April 29, 1930. J. W. BUTLER 1,756,582

UNDERGROUND FIRE EXTINGUISHER

Filed Dec. 15, 1928

Fig. 1.

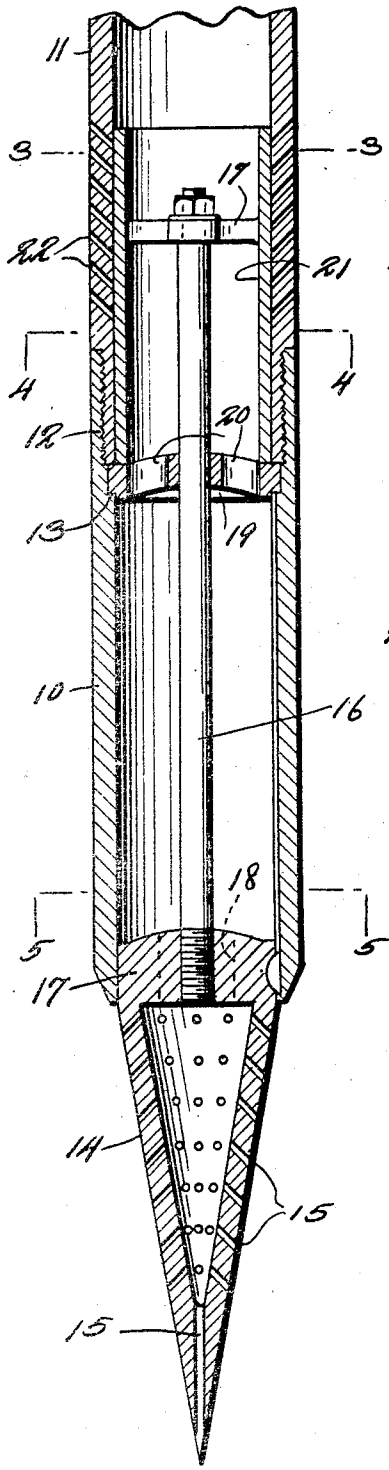


Fig. 3.

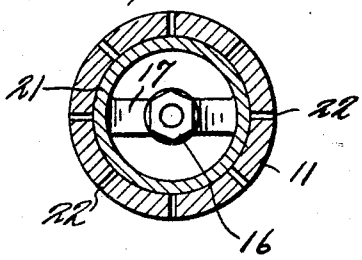


Fig. 4.

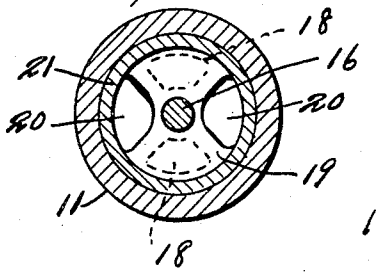


Fig. 5.

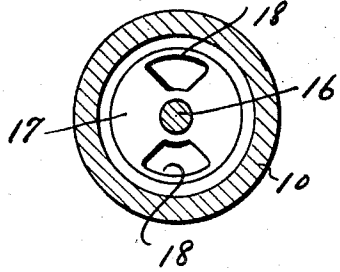
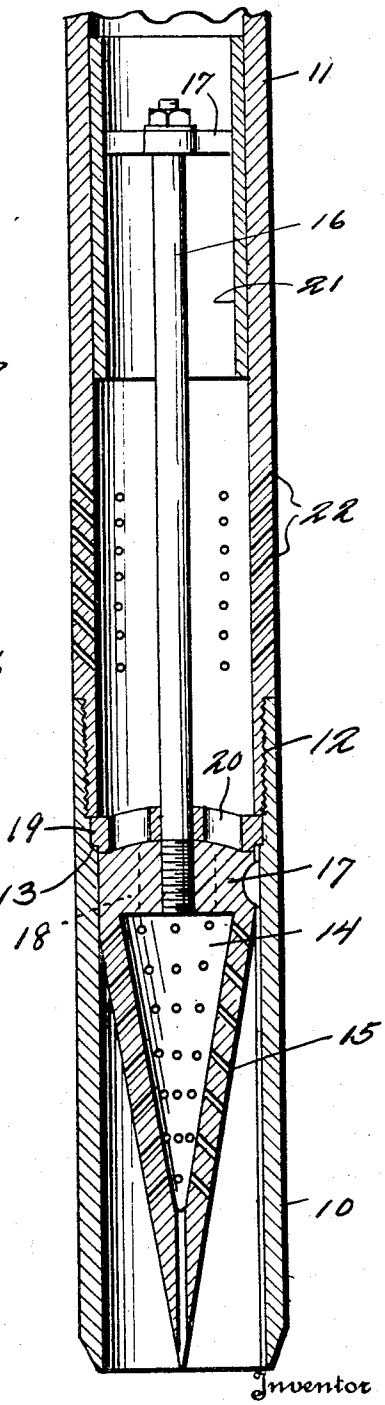


Fig. 2.



Inventor

J. W. Butler

By Watson E. Coleman

Attorney

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UNITED STATES PATENT OFFICE

JOHN W. BUTLER, OF McKEESPORT, PENNSYLVANIA

UNDERGROUND FIRE EXTINGUISHER

Application filed December 15, 1928. Serial No. 326,195.

The object of this invention is to provide a means whereby underground fires may be extinguished, such fires as might occur in a coal mine where a blaze is usually along the roof of a coal vein, and particularly to provide means which is so constructed that by using a high pressure stream of water, the device may be forced downward through the strata to the fire and then direct the water in an upward direction, extinguishing the fire.

A further object is to provide a mechanism of this character which, as it is being lowered into the earth, will automatically dig its own way by the pressure of the water issuing through the extreme lower end thereof and when it reaches the position desired will automatically cut off the water from the drill point as it may be termed and cause the water to be discharged upward and toward the fire.

My invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a vertical sectional view of an underground fire extinguisher constructed in accordance with my invention;

Figure 2 is a like view to Figure 1 but showing the outer casing projected beyond the point;

Figure 3 is a section on the line 3—3 of Figure 1;

Figure 4 is a section on the line 4—4 of Figure 1;

Figure 5 is a section on the line 5—5 of Figure 1.

Referring to these drawings, it will be seen that the extinguisher comprises a tubular barrel 10. This barrel is preferably about four inches in outer diameter and one inch thick. The lower end of the barrel is beveled downward and inward. The upper end of the barrel is reduced in thickness and interiorly screw-threaded. Mounted upon the barrel section 10 by means of screw-threads is a second barrel section 11 whose lower end is reduced and screw-threaded at 12 to engage the screw-threads of the lower barrel. The lower barrel below the screw-threads 12 is formed with a shoulder 13. The upper barrel 11 is screw-threaded for engagement with a string of pipe sections.

Disposed within the lower end of the barrel 10 and having sliding engagement therewith is a hollow drill point 14 having a downwardly extending perforation 15 through its apex and lateral, downwardly and outwardly extending perforations 15 leading from the hollow interior of the drill point to the exterior thereof. The drill point is mounted upon a connecting rod 16 which extends upward into the barrel. The upper end of the drill point is provided with a spider or valve 17 with which the lower end of the connecting rod engages and this spider or valve is formed with two oppositely disposed segmental openings 18.

Preferably the spider or valve is upwardly rounded on its upper surface. The connecting rod passes through a valve seat 19 coacting with the valve 17. This seat rests upon the shoulder 13. The seat is formed with a central aperture for the passage of the connecting rod 16 and with lateral apertures 20 somewhat segmental in form disposed on a line at right angles to the line of the apertures 18. The under face of the seat 19 is upwardly bowed or concaved so as to conform to the upper face of the valve 17. When the valve 17 strikes the seat 19, the imperforate portion of the valve 19 will close the perforations 20 of the valve seat while the imperforate portion of the valve seat 19 will close the apertures 18 so that passage of water into the point is prevented. When, however, the point is in the position shown in Figure 1 with relation to the valve seat, then water can pass through the apertures 18 and thus be discharged through the perforations 15 in the point.

Attached to the connecting rod 16 above the valve seat 19 is a hollow sleeve valve 21. When the point is in the position shown in Figure 1, this sleeve valve 21 rests upon the valve seat 19. The section 11 has a plurality of upwardly and outwardly inclined apertures or perforations 22 and when the sleeve 21 is seated on the valve seat 19, the sleeve closes these apertures.

When this device is to be forced into the ground in order to extinguish a fire, the point 14 is projected as shown in Figure 1. The water enters the upper barrel 11 from a hose,

not shown, passes through the sleeve 21, thence through the perforations in the valve seat 19, and enters the drilling point 14 through the apertures 18.

The force of the water played against the earth through the small holes 15 in the point washes away the earth so that the pipe by its own weight is forced down through the earth, the force of water keeping the point in the position shown in Figure 1. At this time, the apertures 22 are closed by the sleeve 21. When the extinguisher has passed through the fire to a solid basis and can move downward no longer, the weight of the string of tubing forces the sections 11 and 10 downward and this causes the valve seat 19 to bear against the valve 17 and cut off the supply of water to the interior of the point. At this time, the sleeve 21 has the position shown in full lines in Figure 2 and thus uncovers the openings 22 and the water is discharged upward at an angle of 45° to the center line of the barrel. Thus the water is automatically reversed to an upward course in order to keep the barrel from getting hot. Preferably, as before remarked, the sections 10 and 11 are of four inch outside diameter pipe, one inch thick, so as to give plenty of metal to cut the pipe at the valve seat D and set the valve so that there is plenty of material in which to cut slides for the point 14 to work back and forth on.

This extinguisher is suspended from a portable drilling machine so that its position may be changed to drill holes throughout a wide area. As it sinks into the ground, additional lengths of pipe are screwed on to the top of the barrel so that its depth range may be relatively large. Of course, I do not wish to be limited to the exact details illustrated as these might be modified in many ways without departing from the spirit of the invention.

It will be understood that if the ground is particularly hard, then a drilling machine is used to drill a hole down into the fire and then this extinguisher is lowered into this hole with the water turned on so as to permit the ready descent of the extinguisher into the hole. It is to be understood, of course, that while this device has been particularly designed for extinguishing underground fires, it may be capable of other uses as for instance for testing ground in foundations and that I do not wish to be limited, therefore, to the use of this device for extinguishing fires.

I claim:—

1. An underground fire extinguisher including a barrel having laterally extending perforations and open at its lower end, a hollow perforated driving point constituting the lower end of the barrel and movable vertically therein, the barrel being adapted to be connected to a source of water supply, a sleeve operatively connected to the point and when the point is projected closing the perforations in the wall of the barrel, and means acting automatically when the point is forced upward within the barrel by contact with a solid stratum to cut off the passage of water through the point and to move said sleeve to uncover the said lateral perforations, thereby permitting the passage of water through the lateral perforations of the barrel.

2. An underground fire extinguisher of the character described, comprising a pipe having perforations in its side walls and open at its lower end, a hollow perforated point having a diameter the same as the internal diameter of the pipe and normally disposed in projected position at the lower end of the pipe and shiftable upward into the pipe, the upper end of the point having a plurality of apertures and constituting a valve, a valve seat disposed within the pipe and having apertures, the apertures of the valve seat being out of register with the apertures in the valve whereby when the pipe lowers with relation to the point on the point striking an obstruction the valve seat and valve will coact to cut off the flow of water to the interior of the point, a connecting rod mounted upon the point, and a sleeve connected to the connecting rod normally closing the perforations in the body of the pipe and when the pipe is lowered relative to the point, permitting the passage of water through said perforations.

3. An underground fire extinguisher of the character described comprising a pipe having upwardly and outwardly inclined perforations in its side walls and open at its lower end, a hollow perforated point having a diameter the same as the internal diameter of the pipe and normally disposed in projected position at the lower end of the pipe and shiftable upward into the pipe, the upper end of the point having a plurality of apertures and constituting a valve, a valve seat disposed within the pipe and having apertures, the apertures of the valve seat being out of register with the apertures in the valve whereby when the pipe lowers with relation to the point on the point striking an obstruction, the valve seat and valve will coact to cut off the flow of water to the interior of the point, a connecting rod mounted upon the point, and a sleeve, connected to the connecting rod, normally closing the perforations in the body of the pipe, said sleeve being arranged to uncover said perforations when the pipe is lowered relative to the point, permitting the passage of water through said perforations.

4. An underground fire extinguisher comprising a barrel made in two screw-threaded sections, the lower section adjacent its upper end being formed with a seat and being screw-threaded, the upper section having

screw-threaded engagement with the lower section and having the same diameter thereas and above the point of connection being formed with radiating perforations, a pivoted hollow point having its upper end of the same diameter as the internal diameter of the barrel and vertically movable with reference thereto, the upper end of the point being formed with inlet apertures and constituting a valve, an internal shoulder formed at the threaded connection, a valve seat mounted upon said shoulder and having a central aperture and lateral apertures, the lateral apertures being out of alinement with the apertures in the head of the point, a connecting rod engaging the head of the point and extending up through the central aperture of the valve seat, a tubular sleeve open at its opposite ends and mounted upon said connecting rod and when the point is projected resting upon said valve seat, and closing said radiating perforations, a downward movement of the barrel with reference to the point causing the sleeve to uncover said perforations and the upper end of the point to close the apertures through the valve seat to thus prevent liquid flowing to the interior of the point.

5. An underground fire extinguisher comprising a water conducting barrel, a point slidably engaged with the lower end thereof and normally projecting beyond the barrel and having perforations for the discharge of water, the barrel having normally closed perforations adjacent its lower end for the discharge of water, and means acting upon a predetermined upward movement of the point relative to the barrel preventing the passage of water to the point but causing the unclosing of the perforations in the barrel to permit the water to be discharged therethrough.

In testimony whereof I hereunto affix my signature.

JOHN W. BUTLER.