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Eburn, Jr.

[11] **3,890,190**

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[54] **APPARATUS FOR FORMING AND APPLYING TIN-TIE FASTENERS**

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[52] **U.S. Cl.** ..... **156/521**; 156/461; 156/556; 93/1 TS; 53/138 A

[51] **Int. Cl.** **B65b 61/18**

[58] **Field of Search** ..... 156/521, 443, 461, 463, 156/548, 295, 519, 66, 556; 93/1 F, 1 TS; 53/138 A, 139.3; 117/111 R, 122 P, 44

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Assistant Examiner—M. G. Wityshyn
Attorney, Agent, or Firm—St. Onge Mayers Steward & Reens

[57] **ABSTRACT**

Apparatus for severing successive tin-tie fasteners to length, applying an adhesive thereto and adhering the tin-tie fasteners to the collapsed, open end portions of a succession of bags. The apparatus includes means for arcuately bending an elongated tin-tie strip transversely, (i.e, in its transverse section), severing it to form a fastener of the desired length, mounting the fastener on a wheel which rotates the fastener past an adhesive applicator where an adhesive is applied and then into contact with a moving bag where the tin-tie fastener is disengaged from the wheel and adhered to the bag.

11 Claims, 10 Drawing Figures

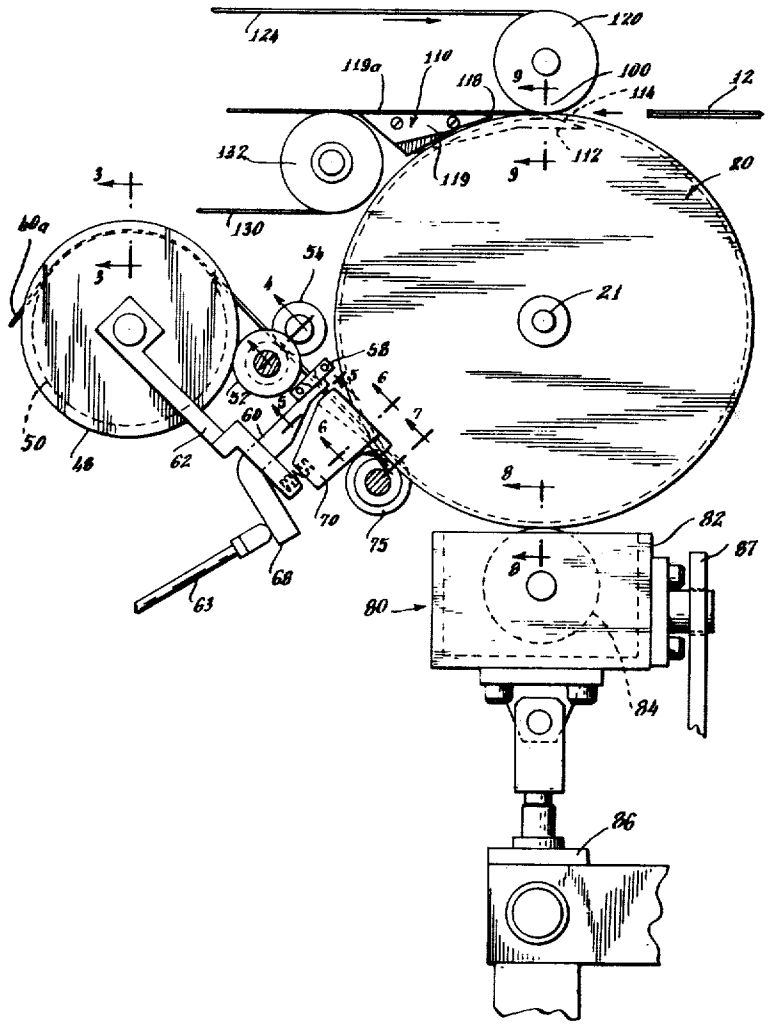
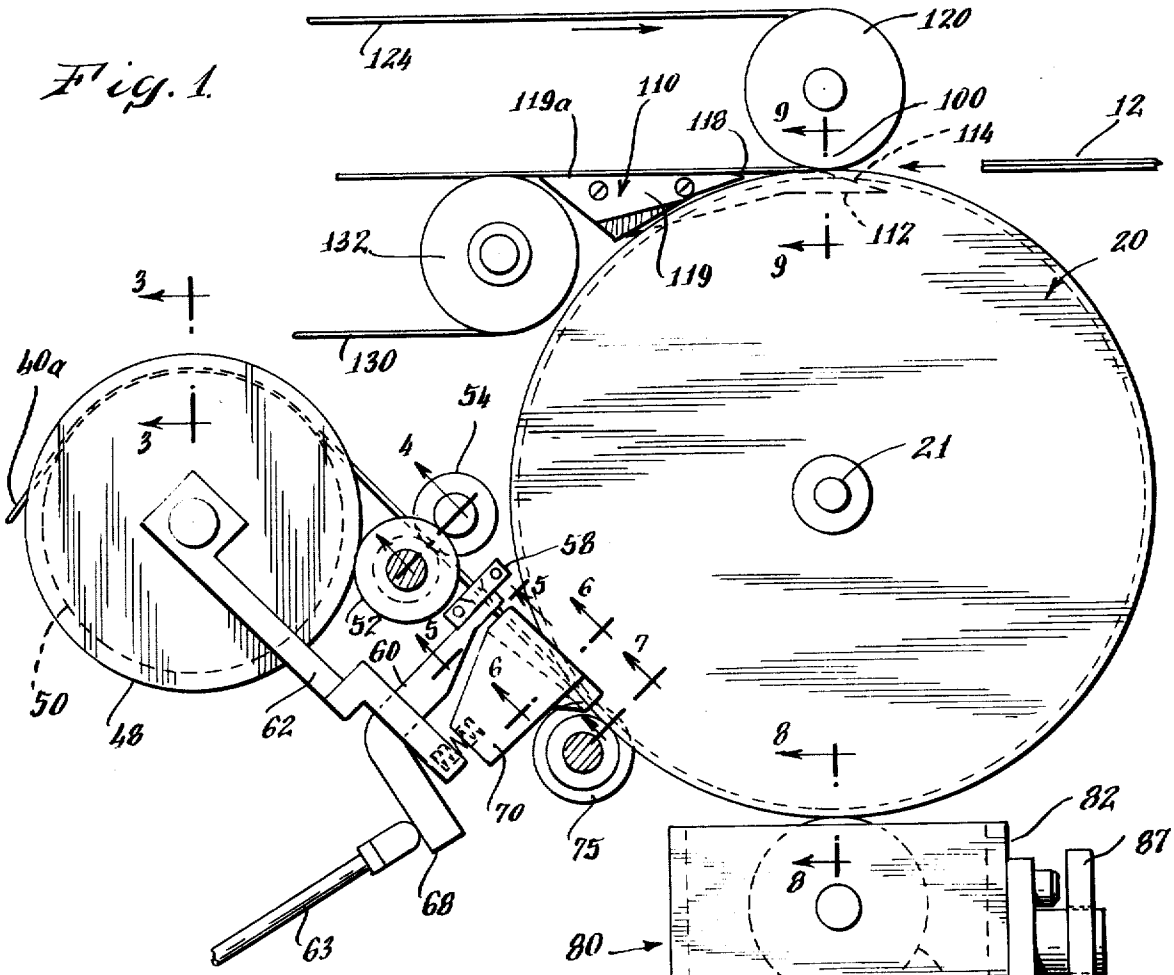


Fig. 1.



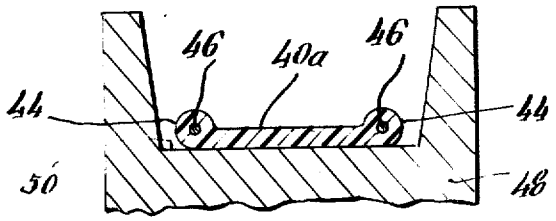


Fig. 3

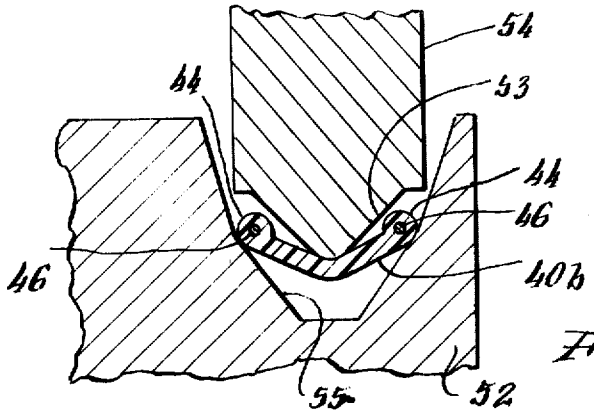
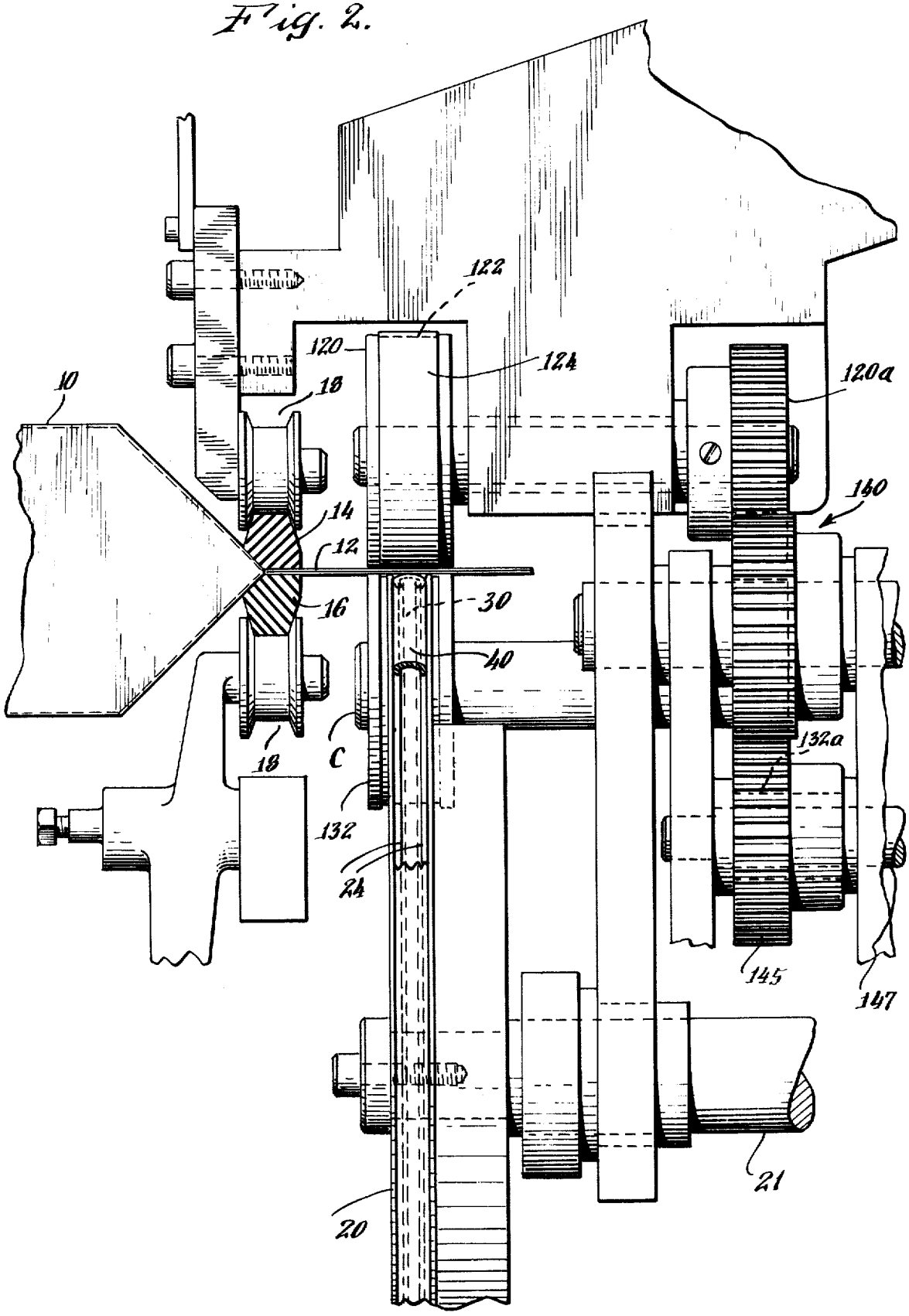


Fig. 4.

Fig. 2.


122
120
124
120a
10
18
14
12
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30
40
140
18
C
132a
132
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145
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Fig. 5.

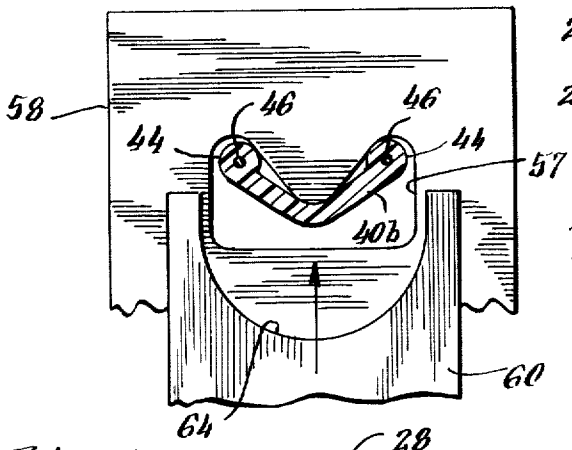


Fig. 6.

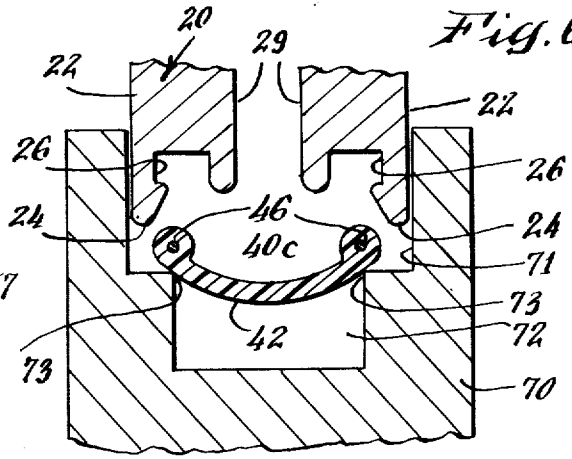


Fig. 7.

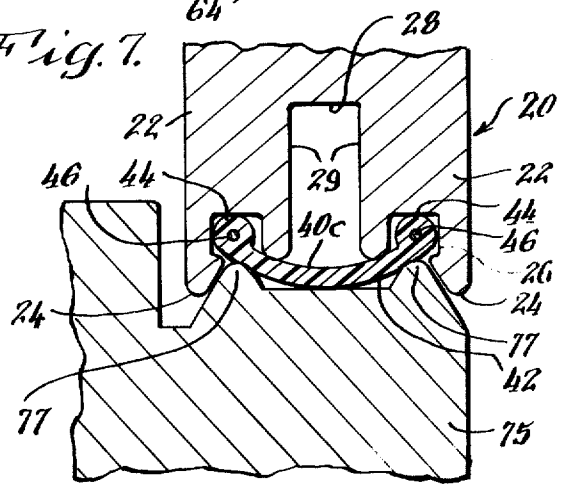


Fig. 8.

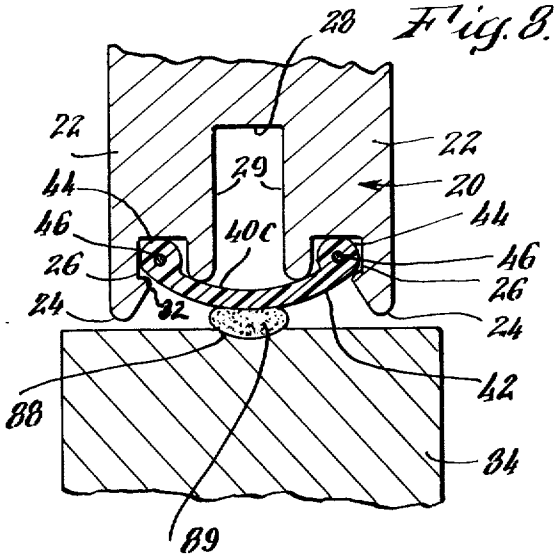


Fig. 9.

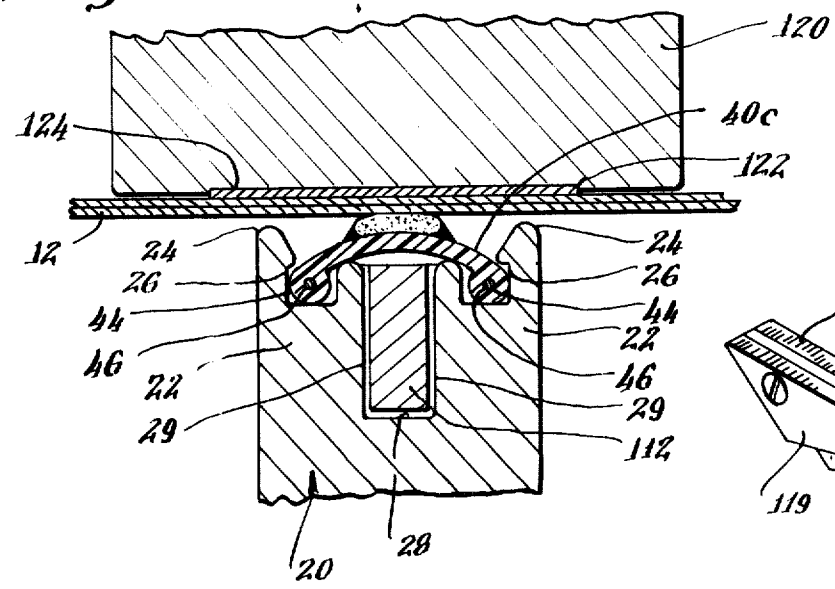
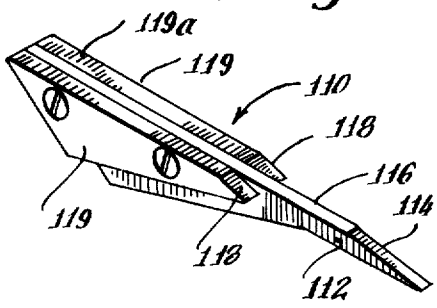


Fig. 10.



APPARATUS FOR FORMING AND APPLYING TIN-TIE FASTENERS

BACKGROUND OF THE INVENTION

1. Field of Invention

The present invention relates to apparatus for forming bag closures including tin-tie fasteners and particularly to novel and improved apparatus for severing to length and securing tin-tie fasteners to a succession of bags.

2. Prior Art

Bag closures in which the open end of a bag is closed by tucking and collapsing the unfilled or open end portion of the bag, folding the end portion upon itself and then bending the ends of a tin-tie fastener attached to the end portion upon themselves to retain the end portion in a folded condition, are well known in the art and have been employed for many years. Tin-tie fasteners generally take the form of elongated strips of a deformable but comparatively rigid material such as sheet metal or wire usually covered with a coating of paper, plastic, or the like. The tin-tie material is supplied in elongated strip form and is cut to length, either before or after attachment to a bag, to form an individual fastener. Attachment systems include adhesives applied in solution form or molten thermoplastics, or by welding. Thus, the basic operations involved in tin-tie fastener attachment usually include — although not necessarily in order — cutting to length, application of adhesive to tin-tie and then attachment to the bag material. The last step may include the application of pressure for a predetermined period as well as the transfer of heat to or from the tin-tie and bag material.

It has been common practice to glue or weld the tin-tie strip to bag panels prior to severing to length and bag formation and filling, see for example, U.S. Pat. No. 3,534,520, and/or to apply successive tin-tie fasteners in separate or intermittent operations in which the bag or bag material and applicator mechanism remain stationary relative to one another. Problems have arisen in varying the lengths of the tin-tie fasteners for different size bags and especially, in making the overall tin-tie severing, gluing and attaching operation rapid and reliable as well as easily variable.

BRIEF DESCRIPTION OF THE INVENTION

Objects of the invention are: to provide novel and improved apparatus for severing an elongated tin-tie strip to form a succession of tin-tie fasteners, applying adhesive to each fastener and attaching the fastener to a bag; to provide apparatus of the type described providing for variation in the length of the tin-tie fasteners and the length thereof to which the adhesive is applied and for applying the fasteners to various width bags; and to provide apparatus as described which is rapid and reliable in its operation and applies tin-tie fasteners securely and in accurately predetermined position to a succession of moving bags moving at relatively high speed, in a minimum time so that succeeding operations can be performed on the bag immediately.

These and other objects of the invention are realized in apparatus including a rotating support member, means for cutting tin-tie strips to fastener length and mounting them on the rotating member, means for applying an adhesive to each mounted tin-tie fastener and for then disengaging the glue-carrying fastener from the support member and pressing it into engagement with a portion of a continuously moving bag. The rotating support member includes a peripheral groove, and the tip-tie fasteners are bent transversely (i.e., in transverse section) and forced into the groove in a configuration such that each presents a portion of its surface to an adhesive applicator adapted to be moved into and from contact with each fastener as it passes the adhesive applicator. The bag portion, to which the tin-tie closure is to be attached, is advanced along a path tangent to the path of the support-mounted tin-tie closure into contact therewith. Means are provided for stripping the closure from the support member and pressing it into engagement with the bag. The apparatus, in a preferred embodiment, also includes means for gripping the moving bag and tin-tie closure to maintain them in compression and to conduct heat to or away from the closure and adhesive as may be required to form a secure attachment in a minimum time.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the apparatus possessing the construction, combination of elements and arrangement of parts, which are exemplified in the following detailed disclosure, and the scope of the application of which will be indicated in the claims.

DESCRIPTION OF THE DRAWINGS

For a fuller understanding of the nature and objects of the invention, reference should be made to the following detailed description taken in connection with the accompanying drawings wherein:

FIG. **1** is an elevational view of key elements of apparatus embodying the invention;

FIG. **2** is a side elevational view of the apparatus of FIG. **1** with certain parts being omitted and certain additional parts being shown;

FIGS. **3, 4, 5, 6, 7, 8** and **9** are sectional views taken substantially along lines **3—3, 4—4, 5—5, 6—6, 7—7, 8—8** and **9—9,** respectively, of FIG. **1**; and

FIG. **10** is a perspective view of a key component of the apparatus.

DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

The embodiment of the invention shown is adapted for use with a tin-tie strip comprising, for example, a narrow web of artificial plastic material such as polyethylene in which are embedded a pair of wires formed of a metal such as steel or aluminum. The wires are embedded in thickened edge portions of the plastic web and function as stiffeners to retain the strip in a folded condition. Tin-tie fastener strip of this type is available commercially from a number of sources. Other forms of flexible tin-tie strips may be employed with the basic apparatus of the invention and will necessitate only minor alterations in shapes and/or sizes of some portions of the basic components of the apparatus, while the essential functions of the components and inventive principles on which the operation of the apparatus is based, remain unchanged.

The apparatus of the invention is especially adapted, although not limited, to use with preformed bags, particularly bags which have been filled and the open or unfilled end portion closed by tucking two sides inwardly and collapsing or compressing the sheet material into a generally flat form. The bags themselves may

be formed of a variety of materials including paper, plastics, metal foils, fabric and/or combinations or laminates of such materials, the latter being the most commonly used in practice. Bag materials, particularly laminates, with which the present invention can be employed, are widely used, well known in the art and available from a large number of sources. Similarly, adhesives suitable for adhering tin-tie fasteners to bags including adhesives of the solvent type as well as the heat activated type, i.e., thermoplastics and/or thermosetting plastics, are also well known and are available commercially from numerous sources.

Reference is now made to FIGS. **1** and **2** of the drawings wherein there is illustrated apparatus for automatically severing a tin-tie strip to form a succession of fasteners, applying an adhesive to each fastener and attaching the fastener to a portion of a filled bag. The apparatus shown in these Figures comprises one station of a machine which, in subsequent operations, creases and folds the end portion of the bag and then bends the ends of the tin-tie fastener upon themselves to retain the end portion of the bag in a folded, closed condition. The apparatus is understood to include means for advancing a succession of bags continuously and without interruption, through the successive stations of the apparatus.

In the form shown in FIG. **2**, the bag-advancing means comprises a pair of belts **14** and **16** having "upper" and "lower" runs which, respectively, engage the "upper" and "lower" surfaces of the tucked and compressed end portion **12** of each bag **10** to grip the bag and retain it in a closed condition. The upper and lower runs of belts **14** and **16** are each supported against each bag end portion **12** by a succession of guide wheels **18** (only one set of these wheels being shown) which are aligned to insure linear motion of the bag end portion. This construction is substantially the same as shown and described in greater detail in the copending and commonly assigned U.S. patent application of William H. Eburn, et al, Ser. No. 274,471 filed July 24, 1972.

For the purposes of clarity as well as brevity, throughout both the drawings and specification illustration and description of standard and/or well known devices and mechanisms such as gears, motors, linkages, power transmissions, hydraulic and pneumatic actuators, switches and the like, have been omitted, particularly where their particular constructions are not pertinent to an understanding of the invention or to enable one skilled in the art to practice the invention; and the particular design and construction would not effect the basic design or operation of those components embodying the invention.

A basic component of the apparatus is a moving support member having a reentrant or continuous closed periphery formed with a groove for receiving and holding a tin-tie fastener during adhesive application and adherence of the tin-tie fastener in proper position on a bag end portion **12**. FIG. **1** of the drawings shows this support member in side elevation as a wheel **20**, and FIG. **2** further illustrates this wheel in edgewise presentation, showing it broken away at its lower part for economy of drafting space. In FIG. **2** there is also shown a shaft **21** appropriately supported on the frame structure of the apparatus for driving the wheel **20** from a power source which is operable in synchronized relation with other parts of the packaging system, as will be more fully explained in later description. FIG. **2** still further shows grooved rollers **120** and **132** synchronously driven in opposite directions of rotation through a gear train indicated generally at **140** and comprising gear members **120a** and **132a** (shown partially in dotted outline) which are respectively connected to rollers **120** and **132.** Linked to this gear train is a further gear **145,** which acts through its shaft **147** to connect and synchronize the gear train **140** with corresponding drive systems for other parts of the packaging apparatus for purposes which will be developed as description of the invention proceeds.

Various significant details of the support wheel **20** are illustrated in FIGS. **6** through **9** of the drawing, to which reference should now be had. Referring particularly to FIGS. **6** and **7,** it will be seen that the peripheral groove previously mentioned has a generally symmetrical cross-section and is bounded by side walls **22.** The oppositely disposed lips **24** of the groove are initially convergent but then diverge to produce opposed annular recesses **26.** The radially inward part of the groove comprises a relatively deep and substantially narrower secondary groove having a bottom boundary **28** and side walls **29** which terminate in radially projecting annular lips **32.** The lips **22** taken with the annular recesses **26** define displaced annular "capture spaces" adapted, as shown in FIG. **8,** to receive and retain the edge portions of a tin-tie strip here designated as **40***c*. This tin-tie strip, which may be assumed to be of the character and composition previously described, comprises (FIG. **6**) a relatively thin medial portion **42** (e.g. of a suitable plastic) and enlarged edge portions **44** in which are embedded stiffening wires **46.** The strip will ordinarily be a fraction of an inch (e.g. ⅜ inch) in width and of a length determined by the dimensions of the bag or other package with which it is to be used. In the condition in which it is shown in FIGS. **6** and **8,** the tin-tie **40***c* is bent or bowed transversely (i.e., in its transverse section) to provide an arcuate section which has its convex surface facing outwardly with respect to the periphery of the wheel **20.** In this condition, as shown in FIG. **8,** it conforms generally to the annular chamber defined at the outer periphery of the wheel **20,** its edge portions **46** being loosely "entrapped" in the "capture spaces" defined by the recesses **26** and the annular lips **32.** The outer convex surface **42** of its median portion extends radially outward to approximately the locus of a line joining the outer peripheral surfaces of the two lips **24.** As will further appear, an important aspect of the present invention consists in the means provided for introducing the tin-tie strip into the wheel-engaging location illustrated in FIG. **8** and in subsequently disengaging the strip from the wheel at a time and place which permits its immediate attachment to a moving bag or other package which it is to serve.

The apparatus provided for this purpose includes means shown in detail in FIGS. **1** and **3** through **7** for cutting successive end sections of an elongated tin-tie strip to form individual fasteners, bending the fasteners transversely (i.e., in transverse section) and inserting them in the peripheral groove of the support wheel **20** while the latter rotates continuously. These means include a guide and drive wheel **48** (FIGS. **1** and **3**) having a peripheral groove **50** which confines a continuous flat tin-tie strip **40***a* a wheel **48** is rotated to withdraw the strip from a supply and feed it into the next stage of the apparatus. This next stage provides means for bending the tin-tie strip transversely (i.e., in its trans-

verse section) into arcuate (i.e., U-shaped) cross-section and, as shown in detail in FIG. **4**, comprises a pair of juxtaposed rollers **52** and **54**. Roller **52** has a concave peripheral surface or groove **55** while roll **54** has a convex peripheral projection **53** mounted to extend into groove **55**. The tin-tie strip **40** is fed and guided by wheel **48** into the bite of driven rollers **52** and **54** which bend the strip transversely into a V-shaped form **40***b* having its convex face directed outwardly in respect to the axis of the roller **54**.

From rollers **52** and **54** the arcuately bent tin-tie strip, still in form **40***b*, is advanced through a U-shaped opening **57** in a die **58** (FIG. **5**) adapted to function as both a guide and as one component of a device for severing the end portion of the tin-tie strip to the desired length to form a fastener. The other component of the severing device comprises an L-shaped cutting member **60** pivotally mounted intermediate its ends on an arm **62**, in turn pivotally mounted about the same axis as wheel **48**. Member **60** includes a cutting edge **64** adapted to slide against the opposed face of die **58** for severing the tin-tie strip when the cutting member **60** is moved upwardly to the right as viewed in FIG. **1**. The means for moving the cutting member may take any desired form such as a solenoid, cam, pneumatically operated piston or the like (designated **63**) and adapted to engage the end section **68** of the member **60** so as to pivot arm **62** (counterclockwise) to move the cutting edge **64** to the upper right to sever the tin-tie strip. The pivotal mounting of the member **60** on lever **62** as well as the application of pressure on the end **68** of this member opposite the cutting edge tends to pivot the member in a counterclockwise direction against die **58** insuring close sliding engagement of the facing surfaces of die **58** and member **60** at the cutting edge **64**.

Variation of the length of the tin-tie fasteners is achieved simply by varying the timing of the action of cutting member **60**. During cutting movement of the member and return movement to its original position, there may be a temporary, but very short, hold up in the tin-tie strip movement through die **58**. This may result in some slight slippage of the strip relative to wheel **48** and between rollers **52** and **54**. An alternative would be to arrest the rotation of wheel **48** and rollers **52** and **54**, particularly if it is desired to provide substantial spacing between successive fasteners mounted on wheel **20** so that an extended hold-up is required.

Beyond the shaping and cutting station defined by parts **58** and **60**, the apparatus includes means, illustrated in section in FIG. **6**, for guiding the tin-tie strip **40**, leading end foremost, into the peripheral groove in wheel **20**. In the form shown, these means comprise a guide block **70** having a channel **72** adapted to engage and guide the tin-tie strip **40***c* from die **58** and a larger channel **71** which has sidewalls **7** embracing the periphery of wheel **20**. The floor of the guide block, particularly the upper bounding edges **73** of the channel **72**, are directed to approach the periphery of the wheel **20** tangentially and thus to steer the leading end the tin-tie strip toward engagement with the lips **24** of that wheel's peripheral channel. It will be noted that the natural resilience of the tin-tie strip causes it, when it is relieved of the restraints imposed by the guide block **58** (FIG. **5**) to change from the V-shape which the guide block obliges it to maintain and to assume the more nearly arcuate configuration indicated at **40***c* in FIGS. **6**, **7**, **8** and **9**.

Actual engagement of the tin-tie with the peripheral channel of the wheel **20** is accomplished by means of an insertion wheel **75** (FIG. **1**) which is shown in partial section in FIG. **7**. This wheel is provided at its outer edge with a pair of peripherally extending projections **77** which engage the arcuately bent tin-tie **40** as it leaves the guide block **70**. These projections, at their region of nearest approach to the wheel **20**, extend between the convergent lips **24** into such position as to force the enlarged edges **44** of the tin-tie strip into the capture spaces which are laterally bounded by the channel walls **26**. Once in this location the tin-tie strip is, by its own resilience, loosely trapped in the peripheral channel of the wheel **20**, as further appears in FIGS. **8** and **9**. It will be understood that any given tin-tie strip is, by electromechanically controlled timing of the cutting member **60**, cut to a length which is, first, less than the circumference of the wheel **20** and second, precisely that which is required to serve the needs of the bag or other package for which the strip is to provide the final closure. Ordinarily, this means that the strip is long enough so that, when centered on the package surface to which it is to be attached, its extremities extend beyond the edges of that surface by a predetermined amount. The first of the conditions as to length specified in the next to last sentence above assures that upon its final passage of the insertion wheel **75**, the entire length of the tin-tie will be retained in the peripheral groove of the wheel **20** with the central portion of its outwardly bent cross-section lying in a circle the circumference of which is approximately that of the outer edges of the wheel **20**.

After passing the insertion wheel **75**, the tin-tie strip mounted in the peripheral groove in wheel **20** is rotated past an adhesive applicator station shown at **80** in FIG. **1**. In the embodiment shown, the applicator is adapted to apply a molten thermoplastic adhesive to a medial portion of the tin-tie fastener periphery as the latter moves past the applicator. The structure of the adhesive applicator includes, as basic components, a container **82** for the adhesive including (if required) heating means (not shown) for maintaining the adhesive in a molten condition and an applicator roller **84** mounted for rotation with the major portion of its surface immersed in the molten adhesive while the upper portion of its surface is located above the surface of the adhesive. The applicator is mounted beneath wheel **20** on a pneumatically or hydraulically operated piston and cylinder system or a solenoid, etc. **86** of a conventional type adapted to raise the adhesive container **82** and applicator roller **84** into contact with a tin-tie fastener to apply adhesive thereto and then lower the applicator roller away from contact with the tin-tie fastener when adhesive application is completed. A guide rail for fixing the path of movement of the container **82** is indicated at **87**. The length of the fastener to which the adhesive is applied is controlled simply by coordinating the timing of raising and lowering of the adhesive applicator with the actuation of cutting member **60** which determines the length of the fastener. To facilitate this coordination, the wheel **20** is rotated continuously and at constant speed (counterclockwise viewing FIG. **1**). In a preferred mode of operation, the speed of rotation of the wheel **20**, and the timing of actuation of the cutting member **60** and the adhesive container **82** are, synchronized through appropriate drive linkages so that the leading edge of the tin-tie strip arrives at the adhe-

sive applicator station shortly before the applicator is moved into its adhesive-applying position, and, conversely, the applicator is wtihdrawn shortly before the trailing end of the strip reaches that station. In this way, the extremities of the tin-tie strip are left free of adhesive so that they may be more readily manipulated by other parts of the packaging machinery.

Further preferred details of the adhesive applicator are shown in FIG. **8.** In that Figure, the applicator roller **84** is shown as having a peripheral groove **88** which induces the development of a central meniscus **89** of adhesive along the center of the peripheral surface of the roller as the roller rotates in and out of contact with the supply of adhesive in the container **82** (FIG. **1**). This meniscus tends in turn to deposit a bead of adhesive along the center line of the tin-tie strip **40***c* as the strip is rotated past the roller and in near contact with it. This arrangement is useful in avoiding unnecesary deposits of adhesive on the edge surfaces of the wheel **20** where they might in time result in obstructive accumulations.

After passing the adhesive applying station, where its convex surface is necessarily and intentionally directed downwardly, the tin-tie strip **40***c* is then carried along the reentrant path established by the wheel **20** to a point **100** (FIG. **1**) at which its convex surface is upwardly directed. Assuming that at the instant of time represented in FIG. **1** the lead end of a given adhesive-bearing tin-tie strip has just reached point **100,** it would be the intended operation of the apparatus (in the application presently under consideration) that the forward edge of a bag closure **12** would be an inch or more from that point but approaching the point at a speed identical with the surface speed of the strip as impelled by the wheel **20.** The distance differential chosen (i.e., under the control of the system's electromechanical governing apparatus) should be such as to bring the leading edge of the bag part **12** to the point **100** at approximately (or a little before) the time when the adhesive-bearing part of the tin-tie strip reaches that point In these circumstances, and a very short time interval later, a vertical section taken through point **100** would disclose the relationship of parts shown in FIG. **9.**

Here, and limiting discussion for the moment to parts already described, the bead of adhesive **89** carried by the adhesive-bearing section of the tin-tie strip **40***c* is shown as being in tangential contact with the underside of the bag closure part **12.** Further aspects of the invention, to be described immediately below, are concerned with means for (*i*) progressively removing the tin-tie strip **40***c* from the wheel **20** and (ii) compressively flattening the adhesivebearing section of the tin-tie strip against the under surface of the bag part **12.**

The removal and compression functions just referred to are initiated by use of a stripping device shown in both FIGS. **1** and **9,** but illustrated separately in detail in FIG. **10.** Cooperating with the stripping device, which is designated as a whole by the numeral **110,** there is provided a guide roller **120** having a peripheral groove **122** for supporting an endless belt **124.** The roller turns (or is driven) clockwise so that the lower course of the belt runs to the left along a line which is roughly tangential to the path of the upper surface of the tin-tie strip as it approaches the point **100.** Clearances are such that at the time the leading edge of the bag part **12** reaches the point **100,** the various elements have the relationship indicated in FIG. **9.** That is to say, the belt **124** (which, for reasons to be mentioned below, is preferably constructed of metal ribbon) applies compression to the upper surface of the bag part **12.**

Beneath the tin-tie strip **40***c*, taken at point **100,** there projects the entering or nose part **112** of the stripping device **110.** This extends into the secondary channel **29** formed in the wheel **20,** and at the location shown in FIG. **9** does not quite contact the under surface of the tin-tie strip. However, as the leading end to the tin-tie strip moves farther to the left, it shortly engages the inclined ramp surface **114** and is wedged up and away from the periphery of wheel **20.** The flexibility of the strip material is sufficient to permit release of the edges of the strip from the "capture spaces" in which they have been retained up to this point. Accordingly, as motion of the tie strip continues it is slid forward to the left along the shaft **116** of the nose piece **112** until it reaches a second and broader ramp formed by inclined surfaces **118** provided on parts **119** which are laterally secured to the nose piece **112.** At this point the lateral edges **44** of the tin-tie strip are engaged by the surfaces **118,** and the tie strip (still under downward compression by the belt **124**) is progressively flattened in its transverse section until, as it reaches the final upper surface **119***a* of the stripping device, it restored substantially to the wholly flattened condition in which it is shown in FIG. **3.**

In this condition, and as the tin-tie strip passes off the left end of the stripping device **110,** it is immediately carried onto the upper surface of a second metal belt **130** carried by a peripherally grooved roller **132.** The belt **130** is similar to the belt **124** except that its upper course moves to the left — at a speed identical with the similar motion of the lower course of the belt **124.** Thus, the bag closure **12** and the tin-tie strip are continued under compression by the opposing actions of the two belts. Moreover, because these belts are constituted of metal or other heat-conducting material (as previously explained), they are useful for setting the adhesive being compressed between the tin-tie strip and the bag closure part. That is to say, if the adhesive employed requires to be cooled to promote its hardening, the two belts provide a heat sink by which such cooling can be accomplished. On the other hand, if a thermo-setting adhesive is used, the belts can readily be heated, either by electric resistance heating or by radiation, to a temperature sufficient to produce the desired curing effect.

The positioning of the tin-tie fastener relative to the bag end portion is controlled simply by properly timing the actuation of the cutting member **60** and/or the spacing between bag end portions **12** inasmuch as in the preferred embodiment, the knife and adhesive applicator are the only components which move intermittently and the timing of which needs to be controlled and coordinated with the arrival of bag end portions at the tin-tie fastener attachment station. The latter is primarily a function of the spacing of the bags and is controlled thereby inasmuch as the components which carry the tin-tie fasteners and move the bags linearly all move continuously and at constant, coordinated speeds which can be relatively rapid.

As previously noted, the length of the bag end portions measured in the direction of travel may be varied and the length of the tin-tie fasteners may be adjusted in a comparable manner. This is accomplished simply by altering the timing of the actuation of the tin-tie sev-

ering knife, the raising and lowering of the adhesive applicator, and the spacing between bag end portions. Variation of the timing of the intermittently operated components controls the length of the fasteners and the adhered area while the spacing of the bag end portions properly locates the fasteners with respect to the bag ends. Thus, it will be seen that tin-tie fastener attachment to the bag is essentially a continuous, high speed operation readily adapted to variations in fastener width, adhesive length, and bag width, while providing for accurate positioning of the fasteners and secure attachment thereof.

Since certain changes may be made in the above apparatus without departing from the scope of the invention herein involved, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. Apparatus for adhering a tin-tie of extended length, moderate width and slight thickness to a surface with which it is to coact, comprising

A. means for deforming the transverse section of the tin-tie into a configuration having a convex arcuate surface;

B. means for confining the edges of the tin-tie to maintain its arcuate configuration while adhesive is applied longitudinally to the central portion of the convex arcuate surface; and

C. means for conveying the convex arcuate surface, with its edges still confined, into progressive engagement with the surface with which it is to coact.

2. Apparatus for adhering a tin-tie of extended length, moderate width and slight thickness to a continuously moving surface with which it is to coact, comprising

A. means for deforming the transverse section of the tin-tie into arcuate form;

B. means for confining the edges of the tin-tie to maintain its arcuate form and for moving successive longitudinal elements of the edge-confined tin-tie along a path which

1. first approaches tangentially a source of transferable adhesive so that adhesive is applied progressively to the central longitudinal portion of the tin-tie's convex arcuate surface and

2. thereafter approaches tangentially the path of movement of the surface with which the tin-tie is to coact, whereby that surface is progressively bonded to the adhesive-bearing surface of the tin-tie.

3. Apparatus according to claim **2** in which the said path is curvilinear and of such form that the convex surface of the tin-tie is presented in a down-oriented direction to the source of adhesive and in an up-oriented direction to the surface with which it is to coact.

4. Apparatus for attaching tin-tie strips to a succession of containers comprising, in combination

A. a rotatable support member having a closed continuous periphery and an annular groove formed in and coextensive with that periphery;

B. means for rotating the support member;

C. means for arcuately bending the transverse section of a tin-tie strip wider than said groove and for feeding the bent strip lengthwise into said groove for temporary retention therein with its convex arcuate surface outwardly directed;

D. applicator means mounted adjacent the periphery of said member for applying an adhesive to the outwardly directed surface of a strip retained in said groove during rotation of the member relative to said applicator means;

E. means for advancing a container along a path tangent to the periphery of said member; and

F. means for simultaneously disengaging an adhesive-bearing strip from said groove and pressing the adhesive-bearing surface of the strip into contact with a container as the latter is moved tangent to the periphery of said member.

5. Apparatus according to claim **4** in which the side walls of said groove are undercut to facilitate retention of a strip therein.

6. Apparatus according to claim **4** wherein the last-mentioned means include a stripping element extending tangent to the periphery of said member into said groove in a direction opposed to the direction of rotation of the member for guiding a strip from said groove into contact with the material of a container.

7. Apparatus according to claim **6** which further includes a backing member for pressing the container material against the strip during and after the action of the stripping element.

8. Apparatus according to claim **7** wherein said backing member comprises an endless belt and further including means for advancing said endless belt at the same linear speed and in the same direction as the strip and container material.

9. Apparatus according to claim **8** further including a second endless belt supported for co-directional movement in juxtaposition with the first-mentioned belt for gripping the container material and strip between said belts.

10. Apparatus according to claim **9** wherein said belts are formed of a heat conductive material for atemperating the adhesive to promote firm adherence of the strip to the container material.

11. Apparatus according to claim **4** which further includes means for cutting a strip to desired length during introduction of the strip into said groove.

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