Dec. 16, 1930. G. A. HUMASON 1,785,123

WELL PACKER

Filed Nov. 10, 1924 3 Sheets-Sheet 1

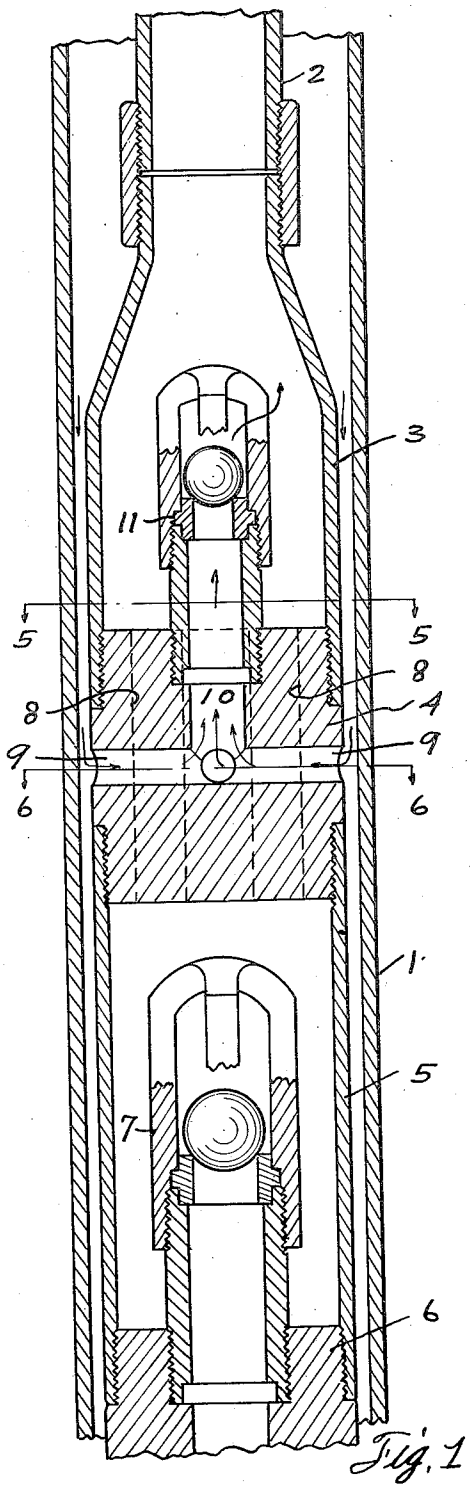


Fig. 1

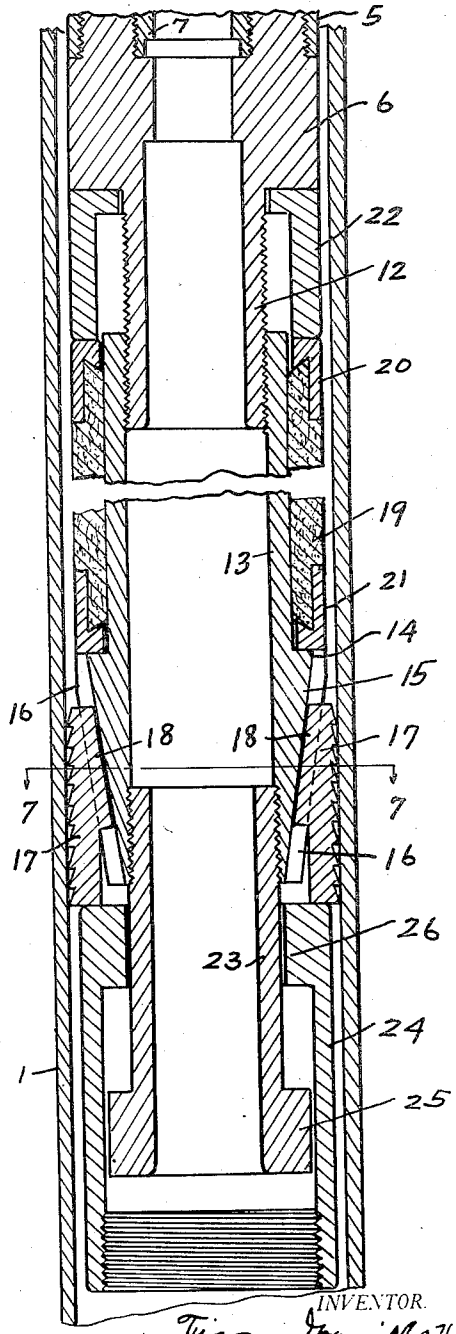


Fig 2.

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WELL PACKER

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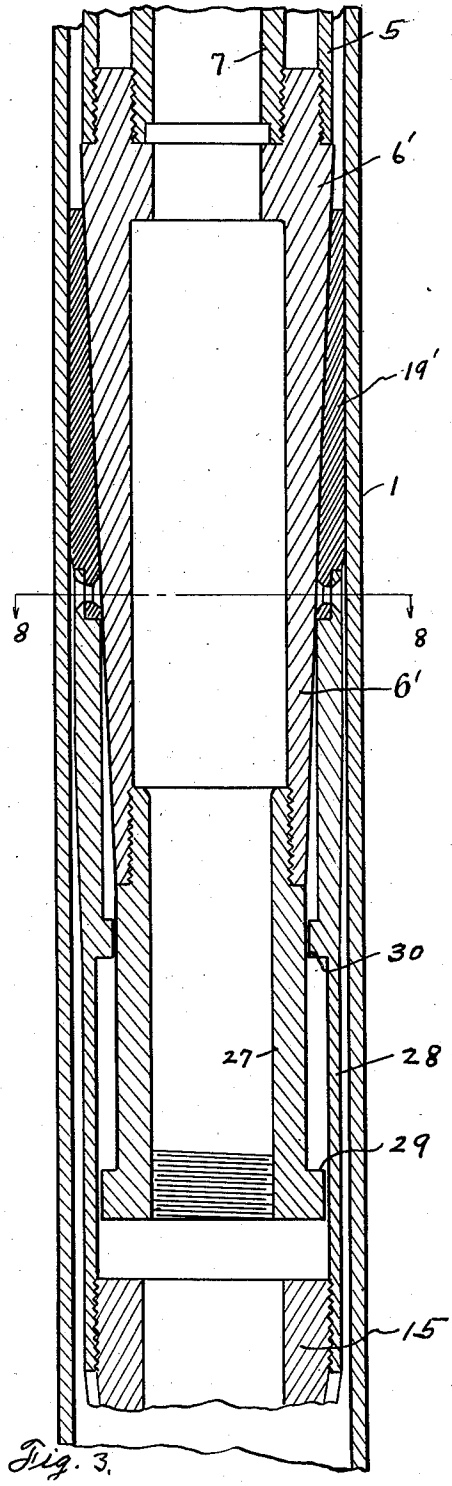


Fig. 3.

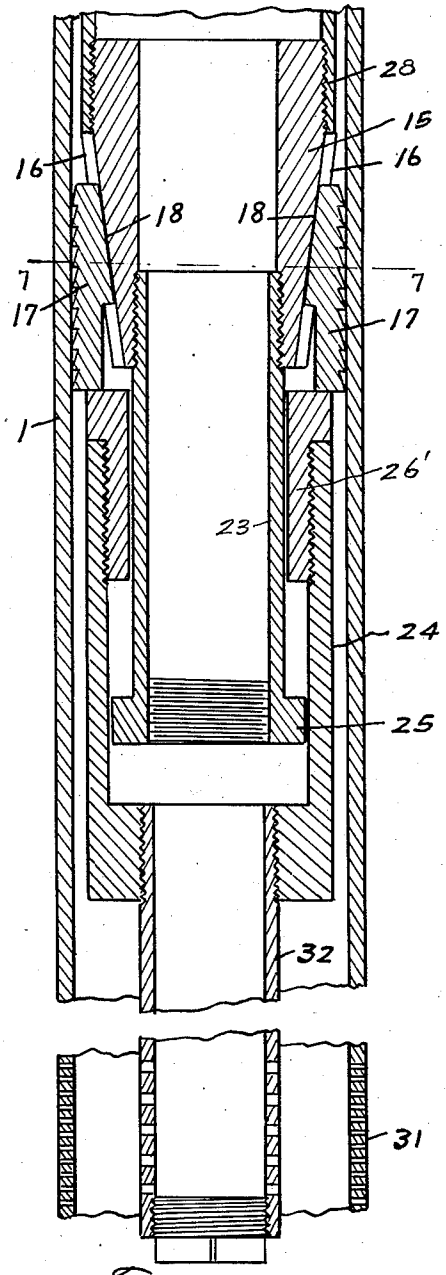


Fig. 4.

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WELL PACKER

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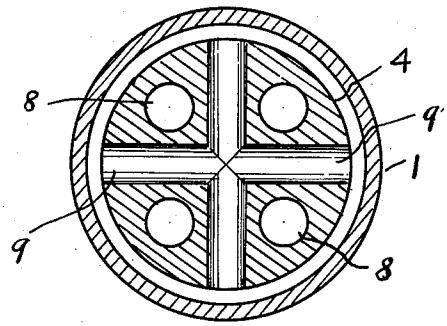


Fig. 6.

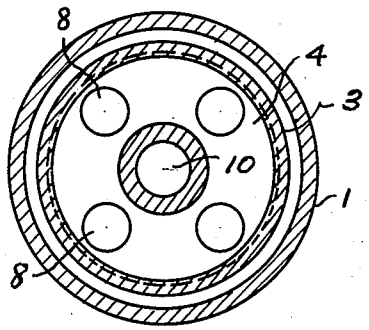


Fig. 5.

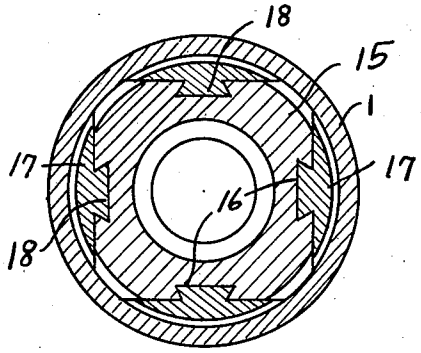


Fig. 7.

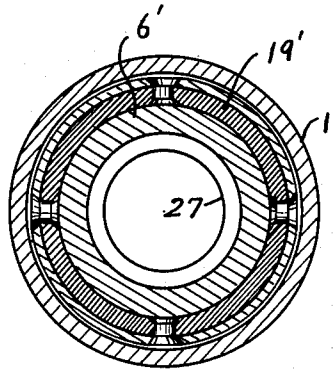


Fig. 8.

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Patented Dec. 16, 1930 1,785,123

UNITED STATES PATENT OFFICE

GRANVILLE A. HUMASON, OF HOUSTON, TEXAS

WELL PACKER

Application filed November 10, 1924. Serial No. 748,830.

This invention relates to new and useful improvements in a well packer.

One object of the invention is to provide a packer adapted to be attached to and suspended from a pump working barrel and designed to form a fluid tight joint, with the well liner or well casing, to prevent the fluid from passing up through the liner or casing around the pump, to the end that the fluid in the well beneath the packer will all pass upwardly through the pump and further that water, or other fluid, in the well above the packer will be cut off so that it will not mingle with the fluid being pumped.

Another object of the invention is to provide a well packer that may be easily and securely set.

A further object is to provide a well packer that may be released and removed from the liner or casing in case it is desired to remove the same.

With the above and other objects in view this invention has particular relation to certain novel features of construction, operation and arrangement of parts an example of which is given in this specification and illustrated in the accompanying drawings, wherein:—

Figures 1 and 2 show vertical sectional views of the upper and lower ends respectively of the device, said views together show one form of the device complete.

Figures 3 and 4 show vertical sectional views of intermediate and lower sections, respectively, of a modified form of the device, which taken together with the top section shown in Figure 1 illustrate a complete view, in vertical section, of said modified form.

Figure 5 shows a transverse sectional view taken on the line 5—5 of Figure 1.

Figure 6 shows a transverse sectional view taken on the line 6—6 of Figure 1.

Figure 7 shows a transverse sectional view taken on the line 7—7 of either Figure 2, or Figure 4, and

Figure 8 shows a transverse sectional view taken on the line 8—8 of Figure 3.

Referring now more particularly to the drawings, wherein like numerals of reference designate similar parts in each of the figures, the numeral 1 designates the well casing, or liner, and the numeral 2 designates the working barrel of the well pump. The lower end of this barrel is flared, forming a bell shaped casing 3 whose lower end is threaded onto the block 4. Depending from this block there is a tubular section 5 which supports the standing valve body 6, which in turn carries the standing valve 7 of any conventional construction. It is contemplated that the usual plunger (not shown) will work in the barrel 2 and will pump the fluid from beneath up through the standing valve 7 and on up through the channels 8 of the block 4. It is further contemplated that pressure fluid will be forced down through the casing or liner 1 around the pump and in through the radiating ducts 9, into the common central duct 10 and up through the upwardly opening valve 11 carried by the block 4. This pressure fluid will assist in ejecting the oil, or other fluid, being pumped, from the well.

Formed integrally with the valve body 6 and depending therefrom there is a tubular nipple 12 which is threaded into the upper end of a tubular mandrel 13. The lower end of this mandrel is enlarged, forming an annular shoulder 14 and beneath this shoulder the mandrel is downwardly tapered forming an expander 15, which is preferably substantially square in cross section, thus providing four tapering faces, each having a dovetailed groove 16. Engaging jaws 17 are mounted to slide on these faces and their inner sides have the dovetailed ribs 18 which work in said grooves. The outer sides of these jaws are arcuate and toothed. Around the mandrel 13 there is a sleeve-like packer 19 whose upper and lower ends are surrounded and protected by the cap-like washer rings 20, 21 the latter of which rests on the shoulder 14 and the former of which supports the gland 22 whose upper end abuts against the lower end of the valve body 6.

Depending from the mandrel 13 and attached to it are the telescoping coupling members 23 and 24, forming a slip joint connection and held in interlocking relation by the overlapping flanges 25 and 26. The lower end of the coupling member 24 is internally

threaded to receive a well screen or pipe which extends on down to the bottom of the bore.

The device is assembled, as shown in Figures 1 and 2 and let down into the well through the pump tubing connected to the barrel 2 and extending to the ground surface until the well screen, or other pipe depending from the coupling 24, rests on the bottom of the bore. The upper end of the member 24 will now abut against and stop the jaws 17 and as the mandrel 13 moves on down the expander 15 will expand said jaws into engagement with the liner, or casing 1. The pump tubing is now turned to the right, while the jaws 17 hold the mandrel 13 stationary, and as the nipple is thus screwed down into the mandrel the packing sleeve 19 will be expanded against the liner, or casing 1 forming the desired fluid tight joint. The packing may be released by a reverse rotation of the pump tubing and the entire mechanism thus withdrawn from the well if desired.

In the form illustrated by Figures 1, 3 and 4 the valve body 6 is elongated downwardly, as well as downwardly tapered, forming in effect a mandrel 6′ which wedges through the surrounding packing sleeve 19′, formed of soft metal, such as lead, or other packing material, and whose inside is contracted downwardly to conform to and snugly receive said mandrel 6′. Connected to the lower end of this valve body 6′ are the telescoping tubular couplings 27, 28, forming a slip joint and having the overlapping interlocking flanges 29, 30. The coupling member 28 is extended upwardly and connected to the packing member 19′ by means of suitable rivets, or otherwise as desired. In this form the expander 15 is carried by the coupling 28 and operates the engaging jaws 17 as described. Depending from the expander 15, Figure 4, are the tubular telescoping connections 23, 24, forming a slip joint, the former of which is connected to the expander 15 and this connection is provided with an external flange 25 at its lower end, and screwed into the upper end of the connection 24, there is a gland 26′ which is adapted to interlock with said flange.

The well screen 31, is connected to the lower end of the liner 1 and a perforated pipe 32 is connected into the lower end of the coupling 24, said screen or perforated pipe being adapted to rest on the bottom of the bore.

This form of device is assembled as shown in Figures 1, 3 and 4 and let down into the well bore until the screen 31 or pipe 32 rests on the bottom of the bore. The gland 26′ will now engage with and stop the jaws 17 and the expander 15 will move on down and wedge between said jaws and expand them into engagement with the liner or casing 1. The packing sleeve 19′ will now be held stationary but the mandrel like body 6′ will be permitted to move on down into the packing 19′ and will expand and set the same to form a fluid tight joint with said liner.

This type of packing may be readily removed by an upward pull on the pump tubing.

What I claim is:—

1. The combination with a tubular member adapted to rest on the bottom of the well bore and having an external abutment and formed of telescopically arranged parts having interengaging shoulders and also having a limited slidable movement relative to each other, of a mandrel connected to the upper end of one of said telescoping parts and formed with an expander, an expansible sleeve around said mandrel, end abutments associated with the mandrel and confining said sleeve, anchoring means adapted to cooperate with said expander and to be engaged and actuated by the abutment on said tubular member into engagement with the walls of said bore.

2. The combination with a standing valve body having a depending tubular nipple, of a tubular mandrel having a threaded connection with said nipple, a tapering expander carried by the lower end of the mandrel and formed with a shoulder, an expansible element around the mandrel and resting on said shoulder, a gland between the valve body and the upper end of said expansible element, engaging jaws associated with said expander, a tubular member whose lower end is adapted to rest on the bottom of the well bore and whose upper end forms an abutment adapted to operate against said jaws, a coupling member attached to said expander and telescoping into said tubular member, said tubular member and coupling member having means which interengage upon upward movement of the coupling member relative to the tubular member.

3. The combination with a standing valve body, of a depending tubular nipple beneath and connected to said body a tubular mandrel connected to said nipple, a tapering expander beneath the mandrel, an expansible element around said mandrel, engaging jaws associated with said expander, a tubular member whose lower end is adapted to rest on the bottom of the well bore and whose upper end forms an abutment adapted to operate against said jaws, a coupling member attached to said expander, said coupling member and tubular member being telescopically arranged and having means which interengage upon upward movement of the coupling member relative to the tubular member.

In testimony whereof I have signed my name to this specification.

GRANVILLE A. HUMASON.