This invention relates to an improvement in sheet feeding machines and more particularly to a device for automatically stopping machine operation when a sheet or card is fed in an improper manner.

In the operation of high speed accounting machines or other machines wherein cards are successively fed along a common path of travel, it frequently happens that a wrinkled or otherwise mutilated card fails to feed properly, and as a result a card jam occurs in which a substantial number of cards are damaged. These cards cannot be used again, and new cards must be perforated to replace them, all of which causes a considerable loss of time and a corresponding decrease in the output.

The prior art discloses a jam detection means comprising a light weight rod which extends the length of the card transporting chamber and is positioned substantially above the plane of the feeding cards. A buckling action of a card or a plurality of cards during sorting would lift the rod and open a set of electrical contacts to break the circuit to the motor of the machine. When placed near the card line, this rod is easily lifted by slightly mutilated cards which are feeding properly to cause a false stopping of the machine. When the rod is positioned far enough above the card line to avoid contact with wrinkled cards, a substantial number of cards would be involved in a card jam before the rod would detect the jam. The present invention eliminates these objectionable features found in the prior art.

The principal object of the present invention is to provide an improved jam detection device for a sheet feeding machine in which the sheet feeding mechanism is automatically stopped when a card fails to feed properly. An object is to provide a jam detection device which quickly stops the card feeding mechanism of a high speed accounting machine to prevent involvement of a substantial number of cards when a card jam occurs.

Another object is to provide a jam detection device which utilizes the cumulative effect of a plurality of card jams to cause the card feeding mechanism to stop quickly.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose, by way of example, the principle of the invention and the best mode, which has been contemplated, of applying that principle.

In the drawings:

Fig. 1 is a schematic elevation of a card feeding mechanism equipped with one form of the present invention.

Fig. 2 is a detail view of the jam detection device partly in section showing the relative position of the parts when a card jam occurs.

Fig. 3 is a sectional view of the card feeding mechanism taken along line 3-3 of Fig. 1 and showing the jam detection device mounted in position.

Referring to the drawings, the preferred embodiment of the present invention is shown in Fig. 1 as applied to the card feeding mechanism of a sorting machine of the type disclosed in U. S. Patent No. 1,741,985, issued to E. A. Ford on December 31, 1929, in which a plurality of sorting pockets are employed. However, the invention is not specifically so limited and is adaptable for use in other suitable machines.

In Fig. 1 an electrically controlled sorting machine is disclosed in which the sorting of record cards is accomplished through the medium of a sorting magnet 11 under control of analyzing brush 22 which causes energization of the magnet 11 as soon as a hole is encountered in the card column analyzed. The electrical circuits which accomplish this are not illustrated herein, since they do not comprise any part of the present invention. According to the point of time at which the energization of the sorting magnet 11 takes place, the armature 23, upon which the ends of the tongues 24 of the guide blades 24 feeding to the card receiving pockets 25 rest, determines the destination of the card being analyzed.

The ends of the tongues 24 are spring-urged downwardly upon the armature 23 so that during the card analyzing cycle the record card R is guided between the end of the tongues 24 and the armature 23, with the result that on the energization of the sorting magnet 11, only as many tongues 24 as are lower by the record card 22 as do not overlie the record card, while the remaining tongues 24 are kept in raised position by the card. For this purpose, there is provided a fixed bar 26, parallel to, and on a level with, the armature 23, in its normal position, arranged to support the record card after the armature is lowered. It may be mentioned that the time of energization of the sorting magnet depends upon the position of the hole in the card column, each of which has twelve index point positions, so that the cards may be guided selectively into any one of twelve sorting pockets 25.

Through the downward movement effected by energization of the sorting magnet, the tongues 24 disengaged from the card R produce a gap between the last tongue caught by the record card and the next adjacent tongue, moved downwardly along with the armature 23, into which gap the record card is conveyed and thereafter guided to the coordinated sorting pocket by means of the usual feeding rollers 27.

If it should happen that there is no perforation in the card column analyzed, the magnet 11 will not be energized, and the card will pass beneath a series of the tongues 24 and will be guided to a thirteenth pocket 25B, known as the "reject" pocket. The card feeding mechanism comprises a picker 28, horizontally reciprocable to feed cards, singly, from the bottom of a stack 29 to a pair of feed rollers 30 which advance the card to and between brush 22 and contact roller 30. The machine is motor driven in the conventional manner.

The jam detection device of the present invention is shown mounted above the card line in Figs. 1 and 3. A channel support member 31 is secured to the frame of the sorting machine and extends almost the full length of the card feeding mechanism. A series of brackets 18 are secured on the rib portion of channel 31 and support the jam detection device on bars 19 which are mounted between the machine side frames. A bracket 32 having a pair of ears 32a is fastened on the rib portion of channel member 31 near the end of the feeding mechanism. An L-shaped arm 33 is pivotally mounted on the ears 32a of bracket 32 through lugs 34 and pivot pin 35. A metal ribbon 36 is fixed at one end to channel member 31 by screws 37 (Fig. 1) and passes over a guide block 38 carried by channel 31. The other end of ribbon 36 is connected to arm 33 at 39. It should be understood that ribbon 36 is not restricted to a metal composition but may be made from any material which provides a similar...
resilient characteristic. A series of projecting guide members 40 are secured to channel 31 and are positioned at spaced intervals. The guide nearest to the center portion of channel 31 has a duo of openings designated 40a (Fig. 3) through which ribbon 36 passes to restrict lateral movement of the ribbon. A spring 41 extends between block 32 and arm 33 to bias the arm in a clockwise direction, as viewed in Fig. 1, and hold ribbon 36 straight across all of the guide members 40.

Referring now to Fig. 2, a microswitch 42 is shown mounted on a bracket 20 which in turn is secured to channel 31. Arm 33 has an extension 33a which carries an adjustable screw 43 on its undersurface, the end of which cooperates with a spring pressed plunger 44 protruding from the microswitch 42. This plunger controls contacts (not shown) supported internally in the microswitch 42. These contacts are in series with the stop key contacts 214 shown in Fig. 15 of the aforementioned U.S. Patent No. 1,741,985, issued to E. A. Ford, and are closed to permit the motor to remain energized. The arm 33 is biased in a clockwise direction, as previously described, and presses the screw 43 against plunger 44, thus maintaining the microswitch contacts closed during normal machine operation.

When a faulty card, in passing through the card feeding mechanism, becomes jammed, other cards will be snagged on the jammed card, thus resulting in destroying or mutilating a substantial number of cards unless the machine is quickly stopped. In Fig. 2, a card jam is shown in which a buckled card urges the ribbon 36 upwardly between the adjacent guide members 40 to cause a pull on the arm 33, thus rotating the arm counterclockwise about pin 35 against the pressure of spring 41. This movement of arm 33 releases the pressure of screw 43 against plunger 44 and the microswitch contacts in the motor circuit. This action is quick to occur, since a small movement upwardly of ribbon 36 causes it to be drawn over the adjacent guides 40 to effect a pull on the arm 33. It can be readily seen that simultaneous card jams at more than one location in the card feeding mechanism have a cumulative effect on the ribbon 36 to cause an immediate pull on the arm 33 which results in opening of the microswitch contacts.

From the foregoing it is apparent that a jam detection device is provided which is sensitive to any variation of a single card or a plurality of cards from the proper path of travel at a particular location or distortions of cards from the path of travel simultaneously from a plurality of locations in the card path to cause improper feeding of cards by the feeding mechanism. This device acts quickly in a positive manner to stop the feeding of cards before damage is done to the cards which follow the jammed card or cards. The mutilation of cards during the sorting or other operation is vastly reduced, and the productive capacity of the machine is increased thereby.

While there have been shown and described and pointed out the fundamental and novel features of the invention as applied to a preferred embodiment, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art, without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. In a machine for feeding sheets, a series of pairs of feed rollers for feeding sheets successively along a common path, a jam detecting ribbon stretching along said path and fixedly anchored at one end thereof, a series of ribbon guides coincident in location with said feed rollers and against which the ribbon rests, a switch for controlling the operation of said feed rollers, and an operable arm connected to the other end of said ribbon for holding said ribbon straight across all of said guides and said switch in one position, distortion of a card from said path pushing transversely on said ribbon between said guides to effect tensioning of said ribbon and cause a pull thereon, whereby said arm is operated to move said switch to the other position and stop the operation of said feed rollers.

2. In an accounting machine, a mechanism for feeding cards successively along a common path, a support member, a switch for controlling the operation of the feeding mechanism, a movable arm for operating said switch to stop the feeding mechanism, a ribbon extending along said path and connected at one end to said arm, the other end of said ribbon being connected to said support member, a plurality of guides projecting from said support member and located at spaced distances along said ribbon, resilient means extending between said support member and said arm to hold said ribbon straight across all of said guides and said switch closed, distortion of a card from said path pushing transversely on said ribbon between said guides to effect a pull on said ribbon, whereby said arm is moved to operate said switch and stop said feeding mechanism.

3. In a statistical machine, a mechanism for feeding records successively along a common path, means having a movable operating arm for controlling the operation of the feeding mechanism, a ribbon extending along said path and connected at one end to said arm and fixedly mounted at the other end, and a plurality of guide members projecting toward and into contact with said ribbon and located at spaced distances along said ribbon, distortion of a record from said path pushing transversely on said ribbon between said members to effect a tensioning of said ribbon and cause a pull thereon, whereby said arm and controlling means are operated to stop the feeding mechanism.

4. In a statistical machine, a mechanism for moving records along a common path in rapid succession with a plurality of them in the path at one time, a switch for controlling the operation of said mechanism, an arm normally holding said switch in one position, a ribbon extending along said path and connected at one end to said arm and fixedly mounted at the other end, and a series of guide members against which said ribbon rests, a plurality of simultaneous distortions of records from said path applying transverse pressure to said ribbon between a plurality of pairs of said members to effect a cumulative tensioning on said ribbon and cause a pull thereon, whereby said arm is operated to move said switch to its other position and stop the record moving mechanism.

5. In a statistical machine, a mechanism for feeding records successively along a common path, means having a movable operating arm for controlling the operation of the feeding mechanism, a ribbon extending along said path and connected at one end to said arm and fixedly mounted at the other end, and a guide member against which said ribbon rests, a plurality of simultaneous distortions of records from said path applying transverse pressure to said ribbon between a plurality of pairs of said members to effect a cumulative tensioning on said ribbon and cause a pull thereon, whereby said arm is operated to move said switch to its other position and stop the record moving mechanism.

6. A card jam detection device, comprising a support member, a switch operator movably mounted on said support member, a ribbon extending along said path and connected at one end to said arm and fixedly mounted at the other end, and a guide member against which said ribbon rests, a switch for controlling the operation of said ribbon to effect a tensioning of said ribbon and cause a pull thereon, whereby said arm is operated to move said switch to its other position and stop the feeding mechanism.

7. A card jam detection device comprising a support member, a switch operator movably mounted on said support member, a ribbon extending the length of said
support member and connected at one end to said switch operator, the other end of said ribbon being connected to said support member, and a series of guides fixed to said support member and engaging said ribbon between its end limits to mount said ribbon in parallel spaced relation to said support member, whereby said ribbon is capable of moving transversely between said guides in response to a card jam to effect a pull on said ribbon and cause operation of said switch operator.

References Cited in the file of this patent

UNITED STATES PATENTS

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