Feb. 21, 1956 C. D. WILSON 2,735,496

OIL WELL BRIDGE

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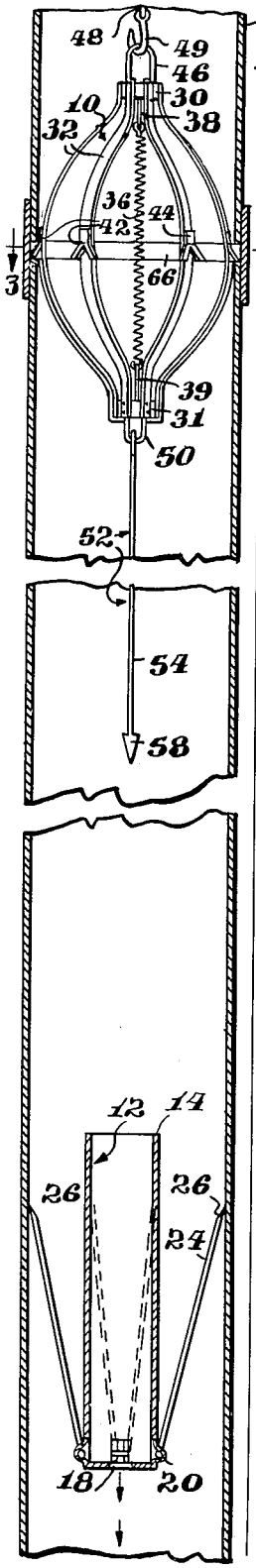

FIG. 2.

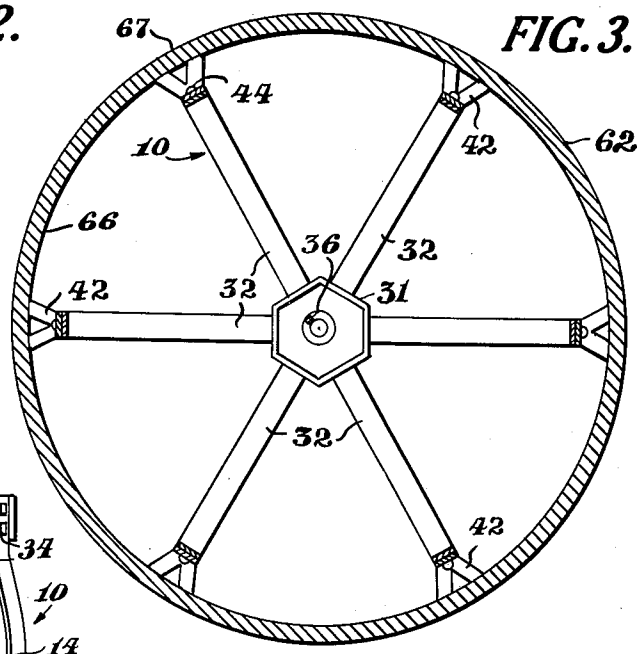

FIG. 3.

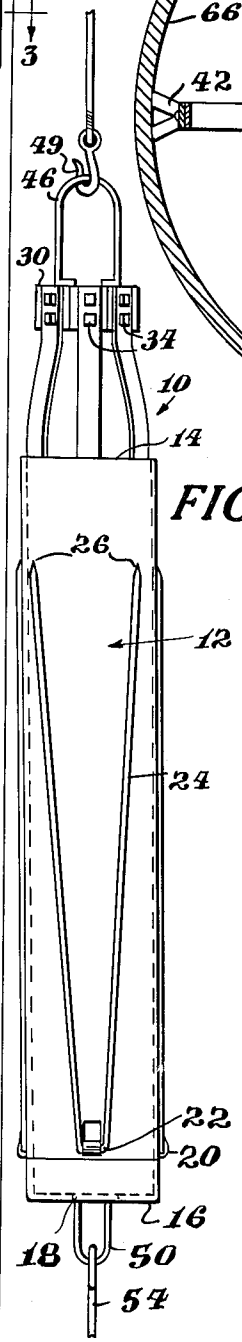

FIG. 1.

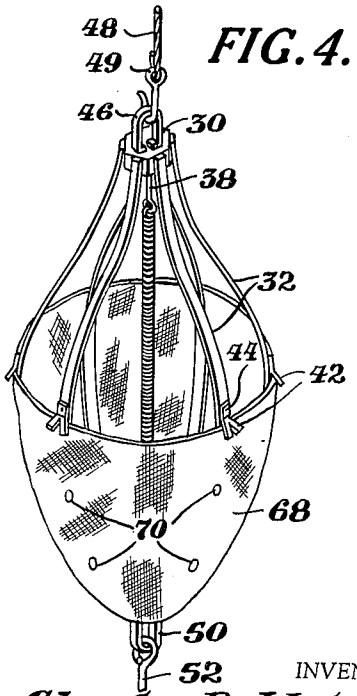

FIG. 4.

INVENTOR

Charles D. Wilson

BY Cushman, Darby & Cushman

ATTORNEYS

United States Patent Office

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OIL WELL BRIDGE

Charles D. Wilson, Great Bend, Kans.

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5 Claims. (Cl. 166—192)

This invention relates to an improved plugging device for deep wells and more particularly to a bridge for supporting stemming matter to close the bore of a deep well at a predetermined point.

Heretofore many attempts have been made to provide a plug of the bridge type which will allow the drilling or operating crew to plug a deep well precisely at a predetermined point. However, such prior art plugs have not proved to be entirely satisfactory as they frequently hang in the bore due to a premature setting action when the plug is being lowered to the desired position. Such premature setting action creates a serious impediment and causes expensive delays for the operating crews.

Many of the plugs presently in use have to be positioned close to the bottom of the hole in order to be set properly and thus are useless when a plug at the upper portion of the bore is required.

It is, therefore, the object of this invention to provide a bridge type plugging device which may be easily and accurately set in any predetermined position in a deep well.

It is a further object of this invention to provide a plugging device which may be lowered into a deep well by gravity and which will not hang in the bore.

It is a still further object of this invention to provide a plugging device which may be lowered into the well within a confining casing and withdrawn from the casing at a predetermined point.

It is a still further object of this invention to provide an expanding deep well bridge with a confining casing to maintain it in a collapsed condition until it is withdrawn from the casing at a predetermined point.

It is a still further object of this invention to provide an expendable canister for confining an expanding deep well bridge until the assembly is lowered to the desired position in the well and to provide means for withdrawing the bridge from the canister.

It is a still further object of this invention to provide an expanding deep well bridge with improved means to grip the side wall of the bore.

It is a still further object of this invention to provide an expanding oil well bridge equipped with a lowering guide means to insure its descent within the true bore of the well.

The various objects and features of my invention will be fully understood from the following detailed description of a typical preferred form and application of the invention, throughout which description reference is made to the accompanying drawings in which:

Figure 1 is an elevation view of the bridge confined within the expendable canister.

Figure 2 is a vertical section view through the well showing both a bridge constructed according to my invention and a vertical section of the expendable canister falling away from the bridge.

Figure 3 is a horizontal section taken along line 3—3 of Figure 2.

Figure 4 is a perspective view of the bridge equipped with a cloth basket in an expanded condition.

Generally, my invention consists of confining a collapsed expanding bridge in a canister, lowering the assembly to a preselected point in a deep well, and withdrawing the bridge from the canister. The bridge will set itself in the selected position as the expendable canister falls freely.

In Figure 1 I have shown the expanding bridge, generally indicated as **10**, collapsed and inserted within canister **12** and held therein by the action of hereinafter mentioned tension spring **36**.

The canister is preferably a cylindrical tube made of a light frangible metal, plastic, or vegetable fiber derivative, with an open upper end **14** and closed or capped lower end **16**, the closure or cap being provided with a small central aperture **18**. Mounted on the periphery of the lower portion of the canister **12** are brackets **20** which pivotably support the base **22** of U-shaped wickers or arms **24** so that their upwardly extending portions may swing out and away from the side walls of the canister. The arms or wickers **24** are preferably formed from hard steel rods provided with sharpened points or end portions **26**.

As shown in Figures 2 and 3 the expanded bridge **10** is made up of hexagonal prism blocks **30** and **31** joined by flexible spring metal ribs or bows **32** which are attached to the peripheries of the blocks by suitable bolts **34**. The blocks **30** and **31** are yieldingly drawn together by tension spring **36** secured to the respective blocks by bails **38** and **39**. The mid points of the convex or exterior surfaces of the bows **32** are provided with fingers **42** extending obliquely downward, the fingers consisting of flat metal projections shaped as an inverted Y with the stems secured to the bows by bolts **44**.

The block **30** (Figures 1 and 2) is provided with a fixed loop or bail **46** which provides a support for attaching measuring cable **48** by hook **49**. Secured to and depending from lower block **32** is a loop or bail **50** which provides a support for the guide assembly, generally indicated at **52**, which consists of an extended rod **54** having a loop **56** at its upper end and a weight **58** at its lower end.

According to my invention the well plugging device is operated as follows:

The exact point where it is desired to set the well plug is determined by appropriate known techniques. The bridge is then collapsed and inserted within the open end **14** of the canister **12**. As shown in Figure 1, the guide rod assembly **52** and the lower bail **50** pass through aperture **18** in the closed end **16** of the canister **12**. The tension spring **36** provides a constant force tending to expand the bridge and bring fingers **42** firmly against the inner wall of the canister **12**. Thus, the bridge is snugly held within the canister and the two are not easily separated by the normal rough handling of the operating crews. The assembled device is lowered in the bore **60** of the deep well by measuring cable **48**. As the wickers **24** are loosely pivoted to brackets **20**, the canister will descend freely within the bore. While the apparatus descends it is held to a course in the true bore by the guide rod assembly **52** and thus there is no danger of apparatus becoming hung on shelves, ledges, or wide openings in the bore. When the measuring cable indicates that the bridge is at the desired depth the cable winch is stopped and the assembly is slowly raised a short distance. The pointed ends **26** of the wide spread wickers **24** engage the side wall of the bore, such as casing **62**, and resist further upward movement of the canister **12**, so that the continuing tensioning of the cable **48** withdraws the bridge **10** from the canister **12**. When the bridge is freed from the confinement of the canister

12 the tension spring 36 immediately expands the bows bringing the periphery formed by their mid portions, and the fingers 42, into forced engagement with the side walls or casing 62 of the bore 60. If the bore is cased with smooth pipe the bridge will adjust itself to the nearest casing coupling 67 where it will be securely held by the projecting of the fingers 42 into the coupling gap 66.

When the bridge 10 is freed from the canister 12, the upward pull on the canister is terminated, and it will either hang inoperative or fall free as shown in Figure 2.

Once the bridge is set at its proper position the measuring line 48 and hook 49 may be detached and withdrawn.

In a small bore well the network of the ribs of the expanded bridge creates a basket like barrier which will catch and hold any stemming metal subsequently introduced, such as stones or rocks. If stemming material such as liquid concrete is to be introduced, the bridge may be provided with a flexible pocket member 68 made of cloth or plastic fabric cut and sewed to form an umbrella shape and attached to the lower portion of the bridge 10 by rivets 70 as shown in Figure 4.

Having described only a typical preferred form and application of my invention, I do not wish to be limited or restricted to the specific details herein set forth, but wish to reserve to myself any variation or modification that may appear to those skilled in the art and fall within the scope of the following claims.

I claim:

1. In a deep well plugging device, an expanding bridge element, a canister element comprising a hollow tube having one end closed, an aperture in the closed end of the tube, a plurality of U-shaped rods, the said rods being pivotably attached to the outside of the said tube at the closed end and projecting upwardly from the said tube, the bridge element being withdrawably inserted within the open end of the said tube.

2. In a deep well plugging device, a bridge element comprising a top member and bottom member, a plurality of flexible bows connecting the said top member and the said bottom member, a tension spring element with one end attached to the said top member and the other end attached to the said bottom member for yieldingly drawing the said members together to expand the said bows,

and a canister tube, said bridge element being withdrawably inserted into the said canister tube, and means for retaining the canister tube in a predetermined position in the deep well when the said bridge element is upwardly withdrawn from the said canister tube.

3. In a deep well plugging device, a bridge element comprising a top member and a bottom member, a plurality of flexible bows connecting the said top member and the said bottom member, a tension spring element with one end attached to the said top member and the other end attached to the said bottom member for yieldingly drawing the said members together to expand the said bows, and a canister element comprising a tube, an arm projecting upwardly from and pivotably attached to the outside of the said tube, the said bridge element being withdrawably inserted within the said canister element.

4. In a deep well plugging device, a bridge element comprising a top member and a bottom member, a plurality of flexible bows connecting the said members, a tension spring yieldingly drawing the said members together to expand the said bows, a plurality of fingers extending obliquely downward and outward from the convex side of the said bows, whereby the bows will positively grip the well bore and seat itself against longitudinal movement when expanded.

5. In a deep well plugging device, a bridge element comprising a top member and a bottom member, a plurality of radially disposed bows formed of resilient material and connecting the said top member and the said bottom member, each of said bows presenting a convex side radially outward, said bows being resiliently biased to peripherally expand while yieldingly drawing the said members together, and a canister tube, said bridge element being withdrawably inserted into the canister tube, and means for retaining the canister tube in a predetermined position in the deep well while the said bridge element is upwardly withdrawn from said canister tube.

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