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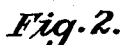
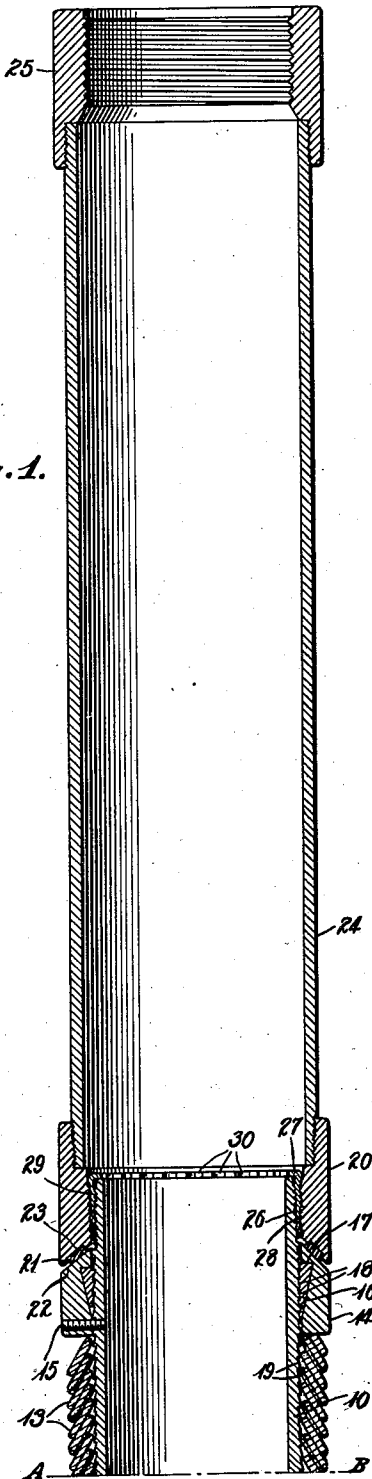
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1,827,842

WELL PACKER

Filed May 31, 1930

3 Sheets-Sheet 1



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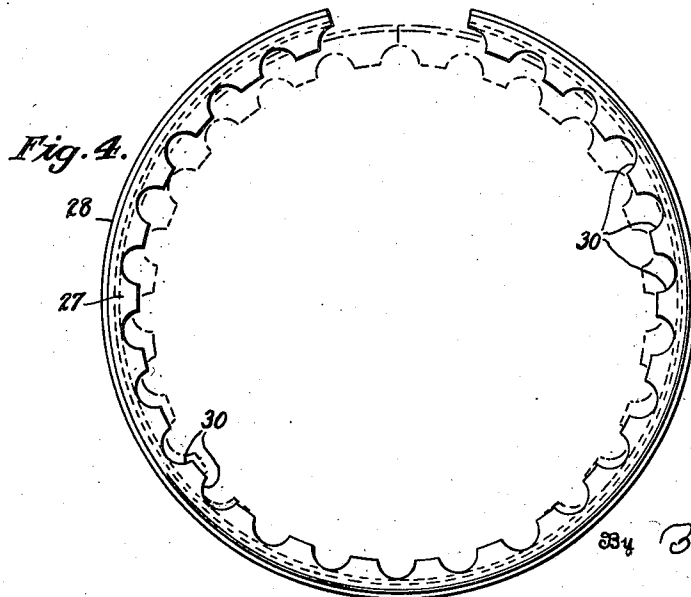
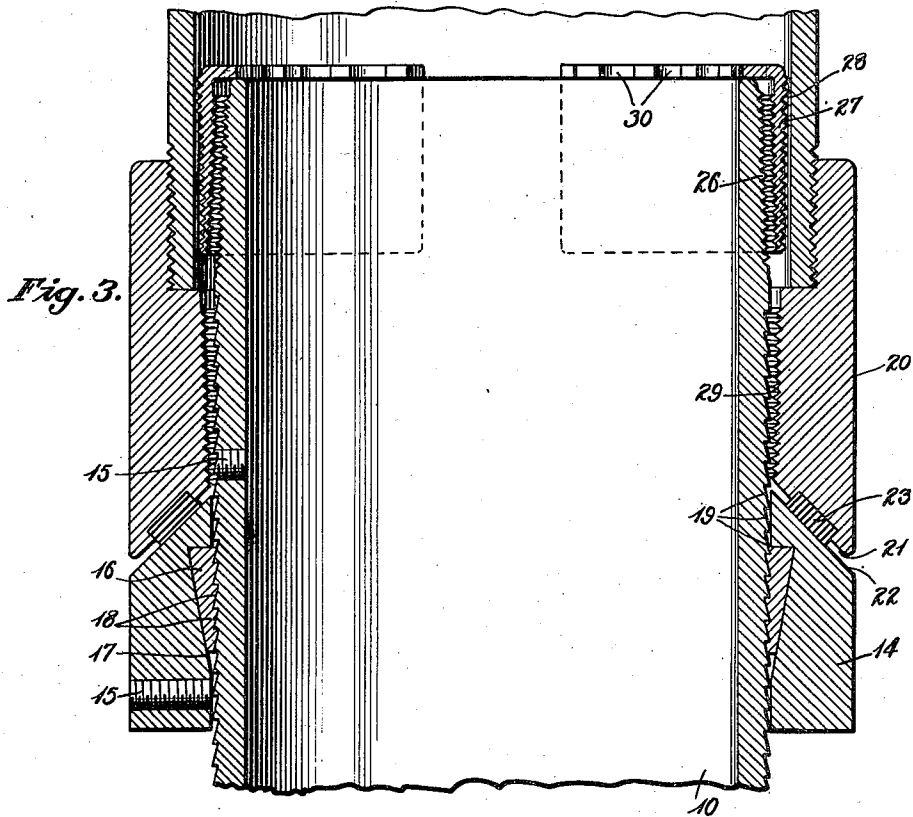
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Fig. 5.

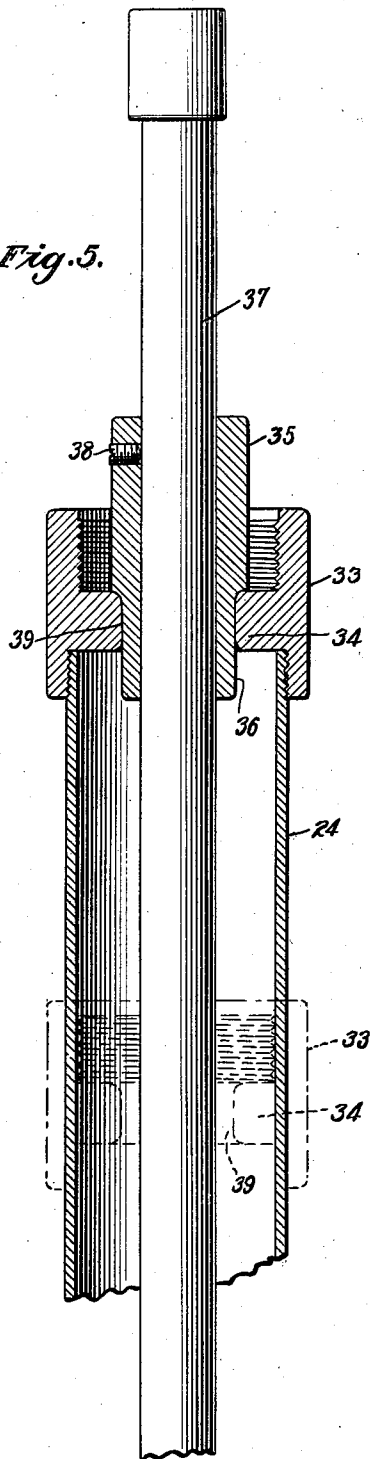
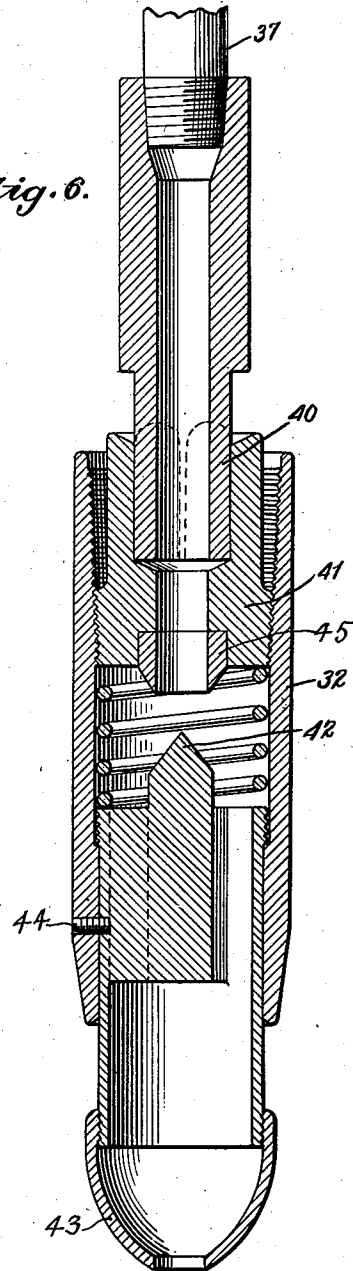


Fig. 6.



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UNITED STATES PATENT OFFICE

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WELL PACKER

Application filed May 31, 1930. Serial No. 458,324.

The invention relates to well packers and has as an object the provision of a packer which may be lowered to place, by means of a drill stem or the like, and which may be set without the use of a setting tool, and after it has been sealed to the well casing, the let down stem may remain in the well, sealed to the packer, so as to permit the fluid of a flowing well to pass through said let down pipe, which is removable and may be pulled out of the well after it has ceased to flow.

It is an object of the invention to provide a well packer which may be used either with or without a wash pipe, and in case a wash pipe is used to permit it to remain in the well during the flowing period, with provision for free passage of the fluids, by the wash pipe through the packer and upward through the let down stem, to the surface of the ground.

It is a further object of the invention to provide a well packer which may be let down into place with a string of casing which will constitute a liner for the well, so that by a single operation, the packer may be set and sealed to the well casing, the let down string remain sealed to the packer, and, on account of the peculiar construction of the packer and setting provisions the well may be finished with casing or piping of any desired size, which will constitute an open unrestricted tube from the bottom of the well to the surface of the ground.

Further objects of the invention will appear from the following description when read in connection with the accompanying drawings showing an illustrative embodiment of the invention and wherein:

Fig. 1 is a vertical central section of the upper portion of the packer;

Fig. 2 is a downward extension of the structure of Fig. 1 shown partly in side elevation;

Fig. 3 is a detail vertical section upon an enlarged scale of the upper portion of the packer when the setting operation is partially completed;

Fig. 4 is a plan view of a ring used in connection with the setting means;

Fig. 5 is a central vertical section of a special form of coupling for the upper end of the packer, a portion of a wash pipe, and a

bushing mounted thereon, which affects a closure of the space between the said bushing and wash pipe; and

Fig. 6 is a central vertical section of a form of foot valve which may be used with the wash pipe of Fig. 5.

As shown the packer utilizes packing means of the nature shown in my co-pending application Serial Number 320,178, filed November 17, 1928, Well packers and setting tools therefor, comprising a cylinder 10 having a shoulder 11 desirably formed by shrinking a ring 12 on the surface of the cylinder 10 or by welding the ring to said surface.

The packing material which it is preferred to use and which is of the nature described in my co-pending application above referred to comprises a strip or a plurality of strips 13, of hard braided or woven cotton or the like similar to lamp wicking but larger and harder braided or woven, wound spirally in overlapping relation upon the surface of cylinder 10. To push the packing strips 13, or other packing material which may be utilized, downwardly to compress the same against the shoulder 11, there is shown a ring 14 which may be initially held in place upon the cylinder 10 with the packing in uncompressed condition by means of a frangible pin 15 as of brass, said pin projecting through an opening in the ring 14 and into an opening in the cylinder 10.

To prevent the ring 14 from being forced upwardly by resilience of the packing after compression thereof, there is shown a split ring 16 which is downwardly wedge-shaped in cross section lying in a groove 17. The ring 16 is shown as formed with grooves 18 upon its interior surface which coact with ridges 19 upon the exterior of the cylinder 10.

To compress the packing by forcing the ring 14 downwardly, a sleeve 20 is shown surrounding the cylinder 10 and coacting with the ring 14 at desirably frusto-conical surfaces 21, 22 upon the sleeve and ring respectively, a packing ring 23 as of rubber, leather, lead or the like being carried in a groove in the surface 21 to seal the joint between the groove and ring.

The sleeve 20 is shown as coupled to a piece

of pipe 24 provided with a coupling 25 at its upper end which may be screwed to the drill stem or other string of pipe for lowering the device.

5 To connect the sleeve 20 to the cylinder 10, the cylinder 10 is shown as provided with a tapered thread 26 at its upper extremity co-acting with a split ring 27 bearing internal and external right-hand threads, both sets of
10 threads being preferably tapered downwardly so that the ring 27 is wedge-shaped in longitudinal cross section, the exterior threads 28 of ring 27 coacting with interior threads 29 carried by the sleeve 20.

15 In assembly of the device the ring 27 is compressed and screwed upon the cylinder 10 and the sleeve 20 is screwed upon the exterior of ring 27 to hold the ring compressed. A special wrench coacting with recesses 30
20 formed in an interior flange of ring 27 is used in the assembly of the device. When the parts have been screwed together as described the ring may be held from turning by means of the wrench referred to whereupon a left-
25 hand rotation of the sleeve 20 will cause the ring 27 to tightly hug the threads 26 due to the tapered form of the ring. The packer being assembled with the desired liner coupled to the lower threaded end 31 of the cylinder
30 10 and with the desired well screen and the foot valve 32 secured upon the lower end of the assembly may then be lowered into the well.

35 When it is desired to set the packer it is only necessary to revolve the lowering pipe to the right whereby to screw the sleeve 20 off from the ring 27 breaking the frangible pin 15 in the act and the weight of the lower-
40 ing pipe will then compress the packer.

45 If the well flows by its own pressure the pipe may be allowed to remain in the described position, the ring 27 due to its resilience having sprung outwardly to the position shown in Fig. 3 wherein the entire bore of the cylinder 10 will be free at its top for
50 flow of the well. After the well has ceased to flow, the lowering pipe carrying with it the piece of pipe 24, the sleeve 20, the packing ring 23, and the ring 27 may be removed from the well and then the pump may be lowered into place to pump the well.

55 If it is desired to use the wash pipe shown in Figs. 5 and 6, the coupling 33 of Fig. 5 may be utilized in place of the coupling 25 of Fig. 1. The coupling 33 is shown as provided with an internal annular flange 34 and a member 35 having a reduced lower end 36 fitting within the opening of flange 34 is shown as
60 secured to the wash pipe 37 as by means of set screw 38.

65 By the coaction between the portion 36 of member 35 and the flange 34, the space between the wash pipe 37 and the interior of pipe 24 will be sealed during the lowering and washing operations. When the packer

is set the pipe 24 will lower with the sleeve 20 carrying the coupling 33 with it as for instance to the position shown in the dotted lines in Fig. 5, thus leaving a space 39 between the wash pipe and the flange 34 for
70 flow of the well.

The foot valve shown in Fig. 6 is so constructed that when the weight of the lowering pipe is brought to bear on the packer to set
75 the same, the cylinder 32 will be forced downwardly since the foot 43 of the valve will rest on the bottom of the hole. The frangible pin 44 will then be sheared and the ring 45 will contact with the conical member 42 to seal the valve. The wash pipe may be later with-
80 drawn removing the member 40 from the socket in member 41.

The ring 27 is preferably made of a good grade of steel so as to be highly resilient and the downwardly directed flange bearing the
85 recesses 30 seats upon the upper end of the cylinder 10 when the device is in assembly.

The recesses 30 provide a cutting away of the material of the ring so as to give the same
90 resilience for its action in expanding and in being contracted.

The device assembles into a rigid structure which is very unlikely to be disturbed during lowering into the well and is amply able to
95 bear the weight of the lowering pipe while the string rests on the bottom of the well and during the operations of washing and completing the well, yet the packer may be very readily set by revolution of the lowering pipe.

Minor changes may be made in the physical embodiment of the invention within the scope of the appended claims without departing
100 from the spirit of the invention.

I claim:

1. A well packer comprising, in combination, a cylinder externally threaded at its
105 upper end and carrying upon its outer surface compressible packing means, an internally screwthreaded sleeve, means to couple said sleeve to a lowering pipe, an internally
110 and externally threaded ring lying in assembled position between said sleeve and the upper end of said cylinder and having screw-
115 threaded engagement with each thereof whereby revolution of said sleeve may free the same from said ring and cylinder to permit the sleeve to slide downwardly upon the cylinder and cause compression of the pack-
120 ing means.

2. A well packer comprising, in combination, a cylindrical member, compressible packing means mounted upon the surface of
125 said member, a ring slidably mounted upon said cylinder to act upon said packing means, a sleeve adapted to cause movement of said ring under influence of the weight of a string
130 of pipe coupled to said sleeve, means to initially hold said sleeve against relative movement with respect to said cylinder compris-
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ing a ring having screwthreaded engagement with both said cylinder and sleeve.

3. A well packer comprising, in combination, a cylinder, compressible packing means mounted thereon, a ring slidable with respect to said cylinder for transmitting pressure to said packing means, a sleeve having means for coupling to a lowering pipe for transmitting pressure of the pipe to said ring, the interior of said ring and the external upper extremity of said cylinder carrying screw threads, an inwardly and outwardly threaded ring coacting with said respective first named threads for holding said sleeve immovable with respect to said cylinder during the lowering operation.

4. A well packer comprising, in combination, a cylinder having an external tapered thread upon its upper extremity, a split ring of resilient material having an internal tapered thread complementary to said first named thread engageable therewith in compressed condition, a sleeve slidable with said cylinder internally threaded to engage the external threads upon said ring, said sleeve having an internal coupling thread to engage a pipe of sufficient internal diameter to allow said split ring when expanded to free itself from the tapered thread upon said cylinder, said sleeve adapted to be freed from said ring by screwing downwardly therefrom whereby to allow the weight of the lowering pipe to which the sleeve is coupled to be applied to packing material carried by the surface of said cylinder.

5. A well packer comprising, in combination, a cylinder bearing an external tapered thread upon its upper extremity, a ring slidable upon said cylinder and connected thereto, a frangible pin entering openings in said ring and cylinder respectively to initially hold the two from relative movement, a sleeve coacting with and rotatable with respect to said ring, said sleeve bearing an internal screw thread and internal shoulder and a coupling thread above said shoulder for connection with the lowering pipe, an internally and externally threaded split ring engaging the tapered thread upon said cylinder and the first named internal thread upon said sleeve respectively to normally hold the sleeve and cylinder from relative movement during the lowering operation, said sleeve adapted to be freed from said ring by rotation whereby to apply the weight of the lowering pipe to said ring to compress packing means carried by the cylinder and to allow said split ring to expand and free itself from said tapered thread.

6. A well packer comprising, in combination, a cylinder bearing an external tapered thread upon its upper extremity, a ring slidable upon said cylinder and connected thereto, a frangible pin entering openings in said ring and cylinder respectively to initially

hold the two from relative movement, a sleeve coacting with and rotatable with respect to said ring, said sleeve bearing an internal screw thread and internal shoulder and a coupling thread above said shoulder for connection with the lowering pipe, an internally and externally threaded split ring engaging the tapered thread upon said cylinder and the first named internal thread upon said sleeve respectively to normally hold the sleeve and cylinder from relative movement during the lowering operation, said sleeve adapted to be free from said ring by rotation whereby to apply the weight of the lowering pipe to said ring to compress packing means carried by the cylinder and to allow said split ring to expand and free itself from said tapered thread, and sealing means between said sleeve and ring.

7. A well packer comprising, in combination, a cylinder having external upwardly tapered threads upon its upper extremity, a sleeve having reversely tapered threads upon its interior, an internal annular shoulder and coupling threads above said shoulder for connection to a lowering pipe, a ring of resilient material formed with downwardly tapered internal and external threads to coact with said external threaded extremity and with said first named interior threads of the sleeve, said sleeve having an inwardly projecting annular flange to seat against the extremity of said cylinder when the ring is compressed and in screwthreaded engagement with both said cylinder and said sleeve, said flange formed with a plurality of recesses to permit of flexure of the ring, a ring slidable upon said cylinder to transmit pressure from said sleeve to packing means carried by the surface of the cylinder, a frangible pin to hold said ring and cylinder from relative movement during the lowering operation, said ring formed with an internal inverted frusto-conical groove, a wedge-shaped split ring lying in said groove, said cylinder formed with a plurality of ratchet grooves in its outer surface, said split ring formed with a plurality of complementary ratchet grooves upon its inner surface to prevent upward movement of the ring after compression of said packing material and means coacting with said second named ring and with said cylinder to prevent relative movement therebetween during the lowering operation.

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