

April 17, 1934.

C. A. DAVENPORT

1,955,113

SHOE FOR TESTING WELL CASINGS

Filed July 21, 1932

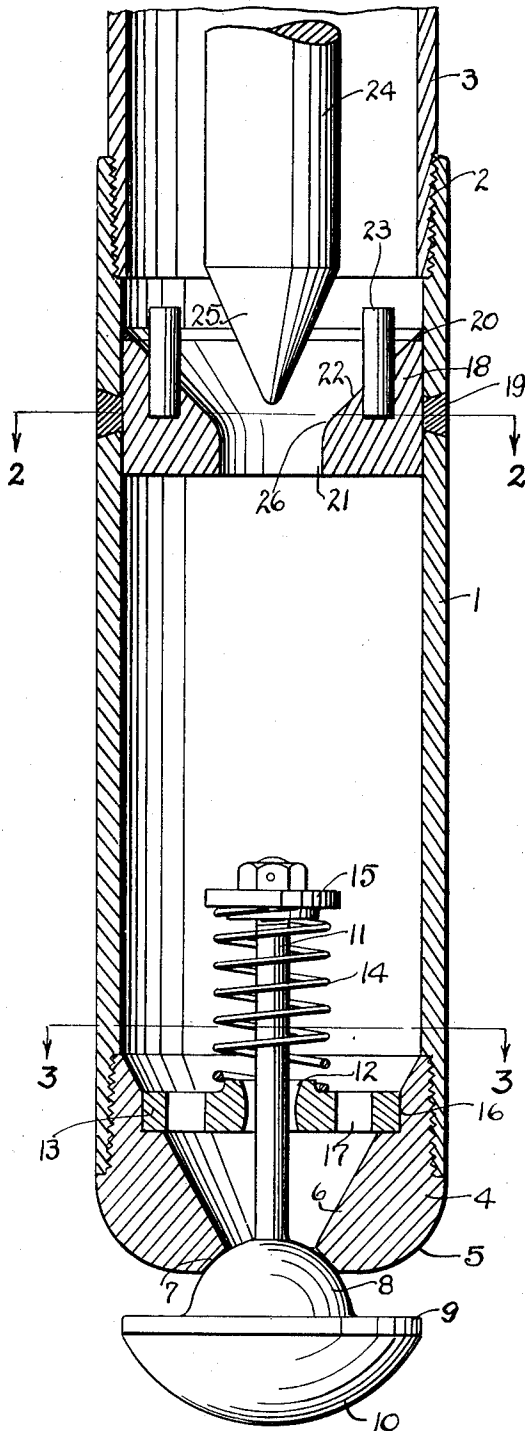


Fig. 1.

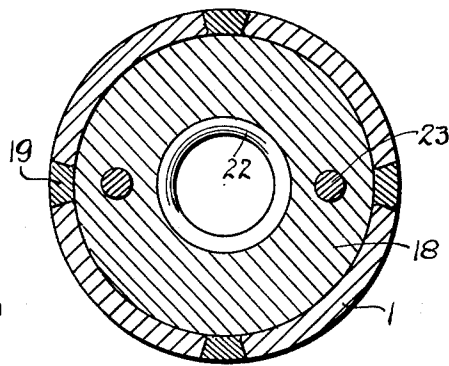


Fig. 2.

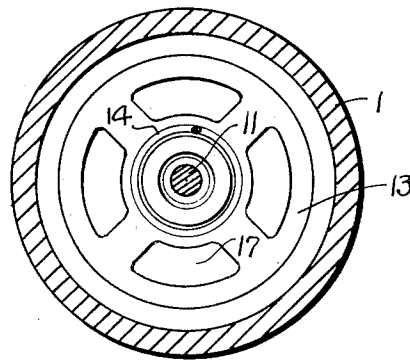


Fig. 3.

C.A.Davenport Inventor

Jesse R. Stone
Lester B. Clark

By

Attorneys

UNITED STATES PATENT OFFICE

1,955,113

SHOE FOR TESTING WELL CASINGS

Clarence A. Davenport, Gladewater, Tex.

Application July 21, 1932, Serial No. 623,762

4 Claims. (Cl. 166—9)

My invention relates to a casing shoe to be placed upon the lower end of the casing when it is introduced into the well preparatory to cementing said casing in position.

Casing shoes are ordinarily employed at the lower end of the casing while it is introduced into the well and these shoes sometimes have valves at the lower end thereof which close the forward end of the shoe and allow the operator to float the casing into the well so as to take some of the weight of the casing off of the wire line. These valves are in the nature of back pressure valves and open downwardly. Such valves, however, are not capable of being tightly sealed against back pressure when it becomes desirable to test the casing to ascertain whether any leaks have developed therein while it is being introduced into the well.

I have as an object of my invention the provision upon the casing shoe of a back pressure valve which may be brought into contact with the bottom of the well so as to tightly seal the lower end of the casing, this making it possible to test the casing for leakage.

The points of novelty connected with the shoe lie largely in the manner in which the valve is constructed and mounted so as to form a reliable seal for the casing.

I also provide a secondary sealing member which may be employed, in case leakage appears, to close the lower end of the casing above the shoe so as to obtain a second test as to the position of such leakage as may be present.

In the drawing herewith Fig. 1 is a central longitudinal section through a casing with a casing shoe thereon employing my invention.

Fig. 2 is a transverse section on the plane 2—2 of Fig. 1; and

Fig. 3 is a similar transverse section on the plane 3—3 of Fig. 1.

My casing shoe 1 is a tubular member secured at 2 to the lower end of the well casing 3. The lower end of the shoe is threaded internally to receive a plug 4, tending to close the lower end of the shoe and also act as a housing for the valve. The lower end of the plug is rounded at 5 to assist in guiding the casing downwardly while it is being introduced into the well.

Said plug is provided with thickened walls, the interior face of which is tapered inwardly and downwardly at 6. The opening through the lower end of the casing is rounded at 7 to form a seat for a valve member. Said valve member has a rounded portion 8 of hemispherical shape and adapted to fit within said seat 7. Below the

rounded portion, the body of the valve is extended laterally at 9, and the lower side of the extension is rounded as shown at 10 to contact with the bottom of the well. The lateral extension of this valve provides a contact member 10 of large diameter which will find a safe support upon the bottom of the well, even where a pilot hole has been drilled ahead of the main well bore. This allows the pressure of the casing to be rested upon the valve, tending to force it firmly to its seat.

The valve has an upwardly extending stem 11, which is projected through an opening 12 within the guide plate 13. The opening 12 receives the stem loosely and is slightly flared at each end to allow lateral movement of the valve stem in adjusting the valve to its seat. There is a spring 14 surrounding the valve stem and bearing against a washer 15, at the upper end of the stem, thus tending to hold the valve normally upward into its seat.

The guide plate 13 may be of any desired construction. I have shown it as formed of a circular disc pressed into a seat 16 on the inner tapered face of the plug 4. It has openings 17 there-through to allow the free passage of circulating fluid downwardly in case circulation is needed while the casing is introduced into the hole.

In case leakage is discovered in the casing, I provide for a closure above the lower end through which a second test may be made. This closure is formed by a plate or partition 18, which is made up of a circular disc of metal welded in position on the interior face of the shoe 1. This weld comprises a plurality of bonds of welding material 19, deposited within openings circumferentially around the plate. I also, for purposes of forming a tight seal, place a bond 20 entirely around the upper outer edge of the plate 18, this bond being of welding material applied in position about the margin of the plate.

This plate has an opening 21 therethrough which is flared outwardly on its upper side at 22 to form a seat. This seat may be used as a support for the wash plug in use and I provide a plurality of upstanding studs or posts 23, adjacent the outer edge of the plate, upon which a cementing plug may be supported. When a seal is desired, however, I employ a bar 24, which may be of steel and of generally cylindrical formation. Its lower end is tapered, however, at 25 to engage within the seat 26 at the upper end of the passage 21. This bar may be lowered through the casing and through its own weight engage within the seat 26 and form a tight seal

therein, thus enabling the operator to make an additional test of the casing above this plate.

In the use of my improved shoe the casing will be introduced into the well with the shoe secured thereon, as shown in Fig. 1. If obstructions are encountered, flushing fluid may be pumped through the casing to wash away the obstruction and when the bottom of the well has been reached the lower side 10 of the valve will engage in the upper end of the pilot hole, in case such a hole has been drilled, and will form a stop, which will seat firmly upon the well bottom and, if thereafter the pressure of the casing is rested upon the valve 8, a tight seal can be assured around the lower end of the shoe. The operator will then force water under high pressure into the casing to ascertain whether leakage occurs at any place along the length of the casing. If leakage occurs and the operator has reason to believe that the leakage is around the shoe, he may drop the valve member 24, which may be in the shape of a sinker bar with the pointed end previously described and such bar will act as a valve engaging in the seat 26 and make a seal at this point.

Thereafter, the pumps may be again started to see whether the leakage occurs above the shoe. In this way two separate tests may be made. Ordinarily the second test will not be necessary.

The advantages of this construction are that before cementing the casing in a well a test may very readily be made to ascertain whether the casing is tight. If the operator finds that the casing has no leaks therein the valve 25 may be withdrawn, the casing may be raised slightly from the bottom and the cement may be forced downwardly through the parts to cement the casing in the well. After the cement has become set, the obstructions at the lower end of the casing may be drilled out and the hole be extended downwardly to form a seat for the strainer. To allow this to be readily done, the parts at the lower end of my improved shoe may be made of metal strong enough to resist the pressure necessary for testing, but which may be easily broken up and disintegrated with the drill. The advan-

tages of this type of construction will be apparent to those skilled in the art.

What I claim as new is:

1. A casing shoe having a rounded plug on the lower end thereof forming a guide, a concaved valve seat in said plug, a valve having a hemispherical upper end engaging said seat, and a widened extension on the lower side of said valve adapted to contact with the larger portion of the well bottom and hold said valve in said seat when said casing is supported thereon.

2. A casing shoe having a rounded plug on the lower end thereof forming a guide, a concaved valve seat in said plug, a valve having a hemispherical upper end engaging said seat, a stem on said valve, a guide for said stem having a guide opening therein materially larger than said stem whereby said stem may have free lateral adjustability, means thereon normally holding said valve resiliently upward, and a widened extension on the lower side of said valve adapted to contact with the larger portion of the well bottom and hold said valve in said seat when said casing is supported thereon.

3. A casing shoe including a tubular member, a guide plug in the lower end thereof extending in advance of said shoe, said plug having a downwardly tapered opening axially thereof, a concaved seat on the lower end of said passage, a valve having a hemispherical upper surface to fit said seat, and a laterally projecting extension on said valve convex on its lower side to contact with the well bottom and furnish a base for said valve, in the manner described.

4. A casing shoe including a tubular member, a guide plug in the lower end thereof extending in advance of said shoe, said plug having a downwardly tapered opening axially thereof, a concaved seat on the lower end of said passage, a valve having a hemispherical upper surface to fit said seat, and means on said valve to contact the well bottom, and furnish a base for said valve when said casing is lowered.

CLARENCE A. DAVENPORT.

50	125
55	130
60	135
65	140
70	145
75	150