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DETECTING DEVICE FOR MACHINES WORKING ON SHEETS

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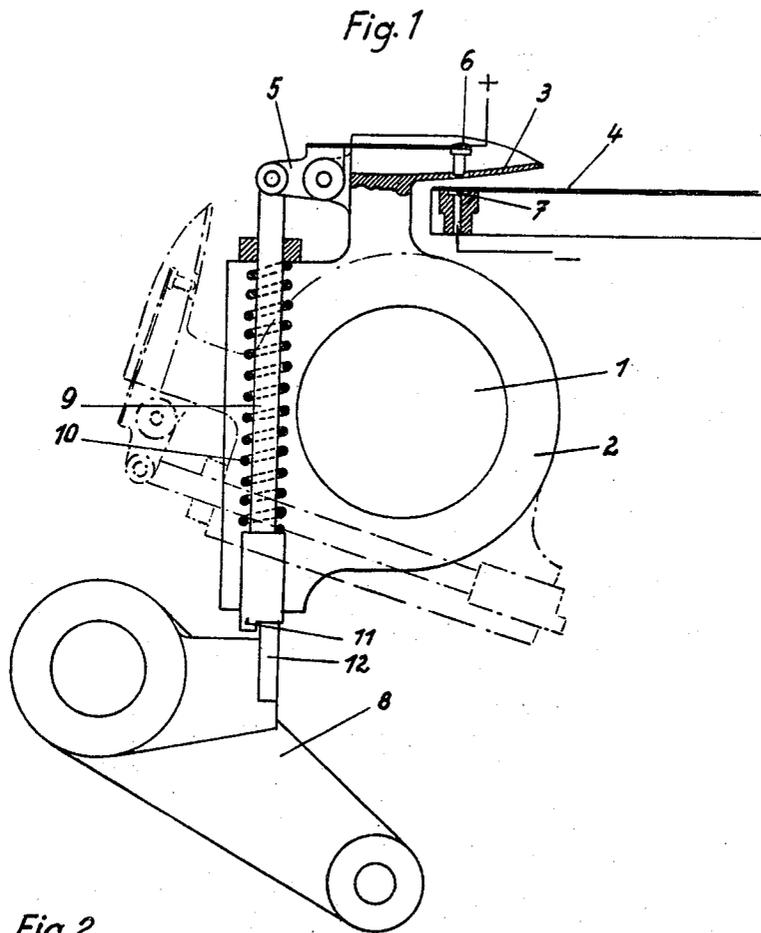


Fig. 2

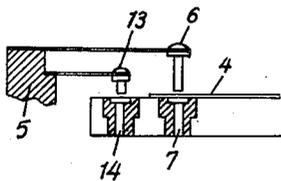
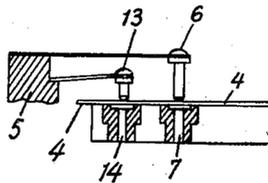


Fig. 3



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**DETECTING DEVICE FOR MACHINES WORKING ON SHEETS**

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7 Claims. (Cl. 101—247)

This invention relates to a detecting device for use in machines operating on sheets of material, such as paper for example. It has particular although not exclusive reference to printing machines, especially such in which the sheets to be printed upon are fed underlapped in a continuously moving path and in which means are provided, to detect sheets which may be incorrectly positioned on the supporting table, or failing altogether, by the cooperation of two or more detecting members, through which the tripping of the printing mechanism is then initiated. For detecting, or feeling, the side edges of the sheets preferably only one detecting device is used, while at the front edge two of such devices are preferably employed.

In these machines the correct position of the sheets is of vital importance. The devices which are at present in use for detecting incorrect positions of the sheets fail in so far as they do not respond to a sheet which in the right moment lies upon the stops or guides marking the correct position instead of against them, or which may have travelled too far in the direction of feed. The reason for this failure, in the known devices, usually rests in that the detecting member or feeler which descends from above settles down upon the sheet and is, therefore, unable to contact with its cooperative member underneath. Such sheets, in the known devices, are advanced like properly positioned sheets; they consequently fail to trip the printing cylinders as they should and will pass at the wrong moment, or in a wrong position, into the machine and thereby often give rise to serious destructions, particularly in the case of strong paper, paste board, or the like material.

It is, therefore, the main object of the invention to provide a detecting device for use in machines operating upon sheets, such as printing machines, in which the aforesaid drawbacks are absent and which will reliably detect any wrong position which any of the sheets may have, before they are able to cause any harm.

Another object of the invention is to unerringly signal such incorrect position of sheets as by immediately and automatically setting the printing mechanism of the machine inactive and to thereby prevent the further advance of such sheets into the machine.

A still further object of the invention is to arrange at least one of the detecting members or feelers to be permanently underneath the plane of the sheet to be controlled, while at least one other member occupies a position of rest also underneath that plane but to be moved in timed relation to the feed of the machine around the sheet edge into its working position above the said plane in line with the other member underneath.

Still another object of the invention is the provision of electric means in connection with the said mechanical means for initiating the tripping of the printing mechanism directly or by interposition of optical or other means.

The invention serves the purpose of eliminating all the disadvantages of the previous devices which have all been adverse to a reliable testing or detecting of the position

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of the sheets on the supporting table and, in a preferred form for use in printing machines, consists in an arrangement in which one or more of the cooperative detector members or feelers are permanently located below the underlapped path of the sheets, while their cooperating members are moved in timed relation to the feed of the sheets from a position below the plane of the sheet to be controlled, or of the supporting table surface respectively, around the edge of the said sheet into a position of work, or work preparedness, above the sheet in line with the detector member or feeler below. When in this position, the feeler member or members are moved by mechanical or other means, which are also driven in timed relation to the feed, into cooperation with their opposing members. If more convenient, both detector members above and below the plane of the sheet may be controlled to jointly carry out the detecting operation or, as a further alternative, the arrangement may be reversed in that the lower members are made to move while the upper members remain stationary.

The device according to the invention may be employed in printing presses with underlapped feed as also in such presses in which the sheets are fed one by one into the printing mechanism of the machine.

In accordance with the invention the movable detector or feeler member is moved into its working position at substantially the same time with the stop or stops for the sheet to be controlled and, for this reason, is preferably also mounted upon the same shaft with the stops. In the case of a sheet having moved beyond its stop line before the stop and the feeler have moved into position, it will be lifted by them so that both feeler members come into contact with each other and thereby initiate the tripping of the printing mechanism.

It may, and sometimes does occur, that a sheet projects but slightly beyond the stop line. In this case the sheet crumples somewhat at the place of the stops as soon as these move into position. The detecting device, normally, would not respond to such positions of the sheet because of the latter then lying between the two feeler members. However, to also meet such contingency two additional members may be provided, which preferably consist of two electric contacts or terminals positioned in the rear of the stop line. In the normal, i. e. in the correct position of the sheets these contacts will touch each other so as to close an electric circuit, which becomes interrupted as soon as a sheet moves beyond the stop line, whereby the tripping of the printing mechanism becomes initiated.

The members cooperating in the detecting operation may be of different kind. They may, for instance, consist of two electric terminals, of which one could be arranged to be moved together with the stops from a position below the plane of the sheet around its edge to a position over the underlapped path of the sheets. If a sheet should fail or be deposited incorrectly, the two terminals, one of which is permanently located below the underlapped plane of the sheets, will come into contact with each other during the detecting operation and thereby close a circuit which initiates the tripping of the printing cylinders.

The various objects and improvements of the invention will now be more closely referred to in the accompanying drawings which illustrate several modifications of a detecting device as applicable to a printing machine with underlapped feed of the sheets, it being understood however, that the figures contained in these drawings are only given by way of example and that the means illustrated may be varied or adapted to suit other purposes and machinery all within the scope of the claims appended at the end of this specification. In these drawings:

Fig. 1 illustrates a detecting device which, in accord-

ance with the invention, is arranged to swing at least one of the detecting means from a place below the plane of the sheet to its working position above the same.

Figs. 2 and 3 represent details of a modified form of a device similar to that shown in Fig. 1, in which two double contacts are used for controlling the position of the sheet. The showing of this and the following figures is largely diagrammatic.

In the example shown in Fig. 1 the shaft, which is denominated with the reference numeral 1, oscillates a ring 2 having an arm 3 in timed relation to the feed of the sheets in the machine. Hereby the arm moves from the position below the plane of the sheet 4, which position is indicated in broken lines in the figure, into the position shown in full lines, in which a contact 6, resiliently carried on a lever 5, becomes temporarily located directly over a stationary contact or terminal 7 provided within a bore of the sheet support or table.

Also in timed relation to the feed of the sheets a control lever 8 raises and lowers a tappet rod 9 which is placed under the action of a compression spring 10. When in the act of feeling the edge of the sheet 4 the tappet rod 9 is raised to tip the lever 5, which is fulcrumed to the arm 3, so that the contact 6 swings downwardly until it comes to rest upon the sheet 4. If no sheet should have been delivered, or if a sheet has been incorrectly placed, the contacts 6 and 7 will touch and thereby close an electric circuit over the wires connected to them and by this circuit, which immediately initiates the tripping of the printing cylinders in a manner known per se. In addition the detecting device remains locked in its circuit closing position by a plate 12 on lever 8 which takes its place in front of an abutment 11 and thus prevents the tappet rod 9 from returning into its original position.

In the modification shown in Figs. 2 and 3 the general arrangement of the parts must be considered to be the same, or substantially the same, as in the example shown in Fig. 1. However, in addition to the one pair of contacts 6, 7 already referred to there is provided another pair of like contacts 13, 14 located outside the normal position of the sheet, to close an auxiliary circuit. If the sheet to be controlled exceeds its normal position as indicated in Fig. 3, this auxiliary circuit will not be closed and the printing mechanism will be tripped.

What we claim and desire to secure by Letters Patent of the United States is:

1. In a detecting device for use in printing machines for printing upon sheets for detecting incorrectly positioned sheets on the feed table of the machine, in combination with said sheet feed table and with electrically controlled means for tripping the printing mechanism of the machine, a feeler permanently located below the plane of the table surface, a second feeler swingingly arranged and normally also located below the said plane remote from the table, an oscillating arm for supporting said second-named feeler, an oscillating shaft for swinging said arm together with said second-named feeler in timed relation to the feed of sheets in the machine to a position above the plane of the table surface in line with the first-named feeler, current conducting means in connection with each of said feelers, and means in addition to said swinging means for moving said second-named feelers in a substantially vertical direction so as to close an electric circuit for initiating the tripping of the printing mechanism of the machine.

2. In a detecting device for use in printing machines for printing upon sheets for detecting incorrectly positioned sheets upon the feed table, in combination with said feed table and means for tripping the printing mechanism of the machine, an electric contact arranged stationary below the plane of the table surface, a second electric contact swingable in relation to the first-named contact and normally also located below the plane of the said table surface, an oscillating arm for swinging said

second-named contact, a rocking shaft for moving said arm together with said second-named contact in timed relation to the feed of the sheets in the machine to a position above the plane of the table surface in line with the said first-named contact, current conductors in connection with each of said contacts, and power-controlled means in addition to said swinging means in association with a reciprocating tappet rod also operable in timed relation to the feed of the sheets for moving, in the case of incorrectly positioned sheets on the table, said second-named contact into engagement with said first-named contact for the closing of a circuit initiating the tripping of the printing mechanism of the machine.

3. In a detecting device for use in printing machines for printing upon sheets for detecting incorrectly positioned sheets upon the supporting table, in combination with said supporting table and means for tripping the printing mechanism of the machine, an electric contact arranged stationary below the plane of the table surface, a fulcrumed lever, a second electric contact on said fulcrumed lever swingable therewith in relation to the first named contact and normally also located below the plane of the said table surface, a rockable arm for carrying said fulcrumed lever and said second-named contact, a rocking shaft for rocking said arm together with said second-named contact in timed relation to the feed of the sheets in the machine to a position above the plane of the table surface in line with said first-named contact, current conductors in connection with each of said contacts, a spring-controlled tappet rod for actuating a fulcrumed lever carrying the second-named contact, and power operated means also operating in timed relation to the feed of the sheets for reciprocating said tappet rod and thereby moving said second-named contact into touch with the first-named contact and to thereby close an electric circuit in the case of an unobstructed passage between the said contacts for initiating the tripping of the printing mechanism in the machine.

4. In a detecting device for use in sheet printing machines for the detecting of incorrectly positioned sheets upon the sheet supporting table, in combination with said sheet supporting table and means for tripping the printing mechanism of the machine, a contact-member permanently located below the plane of the table surface, a second contact member normally also located below said plane remote from the table, means operable in timed relation to the feed of the sheets in the machine for swing said second-named contact member around the edge of the sheet to a position above said plane in line with said first-named contact member, current conductors in connection with each of said contacts, means including a tappet rod also operable in timed relation to the feed of the sheets and to the swinging of the second-named contact for moving said second-named contact member into touch with the first-named contact member when no sheet is positioned between them, to close a circuit for initiating the tripping of the printing mechanism, and a member for maintaining the entire detecting device in its raised position over the stationary electric contact when an electric contact has been established.

5. In a detecting device for use on machines operating on sheets for the detection of incorrectly positioned sheets, in combination with a supporting table and with means for setting the operating mechanism of the machine at rest, a detector member stationarily located at one side of the plane of the supporting table, a second detector member normally also located at the same side of said plane, means for moving said second detector member in timed relation to the feed of the sheets to a point on the other side of said plane in line with said first detector member and back into its initial position, means for moving said second-named detector member from its position in line with said first detector

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member at right angles toward and away from the said first detector member, and power-operated means for effecting said toward-and-away movement after said second-named detector member has been moved into position above the said first detector member and prior to its return movement into its initial position.

6. In a detecting device as set forth in claim 5, in which the cooperative pair of stationary and movable contact members is arranged in duplicate so that one of said pairs responds to sheets not reaching their positioning marks and the other of said pairs responds to sheets passing their positioning marks.

7. In a detecting device for use in printing machines for printing on sheets and for detecting incorrect positions of sheets on the feed table, in combination with said feed table and with means for tripping the printing mechanism of the machine, a feeler located stationary below the plane of the feed table surface, a second feeler swingably arranged about an axis below the said first-named feeler, means operable in timed re-

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lation to the feed of the sheets into the machine for swinging said second-named feeler to a position above the said plane in line with said first-named feeler, means also operable in timed relation to the feed of the sheets for moving said second-named feeler in a substantially vertical direction toward and away from the said first-named feeler, and power-driven means for effecting said toward-and-away movement after the said second-named feeler has been moved into position above the said first-named feeler and prior to the relocation of the said second feeler into its position below the plane of the feed table surface.

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