Nov. 10, 1931. T. R. FLESHER 1,831,488

FIRE EXTINGUISHING DEVICE FOR GAS AND OIL WELLS

Original Filed Sept. 13, 1929 3 Sheets-Sheet 1

Fig. 1.

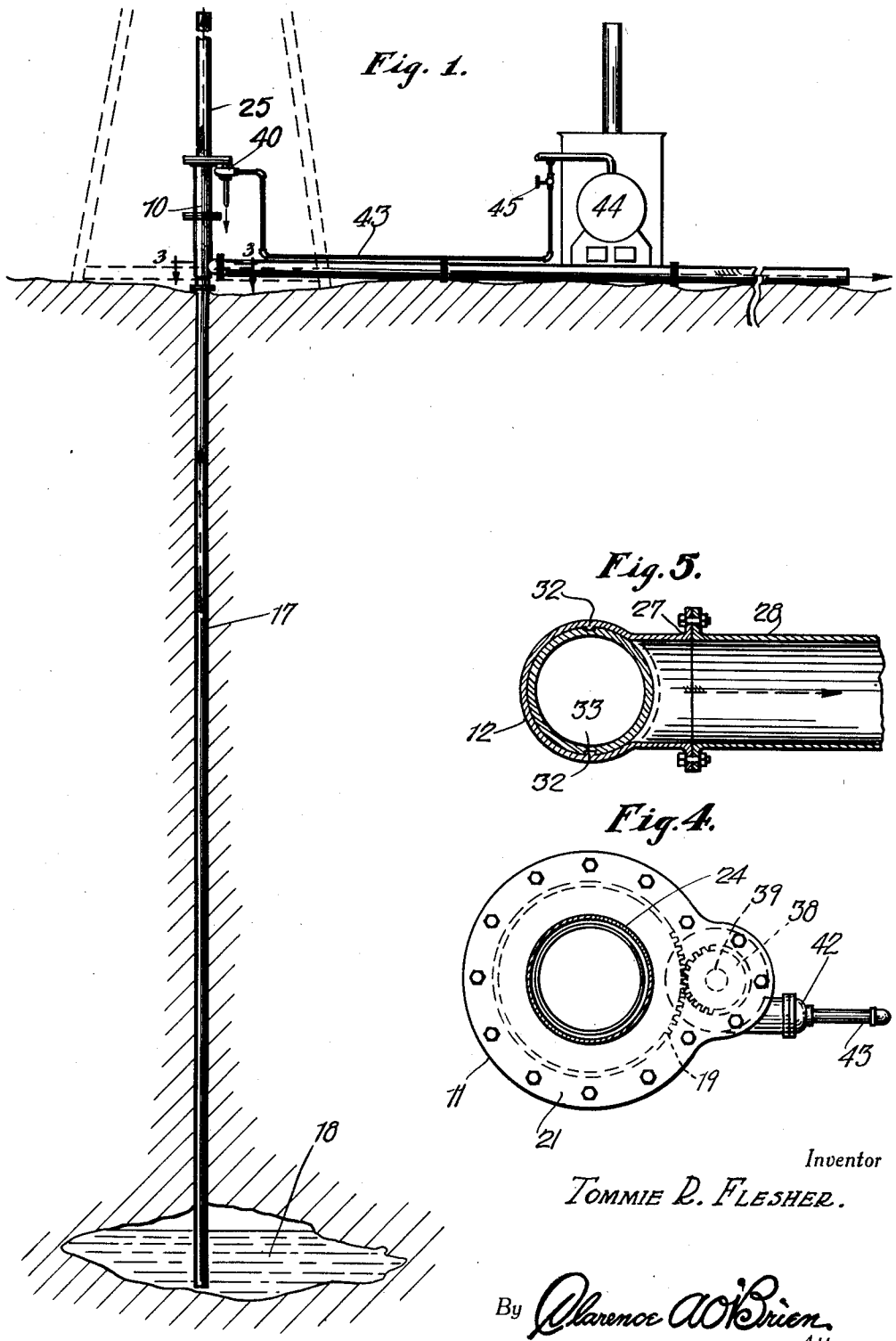


Fig. 5.

Fig. 4.

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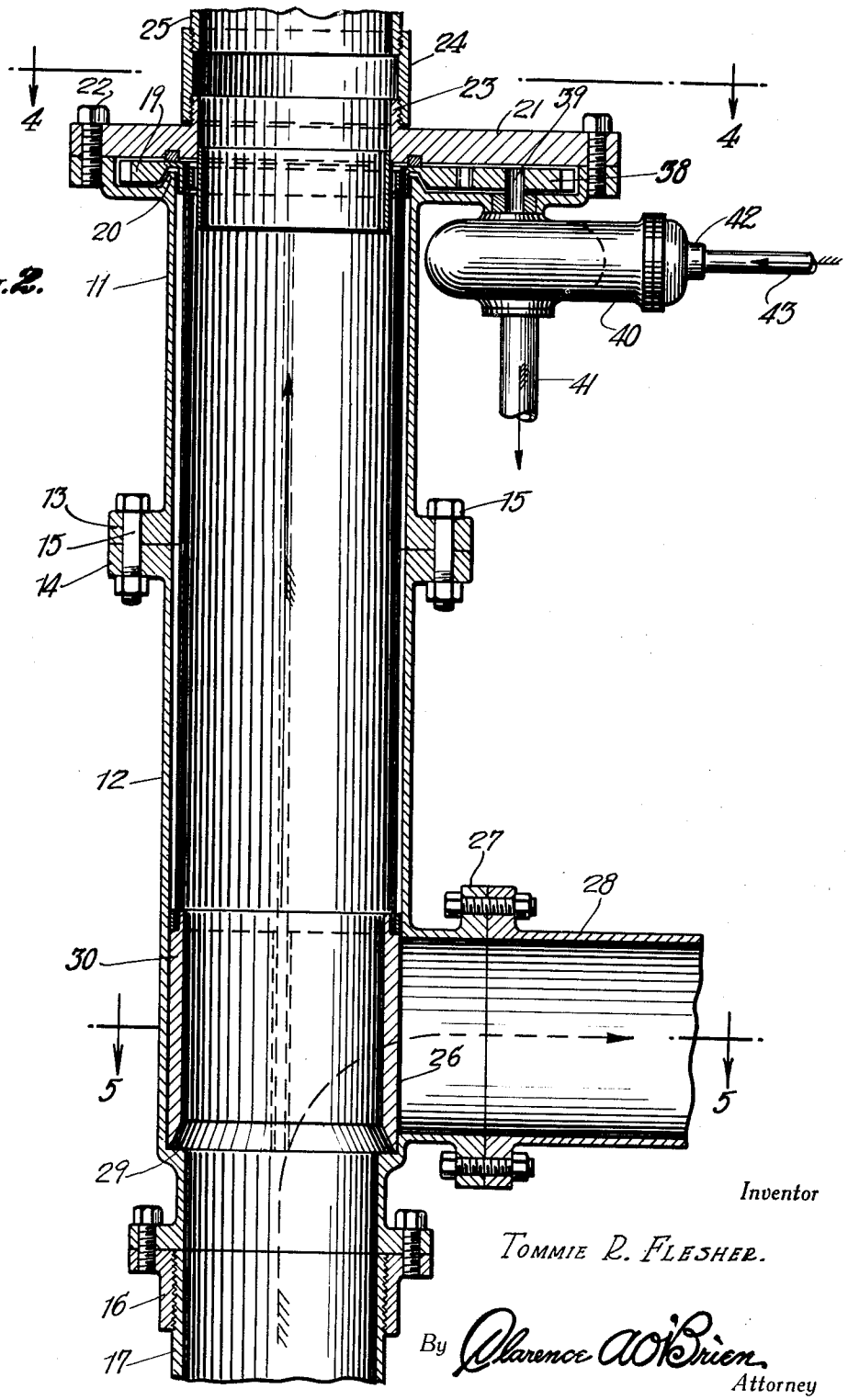
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Fig. 2.



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Fig. 3.

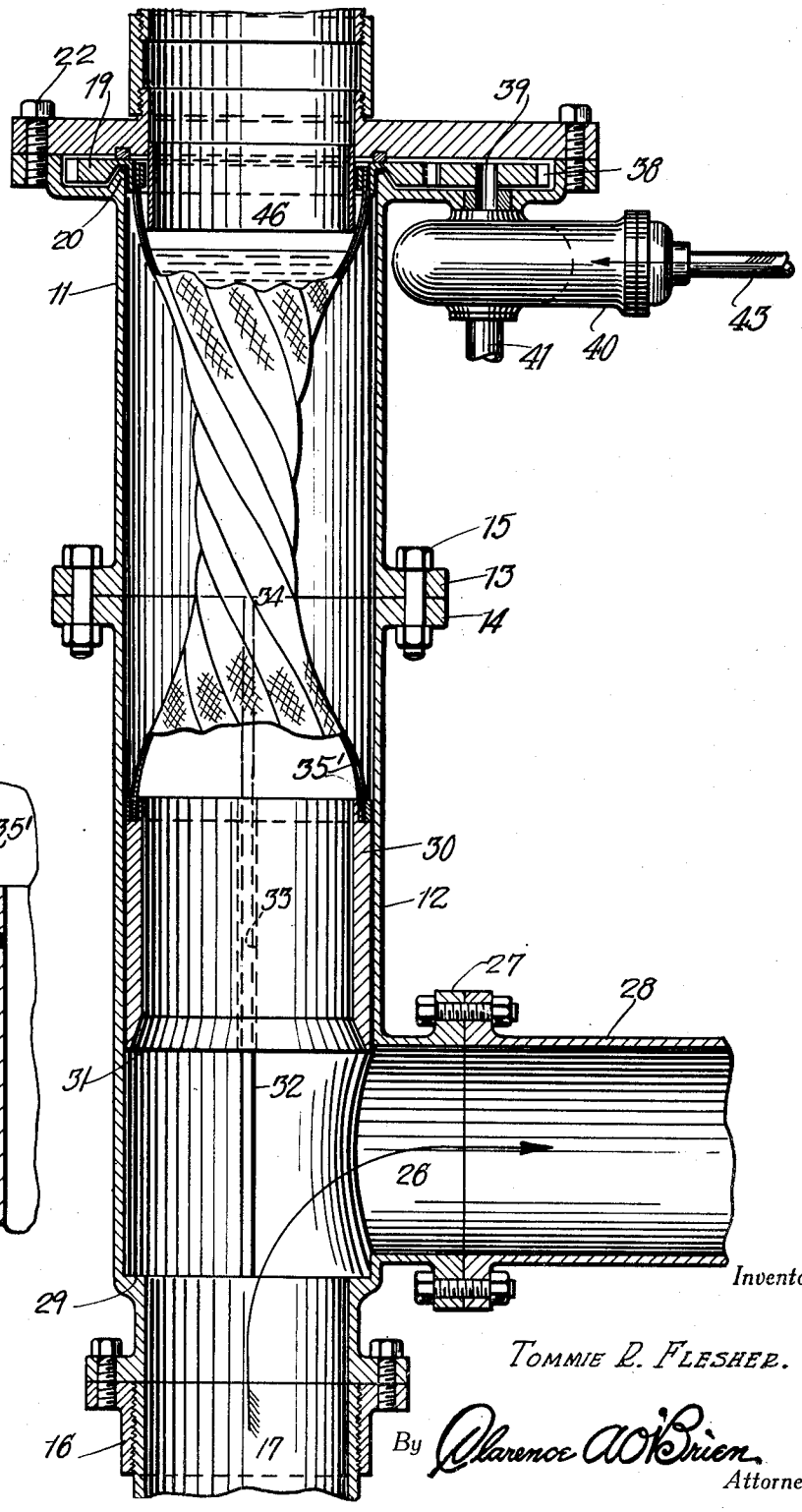
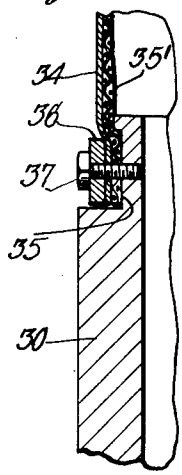


Fig. 6.



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UNITED STATES PATENT OFFICE

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FIRE EXTINGUISHING DEVICE FOR GAS AND OIL WELLS

Application filed September 13, 1929, Serial No. 392,433. Renewed April 11, 1931.

This invention relates to improvements in a fire extinguishing device for gas and oil wells.

The primary object of the invention resides in a device for installation in the pipe line of a well by which the flow of gas or oil may be diverted to a waste pipe line which leads to a distant point remote from the well so that the discharge end of the waste pipe is out of danger of the fire to prevent reigniting of the flowing gas or oil.

Another object of the invention is to provide a fire extinguishing device which may be installed in the casing of a well after a showing of gas or oil and which will not interfere with the drilling operation as the tools are free to pass without interference.

A further object is to provide a flexible tubular element in the well casing, means for twisting the flexible element to close the casing and valve means simultaneously operable for diverting the flow of the well through a waste pipe for releasing the natural pressure of the well against the twisted flexible element.

A still further object is the provision of a fire extinguisher for oil and gas wells which is simple of construction, easy to install, and positive and effective in operation.

With these and other objects in view, the invention resides in the certain novel construction, combination and arrangement of parts, the essential features of which are hereinafter fully described, are particularly pointed out in the appended claims, and are illustrated in the accompanying drawings, in which:

Figure 1 is an elevational view showing my improved fire extinguishing device installed upon an oil well.

Figure 2 is an enlarged detail vertical sectional view through my fire extinguishing device.

Figure 3 is a similar view but showing the position of the parts when operated to extinguish an oil or gas well fire.

Figure 4 is a horizontal sectional view on the line 4—4 of Figure 2.

Figure 5 is a similar view on the line 5—5 of Figure 2.

Figure 6 is an enlarged detail vertical sectional view showing the manner in which the twistable element is fixedly connected to the sleeve valve.

Referring to the drawings by reference characters, the numeral 10 designates my fire extinguishing device in its entirety which includes an upper tubular section 11 and a lower tubular section 12, the same being provided with meeting flanges 13 and 14 which are provided with alined bolt openings for the reception of bolts or like fastening elements 15 whereby the meeting ends of the two sections are fixedly connected together. The lower end of the section 12 has a coupling nipple 16 bolted thereto for facilitating connection of the threaded end of the section 17 of a tubular well casing. In Figure 1 of the drawings it will be seen that my fire extinguishing device is disposed at the ground level, but if desired, the same may be positioned below the level of the ground without interfering with the operation of the device as will be hereinafter understood. The well casing section 17 extends down through the ground to the well 18 in which the natural oil or gas is present.

The upper section 11 is enlarged to house a rotatable ring gear 19 which rotates on a bearing 20 formed on the section 11, while a removable cover plate 21 overlies the enlarged end of the section 11 and is secured thereto by bolts or like fastening elements 22. The cover plate 21 is provided with a threaded nipple 23 to which a coupling member 24 is threaded for securing the upper tubular portion 25 of the well casing to the extinguishing device. It will be appreciated that the device is mounted within the tubular well casing and in practice forms a part thereof.

The lower section 12 is provided with an outlet passage 26 surrounded by a coupling collar 27 which is bolted to a waste pipe 28 which leads to a point remote from the well as shown in Figure 1 of the drawings and for a purpose to be hereinafter explained. The interior of the section 12 below the outlet 26 is provided with a shoulder or seat 29 while slidably mounted within the said sec-

tion is a sleeve valve 30, the lower side walls of which are beveled as at 31 for seating upon the seat 29 when the sleeve valve is in a normal position closing the outlet 26. By beveling the lower end of the sleeve valve the same will firmly seat itself in the event that any mud or gravel should accumulate upon the seat which might be drawn up with the flow of oil or gas through the casing. Vertical ribs or splines 32 extend inwardly from the side walls of the section 12 and are received in vertical grooves or channels 33 in the exterior side of the sleeve valve as clearly shown in Figure 5 of the drawings.

With this arrangement the sleeve valve is free to slide vertically within the tubular section 12 but is prevented from rotating with respect to said section. The sleeve valve is of a weight sufficient to overcome the friction between the inner walls of the section 12 and the said valve so as to normally rest upon the seat 29 to close the outlet 26. Fixedly connected to the upper end of the sleeve valve is an inner linen flexible member or element 35′ and an outer flexible rubber element 34 also of tubular formation, the inner linen element being thicker at its opposite end than at its center for strengthening purposes, while the outer rubber covering serves to seal the joint at the opposite ends of the twistable element against the leakage of oil or gas. The twistable elements 35′ and 34 are secured to the sliding valve member 30 by providing an annular recess 35 in the walls of the valve member and clamping the flexible element thereto by an annular band 36 secured in position by bolts 37 as shown in Figure 6 of the drawings.

The upper ends of the inner and outer flexible elements are fixedly secured to the inner periphery of the ring gear 19 in a similar manner, that is by a clamping ring and fastening element so that the upper end of the twistable elements will turn with the gear 19 for twisting the same in a manner shown in Figure 3 of the drawings. For the purpose of rotating the gear 19 in order to twist the flexible tubular element I provide a driven pinion gear 38 which is journaled in the enlarged portion of the section 11 and is in constant mesh with the gear 19. This gear 38 is fixedly carried by the driven shaft 39 of a steam turbine 40 which includes the usual steam outlet pipe 41 and a steam inlet 42 to which one end of a steam supply pipe 43 is connected, the opposite end of the pipe 43 leading to a steam boiler 44. A regulating valve 45 is arranged in the steam line 43 for controlling the flow of steam from the boiler 44 to the turbine.

A shield or collar 46 is threaded into the cover plate 21 to protect the hub of the ring gear and its connection with the tubular flexible element.

In practice, the parts are normally in the position shown in Figure 2 of the drawings, that is the flexible tubular element is in an untwisted position with the sleeve valve 30 seated upon the seat 29 and closing the outlet 26. With the parts in such position the oil is permitted to flow upward through the well casing to the discharge end thereof, but should the discharge end of the well casing catch fire, the same may readily be extinguished by turning on the steam valve 45 which permits steam to pass through the supply pipe 43 to the turbine 40 which of course imparts rotation to the turbine shaft 39 causing the gear 38 to rotate the ring gear 19. The ring gear in turn being fixed to the upper end of the twistable element, the said element after several revolutions will assume the position shown in Figure 3 of the drawings, and due to the twisting action, the valve 30 will be drawn upwardly thus opening the outlet 26. The twisted portion of the flexible element seals the well casing above the outlet 26 thus the pressure of the flow is diverted through the outlet and waste pipe 28 and discharged at the open end of the pipe which terminates at a point remote from the well casing so that there will be no possibility of the diverted discharge gas or oil becoming ignited. After the turbine has operated the gears to twist the flexible element to the limit of its twisting action, the said turbine becomes stalled as the power produced thereby is proportionate to the amount of power necessary to twist the flexible element to a maximum point. After the fire has been extinguished by shutting off the supply of oil or gas through the well casing and diverting the same to a remote point, the steam valve 45 is closed, thus due to the natural tendency of the flexible element to untwist and also due to the weight of the sleeve valve 30, the flexible element will unwind and the said valve 30 drop to a position upon the seat 29 thus closing the outlet 26 and again permitting the oil or gas to flow unrestricted through the well casing to the discharge end thereof.

If desired, the outer rubber covering 34 may be dispensed with and only the flexible linen element provided, which element of course becomes saturated with oil due to the passage of oil therethrough and when twisted the pores of the linen are made air tight to firmly seal the well at the twisted portion of the element.

While I have described what I deem to be the most desirable embodiment of my invention it is obvious that many of the details may be varied without in any way departing from the spirit of my invention, and I therefore do not limit myself to the exact details of construction herein set forth nor to anything less than the whole of my invention limited only by the appended claims.

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

1. In a fire extinguishing device for oil and gas wells, the combination with a tubular well casing, a tubular flexible element within said casing, and means for turning one end of said flexible element for twisting the same intermediate its ends for closing the passage through said casing.

2. In a fire extinguishing device for oil and gas wells, the combination with a tubular well casing, a waste pipe leading therefrom, a tubular flexible element within said casing, a sleeve valve slidable within said casing and having one end of the tubular flexible element attached thereto, said sleeve valve normally closing the passage from the casing to said waste pipe, means preventing rotation of said sleeve valve relative to said casing, and means for rotating the opposite end of said flexible element for twisting the same to close the passage through said casing and to simultaneously slide said sleeve valve to an open position to establish communication between said casing and said waste pipe.

3. In a fire extinguishing device for oil and gas wells, the combination with a tubular well casing, a waste pipe leading therefrom, a tubular flexible element within said casing, a sleeve valve slidable within said casing and having one end of the tubular flexible element attached thereto, said sleeve valve normally closing the passage from the casing to said waste pipe, means preventing rotation of said sleeve valve relative to said casing, means for rotating the opposite end of said flexible element for twisting the same to close the passage through said casing and to simultaneously slide said sleeve valve to an open position to establish communication between said casing and said waste pipe, said means including a ring gear fixed to said flexible element, and a driven pinion gear meshing with said ring gear.

4. In a fire extinguishing device for oil and gas wells, the combination with a tubular well casing, a waste pipe leading therefrom, a tubular flexible element within said casing, a sleeve valve slidable within said casing and having one end of the tubular flexible element attached thereto, said sleeve valve normally closing the passage from the casing to said waste pipe, means preventing rotation of said sleeve valve relative to said casing, means for rotating the opposite end of said flexible element for twisting the same to close the passage through said casing and to simultaneously slide said sleeve valve to an open position to establish communication between said casing and said waste pipe, said means including a ring gear fixed to said flexible element and a driven pinion gear meshing with said ring gear, power means for driving said pinion gear, and means for controlling the actuation of said power means.

5. In a fire extinguishing device for oil or gas wells, a tubular well casing, a waste pipe leading therefrom, a seat provided within said casing below the passage between said casing and said waste pipe, a weighted sleeve valve slidably mounted in said casing and normally resting upon said seat to close the communication between said casing and said pipe, means preventing rotation of said sleeve valve, a flexible twistable element having one end fixedly connected to said sleeve valve, a ring gear fixed to the other end of said flexible twistable element, a bearing in said casing for rotatably mounting said ring gear therein, and driving means including a pinion gear meshing with said ring gear for rotating the same to twist said flexible twistable elements to seal said casing above the level of said waste pipe and for lifting said sleeve valve to an open position to establish communication between said casing and said waste pipe.

6. In a fire extinguishing device for oil or gas wells, a tubular well casing, means for sealing said casing, said means including a twistable tubular element within said casing and means for relieving the sealing means of the natural pressure of the well by diverting the flow of the well at a point below the seal and discharging the same at a remote distance from said well casing.

7. In a fire extinguishing device for oil and gas wells, a pair of tubular sections fixedly secured together at their meeting end and adapted to have their other ends respectively connected to the tubular sections of a well casing, the lower of said pair of sections being provided with an outlet to which a waste pipe may be connected, a seat provided in said lower section, a sleeve valve slidably mounted in said lower section and normally resting upon said seat by reason of its own weight, coacting means between said sleeve valve and said lower section for preventing rotation of said sleeve valve, a flexible tubular element having one end fixed to said sleeve valve, a ring gear journaled for rotation in the upper of said pair of tubular sections and to which the opposite end of said flexible tubular element is fixedly connected, and a pinion gear journaled for rotation in said upper section and in meshing engagement with said ring gear, substantially as and for the purpose specified.

In testimony whereof I affix my signature.

TOMMIE R. FLESHER.