

June 4, 1929.

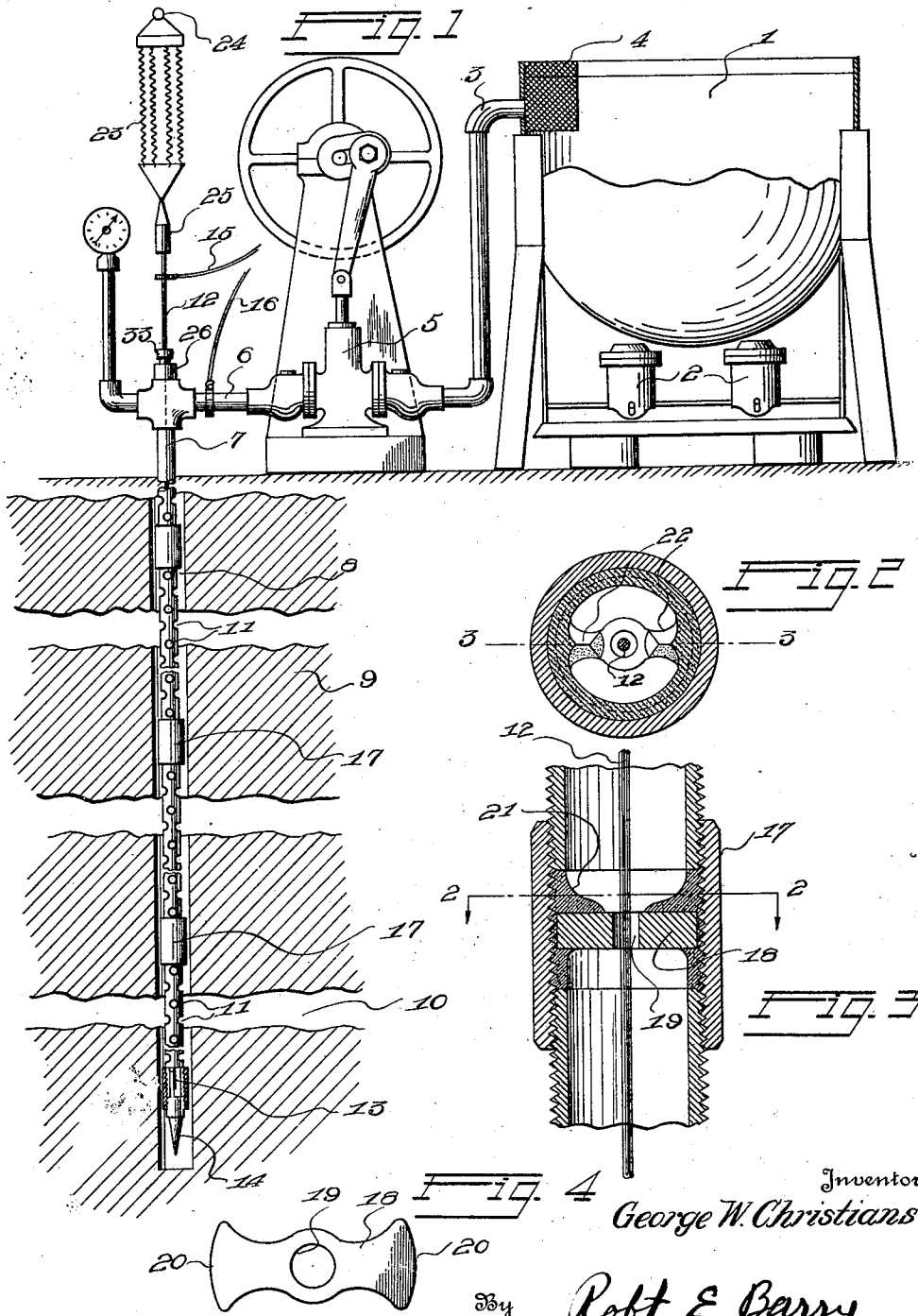
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1,715,592

APPARATUS FOR SEALING CREVICES IN ROCK FORMATIONS OR THE LIKE

Filed Sept. 11, 1926

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

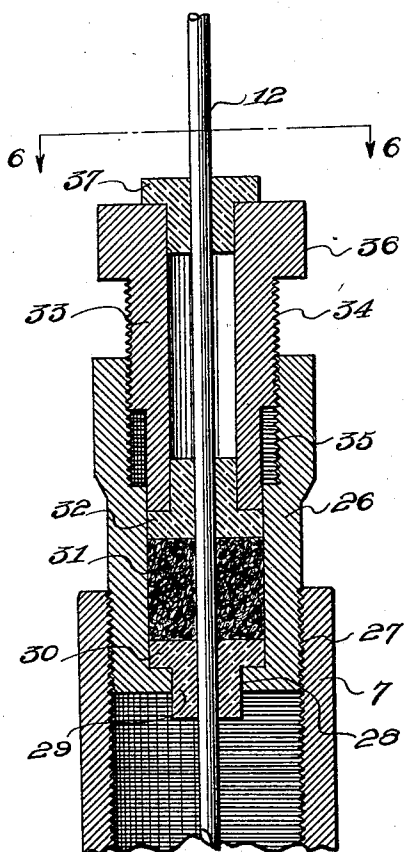


Fig. 5

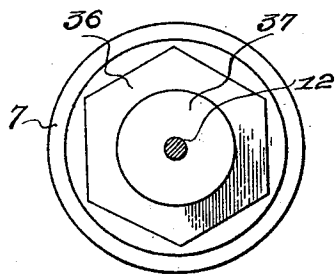


Fig. 6

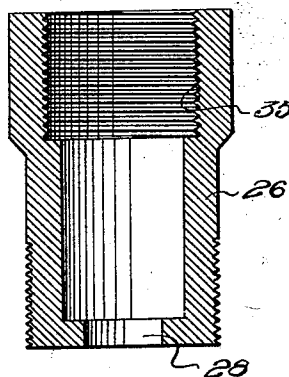


Fig. 7

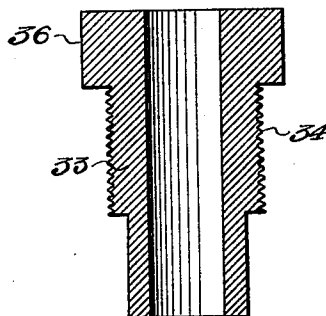


Fig. 8

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APPARATUS FOR SEALING CREVICES IN ROCK FORMATIONS OR THE LIKE.

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This invention relates to the sealing of subterranean crevices. In my Patents 1,327,268 and 1,327,269, dated Jan. 6, 1920, a method and apparatus are disclosed for use in sealing crevices in rock formations and the like. In my system, a pipe is inserted in a hole which extends to the crevice, and hot asphalt or the like is pumped through this pipe. For the purpose of maintaining the sealing material in heated condition while it is travelling through the pipe, a heating wire arranged within the middle of the pipe by spacers of insulating material, as the pipe itself forms part of the electric circuit which includes the heating wire. I have found, in practice, that it is very difficult to prevent short circuiting within the pipe at the points where the spacers are located, as conducting particles carried by the asphalt are liable to lodge on the spacers and eventually bridge the gap between the heating wire and the inner surface of the pipe. Therefore, one of the primary objects of the present invention is to provide novel means for holding the heating wire at the axis of the pipe and for preventing short circuiting while permitting free flow of the hot asphalt through the pipe.

Another object of the invention is to provide the pipe with a special form of insulated stuffing box adapted to permit the passage of the heating wire through the upper end of the pipe without allowing any asphalt to escape at this point. The invention is illustrated in the accompanying drawings, in which, Fig. 1 is a side view partly in section of the complete apparatus. Fig. 2 is an enlarged horizontal sectional view of the feeding pipe, taken through one of the joints and on line 2—2 of Fig. 3. Fig. 3 is a vertical sectional view taken on line 3—3 of Fig. 2. Fig. 4 is a plan view of one of the spacers. Fig. 5 is a vertical sectional view of the stuffing box arranged at the top of the feeding pipe. Fig. 6 is a view taken on line 6—6 of Fig. 5. Figs. 7 and 8 are vertical sectional views of elements of the stuffing box.

In the drawings, 1 designates a kettle heated by burners or the like 2. Asphalt or similar thermo-plastic material is fed into this kettle and as it is heated, it runs off through the gravity feed pipe 3, being strained by a screen 4. The pipe 3 has its outlet connected to the intake of a pump 5, which forces the hot asphalt into a conduit 6 connected to the main feed pipe 7. This main feed pipe is arranged in the hole 8 which has been drilled in the rock formation or the like 9, that contains the crevice which is to be sealed. The portion of the feed pipe arranged in the hole 8 is perforated, as shown at 11, and at the commencement of operations, a canvas wrapping is placed around the perforated portion of the pipe. When sufficient resistance is encountered, the pump 5 will cause the asphalt in the pipe 7 to puncture the canvas, so that the asphalt will flow into the crevices to be sealed. This canvas wrapping forms no part of the present invention and is therefore not illustrated.

The thermo-plastic material will be maintained in heated condition while it flows through the pipe 7 by means of an electric heating wire 12. This wire has its lower end connected at 13 to a metal plug 14 which is in electrical connection with the lower end of the pipe. The wire, however, is held out of contact with the remainder of the pipe, so that the pipe may be used as a part of the circuit for the electric current flowing through the heating wire 12. The electric current may be furnished to the pipe 7 and wire 12 by means of leads 15 and 16.

As shown in Fig. 1, the pipe 7 is made up of a number of sections connected together by metallic couplings 17, and at each point where the coupling is located a spacer 18 is arranged within the pipe. This spacer is shown detached in Fig. 4, and it consists of a short bar, formed of lava, porcelain or other insulating material, provided with a central aperture 19 and curved ends 20. The length of the spacer 18 is about the same as the internal diameter of the coupling 17, and it is preferably secured in the coupling in a horizontal position by some suitable plastic insulating material 21, such as plaster of Paris. As clearly shown in Figs. 2 and 3 of the drawings, this plastic insulating material is arranged as a coating to form an internal ring within the coupling 17, which ring covers the portions of the threads of the coupling which are not engaged with the threads of the pipe sections. Immediately above the spacer 18, the plastic insulating material 21 is extended inwardly as shown at 22 to cover portions of the upper face of the spacer between the hole 19 and the ends 20. These projections 22 have inverted V-shaped upper surfaces so as to guide the asphalt as it flows downwardly and to pre-

vent it from lodging on the upper side of the spacer. My idea is to permit ready flow of the asphalt, but at the same time, shape the parts in such manner that no conducting particles will lodge on the insulator, which would be liable to cause a short circuit.

The heating wire 12 extends through the holes 19 of the spacers and is more or less freely arranged in the holes, so that the wire may be kept taut by springs 23 which have their upper ends secured at 24 to some fixed point, and have their lower ends connected to the wire by an insulator 25. Due to this construction, the wire will be maintained at the center of the pipe and there will be no liability of short circuiting.

The improved stuffing box, which I will now describe, also functions to keep the wire at the center of the pipe, and to permit the wire to exit from the pipe without leakage of asphalt. As the pump 5 forces the asphalt into the pipe 7 under considerable pressure, it is obvious that the asphalt will tend to leak at the upper part of the pipe. Furthermore, as the wire 12 must extend through the upper end of the pipe in such a way that it may be maintained taut by the springs 23, it is apparent that a special form of stuffing box is necessary. The stuffing box which I have devised for this purpose comprises a cup 26 having threads at its lower portion to engage internal threads at the upper end of the pipe, as shown at 27 in Fig. 5. The bottom of the cup is apertured at 28 to receive an insulating bushing 29 formed of any suitable material. The bushing has an annular flange 30 which rests on the bottom of the cup, and also engages the inner surface of the cup to prevent leakage of asphalt at these points.

Within the cup I place on top of the bushing, an asbestos or other suitable packing 31, and above the packing, I arrange an insulating bushing 32 which is similar to the bushing 29, but is inverted so that its flange bears against the under side of an adjusting sleeve 33. This sleeve has external threads 34 which engage internal threads 35 in the upper portion of the cup, and the upper end of the sleeve has a hexagonal surface 36 to receive a wrench, used to adjust the sleeve. A third bushing 37 similar to the bushing 29 is arranged at the upper end of the sleeve, and the heating wire 12 extends through the bushings and packing with a snug sliding fit, so that the wire may be maintained taut and the asphalt prevented from leaking out through the stuffing box.

I am aware that changes may be made in the details which I have disclosed without sacrificing any of the advantages of the invention, and I claim all modifications falling within the scope of the following claims.

What I claim and desire to secure by Letters Patent is:

1. A spacer for maintaining a current conducting wire at the central portion of a current-conducting pipe, said spacer including a bar of insulating material extending diametrically across the interior of the pipe, the spaces between the sides of the bar and the inner surface of the pipe being unobstructed so as to permit ready flow of thermoplastic material through the pipe without liability of short circuiting electric current between the wire and pipe.

2. In combination with a spacer as claimed in claim 1, a tubular lining ring of insulating material arranged in the pipe at the place where the bar is located.

3. A spacer as claimed in claim 1, including ridges of insulating material arranged on the upper face of the bar at opposite sides of the middle of the same.

4. In a structure of the character described, a pipe formed of a plurality of sections, a coupling connecting adjacent ends of the sections, said sections and coupling being of electricity conducting material, a ring of insulating material lining the pipe and located between the adjacent ends of the pipe sections, and a cross bar of insulating material located in the coupling between the ends of the ring and having a centrally disposed aperture, adapted to receive a current conducting wire.

5. In combination, a pipe of electricity conducting material, a ring of insulating material arranged within the pipe, a cross bar of insulating material arranged between the ends of the ring and having an aperture adapted to receive a current conducting wire, said cross bar having its sides spaced from the inner surface of opposite sides of the ring to provide a plurality of relatively large openings capable of permitting the ready flow of fluid through the pipe.

6. A combination as claimed in claim 5, in which ridges of insulating material are arranged on the upper face of the cross bar to facilitate the passage of fluid through the pipe.

7. A combination as claimed in claim 5, in which the ring is formed of plastic material, and the cross bar has curved end surfaces.

8. In combination, a sectional pipe having threaded couplings connecting the sections, the sections and couplings being formed of electricity conducting material, insulating lining rings arranged in the couplings between the ends of the sections, and bars of insulating material extending diametrically across the interior of the couplings and having their ends connected to said rings, said bars having abutment surfaces adapted to hold a current conducting wire away from the inner surface of the pipe.

9. A combination as claimed in claim 8, in which ridges of insulating material integral with the rings are arranged on the upper sur-

faces of the cross bars to facilitate the passage of fluid through the pipe.

10. Means for spacing an electric heating wire from the wall of a metal pipe through which the wire extends, said means comprising a spacer including insulating arms extending radially from the central portion of

the pipe across the interior of the latter to the inner surface of the same, the spaces between the sides of the arms and the inner surface of the pipe being unobstructed, and abutment surfaces at the inner ends of the arms to bear against said heating element.

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