Dec. 19, 1944. D. P. SANFORD 2,365,294

SHEET FEEDER

Filed May 11, 1942 7 Sheets-Sheet 1

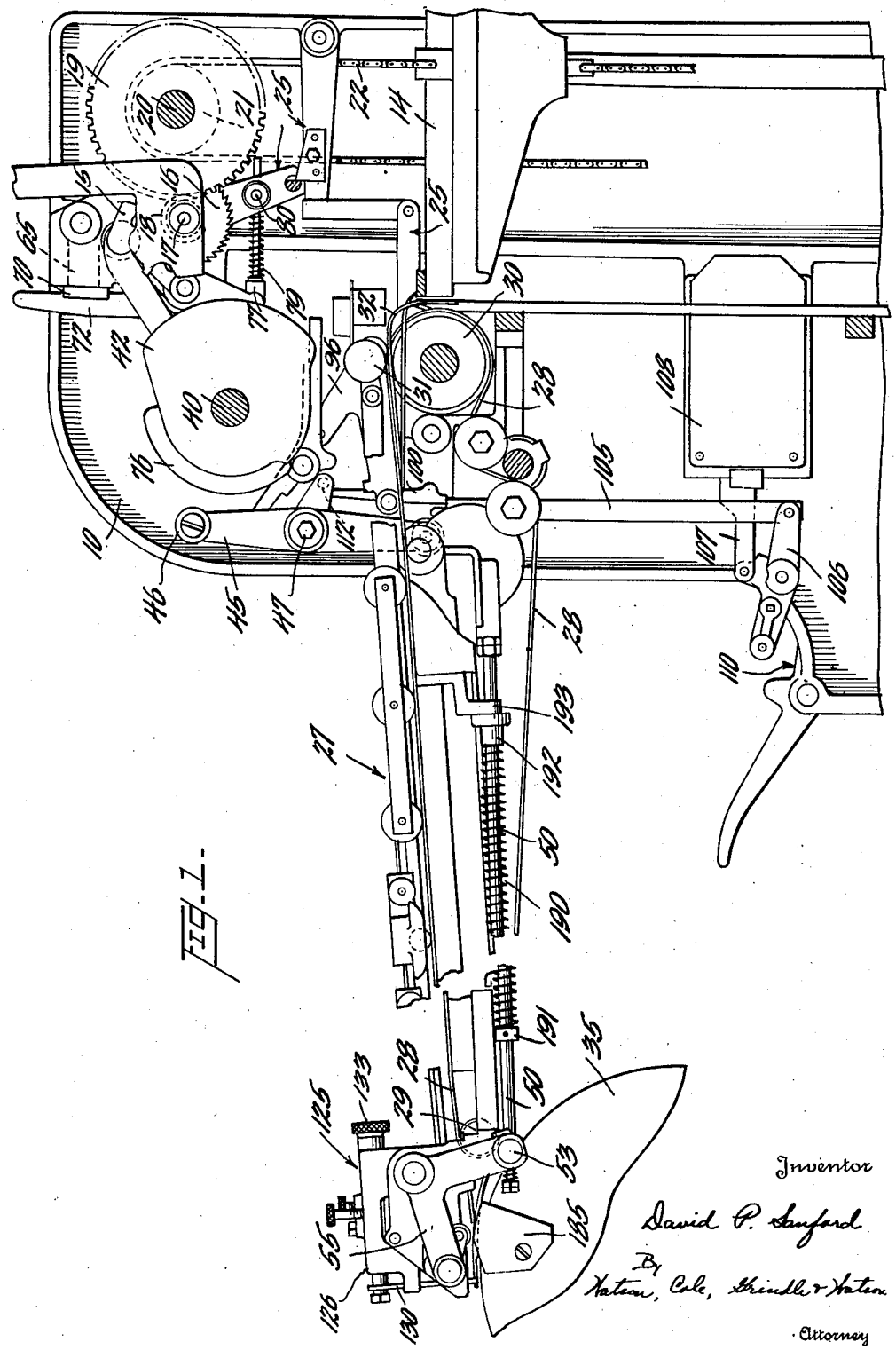

FIG. 1.

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SHEET FEEDER

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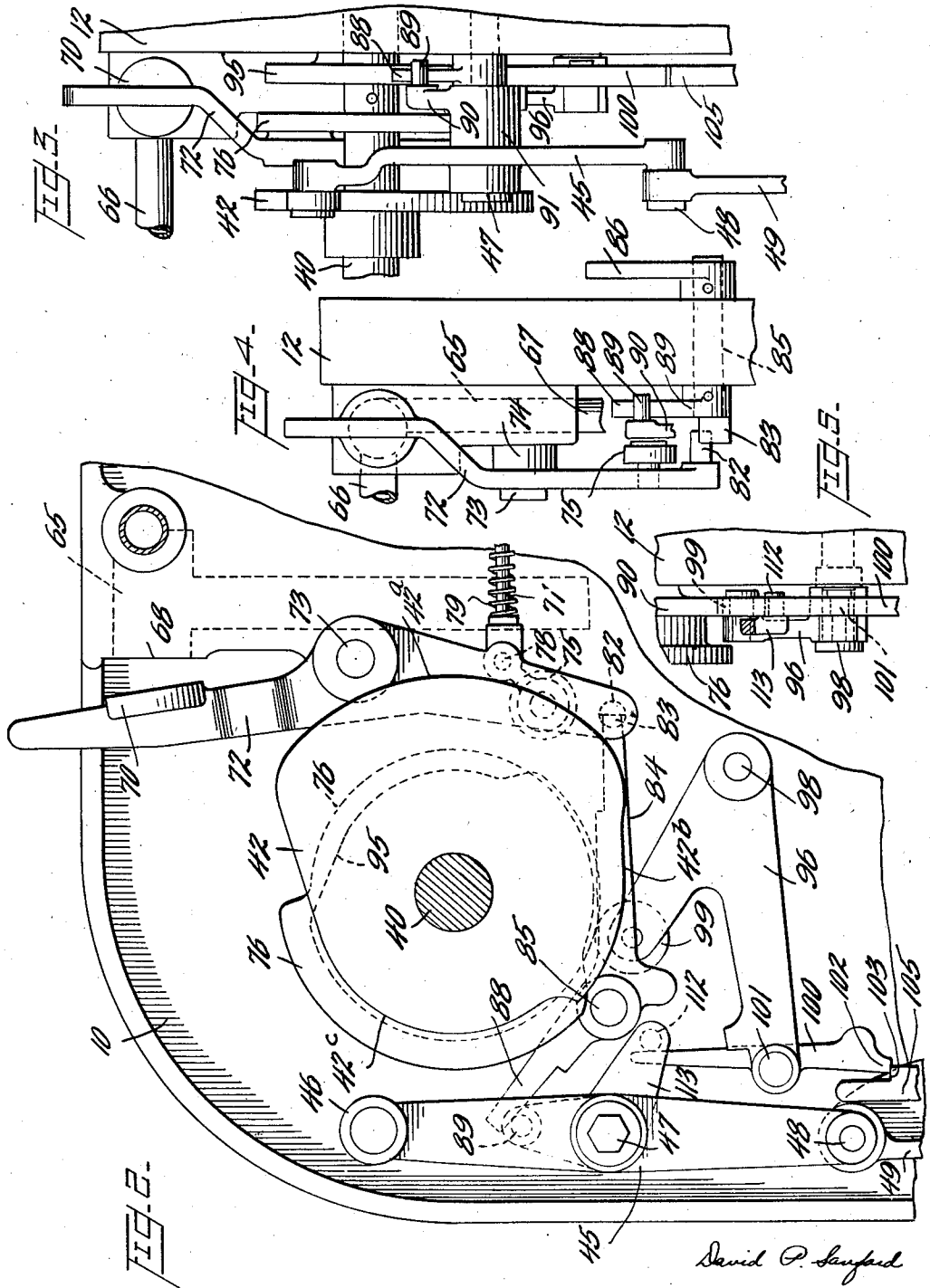

FIG. 2.

FIG. 3.

FIG. 4.

FIG. 5.

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SHEET FEEDER

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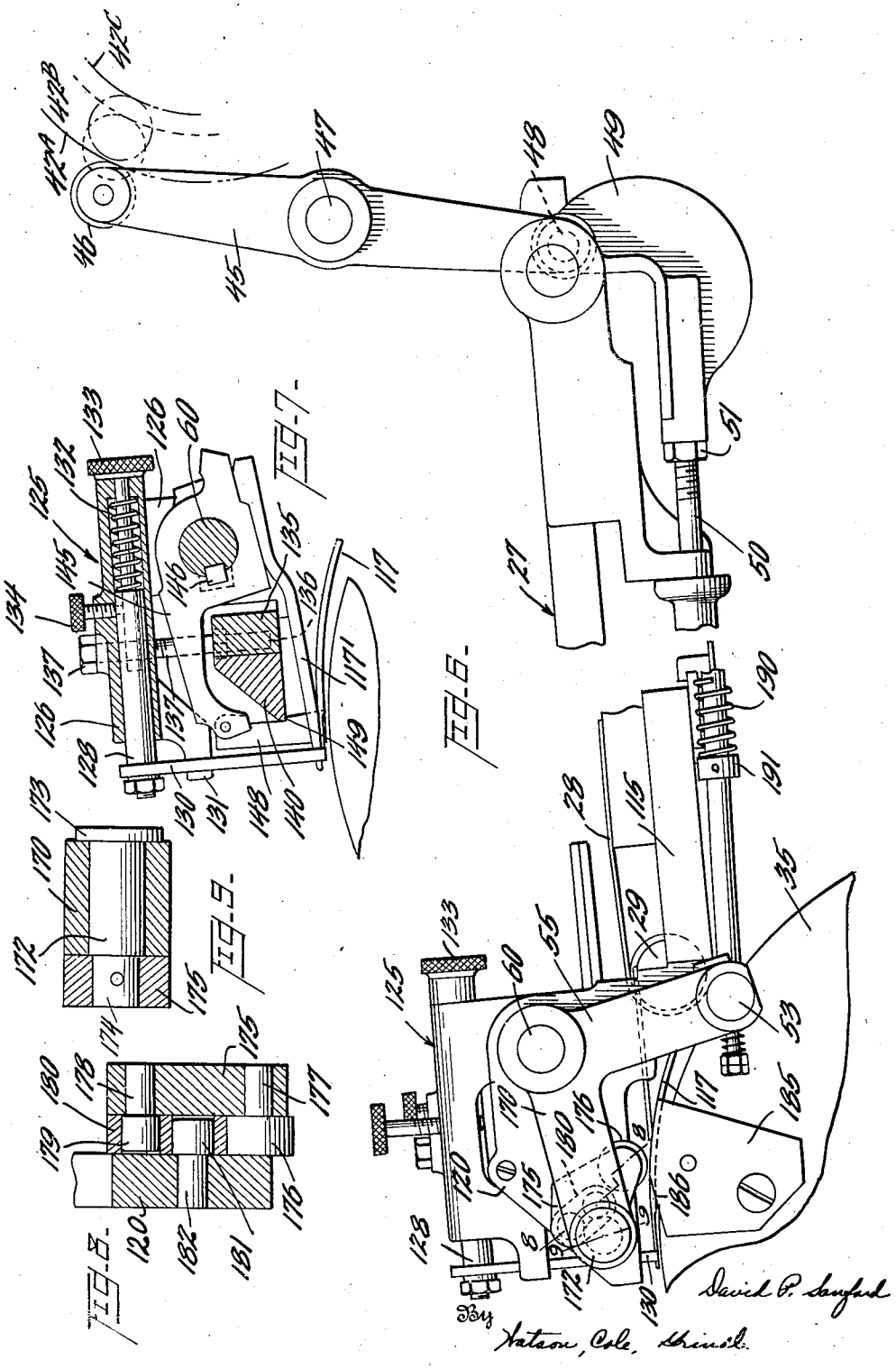

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SHEET FEEDER

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FIG. 10.

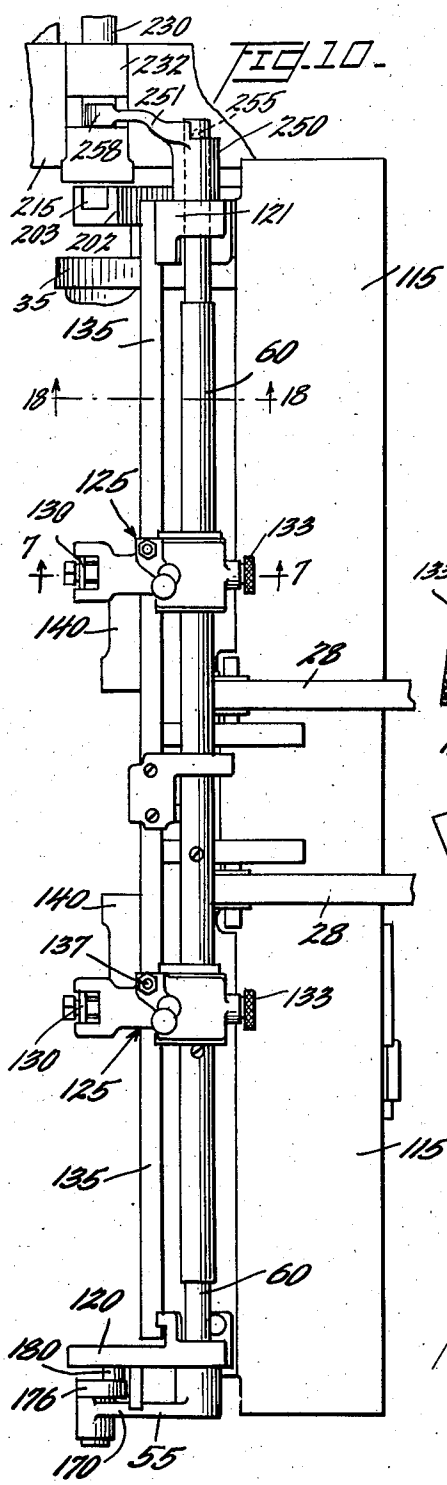


FIG. 11.

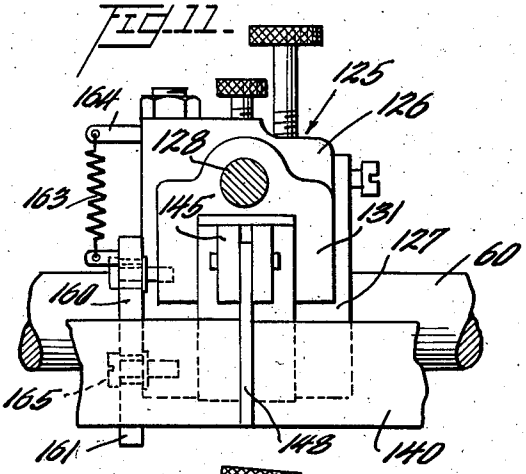


FIG. 12.

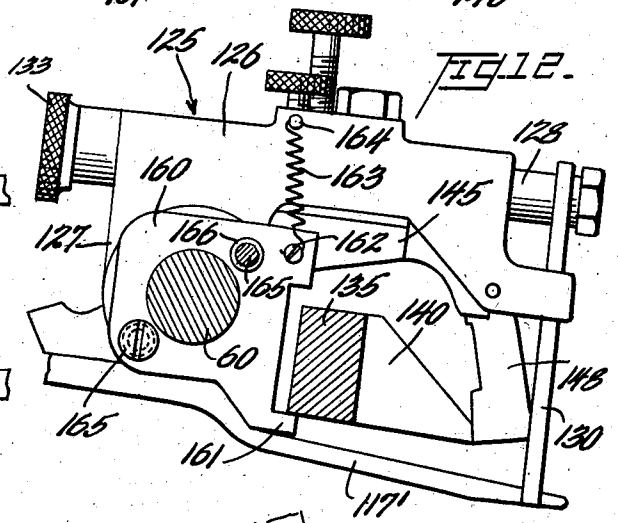


FIG. 13.

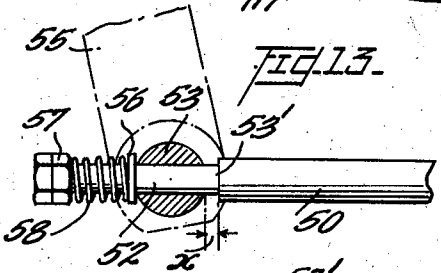
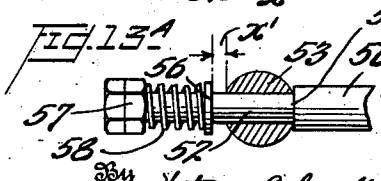


FIG. 13A.



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SHEET FEEDER

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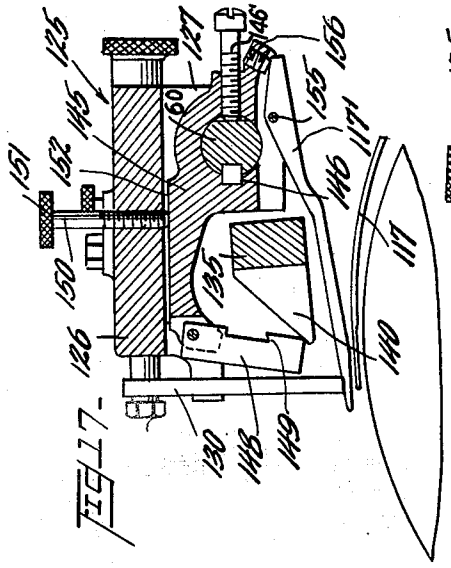

FIG. 17.

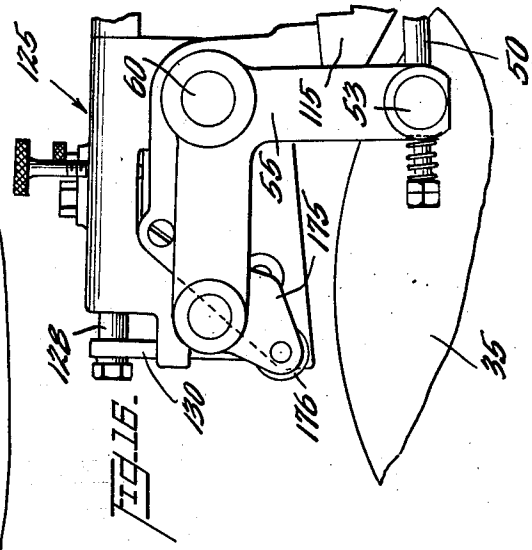

FIG. 16.

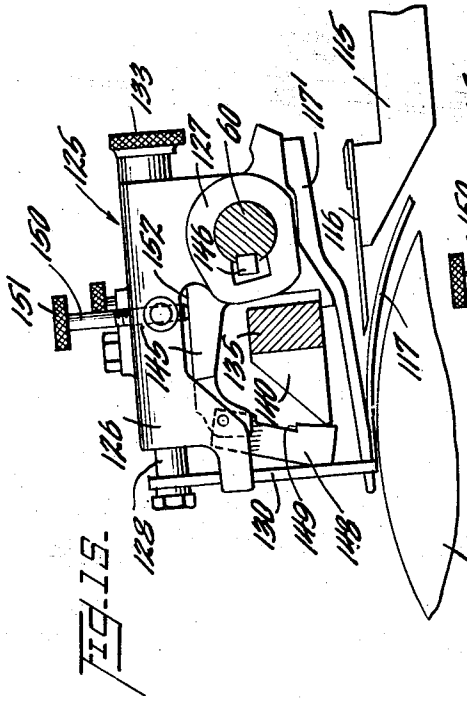

FIG. 15.

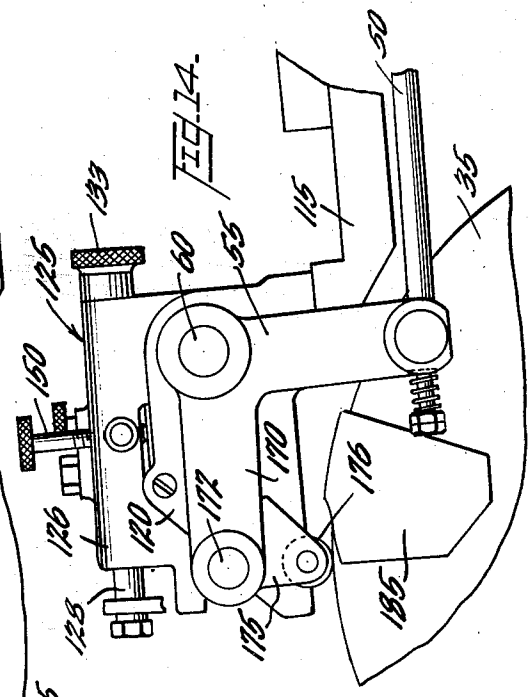

FIG. 14.

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SHEET FEEDER

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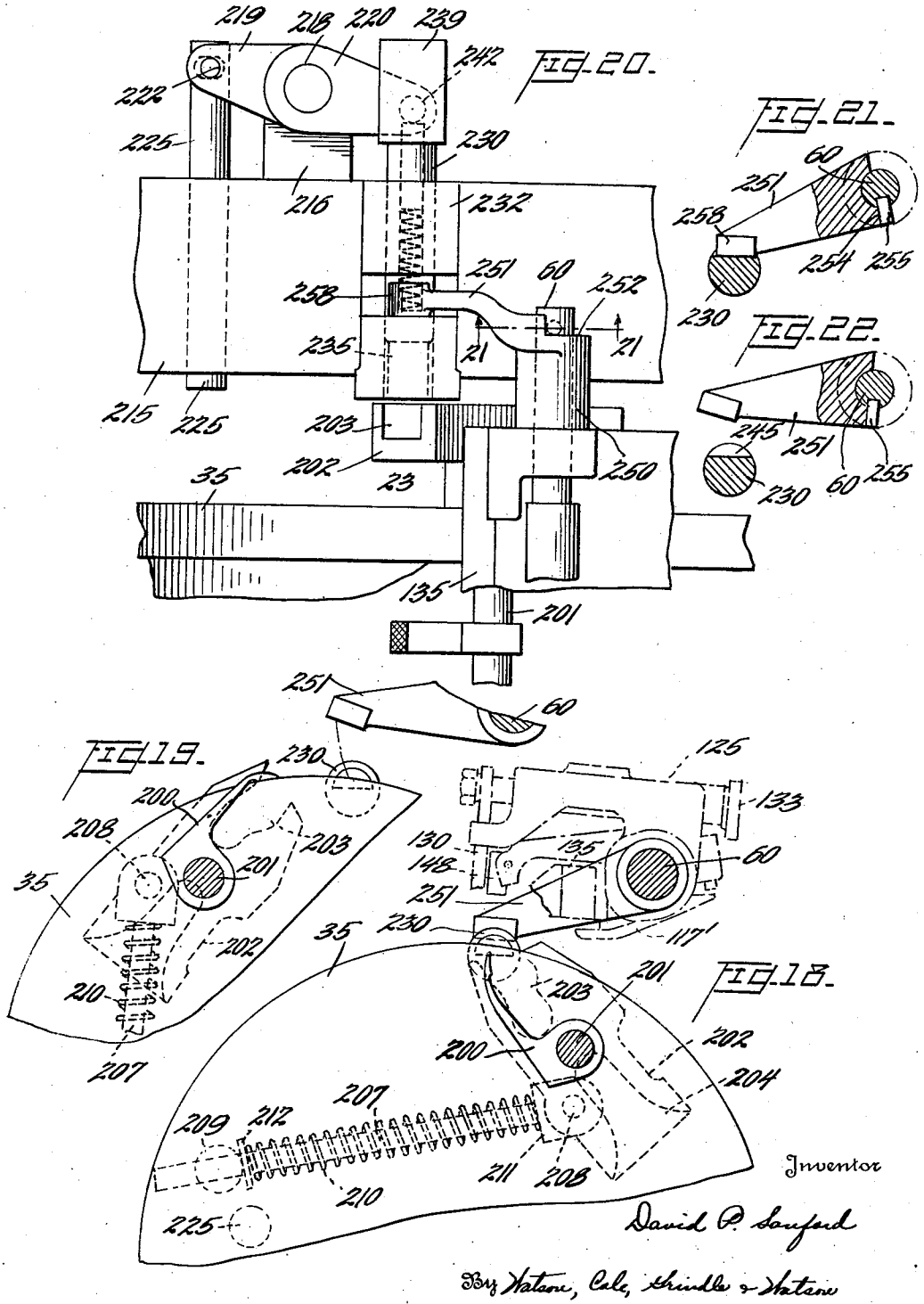

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SHEET FEEDER

Filed May 11, 1942 7 Sheets-Sheet 7

FIG. 23.

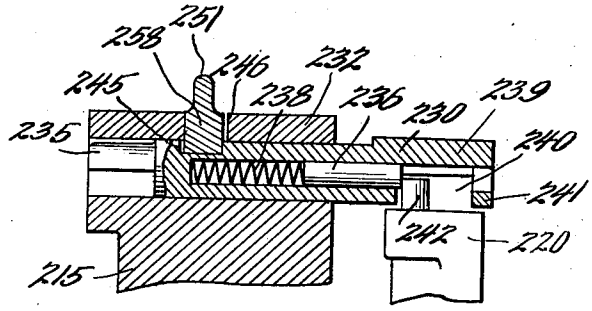


FIG. 24.

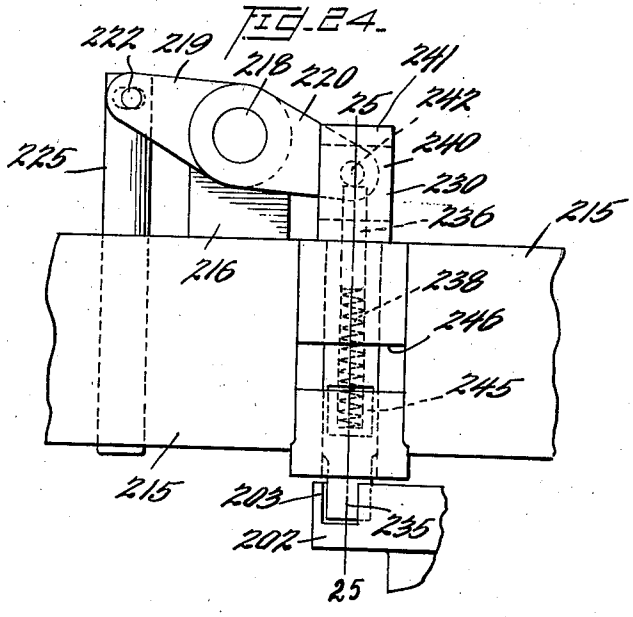
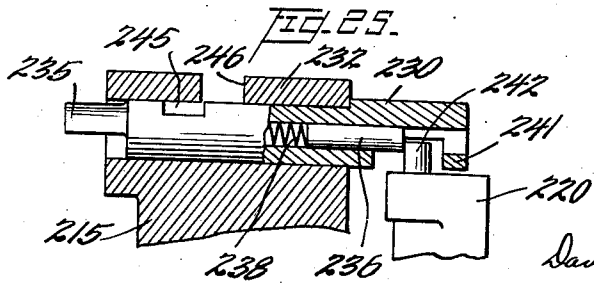


FIG. 25.



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Patented Dec. 19, 1944

2,365,294

UNITED STATES PATENT OFFICE

2,365,294

SHEET FEEDER

David P. Sanford, Elizabeth, N. J., assignor to American Type Founders Incorporated, Elizabeth, N. J., a corporation of New Jersey

Application May 11, 1942, Serial No. 442,490

32 Claims. (Cl. 271—56)

This invention relates to sheet feeding devices and more particularly to mechanism for controlling the feeding of successive sheets of paper or like material to a machine at the proper intervals determined by the cyclic operation of the machine to which the sheets are fed, and for effecting the suspension of the operation of both the sheet feeder and/or said machine, in the event that a sheet is not presented to the machine in the proper position and at the proper time during a cycle of operation.

The general object of the invention is the provision of a novel and improved combined sheet feed timing and sheet detector-interrupter mechanism of the type described and one which will be efficient and positive in its action, of simple and compact construction, and susceptible of application to various types of sheet feeding devices.

Although the invention may be made a part of sheet feeders of widely varying modes of construction and operation, and which can be utilized for forwarding sheets to different machines for treating or handling sheets, such as punching, folding, slitting, gluing, and wrapping machines or the like, it is illustrated and described herein for purposes of exemplary disclosure as forming a part of a suction sheet feeder of the type which forms the subject matter of United States Patent No. 2,263,891 in the name of the present applicant, such feeder being used in connection with a printing press having a rotary impression cylinder as the sheet carrying member of the printing couple. Also, as set forth in the specification of that patent, the sheets may be forwarded to their destination either in spaced sequence, or in overlapping relationship so as to effect what is known as stream feeding.

In feeding sheets to the impression cylinder of a printing press, whether of the single revolution or the two revolution type, it is necessary to provide means for momentarily halting the successive sheets at the front end of the feed board preparatory to their seizure by the cylinder grippers at the proper points during the printing cycle. This means not only detains the sheets until the proper instant of seizure by the grippers but also serves to correct the alignment of the sheets and register them before they leave the feed board. Conventionally, front stop gauges or drop guides are provided for this purpose. These guides are supported as a part of the ordinary cylinder or bed-and-cylinder press, and are actuated in synchronism with the opening and closing of the cylinder grippers and in accordance with the adjustment of the press for single revolution or two revolution operation.

Sheet detectors and interrupters have also been provided for stopping the sheet feeder and the press, and also for tripping the impression, when a sheet is not presented to the front or drop guides at the proper time. Reference is made to the United States Patent No. 1,469,515 to William M. Kelly for an exemplary disclosure of such a detector-interrupter arrangement.

The present invention, in its preferred embodiment, contemplates the provision of a combined drop guide and sheet detector mechanism, which is preferably carried by the feeder at the front end of the feed board and disposed in operative relationship to the impression cylinder of the press to be fed. Preferably the vertically swinging drop guide element and the associated pivoted detector member are disposed for rotation about the same horizontal transverse axis and are conveniently mounted upon the same cross shaft. The detector member carrying a freely pivoted latch element is adapted to be moved intermittently up and down, respectively out of and into the path of the sheets, by a cam or other instrumentality moving in synchronism with the operation of the feeder. The actuating mechanism has three different positions during its cycle, such as would be determined by three concentric levels of a driving cam. At one extreme position, the detector member is at its lowest point and the detector member and the drop guide member are so associated that the drop guide is also down in its sheet stopping and registering position at this time. In the normal intermediate position of the actuating mechanism, the interrupter member is raised from the plane of the sheets, but there is a lost motion connection which permits the drop guide to remain down in sheet holding position. In the opposite extreme position, the detector member is raised still further, and the drop guide is also then held up in its sheet releasing position for the passage of a sheet to the cylinder grippers.

The actuating mechanism embodies a trip device which is adapted to be moved by a cam or projection carried by the impression cylinder at a point adjacent its periphery and a predetermined distance from the cylinder grippers. When the trip device is disposed in the path of the projection and is struck by the cylinder cam, the actuating member moves the drop guide upward and allows the cylinder gripper to seize the sheet and remove it from the feed board.

The trip device is, however, disposed in the

path of the cylinder projection only during the intermediate position of the actuating mechanism. When the mechanism is in either extreme position, the trip device is held in an inoperative position beyond the orbit of the projection.

In a single revolution press, the driving cam for the actuating mechanism lowers the detector member and the drop guide into the path of the sheets and normally operates to release a sheet to the grippers by presenting the trip device to the cylinder projections once during each revolution of the impression cylinder. However, in the case of a press arranged for two revolution operation, the timing is such that the trip device is held in operative position only during alternate passages of the cylinder carrying the tripping projection or cam.

The presence or absence of a properly aligned sheet at the drop guides during the time the actuating mechanism is in its lowermost position, determines whether or not the press and feeder are interrupted. If, for some reason, no sheet is presented to the drop guides—or rather to the closely adjacent detector latch—the latch attaches the whole movable assembly to a fixed part of the feeder and not only prevents the actuating mechanism from returning to its intermediate position where the cylinder would trip the drop guide, but also causes other tripping devices to interrupt the operation of the feeder and of the press, and to trip the impression of the latter machine.

Two or more transversely spaced detector and drop guide devices are provided and this makes it necessary that each sheet be delivered squarely with its forward edge parallel with a line joining the drop guides, to prevent the tripping of the interrupter. Obviously, if only one of these gauges or guides were provided the sheet could be served to the press in a canted position, whereby it would not be seized by all of the cylinder grippers, and the free end of the sheet would then be crumpled or folded back and the increased thickness of this portion of the sheet would be apt to damage the form. Therefore, it is a further object of the invention to provide means for keeping the cylinder grippers open when the interrupter is tripped by the misalignment of a sheet, so that the forwardly extending corner of a crooked sheet will not be seized. Even though the press has been tripped by the other mechanism of the interrupter provided for that purpose, it frequently happens that the momentum of the press causes the cylinder gripper to seize the extended corner, pull the sheet through the drop guides, and carry it down to the form. All of these protective measures are comprised within the objects and purposes of the present invention.

It is a further object of the invention to provide a combined drop guide and sheet detector which includes a latching or stopping mechanism and which may be adjusted as a unit transversely of the feed board to accommodate sheets of various widths. In the preferred embodiment, this combined unit is mounted upon a single shaft and the various parts are so interlocked that they may be shifted along the shaft and secured in new positions without disturbing the relationship of the various parts, and with an absolute minimum of adjustment operations.

Other objects and features of novelty will be apparent from the following specification when read in connection with the accompanying drawings in which one embodiment of the invention is illustrated by way of example.

In the drawings:

Figure 1 is a view in vertical longitudinal section of the upper portion of a printing press sheet feeder embodying the principles of the invention;

Figure 2 is a fragmentary vertical longitudinal sectional view of a portion of the superstructure of the feeder proper;

Figure 3 is a detail view in front elevation of a portion of the feeder and control mechanism;

Figure 4 is a view similar to Figure 3 with certain of the control parts omitted for the sake of clearness;

Figure 5 is a further simplified view with parts shown in both Figures 3 and 4 omitted;

Figure 6 is a view in vertical longitudinal section of the left hand portion of Figure 1 on an enlarged scale, and showing most of the feed board supported elements in side elevation;

Figure 7 is a vertical longitudinal sectional view through the sheet guiding and detector mechanism at the left hand side of Figure 5, and taken substantially on line 7—7 of Figure 10;

Figures 8 and 9 are fragmentary views in transverse section taken on lines 8—8 and 9—9 respectively of Figure 6;

Figure 10 is a top plan view of the delivery end of the feed board showing the front stop and detector mechanisms;

Figure 11 is a view in front elevation of one of the drop guide and detector devices as viewed from the left hand side of Figure 10;

Figure 12 is a view in side elevation of the unit shown in Figure 11 with the transverse shaft and bar shown in cross section;

Figure 13 is a detail view in side elevation of a lost motion connection between the detector and drop guide rock arm and the longitudinal actuating shaft;

Figure 13A is a similar view showing the same parts in another position;

Figures 14 and 15 are views in side elevation and vertical longitudinal section respectively, of the stop and detector devices, corresponding to Figures 6 and 7 but showing the parts in a different position of operation;

Figures 16 and 17 are similar views showing the same parts in still another position;

Figure 18 is a vertical sectional view taken substantially on line 18—18 of Figure 10;

Figure 19 is a fragmentary view similar to Figure 18 but showing the cylinder grippers in a tripped position, as in normal operation;

Figure 20 is a fragmentary plan view similar to the upper end of Figure 10 but on an enlarged scale and showing in more detail the connection between the detector mechanism and the cylinder gripper controls;

Figures 21 and 22 are fragmentary detail views taken on line 21—21 of Figure 20 and showing two positions of the locking arm for the cylinder gripper controls;

Figure 23 is a detail view in vertical section taken on line 23—23 of Figure 20, the gripper actuating controls being in locked retracted position;

Figure 24 is a plan view of the controls similar to Figure 20 but with the element for actuating the grippers to seize a sheet projected into operative position; and

Figure 25 is a view similar to Figure 23 and taken on line 25—25 of Figure 24, and showing the parts in the same position as in the latter figure.

In Figures 1–5 inclusive of the drawings, there

is illustrated a sheet feeder such as that shown in Patent No. 2,263,891, but in which certain details of the control and operating means are shown in addition to the pile supporting elevator, forwarding tape conveyor and other of the mechanisms described in the prior patent. The upper portion of the side frames of the feeder are indicated at 10 and 12 respectively. In Figures 3, 4, and 5, the suction valve and other control mechanism are shown supported by the near frame member 12 instead of the further frame member 10 as in the larger views. The pile elevator is shown at 14 in an upper position, to which it has been brought by the step by step action of the cam operated pawl 15 upon the ratchet wheel 16. The ratchet wheel is mounted upon the shaft 17 which also carries the pinion 18 meshing with the gear 19 secured to the elevator shaft 20 upon which a cog-wheel 21 carrying the chain 22 is mounted. This step by step upward feed of the elevator is controlled by the mechanism indicated generally by the numeral 25 and which is described in detail in the applicant's above mentioned patent. The feed board installation is indicated at 27 and carries the usual hold down devices and the tape conveyor, the tapes 28 of which are carried around the forward and rearward pulleys 29 and 30 respectively. A drop roll 31 and sheet guiding members 32 are disposed so as to cooperate in forwarding the sheets from the feeder to the press, the impression cylinder of which is shown at 35.

As is usual in sheet feeders of this type, the vacuum and both the electrical and mechanical tripping mechanisms are intermittently actuated during the feeding cycles and between the successive transfers of the sheets from point to point so that the detector and interrupter devices may interpose themselves, in the event that no sheet is fed at a certain point, to prevent the next normal operation of these controls, and to positively actuate certain stopping and interrupting mechanisms which will be described. In order to obtain this alternation of these various devices in synchronism with the successive actions of the sheet feeder, certain cam members are disposed upon the same cam shaft 40 which serves to effect the intermittent actuation of the sheet separating and forwarding means of the feeder and the raising of the elevator, all as described in the patent to which reference has been made.

The first cam carried by the shaft 40, which will be described, is the one designated by the reference numeral 42 and which is designed to actuate the sheet detector and drop guide mechanism and to prepare the way for inhibiting the actuation of the other devices in the event the detector mechanism indicates the absence of a sheet. This cam is adapted to rock lever 45 by contacting the cam follower roller 46 carried by the upper end of that lever. The lever is pivoted to a fixed portion of the frame as at 47 and is connected at its lower end as at 48 with the hook-like connection head 49 of the substantially horizontal forwardly extending connecting or actuating rod 50. One end of this rod 50 is adjustably threaded into the connecting head 49 and locked in fixed position by means of a nut 51. The forward end of the operating rod 50 is diminished in diameter as at 52, and passes through a pin 53, pivotally carried by the lower end of a bell-crank lever 55. The formation of the narrowed portion 52 of the rod 50 produces a shoulder as at 53' (Figures 13 and 13A) and upon the other side of the pin 53 a washer 56 is loosely disposed upon the rod. A coil spring 58 of a definite normal length is placed between the washer 56 and the end nuts 57. The arrangement of the coil spring, washer 56, and shoulder 53' is such that there is provided a lost motion connection, the idle movement between the rod 50 and the crank 55 being of a length indicated at x and x' in Figures 13 and 13A. The reasons for this lost motion connection will be apparent as the description proceeds. The crank lever 55 serves as an operating member for both the drop guide and the detector mechanism and is fixed to the transverse actuating shaft 60 which extends across the front end of the feed board as clearly shown in Figure 10.

By means of mechanism under the control of this actuating shaft 60 as it is rocked by the means just described, the drop guides and interrupter devices are alternately raised and lowered to permit the passage of successive sheets during the normal operation of the machines and in synchronism with the printing cycles of the press. All of these devices which form essential parts of the present invention will be described in detail. However, it will be well to first set forth the feeder and press controlling means which are to be interrupted by the detector mechanism. The cam 42 is provided with three principal levels which yield three different well-defined positions for the lever 45 and the mechanism actuated thereby. The high level of the cam 42 is designated by the reference character 42A and the intermediate level by the reference character 42B, and the low level by the character 42C. The relative positions of the cam follower roller 46 when guided by these cam portions is shown diagrammatically in the upper right hand corner of Figure 6 of the drawings. It will be noted that in this figure and also in Figures 1 and 2 of the drawings, the roller 46 and the lever 45 are in the positions which they occupy when in contact with the level 42A, regardless of the position of the cam and other portions of the feeder mechanism in those figures. The positions of the detector and drop guide devices under the influence of the intermediate portion of the cam are shown in Figures 14 and 15 of the drawings; and the positions of these parts, under normal conditions of operation, under the influence of the lowest portion 42C of the cam, are shown in Figures 16 and 17 of the drawings. The operation of these parts will be apparent as the present description proceeds.

Adjacent one side wall 12 of the feeder frame, and located at an intermediate point in the suction line extending from the sheet separating and feeding devices (described in Patent No. 2,263,891) and the suction pump, is the suction chamber 65. A conduit leading to the sheet feeder head from this chamber is shown at 66 in Figures 3 and 4 and a similar conduit 67 connects the suction chamber with a suitable vacuum pump, not shown. The suction chamber 65 is provided with an opening 68 which is closed by means of the valve 70 when a sheet is being lifted from the pile and fed to the forwarding conveyors. At intervals between successive feeding operations, the valve 70 is removed from the opening 68 and the suction chamber 65 vented to the atmosphere. The valve 70 is carried by a rocking lever arm 72 which is pivoted as at 73 to the boss 74 which may be formed on the casing of the valve chamber 65, as clearly shown in Figures 2 and 4 of

the drawings. Beyond the pivot 73, the lower portion of the lever 72 is provided with a cam follower roller 75 which follows the cam 76, this cam having only two levels which serve to move the valve 70 alternately to open and closed position. The cam movement is opposed by a spring device which includes the rod 77 which is pivoted to the lever 72 as at 78 and is surrounded by the coil spring 79 which exerts expansive pressures between the shouldered portion of the rod 77 and a part 80 of the feeder control mechanism which is designated generally by the numeral 25 (see Figure 1). Thus it will be seen that the spring arrangement urges the valve toward closed position and is opposed by the cam 76.

The lowermost end of the lever 72 is provided with a projecting pin 82 which has a flat side formed thereon against which the squared end 83 of a rocking latch lever 84 is adapted to abut, under certain abnormal circumstances, in order to hold the valve in its open position to interrupt the vacuum line controlling the feeding of the sheets. This position of abutment is shown clearly in Figures 2 and 4 of the drawings. This latch lever is pinned to a transverse stub shaft 85 which passes through the frame 12 of the feeder device. To the outer end of the shaft 85 there is secured a manually operable arm 86 by which the latch lever 84 may be positively moved for certain purposes to be later described. The other arm 88 of the lever 84 extends diagonally upward as shown in Figure 2 of the drawings and terminates in the vicinity of the pin or projection 89 carried by the short arm 90 which moves with the lever 45 and may well be formed upon the same boss 91 which provides the pivotal point 47 for the main lever. This is most clearly shown in Figure 3 of the drawings. It may be mentioned briefly at this point that whenever the main control lever 45 occupies the position shown in Figures 1, 2, and 6 of the drawings, that is as would be effected by the high level 42A of the control cam, whether during the intermittent movement to this position between feeding impulses or when it is latched by the detector-interrupter, the valve 70 is retained in open position by the lever 84 which is urged to this latching position by the pressure of a spring (not shown) and is permitted to move to this blocking position by the movement of pin 89 toward the left in Figure 2. Then, if the control lever 45 is free to move back, following the levels 42B and 42C of the cam, the pin 89 moves against the end 88 of the lever 84 and displaces the opposite end 83 from the pin 82 and permits the spring device 77—80 to close the valve 70.

For controlling the impression throw-off of the printing press by means of the detector-interrupter and for opening the switch controlling the power supply to the feeder or the printing press or both of them, the following means are provided. Another cam 95 is carried by the cam shaft 40, this cam being for the purpose of rocking a bell crank lever 96 which is pivoted to the frame 12 as at 96. The upper arm of the bell crank 96 carries the roller 99 which follows the cam 95 whereby the crank 96 is given an oscillating movement in a vertical direction. The lower longer arm of the crank 96 carries a pawl or latch member 100 which is pivotally mounted as at 101.

When the main control lever 45 is in the position shown in Figure 2, the latch or pawl 100 has its lower end 102 resting upon the shoulder 103 near the upper end of the vertically extending bar 105. As shown in Figure 1 of the drawings the bar 105 is pivoted to a multiple rock arm 106 to which a pawl 107 is connected. This pawl is arranged in conventional manner to trip the switch 108 to stop the sheet feeder (and the press also, if desired) and is also arranged to actuate mechanism of conventional type, part of which is indicated generally at 110, for tripping the impression of the press.

During normal operation, the cam 95 swings the lever 96 which carries the pawl 100 intermittently up and down and the downward movement of the lever occurs shortly after the main control lever 45 leaves the upper level of the control cam 42. Under these conditions the pin 112 carried by the arm 113 which stems from the same boss or hub 91 as the lever 45 and the arm 90, moves against the right hand side of the upper end of the latch 100, as viewed in Figure 2, and prevents the toe 102 of the pawl 100 from contacting with the shoulder 103 of the bar 105, and the impression and switches are not tripped. If, however, the control lever 45 is latched in the position shown in Figure 2, by means of the detector-interrupter mechanism to be described, the toe 102 of the pawl is permitted to descend upon the shoulder 103 of the bar 105 upon the next downward movement of the bell crank 96, which will immediately trip the switch 108 and actuate the impression throw-off 110.

It will be readily seen from the foregoing description that upon the normal swinging operation of the control lever 45 by means of the cam 42, the valve 70 will be intermittently opened and closed permitting the vacuum or suction devices of the feeder to operate in normal sequence, and the lever or crank arm 96 will move idly up and down without tripping the throw-off mechanism. Whether or not the valve is latched in open position as shown in Figure 2 and the pawl 100 tripped to actuate the throw-off bar 105, is dependent upon the latched position of control lever 45. It will be seen from Figure 2 that the main control cam 42 has left the lever 45 which must obviously have been latched by the detector-interrupter devices and the parts are therefore shown in this figure in their tripped or interrupted position. The valve 68 is open to the atmosphere and the crank 96 has descended or is descending to move the bar 105 to trip the driving mechanisms.

The novel drop guide and detector-interrupter devices which control the passage of successive sheets from the feed board to the press, and which determine whether or not the control lever 45 is allowed to oscillate normally, will now be described. In this connection particular reference will be made to Figures 6, 7, and 14–17 inclusive for an explanation of the operation of these devices. Referring now more particularly to Figures 6 and 10 of the drawings, it will be seen that at the forward end of the feed board 27 there is disposed a transverse bracket or table 115 from which a feed board extension plate 116 (Figure 15) projects tangent to or very slightly above the cylinder bearers of impression cylinder 35 when off impression. Also carried by the forward end of the feed board assembly are the tongues or strips 117 upon which the sheets are guided to the point where they are to be seized by the cylinder grippers. At one end of the front plate or table 115 of the feed board there is secured a fixed bracket 120 and at the other end another bracket

121 in which the transverse rock shaft 60 is supported for oscillation. As previously indicated, there is secured to one end of the rock shaft 60 the bell crank 55 to the lower arm of which is connected the actuating rod 50.

At adjustably spaced points across the front end of the feed board and carried by the rock shaft 60 are at least two combined drop guide and detector units which are designated generally by the reference numeral 125. The drop guide portion of this assembly will be described first. This device comprises a rocking member 126 which may be formed of a single casting and is provided with perforated, spaced, downwardly extending ears 127 which are freely rotatably and slidably mounted on the rock shaft 60. The drop guide element 126 extends forwardly and is provided with a cylindrical bore which is adapted to receive the shaft 128 upon the feed end of which is bolted the downwardly projecting drop guide plate 130. Spaced arms 131 extend downwardly and forwardly from the member 126 and serve to prevent rotation of the plate 130. The rod 128 is adjustable forwardly and rearwardly against the pressure of the spring 132 by means of the knob 133 and may be secured in fixed adjusted position by means of the set screw 134.

The lower end of the drop guide plate 130 is normally disposed below the level of the sheet guiding tongues 117 and thus serves to stop the forward edges of the sheets and hold them until it is actuated to release the sheets to the cylinder grippers.

Slightly forwardly of the front edge of the table or plate 115 is disposed the transverse fixed bar 135 and this bar is provided with inserted abutment pins 136 against which the lower end of an adjustable bolt 137 may strike to determine the lowermost position of the drop guide. This arrangement is most clearly shown in Figure 7 of the drawings. At spaced intervals along the bar 135, and adjacent the units 125 are formed forwardly projecting wedge-shaped latch blocks 140, which are elongated in a direction transverse to the path of the sheets.

The detector portions of the assemblies 125 comprise the detector arms 145 which are keyed to the rock shaft 60 between the ears 127 of the drop guides as at 146 (see Figures 7, 15, and 17) and secured by means of the set screws 146' at adjusted positions along the shaft in accordance with the width of the sheets being fed. The forward end of the detector arm 145 is split to receive the pivoted latch 148 which in its lowermost position is disposed in the pathway of the sheets across the tongues 117 and immediately in advance of the drop guide plate 130 as shown in Figure 7. The latch element is provided with a hooked portion or shoulder 149 which when it is in its lowermost position rests beneath the forwardly projecting nose of the latch block 140 as clearly shown in Figure 7. Since the detector arm 145 is disposed between the ears 127 of the drop guide and directly beneath the drop guide arm 126, the upward and downward movement of the detector arm serves to control the similar rocking movement of the drop guide. An adjustable screw 150 provided with a knurled head 151 is threaded through the member 126 and the lower end of the screw is adapted to abut the upper flat surface 152 of the detector arm 145. When the detector arm 145 is moved to its lowermost position as shown in Figure 7 of the drawings and when it is in its position indicated in Figure 15 of the drawings, the drop arm 126 is in its lowermost position as limited by the contact of the parts 136 and 137. However, when the detector arm 145 is moved to its extreme uppermost position shown in Figure 17, the surface 152 contacts with the lower end of the screw 150 and moves the drop guide arm 126 upwardly out of the way of the sheets passing to the cylinder.

An upper hold-down tongue 117' is pivoted as at 155 to the detector arm 145 and adjusted by means of the set screw 156 to a position in which it is allowed to bear lightly upon the sheets as they are fed to the front stop guide, but it is adapted to be moved upwardly a slight distance when the parts are in their uppermost position as shown in Figure 17.

Referring now more particularly to Figures 11 and 12 of the drawings, it will be seen that means are provided for urging the drop guide member 126 downwardly toward the lowermost position where the drop guide plate 130 prevents the passage of a sheet. This means includes a flat plate 160 which is provided with a circular opening through which the shaft 60 passes. This plate has a foot 161 which extends under the bar 135. A pin 162 on this plate is connected by means of the spring 163 to a pin 164 secured on the drop guide arm 126. This spring thus insures that the drop guide arms return to the position shown in Figures 7 and 15. The plate 160 is attached to the drop guide arm extension 127 by means of the headed studs 165, these studs being threaded into the arm 127 but having a certain clearance with the margins of the openings 166 in the plate 160 through which they pass. This permits the arm 126 to rotate about the shaft 60 relatively to the plate 160, and of course the plate 160 is moved along with the unit 125 whenever the unit is adjusted along the shaft 60 to accommodate sheets of differing widths.

One of the more essential novel features of the present invention will now be described. This involves the means for enabling the impression cylinder itself to trip the drop guides to permit the passage of a sheet, only when a sheet is presented to the guides at the proper time and its presence detected by the detector device. At the forward end of the upper arm 170 of the bell crank 55 there is provided a stud 172 which has a head 173 and is rotatably carried by the arm. A smaller extension 174 of the stud 172 is pinned to an arm 175 of general quadrilateral shape. This arm is provided upon one of its extensions with a cam roller 176 carried upon a pin 177 (see Figures 6, 8, and 9). At another portion of the arm 175 a pin 178 is secured, which pin has an extension 179 rotatably received within an opening in one end of a short connecting link 180. The other end of this link is pivotally mounted on the end 181 of a pin 182 which is rigidly supported by the fixed bracket 120 disposed at one side of the forward end of the feed board.

Rigidly carried by the impression cylinder 35 at one side thereof is the drop guide tripping cam plate 185, having a gradually inclined approach surface 186 which is adapted to strike the cam roll 176 when that roll is lowered into the path of the slope 186 and raise the roll together with the cranks by which it is supported, to rock the shaft 60 and thus the drop guides 126 and permit the passage of a sheet just in time to be seized by the cylinder grippers.

When the parts are in the position shown in Figures 6 and 7, either one of two conditions prevail, that is, when applied to a two revolution press. In one of these conditions the detector-

interrupter has latched the parts in an off position so that the cam plate 185 will not contact the roller 176, and this is due to the functioning of the detector in the absence of a sheet. Under the other condition, the same position of parts will prevail, but this is during the idle or return revolution of the impression cylinder and the parts are held in this position, not by the latch 148, 140 but by the high level 42A of the operating cam. This also, of course, prevents the tripping of the drop guide by the cam plate 185.

Now, during the normal operation of the device, assuming that the sheet has been properly fed against the drop guide plate 130 and has moved the latch 148 forwardly from beneath the latch block 140, the roller 46 of the control lever 45 moves down on the intermediate level 42B of the control cam. Then the spring 190 which is compressed between the collar 191, pinned to the rod 50, and the abutment 192 forming a part of the guide bracket 193 for the rod, urges the roller 46 to follow the cam and moves the rod 50 to the left as viewed in Figure 6. The slack or lost motion indicated by x in Figure 13 is then taken up and the shoulder 53' abuts the pin 53, and the parts are in the position shown in 13A where the slack or lost motion spacing is at x' on the opposite side of the pin. This movement rocks the crank 55 in a clockwise direction and moves the lever arm 175 downwardly so that the roller 176 is disposed in the path of the cam plate 185. The rocking of the shaft 60 also raises the detector arm 145, together with the latch 148 which has been freed from the overhanging latch block 140 by the contact with the sheet and this movement continues until the approximate point where the top surface 152 of the arm 145 abuts the screw 150. This is the position the parts occupy when the cam 185 is approaching the roller 176 prior to the point when the sheet is to be seized by the cylinder grippers and near the beginning of the printing revolution. When the cam plate 185 strikes the roller 176, the roller, together with its arm or bracket 175, is swung toward the left as seen in Figure 16 and the bell crank 55 is rotated further in a clockwise direction and through its rigid connection with the shaft 60 and the detector arm 145 moves these parts in the same direction. Since contact has already been made between the surface 152 and the screw 150 this further movement of the parts carries with them the drop guide body 126 and raises the plate 130 high enough to permit the passage of a sheet as clearly shown in Figure 17 of the drawings. This additional movement effected by the rotation of the impression cylinder is accomplished rather suddenly and while the rod 50 is still in its intermediate position. This causes the slack or lost motion space x' to be taken up and the space transferred to x on the opposite side of the pin 53. However, almost immediately following the tripping of the drop guides by the cam plate 185 on the cylinder, the roller 46 of the control lever 45 has moved to the right (Figure 6) while traversing the lowest level 42C of the control cam and the rod 50 is shifted further to the left under the influence of the springs 190 and the parts are maintained in their uppermost position which they occupy in Figures 16 and 17, until the entire sheet has been transferred from the feed board by the cylinder grippers. Then prior to the movement of the next succeeding sheet to the delivery point of the feeder at the front guides, the parts are again shifted to the positions they occupy in Figures 6 and 7, by the high level 42A of the cam again acting on the control lever 45. It will be apparent from the foregoing detailed descriptions that the detector devices, of which there are two or more spaced apart transversely of the forward edge of the feed board, will interrupt the feeding and the operation of the press whenever any one of the detector latch fingers is allowed to be detained by the latch block 140. Therefore, the protective device is not only operative whenever no sheet is fed at the proper time of rotation of the cylinder, but also in cases where a sheet is improperly fed through misalignment transversely of the feed board.

As a corollary to the last-named function and operation of the device comprising the present invention, further mechanisms are provided for preventing the cylinder grippers closing upon the projecting corners or advanced edge portion of a crooked sheet, and thus carrying a crumpled or folded sheet through the printing couple, with resultant damage to the form. Normally, alternately projected elements are operative adjacent one margin of the impression cylinder to actuate the cylinder gripper tumbler to snap the grippers into contact with the forward edges of the sheets simultaneously with the raising of the front or drop guides, and to actuate the gripper tumbler in the opposite direction to release the grippers upon delivery of a sheet during alternate revolutions of the cylinder. The mechanism about to be described is associated with the rock shaft 60 of the detector-drop guide assembly and serves to block the tumbler actuating pin upon failure of proper feeding. The grippers are thereby prevented from closing at all whether no sheet is presented or a canted or misaligned sheet is presented to the guides.

Referring more particularly to Figures 10 and 18–25 inclusive of the drawings, it will be seen that the impression cylinder 35 is provided with the conventional set of cylinder gripper fingers 200 which are mounted on the gripper shaft 201, these devices occupying a cut-away segment of the cylinder. The shaft 201 is mounted for rocking movement within bearings carried by the cylinder and carries upon its outwardly projecting end a tumbler member 202 by which the grippers are alternately thrown into operative and inoperative position. The tumbler member 202, together with its associated devices, is very similar to the corresponding parts of the patent to Stobb No. 2,184,725 of December 26, 1939, the tumbler being provided with slots 203 and 204 which open in opposite directions, the slot 203 being adapted to receive the actuating pin for throwing the tumbler into gripper closing position, and the slot 204 arranged to receive another pin or projectable element for throwing the tumbler into gripper releasing position. A rod 207 is pivoted to the tumbler member as at 208 and is arranged to slide through an opening in a pin 209 carried by the cylinder 35. A coil spring 210 surrounds the rod 207 and is compressed between the shoulders or seating portions 211 and 212 so that it biases the tumbler toward its extreme positions and causes it to operate with a snap action.

As clearly shown in Figure 20 the tumbler 202 operates in the space between one end of the cylinder 35 and the cylinder bearing housing 215. Supported by a suitable bracket 216 is a rock shaft 218 carrying a crank arm 219 at one end

and another crank arm 220 at the other. The crank arm 219 is pivotally connected as by means of the pin and slot connection 222 with one end of a pin 225 which is slidably mounted within an opening in the cylinder bearing housing 215. A second pin 230 is slidably mounted within an extension 232 of the housing 215. This pin is provided with a semi-cylindrical projecting end 235 which is adapted to engage and actuate the cylinder gripper tumbler and is for the greater part of its length provided with a cylindrical bore in which a pin 236 may reciprocate while under the influence of the expansive force of the coil spring 238. The inner end 239 of the pin 230 is somewhat enlarged and it is cut away upon one side as at 240, the overhanging portion 241 providing an abutment for engagement by the pin 242 carried upon the end of the crank 220. The outer end of the spring-pressed pin 236 extends into the cut-away portion 240 and is adapted to be retracted by the pin 242 under certain conditions of operation.

Under normal operation of the press and feeder, the end 235 is in its outwardly projected position, as shown in Figures 24 and 25 of the drawings, when the mouth of the slot 203 approaches the pin whereupon the end of the pin enters the slot and causes the tumbler to move from the position shown in Figure 18 to the position shown in Figure 19 whereupon the sheet is gripped and carried through the press. At a certain point during subsequent rotation of the cylinder a cam device (not shown) of conventional structure and arrangement strikes the end 235 of the pin 230 causing it to move through the housing 232 so that the spring-pressed smaller pin 236 rocks the crank 220 outwardly, rotating the shaft 218 and causing the crank 219 to project the other pin 225 through its opening in the housing 215 and positioning its outer end so as to enter the slot 204 of the tumbler and release the grippers at the proper point for delivery of the printed sheet. Then, preparatory to again receiving a sheet, a cam device strikes the projecting end of the pin 225, reverses the movement of the cranks 219 and 220 and pressure of the pin 242 upon the spring-pressed pin 236 causes the tumbler actuated pin 230 to again project to an operative position to cause the grippers to close. This alternating cycle of movement continues so long as normal feed of the sheets is maintained.

The upper surface of the tumbler actuating pin 230 is kerfed or slotted as at 245 and the housing 232 is also kerfed as at 246, these kerfs being in registry when the pin 230 is in retracted position as shown in Figures 20 and 23.

As clearly shown in Figures 20, 21, 22 and 23 of the drawings a sleeve 250 carrying a locking arm 251, is rotatably mounted upon the end of the rock shaft 60 opposite to that at which the operating bell crank 55 is secured. The sleeve 250 is semi-circularly cut away adjacent its outer end as indicated at 252 to provide a shoulder 254 upon the lower side thereof, against which a pin 255 secured to the shaft 60 may abut. The outer end of the lock arm 251 is provided with a squared foot portion 258 which is adapted to enter the kerf 246 of the housing 232 and in certain positions of operation of the pin 230 it may also enter the kerf 245 of this pin and lock it against projection and thus prevent the actuation of the tumbler.

During normal operation of the press, the rock shaft 60 will oscillate together with the crank 55 and rod 50 under the influence of the action of the cam 42 on the lever 45. The arrangement of the lock arm 251 is such that as the shaft 60 rocks, the pin 255 presses aaginst the shoulder 254 and moves the latch arm 251 alternately into and out of the kerfs 245 and 246. The removal of the latch arm from the kerfs is synchronized with the projection of the pin 230 to control the grippers. However, when one or more of the detectors remain latched, the shaft 60 does not rotate and the lock arm 251 remains within the kerf 245 of the pin 230. Then, upon the next operative movement of the crank 220 when the pin 225 is cammed, the pin 236 will be forced inward against the pressure of the spring 238, but the main tumbler actuating pin 230 will not be projected. Thus, the next actuation of the grippers 200 will not take place and the grippers will be prevented from closing upon the unoccupied blanket of the cylinder or upon any portion of a canted or misaligned sheet. It will thus be seen that not only does my improved detector and front guide mechanism serve to interrupt the feeder and throw off the impression, but also prevents the cylinder grippers from closing and thus prevents damage to the operating portions of the press.

Although the operation of certain parts of the device has been indicated as the construction of these elements has been described, it will be well to review the entire operation of the drop guide and detector-interrupter mechanism as a whole. As already described, the various cams carried upon the shaft 40 serve to intermittently open and close the suction feeder governing valve 70 and to intermittently actuate the bell crank 96, between the feeding of each sheet from the pile upon the elevator 14, and between each delivery of a sheet from the front guides to the impression cylinder. The main controlling lever 45 is also rocked upon its pivot 47 in synchronism with the action of the other two devices and this movement not only raises and lowers the detector-latch device 145, 148 to alternately dispose it in the path of the sheets and remove it therefrom, but also intermittently removes the cam roller 176 from the path of the cylinder cam plate 185. Thus the three devices described—namely, the valve 70, the rock arm 96, and the trip means 175, 176—are alternately placed in a temporary "throw off" position where they can be retained in case the detector-latch is not displaced by the presence of a sheet. If a sheet is properly presented, the latch 148 is freed from the block 140 and the device 145 is raised by the rocking of the crank 55 and the trip arm 175 and roller 176 lowered to the positions shown in Figures 14 and 15. Then as has been described, the cam plate 185 contacting the roller 176 on the arm 175 raises both of the devices 145 and 126 to the position shown in Figures 16 and 17 whereupon the sheet is seized by the grippers. During the movement of the parts from the position shown in Figures 6 and 7 to the successive positions shown in Figures 14 and 15 and Figures 16 and 17, the other cams on the shaft 40 act to permit the restoring of the valve 70 to closed position and permit the rocking of the crank 96 to its normal upward position.

Also the return movement of lever 45 following the lower portions of the cam 42 under the influence of the spring 190, moves the lever 84 in a clockwise direction as viewed in Figure 2 so that the end 83 thereof is removed from the pin 82 so that the valve arm 72 may follow the valve cam 76 and the valve may be closed under the influence of the spring 79. At the same time

the pin 112 carried by the arm 113 rigid with the lever 45 strikes the upper end of the pawl 100 and removes the toe 102 from the shoulder 103 of the bar 105, thus preventing the tripping of the switches and the impression when the crank 96 is moved downwardly under the influence of the cam 95. Also during the normal operation of the device, the rock shaft 60 causes the lock arm 251 to intermittently enter and idly withdraw from the kerf or slot 245 in the gripper actuating pin 230.

Now, however, if no sheet is presented against the front guide plate 130, the latch 148 is not rocked and remains in the position shown in Figure 7. Then when the high level 42A of the cam 42 moves away from the roller 46 on the control lever 45, this lever and all of its associated parts including the rod 50 and the bell crank 55 remain locked in the position shown in Figure 6. Under these conditions, the cylinder cam plate 185 will not strike the cam roll 176 and the front guide will not be tripped; the lever 84 will not be displaced by the pin 89 and the valve lever 72 will remain in open position, destroying the effectiveness of the vacuum in the sheet feeder; and the pawl 100 will not be displaced from the position shown in Figure 2, whereupon the downward movement of the bell crank 96 caused by the cam 95 will depress the bar 105 and trip the switch 108 and the impression throw-off devices 110. Also the shaft 60 fails to rock, the lever 251 remains in the slot or kerf 245, the gripper actuating pin is retained in retracted position, and the cylinder grippers do not function.

Thereupon, the reason for the non-feeding of the sheet may be ascertained and the devices placed in proper running order. Before restarting the feeder and press, it may be necessary to manually rock the lever 84 by means of the handle 86 (Figures 2 and 4) so as to permit the valve 70 to be closed to feed several sheets from the pile down to the drop guide.

It will be noted that provision is not only made for combining the drop guide and detector elements into a unitary assembly requiring but a single adjustment, but the latch or stop means and the interrupter elements are also associated with the same pivotal axis as the combined drop guide and detector unit. Thus, the number of parts are reduced, as well as the number of adjustment points necessary in adapting the arrangement to sheets of different widths.

It is understood that various changes and modifications may be made in the device as described without departing from the scope of the invention as defined in the accompanying claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In a power driven sheet feeder for printing presses or similar machines, a feed board extending toward the machine to which the sheets are to be fed, a combined drop guide and sheet detector device carried by the front end of said feed board, said device comprising a pivoted detector element and a pivoted drop guide element, a common pivotal axis for said elements about which said elements separately move, and means operated by the source of power for driving the feeder for normally intermittently swinging the drop guide into and out of the path of the sheets moving along the feed board, means associated with said guide and detector element for preventing the normal operation of said drop guide when no sheet is presented to the detector element of the combined device.

2. In a power driven sheet feeder for printing presses or similar machines, a feed board extending toward the machine to which the sheets are to be fed, a combined drop guide and sheet detector device carried by the front end of said feed board, said device comprising a pivoted detector element and a pivoted drop guide element, a common pivotal axle for said elements, the detector element being fixed to said axle and the drop guide mounted loosely thereon in position to be contacted and moved by said detector element, means operated by the source of power for driving the feeder for normally intermittently swinging the drop guide into and out of the path of the sheets moving along the feed board, and means associated with said guide and detector element for preventing the normal operation of said drop guide when no sheet is presented to the detector element of the combined device.

3. In a power driven sheet feeder for printing presses or similar machines, a feed board extending toward the machine to which the sheets are to be fed, a combined drop guide and sheet detector device carried by the front end of said feed board, said device comprising a pivoted drop guide element and a separately pivoted detector element, means operated by the source of power for driving the feeder for normally intermittently swinging the drop guide into and out of the path of the sheets moving along the feed board, means for regularly and intermittently setting the sheet feeding mechanism in condition for being rendered inoperative during a subsequent phase of its normal cycle and alternately unsetting said condition, means associated with said guide and detector elements for directly preventing the normal operation of said drop guide and preventing the unsetting of the feeder mechanism when no sheet is presented to the detector element of the combined device.

4. In a power driven sheet feeder for printing presses or similar machines, a feed board extending toward the machine to which the sheets are to be fed, a combined drop guide and sheet detector device carried by the front end of said feet board, said device comprising a pivoted detector element and a pivoted drop guide element, means operated by the source of power for driving the feeder for normally intermittently swinging the drop guide into and out of the path of the sheets moving along the feed board, means carried by the machine to which sheets are to be fed for tripping the drop guide to release sheets from the feed board immediately before the operation of swinging the drop guide out of said path effected by said first named means, and means associated with said guide and detector element for preventing the normal operation of said drop guide when no sheet is presented to the detector element of the combined device.

5. In a power driven sheet feeder for printing presses or similar machines, a feed board extending toward the machine to which the sheets are to be fed, a combined drop guide and sheet detector device carried by the front end of said feed board, said device comprising a pivoted detector element and a pivoted drop guide element, means operated by the source of power for driving the feeder for normally intermittently swinging the drop guide into and out of the path of the sheets moving along the feed board, means carried by the machine to which sheets are to be fed for positively tripping the drop guide to re-

lease sheets from the feed board immediately before the operation of swinging the drop guide out of said path effected by said first named means, said first named means serving to prolong the duration of the displacement of the drop guide after it is tripped, to permit the passage of the full length of a sheet, and means associated with said guide and detector element for preventing the normal operation of said drop guide by the first named means and the tripping of the guide by the machine carried means when no sheet is presented to the detector element of the combined device.

6. In combination with a printing press or the like having an impression cylinder and sheet feeding means therefor, a feed board, a front drop guide device positioned adjacent the forward end of said feed board, and a sheet detector adjacent thereto, a trip element on said impression cylinder adapted to intermittently contact a portion of said drop guide device to remove the drop guide from the path of the sheets, and means operated by said detector in the absence of a sheet at the proper time, to prevent contact between said trip element and said drop guide device.

7. In a sheet feeding device for printing presses having an impression cylinder as one member of the printing couple, and intermittently operated sheet grippers on said cylinder, in combination, a feed board along which successive sheets are fed disposed with its front edge in close juxtaposition to the impression cylinder of the press, a drop guide carried by the feed board adjacent said front edge, a cam block on the periphery of said impression cylinder for tripping the drop guide to release a sheet just prior to its seizure by the cylinder grippers, a member operatively connected to said drop guide and adapted to be projected into the path of said block to be actuated thereby to trip the drop guide, and means for projecting said member into the path of the cam block only when a sheet is properly positioned at said drop guide.

8. In a sheet feeding device for printing presses having an impression cylinder as one member of the printing couple, and intermittently operated sheet grippers on said cylinder, in combination, a feed board along which successive sheets are fed disposed with its front edge in close juxtaposition to the impression cylinder of the press, a drop guide carried by the feed board adjacent said front edge, a cam block on the periphery of said impression cylinder for tripping the drop guide to release a sheet just prior to its seizure by the cylinder grippers, a member operatively connected to said drop guide and adapted to be projected into the path of said block to be actuated thereby to trip the drop guide, means for projecting said member intermittently into the path of said block and withdrawing it therefrom during the normal operation of said device, and means for rendering said last named means ineffective when no sheet is fed to the drop guide.

9. In a sheet feeding device for printing presses having an impression cylinder as one member of the printing couple, and intermittently operated sheet grippers on said cylinder, in combination, a feed board along which successive sheets are feed disposed with its front edge in close juxtaposition to the impression cylinder of the press, a combined sheet detector and drop guide device carried by the feed board adjacent said front edge, a cam block on the periphery of said impression cylinder for tripping said device to release a sheet just prior to its seizure by the cylinder grippers, a member operatively connected to said drop guide and detector device and adapted to be projected into the path of said block to be actuated thereby to trip the drop guide, means for projecting said member intermittently into the path of said block and withdrawing it therefrom during the normal operation of said device, and means including the sheet detector portion of said device for rendering said last named means ineffective when no sheet is fed to the drop guide.

10. In a self contained power driven sheet feeding device adapted to be disposed closely adjacent and in feeding relationship to printing presses having an impression cylinder as one member of the printing couple, and intermittently operated sheet grippers on said cylinder, in combination, a feed board along which successive sheets are fed disposed with its front edge in close juxta-position to the impression cylinder of the press, a drop guide carried by the feed board adjacent said front edge, a projection on the periphery of said impression cylinder for tripping the drop guide to release a sheet just prior to its seizure by the cylinder grippers and follow up means for retaining said drop guide in tripped position during the passage of the entire sheet.

11. In a sheet feeding device for printing presses having an impression cylinder as one member of the printing couple, and intermittently operated sheet grippers on said cylinder, in combination, a feed board along which successive sheets are fed disposed with its front edge in close juxtaposition to the impression cylinder of the press, a tripping block carried by said impression cylinder at a point on its periphery, a combination device carried by the feed board adjacent its front end and comprising three pivotally mounted members, namely a drop guide, a sheet detector, and a member adapted to be projected into the path of said tripping block, drive means associated with the sheet forwarding mechanism of the sheet feeder, operative connections between the respective three members of said combination device and between said drive means and said device, whereby the latter is actuated through three stages, one in which the drop guide is in operative sheet registering position, the detector is in the path of the sheets, and the projectable member is retracted; a second stage in which the drop guide is still in operative position, the detector is partially retracted and clear of the path of the sheets, and the projectable member is in projected position in readiness to be tripped by said block; and a third stage in which the drop guide is held in operative sheet delivery position, the detector is retracted further, and the projectable member is in another retracted position.

12. In a sheet feeding device for printing presses having an impression cylinder as one member of the printing couple, and intermittently operated sheet grippers on said cylinder, in combination, a feed board along which successive sheets are fed disposed with its front edge in close juxtaposition to the impression cylinder of the press, a combined sheet detector and drop guide device carried by the feed board adjacent said front edge, a cam block on the periphery of said impression cylinder for tripping said device to release a sheet just prior to its seizure by the cylinder grippers, said combined device comprising a freely pivoted drop guide element

and a positively actuated detector member having means moving therewith to be projected into the path of said block, said drop guide being disposed in the path of movement of said detector member toward displaced position, whereby said block moves said last named means, said detector member, and finally said drop guide.

13. In a sheet feeding device for printing presses having an impression cylinder as one member of the printing couple, and intermittently operated sheet grippers on said cylinder, in combination, a feed board along which successive sheets are fed disposed with its front edge in close juxtaposition to the impression cylinder of the press, a drop guide carried by the feed board adjacent said front edge, a tripping block carried by said impression cylinder at a point on its periphery, a projectable element operatively connected with said drop guide and movable to and from the path of said block, drive means actuated in synchronism with the operating mechanism of the sheet feeder and operatively connected with said element and said drop guide for alternately moving said guide into and out of operative position in the path of the sheets and said element out of, into, and beyond the path of said block, a lost motion connection between said drive means and said element, whereby said element and said drop guide may be moved by contact with said block and independently of said drive means, and a lost motion connection between said element and said drop guide whereby said element may be moved into the path of the block without moving the drop guide, but both will be moved together during movement of said element beyond said intermediate position in the path of said block.

14. The device as set forth in claim 13 in which the operative connection between said element and said drop guide includes a sheet detector provided with latch means which during normal operation when sheets are properly presented to the drop guide, is inoperative, but which in the absence of a sheet locks the projecting element in retracted position and the drop guide in sheet stopping position.

15. The device as set forth in claim 11 in which the means for operating the combined device during normal operation is a cam driven in synchronism with the sheet forwarding mechanism of the feeder and a cam following lever operatively connected with the device, and means are provided in connection with the sheet detector for holding the lever away from said cam when no sheet is presented to the drop guide.

16. The device as set forth in claim 11 in which the means for operating the combined device during normal operation is a cam driven in synchronism with the sheet forwarding mechanism of the feeder and a cam following lever operatively connected with the device, and in which there are provided means in connection with the sheet detector for holding the lever away from said cam when no sheet is presented to the drop guide, and means carried by said cam-following lever for interrupting the operation of the feeder when said lever is prevented from following said cam.

17. A combined drop guide and sheet detector device for use in a sheet feeder for a printing press having an impression cylinder, said device comprising a freely vertically pivoted drop guide arm, a sheet detector arm vertically pivotally mounted concentrically with said drop guide arm and disposed at a predetermined distance beneath the latter, whereby when said detector is swung upwardly beyond a predetermined point the drop guide is also raised.

18. A combined drop guide and sheet detector device for use in a sheet feeder for a printing press having an impression cylinder, said device comprising a freely pivoted drop guide arm, a sheet detector arm pivotally mounted concentrically with said drop guide arm and disposed beneath the latter, whereby when said detector is swung upwardly beyond a predetermined point the drop guide is also raised, and adjustable contact means between said arms for regulating the timing of the raising of the drop guide arm by the detector arm.

19. A device as set forth in claim 17, which includes spring means for urging the drop guide arm downwardly in opposition to the upward movement of the detector arm, whereby the drop guide arm will maintain contact with the detector arm during their upward movement together regardless of the abruptness of the movement.

20. The device as set forth in claim 17 which includes two means for moving the detector arm and thus the drop guide arm, one of said means being operated by the sheet feeder drive and in synchronism therewith and the other by a tripping member carried by the impression cylinder.

21. The device as set forth in claim 17 which includes two means for moving the detector arm and thus the drop guide arm, one of said means being operated by the sheet feeder drive and in synchronism therewith and the other by a tripping member carried by the impression cylinder, the first of said two means including a lost motion connection for enabling the second means to operate in advance of the other.

22. In a printing press and sheet feeder assembly, an impression cylinder, a feed board extending toward said cylinder, a combined drop guide and sheet detector device carried by the front end of said feed board, said device comprising a pivoted detector element and a pivoted drop guide element, a common pivotal axle for said elements about which said elements are separately pivoted, cylinder grippers carried by said cylinder for seizing a sheet from said feed board upon release by said drop guide, means for actuating said cylinder grippers in synchronism with the operation of said drop guide, means controlled by said axle for alternately obstructing and freeing said cylinder gripper actuating means, means operated by the source of power for driving the feeder for normally intermittently rocking said axle, swinging the drop guide into and out of the path of the sheets moving along the feed board, and operating said controlled means, and means associated with said guide and detector element for preventing the normal operation of said axle, and consequently of said drop guide and said cylinder gripper actuating means, when a sheet is not properly presented at said drop guide.

23. In a printing press and sheet feeder assembly, an impression cylinder, a feed board extending toward said cylinder, a combined drop guide and sheet detector device carried by the front end of said feed board, said device comprising a pivoted detector element and a pivoted drop guide element, a common pivotal axle for said elements, the detector element being fixed to said axle and the drop guide mounted loosely thereon in position to be contacted and moved by said detector element, cylinder grippers carried by

said cylinder for seizing a sheet from said feed board upon release by said drop guide, means for actuating said cylinder grippers in synchronism with the operation of said drop guide, means for alternately blocking and unblocking the movement of said cylinder gripper actuating means, said blocking means being operatively connected with said axle to be contacted and moved thereby under normal operating conditions, means operated by the source of power for driving the feeder for normally intermittently rocking said axle, swinging the drop guide into and out of the path of the sheets moving along the feed board, and operating said controlled means, and means associated with said guide and detector element for preventing the normal operation of said axle, and consequently of said drop guide and said cylinder gripper actuating means, when a sheet is not properly presented at said drop guide.

24. In a printing press and sheet feeder assembly, an impression cylinder, a feed board extending toward said cylinder, a front guide and a sheet detector carried by the forward end of said feed board, cylinder grippers carried by said cylinder for seizing a sheet from said feed board upon release by said front guide, a tumbler member for alternately opening and closing said grippers in timed sequence with the cycle of operation of the press, alternately actuated pins adapted to be projected into and out of the path of said tumbler for respectively opening and closing said grippers, one of said pins being extensible and contractible, means operatively connected with said detector device for blocking a portion of said pin and preventing its projection, whereby the grippers are rendered inoperative when no portion of the sheet is presented to the detector device at the proper time.

25. A substantially self-contained power driven sheet feeder adapted to be disposed adjacent a printing press or the like to which sheets are to be fed, said printing press having a rotatable impression cylinder, cylinder grippers carried by said impression cylinder, and means for intermittently actuating said grippers to seize a sheet from the feeder; said feeder comprising a feed board, means for feeding a sheet along said feed board toward the cylinder, a transverse rock shaft carried by said feed board at the forward edge thereof, a sheet detector fixed on said shaft, an arm on said shaft adapted to be swung into and out of obstructing relationship with said gripper actuating means carried by the press, means driven by the driving means for the feeder for intermittently rocking the shaft in synchronism with the operation of the feeder and press to move the sheet detector into and out of the path of the sheets being fed and to swing said arm, latching means for holding said sheet detector in the path of the sheets when no sheet is presented, thereby locking said shaft from rocking and retaining said arm in position obstructing the actuation of the cylinder grippers.

26. In a printing press and sheet feeder assembly, an impression cylinder, a feed board, extending toward said cylinder, a front guide and a sheet detector carried by the forward end of said feed board, cylinder grippers carried by said cylinder for seizing a sheet from said feed board upon release by said front guide, a tumbler member for alternately opening and closing said grippers in timed sequence with the cycle of operation of the press, alternately actuated pins adapted to be projected into and out of the path of said tumbler for respectively opening and closing said grippers, an element carried by the feed board and operatively connected with said detector device for blocking the pin which closes the grippers and preventing its projection, whereby the grippers are rendered inoperative when no sheet is presented to the detector device at the proper time.

27. In a power driven sheet feeder for printing presses or similar machines, a feed board extending toward the machine to which sheets are to be fed, a transverse rock shaft carried by the feed board, a sheet detector carried by said shaft for pivotal movement about the axis of said shaft, and a front drop guide carried by said shaft and separately mounted for pivotal movement about said axis.

28. In a power driven sheet feeder for printing presses or similar machines a feed board extending toward the machine to which sheets are to be fed, a transverse rock shaft carried by the feed board, a sheet detector carried by said shaft for pivotal movement about the axis of said shaft, and a front drop guide carried by said shaft and separately mounted for pivotal movement about said axis, and means for interrupting the operation of the feeder also carried by the same shaft and responsive to the sheet detector.

29. In a power driven sheet feeder for printing presses or similar machines, a feed board extending toward the machine to which sheets are to be fed, a transverse rock shaft carried by the feed board, and a combination sheet detector and drop guide device carried by said shaft and comprising a detector element and a drop guide element each separately pivoted about the axis of said shaft, the combination device being adjustable longitudinally of said shaft to selected positions suitable to the size of sheet being fed.

30. The mechanism set forth in claim 29 in which there is provided feeder interrupting means controlled by said detector element through said rock shaft itself, whereby the selective adjustment of the combination device only along the shaft is sufficient to accommodate the mechanism to sheets of various widths.

31. In a self-contained power driven sheet feeder adapted to be disposed adjacent a printing press or similar machine for feeding sheets thereto, the combination of a feed board extending toward the machine to which the sheets are to be fed, a driving member carried by said feeder, a combination drop guide and sheet detector device carried entirely by the front end of said feed board, means on said feeder operatively connecting said device with said driving member for normally and intermittently swinging the drop guide into and out of the path of the sheets moving along the feed board, and means also carried by said feed board and associated with said guide and detector element for preventing the normal operation of said drop guide when no sheet is presented to the detector element of the combined device.

32. In a self-contained power driven sheet feeder adapted to be disposed adjacent the impression cylinder of a printing press or similar machine for feeding sheets thereto, the combination of a feed board extending toward the machine to which the sheets are to be fed and having its front end in close juxtaposition to said impression cylinder, a driving member carried by said feeder and synchronized with the operation of said machine, a combination drop guide and sheet detector device carried entirely by the front

end of said feed board, means on said feeder operatively connecting said device with said driving member for normally and intermittently swinging the drop guide portion of the device into and out of the path of the sheets moving along the feed board, means also carried by said feed board and associated with said guide and detector element for preventing the normal operation of said drop guide when no sheet is presented to the detector element of the combined device, an element carried by said feed board and connected to said drop guide portion and projected toward said impression cylinder only when a sheet is properly fed to said drop guide, and a tripping projection fixed on the periphery of said impression cylinder and adapted to trip the drop guide to permit a sheet to be released only when said element is projected into the path of said projection.

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