Oct. 14, 1941. E. A. TERRELL 2,258,691

METHOD AND MEANS FOR SPINNING RIMS ON SPOOL HEADS

Filed May 17, 1939 4 Sheets-Sheet 1

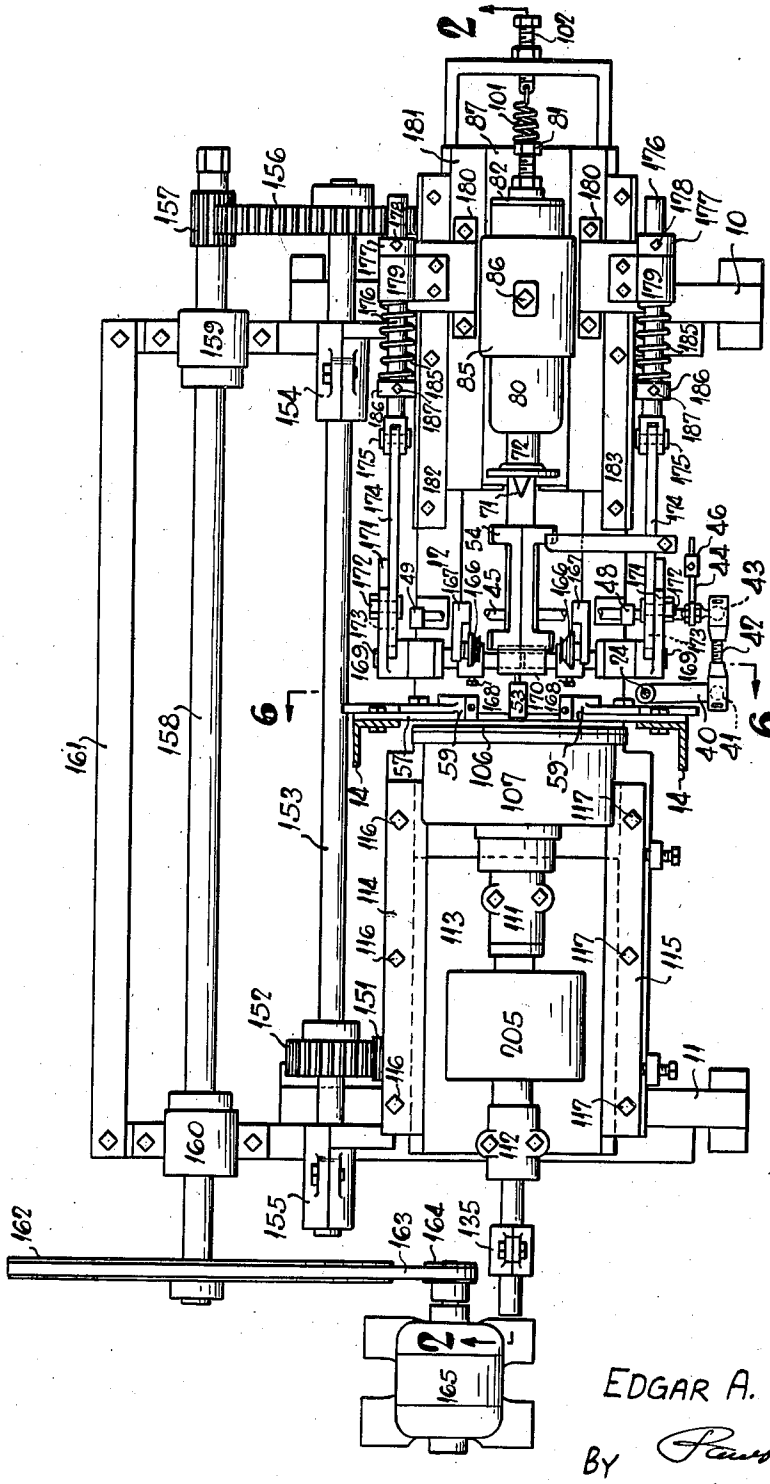

FIG-1

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METHOD AND MEANS FOR SPINNING RIMS ON SPOOL HEADS

Filed May 17, 1939 4 Sheets-Sheet 2

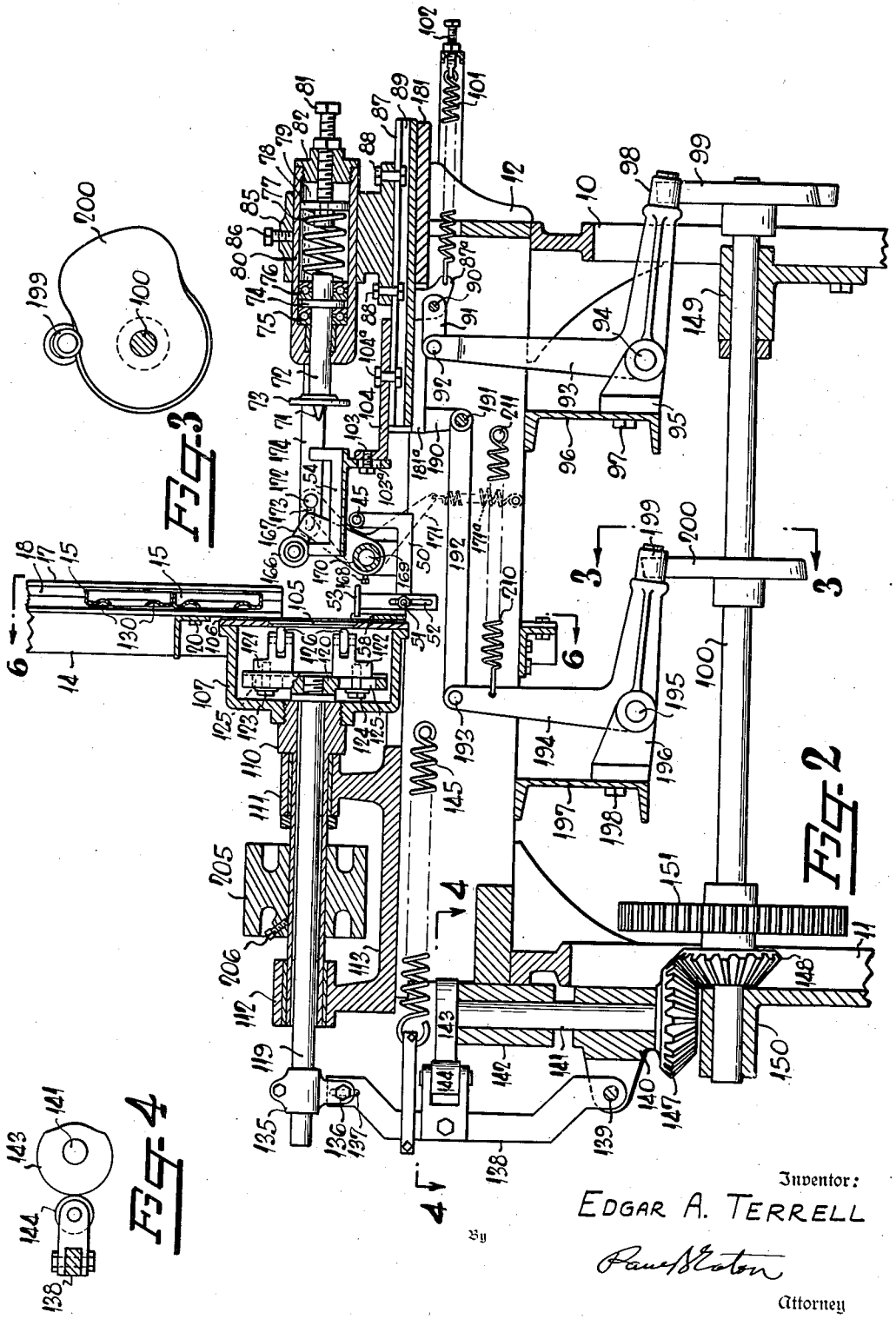

Fig-2

Fig-3

Fig-4

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METHOD AND MEANS FOR SPINNING RIMS ON SPOOL HEADS

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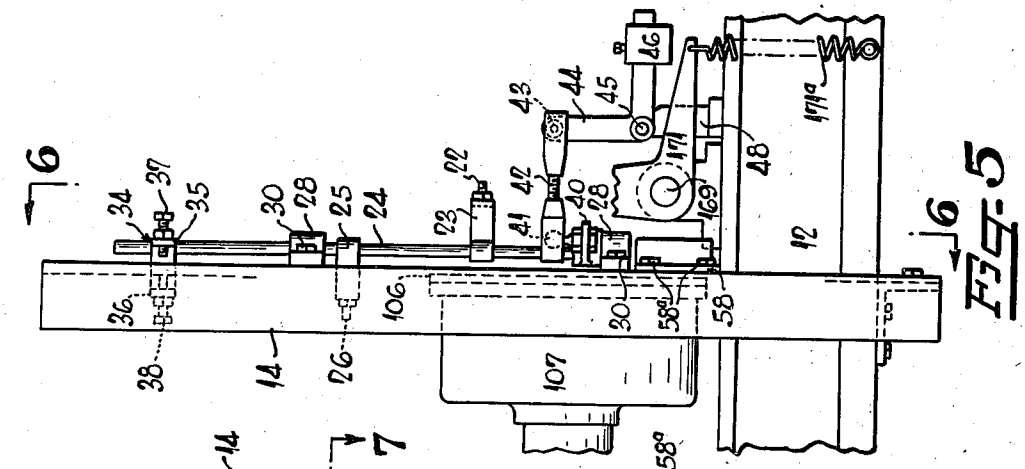

Fig-5

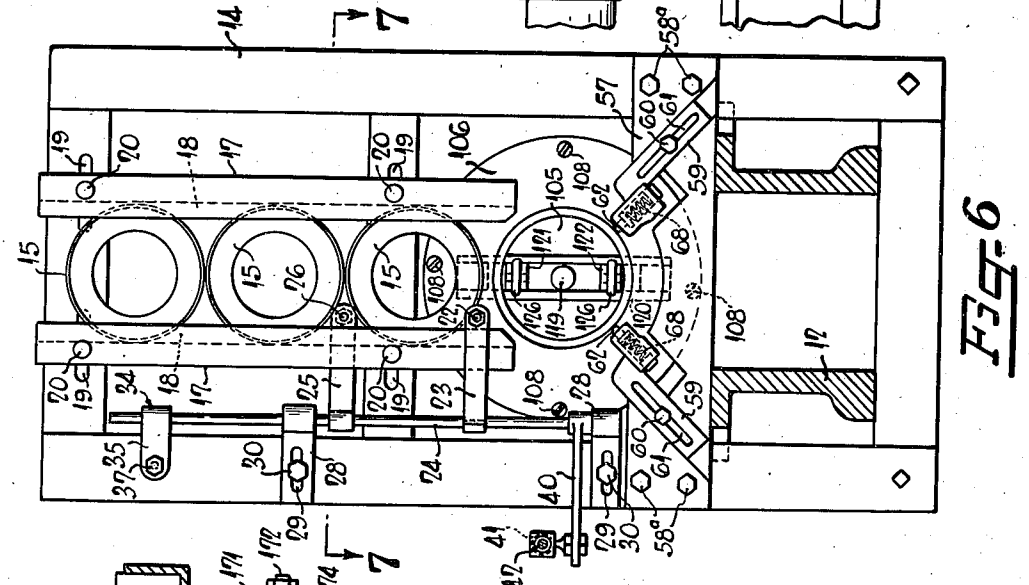

Fig-6

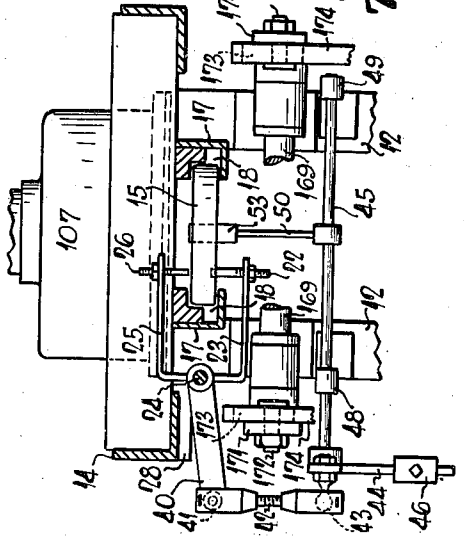

Fig-7

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METHOD AND MEANS FOR SPINNING RIMS ON SPOOL HEADS

Filed May 17, 1939 4 Sheets-Sheet 4

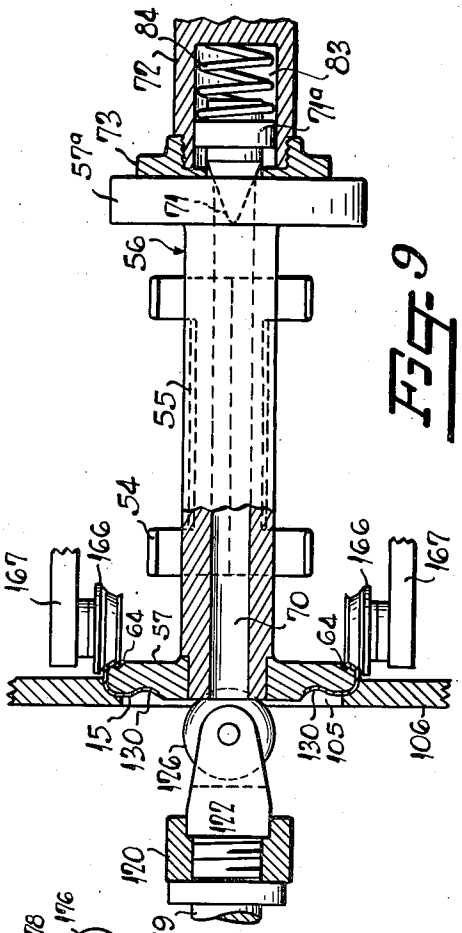

Fig. 9

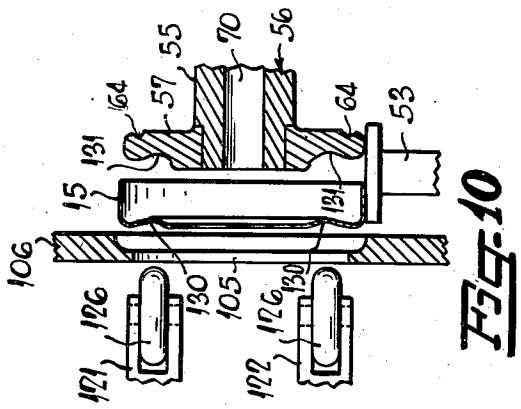

Fig. 10

Fig. 8

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Patented Oct. 14, 1941

2,258,691

UNITED STATES PATENT OFFICE

2,258,691

METHOD AND MEANS FOR SPINNING RIMS ON SPOOL HEADS

Edgar A. Terrell, Charlotte, N. C.

Application May 17, 1939, Serial No. 274,217

14 Claims. (Cl. 113—52)

This invention relates to a method and means for applying metallic shields to spool heads so that the periphery of the head will have a smooth surface which is contacted by the yarn as it is drawn from the spool. Spools are usually made from a suitable wood, which is usually a hardwood; consequently the flanges become worn or splintered after slight use, thus creating irregularities which are engaged by the yarn as it is drawn from the spool. Some spool heads have been made of sheet metal but these are expensive and easily bent out of shape. Other spool heads have been made from a wear-resisting composition material but these are expensive and have certain undesirable features. By affixing a metallic rim around the periphery of a wooden head, proper strength is obtained, low-cost production is made possible and the yarn on the spool does not engage the wood, but instead acts as a shield and wearing surface.

It is also necessary to reinforce these heads with a suitable band to make them substantial enough to withstand the ordinary wear and tear in the mill when the spools are not in use on a textile machine. If a combination of metal and wood is used to form a spool head, the thickness of the head can be substantially decreased without affecting the strength and durability of the spool.

The general purpose of the invention is the provision of an improved apparatus for producing spools of the type specified, comprising means for holding a plurality of preformed shields in a magazine, means actuated by the insertion of a spool for releasing one of said shields to allow it to be positioned adjacent a spool head, means for moving the spool endwise and clamping it against the released shield, means for rotating both the spool and the flange, and means for crimping said shield into the flange during this rotation of the spool.

It is a further object of this invention to provide a method of affixing a shield to a spool head which shield is preformed so as to engage the periphery and adjacent portions of the outer sides of the head, the steps of which comprise the positioning of the spool for the reception of the head, the moving of the spool head endwise and clamping the shield thereon, then rotating both the head and the shield while one edge of said shield is spun against the inner face of the head and the other edge portion of the shield is spun into a circular cavity in the outer face of the head.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings, in which—

Figure 1 is a top plan view of my improved apparatus for placing shields upon spool heads with the feeding apparatus omitted;

Figure 2 is a vertical longitudinal sectional view taken along the line 2—2 in Figure 1, with a portion of the feeding apparatus shown;

Figure 3 is a sectional view taken along the line 3—3 of Figure 2 showing the cam for actuating the rollers for spinning a shield on the inner face of a spool head;

Figure 4 is a sectional view taken along line 4—4 in Figure 2 showing the cam for actuating the spinning rollers which engage the outer face of the spool shield;

Figure 5 is an elevation of the top central portion of Figure 2, showing the shield feeding mechanism;

Figure 6 is a vertical sectional view taken along the line 6—6 in Figures 1, 2 and 5;

Figure 7 is a sectional plan view taken along the line 7—7 in Figure 6;

Figure 8 is an elevation looking at the right-hand end of Figures 1 or 2;

Figure 9 is an enlarged sectional view similar to the central portion of Figure 1 but showing a spool with its head and shield in a position where the shield is being spun onto the head;

Figure 10 is an enlarged vertical sectional view similar to the central part of Figure 2, showing the position of the spool head and the shield immediately before the spinning action is effected.

Shield feeding mechanism

Referring more specifically to the drawings, the numerals 10 and 11 denote suitable end supports which have mounted thereon a bed plate 12.

Secured around the central portion of the bed plate 12 is a framework 14 which is adapted to support the feeding mechanism which allows suitable shields 15 to fall in position for being secured to the ends of the spool heads. By referring to Figures 2 and 6, it is seen that the shields 15 are circular and are stacked one upon the other between guideways 17. These guideways have grooves 18 in their proximate faces so as to accommodate the shields 15.

In order to adjustably secure these guide members 17 to the framework 14, suitable slots 19 are provided in the framework and these slots are adapted to be penetrated by bolts or screws 20 which also penetrate the vertical guide members 17. By loosening the nuts on the bolts or screws 20, the distance between the proximate faces of

the guide members can be varied to accommodate shields of different diameters.

The stack of shields 15 is normally supported by the end of a horizontally disposed bolt 22 (Figures 6 and 7). This bolt is adjustably secured in an arm 23 which, in turn, is secured to the rod 24 directly above the arm 23, and adjustably secured in the free end of this arm is a bolt 26, which bolt is positioned substantially midway between the two lowermost shields. In Figure 7, it is seen that the bolt 22 projects beneath the lowermost shield 15; whereas the bolt 26, thereabove, is in such a position that the shields may move downwardly without contacting its end. When it is desired to release the lowermost shield between the guides 17, it is necessary to slightly rotate the shaft 24 in a clockwise manner in Figure 7, thereby causing the end of bolt 22 to move out from beneath the lowermost shield 15 and at the same time causing the end of bolt 26 to move beneath the adjacent shield thereabove to prevent it from falling.

The vertically disposed rod 24 is mounted for oscillation in bearings 28 each of said bearings having a slot 29 therein which is penetrated by a stud bolt 30 which has its end threadably secured in framework 14. By manipulating the bolts 30 and the bearings 28, the position that the supporting bolts 22 and 26 occupy relative to the center line of the shields 15 can be varied.

In order to limit the oscillation of shaft 24, a suitable stop bracket 34 has been fixedly secured around the upper end of the rod 24, said bracket having prongs 35 and 36 integral therewith (Figures 5 and 6). The prong 35 is penetrated by bolt 37, the end of which is adapted to rest against the face of framework 14 when the rod 24 has been oscillated its limit in a clockwise direction in Figure 7. In order to provide a stop when the shaft 24 oscillates in a counterclockwise manner in Figure 7, a bolt 38 has been provided in the prong 36.

The lower portion of rod 24 (Figure 6) has fixedly secured thereto a lever 40, the outer end of which has a ball 41 extending upwardly therefrom and this ball fits into one end of a link 42. The other end of the link 42 is adapted to fit over a ball 43 (Figure 5) in the upper end of a bell crank 44, said bell crank being fixedly secured around a transversely disposed shaft 45. The outstanding leg of bell crank 44 has a weight 46 adjustably mounted thereon so as to provide the necessary weight to normally hold the end of supporting bolt 22 beneath the lowermost shield 15 in the manner shown in Figure 7. Of course when the end of the bolt 22 is beneath the lowermost shield as just stated, the end of the stop bolt 38 in Figure 5 will be contacting the framework 14 in the manner shown.

The shaft 45 is rotatably mounted in bearings 48 and 49 on the top of bed plate 12. Fixedly secured to the intermediate portion of the shaft 45 (see Figure 2) is an L-shaped lever 50, the horizontal leg of which has a bolt 51 therein penetrating a slot 52 in an upwardly extending treadle 53. The top of treadle 53 is positioned at a slightly lower level than a V-shaped spool support 54 (see Figures 1 and 2). This V-shaped support is adapted to accommodate the barrel 55 of a spool 56 in the manner shown in Figure 9, said barrel having suitable flanges or heads 57 and 57a on its ends. When the spool is placed in the V-shaped support 54 in the manner shown in Figure 9 the lowermost portion of the spool head 57 will normally rest upon the treadle 53. The pressure exerted by the lower portion of the spool head 57 upon the treadle will cause its associated lever 50 to rotate in a counter-clockwise manner in Figure 2 thus causing the bell crank 44 (Figure 5) to rotate in a like manner so that the link 42 will move to the left. This movement to the left in Figure 5 of link 42 will cause the lever 40 in Figure 7 to rotate shaft 24 in a clockwise manner and thus cause the lowermost supporting bolt 22 to move out from beneath the lowermost shield 15 and at the same time cause the supporting bolt 26 thereabove to move beneath a shield and support it in this position. When the spool is removed from the V-shaped support 54, the weight 46 on the end of bell crank 44 in Figures 5 and 7 will return the supporting bolt 22 to the position shown in Figure 7 and also rotate the next uppermost bolt 26 to the position shown. This, of course, will allow the shield which was previously supported by the uppermost bolt 26 to fall downwardly between the guides and upon the end of lower supporting bolt 22. It is therefore seen that each time a spool is inserted in the proper position that a shield is released from the magazine thereabove.

Supporting mechanism for released shields

Secured to the face of the framework 14 (Figure 6), directly above the bed plate 12, is a plate 58 by any suitable means such as bolts 58a. Adjustably secured by bolts 60 to the face of this plate is a pair of angularly disposed brackets 59 and each of these bolts is adapted to penetrate a slot 61 in this bracket. The upper end of each bracket has a plunger 62 mounted therein. It will be noted by observing Figure 6 that each of these plungers are radially disposed about the longitudinal center line of a shaft 119. Also it is to be noted that the center line of the shaft 119 is in alinement with the longitudinal center line of the spool 56 when it is placed on support 54 and in the position for placing a shield 15 thereon. The plungers 62 are normally held in an extended position as shown in Figure 6 by means of suitable compression springs 68. The purpose of providing these plungers and brackets is to support the lowermost released shield 15 in the proper position so that when the spool head 57 is moved longitudinally of the center line of the barrel 55, the shield will be in such a position as to fit over this spool head. It is of course evident that if the diameter of the spool head 56 changes a corresponding change must be made in the shield and also a corresponding adjustment must be made in the positions of the brackets 59. In other words, the center line of the released shield must be concentric with the longitudinal center line of the barrel 55, before the spool head 57 is moved into the released shield.

Clamping mechanism for spool and released shield

After the spool 56 has been placed in the support 54 and a shield has been released, the parts are in the position shown in Figure 10. It is then necessary to move the spool endwise, that is to the left from the position shown in Figure 10 to the position shown in Figure 9 to cause the shield to be inserted over the periphery of head 57.

The spool barrel 55 in Figures 9 and 10 is shown with a longitudinal bore 70 therein. After the spool has been placed upon support 54, the right hand end of this bore is penetrated by a plunger 71 on the end of shaft 72. This plunger

has a washer 73 mounted therearound which will engage the outer face of head 57*a*, if the hole 70 is large enough to permit the plunger to penetrate it this far. Upon the penetration of the plunger the spool head is moved endwise toward the released shield.

The right hand end of the shaft 72 has a collar 74 integral therewith (see Figure 2) and disposed on opposed sides of this collar are thrust bearings 75 and 76. The bearing 76 has one end of a compression spring 77 normally pressing thereagainst which will cause the left-hand end of shaft 72 to be pushed out to extended position. The right hand end of the spring 77 is normally resting against a washer 78, which washer is slidably mounted in bore 79 inside of a casing 80. The washer 78 has one end of a screw 81 rotatably mounted thereon, said screw having its intermediate portion threadably mounted in cap 82 which, in turn, is threadably secured in the right hand end of casing 80. By adjusting the screw 81 it is seen that the amount of tension placed upon the spring 77 can be varied, which will likewise vary the resistance offered by the left-hand end of shaft 72 to the end of the spool.

Plunger 71 has a collar 71*a* integral with its intermediate portion which fits into a bore 83, said bore having a compression spring 84 mounted therein. This spring normally presses the plunger 71 outwardly until the collar 71*a* engages washer 73. This construction provides a resilient mounting for the plunger.

The casing 80 is adjustably secured in bracket 85 by any suitable means such as set screw 86. This bracket has its lower portion secured to dove-tailed slide 87 by any suitable means such as bolts 88, the heads of said bolts being adapted to fit into longitudinal groove 89 in the top of dove-tailed slide (see Figures 2 and 8). Extending from the lower side of the slide 87 is a lug 87*a* to which is pivoted as at 90, a link 91. The link 91 is pivoted as at 92 to the vertical leg of bell crank 93, said bell crank being pivoted as at 94 to bracket 95. This bracket 95 is secured to a cross channel support 96 by any suitable means such as a bolt 97. The horizontal leg of the bell crank 93 has a roller 98 thereon and this roller normally rests upon cam 99 on the end of cam shaft 100. In order to hold the roller 98 normally upon the periphery of cam 99, a suitable tension spring 101 is provided. If it is desired to adjust the tension on the spring 101, a suitable bolt 102 is manipulated.

As the slide 87 moves to the left in Figure 2, the spool support 54 also moves along with it. This support is adjustably secured to bracket 104 by means of bolt 103, said bolt penetrating slot 103*a* in the support; therefore the elevation of the support 54 can be varied. Bracket 104 is secured to slide 87 by means of bolt 104*a* and this bolt has its head mounted in slot 89 in the slide. If it is desired to move the support 54 longitudinally of the machine, it is only necessary to reposition bolt 104*a* in slot 87.

As the shaft 100 is rotated the bell crank 93 is caused to oscillate back and forth which in turn will cause the slide 87 and its associated shaft 72 to reciprocate back and forth. For example, when the roller 98 rides on the high side of cam 99 (Figure 8) the plunger 71 will move to the left in Figures 1, 2 and 9 to cause the right-hand end of bore 70 to be penetrated. This movement will also cause the left hand head 57 of the spool to move into released shield 15, which in turn will move into a hole 105 in the manner shown in Figure 9. Due to the fact that hole 105 is the same diameter as the shield 15, it is seen that the shield as well as the head 57 will move into this cavity thereby providing a chuck or clamping member for engaging the left hand end of the spool while the right hand end is engaged by the plunger 71.

By observing Figures 2 and 6, it can be seen that the hole 105 is disposed in plate 106, said plate being secured to bell shaped member 107 by any suitable means such as screws 108. This plate is made removable due to the fact that it very often is necessary to provide a larger or smaller hole 105 in the plate for gripping spool heads of different diameters. In any event the cavity or hole 105 acts as a chuck for holding one spool head in position whereas the plunger 71 fits into the bore 70 to hold the other end of the spool. It is in this clamped position that the metal forming takes place to cause the shield to be spun securely around the periphery of the spool head 57.

The bell shaped member 107 is threadably secured upon the right hand end (Figure 2) of a sleeve 110, said sleeve being journaled in bearings 111 and 112 and these bearings form an integral part of slide 113. The slide 113 is secured upon the top of bed plate 12 and between guide plates 114 and 115 (Figure 1). These plates are secured to the top of the bed plate by means of bolts 116 and 117, respectively. When the slide 113 has been placed in an adjusted position, the bolts 116 and 117 are tightened to prevent any further movement.

Mechanism for spinning the shield onto the exterior face of the spool head

Mounted for longitudinal sliding movement within the sleeve 110 is a shaft 119, said shaft having threadably secured on its right hand end (Figure 2), a suitable bar 120. Secured to the bar 120 by any suitable means such as bolts 123 and 124, respectively, are brackets 121 and 122. The bolts 123 and 124 penetrate suitable slots 125 in the bar 120 thereby making it possible to vary the distance that the brackets 121 and 122 occupy from the center line of shaft 119. Each of the brackets 121 and 122 has a roller 126 mounted therein. These rollers are adjusted so as to lie on the same radius with respect to the shaft 119. Also these rollers are placed in such a position relative to the center line of the bore 70 in the spool barrel 55 that their periphery will engage an annular groove 130 in the vertical flange of shield 15. This groove 130 in the vertical flange is adapted to fit in an annular groove 131 in the exterior face of spool head 57 as shown in Figure 10. The purpose of providing the rollers is to have them firmly press that portion defined by the groove 130 of the shield into the groove 131 in the spool head.

The rollers 126 are moved to the right from the position shown in Figures 2 and 10, to the position shown in Figure 9, immediately after the opposed ends of the spool 56 are engaged by plate member 106 and plunger 71. In order to have means for moving these rollers to the right at the proper time, a suitable connection has been provided between the shaft 119 and the cam shaft 100. This connection comprises a fitting 135 which is fixedly secured around the left hand end of shaft 119 and the lower end of this fitting has a bolt 136 extending therethrough

which penetrates a slot 137 in the upper end of lever 138, said lever 138 being pivoted as at 139 to bearing 140. The bearing 140 is secured to the end support 11. This bearing is also adapted to accommodate the lower end of a cam shaft 141 which shaft is also mounted for rotation in a bearing 142 thereabove. Secured to the upper end of shaft 141 is a cam 143, said cam being normally engaged by a roller 144 which, in turn, is secured to the intermediate portion of lever 138. This roller is normally held in contact with the cam 143 by a tension spring 145. Cam 143 is shown in Figures 2 and 4 with the high side engaging the roller 144; consequently the metal spinning rollers 126 on the right-hand end of the shaft 119 are withdrawn from the hole 105 in plate 106 and from the end of the spool head. As the shaft 141 rotates, however, to a position where the low side of the cam will be contacted by roller 144, the spring 145 will normally move the shaft 119 to the right to thereby force the rollers 126 through the opening 105 to the position shown in Figure 9 at which time the rollers will engage the preformed groove 130 in the vertical face of shield 15.

The lower end of the shaft 141 (Figure 2) is driven by the main drive shaft 100 through the medium of beveled gears 147 and 148, the gear 147 being disposed on the lower end of shaft 141 and the gear 148 being disposed on the left-hand end of cam shaft 100.

Driving mechanism for cam shaft 100

The cam shaft 100 has its ends mounted in bearings 149 and 150 which bearings are secured to the end supports 10 and 11, respectively. This shaft has a gear 151 fixedly secured thereon which meshes with a pinion 152 on shaft 153, said shaft 153 having its ends journaled in bearings 154 and 155 extending outwardly from supports 10 and 11, respectively. The right hand end of shaft 153 (Figure 1) has a relatively large gear 156 fixedly secured thereon and this gear meshes with a small pinion 157 on the right-hand end of shaft 158 said shaft 158 being rotatably mounted in bearings 159 and 160 on framework 161, said framework being supported between members 10 and 11. The left-hand end of the shaft 158 has a pulley 162 thereon upon which is mounted a belt 163. This belt is also mounted upon a motor pulley 164 of motor 165. It is seen that upon the operation of motor 165 that the main cam shaft 100 is driven to cause the shaft 72 in Figure 2 to move to the left thus moving the head 57 and shield 15 into the hole 105. At the same time the shaft 119 is moved to the right thus embedding the rollers 126 into the preformed groove 130 of shield 15 in the manner shown in Figure 9.

Mechanism for spinning the shield against the inner surface of the spool head

Simultaneously with the movement to the right of the roller 126 to engage the vertical face of the shield 15 in the manner shown in Figure 9, a second pair of rollers 166 move to the left in Figures 1, 2 and 9 to spin the projecting rim of the horizontal flange of the shield 15 against the inner face of head 57 and into groove 64. The forming rollers 166 are mounted on the upper end of arms 167 and these arms extend downwardly and have their lower ends adjustably secured as at 168 to transversely disposed shafts 169. It is seen by observing Figure 1 that the two shafts 169 are separate and therefore, independently operable, the proximate ends of these shafts being coupled together by means of a collar 170. This collar however does not prevent relative rotation from taking place between the shafts. Also since the arms 167 are adjustably mounted by means of set screws 168, their position on their respective shafts 169 may be varied to accommodate spool heads of different diameters.

Fixedly secured on the outer ends of shafts 169 are bell cranks 171, the upstanding leg of each bell crank having a bolt 172 extending therethrough which also penetrates a slot 173 in a horizontally disposed link 174. The right hand end of each of these links is pivoted as at 175 to a shaft 176, said shaft 176 having a collar 177 adjustably secured thereto by any suitable means such as set screws 178, the intermediate portion of each shaft 176 being slidably mounted in a bearing 179 which, in turn, is supported by a block 180 (see Figure 8). The dove-tailed slide 181 also supports the dove-tailed slide 87, previously described. Slide 181 is mounted for sliding movement between guide plates 182 and 183 on the top of bed plate 12.

By observing Figure 1, it will be noted that each shaft 176 has a spring 185 mounted therearound with one end of the spring abutting the bearing 179 and the other end abutting a suitable collar 186, said collar being adjustably secured around the shaft by any suitable means such as set screw 187. The purpose of providing the springs 185 is to have the desired amount of flexibility when the rollers 166 are moved to the left into contacting position with the lateral flange of shield 15. In other words, should there be a difference in the width of the head 57 then one roller could move farther inwardly toward the hole 105 than the other without transmitting undue pressure upon the thick side of the flange. This spinning or forming action by the rollers 166 as heretofore stated, takes place simultaneously with the inward movement of rollers 126. Consequently, the pressure is being applied simultaneously to opposed sides of the spool head 57 so that the head will not be placed under any undue strain. When it is necessary to move the rollers inwardly, from the position shown in Figures 1 and 2 to the position shown in Figure 9 the slide 181 is moved to the left in Figures 1 and 2. This slide has a downwardly depending lug 190 integral with the left-hand end thereof and pivoted to this lug as at 181 is the right hand end of a link 192. The left hand end of link 192 is pivoted as at 193 to the upper end of bell crank 194, said bell crank being pivoted as at 195 to bearing 196. The bearing 196 is secured to a transverse channel member 197 by means of bolt 198. Rotatably mounted upon the end of the horizontally disposed leg of bell crank 195 is a roller 199. This roller normally contacts cam 200 on drive shaft 100. The cam 200 is similar in many respects to the cam 99 on this same shaft except for the fact that the dwell is somewhat shorter. In other words, the cam 200 is so shaped that the rollers 166 will not be moved into engaging position until after the cam 99 has moved the shaft 72 to the left to clamp the spool and shield in position.

Spool rotating mechanism

Thus far in the description means have been described for first releasing a shield to inserting position, means for clamping a spool head against the released shield, means for moving suitable

forming rollers into contact with the outer face of the shield and means for moving a second pair of forming rollers into contact with the inner rim of the shield to perform a second spinning operation. The final operation comprises the rotating of the shield and the spool to allow the stationary rollers 126 and 166 to perform their spinning operations as the shield with its spool turns.

The hollow shaft 110 has a pulley 205 secured thereon by any suitable means such as set screw 206 (see Figure 2). This pulley is driven from a separate source of power not shown, but it is evident that when this pulley is rotated, the hollow shaft will be rotated as well as bell shaped member 107 and the plate 106, which plate is secured to the right hand end thereof. Due to the fact that the plate 106 acts as a clamping member for one end of the spool, it is evident that the spool will be rotated along with this plate member. Also the thrust bearings 76 and 77 are provided for taking up the thrust which is exerted against the head of the spool by virtue of the rollers 126. Due to the fact that these thrust bearings are mounted in the manner shown it is possible for the shaft 72 to rotate along with the spool 56 during the crimping operation.

For each revolution of the shaft 100 the necessary mechanical movements are effected for releasing a shield, clamping a spool between two chuck members 71 and 106, moving rollers 176 into engagement with the outer face of the shield, simultaneously moving a second pair of rollers 166 into engagement with the lateral flange of the shield and for rotating the shield and the spool so that the necessary spinning operations will take place.

The bottom slide 181 is normally forced to the left to cause the rollers 166 to engage the lateral flange of the shield 15 by virtue of a tension spring 210, said spring having one end thereof secured to the vertical leg of bell crank 194 (Figure 2) and its other end anchored as at 211.

By observing Figure 2 it will also be noted that the bell crank 171 has a tension spring 171*a* connected to the laterally extending leg which normally holds the bolts 172 in the right hand end of slots 173 of link 174. In other words, the tension spring 171*a* removes the rollers 166 from contact with the inner face of the spool head 56 when the cam roller 199 is contacting the low side of cam 200.

In order to provide the necessary clearance for the downwardly depending lug 87*a* which extends downwardly from slide 87, a suitable slot 181*a* has been cut in the left hand end of slide 181 (Figure 2). By the provision of this slot the upper slide 87 together with its clamping shaft 72 can move to the left in advance of the lower slide. After the shaft 72 has been moved to the left to perform the necessary clamping operation, the lower slide 181 follows this slide, after a short interval and likewise moves to the left to cause the forming rollers 166 to move to spinning position as shown in Figure 9; however, it will be observed bycomparing the cams 99 and 200 in Figues 8 and 3, respectively, that the slides 181 and 87 are returned to non-engaging position substantially at the same time after the spinning operation has been performed. This return is effected by springs 101 and 210, when the rollers 98 and 199 are contacting the low sides of cams 99 and 200, respectively.

In the drawings and specification, there has been set forth a preferred embodiment of the invention, and although specific terms are employed, they are used in a generic and descriptive sense only, and not for the purpose of limitation, the scope of the invention being set forth in the appended claims.

We claim:

1. In a machine for spinning a preformed cup-shaped annular metallic rim onto the peripheral portions of a circular spool head having preformed circular cavities in its side surfaces adjacent the periphery thereof, a magazine for supporting a plurality of the rims, means for supporting the spool, means controlled by the supported spool for releasing a rim from the magazine, means for arresting the rim and supporting the same in axial alinement with the spool, a driven sleeve member, a chuck on the sleeve member, means for moving the spool and the rim against said chuck, means for imparting rotation to the sleeve member for rotating the spool, forming means disposed inside the sleeve member and being operable automatically to move into engagement with one edge of the rim to spin the same into the cavity in the side of the spool head disposed adjacent the chuck, and other forming means operable automatically for engaging the other edge of the rim and spinning it into the preformed cavity in the other side of the spool head.

2. Apparatus for affixing a cup-shaped metallic rim member over the periphery and against opposed side portions of a circular spool head provided with circular cavities disposed in each side surface adjacent the periphery of the spool head, comprising means for placing the member over the periphery of the spool head in gripping contact with the spool head, a plurality of means for simultaneously engaging the edge and bottom portions of the member, means for causing relative rotative motion between the spool and the means for engaging the edge and bottom portions of the member to thereby spin the edge and bottom portions of the member into said circular cavities in opposed side surfaces of the spool head.

3. Apparatus for spinning a metallic cup-shaped shield onto the periphery and against opposite side portions of a disk-like spool head, comprising means for imparting rotation to the spool, and a pair of forming rollers for engaging the outer edge of the cup-shaped shield for spinning the rim of the cup into close proximity to the periphery and one side of the spool head, and a second pair of forming rollers for engaging the bottom of the cup-shaped shield and spinning it into close contact with the other side of the spool head.

4. Apparatus for securing a preformed metallic cup onto the periphery and opposed side portions of a disk-like spool head, comprising means for guiding a cup into axial alinement with the supported spool, means for forcing one end of the spool head into the cup and for pressing the cup against a rotating chuck, means for imparting rotation to the chuck, a forming member operable automatically for engaging the edge of the cup and spinning the rim portion of the cup into intimate engagement with the periphery and one side of the head of the spool, a second forming member for engaging the bottom of the cup and spinning it into intimate engagement with the other side of the head at the same time the first forming member engages the rim of the cup, and means operable automatically after a pre-

determined number of revolutions have been imparted to the spool for releasing it from the rotating means.

5. Apparatus for spinning a preformed cup-shaped shield onto a circular disk-like head of a spool comprising means for positioning a shield in axial alinement with a spool, means for producing relative movement between the spool and the shield to force the shield over the spool head and against a rotatable chuck, means for imparting rotation to the chuck and the spool, a plurality of forming rollers for engaging the edge of the cup and another pair of forming rollers for simultaneously engaging the bottom of the shield and spinning the shield into conformity with the surface of the periphery and both sides of the spool head, and means operable automatically for withdrawing the spinning means from contact with the spool head and separating the rotating means from engagement with the spool so that the finished spool may be removed from the machine.

6. Apparatus for affixing an annular metal member around the periphery of a disk on the end of a spool comprising means for positioning a metal member in axial alinement with the spool, a rotary member, a longitudinally movable member for engaging the spool and forcing it into driving contact with the rotary member, two forming members, means operable automatically upon positioning of the spool against the rotary member for simultaneously moving one of the forming members into engagement with the outer periphery of the metal member and for moving the other forming member into contact with the bottom of the metal member to simultaneously spin the metal member around the periphery of the spool head and against both sides of the spool head.

7. Apparatus for applying an annular cup-shaped metal member around the periphery of a disk on the end of a spool, comprising means for supporting a metal member in axial alinement with the spool, a rotary member, a longitudinally movable member for engaging the spool and forcing it against the rotary member, a plurality of forming rollers, means operable automatically upon positioning of the spool against the rotary member for simultaneously moving some of the forming rollers into engagement with the outer edge and the bottom of the metal member, and for moving the other forming rollers into engagement with the bottom of the cup-shaped member to simultaneously spin the same against the opposed sides of the spool head and into intimate contact with the periphery of the spool head, and means operable automatically for separating the spool head from the rotary member and to cause the longitudinally movable member to return to normal position, whereby the spool may be removed from its supporting means.

8. Apparatus for spinning a cup-shaped metallic shield into intimate contact with the periphery and opposed sides of a circular spool head comprising means for supporting a shield in axial alinement with the spool head, means for moving the spool endwise, a rotary means against which endwise movement of the spool causes the shield to be positioned and whereby the shield will be fitted over the periphery of the spool head, means operable automatically for imparting rotation to the rotary means to impart rotation to the spool and the shield disposed on its head, a plurality of forming means operable automatically for simultaneously engaging the periphery of the shield and the bottom of the shield and spinning it into intimate contact with both sides of the spool head adjacent the periphery of the spool head.

9. That method of placing a cup-shaped metallic rim on a circular-disk-like spool head which comprises positioning the spool and a preformed rim in axial alinement, producing relative longitudinal movement between the spool and the rim to force the rim around the periphery of the spool head, imparting rotary motion to the spool and rim, and simultaneously engaging the edge and bottom portions of the rim with forming members to spin the rim into intimate contact with the periphery and opposed side surfaces of the spool head.

10. In a machine for affixing a pre-formed cup-shaped annular metallic rim onto the peripheral opposed side portions of a circular disk-like spool head having pre-formed circular cavities in its side surfaces adjacent the periphery thereof, means for supporting a rim in axial alinement with the spool, a driven sleeve member, a chuck on the sleeve member, means for moving the spool and the rim against said chuck, means for imparting rotation to the sleeve member for rotating said spool, and a plurality of forming members for simultaneously engaging the bottom of the rim and also engaging the rim adjacent its edge portions for spinning the edge portions and bottom of the rim into the preformed cavities in the spool head.

11. Apparatus for affixing a cup-shaped metallic rim onto the periphery and opposed side portions of a circular spool head, comprising means for causing relative longitudinal movement between the rim and the spool to pass the rim snugly over the periphery of the head, a plurality of forming means for simultaneously engaging the edge and bottom of the rim, and means for causing relative rotary movement between the spool with its rim on the one hand and the forming means engaging the edge and bottom of the rim to simultaneously spin the edges and bottom of the rim into intimate contact with the spool head.

12. Apparatus for affixing a cup-shaped metallic rim member over the periphery and against opposed side portions of a circular spool head provided with circular cavities disposed in each side surface adjacent the periphery of the spool head, comprising means for placing the member over the periphery of the spool head in gripping contact with the spool head, a plurality of forming means for simultaneously engaging the edge and bottom portions of the member, means for causing relative rotative motion between the spool and the means for engaging the edge and bottom portions of the member to thereby spin the edge and bottom portions of the member into said circular cavities in opposed side portions of the spool head.

13. That method of placing a preformed, cup-shaped annular metallic member around the periphery and opposed side portions of a circular spool head which comprises placing the spool and the member in axial alinement with each other, causing relative longitudinal movement between the spool and the member to press the member snugly over the periphery of the spool head, then imparting rotary movement to the spool with the member disposed on the head and simultaneously engaging the member on opposed sides of the spool head with a plurality of forming elements to spin the rim of the member and

the bottom of the member into intimate contact with the periphery and opposed side portions of the spool head.

14. That method of securing an annular metallic cup-shaped member onto the periphery and opposed side portions of a circular spool head which comprises supporting the spool, moving the cup-shaped member into axial alinement with the spool, axially moving the spool to cause its head to move into the member and to snugly engage the interior surface of the member, then imparting rotation to the spool and its member and then simultaneously engaging the bottom and rim of the member, with forming members to spin the edge of the member into intimate contact with one side of the spool head simultaneously with the spinning of the bottom of the member into intimate contact with the other side of the spool head.

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