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[54] BLADDER EXPANDER AND CASKET PRODUCT

5 Claims, 13 Drawing Figs.

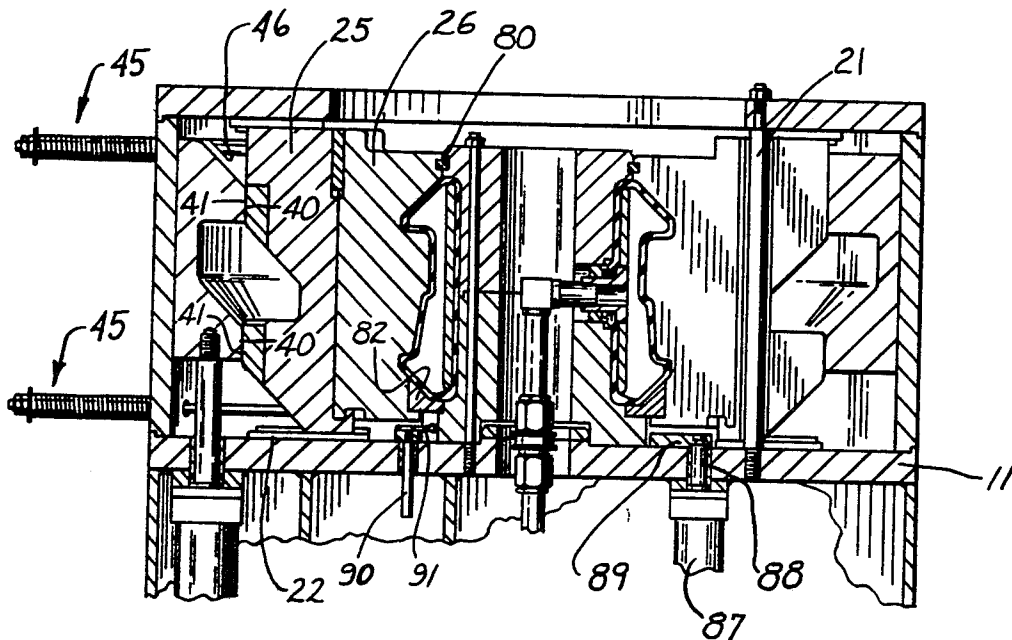
[52] U.S. Cl. 72/63
 [51] Int. Cl. B21d 22/12
 [50] Field of Search. 72/63;
 25/45; 162/401; 287/189.36; 152/330, 345, 349,
 350

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ABSTRACT: An expander for forming a drawn metal product such as a casket and the like. The expander includes a bladder which surrounds a ring. Hydraulic fluid is pumped into the bladder to cause the bladder to expand and force the work-piece against a rigid outer die, the hydraulic fluid being conveyed by a conduit which extends through the bladder and ring and is fixed to the ring. The above mentioned caskets have a one-piece single-seam construction for their sidewalls.



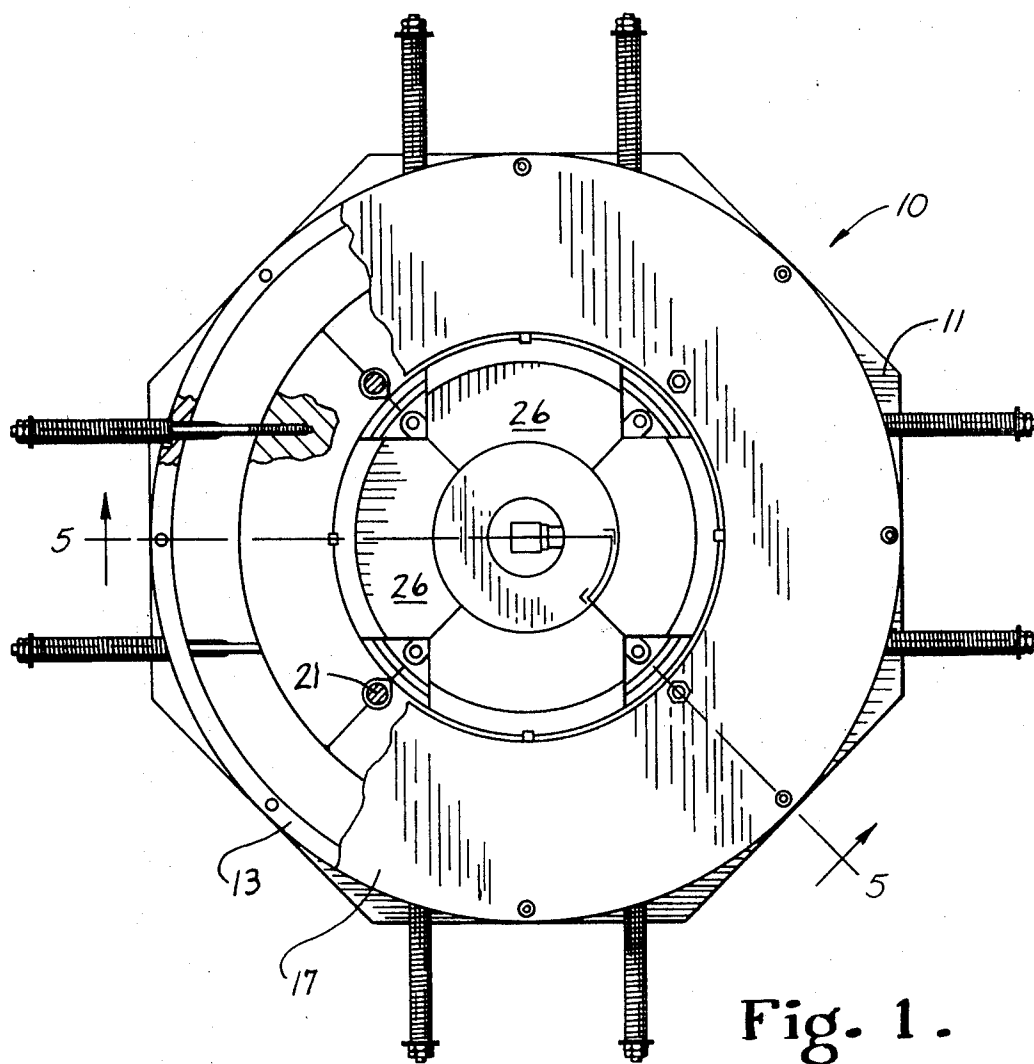


Fig. 1.

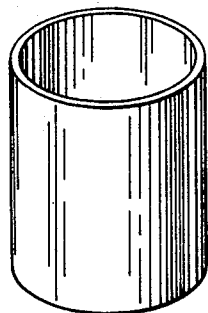


Fig. 2.

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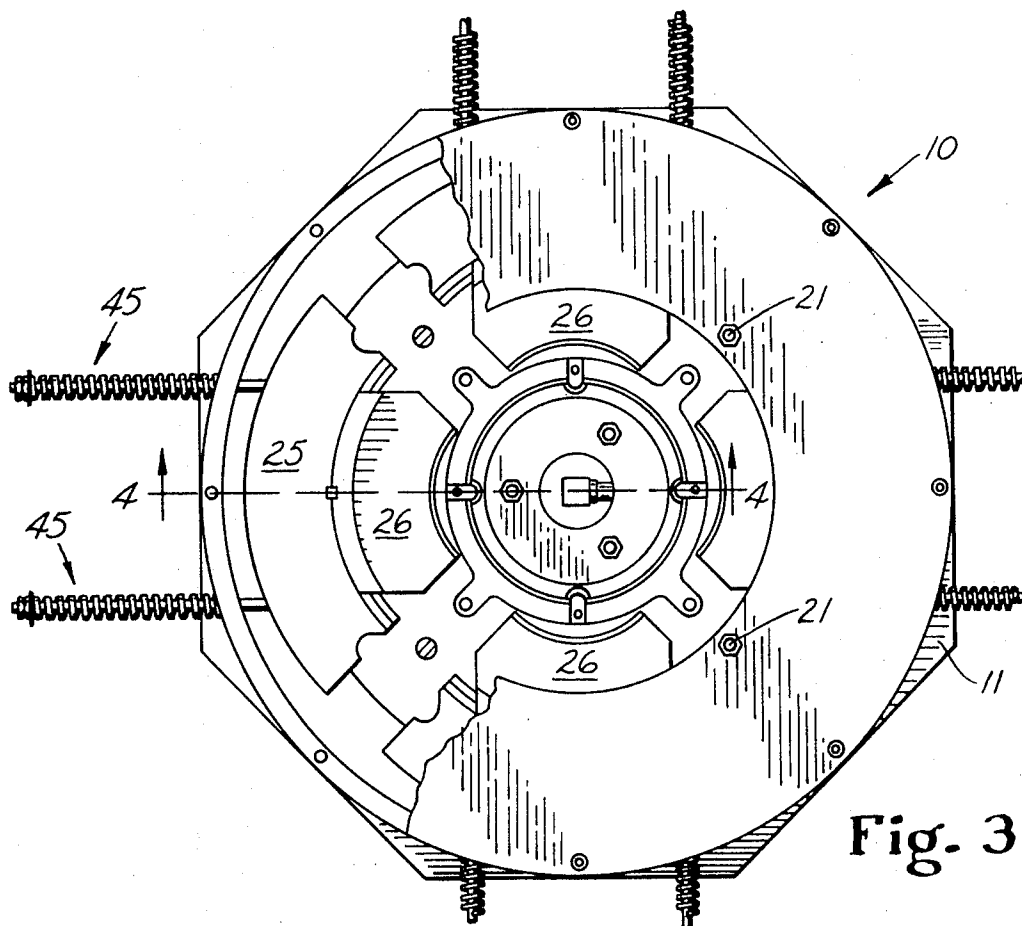


Fig. 3.

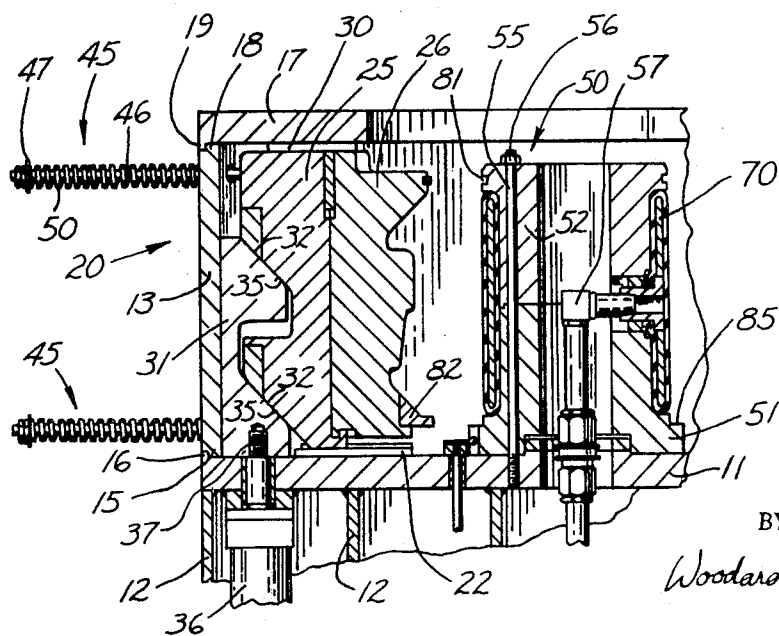


Fig. 4.

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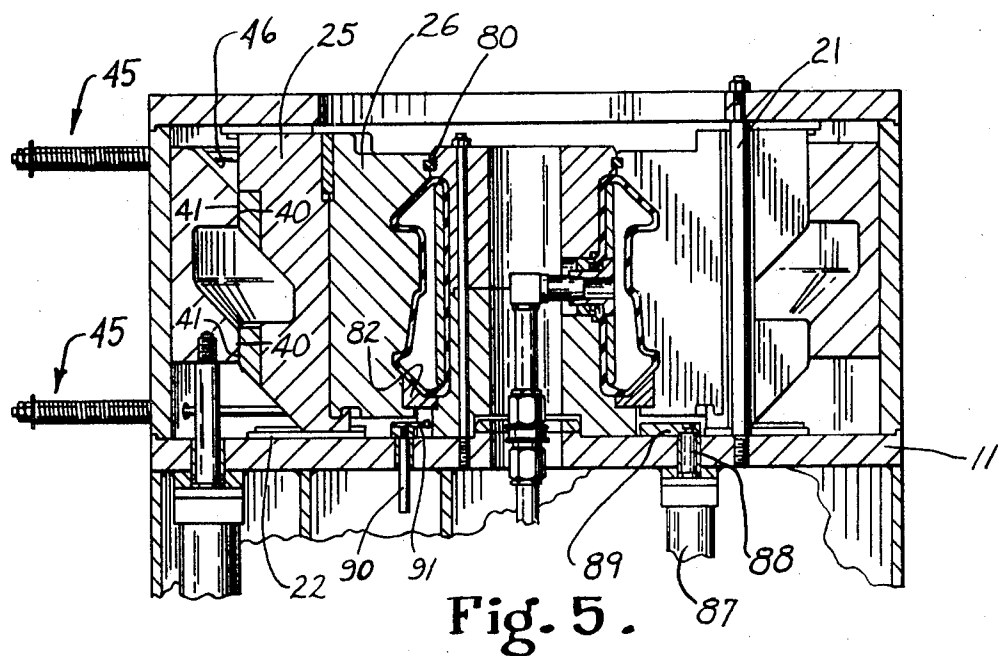


Fig. 5.

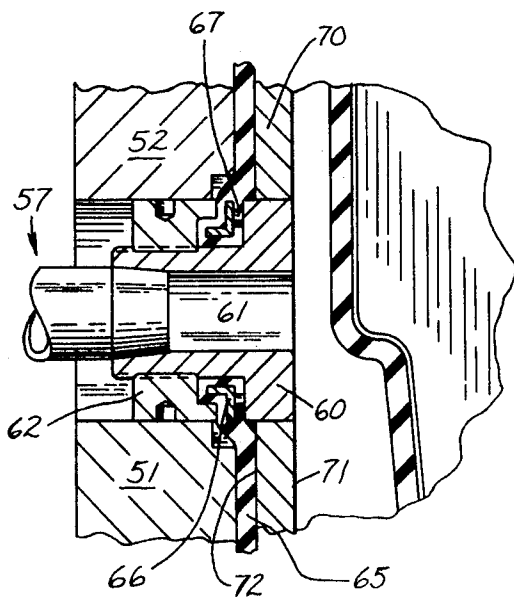


Fig. 6.

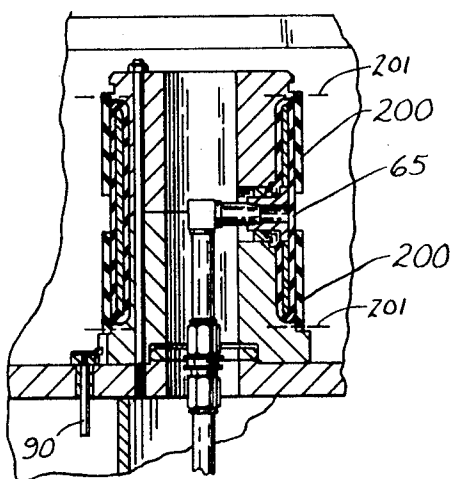


Fig. 7.

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Fig. 13.

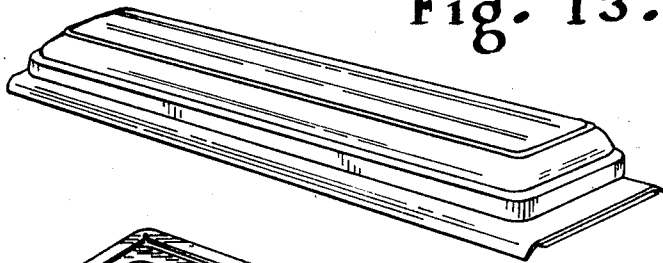


Fig. 12.



Fig. 9.

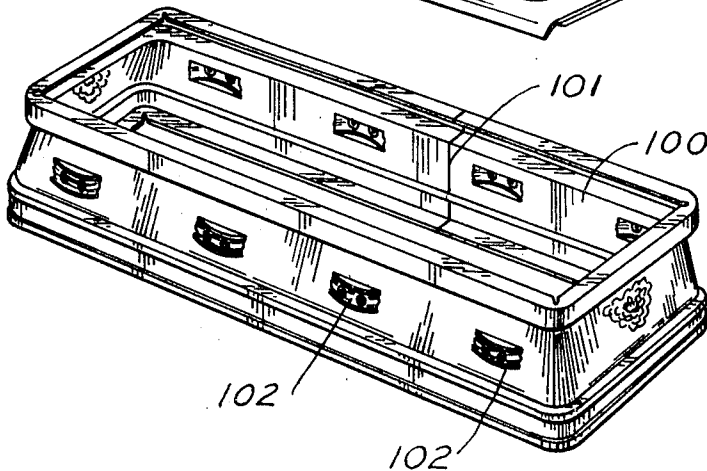
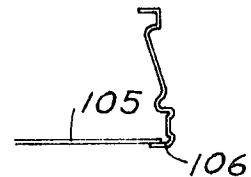


Fig. 8.

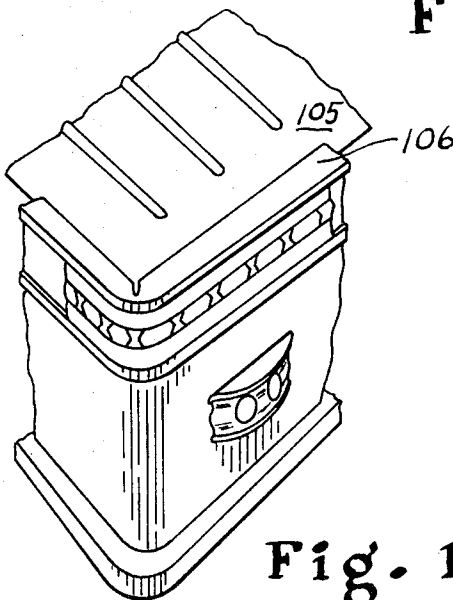


Fig. 10.

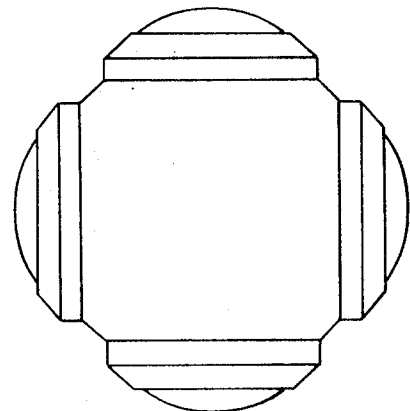


Fig. 11.

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BLADDER EXPANDER AND CASKET PRODUCT

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to expander apparatus and to a casket product formed thereby.

2. Description of the Prior Art

Various expander devices have been created which include bladders as the means for exerting a force on the workpiece. One such apparatus includes a bladder consisting of a closed sheet of flexible stretchable material having enlarged lips along the two edges thereof. These enlarged lips are received within two recesses each of which extends completely around the expander apparatus. The bladder is expanded by hydraulic fluid which fills the space between the rigid portions of the expander and the bladder. In such an arrangement there is a tendency for the hydraulic fluid to leak past the lips. Also there is a tendency for the bladder to wear out rapidly so that before too many cycles of operation it is necessary to replace the bladder. Consequently, there is room for improvement in such bladder expanders. Examples of the patented prior art are shown in the U.S. Pats. to Stary, No. 2,690,205; Peabody, No. 2,693,697; Margedant, No. 2,234,774 and Jager, No. 2,395,832.

SUMMARY OF THE INVENTION

One embodiment of the apparatus of this invention might include expander apparatus comprising a bladder of annular configuration, a ring received within said bladder, a conduit projecting through said bladder and through said ring from a first side of said ring to a second side thereof and opening on said second side, and means for supplying hydraulic fluid under pressure to said conduit for expanding said bladder.

One embodiment of the product of the present invention might include a casket construction comprising a closed sheet of plastically deformable material, said sheet including a single seam at which said sheet is closed and adhered together.

One object of this invention is to provide an improved expander apparatus.

A further object of this invention is to provide an expander apparatus incorporating a bladder which does not leak.

Still another object of this invention is to provide an expander with bladder arrangement having a longer life than existing bladder arrangements. Related objects and advantages will appear as the description proceeds.

BRIEF DESCRIPTION OF THE DRAWINGS

The full nature of the invention will be understood from the accompanying drawings and the following description and claims.

FIG. 1 is a top plan view of an expander embodying the present invention.

FIG. 2 is a perspective view of a closed sheet metal member which is the workpiece for the apparatus of FIG. 1.

FIG. 3 is a top plan view similar to FIG. 1 but showing the expander in open or outer die retracted position ready to receive the workpiece in FIG. 2.

FIG. 4 is a vertical section taken along the line 4-4 of FIG. 3 in the direction of the arrows.

FIG. 5 is a vertical section taken along the line 5-5 of FIG. 1 in the direction of the arrows.

FIG. 6 is an enlarged fragmentary view similar to FIG. 5 showing in greater detail a portion of the structure illustrated in FIG. 5.

FIG. 7 is a view similar to FIG. 4 and showing an alternative embodiment of the present invention.

FIG. 8 is a perspective view of a casket which forms a product of the structure of FIGS. 1 through 7 and which embodies the present invention.

FIG. 9 is a vertical section taken through a portion of the structure of FIG. 8 and additionally showing attached thereto a base for a portion of the structure of FIG. 8.

FIG. 10 is a perspective view of the bottom and end of the casket as illustrated in FIGS. 8 and 9.

FIG. 11 is an end view of a workpiece having formed therein a cluster of tops for caskets.

FIG. 12 is a section taken through a portion of the structure illustrated in FIG. 11 showing a single-casket top and cross section detached from the remainder of the cluster.

FIG. 13 is a perspective view of the casket top in FIGS. 11 and 12.

DESCRIPTION OF THE PREFERRED EMBODIMENT

For the purposes of promoting an understanding of the principles of the invention, reference will now be made to the embodiment illustrated in the drawings and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended, such alterations and further modifications in the illustrated device, and such further applications of the principles of the invention as illustrated therein being contemplated as would normally occur to one skilled in the art to which the invention relates.

Referring now more particularly to the drawings, there is illustrated in detail in FIGS. 1, 3, 4, 5 and 6 an expander apparatus 10 which operates upon the cylindrically shaped enclosed sheet metal structure shown in FIG. 2 to expand it into a cluster of connected sheet metal parts. The expander includes a base 11 supported upon vertically extending members 12 and having fixed thereto a cylindrical or ring-shaped member 13. In order to locate the ring-shaped member 13 with relation to the base 11, the member 13 is provided with a downwardly projecting annular lip 15 which is received inboard of an upstanding lip 16 on the base. An annular top plate 17 is fixed to the upper edge of the ring-shaped member 13 in similar fashion with lip 18 provided inboard of the downwardly projecting flange 19 whereby rigid cylindrical housing 20 is provided. To provide an even further amount of strength and rigidity, four shouldered vertical pins 21 are received within suitable apertures in the base and top plate and fix the members in spaced relation.

A plurality of radially extending keys 22 are fixed to and received within suitable radially extending apertures in the base 11. The keys 22 provide trackways for four tool or die carrier members 25. Fixed to the inner faces of the tool carriers 25 are scab dies 26 which can be removed and replaced by different shaped dies if desired depending upon the type of part being formed. The annular top plate 17 has fixed to the lower face thereof radially extending bearings 30 which act as bearing surfaces for the outer die carriers 25. The outer die carriers are moved inwardly by means of cam means 31 which may be in the form of a ring.

The cam ring 31 is provided with tapered inwardly facing cam surfaces 32 which act against cooperating surfaces 35 on the external faces of the outer die carriers 25. A plurality of fluid cylinders 36 are fixed to the base 11 and have their piston rods 37 fixed to the cam ring 31 whereby upward projection of the piston rods 37 causes the cam surfaces 32 to move across the cam surfaces 35 of the outer die carriers and to move the outer die carriers radially inwardly. The innermost position of the die carriers 25 is shown in FIG. 5. In this position the vertical surfaces 40 of the cam ring are in engagement with the vertical surfaces 41 of the outer die carriers. Consequently, further vertical movement in seating of the cam rings 31 against the top plate 17 produces no corresponding radial movement of the die carriers and the die carriers are locked in the illustrated inward position by the surfaces 40 and 41.

Spring means 45 function to retract the outer die carriers 30. Each of the spring means 45 includes a rod 46 fixed to a respective outer die carrier 30 and extending through a suitable aperture in the ring-shaped member 13. At the outer end of each rod 46 there is fixed a stop element 47 against which bears a respective compression spring 50. The inward end of the compression spring 50 bears against the outer surface of the ring-shaped member 13. Thus it can be seen when the ap-

paratus is in the position of FIGS. 3 and 4 the compression spring 50 is separated or has its turns separated apart while when in the position of FIG. 5, for example, the various turns of the compression springs are in contact with one another as illustrated in FIG. 5. It can be appreciated from the inner configuration of the dies 26 as illustrated in FIGS. 1 and 3 that the cross-sectional configuration of the part being formed by the particular illustrated dies is circular in cross section. It should be mentioned, however, that various shaped parts can be formed by the present apparatus and they need not be circular in cross section. It will be noted, however, that when the various outer dies have been moved inwardly to the position of FIG. 1, all of the dies 26 are contacting adjacent dies so that a continuous outer die forming surface is presented.

Coaxial with the base 11 there is mounted a bladder arrangement 50. The bladder arrangement 50 includes a pair of supporting members 51 and 52 which are fixed to the base 11 by a plurality of rods 55 and nuts 56, the rods 55 being threaded into the base 11. Fixedly clamped between the two supporting members 51 and 52 is a hydraulic conduit 57. Referring to FIG. 6, the hydraulic conduit 57 has fixed thereto an annular collar 60 having a passage 61 therethrough in communication with the conduit 57. The conduit 57 is clamped between the two members 51 and 52 by means of a nut 62 which is threaded onto external threads on the outside of the member 60. The nut 62 bears against the bladder 65 and an annular L-shaped cross-sectional metal member 66 so as to force the member 66 and the bladder 65 hard against the annular member 60 so as to prevent leakage between the bladder 65 and the member 60.

The L-shaped member 66 is secured to the member 60 by means of epoxy cement 67 which is placed in the mold between the collar 60 and the L-shaped cross-sectional member 66 when the bladder 65 is molded. The bladder, being formed of urethane, bonds to the epoxy cement 67 so as to provide an integral construction. When the bladder 65 is molded, not only are the members 60 and 66 as well as the cement 67 placed in the mold in the position shown but the annular member 70 is also placed in the mold and fixed to the member 60. Petroleum jelly is placed on the external surface of the member 70 and particularly on the external surface 71 thereof and not on the internal surface 72 thereof. Thus the urethane making up the bladder 65 tends to adhere to the surface 72 but because of the petroleum jelly on the surface 71 does not adhere to that surface. In other words, during operation of the present apparatus the fact that the external surface 71 has petroleum jelly on it permits the bladder to move outwardly and to expand away from the surface 71 to the expanded position shown in FIG. 5.

In order to form a part such as, for example, the casket illustrated in FIG. 8, the workpiece of FIG. 2 is placed inside of the outer die 26 and outside of the bladder 65. It should be mentioned that the particular scab dies 26 illustrated are intended for the production of washing machine tubs. However, those dies could be appropriately replaced by external dies making possible the expansion of the construction shown in, for example, FIG. 8. The outer cam ring 31 is then moved from the position of FIG. 4 to the position of FIG. 5 by projection of the piston rods 37 of the cylinders 36. The outer die will then mate with the bladder support members 51 and 52 as illustrated in FIG. 5. It will be noted that a key 80 is provided for each outer die member and is received within a suitable recess 81 appropriately located in the bladder support member 52. Also fixed to the respective outer dies 26 are members 82 which engage an upwardly facing abutment surface 85 on the lower support member 51. Such engagement is illustrated in FIG. 5.

The apparatus is now in readiness for the expansion of the bladder 65. Hydraulic fluid under pressure is introduced into the bladder 65 through the conduit 57. As the bladder is filled it moves away from the external surface 71 of the ring-shaped member 70 and forces the workpiece against the internal surfaces of the scab dies 26 to form the workpiece into the desired configuration. After forming is complete, the bladder

is drained of the hydraulic fluid through the conduit 57 and the external dies are moved outwardly by retraction of the piston rods 37 which causes the springs 45 to move the external dies 26 radially outwardly. The formed part is then removed from the apparatus by upward projection of pistons 88 which are vertically reciprocal in the base member 11 and which have a ring 89 and pads 91 at their upper ends for engaging and lifting the formed workpiece. The ejector pistons are operated by cylinders 87 fixed to the base 11. The rod 90 is fixed to ring 89 and operates a microswitch (not shown).

Referring to FIG. 7, there is illustrated an improvement on the apparatus illustrated in FIGS. 1-6. The structure illustrated in FIG. 7 is identical to that of FIGS. 1-6 with the exception that a pair of annular boots 200 are placed so as to surround the bladder 65 at the lower and upper ends thereof but with the center portion of the bladder 65 uncovered. The boots are secured to the members 51 and 52 by screws positioned at the lines 201. The boots 200 are formed of the same flexible urethane material as is the bladder 65. When the bladder 65 is expanded it has been found that the boots 200 prevent a substantial amount of wear at the portions of the bladder where the metal is moving the greatest so that normally these portions would be very greatly worn and would cause the bladder's useful life to be substantially reduced. At the center of the bladder 65 there is not a substantial amount of metal movement and consequently a little wear occurs in this area. After the boots 200 have become so completely worn as to be no longer useful, they can be replaced and the initial bladder 65 continued in use for a longer useful life.

Referring now to FIG. 8, there is illustrated a casket construction which might be formed by the apparatus of the present invention. It can be seen that the casket construction includes a closed sheet of plastically deformable metal 100 which is welded closed along the line 101. The external surface of the sheet 100 is formed with various attractive configurations 102 normally desired and found in caskets. The base of the casket may consist of a single flat sheet of metal 105 which is welded to the intumed lower flange 106 of the casket as shown in FIGS. 9 and 10.

The casket top is illustrated in FIG. 13. The top of the casket can be formed as a cluster of parts illustrated in FIG. 11. Such a cluster of parts can be formed by use of the expander apparatus illustrated in my U.S. Pat. No. 3,222,910 or may be formed by the apparatus illustrated in the present application. After the cluster of parts has been formed as illustrated in FIG. 11 they are separated to provide individual casket tops as shown in FIG. 12.

It will be evident that the present invention provides an improved casket construction and also provides an improved expander apparatus. It will be further evident that the expander apparatus of the present invention incorporates a bladder which does not leak. It can also be seen that the expander apparatus of this invention provides a bladder which has a longer life than existing bladder arrangements.

While the invention has been illustrated and described in detail in the drawings and foregoing descriptions, the same is to be considered as illustrative and not restrictive in character, it being understood that only the preferred embodiment has been shown and described and that all changes and modifications that come within the spirit of the invention and the scope of the claims are also desired to be protected.

I claim:

1. Expander apparatus comprising a bladder of toroidal configuration having an outer wall and an inner wall integrally joined a ring-shaped band member received within and coaxial with said bladder, a conduit communicating with said bladder through said ring-shaped member, means for supplying hydraulic fluid under pressure through said conduit for expanding said bladder, a set of outer dies positioned outwardly of said bladder, said bladder being expandable to force a workpiece against said outer dies, and support means for said bladder and ring-shaped member, said support means positioning said bladder in fixed relation to said outer dies and preventing inward expansion of said bladder.

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2. The expander apparatus of claim 1 additionally comprising a collar receiving said conduit and opening in said bladder, an annular member embedded in said bladder and surrounding said collar outwardly of the area at which said conduit communicates through said ring-shaped member, said collar being secured to said ring-shaped member.

3. The expander apparatus of claim 2 wherein said bladder is adhered to said ring-shaped member adjacent said conduit on said first side of said ring-shaped member and wherein said bladder is otherwise separated from said ring-shaped member

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by petroleum jelly.

4. The expander apparatus of claim 2 additionally comprising epoxy cement securing and positioning aid annular member relative to said ring-shaped member, said epoxy cement forming a part of said bladder, said bladder being otherwise formed of urethane which bonds to said epoxy.

5. the expander apparatus of claim 1 additionally comprising a pair of boots of expandable flexible material surrounding said bladder at the upper and lower ends thereof.

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