United States Patent

[11] 3,568,769

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[54] **WELL CASING CAP**
7 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **166/88**
[51] **Int. Cl.** **E21b 33/03**
[50] **Field of Search** 166/75, 81, 82, 85, 88, 93, 95; 285/140, 141

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ABSTRACT: The cap has a circular flange, has a depending circular rib spaced inwardly from the flange to provide a circular gasket-receiving groove to fit over the upper end of the well casing, and has a central depending boss connected by radial ribs with the circular rib, the boss having a downwardly and outwardly flared central hole which can be bored to a required well pipe size. On the top of the cap there is an annular groove to receive an O-ring surrounding the discharge pipe, and there is a washer which has a complementary groove for receiving the upper portion of the O-ring, the discharge pipe having a shouldered portion above the washer whereby the weight of the piping and submersible pump tend to produce a self-seal around the discharge pipe and a self-seal on the upper edge of the well casing.

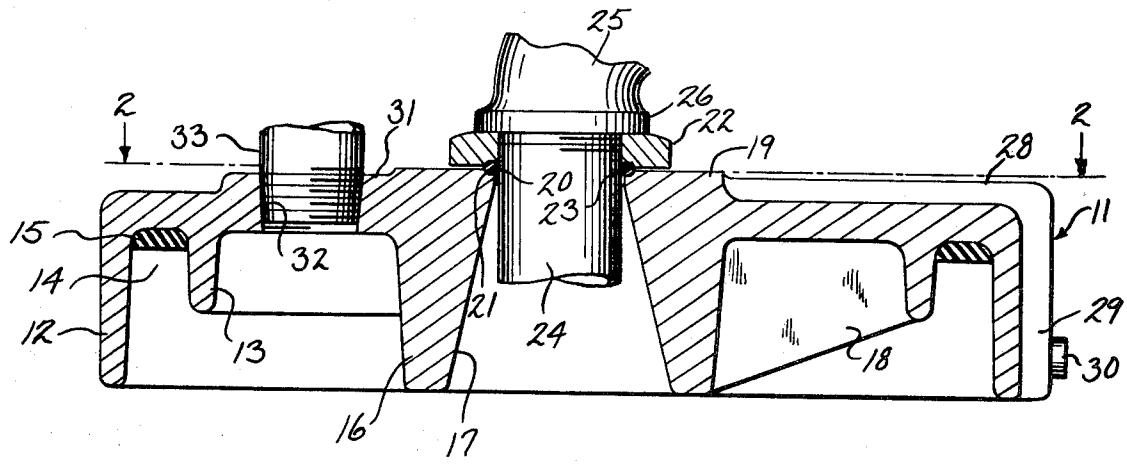


Fig. 1

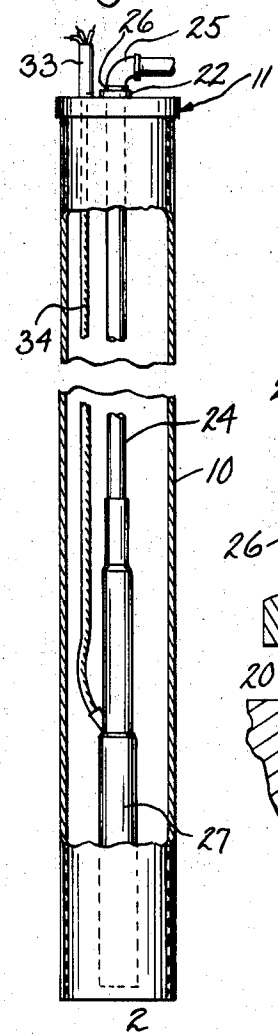


Fig. 2

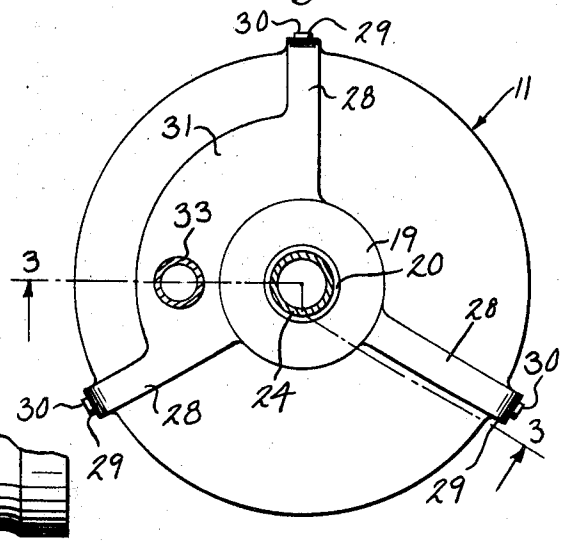


Fig. 5

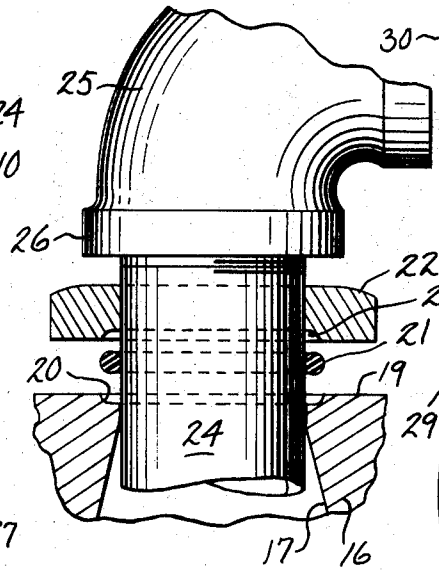


Fig. 4

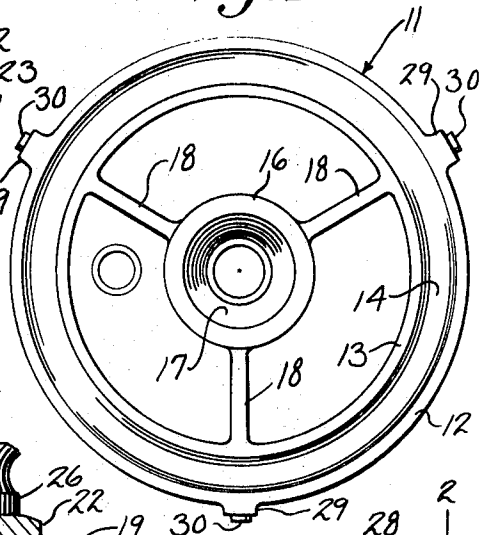
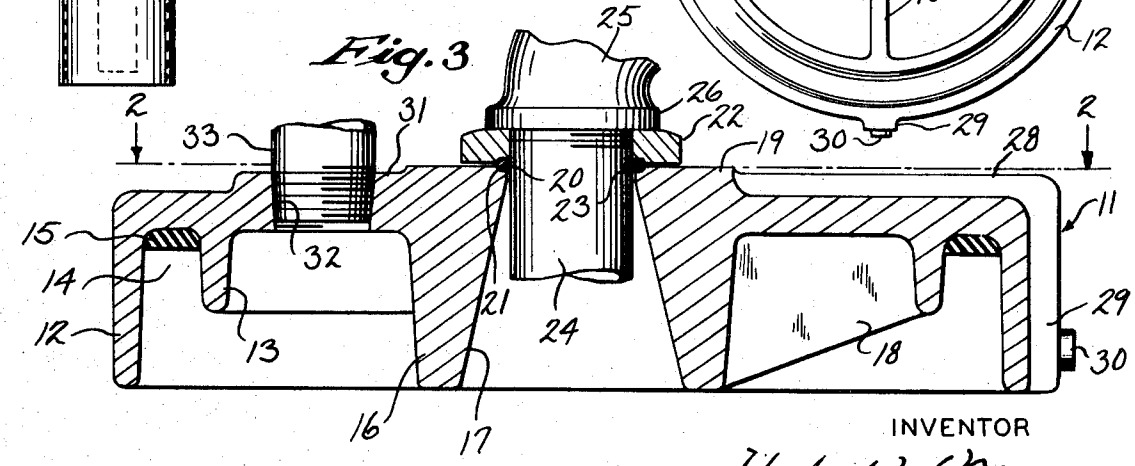


Fig. 3



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WELL CASING CAP

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention pertains to caps for the casings of submersible pumps with an "over-the-top" type of discharge.

2. Description of the Prior Art

With the conventional cap for an "over-the-top" type of discharge there is no support below the ground to take the load of the piping and submersible pump, so all of this load, including, in certain cases, the hundred or more feet of piping, is borne by the center of the cap. Most of these caps are formed of cast iron or cast aluminum and, as normally constructed, the severe load on the center of the cap has in turn produced a heavy load on the outer rim, with breakage of caps quite common.

SUMMARY OF THE INVENTION

With the present invention the cap is formed in a special way to enable it to withstand the central load, the cap having an outer gasket-receiving groove fitted over the end of the well casing, the inner portion of said groove being formed by a circular rib which is connected by radial ribs with a strong, depending central boss which has a downwardly and outwardly flared central hole which can be readily bored to the required size for a selected discharge pipe, there being a shoulder on a discharge pipe fitting engaging a washer, and there being special O-ring receiving grooves formed in the washer and the top of the cap whereby the weight of the submersible pump and piping causes self-sealing at the upper end of the discharge pipe at the same time that there is self-sealing on top of the well casing.

A general object of the invention is to provide a one-piece, self-sealing, overlapping well casing cap for an "over-the-top" type of discharge.

A further object of the invention is to provide a well casing cap which is so constructed and reinforced as to eliminate the possibility of the cap breaking from the weight of the load.

A further object of the invention is to provide a well casing cap which has a specially reinforced portion through which the electric conduit and/or vent pipe can pass without weakening the cap, the construction also providing sufficient stock for tapping.

A further object of the invention is to provide a cap which is easily installed and easily removed for servicing, it being merely necessary to lift up on the fitting at the top of the discharge pipe, thereby releasing the O-ring seal, and the construction being such that the same O-ring may be used repeatedly.

With the above and other objects in view the invention consists of the improved well casing cap, and all of its parts and combinations, as set forth in the claims, and all equivalents thereof.

BRIEF DESCRIPTION OF THE DRAWING

In the accompanying drawing, in which the same reference numerals designate the same parts in all of the views:

FIG. 1 is an elevational view of a well casing with the improved cap installed thereon, a central portion in the length of the casing being removed, and a portion in the and a portion of the casing wall being broken away and shown in section;

FIG. 2 is a top view of the cap taken approximately on the line 2–2 of FIG. 3;

FIG. 3 is a sectional view taken approximately on the line 3–3 of FIG. 2;

FIG. 4 is a view of the underside of the cap removed; and

FIG. 5 is an enlarged fragmentary exploded view, partially in vertical section, showing the seal assembly around the upper end of the discharge pipe.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring more particularly to the drawing, the numeral **10** designates a typical well casing, and the numeral **11** the improved cap. The cap is usually formed of cast iron or cast aluminum or suitable alloy. It is of one-piece construction and includes a deep outer depending annular flange **12**. Spaced inwardly of the flange is a depending annular rib **13** to provide an annular groove **14** for receiving a gasket **15**. Centrally of the cap is a depending boss **16** which has a downwardly and outwardly flared hole **17**. The boss is connected by radial ribs **18** with the circular rib **13**.

At the top of the cap there is a central elevated hub portion **19** above the top of the boss, which hub has a countersunk recess **20** therearound shaped to receive the lower portion of an O-ring **21**. A washer **22** has its underside formed with an annular countersunk recess **23** positioned to receive the upper portion of the O-ring **21**. The washer and O-ring surround a discharge pipe **24** which extends through the central hole **17**. Above the cap the discharge pipe is equipped with a fitting such as the elbow **25** having a lower end shoulder **26** positioned to bear against the top of the washer **22** so that the weight of the submersible pump **27** and the well piping **24** will cause a self-sealing of the O-ring around the upper end of the discharge pipe, as shown in FIG. **3**.

The top of the cap has radially extending ribs **28** which merge with protuberances **29** on the outer side of the outer flange **12**, which protuberances may receive set screws **30**. Between two of the top ribs **28** and merging into the top hub portion **19** is a thickened area **31**. This provides sufficient stock for tapping as at **32** to threadedly receive the lower end of a pipe **33** which may be a vent pipe, or a pipe through which electric cables may pass, or it may perform both functions. This thickened portion **31** permits the tapping as at **32** without weakening of the cap.

In use of the improved cap it is not necessary to furnish caps for each size of discharge pipe. Discharge pipes usually come in sizes of 1 inch, 1¼ inch, 1½ inch and 2 inch. With the present invention, because of the thickness of the stock at **16** and the novel flare, the central hole can originally be furnished to receive a 1-inch discharge pipe, but it can be readily bored to enlarged size for receiving discharge pipes of larger size and, of course, after such boring, the countersunk recess **20** should be machined around the upper end of the bore hole and a larger washer **22** should be used.

With the parts installed as shown in FIGS. **1** and **3**, the weight of the piping **24** and submersible pump **27** will draw the cap down on the upper end of the well casing, causing said upper end to seal against the gasket **15**. Also, the weight of the pump and piping will cause the shoulder **26** to bear against the washer **22** with the latter causing a self-sealing of the O-ring **21** around the upper end of the discharge pipe. Thus the cap will be thoroughly sealed against the undesirable entrance of surface water, to meet exacting sanitary requirements.

Due to the novel construction of the cap the central load is well distributed by the radial ribs and there is no danger of the cap breaking from the weight. Nor is there a breaking stain on cap rim portions which rest on top of the casing. The thickened stock at **31** permits tapping as at **32** to receive the vent or electric cable pipe **33** through which the electric cables **34** may extend. Thus, there is ample stock for tapping and there is no danger of the hole **32** unduly weakening the cap. With the novel reinforced arrangement the usual strains which are placed on the outer rim will be eliminated and the cap can withstand loads in the neighborhood of 1 ton. The cap is self-sealing and self-retaining in position but, if desired, the set screws **30** may be employed to additionally lock the flange to the outer side of the well casing. The exterior radial ribs **38** are preferably located directly over the depending radial ribs **18** on the underside, and it is to be noted that the thickened area **31** extends from one of the ribs **28** to the next rib **28**.

The flared hole **17** in the central boss has its lower portion of a diameter which is at least equal to the diameter of the lar-

gest size well pipe 24 which might be used. Conventionally this is a 2-inch pipe. The top of the hole 17 is originally of a diameter to fit the smallest diameter pipe which might be used. Conventionally this is a 1-inch pipe. The upper portion of the flared hole may, however, be bored to fit any of the larger sized well pipes which are conventionally used. The boss 16 is of such thickness, particularly at its upper end, that such boring may be performed without any danger of weakening the cap.

It is to be understood that I do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

I claim:

1. In a well installation having a well casing, a well casing cap, a boss depending from the center of said cap and having a central hole, and a well pipe extending through said hole, said hole in the boss being downwardly and outwardly flared to provide a lower portion of a diameter at least equal to the maximum diameter of the well pipe to be used therewith and the upper end of the hole being of a size to fit a well pipe of minimum diameter, the boss being of such thickness that the upper end of the hole may be readily enlarged to fit a well pipe of selected larger diameter.

2. In a well installation having a well casing, a well casing cap comprising a top disc having an outer circular depending flange, an annular rib depending from said disc and spaced inwardly from said flange to provide a circular groove within which the upper end of the well casing fits, a boss depending from the center of said cap and having a central hole, a well pipe extending through said hole, and radial ribs projecting from the underside of the cap connecting the boss with said depending annular rib, the top of the cap having an area of increased thickness, with said area extending from over one of the depending radial ribs to a position over another depending radial rib, said increased thickness area having a tapped pipe-receiving hole therein.

3. A well installation as claimed in claim 2 in which the top of the disc has radial ribs over the depending radial ribs, and in which the increased thickness area is between two of said ribs.

4. In a well installation having a well casing, a well casing cap comprising a top disc having an outer circular depending flange, an annular rib depending from said disc and spaced inwardly from said flange to provide a circular groove within which the upper end of the well casing fits, a boss depending from the center of said disc and having a central hole, a well pipe extending through said hole, and radial ribs projecting from the underside of said top disc and connecting the boss with said depending annular rib.

5. In a well installation having a well casing, a well casing cap having a central hole, a well pipe extending removably through said hole and having a shoulder above the cap, a washer slideably surrounding the well pipe between said shoulder and cap, and an O-ring between the washer and the top of the cap positioned over the margin of the central hole and fitting snugly around the well pipe whereby the suspended weight from the well pipe will cause self sealing of the O-ring around the well pipe over the top of its hole, the O-ring frictionally engaging the pipe to be removable therewith.

6. A well installation as claimed in claim 5 in which the top of the cap has a countersunk recess surrounding the well pipe hole for receiving a lower portion of the O-ring and in which the bottom of the washer has a recess surrounding the well pipe for receiving an upper portion of the O-ring.

7. A well installation as claimed in claim 6 wherein the depth of the countersunk recesses are such that the O-ring normally maintains the washer in spaced position above the top of the cap.