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J. A. WILSON

2,965,422

WELL SWABS

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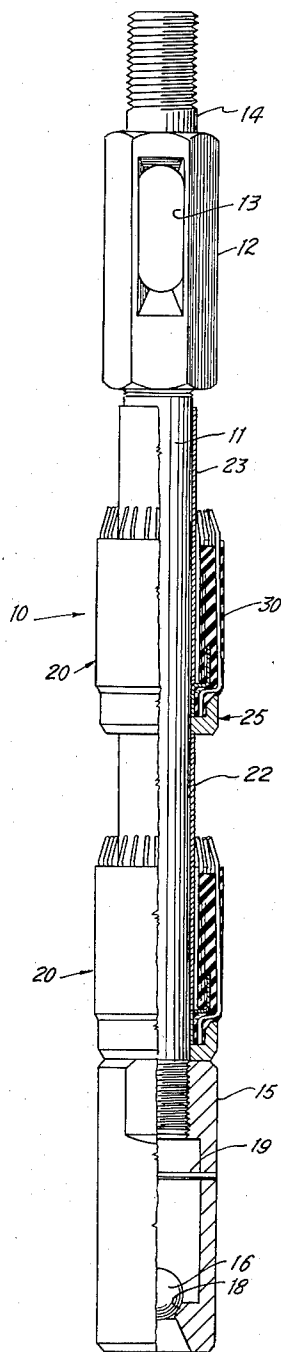


Fig. 1

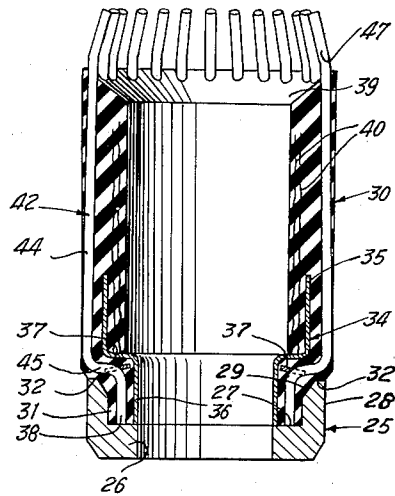


Fig. 2

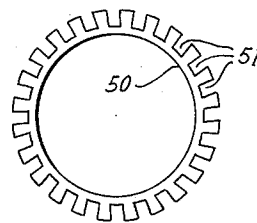


Fig. 3

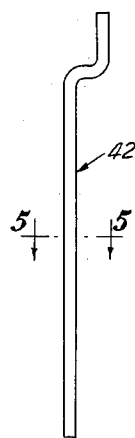


Fig. 4

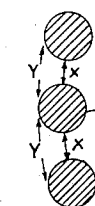


Fig. 5

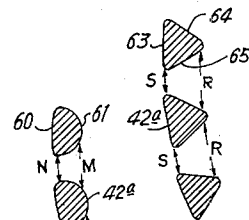


Fig. 6

INVENTOR

James A. Wilson

BY *Hastings Ashley*
ATTORNEY

Fig. 7

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WELL SWABS

James A. Wilson, 2039 Amelia St., Dallas 35, Tex.

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This invention relates to well swabs and more particularly to swabs having swab cups provided with reinforcing resilient wires or members.

One object of this invention is to provide a new and improved well swab.

Another object is to provide a reinforced swab cup which will function properly under a wide range of fluid loading conditions.

Still another object is to provide a new and improved well swab having a swab cup which is sufficiently flexible to handle light fluid loads and strong enough to handle heavy fluid loads.

A further object of the invention is to provide a swab cup having a plurality of longitudinally extending circumferentially spaced reinforcing wires embedded in the resilient substance of the swab cup and outwardly and inwardly movable throughout their complete lengths.

A still further object is to provide a resilient substantially tubular body whose lower portion is reduced in diameter and connected to the tubular body by a substantially transversely extending annular portion, and wherein such reduced lower portion has an inner cylindrical member or ferrule disposed therein formed with a transverse annular portion which is positioned at the upper surface of the transverse annular portion of the tubular body.

Another object is to provide a swab cup having a resilient body having a lower reduced portion confined between a bowl and an inner cylindrical member, said resilient body having reinforcing wires or members embedded therein with lower portions disposed inwardly of the upper portions thereof and disposed in the lower reduced portion of the body between the bowl and the inner cylindrical member and spaced from the bowl and the inner cylindrical member whereby the reinforcing members are free to move throughout their complete lengths relative to the bowl and the inner cylindrical member.

Still another object is to provide a swab cup having a lower portion held against lateral deflection, a central or intermediate portion reinforced to resist substantial lateral expansion or deflection and an upper portion relatively free for expansion or deflection laterally to sealing position.

A further object is to provide a swab cup having a resilient body, an inner cylindrical member provided with an enlarged cylindrical upper portion disposed within a resilient body and bonded thereto, the upper portion of the inner cylindrical member being spaced below the upper end of the resilient body whereby such upper portion of the resilient body may flex inwardly and outwardly relative to the inner cylindrical member; reinforcing members longitudinally extending through and embedded in the resilient body for reinforcing the resilient body and also altering the upper end portion thereof and flexible reinforcing means disposed inwardly of the inner cylindrical member and extending to a point spaced below the upper end of the resilient body to resist cold flow of the

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substance of the resilient body outwardly between adjacent reinforcing members, whereby the upper portion of the cup body is relatively flexible, the central portion relatively limited flexible and the lower portion confined against flexing outwardly.

Still another object is to provide a swab cup having a resilient body provided with circumferentially spaced longitudinally extending reinforcing members embedded therein adjacent the outer surface thereof which are capable of outward and inward lateral movement relative to the resilient body and to one another throughout their complete lengths.

A further object is to provide a swab cup wherein the reinforcing members are of non-circular configuration in cross-section whereby the spacing between adjacent reinforcing members is progressively narrower toward the exterior of the resilient body whereby the flow of the substance of the resilient body between the reinforcing members compresses the substance therebetween to compensate for the wear at the outer surface thereof.

A still further object is to provide a swab cup having a resilient body having circumferentially spaced longitudinally extending reinforcing members of such cross-sectional configuration as to minimize the formation of external longitudinal grooves in the resilient body between the reinforcing members.

Another object of the invention is to provide a swab cup having a plurality of longitudinally extending reinforcing members embedded in a resilient body wherein the space between adjacent reinforcing members decreases toward the exterior of the swab cup whereby flow of the resilient substance of the resilient tubular body between adjacent reinforcing members causes a large volume of the resilient substance to flow outwardly through an ever decreasing space whereby the loss in seal caused by wear resulting in the formation of longitudinal grooves in the exterior of the resilient body between the reinforcing members is minimized.

Still another object of the invention is to provide a swab wherein the reinforcing members are in no manner locked or attached to the bowl or to the inner cylindrical member and are free for limited movement relative to the cylindrical member and to the bowl throughout their complete lengths.

Additional objects and advantages of the invention will be readily apparent from the reading of the following description of a device constructed in accordance with the invention, and reference to the accompanying drawings thereof, wherein:

Figure 1 is a view partly in side elevation and partly in section, of a swab assembly provided with swab cups embodying the invention;

Figure 2 is a vertical sectional view of one of the swab cups of the device illustrated in Figure 1;

Figure 3 is a top plan view of a spacing ring of the swab cup for holding the reinforcing members of the swab cup in circumferentially spaced positions;

Figure 4 is a side elevation of one of the reinforcing elements of the swab cup illustrated in Figure 2 prior to its assembly in the swab cup and the inward bending of its free end portion;

Figure 5 is a cross-sectional view taken on line 5—5 of Figure 4 and showing spacing between adjacent reinforcing members;

Figure 6 is a cross-sectional view showing a plurality of asymmetrical lenticularly shaped reinforcing members, illustrating the constantly diminishing space from the interior toward the exterior between adjacent reinforcing members; and,

Figure 7 is similar to Figure 6 showing a plurality of

reinforcing members of substantially triangular cross-sectional configuration.

In the drawings, the well swab assembly 10 includes a hollow mandrel 11 having a head or fixture 12 threaded on its upper end and provided with longitudinal slots 13 which communicate with the internal bore of the head. The head is also provided with a threaded pin 14 at its upper end by means of which the well swab assembly 10 may be connected to any suitable means for moving it through a well flow conductor. The opposite lower end of the mandrel 11 has threaded thereon a valve cage 15 in which a ball valve 16 is movably disposed. Ball valve 16 when in the lower position illustrated in Figure 1 engages a valve seat 18 to prevent downward flow of well fluids through the mandrel and through the valve cage. A transverse stop pin 19 limits upward movement of the ball valve in the valve cage. The ball valve when displaced upwardly from its valve seat permits upward flow of fluids through the valve cage and through the mandrel to the slots 13 of the head 12 and thence outwardly of the swab assembly above the swab cups 20 to facilitate downward movement of the well swab through a well flow conductor.

The pair of swab cups 20 are disposed about the mandrel and held in spaced relation relative to one another and to the head 12 of the swab assembly by means of a lower spacer sleeve 22 and an upper spacer sleeve 23, respectively. Each of the swab cups 20 includes a steel bowl 25 having an internal annular flange 26 which provides an internal upwardly facing annular shoulder 27 and a vertical peripheral annular flange 28 having an inner upwardly and outwardly extending annular shoulder 29.

A resilient cylindrical or tubular body 30, formed of any suitable resilient substance, such as rubber, plastic or the like, has a reduced lower end portion 31 which is disposed within the bowl with its lower annular end abutting the upwardly facing shoulder 27 of the bowl. The downwardly facing annular shoulder 32 provided by the reduced lower end portion 31 of the resilient body abuts the upper surface of the peripheral vertical flange of the bowl.

An inner cylindrical member 34 has an upper cylindrical portion 35 embedded in the resilient body between the inner and outer cylindrical surfaces thereof above the reduced lower cylindrical portion 31. The reduced lower cylindrical portion 36 is connected to the upper cylindrical portion by an annular intermediate horizontal section 37 spaced above the upper end of the peripheral vertical flange of the bowl. The lower cylindrical portion of the inner cylindrical member telescopes into the bowl and is spaced inwardly of the peripheral vertical flange of the bowl. The lower end of the lower cylindrical portion abuts the upwardly facing annular shoulder 27 of the bowl. The lower cylindrical portion of the inner cylindrical member has an internal diameter substantially equal to the internal diameter of the inner flange 26 of the bowl which in turn is substantially equal to the external diameter of the mandrel 11 so that the internal annular surface of the internal flange of the bowl 25 and the internal surface of the lower cylindrical portion of the inner cylindrical member abut the mandrel 11 when the swab cup assemblies 20 are disposed on the mandrel.

The inner cylindrical member 34 has its upper end spaced below the upwardly and outwardly beveled upper end 39 of the resilient body 30 so that the upper portions of the resilient body 30 above the upper end of the inner cylindrical member may flex laterally inwardly and outwardly. A plurality of layers 40 of a suitable reinforcing fabric, such as nylon or the like, are embedded in the resilient body 30 inwardly of the upper cylindrical portion 35 of the inner cylindrical member to help prevent cold flowing of the substance of the resilient body under pressure. The reinforcing layers extend from the inter-

mediate section 37 of the inner reinforcing member to a point spaced below the upper end surface 39 of the tubular body and above the upper end of the inner cylindrical member so that the extreme upper end portion of the resilient body is very flexible and may easily flex or deform laterally inwardly or outwardly.

A plurality of elongate reinforcing members 42 embedded in the resilient body have inwardly offset lower end sections 38 disposed between the lower portion 36 of the inner cylindrical member and the peripheral flange 26 of the bowl, the lower end sections of the reinforcing members being spaced both from the peripheral flange of the bowl and from the lower cylindrical portion of the inner cylindrical member so that the reinforcing members may move laterally of the tubular body, the inner cylindrical member and the bowl. The inwardly offset end sections of the reinforcing members are connected to the intermediate elongate sections 44 by transverse connecting sections 45 which extend substantially perpendicularly from the end sections and the intermediate sections and are disposed in the space between and spaced from the upper end of the peripheral flange of the bowl and the intermediate horizontal section 37 of the inner cylindrical member. The intermediate elongate sections of the reinforcing members are disposed above and slightly outwardly of the peripheral flange of the bowl and are provided at their upper ends with inwardly and upwardly inclined free end portions 47 disposed above the upper annular end shoulder 39 of the resilient body.

The reinforcing members 42 are held in circumferentially spaced relationship to one another by a spacer ring 50 having peripheral slots 51 in which are received the connecting sections 45 of the reinforcing members, the spacer ring being disposed below the transverse connecting section 37 of the inner circular member and above the upper end of the peripheral flange 26 of the bowl. The spacing ring 50 slopes from its inner annular edge downwardly and outwardly in all directions to engage the transverse connecting sections 45 of the reinforcing members to prevent circumferential movement of the reinforcing members relative to one another and to hold them properly spaced both during the molding of the swab cup as well as during the operational use of the swab cup. The outwardly and downwardly shaped spacing ring thus has a substantially frusto-conical configuration. The spacing ring helps to movably lock the reinforcing members in operative position between the inner cylindrical member and the bowl. The reinforcing members are free to move inwardly and outwardly in the slots 51 so that the lower end sections as well as the intermediate elongate sections are free to move inwardly and outwardly relative to the bowl.

The layers of reinforcing fabric, the reinforcing members, the inner cylindrical member, the bowl and the resilient body are preferably molded in one operation into a unitary assembly. The upper free ends 47 are then bent inwardly to the portions shown. All of these elements of the swab cup assembly are thus bonded one to another but, since the tubular resilient body 30 is formed of a resilient substance such as a plastic, rubber or other suitable resilient substance, the upper portion of the tubular resilient body disposed above the upper cylindrical section of the inner cylindrical member is free to flex inwardly and outwardly, the fabric 40 and the reinforcing members 42 moving as required to accommodate such flexing movement. It will also be noted that the upper end portion of the resilient tubular body 30 above the upper edges of the reinforcing fabric 40 is even more flexible so that the upper end portions of the resilient body are quite flexible and may be readily moved outwardly by fluid pressures. It will be further noted that the lower end sections 38 of the reinforcing members are also free to move inwardly and outwardly as well as to pivot about their intermediate sections 45 but that upward longitudinal movement of the reinforcing members

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out of the bowl is limited by the transverse connecting section 37 of the inner cylindrical member so that the reinforcing members cannot be displaced from between the bowl and the inner cylindrical member during use.

In use, the well swab assembly is lowered through a well flow conductor by any suitable means to which it is connected by its threaded pin 14. Any fluids in the well flow conductor flow upwardly through the valve cage 15 and the mandrel to the head fixture 12 and thence outwardly through the slots 13 thereof whereby the passage of the swab through the well flow conductor is not hindered by the presence of well fluids therein, the ball valve 16 moving upwardly off its seat 18 in the valve cage to permit such flow of well fluids through the mandrel. When the swab has been lowered below the position at which swabbing operations are to be connected, the well swab assembly is lifted upwardly whereupon the ball valve 16 is moved downwardly into engagement with its seat 18 by the pressure of the fluid in the well flow conductor. Further upward movement of the swab now causes the swab cups 20 to lift a column of the fluid therewith during their upward passage. The pressure of the fluid acting on the swab cups moves the upper end portions of the swab cups outwardly into engagement with the internal wall surfaces of the well flow conductor. The reinforcing members 42 are movably mounted in the resilient body between the bowl and the inner cylindrical member so that if even a column of fluids of short length is positioned above such swab cups and thus only a light fluid load is being lifted by the swab cup, the reinforcing members move outwardly to permit such outward flexing of the upper portions of the resilient body into engagement with the internal wall surfaces of the well flow conductor. The reinforcing members, however, are strong enough that even when a column of fluid of great length is positioned above the swab cup and thus a heavy fluid load is being lifted by the swab cup, the reinforcing members prevent undue distortion or rupture of the resilient body 30. The bonding of the inwardly offset end sections of reinforcing members in the resilient body between but spaced from lower cylindrical portion of the inner cylindrical member and the peripheral vertical flange 26 of the bowl causes the reinforcing members to be movably secured thereto and prevent their displacement from the bowl even under very heavy fluid loads other than by complete destruction of the swab cup.

As seen in Figures 1, 2, 4 and 5 the reinforcing members 42 are circular in cross-section. It is found that in some applications where heavy fluid loads are encountered there is a tendency for the outer surfaces of the resilient body to wear away between the reinforcing members to form external longitudinal grooves in the swab cup. The extrusion of the resilient substance of which the resilient body 30 is composed causes it to move out, as its outer surfaces are worn away by abrasion with the internal wall surfaces of the well flow conductor through which it is being pulled, through the narrow space X, indicated in Figure 5, to the wider space Y disposed outward of the space X due to the curvature of the round reinforcing members so that an insufficient amount of substance is caused to flow between the adjacent reinforcing members to compensate for this wear or abrasion.

In Figure 6 are illustrated reinforcing members 42a which have outer surfaces 60 having a greater radii of curvature than the inner surfaces 61 whereby the portions of the resilient body 30 which are caused to flow outwardly between adjacent reinforcing members move between adjacent reinforcing members through the relatively wide spaces M to the narrow spaces N. As a result a greater amount of the substance of the resilient body flows outwardly to the narrower space under the fluid pressure exerted within the cup to compensate for the wear or abrasion so that the tendency for longitudinal

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grooves to be formed between the reinforcing members is minimized.

The reinforcing members 42a illustrated in Figure 7 are of substantially triangular shape having the flat sides 63 facing outwardly with the other two sides 64 and 65 extending inwardly and convergently whereby the outermost spacings S are progressively smaller than the inner spacings R between each of the adjacent sides 64 and 65 of adjacent triangular reinforcing members 42a. The tendency of the resilient body to form external longitudinal grooves between reinforcing members is thus compensated for by the flow of greater amounts of the resilient substances into the ever diminishing spaces between adjacent reinforcing members.

The upper surfaces of the inner cylindrical members of the swab cups are each engaged by the lower end of a spacer sleeve to limit upward movement of the swab cup, such surfaces thus providing stop shoulders in the bore of the swab cup. Sometimes during the molding of the swab cups the inner upper surface of the intermediate connecting section 37 of the inner cylindrical member is covered by a layer of the resilient substance of which the body 30 is formed. Such layer will not prevent the functioning of the swab cup in the usual manner as the sleeve 22 or 23, as the case may be, will still engage the swab cup to prevent undesired displacement of the swab cup on the mandrel.

It will now be seen that the swab cup 20 includes a tubular resilient body 30 having a plurality of circumferentially spaced reinforcing members 42 embedded therein and having upper and lower end sections 47 and 38 which are free to move relative to the bowl 25 and the inner cylindrical member 34 within predetermined limits whereby the greater flexibility of the resilient body thus obtained permits the swab cup to be flexible enough to handle light fluid loads and still be strong enough to handle heavy fluid loads.

It will further be seen that the inwardly offset lower end sections 38 of the reinforcing members are spaced both from the peripheral flange of the cup 25 and from the cylindrical member and are embedded in the lower cylindrical portion 31 of the resilient body whereby the lower ends may be moved inwardly and outwardly against the yielding resistance offered by the resilient substance of which the body 30 is formed.

It will further be seen that the cylindrical inner member 35 prevents lateral flexing of the lower portions of the resilient body but permits lateral inward and outward flexing of the upper portions since its upper end is disposed below the mid-length of the resilient body and that the layers 40 of fabric which limit the flexibility of an intermediate portion of the resilient body terminate below the upper end shoulder 39 thereof and above the upper end of the cylindrical inner member so that the extreme upper end portion of the tubular body is very flexible and is easily movable inwardly and outwardly.

It will further be seen that the spacing ring 30 which engages the transverse connecting sections 45 of the reinforcing members hold the reinforcing members in vertical and axial alignment during molding operations and also increases the locking effect created by the inward offsetting of the lower end portions 38 of the reinforcing members and their placement between the inner cylindrical member and the peripheral flange of the cup so that while the reinforcing members may move inwardly and outwardly both at their upper and lower ends relative to the bowl and to the inner cylindrical member, the reinforcing members can be separated from the resilient body and the bowl only by destruction of the swab cup. It will thus be seen that the reinforcing members are locked to and form an integral part of the swab cup without in any manner being immovably attached to the inner cylindrical member or to the bowl at their lower ends.

It will further be seen that the resilient body, the inner cylindrical member and the bowl are bonded to form a

single integral unit to provide for great strength and permit handling of heavy fluid loads by the swab while at the same time the upper portions of the swab are easily flexible to permit outward flexing of the upper portions of the swabs into engagement with the internal surfaces of the flow conductor through which they are moved.

It will further be seen that the bowl, the inner cylindrical member and the reinforcing member may be formed of any suitable metal, such as steel, to provide the swab cup with the strength required for heavy fluid loads.

The foregoing description of the invention is explanatory only, and changes in the details of the constructions illustrated may be made by those skilled in the art, within the scope of the appended claims, without departing from the spirit of the invention.

What is claimed and desired to be secured by Letters Patent is:

1. A swab cup including: a flexible body; a bowl below said body and having an inwardly extending flange, said body having a reduced lower end portion extending into the bowl and abutting the flange; a cylindrical inner member disposed in the lower portion of the body and having a lower reduced portion disposed in the bowl whose lower end engages the internal flange of the bowl; and reinforcing members embedded in the body and spaced circumferentially therein, said reinforcing members having inwardly offset lower end portions disposed between and spaced from the bowl and from the lower reduced portion of the inner cylindrical member.

2. A swab cup including: a flexible body; a bowl below said body and having an inwardly extending flange, said body having a reduced lower end portion extending into the bowl and abutting the flange; a cylindrical inner member disposed in the lower portion of the body and having a lower reduced portion disposed in the bowl whose lower end engages the internal flange of the bowl; and reinforcing members embedded in the body and spaced circumferentially therein, said reinforcing members having inwardly offset lower end portions disposed between and spaced from the bowl and from the lower reduced portion of the inner cylindrical member, the inner cylindrical member having an upper cylindrical section and a lower cylindrical section of reduced diameter connected by an annular transverse section, said lower cylindrical section being of smaller diameter than the flexible body above its reduced lower end portion whereby the transverse connecting section provides an internal upwardly facing stop shoulder in the bore of the swab cup.

3. A swab cup including: a flexible body; a bowl below said body and having an inwardly extending flange, said body having a reduced lower end portion extending into the bowl and abutting the flange; a cylindrical inner member disposed in the lower portion of the body and having a lower portion of reduced diameter disposed in the bowl with its lower end engaging said internal flange of the bowl; and reinforcing members embedded in the body and spaced circumferentially therein, said reinforcing members having inwardly offset lower end portions disposed between and spaced from the bowl and from the lower reduced portion of the inner cylindrical member, said inner cylindrical member having an upper end spaced below the upper end of the body.

4. A swab cup including: a flexible body; a bowl below said body and having an inwardly extending flange, said body having a lower end portion of reduced diameter extending into the bowl and abutting the flange; an inner cylindrical member having an upper cylindrical section disposed in the body and having a lower cylindrical section whose lower end engages said internal flange of the bowl; reinforcing members embedded in the body and spaced circumferentially therein, said reinforcing members having inwardly offset lower end portions disposed between and spaced from the bowl and from the lower portion of the inner cylindrical member; an annular

transverse section of the inner cylindrical member connecting the upper cylindrical section to the lower cylindrical section, said lower cylindrical section being of smaller diameter than the flexible body above its lower end portion whereby the transverse connecting section provides an internal upwardly facing stop shoulder in the bore of the swab cup; and flexible reinforcing means embedded in said body inwardly of the upper cylindrical section and having its upper end spaced below the upper end of the body and above the upper end of the inner cylindrical member.

5. A swab cup including: a flexible body; a bowl below said body and having an inwardly extending flange, said body having a lower end portion of reduced diameter extending into the bowl and abutting the flange; an inner cylindrical member having an upper cylindrical section disposed in the body and having a lower cylindrical section of reduced diameter whose lower end engages said internal flange of the bowl; and reinforcing members embedded in the body and spaced circumferentially therein, said reinforcing members having inwardly offset lower end portions disposed between and spaced from the bowl and from the lower cylindrical section; the upper cylindrical section and the lower cylindrical section being connected by an annular transverse section, said reduced cylindrical section being of smaller diameter than the flexible body above its lower end portion whereby the transverse connecting section provides an internal upwardly facing stop shoulder in the bore of the swab cup, said reinforcing members having intermediate longitudinal sections and inwardly offset lower end sections connected by transverse sections, said transverse sections of the reinforcing members being disposed between the transverse section of the cylindrical member and the upper end of the bowl and spaced therefrom to prevent upward longitudinal displacement of the reinforcing members from the bowl.

6. A swab cup including: a flexible body; a bowl below said body and having an inwardly extending flange, said body having a lower end portion of reduced diameter extending into the bowl and abutting the flange; a cylindrical inner member having an upper cylindrical section disposed in the lower portion of the body and having a lower cylindrical section of reduced diameter whose lower end engages said internal flange of the bowl; reinforcing members embedded in the body and spaced circumferentially therein, said reinforcing members having inwardly offset lower end portions disposed between and spaced from the bowl and from the lower cylindrical section, an annular transverse section connecting the upper and lower cylindrical sections, said lower cylindrical section being of smaller diameter than the flexible body above its lower end portion whereby the transverse connecting section provides an internal upwardly facing stop shoulder in the bore of the swab cup, said reinforcing members having intermediate longitudinal sections connected to the inwardly offset lower end sections by transverse sections, said transverse sections being disposed between the transverse connecting section of the cylindrical member and the upper end of the bowl and spaced therefrom; and a spacing ring provided with a plurality of peripherally spaced outwardly opening slots, the transverse sections of the reinforcing members being disposed in said slots.

7. A swab cup including: a flexible body, a bowl below said body and having an inwardly extending flange, said body having a lower end portion of reduced diameter extending into the bowl and abutting the flange; a cylindrical inner member having an upper cylindrical section disposed in the lower portion of the body and having a lower section whose lower end engages said internal flange of the bowl; reinforcing members embedded in the body and spaced circumferentially therein, said reinforcing members having inwardly offset lower end portions disposed between and spaced from the bowl and from the

lower reduced portion of the inner cylindrical member, the inner cylindrical member having an annular transverse section connecting the upper and lower cylindrical sections, said lower cylindrical section being of smaller diameter than the flexible body above its lower end portion whereby the transverse connecting section provides an internal upwardly facing stop shoulder in the bore of the swab cup, said reinforcing members having longitudinal sections connected to the inwardly offset lower end sections by transverse sections, said transverse sections being disposed between the transverse section of the cylindrical member and the upper end of the bowl and spaced therefrom; and a spacing ring provided with a plurality of peripherally spaced outwardly opening slots, the transverse sections of the reinforcing members being disposed in said slots, said spacing ring extending downwardly and outwardly from its inner annular edge.

8. A swab cup comprising: a resilient body, a supporting member below said body and supporting the body; and a plurality of peripherally spaced longitudinally extending reinforcing members having upper sections and inwardly offset lower end portions and transverse sections connecting said upper sections to said lower portions, said reinforcing members being embedded in said resilient body and spaced from the supporting member for lateral movement relative to the supporting member and to the body.

9. A swab cup comprising: a resilient body, a bowl below said body, a lower portion of the body being received in said bowl; a plurality of peripherally spaced longitudinally extending reinforcing members having inwardly offset end portions disposed in said bowl and embedded in said resilient body for lateral movement relative to the bowl and to the body; and an inner cylindrical member secured to the body and extending into the bowl, said inwardly offset end portions of the reinforcing members being embedded in said body and spaced radially from said bowl and from said inner cylindrical member to permit lateral inward and outward movement of said reinforcing means throughout their complete lengths.

10. A swab cup comprising: a resilient body, a bowl below said body, said body having a lower portion received in the bowl; and a plurality of peripherally spaced longitudinally extending reinforcing members having inwardly offset end portions disposed in said bowl and embedded in said resilient body for lateral movement relative to the bowl and to the body; and an inner cylindrical member secured to the body and extending into the bowl, said inwardly offset end portions of the reinforcing members being embedded in said body and spaced radially from said bowl and from said inner cylindrical member to permit inward and outward movement of said reinforcing means throughout the complete length, said reinforcing members extending upwardly of the upper end of the body.

11. A swab cup comprising: a bowl; a resilient body having a lower portion disposed in the bowl; and a plu-

rality of peripherally spaced longitudinally extending reinforcing members having inwardly offset end portions disposed in said bowl and embedded in said resilient body for lateral movement relative to the bowl and to the body, said reinforcing members being of non-circular configuration to provide adjacent reinforcing members with outwardly convergent surfaces whereby the space between adjacent side surfaces of adjacent reinforcing members decreases toward the outer surface of the cup.

12. A swab cup comprising: a bowl; a resilient body having a lower end portion received in the bowl; and a plurality of peripherally spaced longitudinally extending reinforcing members having inwardly offset end portions disposed in said bowl and embedded in said resilient body for lateral movement relative to the bowl and to the body, said reinforcing members having inner and outer arcuate surfaces, said outer arcuate surfaces having greater radii of curvature than the inner arcuate surfaces.

13. A swab cup comprising: a bowl; a resilient body having a lower end portion received in the bowl; and a plurality of peripherally spaced longitudinally extending reinforcing members having inwardly offset end portions disposed in said bowl and embedded in said resilient body for lateral movement relative to the bowl and to the body, said reinforcing members being substantially triangular in cross-section and having outer side surfaces extending substantially parallel to the outer surface of the body and having their other side surfaces converging inwardly.

14. A swab cup comprising: a bowl; a resilient body having a lower end portion received in the bowl; and a plurality of peripherally spaced longitudinally extending reinforcing members having inwardly offset end portions disposed in said bowl and embedded in said resilient body for lateral movement relative to the bowl and to the body, said reinforcing members being of non-circular configuration and having inner and outer surfaces, said outer surfaces being of greater width than said inner surfaces whereby the spaces between adjacent reinforcing members decrease progressively toward the outer surface of the swab cup.

15. The swab cup of claim 9 wherein said reinforcing members are of non-circular configuration to provide adjacent reinforcing members with outwardly convergent surface portions whereby the space between such adjacent surface portions of adjacent reinforcing members decreases toward the outer surface of the cup.

16. The swab cup of claim 9, wherein said reinforcing members are of circular configuration.

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