Nov. 1, 1932. W. E. KING 1,886,340

COMBINED BLOW-OUT PREVENTER AND VALVE

Filed May 17, 1928

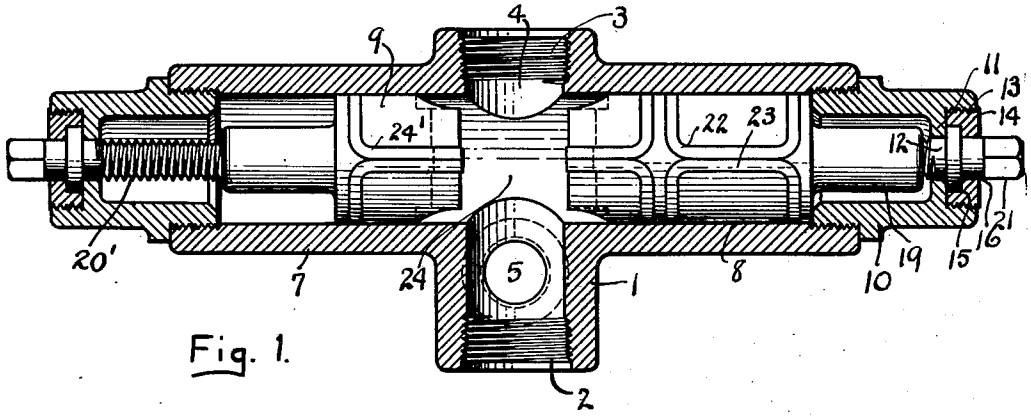


Fig. 1.

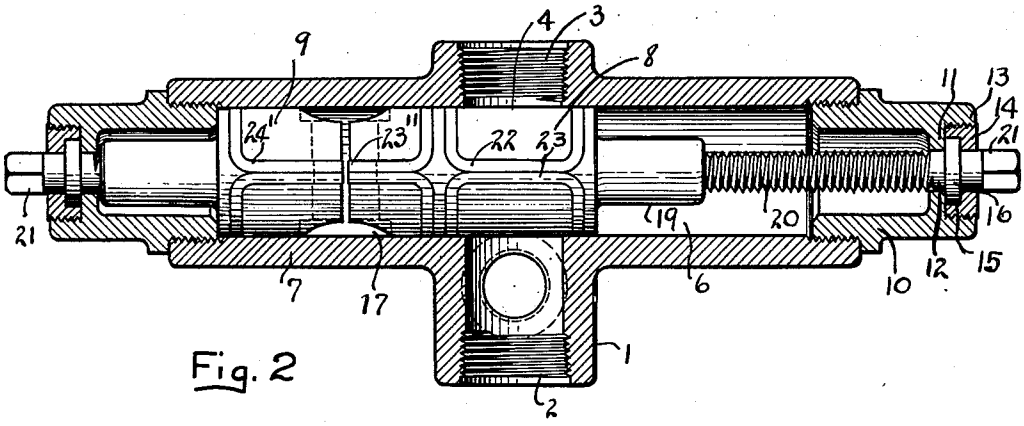


Fig. 2

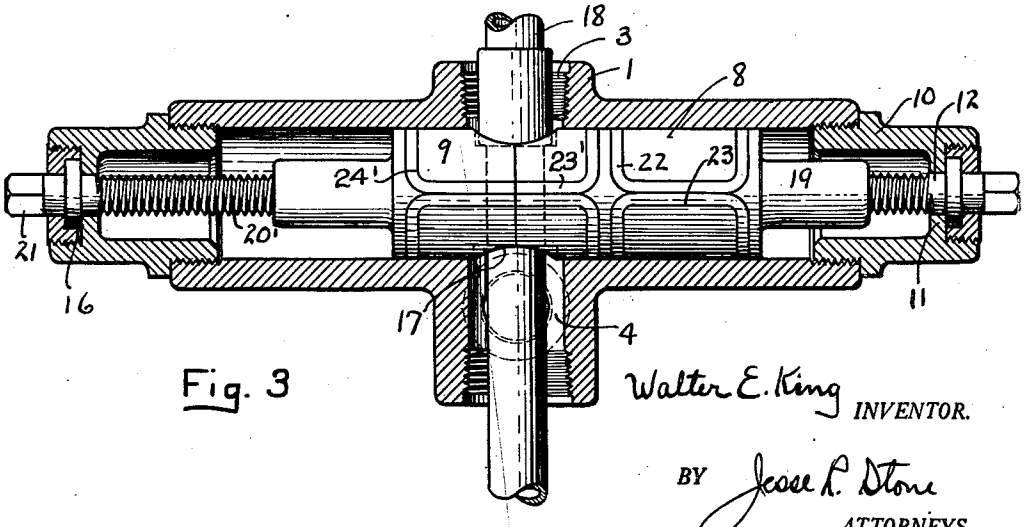


Fig. 3

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UNITED STATES PATENT OFFICE

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COMBINED BLOW-OUT PREVENTER AND VALVE

Application filed May 17, 1928. Serial No. 278,539.

My invention relates to means to be employed at the upper end of a well casing to close the opening through the casing in case of emergency.

In drilling operations in deep wells for oil, gas, sulphur and the like, it frequently happens that the producing stratum lies in areas where gas pressure is high, and when the well is being drilled in it is necessary to take precautions to prevent the gas from blowing the mud laden fluid from the well and also blowing out the drill stem, and perhaps the casing. It is customary to provide a gate valve at the upper end of the casing which may be closed in case the drill stem is out of the hole and to also provide a blowout preventer to close the space above the drill stem where the drill stem still remains in the hole.

It is an object of my invention to provide a unitary structure which is adapted to close the passage through the casing both when the drill stem is in position and also when the drill stem is removed, thereby providing a valve and blowout preventer in one structure.

It is another object to provide a device of this character which may be operated positively and which will close the passage through the casing even under extreme conditions of pressure.

Referring to the drawing herewith, Fig. 1 is a central vertical section through a casing attachment with my invention employed therein, the passage being shown as open.

Fig. 2 is a similar vertical section illustrating the drill stem removed and the passage through the casing closed.

Fig. 3 is another similar section illustrating the passage closed about the drill stem.

The device constituting my invention employs a central body member 1, which may act as a coupling between sections of the casing at a point above the ground. The lower end 2 is threaded for connection with the upper end of the casing, and the upper end is likewise threaded at 3 to engage with an upper casing section or with a casing head. The center passage 4 through the coupling is adapted to receive the drill stem and drill and to provide a fluid passage into the well. A lateral outlet 5 may be formed at one side of the passage 4 below the valve chamber.

At each side of the center passage 4 through the valve body are oppositely extending cylinders 6 and 7. Said cylinders extend from the center passage a material distance and are adapted to accommodate piston members 8 and 9, respectively. The outer end of the cylinder 6 is closed by means of a plug 10 recessed on its inner end, and at its outer end is provided with an inwardly extending flange 11 to receive a rotatable valve stem 12. On the outer side of the flange 11 is a threaded recess 13 to receive a nut 14 adapted to fit about the valve stem and provided with a recess 15 on its inner face to receive the flange 16 of the valve stem.

The piston 8 is materially longer than is the piston 9. It has on its forward end a semi-cylindrical recess 17 which is adapted to engage against the drill stem 18. The opposite end of the piston 8 is provided with a neck 19 threaded to receive the shaft 20 of the valve stem.

The said valve stem is held from longitudinal movement in the plug 10 by engagement of the flange 16 with the nut 14, as will be seen from the drawing. The outer end 21 of the valve stem is squared to receive a handle or crank by means of which it may be rotated.

The piston 8 is provided with packing strips 22 and 23 on its outer surface. The strips 22 are set in grooves in the outer face of the piston and are made up two endless sections, each fitting within a central longitudinal groove at each side and passing around the end of the piston, as will be seen from the drawing. The longitudinal portion 23′ of this packing is adapted to fit against the side walls of the cylinder shown at 24, so that it will prevent the passage of fluid upwardly along the sides of the piston. The end portions of each of the strips prevent the passage of fluid into the cylinders.

The packing 23″ at the forward end of the piston 8 extends around the piston at a point spaced from the end, the longitudinal portion of the packing being extended forwardly and around the semi-cylindrical forward face so as to make a tight contact with the drill stem.

The packing 24′ upon the piston 9 is arranged to close off the passage of liquid around the piston in a manner similar to the forward packing upon the piston 8.

In the operation of my device, the two pistons 8 and 9 will be in spaced position adjacent to passage 4 through the body of the device as shown in Fig. 1. If a blowout of gas is threatened and the drill stem can be removed, it will then be possible to close the passage 4 by means of the piston valve 8. The shaft 20 will be rotated to screw the piston forwardly across the passage in the position shown in Fig. 2. The piston valve 9 being moved to the outer end of its cylinder 7. As will be seen from Fig. 2, the passage 4 will then be closed against the passage of fluid from the well.

If the blowout is threatened before the drill stem can be withdrawn it will be necessary to screw both of the valves forwardly against the drill stem as quickly as possible, the parts assuming the position shown in Fig. 3. This will form a blowout preventer closing the space in the casing around the drill stem in a similar manner to that of the ordinary blowout preventer.

The advantages of this construction lie in the fact that the same device may be employed in case of emergency both when the drill stem is in position and when it has been removed, and the structure of the device will not be modified to adapt it for this change of condition. It is a simple compact device and positive in its action.

Having thus described my invention, what I claim as new is:

1. A device of the character stated including a tubular body having a passage therethrough threaded at its ends for engagement within a casing, oppositely extending cylinders on said body, a recessed plug closing each cylinder, pistons in said cylinders, said pistons having their forward faces concaved to fit about a drill stem and the other end thereof reduced to fit said recessed plug, one of said pistons being adapted to be moved entirely across said passage when desired, packing on said pistons to close the passage of fluid about said pistons, and means to move said pistons.

2. In a blowout preventer, a housing including opposite cylinders, a piston in one of said cylinders arranged to partly or entirely close the passage through the blowout preventer, a packing to seal the face of the piston and one side of the housing when said piston is in the partly closed position, and two additional pieces of packing to seal with the walls of the cylinders around the periphery of said piston on both sides of said housing when said piston is in the entirely closed position.

3. In a blowout preventer, a piston, a substantially semi-circular concaved portion on the forward end thereof, packing material crossing said concavity and surrounding said piston, and two additional rings of packing material surrounding said piston whereby a seal may be maintained about said piston at three points.

In testimony whereof I hereunto affix my signature this 11th day of May A. D. 1928.

WALTER E. KING.