July 25, 1933. P. H. MACK 1,919,853

WELL PACKER

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Fig. 1.

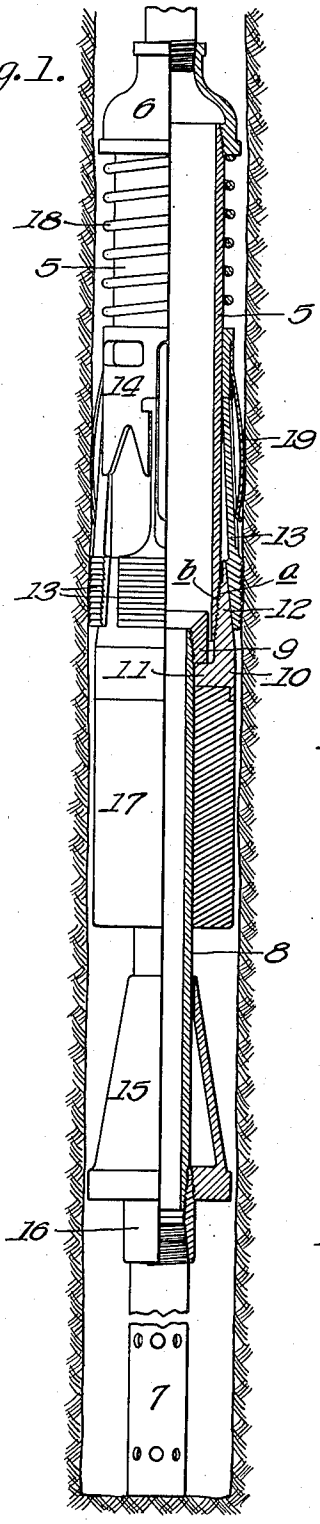
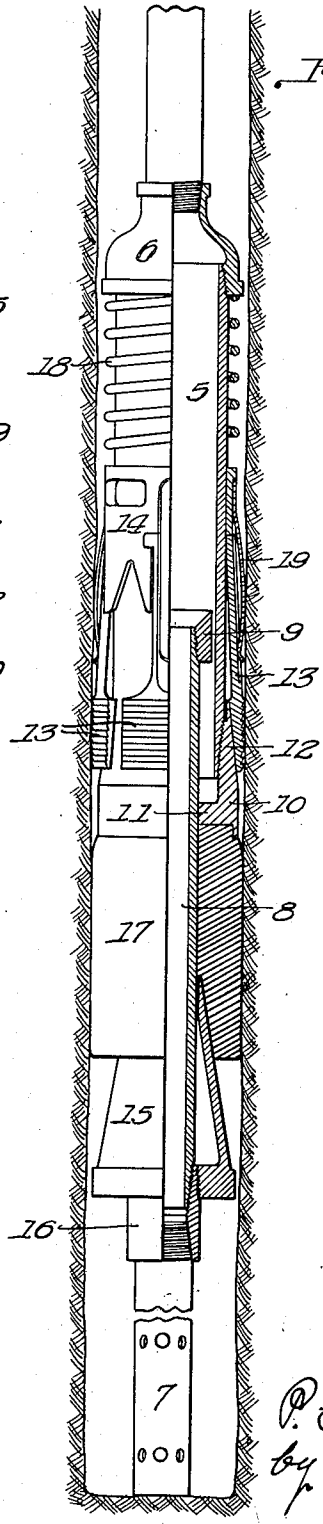


Fig. 2.



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Fig.3.

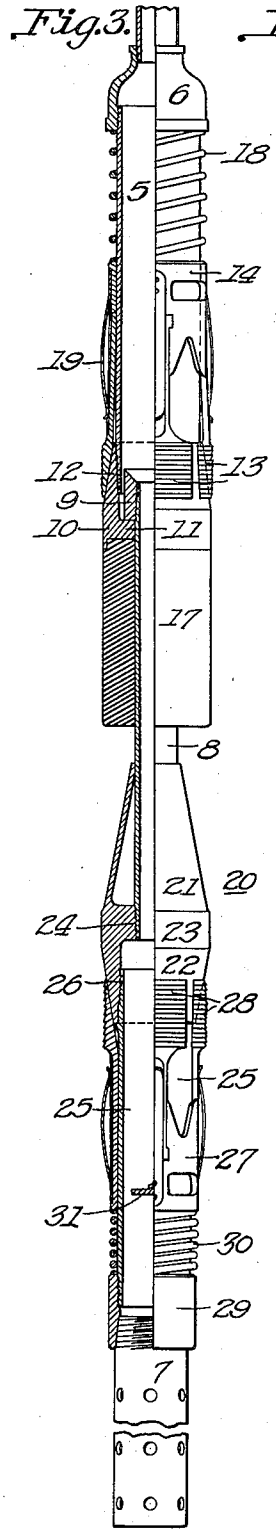


Fig.4.

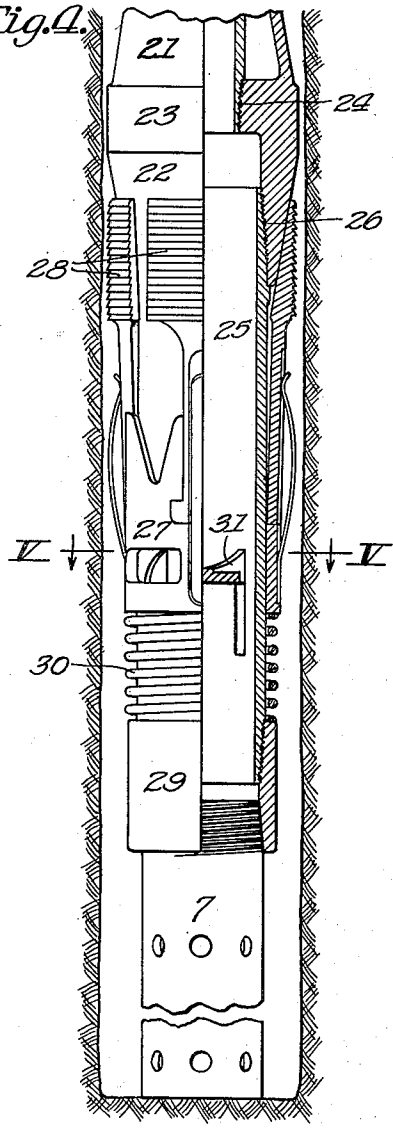


Fig.5.

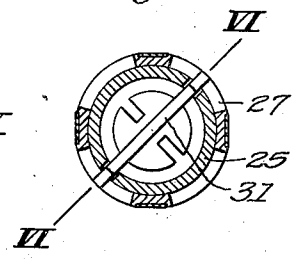
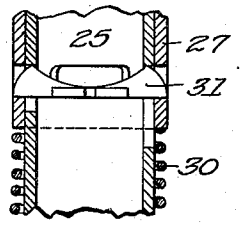


Fig.6.



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UNITED STATES PATENT OFFICE

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WELL PACKER

Application filed February 12, 1929. Serial No. 339,291.

This invention relates to well packers, and more particularly to a packer especially designed for use at the top of the oil sand to shut off water and to introduce a fluid pressure when required into the formation below the packer.

The prime object of the present invention is to provide a packer of the character stated embodying means for effectively sealing the well at the top of the oil sand, while at the same time permitting the introduction of a fluid under pressure to a point below the packer when desired.

In the accompanying drawings, which illustrate applications of my invention:

Fig. 1 is an elevational view, partly in section, showing my improved packing structure positioned in a well;

Fig. 2, a view similar to Fig. 1, showing the parts in packing position;

Fig. 3, a modified form of my invention, showing a double slip construction;

Fig. 4, an enlarged detail view of a portion of Fig. 3, showing the modified construction;

Fig. 5, a sectional view on the line V—V of Fig. 4; and

Fig. 6, a sectional view on the line VI—VI of Fig. 5.

Referring to the drawings, the packer structure or shut-off tool, as illustrated and as preferred, includes a hollow cylindrical body portion 5 having at its upper end a cap 6, the latter being designed to be coupled to a string of tubing or pipe by which it is lowered into the well in the usual manner.

In the drawings, I have shown two embodiments of my invention. In each form, the packer or tool is designed to be employed with a perforated pipe 7 secured to and depending from the bottom of the device. The lower end of pipe 7 is designed to rest on the bottom of the well when the packer is lowered to the desired operative position.

The packer structure, in each form of my invention, includes in addition to the body 5, an elongated sleeve 8 provided at its upper end with a collar 9. This sleeve 8 is connected with the body 5 by means of a coupling member 10 having a flange 11 to engage collar 9 and an upwardly extending tapered or wedging portion 12 internally threaded at *a* to engage an externally threaded portion *b* formed at the lower end of the body. Coupling member 10 thus functions through the wedging portion 12 as an expanding means for slips 13 depending from a slip cage 14 slidably mounted on the body 5.

Expanding coupling member 10 is mounted on sleeve 8 to have vertical movement thereon; and as the body is connected with coupling 10, the body and slip cage move relatively to the sleeve.

Located at the lower end of sleeve 8, I provide combined coupling and packer element expanding means, including a tapering or cone shaped element 15 and a collar 16; and interposed between the upper end of element 15 and member 10, I provide a packing element 17 of rubber or some other suitable packing material.

Surrounding the body 5 and disposed between the cap 6 and the upper end of the slip cage is a light coil spring 18. Spring 18 is provided to assist the setting of the slips, and is sufficiently light so that when the packer is being lowered into the well, the slips will be permitted to slide upwardly somewhat to relieve the pressure contact of the springs 19 of the slips against the side of the hole.

In setting the packer structure, it is let down into the well by a string of tubing until the perforated pipe 7 reaches the bottom of the hole. The tubing is then further lowered, causing a downward movement of coupling 10 and the packing element 17, sufficient to force said element over the cone shaped expander, thus expanding said element 17 into operative packing contact with the wall of the well. At the same time, the slips are forced out into tight engagement with the wall by means of the slip expander and coupling member.

In the embodiment of my invention as illustrated by the form of Fig. 3, I have shown a double slip construction or a packer having a plurality of oppositely disposed slips in combination with other elements entering into the packer structure. In this form, I have retained all the parts of the packer structure as described above, with the exception of the combined coupling and expanding means located at the lower end of the depending sleeve 8.

In place of the said combined coupling and expanding member of the form of Fig. 1,

I employ a slightly different construction, as shown at 20. Member 20, as illustrated and as preferred, is provided with an upper tapered or cone shaped portion 21 and a lower tapered or cone shaped portion 22, said portions projecting outwardly in opposite directions from a base 23. Base 23 is internally threaded, as at 24, to engage the lower end of the upper depending sleeve 8. In this form of my invention, I employ a second depending sleeve 25 secured to the lower tapered portion of coupling member 20 by a threaded connection, as shown at 26.

27 designates a slip cage freely mounted on the lower sleeve 25 having its slip members 28 thereof adapted to cooperate with the tapered portion 22 of member 20. Interposed between a collar 29 located at the lower end of sleeve 25 and the bottom of the cage, is a powerful spring 30. Spring 30 functions to drive the cage and its slips upwardly to expand the slips after a frangible retaining means or disc 31 is broken by dropping a weight down through the tubing, as is well known in this art.

In some oil fields or locations, it is desirable to employ the form of Fig. 1. This is especially the case where the fluid pressure is constant. Where the fluid pressure fluctuates, it is desirable to employ the form of Fig. 3, as this construction will positively prevent a vertical movement of the packer structure after being set, due primarily to the oppositely disposed slips operated by the oppositely extending inclined or tapered faces on which they are mounted.

It will be noted that in the event it is desired to introduce a fluid under pressure from the top of the well to a point below the packer, this may be readily accomplished, as there is an uninterrupted passage through my device that is in open communication with the string of tubing.

I claim:

1. A well packer including a hollow body member, a depending hollow sleeve, a coupling for connecting the sleeve to the body having a tapering slip expanding portion, a slip cage carrying slips cooperating with the said tapering portion mounted on the body, a cap on the body, a spring disposed on the body between the cap and the cage for moving the slips on the tapered portion, a packing expanding member carried by the sleeve, and a packing element on the sleeve disposed between the coupling member and the expanding member.

2. A well packer including a hollow body member, a depending hollow sleeve, a coupling for connecting the sleeve to the body for longitudinal movement relatively thereto, a packing-expanding member carried at the lower end of the sleeve, a packing element on the sleeve, said expanding member having means to engage a second sleeve, a second sleeve depending from the expanding member, slips mounted on the second sleeve, said expanding member having means for expanding said slips.

3. A well packer including a hollow body member, a depending hollow sleeve, a coupling for connecting the sleeve to the body for longitudinal movement relatively thereto, a packing-expanding member carried at the lower end of the sleeve, a packing element on the sleeve, said expanding member having means to engage a second sleeve, a second sleeve depending from the expanding member, a slip cage carrying slips mounted on the second sleeve, a frangible cage retainer and a spring for moving the slips on the expanding member upon breaking the said retainer.

4. In combination, a lower section of well tubing, an upper section of well tubing and a well packer connecting said sections including telescoping members carried respectively by the upper and lower sections of tubing, a packing element surrounding one of said members and connected to the other member to move therewith, the member surrounded by the packing element being provided with expanding means engageable by the packing element for expanding the same, and gripping means associated with each of said members to position the same in a well.

5. In combination, a lower section of well tubing, an upper section of well tubing and a well packer connecting said sections including telescoping members carried respectively by the upper and lower sections of tubing, a packing element surrounding one of said members and connected to the other member to move therewith, the member surrounded by the packing element being provided with expanding means engageable by the packing element for expanding the same, gripping means associated with each of said members to position the same in a well, and frangible means for retaining one of said gripping means in inoperative position.

6. A well packer including a hollow body member, a sleeve telescoping with the body member, a pair of coupling members secured respectively to the sleeve and to the body member, slips on the body member and a packing element surrounding the sleeve, the coupling secured to the body member having an inclined outer surface for engaging the slips to expand the same.

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