(No Model.) 3 Sheets—Sheet 1.

J. McNAUGHTON.

LOCOMOTIVE FIRE KINDLING APPARATUS.

No. 515,009. Patented Feb. 20, 1894.

FIG. 1.

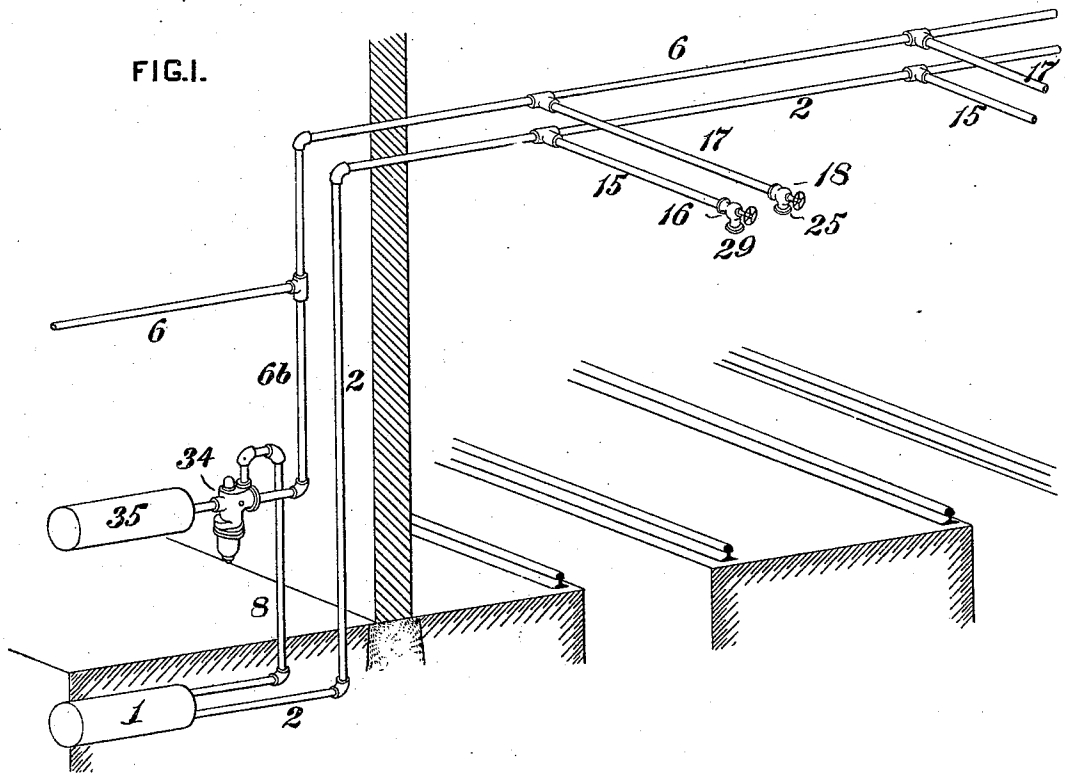
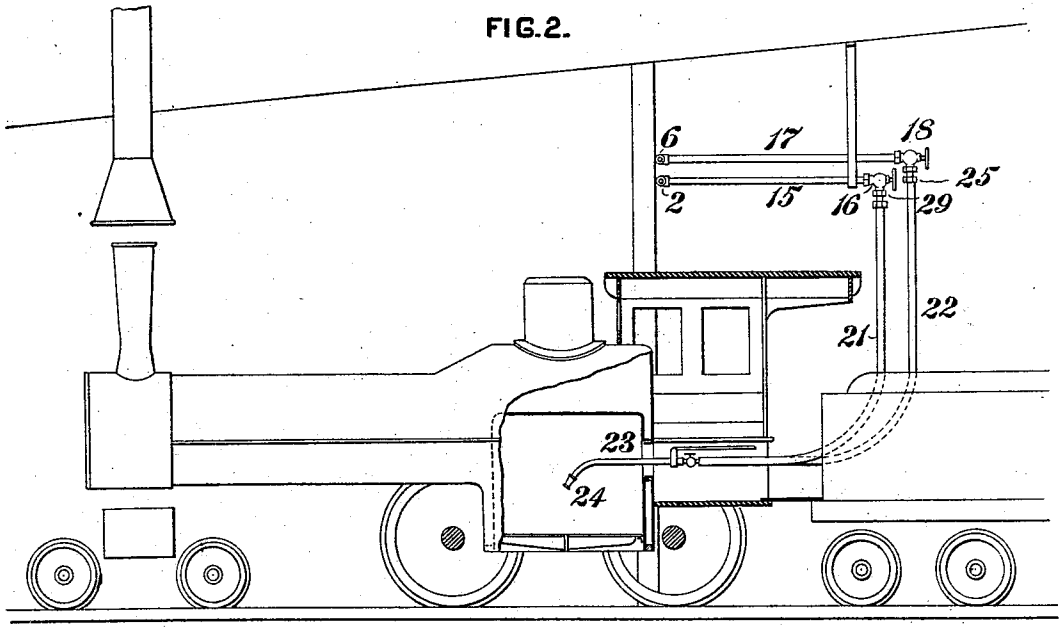


FIG. 2.



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(No Model.) 3 Sheets—Sheet 2.

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FIG. 3.

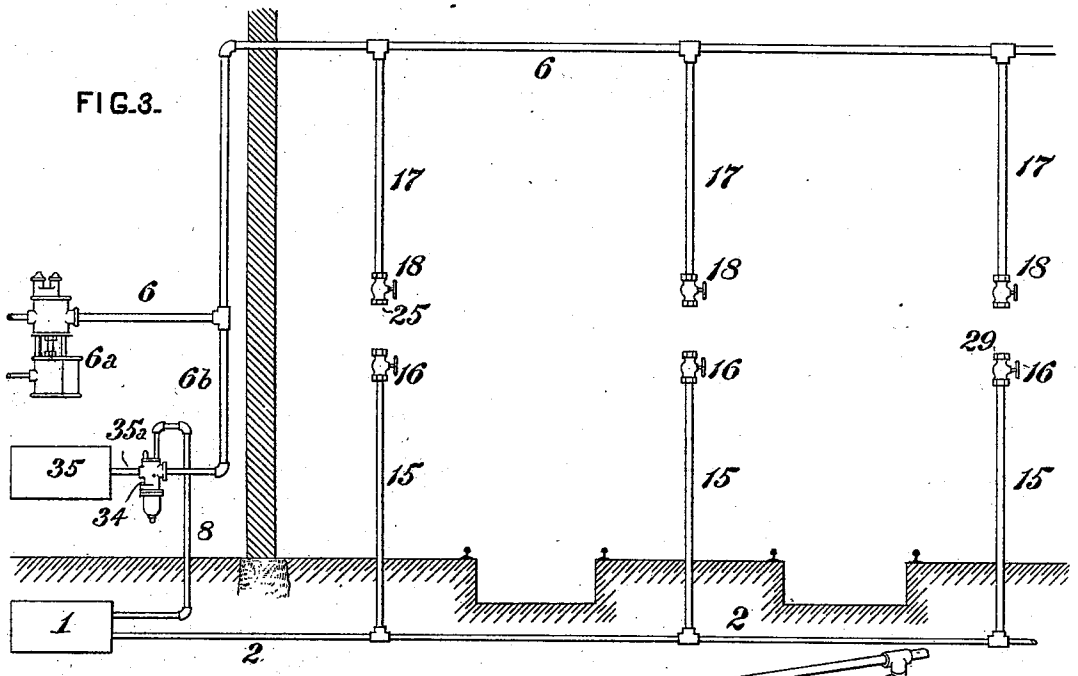

FIG. 4.

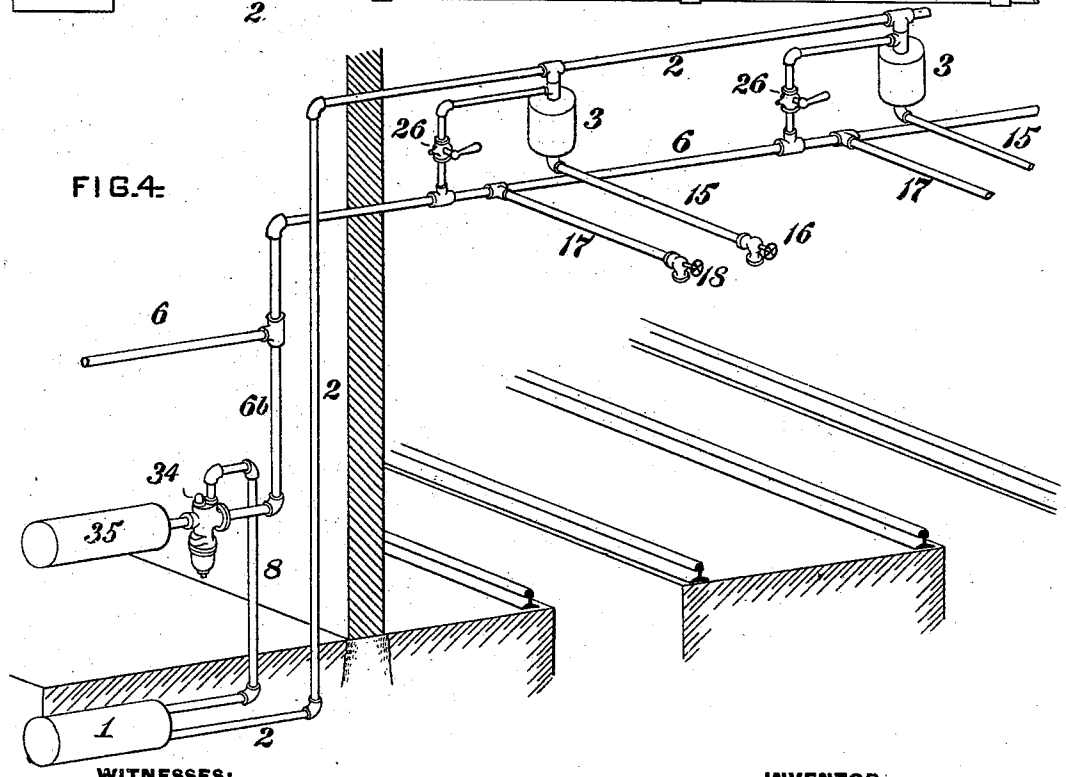

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FIG. 5.

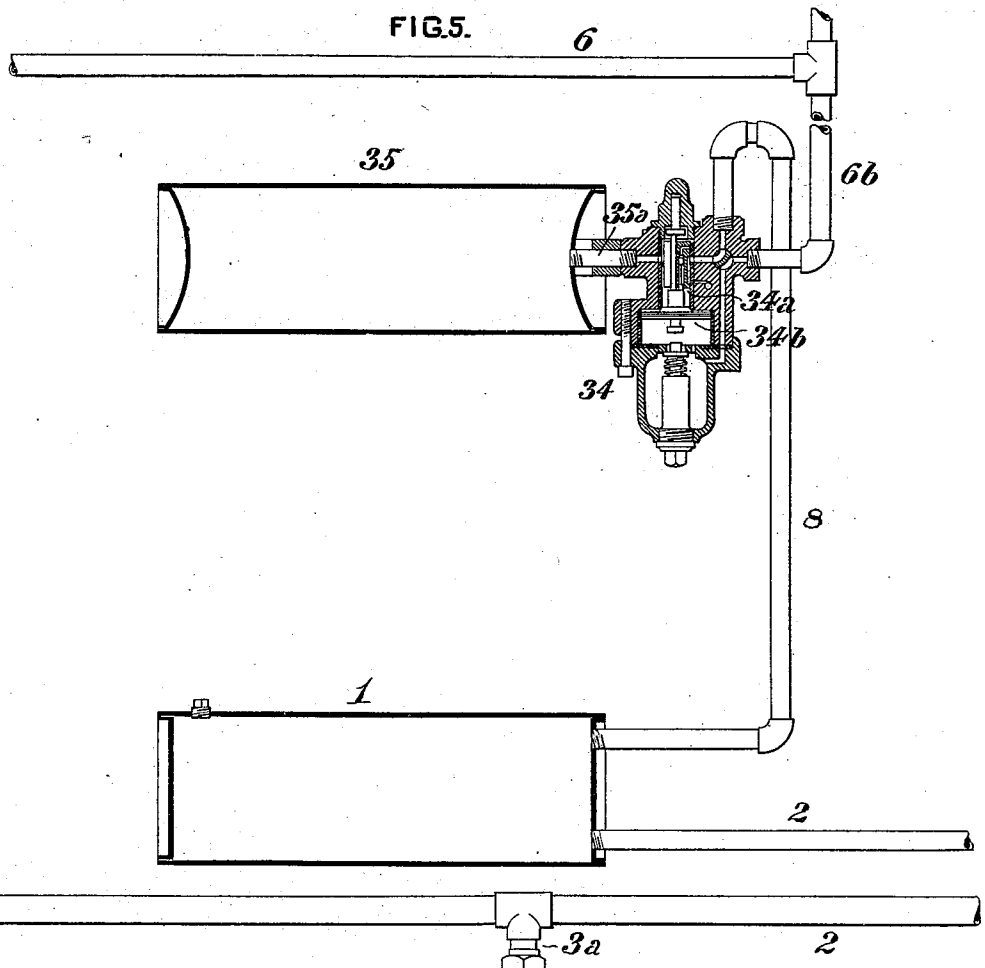


FIG. 6.

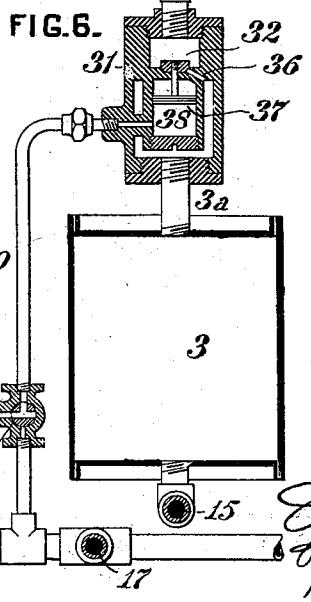
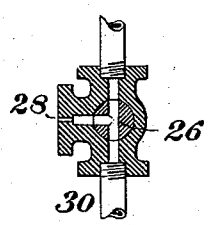


FIG. 7.



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LOCOMOTIVE FIRE-KINDLING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 515,009, dated February 20, 1894.

Application filed September 14, 1893. Serial No. 485,491. (No model.)

To all whom it may concern:

Be it known that I, JAMES McNAUGHTON, of Waukesha, in the county of Waukesha and State of Wisconsin, have invented a certain new and useful Improvement in Locomotive Fire-Kindling Apparatus, of which improvement the following is a specification.

My invention relates to fluid distribution apparatus for kindling locomotive engine fires, of the general class or type set forth in Letters Patent of the United States, Nos. 495,904 and 508,739, granted and issued to me under dates of April 18, 1893, and November 14, 1893, respectively.

The object of my invention is to provide other and further effective and desirable means for the delivery of liquid fuel and air under pressure to any desired point in a system of distribution piping, for kindling a fire in a locomotive engine firebox, and the automatic return of surplus or unused liquid fuel to a reservoir, the system being of such structural and operative character, that no liquid fluid need be stored in or remain in the distribution piping, during the intervals between the operations of the apparatus.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings: Figure 1 is a view, in perspective, of an apparatus for kindling locomotive engine fires, illustrating an application of my invention; Fig. 2, a vertical transverse section through the same, showing its application in kindling a fire in a locomotive engine; Fig. 3, a section taken through a portion of a locomotive engine house, showing, in side elevation, a modified form of the apparatus; Fig. 4, a view, in perspective, showing a further modified form; Fig. 5, a vertical section, on an enlarged scale, through the valvular appliance which controls application and release of fluid pressure to and from the fuel reservoir; Fig. 6, a similar section through one of the release cocks and one of the service reservoirs shown in Fig. 4; and Fig. 7, a similar section through a release cock, when in position for charging a service reservoir.

In the practice of my invention I provide a main or fuel supply reservoir 1, for the reception of the liquid fuel, such as crude petroleum or other fuel oil, which is to be used for kindling, said reservoir being of any desired capacity and being located in, or conveniently adjacent to an engine house, in which locomotives are housed during intervals between trips as for example, set in a pit or cellar or in a suitable fire-proof casing near the engine house. Liquid fuel from the main reservoir 1, is conveyed, by fluid pressure to, and, together with air under pressure, is delivered at, different desired points in the engine house, by a system of distribution piping, the construction and operation of which will now be described.

Referring first to Figs. 1, 2 and 3, a supply pressure pipe 6 leads from any suitable source of fluid pressure, as a reservoir of fluid under pressure, or an air compressor, 6^a, and passes along the engine house, above the several engine stalls and pits, being suspended at a convenient height above the floor. The supply pressure pipe 6 is provided, adjacent to each stall, with an air delivery pipe 17, the discharge end of which is fitted with a coupling or other suitable connection, 25, for a flexible hose, and is controlled by a cock or valve 18. The supply pressure pipe 6 is also connected, by a branch pipe 6^b, with a suitable differential pressure valvular appliance 34, which is, in turn, connected, by a pipe 8, with the main fuel reservoir 1, above the level of the fluid therein. The valvular appliance 34 may be of any suitable construction adapted for automatically controlling the application of fluid pressure to, and the release of pressure from, the liquid fuel in the main reservoir 1, so as to effect the discharge of liquid fuel therefrom and admit of its automatic return thereto, respectively, and the drawings show the valvular appliance 34 in the preferred form of a plain triple valve, of similar construction to, and operating similarly to, the plain triple valves employed in the standard Westinghouse automatic air brake system.

The specific valvular appliance 34 selected for illustration, not being, in and of itself, claimed as of my invention, and its construction and manner of operation being well known to those familiar with the management and use of locomotive engines, it need not,

except as to its operative relation to other members of the apparatus, be herein at length described.

The valvular appliance 34 is connected, by a pipe 35^a, with an auxiliary pressure reservoir 35, and is connected, as before stated, by a pipe 8, with the main fuel reservoir 1, above the level of the fluid therein. The slide valve 34^a, of the valvular appliance 34, in the position which it occupies when the apparatus is not in operation in kindling a fire establishes an open communication between the main fuel reservoir 1 and the atmosphere, through the pipe 8 and the exhaust port of the appliance 34. Communication is also established between the supply pressure pipe 6 and the auxiliary pressure reservoir 35, through the piston chamber of the valvular appliance and a small charging groove which extends past the piston thereof when at the upper end of its stroke. In the position occupied while a fire is being kindled, the piston of the valvular appliance 34 closes communication between the supply pressure pipe 6 and reservoir 35, and the slide valve 34^a closes communication between the reservoir 1 and the atmosphere, and opens communication between said reservoir and the auxiliary pressure reservoir 35, through the pipe 35^a, the appliance 34, and the pipe 8, the change of position of the piston 34^b, and slide valve 34^a, of the appliance, being effected by increase and by reduction respectively, of pressure in the supply pressure pipe 6, as in an automatic air brake apparatus.

A fuel service pipe 2, leads out of the lower portion of the main fuel reservoir 1, and extends along the engine house, and fuel delivery pipes 15 lead from the fuel service pipe 2 adjacent to the several stalls, said delivery pipes having their discharge ends fitted with couplings or other suitable connections 29, for flexible hose, and being controlled by cocks or valves 16. As shown in Fig. 1, the fuel service pipe 2 is suspended above the floor, adjacent to the supply pressure pipe 6, but in order to reduce, as far as practicable, the quantity of oil required to be within the engine house at any time, during the operation of the apparatus, and the number of joints at which leakage may be possible, the alternative arrangement shown in Fig. 3, may be adopted. In such case the fuel service pipe 2 is laid underground, and the fuel delivery pipes 15 extend vertically therefrom to points at a proper distance above the floor level adjacent to the several stalls of the engine house.

Fig. 4 illustrates a modified form of the apparatus in which the supply pressure pipe 6, main fuel reservoir 1, valvular appliance 34, auxiliary pressure reservoir 35, and fuel service pipe 2, are combined and operate as in the instance first described, but in this case, delivery of liquid fuel is made from either of a series of service reservoirs 3, each of such capacity as to contain a supply sufficient for kindling a single fire, as in Letters Patent No. 495,904 aforesaid, instead of from the fuel service pipe 2 as first described. Moreover, the several service reservoirs 3, instead of being and remaining charged with liquid fuel during the intervals between the operations of kindling fires, as in said Letters Patent, are in this case, normally empty, and any determined reservoir of the series, from which it is desired to deliver a proper supply of liquid fuel for kindling a single fire, is first charged therewith, by fluid pressure, and the charge thereafter delivered or discharged from the service reservoir by gravity, the surplus in the pipe 2 being also returned to the main fuel reservoir by gravity.

Each of the service reservoirs 3, is connected at top, by a pipe 3^a, with the fuel service pipe 2, and a fuel delivery pipe 15, leads from its lower end, the discharge end of said pipe being provided with a coupling or other suitable hose connection 29, and being controlled by a valve 16. A valve casing or chest 31 is interposed between each of the service reservoirs 3 and the fuel service pipe 2, being connected, at top and bottom, to sections of the pipe 3^a, and communication between the pipe 2 and reservoir 3, through the valve casing 31, is opened and closed as required, by a feed valve 32, controlling a port 36, in a partition in said valve casing. The valve 32 has a piston 37, formed upon or fixed to its lower side, said piston working in a chamber 38, which communicates, by a pipe 30, with the supply pressure pipe 6. The pipe 30 is controlled by a release cock 26, of the three way type, which, in one position, as in Fig. 6, closes communication between the chamber 38 and supply pressure pipe 6, and in another, as in Fig. 7, opens communication between said chamber and pipe, and also between the pipe 6 and a release port 28, of smaller diameter than said pipe, and leading therefrom to the atmosphere.

In the operation of the apparatus, as shown in Figs. 1, 2 and 3, the main reservoir 1 having been charged with the fuel oil which is to be used, a suitable quantity of coal, in practice about four hundred pounds, is placed upon the grate of the engine in which a fire is to be kindled. Flexible hose sections, 21 and 22, are coupled, respectively, to the fuel delivery pipe 15 and the air delivery pipe 17, adjacent to the engine, and are connected, at their opposite ends, to a pipe 23, having, upon its outer end, a burner or mixer 24, of any suitable and preferred construction, which is passed into the firebox of the engine and placed adjacent to the coal therein. The valve 18 (which in this case acts as a release cock, and obviates the necessity for a separate or special release cock) is then opened, thereby effecting a reduction of pressure in the supply pressure pipe 6, and on the lower side of the piston 34^b of the valvular appliance 34, which piston will consequently be automatically moved downward by the then

higher pressure in the auxiliary pressure reservoir 35, carrying with it the slide valve 34[a] of the valvular appliance, which closes communication between the main fuel reservoir 1 and the atmosphere, and opens communication between said reservoir 1 and the auxiliary pressure reservoir 35. The pressure in said auxiliary pressure reservoir, acting upon the liquid fuel in the reservoir 1, forces it therefrom, through the fuel service pipe 2 and fuel delivery pipe 17, and out at the opening of the burner or mixer 24, air under pressure being coincidently delivered to the burner from the supply pressure pipe 6, through the flexible hose 22. A spray of mingled fuel oil and air is thereby forced out of the opening of the burner or mixer 24, and, being ignited, its flame is projected downwardly upon the coal in the firebox of the engine. The combustion at the burner openings is continued for about ten minutes or less, after which the fire will be found to be fully ignited, and the burner or mixer can be withdrawn from the firebox.

After the fire has been kindled, the valves 16 and 18 of the fuel and air delivery pipes, are closed, the closure of the valve 18 restoring the air pressure in the supply pressure pipe to its normal degree. The piston 34[b] of the valvular appliance 34, is thereupon automatically moved upward by the then greater pressure below it, carrying with it the slide valve 34[a], which then closes communication between the auxiliary pressure reservoir 35 and the main fuel reservoir 1, and opens communication between the reservoir 1 and the atmosphere. The pressure on the liquid fuel in the reservoir 1 being thereby released, the surplus liquid in the fuel service pipe 2 and fuel delivery pipe 15 drains back, by gravity, to the reservoir, thus completely freeing the system of piping in the engine house from liquid fuel, until it is desired to kindle another fire. The hose sections 21 and 22 with the attached burner 24, are disconnected and removed, in readiness for use in the next kindling operation that may be desired.

The operation of the modified form of the apparatus shown in Figs. 4, 6, and 7, is similar to that above described, except as to the charging and the discharge of the service reservoirs, as will now be explained. The firebox of the engine having been charged with coal, and the hose sections 21 and 22 coupled to the fuel delivery pipe 15, and air delivery pipe 17, adjacent to the engine, the operator turns the release cock 26 into the position shown in Fig. 7, thereby exhausting sufficient air from the supply pressure pipe 6 to reduce the pressure therein below that in the auxiliary pressure reservoir 35, whereupon the valvular appliance 34 automatically operates, as before described, to close communication between the main fuel reservoir 1 and the atmosphere, and to open communication between said reservoir 1 and the auxiliary pressure reservoir 35. The pressure in said auxiliary pressure reservoir, then acting upon the liquid fuel in the reservoir 1, forces it therefrom through the fuel service pipe 2, and pipe 3[a], into the valve casing 31 of the feed valve 32 which communicates with the release cock 26 that has been actuated. Coincidently with the opening of communication between the fuel reservoir 1 and the auxiliary pressure reservoir 35, the feed valve 32 will be raised from its seat, and will open the port 36, by the back pressure in the chamber 38, acting on its piston 37, such back pressure being due to the small diameter of the release port 28 relatively to the pipe 6, and will be held unseated to charge the service reservoir, so long as the release cock is kept in the position shown Fig. 7. As soon as the service reservoir is charged, the release cock 26 is turned into the position shown in Fig. 6, whereupon the valve 32 is immediately seated, cutting off communication between the fuel service pipe 2 and the service reservoir 3. The pressure in the supply pressure pipe 6 is coincidently restored to its normal degree, and the valvular appliance 34 automatically operates, as before described, to close communication between the auxiliary pressure reservoir 35 and the main fuel reservoir 1, and to open communication between said reservoir 1 and the atmosphere. The pressure on the liquid fuel in the reservoir 1 being thereby released, the surplus liquid in the fuel service pipe 2 drains back, by gravity, to the reservoir. The valves 16 and 18, of the fuel and air delivery pipes, being opened, the liquid fuel in the reservoir is discharged therefrom, by gravity, to the burner 24, and there combines with the jet of air under pressure delivered from the supply pressure pipe 6 through the hose 22, thus forming a spray of mingled liquid fuel and air, which is forced, by the pressure in the pipe 6, out of the burner, and being ignited, its flame is projected downwardly upon the coal in the firebox of the engine. Upon the exhaustion of the supply of fuel from the service reservoir 3, the fire will be found to be fully ignited, and the burner is withdrawn from the firebox, the cocks 16 and 18 closed, and the hose sections and burner disconnected and removed for use at another stall when required.

While I have illustrated, as a preferable construction, a system in which pressure for discharging fluid fuel from the main fuel reservoir is admitted thereto from an auxiliary pressure reservoir, it will be obvious that such auxiliary pressure reservoir is not an essential of my invention, and a construction in which discharging pressure is admitted directly to the main fuel reservoir from the supply pressure pipe or other suitable source of supply by a reduction of pressure in the supply pipe, I include in my invention as the equivalent of that specifically shown and described.

The leading and characteristic feature of my invention is the provision of a distribution system requiring only two main lines of

piping, in which, by variations of fluid pressure effected at or near any desired location of delivery, liquid fuel is automatically supplied to a burner adjacent to such location, and the automatic and complete return of any surplus liquid fuel to a storage reservoir is effected at the conclusion of each operation of the system.

I claim as my invention and desire to secure by Letters Patent—

1. The combination, in a fluid distribution apparatus for kindling locomotive engine fires, of a main fuel reservoir, a fuel service pipe leading therefrom, a supply pressure pipe leading from a source of fluid pressure supply to the fuel reservoir, and means for opening communication between the main fuel reservoir and a source of fluid pressure, in and by a reduction of pressure in the supply pressure pipe, substantially as set forth.

2. The combination in a fluid distribution apparatus for kindling locomotive engine fires, of a main fuel reservoir, a fuel service pipe leading therefrom, a supply pressure pipe leading from a source of fluid pressure supply to the fuel reservoir, and a differential pressure device interposed between the supply pressure pipe and main fuel reservoir, which automatically effects the discharge of fluid from said main fuel reservoir into and through the fuel service pipe, in and by the reduction of pressure in the supply pressure pipe, substantially as set forth.

3. The combination, in a fluid distribution apparatus for kindling locomotive engine fires, of a main fuel reservoir, a fuel service pipe leading therefrom, a supply pressure pipe leading from a source of fluid pressure supply to the fuel reservoir, and a differential pressure device, interposed between the supply pressure pipe and main fuel reservoir, which automatically effects the discharge of fluid from said main fuel reservoir into and through the fuel service pipe, and the return of fluid from said pipe to said reservoir, in and by the reduction and the restoration, respectively, of pressure in the supply pressure pipe, substantially as set forth.

4. The combination, in a fluid distribution apparatus for kindling locomotive engine fires, of a main fuel reservoir, a supply pressure pipe leading thereto from a source of fluid pressure supply, a valvular appliance interposed between the supply pressure pipe and fuel reservoir and controlling the application and release of fluid pressure to and from the interior of the fuel reservoir, by variations of pressure in the supply pressure pipe, a fuel service pipe leading from the fuel reservoir, a delivery connection for discharge from the fuel service pipe, and a release cock or valve controlling an opening for discharge from the supply pressure pipe, substantially as set forth.

5. The combination, in a fluid distribution apparatus for kindling locomotive engine fires, of a main fuel reservoir, a supply pressure pipe leading thereto from a source of fluid pressure supply, a valvular appliance interposed between the supply pressure pipe and fuel reservoir and controlling the application and release of fluid pressure to and from the interior of the fuel reservoir by variations of pressure in the supply pressure pipe, a fuel service pipe leading from the fuel reservoir, a series of valved delivery connections for discharge from the fuel service pipe at any one of a series of points in its length, and a series of release cocks or valves, each controlling an opening for discharge from the supply pressure pipe adjacent to one of the delivery connections of the fluid service pipe, substantially as set forth.

6. The combination, in a fluid distribution apparatus for kindling locomotive engine fires, of a main fuel reservoir a supply pressure pipe leading thereto from a source of fluid pressure supply, an auxiliary pressure reservoir, a valvular appliance, as a triple valve, controlling communication between the supply pressure pipe and auxiliary pressure reservoir, between the auxiliary pressure reservoir and the main fuel reservoir, and between the main fuel reservoir and the atmosphere, a fuel service pipe leading from the fuel reservoir, a delivery connection for discharge from the fuel service pipe, and a relief cock or valve, which controls an opening through which fluid under pressure may be discharged from the supply pressure pipe to automatically actuate the valvular appliance in direction to impart pressure to the fluid in the main fuel reservoir, and by the closure of which pressure is restored in the supply pressure pipe to automatically actuate the valvular appliance in direction to release pressure from the fluid in the main fuel reservoir, substantially as set forth.

7. The combination, in a fluid distribution apparatus for kindling locomotive engine fires, of a main fuel reservoir, a fuel service pipe leading therefrom, a supply pressure pipe, leading from a source of fluid pressure supply to the main fuel reservoir, a service fuel reservoir, means for simultaneously opening communication between the fuel service pipe and the service fuel reservoir, and between the main fuel reservoir and the source of fluid pressure and a delivery connection leading from the service fuel reservoir, substantially as set forth.

8. The combination, in a fluid distribution apparatus for kindling locomotive engine fires, of a main fuel reservoir, a fuel service pipe leading therefrom, a supply pressure pipe, leading from a source of fluid pressure supply to the main fuel reservoir, a valve device for controlling the supply of fluid from the source of fluid pressure supply to the main fuel reservoir and also to a valve device for opening communication from the fuel service pipe to a service fuel reservoir and a delivery connection leading from the service fuel reservoir, substantially as set forth.

9. The combination, in a fluid distribution apparatus, for kindling locomotive engine fires, of a main fuel reservoir, a fuel service pipe leading therefrom, a supply pressure pipe leading from a source of fluid pressure supply to the main fuel reservoir, a service fuel reservoir a delivery connection leading therefrom, a valve controlled communication between the fuel service pipe and service fuel reservoir, and a valvular appliance, interposed between the supply pressure pipe and main fuel reservoir, which automatically effects the discharge of fluid from said main fuel reservoir into and through the fuel service pipe, and the coincident opening of communication between said fuel service pipe and the service fuel reservoir, in and by a reduction of pressure in the supply pressure pipe, and which closes communication between the fuel service pipe and service fuel reservoir, and coincidently effects the return of fluid from the fuel service pipe to the main fuel reservoir, in and by a restoration of pressure in the supply pressure pipe, substantially as set forth.

10. The combination, in a fluid distribution apparatus for kindling locomotive engine fires, of a main fuel reservoir, a supply pressure pipe leading from a source of fluid pressure supply to the main fuel reservoir, a valvular appliance controlling the application and release of fluid pressure to and from the interior of the fuel reservoir, by variations of pressure in the main supply pressure pipe, a fuel service pipe leading from the fuel reservoir, a delivery connection leading therefrom a service fuel reservoir, a feed valve controlling communication between the fuel service pipe and service fuel reservoir, and a release cock which coincidently controls a discharge passage from the supply pressure pipe, for reducing and restoring, respectively, the pressure therein, and a passage through which, while open, pressure from said pipe effects and maintains the unseating of the feed valve, substantially as set forth.

11. The combination, in a fluid distribution apparatus for kindling locomotive engine fires, of a main fuel reservoir, a supply pressure pipe leading from a source of fluid pressure supply to the main fuel reservoir, a valvular appliance controlling the application and release of fluid pressure to and from the interior of the main fuel reservoir by variations of pressure in the supply pressure pipe, a fuel service pipe leading from the fuel reservoir, a delivery connection leading therefrom, a service fuel reservoir, a feed valve controlling communication between the fuel service pipe and service fuel reservoir, and a release cock which coincidently controls communication between the supply pressure pipe, and the atmosphere, and between the supply pressure pipe and a pressure device for unseating the feed valve, substantially as set forth.

12. The combination, in a fluid distribution apparatus for kindling locomotive engine fires, of a main fuel reservoir, a supply pressure pipe leading from a source of fluid pressure supply to the main fuel reservoir, a valvular appliance controlling the application and release of fluid pressure to and from the interior of the main fuel reservoir by variations of pressure in the supply pressure pipe, a fuel service pipe leading from the fuel reservoir, a series of service fuel reservoirs connected to the fuel service pipe at different points in its length, and each provided with a valved delivery connection, a series of feed valves, each controlling communication between the fuel service pipe and one of the service fuel reservoirs, and a series of release cocks, each located adjacent to one of the fuel service reservoirs and coincidently controlling communication between the supply pressure pipe and the atmosphere, and between the supply pressure pipe and a pressure device for unseating the feed valve of the adjacent service reservoir, substantially as set forth.

13. The combination, in a fluid distribution apparatus for kindling locomotive engine fires, of a main fuel reservoir, a fuel service pipe leading therefrom, a delivery connection leading from the fuel service pipe, a supply pressure pipe leading from a source of fluid pressure supply to the main fuel reservoir, and a differential pressure device which cuts off the discharge from the supply pressure pipe and controls the release of pressure from the main fuel reservoir, substantially as set forth.

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