

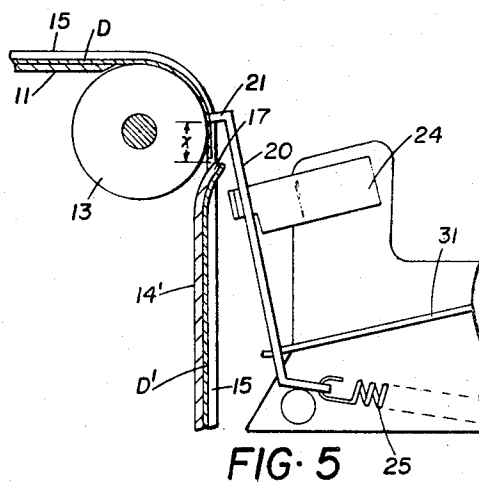
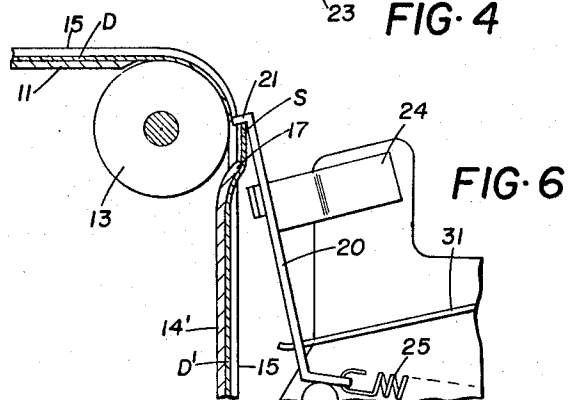
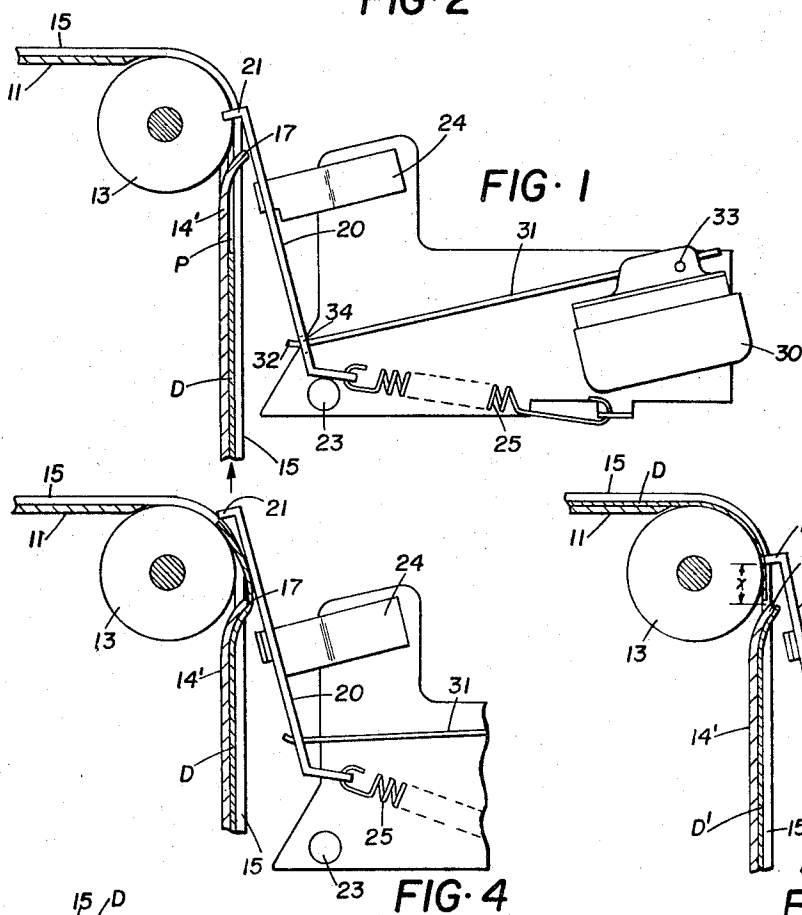
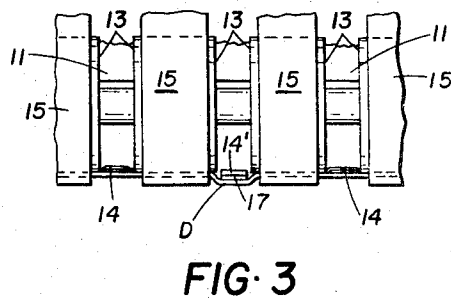
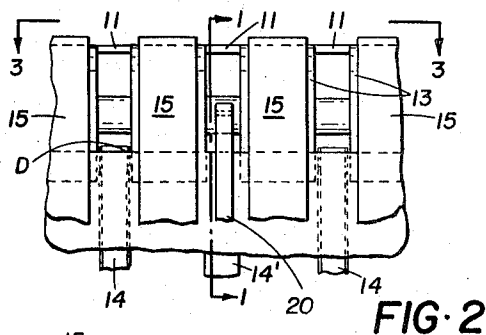
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SHEET RESPONSIVE CONTROL DEVICE

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SHEET RESPONSIVE CONTROL DEVICE

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7 Claims

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ABSTRACT OF THE DISCLOSURE

A control device is disclosed for actuating or initiating functions relating to an apparatus in response to the movement of individual sheets along the path associated with the apparatus. The apparatus has a sheet deflecting portion for deflecting the leading end of each sheet into positive engagement with a sheet engaging member of the control device.

The present invention relates to a control device which is responsive to individual sheets fed along a given path. More specifically, the present invention concerns an improved device for actuating or initiating functions relating to an apparatus, in response to the movement of individual sheets along a path associated with the apparatus. In accordance with the improved actuating device of the present invention, a definite engagement is provided between the sheet engaging member and individual sheets fed past the engaging member, even under conditions of close sheet spacing and rapid feed rates.

It will be apparent from the following description that the present invention has many useful adaptations and can be used in conjunction with numerous types of apparatus. For purposes of illustration, the invention is hereinafter described as it might be incorporated to actuate control functions in a continuous microfilmer, such functions including, for example, operating a counter, lamp or shutter by means of a document-actuated microswitch. However, other equivalent connections such as a mechanical linkage or fluid coupling can be used to initiate functions relating to the apparatus in which it is used. Likewise, it will be apparent that the actuating member can be adapted to effect such functions itself without operating through other mechanisms.

Previous devices are known which provide an actuating movement in response to individual sheets fed past the device; however, difficulty has been experienced in achieving a reliable actuation in response to each sheet in situations where the individual documents are spaced at close intervals along the path of travel and/or fed at rapid rates. Under such conditions, the actuations provided by devices of the type previously known in many instances are not initiated at all or at best are quite erratic because proper engagement between individual sheets and the actuating arm did not occur. By way of example, when a typical prior art device is utilized to actuate a document counter in a continuous microfilmer, the actuation of the counter mechanism becomes erratic at document feed rates of about 500 or more check sized documents per minute.

The actuating device which is the subject of this invention overcomes the difficulties previously encountered under conditions of high feed rate and/or close document spacing by providing a more definite engagement between the leading edge of individual sheets and an engaging portion of the actuating member which extends generally perpendicularly to and through the main path of document travel. The more definite engagement between these elements is achieved in part by providing means to displace a portion of each document out of the main path of docu-

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ment travel, thus forming a bowed shelf which engages the engaging portion at a point which is out of the main path of travel. Additionally, as will subsequently be described in greater detail, the definite engagement of the present invention is made more effective by providing a time lapse for the end of the engaging portion of the actuating arm to return to the main path of travel before the engaging portion is contacted by the next succeeding document. By utilizing the improved actuating mechanism of the present invention for the document counter in the previously-mentioned microfilmer, the same documents can be accurately counted even when fed at a rate of 1,000 per minute, approximately twice that possible with the prior art devices.

It is, therefore, an object of this invention to provide a device for initiating functions relating to an apparatus in response to individual sheets fed along a given path associated therewith.

Another object of the present invention is to provide a sheet responsive actuating device which performs reliably under conditions of rapid sheet feed and/or when the sheets are closely spaced along the feed path.

Yet another object of the present invention is to provide an actuating device which can accommodate the individual sheets at a more rapid rate than previously known devices while maintaining certain, reliable response to each sheet fed thereby.

Still another object of the present invention is to provide means for effecting more definite and certain engagement between an actuating member and individual sheets fed along a fixed path.

Other objects and advantages of the present invention will become apparent to those skilled in the art from the following description, with reference to the accompanying drawing in which like characters denote like parts, and in which:

FIG. 1 is an elevation view taken along the cross-sectional lines 1—1 of FIG. 2 illustrating one embodiment of the invention and showing the position of the actuating arm prior to contact with the first of a series of sheets.

FIG. 2 is a fragmentary front view of a portion of the document feed path further showing the invention.

FIG. 3 is a top view of the fragmentary section in FIG. 2.

FIGS. 4-6 are elevational views similar to FIG. 1 but showing the various positions of the actuating arm and feed sheets during different stages of the actuating sequence.

Referring to FIGS. 1 and 2, a segment of the path of travel P of a document D through a typical apparatus embodying the present invention can be seen. The main path of travel P is defined on one side by the guide plates 11, rollers 13 and guide plates 14. Feed belts 15 define the other side of the main path of document travel and are moved over the rollers 13 and other rollers (not shown) so as to carry the documents D along the path P from an upstream to downstream position in the direction indicated by the arrow in FIG. 1.

In FIGS. 1 and 2, it can be seen that an actuating arm 20 is disposed adjacent the main path of document travel with a sheet engaging portion 21 thereof extending generally perpendicular to and through the path P at a location between the feed belts 15 and downstream along the path of document travel from the end of the center guide plate 14. The actuating arm 20 is supported in the rest position shown in FIG. 1 by the bottom stop 23 and the guide bracket 24 and is resiliently urged against the stop and bracket by the spring 25 which is attached near the end opposite the engaging portion 21.

As illustrated in FIG. 1, a microswitch 30 is so lo-

cated that a microswitch arm 31, pivotally attached thereto at axis 33, extends to engage the actuating arm 20 between its two ends. The microswitch arm 31 is formed having a necked down end 32 and is of a length so that the end 32 extends through an opening 34 formed in actuating arm 20. It can be seen, therefore, that actuating arm 20 is free to move against the spring 25 so that the sheet engaging portion 21 can be moved along the path of document travel when engaged by documents fed thereby. As seen in FIG. 4, the movement of the actuating arm along the path of travel moves microswitch arm 31 about the axis 33 and effects closing of the microswitch 30.

As can be seen in FIG. 4, after the leading edge of a document D has moved a distance around the rollers 13, the sheet engaging portion 21 of the actuating arm 20 is disengaged therefrom. The actuating arm is thereafter moved back against bottom stop 23 by the spring 25 and into the position illustrated in FIG. 5.

Again referring to FIGS. 1 and 2, it can be seen that the center guide plate 14' is formed with a raised guide finger 17 extending from the end thereof through the main path of document travel defined between the plates 14 and feed belts 15. By reference to FIG. 5 it can be seen that the end of the guide finger 17 is located a distance X back along the path of travel from the lowermost position of the end of the sheet engaging portion 21 of the actuating arm 20.

As each document passes over the guide finger 17, a portion of the document is displaced out of the main path of document travel towards the actuating arm 20. Referring to FIGS. 2 and 3, it can be seen that the belts 15 continuously urge the portion of documents thereunder into the main path of document travel. Referring to FIGS. 4-6 it will therefore be apparent that a shelf is formed between the belts and above the main path of document travel by the displaced portion of each document. The shelf S will be formed on that portion of the document D from the time the leading document edge passes over the guide finger 17 until that portion has moved sufficiently beyond the finger 17 that belts 15 can return it to the main path of travel. Once the trailing end of a document passes over the guide finger, the belts 15 rapidly return the trailing portion of the document to the document path so that the entire document thereafter lies substantially within the main path of travel.

Operation of the improved actuating device normally commences when a series of documents are fed into the apparatus along the feed path, in which instance the actuating arm is initially in the rest position shown in FIG. 1. As the leading edge of the first document D in the series is fed past the actuating arm 20, the portion 21 is engaged thereby and moved to the position shown in FIG. 4, at which point the portion 21 is disengaged from the edge of the document. During this movement of the arm 20, actuation is effected by the device, in this instance a closing of microswitch 30 through the linkage of microswitch arm 31. After disengagement of the portion 21, the spring 25 returns the actuating arm 20 to the bottom position shown in FIG. 5 with the end of the sheet engaging portion 21 thereof riding on the trailing surface of the document from which it has been disengaged.

As the trailing portion of the first document D passes off of guide finger 17, the entire document is restored to the main path of travel by belts 15. From this point, as illustrated in FIG. 5, the end of the engaging portion 21 rests on the surface of the first document. As can also be seen in FIG. 5, a portion of the leading end of the next succeeding document D' is, during the same time, displaced out of the path by finger 17. The displaced portion of the succeeding document forms the bowed shelf S which provides a definite engagement with the portion 21 without relying on any movement by that portion into the main path of travel. After the leading edge of engagement shelf S has traveled the distance X, it contacts the

engaging portion 21 and moves the actuating arm 20 along the path of travel in the manner previously described. This sequence is repeated until the last document of the series is fed past the actuating arm. During each sequence, the end of engaging portion 21 may move off of trailing edge and between the successive documents into a position like that in FIG. 1; however, it will be apparent that movement of the engaging portion into the gap between documents is not necessary for operation of the device because of the novel engagement shelf S.

From the foregoing description it will be appreciated that the actuating device herein described affords a more certain engagement between the actuating arm and each sheet fed therepast, which engagement does not depend on a gap in the direction of document feed existing between the trailing and leading edges, respectively, of successive documents.

It will also be apparent as viewed in FIG. 5 that the distance X between the end of guide finger 17 and the furthestmost position upstream of engaging portion 21 provides an extended time period for engaging portion 21 to move into an engaging position, which period is likewise not dependent upon the gap existing between the documents.

Although the invention has been described in detail, it will be understood that variations and modifications can be effected within the spirit and scope of the invention as described hereinabove, and as defined in the appended claims.

We claim:

1. A device for effecting actuation of a mechanism in response to individual sheets moved past the device and along a given path of travel from an upstream to a downstream position comprising:
 - an actuating arm connected to said mechanism and located on one side of said path, said arm having a sheet engaging portion engageable and movable by the leading edge of each of the individual sheets fed therepast; and
 - guide means extending into said path for displacing at least a portion of each sheet passing thereover out of said path and into engagement with said sheet engaging portion of said actuating arm.
2. The device as described in claim 1 wherein said guide means is positioned upstream along said path of travel from the engaging portion of said actuating arm.
3. The device is described in claim 2 further comprising means contacting said sheet during movement along said path of travel for urging said sheet into said path, whereby the portion of a sheet displaced from said path by said guide means is rapidly moved back into said path after the trailing edge of said sheet moves out of contact with said guide means.
4. In an apparatus having means for feeding individual sheets along a given path of travel from an upstream to a downstream position, a device for initiating functions relating to said apparatus in response to individual sheets fed therepast comprising:
 - (a) an actuating arm disposed on one side of said path of travel and having a sheet engaging portion adapted for movement along said path of sheet travel from a first position to a second position downstream from said first position;
 - (b) guide means disposed across said path of travel at a position upstream from said first position of said engaging portion for displacing at least a portion of the sheet passing thereover out of the path of travel and into a position for more certain engagement with said engagement portion of said actuating arm; and
 - (c) means responsive to movement of said actuating arm for initiating functions related to said apparatus.
5. The device as described in claim 4 wherein said guide means comprises a guide plate having a flat portion extending along said path of travel on the side opposite

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said one side and an end portion extending from said flat portion across said path at a locatoin upstream from, along the direction of feed, said first position of said sheet engaging portion.

6. The device as described in claim 4 further comprising means contacting said sheet during movement along said path of travel for moving said displaced portion of said sheet back into said path after the trailing edge of said sheet moves past said guide means.

7. The device is described in claim 6 wherein said means for moving said sheet back into said path comprises at least two belts disposed on said one side of said path so that each respectively engages said document on an opposite side transversely from said guide means at at

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least one point forward along the path of travel from said guide means.

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