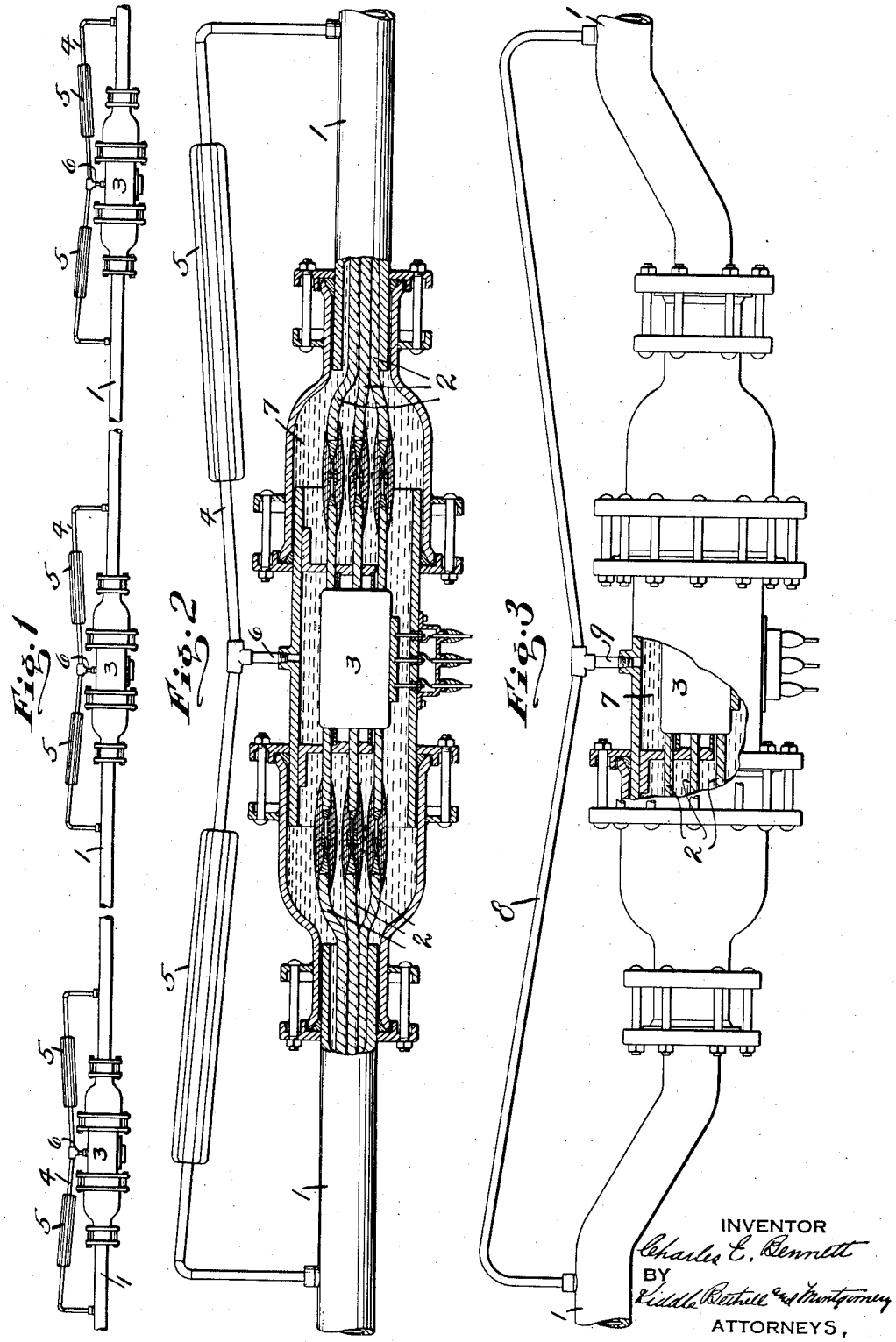
Jan. 5, 1937. C. E. BENNETT 2,066,322

ELECTRIC CABLE SYSTEM

Filed Dec. 7, 1935 2 Sheets-Sheet 1



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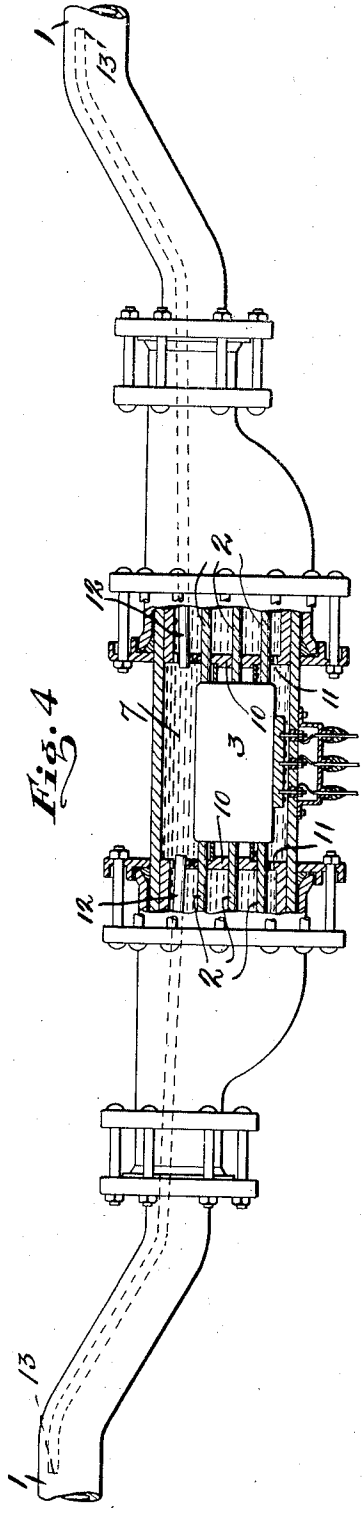


Fig. 4

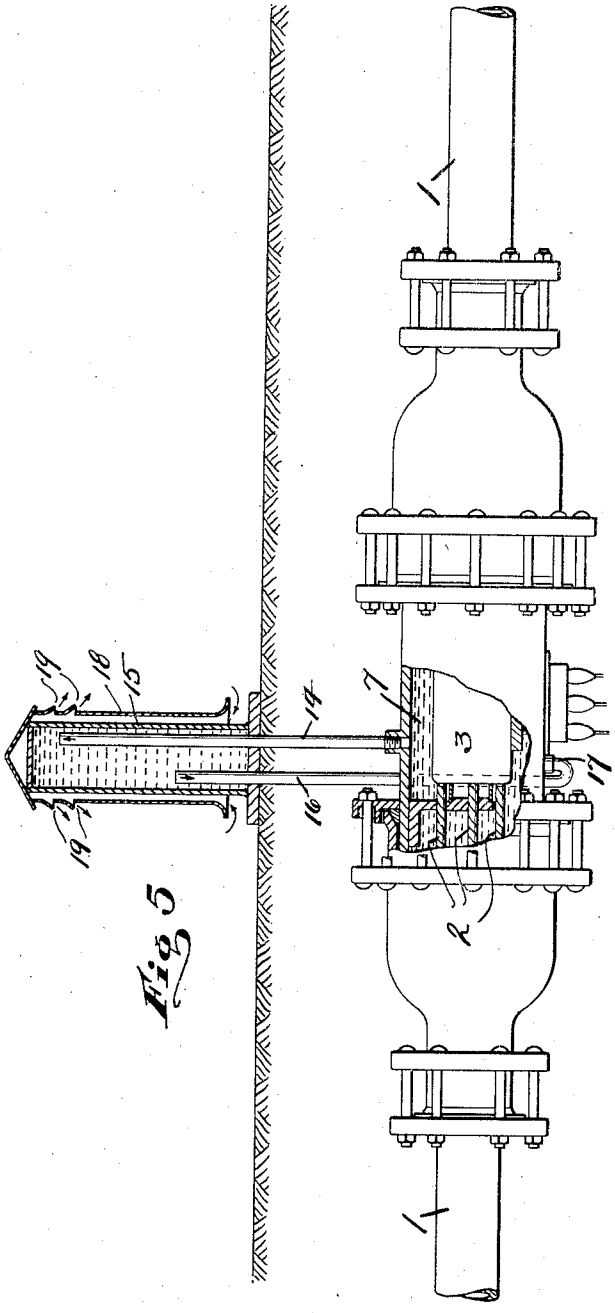


Fig. 5

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2,066,322

ELECTRIC CABLE SYSTEM

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Application December 7, 1935, Serial No. 53,344

2 Claims. (Cl. 247—3)

This invention relates to electric distribution systems particularly adapted for use in connection with the distribution of power for street lighting, house lighting and other domestic or commercial loads, and provides a construction wherein the cable conductors and the transformers for the system are installed in a pipe line filled with an insulating fluid such as oil in which the insulated conductors and transformers are immersed at all times. The entire system is buried in the ground, means being provided for dissipating the heat generated in the system with particular reference to the heat generated by electric losses in the transformers, thereby insuring best operating conditions at all times.

In the drawings accompanying this application I have shown several embodiments of my invention.

In Figs. 1 and 2 I show one embodiment of my invention;

Fig. 3 is a fragmentary part sectional elevational view of another embodiment of my invention;

Fig. 4 is a part sectional elevational view of a further embodiment of my invention; and

Fig. 5 shows in part sectional elevation still another embodiment of the invention.

Referring to the drawings in detail and first of all to Figs. 1 and 2, 1 designates a pipe line into which the cable conductors 2 are drawn, transformers shown at 3 being mounted in the pipe line and electrically connected to the cable conductors 2. The method of mounting the transformers in the pipe line is covered by my copending application Serial No. 46,064, filed October 22, 1935.

At intervals along the pipe line but adjacent the transformer locations I provide a radiating pipe 4. Each of these radiating pipes communicates with the pipe line 1 at each side of the transformer 3 and each pipe is provided with radiating fins 5. In addition to the connections just mentioned of the radiating pipes 4 to the pipe line 1 I provide cross connections 6, these connections communicating with the pipe line 1 at the transformers. The radiating pipes 4 are installed at the upper side of the pipe line and as will be seen from the drawings the cross connections 6 enter the pipe line over the transformers.

It will be quite apparent from the foregoing that any heat generated in the oil or other insulating fluid 7 which fills the system will be effectively dissipated by my improved construction, the warm oil moving away from the transformers 3 through the radiating pipes 4 where the heat of the oil is dissipated, the cooled oil returning to the pipe line at the ends of the radiating pipes.

The insulating fluid 7 is preferably maintained under a pressure sufficiently high materially to increase its dielectric strength, for example five atmospheres minimum.

In the construction shown in Fig. 3 I shows a system similar to the construction of Figs. 1 and 2 in that the cable conductors 2 and transformers 3 are enclosed in a pipe line 1 which is maintained filled with oil or other insulating fluid 7 preferably maintained under pressure of the magnitude above mentioned.

That part of the system of this embodiment of my invention in which the transformers 3 are installed is lowered as compared with the main part of the pipe line 1.

Adjacent the location of each of the transformers 3 is a radiating pipe 8, the ends of which are in constant communication with the pipe line 1 at each side of the transformers 3. Cross connection 9 maintains this radiating pipe in communication with the pipe line 1 immediately over the transformers 3. If desired the radiating pipes 8 may be provided with radiating fins such as shown at 5 in Figs. 1 and 2. The operation of this embodiment of my invention so far as dissipation of the heat generated by the transformers 3 is concerned is the same as the embodiment of my invention shown in Figs. 1 and 2. In other words, I obtain a thermal siphon effect, the warm oil at the transformers moving through the cross connection 9 into the radiating pipes 8 to be cooled and returned by these pipes to the pipe line 1.

In Fig. 4 I show an embodiment of my invention in which the cable conductors 2 and transformers 3 are enclosed in a pipe line 1. As in the construction shown in Fig. 3 that part of the pipe line in which the transformers 3 are mounted is lowered with respect to the level or plane of the main part of the pipe line. The transformers 3 are mounted in the pipe line in suitable brackets 10 which in this case function as baffles for the oil 7 with which the pipe line is filled and in which the cable conductors 2 and transformers 3 are immersed. These baffles are provided adjacent the lower edges with suitable openings or ports 11 to permit of the movement of the oil in the pipe line 1 from the outer side of the baffle plates to the transformer side.

At the upper part of the baffles 10 I provide short lengths of pipe 12 which are within the

pipe line and extend a short distance outwardly from the transformer locations, these pipes terminating within the pipe line as shown at 13 at any suitable distance from the transformer locations. It will be quite apparent that in this embodiment of my invention a thermal-siphon effect is obtained, the oil 7 immediately about the transformers 3 and which is heated by the electric losses in the transformers moving outwardly away from the transformer through the pipes 12, the heat in this oil being dissipated by the pipes 13 being immersed in the relatively cooler oil in the pipe line remote from the transformer and returning to the oil in the pipe line at the ends of these pipes and flowing back to the transformers again.

In the construction of my system as illustrated in Fig. 5 the cable conductors 2 and transformers 3 are mounted within the pipe line 1 and immersed in oil or other insulating fluid 7 with which the pipe line is filled, and which may, as above mentioned, be maintained under a pressure sufficiently high to increase its dielectric strength. Extending vertically from the upper side of the pipe line 1 immediately above the transformers 3 is a pipe 14 which extends above the ground into a cooling tower 15 mounted on the surface of the ground, a pipe 16, the upper end of which terminates short of the upper end of the pipe 14 extending from this tower downwardly to the underside of the pipe line 1 where it is connected to the pipe line as shown at 17. It will be apparent that this construction will provide for a thermal siphon movement of the insulating fluid 7 upwardly in the pipe 14 to spill over into the tower 15, the relatively cool oil returning to the pipe line beneath the locations of the transformers 3.

To facilitate cooling of the fluid in the tower 15, the tower is provided with an outer tube 18 which loosely surrounds the tower and is provided adjacent its top with air outlets 19. This arrangement provides for a circulation of air past and in contact with the tower as indicated by the arrows on the drawings.

In all of the embodiments of my invention above described, it will be seen that I have provided an electric distribution system in which the conductors of the system and transformers are enclosed in a pipe line which contains oil or other insulating fluid in which the cable conductors and transformers are immersed, means being provided for permitting of a movement of the insulating fluid away from the transformers for dissipation of heat generated by electric losses in the transformers. It will be quite evident that these various arrangements will insure good operating conditions at all times in the system from a thermal standpoint.

What I claim is:—

1. A buried electric distribution system comprising in combination a pipe line, insulated cable conductors and a transformer electrically connected thereto mounted within said pipe line, a body of insulating fluid in the pipe line under superatmospheric static pressure surrounding the cable conductors and transformer and in which the cable conductors and transformer are immersed, a radiating pipe adjacent said pipe line having its ends communicating with the interior of the pipe line at each side of the transformer, and a cross connection between said pipe and pipe line intermediate the ends of the pipe and adjacent the transformer.

2. A buried electric distribution system comprising in combination a pipe line, insulated cable conductors and a transformer electrically connected thereto mounted within said pipe line, a body of insulating fluid under superatmospheric pressure in the pipe line surrounding the cable conductors and transformer and in which the cable conductors and transformer are immersed, a pipe disposed adjacent said pipe line having its ends communicating with the interior of the pipe line at each side of the transformer, a cross connection between said pipe and pipe line communicating with the pipe line at the transformer, and radiating fins on said pipe at each side of said cross connection.

CHARLES E. BENNETT.