March 9, 1965 M. A. BROWN ETAL 3,172,572

HEADER CONSTRUCTION FOR UNDERGROUND STORAGE TANK

Filed Feb. 7, 1963 5 Sheets-Sheet 1

Fig. 1

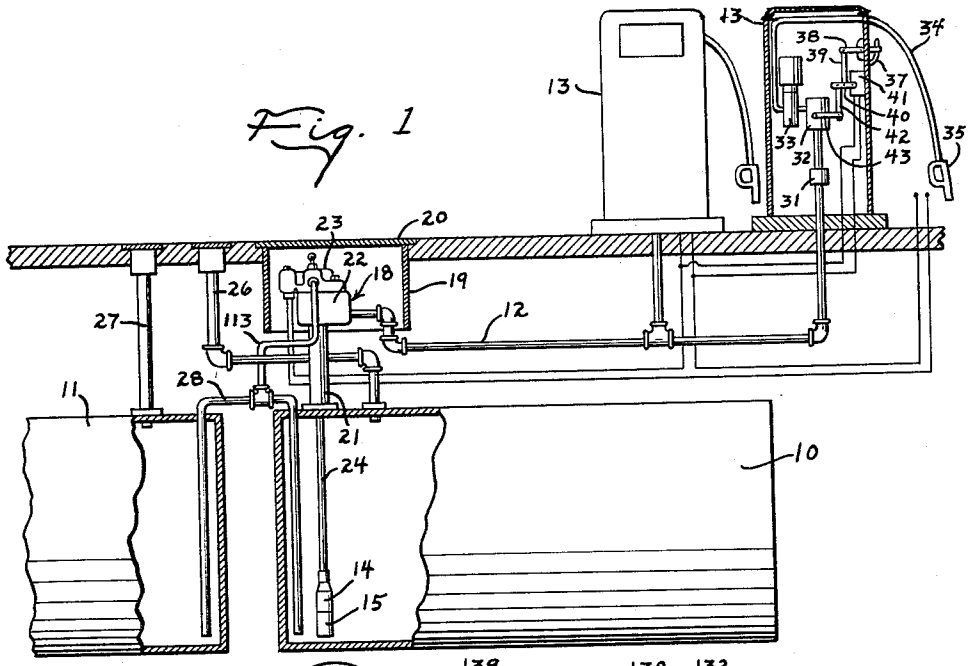

Fig. 2

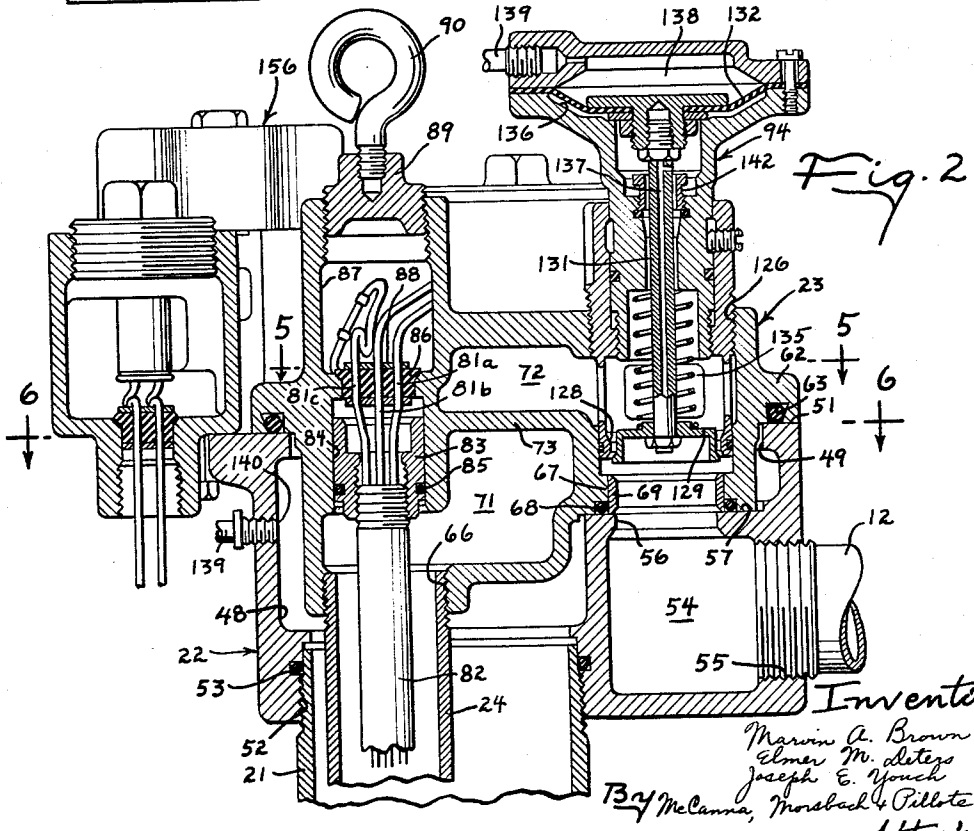

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Fig. 3

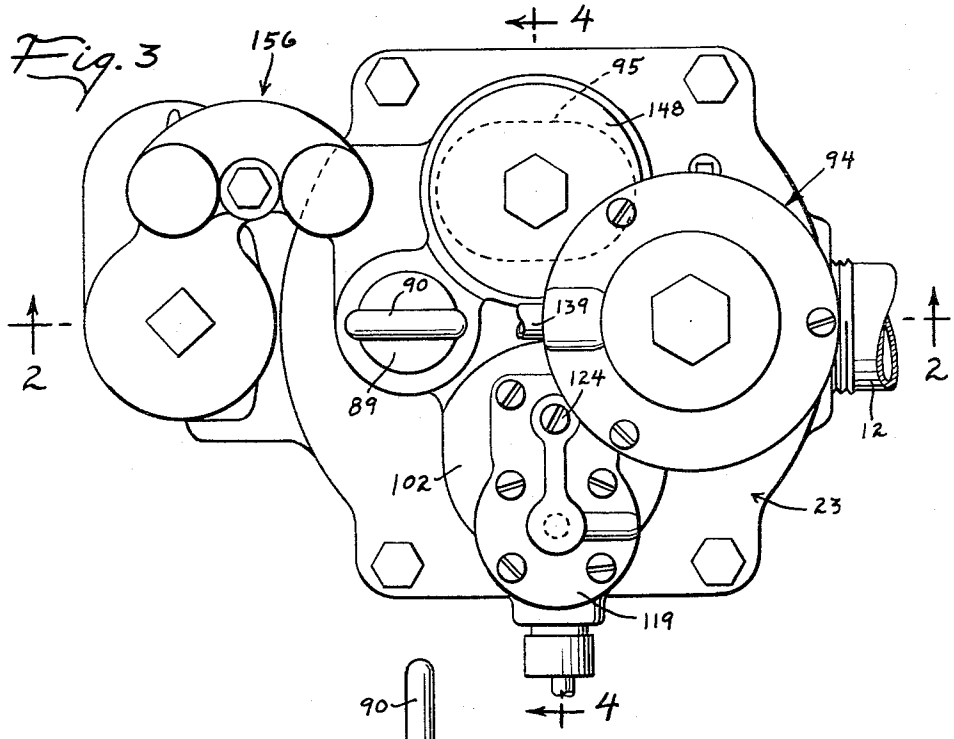
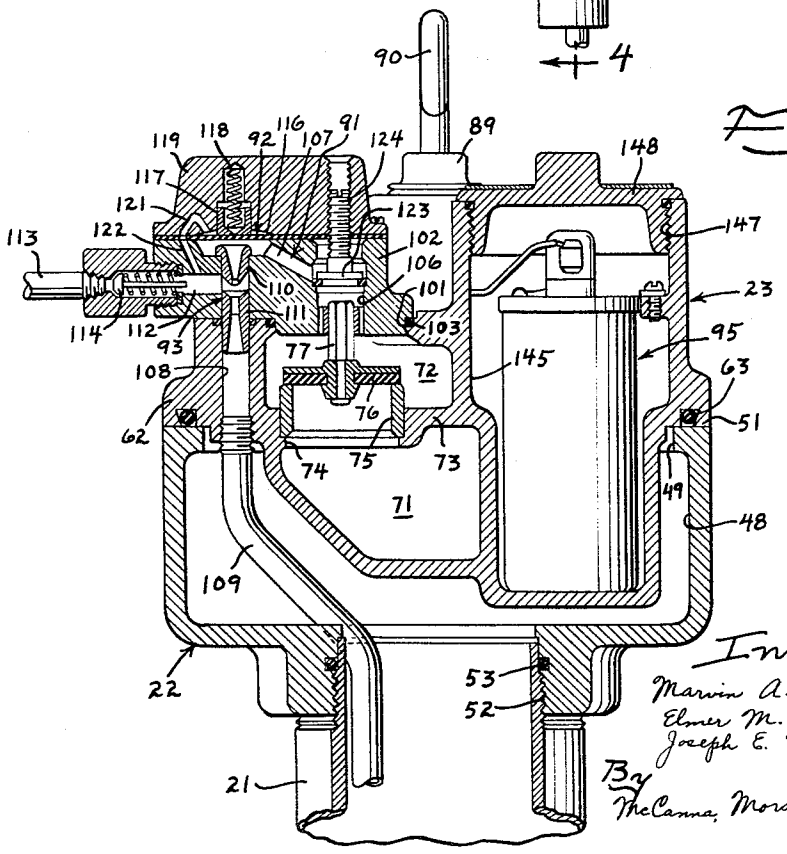


Fig. 4



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HEADER CONSTRUCTION FOR UNDERGROUND STORAGE TANK

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Fig. 5

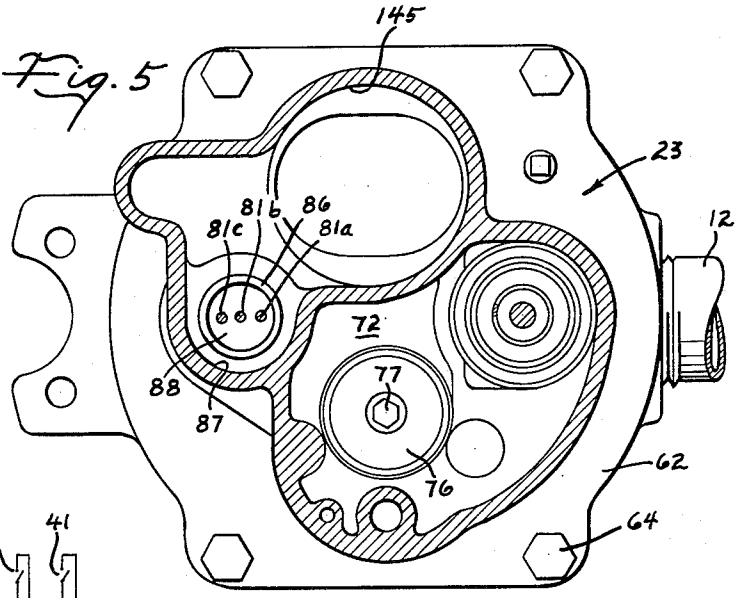


Fig. 7

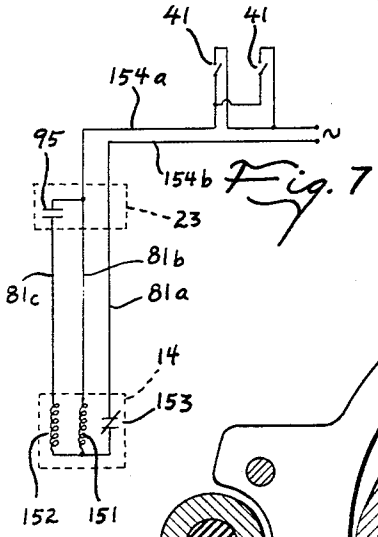
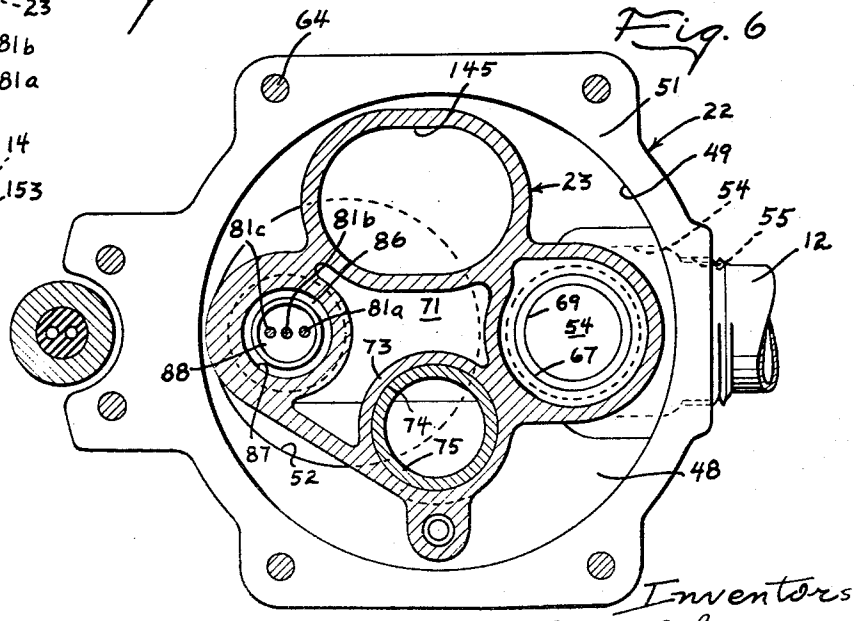


Fig. 6



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HEADER CONSTRUCTION FOR UNDERGROUND STORAGE TANK

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Fig. 10

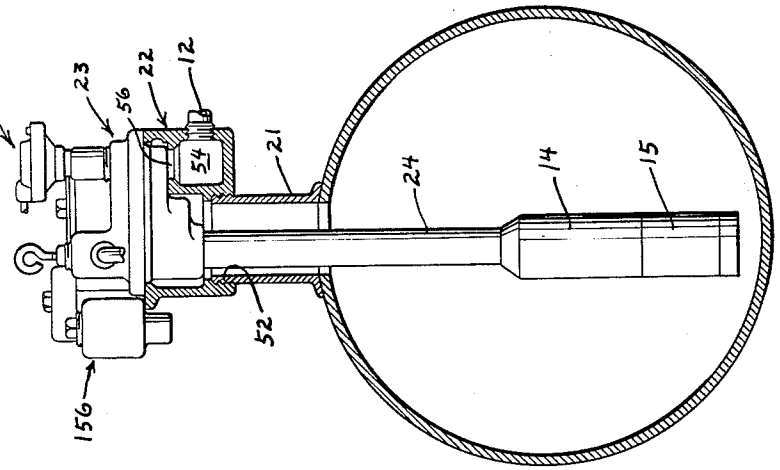


Fig. 9

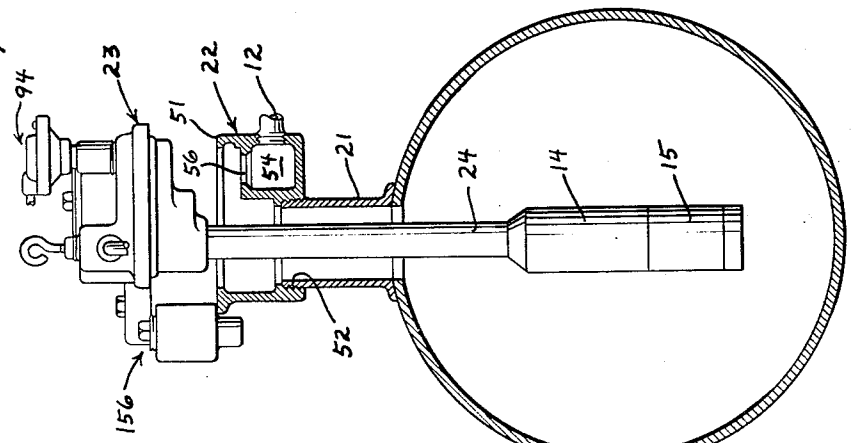
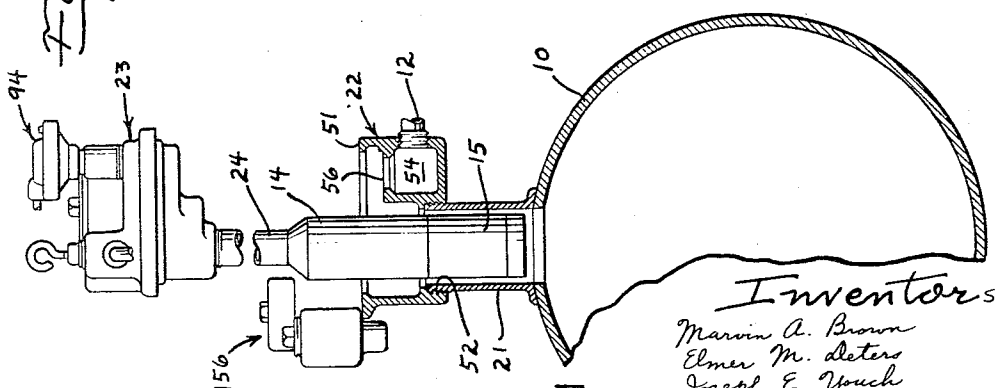


Fig. 8



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HEADER CONSTRUCTION FOR UNDERGROUND STORAGE TANK

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Fig. 11

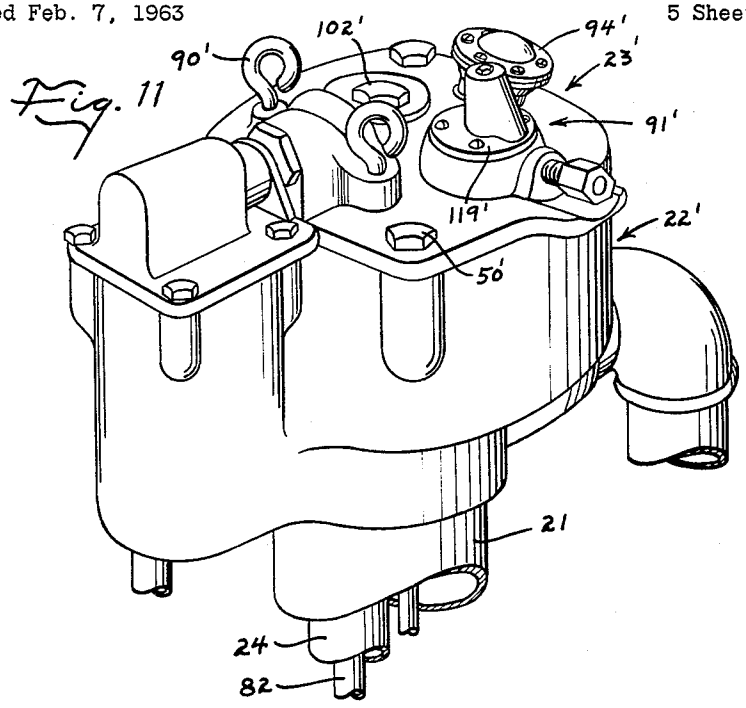
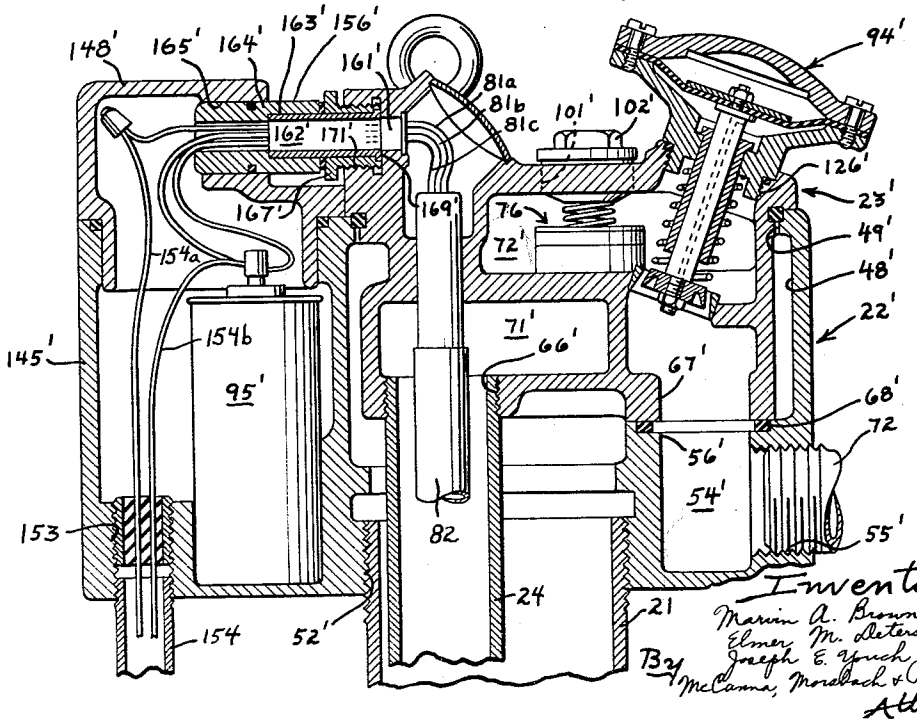


Fig. 12



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United States Patent Office 3,172,572 Patented Mar. 9, 1965

3,172,572

HEADER CONSTRUCTION FOR UNDERGROUND STORAGE TANK

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Filed Feb. 7, 1963, Ser. No. 256,944
19 Claims. (Cl. 222—109)

This invention relates to a dispensing system wherein liquid is pumped from a tank to one or more remote delivery outlets, and particularly to an improved header construction for use at the tank to connect the pump to the delivery lines.

The dispensing system of the present invention is adapted for use in gasoline service stations and the like wherein the storage tank is located remote from the dispensing outlet, and the pump is located in the tank for pumping fluid under pressure to the remote outlets. In order to facilitate installation and servicing of the pump, a header is commonly provided at the tank, which header includes a stationary manifold connected to the tank and having a discharge passage connected to the delivery line, a removable packer in the manifold which is connected to the pump through a drop pipe, and a passage means in the packer for communicating the drop pipe with the discharge passage in the manifold. With this arrangement, the packer, drop pipe and pump can be inserted and removed from the manifold and tank, without requiring disconnection of any of the pipelines, for easy service and repair of the pump and motor, when necessary.

In such dispensing systems, it is generally necessary to provide a number of control elements including flow control elements and electrical control elements for the pump and motor and an important feature of the present invention resides in the arrangement of the several control elements and the header to simplify installation as servicing of the dispensing system.

An important object of this invention is to provide a header construction for use in a remote dispensing system in which a number of the control elements for the dispensing system are mounted on the header.

Another object of this invention is to provide a header construction in which a plurality of control elements are mounted at the header and so arranged on the header as to provide very compact overall assembly, to minimize the size of the pit required for the header, and to minimize the size and weight of the packer for easy removal and insertion of the packer and pump.

Another object of this invention is to provide a header construction in which a plurality of control elements are mounted at the header, and in which the several control elements are so arranged on the header as to enable service and repair of the control elements without requiring removal of the packer from the manifold.

Still another object of this invention is to provide a header construction for use in a dispensing system for connecting the pump in the tank to the delivery line, and which header is so arranged as to preclude leakage of fluid into the ground around the header, in the event of a leak in the gaskets between the packer and manifold.

A further object of this invention is to provide a remote type of dispensing system in which the pump and motor are located in a tank remote from the motor operating switch at the dispensing outlet, and which minimizes the number of conductors which must be run from the switch at the dispensing outlet to the header, to thereby simplify installation of the dispensing system.

These, together with other objects and advantages of this invention will be more readily appreciated as the invention becomes better understood by reference to the following detailed description when taken in connection with the accompanying drawings wherein:

FIG. 1 is a diagrammatic view illustrating a dispensing system employing the present invention;

FIG. 2 is a fragmentary vertical sectional view through the header, taken on the plane 2—2 of FIG. 3;

FIG. 3 is a plan view of the header;

FIG. 4 is a fragmentary vertical sectional view taken on the plane 4—4 of FIG. 3;

FIG. 5 is a horizontal sectional view taken on the plane 5—5 of FIG. 2;

FIG. 6 is a horizontal sectional view taken on the plane 6—6 of FIG. 2;

FIG. 7 is a schematic diagram illustrating the electrical controls for the pump;

FIGS. 8–10 are diagrammatic sectional views illustrating the assembly of the pump and packer into the tank and manifold;

FIG. 11 is a fragmentary perspective view of a modified form of header construction; and

FIG. 12 is a vertical sectional view through the header of FIG. 11.

The header construction of the present invention is generally adapted for use on a storage tank to connect the submersible motor-pump unit in the tank to a delivery line and is herein shown and described in conjunction with a so-called "remote" type dispensing system for use in gasoline service stations and the like. A remote type dispensing system is diagrammatically shown in FIG. 1 and, in general, includes one or more storage tanks **10**, **11** for storing a quantity of gasoline, and a delivery line **14** for deliverying gasoline from the tank to one or more dispensing pedestals **13**. A pump and motor **14**, **15** is disposed in one of the tanks **10** for pumping gasoline from the tank to the delivery line **12**. In order to facilitate insertion and removal of the motor-pump until from the tank for service and repair after the tank is buried in the ground, a header construction **18** is employed to connect the motor-pump unit to the delivery line. In general, the header construction includes a casing **21** attached to the tank and extending upwardly therefrom and a manifold **22** mounted on the upper end of the casing and having a lateral discharge passage connected to the delivery line **12**. A packer **23** is removably mounted in the manifold and has a drop pipe **24** attached thereto and connected to the outlet of the motor-pump unit. The packer, as described hereinafter, has passage means which communicates the drop pipe with the delivery line **12** attached to the manifold, and the casing **21** and manifold are dimensioned sufficiently larger than the motor-pump unit to enable insertion and removal of the motor-pump unit therethrough. As is conventional, the manifold is positioned in a below-grade pit formed by a pit casing **19** having a removable cover plate **20**.

The tanks **10** and **11** are arranged to be filled through filler pipes **26** and **27** which extend from the tank to a point adjacent ground level and, where more than one tank is employed, a siphon line **28** is advantageously provided for transferring liquid from one storage tank such as **11** to a storage tank **10** having the motor-pump unit **14**, **15** therein. The pedestals **13** may be of any conventional construction and include a check valve **31**, an interlock valve **32**, a meter **33** and a delivery hose **34** having a valved nozzle **35** at its end. The pedestal includes the conventional nozzle support **37** and a lever **38** which extends over the nozzle support. The lever **38** is connected through a link **39** to an operating lever **40** for a pump control switch **41** and is also connected through a link **42** to an operating lever **43** for the interlock valve **32**. The interlock valve is of conventional construction and is disposed in the supply line leading to the hose **34** and is normally closed, the interlock valve being opened in response

to movement of the lever 38 to a position to close the pump control switch 41.

Reference is now made more specifically to the header construction illustrated in FIGS. 2–6. The manifold 22 is conveniently in the form of a cast body and defines a preferably generally circular manifold cavity 48, which cavity has a top opening 49. An annular rim or seat 51 is preferably formed around the top opening. The manifold also has a downwardly facing access opening 52 at the underside thereof and which is attached, as by threaded engagement, with the upper end of the casing 21. A gasket, conveniently in the form of an O-ring 53, is provided for sealing the manifold to the casing and, for reasons set forth hereinafter, the access opening 52 is positioned eccentrically of the cavity 48 so as to extend closely adjacent one side of the cavity, as is clearly shown in FIGS. 2 and 6. The manifold also has a passage 54 adjacent one side thereof. The discharge passage has a lateral opening 55 connected to the delivery pipe 12, and the discharge passage communicates with the manifold cavity through an opening 56. The opening 56 is laterally offset from the access passage 52 and, preferably, the opening 56 faces upwardly and has a seat 57 therearound generally paralleling the rim 51 at the upper end of the manifold. As is best shown in FIGS. 2 and 6, the opening 56 of the discharge passage 54 is disposed eccentrically of the cavity 48 at the side opposite the side from which the access opening 52 extends.

The packer 23 is removably mounted on the manifold and is arranged to communicate the drop pipe 24 with the discharge passage 54 in the manifold. In accordance with the present invention, the packer and manifold are so constructed and arranged as to preclude leakage of the pumped fluid into the ground surrounding the header, in the event of leakage of the gaskets between the packer and the manifold. More particularly, the packer comprises a multi-chamber body that spans the cavity 48 in the manifold adjacent the top opening 49. As best shown in FIG. 2, the packer has a flange portion 62 that overlies the rim 51 on the upper end of the manifold, and which flange portion is sealed to the manifold by a gasket 63 conveniently positioned in a groove in the packer. The packer is removably secured to the manifold as by fasteners 64 (see FIG. 5). The packer has a downwardly facing inlet opening 66 which is connected as by threaded engagement with the drop pipe 24 and which opening, for reasons set forth hereinafter, is positioned on the packer so as to extend eccentrically of the access opening 52 in the manifold and adjacent the same side of the manifold cavity at which the access opening 52 is located. The packer also has an outlet opening 67 which is located to register with the opening 56 of the discharge passage, when the packer is mounted on the manifold. The packer is sealed to the manifold around the outlet opening 67 and, as shown, an O-ring 68 is positioned in a groove in the packer and is retained therein by a ring 69, which O-ring engages the seat 57 on the manifold and forms a gasket for sealing the packer to the manifold around the outlet opening 67. A passage means is formed in the packer for communicating the downwardly facing inlet opening 66 with the outlet opening 67 which passage means includes an inlet chamber 71 that communicates with the inlet opening and an outlet chamber 72 that communicates with the outlet opening 67. A partition 73 separates the inlet and outlet chambers, and the partition has a check valve opening 74 therein and a check valve seat 75 around the opening. A check valve 76 having a stem 77 is provided for controlling flow through the opening 74 and is arranged to open for flow from the inlet chamber to the outlet chamber, and to close to prevent return flow.

The assembly of the packer and motor-pump unit is the manifold and tank as illustrated in FIGS. 8–10. As shown, the drop pipe 24 is attached to the motor-pump unit 14–15 to extend generally axially thereof and the casing 21 is dimensioned sufficiently large to permit axial insertion and

removal of the motor-pump unit therethrough. The motor-pump unit is initially positioned axially of the casing and, at time, the packer is located eccentric to the manifold cavity 48. The motor-pump unit is then inserted axially through the casing as shown in FIG. 8 until the motor-pump unit extends into the tank. The drop pipe has a length greater than the length of the casing 21 so that the packer does not engage the manifold when the motor-pump unit enters the top of the tank, as shown in FIG. 9, and the assembly of the packer, drop pipe and motor-pump unit is then shifted laterally to align the packer with the manifold cavity and permit seating of the packer on the manifold as shown in FIG. 10. In order to withdraw the packer and pump, it is necessary to raise the packer out of the manifold and shift the packer laterally to align the pump with the casing to enable movement of the motor-pump unit out of the tank.

As will be seen, the gasket 68 seals the manifold around the liquid flow passage, and this gasket is the only gasket which is subjected to full pump pressure. The other O-ring gasket 63 is spaced from the gasket 68 and seals the packer body to the manifold to prevent escape of the gas vapors from the tank and to prevent entrance of ground water into the tank. The space in the manifold cavity 48 below the gasket 63 and outside of the gasket 68 is in open communication with the access opening 52 in the manifold and hence is vented through the casing 21 back into the tank 10. Consequently, if the gasket 68 should leak, as may be caused by deterioration of the gasket by the pump liquid, the leakage will not flow into the ground surrounding the header, but instead will be vented back to the tank. Since the top gasket 63 only seals against the escape of tank vapors, deterioration of the upper gasket will not cause leakage of gasoline into the ground. Moreover, it will be noted that the gasket 68 and the seat 57 on the manifold are arranged to form a face type seal. Therefore, any swelling of the gasket which is sometimes caused by contact with the pump liquid such as gasoline, will not impede withdrawal of the packer from the manifold.

The motor conductors 81*a*–81*c* for the submersible motor 15 conveniently extend through the drop pipe 24 and are sealed from communication with the pump liquid by a conduit 82. The upper end of the conduit has a sealing gland 83 thereon which extends into a bore 84 in the packer and is sealed thereto as by a gasket 85. The wires extend from the bore 84 through a resilient seal 86 and into a junction chamber 87 in the packer. The seal may be of any suitable construction and conveniently is in the form of a resilient dielectric body having clamp plates on opposite sides which are adjustable toward each other to axially compress the body and radially expand the same into sealing engagement with the wires and with the packer. The upper end of the junction chamber 87 is closed by a plug 89 and an eye or hook 90 is conveniently attached to the plug to facilitate raising and lowering of the packer unit.

In a dispensing apparatus of the type described, it is necessary to provide a number of flow control elements and motor control elements in addition to the check valve 76. For example, an air eliminator designated 91 is generally provided for returning air and gaseous vapor back to the tank, to prevent delivery of air and gaseous vapor to the delivery outlet. A pressure relief valve designated generally by the numeral 92 is generally provided for preventing the build up of excess pressure in the delivery line, when the pump is shut off, due to thermal expansion of the liquid in the line. When more than one storage tank is provided and the tanks interconnected by a siphon line such as 28, a siphon priming ejector 93 is also provided. In addition, a leak detector apparatus designated generally by the numeral 94 is also advantageously provided in the system to detect a leak from the delivery line 12 and to prevent a dangerous accumulation of gasoline in the

event of a leak from the delivery line. Further, motor control components such as a motor capacitor 95 are also necessary. It is advantageous to locate these components at the header, to not only simplify installation of the pumping apparatus, but to also facilitate service and repair.

In accordance with the present invention, the aforementioned check valve 76, air eliminator 91, relief valve 92, siphon priming ejector 93, leak detector 94 and motor capacitor 95 are all located at the header. The header is constructed and the several control components are so arranged on the header as to provide a very compact overall assembly to minimize the size of the pit required to enclose the header, and to also minimize the size of the packer so as to facilitate insertion and removal of the packer and motor-pump unit from the tank. As previously described, the access opening 52 in the manifold is located eccentrically of the manifold cavity, so as to be positioned closely adjacent one side of the cavity and the drop pipe 24 on the packer is similarly eccentrically positioned with respect to the access opening so as to extend closely adjacent the same side of the manifold cavity 48. Consequently, the drop pipe and the motor conductors 81*a*–81*c* are positioned closely adjacent one side of the packer body, as is clearly shown in FIGS. 2 and 3, and this enables a compact arrangement of the other control components on the packer body and in such a manner that each of the components can be individually removed for service and repair, without requiring withdrawal of the packer from the manifold.

The check valve 76 is spaced radially from the center of the packer and manifold, and is angularly spaced from the drop pipe approximately 90°, as is best shown in FIG. 5. An opening 101 is formed in the packer body above the check valve, to enable insertion and removal of the check valve therethrough and the opening enclosed by a cap body 102 which is sealed to the packer by a gasket 103. The air eliminator 91, relief valve 92 and siphon priming ejector 93 are conveniently of the type disclosed in the application of Elmer M. Deters and Joseph E. Youch, Serial No. 260,471, filed Feb. 25, 1963, for Header for Gasoline Pumping Systems, now U.S. Patent No. 3,172,567 of March 9, 1965, and, as shown, are carried by the cap body 102. In general, the air eliminator 91 includes a chamber 106 that communicates with the outlet chamber 72 at a high point in that chamber, and which chamber 106 is communicated through passages 107 and 108 with a return conduit 109 leading to the tank. In this manner, any air or gaseous vapor that accumulates in the high portion of the outlet chamber 72 is vented back to the tank, to prevent delivery of air and gaseous vapor to the delivery line. The siphon priming ejector 93 is conveniently formed in the passage 108 and includes a nozzle 110 and throat 111. The liquid flowing through the passage 108 when the pump is operating produces a low pressure at the throat of the ejector, and the throat passage 112 of the ejector is connected through a siphon priming line 113 to a high point in the siphon line 28. A check valve 114 is provided in the siphon priming line to prevent the loss of siphon when the pump is stopped. The relief valve 92 is in the form of a diaphragm 116, which diaphragm is yieldably urged by a plunger 117 and spring 118 to a position enclosing the inlet of the nozzle 110. The stiffness of the spring is proportioned in relation to the area of the diaphragm 116 so as to maintain the diaphragm seated against the nozzle when the pump is stopped, to prevent draining of the liquid from the delivery line, and to open at a pressure somewhat below full pump discharge pressure to allow venting of air and gaseous vapor, and to also prime the siphon line, when the pump is operating. As will be noted, the relief valve is also arranged to open when the pump is stopped, if the pressure in the delivery line increases, due to thermal expansion or the like, above the pressure at which the relief valve is set to open. The diaphragm 116 is maintained in assembled relation on the cap body by a cap 119 and the upper side of the diaphragm is vented to atmosphere. As described in the aforementioned application, the diaphragm is conveniently vented through passages 121 and 122 in the cap and cap body respectively, which last mentioned passage communicates with the throat passage 112. A pressure testing valve 123 is also advantageously provided and is adjustably mounted at 124 on the cap. The pressure testing valve is arranged to block communication between the outlet chamber 72 and the air vent passage 107, and to also hold the check valve in its closed position to enable pressure testing of the line and tank. The packer body is also formed with a second top opening 126 which communicates with the outlet chamber 72. The opening 126 is also radially spaced from the center of the packer body and is angularly spaced approximately 180° from the drop pipe 24. The leak detector valve 94 is removably mounted in the opening 126 as by threaded engagement therewith to enable insertion and removal of the leak detector valve from the packer without requiring withdrawal of the packer from the manifold. The leak detector valve 94 is conveniently of the construction shown in the copending application of Elmer M. Deters, for "Leak Detector," Serial No. 245,733, filed December 19, 1962. As more fully described in that application, the leak detector includes a seat 128 positioned in the path of flow of liquid from the outlet chamber 72 to the discharge passage 54 in the manifold. A valve member 129 is provided for controlling flow through the seat and is connected through a stem 131 to a pressure responsive diaphragm 132. The valve member is yieldably urged by a spring 133 to the position shown in FIG. 2 in which it is spaced axially from one side of the seat a distance sufficient to provide limited flow of fluid, less than full pump delivery. Pressure at the outlet side of the leak detector valve 129 is applied to the chamber 136 at the underside of the diaphragm 132 through a passage 137, conveniently formed in the valve stem. The chamber 138 at the upper side of the diaphragm is vented to atmosphere, and is conveniently connected through a tube 139 to an opening 140 in the manifold cavity. When the pump is started, the valve 129 allows fluid to flow past the leak detector valve to the delivery line to rapidly fill the line. As the pressure in the line builds up to a preselected value below full pump discharge pressure, for example five p.s.i., the valve member moves upwardly to a position blocking flow through the seat 128. At that time, a restricted flow of liquid is passed to the delivery line at a rate equal to the maximum leakage rate. In the form shown, the leakage rate is controlled by the clearance between the valve stem and stem guide 142. If there is no significant leak in the delivery line, this restricted bypass of fluid to the delivery line will build up the pressure in the line sufficient to move the leak detector valve to its fully open position and permit full flow to the delivery line.

In this embodiment, the motor capacitor 95 is also mounted in the packer for removal as a unit therewith. For this purpose, the packer is formed with a capacitor receiving cavity 145 which is also radially spaced from the center of the packer and disposed substantially diametrically opposite to the check valve 76. The capacitor cavity 145 communicates with the junction chamber 87 and is sealed from communication with the flow chambers 71 and 72. The cavity 145 has a top opening 147 and a removable cap 148 at the upper end to provide access to the capacitor and enable service and replacement of the capacitor from the top of the packer, without requiring removal of the packer from the manifold.

In accordance with the present invention, the pump drive motor **15** is of the permanent split capacitor type having a main winding **151**, a start winding **152** and a preferably built-in overload protector switch **53**. Such a permanent split capacitor motor does not require the usual starting capacitor and motor starting relay, and instead employs a single motor capacitor **95** which is permanently connected to the start winding as by the conductor **81***c* (FIG. 7). As will be seen from FIG. 7, the use of the permanent split capacitor motor, and the location of the motor capacitor **95** at the header, simplifies the wiring required and necessitates only two conductors designated **154***a* and **154***b* between the header and the switches **41** at the remote dispensers. An electrical disconnect **156** is preferably provided at the header to facilitate disconnection of the power conductors of the packer, and, as shown, the disconnect is conveniently of the type disclosed and claimed in the copending application of Elmer M. Deters and Joseph E. Youch for "Header Construction With Interlocked Electrical Disconnect," Serial No. 251,964, filed January 16, 1963.

A modified form of header construction is illustrated in FIGS. 11 and 12. The header is generally similar to that previously described in like numerals followed by the subscript (') are used to designate corresponding parts. As in the preceding embodiment, the header includes a manifold **22'** defining an internal cavity **48'** having a top opening **49'** and a lower access opening **52'** connected to the casing **21**. The access opening is eccentrically positioned relative to the cavity as is best shown in FIG. 12 and the manifold has an outlet passage **54'** adjacent the other side of the cavity. The outlet passage has an opening **55'** connected to the delivery pipe and an upwardly facing opening **56'**. A packer **23'** is removably positioned in the manifold and held therein as by fasteners **50'**. The packer has an inlet opening **66'** positioned eccentrically of the access opening **52'** in the manifold and connected to the drop pipe **24** so that the drop pipe extends downwardly along one side of the casing **21**. The packer also has an outlet opening **67'** which registers with the discharge passage **54'** in the manifold, and which is sealed thereto by a gasket **68'**. A passage including an inlet flow chamber **71'** and an outlet flow chamber **72'** interconnecting the openings **66'** and **67'** in the packer and a check valve **76'** is provided for controlling flow between the inlet and outlet chamber.

In this embodiment, a plurality of control elements including the check valve **76'**, a combination air eliminator, relief valve and siphon priming ejector **91'**, a leak detector apparatus **94'** and a motor capacitor **95'** are located at the header. However, in this embodiment, the check valve **76'**, air eliminator apparatus **91'** and leak detector apparatus **94'** are mounted on the packer while the motor capacitor **95'** is mounted in the manifold. The check valve **76'** is spaced radially from the center of the packer and is angularly spaced approximately 90° from the drop pipe. An opening **101'** is formed in the top of the packer above the check valve and is closed by a removable cap **102'**, to enable service and repair of the check valve from the top of the packer. The combination air eliminator, relief valve and siphon priming ejector **91'** is generally similar to that previously described and, as shown, is mounted in a removable cap **119'**, which cap is also accessible from the top of the packer. The leak detector **94'** is also generally similar to that previously described and is removably mounted on the top of the packer in an opening **126'**. In this embodiment, the manifold **22'** is formed with a capacitor receiving cavity **145'** located externally of the main manifold cavity **48'**. The motor capacitor **95'** is positioned in the cavity and the cavity has a passage **153** for the power supply conductors **154***a* and **154***b*, which passage is connected to a conduit **154'** leading to the remote dispensers. An electrical disconnect **156'** is advantageously provided for connecting the power conductors **154***a* and **154***b* to the motor conductors **81***a*–**81***c* on the packer. As shown, the disconnect **156'** includes a male type plug element **161'** mounted on the packer and a female type plug element **162'** mounted on the manifold. The plug element **162'** is advantageously enclosed in a metal sheath **163'**, which sheath is attached to a sleeve **164'** that is slidably supported in an opening **165'** in the cap **148'**, to support the plug member **162'** for movement toward and away from the plug member **161'**. A gland **167'** is rotatably supported on the sheath **163** between the sleeve **164'** and a flange **169'** on the end of the sheath. The gland is adapted to threadedly engage an opening **171'** in the packer to join and separate the plug members **161** and **162**. As in the preceding embodiment, the pump-motor is advantageously of the permanent split capacitor type. Thus, when the motor capacitor **95'** is mounted at the header, only two conductors **154***a* and **154***b* are required between the header and the remote dispensers.

From the foregoing, it will be seen that in both embodiments, all of the flow and motor control elements are mounted at the header, and in such a manner as to enable ready access to the several control components from the top of the packer, without requiring removal of the packer from the manifold. Moreover, the eccentric positioning of the access opening in the manifold and the drop pipe on the packer enables the control components to be very compactly arranged in a generally annular pattern on the packer to minimize the overall size of the packer required to house the several components. A small size packer enables use of a small manifold and a small pit casing **19**. It also reduces the weight of the packer and facilitates insertion and removal of the packer from the manifold. Further, the use of the permanent split capacitor motor and the location of the motor capacitor at the header eliminates the necessity of providing a control box at the service station and also simplifies the wiring since only two wires are required between the dispensing pedestals and the header.

We claim:

1. A header construction for use with a tank having a pump therein comprising, a casing adapted for connection to the tank to extend upwardly therefrom and dimensioned for insertion and withdrawal of the pump therethrough, a manifold defining a cavity having a top opening and a downwardly facing access opening at the underside connected to the upper end of said casing, said manifold having a lateral discharge passage communicating with said cavity below the top opening, a packer removably mounted in said manifold and spanning said cavity adjacent the top opening in the manifold, a drop pipe attached to said packer and extending downwardly through the casing for connection to the pump, said packer having passage means communicating said drop pipe with said lateral discharge outlet in said manifold, a first gasket means sealing the packer to the manifold at the interface between the passage means in the packer and the discharge passage in the manifold, a second gasket means spaced from the first gasket means sealing the packer to the manifold adjacent said top opening, said packer being spaced from the manifold in a zone between said first gasket means and said second gasket means, the space in said cavity between the first gasket means and the second gasket means being vented through said casing to the tank whereby any liquid which leaks past said first gasket means is vented back to the tank.

2. A header construction for use with a tank having a pump therein comprising, a casing adapted for connection to the tank to extend upwardly from the tank and dimensioned for insertion and withdrawal of the pump therethrough, a manifold defining a cavity having a top opening and a downwardly facing access opening at the underside thereof connected to the upper end of said casing, said manifold having a discharge passage therein offset to one side of said access opening and a seat ex-

tending around the inner end of the discharge passage, a packer removably mounted in said manifold and spanning said cavity adjacent said top opening in the manifold, a drop pipe attached to said packer and extending downwardly through the casing for connection to the pump, said packer having passage means extending from said drop pipe to said seat, a first gasket sealing said packer to said seat around said passage means, a second gasket means spaced from the first gasket sealing the packer to the manifold adjacent said top opening, said packer being spaced from said manifold in a zone between said first gasket and said second gasket means, the space in said cavity between the first gasket and the second gasket means being vented through said casing to the tank whereby any liquid that leaks past said first gasket is returned to the tank.

3. A header construction for use with a tank having a motor-pump unit therein comprising a casing adapted for connection to the tank to extend upwardly from the tank and dimensioned for insertion and withdrawal of the motor-pump unit therethrough, a manifold defining a cavity having a top opening and a downwardly facing access opening at the underside thereof connected to the upper end of said casing, said manifold having a discharge passage therein offset to one side of the access opening and an upwardly facing seat extending around the inner end of the discharge passage, a packer removably mounted in said manifold and spanning said cavity adjacent said top opening in the manifold, a drop pipe attached to said packer and extending downwardly through said casing for connection to the motor-pump unit, said packer having passage means extending from said drop pipe to said seat, a first gasket sealing said packer to said seat around said passage means, a second gasket spaced from said first gasket sealing the packer to the manifold adjacent said top opening, said packer being spaced from said manifold in a zone between said first gasket and said second gasket, the space in said cavity between said first gasket and said second gasket being vented through said casing to said tank whereby any liquid that leaks past said first gasket is returned to the tank.

4. The combination of claim 3 wherein said upwardly facing seat is spaced below the top opening in the manifold.

5. A header for use with a tank having a motor-pump unit therein comprising a casing adapted for connection to the tank to extend upwardly from the tank and dimensioned for insertion and withdrawal of the motor-pump unit therethrough, a manifold defining a cavity having a top opening and a downwardly facing access opening at the underside disposed eccentrically of said cavity adjacent one side thereof and connected to said casing, said manifold having a discharge passage therein and a seat at the inner end of the discharge passage offset from the access opening adjacent the other side of the cavity, a packer removably mounted in said manifold and spanning said cavity adjacent said top opening, a drop pipe attached to said packer at a point eccentric to said access opening adjacent said one side of said cavity, said drop pipe extending downwardly through said casing adjacent one side thereof for connection to the motor-pump unit, said packer having passage means communicating with said drop pipe and extending from the drop pipe to the seat around the discharge opening in the manifold.

6. A header for use with a tank having a motor-pump unit therein comprising a casing adapted for connection to the tank to extend upwardly from the tank and dimensioned for insertion and withdrawal of the motor-pump unit therethrough, a manifold defining a cavity having a top opening and a downwardly facing access opening at the underside disposed eccentrically of said cavity adjacent one side thereof and connected to said casing, said manifold having a discharge passage therein and a seat at the inner end of the discharge passage offset from the access opening adjacent the other side of the cavity, a packer removably mounted in said manifold and spanning said cavity adjacent said top opening, a drop pipe attached to said packer at a point eccentric to said access opening adjacent said one side of said cavity, said drop pipe extending downwardly through said casing adjacent one side thereof for connection to the motor-pump unit, said packer having passage means communicating with said drop pipe and extending from the drop pipe to the seat around the discharge opening in the manifold, a first gasket sealing said packer to said seat around said passage means, a second gasket spaced from said first gasket and sealing packer to said manifold adjacent said top opening, said packer being spaced from said manifold in a zone between said first gasket and said second gasket, the space in said cavity between said first gasket and said second gasket being vented through said casing to said tank whereby any liquid that leaks past said first gasket is returned to the tank.

7. In combination with a tank, a generally cylindrical motor-pump unit for pumping liquid from the tank, a casing connected to the tank to extend upwardly therefrom and dimensioned for insection and withdrawal of the motor-pump unit therethrough, a manifold defining a cavity having a top opening and a downwardly facing access opening in the underside thereof connected to said casing, said casing having a discharge opening therein at one side of said access opening, a packer removably mounted in said manifold and spanning said cavity adjacent the top opening, a drop pipe attached to said motor-pump unit and extending generally axially of the motor-pump unit, said packer having passage means communicating said drop pipe with said discharge opening in said manifold, said drop pipe being attached to said packer at a point eccentric to said access opening and having a length greater than the length of said casing whereby the motor-pump unit and drop pipe can be inserted through the casing generally axially thereof and the packer, drop pipe and motor-pump unit then shifted laterally after the motor-pump unit enters the tank to permit mounting of the packer on the manifold with the drop pipe extending eccentric to the access opening and casing.

8. A header construction for use with a tank having a motor-pump unit therein comprising, a casing adapted for connection to the tank to extend upwardly therefrom and dimensioned for insection and withdrawal of the motor-pump unit therethrough, a manifold defining a cavity having a top opening and a downwardly facing access opening at the underside located eccentric to said cavity adjacent one side thereof and connected to said casing, said manifold having a discharge passage therein at one side of said access opening adapted for connection to a delivery line, a packer removably mounted in said manifold and spanning said cavity adjacent said top opening, a drop pipe attached to said packer at a point eccentric to said access opening and adjacent said one side of said cavity and extending downwardly through said casing adjacent one side of the casing for connection to the motor-pump unit, said packer having passage means communicating said drop pipe with said discharge passage in said manifold, said packer having at least one flow control valve mounted thereon at a point laterally offset from the drop pipe for controlling flow through said passage means, said packer having an opening and a removable cap on the upper side thereof to provide access to said valve from the top of the packer without removing the packer from the manifold.

9. A header construction for use with a tank having a motor-pump unit therein comprising, a casing adapted for connection to the tank to extend upwardly therefrom and dimensioned for insertion and withdrawal of the motor-pump unit therethrough, a manifold defining a cavity having a top opening and a downwardly facing access opening at the underside located eccentric to said cavity adjacent one side thereof and connected to said casing, said manifold having a discharge passage therein at one side of said

access opening adapted for connection to a delivery line, a packer removably mounted in said manifold and spanning said cavity adjacent said top opening, a drop pipe attached to said packer at a point eccentric to said access opening and adjacent said one side of said cavity and extending downwardly through said casing adjacent one side of the casing for connection to the motor-pump unit, said packer having passage means communicating said drop pipe with said discharge passage in said manifold, said packer having a first chamber therein laterally offset from the drop pipe and sealed from said passage means, a motor capacitor in said first chamber, at least one flow control valve mounted on said packer at a point offset from said drop pipe and said chamber for controlling flow through the passage means, said packer having packer, openings in the top thereof and removable cap means covering said packer openings, to provide access to said first chamber and to said valve from the top of the packer without removing the packer from the manifold.

10. A header construction for use with a tank having a motor-pump unit therein comprising, a casing adapted for connection to the tank to extend upwardly therefrom and dimensioned for insertion and withdrawal of the motor-pump unit therethrough, a manifold defining a cavity having a top opening and a downwardly facing access opening at the underside located eccentric to said cavity adjacent one side thereof and connected to said casing, said manifold having a discharge passage therein at one side of said access opening adapted for connection to a delivery line, a packer removably mounted in said manifold and spanning said cavity adjacent said top opening, a drop pipe attached to said packer at a point eccentric to said access opening and adjacent said one side of said cavity and extending downwardly through said casing adjacent one side of the casing for connection to the motor-pump unit, said packer having passage means communicating said drop pipe with said discharge passage in said manifold, said packer having first and second liquid flow control devices mounted thereon at points laterally offset from said drop pipe and from each other for controlling flow through said passage means, said packer having packer openings in the top thereof and removable cap means covering said packer openings to provide access to said first and second flow control devices from the top of the packer without removing the packer from the manifold.

11. A header construction for use with a tank having a motor-pump unit therein comprising, a casing adapted for connection to the tank to extend upwardly therefrom and dimensioned for insertion and withdrawal of the motor-pump unit therethrough, a manifold defining a cavity having a top opening and a downwardly facing access opening at the underside located eccentric to said cavity adjacent one side thereof and connected to said casing, said manifold having a discharge passage therein at one side of said access opening adapted for connection to a delivery line, a packer removably mounted in said manifold and spanning said cavity adjacent said top opening, a drop pipe attached to said packer at a point eccentric to said access opening and adjacent said one side of said cavity and extending downwardly through said casing adjacent one side of the casing for connection to the motor-pump unit, said packer having passage means communicating said drop pipe with said discharge passage in said manifold, said packer having a check valve mounted thereon at a point laterally offset from said drop pipe for controlling flow through said passage means and operable to open for flow from the drop pipe to the discharge passage, a leak detector valve mounted on said packer at a point laterally offset from the drop pipe and from the check valve operable to control flow through said passage means in the event of a leak in the delivery line connected to the discharge passage.

12. A header construction for use in a tank pumping apparatus having a motor-pump unit in the tank, said header construction including a manifold defining a cavity having a top opening and a downwardly facing access opening in the underside thereof, said manifold having a discharge passage therein, a packer removably mounted on said manifold and extending across said cavity adjacent said top opening, a drop pipe connected to said packer and adapted for connection to the motor pump unit, said packer having passage means therein communicating the drop pipe with said discharge passage in said manifold, said packer having a first check valve receiving opening in the top thereof and a second leak detector receiving opening in the top thereof each communicating with said passage means, one of the items comprising said manifold and said packer having a motor capacitor receiving chamber therein sealed from said passage means, said last mentioned item having a third opening at the top for insection and removal of a motor capacitor from the chamber and cover means overlying said first, second and third openings arranged for removal without withdrawing the packer from the manifold to enable installation and repair of the check valve, leak detector valve and motor capacitor on the header while the packer is in position on the manifold.

13. A header construction for use in a tank pumping apparatus having a motor-pump unit in the tank, said header construction including a manifold defining a cavity having a top opening and a downwardly facing access opening in the underside thereof, said manifold having a discharge passage therein, a packer removably mounted on said manifold and extending across said cavity adjacent said top opening, a drop pipe connected to said packer and adapted for connection to the motor-pump unit, said packer having passage means therein communicating the drop pipe with said discharge passage in said manifold, said packer having a first check valve receiving opening in the top thereof and a second leak detector receiving opening in the top thereof each communicating with said passage means, said packer having a motor capacitor receiving opening therein sealed from said passage means and a third opening at the top of the packer for insertion and removal of a motor capacitor from the chamber, and cover means overlying each said first, second, and third openings arranged for removal from the packer without withdrawing the packer from the manifold.

14. In a remote pumping system including a tank having a motor-pump unit therein and at least one remote dispenser having a motor operating switch thereat, a header at the tank having a stationary manifold and a packer removably mounted in the manifold, a delivery line extending from the manifold to the remote dispenser and passage means on the packer for passing fluid from the motor-pump unit to the delivery line, characterized in that one of the items comprising said manifold and said packer has a capacitor receiving chamber therein sealed from said passage means and a motor capacitor is mounted in said chamber and connected to said motor and through said motor operating switch to a power supply.

15. The combination of claim 14 wherein said capacitor receiving chamber is located in said packer and said capacitor is removable with said packer.

16. In a remote pumping system including a tank having a motor-pump unit therein and at least one remote dispenser having a motor operating switch thereat, a header at the tank having a stationary manifold and a packer removably mounted in the manifold, a delivery line extending from the manifold to the remote dispenser and passage means on the packer for passing fluid from the motor-pump unit to the delivery line, characterized in that said motor is of the permanent-split capacitor type having a main winding and an auxiliary winding, one of the items comprising said manifold and said packer has a capacitor receiving chamber therein sealed from said passage means, and a capacitor in said chamber connected to said auxiliary winding of said motor.

17. A header construction for use with a tank having a motor-pump unit therein comprising, a casing adapted for connection to the tank to extend upwardly therefrom and

dimensioned for insertion and withdrawal of the motor-pump unit therethrough, a manifold defining a cavity having a top opening and a downwardly facing access opening at the underside thereof connected to said casing, said manifold having a discharge passage therein at one side of said access opening adapted for connection to a delivery line, a packer removably mounted in said manifold, a drop pipe attached to said packer and extending downwardly through said casing for connection to the motor-pump unit, said packer having passage means communicating said drop pipe with said discharge passage in said manifold, said packer having a first chamber therein sealed from said passage means, a motor capacitor in said first chamber, at least one flow control valve mounted on said packer at a point laterally offset from said first chamber for controlling flow through the passage means, said packer having first and second laterally spaced packer openings in the top thereof respectively communicating with said first chamber and said passage means, and removable cap means covering said packer openings to provide access to said first chamber and to said valve from the top of the packer without removing the packer from the manifold.

18. A header and pump construction for use with a tank comprising, a motor-pump unit adapted to extend into the tank, a casing adapted for connection to the tank to extend upwardly therefrom and dimensioned for insertion and withdrawal of the motor-pump unit therethrough, a manifold defining a cavity having a top opening and a downwardly facing access opening at the underside thereof connected to said casing, said manifold having a discharge passage at one side of said access opening adapted for connection to a delivery line, a packer removably mounted in said manifold and extending into said cavity, a drop pipe attached to said packer and extending downwardly through said casing and connected to the motor-pump unit, said packer having passage means communicating said drop pipe with said discharge passage in said manifold, said manifold having a capacitor receiving chamber separate from said cavity, and a motor capacitor in said chamber operatively connected to said motor.

19. A header and pump construction for use with a tank comprising, a motor-pump unit adapted to extend into the tank, a casing adapted for connection to the tank to extend upwardly therefrom and dimensioned for insertion and withdrawal of the motor-pump unit therethrough, a manifold defining a cavity having a top opening and a downwardly facing access opening at the underside thereof connected to said casing, said manifold having a discharge passage at one side of said access opening adapted for connection to a delivery line, a packer removably mounted in said manifold and extending into said cavity, a drop pipe attached to said packer and extending downwardly through said casing and connected to the motor pump unit, said packer having passage means communicating said drop pipe with said discharge passage in said manifold, said manifold having a capacitor receiving chamber separate from said cavity and laterally offset to one side of the cavity and packer, said manifold having a second opening in the upper side thereof laterally offset from said top opening and communicating with said chamber, a cover means removably attached to said manifold covering said second opening to provide access to said chamber without removing said packer from the manifold, and a motor capacitor in said chamber operatively connected to said motor.

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LOUIS J. DEMBO, *Primary Examiner.*

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,172,572 March 9, 1965

Marvin A. Brown et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 10, line 45, and column 12, line 15, for "insection" each occurrence, read -- insertion --; column 11, line 15, after "packer" strike out the comma; line 17, after "openings" strike out the comma.

Signed and sealed this 3rd day of August 1965.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents