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FIRE EXTINGUISHER AND BLOWOUT PREVENTER

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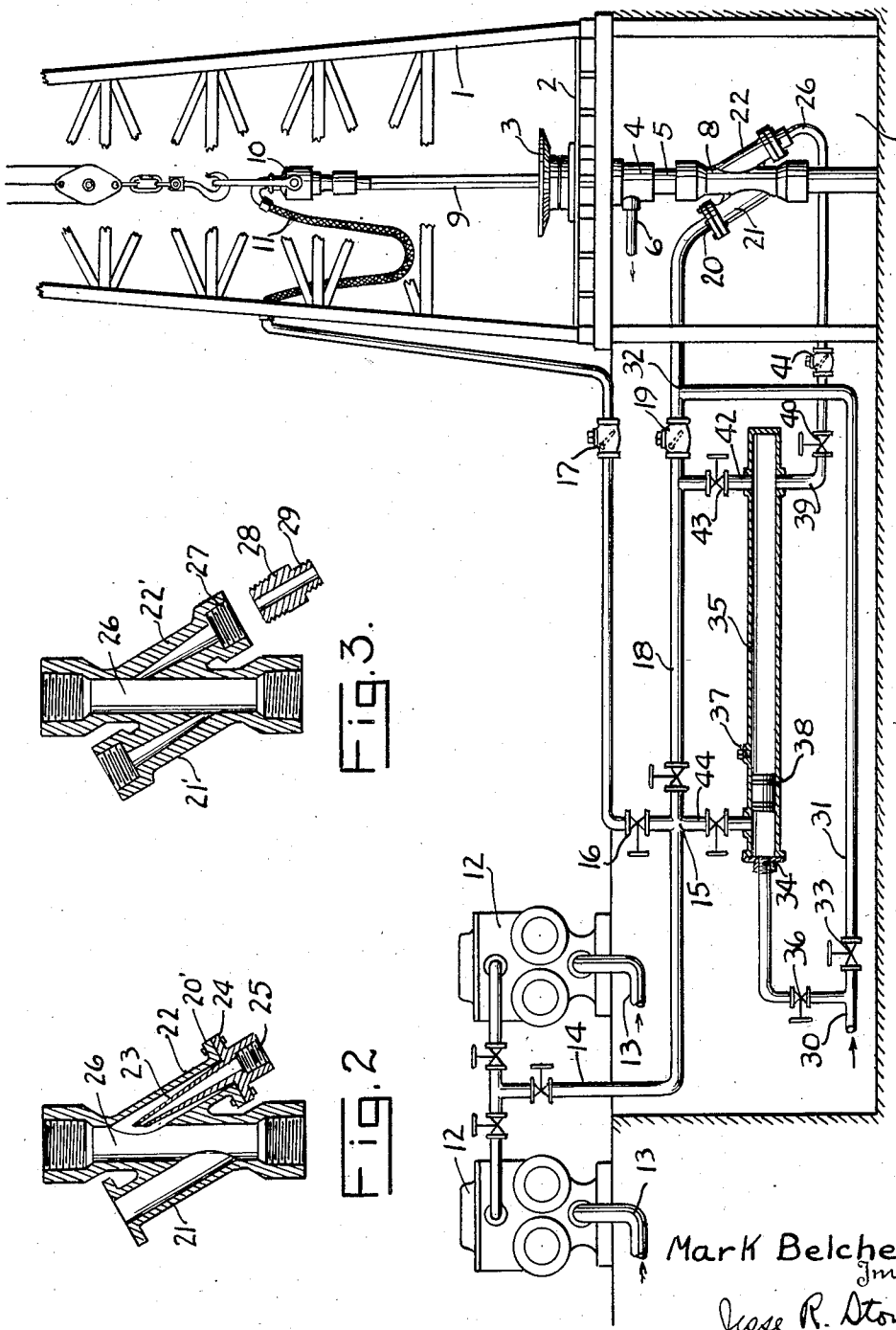


Fig. 1.

Fig. 3.

Fig. 2.

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FIRE EXTINGUISHER AND BLOWOUT PREVENTER

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9 Claims. (Cl. 166—15)

My invention relates to an apparatus for installation upon a well casing whereby blowouts of gas and oil from the well may be overcome and fires may be extinguished.

I desire to provide an apparatus which may be readily installed in connection with the usual equipment about a well and enable the driller to employ the steam from the boiler or the mud from the mud pumps to overcome a blowout, and particularly a blowout resulting in fire.

I desire to arrange the equipment so that mud may be introduced into the well in a forceable downward discharge against the force of the gas pressure. I also desire to be able to discharge steam or chemicals into the gas and oil which are blowing from a well so as to extinguish any fire which may have resulted.

It is also a part of the invention to so connect the lines leading to the well casing that mud or steam may be discharged into the casing in either an upward or downward direction.

In the drawing herewith Fig. 1 shows a side view partly in section illustrating the connections whereby my invention may be carried out.

Fig. 2 is a central longitudinal section through a fitting to be connected in the well casing, formed to allow the discharge to the casing of materials for overcoming the blowout.

Fig. 3 is a similar longitudinal section showing a slightly different embodiment thereof.

In the drawing I have shown somewhat diagrammatically a well derrick 1 having the usual platform 2 at the lower end thereof and a rotary table 3 mounted thereon, the principal operating elements connected with the rotary having been removed for greater clearness. The rotary table is mounted above the casing head 4, which is connected with the well casing 5 in the usual manner. Said well casing has a lateral fluid conducting pipe 6 connected therewith in the usual manner.

Below the casing head and at a desired point within the cellar 7 is a fitting 8 through which fluid may be discharged into the casing as will be later described.

The well drilling apparatus includes the usual drive stem or kelly 9 shown as extending downwardly through the rotary into the casing, it being understood that the usual drill stem and well drill are connected with the kelly. At the upper end of the drive stem or kelly is the usual swivel 10 having connection with a mud line 11, through which drilling mud may be forced downwardly through the drill stem in the process of rotary drilling.

The mud which is ordinarily used as a flushing fluid in drilling operations is forced through the mud line 11 from a pump or pumps 12. These pumps are ordinarily steam operated and mud is drawn in from a mud pit through an inlet pipe 13 leading to the pump and is discharged from one or both of the pumps, either separately or simultaneously, through the pipe 14, which, when ordinary drilling is being conducted, will pass to the cross-shaped fitting 15 and from there past the valve 16 and the check valve 17 to the mud line 11 previously noted.

It will be seen that the T 15 has a branch 18 which leads by way of the check valve 19 to the fitting 8. It is connected by flanged attachment 20 to the branch 21 of the fitting 8.

The construction of this fitting 8 may be seen in Figs. 2 and 3. The branch 21 on this fitting is inclined downwardly so that fluid discharged from the pump through this branch will be directed downwardly into the well casing. On the opposite side of the fitting is an upwardly directed branch 22 which is provided with flanges at 20' for connection with any fluid conducting line. This branch and also the branch 21 may have a nozzle extending therein and I have shown a nozzle comprising a tapered forward end 23, having a flange 24 toward the outer end which may serve as a connection with the flange 20' when bolted thereto. This nozzle has a threaded socket 25 for engagement with the branch pipe 26, as seen in Fig. 1. The use of a nozzle of this type may be employed where a high spraying effect is to be employed.

In Fig. 3 I have shown how the passage within the branches 21' and 22' may be tapered inwardly toward the passage 26 through the fitting so that fluid discharged therethrough may find an exit into the fitting at a high velocity. The branches 21' and 22' may have threaded sockets 27 at each end to engage with the fluid-conducting pipe.

I contemplate employing steam in connection with the control and prevention of blowouts. The steam line is shown at 30 in Fig. 1. This line has two branches, one branch 31 being connected at 32 with the line 18. There is a valve 33 in this line whereby it may be closed off as a fluid passage where its use is not desired.

The other branch of the steam line 30 is connected at the end 34 of a barrel 35. There is a valve 36 in this line whereby it may also be closed off when its use is not desired.

The barrel 35 is intended primarily as a container for chemicals of a fire extinguishing nature. There is an upper plug 37 therein which closes an opening through which chemicals may be introduced into the barrel. At one end of this barrel is a piston 38, which is to be employed in forcing the chemical from the barrel. On the discharge end of the barrel is an outlet at 39 leading past the hand-operated valve 40 and the check valve 41 to the inlet 26 to the fitting 8. This enables the flow of chemicals from the barrel to be discharged upwardly into a stream of

oil and gas which may be escaping from the casing and which has caught afire.

Another branch **42** at the end of the barrel **35** is connected across to the pipe **18** and has a valve **43** therein. There may also be a connection from the mud line **14** through the T **15** and the connecting pipe **44** to the inlet or up-stream end of the barrel **35**.

When the drilling operation is proceeding in the ordinary manner the mud from the mud pumps will be discharged through lines **14**, the T **15**, and the mud line **11** to the swivel, and downwardly through the drill stem. If a blowout is imminent and it is desired to introduce mud under higher pressures into the casing the line **18** is opened up so that mud may also be discharged directly into the casing outside of the drill stem. Thus the rising current of mud outside the drill stem will be forced back toward the bottom of the well with sufficient pressure to keep the gas from entering the well at the lower end thereof, thus holding the gas against blowout until further preparations may be made to prevent the blowout. If it is desired steam pressure may also be exerted through the branch **21** of the fitting **8** so as to exert the steam pressure from the boiler to the interior of the well.

If the well has already started to blow out and has caught fire chemicals may be employed in extinguishing the fire by filling the barrel **35** with fire-extinguishing solutions and forcing this chemical, preferably through the branch **39** and **26** to the inlet **22**, blowing the chemicals upwardly with the current of oil and gas and extinguishing the fire. This flow of chemicals is caused by the introduction of steam pressure or mud pressure as desired behind the piston **38** and driving it along the barrel until the contents have been discharged and the piston **38** moves into the further end of the barrel, as will be noted from Fig. 1. The introduction of chemicals in this manner ordinarily is sufficient to extinguish the fire. However, it will be obvious that mud may also be employed, as previously noted, and if it is desired to introduce mud through the branch line **22** this may be done by allowing mud from the line **14** to pass through either branch **44** or **42**, and from there through the line **39** and **26** to the fitting.

With this arrangement it will be obvious that I am enabled by the manipulation of the various valves to employ mud or steam, or both, in fighting the gas pressure. Furthermore, if the well blows out and catches fire the fire may be extinguished by the introduction of chemicals or by the use of steam or by both methods. It will therefore enable the driller by the use of my apparatus to ordinarily prevent a blowout from the well and if by accident the well does blow out it may be brought under control by the pressure of mud and, if fire occurs, the fire may be extinguished. The advantages of this construction will be obvious to those skilled in the art.

What is claimed as new is:

1. In combination with a well casing, a drill stem operating therein, and pumps arranged to pump mud downwardly through said drill stem, a fitting in said casing, and fluid conducting pipes from said pumps to said fitting, whereby mud may be discharged downwardly into said casing outside said drill stem.

2. In combination with a well casing, a drill stem operating therein, and pumps arranged to pump mud downwardly through said drill stem, a fitting in said casing, opposed branches on said fitting, one inclined downwardly and the other upwardly, and fluid connections with said branches whereby fluid may be forced into said casing in either an upward or a downward direction.

3. In combination with a well casing, a drill stem operating therein, and pumps arranged to pump mud downwardly through said drill stem, a fitting in said casing, opposed branches on said fitting, one inclined downwardly and the other upwardly, nozzles directed inwardly in said branches, and fluid connections with said branches whereby fluid may be forced into said casing in either an upward or a downward direction.

4. In a rotary well drilling installation, a well casing, a rotary drill stem operating therein, a fitting in said casing below the upper end thereof, opposite branches on said fitting and fluid connections with said drill stem and the branches on said fitting whereby fluid under pressure may be forced into said drill stem and in either an upward or a downward direction in said casing outside said drill stem.

5. In a rotary well drilling installation, a well casing, a rotary drill stem operating therein, a fitting in said casing below the upper end thereof, opposite branches on said fitting, fluid conducting pipes connected with said drill stem and the branches on said fitting, pumps to force fluid under pressure through said pipes, a chemical container, and means operated in response to pressure of fluid to force the chemical from said container to either of said branches.

6. In a well casing for rotary drilling, a fitting in said casing, an upwardly inclined branch on said fitting and a downwardly inclined branch thereon, fluid conducting pipes connected with said branches and connections between said pipes to permit either steam or drilling fluid to be forced through said fitting into said casing in either direction.

7. In a well casing for rotary drilling, a fitting in said casing, an upwardly inclined branch on said fitting and a downwardly inclined branch thereon, nozzles in said branches converging inwardly, fluid conducting pipes connected with said branches and connections between said pipes to permit either steam or drilling fluid to be forced through said fitting into said casing in either direction.

8. In a well casing for rotary drilling, a fitting in said casing, an upwardly inclined branch on said fitting and a downwardly inclined branch thereon, fluid conducting pipes connected with said branches and connections between said pipes to permit either steam or drilling fluid to be forced through said fitting into said casing in either direction, a barrel for chemicals, a piston therein, connections between said barrel and both of said branches, and means to convey pressure fluid from said pipes behind said piston to discharge said chemicals from said barrel.

9. A fitting having a longitudinal passage adapted to be connected in a well casing, opposed branches in said fitting, one of which is directed at an upward inclination and the other of which has a downward inclination, and nozzles in said branches directed inwardly.

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