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(54) APPARATUS FOR CUTTING FILM STRIPS

(71) We, AGFA - GEVAERT AKTIEN-GESELLSCHAFT, a body corporate recognised under German Law, of Leverkusen, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to apparatus for cutting film strips into lengths on the basis of scannable indicating marks positioned in association with the frame edges. Each cut is made at the dividing bar between a pair of adjacent frames, and the scannable marks are commonly notches or perforations.

It has previously been proposed to provide a scanning device arranged to stop film transport means simultaneously with the detection of a mark, the scanning device being spaced at such a distance from the cutting device that the dividing bar at which the cut is to be made just stops at the cutting device. Apparatus operating on this principle suffers from several disadvantages. Firstly, in order to change the apparatus over from one frame length to another either the separation between the scanning device and the cutting device must be altered accordingly or a large number of scanning devices must be provided, each arranged at a different distance from the cutting edge. The latter arrangement has the additional disadvantage that the film drive means must then be arranged at a greater distance from the cutting edge (the scanning devices being between the two) which results in a certain unreliability, since the film can form curves while being pushed towards the cutting edges which, with long lengths of film can result in cutting errors of the order of several tenths of a millimetre.

The present invention provides apparatus for cutting film strips having indicating marks associated with the frames thereon, which comprises scanning means for detecting marks and arranged to emit a signal when a mark is detected, a cutting device spaced apart from the scanning means, film transport means arranged to act on the film between the scanning device and the cutting

device, and a control means which includes a length-measuring device, the control means being arranged to receive signals from the scanning means and to stop film transport and actuate the cutting device after a predetermined length of film has been advanced since the detection of a mark.

The predetermined length is so chosen, taking into account the distance between the scanning position and the cutting position and the distance between the indicating marks and the associated frame edges, that, when the film stops, the cutting device will sever the film at a dividing bar.

Due to the arrangement of the film transport means between the scanning device and the cutting device, the film is pulled along the scanning section and is not therefore subjected to any alterations in length caused by damming of the film, especially when, as is preferable, the film transport means is arranged to act on the film immediately before it reaches the cutting device. The fact that the cutting operation is not released immediately on detection of an indicating mark, but after advancement of a predetermined length of film after detection of a mark, allows very accurate control of the film transport at high speed up to a distance from the cutting point which just corresponds to the required braking distance. This is possible because the distance to the stopping of the feed is known, whilst with apparatus constructed in accordance with previous proposals the feed has to be stopped simultaneously with the location of a mark.

It will be appreciated that if, as will usually be the case, each cut strip is to carry several frames, the apparatus will include means for preventing the mark or marks within a second predetermined length (chosen in accordance with the desired strip length), from initiating a cutting operation.

Apparatus constructed in accordance with the invention will now be described, by way of example, with reference to the accompanying drawings, in which:—

Fig. 1 is a block wiring diagram for the electrical control of the apparatus in the form of a data flow diagram; and

Fig. 2 is a more detailed block diagram of the apparatus in conjunction with the mechanical components.

Referring to Fig. 1, the reference numeral 1 indicates a gate which takes a positive input from a start key 2 and a negation input from a test key 3 which is to be actuated during the operating function "Test" described hereinafter. To the output of the gate 1 there is connected an Or-gate 4, the second input of which is taken from a film cutting device 5. The output of the Or-gate 4 is connected to an input of a gate 6 which also has two negation inputs; one of these negation inputs is connected to a generator for an end of order signal or a stop signal, and the second is connected to an emergency stop device 71 which will be described hereinafter. The output of the gate 6 is connected to a film feed device 7, which has an output connected to a gate 8 and to a gate 9. The gate 8 also has a negation input from the test signal generator 3 and the And-gate 9 also has two inputs from the start and test signal generators 2 and 3, respectively. The outputs of the two gates 8 and 9 both lead to an Or-gate 10, the output of which controls the film cutting device 5 by way of a gate 11, which has a negation input from the emergency stop device.

The operation of the block wiring flow diagram is as follows:

If the start key 2 is actuated, without the test programme 3, emergency stop, end of order, or stop being set, the film feed device 7 is set in motion by way of the gates 4 and 6. The film feed device, by counting the image mark signals and/or measuring the length travelled, runs until a certain length of film has been advanced and then stops. The two gates 8 and 9 then receive an L-signal. Since the test key 3 has not been pressed first, the signal at the gate 8 passes on to the gate 11 and actuates the film cutting device 5. After cutting has been completed, the film feed starts up again by way of the gates 4 and 6 and the cycle described is repeated until the film is cut right up to its end and the end of order signal is applied to the gate 6. After removal of the cut film strips the apparatus must then be set in motion again by an operator by pressing the start key 2 and simultaneously erasing the end of order signal.

The test programme is initiated by depressing the test key 3, which blocks the gate 1. When the start key 2 is then depressed, the three-input gate 9 gives a cutting command by way of the gates 10 and 11 to the device 5, provided that the film stop has been reached by a corresponding position of the film feed device. After the film is cut the film feed is set in motion again,

but the gate 8 is locked by means of the test key 3, so that the film cutting device can only be actuated by way of the gate 9. This, however, is only possible by means of re-actuation of the start key 2. To sum up, in order to check the functioning of the apparatus, the test programme enables the automatic programme to be interrupted in each case after the end of the film feed, so that the position of the film in the cutting position can be checked before the film cut, and subsequent re-start of the film movement, is carried out by re-actuating the start key 2.

Referring to Fig. 2, the reference numeral 12 indicates a photographic film which carries edge notches 12a associated with printable originals. The notches 12a have been applied, for example, after developing of the film, by means of a suitable apparatus, in such a way that they lie in each case in the middle of the original fields 12b. In addition, the film contains splicing points at which the butt-joints between two films are bridged by means of self-adhesive strips 12c. Notches 12d are stamped out on both sides at the splicing points, and serve to prevent the film guiding means from being smeared with adhesive. The film 12 is pulled over a photoelectric scanning device 13 arranged to detect the notches 12a (or other image marks) and the splicing point notches 12d. The photoelectric scanning device contains three different scanning elements 13a, 13b, 13c, each of which is provided with a light source and a photoelectric element for receiving the light reflected by the film. The element 13a emits a pulse when a notch 12a passes over the scanning device. The elements 13a and 13c both emit a pulse when a splicing point with notches 12d is scanned, and the scanning element 13b, which is arranged to scan a region near one edge of the film, emits a pulse on scanning a film perforation, and enables the apparatus to handle film of the kind having perforations associated with exposed fields, such perforations having already served to control the transport means in the camera.

The scanning device 13 is arranged at a distance of approximately 50 mm. from a cutting edge 14. This distance is necessary in order to arrange drive rollers 15 and a length-responsive device 16 between the cutting edge 14 and the scanning device 13. The drive motor for the rollers 15 is a direct current motor 17, the rotation speed of which is regulated very accurately by means of a tachogenerator 18, in each case according to a prescribed comparison voltage. The length-responsive device 16 comprises a metal runner 19 of accurate diameter which fits loosely on a roller-supported spindle 20, which has at its other end a

perforated disc 21. A light-emitting diode (LED) 22 is arranged on one side of the perforated disc, and a photo-transistor 23 is arranged on the other side, so that each time the path of rays from the LED to the photo-transistor is interrupted an electrical pulse is emitted. Sufficient apertures are provided on the periphery of the perforated disc 21 that a pulse is emitted for a film travel of 0.2 mm.

The photo-transistor 23 controls a pulse former 24, for example, a Schmitt trigger, which supplies a main counter 25, an identification device 26, a frequency comparison device 27, and an auxiliary counter 46, with a signal corresponding to the distance travelled by the film. The main counter 25 is a device built up from digital units and is arranged to count pulses in ranges corresponding to four prescribed lengths chosen in accordance with the length of the image fields 12b. A control signal is emitted on completion of each range. The distances 28, 29, 30 and 31 indicated in the box 25 symbolise the four counting lengths, which are defined as follows:

The pre-counting length 28 begins when the start key 2 is depressed, or at the end of the preceding cutting operation. For this purpose a corresponding erasing device for the counter is provided in the course of the speed control for the transport 15. The pre-counting length can be freely selected and depends on approximately how long the film strips are to be. The film strip length may for example be selected between two and five frames of the 24×36 mm size, or between 3 and 6 frames of the square format. If, for example, the strip length is not to exceed 180 mm., the range 28 should correspond to a distance of approximately 140 mm.

The section 29 defines the period during which the apparatus is ready to respond to signals arising from the notches 12a. The section 29 corresponds approximately to the frame length on the film which is to be handled. Within this section 29 a change in the method of counting occurs when a notch is located, and counting of the third section 30 begins, irrespective of how much of the section 29 has been completed. The magnitude of the section 30 depends on the frame length and the distance between the notch scanning device 13 and the cutting edge 14. The fourth section 31, which is begun on completion of the section 30, serves as a braking section within which the transport speed of the film is reduced from a high running speed to a low one. Typically, the length corresponding to the braking section 31 will be approximately 2 mm.

In the case of film having a frame size of 24×36 mm., the length corresponding to the section 30 will be approximately 29 mm.

if the cut is to be made at the leading edge of the frame and if the distance between the scanning device 13 and the cutting edge 14 is 50 mm. If the section 30 is about 38 mm. longer, the cut will be made at the trailing edge of the frame.

If no frame notch has been found within the counting section 29, the film transport is stopped after an over-run approximately equal in length to that of the section 29, and a corresponding control signal is emitted. The circuitry arrangement of the counter is such that at the end of the counting section 28 a flip-flop store 32 which influences an AND-gate 33 is switched over. The other input of the And-gate 33 is supplied with a pulse on completion of the over-run following section 29. The gate 33 then delivers a pulse to an Or-gate 34 which by way of a flip-flop store 35 applies to the motor control 36 a comparison voltage which results in the immediate stopping of the motor 17. The switching over of the store 35 also results in the switching back of a series of other stores, for example, the store 32. The length holding gate 33 also influences a further And-gate 37, the second input of which is connected up for a particular type of operation.

If the cutting-up of negatives is to be avoided, an L-signal will be applied to the second input of the gate 37, so that a signal will pass from the output of that gate to an And-gate 38. The resulting output will switch over a store flip-flop 39 which sets in operation a warning device, for example, a blinker circuit 40 by way of an O-gate 41. The Or-gate 41 also affects a negation gate 42 which acts on an And-gate 43 and prevents the release of the cutting operation.

On the other hand, if the cutting-up of a negative is acceptable, i.e., if it is unprintable, then no signal will be applied to the second input of the gate 37, and, in consequence, the negation gate 42 will not operate to prevent the cutting operation.

The termination of the counting length 28 in the main counter 25 also effects the switching-over of a timed flip-flop store 44, which is returned to its initial position by the ending of the section 29. This store 44 effects the opening of the circuit for image notch signals to render the apparatus responsive thereto, by applying a signal to an And-gate 45 which has the identification device 26 connected to its other input.

By way of pulse formers 68, 69 and 70, the identification device 26 receives signals when a notch or perforation passes over the scanning device 13. The device also receives and counts pulses from the pulse former 24. By means of certain adjustable phase shifts (which may also be used to adjust the cutting point without mechanical displacement of the scanner or cutter), the

identification device 26, with a certain adjustable delay, delivers a signal for an image mark to the output 26a and a signal for a splicing point to the output 26b. If the counter 25 is in the range 29, a mark signal passes the gate 45, causes the main counter 25 to be switched back to commence counting of the section 30, and after switching over a timed flip-flop store 47 reaches an And-gate 48 which has its second input connected to the counting section 30. When the counting section 30 has been completed after location of an image notch, a signal from the gate 48 returns the main counter 25 to zero again and, by way of an Or-gate 49, a timed flip-flop store 50 is switched over and directly changes over the motor control 36 to a value corresponding to a reduced speed for the motor 17.

The reduced speed, at which the film runs through the section 31, is such that the film feed device, together with the film, can be brought to a standstill within a very short time and with negligible scatter. After termination of the counting section 31, a control signal is applied to the second input of an And-gate 51 and is passed on to an Or-gate 34, which releases the film stop. For this purpose the timed store 35 is switched over, which causes the stores 32, 44, 47 and 50 to be returned to their initial state by way of suitable pulse leads, and causes the comparison voltage for the tachogenerator 18 in the motor control 36 to be set to zero so that the motor 17 is braked with a high braking torque. At the reduced speed at which the motor is already running, this means that the motor is brought to a standstill in the shortest possible time.

Finally, a further result of the switching over of the store 35 on completion of the braking section 31 is that the potential at a differentiation device 60 changes suddenly so that the device delivers a pulse to a gate 61 connected after it. The gate 61 has a negation input which blocks the gate when a key 3 (corresponding to the key 3 shown in Fig. 1), is pressed to initiate a test programme. The output of the gate 61 represents one input of the Or-gate 62 which has as its second input the output of an And-gate 63. The output of the gate 62 is connected to an input of an And-gate 43, the other input of which is connected to the gate 42 which blocks the gate 43 if the film transport is stopped in an emergency, that is to say, otherwise than on completion of sections 30 and 31 in the main counter 25. The output of the gate 43 is connected to a cutting store 64, which in the switched over position actuates a cutting blade 14 by way of an amplifier 65 and a cutting magnet. A detector switch arranged on the cutting blade emits a pulse when the lower end position of the blade 14 is

reached; this pulse leads to the return of the cutting store 64. A further scanning device in the form of a switch delivers a pulse to an Or-gate 59 on the return of the cutting blade 14 to the upper end position (that is to say, the rest position); this pulse returns the stop store 35 by way of the And-gate 53, provided that none of the negation gates 52, 55, 56 and 58 is activated. The return of the stop store 35 initiates a new film transport movement.

It will be appreciated that the predetermined length between the detection of a mark and the consequent cutting of the film depends both on the magnitude of the delay in the identification device 26 and the magnitude of the counting ranges 30 and 31.

A notch signal at the output 26a of the identification device 26 causes the auxiliary counter 46 to erase and recommence counting.

A splicing point signal at the output 26b passes the Or-gate 49 and causes the speed reduction store 50 to switch over, and, after the end of the braking section 31 the stopping operation is brought about by way of the gates 51 and 34. The switching over of a so-called splicing-point store 72 effects the indication for the end of the order and also blocks the re-starting of the transport means 17, 18, 36, by way of a negation gate 52 and the And-gate 53.

The frequency comparison device 27 compares the frequency of the beat from the pulse former 24 with that which would be expected on the basis of the rotation speed of the motor and, if the measured frequency deviates from the expected one, delivers a film damping signal which switches over a store 54. The result of this is that a signal passing through the gate 34 sets the film stop store 35, and that a gate 55 applies to the And-gate 53 a negative signal which prevents re-starting of the film feed. Cutting of the film is prevented by way of the gates 41 and 42. Connected to two further inputs of the And-gate 53 there is a gate 56, controlled by the store 39, which emits an emergency stop signal when a lamp fails in the scanning device 13, and a gate 58 controlled by a manually actuated key 57 to stop the transport.

The auxiliary counter 46, which is erased by way of the outputs 26a and 26b of the identification device 26 when a notch or a splicing point, respectively, is located, is restarted each time an image mark occurs. It then counts the beats of the pulse former 24 until the next image mark signal enters. After a particular distance, proceeding from the last image mark signal and corresponding to the distance 30 after the last image notch, the auxiliary counter 46 begins to emit signals at intervals of whole-number multiples of the frame length. The signals

from the auxiliary counter 46 are delivered to the Or-gate 49 by a device 66.

The method of operation of the apparatus described is as follows:

5 Proceeding from a cutting operation, the counter 25 counts the travel length beats of the pulse former 24. After termination of the cutting operation, the stop store 35
10 ing over of the stores 32 and 44, counting of the section 29 begins, within which section an image mark signal from the output 26a will switch over the store 47 by means of the gate 45, whereupon the stop command and the cutting command come by way of the
15 gates 48, 49, the store 50, the gate 51 and the gate 34 on completion of the section 30 and 31 in the main counter 25. If a splicing point is identified at any time, a signal is emitted at output 26b after a
20 certain delay (chosen so that the subsequent cut is correctly located), and that signal is applied to the gate 49 and so brings about an immediate speed reduction, and the subsequent film stop (on completion of braking
25 section 31) is effected with a simultaneous cutting command. Re-starting of the device by way of the gate 59 is prevented by means of the gate 53 and the negation gate 52, which receives a signal through the store 72.

30 If there is an image mark 12a missing in association with a cutting point, i.e. because the original is not printable, with the result that no image mark signal is emitted at 26a during the counting section 29, the
35 auxiliary counter 46 releases the braking and cutting operation after a distance equal to the sum of the shift distance 30 and a distance corresponding to the normal frame length (or a whole-number multiple thereof),
40 after the preceding image notch detected during the counting range 28. This prevents it being necessary for the operator to intervene if the device is stopped by the lack of a mark. Further, in contrast with the
45 situation arising if no mark is detected during the range 28, there is no risk of cutting through an original which at first appears unprintable simply on the basis of an input for the maximum strip length.

50 The test programme, which has already been briefly explained with reference to Fig. 1, is initiated by means of the test key 3. By this means an L-signal is applied to the gates 61, 63 and to a further gate 67,
55 so that when the start key 2 is pressed the gate 67 does not effect the starting up of the transport means. A cutting operation is, however, effected by means of a signal from the And-gate 63. After completion
60 of the cutting operation, the stop store 35 is switched back and the film transport is commenced. The course of the film transport corresponds to that in normal operation, but by means of the gate 61 the release
65 of the cutting operation is prevented if the

test key 3 is pressed. The cutting operation must be released by re-actuation of the start key 2.

The apparatus described makes it possible, on the basis of the information obtained from the image marks and the path lengths travelled so to control the cutting operation for the films that the length of the strips lies between a certain minimum value and a certain maximum value, and that, in particular, incorrect cutting of the customers' originals is avoided in all cases.

WHAT WE CLAIM IS:—

1. Apparatus for cutting film strips having indicating marks associated with the frames thereon, which comprises scanning means for detecting marks and arranged to emit a signal when a mark is detected, a cutting device spaced apart from the scanning means, film transport means arranged to act on the film between the scanning device and the cutting device, and a control means which includes a length-measuring device, the control means being arranged to receive signals from the scanning means and to stop film transport and actuate the cutting device after a predetermined length of film has been advanced since the detection of a mark.

2. Apparatus as claimed in claim 1, wherein the length-measuring device includes a rotatably-mounted runner arranged to bear resiliently on the film so that advancement of the film causes rotation of the runner, a laminar member connected to the runner so as to rotate therewith, the said laminar member having regularly spaced open areas, means for illuminating the laminar member and a photo-electric transducer arranged to receive light passing through the open areas of the laminar member and to emit a pulse for each such area.

3. Apparatus as claimed in claim 2, wherein the laminar member comprises a sector disc.

4. Apparatus as claimed in claim 2, wherein the laminar member comprises a perforated disc.

5. Apparatus as claimed in any one of claims 2 to 4, wherein the laminar member and the runner are arranged to rotate on a common spindle.

6. Apparatus as claimed in any one of claims 1 to 5, wherein the film transport means includes a pair of rollers arranged to engage opposite margins of the film strip.

7. Apparatus as claimed in claim 6, wherein there is provided a direct-current motor for driving the rollers.

8. Apparatus as claimed in claim 6 or claim 7, wherein there is provided a tachogenerator for regulating the speed of the motor.



from the auxiliary counter 46 are delivered to the Or-gate 49 by a device 66.

The method of operation of the apparatus described is as follows:

5 Proceeding from a cutting operation, the counter 25 counts the travel length beats of the pulse former 24. After termination of the cutting operation, the stop store 35
10 ing over of the stores 32 and 44, counting of the section 29 begins, within which section an image mark signal from the output 26a will switch over the store 47 by means of the gate 45, whereupon the stop command and the cutting command come by way of the
15 gates 48, 49, the store 50, the gate 51 and the gate 34 on completion of the section 30 and 31 in the main counter 25. If a splicing point is identified at any time, a signal is emitted at output 26b after a
20 certain delay (chosen so that the subsequent cut is correctly located), and that signal is applied to the gate 49 and so brings about an immediate speed reduction, and the subsequent film stop (on completion of braking
25 section 31) is effected with a simultaneous cutting command. Re-starting of the device by way of the gate 59 is prevented by means of the gate 53 and the negation gate 52, which receives a signal through the store 72.

30 If there is an image mark 12a missing in association with a cutting point, i.e. because the original is not printable, with the result that no image mark signal is emitted at 26a during the counting section 29, the auxiliary counter 46 releases the braking
35 and cutting operation after a distance equal to the sum of the shift distance 30 and a distance corresponding to the normal frame length (or a whole-number multiple thereof),
40 after the preceding image notch detected during the counting range 28. This prevents it being necessary for the operator to intervene if the device is stopped by the lack of a mark. Further, in contrast with the
45 situation arising if no mark is detected during the range 28, there is no risk of cutting through an original which at first appears unprintable simply on the basis of an input for the maximum strip length.

50 The test programme, which has already been briefly explained with reference to Fig. 1, is initiated by means of the test key 3. By this means an L-signal is applied to the gates 61, 63 and to a further gate 67,
55 so that when the start key 2 is pressed the gate 67 does not effect the starting up of the transport means. A cutting operation is, however, effected by means of a signal from the And-gate 63. After completion
60 of the cutting operation, the stop store 35 is switched back and the film transport is commenced. The course of the film transport corresponds to that in normal operation, but by means of the gate 61 the release
65 of the cutting operation is prevented if the

test key 3 is pressed. The cutting operation must be released by re-actuation of the start key 2.

The apparatus described makes it possible, on the basis of the information obtained from the image marks and the path lengths travelled so to control the cutting operation for the films that the length of the strips lies between a certain minimum value and a certain maximum value, and that, in particular, incorrect cutting of the customers' originals is avoided in all cases.

WHAT WE CLAIM IS:—

1. Apparatus for cutting film strips having indicating marks associated with the frames thereon, which comprises scanning means for detecting marks and arranged to emit a signal when a mark is detected, a cutting device spaced apart from the scanning means, film transport means arranged to act on the film between the scanning device and the cutting device, and a control means which includes a length-measuring device, the control means being arranged to receive signals from the scanning means and to stop film transport and actuate the cutting device after a predetermined length of film has been advanced since the detection of a mark.

2. Apparatus as claimed in claim 1, wherein the length-measuring device includes a rotatably-mounted runner arranged to bear resiliently on the film so that advancement of the film causes rotation of the runner, a laminar member connected to the runner so as to rotate therewith, the said laminar member having regularly spaced open areas, means for illuminating the laminar member and a photo-electric transducer arranged to receive light passing through the open areas of the laminar member and to emit a pulse for each such area.

3. Apparatus as claimed in claim 2, wherein the laminar member comprises a sector disc.

4. Apparatus as claimed in claim 2, wherein the laminar member comprises a perforated disc.

5. Apparatus as claimed in any one of claims 2 to 4, wherein the laminar member and the runner are arranged to rotate on a common spindle.

6. Apparatus as claimed in any one of claims 1 to 5, wherein the film transport means includes a pair of rollers arranged to engage opposite margins of the film strip.

7. Apparatus as claimed in claim 6, wherein there is provided a direct-current motor for driving the rollers.

8. Apparatus as claimed in claim 6 or claim 7, wherein there is provided a tachogenerator for regulating the speed of the motor.



9. Apparatus as claimed in any one of claims 1 to 8, wherein the scanning means includes three photo-electric scanning elements, two of which are arranged to scan opposite edges of the film, and the third of which is arranged to scan the film at a position near one edge, the arrangement being such that, in operation, the scanned areas all lie on a line extending normal to the direction of motion of the film.

10. Apparatus as claimed in claim 9, wherein the control means includes an identification device arranged to receive signals from the photo-electric scanning elements and to emit a signal at a first output a predetermined period after receiving a signal from one of the two edge-scanning elements or from the third scanning element, and to emit a signal at a second output a predetermined period after receiving signals from the first two elements simultaneously.

11. Apparatus as claimed in claim 10, wherein the said predetermined period is adjustable.

12. Apparatus as claimed in any one of claims 1 to 11, wherein there is provided delay means arranged to render the control means non-responsive to mark signals during the advancement of a second predetermined length of film after a cutting operation and after commencement of film transport.

13. Apparatus as claimed in claim 12, wherein the length-measuring device includes means for emitting a pulse for each unit of length of film advanced, and there is provided means for counting the pulses in a repeating sequence of four ranges, which comprise a first range which corresponds to the said second predetermined length and at the end of which a control signal is emitted to render the delay means inoperative, a second range during which the detection of a mark will cause counting of a third range to begin, at the end of which third range a control signal is emitted causing the film transport means to run at a reduced speed, and a fourth range following the third range, at the end of which fourth range a control signal is emitted causing the film transport means to stop and the cutting device to operate, the arrangement being such that if the second range is completed without transfer to the third range being initiated, the film transport is stopped, without activation of the cutting device, after an over-run range has been counted.

14. Apparatus as claimed in claim 13 as appended to any one of claims 10 to 12, wherein the counter is arranged to transfer directly from the second range to the fourth range, and to reduce the speed of the film transport means, when a signal is emitted at the second output of the identification device.

15. Apparatus as claimed in claim 13

or claim 14, wherein the counter is arranged to be erased before the commencement of each of the said ranges.

16. Apparatus as claimed in any one of claims 11 to 15 as appended to claim 10, wherein the control means includes an auxiliary counter for the said pulses, which counter is arranged to be erased and re-started when a signal is emitted at the said first output and to be erased, without being re-started, when a signal is emitted at the said second output, and which is arranged to emit control signals at predetermined intervals commencing a preset distance after receiving a signal from the said first output, which signals have the same effect as the control signal emitted on completion of the said third counting range.

17. Apparatus as claimed in any one of claims 13 to 16, wherein the control means includes a differentiation device which, in response to the control signal emitted at the end of the said fourth range, delivers a pulse which passes through a series of three logic gates and actuates the cutting device, the first and last gates of the series being gates to which a blocking negation input can be applied, and the second gate being an Or-gate.

18. Apparatus as claimed in any one of claims 1 to 17, wherein the control means includes an electric digital circuit having store cells and logic gates, which circuit is arranged to ensure that the cutting device is not actuated unless the film transport means is stopped, and that film transport is not started unless the cutting device is in its rest position.

19. Apparatus as claimed in any one of claims 1 to 18, wherein there is provided means for operating a test programme in which an initial cutting operation is followed by film advancement until the film is stopped by the control means in response to a signal from the scanning means, and manually releasable means for preventing the control means from actuating the cutting device.

20. Apparatus as claimed in any one of claims 1 to 19, wherein the length-measuring device includes means for emitting a pulse for each unit of length of film advanced, and there is provided means for comparing the frequency of said pulses with a reference frequency, the said frequency comparison means being arranged to stop film transport and/or cause a warning signal to be released if the said frequencies differ by more than a predetermined amount.

21. Apparatus as claimed in any one of claims 1 to 20, wherein the film transport means is arranged to act on the film strip at a position immediately before the cutting device.



* C L H S *

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22. Apparatus for cutting film strips, substantially as hereinbefore described with reference to and as shown in, the accompanying drawings.

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