June 17, 1958 C. F. HOLTKAMP 2,838,757

STAYING MACHINE

Filed July 26, 1954 6 Sheets-Sheet 1

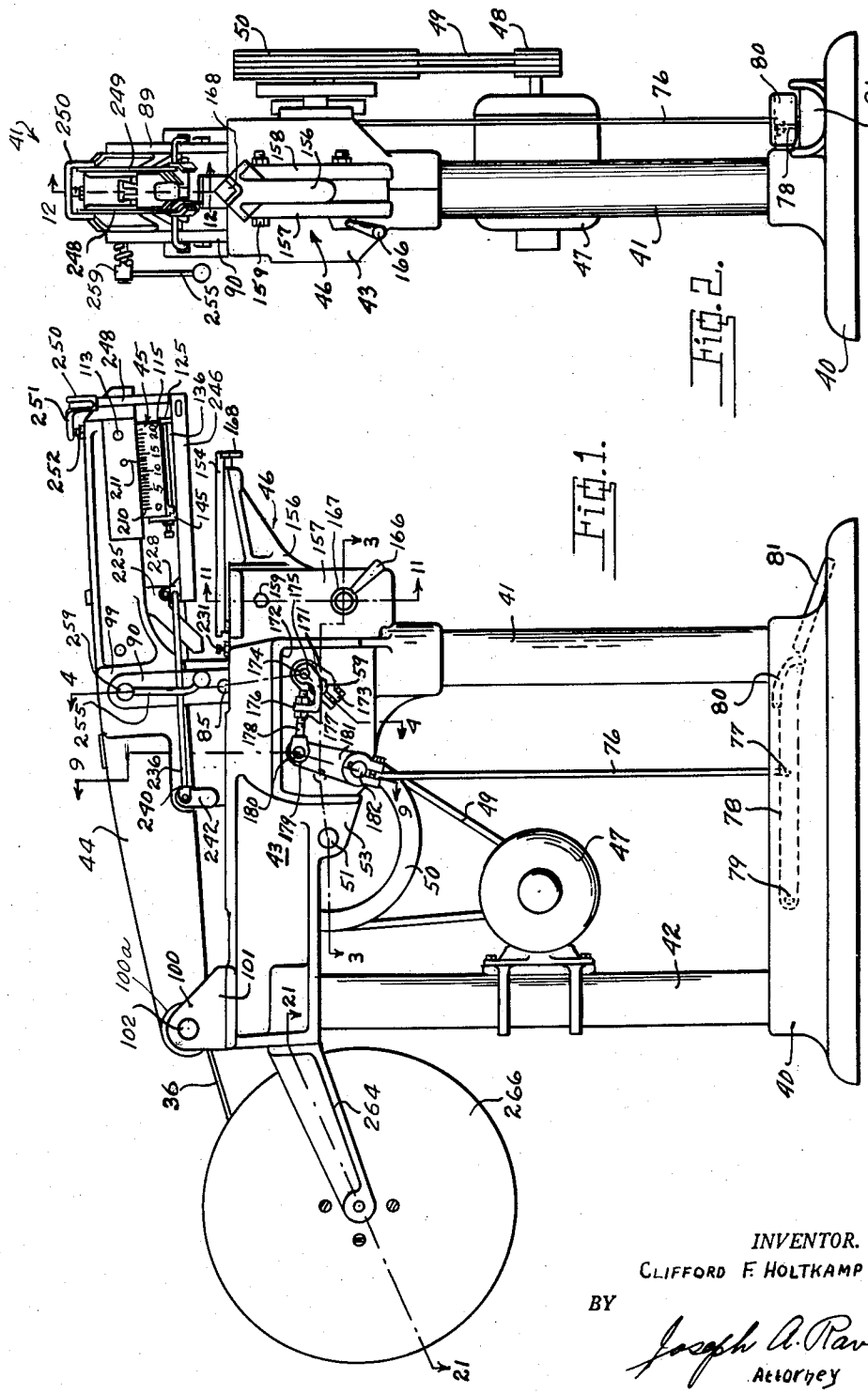


Fig. 1.

Fig. 2.

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STAYING MACHINE

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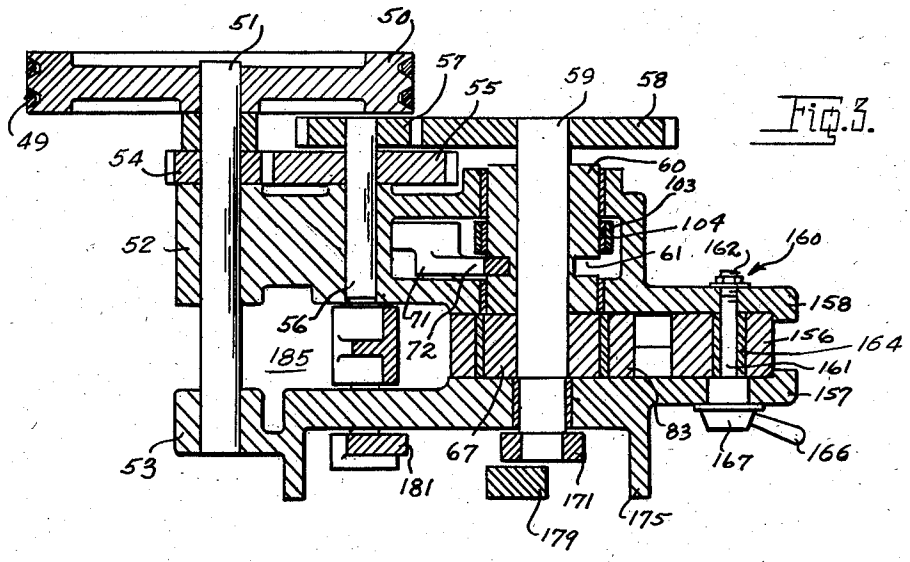


Fig. 5.

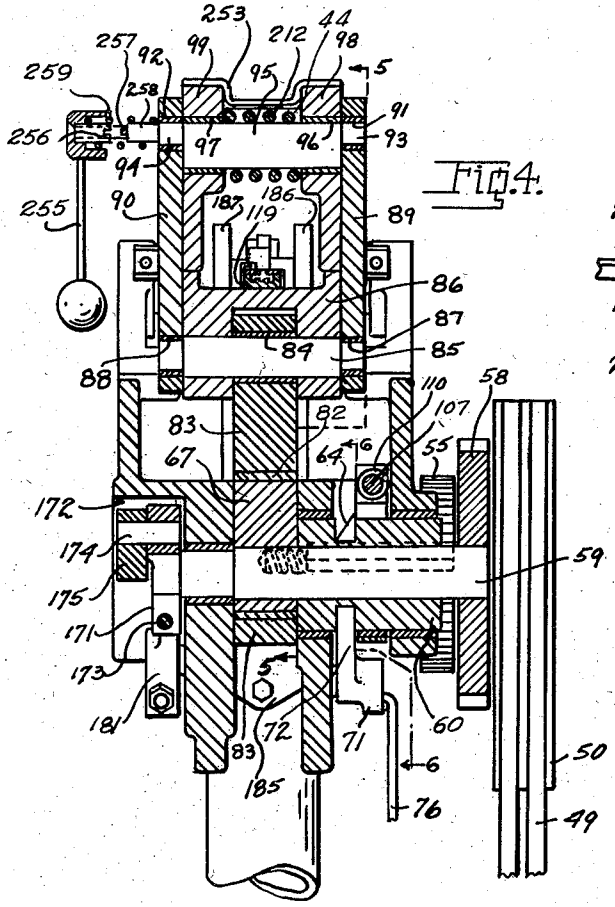


Fig. 4.

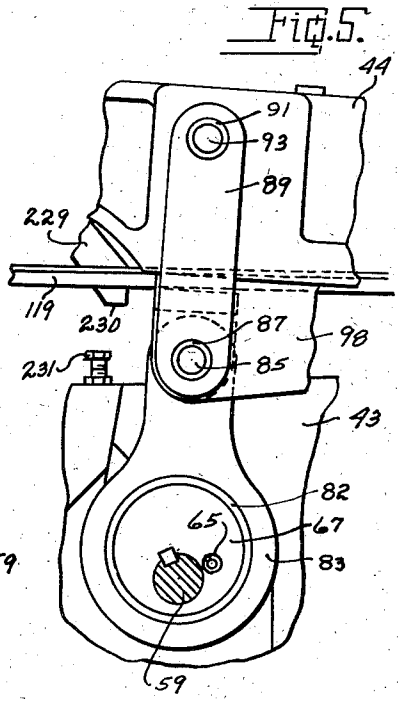


Fig. 5.

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STAYING MACHINE

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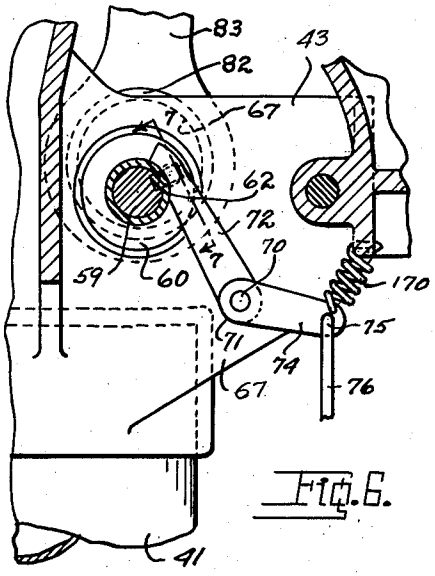


Fig. 6.

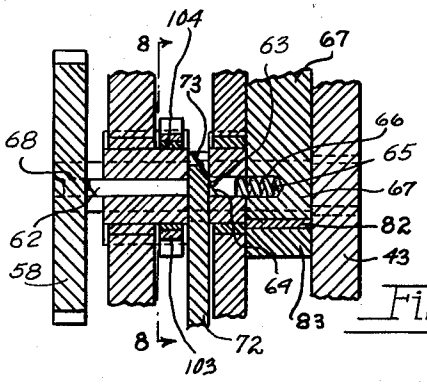


Fig. 7.

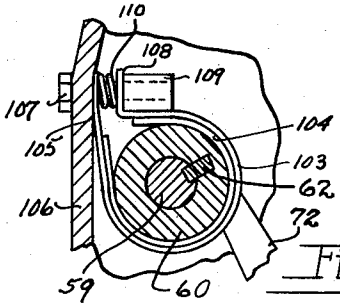


Fig. 8.

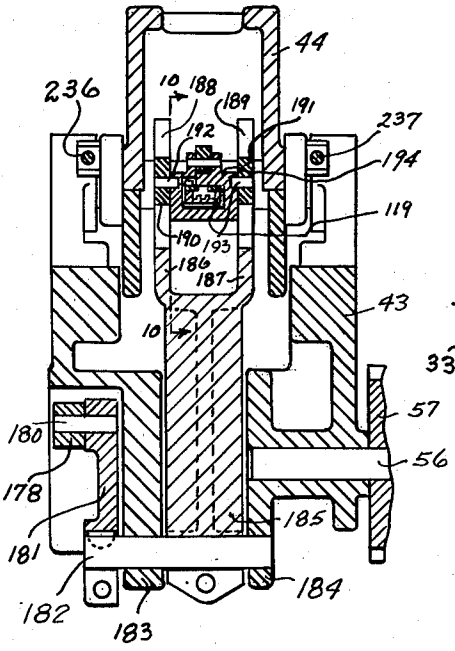


Fig. 9

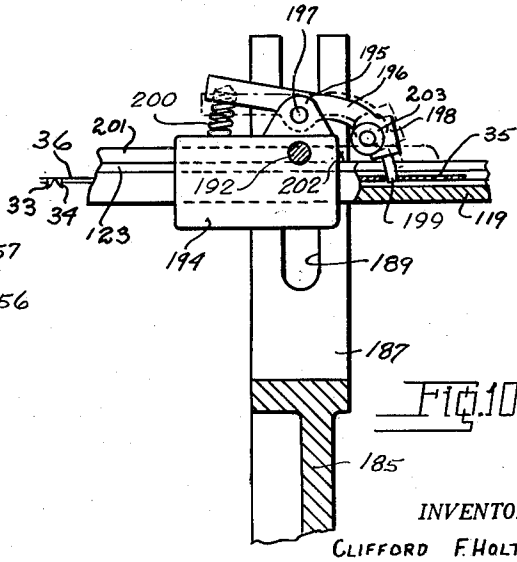


Fig. 10.

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STAYING MACHINE

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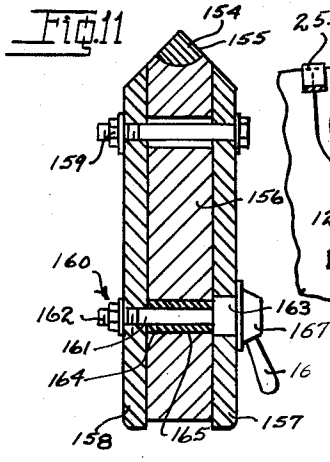


Fig. 11

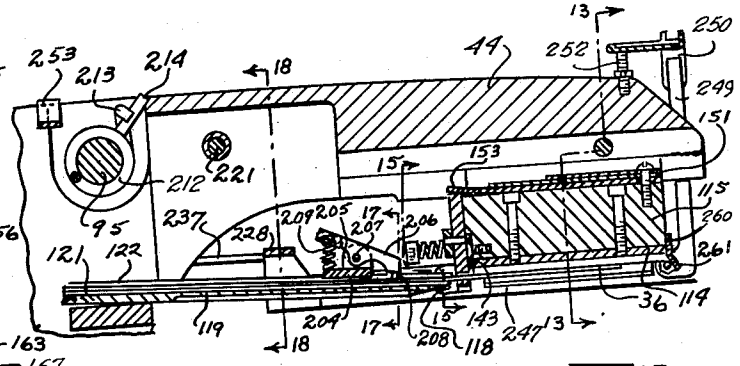


Fig. 12.

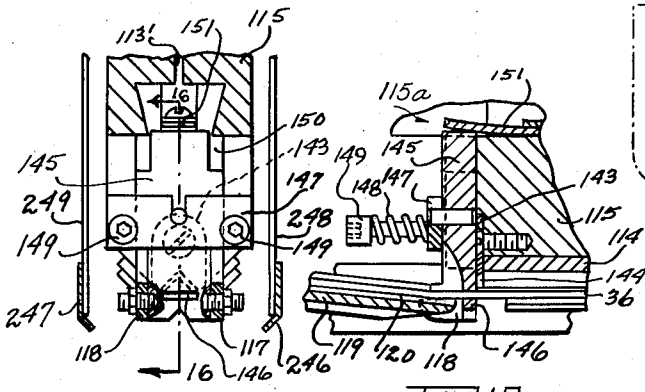


Fig. 15.

Fig. 16.

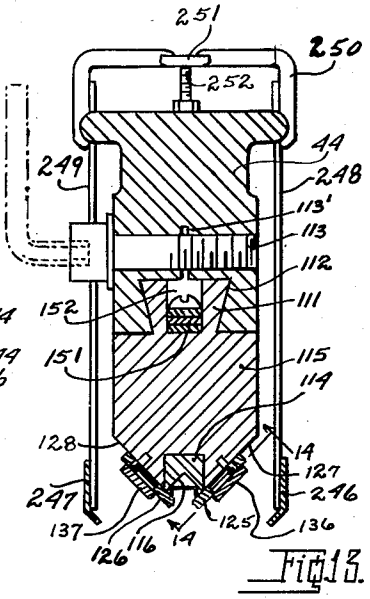


Fig. 13.

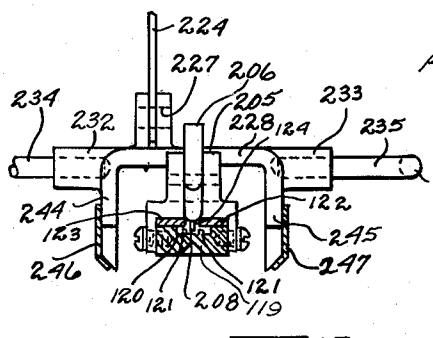


Fig. 17.

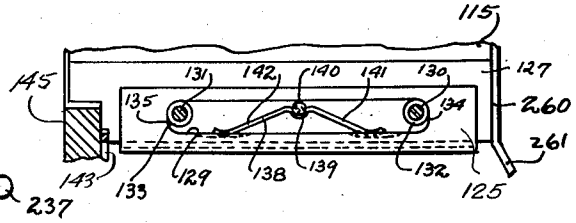


Fig. 14.

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STAYING MACHINE

Filed July 26, 1954 6 Sheets-Sheet 5

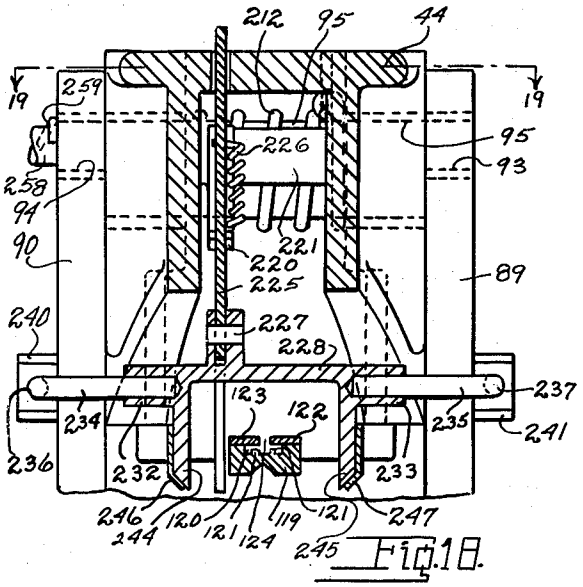


Fig. 18.

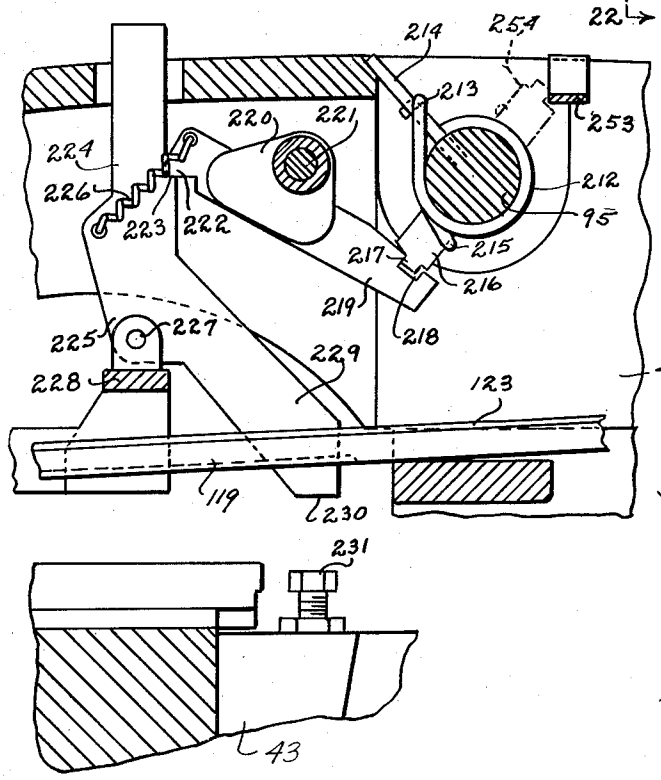


Fig. 20.

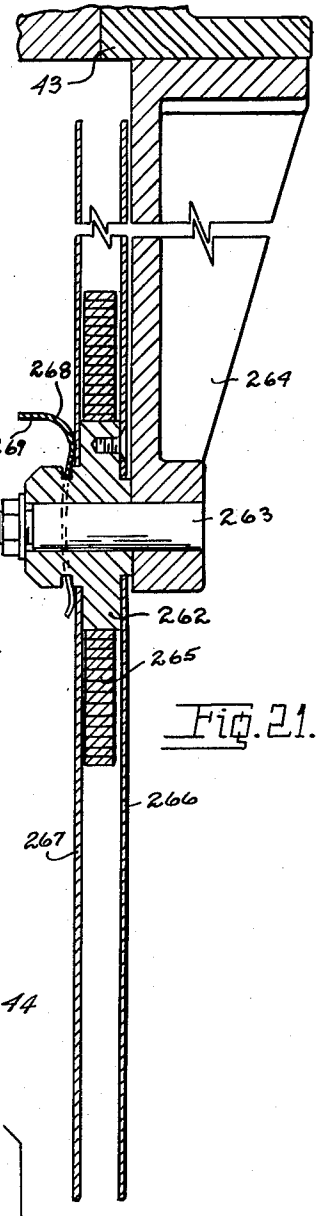


Fig. 21.

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STAYING MACHINE

Filed July 26, 1954 6 Sheets-Sheet 6

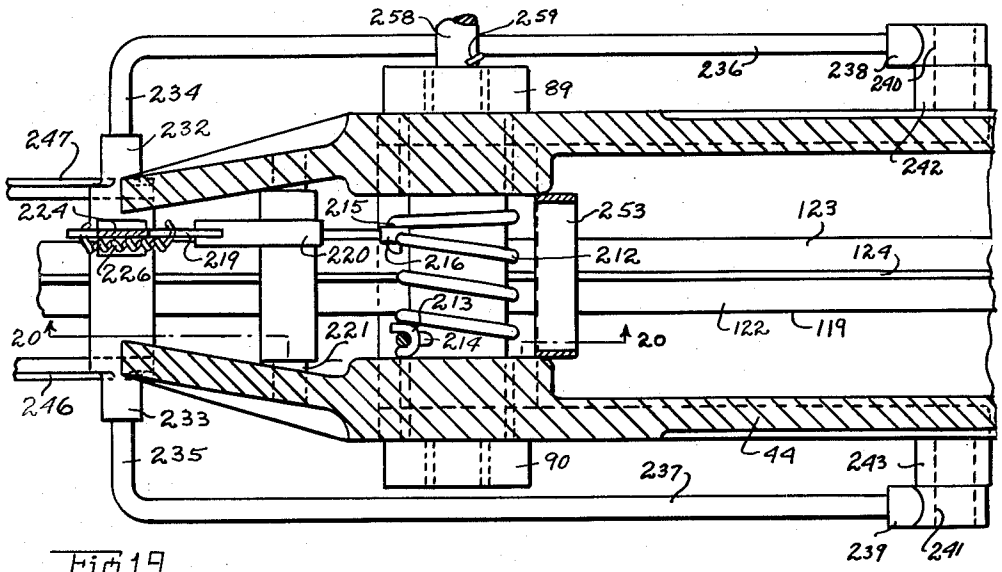


Fig. 19.

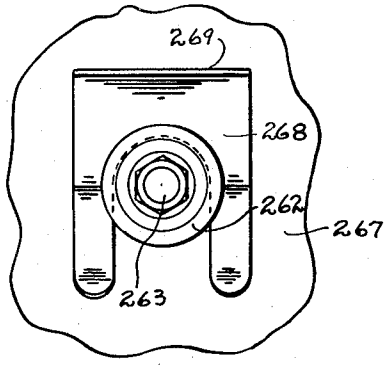


Fig. 22.

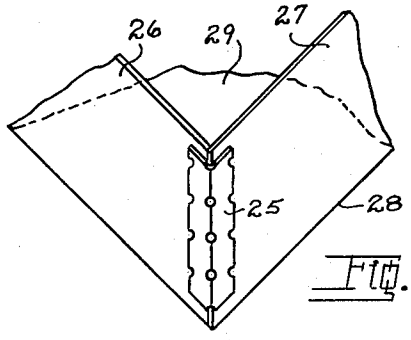


Fig. 25.

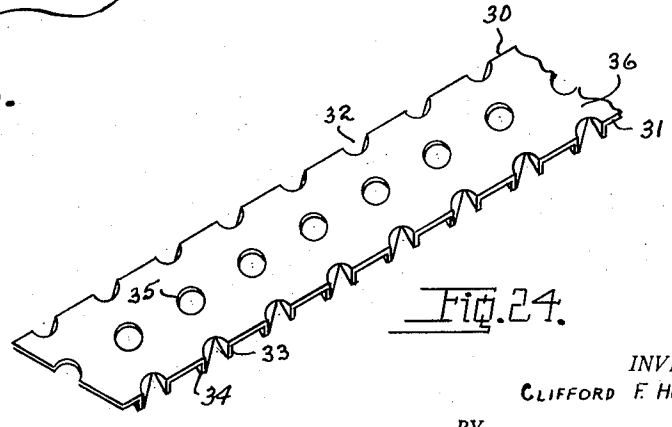


Fig. 24.

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Joseph A Rave

ATTORNEY

United States Patent Office 2,838,757 Patented June 17, 1958

2,838,757

STAYING MACHINE

Clifford F. Holtkamp, Cincinnati, Ohio, assignor, by mesne assignments, to Kamp Company, Inc., Cincinnati, Ohio, a corporation of Ohio

Application July 26, 1954, Serial No. 445,651

8 Claims. (Cl. 1—42.9)

This invention relates to improvements in a staying machine, that is, a machine for applying a metal reinforcing corner to a card or paperboard box and securing the adjacent edges of the walls of said box to one another and for strengthening the corners thereof.

A staying machine in and of itself is known but prior machines have been quite bulky and cumbersome in structure and in operation. Prior machines have also failed in being safe for the operator due primarily to the particularly bulky construction and faulty engineering in their general makeup.

The staying machine of the present invention overcomes each of the objections to the prior machines and at the same time employs a new and improved stay or metal corner.

It is, therefore, the principal object of the present invention to provide a staying machine that is compact and smoothly operative for efficiency and convenience.

Another object of this invention is the provision in a staying machine of a safety device that will readily trip the mechanism for the protection of the operator since the machine exerts considerable pressure in forming the strip and in clinching same in operable position.

Another object of this invention is the provision in a staying machine of simple control means that gives maximum comfort to the operator while permitting the ready control of the machine.

A still further object of the present invention is the provision of a staying machine that can be economically produced yet durable of construction and efficient in production.

Other objects and advantages of the present invention should be readily apparent by reference to the following specification considered in conjunction with the accompanying drawings forming a part thereof and it is to be understood that any modifications may be made in the exact structural details there shown and described, within the scope of the appended claims, without departing from or exceeding the spirit of the invention.

In the drawings:

Fig. 1 is a front elevational view of the staying machine forming the subject matter of the present invention.

Fig. 2 is an end elevational view of the staying machine of Fig. 1 as seen from the right hand side thereof in said Fig. 1.

Fig. 3 is an enlarged, horizontal, sectional view through a portion of the machine as seen from line 3—3 on Fig. 1.

Fig. 4 is an enlarged, fragmentary, vertical sectional view through the machine as seen from line 4—4 of Fig. 1.

Fig. 5 is a vertical sectional view through a portion of the machine with certain parts in elevation as seen from line 5—5 on Fig. 4.

Fig. 6 is a fragmentary, vertical, sectional view through a portion of the machine as seen from line 6—6 on Fig. 4.

Fig. 7 is a fragmentary sectional view through a portion of Fig. 6 as seen from line 7—7 on said Fig. 6.

Fig. 8 is a fragmentary, vertical, sectional view through certain parts of Fig. 7 as seen from line 8—8 on said Fig. 7.

Fig. 9 is an enlarged, vertical, sectional view through a portion of the machine, in a plane to the left of Fig. 4 on Fig. 1, as seen from line 9—9 on said Fig. 1.

Fig. 10 is an enlarged, fragmentary, sectional-elevational view of certain parts of Fig. 9 as seen from line 10—10 on said Fig. 9.

Fig. 11 is an enlarged, vertical, sectional view through the knee and clinching anvil as seen from line 11—11 on Fig. 1.

Fig. 12 is an enlarged, fragmentary, vertical sectional view through the cutoff forming and clinching head as seen from line 12—12 on Fig. 2.

Fig. 13 is an enlarged, vertical, sectional view through Fig. 12 as seen from line 13—13 on said Fig. 12.

Fig. 14 is a sectional view through a staying strip guide as seen from line 14—14 on Fig. 13.

Fig. 15 is an enlarged, vertical, sectional view taken on line 15—15 on Fig. 12.

Fig. 16 is a sectional view through certain parts of Fig. 16 as seen from line 16—16 on said Fig. 15.

Fig. 17 is an enlarged, sectional and elevational, view of certain parts of Fig. 12 as seen from line 17—17 on said Fig. 12.

Fig. 18 is an enlarged, vertical, sectional view through Fig. 12 as seen from line 18—18 on said Fig. 12.

Fig. 19 is a fragmentary, horizontal, sectional view through certain of the parts of Figs. 12 and 18 as seen from line 19—19 on said Fig. 18.

Fig. 20 is a vertical, sectional view through certain of the parts of Fig. 19 as seen from line 20—20 on said Fig. 19.

Fig. 21 is an enlarged sectional view through the mounting device for a roll of stay strip material and from which the box stays are formed, cut and applied, said Fig. 21 being taken on line 21—21 on Fig. 1.

Fig. 22 is an elevational view of certain parts of Fig. 21 as seen from line 22—22 adjacent to said Fig. 21.

Fig. 23 is a perspective view of a corner of a box or container showing a stay-strip applied thereto by the staying machine of the present invention.

Fig. 24 is a perspective view of a portion of a stay-strip and from which the box stays are formed, cut and applied.

Throughout the several views of the drawing similar reference characters are employed to denote the same or similar parts.

The staying machine of the present invention is particularly adapted for applying stays from a strip such as disclosed in applicant's pending application for patent on said Stay-strip which was filed on March 22, 1954, under Serial No. 417,841.

The staying machine of the present invention, while particularly adapted for use with the stay strip of the above identified application, is not limited exclusively to said strip but through very minor changes may be adapted for utilizing other stay strips presently on the market.

As illustrated in Fig. 23, the stay 25 is employed at the corner of a box for forming the corner between adjacent walls 26 and 27 of the said box 28. The walls 26 and 27 upstand from adjacent edges of the box bottom or top panel 29, depending upon whether a container or a cover is being made, and not only reinforces the corner where the said walls meet but also is a means for securing said walls in their operative upstanding positions.

As will presently be made clear, the stay 25 is cut

from a strip in the form of a roll with said strip formed as illustrated in Fig. 24.

The strip 36 has parallel longitudinal edges 30 and 31 into which is formed at regular intervals a substantially semi-circular notch 32 with the material normally in said notch bent toward the longitudinal center of the strip for thereby providing, for each depression 32, a pair of downwardly disposed prongs 33 and 34.

The prongs 33 and 34 are substantially identical in shape and construction with each being in the form, generally, of a triangle and each having its body portion formed transversely as an arc. It is the prongs 33 and 34 that are clinched after embedment in the box walls 26 and 27 for thereby securing the said stay in position on the box walls.

It will be noted from Fig. 24 that the notches in the periphery of the strip are in transverse alignment and with the said strip longitudinally apertured, as at 35, with said apertures equidistant from one another.

The stay strips are made of a length of approximately 100 feet and arranged in a flat roll at the factory for subsequent mounting on the staying machine as will subsequently be made clear.

The staying machine, as disclosed in the drawings, comprises a base 40 from which upstands a front column 41 and a rear column 42 together supporting the housing 43. Pivotally mounted on the housing 43 is the staying arm 44 which is power actuated to cause the forming, clinching and cut-off head 45 at its outer end to approach and cooperate with the anvil-knee 46.

During a portion of the time of the oscillation of the arm 44, the stay strip 36 is advanced to replace the portion thereof previously applied to a box corner, as will subsequently be made clear.

The head 45 is adjustable longitudinally of the arm 44 so that more or less of the stay strip may be fed into the head and stays of greater or lesser lengths may be applied depending upon the depth of the box or the height of the box wall being operated upon. The anvil-knee 46 is vertically adjustable with respect to the bed 43 depending upon the thickness of the material of which the box is formed.

The machine is operated from an electric motor 47 secured to the rear upright 42 and is provided with a driving pulley 48 about which is trained belts 49. The belts 49 in turn are trained about a fly wheel pulley 50 keyed or otherwise secured to a primary shaft 51 journaled, see Fig. 3, in suitable bearings 52 and 53 depending from the housing 43.

It should be noted that the housing 43 is in fact a pair of housing castings secured to one another in any desirable manner. The said housing 43 is formed of said housing castings, instead of as an integral member, simply for convenience in machining and the said housing castings at their front and rear ends form sockets into which the uprights 41 and 42 are disposed.

The shaft 51 has additionally, keyed or otherwise secured thereto a pinion 54 which meshes with a gear 55 keyed or otherwise secured to an intermediate shaft 56 which in turn has keyed or otherwise secured thereto a pinion 57. The pinion 57 in turn meshes with a gear 58 loosely journaled on the main drive shaft 59, and which gear 58 and shaft 59 are clutched and unclutched to one another as will presently be made clear.

The pinions and gears 54, 55, 57 and 58 constitute a speed reducing train between the primary shaft 51 and the drive shaft 59.

Keyed or otherwise secured to the drive shaft 59 is a driving hub 60 provided intermediate its ends with a circumferential groove 61 and which hub 60 may also be termed a single revolution clutch body.

The hub 60 is connected with the drive shaft 59 through a sliding key 62 disposed for sliding movement in a keyway in said shaft 59 and the key 62 is provided with a slot 63 intermediate its ends and with said slot having one wall formed as a cam face 64. The key 62 is spring loaded by an expansion spring 65 disposed in a socket 66 formed in an eccentric driver 67. The driver 67 is keyed to the main driving shaft 59 for rotation therewith.

The key 62 is adapted to be projected by the spring 65 through the hub 60 into the key-way 68 in the normally loose driving gear 58 for thereby effecting a driving connection between the said driving gear 58 and main driving shaft 59.

Pivotally mounted on a depending flange 69, as at 70, is a bell crank lever 71 having at the outer end of the arm 72, of said lever 71, an inclined cam face 73 that normally rides in the circumferential groove 61 of the hub 60.

The second arm 74 of the bell crank lever 71 has connected thereto the upper end 75 of a link 76. The lower end of the link 76, see Figs. 1 and 2, is pivotally mounted at 77 to a foot treadle 78 which has its one end pivoted at 79 to the machine base 40 and which lever 78 has its other end formed as a toe pad 80 in operative position with an inclined foot rest 81 formed on the base of the machine along its right hand edge as seen most clearly in Fig. 2.

The eccentric cam driver 67 is located, as seen in Fig. 4, on the main driving shaft 59 so as to be substantially vertically of the center of the operating arm 44. The said eccentric cam driver 67 is disposed in a bushing 82 pressed into the cam follower connecting arm 83 which has its upper end provided with a bushed aperture 84 in which is journaled a pin 85. The pin 85 extends through a spacer and connecting block 86 to have each end outwardly projecting therefrom and with said projecting portions of the shaft respectively disposed in bushed apertures 87 and 88 respectively at the lower ends of links 89 and 90. The links 89 and 90 are respectively provided at their upper ends with bushed apertures 91 and 92 respectively receiving trunnions 93 and 94 projecting from opposite ends of an eccentric shaft 95 which, as later will be made clear, constitutes a part of a safety mechanism.

The eccentric shaft 95 has its ends disposed in bushed apertures 96 and 97 respectively in the right hand portion 98 and the left hand portion 99 of the arm 44. The said right and left hand portions 98 and 99 of the arm are respectively provided with an opening downwardly of their upper surfaces to afford access to the aforementioned safety mechanism and which mechanism will be subsequently described in detail.

The arm 44 is provided at its rear end on each side thereof with a bearing pad 100*a* to be disposed between upstanding ears 100 of a bracket 101 suitably secured to the rear end of the housing 43. The ears 100 and the rear end of the arm 44 are provided with apertures in axial alignment to receive the pivot shaft 102 and on which the arm 44 is oscillated by the eccentric driver 67.

It will be appreciated that the arm is to be stopped in its uppermost position each time it is disconnected from the power source and in order to overcome the momentum in the parts it is desirable to brake its movement, wherefore, the hub 60 has applied thereto a braking mechanism. The brake is most clearly illustrated in Fig. 8 and comprises a brake band 103 provided with a suitable brake lining 104 and operable on said hub 60 inwardly of its bearing mounting in the housing 43. The brake band 103 has its one end 105 anchored against the housing front wall 106 by a bolt 107 and has its other end 108 adjustable toward the anchored end 107 by a nut 109 on the bolt 107. A spring 110 is disposed between the brake band ends 105 and 108 to permit a relative give or slip between the said driving hub 60 and the said brake band 103 when the clutch is in driving position.

The head 45 is in the form of a solid block 115 having a dovetailed lug 111 extending upwardly and longitudinally thereof and received in a corresponding shaped groove

112 let into the undersurface of the arm 44 and extending rearwardly from its forward end. A slit 113' upwardly of the groove 112 affords a clamping of the head in adjusted positions by means of a clamp bolt 113 which extends transversely of the said slit 113'.

A forming and clinching block 114 is inserted into the head block 115 with said forming and clinching block 114 having formed longitudinally thereof a V-shaped groove 116 with said groove having its sides at right angles to one another and against which the walls 26 and 27 of the container engage when a stay 25 is pressed thereinto.

The head block 115 has rearwardly projecting from it the stay strip supporting slide 119 which has its forward end connected to corner lugs 117 and 118 rearwardly projecting from a cut-off knife mechanism 115*a* carried by the rear face of the head block 115.

The supporting slide 119 is of a length extending from the head block 115 to a point just short of the arm mounting bracket 101. The slide 119 has a cross section as illustrated in Figs. 9 and 17, the latter figure being to a greater scale than Fig. 9, and comprises a groove 120 for the full length of the slide and of a width substantially equal to the width of the stay strip 36 between its side edges 30 and 31. A ridge 121 upstands on each side of the longitudinal center of the groove 120 for thereby providing a space between each side of the groove and its adjacent ridge and at the same time providing a supplemental groove between said ridges. With the stay strip 36 mounted in the groove 120 the central apertures 35 therein are over the said supplemental groove between the ridges 121 while the prongs 33 and 34 downwardly projecting from each side 30 and 31 of the stay strip are respectively disposed in the spaces outwardly of the said ridges. The groove 120 is covered inwardly from the sides of the slide 119 by cover plates 122 and 123 with said cover plates stopping short of one another along the longitudinal axis of the slide for thereby providing a space 124 through which access is had to the stay strip and particularly to the central apertures so that pawls, later to be described in detail, may engage with said strip apertures for effecting a feeding thereof. The slide 119 is supported by suitable bearings extending transversely of the lower end of the arm 44 wherefor the said slide 119 partakes of the limited oscillation of said arm 44 about its pivot pin 102.

From the foregoing, it will be noted that the stay strip may be fed longitudinally of the slide which is aligned, substantially, with the outer corners of the V-shaped groove 116 in the clinching block 114. As a matter of fact, the stay strip is within the sides 116 of the clinching block bottom groove as illustrated in Fig. 13. The stay strip is retained within the clinching block groove by means of supporting and guiding plates 125 and 126 respectively secured to the upwardly inclined sides 127 and 128 of the head block 115. In operation, the supporting plates 125 and 126 are displaced just before a portion of the stay strip is to be formed and cut-off as a stay 25 so that the prongs 33 and 34 of the stay strip may be forced into the box walls and clinched. In order to effect this, the said plates 125 and 126 are each provided within its borders, see Fig. 14, with an elongated aperture 129 through which extends supporting and guiding studs 130 and 131 projecting from the block side 127, for the plate 125, and projecting from the block side 128, for the plate 126. The studs 130 and 131 have respectively mounted thereon a roller 132 and 133 which are positioned with respect to the aperture 129 to ride against the vertical edges 134 and 135 of the said aperture.

The supporting and guide plates 125 and 126 are retained, respectively, against its side of the clinching block by means of a cap plate 136 and 137, respectively, and the said plates 125 and 126 are respectively, retained in their projected supporting and guiding positions by a similar mechanism, such as illustrated in Fig. 13 for a supporting and guiding plate 125, namely, by a leaf spring 138 disposed within the elongated aperture 129. Each of the leaf springs has the formation of that illustrated in Fig. 14 to include a seat portion 139 engaging a lug 140 projecting from the block 115 into the aperture 129 and with said spring 138 having diverging spring arms 141 and 142 from its seat 139. The arms 141 and 142 yieldably downwardly move and through their seats on the supporting and guiding plate 125 shift the said plate to the position illustrated therefor in Figs. 13 and 14.

As will later be made clear, the said supporting and guiding plates 125 and 126 are actuated upwardly of their respective supporting sides 127 and 128 on the clinching block 115 by the box sides just prior to and during the clinching of a stay to its box.

As was noted above, a stay of the desired length is severed from the strip at the time of being clinched into the box and which is automatically effected.

Accordingly, the head block 115 carries at its rear face a cutoff device for severing the stay from its strip and which comprises a fixed knife 143 secured to the rear face of the head block with said fixed knife having formed in its lower end a V-shaped notch 144 to the same dimension as the V-shaped groove 116 in the clinching block 114.

Against the rear face of the head block 115 and the rear face of the fixed knife 143 is the movable knife 145 which has formed therein, upwardly of its lower end, a transverse elongated aperture 146 through which the stay strip passes to be disposed in the V notch 116 of the clinching block 114. The movable knife blade 145 is yieldably retained in its operative position by a yieldably pressed plate 147, yieldably retained in position by springs 148 whose tension is adjustable by bolts 149 extending into the block 115 on each side of a vertical groove 150 in which the movable knife 145 is disposed. The movable knife 145 is retained in its normal, lowermost, position by means of leaf springs 151 secured in a groove 152 extending longitudinally of the head block dovetailed tongue 111 and with said leaf springs 151 disposed on the upper end of the movable knife 145 as illustrated at 153 in Fig. 12.

The clinching block 114 of the head 45 cooperates with the anvil-knee, indicated, as noted above, in general by the reference numeral 46. This anvil-knee comprises an anvil block 154 having a V-shaped upper end and having its sides 155 at the same angle to one another as the sides of the clinching block groove 116. The anvil block 154 is secured to the upper end of a knee-block 156 and the said knee block 156 is disposed between outwardly projecting side members 157 and 158 from the housing 43. The knee-block 156 is secured between the said bed sides 157 and 158 by a clamp bolt 159 as well as by an adjusting mechanism, indicated in general by the reference numeral 160. The adjusting mechanism 160 comprises a bolt 161 having a reduced threaded end 162 and an enlarged collar 163 which are concentric with one another and rotatable in axially aligned apertures in the housing projecting sides 157 and 158. An eccentric sleeve 164 is pinned to the bolt 161 between the concentric ends 161 and 163 and the said eccentric sleeve 164 is disposed in a suitable aperture 165 through the knee-block 156. A handle 166 is secured to a dial 167 integral with the bolt exteriorly of one of the housing sides, side 157, for example. It will be understood that the vertical adjustment of the anvil-knee 46 is effected at the beginning of a run of a lot of boxes and remains in its adjusted position for the entire run and is only additionally adjusted when a box or lot of boxes of a different thickness is to be operated upon.

Secured to the outer end of the anvil block is a plate 168 against which the bottom of the box being worked

upon is held. The operation of the machine as thus far described is as follows:

The operator is disposed in front of the machine, to the right of the machine as illustrated in Fig. 1, and places a box blank on the anvil-knee by pushing the bottom 29, for example, as illustrated in Fig. 23, against the plate 168 and manually holds the box sides 26 and 27 simultaneously on the anvil block sides 155 with the ends of said box sides in the position illustrated in Fig. 23. Whereupon and with his foot on the rest 81 and toe on the toe plate 80, depresses the treadle for correspondingly actuating the rod 76. The actuation of said rod 76 oscillates the bell crank 71 in a clockwise direction against the resistance of a spring 170 for retracting the cam 73 of the bell crank lever 72 from the groove 63 in the key 62. The spring 65 immediately shifts said key 62 to the left, as seen in Fig. 7, and as soon as the keyway 68 in gear 58 is aligned, with the said key the driving connection between the motor and main drive shaft 59 is completed for actuating the eccentric cam driver 67. Rotation of the eccentric cam driver 67 through the cam follower connecting arm 83, pin 85, links 89 and 90 downwardly actuates the arm 44.

Downward actuation of the arm 44 carries with it the head 45 and head block 115 together with the portion of the stay strip within the groove 116 in the clinching block 114. As the clinching block 114 and head block 115 reach the anvil block 154 the sides 155 of the anvil block engage with the supporting and guiding plates 125 and 126 and actuates said plates outwardly and upwardly of the head block inclined sides 127 and 128. At this time the apex of the anvil 154 is engaging the undersurface of the portion of the stay strip within the clinching block groove 160 with, of course, the ends of the box sides interposed therebetween. The continued downward movement of the clinch block 114 and the head block 115 causes the stay strip to be bent to the form of the sides 155 of the anvil block 154 and the lugs 33 and 34 to penetrate the material of the box sides and engage the anvil sides 155 and are clinched upon further downward movement of the arm 44 and its head 45.

At about the time that the bending of the portion of the stay strip beneath the clinch block 115 is completed, the movable knife 145 engages the anvil block, in fact, engages the ends of the box walls just below the upper edges thereof and holds the stay strip material within its elongated passageway 146 against bending, while the fixed knife blade 143, immovable with respect to the clinch block 115, moves relative to the now stationary cutting blade 145 and effects a shearing of the stay strip and at the same time forces the end of the stay strip to follow the inclined sides 155 of the anvil block 154 and be embedded in the box material.

It will be appreciated that the operator upon depressing the treadle 78 to initiate a cycle of operation of the machine immediately released the same whereupon the spring 170 actuated the bell crank lever 71 in a counterclockwise direction forcing the cam face 73 of the bell crank lever arm 72 into the hub circumferential groove 61 so that as soon as a complete rotation of the main drive shaft 59 is effected, the said cam face 73 of the arm 72 engaged the cam face 64 of the key slot 63 retracting said key 62 from the keyway 68 of the gear 58 and stops the rotation of the eccentric driver 67.

The operator now turns the box through 90 degrees for positioning the next corner of the box and during this operation by the operator, a new piece of stay strip is positioned beneath the head 45 for insertion in the said next corner of the box or carton.

Any suitable or desirable means may be employed for effecting the feeding of the stray strip, preferably that shown in the drawings.

As disclosed in the drawings, the main drive shaft 59 has secured to it a crank 171, which is frictionally secured to said shaft in a suitable cavity 172 exteriorly of the housing. The crank 171 is secured through an adjustable clamp 173 integral with said crank so that, when necessary, the crank 171 may be angularly adjusted with respect to the axis of the drive shaft 59. The free end of the crank 171 is provided with a pivot pin 174 to which is secured one end of a lever 175, which has its other end upwardly bent as a finger 176 for adjustable attachment, through lock nuts 177, to an eye bolt 178. The eye bolt 178 is connected through its eye 179 with a pivot pin 180 at one end of an oscillatable lever 181.

The lever 181 is secured to an oscillatable shaft 182 oscillatably journaled, see Fig. 9, in the housing 43, preferably, in depending webs 183 and 184 of the said housing 43.

Secured to said oscillatable shaft 182 between the said depending housing webs 183 and 184 is a fork 185 having its arms 186 and 187 slotted for the major portion of their lengths as at 188 and 189. Disposed in each of the slots 188 and 189 are riders 190 and 191 each having inwardly projecting therefrom pins 192 and 193. The pins 192 and 193 form a pivot connection for a slider 194 which encircles the stay strip supporting slide 119, as seen most clearly in Figs. 9 and 10.

The slider 194 has upwardly extending therefrom a furcated ear 195 in which is pivotally mounted a pawl 196 through the agency of a pivot pin 197. The pawl 196 has at its one end a sleeve 198 in which is secured to project therefrom, a dog 199. The dog 199 is preferably circular in cross section and of a diameter sufficiently less than the diameter of the stay strip aperture 35 so as to freely enter said aperture to pick up and advance the said stay strip. The dog 199 is adapted to be disposed in the space 124 between the inner ends of the stay strip slide covering plates 122 and 123. The other end of the pawl 196 is biased by an expansion spring 200 which has its one end in a suitable socket provided by the pawl 196 and its other end retained on the slider 194, wherefore the pawl 196 is yieldably actuated toward the stay strip to have its dog always in position for engaging said stay strip.

Disposed on the pawl 196, preferably on the sleeve 198, is a roller 203 adapted to engage with a cam strip for actuating said pawl 196 against the yieldable resistance of its biasing spring 200 so as to disengage the dog 199 from the said staying strip when the said slider is retracted to a position for a new bite on the stay strip upon the clinching into position of the stay on the box corner.

Secured to the stay strip slide 119 at a point just behind the head 45 is a holding pawl which includes a bridging piece 204 above the stay strip groove 120 and from which bridging piece extends a furcated ear 205 having pivotally mounted therebetween a holding pawl 206 utilizing a pivot pin 207. The pawl 206 has projecting from its one end a holding dog 208 which, similar to the feed pawl dog 199, is circular in cross section and of a diameter to readily enter the aperture 35 in the stay strip. The pawl 206 is actuated to its holding position by a spring 209 which, similar to the mounting of the feed pawl spring 200, has one end in a socket in the pawl 205 and its other end anchored on the bridging piece 204.

From the foregoing, it will be understood that upon connection of the normally idle driving gear 58 with the main drive shaft 59 through the key 62, the stay strip feeding crank 171 is actuated. The arrangement of the parts is such that the stay strip is actuated to its final position prior to the cutting off of the stay and the clinching thereof in the box walls material and that the feed mechanism is returning to its own feeding position during the actual clinching and cutting off of the stay. The feed of the stay is completed upon the feed pawl roller 203 riding up onto the cam strip 201 for disengaging the pawl feed dog 199 from the said stay strip. From this, it will be noted that the cam track 201 is of considerable length with respect to the machine since, as

will presently be made clear, the pickup and feed mechanism feeds the stay strip for a relatively small amount for shallow boxes and a relatively large amount for deep boxes. In practice, the holding pawl **206** retains the strip in its operative position upon the retraction of the feeding pawl and permits the stay feeding pawl dog **199** to jump from aperture to aperture in the staying strip to pick up the desired amount of said staying strip. Conversely the holding dog **208** likewise jumps from aperture to aperture in the stay strip during the actual feeding thereof.

As was noted above, the length of the stay of a box depends upon its depth and is generally measured by the number of apertures in the stay. As illustrated in Fig. 1, the head **45**, preferably the head block **115**, is adjusted longitudinally of the arm to determine the said stay length and head block is provided on one surface thereof with graduations **210**, corresponding to the spacing of the stay strip apertures, which cooperate with a pointer **211** on the face of the arm during the setting up of the machine.

Since the stay strip supporting slide **119** is carried by the head block **115** and the cam track **201** is secured to, or integral with, said slide any movement of the head block **115** longitudinally of the arm **44** carries with it the stay strip supporting slide and cam track for thereby adjusting the end **202** of the cam track **201** toward or from the end of the stroke of the slider **194**. In this way, the feed pawl **196** and particularly its pickup dog **199** is disengaged from the said stay strip at a point greater or lesser beyond the cam track end **202** depending on the position of the head block **115**.

As specifically illustrated in the drawings, the head block **115** is positioned to permit a feed of 13 apertures per feed stroke. To stay the box illustrated in Fig. 23 the head block **115** would be adjusted so that its graduation corresponding to 4 would be aligned with the pointer **211** which would position the cam track **201** and its cam end **202** so that the feed dog **199** would be raised from the stay strip after a feed of but four holes. It will be understood, as noted above, that the feeding of the stay strip causes, in effect, a release thereof from the retaining dog **208**.

It will, of course, be understood that the head block **115** is manually adjusted axially thereof after the clamp screw **113** is released and that upon adjustment the said clamp screw is tightened.

As was noted above, the connection of the staying arm driving member **83** with the said arm is by way of an eccentric shaft **95** at the upper ends of connecting links **89** and **90**. This eccentric shaft **95** forms a part of a safety mechanism to prevent the coming together of the head **45** and anvil-knee **46**, and particularly the coming together of the clinch block **114** of the head block **115** and the anvil block **154** of the anvil-knee **46**. As illustrated in Fig. 4, the eccentric shaft **95** is normally in a position for having its eccentric axis nearest the axis of the connecting pin **85** for thereby having the arm **44** and transverse block **86** in operative stay clinching position. The eccentric shaft **95** has encircling it a torsion spring **212** which has one end **213** engaged with a pin **214** anchored against a shoulder provided by the arm **44**. The other end **215** of the torsion spring **212** is engaged with a trigger finger **216** which has an outwardly projecting lug **217** disposed in a notch **218** at the lower end of a trigger **219**. The trigger **219** is secured to a carrier **220** loosely oscillatably mounted on a pivot shaft **221** carried by the arm **44**. The trigger **219** has formed at its other end a pawl **222** disposed on a shoulder **223** in one arm **224** of a bell crank latch **225**. A spring **226** having one end secured to the trigger **219** and the other end secured to the bell crank latch **225** retains the trigger pawl **222** and bell crank latch shoulder **223** in yieldable engagement.

The bell crank latch **225** is pivoted at **227** to the bridge or base of a yoke **228** and the bell crank latch **225** is provided at the outer end of its other arm **229** with a seat portion **230**. The said seat **230** of the bell crank **225**, in the normal operation of the machine, is adapted to engage with an abutment **231** upstanding from the machine housing **43**.

In operation the engagement of the bell crank latch seat **230** with the abutment **231** prevents the separation of the said bell crank latch and the trigger so that the parts operate normally. The bridging piece of the yoke **228** has projecting from the sides thereof sleeves **232** and **233** from each of which projects a finger **234** and **235** which in turn have rearwardly projecting therefrom, see Fig. 19, arms **236** and **237**. The arms **236** and **237** respectively terminate in a lug **238** and **239** through which respectively extends a pin **240** and **241** respectively projecting from the upper ends of brackets **242** and **243** secured the exterior sides of the arm **44**.

The yoke **228** includes depending arms **244** and **245** to which are respectively secured bars **246** and **247**. The said bars extend along each side of the stayer head **45** to the front end of the machine, particularly the sides of the forward end of the arm **44**, and have secured to their outer ends upstanding arms **248** and **249**. The arms **248** and **249** have their upper ends connected by a U-shaped connecting member **250** from the rear end of which projects a tongue **251** adapted, in the normal position of the parts, to rest on an adjustable stop **252**. The adjustable stop **252** similar to the adjustable lug **231** is in the form of a bolt threaded into the top surface of the arm **44** and secured in position by a lock nut.

The stop **252** is for the purpose of positioning the bars **246** and **247** relative to the apex of the anvil block **154** so that the said bars are contacted before the clinching block **114** and anvil block **154** engage, in the event that there is an obstruction, such as the operator's hand or finger, in the path of movement of the said head block **115** and clinching block **114**.

The operation of the safety mechanism is as follows:

Should the operator not have the sides of the box in the proper position or his fingers or hands outwardly of the machine while holding the box to have a stay attached thereto, the said box material or the operator's fingers or hands upon engagement with the said safety bars **246** and **247** would elevate the said bars and cause an oscillation of the said bars **246** and **247**, the yoke **228** and the rods **236** and **237** about the axis of pins **240** and **241**. This movement of the yoke **228** will carry with it the bell crank latch **225** which through its shoulder **223** acting on the pawl **222** of the trigger **219** would oscillate the said trigger **219** in a clockwise direction on its pivot shaft **221** as seen in Fig. 20. The said oscillation of the trigger **219** will release from its notch **218**, the lug **217** of pin **216** thereby releasing the torsion spring **212** and permitting it to rotate the eccentric shaft **95** and thereby raise the arm above the links **89** and **90** an amount equal to the eccentricity of said shaft **95**. This would separate the arm from the block **86** and upon the driving member **83** reaching its lowermost position, the clinch block **115** and anvil block **154** will have space therebetween as represented by the eccentricity in the said eccentric shaft **95**.

In other words, with the eccentric shaft **95** in a position 180 degrees angularly displaced the clinch block and anvil block cannot be brought into clinching engagement and in fact cannot be brought close enough to one another to seriously injure the operator's finger or hand.

The operation of the torsion spring **212** upon release of the safety mechanism is limited by a suitable bracket **253** carried by the arm **44** and engages with the projecting lug **217** of the pin **216** when it is in a position 180 degrees removed from its operative position. The said inoperative position of the pin **216** is illustrated in phantom lines at **254** in Fig. 20 and it is in this position that

the eccentric shaft is placed upon the release of the safety mechanism.

The safety mechanism is returned to its operative position through a lever **255** loosely mounted on an extended portion of the eccentric shaft **95** with said lever having a clutch **256** on its inner surface for engagement with suitable clutch teeth **257** on said extending portion **258** of the eccentric shaft. A spring **259** normally separates the lever clutch teeth **256** from the shaft clutch teeth **257**.

It will be obvious that to reset the safety mechanism it is only necessary to engage the actuating lever and eccentric shaft clutches **256—257** and actuate the eccentric shaft **95** in a counter clockwise direction as seen in Fig. 20 until the lug **217** of the trigger finger **216** engages with the trigger notch **218**. The trigger **219** is retained in position for the reception of said latch lug **217** by the spring **226** which retains the trigger and latch in their operative positions at all times.

Upon the actuation of the safety device the cutoff knife mechanism is also rendered inoperative and upon the subsequent resetting of the safety device and operation of the machine an additional amount of stay strip is fed into and through the head **45**. In the event a relatively long stay were being employed the second feed thereof may project the stay strip forwardly of the machine and since the operator is positioned in close proximity to the front end of the machine the said second feeding of the stay strip may be projected into the face of the operator. To avoid this, the head block and/or clinch block **115** and **114**, see Fig. 12, have secured to their front ends a guard **260** which has its lower end outwardly bent as at **261** for engagement by the forward end of the stay strip and a deflection downwardly away from the operator.

As was noted above, the stay strip is supplied in a coil of 100 feet or more to the coil and part of which coil is illustrated in Fig. 21 as mounted on a spindle **262** loosely rotatable on a stud **263** projecting from the outer end of a bracket arm **264** secured to and rearwardly projecting from the rear end of the main housing **43**. The stay strip coil, indicated by the reference numeral **265**, after mounting on the spindle **262**, is sheathed by a pair of plates **266** and **267**. The plate **266** is permanently secured to and becomes a part of the spindle **262** while the plate **267** is readily removable from the spindle to permit coil replacement with said removable plate being temporarily and yieldably retained in position by a spring retainer **268** illustrated in section in Fig. 21 and in elevation in Fig. 22.

It is believed obvious how the coil is replaced since the spring retainer is removable from the spindle **262** by an upward pull on its handle portion **269** whereupon the plate **267** is removable from the spindle **262**. A new coil **265** is then mounted on the spindle **262** and the said parts, plate **267** and spring retainer **268** then returned to operative positions. The end of the coil is then manually fed into and through the stay strip supporting slide **119** until, at least, the first hole **35** therein engages with the pawl retaining dog **208** whereupon the machine may be started and the automatic feed of the stay strip effected.

In view of the foregoing, it will now be obvious that there has been provided a staying machine for applying stays to the corners of a box and that the machine herein described accomplishes the objects originally set forth.

What is claimed is:

1. In a staying machine, the combination of a housing, a staying arm overlying the housing and pivotally mounted at one end thereof to the housing, a clinching head at the other end of the arm, power actuated means within the housing including an eccentric cam driver connected with the arm for effecting its oscillation, an anvil carried by the housing beneath and cooperating with the clinching head in applying and clinching a stay, means mounting one of said clinching head and anvil for adjustment to establish an effective distance between them, said power actuated means for oscillating the arm including a link having one end pivotally mounted on the arm and the other end pivotally mounted on the eccentric cam driving means, and one of said link pivotal connections being in the form of a rotatable eccentric moveable through approximately 180 degrees so that the effective distance between the clinching head and anvil may be rendered ineffective.

2. In a staying machine, the combination of a housing, a staying arm overlying the housing and pivotally mounted at one end thereof to the housing, a clinching head at the other end of the arm, power actuated means within the housing including an eccentric cam driver connected with the arm for effecting its oscillation, an anvil carried by the housing beneath and cooperating with the clinching head in applying and clinching a stay, means mounting one of said clinching head and anvil for adjustment to establish an effective distance between them, said power actuated means for oscillating the arm including a link having one end pivotally mounted on the arm and the other end pivotally mounted on the eccentric cam driving means, one of said link pivotal connections being in the form of a rotatable eccentric shaft moveable through approximately 180 degrees so that the effective distance between the clinching head and anvil may be rendered ineffective, and releasable spring means for holding the eccentric shaft against rotation and maintaining said effective operative distance between said clinching head and anvil.

3. In a staying machine the combination of a housing, a staying arm overlying said housing and having one end thereof pivotally mounted on the housing, power actuated means carried by said housing including a driver and a link between the driver and staying arm, with said link and staying arm being pivotally connected to one another, a clinching head carried by the staying arm at one end thereof outwardly of the housing, an anvil carried by the housing outwardly thereof beneath the clinching head for cooperation therewith, said power actuating means oscillating said arm from a position wherein the clinching head and anvil are operatively associated to a position where said parts are normally remote from one another, said pivotal connection of the link with the arm including an eccentric operable relative to the arm and link whereby the said clinching head is placed in a position farther from the anvil than when in its normally remote position and whereby the power actuating means for oscillating the head cannot bring it into operative position with the anvil, and means normally inoperative for actuating the eccentric.

4. In a staying machine the combination of a housing, a staying arm overlying said housing and having one end thereof pivotally mounted on the housing, power actuated means carried by said housing including a driver and a link between the driver and staying arm, with said link and staying arm being pivotally connected to one another, a clinching head carried by the staying arm at one end thereof outwardly of the housing, an anvil carried by the housing outwardly thereof beneath the clinching head for cooperation therewith, said power actuating means oscillating said arm from a position wherein the clinching head and anvil are operatively associated to a position where said parts are normally remote from one another, said pivotal connection of the link with the arm including an eccentric operable relative to the arm and link whereby the said clinching head is placed in a position farther from the anvil than when in its normally remote position and whereby the power actuating means for oscillating the head cannot bring it into operative position with the anvil, means normally inoperative for actuating the eccentric including a torsion spring adapted for actuating the eccentric, means normally restraining opera-

tion of the torsion spring, and means for rendering the torsion spring retaining means inoperative.

5. In a staying machine of the class described, the combination of a housing, a staying arm overlying the housing and having one end thereof pivotally connected with the housing, means for actuating the arm about its pivot toward and from the housing through a given path of movement, said means including an eccentric capable of rotation through 180 degrees for thereby elevating the path of movement of the arm as effected by the arm actuating means, yieldable means for rotating the eccentric through said 180 degrees, means for restraining the said eccentric rotating means, and means exteriorly of the arm for rendering the last mentioned means inoperable so that said eccentric rotating means is operable.

6. In a staying machine of the class described, the combination of a housing, a staying arm overlying the housing and having one end thereof pivotally connected with the housing, means for actuating the arm about its pivot toward and from the housing through a given path of movement, said means including an eccentric capable of rotation through 180 degrees for thereby elevating the path of movement of the arm as effected by the arm actuating means, yieldable means for rotating the eccentric through said 180 degrees, means for restraining the said eccentric rotating means, and means exteriorly of the arm for rendering the last mentioned means inoperable so that said eccentric rotating means is operable, said eccentric rotating means comprising a torsion spring on said eccentric, a latch and trigger operatively connected with one another restraining the torsion spring, and a frame extending longitudinally of the arm exteriorly thereof for tripping the latch and trigger.

7. In a staying machine of the class described, the combination fo a housing, a staying arm overlying the housing and having one end thereof pivotally connected with the housing, means for actuating the arm about its pivot toward and from the housing through a given path of movement, said means including an eccentric capable of rotation through 180 degrees for thereby elevating the path of movement of the arm as effected by the arm actuating means, yieldable means for rotating the eccentric through said 180 degrees, means for restraining the said ecentric rotating means, means exteriorly of the arm for rendering the restraining means inoperable so that said eccentric rotating means is operable, and additional means operable to lock the last mentioned means against operation.

8. In a staying machine of the class described, the combination of a housing, a staying arm overlying the housing and having one end thereof pivotally connected with the housing, means for actuating the arm about its pivot toward and from the housing through a given path of movement, said means including an eccentric capable of rotation through 180 degrees for thereby elevating the path of movement of the arm as effected by the arm actuating means, yieldable means for rotating the eccentric through said 180 degrees, means for restraining the said eccentric rotating means, means exteriorly of the arm for rendering the restraining means inoperable so that said eccentric rotating means is operable, and additional means operable to lock the last mentioned means against operation, said yieldable rotating means comprising a torsion spring encircling the eccentric, a latch and trigger pivotally connected with one another restraining the torsion spring, and a frame extending longitudinally of the arm exteriorly thereof for tripping the latch and trigger, and an abutment preventing operation of the trigger and latch even though the frame is actuated for tripping the same.

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