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L. S. SORESENSEN

2,502,803

OIL SAVER AND DRILLING CONTROL

Filed Nov. 28, 1945

2 Sheets-Sheet 1

Fig. 1.

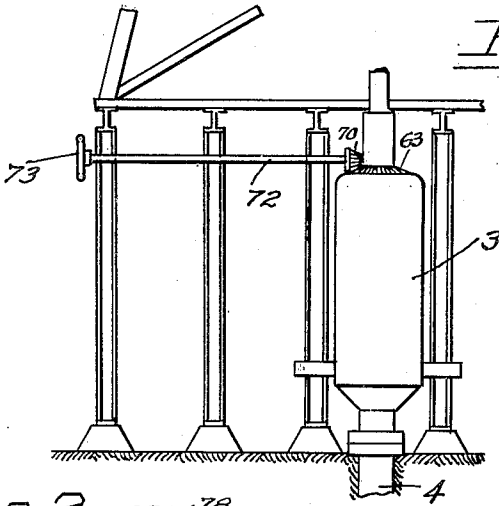


Fig. 9.

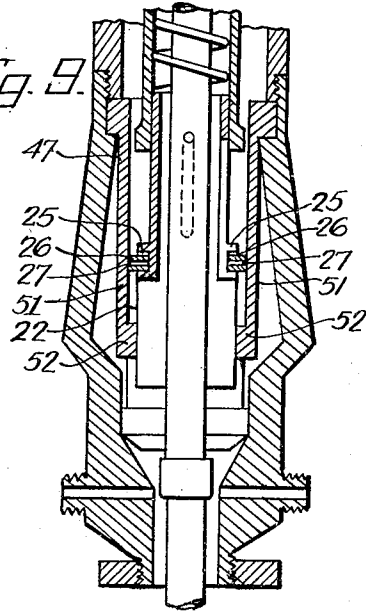


Fig. 2.

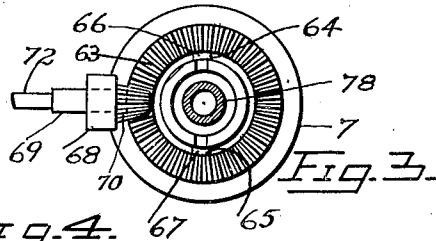
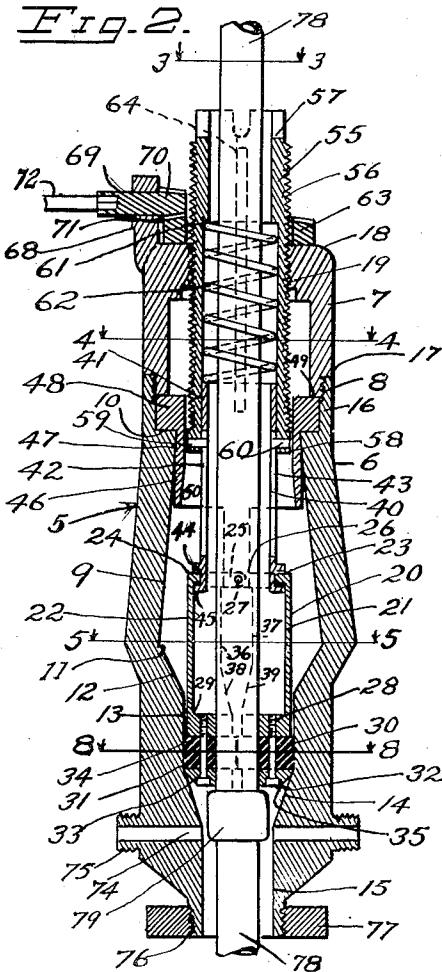


Fig. 4.

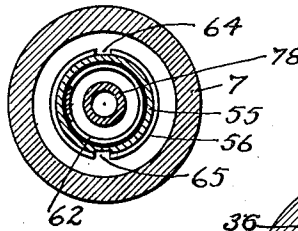
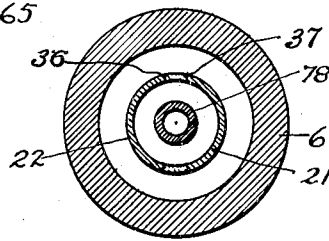


Fig. 5.



INVENTOR;
LEE S. SORESENSEN;
BY *Calvin Brown*,
Attorney.

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Fig. 6.

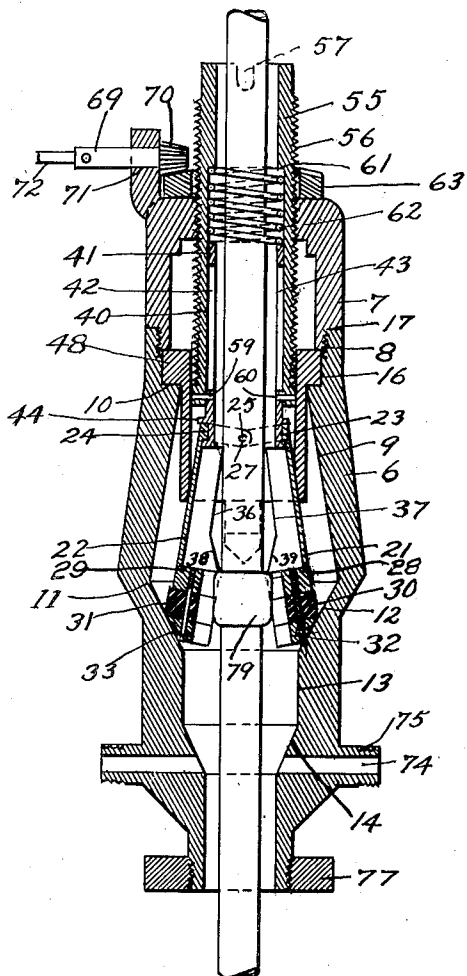


Fig. 7.

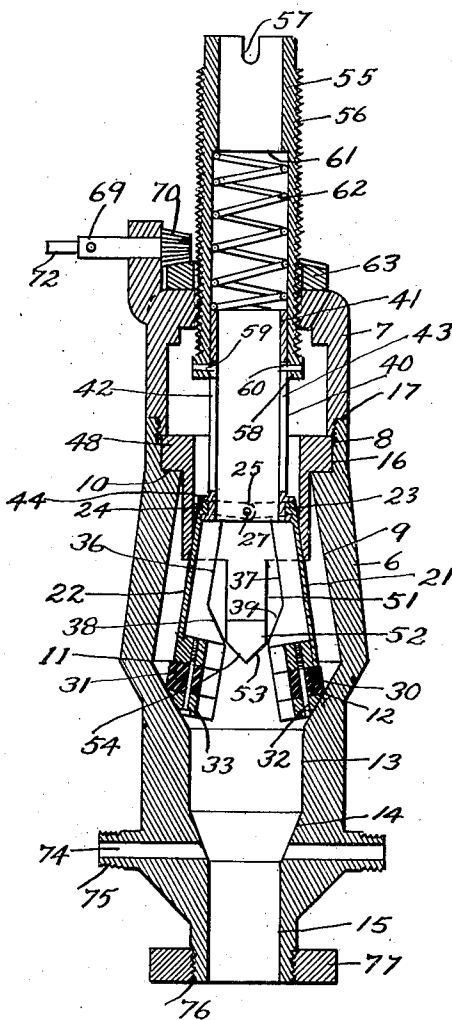
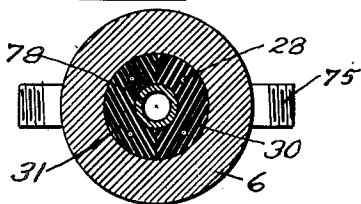


Fig. 8.



INVENTOR,
LEE S. SORENSEN;

BY
Calvin Brown
Attorney

UNITED STATES PATENT OFFICE

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OIL SAVER AND DRILLING CONTROL

Lee S. Sorensen, Long Beach, Calif.

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5 Claims. (Cl. 166—15)

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The present invention relates to the oil art, and specifically to a device which acts in the capacity of preventing blowouts and also as an oil saver.

The invention has for an object the provision of a device which simplifies to a marked degree apparatus of the type of this invention. The average blowout preventer and oil saver, where they are combined, is of many parts among which may be mentioned ram blocks and holders, sprockets and chains, the use of a large number of packer rings, and the like, all of which the present invention does not need nor utilize, with the result that the device of the present invention is more economical in cost of manufacture and in cost to the user.

An object of the present invention is to provide a device which is semi-automatic in operation in that it will not only pack off and wipe tubing or casing that is being withdrawn from a well hole, but will allow the passage of collars therethrough during the raising of the drill pipe or tubing. The present device is semi-automatic in the sense that an operator need not open or close the device as the pipe is raised, a feature of importance when the pipe is of considerable length.

The present invention has for an object a device which will clean the mud from a drill pipe as it is being raised from the well hole. In the case of tubing it will wipe the oil from the tubing as the tubing is raised.

Other objects will become apparent from the description.

In the drawing:

Fig. 1 is a fragmentary elevation showing the oil saver and blowout preventer in the cellar beneath an oil well derrick;

Fig. 2 is a longitudinal sectional view of the device of the invention;

Fig. 3 is a sectional view on the line 3—3 of Fig. 2, and looking in the direction of the arrows;

Fig. 4 is a cross-sectional view on the line 4—4 of Fig. 2;

Fig. 5 is a cross-sectional view on the line 5—5 of Fig. 2;

Fig. 6 is a longitudinal sectional view showing certain parts of the device in a changed relationship from that of Fig. 2;

Fig. 7 is a longitudinal sectional view of the device showing movement of certain portions of the device from the positions illustrated in both Figs. 2 and 6; and

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Fig. 8 is a sectional view on the line 8—8 of Fig. 2, and

Fig. 9 is a vertical section at 90° to the view shown in Fig. 2.

Referring to the drawings

I have shown in Fig. 1 a well derrick 1, suitably elevated on supports 2, with the improved oil saver and drilling control 3 positioned within what is termed the cellar of the derrick. The oil saver 3 communicates with a casing 4.

The oil saver and drilling control includes a housing 5, formed in two parts 6 and 7, which are held together by screwthreading 8. The housing member 6 is so formed as to have a tapered bore 9, divergently extending from one end portion 10 to a zone 11 where a downwardly tapered wall 12 is provided. The diameter of the housing at 13 is constant for a portion and then is downwardly tapered at 14. The tapered portion communicates with constant diameter bore 15. The tapered portion 14 acts as a tapered seat for an element to be described. The housing member 6 is provided with a thin annular wall 16, which has threaded connection with member 7. The member 7 constitutes a cap for the housing in that it is so formed as to shoulder against the end of part 16, as shown at 17, and is formed with an annular end 18 which is screwthreaded at 19.

The packing assembly 20 includes two semicircular members 21 and 22, both provided with internal end flanges 23 and 24, which flanges are extended to provide pairs of diametrically positioned arms 25 and 26 held together by means of pins 27. This construction permits the two halves 21 and 22 to separate, using the pins 27 as centers. The opposite end of each half 21 and 22 is provided with an enlarged semicircular internal flange 28 and 29. Semicircular packing members 30 and 31 are held against the base portion of the flanges 28 and 29 by semicircular metal rings 32 and 33 through the medium of screws or the like 34, passed transversely through said rings 32 and 33, the packing members and secured to the base members 28 and 29. The arrangement is such that the semicircular rings 32 and 33 both have beveled surfaces 35, and the said rings and packing members are held in loose engagement, to the end that when the beveled surfaces at 35 contact the tapered seat 14, the metal ring will compress the packing members against the bases of portions 28 and 29 and cause radial movement of the packing to effect a tight seal with the housing. The semicircular members 21 and 22 have substantial meeting engagement in the zone of

the flanges 28 and 29. That area between the arms 25 and 26 and the flanges is such as to provide separation between the diametric edges at 36 and 37, which edges are substantially parallel, and then tapered inwardly at 38 and 39 to where it meets the constant diameter portion adjacent the flanges 28 and 29. The inwardly tapered edges 38 and 39 function as cam edges, as hereinafter described, and the separation of edges 36 and 37 provides diametric ways between the semi-circular members 21 and 22.

I provide at 40 a packing assembly retainer, constituting in the present embodiment a tube 41, provided with two longitudinally extending and diametrically positioned slots 42 and 43. One end of said tube is formed with an annular flange 44, provided with an annular groove 45, the said flanges 23 and 24 fitting within said annular groove so as to hold the packing assembly pendent therefrom.

Expansion means for the packing assembly is provided at 46, and said means includes a sleeve 47, provided at one end with a flange 48 adapted to be positioned between the ends 10 and 49 of housing parts 6 and 7. It is not intended that the flange 48 should be clamped but should have slight play. The inner surface 50 of the sleeve tapers to correspond to the tapered wall 9 of housing 6. The said sleeve carries a pair of diametrically positioned arms designated generally as 51, see Fig. 7, both arms provided with a transversely enlarged end 52 formed with inclined intersecting edge portions 53 and 54. The said edge portions 53 and 54 function as a cam means for separating the members 21 and 22, as hereinafter described.

An adjusting sleeve 55 is externally provided with screwthreads 56, and is formed at one end with castellations 57 and the opposite end is externally flanged at 58. Passed through said flange are screws 59 and 60 for position within the diametric slots 42 and 43 of the packing assembly retainer. The internal diameter of the adjusting sleeve varies to provide a shoulder at 61. Within the adjusting sleeve is a coil spring 62, one end of which bears against shoulder 61, and the other end of which engages one end of tube 41. Carried on part 18 of the housing 7 is a crown gear 63. This crown gear loosely surrounds the adjusting sleeve 55 and is keyed to said sleeve, the side of the sleeve being provided with a diametric pair of longitudinally extending grooves or keyways 64 and 65, see Fig. 4, to receive keys 66 and 67 formed on the said crown gear, see Fig. 3. A bracket 68 extends upwardly from the housing member 7 and is drilled to accommodate shank 69 of a pinion 70. The teeth of the pinion engage the teeth of the crown gear, as indicated at 71. The shank 69 may be provided with a squared opening to receive the squared end of a shaft 72, the end of which shaft carries a hand wheel 73 in convenient position for an operator to turn the same.

The base end of the housing 5 is provided with one or more transverse bleed ports 74 opening within the bore 15 and immediately below the tapered seat 14. The usual nipples 75 provide a means whereby pipes may communicate with the bleed ports. These ports function in the usual manner to relieve pressure between the tubing and casing.

The operation, uses and advantages of the invention just described are as follows:

It will be assumed that the blowout preventer is placed within the cellar shown in Fig. 1 and

coupled to the flange of casing 4. In other words, the external surface of the housing is threaded at 76 to receive a flange 77, which flange cooperates with the uppermost flange of the casing, with the flanges bolted together. The operator may make such adjustments as are necessary by manipulating the hand wheel 73. As lengths of tubing 78, interconnected by collars of the type shown at 79, are lowered into the well either for drilling purposes or for the removal of oil, the said collars will readily pass through the packing assembly. To accomplish this, the hand wheel 73 is turned, which rotates pinion 70 and turns the crown gear 63 to raise or lower the adjusting sleeve 55, depending upon the direction of rotation of the hand wheel. Assuming that the adjusting sleeve is to be raised, movement upwardly of the adjusting sleeve from the position shown in Fig. 2 to that of Fig. 7 will raise the packing assembly retainer and the packing assembly. The expansion sleeve, however, is stationary, and the cam edges 53 and 54 for arms 51 move within the ways provided by edges 36 and 37 of the packing assembly until said cam edges contact the tapered edges 38 and 39 of the packing assembly, whereupon the members 21 and 22 are angularly disposed, with the packing portions separated. The members 21 and 22 do not bind during movement thereof due to the taper of bore 9 and the corresponding taper of wall 50.

The operation of the present device is semi-automatic, and if the operator turns the hand wheel 73 to a certain position, say one in which spring 62 is not entirely compressed, the device will function in the following manner when the tubing is raised. When the collar 79 engages the semicircular rings 32 and 33, the packing assembly 20 and the packing assembly retainer 40 will move upwardly, and the base members 28 and 29 will not separate for the reason that said base members, together with the packing, are held within the uniform diameter bore 13. As upward movement continues, the packing assembly retainer compresses the spring between the upper end thereof and the shoulder 61 of the adjusting sleeve 55, as for instance illustrated in Fig. 6. When the semicircular rings 32 and 33 reach the beveled portion 12, they begin to separate, which separation proceeds until the zone 11 is reached and the collar 79 is permitted passage therebetween. Separation is of course forced by the cam ends of the arms carried by the expansion sleeve 46 engaging the tapered edges 38 and 39 of the packing assembly. When the collar 79 escapes from the flanges 28 and 29, the spring 62, which is under compression, expands and forces the packing assembly retainer downwardly, which produces movement in the packing assembly to again seat the same. Thus the tubing may be rapidly raised, the device functioning semi-automatically to engage the periphery of the tubing to allow passage of collars therethrough, with the packing again engaging the periphery of the tubing after passage of the collar. In this manner, the device in addition to functioning as a blowout preventer, also functions as an oil saver in the case of oil tubing, as it tends to wipe the periphery of the tubing during its upward movement. In the case of drill pipe the operation of the packing assembly is such that mud is wiped from the periphery of the pipe.

When the hand wheel 73 is rotated, the pinion through the crown gear will rotate the adjusting sleeve 55, for the reason that the crown gear carries keys 66 and 67 positioned in keyways 64 and

65 of the sleeve, see Figs. 3 and 4. Rotation of the sleeve produces rotation in the packing assembly retainer for the reason that screws 59 and 60 carried by the adjusting sleeve 55 are positioned within longitudinally extending slots 42 and 43 of said retainer. The packing assembly does not rotate, as the flanges 23 and 24 are loosely carried within the annular groove 45 of the packing assembly retainer. As a consequence, there can be no wear on the packing 30 during movement of the adjusting sleeve, nor does the packing assembly 20 rotate when raised from the position of Fig. 2 to that of either Fig. 6 or Fig. 7. However, if there was any tendency for the packing assembly to rotate when raised to the position of either Fig. 6 or Fig. 7, there would be no bind between said packing assembly and the expansion sleeve, as the expansion sleeve flange 48 is loosely carried on end 10 of the housing member 6. The flange is not clamped between the housing members 6 and 7.

In the event the operator does not use the hand wheel 13, the usual spanner wrench may engage the castellations 57 to rotate the adjusting sleeve.

The device has been found to function satisfactorily in actual use and service, and to act effectively as a blowout preventer and as a means for both cleaning the pipe of mud and as an oil saver.

I claim:

1. A combination oil saver and drilling control, including an annular housing through which drill pipe and oil tubing joined together by collars may axially pass, said housing provided with an internal tapered seat portion and with a chamber portion of greater internal diameter than the seat portion, a pair of semi-circular arms hinged together each at one end thereof, split annular packing at the opposite end of each of said arms, means secured to the housing and to the hinged ends of said arms for supporting the said arms for axial movement within the housing, said arms in one position, seating said packing on the said tapered seat portion of the housing, and in a second location, positioning the arms and packing in the zone of the chamber portion.

2. A combination oil saver and drilling control including an annular housing through which drill pipe and oil tubing joined together by collars may axially pass, said housing provided with a tapered seat portion and with a chamber portion of greater internal diameter than the seat portion, a pair of semi-circular arms within said housing, hinge means securing said arms together, each at one end thereof; split annular packing carried at the opposite end of each of said arms, said packing adapted to surround the tubing or drill pipe and engage the same when the said packing engages the tapered seat of the housing, a tube and means on the housing supporting one end of said tube for axial movement within said housing, the said tube at its opposite end supporting the hinged end of the said arms, and a coil spring urging the tube in one axial direction to resiliently maintain the said packing on said seat.

3. A combination oil saver and drilling control including an annular housing through which drill pipe and oil tubing joined together by collars may axially pass, said housing provided with a tapered seat portion and with a chamber portion of

greater internal diameter than the seat portion, a pair of semi-circular arms within said housing, hinge means securing said arms together, each at one end thereof; split annular packing carried at the opposite end of each of said arms, said packing adapted to surround the tubing or drill pipe and engage the same when the said packing engages the tapered seat of the housing, a tube and means on the housing supporting one end of said tube for axial movement within said housing, the said tube at its opposite end supporting the hinged end of the said arms, a coil spring urging the tube in one axial direction to resiliently maintain the said packing on said seat, and means for adjustably regulating the compression of said spring against said tube.

4. In a device of the character disclosed, an annular housing provided with an internal tapered seat portion and with a chamber portion of greater internal diameter than the seat portion, a pair of semi-circular arms hinged together at one end, positioned within said annular housing; split annular packing carried by the opposite ends of said arms and adapted to engage the tapered seat portion, a tube supporting at one end the hinged end of said arms, a threaded sleeve axially screw threaded within said housing, a slide connection between the tube and the sleeve, a coiled spring within the sleeve and engaging an end of said tube to normally urge said tube in one direction to move the packing end of the arms into engagement with the tapered seat portion of the housing, and means for regulating the compression of said spring.

5. In a device of the character disclosed, a housing, an externally threaded sleeve axially screw threaded within said housing, a tube telescopically received within said sleeve, means securing said sleeve and tube together for relative axial movement, a pair of semi-circular arms pendant from said tube, hinge means securing said arms together each at one end thereof, split annular packing at the opposite end of each of said arms, said housing formed with a seat portion for receiving and moving said arms and packing together to compress the packing, a coil spring within said sleeve and normally urging said tube, arms and packing in the direction to seat said packing on said seat portion to compress the packing, and cam means carried by the housing and positioned between said semi-circular arms for separating said arms about their hinge point when the arms and packing are moved upwardly to compress the said spring; the said sleeve by its position relative to the housing regulating the seating compression of said packing.

LEE S. SORESENSEN.

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