

PATENT SPECIFICATION

(11)

1 372 072



09

1 372 072

- (21) Application No. 46062/71 (22) Filed 4 Oct. 1971 (19)
 (31) Convention Application No. 2 048 412
 (32) Filed 2 Oct. 1970 in
 (33) Germany (DT)
 (44) Complete Specification published 30 Oct. 1974
 (51) International Classification B65H 35/04 31/02 31/20
 (52) Index at acceptance
 B8R 210 220 285 287 318 323 A1

(54) IMPROVEMENTS IN AND RELATING TO APPARATUS FOR SEVERING AND STACKING FILMS

(71) We, AGFA-GEVAERT AKTIENGESELLSCHAFT, 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:—

The invention relates to apparatus for severing films into strips, each containing several frames and for stacking the strips.

Apparatus of this type can reach a high output, creating a problem with regard to feeding the film strips in the required sequence to an order wallet.

The invention provides apparatus for severing a length of film into a plurality of shorter strips and for stacking the strips, which comprises severing means, means for feeding the film intermittently to the severing means, the feeding means and the severing means being arranged to operate so that the film is severed transversely at intervals along its length to produce a plurality of film strips, a collecting chamber open at one end to receive the film strips and open along one side, and means for advancing the film strips lengthwise and in turn into the collecting chamber, the arrangement being such that, within the collecting chamber, the film strips form a stack which can be withdrawn through the open side of the chamber.

Advantageously, the arrangement is such that the stack of films formed in the collecting chamber can be removed from the chamber manually.

One form of apparatus constructed in accordance with the invention will now be described, by way of example, with reference to the accompanying drawing, in which:

Fig. 1 is a diagrammatic side view of the apparatus; and

Fig. 2 is a cross-section taken on the line II—II of Fig. 1.

Referring to Fig. 1 of the accompanying drawing, the apparatus comprises a guide member 1 for a photographic film 2 which

is fed intermittently by means of a pair of co-operating drive rollers 3 and 4 to a severing device having a cutting blade 5. Intermittent feed devices of this type which are already known transport the film at each movement, in accordance with marks provided in association with the image fields or frames, through a distance such that, on the right of the severing device (as seen in Fig. 1) there is a strip of, for example, four 24×36 mm pictures when the cutting blade 5 severs the film as an electro-magnet 6 is supplied with current.

Beyond the cutting blade 5 further transport means in the form of endless conveyor belt means 7 and 8, are fitted which are tensioned and driven by means of rollers 9 and 10, and 11 and 12, respectively. The belt means are each in the form of a pair of narrow belts which come into contact only with the edges of the film. Between parallel opposing runs of the belts 7 and 8 there is a vertical gap which is greater than, or equal to, the thickness of the film and which forms approximately an extension of the film path defined by the guide member 1. The roller 9 is coupled to the roller 11, for example, by means of a drive belt (not shown), and is coupled, by means of a drive belt 13, to a drive pulley 14 which is in turn coupled by way of a belt drive 15 to a drive pulley 17 on the spindle of a drive motor 16.

At the outlet end between the part conveyor belts 7 and 8, freely rotating rollers 18 of larger diameter than the rollers 11 and 12 are provided which extend approximately into the plane of the upper conveyor belt 7. The position of the pulleys 18 with respect to the plane of the conveyor belts 7 and 8 can be adjusted according to the curling tendency of the films.

At the outlet end of the conveyor belts 7 and 8 a discharge or collecting chamber commences which is formed by upper and lower rails 19 and 20, respectively, and a rear limiting surface 21. The front side of the discharge chamber is open and there is provided at the front side a holder for film

wallets including means for conveying a stack of wallets. The width of the rails 19 is less than the width of the films which are to be handled (instead, apertures may be provided in wider rails) in order to allow the stacked films to be removed by hand. The rails 19 and 20, in order to increase the friction, are coated with rubber except for the funnel-like portions in which the rails terminate at the inlet end of the chamber which are polished in order to keep the friction factors as low as possible.

A stop 23, which is rotatable about a pin 24, is attached to the upper rail 19 by means of a magnetic clamp 22. The stop 23 is held by its own weight and a spring which is not shown, in the position illustrated, in which it terminates the movement of strips of film.

Within the discharge chamber, which is open at the front, there are shown in Fig. 2 several strips of film 2a and 2b which project laterally beyond the rails 19 and 20.

The method of operation of the apparatus is as follows:

The leading end portion of a strip of film which is pushed forward by the transport means 3 and 4 is engaged by the conveyor belts 7 and 8 and conveyed towards the right (as seen in Fig. 1), at a speed equal to the peripheral speed of the transport rollers 3 and 4. The conveyor belts 7 and 8 run at a speed which is approximately one third greater than the peripheral speed of the rollers 3 and 4, but the driving of the strip of film by the belts is very weak, owing to the gap between the belts 7 and 8, which is somewhat greater than the film thickness. The speed is, therefore, determined by the rollers 3 and 4 which press firmly against the film.

The leading end portion of the strip of film then moves along between the conveyor belts 7 and 8, is engaged more strongly by the roller 18 and can deflect upwards or downwards beyond the conveyor belts, depending on its tendency to curl. When it meets the polished opening portions of the rails 19 and 20, the leading edge of the film slides along until it arrives in the chamber between the rails 19 and 20. After a certain travel distance, the transport by means of the rollers 3 and 4 is stopped and the film strip is severed from the remainder of the film by means of the blade 5. Immediately after being severed, the film strip starts to move again owing to the drive of the conveyor belts 7 and 8, and travels until its trailing end leaves the outlet end of the conveyor belts. The stop 23 is so adjusted in accordance with the selected strip length, that the leading edge of the strip of film reaches it shortly after the trailing edge has emerged from the conveyor belts 7 and 8. Depending on the tendency of the film to curl, the trailing end will therefore come to

rest against the upper rail 19 or the lower rail 20 at the inlet end. The beginning of the next strip of film therefore has enough room between the rail 20 or 19, respectively, and the film already deposited in the chamber to allow it to enter the chamber. In this way, one strip of film after the other is inserted, and by means of the stop 23, following films are prevented from pushing along films which are already inserted. A stack of strips of film is thus produced in which the righthand edges are practically all in the vicinity of the stop 23. On completion of the cutting of a film and the resultant stopping of the severing device, this stack can be removed by hand and inserted into a film strip wallet.

To facilitate handling, and especially to permit both hands to be used to insert film strips into a film strip wallet, the film strip wallet which comprises a front wall and a rear wall joined on three sides may be arranged with its rear wall pulled outward and the shorter front wall upright in a holder. It is especially advantageous for these wallets to be arranged as a stack in a corresponding transport means so that each time the stack of strips of film has been inserted the filled wallet can be removed from the wallet stack.

If it is desired that films are to be ejected without being cut, for example, if prints are to be taken from them again, the rollers 3 and 4 are arranged to transport the whole film without the cutting device 5 being set in operation. The beginning of the film is then pushed by means of the rollers 3 and 4 and the conveyor belts 7 and 8 with such a force that it is capable of deflecting the pivotably suspended stop 23 to an inoperative position. The film, pushed through the chamber below the stop 23, then travels until its trailing end has left the conveyor belts 7 and 8. The film is then lightly clamped by means of the stop 23 so that it cannot drop down.

The apparatus described is also capable of operation if the conveyor belts 7 and 8 are not provided. However, it is then necessary to take into account that oblique stress exerted on the film by the cutting blade 5 may tend to cause strips of film to be thrown out of the discharge chamber.

WHAT WE CLAIM IS:—

1. Apparatus for severing a length of film into a plurality of shorter strips and for stacking the strips, which comprises severing means, means for feeding the film intermittently to the severing means, the feeding means and the severing means being arranged to operate so that the film is severed transversely at intervals along its length to produce a plurality of film strips, a collecting chamber open at one end to

wallets including means for conveying a stack of wallets. The width of the rails 19 is less than the width of the films which are to be handled (instead, apertures may be provided in wider rails) in order to allow the stacked films to be removed by hand. The rails 19 and 20, in order to increase the friction, are coated with rubber except for the funnel-like portions in which the rails terminate at the inlet end of the chamber which are polished in order to keep the friction factors as low as possible.

A stop 23, which is rotatable about a pin 24, is attached to the upper rail 19 by means of a magnetic clamp 22. The stop 23 is held by its own weight and a spring which is not shown, in the position illustrated, in which it terminates the movement of strips of film.

Within the discharge chamber, which is open at the front, there are shown in Fig. 2 several strips of film 2a and 2b which project laterally beyond the rails 19 and 20.

The method of operation of the apparatus is as follows:

The leading end portion of a strip of film which is pushed forward by the transport means 3 and 4 is engaged by the conveyor belts 7 and 8 and conveyed towards the right (as seen in Fig. 1), at a speed equal to the peripheral speed of the transport rollers 3 and 4. The conveyor belts 7 and 8 run at a speed which is approximately one third greater than the peripheral speed of the rollers 3 and 4, but the driving of the strip of film by the belts is very weak, owing to the gap between the belts 7 and 8, which is somewhat greater than the film thickness. The speed is, therefore, determined by the rollers 3 and 4 which press firmly against the film.

The leading end portion of the strip of film then moves along between the conveyor belts 7 and 8, is engaged more strongly by the roller 18 and can deflect upwards or downwards beyond the conveyor belts, depending on its tendency to curl. When it meets the polished opening portions of the rails 19 and 20, the leading edge of the film slides along until it arrives in the chamber between the rails 19 and 20. After a certain travel distance, the transport by means of the rollers 3 and 4 is stopped and the film strip is severed from the remainder of the film by means of the blade 5. Immediately after being severed, the film strip starts to move again owing to the drive of the conveyor belts 7 and 8, and travels until its trailing end leaves the outlet end of the conveyor belts. The stop 23 is so adjusted in accordance with the selected strip length, that the leading edge of the strip of film reaches it shortly after the trailing edge has emerged from the conveyor belts 7 and 8. Depending on the tendency of the film to curl, the trailing end will therefore come to

rest against the upper rail 19 or the lower rail 20 at the inlet end. The beginning of the next strip of film therefore has enough room between the rail 20 or 19, respectively, and the film already deposited in the chamber to allow it to enter the chamber. In this way, one strip of film after the other is inserted, and by means of the stop 23, following films are prevented from pushing along films which are already inserted. A stack of strips of film is thus produced in which the righthand edges are practically all in the vicinity of the stop 23. On completion of the cutting of a film and the resultant stopping of the severing device, this stack can be removed by hand and inserted into a film strip wallet.

To facilitate handling, and especially to permit both hands to be used to insert film strips into a film strip wallet, the film strip wallet which comprises a front wall and a rear wall joined on three sides may be arranged with its rear wall pulled outward and the shorter front wall upright in a holder. It is especially advantageous for these wallets to be arranged as a stack in a corresponding transport means so that each time the stack of strips of film has been inserted the filled wallet can be removed from the wallet stack.

If it is desired that films are to be ejected without being cut, for example, if prints are to be taken from them again, the rollers 3 and 4 are arranged to transport the whole film without the cutting device 5 being set in operation. The beginning of the film is then pushed by means of the rollers 3 and 4 and the conveyor belts 7 and 8 with such a force that it is capable of deflecting the pivotably suspended stop 23 to an inoperative position. The film, pushed through the chamber below the stop 23, then travels until its trailing end has left the conveyor belts 7 and 8. The film is then lightly clamped by means of the stop 23 so that it cannot drop down.

The apparatus described is also capable of operation if the conveyor belts 7 and 8 are not provided. However, it is then necessary to take into account that oblique stress exerted on the film by the cutting blade 5 may tend to cause strips of film to be thrown out of the discharge chamber.

WHAT WE CLAIM IS:—

1. Apparatus for severing a length of film into a plurality of shorter strips and for stacking the strips, which comprises severing means, means for feeding the film intermittently to the severing means, the feeding means and the severing means being arranged to operate so that the film is severed transversely at intervals along its length to produce a plurality of film strips, a collecting chamber open at one end to



- receive the film strips and open along one side, and means for advancing the film strips lengthwise and in turn into the collecting chamber, the arrangement being such that, within the collecting chamber, the film strips form a stack which can be withdrawn through the open side of the chamber.
2. Apparatus as claimed in claim 1, wherein the arrangement is such that the stack of film strips formed in the collecting chamber can be removed manually therefrom through the open side of the chamber.
3. Apparatus as claimed in claim 2, wherein the width of the chamber is less, over at least a part of the length of the chamber, than the width of the film so that, over at least a part of their length, the lateral edge portions of the film strips on one side of the stack protrude through the open side of the chamber.
4. Apparatus as claimed in claim 3, wherein the upper and lower walls of the collecting chamber are provided, adjacent to the open side of the chamber, with recesses into which the lateral edge portions of the film strips on one side of the stack can protrude.
5. Apparatus as claimed in any one of claims 1 to 4, wherein the upper and lower walls of the collecting chamber are provided over at least a substantial part of their length with a relatively high-friction internal surface.
6. Apparatus as claimed in claim 5, wherein the high-friction surface is rubber.
7. Apparatus as claimed in any one of claims 1 to 6, wherein the upper and lower walls of the collecting chamber converge, over a portion of their length adjacent to the open end of the chamber through which the film strips enter the chamber, in the direction of advance of the film strips during their entry into the chamber.
8. Apparatus as claimed in claim 7, wherein the converging portions of the upper and lower walls of the collecting chamber have relatively low-friction inner surfaces.
9. Apparatus as claimed in claim 8, wherein the converging portions of the upper and lower walls of the collecting chamber have polished inner surfaces.
10. Apparatus as claimed in any one of claims 1 to 9, wherein there is provided a stop member pivotable between an operative position in which it extends into the collecting chamber to limit the advance of film strips and an inoperative position in which the film strips can advance, past the stop member, through the collecting chamber.
11. Apparatus as claimed in claim 10, wherein the stop member is so mounted as to enable its position along the length of the collecting chamber to be adjusted.
12. Apparatus as claimed in any one of claims 1 to 11, wherein the means for advancing the film strips into the collecting chamber comprises a pair of endless conveyor belt means having runs that extend parallel to one another, the gap between these runs being greater than or equal to the thickness of the film and the arrangement being such that the film enters the said gap between the runs after passing the severing means.
13. Apparatus as claimed in claim 12, wherein the speed at which the said conveyor belt means are arranged to be driven is greater than the speed at which the intermittent feeding means is arranged to feed the film to the severing means.
14. Apparatus as claimed in claim 13, wherein the speed at which the conveyor belt means are arranged to be driven is greater by approximately one third than the speed at which the intermittent feeding means is arranged to feed the film to the severing means.
15. Apparatus as claimed in any one of claims 12 to 14, wherein the inlet end of the said gap between runs of the conveyor belt means lies approximately in the plane in which the film is arranged to be fed to the severing means.
16. Apparatus as claimed in claim 15, wherein the outlet end of the said gap between runs of the conveyor belt means is displaced upwardly or downwardly with respect to the central horizontal plane of the collecting chamber to take account of the tendency of the film to curl.
17. Apparatus as claimed in any one of claims 12 to 16, wherein each of the said conveyor belt means comprises a pair of belts so separated laterally from one another that they are arranged to engage only the lateral marginal portion of the strips.
18. Apparatus as claimed in any one of claims 12 to 17, wherein, with rollers on which the conveyor belt means run at their outlet ends, there is associated a freely rotating roller which can be urged as required into the plane of the upper or lower conveyor belt in order to control the discharge of uncurved films.
19. Apparatus as claimed in any one of claims 1 to 18, wherein, in front of the open side of the discharge chamber, there is provided a holder for film wallets.
20. Apparatus as claimed in claim 19, wherein the holder comprises stack conveying means.



21. Apparatus for severing a length of
film into a plurality of film strips, and for
stacking the strips, substantially as herein-
before described with reference to, and as
5 shown in, the accompanying drawing.

ABEL & IMRAY,
Chartered Patent Agents,
Northumberland House,
303—306 High Holborn,
London, WC1V 7LH.

Printed for Her Majesty's Stationery Office by Burgess & Son (Abingdon), Ltd.—1974.
Published at The Patent Office, 25 Southampton Buildings, London, WC2A 1AY,
from which copies may be obtained.

