

May 24, 1966

T. H. HOULE ETAL

3,252,620

DISPENSING AND METERING CONTROL

Filed July 6, 1964

4 Sheets-Sheet 1

FIG. 1.

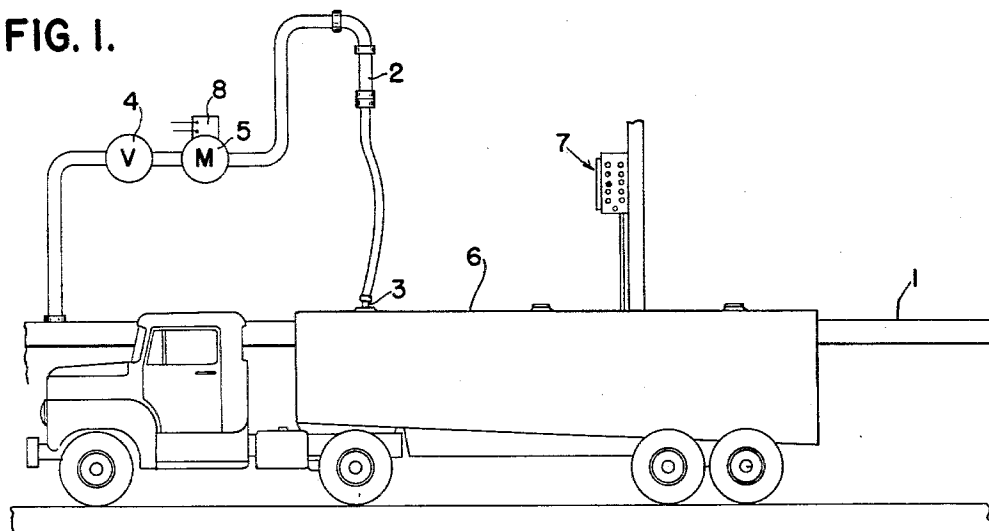
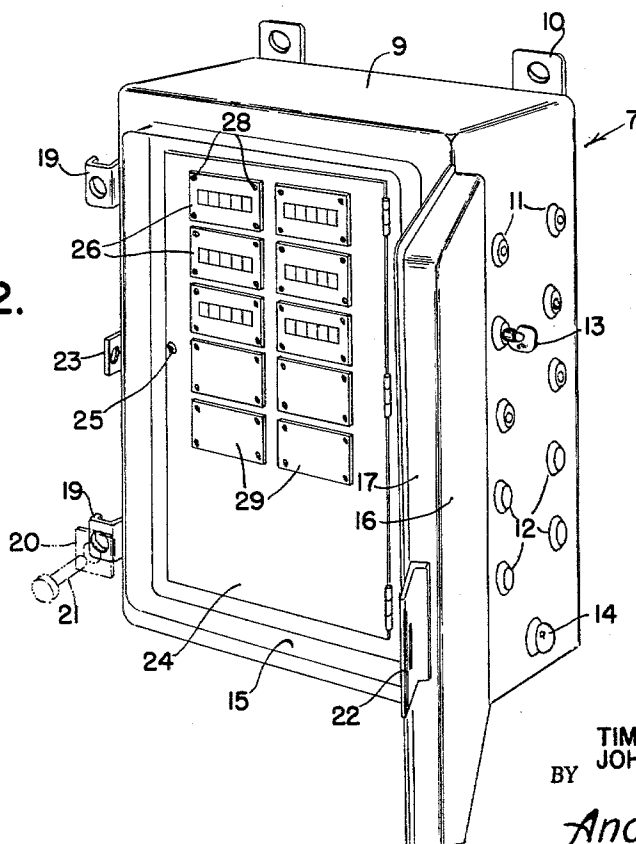


FIG. 2.



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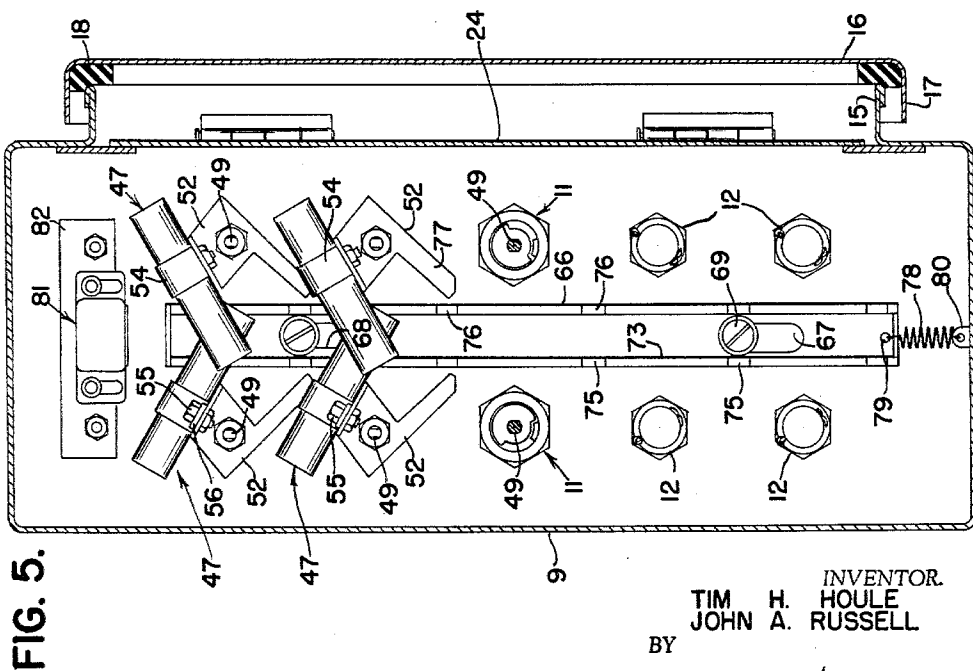
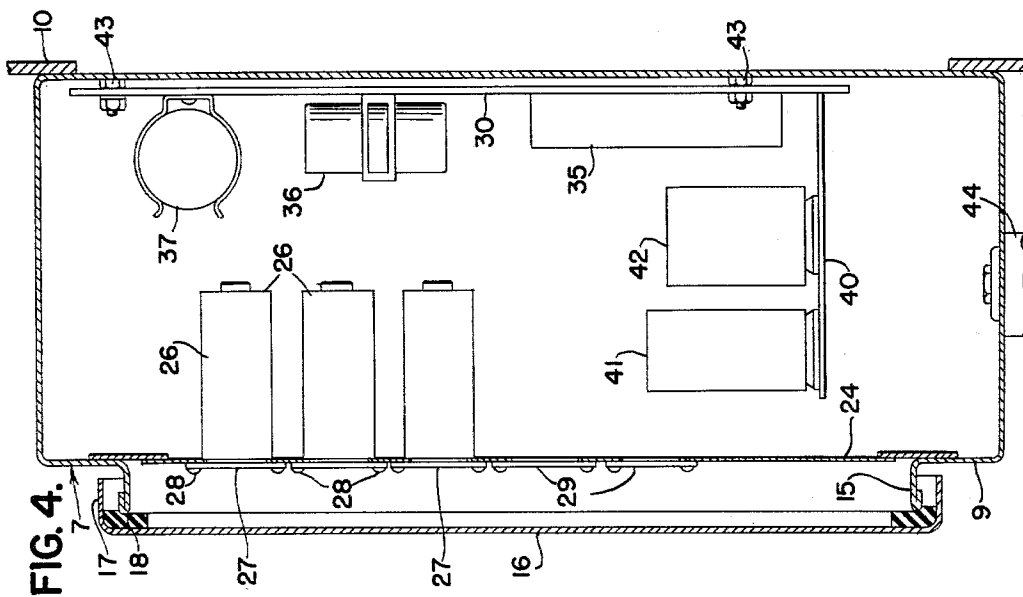
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DISPENSING AND METERING CONTROL

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4 Sheets-Sheet 3



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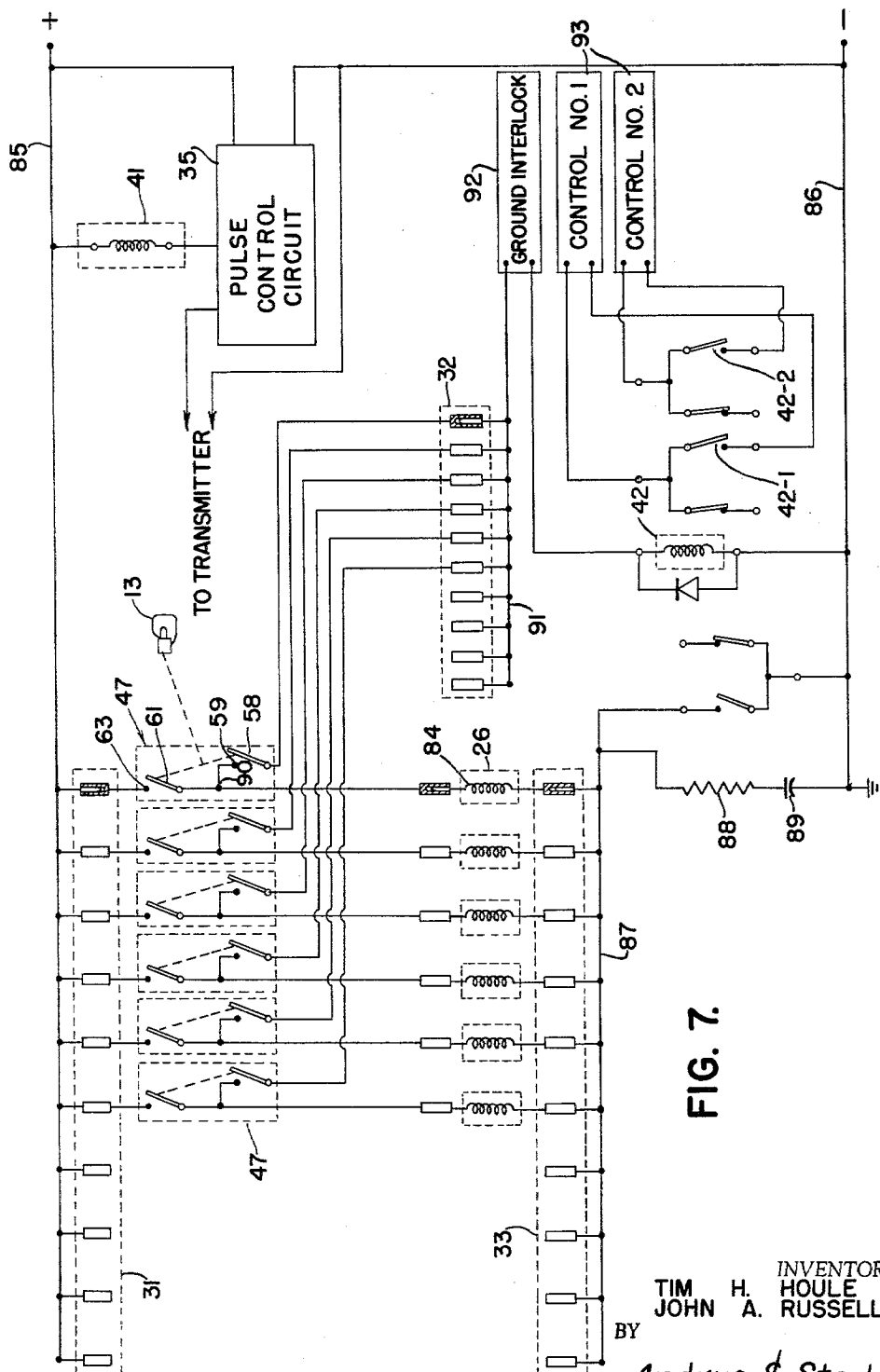
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DISPENSING AND METERING CONTROL

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4 Sheets-Sheet 4



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3,252,620

DISPENSING AND METERING CONTROL

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Filed July 6, 1964, Ser. No. 380,379
12 Claims. (Cl. 222—2)

This invention relates to an automatic dispensing and metering control system and particularly to such a control system which is selectively actuated by authorized personnel through movement of a suitable code device such as a key or the like to permit selective withdrawal of fluid in the absence of supervisory attendants.

Although the present invention may be employed in general to permit unattended dispensing control, it is of a particular advantage in connection with bulk storing and loading stations for the distribution of petroleum products such as gasoline, kerosene, fuel oil and the like.

In the distribution of petroleum products, bulk loading stations are provided in which substantial quantities of the several products are stored for subsequent distribution to the retailer. Key and token operated control devices have been suggested such that the bulk loading station can be maintained open during a 24 hour period without the necessity of supervisory attendants at the station at all times. Such a system provides better utilization of the terminal as well as the trucks through a more rapid and around-the-clock loading arrangement. Such systems must however provide for a high degree of security, automatic recording of the amount of product withdrawn and a very reliable system such that the danger of breakdown is held to a minimum. Such system must also be arranged and constructed to eliminate explosive conditions as a result of its operation.

The present invention is particularly directed to a highly reliable and economical key or token controlled system which may be mounted directly within the area of the dispensing or loading platforms. In accordance with the present invention, a low voltage control circuit and control components are mounted within an enclosure within the dispensing area and interconnected through a low voltage wiring system to control discharge operation. A plurality of key or like locks are provided one for each authorized customer. Each of the key lock units takes a unique key under the control of the central control station or bulk station operator and the respective customers. In accordance with the present invention, each of the key actuated locks carries a mercury switch within which two sets of contacts are enclosed. The mercury switch is of a known variety wherein the one set of contacts is housed in one end of the unit and the opposite end of the enclosure is contact free such that with the free end below the horizontal, the mercury will be held therein and the contacts will be in an open condition. Reversing the tilt position such that the contact end is below the horizontal will move the mercury mass to the opposite end and thereby complete the circuit across the contacts.

The present mercury switch however further includes a pair of timed contacts which are closed simultaneously with the initial or first contacts. However, in moving to the opposite end, the mercury is held into engagement with the extended second or timed contacts such that there is a selected time delay in the off direction. The mercury switch is mounted on the key lock unit to dispose the free end below the horizontal in the standby position. When the key is actuated or moved to the operated or discharge position, the mercury switch is automatically tilted to the opposite direction to thereby instantaneously and simultaneously close the related contacts.

In accordance with the present invention, a pair of

branch circuits is provided for each of the key devices. The one branch circuit includes a counter mechanism and the second branch circuit includes the instantaneous contacts in series with a product discharge relay. Timed contacts are connected in a common circuit connection between the branch circuits and a power lead to simultaneously provide power to the two related branch circuits. Additionally, the counter mechanism is operatively connected in circuit through an interlocking relay controlled by the transmitter circuit such that if for any reason the transmitter contact circuit is not operative the counter circuit will be opened.

The counting mechanism of this invention may be mounted directly within the enclosure and wired through a pulse transmitting circuit of a low voltage variety to record the several withdrawals of fluid per customer. Separate circuits are provided for selectively actuating corresponding counters and the release control relay or the like.

A further very important feature of the present invention provides a mechanical interlock between the several key lock units such that actuation of one unit substantially prevents actuation of the other units. The several key lock units are mounted in adjacent relationship and an interlocking plate member is slidably mounted within the enclosure to span all units having outstanding side slotted members. Interlock levers are interconnected one each to the rotatable portion of the key lock units with an outer locking element aligned with and spaced laterally of a correspondingly positioned locking element in the locking plate. Thus, the plate may have appropriately spaced slots for accommodating a lever projection of an aligned lever. The initial rotation of any one of the key lock units will move the locking lever projection into the related slot and the final rotation of the member will cause the lever to move upwardly carrying the locking plate with it. This movement of the locking plate misaligns the other slots and locking lever projections and thereby positively prevents complete movement of the other key lock units. This provides a very simple and reliable interlocking means which will prevent accidental simultaneous operation of a plurality of circuits.

Additionally, in accordance with the present invention, a magnetic or other suitable latch assembly is associated with the locking plate. The initial key movement moves the locking plate into the locking position which is then releasably held in place by the latch assembly. The latter feature is of a substantial practical significance to prevent accidental release of the assembly as a result of vibrations, the inherent weight of the assembly and the like.

The present invention thus provides a relatively simple, reliable and economical system for an unattended bulk loading plant or the like. The system has a long life and will require a minimum amount of maintenance. Further, the construction with a low voltage circuit arrangement and with essentially complete elimination against the dangers of arcing permits its application and direct mounting within the normally explosive vicinity of the bulk loading platform.

The drawings furnished herewith illustrate a preferred construction for carrying out the present invention and more clearly illustrate the several features heretofore discussed as well as other features and advantages which will be obvious to those familiar with the art.

In the drawings:

FIG. 1 is an elevational diagrammatic view generally illustrating a key stop controlled bulk loading station;

FIG. 2 is an enlarged pictorial view of the control box assembly constructed in accordance with the present invention;

FIG. 3 is an enlarged front elevational view with a

front panel partially removed to show certain details of construction;

FIG. 4 is a simplified vertical section through the control unit of FIGS. 1-3 illustrating the mounting of the several operating components within the enclosure;

FIG. 5 is a vertical section taken on line 5-5 of FIG. 3 illustrating the control mercury switch mounting system of the present invention;

FIG. 6 is a fragmentary view of the structure shown in FIG. 5 illustrating details of a preferred switch construction and the operated position of the interlocking mechanism; and

FIG. 7 is a simplified schematic circuit diagram of a control circuit incorporating the components shown in FIGS. 1-6, inclusive.

Referring to the drawings and particularly to FIG. 1, a bulk truck loading platform 1 is diagrammatically illustrated and a plurality of pumping and related operating mechanism, of which only a discharge piping 2 is shown, is disposed immediately below and otherwise adjacent the loading station. Generally, a loading nozzle unit 3 is mounted immediately above the platform area and connected through piping 2 to a source of fuel or suitable petroleum products for loading. A valve unit 4 and a meter 5 are connected between the nozzle unit 3 and a bulk storage tank or other source, not shown, for selective control of the withdrawal of the product from the bulk storage unit. A petroleum product tank truck 6 is shown located to one side of the platform 1 with the nozzle unit 3 located within the top tank portion of the truck for the discharge of the petroleum product from the storage unit thereto. A key actuated control unit 7, particularly forming a part of the present invention, is shown mounted at the platform 1 and in accordance with the present invention is constructed and connected to control the valve unit 4 for controlling the withdrawal of products from the bulk storage unit independently of any supervisory control or personnel, as hereinafter discussed.

Generally, the trucker can enter the loading station and dispose his truck 6 adjacent to the platform 1. By proper actuation of the key actuated control 7 he can directly withdraw a selected product from the storage unit without the presence of an attendant. The meter 5 drives a pulse transmitter 8 for generating a train of electrical pulses proportional to the amount of liquid dispensed.

Referring particularly to FIGS. 1 and 2, the control unit 7 includes an enclosure or housing 9 having a plurality of mounting lugs 10 for mounting of unit 7 at platform 1. Two columns of key lock units 11 and dummy plug units 12 are secured within an outer side wall of the housing 9. The illustrated control 7 is arranged to permit actuation by up to ten separate customers; with control connected for six customers through actuation of corresponding units 11 and dummy plugs 12 provided to close the opening at which additional customer unit 11 may be subsequently provided by the mere insertion of proper key lock units. The key lock units 11 are separately and uniquely actuated by a related key 13, only one of which is shown. Additionally, a lamp 14 is mounted immediately below the columns of the key locks 11 to indicate proper operation of the control circuit.

Generally, although not specifically shown, an additional switch or other interlocking mechanism, separate from control 7, is provided which must be operated after actuation of the key 13 which conditions the discharge pumping system; for example, a motor-pump unit, not shown, for discharging of the product. Such additional controls are not essential to an understanding of the present invention and consequently no description or illustration thereof has been given.

In the present invention, the housing 9 is provided with a front opening having an outwardly projecting encircling tubular wall 15 defining an outer sealing flange. A front door or cover 16 having an edge wall 17 cor-

ponding to wall 15 is hinged along one edge to the front wall of the housing 8. The door 16 telescopes over the wall 15 in the closed position and is provided with a sealing gasket 18 on its inner face in alignment with the edge of wall 15 to seal the unit against leakage. Apertured lugs 19 are secured to the housing 8 adjacent the wall 15 opposite the hinged connection of door 16 and a clamp 20 is releasably secured thereto as by a bolt unit 21. The door edge wall 17 is flanged outwardly and engaged by clamp 20 when the door 16 is closed to tightly seal the opening to housing 8. An apertured tab 22 on the free edge of the door 16 mates with a lug 23 on the housing for locking the door in the closed position by a suitable lock, not shown.

In accordance with the present invention, an inner door 24 is pivotally secured or hinged along one edge to the housing 18 in the plane of the front wall thereof. The door 24 is releasably held in place by a screw type latch 25 secured to the edge of the door opposite that of the hinged connection. A plurality of counters 26, one for each of the key lock units 11, is mounted within suitable openings within the inner door 24 and operatively connected in separate counting circuits by the corresponding key lock units 11, as subsequently described. In the illustrated embodiment of the invention, each of the counters 26 includes a rectangular front mounting panel 27 adapted to overlie the outer edges of the openings for the counter and secured in position by attachment screws 28 extending through aligned openings into correspondingly tapped openings in the door 22. The counters 26 extend into the housing 8 from the door 24. Dummy cover panels 29 are similarly secured covering the openings corresponding to the position of the dummy plugs 12. This eliminates the expense of providing counters except for operative positions.

The internal structure of counters 26 may be of any suitable construction depending upon the form of signals generated by the dispensing of a product. The present invention has been employed with pulse driven counters operated from a low voltage source of 24 volts. As such counters are known and have been employed, no further description thereof is deemed necessary or given.

In the illustrated embodiment of the present invention, a component support chassis or panel 30 is bolted or otherwise secured to the inner back wall of the housing 9 as most clearly shown in FIGS. 3-5. Four connecting or terminal strips 31, 32, 33 and 34 are mounted in insulated relation generally centrally of the panel 30 to permit simple interconnection of the several components as shown in FIG. 7 and presently discussed. A pulse control module 35 and a pair of capacitors 36 and 37 are mounted on the panel to the top and side of the terminal strips as viewed in FIG. 3. A power transformer 38 is mounted on the upper left-hand corner and provides power to a rectifier bank 39 shown generally centrally of the unit. A horizontal supporting platform 40 is integrally formed on the lower end of the panel 30 and projects forwardly terminating in slightly spaced relation to the inner door 24. A pair of operating relays 41 and 42 is secured to the platform 40 for connection in circuit through the connecting or terminal strips 31-34.

The panel 30 is supported by a plurality of mounting nut and stud units 43 which are welded to and project inwardly from the inner surface of the back wall of the housing 9 to completely enclose all of the components within the housing and permit access thereto only through the front door. Power and signal lead connectors 44 are secured to the bottom wall and locked in place by an internal attachment bolt. Separate lead conduit openings 45 and 46 provide separate connection of the power and signal leads, not shown. The power connection of the several components is controlled, in accordance with the present invention, by a plurality of mercury switch units 47, each of which is controlled by one of the key lock units 11.

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Generally, the key lock units 11 may be of any suitable variety adapted to receive a unique key 13 and having an internal rotating element; for example, as shown in U.S. Patent 2,777,555. Key lock units 11 are therefore only briefly described. The illustrated unit is diagrammatically shown as a tumbler type unit having a tumbler 48 mounted within an opening in the housing 9 and adapted to receive the key 13. A stud bolt 49 is threaded into the innermost end of the tumbler 48 and provided with a central stop flange 50 abutting the innermost end of the tumbler. A switch mounting bracket 51 and an interlocking actuating cam 52 are clamped onto the innermost end of the stud bolt 49 against the central flange 50 by a clamping hex nut 53 for simultaneous movement which provides a related actuation of a switch unit 47 and mechanical interlock whereby only one of the key lock units 11 can be actuated at any given time.

The switch mounting bracket 51 is generally an L-shaped member having an apertured leg secured to the inner end of the stud bolt 49. The other arm of the bracket 51 extends laterally from the side wall of the housing to provide a mounting arm upon which the mercury switch unit 47 is secured. The switch unit 47 is generally a cylindrical member and an encircling clamp 54 is interconnected to the mounting arm of bracket 51 by a suitable attachment nut and bolt unit 55 which passes through aligned openings in a tab 56 of the clamp 54 and the bracket 51. As noted particularly in FIGS. 5 and 6, the inner or adjacent ends of the switch units 47 of adjacent key lock units 11 overlap. In accordance with the illustrated embodiment of the invention, the overlap is provided for by extension of the arms of bracket 51 for the units shown to the right in FIGS. 5 and 6 and by opposite mounting or disposition of the clamps 54 with the tabs 56 facing opposite directions. The switch units 47 are thereby laterally offset with respect to the adjacent side wall, as most clearly shown in FIG. 3.

Referring particularly to FIG. 6, each of the mercury switch units 47 generally includes an encapsulated tubular glass enclosure or housing 57 having a set of instantaneous make and break contacts 58 and 59 mounted in one end with a pair of leads 60 secured thereto and extending outwardly therefrom. Contact 59 extends longitudinally along the wall of housing 57 to the center of the housing and is connected to a central time delay contact plate 61 spanning the central portion of the housing and including a small aperture 62 in the lower portion thereof. A control lead 63 extends along the opposite side of housing 47, beginning in spaced relation to plate 61 and having a lead 64 passing outwardly with leads 60. A mercury mass 65 is provided within housing 57 and is disposed in accordance with the angular placement of housing 57 with respect to the horizontal. The mercury 65 passes from the one end as the housing 57 is tilted to dispose the opposite end below the horizontal. The aperture 62 is selected to allow the free movement of the mercury from the free end to the contact end while restricting the flow of the mercury from the contact end or side of plate 61 to the free end of the housing. In effect, the movement of the mercury switch unit 47 to dispose the contact end below the free end provides an essentially simultaneous and instantaneous actuation of the two switches formed by the contacts 61, 63 and common contact 58 which may if desired be formed as a pair of separate contacts. However, when the switch 47 is moved to the off position, the mercury 65 immediately moves down into engagement with the plate 61 thus breaking the circuit between the contacts 58 and 59 while maintaining a path between the contacts 59 and 63. The mercury 65 slowly passes through the opening or aperture 62 in plate 61 and provides a timed opening of the contacts 59 and 63. Instantaneous closing of the contacts 59 and 63 and the combined instantaneous opening of contacts 58 and 59 with timed opening of the op-

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posite set of contacts 59 and 63 maintains operation of the counter 26 after the valve 5 closes as hereinafter described in more detail with respect to FIG. 7.

Additionally, in accordance with the present invention, a key interlock plate 66 is slidably mounted between the key lock units 11 on the inner wall of the housing 9 and is coupled through cams 52 to restrict operation of the device to a single key lock unit 11 at any given time.

The illustrated slide interlock plate 66 is generally a U-shaped member having a pair of guide slots 67 and 68 within the base portion thereof for vertical guided movement as follows. Reference is made to the lower slot 67 for purposes of description.

A guide bolt 69 passes through the slot 67 and threads into a suitable nut unit 70 welded to the inner side of the housing 9. A guide spacer 71 encircles the bolt 69 immediately adjacent the inner wall and includes a guide boss corresponding to the width of and projecting through the corresponding slot. A washer 72 bears on the guide spacer 71 and in cooperation therewith defines an annular guide for the plate.

The U-shaped plate 66 has side arms 73 and 74 which project inwardly in parallel relation immediately adjacent and between the inner portions of key lock units 11. Each of the arms is provided with a plurality of slots 75 and 76, respectively, aligned one each with the respective key lock units 11 as shown most clearly in FIGS. 5 and 6. The slots 75 and 76 are spaced somewhat below the corresponding key lock unit 11 for cooperative interaction with a latch arm 77 of the cam 52.

Each of the cams 52 is generally a plate-like member which may be formed of any suitable material; for example, a 12-gauge galvanized steel. The cam 52 includes a generally rectangular body with a central mounting opening which passes over the stud 49 for interconnection with the corresponding key lock unit 11. The operating arm 77 extends laterally inwardly from an edge of cam 52 toward the slots 75 or 76. The outermost end of the arm 77 generally terminates in lateral alignment with the related operating slots 75 and 76 in the standby position; that is, prior to operation of the key lock unit 11. When a key 13 is inserted into a key lock unit 11, the initial rotation of the key 13 effects a corresponding rotation of the stud 49 and the operating arm 77 of cam 52 about the axis of the assembly and causes the outermost end of arm 77 to move into the corresponding slot and into engagement with the upper edge thereof. The final movement of the key 13 to a position which will orient the mercury switch unit 47 to locate the mercury mass 65 to the contact end of housing 57 lifts the interlock plate 66 upwardly to misalign all of the other slots with respect to the corresponding operating cam arms and thereby positively prevents the final movement of the other key lock units 11, as shown most clearly in FIG. 6. Thus, assuming one of the key lock units 11 has been actuated as just described, the attempted actuation of a second key lock unit 11 will merely cause slight rotation of the cam 52 until the outer end of the arm 77 engages the adjacent continuous portion of the plate arm 73 or 74 which presents a positive stop to further movement thereof.

The interlock plate 66 is biased to the lower, aligned position by a coil spring 78 which is secured to the lower end of the plate 66 through a hook opening 79 and to the bottom wall of the housing by pin or eye hook lug 80. When the operator inserts the key 13, he will have to exert a sufficient force to overcome the load of the spring 78 to effect a closing of the mechanism.

The plate 66 is held in a raised position against the action of spring 78 by a permanent magnet latch assembly 81 which is secured to the inner wall of the housing 9 by a mounting bracket 82 in upwardly spaced relation from the top end of the plate 66. A strike plate 83 is welded or otherwise secured to the top of the slide plate 66. When the plate 66 is moved upwardly, by turning of any key lock unit 11, the permanent magnet latch as-

sembly 81 engages the strike plate 83 and provides a positive magnetic latch of the mechanism in the raised position. The strength of the magnet latch assembly 82 is sufficient to overcome the force of the spring 78 as well as any other minor forces, such as vibration forces which may occur in the vicinity of the assembly.

Thus, the illustrated unit provides a rugged reliable assembly which can be mounted for operation in the vicinity of the bulk dispensing unit. Generally, the switch units 47 and the counters 26 are interconnected in a control and recording circuit, preferably constructed for example as shown in FIG. 7.

Referring particularly thereto, each of the counters 26 is similarly diagrammatically illustrated as including a drive winding 84 connected to direct current power leads 85 and 86 by the corresponding mercury switch units 47 and terminal strips. The instantaneous open and break contacts 58 and 59 and the timed opening contacts 61-63 as heretofore discussed with respect to FIG. 6 are shown diagrammatically in FIG. 7 in accordance with an approved switch illustration. The several connecting strips 31, 32, and 33 of FIG. 3 are also diagrammatically illustrated in FIG. 7 as pin and socket units with corresponding numbers applied to each group or bank thereof. In the subsequent description other corresponding elements in the schematic circuit and the preferred illustrated construction of FIGS. 1-6 are similarly numbered for purposes of simplicity and clarity of explanation. Further, each of the counters 26 and mercury switch units 47 are similarly connected in independent control circuits and consequently a single unit is described. All other units operate in an identical manner, in response to actuation of an associated lock unit 11, to provide the desired coded control or actuation of the product delivery.

The counter drive winding 84 is connected in a first branch circuit in series with the switch or contacts 61 and 63 between the one D.C. power lead 85 and a common return lead 87 which is returned to the other D.C. power lead 86 via a set of relay contacts 41-1 of relay 41 shown in FIG. 4 and connected in the output of pulse control module 35. A resistor 88 and a capacitor 89 are connected parallel with the relay contacts to provide arc suppression in accordance with well known operations.

Each of the counters 26 is a similar device adapted to record a single count for each pulsed energization of the counter winding 84. As such devices are well known, no further description thereof is given.

The switch contacts 58-59 of the mercury switch unit 47 are connected in a product release branch circuit having one end connected at a junction 90 between the winding 84 and the related switch contact 61 which is common to contact 59. The opposite contact 58 is connected to a common return lead 91 through one of the connecting strips 32. A ground interlock contact unit 92 and a product release relay 42, also shown in FIG. 4, are connected in series between lead 91 and power lead 86. The ground interlock contact unit 92 must be connected to and ground the truck 1, in accordance with well known circuit connection, prior to energization of the relay 42 for releasing of the products.

The relay 42 controls first and second sets of contacts 42-1 and 42-2 connected in separate power circuits for controlling a pair of control devices 93 for a given product to be selectively delivered to the truck. For example, in a bulk loading plant, a start motor control device and a block valve control device might be actuated by the closure of contacts 42-1 and 42-2.

The operation of the illustrated embodiment of the invention is briefly summarized as follows. Generally, the key lock control unit 7 has the front door 16 closed and locked in place to prevent unauthorized tampering of the components within the enclosure or housing 8. When a product is to be withdrawn, the driver properly positions his truck 6 and interconnects the ground interlock unit 92 to the truck to provide a circuit between the

common lead 91 and the product release relay 42 shown in FIG. 7. The key 13 is inserted into the appropriate key lock unit 11 and rotated. As shown in FIGS. 5 and 6, the initial rotation of the key 13 rotates cam 52 to pivot arm 77 into the aligned slot 75 or 76 and into engagement with the upper edge thereof. Simultaneously, the corresponding mercury switch unit 47 is pivoted but remains tilted generally in the off position such that the contacts remain open. The final movement of the key 13 causes essentially simultaneous closure of the contacts 58-59 and 61-63 and the raising of the interlock plate 66. As a result, once the operator has turned the key 13 to an operative position, he must return it to the off position before another key lock unit 11 can be actuated.

The magnetic latch assembly 81 positively holds the key 13 and the associated mechanism in the actuated position until the operator provides a positive return force.

The closing of contacts 58-59 and 61-63 completes the circuit to the proper counter winding 84 and to the product release relay 42. The truck driver may then have to actuate an auxiliary control, not shown, to deliver the product to the truck.

To terminate delivery, he may operate the auxiliary control and then turn the key 13 to the off position, or he may merely turn the key to the off position. The latter instantaneously opens the branch circuit to the product release relay 42 as a result of the opening of the contacts 58-59. As a result, the circuit actuation of product delivery is disabled and the positive delivery of fluid is immediately terminated.

However, the contacts 61-63 remain closed for the time period required for mercury 65 to pass through opening 62 sufficient to break the circuit therebetween. This then maintains power to the counter drive winding 84 for a short period. This is desirable to maintain the operative circuit connection to the counter 26 for recording any final flow of fluid through the metering unit. This unit is normally downstream from the drive unit and the pump and valve unit and thus if the timed opening of the contacts 61-63 was not provided and the counter 26 were instantaneously disconnected, a small but noticeable quantity of the product would be discharged without recording thereof. Although the amount in any given delivery may be relatively small, the accumulative amount would be appreciable and undesirable. Use of the present dual switching arrangements provides a very simple and inexpensive means for automatically eliminating such loss. The time required to record this final flow is so minute that there is essentially no danger that there will be an accidental closing of another circuit prior to the opening of this circuit and the simultaneous recording on two counters of the final flow of fluid. Therefore, although such an accidental occurrence or recording is possible, the probability thereof is so slight as to be negligible and of no practical significance.

Periodically, the attendant of the bulk loading plant will take a reading of the respective counters for billing purposes and the like.

Further, if at any time it is desired to withdraw credit from a keyed customer, this may be rapidly and efficiently done by the simple opening of the inner door and the removal of the appropriate lead shown at the circuit strip connector which connects the positive power lead 85 to the corresponding circuit for the related counter 26.

The present invention thus provides a relatively simple and economical low voltage control system which can be mounted in a bulk loading plant to provide for unattended dispensing of the several stored products. The encapsulated enclosure of the mercury switch unit 47 and the low voltage circuits within the platform area eliminates the danger of explosion and thus permits mounting of the control unit 7 in the explosive atmosphere

without violation of underwriting laboratory rules and the like. The mechanical interlock of the key lock units 11 provides a reliable means for restricting operation of the system to a single customer at any given time without unduly complicating the control mechanism.

Various modes of carrying out the invention are contemplated as being within the scope of the following claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention.

We claim:

1. An unattended dispensing system for controlling actuation of means for feed of flowable material, comprising

a control circuit for said means having a plurality of separate branch circuits, one for each customer and each of which is operable to energize the means, a plurality of counters, one for each customer, switch means connected in said control circuit to selectively complete the branch circuits, counter switch means connected to selectively operably connect said counters to record the material flow, a plurality of coded input elements having a first position to turn off related switch means and a second position to turn on the corresponding switch means, timed holding means to maintain the counter switch means closed for a selected period after the corresponding input element is moved from the second to the first position, and an interlock means actuated by each of said input elements and arranged to prevent actuation of more than one element at one time.

2. An unattended dispensing system for controlling actuation of dispensing means for a flowable material, comprising

a control circuit for said dispensing means having a plurality of separate branch circuits, one for each customer and each of which is operable to energize the dispensing means, a plurality of counters, one for each customer, switch means connected in said control circuit to selectively complete the branch circuits, switch means connected to selectively operably connect said counters to record the material flow, a plurality of coded input units adapted to be actuated to actuate the related switch means, and a mechanical interlock means coupled to be actuated by each of said input units and arranged to limit actuation to one unit at a time.

3. The unattended dispensing system of claim 2 wherein said interlock means includes a plurality of operators secured one each to the input units and similarly positioned thereby between a standby position and an operable position and interlocking plate element selectively coupled to each operator by an aligned slot and arm coupling in the standby position of all input units, movement of any input unit effecting engagement of the corresponding coupling and destroying alignment of all other couplings.

4. The unattended dispensing system of claim 2 wherein,

said input units are key actuated lock units having a rotatable inner member supporting the related switch means for operation and a movable locking member is secured to the inner member, and the interlocking means includes a slidably mounted U-shaped plate having side walls with slots aligned with and disposed in the path of the locking members whereby initial rotation of any lock unit moves the corresponding member into the slot and final rotation thereof moves the plate to misalign all other slots and locking members.

5. An unattended fluid dispensing and indicating unit for a petroleum product bulk loading station,

a circuit having a plurality of control branches and indicating branches connected to power supply lines with related control branches and indicating branches connected through a separate common circuit portion,

a plurality of control switches, one for each customer and each having an instantaneous make and break contact means connected in said control branches and a timed break contact means connected in said indicating branches,

a control housing for said circuit and said control switches,

a plurality of input devices one for each of said control switches mounted in the wall of the housing and having each constructed to receive a unique cooperative actuator for operating a movable member within the housing,

means coupling said movable members to the corresponding switches, and

an interlocking element disposed to be engaged by each movable member and moved thereby to prevent movement of any other movable member.

6. The unattended fluid dispensing and indicating unit of claim 5 having at least one terminal strip in the control branches whereby an input device is made inoperable by removal of a single lead from the terminal strip.

7. The dispensing and indicating unit of claim 5 wherein,

said input devices are key actuated lock units having a rotatable inner member and said movable members are secured to rotate with the inner member with a locking leg extending generally radially therefrom, and

said interlocking element is a slidably mounted U-shaped plate having side walls with slots aligned with and disposed in the path of the locking legs whereby initial rotation of any lock unit moves the corresponding leg into the slot and engagement with the edge thereof and final rotation thereof moves the plate to misalign all other slots and legs.

8. The dispensing and indicating unit of claim 6 wherein,

each of said switches is a mercury switch having a hermetic enclosure with the instantaneous make and break contact means in a contact end and the timed break contacts in the corresponding end and the central portion and a mercury mass held at and between the opposite ends in accordance with the angular positioning of the enclosure, and

means to mount said mercury switch upon said rotatable inner member and arranged to dispose the free end of the enclosure below the horizontal in the standby position and to dispose the contact end below the horizontal during the final rotation of the corresponding lock unit.

9. An unattended fluid dispensing and indicating system for a petroleum product bulk loading station,

a low voltage circuit having a plurality of control branches and related indicating branches connected to power supply lines with each related control branch and indicating branch connected to one power line through a separate common circuit portion,

a plurality of hermetically enclosed control switches, one for each customer and each having an instantaneous make and break contact means connected in said control branch and a timed break contact means connected in said common circuit portion, a control housing for said low voltage circuit and said control switches,

a plurality of input devices one for each of said control switches mounted in the wall of the housing and having each constructed to receive a unique cooperative actuator for operating a movable member within the housing,

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means mounting the corresponding switches upon said movable members for actuation in accordance with the movable member, and
 an interlocking element disposed to be engaged by each movable member and moved thereby to prevent movement of any other movable member.

10. An unattended fluid dispensing and indicating system for a petroleum product bulk loading station, comprising

- a control housing adapted to be mounted in the flow and dispensing area of the station,
- a control circuit mounted within the housing and including a plurality of paralleled dispensing control branches and a similar plurality of related indicating branches,
- a control relay connected in series with one end of the control branches,
- a pulse means connected in series with one end of the indicating branches,

means to actuate the pulse means in accordance with the flow,

- a similar plurality of electrically pulse operated counters connected one each in each indicating branch,
- a similar plurality of mercury control switches one for each of the related control and indicating branches and each of which includes a set of instantaneous make and break contacts and a set of timed break contacts within a hermetic enclosure, said instantaneous contacts being connected in said control branches and said timed break contacts being connected in common to the related control and indicating branches,
- a set of low voltage power leads in the housing and connected to the paralleled branches through said switches and said pulse means to selectively energize the control relay and said counters,
- a control housing for mounting directly in the flow and dispensing area,
- a plurality of input devices one for each of said control switches mounted in the wall of the housing and having each constructed to receive a unique cooperative actuator for operating a movable member within the housing,

means coupling said movable members to the corresponding switches, and
 an interlocking element disposed to be engaged by each movable member and moved thereby to prevent movement of any other movable member.

11. The fluid dispensing and indicating system of claim 10 wherein,

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said input devices are key actuated lock units having a rotatable inner member and said movable members are secured to rotate with the inner member with a locking leg extending therefrom, and
 said interlocking element is a slidably mounted U-shaped plate having side walls with slots aligned with and disposed in the path of the locking legs whereby initial rotation of any lock unit moves the corresponding leg into the slot and engagement with the edge thereof and final rotation thereof moves the plate to misalign all other slots and legs.

12. An unattended dispensing system for controlling actuation of dispensing means for feed of flowable material, comprising

- a plurality of indicating means,
- a control circuit for said dispensing means and said indicating means,
- a plurality of control switches, one for each indicating means, each of said switches including a hermetic tubular enclosure with a set of instantaneous contacts in a contact end thereof and a set of time delay contacts in the central portion and the contact end thereof for engagement by a mass within the enclosure and movable between the contact end and a contact free end, said instantaneous contacts being connected for actuating the dispensing means and the time delay contacts actuating the corresponding indicating means,
- a plurality of code input means, one for each of the control switches,

means to mount said switches for positioning by the related input means and arranged to dispose the free end of the enclosure below the horizontal in the standby position and to dispose the contact end below the horizontal during the final movement of the corresponding input means, and
 an interlock means actuated by said input means and arranged to prevent actuation of more than selected means at one time.

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