



(11) Publication number : **0 559 396 A1**

(12) **EUROPEAN PATENT APPLICATION**

(21) Application number : **93301482.1**

(51) Int. Cl.⁵ : **G03D 13/14**

(22) Date of filing : **26.02.93**

(30) Priority : **26.02.92 GB 9204118**

(43) Date of publication of application :
08.09.93 Bulletin 93/36

(84) Designated Contracting States :
**AT BE CH DE DK ES FR GB GR IE IT LI LU MC
NL PT SE**

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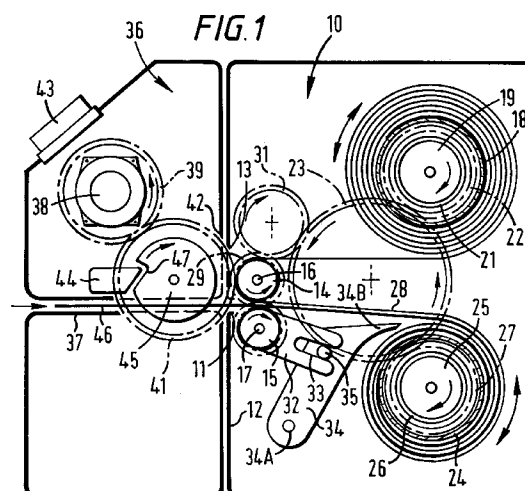
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(54) **Method of and apparatus for handling test samples of sensitive thin material.**

(57) A cassette (10) contains two spools (18 and 24) and a pair of nip rollers (14 and 15). A plastic support (28) runs between the two spools (18 and 24), around the nip roller (14) and between the nip rollers (14 and 15). Test samples (46) of photographic material are inserted or dispensed through a slot (11) in the cassette (10) which is in line with the nip between the nip rollers (14 and 15). Samples (36) inserted are stored between the convolutions of the support (48) wound on the spool (24). The cassette (10) co-operates with an interface mechanism (36) which houses a drive motor (38). Gearing (22, 23, 27, 31, 29, 41 and 39) transmits drive from the motor (38) to the spool (18). The cassette (10) is used to receive/insert the test samples (46) from or into each piece of test equipment, through a respective interface (36), in which one step of the test procedure is performed on the samples (46).



This invention relates to a method of and apparatus for handling sensitive thin material during a treatment procedure. It may relate to handling test samples during a batch testing procedure. The material could be photographic material such as sensitized paper or sensitized film. The latter may be for developing, printing, cutting and/or reprinting.

In testing sensitized photographic material, such as film, a sample of the material to be tested is subjected to a series of steps, each step being carried out in a respective one of a series of test equipment. Usually the sensitized material is exposed, developed and observed or examined during the test procedure. In particular, it is observed or examined for its optical density at the end of the test procedure. Up to now short samples of the material to be tested have been loaded into and unloaded from the test equipment by hand and carried from one piece of the test equipment to another in a suitable portable container.

In practice such samples are tested in batches. For example, a number of similar samples of different sensitized material may be subjected to the same tests, or a number of samples of the same material may be subjected each to different tests, or the batch may comprise samples of different material and the tests performed on those samples may be different.

Since the material is delicate, light sensitive until developed, and chemically active, it has to be handled with care. That is so regardless of its length. In other words, it applies as much to a complete roll of exposed film which is to be processed and which may be about 1 1/2 metres, as it does to shorter test samples which may be about 30 cms long.

Technical development of photographic test equipment has improved such equipment continually. As a result current systems can include automated sample loading into the mechanism (for example an operator posts a sample in) and computer control of the process particularly to achieve different settings. It often follows that the cycle time for the operation becomes extended and manual operations are reduced to a simple level. The operation is prone to human error as a result of periods of inactivity and repetitive, undemanding operation as well as the effects of the darkness or subdued lighting in which the photographic processes are carried out.

Although it is no longer light sensitive and is not so chemically active, film which has been processed still needs to be handled with care for printing and cutting.

Current practice is for processed film strips to be hung up between processing and printing and that can be inconvenient especially when there is a considerable time interval between processing and printing. Also it is customary for the film strip to be cut into short lengths after printing. Those short lengths, which are usually about 4 frames in length, are given to the customer with his prints for him to use when or-

dering reprints. At present, when a reprint is needed, a punched paper tape strip is attached to the appropriate negative strip or length. The punched paper tape is used to locate the negative strip at the appropriate position in the printer so that the reprint can be made.

An object of this invention is to provide a method and apparatus for handling sensitive thin material such as sensitized film which caters for the problems discussed above and provides an opportunity to improve the work content and productivity of technical staff.

According to one aspect of this invention, there is provided a method of handling sensitive thin material during a procedure in which the sensitive thin material is subjected to a respective treatment step in respective equipment, the sensitive thin material, which is vulnerable to physical or chemical damage during handling, being loaded into each piece of equipment and, prior to being loaded for the final step of the treatment procedure, is retrieved from each piece of equipment for the next step, wherein the handling of the sensitive thin material is automated by being loaded in a cassette, both before the start of the treatment and automatically by said retrieval of that sensitive thin material from a piece of equipment, the sensitive thin material being loaded in the cassette by being placed between convolutions of an elongate, chemically inert, thin support medium which is wound onto one spool within the cassette, and is dispensed from the cassette by unwinding said support medium from said one spool, the cassette so loaded then being presented to the piece of equipment appropriate for the next step of the treatment procedure and being operated automatically to dispense the sensitive thin material to the appropriate piece of test equipment.

If the support medium is made from the same thin material as the sensitive thin material being handled, the resultant containment of the sensitive thin material in the cassette matches the conditions to be found during its manufacture whereby the risk of physical or chemical damage because of mishandling is reduced.

The support medium may be unwound from said one spool by being wound onto another spool within the cassette and vice versa, at least one of said spools being driven to effect unwinding of said support medium from said one spool or rewinding of said support medium onto said one spool.

Preferably the sensitive thin material comprises a batch of discrete lengths of sensitive thin material and the procedure comprises subjecting at least a selected one of the discrete lengths to a respective step in the respective equipment, the discrete lengths of each batch being loaded into each piece of equipment in a pre-determined sequence by automatic operation of the cassette to dispense the discrete lengths of that batch to the appropriate piece of equipment in said sequence. In one embodiment of this invention the

discrete lengths are test samples and the procedure comprises a batch testing procedure in which each of the batch of such test samples is subjected to a respective testing step in respective test equipment. In another embodiment of this invention the discrete lengths comprise cut lengths of processed film negatives, each length comprising several frames, wherein the respective treatment step is printing and the cut lengths are dispensed from the cassette into the printer.

Positive drive may be imparted to each discrete length, for example, by passing it, and the portion of the support medium against which it is placed, between a pair of nip rollers as said portion is wound or unwound onto or from said one spool. The support medium may be unwound from or wound onto said one spool incrementally, each increment being of a certain, preselected length selected to suit the length of the discrete lengths.

Each discrete length may be positively separated from the portion of the support medium on which it is placed for dispensing as that portion is unwound from said one spool.

According to another aspect of this invention there is provided apparatus for handling sensitive thin material by a method according to said one aspect of this invention, during a procedure in which the sensitive thin material is subjected to a respective treatment step in respective equipment, the sensitive thin material, which is vulnerable to physical or chemical damage during handling, being loaded into each piece of equipment and, prior to being loaded for the final step of the treatment procedure, being retrieved from each piece of equipment for loading for the next step, the apparatus including a cassette which is adapted to be loaded with the sensitive thin material and to store it in chemically inert storage means enclosed therein, said storage means comprising a spool within the cassette and an elongate, chemically inert thin support medium which is secured to the spool so as to be wound thereon with the sensitive thin material located between convolutions of the support medium that is wound onto said one spool whereby the cassette is loaded with said sensitive thin material and so as to be unwound whereby to dispense said sensitive thin material, entry interface means for each piece of equipment adapted to interact with said cassette whereby the sensitive thin material loaded in said cassette can be unloaded and fed into the respective piece of equipment, and exit interface means for each piece of equipment except that in which the final step of the procedure occurs, said exit interface means being adapted to interact with said cassette whereby the sensitive thin material in the respective piece of equipment can be retrieved and reloaded in said cassette, there being automatically operable driving means adapted to be coupled with said cassette when the latter interacts with each said

interface means whereby to drive said cassette to load and unload the cassette with sensitive thin material as appropriate.

Where the apparatus is for handling sensitive thin photographic material, the cassette is adapted to store the material therein in a substantially light-proof manner.

There may be another spool within the cassette and the other end of the support medium may be secured to that other spool so that the support medium is unwound from said one spool by being wound onto said other spool and vice versa, either said one spool or said other spool being driven by said driving means to effect automatic winding of said support medium onto said other spool from said one spool to automatically dispense said sensitive thin material or to effect automatic rewinding of said support medium from said other spool onto said one spool whereby to reload said sensitive thin material into said cassette. Each spool may be driven by said driving means through respective slip clutch means whereby to maintain tension in said support medium between said spools.

The apparatus may be for handling a batch of discrete lengths of sensitive thin material, there being such entry interface means and exit interface means for each piece of equipment in which a respective step of the procedure is to be carried out, the exit interface means being adapted to interact with said cassette whereby the batch of discrete lengths of sensitive thin material is loaded into said cassette in a predetermined sequence and said entry interface means being adapted to interact with said cassette whereby the batch of discrete lengths in the respective piece of equipment can be loaded into the cassette in the reverse of said sequence, the automatically-operable driving means being operable to drive said cassette to load and unload it with the batch of discrete lengths. As stated above, the discrete lengths may be test samples or cut lengths of processed film negatives.

A pair of nip rollers may be provided through which each discrete length, and the portion of the support medium against which it is placed, are passed when that portion is unwound from the said one spool. Drive may be imparted to each discrete length by the pair of nip rollers or by other positive driving means. The apparatus may include conductive pick-off means which engage the outer surface of said support medium wound on said one spool whereby to positively separate each discrete length from the portion of the support medium against which it is placed, for dispensing as that portion is unwound from said one spool. Said support medium may be an inert plastic film and it may be sufficiently clear for dirt to be visible through it.

One embodiment of this invention is described now by way of example with reference to the accompanying drawings, of which:-

Figure 1 is a schematic illustration of a cassette and a co-operating interface mechanism through which a batch of test samples can be retrieved from a piece of test equipment and loaded into the cassette; and

Figure 2 is a diagram illustrating the cassette in combination with an interface mechanism by which a batch of test samples loaded in the cassette can be unloaded from the cassette and introduced into a piece of test equipment for testing.

Figure 1 shows a cassette 10 which comprises a hollow rectangular casing having a slot 11 formed substantially at the middle of one of its longer edges 12 and an aperture 13 in that edge 12 adjacent the slot 11. The slot 11 has a length greater than its width and that length extends between the two major faces of the casing that are separated one from another by the edges of the casing. The slot 11 is normally closed in a light-tight manner by a rotary device (not shown) which has a passage extending through it, and which is urged by a spring into its position in which it closes the slot 11 and in which the passage is displaced from the slot 11. The rotary device is arranged to be caused by means described below to rotate against the spring loading into a position in which the passage is aligned with the slot 11 to allow transfer of a test sample through the slot 11 and the passage.

A pair of nip rollers 14 and 15 are journaled within the casing on respective axles 16 and 17 which are anchored at either end in the respective one of the major faces of the casing so that the axes of rotation of the nip rollers 14 and 15 are substantially parallel to the longitudinal axis of the slot 11 which is aligned with the narrow gap formed by the juxtaposed portions of the nip rollers 14 and 15. A spool 18, which conveniently is formed of cardboard, is journaled on a bearing support 19 which is mounted within the casing with its axis substantially parallel to the axes of the axles 16 and 17. The spool 18 is mounted on the bearing support 19 by a respective slip clutch arrangement 21 which has an integral pinion 22 which meshes with a gear wheel 23. Another spool 24, also conveniently formed of cardboard, is similarly mounted on another bearing support 25 by another slip clutch arrangement 26 which also carries an integral pinion 27 which is also meshing with the gear wheel 23.

A long length of band or tape 28 formed of an inert clear plastic material is connected at either end to a respective one of the spools 18 and 24 so that it is unwound from one spool whilst being wound onto the other spool 18, 24. The material of the tape 28 is the same as that of the samples to be tested. Hence it is inert and, in the case of film, it is a clear plastic material. The length of tape 28 between the two spools 18 and 24 is led around the nip roller 14. The slip clutch arrangements 21 and 26 are arranged so that one slips whilst the other drives for one sense of an-

gular rotation of the gear wheel 23 and vice versa for the opposite sense of angular rotation of the gear wheel 23. Hence the tape 28 is held in tension by the action of the slip clutches as it is transferred from one of the spools 18 and 24 to the other.

The nip roller 14 has an integral pinion 29 which meshes with a gear wheel 31 which in turn meshes with the gear wheel 23. The pinion 29 is arranged so that its teeth pass through or adjacent to the aperture 13.

A radial arm 32 is journaled at one end on the axle 17 and has an open-ended slot 33 at its other end, the slot 33 extending substantially radially with respect to the axle 17. A conductive pick-off arm 34 is pivoted at one end 34A within the casing for angular movement about an axis which is substantially parallel to the axes of rotation of the nip rollers 14 and 15 and the spools 18 and 24, and carries a lateral peg 35 which is engaged in the open-ended slot 33. The other end 34B of the pick-off arm 34 is angled and tapered, the taper projecting into the space formed between the tape wound onto the spool 24 and the length of that tape 28 that runs between the nip roller 14 and that spool 24. The pick-off arm 34 is lightly spring loaded so that its tapered end is urged into contact with the outer turn of the tape 28 that is wound upon the spool 24.

The cassette 10 is provided with formations (not shown) by which it can be coupled with the housing of an interface mechanism which is provided at both the entry and exit of a piece of test equipment in which test samples of film are to be tested. A counter (not shown) is provided in the cassette 10 and is arranged to be advanced by one each time the cassette 10 is coupled with the interface mechanism. The latter is provided with a pin (not shown) which is adapted to engage the rotary device of the cassette 10 as the cassette 10 is coupled to it, the pin engaging the rotary device and causing it to rotate against the spring loading and bring its through passage in line with the slot 11.

Figure 1 shows the cassette 10 positioned relative to an exit interface mechanism 36 with its slot 11 aligned with a passage 37 through the exit interface mechanism 36 by which test samples are fed one behind the other from the piece of test apparatus into the cassette 10 through the slot 11. Guides are provided in the housing for guiding test samples through the passage 37.

The interface mechanism 36 has a DC motor 38 mounted in it, the output drive of the motor 38 being coupled to an output gear 39 which meshes with a gear wheel 41 which projects through an aperture 42 in the casing of the interface mechanism 36 so as to mesh in the aperture 13 with the pinion 29 of the gear train in the cassette 10 when that cassette 10 is coupled with the interface mechanism 36. A power switch 43 is mounted externally on the housing of the inter-

face mechanism 36 and is connected into the power circuit for the DC drive motor 38.

A microswitch 44 is also connected in the power circuit of the DC drive motor 38. A cam 45 on the gear wheel 41 is operable to make and break the circuit through the microswitch 44 so that the supply to the drive motor 38 is disconnected after one revolution of the gear wheel 41 and the cam 45, there being a notch 47 in the cam 45 arranged to receive the actuating button of the microswitch 44 to break the circuit.

In operation of the invention, to load the cassette 10 with a batch of test samples, either initially before the start of the test procedure or in order to retrieve test samples from one piece of test equipment in which a step of the test procedure was performed so as to transfer that batch of test samples to another piece of test equipment in which the subsequent step of the test procedure is to be performed, the first sample 46 of the batch of test samples is located in the passage 37 of the respective interface mechanism 36 with which the cassette 10 is coupled, with its leading edge projecting from the end thereof through the slot 11 and the through passage of the rotary device of the cassette 10 into the gap between the pair of nip rollers 14 and 15. The width of each test sample is less than the width of the tape 28.

The power switch 43 is depressed to energise the drive motor 38. The latter drives the output gear 39 which in turn drives the gear wheel 41 to rotate the cam 45 through 360° until the actuating button of the microswitch 44 drops into the notch 47 of the cam 45 whereupon the circuit is broken by the microswitch 44 and the motor stopped.

The train of gears 29,31,23,22 and 27 in the cassette 10 is driven by rotation of the gear wheel 41. As a result a certain length of the tape 28 is unwound from the spool 18 and wound onto the spool 24 carrying the sample 46 with it to which a positive drive was imparted by the pair of nip rollers 14 and 15. The sample 46 is guided by the guides in the passageway 37 and by the adjacent edges of the radial arm 32 and of the conductive pick-off arm 34 as it is driven positively towards the spool 24 by the nip rollers 14 and 15. The radial arm 32 and the conductive pick-off arm 34 limit displacement of the sample 46 from the tape 28 and the adjacent edge of the pick-off arm 34 serves as a ramp which guides the sample 46 into the diminishing gap between the length of tape 28 running between the nip rollers 14 and 15 and the spool 24 on the one hand and the outer turn of the tape 28 on the spool 24 on the other hand.

The sample 46 is wound onto the spool 24 with the length of tape 28, being sandwiched between that length of tape 28 and the previously wound convolution of that tape 28 on the spool 24.

The procedure is repeated for each subsequent sample 46 of the batch that is to be wound onto the spool 24 in a certain sequence. The number of sam-

ples that can be wound onto the spool 24 depends upon the size of the cassette 10 and upon the thickness of the tape 28. In a preferred form of cassette 10, up to 60 samples could be wound onto the spool 24.

In certain situations, given that the tape 28 is sufficiently wide and the samples 46 are sufficiently narrow, two samples that are to be subjected to the same tests could be wound onto the spool 24 side by side at the same time.

When the cassette 10 has been loaded with the batch of samples, it is decoupled from the interface mechanism 36 and carried to the piece of test equipment in which the next step of the test procedure is to be performed. That test equipment will be provided with an interface mechanism at the entry to the test equipment and Figure 2 diagrammatically illustrates such an entry interface mechanism 48 with the cassette 10 adjacent to it. The interface mechanism 48 would be provided with a similar drive motor and output gearing to that described above for the interface mechanism 36 although it will be understood that the drive motor will be arranged to drive the output gearing in the opposite sense so that tape 28 is unwound from the spool 24 and wound onto the spool 18 after having been passed around the nip roller 14.

Each test sample 46 tends to follow the tape 28 as the latter is unwound from the spool 24 and led to the nip rollers 14 and 15. Any tendency for a test sample 46 not to do so but to adhere to the outer turn of the tape 28 on the spool 24 is inhibited by the tapered end portion 34B of the pick off arm 34 that ensures that each test sample 46 is separated from the outer turn of the tape 28 as it is passed to the pair of nip rollers 14 and 15 towards which it is guided by the adjacent edges of the radial arm 32 and of the conductive pick-off arm 34. Again these arms 32 and 34 limit displacement of the sample 46 from the tape 28 and the adjacent edge of the radial arm 32 serves as a ramp which guides the sample 46 into the nip of the rollers 14 and 15. The diameter of the nip roller 14 is sufficiently small to ensure that each sample 46 separates from the tape 28 as the latter is led around the nip roller 14. Hence each test sample 46 is positively driven out of the casing through the passage in the rotary device and through the slot 11, into the entry interface mechanism 48 by the pair of nip rollers 14 and 15. The tape 28 is indexed forward to ensure that each sample is clear of the nip rollers 14 and 15 before that sample is ejected from the cassette 10 into the test equipment. The entry interface mechanism 48 would have a passageway similar to the passageway 37 of the mechanism 36, there being appropriate guides provided in that interface mechanism 48 to guide each sample into the test equipment in which it is to be loaded.

It will be understood that the use of a tape which is inert to the sample, and the use of a standard cardboard spool protects the samples and reduces ad-

verse photographic effects. Provision of the rotary device leads to the samples being stored in the cassette 10 in substantially light-proof conditions. The use of a cassette for loading and unloading test samples automatically will reduce the time taken to operate the test equipment. The use of clear film support for the tape when the samples are film will provide easy inspection for the ingress of dirt, because the cassette could be opened easily to inspect the tape 28. The counter enables an operator to judge whether or not to open the cassette 10 for inspection of the clear support. Handling operations would be simplified by the use of a common cassette which may be used with different styles of equipment via appropriate interface mechanisms.

The cassette 10 may be provided with another counter which is adapted to be driven by the gear train. That other counter would provide an operator with information about the state of loading of the cassette 10 with test samples, and would enable him to identify which sample was being loaded or unloaded at any one instant.

The interface mechanisms could be arranged so that additional operations could be carried out upon test samples passed through them. For example the samples could be labelled, say by the application of bar codes for identification, and provision could be made for the automatic measurement of features of the sample such as density.

The mounting of the cassette drive motor in the interface mechanism has the advantage of reducing costs and providing for flexibility and speed of drive of the tape.

In case the metering action of the nip rollers 14 and 15, by which a certain length of the tape 28 is advanced between the spools 18 and 24, carrying a sample 46 with it, is not sufficiently stable due to possible errors in the manufacture of the rollers 14 and 15, build up of dirt on them or slippage of the tape 28 over them, a driven sprocket may be fitted coaxially to the gear wheel 31 and arranged so that its sprocket teeth engage in co-operating perforations formed in the tape 28. Hence the advance of the tape 28 between the spools 18 and 24 would be controlled positively by the interaction of the sprocket wheel teeth and the co-operating perforations in the tape 28 rather than by the action of the nip rollers 14 and 15.

Consideration could be given to the use of an antistatic support material if static should cause a build up of dirt or adhesion of test samples to the tape. The microswitch 44 and the associated cam 45 could be located within the cassette 10 rather than in the interface mechanism 36 as described above, the cam 45 being mounted on one of the gear wheels in the cassette.

A cassette in which this invention is embodied can also be used to handle exposed film strip which is to be developed and printed. For that purpose the

cassette of this invention would be provided with an appropriate separable entry interface mechanism adapted to receive the roll of exposed film housed in the usual cylindrical container by which that film was loaded into the camera for exposure. Also the drive motor that is operable to drive one of the spools of the cassette in which this invention is embodied may be arranged to run continuously for sufficient time to draw the whole of the roll of exposed film out of the cylindrical container rather than be stopped after one turn by operation of the cam and microswitch as described above. In that case a sensor responsive to passage of a trailing end of the film may be arranged to cause the motor to stop after the passage of a predetermined time interval after the passage of the end of the film.

The leading end of the roll of exposed film within the cylindrical container would be passed through the passage through the interface mechanism, through the entry slot and through the passage through the rotary closure device of the cassette in which this invention is embodied, into the gap between the pair of nip rollers of that cassette in the act of inserting the cylindrical container into the interface mechanism.

Once the cylindrical container has been inserted into the interface mechanism with the leading end of its film within the gap between the pair of nip rollers of the cassette in which this invention is embodied, the drive motor will be activated to run continuously for the appropriate time interval so that the tape of the cassette in which this invention is embodied is unwound continuously from the driven one of the spools and wound continuously onto the other spool carrying the strip of exposed film with it so that it is withdrawn from the cylindrical container and until the whole of the roll of exposed film has been wound onto that other spool, being interleaved between the adjacent turns of the tape on that other spool. The drive motor is then deactivated and the rotary device closed to make the cassette light-tight.

When the cassette has been loaded with the roll of exposed film, it is decoupled from the entry interface mechanism and carried to a film processing unit such as the processing unit described and illustrated in our International Publication no. WO90/08981 for example. That film processing unit would be provided with an interface mechanism at its entry, similar to the interface mechanism described above with reference to Figure 2. The cassette would be coupled with that interface mechanism and the drive motor would be activated to unwind the tape of the cassette from the other spool onto the driven spool and thereby feed the roll of exposed film from that other spool out of the cassette and through the interface mechanism into the film processing unit.

The film processing unit would also be provided with an exit interface mechanism operable to return the processed film from the processing unit back into

the cassette in a manner similar to that described above for loading the cassette with the roll of exposed film from the cylindrical cassette.

The cassette loaded with the processed roll of film would then be decoupled from the processing unit exit interface mechanism and carried to a printer which would be provided with an entry interface mechanism and an exit interface mechanism. The cassette would be presented to the entry interface mechanism in a manner similar to that described above for the entry interface mechanism of the processing unit and the processed film would be withdrawn from the cassette and fed into the printer for exposure onto photographic paper. After printing, the processed film would be loaded again into the cassette through the exit interface mechanism in a manner similar to that described above for the processing unit. The cassette could then be carried to the usual negative cutter, the processed film being unloaded from the cassette into the cutter to be cut into the usual four frame lengths by the normal negative cutting technique.

Use of a cassette as described above for handling a roll of exposed film during processing and printing eliminates the need for processed film strips to be hung up between processing and printing and provides a convenient storage facility for processed film strips should they be not needed for some time.

It is particularly advantageous to use a cassette in which the present invention is embodied when reprinting from negatives which have been cut into four frame lengths. Those four frame length negative strips would be fed into the cassette in a predetermined order, in a manner similar to the method of loading the cassette 10 with test samples in a predetermined sequence as described above with reference to Figures 1 and 2.

Hence the location of each frame relative to the tape of the cassette is determinable. It follows that a frame to be reprinted will be identifiable and locatable in the printer for reprinting by operating the drive motor to advance the appropriate length of tape necessary to correctly position the frame to be reprinted.

Claims

1. A method of handling sensitive thin material (46) during a procedure in which the sensitive thin material (46) is subjected to a respective treatment step in respective equipment, the sensitive thin material (46), which is vulnerable to physical or chemical damage during handling, being loaded into each piece of equipment and, prior to being loaded for the final step of the treatment procedure, is retrieved from each piece of equipment for the next step, characterised in that the handling of the sensitive thin material (46) is auto-

mated by being loaded in a cassette (10), both before the start of the treatment and automatically by said retrieval of that sensitive thin material (46) from a piece of equipment, the sensitive thin material (46) being loaded in the cassette (10) by being placed between convolutions of an elongate, chemically inert, thin support medium (28) which is wound onto one spool (24) within the cassette (10), and is dispensed from the cassette (10) by unwinding said support medium (28) from said one spool (24), the cassette (10) so loaded then being presented to the piece of equipment appropriate for the next step of the treatment procedure and being operated automatically to dispense the sensitive thin material (46) to the appropriate piece of test equipment.

2. A method according to claim 1, wherein the support medium (28) is made from the same thin material as the sensitive thin material (46) being handled.

3. A method according to claim 1 or claim 2, wherein the support medium (28) is unwound from said one spool (24) by being wound onto another spool (18) within the cassette (10) and vice versa, at least one (18) of said spools (18 and 24) being driven to effect unwinding of said support medium (28) from said one spool (24) or rewinding of said support medium (28) onto said one spool (24).

4. A method according to claim 1, claim 2 or claim 3, wherein positive drive is imparted to said sensitive thin material (46).

5. A method according to claim 4, wherein positive drive is imparted to said sensitive thin material (46) by passing it, and the portion of the support medium (28) against which it is placed, between a pair of nip rollers (14 and 15) as said portion is wound or unwound on to or from said one spool (24).

6. A method according to any one of claims 1 to 5, wherein the support medium (28) is unwound from or wound onto said one spool (24) incrementally, each increment being of a certain preselected length to suit the length of the sensitive thin material (46) being handled.

7. A method according to any one of claims 1-6, wherein said sensitive thin material (46) is positively separated from the portion of the support medium (28) on which it is placed for dispensing as that portion is unwound from said one spool (24).

8. A method according to any one of claims 1-7, wherein the sensitive thin material comprises a batch of discrete lengths (46) of sensitive thin material and the procedure comprises subjecting at least a selected one of the discrete lengths (46) to a respective step in the respective equipment, the discrete lengths of each batch being loaded into each piece of equipment in a predetermined sequence by automatic operation of the cassette (10) to dispense the discrete lengths (46) of that batch to the appropriate piece of equipment in said sequence.
9. A method according to claim 8, wherein the batch comprises a batch of test samples (46) and the procedure comprises a batch testing procedure in which each (46) of the batch of such test samples (46) is subjected to a respective testing step in respective test equipment.
10. A method according to either of claims 8 and 9 when appended to either of claims 4 and 5, wherein positive drive is imparted to each discrete length (46).
11. A method according to either of claims 8,9 and 10 when appended to claim 6 wherein the length of each increment was selected to suit the length of each discrete length.
12. A method according to any one of claims 1 to 8, wherein the sensitive thin material is exposed film strip which is to be processed, printed and/or cut.
13. A method according to claim 12 when appended to claim 8, wherein the discrete lengths comprise cut lengths for processed film negatives, each length comprising several frames, wherein the respective treatment step is printing and the cut lengths are dispensed from the cassette (10) into the printer.
14. Apparatus for handling sensitive thin material by a method according to any one of claims 1 to 10, during a procedure in which the sensitive thin material (46) is subjected to a respective treatment step in respective equipment, the sensitive thin material (46), which is vulnerable to physical or chemical damage during handling, being loaded into each piece of equipment and, prior to being loaded for the final step of the treatment procedure, being retrieved from each piece of equipment for loading for the next step, the apparatus including a cassette (10) which is adapted to be loaded with sensitive thin material (46) and to store it in chemically inert storage means enclosed therein, said storage means comprising a

spool (24) within the cassette (10) and an elongate, chemically inert thin support medium (28) which is secured to the spool (24) so as to be wound thereon with the sensitive thin material (46) located between convolutions of the support medium (28) that is wound onto said one spool (24) whereby the cassette (10) is loaded with said sensitive thin material (46) and so as to be unwound whereby to dispense the sensitive thin material (46), entry interface means (48) for each piece of equipment adapted to interact with said cassette (10) whereby the sensitive thin material (46) loaded into said cassette (10) can be unloaded and fed into the respective piece of equipment and exit interface means (36) for each piece of equipment except that in which the final step of the procedure occurs, said exit interface means (36) being adapted to interact with said cassette (10) whereby the sensitive thin material (46) in the respective piece of equipment can be retrieved and reloaded into the cassette (10), there being automatically operable driving means (38) adapted to be coupled with a cassette (10) when the latter interacts with each said interface means (36,48) whereby to drive said cassette (10) to load and unload said cassette (10) with sensitive thin material (46) as appropriate.

15. Apparatus according to claim 14 for handling sensitive thin photographic material (14), wherein said cassette (10) is adapted to store said sensitive thin material (46) in a light-tight manner.

16. Apparatus according to claim 14 or claim 15, wherein the support medium (28) is made from the same thin material as the sensitive thin material (46).

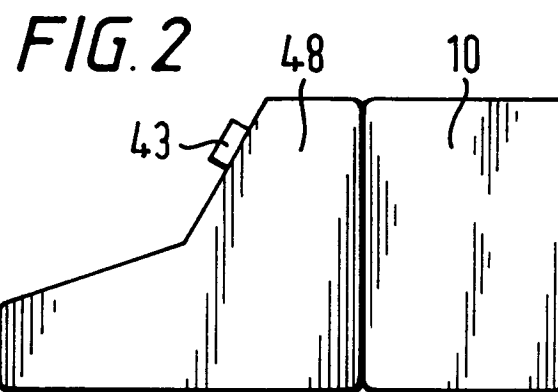
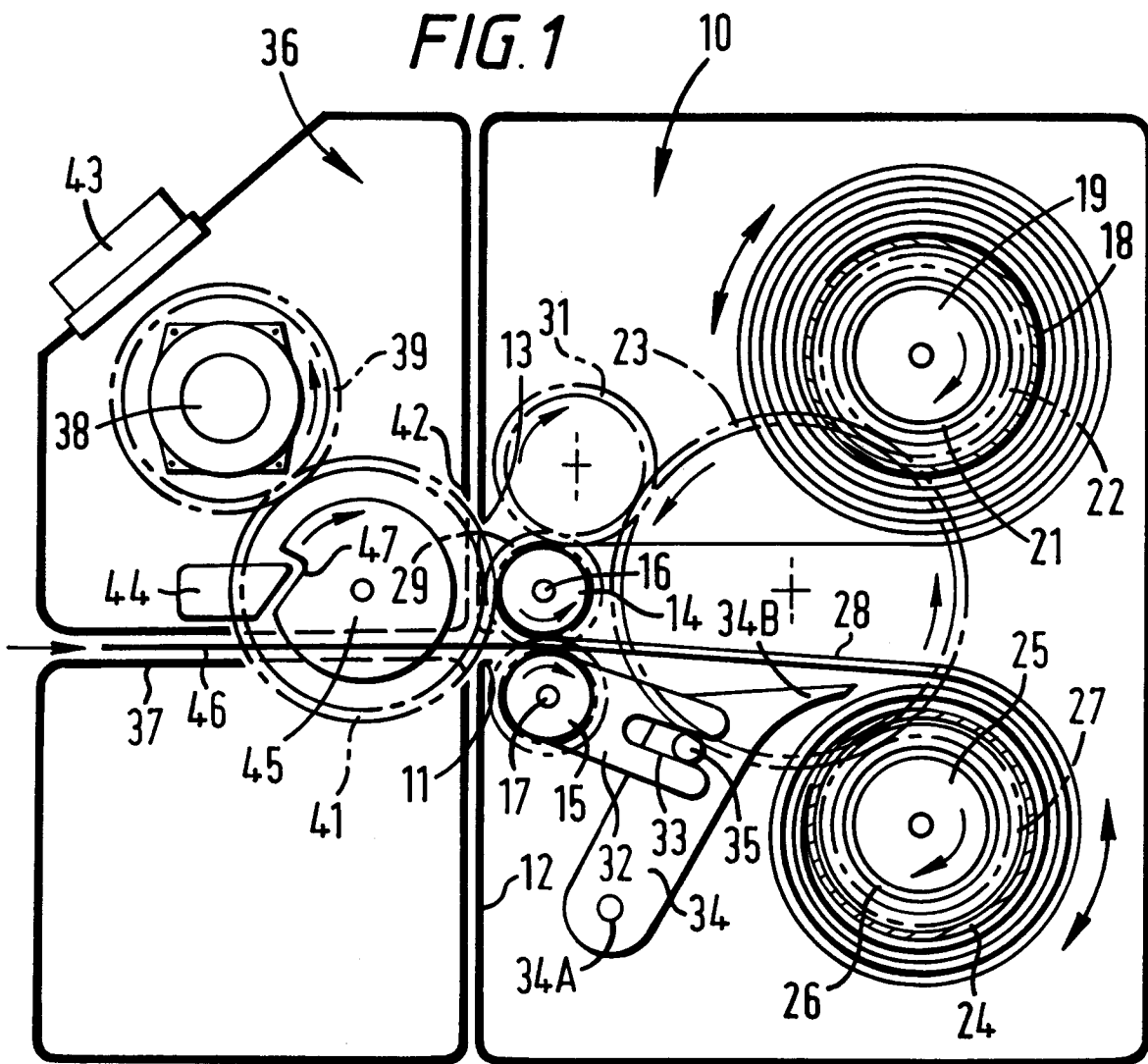
17. Apparatus according to any one of claims 14 to 16, wherein there is another spool (18) within the cassette (10) and the other end of said support medium (28) is secured to that other spool (18) so that the support medium (28) is unwound from said one spool (24) by being wound onto said other spool (18) and vice versa, either said one spool (24) or said other spool (18) being driven by said driving means (38) to effect automatic winding of said support medium (28) onto said other spool (18) from said one spool (24) to automatically dispense said sensitive thin material (46), or to effect automatic rewinding of said support medium (28) from said other spool (18) onto said one spool (24) whereby to reload said sensitive thin material (46) into said cassette (10).

18. Apparatus according to claim 17 wherein each spool (18,24) is driven by said driving means (38) through respective slip clutch means (21,26)

whereby to maintain tension in said support medium (28) between said spools (18 and 24).

19. Apparatus according to any one of claims 14-18, including a pair of nip rollers (14 and 15) through which said sensitive thin material (46), and the portion of the support medium (28) against which it is placed, is passed when that portion is unwound from said one spool (24). 5
20. Apparatus according to any one of claims 14 to 19, wherein positive driving means operable to impart positive drive to the support medium (28) are provided. 10
21. Apparatus according to any one of claims 14-20, including conductive pick off means (34) which engage the outer surface of said support medium (28) wound on said one spool (24) whereby to positively separate said sensitive thin material (46) from the portion of the support medium (28) on which it is placed, for dispensing as that portion is unwound from said one spool (24). 15 20
22. Apparatus according to any one of claims 14-21, wherein said support medium (28) is an inert plastic film. 25
23. Apparatus according to any one of claims 14-22, wherein said support medium (28) is sufficiently clear for dirt to be visible through it. 30
24. Apparatus according to any one of claims 14 to 23, for handling a batch of discrete lengths (46) of sensitive thin material, there being such entry interface means (48) and exit interface means (36) for each piece of equipment in which a respective step of the procedure is to be carried out, the exit interface means (36) being adapted to interact with said cassette (10) whereby the batch of discrete lengths (46) of sensitive thin material is loaded into said cassette (10) in a pre-determined sequence and said entry interface means (48) being adapted to interact with said cassette (10) whereby the batch of discrete lengths (46) in the respective piece of equipment can be loaded into the cassette (10) in the reverse of said sequence, the automatically-operable driving means (38) being operable to drive said cassette (10) to load and unload it with the batch of discrete lengths (46) in said sequence as appropriate. 35 40 45 50
25. Apparatus according to claim 24, wherein the discrete lengths comprise test samples (46) and the procedure comprises a batch testing procedure in which each (46) of the test samples is subjected to a respective testing step in respective test 55

equipment, the test samples (46) to be loaded into each piece of test equipment in a pre-determined sequence.





European Patent
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EUROPEAN SEARCH REPORT

Application Number

EP 93 30 1482

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	EP-A-0 000 227 (AGFA-GEVAERT) * page 2, line 11 - page 6, line 6 * * figures 2,3 *	1,3-5,8 10,14,15 17-20,22	G03D13/14
X	FR-A-2 135 841 (COMPAGNIE GENERALE DE RADIOLOGIE) * page 1-2 *	1,3-5,8, 10,14 15,17, 19,20,22	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			G03D G03B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 24 MAY 1993	Examiner LANGE J.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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