Jan. 31, 1933. E. E. YOUNG 1,895,905

WELL PACKER

Filed Sept. 21, 1932

Fig. 1.

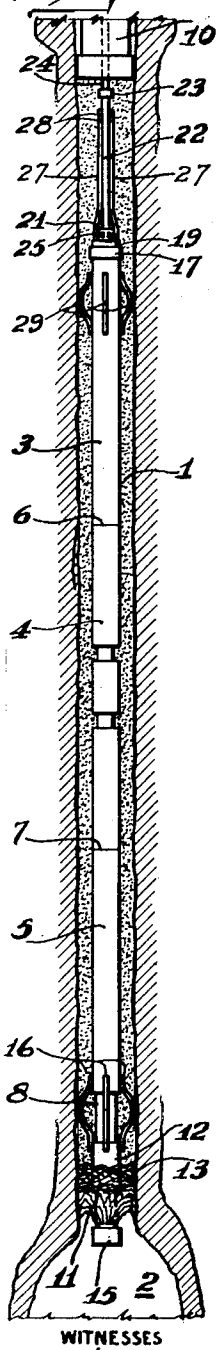


Fig. 2.

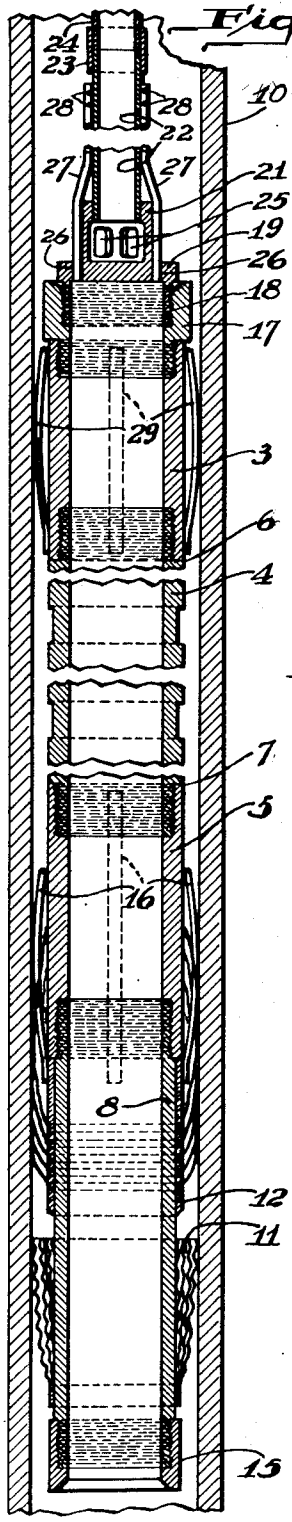
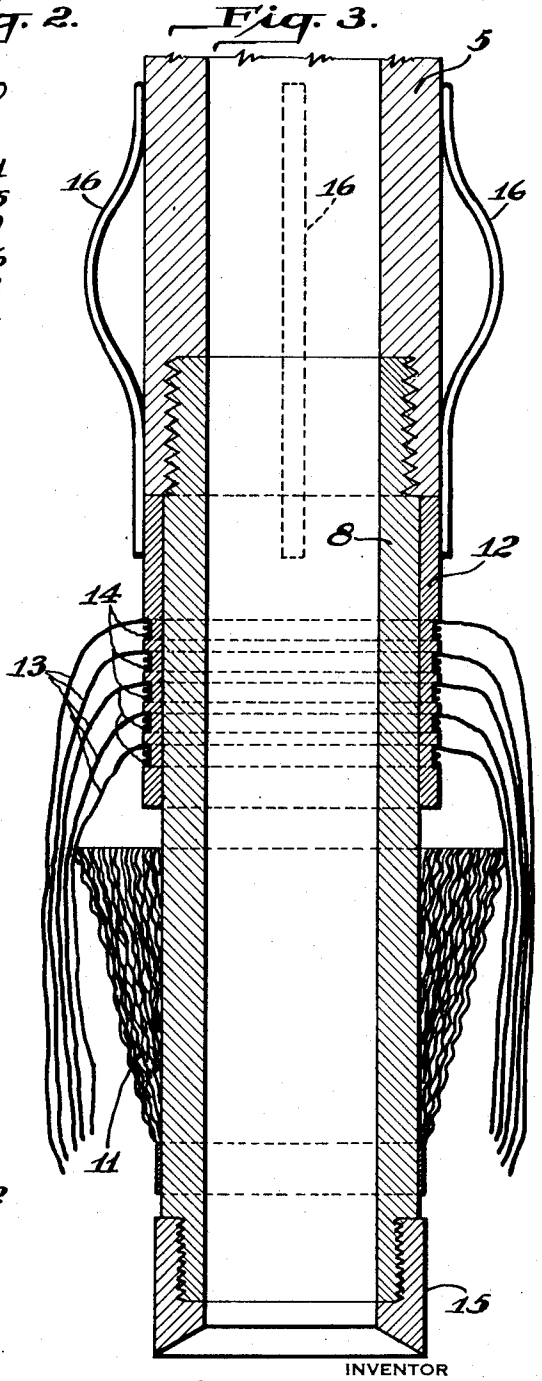


Fig. 3.



WITNESSES

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UNITED STATES PATENT OFFICE

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WELL PACKER

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This invention relates to what is known in the well drilling art as a well packer or cementing barrel.

The primary object of the invention is to provide an improved form of packer which, although it may be used in any part of the well, is especially adapted for use in building up the wall of a drilled well in the vicinity of a cave-in or shot hole to prevent the surface materials and liquids in the casing sinking to the bottom of the well and getting into the lower end of the well tubing.

A more particular object is to provide a packer of the aforementioned character which is equipped with a novel arrangement for getting the cement into the well bore about the packer and an efficient and effective basket construction capable of stopping up relatively large openings in a manner to support the cement at the lower end of the packer.

It is also an object to provide a packer which is simple and sturdy of construction, and in addition is adapted to be easily and dependably installed.

These and various other objects, as well as the various other novel features and advantages of the invention, will be apparent when the following detailed description is read in conjunction with the accompanying drawing of which, Fig. 1 is a view of a well bore in section illustrating a packer therein constructed in accordance with the invention; Fig. 2 an enlarged sectional view of the same packer showing it being lowered through the well tubing; and Fig. 3 a still further enlarged sectional view of the lower end of the packer.

Referring first to Fig. 1 of the drawing, a well bore 1 is shown having a shot hole 2 at its lower end, which is some distance below the end of the well casing 10. To prevent the wall of the well below the casing caving in or surface liquids or other materials getting into the well about the well tubing, and thereby ruining or seriously hampering the operation of the well, a cementing barrel or packer is provided in accordance with this invention for building up the wall of the well above the shot hole by lining it with cement.

In the embodiment of the invention shown the packer, as it is more aptly termed, is illustrated as comprising a series of tubular sections 3, 4 and 5 having inner and outer dimensions determined by the dimensions of the well casing 10 through which the packer must be lowered and the well tubing which must pass through it and joined together by flush screw joints 6 and 7 to permit their having a maximum outer diameter.

To provide for plugging up the well bore about the lower end of the packer so that a quantity of cement may be poured into the well and be supported by it until it hardens to form a lining for the well, a basket assembly is provided on the lower end of the lower barrel section 5. This assembly comprises a tube 8 threadably connected to section 5 which has an inner diameter that is the same as the rest of the packer, and an outer diameter which is somewhat smaller than the rest of the packer. On the lower end of this reduced section of the barrel there is mounted an inverted skirt of basket forming staves or wires 11 which are attached at their lower ends and adapted to flare out and engage the wall of the well, being made in varying lengths for use in different sized well bores. Above these flares, which are made as thick as will conveniently pass through a well casing, there is mounted a movable sleeve 12 on which there is attached a series of encircling layers of strips 13 of burlap or other suitable packing material for assisting the staves 11 blocking off a well bore so as to hold a lining of cement. While other means may be employed for such purpose, in the present instance to reduce the diameter of the packer as much as is possible, and thereby permit the use of the maximum amount of burlap which will pass through the well casing, the lower ends of these burlap strips are attached to the sleeve 12 by wiring them in grooves 14 cut in the sleeve.

To protect the lower end of the packer and prevent it from becoming deformed so that it will not interfere with the passage through the packer of the well shaft, a fitting 15 formed of hardened steel is attached to the lower end of tube 8. While for guiding the lower

end of the packer as it is lowered into a well, and for also maintaining it centralized in the bore once it is in position, a series of outwardly bowed spring clips 16 are attached at their lower ends to the burlap supporting sleeves 12 and positioned with their inwardly curved ends bearing against the exterior of the lower main barrel section 5 where they slide when the sleeve is moved.

At the upper end of the packer barrel there is provided a hardened fitting 17 which, in addition to functioning in the same fashion as the lower fitting 15 is provided with an internal thread 18 for the reception of a perforated connector plug 19. This connector plug is provided with a cup shaped crown 21 to which a pipe 22 having the same diameter as the well tubing is attached. This in turn is connected by an ordinary coupling 23 to the regular well tubing 24 which is employed to both lower the packer into the well and convey the cement into the bore about the packer barrel. To permit the cement which is poured into the shaft 24 in a liquid form to flow into the well bore over the top of the packer a series of holes 25 are cut in the side wall of the crown 21 and to permit the gas in the well to escape through the packer a pair of holes 26 is drilled in plug 19 and in these small tubes 27 are fitted and extended upwardly along the side of the pipe 22 to carry them above the cement when such is being poured, being provided near their upper closed ends with small openings 28 for the gas to escape through.

For guiding and maintaining the upper end of the packer centralized in the bore of the well like the lower end, a series of bowed spring guides 29, similar to the springs 16 attached to the sleeve 12, is provided near the upper end of section 3 of the barrel. The lower ends of these springs are soldered or otherwise attached to the barrel while their upper ends are allowed to slide along the wall thereof so that they can be collapsed to permit the packer to be lowered through the casing 10 of the well. These guides also function to lock the barrel in the cement lining in which it is cased when the barrel is completely installed.

To place the packer in a well, it is attached to the regular well tubing 24 and lowered through the casing 10, as shown in Fig. 2. When passing through this casing the basket forming wire staves 11 are forced closely against the sides of the lower tubular section 8 of the barrel. The strips of burlap 13 in a similar fashion hug the barrel, the friction between them and the casing causing the sleeve 12 to slide upwardly on tube 8 to a point above the staves 11, thereby affording the staves the maximum amount of space between the tube 8 and the casing 10. As soon as the barrel sinks below the end of the casing the staves 11 and the spring guides 16 and 29 expand until they engage the wall of the well bore, thereby maintaining the barrel in the same relative position in the bore which it had in the casing. However, as the packer sinks into a cavity, such as the shot hole 2, the basket forming staves 11 flare out sharply and the strips of burlap 13 fall down over them in the manner shown in Fig. 3. Then by pulling the packer back upwards into the bore, as is done, the staves 11 are caused to jam and buckle against the side of the bore and in doing so they, together with the burlap strip, form a substantially solid and fluid-tight plug about the base of the packer. During this plugging operation the sleeve 12 which supports the burlap packing above the wire staves when the packer is lowered through the casing 10 to thereby allow the maximum amount of staves to be used, permits the burlap to fall down onto the staves in the most advantageous position when the packer is pulled back into the well bore after being lowered to the shot ball, and also provides a yieldable attachment for the burlap strips whereby they are prevented from being torn from the barrel by the friction of the well wall as the packer is pulled into place.

After the packer has been anchored in the aforementioned manner cement is poured into the shaft 24 until a sufficient quantity has passed through the opening 25 in the crown of the attachment plug 19 to fill the cavity surrounding the packer barrel. In case too much cement is poured into the shaft to fill this cavity causing it to rise over the top of the packer barrel a bailer (not shown) is lowered into the shaft and the excess cement removed. As soon as the cement is poured the attachment plug 19 may be unscrewed and removed with the tubing 24 placing the well in readiness for use when the cement has set. To prevent the tubing 24 from coming apart above the packer when the plug 19 is unscrewed, the plug is attached to the top of the packer barrel by a thread having a reverse helix to that used in the tubing couplings; consequently, the unscrewing of the plug tends to tighten the tubing joints rather than uncouple them.

As will be appreciated from the foregoing, if it is desired to vary the length of the packer, which may be necessary in wells requiring different lengths of cement lining, the central section 4 of the barrel may be removed to shorten it or auxiliary sections may be inserted between the upper and lower sections 3 and 5 to lengthen it.

Among the outstanding advantages of the invention is the ease and perfection with which a packer constructed in accordance therewith may be installed and used for packing a well at the top of a shot hole. Prior hereto there has usually been considerable trouble encountered in the packing of shot wells, as prior packers were not capable of

packing such large cavities as are usually produced when a well is shot.

Another important advantage is that the regular well tubing may be used for placing the packer in the well, thus eliminating the carting of apparatus to the well not needed in its regular operation.

According to the provisions of the patent statutes, I have explained the principle and mode of operation of my invention, and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. A well packer comprising a liner barrel, an inverted skirt formed of upwardly and outwardly projecting flexible staves attached at their lower end to the lower end of said barrel, a sleeve loosely mounted on said barrel above said staves, a skirt of fibrous strips mounted on said sleeve, and means coupled to the top of said barrel for lowering it into a well and for by-passing cement into the well above its upper end.

2. A well packer comprising a liner barrel having a section of lesser diameter than the barrel proper forming its lower end, a cement supporting and well plugging basket assembly mounted on said lower barrel section consisting of an inverted skirt formed of upwardly and outwardly projecting staves attached at their lower end to the lower end of said liner barrel section, a similar skirt of fibrous material attached to a sleeve loosely mounted on said lower liner section above said staves, and means coupled to the top of said barrel for lowering it into a well and for by-passing cement into the well about the packer.

3. A well packer comprising a liner barrel having a section of lesser diameter than the barrel proper forming its lower end, a cement supporting and well plugging basket assembly mounted on said lower barrel section consisting of an inverted skirt of upwardly and outwardly projecting staves attached at their lower end to the lower end of said lower barrel section, a sleeve movably mounted above said staves, a skirt of fibrous strip attached to said sleeve to fall over said staves, and means coupled to the top of said main barrel for lowering it into a well and for by-passing cement passed through the lowering means into the well about the packer.

4. A well packer comprising a barrel formed of a plurality of tubular sections joined together by flush screw joints, an inverted skirt formed of upwardly and outwardly projecting and flexed staves attached at their lower end to the lower end of said barrel, a movable sleeve mounted on the barrel above said staves, a skirt of fibrous strips attached to said sleeve in a manner to fall over said staves, guiding means on said sleeve and the upper end of said barrel for maintaining the packer centralized in a well, and means at the top of the barrel for lowering it into a well and for by-passing cement over the top of the packer.

5. A well packer comprising a liner barrel, a plug provided with means for permitting gas to escape through it attached to the top of said barrel, means attached to said plug for connecting it to a well shaft for lowering it into a well and delivering cement to the top of the packer where it is passed through openings in said plug into the well, an inverted skirt of upwardly extending and outwardly projecting staves attached to the bottom of said barrel, a sleeve movably mounted on said barrel above said staves, and a skirt of fibrous material attached to said sleeve and adjusted to fall against said staves and assist the latter in forming a stopper between the packer barrel and the side of the well.

6. A well packer comprising a liner barrel having a section of lesser diameter than the barrel proper threadably attached to its lower end, a cement supporting and well plugging skirt of upwardly extending and outwardly projecting staves attached to the lower end of said lower barrel section, a sleeve mounted on said latter section above said skirt of staves, a plurality of layers of fibrous strips adapted to fall onto said staves mounted on said sleeve, means at the upper and lower end of said barrel for centralizing it in a wall, a plug attached by a reverse thread to the upper end of said barrel, gas escapement tube extended through said plug to a point above said barrel, and a tube connected to the top of said plug for lowering the packer into a well and delivering cement to the upper end where it is by-passed into the well through openings in the side of the plug.

In testimony whereof, I sign my name.

EDWARD E. YOUNG.