# United States Patent [19]

**Hujer et al.**

[11] **3,753,330**

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[54] **APPARATUS FOR PACKING STRIPS OF PHOTOGRAPHIC FILM**


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[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** ..... **53/123**, 53/180, 156/517

[51] **Int. Cl.** ..... **B65b 55/00**, B32b 31/00

[58] **Field of Search** ..... 156/519, 522, 516, 156/264, 256, 269; 53/123, 180



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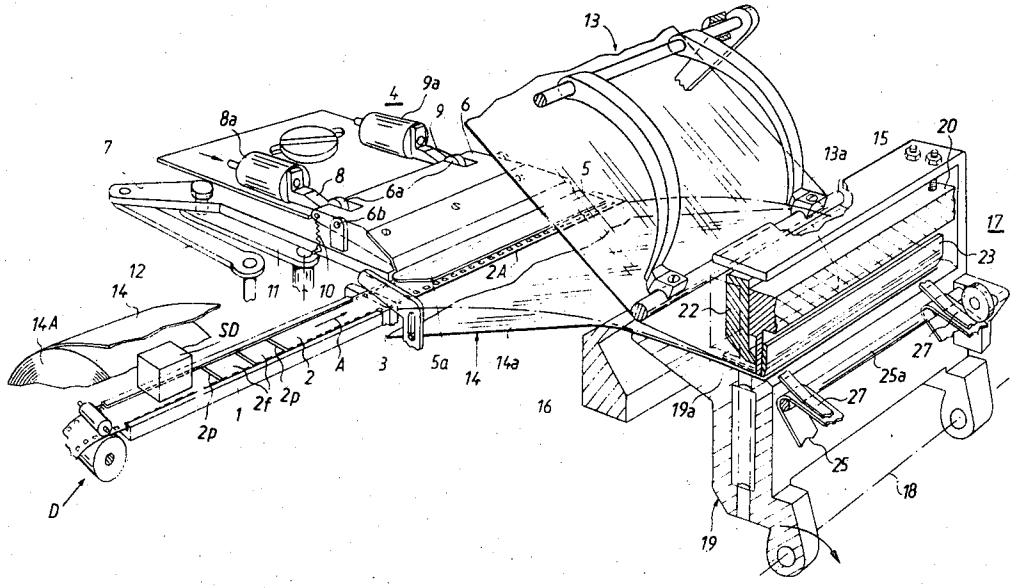
[57] **ABSTRACT**

Apparatus for enclosing sections of photographic roll films in transparent envelopes has two rolls of convoluted webs of weldable synthetic plastic material from which the webs are being withdrawn in such a way that their leading portions form a funnel. A severing device subdivides successive films into sections of requisite length, and a transfer device collects and introduces such sections into the funnel between the webs and all the way to a welding station where the webs are intermittently welded to each other to form envelopes each of which contains a single section or a stack of two or more superimposed sections. The webs can be severed subsequent to formation of each envelope or subsequent to formation of two or more interconnected envelopes to thus separate from the webs a series of discrete envelopes or a series of composite envelopes. Such composite envelopes can be folded in leporello fashion.


**17 Claims, 8 Drawing Figures**



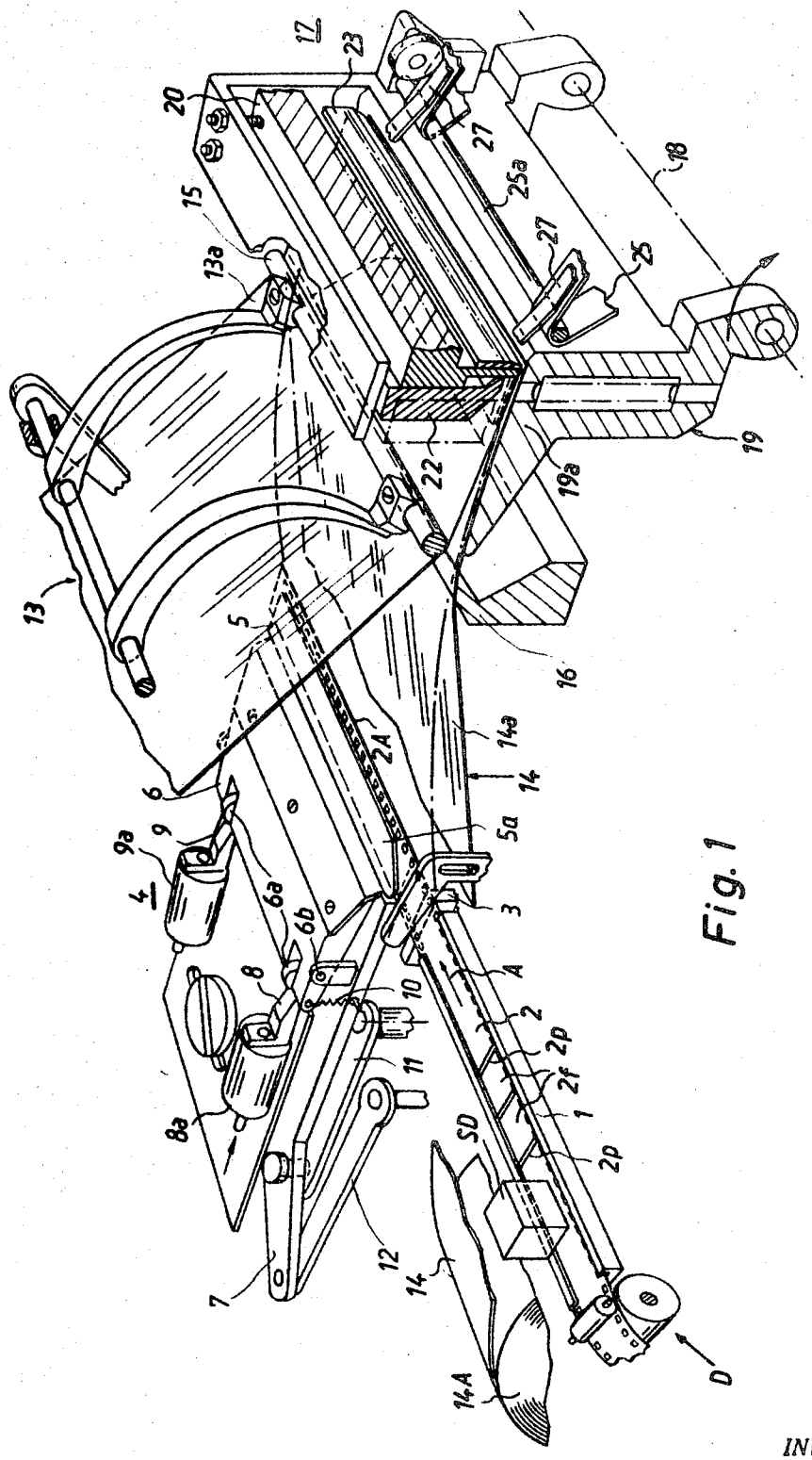



Fig. 1

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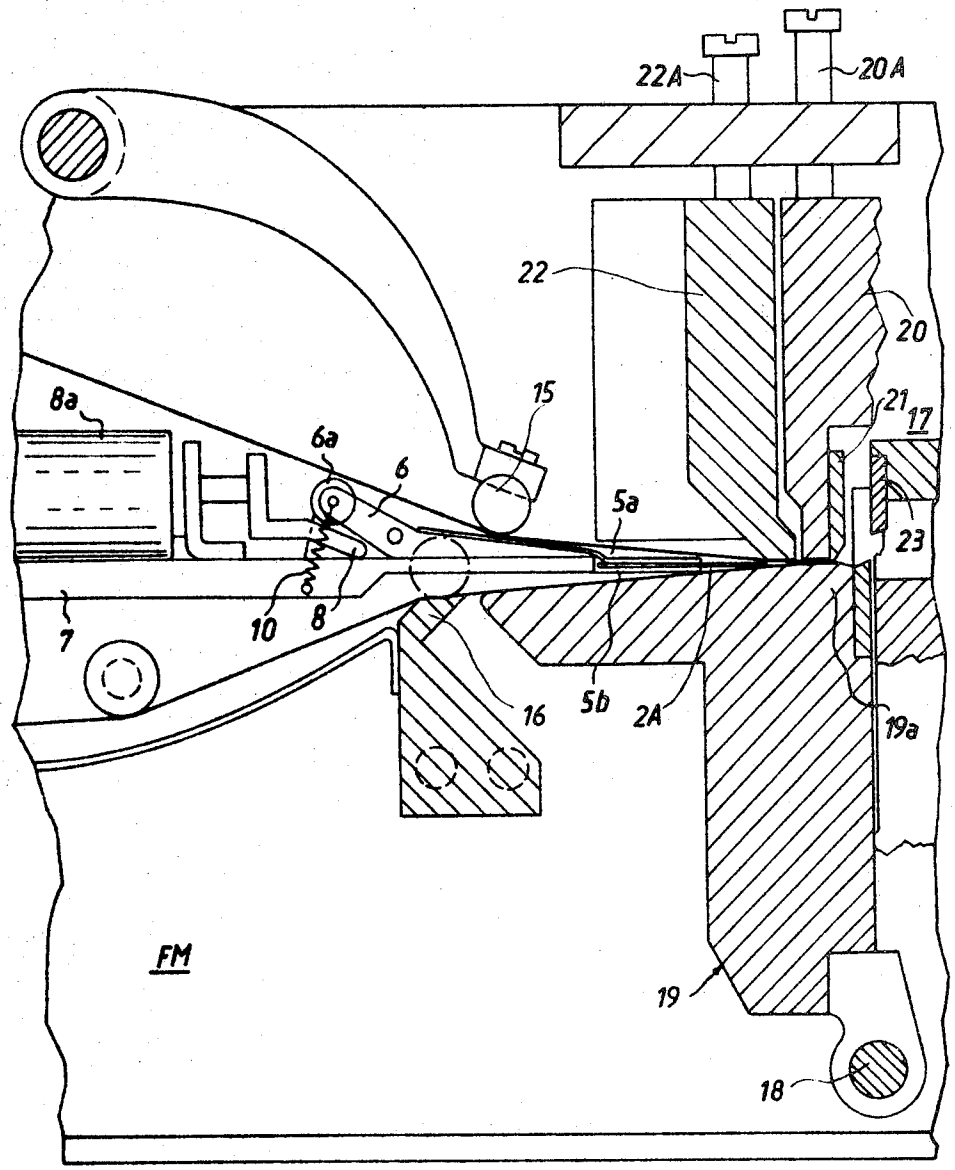


Fig. 2

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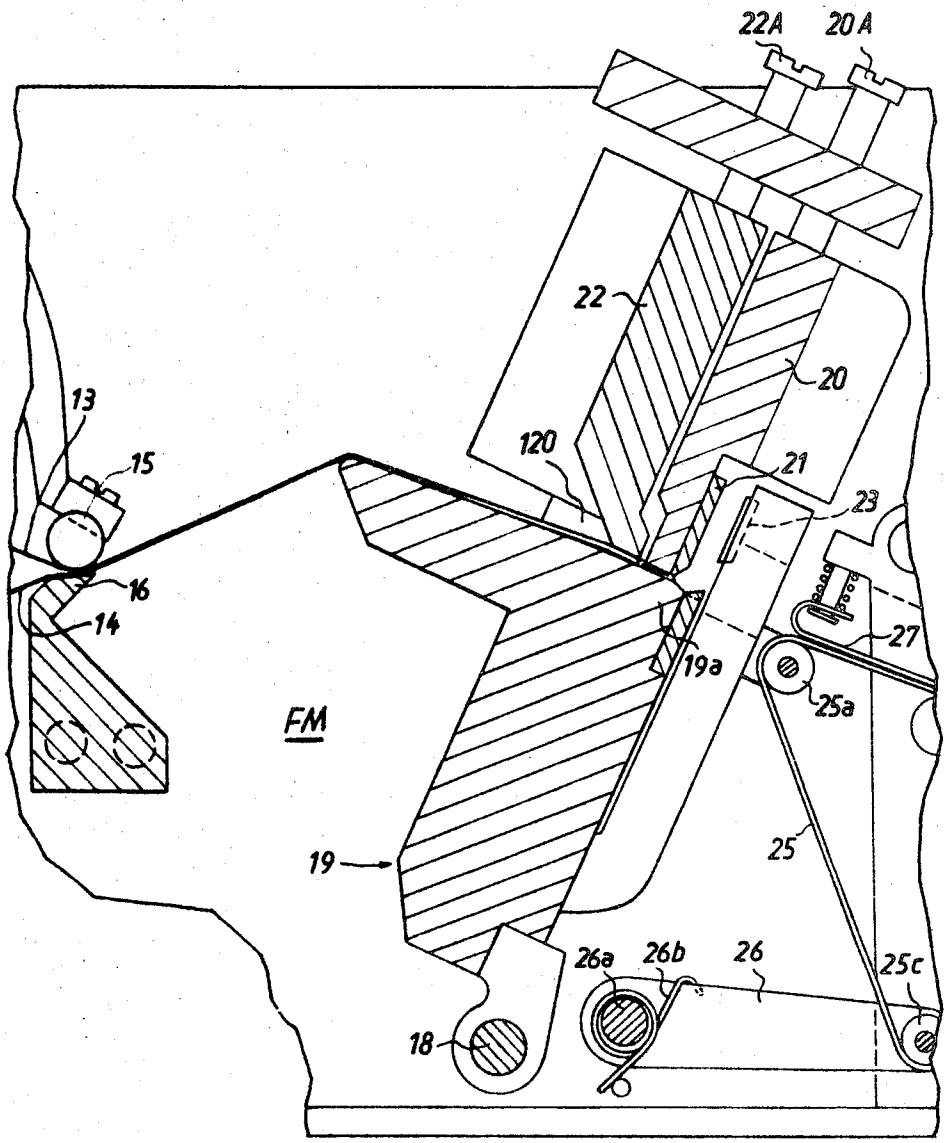


Fig. 3

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Fig.4

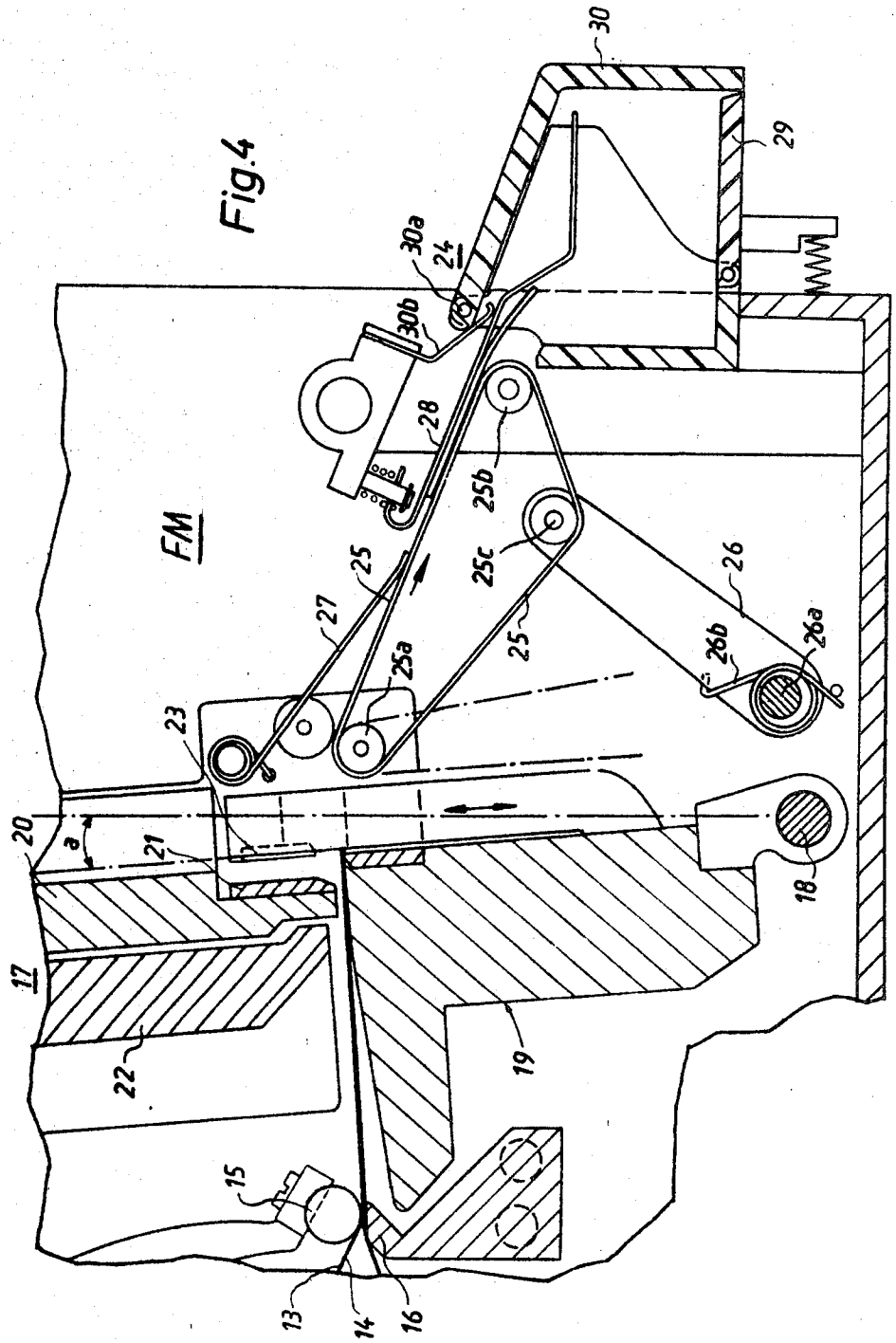


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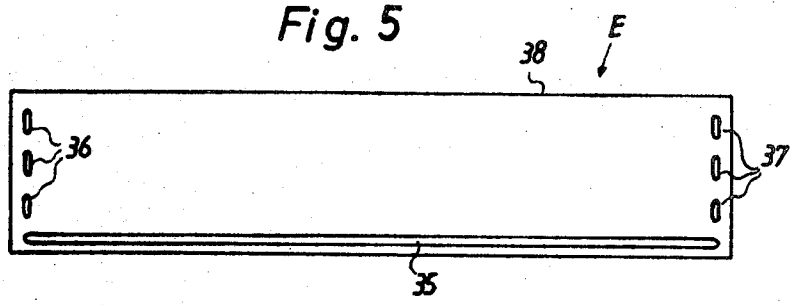
Fig. 5



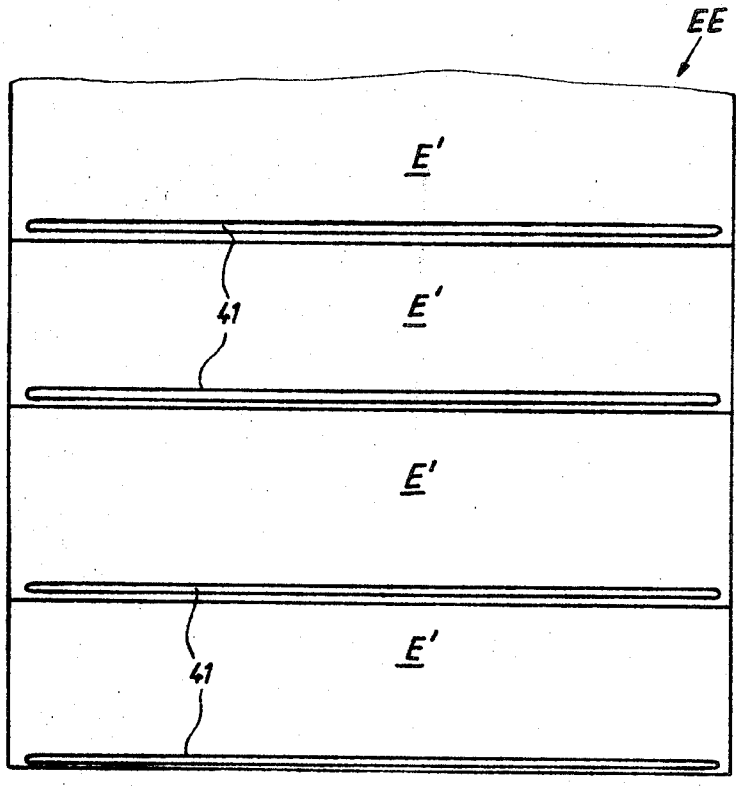




Fig. 6

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Fig.7

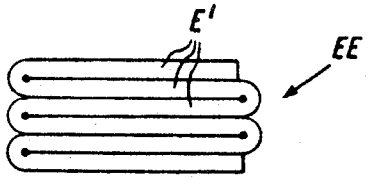
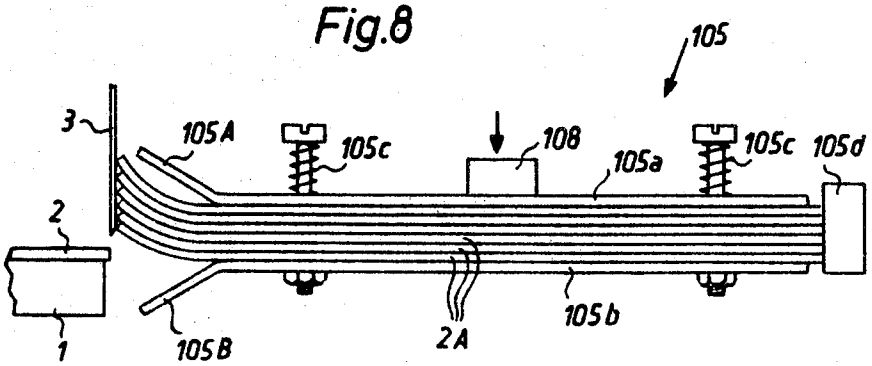



Fig.8

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# APPARATUS FOR PACKING STRIPS OF PHOTOGRAPHIC FILM

## BACKGROUND OF THE INVENTION

The present invention relates to improvements in apparatus for packing sections of photographic roll films or analogous strips of flexible material, and more particularly to improvements in the making of envelopes or packs which are used to store sections of photographic films and normally consist of flexible synthetic plastic sheet material.

In accordance with a presently known proposal, a full-length strip of photographic roll film is placed between two sheets of synthetic plastic material and the longitudinal edge portions of the sheets are welded to each other to form an elongated flat tube which confines the film. The tube is thereupon severed by an operator at several points, always across a frame line between adjoining film frames, so as to form a series of discrete envelopes each of which is open at both ends. Such procedure is time-consuming and expensive. Furthermore, the subdivided portions of the tube are seldom of uniform length because the severing is done by hand and the accuracy of such severing actions depends on the skill and carefulness of the operator.

It is also known to automatically subdivide a strip of photographic film into sections of desired length, normally not exceeding 180 millimeters, and to thereupon automatically introduce such sections into prefabricated envelopes which are made of parchment or the like. Such procedure is also costly and time-consuming, mainly because the opening of prefabricated envelopes and the introduction of film sections into such envelopes necessitates the provision of expensive, complicated and bulky equipment.

Manual introduction of film sections into prefabricated envelopes, especially into envelopes of the type known as leporello envelopes, also failed to gain widespread acceptance in the industry, mainly because of excessive costs for man hours and the lack of uniformity of introduction of film sections into separate pockets of leporello envelopes.

## SUMMARY OF THE INVENTION

An object of the invention is to provide a novel and improved apparatus for automatic packing of sections of photographic roll film or like strip-shaped material into simple or composite envelopes, either by placing each section into a discrete envelope, by placing several sections into a single envelope, or by placing one or more sections into each of a series of coherent or interconnected envelopes.

Another object of the invention is to provide an apparatus which can reliably form a succession of envelopes, each of which contains one or more elongated film sections, in such a way that the apparatus can be supervised and serviced by a single attendant.

A further object of the invention is to provide an apparatus wherein the envelopes are formed at the rate at which a photographic film is subdivided into sections of desired length.

An additional object of the invention is to provide an apparatus which can be rapidly and conveniently converted for the formation of different types of envelopes and for storing a desired number of sections in each of a series of discrete envelopes or in each of a series of interconnected envelopes.



Another object of the invention is to provide an apparatus which is capable of automatically stacking the envelopes and which is also capable of storing all sections of a full-length photographic film or the like in a single envelope, in several discrete envelopes or in a series of interconnected envelopes.

An ancillary object of the invention is to provide the apparatus with novel means for stacking and transferring sections of photographic film or the like and with novel means for making envelopes for such sections.

The improved apparatus can be utilized for enclosing elongated sections of photographic roll films or analogous strip-shaped materials in envelopes, for example in transparent or translucent envelopes. The apparatus comprises two sources of webs which consist of weldable synthetic plastic material, guide means for guiding the webs along two convergent paths so that the leading portions of such webs form a funnel, a welding device adjacent to the paths for the webs and including electrode means for intermittently welding the leading portions of the webs to each other so as to form envelopes each of which has at least two welded seams, severing means for subdividing successive strip-shaped materials into sections whose length at most equals the width of the webs, and transfer means for introducing the thus obtained sections, either singly or in stacks of two or more superimposed sections, into the funnel between the leading portions of the webs so that each envelope contains at least one section. The formation of envelopes (the operation of electrode means) normally follows the transfer of sections into requisite positions for confinement in the envelopes.

The novel features which are considered as characteristic of the invention are set forth in particular in the appended claims. The improved apparatus itself, however, both as to its construction and its mode of operation, together with additional features and advantages thereof, will be best understood upon perusal of the following detailed description of certain specific embodiments with reference to the accompanying drawing.

## BRIEF DESCRIPTION OF THE DRAWING:

FIG. 1 is a fragmentary perspective view of a packing apparatus which embodies the invention;

FIG. 2 is an enlarged vertical sectional view of a welding device in the apparatus of FIG. 1, such welding device being shown in a first position in which it is ready to receive film sections from the transfer means of the apparatus;

FIG. 3 illustrates the welding device of FIG. 2 in a second position;

FIG. 4 illustrates the welding device of FIG. 2 in a third position and further shows a conveyor system which serves to introduce successively formed envelopes into a collecting receptacle;

FIG. 5 is a plan view of a first envelope which can be formed in the apparatus of FIGS. 1 to 4;

FIG. 6 is a fragmentary plan view of a modified envelope;

FIG. 7 is an end elevational view of the envelope shown in FIG. 6, with the pockets of such envelope folded over each other in leporello fashion; and

FIG. 8 is a fragmentary side elevational view of a modified gripping device which can be used in the transfer unit of FIG. 1 to accumulate stacks of film sections.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS:

Referring first to FIG. 1, there is shown a portion of an apparatus which is utilized for packing strip-shaped sections 2A of exposed and developed photographic films 2. The apparatus comprises a substantially horizontal guide 1 wherein successive films 2 are transported lengthwise (arrow A) one after the other in stepwise fashion so that a film which is caused to travel in the guide 1 advances through distances of predetermined length, for example, through distances corresponding to the combined width of four, five or six film frames 2*f*. During each period of dwell, the film 2 in the guide 1 is severed midway across one of the frame lines 2*p* between adjoining film frames 2*f*. The cutting of film 2 takes place at a severing station accommodating a severing device 3 whose construction forms no part of the present invention. The arrangement is preferably such that a scanning device SD which is adjacent to the path of the film 2 in the guide 1 scans longitudinally spaced indicia or marks (not shown) which are applied to the film and causes the drive D for the film 2 to come to a stop at the exact moment when a selected film frame line 2*p* registers with the knife or knives of the severing device 3. The latter is actuated by the scanning device SD or by the drive D to move a knife across the path of the film 2 and to thereby sever the adjoining frame line 2*p*. The thus separated section 2A of the film 2 is then movable sideways for insertion into a plastic envelope. The distribution of aforementioned indicia or marks on the film 2 is such that the scanning device SD is capable of arresting the drive D for the film 2 at the exact moment when each n-th from line 2*p* reaches the serving station. The indicia may be in the form of perforations, graphite marks or the like, and the scanning device SD may include a photoelectric detector or a detector which is capable of discriminating between the condutivity of film 2 and the conductivity of a graphite mark. Of course, a photoelectric detector is also capable of detecting a graphite mark. Furthermore, the scanning device SD may employ a mechanical detector which tracks the film 2 for the presence of perforations or projections and produces signals which are used to arrest the drive D and to actuate the severing device 3. For example, the length of film sections 2A can be selected to be in the range of 180 millimeters. The details of an apparatus which includes a scanning device, a drive and a severing device for photographic film are disclosed, for example, in the German printed publication (DAS) No. 1,497,400 which is owned by the assignee of the present application.

The severing device 3 is located immediately upstream of ahead of a transfer unit 4 which comprises a device 5 for gripping and transporting one or more film sections 2A sideways, namely, in a direction to the right, as viewed in FIG. 1. The gripping device 5 comprises an elongated tongs having a lower plate-like gripping element or jaw 5*b* (FIG. 2) and a pivotable plate-like upper gripping element or jaw 5*a*. The jaw 5*a* is mounted on a holder 6 which is pivotably secured to a reciprocable carriage 7; the latter also supports the fixedly mounted lower jaw 5*b*. The jaw 5*b* is located below and the jaw 5*a* is located above the path for the sections 2A when the transfer unit 4 dwells in the starting position shown FIG. 1. The upper jaw 5*a* is then held in an angular position in which its underside remains spaced from the upper side of the jaw 5*b* so that the two jaws form an elongated channel of triangular cross-sectional outline into which the strip 2A advances in response to lengthwise movement of the film 2 under the action of the drive D. The jaws 5*a*, 5*b* may consist of sheet metal.

The carriage 7 further supports two electromagnets 8*a*, 9*a* having reciprocable wedge-like armatures 8, 9, which can move lengthwise along roller followers 6*a* of the holder 6 so as to pivot the latter about the axis of a shaft 6*b* on the carriage 7 in a direction to move the upper jaw 5*a* toward the lower jaw 5*b* whereby the two jaws grip one or more film sections 2A in the aforementioned channel. The electromagnets 8*a*, 9*a* preferably energized to move the armatures 8, 9 forwardly in automatic response to completion of each severing action or even prior to severing, for example, in immediate response to emission of a signal by the detector of the scanning device SD. A helical spring 10 which is attached to the carriage 7 tends to pivot the holder 6 in a counterclockwise direction, as viewed in FIG. 1, so as to move the upper jaw 5*a* away from the lower jaw 5*b*. Thus, the gripping device 5 opens in automatic response to deenergization of the electromagnets 8*a*, 9*a*. It is clear, however, that the electromagnets 8*a*, 9*a* can be deenergized in response to signals from the scanning device SD so that the armatures 8, 9 move forwardly and pivot the jaw 5*a* against the jaw 5*b* in response to the action of suitable springs (not shown) which are installed in the electromagnets and whose bias is overcome on energization of the electromagnets.

The carriage 7 is mounted on a system of parallel levers 11, 12 which can be moved by suitable cams (not shown) to transport the carriage along a predetermined endless path in a direction transversely of the path of movement of films 2 in the guide 1. The levers 11, 12 can impart to the carriage 7 a movement having a component which is parallel with the direction of lengthwise movement of the film 2 during a first stage of a complete cycle to avoid contact of the trailing edge of the film with the severing device and thereupon a component of movement at right angles to the longitudinal direction of the guide 1 so as to move a freshly severed section 2A sideways toward a wrapping and sealing station. The means for imparting such movements to the carriage 7 by way of the levers 11, 12 or similar supports may include the aforementioned cams, one or more electromagnets, a pneumatic drive or a mechanical driving device.

The apparatus further comprises two sources of convoluted plastic sheet material which respectively discharge flexible webs 13, 14 so that the webs move along two discrete paths which converge toward each other in a region to the right of the positions of jaws 5*a*, 5*b* in the starting position of the transfer unit 4. The leading portions or panels 13*a*, 14*a* of the webs 13, 14 form a funnel whose width increases in a direction toward the foremost part of the guide 1 and which is wide enough to permit entry of the jaws 5*a*, 5*b* with one or more film sections 2A therebetween. The webs 13, 14 preferably consist of weldable or fusible synthetic plastic material so that they can be bonded to each other in response to the application of heat and pressure. These webs are preferably transparent so that one can discern the film frames 2f of the film sections 2A in a finished envelope; this is particularly advantageous when each envelope contains a single film section 2A.

A portion of the roll **14A** which constitutes a source of supply of web **14** is shown in the lower left-hand portion of FIG. **1.** This lower web **14** passes over a fixedly mounted deflector or guide **16.** The upper web **13** passes below a movably mounted deflector or guide **15** which resembles a rod and extends transversely of the path of the webs **13, 14.** The front ends of the webs **13, 14** are located at a welding or bonding station which accommodates a welding device **17** (FIGS. **2–4**). Such front ends are clamped against each other by a vertically movable clamping element **22** of the welding device **17** so that the width of the gap between the webs **13, 14** increases from the clamping element **22** to the deflectors or guides **15, 16** and thereupon increases still further in a direction from the deflectors **15, 16** toward the respective sources of supply of convoluted plastic wrapping material. This provides ample room for movements of the carriage **7** in a direction transversely of the guide **1** so as to advance the gripping device **5** to the right of the deflectors **15, 16** whereby the jaws **5***a*, **5***b* can introduce one or more sections **2A** all the way into the welding device **17.** The leading portions **13***a*, **14***a* of the webs, **13, 14** may serve as a guide to inure proper introduction of one or more film sections **2A** into the welding station.

The width of the webs **13, 14** exceeds the length of film sections **2A**, for example, by about 10 millimeters.

The entire welding device **17** is pivotable between three positions about the axis of a horizontal shaft **18** which is preferably parallel with the guide **1.** The welding device **17** includes a block-shaped support **19** which is mounted on the shaft **18** and carries the aforementioned clamping element **22.**

The block **19** is further provided with substantially vertical ways for a reciprocable welding electrode **20** which is heated by an electric resistance heater or by circulating fluid and is provided with an elastic blade **21.** The support **19** is also provided with ways for the clamping element **22** which is movable in parallelism with and is located ahead of the electrode **20.** Still further, the support **19** carries a cutting device which includes a stationary counterknife below and a reciprocable knife **23** above the path of the webs **13, 14.** The means for moving the parts **20, 22, 23** up and down in a predetermined sequence may comprise a camshaft which is driven at a predetermined speed and whose cams cooperate with springs (not shown) to impart to the parts **20, 22, 23** movements in a predetermined sequence and for predetermined periods of time. The parts **20A, 22A** shown in FIG. **2** constitute components of the means for moving the electrode **20** and clamping element **22** up and down with reference to the support **19.**

The support **19** further includes ways (not shown) for lateral welding electrodes **120** one of which is indicated in FIG. **3** behind the electrode **20.** The purpose of the lateral electrodes **120** is to at least partially seal the longitudinal ends of envelopes for the film sections **2A** in a manner as shown in FIG. **5.** The arrangement is preferably such that the formation of longitudinally extending seams which are produced by the lateral electrodes **120** takes place with a certain delay following the formation of transverse seams by the electrode **20.** This allows for unimpeded withdrawal of the gripping device **5** from the funnel which is defined by the leading portions **13***a*, **14***a* of the webs **13, 14.**

As best shown in FIG. **4,** the welding device **17** is followed by an conveyor system **24** which serves to introduce and stack successively formed envelopes in a receptacle **29.** The conveyor system **24** includes one or more continuously driven endless belts **25** each of which is trained over a driven first roller **25***a* mounted on the support **19,** a second roller **25***b* mounted on a stationary frame member FM, and a third roller **25***c* which is mounted on a tensioning arm **26.** The latter is mounted on a shaft **26***a* of the frame member FM and is biased in a clockwise direction by a torsion spring **26***b*. The support **19** further carries one or more elastic pressing members **27** which are preferably leaf springs and are located above the upper stretch of the belt **25.** One or more elastic envelope directing members **28** are mounted on the frame member FM downstream of the pressing member **27** and in part above the upper stretch of the belt **25** to direct successively formed envelopes into the receptacle **29.** The latter has a lid **20** which is hinged to the frame member FM, as at **30***a*, and is biased by a spring **30***b* so that it normally dwells in the illustrated closed position.

## THE OPERATION

When the apparatus is idle, the jaws **5***a*, **5***b* of the gripping device **5** are spread apart and define the aforementioned channel for entry of the foremost part of a film **2** in the guide **1.** The knives of the severing device **3** also allow unimpeded lengthwise movement of the film. When the drive D is started, the film **2** moves lengthwise and the drive is automatically arrested by the scanning device SD when the latter detects a mark which has been applied to the film for the purpose of causing it to be severed at predetermined intervals. The signal from the scanning device SD also causes the electromagnets **8***a*, **9***a* to move their armatures **8, 9** forwardly and to pivot the jaw **5***a* in a direction toward the jaw **5***b* so that the two jaws grip the foremost portion of the film **2** as soon as the latter is brought to a standstill. In the next step, the severing device **3** cuts the film midway across the adjacent frame line **2***p* to separate therefrom a section **2A** containing a predetermined number of film frames **2***f*.

During such forward transport, stoppage and severing of the film **2,** the welding device **17** dwells in the first position shown in FIG. **2.** The deflector or guide **15** is spaced from the deflector or guide **16** so as to provide room for introduction of the gripping device **5** into the space between the leading portions **13***a*, **14***a* of the webs **13, 14** and all the way into the welding device **17.** Such movement of the gripping device **5** takes place in response to displacement of the carriage **7** by the levers **11** and **12.** The rightward movement of the gripping device **5** (as viewed in FIG. **2**) is terminated when the section **2A** which is held by the jaws **5***a*, **5***b* enters the space below the clamping element **22.** At such time, the welding electrode **20** and its blade **21** press the over-lapping front edge portions of the webs **13, 14** against each other and against an anvil **19***a* of the support **19.**

The carriage **7** is thereupon caused to move to the left, as viewed in FIG. **2,** after the electromagnets **8***a*, **9***a* allow the spring **10** to pivot the upper jaw **5***a* away from the lower jaw **5***b* so that the section **2***a* remains in the space below the clamping element **22.** As shown in FIG. **2,** the righthand marginal portion of the section **2A** extends beyond the jaws **5***a*, **5***b* and is held by fric-

tional engagement with the webs **13, 14** when the carriage **7** is caused to perform a return stroke with the upper jaw **5***a* in open position. Such return movement of the carriage **7** takes place simultaneously with clockwise pivotal movement of the support **19** from the first position of FIG. **1** to a second position shown in FIG. **3**. The electrode **20** is heated, preferably by electric current, so that the overlapping front edge portions of the webs **13, 14** are welded to each other. The lateral electrodes **120** are caused to descend and are heated to form two short seams at the longitudinal ends of the section **2A** as soon as the transfer unit **4** is retracted sufficiently to allow for unimpeded movements of lateral electrodes to their operative positions. An advantage of welding while the support **19** pivots to the second position shown in FIG. **3** is that the welding and cooling of webs **13, 14** can take up a longer interval of time.

The second position of FIG. **3** is the right-hand end position of the support **19**. When the support **19** reaches such position, the welding of webs **13, 14** by the electrodes **20** and **120** is already completed. The deflector **15** is caused to move to its lowermost position so as to press the adjacent portions of the webs **13, 14** against each other and to press the web **14** against the fixed deflector **16**. This prevents any rearward (leftward) movement of webs **13, 14** while the support **19** pivots from the end position of FIG. **3** to a third position shown in FIG. **4**. The electrodes **20** and **120** are lifted above and away from the anvil **19***a*, before the support **19** begins its movement to the position of FIG. **4** while elastic blade **21** assists severing of electrodes **20** and the web **15**. The inherent stiffness of the webs **13, 14**, coupled with the stiffening of their front protions by the confined section **2A** and the seams which were formed by the electrodes **20** and **120**, suffices to insure that the envelope for the confined section **2A** does not share the movement of the support **19** to the position of FIG. **4**. Moreover, as the support **19** pivots from the position shown in FIG. **3**, the envelope with the confined section **2A** therein is engaged by the driven belt **25** of the conveyor system **24**. The engagement between the envelope and the upper stretch of the belt **25** results in tensioning of those portions of the webs **13, 14** which extend to the right of the deflectors **15, 16** (at the time of pivotal movement of the support **19** from the position of FIG. **3** to the position of FIG. **4**, the deflectors **15, 16** act not unlike a pair of clamps which prevent any leftward movement of the webs **13, 14** in response to counterclockwise pivotal movement of the support **19**).

When the support **19** reaches the position of FIG. **4**, the knife **23** of the cutting device is caused to sever the webs **13, 14** and to thus separate from the leading portions **13***a*, **14***a* an envelope which is sealed at the front (right-hand) side as well as at both ends but is open at the left-hand side to permit removal of the confined section **2A**. As soon as the webs **13, 14** are severed by the knife **23** of the cutting device, the belt **25** is free to transport the freshly separated envelope E into the receptacle **29** whereby such envelope moves along the undersides of the members **27** and **28**.

The electrode **20** and its blade **21** are caused to descend when the movable knife **23** of the cutting device in the welding device **17** performs its working stroke whereby the adjacent portions of the webs **13, 14** are clamped against the anvil **19***a* behind the freshly separated envelope E but not immediately adjacent to the front edges of the webs. The clamping action of the electrode **20** and its blade **21** is weaker than the clamping action of the deflectors **15, 16** so that, when the support **19** is thereupon pivoted through a small angle in a clockwise direction to reassume the position shown in FIG. **2**, the webs **13, 14** slip between the anvil **19***a* and the blade **21** to thus insure that the next seam will be formed immediately behind the front edges of the webs. A comparison of the positions of the support **19** as shown in FIGS. **2** and **4** will reveal that the angular movement of this support (see the angle alpha in FIG. **4**) is small but suffices to move the electrode **20** into engagement with the foremost portions of the webs **13, 14**. The upper deflector **15** is thereupon caused to move away from the fixed deflector **16** to assume the position shown in FIG. **2**. The apparatus is then ready for the next severing, transferring, welding, cutting and conveying operation.

A discrete finished envelope E is shown in FIG. **5**. This envelope has a longitudinal extending seam **35** which is formed by the electrode **20** and two transverse seams **36, 37** which are formed by the lateral electrodes **120**. The overall length of the envelope E may may exceed the length of the section **2A** therein by about **10** millimeters. The width of the envelope E is such that the space between the seam **35** and the open side **38** suffices to fully accommodate the section **2A**. FIG. **5** further shows that each of the seams **36, 37** which are formed by the lateral electrodes **120** may consist of a row of discrete lines or spots. Such interrupted seams are still sufficiently strong to prevent uncontrolled escape of the section **2A** at the one or the other longitudinal end of the envelope E. An advantage of the interrupted seams is that the webs **13, 14** need not be heated along a pair of uninterrupted lines in the longitudinal direction thereof. As can be readily determined by looking at FIGS. **1** to **4**, the seams **36, 37** extend in the longitudinal direction of the webs **13, 14**, i.e., in the direction of pronounced stretching or elongation of these webs during manufacture. It is well known that such plastic webs are stretched beyond the flow limit of their material and that the stretching takes place in the longitudinal direction of webs. This enhances the tensile strength and reduces the thickness of the webs. A heating of such webs releases tensile stresses which are frozen into the material of the webs so that the heated webs tend to shrink, i.e., to reduce their length, especially if the lateral electrodes **120** are disengaged prior to complete cooling of the webs. This causes the formation of folds or pleats between the heated and unheated portions of the webs. It was found that the making of interrupted seams **36, 37** reduces the likelihood of the formation of folds even though the time for cooling the webs **13, 14** prior to opening of the lateral electrodes **120** is normally very short.

FIG. **6** illustrates a composite envelope EE which comprises several interconnected envelopes E'. The envelope EE is obtained by actuating the knife **23** on the support **19** after each n-th transfer of a section **2A** by the unit **4**. For example, the composite envelope EE may comprise such a number of envelopes E' that it can accommodate the sections **2A** of a complete full-length film **2**. In order to reduce the overall size of the envelope EE, the latter can be folded back and forth in the so-called leporello fashion which is often employed for folding of road maps, engineering drawings and the

like. A properly folded envelope EE with six interconnected envelopes E' is shown in FIG. 7. It will be readily understood that at least one of the lateral electrodes 120 is either omitted or rendered inactive if the apparatus is to form composite envelopes of the type shown in FIGS. 6 7 because the sections 2A in the envelope E' can be removed only by shifting them lengthwise beyond the one or the other end of the respective envelope E'.

Each envelope E or E' is formed in such a way that a single film section 2A or a stack of film sections 2A therein is flanked by seams at at least two sides. Thus, in FIG. 6, each section 2A is flanked by two longitudinally extending seams 40; in FIG. 5, the section in the envelope E is flanked by three seams 36, 37, 38.

It is further within the purview of the present invention to operate the improved apparatus in such a way that each discrete envelope E of the type shown in FIG. 5 can receive two or more superimposed or stacked sections 2A, for example, all sections which are obtained on severing of a full-length film 2. The gripping device of the transfer unit 4 then serves as a means for superimposing a succesion of sections 2A (two or more) and to transfer such superimposed sections 2A into the welding device 17 after each second, third, fourth, etc., actuation of the severing device 3. The gripping device 5 is then preferably replaced with a modified gripping device 105 of the type shown in FIG. 8. This modified device 105 comprises a lower gripping element or jaw 105*b* which can be fixedly mounted on the carriage (not shown) and an upper gripping element or jaw 105*a* which is parallel with the lower jaw 105*b* and is biased toward the latter by one or more relatively weak springs 105*c*. The closing means 6, 8, 8*a*, 9, 9*a* of the transfer unit 4 is then replaced by a closing device 108 which can move the upper jaw 105*a* downwardly toward the lower jaw 105*b* after the space between such jaws accommodates a desired number of superimposed sections 2A to thus augment the action of the springs 105*c*. The inlet ends of the jaws 105*a*, 105*b* preferably flare outwardly, as at 105A and 105B, to facilitate the entry of successive sections 2A. Such entry is further facilitated in view of the natural tendency of the film 2 to curl so that the trailing end of each section 2A is normally curved upwardly or downwardly and provides space for substantially unimpeded entry of the leading end of the next-following section 2A. Also, even if the film 2 does not exhibit any tendency to curl, the weight of the trailing portions of successive sections 2A will cause such trailing portions to flex downwardly and to thus move out of the way to permit unimpeded introduction of the leading portion of the next-following section. The bias of the springs 105*c* is preferably so weak that they exhibit little resistance to upward movement of the jaw 105*a* away from the lower jaw 105*b* in response to introduction of a fresh section 2A. It is clear that the movable jaw 105*a* can be mounted below the jaw 105*b*. A stop 105*d* at that end of the gripping device 105 which is remote from the severing device 3 (not shown in FIG. 8) serves as an abutment for the front edges of successively introduced sections 2A. The stop 105*d* further insures that the sections 2A which are already accommodated in the channel between the jaws 105*a*, 105*b* are not shifted lengthwise in response to introduction of a further section 2A.

The thus obtained stack of sections 2A in the gripping device 105 is thereupon clamped by moving the jaw 105*a* toward the jaw 105*b* under the action of the closing device 108 and the transfer unit including the gripping device 105 is then ready to deliver the stack of sections 2A into the welding device 17.

It is further clear that the transfer unit which employs the gripping device 105 of FIG. 8 can be used in connection with the formation of composite envelopes of the type shown in FIG. 6, for example, by introducing into the welding device 17 successive groups or stacks of two or three or more sections 2A so that each part E' of the envelope EE contains several film sections.

An important advantage of the improved apparatus is that it can form and fill a large number of envelopes per unit of time, that the formation of envelopes is uniform, and that such envelopes can be formed and piled up with minimal expenditures for salaries. A single workman can supervise and service the apparatus by feeding successive lengths of film 2 into the drive D, by intermittently removing envelopes which accumulate in the receptacle 29, and by replenishing from time to time the source of supply for the web 13 and/ or 14.

A more specific advantage of the improved apparatus is that the convergent webs 13, 14 allow for convenient introduction of discrete film sections 2A or of stacked film sections into the welding device 17 wherein the sections are confined in envelopes which are formed at the same rate at which the transfer unit 4 delivers sections to the station below the clamping element 22.

Without furher analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features which fairly constitute essential characteristics of the generic and specific aspects of our contribution to the art and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended:

1. In an apparatus for enclosing sections of photographic films in envelopes, a combination comprising two sources of webs of weldable synthetic plastic material, each of said webs having a predetermined width; guide means for guiding said webs for movement along a pair of convergent paths so that the leading portions of the thus guided webs form a funnel; a welding device adjacent to said paths and including means for intermittently welding said leading portions of the webs to each other to thus form envelopes each of which has at least two welded seams; severing means for subdividing successive films into sections whose length at most equals said predetermined width; and transfer means for introducing the thus obtained sections into said funnel between said leading portions of the webs so that each of said envelopes contains at least one section.

2. A combination as defined in claim 1, wherein said means for intermittently welding said leading portions comprises electrode means arranged to produce at least one interrupted seam.

3. A combination as defined in claim 2, wherein said interrupted seam extends in the longitudinal direction of said webs.

4. A combination as defined in claim 1, further comprising second guide means for successive films and drive means for intermittently moving such films

lengthwise along said second guide means, said severing means being adjacent to the path for films in said second guide means and said tranfer means being located immediately past said severing means.

**5.** A combination as defined in claim **4**, further comprising means for moving said transfer means along a path wherein said transfer means has a component of movement which is parallel to the direction of movement of films in said second guide means.

**6.** A combination a defined in claim **1**, wherein said means for intermittently welding said leading portions of the webs comprises a first electrode arranged to provide said webs with transversely extending seams and two additional electrodes arranged to provide said webs with longitudinally extending seams.

**7.** A combination as defined in claim **6**, wherein said welding device further comprises means for cutting said webs in substantial parallelism with said transversely extending seams to form discrete envelopes each having an open side and each confining at least one section of film.

**8.** A combination as defined in claim **7**, further comprising a receptacle for the collection of discrete envelopes and conveyor means for transporting discrete envelopes from said cutting means into said receptacle.

**9.** A combination as defined in claim **1**, wherein said means for intermittently welding said leading portions of the webs comprises electrode means arranged to provide longitudinally spaced portions of said webs with transversely extending seams to thus form a series of interconnected envelopes each of which contains at least one section.

**10.** A combination as defined in claim **9**, wherein said welding device further comprises means for cutting said webs in parallelism with said transversely extending seams to thus separate from the webs a composite envelope consisting of several interconnected envelopes, such composite envelope being foldable in leporello fashion.

**11.** A combination as defined in claim **1**, wherein said transfer means comprises means for collecting stacks of superimposed sections and for introducing such stacks between said leading portions of the webs so that each of said envelopes contains a stack of sections.

**12.** A combination as defined in claim **11**, wherein each of said stacks contains all sections obtained on severing of a full length of film.

**13.** A combination as defined in claim **11**, wherein said stack collecting means comprises a pair of clamping elements one of which is movable toward and away from the other element and means for biasing said one element toward said other element, said elements having outwardly extending inlet portions to facilitate lengthwise movement of successive sections therebetween.

**14.** A combination as defined in claim **13**, wherein said transfer means further comprises means for pressing said one element toward said other element to augment the action of said biasing means and to thus clamp a stack of sections between said elements during insertion of a stack between said leading portions of the webs.

**15.** A combination as defined in claim **1**, wherein said welding device is movable between a plurality of positions.

**16.** A combination as defined in claim **15**, wherein said means for intermittently welding said leading portions of the webs is arranged to provide such leading portions with seams during movement of said welding device between a pair of said positions.

**17.** A combination as defined in claim **1**, wherein said transfer means comprises a gripping device including film engaging tongs and movable from a first position in which said gripping device engages the foremost section of a film during subdivision of the film by said severing means to a second position to thereby introduce the freshly separated section between said leading portions of the webs.

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