March 18, 1958 A. P. BATTEY 2,827,293

DETECTOR MECHANISM

Filed Dec. 31, 1953 2 Sheets-Sheet 1

FIG. 2.

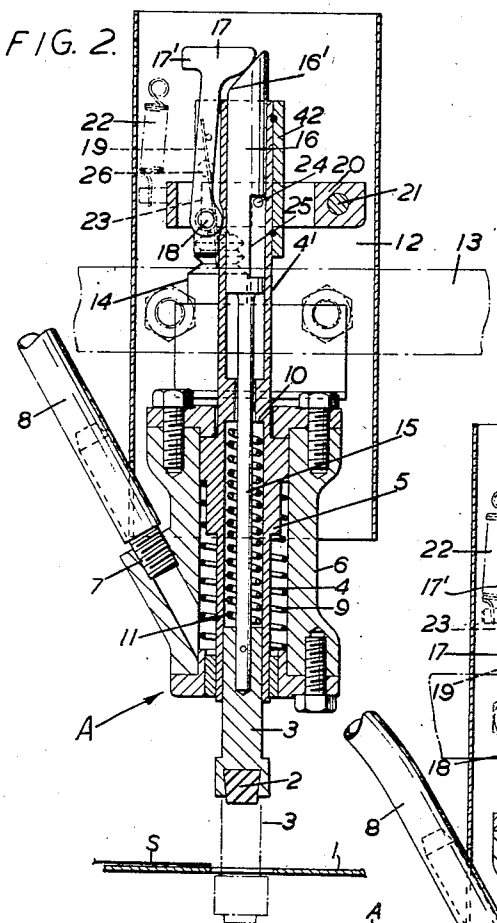


FIG. 3.

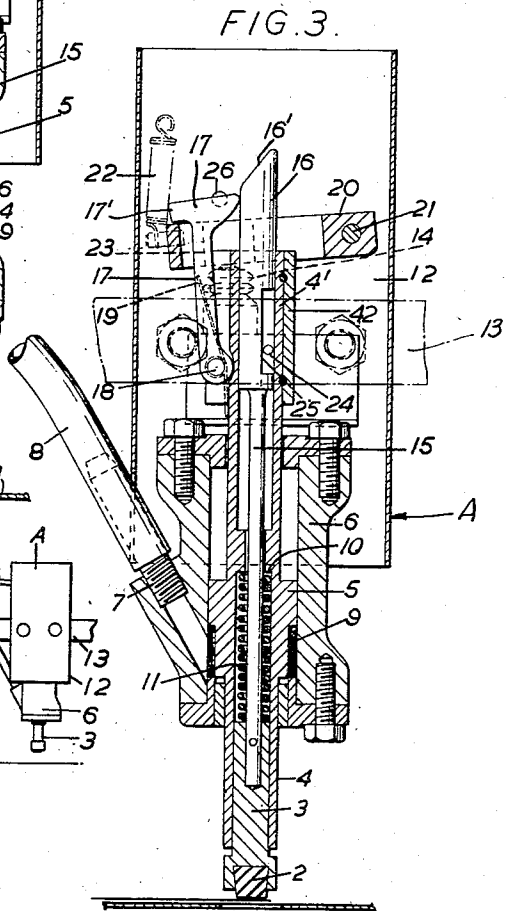
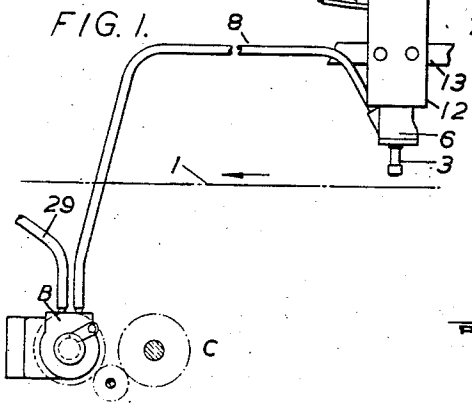


FIG. 1.



Inventor
Alfred Pierssene Battey, deceased,
By Lillian Violet Battey, Executrix
By Baldwin & Wight
Attorneys

March 18, 1958 A. P. BATTEY 2,827,293

DETECTOR MECHANISM

Filed Dec. 31, 1953 2 Sheets-Sheet 2

FIG. 4.

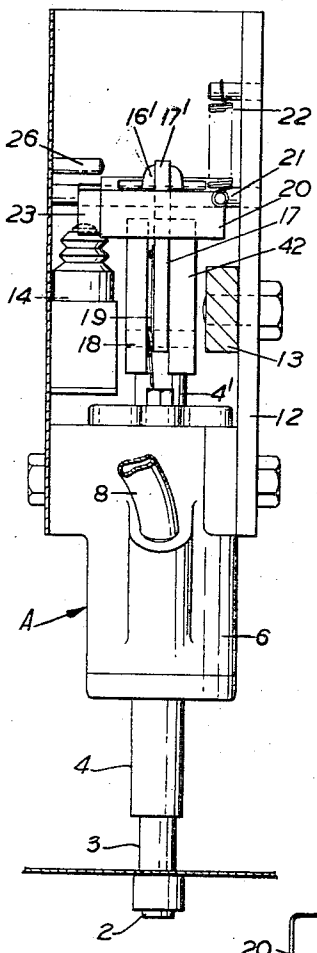


FIG. 6.

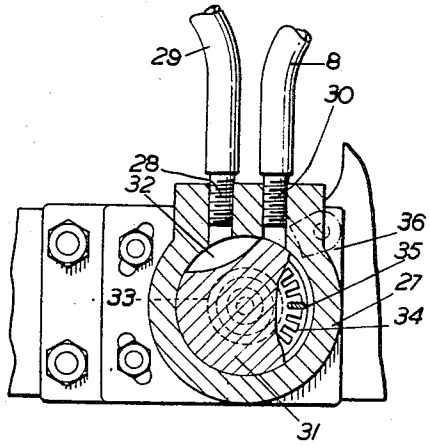


FIG. 7

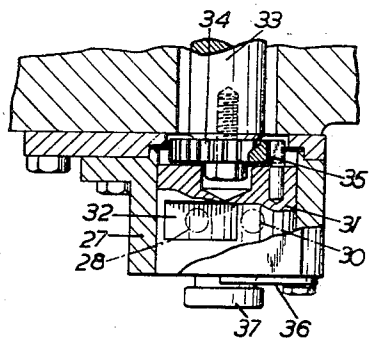
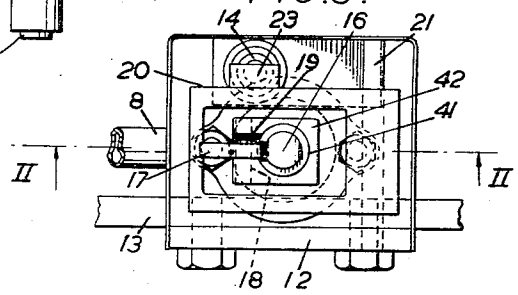


FIG. 5.



Inventor
Alfred Piersonne Battey deceased,
By Lillian Violet Battey, Executrix
By Baldwin & Wight
Attorneys

United States Patent Office 2,827,293 Patented Mar. 18, 1958

2,827,293

DETECTOR MECHANISM

Alfred Pierssene Battey, deceased, late of Rotherfield, Crowborough, England, by Lillian Violet Battey, executrix, Rotherfield, England, assignor to R. W. Crabtree & Sons Limited

Application December 31, 1953, Serial No. 401,616

13 Claims. (Cl. 271—56)

This invention relates to mechanism to detect the arrival (or non-arrival) of a moving sheet at a predetermined point at a predetermined time. Such a condition arises in various machines which operate upon sheets in succession; sheet-printing machines form an important example of such machines and in what follows, reference will for convenience be made to sheet-printing machines.

In sheet printing machines, it is necessary for proper operation of the machines that the passing of a sheet at a proper time be checked at one or more points in its travel to, through, or from the machine: if a sheet fails to respond to the check, it is necessary to cause the automatic operation of some device or other which will prevent damage to the machine and avoid mis-printing of the sheet.

Various proposals have been made for the purpose referred to, but these proposals are connected with the detection of sheets of a relatively flimsy nature such as paper. This invention is concerned with the detection of sheets of relatively rigid material such as tin or stiff paper or cardboard. In cases where the sheets are coated or printed it is very necessary that the detector shall not touch the surface of the sheet, the coating or printed impression on which could still be wet. Moreover, the rigidity of the sheet precludes the use of many detector arrangements, which rely for operation on the flexibility of the sheets.

According to the present invention, use is made of a detecting mechanism, the detecting component of which is operated so as normally not to engage the sheet in its detecting operation. For this purpose, the detecting component is moved in synchronism with the passing of sheets of stiff material moving through a machine in regular succession in spaced relationship. The movement of the detecting component is timed so as to pass across the path of movement of the sheets past an edge of a properly located sheet. If the sheet is improperly located, the detecting component is arrested by engagement with it, and the arresting of the detector component is utilized to set into action a normally inactive control mechanism to effect a proper control on the machine through which the sheets are passing.

The detector component can conveniently be moved to and fro on its detecting movement by pneumatic apparatus operating to drive the detector through a resilient means which is enabled to yield if the detector component is arrested. The arresting of the detector component causes the continuing operation of the pneumatic means to set into action the control mechanism, which conveniently may comprise an electrical switch device.

The invention is illustrated in the accompanying drawings in which Figure 1 is a diagrammatic view showing the parts of this invention in position in a machine, and Figures 2–7 are views of the parts detached, Figures 2 and 3 being vertical sections on the line II—II of Figure 5 of the sheet detector unit in two different positions, Figure 4 being a side elevation and Figure 5 being a plan

view while Figures 6 and 7 are views of the control valve unit.

Referring firstly to Figure 1, this indicates at 1 the feed board of a sheet handling machine such as a printing machine, sheets being passed along the board in regular succession for a printing operation on them: such machines are well known and it is believed to be sufficient to observe that the sheets must be in a certain position of the feed board at a certain time related to the operation of the printing machine. Such machines include a device to check whether a sheet is properly or normally located at the proper time and, if it is improperly or abnormally located to cause some operation (such as tripping the printing cylinders of the printing machine) to be effected automatically.

The purpose of the present invention is to provide an improved sheet detecting or checking arrangement which is intended for use where the sheets are of relatively stiff material such as sheets of tin or cardboard. The mechanism of this invention comprises two units marked A and B in Figure 1, the unit A being the detector which is operated pneumatically (i. e. by suction) at regular intervals under the control of a valve constituting the unit B, this valve being operated in phase with the printing machine through gearing indicated at C: if, in a manner to be described a sheet is detected as being incorrectly located at the time the detector is actuated, an electrical control signal is transmitted via the connection D to effect the necessary operation.

This operation may consist for example in cutting off the supply of suction to sheet taking suckers which take a sheet from a pile of sheets to cause a cessation in the supply of sheets.

Again the operation may result in causing the printing cylinders of the printing machine to be tripped, an operation which is commonly used.

Referring now to Figures 2–5, the detector comprises a rubber insert 2 in the foot end of a plunger 3 which is slidable in a sleeve 4 fast with a ram or piston 5. The piston is slidable in a cylinder 6 to which a connection is made via a nipple 7 from a line 8 to which suction is intermittently applied at predetermined intervals related to the times of passing of a sheet. When suction is applied, the piston 5 is drawin down against the return action of a spring 9 and the downward movement of the piston 5 is transmitted to the plunger 3 through a shoulder 10 in the plunger to a second spring 11 which is interposed between that shoulder 10 and the plunger 3 which is thereby also moved.

The cylinder 6 is carried by a back-plate or bracket 12 mounted on a rail 13 which is adjustable so that the detecting foot 2 can be adjusted in the direction of the travel (i. e. the length) of the sheets S to be detected.

The assembly would be set, in any particular case, so that when a sheet S is properly in position, the foot component 2 would pass down just behind the trailing end of a sheet as is indicated in dotted lines in Figure 2, that is, into the gap between the adjacent edges of two contiguous normally relatively located sheets. The downward movement of the detector component 2 is effected by the application of suction to the cylinder 6 which causes the piston 5, the sleeve 4, and the plunger 3 to move downwardly as a unit without relative movement between the parts. If, however, as is shown in Figure 3, the foot 2 engages a sheet by reason of its being incorrectly positioned, the foot 2 and therefore the plunger 3 are stopped in their movement, but the piston 5 and sleeve 4 continue their movement and move against the action of the second spring 11 relatively to the plunger 3 and its detecting foot 2.

This relative movement is employed to actuate, in the arrangement shown, a switch 14 which, since it is actuated

only by relative movement caused by improper sheet arrival, is normally inactive. For this purpose, the plunger 3 is extended by a rod 15 through the sleeve 4 and is secured to an operating block 16 having a cam surface 16' to operate a pawl 17 pivoted at 18 to a support 42 on the sleeve 4 at its upper end which is extended to provide a guide for the block 16, the pawl 17, the sleeve 4, 4', and the block 16 normally moving together. In the normal condition the pawl 17 is held by a spring 19 snug to the cam surface 16': the pawl 17 has an operating projection 17' which in this normal condition is able to move freely past a switch-operating member 20 pivoted at 21 and loaded by a spring 22, this member 20 having a switch-operating projection 23. When, however, the plunger 3 is arrested (as is shown in Figure 3) by an incorrect sheet, the continued movement of the sleeve 4 moves the pawl 17 over a cam surface 16' on the block 16: the pawl is thereby rocked to a position in which its projection 17' engages the switch-operating member 20 whereby this continued movement of the sleeve rocks the switch-operating member 20 the projection 23 on which actuates the switch 14. This switch can be of any convenient type and as shown it is a micro-switch.

The relative movement between the plunger 3 and the sleeve 4 is limited by a pin 24 on the sleeve 4 entering a groove 25 in the block 16 and the movement of the switch-operating member 20 under the action of the spring 22 is limited by a stop pin 26.

The operation of the detector assembly A is controlled pneumatically by suction pulses applied to it through the pipe line 8 under the control of the valve unit B. This unit comprises as is shown in Figures 6 and 7 a casing 27 having a suction supply nipple 28 connected by a pipe line 29 to a source of vacuum and a nipple 30 receiving the pipe line 8 which extends to the detector unit A. In the casing 27 is a rotor 31 having a control recess 32: the rotor is rotated through the gearing C (Figure 1) in phase with the operation of the printing machine and as the rotor rotates the recess 32 intermittently connects the line 29 to the line 30 and so transmits the suction effect to the detector unit A to cause its operation in the manner already described.

Drive to the rotor 31 is effected from a shaft 33 and provision is made to enable adjustment of the timing of the vacuum pulses to be made: for this purpose, the shaft has secured to it a notched plate 34 and the rotor 31 is provided with a peg 35 to enter any one of the notches. The casing 27 has a retaining arm 36 which normally engages the end of the rotor 31 to hold it in position but which can be moved clear of the rotor to enable it to be moved axially to carry the peg 35 clear of the plate 34, the rotor then being turned to give the required timing and then re-engaged with another notch: the rotor is provided with a hand knob 37 to enable it to be manipulated.

It will be obvious that a number of units A may be disposed at various points in the travel of a sheet through the machine, the suction supply being controlled to suit the time of arrival at the particular point concerned.

The arrangement of this invention is simple but reliable, it requires the connection to it of only the flexible supply line 8 and the control line D (whether this be for electrical or fluid-pressure control transmission) and so adjustment of the unit can readily be effected. Because of the minimum connections to the unit little obstruction is set up to the removal of a faulty sheet or to the setting up of the machine.

What is claimed is:

1. Detector mechanism for checking the location of sheets of relatively stiff material which move in a path through a machine during normal operation of the machine in regular succession with a gap between them, said detector mechanism comprising a detector component; means to move the detector component at regular intervals across the path of and into the gap between the adjacent edges of two contiguous normally relatively located sheets; means for timing said movements of the detector component to coincide with the presentation to the component of the gaps between normally located sheets; normally inactive means to control the operation of the machine; and means responsive to engagement of said component with an abnormally located sheet with prevention of movement of said detector component across the path of the sheets to render the control means active.

2. Detector mechanism for checking the location of sheets of relatively stiff material which move in a path through a machine during normal operation of the machine in regular succession with a gap between them, said detector mechanism comprising a detector component; means to move the detector component at regular intervals across the path of and into the gap between the adjacent edges of two contiguous normally relatively located sheets; means for timing said movements of the detector component to cause the detector to move past an edge portion of the sheets and out of engagement with normally located sheets; normally inactive means to control the operation of the machine; and means responsive to engagement of said component with an abnormally located sheet with prevention of movement of said detector component across the path of the sheets to render the control means active.

3. Detector mechanism for checking the location of sheets of relatively stiff material which move in a path through a machine during normal operation of the machine in regular succession in spaced relationship, said mechanism comprising a detector component, pneumatically operable means to move the detector component at intervals across the path of movement of the sheets and between the adjacent edges of two contiguous normally relatively located sheets; means for timing said movements of the detector component to cause said detector component to move past an edge of a normally located sheet and out of engagement therewith; normally inactive electrical switch means for transmitting an electrical control signal for controlling the operation of the machine; and means responsive to engagement of said component with an abnormally located sheet with prevention of movement of said detector component across the path of the sheets to render the switch means active.

4. Detector mechanism for checking the location of sheets of relatively stiff material which move through a machine in regular succession in spaced relation during normal operation of the machine; said mechanism comprising a detector component; means for moving the component across the path of movement of said sheets between the adjacent edges of and out of engagement with normally located adjacent sheets; resilient means mounting said component and permitting arresting of movement of said component upon its engagement with an abnormally located sheet during continued operation of said component moving means; normally inactive control means for controlling the operation of said machine; and means responsive to the arresting of movement of said component by its engagement with an abnormally located sheet for rendering said control means active.

5. Detector mechanism for checking the location of sheets of relatively stiff material which move through a machine in regular succession in spaced relation during normal operation of the machine; said mechanism comprising a detector component; pneumatic means for moving the component across the path of movement of said sheets between the adjacent edges of and out of engagement with normally located adjacent sheets; resilient means mounting said component and permitting arresting of movement of said component upon its engagement with an abnormally located sheet during continued operation of said pneumatic means; normally inactive control means for controlling the operation of said machine;

and means responsive to the arresting of movement of said component by its engagement with an abnormally located sheet for rendering said control means active.

6. Detector mechanism for checking the location of sheets of relatively stiff material which move through a machine in regular succession in spaced relation during normal operation of the machine; said mechanism comprising a detector component; means for moving the component across the path of movement of said sheets between the adjacent edges of and out of engagement with normally located adjacent sheets; means for timing the movement of said component to coincide with the presentation to said component of the space between successive normally located sheets; resilient means mounting said component and permitting arresting of movement of said component upon its engagement with an abnormally located sheet during continued operation of said component moving means; normally inactive control means for controlling the operation of said machine; and means responsive to the arresting of movement of said component by its engagement with an abnormally located sheet for rendering said control means active.

7. Detector mechanism for checking the location of sheets of relatively stiff material which move through a machine in regular succession in spaced relation during normal operation of the machine; said mechanism comprising a detector component; pneumatic means for moving the component across the path of movement of said sheets between the adjacent edges of and out of engagement with normally located adjacent sheets; means for timing the movement of said component to coincide with the presentation to said component of the space between successive normally located sheets; resilient means mounting said component and permitting arresting of movement of said component upon its engagement with an abnormally located sheet during continued operation of said pneumatic means; normally inactive control means for controlling the operation of said machine; and means responsive to the arresting of movement of said component by its engagement with an abnormally located sheet for rendering said control means active.

8. Mechanism as set forth in claim 7 in which the timing means includes a valve for controlling the operation of said pneumatic moving means.

9. Mechanism for checking the location of sheets of relatively stiff material which move in a path through a machine during normal operation of the machine in regular succession with a gap between them, said mechanism comprising a cylinder; a ram mounted in said cylinder for reciprocating movement; means for reciprocating said ram; a plunger mounted in said ram and movable therewith across the path of movement of the sheets out of engagement with normally located sheets during normal operation of the machine, and capable of movement relative to said ram upon engagement of said plunger with an abnormally located sheet; normally inactive control means for controlling the operation of the machine; and means responsive to relative movement of said ram and plunger for rendering said control means active.

10. Mechanism for checking the location of sheets of relatively stiff material which move in a path through a machine during normal operation of the machine in regular succession with a gap between them, said mechanism comprising a cylinder; a ram mounted in said cylinder for reciprocating movement; means for reciprocating said ram; a plunger mounted in said ram and movable therewith across the path of movement of the sheets out of engagement with normally located sheets during normal operation of the machine, and capable of movement relative to said ram upon engagement of said plunger with an abnormally located sheet; means for timing reciprocating movement of said ram so that movement of said plunger coincides with the presentation to said plunger of the gap between successive normally located sheets; normally inactive control means for controlling the operation of the machine; and means responsive to relative movement of said ram and plunger for rendering said control means active.

11. Mechanism for checking the location of sheets of relatively stiff material which move in a path through a machine during normal operation of the machine in regular succession with a gap between them, said mechanism comprising a cylinder; a ram mounted in said cylinder for reciprocating movement; means for reciprocating said ram; a plunger slidably mounted in said cylinder and projecting from one end of said ram and being movable with said ram so as to cross the path of movement of said sheets at regular intervals timed to coincide with the presentation to said plunger of the gap between successive normally located sheets, said plunger being slidable relatively to said ram upon engagement of said plunger and an abnormally located sheet; normally inactive control means for controlling the operation of the machine; and means responsive to relative movement of said ram and plunger for rendering said control means active.

12. Detector mechanism for checking the location of sheets of relative stiff material which move through a machine in regular succession in spaced relation during normal operation of the machine, said mechanism comprising a cylinder; a ram mounted for reciprocating movement relative to said cylinder; a sheet detector component; means connecting said sheet detecting component to said ram so that reciprocation of said ram normally causes corresponding movement of said detector component across the path of movement of the sheets but out of engagement with normally located sheets, engagement of said sheet detecting component with an abnormally located sheet arresting the movement of said sheet detecting component; means for reciprocating said ram; normally inactive control means for controlling the operation of said machine; and means responsive to the arresting of movement of said sheet detector component for rendering said control means active.

13. Detector mechanism for checking the location of sheets of relatively stiff material which move through a machine in regular succession in spaced relation during normal operation of the machine, said mechanism comprising a cylinder; a ram mounted for reciprocating movement relative to said cylinder; a sheet detector component; means connecting said sheet detector component to said ram so that reciprocation of said ram normally causes corresponding movement of said detector component across the path of movement of the sheets but out of engagement with normally located sheets, engagement of said sheet detecting component with an abnormally located sheet arresting the movement of said sheet detecting component; means for reciprocating said ram; means for timing movement of said ram in sheet detecting direction so that movement of said sheet detector component in a corresponding direction coincides with the presentation to said detector component of the spaces between successive normally located sheets; normally inactive control means for controlling the operation of said machine; and means responsive to the arresting of movement of said sheet detector component for rendering said control means active.

References Cited in the file of this patent

UNITED STATES PATENTS

1,468,754	Smith	Sept. 25, 1923
2,178,713	Wood et al.	Nov. 7, 1939