The present invention relates to can sewing machines and has particular reference to an improved sewing chuck which prevents skidding of a beaded can end during the sewing operation.

The can manufacturing and canning industries have always been faced with the problem of the skidding or slipping of the can ends relative to positively driven sewing chucks while they are being double seam to the can bodies by seaming rolls which are not positively rotated and thus put a drag on the end. Such skidding results in incomplete seams, but fortunately is not a major problem and can usually be controlled by proper adjustment of the mechanism of the sewing machine. However, even if such adjustments are carefully made, skidding does occur sporadically. The exact cause of the skidding frequently cannot be definitely ascertained, but it is believed to be connected with variations in the surface characteristics of a particular batch of ends being used which sometimes reduce the coefficient of friction between the contacting surfaces of the ends and the rotating can sewing chucks that skidding results. This problem is perhaps most often encountered in sewing beaded beer can ends to beer can bodies, and is probably due to the fact that such ends are made in a wide variety of finishes, such as metallic tin, and various types of pigmented and unpigmented lacquers and enamels.

Attempts have been made in the past to eliminate this skidding of the ends by means of special chuck constructions, but such attempts have generally proved unsuccessful.

The present invention provides a sewing chuck which substantially eliminates such skidding. The chuck of the instant invention is provided with an annular inclined groove which provides a seat for a rubber friction ring which projects below the undersurface of the chuck and is compressed against the upper surface of the can end during the sewing operation to provide a non-skidding engagement between the chuck and the can end. The invention contemplates that contact between this rubber friction ring and the can end be made on the inner portion of an upwardly projecting rounded bend formed in the can end in order that a substantially conical area of engagement, somewhat similar to that encountered in the conventional cone type clutches, be established to substantially increase the resistance to slippage between the chuck and the can end. It has been found that this construction provides a chuck which substantially eliminates slippage between the chuck and the can end.

In its preferred form, the rubber friction ring comprises a rubber O-ring of the type which is commercially available in most areas and thus can be easily replaced at low cost. Also, because of its rounded cross-section, the O-ring can be easily inserted and removed from the undercut groove without the use of special tools.

An object of the invention therefore is the provision of an improved can seamer chuck which prevents slippage of the can end during the sewing operation and thus improves the quality of the finished double seam.

Another object of the invention is the provision of such a chuck which is simple in construction and which incorporates a low cost friction ring which is securely held in place but which may be easily removed and replaced when required.

A further object is the provision of a non-skidding chuck provided with a resilient friction ring which is engageable against a beaded surface of the can end in order to provide a substantially conical area of frictional contact which is resistant to skidding.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings: FIGURE 1 is a side elevation of a portion of a can sewing machine which utilizes a chuck made according to the principles of the instant invention; FIG. 2 is a plan view of the friction ring which is used to provide a non-skidding surface in the sewing chuck; FIG. 3 is an enlarged fragmentary vertical sectional view taken radially through the chuck and the can body and end just prior to the application of longitudinally applied pressure between the chuck and the can end, parts being broken away; and FIG. 4 is a view similar to FIG. 3 but showing the deformation of the rubber ring during the application of such pressure.

As a preferred and exemplary embodiment of the instant invention, the drawings illustrate the principles parts of the can body seaming machine of the type disclosed in United States Patent 2,447,525 to Nordquist, issued August 24, 1948, and entitled “Can Closing Machine.” This machine preferably includes a rotatable seaming turret 10 which comprises an upper web 12 and a lower web 14 which respectively center and support a can end A and a can body B which are to be joined in a double seam.

The can end A comprises a countersunk flat central panel 16 which at its outer edge merges into an upwardly projecting annular bead 18 having a gently rounded upper surface. The bead 18 merges into an upwardly projecting annular countersink wall 28 which at its upper end merges into a horizontal flange 22 which is provided with an edge curl 24. The flange 22 is lined with the usual lining compound 26 which functions to make the completed seam hermetic. The can end A is guided into the turret 10 by a semi-circular pocket 26 of the rotating cover feed turret 25 (FIG. 1), and is received on a horizontal ledge 30 of a semi-circular pocket 32 formed in the upper turret web 12.

The can body B comprises a tubular cylindrical side wall 34 formed at its upper end with an annular flange 36 and includes an imperforate end member 38 double seam to its bottom end, said can body being received from a feed-in conveyor (not shown) on a horizontal annular ledge 40 of a circular pocket 42 formed in the lower turret web 14. Both the can end A and the can body B are fed into the turret 10 at about the same time. As initially received in the seaming machine, the can end A is spaced vertically above the can body B as seen in FIG. 1. However, as soon as the body B has been received in the pocket 42, a lifter plunger 44 moves upwardly into engagement against the bottom end 38 of the can body B and moves the body B upwardly off the ledge 40 and into engagement with the can end A, and continues its upward motion to lift the can end A upwardly off the ledge 30 and bring it into engagement with a knock-out pad 46 which is disposed in vertical alignment with the plunger 44 and is mounted on the bottom end of a shaft 48. The plunger 44 continues its upward motion, carrying with it the can body B, the can end A and the knock-out pad 46 and eventually brings the can end A into engagement with a positively rotated seaming chuck which comprises the subject of the instant invention and which frictionally en-
gages the can end A and frictionally rotates it during the seaming operation.

The positively rotated seaming chuck comprises a chuck body 50 which is mounted at the bottom end of a rotatable hollow shaft 52 and is formed with a central recess 54 which receives the knock-out pad 46. The chuck body 50 is of a size and shape to fit into the can end A, and its bottom end is provided with an annular upright back-up wall 56 which closely engages with the annular countersink wall 20 of the can end A and thus provides the required internal support during the formation of the end seam by a conventional first operation seaming roll 57 and a second operation seaming roll (not shown). The seaming rolls are freely rotatable, and are positively driven either than through their frictional contact with the rotating can end A.

The bottom end of the chuck 50 is provided with an annular recess 58 which overlies the can end bead 18. The outer portion of the recess 58 comprises a shallow annular groove 59 which receives the outer portion of the upwardly extending bead 18 of the can end A. The inner portion of the recess 58 comprises a much deeper, annular, oppositely inclined recess or groove portion 60 which is disposed immediately adjacent, constitutes a vertical continuation of the shallow annular groove 59. The deep recess portion 60 is formed with inwardly inclined inner and outer walls 62, 64 and an outwardly inclined connecting wall 66.

A resilient friction member or ring 68, in the preferred form of the invention comprises an O-ring of circular cross-section constructed of rubber or other resilient material which is disposed in the deep recess portion 60. Said friction ring 68 is firmly retained within the recess portion 60 by the inwardly inclined inner wall 62 of the recess portion 60. The friction ring 68 can be easily inserted into and removed from the recess without special tools due to the fact that it is resilient and can be easily stretched during its application and removal.

As shown in FIG. 3, the friction ring 68 has a cross-sectional diameter which is approximately equal to the spacing between the inclined groove walls 62, 64, and said ring contacts the three recess walls 62, 64, 66, the bottom of the rubber ring 68 projecting below the bottom of the chuck body 50 and being disposed inwardly of the shallow groove 59, is so located that it engages the inner portion of the annular bead 18 of the can end A. The initial contact between the friction ring or annulus 68 and the can end A occurs at or near the juncture of the bead 18 and the can end panel 16. However, as the lifter plunger 44 reaches the top of its stroke it exerts considerable pressure against the can body B and this pressure is transmitted to the can end A, thus forcing it firmly against the rubber ring 68 and causing the temporary deformation or flattening of the rubber ring 68 (see FIG. 4) thus increasing the area of frictional engagement between the ring 68 and the can end A.

As seen in FIG. 4, the deformed rubber ring 68 frictionally engages the inner portion or slope of the can end bead 18 over an area of contact which is inclined in a generally upward and outward direction and which bead, although gently curved, is substantially frusto-conical in shape and functions in the manner of a cone clutch to create a very effective nonslipping driving connection between the seaming chuck and the can end A. The effectiveness of this engagement is further enhanced by the fact that the can end bead 18 provides a very rigid reinforced can end portion which resists downward flexing and thus maintains firm contact with the rubber friction ring 68.

As seen in FIG. 4 the rubber ring 68 assumes its fully deformed condition when the chuck body 50 is fully seated within the can end A. In this position, the back-up wall 56 of the chuck is in intimate engagement with the countersink wall 20 of the can end A. When this condition is fulfilled, the first operation seaming roll 57 moves inwardly into rolling frictional engagement against the rotating can end flange 22 (see FIG. 4) and performs the first seaming operation, after which the second operation seaming roll moves in as described in the aforementioned United States Patents 2,447,257 and 2,447,525 to end the seaming operation. During the entire seaming operation, the can lifter plunger 44 continues to exert an upward pressure against the can body B and thus maintains the pressured nonskid engagement between the can end A and the seaming chuck body 50.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form herebefore described being merely a preferred embodiment thereof.

We claim:

1. In a can seaming machine, the combination of a rotatable chuck having means for positively rotating the same, said chuck having a bottom end engageable with a can end body for backing up and rotating said end body during a seaming operation thereon by a seaming roll rotationally rotated thereby, an annular recess in said chuck opening into its said bottom end, said recess including a radially spaced inner and outer wall with said inner wall being angularly inclined relative to the axis of said chuck, and a resilient deformable friction ring of substantially circular cross-section housed within said recess and confined against displacement therefore by said angularly inclined recess wall, the lower portion of said friction ring projecting downwardly from said recess for resilient deformable engagement with said can end to impart frictional rotation thereto by said chuck and to assure against slipping of said can end relative to said chuck during the seaming operation.

2. The can seaming machine of claim 1 wherein both of said radially spaced recess walls are angularly inclined relative to the chuck axis and said recess merges into a relatively shallow concentric recess portion for receiving an annular reenforcing bead on said can end, said friction ring being engageable as described with said bead to insure said frictional rotation of the can end by said chuck without slipping.

3. The can seaming machine of claim 1 wherein said friction ring is an O-ring removably confined in said can end recess with its lower annular portion depending therefrom.

References Cited in the file of this patent

UNITED STATES PATENTS

2,224,478 Jones ------------ Dec. 10, 1940
2,447,254 Nordquist ----------- Aug. 24, 1948
2,608,918 Kirk -------------- Sept. 2, 1952
2,666,307 Higert ------------- Jan. 19, 1954
2,795,441 Gilbert et al. ------ June 11, 1957
2,870,727 Strickler ----------- Jan. 27, 1959