Feb. 1, 1944. O. JOHNSON 2,340,473

CONTAINER

Filed March 18, 1941

Fig. 3.

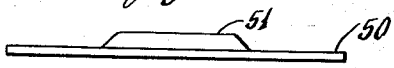


Fig. 2.

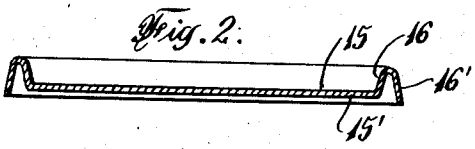


Fig. 1.

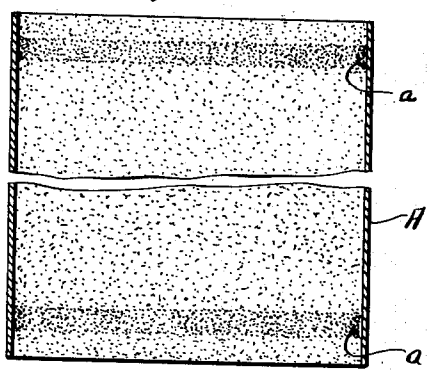


Fig. 5.

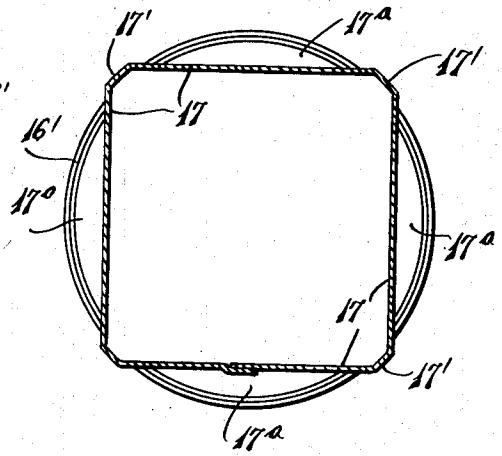


Fig. 4.

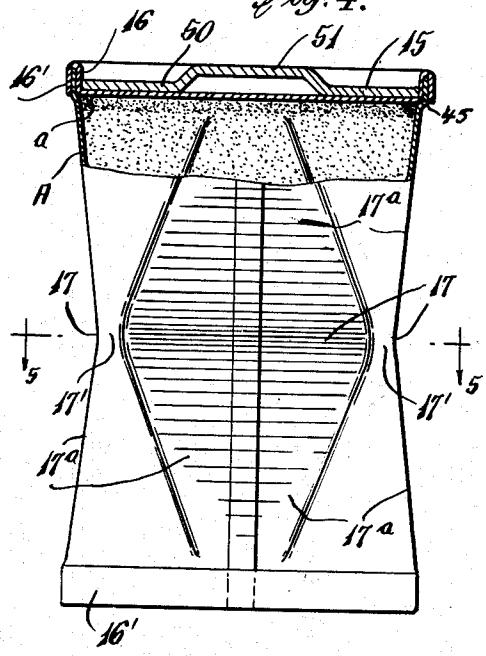
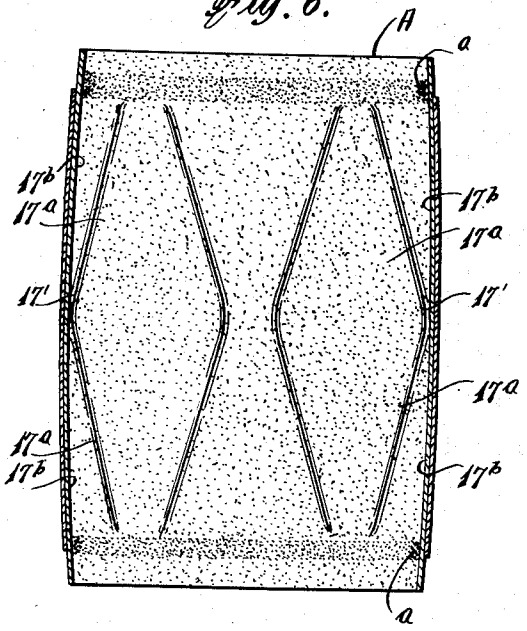


Fig. 6.



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2,340,473

CONTAINER

Ogden Johnson, Bronxville, N. Y.

Application March 18, 1941, Serial No. 383,916

5 Claims. (Cl. 229—4.5)

This invention relates to containers, and more particularly to containers of fibrous material, such as paper, and the present application is a continuation in part of application Serial 350,952, filed August 3, 1940.

It is the primary object of the invention to provide a new and improved container.

It is a further object of the invention to provide a new and improved oil and grease proof and/or moisture proof paper container.

Paper containers of this character include a tubular body of uniform cross section and closure disks or heads of fibrous material adhesively secured in the ends of the body, or secured in the body by a seam interlocking the end of the body with the peripheral portion of the closure disk or head. The contents of the container constantly exert an outward force on the wall of the container body which tends to separate the body from the closures or heads of the container, and such outward force is also exerted on the container wall by an expansion of the contents of the container with a consequent leakage of the contents from the container.

It is a further object of the invention to provide an improved container wherein the container body is of tubular form and opposite portions of the container body intermediate the ends are collapsed inwardly to reduce the volumetric capacity of the container and serve to reinforce and add rigidity to the container body as well as take up any pressure of the contents of the container on the body of the container which exert a force on the container body tending to separate the seam parts between the body and the closure ends of the container, said collapsed portions also being adapted to be expanded by expansion of the contents of the container to increase the volumetric capacity of the container and compensate for expansion of the contents of the container, and the collapsed portions automatically assuming their original collapsed condition upon the contraction of the contents of the container.

In containers of this character should the container be subjected to a jar, as by dropping the container, the impact of the container with the surface upon which it is dropped will cause separation of the connecting seam between the end closures and body of the container with a consequent leakage should the contents of the container consist of liquid.

It is another object of the invention to provide an improved closure for container bodies and means for securing closures to container bodies.

To adapt paper containers for dispensing oils and greases and to also render the same moisture proof, the inner surface of the material of the paper body is provided with a coating of thermoplastic material, such as vinyl resin, having the properties of being oil, grease and moisture proof and to also constitute a thermoplastic adhesive to unite the container parts. A surface of the material of the end closures is also provided with a coating of such thermoplastic material preparatory to shaping the same to closure form and the closures are adhesively secured to the container body by the thermoplastic material under heat and pressure, a coating of suitable moisture and water proof material being applied to the exterior surface of the container. In securing the end closures to the container body by the thermoplastic material under pressure and heat to intimately contact the closure parts and render the thermoplastic material viscous to adhesively unite the closure parts, it is possible that portions of the closure parts may not be in contiguout or intimate contact with the container body, or may not be heated to the proper temperature so that the thermoplastic material on said seam portions will not be rendered sufficiently viscous and tacky to cause the thermoplastic material to unite the closure parts to the container body in a firm and continuous bond with the result that the oil and grease or other liquid contents will permeate through the seam or joint.

It is another object of the invention to overcome this disadvantage by providing the seams between the container parts with a fillet or reinforcing seal, comprising an annular layer of thermoplastic material applied in semi-liquid form to the inner surface of the container body adjacent the ends thereof and cooling to a semi-solid or semi-plastic state at normal temperatures, and said material crowded into the interstices or crevices and forming a sealing fillet at the juncture of the closure with the container body as the closure is inserted in the end of the container body and adapted to be rendered viscous when the container parts are subjected to an elevated temperature to adhesively unite the closures to the container body and then solidifying or setting.

Other objects and advantages of the invention will hereinafter appear.

In the drawing accompanying and forming a part of this application, Figure 1 is a longitudinal sectional view of a cylindrical member constituting the body of my improved container and showing the inner surface provided with a coating of oil, grease and moisture proof thermo-

plastic material and an annular layer of such material within the ends of said member.

Figure 2 is a transverse section of a peripherally flanged disk constituting a part of the end closures for the container.

Figure 3 is an edge view of a reinforcing disk engaged within the flange of the disk shown in Figure 2 to constitute a part of the end closures of the container.

Figure 4 is a side elevation of my improved container partly broken away to show the method of securing the end closures in the container body.

Figure 5 is a sectional view taken on the line 5—5 of Figure 4, and

Figure 6 is a longitudinal sectional view of the container body.

In carrying out the embodiment of the invention illustrated in the drawing, there is provided a tubular member A of pliable though somewhat stiff fibrous material, such as paper, to constitute the body of the container, and formed from a blank severed from a sheet or web and shaped to cylindrical form with one side marginal portion of the blank overlapping the opposite side marginal portion and adhesively secured thereto. The interior surface of the body is provided with a coating of thermoplastic material having a high fusing point and the properties of being resistant to oil and grease, including hydrocarbon and mineral oils and greases, and moisture resistant. I have found that vinyl resins are efficient for the purpose. Preferably the thermoplastic material is applied to the sheet or web from which the blanks are cut and after the blank is shaped to cylindrical form a coating of a reinforcing thermoplastic material is applied over the raw edge of the blank within the body. The coating material also constitutes a thermoplastic adhesive and serves to adhesively unite the overlapped portions of the blank, said overlapped portions being united under pressure and heat to intimately contact said parts and render the thermoplastic material viscous and tacky, the thermoplastic material when cooled solidifying and uniting the overlapped portions of the blank in an impregnable bond. The inner surface of the body A is also provided with an annular layer of a reinforcing thermoplastic material adjacent each end thereof, as shown in heavy strippling at *a*, said material being normally in a semi-solid or semi-plastic state and of a thickness several times the thickness of the coating on the container and adapted to function as a sealing fillet at the interstices or crevices at the juncture of the closures or heads with the body, as hereinafter described.

Closures or heads are secured in the opposite ends of the body, comprising disks 15 of pliable fibrous material, such as paper, having on a surface thereof, as 15', a coating of thermoplastic material similar to the coating material on the inner surface of the cylindrical member, the disks 15 being severed from a sheet or web to the surface of which the coating of thermoplastic material has been applied. The disks 15 are arranged with a reversely bent peripheral flange, the flange including a portion 16 extended laterally from the surface opposite the coated surface of the disk and an outwardly curved depending portion 16', the depending portion being of slightly greater length than the portion 16, as shown in Figure 2. A disk 50 (Figure 3) of relatively rigid material, preferably fibrous material, is assembled upon the disk 15 within the laterally extending portion 16 of the flange and preferably adhesively united to the disk 15. The disk 50 has a raised portion 51 centrally thereof, the side wall of which raised portion converges from the body of the disk to the bottom of the raised portion and is of a length so that the bottom of the raised portion 51 will extend in the same plane as the curved connecting portion of the flange 16, 16' of the disk 15 when the disk 50 is assembled on the disk 15. The raised portion 51 of the disk 50 reinforces and adds rigidity to said disk and is also adapted when applied to a container body to cooperate with the end of the container embraced by the flange 16, 16' to support the container, as hereinafter described.

In the present embodiment of the invention, the tubular container body is preformed to body final shape preparatory to securing the closures or heads therein by constricting the body intermediate the ends thereof, which is effected by inwardly depressing or collapsing portions of the body preferably located diametrically opposite and intermediate the ends, as at 17, which collapsed portions may, as shown, form the container body midway the ends thereof to angular form in cross section and the corners 17' are arranged to extend diagonally of the angle portions, as shown in Figure 5, and said depressed wall portions being substantially of concave form in longitudinal section with the opposite side portions inclining and progressively decreasing in width from the angle portion 17 toward and terminating within the opposite circular ends of the body, as at 17*a*, the portions of the body extending from the corner portions 17' toward the opposite ends of the body bulging outwardly and assuming a progressively decreasing convex form, as shown at 17*b* in Figure 6. By this arrangement of the body, there is exerted a yielding inward stress thereon which not only reinforces and adds rigidity to the body but takes up pressures exerted outwardly on the body wall by the contents of the container, thus adapting the body to be expanded to compensate for any expansion of the contents of the container and when the contents contract automatically assuming its preformed shape by the inherent resiliency of the material of the body and a reduction of pressure in the container produced by the contracting of the contents of the container.

The body is preformed and held in its preformed condition during the insertion and securing of a bottom closure in the end of the body and during the period the contents is filled into the container and the closure for the filler opening of the container is inserted in and secured to the body.

The reinforcing and stiffening disk 50 and the thickness of the portion 16 of the flange of the disk 15 disposed about the periphery of the disk 50 is of a diameter slightly larger than the internal diameter of the cylindrical portion at the end of the container body preformed in the holder sections 18. To facilitate engaging the composite disk 15, 50 in the end of the body, the end of the body preparatory to inserting the closures or heads therein may be slightly expanded or stretched, which may be effected by engaging the tapered head of a plunger into the end of the body, or said disks 15, 50 may be engaged upon such a plunger head and thereby engage into the end of the body, and as the portion 16 of the closure flange is of slightly larger diameter than the internal diameter of the body, the end of the body is slightly expanded and a shoulder or seat is formed at the juncture of the expanded end por-

tion with the body against which the closure is seated, as shown at 45, and the outwardly depending portion 16' of the flange of the disk 15 is disposed over and crowds the end of the container body in the outwardly curved portion of the flange. The closure is adhesively secured in the body by the thermoplastic material on the surface of the disk 15, the depending portion 16' of the flange being pressed to the end of the container body and subjected to pressure and an elevated temperature by suitable means to intimately contact the portions 16, 16' of the flange with the interposed end of the container body and render the coating of thermoplastic material viscous and tacky and cause it to penetrate the material of the body and adhesively unite the parts.

After the contacting parts of the closure and body have been united under pressure and heat, the thermoplastic material uniting the closure to the body is cooled forming an impregnable bond between the same.

The quantity of the material to be dispensed in the container is somewhat less than the capacity of the container to provide an air space above the material in the container. The head or closure for the filler end is the same as the bottom end or closure and is engaged upon and inserted by a plunger head into the end of the body. Simultanously with inserting the closure into the body, the layer of thermoplastic material *a* is crowded forwardly of and into the crevice at the juncture of the closure with the body. By providing the air space above the contents of the container as the closure is engaged in the body there is a partial compression of such air which causes the layer of material *a* to crowd into the crevice at the juncture of the closure with the body and form a sealing fillet therein preventing the contents of the body, such as oil or grease, to permeate to the thermoplastic material adhesively uniting the closure body to the container.

By the arrangement of juxtaposing the rigid disk 50 within the flange 16 of the disk 15 and making the disk of a diameter substantially the same as the internal diameter of the container body at the ends thereof and the flange portion 16 of larger diameter, the rigid disk serves not only to clamp the flange portion 16 to the wall of the container body, but also reinforces and adds rigidity to the closure ends of the container and absorbs the shock of any jar to which the ends of the body are subjected, as by dropping the container, and prevents the separation of the seam parts between the closures and body and consequent leakage of the contents from the container. The raised portion 51 of the disk 50 further reinforces and adds rigidity to said disk and the end of the container and when the container is supported at an end thereof said raised disk portion 51 and the end of the container body within the flange 16, 16' engage the supporting surface not only supporting the container on the supporting surface but also relieving the disk 15 of practically all of the weight of the contents of the container and obviating the possibility of the weight and vibratory movement of the material in the container during transportation of the same opening the joint or seam between the flange 16 of the disk 15 and the body of the container and a consequent leakage of the contents from the container should the contents comprise a liquid. The inwardly depressed or collapsed portions 17*a* of the container body retain such position in the filled condition of the container and are yieldingly urged to such position by the inherent resiliency of the material of the body and a reduction of pressure in the container induced by the contracting of the contents of the container, and they resist outward movement thereof by pressure exerted thereon by the weight of the contents of the container. However, should there by an extraordinary outward pressure exerted thereon by the contents of the container, as by the force of expansion of the contents of the container, the inwardly collapsed portions of the container body will yield under such force and compensate for any increase in the contents of the container due to the expansion thereof, thus preventing such pressure from separating the seam between the body and closures, and when the contents of the container are contracted, the collapsed portions of the container will automatically assume their original inwardly collapsed position.

The exterior of the container is provided with a coating of moisture and water resistant material, such as paraffine, or said coating may consist of a vinyl resin, the same as on the inner surface of the container, having the properties of being oil and grease or moisture resistant. Said coating material may be applied to the surface of the sheets or webs from which the body blanks and ends are cut, but it is preferably applied thereto after the container has been manufactured and filled with the head or closure secured in the filler end of the container and may be applied by submerging the container in a bath of the coating material or the coating material sprayed onto the container, depending on the nature of the material dispensed in the container.

Having described my invention, I claim:

1. A multi-part container including a tubular body of rigid though yielding material constricted to angular form intermediate the ends thereof with the opposite sides of the constricted portion extending in parallel relation and the wall of the body diverging from said opposite sides of the constricted portion toward and terminating in circular portions at the ends, and rigid closures of a diameter slightly larger than the internal diameter of and secured in the circular ends of the body and placing the body under a tensional stress in a longitudinal direction acting to permit the constricted portion of the body to be expanded by pressures within the container and to assume its original constricted condition by a reduction in said pressures.

2. A multi-part container, comprising a tubular body having a constricted portion of polygonal form in cross section intermediate the ends thereof with the wall of the body diverging from opposite sides of said polygonal constricted portion toward the ends of the body and of progressively decreasing convex form longitudinally of the body at the corner portions of the sides of the constricted portion, and said diverging and convex wall portions terminating in a circular portion at the ends of the body, and closures engaged and secured in the circular ends of the body adapted to place the wall of the body under a tensional stress in a longitudinal direction acting to yieldingly urge the body to predetermined constricted condition and permit of expansion of the body by pressures within the container and cause the body to assume its original constricted condition by a reduction in said pressures.

3. A multi-part container, consisting of a tubular body having a constricted portion of polygonal form in cross section intermediate the ends

thereof with the corner portions thereof arranged to extend diagonally of the angles of the polygonal portion with the wall of the body diverging from opposite sides of the polygonal portion and the diagonal corner portions arranged of progressively decreasing convex form longitudinally of the body, and said diverging and convex wall portions terminating in a circular portion at the ends of the body, and closures having a diameter larger than and secured in the ends of the body subjecting the body to a tensional stress acting to yieldingly urge the body to predetermined constricted form and permit expansion of the body by pressures within the container and cause the body to assume its predetermined constricted condition by a reduction of the pressures within the container.

4. A container comprising a tubular body collapsed inwardly and shaped to polygonal form in cross section midway the ends thereof and having flat wall portions diverging from such polygonal portion, said wall portions progressively decreasing in width toward and merging with circular portions at the opposite ends of the body, said flat wall midway of the ends of the body having portions extending farther from the longitudinal axis of the body than the circular portion and closures secured in the circular ends of the body, said closures yieldingly retaining the body in position with the collapsed portion in collapsed condition and permitting expansion of said collapsed portion of the body by expansion of the contents and increase in pressure in the container.

5. As an article of manufacture, a container including a preformed body collapsed inwardly and shaped to polygonal form in cross section intermediate the ends thereof, flat wall portions extending oppositely from such polygonal collapsed portion and being of concave form in longitudinal section and merging with circular portions at the ends of the body, said flat wall midway of the ends of the body having portions extending farther from the longitudinal axis of the body than the circular portion and closures secured to the circular ends of the body retaining the ends of the body in rigid condition and the intermediate collapsed portion yieldingly in collapsed condition and permitting said collapsed portion to be expanded by the expansion of the contents and increase in the pressure in the container and cause the same to assume its collapsed condition by contraction of the contents and reduction of the pressure in the container.

OGDEN JOHNSON.