

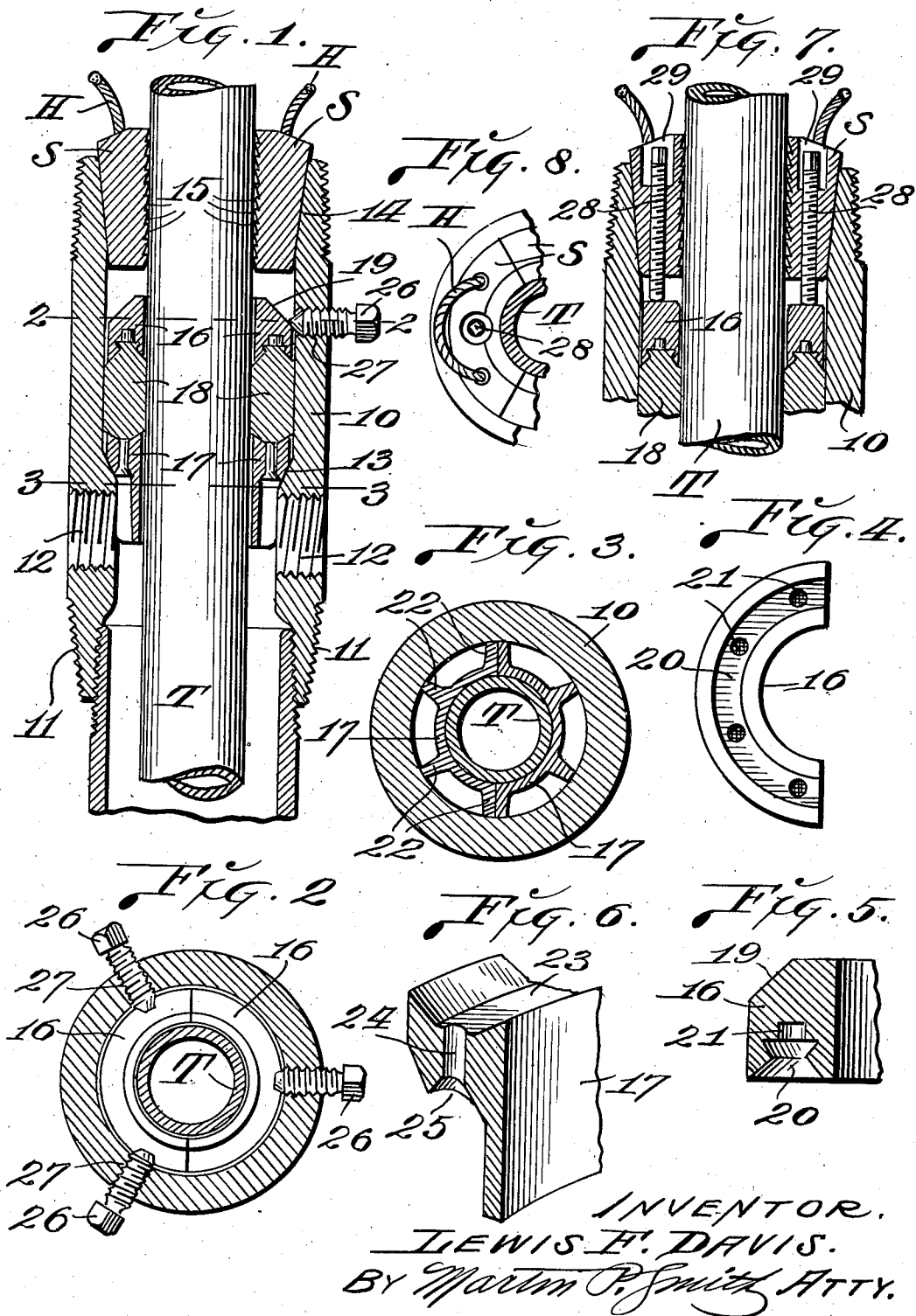
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L. F. DAVIS

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OIL WELL PACKING HEAD

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UNITED STATES PATENT OFFICE

LEWIS F. DAVIS, OF SANTA ANA, CALIFORNIA

OIL-WELL PACKING HEAD

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My invention relates to a packing head for the casings of oil wells, and has for its principal objects the provision of a relatively simple, practical and efficient appliance that may be advantageously employed at the upper ends of oil well casings for packing the joint or opening between the casing and the drill tubing so as to effectively eliminate any possibility of blow-outs;—further to provide a packing head having a compressible packing member that is formed in sections in order that it may be readily positioned within the bowl or cylindrical member, that is applied to the upper end of the casing;—further to provide means that operate independently of the weight of the tubing for acting upon the compressible portion of the packing head so as to compress the same and effect a fluid pressure tight joint between the casing and the tubing, and further to provide a packing head that will enable the tubing to be readily manipulated while being raised or lowered relative to the casing.

A further object of my invention is to provide a packing head having a compressible member that is formed in sections, certain of which sections are formed of rubber or analogous elastic material, and which elastic sections are arranged between and very firmly anchored to metal rings or segments so that said elastic members are very thoroughly protected against wear and deterioration as a result of contact with oil and gas that may flow through the head.

A further object of my invention is to generally improve upon and simplify the construction of the existing forms of casing head packers.

With the foregoing and other objects in view, my invention consists in certain novel features of construction and arrangement of parts that will hereinafter be more fully described and claimed and illustrated in the accompanying drawing, in which—

Fig. 1 is a vertical section taken through the center of a packing head that embodies the principles of my invention.

Fig. 2 is a horizontal section taken on the line 2—2 of Fig. 1.

Fig. 3 is a horizontal section taken on the line 3—3 of Fig. 1.

Fig. 4 is an elevational view looking against the underside of a portion of the metal ring that is positioned on top of the elastic or compressible portion of the packer.

Fig. 5 is an enlarged cross section of the upper ring that is positioned on the elastic or compressible member of the packer.

Fig. 6 is a perspective view of a portion of the metal ring that is positioned against the underside of the elastic or compressible member.

Fig. 7 is a vertical section taken through the upper portion of a modified form of the packing head.

Fig. 8 is a top plan view of one of the slips used in the modified form of the packing head.

Referring by numerals to the accompanying drawings, which illustrate a practical embodiment of my invention, 10 designates a bowl or short tubular member, the lower portion of which is internally threaded in order to receive the externally threaded upper end of a section of ordinary casing C and the lower end of this bowl is also externally threaded as designated by 11 in order to receive a fitting which in some instances may be utilized for connecting the bowl to the casing.

Formed through the wall of the bowl 10 a short distance above the threaded lower portion thereof are threaded apertures 12 for the reception of pipes or tubes utilized in carrying off oil or gas that discharges upwardly through the casing.

Formed on the inner face of the bowl just above the openings 12 is an inclined shoulder or tapered seat 13, upon which the lower ring of the compressible packer is adapted to rest and the upper end of the bowl is reamed to provide an inclined or tapered seat 14 for a series of ordinary tube engaging and supporting slips S, and which latter are provided on their inner faces with horizontally disposed ribs or teeth 15 that are adapted to engage the surface of the tubing T. The slips S are provided with suitable handles H, preferably flexible, and which are engaged when the

slips are seated in or removed from the upper end of the bowl.

The compressible packing member or collar forming a part of my invention, and which is positioned within the bowl immediately above the tapered seat 13, is preferably formed in halves or mating sections that are identical in construction; the dividing line between the parts being vertically disposed and intersecting the axis of the body, and each part comprises an upper segment 16 preferably of metal, a lower segment 17 preferably of metal and an intermediate segment 18 of rubber or analogous compressible elastic material. The two segments 16 combine to form a ring at the top of the packing collar and the upper outer corner of this ring is cut away to form a circumferential inclined surface 19 that occupies an angle of approximately 45° relative to horizontal and vertical planes.

Formed in the under faces of the ring forming members 16 is a circumferentially disposed under-cut groove 20 and extending from the bottom of this groove upwardly into the ring sections 16 are short recesses such as 21. These undercut grooves 20 and recesses 21 receive the upper portion of the two-part elastic ring 18, and when the latter is formed those portions of the body of rubber that enter the groove and recesses is vulcanized therein. As a result of this arrangement the upper portions of the two-part elastic ring are very rigidly secured to the top ring 16 and it is practically impossible under working conditions to separate the metal and rubber rings or for one ring to rotate relative to the other as such relative movement is prevented by the plugs of rubber that enter the recesses 21.

This manner of forming the joints between the ring members 16 and 18 materially increases the life of the rubber ring 18, for the joints between said ring and the metal ring 16 are protected against contact with oil and resultant deterioration of the rubber.

The lower two-part ring 17 is provided on its underside with a series of depending vertically disposed webs 22 the outer edges of which and the outer face of the lower portion of said ring 17 being tapered so as to fit snugly upon the inclined shoulder or tapered seat 13.

Formed in the top of the two-part lower ring 17 is a shallow groove 23 and leading therefrom downwardly through the body of the ring are apertures 24, the lower ends of which are reamed or enlarged as designated by 25.

When the body of the rubber ring 18 is formed portions thereof occupy and are vulcanized in the apertures 24 having the enlarged lower ends 25, and thus said rubber ring is very securely anchored to the ring 17 and under working conditions it is prac-

tically impossible to separate the lower ring 17 from the elastic ring 18.

Under normal conditions the two-part packing collar comprising the rings 16, 17 and 18 has an external diameter that is a slight degree less than the internal diameter of the bowl 10 and when positioned in said bowl around the tubing T the two parts of the packing collar are assembled around the tubing and dropped into the bowl, and when at rest the tapered lower end of the collar rests upon the inclined seat or shoulder 13.

In order to compress the two-part ring 18 and effect a fluid tight joint between the bowl and tubing screws 26 are seated in threaded apertures 27 in the wall of the bowl 10; and the inner ends of said screws being tapered for engagement with the inclined face 19, and after the packing collar has been inserted in the bowl, screws 26 are turned so that the same move inward and the tapered inner ends of said screws bear on the inclined face 19, thereby forcing the upper ring 16 downward and compressing the elastic ring 18, and as a result fluid pressure tight joints are produced between the elastic ring and the inner face of the bowl 10, and the external face of tube T.

When it becomes necessary to raise or lower the tubing, screws 26 are partially withdrawn, thereby permitting the compressible ring 18 to expand and when this is done the tubing may be elevated or lowered as desired, and through the use of the slips S said tubing may be supported at the desired elevation.

In some instances it may be found desirable to utilize the weight of the tubing for compressing the packing collar, and where this is done the slips S are removed from the upper end of the bowl and the collar or nipple that connects two sections of the tubing is permitted to rest on top of ring 16, and thus the weight of the tubing will move said ring 16 downward and compress ring 18 so as to produce the desired fluid pressure tight joint.

Obviously when ring 16 is moved downward by means of the screws 26 or by the weight of the tubing the two parts of ring 18 under compression will expand equally in all directions, and thus the joints between the ends of the compressible ring sections will be sealed and packed against the passage of fluid pressure.

In the modified construction illustrated in Figs. 7 and 8, screws 28 are seated in the slips S and the upper ends of said screws being arranged in recesses 29 that are formed in the upper portions of the slips. The upper ends of these screws are made non-circular for the reception of a socket wrench or the like, and when said screws are moved downward they will engage and bear upon the upper two-part ring 16 and move the same

downward to compress the rubber ring 18 and accomplish the desired results.

Among the desirable features of my invention are the formation of the packing collar in two parts, which greatly facilitates production and manipulation when placed in or removed from the bowl, and further the vulcanizing of the intermediate ring sections 18 to the upper and lower metal ring sections 16 and 17, for by such arrangement the intermediate rubber ring is very firmly secured to the metal rings without the use of bolts or extraneous means, and the life or period of service of the rubber ring is materially lengthened by reason of the fact that the joints between the rubber and metal rings are arranged so that it is practically impossible for oil and gas to enter said joints.

Thus it will be seen that I have provided a packing head for oil well casings that is relatively simple in construction, inexpensive of manufacture, capable of being compressed to produce a fluid tight joint by the manipulation of screws that engage the upper portion of the packing collar or by the weight of the supported tubing, and which packing head is very effective in performing the functions for which it is intended.

It will be understood that minor changes in the size, form and construction of the various parts of my improved oil well packing head may be made and substituted for those herein shown and described without departing from the spirit of my invention, the scope of which is set forth in the appended claims.

I claim as my invention:

1. In an oil well casing packing head, a packing collar comprising a pair of separately formed and independently operable sections, each section comprising upper and lower segments, each upper and lower segment being provided with an externally arranged beveled face, the two beveled faces occupying oppositely disposed angular planes, externally arranged ribs formed on the segments of the lower section, and an intermediate segment of compressible material arranged between each pair of upper and lower segments.

2. In an oil well casing packing head, a bowl adapted to be secured to the upper end of the well casing, which bowl is provided with an internally arranged shoulder, a packing collar comprising a pair of separately formed and independently operable sections, each section comprising upper and lower segment, each segment being provided at both ends with externally arranged bevelled faces, the two bevelled faces occupying oppositely disposed angular planes, an intermediate segment of compressible material arranged between each pair of upper and lower segments, horizontally disposed screws seated in the wall of the bowl with their inner ends bearing against the bevelled face on the upper pair of

segments and which screws are disposed substantially 120° apart.

3. In an oil well casing packing head, a bowl adapted to be secured to the upper end of the well casing, which bowl is provided with an internally arranged shoulder, a packing collar comprising a pair of separately formed and independently operable sections, each section comprising upper and lower segment, each segment being provided at both ends with externally arranged bevelled faces, the two bevelled faces occupying oppositely disposed angular planes, an intermediate segment of compressible material arranged between each pair of upper and lower segments, horizontally disposed screws seated in the wall of the bowl with their inner ends bearing against the bevelled face on the upper pair of segments, which screws are disposed substantially 120° apart and externally arranged ribs formed on the segments of the lower section.

4. In an oil well casing packing head, a bowl adapted to be secured to the upper end of the casing, which bowl is provided with an internally arranged shoulder, a two part compressible packing collar adapted to be positioned within the bowl and to encircle the tube passing therethrough, the lower portion of which packing collar is provided with an inclined shoulder that engages the shoulder within said bowl, the parts of said packing collar being capable of independent removal from and insertion within said bowl, the upper end of the collar being provided with an inclined shoulder that is oppositely disposed with respect to the inclined shoulder at the upper end of the packing collar, horizontally disposed screws seated in the bowl, the inner ends of which screws bear on the inclined shoulder at the top of the packing collar and which screws are arranged 120° apart.

In testimony whereof I affix my signature.

LEWIS F. DAVIS.