June 18, 1940. W. C. CHILDRESS 2,204,572

ELECTRICALLY DRIVEN STRETCHING TOOL

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Fig. 1

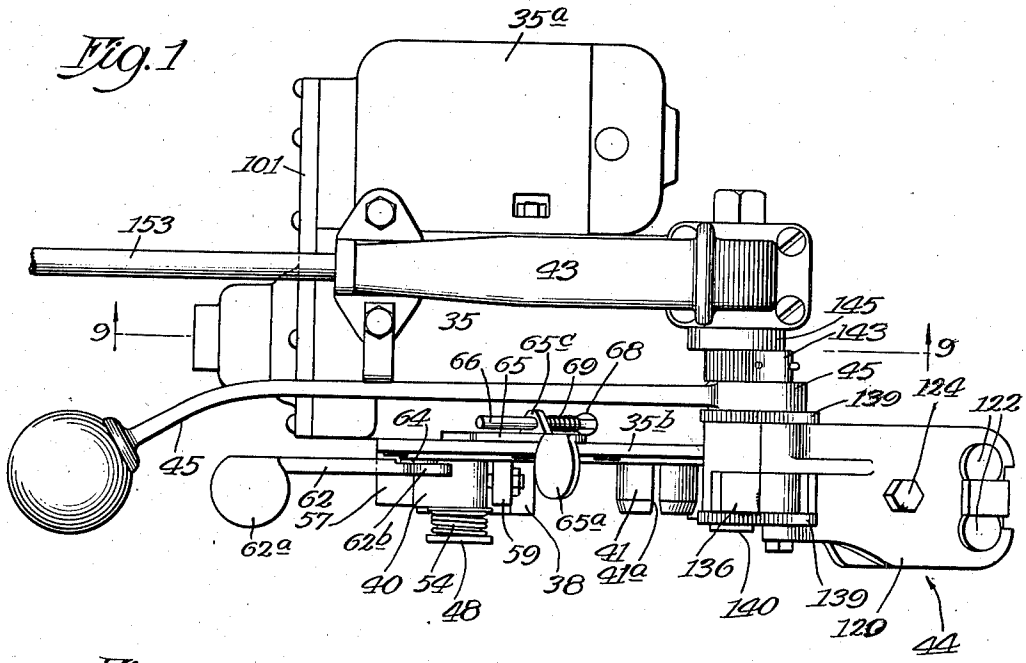
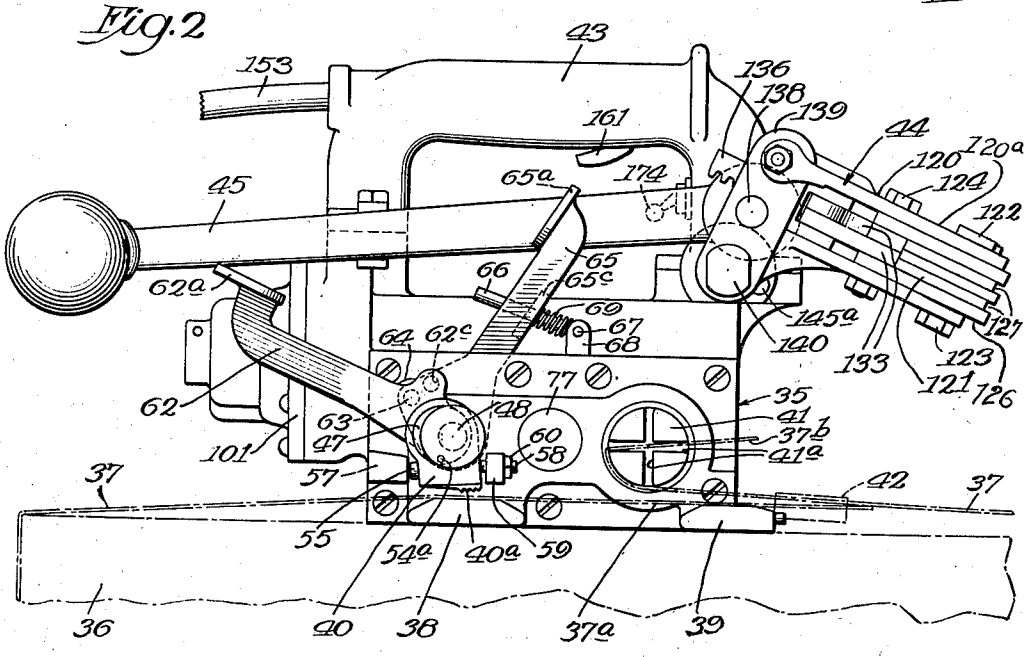


Fig. 2



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ELECTRICALLY DRIVEN STRETCHING TOOL

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Fig. 3

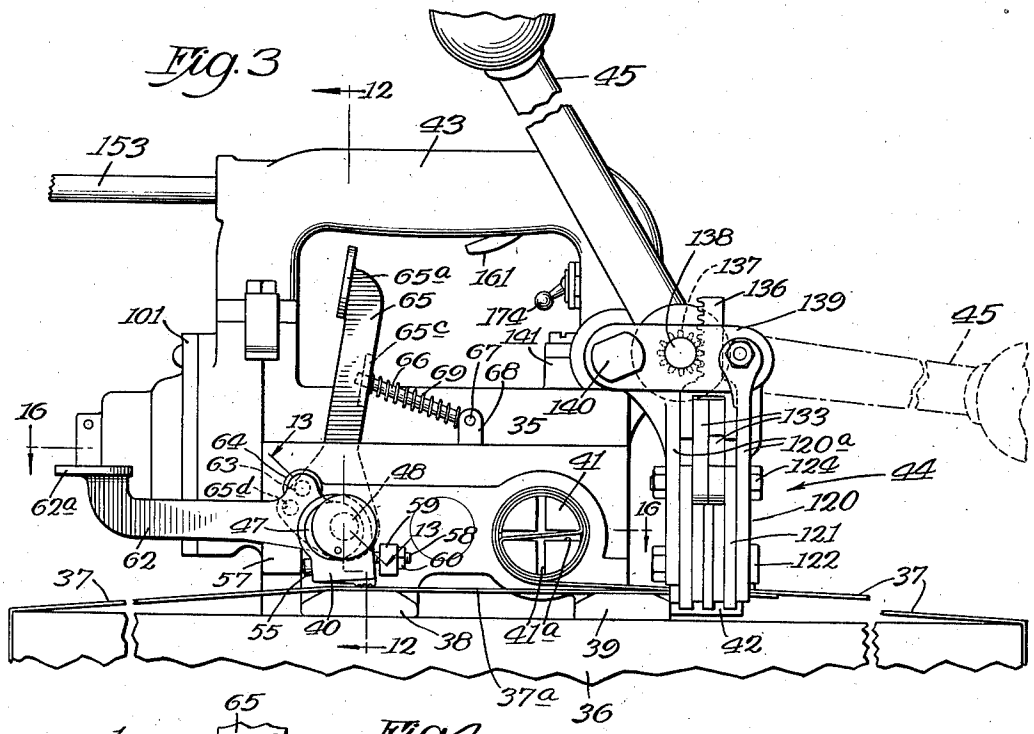


Fig. 4

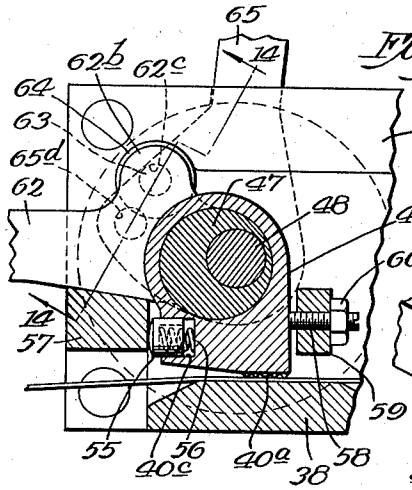


Fig. 8

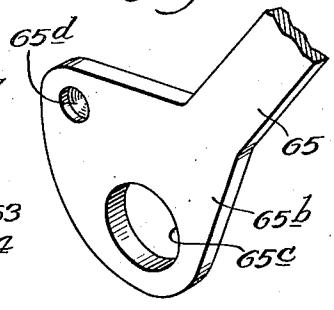


Fig. 7



Fig. 6

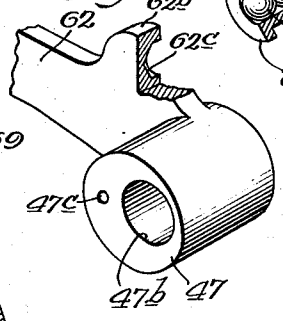
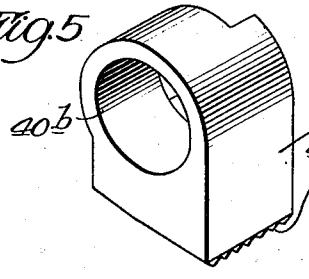


Fig. 5



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ELECTRICALLY DRIVEN STRETCHING TOOL

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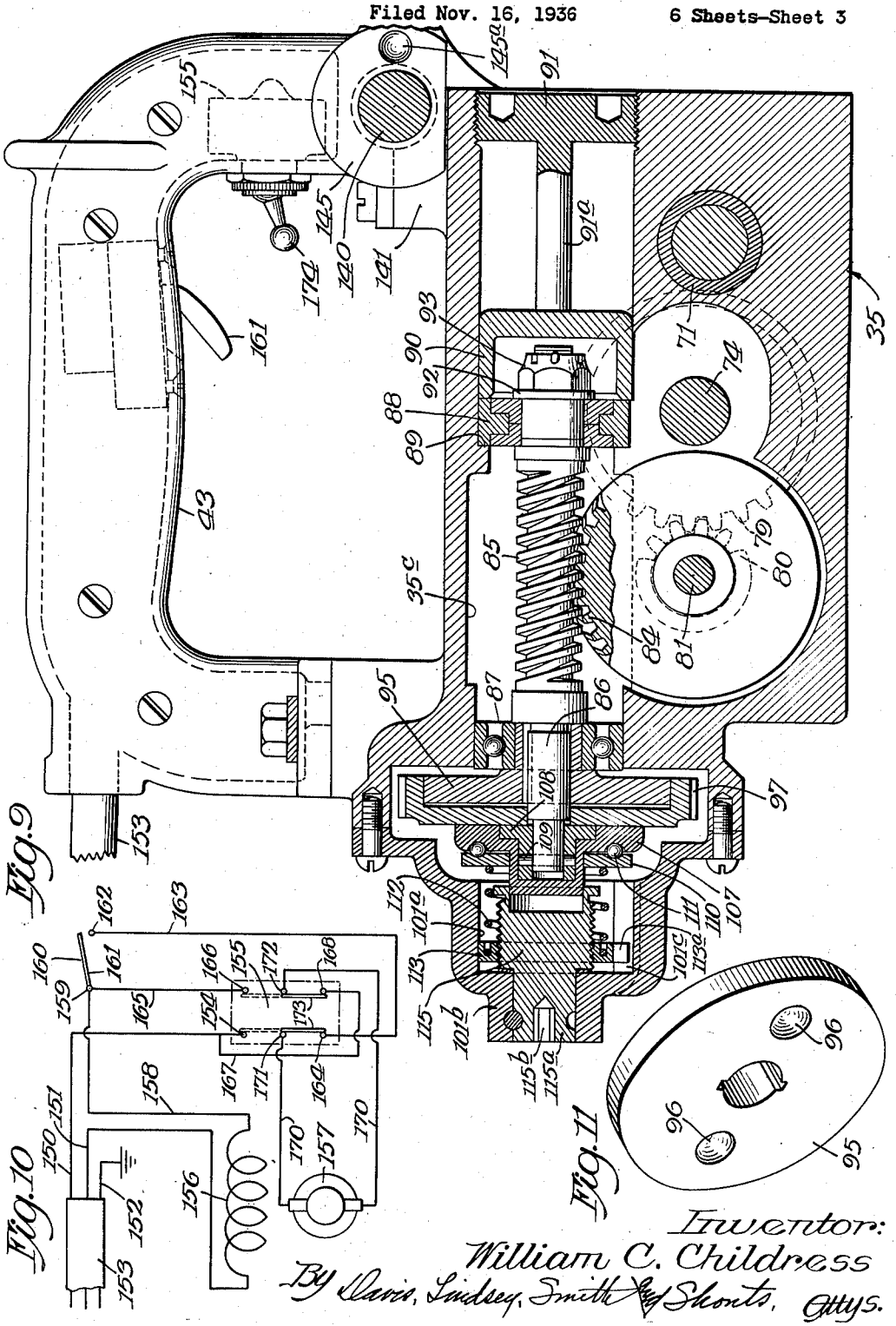


Fig. 9

Fig. 10

Fig. 11

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ELECTRICALLY DRIVEN STRETCHING TOOL

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Fig. 13

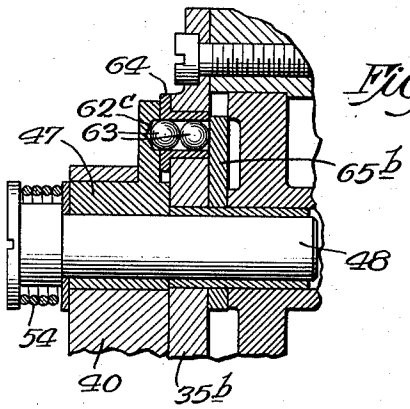


Fig. 14

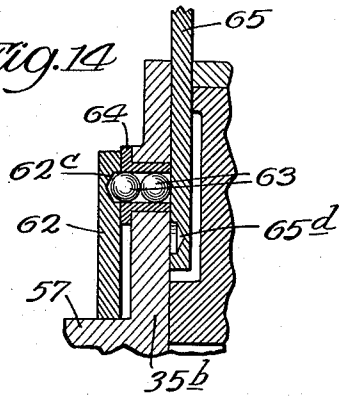


Fig. 12

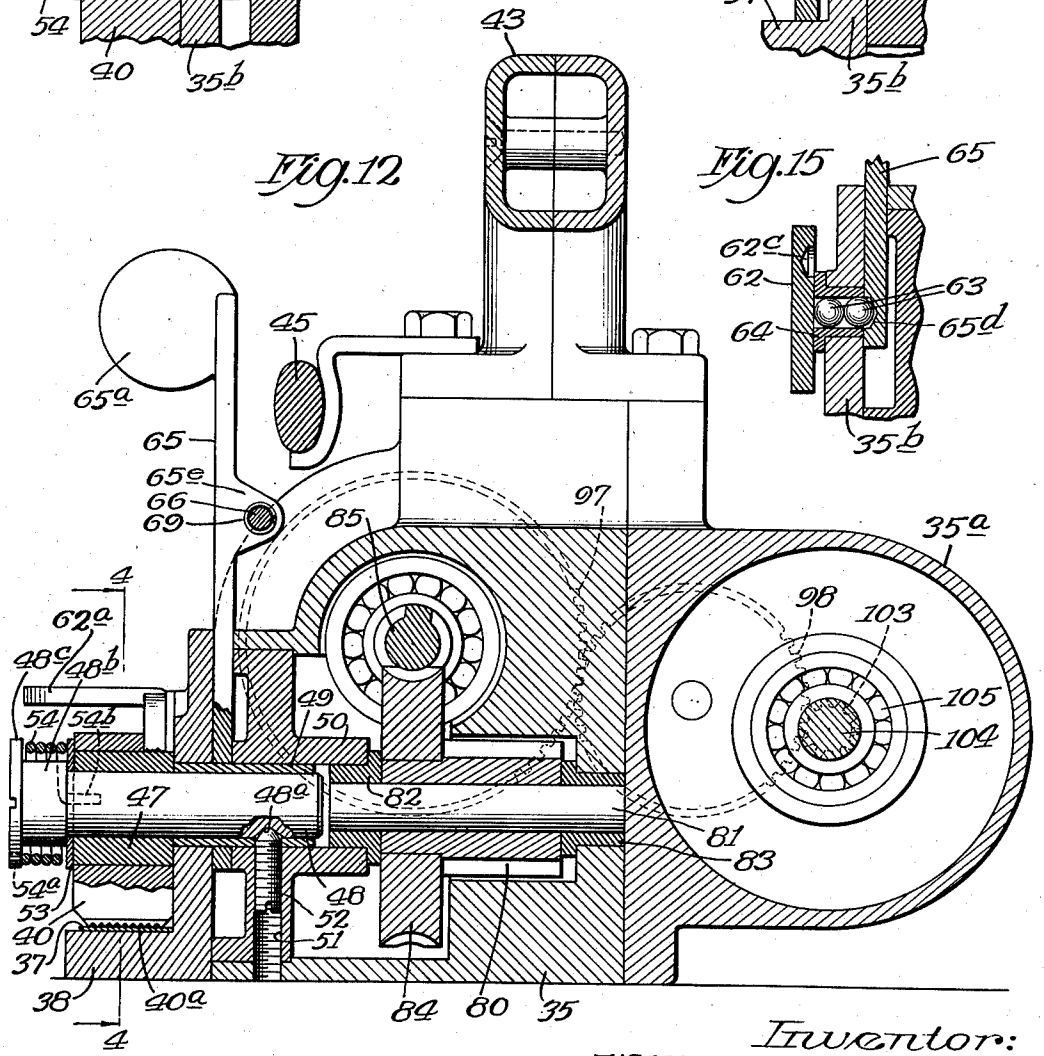


Fig. 15

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ELECTRICALLY DRIVEN STRETCHING TOOL

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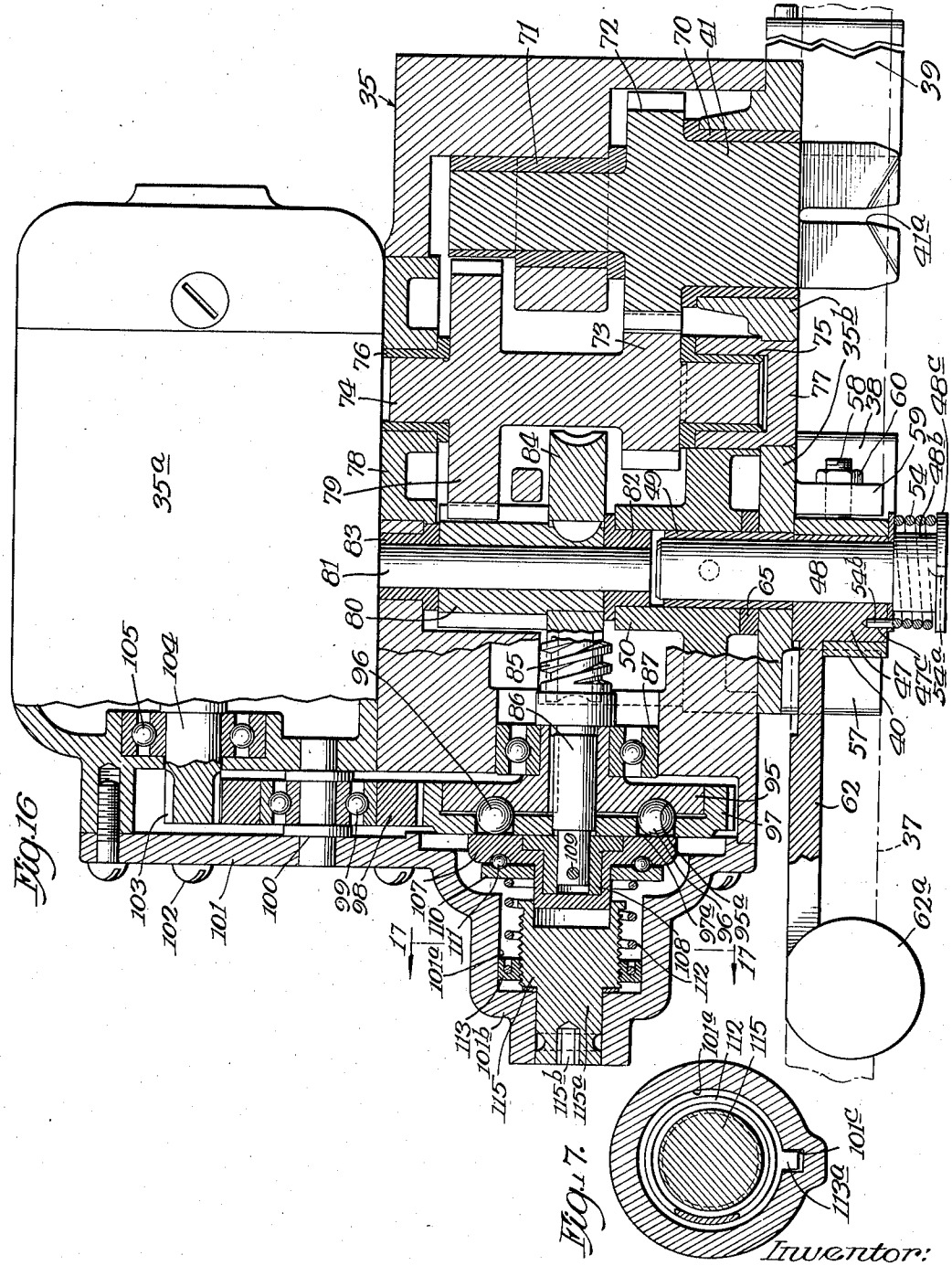


Fig. 16

Fig. 17.

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June 18, 1940. W. C. CHILDRESS 2,204,572

ELECTRICALLY DRIVEN STRETCHING TOOL

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Fig. 18

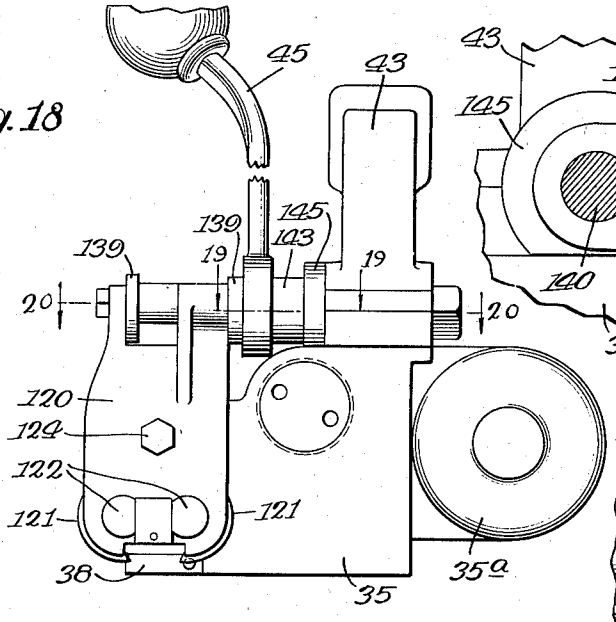


Fig. 21.

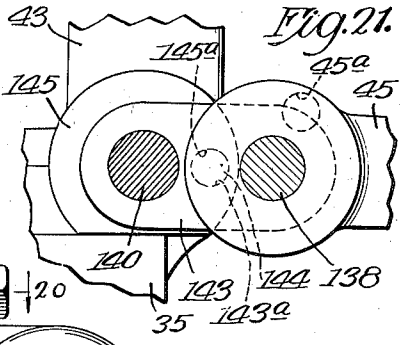


Fig. 19.

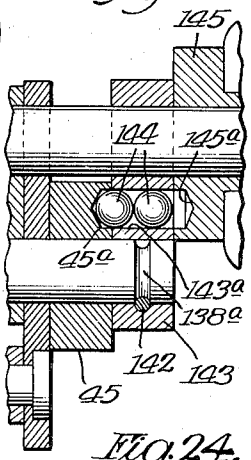


Fig. 20

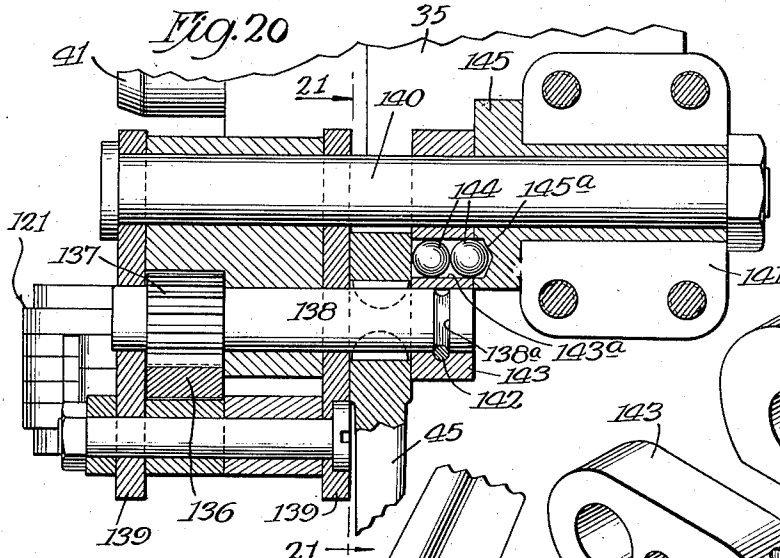


Fig. 24.

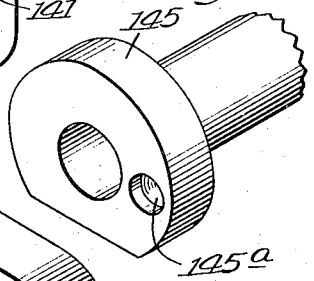


Fig. 23.

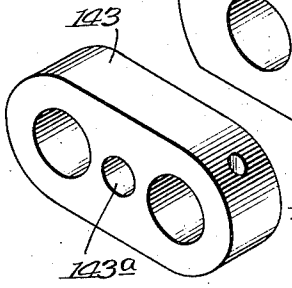
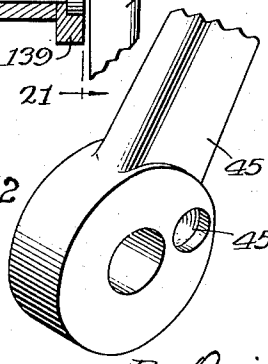


Fig. 22



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Patented June 18, 1940 2,204,572

UNITED STATES PATENT OFFICE

2,204,572

ELECTRICALLY DRIVEN STRETCHING TOOL

William C. Childress, Oak Park, Ill., assignor to Acme Steel Company, Chicago, Ill., a corporation of Illinois

Application November 16, 1936, Serial No. 111,088

6 Claims. (Cl. 254—51)

This invention relates to improvements in strap stretching and sealing apparatus and its purpose is to provide impoved means for drawing a metal strap taut around a package or group of packages and then sealing the overlapping ends of the strap. The principal object of the invention is to provide an improved form of apparatus of this type in which the mechanism for drawing the strap taut is actuated by an electric motor or other power driven means. A further object of the invention is to provide an improved apparatus of the type referred to comprising power driven strap stretching mechanism which is adapted to be automatically released when a predetermined degree of tension has been created in the strap. A further object of the invention is to provide strap stretching mechanism comprising means for drawing a strap taut to a predetermined degree and adjustable means for varying the degree of tension which is set up in the strap. A further object of the invention is to provide strap stretching and sealing mechanism comprising means for holding or gripping opposite end portions of the strap and drawing the strap taut with its ends overlapping in combination with means for controlling the grip on the strap and means for applying a seal to the overlapping strap ends after the strap has been drawn taut. Still another object is to provide apparatus of the type referred to comprising improved means for actuating and controlling a gripping device by which one end of the strap is held. Another object is to provide improved means for actuating and reversing the circuit of the motor by which the strap stretching mecahnism is driven. A further object is to provide improved mechanism for actuating and controlling the movements of the relatively movable jaws of the sealing device by which a seal is applied to the overlapping strap ends to form an interlocking joint. Other objects relate to various features of construction and arrangement which will appear more fully hereinafter.

The nature of the invention will be understood from the following specification taken with the accompanying drawings, in which one embodiment is illustrated.

In the drawings,

Fig. 1 shows a top plan view of the improved strap stretching and sealing apparatus of the present invention;

Fig. 2 shows a side elevation of the apparatus illustrated in Fig. 1 with the strap sealing device and the strap gripping dog in their elevated positions;

Fig. 3 is a side elevation similar to that of Fig. 2, showing the gripping dog engaging one end of the strap and showing the position of the sealing head after it has been moved to bring the jaws into engagement with a seal on the overlapping strap ends;

Fig. 4 is a vertical section taken on the line 4—4 of Fig. 12 showing the gripping dog and the mechanism by which the dog is actuated;

Fig. 5 is a perspective view of the gripping dog illustrated in Figs. 2, 3 and 4;

Fig. 6 is a perspective view of the eccentric on which the gripping dog is mounted together with a portion of its operating lever, a part of which is broken away;

Fig. 7 shows a perspective view, partly in section, of the sleeve in which the locking balls are mounted for controlling the movement of the lever and eccentric illustrated in Fig. 6;

Fig. 8 is a perspective view of the lower portion of the locking lever which is employed in conjunction with the parts shown in Figs. 6 and 7 to effect the locking and release of the eccentric on which the gripping dog is mounted;

Fig. 9 shows an enlarged section taken on the line 9—9 of Fig. 1, illustrating in vertical section a portion of the driving mechanism by which the strap is drawn taut;

Fig. 10 is a somewhat diagrammatic view of the circuit connections of the motor and its controlling switches by which the strap stretching mechanism is actuated;

Fig. 11 is a perspective view of the clutch disk which is embodied in the construction shown in Fig. 9 to effect the automatic disengagement of the driving mechanism when a predetermined tension has been set up in the strap;

Fig. 12 is a vertical section taken transversely of the apparatus on the line 12—12 of Fig. 3;

Fig. 13 is an enlarged detail section taken on the line 13—13 of Fig. 3, showing the locking device by which the movement of the gripping dog is controlled;

Fig. 14 is an enlarged detail section taken on the line 14—14 of Fig. 4, showing the relative positions of the parts after they have been actuated to cause the locking members to hold the eccentric lever against angular movement;

Fig. 15 is an enlarged detail section similar to that of Fig. 14 showing the relative positions of the parts after they have been actuated to cause the locking members to secure the locking lever against angular movement;

Fig. 16 shows an enlarged horizontal section on the line 16—16 of Fig. 3 illustrating the con-

nections of the driving motor with the mechanism by which the strap is drawn taut;

Fig. 17 is a sectional view taken on the line 17—17 of Fig. 16;

Fig. 18 shows an end elevation of the strap stretching and sealing apparatus looking toward the left as viewed in Fig. 1 and illustrating the position of the sealing head after it has been lowered to engage a seal on the overlapping strap ends;

Fig. 19 shows an enlarged detail section on the line 19—19 of Fig. 18, showing the locking means for controlling the movement of the operating lever by which the sealing head is actuated;

Fig. 20 is a sectional view taken on the line 20—20 of Fig. 18 showing on an enlarged scale the relative positions of the parts of the locking means after they have been actuated to permit downward angular movement of the operating lever for effecting relative movement of the jaws of the sealing head;

Fig. 21 is a vertical section taken on the line 21—21 of Fig. 20;

Fig. 22 is a perspective view of the lower hub portion of the operating lever by which the sealing head is actuated;

Fig. 23 is a perspective view of the supporting member on which the sealing head is mounted; and

Fig. 24 is a perspective view of the stationary member on which the movable supporting member shown in Fig. 25 is mounted.

As shown in the drawings, the invention comprises a casing 35 adapted to rest upon the surface of a box or package 36 about which a flexible binder 37, shown as a flat steel strap, is adapted to be drawn taut preliminary to having its overlapping ends secured together by means of a seal which is deformed along with portions of the strap ends, by a portion of the apparatus in order to form an interlocking joint. The frame 35 is provided at its lower edge with two projecting feet or flanges 38 and 39 upon which the free end 37a of the strap is adapted to rest, as shown in Fig. 2. This free end portion of the strap is adapted to be held in engagement with the foot 38 by means of a gripping dog 40 which is capable of adjustment toward and from the foot for the purpose of gripping and releasing the strap. After being passed around the package 36, the other end portion of the strap 37b is passed into engagement with one of the transverse slots 41a of a rotatable drum 41 by which the strap is adapted to be drawn taut about the package before applying thereto a seal 42 which is preferably constructed as a channel-shaped metal member adapted to embrace the overlapping end portions of the strap adjacent to the foot 39, the end portion 37a being projected beyond this foot a sufficient amount to permit the application of the seal at this point. The drum 41 is adapted to be rotated through suitable driving mechanism actuated by an electric motor which is mounted in an auxiliary casing 35a carried at one side of the casing 35. The casing 35 has a handle 43 which permits it to be carried around conveniently and to be located at any desired point on the surface of the box or package 36 to permit the application of a strap 37. After the strap has been drawn taut by the winding of the drum 41, the seal 42 is applied thereto to form an interlocking joint by means of a sealing head 44 which is pivoted on the upper part of the casing adjacent one end of the handle and which is adapted to be moved downwardly, by means of an operating lever 45, to a position where it embraces the seal 42 and the overlapping strap ends.

The gripping dog 40 is provided with a serrated portion 40a adapted to engage the upper surface of the strap 37 and this dog also has a cylindrical opening 40b which is rotatably engaged by a cam or eccentric member 47 having the form shown particularly in Fig. 6. This cam or eccentric member is provided with an eccentrically located opening 47b which is engaged by a pin 48 upon which the eccentric has angular movement. As shown in Fig. 12, the pin 48 is mounted in a bushing 49 located in a hub or bearing member 50 which is mounted in the side of the casing 35. A threaded aperture 51 extends through the bearing member and through the bottom of the casing and is engaged by a headless screw 52 which passes through an aperture in the bushing 49 and which has its extremity engaging a recess 48a in the pin, thus holding the pin against longitudinal or rotative movement. At its outer end, the pin 48 has an enlarged cylindrical portion 48b and at its outer end the pin is provided with a flat head 48c. A washer 53 is inserted between the enlarged portion 48b of the pin and the adjacent face of the eccentric or cam 47. A coil spring 54 surrounds the portion 48b of the pin with one extremity 54a thereof engaging an aperture in the head 48c of the pin and with the other extremity 54b thereof engaging an aperture 47c in the outer face of the eccentric 47. The spring thus tends to turn the eccentric 47 normally in a direction adapted to swing the gripping dog 40 downwardly against the surface of the strap. The gripping dog 40 has a recess 40c in the lower part thereof which is engaged by a movable block 55. A coil spring 56 is mounted in this recess and engages a recess in the block to force it normally against a lug 57 which forms a part of the casing 35. The spring 56 thus tends to swing the gripping dog 40 in a counterclockwise direction, as viewed in Fig. 4, so that the upright face 40d of the gripping dog bears against a stop screw 58 which is adjustably mounted in a lug 59 carried by the casing 35. A nut 60 is mounted on the projecting end of the stop screw 58 to secure it in adjusted position. The tension in the strap 37, being directed toward the left as viewed in Fig. 3, normally tends to tighten the grip of the dog 40 upon the strap due to the fact that the serrated portion 40a of the gripping dog is offset toward the right, as viewed in that figure, from a vertical plane passing through the axis about which the gripping dog pivots. When the tension upon the strap is relieved, the coil spring 56 pressing on the block 55 tends to swing the gripping dog about the eccentric so that the serrated portion 40a moves upwardly away from the surface of the strap and the extent of this angular movement of the gripping dog may be regulated by adjusting the position of the stop screw 58.

The cam or eccentric 47 is adapted to be moved about the pin 48 by means of a lever 62 which is secured to or formed integrally with the cam or eccentric, as illustrated in Fig. 6. The lever 62 is provided at its outer end with a transverse handle 62a adapted to be engaged by the fingers of the operator and it is provided adjacent the eccentric 47 with a laterally extending projection 62b having formed therein a recess 62c, having a cone-shaped bottom, which is adapted to receive one of the two spherical balls 63 mounted in a flanged bushing 64. This bushing is mounted in a recess formed in the plate 35b of the casing

which carries the feet 38 and 39, as shown in Fig. 13, and when the parts are in the position illustrated in this figure, the outer ball 63 engages the recess 62c to prevent angular movement of the cam or eccentric 47. The release of the lever 62 by the ball 63 is controlled by another lever 65 which has a handle 65a at one end thereof to be engaged by the fingers of the operator and which has an enlarged plate or hub 65b at the other end thereof provided with an aperture 65c which permits the lever to be journaled upon the bushing 49 in which the pin 48 is secured. This plate 65b is further provided with a recess 65d in its outer side, having a cone-shaped bottom, and when the lever 65 is adapted to register with the bushing 64 so that the lever 62 may then be turned to force the balls inwardly and cause one of them to engage the recess 65d in the controlling lever. The controlling lever 65 is further provided between its ends with a transverse flange 65e having an aperture therein which is slidably engaged by a pin 66 and this pin is pivoted at 67 by a lug 68 carried by the casing 35, as shown in Figs. 2 and 3, and a coil spring 69 is mounted on this pin 66 between the lug 68 and the flange 65e so that the spring tends normally to force the controlling lever toward the normal upright position shown in Fig. 3.

When the lever 65 is in the upright position shown in Fig. 3, the recess 65d in the hub portion thereof is out of registry with the bushing 64 and the balls 63 are thus held outwardly so that the outer one engages the recess 62c in the lever 62 and prevents rotation of the eccentric 47, thus holding the gripping dog 40 in a position where it grips the strap 37 as shown in Fig. 3. If the lever 65 is moved from the position shown in Fig. 3 toward the position shown in Fig. 2, with the resulting compression of the spring 69, a position is reached where the recess 65d registers with the balls 63 and the lever 62 may then be moved angularly with the result that the wall of the recess 62c forces the balls inwardly into the recess 65d, as shown in Fig. 15, while the rotation of the lever 62 may be continued in an upward direction to cause the elevation of the gripping dog 40 out of engagement with the strap 37. When the lever 62 is again operated to rotate the eccentric and cause the dog to be lowered into engagement with the strap, the balls will again enter the recess 62c as the lever 65 is returned to its normal upright position by the action of the spring 69 so that the lever 62 will then again be locked in its lower position until the operator wishes to release the strap from the grip of the dog 40.

The drum 41, upon which the end 37b of the strap is wound during the operation of drawing the strap taut around the package, is journaled in bushings 70 and 71 mounted in bearing members carried by the casing 35, as shown in Fig. 16, and the intermediate part of this drum has formed integrally therewith a gear 72 which is adapted to mesh with a pinion 73 secured on or formed integrally with an intermediate shaft 74. This shaft 74 is journaled in bushings 75 and 76 which are mounted in bearing members 77 and 78, respectively, secured in the walls of the casing 35. Adjacent the bushing 76, the shaft 74 has formed integrally therewith, or secured thereon, a gear 79 which is driven by a pinion 80 secured upon the shaft 81. The shaft 81 is journaled in bushings 82 and 83 which are mounted in the bearing member 50 and in the inner wall of the casing 35, respectively. The hub of the pinion 80 has secured thereto a worm wheel 84 which meshes with a worm 85 secured upon the longitudinal shaft 86. The outer end of the shaft 86 is journaled in a ball bearing unit 87 which is mounted within the tubular bore 35c of the casing, as shown in Fig. 9, and the inner end of this shaft is journaled in another ball bearing unit 88 which is mounted in a portion of this bore having a reduced diameter where it seats against an annular shoulder 89. The ball bearing unit 88 is maintained in position against the shoulder 89 by means of a cup-shaped retaining member 90 which fits within the bore and which is held in place by a nut 91 threadedly engaging the end of the bore and having a stem 91a which bears against the end face of the retaining member 90. The shaft is held against endwise movement with respect to the ball bearing unit 88 by means of a washer 92 and nut 93 mounted on the end of the shaft. In this way a relatively rapid rotary motion imparted to the shaft 86 is transmitted through the train of gearing described above into a comparatively slow rotary motion of the drum 44 on which the end of the strap is wound during the operation of drawing it taut.

The shaft 86 is adapted to be driven by the electric motor mounted in the auxiliary casing 35a and in order that this driving power may be automatically disconnected when the strap 37 has been drawn taut around the package to a predetermined degree, a clutch is provided for disconnecting the motor when that degree of tautness in the strap has been reached. For this purpose, a clutch disk 95 is secured on the shaft 86 adjacent to the ball bearing unit 87, the hub of the disk in this instance being extended within the ball bearing unit. The disk 95 is provided with recesses 95a which are normally engaged by the spherical balls 96 which also extend into openings 97a formed in the radial disk of a clutch gear 97 which is arranged to revolve about the shaft 86 and which has its peripheral flange extending around the outer edge of the clutch disk 95. When the balls 96 are in engagement with the recesses 95a, as shown in Fig. 16, the clutch gear 97 drives the clutch member 95 and thereby actuates the worm shaft 86. The clutch gear 97 is driven by an intermediate gear 98 which is mounted on a roller bearing unit 99 carried by a short shaft 100 which has one end secured in the end wall of the motor casing and the other end secured in the end plate 101 of the casing 35 which is detachably secured thereto by screws 102. The intermediate gear 98 is driven by a pinion 103 which is secured on or formed integrally with the motor shaft 104. This motor shaft is mounted to revolve in a ball bearing unit 105 carried by the end wall of the motor casing 35a.

When a predetermined degree of tautness has been set up in the strap 37 by the rotation of the drum 41, the clutch balls 96 are adapted to move out of the recesses 95a due to the wedging action of the semi-spherical walls of these recesses, thereby breaking the connection between the clutch gear 97 and the clutch member 95 so that the worm shaft 86 will no longer be driven. The point at which the balls 96 thus move out of driven engagement with the clutch member 95 is determined by certain adjustable mechanism including a cap member 107 which normally seats against the outer end face of the clutch gear 97 opposite the balls 96 so that it maintains the balls in engagement with the recesses 95a. This cap member 107 is journaled upon a bushing 108

which is secured on the end of the shaft 86 by means of a transverse pin 109. A collar 110 surrounds the hub of the cap member 107 and this collar and the cap member are provided with registering annular grooves engaged by a series of balls 111 so that the cap member may rotate freely without carrying with it the collar 110. A coil spring 112 bears against the outer face of the collar 110 and has its outer end secured within the annular groove of an adjusting ring 113. This adjusting ring fits within the tubular bore 101a of the hub portion 101b of the end plate 101 and the lower part of the ring 113 is provided with a downwardly extending projection 113a which engages a groove 101c in the bottom of the hub portion of the end plate for the purpose of preventing the ring from rotating. This adjusting ring 113 is internally threaded and is engaged by the external threaded adjusting nut 115 which is recessed at its inner end to fit over the hub portion of the cap member 107 and which is provided at its outer end with a reduced part 115a journaled in the outer end of the hub portion 101b of the end plate. This adjusting nut 115 is provided at its outer end with an axially extending recess 115b of hexagonal or other non-circular cross-section to be fitted by a wrench so that the adjusting nut may be rotated to cause longitudinal movement thereon of the adjusting nut 113, thereby varying the normal compression of the spring 112. In order that the balls 96 may become disengaged from the recesses 95a in the clutch member 95, it is necessary that the balls move longitudinally of the shaft 86 against the compression of the spring 112 and by varying the initial compression of this spring, the degree of tautness which is brought about in the strap 37, before the driving connection to the winding drum is broken, may be varied as desired.

The sealing head 44 by which the metal seal 42 is applied to the overlapping strap ends, comprises a housing 120 having inner and outer side plates 120a between which are mounted a pair of sealing jaws 121. These jaws are pivoted on pins 122 which extend through the side plates and which are engaged on the inner or under side of the sealing head by nuts 123. A bolt 124 extends through the side plates between the upper parts of the jaws and is engaged at its inner end by a nut 125. Each jaw 121 is made up of a plurality of die plates including a series of bending dies 126 and a plurality of intermediate cutting or shearing dies 127. All of these dies are engaged by the pivot pins 122 and, in addition, they are restrained against relative angular movement by other pins which extend through registering apertures in the die plates of each jaw and which bear at their ends against the side plates 120a of the head. When the sealing head 44 is swung by the handle 45 from the position shown in Fig. 2 to the position shown in Fig. 3, the jaws 121 are caused to embrace a channed shaped seal 42 which is mounted over the overlapping strap ends, as shown by dotted lines in Fig. 2. The handle 45 may then be moved about its pivot to cause relative movement of the jaws 121 with the result that the bending dies 126 first bend the side walls of the seal downwardly and then inwardly about the overlapping strap ends, after which the shearing dies 127 shear the lateral edges of the seal and the enclosed strap ends to form the type of interlocking joint which is described and claimed in the U. S. patent to Ralph H. Norton, No. 1,260,016, dated March 19, 1918.

The upper ends of the bending dies 126 of each jaw extend beyond the upper extremities of the shearing dies 127 and these projecting portions of the bending dies are adapted to receive between them the lower ends of a pair of links 133 to which they are pivotally connected by pins 134. These links converge upwardly and are pivotally connected at their upper ends by a single pin 135 to the depending flanges 136a of a rack bar 136 which is mounted to reciprocate between the upper portions of the side plates 120a. When the rack bar is forced downwardly, it causes the lower ends of the links 133 to separate, thereby causing a corresponding inward movement of the lower portions of the jaws. This movement of the rack bar 136 is effected by a pinion 137 which is mounted upon a shaft 138 journaled in the upper transverse bars 139 of the head 44. These bars 139 and also the inwardly extending projection 120c of the inner side plate are journaled upon a pin or bolt 140 which is secured in a stationary position in a bracket 141 carried by the end of the casing 35. In this way, the head 44 is adapted to swing bodily about the pin 140 in moving from the elevated position shown in Fig. 2 to the position shown in Figs. 27 and 28, where the lower portions of the jaws embrace the seal 42 on the overlapping strap ends. In addition to this bodily movement of the head 44, the jaws 121 have the relative angular movement previously referred to for the purpose of bending and deforming the seal and the overlapping strap ends, and it is desirable that both of these movements of the head and of the jaws be effected by the single operating lever 45, previously referred to. For this purpose, the lever 45 is keyed upon the projecting end of the shaft 138 which carries the pinion 137 for actuating the jaws and connections are provided whereby this lever may also be utilized for swinging the head 44 about the pin 140 without at the same time effecting relative movement of the jaws.

The locking mechanism for bringing this about includes a locking bar 143 which is pivotally mounted upon the pin 140 and which is also pivotally engaged by the projecting end of the shaft 138. The shaft may be provided with an angular groove 138a to receive a pin 142 which is secured in the member 143. The bar 143 is provided between the pin 140 and the shaft 138 with a cylindrical opening 143a extending completely therethrough and adapted to receive a pair of spherical balls 144. These balls are adapted to move partially out of the opening 141a into a recess 45a formed in the side face of the hub of the operating lever 45 or into another similar recess 145a which is formed in the side face of a block 145 mounted adjacent the bracket 141. When the head 44 is in its uppermost position, as shown in Fig. 2, and the lever 45 is in the position shown in that figure, one of the balls is adapted to extend into the recess 45a in the hub of the operating lever while the other end of the opening 143a in the locking bar is closed by the end face of the block 145 so that an upward movement of the lever 45 toward the right, as viewed in Fig. 2, would then swing the head 44 bodily downward about the pin 140 to position the jaws over the seal on the overlapping strap ends, as shown in Fig. 3. As the limit of this bodily movement is reached, the bar 143 will reach the position shown in Fig. 19 where the balls 144 will register with

the recess 145a in the block 145 and the wall of the recess 145a will then exert a wedging action upon the coacting ball to cause the balls to move toward the right, as viewed in Fig. 19, until one of these balls engages the recess 145a and until the other ball is free of the recess 45a. The lever 45 will then be free to turn with respect to the locking bar 143 and the continued motion of the lever 45 in the same direction will cause relative movement of the jaws 121 through the pinion 137 and the rack bar 136, thereby bending the seal and deforming the edges of the strap and seal. When the sealing operation has been completed, the lever 45 will be moved upwardly with the result that the initial motion thereof will cause the lower portions of the jaws to separate from each other and when this separation has reached the point where the upper parts of the jaws engage the transverse bolt 124, further angular movement of the operating lever 45 about the pivotal axis of the shaft 138 will be prevented and further pressure on the lever will cause the entire head 44 to move bodily upward about the pivot 140. During this upward movement of the lever 45, a point will be reached where both recesses 45a and 145a will align with the balls 144 and the bodily movement of the head will cause the wall of recess 145a to force the balls partially into the recess 45a as the upwardly bodily swinging movement of the head 44 continues, so that when the head reaches its upper position, the operating lever 45 will be locked to the locking bar 143 in readiness for the next downward swinging movement of the head. The sealing mechanism described above and the parts associated therewith are described and claimed in my copending divisional application, Serial No. 225,680, filed August 19, 1938.

The electric motor contained in the casing 35a is connected in an electric circuit which is shown diagrammatically in Fig. 10. This circuit comprises two line conductors 150 and 151 and a conductor 152 connected to the ground, all of which are contained in a single conduit 153. The conductor 150 leads to the terminal 154 of a reversing switch 155 and the other conductor 151 leads to the field winding 156 of the electric motor, the rotor of which is indicated diagrammatically at 157. From the other end of the field winding 156 a conductor 158 leads to the terminal 159 of a circuit controlling switch 160. This switch has a blade 161 which is adapted to engage a terminal 162 connected by a conductor 163 to a terminal 164 of the reversing switch which is opposite to the terminal 154. From the terminal 159 of the switch 160 a conductor 165 leads to a terminal 166 of the reversing switch and from a point on the conductor 150 another conductor 167 leads to a terminal 168 of the reversing switch which is opposite to the terminal 166. The terminals of the motor armature are connected by conductors 170 to two intermediate terminals 171 and 172 of the reversing switch which are adapted to be connected to either of the terminals 154—166 or 164—168 by the blades 173. By moving the blades from the position shown by full lines in Fig. 10 to the position shown by dotted lines, the connections to the rotor of the motor are reversed and the direction of rotation is thereby reversed. The switch 160 is mounted in the handle 43 of the device, as shown in Fig. 9, so that the blade 161 may be conveniently manipulated by a finger of the operator for opening and closing the circuit when desired. The reversing switch has an operating handle 174 which is located at the end of the handle 43 in a position to be conveniently engaged by the finger of the operator when it is desired to reverse the direction of rotation of the motor, which occurs after the strap has been wound and the seal has been applied when it is desirable to reverse the direction of rotation of the drum 41 for a short interval in order to loosen the length of strap which has been wound thereon, thereby enabling the operator to remove the strap from the slots of the drum.

In the operation of the device, the end 37a of the strap is first placed over the foot 38 and the lever 62 is operated to move the gripping dog 40 downwardly into engagement with the strap. When that has been done, the controlling lever 65 is operated to cause the balls 63 to lock the lever 62 to prevent its actuation for elevating the gripping dog from the gripping position. The strap is then passed around the package and the other end portion 37b thereof is passed transversely through one of the slots in the end of the winding drum 41. The operator then operates the switch blade 161 on the handle 43 to cause the motor to be actuated with the result that the drum 41 is turned and the strap is gradually wound thereon as it is tightened around the package 36. When a predetermined tension has been set up in the strap, the wedging action of the bottoms of the recesses 95a on the balls 96 will overcome the compression of the spring 112, with the result that the retaining member 107 will be forced longitudinally and the balls 96 will move out of the recesses 95a so that the clutch gear 95 will then rotate freely without at the same time rotating the clutch member 95 or the shaft 86. The clutch gear 97 will then continue to rotate with the balls 96 temporarily engaging the recesses 95a at each half revolution of the clutch gear until the switch is actuated to stop the motor. After this has been done, a seal 42 is placed over the overlapping strap ends and the lever 45 is actuated to swing the sealing head 44 downwardly and then to operate the jaws 121 of the head to form an interlocking joint between the seal and the strap ends. It may then be desirable to reverse the direction of rotation of the motor in order to loosen the scrap which has been wound on the drum 41 and this may be done by actuating the switch handle 174, causing a short period of reverse rotation with the drum 41. The motor is then stopped and the end portion of the strap which has been in engagement with the drum may be removed therefrom by sliding the casing sidewise and removing the foot 39 from its position beneath the strap, after which the projecting end portion of the strap adjacent the seal 42 may be cut off. To facilitate the removal of the foot 39 from its position beneath the strap, it may first be desirable to release the gripping dog 40 from the strap so that the entire casing may be removed laterally with respect to the strap and this may be done by actuating the controlling lever 65 to permit the balls 63 to move out of their locking engagement with the lever 62 whereupon the lever 62 may be actuated to rotate the eccentric 47 and cause the elevation of the dog 40 which will then tilt automatically toward the right, as viewed in Fig. 2, under the influence of the spring 55, so that the serrations 40a will move out of engagement with the surface of the strap.

Although one form of the invention has been shown and described by way of illustration, it will be understood that it may be constructed in vari-

ous other embodiments coming within the scope of the appended claims.

I claim:

1. The combination in a strap stretching device, of a casing having a flange adapted to extend beneath a strap, a gripping dog adapted to engage said strap, and means for locking said gripping dog in engagement with said strap.

2. The combination in a strap stretching device, of a casing having a flange adapted to extend beneath a strap, a movable gripping dog positioned over said flange, a lever for operating said gripping dog, and locking means adapted to prevent operation of said lever when said gripping dog is in engagement with said strap.

3. The combination in a strap stretching device, of a casing having a flange adapted to extend beneath a strap, a gripping dog extending over said flange and adapted to engage said strap, means for moving said gripping dog into engagement with said strap, locking means for preventing reverse movement of said gripping dog, and a lever for controlling the operation of said locking means.

4. The combination in a strap stretching device, of a casing having a flange adapted to extend beneath a strap, a gripping dog positioned above said flange, an eccentric member having said gripping dog pivotally mounted thereon, means for rotating said eccentric to move said gripping dog into engagement with said strap, locking means for controlling the rotation of said eccentric, and a lever for controlling the operation of said locking means.

5. The combination in a strap stretching device, of a casing having a flange adapted to extend beneath a strap, a gripping dog positioned above said flange, an eccentric member having said gripping dog pivotally mounted thereon, a lever for rotating said eccentric, said lever having a recess, a controlling lever mounted adjacent said first named lever and having a recess, and means for supporting locking balls between said levers to move into either of said recesses depending upon the positions of said levers.

6. The combination in a strap stretching device, of a casing having a flange adapted to extend beneath a strap, a gripping dog positioned above said flange, an eccentric member having said gripping dog pivotally mounted thereon, a lever for rotating said eccentric, said lever having a recess, a controlling lever mounted adjacent said first named lever and having a recess, means for supporting locking balls between said levers to move into either of said recesses depending upon the positions of said levers, and resilient means for normally returning said controlling lever to a position wherein said locking balls prevent movement of said first named lever.

WILLIAM C. CHILDRESS.