

**[54] DISPENSING NOZZLE ARRANGEMENT
PROVIDING ELECTRICAL LOCKOUT**

[75] Inventor: **William B. Hansel, Media, Pa.**

[73] Assignee: **Sun Oil Company of Pennsylvania,**
Philadelphia, Pa.

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222/566, 141/351

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[58] **Field of Search** 141/351, 352, 104, 100,
141/98, 192, 193, 198, 99; 222/26, 27, 74,
75, 52, 63, 144.5, 566

[56] **References Cited**

UNITED STATES PATENTS

1,978,753	10/1934	Lent.....	222/52 UX
3,750,906	8/1973	Hansel.....	222/74
3,759,423	9/1973	Hansel.....	222/566 X

Primary Examiner—Robert B. Reeves

Assistant Examiner—Joseph J. Rolla

Attorney, Agent, or Firm—George L. Church; Donald R. Johnson; Frank A. Rechif

[57]

ABSTRACT

Nozzle arrangement which positively prevents the dispensing of unspecified fuels (e.g., leaded fuels) into "specification" automobiles which require "specification fuel" (e.g., non-leaded fuel) exclusively, while permitting the dispensing of unspecified fuels into other, "non-specification" automobiles. Separate pumping means are utilized for unspecified fuel and for specification fuel. The special fuel filler inlets of specification automobiles are modified (made special) to prevent use therein of a dispensing nozzle spout of standard configuration, a non-standard spout being employed for such automobiles. This non-standard spout incorporates an electrical lockout arrangement which functions to automatically render the unspecified-fuel pumping means inoperative whenever the non-standard spout is being utilized for dispensing into a special fuel filler inlet. Under other dispensing conditions, the unspecified-fuel pumping means is operative.

10 Claims, 5 Drawing Figures

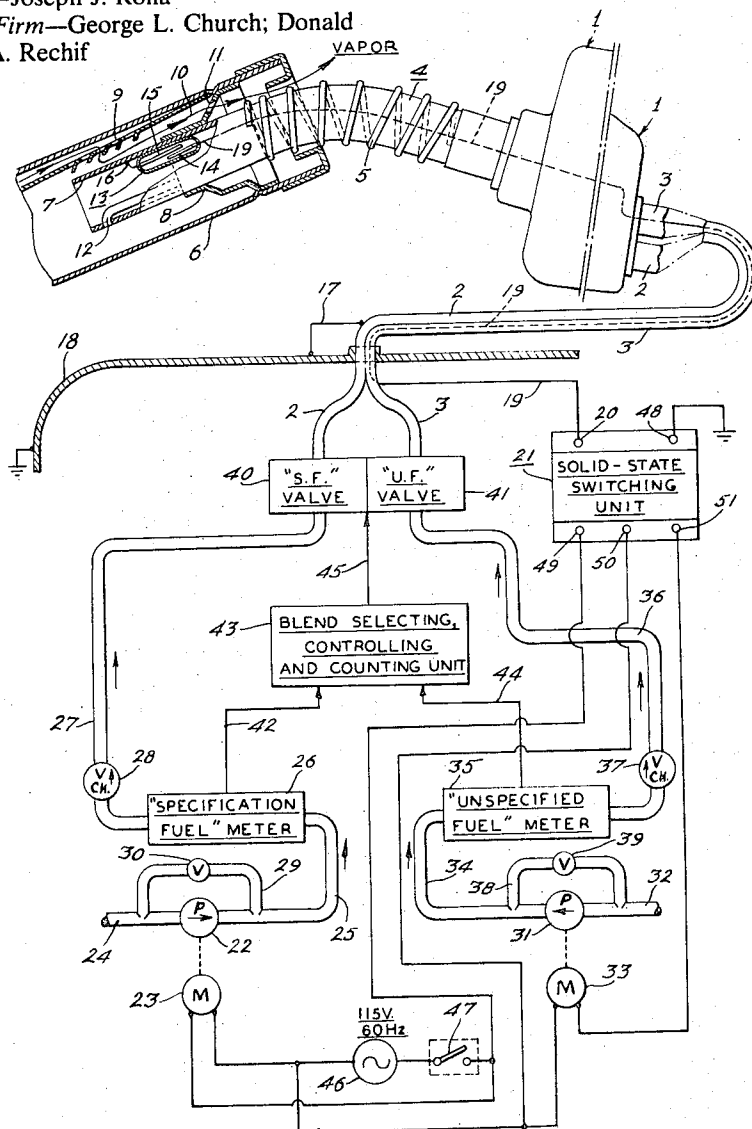


FIG. 1.

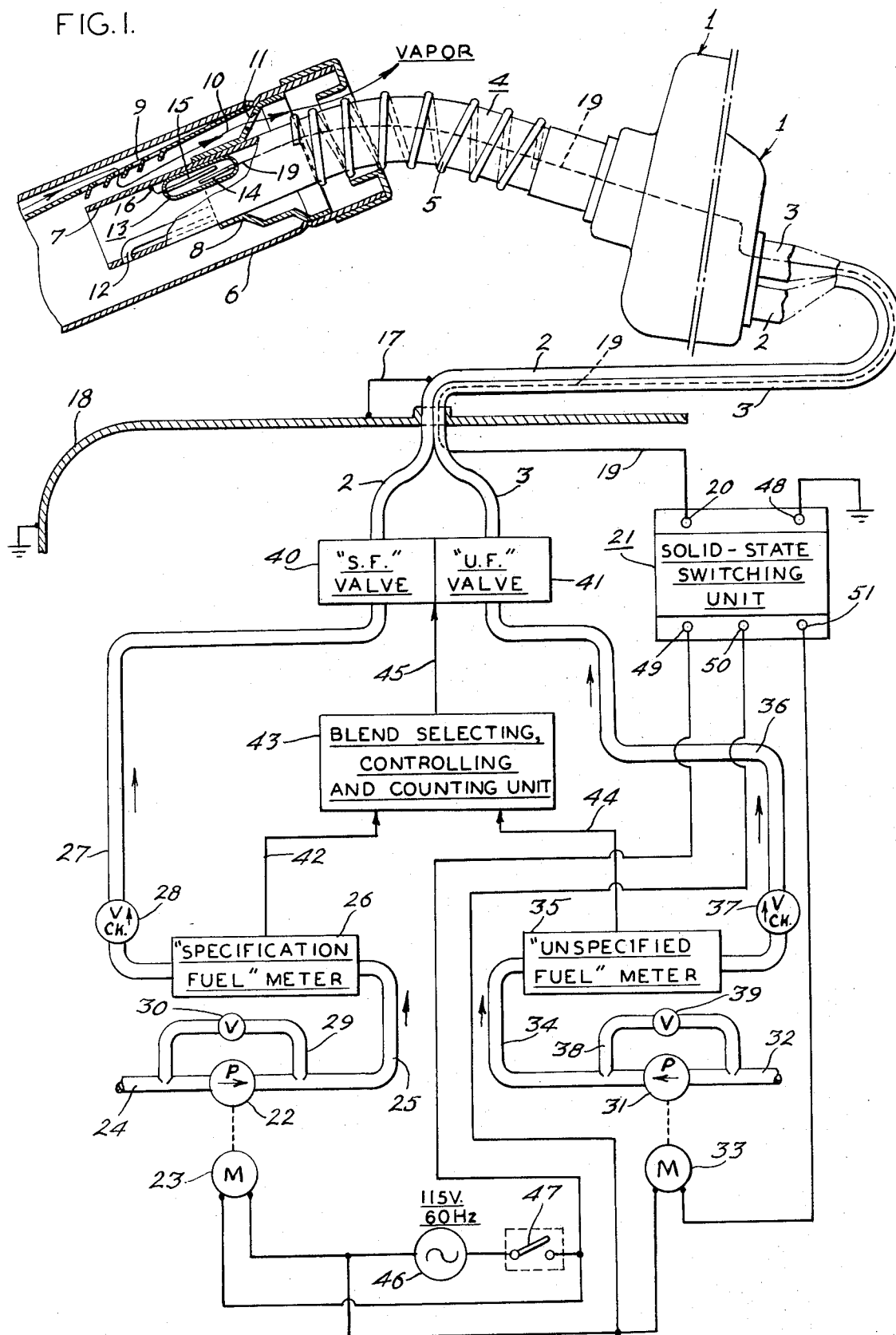


FIG. 2.

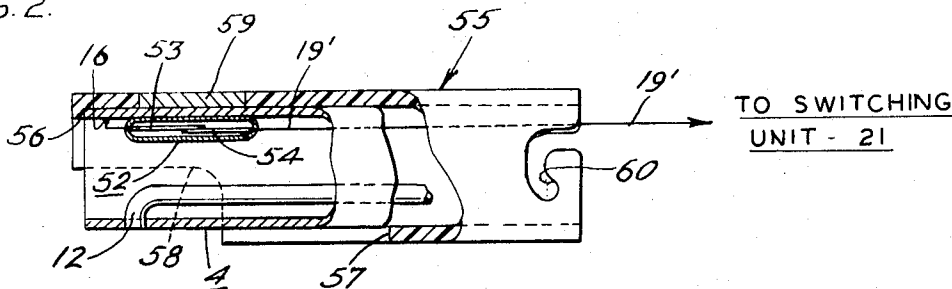


FIG. 3

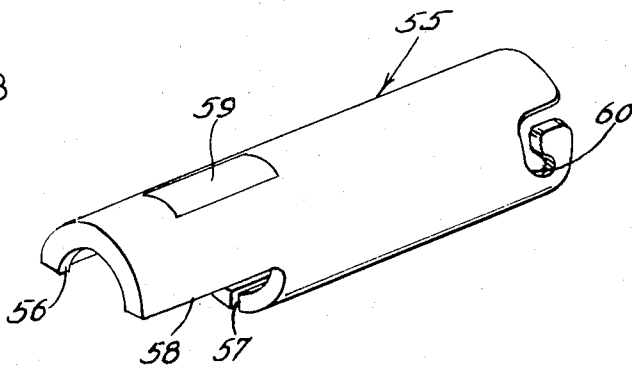


FIG. 4.

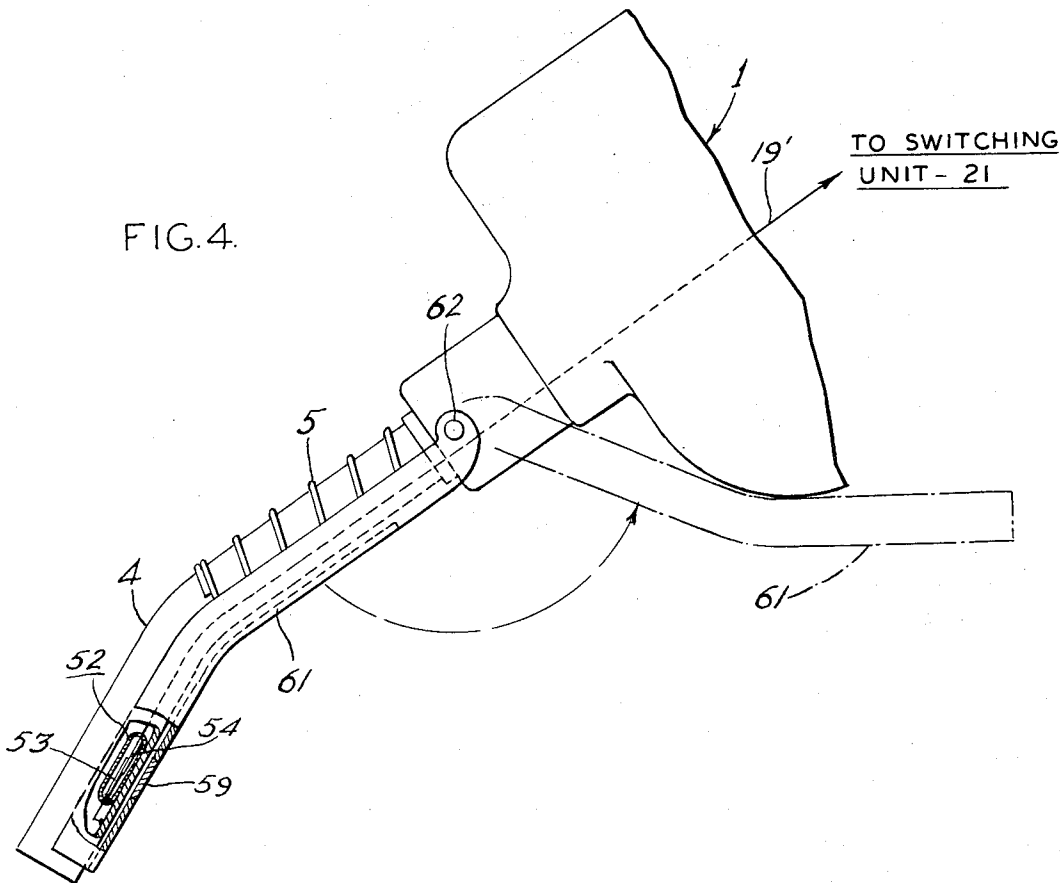
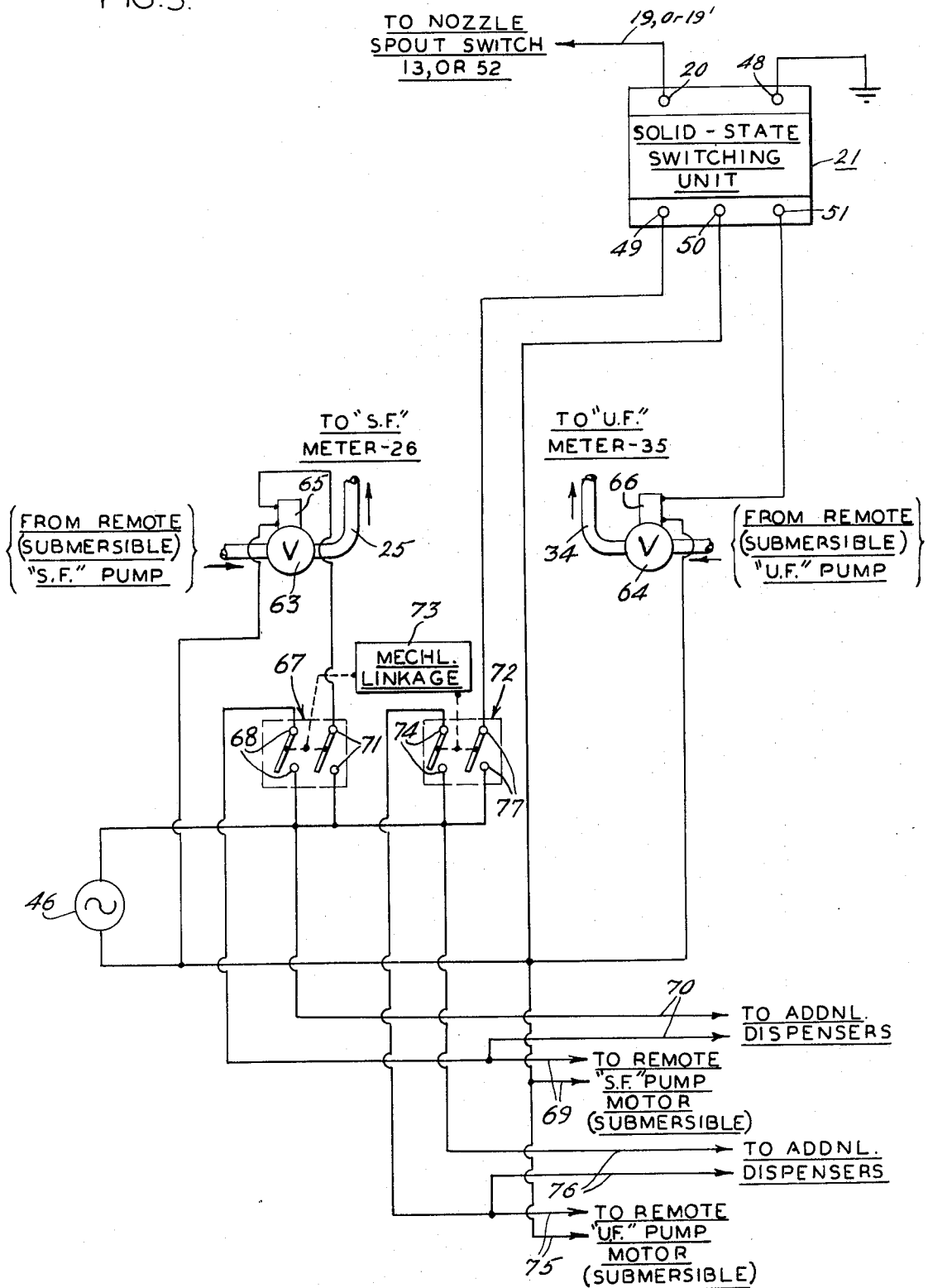


FIG. 5.



DISPENSING NOZZLE ARRANGEMENT PROVIDING ELECTRICAL LOCKOUT

This invention relates to a liquid fuel dispensing nozzle arrangement suitable for dispensing, selectively, both a specification fuel (typically, a non-leaded or unleaded fuel) and an unspecified fuel (typically, a highly leaded fuel), as well as various blends of these two fuels.

At the present time, there is being used rather extensively a multi-grade fuel dispensing apparatus which can be adjusted to dispense, selectively, solely a "hi" gasoline (referring to a relatively high-octane liquid fuel component), solely a "lo" gasoline (referring to a relatively low-octane liquid fuel component), or a blend of these "hi" and "lo" gasoline components or constituents. An apparatus of this type is disclosed in U.S. Pat. No. 2,880,908 and also in U.S. Pat. No. 2,977,970, both of which are assigned to the assignee of the present application.

As disclosed in U.S. Pat. No. 2,977,970, two separate conduits are utilized to convey the fuels from the housing of the dispensing apparatus to a dispensing nozzle, where mixing of the two components takes place (assuming that a blend of the two has been called for). The dispensing nozzle used in such an apparatus may therefore be termed a blending-type nozzle.

It has been announced that some automobiles (herein termed specification automobiles) will be provided with exhaust emission control equipment (such as a catalytic converter or catalytic muffler on the automobile exhaust) which requires a specification fuel exclusively, the term specification fuel denoting one which is lead-free or substantially lead-free, that is, an unleaded or non-leaded fuel.

In the dispensing of gasoline, it is essential to provide some scheme for differentiating between specification fuel and all other unspecified fuels (which latter may contain lead anti-knock compounds or octane improvers, and which are commonly used in so-called non-specification automobiles), in order to prevent the dispensing of unspecified fuels into specification automobiles. One such scheme which has met with approval is the use of special fuel filler inlets on specification automobiles, the term special here referring to fuel filler inlets which will prevent the entry therein of dispensing nozzle spouts of standard configuration, now universally used on dispensing nozzles; such standard configuration nozzle spouts have a nominal O.D. of 15/16 inch, or more. Then, for example, the special fuel filler inlets would be equipped with inserts which have the effect of reducing the diameter of such inlets so as to prevent the entry of standard-diameter nozzle spouts therein. Thus, standard dispensing nozzles cannot be used to dispense fuel into the fuel tanks of the specification automobiles. Under this scheme, nozzle spouts used to dispense specification fuel into specification automobiles would have a nominal O.D. of 13/16 inch, or less.

To satisfy the demand by owners of specification automobiles for the specification fuel, in the multigrade fuel dispensing apparatus previously mentioned the "lo" gasoline could be the specification fuel or non-leaded fuel, while the "hi" gasoline could be the unspecified fuel. Thus, the customer desiring (requiring) a specification fuel could obtain the same by calling for the dispensing of the "lo" gasoline alone.

It will be realized that it would be possible to use, in conjunction with the multigrade fuel dispensing apparatus mentioned, only a single non-standard (smaller diameter) nozzle spout for dispensing both specification fuel and unspecified fuels, since such a spout would fit into both the special fuel filler inlets (of the specification automobiles) and the conventional fuel filler inlets of the non-specification automobiles. However, if this is done, some fool-proof, automatic arrangement must be provided to make absolutely certain that unspecified fuels cannot be dispensed into the fuel tanks of specification automobiles. In other words, some means must be provided (preferably on the spout itself) which positively prevents the dispensing of unspecified fuels into fuel filler inlets designed to accept only specification fuel.

An object of this invention is to provide a blending-type dispensing nozzle which, under certain dispensing conditions, acts automatically to positively prevent the dispensing of one of the two blending components.

Another object is to provide a novel blending-type dispensing nozzle which positively prevents the dispensing of unspecified fuels into fuel filler inlets designed to accept only specification fuel.

A further object is to provide, in a blending-type nozzle having a non-standard spout adapted to be inserted into special fuel filler inlets, means which automatically and positively prevents the dispensing of one blending component whenever such spout is inserted into a special fuel filler inlet.

An additional object is to provide a removable adapter means for a blending-type dispensing nozzle having a non-standard spout which will enable such nozzle to be used for dispensing unspecified fuel into conventional fuel filler inlets, as well as (when the adapter is not used) for dispensing specification fuel into special fuel filler inlets.

Still another object is to provide, in a blending-type dispensing nozzle having a non-standard spout for insertion into special fuel filler inlets, an electrical lockout arrangement for locking out one blending component from the nozzle.

The objects of this invention are accomplished, briefly, in the following manner: In a first embodiment, a normally closed proximity switch is mounted in a non-standard dispensing nozzle spout (which is capable of being inserted into a special fuel filler inlet), this switch being connected electrically into the energization circuit for the unspecified fuel (i.e., the leaded blending component) pumping means in such a way that opening of this switch renders this pumping means inoperative. When this spout is thrust into a special fuel filler inlet containing an insert of ferromagnetic material, the proximity switch is magnetically operated to open position. In another embodiment, a normally open reed switch is mounted in the non-standard dispensing nozzle spout and is electrically connected in the same manner as in the first embodiment. When dispensing of unspecified fuel into non-specification automobiles (having conventional fuel filler inlets) is called for, a removable adapter carrying a switch-operating means in the form of a permanent magnet is placed over the non-standard spout, to convert it to a standard configuration and to magnetically operate the reed switch to closed position.

A detailed description of the invention follows, taken in conjunction with the accompanying drawings, wherein:

FIG. 1 is a combined block and schematic diagram illustrating the liquid, mechanical, and electrical connections of various elements involved in a dispensing apparatus employing one embodiment of a nozzle arrangement according to this invention;

FIG. 2 is a cross-section showing a nozzle spout utilizing another form of electrical control means, with an adapter in position over the spout;

FIG. 3 is an isometric view of the adapter sleeve used in the FIG. 2 embodiment;

FIG. 4 is an elevational view illustrating another form of spout adapter; and

FIG. 5 is a schematic diagram illustrating the electrical connections involved in a dispensing apparatus utilizing a nozzle arrangement according to this invention, but employing another form of pumping means.

Referring now to FIG. 1, the upper end of a dispensing nozzle according to a first embodiment of the invention includes an elongated chambered body or housing denoted generally by numeral 1, in the form of a metallic casting. The dispensing nozzle is of the so-called blending type, and is adapted to be supplied with two liquid fuel components by means of two respective hoses 2 and 3 (to be later referred to in more detail) which are coupled to the extreme upper end of the nozzle body 1, as shown. The chambered body 1 may contain structure (not shown) appropriate to a blending-type nozzle, including at least one main poppet valve operated by means of a pivoted lever, automatic shut-off mechanism for this valve, etc., all as known to those skilled in the art; typical structure which can be used is shown in my abandoned application, Ser. No. 63,827, filed Aug. 14, 1970.

To the lower end of housing 1 is secured (as by brazing or welding) the upper end of a tubular metallic spout 4 which is of non-standard size (O. D.), as set forth in a recommended practice for the dispensing of specification fuel (ordinarily, an unleaded or non-leaded fuel). The spout 4 has a nominal O. D. of 13/6 inch or less, as contrasted to spouts of standard configuration (used throughout the industry), which have a nominal O. D. of 15/16 inch or more. A more or less conventional friction-providing and electrical-contact-making spring 5 is mounted about the spout 4. The spout 4 is curved to facilitate insertion into the fuel filler inlet (fillpipe) 6 of an automobile's fuel tank. When spout 4 is in dispensing position, spring 5 provides electrical contact between the metallic fuel filler inlet 6 and the spout 4.

The non-standard spout 4 is capable of being inserted into the special fuel filler inlet 6 provided on a specification automobile, which automobile requires a specification fuel exclusively (because of the emission control equipment carried by such automobile). Thus, in addition to its smaller (i.e., smaller than standard) O. D., the spout 4 should be straight for at least 3 inches from its outlet 7, and the lower end of the spring 5 should be at least 4 inches away from the outlet.

As illustrated, the special fuel filler inlet 6 is provided with means whereby it is capable of accepting only a non-standard nozzle spout as above described, that is, with means sized to stop insertion of all nozzle spouts larger in diameter than about 0.850 inch (which includes all popular or standard current and past model

nozzle spouts). This means may comprise a stamped skirt or insert 8 of ferromagnetic material, providing a nozzle port of about 0.850 inch inside diameter, securely mounted in the upper end of a conventional outer fill tube (which is 2 inches in diameter).

The special fuel filler inlet 6 includes a conventional vapor baffle 9, which causes expelled vapor to follow the general path indicated by the directed line 10, through a vapor vent 11 provided in insert 8. If desired, the vapor so expelled or displaced from the fuel tank, when fuel is dispensed thereto, may be collected by a vapor seal device (flexible bellows, or boot, not shown) of the type described in my U.S. Pat. No. 3,566,928.

The spout 4 has, near the outlet end 7 thereof, the usual orifice (schematically indicated at 12) for an automatic shut-off mechanism, of conventional type.

A proximity switch 13 (magnetically-actuated) having a pair of contacts 14 and 15 is mounted in the wall of spout 4. Contact 15 is electrically connected at 16 to the metallic spout 4, which provides a ground for the system. The spout 4, as is customary in devices of this nature, is metallically connected through the nozzle body 1 to the outer ends of conventional metallic braids or metallic springs (not shown) provided in each of the hoses 2 and 3. These springs mechanically reinforce or strengthen the hoses, as well as providing the required electrical ground connections. The inner ends of these springs are electrically connected as at 17 to the grounded housing 18, which houses the fuel pumps and other components of the liquid fuel dispensing apparatus, to be described.

Contact 14 of the proximity switch 13 is electrically connected to the lower end of an insulated electrical conductor 19, which extends through one of the hoses (illustrated as hose 3) to the interior of housing 18; inside housing 18, the upper end of conductor 19 is connected to one switch terminal 20 of a solid-state switching unit 21, to be later described.

The proximity switch 13 has incorporated therein, as an essential part thereof, a pair of permanent magnets (not shown) which are arranged to normally (that is, at all times except when spout 4 is positioned within the special fuel filler inlet 6, in close juxtaposition to the ferromagnetic insert 8) exert magnetic forces on contacts 14 and 15 such as to keep them in engagement (that is, closed). That is to say, the proximity switch 13 is normally closed. However, when spout 4 is inserted into the special inlet 6, the ferromagnetic insert 8 alters the normal magnetic flux pattern in such a way as to move the contacts 14 and 15 away from each other (thereby to open the switch). Since spout 4 is illustrated in FIG. 1 as being inserted into the special inlet 6, the switch 13 is illustrated in its open position. When spout 4 is inserted into a standard or conventional fillpipe (without the insert 8), no ferromagnetic material is brought into close juxtaposition with proximity switch 13; hence, under these dispensing conditions no alteration of the normal magnetic flux pattern occurs, and the switch contacts 14 and 15 remain closed.

The apparatus housing indicated at 18 (which is grounded as illustrated) may be of generally conventional type, locked against unauthorized access, and provided with windows and various operating devices accessible from the outside of the housing, as will hereafter appear. Generally speaking, the two liquid fuel (gasoline) blending components previously referred to

comprise (1) a specification fuel of relatively "lo" octane, which would be a non-leaded or unleaded fuel, and (2) an unspecified fuel of relatively "hi" octane, which would be a leaded or lead-containing fuel. It should be mentioned at this juncture that, since all blends of the two components contain, of course, some of the leaded component, they would also be so-called unspecified fuels. Included in the apparatus in housing 18 is a specification fuel or "lo" fuel pumping means, comprising a suction pump 22 driven by an electric motor 23, the pump 22 being provided with an inlet or suction connection 24 from the specification fuel supply tank. The specification fuel to be dispensed flows through connection 25 and a conventional specification fuel meter 26 and thence through the pipe connection 27 incorporating a check valve 28. A bypass 29 is provided containing a relief valve 30 to bypass the pump 22 in the event a delivery valve is closed.

A "hi" or unspecified fuel pumping means includes a suction pump 31 which draws its supply of unspecified fuel ("hi" or lead-containing gasoline) from a tank through suction pipe connection 32. This pump 31 may be of the same type as pump 22 and may be driven by a separate electric motor 33. The unspecified fuel pump 31 delivers such fuel through line 34 to the unspecified fuel meter 35 which may be of the type serving to meter the specification fuel. Delivery from the meter 35 takes place through piping 36 which includes the check valve 37. Associated with the pump 31 is a bypass 38 incorporating a relief valve 39.

The specification and unspecified fuels delivered, respectively, through lines 27 and 36 are respectively controlled by the proportioning valves 40 and 41, from which they are delivered through the hoses 2 and 3, the inner end of hose 2 being connected (inside housing 18) to the outlet side of valve 40 and the inner end of hose 3 being connected (also inside housing 18) to the outlet side of valve 41. (The outer ends of hoses 2 and 3 are connected to the nozzle body 1 in a suitable manner, for example as shown by my aforementioned abandoned application.) As disclosed in said abandoned application, the hose passages are maintained separate, communicating with each other only closely adjacent the nozzle poppet valve. Thus, admixture of the two fuel components cannot take place to any substantial degree so as to markedly change the composition dispensed.

The solid connecting lines provided with arrows in FIG. 1 indicate mechanical connections, while the solid connecting lines without arrows indicate electrical connections. The specification fuel meter 26 provides one input 42 to a blend selecting, controlling, and counting unit 43, the other input to which is provided at 44 from unspecified fuel meter 35. The unit 43 preferably comprises various gear boxes, differentials, counters, a variator, etc., interconnected and functioning in the manner disclosed in the above-mentioned U.S. Pat. No. 2,880,908. As disclosed in said patent, the unit 43 includes a final blend controlling differential the mechanical output of which at 45 controls concurrently the relative positions of the specified or "lo" and unspecified or "hi" proportioning valves 40 and 41.

The electric motors 23 and 33 for the pumps 22 and 31, respectively, are adapted to be energized from the 115-volt alternating current source 46. The motor 23 for the specification fuel pump 22 is connected across the source 46 in series with the manually-operated

switch 47 so that whenever switch 47 is closed, motor 23 is energized and pump 22 is turned on. Switch 47 is preferably actually located on the outside of housing 18, as shown, for example, in U.S. Pat. No. 3,006,504.

The second switch terminal 48 of the solid-state switching unit 21 is connected to the ground point, as illustrated. Thus, under so-called normal conditions (to wit, at all times except when spout 4 is inserted into the special inlet 6), contacts 14 and 15 of the proximity switch 13 are closed, completing a circuit between the terminals 20 and 48 (since switch contact 15 is grounded). However, when spout 4 is inserted into the special inlet 6, the proximity switch contacts 14 and 15 are opened, thereby opening the circuit between switch terminals 20 and 48.

The unit 21 is an intrinsically safe, solid-state, single-pole, single-throw switching unit, and may be, for example, a Safe-Pak switching unit, as manufactured by the Gems Division, De Laval Turbine, Farmington, Connecticut. Such a unit, located in a non-hazardous area such as within apparatus housing 18, can provide switch control of a load (connected to its load terminals 49, 50, and 51 as will be described) from a remote sensing device (such as proximity switch 13) in a hazardous location (to wit, closely adjacent the gasoline-dispensing end of nozzle spout 4). Since the unit 21 has been designed to be intrinsically safe, no explosion-proof housing is necessary for switch 13, even though this switch is located in a hazardous area or hazardous location.

The motor 33 for the unspecified fuel pump 31 is controlled or switched by the switching unit 21. One load terminal 49 of unit 21 is connected to one side of the power source 46 through the switch 47, the second load terminal 50 is connected to the other side of source 46 and to one energization terminal of motor 33, while the third load terminal 51 is connected to the other energization terminal of motor 33. The switching unit 21 opens, thereby disconnecting motor 33 from the energization source or power source 46, in response to the opening of the proximity switch contacts 14 and 15; it will be recalled that the contacts 13 and 14 are opened whenever the spout 4 is thrust into a special inlet 6, containing ferromagnetic insert 8. Hence, an electrical lockout arrangement is provided which functions to automatically render the unspecified-fuel pump 31 inoperative (by deenergizing its driving motor 33) whenever the nonstandard spout 4 is being utilized for dispensing into a specification fuel filler inlet 6. In this connection, it will be realized that it will be absolutely impossible for the apparatus to dispense any unspecified fuel whenever the pump 31 is not driven by its motor 33. Thus, the spout 4 is provided with means 13, 21, etc. which positively prevents the dispensing of unspecified fuels (to wit, either the leaded fuel component solely, or blends of the leaded and non-leaded fuel components) into fuel filler inlets (such as inlet 6) designed to accept only specification fuel.

The switching unit 21 closes, thereby connecting motor 33 to energization source 46, when the proximity switch contacts 14 and 15 are in their normal, closed position; these contacts 14 and 15 are closed when the spout 4 is being used for dispensing into a conventional or standard, non-specification fuel filler inlet. Hence, the pump 31 is fully operative under these

conditions and may be used to dispense unspecified fuels into non-specification automobiles, if desired.

As disclosed hereinabove and in the previously mentioned U.S. Pat. Nos. 2,880,908 and 2,977,970, in a multi-grade fuel dispensing apparatus of the type referred to the specification fuel and unspecified fuel streams are metered by separate meters 26 and 35, and the outputs from these meters are fed to the inputs of respective gear boxes (adjusted or set by means of a blend selector, manually operable) in unit 43, whose outputs drive a subtractive differential (also in unit 43). The output of the differential, in turn, controls at 45 the two control valves 40 and 41, which may be thought of as a blend control valve.

In operation, the output of the differential referred to controls the relative positions of the control valves 40 and 41 in such a way that, with particular settings of the specification fuel gear box and unspecified fuel gear box, if the meters 26 and 35 indicate a proper ratio of deliveries of the two fuel components, the output of the differential is zero and does not affect the settings of the control valves 40 and 41; on the other hand, if this correspondence does not exist, an output from the differential adjusts these control valves to control the composition of the desired blend. More specifically, as one control valve opens the other control valve closes, the relative positions of the valves controlling the proportioning of the components. The settings of the gear boxes determine the relative flows which would be required to maintain at zero the output of the differential to hold the control valves in fixed relative position; if the rate of flow of "lo" gasoline or specification fuel relative to "hi" gasoline or unspecified fuel exceeds the predetermined ratio, the differential output is of such a direction as to move the "lo" control valve 40 toward closed position and the "hi" control valve 41 toward open position.

As previously described, the dispensing of unspecified fuels into special fuel filler inlets is positively prevented (by rendering the pump 31 in effect inoperative when the nozzle spout 4 is inserted into such an inlet). This result comes about even when the operator inadvertently fails to set the blend selector to deliver solely specification fuel when dispensing into the special fuel filler inlet 6 of a specification automobile. For example, suppose the operator inadvertently sets the blend selector for a blend of "lo" and "hi" gasolines (i.e., for an unspecified fuel), then inserts the nozzle spout 4 into a special fuel filler inlet 6. This causes the proximity switch contacts 14 and 15 to open, as above described. Now, when the nozzle main poppet valve (not shown) is manually opened, no unspecified fuel can flow, because the pump 31 is rendered inoperative by deenergization of its driving motor 33.

Since the gear boxes were set for a certain proportion of unspecified fuel relative to specification fuel, but no unspecified fuel is flowing through the meter 35 (pump 31 not being running), the differential output moves the valve 41 toward open position and the valve 40 toward closed position, and this continues (because no unspecified fuel at all can flow, even though the control valve 41 is opened wide) until, at the point where the valve 40 is completely closed, a control arm (not shown) is mechanically moved to shut off the specification fuel motor 23. Such a control arm is conventionally provided in multi-grade fuel dispensing apparatus of the type described in the above-mentioned U.S. Pat.

No. 2,880,908. Thus, under these conditions also (spout 4 inserted into a special filler inlet 6, and blend selector set to some stop other than that for solely specification fuel), no leaded or unspecified fuel can flow into the specification automobile; some non-leaded or specification fuel will flow until the pump 22 is automatically rendered inoperative by the action of the differential (cutting off motor 23), above described.

Now refer to FIGS. 2 and 3, which illustrate a generally preferred embodiment of the invention. In FIGS. 2 and 3, elements the same as those previously described are denoted by the same reference numerals, while similar elements are denoted by the same reference numerals but carrying prime designations. In the embodiment of FIGS. 2 and 3, the non-standard metallic nozzle spout 4 (which has, as in the FIG. 1 embodiment, a nominal O. D. of 13/16 inch or less, such that it can enter into the special fuel filler inlet 6 of a specification automobile) has mounted therein a magnetic reed switch 52 with a pair of contacts 53 and 54 which are normally open, but which are illustrated in FIG. 2 (for reasons which will later become apparent) in the closed position. The switch 52 may, for example, be an IBM Miniature Dry Reed Switch, manufactured by International Business Machines Corporation, Industrial Products, White Plains, New York. In brief, such a switch consists of two reeds 53 and 54 of ferromagnetic material, inserted into opposing ends of a glass envelope in a cantilever fashion. The internal ends of the reeds are overlapped, the glass envelope is fused to the reed shanks, and a fixed air gap is established between the cantilever beams. When a magnetomotive force (MMF) is applied to the envelope by a permanent magnet, the reed becomes a flux-carrying element in the magnetic circuit. The noble metal contact ends assume opposite polarity and are thus snapped together, closing the switch.

The switch contact 53 is electrically connected at 16 to the body of nozzle spout 4 and is thus connected to ground, while the remaining switch contact 54 is connected to the insulated lead 19', which extends to the dispensing apparatus housing and is connected inside such housing to the switch terminal 20 of a solid-state switching unit 21, as in FIG. 1, the other switch terminal 48 of the unit 21 being grounded. The circuit utilized in connection with the FIG. 2 device is exactly the same as in FIG. 1, with the switching unit 21 controlling the energization of the unspecified fuel pump driving motor.

For the dispensing of specification fuel into specification automobiles, the non-standard spout 4 is used without the removable adapter member (sleeve) 55 which will later be described, since this spout is sized for insertion into the special fuel filler inlet 6 only when the adapter 55 is not present on the spout 4. Since the reed switch contacts 53 and 54 are normally open, they will, under the presently described dispensing conditions, be open, electrically locking out the unspecified-fuel or leaded-fuel pump 31 by deenergization of its driving motor 33 (the circuit between the switch terminals 20 and 48 of switching unit 21 now being open). Thus, the reed switch 52 (in combination, of course, with the solid-state switching unit 21) comprises a means which positively prevents the dispensing of unspecified fuels into fuel filler inlets (such as 6, FIG. 1) designed to accept only specification fuel.

For the dispensing of unspecified fuels into non-specification automobiles, a removable (slip-on) adapter member (sleeve) 55 is provided, to be slipped over the outer or dispensing (free) end of the non-standard spout 4, as illustrated in FIG. 2; the adapter member itself is illustrated in FIG. 3. When the adapter 55 is in place on nozzle spout 4, a composite spout of standard configuration (nominal O. D. of 15/16 inch or more) is formed. This composite spout, of standard configuration, is too large to be inserted into the special fuel filler inlet 6 (and hence cannot be inserted thereinto), but can readily be inserted into the standard or conventional fuel filler inlet of a non-specification automobile.

The spout adapter (sleeve) 55 is made of a suitable thermoplastic material and has a cylindrical outer configuration, being sized to slip over the O. D. of the non-standard nozzle spout 4 and having a radially inwardly extending lip 56 at its forward end which comes into engagement with the outer or free end of the nozzle spout 4 to establish the home position of the adapter when it is pushed over the spout. The adapter sleeve is slotted longitudinally at 57 for a certain distance rearwardly from its forward end, to accommodate small variations in spout O. D.s by providing a degree of resilience. For some distance back from the forward end thereof, approximately half of the sleeve circumference is cut away, as at 58, so that, when sleeve 55 is placed over the nozzle spout as in FIG. 2, there will be no interference by the sleeve (during the dispensing of fuel through the nozzle spout) with the orifice 12 used for automatic shut-off of the nozzle.

The spout adapter 55 has fixed thereto, in any suitable manner, a permanent magnet 59 so located as to come into juxtaposition with the reed switch 52 when the adapter is slipped onto the nozzle spout, as in FIG. 2. When the permanent magnet 59 is placed in juxtaposition with respect to the reed switch 52 by slipping the adapter 55 over the nozzle spout 4, the switch contacts 53 and 54 are snapped together in response to the applied MMF, closing the switch as illustrated in FIG. 2. It may be noted at this juncture that the nozzle spout 4 is made of a nonmagnetic (paramagnetic) material such as aluminum.

The adapter (sleeve) 55 is of course pushed over the nozzle spout 4 from the free or outer end of the latter. In order to assure that, when the adapter is applied to the nozzle spout, the permanent magnet 59 will be located properly for operation of reed switch 52, the adapter 55 has therein, at its rear end, a bayonet-type slot 60 which is designed to receive an outwardly-extending positioning pin (not shown) fixed in the nozzle spout 4.

When the reed switch contacts 53 and 54 are closed by the application to the nozzle spout of the adapter sleeve 55, a circuit is completed between the switch terminals 20 and 48 of the switching unit (FIG. 1), energizing the motor 33 for the unspecified fuel pump 31 (assuming, of course, that the manually operated pump motor switch 47 has been operated to on). Then, dispensing of unspecified fuels into the conventional fuel filler inlet of a non-specification automobile may take place.

In this connection, it should be apparent that in the FIG. 1 embodiment also, the closing of the proximity switch contacts 14 and 15 (due to withdrawal of the nozzle spout from the special fuel filler inlet 6) will not

result in energizing the unspecified fuel pump motor 33 unless the manually-operated master switch 47 has been operated to on.

As previously mentioned, the non-standard spout 4 is straight for at least 3 inches from the outlet, and the retention spring 5 (see FIG. 1) is at least 4 inches away from the outlet. The adapter sleeve 55 is well under 3 inches long; it can therefore be readily slipped over the straight portion of the nozzle spout, and will not interfere with the spring 5. Also, since the adapter 55 (when mounted on the nozzle spout) is positioned in the area between the lower end of spring 5 and the outlet end of the spout, it does not preclude or prevent the use of a vapor recovery device on the nozzle spout, and, specifically, does not interfere in any way with the vapor recovery bellows or boot disclosed in my U.S. Pat. No. 3,566,928 previously mentioned. Of course, the said bellows or boot may be easily used with the arrangement of FIG. 1 also (since the spout only is used in such arrangement, with no external adapter whatever).

Refer now to FIG. 4. In this embodiment, a shroud 61 of non-magnetic material is pivotally mounted at 62 on the nozzle housing 1, and is adapted to be swung between a position (illustrated in solid lines) wherein it overlies the nonstandard spout 4 and a position (illustrated in dotted lines) wherein it is widely separated from the nozzle spout and is close to a portion of the nozzle housing or body. In FIG. 4, the shroud 61 carries a permanent magnet 59 which is adapted to cooperate with a reed switch 52 exactly like that shown in FIG. 2, similarly mounted in the non-standard nozzle spout 4, and electrically connected in the same manner as in the FIG. 2 embodiment. When shroud 61 is in the solid-line position (swung over the non-standard spout), the reed switch contacts 53 and 54 are closed in response to the application of the MMF, but when the shroud is in the dotted-line position, away from the nozzle spout, these reed switch contacts are in their normal, open position.

The shroud 61 has a somewhat trough-shaped transverse cross-section, and when swung over the non-standard spout, has the effect of enlarging its O. D. so that it cannot then be inserted into the special fuel filler inlet 6. In this position, however, the reed switch contacts are closed (turning on the unspecified fuel pump motor 33), and the composite spout will fit into a standard configuration fuel filler inlet and can be used to dispense unspecified fuels into non-specification automobiles.

When the shroud 61 is pivoted to the dotted-line position, away from the spout 4, the non-standard spout 4 can enter into the special fuel filler inlet 6 of a specification automobile. With the shroud in this position, however, the reed switch contacts are in their normal, open position, so the unspecified fuel pump 31 is in effect inoperative (because its motor 33 is not energized). Hence, the dispensing of unspecified fuels into the fuel filler inlet 6 (designed to accept only specification fuel, since it is on a specification automobile) is again positively prevented.

The preceding has described utilization of the invention (automatic electrical lockout of the unspecified fuel pumping means, under certain conditions) in connection with suction pumps 22 and 31 which are both located within the dispensing apparatus housing 18. However, it is also applicable to fuel pumping means of the so-called remote dispenser type, wherein the pumps

themselves are of the submersible type and are located within the underground fuel storage tanks, remote from the dispensing apparatus housing 18.

Refer now to FIG. 5, which is a somewhat simplified circuit schematic of an electrical lockout arrangement for a pumping means of the last-mentioned or remote type. Again, elements the same as those previously described (particularly in connection with FIG. 1) are denoted by the same reference numerals. The circuitry of FIG. 5 is all located within a dispensing apparatus housing similar to housing 18, but of the remote dispenser type.

A remote (submersible) specification fuel pump (not shown), located in the subterranean specification fuel storage tank, is arranged to supply this fuel through a pipe 25, under the control of a solenoid valve 63 located in the dispensing apparatus housing, to the specification fuel meter 26. The remote dispenser fuel pumping means for the specification fuel thus comprises the remote pump just mentioned, in conjunction with the valve 63. Similarly, a remote (submersible) unspecified fuel pump (not shown), located in the subterranean storage tank containing the unspecified fuel, is arranged to supply this latter fuel through a pipe 34, under the control of a solenoid valve 64 also located in the dispensing apparatus housing, to the unspecified fuel meter 35. The remote dispenser fuel pumping means for the unspecified fuel thus comprises the remote pump just mentioned, in conjunction with the valve 64. The solenoid valves 63 and 64 are opened in response to the energization of their respective solenoids 65 and 66, and are closed when these solenoids are not energized.

A double-pole, single-throw specification fuel switch 67 has one pair of contacts 68 connected in series in an energization circuit (by way of a pair of leads 69) for the driving motor of remote specification fuel pump, this circuit being supplied from the alternating current source 46. Thus, when contacts 68 are closed, the specification fuel pump will be energized. Since the same specification fuel pump must supply fuel to other dispensers, the corresponding switch contacts 68 of these additional dispensers are connected to the leads 70 paralleled to contacts 68; thus, the specification fuel pump may be energized from these additional dispensers, also.

The second pair 71 of contacts of switch 67 is connected in series in an energization circuit for solenoid 65 of the specification fuel valve 63, from the source 46; when contacts 71 are closed, solenoid 65 is energized to open valve 63, and specification fuel may then flow through the pipe 25 (provided, of course, that the corresponding remote pump is then operating, which will be the case because contacts 68 are also closed at this time).

A double-pole, single-throw unspecified fuel switch 72 is coupled by means of a suitable mechanical linkage 73 to switch 67, in such a way that: (1) switch 67, only, is closed when solely "lo" gasoline is being dispensed; (2) switch 72, only, is closed when solely "hi" gasoline is being dispensed; and (3) both switches 67 and 72 are closed when blends of "lo" and "hi" gasolines are being dispensed. The switch arrangement 67, 72, 73 is operable from the outside of the dispenser housing.

Although not described earlier, actually two switches and a mechanical linkage similar to that described in

the preceding paragraph (referring to 73) would be used at 47 in FIG. 1.

One pair 74 of contacts of the switch 72 is connected in series in an energization circuit (by way of a pair of leads 75) for the driving motor of the remote unspecified fuel pump, this circuit being supplied from the source 46. Thus, when contacts 74 are closed, the unspecified fuel or "hi" gasoline pump will be energized. Since the same "hi" gasoline pump must supply fuel to other dispensers, the corresponding switch contacts 74 of these additional dispensers are connected to the leads 76 paralleled to contacts 74; thus, the "hi" gasoline pump may be energized from these additional dispensers, also.

In FIG. 5, the solid-state switching unit 21 is connected to control the energization of the solenoid 66 of "unspecified fuel" valve 64, in a manner analogous to the control of pump motor 33 by the unit 21, in FIG. 1. Thus, terminal 51 of unit 21 is connected to one end of solenoid 66, the other end of this solenoid being connected to one line terminal (of 46) and also to terminal 50 of unit 21. Terminal 49 of unit 21 is connected in series with the pair 77 of contacts of the switch 72, to the other line terminal (of 46).

The ungrounded switch terminal 20 of unit 21 may be connected, by means of the lead 19, or 19', to a nozzle spout switch, either the proximity switch 13, or the reed switch 52.

Assuming switch contacts 77 are closed at the start of a dispensing operation (as they normally would be in order to dispense an unspecified fuel), when contact 20 is grounded (switch 13 being closed when the small-diameter nozzle spout is used in a standard fuel filler inlet, or switch 52 being closed by means of the sleeve adapter 55 or the pivoted adapter 61), unit 21 operates to complete the energization circuit to solenoid 66 of the unspecified fuel valve 64. Valve 64 is then opened, and unspecified fuel may then flow through pipe 34 (provided, of course, that the corresponding remote pump is then operating, which will be the case because contacts 74 are also closed at this time).

When the non-standard or small-diameter spout is used in a special fuel filler inlet as in FIG. 1, switch 13 is opened, as previously described; when the adapters of FIGS. 2 or 4 are not in operative position, so that the spout can be used in a special fuel filler inlet, the switch 52 is opened. In both of these cases, the circuit between terminals 20 and 48 of switching unit 21 is broken or incomplete; the unit 21 then opens the energization circuit to solenoid 66, closing the valve 64 and preventing the flow of unspecified fuel through pipe 34. Thus, the unspecified fuel is electrically locked out and any dispensing thereof into specification automobiles is automatically and positively prevented, even though switch 72 is inadvertently closed at this time.

It can therefore be seen that electrical lockout of the unspecified fuel under the desired conditions is again the result, though in the case of the remote dispenser pumping means of FIG. 5 the solenoid valve 64 for the unspecified fuel is controlled, rather than the motor 33 for the unspecified fuel pump, as in the case of the suction pumping means described in connection with FIG. 1.

The invention claimed is:

1. In a motor fuel dispensing apparatus capable of dispensing specification fuel into the fuel tanks of specification automobiles requiring such fuel exclusively

and having their fuel filler inlets constructed and arranged to prevent the insertion thereof of dispensing nozzle spouts of standard configuration, said apparatus being also capable of a dispensing unspecified fuels into the fuel tanks of other, non-specification automobiles: a dispensing nozzle with a non-standard spout capable of insertion into the fuel filler inlets of both specification and non-specification automobiles, separate controllable means for pumping specification and unspecified fuels, respectively, through said nozzle spout, and means associated with said nozzle spout for causing the unspecified-fuel pumping means to be rendered inoperative whenever said non-standard spout is inserted into the fuel filler inlet of a specification automobile.

2. Combination according to claim 1, wherein each of said pumping means includes an electric pump driving motor, and wherein said spout-associated means includes electrical circuitry for controlling the energization of the motor for the unspecified-fuel pumping means.

3. Combination according to claim 1, wherein each of said pumping means includes a pump and a solenoid valve coupled to the discharge of the corresponding pump, and wherein said spout-associated means includes electrical circuitry for controlling the energization of the solenoid valve for the unspecified-fuel pumping means.

4. Combination according to claim 1, wherein said spout-associated means includes a normally closed proximity switch mounted in said spout and magnetically operated to open position in response to the insertion of said non-standard spout into the fuel filler inlet of a specification automobile, the opening of said switch serving to render the unspecified-fuel pumping means inoperative.

5. Combination according to claim 1, wherein said spout-associated means includes a normally open switch mounted in said non-standard spout, said switch when open causing the unspecified-fuel pumping means to be rendered inoperative.

6. Combination defined in claim 5, including also a removable adapter for said non-standard spout operable to convert said spout to a standard configuration, and means carried by said adapter for operating said switch to closed position upon the placing of said adapter in operative position on said non-standard spout, thereby to render operative the unspecified fuel pumping means.

7. Combination according to claim 6, wherein said normally-open switch comprises a magnetic reed switch, and wherein the switch-operating means carried by said adapter comprises a permanent magnet.

8. Combination according to claim 6, wherein the standard spout has a larger outer diameter than the said nonstandard spout, and wherein the removable adapter comprises a member adapted to be placed over the non-standard spout to convert it to a standard configuration.

9. Combination defined in claim 8, wherein said member comprises a sleeve of non-magnetic material adapted to be slipped over the non-standard spout and carrying switch-operating means comprising a permanent magnet.

10. Combination defined in claim 8, wherein said member comprises a shroud of non-magnetic material pivotally mounted on the nozzle body and adapted to be swung over the non-standard spout, said shroud carrying switch-operating means comprising a permanent magnet.

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