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HYDRAULIC OR AIR EXPANDED PACKER

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Fig. 1.

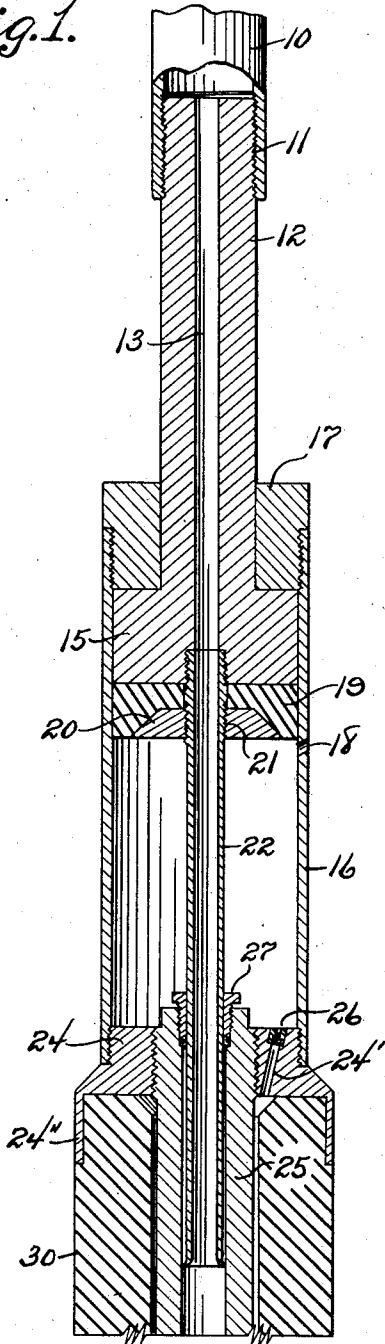
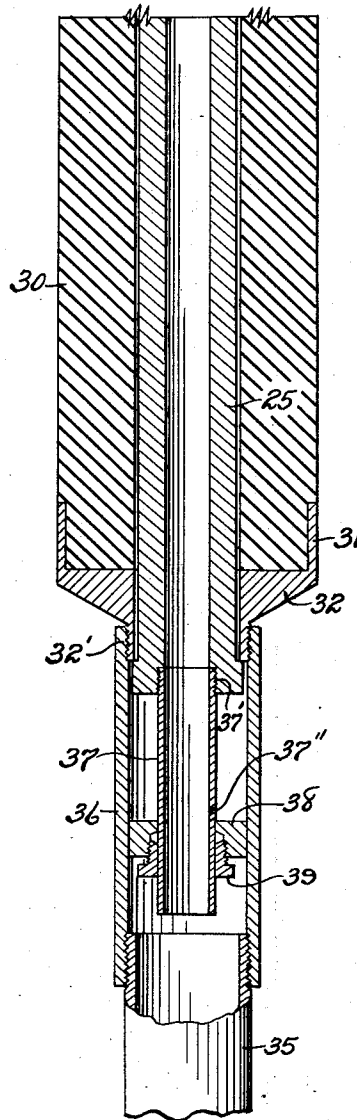


Fig. 2.



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HYDRAULIC OR AIR EXPANDED PACKER

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The object of this invention is to expand a packer of the type used in well drilling operations, and especially to provide a long element of packing, formed of rubber; canvas, or other suitable material which will not be damaged in use, and is expanded by hydraulic means or by the use of compressed air.

A further object is to avoid placing reliance on the weight of the pipe to effect expansion of the packing element, and to avoid any restriction regarding the size or capacity of the device.

A further object is to provide a device of this kind which may be employed whether or not the well is provided with a casing.

A further object is to provide a packing which may be set at any depth desired, by adding sufficient length of pipe at the point required to effect that result.

With the foregoing and other objects in view, the invention consists in the novel features of construction and in the novel arrangement of the elements herein disclosed, it being understood that modifications, alterations or changes may be made within the scope of the claims without departing from the spirit of the invention.

In the drawings forming part of this application:—

Figures 1 and 2 are in vertical section and are to be read together, the packer of rubber or similar material being broken away and a portion appearing at the bottom of Figure 1 and the remainder at the top of Figure 2.

The element 10 may be considered as the end of a drill pipe or tube, and it is provided with an internal threaded bore at 11, designed for cooperation with the external threaded piston rod 12, the latter having a bore 13 which is in communication with aligned bores disclosed in the drawings, forming a continuous passageway throughout the length of the structure.

The piston 15 enters and operates within the cylinder 16 and a piston retaining head is shown at 17 and is threaded into the upper end of the cylinder. This cylinder is provided with an inlet port 18, and an element of rubber or composition, shown at 19, is re-

tained in position by means of a follower plate 20 which may be countersunk within the element 19, as shown, and is threaded at 21 for connection with the tube 22 extending downwardly through the cylinder 16 and through the structure shown at the lower portion of Figure 1.

A cylinder head and packer head 24 is threaded into the lower end of cylinder 16, and is provided with an internal bore within which the upper end of the steel mandrel 25 is threaded. Said element 24 is provided with a bore 24' and with a check valve 26 near the upper end of the bore, whereby the fluid introduced through port 18 may pass downwardly and from cylinder 16, but return flow is prevented. A gland 27 surrounds tube 22 and enters the upper end of element 25, retaining the packing there shown.

The head 24 includes a flange 24'', the latter surrounding the upper end of the packer 30 to be formed of rubber or canvas, as before indicated, and of considerable length. This element is shown in both Figures 1 and 2, and in Figure 2 it will be observed that the lower portion of packer 30 is received within flange 31 of the packing head 32, the latter surrounding the steel mandrel before mentioned and designated 25.

An anchor pipe 35 is threaded at its upper end into a tubular element 36, and the latter has threaded engagement at its upper end with flange 32' of element 32. A lower duct or pipe 37 is connected at 37' with the mandrel, and passes through the element 38 constituting a mandrel stop. A packing nut or gland 39 serves an obvious purpose in this connection. Element 37 is provided with an outlet port at 37'', and it will be observed that all of the centrally disposed elements described have bores in alignment with each other, providing a continuous passageway, and fluid passing through this continuous duct is afforded unobstructed passage.

In order to expand the packer, the pipe is lifted for approximately the length of the cylinder and the piston is thereby raised, allowing the cylinder to fill with fluid, either hydraulic pressure or compressed air being

under consideration, and the fluid enters at the inlet port 18, the pipe being lowered slowly, causing the piston to travel downwardly and forcing the fluid through the outlet to the inside of the packer. This operation is repeated as many times as may be required to expand the packer, and it will be observed that the valve positioned at 26 retains the pressure thus introduced because the port of valve 26 is small compared with inlet port 18, and pressure will build up in tubular element 16, causing mandrel 25 to drop and close port 37". Space is provided between the bottom of mandrel 25 and the mandrel stop 38, in order to allow the packer to expand by weight of the pipe, thus affording slack and relieving any strain on ends of the packer when pressure is applied.

What is claimed is:—

1. In a device of the class described, a cylinder, a piston therein, upper and lower heads connected with the cylinder, a tubular packer abutting the lower head of the cylinder, a tubular mandrel connected with this head and extending through the packer, the cylinder and lower head thereof having ports, one of which discharges from the cylinder to the bore of the packer, a fluid discharge duct, extending from the tubular mandrel and having communication with the bore of the packer between the latter and the mandrel, anchor pipe retaining means surrounding the duct, and a lower packer head connected with the retaining means at a point above the lower end of the mandrel.
2. A structure comprising the elements of claim 1, and an annular element positioned between the anchor pipe retaining means and the discharge duct and constituting a mandrel stop.
3. A structure comprising the elements of claim 1, the piston rod having a bore, and tubular means extending from this bore and into the bore of the tubular mandrel, providing a continuous passage through the latter and the discharge duct.

In testimony whereof I affix my signature.

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