

March 23, 1937.

J. W. POULTER

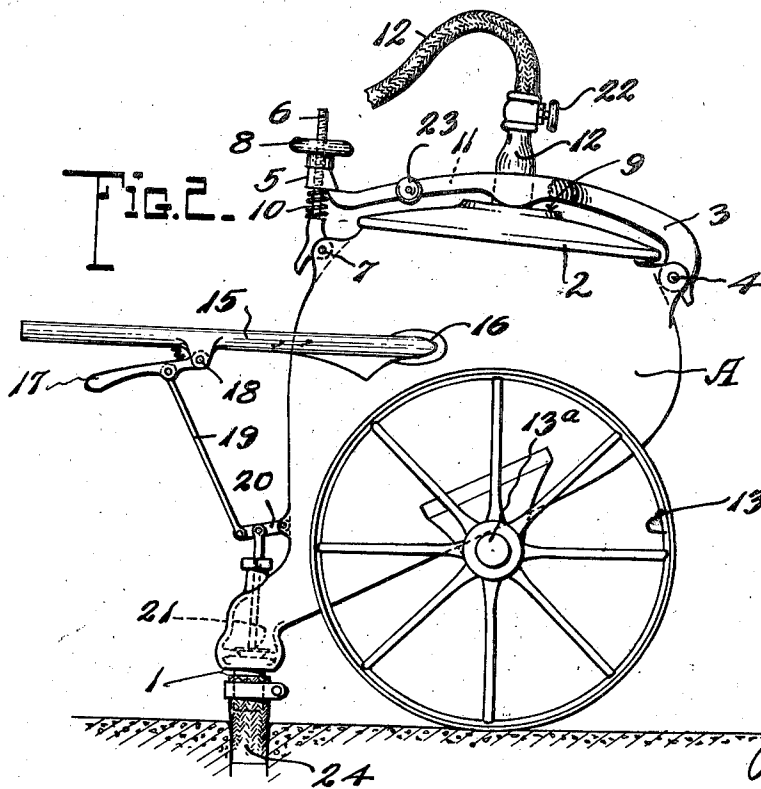
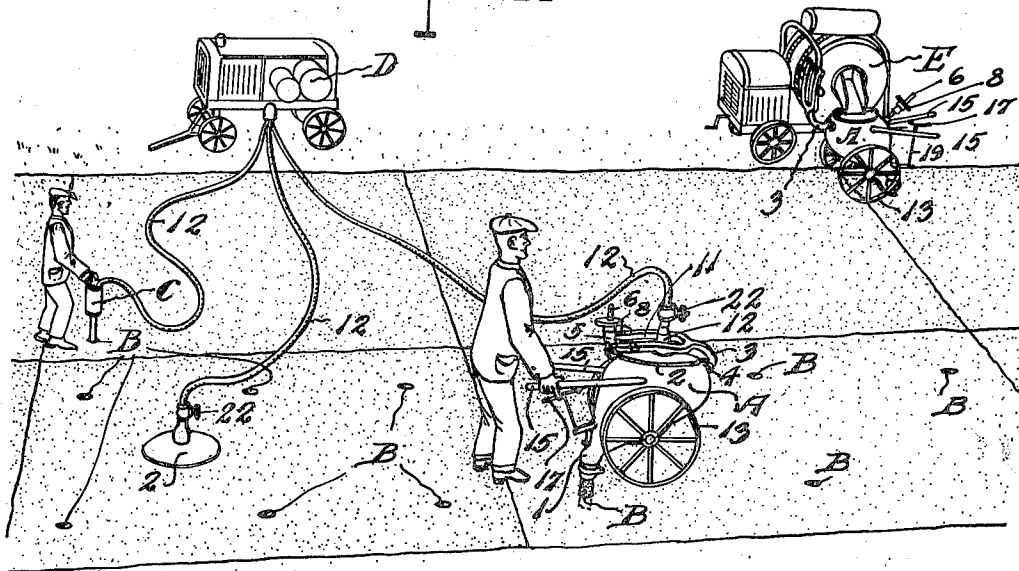
2,074,756

FLUID PLACING AND PAVEMENT RAISING APPARATUS

Original Filed Dec. 1, 1933

3 Sheets-Sheet 1

FIG. 1.



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3 Sheets-Sheet 2

Fig. 5.

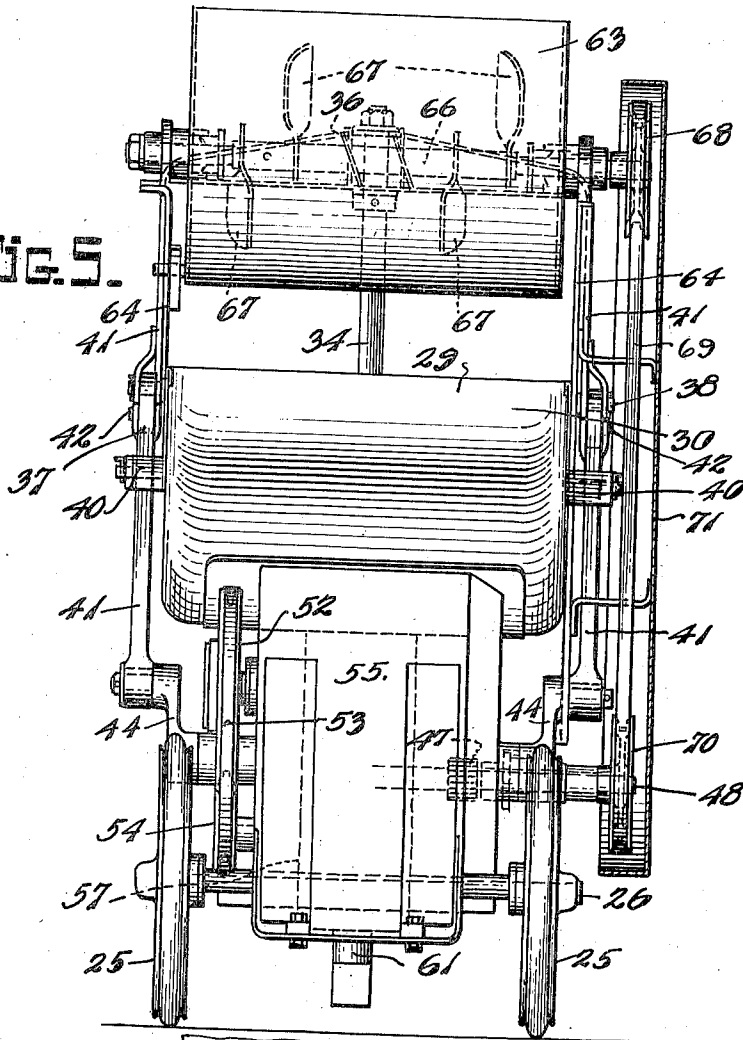
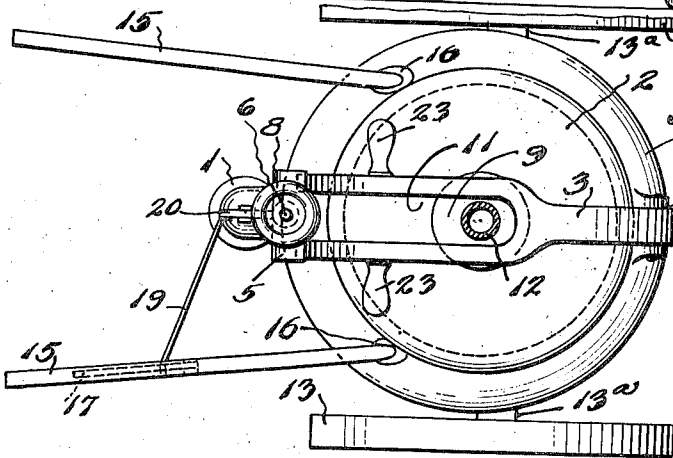


Fig. 3.



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UNITED STATES PATENT OFFICE

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FLUID PLACING AND PAVEMENT RAISING
APPARATUSJohn W. Poulter, Milwaukee, Wis., assignor to
National Equipment Corporation, Milwaukee,
Wis., a corporationApplication December 1, 1933, Serial No. 700,561
Renewed January 13, 1937

15 Claims. (Cl. 94—39)

The present invention relates to improvements in pavement raising and void filling apparatus and has for one of its objects to provide a small compact and readily portable machine which may be placed over the slab to be raised, the machine having a fluid injection nozzle carried thereby which may be positioned into the fluid receiving opening in the pavement incident to the location of the apparatus on the pavement. This arrangement dispenses with the use of a long fluid hose and its corresponding disadvantages, such as the skin friction created due to the passage of the fluid therethrough, and the additional power necessary to operate a machine so equipped.

The present invention is most useful in requiring and raising small work, such as side walks, curb depressions, and filling small voids under the same, and primarily it contemplates the use of a wheeled receptacle of somewhat small capacity and size so that it may be readily loaded with a suitable mobile filler composition such as a mud fluid as now is well known in this art, and rolled like a wheel barrow to the place of injection by a single operator or workman.

The receptacle is tiltable and primarily designed to be filled from some source of supply such as a suitable mixer apparatus and after the same has been properly positioned on the work, the short mud fluid injection nozzle directly carried by the apparatus, is inserted into the fluid receiving opening in the pavement as an incident to a tilting movement of the receptacle.

One form of my invention contemplates a machine or apparatus having an open receptacle somewhat of the wheel barrow type, and having preferably a self-contained pumping means (somewhat of the same general type as disclosed in my copending application Serial No. 542,153, filed June 4, 1931), which means may be driven by any suitable means such as a small light gas motor or engine.

It is contemplated in this form of the invention that a tiltable mixing unit may be mounted above the receptacle to receive and mix the aggregates forming the mud fluid and then be tilted to dump the mix directly into the receptacle.

In this way a minimum amount of time only will elapse before the actual injection into voids or openings, thus reducing any tendency of the mud fluid or cement to set before injection.

In another form of my invention I contemplate the use of a small wheeled receptacle or container of a somewhat conical form having a removable fluid-tight cover, to which is connected

an air or fluid pressure hose which leads to a suitable pressure source.

In this form of the invention the cover is removed after which the receptacle is suitably filled with the mud fluid which has already been mixed. The cover is replaced and the mud fluid injection nozzle forming an extension of the receptacle is positioned and lowered into the opening in the pavement as in the other form of my invention. The pressure is introduced into the container or receptacle above the mud fluid level therein and the ejection through the nozzle is controlled by a manually controlled valve.

An important object of the invention in each form thereof is to arrange the elements so that the entire unit by reason of its weight will tend to maintain the ejector nozzle seated firmly in the hole in the pavement through which the mud fluid filler is forced beneath the thing to be elevated or moved.

Other and further objects and advantages of the invention will be hereinafter set forth and the novel features thereof defined by the appended claims.

In the drawings:

Figure 1 is a perspective view disclosing one form of my invention and the method of using the same;

Figure 2 is a side elevation of the form of my invention disclosed in Figure 1;

Fig. 3 is a top plan view of the form shown in Figs. 1 and 2;

Fig. 4 is a side elevation of another form of my invention disclosing my mobile fluid mixing hopper attached in place thereon, parts being broken away and shown in section;

Fig. 5 is a front or end view of the invention disclosed in Fig. 4; and

Fig. 6 is a fragmentary detail view taken approximately on the line 6—6 of Fig. 4.

Fig. 7 is a sectional view of the combined nozzle and support, a modification of the invention.

Like reference characters designate corresponding parts in the several figures of the drawings.

Referring more specifically to Figs. 1, 2, and 3 A denotes a receptacle or container for introducing the mobile or mud fluid into the openings B which have been previously prepared by suitable air operated hammers or drills C operated from a compressor D. This compressor is also utilized for supplying air pressure to the container A to force the mobile fluid therefrom through the openings B and into the voids under the pavement, or for elevating the pavement as the case

may be. The container A may be charged with the mobile fluid which has been previously mixed by any suitable mixing apparatus such as a concrete mixer which is illustrated at E, in Fig. 1.

Referring more particularly to Fig. 2 the container A is somewhat frusto-conical and is provided at its lowest extremity with a discharge nozzle 1. The upper portion of the container tapers inwardly and is closed by a removable cover or lid 2 held in place by the cover retaining arm 3. This retaining arm is pivoted at one end to the container as indicated at 4 while the other extremity of the arm is designed to engage a detent or latch member 5 mounted on a pivoted rod 6. The rod 6 is pivoted to the container A at 7 and has threaded thereon the clamping hand-wheel 3 for forcing the cover retaining arm into engagement with the flat surface 9 on the cover 2 and thus causing the same to tightly seal the opening in the top of the container A.

A coil spring 10 is disposed on the rod 6 below the detent 5 to force the detent upwardly upon rotation of the clamping wheel 3 in one direction in order to release the cover retaining arm 3. The cover retaining arm is bifurcated at 11 to receive the pressure supply line 12 for introducing air pressure into the container A above the level of the mobile fluid contained therein. The container A is carried by a wheeled support 13 having its axis 13a located under the container so that the weight of the apparatus tends to hold the discharge nozzle 1 firmly in the opening in the pavement or structure to be moved.

Handle members 15 are attached to the container or receptacle at 16 so that the operator may readily move the apparatus as desired. One of these handle members is provided with a valve control lever 17 pivoted at 18 which is designed through the linkage 19 and lever 20 to operate a valve member 21 located in the discharge nozzle 1.

The air or pressure supply line 12 is provided with a shut-off valve 22 for interrupting the flow of air from the compressor D to the receptacle A. In the operation of this form of the apparatus the shut-off valve 22 is first closed, the clamping wheel 3 is screwed upwardly on the rod 6 after which this rod may be swung on its pivot 7 to disengage the cover retaining arm 3. The operator then grasps the handles 23 and swings the cover retaining arm on its pivot 4 upwardly and away from the cover 2. The cover may then be removed from the container and the container wheeled to a position under the discharge chute of the fluid mixing apparatus E and refilled, after which the container is returned to position adjacent to the openings into which it is desired to inject the mobile fluid and after the cover has been replaced and the clamping arm restored to its clamping position under the detent 5 and the clamping wheel 3 is screwed down in proper position, the shut-off valve may then be opened and the apparatus is again ready for use.

It should be observed that the discharge nozzle 1 is located at one side of the pivotal or rocking center of the receptacle so that upon tilting of the receptacle the nozzle will move in a vertical plane. Once the nozzle is located substantially over one of the openings B the operator by depressing the handles 15 will cause the short flexible discharge hose 24 forming a part of the nozzle 1 to be introduced into the opening B. By operating the valve control lever 17 the valve 21 is raised allowing the mobile or mud fluid to be injected under pressure through the opening B

and thereby fill the voids beneath the pavement or actually raise the pavement if this is desired.

In Fig. 1 of the drawings one of the mud fluid injection apparatuses is disclosed in operative position with its discharge nozzle projecting into an opening B while the other apparatus is disclosed with its cover removed and being filled or charged by the fluid mixing apparatus E.

Referring now to the second form of my invention as disclosed in Figs. 4 to 6, I provide a wheeled support 25, the axis of which is indicated at 26 and constitutes a tilting support for the apparatus proper. This wheeled support 25 carries a frame 27 on which is mounted an elongated somewhat rectangular container or receptacle 28 which is somewhat similar to a wheel barrow receptacle and comprises a shallow end 29 and a relatively deep end 30 on which is located the pumping apparatus 31. This pumping apparatus is somewhat similar to that disclosed in my copending application, aforementioned, and comprises a piston member 32 provided with a discharge opening and valve seat 33 through which the mobile fluid is designed to pass on the upward stroke of the piston.

The piston member is slidably mounted on the piston rod 34 which rod is provided with a valve 35 designed to cooperate with the valve seat in the piston member on the downward stroke of the rod 34. In order to reciprocate the piston operating rod 34 I preferably provide a cross-head 36 attached to the end of the rod and extending downwardly on opposite sides of the container 28. Levers 37 are pivotally secured at 38 to the free ends of the cross-head 36 while the other ends of the levers are secured at 39 to brackets 40 projecting from the receptacle 28. Connecting links 41 are pivotally connected intermediate the ends of the levers 37 at 42 while the other ends of the connecting links 41 are pivoted at 43 to the operating cranks 44. These cranks are secured to a shaft 45 having fixed thereto the gear wheel 46 meshing with the smaller gear 47 journaled on the second shaft 48. This shaft 48 has affixed thereto a large gear 49 which meshes with a small gear 50 located on the clutch shaft 51 which is driven through a suitable clutch from the pulley wheel 52. This pulley wheel is in turn driven through the belt 53 and pulley 54 by any suitable power source such as the gas engine 55. A clutch lever 56 is provided for shifting the clutch to establish driving relation between the pulley wheel 52 and the shaft 51.

The pumping apparatus 31 including a pump cylinder 57 suitably secured to the receptacle 28 by bolts 58 and has disposed in its lower portion a float check valve 59 in the form of a hollow ball. A spider 60 is disposed below the ball to support the same in spaced relation to the discharge nozzle 61 located on the bottom of the cylinder 57.

With the form just described the apparatus is designed to be used somewhat similar to the form shown in Figs. 1 to 3 of the drawings. The device being somewhat small in size and capacity and slightly over balanced on the wheeled support 25 the operator may readily wheel the same under the discharge chute of the fluid mixing device and after the receptacle 28 has been filled with the mobile or mud fluid the operator can with little effort roll the apparatus and by tilting or lowering of the handles 62 the discharge nozzle can easily be inserted directly into the prepared openings in the pavement. The clutch lever 56 is then moved to cause reciprocation of the pump

piston and thus forcibly inject the fluid through the opening and under the pavement. Operation can be discontinued when desired by shifting of the clutch lever in the opposite direction.

5 Figs. 4 to 6 disclose what I term as a mixing unit attachment applied to my container. This mixing unit is generally indicated at F and comprises a mixing hopper 63 which is suitably journaled for tilting movement on the brackets 64 depending therefrom and bolted or otherwise secured at 65 to the receptacle 28. The brackets 64 also support a shaft 66 extending through the hopper 63 and having fixed thereon mixing blades 67. The shaft 66 carries at one end there- 10 of a pulley 68 which is in turn driven by the belt 69 from a lower pulley 70 removably secured to the second shaft 48. If desired a suitable guard or shield 71 may be secured over the pulley 68, 70 and belt 69.

20 The mixing hopper 63 is preferably provided with a projection 72 designed to engage a spring detent 73 secured to one of the brackets 64, for preventing accidental tilting.

With the mixing unit supported in position 25 over the receptacle 28 as disclosed in Fig. 4 the apparatus is substantially self-contained in that the aggregates and liquid making up the mobile or mud fluid are introduced into the mixing hopper 63 and mixed therein while the mobile fluid is 30 being pumped from the container 28 by the pumping apparatus 57. After the supply in the container has been substantially exhausted the operator will cause the mixing hopper 63 to be tilted in the direction of the arrow in Fig. 4 and 35 dump the material directly into the container 28. The hopper may then be returned and refilled.

As shown in Fig. 7 I may employ a special form of nozzle similar to those previously described 40 herein, but specifically comprising a pipe section 75 providing a rigid leg member, said pipe section being surrounded by a flexible nozzle section 76 of hose material clamped to the pipe section by clamp means 77. The pipe section or leg member 45 75 is cut away at one side, as shown at 75a, whereby the lower end portion of the flexible section 76 may be more readily inserted into the opening in the pavement or structure that is to be moved. When the cementitious or mud filler 50 passes through the nozzle means just described, it tends to expand the flexible hose section 76 in the opening through which the nozzle will discharge, provided in the pavement or other structure, and this expansion will cause sufficient friction between the nozzle part 75-76 and the walls 55 of the opening to readily hold the nozzle device in place.

By providing the rigid nozzle section 75 in the manner described, this member may form a leg 60 support for the apparatus, acting as a rest when the operator releases the handles 15 or 62, as the case may be, of lifting force. It is the intention that the weight of the apparatus according to this invention may be availed of to effectively 65 hold or maintain the nozzle means of my apparatus firmly inserted and tightly engaged with the walls of the opening in the structure or pavement with which the nozzle means cooperates for the ejection or discharge of the fluid filler beneath said structure.

70 The fluid filler may, of course, be a cementitious material such as heretofore proposed in the art, which will harden after being discharged and forced beneath the structure to be moved, the 75 hardening causing a setting up of material to

maintain said structure in its moved position. Of course, however, the invention is useful in 5 emplacing filler substances, of fluid nature, in voids beneath or at a side of structures, irrespective of whether sufficient pressure is applied to move such structure.

While the specific details of construction have been herein shown and described, the invention is not confined thereto as alterations may be 10 made without departing from the spirit thereof as defined by the appended claims.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a pavement raising apparatus of the type 15 wherein a mobile fluid is forced beneath the pavement through an opening in the pavement, a wheeled support, a mobile fluid receiving container pivotally carried by said support, and fluid injection means for injecting the mobile fluid 20 into an opening in a pavement, said injection means being formed on said container, said injection means having its longitudinal axis disposed for vertical insertion and withdrawal movements relatively to the pavement opening 25 incident to pivotal movement of the container on the support.

2. In fluid pumping apparatus of the class described, a wheeled support, a fluid receiving container rockably carried by said support, fluid 30 ejection means for said container, and a short vertical discharge nozzle on said container at one side of the rocking center of the container, arranged for shifting movement selectively disposing the lower end of the nozzle above or below 35 the surface on which the wheeled support normally rests, incident to rocking of the container.

3. In an apparatus of the class described, a two-wheeled support, a mobile fluid receiving receptacle and pumping apparatus partly over balanced on said wheeled support and having a mobile fluid delivery nozzle disposed at one side of the wheeled support, manually operable means for controlling the delivery of fluid through said 40 nozzle by said pumping apparatus, a mixing unit supported above the receptacle to discharge 45 thereinto, and means to operate said mixing unit under the control of said manually operable means.

4. In a pavement raising and void filling apparatus of the class described, a two-wheeled support having a transverse axis, a shallow open receptacle disposed on said support and rockable about the axis of said support and having a deep end and a shallow end, a fluid pump-cylinder at 50 the deep end of said receptacle having a valved piston operable therein, a piston rod for operating said valve and piston, a cross-head on said rod, operating levers connected to said cross-head and having their ends pivotally secured to the 55 sides of the receptacle, operating links pivoted to said levers intermediate the ends thereof, means to reciprocate said links comprising a suitable power source, gearing driven therefrom, operating cranks driven by said gearing and connecting the lower ends of said links, a check valve in 60 said cylinder, a fluid injected nozzle on said cylinder for introducing the mobile fluid through an opening in a pavement to raise the same or fill voids thereunder and movable vertically by rocking of the receptacle. 65 70

5. In fluid injection apparatus for raising sunken pavements and filling voids a wheeled support, a shallow pan-shaped receptacle tiltably carried by said support having one end thereof 75

extending to one side of said support, pumping means disposed on said receptacle at said end, power means carried by the support for operating said pumping means, and fluid injection means on said pumping means arranged for insertion in an opening in a sidewalk upon tilting of the receptacle in one direction.

6. In fluid pumping apparatus of the class described, a wheeled support, an open receptacle tiltably carried by said wheeled support having one end extending materially to one side of the wheeled support, pumping means in the aforesaid end of the receptacle, means to operate said pumping means, a fluid injection nozzle adjacent the pumping means to receive the material pumped from said receptacle and inject the same, and mixing means operable from said pump operating means supported by the receptacle above the same and dischargeable into said receptacle.

7. In apparatus of the class described, a wheeled support, a pan-shaped receptacle tiltably mounted above said support having one end extending to one side of said support, pumping means disposed on the aforesaid end, power means on said wheeled support for operating said pumping means and disposed at the other side of the support to partially balance the receptacle and its contents on said support, and a discharge nozzle extending from said pumping means and seated by the weight of the apparatus.

8. In apparatus of the class described, a wheeled support, a pan-shaped receptacle tiltably mounted above said support having one end extending to one side of said support, pumping means disposed on the aforesaid end, power means on said wheeled support for operating said pumping means and disposed at the other side of the support to partially balance the receptacle and its contents on said support, a discharge nozzle extending from said pumping means, and a mixing unit mounted on said receptacle substantially over said support and dischargeable directly into said receptacle.

9. In apparatus of the class described, a two-wheeled support, an elongated pan-shaped receptacle tiltably mounted on the support above the same and having one end extending to one side of said support, pumping means on the aforesaid end, power means on said wheeled support for operating said pumping means, and disposed at the other side of said support, a discharge nozzle extending from said pumping means, a trough-shaped tiltable mixing receptacle mounted above said receptacle substantially over said two-wheeled support having its tilting axis disposed transversely of said elongated receptacle and directly dischargeable thereinto, mixing means in said receptacle operable from said power means, and means for retaining said receptacle in non-discharging position.

10. In an apparatus of the class described, a wheeled support, a tiltable mobile fluid receiving container mounted on said support, a closure member for said container having a fluid pressure inlet therein, clamp means for said closure member, a shut-off valve in said inlet, a discharge nozzle formed on said container at one side thereof for discharging the contents thereof into an opening in a sidewalk or the like, and a handle member for tilting said container to raise or lower said nozzle and constituting means for inserting

the nozzle into and withdrawing the same from the opening.

11. In pavement elevating apparatus, a two-wheeled support having an axle, a hopper shaped container supported above said axle between the wheels, said container having a discharge extension formed on the lower portion thereof at one side of a vertical plane passing through said axle so that rocking of the container on said axle effects a raising and lowering of the discharge extension respectively above and below the surface on which the two-wheeled support normally rests, a valve in said extension, a fluid-tight cover for the top of said container, means for admitting air pressure or the like through said cover to the interior of the container, means for removably securing said cover on the container in sealing relation, a handle for tilting said container and manually operable means for operating said valve to control the passage of a pavement elevation fluid from said container.

12. In apparatus of the class described, a support, a mobile fluid receiving container mounted in over-balanced position thereon, mechanism for causing discharge of the mobile fluid received in said container, a nozzle carried by said container, the longitudinal axis of which is arranged vertically so that the weight of the container will maintain said nozzle mouth engaged with a structure to or through which the mobile fluid is to be discharged and arranged for vertical insertion into an opening in said structure.

13. In apparatus of the class described, a support, a filler fluid receiving container mounted on the support, and a nozzle device carried by said container, said nozzle device comprising a vertical rigid pipe section, the end of which forms a rest to hold the support at a position of rest, said nozzle device when said support is in such position presenting its mouth to the surface on which it rests and also comprising an expansible hose section surrounding said pipe section and constructed and arranged to conduct filler fluid from the container to the structure which is supplied with said fluid by the apparatus and to hold the nozzle while supplying the filler.

14. In apparatus of the class described, a support, a filler fluid receiving container mounted on said support, a nozzle device carried by said container, said nozzle device including a rigid pipe section from which a portion thereof has been removed and having its lower portion adapted to form a rest to hold the support at a position of rest, a flexible hose section surrounding said pipe and adapted to conduct filler fluid from the container to the structure which is supplied with said fluid by the apparatus, said rest also being adapted to extend to substantially the lower end of said hose section, and the removed portion of the pipe section allowing pressure of fluid material to be exerted against lower inside of said hose section to expand same.

15. In pavement raising and void filling apparatus, a wheeled support having means thereon for supplying a fluid filling material including a vertically movable mobile fluid injection nozzle, the longitudinal axis of which is arranged vertically, said support being constructed and arranged to introduce into and withdraw the mouth of the nozzle from an opening in a pavement by relative rocking movement of the support.

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