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Erickson et al.

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[54] **PROCESSOR'S METHOD AND APPARATUS FOR PACKING PHOTOGRAPHS**

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[22] Filed: **Mar. 3, 1971**

[21] Appl. No.: **120,551**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 26,723, April 8, 1970, abandoned.

[52] **U.S. Cl.**.....**53/29,** 53/183

[51] **Int. Cl.**.....**B65b 43/00,** B65b 39/00

[58] **Field of Search**.....53/28, 29, 35, 37, 53/50, 51, 178, 179, 182, 183, 186, 187

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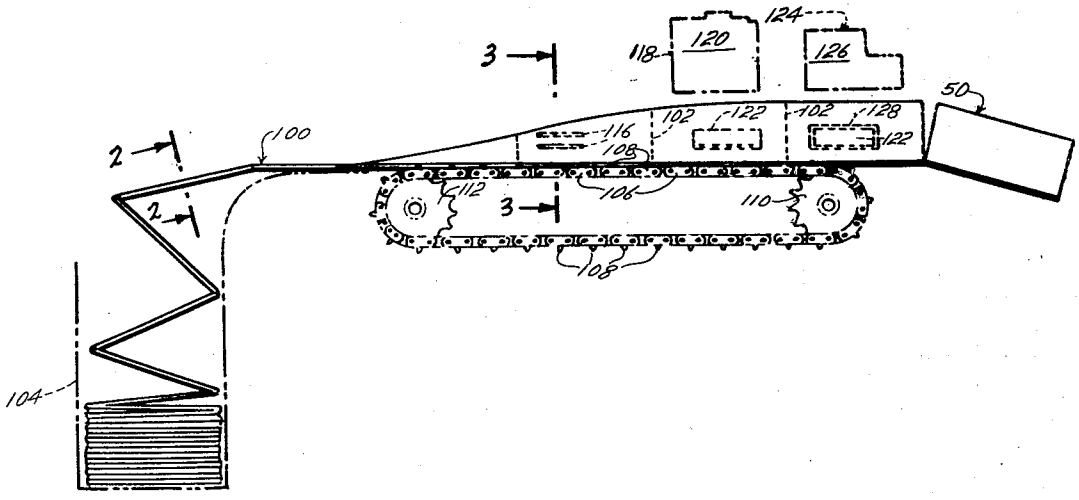
[57] **ABSTRACT**

Items such as processed cut films and interrelated prints representing individual customer orders are packed in respective multi-leaf, flexible strip assembly carriers interjoined at a common edge and separable at the opposite and intervening edges for insertion and removal of films and prints received in the successive inter-leaf spaces. A packing method and apparatus are disclosed utilizing carrier stock comprising an elongated multi-leaf flexible strip assembly adapted, such as by a series of perforations therein, to be machine fed lengthwise in positive manner and the leaves of which spread apart progressively as they approach a packing station. There the cut films and prints are packed in the strip assembly by transverse insertion into the open spaces between the leaves in such timed relation with advancement of the strip assembly as to space the groups of interrelated items respectively in successive carrier-length sections of the strip assembly. Then the packed individual carrier-length sections are severed from the stock body for subsequent processing. In the preferred embodiment the carrier stock leaves, of material protective to the films and prints, are transversely scored and thereby weakened at carrier-length intervals along their lengths so as to permit severing the carrier-length sections by tearing. The face leaf is transparent so as to permit markings to be seen through it, and is of lesser width than an underlying leaf such that the latter's projecting edge may serve as a marking tab.

11 Claims, 14 Drawing Figures



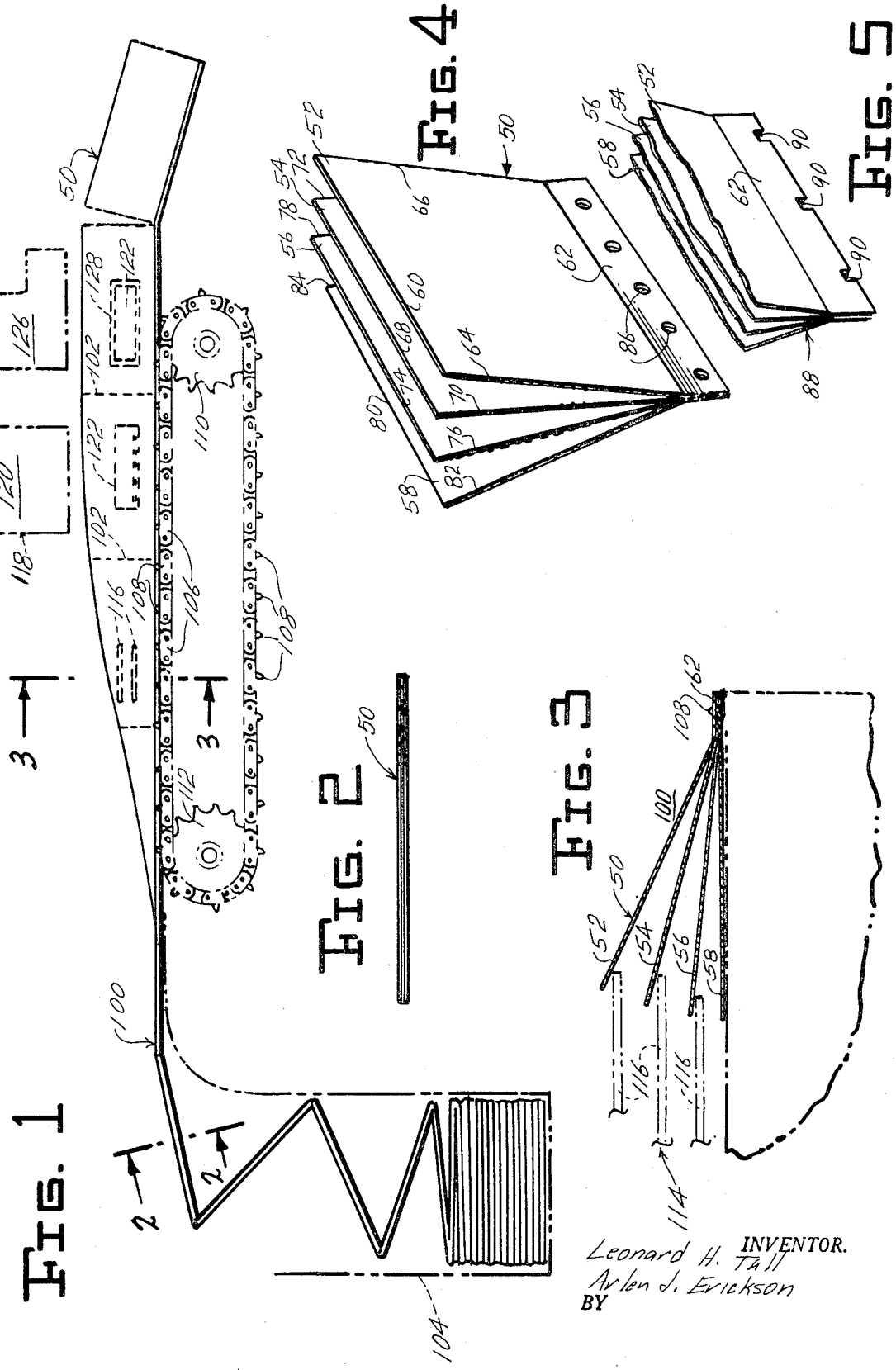


FIG. 1
FIG. 2
FIG. 3
FIG. 4
FIG. 5
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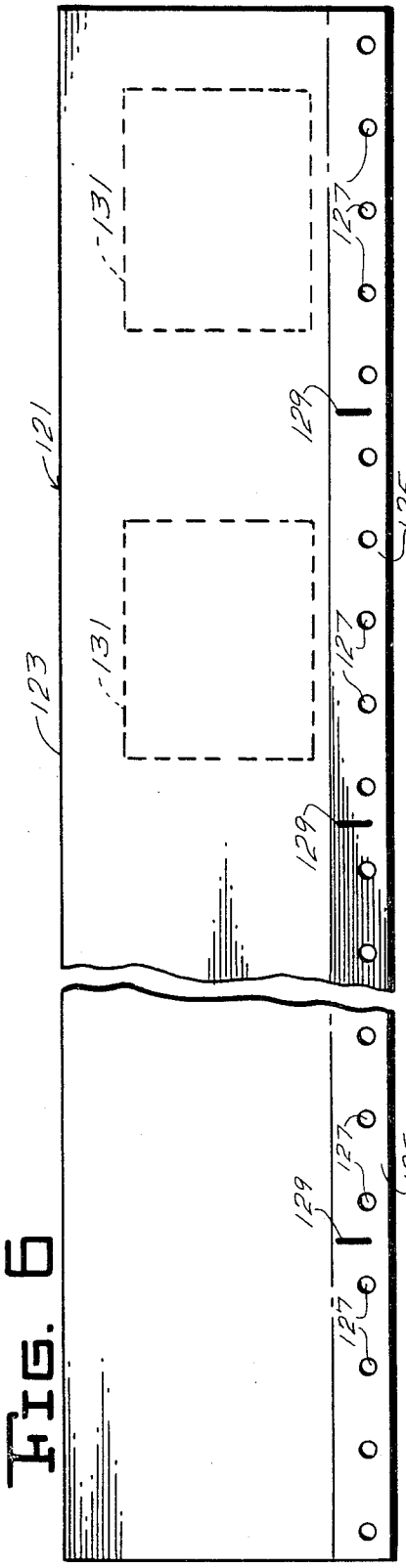

Fig. 6

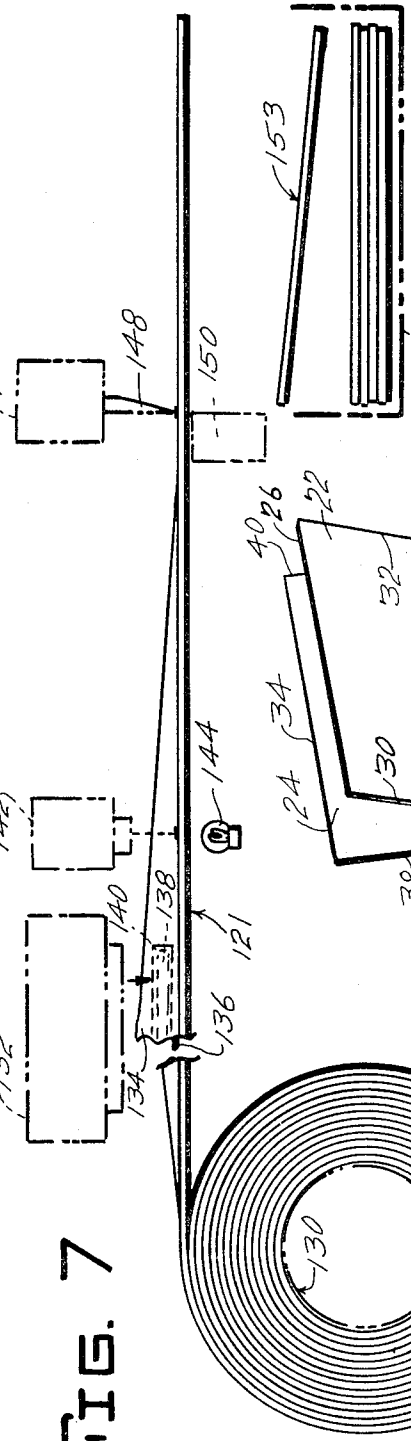

Fig. 7

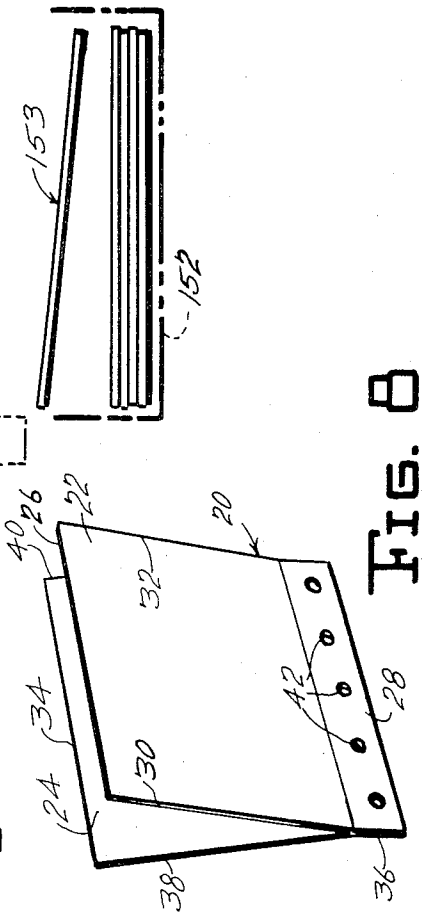

Fig. 8

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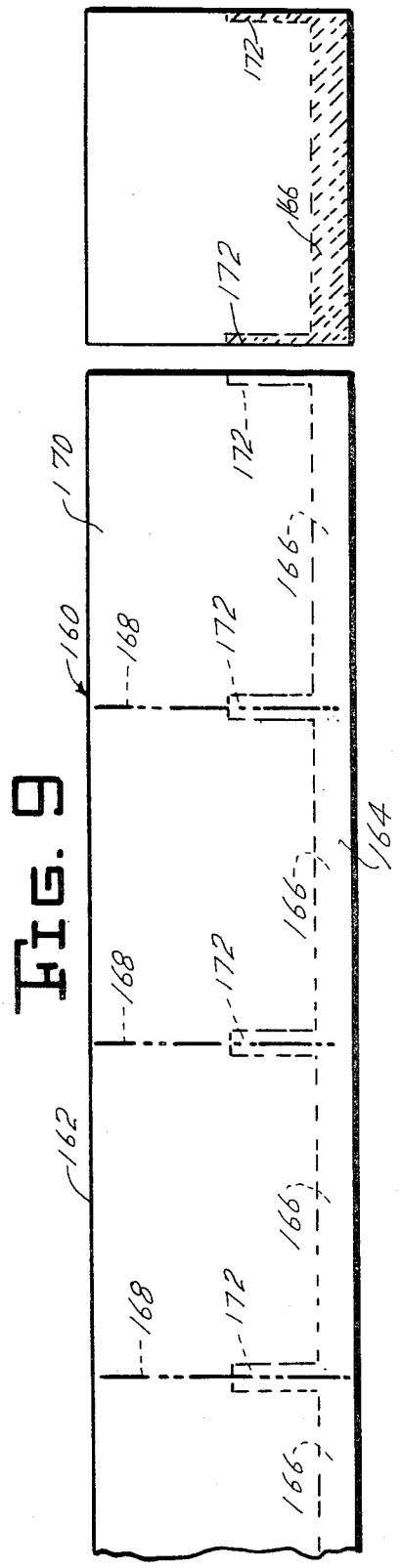

Fig. 9

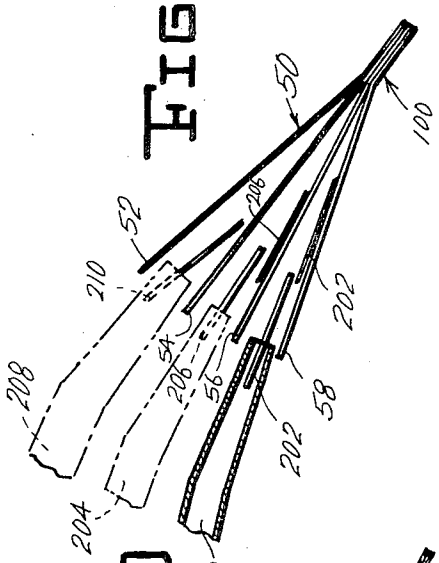

Fig. 11

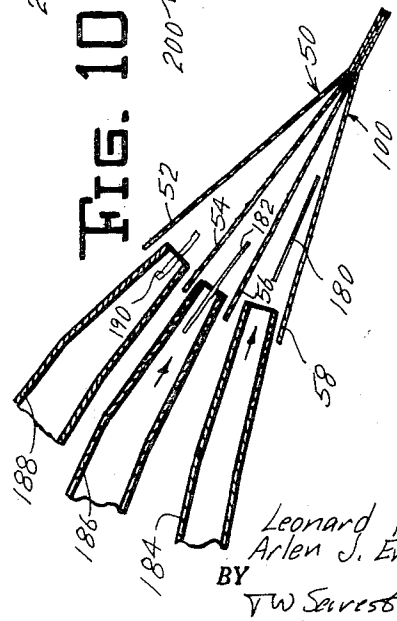

Fig. 10

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Fig. 13.

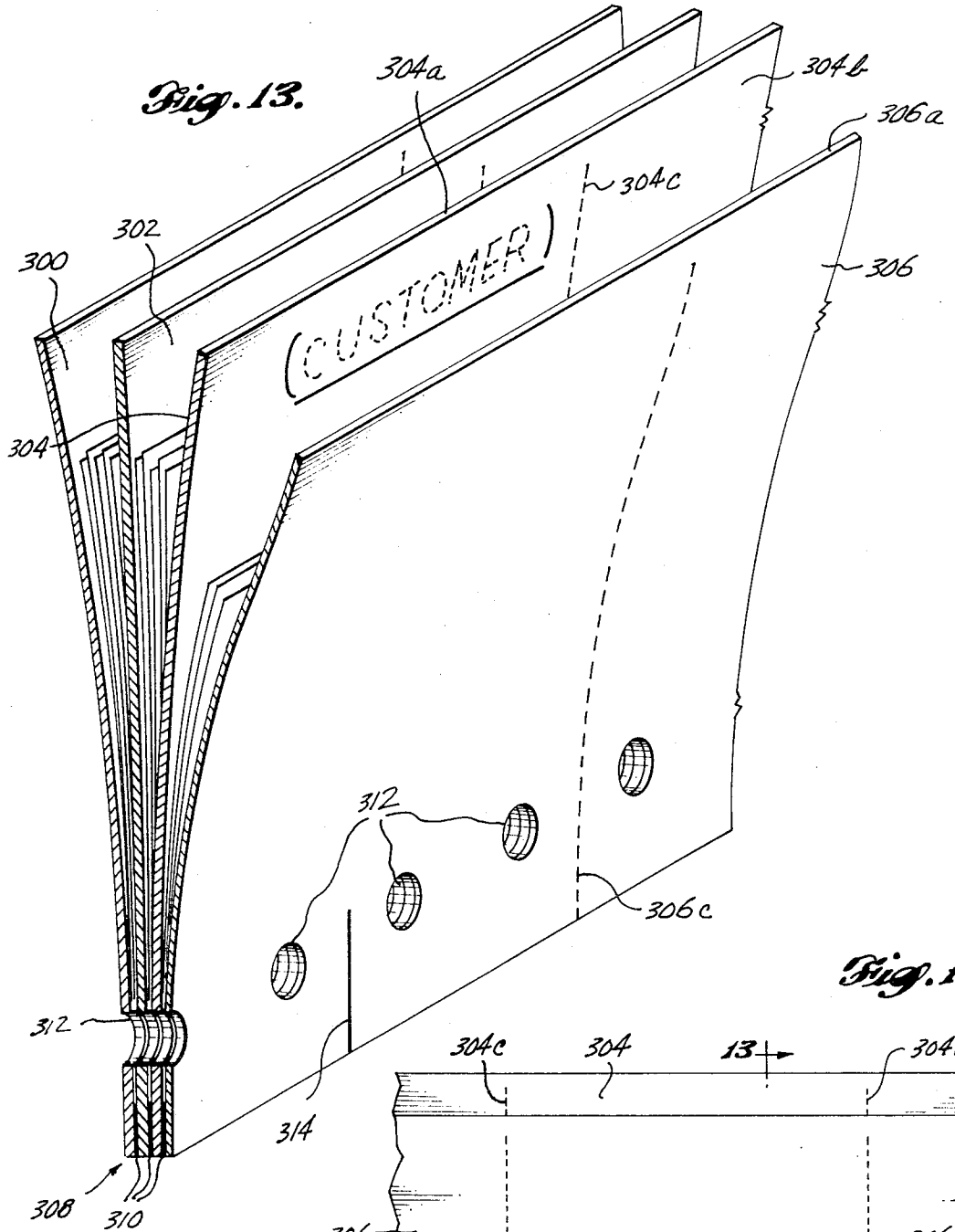

Fig. 12.

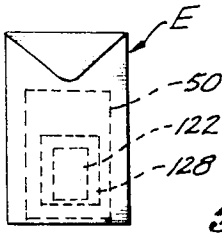

Fig. 14.

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PROCESSOR'S METHOD AND APPARATUS FOR PACKING PHOTOGRAPHS

BACKGROUND

This application is a continuation-in-part of Ser. No. 26,723 filed Apr. 8, 1970, entitled "Package for Sheet Material" by Leonard H. Tall and Arlen J. Erickson (now abandoned).

In photographic film processing laboratories which handle a large volume of exposed films, developed negatives and prints, the film strips received from customers are generally processed in continuous strip form, one customer's film being spliced onto that of another and the entire strip fed continuously through the development machine and thereafter through a printer with an emulsion paper strip. Finally the continuous film negative and print paper strips are severed into individual prints and negatives and these segregated and grouped by individual customer orders for packaging. The assembled prints and negatives with any other items to be packaged with them in total are then inserted by hand into a delivery envelope.

The above-described procedure in a competitive photographic processing laboratory represents a relatively large item of expense. At the low profit margin involved it is difficult to pay wages which will attract reliable and steady employees. Also the procedure is further complicated for the processor because it is necessary to provide considerable working area for the number of operators and the space they require in order to keep up with the production rate capability of automatic film and print processing apparatus now in use. Moreover, if the operators are unskilled or careless, expensive mistakes are readily possible in the mixing up of prints and negatives of different customer orders. If the mistakes are fortunately caught in time, the loss is only directly in terms of extra delay and wages, but of course, if such an error is not caught before the work product is released to customers, possible claims of damages may result, as well as loss of business good will.

A broad object of this invention is to overcome the above and related problems.

A further object of this invention is to provide an improved technique, including a mechanical packing technique and related carrier means which is designed essentially to facilitate machine correlation, packing and subsequent handling of such items as interrelated groups of films and prints in a photographic processing laboratory. A related object is to provide interim protection and reliable retention of the related items together as a group. Thus in the case of photographic films and prints of a laboratory customer, the invention protects the delicate emulsion surfaces against marking or abrasion and prevents physical mix-ups between the prints and negatives of other customers by fumbling or careless handling throughout subsequent procedures such as quality control inspections, pricing, and finally insertion into customer delivery envelopes. Moreover, the novel carrier means utilized conveniently remains as a retaining and separating carrier for the items adding an important degree of protection to the items even in the delivery envelope.

A further object hereof is to devise an inexpensive and rapid technique for protectively packing and separating individual customer orders of associated prints and negatives or similar items.

Still another object of the invention is to devise an improved carrier device and carrier device stock which can be fed into and through a packing machine to receive individual customer orders of photographic prints and negatives. A related object is to provide such a stock, carrier-length sections of which can be readily severed in the machine as each successive section receives its assigned group of prints and negatives. Further the improved carrier is so designed as to facilitate identifying inspection of items packed therein without removing them from the carrier.

A further object of the invention is to devise a novel carrier stock of the general character indicated which is adapted to be machine fed in indexed timed relation to machine feed of the cut film strips and negatives so as to reliably correlate the associated negatives and strips for insertion into the same carrier and to assure proper location of the packed items between the end margins of the carrier-length sections of stock before severance.

BRIEF DESCRIPTION

In accordance with the invention the packing carriers which serve as collecting and interim retainers for the cut films and prints are severed as sections of carrier stock which comprises an elongated multi-leaf flexible strip assembly made up of mutually superimposed leaves of paper-like strip material joined together substantially continuously along a common first longitudinal edge and freely separable from each other substantially continuously along their opposite second longitudinal edge. The leaves of the strip assembly have resistance to tearing in a longitudinal direction which is substantially uniform across a major portion of the width thereof extending from the first edge towards the second edge of the strips and in the preferred instance the strip assembly is transversely scored and thereby weakened at intervals along its length so as to permit severing individual carrier-length sections therefrom by tearing. In order to permit progressive separation of the leaves of the carrier assembly for machine packing with negatives and prints as the strip assembly approaches the loading station of the packing machine, it is preferred that the transverse scoring of the strips which weakens the assembly for tearing be terminated short of the second edge thereof so as to maintain greater strength against such tearing adjacent the latter edge when the strips are being spread apart and subjected to any stresses in the packing operation. Once the negatives and prints are inserted into the inter-leaf spaces of the carrier strip, the negatives being inserted in a pocket space adjacent that occupied by the related prints of the same customer order, and at a location intermediate successive score lines in the strip, the sectional length of carrier which contains the negatives and prints is then torn off for subsequent inspection or other handling and for eventual insertion into a delivery envelope.

Preferably an outside leaf of the carrier is substantially transparent so as to permit reading through it markings on an item packed behind it, and the second edge of the leaf behind the transparent leaf projects beyond the second edge of the transparent leaf so as to provide space for labeling if desired on the projecting edge. In the preferred embodiment the carrier stock strip assembly has a series of perforations formed in and along the joined edge thereof which are machine

engageable so as to permit feeding the stock positively and thereby enabling it to be positioned correctly for each action cycle of the packing mechanism which inserts the films and negatives.

These and other features, objects and advantages of the invention will become more fully evident from the following description by reference to the accompanying drawings.

FIG. 1 is a schematic simplified side elevation view of a packing machine according to this invention.

FIG. 2 is a view taken on line 2—2 in FIG. 1 showing at an enlarged scale the carrier stock assembly in one form.

FIG. 3 is a fragmentary sectional view taken on line 3—3 in FIG. 1 illustrating a means for separating the leaves of the carrier strip assembly progressively as successive sections thereof approach the packing station to receive the prints and negatives.

FIG. 4 is a perspective view of a film and negative carrier, namely a severed section of carrier stock, with the leaves partially separated.

FIG. 5 is a perspective view similar to FIG. 4 illustrating fragmentarily a carrier featuring somewhat different elements which are machine engageable to feed the carrier stock positively.

FIG. 6 is a face view of a section of carrier stock as shown in FIG. 1, shown in this case without scoring perforations to form tear lines.

FIG. 7 is a simplified schematic side elevation view of a modified machine and process for packing items in carrier-length sections of a roll of carrier stock.

FIG. 8 is a perspective view showing a severed section of carrier stock with but two leaves which may suffice in some applications of the process.

FIG. 9 is a view similar to FIG. 6 of further modified carrier stock, in this case scored for tearing but lacking preformed discrete elements engageable by feed mechanism.

FIG. 10 illustrates one suitable guide means for loading sheet material into adjacent pocket spaces between leaves of the carrier, such as in the machine of FIG. 7.

FIG. 11 is a view similar to FIG. 10 illustrating modified guide means for loading.

FIG. 12 is a fragmentary view showing still another modified form of carrier.

FIG. 13 is a perspective view of an individual carrier as severed from the stock shown in FIG. 12, with the adjacent end portion of the carrier being shown in section taken on line 13—13 in FIG. 12.

FIG. 14 shows a typical customer's order delivery envelope into which a loaded carrier 50 has been inserted.

DESCRIPTION BY REFERENCE TO DRAWINGS

As shown, the elongated carrier stock strip assembly 100 of this invention may be bulk stored compactly for feed purposes in an accordion fold configuration (FIG. 1) and thus retained in a bin 104, or it may be stored in a rolled configuration 130 upon a shaft (FIG. 7). In FIGS. 1 through 5, the illustrated carrier stock strip 100 comprises an elongated multi-leaf flexible strip assembly including mutually superimposed leaves of paper-like material such as cellulosic pulp paper or, if desired, any of various other natural or synthetic materials which may be made or are inherently suitable to protectively engage and cover photographic emulsion surfaces without marking or marring them while in sliding contact under pressure. In this instance four leaves are shown, designated respectively 52, 54, 56 and 58. The successive leaves are interjoined substantially continuously along a common first longitudinal edge 62 and are freely separable from each other substantially continuously along their opposite second longitudinal edge as shown in FIGS. 3 and 4 for packing of items behind the leaves. The separable edges of the respective leaves are designated 60, 68, 74 and 80. Also the leaves of the strip assembly have a resistance to tearing in a longitudinal direction which resistance is substantially uniform across a major portion of the width of the strip assembly extending uninterruptedly from the interjoined edge 62 toward the opposite edge of the strip assembly, so that as the leaves held at edge 62 by feed mechanism are being progressively spread apart and otherwise stressed in the machine loading process, or later severed in carrier-length sections 50 from the stock, the leaves will remain intact and together. In FIG. 3 stationary elements 116 comprising parts of a packing machine are interposed between adjacent leaves along the path of feed of the strip assembly so as to progressively open up the leaves for eventual reception of the prints and negatives.

The strip assembly depicted in FIG. 1 is transversely scored or perforated and thereby weakened along tear lines 102 at intervals spaced along its length so as to permit severing individual carrier-length sections 50 thereby by tearing, as at the right-hand side of FIG. 1. Such severance of the successive carrier-length sections occurs after each is loaded with its group of negatives and prints for the customer.

In FIG. 4 a severed carrier 50 is depicted. In this embodiment an intervaled series of holes 86 is formed in and along the interjoined edge 62 of the strip assembly. These holes are engageable by pins 108 (FIG. 1). These project from the outer face of an endless feed chain 106 encircling spaced sprockets 110 and 112. One of these is intended to be driven in any suitable or known manner so as to properly feed and position successive sections of the stock 100 at a loading station when the loading mechanism is to cycle. The loading station in FIG. 1 has two sections 118 and 124 spaced respectively along the length of feed of the strip assembly. At station section 118 a suitable mechanism 120, the details of which are not here important, deposits negatives 122 into a pocket between leaves of strip assembly 100. At station section 124 a mechanism 126 deposits the related prints 128 of the same customer's order adjacent the negatives 122, meanwhile the feed 106–112 having advanced the strip assembly by the necessary distance to achieve such registry. As depicted, the negative loader 120 inserts the negatives 122 between the leaves 56 and 58 at a location along the strip assembly 100 intermediate successive score lines 102 which define a single carrier-length section of the assembly. The mechanism 126 inserts the associated customer order prints 128 between two other leaves such as the leaves 54 and 56 of the same carrier-length section 50. Into the remaining or third pocket of the illustrated carrier (FIG. 4), such as that defined between the leaves 52 and 54 may be deposited, at either station section 118 or 120 or at a third (not shown), any special items such as film ends, overexposed or underexposed sections of film, notices or other sheet items (such as 190 in FIG. 10). Thereafter, that is with the last carrier-length section 50 loaded, it is torn off either manually or by ma-

chine at a score line **102.** It may then undergo any further procedures including ultimate insertion in an appropriately identified customer order envelope E (FIG. **14**).

It will be appreciated that the illustration of FIGS. **1** and **3** is simplified and schematic. Thus, whereas the leaf spreader elements **116** are shown as simple plates it will be recognized that these are intended to illustrate a function and that any of various spreader configurations may be employed to open up the leaves of the advancing strip assembly as its sections approach and reach the loading station of the packing machine. Also it will be self-evident that details of the loading means may vary. In FIG. **1**, for example, the loading station comprises successive sections **118** and **124.** FIG. **11** portrays successively located loader guides **200, 204** and **208,** such as in a two-or three-section loading station machine. FIG. **10** illustrates the case of FIG. **7,** however, wherein the prints and negatives are deposited into the same carrier-length section of the strip as by means of loading chutes depicted as **184, 186** and **188,** respectively, with the carrier stock **100** remaining in the same feed position as all pockets are being loaded. Alternatively, of course, any separate items such as **190** in FIG. **10** or **210** in FIG. **11** may be inserted by hand into a carrier pocket. The chutes may be fixed as spreaders between leaves.

In the operation of the process and machine depicted in FIG. **1,** it will be recognized that any suitable controls and drive mechanisms may be incorportated by which to operate the loading mechanisms **120** and **126** in timed relationship with the advancement of the carrier strip assembly **100.** Because the pins **108** positively engage in the feed apertures **86** in the bound edge **62** of the carrier strip assembly slippage is avoided and, either with the strip assembly in motion or with it temporarily arrested at each point of discharge from the loading mechanisms **120** and **126,** the negatives and prints are deposited in the spaces between successive score lines **102** in such a manner that the prints and negatives of a given customer order will be packaged in the same carrier-length section **50** subsequently to be torn or detached from the succeeding strip. During detachment of the endmost loaded carrier **50** the feed means pins **108** engaged in the holes **86** of the following body of strip **100** firmly hold the latter against shifting when the tearing occurs. For example, operation of the feed mechanisms **120** and **126** may be made intermittent so as to advance the strip **100** by increments, and with the pause that marks completion of each step of feed an automatic control or a human operator may actuate one or both loading mechanisms **120** and **126.** Alternatively the method may be practiced with the drive motion a continuous one and the loaders operable at correctly controlled intervals to insert their loads into the proper sections **50** of strip **100.**

In the modification shown in FIG. **5** instead of holes **86** formed in the bound edge portion of the carrier strip assembly, notches **90** are formed in the very edge thereof and may be used as a means to provide a positive indexing or positioning means for driving of the strip assembly positively. Mechanism for engaging the notches **90** is not illustrated but may be of any suitable or known type which is equivalent to that representing the chain supported drive pins **108** depicted in FIG. **1.** If sufficiently reliable and positive, frictional surfacing of the stock to enable feeding and positioning the stock positively may be employed, or the stock may be perforated by sharpened pins on a feed wheel or the like in the act of feeding it to a similar end. The important requirement is that of positioning each successive carrier-length section of stock in correct loading position for each loading sequence of the machine.

The packing machine and process depicted in FIG. **7** is assumed to be for use in feeding and packing a strip assembly such as that shown in FIG. **6** stored in a roll at **130.** The strip assembly **121** in this instance comprises two or more leaves of flexible paper-like material interjoined at a first longitudinal edge **125** and having respectively severable opposite edges **123.** Machine feed apertures **127** are located in series along the edge **125** as in the previously described embodiment of the strip assembly, and in this case transverse score lines to weaken the strip assembly leaves are omitted. Instead severance of successive carrier-length sections from the carrier strip assembly is accomplished by means of a shear **146, 150.**

In addition optically detectable indicia marks **129** located at carrier-length intervals along the strip assembly are sensed by a photocell device **142** and associated light source **144** using known or suitable circuit techniques in order to control operation of the shear, also of the loading mechanism **132** by which negatives **138** and/or prints **131** are inserted between the separated leaves **134** and **136** of the strip assembly. Illustration of the feed mechanism for advancing the strip assembly is omitted from FIG. **7** as are the means by which the leaves are separated.

In the operation of the mechanism shown schematically in FIG. **7,** it is assumed that suitable feed mechanism such as that shown in FIG. **1** is operated to advance the strip assembly from the roll **130** past the loading mechanism **132** and thereafter past the photocell sensor **142** and the cutter mechanism **146.** The cutter **146** is so positioned in relation to the photocell and the latter in relation to the loading mechanism **132** that each time the strip assembly reaches a certain point of advance the photocell senses the presence of an indicia mark **129** causing actuation of the cutter mechanism **146** and of the loading mechanism **132.** The strip assembly is then positioned such that the cutter **146** correctly severs a previously loaded carrier-length section **153** of the strip assembly. The section drops into a receiving bin **152** at the same instant the loader **132** inserts prints and/or negatives into the carrier strip.

In FIG. **8** a carrier or package **20** is depicted having a first leaf **22** and a second leaf **24** mutually superimposed in the leaf **22.** The leaves are joined together along a common edge **28, 36** and are separable from each other along respectively opposite edges **26** and **34.** The intervening side edges **30** and **32** of leaf **22** and side edges **38** and **40** of leaf **24** are also separable for reception of sheet material between the leaves. The joined edge **28** has a series of drive pin apertures **42** for machine engagement in feeding and packing of the strip assembly from which the carrier has been severed in the described process.

In the embodiment shown in FIG. **9** the strip assembly **160** comprises an elongated bound edge **164** joining the leaves together and an opposite edge **162** at which the leaves are separable from each other. The individual carrier length sections **170** of the strip assembly are defined by transverse score lines **168** spaced at intervals along the length thereof and in this instance the

joining together of the strip assembly along the first longitudinal edge **164** is accomplished by the use of an adhesive interlayer **166.** The adhesive extends upwardly along the side edges of the individual carrier length sections in the narrow regions **174** by materially less than the distance from the bound edge **164** toward the separable or free edges **162** of the multi-leaf assembly so as not to interfere substantially with spreading of the leaves during loading of the carrier. Thus the leaves are still freely separable at the edge **162** and for a distance across the width of the strip assembly toward the bound edge **164.** These bounded regions **172** partially close off the ends of the carriers **170** so as to form a shallow pocket in each.

In the embodiment of FIGS. **12** and **13** the presently preferred form of the carrier strip assembly appears, featuring in this instance four mutually superimposed leaves of paper-like strip material respectively designated **300, 302, 304** and **306,** these being bound together along a common longitudinal edge at **308** by interposed adhesive deposits **310.** Machine drive perforations **312** extend in spaced series relationship along the bound edge of the assembly as in previous embodiments and in this instance at least one of the front or face sheets, such as **306,** is formed of a relatively transparent material such as a thin tissue paper through which markings are visable, such as identification numbers or initials which may be placed on items stored in the space between the sheet **306** and the sheet **304.** Also in this instance leaf **306** is narrower than leaf **304** (or a succeeding leaf) so that the free edge **306***a* of sheet **306** is located short of the free edge **304***a* of sheet **304.** The edge **304***a* then provides a projecting marginal tab **304***b* available for labeling or similar usage.

Also in this preferred embodiment the transverse score line **306**c which weakens the face leaf **306** for tearing transversely, and the similar score line **304***c* applied to the next sheet **304** (and similarly to the sheets beyond it) start at the bound edges of the assembled leaves and terminate short of their respective free edges **306***a* and **304***a*. Therefore the leaves are strengthened against such tearing prematurely at those edges where and while stress in the strip assembly during loading is greatest, namely at the spread-apart edges of the carrier assembly during loading thereof. Also in FIG. **12** it will be seen that photoelectrically detectable markings **314** applied to the carrier strip assembly at interval locations along the length thereof may be used to control timing of the loading sequence as in previous embodiments.

We claim:

1. A method of packing photographic films, prints and similar items in carriers, comprising the steps of providing an elongated multi-leaf flexible strip assembly including interjoined mutually superimposed leaves of paper-like strip material joined together in face-to-face relationship along a common first longitudinal edge and freely separable from each other substantially continuously along their opposite second longitudinal edge, progressively machine feeding the strip assembly lengthwise to a packing station with the strip assembly positionally held by its first edge and with its leaves initially closed upon each other, progressively spreading apart the leaves of the strip assembly to open successive length sections of the adjacent leaves in approaching and reaching the packing station, inserting items to be packed transversely between said opened leaves at the packing station in timed relation with the advancement of the strip assembly so as to space the items respectively at intermediate positions lengthwise of the strip assembly in the successive length sections of the strip assembly, progressively reclosing the leaves to hold the inserted items between the leaves beyond the packing station, and severing the length sections carrying such items successively from the remainder of the strip assembly to form section-length individual carriers open along their second longitudinal edge and along their adjoining side edges holding the inserted items between the leaves of such carriers.

2. The method defined in claim **1,** including providing the strip assembly with at least three such interjoined leaves progressively spread apart to open up the spaces between them at the packing station, and inserting items to be packed by groups between the leaves, with at least one item of each group inserted between two leaves and at least one other item of the same group inserted between a different two leaves, in the same length section of the strip assembly.

3. The method defined in claim **2,** wherein the items of each group are inserted substantially simultaneously.

4. The method defined in claim **2,** wherein the respective items of each group are inserted first between two leaves and thereafter between a different two leaves with the strip assembly further advanced.

5. The method defined in claim **1,** wherein the steps of inserting items and severing the length sections of the strip assembly are timed by indexing elements carried by the strip assembly at interval locations along its length.

6. The method defined in claim **2,** wherein the step of progressively spreading apart the leaves is performed by interposing between the leaves physical separation means maintained in substantially fixed position relative to the packing station while advancing the strip assembly past such means.

7. Apparatus for packing photographic films, prints and similar items in carriers formed from carrier stock comprising an elongated multi-leaf flexible strip assembly including mutually superimposed leaves of paper-like strip material joined together along a common first longitudinal edge in face-to-face relationship and freely separable from each other substantially continuously along their opposite second longitudinal edge, said apparatus comprising feed means engageable with the strip assembly adjacent the first longitudinal edge thereof with the leaves of the strip assembly closed upon each other to advance the strip assembly lengthwise in controlled manner to a loading station, guide means operatively associated with the feed means and physically interposed between the leaves of the strip assembly so as to progressively open up successive length sections of such leaves in approaching and reaching the loading station, loading means at the loading station in such relative position and operable so as to insert items to be packed into the space between successive leaves of the assembly, said loading means being operable in timed relation to advancement of the strip assembly to the loading station so as to locate the inserted items in successive carrier-length sections along the length of the strip assembly, said guide means being formed and positioned to permit progressive reclosure of successive sections of the leaves upon the items inserted therebetween in advancing beyond the loading station, and means beyond the loading station adapted for use

in severing the reclosed leaves to form section-length individual carriers open along their second longitudinal edge and along their adjoining side edges holding the inserted items between the leaves of such carriers.

8. The apparatus defined in claim **7,** wherein the strip assembly is provided with a series of openings adjacent the interjoined edge of the leaves and the feed means comprises elements positively engaged in said openings to positively advance and position the strip assembly in relation to the loading station.

9. The apparatus defined in claim **7** further including photoelectric sensing means to operate the loading means in timed relation to positioning movement of the strip assembly, the strip assembly having marks thereon effective to actuate the photosensing means, such marks being placed at intervals along the length of such strip assembly.

10. The apparatus defined in claim **9** further including a shear positioned beyond the loading station and connected to be controlled for operation in response to the photosensing means in timed relation to positioning movements of the strip assembly by the feed means.

11. The apparatus defined in claim **7,** wherein the loading station comprises a plurality of separate but mutually adjacent loading guides operable to and positioned in relation to the openings between leaves to insert different but related items between different pairs of leaves in the same carrier-length section of the strip assembly.

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