May 25, 1971 J. E. DOANE ET AL 3,580,786

BANDING APPARATUS FOR STACKED ARTICLES

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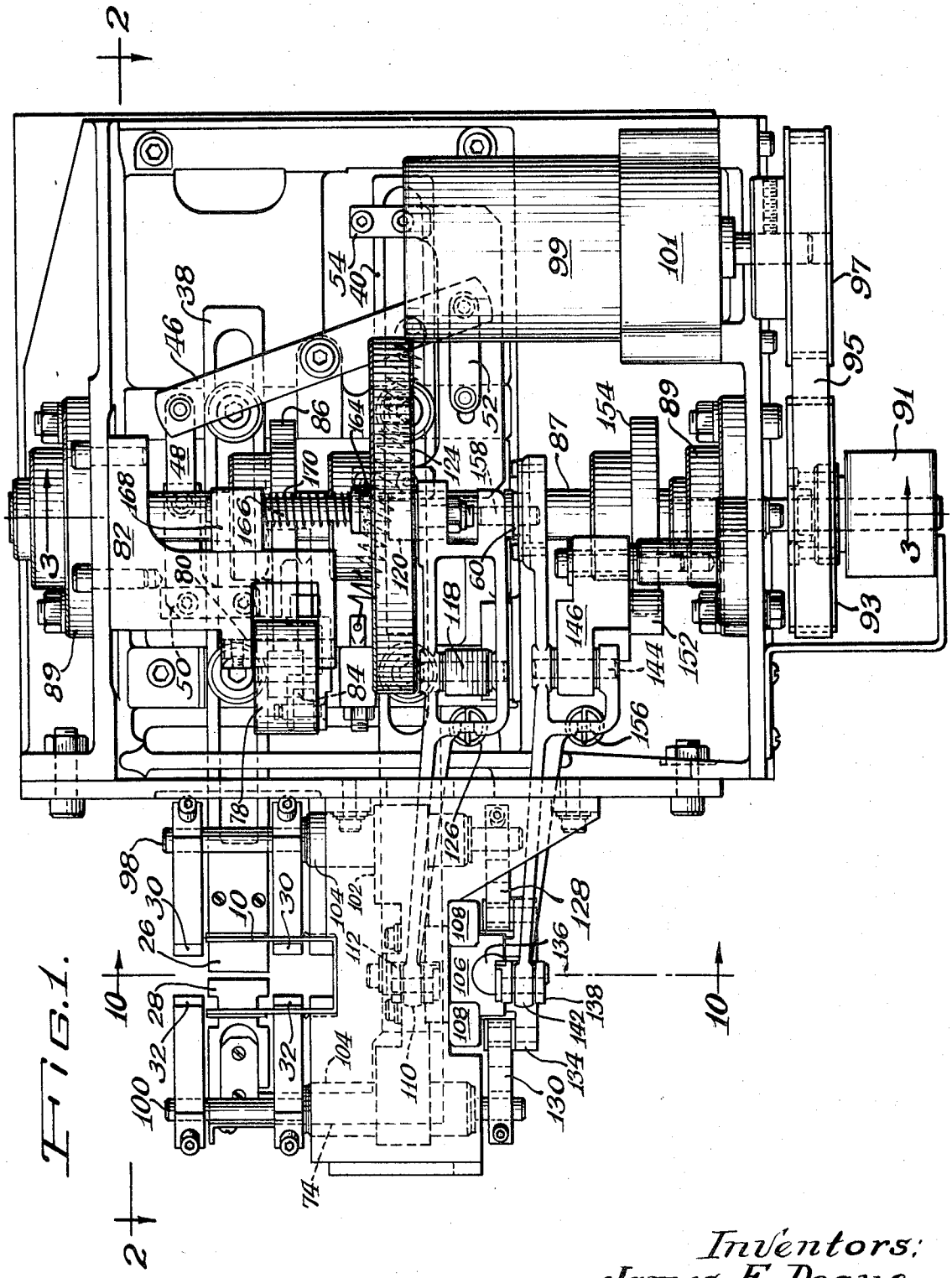


FIG. 1.

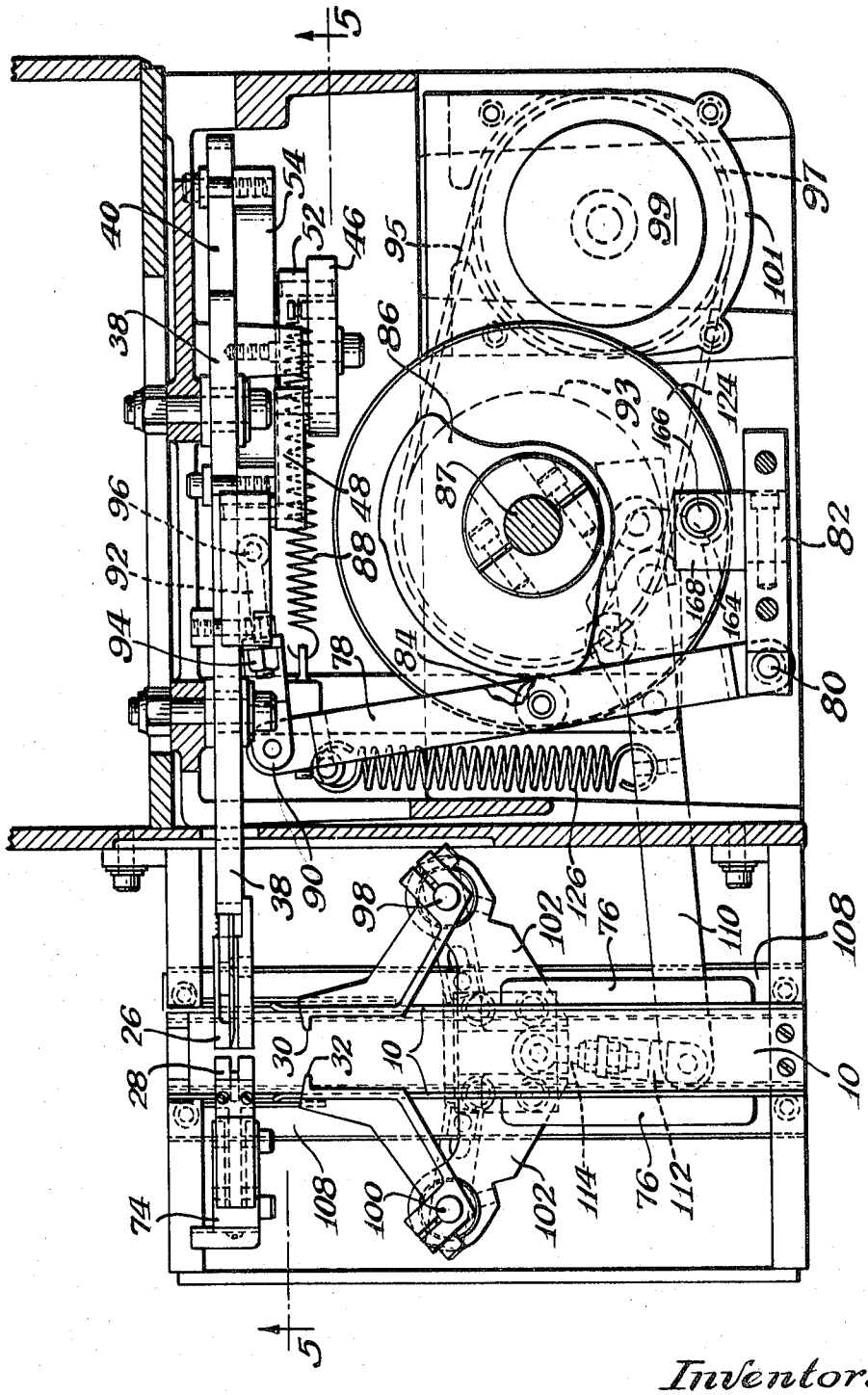
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BANDING APPARATUS FOR STACKED ARTICLES

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Fig. 2.



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FIG. 3.

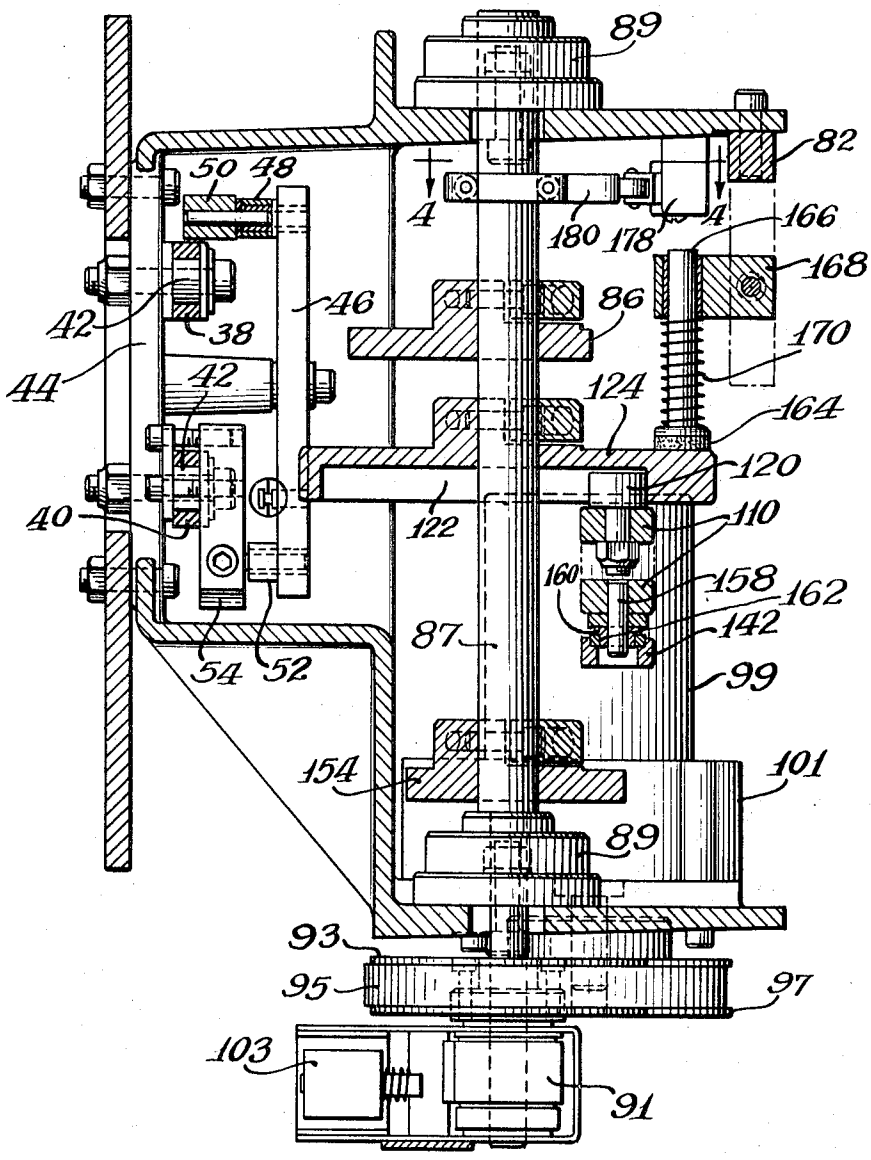
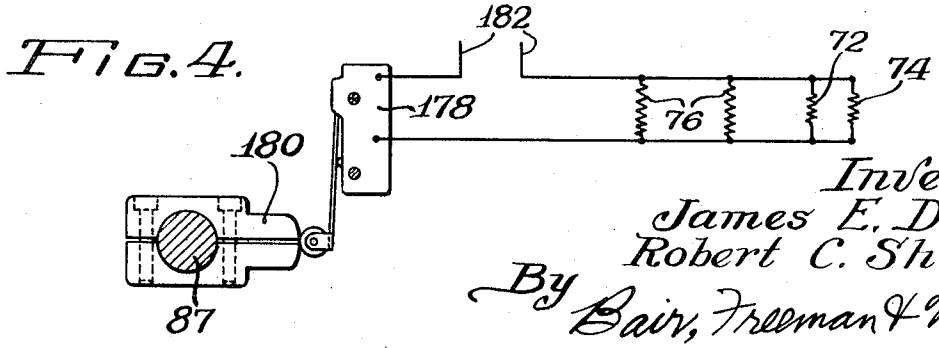


FIG. 4.



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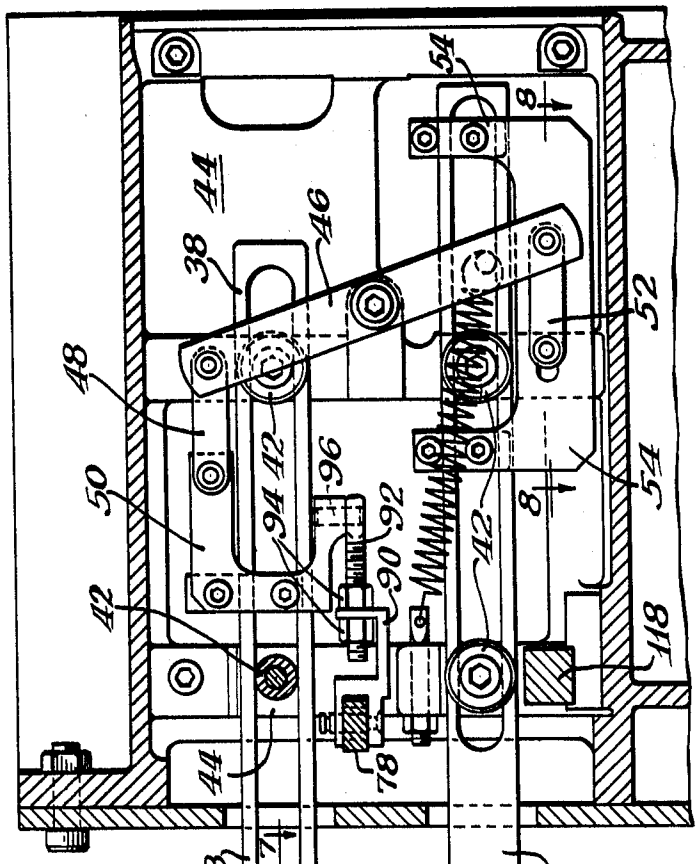


FIG. 5.

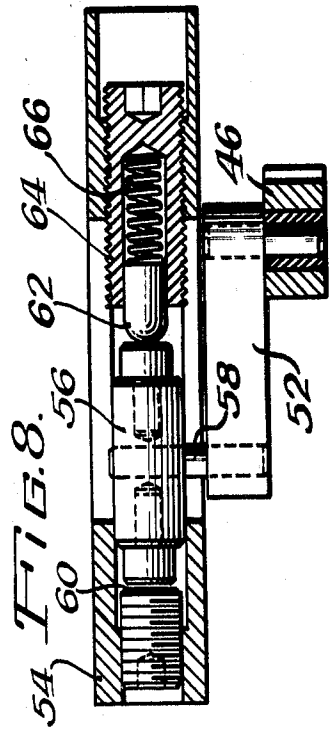


FIG. 8.

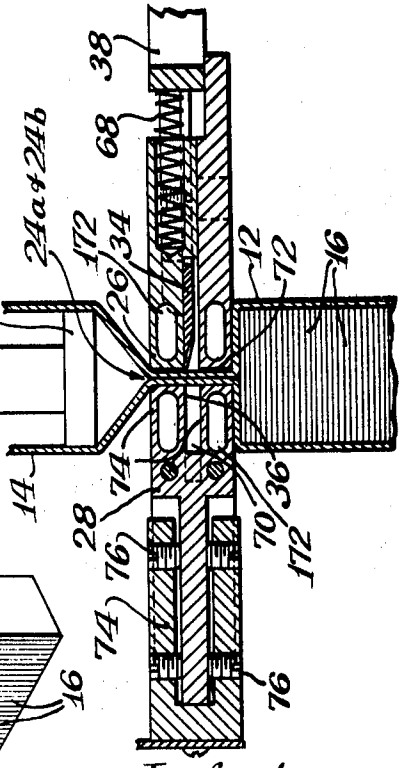


FIG. 7.

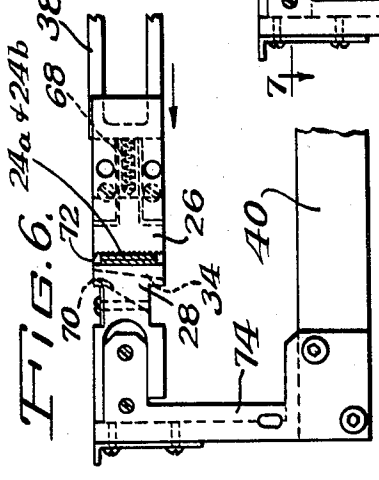


FIG. 6.

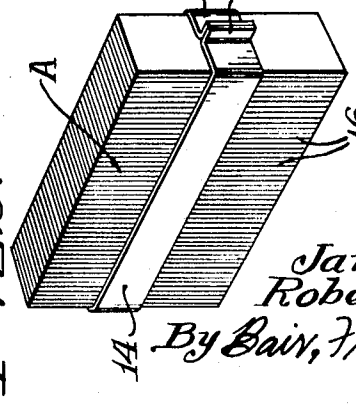


FIG. 9.

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FIG. 10.

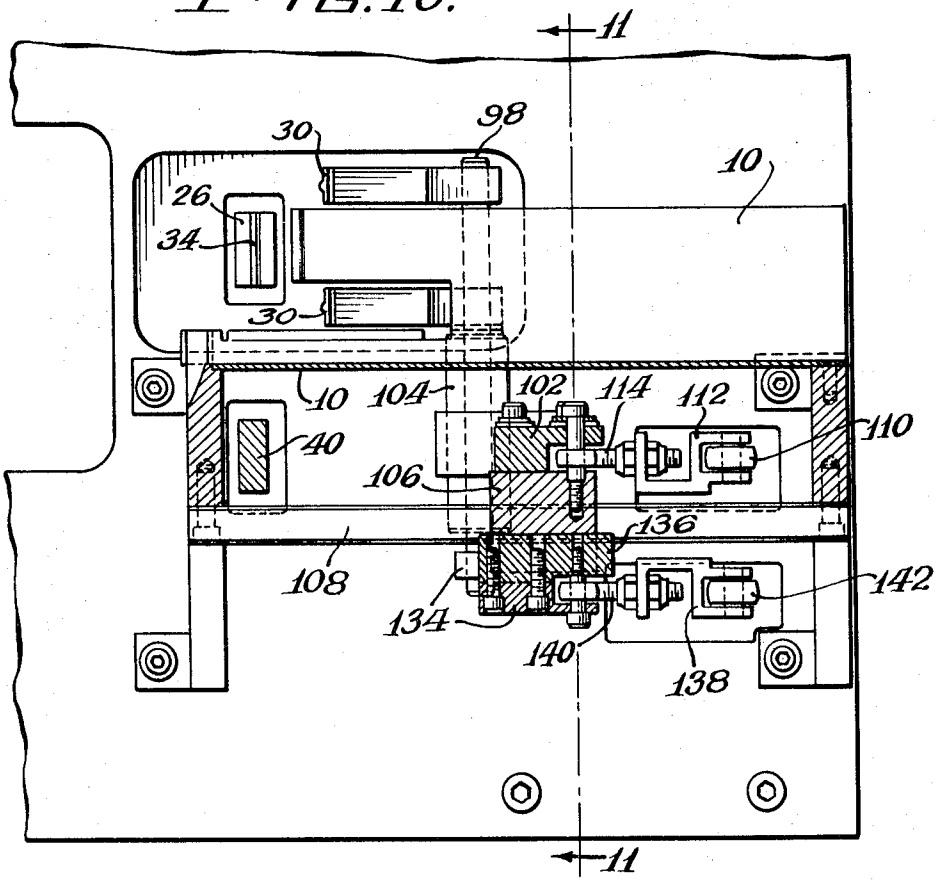
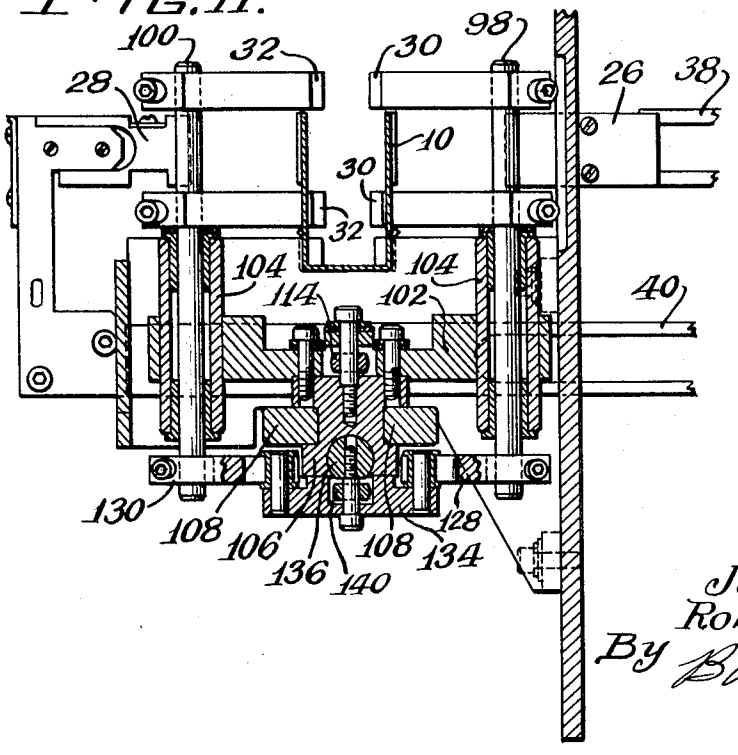


FIG. 11.



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FIG. 12.

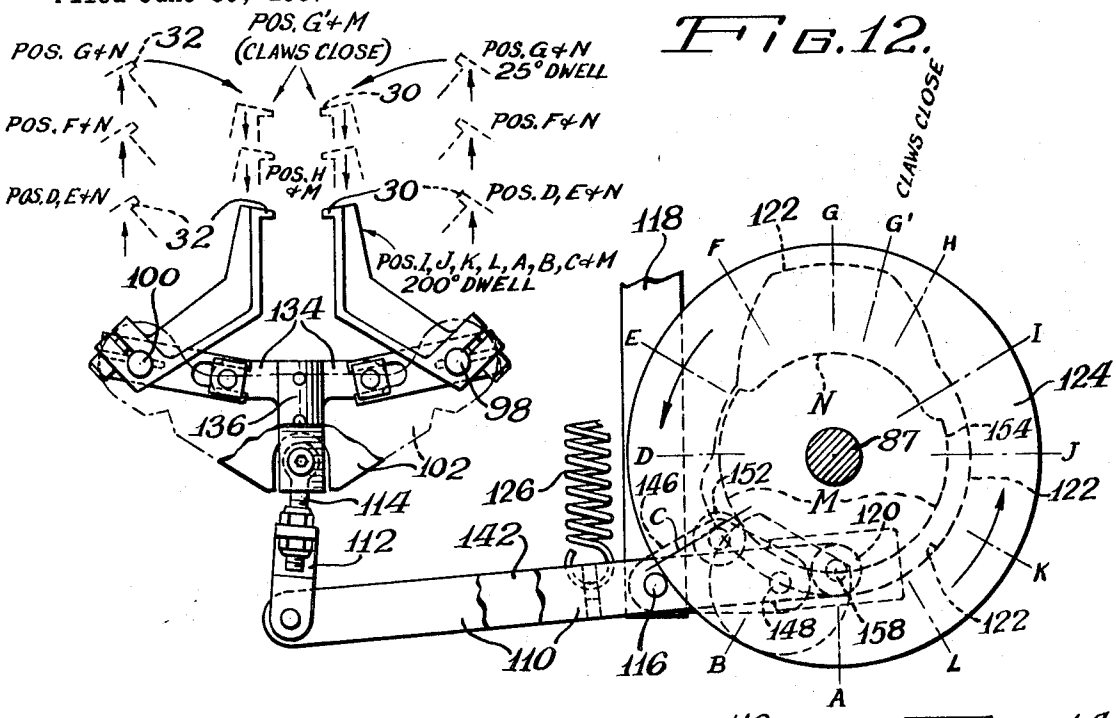


FIG. 13.

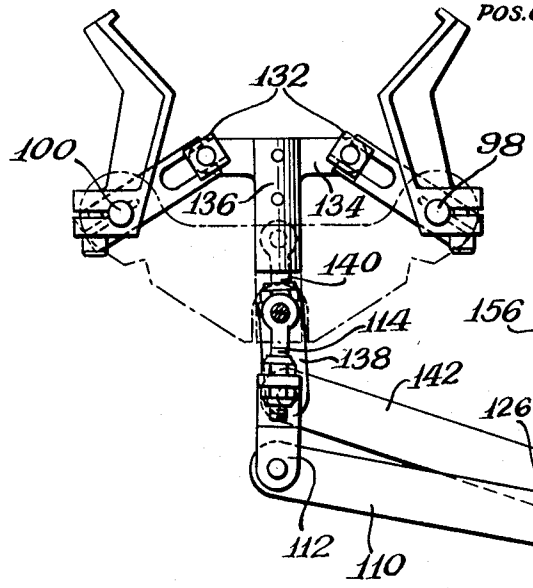
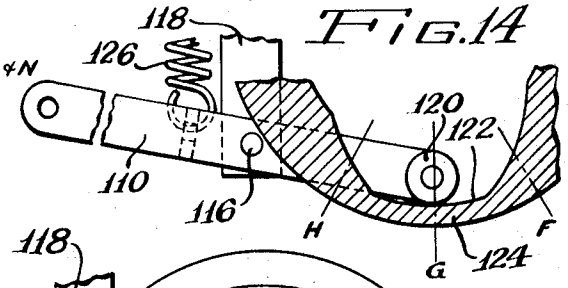


FIG. 14



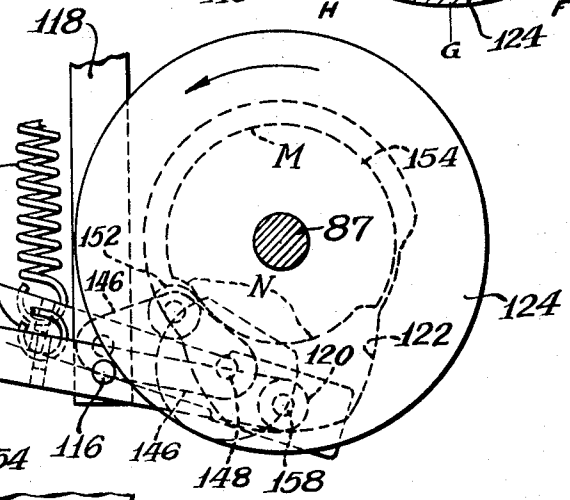
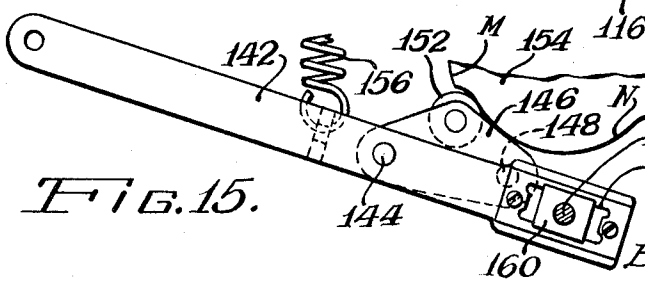


FIG. 15.



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FIG. 16.

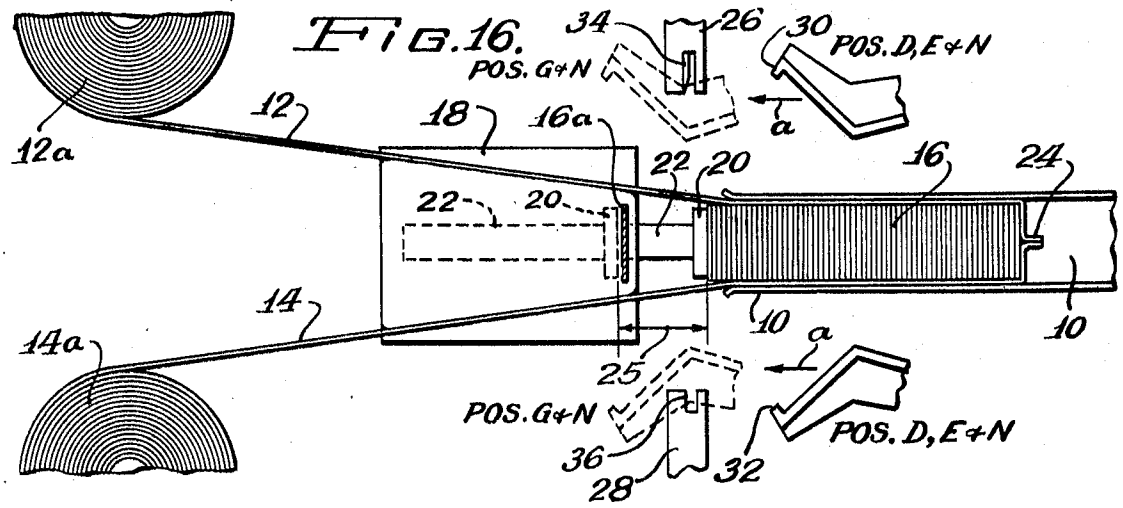


FIG. 17

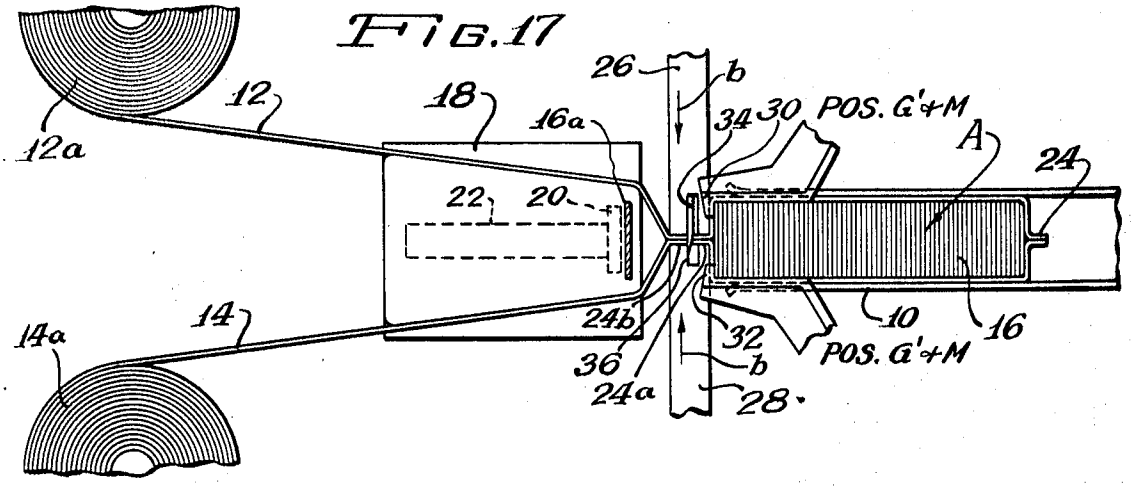
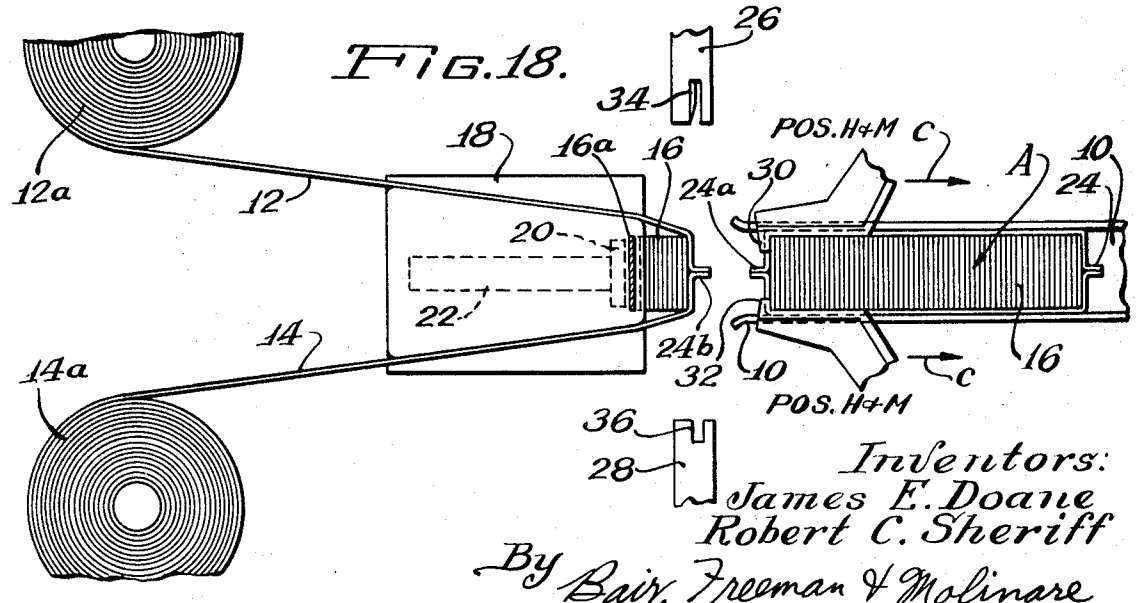


FIG. 18.



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United States Patent Office 3,580,786 Patented May 25, 1971

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BANDING APPARATUS FOR STACKED ARTICLES

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Filed June 30, 1967, Ser. No. 650,296
Int. Cl. B65b 13/06; B65c 1/04
U.S. Cl. 156—475 10 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus for adhering a band around stacked articles such as labels, facing slips and the like wherein a combination of clampnig jaws operate to adhere ends of the bands around individual stacks and sever the bands between stacks, and transport claws engage the banded stack to advance it along a trough to a discharge position. Heating elements are provided for the clamping jaws and the sides of the trough if the bands are of heat-seal type.

One object of the invention is to provide a banding apparatus for stacked articles which comprises a trough adapted to have a pair of banding elements moved into the trough along the side walls thereof by the articles as they are stacked therein.

Another object is to provide means for manipulating the pair of banding elements to adhere portions thereof together behind the stack of articles comprising a pair of clamp jaws movable toward each other in a direction laterally of the trough to engage portions of the banding elements and bend such portions behind the stack of articles and thereafter clamp predetermined areas of these portions into adhering relation to each other.

Still another object is to provide the clamp jaws with severing means for the banding elements at positions intermediate the limits of said areas.

A further object is to provide a novel type of severing means built into the clamping jaws and effective to sever the banding elements after the jaws have clamped them together

Still a further object is to provide opposed transport claws which engage the rear end of a stack of articles, then advance to bodily move the completed stack to a discharge position, and then return to engage the rear end of the next successive stack of articles.

An additional object is to provide means for reciprocating the clamping jaws in opposite directions comprising slides carrying the jaws and a centrally pivoted lever having its ends operatively connected with the respective slides.

Another additional object is to provide means for oscillating the pivoted lever comprising an actuating shaft, and a jaw cam mounted thereon and operatively connected with the pivoted lever.

Still another additional object is to provide the clamp jaws and the side walls of the trough with heating elements when the apparatus is used for banding a stack of articles with banding elements which are coated with heat sensitive adhesive.

A further additional object is to provide the transport claws mounted on a carriage, and cam means on the actuating shaft to reciprocate the carriage and pivot the claws relative to the carriage.

Still a further additional object is to provide first and second levers for the carriage and the transport claws with a novel arrangement to increase the pivoting action of the claws by pivoting the second lever to the first lever so that the cam action of the cam for the first lever is added to the cam action of the cam for the second lever.

With these and other objects in view, our invention

consists in the construction, arrangement and combination of the various parts of our banding apparatus for stacked articles whereby the objects above contemplated are attained, as hereinafter more fully set forth, pointed out in our claims and illustrated in detail on the accompanying drawings, wherein:

FIG. 1 is an end elevation of our banding apparatus looking at the stacked-article discharge end thereof.

FIG. 2 is a horizontal sectional view on the line **2—2** of FIG. 1 showing the major portion of the apparatus in plan view.

FIG. 3 is a vertical sectional view on the line **3—3** of FIG. 1 to show an actuating shaft, cams mounted thereon and other details.

FIG. 4 is a sectional view on the line **4—4** of FIG. 3 showing a control switch for certain heating elements of the apparatus, and a cam on the actuating shaft therefor.

FIG. 5 is a vertical sectional view on the line **5—5** of FIG. 2 showing banding elements being clamped prior to being severed.

FIG. 6 illustrates a fragmentary portion of FIG. 5 with the parts in a different position when the banding elements are severed after clamping.

FIG. 7 is an enlarged horizontal sectional view on the line **7—7** of FIG. 5 showing the clamping action.

FIG. 8 is an enlarged sectional view on the line **8—8** of FIG. 5 showing an overtravel connection for one of the clamping jaws.

FIG. 9 is a perspective view of a stack of articles banded in accordance with the banding method herein disclosed, and accomplished by the apparatus herein disclosed.

FIG. 10 is a sectional view on the line **10—10** of FIG. 1 showing a reciprocating carriage and pivoted transport claws carried thereby.

FIG. 11 is a vertical sectional view on the line **11—11** of FIG. 10 to show further details of the carriage and transport claws.

FIG. 12 is a semi-diagrammatic view showing the cams for actuating the carriage and the transport claws, and showing various progressive positions of the claws during a cycle of operation which completes the banding of a stack of articles of predetermined size.

FIG. 13 is a similar view showing the cams and associated parts in a different position.

FIG. 14 is a view showing the essential parts of a carriage actuating lever of FIG. 13.

FIG. 15 is a similar view showing the essential parts of the transport claw actuating lever of FIG. 13.

FIG. 16 is a diagrammatic plan view showing articles being stacked and already enclosed along three sides by a pair of banding elements.

FIG. 17 shows the fourth side being enclosed by clamping jaws which adhere certain areas of the banding elements together and sever them so that the transport claws can move the completed stack of articles to a discharge position; and

FIG. 18 shows the transport claws moving the completed stack of articles to discharge position.

On the accompanying drawings I have used the reference numeral **10** to indicate a channel-shaped trough (see FIG. 1) adapted to have a pair of banding elements **12** and **14** (see FIG. 16) moved into the trough and along the side walls thereof by the articles as they are stacked in the trough. The banding elements may be continuously supplied from supply rolls **12***a* and **14***a* thereof which are freely rotatable except provided with some degree of frictional constraint to prevent too-free unreeling from the supply rolls.

Stacked articles **16** are illustrated (FIG. 16) which may be labels, facing slips or the like cut from a con-

tinuous strip **16***a* by a cut-off unit **18** forming no part of our present invention. The cut-off unit **18** includes means for cutting labels or the like (see FIG. 9 as one example) from the continuous strip **16***a* fed from a reel or the like. The cut-off unit includes a stacker head **20** as shown in FIG. 16 mounted on a reciprocating stacker-plunger **22** having a throw indicated at **25** so that each label cut from the strip **16***a* is transferred along the trough **10** to the stack of articles as shown. Accordingly the stacker head, through the articles **16**, causes a gradual advance of the stack and a wrapping of the banding elements **12** and **14** around three sides of the stack because of the advance ends of the banding elements being adhered together as indicated at **24** from a previous operation as will hereinafter appear.

When a predetermined number of articles **16** are stacked as determined by a counter or the like the cut-off unit and its stacker may be stopped and our banding apparatus operated through a cycle as hereinafter described which cycle results in the operation of significant parts of the banding apparatus as will now be further described in connection with FIGS. 16, 17 and 18.

In FIG. 16 a pair of clamping jaws **26** and **28** are illustrated, and also a pair of transport claws **30** and **32**. Operation will be described before going on to describe the details of the apparatus. It will be noted the clamping jaws and transport claws are spread apart.

When the predetermined number of stacked articles **16** are assembled, the stacker head **20** of the cut-off unit **18** is stopped in the position shown in FIG. 17 and the clamping jaws **26** and **28** approach each other until they adhere an area represented by reference numerals **24***a* plus **24***b* together, the facing surfaces of the banding elements **12** and **14** being provided with either pressure-sensitive adhering material or material which may be adhered upon the presence of moisture or heat.

In FIG. 16 a knife blade **34** is illustrated in a recess of clamping jaw **26**, and in FIG. 17 the knife blade is shown extended. The operation of the apparatus is such that first the adjacent ends of the jaws **26** and **28** clamp both adhered portions **24***a* and **24***b* together, and then the knife passes through the adhered portions to sever them into the individual adhered portions **24***a* and **24***b* shown in FIG. 18. Thus, the completed banded stack of articles (which may now be identified as A) is ready for movement along the trough **10** to a discharge position or into a discharge chute or conveyor as desired. The completely banded stack of articles is also illustrated at A in FIG. 9.

The transport claws **30** and **32**, during the stacking of the articles **18**, move (arrows *a*) from certain positions in FIG. 16 indicated POS. D, E and N to those indicated POS. G and N, and then as the clamp jaws **26** and **28** move (arrows *b*) to the position of FIG. 17 the claws move to POS. G′ and M. Now the transport claws (arrow *c* in FIG. 18) move from POS. G′ and M in FIG. 17 to POS. H and M in FIG. 18, thus moving the completed banded stack A along the trough **10** for discharge from the banding apparatus.

FIG. 1 at the upper left portion thereof illustrates the clamp jaws **26** and **28**, and the transport claws **30** and **32**. It will be noted that the transport claws are made in pairs so as to straddle the clamp jaws for the purpose of keeping the stack A squarely upright as it is slid by the transport claws along the trough **10**. The mechanism which carries the clamp jaws **26** and **28** is best shown in FIG. 5 wherein it will be noted the clamp jaw **26** is mounted on an upper slide **38** and the clamp jaw **28** is mounted on a lower slide **40**. The slides **38** and **40** are slotted as shown and the sides of the slots ride on rollers **42** journalled on a vertical frame plate **44** as shown in FIG. 3. The frame plate **44** is part of a housing for the apparatus as shown throughout several figures of the drawings.

The slides **38** and **40** are reciprocated in opposite directions by means of a centrally pivoted lever **46** (see FIG. 5) connected by a link **48** and a clamp **50** to the slide **38**, and by a link **52** and a clamp **54** to the slide **40**. The clamps **50** and **54** permit adjustment as between the slides and the links, and the clamp **54** is provided with a lost-motion, spring-biased, overtravel connection to the link **52** as illustrated in detail in FIG. 8. A plunger **56** is slidable in a bore of the clamp **54** and pivoted on a pin **58** extending from the link **52**. The left hand end of the plunger **56** is normally engaged with a stop **60** under the action of a spring-pressed plunger **62** engaging its left hand end, the plunger being slidable in a sleeve **64** within which a spring **66** for the plunger is located.

With respect to the construction of the clamp jaws **26** and **28**, the jaw **26** is slidable on the slide **38** as shown in FIGS. 5, 6 and 7 being spring biased in a left hand direction by a spring **68**. A shearing shoulder **36** is formed by one side of a slot **70** in the clamp jaw **28** and this clamp jaw is adjustably mounted in a vertical extension **74** by means of four set screws **76** in order to accurately locate the shearing shoulder **46** in relation to a cut-off knife blade **34**. The left hand end of the jaw **26** is preferably serrated as shown at **72** in FIGS. 5, 6 and 7 to increase the effectiveness of the clamping and adhering action thereof on the adhered portions **24***a* and **24***b* of the banding elements **12** and **14**.

In the operation of the clamp jaws **26** and **28**, when they are moved from the position of FIG. 16 toward the position of FIG. 17 according to the arrows *b* in FIG. 17, they first engage the areas **24***a* and **24***b* of the banding elements **12** and **14** while the knife blade **34** is in a position of non-projection with respect to the jaw **26** as shown by dotted lines in FIG. 5 and as also shown in FIGS. 7 and 16 with the left hand end of the plunger **56** in FIG. 8 in contact with the stop **60**. Upon slight further pivoting of the lever **46** the plunger **56** will move away from the stop **60** as illustrated, the spring **66** serving to keep the jaw **28** in contact with the banding element **14**, and upon further pivoting of the lever **46** the slide **38** will move toward the left to propel the knife blade **34** to the severing position shown dotted in FIG. 6 and also in FIG. 17, and with the spring **68** under further compression as shown in FIG. 6. Thus overtravel of the jaw **26** with respect to the jaw **28** is permitted by the connection between the link **52** and the clamp **54** illustrated in FIG. 8, the plunger **56** at that time being moved further toward the right and further compressing the spring **66**.

For oscillating the lever **46** a horizontally disposed lever **78** shown in FIG. 2 is provided, the same being pivoted at **80** to the mechanism housing through a suitable adjustable bracket **82**. The lever **78** carries a roller **84** urged to engage the cam surface of a clamping jaw cam **86** by a spring **88**. The clamping jaw cam **86** is mounted on an actuating shaft **87** rotatable in bearings **89** as best shown in FIG. 3, and the shaft is operatively connected by a one-revolution clutch to a driven pulley **93**. The pulley **93** is driven by a timing belt **95** from a drive pulley **97** on the shaft of a speed reducer unit **101** actuated by an electric motor **99** (see FIG. 1). The clutch **91** may be rendered operative by a solenoid **103** shown in FIG. 3 under control of any suitable mechanism such as a stacked-article counter as hereinbefore referred to. Thus, automatic operation is had through circuitry which forms no part of our present invention, the same being well known in the art.

The operative connection between the lever **78** and the clamp **50** is shown in FIG. 5 and consists of a link **90** pivoted to the lever **78** and an eye bolt **92** which is adjustable relative to the link **90** by means of a pair of lock nuts **94**. The eye of the eye bolt **92** is pivoted on a pivot pin **96** carried by the clamp **50**.

From the construction of the parts just described it will be obvious that the lever **78** effects reciprocation of the clamp **50** and thereby the slide **38**, and also oscillates the lever **46** which in turn reciprocates the slide **40**, the directions of reciprocation being opposed to each other.

The clamp jaws **26** and **28** are also thereby reciprocated as hereinbefore described.

Referring to FIG. 1 the transport claws **30** are clamped on a vertical rock shaft **98** and the transport claws **32** are clamped on a vertical rock shaft **100**. The rock shafts are journalled in bearings of a carriage **102** shown in FIG. 2, the bearings being shown in greater detail at **104** in FIGS. 10 and 11. The carriage **102** is mounted on a shoe **106** slidable along a pair of stationary bars **108**. The carriage is operatively connected to a carriage actuating lever **110** by a link comprising a bracket **112** pivoted to the lever **110** and an eye bolt **114** pivoted to the carriage **102** and its shoe **106** as shown in FIG. 10. FIGS. 2 and 13 illustrate the lever and link connection in plan view. The carriage actuating lever **110** as also shown in FIGS. 2, 12 13 and 14 is pivoted at **116** to a stationary bar **118** and carries a roller **120** held in contact with an internal cam surface **122** of a carriage cam **124** by a spring **126**. The cam **124** is mounted on the actuating shaft **87**.

On the lower ends of the rock shafts **98** and **100** are arms **128** and **130** respectively as shown in FIGS. 1, 11, 12 and 13. The outer ends of the arms are slotted, and slide blocks **132** are slidable therein. The slide blocks are pivoted to a T-shaped head **134** mounted on a slide rod **136** which is slidable in a bore of the shoe **106** as shown in FIG. 11 whereby the T-shaped head **134** is reciprocably mounted with respect to the shoe and the carriage **102**.

For reciprocating the head **134** and the slide rod **136** independently of the shoe and carriage, a second link is provided comprising a pivot bracket **138** and an eye bolt **140** as shown in FIG. 10. The bracket **138** is pivoted to a claw actuating lever **142** which as shown in FIGS. 1, 2, 12, 13 and 15 is pivotally mounted at **114** on a secondary lever **146** pivoted at **148** to a stationary bracket **150**. The secondary lever carries a roller **152** engaged with a cam surface of a claw cam **154** by a spring **156**. The claw cam **154** is also mounted on the actuating shaft **87** as shown in FIG. 3.

A pivotal connection is provided for the right hand end of the claw actuating lever **142** as shown in FIGS. 1, 12, 13 and 15 and comprises a pivot pin **158** carried by the right hand end of the carriage actuating level **110** in axial alignment with the roller **120** thereon and projecting downwardly into a slide **160** which is slidable in a slot **162** of the claw actuating lever **142**. Thus, the oscillations of the lever **142** are produced by a composite of cam actions produced by both the cam **154** and its roller **152**, and the cam **124** and its roller **120** as will hereinafter appear. The axial alignment of the pivot pin **158** with the roller **120** is best shown in FIG. 3 wherein is also illustrated means to prevent over-run of the actuating shaft **87** (when the one-revolution clutch **91** releases) in the form of a friction shoe **164** carried by a slide rod **166**. The rod is vertically slidable in a stationary bracket **168**, and a spring **170** serves to provide the desired degree of friction of the shoe **164** against the carriage cam **124**.

The banding elements **12** and **14** may be provided on their facing surfaces with pressure-sensitive adhesive, or they may be coated with a heat-set type of adhesive in which case it is desirable to provide means for heating the clamping jaws **26** and **28**. Referring to FIG. 7 heating elements **72** and **74** for this purpose may be embedded in the jaws **26** and **28** respectively. Referring to FIG. 2 heaters **76** are provided for the sides of the trough **10**. The heating elements **72** and **74** and the heaters **76** may be of electric type, and may be continuously heated if desired. On the other hand they may be of the radiant type requiring energization only at certain times such as when the banding cycle is being performed by the banding apparatus. Accordingly as shown in FIGS. 3 and 4 a normally closed control switch **178** may be provided which is held normally in the open position by a switch cam **180** on the actuating shaft **87**. The electric circuit for the heating elements and the heaters is diagrammatically illustrated including current supply wires **182**.

In FIG. 12, twelve positions A through L are shown for the transport claws **30** and **32**. These positions are a result of both reciprocations of the carriage **102** along the stationary bars **108** and rocking of the rock shafts **98** and **100**. The positions of the carriage **102** are effected through the links **114**, **112**, the lever **110** and the roller **120** coacting with the cam surface **122** as also shown in FIGS. 13 and 14. In FIG. 12 the lever **142** for oscillating the rock shafts **98** and **100** is in a position directly below the lever **110**. The cam surface **122** in FIG. 12 has twelve stations indicated A through L. The corresponding positions of the transport claws **30** and **32** corresponding thereto are indicated "POS. A" etc. at which various positions hook ends of the transport claws for engaging the stacked and banded articles are shown by dotted lines. The positions are further characterized by "&M" or "&N" which correspond to a high dwell M and a low dwell N of the transport claw cam **110** which coact with the roller **152** as shown best in FIG. 15. Accordingly, starting with the full line position shown in FIG. 12, the transport claws **30** and **32** are at positions I, J, K, L, A, B and C and M which is a 200° low dwell as shown from I to D on the cam **124**. At the same time the roller **152** is on the high dwell M of the cam **110** in FIG. 12.

It will be noted that a lower dwell occurs from station D to station E on the clam **124** which effects some opening of the transport claws **30**, **32** but not enough. Accordingly, by the combination of the lower dwell D to E, the transport claws **30** and **32** are opened even further to the position D, E and N by reason of the roller **152** leaving the high dwell M and entering the low dwell N of the cam **110**. Then the transport claws pass through the position F and N and arrive at the position G and N as also shown in FIGS. 13 and 16.

At the time the transport claws close from the position G and N to the position G' and N the roller **152** leaves the low dwell portion N of the cam surface of the cam **110** and engages the high dwell surface M to thereby secure the desired additional travel from open to closed position of the transport claws. Thus, by pivoting the lever **142** at **158** (in effect using the roller **120** as a pivot) the cam **124** imparts action to the lever **142** in addition to the action imparted thereto by the roller **152**. Because of the linkage arrangement required and as shown in FIG. 15, variations in center-to-center distances as between the pivots **144**, **148** and **158** occur which are taken care of by the slide connection of slide **160** in slot **162**.

From the foregoing specification it will be obvious that we have provided a banding apparatus suitable for banding stacked articles such as labels, coupons, facing slips and the like with the type of band illustrated in FIG. 9, the resulting banded articles being restrained against disintegration of the assembly by the adhesive facing surfaces of the banding elements adhering to the edges of the labels or the like, yet when the band is broken at one end of the stack the labels may be removed one at a time without difficulty and without disturbing the remaining labels. Thus, a substantial banded package is produced without the necessity of wrapping all six sides of the stack as with usual packaging methods.

Some changes may be made in the construction and arrangement of the parts of our banding apparatus without departing from the real spirit and purpose of our invention and it is our intention to cover by our claims any modified forms of structure or use of mechanical equivalents which may reasonably by included within their scope.

We claim as our invention:

1. In a banding apparatus for stacked articles, a trough adapted to have a pair of banding elements which have their advance ends adhered together moved into said trough along the side walls thereof by the articles as they are stacked therein, said pair of banding elements thereby constituting a band for three sides of the stack of articles;

means for manipulating said pair of banding elements to adhere portions thereof together behind the stack of articles comprising a pair of clamp jaws movable toward each other in a direction laterally of said trough to engage portions of said bands, bend said portions behind the stack of articles and clamp predetermined areas of said portions into adhering relation to each other to form a fourth side of a band for said articles; means for reciprocating said clamp jaws in opposite directions including a slide carrying each jaw and a centrally pivoted lever having its ends operatively connected with the respective slides; said clamp jaws including severing means for said bands at positions intermediate opposite limits of said areas spaced longitudinally of said bands; opposed transport claws adapted to engage the rear end of a stack of articles; and means adapted following severing of said band to actuate said transport claws to bodily move a completed stack thereof to a discharge position, and then return said transport claws to engage the rear end of the next successive stack of articles.

2. A banding apparatus according to claim **1** wherein said severing means comprises a knife associated with one of said clamp jaws, the other of said clamp jaws having a shearing shoulder for coaction with said knife.

3. A banding apparatus according to claim **2** wherein said jaw associated with said knife is floatingly mounted on the knife and is biased to an advance position relative thereto for clamping action prior to severing action.

4. A banding apparatus according to claim **1** wherein a carriage is provided for supporting said transport claws and is slidable longitudinally of said trough, said transport claws being pivotally mounted on said carriage.

5. In a banding apparatus for stacked articles, a trough adapted to have a pair of banding elements which have their advance ends adhered together moved into said trough along the side walls thereof by the articles as they are stacked therein, said pair of banding elements thereby constituting a band for three sides of the stack of articles; means for manipulating said pair of banding elements to adhere portions thereof together behind the stack of articles comprising a pair of clamp jaws movable toward each other in a direction laterally of said trough to engage portions of said bands, bend said portions behind the stack of articles and clamp predetermined areas of said portions into adhering relation to each other to form a fourth side of a band for said articles; means for reciprocating said clamp jaws in opposite directions including a slide carrying each jaw, a centrally pivoted lever having its ends operatively connected with the respective slides, and means for oscillating said pivoted lever including an actuating shaft and a jaw cam mounted on said actuating shaft and operatively connected with said pivoted lever; and a heating element for each of said clamp jaws and said trough side walls to heat seal said predetermined areas to one another and said banding elements to the side edges of the articles in the stack of articles.

6. A banding apparatus according to claim **5** wherein a normally-closed switch is provided in circuit with said heating elements, and a cam is provided on said actuating shaft to open said switch in a position of rest of said shaft between actuations of said pivoted lever.

7. In a banding apparatus for stacked articles, a trough adapted to have a pair of banding elements which have their advance ends together moved into said trough along the side walls thereof by the articles as they are stacked therein, said pair of banding elements thereby constituting a band for three sides of the stack of articles; means for manipulating said pair of banding elements to adhere portions thereof together behind the stack of articles comprising a pair of clamp jaws movable toward each other in a direction laterally of said trough to engage portions of said bands, bend said portions behind the stack of articles and clamp predetermined areas of said portions into adhering relation to each other to form a fourth side of a band for said articles; opposed transport claws adapted to engage the rear end of a stack of articles, then advance to bodily move a completed stack thereof to a discharge position, and then return to engage the rear end of the next successive stack of articles; a carriage for supporting said transport claws, said carriage being slidable longitudinally of said trough, said transport claws being pivotally mounted on said carriage, an actuating shaft for said carriage and said transport claws, a first lever for sliding said carriage, a second lever for swinging said transport claws, and a pair of cams on said actuating shaft for respective coaction with said first and second levers to oscillate them.

8. A banding apparatus according to claim **7** wherein said second lever is pivoted to said first lever to add the cam action of the cam for the first lever to the cam action of the cam for said second lever whereby added travel for opening and closing said transport claws is had when compared to the cam actuation of the cam for said second lever only.

9. A banding apparatus for stacked articles, a trough adapted to have a pair of banding elements which have their advance ends adhered together moved into said trough along the side walls thereof by the articles as they are stacked therein, said pair of banding elements thereby constituting a band for three sides of the stack of articles; means for manipulating said pair of banding elements to adhere portions thereof together behind the stack of articles comprising a pair of clamp jaws movable toward each other in a direction laterally of said trough to engage portions of said bands, bend said portions behind the stack of articles and clamp predetermined areas of said portions into adhering relation to each other to form a fourth side of a band for said articles, said clamp jaws including severing means for said bands at positions intermediate opposite limits of said areas longitudinally of said bands; opposed transport claws adapted to engage the rear end of a stack of articles, then advance to bodily move a completed stack thereof to a discharge position, and then return to engage the rear end of the next successive stack of articles; a carriage for supporting said transport claws and slidable longitudinally of said trough, said transport claws being pivotally mounted on said carriage; an actuating shaft for said carriage and said transport claws, a first lever for sliding said carriage, a second lever for swinging said transport claws, and a pair of cams on said actuating shaft for respective coaction with said first and second levers to oscillate them.

10. A banding apparatus according to claim **9** wherein said second lever is pivoted to said first lever to add the cam action of the cam for the first lever to the cam action of the cam for said second lever, whereby added travel is produced for opening and closing said transport claws.

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U.S. Cl. X.R.

53—198; 156—515