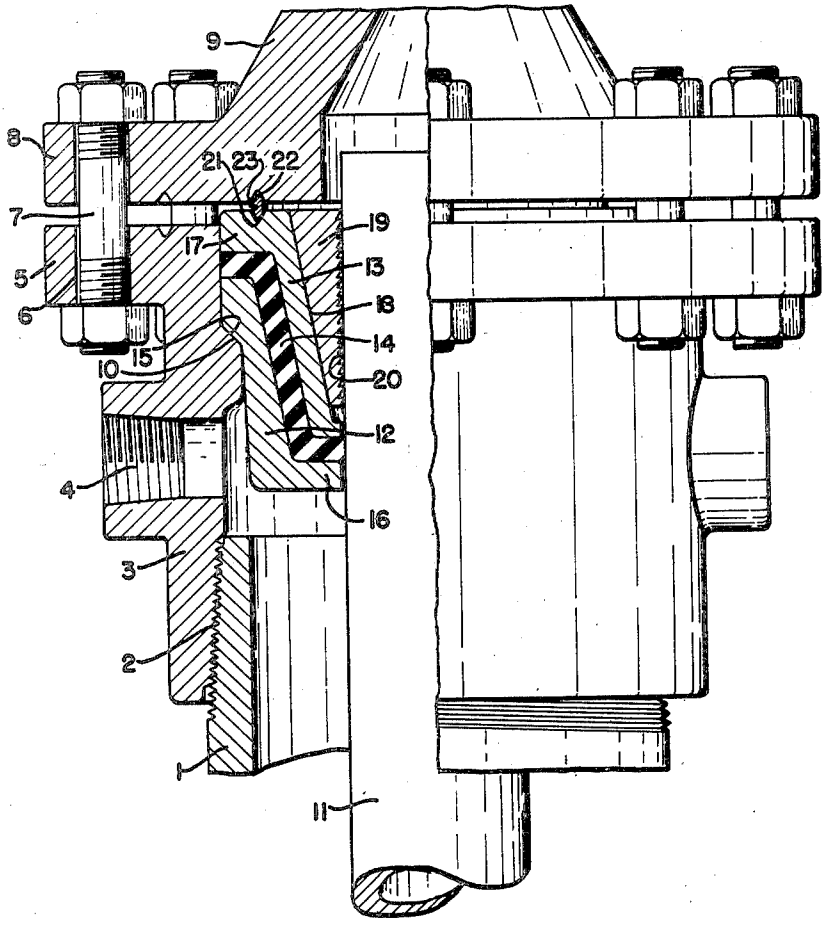
Jan. 31, 1950 M. T. WORKS 2,496,190

WELL HEAD SEALING ARRANGEMENT

Filed Jan. 3, 1947



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Patented Jan. 31, 1950 2,496,190

UNITED STATES PATENT OFFICE

2,496,190

WELLHEAD SEALING ARRANGEMENT

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Application January 3, 1947, Serial No. 720,004

3 Claims. (Cl. 285—22)

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This invention relates to seal assemblies and has for its general object the provision of a seal assembly which though useful in most instances in which an annular seal is desired, is particularly adapted for use in providing a seal between the casing or tubing head of a well and an inner casing or tubing extending upwardly therethrough.

More specifically it is an object of this invention to provide an assembly of the type referred to which will be compacted and capable of being used in the conventional short style of casing or tubing heads.

Another object of this invention is to provide such assembly which may be used in the same location in a casing or tubing head as the means customarily employed for supporting a casing or tubing in such head.

Another object of this invention is to provide such an assembly which will serve both the function of supporting the casing or tubing and of forming a seal between the casing head or tubing head and the casing or tubing as the case might be.

Another object of this invention is to provide an assembly of the type referred to which may be employed to form a seal between a casing or tubing head and a casing or tubing passing therethrough, which utilizes either the force exerted by the hanging of the casing or tubing therein or a force independent thereof, or both.

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 drawing, the single figure is a view partly in vertical cross section and partly in side elevation illustrating a seal assembly constructed in accordance with this invention in place within a casing head and about the casing of a well.

The well casing 1 is threaded at its upper end as shown at 2 to receive the casing head 3 which is provided with the usual casing flow openings 4. At its upper end the casing head is provided with a laterally extending flange 5 having holes 6 therethrough for the reception of the studs 7 by which the flange 8 of a tubing head or the like 9 may be secured to and drawn toward the casing head. This casing head is of the usual short form having an inner upwardly facing seat 10 adapted to receive a slip bowl or other means for supporting within the casing head the casing 11.

In the present instance the usual slip bowl employed for hanging a casing in the casing head is replaced with an assembly constructed in accordance with this invention and comprising a relatively rigid support member 12, a relatively rigid hanger member 13 and a packing member 14

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intermediate the support 12 and hanger 13 and formed of a relatively soft packing material flowable under pressure. It will be noted that the support member 12 is provided with a downwardly facing tapered shoulder 15 adapted to seat upon the hanger seat 10 in the casing head and thereby to support the seal assembly just referred to. At its lower end this support is provided with an inwardly extending flange 16 having an opening therethrough of a size to closely embrace the casing 11. Taken in its entirety the support 12 is of cup-shaped formation and is adapted to receive packing member 14 which extends into the cup-shaped portion of the member 12 and nests therein. Likewise, the member 13 extends into the cup-shaped inner portion of the member 14 so that all three of these members nest with each other and provide an assembly in which the members have relatively large areas of contact between them and yet provide an overall assembly which is much shorter than it would be if the members were not nested or telescoped with respect to each other.

It is noted that the member 14 is of substantially the same thickness throughout and that it has an inner diameter and an outer diameter such as to normally fit snugly about the casing 11 and within the casing head 3. The member 13 at its upper end is provided with an outwardly extending flange 17 which fits snugly within the upper end of the casing head and at its lower end is provided with an inner diameter substantially the same as that of the member 16 and the member 14.

In the illustration shown in the drawing the member 13 is provided with a tapered bore 18 forming a slip bowl adapted to receive slips 19 having inwardly facing teeth 20 which engage the outside of the casing 11 to support the same.

The upper surface of the flange 17 is provided with a sealing ring receiving groove 21 and the lower surface of the tubing head flange 8 is provided with a similar groove 22, said grooves registering with each other and serving to receive a metal sealing ring 23 for the purpose of forming a seal between the members 13 and 9.

It will readily be seen that the assembly consisting of the members 12, 13 and 14 occupies substantially no more space than the oridinary slip bowl customarily employed in a casing head for supporting a casing therein, and that this assembly does not require any extension on the length of the casing head yet provides adequate supporting area between the parts and an adequate size of slip bowl for the slips 19, which support the casing.

It will further be seen that in assembling the structure just described the parts 12, 13 and 14 may either be formed as separate parts and placed in the casing head in succession or if de-

sired they may be molded together as a unitary assembly so that these three parts may be put in as one. The slips 19 can then be put in place in the slip bowl formed in the member 13 and will serve to support the casing 11. The tubing head will then be put in place with the sealing ring 23 between the tubing head and the member 13, after which the studs 7 will be inserted and tightened. It will be seen that whether or not any appreciable weight is applied to the slips 19 by the casing 11, the packing member 14 may be caused to form a seal between the casing and the casing head by tightening of the studs 7 since this tightening will serve to cause extrusion of the member 14 both radially inwardly into sealing contact with the casing and radially outwardly into sealing contact with the casing head. At the same time, the seal ring 23 will be made tight to provide a seal between the member 13 and the tubing head 9.

It will further be seen that once the member 13 has been drawn downwardly until a seal is formed between the member 14 and the casing and casing head respectively, the studs 7 may be loosened or removed if desired and the member 13 will be held downwardly in position to maintain the seals thus formed by virtue of the engagement between the slips 19 and the casing 11. It will be understood that normally a strain will be taken on the casing 11 before the slips 19 are set, so that when the casing 11 is released the slips 19 will carry a substantial portion of its weight and this weight will serve to extrude the packing member 14 to form the desired seals even before the tubing head 9 is put in place, but that if a sufficient seal is not formed in this manner the seal may be subjected to greater pressure by means of the tightening of the studs 7 after the tubing head has been put in place. Thus, the sealing forces applied by the weight of the casing and by the tightening of the studs 7 will be added to each other, but either may be used to apply a sealing force even though the other be not present.

From the foregoing it will be seen that a means has been provided for carrying out and accomplishing all of the objects sought by this invention.

Having described my invention, I claim:

1. A device for suspending and sealing a pipe within a wellhead comprising a bowl adapted to seat within a wellhead and having a socket therein with inwardly and outwardly extending upwardly facing shoulders at its lower and upper ends respectively, a second bowl-shaped member adapted to fit within the first in spaced relation thereto and having an inner slip receiving surface adapted to receive slips for supporting the pipe, and a layer of a sealing material flowable under pressure substantially filling the space between said bowl members.

2. A device for suspending and sealing a pipe within a wellhead comprising a lower member adapted to seat in the wellhead, an upper member adapted to receive a pipe suspending means, said members being spaced apart and out of contact with each other, and an intermediate member substantially filling the space between said two first mentioned members, and consisting of a sealing material flowable under pressure, said members being shaped respectively so as to telescopingly engage each other.

3. A device for suspending and sealing a pipe within a wellhead comprising a lower support member, an upper hanger member and an intermediate sealing member of a material flowable under pressure between the support and hanger members, all of said members nested within each other.

4. A device for suspending and sealing a pipe within a wellhead comprising a lower support member, an upper hanged member and an intermediate sealing member of a material flowable under pressure between the support and hanger members, all of said members nested within each other, and said hanger member having an annular sealing ring groove formed in its upper surface.

5. In combination with a casing head having an upwardly facing seat therein to receive a pipe hanger and means at its upper end for securing additional wellhead equipment thereon and drawing it into tight engagement therewith, an annular support member seated upon said seat within the casing head and having an inner periphery of a size to closely embrace a pipe to be suspended therein and having its upper surface cup-shaped, an annular hanger member disposed within said casing head above said support member and having its outer periphery closely embraced by said casing head and its inner periphery of substantially the same size as that of said support member and having its inner portion nested within the cup-shaped upper surface of the support member, said support member and hanger member being spaced apart throughout their adjacent surfaces and said hanger member having a tapered inner slip receiving surface lying partly within the cup-shaped portion of the support member and having its uppermost surface formed with a seal ring receiving annular groove, and a sealing member of a material flowable under pressure substantially filling the space between the adjacent surfaces of said support and hanger members.

6. An annular seal assembly comprising three nested substantially cup-shaped members, the intermediate member being formed of a sealing material flowable under pressure and the other two members being adapted to be forced toward each other to cause extrusion of the sealing member outwardly and inwardly, said other two members being relatively hard and rigid as compared with the sealing member.

7. An assembly as set forth in claim 6 wherein one of said relatively rigid members is provided with a seating surface adapted to support the assembly and the other of said relatively rigid members is provided with means for receiving a pipe supporting device, and a pipe supporting device cooperating therewith.

8. An assembly as set forth in claim 6 in combination with means for forcing said relatively rigid members into closer nesting engagement with each other to cause extrusion of said intermediate member inwardly and outwardly from between said relatively rigid members, and a pipe supporting device carried by one of said relatively rigid members.

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