United States Patent [19]

D'Ercole et al.

[11] **3,722,055**

[45] **Mar. 27, 1973**

[54] CARTRIDGE OPENING DEVICE

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[73] Assignee: **Eastman Kodak Company,** Rochester, N.Y.

[22] Filed: **Sept. 9, 1971**

[21] Appl. No.: **178,955**

[52] **U.S. Cl.** .....**29/200 D,** 225/93

[51] **Int. Cl.** **B23p 19/00**

[58] **Field of Search**.....29/200 D, 200 B, 200 R; 225/93

[56] **References Cited**

UNITED STATES PATENTS

3,411,682	11/1968	Leader et al.	225/93
3,548,478	12/1970	Blackman	29/200 D

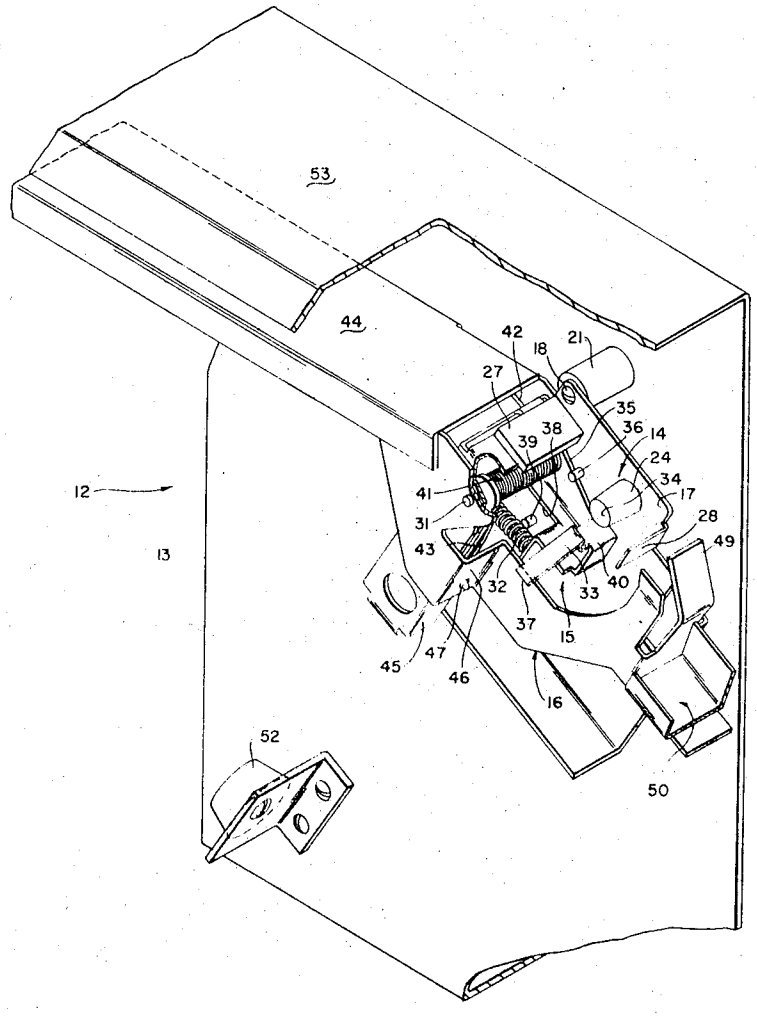
Primary Examiner—Thomas H. Eager

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[57] **ABSTRACT**

A device for breaking open a frangible cartridge which is adapted to contain a web, the cartridge being of the kind provided with spaced web supply and take-up chambers and with an interconnecting web guide channel. The device includes a fixture for engaging the web take-up chamber of such a cartridge in a manner preventing movement of the web take-up chamber in at least one direction and a guide surface which serves to direct the web take-up chamber into engaged relation with the fixture. An offset portion of the guide surface retains the web take-up chamber at the fixture. The device further includes a breaker lever which is mounted for movement relative to the fixture for moving, generally in the one direction, the web supply chamber and web guide channel of a cartridge whose web take-up chamber is engaged by the fixture. Accordingly, the cartridge can be broken open for extraction of a web from the web take-up chamber.

9 Claims, 6 Drawing Figures



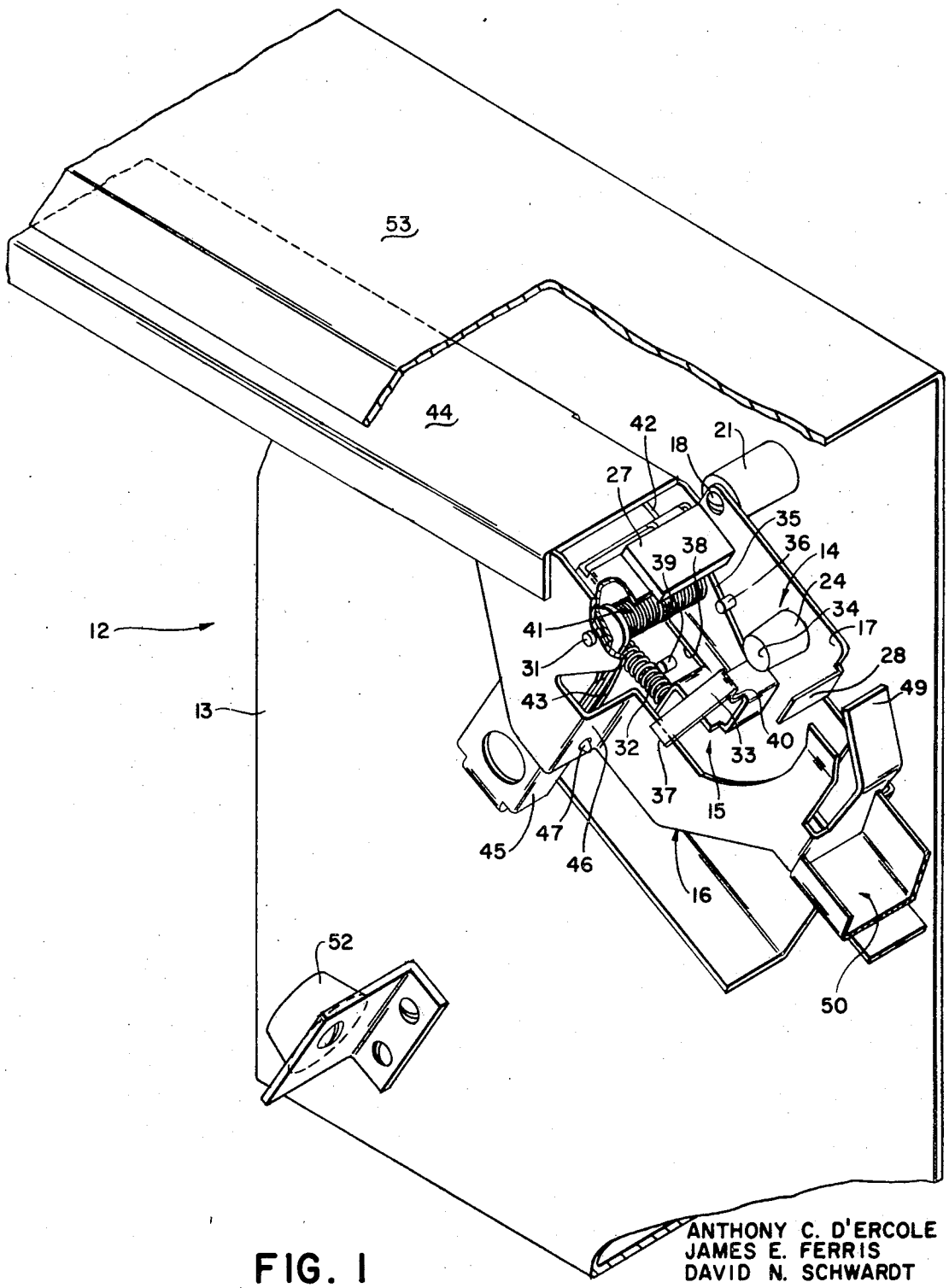


FIG. 1

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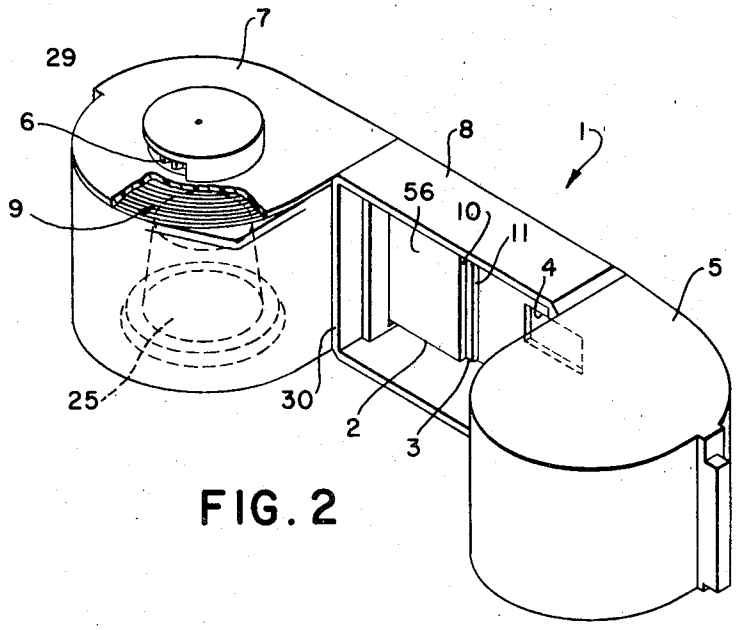


FIG. 2

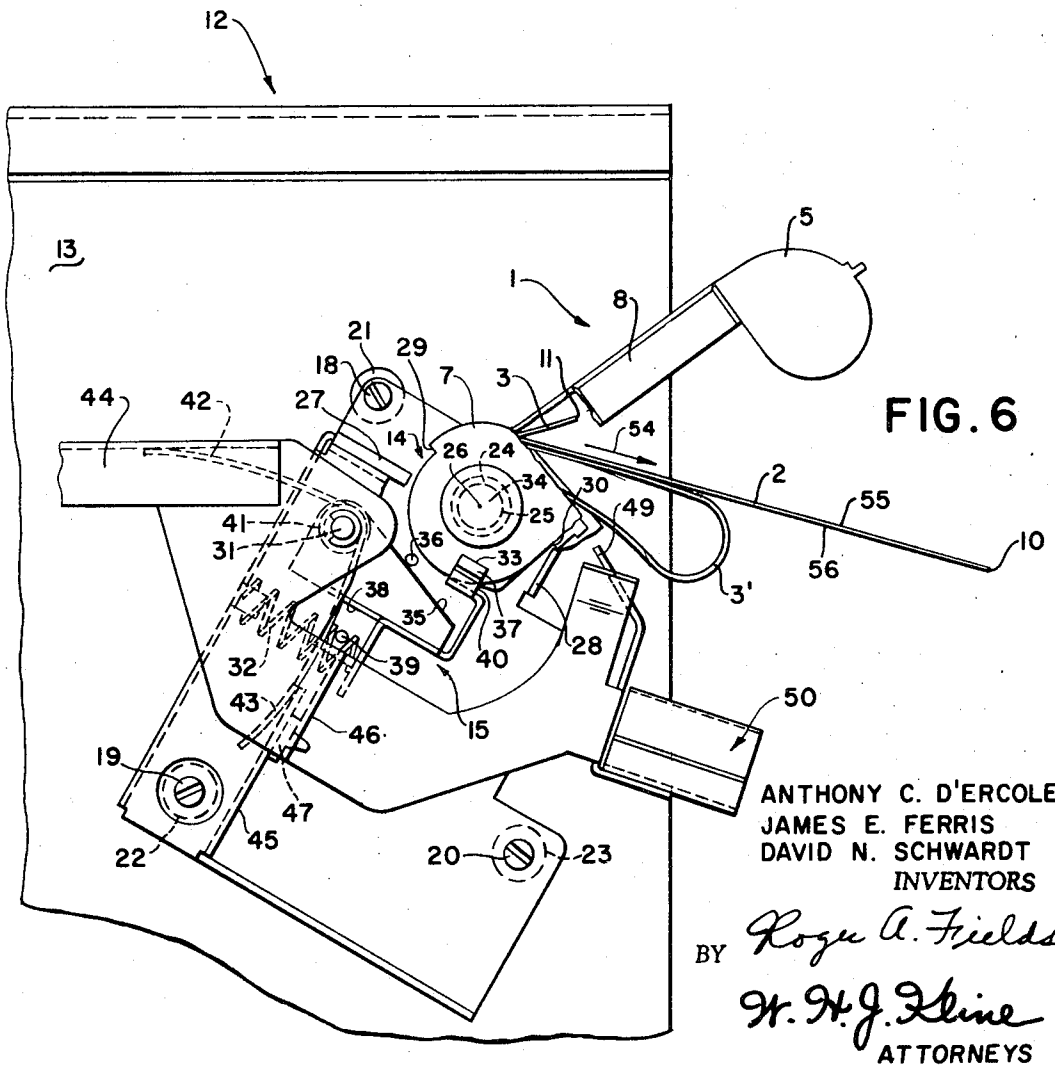
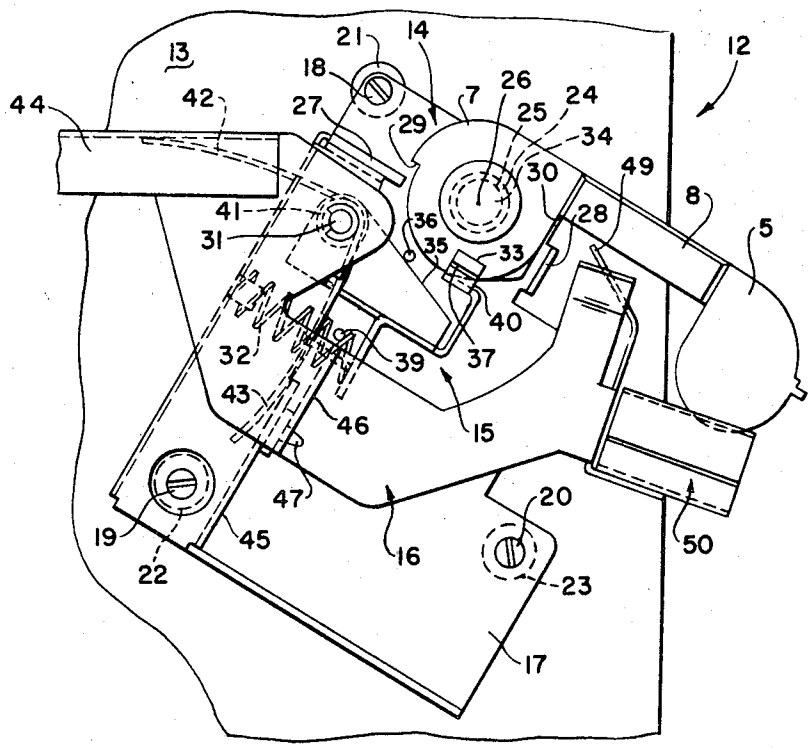


FIG. 6

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FIG. 3



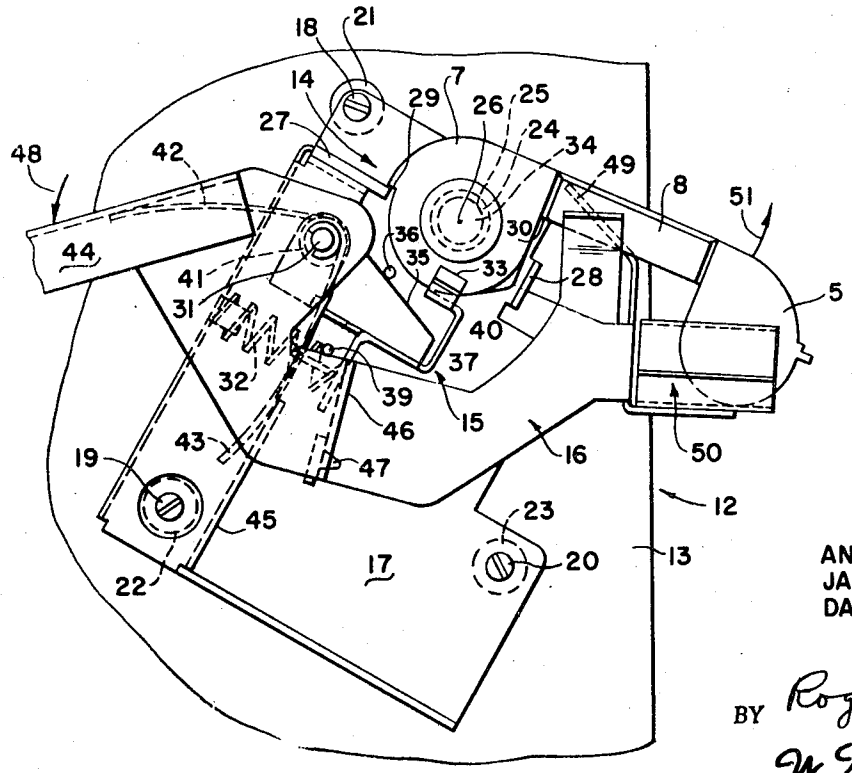


FIG. 4

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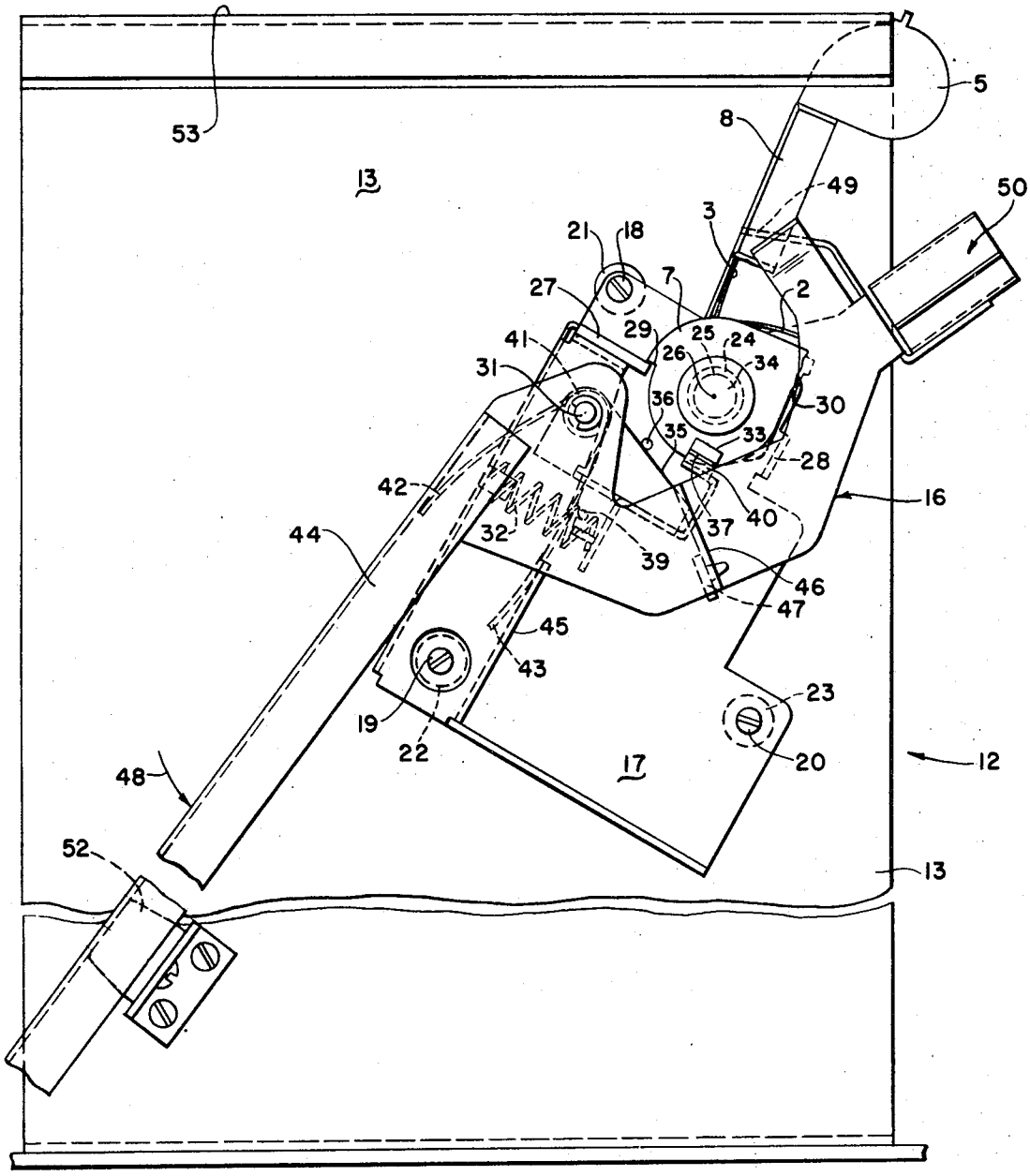


FIG. 5

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CARTRIDGE OPENING DEVICE

CROSS-REFERENCE TO RELATED APPLICATIONS

Reference is made to commonly assigned copending U.S. Pat. application Ser. No. 25,848, U.S. Pat. No. 3,684,206, entitled FILM CARTRIDGE AND PHOTOGRAPHIC APPARATUS USING SAME, and filed in the name of Evan A. Edwards on April 6, 1970.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a device for breaking open a frangible cartridge in which a web is contained, and more particularly to a cartridge opening device which is adapted for use with a cartridge of the kind provided with spaced web supply and take-up chambers and with an interconnecting web guide channel. Moreover, this invention relates to a cartridge opening device for breaking open a cartridge in which is contained a roll of exposed film and for supporting such an opened cartridge to facilitate removal of exposed film therefrom under darkroom conditions.

2. Description of the Prior Art

Concurrent with the introduction of film cartridges, a need arose for simple and efficient cartridge opening devices operable under darkroom conditions for breaking open a frangible cartridge in which is contained a film spool and for then supporting the film spool to facilitate unwinding of exposed film therefrom in preparation for splicing, processing, etc. It has generally been necessary in the past for photofinishers under darkroom conditions to break open a film cartridge, manually remove a film spool from such opened cartridge, and thereafter hold the film spool with one hand while unwinding the exposed film with the other hand.

Recently, several cartridge opening devices have been conceived which are adapted to retain a film spool on the device, for unwinding of exposed film from such spool, after separating the film spool from an opened cartridge. An example of such a device is illustrated in U.S. Pat. Nos. 3,411,682 and 3,548,478, which disclose cartridge opening devices wherein a film take-up chamber of the cartridge is supported on a spindle member of the device. A spool, located within the film take-up chamber, serves to support a roll of exposed film. The cartridge is moved relative to the spindle and subjected to deforming stresses until the cartridge breaks apart sufficiently to fall away from the spool, which is retained on the spindle. Thereafter, the roll of exposed film may be unwound off the spool in preparation for splicing, processing, etc.

A drawback persisting with respect to the cartridge opening devices disclosed in U.S. Pat. Nos. 3,411,682 and 3,548,478, as well as with respect to other previously known devices of a similar kind, is that in requiring the cartridge to be sufficiently broken open to permit the cartridge to fall away from the film spool, a significant number of chips of the cartridge material may be produced which can fall onto and contaminate the exposed film.

Moreover, since in devices of this kind, the cartridge containing the exposed film is intended to be placed on the spindle under darkroom conditions, difficulty has been encountered in guiding such cartridge onto the spindle in a position for breaking open the cartridge and removing the exposed film.

SUMMARY OF THE INVENTION

Accordingly, an object of the present invention is to provide a cartridge opening device which is improved so as to avoid the foregoing difficulties existing with respect to those devices previously known.

Another object of the present invention is to provide an improved cartridge opening device which is simple to operate under darkroom conditions and inexpensive to manufacture.

A further object of the present invention is to provide an improved cartridge opening device which effects opening of the cartridge in a manner resulting in a minimum number of chips of cartridge material which might fall onto and contaminate a web contained in the cartridge.

Yet another object of the present invention is to provide an improved cartridge opening device, including a guide member which serves to readily direct a cartridge into a position on such device for breaking open the cartridge and removing a web therefrom.

In accordance with a preferred embodiment of the present invention, there is disclosed hereinafter a device for breaking open a frangible cartridge which is adapted to contain a web, such as a strip of exposed film. Generally, the cartridge is of the kind provided with spaced web supply and take-up chambers and with an interconnecting web guide channel. The device includes a fixture for engaging the web take-up chamber of such a cartridge in a manner preventing movement of the web take-up chamber in at least one direction and a guide surface which serves to readily direct the web take-up chamber, even under darkroom conditions, into engaged relation with the fixture. Upon engagement of the web take-up chamber of such a cartridge by the fixture, the cartridge will be positioned to be broken open and for thereafter removing a web from the web take-up chamber. An offset portion of the guide surface retains the web take-up chamber at the fixture. The device further includes a breaker lever which is mounted for movement relative to the fixture for moving, generally in the one direction, the web supply chamber and web guide channel of a cartridge whose web take-up chamber is engaged by the fixture (and thus prevented from movement in the one direction). Accordingly, the cartridge can be broken open at a location between the web guide channel and the web take-up chamber to enable removal of a web from the web take-up chamber.

BRIEF DESCRIPTION OF THE DRAWINGS

The above-mentioned and other features and objects of the present invention and the manner of obtaining them will become more apparent by reference to the following detailed description of a preferred embodiment of such invention taken in conjunction with the accompanying drawings wherein:

FIG. 1 is a perspective front view of the cartridge opening device according to a preferred embodiment of the present invention;

FIG. 2 is a perspective bottom view of a web roll cartridge of the kind disclosed in commonly assigned copending U.S. Pat. application Ser. No. 25,848;

FIG. 3 is a front elevation view of the cartridge opening device and the web roll cartridge, showing the cartridge retained in position on the device for breaking open the cartridge;

FIGS. 4 and 5 are front elevation views of the cartridge opening device and the web roll cartridge, showing the manner in which the cartridge is broken open by the device; and

FIG. 6 is a front elevation view of the cartridge opening device and the web roll cartridge, showing a web roll being removed from the broken-open cartridge.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Since a web roll cartridge with which a preferred embodiment of the present invention is adapted to be used is fully disclosed in commonly assigned copending U.S. Pat. application Ser. No. 25,848, we have shown and will describe only those features of such cartridge which are necessary for a complete understanding of the purposes and operation of the present invention. Referring to FIG. 2, this cartridge 1 is made of plastic, or some other frangible material, and is provided with a contiguously disposed filmstrip 2 and radiation-protective backstrip 3 which are wound together in a convoluted manner, within the cartridge, such that successive convolutions are alternately formed by filmstrip and backstrip portions. The filmstrip 2 is not attached to the backstrip 3 but rather is simply in frictional contact with the backstrip. Since the backstrip 3, which can be a paper material, is intended to shield the filmstrip 2 from unintentional exposure to light passing through a rectangular aperture 4 in the cartridge, the filmstrip and the backstrip are wound so that the outermost convolution is formed by a backstrip portion.

When the cartridge 1 is first loaded into a camera (not shown) a substantial length of the filmstrip 2 and a corresponding length of the backstrip 3 are wound together in a web supply chamber 5 of the cartridge, with leading end portions of the filmstrip and the backstrip secured about a winding core 6 rotatably supported within a take-up chamber 7 of the cartridge. Upon rotation of the winding core 6, the filmstrip 2 and the backstrip 3 will be simultaneously drawn out of the web supply chamber 5, through an interconnecting web guide channel 8, and thence into the web take-up chamber 7. Accordingly, a web roll 9 comprising successive alternate convolutions of the filmstrip 2 and the backstrip 3 will be formed about the winding core 6, with the outermost convolution being formed by a backstrip portion. If the cartridge 1 should now be broken open at a location adjacent the web take-up chamber 7 and the web guide channel 8, by a cartridge opening device to be described hereinafter in detail, the filmstrip 2 and the backstrip 3 can be drawn (by their respective free leading end portions 10 and 11) simultaneously off the winding core 6 and out of the web take-up chamber.

Coming now to a preferred embodiment of the present invention, there is shown in FIG. 1 a device 12 for breaking open the frangible cartridge 1. For clarity purposes, this device 12 will be considered and described in terms of four components respectively comprising: (1) a stationary base 13; (2) a fixture 14, connected to the base, for supporting the web take-up chamber 7 of the cartridge 1 in a position for breaking open the cartridge and removing the filmstrip 2 and the backstrip 3 from such chamber; (3) a guide arm 15, movably mounted on the base, for directing the web take-up chamber to the fixture and for removably retaining such chamber in the foregoing position; and (4) a breaker lever 16, movably mounted on the base, for breaking open the cartridge.

The stationary base 13 can be secured to either a horizontally or vertically disposed surface (not shown), such as a table top or a wall, depending upon whether a particular workstation with which the cartridge opening device 12 is to be associated lends itself to the horizontal or vertical mounting of the device. For purposes of the description hereinafter, the device 12 including the base 13 will be assumed to be vertically mounted as viewed in FIGS. 1 and 2–5.

Now considering the fixture 14, there is shown in FIGS. 1 and 3 a plate 17 which is fastened, in spaced relation, to the stationary base 13 by means of fastener pins 18, 19 and 20 respectively extending through vertical spacers 21, 22 and 23. A tapered stud or spindle 24, fixedly disposed on the plate 17, is adapted to be received in a complementary-shaped recess 25 in the web take-up chamber of the cartridge 1 so as to support such chamber, as viewed in FIG. 3, for clockwise and counterclockwise rotation about the spindle 24 and a web roll axis 26. This rotation, however, is limited by stops 27 and 28 which are fixedly disposed on the plate 17 and adapted to engage peripheral shoulder extensions 29 and 30 of the cartridge 1, in the manner respectively shown by FIGS. 4 and 6.

The guide arm 15 is supported for movement relative to the fixture 14 by a pivot pin 31, secured to the plate 17. A helical compression spring 32 urges the guide arm 15 in a counterclockwise direction, as viewed in FIG. 3, about the pin 31 toward the fixture spindle 24. As can best be seen in FIG. 1, an elongate guide surface 33 of the guide arm 15 generally extends toward a free end 34 of the spindle 24 when an edge 35 of the guide arm is abutted against a stop 36, fixedly disposed on the plate 17. If an operator were to initially place the web take-up chamber 7 of the cartridge 1 on the guide surface 33 (at a location adjacent a free end 37 of the guide surface and in a manner such that the open recess 25 of the web take-up chamber faced the free end 34 of the spindle 24), and then were to slide the web take-up chamber along the guide surface toward the spindle (while bearing down on the cartridge 1 to slightly pivot the guide arm 15 in a clockwise direction, as viewed in FIG. 3, until an edge 38 of the guide arm abutted against a stop 39, fixedly disposed on the plate 17), then the web take-up chamber would be positioned to be received on the spindle. Upon sliding the web take-up chamber 7 past an offset portion 40 of the guide surface 33, such chamber would be fully received on the spindle 24 and the guide arm 15 would immediately be pivoted in a counterclockwise direction by the force of spring 32 to a cartridge retaining position as shown in FIG. 3. In such position, the offset portion 40 is adapted to abut against the web take-up chamber 7 of the cartridge 1 so as to retain the web take-up chamber on the spindle 24. Should the operator subsequently wish to remove the web take-up chamber 7 from the spindle 24, the guide arm 15 would have to be pivoted in a clockwise direction until the edge 38 of the guide

arm abutted against the stop 39. Accordingly, the guide arm 15 would be disposed in a cartridge releasing position (not shown) wherein the offset portion 40 of the guide surface 33 was sufficiently spaced from the web take-up chamber 7 to enable removal of such chamber from the spindle 24.

As shown in FIG. 1, the breaker lever 16 is supported for movement relative to the fixture 14 by the pivot pin 31. A leaf compression spring 41 is coiled about the pivot pin 31 and includes two arms 42 and 43 which are respectively abutted against a handle 44 of the breaker lever 16 and a backstop wall 45 of the plate 17 to urge the breaker lever in a clockwise direction, as viewed in FIG. 3, about the pivot pin. The breaker lever 16 includes an offset portion 46 on which is secured a bumper 47. When the breaker lever 16 is disposed in an idle position, as shown in FIG. 3, the bumper 47 will be abutted against the backstop wall 45 so as to limit movement of the breaker lever in a clockwise direction about the pivot pin 31.

Upon support of the web take-up chamber 7 of the cartridge 1 on the spindle 24, as shown in FIG. 3, the cartridge will be positioned to be broken open by the breaker lever 16. Referring to FIG. 4, when the breaker lever handle 44 is pivoted in a counterclockwise direction, generally indicated by arrow 48, a blade 49 and a jaw 50 of the breaker lever 16 will be moved into abutment respectively against the web guide channel 8 and web supply chamber 5 of the cartridge 1. The cartridge 1, in turn, will be slightly pivoted in a counterclockwise direction, generally indicated by arrow 51, on the spindle 24 so that the peripheral shoulder extension 29 on the web take-up chamber 7 is moved into engagement with the fixture stop 27. Now referring to FIG. 5, on continued pivoting of the breaker lever 16 in the counterclockwise direction, generally indicated by arrow 48, the cartridge 1 will be broken open at a location adjacent the web take-up chamber 7 and the web guide channel 8, since counterclockwise rotation of the web take-up chamber 7 on the spindle 24 is prevented by engagement of the chamber shoulder 29 with the fixture stop 27.

The extent to which the cartridge 1 is broken open by the breaker lever 16 is limited by a bumper stop 52, fixedly mounted on the base 13, and against which the breaker lever handle 44 abuts when the breaker lever is disposed in a final breaking position, as shown in FIG. 5. It has been found that this limitation in breaking open the cartridge 1, tends to result in very few chips of cartridge material being produced which might injure an operator of the cartridge opening device 12 and/or which might fall onto and contaminate the filmstrip 2 in the web take-up chamber 7. However, should any chips be produced upon breaking open the cartridge 1 in the manner previously described, the base 13 includes a shield 53 which is intended to protect an operator of the cartridge opening device 12 against any such flying debris.

After breaking open the cartridge 1, the breaker lever 16 should be released and thus permitted to return from the final breaking position, shown in FIG. 5, to the idle position, shown in FIG. 3, by the spring 41. Thereafter, the filmstrip 2 and the backstrip 3 can be drawn out of the take-up chamber 7 in the manner shown by FIG. 6. On first drawing the filmstrip 2 and the backstrip 3 out of the web take-up chamber 7, the web take-up chamber will be slightly rotated about the spindle 24 in a clockwise direction, as viewed in FIG. 6; whereupon, the chamber shoulder 29 will be moved out of engagement with the fixture stop 27 and the chamber shoulder 30 will be moved into engagement with the fixture stop 28. Accordingly, the web take-up chamber 7 will be prevented from further clockwise rotation on the spindle 24 so as to facilitate unwinding of the filmstrip 2 and backstrip 3 from the winding core 6 and withdrawal of the filmstrip and backstrip, in a direction generally indicated by arrow 54 in FIG. 6, from the web take-up chamber 7.

As shown in FIG. 6, filmstrip 2 is of the kind provided with a base or support face 55 and with an emulsion face 56. Generally, the support face 55 of the filmstrip 2 exerts less frictional force on the interior side (not shown) of a convolution of the backstrip 3 than the frictional force exerted by the emulsion face 56 of the filmstrip on the exterior side (not shown) of the same convolution. This is so because the support face 55 is relatively smoother than the emulsion face 56 and because of the clock-springed tendency of the filmstrip 2 when wound in the web take-up chamber 7 to move the emulsion face 56 into abutment against the next inwardly succeeding convolution of the backstrip 3. Therefore, upon first drawing the filmstrip 2 out of the web take-up chamber 7, the convolution of backstrip 3 which is located immediately inward of the outermost convolution of filmstrip will form a loop 3' as shown in FIG. 6. This loop 3', formed from the backstrip 3, will continually be enlarged as further filmstrip 2 is withdrawn from the web take-up chamber 7 and may be collected in an appropriate receptacle (not shown) which is disposed adjacent the cartridge opening device 12.

There has now been described, according to a preferred embodiment of the present invention, a simple and efficient cartridge opening device 12 which effects the opening of a cartridge 1 in a manner resulting in a minimum number of chips of cartridge material which might fall onto and contaminate a filmstrip 2 contained in the cartridge. It will be appreciated further that the cartridge opening device 12, as described above, is provided with a guide arm 15 which serves to readily direct the cartridge 12, under darkroom conditions, into a position on such device for breaking open the cartridge and removing the filmstrip 2.

The present invention has been described in considerable detail with particular reference to a preferred embodiment thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of such invention.

We claim:

1. A cartridge opening device for breaking open a frangible cartridge which is adapted to contain a web, the cartridge being of the kind provided with spaced web supply and take-up chambers and with an interconnecting web guide channel, said cartridge opening device comprising:

means for supporting the web take-up chamber of such a cartridge in a manner preventing movement of the web take-up chamber in at least one direction; and

means for moving, generally in said one direction, the web supply chamber and web guide channel of such a cartridge whose web take-up chamber is prevented from movement in said one direction by said supporting means, whereby such a cartridge can be broken open so as to enable a web to be removed from the web take-up chamber.

2. A cartridge opening device as recited in claim 1, wherein said moving means includes:

a breaker member; and

means for mounting said breaker member for movement, generally in said one direction, into abutment against the web guide channel of such a cartridge whose web take-up chamber is prevented from movement in said one direction by said supporting means.

3. A cartridge opening device from breaking open a frangible cartridge which is adapted to contain a web, the cartridge being of the kind provided with spaced web supply and take-up chambers and with an interconnecting web guide channel, said cartridge opening device comprising:

means for supporting the web take-up chamber of such a cartridge in a manner preventing movement of the web take-up chamber in first and second different directions; and

means for moving, generally in said first direction, the web supply chamber and web guide channel of such a cartridge whose web take-up chamber is prevented from movement in said first and second directions by said supporting means and for thereby breaking open the same cartridge at a location adjacent the web guide channel and the web take-up chamber so as to enable a web to be withdrawn, generally in said second direction, from the web take-up chamber.

4. A cartridge opening device as recited in claim 3, wherein said moving means includes:

first and second breaker members; and

means for mounting said first and second breaker members for movement, generally in said first direction, respectively into abutment against the web guide channel and web supply chamber of such a cartridge whose web take-up chamber is prevented from movement in said first and second directions by said supporting means.

5. A cartridge opening device as recited in claim 4, wherein the web take-up chamber of such a cartridge is provided with first and second members which are respectively engageable generally in said first and second directions, and wherein said supporting means includes:

a spindle member for supporting such a web take-up chamber; and

first and second means for respectively engaging, generally in said first and second directions, the first and second members of such a web take-up chamber which is supported on said spindle member.

6. A cartridge opening device as recited in claim 3, wherein the web take-up chamber of such a cartridge is adapted to support a web roll for rotation about a web roll axis, and wherein said supporting means includes:

a spindle member for supporting such a web take-up chamber for rotation about the web roll axis; and

means for preventing rotation of such a web take-up chamber about the web roll axis in a manner enabling a web roll to be unwound for withdrawal, generally in said second direction, from such web take-up chamber.

7. A cartridge opening device for breaking open a frangible cartridge which is adapted to contain a web, the cartridge being of the kind provided with spaced web supply and take-up chambers and with an interconnecting web guide channel, said cartridge opening device comprising:

means for supporting the web take-up chamber of such a cartridge in a manner preventing movement of the web take-up chamber in at least one direction;

means for guiding such a cartridge from a first location, whereat the web take-up chamber of such cartridge is spaced from said supporting means, to a second location, whereat the web take-up chamber of such cartridge is prevented from movement in said one direction by said supporting means;

said guiding means including means for retaining the web take-up chamber of such a cartridge at said second location; and

means for moving, relative to said supporting means and generally in said one direction, the web supply chamber and web guide channel of such a cartridge which is disposed at said second location,

whereby such a cartridge can be broken open so as to enable a web to be removed from the web take-up chamber.

8. A cartridge opening device as recited in claim 7, wherein said guiding and retaining means includes:

a guide surface along which such a cartridge is movable from said first location to said second location,

said guide surface including an offset portion for retaining the web take-up chamber of such a cartridge at said second location; and

means for mounting said guide surface and offset portion for movement relative to said supporting means between a retaining position, wherein said offset portion is disposed for abutment against the web take-up chamber of such a cartridge to retain the web take-up chamber at said second location, and a release position, wherein said offset portion is spaced from the web take-up chamber of such a cartridge to enable removal of the web take-up chamber from said second location.

9. A cartridge opening device as recited in claim 7, wherein said supporting means includes:

a spindle member for supporting the web take-up chamber of such a cartridge which is disposed at said second location;

and wherein said guiding and retaining means includes:

a guide surface along which such a cartridge is movable, from said first location, onto said spindle member;

said guide surface includes means, defined by an offset portion of said guide surface, for retaining the web take-up chamber of such a cartridge on said spindle member;

means for mounting said guide surface and offset portion for movement relative to said supporting means between a retaining position, wherein said

offset portion is disposed for abutment against the web takeoup chamber of such a cartridge to retain the web take-up chamber on said spindle member, and a release position, wherein said offset portion is spaced from the web take-up chamber of such a cartridge to enable removal of the web take-up chamber from said spindle member; and

means for resiliently urging said guide surface and offset portion from said release position to said retaining position.

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