Oct. 6, 1931. W. H. GIBSON 1,826,463

AUTOMATIC SHEET ASSOCIATING MECHANISM AND CONTROL

Filed June 17, 1929 9 Sheets-Sheet 1

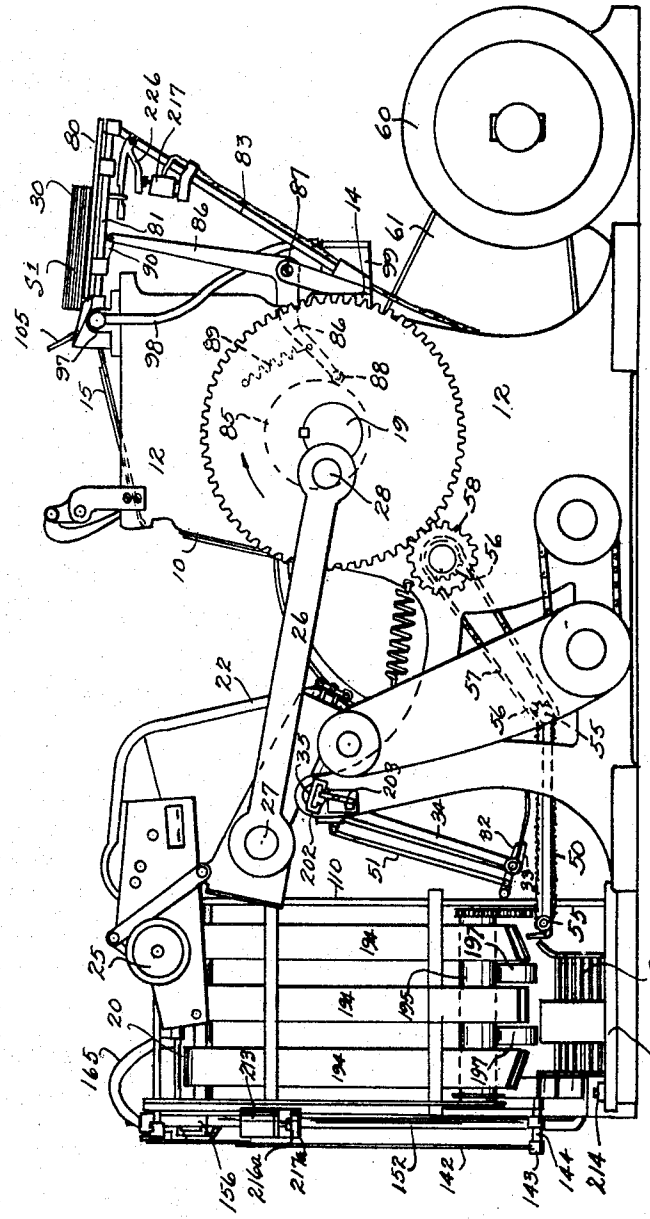


FIG.-1

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Oct. 6, 1931. W. H. GIBSON 1,826,463

AUTOMATIC SHEET ASSOCIATING MECHANISM AND CONTROL

Filed June 17, 1929 9 Sheets-Sheet 2

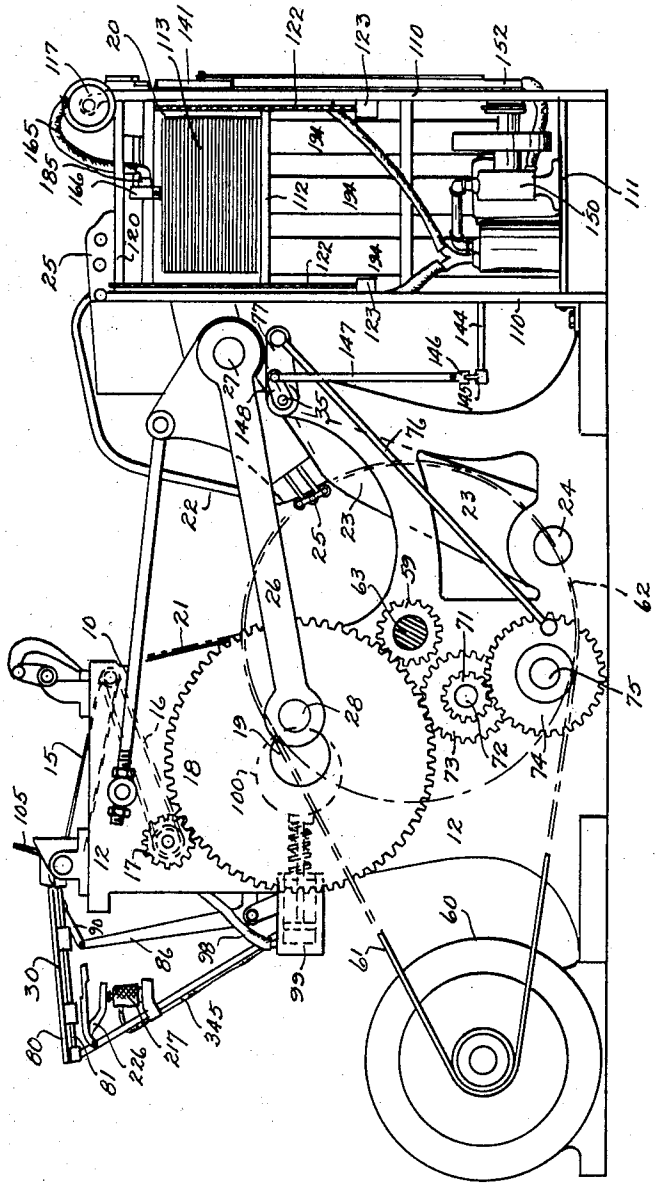


FIG. 2

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AUTOMATIC SHEET ASSOCIATING MECHANISM AND CONTROL

Filed June 17, 1929 9 Sheets-Sheet 3

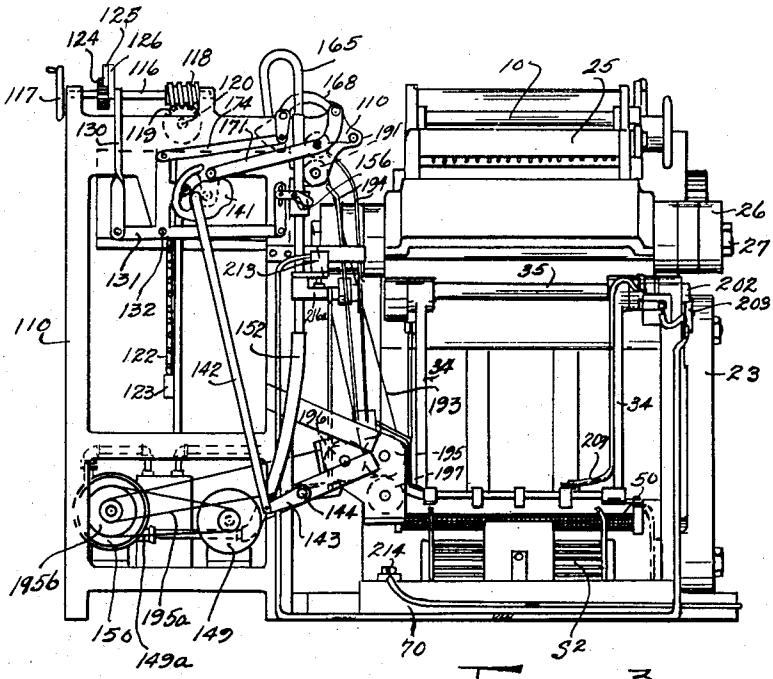


FIG.-3

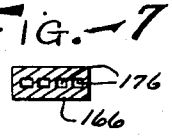


FIG.-7

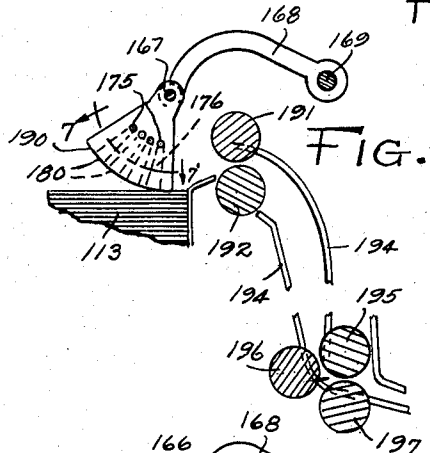


FIG.-6

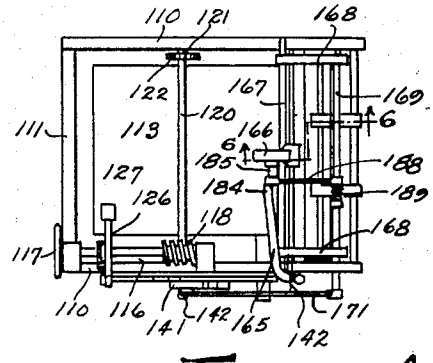


FIG.-4

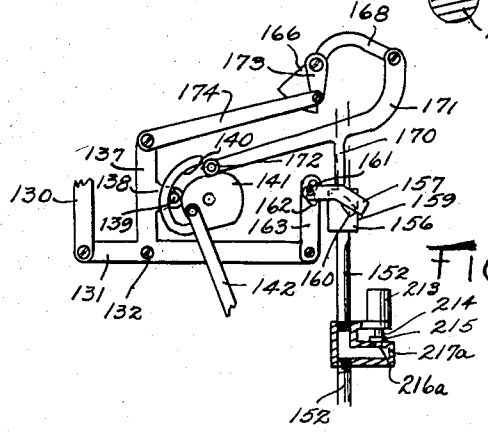


FIG.-5

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AUTOMATIC SHEET ASSOCIATING MECHANISM AND CONTROL

Filed June 17, 1929 9 Sheets-Sheet 4

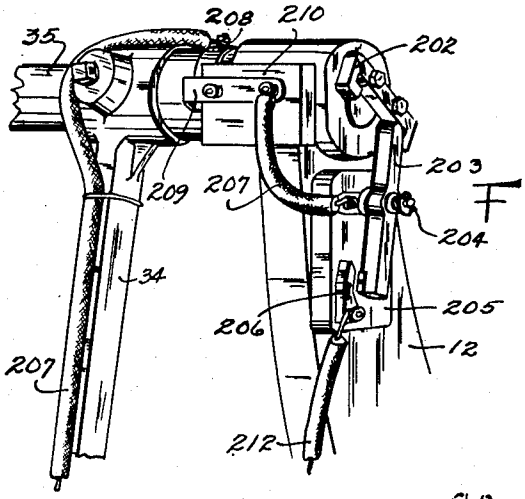


FIG.-8

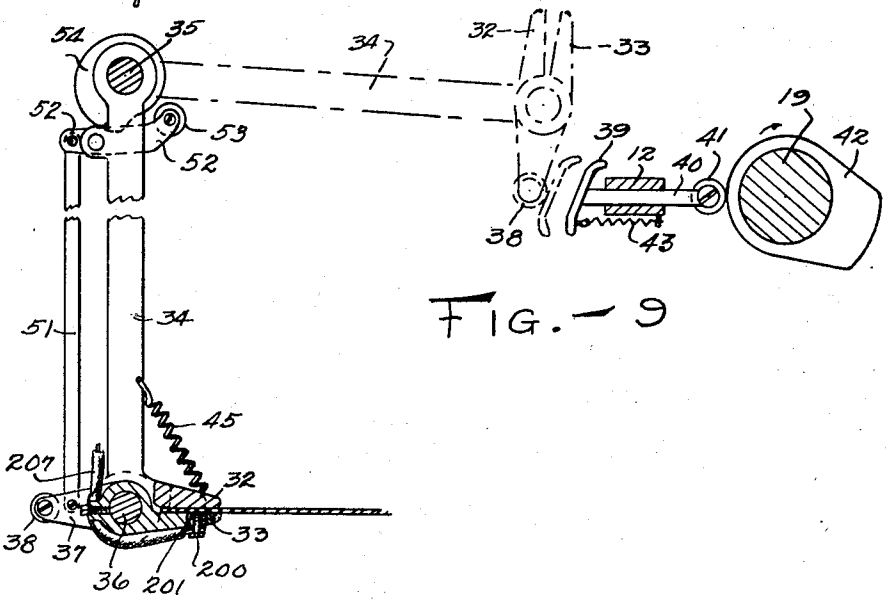


FIG.-9

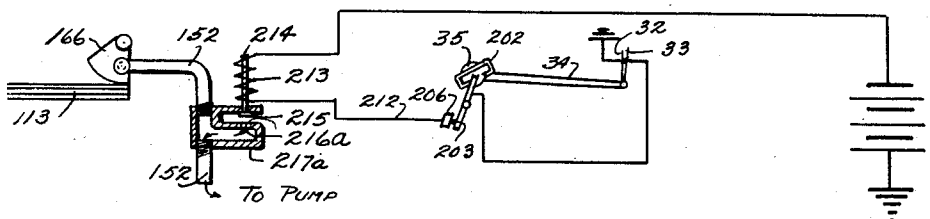


FIG.-10

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Oct. 6, 1931. W. H. GIBSON 1,826,463

AUTOMATIC SHEET ASSOCIATING MECHANISM AND CONTROL

Filed June 17, 1929 9 Sheets-Sheet 5

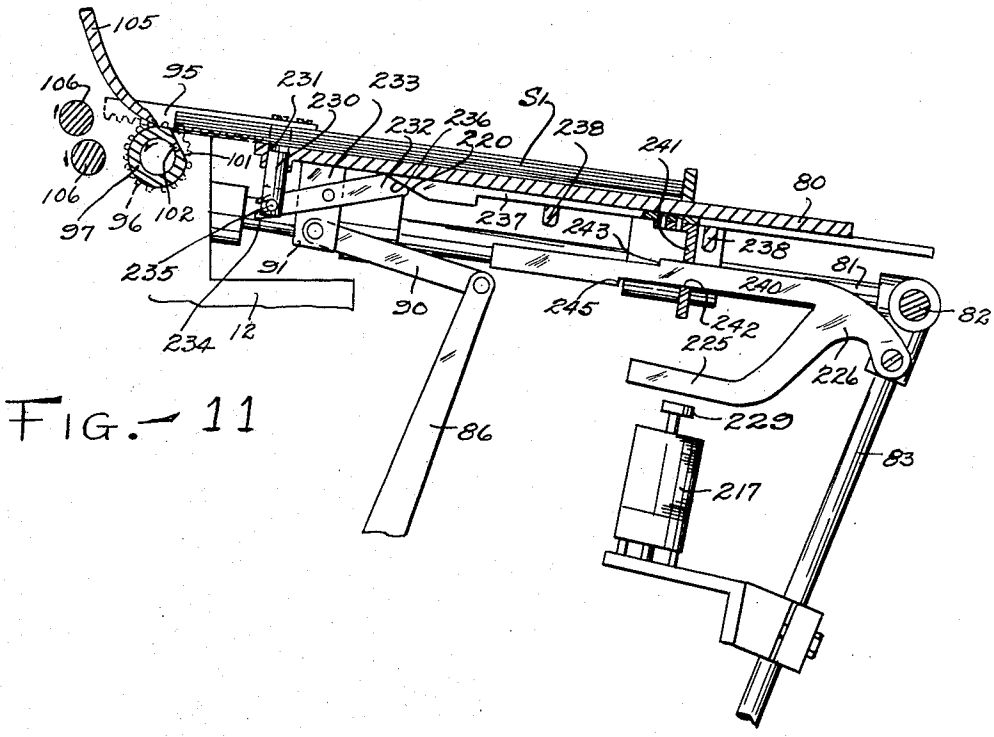


FIG. 11

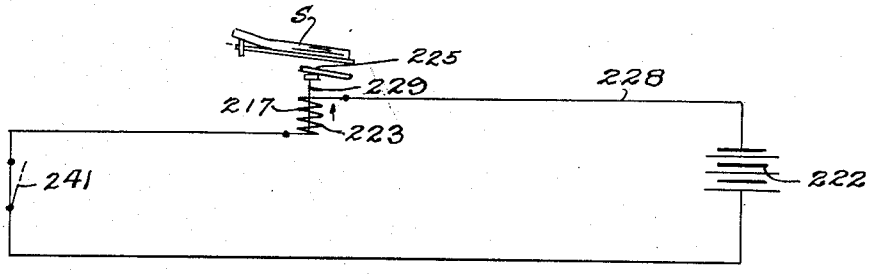


FIG. 12

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Oct. 6, 1931. W. H. GIBSON 1,826,463

AUTOMATIC SHEET ASSOCIATING MECHANISM AND CONTROL

Filed June 17, 1929 9 Sheets-Sheet 6

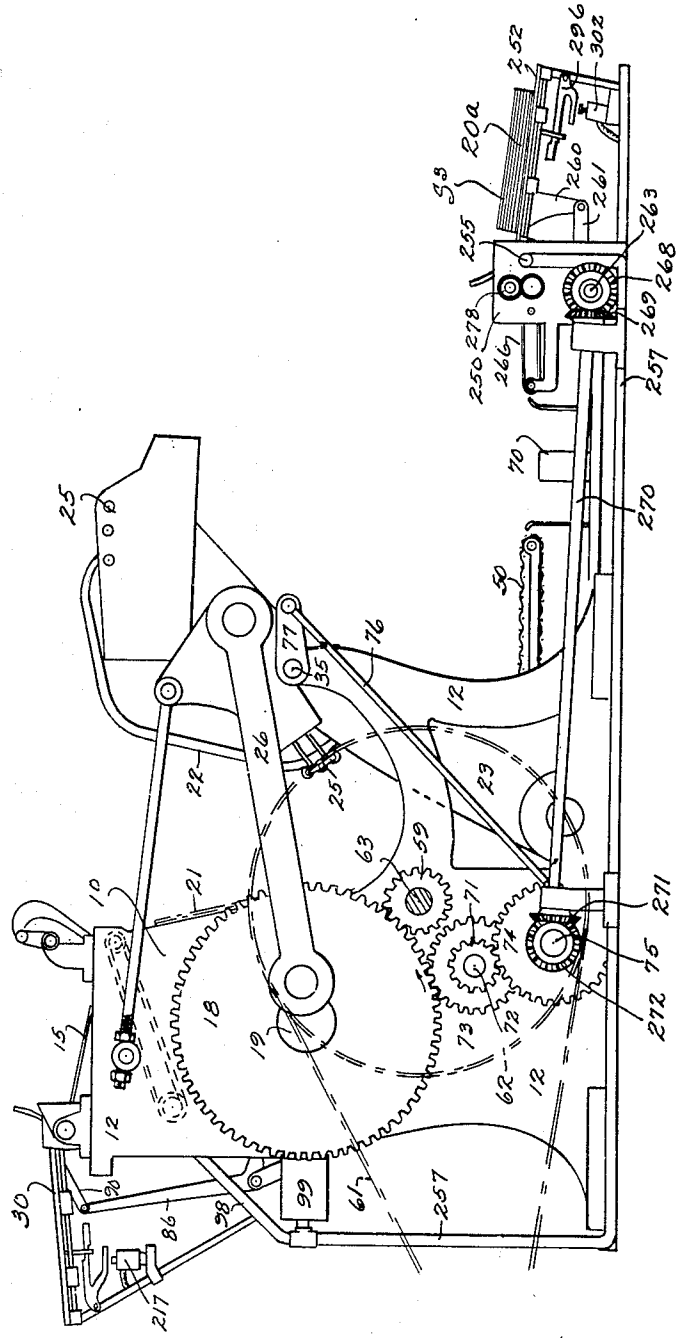


FIG. 13

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Oct. 6, 1931. W. H. GIBSON 1,826,463

AUTOMATIC SHEET ASSOCIATING MECHANISM AND CONTROL

Filed June 17, 1929 9 Sheets-Sheet 7

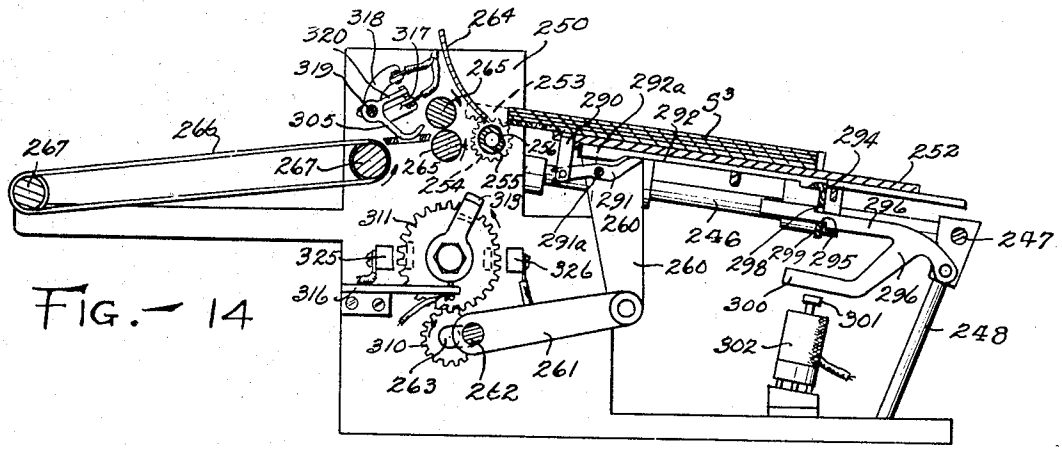


FIG.— 14

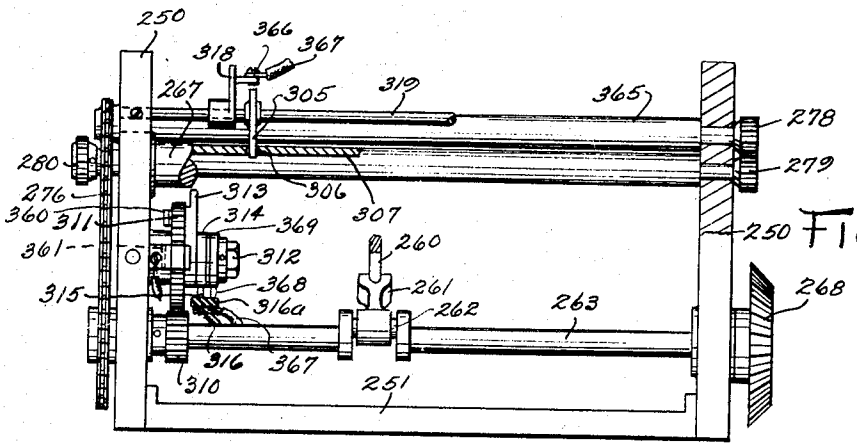


FIG.— 15

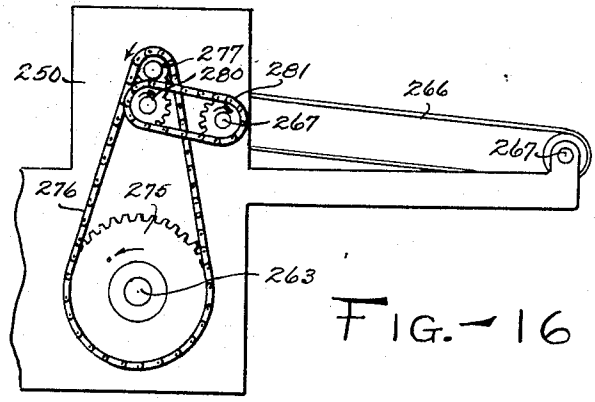


FIG.— 16

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Oct. 6, 1931. W. H. GIBSON 1,826,463

AUTOMATIC SHEET ASSOCIATING MECHANISM AND CONTROL

Filed June 17, 1929 9 Sheets-Sheet 8

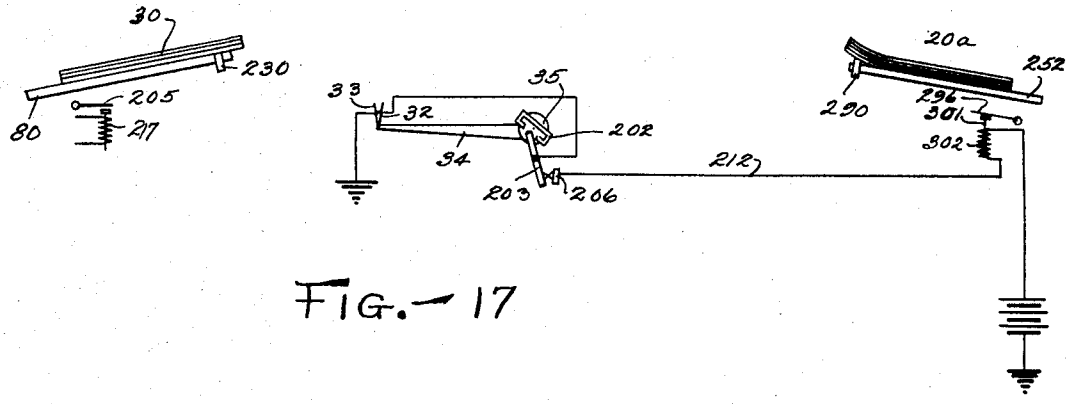


FIG.—17

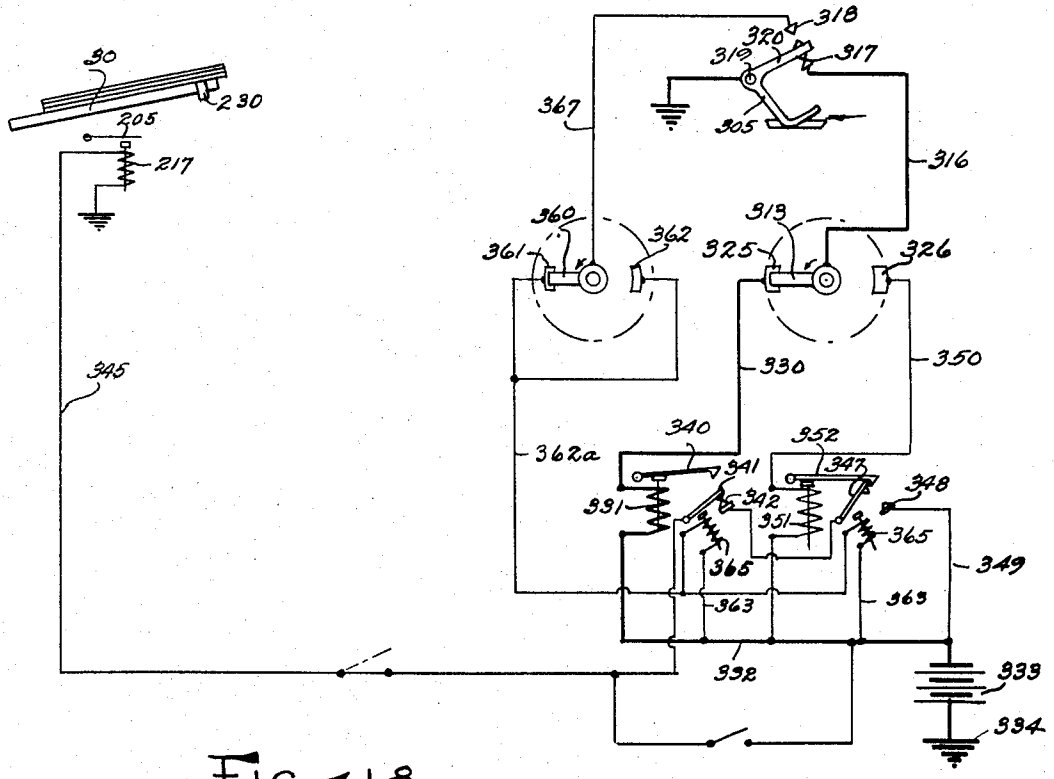


FIG.—18

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AUTOMATIC SHEET ASSOCIATING MECHANISM AND CONTROL

Filed June 17, 1929 9 Sheets-Sheet 9

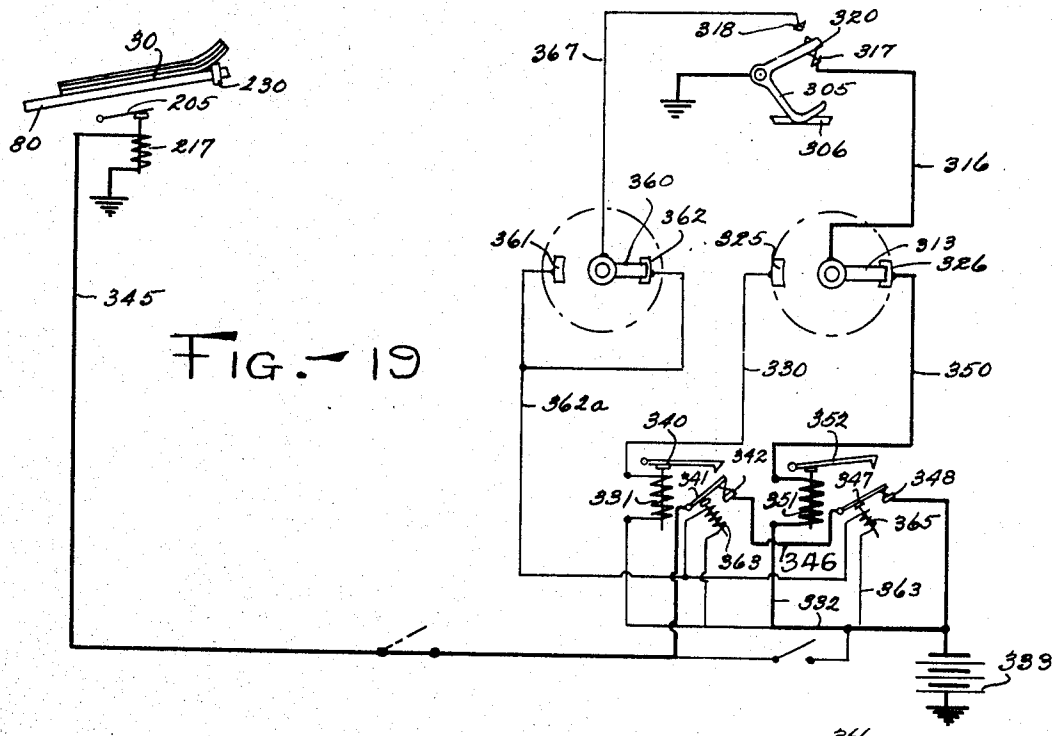


FIG. 19

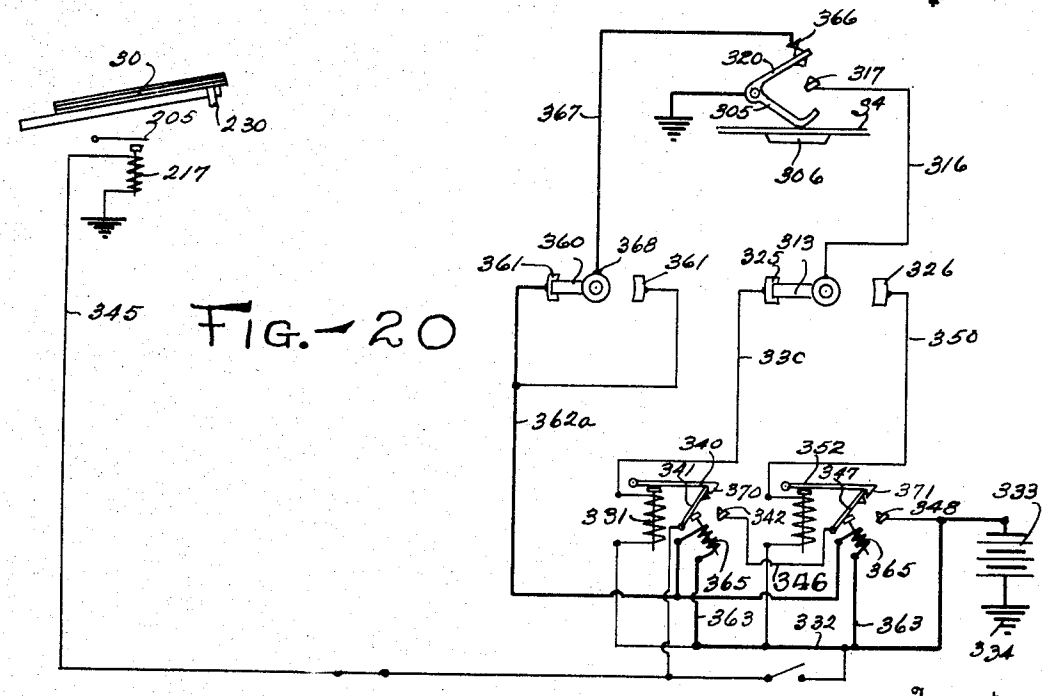


FIG. 20

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Patented Oct. 6, 1931

1,826,463

UNITED STATES PATENT OFFICE

WILLIAM H. GIBSON, OF CINCINNATI, OHIO, ASSIGNOR TO THE GIBSON ART COMPANY, OF CINCINNATI, OHIO, A CORPORATION OF OHIO

AUTOMATIC SHEET ASSOCIATING MECHANISM AND CONTROL

Application filed June 17, 1929. Serial No. 371,614.

This invention relates to feeding mechannisms for printing presses, and more particularly to feeding mechanisms for interposing slip sheets between printed sheets as the printed sheets are discharged by the press, whereby the fresh ink on the printed sheets will not leave an impression on the undersides of the printed sheets as they are automatically stacked.

One of the objects of this invention is the provision of a paper feeding mechanism which may be controlled by the press so as to alternately feed a slip sheet between each of the printed sheets as the latter are discharged by the press.

Another object of the invention is to provide a paper feeding mechanism which may be directly controlled in a timed relationship with the operation of the printing press.

Another object of this invention is to provide a paper feeding apparatus, which will feed sheets to a printing press, to be printed and a second sheet feeding mechanism operating in a timed relationship with the first named feeding mechanisms, adapted to discharge unprinted sheets, or slip sheets, alternately with the printed sheets which are discharged from the press.

A further object is to provide an automatic control mechanism, which, upon a failure of the slip sheet feeding mechanism to feed a slip sheet will cause a failure of the feed mechanism supplying the press with sheets to be printed, thereby preventing an excessive waste of material.

Another object of the invention is to supply a sheet feeding mechanism adapted to feed slip sheets to the stack of printed sheets being discharged by the press, in such a manner that a failure of the press to discharge a printed sheet will cause a failure of the slip sheet feeding mechanism, thereby preventing a waste of slip sheets.

Other objects of my invention will become apparent from the following description relating to the accompanying drawings and the essential characteristics thereof are summarized in the claims.

In the drawings Fig. 1 is a side elevation of one form of a printing press with the preferred forms of sheet feeding mechanisms embodied therein. Fig. 2 is a side elevation of the mechanism shown in Fig. 1, but from the opposite side of the press. Fig. 3 is an end elevation of the press and feeding mechanism looking from the left hand side of Fig. 1. Fig. 4 is a plan of the slip sheet feeding mechanism. Fig. 5 is a diagrammatic detail of a portion of the operating mechanism associated with the slip sheet feeding apparatus. Fig. 6 is a section taken along the line 6—6 of Fig. 4. Fig. 7 is a section taken along the line 7—7 on Fig. 6. Fig. 8 is a perspective of a portion of the control mechanism for the slip sheet feeding apparatus. Fig. 9 is a detail showing the discharge mechanism of the printing press. Fig. 10 is a diagram illustrating the electrical control for the slip sheet feeding mechanism. Fig. 11 is a longitudinal centrally located section of the feeding mechanism which feeds sheets to the press to be printed. Fig. 12 is an electrical diagram illustrating a manually operated electrical control for the paper feed mechanism illustrated in Fig. 11. The remaining figures illustrate a modified form of my invention wherein the paper feed mechanism for supplying the slip sheets to the press is substantially the same as that used for supplying sheets to be printed by the press. This embodiment also illustrates an automatic control for both sheet feeding mechanisms. Fig. 13 is a side elevation of the modified form taken from the same side as Fig. 2. Fig. 14 is a centrally located section through the slip sheet feeding mechanism illustrated in Fig. 13. Fig. 15 is a section taken along the line 15—15 of Fig. 14. Fig. 16 is a side elevation of the feeding mechanism shown in Fig. 14, looking from the opposite side and illustrates a portion of the

driving mechanism therefor. Fig. 17 is an electrical diagram illustrating the automatic control of the slip sheet feeding mechanism illustrated in Fig. 13. Figs. 18, 19, and 20 are electrical diagrams illustrating the automatic control for the feeding mechanism which feeds sheets to the press to be printed.

In the embodiment illustrated in Figs. 1 to 12 inclusive, the printing press is generally indicated at 10. The paper feed mechanism for feeding the press with sheets to be printed is generally indicated at 30, and the feeding mechanism for feeding slip sheets to the press is generally indicated at 20. The printing press may be the usual type of platen press having a reciprocating bed and the usual inking apparatus. The press may comprise side frame members 12 joined by suitable cross members not shown. The frame members 12 may support the paper feeding mechanism 30, which will be hereinafter described in detail, and a paper table 15 to which the feeding mechanism 30 feeds the sheets of unprinted material one at a time. The table 15 may be provided with a conveyor adapted to progress the sheets forward, where they may be stopped by suitable stop fingers, not shown. This conveyor may be of the ordinary belt type conveyor and may be driven in any suitable manner, such as by a chain 16, and gear 17, which cooperates with a main driving gear 18 of the press. As the sheets reach the stop fingers their movement is arrested and they are in position to be picked up by suitable fingers, (not shown) of the usual type, which progress the sheet downward and place it on a platen 21, in a position to be printed. The fingers which place the sheet on the platen may be operated in the usual manner from the main drive shaft 19.

A type bed 22 may be supported by supplemental frame members 23 which may be pivoted to a cross shaft 24, mounted in the frame members 12 of the press. The supplemental frame members 23 also carry a suitable inking mechanism of the usual type, generally indicated at 25. The type bed may be reciprocated by means of connecting rods 26, pivoted at one end to the frames 23 at 27, the other extremity of the rods being pivoted to driving gears 18 of the press, as at 28. The rotation of the driving gears 18 therefore will cause the type bed to oscillate about the axis of the cross shaft 24, causing the type bed to co-act with a sheet held in position against the platen 21, thereby causing an impression to be made on the sheet.

To discharge the printed sheet from the platen I prefer to utilize paper ejector fingers 32 and 33 which may be supported by arms 34 and which may be rigidly mounted on a shaft 35, rotatably journalled in the frame members 12. The shaft 35 is oscillated as will hereinafter be described, thereby causing an oscillation of the fingers 32 and 33. The ejector fingers are best illustrated in Fig. 9 and may comprise an upper and lower half 32 and 33 respectively, the upper half 32 being rigid with the arms 34 and the lower half 33 may be carried by a shaft 36 rotatably journalled in the arms 34. One of the portions 33 has a rearward extending ear 37 which carries a roller 38 adapted to co-act with a cam 39 on the forward movement of the bar thereby causing the fingers 32 and 33 to be separated, permitting them to embrace the printed sheet in place on the platen. The cam 39 is supported by a bar 40 slidably mounted in one of the frame members 12. A roller 41 mounted on the cam bar 39 is held in contact with a cam 42 rigidly secured to the drive shaft 19 of the press by a suitable spring 43. The retraction of the cam 39 by reason of the rotation of the cam 42 permits the fingers to be drawn together in a closed position by the spring 45, one end of which is secured to the lower fingers 33 and the other end to the arms 34. The shaft 35 is then oscillated so as to cause a printed sheet to be drawn rearwardly in a position over a conveyor 50.

In order that the sheet may be released from the grip of the fingers 32 and 33 the ear 37 of one of the lower gripper fingers 33 is connected by means of a link 51 to a rock arm 52 pivoted to the bar 34 adjacent the shaft 35. The arm 52 carries a roller 53 adapted to co-act with a stationary cam 54, mounted on the frame of the press. This cam causes the fingers 32 and 33 to be separated, thereby permitting the paper to drop free upon the conveyor 50.

The conveyor 50 (see Fig. 1) upon which the paper falls, carries the paper to a stacking or jogging mechanism of any suitable type 70. The conveyor 50 may be of the belt conveyor type supported by rollers 55. The conveyor may be driven in any suitable manner, such as by sprockets 56, a chain 57 and a gear 58, which meshes with one of the drive gears 18 which is rigidly secured to the main drive shaft 19 of the press. The conveyor is, however, driven at a slower speed than the peripheral speed of the fingers 32 and 33 in order that the fingers upon releasing the paper may be permitted to pass clear of the paper before the arms 35 start their return movement to discharge another sheet from the platen 21.

The press may be driven by any suitable source of power. As illustrated in Figs. 1 and 2 the press is driven by means of a motor 60, a belt 61 and a pulley 62, drivingly mounted on a cross shaft 63, which is journalled in the frame members 12 of the press. The cross shaft 63 carries spur pinions 58 and 59 which mesh with the driving gears 18 of the press.

The feeding apparatus for supplying the press with sheets to be printed is shown in Figs. 1, 2 and 11 and will now be described.

A table 80 is mounted on slide bars 81 which are supported at one end by the frame members 12 and at the other by a cross shaft 82 and a supporting bar 83 which is secured to the frame member 12. The feed table 80 may be reciprocated by means of a cam 85, rigidly secured to the drive shaft 19 of the press. A rock arm 86 pivoted to a frame member 14, at 87 carries a roller 88 which is held in contact with the cam 85 by means of a spring 89. The upper portion of the rock arm 86 may be pivotally connected by means of a link 90 to a boss 91 on the table 80. Therefore, each revolution of the shaft 19 will cause the feed table 80 to be reciprocated once.

A vacuum may be introduced to feed the individual sheets. To accomplish this, the table 80 carries a rack 95, (see Fig. 11) which coacts with a gear 96 rigidly secured to a hollow shaft 97, journaled in the frame members 12. The reciprocation of the table 80 will therefore cause the shaft 97 to be oscillated. A stack of sheets to be printed is placed on the table 80 in such a manner that the end of the stack will overlie the table and upon the forward stroke of the table (to the left in Figs. 1 and 11) the stack will overlie the hollow shaft 97. The shaft 97 may be connected by means of a suitable conduit 98 (see Fig. 1) to a vacuum pump 99 which is operated by a cam 100 rigidly secured to the main shaft 19. The hollow shaft 97 (Fig. 11) is provided with a flattened portion 101 having a slot 102. As the paper table is oscillated (to the left in Fig. 11) the lowermost sheet of paper is drawn in contact with the flattened portion 101 of the shaft 97, by reason of the vacuum acting through the slot 102, and is carried underneath a deflector bar 105 into the grip of feed rollers 106 which carry the sheet forward onto the conveyor belts 15. The balance of the stack is diverted upwards by the deflector bar 105 while the lowermost sheet is drawn from the stack by the rollers 106, thus causing the paper to be fed to the press, one sheet at a time for each revolution of the driving gear 18 of the press.

The type bed 21 of the press is oscillated by means of the connecting rods 26 (see Figs. 1 and 2) which are pivoted to the driving gears 18 and is likewise brought into contact with the sheet once for each rotation of the gear 18, sheet discharge arms 34 are likewise brought into operation once during each revolution of the gear 18. A gear 71 mounted on a stub shaft 72 is driven by a gear 73 which meshes with the drive gear 18. A gear 74 mounted on a stub shaft 75 carried by the frame 12 is driven by the gear 73 at the same speed as the driving gear 18. A rod 76 pivotally secured to the gear 75 cooperates with a crank arm 77 rigidly secured to the shaft 35 to cause the arms 34 to be oscillated. This oscillating movement of the arms causes a printed sheet to be discharged from the press onto a conveyor 50 from which it is discharged onto the stack S2, once for each revolution of the driving gears 18.

It is evident that if the printed sheets are discharged one on top of another the fresh ink would offset on the underside of the next succeeding sheet leaving a more or less distinct impression. In the past the practice has been to feed manually unprinted sheets of an inferior grade of material, known as slip sheets, alternately to the pile of printed sheets as the latter are discharged from the press. It is evident that the feeding of these slip sheets by hand is a slow operation which restricts the speed of the press to that of the operator who feeds the slip sheets. This manual feeding of slip sheets is also a tiresome operation and therefore, very undependable. I therefore provide mechanism associated in timed relationship with the printing mechanism to automatically feed the slip sheets to the stack of sheets being discharged from the press in such a manner as to alternately discharge first a printed sheet from the press and then a slip sheet to the stack. This of course, will avoid any offsetting on the under-side of the printed sheets.

A feeding mechanism for the slip sheets is generally indicated at 20 and may be essentially similar to the sheet feeding mechanism shown in the Patent No. 1,546,184, issued to L. K. Aldrich. It is apparent, however, that I may employ other types of sheet feeding mechanisms for this purpose, such as is illustrated in Figs. 13 to 20 inclusive. As illustrated in Figs. 1 to 12 inclusive, this mechanism may comprise substantially a frame of rectilinear cross section having side members 110 and cross members 111, which carry a vertically reciprocal table 112, adapted to provide a support for a stack of slip sheets 113. The table is fed upwardly for advancing the stack 113 towards a suction nozzle 166 that is employed for removing the individual sheets from the stack and feeding them to a mechanism adapted to carry them to the stack of printed sheets S2.

Any suitable means may be used for advancing the table 112. As shown in Figs. 2, 3 and 4, the advancing means may comprise a shaft 116 supported by the side frame members 110. The shaft 116 may carry a suitable hand wheel 117 and a worm 118. The worm 118 drives a worm wheel 119 mounted on a shaft 120 which shaft carries sprockets 121. Chains 122 extend about the sprocket and support at one end the table 112 and carry at their other ends weights or counter-balances 123. An automatic advancing means may be provided for the table 112 which may comprise a ratchet wheel 124

mounted on the shaft 116 and engaging a pawl 125, carried by a ratchet plate 126 mounted for oscillation on the shaft 116. The ratchet plate 126 may extend transversely of the frame and is weighted at its inner end as shown at 127, and carries at its other end a pin which is engaged by an elongated slot formed in a link 130, depending from said ratchet plate. The lower end of the link 130 is pivotally connected to the forward end of an arm 131; the arm 131 may be actuated about its pivotal mounting 132 on the frame in any suitable manner for actuating the link 130.

From the foregoing it will be apparent that the weight 127 serves to move the ratchet plate in a counter-clockwise direction while the upper end of the slot in the link 130 limits such counter-clockwise direction of the ratchet plate. Any suitable means may be used to limit the movement of the ratchet plate, so that the movement of the link 130 will have no effect on the advancing of the stack of sheets 113 until desired.

Any suitable mechanism may be used to actuate the arm 131. As illustrated in Figs. 3 and 5 the arm 131 carries an upwardly projecting extension 137 whcih is provided with a rearwardly extending finger 138 upon which finger is mounted a roller 139. The roller is contained in a slideway 140 formed in a cam 141. From the foregoing it will be apparent that the movement of the cam serves to actuate the arm 131 and the various mechanisms connected to the arm. The cam in turn is actuated by a link 142, which is pivotally connected at one end to the cam 141 and pivotally connected at its other end to a rock arm 143 rigidly carried by a shaft 144 which is rotatably mounted in the frame 110. The shaft 144 (see Fig. 2) also carries a rock arm 145, which is connected by means of a universal joint 146 to a link 147 which is pivotally connected to a rock arm 148, rigidly secured to the shaft 35, which carries the paper ejecting fingers 32 and 33 of the press. It is evident, therefore, from the foregoing, that the cam 141 is actuated once for each cycle of operation of the press and in a different timed relationship with the operation of the paper ejector fingers 32 and 33.

Any suitable source of power may be used to drive this feed mechanism and supply the vacuum. As illustrated in Figs. 2 and 3 a motor 149 is mounted on a frame member 111 and it is adapted to drive a suction pump 150 which receives air by the way of a pipe 152 whereby there is a tendency toward a vacuum within the pipe. A valve 156 (see Figs. 3 and 5) is controlled by the rear end of the arm 131 in such a manner as to modify the degree of vacuum tendency within the pipe 152. The valve 156 comprises a shutter 157 that is pivotally mounted upon a block 159 with which the pipe 152 communicates. The block is provided with a port 160 for which the shutter 157 serves as a closure. The rear end of the shutter 157 carries a pin 161 that is disposed within an elongated slot 162 formed in the upper end of an upright extension 163 formed on the rear end of the bar 131. The shutter 157 is practically balanced on its pivot and is actuated in opposite directions by the wall of the aperture 162 and a depending extension 170 of an arm 171. The pipe 152 communicates by means of a hose 165 with an oscillating nozzle 166.

The pickup device for picking up individual sheets from the stack 113 includes the nozzle 166 which may be rigidly mounted on a shaft 167 extending transversely at the top of the frame (see Figs. 2 and 4). The shaft may be supported by brackets 168 mounted on a shaft 169. The shaft 169 may be rotatably supported by the sides 110 and the roller arm 171 is rigidly secured at one end of the shaft 169 and carries a roller 172 adapted to engage a cam 141. From the foregoing it will be apparent that as the roller 172 is raised and lowered by means of the cam 141 the arm 171 may cause the brackets 168 to raise and lower the shaft 167 together with the nozzle 166. The shaft 167 which is rotatably supported by the brackets 168 has rigidly mounted at one end a crank arm 173 that is pivotally connected by means of a link 174 to the extension 137 of the operating arm 131.

From the foregoing it will be apparent that the nozzle may have imparted to it both the oscillating movement about the shaft 167 and an oscillating movement about the shaft 169. The nozzle 166 is provided with a plurality of suction valves 175 which may communicate by way of passages 176 formed in the nozzle with ports 180. The ports 180 may be brought into communication with the suction hose 165 which results in removing the upper sheet from the stack 114 by means of the nozzle. The end 184 of the hose 165 is connected with a tubular stem 185 that may register with the ports 180. The stem 185 may be supported by a bracket 188 carried by the shaft 169 against which bracket a spring 189, mounted on a shaft 169 may abut. In this case the block 186 is held in yielding engagement upon the side of the nozzle 166.

The operation of the feeding mechanism is as follows: A stack of slip sheets 113 is placed on the table 112, the hand wheel 117 is then actuated to bring a stack of slip sheets to a proper level. When the printing press is started the cam 140 will actuate the nozzle 166, bringing the nozzle downwardly into engagement upon the uppermost sheet and sealing the port 160 and the valve 156. The suction then causes the uppermost sheet to engage the nozzle 166; the arm 171 is then actuated by the cam 141 for elevating the shaft 167. The raising movement of the shaft 167 serves to raise the uppermost sheet from the

stack. The continuous movement of the cam acts through the linkage 137, 173, 174 and the shaft, 167 to swing the nozzle in a counter-clockwise direction, (Figs. 3 and 6), thereby feeding the sheet to the discharge rolls 191 and 192.

The operation of the feeding mechanism to discharge a sheet which has been previously separated from the stack 113 by reason of the vacuum exerted upon it by the nozzle 166 will now be described in detail. The movement of the nozzle is continued until the end of the uppermost sheet is passed between rollers 191 and 192 whereupon the sheet is released from the suction nozzle 166 by reason of the port 160 of the valve 156 being opened by reason of the extension 163 of the operating arm 131 actuating the shutter 157. The rollers 191 and 192, then, feed the sheet downwardly through a trough 194 into the bite of rollers 195 and 196, which in turn propel the sheet between the rollers 195 and 197 which discharge the sheet upon the stack of sheets S2 which have been discharged by the press. The rollers 191 and 192 may be driven by a belt 193 from the roller 195 which also frictionally drives the rollers 196 and 197. The roller 195 may be driven by means of a belt 195*a*, either from the motor 149 or as illustrated in Fig. 3, from the pulley 195*b* mounted on the vacuum pump 15, which in turn is driven from the motor 149 by a suitable belt 149*a*. The operation of the feeding device for slip sheets is so timed that immediately after the fingers 32 and 33 of the press have engaged a printed sheet to discharge it from the platen 21 of the press the suction nozzle 166 of the slip sheet feeding mechanism is in position to pick up the uppermost sheet from the stack of slip sheets 113 and deliver the slip sheet thus picked up to the stack of printed sheets, shortly after the printed sheet which has been gripped by the discharge fingers 32 and 33 has been discharged, to the stack, from the press.

It is desirous to provide a mechanism which will control the operation of the slip sheet feeding mechanism, depending upon the presence or non-presence of a printed sheet between the fingers 32 and 33. It is evident that such a mechanism will prevent unnecessary waste of slip sheets. To accomplish this, I prefer to electrically ground finger 32 with the press and its associated mechanism. The finger 33 may carry an electrical contact member 200 which may be insulated from the finger by insulation 201. The contact 200 is so positioned that when the fingers 32 and 33 are in a closed position, in which position they are, when holding a sheet to be discharged, an electrical contact will be made between the contact member 200 and the finger 32 if there is no paper present. However, if a sheet of paper is present the contact 200 will be insulated from the finger 32 by the sheet, thereby preventing the circuit from being made. In order that the contact 200 may be energized only at predetermined times the following mechanism may be employed. Rigidly secured to the shaft 35 (Figs. 1 and 8) may be a yoke 202, the opposite ends of the yoke may be adapted to engage a lever 203 pivotally secured, intermediate its ends, at 204 to an insulating block 205, rigidly secured to the frame 12 of the press. The yoke 202 is so positioned on the shaft 35 that when the fingers 32 and 33 are in the position shown in dotted lines in Fig. 9 the lower end of the walking beam 203 is in a position where it is in contact with a contact member 206, which is rigidly secured to the insulating block 205. In this position the fingers 32 and 33 are held open by the cam 39, ready to receive a printed sheet and if upon the closing of these fingers there is no sheet in the platen the fingers will come together and a contact will be made by means of the fingers 32 and the contact member 200.

A collector arm 209 mounted on an insulating block 210 contacts with the contact member 208 and is connected with the rock arm 204 by means of wiring 207. This will energize the contact member 208 rigidly secured to the shaft 35 and connected to the contact 200 by means of wiring 207. The yoke 202 does not engage the arm 203 until the arms 34 carrying the fingers 32 and 33 are in a rearward position. Hence, the contact member 206 will be energized for a considerable length of time during which time the nozzle 166 would normally be in an operating condition. The contact 206 is connected by means of a wire 212 to a solenoid winding 213 (Fig. 10), the core 214 which is provided with a flanged head 215 adapted to form a valve closure member which cooperates with a port 216*a* in a valve block 217*a*, the other pole of the solenoid winding is connected to any suitable source of power such as a battery 218, one side of which is grounded. It is evident from the foregoing that when the circuit is made causing the core 214 of the solenoid to be raised the port 216*a* of the valve 217*a* will be opened. The valve 217*a* may be positioned anywhere in the vacuum line 152, as shown on Figs. 3 and 5 it is slightly below the valve 156. It is evident therefore, that as the core 214 opens the valve port 216*a* that the suction on the nozzle 166 is relieved and it will therefore fail to function on the uppermost sheet of the stack 113, and will for that reason, be inoperative for that cycle of operation. However, when the shaft 35 has carried the fingers 32 and 33 to their extreme rearward position the yoke 202 will cause the arm 203 to rotate withdrawing it from contact with the member 206, thereby breaking the circuit to the solenoid and closing the port 216*a*. This will permit the nozzle 166 and its associated parts to be in

position to function normally on the next succeeding sheet providing, of course, that a printed sheet is gripped by the fingers 32 and 33 on the next cycle of operation of the press.

In the embodiment shown in Figs. 1 to 12 inclusive I prefer to employ a manually operating electrical control for the sheet feeding mechanism 30 which feeds the press with sheets to be printed. I find that a manual control is sometimes desirable as it tends to keep the press operator on the alert and in case the press or the sheet feeding mechanism fails to function properly the operator will then be ready to correct the failure and maintain the press inoperation. This manual control is also desirous because of the fact that when an operator removes the stack of printed sheets S2 he must necessarily stop the press.

In Fig. 1 I show a manually operated switch 214 mounted adjacent the table 70, which supports the stack S2. In this position the switch is readily accessible to the operator when he removes the stack. Referring to the wire diagram in Fig. 12 the switch 214 has one terminal connected to a battery or other source of power 222 and the other terminal is connected to windings 223 of the solenoid 217. The other terminal of the windings is connected to the battery or source of power 222 by suitable wiring 228, to complete the circuit. It will be seen that when the switch 214 is in a closed position as shown in Fig. 12 a core 229 of the solenoid will raise and carry with it an arm 225 of a lever 226.

The paper feed table 80 is provided with a plunger 230 which operates in a vertically extending opening 231 in the table adjacent its foremost end. A rock arm 232 pivoted to a depending lug 233 of the table has a forked end 234 which coacts with a pin 235 in the plunger 230 to raise and lower the latter. The other end of the rock arm 232 has a tapered face 236 adapted to be operated on by a cam portion 220 of a bar 237, which is slidably mounted in brackets 238 depending from the table 80.

The vertical position of the plunger determines whether or not a sheet will be fed by the mechanism. Normally, the plunger 230 is in its lowermost position and the cam bar 237 is drawn fully to the right with reference to the table 80, as shown in Fig. 11. Rigidly secured to the bar 237 is a depending lug 241 which has a slotted opening 242 adapted to receive an arm 240 of the lever 226. The slot 242 is of sufficient height to permit the arm 240 to slide freely in the slot. In the normal operation of the table 80 the cam bar 237 and the lug 241 reciprocate together uninterrupted by the arm 240. However, if, when the table 80 is in its foremost position the solenoid should cause the arm 240 to raise, the rearward movement of the table 80 will cause a shoulder 243 of the arm 240 to engage the lug 241 and prevent further rearward movement of the lug and its associated cam 220. The table 80, however, will continue in its rearward movement carrying with it the rock arm 232, the bevelled portion of which, will then be cammed downwardly by the cam portion 220 causing the plunger 230 to raise the stack of sheets S1 a distance sufficient to carry them free of the suction roll 97. Hence, in this event there will be no paper fed. The solenoid 217 then acts to release the lever 240 and permits it to assume its lowermost position in the slot 242 of the lug 241. Upon the next forward movement of the table 80, the lug 241 will be arrested by a shoulder 245 of the arm 240, while the table 80 will continue in its forward movement, causing the rock arm 232 to be withdrawn free of the cam 237 and permit the plunger 230 and stack of paper S2 to return to their normal positions, in which position they will permit the feeding mechanism to function on its next forward movement.

It will be seen from the foregoing description that I have provided paper feeding mechanisms which operate in timed relationship to the printing press, one of which feeding mechanisms is adapted to supply the press with sheets to be printed while the other feeding mechanism, is adapted to supply a slip sheet to the stack of printed sheets delivered from the press, and wherein one of the feeding mechanisms may be automatically controlled depending upon the failure or non-failure of the other feeding mechanism, while a conveniently located manual control is provided for controlling the second feeding mechanism.

I find that, in some instances, it is desirous to provide an automatic control whereby each feeding mechanism may be automatically controlled. Figs. 13 to 20 inclusive illustrate an embodiment wherein the slip sheet mechanism is similar in operation to that of the paper feed mechanism 30 and wherein each sheet feeding mechanism is controlled by the failure or non-failure of the other to feed. In this embodiment the press 10 may be identical to the press shown in Figs. 1, 2 and 3. The operation of the feeding mechanism 30 which feeds the press with sheets to be printed may likewise be the same. However, the feeding mechanism 20*a* which is employed to feed slip sheets to the stack S2 is similar in operation to the feeding mechanism 30 and is driven as well as controlled by the press itself. The feeding mechanism as shown in Figs. 13 to 16, may comprise frame members 250 and suitable cross members 251 which support a paper table 252 slidably mounted upon bars 246 secured at one end to the frame members 250 and supported at their other ends on a cross member 247 which is supported by a substantially upright member 248.

The table 252 carries a rack 253 which coacts with a pinion 254, rigidly secured to a hollow shaft 255. Hence, when the table 252 is reciprocated the shaft 255 will be caused to oscillate. The shaft 255 has a slotted opening 256 by means of which a vacuum may be exerted upon the lowermost sheet of a stack of slip sheets S3. A conduit 257 (Fig. 13) may connect the hollow shaft 255 with the vacuum pump 99 heretofore described. The table 252 has a depending ear 260 which is connected by means of a connecting rod 261 to a crank arm 262 of the shaft 263. Hence, when the shaft 263 is rotated the table 252 will be caused to reciprocate and upon the forward movement of the table the slot 256 of the hollow shaft 255 will coact with the lowermost sheet of the stack S3 and by reason of the vacuum cause such sheet to pass below a deflector bar 264 and between the bite of a pair of feed rollers 265 which withdraw the sheet from beneath the stack and carry the same to a suitable conveyor 266 mounted upon rollers 267 rotatably mounted in the frame members 250. The shaft 263 may be provided with a bevelled gear 268 which meshes with a bevelled gear 269 carried by a shaft 270. The shaft 270 carries at its other end a bevelled gear 271 which meshes with a bevelled gear 272 rigidly secured to the shaft 75, which, as has been heretofore described, makes one complete rotation for each rotation of the main driving gear 18 of the press. The gearing is such that the shaft 263 is likewise rotated once for each revolution of the gear 18, thereby causing a slip sheet to be fed to the stack S2 from the feed table 252 once for each cycle of operation of the press.

The shaft 263 may drive the ejector mechanism; as shown in Fig. 16 the shaft carries a sprocket 275 which, by means of a chain 276 drives a sprocket 277 on the upper feed roll 265. A gear 278 secured to the upper roller 265 meshes with a gear 279 to drive the lower feed roll 265. Rigidly secured to the lower feed roll is a sprocket 280 which, by means of a chain 282 drives a sprocket 281 rigidly secured to one of the rollers 267, thereby driving the conveyor 266. This feeding mechanism is timed to feed a slip sheet immediately after a printed sheet has been delivered from the press to the stack S2.

To prevent waste of either sheets to be printed or slip sheets, it is desirous to provide an automatic control for both sheet and feeding mechanisms. To control the slip sheet feeding mechanism I employ a plunger 290 which is slidably mounted in a vertical slideway in the table 252 and is raised and lowered by a rock arm 291. A cam portion 292*a* of the bar 292 coacts with the rock arm 291 to cause the plunger 290 to be raised in a position which will raise the stack S3 to cause the stack to clear the slot 256 in the shaft 255, whereupon the feeding mechanism will fail to feed a slip sheet. The bar 292 is provided with a depending ear 294 which has a slotted opening 295 and normally reciprocates with the table 252. An arm 296 of a lever 297 normally slides idle in the slot 295. However, if the arm 296 is raised the forward movement of the table 252 will cause the lug 294 to engage the shoulder 298 of the arm 296 and will prevent the bar 292 from further movement forward (to the left in Fig. 14) whereas the table 252 will continue in its movement and carry with it the rock arm 291, which will be cammed about its pivot 291*a* in such a manner as to raise the plunger 290. If the arm 296 then returns to a normal position a rearward movement of the table 252 will cause the depending lug 294 to engage a shoulder 299 of the arm 296, thereby restraining the bar 292 from further movement to the right and the table 232, continuing in its movement, will withdraw the cam portion 292*a* of the bar 292 from contact with the rock arm 291 thereby permitting the plunger 290 to return to its normal position.

To raise and lower the lever 296 I provide the latter with an arm 300 which overlies a plunger 301 of a solenoid 302. The solenoid 302 may be energized by means of the contact 200 and the fingers 32 and 33 of the press and their associated mechanisms as shown in Figs. 8 and 9 and heretofore described in detail. In this instance, however, instead of the solenoid operating a vacuum valve, it serves to operate the plunger 290 as heretofore described and diagrammatically illustrated in Fig. 17.

It is evident that the foregoing control will operate to cause the slip sheet feeding mechanism to fail to function when the fingers 32 and 33 fail to receive a printed sheet from the press. This, therefore, prevents waste of slip sheets.

To complete the automatic control it is also desirous to automatically control the sheet feeding mechanism 30 which feeds the press with sheets to be printed. To accomplish this I prefer to cause the sheet feeding mechanism 30 to fail only when the slip sheet feeding mechanism fails to feed two consecutive sheets. I find that by so doing I obtain great efficiency from the press. However, it is contemplated that I may cause the sheet feeding mechanism 30 to fail upon a single failure of the slip sheet feeding mechanism, if so desired. To accomplish this I prefer to utilize the solenoid 217 and its associated mechanism as shown in Fig. 11 and heretofore described in detail. Rigidly secured to the shaft 263 of the slip sheet feeding mechanism is a pinion 310 which meshes with a gear 311 rotatably mounted on a stud 312 secured to the frame 250. The ratio of this gearing is such that the gear 311 will rotate once for every two revolutions, each

revolution of the gear 310 which rotates once for each revolution of the driving gear 18 of the press. Secured to the gear 311 and insulated therefrom, is a contact arm 313 which is electrically connected to a collector ring 314 on the hub of the gear 311. A brush 315 mounted on an insulating bracket 316 bears against the collector ring 315 and provides an electrical contact, by means of a wiring 316*a*, between the contact arm 313 of the gear and a contact member 317 which is carried by an insulating arm 320 rigidly secured to a shaft 319, mounted in the frame members 250. Rotatably mounted on a shaft 319 is a detector finger 305 which normally lies in the slot 306 of the table 305. In the normal operation of the feed table 252, a slip sheet will raise the paper detector 305 causing an arm 320 to break the contact between itself and the contact member 317.

It is necessary that the contact member 317 be energized only at stated intervals, and at such time that under normal operation conditions there would be a slip sheet on the table 316. To accomplish this I prefer to provide two contact members 325 and 326 which may be rigidly secured to a frame member 223 in such a manner that the arm 313 will make a contact with them once for each revolution of the gear 311.

When the arm 313 is in contact with the member 325, and there is no paper on the table 306, to cause the contact between the arm 320 and the member 317 to be broken, a circuit will be made through the arm 320 and member 317 to the arm 313 and thence through the contact 325 and wiring 330 to a solenoid 331, thence through wiring 332 to a battery 333, or other source of power, one terminal of which may be grounded as at 334. In this instance the solenoid 331 acts to raise a latch 340 releasing an arm 341 which contacts with a member 342. It will be noted that under these conditions the solenoid 217 is not affected. The solenoid 217 is on an independent circuit from that of the relay 331. The solenoid 217 is connected by means of wiring 345 to the arm 341 and if the arm 341 is in contact with a member 342 a circuit would be possible through wiring 346 to energize an arm 347. However, the arm 347 is out of contact with a member 348, causing a break in the circuit as the member 348 connects with the source of power by wiring 349 and both the source of power and the solenoid 217 are grounded for the return circuit. This condition is best illustrated in Fig. 18.

If the feeding mechanism should fail to feed two consecutive sheets the coil 217 will be energized. This condition is illustrated in Fig. 19. The feeding mechanism here has failed to deliver two consecutive sheets. The failure to deliver the first sheet has caused the arm 341 to contact with the member 342 as heretofore described. The failure to feed the second sheet, however, causes the arm 320, which is grounded, to contact with the member 317 and energize the arm 313 by means of wiring 316, as heretofore described. But in this instance the arm 313 will be in contact with the member 326, which by means of wiring 350 energizes a solenoid 351 which is joined by means of wiring 332 to the source of power 333. The energization of the solenoid 351 causes a latch 352 to release the arm 347 and permit it to contact with the member 348, thereby closing the circuit to the solenoid 217, causing the latter to raise the arm 205 thereby causing the feeding mechanism 30 to fail to function.

When the slip sheet feeding mechanism, after one failure or even two consecutive failures commences to feed again it is desirous to return the arms 341 and 347 to their normal or latched position in which position they are out of contact with the members 342 and 348 thereby opening the circuit to the solenoid 217 permitting the paper feeding mechanism 30 to function normally. This may be accomplished by means of a second arm 360 rigidly secured to the gear 311 and adapted to contact with members 361 and 362 which may be rigidly secured to the frame 250. Both members 361 and 362 are connected with a pair of solenoids 365 by means of wiring 362*a*. The solenoids 365 are so arranged that both of them will be energized by either the contact 361 or 362, and they are connected by means of wiring 363 and 332 to the source of power 333, one terminal of which may be grounded for the purpose of a return circuit.

When the slip sheet feeding mechanism functions normally and feeds a sheet of paper S4 (Fig. 20) to the table 306 the arm 305 is raised thereby breaking the contact between the arm 320 and the member 317 and making a contact between the arm 320 and a contact member 366. The member 366 is connected by means of wiring 367 to a suitable brush 368 which coacts with a collector ring 369 rigidly secured to the hub of the gear 301 and adapted to energize the arm 360 which at this time is in contact with the member 361. Hence a contact between the arm 320 and the member 366 may energize the solenoids 365. causing them to raise the arms 341 and 347 camming the latches 340 and 352 upwardly by reason of bevelled portions 370 and 371 of the latches and causing the arms to be engaged by their respective latches, thereby returning the entire circuit to a normal condition.

It is apparent from the foregoing description that I have provided paper feed mechanisms which are adapted for use with a printing press and which may be readily controlled, wherein one feeding mechanism may

be used to supply the press with sheets of stock to be printed and the second feeding mechanism may be used to supply slip sheets to a stack alternately with the printed sheets as the latter are discharged by the press. Such feeding mechanisms may be controlled by the failure of one or the other to function, that is, the slip sheet feeding mechanism may be controlled by the failure of the feeding mechanism which feeds the press with sheets to be printed, which of course, causes the press to fail to discharge the sheet. Likewise, the feeding mechanism which supplies the press with sheets to be printed may be caused to fail by reason of a failure of the slip sheet feeding mechanism. It is also evident that I supply a pair of feeding mechanisms both of which may be controlled by the failure or non-failure of the other feeding mechanism to function and by reason of such control I have provided a printing press feeding mechanism which is adapted for use on the ordinary printing press and permits great economy both in stock to be printed and in slip sheet material. By controlling the stock feeding mechanism by the failure or non-failure of the slip sheet feeding mechanism I greatly reduce the loss of printed sheets due to offsetting of the ink from a previously discharged sheet. By providing a slip sheet feeding mechanism which controlled by a failure of the press to discharge a printed sheet, economy results in that fewer slip sheets are required and that the stack of printed sheets and slip sheets discharged by the respective mechanisms contains no surplusage of slip sheets and is therefore more readily handled.

What I claim is:

1. In combination with a printing press, a sheet feeding mechanism adapted to feed sheets to the press, a sheet discharge mechanism associated with the press and a sheet associating mechanism adjacent the press and operating in timed relationship with the press and adapted to associate sheets alternately with the sheets discharged by the aforesaid discharge mechanism and in a path normal to the path of the sheet discharged by the first-named discharge mechanism.

2. In combination with a printing press a sheet feeding mechanism adapted to feed sheets to the press, a sheet discharge mechanism associated with the press, a sheet discharge mechanism adapted to feed sheets to a common stack alternately relative to sheets being discharged by said discharge mechanism, a sheet detector associated with one of said discharge mechanisms and means associated with said detector to cause the mechanism associated with the other discharge mechanism in its fail of function to feeding a sheet upon the failure of the first discharge mechanism to feed a sheet.

3. In combination with a printing press a sheet feeding mechanism adapted to feed sheets to the press, a sheet discharge mechanism associated with the press, a sheet stacking mechanism associated with the press adapted to stack the discharged sheets, a second sheet feeding mechanism for feeding sheets to the stacking mechanism alternately relative to sheets discharged by said discharge mechanism and a control means connecting the press, the associated discharge mechanism and both sheet feeding mechanisms whereby they are operated in synchronism.

4. In an apparatus of the class described a sheet feeding means, means adapted to change the character of the sheets fed by said feeding means including a sheet discharge mechanism, a second sheet feeding and discharge mechanism adapted to alternately discharge sheets to a common stack with the aforesaid discharge mechanism and a sheet detector associated with the first-named discharge mechanism and means associated with said detector to cause the last-named feeding mechanism to fail to function to feed a sheet.

5. In combination with a sheet feeding mechanism a printing mechanism to perform work on the sheets, a second sheet including a discharge mechanism feeding mechanism adapted to feed slip sheets to a common stack alternately with the sheets discharged by the work performing means and means responsive to the presence or absence of a sheet whereby a failure of either sheet feeding mechanism to function will automatically result in a failure of the other feeding mechanism.

6. In combination with a printing press a sheet feeding mechanism adapted to feed sheets to the press to be printed, a sheet stacking mechanism, discharge mechanism associated with the press adapted to discharge printed sheets to the stacking mechanism, a second sheet feeding mechanism controlled by the press and adapted to discharge slip sheets to the stacking mechanism alternately relative to the sheets discharged by press discharge mechanism and means associated with one of said mechanisms whereby a failure of the other discharge mechanism associated with the other feeding mechanism to discharge a sheet to the stack will cause an interruption in the feed of the former sheet feeding mechanism and means acting on the next cycle of operation dependent upon the discharge of a sheet by said discharge mechanism to automatically cause the former feeding mechanism to function.

7. In an apparatus of the class described a sheet feeding means, including a sheet discharge mechanism, means interposed between the feeding means and the discharge

mechanism adapted to change the character of the work, a second sheet feeding mechanism adapted to feed sheets alternately with the first-named discharge mechanism, a sheet detector associated with one of said discharge mechanism, and means including a solenoid adapted to be controlled by the detector, to cause a failure of one of said discharge mechanisms upon a failure of the other feeding mechanism to discharge a sheet.

8. In combination with a printing press a sheet feeding mechanism adapted to feed sheets to the press to be printed, discharge mechanism associated with the press adapted to discharge printed sheets to a common stack, a second sheet feeding mechanism operating in synchronism with the press, adapted to feed slip sheets to the stack of sheets, alternately relative to the discharge of printed sheets from the press and means associated with both of said feeding mechanisms whereby a failure of either mechanism to discharge a sheet to the stack will result in temporary interruption of the feed of the other sheet feeding mechanism.

9. In an apparatus of the class described a sheet feeding means, means adapted to perform work on the sheets fed by the aforesaid feeding means including a sheet discharge mechanism adapted to discharge sheets to a common stack, a second sheet feeding mechanism adapted to feed sheets to the stack alternately relative to sheets fed by the first-named discharge mechanism and means acting on each feeding mechanism responsive to the presence or non-presence of a sheet to cause a failure of either of said feeding mechanisms upon a failure of the other feeding mechanism to discharge a sheet and means acting on the next succeeding cycle of operation to cause the former discharge mechanism to discharge a sheet, said means being dependent upon the discharge of the sheet by the former discharge mechanism.

10. In combination with a printing press a sheet feeding mechanism adapted to feed sheets to the press to be printed, discharge mechanism associated with the press adapted to discharge printed sheets to a suitable stacking mechanism, a second sheet feeding mechanism controlled by the press adapted to feed slip sheets to the stack of sheets alternately relatively to the discharge of printed sheets from the press and means, responsive to the presence or absence of a sheet, associated with both of said feeding mechanisms whereby a failure of either mechanism to discharge a sheet to the stacking mechanism will cause the other sheet feeding mechanism to fail to feed a sheet and means acting on the next succeeding cycle of operation to automatically cause both feeding mechanisms to feed sheets.

11. In a printing mechanism including a plurality of sheet feeding mechanisms the combination of a printing press disposed between said mechanisms, means whereby the feeding mechanism and the printing press may be controlled to operate in synchronism with each other, and a control means associated with the feeding mechanism and the press, adapted to automatically cause a failure of one of the sheet feeding mechanisms, when the press fails to discharge a printed sheet or another feeding mechanism fails to feed a sheet and means acting to cause the other feeding mechanism to function on the next succeeding cycle of operation, said means dependent upon the presence of a sheet in the press discharge mechanism.

12. In combination with a plurality of sheet feeding mechanisms, a printing press including a sheet discharge mechanism disposed between said feeding mechanisms, means whereby the feeding mechanisms and the printing press may be controlled to operate in synchronism with each other, one of said feeding means being adapted to feed sheets to the press to be printed, another sheet feeding mechanism being adapted to discharge a slip sheet alternately relative to the discharge of printed sheets by the press, a control means associated with the feeding mechanisms and the discharge mechanism of press adapted to cause a temporary failure of the slip sheet feeding mechanism if the press should fail to discharge a sheet and automatically feed a slip sheet on the next succeeding cycle of operation, dependent upon the presence of a sheet in the press discharge mechanism.

13. In combination with a plurality of sheet feeding mechanisms, a printing press including a discharge mechanism, disposed between said feeding mechanisms, means whereby the feeding mechanisms and the printing press may be controlled to operate in synchronism with each other, one of said feeding means being adapted to feed sheets to the press to be printed, another of said sheet feeding mechanisms being adapted to discharge a slip sheet alternately relative to the discharge of printed sheets by the press, control means associated with each of said feeding mechanisms and the press adapted to automatically cause a failure of the slip sheet feeding mechanism when the press fails to discharge a sheet and to automatically cause the first named feeding means to fail when the slip sheet feeding mechanism fails to discharge a predetermined number of successive sheets.

14. In combination with a printing press, including a sheet discharge mechanism adapted to discharge printed sheets to a stack, a slip sheet associating mechanism adapted to discharge slip sheets to the stack between each printed sheet as the printed sheets are discharged by the press, and means including

a sheet detector associated with the press and a solenoid associated with the sheet associating mechanism and controlled by the presence or absence of a sheet in the press discharge mechanism whereby a failure of the press to discharge a printed sheet will cause an interruption in the operation of the slip sheet associating mechanism.

15. In combination with a printing press including a sheet discharge mechanism, adapted to discharge printed sheets to a stack, a sheet feeding mechanism adapted to feed sheets to be printed to the press, a sheet feeding mechanism adapted to feed sheets to the stack alternatively relative to sheets being discharged by the press, control mechanism adapted to cause the first-mentioned feeding mechanism to fail to feed a sheet to be printed to the press and a relay mechanism adapted to operate said control mechanism and responsive to a predetermined number of successive failures of the second-named feeding mechanism to feed sheets to the stack.

16. In combination with a sheet feeding mechanism means adapted to perform work on sheets fed by such mechanism whereby a plurality of sheets are in progress in such work-performing means, means comprising a pair of gripper fingers adapted to discharge sheets to a common stack, a second sheet feeding mechanism adapted to discharge sheets alternatively relative to sheets discharged by such first-named discharge means and means responsive to the presence or non-presence of a sheet in said gripper fingers to cause the last-named feeding means to fail to feed a sheet and wherein the presence of a sheet in said gripper fingers on the next succeeding cycle of operation will cause the last-named feeding means to function to feed a sheet.

17. In combination, a printing press, including a sheet discharge mechanism adapted to discharge printed sheets to a stack, a slip sheet associating mechanism adapted to discharge the slip sheet to the stack between each printed sheet discharged by the press and including discharge rolls and a pneumatic means adapted to remove the sheet from a pile and feed it to the roll, a valve controlling said pneumatic means, a solenoid adapted to operate said valve, and means responsive to the presence or non-presence of a printed sheet in said discharge mechanism adapted to cooperate with the solenoid associated with the sheet associating mechanism whereby a failure of the press to discharge a printed sheet will cause the valve to operate on a pneumatic means to cause an interruption in the operation of the slip sheet associating mechanism.

18. In combination with a printing press including a sheet discharge mechanism adapted to discharge printed sheets to a stack, a sheet feeding mechanism adapted to feed sheets to the press to be printed, a sheet feeding mechanism adapted to feed sheets to the stack alternatively relative to the sheets being discharged by the press, control mechanism adapted to cause the first-mentioned feeding mechanism to fail to feed a sheet to the press to be printed, a normally idle relay mechanism responsive to a failure of the second-named feeding mechanism, to feed sheets and adapted to operate said control mechanism when the feeding mechanism fails to feed a predetermined number of successive sheets, and means to restore said relay to a normal position when the feeding mechanism functions to feed a sheet before the predetermined number of successive failures is reached.

19. In combination with a printing press, including a sheet discharge mechanism adapted to discharge printed sheets to a stack, a slip sheet associating mechanism operatively controlled by the press adapted to discharge a slip sheet to the stack between each printed sheet discharged by the press, and means including a sheet detector associated with the press and a vacuum nozzle associated with the sheet associating mechanism whereby a failure of the press to discharge a printed sheet will cause an interruption in the operation of the slip sheet associating mechanism.

20. In combination with a plurality of sheet feeding mechanisms, discharge means associated with each sheet feeding mechanism adapted to feed sheets to a common stack, each discharge mechanism acting in timed relationship with each other to alternatively discharge sheets means responsive to the presence or absence of a sheet in each of said discharge mechanisms to cause a temporary interruption of the feeding mechanism associated with the remaining discharge mechanism.

21. The combination with a printing press a sheet feeding mechanism adapted to feed sheets to the press, a sheet discharge mechanism associated with the press, a second sheet feeding mechanism operating in timed relationship with the press and adapted to feed sheets alternately with the sheets discharged by the aforesaid discharge mechanism and means responsive to the presence or absence of a sheet in the press discharge mechanism to cause a failure of the second named feeding mechanism and means responsive to the presence or absence of a predetermined number of successive discharge sheets in the second named feeding mechanism to cause the first named feeding mechanism to fail to supply the press with sheets to be printed.

22. In an apparatus of the class described a sheet feeding means, a discharge mechanism, means interposed between the sheet feeding means and the discharge mechanism

adapted to perform work on the sheets fed by the aforesaid feeding means, a second sheet feeding mechanism adapted to feed sheets to a common stack alternately relative to the sheets discharged by the first named discharge mechanism, and means responsive to the presence or absence of a sheet in one discharge mechanism to cause a failure of one of said feeding mechanisms upon a failure of the other feeding mechanism to discharge a sheet.

In testimony whereof, I hereunto affix my signature.

WILLIAM H. GIBSON.