

June 15, 1937.

H. T. BACKHOUSE

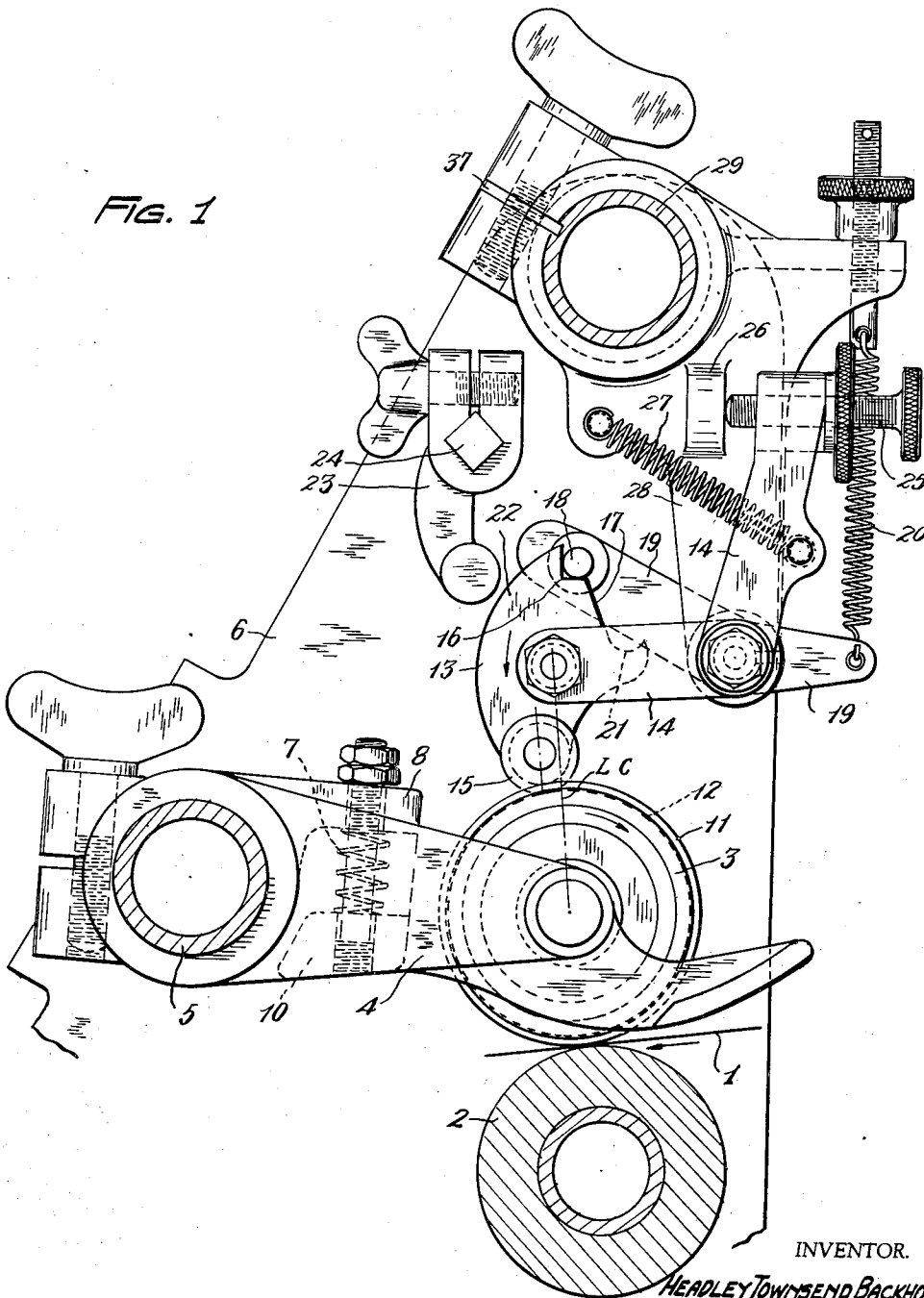
2,083,936

SHEET DETECTOR

Filed July 17, 1935

2 Sheets-Sheet 1

FIG. 1



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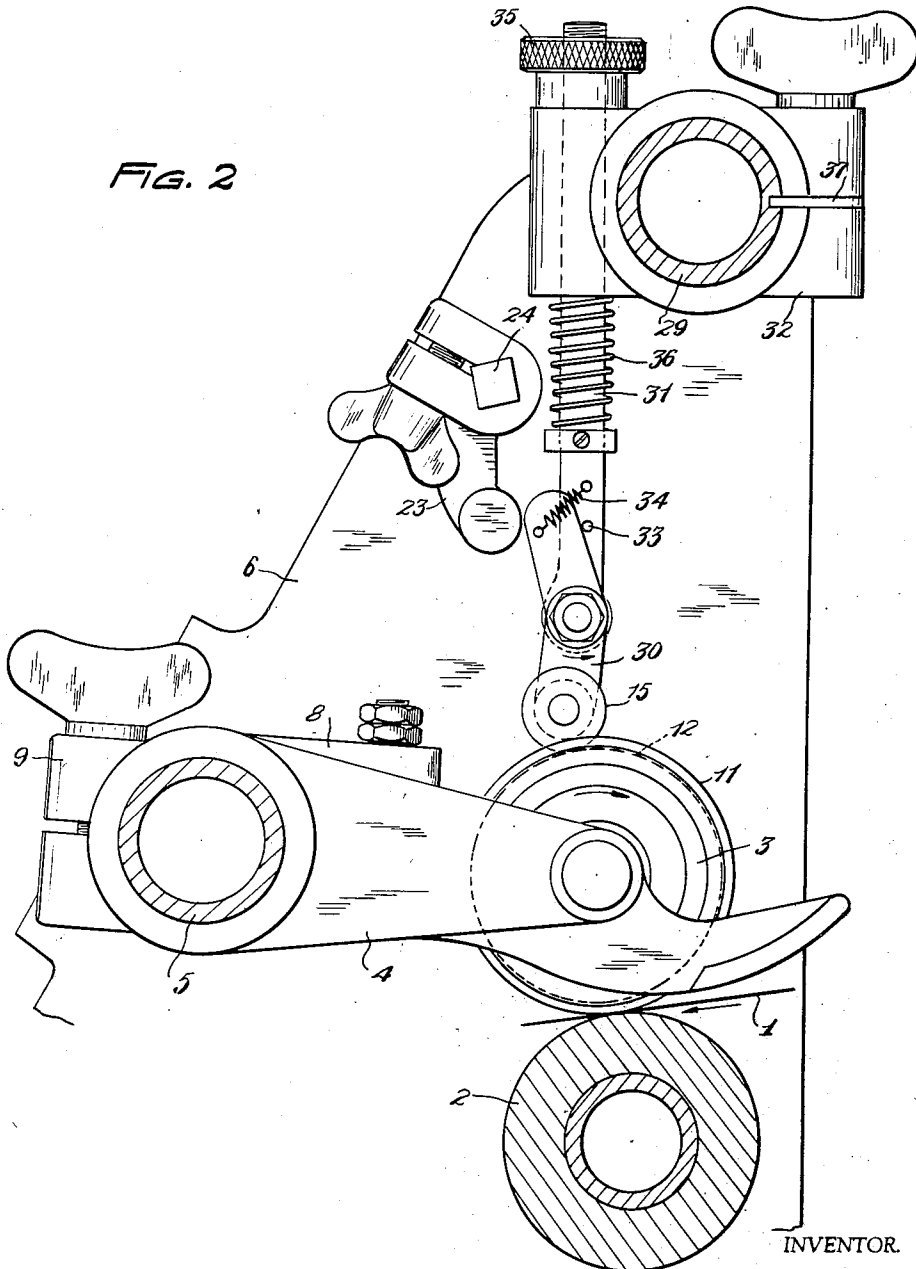
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SHEET DETECTOR

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2 Sheets-Sheet 2

FIG. 2



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2,083,936

SHEET DETECTOR

Headley Townsend Backhouse, London, England

Application July 17, 1935, Serial No. 31,878. In
Great Britain August 2, 1934

6 Claims. (Cl. 192—126)

This invention consists in improvements in sheet detectors, and relates to machines for feeding sheets of paper, cardboard or the like, one or more at a time (e. g. as separate sheets or as a series of single sheets in partly overlapped formation), and has particular, although not exclusive, reference to machines for feeding printing presses.

It has already been proposed to incorporate in machines of this kind means for detecting the accidental feeding of more than the predetermined number of sheets and comprising a friction wheel under which the sheets pass, the said wheel being so adjusted that it is just clear of the sheets when the normal thickness of sheets is passing beneath it. So long as this thickness is normal no motion of the friction wheel takes place, but if the thickness is increased above the normal by the passage of an additional sheet or sheets then the wheel is turned by contact with the sheets passing under it and this turning of the wheel is arranged to operate, or to cause to operate, means for stopping the feeding of the sheets.

It is evident that in this previously proposed arrangement the friction wheel must offer very little resistance to rotation and that if stiff sheets are being fed the arrangement has the disadvantage that any irregularity or waviness in the surfaces of the sheets may be sufficient for one of them to touch the wheel and to rotate it thus operating the stopping mechanism. It is an object of the present invention to provide in machines of the above kind means for detecting the feeding of more than the predetermined number of sheets in which this disadvantage is reduced or eliminated.

With this object in view the present invention provides a sheet feeding machine of the above kind characterized by means for detecting the feeding of more than the predetermined number of sheets comprising a pressure roller arranged to bear on the surface of the sheets being fed and to be lifted by the increased sheet thickness should more than the predetermined number of sheets be fed at a time, and a trip device operable by the lifting movement of the pressure roller as aforesaid to stop the feeding of the sheets. The pressure of the roller on the sheets should be sufficient to flatten out any irregularity or waviness of the sheets and may be obtained either by the weight of the roller and its associated parts or the roller may be spring-pressed into contact with the sheets.

In one form of the invention the trip device

comprises a detector wheel (or its equivalent) which is engaged and rotated by the pressure roller when in the lifted position, and on such rotation operates, or causes the operation of, mechanism for stopping the feeding of the sheets.

Fig. 1 is a vertical longitudinal sectional view of a portion of a sheet feeder embodying my invention.

Fig. 2 is a similar view of a different form of the invention.

A specific embodiment of the invention will now be described by way of example with reference to Fig. 1 of the drawings, in which 1 represents a sheet of paper being fed over a support roller 2 and under a pressure roller 3 supported on an arm 4 pivoted on a fixed shaft 5 extending across the machine and supported at each end in frame members 6. The roller 3 is pressed in contact with the paper by a compression spring 7 acting between a lug 8 on an arm 9 adjustably fixed on the shaft 5 and a lug 10 on the arm 4. The pressure roller 3 is provided with a rubber tire 11 which runs in contact with the paper, and has a portion 12 of less diameter than that of the tire. Above the pressure roller is a detector plate 13 mounted for rotation on a bell crank 14 supported on a bracket 28 dependent from, and adjustable along, a bar 29 extending across the machine, rotation of the bracket with respect to the bar being prevented by a key 37 engaging a slot in the bar. It is not necessary that the detector plate 13 should have a completely rounded perimeter since only a limited sector contacts with the pressure roller 3, and in the present example the detector plate has been cut away to the form shown and has been provided with a rubber contact 15 for cooperation with the portion 12 of the pressure roller.

The detector plate 13 is formed with a cam surface 16, 17 cooperating with a follower 18 on a bell crank 19, and so arranged that, after an initial rotational movement of the detector plate in the direction of the arrow, the follower under the action of a spring 20 on the bell crank 19 applies pressure to the cam surface 17 tending to continue the rotational movement until the follower rests against a stop 21 at the end of the cam surface.

Adjacent to the surface 22 of the detector plate, which is also a cam surface, is the end of an arm 23 depending from a square bar 24 extending across the machine and supported in bearings in the frame members 6. This square bar is the bar 5 shown and described in my copending application Serial No. 6,224, filed February 12, 1935, and

rotation of the bar as described in that application puts into operation, or allows the operation of, mechanism which stops the conveyor, and which forms no part of the present invention.

5 In the operation of the mechanism the pressure of the pressure roller is first adjusted by rotation of the arm 8 until the pressure is sufficient to flatten out any irregularity or waviness of the sheets being dealt with. The detector plate is
10 then adjusted by rotation of the bell crank 14 by means of a screw 25 acting against a lug 26 and against the action of a spring 27 until the clearance between the detector plate and the pressure roller is less than the thickness of one sheet of the
15 material when the pressure roller is resting on the normal thickness of sheets. During the feeding of sheets, and so long as the normal thickness of sheets is being fed, the pressure roller rotates on the sheets and remains clear of the detector
20 plate and its contact 15. If, however, an additional sheet is fed, the thickness of the sheets under the pressure roller increases and the roller rises and contacts with the contact 15, rotating the detector plate anti-clockwise, as indicated by
25 the arrow, until the follower 18 moves on to the cam surface 17, when rotation of the detector plate is continued under the action of the spring 20. This rotation of the detector plate brings it into contact with the arm 23 causing rotation of the
30 bar 24 and, as a consequence, stoppage of the feeding of the sheets.

It is to be noted that in the above example the point of initial contact, on lifting of the pressure
35 roller 3, between the pressure roller and the detector plate 13, is to one side of the line LC joining the centers of the roller and plate and that the arrangement is such that the initial movement of the detector plate brings contact
40 15 increasingly closer to said line of centers LC, resulting in a small lifting of the detector plate against the spring 27 and also increasing the pressure and insuring strong frictional contact between the roller and plate over an appreciable
45 arc of movement of the plate. This arc of movement may in itself be sufficient to enable the detector plate to operate trip mechanism without the use of additional means to continue the rotation of the plate as described above.

An example of this arrangement is shown in
50 Fig. 2 in which the detector plate consists of a lever 30 pivoted on a rod 31 carried on a bracket 32 adjustably secured on the cross bar 29. The lever 30 is normally held in contact with a stop 33 on the rod 31 by a light spring 34, this position
55 of the lever being such that the point of contact between a rubber contact wheel 15 on the lever and the pressure roller is, as in the previous case, to one side of the line joining the axes of the roller and lever. The rod 31 is axially adjustable
60 in the bracket 32 by means of a nut 35 acting against a spring 36. As in the previous example, rotation of the lever 30 in the anti-clockwise direction brings it into contact with an arm 23 causing the stopping mechanism to operate.

It is to be understood that the invention is not restricted to the precise constructional details set forth, for example lifting movement of the pressure roller may be arranged to operate electrical
70 mechanism for stopping feeding of the sheets either directly or through a detector wheel. Further the invention may be applied to any machine which feeds sheets, including, for example, a printing press.

75 Having thus described my invention, I claim:

1. In a sheet feeder, an element for supporting sheets as they are fed, a roller arranged above said supporting element mounted to permit up and down movement bodily and running upon the sheets passing over the supporting element, and tripping means set in motion by the rise of said roller when more than the predetermined number of sheets pass beneath it, said tripping means comprising a pivoted detector plate normally out of engagement with said roller and adapted to be
5 engaged and turned by the roller when the latter is lifted above its normal position, that part of said roller which engages with said detector plate when the roller rises being of less diameter than the portion which engages with the sheets being
10 fed.

2. In a sheet feeder, an element for supporting sheets as they are fed, a roller arranged above said supporting element mounted to permit up and down movement bodily and adapted to run
20 upon the sheets passing over the supporting element, tripping means set in motion by the rise of said roller when more than the predetermined number of sheets pass beneath it, said tripping means comprising a pivoted detector plate normally out of engagement with said roller and adapted to be engaged and turned by the roller when the latter is lifted above its normal position, and means other than the rotation of said
25 roller for continuing the turning movement of said detector plate after said movement is begun by the lifted roller.

3. In a sheet feeder, an element for supporting sheets as they are fed, a roller arranged above said supporting element mounted to permit
35 up and down movement bodily and adapted to run upon the sheets passing over the supporting element, tripping means set in motion by the rise of said roller when more than the predetermined number of sheets pass beneath it, said tripping
40 means comprising a pivoted detector plate normally out of engagement with said roller and adapted to be engaged and turned by the roller when the latter is lifted above its normal position, and spring actuated means released by the
45 first turning movement of said detector plate for continuing said turning movement.

4. In a sheet feeder, an element for supporting sheets as they are fed, a roller arranged above said supporting element mounted to permit up and down movement bodily and adapted to run
50 upon the sheets passing over the supporting element, tripping means set in motion by the rise of said roller when more than the predetermined number of sheets pass beneath it, said tripping
55 means comprising a detector plate pivotally mounted to turn about an axis parallel to the axis of said roller but normally out of engagement with said roller, one portion of said plate being adapted to be engaged and turned by the
60 roller when the latter is lifted above its normal position, another portion of the detector plate having a cam surface, and means released by the first turning movement of said plate adapted to operate against said cam surface and thereby
65 continue the turning movement of the plate.

5. In a sheet feeder, an element for supporting sheets as they are fed, a roller arranged above said supporting element mounted to permit up and down movement bodily and adapted to run
70 upon the sheets passing over the supporting element, tripping means set in motion by the rise of said roller when more than the predetermined number of sheets pass beneath it, said tripping means comprising a pivoted detector plate nor-
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5 mally out of engagement with said roller and adapted to be engaged and turned by the roller when the latter is lifted above its normal position, and spring means for holding the detector
10 plate in its normal position against a stop, the first point of contact between the plate and roller being to one side of the line of centers of the plate and roller, and being adapted to be moved toward that line by the turning movement of the plate against the action of said spring means, whereby the tractive force tending to turn the plate is increased.

6. In a sheet feeder, an element for supporting

sheets as they are fed, a roller having two portions of different diameters, said roller being arranged above said supporting element and mounted to permit up and down movement bodily, the larger diameter portion running upon the sheets
5 passing over the supporting element, and a tripping device for stopping the feeder when the roller is raised by the passing of more than a predetermined thickness of sheets, said device being arranged to contact with the smaller diameter portion of the lifted roller.
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