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STEAM OPERATED EMERGENCY VALVE FOR OIL AND GAS WELLS

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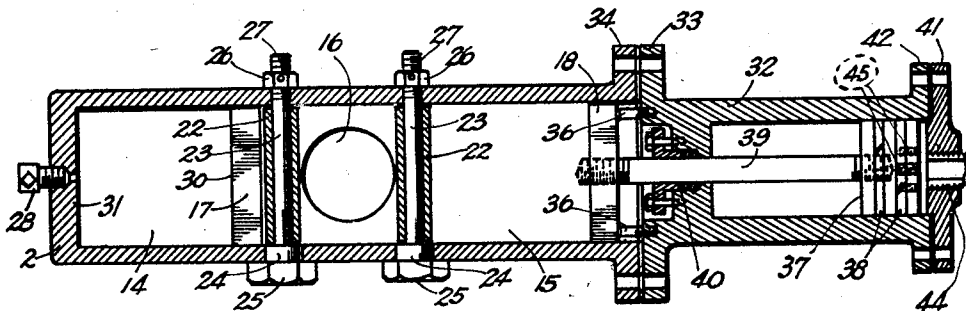


FIG. 1.

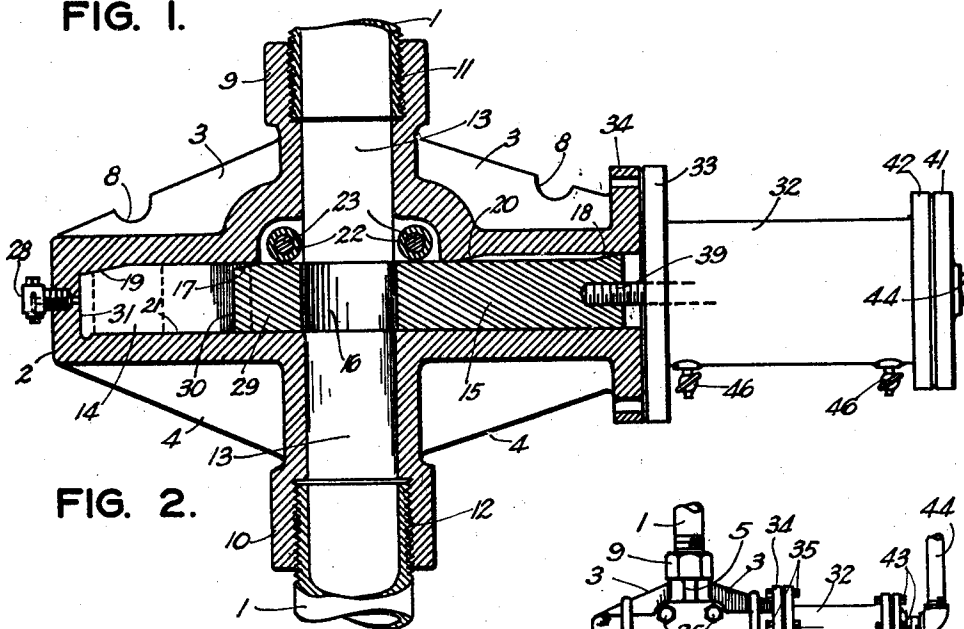


FIG. 2.

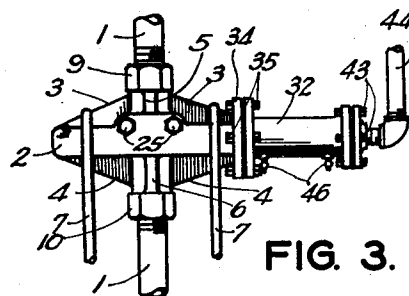


FIG. 3.

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STEAM-OPERATED EMERGENCY VALVE FOR OIL AND GAS WELLS

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My invention relates to improvements in valve control to cut off the supply of oil and gas in case of a fire in high pressure wells.

The principal objects of my invention are to provide a device of this character which is positive in action, simple and inexpensive in construction; new, novel and easily operated; which is strong, durable, reliable and of evident utility; which cannot easily get out of order and is efficient for the purposes for which it is intended; to provide a valve adapted to be seated on the well casing above the master gate valve, operated by steam and controlled from the boiler or any convenient point remote from the intense heat caused by the burning well; a valve which will close instantly on admitting steam into the piston which operates the gate; a valve which can be quickly disconnected from the casing and moved to another location when the well is under production and the emergency is past.

With these and other objects in view my invention consists of the construction, novel features and combination of parts herein-after more fully described, illustrated in the accompanying one-sheet drawing and pointed out in the claims hereto appended. Various changes in the form, proportion, size, shape, weight and minor details of construction, within the scope of my invention may be resorted to without departing from the spirit or broad principle of my invention or sacrificing any of the advantages thereof.

In the accompanying drawing, Figure 1 is a sectional plan view of the device; Fig. 2 is an elevation partly in section; and Fig. 3 is an assembly view in elevation.

In the following description like characters of reference designate like parts in all the figures, and it is to be understood that the drawings are to be interpreted as being illustrative and not restrictive.

The destruction wrought by the firing of a well producing large quantities of oil and gas under high pressure has been demonstrated

in many fields. Aside from the great losses of oil and gas from the well itself, the danger to other near-by wells and surrounding property, especially when drilling is carried on in proximity to cities and built-up areas, requires prompt, immediate action in controlling and extinguishing the fire. The wooden portions of the derrick and drilling plant are rapidly consumed, and the metal portions are converted into a mass of twisted iron and steel. This and the intense heat prevent close approach to the casing head and the master gate valve under these conditions cannot be closed. My steam operated emergency valve obviates all of this as it is so constructed as to close instantly and is operated from the boilers.

One embodiment of my invention is shown as follows: The valve body 2 is strengthened by the longitudinal re-inforcing ribs 3 and 4 and the transverse ribs 5 and 6. The said body 2 is anchored down by the rods 7 seated in cuts 8 of said ribs 3. Wrench hexagons 9 and 10 together with screw threads 11 and 12 provide means for attachment of said body 2 to casing 1. Central passage 13 of body 2 coincides with the inside diameter of casing 1 and permits the unobstructed operation of the drill stem, fishing cable and the like through the said body 2. At right angles to said passage 13 I provide valve chamber 14 for slidably seating gate 15. Adjacent the forward end of gate 15 is positioned circular opening 16, slightly larger in diameter than said casing 1 but made to seat on the same vertical axis as that of the said casing 1 when said gate 15 is in its retrieved position as can best be seen in Figs. 1 and 2. At 17 I provide an inclined transverse surface across the upper forward end 30 of gate 15 and a similar inclined surface 18 across the upper surface at the rear of said gate 15. At 19 and 20 on the upper wall of valve chamber 14 are correspondingly inclined seats for the said inclined surfaces 17 and 18 respectively, said

seats 19 and 20 co-acting with said surfaces 17 and 18 to force the gate 15 downward against the ground bottom surface 21 of valve chamber 14 and close the passage 13 when the said gate 15 is moved forward to the final seating position as indicated by the dotted lines in Fig. 2. In order to provide against friction on gate 15 due to the upward pressure of the gas and oil as the said gate 15 is being closed, roller bearings 22 mounted on bolt shafts 23 are placed over said gate 15 on either side of passage 13. The bolt shafts 23 are furnished with a short enlarged section 24 adjacent the oversized hexagonal head 25, said section 24 being adapted to fit snugly in and close the hole through which roller bearings 22 are inserted into the space provided for said bearings 22 within the valve body 2 and above gate 15. Bearings 22 and bolts 23 are secured to body 2 by means of nuts 26 and cotter keys 27.

The air confined between forward end 30 of gate 15 and wall 31 of chamber 14 forms a cushion and prevents gate 15 being driven into seating position with such force as to damage the valve body 2. Air release valve 28 in wall 31 allows the air to escape when gate 15 is finally seated. Sufficient metal 29 is provided between opening 16 and forward end 30 of gate 15 to completely close-in the air and prevent mud, sand or other substances from filling the air space just described and forming an obstruction to the seating of gate 15.

The means for actuating the gate 15 consists of steam cylinder 32, having flange 33 for connecting with flange 34 of valve body 2. The said flanges 33 and 34 are secured together by bolts 35. Adjustable pin stops 36 screwed into cylinder 32 bear against the rear end of gate 15 and position opening 16 in exact alinement with casing 1 and passage 13. Steam piston 37, provided with piston rings 38, is connected with gate 15 by piston rod 39 having packing gland or stuffing box 40 of any suitable construction. Cylinder head 41 secured to flange 42 on steam cylinder 32 by bolts 43 provides means for connecting steam pipe 44 with said steam cylinder 32. Threaded sockets 45 in piston 37 furnishes means for retrieving gate 15 when cylinder head 41 is removed and also screwing piston rod 39 into said gate 15. Petcocks 46 serve the purpose of draining the steam cylinder.

In assembling my valve, gate 15 is inserted in chamber 14, pin stops 36 are adjusted in cylinder 32 to properly aline opening 16 and passage 13, flanges 33 and 34 are bolted together with proper packing therebetween, piston rod 39 seated through stuffing box 40 with piston 37 attached thereto is screwed into gate 15 by means of sockets 45, cylinder head 41 is bolted to flange 42 with proper packing therebetween and steam pipe 44 is

screwed into cylinder head 41. Roller bearings 22 having been placed in position the valve is connected to casing 1 above the master gate, anchoring rods 7 are secured to the cellar floor, derrick base or other suitable support, pipe 44 is connected with the boiler and under control of a quick acting steam valve and my emergency valve is ready for operation.

Should a well protected by my improved, steam operated valve become ignited by a spark, static electricity or other cause, all that is necessary to extinguish the fire is for the man nearest to the boiler to open the quick acting valve on steam pipe 44 and the fire is immediately extinguished. The steam, acting on piston rod 39 through piston 37 forces gate 15 against the air cushion with near the speed of a bullet. The air is highly compressed and escapes through valve 28 as the gate 15 comes to rest, inclined surfaces 17 and 18 wedging under inclined seats 19 and 20 force the said gate 15 into a leak-proof junction with ground bottom surface 21 of chamber 14. When the emergency is past and the valve is of no further use at a given location it can easily and quickly be disconnected and moved to a new well there to again serve as effectively.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a device of the character described the combination, a valve body with pairs of transverse and longitudinal reinforcing ribs, said body having a central passage therethrough, means on a pair of said longitudinal ribs for anchoring said body, screw thread connecting means for a well casing within the walls of the said central passage, wrench receiving means adjacent said screw threads, walls of said body at right angles to said central passage forming a valve chamber, a perforated sliding gate adapted for seating within said chamber, inclined transverse surfaces across said gate adapted to co-act with correspondingly inclined seats on the upper wall of said chamber, a ground surface on the bottom of said chamber adapted to form a leak-proof closure with said gate for said casing, roller bearings within said body above said gate adjacent each side of said central passage, remote control steam actuated piston for sliding said gate into closing position and means providing an air cushion stop for said gate to prevent injury to said body by the closure of said gate.

2. In a steam operated emergency valve, the combination with a steam cylinder under remote control, of a perforated sliding gate adapted for seating within a chamber in a valve body, a valve body having a central passage therethrough, the perforation of said gate being adapted to aline with said central passage when said gate is in open position, walls of said body at right angles to said pas-

sage forming a valve chamber, inclined seat means on the upper wall of said chamber co-acting with inclined surfaces adjacent the end of said gate to form a leak-proof joint between the bottom of said gate and the lower
5 wall of said chamber, the forward end of said gate co-operating with the forward end of said chamber to form an air trap within said chamber, said air in said trap serving as a cushion in seating said gate in closing said
10 valve and means for releasing the compressed air from said trap as said gate is fully seated.

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