July 28, 1964 E. M. CAFERRO 3,142,266

DUPLEX FOOD EXTRUSION

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Fig. 1

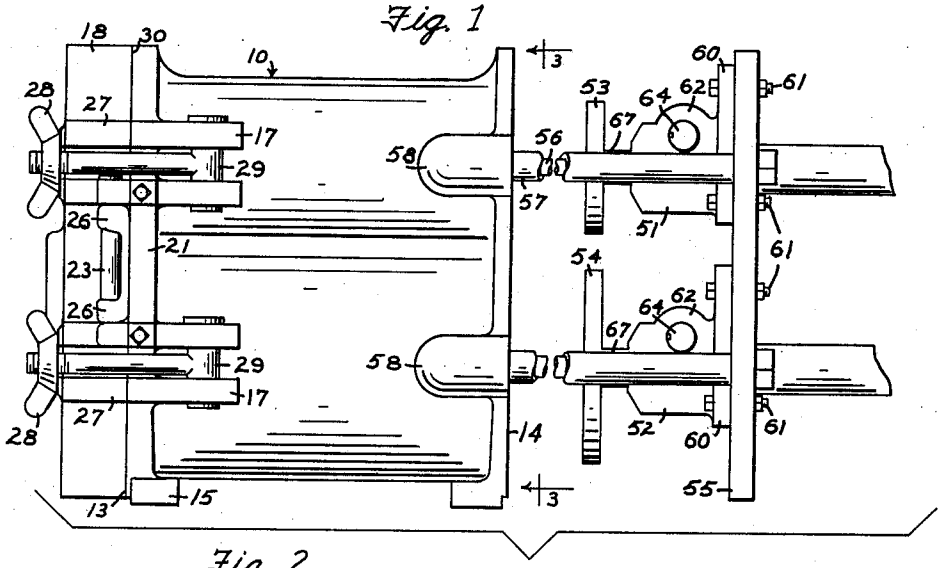


Fig. 2

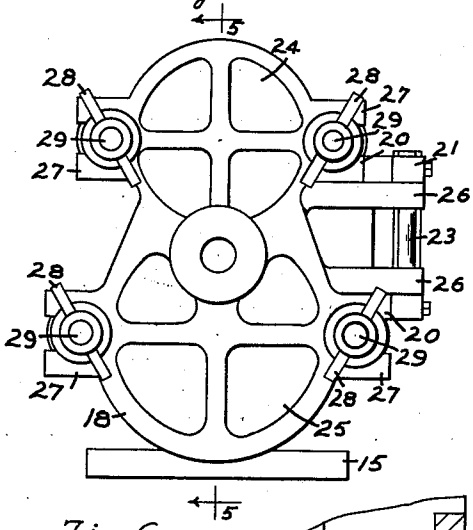


Fig. 3

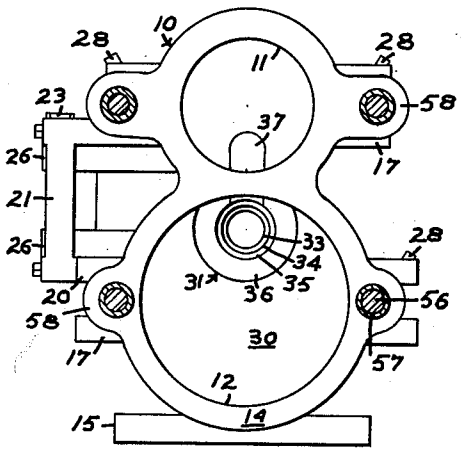
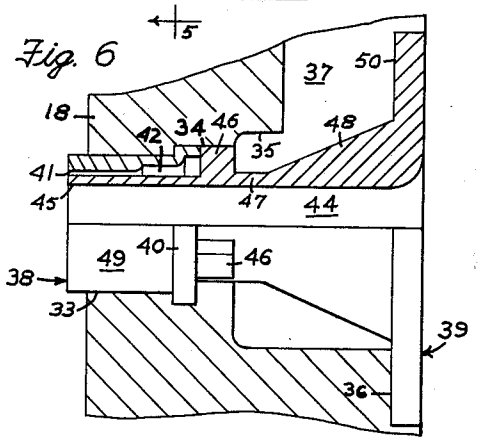


Fig. 6



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DUPLEX FOOD EXTRUSION

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Fig. 4

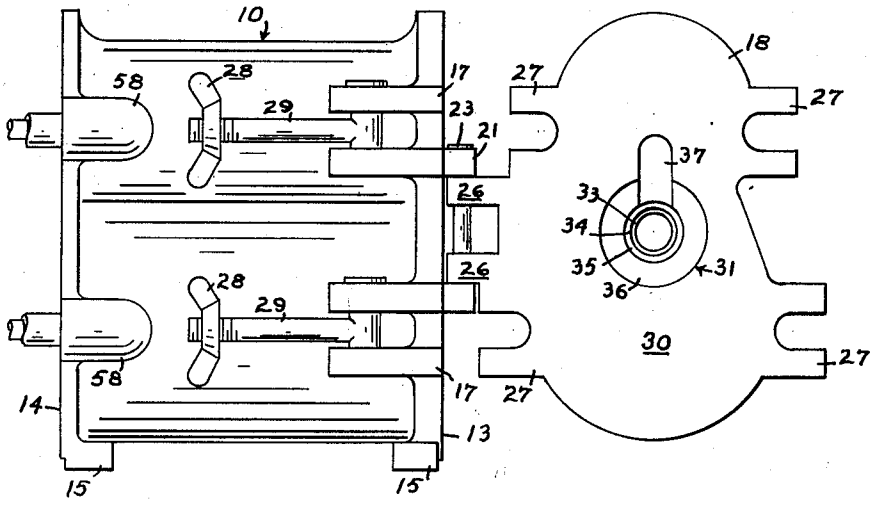
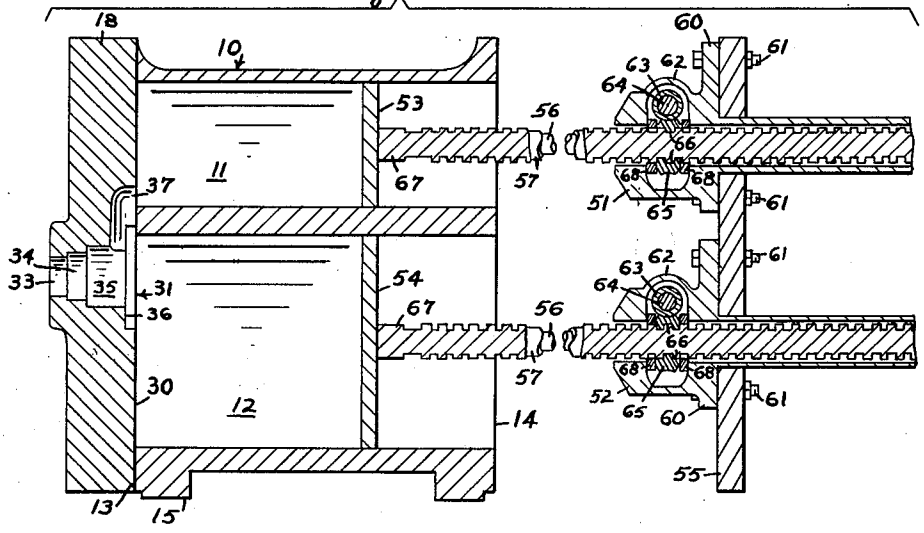


Fig. 5



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DUPLEX FOOD EXTRUSION

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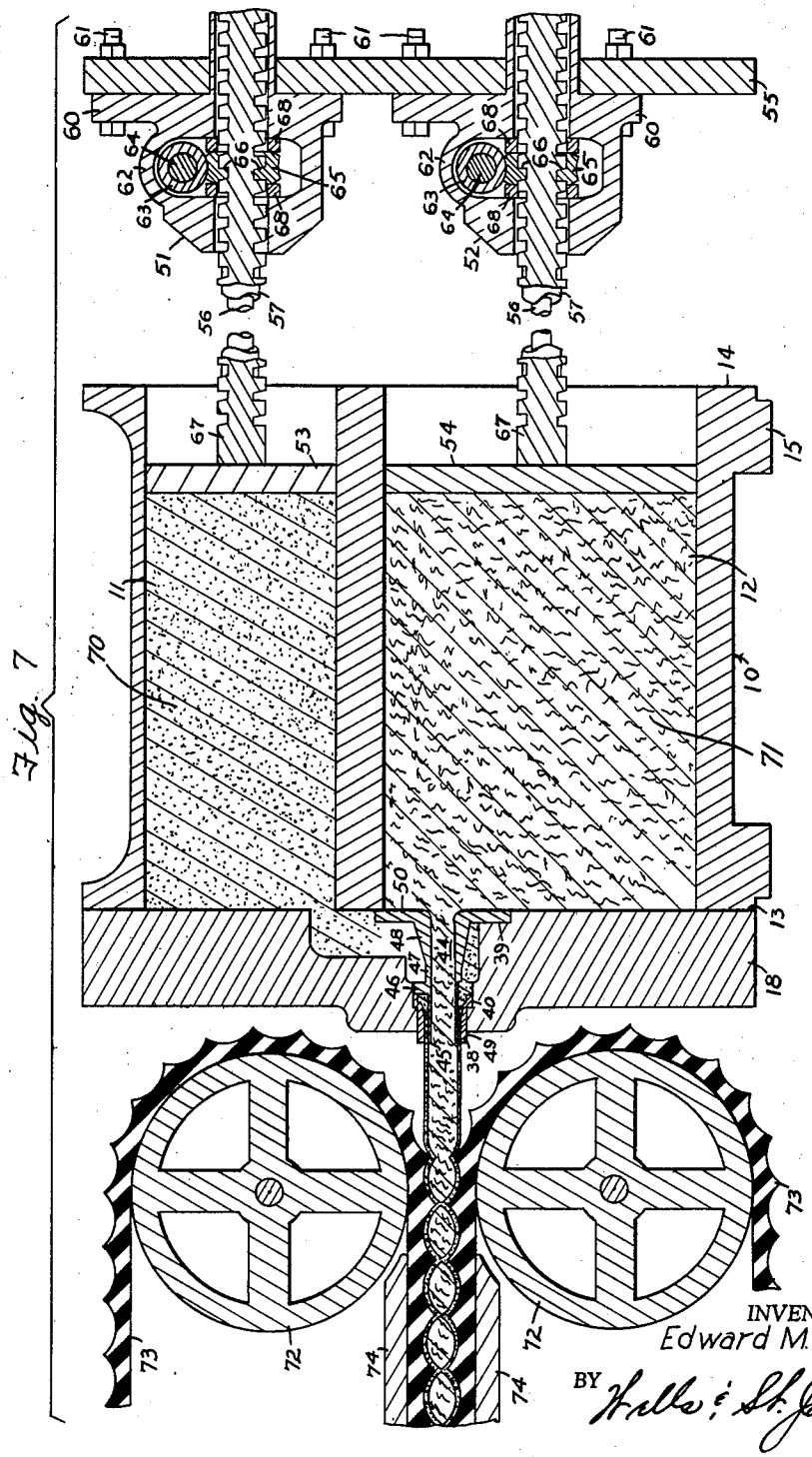


Fig. 7

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3,142,266

DUPLEX FOOD EXTRUSION

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1 Claim. (Cl. 107—1)

This invention particularly relates to the production of foods wherein a material is enrobed or covered circumferentially with another food material which serves as a protective covering and part of the final food product. While not limited thereto, this invention is particularly applicable to the production of ravioli.

One of the purposes of this invention is to provide a continuous process and an apparatus for use in carrying out this process, wherein an enrobing material in paste form is forced to flow through an extrusion port having a tubular shape and interior food material is simultaneously forced through the port within the tubular form of the enrobing material. In this manner a continuous cylinder of the interior material flows through the port within the tubular form of the enrobing material so that a continuous cylinder of the final product is produced. The amount of interior material in the tube is such that the tube can be squeezed and cut at intervals to seal off sections of the tube from each other in pillow like units. Obviously other final forms of the pressed material are possible.

Another purpose of this invention is to provide a device for carrying out the method outlined above wherein the two extrusion cylinders are closed by a common door that carries the extrusion port with a dividing nozzle therein situated to provide entry from both cylinders to the port. The dividing nozzle is held in position within the door by its closure against the cylinders. This arrangement allows for easy cleaning of the entire unit with only one moveable part—the door.

The apparatus for carrying out this invention consists of a main casting embodying an upper cylinder and a lower cylinder of different sizes. The cylinders are parallel and open at both ends. The door is hinged to the cylinder block at one end thereof. The door is adapted to lie flat against the front end of the cylinder block and is held in place by lock-bolts. The die used to form the inner and outer materials being extruded is carried within the door and is held thereby against the front wall of the cylinder block between the two cylinders.

This invention will be better understood by a study of the following description and the accompanying drawings which show one preferred form of this invention. It is to be understood that this form is exemplary and is not intended to limit or restrict the extent of the invention except as it is limited in the claim which follows the disclosure.

In the drawings:

FIGURE 1 is a side view of the invention with the door in closed position without a die in place;

FIGURE 2 is a front view looking at the door in FIGURE 1;

FIGURE 3 is a sectional view of the device taken along line 3—3 in FIGURE 1;

FIGURE 4 is a side view taken oppositely to FIGURE 1 showing the door in a partially open position;

FIGURE 5 is a view taken along line 5—5 in FIGURE 2;

FIGURE 6 is a view on an enlarged scale of the forming die insert; and

FIGURE 7 is a view similar to FIGURE 5 on an enlarged scale showing the extrusion machine in operation.

Referring now to the drawings, the machine for carrying out the present invention consists of a main casting

generally designated as 10 which has bored therein an upper cylinder 11 and a lower cylinder 12. The upper cylinder 11 is of a smaller diameter than the lower cylinder 12 and the axes of the two cylinders are parallel. Both the upper cylinder 11 and the lower cylinder 12 have smooth machined inner surfaces forming cylindrical tubes. Cylinders 11 and 12 are open at each end. One end of each cylinder is terminated at a machined vertical surface 13 on the front end of the main casting 10. The remaining end of the cylinders 11 and 12 open to the rear surface 14 of casting 10, which is adapted to receive the jack assemblies which will be described below. Casting 10 is further provided with an integral base 15 adapted to secure the machine to a suitable foundation with the cylinders 11 and 12 in horizontal position. At the forward end of casting 10 are formed four ears 17 which are used to bolt a cover 18 in place. At the right hand side of the casting 10, as seen in FIGURE 2 are formed two bosses 20 on the ears 17. The bosses 20 are threadably bored and are used to mount a hinge bracket 21 which is fixedly secured to the main casting 10. The bracket 21 is provided with vertically aligned apertures which receive a pin 23 which acts as a pivot shaft for the cover 18. As seen in FIGURE 2 the cover 18 is a solid one piece casting having two generally circular areas 24 and 25 adapted to fit over the ends of cylinders 11 and 12 respectively. At the right end of cover 18 as seen in FIGURE 2 are two projections 26 which extend outward to vertically aligned positions. The projections 26 have apertures cut therethrough which receive the pivot pin 23 to thereby hinge cover 18 with respect to casting 10 about a vertical axis. The cover 18 is also provided with four ears 27 which correspond to the previously described ears 17 and which lie thereon respectively when the cover 18 is closed flush against the front surface 13 of the casting 10. The four ears 27 are then secured by pivoted bolts 29 and wing nuts 28 in normal fashion to thereby seal the cover 18 to the casting 10 in a leak proof manner.

The cover 18 is provided with a plane inner surface 30 which is machined to the same degree as the front surface 13 of casting 10. This surface 30 is designed to fit snugly against the surface 13 and to thereby seal each cylinder 11 and 12 from the atmosphere and also from each other.

Cover 18 is provided with an aperture 31 cut therethrough which is best seen in FIGURES 4 and 5. The central axis of this aperture 31 lies in a horizontal plane parallel to the axes of cylinder 11 and 12 and is located within the open area of cylinder 12. The aperture 31 is designed primarily to fit the die 39 which will be described below. The aperture 31 is formed through the thickest part of the cover 18. It consists of an outer cylindrical bore 33, and an intermediate bore 34 terminating in a rounded annular configuration that opens to a large cylindrical chamber 35 which in turn is terminated at the cylindrical shoulder 36. Also cut in relief to the inner surface 30 of cover 18 is a recess 37. Recess 37 is formed with rounded edges and opens to the large cylindrical chamber 35, being cut to approximately one half the full depth of the chamber 35. The recess 37 is formed vertically and opens at its upper end to the interior of the upper cylinder 11 when cover 18 is closed against the casting 10.

The die assembly is best seen in FIGURES 6 and 7. It consists of an outer die 38 and inner die 39. The outer die 38 is formed with an exterior cylindrical shoulder 40 adapted to abut the terminus of the outer cylindrical bore 33 in cover 18. The shoulder 40 serves as the terminus of a cylindrical portion of the outer die 38 which is designated as 49 and which extends outwardly beyond the sur-

face of the cover 18. The inner surface of die 38 is cylindrical and is designated as 41. This surface opens inwardly to an enlarged interior area 42 which is rounded annularly from the interior area of the outer die 38. The enlarged area 42 terminates at shoulder 40.

Inner die 39 is formed individually and has a smooth inner cylindrical bore 44 extending axially through its entire length. At its outer end the bore 44 is formed by a smooth cylindrical collar 45 which extends outwardly to a position flush with the end of the outer die 38. The collar 45 extends inwardly to an area defined by three radially projecting ribs 46. These ribs 46 are adapted to abut the rear shoulder 40 and have a radial dimension equal to that of the intermediate bore 34. The ribs 46 extend inwardly in cover 18 to the end of the intermediate bore 34. Between the ribs 46 the interior die 39 is enlarged from the thickness of collar 45 but is less thick than the ribs 46 so that the material can flow freely between these ribs 46 and into the area between the enlarged interior area of outer die 38 and the collar 45. Going inwardly from the ribs 46 the die 39 is formed with an exterior cylindrical area 47 which terminates in an enlarged conical surface 48 which in turn terminates at an enlarged cylindrical abutment 50. The abutment 50 is designed to fit snugly within the area defined by the large cylindrical shoulder 36 in aperture 31. The surfaces of die 39 are sufficiently fine and mate with the surfaces of aperture 31 to thereby seal the interior of aperture 31 from the interior of the upper cylinder 11 by the sealing action of abutment 50 against the cylindrical shoulder 36. It is to be noted that the recess 37 opens to aperture 31 within the area defined between the ribs 46 and the abutment 50. As can be seen in FIGURE 7 this is designed to allow material in the upper cylinder 11 to flow through the recess 37 and around the conical area 48 and between ribs 46 and into the area defined between the outer die 38 and the long collar 45 of the inner die 39. At the same time material in the lower cylinder 12 may flow freely through the inner cylindrical bore 44 of the inner die 39. In this way each material is isolated from the other by the die structure which is held in place by the closing of door 18 against casting 10. The ribs 46 and the abutment 50 position the inner die within the aperture 31 while also locking the outer die 38 in place within the aperture 31. As no further locking mechanism is required to adequately secure and seal the dies 38 and 39 within the cover 18. When the door 18 is open dies 39 and 38 can easily be removed for cleaning purposes.

In order to push material through the cylinders 11 and 12 a pair of jacks 51 and 52 are provided. Since each jack is identical in structure the same numerals will be applied to each jack assembly 51 or 52. The only difference between the assemblies is that the pusher plate 53 of the upper jack assembly 51 is of less diameter than the corresponding pusher plate 54 of the lower jack assembly 52. The plates 53 and 54 are respectively formed to seal against the smooth interior surfaces of the cylinders 11 and 12 respectively. The two jack assemblies 51 and 52 are mounted on a vertical backing plate 55 which is spaced from the rear surface 14 of casting 10 by four long bolts 56 and surrounding space collars 57. The bolts 56 are threadably engaged by enlarged bosses 58 formed on the exterior of the casting 10 adjacent the rear surface 14.

The jack assemblies 51 and 52 are conventional and will be only generally discussed herein since such jacks are in common use. They consist of a mounting plate 60 which is adapted to be secured against the backing plate 56 by means of four bolts 61. The mounting plate 60 has formed integrally therewith a gear housing 62 which houses a worm gear 63 fixed upon an input shaft 64. The worm gear 63 meshes with a gear 65 having interior threads formed therein and designated by the numeral 66. The threads 66 engage a jack 67 which rotatably mounts the backing plate 53 or 54. The gear 65 is suitably

mounted within the casing 62 by a pair of bearings 68. The shaft 64 of each jack assembly 51 and 52 is individually driven by a suitable variable speed motor assembly (not shown). Each of the variable speed assemblies may be adjusted to provide the desired speed of travel.

Various other mechanisms could be used to move material within the cylinders 11 and 12. For continuous work a screw feed mechanism might be required using a continuous feed of material to the cylinders 11 and 12 and using variable speed drive to each of the screw assemblies. It might also be possible to use hydraulic or pneumatic jacks in place of the gear assembly shown in the drawings. Such changes are merely superficial and are the equivalent of the mechanism shown in the embodiment described above.

The operation of this machine is quite simple and is best seen in FIGURE 7. The machine after being cleaned and readied for operation is locked by the wing nuts 28 and bolts 27 so that cover 18 is sealed against the front surface 13 of the casting 10. The two dies 38 and 39 are thus locked in place against the interior of aperture 31 and the surface 13 between the two cylinders 11 and 12. It is to be noted that the bore 44 of the inner die 39 is opened to the lower cylinder 12. The upper cylinder 11 is sealed from the bore 44 by the large abutment 50 on the inner die 39. The recess 37 is open to the upper cylinder 11 but is isolated from the lower cylinder 12 by the conical portion 48 and abutment 50 of the inner die 39. Thus material in the upper cylinder 11 can pass between the outer die 38 and the inner die 39 but cannot pass to the lower cylinder 12. At the same time material from the lower cylinder 12 may pass through the bore 44 of the inner die 39 but is prevented from mixing with the material from the upper cylinder 11. The two food materials are designated in FIGURE 7 by the numerals 70 and 71. When the machine is used for making ravioli the material 70 will be a paste while the material 71 in lower cylinder 12 will be a mixture of meat and other condiments. Since the described machine is adapted for batch work a batch of the materials 70 and 71 will be manually inserted into the cylinders 11 and 12 respectively. Then the pusher plates 53 and 54 of the jack assemblies displace materials 70 and 71 towards the cover 18. The amount of relative travel between the two plates 63 and 64 can be adjusted by manipulation of the control of the motor units. In this manner the materials 70 and 71 will be extruded between the dies 38 and 39 to provide a continuous cylindrical flow of material from the machine consisting of an inner cylindrical filler of the material 71 and an outer covering of the material 70. If the usual form of ravioli is desired the continuous tube can then be pressed by revolving wheels 72 and dimpled belts 73 passing between stationary pressure members 74. This produces the normal pillow shape and may be cut as desired.

This novel method of producing foods such as ravioli is continuous and does not require the use of costly or elaborate pressing plates. It provides an accurate method of balancing the flow of the two materials 70 and 71 by adjustment of the motor units. Further adjustment of the relative proportions of the food mixture 70 and 71 can be provided by varying the thickness of the two dies 32 and 38 to restrict or increase flow of one or other of the two mixtures. Such adjustments will depend upon the nature of the material being processed and upon the demands of the user.

Various modifications will be readily observable to those skilled in this art. However, the above embodiment is intended to be merely one illustration of a practical form of the invention. For this reason only the following claim is intended to define my invention.

Having thus described my invention, I claim:

Apparatus for preparing foods wherein a first substance is enveloped by a second substance;

comprising a fixed body having formed therein a pair of spaced tubular bores having parallel longitudinal axes, each of said bores terminating at a plane exterior surface of said body which is perpendicular to the respective axes of said bores;

a cover pivotally mounted on said body adjacent to said plane exterior surface having a plane surface adapted to seal against said plane exterior surface to thereby enclose one end of each of said bores;

an aperture cut through said cover terminating at its plane surface in a location open to the interior of one of said bores when said cover is sealed against said body;

a recess cut in the plane surface of said cover in communication with said aperture and extending to a location open to the interior of the other bore;

die means mounted within said aperture having an enlarged planar end surface formed at one end thereof adapted to be positioned flush with the plane surface of said cover and to abut the plane exterior surface

of said body when the cover is sealed against the body;

said die means being further adapted to seal said one bore from said recess when the cover is sealed against said body, said die means including a forming collar having an axial bore and rib means adjacent said one end of said die means adapted to abut the interior of said aperture to thereby space said collar from the interior walls of said aperture, said recess being in communication with said aperture intermediate the ends of said die means.

References Cited in the file of this patent

UNITED STATES PATENTS

1,463,636	Stricker	July 31, 1923
2,673,675	Anderson	Mar. 30, 1954

FOREIGN PATENTS

1,132,821	France	Nov. 5, 1956