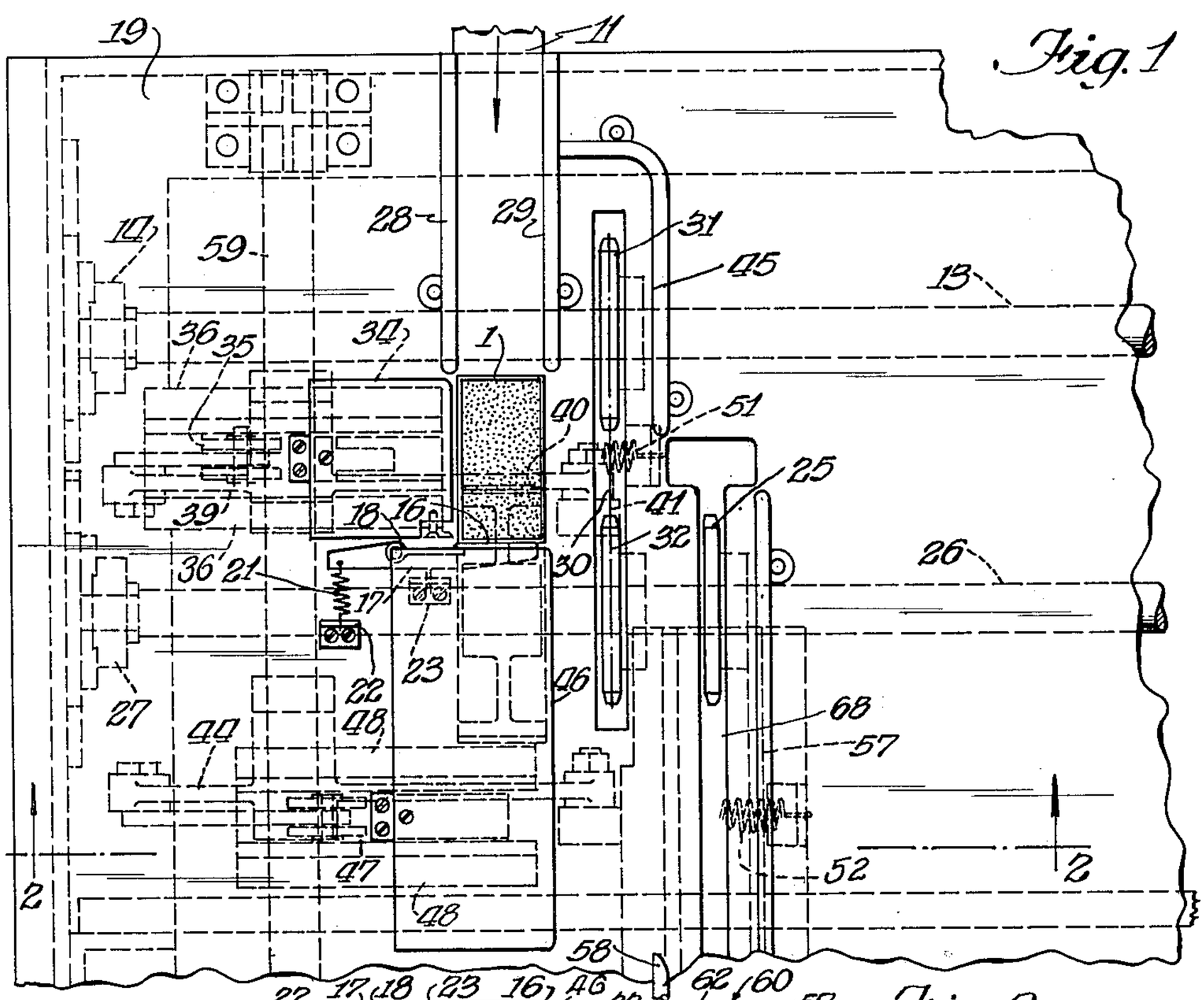
March 3, 1953 J. RIEMER 2,629,977

PACKAGE TOP SEALING APPARATUS

Filed Nov. 4, 1947 7 Sheets-Sheet 1

Fig. 1



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PACKAGE TOP SEALING APPARATUS

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Fig. 3

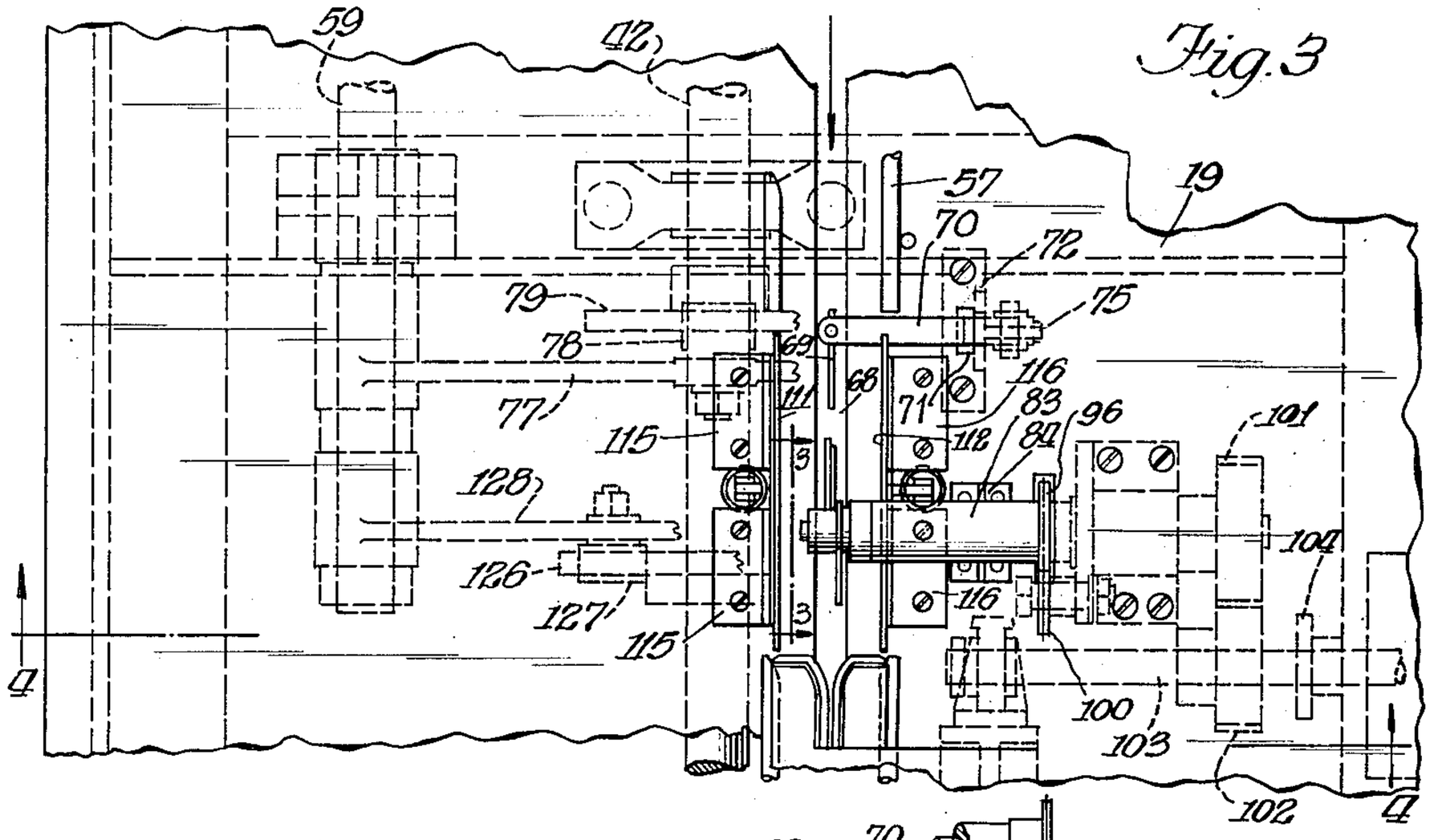

Fig. 4

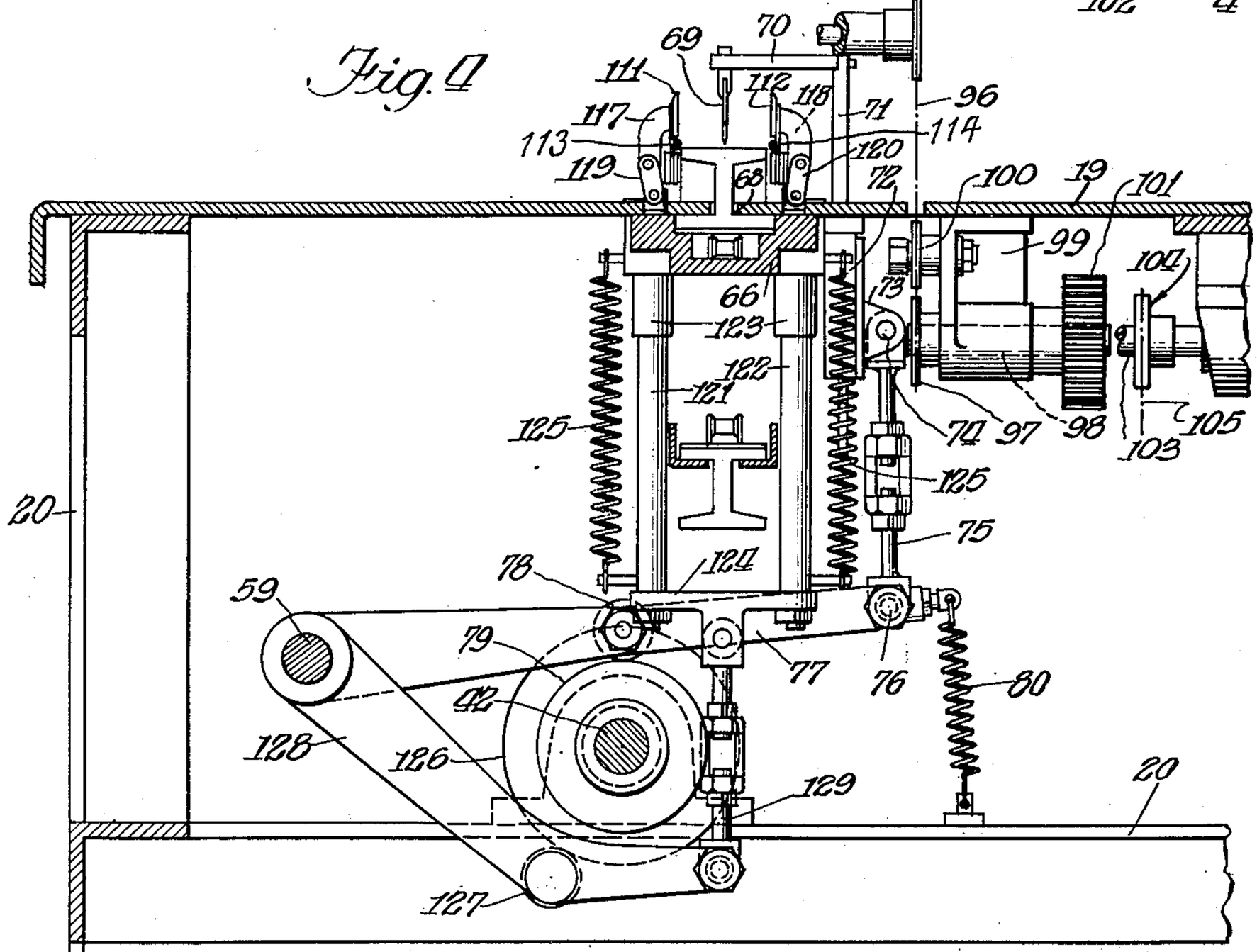

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Fig. 5

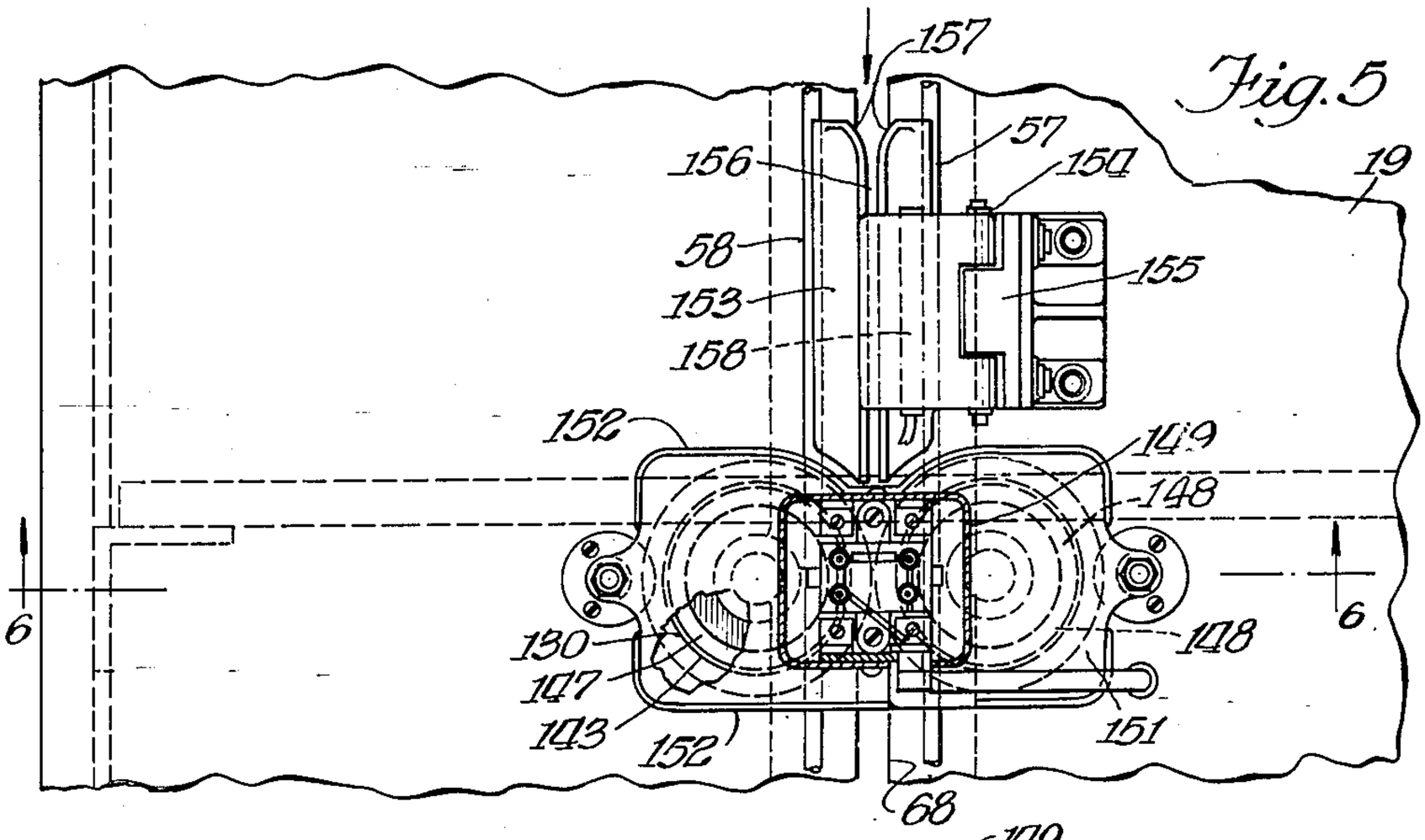
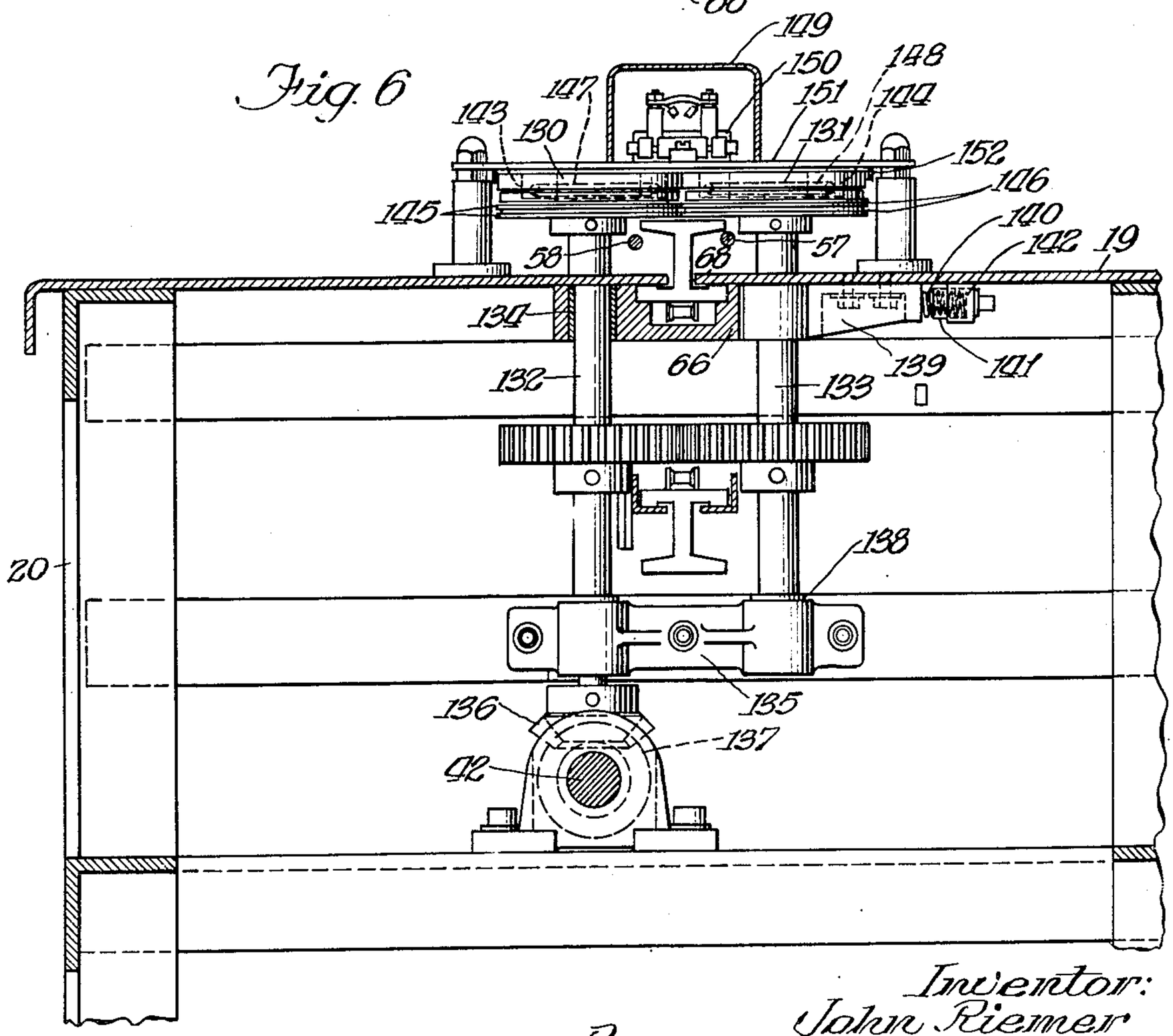


Fig. 6



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PACKAGE TOP SEALING APPARATUS

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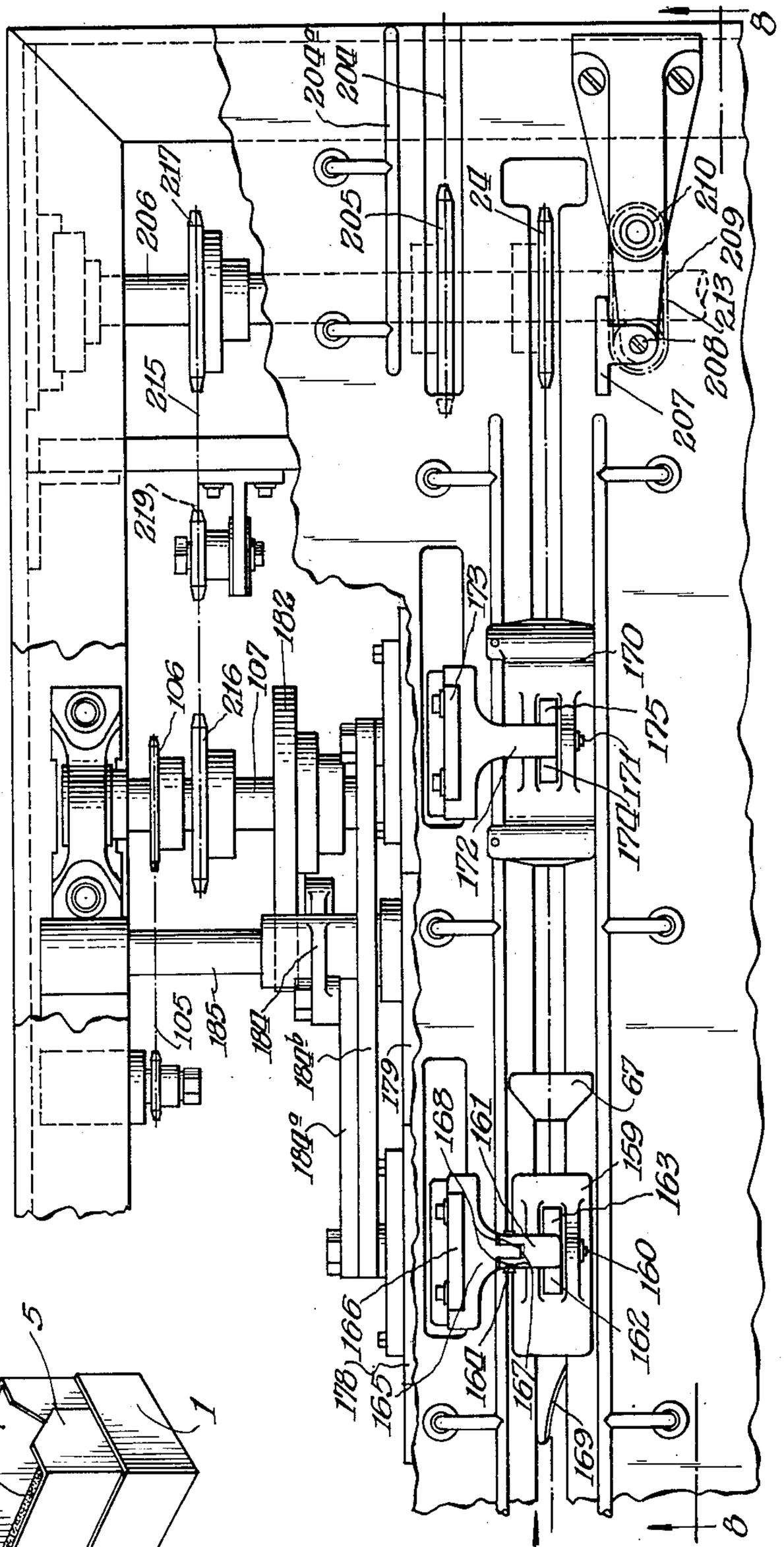

Fig. 7

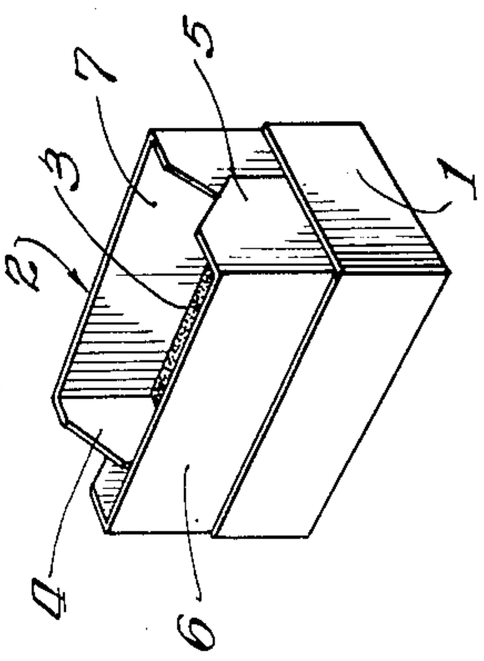

Fig. 10

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PACKAGE TOP SEALING APPARATUS

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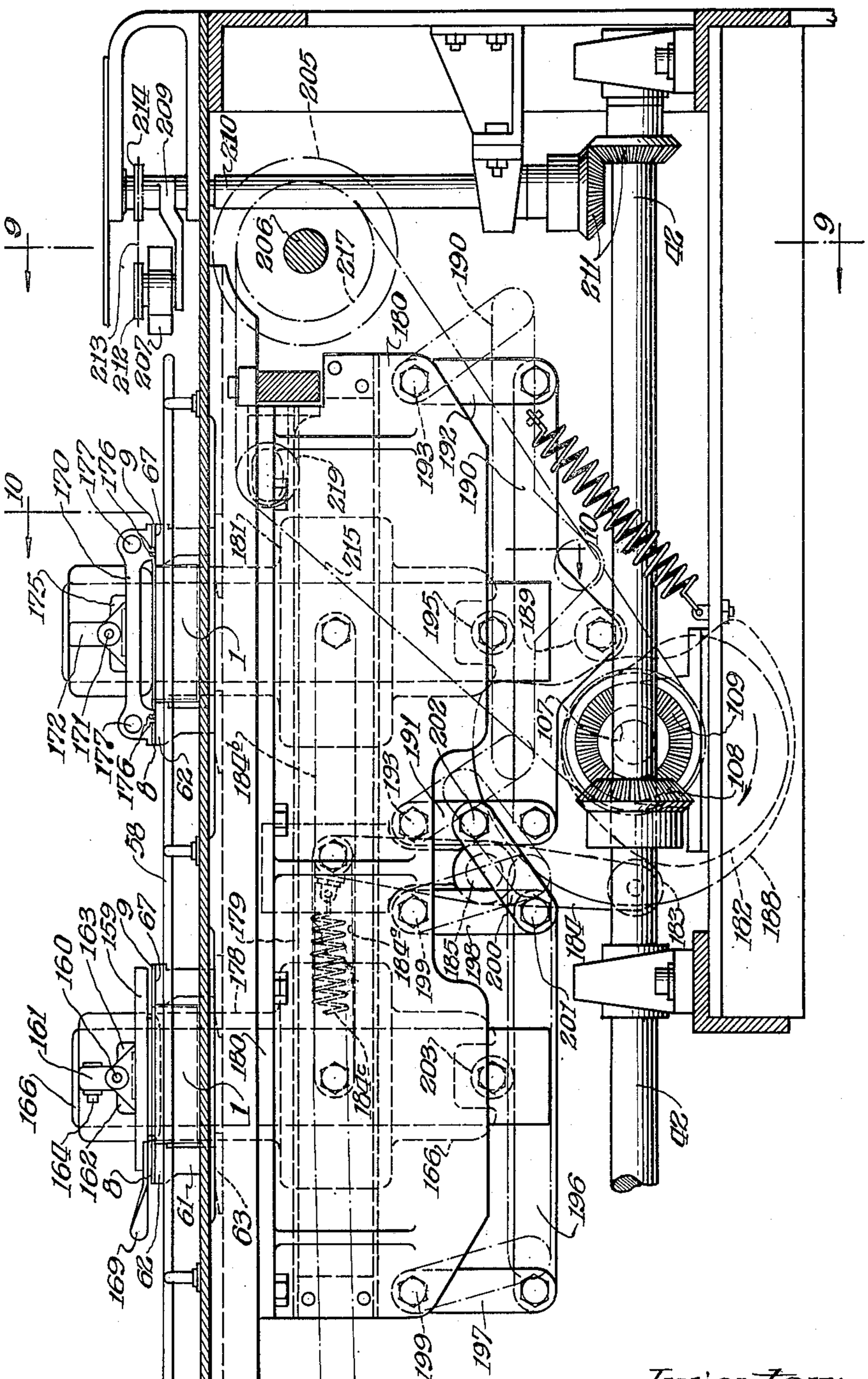

Fig. 8

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March 3, 1953 J. RIEMER 2,629,977

PACKAGE TOP SEALING APPARATUS

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Fig. 9

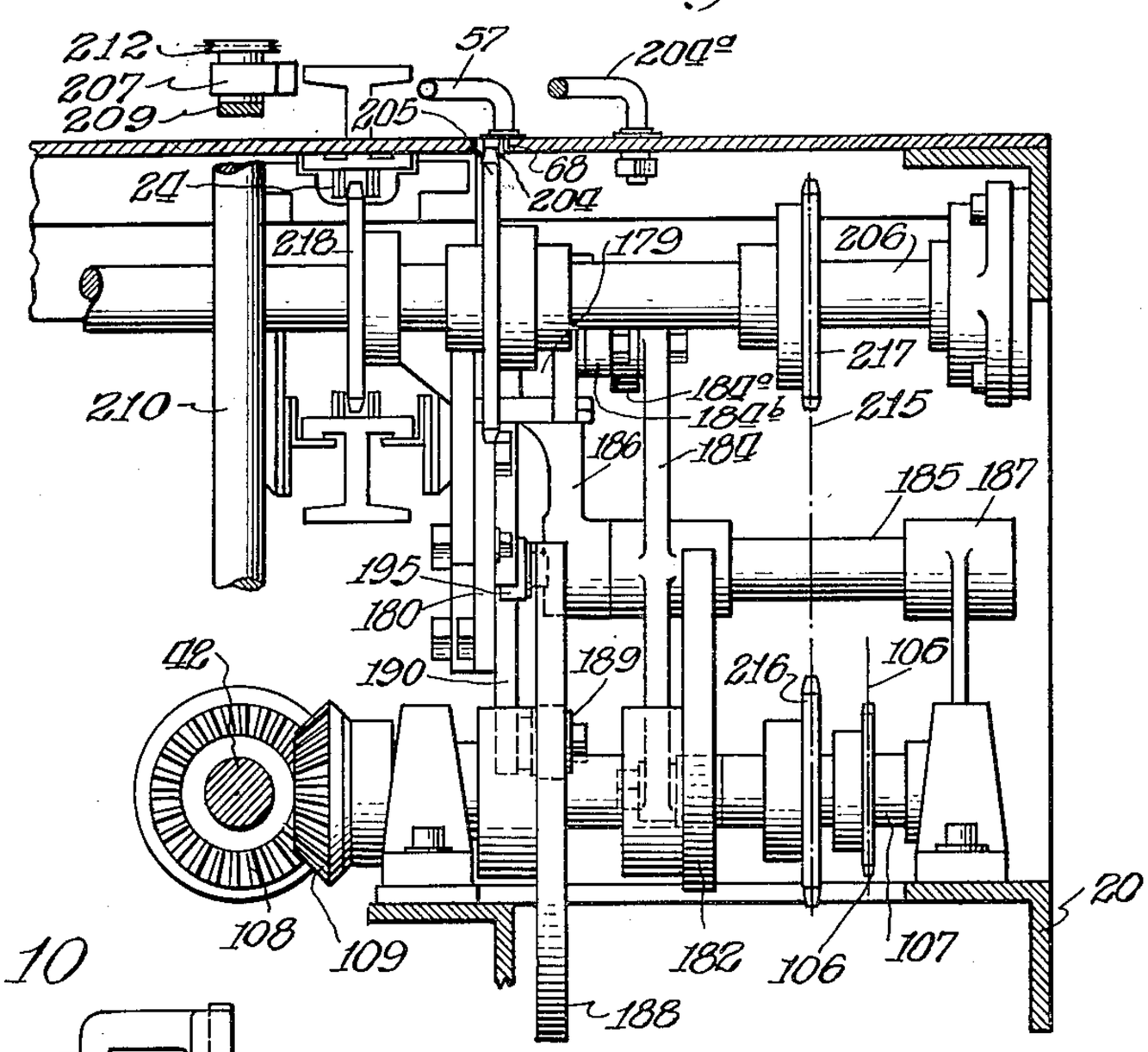


Fig. 10

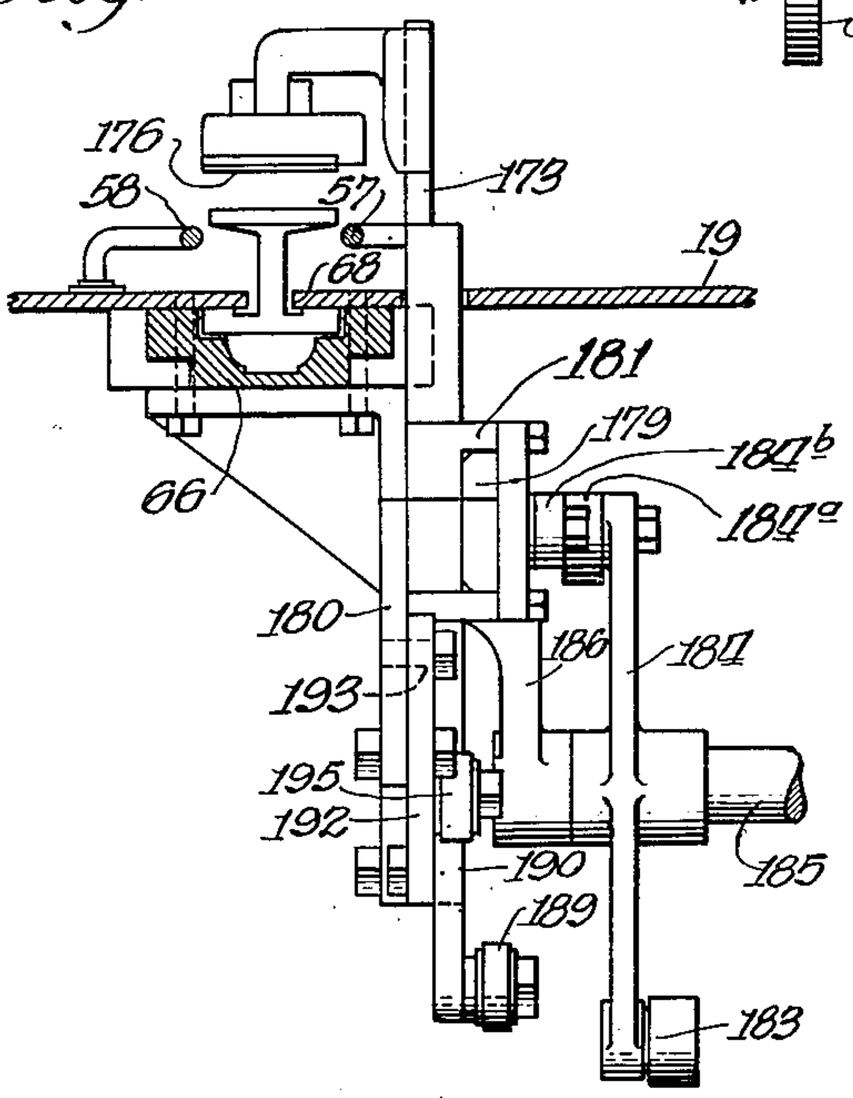
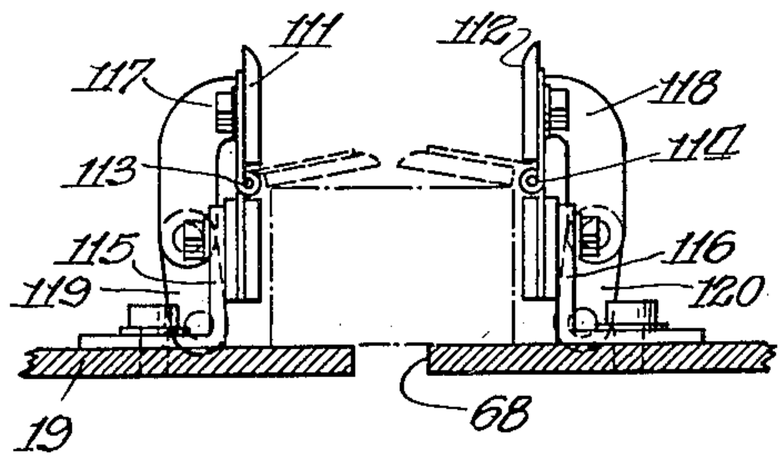


Fig. 11



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PACKAGE TOP SEALING APPARATUS

Filed Nov. 4, 1947 7 Sheets-Sheet 7

Fig. 12

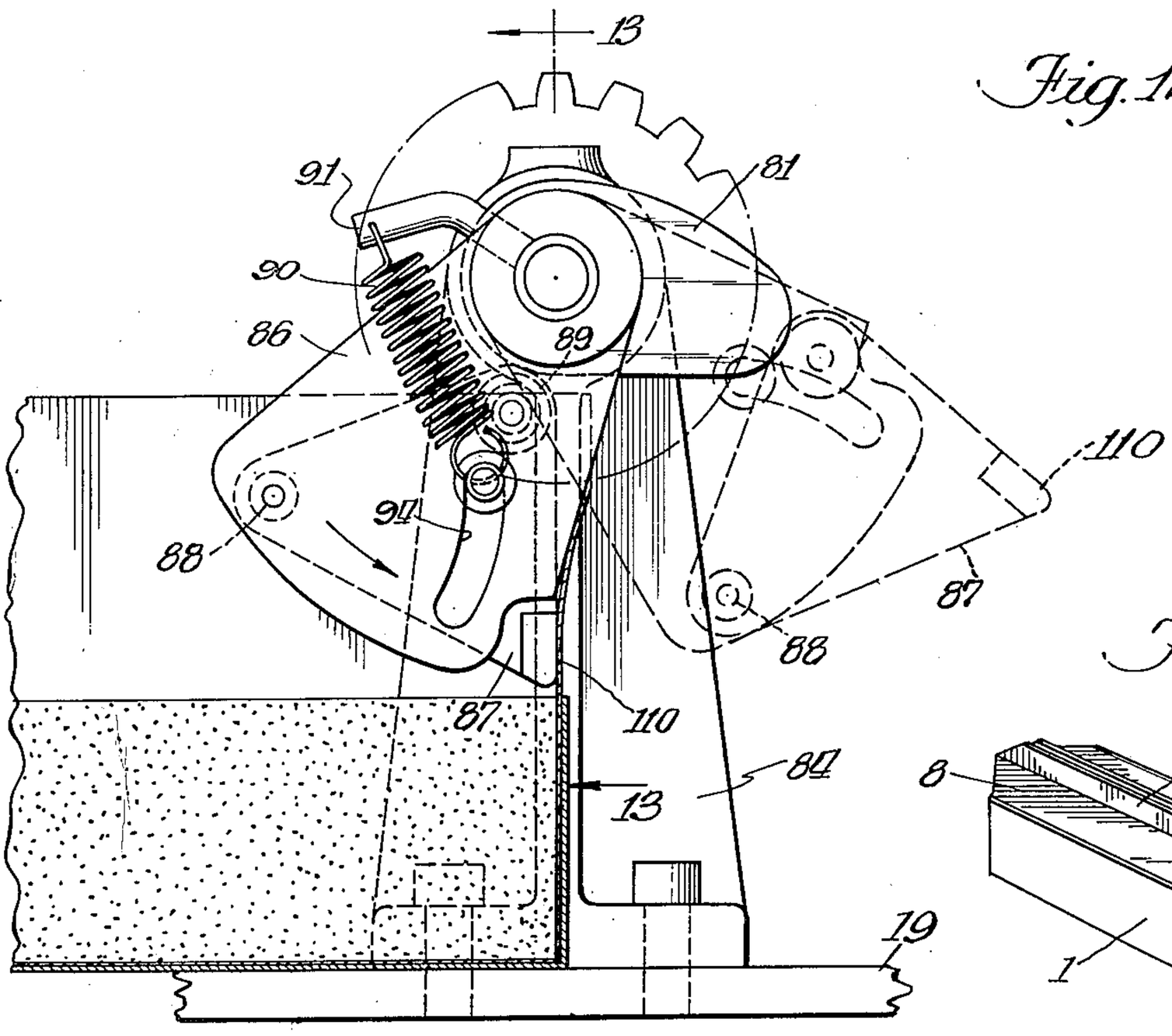


Fig. 15

Fig. 13

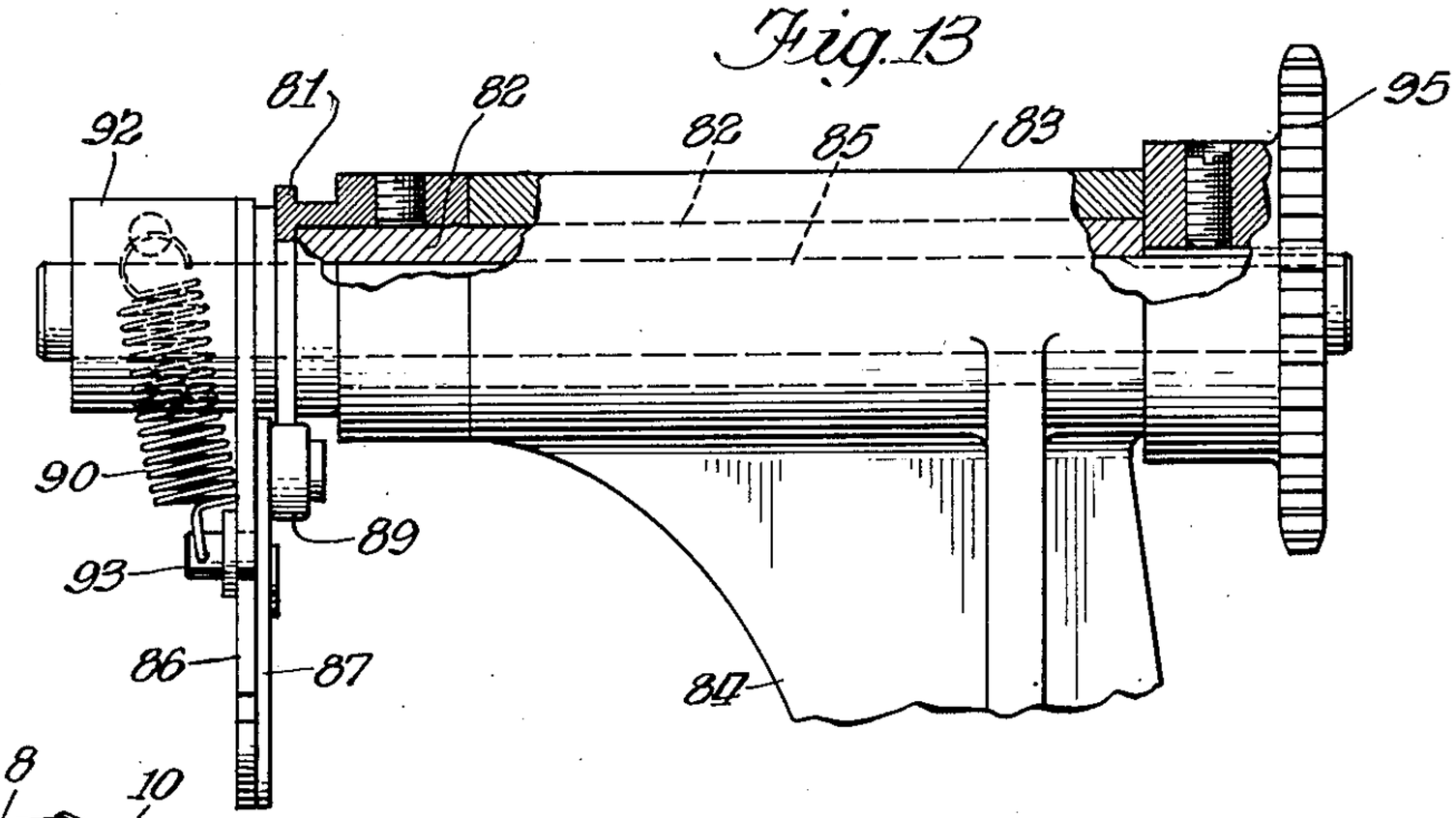
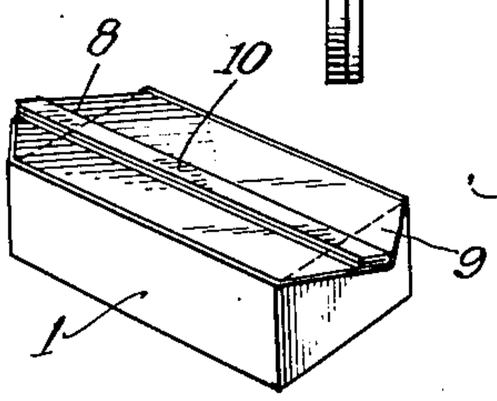


Fig. 16



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Patented Mar. 3, 1953

2,629,977

UNITED STATES PATENT OFFICE

2,629,977

PACKAGE TOP SEALING APPARATUS

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Application November 4, 1947, Serial No. 783,939

5 Claims. (Cl. 53—144)

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This invention relates to apparatus for sealing the tops of bags or other containers which have previously been filled with material, and the invention is more particularly concerned with mechanism for closing the bag-like liner of a paperboard tray or like container such as is employed for packaging cheese and perhaps other products. In the preparation of such package, a paperboard tray is initially lined with a suitable impervious material, the liner being so applied and so formed that the portions thereof which line the side walls of the tray extend upwardly beyond the upper edges of the said side walls and are adapted to be folded inwardly over the top of the material with which the lined tray is filled so as to close the container.

One apparatus for closing and sealing containers of the type herein referred to is shown in U. S. Patent No. 2,331,927 to Palmer, October 19, 1943, and this application is concerned with certain refinements and improvements on the said Palmer patent mechanism.

The main objects of the present invention are to provide a mechanism of the character indicated which will receive the filled but open topped packages one by one from a filling machine and unerringly transfer the same to a conveyor for conducting the packages through mechanisms which perform the operations of closing and sealing the package; to provide improved mechanism for closing the package and sealing the same along lines extending both longitudinally and transversely of the package and its direction of travel through the apparatus; to provide such improved closing and sealing mechanism which will be operative during travel of the package in a unitary direction, and which will be operative during continuous or uninterrupted travel of the package; to provide mechanism for ejecting the package from the closing and sealing apparatus and delivering it to the conveyor and other apparatus for subsequently acting on the package without turning the package, but at the same time shifting the package laterally from the path of travel of the conveyor of the closing and sealing apparatus to the path of travel of the conveyor of the subsequent mechanism which may be laterally offset relative to the sealing apparatus conveyor; and, in general, it is the object of the present invention to provide an improved package closing and sealing apparatus of the character indicated.

Other objects and advantages of the invention will be understood by reference to the following specification and accompanying drawings (7

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sheets) wherein there is disclosed apparatus embodying a selected form of the invention, and designed for the purpose of closing and sealing cheese packages lined with thermoplastic or thermoplastically coated lining material.

The foregoing reference to the closing and sealing of cheese packages is not intended to limit the applicability of the apparatus to the packaging of other materials, and this mention of cheese packaging occurs merely because the present apparatus was designed for that purpose, and this particular apparatus is herein illustrated and described as representing a satisfactory exemplification of the invention.

In the drawings:

Fig. 1 is a top plan view and Fig. 2 is a cross-section approximately on the line 2—2 of Fig. 1, these views illustrating mechanism for receiving the open packages and placing them on a conveyor for carriage through closing and sealing mechanism;

Fig. 3 is a plan, and Fig. 4 is a cross-section approximately on the line 4—4 of Fig. 3, these views representing a portion of the apparatus to which open and unsealed packages are delivered from the mechanism shown in Fig. 1, and whereby the packages are closed;

Fig. 5 is a plan, and Fig. 6 is a cross-section on the line 6—6 of Fig. 5, these views representing a portion of the apparatus which acts on the packages to partially seal the same in closed condition;

Fig. 7 is a plan, and Fig. 8 is a section approximately on the line 8—8 of Fig. 7, these views illustrating mechanism by which sealing of the package is completed and whereby the sealed package is transferred to another conveyor which is laterally offset from the conveyor of the sealing apparatus;

Figs. 9 and 10 are cross-sections respectively approximately on the lines 9—9 and 10—10 of Fig. 8;

Fig. 11 is an enlargement of certain elements of mechanism appearing also in Fig. 4;

Fig. 12 is a side elevation on an enlarged scale of a unit of mechanism which appears also in the top plan view in Fig. 3;

Fig. 13 is a section on the line 13—13 of Fig. 12;

Figs. 14, 15 and 16 are perspective illustrations respectively of the top of the package delivered to the present apparatus, an intermediate condition of the package, and the final condition of the package as discharged from the present apparatus.

The package which the present apparatus closes and seals is represented in Fig. 14. It consists of a paperboard outer container 1 which is of generally rectangular formation having a bottom wall and a side wall extending upwardly therefrom, the details of construction of the container being of any desirable form, and of no importance in respect of the present subject. The container 1 is lined with a sheet of thermoplastic or thermoplastically coated sheeting represented at 2, the liner extending upwardly beyond the upper edges of the container 1 to provide material which is adapted to be folded over the top of the content of the package and sealed to provide a substantially air-tight and moisture-proof package. The package as received by the present apparatus has already been filled with cheese (or other material), the top surface of which is represented at 3, and the level of which is approximately in the plane of the top edges of the outer container 1.

During the travel of the package through the present apparatus, the end portions 4 and 5 of the upstanding liner are folded outwardly and the upstanding side portions 6 and 7 of the liner are folded inwardly over the top 3 of the package content, the upper marginal portions of the end and side walls being brought into upstanding face-to-face relation to produce a structure as illustrated in Fig. 15. In Fig. 15, the package is illustrated as having outwardly extending end ears 8 and 9 formed as a result of the outward folding of said end portions 4 and 5 of the liner, and upstanding face-to-face flange-like portions 10 formed as the result of bringing together the side portions 6 and 7 of the liner walls as aforesaid. During the passage of the package through the present apparatus, the upstanding flanges 10 are sealed together and then folded down into face-to-face engagement with the top of the package so that when the package is discharged from the present apparatus it appears as shown in Fig. 16.

Filled, open-top packages, such as represented in Fig. 14, are delivered to the present apparatus by a conveyor 11 (Figs. 1 and 2) which is supported in the present apparatus by a pulley 12 carried by a shaft 13. The shaft 13 is journalled in suitable bearings, one of which is represented at 14, which are carried by a part of the frame structure of the present apparatus. The belt 11 also extends around a suitable pulley constituting a part of the package filling machine, or the belt may merely be a conveyor belt for transferring the filled packages from the filling machine to the present closing and sealing apparatus.

The conveyor 11 enters the present apparatus in the direction indicated by the arrow thereon, and it carries the filled, open packages in an endwise direction to deliver them successively against the free end portion 16 of a stop arm 17. The stop arm 17 is pivoted intermediate its ends as indicated at 18 on the top plate 19 of the apparatus, the said top plate being supported by the frame structure 20, all parts of which are herein referred to by this reference number 20. The opposite end of the stop arm 17 is connected by a spring 21 to a spring anchor 22 which is also secured to the top plate 19. The spring 21 is a relatively light spring which is strong enough to rock the lever 17, but not strong enough to resist opposite rocking of the lever under the force of a container directed against the arm end 16 by the conveyor 11. Rocking of the stop arm under the force on a container delivered thereagainst is limited by an adjustable set screw 23.

A conveyor 24 (see Fig. 2) is provided for propelling the packages continuously through the various operating units of the mechanism, the said conveyor being a chain conveyor which is supported at its receiving end by a sprocket 25 which is carried by a shaft 26, the latter being suitably journalled in bearings carried by the frame structure as represented at 27 (Fig. 1). This conveyor 24 is offset laterally from the line of the delivery conveyor 11, and as illustrated, it is offset in this instance a distance approximating twice the width of the containers. There is no special significance in this relationship between the container width and the spacing of the conveyor 24 from the conveyor 11 except to indicate that the spacing is substantial. It is preferred to employ two steps of movement to deliver the containers laterally from the conveyor 11 to the conveyor 24, especially in view of the fact that the conveyor 24 is propelled continuously while the package is initially at rest relative to the travel of the conveyor 24, and thus has considerable inertia to being moved endwise by the conveyor 24. To facilitate transfer of the packages over the wide space indicated, and to initiate endwise travel of the packages without imposing intermittent shock loads on the conveyor 24, the following two-step transfer mechanism is provided.

The packages delivered to the present apparatus are guided by guide rods 28 and 29, respectively, located along the side edges of the conveyor 11. As shown in Fig. 1, the filled container 1 has been delivered against the stop arm portion 16 and is in position for initial transverse movement into the path of travel of an intermediate or auxiliary conveyor 30 which travels continuously over sprockets 31 and 32 on the shafts 13 and 26, respectively. The conveyor 30 is provided with pusher arms 33 (Fig. 2) at suitably spaced intervals for engaging the rear end of the package delivered thereto so as to pick up and propel the package in the endwise direction in which the package is to be moved through the apparatus.

A pusher 34 is supported for horizontal sliding movement crosswise of the path of the direction of travel of the containers, by means of a pusher slide 35 which is horizontally slidably mounted on the underside of the table plate 19 through the agency of suitable guides 36—36 which are suitably secured to the underside of the table plate 19. The pusher slide 35 has a depending ear 37 (Fig. 2) which is connected by means of a short link 38 to the free end of the arm 39 by a bell crank lever, the other arm 40 of which has its free end provided with a cam following roller 41 (Fig. 1) adapted to engage a rotating cam (not shown) mounted on the rotatably driven shaft 42 which is suitably journalled in bearings carried by the frame structure.

The cam which is not shown is similar to the cam 43 (Fig. 2), and the bell crank comprising the arms 39 and 40 is similar to the bell crank 44 which actuates a second transfer pusher which will presently be described. The cam 43 and bell crank 44 as seen in Fig. 2 conceal the cam which acts on the bell crank arm 40, and the bell crank 44 similarly conceals the bell crank arms 39 and 40, wherefore they do not appear in Fig. 2. The cam which actuates the bell crank arms 39 and 40 and the pusher 34 is properly shaped and timed to effect lateral shifting of the container

1 so that the container will be delivered over the conveyor 30 in front of one of the conveyor pushers 33 rather than against the side of the finger. This timing is, of course, effected by inter-connecting the shaft 26 with the cam shaft 42 by means of driving gears or chains or by other suitable means whereby these shafts may be timed relative to each other. Such driving connections are well known to those skilled in the art, and, therefore, not herein illustrated.

An auxiliary guide rail 45 (Fig. 1) is provided to limit the transverse movement of the container by the pusher 34. This guide rail is suitably mounted on the table plate 19, and may be fabricated as a part of the guide rail 29 substantially as illustrated.

The package which has been initially transferred to the intermediate conveyor 30 will, of course, be propelled endwise by that conveyor, and it will thereby be brought alongside a second pusher 46 which is elongated, as shown, in the direction of travel of the package. The pusher 46 is mounted for transverse sliding movement through the agency of a slide member 47 which is slidably mounted in guides 48—48 which are secured to the underside of the table top 19. The slide 47 is reciprocated through the agency of a link 49 which has its ends connected respectively to an ear 50 depending from the slide 47 and the upper end of one arm of the bell crank lever 44, the other arm of which has its end provided with a cam following roller 44*a* for engagement with the rotating cam 43.

Springs indicated at 51 and 52 are provided for yieldingly urging the pushers to move in their operative directions, and the cams retract the pusher. The spring 51 is stretched between an anchor bracket 53 and an attaching ear 54 which is secured to the slide 35. Similarly, the spring 52 has one end secured to an anchoring bracket 55 and its other end secured to a spring attaching bracket 56 which is secured to the pusher slide 47. In the event of any obstruction to the normal transferring movement of the pushers, the springs 51 and 52 will yield, that is to say, they will not force the pushers to the extent of causing breakage if normal movement is obstructed, and the movement of the pushers is, of course, timed by the cams which also serve to retract the pushers as already indicated.

The pusher 46 is elongated, as aforesaid, so that it will be operative against the package which is in endwise movement as a result of its engagement by the auxiliary conveyor 30, and also as a result of its subsequent engagement with the main conveyor 24. By elongating the second pusher 46, the package will positively be positioned squarely in the path of travel of the conveyor 24 with one side of the package in guiding engagement with the guide rail 57. As the package advances with the conveyor 24, its travel is additionally guided by a guide rod 58 so that the travel of the package is normally guided between the said guide rails 57 and 58.

The bell crank 44 and the bell crank comprising the arms 39 and 40 are pivotally mounted on a shaft 59 which is suitably supported in brackets secured to the frame structure.

The conveyor 24 is provided with upstanding pusher arms 60 which are suitably secured to the conveyor chain 24. Said pushers 60 have narrow central arms 61, upper end cross arms 62, the width of which is approximately the same as the width of the packages being propelled, and lower end cross arms 63 which are formed to slidably fit in guide ways 64 and 65 formed in a guide strip 66 which is secured to the bottom of the table top 19, and additionally supported through the agency of brackets (not shown) connected to the frame structure. The lower cross arms or bases 63 of the pushers are elongated in the direction of travel of the pushers as shown in Fig. 8 so that the pushers are effectively guided against turning in their tracks. The length of the bases 63 together with their depth also serves to prevent tipping of the pushers rearwardly because of resistance of the package to movement, the said base thickness being such as to fit between the bottoms of the ways 64 and 65 and the underside of the table plate 19, as clearly shown in Fig. 2.

The heads 62 of the pushers are widened in the direction of travel of the conveyor so as to form anvils or platens over which one of the end ears (8 or 9) of the container package will be positioned for sealing purposes as will presently be explained. For a similar sealing purpose, the conveyor 24 is provided with anvil members 67 (Fig. 8) which may be of substantially the same construction as the pusher members. An anvil member 67 is provided in association with each pusher member, and the cooperating pusher and anvil members are so spaced from each other that the length of the packages will freely fit between the members with the ears 8 and 9 (which are ultimately formed on the package) overlying the tops of the pusher and anvil members. The table top 19 is, of course, slotted as indicated at 68 (Fig. 1) for the passage of the upstanding central parts of the pushers and anvils.

The package having been delivered to the conveyor 24, is then in continuous motion through the apparatus and it is first brought into the zone of operation of mechanism which folds the upstanding liner portions from the condition illustrated in Fig. 14 to the package-closing position illustrated in Fig. 15. The liner-folding mechanism is similar to that shown in the above-mentioned Patent 2,331,927. It consists of a vertically reciprocable but otherwise stationary end folder 69 (see Figs. 3 and 4) which is carried by a cross arm 70 secured to the upper end of a vertically reciprocable rod 71. The rod 71 is vertically slidably mounted in a suitable bracket or guide 72 which is secured to the conveyor guiding strip 66 and the underside of the table top 19. An ear 73 projecting laterally from the rod 71 through a vertically extending slot in said guide 72 has pivoted to it as indicated at 74 one end of an adjustable link 75. The other end of said link is pivoted as indicated at 76 to the free end of a long transverse arm 77 which is rockably mounted on the shaft 59. Said arm 77 is provided with a roller 78 which engages a cam 79 so formed as to periodically permit the rod 71 and the folder 69 to be lowered from its normally elevated position as illustrated in Fig. 4. A spring 80 stretched between the free end of the arm 77 and a frame-carried anchor serves to normally pull the arm and link 75 downwardly as permitted by the cam 79. The cam is so shaped and so timed relative to the travel and position of each package space provided in the conveyor 24 that the folder 69 will be lowered into the inside of the package as soon as the upstanding leading end wall of the liner has passed said folder. Continued travel of the package will then cause the rear end wall of the package liner to engage the lowered folder so as to be thereby folded rearwardly or outwardly relative to the rear end of the moving package.

The folder 69 is, of course, restored to its elevated position in time to permit the leading end of the next succeeding package to pass thereunder without engaging it.

At about the same time that the rear end of the upstanding liner is being folded rearwardly and outwardly, the front end is being folded forwardly and outwardly during continuation of the normal forward travel of the package. The front end folding mechanism is illustrated in detail in Fig. 12. It, too, is similar to mechanism shown in said Patent 2,331,927 and consists of a stationary cam 81 (see Figs. 3, 12 and 13) carried by a stationary tubular shaft or a bushing 82 which is fitted in a tubular head portion 83 of a fixed, upstanding bracket 84. A shaft 85 is journalled in said bushing 82, and is provided adjacent the cam 81 with an expandible or extendible rotary head comprising a plate part 86 which is rigidly secured to the shaft 85 and a plate part 87 which is pivoted as indicated at 88 to the rigid part 86. The plate 87 is equipped with a roller 89 which engages the periphery of the cam 81, a spring 90 being provided for urging said cam follower 89 into engagement with said cam. The spring 90 is stretched between an anchor pin 91 which is rigidly secured to the hub 92 of the plate 86, and a pin 93 which is fixed to the plate 87 and extends through an arcuate slot 94 in the plate 86.

The shaft 85 with its expandible head structure comprising the parts 86 and 87 is rotated by means of a chain drive from a driven shaft below the table plate 19. To that end the shaft 85 has a sprocket 95 secured to its outer end. The sprocket 95 co-operates with a chain 96 which extends downwardly through a slot in the table plate (see Figs. 3 and 4) into engagement with a sprocket 97. The sprocket 97 is carried by one end of a shaft 98 which is suitably journalled in a bearing bracket 99 suspended from the table top 19. An idler sprocket 100 horizontally, adjustably mounted on the bracket 99 is provided for maintaining a chain 96 at the proper degree of tautness.

The shaft 98 has secured to its other end a gear 101 which meshes with a gear 102 carried by a shaft 103 which is suitably journalled in bearings mounted in the frame structure. Said shaft 103 is provided with a sprocket 104 for cooperating with a driven chain whereby the shaft 103 is driven to thereby also drive the shaft 98 and the rotary front end folding mechanism. The chain represented at 105 which engages the sprocket 104 passes over suitable guiding sprockets (not shown) and to a driving sprocket 106 (Fig. 9) which is carried by a driven cross-shaft 107, the latter being suitably journalled in bearings supported in the frame structure 20. The cross-shaft 107 is driven by a bevelled gear connection comprising the bevel gears 108 and 109 which are respectively secured to the main drive shaft 42 and the said shaft 107.

The main drive shaft 42 may be driven by an electric motor or by connection to any other source of power. An electric motor may conveniently be housed within the frame structure of the present apparatus, and it may be operatively connected to the main drive shaft 42 through the agency of a chain drive or suitable speed reducing and speed controlling mechanism or in any other suitable, known manner. If desired, the power source may consist in a driven connection to either the container filling mechanism or to a unit of mechanism to which the packages are delivered by the closing and sealing mechanism herein disclosed.

Incident to the rotation of the end folder elements 86 and 87 around the cam 81 (Fig. 12) the member 87 will be rocked on its pivot 88 relative to its carrying member 86 so as to thereby project its leading edge and corner portion 110 forwardly relative to the corresponding edge and corner portion of the member 86 thereby, in effect, accelerating the forward travel of the member 86. Such acceleration of the forward movement of the rotary structures 86 and 87 causes the forward edge 110 of the member 87 to engage and fold outwardly the leading end wall of the container structure.

At the same time that the leading and trailing ends of the container end walls are being folded forwardly and rearwardly of the package, the side wall portions are folded inwardly into overlying relation to the top of the package content. Such folding is effected by a pair of folder plates 111 and 112 (see Figs. 3, 4 and 11) which are respectively hinged as indicated at 113 and 114 to the upper edges of suitable brackets 115 and 116 which are respectively secured to the table top 19. These folding plates 111 and 112 are adapted to be rocked inwardly from the vertical upstanding position as illustrated in full lines in Figs. 3, 4 and 11 to horizontally inwardly extending position approximately as represented in dotted lines in Fig. 11. The folder plates may approach a true horizontal position somewhat more closely than is illustrated in dotted lines, which position does not necessarily represent the final folded position but may be an intermediate position close to the ultimate inwardly folded position. When the plates are so rocked, the upstanding side portions 6 and 7 of the container liner will, of course, be folded inwardly. The folding plates 111 and 112 are somewhat longer than the length of a package so as to maintain sliding contact with the liner portions during the travel of the package.

The inward folding of the liner side portions 6 and 7 is effected in such timed relationship to the outward folding of the end portions thereof, i. e. at about the same time, that the parts will be smoothly folded to form the projecting ears 8 and 9 and the upstanding sealing flange 10. The rear end folder 69 and the front folder structure 86, 87 serve to support the marginal portions of the walls while the side folders 111 and 112 are folded inwardly, whereby the upstanding joint flange 10 is produced.

The folders 111 and 112 are provided with outwardly and downwardly extending arms 117 and 118 respectively (see Figs. 4 and 11), the lower ends of which arms are connected by means of links 119 and 120 to the upper ends of vertically reciprocable rods 121 and 122. The rods 121 and 122 are vertically slidably mounted in suitable guide brackets or sleeves 123—123 which are secured to the chain guiding strip 66 in proper alignment with the folder arms 117 and 118.

The lower ends of the vertically slidable posts 121 and 122 (see Fig. 4) are secured to a crosshead 124 which cooperates with the guides 123 to maintain the posts 121 and 122 in parallel relation for free sliding movement in the said guides 123. Coil springs 125—125 stretched between anchoring pins secured to the upper ends of the guide members 123 and to the lower ends of the posts 121 and 122, serve to normally urge the posts to move upwardly through the guides 123 and to thereby act through the links 119 and 120 to rock the folders 111 and 112 inwardly to effect

their described folding operation. Said folding movement is controlled by a cam 126 carried by the main shaft 42. Said cam acts against a roller 127 which is secured to the arm 128 having one end rockably mounted on the shaft 59. The free end of the arm 128 is connected by means of an adjustable length link 129 to the cross-head 124 so that the cam 126 is operative to pull the posts or rods 121, 122 downwardly against the tension of the springs 125 to thereby unfold or open the folding plates 111 and 112.

After the upstanding liner portions have been folded to the closed position illustrated in Fig. 15, the package passes through a sealing mechanism which unites the upstanding joint flap portions 10. This sealing mechanism is shown in Figs. 5 and 6. It comprises a pair of sealing wheels or rolls 130 and 131 which are secured to the upper ends of vertically disposed shafts 132 and 133 respectively. The shaft 132 is journalled near its upper end in a bearing 134 provided in a portion of the chain guide strip 66, and its lower end is journalled in a bearing bracket 135 which is secured to a transverse part of the frame structure 20. A suitable thrust bearing is employed in the mounting of the shaft 132 to support it against downward movement. The shaft 132 is driven by a bevel gear connection to the main drive shaft 42, the shaft 132 having a bevel gear 136 secured to its lower end, and the shaft 42 having a bevel gear 137 secured thereto and meshing with the gear 136.

The shaft 133 which carries the other sealing roll, is mounted at its lower end in a bearing 138 provided in the bearing bracket 135, said bearing 138 being of the self-aligning type which permits the bearing sleeve proper to rock to a limited extent within the supporting bracket 135. Near its upper end, the shaft 133 is journalled in a bearing carried by a bracket 139 which is secured to the underside of the table top 19 in such manner that it may shift slightly horizontally toward and from the shaft 132. Spring means 140 is provided for normally urging the bracket 139 toward the shaft 132. The spring 140 is seated in an externally screw-threaded socket or sleeve 141 which is threaded through a bracket 142 which is secured to the underside of the table top 19. By adjusting the sleeve 141 toward or from the bracket 139, the pressure of the spring 140 on the bracket 139 may be adjusted.

The sealing rolls 130 and 131 are provided with annular chambers 143 and 144 respectively in their upper portions, and their peripheral portions are grooved so as to provide relatively narrow ribs 145 on the roll 130 and 146 on the roll 131. These ribs 145 and 146 receive between them the upstanding joint flange 10 of the package, and, incident to the travel of the package and the passage of said flange between said ribs, applies sealing pressure to unite the same.

It will be seen that the spring pressure arrangement 140, 142 permits the rolls to separate sufficiently to receive the joint flange therebetween while at the same time providing adequate sealing pressure. To heat the peripheral ribs of the sealing wheels, suitable electrical heating elements represented at 147 and 148 are disposed in the annular chambers 143 and 144 respectively of the sealing rolls. The said heating elements have terminals which extend upwardly into a housing 149 wherein connections are made to a suitable source of power. The

heating elements 147 and 148 are stationary and do not contact the respective rolls, but they are arranged very close thereto so as to effectively heat the rolls. By heating the rolls as described, they are made effective to fuse the thermoplastic material of the flanges so as to more effectively seal said flanges together.

A terminal block 150 supports the heater elements and their terminals and said block is mounted on a bridge plate 151 which is supported at its ends by suitable posts extending upwardly from the table plate 19. This bridge plate 151 is provided with peripheral flange portions represented at 152 which depend from the plate so as to partially cover the sides of the sealing rolls, thereby improving the general appearance of the structure while also to some extent providing a guard against accidental entrance of foreign material between the sealing rolls.

To condition the joint flange 10 for passage between the sealing rolls, that is to insure that the joint flange extends upwardly in proper position to enter between the sealing rolls, there is provided a guide member 153 which is hinged as indicated at 154 to a bracket 155 extending upwardly from the table plate 19. Said guide member 153 is formed with a longitudinal slot 156 having a flared entrance or mouth as shown at 157 to receive and straighten up the joint flange. This member 153 becomes somewhat heated from the heat of the sealing rolls, and serves as a preheater for the joint flange to thereby preliminarily condition the joint flange for the fusing operation effected by the sealing rolls. If desired, the guide member 153 may be equipped with an independent heating unit 158 which may be connected by flexible conductors to a power source within the terminal box 149. This heating element is not essential but, in some instances, depending upon the character of the lining material employed, may be desirable.

After the joint flange has been sealed by the sealing rolls, the package is acted upon by a presser head which folds the upstanding joint flange into flat face-to-face engagement with the top of the package, and also applies pressure to the entire top area of the package to flatten the same and to also expel any air which may remain between the folded over liner portions and the package content. Air may be so expelled through the ends of the liner end ears 8 and 9 which constitute, in effect, flat tubes which communicate with the interior of the package. Means for sealing the endwise projecting ears 8 and 9 by seals extending crosswise of said ears is provided in association with said air expelling device. These associated units of mechanism are shown in Figs. 7 to 10, inclusive.

The folding and pressing mechanism for flattening the package top and expelling air comprises a presser head 159 which is pivoted as indicated at 160 to a hanger 161 so as to be capable of limited rocking movement about the axis of the pivot 160. To limit such rocking movement, the lower end of the hanger 161 is provided with lateral extensions 162 and 163 which have their lower surfaces spaced slightly from the top surface of the presser plate 159 for the purpose indicated. The hanger 161 is pivoted as indicated at 164 on an axis transverse to the axis of the pivot 160, to a bracket 165 which extends laterally from a vertically slidably supported post 166. The hanger 161 is capable of only limited rock-

ing movement about the axis of its hinge pin 164, such movement being limited by providing square ends 167 on the hanger for cooperation with correspondingly squared shoulders 168 on the bracket 165.

For folding the joint flange of the package to flatwise position on the top of the package, the presser head 159 has attached to it a folding finger 169 so positioned and so formed that as an incident to the travel of the package, the joint flange will come into engagement with the folder 169 and be turned over to the desired flatwise position on the top of the package. Subsequently, the presser head 159 is lowered into pressing engagement with the top of the package so as to expel any air which may up to that time remain between the wrapper and the package content. The presser member 159 is also moved horizontally so as to travel in unison with the package whereby the air expelling pressure may be maintained on the package for a short time interval, while the package continues its normal travel. The presser plate is automatically elevated from the package and returned to its starting position for engagement with the next succeeding package, and the pressed package enters into the zone of operation of mechanism for sealing the end ears.

The ear sealing mechanism comprises a sealing head 170 which is pivoted as shown at 171 to a hanger arm 172 which is rigidly secured directly to the upper end portion of a vertically slidable post 173. The hanger 172 is provided with lateral ear extensions 174 and 175 which are so formed that their lower surfaces are slightly spaced from the upper surface of the sealing head 170 to permit a very limited rocking movement of the sealing head about its pivot pin 171.

At the ends of the sealing head 170 and on its bottom surface, there are provided pairs of downwardly projecting transverse ribs 176. These ribs are adapted to engage the ear portions 8 and 9 of the package which are supported on the anvils 62 and 67 of the conveyor chain 24. The ends of the sealing head 170 are also transversely bored to receive electrical heating elements 177, 177 for heating the ribs 176 to the extent necessary to insure effective fusing together of the contacting surfaces of the plies of lining material which form the ears 8 and 9 of the package. Electrical connections for the heaters 177 may be made in any suitable manner, and they may be made in the terminal box 149 of the joint flange sealing rolls, if desired.

The ear sealing head 170, like the presser head 159 is initially lowered into engagement with the package ears, then moved laterally in unison with the travel of the package, then moved upwardly away from the package, and rearwardly to its starting position in preparation for operation on the next package. The presser head 159 and ear sealing head 170 operate simultaneously on successive packages.

The post 166 which carries the presser head 159 is vertically slidably mounted in a slide 178 which is horizontally slidably mounted on a horizontal track or bar 179. The horizontal track or bar 179 is fixedly mounted at its ends and at a point intermediate its ends, on a frame plate or bracket 180, the latter being secured to the underside of the chain track 66 and to the table 19 by means of bolts as indicated in Fig. 10. The portions of the bar 179 intermediate its points of attachment to said bracket 180 are spaced from the bracket so as to permit the slide 178 and a similar slide 181 to be moved horizontally along said bar 179. The slide 181 vertically slidably supports the post 173 which carries the ear sealing head 170.

Horizontal sliding movement is imparted to the slides 178 and 181 by means of a cam 182 carried by the cross-shaft 107. This cam 182 acts against a cam following roller 183 which is carried by the lower end of an arm 184, the latter being rockably mounted intermediate its ends on a shaft 185. The shaft 185 is supported in fixed position by means of a hanger 186 and an upstanding bracket 187 (see Figs. 9 and 10), the bracket 186 being secured to the bracket plate 180, and the bracket 187 extending upwardly from a part of the frame 20.

The upper end of the arm 184 is connected by means of a link 184*a* to the slide 178 which is in turn connected by a long link 184*b* to the slide 181. A spring 184*c* stretched between the upper end of the arm 184 and an anchoring point on the frame serves to yieldingly maintain the cam following roller 183 in operative engagement with the cam 182. The cam 182 rotates in a clockwise direction as viewed in Fig. 8, and serves by rocking the arm 184 in a clockwise direction of movement to advance the slides 178 and 181 on the horizontal bar 179. Return movement of the slides is, of course, effected by the spring 184*a*.

For effecting the vertical component of movement of the presser head 159 and the ear sealing head 170, there is provided a cam 188 on the said shaft 107, said cam operating against a cam following roller 189 which is carried by an ear or lug depending from a bar 190. The bar 190 is suspended from the bracket 180 by means of a pair of links 191 and 192 so that the bar 190 may be rocked about the axes of the upper end pivots 193 of the links 191 and 192. A tension spring 194 is stretched between an anchor point on the frame structure and the bar 190 in such a manner as to maintain the cam following roller 189 in operative engagement with the cam 188.

It will be seen that the cam 188 acting against the roller 189 is operative to rock the bar 190 laterally as a result of which the bar swings about the axes of the said pivots 193.

The bar 190 acts through a roller 195 which is carried by the lower end portion of the post 173 to control lowering and to effect raising of said post as an incident to the said swinging movement of the bar 190. Upward movement of the post 173 and the sealing head 170 is positively effected by force derived from the cam 188. Downward movement of the sealing head and its post 173 is dependent upon gravity, but if desired a suitable spring or weight means may be provided to additionally urge the post 173 downwardly. However, the weight of the post and of the sealing head carried thereby is substantial and provides adequate force for moving these parts downwardly and keeping the roller 195 in engagement with the upper edge of the bar 190. The weight of these vertically moving parts thus determines the sealing pressure applied by the heating ribs 176 against the package ears and the underlying anvil parts which support said ears.

The presser head post 166 is moved vertically in the slide 178 by a similar arrangement which comprises a bar 196 which is suspended at its ends from the bracket 180 by a pair of links 197 and 198. The bar 196 is thus swingable about the axes of the upper pivots 199, 199 of the links 197

and 198. Such swinging movement is effected by means of an angularly disposed link 200 which is pivoted at its lower end as shown at 201 to one end of the bar 196 by a pivot bolt which also connects the link 198 to the bar 196. The other end of said angularly disposed link 200 is pivotally connected as indicated at 202 to the link 191 intermediate the ends of the latter. When the link 191 swings about its upper end pivot 193, its movement will be imparted through the angularly disposed link 200 to the bar 196. Because of the location of the pivot 202, the extent of swinging movement imparted to the bar 196 will be somewhat less than that of the bar 190. Upward movement of the bar 196 is transmitted to the presser plate post 166 by means of a roller 203 which is secured to the lower end portion of the post 166 in position to rest on the upper edge of the bar 196. The reduced extent of vertical motion imparted to the presser head (incident to the described arrangement of the actuating link 200) is sufficient, and it will, of course, be understood that the weight of the post 166 and the presser head structure determines the pressure which the presser head 159 applies to the top of the package for smoothing and air expulsion purposes. Here again, weights or springs may be applied, if desired, to add to the downward pressure of the presser head. The cams 182 and 188 are, of course, so formed and so timed relative to each other as to effect vertical and horizontal components of motion of the presser head and sealing head in the relationship desired.

In Fig. 8, the presser and sealing heads 159 and 170 respectively are illustrated in an intermediate lowered position wherein the presser head 159 is expelling air from one package and the sealing head is sealing the end ears of a preceding package. As shown in this position, the bars 190 and 196 are in their lowermost positions and are temporarily at rest, the cam follower 189 being in engagement with an intermediate portion of a recessed, concentric, rest portion of the cam 188. The presser and sealing heads are, however, in horizontal movement due to the action of a rising portion of the cam 182 and the cam follower 183 and its lever 184.

At about the end of the horizontal travel of the presser and sealing heads, or slightly before the end of such travel, a rising portion of the cam 188 acts on the cam follower 189 to effect upward swinging movement of the bars 190 and 196 about their supporting pivots, thereby to effect upward movement of the presser and sealing heads from the respective packages preparatory to rearward return movement of said heads for engagement with succeeding packages. Upon disengagement of the presser and sealing heads from the packages, horizontal return motion is imparted to said heads by the action of the spring 184c which is permitted to contract by a falling portion of the cam 182. Meanwhile, the cam 188 maintains the presser and sealing heads in elevated position incident to a high concentric or rest portion of the cam. When the presser and sealing heads arrive at their retracted, starting position, a falling or descending portion of the cam 188 permits the spring 194 to effect downward swinging movement of the bars 190 and 196 from the elevated position illustrated in dotted lines in Fig. 8. Such downward swinging movement of the bars 190 and 196 serves, of course, to effect lowering of the presser and sealing heads into engagement with the underlying packages as already explained, and a rising portion of the cam 182 then acts to

effect forward movement of the slides 178 and 181 and the presser and sealing heads as aforesaid. It will be understood that the cams 182 and 188 are so formed that the downward and upward starting and finishing movements of the presser and sealer heads are effected while these heads are also moved forwardly at the same speed that the packages are propelled by the package conveyor. Hence, there is no slippage or wiping movement of the presser and sealing heads on the portions of the package which they engage. Injury to the packages is thereby avoided.

After the ear sealing operation has been completed, the packages are ready to be transferred to other mechanism which will complete the package by applying a cover thereto or performing other operations. In this instance, subsequent apparatus may receive the packages by means of a conveyer diagrammatically represented at 204 (Fig. 7) which extends between the present top closing and sealing apparatus and the subsequent apparatus. In the present apparatus, the conveyor 204 is guided by a sprocket wheel 205 which is carried by a shaft 206 suitably journalled in bearings carried by the frame structure 20 (see Figs. 7, 8 and 9). As shown, the conveyor 204 is laterally offset from the main conveyor 24 of the present closing and sealing apparatus. For shifting the packages transversely from the conveyor 24 to the conveyor 204, there is provided a rotary shifting device which consists of a head 207 (Figs. 7 and 8) which is journalled as indicated at 208 on one end of an arm 209. The arm 209 is fixedly mounted at its other end on the upper end of a vertical shaft 210 which is suitably journalled in bearings carried by the frame structure and driven by intermeshing bevel gear connection indicated at 211 to the main drive shaft 42. The head 207 has fixedly associated therewith a sprocket 212 which meshes with a chain 213 which in turn also engages a sprocket 214 on the upper end of said shaft 210. Rotation imparted to the arm 209 will, of course, be transmitted to the head 207, but because of the sprocket and chain connections 212, 213 and 214, the head 207 will maintain a relatively fixed position in which its broad head will maintain contact with the side of the package during its lateral movement from the conveyor 24 to the conveyor 204. The conveyor 204 is, of course, provided with suitable means for engaging the package to insure its movement with the conveyor, and a guide bar 204a is provided at one side of the conveyor for cooperating with the transfer head 207 to position the packages squarely over the conveyor 204.

The shaft 206 may be driven by means of a chain drive comprising a chain 215 which engages sprockets 216 on the shaft 107 (Fig. 9) and 217 on the shaft 206. The shaft 206 also carries a sprocket 218 which is engaged by the conveyor chain 24 to drive the latter. To maintain the chain 215 at the proper degree of tautness for smoothly driving the shaft 206, the chain 215 may engage an idler sprocket 219 (Fig. 8) which may be horizontally movably mounted and/or adjustably mounted for setting in selected position resiliently urged to move horizontally away from the sprocket 217 relative to said sprocket 217.

The described mechanism provides package closing, pressing and sealing mechanism which performs its operations on the packages while they travel continuously, in a single direction, through the machine. Smooth working, quiet, rapid and trouble-free operation is thereby attained. The mechanism is of comparatively simple character, presents a clean cut appearance

and, because of its relative simplicity, is easy to keep in a clean and sanitary condition. Various changes in the described arrangement may be made without departing from the invention.

I claim:

1. In package sealing apparatus of the class described, the combination of a continuously driven conveyor, means for delivering unsealed packages to said conveyor, and means operative during the continuous travel of the packages on said conveyor to seal the packages along lines extending transversely of their direction of travel on said conveyor, said sealing means comprising an anvil member carried by said conveyor for supporting a portion of the package which is to be sealed, a pressure member normally overlying the path of travel of the packages carried by said conveyor, and means for lowering said pressure member into cooperating engagement with said anvil and for effecting travel of said pressure member in unison with said anvil, whereby said pressure member and anvil cooperate to effect said transverse sealing of the package during the travel thereof as aforesaid.

2. In package sealing apparatus of the class described, the combination of a continuously driven conveyor, means for delivering unsealed packages to said conveyor, and means operative during continuous travel of the packages on said conveyor to seal the packages along lines extending transversely of their direction of travel on said conveyor, said means comprising an anvil carried by said conveyor and serving to support a portion of the package which is to be sealed, a pressure member normally spaced from said anvil, means for moving said pressure member toward said anvil for cooperating therewith to apply pressure to said package portion, and means for effecting movement of said pressure member in unison with said anvil for a limited portion of the travel of said anvil while maintaining said cooperating relationship between said pressure member and anvil.

3. In apparatus of the class described, the combination of a continuously driven conveyor for propelling packages which are to be sealed, an anvil carried by said conveyor for supporting a sealable portion of a package during its propulsion by said conveyor, a pressure member, means for mounting said pressure member for movement toward and from said anvil and for movement in unison with said anvil, and cam means for imparting to said pressure member

said movement toward and from and in unison with said anvil.

4. In package sealing apparatus of the class described, the combination of a continuously driven conveyor, means for delivering to said conveyor packages having tubular, unsealed ears extending laterally therefrom, and means operative during the continuous travel of the packages on said conveyor to seal said ears along lines extending transversely of their direction of travel, said sealing means comprising anvils carried by said conveyor for supporting said ears, a sealing member adapted to successively cooperate with said anvils to effect said sealing, means mounting said sealing member for vertical movement toward and from said anvils and for horizontal movement in unison therewith, and means for effecting said vertical and horizontal movement of said sealing member.

5. Apparatus according to claim 4 wherein the means for mounting the sealing member comprises a normally stationary horizontal guide bar, a slide element movable horizontally on said guide bar, a post vertically slidably mounted in said slide element, said sealing member being secured to said post, and wherein the means for effecting said vertical and horizontal movement of the sealing member comprises a cam, means actuated by said cam for imparting horizontal movement to said slide, a second cam, and means actuated by said cam for effecting vertical movement of said post, said cams being timed to effect the vertical and horizontal components of motion of said sealing member in predetermined cooperating relationship to said conveyor carried anvil.

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