grippers 12 thereon adapted to clamp the front edge of a sheet placed against front guides 13, against gripper abutments 14 carried by the beam 15 extending across the cylinder 10. The usual apparatus for opening and closing the grippers 12 is provided and in Figure 1 the grippers are shown as having just closed on a sheet positioned against the front gages 13. As shown in Figure 1, the front gages are provided with a coarse registering device which consists in the illustrative form of a lower contact member 16 and an upper movable contact member 17, the member 17 being attached to a lever 18 pivoted at 19 and controlled through suitable connections by a cam lever 20 operated by a cam 21 connected to the shaft 60 of the cylinder 10. Normally, the contacts 16 and 17 are open, but just prior to the closing of the grippers 12, contact 17 is moved by the cam 21 downward so as to touch the contact 16 if there is no sheet placed between them. It will be noted, however, that because of the shape of the contacts 16 and 17, a sheet may have considerable latitude in its position in relation to the gage 13, and still be capable of holding the contacts 16 and 17 apart. In other words, a sheet may be considerably out of register and still prevent the operation of the coarse detector constituted by the contacts 16 and 17.

A fine register detector which will have exceedingly small detection limits so as to be operated when a sheet presented to the gages 13 or taken by the grippers 12 is only slightly out of registered position is also provided. As a suitable form of such device, we have shown the arrangement disclosed in the said White application No. 330,023, in which a detector blade 22 is pivoted at 23 in the cylinder 10 and weighted by the weight 24 so as to move normally counter-clockwise around 23, when permitted to do so, to bring the blade 22 against the front edge of a sheet after the latter has been positioned against the gage 13 and taken by the grippers 12. If the sheet has been exactly positioned then the arm 25 connected to the blade 22 will fall into the deep groove 26 on the switch lever 27, this switch lever being moved in the manner shown in the said White application so as to move clockwise around its shaft 28 at each cycle of the press. If the sheet is not in proper position then the arm 25 will be thrown either too high or too low so as to stop the motion of the arm 27 in its turning around the shaft 28. On the cylinder 10 is a pair of switch bars 30, 31 spanned normally by a contact pad on the lever 27. The bars 30, 31 are in turn respectively connected to bars 32, 33 on the exterior of the cylinder 10 and arranged to contact at a predetermined point in the rotation of the cylinder 10 with a pair of pins 34, 35 on the side frame of the machine. When the lever 27 is in the position shown in Figure 1, it will be clear that a current may pass through a circuit which includes the bars 30 and 31, but that if the lever 27 can swing sufficiently to the right of Figure 1 so as to clear the bar 30, as will be the case when a sheet has been properly positioned and taken by the fingers 12, then no circuit can be established through these bars.

The pins 34, 35 are connected through wires 36, 37 to the trip-controlling mechanism, of our illustrative form of which is shown in Figure 2. 40 represents the trip-actuating member which will operate the devices which cause the printing couple to separate in the usual manner. This couple-separating mechanism has not been illustrated because it is not part of our present invention and any one of many forms of such apparatus may be used. For instance, the printing couple may be moved apart by the apparatus shown in the prior patent to Joseph White, No. 1,112,665, granted October 6, 1914, the rod 40 being moved vertically in the form shown in Figure 2 to raise the operating fork, shown in said patent, into position to separate the printing couple. On the end of the cylinder 101, constituting the other member of the printing couple, we fasten a cam 41 contacted by a roller 42 on a lever 43 pivoted at 44 and having at its opposite end a trip-controlling lever 45 pivoted at 46 and held in the position shown in Figure 1 by a spring 47 against a stop pin 48. The lower end of the rod 40 is notched and the upper end of the arm 45 is angled so that when it engages the notch in the rod 40 it will be held therein. It will be noted, however, that as the lever 43 is swung to raise the arm 45 upward, the upper end of the arm 45 will clear the lower end of the rod 40 when the parts are in the position shown in Figure 2.

The arm 45 has an arm 49 fastened thereto and extending over a pin 50 which is connected to the movable core 51 of a solenoid 52 to which the wires 36, 37 connected to the pins 34, 35 (see Figure 1) are connected. It will be understood that a source of power is placed in this circuit.

When a sheet has been properly positioned

so that the arm 25 connected to the blade 22 enters the deep slot 26 to permit the lever 27 to swing to its extreme position to the right of Figure 1, no current can pass through the solenoid 51 because of the break in the circuit between the bars 30 and 31. On the other hand, if the sheet has not been properly positioned, then lever 27 will be prevented from moving a sufficient distance to break the connection between 30 and 31 so that when the bars 32, 33 contact with the pins 34, 35 a current will pass through the solenoid 52 to operate it and to move the pin 50 upward. This motion will take place just prior to the upward motion of the arm 45 so that the upper end of this arm will now enter the notch in the lower end of the rod 40 to trip the press. As soon as the bars 32, 33 pass the pins 34, 35 the circuit is broken so that the parts are returned to the position shown in Figure 2 for the next cycle commencer.

In the arrangement shown in Figure 1 the sheets are carried to the gages 13, which in this instance are shown as stationary, by a series of endless tapes 55 engaging pulleys 561, 571, all in the usual manner. Preferably, the sheets are fed to this bank of tapes 55 by any of the well-known automatic sheet separating and feeding devices, and, as is usual, such automatic sheet feeder will be driven through suitable connecting mechanism from the printing press. In our illustrative form of machine, this driving connection is illustrated as a driving chain 56 engaging a sprocket 57 and turning loosely on the center 58, a gear 59 being connected to the sprocket 57.

Keyed to the end of the shaft 60 of the cylinder 10 is a driving member 61 having a driving notch 62. The gear 63 meshing with the gear 59 is loosely mounted to turn on the member 61. On a pin 64 extending through the gear 63 is mounted a driving pawl 65 having a hook end which is adapted to engage in the driving notch 62 and an end opposite the hook which is contacted by a spring-operated pin 66 which tends to turn the pawl 65 counterclockwise on the pin 64. Normally, therefore, the pawl 65 would be in engagement with the driving notch 62 so that the gear 63 would be driven from the shaft 60 to drive the chain 56, and from this the automatic sheet feeder. Loosely mounted on the outer end of the gear 63 is a notched member 67 having a slot 68 in which engages a pin 69 attached to an arm 70 of the driving pawl. The exterior of the member 67 is provided with a multiplicity of notches, as shown in Figure 2, any one of which is adapted to be engaged by a stop member 71 mounted to slide toward and away from the notched member 67 and controlled by a lever 72 linked to the movable core 73 of a solenoid 74 which is connected into a circuit, as will be more fully explained hereinafter. When the solenoid 74 is excited the core 73 will be drawn upward to move the stop member 71 toward the notched member 67. This will cause it to engage one of the notches in said member and hold it stationary. The pin 64 is at this time being carried counterclockwise so that when the pin 69 is held momentarily there will result a clockwise turning of the pawl 65 on the pin 64 to move the pawl out of engagement with the notch 62. This will suspend the driving of the chain 56 and stop the automatic sheet feeder until the press operator breaks the circuit through the solenoid 74, in which case the driving pawl 65 will be again engaged by the notch 62 and the operation resumed.

Preferably, we provide a coarse side register detector in the form illustrated in Figure 1. On the same shaft with the pulleys 571 and at either one or both sides of the sheet is positioned a contact roller 80 with the surface of which a brush 81 contacts. Above the member 80 is an upper contact member 82 mounted on the end of an arm 83 controlled through proper links by the cam lever 20. The members 80, 82 are interposed in a suitable electric circuit to be described more fully hereinafter, and the member 82 is raised and lowered at appropriate times in the operation of the press. If a sheet is properly positioned laterally so as to prevent the members 80, 82 from contacting, then no current can pass through this circuit. On the other hand, if there is no sheet or if the sheet is so out of place laterally as not to come between the members 80, 82, then these members will contact and the circuit is closed. This side register device is preferably a coarse one; that is, its detection limits are such as to permit a considerable variation in the position of the sheet without affecting the operation or non-operation of the detector. In other words, it is of the same characer as the coarse front sheet detector made up of the contacts 16, 17.

The front gages 13 in the form illustrated are mounted on a shaft 85 connected through suitable links with the cam lever 86 operated by a cam 87 attached to the shaft 60 so as to swing these gages out of position when the grippers 12 close, all in the well-known manner. It will be understood, of course, that any other form of gage may be used in the place of that illustrated, and particularly it should be understood that the gage 13 may be mounted on a moving chain or the like, as is shown for instance in the prior patent to Joseph White, No. 1,158,761, granted November 2, 1915.

With the mechanism which we have just described it will be obvious that a sheet presented to the tapes 55 will first pass the coarse side register sheet detector 80, 82,

and will hold open or cause to be closed, the circuit passing through these contacts, in accordance with the lateral position of the sheet. In the further travel of the sheet the front edge will come adjacent the gage 13 and if at the time the contact 17 is lowered the sheet is positioned so as to keep this contact from striking the lower contact 16, the circuit through these two contact members will be held open. If, on the other hand, the sheet is so far out of registered position that these contacts may touch each other, then a current may pass through 16 and 17. Assuming that the sheet is at least approximately correctly positioned, then the grippers 12 will close thereon, the gage 13 at the same time swinging out of the way so that the sheet is now carried by the cylinder 10. Now the lever 27 turns to permit the blade 22 to swing to the right of Figure 1 to contact with the front edge of the sheet as it is held by the grippers 12. If the sheet is in its predetermined normal or registered position, contact therewith by the blade 22 will break the circuit through the bars 30, 31, as has been heretofore explained. If, on the other hand, the sheet is not properly positioned under the grippers 12, either because the sheet was not properly positioned against the gage 13 or because the grippers 12 did not take it properly from the gage 13, or for any other reason, then the circuit through the bars 30, 31 remains closed to permit a current to pass when the bars 32, 33 contact with the stationary pins 34, 35.

As has been explained, on some jobs it is not necessary to carry out the same operation in the press in the event of the sheet not being in fine register, although being in coarse register, as there will be if the sheet were out of coarse register, and we provide an arrangement by which the press operator or a supervisor at some distant point may have knowledge of the operating conditions within the press. To this end we provide a signalling device, such as a lamp or a bell, connected up preferably by suitable circuits to the detectors which we have just described, so that the signalling device will be operated preferably only when the fine detector shows that the sheet taken by the grippers 12 is out of register. At the same time we preferably connect up the press trip and the automatic feed stop, if the press has an automatic feeder, so that the press will be tripped when the sheet presented to it is out of register within the limits of the fine detector or within the limits of the coarse detector. In other words, by our arrangement the press may be tripped to prevent the printing of any sheet which is not in fine register. In such connection, however, we provide an arrangement by which, if desired, the tripping of the press when a sheet is outside of the detection limits of the fine detector but within the detection limits of the coarse detector, will be prevented. Such an arrangement will be used where large output is desired without fine register. We also preferably connect the detectors with the feed stop so that if the sheets presented to the press are so far out of register as to be outside of the detection limits of the coarse detectors, either front or side, the further feeding of sheets will be suspended, the presentation of sheets so far out of register being an indication that something is grossly wrong with the automatic feeder and it is therefore necessary to suspend its operation and prevent a clogging up of the press. Preferably, we arrange the signalling device so that it is not operated by the coarse detectors, it being sufficient to stop the flow of sheets from the automatic detector, which is direct visual evidence to the press operator that something is wrong and needs adjustment.

In Figure 4 we have illustrated a wiring diagram for the illustrative form of our invention in which the solenoids 52 and 74, operating respectively the press trip and the feeder stop, are indicated diagrammatically. The switch 130 is the equivalent of the circuit making and breaking arrangement shown in Figure 1 as being controlled by the lever 27. Switch 180 is the equivalent of the side register circuit making and breaking contacts 80, 82 of Figure 1. Switch 117 is the equivalents of the coarse front sheet detector made up of the contacts 16 and 17 of Figure 1. The source of current is indicated by the mains X, Y, and switches 101, 102 represent the usual main-starting switches for the operation of the press. Switch 103 indicates diagrammatically a hand-operated switch for stopping the automatic sheet feeder when it is desired to operate the press without sheets as is done in preparing printing forms for the job, and switch 104 is a switch controlled by the usual "two-sheet" detector. We have not illustrated such a two-sheet detector, but any of the usual types of such detectors may be used. 105 represents a signalling device which may be either a lamp or a bell and which may be located directly on the press and in fact on some of the moving parts thereof, but preferably will be stationary, and if desired, may be placed a considerable distance from the press. 106 is a snap switch in the fine detector circuit, and 107 is a snap switch in the circuit of the fine detector and the signalling device 105. 108 is a composite switch controlled by a solenoid 109 placed in a circuit which includes the switches 117 and 180. This switch 108 is normally open as to some of the circuits and normally closed as to others, as will be explained hereinafter.

Assuming that the press is provided with the complete apparatus which we have just

described, and the switches 101, 102 are closed so that the press is in operation, then if a sheet presented to the press is so much out of register as to cause contacts 80 and 82 to touch each other and thus close the switch 180 of Figure 4, a circuit will be established from the main Y through the wires 110, 111, 112, the solenoid 109, the wire 113 and the main X. The solenoid 109 will therefore be actuated and the switch 108 drawn upward to close the four upper contacts indicated, and to open the two lower contacts. A circuit will now be established from the main Y through the wire 110, the switch 102, the switch 108, the wire 114, the switch 101, the wire 115, the solenoid 74 and the wire 116. The solenoid 74 will thus be actuated to operate the automatic sheet feeder stop. At the same time a circuit will be established from the main Y through the wires 110, 111, the switch 180, the wire 116, the switch 108, the wire 118, the solenoid 52 and the wire 119 to the main X. The solenoid 52 will operate the press trip to separate the printing couple. Similarly, if the sheet is within the detection limits of the coarse side register detector and is out of the detection limits of the coarse front sheet detector represented by the contacts 16 and 17, then the switch 117 which is the equivalent of the contacts 16, 17 of Figure 1, will be closed and the same operation will take place since, as will appear from Figure 4, switches 117 and 180 are in parallel between the wires 111 and 112.

Assuming, however, that the sheet presented is within the detection limits of the coarse side and front detectors, then the switches 117 and 180 will remain open and the sheet feeder will continue in operation and the printing couples in contact. If, however, after the sheet is taken by the grippers 12 the front edge is out of the detection limits of the fine sheet detector, then switch 130 will be closed to establish a circuit from the main Y through the wires 110, 111, through switch 130, the wire 120, and through the switches 106 and 107, both of which usually will be closed, and from the switch 107 through the signalling device 105 through wire 121, to switch 108 and the wire 123 to the main X. The signalling device 105 will, therefore, be actuated if the sheet is outside of the detection limits of the fine detector. Similarly, the current will flow through the switch 106, the wire 122 and the wire 118 to the solenoid 52 and from thence through the wire 119 to the main X to trip the press.

With the arrangement described, it will be seen that the signalling device will operate only when the sheet is outside of the detection limits of the fine detector but within the detection limits of the coarse detectors, that the press will be tripped if a sheet is outside of the detection limits of any one of the detectors and that the automatic sheet feeder will be stopped only when the sheet is outside of the detection limits of one of the coarse detectors.

By opening switch 106, the operation of the switch 130 will be suspended so far as the tripping of the press when sheets are presented which are in coarse register but not in fine register. If at this time the switch 107 remains closed, then the signalling device will operate as before. In other words, the sheets will be printed whether in or out of fine register, but the printer will be advised at all times whether or not the sheets are in register. Consequently, if the out-of-register condition persists he can then stop the press and readjust, if he desires to do so. If, on the other hand, only an occasional sheet is out of fine register, he may continue the operation of the machine if the work is not such as to require fine register. Similarly, by opening the switch 107 the operation of the signalling device can be suspended at any time.

The solenoid 74 controlling the sheet feeder is also in a circuit including the switch 103 so that when this switch is closed, as by hand, the operation of the feeder may be suspended at any time without suspending the other operations of the press. The two-sheet detector switch 104 is also normally open but will be closed when two sheets are fed at a time to actuate the solenoid 74 in a manner similar to the closing of the switch 103.

While preferably we operate our signalling device and also the feeder stop and press trip by means of the circuits which we have illustrated and described, it will be understood that any other forms of connections between the detectors and the various operating parts of the press may be used. It will also be obvious that if desired a fine sheet detector may be applied to the side register of the sheets as well as to the front register as illustrated. It will be also understood that the arrangement of circuits may be widely varied to carry out our invention and that the one which we have described is merely illustrative.

By placing the sheet feed stop adjacent the point of drive from the press, all of the operating parts of the feed are suspended which would not be the case if such disconnection took place at the front.

It will be understood that, while we preferably operate the fine detector to contact with the sheet after the grippers are closed on it, such detector may be arranged to contact with the sheet as it rests near or against the sheet front gage, whether this latter is of the stationary form illustrated, or moving with the sheet.

While we have illustrated separate coarse

and fine detectors, it should be understood that the functions of the two detectors may be combined in one device. Thus the detector blade may be arranged to cause a switch blade to contact with a pair of short bars, so that when the sheet contacting with the detector blade is within the coarse detection limits but outside the fine detection limits, a circuit through the operating device will be closed, but will be opened if the switch blade is not caused to be moved into contact with the bars by the sheet or is moved through its entire throw and off the bars when the sheet is properly against the gage. In other words, the detector and switch will be arranged so that the switch is open if the sheet is outside the detection limits of coarse detection and within the limits of fine detection, but will be closed when it is between the two. Similarly, either in combination with the foregoing or separately, the blade, when within the fine detection limits but not in registered position, may be made to close a switch to operate the signalling device and the trip or each separately, and when outside the coarse detection limits, may be made to close another switch to operate the feed stop and the trip or either of them separately. It should be understood, therefore, that where, in the following claims, we specify a coarse register detector and a fine register detector, we do not wish to be limited to entirely separate devices, but intend to include any arrangement by which the position of a sheet in relation to two predetermined limits is ascertained.

We claim:—

1. The method of operating a printing press which consists in presenting a sheet to the press, determining its relation to the press gage and giving a signal only when the sheet is nearer than a predetermined large distance from the gage and farther than a predetermined smaller distance from the gage.

2. The method of operating a printing press which consists in presenting a sheet to the press, determining its relation to the press gage, giving a signal and separating the printing couple when the sheet is nearer than a predetermined large distance from the gage and farther than a predetermined small distance from the gage, and only separating the printing couple when a sheet is farther than the predetermined large distance from the gage.

3. The method of operating a printing press which consists in presenting a sheet to the press, determining its relation to the press gage, giving a signal when the sheet is nearer than a predetermined large distance from the gage and farther than a predetermined small distance from the gage, and separating the printing couple when a sheet is farther than the predetermined large distance from the gage.

4. The method of operating a printing press having an automatic sheet feeder which consists in presenting a sheet to the press, determining its relation to the press gage, only giving a signal and separating the printing couple when the sheet is nearer than a predetermined large distance from the gage and farther than a predetermined small distance from the gage and only separating the printing couple and stopping the automatic feeder when the sheet is farther than the large distance from the gage.

5. The method of operating a printing press having an automatic sheet feeder which consists in presenting a sheet to the press, determining its relation to the press gage, giving a signal when the sheet is nearer than a predetermined large distance from the gage and farther than a predetermined small distance from the gage and separating the printing couple and stopping the automatic feeder when the sheet is farther than the large distance from the gage.

6. The method of operating a printing press having an automatic sheet feeder which consists in presenting a sheet to the press, determining its relation to the press gage, only giving a signal when a sheet is nearer than a predetermined large distance from the gage and farther than a predetermined small distance from the gage and only stopping the automatic feeder when the sheet is farther than the predetermined large distance from the gage.

7. The method of operating a printing press having an automatic sheet feeder which consists in presenting a sheet to the press, determining its relation to the press gage, only separating the printing couple when the sheet is less than a predetermined large distance from the gage and farther than a predetermined small distance from the gage and only separating the printing couple and stopping the automatic feeder when the sheet is farther than the large distance from the gage.

8. In a printing press, a sheet detector, a signalling device, connections between the detector and the signalling device, and means, controlled by the detector, to actuate said connections to operate said signal only when a sheet presented to the press is less than a predetermined large distance and greater than a predetermined small distance from the predetermined normal position of the sheet.

9. In a printing press, a coarse register sheet detector, a fine register sheet detector, a signalling device, connections between each of the detectors and the signalling device, and means, controlled by the detectors, to actuate said connections to operate said signal only when a sheet presented to the press is

outside the detection limits of the fine detector and within the detection limits of the coarse detector.

10. In a printing press, a coarse register sheet detector, a fine register sheet detector, a signalling device, an electric circuit including said signalling device, and means, controlled by the detectors, to energize said circuit to operate said signalling device only when a sheet presented to the press is outside the detection limits of the fine detector and within the detection limits of the coarse detector.

11. In a printing press, a coarse register sheet detector, a fine register sheet detector, a signalling device, and an electric circuit including the signalling device, a first switch controlled by the fine detector, and a second switch controlled by the coarse detector, the switches being arranged to close the circuit to operate the signalling device only when a sheet presented to the press is outside the detection limits of the fine detector and within the detection limits of the coarse detector.

12. In a printing press, a coarse register sheet detector, a fine register sheet detector, a signalling device, and an electric circuit including the signalling device, a first switch controlled by the fine detector, and a second switch controlled by the coarse detector, the first switch being normally open and arranged to be closed when a sheet presented to the press is outside the detection limits of the fine detector, and the second switch being normally closed and arranged to be opened when such sheet is outside the detection limits of the coarse detector.

13. In a printing press, a moving sheet conveyor, a coarse register sheet detector, a fine sheet detector on the conveyor, a stationary signalling device and connections therebetween constructed and arranged to operate the signalling device only when a sheet presented to the conveyor is outside the detection limits of the fine detector and within the detection limits of the coarse detector.

14. In a printing press, a moving sheet conveyor, a stationary coarse register sheet detector, a fine sheet detector on the conveyor, a stationary signalling device and connections therebetween constructed and arranged to operate the signalling device only when a sheet presented to the conveyor is outside the detection limits of the fine detector and within the detection limits of the coarse detector.

15. In a printing press, a sheet conveyor, a coarse register sheet detector and a fine register sheet detector, the coarse detector being arranged to contact with a sheet on the conveyor before the sheet contacts with the fine detector, a signalling device and connections between the detectors and the signalling device constructed and arranged to operate the signalling device only when a sheet on the conveyor is outside the detection limits of the fine detector and within the detection limits of the coarse detector.

16. In a printing press, a sheet conveyor, a coarse register sheet detector and a fine register sheet detector, the coarse detector being arranged to contact with a sheet on the conveyor before the sheet contacts with the fine detector, a signalling device and an electric circuit including the signalling device, the circuit being arranged to be opened when a sheet on the conveyor is outside the detection limits of the coarse detector and to be closed to operate the signalling device only when such sheet is within the detection limits of the coarse detector and outside the detection limits of the fine detector.

17. In a printing press, a press trip, a coarse register sheet detector, a fine register sheet detector, a signalling device and connections therebetween constructed and arranged to operate only the press trip when a sheet presented to the press is outside the detection limits of both the fine detector and the coarse detector and to operate only the signalling device when such sheet is within the detection limits of the coarse detector and outside the detection limits of the fine detector.

18. In a printing press, a press trip, a coarse register sheet detector, a fine register sheet detector, a signalling device and connections therebetween constructed and arranged to operate only the press trip when a sheet presented to the press is outside the detection limits of both the fine detector and the coarse detector and to operate both the signalling device and the press trip when such sheet is within the detection limits of the coarse detector and outside the detection limits of the fine detector.

19. In a printing press, a press trip, a coarse register sheet detector, a fine register sheet detector, a signalling device and connections therebetween constructed and arranged to operate only the press trip when a sheet presented to the press is outside the detection limits of both the fine detector and the coarse detector and to operate both the signalling device and the press trip when such sheet is within the detection limits of the coarse detector and outside the detection limits of the fine detector, and means under the control of the operator whereby the operation of the press trip may be suspended when such sheet is outside the detection limits of the fine detector but within the detection limits of the coarse detector.

20. In a printing press, a sheet detector, a press trip, a signalling device, and connections therebetween constructed and arranged to operate only the press trip when a sheet

presented to the press is farther than a predetermined large distance from the predetermined normal position of the sheet and to operate both the signalling device and the press trip when the sheet is nearer than such large distance but farther than a predetermined small distance from such normal position.

21. In a printing press, a sheet detector, a press trip, a signalling device, and connections therebetween constructed and arranged to operate only the press trip when a sheet presented to the press is farther than a predetermined large distance from the predetermined normal position of the sheet and to operate the signalling device when the sheet is nearer than such large distance but farther than a predetermined small distance from such normal position.

22. In a printing press, a sheet detector, a press trip, a signalling device, and connections therebetween constructed and arranged to operate only the press trip when a sheet presented to the press is farther than a predetermined large distance from the predetermined normal position of the sheet and to operate both the signalling device and the press trip when the sheet is nearer than such large distance but farther than a predetermined small distance from such normal position, and means under the control of the operator whereby the operation of the press trip may be suspended when such sheet is nearer than such large distance but farther than such small distance from such normal position.

23. In a printing press, a press trip, a coarse register sheet detector, a fine register sheet detector, a signalling device, and an electric circuit including the signalling device and the press trip and constructed and arranged to operate only the press trip when a sheet presented to the press is outside the detection limits of both the fine detector and the coarse detector and to operate both the signalling device and the press trip when such sheet is within the detection limits of the coarse detector and outside the detection limits of the fine detector.

24. In a printing press, a press trip, a coarse register sheet detector, a fine register sheet detector, a signalling device, and an electric circuit including the signalling device and the trip and a first switch controlled by the fine detector and a second switch controlled by the coarse detector, and a second electric circuit including the trip and the fine detector switch, the switches being arranged to close the first circuit to operate the trip and the signalling device when a sheet presented to the press is outside the detection limits of the fine detector and within the detection limits of the coarse detector and to close the second circuit to operate the trip when such sheet is outside the detection limits of either the coarse or of the fine detector.

25. In a printing press, a press trip, a coarse register sheet detector, a fine register sheet detector, a signalling device and connections therebetween constructed and arranged to operate only the press trip when a sheet presented to the press is outside the detection limits of both the fine detector and the coarse detector and to operate only the signalling device when such sheet is within the detection limits of the coarse detector and outside the detection limits of the fine detector, and means under the control of the operator whereby the operation of the press trip may be suspended when such sheet is outside the detection limits of the fine detector but within the detection limits of the coarse detector.

26. In a printing press, a press trip, a coarse register sheet detector, a fine register sheet detector, a signalling device, and an electric circuit including the signalling device and the press trip and constructed and arranged to operate only the press trip when a sheet presented to the press is outside the detection limits of both the fine detector and the coarse detector and to operate only the signalling device when such sheet is within the detection limits of the coarse detector and outside the detection limits of the fine detector, and a hand-operated switch whereby the operation of the press trip may be suspended when such sheet is outside the detection limits of the fine detector but within the detection limits of the coarse detector.

27. In a printing press, an automatic sheet feeder having a drive stop, a coarse register sheet detector, a fine register sheet detector, and connections therebetween constructed and arranged to operate the drive stop when a sheet presented to the press is outside the detection limits of the coarse detector and to maintain the feeder drive in operation when such sheet is within the detection limits of the coarse detector and outside the detection limits of the fine detector.

28. In a printing press, an automatic sheet feeder having a drive stop, a coarse register sheet detector, a fine register sheet detector, and an electric circuit including the drive stop and constructed and arranged to operate the drive stop when a sheet presented to the press is outside the detection limits of the coarse detector and to maintain the feeder drive in operation when such sheet is within the detection limits of the coarse detector and outside the detection limits of the fine detector.

29. In a printing press, an automatic sheet feeder having a drive stop, a coarse register sheet detector, a fine register sheet detector, a press trip, and connections therebetween constructed and arranged to operate the drive stop and the trip when a sheet pre-

sented to the press is outside the detection limits of the coarse detector and to operate only the press trip when such sheet is within the detection limits of the coarse detector and outside the detection limits of the fine detector.

30. In a printing press, an automatic sheet feeder having a drive stop, a sheet detector, a press trip, and connections therebetween constructed and arranged to operate the drive stop and the trip when a sheet presented to the press is farther than a predetermined large distance from the predetermined normal position of the sheet and to operate only the press trip when such sheet is nearer than such large distance but farther than a predetermined small distance from such normal position.

31. In a printing press, an automatic sheet feeder having a drive stop, a coarse register sheet detector, a fine register sheet detector, a press trip, and a first electric circuit including the press trip and a switch controlled by the fine detector, a second electric circuit including the press trip and the drive stop and a switch controlled by the coarse detector, the switches being arranged to close the first circuit to operate the press trip when a sheet presented to the press is outside the detection limits of the fine detector and within the detection limits of the coarse detector and to close the second circuit to operate both the trip and the drive stop when such sheet is outside the detection limits of the coarse detector.

32. In a printing press, an automatic sheet feeder having a drive stop, a coarse register sheet detector, a fine register sheet detector, a press trip and a signalling device and connections therebetween constructed and arranged to operate only the drive stop and the press trip when a sheet presented to the press is outside the detection limits of the coarse detector and to operate only the press trip and the signalling device when such sheet is within the detection limits of the coarse detector and outside the limits of the fine detector.

33. In a printing press, an automatic sheet feeder having a drive stop, a sheet detector, a press trip, a signalling device and connections therebetween constructed and arranged to operate the drive stop and the press trip when a sheet presented to the press is farther than a predetermined large distance from the predetermined normal position of the sheet and to operate the press trip and the signalling device when such sheet is nearer than such large distance but farther than a predetermined small distance from such normal position.

34. In a printing press, an automatic sheet feeder having a drive stop, a sheet detector, a signalling device and connections therebetween constructed and arranged to operate the drive stop when a sheet presented to the press is farther than a predetermined large distance from the predetermined normal position of the sheet and to operate the signalling device when such sheet is nearer than such large distance but farther than a predetermined small distance from such normal position.

35. In a printing press, an automatic sheet feeder having a drive stop, a coarse register sheet detector, a fine register sheet detector, a press trip and a signalling device and a first electric circuit including the drive stop and the press trip and a switch controlled by the coarse detector, and a second electric circuit including the press trip and the signalling device and a switch controlled by the fine detector, the switches being arranged to close the first circuit to operate the drive stop and the trip when a sheet presented to the press is outside the detection limits of the coarse detector and to close the second circuit to operate the trip and the signalling device when such sheet is within the detection limits of the coarse detector and outside the detection limits of the fine detector.

36. In a printing press, a coarse sheet register detector, a fine sheet register detector, an electric circuit including an operating device and a normally closed switch controlled by the coarse detector and adapted to be opened when a sheet presented to the press is outside the detection limits of the coarse detector, and a normally open switch controlled by the fine detector and adapted to be closed when such sheet is outside the detection limits of the fine detector.

37. In a printing press, a coarse sheet register detector, a fine sheet register detector, a first electric circuit including an operating device and a normally closed switch, a second circuit including a solenoid arranged to open the normally closed switch when the second circuit is closed, and a normally open switch controlled by the coarse detector and arranged to be closed when a sheet presented to the press is outside the detection limits of the coarse detector, the first circuit having a normally open switch controlled by the fine detector and arranged to be closed when such sheet is outside the detection limits of the fine detector.

38. In a printing press having an automatic sheet feeder, a driving member on the press, a driven member, connections between the driven member and the feeder, a clutch pawl carried by the driven member and normally engaging the driving member, an operating member normally moving with the driven member and capable of independent motion in relation thereto, a connection between the last-named member and the pawl, the last-named member being

provided with notches and a detent adapted to be moved into engagement with one of the notches to retard the last-named member, whereby the pawl is disengaged from the driving member to stop the feeder while the press continues in motion.

39. In a printing press having an automatic sheet feeder, a driving member on the press, a driven member, connections between the driven member and the feeder, a clutch pawl carried by the driven member and normally engaging the driving member, an operating member normally moving with the driven member and capable of independent motion in relation thereto, a connection between the last-named member and the pawl, the last-named member being provided with notches and a detent adapted to be moved into engagement with one of the notches to retard the last-named member, whereby the pawl is disengaged from the driving member to stop the feeder while the press continues in motion, a solenoid connected to the detent, and means to energize the solenoid to move the detent into engagement with one of the notches.

40. In a printing press having an automatic sheet feeder, a driving member on the press, a driven member, connections between the driven member and the feeder, a movable clutching member between the driving and driven members and carried by the driven member, a circular member normally moving with the driven member and capable of independent rotation in relation thereto, the circular member having a plurality of notches extending around its periphery, connections between the clutching member and the circular member adapted to move the clutching member out of clutching engagement when the circular member is rotated relatively to the driven member and a detent adapted to enter any one of the notches and retard the rotation of the circular member, whereby the operation of the feeder may be stopped at any point in the cycle of the press.

41. In a printing press, a press trip-operating means including a trip-operating member, an actuating device operating at each cycle of the press and normally out of position to engage with said member, a solenoid arranged to move said device into engaging position when the solenoid is operated, a sheet detector and an electric circuit including the solenoid and a normally open switch arranged to be closed when a sheet is outside the detection limits of the detector.

42. In a printing press, a press trip-operating means including a trip-operating member, a reciprocating actuating device normally out of position to engage with said member, a solenoid arranged to move said device into engaging position when the solenoid is operated, a sheet detector and an electric circuit including the solenoid and a normally open switch arranged to be closed when a sheet is outside the detection limits of the detector.

43. In a printing press, a press trip-operating means including a trip-operating member, an actuating device operating at each cycle of the press and normally out of position to engage with said member, a pivoted reciprocating actuating device normally out of position to engage with said member, a solenoid arranged to turn said device on its point into engaging position when the solenoid is operated, a sheet detector and an electric circuit including the solenoid and a normally open switch arranged to be closed when a sheet is outside the detection limits of the detector.

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