Feb. 21, 1933. C. S. CRICKMER 1,898,292

FLEXIBLE SWAB BODY

Filed April 1, 1931 3 Sheets-Sheet 1

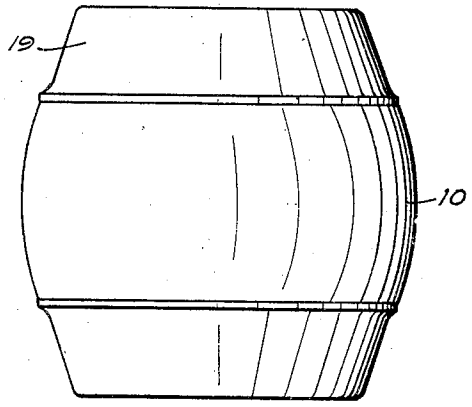



Fig. 1

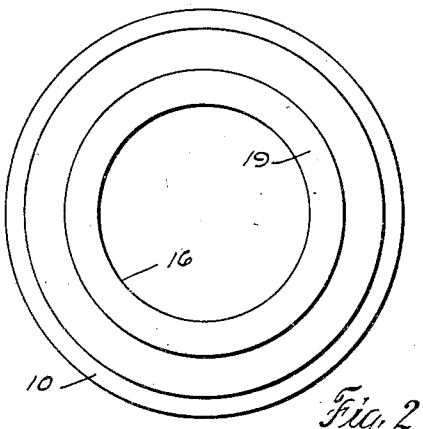



Fig. 2

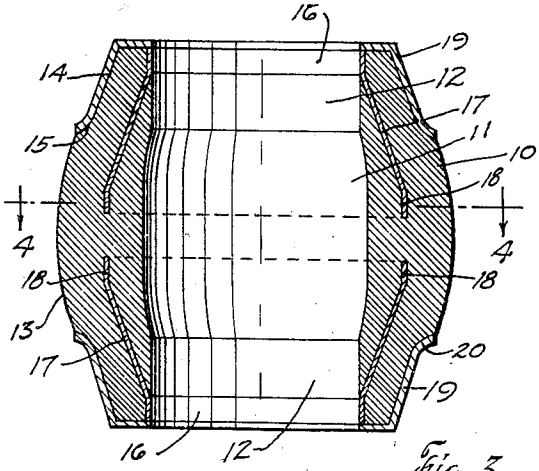



Fig. 3

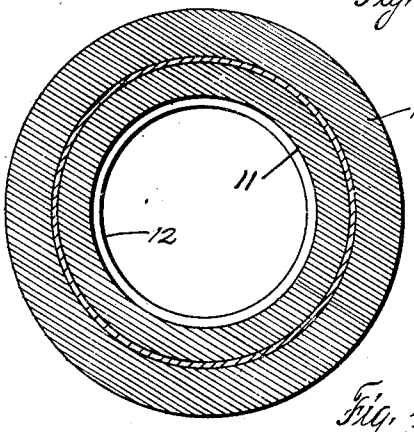



Fig. 4

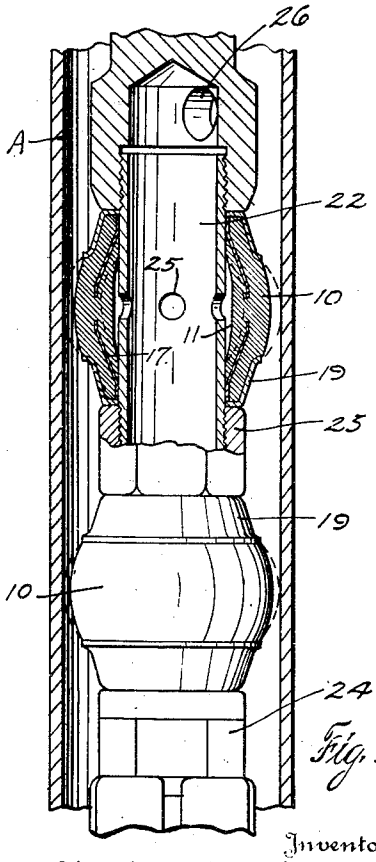



Fig. 5

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FLEXIBLE SWAB BODY

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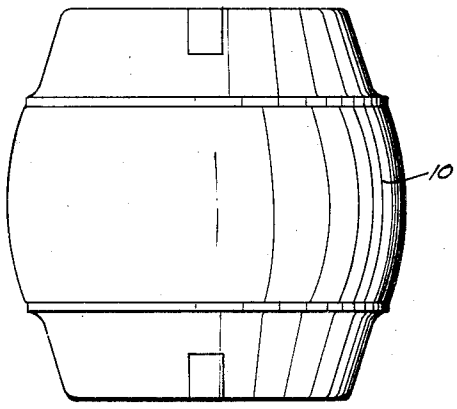



Fig. 6

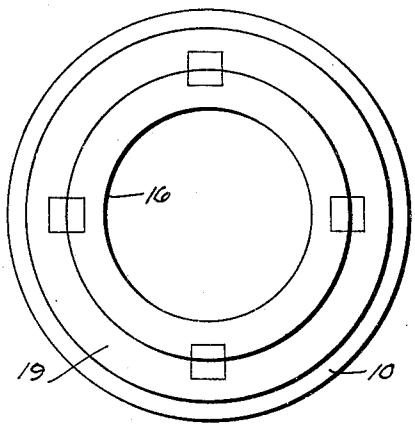



Fig. 7

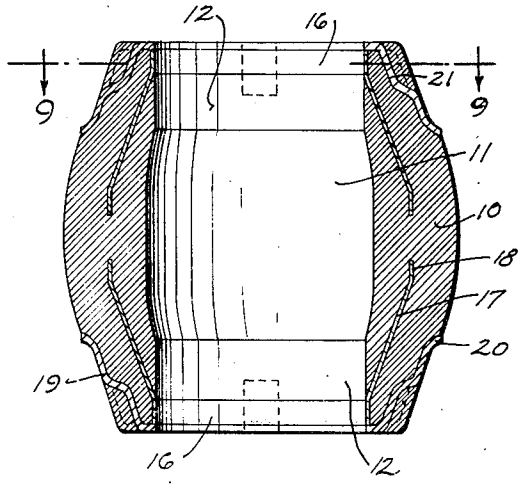



Fig. 8

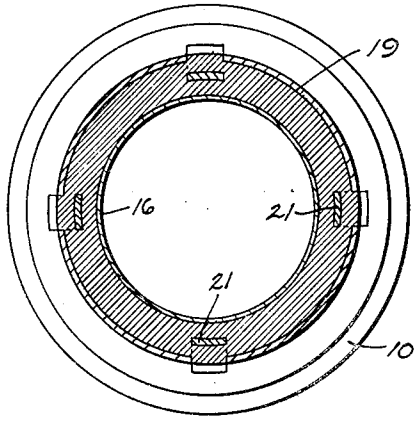



Fig. 9

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FLEXIBLE SWAB BODY

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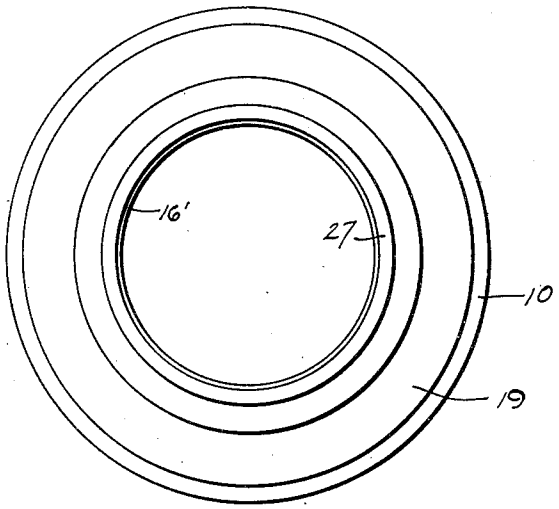



Fig. 11

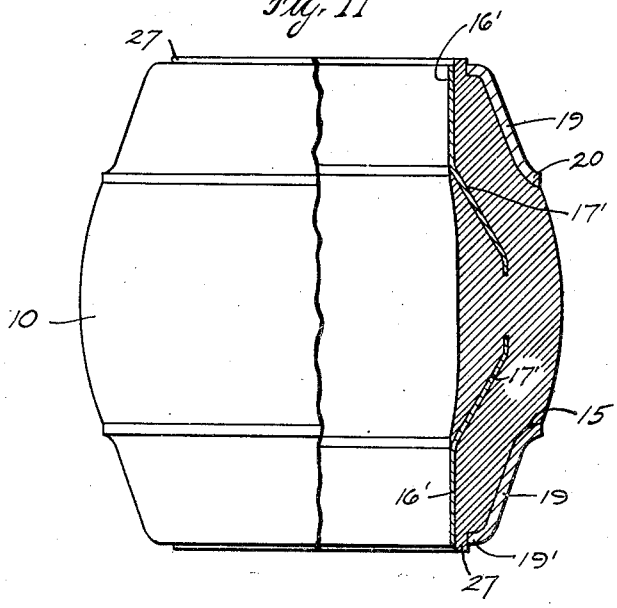



Fig. 10

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Patented Feb. 21, 1933

1,898,292

# UNITED STATES PATENT OFFICE

CHARLES S. CRICKMER, OF DALLAS, TEXAS, ASSIGNOR TO THE GUIBERSON CORPORATION, OF DALLAS, TEXAS, A CORPORATION OF DELAWARE

## FLEXIBLE SWAB BODY

Application filed April 1, 1931. Serial No. 526,943.

This invention relates to new and useful improvements in flexible swab bodies.

One object of the invention is to provide metal reinforcements as well as metal protectors.

A particular object of the invention is to provide an internal reinforcing member, a portion of which is exposed in the bore of the cup for contacting with the mandrel of the swab and a portion of which is embedded in the wall of the cup for reinforcing the same.

A further object of the invention is to employ two of the internal reinforcing members mounted on opposite ends of the cup or swab body with their reinforcing members or aprons extending inwardly in the wall of the cup and terminating short of each other at the central portion of said cup, whereby the end portions of the cup are reinforced and owing to the resilient quality of said aprons the central portion of the cup is permitted to expand, but is prevented from blowing out under high internal pressure or unduly expanding.

Another object of the invention is to provide for each end of the cup or body a surrounding metal thimble snugly embracing the tapered side walls and the ends of the cup and either connected with the reinforcing member or partially embedded in the flexible wall of the cup, or both, so as to remain attached to the cup body and afford a permanent guard or protector.

A construction designed to carry out the invention will be hereinafter described together with other features of the invention.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings in which an example of the invention is shown, and wherein:

Figure 1 is an elevation of a swab body made in accordance with the invention,

Figure 2 is a plan view of the same,

Figure 3 is a vertical sectional view of the body,

Figure 4 is a horizontal cross-sectional view taken on the line 4—4 of Figure 3,

Figure 5 is a partial assembly view of a swab in a tubing, portions being shown in elevation and portions in section, and the retracted positions of the bodies being indicated in full lines and the expanded positions in dotted lines,

Figure 6 is an elevation of a swab body similar to Figure 1, showing an embedded type of thimble,

Figure 7 is a plan view of the same,

Figure 8 is a vertical sectional view,

Figure 9 is a horizontal cross-sectional view taken on the line 9—9 of Figure 8,

Figure 10 is a view of another form of body, partly in elevation and partly in section, and

Figure 11 is a plan view of the same.

This invention is in some respects an improvement upon the structure shown in my Letters Patent No. 1,565,797, dated December 15, 1925, and No. 1,735,264, dated November 12, 1925, and while I have illustrated the invention in connection with a swab body with reinforcing members or bushings and protecting thimbles applied to each end, it is to be understood that such elements may be applied to a swab cup as set forth in the patents referred to.

In the drawings the numeral 10 designates a flexible body or sleeve composed of rubber, or rubber compound, either of which may be combined with fabric or any other suitable material capable of use with the invention. The flexible body illustrated is of the ball or sleeve type such as is in common use on well swabs for lifting fluids in a well or for cleaning the tubular conductors of a well and for similar purposes, but the invention is not limited to such a body or shape and may be applied to any style of body or cup where its use is found advantageous.

The flexible body 10 chosen for illustration has an axial bore which includes an enlarged central or intermediate expanding portion or section 11 and annular reduced collar portions 12 at each end. The central or intermediate outer portion of the body is provided with an annular vertically curved surface 13, which gives the body a ball effect. The ends of the body have exteriorly tapered annular surfaces 14 terminating in curved annular

shoulders 15 which merge into the surface 13.

In each end of the body is mounted a reinforcing member including an annular collar 16 and a flared apron 17. This member is preferably made of comparatively thin resilient metal, either by spinning, pressing or drawing, so that the apron 17 thereof is capable of a limited outward expansion when subjected to a heavy internal pressure. Each member has its collar embedded in the collar portion 12 of the body so as to lie substantially flush therewith and to extend to the end face of the body. The apron which constitutes the greatest portion of the member is flared outwardly from the collar and embedded in the wall of the body. Each apron at its outer end may be bent to form an annular flange 18.

The aprons 17 and their flanges 18 are directed toward each other and extend into the central or expanding section of the body. The flanges 18 terminate short of each other leaving a short gap therebetween, but otherwise reinforcing the wall of the body. The greatest expansion is, of course, at the center of the body and being limited to the section 11 of the bore, only the flanges 18 and the portions of the aprons 17 contiguous thereto will undergo expansion and the degree of expansion will be graduated toward the collars 16.

Metal thimbles 19 are secured on each end of the body 10 and are shaped to fit the end faces of the body and the tapered walls 15. Each thimble has an outwardly curved annular lip 20 seated in one of the shoulders 15 so as to avoid cutting into the flexible body when the latter is expanded. The thimbles are preferably made of heavier metal than the reinforcing members and also overhang the ends of the collars 16 so as to protect the same and to provide a continuous end surface. If desired the collars 16 may be welded or otherwise secured to the thimbles to form a unitary structure, but this is optional.

In Figures 6 to 9 inclusive, I have shown a modified form of thimble. In this form the thimble is provided with inwardly offset lugs 21 formed by slitting the thimble and bending the slit portions inwardly to form said lugs. When the body 10 is formed in the mold, the material thereof will flow around the lugs thus embedding them in the tapered ends and firmly uniting the thimble with the body. Where the thimble is so mounted it can not be readily displaced from the body and will remain in position even though it is not attached to the collar 16. Otherwise the structure is the same as is shown in Figure 1.

In Figure 5 I have shown two of the swab bodies 10 mounted on a tubular swab mandrel 22 and separated by a nut 23 which engages the adjacent circular ends of the thimbles 19. These swab bodies are held in position against the nut by a head element 23 and a foot element 24 fastened on the mandrel. The mandrel is provided with ports 25 opposite the central portion of the body and the head 23 has one or more inlet ports 26. When the swab is lifted the liquid in the tubing A in which the swab is immersed, enters the port 26 and flows through the ports 25 into the expanding section 11 of the bore of each body.

It will be apparent that when a sufficient load has been accumulated the pressure of the liquid will be heavy enough to expand the body 10 outwardly as shown in dotted lines in Figure 5. It will be noted that the thimbles 19 limit the expansion to the curved or ball portion 13 between said thimbles, although the lips 20 might undergo a slight expansion. The bore of the body between the collars 16 being flexible is of course subject to compression and expansion, but the bulk of the expansion will be in the section 11 and the greater distortion will of course be at the gap between the flanges 18. However, the entire ball portion of the body will be expanded so that the surface 13 will engage the inner wall of the tube A. The aprons 17 will proportionately expand with the flanges 18, but they will protect the body against undue expansion and will prevent blowing out of said body.

In Figures 10 and 11 I have shown another form of swab body wherein the collar 16′ extends the full length of the collar portion 12 of the body, thus holding the body out of contact with the metal mandrel. This shortens the apron 17′. The flange 19′ of the thimble 19 is terminated short of the collar 16 and the flexible body is permitted to project between the flange and the collar to form an annular sealing ring 27 which engages the metal support on the mandrel when the assembly is made. This provides a fluid seal similar to the seal formed by the collar portion 12 of the other forms.

This is a step forward in the swabbing art because not only do swab bodies blow out, but excessive wear is caused by undue expansion. The aprons will more or less control the expansion and permit enough to form a seal against the wall of the tubing to support the load, but will prevent over expanding, thus reducing the frictional contact with the wall of the tube A, thereby preventing burning and excessive wear. The thimbles will of course aid in preventing undue expansion and will protect the ends of the body as well as holding them in shape and lending support to the entire body structure.

Various changes in the size and shape of the different parts, as well as modifications and alterations, may be made within the scope of the appended claims.

Having illustrated and described pre-

ferred forms of the invention, what I claim is:

1. A swab body comprising a flexible body provided with an axial opening, a metallic reinforcing member at one end of the body having a portion exposed in the bore of said body and a portion embedded in the wall of the body, and a metallic thimble surrounding the end of the body at which the reinforcing member is located and having a portion embedded in the body for permanently attaching the thimble thereto.

2. A swab body comprising a flexible body having a tapered end, and a metallic thimble, snugly embracing the end of the body and having a portion offset inwardly and embedded in the body for permanently securing said thimble thereon.

3. As an article of manufacture, a swab member comprising a flexible body provided with an axial opening therethrough, a metallic reinforcing member in one end of the flexible body and having a portion exposed in the opening of said body, and a sheet-like metallic thimble surrounding and vulcanized to the end of the body at which the reinforcing member is located.

4. As an article of manufacture, a swab member comprising a flexible barrel-shaped body provided with an axial bore, metallic reinforcing members disposed in each end of the body and having portions exposed in the bore, and reduced metallic thimbles surrounding the ends of the body and vulcanized thereto.

5. An article of manufacture as set forth in claim 3 in which the thimble is provided with an inwardly directed annular portion vulcanized to the end of the body and also has an outwardly directed annular lip.

In testimony whereof I affix my signature.

CHARLES S. CRICKMER.