May 31, 1966 C. ALTMANN 3,254,167

SHEET RESPONSIVE CONTROL DEVICE

Filed April 6, 1964

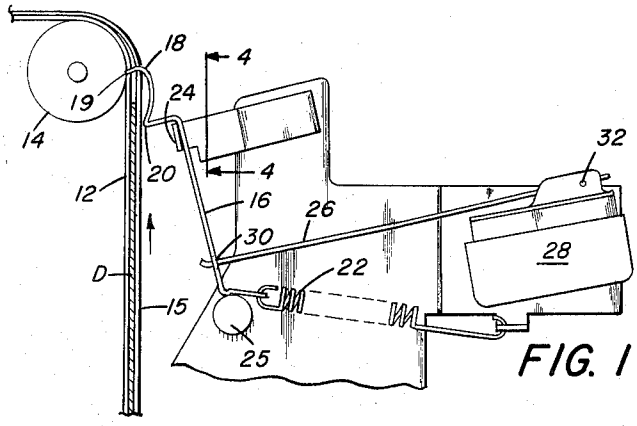


FIG. 1

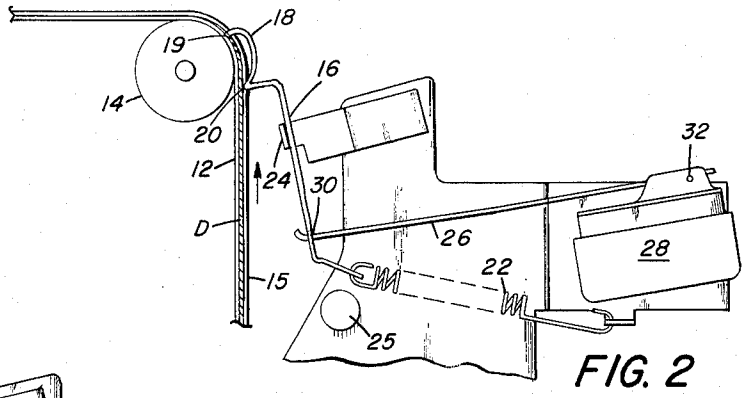


FIG. 2

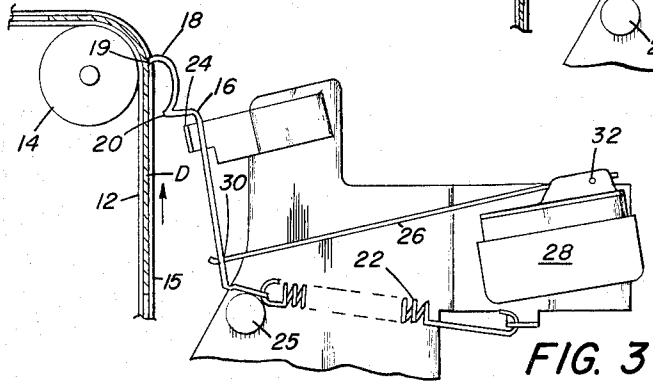


FIG. 3

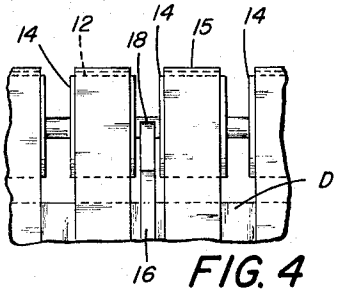


FIG. 4

CONRAD ALTMANN
INVENTOR.

BY R. Frank Smith
Gene D. Watson
ATTORNEYS

United States Patent Office 3,254,167 Patented May 31, 1966

3,254,167

SHEET RESPONSIVE CONTROL DEVICE

Conrad Altmann, Rochester, N.Y., assignor to Eastman Kodak Company, Rochester, N.Y., a corporation of New Jersey

Filed Apr. 6, 1964, Ser. No. 357,662
6 Claims. (Cl. 200—61.13)

The present invention relates to a control device. More particularly, the invention relates to a sheet responsive device for controlling a microswitch or the like, which is actuated by engagement with a moving sheet and which thereafter is disengaged from the sheet so as not to impede the movement of the sheet.

As will become apparent from the following description, the present invention has many useful adaptations and be used in numerous types of apparatus. However, for purposes of illustration, the invention is described herein as it might be incorporated in a document photographing apparatus, such as, for example, a continuous microfilmer. Quite often in this type of apparatus, the movement of each document through the apparatus is utilized to initiate and terminate the sequence of the several operations within the apparatus. For example, by actuating microswitches located in the various electrical circuits of the apparatus, the document controls the timed movement of the recording film strip, the energizing of exposure lamps, the opening and closing of a shutter, and the counting of exposures.

Known sheet responsive devices occasionally damage the leading edge of a document, and particularly a thin document, moving through a microfilmer as a result of the initial impact with the device, and/or as a result of the force that must be exerted by the document against the device to move it out of the document path so that the document can continue its movement. The present invention comprises an improved sheet responsive device which minimizes the possibility of sheet damage by providing an arm which is engaged and moved by the sheet, and which, when the arm has been moved a sufficient distance to actuate a controlled operation, is cammed out of engagement with the sheet by a camming knee on the arm moving against a face of the sheet.

One object of the present invention is to provide a sheet responsive control device which minimizes the possibility of damage occurring to sheets which actuate the device.

Another object of the present invention is to provide a device which is easily disengaged from a moving sheet of material after it has been engaged and displaced through a predetermined distance by the sheet.

Still another object of the present invention is to provide a sheet responsive device having a movable document engaging arm which insures positive document engagement, but which, when the arm has been moved a given distance by the document, cams itself out of engagement therewith.

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

FIG. 1 is an elevation view illustrating one embodiment of the invention and showing the position of a sheet responsive arm prior to engagement by a moving document;

FIG. 2 is an elevation view showing the position of the arm just before disengagement from the document;

FIG. 3 is an elevation view showing the arm and document positions following disengagement but before the document has cleared the arm; and

FIG. 4 is a section view taken along line 4—4 of FIG. 1.

As shown in FIG. 1, a document D is transported in the direction indicated by the arrow along a path which is defined by conveyor belt **12**, which moves around idler roller **14**, and a sandwiching conveyor belt **15**. Although the sandwiching belt **15** is not needed to hold a document on belt **12** where the document is being transported in a horizontal plane, the presence of belt **15** has an advantage of giving the document additional rigidity for engaging and moving document responsive arm **16**. In addition, belt **15** cooperates with the camming means presently described in guiding and pulling the document out of engagement with the arm as the document moves around roller **14**. Arm **16** has a curved end portion **18** and a camming knee **20** adjacent to this curved portion, and is resiliently mounted in an apparatus such that curved portion **18** intercepts and is movable along the document path by a moving document. The curved end portion **18**, in addition to providing a cushioning effect to the initial contact between the document and arm, provides a positive engaging action which facilitates movement of the arm along the document path but which does not impede disengagement of the document. In the embodiment shown, arm **16** is resiliently held in this intercepting position by a spring **22**, and two fixed stop members **24** and **25** toward which the arm is pulled by the bias of the spring. Spring **22**, in addition to pulling arm **16** in a direction substantially parallel to its length and against these stop members, also tends to rotate the curved portion **18** of the arm counterclockwise around stop **24** and into the document path. A microswitch arm **26** which controls a given operation of the apparatus, for example film movement during photographing, by the opening or closing of an electrical contact in the microswitch **28**, is inserted through an aperture **30** in the document responsive arm **16**.

As a document D is carried by belt **12** into engagement with the curved portion **18** of arm **16**, the arm **16** is forced by the leading edge of the document to move against the bias of spring **22** and along the document path as shown in FIG. 2. Movement of arm **16** against the shoulder of microswitch arm **26** forces the arm **26** to pivot around its fixed end **32** to an actuating position at which the microswitch arm **26** closes the electrical circuit controlled by the microswitch. The path of arm **16**, in addition to moving substantially along the document path, rotates slightly such that the path of knee **20** intersects the path of the document. Continued movement by the document along the path, after the knee **20** moves into contact with the surface of the document, cams the curved portion **18** out of the document path and out of engagement with the document. Following disengagement, the bias of spring **22** pulls the arm against stop **25** as shown in FIG. 3. The end **19** of the curved portion bears agains the surface of the document, and resets in engagement position as soon as the trailing edge of the document clears the end **19** of the arm. This provides for rapid resetting of the arm for closely spaced documents. It should be noted that extremely slight force between the leading edge of a document and the contacting arm is sufficient to force knee **20** to cam the curved portion **18** of arm **16** out of engagement with the document and out of the document path, and that the relative movement of arm **16**, as illustrated by the drawings, has been exaggerated to better show the operation of a preferred embodiment of the invention. Accordingly, in a device embodying the novel concept of the present invention, the slight force present results in little or no wear and damage to the documents which come in contact with the document responsive arm.

It will now be appreciated that the described sheet responsive device represents an improvement in the art by providing a device which minimizes damage to the leading

edge of a sheet coming in contact therewith. Although the invention has been described with reference to a preferred embodiment thereof, 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.

Having now particularly described my invention, what I desire to secure by Letters Patent of the United States and what I claim is:

1. A device for engaging and disengaging one edge of a sheet as the sheet moves along a given path, comprising:

(a) an arm member having means for engaging said one edge of the sheet;

(b) means for resiliently mounting said arm member for movement of said engaging means in and along said path from a first position to a second position in response to the movement along the path of the sheet thus engaged thereby;

(c) said arm member further including camming means for disengaging said engaging means from said one edge of said sheet;

(d) said camming means being spaced from said engaging means and positioned to move into camming contact with the face of said engaged sheet as said engaging means is moved by the edge of said sheet to said second position.

2. A device in accordance with claim 1 wherein said engaging means comprises a curvilinear end portion of said arm for intercepting and engaging said one edge of said sheet.

3. A device for engaging and disengaging one edge of a sheet as the sheet moves along a given path, comprising:

(a) an arm having a curvilinear end portion for intercepting and engaging said one edge of said sheet;

(b) means for resiliently mounting said arm for movement in and along said path from a first position to a second position in response to the movement of said sheet in the path;

(c) camming means on said arm for disengaging said end portion from said one edge of said sheet comprising a knee formed on said arm which is moved toward said path and against a face of said sheet in response to movement of the arm to said second position by an engaged sheet, whereby said end portion is disengaged from the sheet.

4. A device in accordance with claim 3 and further comprising means for pivotally mounting said arm for movement substantially along the path.

5. A device for controlling the opening and closing of a microswitch in response to a sheet passing along a given path, comprising:

(a) an arm having a curved end portion mounted for engagement with, and movement along said path by, said sheet;

(b) a camming knee on the arm for contacting one face of the sheet after engagement by said arm with said sheet, to cam said curved portion out of engagement with the sheet after a predetermined movement of said arm along said path;

(c) means for resiliently supporting said arm for movement along said path in response to engagement of said end portion by the moving sheet; and

(d) means responsive to the movement of said arm by said sheet for actuating said microswitch.

6. A device in accordance with claim 5 and further comprising:

(a) stop means for defining a rest position for the arm and adapted to abut and position the arm with said end portion disposed in said path for engagement with said sheet; and

(b) means for returning said arm to said rest position following disengagement of the sheet by said arm.

References Cited by the Examiner

UNITED STATES PATENTS

2,639,340	5/1953	Gaite	200—46
2,649,517	8/1953	Egan	200—61.13

BERNARD A. GILHEANY, *Primary Examiner.*

R. N. ENVALL, JR., *Assistant Examiner.*