March 19, 1940. H. ALLEN 2,194,260

SINGLE SCREW BLOWOUT PREVENTER

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FIG. 1.

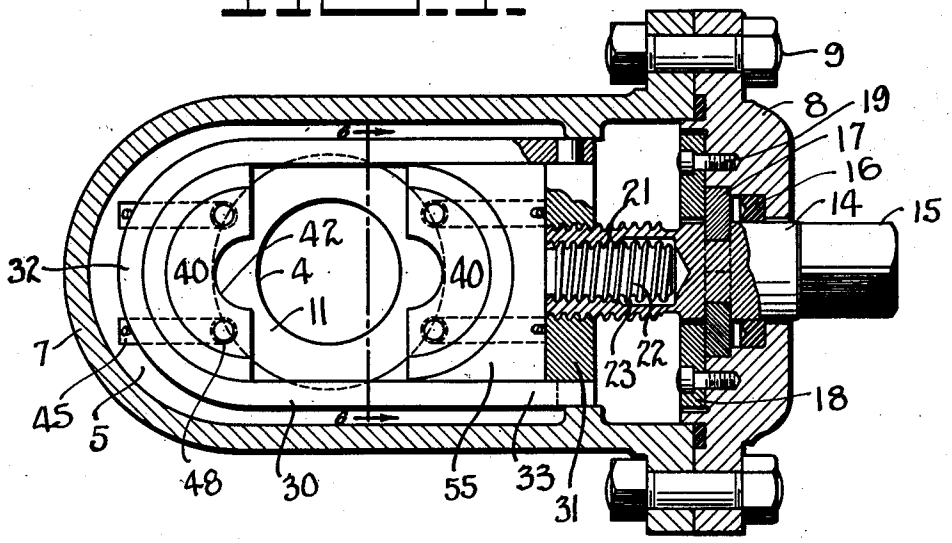


FIG. 2.

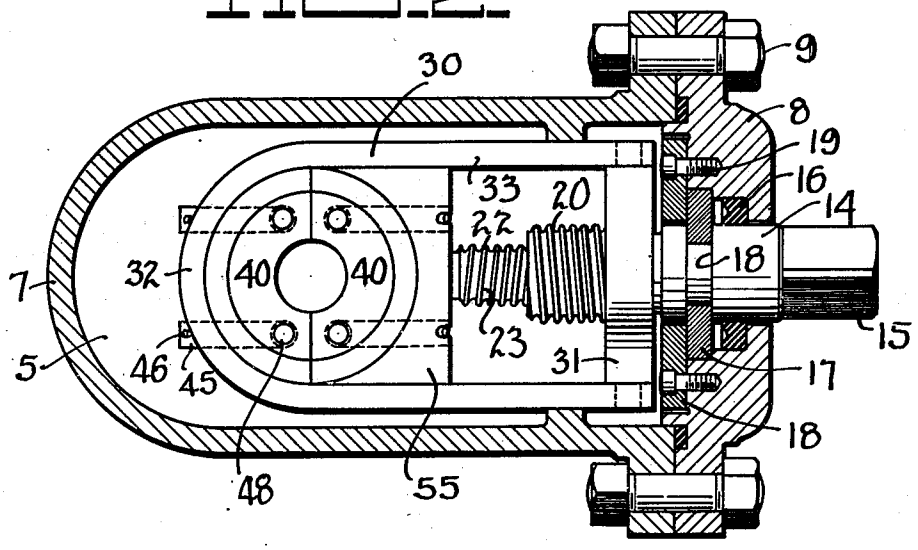
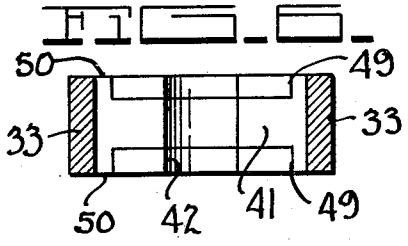


FIG. 6.



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FIG. 3.

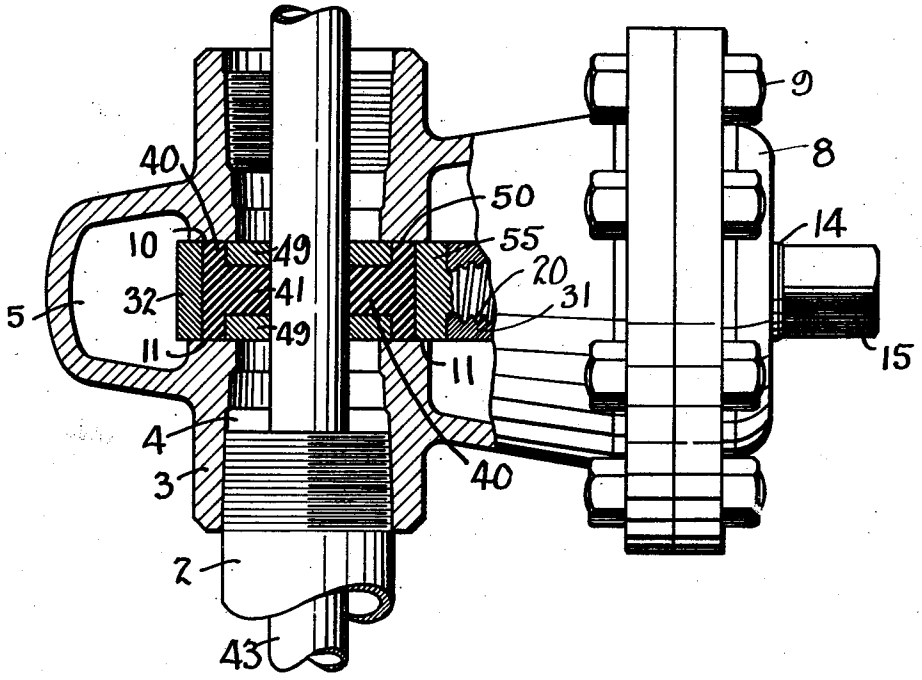


FIG. 4.

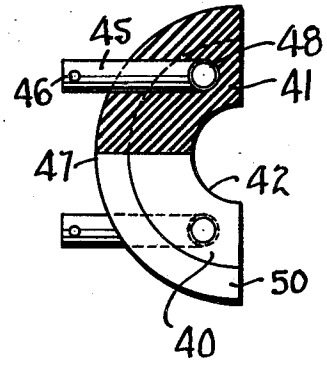
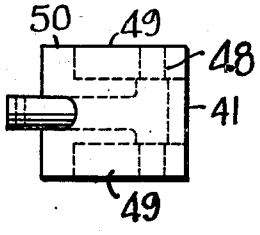


FIG. 5.



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UNITED STATES PATENT OFFICE

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SINGLE SCREW BLOWOUT PREVENTER

Herbert Allen, Houston, Tex., assignor to Cameron Iron Works, a corporation of Texas

Application June 7, 1938, Serial No. 212,243

1 Claim. (Cl. 251—59)

The invention relates to a blowout preventer of the type which can be manipulated by operation of a single screw and wherein the manipulation of this screw serves to compress a sealing member in position and to completely confine it so that a uniform pressure will be applied to both the pipe and to the housing.

It is one of the objects of the invention to provide in combination a housing, yoke and sealing member which will cooperate together so that the sealing member is confined under pressure by the housing and yoke.

Another object of the invention is to provide a supporting yoke for blowout preventers which will support a resilient sealing member in position to be confined under pressure.

Still another object of the invention is to provide a demountable type sealing member for blowout preventers.

Still another object of the invention is to provide a flat ram type blowout preventer wherein the packing material is completely confined when under pressure so as to effect a uniform sealing pressure at all of the points of contact.

Other and further objects of the invention will be readily apparent when the following description is considered in connection with the accompanying drawings wherein:

Fig. 1 is a horizontal sectional view through the preventer and showing the arrangement of the parts when the preventer is open.

Fig. 2 is a view similar to Fig. 1 but showing the preventer closed.

Fig. 3 is a side elevation with certain portions shown in section to illustrate the confining of the sealing material under pressure.

Fig. 4 is a plan view of one of the sealing assemblies with the upper half shown in section.

Fig. 5 is a side elevation of the sealing assembly.

Fig. 6 is a section taken on the line 6—6 of Fig. 1 and looking in the direction of the arrow.

In Fig. 3 the well head or casing is illustrated at 2 and serves as a foundation for the blowout preventer which includes the housing 3. This housing may be threaded or flanged to the pipe 2. A vertical or central passage 4 which is a continuation of the well bore is formed in the housing 3 and this passage is intersected by the transverse chamber 5 which extends to either side of the vertical passage 4. The chamber 5 is of course best seen in Figs. 1 and 2. The housing 3 is shown as being integral at 7 on the left hand side as view in the drawings, while the right hand side is closed by the cover plate 8 which may be held in position by bolts 9. Particular attention is directed to the flanges or ring seats 10 and 11, which project into the chamber 5 from above and below respectively. These flanges, as seen in Fig. 1 are circular and tend to define the passage 4.

A closure assembly is operatively carried by the cover plate 8 and includes a spindle or screw 14. This spindle is rotatably mounted in the cover plate 8 and may have a non-circular end 15 to which a hand wheel or wrench may be applied in order to operate the screw. The packing ring 16 may be disposed in the cover plate about the screw 14 to provide a seal. A groove 18 in the spindle receives the locking ring 17 in order to hold the spindle against longitudinal thrust. The locking ring 17 is held in place by the hold-down plate 18, which is, in turn, connected to the cover plate by the cap screws 19. In this manner the screw is rotatably but not longitudinally movable. Removal of the cap 8 will remove the entire assembly except the housing so that the rams and packings may be readily replaced if worn or a different size inserted to fit a different size pipe.

The screw 14 has a thread 20 formed on the area close to the cap plate 8. The inside of the screw 14 is hollow and threaded at 21 in order to receive the threaded end 22 of the spindle 23.

Carried by the thread 20 is a yoke 30 which is in the form of an elongated U-shaped frame which is affixed to the cross bar 31 which is internally threaded to travel on the thread 20. This yoke 30 projects into the chamber 5 and across the passage 4 in such a manner that it is disposed between the flanges 10 and 11. The left hand end of this yoke as viewed in the drawings is semi-circular at 32 and the legs 33 are the parts thereof which are connected with the cross bar 31.

The flanges 10 and 11 hold this yoke against rotation so that it seems clear that as the screw 14 rotates, the yoke will be caused to move transversely to the passage 4.

The sealing unit 40 is seen in Fig. 4 and is made up of a body of resilient material 41, such as rubber or other suitable material. This body is substantially semi-circular and may be provided with a recessed or cutout area 42 which is arranged to fit about a pipe or other member 43 in the well bore. The body 41 carries the retainer rods 45 which extend rearwardly therefrom and have an opening 46 therein to receive a locking pin.

This assembly is so arranged that the rear

semi-circular face 47 will fit the curved end 32 of the yoke 30 and by inserting suitable locking pins, the unit will be securely held in the yoke, as best seen in Figs. 1 and 2. The rods 45 may have a T-head 48 on the forward end thereof, in order to serve as a retainer or support for the confining or reinforcing plates 49, one of which is positioned each on the top and the bottom of the resilient body 41. These plates leave a semi-circular exposed face 50 on each the top and the bottom of the sealing unit. These faces are arranged to engage with the faces of the flanges 10 and 11 on the housing.

As seen in Fig. 3 the curved portion 32 of the yoke 30 is arranged in between the flanges 10 and 11 at the time the sealing member closes about the pipe 43. The confining plates 49 cover the packing material in that area around the pipe 43 and inside of the flanges 10 and 11. It seems obvious that when pressure is applied to the yoke 30 and it is moved to the right, as seen in Fig. 6, that a pressure will be applied to the packing 41, tending to force it against the pipe 43. Of course with the plates 49 about the pipe they are prevented from further movement so that any additional movement of the yoke 30 compresses the packing material 41 and inasmuch as it is resilient, this pressure will be distributed uniformly through the material. The material will be forced against the periphery of the pipe 43 in between the plates 49 and it will be forced against the flanges 10 and 11, as well as against the inside face of the yoke 30. These parts will serve to completely confine the packing material so that any desired pressure can be applied to it in order to hold it in sealing position and to maintain a sealing. In event a part of the packing material should wear away, of course there will be a flow of material under pressure to compensate for such wearing away and in this manner a uniform sealing pressure can be maintained.

A similar sealing unit 40 is carried by a head 55 which is slidably mounted within the yoke 30. This head 55 is actuated by the spindle 23 when the threads 22 move relative to the threads 21 on the inside of the screw 14. It will be understood that the threads 20 and 22 will be opposite so that when the thread 20 causes the yoke to move in one direction, that the head 55 will then move in the opposite direction. In this manner a double action is obtained to move both the sealing units 40 about the pipe or other member 43 and as these units pass about the pipe, any desired pressure can be applied to the sealing material by further rotation of the screw 14. In event any of the sealing material is worn away, additional material will immediately move forward to compensate therefor and maintain a seal because the material is always under pressure and is completely confined.

Particular attention is directed to the fact that neither the yoke 30 nor the head 55 are in positive contact with the pipe 43 and that the pressure of these parts is utilized for sealing only through the medium of the packing material 41 and that the plates 49 are floating on the packing material so that once they abut the pipe 43 they are restrained against further movement. The exposed faces 50 of the packing material are in contact with the flanges 10 so that the applied pressure tends to extrude the resilient material against the pipe 43 and between the plates 49. To obtain additional sealing pressure it is therefore only necessary to take an additional turn on the screw 14 and the valve is in this manner arranged to accommodate any desired pressure in order to maintain a seal.

Broadly the invention contemplates a single screw double acting type of blowout preventer, which will compensate for wear and maintain a uniform seal about a well passage.

What is claimed is:

A single screw double acting ram type blowout preventer having a housing, a well passage therethrough, a transverse chamber intersecting such passage, outstanding flanges to provide seats on said housing about said passage and projecting into said chamber from the top and from the bottom, a pipe extending through said passage and about which a seal is to be formed, a pair of ram members in said chamber on opposite sides of said passage, a resilient packing carried by each ram, confining plates floating on the top and bottom of the forward edge of said packings to span the space between the pipe and said flange seats, and means to move said rams so as to apply pressure to said packings as they are completely confined by the pipe, said plates, said flange seats and said rams so that the pressure in said packing is proportional to the applied pressure.

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