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G. H. McLEAN

WELL STOPPER

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Fig. 1.

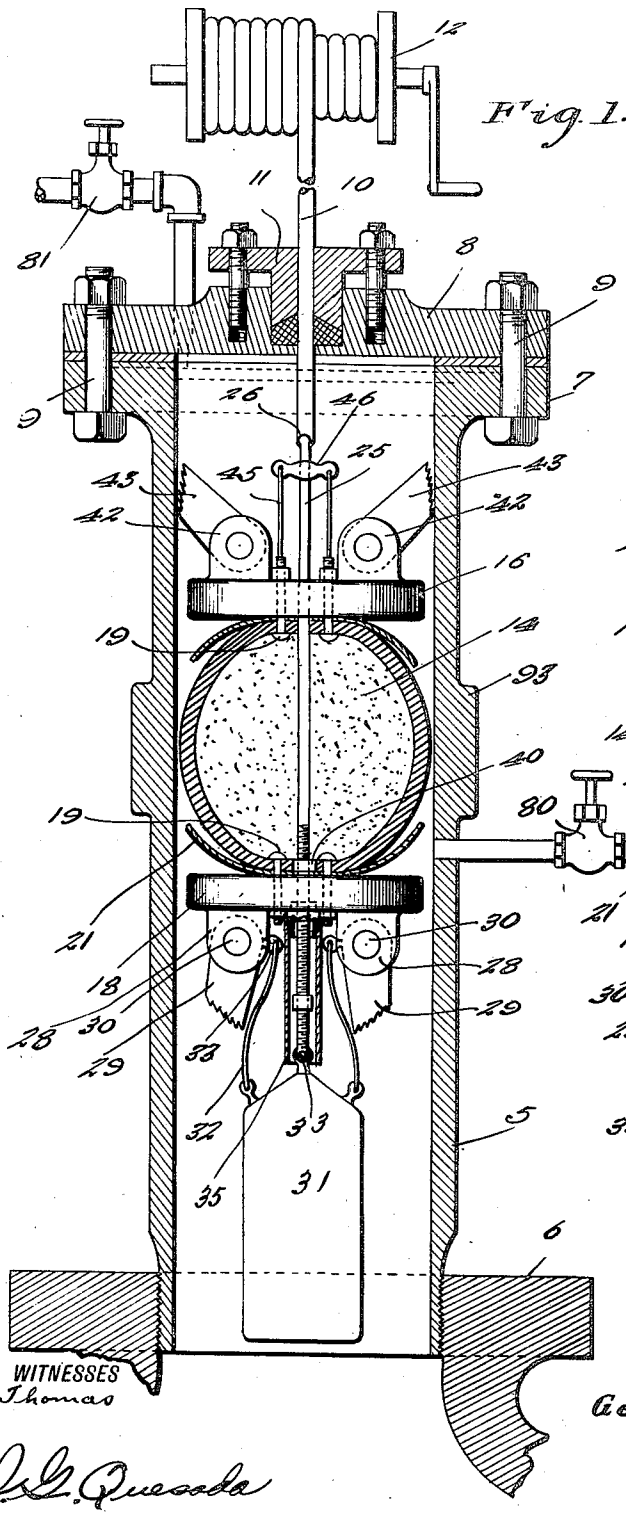
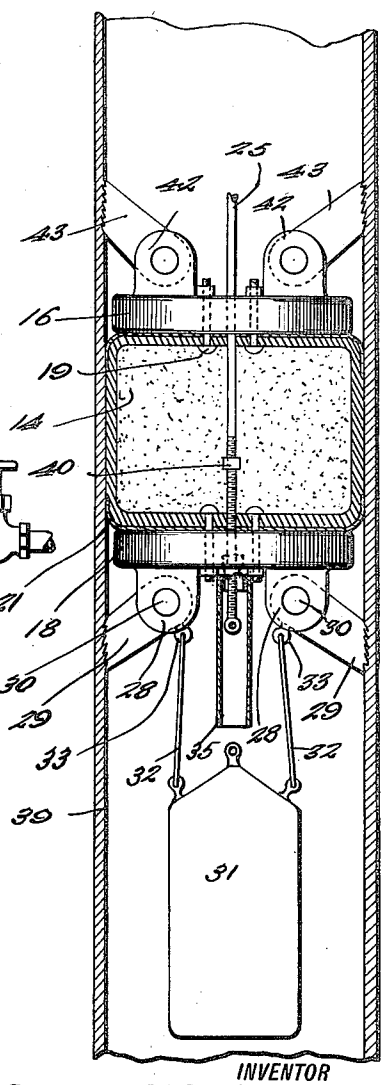


Fig. 2.



WITNESSES

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WELL STOPPER.

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To all whom it may concern:

Be it known that I, GEORGE H. McLEAN, a citizen of the United States, and a resident of Tampico, in the State of Tamaulipas, and Republic of Mexico, have invented certain new and useful Improvements in Well Stoppers, of which the following is a specification.

This invention relates to packers or stoppers especially adapted for use in wells.

Briefly stated, an important object is to provide a well stopper having novel means whereby the same may be firmly engaged with the wall of the well or casing at any desired point, the extent of descent being entirely under the control of the operator.

Further, the invention aims to provide simple and reliable means whereby the downward expansion of the packer is prevented when the stopper is released for engagement with the well casing, the said means also acting to stretch the packer during its descent whereby to decrease its cross-sectional area.

A further object is to provide a well stopper which is of highly simplified construction, durable in use and cheap to manufacture.

In the accompanying drawing forming a part of this application and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a vertical sectional view illustrating the improved packer.

Figure 2 is a detail sectional view illustrating the stopper or packer in a set or expanded position.

In the drawing the numeral 5 designates a cap the lower portion of which is threaded into the member 6 whereby the cap is supported in longitudinal alignment with the casing.

The upper portion of the cap 5 is provided with a flange 7 to which a closure 8 is securely connected by means of fastening bolts 9. The central portion of the closure 8 is provided with an opening through which a lowering cable 10 extends and it will be observed that a packing or sealing unit 11 is connected to the closure 8 and provides a tight joint between the cable and the cap. Of course this connection is sufficiently loose to permit of the movement of the cable 10 when the drum 12 is operated.

The packing unit 14 may be in the form of a sphere or it may be oval shaped and it is formed from corded rubber or woven material. In carrying out the invention, the packer may be filled with such material as sand and cement, oakum, cotton, lead wool or other mineral wool. It might be stated that the packing unit 14 is more or less yieldable and is capable of assuming the elongated form illustrated in Figure 1 or the compressed form illustrated in Figure 2.

The packing unit 14 is connected to upper and lower disks or plates 16 and 18 respectively through the medium of fastening or connecting devices 19. If desired reinforcing or strengthening members 21 may be arranged interiorly or exteriorly of the packer and prevent the connection between the packer and the members 16 and 18 from being broken.

As illustrated in Figure 1, a stem 25 is extended centrally through the packer 14 and has its upper end connected to the cable 10 by a frangible element 26 so that when the strain exceeds a predetermined point the connection between the stem and the cable will be broken. As illustrated in Figure 1, the disk 18 is provided with a plurality of depending ears 28 to which locking pawls 29 are pivoted as indicated at 30. The pawls 29 are normally held out of engagement with the casing through the medium of a weight 31 connected by wires 32 to eyelets 33 formed on the inner sides of the pawls.

Figure 1 illustrates that the stem 25 is connected to the upper portion of the weight 31 by the frangible pin 33 and when an upward pull is exerted on the stem the weight 31 will be engaged with a relatively stationary guide member or tube 35 whereby to break the connection between the stem and the weight. When the weight 31 is thus released it exerts a downward pull on the links 32 and thereby swings the pawls outwardly into engagement with the wall of the casing 39.

When the pawls 29 are thus swung outwardly the elongation or stretching of the packer 14 is prevented so that a lateral expansion of the packer takes place. Figure 1 illustrates that a nut 40 is threaded on the stem at the lower portion of the packer and urges the lower cap or disk 18 downwardly with the result that the illustrated elongation of the packer is obtained. That is to say, the weight 31 will urge the stem down-

wardly so that the nut thereon will exert a downward pressure on the member 18 and consequently stretch the packer.

The upper disk 16 is provided with ears 42 having connection with pawls 43 which contact with the wall of the casing and thereby prevent the upward movement of the packer. The upper member 16 is connected to the stem 25 by means of frangible wires 45 and a cross head 46 rigidly secured to the rod 25. When an upward pull on the stem is exerted the wires 45 will be broken and the packer allowed to expand into engagement with the well.

The disk 18 is engaged by the nut 40 and the wires 45 which are connected to the cross head 46 and the disk 16 maintains the upper disk in spaced relation to the lower disk until such time as it is desired to set the packer.

In carrying out the invention the upper and lower disks may be of a suitable diameter, flat on the bottom with two or more pawls and the top disk may be made with a cylinder above the disk so that any number of pawls may be arranged in superposed or staggered relation. Also if desired, the lower disk may be made cone-shaped.

It will be seen that the nut 40 not only insures the stretching of the packer 14, but also prevents dropping of the weight with relation to the device prior to the breaking of the frangible pin 33.

Therefore, in use the device is lowered into the well by a cable 10 and when it reaches the proper point a slight upward pull is exerted on the cable with the result that the pawls 43 are engaged with the wall of the casing or well and further upward movement of the packer prevented. When the upward movement of the packing device is thus stopped a strain is placed on the frangible pin 33, that is to say the upward pull of the cable 10 forces the weight 31 into engagement with the relatively stationary tube 35 and the frangible pin 33 is thus broken, allowing the weight to swing the lower set of pawls 29 outwardly into engagement with the wall of the well.

The pet cocks 80 and 81 may now be opened for allowing the air and pressure above the packer to be discharged whereupon the pressure beneath the packer will expand the device so that it assumes the position illustrated in Figure 2.

In carrying out the invention the cap 5 may be provided with annular boss 93 to which anchor bolts may be connected in case there is a high pressure in the well.

Having thus described the invention, what is claimed is:—

1. A well packer comprising a pair of disks, a yieldable packing element arranged between the disks and connected thereto, pivoted pawls connected to said disks and adapted for engaging the wall of the well whereby to anchor the packing element, a stem extended through said packing element and adapted for connection with a lowering means and means frangibly connected to said stem for operating certain of said pawls.

2. A well packer comprising a pair of disks, a yieldable packing element arranged between the disks and connected thereto, pivoted pawls connected to said disks and adapted for engaging the wall of the well whereby to anchor the packing element, and a weight connected to said stem and to the lower pawls for urging the lower pawls outwardly into engagement with the wall of the casing whereby to permit the expansion of the packing element.

3. A packer for wells comprising a packing element of yieldable material, and a pawl arranged beneath said packing element, a weight having connection with said pawl for moving the same into engagement with the wall of the casing, and a lowering member having connection with said weight and normally holding the same in an inoperative position.

4. A stopper for wells comprising a packing element of yieldable material, a stem extended through the packing element, a weight having a frangible connection with said stem, a pawl actuated by said weight, and means associated with said stem for stretching the packing element during its descent and for limiting the downward movement of the weight with relation to the packing element during the descent of the stopper.

5. A stopper for wells comprising a packing element of yieldable material, a stem extended through the packing element, a weight having a frangible connection with said stem, a pawl actuated by said weight, and upper and lower disks arranged on opposite sides of said packing element, the lower disk constituting a supporting means for said pawl.

6. A stopper for wells comprising a packing element of yieldable material, a stem extended through the packing element, a weight having a frangible connection with said stem, a pawl actuated by said weight, and a stop element carried by said lower disk and arranged in the path of travel of said weight whereby the upward movement of the stem will break the frangible connection between the stem and the weight.

7. A stopper for wells comprising a packing element, upper and lower disks arranged on opposite sides of said packing element, means connecting said packing element to said disks, upper and lower pawls pivoted to said disks, a stem extending through said disks and said packing element, a weight

frangibly connected to said stem, links connected to said weight and to said lower pawls, means on said stem to transmit the load of said weight to said lower disk whereby to stretch the packer during its descent, and reinforcing means associated with said packing element.

8. A stopper for wells comprising a packing element, upper and lower disks arranged on opposite sides of said packing element, means connecting said packing element to said disks, upper and lower pawls pivoted to said disks, a stem extending through said disks and said packing element, a weight frangibly connected to said stem, links connected to said weight and to said lower pawls, means on said stem to transmit the load of said weight to said lower disk whereby to stretch the packer during its descent, and a tubular striking element receiving said stem and arranged in the path of travel of said weight.

9. A stopper for wells comprising a packing element, upper and lower disks arranged on opposite sides of said packing element, means connecting said packing element to said disks, upper and lower pawls pivoted to said disks, a stem extending through said disks and said packing element, a weight frangibly connected to said stem, links connected to said weight and to said lower pawls, means on said stem to transmit the load of said weight to said lower disk whereby to stretch the packer during its descent, and frangible means connecting said upper disk to said stem.

10. A stopper for wells comprising a packing element, upper and lower disks arranged on opposite sides of said packing element, means connecting said packing element to said disks, upper and lower pawls pivoted to said disks, a stem extending through said disks and said packing element, a weight frangibly connected to said stem, links connected to said weight and to said lower pawls, means on said stem to transmit the load of said weight to said lower disk whereby to stretch the packer during its descent, and a weight frangibly connected to said stem.

11. A well stopper comprising a body, a stem supporting the body, a weight carried by the stem, anchoring means having connection with said weight and operated thereby, and means to break the connection between the weight and the stem, whereby the weight may move said anchoring means to operative position.

12. A well stopper comprising a body, a stem supporting the body, a weight carried by the stem, anchoring means having connection with and operated by said weight, and means carried by said body and arranged in the path of travel of said weight to break the connection between the weight and the stem, whereby the weight may drop under force of gravity and move said anchoring means to operative position.

13. A well stopper comprising a body, a stem supporting the body, anchoring means having connection with the body, an operating member for said anchoring means, a frangible member connecting said stem and said operating member, there being means to break the frangible connection between the stem and the operating member whereby to allow the operating member to swing said anchoring means to operative position.

14. A well stopper comprising a body, pawls carried by the body, an operating member for the pawls, a stem having frangible connection with the operating member, and means receiving the stem and arranged in the path of travel of the operating member to break the connection between the stem and the operating member whereby to allow the operating member to swing the pawls to operative position.

GEORGE H. McLEAN.