June 6, 1933. L. C. TILBURY 1,912,805

WALL PACKER

Filed July 6, 1931 2 Sheets-Sheet 1

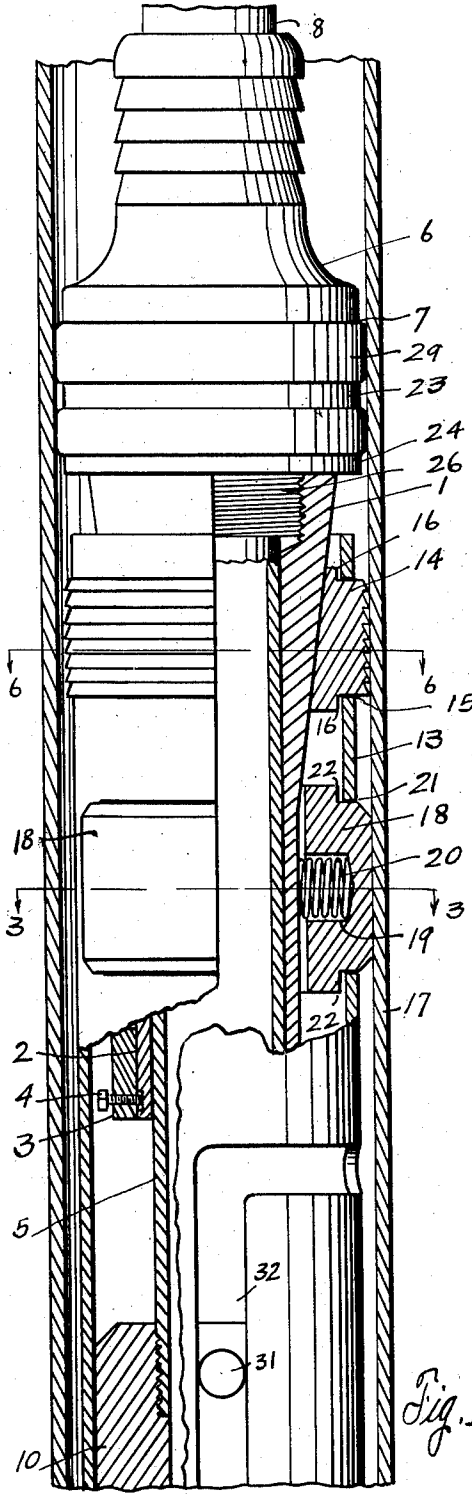


Fig. 1.

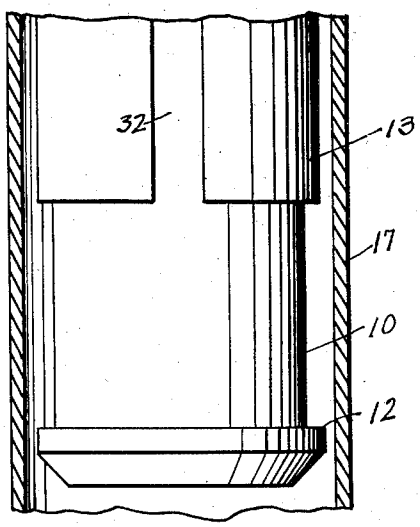


Fig. 2.

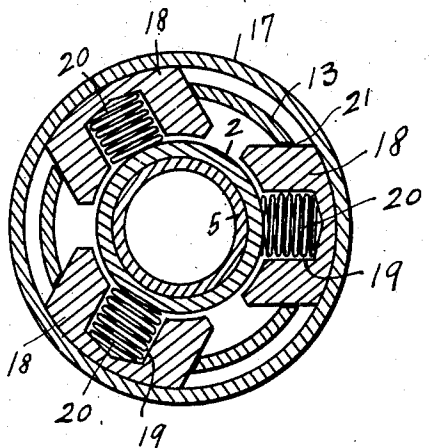


Fig. 3.

Inventor

Lyle C. Tilbury

By Hardway & Cathey

Attorneys

June 6, 1933. L. C. TILBURY 1,912,805

WALL PACKER

Filed July 6, 1931 2 Sheets-Sheet 2

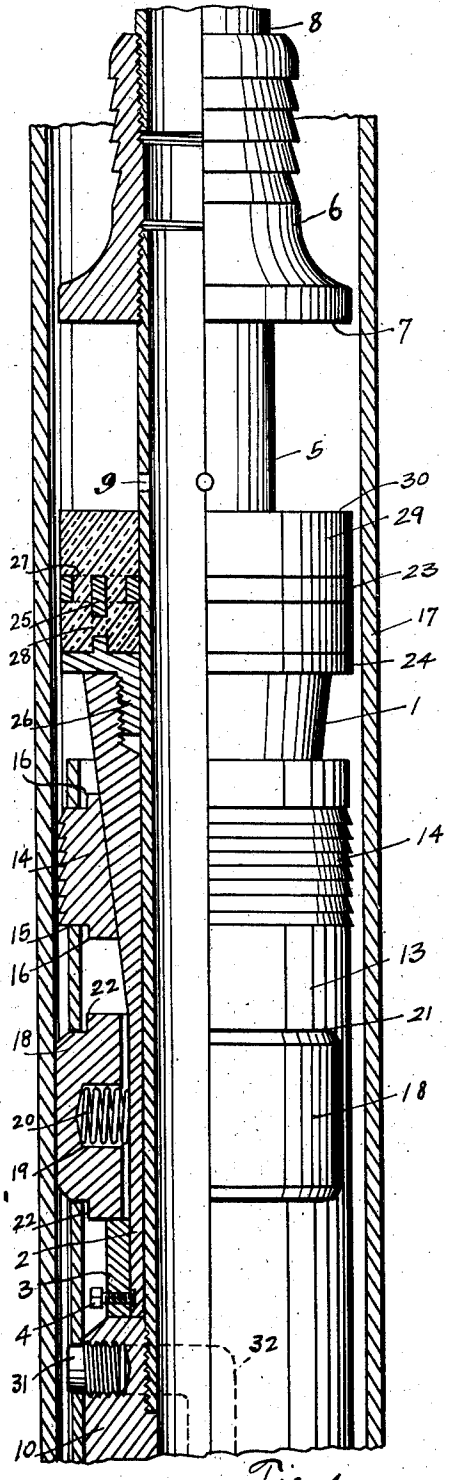


Fig. 4.

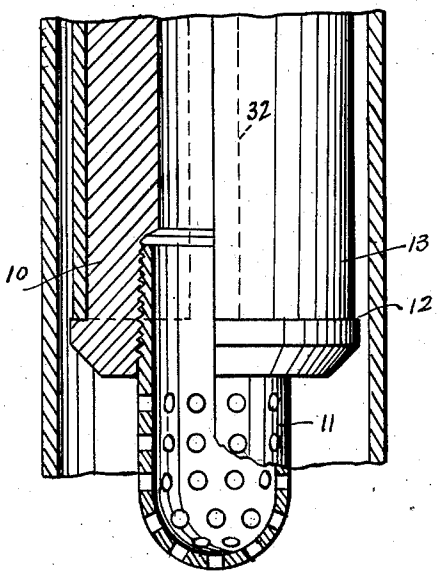


Fig. 5.

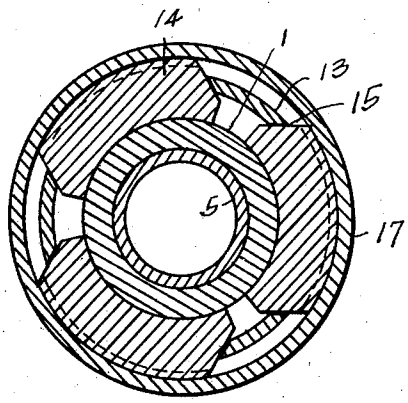


Fig. 6.

Inventor

Lyle C. Tilbury

By Hardway & Cathey

Attorney

Patented June 6, 1933 1,912,805

UNITED STATES PATENT OFFICE

LYLE C. TILBURY, OF HOUSTON, TEXAS

WALL PACKER

Application filed July 6, 1931. Serial No. 548,855.

This invention relates to a wall packer.

One object of this invention is to provide apparatus of the character described whereby a fluid tight seal may be formed between a pipe let down into a well and the surrounding casing or other wall of the well bore.

Another object of the invention is to provide a packing apparatus of the character described that may be maintained in its collapsed position while being lowered or raised in the well but which may be fixed at any desired place in the well and the packing element expanded to form a fluid tight seal between the casing and the string of tubing or inside pipe carrying the packing apparatus.

A further object of the invention is to provide a device of the character described having a drain port which is open when the packer is collapsed to permit the fluid in the well above to drain through into the well beneath as the packer is elevated in the well.

With the above and other objects in view the 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:

Figure 1 shows a fragmentary sectional view, showing the packer set in the well casing.

Figure 2 shows a fragmentary side view of the lower end thereof.

Figure 3 shows a transverse sectional view taken on the line 3—3 of Figure 1.

Figure 4 shows a fragmentary side elevation partly in section, showing the device in collapsed position.

Figure 5 shows a fragmentary side elevation partly in section of the lower end thereof, and

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

Referring now more particularly to the drawings, wherein like numerals of reference designate similar parts in each of the figures, the numeral 1 designates an upwardly flared tubular mandrel whose lower end is extended downwardly forming the sleeve 2 around the lower end of which there is a ring 3 secured thereto by means of suitable set bolts 4. Slidable through said mandrel and sleeve there is a tube 5 to the upper end of which is attached the head 6 having the flat under face 7 and the lower end of the setting string, or pipe, 8, is connected to said head and extends to the ground surface. Beneath the head the tube 5 has the drain ports 9 for a purpose to be hereinafter described.

Attached to the lower end of the tube 5, beneath the mandrel sleeve 2 there is an enlarged tubular guide 10 and a perforated cage 11 may have its upper end connected into said guide as shown in Figure 5 to prevent a swab, or bailer, if later used in the tubing, from passing through the said tubing and being dropped into the well.

There are the casing engaging jaws 14 whose inner faces are formed to conform to the shape of and to fit against the flared mandrel 1 and these jaws work through suitable openings 15 in the upper end of the housing 13. The outer ends of the jaws 14 are reduced forming the inside shoulders 16 to limit their outward movement and their outer surfaces are toothed to engage the well casing 17.

Beneath said jaws and located within the housing are the friction members 18 having the inside sockets 19 in which are located the coil springs 20 whose inner ends bear against the mandrel sleeve 2 and normally hold the outer ends of the friction members projected through the openings 21 in the housing 13 and provided for the purpose of holding the housing at a selected place in the casing when it is desired to set the packer. The friction members 18 have their outer ends reduced, forming the inside shoulders 22 which limit their outward movement.

Located on the upper end of the mandrel 1 there is a cage having the upper and lower annular metal plates 23, 24 connected by the annular web 25 and the lower plate has the depending outwardly threaded nipple 26 which is screwed into the upper end of the mandrel. The upper plate 23 has the

openings 27 therethrough and the web 25 has the openings 28 therethrough and there is an expansible element 29 preferably formed of rubber moulded onto this cage and anchored in place thereby and having the upper flat face 30 confronting the lower face 7 of the head.

The guide 10 has a projecting pin 31 which is arranged to move in the J-slot 32 in the housing 13. When the apparatus is assembled as shown and the pin 31 moved into the laterally turned upper end of the J-slot 32, the expander head 6 will be held spaced above the expansible packing element 29 and as thus assembled the packing device may be lowered into the well. The friction members 18 will be held in frictional engagement with the walls of the bore during the lowering operation and the ring 3 will engage the friction members 18 to limit the upward movement of the mandrel and packing and to prevent the engagement of the packing with the head 6 and the expansion of the packing while going in. If it be now desired to set the packer, that is to expand the packing element 29 against the surrounding walls of the bore, the setting string 8 may be appropriately turned to carry the pin 31 out of the laterally turned portion of the J-slot 32. Said friction members 18 will hold the housing 13 against turning during this operation. The string 8 and the stem 5 may now be lowered, but the friction members 18 will hold the housing 13 stationary during this lowering movement and the weight of the mandrel and the expansible packing element will move the wall engaging jaws 14 outwardly into contact with the walls of the well and when the expander head 6 lands on said packing element 29, the additional weight will cause the mandrel 1 to expand the jaws 14 into secure engagement with the casing 17 or other walls of the well, and said expansible packing element will thus be anchored against downward movement and the weight now sustained by said packing element will cause the expansion thereof outwardly against the walls of the well to form a fluid tight joint with said walls.

The packer will usually be set beneath the level of the oil in the well and the oil and gas beneath will now be forced to flow up through the cage 11 and tube 5 and out through the setting string 8 which serves as a flow line, the gas pressure thus being utilized to create the flow. The reduction of the capacity of the outlet line for the well fluid may cause the fluid produced by the well to flow voluntarily from the well and it is for this purpose primarily that a smaller flow line than the pipe or casing 17 is introduced into the well and packed as above described. However, the type of packing mechanism disclosed is capable of general use for forming a fluid tight joint between an outer pipe and an inner string in a well.

In case it may be desired to unseat, that is to collapse the packer, the setting string 8 may be elevated to lift the expander head 6 from the packing element 29 and this will permit said packer element to contract and release the walls of the well and the upper end of the guide 10 will abut the lower end of the mandrel sleeve 2 forcing the mandrel upwardly and cause it to release the jaws 14 permitting said jaws to relax and the entire apparatus may then be pulled out of the well or relocated therein. If it should be desired to relocate the apparatus deeper in the well, the string 8 should be turned to the left to carry the pin 31 again into the laterally turned portion of the J-slot 32 so as to lock the parts in inactive position while the apparatus is being lowered.

When the expander head 8 is elevated or lifted up from the packing element 29 as above explained, the ports 9 will be uncovered and the fluid in the well above the head 6 will be permitted to drain through the ports 9 into the well beneath, while the device is being pulled from the bore so that the weight of the fluid column above will not hold the packer expanded against the walls of the well.

The drawings and description disclosed what is now considered to be a preferred form of the invention by way of illustration only while the broad principle of the invention will be defined by the appended claims.

What I claim is:

1. A packer for wells including a tube, a mandrel slidable thereon, an expansible packing element on the mandrel, a tubular housing around the mandrel having openings, a head on said tube, means connecting the tube to the housing to hold the head and packing element spaced apart, friction means working through the openings of the housing and in frictional engagement with the surounding wall of the well, said connecting means being releasable to permit, the head to land on said element to expand the same, and means arranged to be actuated by the mandrel into engagement with the walls of the well to anchor the mandrel to said walls.

2. A packer for wells including a tube, a mandrel thereon, an expansible packing element on the mandrel, a housing about the mandrel having bearings, friction means working through bearings of the housing adapted to engage the walls of the well, anchoring means working through bearings of the housing arranged to be actuated by the mandrel into engagement with the walls of the well to anchor said mandrel to said walls, a head on the stem, means connect-

ing the tube to said housing to hold the head spaced from said packing element, said connecting means being releasable to permit said head to land on said packing element to expand said element and to force said anchoring means into engagement with said walls.

3. A packer for wells including a tube, a mandrel thereon, a housing associated with the mandrel and having openings, friction means working through the housing openings adapted to engage the walls of the well, anchoring means working through the housing openings adapted to be actuated by the mandrel into engagement with said walls, an expansible element on the mandrel, a head on the tube, means for connecting the tube to the housing to hold said head above said packing element, said connecting means being releasable to permit said head to land on said element.

4. A packer for wells including a tube having a drain passageway, a head on the tube, a mandrel through which the tube is slidable, an expansible packing element on the mandrel, a housing around the mandrel having bearings, friction means on the housing working through some of said bearings to engage the walls of the well, anchoring means on the housing working through other of said bearings adapted to be actuated by the mandrel into engagement with the walls of the well, means for connecting the tube to the housing to hold said head and passageway above said expansible element interengaging means to limit the upward movement of the packing element relative to the housing, said connecting means being releasable to permit said head to land on said element.

5. A packer for wells including a tube, a mandrel through which said tube is slidable, a packing element on the mandrel having a substantially plane upper face, an expander on the tube above said packing element having a substantially plane underface, a tubular housing around the mandrel and having bearings, means working through the housing bearings for anchoring the mandrel to the walls of the well, means arranged to interlock with said housing to support said expander spaced above said packing element said locking means being releasable to allow the expander to land on said packing element to expand the same.

6. A well packer including a tube having an expander thereon and having a liquid passage beneath the expander, an expansible packing element on the tube beneath said expander, means for releasably anchoring said packing element in the well, said anchoring means including a housing having bearings, a mandrel in the housing supporting the packer and jaws working through the housing bearings and adapted to be actuated by the mandrel into engagement with the walls of the well, said tube being movable downwardly, relative to said element to close said passage and to land said expander on the element to expand the same and the tube being movable upwardly relative to said element to release the expander from said packing element and to uncover said passage.

7. A packer for wells including a tube, a mandrel slidable thereon, an expansible packing element on the mandrel, a tubular housing around the mandrel having openings, a head on said tube, means connecting the tube to the housing to hold the head and packing element spaced apart, friction means working through the housing openings and in frictional engagement with the surrounding walls of the well, said connecting means being releasable to permit the head to land on said element to expand the same, wall engaging jaws mounted in the housing working through housing openings and arranged to be actuated by the mandrel into engagement with the walls of the well to anchor the mandrel to said walls.

8. A packer for wells including a tube, a mandrel slidable thereon, an expansible packing element on the mandrel, a tubular housing around the mandrel, a head on said tube, means connecting the tube to the housing to hold the head and packing elements spaced apart, yieldably mounted friction means working through the wall of said housing and in frictional engagement with the surrounding walls of the well, means arranged to interlock the housing and mandrel arranged to limit the upward movement of said mandrel and packing element thereon relative to the housing, said connecting means being releasable to permit the head to land on said element to expand the same and wall engaging jaws working through the housing and arranged to be actuated by the mandrel into engagement with the walls of the well to anchor the mandrel to said walls.

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

LYLE C. TILBURY.