To all whom it may concern:

Be it known that I, William J. Towle, citizen of the United States, resident of St. Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in Methods of Lining Can Ends and Mechanism Therefor, of which the following is a specification.

This invention consists in a novel method of lining can ends, and in improved means or mechanism therefor.

The principal object of the invention is to provide a method of forming a gasket liner wherein the can end is utilized as a die element in cutting both the inner and outer edges of the gasket; applying the gasket, thus formed, to the flanged part of the can end, and upturning the outer edge of the flange of the can end to secure, retain and protect the gasket, all in one operation.

Another object of the invention is to provide a method of forming the gasket liner in which the wall of a shoulder or panel, formed in the can end, is utilized as a die member for cutting the inner edge of the gasket, and utilizing the edge of the flange, as it is upturned, as a die member, to cut the outer edge of the gasket.

Another object of the invention is to provide a method by which the gasket is firmly seated and snugly held in a groove in the can end formed between the shoulder or wall of the panel and the upturned edge of the flange.

The invention consists generally in the method or process, and in the constructions and combinations, hereinafter described and particularly pointed out in the claims.

In the accompanying drawings

Figure 1 is a partial sectional view of a machine adapted to be used in carrying out my process and also showing the means for feeding the strip of gasket material into the machine.

Figure 2 is an enlarged vertical section on line 2—2 of Figure 3, showing the strip of gasket material, in position between the die punch and the can end.

Figure 3 is a partial sectional view on the line 3—3 of Figure 2, looking in the direction of the arrow.

Figure 4 is a detail view showing the die punch lowered to a position to allow the rubber pad on the knock-out plate to firmly hold the paper strip against the can end before the commencement of the cutting operation.

Figure 5 is a view, similar to Figure 4, showing the position of the die punch after cutting the inside of the gasket.

Figure 6 is a view, similar to Figures 4 and 5, showing the position of the die punch after the gasket has been completely cut and positioned in the can end.

Figure 7 is an enlarged sectional detail of a can end showing the gasket applied thereto.

Figure 8 is a vertical section showing certain modifications.

In the drawings, 2 represents the base of a machine, having a bed plate 3, and the usual plunger or ram 4 to which the die punch, hereinafter described, is secured. The means for operating the plunger 4 may be of any well-known type and construction (not shown).

The strip of gasket material 5, preferably paper, is fed by suitable feed rolls 6 and 7, mounted preferably on the bed plate 3. A guide plate 8, preferably formed of spring steel, so as to be capable of yielding, is secured to the bed plate, adjacent to the feed rolls 6 and 7, to guide the gasket strip over a forming die 9, and centering block 10, secured to the bed plate by screws 11 and 12 respectively. A drawing ring 13 is provided in the forming die 9, and is yieldingly held in its upper or normal position by pins 14, preferably four in number, bearing against a plate 15, which co-acts with a rubber cushion 16, washer 17, and nut 18, on the stand bolt 19, secured to the bed plate 3. A flange 20 is provided on the drawing ring 13, to engage the upper part of the recess 21 in the forming die, to limit the upward movement of said ring. The centering block 10 may be stationary or a movable member properly supported, or again may be made a part of the drawing ring 13, and is preferably arranged to project slightly above the face of the forming die 9, as shown in Figure 2, and is of substantially the same form as the inside of the raised or paneled portion of the can end 22, thereby serving as a centering means for the can end, and preventing lateral movement of said can ends during the operation of cutting and applying the gasket.

A die punch 23 which may be of any usual or preferred construction is secured to the
lower face of the plunger 4 in alignment with the forming die 9 and centering block 10. Within this punch I provide a knock-out plate 24 of any usual or preferred construction held in place by screws 25, and, preferably, compression springs 26 arranged in sockets 27 in the plunger 4. A rubber pad or cushion 28 is preferably used and is secured by suitable means to the face of the knock-out plate 24, and projects normally slightly below the cutting edge of the punch, being held in its lowest position by springs 26, bearing against the heads of the screws 25. A pair of gripper bars 29 are shown and may be employed, one on each side of said punch, with their lower edges extending downward practically on a level with the cutting edge of the punch 23. Tension bars 30 are also shown yieldingly secured to the bed plate by means of bolts 32 and springs 31. These tension bars are shown arranged beneath the gripper bars 29.

For feeding the can ends into the machine and bringing them into proper position over the centering block 10, I preferably provide a chute 33 arranged on the bed plate 8. I have here shown a feeding mechanism consisting of a reciprocating slide 37 arranged to move in a groove in a support 38 and operated by an oscillating arm 39. A pusher blade 40 is pivotally mounted, at 41, on the slide 37, and when the slide moves back to engage a new can end, the pusher blade yields slightly upward and passes over the can end nearest the forming die, until the shoulder 42 on the pusher blade engages the raised portion of said can end, and on the forward stroke moves it beneath the punch, centering it upon the block 10.

I prefer to provide upon the pusher blade a finger 43 preferably made of spring steel that bears upon the top of the can end as the same is being moved forward by the pusher blade, to securely locate the can end on the block 10.

I also prefer to provide an inclined guide plate 45, preferably secured by screws 46 in a recess 47 in the upper surface of the forming die 9, in line with the chute through which the can ends are fed into the machine, its function being to sufficiently elevate the forward flange of the can end so that said flange will clear the raised portion of the centering block 10 when the can end is forced over said block. I have shown, and may use transverse rods 34, supported in lugs 35 mounted on the bed plate 3 in position so that the strip, 36b, which lies below said rods, is guided by said rods.

The upward movement of the strip with the die is limited by said rods.

In Figure 3 I have shown a modified construction in which a die block 2 is secured to the bed plate 3 supported upon the base 2 said die block being provided with a series of holes 10 permitting the use of various sizes of centering blocks 10, draw-rings 13 and forming dies 9. With this construction the pins 14 are shown resting upon the blocks 14b, carried by the plate 16.

In this view I have also illustrated a bell-crank lever 33, carried by the plunger and of usual construction, to operate the knock-out plate 24. The lever is shown provided with a wheel 35 arranged to control the movement of the lever by its engagement with a stationary track rail 33.

In this construction I have shown a guide plate 8, pivotally supported at 47 upon a block 48, provided with a lug 49 that limits the upward movement of the guide plate 8. A spring 50 is arranged to yieldingly support the guide plate. Arranged upon the end of a guide plate is a recessed guide bar 51 secured to said plate by suitable screws 52. The gasket strip 5 passes between the plate 8 and the under surface of the guide bar 51. A bar 29 is secured to the plunger 4 in position to engage the guide bar 51 as the plunger descends, thereby permitting the gasket strip to be moved downward into contact with the can end.

Operation.

The can ends are fed into the machine by any suitable means. I prefer the mechanism herein shown by which they are pushed through the chute and over the centering block 10, which brings them in proper alignment in respect to the punch. The strip of gasket material is fed across the can end that has been positioned in the machine and the downward movement of the punch brings the face of the rubber pad or block 28 into engagement with the paper strip and moves the same downward into contact with the upper face of the can end. A further movement of the punch carries the knock-out plate and rubber pad 28, which have been stopped by contact with the upper face of the can ends, to be pressed firmly against the face of the can end, under tension of the springs 26 which are compressed in the sockets in which they are placed, the heads of the screws which are now in a stationary position acting with the ends of the sockets to compress said springs as the punch continues its downward movement.

The die 23 fits the vertical wall or shoulder forming the panel in the can end, and the center of the gasket is cut out as the inner edge 22° of the die comes in contact with this vertical wall of the can end. A further movement of the die carries the paper strip against the upper surface of the flange 22° of the can end, and pressure of the face of the die upon this flange forces the ring 13 downward, the rubber cushion 16 yielding for this purpose. The face of the die 23 is slightly narrower than
the opening in die 9 so that further downward movement of the die 23 causes the edge of the flange 22° of the can end to be turned sharply upward between the outer face of the die 23 and the inner face or wall of the forming die 9.

The downward movement of the draw-ring 13 is preferably limited by its contact with the upper face of the bed plate 3 (Figure 6), and during the movement of the draw-ring from the position shown in Figure 4 to that shown in Figure 6 the gasket material will be forced against the outer edge 29° of the die 23 as the edge of the flange 22° is turned up which cuts the outer line of the gasket. This action cuts the gasket and forms the recess simultaneously and seats said gasket firmly in said recess, so that there will be no danger of said gasket becoming loosened and dropping out of said recess during the subsequent handling of said can ends.

As the gasket is cut out by the co-action of the punch die and the can end, the process of seating the gasket in the groove in the can end takes place simultaneously with the turning up of the edge of the flange to form the wall of said groove. As the inner edge of the gasket is cut by the shoulder or panel wall, and the outer edge by the upsetting of the flange of the can end, it follows that the gasket fits snugly within the groove or space that is formed between the shoulder or wall of the panel and the upset edge of the flange. The gasket will remain in position in this groove without the use of glue or other adhesive material. The can ends may, therefore, be freely handled without any danger of the gaskets dropping out of the grooves.

The can ends may be circular, oval, rectangular, or of any other desired shape. The gaskets will usually be formed of paper, though any other suitable material may be employed. While I have referred to the element or part 13 as a draw-ring it will be understood that the shape of this element, as well as the shape of the centering block 10, the forming die 9 and the punch die 23 will correspond to the shape or outline of the can end.

Upon the reverse or upward movement of the plunger 4 the can end will travel upward with the die until pushed off by the knock-out plate. The machine will ordinarily be arranged in an inclined position so that as the can ends with the inserted gaskets drop from the die face they will slide into a suitable chute and pass out of the machine.

The details of the construction of the mechanism may obviously be varied in many particulars without departing from my invention.

I claim as my invention:

1. The method of forming and applying gasket liners to metal can ends having a shouldered or panel center and a laterally projecting flange, which consists in bringing the strip of gasket material over the can end, pressing said strip against the can end and cutting the inner edge of the gasket by contact of the gasket strip with the panel wall or shoulder, and cutting the outer edge of the gasket by contact of the gasket strip with the outer edge of the laterally projecting flange at the time this outer edge is being turned up, and seating said gasket in the groove in the can end thus formed between said upturned edge and said shoulder, all at one operation.

2. The method of forming and applying gasket liners to metal can ends having a shouldered or panel center, which consists in pressing the strip of gasket material against the can end, and cutting the inner edge of the gasket by contact of the gasket strip with the panel wall or shoulder, and cutting the outer edge of the gasket by contact of the gasket strip with the outer edge of the laterally projecting flange at the time this outer edge is being turned up, and seating said gasket in the groove or recess in the can end formed between said upturned edge and said shoulder, all at one operation.

3. The method of forming and applying gasket liners to metal can ends having a shouldered or panel center and a laterally projecting flange, which consists in pressing the strip of gasket material against the can end, thereby cutting the inner edge of the gasket from the gasket strip by using the panel wall or shoulder as a die member, and seating the same on said flange around said shoulder all at a single operation.

4. The method of forming and applying gasket liners to metal can ends having a laterally projecting flange, which consists in turning up the edge of the flange and pressing the strip of gasket material against said edge as the same is being turned up, and thereby cutting the outer edge of the gasket, and seating said gasket on said flange within said upturned edge, all at a single operation.

5. The method of forming and applying gasket liners to metal can ends having a laterally projecting flange, which consists in pressing the strip of gasket material against said flange, turning up the outer edge of the flange, thereby cutting the outer edge of the gasket as the outer edge of the flange is being turned up, and seating said gasket on said flange, within said upturned edge, all at a single operation.

6. The method of forming and applying
gasket liners to metal can ends having a shouldered or paneled center and a laterally projecting flange which consists in pressing the strip of gasket material against the can end, thereby cutting the inner edge of the gasket by contact of the gasket strip with the panel wall or shoulder, turning up the outer edge of the flange, thereby cutting the outer edge of the gasket as the outer edge of the flange is being turned up, and seating said gasket on said flange within said upturned edge and around said shoulder, all at one operation.

7. The method of forming and applying gasket liners to metal can ends having a shouldered or panel center and a laterally projecting flange, which consists in pressing the strip of gasket material against the can end, thereby cutting the inner edge of the gasket by contact of the gasket strip with the panel wall or shoulder, seating the same around said shoulder, turning up the edge of the flange and pressing the strip of gasket material against said edge as the same is being turned up, thereby cutting the outer edge of the gasket, and seating said gasket on said flange between said upturned edge and the panel wall or shoulder, all at a single operation.

8. Means for forming and applying gasket liners to can ends having a raised or paneled center and a laterally projecting flange, comprising, in combination, means for centering and holding a can end, a forming die upon which the outer portion of said flange rests, a drawing ring within said die, means for feeding a strip of gasket material across said centering means and said die and drawing ring, and a punch arranged in alignment with said centering means and co-operating with the can end shoulder to cut the inner edge of the gasket and press said gasket upon the flange of the can end.

9. Means for forming and applying gasket liners to can ends having a laterally projecting flange, comprising, in combination, means for centering and holding a can end, a forming die upon which the outer portion of said flange rests, a drawing ring within said die, means for feeding a strip of gasket material across said centering means and said forming die and drawing ring, and a punch arranged in alignment with said centering means, and co-operating with the forming die to turn up the outer edge of the flange and simultaneously cut the outer edge of the gasket.

10. Means for forming and applying gasket liners to can ends having a laterally projecting flange, comprising, in combination, means for centering and holding a can end, a forming die upon which the outer portion of said flange rests, means for feeding a strip or gasket material across said centering means and forming die, a punch arranged in alignment with said centering means, and co-operating with the forming die to turn up the outer edge of the flange and simultaneously cut the outer edge of the gasket.

11. The combination, with a centering block arranged to hold a can end having a raised or paneled center, of means for feeding a strip of gasket material across said centering block, and a punch having a die arranged to co-operate with a can end held upon said centering block to cut the inner edge of a gasket liner between the edge of said die and the wall of a can end acting as a die member and supported upon said centering block.

12. The combination, with a centering block arranged to hold a can end having a raised or paneled center, of means for feeding a sheet of gasket material across said centering block, a punch having a die arranged to co-operate with a can end held upon said centering block to cut the inner edge of a gasket liner between the edge of the die and the wall of a can end acting as a die member supported upon the centering block.

13. The combination with means arranged to center and hold a can end, having a laterally projecting flange, of a forming die arranged to support the outer edge of said flange, a drawing ring arranged within said forming die, means for passing a sheet of gasket material across said drawing ring and forming die, a punch having a die arranged to press the flange of the can end against said drawing ring, thereby causing the forming die to turn up the outer edge of the flange, and to cause the upturning of the outer edge of the flange to cut the outer edge of the gasket.

In witness whereof, I have hereunto set my hand this first day of April 1929.

WILLIAM J. TOWLE,