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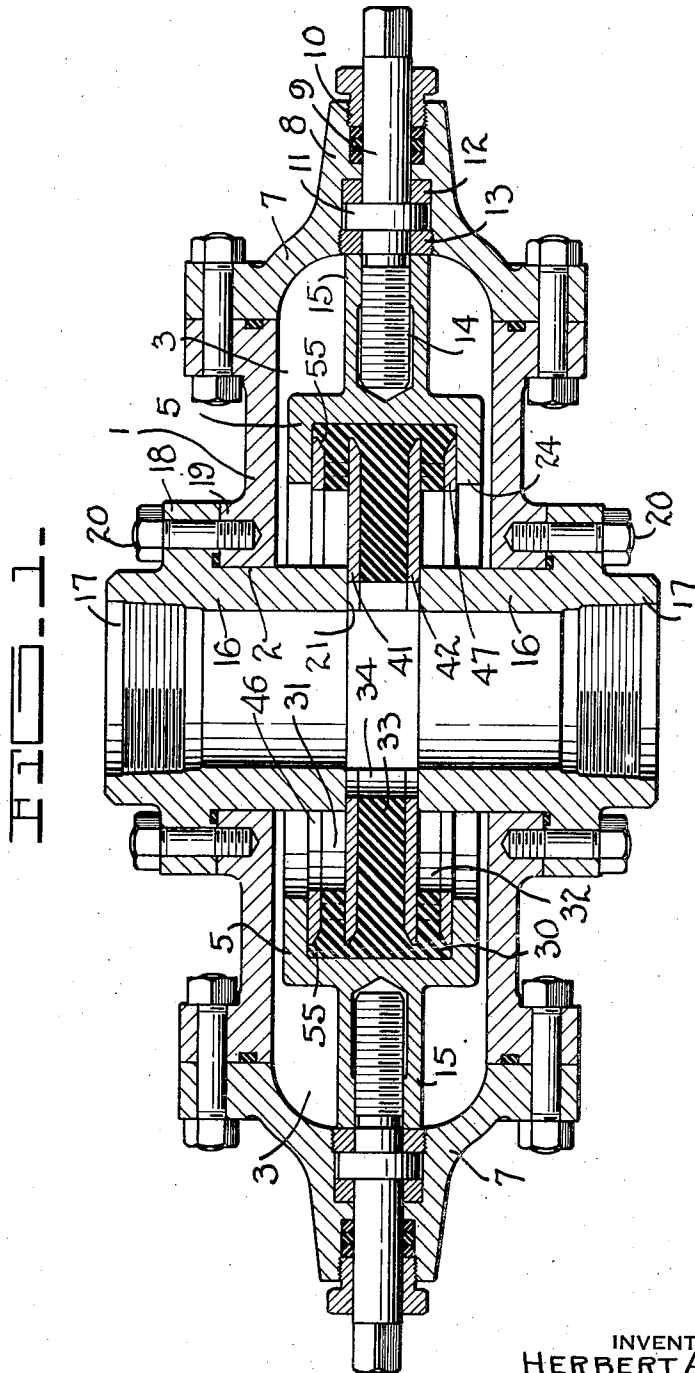
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2,194,256

MULTIPLE SEAL BLOWOUT PREVENTER

Filed May 7, 1937

5 Sheets-Sheet 1



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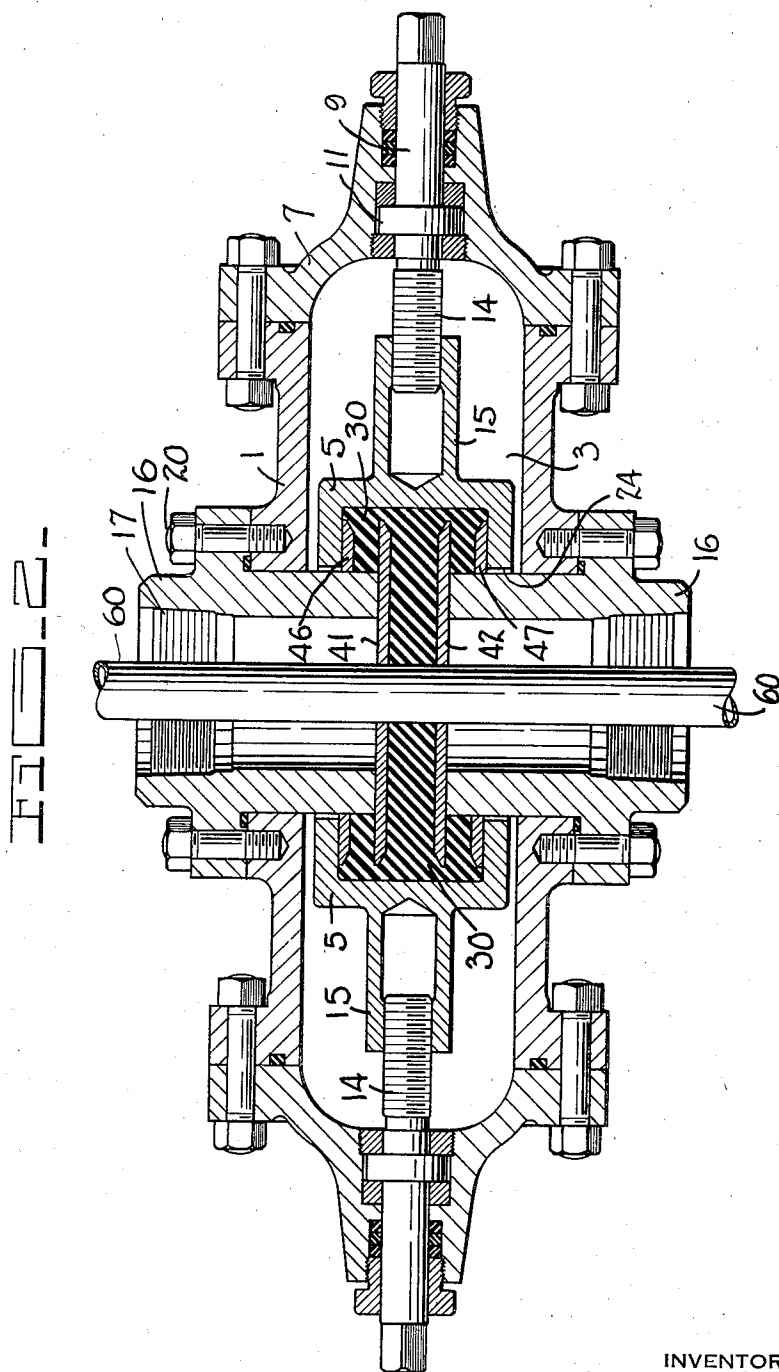
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5 Sheets-Sheet 2



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FIG. 3.

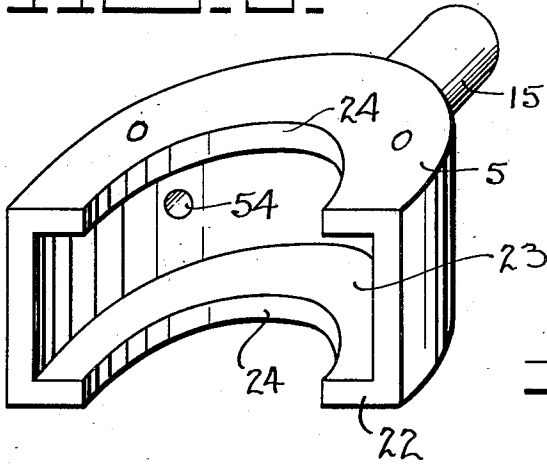


FIG. 4.

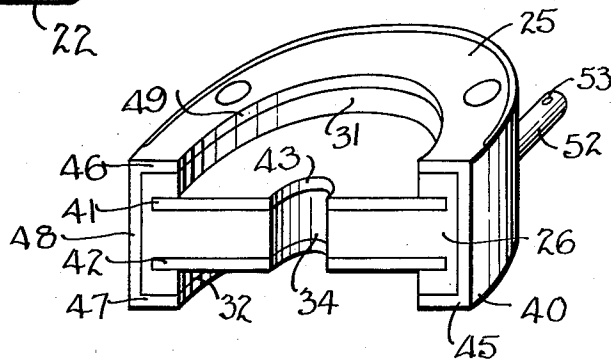
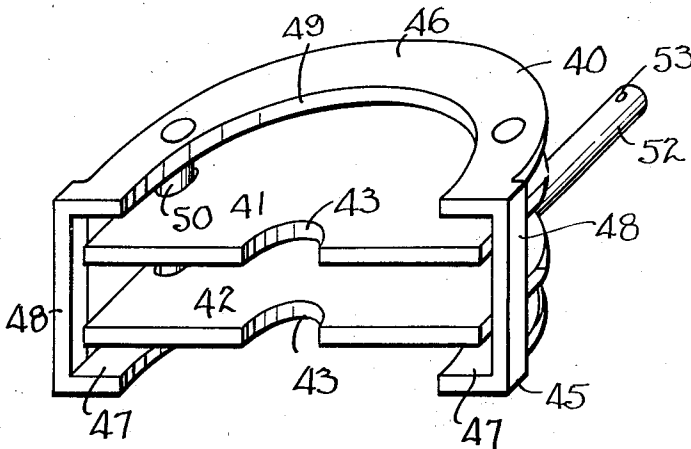


FIG. 5.



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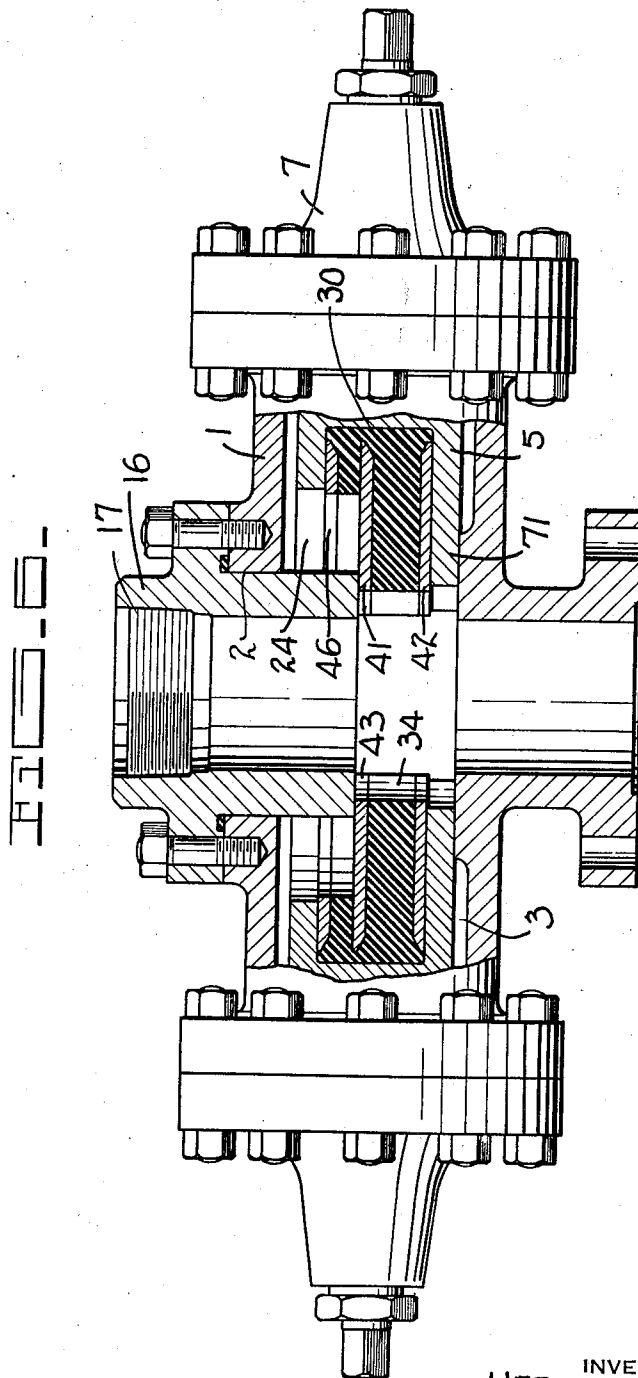
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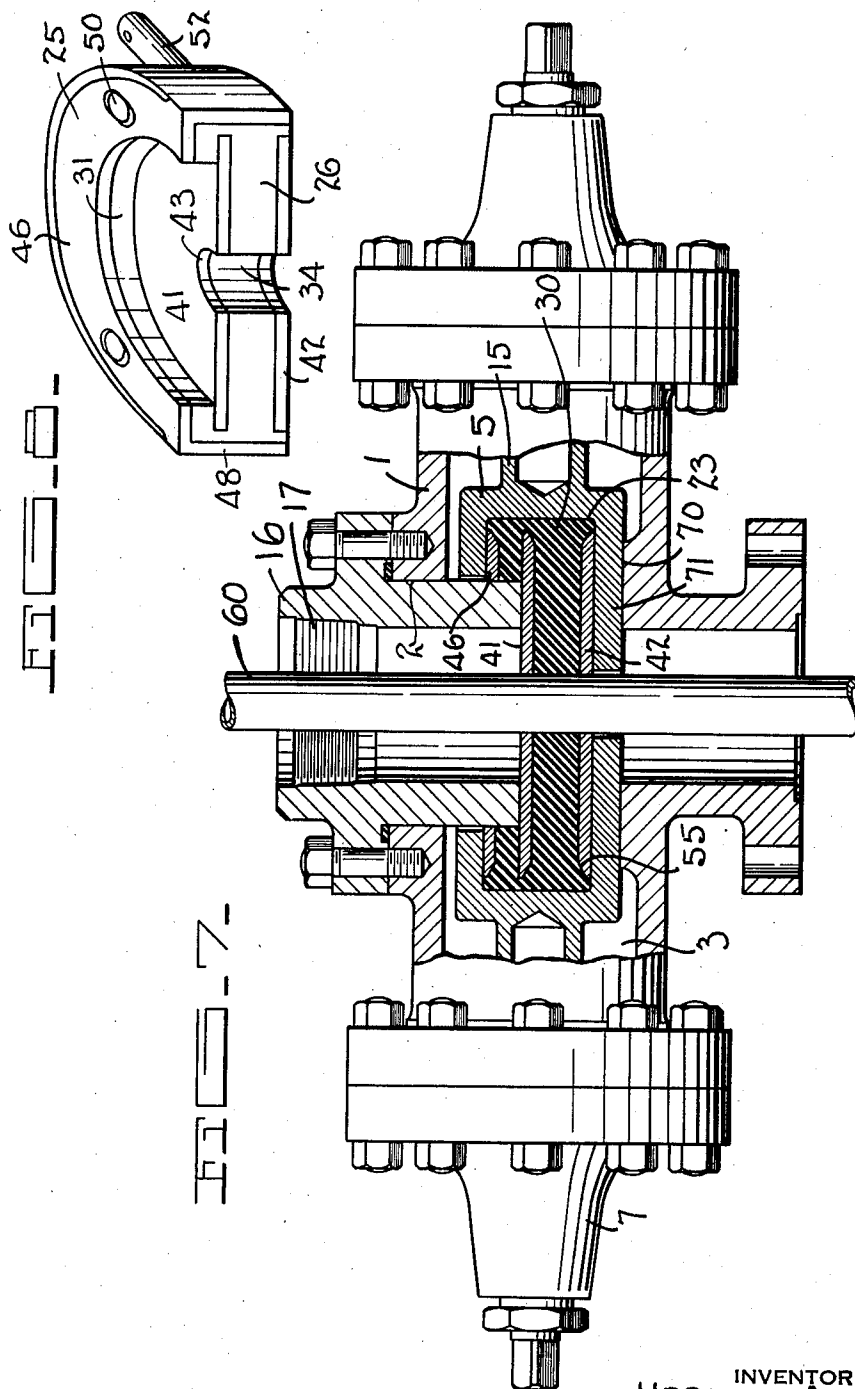
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MULTIPLE SEAL BLOWOUT PREVENTER

Filed May 7, 1937

5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

2,194,256

MULTIPLE SEAL BLOWOUT PREVENTER

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Application May 7, 1937, Serial No. 141,228

7 Claims. (Cl. 251—59)

This invention pertains to blowout preventers such as are employed in rotary well drilling to form a seal about an inner pipe to prevent the passage of fluid upwardly from the well between the said inner pipe and the inner portion of the blowout preventer.

The invention is an improvement upon the ordinary type of blowout preventer usually referred to as the ram type of blowout preventer in which two opposed rams are adapted to be moved inwardly against the inner pipe and form a seal therewith, and is particularly an improvement over the preventer shown in the patent to Neuhaus 2,044,590, June 16, 1936.

It is an object of the invention to provide a blowout preventer in which the rams are equipped with a novel and effective type of sealing device for engagement with the housing of the preventer and with the inner pipe where the packing will yield so as to form a seal with both the housing and the pipe.

Another object is to provide a blowout preventer in which the sealing assembly is equipped with means to reenforce and support the sealing member and also to displace the packing and force it to flow into sealing engagement with the surface contacting with the pipe and against the housing.

It is a general object of the invention to provide a sealing member which is particularly strong in construction and which will maintain a sealing contact for a relatively long period after material wear in said sealing member has occurred.

It is an object of the invention to so construct the sealing surface of the ram that the seal may be maintained with the housing both above and below the ram on the forward face of the ram.

Another object of the invention is to provide a packing on the ram which is resilient so as to form a double seal to prevent leakage either along the pipe or around the rams.

The invention is capable of adaptation for various forms of construction and in the drawings herewith certain preferred embodiments are disclosed.

Fig. 1 shows a central longitudinal section through a blowout preventer embodying the invention where a triple seal is had, the rams being shown in open position.

Fig. 2 is a similar view showing the rams in closed position.

Fig. 3 is a perspective view showing only the metal frame work of one of the rams.

Fig. 4 is a similar perspective view showing only the packing member.

Fig. 5 is a perspective view showing the metal skeleton of the packing member.

Fig. 6 is a side view partly in central vertical section illustrating a slightly different embodiment when only a double seal is maintained.

Fig. 7 is a view similar to Fig. 6 but with the rams closed against the inner pipe.

Fig. 8 is a perspective view of only the packing member of Figs. 6 and 7.

In Figs. 1 and 2, I have shown the invention as applied to a blowout preventer of special construction. Said preventer comprises a housing 1 having a central vertical opening therethrough, as is shown at 2, and two laterally chambers 3 in which the rams 5 are housed.

These chambers 3 may have at their outer ends a flange connection with a bonnet 7 extended laterally at 8 to provide a support for an operating stem 9. The stem 9 is similar to the usual non-rising valve stem in that it is rotatable in the bonnet 7. It is sealed about by means of a stuffing box 10 and the said stem is prevented from longitudinal movement by a radial flange 11, fixed to the stem and bearing on one side against a ring 12, which is fixed in the bonnet. The stem is held in position against the ring 12 by a locking ring 13. The stem is thus rotatable but is incapable of longitudinal movement in its position in the housing. The inner end is threaded at 14 with a coarse thread to engage within a threaded sleeve 15 extending rearwardly from the head of the ram 5.

The opening 2 vertically through the housing 1 has a collar or bushing 16 fitted closely therein, the outer end of which is threaded at 17 to engage with the casing or to the pipe, or it may be flanged or provided with a slip or tubing hanger bowl as desired. The collar has a radial flange 18 for attachment to the outer margin 19 of the housing about the opening 2 through means of bolts or studs 20. The inner end of the collar 16 is extended into the housing for a suitable distance to extend part way across the chamber 3, the inner end being machined off flat, as shown at 21. The lower opening through the housing is similarly equipped with a collar 16 held in place in the same manner as is the upper collar 16.

The ram 5 is composed of a metallic frame work or body shown in Fig. 3. This body member is preferably arcuate in shape in order to act as a yoke or saddle for the packing member. The sleeve or nipple 15 is at the rear thereof.

The inner face of the ram is flattened off at 22 to contact with the forward face of the opposing ram. Centrally of the forward face, however, the body is recessed at 23 and has the out-
 5 standing top and bottom lips 24 to fit about the inwardly extending collars 16.

Within this metal saddle is fitted the sealing member 25 which is shown in assembled form in Fig. 4. The body 26 of the sealing member is
 10 of rubber or other equivalent resilient material. The sealing member is arcuate to fit within the recess or chamber 23 in the ram body 5.

Particular attention is directed to the sectional views of the packing member as seen in Figs. 1
 15 and 2 where it will be observed that this body is made up of an arcuate portion 30 which is substantially in the form of a semi-circle so as to provide the sealing face 31 above and the sealing face 32 below. Intermediate these faces is the
 20 central outstanding portion 33 which terminates in the front sealing face 34. It will be observed, therefore, that the faces 31 and 32, when considered with 34, provide a stepped packing construction. This peculiar arrangement is provided so
 25 that the front face 34 may seal about a pipe which is disposed in the well bore at the same time that the faces 31 and 32 are sealing about the upper and lower bushings 16 so that a seal may be formed with the housing 1 at the same
 30 time that the seal is being formed about the pipe.

As seen in Fig. 5, this rubber or resilient body of packing material 25 may be vulcanized or otherwise molded about a metal frame work indicated generally at 40. This frame, as seen in
 35 Fig. 5, constitutes the two central plates 41 and 42, each of which is formed with an arcuate cut-away portion 43 to correspond with the cutaway sealing face 34 of the packing material. These plates are more or less floating inside of the
 40 frame work 45 of the skeleton, which frame work includes the upper plate 46 and the lower plate 47, these two plates being spaced apart by the connecting members 48, one of which is shown at each side of the front forward portion. These
 45 plates 46 and 47 are arcuate in shape so that the front edge 49 thereof conforms with the configuration of faces 31 and 32 of the packing body. In order that these floating plates 41 and 42 will be properly retained within the frame work the
 50 vertical dowel pins 50 have been provided and these are shown passing into the upper and lower plates of the frame work 40. In order that the packer may be held in proper position in the yoke 23 of the ram a pin or rod 52 is affixed
 55 to the rear portion of the skeleton 40 and is provided with an opening 53, through which a suitable pin may be passed. There may be two of these rods 52, each of which passes through an opening 54 in the yoke or ram, as seen in Fig. 3.

Fig. 4 shows the resilient material molded integrally with the re-enforcing plates and shows the packing assembly ready for insertion in the yoke or ram, which is in turn seen in Fig. 3. It
 60 will be particularly noted that the rear edge of each of the plates 46, 41, 42 and 47 is beveled at 55, as best seen in Fig. 1. This bevel construction is of advantage in assisting in the extruding of the resilient material as it moves forwardly to provide a seal. The yoke 23 firmly confines
 70 the rear portion of the resilient packing body and as will be apparent from Fig. 2, when the yoke or ram is moved forwardly the sealing face 34 will contact about the pipe 60 so as to form a seal. At approximately the same time the sealing faces 31 and 32 will abut against the bush-

ings 16 so that a double seal is formed with the blowout preventer housing, both above and below the central portion of the packing, and at the same time the seal is provided about the pipe 60. The particular advantage of the present construction is the fact that the pressure on the bushings and the pipe may be equalized because of the ability of the packing material to flow under pressure so that pressure applied at one point will be applied uniformly throughout the packing and all points of contact. In this manner any inequalities in positioning of the pipe or the seal about the pipe with respect to the blowout preventer housing will be compensated for by the fact that the packing material will be extruded due to pressure at any other point so as to form a seal of equal strength or pressure at every point. This is particularly true because of the position of re-enforcing or retaining plates 46, 41, 42 and 47.

These plates confine the packing material as it is extended forwardly so that if wear should occur along the pipe there would be a tendency for the material of the packing body which was placed against the bushing to relieve itself slightly in order to compensate for the wearing away which occurred at the pipe and the same would be true if wear occurred around the bushings. In other words, a packing has been provided which can accommodate itself to any inequalities of construction, arrangement and actual practice and which will provide a uniform seal at all points. It is needless to say that if the yoke portion is advanced forwardly in order to compensate for wear that there will be an equal pressure applied at both points of the seal; namely, either the upper or lower portions, as well as around the pipe and again as well as around the contacting flat portions of the central portion of the rams 5 where these front faces come into contact with each other. The flowing of the resilient material under pressure will also force the plates 41 and 42 against the ends 21 of the sleeves 16. If one ram is not moved quite as closely or firmly against the pipe as the other, then there will be a tendency of the other ram having the greater pressure to equalize itself against the first ram and a seal will be formed regardless of any form or inequalities in pressure.

It seems obvious that the entire packing assembly will be readily removed and released, either by releasing the bolts and removing the bonnet ends of the housing or by withdrawing the packing after removing of the bushings 16.

Figs. 6, 7 and 8 show a slightly modified form of the invention wherein the lower sleeve 16 has been omitted and the housing 1 of the blowout preventer has been extended inwardly to form a seat upon which the lower flange 70 of the yoke 23 is arranged to slide in order to support the lower re-enforcing plate 42. This type of construction may be of advantage where excessive pressures are not contemplated. The general construction of the packing assembly and the other parts are substantially the same as described in connection with Fig. 1. Fig. 8 shows the packing assembly and Fig. 7 shows this modified form of the ram construction in closed position.

What is claimed is:

1. A blowout preventer comprising a housing, a central chamber therein, an opening at the top and the bottom of said housing, a bushing in each opening, a sleeve portion on each bushing

projecting into the chamber in said housing, opposed rams in said chamber, and sealing means on each ram to flow under pressure upon engagement with a pipe and said sleeves so as to equalize the pressure thereon, and means on each ram to seal with the ends of said sleeves.

2. A blowout preventer comprising a housing, a central chamber therein, an opening at the top and the bottom of said housing, a bushing in each opening, a sleeve portion on each bushing projecting into the chamber in said housing, the ends of said sleeves being spaced apart, opposed rams in said chamber, and a packing on each ram to project in between the ends of said sleeves to seal about a pipe and be confined by the ends of said sleeves.

3. A blowout preventer ram construction comprising a yoke, a packing assembly therein, said assembly including a body of resilient material; a set of vertically spaced plates floating on said body to confine and reenforce said body, said plates being of different sizes and shaped to fit and held in position by said resilient material about circular members of different sizes.

4. A packing construction for double seal blowout preventers comprising a body of resilient ma-

terial, a stepped front face thereon, and an arcuate plate floating on the resilient material on each step to confine the resilient material when it is subjected to pressure.

5. A packing assembly skeleton for valves comprising a frame having top and bottom plates spaced apart, a pair of plates loosely arranged in said frame, and a retainer rod projecting from said frame.

6. A packing assembly skeleton for valves comprising a frame having top and bottom plates spaced apart, a pair of plates loosely arranged in said frame, said top and bottom plates being arcuate.

7. In a device adapted to abut an object to seal an opening against pressure, a packing carried by the device, means on the packing disposed to abut the object and the packing to confine the packing, means to force the device toward the object to compress the packing and establish a pressure in the confined packing of a value greater than that in the opening to be closed, said packing having three stepped front sealing faces and said confining means positioned to confine the material of each stepped face.

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