Jan. 21, 1941. H. H. GREENE 2,229,325

DEEP WELL BRIDGE

Filed Aug. 3, 1940

FIG. 1

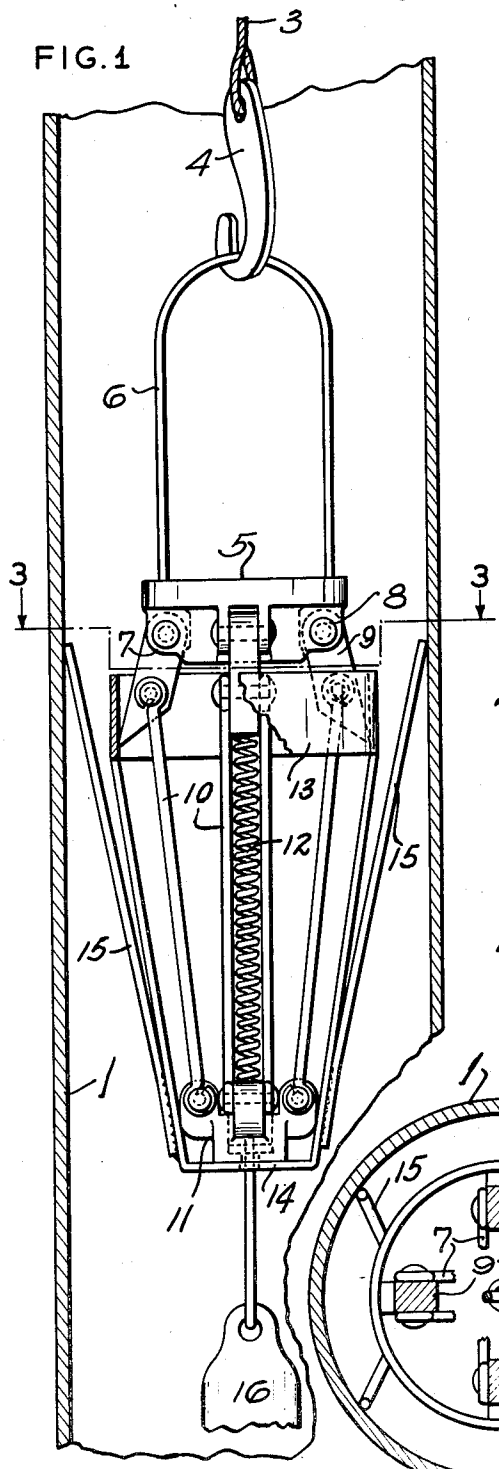
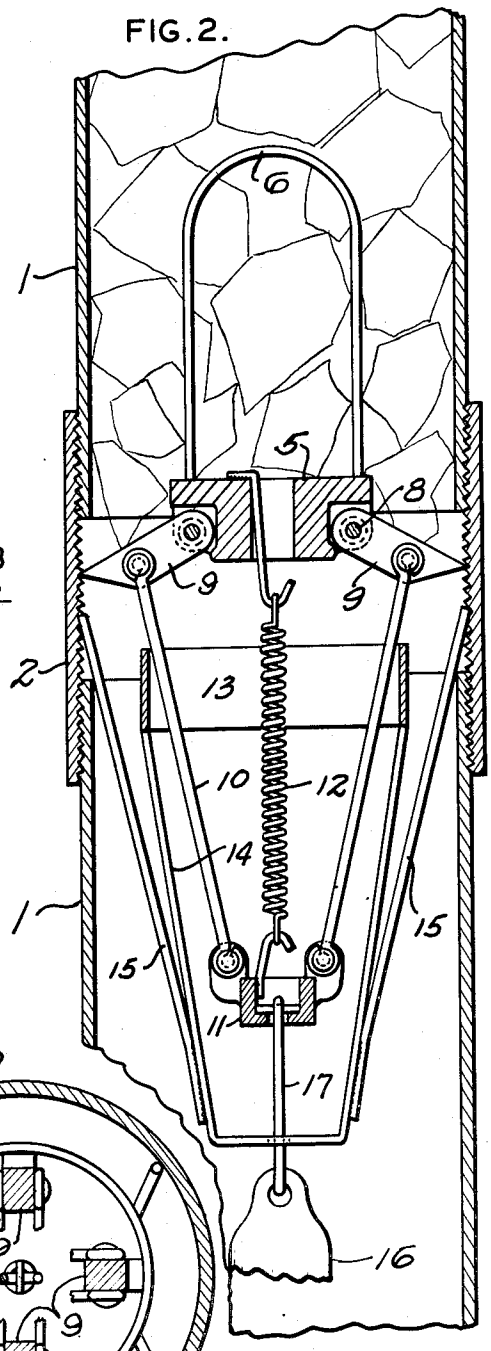


FIG. 2.



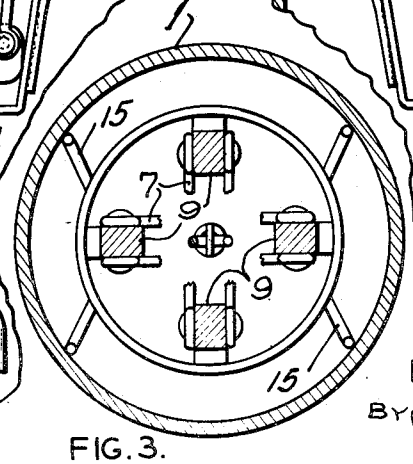


FIG. 3.

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DEEP WELL BRIDGE

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7 Claims. (Cl. 166—13)

The invention relates to the formation of a bridge in a deep well, such as an oil well, and comprises all of the novel structure illustrated in the accompanying drawing and described herein.

As is well understood in the art, it is necessary on occasion to close off the lower portion of a well; for example, when it is desired to produce from an elevation higher than the bridged portion. In some instances such bridges are used when a well is abandoned as is required by various state rules and regulations.

The main object of the invention is to provide a simple, economical, effective device which may be lowered to any desired depth in a well and retained at the desired depth and adapted to firmly support any quantity of bridge forming material, such as rock, cement, earth, etc.

Other detail objects of the invention will be indicated below, reference being made to the accompanying drawing in which—

Figure 1 is a longitudinal section through a portion of a deep well showing the present device in elevation in the condition assumed as the device of the present invention is being lowered.

Figure 2 is a similar section through the well showing the device of the present invention in the condition assumed in being held at a desired position in the well.

Figure 3 is a transverse section taken on the line 3—3 of Figure 1.

The well casing consists of the usual sections 1 with threaded ends connected by couplings 2. The device is lowered into the well by the usual line 3 having hook 4 at its lower end.

A cup 5 forms the body of the device and has a bail 6 arranged to engage hook 4. Ears 7 depend from body 5 and by means of pins 8 pivotally mount a plurality of arms 9, here shown as four in number, adapted to swing from the position shown in Figure 1 to the position shown in Figure 2. Pivotally connected to and extending downwardly from the lower ends of arms 9 are corresponding links 10 pivotally connected at their lower ends to a collar 11.

A coil spring 12 is tensioned between body 5 and collar 11 and tends to pull these two members towards each other, thus forming a toggle action which thrusts the lower ends of arms 9 outwardly from the position shown in Figure 1 to the position shown in Figure 2.

A ring-like band 13 surrounds arms 9 in Figure 1 and holds the lower ends of the arms in the substantially vertical position shown in which they are spaced inwardly from the sides of the well and will not interfere with the movement of the device in either direction.

A yoke-like member 14 depends from band 13 extending around the bottom of collar 11 whereby the yoke and band are positively held against movement upwardly, relative to arms 9, from the position shown in Figure 1.

Spring rods 15 are secured at their lower ends to the lower portion of yoke 14 and have their upper ends sprung outwardly to be thrust against a well casing but to yield as the device moves downwardly in the well so as to slide freely over any irregularities in the casing such as exits at a joint between two casing sections. Upon movement of the device upwardly, however, the free ends of rods 15 are disposed to engage any projection, such as the threads of a coupling 2 or the lower end of a casing section 1, whereupon upward movement of the rods 15, yoke 14 and band 13 is arrested and, upon further upward movement of body 5, arms 9, links 10, collar 11 and spring 12, the arms are released from the band and their lower ends are thrust outwardly by spring 12 and engage the side of the casing and support the device. If the support is not immediately positive, it will become so as soon as the arm ends strike an irregularity in the casing, such as the coupling threads or the shoulder formed by the upper end of a casing section.

The hook may then be released and the line withdrawn from the well. Rock or other material then dumped into the well and resting upon body 5 will cause the arms to more tightly engage the side of the well and thus provide a firm bridge across the well.

Usually a sash weight 16 or a long tube or shell filled with sand would be attached to collar 11 by a line 17 extending through and opening in the lower end of yoke 14 to insure the downward movement of the device irrespective of the fluid in the well, or friction between the sides of the well and rods R, which might tend to interfere with the downward movement of the device and the disengagement of hook 4 and bail 6.

If desired, a cylindrical plug slidable freely through the well may be dropped on top of body 5 after the lowering line has been removed and before loose rock, cement, etc., is dumped into the well.

The details of the device may be changed substantially without departing from the spirit of the invention, and the exclusive use of such modifications of the structure as come within the scope of the appended claims is contemplated.

What is claimed is:

1. In a device of the class described, a body arranged to be suspended from a line whereby it may be lowered into a well, arms pivoted to said body and arranged to be swung upon their pivots to a projected position in which downwardly facing parts thereof spaced from their pivots may engage the side of a well, or to a retracted position in which they clear the well side, means tending to move said arms to projected position, a member slidably engaging said arms to hold them in retracted position, and means for withdrawing said jaws and member from each other upon movement of the device upwardly in a well.

2. A device as described in claim 1 in which the arm engaging member comprises a ring-like band of substantially less than the diameter of the well for which the device is intended and normally surrounding the swinging arms.

3. A device as described in claim 1 in which the means for withdrawing the jaws and member from each other comprises elements secured to the member and having upwardly facing and outwardly thrust portions disposed to engage the well side to resist upward movement of the member in the well.

4. A device as described in claim 1 in which the means tending to move the arms to projected position comprises links pivotally secured to said arms at points spaced from their pivotal connection to said body and extending downwardly from said arms and a spring tensioned between said body and the lower ends of said links.

5. In a device of the class described, a body arranged to be suspended from a line whereby it may be lowered into a well, arms pivoted to said body and depending therefrom with their lower ends movable about the arm pivots so as to swing outwardly from the axis of the device to engage the side of a well, a member including a band surrounding the lower parts of said arms and limiting their outward movement, respective links pivotally connected to the lower ends of said arms and extending downwardly therefrom, a collar pivotally secured to the lower ends of said links, a spring tensioned between said collar and said body and exerting an upward thrust on said links and, through the latter, an outward thrust on said arms, said member including a yoke extending from said band downwardly and beneath said collar and held by the latter against movement upwardly over said arms, and elements extending outwardly and upwardly from said member with their upper ends disposed to slide over the inner side of the well wall when the device is lowered into the well but adapted to engage a downwardly facing element of the well wall when the device is raised from the well whereby said band may be pulled downwardly off of said arms to permit their lower ends to engage the well wall.

6. A device as described in claim 5 in which the collar at the lower end of the links is arranged to carry a weight-supporting line and the portion of the yoke extending beneath said collar is apertured to slidably receive such a line.

7. In a device of the class described, a body arranged to be suspended from a line whereby it may be lowered into a well, arms pivoted to said body and arranged to be swung upon their pivots to a projected position in which downwardly facing parts thereof spaced from their pivots may engage the side of a well, or to a retracted position in which they clear the well side, means tending to move said arms to projected position, a cylindrical member surrounding said arms and holding them in retracted position and interposed between said parts and the well side and slidable downwardly over said arms, and means associated with said member for engaging the well side to resist upward movement of said member in the well.

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