

Nov. 24, 1964

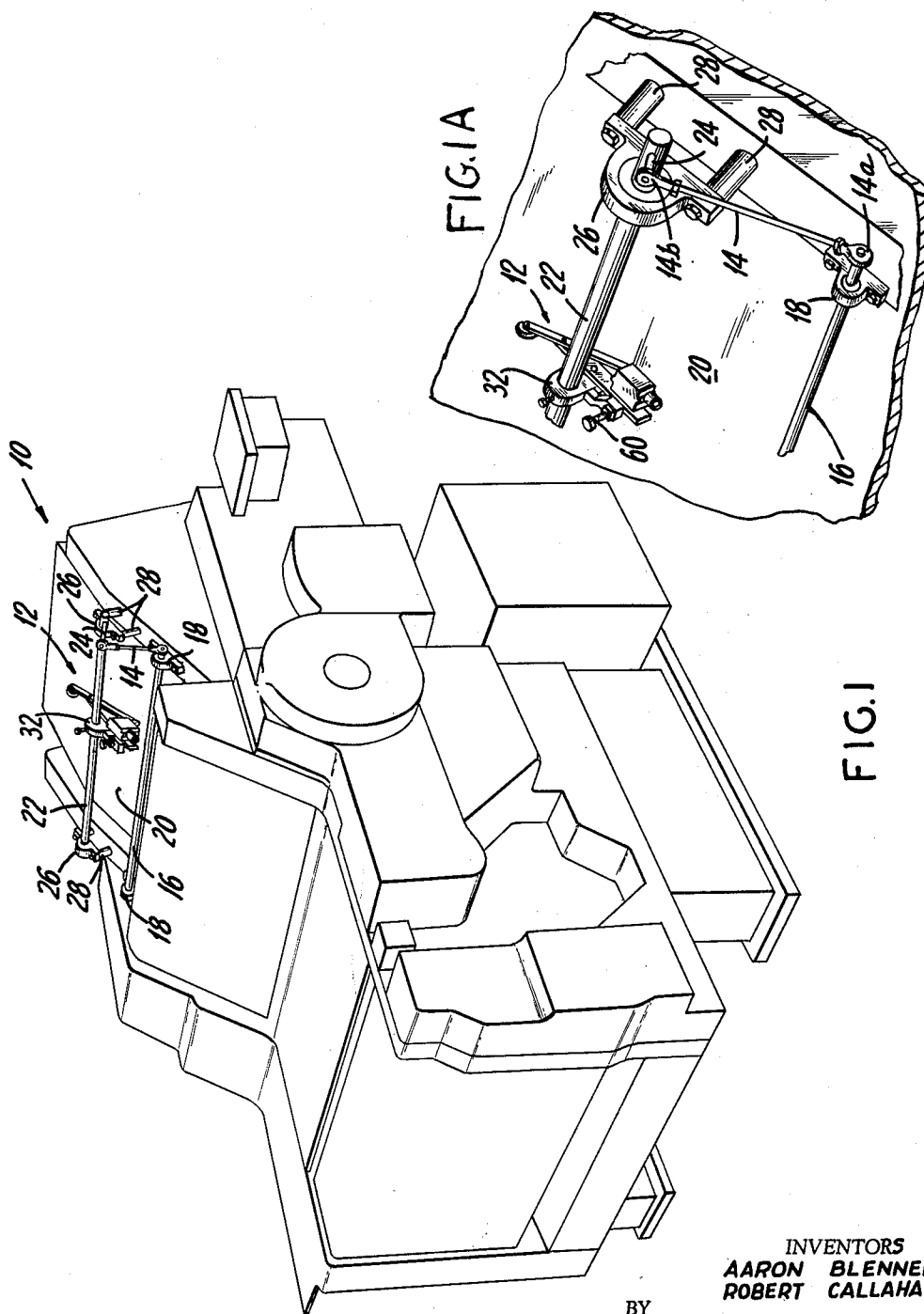
A. BLENNER ET AL.

3,158,369

DOUBLE SHEET DETECTOR FOR PRINTING PRESSES

Filed Dec. 10, 1962

3 Sheets-Sheet 1



INVENTORS
AARON BLENNER
ROBERT CALLAHAN

BY

Leonard H. King
ATTORNEY

1

3,158,369

DOUBLE SHEET DETECTOR FOR PRINTING PRESSES

Aaron Blenner, 120—22 231st St., Cambria Heights, Queens, N.Y., and Robert Callahan, 6802 Narrows Ave., Brooklyn, N.Y.

Filed Dec. 10, 1962, Ser. No. 243,440
6 Claims. (Cl. 271—57)

The present invention relates to a mechanism for the automatic detection of plural sheet feeding in a printing press.

In single sheet printing, a laborious and time consuming operation is the physical inspection of the output of the printing press to detect feeding of more than one sheet of paper at a time. To eliminate the high cost of the sheet by sheet inspection there is provided by the present invention, automatic, unattended detector means that may be easily installed in a printing press already in use. Actuation of the detector, either by a plural number of sheets or a single sheet folded on itself to form a double thickness, will cause the press to stop, enabling the operator to remove the defectively fed sheet and in addition, or in the alternative, sound an alarm. In some types of presses, the detector may be wired in a circuit that will activate automatic removal means for the defectively fed paper.

The detector means of the present invention is so arranged as to have a minimum of contact with properly fed paper. Therefore, the paper will not be marred nor the feeding action of the press interfered with. The detector of the present invention is also timed with the feed action of the press so that it is in proper position when the paper approaches. If only a single sheet is fed, it will pass beneath the detector while if more than one thickness of paper is present, the detector will be activated.

A feature of the present invention is the manner in which a spring loaded switch is utilized in conjunction with the sensing element. It has been found advantageous to arrange the switch such that it is in the "on" position (circuit make) when the switch is released, and when depressed the switch is in the "off" condition (circuit break). This invention utilizes the fact that, for a typical spring loaded switch, the switch arm travels three-thousandths of an inch to engage the switch and only two-thousandths of an inch to release the switch or close the contacts. In this invention, the switch is held in the "off" position since it is normally depressed and is actuated into the "on" position only when the sensor detects an added or folded sheet.

It should be noted that a feature of the present invention is its comparative simplicity and low cost. The apparatus of this invention may be installed in a pre-existing feeding mechanism by any qualified machinist in a matter of hours. The ease with which the present invention is adjusted or repaired adds to its commercial attractiveness and illustrates its improvement over the prior art.

It is, therefore, a principal object of this invention to provide a sheet detector which may be installed on existing printing presses.

It is another object of the present invention to provide a sheet detector which will indicate an undesirable number of sheets.

It is still another object of this invention to provide a sheet detector including a sensing element designed to detect the presence of an undesirable number of sheets without marring or disturbing the sheets.

It is still a further object of the present invention to provide a sheet detector which may be quickly and conveniently installed.

A particular object of the invention is to provide an easily and accurately adjustable detecting device.

These and other features, objects and advantages of the invention will, in part, be pointed out with particularity and will, in part, become obvious from the following more

2

detailed description of the invention taken in conjunction with the accompanying drawing, which forms an integral part thereof. In the various figures of the drawing like reference characters designate like parts.

In the drawing:

FIG. 1 is a perspective view of a typical press with the apparatus of the present invention installed thereon.

FIG. 1A is an enlarged perspective view showing the relationship of the present invention with respect to a portion of the press.

FIG. 2 is a side elevation view of the detector in operating position illustrating two conditions of use.

FIG. 3 is a side elevation view of the detector in its non-operative position.

FIG. 4 is a plan view of the detector.

FIG. 5 is a circuit diagram of a control and alarm system for use with the detector of the present invention.

In FIG. 1, there is shown a printing press 10 of the Heidelberg type having installed thereon a multiple thickness paper detector generally characterized by the numeral 12. An operative connection is made between the press and the detector by a connecting rod 14 having spherical, self-aligning bearings 14a and 14b at each end thereof. Commercially available rod ends of this type have been chosen because of their low coefficient of friction and also their ability to withstand extremes in vibration. Bearing 14a is affixed to the existing oscillatory main gripper shaft 16 which is supported transversely in pillow blocks 18 on either side of feed board 20. During press operation shaft 16 is oscillated in timed relation to paper feeding. This motion is transmitted through connecting rod 14 and bearing 14b to a parallel, transverse rocker shaft 22 by means of a radial stud 24 mounted in an extension thereof. Shaft 22 is similarly rotatably secured on either side of feed board 20 in pillow blocks 26, which are in turn secured to stand-offs 28 mounted on the press frame. It will be appreciated that the installation of the support equipment, as well as the connection to existing structure, is relatively simple, permitting completion in a matter of hours by a competent mechanic. While the drawings show the oscillation of the detector derived from the main gripper shaft of the press, it should be understood that on a different size press, as well as presses of other manufacture, the same motion may be generated by tying into the oscillating side guard motion shaft.

Secured approximately midway on shaft 22 is the plural thickness detector 12 of the present invention. Detector 12 comprises a support block 32 connected to and oscillated together with shaft 22. An elongated lever 34 is pivotally secured to block 32 by stud 36 which is suitably mounted in a low friction bearing 38. Fastened to one end of lever 34 is a spring loaded switch 40 of the normally open type such as the "Microswitch" manufactured by Minneapolis-Honeywell Regulator Co. Contact button 42 of switch 40 is held in its normally open or "off" position by roller 44 affixed to one end of arm 46 by means of stud 47. Arm 46 is pivotally mounted on lever 34 by means of stud 48 suitably secured in a low friction bearing 50. Affixed to the opposite end of arm 46 is an additional roller 52 mounted on stud 54. As may be seen in FIG. 2 in solid outline, a single thickness of paper T₁ may freely pass beneath roller 52. However, a double thickness of paper T₂ will cause a counterclockwise rotation of arm 46 moving roller 44 away from contact button 42 thus closing switch 40. This latter action is illustrated in dotted outline in FIG. 2.

Various adjusting means are incorporated in the detector. Clamp screw 56 permits the detector, as a unit, to be set at different angles depending upon the slope of the press feed board. Bracket 58, depending outwardly of block 32 carries a threaded adjusting stud 60 and a lock-nut 62. The bracket is so positioned that the stud is

brought to bear against the top surface of lever 34. To set the detector, a single thickness of the paper to be printed is used as a feeler gauge. It is placed on the feed board beneath roller 52 and the stud 60 is turned so that the paper will just slide under the roller without appreciable contact. A double thickness of paper is then employed. The alarm circuit described hereinafter is used to determine whether or not the device is properly set. Since switch 40 is also mounted on lever 34, button 42 will remain in contact with roller 44 as lever 34 is rotated about stud 36 to obtain a gap substantially equal to T_1 . Spring biasing means 64 maintains lever 34 in engagement with stud 60 and spring biasing means 66 maintains roller 44 in contact with button 42 of switch 40.

FIG. 3 illustrates the non-detecting position assumed by assembly 12 during that part of the cycle when no paper is on the press feed board. As explained hereinbefore, assembly 12 is rocked by the oscillating action of either the main gripper shaft 16 or the side guard motion shaft.

A preferred control and alarm system is shown in FIG. 5. Leads 101 are connected to a nominal 115 v. A.C. power source. Fuse 102 is in series with the power lead and switch 40 of the detector 12. Neon lamp 103 is connected in parallel with the contacts of the switch 40. Thus when the switch 40 is open, the neon lamp 103 will light.

When switch 40 closes, relay solenoid 104 is energized, closing N.O. contacts *a-b* and *c-d*. Contacts *a-b* are in a relay hold circuit. Closing of the contacts *a-b* causes lamp 113 and an alarm typified by bell 105, to be energized through transformer 106. If desired, either the lamp or bell alarm may be employed in a given installation. The alarm will continue to be sounded until the operator presses "off" button 108 disabling the hold circuit for solenoid 104. The circuit may also be employed to energize the standard press trip solenoid to stop the press. This is done by closing switch 108. In this mode of operation, when relay 104 is energized, contacts *c-d* complete a circuit to the press trip solenoid. Since the press trip solenoid need be energized for only a few seconds, time delay 110 delays the energization of relay solenoid 111 for the requisite time after which relay 111 contacts *e-f* are opened. This disables the entire circuit including relay 104, returning it to its start condition.

Switch 112 is provided for the manual adjustment of the sensor. When this switch is open, the holding circuit for relay 104 is open preventing relay 104 from becoming locked. In this condition, when the operator brings the sensor down on one thickness of paper and slowly adjusts screw 60, the alarm stops ringing. He then tests the device with two paper thicknesses to make certain the alarm rings. The operator then closes switch 112 for normal operation.

It will be seen then that the apparatus hereinbefore described is of very rugged construction, capable of withstanding the vibration occurring during the operation of a printing press. Further, this ruggedness is obtained without sacrificing the sensitivity needed for detecting the presence of a defectively fed single sheet of paper which may be of the order of but 0.001" thick. In one test, 0.0015" thick paper stock was being run without sounding the alarm. A 0.0005" shim sheet was then run together with the 0.0015" paper. The difference of but 0.0005" resulted in the sounding of the alarm. Combined with inherent ruggedness or rigidity are two forms of adjustment. The first, of course adjustment, permits use of the apparatus with a variety of presses having a range of feed board slopes. The second, or fine adjustment, allows for use with various thickness papers in a single press. Should the grade or thickness of paper be changed either during the course of a particular run or at any other time, the apparatus may be readily changed to meet the new operating conditions.

It should be understood that the rollers and bearings illustrated in the drawings may be made from a number of materials including nylon, oil impregnated bronze, etc.

There has been disclosed heretofore the best embodiment of the invention presently contemplated and it is to be understood that various changes and modifications may be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

1. A plural paper sheet detector for printing presses having a shaft oscillating in timed relation to the feed of individual sheets of paper and a feed board comprising:
 - an oscillating rocker shaft mounted transverse the printing press feed board in spaced relation thereto;
 - connective means secured to both said printing press oscillating shaft and said rocker shaft for transmitting the timed oscillation of said printing press shaft to said rocker shaft;
 - a support block adjustably secured to said rocker shaft said support block being arranged to oscillate together with said rocker shaft;
 - a spring loaded switch having an external contact button;
 - support means for said switch, said support means being pivotally mounted on said support block said support means being arranged to oscillate together with said rocker shaft whereby said switch is also oscillated; and
 - an actuator pivotally supported on said support block and in positive, biased engagement with said switch, said actuator being positioned proximate the printing press feed board only when the paper is being fed past said actuator, whereby the feeding of more than one thickness of paper between said actuator and said feedboard will disengage said actuator from said switch.
2. The apparatus of claim 1 wherein said actuator maintains said switch in an engaged condition until more than one thickness of paper is fed between said actuator and the feed board.
3. The apparatus of claim 1 wherein said actuator comprises:
 - an elongated arm having first and second ends; and
 - a follower mounted on said first end in engagement with said switch contact button and a roller pivotally mounted on said second end, said roller being positioned proximate the printing press feed board whereby the feeding of more than one thickness of paper between said actuator and the feed board will disengage said actuator from said switch.
4. The apparatus of claim 1 wherein said actuator comprises:
 - an elongated arm having first and second ends;
 - a first roller pivotally mounted on said first end, said first roller being in engagement with said switch contact button and a second roller pivotally mounted on said second end, said second roller being positioned proximate the printing press feed board whereby the feeding of more than one thickness of paper between said actuator and said feed board will disengage said actuator from said switch.
5. The apparatus of claim 1 including adjusting means comprising a bracket secured to and depending substantially perpendicular from said support block, said bracket having a threaded aperture therein and a threaded stud adapted to pass through said aperture and bear on said switch support means to maintain said support means in a predetermined, fixed relation to the feed board.
6. The apparatus of claim 5 including first resilient biasing means between said bracket and said switch support means and a second resilient biasing means between said bracket and said switch actuator.

References Cited in the file of this patent

UNITED STATES PATENTS

2,665,907	Ribich	Jan. 12, 1954
2,670,954	Bach	Mar. 2, 1954
2,992,820	Tarback	July 18, 1961