Oct. 13, 1953 B. W. MORRISON 2,654,901

PRESSING APPARATUS FOR FOOTWEAR AND THE LIKE

Filed Jan. 28, 1950 2 Sheets-Sheet 1

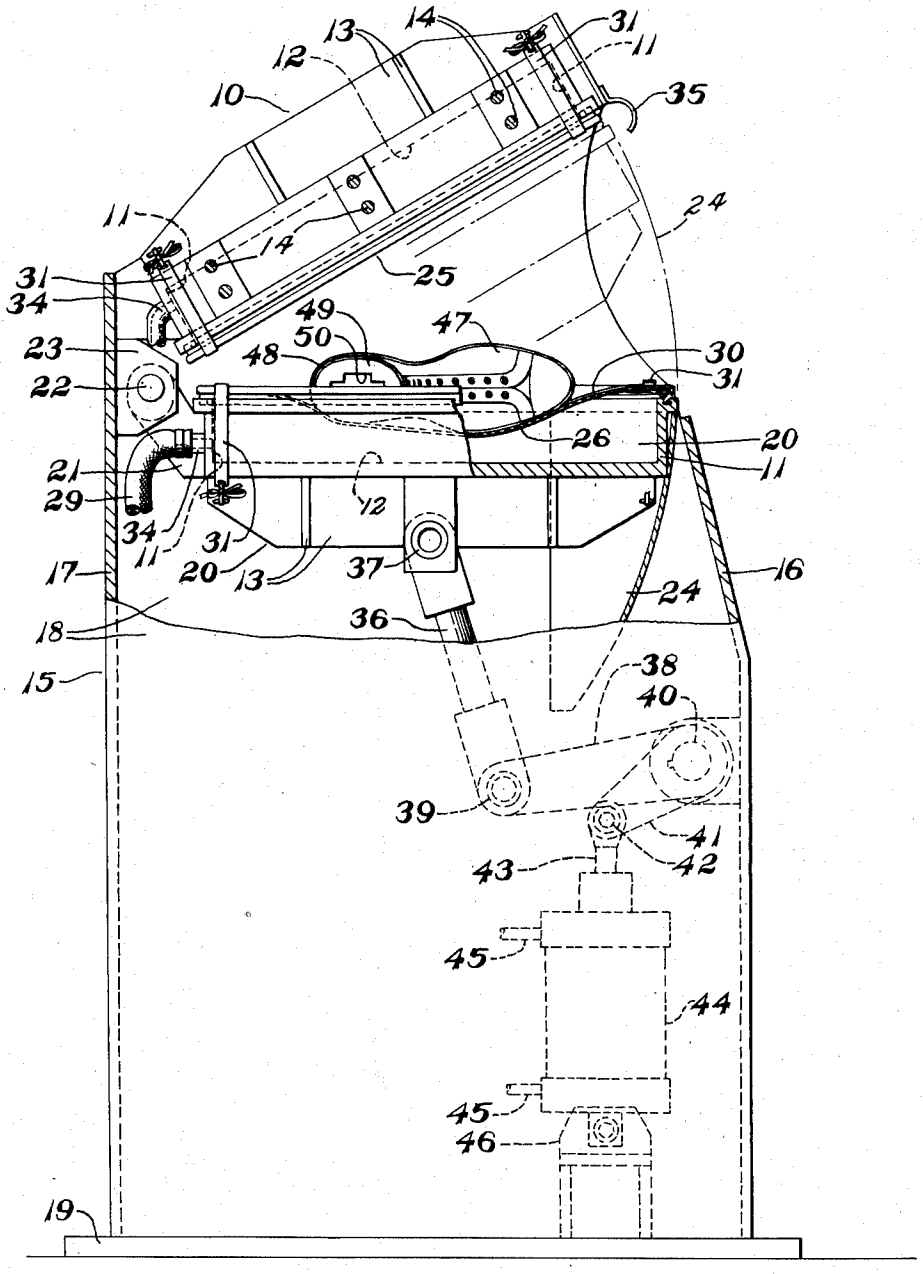


Fig-1

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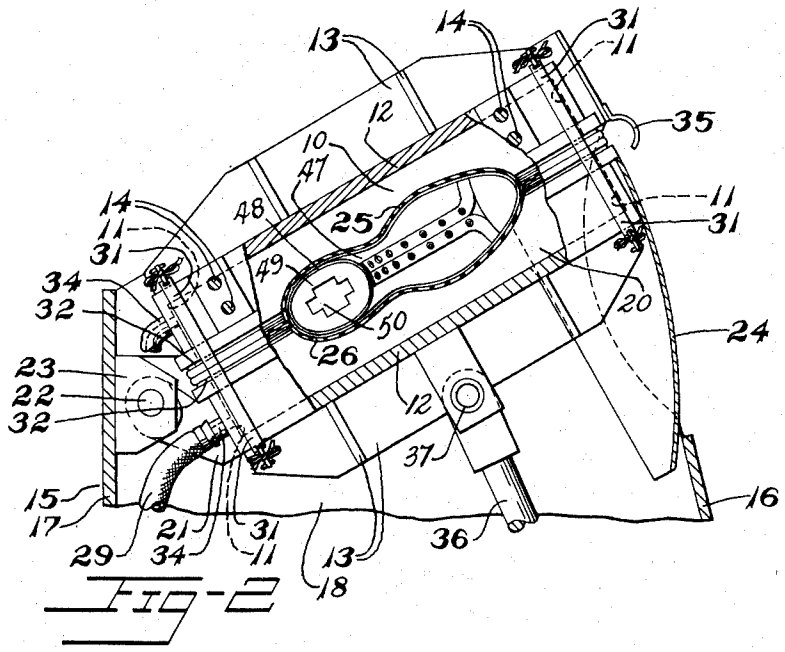


Fig-2

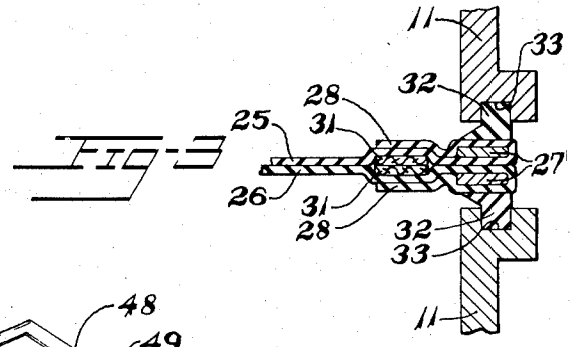


Fig-3

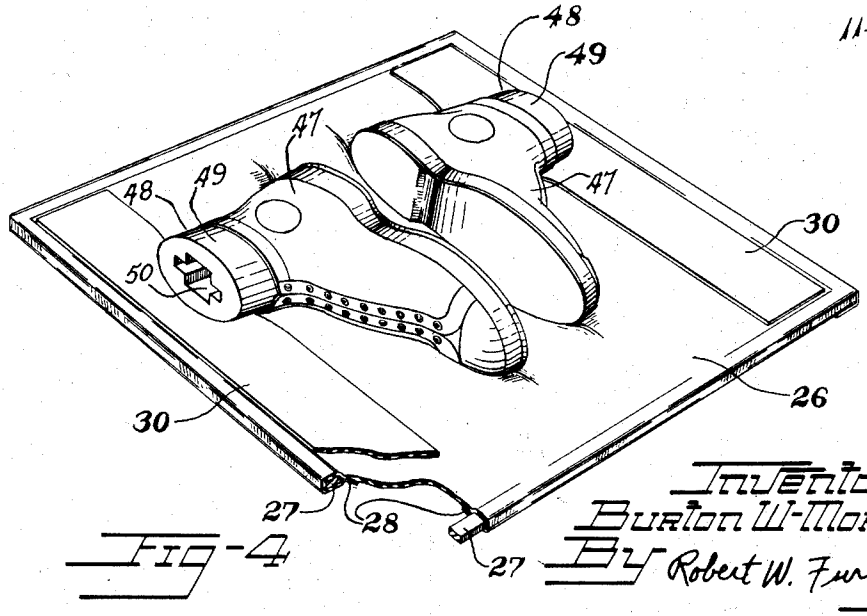


Fig-4

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UNITED STATES PATENT OFFICE

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PRESSING APPARATUS FOR FOOTWEAR AND THE LIKE

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10 Claims. (Cl. 12—1)

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This invention relates to apparatus for applying pressure to the assembled members of an article and pertains more particularly to apparatus in which expansible elastic members exert a desired pressure on assembled articles of footwear and the like.

It is an object of this invention to provide pressing apparatus which will exert a desired uniform pressure on the surface of the assembled members of an article regardless of the configuration of the article.

Another object of this invention is to provide pressing apparatus having expansible elastic pressure exerting members which can be readily removed and replaced.

Still another object of this invention is to provide pressing apparatus having expansible elastic members which will withstand the relatively sharp edge of the jack-receiving cavity in the last upon which the footwear is assembled, while at the same time being sufficiently thin and flexible to conform to the irregular shape of the footwear.

A further object of this invention is to provide pressing apparatus having expansible elastic members which function without the necessity of rigidly securing the article in one particular position on said elastic members.

It is also an object of this invention to provide pressing apparatus having a pair of expansible elastic members capable of completely encompassing an article placed therebetween when said expansible elastic members are expanded.

Another object is to provide apparatus capable of pressing satisfactorily articles of footwear having a wide range of last sizes and shapes, without the necessity for any changes or adjustments in the apparatus.

Other objects of this invention will be apparent from the drawings and description which follow.

It has been customary in the construction of footwear, such as overshoes, boots, gaiters, and the like, in which numerous members are adhered together to form an integral unit, to press each member with a hand tool onto members previously assembled on a last forming a bond between the assembled members. Assembling footwear in this manner is tedious and time consuming and frequently results in unsatisfactory adhesion between the members in the finished article due to fatigue of the operator and to an uneven pressure having been exerted on the various members of the assembled article.

Several pressure exerting devices having expansible elastic members have been proposed, but

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have proven unsatisfactory in various respects: the edges of the form or last upon which the article is built readily tear or cut the expansible elastic members of the apparatus; the expansible elastic members are incapable of exerting the desired uniform pressure about the entire outer surface of the article; and it is necessary to secure the article rigidly in one particular position during the pressing operation, a step which is very time consuming and which increases greatly the cost of the pressing operation. Furthermore, the apparatus heretofore available has been capable of handling only a very limited range of sizes and shapes of footwear without the necessity for extensive changes and adjustments.

Pressure exerting apparatus constructed in accordance with this invention comprises a pair of relatively thin expansible elastic diaphragms secured to pressure chambers into which a fluid under pressure is forced when the apparatus is in an operating position to expand the diaphragms which completely encompass and exert a uniform pressure on the entire outer surface of the article to be pressed. The article is merely placed between the diaphragms and is not rigidly secured in one particular position thereby requiring less care and fewer operations to be performed by the operator. The expansible elastic diaphragms are provided with reinforced areas to resist the relatively sharp marginal zones of a form or last upon which the article is assembled, eliminating the difficulties encountered heretofore with expansible elastic diaphragms which readily tore when the diaphragms were expanded in contact with the marginal zones of a form or last.

In the drawings:

Fig. 1 is a view in elevation partly broken away and in section of a pressing apparatus embodying this invention in the open position and a shoe on a last in position to be pressed;

Fig. 2 is a view in elevation partly broken away and in section of the upper and lower pressure chambers of a pressure exerting apparatus embodying this invention in a closed operating position and showing a shoe on a last being pressed between two expanded elastic diaphragms;

Fig. 3 is an enlarged sectional view showing the construction of the diaphragm margin and a means for sealing the diaphragm to the pressure chamber; and

Fig. 4 is a view in perspective partly broken away and in section of an expansible elastic diaphragm with lasted shoes in position for the pressing operation.

The pressing apparatus comprises an upper

pressure chamber 10 defined by side walls 11, 11 and upper wall 12 and having its lower face open. Upper wall 12 of pressure chamber 10 is provided with a web of reinforcing ribs 13, 13 to strengthen the chamber. Supporting frame 15 consisting of front wall 16, rear wall 17, side walls 18, 18 and base member 19 serves to support upper pressure chamber 10 which is secured thereto in an inclined position by bolts 14, 14.

Lower pressure chamber 20 having a construction similar to pressure chamber 10 but having its open face uppermost is mounted beneath pressure chamber 10. A pivot bracket 21 which is secured to lower pressure chamber 20 pivots about pin 22 which is supported by bracket 23 secured to rear wall 17 of supporting frame 15 permitting lower pressure chamber 20 to be rotated from the open horizontal position as shown in Fig. 1 to the closed position as shown in dotted lines in Fig. 1. Front wall 16 of supporting frame 15 terminates just below the upper face of lower chamber 20 when it is in a horizontal position to provide an access opening in the fore part of the apparatus through which articles to be pressed may be introduced and withdrawn. An arcuate shield 24 which is secured to lower chamber 20 provides a cover for the above-mentioned access opening when lower chamber 20 is in the closed position.

Relatively thin flat flexible expansible elastic diaphragms 25, 26 are disposed over the open faces of pressure chambers 10, 20. Diaphragms 25, 26 as shown in Fig. 4 are constructed about metal frames 27, 27 which impart the desired configuration to diaphragms 25, 26 and provide reinforcement for the marginal areas 28, 28. The diaphragms are constructed of a relatively thin flexible elastic rubbery sheet, preferably of vulcanized natural rubber such as caoutchouc and the like, whose margins 28, 28 are secured around frames 27, 27 as shown in Fig. 3 and are adhered to the opposing face of the diaphragm.

Elastic reinforcing membranes 30, 30 comprising a sheet of flexible elastic rubbery material, preferably a vulcanized natural rubber such as caoutchouc and the like, are disposed along two marginal zones of the outer faces of diaphragms 25, 26 in an opposing face-to-face relationship when chamber 20 is in the closed position providing a double thickness of elastic material along the margins of each diaphragm 25, 26. However, reinforcing membranes 30, 30 should be sufficiently thin and flexible to permit the diaphragms 25, 26 to conform to the irregular shape of an article placed therebetween. It is preferable that membranes 30, 30 not be adhered to diaphragms 25, 26, so that the membranes may readily be replaced if they become worn.

Straps 31, 31 which are secured to webs 13, 13 and extend across the open faces of chambers 10, 20 provide means for holding diaphragms 25, 26 and membranes 30, 30 across the open faces of pressure chambers 10, 20. Straps 31, 31 are easily removed permitting diaphragms 25, 26 and/or membranes 30, 30 to be readily replaced. Pressure sealing gaskets 32, 32 are fitted into channels 33, 33 in upper pressure chamber 10 and lower pressure chamber 20 to seal diaphragms 25, 26 to the pressure chambers.

Fittings 34, 34 as shown in Fig. 1 provide means through which air under pressure is delivered to and removed from pressure chambers 10, 20. It is necessary that hose 29 attached to fittings 34, 34 leading to lower chamber 20 be flexible to permit chamber 20 to move from the open to the closed operating position.

Guard 35 secured to chamber 10 prevents the operator's hands from being caught between diaphragms 25, 26 as the lower chamber 20 is closed.

The opposing margins of diaphragms 25, 26 do not form an air tight joint when the chambers 10, 20 are in the closed position because of double thicknesses of rubbery material at the corners of frames 27, 27 and because of straps 31, 31, so that air trapped between the opposing faces of diaphragms 25, 26 as chamber 20 moves to a closed position is permitted to escape.

Lower pressure chamber 20 is actuated from an open to a closed position and returned to an open position by a pneumtic toggle lever system. The toggle system comprises toggle arm 36 which is secured to chamber 20 by pin 37 and to a second toggle arm 38 by pin 39. Toggle arm 38 is keyed to shaft 40. One end of connecting arm 41 is likewise keyed to shaft 40 and the other end is secured by pin 42 to piston 43 which slides in cylinder 44. Connections 45, 45 on cylinder 44 provide a means for admitting and removing compressed air from cylinder 44. Cylinder 44 is pivotally secured to pivot support 46 which in turn is mounted on base member 19.

Pressure chambers 10, 20 normally are maintained in an open position as shown in Fig. 1. To illustrate the operation of the pressing apparatus a shoe 47 constructed of numerous members assembled on a last 48 is placed on lower diaphragm 26, as shown in Fig. 4, with the head 49 of last 48 resting on a reinforcing membrane 30. Compressed air is admitted into cylinder 44 forcing piston 43 upward activating the toggle lever system which causes the lower pressure chamber 20 to pivot about pin 22 until chamber 20 is in a closed position, as shown in Fig. 2. When lower pressure chamber 20 is in the closed position compressed air is admitted into pressure chambers 10, 20 expanding diaphragms 25, 26 which completely envelop shoe 47 and exert a uniform pressure on all of the members of shoe 47 forming a bond between said members. After a desired time has elapsed during which pressure is being exerted on shoe 47, the pressure is released from pressure chambers 10, 20 permitting diaphragms 25, 26 to return to a generally flat configuration. Pressure is then released from cylinder 44, and compressed air is admitted to the opposite end of piston 43 forcing piston 43 downward urging chamber 20 to the open position. Shoe 47 is removed and another operation cycle may begin.

Forms, such as last 48 upon which articles are asembled, generally are provided with a jack-receiving cavity 50 which has relatively sharp edges tending to cut or tear diaphragms 25, 26. Diaphragms constructed in accordance with this invention having at least one reinforcing member against which the head of a form is placed are not as readily cut or torn, since the reinforcing members provide additional resistance to the cutting tendencies of the form as the diaphragms are expanded.

A pressing apparatus made in accordance with this invention is capable of pressing several articles in one operating cycle and is useful in pressing articles of varying configurations and sizes.

A pressing apparatus constructed in accordance with this invention applies a uniform pressure upon the entire outer surfaces of the article which bonds all of the adherent surfaces together

forming an integral article having uniform unbroken bonded members.

It is clear that obvious variations and modifications may be made without departing from the spirit and scope of this invention as defined in the appended claims.

I claim:

1. A pressing apparatus for pressing irregularly-shaped articles which comprises a pair of rigid open faced pressure chambers, at least one of said chambers being mounted for movement to and from the other with their open faces opposed, a normally flat thin flexible expansible elastic diaphragm disposed across the open face of each said chamber, at least one relatively thin flexible expansible elastic reinforcing membrane disposed across a restricted zone of the outer pressing face of each said diaphragm, said reinforcing membranes being in opposed mating relationship when said chambers are in face-to-face relationship, means for moving said chambers toward and from a position in which said diaphragms are pressed together along their margins, and means for introducing a fluid under pressure into said chambers while said diaphragms are opposed to press said diaphragms toward each other and about said article disposed therebetween.

2. A pressing apparatus for pressing irregularly-shaped articles which comprises a pair of rigid open faced pressure chambers, at least one of said chambers being mounted for movement to and from the other with their open faces opposed, a normally flat thin flexible expansible elastic diaphragm disposed across the open face of each said chamber, a pair of relatively narrow thin flexible expansible reinforcing membranes disposed across spaced parallel zones of the outer face of one of said diaphragms, corresponding membranes disposed across corresponding zones of said second diaphram, means for moving said chambers toward and from a position in which said diaphragms are pressed together along their margins, and means for introducing a fluid under pressure into said chambers while said margins are opposed to press said diaphragms toward each other and about said article disposed therebetween.

3. A pressing apparatus for pressing irregularly-shaped articles which comprises a pair of rigid open-faced pressure chambers, at least one of said chambers being mounted for movement to and from the other with their open faces opposed, a normally flat thin flexible expansible elastic diaphragm disposed across the open face of each said chamber, at least one relatively thin flexible expansible elastic reinforcing membrane disposed across a restricted zone of the outer pressing face of each said diaphragm and detachably secured thereto, said reinforcing membranes being in opposed mating relationship when said chambers are in face-to-face relationship, means for moving said chambers toward and from a position in which said diaphragms are pressed together along their margins, and means for introducing a fluid under pressure into said chambers while said diaphragms are opposed to press said diaphragms toward each other and about said article disposed therebetween.

4. A pressing apparatus for pressing irregularly-shaped articles which comprises a pair of rigid open-faced pressure chambers, at least one of said chambers being mounted for movement to and from the other with their open faces opposed, a normally flat thin flexible expansible elastic diaphragm disposed across the open face of each said chamber, a pair of relatively narrow thin flexible expansible reinforcing membranes disposed across spaced parallel zones of the outer face of one of said diaphragms and detachably secured thereto by mechanical means, corresponding membranes disposed across corresponding zones of said second diaphragm and detachably secured thereto by mechanical means, means for moving said chambers toward and from a position in which said diaphragms are pressed together along their margins, and means for introducing a fluid under pressure into said chambers while said margins are opposed to press said diaphragms toward each other and about said article disposed therebetween.

5. A pressing apparatus for pressing articles which comprises an upper pressure chamber having an open bottom face, said chamber being rigidly secured in an inclined position, a lower pressure chamber having an open top face mating with the open face of said upper chamber, said lower chamber being pivotally mounted for rotational movement about an axis adjacent the lowermost portion of said inclined upper chamber to and from an open position in which the open face of said lower chamber is substantially horizontal and a closed position in which the open faces of said chambers are in substantially parallel opposing relationship, a compressible sealing means disposed along the extent of the margin of each said open face, a normally flat thin flexible expansible elastic diaphragm disposed over the open face of each said chamber with the margin of said diaphragm overlying said sealing means, at least one relatively thin flexible expansible elastic reinforcing member disposed across a restricted zone of the outer pressing face of each said diaphragm, means for rotatably moving said lower chamber to and from said open and closed position, and means for introducing a fluid under pressure into said chambers while said chambers are in the closed position to press said diaphragms toward each other and to stretch them about the entire outer face of said article disposed therebetween.

6. Pressing apparatus adapted to press irregularly-shaped articles which comprises a pair of rigid open-faced pressure chambers, at least one of said chambers being mounted for movement to and from the other with their open faces opposed, a compressible sealing means disposed along the extent of the margin of each said open face, a normally flat thin flexible expansible elastic diaphragm disposed over the open face of each said chamber with the margin of said diaphragm overlying said sealing means, at least one relatively thin flexible expansible elastic reinforcing membrane disposed across a restricted zone of the outer pressing face of each said diaphragm, means for moving said chambers toward and from a position in which said diaphragms are pressed together along their margins, and means for introducing a fluid under pressure into said chambers while said diaphragms are opposed to press said diaphragms toward each other and closely about said irregularly-shaped article disposed therebetween.

7. Pressing apparatus adapted to press irregularly-shaped articles which comprises a pair of rigid open-faced pressure chambers, at least one of said chambers being mounted for movement to and from the other with their open faces opposed, a compressible sealing means disposed along the extent of the margin of each said open face, a

normally flat thin flexible expansible elastic diaphragm disposed over the open face of each said chamber with the margin of said diaphragm overlying said sealing means, a pair of relatively narrow thin flexible expansible elastic reinforcing membranes disposed across spaced parallel zones of the outer face of one of said diaphragms, corresponding membranes disposed across corresponding zones of said second diaphragm, means for moving said chambers toward and from a position in which said diaphragms are pressed together along their margins, and means for introducing a fluid under pressure into said chambers while said margins are opposed to press said diaphragms toward each other and closely about said irregularly-shaped article disposed therebetween.

8. Pressing apparatus adapted to press irregularly-shaped articles which comprises a pair of rigid open-faced pressure chambers, at least one of said chambers being mounted for movement to and from the other with their open faces opposed, a compressible sealing means disposed along the extent of the margin of each said open face, a normally flat thin flexible expansible elastic diaphragm disposed over the open face of each said chamber with the margin of said diaphragm overlying said sealing means, at least one relatively thin flexible expansible elastic reinforcing membrane disposed across a restricted zone of the outer pressing face of each said diaphragm, and detachably secured thereto, said reinforcing membranes being in opposed mating relationship when said chambers are in face-to-face relationship, means for moving said chambers toward and from a position in which said diaphragms are pressed together along their margins, and means for introducing a fluid under pressure into said chambers while said diaphragms are opposed to press said diaphragms toward each other and closely about said irregularly-shaped article disposed therebetween.

9. Pressing apparatus adapted to press irregularly-shaped articles which comprises a pair of rigid open-faced pressure chambers, at least one of said chambers being mounted for movement to and from the other with their open faces opposed, a compressible sealing means disposed along the extent of the margin of each said open face, a normally flat thin flexible expansible elastic diaphragm disposed across the open face of each said chamber, with the margin of said diaphragm overlying said sealing means, a pair of relatively narrow thin flexible expansible reinforcing membranes disposed across spaced parallel zones of the outer face of one of said diaphragms and detachably secured thereto by mechanical means, corresponding membranes disposed across corresponding zones of said second diaphragm and detachably secured thereto by mechanical means, means for moving said chambers toward and from a position in which said diaphragms are pressed together along their margins, and means for introducing a fluid under pressure into said chambers while said margins are opposed to press said diaphragms toward each other and about said article disposed therebetween.

10. A pressing apparatus for pressing articles which comprises an upper pressure chamber having an open bottom face, said chamber being rigidly secured in an inclined position, a lower pressure chamber having an open top face mating with the open face of said upper chamber, said lower chamber being pivotally mounted for rotational movement about an axis adjacent the lowermost portion of said inclined upper chamber to and from an open position in which the open face of said lower chamber is substantially horizontal and a closed position in which the open faces of said chambers are in substantially parallel opposing relationship, a normally flat thin flexible expansible elastic diaphragm disposed over the open face of each said chamber, at least one relatively thin flexible expansible elastic reinforcing member disposed across a restricted zone of the outer pressing face of each said diaphragm, means for rotatably moving said lower chamber to and from said open and closed position, and means for introducing a fluid under pressure into said chambers while said chambers are in the closed position to press said diaphragms toward each other and to stretch them about the entire outer face of said article disposed therebetween.

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