July 1, 1969 E. B. BERKLEY 3,452,652

ROTARY ENVELOPE MAKING MACHINE HAVING INTERCHANGEABLE SECTIONS

Filed Feb. 23, 1967 Sheet 1 of 2

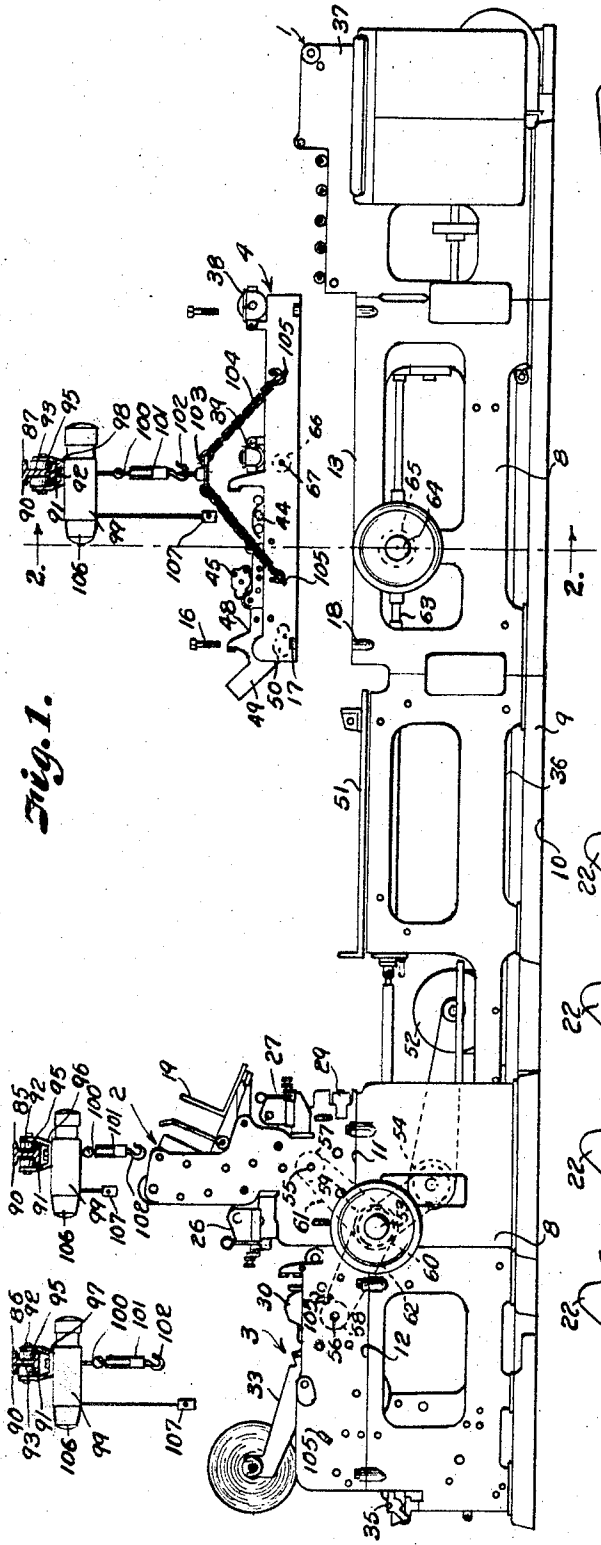

Fig. 1.

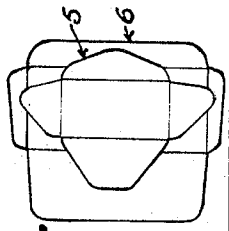

Fig. 4.

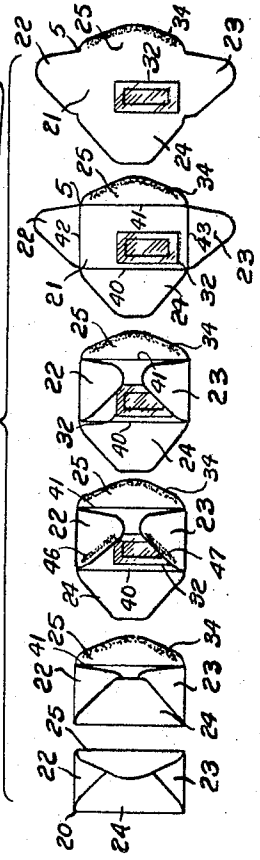

Fig. 6.

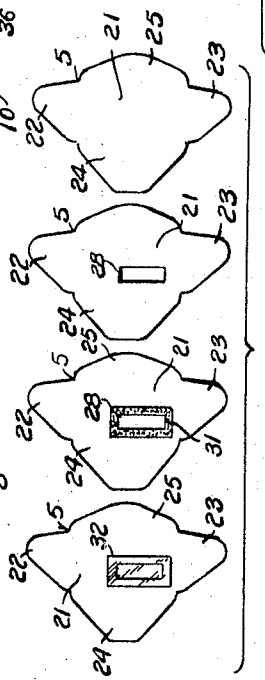

Fig. 5.

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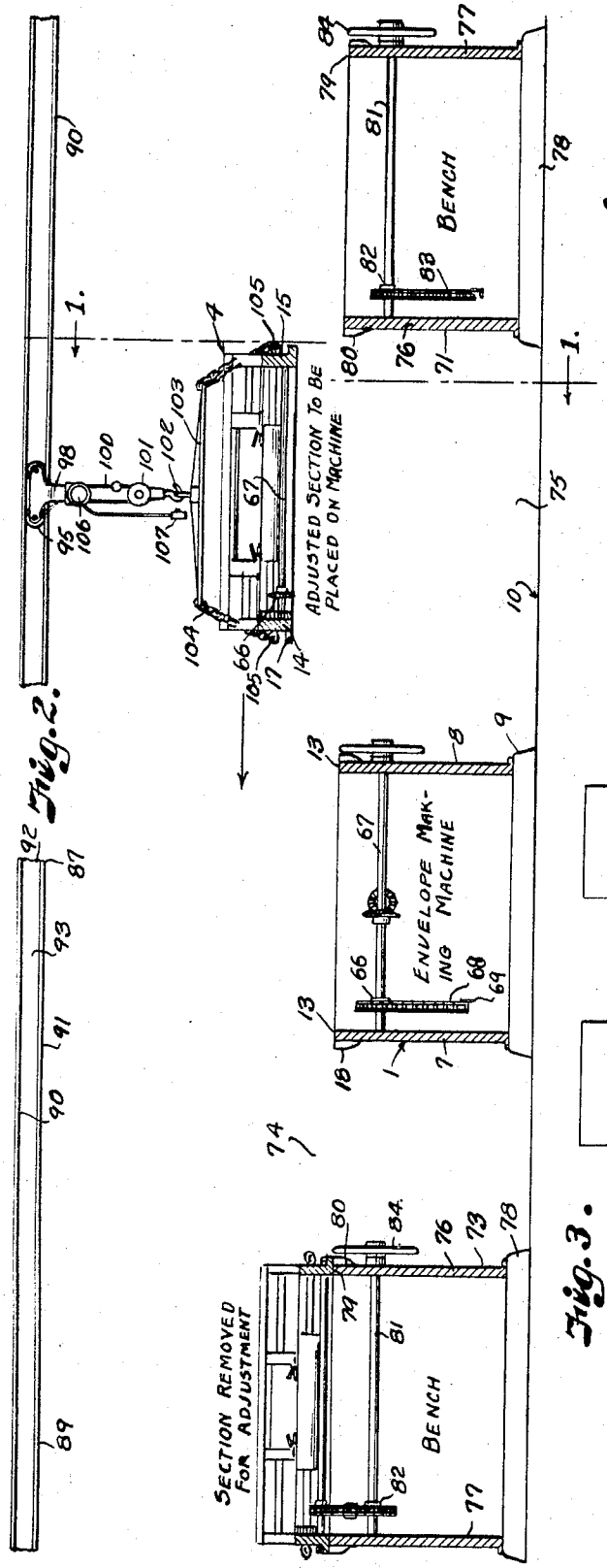

Fig. 2.

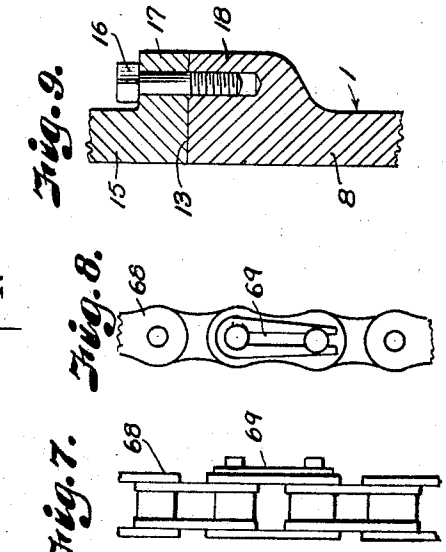

Fig. 9.

Fig. 8.

Fig. 7.

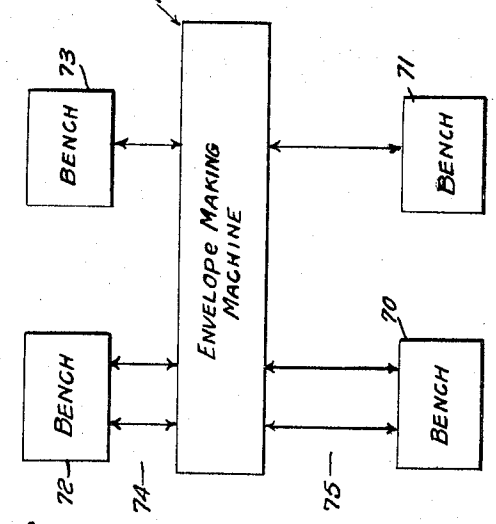

Fig. 3.

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3,452,652

ROTARY ENVELOPE MAKING MACHINE HAVING INTERCHANGEABLE SECTIONS

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Int. Cl. B31b 21/26, 21/14, 21/74
U.S. Cl. 93—62 3 Claims

ABSTRACT OF THE DISCLOSURE

An envelope making machine has a series of mechanisms thereon for folding and sealing envelope blanks, which mechanisms are mounted in predetermined associations on sections which are conveniently removable from the machine while similar sections, preadjusted to accommodate a different blank, immediately replace same, whereupon the machine is kept in substantially continuous production.

This invention relates to a rotary envelope making machine having interchangeable units in which various operations are performed on envelope blanks, such as feeding, printing, cutting window openings, applying patches, applying adhesive, collating the blanks to apply adhesive to the closure flaps, decollating the blanks, scoring the blanks preparatory to making the folds of the flap portions, folding the side flap portions, applying the side seam adhesive, and folding the bottom and closure flap portions. The mechanisms for accomplishing these functions are all positioned in consecutive order and various components must operate in timed relation with travel of the blanks, in order that the operations are performed in proper places on the blanks to make satisfactory envelopes.

It is obvious that the components of such mechanisms must all be adjusted and retimed when changing over from one size and/or style of envelope to another. These adjustments are complicated and must be extremely accurate. This also requires adjustment and readjustments of the components relatively to each other to get them working in proper time. The adjustments and servicing of the units require expert technicians. In addition, the time required in making the adjustments is, for example, from four to sixteen hours, during which time the machine is not producing. Consequently, the cost in investment, labor and loss in operating time makes orders for special sizes and/or styles of envelopes in quantities of 25,000 to 100,000 impractical.

The principal objects of this invention are: to provide the machine with removable units or sections, whereby a unit can be easily removed and replaced by a preadjusted unit when it is necessary to change over from one size and/or style of envelope to another; to provide suitable work benches or supports along sides of the envelope making machine that are equipped with means for manually turning the mechanisms when making the required adjustments; to provide an arrangement of work benches so that an empty bench is available to receive the unit from the machine to clear the machine for a preadjusted unit which has been adjusted to the size of the envelope blanks for the next run; and to provide traveling conveyor means for moving the units to and from the work bench means.

In accomplishing these and other objects of the invention as hereinafter described, I have provided improved structure, illustrated in the accompanying drawings, wherein:

FIG. 1 is a longitudinal section showing the invention with one of the removable sections being moved from the machine to one of the work bench means, and on which the unit is readily adjusted to produce a different size and/or style of envelope, without interference with operation of the envelope making machine, the section being taken on the line 1—1 of FIG. 2.

FIG. 2 is a cross section taken on the line 2—2 of FIG. 1, to show the arrangement of work benches relatively to the envelope making machine where a unit that has been adjusted for a new run of envelopes is ready and waiting to be transferred to its place in the envelope making machine.

FIG. 3 is a diagrammatic plan view of the envelope making machine, illustrating an arrangement of work benches.

FIG. 4 is a plan view of two different sizes and styles of blanks, superimposed one on the other to better illustrate the adjustments that will be required.

FIGS. 5 and 6 are plan views of the different operations that are performed on an envelope blank in making an envelope, all of which are performed in consecutive order progressive with conveyance of the blank through the various mechanisms of the envelope making machine.

FIGS. 7 and 8 are side and face views, respectively, of a portion of the drive chain for one of the removable units, to illustrate one way of disconnecting the drive of the unit from the main drive of the envelope making machine.

FIG. 9 is a fragmentary section through one means for anchoring a removable unit to the frame of the machine and to the work bench means.

Referring more in detail to the drawings:

1 designates an envelope making machine having replaceable sections or units in accordance with the present invention and designated generally by the numerals 2, 3 and 4. The sections 2, 3 and 4 contain the operating mechanisms of the envelope making machine that require the greatest time in making precision adjustments when changing the machine from a run of one size and/or type of envelopes for a run of different size and/or type of envelopes, for example, as represented in FIG. 4 by the blanks 5 and 6.

The machine illustrated has side frames 7 and 8 suitably connected and supported on a base 9 mounted on a floor 10. The side frames 7 and 8 are provided with seats 11, 12 and 13 for seating side frames 14 and 15 of the respective sections. The sections 2, 3 and 4 are suitably anchored to the seats of the side frames 7 and 8, for example, by fastening devices such as cap screws 16 that extend through ears 17 and threaded into bosses 18 on the respective side frames 7 and 8, as best illustrated in FIG. 9.

The section 2 carries a stack support 19 for carrying a stack of blanks, for example, the blanks 5, for making one type and size of envelopes 20 (see FIG. 6). The blanks 5 are ordinarily died from paper stock to provide a front panel portion 21, side flap portions 22 and 23, and bottom and closure flaps 24 and 25 (see FIGS. 5 and 6). If the blanks are to be printed on the exterior or interior sides, the section 2 also carries printing mechanisms 26 and 27. If the front panel portions of the blanks are to have window openings 28 formed therein, the section 2 may carry a window cutting mechanism 29.

The blanks are withdrawn one at a time from the stack support 19 and fed by a system of rollers into contact with the printing mechanisms 26 and 27 and window cutter 29, from which they are advanced to the section 3.

The section 3 carries an adhesive applying mechanism 30 for applying adhesive 31 around the window opening 28 for attaching a patch 32 (FIG. 5) applied by a patch

mechanism generally designated **33**, also carried by and forming a part of the section **3** (FIG. 1). As in conventional rotary window envelope making machines, the blanks are collated to apply adhesive **34** (FIG. 6) to the closure flaps **25** of the blanks by an adhesive applicator **35** (FIG. 1). The direction of the blanks is reversed, so that the blanks are carried through a drying chamber **36** to the opposite end **37** of the machine **1**, where the blanks are decollated by a decollating mechanism **38** and timed for scoring and folding of the flaps into envelopes.

The decollating mechanism **38** forms a part of the section **4** in which the blanks are conveyed through a scoring mechanism **39**, also carried by the section **4**, for forming longitudinal scores **40** and **41** and transverse scores **42** and **43** (FIG. 6) to define the front panel of the envelope and provide lines of fold for the side, bottom and closure flaps. The section **4** also carries a side flap folding mechanism **44** (FIG. 1) which folds the side flaps over the inner face of the front panel, as shown in FIG. 6. The section **4** also includes an adhesive applicator **45** for applying adhesive stripes **46** and **47** to the folded-over side flaps **22** and **23**, also shown in FIG. 6. The section **4** also includes a bottom flap folding mechanism **48** to fold the bottom flaps **24** on the transverse score **40** in overlying relation with the side flaps and in sealing contact with the adhesive stripes **46** and **47**. After folding over the bottom flaps **24**, the blanks are passed to a trap **49**, where the direction is reversed to fold over the closure flaps on the transverse lines of score **41** by a folding mechanism **50**, also carried by the section **4**. The folded envelopes are then delivered onto a work table **51**, where they are inserted in boxes by the machine operator who stands alongside the work table portion of the machine.

All of the various mechanisms of the envelope making machine thus far described, including the mechanisms of sections **2**, **3** and **4**, are driven by a motor **52** suitably connected with a countershaft **53** by driving connections **54**. The sections **2** and **3** carry transverse shafts **55** and **56** having sprockets **57**, **58** indicated by the dotted lines in FIG. 1. The countershaft **53** has sprockets **59** and **60** aligning with the sprockets **55** and **56**. Operating over the sprockets **57** and **59** is a chain **61**, and the sprockets **58** and **60** are connected by a similar chain **62**. The various mechanisms on the sections **2** and **3** are driven by driving connections such as gears with the shafts **55** and **56** in suitable manner to operate the mechanisms in timed relation. A longitudinal shaft **63** has a driving connection with the countershaft **53** to drive a countershaft **64** which carries a sprocket **65** on the countershaft aligning with a sprocket **66** on a transverse shaft **67** carried by the section **4**. Operating over the sprockets **65** and **66** is a chain **68** (FIG. 2). The chains **61**, **62** and **68** have removable links **69**, as shown in FIG. 7, whereby the chains may be disconnected when the sections **2**, **3** and **4** are to be removed and replaced by similar sections in accordance with the present invention.

With the exception of the removable sections **2**, **3** and **4**, all of the structure thus far described may be a part of any existing rotary envelope making machine, and the various drives, of course, vary with the particular type of machine to which the present invention is adapted. However, all envelope making machines will have similar driving mechanisms and the operating mechanisms on the blanks will be of various constructions, so that it is to be understood that the invention is not restricted to the particular structure shown.

As above explained, changing the adjustments of the various mechanisms to set the machine up for a run of a certain size and/or style of envelope blank requires from four to sixteen hours, during which time the machine is out of production.

The present invention is to maintain the machine in substantially continuous production by providing similar sections that can be adjusted alongside or near the envelope making machine while the machine is in production, and which are later replaced with the sections in the machine.

To facilitate support of the sections under adjustment for a different size and/or style of envelope, for example, an envelope made from the blank **6** of FIG. 4, the invention contemplates a bench means along one side of the machine, as indicated at **70** and **71**, FIG. 3. Similar bench means are located at the opposite side of the machine, as indicated at **72** and **73**, to receive thereon the sections **2**, **3** and **4** from the machine when the machine is to be cleared for the preadjusted sections on the bench means **70** and **71**.

The bench means **70** and **72** are preferably located in spaced registry with the sections **2** and **3** to support both sections. The bench means **71** and **73** are in laterally spaced relation with the section **4**. The space **74** along the back side of the envelope making machine may be only that required to readjust the sections, however, the space on the operator's side of the machine is wider to provide a service area **75** for the machine and also permit a mechanic to adjust and service the sections mounted on the bench means **70** and **71** without interfering with the machine operator's work.

Each bench means has side frames **76** and **77** conforming to the side frames of the envelope making machine, and which are mounted on bases **78** so that the upper edges **79** of the frames **76** and **77** are at substantially the same level as the seats **11**, **12** and **13** to seat the sides **14** and **15** of the sections thereon. The side frames **76** and **77** also have internally threaded bosses **80** to receive the fastening devices **16**, so that the sections may be anchored on the benches substantially in the same manner as they are anchored on the side frames of the envelope making machine.

The benches also have countershafts **81**, similar to the shafts **55**, **56** and **64** of the envelope making machine. The countershafts **81** carry a sprocket **82** that aligns with the sprockets **57**, **58** and **65**, so that chains **83** may be run thereover to connect the countershafts **81** of the benches with the drive sprocket of the section mounted thereon, in exactly the same manner as they are connected in the envelope making machine. The countershafts have hand wheels **84** on one outer end thereof for manual rotation of the mechanisms of the sections to facilitate adjustment thereof and feed of the envelope blanks through the sections.

Transfer of the sections to and from their seats in the envelope making machine is effected by conveying means which in the illustrated instance includes overhead tracks **85**, **86** and **87** located over the respective sections **2**, **3** and **4** and having opposite ends **88** and **89** extending across the bench means, as shown in FIGS. 1 and 2. The tracks have upper and lower flanges **90** and **91** connected by a web **92** to provide ways **93** on the respective sides of the web. Operable in the ways are the wheels **95** of trolleys **96**, **97** and **98**. Carried by each trolley is a hoist **99** including a tackle **100** having a tackle block **101** equipped with a hook **102**. The hook **102** carries a spreader bar **103** having chains **104** adapted to be fastened to eyes **105** at the respective corners of the section, whereby the sections may be fastened to the hoist. The hoists are preferably actuated by an electric motor **106** under control of a depending switch **107**.

Assume that the envelope making machine has been operating for making the envelopes **20** from the blanks **5**, and that the run has been completed. While the machine was in operation, extra sections **2**, **3** and **4**, which are on the bench means **70** and **71**, were adjusted for operation on the next run of envelopes, for example, envelopes to be made from the blanks **6**.

The sections **2**, **3** and **4** are released from the frame of the envelope making machine by unscrewing the cap screws **16** and disconnecting the drive chains **61**, **62** and **68** at the removable links **69**.

The hoists **99** are then moved on the tracks **85**, **86** and **87** to center the spreader bars **103** over the sections **2**, **3**

and 4 that are to be removed. The hooks in the ends of the chains **104** are engaged with the eyes **105** in the frames of the sections, to lift the sections clear of the machine, as shown in FIG. 1. The sections, suspended from the trolleys, are carried to the bench means **72** and **73** for deposit thereon by lowering the hoists. Fastening devices **16** are used to anchor the sections to the bench means.

The machine has now been cleared for the previously adjusted sections which were made ready on the beach means **70** and **71**.

The hoists are moved along the overhead tracks to positions over the sections on the bench means **70** and **71** to connect the chains **104**, for lifting the sections from the bench means after the drive chains have been released from the shafts **81** used in turning the mechanisms during adjustment thereof and after the fastening devices **16** have been removed.

The sections now suspended by the hoists are quickly moved to a position over the envelope making machine and lowered onto the seats **11**, **12** and **13**. The fastening devices **16** are then inserted to anchor the sections in place on the machine. It is to be understood that these sections have been adjusted so that the mechanisms thereof will operate upon the blanks **6**.

The chain drives **61**, **62** and **68** are then connected and the machine is ready to start on the blanks **6**. It is obvious that the changeover requires only a short time, so that the envelope making machine is soon back in service. Some minor adjustments may be required in the envelope making machine, but these are easily and quickly made.

With the machine **1** producing envelopes, work on adjusting the sections on the bench means **72** and **73** is started, so that the adjustments are completed by the time the run of the blanks **6** is finished.

The removable sections may be of any number that is best adapted to the type of envelope machine. Also, the

sections illustrated may be divided into smaller units, if desired.

What I claim and desire to secure by Letters Patent is:

1. The method of adjusting an envelope making machine having a main drive and a series of mechanisms for folding and sealing blanks into envelopes operable in consecutive order and in timed relation with travel of the blanks for performing the various operations on the blanks and which mechanisms are adjustable when changing over from the production of one size and style of envelope to another, including the steps of:

removing a removable section carrying a plurality of said mechanisms interconnected by a common drive as a unit,

replacing said removable section with a similar section interchangeable with the removable section and in which the mechanisms have been adjusted while said first named section is used in the machine, and

connecting said similar section by said common drive to the said main drive of said machine, whereby said machine is maintained in substantially continuous operation.

2. The method as set forth in claim **1** wherein:

said first named removable section is lifted and conveyed from the machine and said similar section is lifted and conveyed to the machine.

3. The method as set forth in claim **1**, wherein:

the mechanisms on said similar section are adjusted away from the machine through connection of drive means to said common drive.

References Cited

UNITED STATES PATENTS

3,017,731	1/1962	Lohse	53—201
3,186,316	6/1965	Lenk	93—62

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