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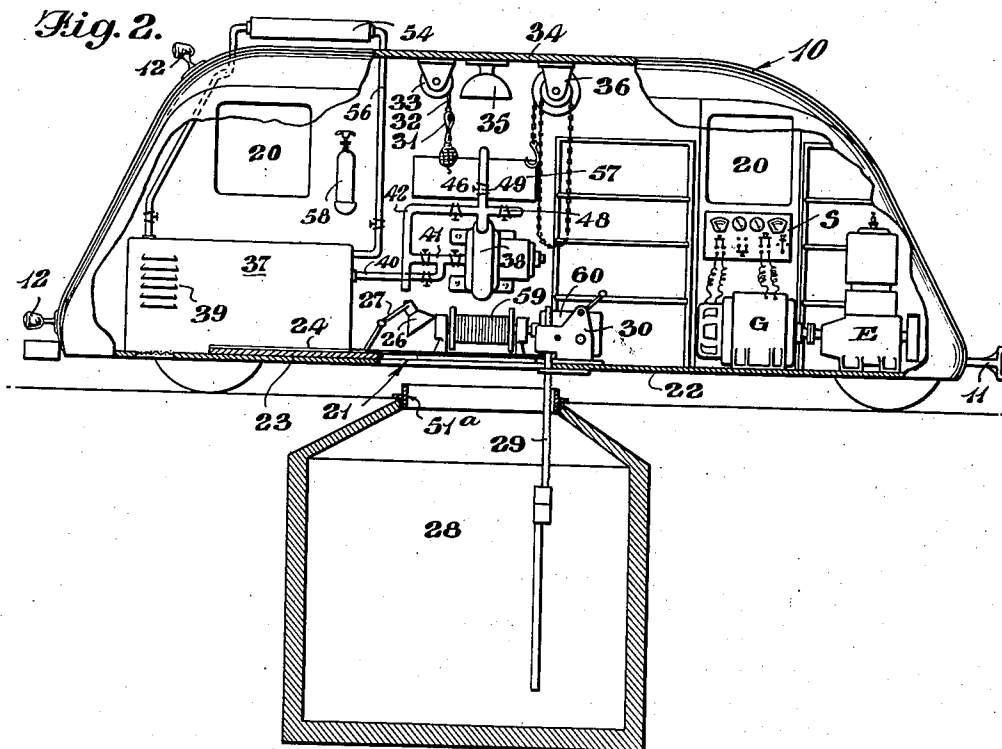
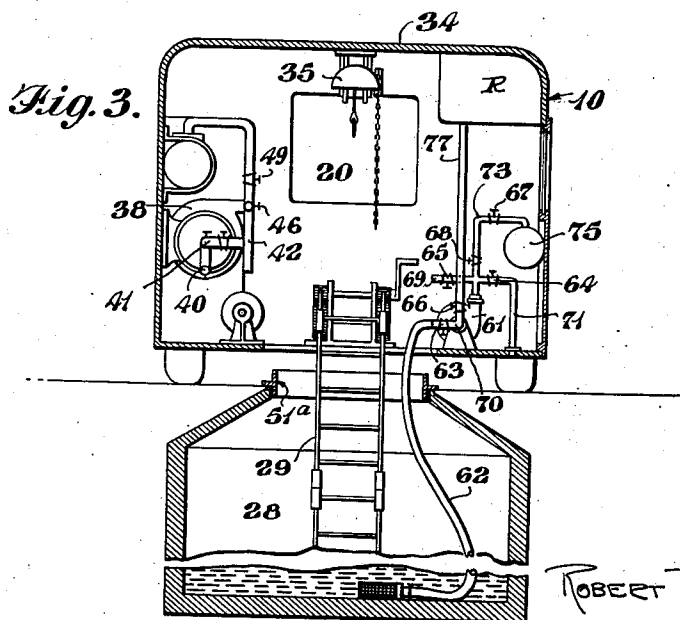
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FIELD SERVICE METHOD AND APPARATUS

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FIELD SERVICE METHOD AND APPARATUS

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This invention relates to a process of and portable equipment for the servicing, repairing, and otherwise treating ground areas, sub-surface tunnels, sewers, and utility equipment in surface and sub-surface areas such as fluid conduits, power lines, fuel lines, surface and sub-surface structures and the like.

Prior to the instant invention, servicing and repair work on surface and sub-surface areas has usually been carried out in fair weather because of the inconveniences and hazards associated with inclement weather. For example, it is well known that there are relatively great dangers involved in the handling of electric equipment in wet weather as then material which would ordinarily act as an insulator serves to become a conductor. In addition, the efficiency of a crew of men in the open in inclement weather is decidedly low. As service to such areas is frequently of a character as to be classified as an emergency, the repairs or changes or revisions must nevertheless be made by the emergency or repair crew in inclement weather with accompanying undesirable results or sacrifice of efficiency.

In order that repair or emergency crews may work in inclement weather, it has been suggested that temporary shelters such as shacks or tents be erected on the site of the work in order to facilitate the same. However, the extra equipment is cumbersome, requires time in erection prior to the initiation of emergency or repair operations and in the subsequent disassembly and stowing away of the temporary shelter. Accordingly, considerable time is involved prior to the making of necessary emergency repairs with correspondingly undesirable results. In fact by the time a shelter can be erected at the site where the emergency repair is to be made, it may be too late to make the emergency repair and complete reinstallation of new equipment may be necessitated.

For repairs of the character discussed above, it is common to provide mobile equipment for the convenience of the emergency or repair crew and tools and parts and sometimes temporary collapsible or other temporary shelters. In accordance with the instant invention, it is contemplated to associate with the mobile equipment now utilized a trailer or a compartment of the main mobile equipment so constructed and arranged as to facilitate emergency service, repair, revisions and additions to surface and sub-surface areas.

It is an object of the instant invention to set

forth a process involving the servicing and repairing of surface and sub-surface areas in the field by working with a permanent portable compartment capable of operating out of a central station and operating through the floor thereof with suitable equipment.

It is a further object of the instant invention to provide a portable car having an opening in its floor and servicing and repair equipment located within the car in cooperating relationship with the opening in the floor thereof whereby when the portable car is moved to the surface or sub-surface area to be serviced, repairs, service, changes or revisions may be made in clement or inclement weather without sacrifice of efficiency or time and relatively without danger.

It is still another object of the instant invention to provide a process for repairing and servicing which is readily adaptable to the needs of public utilities, municipalities, and others for the treatment, servicing, repairing, revising and installing of equipment and structures in surface or sub-surface areas.

Other objects and the nature and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawings, wherein:

Fig. 1 is an elevational view of a trailer in accordance with the invention;

Fig. 2 is a schematic view partly in section and partly in elevation of the trailer in Fig. 1 arranged over a manhole and in position to service a sub-surface area;

Fig. 3 is a transverse sectional view of the trailer arranged over a manhole and in position to service a sub-surface area; and,

Fig. 4 is a fragmentary sectional view of the trailer arranged over a manhole and illustrating in particular the blower equipment.

Referring to the drawings, a trailer 10 is provided with a coupling arrangement 11 at its forward end whereby the said trailer may be associated with a tractor or other mobile equipment adapted to pull the trailer to a desired location where servicing, repairs or revisions or the like is to be made. Though the trailer 10 is illustrated as being adapted to be pulled by a tractor or other equipment, it is to be understood that it is contemplated, in accordance with the invention, that the trailer 10 may be provided with its own motor and drive means whereby it is unnecessary to associate it with other mobile equipment.

Lights 12 may be arranged at various strategic locations on the car 10 in order to warn ap-

proaching vehicles of the location of the car 10 while the same is stationary and arranged for work on some surface or sub-surface area. Though the lights 12 are shown at but the front and rear of the car 10 in the drawings, it is contemplated that they may be arranged at several other points including the sides so as to provide for sufficient warning.

To facilitate loading and unloading of the car 10, it may be provided with doors 13 located at the front and back, which doors are hinged at their tops 14 and provided with suitable aligning and holding mechanism 15 whereby the doors 13 may be held in fully opened position without attention. In addition to the doors 13 the sides of the car may be provided with vertically hinged loading or unloading doors 16 provided with suitable latches 17. These doors 16 may be arranged on both sides of the car. A door 18 provided with a conventional door latch 19 may be located toward the forward end of the car for the entrance and exit of the car crew. To provide natural light to the interior of the car the windows 20 may be arranged as shown in Figs. 1 and 2.

The walls, roof and floor of the car 10 are fabricated in a manner to provide for relatively great strength to support equipment which will be later described, which equipment is arranged in cooperating relationship with the hatch or opening 21 formed in the floor 22 of the car 10. A sliding closure 23 slidably supported by angle irons 24 and substantially sealed by gasket material 25 is arranged on the floor of the car and is adapted to successively close and open the hatch opening 21 as desired. It is to be understood that it is within the scope of the invention to arrange the closure for the hatch opening directly beneath the floor 22 instead of directly thereabove as shown in Fig. 2. Supported by the floor 22 and in cooperating relation with the opening 21 is the relatively high powered spotlight 26 which may be universally adjusted by the mechanism 27 to provide the proper light through the opening 21 to a surface area beneath the car 10 or within the sewer 28, see Fig. 2. A collapsible ladder 29 is associated with automatic mechanism 30 for automatically lowering or elevating the same in cooperation with the opening 21 whereby the crew of the car 10 may have ready access to the sewer and illumination from the light 26 for their work within the sewer 28 or beneath the car 10. An extension lamp or work light 31 having a cord 32 adapted to be unwound from the reel 33 which may contain a spring to provide for automatic rewinding is supported from the interior of the roof 34 of the car 10. This lamp 31 may be pulled through the opening 21 to work within the sewer 28 at a point or location not illuminated by the spotlight 26 to further facilitate the work within the sewer. The ceiling light fixture 35 may be supported by the ceiling 34 so as to provide for illumination within the car 10 and also may be arranged in cooperating relation with the opening 21 so as to provide for additional illumination beneath the surface beneath the floor 22 and even within the sewer 28. Additional lamps, not shown, similar to the lamp 35 may be arranged within the car 10 at suitable places as desired.

A hoist 36 may be supported by the interior of the roof 34 in cooperating relation with the opening 21 so that a manhole cover or other equipment may be raised from the surface beneath the car 10 or a piece of equipment or structure within the sewer 28 may be raised to within the car 10

and then swung outwardly thereof through the doors 16 for example, if desired.

A cooling and heating unit 37 may be arranged within the car to provide for cooling or heating of fluids passed therethrough. For example, if it is desired to pass cool or heated air from within the car to the sewer 28, the blower 38 may be operated to pull air from the car through the louvres 39, through the unit 37, through conduit 40 and to conduit 41, thence through the blower 38 to the conduit 42 and then by a flexible pipe attached to the outlet 43 of the conduit 42 to within the sewer 28. This operation would involve opening the valves 44, 45 and 46 and closing valves 47, 48 and 49. The cooling and heating unit 37 may also be provided with an opening 50 leading to the air outside of the car whereby air from without the car may be pumped to the sewer 28. The car 10 may carry a collar 51a provided with tight fitting rubber rim 51b, which collar 51a is adapted to be placed around and within the mouth of the manhole opening 51 to prevent flooding from drainage particularly when the connection is effected between the outlet 43 of the conduit 42 and the manhole opening 51, as illustrated in Fig. 4. This connection may comprise flexible material having a relatively large end 52 provided with a bead 53 within which is located a coil spring 54 under compression whereby a fluid tight joint may be effected between the manhole opening 51 and the end 52 of the conduit connection 53. The cooling and heating unit 37 may be provided with a heat rejecting or absorbing coil 54 located on the roof of the car 10 and a heat rejecting or absorbing coil within the unit 37. A compressor may be located in series with these two coils by means of the conduits 55 and 56 and cross connections may be so associated with these conduits and the compressor whereby the coil within the unit 37 may act as a condenser or evaporator and the coil 54 may also act as a condenser or evaporator. That is, when the coil within the unit 37 is an evaporator the coil 54 is a condenser and vice versa. A volatile refrigerant may be charged into the circuit of the heating and cooling unit and the compressor operated to pass compressed fluid first either through coil 54 or the coil within the unit 37 as desired. When the compressed fluid first passes through the coil 54, the coil 54 is a condenser and the coil within the unit 37 is an evaporator and serves to cool the ambient passed thereover. When the compressed fluid is first passed through the coil within the unit 37 and subsequently through the coil 54 the coil within the unit 37 is then a condenser and serves to reject heat to the ambient passing thereover. This reversible compressor condenser expander system, in which suitable and proper valves may be incorporated, serves as a heater or cooler as desired. It forms by itself no part of the instant invention but does form part of the instant invention in its combination with the car 10 and as it cooperates with the opening 21 to provide service for the area therebelow.

When it is desired to pump air or ambient from within the sewer 28 to without the car 10 the valves 44, 45 and 48 are opened and the valves 47, 46 and 49 are closed. When it is desired to pump the ambient from within the sewer 28 to the tank 57, whereby the said ambient may be later analyzed or used for other purposes, the valves 44, 46 and 48 are closed and the valves 47, 45 and 49 are opened. Accordingly it will be understood that heated or cooled air from within or without

the car may be pumped to within the sewer 28 through the opening 21 and also the ambient within the sewer 28 may be collected for sampling or for other purposes or pumped to without the car 10 as desired.

For emergency purposes a fire extinguisher 58 may be located within the car 10 and used as required.

Located in cooperating relation with the opening 21 is the winch 59 driven by the motor 60. This winch may be used for raising and lowering equipment, reeling or unreeling tubes and wires and for other purposes as will be readily apparent. At all times the winch 59 cooperates with the opening 21 in the floor 22 of the car 10.

A pump 61 may be located on the floor 22 of the car 10 and be connected by a hose 62 with the interior of the sewer 28 whereby liquids may be pumped to or from the sewer. When it is desired that liquid be pumped from the sewer, the valves 63, 64 are opened and the valves 65, 66, 67 and 68 are closed, whereby fluid will pass upwardly through the flexible conduit 62 through the pump inlet conduit 70 through the pump 61 and through the conduit 71 through the floor 22 of the car 10 the exterior of the car. When it is desired that some of the liquid material within the sewer 28 be collected, the valves 63, 68 and 67 are opened and the valves 66, 65, 64 are closed. The material is then sucked upwardly through conduit 62 through the pump 61 through conduit 73 to the tank 75. When it is desired that liquid from the reservoir R be pumped to within the sewer 28, the valves 66 and 65 are opened, the valves 63, 64, 68 and 67 are closed and the upper end of pipe 62 connected to outlet 69. Fluid may then pass from the tank R through the conduit 77 to the conduit 70, through the pump 61 and thence through the conduit 78 to the flexible conduit 62 to the sewer 28.

To provide for power for the operation of the various devices above described including the cooling and heating unit 37 the motor fan 38, the motor pump 61, the winch 59, the generator G driven by the engine E supplies power through the switchboard S illustrated in Fig. 1. The generator G may be driven by the motor for the car 10 when the same is self-propelled or electric power at the location on which the repairs, or servicing is done may be tapped and utilized through the switchboard to provide for the operation of the various motor driven elements all of which cooperate with the opening 21 to permit the servicing, the repairing and working on surface or sub-surface areas below the car without expenditures of time otherwise necessary in the erection of temporary shelter.

In general, the operations described above involve a process and equipment for the rapid servicing or repairing of surface or sub-surface areas such as frequently are made by work crews in the field in order to maintain or install equipment for power companies, other utilities and municipalities. The novel process and equipment insure service during both clement and inclement weather and save time and money for a lesser number of crews are necessary to maintain, install and repair equipment in a locality of predetermined size.

Though the air and liquid pumping apparatus are schematically shown in the drawings for the purpose of clarity as being in the center of the car 10, it is to be understood that the equipment is located on the walls and floor of the car and out of the way of the doors 16 and other equipment.

It will be obvious to those skilled in the art that various changes may be made in this device without departing from the spirit of the invention and therefore the invention is not limited to what is shown in the drawings and described in the specification but only as indicated in the appended claims.

What is claimed is:

1. The method of effecting emergency service in the field to surface and sub-surface areas, comprising: moving over the ground surface a wheeled vehicle, enclosed on the top and sides and provided with an access opening in the bottom of a size sufficient to accommodate passage of the vehicle crew therethrough and for the manipulation of equipment by the crew therethrough, to a location directly above the area to be serviced, and rendering service to said area under the shelter of said enclosed vehicle.

2. The method of effecting emergency service in the field to surface and sub-surface areas involving the passage of material between the area to be serviced and a second space, comprising: moving over the ground surface a wheeled vehicle, enclosed on the top and sides and provided with access openings in the sides and the bottom for the manipulation of equipment by the crew therethrough to a location directly above the area to be serviced, and rendering service to said area under the shelter of said enclosed vehicle including passing material between said area and a space outside of said vehicle above the ground by passing said material into said vehicle through one of said openings and out of said vehicle through the other of said openings.

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