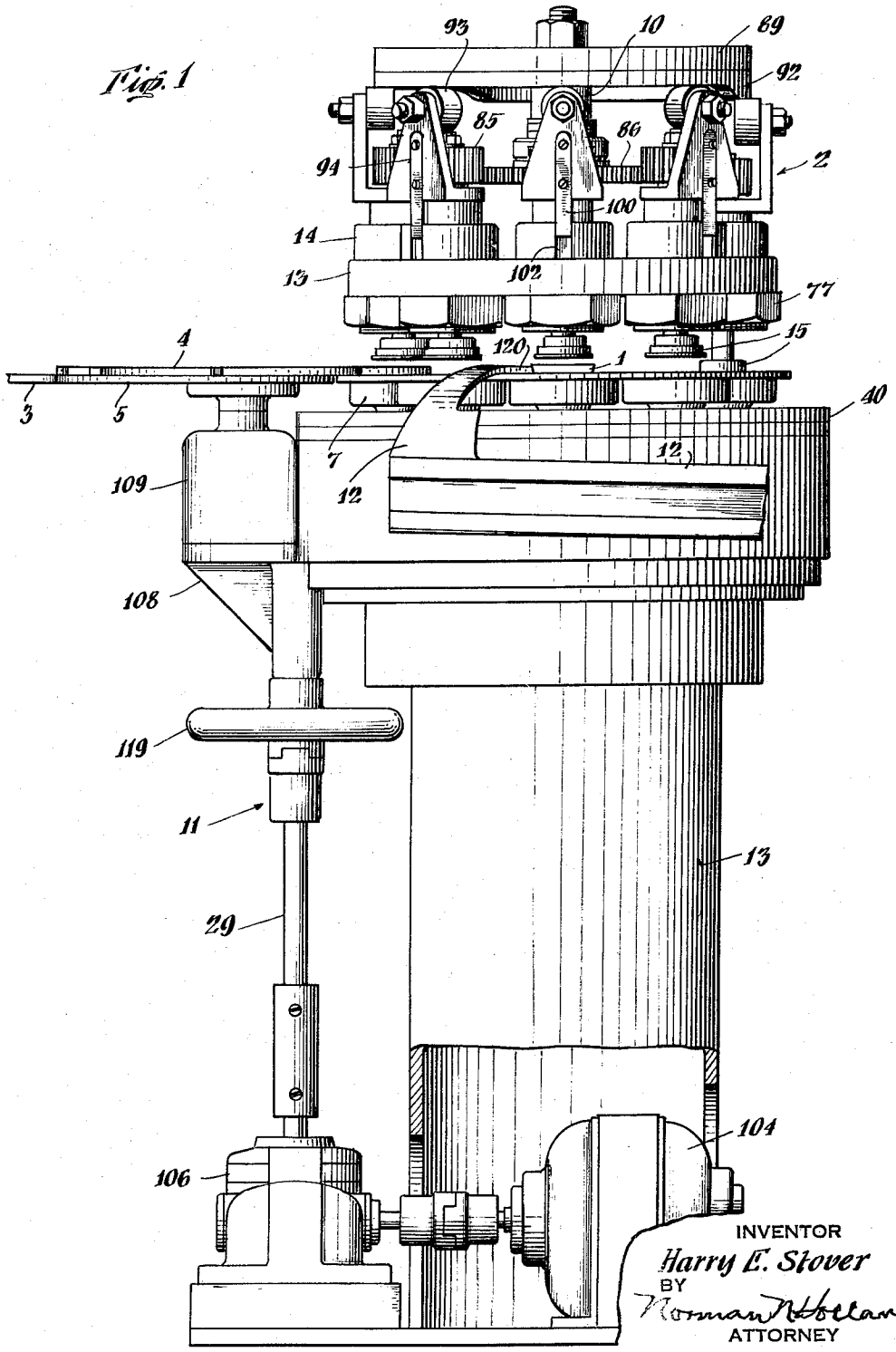
Feb. 16, 1960 H. E. STOVER 2,924,848

METHOD AND MEANS FOR GROOVING CLOSURE GASKETS

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Fig. 1



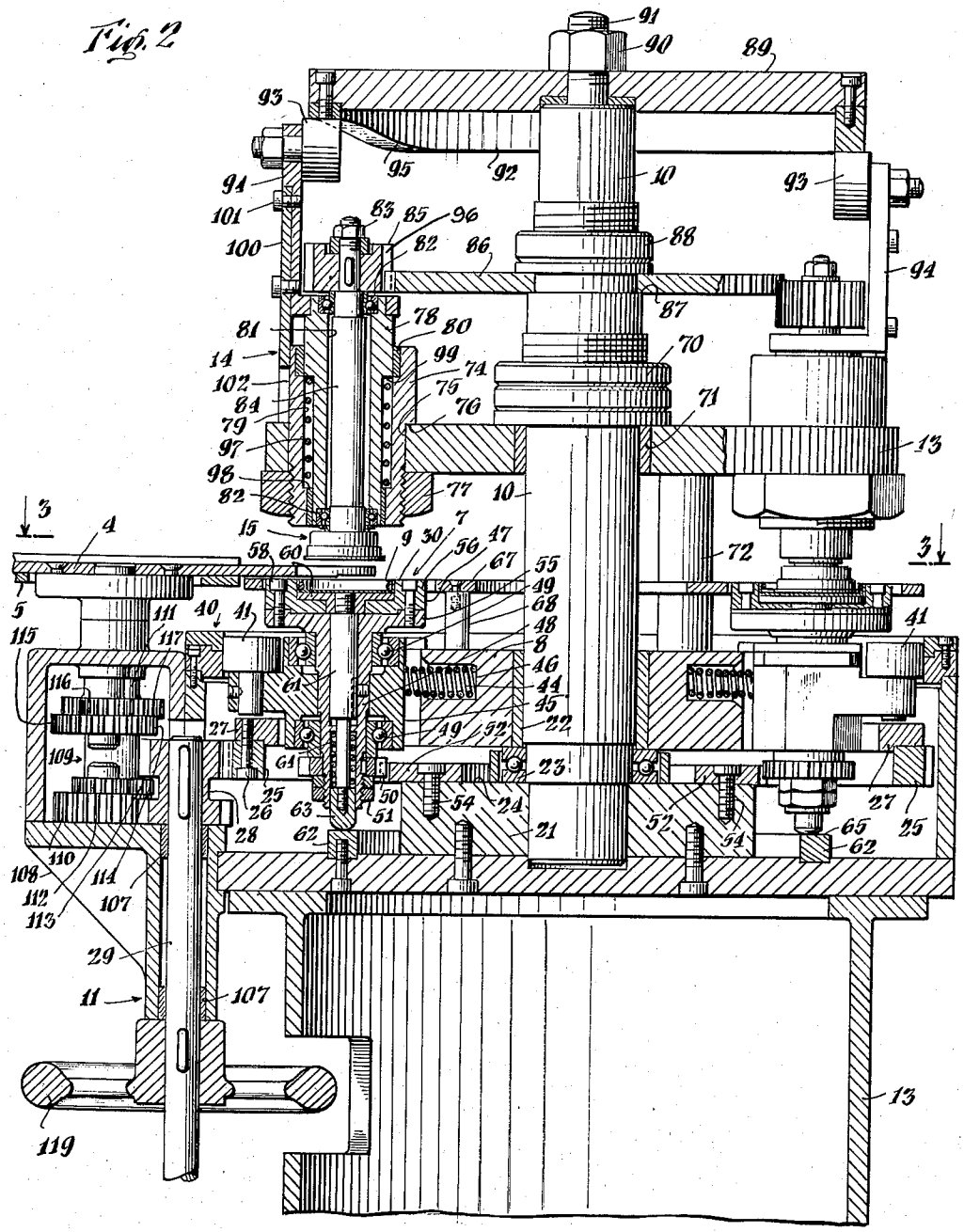
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Fig. 2



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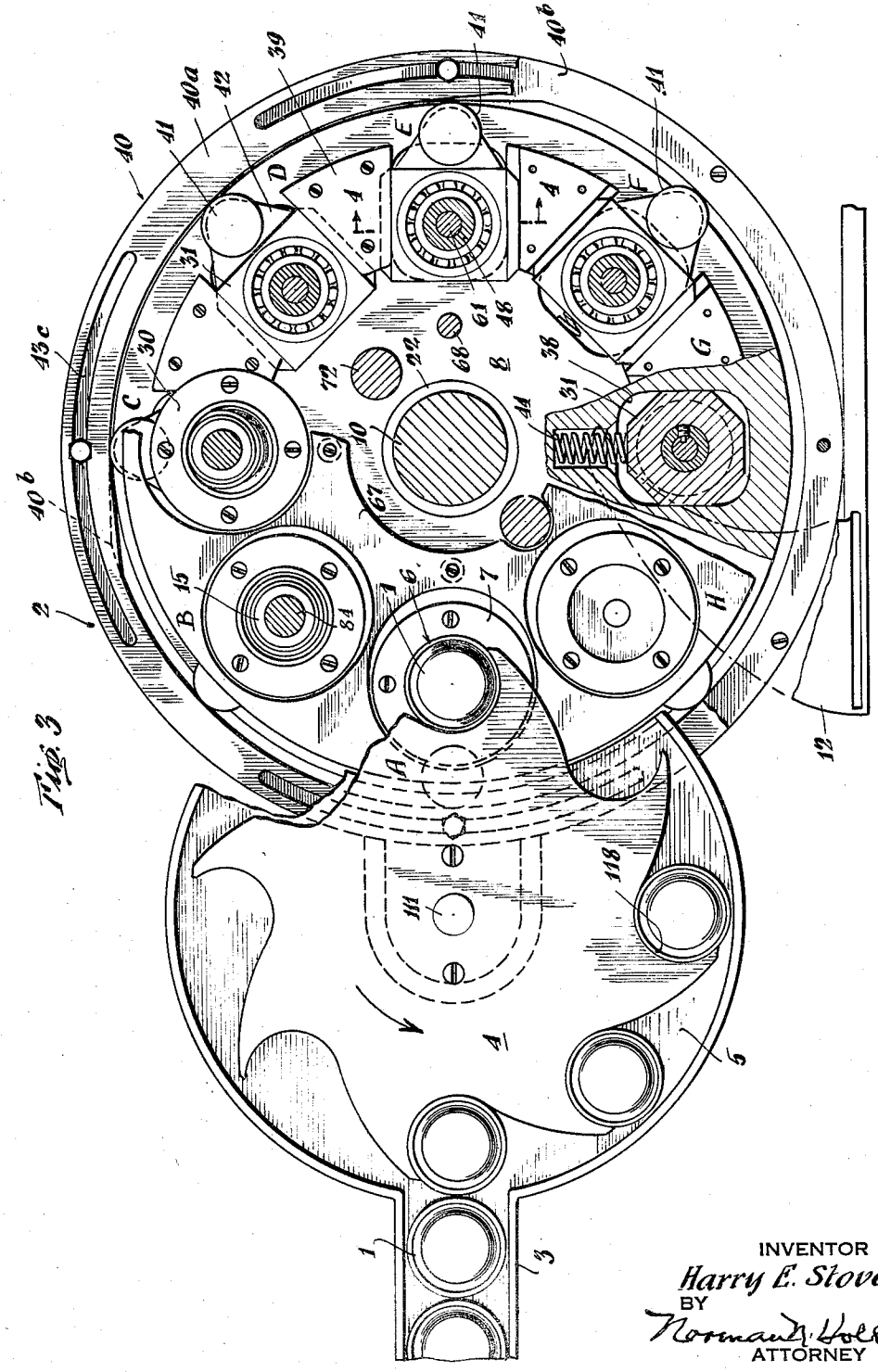


Fig. 3

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METHOD AND MEANS FOR GROOVING CLOSURE GASKETS

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Fig. 4

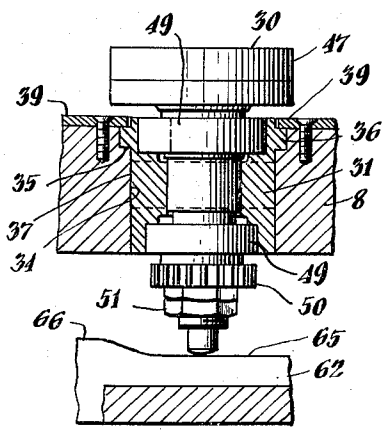
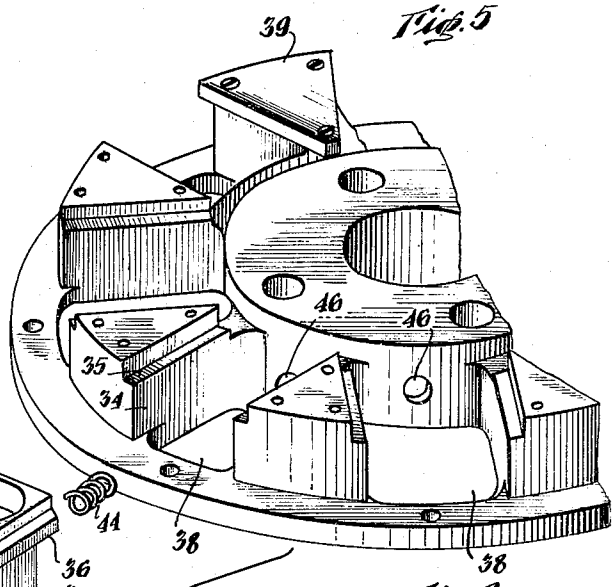


Fig. 5



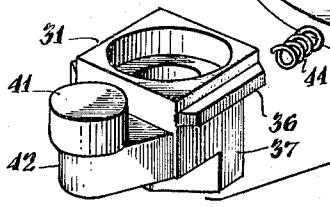


Fig. 6

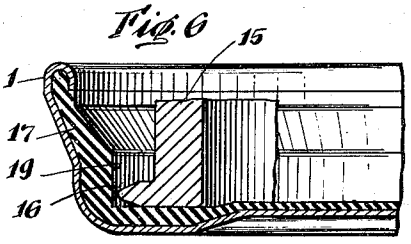


Fig. 7

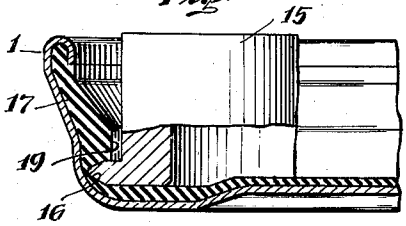


Fig. 8

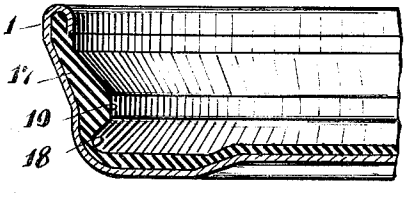


Fig. 9

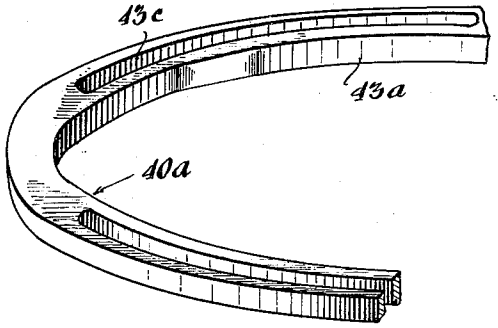
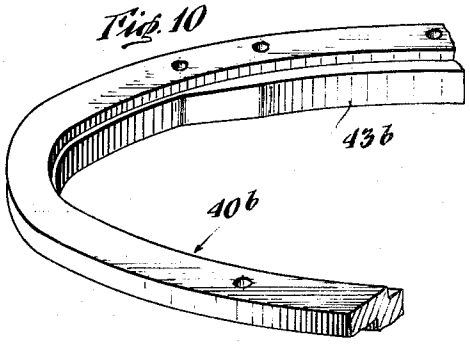


Fig. 10



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Fig. 14

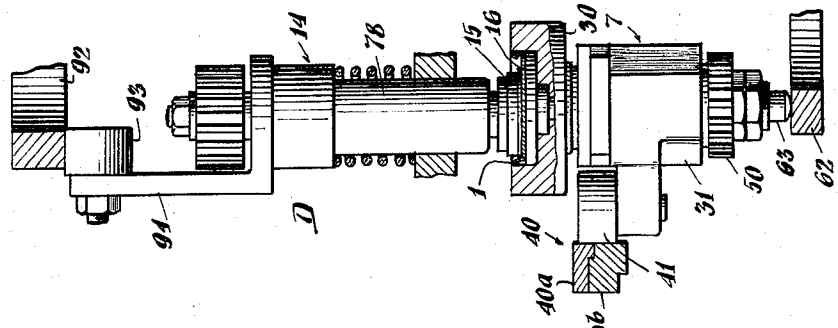


Fig. 13

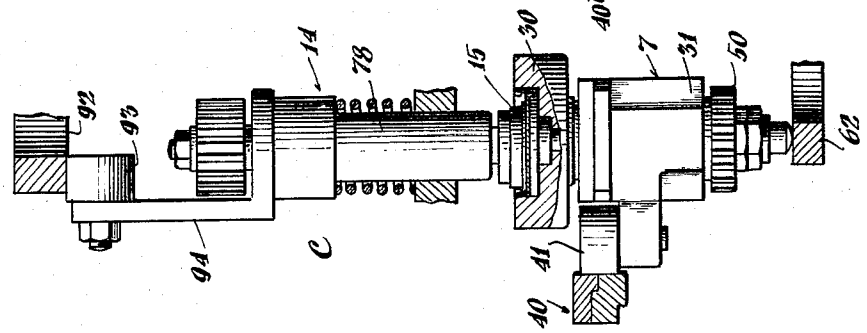


Fig. 12

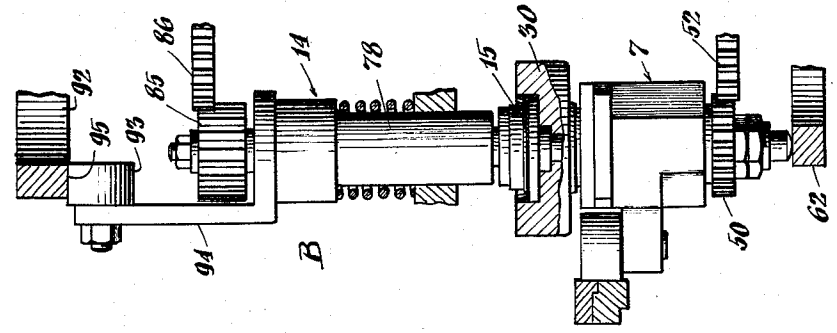
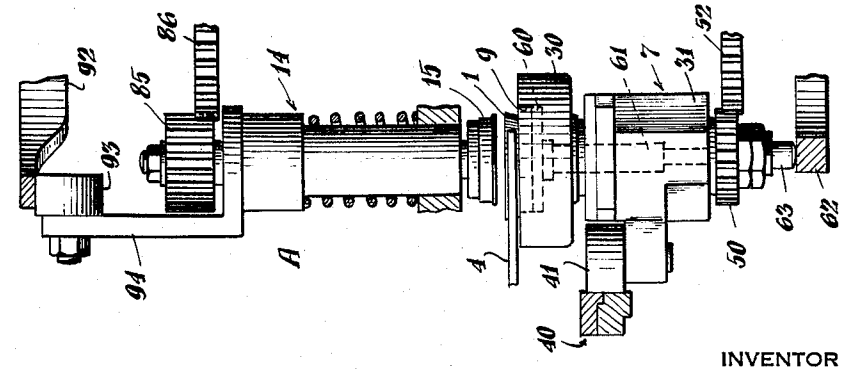


Fig. 11



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Fig. 18

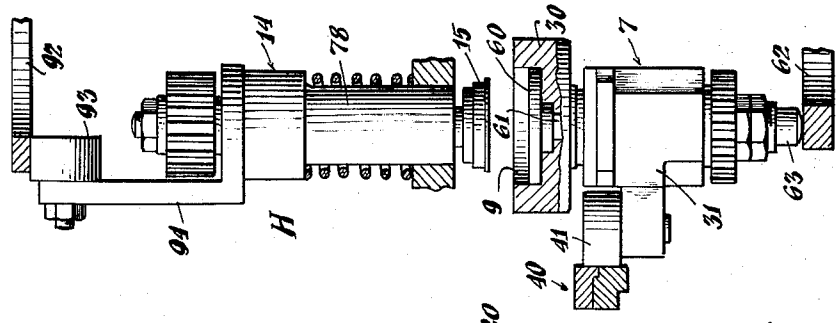


Fig. 17

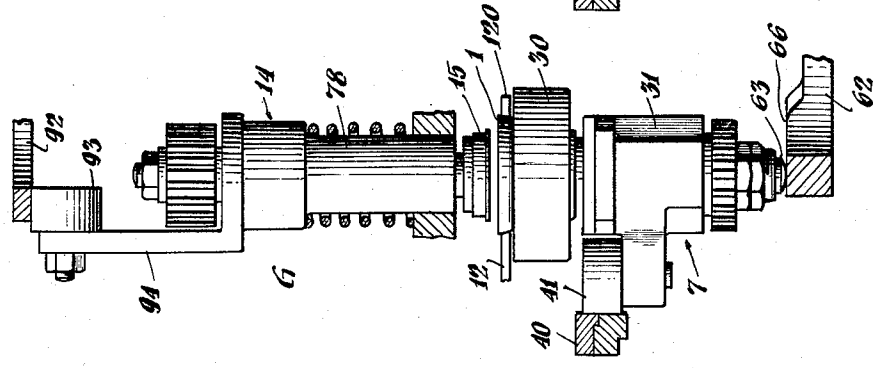


Fig. 16

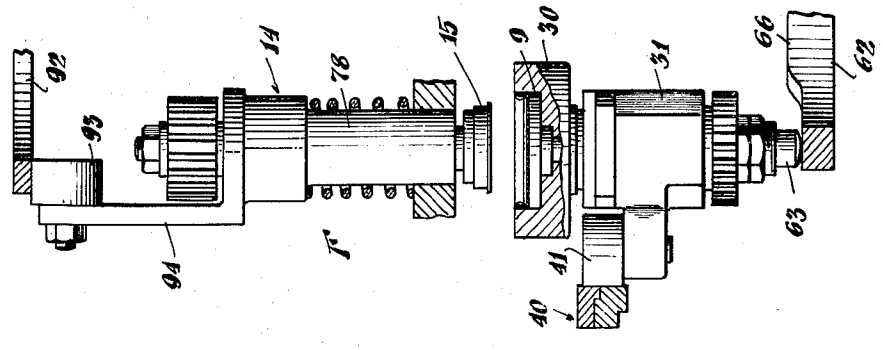
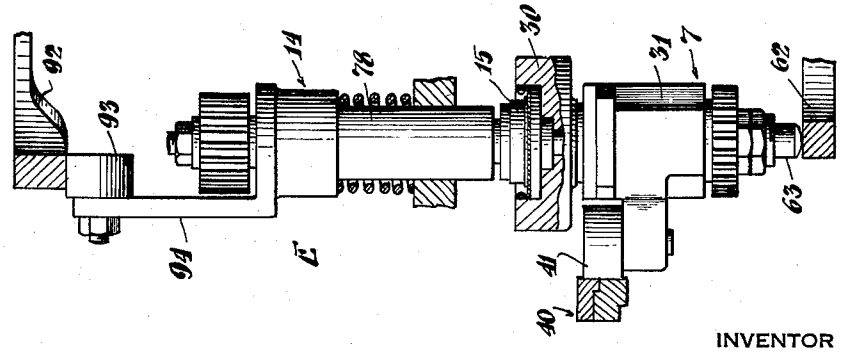


Fig. 15



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METHOD AND MEANS FOR GROOVING CLOSURE GASKETS

Harry E. Stover, Lancaster, Ohio, assignor to Anchor Hocking Glass Corporation, Lancaster, Ohio, a corporation of Delaware

Application March 28, 1956, Serial No. 574,501

8 Claims. (Cl. 18—5)

The present invention relates to a method and machine for making closures and more particularly to a method and machine for making closures having a peripheral groove on the portion of the gasket which covers the skirt or flange of the closure.

This application is a continuation-in-part of application Serial No. 397,878 for Closure Cap for Glass Containers and Method of Making, filed in the United States Patent Office on December 14, 1953, now Patent No. 2,772,013.

In the present improved machine and method a metal shell is first lined with a rubber or similar composition gasket over at least the inner side of the skirt and prior to the vulcanization of the gasket a groove is rolled in the gasket for cooperating with the finish on a glass container to form a secure sealing. After the forming of the groove in the gasket, the gasket material is preferably vulcanized to cause the groove to retain its shape until it conforms in part to the glass finish in the sealing operation.

The improved machine forms the grooves in a continuous operation at a high speed with the accuracy and uniformity conforming to the standards required in forming seals on glass containers with high speed sealing machines.

An object of the invention is to provide an improved method and means for making closures having a groove in the gasket thereof.

Another object of the invention is to provide an improved method and machine for forming grooves in a closure gasket.

Another object of the invention is to provide a method and machine for forming grooves in closure gaskets at high speeds.

Another object of the invention is to provide a method and means for forming grooves in closure gaskets with great precision and close tolerances.

Another object of the invention is to provide a method and means for forming grooves in closures which is relatively simple and reliable.

Another object of the present invention is to provide a method and means for forming grooves in closure gaskets which is automatic in its operation.

Another object of the present invention is to provide a method and means for forming grooves in gaskets which is adjustable to provide a variety of groove shapes.

Another object of the present invention is to provide a method and means for forming grooves in closures which is adaptable for use with a variety of closure shapes and sizes.

Other and further objects of the invention will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description and

is shown in the accompanying drawings, forming a part of the specification, wherein:

Fig. 1 is a front elevational view of the machine of the invention;

Fig. 2 is a front elevational view in section of the upper portion of the machine of Fig. 1;

Fig. 3 is a top plan view in section taken along the line 3—3 of Fig. 2;

Fig. 4 is a fragmentary elevational view of a closure holder taken along the line 4—4 of Fig. 3;

Fig. 5 is a fragmentary exploded perspective view of the rotating table showing one of the closure holder carriages;

Fig. 6 is an enlarged fragmentary sectional view of a closure and the grooving wheel before the grooving action;

Fig. 7 is an enlarged fragmentary sectional view similar to Fig. 6 showing the gasket being grooved by the grooving wheel;

Fig. 8 is an enlarged fragmentary sectional view similar to Fig. 7 showing the gasket shape after the grooving action;

Fig. 9 is a fragmentary perspective view of the upper portion of the closure holder positioning cam;

Fig. 10 is a fragmentary perspective view of the lower portion of the closure holder positioning cam corresponding to the upper portion shown in Fig. 9; and

Figs. 11–18 are diagrammatic views of the closure holder and groover showing the successive steps comprising the grooving action of the grooving apparatus of Fig. 1.

The grooving method and means will first be described generally with particular reference to Figs. 1, 2, and 3. Closures 1, having gaskets therein which are to be grooved, are fed into the grooving apparatus 2 by chute 3 (Fig. 3) in a continuous line from a suitable conveyor or other closure handling means (not shown). Closures 1 pass from chute 3 into a rotating star wheel 4 which slides the closures around the support plate 5 into a suitable position indicated at 6 above one of the closure holders 7, a plurality of which are mounted in a rotating table 8. Rotating table 8 is rotated in cooperation and synchronization with the star wheel 4 to present a closure holder 7 at position 6 at the same time that the star wheel 4 moves a closure 1 into this position above a closure holder 7 so that the closure 1 drops into a pocket 9 in the closure holder 7.

Rotating table 8 is rotatably mounted on a stationary vertical shaft 10 (Fig. 2) on the base 13 of the grooving apparatus 2 and is rotated about the vertical shaft 10 by a suitable drive means 11 so that the closures 1 are carried in pockets 9 of closure holders 7 in a circular path around the shaft 10 from the loading point 6 to a discharge chute 12. A groover 14 is mounted above each of the closure holders 7 on a rotatable groover support 13 so that it rotates about the vertical shaft 10 in synchronism with closure holder 7. Each of the groovers 14 has a grooving wheel 15 rotatably mounted therein which is moved downwardly into the closure 1 seated in the pocket 9 of closure holder 7 beneath the groover 14 to form a groove in the gasket of the closure 1 as the closure 1 is moved between the closure loading point 6 and the discharge chute 12. The details of the closure holders 7 and the groovers 14 will be described under appropriate headings below.

The grooving action of grooving wheel 15 is shown in Figs. 6, 7 and 8. Both the closure 1 and the grooving wheel 15 are continuously rotated about a vertical axis through their centers at the same rate and in the same direction by the closure holder 7 and the groover 14, respectively. The rotating grooving wheel 15 is first moved downwardly within the closure 1 by the downward motion

of the groover 14 so that a suitably shaped grooving flange 16 on the grooving wheel 15 is positioned at a predetermined position with respect to the closure gasket 17. The closure 1 seated in pocket 9 of the closure holder 7 is now moved radially inwardly on the rotating table 8 by the closure holder 7 so that the grooving flange 16 of the grooving wheel 15 is forced into the closure skirt gasket 17 to a predetermined depth. As both the closure 1 and the grooving wheel 15 are rotating at the same speed and direction and as the radius of the grooving flange is approximately equal to the distance of the inner surface of the gasket 17 from the center of the closure, a rolling contact will occur between the grooving flange 16 and the closure gasket 17 rolling a groove 18 in surface 19 of the closure gasket 17. The depth of penetration of the grooving flange 16 into the closure gasket 17 is controlled by the radial motion of the closure holder 7 on the rotating table 8 as will be explained more fully below.

After the grooving wheel 15 has passed one or more times around the closure skirt gasket, as desired, to completely form the groove 18, the closure 1 is moved radially outwardly on the rotating table 8 by the closure holder 7 to disengage the grooving flange 16 from the closure skirt gasket 17. The final groove shape as seen in Fig. 8 differs from the shape of grooving flange 16 as the gasket material decompresses and reshapes itself slightly after the removal of the groover. The shape of the flange 16 is designed to take this change into account to provide a final groove shape as desired.

After being moved away from the gasket 17 the grooving wheel 15 is raised vertically clear of the closure 1 by the groover 14 so that the closure 1 may be ejected from the grooving apparatus 2.

Rotating table and closure holders

The rotating table 8, as described above, mounts a plurality of closure holders 7 and carries them through a circular path about the vertical shaft 10 while the grooving operation is being performed on closures 1 held in closure holders 7. Rotating table 8 is rotatably mounted on bearing 22 on the stationary vertical shaft 10, which is fitted into a mounting plate 21 attached to the top of the base 13. The rotating table 8 is supported vertically by a thrust bearing 23 positioned about the vertical shaft 10 and seated on the upper surface 24 of the shaft mounting plate 21. Rotating table 8 is rotated about the vertical shaft 10 by means of a ring gear 25 which is bolted by bolts 26 to flanged edge 27 of the table 8. This ring gear 25 meshes with gear 28 fastened to the top of the vertical drive 29 to couple table 8 to the drive system, as will be more fully described below.

In the embodiment shown in the drawings, eight closure holders 7 are shown mounted on the rotating table 8. It is obvious that the number of closure holders 7 which are mounted on the rotating table 8 may be fixed in accordance with the requirements of a particular machine and more or less may be used. Each of the closure holders 7 comprises a rotatable closure chuck 30 (Fig. 4) which holds the closures during the grooving operation and a chuck carriage 31 which rotatably mounts the chuck 30 on table 8. In order to mount the closure holders 7 so that they may be moved in a radial direction with respect to the rotating table 8, a radially directed slot 34 is formed in the rotating table 8 for each of the eight closure holders 7 (Figs. 4 and 5). At the two opposite upper edges of each slot 34 a flange seat 35 is cut to receive the two flanges 36 formed on the opposite sides 37 of the chuck carriages 31 of the closure holders 7. Beneath each slot 34 a suitable aperture 38 is formed to pass the lower portion of the closure chuck 30. The flanges 36 of the chuck carriages 31 are slidably held in position against the flange seat 35 by triangular guide plates 39 which are bolted to the top of the rotating table 8 between the radial slots 34.

The radial position of the slidably mounted closure holders 7 in the rotating table 8 to provide the above-described inward and outward radial motion of the closure holder 7 at the beginning and end of the grooving action is controlled by a cam system. The cam system comprises a circular groove depth cam 40 (Figs. 2 and 3) fixedly mounted on the grooving apparatus base 13 surrounding the rotating table 8 and a cam follower 41 on the chuck carriage 31 of the closure holder 7 which engages the circular cam 40. Cam follower 41 is rotatably mounted in an end flange 42 (Fig. 5) of the chuck carriage 31. The cam follower 41 is urged radially outwardly against the circular cam 40 by a compressed spring 44 having one end bearing against the inner end 45 of the chuck carriage 31 and its other end seated in a radially directed aperture 46 in table 8 at the end of slot 34.

The circular cam 40 is preferably formed of superimposed top and bottom portions 40*a* (Fig. 9) and 40*b* (Fig. 10). Generally co-extensive raised portions 43*a* and 43*b*, respectively, are provided on each portion, and the top portion 40*a* has elongated slots 43*c* for its fastening nuts to allow the relative positions of the raised portions 43*a* and 43*b* to be adjusted to lengthen the rolling period that the cam follower 41 moves the closure holder inwardly to hold the closure gasket 17 against the groove roller 15. Thus, as seen in Fig. 1, the upper portion 40*a* of the cam 40 has been rotated counterclockwise with respect to the lower portion 40*b* to thereby lengthen the time that the closure holder 7 is in its inward or grooving position on revolving table 8.

The rotatable chuck 30, one of which is mounted in each chuck carriage 31 to hold and rotate the closures 1 during the grooving action, comprise an upper closure seating portion 47 (Fig. 2) and a lower shaft portion 48 which is rotatably mounted in the chuck carriage by suitable bearings 49. The drive means to rotate the chuck 30 comprises a drive gear 50 splined to the lower end of the shaft 48 and fastened thereon by nuts 51. Drive gear 50 engages a fixed ring gear 52 mounted on the shaft mounting plate 21 by bolts 54. As the table 8 rotates around vertical shaft 10, the drive gear 50 is engaged by and is rotated in bearings 49 by ring gear 52 so that the chuck 30 is rotated at a rate which is a multiple of the rotational rate of the revolving table 8.

The closure seating portion 47 of chuck 30 comprises a fixed flange 55 and a removable flange 56 which is attached to fixed flange 55 by suitable bolts 58 and which may be changed as desired to accommodate closures of different shapes. A lift plate seat 60 is slidably fitted into removable flange 56 at the bottom of pocket 9. The lift plate is removably attached to a lift rod 61 which is slidably fitted into a vertical aperture 62 through the shaft portion 48 of chuck 30. The lift plate 60 is normally in a recessed position to allow a closure 1 to be seated thereon in pocket 9. After the grooving action which forms the groove in the closure gasket 17, lift plate seat 60 is raised by lift rod 61 to lift the closure 1 out of pocket 9 for ejection from the grooving apparatus 1. The vertical position of lift rod 61 is controlled by a circular lift rod cam 62 mounted on the base 13 beneath the lift rod 61 and in contact with cam follower 63 on the bottom of the lift rod 61. A spring 64 around lift rod 61 and compressed between the shaft portion 48 of the chuck 30 and the cam follower 63 urges the lift rod downwardly against the cam surface 65 of the lift rod cam 62. The cam surface 65 has a suitable upward slope 66 (Fig. 4) at the ejection position to raise the lift rod 61 to thereby raise the lift plate 60 and closure 1 from chuck pocket 9 to allow the closure 1 to be forced from chuck 30 at discharge chute 12.

A top plate 67 is mounted on the top of rotating table 8 by suitable spacers 68 to provide a smooth surface level with plate 5 to support the closures 1 on a level with the top of the closure holder 7 as star wheel 4 moves them over pocket 9 at loading position 6 and to provide a level surface adjacent the discharge chute 12.

Groovers

A groover 14 is mounted on a groover support 13 above each of the chucks 30 on the revolving table 8. Thus, in the embodiment shown in the drawing, eight groovers 14 are mounted around the circumference of a circular groover support 13 which is rotatably mounted on a bearing 71 (Fig. 2) on the stationary vertical shaft 10. Spacer rod 72, suitably fastened to the revolving table 8 and to the groover support 13, holds the groover support 13 in spaced relation with revolving table 8 and beneath spacer nut 70 and causes it to rotate in synchronism therewith as the revolving table 8 is rotated about the vertical shaft 10.

Each of the groovers 14 comprises a collar 74 fastened in aperture 75 in groover support 13 between a shoulder 76 and a nut 77. The collar 74 has a vertical aperture 79 therein adapted to slidably mount a groover wheel support 78 in bearings 80. In a center aperture 81, rotatably mounted on bearings 82 is a grooving wheel shaft 84 which mounts grooving wheel 15 on its lower end. A grooving wheel drive gear 85 is attached by nut 83 to the upper end of the grooving wheel shaft 84 which engages a fixed horizontal gear 86 fixedly mounted on the vertical shaft 10. Fixed gear 86 is held in place on the vertical shaft 10 between collar 87 and a lock-nut 88. As the groover support 13 is rotated about the vertical shaft 10 in synchronism with the revolving table 8, the grooving wheel drive gear 85 meshes with the fixed gear 86 on the vertical shaft 10 and rotates the grooving wheel shaft 84 at a rate which is a multiple of the turning rate of the revolving table 8. The grooving wheel drive gear 85 is proportioned with respect to fixed gear 86 so that the grooving wheel shaft 84 and its attached grooving wheel 15 rotate at approximately the same rate as the chuck 30 to provide the above-described rolling grooving action when the grooving wheel 15 has been moved against the closure gasket 17 of closure 1. In order to move the support 78 with its rotatably attached grooving wheel 15 downwardly with relation to the collar 74 and the chuck 30, a grooving wheel cam system is mounted on the upper end of vertical shaft 10.

The cam system comprises a circular grooving wheel cam plate 89 attached by nut 90 to a threaded portion 91 at the upper end of the vertical shaft 10 and a circular grooving wheel cam 92 bolted to the lower surface of the grooving wheel cam plate 89 adjacent its outer edge. A grooving wheel cam follower 93 is rotatably mounted on the upper end of a cam follower rod 94 which has its lower end attached to the grooving wheel support 78 so that the grooving wheel support 78 is positioned vertically in accordance with the position of the cam follower 93 on the grooving wheel cam 92 as the cam follower 93 rolls along the cam surface 95 of the grooving wheel cam 92. The grooving wheel drive gear 85 has relatively long teeth 96 (Fig. 2) to allow it to maintain contact with the fixed gear 86 as the groover 14 is moved up and down in an axial direction under the control of the grooving wheel cam 92. A spring 97 encircling the grooving wheel support 78 is compressed between flange 98 on the grooving wheel collar 74 and flange 99 on the grooving wheel support 78 to urge the cam follower 93 upwardly into contact with the cam surface 95 of the grooving wheel cam 92. An elongated guide rod 100 fastened by bolts 101 to the cam follower rod 94 slidably fits within an elongated vertical slot 102 in the outer surface of the grooving wheel collar 74 to axially position groover 14 during its vertical reciprocation by the action of the grooving wheel cam means. As will be explained more fully in connection with the operation of the grooving apparatus, the grooving wheel cam 92 is shaped to move the rotating grooving wheel 15 downwardly within a closure 1 positioned in the chuck 30 beneath the groover 14 during the grooving action, as the closure 1 is carried from the loading position 6 to the discharge chute 12.

Drive system

The drive power for star wheel 4 and the rotating table 8, which in turn provides the drive for the motions of the closure holders 7 and the grooving means 14, is provided by electric drive motor 104 mounted in a convenient position at the base of the machine. A vertical drive shaft 29 is coupled to the drive motor through a right-angle speed reducer 106. The upper end of drive shaft 29 is rotatably mounted in bearings 107 in drive housing 108. The gear 28 splined to the upper end of drive shaft 29 connects the drive shaft 29 to the ring gear 25 on the rotating table 8 and also connects drive shaft 29 to the star wheel 4 through a step-down gear train 109. The ring gear 25 on rotating table 8 is fastened to the edge of the table 7 by suitable bolts 26 so that rotation of the drive shaft 29 turns the rotating table 8 on bearing 22 about the vertical shaft 10. As more fully described above, the rotation of rotating table 8 also revolves the interconnected groover support 13 and the chucks 30 and the grooving wheels 15. The step-down gear train 28 comprises gear 110 which meshes with gear 28 on drive shaft 29 and which is coupled to drive shaft 111 of the star wheel 4 through the step-down gear train 112, 113, 114, 115, 116, 117. The step-down ratio of gear train 109 is fixed so that the star wheel 4 revolves at the same rate as the rotated table 8 and the relative positions of the star wheel 4 and the rotating table 8 are adjusted so that the closure retaining pockets 118 of the star wheel 4 are moved into registry with the closure retaining pockets 9 in the closure holders 7 at the closure loading position 6 (Fig. 3). A hand wheel 119 is provided on drive shaft 29 to allow for trial operations during the adjustment of the machine.

Operation

As seen in Fig. 3, the closures 1 are fed in an inverted position in a continuous line on a chute 3 from a conveyor or other feed means (not shown) to rotating star feed wheel 4. Pocket 118 of the star feed wheel 4 picks up a closure 1 and carries it from chute 3 to a closure loading position 6 for rotating table 8. The star feed wheel 4 is synchronized with the rotating table 8 so that each pocket 118 of the star wheel 4 presents a closure 1 to a closure holder 7 on the rotating table 8. The closure 1 drops from the pocket 118 of the star wheel 4 into a pocket 9 in a rotating chuck 30 in the closure holder 7.

The rotating table 8 carries the closure in the closure holder 7 in a circular path between the loading position 6 and a discharge chute 12. During the interval between the loading of the closure 1 into the closure holder 7 and the discharge of the closure 1 at the chute 12, the groovers 14 perform the grooving action on the closure gaskets.

The operation of the groovers 14 and the closure holder 7 to form the gasket groove in the closure 1 as the closure 1 is carried by the rotating table 8 between the loading point 6 and discharge chute 12 is shown in Figs. 11–18. Each of the eight figures indicates the position of a groover 14 and its associated closure holder 7 at one of the eight closure holder positions shown in Fig. 3 which are designated by the letters A through H.

Fig. 11 corresponds to the loading position indicated at 6 and labeled A in Fig. 3. The star wheel 4 is shown delivering a closure 1 to the chuck 30 of a closure holder 7. The closure seat 60 is in its lower position within chuck 30, providing a pocket 9 in the upper portion of the chuck 30 to accommodate the closure 1. The position of the closure seat 60 is controlled by the cam 62 and the cooperating cam follower 63 mounted on the lower end of the slidable lift rod 61. The groover 14 in Fig. 11 is shown in its raised position clear of the chuck 30 and with the cam follower 93 engaging a raised portion of the cam 92.

Fig. 12 corresponds to the next closure holder B mov-

ing clockwise from the closure holder A at loading position 6. The closure 1 is seated in the pocket 9 of chuck 30 and the groover 14 has been lowered downwardly by a downwardly inclined portion of the cam surface 95 of circular grooving wheel cam 92 to position the grooving wheel 15 within the closure.

The relative positions of groover 14 and closure holder 7 when the closure holder 7 is at positions C in Fig. 3 is shown in Fig. 13. In this position the grooving wheel 15 remains lowered within closure 1 by the action of cam roller 93 on the grooving wheel cam 92. Closure holder 7 meanwhile has been moved radially inwardly of the rotating table 8 by cam roller 41 and its cooperating circular cam 40 so that the edge 16 of the grooving wheel 15 is moved into the closure gasket to a predetermined depth. The simultaneous and synchronized rotation of the grooving wheel 15 and the chuck 30 of the closure holder 7 cause a groove to be rolled by grooving wheel 15 around the inner surface of the closure gasket at a position determined by the vertical positioning of grooving wheel 15 by cam 92 and the horizontal positioning of the closure holder 7 and the chuck 30 by the circular closure holder positioning cam 40.

Fig. 14 corresponds to the next closure holder 7 indicated at D in Fig. 3. Cams 92 and 40 maintain the grooving wheel 15 and the chuck 30 in the same relative positions as shown in Fig. 12 so that a continued grooving action is obtained, allowing the grooving wheel 15 to pass one or more times around the closure gasket.

In Fig. 15 corresponding to position E in Fig. 3 the closure holder 7 has been moved radially outwardly of the rotating table 8 to re-center the grooving wheel 15 within the closure 1 so that its grooving flange is clear of the gasket, allowing the closure wheel 15 to be thereafter raised vertically out of the grooved closure 1 under the control of the cam 92 as is shown in Fig. 16 corresponding to position F.

Fig. 17 shows the closure holder 7 at position G as it reaches the closure ejection position adjacent to chute 12. Closure seat 60 has been raised upwardly by the raised portion 66 of cam 62 through the intermediation of the cam follower 63 and its connected lift rod 61. Closure 1 is now on a level with the surface of chuck 30 so that continued rotation of the revolving table 8 moves the closure 1 against the inclined clearing arm 120 of the closure chute 12 which slides the closure 1 outwardly into chute 12 as the revolving table 8 carries the chuck 30 beneath the inclined clearing arm 120.

Fig. 18 shows the closure holder 7 at position H as it approaches the closure loading position 6 to pick up another ungrooved closure 1 from the star wheel 4. Closure seat 60 is again lowered by cam 62 to form a pocket 9 for the closure which will be delivered by star wheel 4 as shown in Fig. 11.

Closure 1, which has been ejected from the grooving apparatus into chute 12, is carried by chute 12 to suitable lubricating or vulcanizing apparatus as required.

It will be seen that the present invention provides an improved method and means adapted to form grooves in the gaskets of circular closure skirts, the grooving means is automatic in operation and is adapted to operate at high speeds to handle a relatively large number of gaskets. The operation of the grooving means is relatively simple and its design is adapted for relatively rugged construction to provide a grooving device of extreme reliability. Adjustments are easily made to accommodate the grooving machine for the application of varying groove shapes and sizes in gaskets of different shapes and sizes. The machine is also adapted for use in forming gasket grooves of exact shapes with close tolerances for closures having modern gasket designs used in vacuum sealing.

As various changes may be made in the form, construction and arrangement of the parts herein without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in a limiting means.

Having thus described my invention, I claim:

1. A grooving machine for rolling grooves in gaskets in circular closures comprising the combination of a rotatable closure holder, a grooving wheel rotatably mounted adjacent to said closure holder having a circular grooving flange, a movable mounting for said grooving wheel adapted to move said grooving wheel axially into a closure held in said closure holder, a movable mounting for said closure holding means adapted to move the closure gasket of the closure in the closure holder radially against the grooving flange of said grooving wheel when said grooving wheel is in the closure, and drive means operatively connected to said grooving wheel and to said closure holder and adapted to rotate said grooving wheel and said closure holder in synchronism whereby said grooving flange rolls a groove in the closure gasket.

2. A grooving machine for rolling annular grooves in annular gaskets on closure skirts comprising the combination of a rotatable closure holder having a closure containing pocket adapted to hold a closure gasket side out, a grooving wheel rotatably mounted opposite to said closure holder pocket having a radially directed annular grooving flange, a movable mounting for said grooving wheel adapted to move it within the closure with the grooving flange adjacent the closure skirt gasket, a movable mounting for said closure holder adapted to move the closure gasket against the grooving flange of the grooving wheel, drive means operatively connected to said grooving wheel and said closure holder adapted to rotate them in synchronism whereby said grooving flange rolls an annular groove in the closure skirt gasket when moved thereagainst.

3. A grooving machine for rolling grooves in closure gaskets comprising the combination of a rotatable table mounted for rotation about a fixed shaft, a plurality of rotatable closure holders mounted on said rotatable table, a groover support rotatably mounted on the fixed shaft above said rotatable table and coupled thereto to rotate therewith, a plurality of groovers mounted on said groover support, each one adjacent one of the rotatable closure holders, a rotatable grooving wheel reciprocally mounted in each of said groovers for reciprocation toward and away from said closure holders, said closure holders having a radially reciprocable mounting on said rotating table, a first drive means to rotate said rotatable table and said connected groover support about the fixed shaft, a second drive means operatively coupled to each of said grooving wheels to rotate said grooving wheels, a third drive means operatively coupled to each of said closure holders to rotate them in synchronism with said grooving wheels, a first cam system engaging said grooving wheel to move said grooving wheel into the closure in one of said closure holders during a portion of a turn of the rotatable table about the fixed shaft, and a second cam system engaging said closure holders to move them radially during a portion of the time that said grooving wheel is moved into the closure by said first cam system whereby said rotating grooving wheel is brought into rolling contact with the gasket of the closure to roll a groove therein.

4. The grooving machine as claimed in claim 3 in which said second drive means comprises a first gear concentrically mounted on said fixed shaft and a second gear on each of said grooving wheels engaging said first gear and rotated thereby as said table rotates about said fixed shaft and said third drive means comprises a third gear concentrically and fixedly mounted with respect to said fixed shaft and a fourth gear on each of said rotatable closure holders engaging said third gear and rotated thereby as said table rotates about said fixed

shaft whereby said grooving wheels and said closure holders rotate in synchronism.

5. A grooving machine for grooving gaskets in circular closures comprising the combination of a horizontal rotatable table mounted for rotation about a vertical shaft, a plurality of rotatable closure holders mounted on said rotatable table, a groover support rotatably mounted on the vertical shaft above said rotatable table and coupled thereto to rotate therewith and having a plurality of groovers thereon, each one mounted above one of the rotatable closure holders, a rotatable grooving wheel reciprocally mounted in each of said groovers for vertical reciprocation toward and away from said closure holders, said closure holders having a radially reciprocable mounting on said rotating table, a first drive means to rotate said horizontal rotatable table and said connected groover support about the vertical shaft, a second drive means operatively coupled to each of said grooving wheels to rotate said grooving wheels, a third drive means operatively connecting said closure holders with said grooving wheels to rotate them in synchronism with said grooving wheels with said grooving wheels, a first cam system engaging said grooving wheel to lower it adjacent to said closure holder whereby it enters closures in one of said closure holders during a portion of a turn of the rotatable table about the vertical shaft, a second cam system engaging said closure holders to move them radially during a portion of the time that said grooving wheel is lowered by said first cam whereby said rotating grooving wheel is brought into rolling contact with the gasket of a closure being rotated by said one closure holder to roll a groove therein.

6. A grooving machine for grooving gaskets in circular closures comprising the combination of a horizontal rotatable table mounted for rotation about a vertical shaft, a plurality of rotatable closure holders mounted on said rotatable table, a closure delivery means adjacent to said rotatable table and operatively synchronized therewith to deliver a closure to each of said closure holders as said rotatable table moves the closure holders past said closure delivery means, a groover support rotatably mounted on the vertical shaft above said rotatable table and coupled thereto to rotate therewith and having a plurality of groovers thereon, each of said grooves being mounted above one of the rotatable closure holders, a rotatable grooving wheel reciprocally mounted in each of said groovers for vertical reciprocation toward and away from said closure holders, said closure holders having a radially reciprocable mounting on said rotating table, a first drive means to rotate said horizontal rotatable table and said connected groover support about the vertical shaft, a second drive means operatively coupled to each of said grooving wheels to rotate said grooving wheels, a third drive means operatively connecting said closure holders to said grooving wheels to rotate them in synchronism, a first cam system engaging said grooving wheel to lower it adjacent to said closure holder whereby it enters closures in one of said closure holders during a portion of a turn of the rotatable table about the vertical shaft, a second cam system engaging said closure holders to move them radially during a portion of the time that said grooving wheel is lowered by said first cam system whereby said rotating grooving wheel is brought into rolling contact with the gasket of a closure being rotated by said one closure holder to roll a groove therein.

7. The grooving machine as claimed in claim 6 in which said second drive means comprises a first gear fixedly and concentrically mounted on said vertical shaft and a second gear mounted on each of said groovers and engaging said first gear whereby rotation of said groover supports about said vertical shaft rotates said second gears, and said third drive means comprises a third gear fixedly mounted concentrically of said vertical shaft and engaging a fourth gear mounted on each of said closure holders whereby rotation of said closure holders about said vertical shaft rotates said fourth gears in synchronism with said second gears.

8. A grooving machine for rolling grooves in gaskets in circular closures comprising the combination of rotatable closure holder means, grooving wheel means rotatably mounted adjacent to said closure holder means having a circular grooving flange, mechanism operatively connected to said grooving wheel means and said closure holding means for moving them first axially and then radially relative to each other with a closure having a gasket held in said closure holder means, and drive means operatively connected to said grooving wheel means and to said closure holder means and adapted to rotate said grooving wheel means and said closure holder means in synchronism whereby said grooving flange rolls a groove in the closure gasket.

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