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㉗ Applicant: **POLAROID CORPORATION**
549 Technology Square Cambridge,
Massachusetts 02138. (US)

㉘ Inventor: **Wareham, Richard Rogers**
4 Rainbow Road Marblehead,
Massachusetts. (US)

㉙ Representative: **Wallach, Curt, Dipl.-Ing. et al**
Kaufingerstrasse 8
D-8000 München 2. (DE)

㉚ Transparency film strip cartridge together with apparatus for processing thereof.

㉛ A photographic film assemblage (10) of the self-developing type is specially configured for use in conventional cameras including those of the 35 mm type. Photographic processing apparatus (11) is provided for use in conjunction with the self-developing type film assemblages (10) which have been previously exposed by the conventional type camera. The film assemblages (10) comprise a substantially lighttight cartridge (34) into which the film strip may be rewound subsequent to exposure in the conventional type camera thereby facilitating its removal from the camera and its insertion into the processing apparatus (11) which operates again to withdraw the film strip from its cartridge so as to effect the processing of the film strip. After processing, the film strip is advanced from the processing apparatus to provide a plurality of fully developed transparencies which may be cut and framed in a conventional manner.

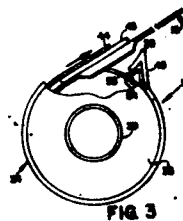


FIG 3

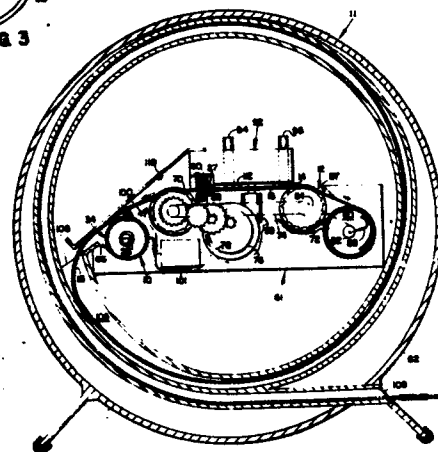


FIG 6

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Transparency Film Strip Cartridge together with
Apparatus for Processing thereof

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates generally to a film assemblage
5 of the self-developing type together with apparatus
for processing thereof, and more particularly to a
self-developing film assemblage for use in conven-
tional cameras together with apparatus for processing
the exposed film in order to provide immediate
10 photographic prints of the transparency type.

Background of the Prior Art

Cameras for use with self-developing type film are
well known in the art and generally include special
15 apparatus for effecting the rapid processing of the
self-developing type film. One such camera as
described in U. S. Patent No. 3,350,990 entitled
"Camera Apparatus", by P. Finelli, issued November 7,
1967, relates to a camera of a miniature or so called
20 35mm type embodying special structural elements which
cooperate to effect the loading, exposure, processing
and removal of the film pack used therewith. The

aforementioned camera additionally includes special apparatus for producing a completely processed and mounted transparency quickly following each photographic exposure. The special processing apparatus associated with this camera includes, in brief, a magazine, a transport means for drawing each film unit between a pair of pressure rolls and depositing the compressed film unit in a lighttight chamber wherein it is processed. The pressure rolls are closed and opened in a programmed sequence and access to the chamber is provided for removal of processed prints. The self-developing type film units specially configured for use in this camera are not suitable for use in other conventional 35mm cameras.

Therefore, it is a primary object of this invention to provide a film assemblage of the self-developing type which may be used in conventional commercially available cameras including those of the 35 mm type.

It is a further object of this invention to provide a photographic processing apparatus for processing self-developing type film units that have been previously exposed in a conventional commercially available type camera.

It is an even further object of this invention to provide a photographic processing apparatus for use with self-developing type film which has been previously exposed in a conventional type camera to provide a plurality of fully developed transparencies suitable for cutting and framing in a well known manner.



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Other objects of the invention will in part be obvious and will in part appear hereinafter. The invention accordingly comprises the mechanism and system possessing the construction, combination of
5 elements and arrangement of parts which are exemplified in the following detailed disclosure.

SUMMARY OF THE INVENTION

10 A photographic system is provided for processing an elongated exposed film strip of the type comprising at least two superposed sheets of photographic material and at least one pod of photographic processing composition disposed adjacent the trailing
15 end of the film strip wherein the film strip is helically wound for containment in a substantially lighttight cartridge from which it may be withdrawn, leading end first, in a given direction. The photographic processing system comprises an opaque housing
20 to provide a substantially lighttight environment in which the exposed film unit may be withdrawn from its cartridge in a given direction without further exposure thereof. Means are provided within the housing for receiving and releasably holding the film
25 cartridge to allow the withdrawal of the film strip from its cartridge without substantially moving the cartridge. Processing means are also included for first withdrawing the exposed film strip, leading end first, from its cartridge in the given direction and
30 then winding the withdrawn film strip in a helical coil. The processing means operates to withdraw the entire length of the film strip including the pod of processing composition and is thereafter actuatable subsequent to the withdrawing and winding of the film

strip for advancing the exposed film strip, trailing end first, in a direction generally opposite to the given direction. The processing means additionally operates to apply pressure to the film strip wherein
5 the pressure is of sufficient force to break the pod of processing composition to effect the spreading of the processing composition between the superposed sheets in correspondence with film advancement through the pressure applying means. Means are also
10 provided for accommodating the exit of the exposed processed film strip, trailing end first, from the housing without effecting the substantially light-tight environment within the housing.

15 DESCRIPTION OF THE DRAWINGS

The novel features that are considered characteristic of the invention are set forth with particularity in the appended claims. The invention itself, however,
20 both as to its organization and method of operation together with other objects and advantages thereof will be best understood from the following description of the illustrated embodiment or when read in connection with the accompanying drawings
25 wherein like numbers have been employed in the different figures to denote the same parts and wherein:

Fig. 1 is an exploded perspective view of the film
30 assemblage of this invention;

Fig. 2 is a side elevational view with portions broken away of the film assemblage of Fig. 1 in a particular mode of its operation;

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- Fig. 3 is a side elevation view with portions broken away of the film assemblage of Fig. 1 in another mode of its operation;
- 5 Fig. 4 is an exploded perspective view of the film processing apparatus of this invention;
- Fig. 5 is a cross-sectional view of Fig. 4 in a particular mode of its operation;
- 10 Fig. 6 is a cross-sectional view of the processing apparatus of Fig. 1 in another mode of its operation;
- 15 Fig. 7 shows an enlarged portion of Fig. 5 in another mode of its operation; and
- Fig. 8 shows an enlarged portion of Fig. 5 in still another mode of its operation.

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DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to Fig. 1 there is shown generally at
25 10 a film assemblage of this invention which is suitable for use with known commercially available cameras which may be of the 35mm type, a representative model of which is more fully described in U. S. Patent 3,377,936 entitled "Easy Loading Apparatus For
30 Film Supply For Photographic Cameras" issued April 16, 1968. Such known cameras generally include means for operably locating a conventional single reel cartridge of film of the non-self-processing type which has a generally cylindrical housing structure

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of a given diameter and a given length with an elongated light sealed opening extending there-through. A spool is mounted in the housing structure for rotation about an axis extending lengthwise of the housing structure and includes a central substantially uninterrupted axle portion around which an elongated strip of photographic film is coiled for storage intermediate the central axle portion of the spool and the inner surface of the cylindrical housing structure with a free end of the film strip extending through the opening. For further information regarding such well known film cartridges, reference may be made to U. S. Patent No. 3,537,376 entitled "Light Lock For The Entrance/Exit Passageway of A Container For Light Sensitive Material" by P. Fleming et al. issued November 3, 1970.

The film assemblage 10 of this invention includes an elongated film strip 12 comprising at least 2 superposed sheets 14, 16 of photographic film material having leading and trailing end portions, shown respectively at 17 and 19, together with at least one pod 26 of photographic processing fluid or composition 27 (see Fig. 7) disposed adjacent the trailing end 19 of the film strip between the superposed sheets 14 and 16 of photographic film material.

The photographic sheet material 14 may comprise a silver halide strata to operate as a negative while the photographic film sheet 16 comprises a silver receptive strata to operate as a positive. The processing composition 27 within the pod 26 may contain for example, a silver halide developer such

as hydroquinone, a silver halide solvent such as sodium thiosulfate, and a film forming material such as a water-soluble polymer, such as starch or gum. Either or both the silver halide stratum 14 together
5 with the silver receptive strata 16 are preferably semi-transparent so that the image presented by the superposed negative and positive prints may be readily observed by transmitted light. The spreading of the processing composition 27 in a uniformly thin
10 layer between the superposed sheets 14 and 16, for example by advancing the film strip 12 between a pair of pressure applying rollers in a manner to be more fully described, results in the formation of a negative print in the photographic sheet 14 by reducing
15 silver halide to silver, and also by reacting with unreduced silver halide, results in the formation of complex silver salts which migrate to the film sheet 16 where they are reduced to silver to form a positive print. When the processing composition 27 is
20 dry, there is formed a more or less solid residue which serves as an adhesive to bond the superposed sheets 14 and 16 of photographic film material together. Additional information regarding the aforementioned film strip 12 may be provided by
25 referring to U. S. Patent No. 2,861,885 entitled "Photographic Processes and Products" by E. Land, issued November 25, 1958.

The film strip 12 may also comprise spaced apart
30 strips of heat activatable adhesive as shown generally at 22 and 24 disposed generally along the longitudinal edges of the film strip 12 between the superposed sheets 14 and 16 of photographic material. In addition, one of the sheets of

photographic material, as is shown at 16, may also include rows of spaced apart perforations as shown generally at 18 and 20, which rows are disposed along the longitudinal edges of the film strip 12 in a conventional manner to facilitate the movement of the film strip in a manner as is well known in the art.

The film assemblage 10 additionally includes a spool as shown generally at 28, about which the film strip 12 is helically wound. The spool 28 comprises a center axial portion 30 which is adapted to releasably connect to the trailing end 19 of the film strip 12 in a well known manner to accommodate the winding of the film strip 12, trailing end 19 first, about the center axial portion 30. The center axial portion 30 includes a recess 32 formed therein of a given depth and a given width which is preferably less than the width of the film strip 12. The recess 32 is provided to receive and store the pod 26 of photographic processing composition substantially within the limits defined by the outer periphery of the center axial portion 30. Thus the pod 26 of processing composition is dimensioned to be seated in the recess 32 so that substantially the same length of film strip 12 can be stored around the center axial portion 30 within the film assemblage 10 as could otherwise be stored were the pod 26 to be removed from the film strip 12. The spool 28 additionally includes journal portions 39 and 41 extending outward from the opposed ends thereof to facilitate the rotatable mounting of the spool 28 in a manner to be subsequently described.

The film assemblage additionally includes an opaque

generally cylindrical cartridge or housing 34 of substantially the same given length and diameter as the aforementioned conventional film cartridge (see U. S. Patent No. 3,537,376, supra). Cartridge 34
5 comprises cylindrical endwall portions 36 and 38 interconnected by a cylindrical sidewall portion 40 to define a substantially lighttight chamber therein. The end wall portions 36, 38 may be connected in any conventional manner to the sidewall portion 40 such
10 as by press fitting. The endwalls 36 and 38 include respective bearing surfaces, one of which is shown at 37, for rotatably supporting respective journals 39 and 41 from the spool 28 thereby mounting the spool 28 for rotation about an axis extending lengthwise of
15 the cartridge 34. The cartridge 34 is provided with a substantially lighttight or light sealed opening as shown generally at 42 extending lengthwise thereof through which the leading edge 17 of the film strip 12 extends in order to facilitate its withdrawal from
20 the cartridge. The lighttight opening 42 is defined by two tangentially extending lip portions 44 and 46, each of which is respectively faced with a foam-cloth laminate 43, 45 to provide an effective light lock as is more fully described in U. S. Patent No.
25 3,537,376, supra. The lighttight opening 42 is preferably of sufficiently narrow width to inhibit the withdrawal of the pod 26 of processing composition from the cartridge 34. A projection 15 is also provided adjacent the leading edge 17 of the
30 film strip 12 to prevent the leading edge 17 from being rewound into the cartridge 34 for reasons which will become apparent from the following discussion.

Means are cooperatively associated with the

lighttight opening 42 in the form of a pull tab 48 which may be manually actuated to allow an increase in the width of the opening 42 to allow the withdrawal of the pod 26 of processing composition from the cartridge 34. The pull tab 48 includes an elongated opening 50 therethrough for receiving the lip portions 44 and 46 in generally tight frictional engagement therewith. Thus, the pull tab 48 may be releasably connected in overlying relation with respect to the sidewall 40 with the pull tab opening 50 in registration with the lighttight opening 42.

The sidewall portion 40 additionally includes two spaced apart parallel cuts or slits 56, 56' which extend from the lip portion 46 of the lighttight opening 42 along the side wall 40 to a fold line 54 which extends substantially along the length of the side wall portion 40 to interconnect the opposed cuts.

As is now readily apparent, the slits 56 are spaced apart by a distance at least as long as the lighttight opening 42 so as to lie substantially adjacent respective end wall portions 36, 38. Thus, removal of the pull tab 48 operates in cooperation with the fold line 54 to permit a portion of the side wall 40 to be folded outwardly as shown in Fig. 3 thereby allowing pod 26 of processing composition to be entirely withdrawn from the cartridge 34. Prior to its removal, the pull tab 48 operates to preclude the passage of the pod 26 of processing composition from the cartridge 34 without precluding the withdrawal of the forward portion of the film strip by reinforcing the edges of the lighttight opening 42 and

particularly that portion of the side wall 40 between the slits 56 from being bent outwardly about the fold line 54 in the manner as shown in Fig. 3. Thus, removal of the pull tab 48 permits the pod 26 of processing composition to be pulled against that portion of the side wall 40 intermediate the slits 56 so as to bend that portion of the side wall outwardly about the fold line 54 thereby effecting an increase in the width of the opening in the cartridge 34 through which the pod 26 of processing composition can be withdrawn.

The slits 56, 56' thereby provide sufficient depth to the lighttight opening 42 to permit the film strip 12 including the pod 26 of processing composition to be withdrawn therethrough without effecting the rupture of the pod 26.

Referring now to Figs. 4 through 6, there is shown a photographic processing apparatus at 11 having an opaque cylindrical housing 62 through which access may be provided by means of a hinged access door 64. When the access door 64 is closed, the housing 62 provides a substantially lighttight environment in which an exposed film strip 12 may be withdrawn from its cartridge 34 in a given direction without risk of further exposure to the film strip. Centrally disposed within the housing 62 there is provided a base block 61 which is selectively machined to define a film cartridge chamber 66 for receiving and releasably holding or locating an exposed film assemblage 10 to allow the withdrawal of the exposed film strip 12 from its canister 34 without substantially moving the canister 34.

Photographic processing means, which when connected to the leading end 17 of the film strip 12, operate to progressively withdraw the exposed film strip 12, leading end 17 first, from its canister 34 in a given direction and then wind the withdrawn film strip 12 in a helical coil. The film strip 12 may be withdrawn from its canister 34 by means of two spaced apart sprocket wheels 70, 72 which are rotatably disposed with respect to the base block 61. The sprocket wheels 70 and 72 may be rotatably driven in concert with each other by means of a chain or belt 74 which drivably connects the two sprocket wheels 70 and 72. The sprocket wheel 70 may be rotatably driven by way of a motor 76 and an interconnecting gear train 78.

Means comprising a generally cylindrical film receiving chamber 80 are provided for facilitating the automatic progressive winding of the withdrawn film strip 12 in helical coil so as to temporarily store the film strip 12. A rotatable member 82 is disposed for rotation along the center axis of the chamber 80 and includes a flexible wiper member 86 extending radially outward therefrom along the longitudinal length thereof. The rotatable member 82 and its associated wiper member 86 are rotatably driven in concert with the sprocket wheels 70, 72 by means of an interconnecting belt drive as shown generally at 84. The leading end 17 of the film strip 12 is guided into film receiving chamber 80 by way of a tapered inlet opening 87 as best viewed in Fig. 8.

A pair of opposed pressure applying rollers 88, 90 are provided to define a roller bite therebetween for processing the film strip 12 in a manner to be made

more apparent from the subsequent discussion. As is readily apparent, roller 88 is rotatably connected with respect to the base block 61 whereas roller 90 is connected for rotation with respect to a movable
5 frame member as shown generally at 92. Frame member 92 is disposed for vertical translation away from the base block 61 along two spaced apart stanchions 94, 96 which extend outward from fixed connection with respect to the base block 61. Translation of the
10 frame member 92 along the stanchions 94, 96 may be controlled by way of a solenoid 98 in a manner to be subsequently described. The processing means additionally includes a photodiode 100 for sensing the complete withdrawal of the film strip 12 from its
15 canister 34 for reasons which will also become apparent from the following discussion. The photodiode 100 in turn signals a control circuit 101 which controls the actuation of solenoid 98 and the direction of rotation of the motor 76 in a manner to
20 be subsequently described.

Means are provided for accommodating the exit of an exposed processed film strip 12 from the housing 62 without effecting the substantially lighttight
25 environment within the housing. Such means may comprise a helical elongated imbibition chamber 104 having an inlet opening 106 for receipt of the film strip 12 and an outlet opening 108 through which the developed film strip 12 may exit from the housing 62.
30 The exposed and processed film strip 12 may be deflected into the inlet opening 106 by means of a film deflecting plate 110 which extends laterally outward from the frame member 92.

As previously discussed, the film assemblage 10 may be exposed in a conventional manner in any well known camera. During exposure of the film strip 12, the pull tab 48 remains connected to the canister 34 so as to inhibit the withdrawal of the entire film strip 12 including the pod 26 of processing composition. After the last frame of the film strip 12 is exposed, it may be rewound in the camera in a well known manner thereby permitting the removal of the film assemblage 10 from the camera without risk of further exposing the film strip 12. As is now readily apparent, the projection 15 prohibits the leading edge 17 of the film strip 12 from being rewound into the cartridge 34, thereby permitting its subsequent withdrawal in a manner to be herein described. After removing the film assemblage 10 from the camera, the user may then grasp the pull tab 48 so as to forceably remove it from the canister 34. Such removal need not be particularly difficult since the pull tab 48 may only be retained to the cartridge 34 by way of the frictional engagement between the tangentially extending lip portions 44 and 46 and the pull tab opening 50. Alternatively, a frangible adhesive could be utilized to connect the pull tab 48 to the cartridge 34 during exposure.

After exposing the film strip 12 and removing the pull tab 48 from the cartridge 34, the user may then insert the film assemblage 10 into the photographic processing apparatus 11 by way of the access door 64. The exposed film assemblage 10 may then be placed into the film receiving chamber 66 as shown in Fig. 4. The leading end 17 of the film strip 12 which was not rewound into the cartridge 34 may then be

withdrawn in the given direction away from the cartridge 34 so as to at least overlies the sprocket wheels 70 and 72 with the rows 18 and 20 of spaced apart perforations engaged by the sprockets from
5 respective sprocket wheels 70 and 72. As is readily apparent, the frame member 92 is actuated by the solenoid 98 to translate outwardly from the base block 61 thereby separating the distance between the rollers 88, 90 so as to define a gap therebetween in
10 order that the rollers 88, 90 become ineffective in applying pressure to the exposed filmstrip 12 as the film strip 12 is withdrawn from its cartridge 34. Closure of the access door 64 may operate by way of the control circuit 101 to actuate the motor 76 which
15 in turn drives the sprocket wheels 70, 72 by way of interconnecting gear train 78 and drive chain 74. In this manner, the exposed film strip 12 may be entirely withdrawn from its canister 34.

20 As the exposed film strip 12 is withdrawn in the given direction from its cartridge 34, the leading end 17 enters the film receiving chamber 80 by way of the inlet opening 87 and is thereafter grasped
25 between the outside edge of the wiper member 86 and the inside surface of the film receiving chamber 80 (see Fig. 8) so as to continue the forward movement of the leading end 17 of the film strip around the cylindrical chamber 80 in a manner as is more fully taught in U. S. Patent No. 3,377,936 entitled "Easy
30 Loading Apparatus For Film Supply For Photographic Cameras", issued April 16, 1968. As the winding of the exposed film strip 12 increases in the number of its turns within the chamber 80, the flexible wiper member 86 automatically reduces itself in outer

diameter. The pod 26 of processing composition is ultimately withdrawn through the opening 42 by bending over that portion of the side wall 40 between the slits 56 and about the fold line 54 as previously described. The photodiode 100 thereafter senses the trailing end 19 of the exposed film strip 12 (see Fig. 7) so as to signal the motor 76 by way of the control circuit 101 to reverse its direction of rotation while simultaneously actuating the solenoid 98 to cause the frame member 92 to move toward the base block 61 thereby moving the pressure applying rollers 88, 90 into juxtaposed position with each other to establish a roller bite therebetween. Frame member 92 may additionally support a heater element 112 which is complementary to the spaced apart strips 22, 24 of the heat activatable adhesive so as to effectively activate the adhesive strips 22, 24 when the frame member 92 is moved to its position closely adjacent the base block 61 as shown in Fig. 6. The heater element 112 may also be activated by way of the control circuit 101.

Reversing the rotational direction of the motor 76, as is readily apparent, reverses the rotational direction of the sprocket wheels 70, 72 so as to advance the film strip 12, trailing end 19 first, in a direction generally opposite to the given direction in which the exposed film strip 12 was previously withdrawn from the cartridge 34. Advancement of the exposed film strip 12 past the heater element 112 operates to activate the spaced apart strips 22 and 24 of adhesive so as to bond the longitudinal edges of the two superposed sheets 14, 16 of photographic material together immediately prior to the

application of pressure to the film strip 12 by way of the rollers 88, 90. The rollers 88, 90 thereafter exert a compressive force against progressive incremental sections of the film strip 12 containing the recorded images as it is advanced from the chamber 80 by the sprocket wheels 70, 72 to facilitate the rupturing of the pod 26 of processing composition and the spreading of the processing composition 27 between the superposed sheets 14, 16 in correspondence with film advancement through the pressure applying rollers 88, 90. The trailing edge 19 of the exposed and processed film unit 12 is thereafter advanced by way of the deflecting plate 110 into the inlet opening 106 of the imbibition chamber 104 from which it ultimately exits from the housing 62 by way of the outlet opening 108 after a sufficient duration has elapsed to allow the exposed and processed film strip 12 to develop a viewable image in the aforementioned manner. The viewable images provided by the exposed, processed and developed film strip 12 may be viewed by transmitted light and thus are categorized as transparencies. Such transparencies may thereafter be cut from the film strip 12 and mounted in frames suitable for insertion in a slide projector as is well known in the art. In this manner the photographer may process his own slide transparencies at home in an economical and efficient manner so that they may be viewed immediately after the last frame of the film strip 12 is exposed.

Since certain changes may be made in the above described embodiment without departing from the scope of the invention herein involved, it is

intended that all matter contained in the above description or shown in the accompanying drawings be interpreted as illustrative and not in a limiting sense.

Claims:

1. Apparatus for use with commercially available cameras having means for operably locating a single reel cartridge of film of the non-self-processing type which has a generally cylindrical housing structure of a given diameter and a given length with an elongated light sealed opening extending therethrough, a spool mounted in the housing structure for rotation about an axis extending lengthwise of the housing structure and including a central substantially uninterrupted axle portion around which an elongated strip of such photographic film is coiled for storage intermediate the central axle portion of the spool and the inner surface of the cylindrical housing structure with a free end of the film strip extending through the opening, said apparatus comprising:
 - a generally cylindrical housing structure of substantially said given diameter and given length and having an elongated light sealed opening extending lengthwise thereof;
 - a spool mounted in said housing structure for rotation about an axis extending lengthwise of said housing structure, said spool including a central axle portion having a recess formed therein of given depth and width;
 - an elongated strip of self-developing film having a width greater than the length of said spool recess and a first end connected to said spool, said self-processing film strip being coiled around said spool's central axle portion with its other end extending through said housing

structure's opening, said self-processing film strip including a pod of processing fluid located adjacent said first end of said self-processing film strip and dimensioned to be seated in said
5 recess of said spool's central axle portion so that substantially the same length of said self-processing film strip can be stored around said central axle portion within said cylindrical housing structure as could be so stored in said
10 apparatus with said pod of processing fluid removed therefrom and whereby the same camera may be employed to effect the exposure of said self-processing film strip as well as the type of film heretofore utilized therein; and
15 means for precluding said other end of said self-processing film strip from being drawn inside of said housing structure.

2. The apparatus of claim 1 wherein said elongated
20 light sealed opening is of sufficient depth to permit said self-processing film strip including the portion thereof containing said pod of processing fluid to be withdrawn therethrough without effecting the rupture of said pod and
25 additionally including means for selectively precluding the passage of said pod containing portion of said self-developing film strip through said opening without precluding the withdrawal therethrough of portions of said self-developing film strip intermediate its said pod
30 containing portions and its said other end.

3. Apparatus for effecting the processing of an elongated strip of self-processing film, having

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a pod of processing fluid and housing in a single reel type of cartridge, after its exposure in a presently commercially available camera to record a plurality of images therealong, the cartridge including a general cylindrical housing structure having an elongated light sealed opening passing therethrough and a spool having a central axle portion with a recess mounted for rotation in the housing structure about an axis extending lengthwise of the housing structure, the self-processing film strip having one end thereof connected to the spool and being coiled around the spool's central axle portion with its pod disposed in the spool's recess and with its other end extending through the housing structure's elongated light sealed opening, said apparatus including:

means for releasably locating the cartridge;
an elongated imbibition channel;

means, once operably connected to the film strip adjacent the other end thereof, for progressively withdrawing the film strip from the cartridge and, after the film strip has become completely disengaged from the cartridge, for progressively advancing the film strip, other end first, into said elongated imbibition channel;

means for automatically progressively receiving and storing at least the major portion of the film strip as it is withdrawn from the cartridge by said withdrawing and advancing means; and

means for exerting a compressive force against progressive incremental sections of a film strip as it is being advanced from said receiving and storing means responsive to the operation of said

withdrawing and advancing means to facilitate the rupturing of the film strip's pod of processing fluid and the spreading of the released fluid along the length of the film strip containing the recorded images.

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4. Photographic system for processing an elongated exposed film strip of the type comprising at least two superposed sheets of photographic film material and at least one pod of photographic processing composition disposed adjacent the trailing end of the film strip and wherein the film strip is helically wound for containment in a substantially lighttight film cartridge from which it may be withdrawn, leading end first, in a given direction, said photographic processing system comprising:
- an opaque housing to provide a substantially lighttight environment in which the exposed film unit may be withdrawn from its cartridge in the given direction without further exposure thereof; means within said housing for receiving and releasably holding the film cartridge to allow the withdrawal of the film strip from its cartridge without substantially moving the cartridge;
- processing means for first withdrawing the exposed film strip, leading end first, from its cartridge in the given direction and then winding the withdrawn film strip in a helical coil, said processing means operating to withdraw the entire length of the film strip including the pod of processing composition and being thereafter actuatable subsequent to the withdrawing and

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winding of the film strip for advancing the exposed film strip, trailing end first, in a direction generally opposite to the given direction and for applying pressure to the film strip of sufficient force to break the pod of processing composition to effect the spreading of the processing composition between the superposed sheets in correspondence with film advancement through said pressure applying means; and means for accommodating the exit of the exposed and processed film strip, trailing end first, from said housing without effecting the substantially lighttight environment within said housing.

5. The photographic apparatus of claim 4 wherein said film exit means defines an elongated imbibition chamber having an inlet opening disposed to receive the exposed and processed film strip, trailing end first, as it is advanced by said processing means, said imbibition chamber having an outlet opening spaced sufficiently apart from said inlet opening to provide a substantially lighttight environment to the exposed and processed film strip as it is advanced for a sufficient duration to allow the exposed and processed film strip to develop a viewable image before exiting through said outlet opening.

6. The photographic apparatus of claim 5 wherein said elongated imbibition chamber is structured and configured to define a helical chamber between its inlet and outlet openings, said

helical chamber being disposed within said opaque housing and around said receiving and holding means and said processing means.

- 5 7. The photographic apparatus of claim 4 wherein
said processing means includes: a generally
cylindrical chamber having one elongated center
shaft disposed for rotation along the center axis
10 of said chamber together with a flexible wiper
extending radially outward of said center shaft
so as to grasp the leading end of the withdrawn
film strip between the outside edge of said
wiper and the inside surface of said cylindrical
15 chamber thereby effecting the winding of the
withdrawn film strip in a helical coil about said
elongated member inside said cylindrical chamber.
- 20 8. The photographic apparatus of claim 7 wherein
said processing means includes: at least one
sprocket wheel for threadably engaging the film
strip to withdraw the film strip in the given
direction, and a motor for rotatably driving said
sprocket wheel and elongated member in concert
25 with each other.
- 30 9. The photographic apparatus of claim 4 wherein
said processing means includes a pair of opposed
pressure applying rollers each connected for
rotation with respect to said housing, said
rollers being maintained in juxtaposition with
respect to each other to define a roller bite
therebetween at least subsequent to the
withdrawal and winding of the film strip, said
processing means additionally including: at least

one sprocket wheel for threadably engaging the film strip to advance the film strip in the opposite direction through the bite of said rollers, a motor for driving said sprocket wheel, and a photodiode for sensing the complete withdrawal of the film strip from its canister so as to terminate the winding of the film strip and thereafter actuate the advancement of the film strip in the opposite direction.

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10. The photographic apparatus of claim 9 wherein said processing means includes means for positioning said rollers between said receiving and holding means and the location in which the film strip is helically wound so that the film strip may pass between said rollers subsequent to being withdrawn from its canister and prior to being wound in said helical coil, said positioning means additionally including means for separating the distance between said rollers to define a gap therebetween in order that said rollers are ineffective to apply pressure to the film strip as the film strip is withdrawn from its cartridge and wound in said helical coil, said positioning means additionally being actuatable by way of said photodiode upon the complete withdrawal of the film strip from its canister for moving said rollers into juxtaposition with respect to each other to establish said roller bite.

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11. The photographic apparatus of claim 4 wherein the film strip includes spaced apart strips of actuatable adhesive disposed along the longitudinal edges thereof between the superposed sheets of

- photographic material, and wherein said processing means further includes means for activating the adhesive so as to effectively bond the superposed sheets along their longitudinal edges during film advancement in said opposite direction immediately before the application of said pressure to spread said processing fluid.
- 10 12. The photographic apparatus of claim 11 wherein the adhesive is of the heat activated type and wherein said activating means provides heat to the film strip to activate the adhesive.
- 15 13. A photographic film assembly comprising:
an elongated film strip comprising at least two superposed sheets of photographic film material having leading and trailing end portions together with at least one pod of photographic processing composition disposed adjacent the trailing end of the film strip between said superposed sheets of photographic film material;
20 a spool about which said film strip is helically wound trailing end first, said spool having an elongated center axle portion structured and configured to releasably connect to the trailing end of the film strip to enable the film strip to be helically wound thereabout, said axle portion additionally including a recessed portion thereof
25 for receiving and storing said pod of processing composition substantially within the limits defined by the outer periphery of said axle portion;
30 an opaque cartridge including opposed end wall

portions structured to rotatably mount said spool therebetween and additionally including sidewall portions interconnecting said endwall portions to define a substantially lighttight chamber
5 therein, said sidewall portions including a substantially lighttight opening through which said film strip extends from said cartridge, leading end first, said lighttight opening being of sufficiently narrow width to inhibit the
10 withdrawal of said pod of processing composition from said cartridge, said sidewalls additionally including manually actuatable means cooperatively associated with said lighttight opening for allowing an increase in the width of said opening
15 to allow the withdrawal of said pod of processing composition from said cartridge; and means for precluding said leading end of said film strip from being drawn inside of said cartridge.

20

14. The film assembly of claim 13 wherein said elongated film strip is of the 35mm type.

25

15. The film assembly of claim 13 wherein said superposed sheets of film material comprise respectively, a negative and a positive.

30

16. The film assembly of claim 13 wherein said film strip comprises spaced apart strips of actuatable adhesive disposed along the longitudinal edges thereof between said superposed sheets of photographic material.

17. The film assembly of claim 16 wherein said

adhesive is of the heat actuatable type.

18. The film assembly of claim 13 wherein said width
increasing means comprises a pull tab releasably
5 connected to said cartridge in overlying relation
with respect to said side wall and lighttight
opening, said pull tab having an opening
therethrough of sufficiently narrow width to
inhibit the withdrawal of said pod of processing
10 composition through said lighttight opening when
said pull tab opening is in substantial
registration with respect to said lighttight
opening thereby reinforcing the edges of said
lighttight opening and inhibiting the deformation
15 of the edges of said lighttight opening against
the strain imposed by said pod in the course of
withdrawing said film strip from said cartridge,
said sidewall being structured to effect an
increase in the width of said lighttight opening
20 subsequent to the removal of said pull tab
thereby permitting the withdrawal of said pod
from said cartridge.

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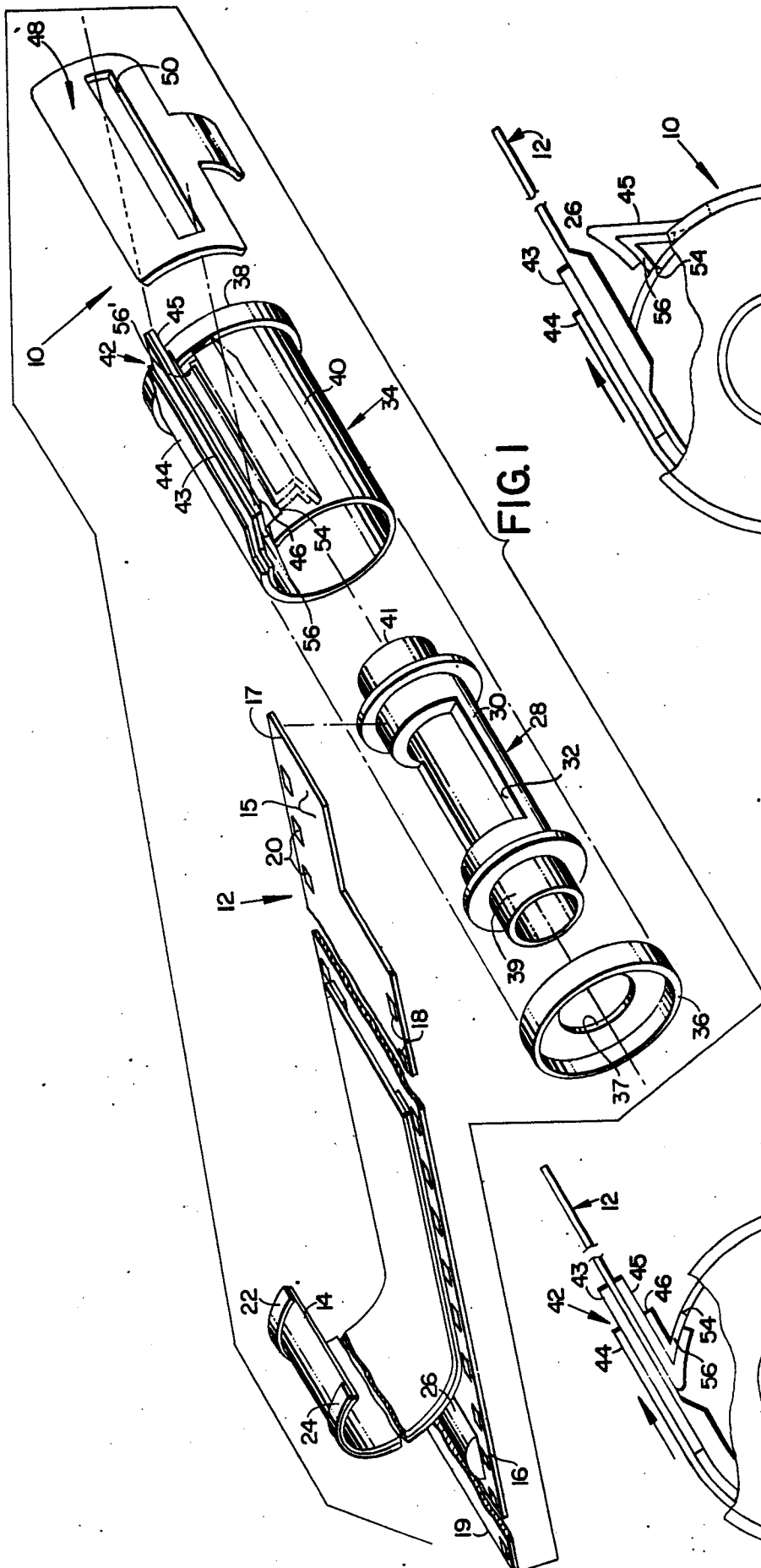


FIG. 1

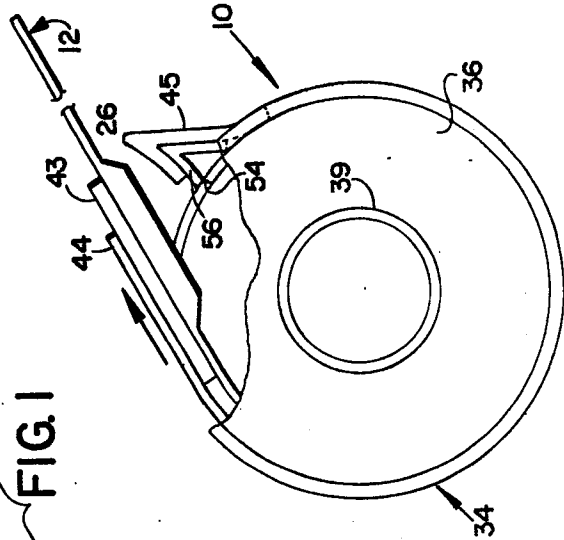


FIG. 3

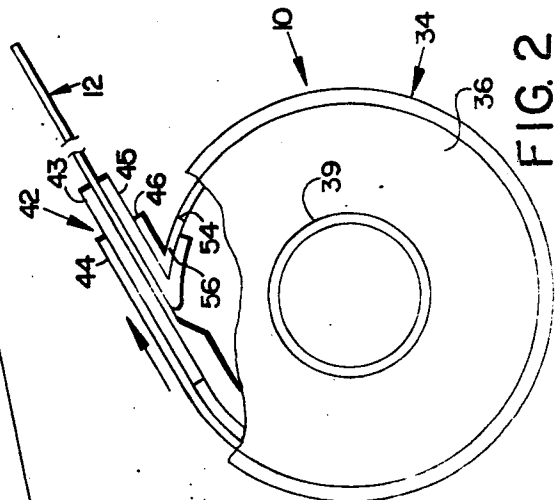
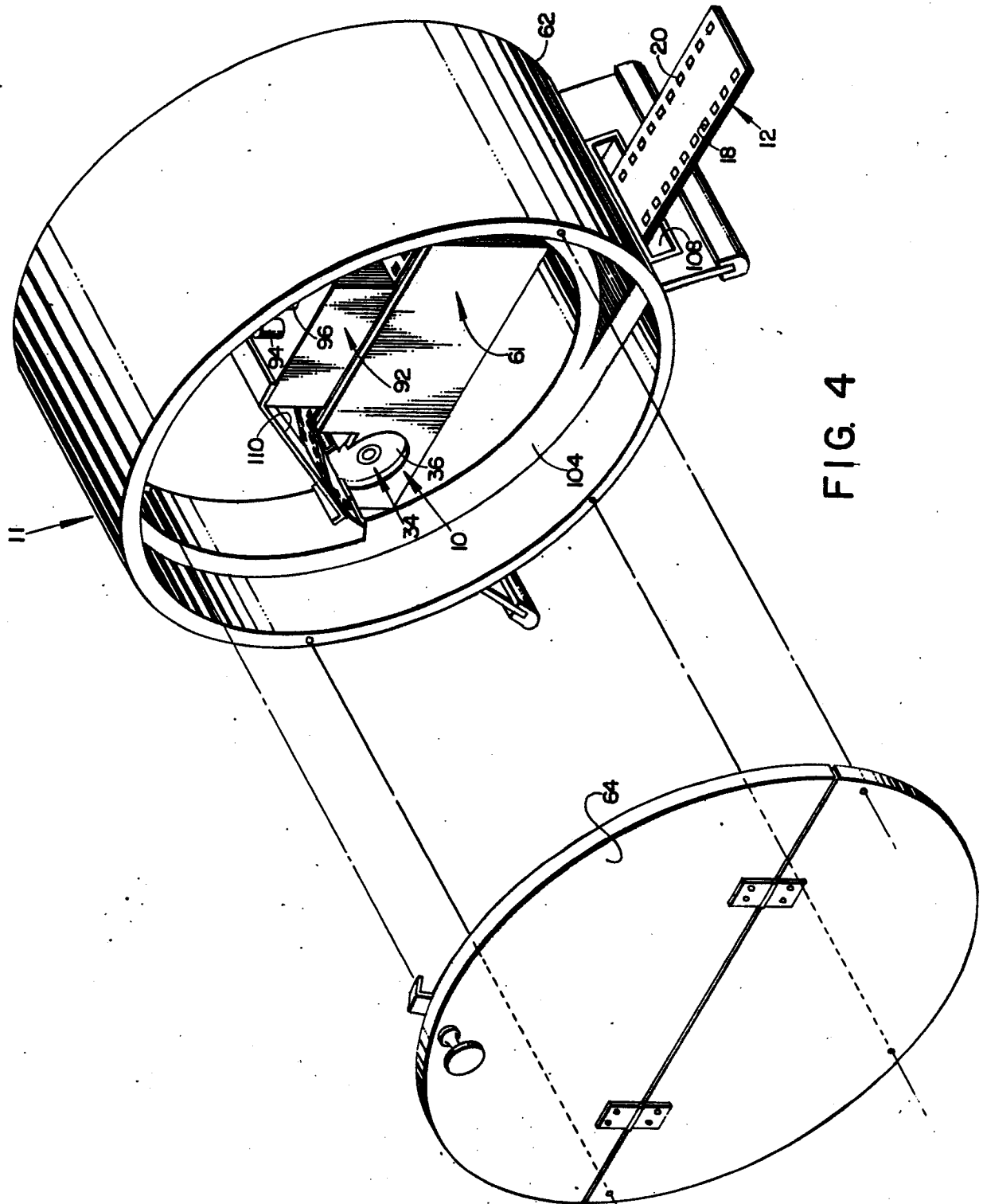


FIG. 2



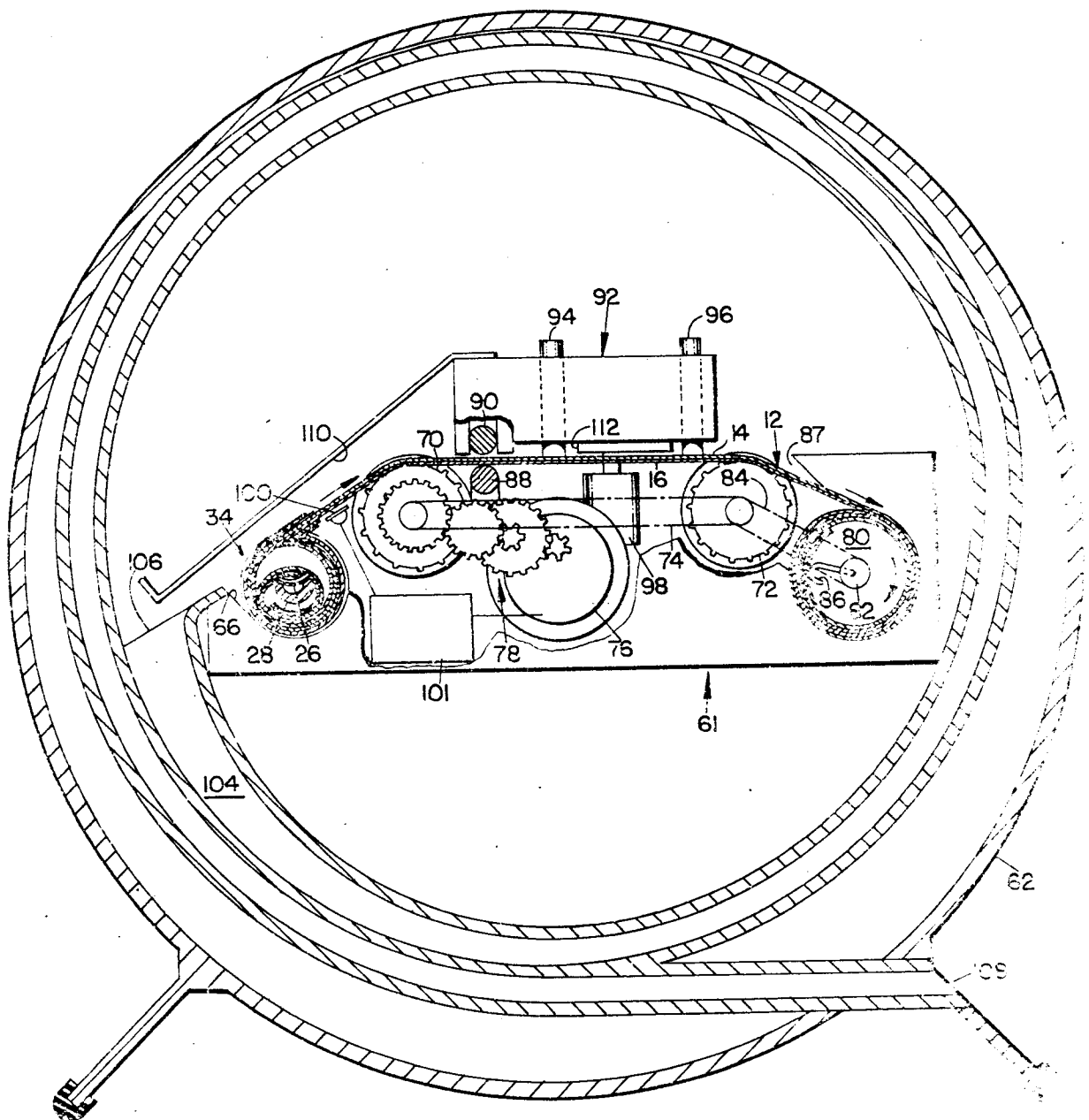


FIG. 5

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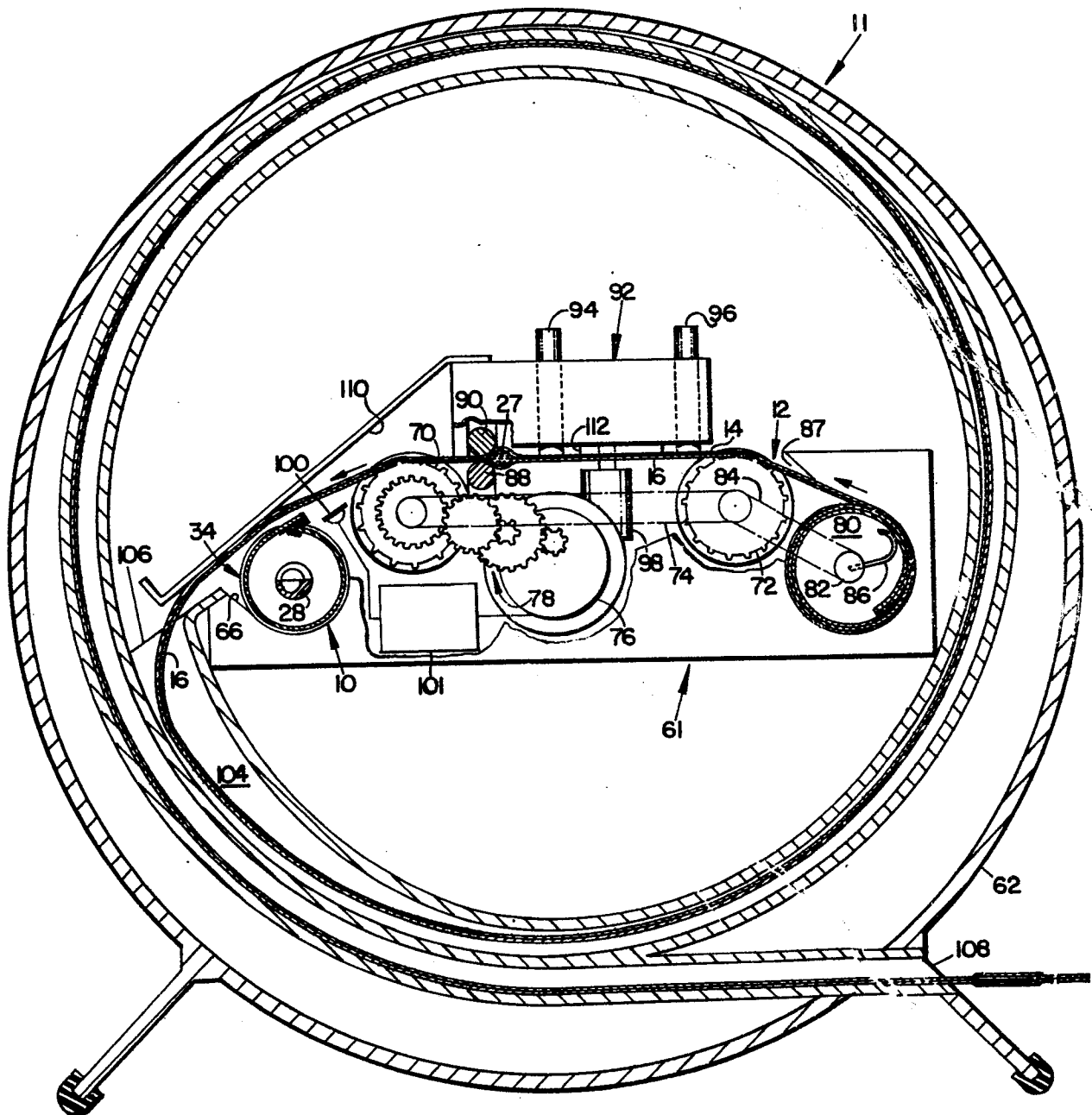
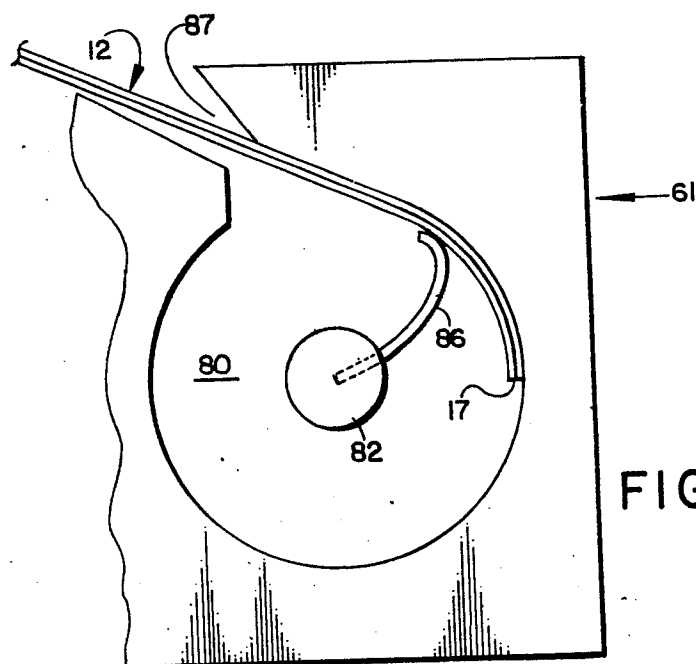
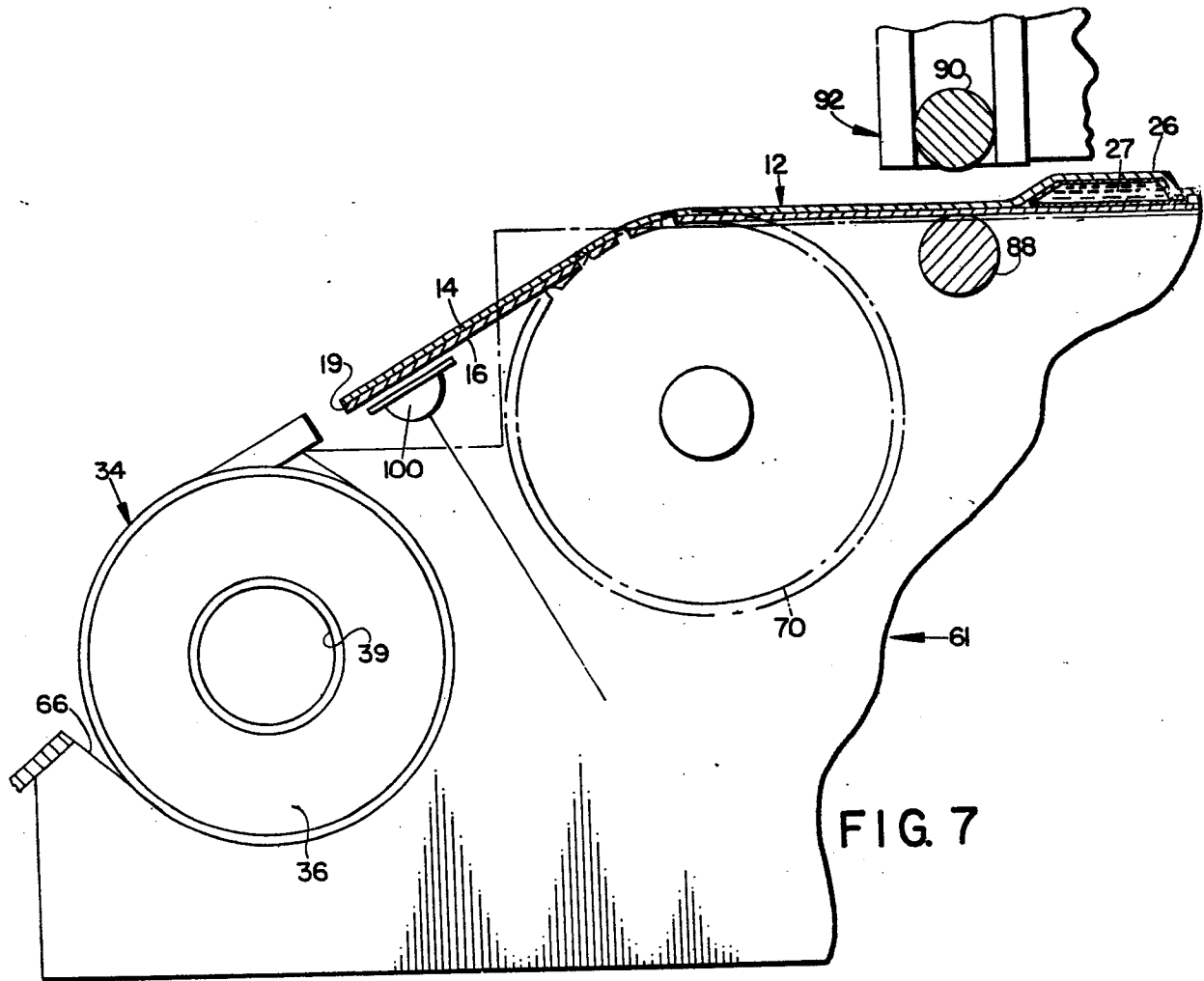


FIG. 6





European Patent
Office

0000469
EUROPEAN SEARCH REPORT

Application number

EP 78 10 0056

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
	<u>GB - A - 897 971</u> (R.N.HEJNOCHOWICZ) 1 * Page 2, lines 10-130; page 3, lines 1-70; figures 1-11 * --- <u>FR - A - 1 567 353</u> (AGFA-GEVAERT, AG) 1 * Page 2, lines 32-43; page 3, lines 1-5; figures 1-5 * ---		G 03 B 17/30 G 03 D 9/02
D	<u>US - A - 2 861 885</u> (E.H.LAND) * Column 2, lines 15-38; figures 1,2 * ---	1, 15	TECHNICAL FIELDS SEARCHED (Int.Cl.) G 03 B 17/30 G 03 D 9/02 G 03 B 17/52 G 03 C 5/54
DA	<u>US - A - 3 350 990</u> (P.L.FINELLI) * Columns 3-8; figures 1-11 * ---	1	
A	<u>US - A - 3 667 361</u> (D.H.MEGGS) * Columns 2,3; figures 1-4 * ---	1	
A	<u>US - A - 3 483 809</u> (R.SCHMIDT et al.) * Columns 2,3; figures 1-3 * ----	1	CATEGORY OF CITED DOCUMENTS X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
☒ The present search report has been drawn up for all claims			&: member of the same patent family, corresponding document
Place of search		Date of completion of the search	Examiner
The Hague		31-10-1978	BOEYKENS