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PACKING

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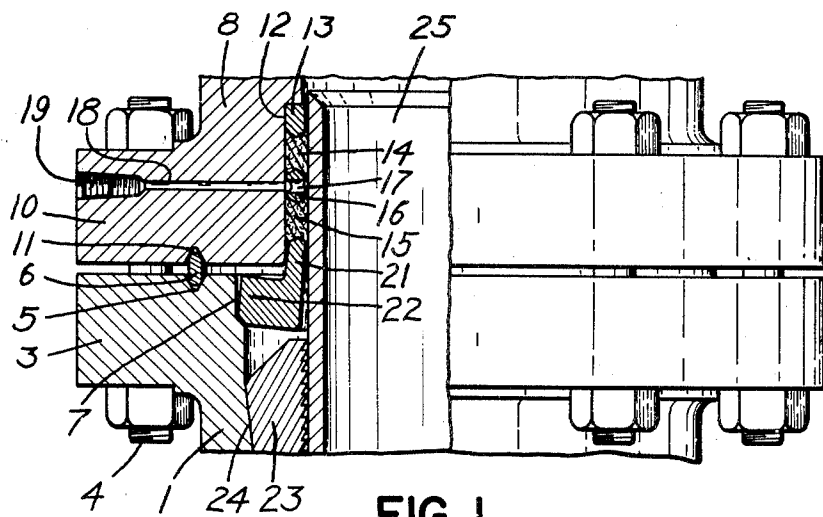


FIG. 1

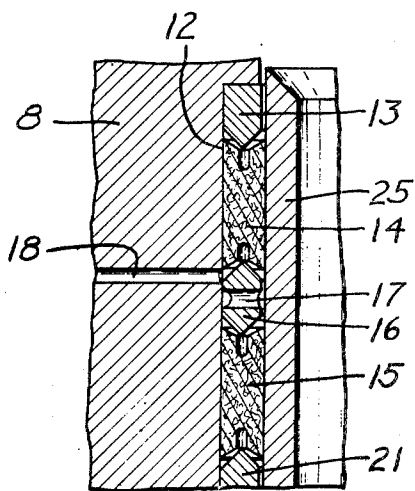


FIG. 2

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PACKING

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This invention relates to an arrangement for providing the necessary seals between certain elements employed in a well head and has for its general object the provision of a means for forming simultaneously an effective seal between a casinghead and an annular member carried thereon and between the combination thus formed and a casing extending upwardly therein.

More specifically, it is an object of this invention to provide a structure in which the tightening of the equipment on a casinghead against the head itself will provide a sealing engagement between the casinghead and the member mounted thereon, such as a tubing head, and independently of such seal provide a seal between the combination thus formed and a casing extending through such combination.

Another object of this invention is to provide such a structure which may be assembled in the member which is to be placed on the casinghead before such member is actually placed on the casinghead.

Another object of this invention is to provide such a structure in which the formation of the seal between the combination and casing will not prevent additional movement of the annular member toward the casinghead to render effective a seal between such annular member and casinghead.

Another object of this invention is to provide a structure in which the two seals referred to will be formed independently of each other but in which both will be formed by movement of the annular member toward the casinghead.

Another object of this invention is to provide a structure of the type referred to in which it will be possible after the parts are fully assembled and both seals affected, to test the efficacy of the seal between the casing and the members surrounding it.

Yet another object is to provide a flexible means for expanding a packing.

Other objects and advantages of this invention will become apparent from the following description taken in connection with the accompanying drawings, wherein is set forth by way of illustration and example one embodiment of the invention.

In the drawings:

Fig. 1 is a view partly in vertical cross section illustrating a structure constructed in accordance with this invention.

Fig. 2 is a fragmentary view illustrating the parts of the packing which forms a seal about

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the casing when such parts are in their inactive positions.

The casinghead 1 illustrated in Fig. 1 may be mounted in any customary manner as on the upper end of a string of surface casing, and is provided with the conventional laterally extending flange 3 at its upper end. This flange 3 in the customary manner is provided with holes through which are received studs 4, and with a ring groove 5 adapted to receive a metallic sealing ring 6. The only unconventional structure forming part of this casinghead is the counterbore 7 adjacent its upper end, the purpose of which will be presently described.

Above the casinghead is an annular member 8 which it may be desired to employ above the casinghead and this annular member may be a structure customarily referred to as a tubing head. This upper annular member 8 at its lower end has a laterally extending flange 10 with openings therein to receive the studs 4 and with a groove 11 in its lower surface to receive the metallic sealing ring 6.

It will readily be seen that by tightening the studs 4 the flanges 3 and 10 may be drawn together until a seal is provided between the casinghead 1 and the annular member 8 by means of the metallic sealing ring 6.

The tubing head or other annular member 8 is provided with a counterbore 12 extending upwardly from its lower end and adapted to receive a packing assembly consisting of a packing abutment ring 13, packing rings 14 and 15 of material flowable under pressure, and a spacer ring 16 between the packing rings. The spacer ring 16 is provided with a radial passageway 17 there-through and the tubing head or other annular member 8 is provided with a passageway 18 extending from its outer surface into the counterbore 12 at such a point that when the packing rings are compressed to their greatest permissible extent the passageway 17 in the spacer ring will be in communication with the passageway 18 in the tubing head. The outer end of this passageway 18 is provided with pipe threads 19 or other means for connecting a conduit for supplying test fluid under pressure thereto, and it will be appreciated that when not in use for supplying test pressure, this passageway 18 may be closed by means of a pipe plug or the like.

The packing rings 14 and 15 are intended to be expanded by the engagement of the lower packing ring with the upper end of a gland 21 which extends downwardly to a point below the lower end of the counterbore 12 and actually into

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the upper end of the casinghead 1. This gland has formed therein adjacent its lower end a radially outwardly extending flange 22 which is shown as being of a size to just fit within and seat upon the shoulder at the lower end of the counterbore 7 in the casinghead. It is noteworthy that this flange is made of a material which is sufficiently flexible and resilient so that when the packing rings have been expanded to their greatest permissible extent, the flange 22 may flex to permit additional movement of the annular member 8 toward the casinghead in order that a perfect seal might be provided by the seal ring 6.

Suspended within the casinghead 1 in any usual manner as by means of slips 23 mounted in the tapered bowl portion 24 of the casinghead, is the casing 25. This casing preferably extends upwardly through the casinghead-tubing head combination to a point just above the upper end of the counterbore 12 in the annular member, and it will be understood that the packing rings 14 and 15 when fully expanded are intended to provide a seal between the annular member 8 and the casing 25.

In operation, the casinghead will be set in the usual manner and after the drilling has been completed, the casing will be run into the well and hung by means of the slips 23. Thereupon the casing will be severed at the appropriate level and the packing rings 14 and 15 will be assembled with the abutment ring 13 and the spacer ring 16 in the counterbore 12 of the tubing head or other annular member to be employed on the casinghead. The gland 21 may be placed in the counterbore in the upper end of the casinghead or inserted into the lower end of the annular member 8, and after the sealing ring 6 has been placed in the ring groove 5 the annular member 8 will be placed over the upper end of the casing. Preferably the packing rings 14 and 15 and their associated parts are of such extent when uncompressed that they will hold the flange 10 out of contact with the sealing ring 6. The studs 4 will be put in place and tightened to draw the flange 10 toward the flange 3 and as this is done it will be seen that the gland 21 will be forced against the lower packing ring and that this packing ring will be compressed and thereby caused to expand radially inwardly, and at the same time moved bodily upwardly with respect to the counterbore carrying the spacer ring 16 with it and serving to effect longitudinal compression and radially inward expansion of the upper sealing ring. When the two sealing rings 14 and 15 have been expanded radially inwardly to the limit permitted by a sealing engagement with the outer surface of the casing, if the flange 10 has not yet made perfect sealing engagement with the sealing ring 6 the annular member 8 may be moved an additional amount toward the casinghead until this engagement is made sufficient to provide the necessary seal. This additional movement is permitted by the flexing of the resilient flange 22 on the gland 21.

After all seals have thus been effected, the spaced seals provided by the rings 14 and 15 between the casing on the one hand and the annular member-casinghead combination on the other hand may be tested by removing the pipe plug from the passageway 18 and connecting thereto a suitable source of test fluid under pressure. This testing fluid may flow in through the passageway 18 and the passageway 17 in the spacer ring 16 and it will be seen that it will tend to flow both upwardly and downwardly between

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the respective spacer rings and the casing and between the respective spacer rings and the annular member 8. Leakage along any of these paths may be detected by loss of testing fluid. After the test has been completed, if the seals are found to be sufficient, the passageway 18 may be closed again by means of the pipe plug so as to prevent the entry of dirt and the like.

From the foregoing it will be appreciated that a means has been provided for carrying out all of the objects and advantages sought by this invention. It will further be appreciated that the invention is not limited to the specific embodiment herein shown and described but is to be limited only by the prior art and by the terms of the appended claims.

Having described my invention, I claim:

1. In combination with a casinghead, a casing extending therethrough and an annular member mounted on and adapted to be sealed to the casinghead, said annular member being counterbored adjacent its lower end and said casinghead being counterbored adjacent its upper end on a larger diameter than the counterbore in the annular member, said casing extending into the annular member, packing in said counterbore adapted to be compressed longitudinally and expanded radially inwardly into contact with said casing, a gland projecting into the lower end of said counterbore in the annular member and engaging said packing to compress the same longitudinally, said gland projecting below said annular member and having an outwardly extending substantially radial flexible flange seated within the counterbore in the casinghead, and means for drawing said annular member toward said casinghead to force said gland to compress said packing longitudinally and to provide sealing engagement between said annular member and casinghead, the flexibility of said flange on the gland permitting additional movement of the annular member to provide a sealing engagement with the casing head after said packing has been compressed longitudinally to the permissible limit.

2. In combination, a casing head, an annular member adapted to be sealed to the upper end of the casing head, means for drawing said annular member and casing head together to provide a sealing engagement between them, a packing within one part of the casing head-annular member combination adapted to be expanded radially, and means independent of the seal between said head and member and engaging the other part of said casing head-annular member combination for producing radial expansive movement of the packing upon movement of said head and member toward each other, said last mentioned means including a yieldable element to provide for additional movement of the annular member toward the casing head after said packing has been expanded radially to the greatest permissible extent.

3. In a combination, a casing head, an annular member adapted to be sealed to the upper end of the casing head, means for drawing said annular member and casing head together to provide a sealing engagement between them, a packing within one part of the casing head-annular member combination adapted to be expanded radially, and means independent of the seal between said head and member and engaging the other part of said casing head-annular member combination for producing radial expansive movement of said

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packing upon movement of said head and member toward each other, said last mentioned means including a resilient gland driving means in engagement with said other part of said casing head-annular member combination.

4. In combination, a casing head, an annular member adapted to be sealed to the upper end of the casing head, means for drawing said annular member and casing head together to provide a sealing engagement between them, a packing member combination adapted to be expanded radially, and means independent of the seal between said head and member and engaging the other part of said casing head-annular member combination for producing radial expansive movement of said packing upon movement of said head and member toward each other, said last mentioned means including a gland having an outwardly extending resilient flange engaging adjacent its outer margin said other part of said casing head-annular member combination.

5. In combination, a casing head, an annular member carried on the casing head and adapted to be drawn into sealed engagement therewith, means for drawing said annular member into sealed engagement with the casing head, said annular member having a counterbore therein, a packing in said counterbore, and means for causing the radial expansion of said packing along two spaced zones, said annular member having a passageway from its exterior surface into the space between said zones whereby testing fluid under pressure may be injected into the space between said zones to test a seal provided along said zones by expansion of said packing, a means for expanding said packing radially, engaging said casing head independently of the seal be-

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tween the casing head and the said member whereby movement of said annular member and casing head toward each other to provide a seal between them will simultaneously cause radial expansion of the packing.

6. In combination, a casing head, an annular member carried on the casing head and adapted to be drawn into sealed engagement therewith, means for drawing said annular member into sealed engagement with the casing head, said annular member having a counterbore therein, a packing in said counterbore, and means for causing radial expansion of said packing along two spaced zones, said annular member having a passageway from its exterior surface into the space between said zones whereby testing fluid under pressure may be injected into the space between said zones to test a seal provided along said zones by expansion of said packing, the means for causing radial expansion of the packing including a gland having resilient engagement with the casing head.

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