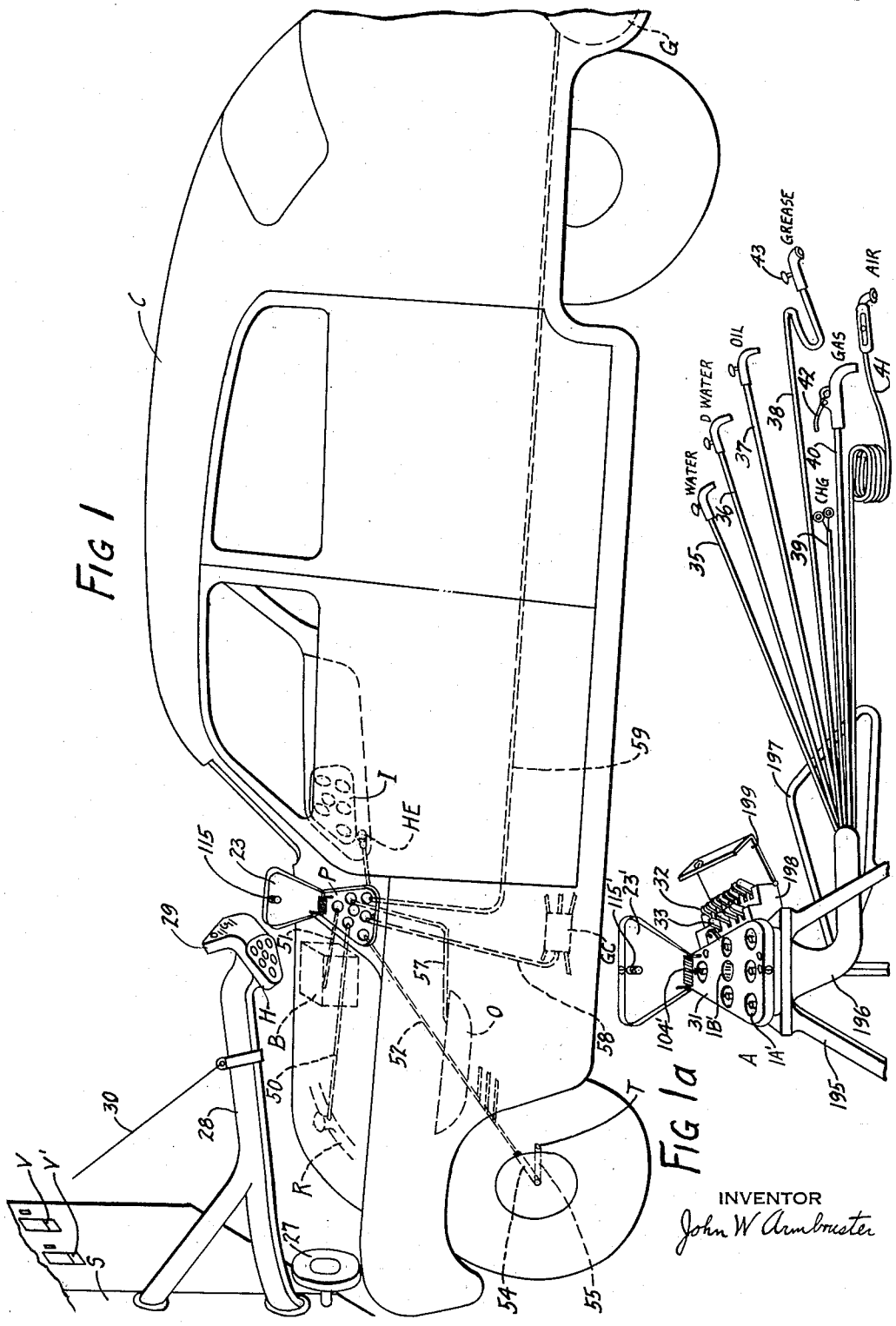
Dec. 27, 1960 J. W. ARMBRUSTER 2,966,248

SERVICING DEVICES

Filed May 20, 1950 3 Sheets-Sheet 1



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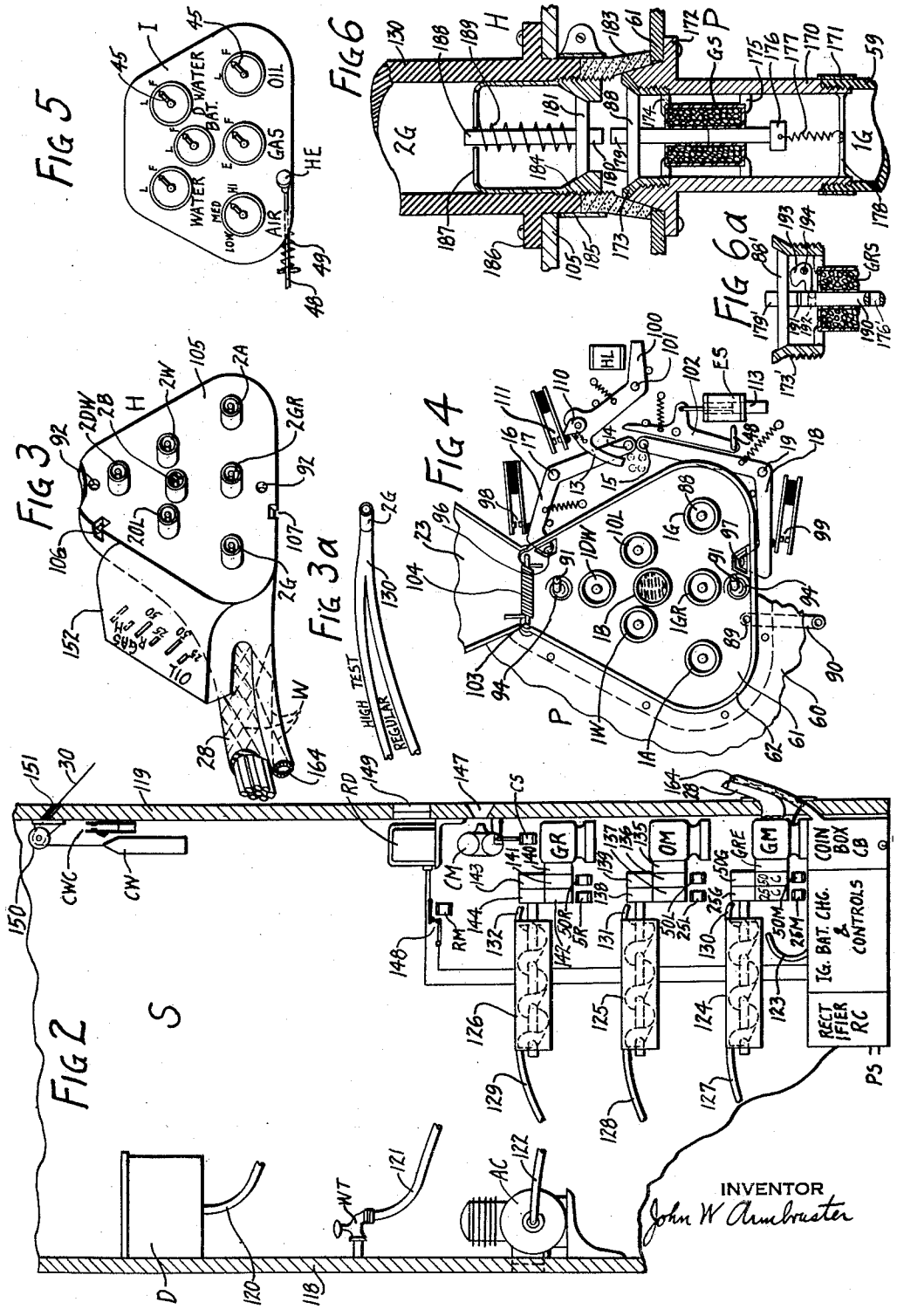
SERVICING DEVICES

Filed May 20, 1950 3 Sheets-Sheet 2



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SERVICING DEVICES

Filed May 20, 1950 3 Sheets-Sheet 3

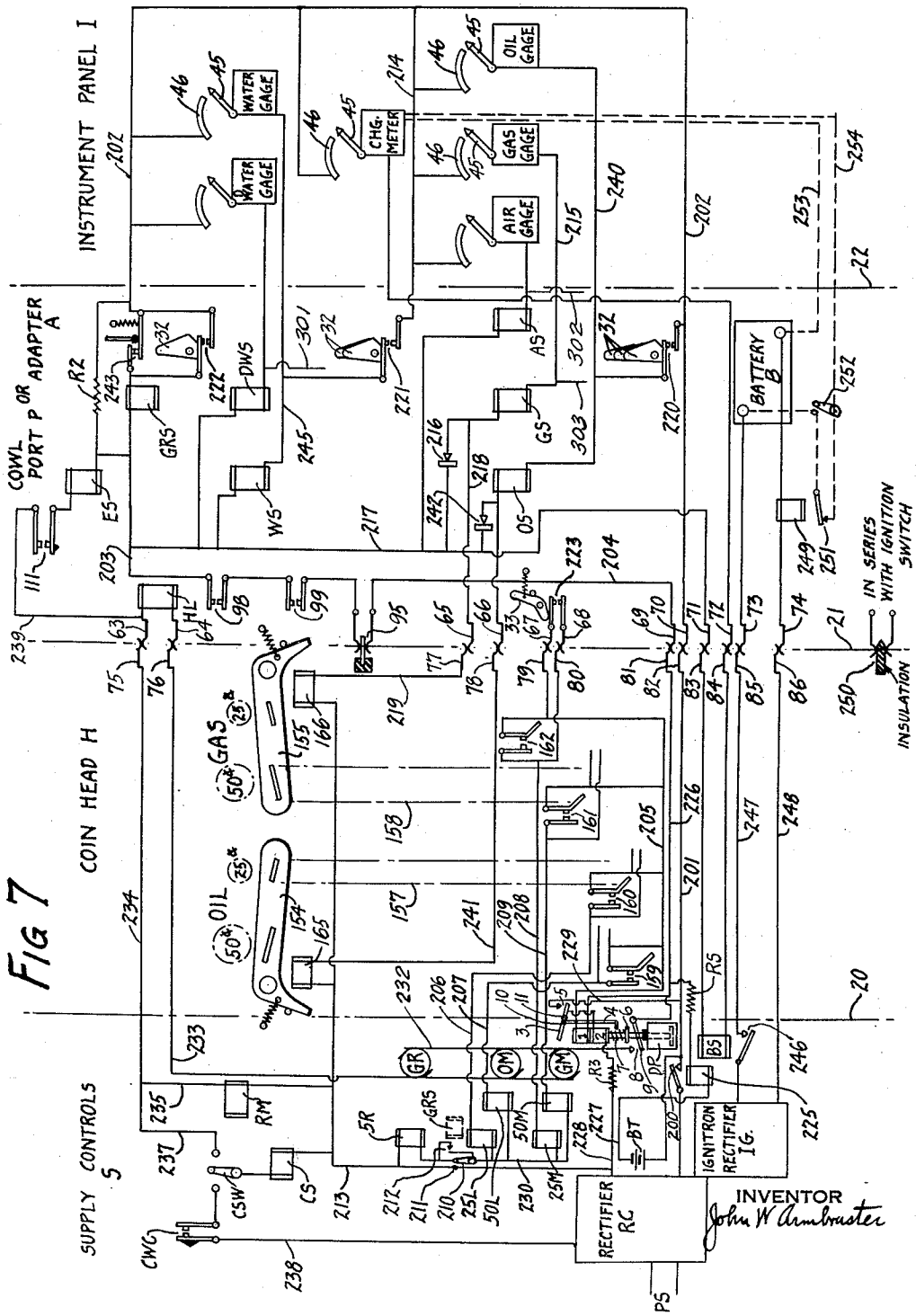

FIG 7

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SERVICING DEVICES

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32 Claims. (Cl. 194—13)

This invention relates generally to improvements in devices for servicing transportation devices such as automobiles, airplanes, tractors, boats, etc., and more specifically to coin operated devices for automatic complete servicing of machines.

An object of the invention is to not only provide self service means for servicing a motor vehicle, but also insuring that all needs are taken care of automatically. In other words, when a quantity of oil and or gas is purchased, there is the automatic free supply of grease, air, water, battery charge and distilled water. Thus a car so serviced is always fully conditioned for its peak performance.

Heretofore, the servicing of a car was a haphazard affair depending largely on the amount of time the owner took to personally demand attention for the less important needs of the car.

The absolute necessity for the movement of a motor vehicle is the constant supply of gas, but the other needs such as oil, air, water, distilled water, battery charge, and grease were often neglected in the order mentioned. Accordingly, the need for gas is most constantly supplied, but careful attention to the grease cups, battery, radiator, tires and oil supply is not a universal custom.

Therefore, it is an object of the present invention to provide means whereby an owner of a vehicle not only saves time in being able to gain instantaneous self service, but also gains means for insuring that all the needs of his vehicle are taken care of by merely purchasing one or both of the essential needs such as oil and gas.

An object is to provide a general supply port for all motor needs within reach of the driver. Without leaving his driving seat the owner can uncover the supply port which has tube ends and electric terminals leading to all motor needs such as gas, oil, water, grease, air, battery charge and distilled water. He can then attach a supply head which contains the supply tube ends, wires and coin operated controls. Six of the eight tubes in the head lead back into the station tanks for the supplies of the various motor needs. The instrument panel of the motor is electrically connected to magnets or solenoids for values in the tube ends and to the coin controls in the head. The water and air supplies are simple gravity or pressure urged devices, but the grease, oil and gas supplies are delivered in measured quantities by motor and clutch controlled screw feeds. A small measure of grease is to be supplied free along with air and water for each 25¢ or 50¢ or more purchase of oil and gas. Tokens of credit or monetary value can be used for control as well as coins.

Another object is to provide interlocks insuring fool proof operation and prevent tampering with unattended stations. A dashboard dial must indicate low or less than full before a substance can be poured into the related tube wherein the valve is controlled by the dashboard indicator needle.

The supply head must be correctly attached and latched before the coin slots are available for purchase. When a coin is once dropped and the supply motors are started,

the head is locked on as long as the motors operate, which is governed by a dash pot hold circuit. As soon as the head latch is unlocked, ejection springs throw the head up and to the side for a quick release for the customers car and also to prevent dripping on the side of the car. Each supply valve is closed before the receiver valve is closed to eliminate dripping outside the receiving port.

The gas or oil coin slots are closed until the head is on securely and opened only when the related supply is less than full.

In order to protect those who would finger the dispensing head while it is not in use, the operating circuit lines are broken as soon as the head is ejected from a car. In other words, the main higher voltage lines from the service station to the exposed terminal in the head are normally without electric current. A low voltage relay line is provided and ready to become active to call in the higher voltage circuit as soon as the dispensing head is attached to a car, thus making the higher voltage line inaccessible. Therefore it is possible to get a slight harmless shock by putting fingers in the electric terminal tube, but the operating current lines are not alive in the unattached dispensing head.

Another object of the invention is to furnish automatically free radio weather and news reports at a self operated automobile service station. Upon the purchase of a supply of gas or oil the customer receives not only full servicing of his car but also hears the news as given out by standard broadcasting stations. By timing his use of the station on the hour or half hour period he can select the report he wishes to receive. Not only is the radio turned on automatically, but the filaments of the tubes therein are maintained hot by standby current.

A feature of the invention is the automatic recording of license numbers of cars using the station. This is done by photographing single frames of standard movie film by a camera pointed through the walls of the station at the rear of cars being serviced. Electrical controls for operating a "single frame" button of the camera are operable either by the counterweight of the service tube which is the first thing moved by the customer, or by the coin controlled circuit which would record only definite sales. The former method would also help to detect efforts at vandalism of the well lighted but unattended station.

A feature of the invention is the provision of an automatic paired valve structure comprising normally closed valves for the outlet end of each feed tube and the inlet end of each receiving tube. Related tube ends are connected by a flexible rubber snout and have normal connected positions wherein the two related valves are superimposed so that when a solenoid opens an inner valve, it in turn opens the related outer valve. To provide for full dispensing and drainage to permit entry of the last few drops of water, oil, gas, etc., there is an operational time lag arranged whereby the feed valve closes first while the lower entry valve is open slightly longer to permit downward and inward flow of all supplies before the entrance valve is closed. This prevents dripping and residue of leavings of the various supplies.

An additional feature is the valve construction wherein an interposer cam or wedge is put between the valve head and the solenoid plunger in the case of supply tubes carrying air or grease under pressure tending to close the valve. The interposer is a form of prop to hold an operated valve open against pressure of incoming elements, said prop being spring tripped when the related solenoid is deenergized.

It is also an object of the invention to not only lighten the dispensing head for ease in handling, but also to prevent theft of the coins received by providing an armored coin tube as a gravity chute tube leading down from the

head to a coin box inside the service station. Thus the weight of accumulated coins is not added to that of the head. And it is a preventative of theft that the coins are not left to accumulate in the head in an accessible coin holder. It is also contemplated that the electrical control and operating wires drawn from the station to the head are to be laced along the underside of the armored coin tube so that if it is cut the wires are also severed to prevent coin reception and provide an alarm or warning that some tampering has been done.

A feature of the invention is the provision of a full complement of liquid level, electric charge and pressure indicating gages or meters for gas, oil, water, battery, grease and air requirements shown on an instrument panel of the dashboard, said meters each playing an active part in electrical control over related inlet service ports. When a meter indicator is at "low" or "not full" it becomes part of a demand circuit for not only making coin reception possible, but also making active the related material delivering means and an inlet valve permitting proper ingress of the material.

Another object of the invention is the provision of a token controlled self-service machine service station of the usual manually operable kind. Not only for the purpose of taking care of cars of the o'd fashioned type, but also for dual operation of daytime attended service and nighttime unattended service, it is desirable to install manual controls.

The manual controls take the form of an adapter or portable receiving port which is snapped onto the dispensing head. This port is provided with a set of levers to close contacts which take the place of the automatic meter contacts of a car. The attendant first looks over a car and determines which of the elements gas, oil, grease, water, distilled water, air and battery charge are needed and he presses the corresponding levers on the adapter port to close and hold the related contacts with circuits extending to related valve solenoids in the receiving tubes. These tubes instead of extending directly to the car parts as in the case of fixed car service tubes, are in the form of flexible hose, each with a lever operated nozzle valve for manual dispensing of an element and for a lever closed contact and terminal conductors in the case of the battery charging tube. Gas, oil and grease are dispensed in measured paid amounts while other free services are made easier to take care of than in the old fashioned station.

Another object of the invention is to provide a locked cover for a supply port on an automobile. The port is provided with latching devices for holding a dispensing head on the port during refueling. Those same latching devices are also used to hold the cover closed when not opened to receive the head for replenishing supplies. The release means or instrument panel button for the latching devices is within the car so that the supply port cannot be tampered with on a locked but unattended car. Thus a common latching device and release means are used for both the dispensing head and the cover.

Another object of the invention is to provide portable and mobile automatic machine servicing devices for land, sea and air machines such as trucks, boats and planes. When the sources of all service elements are mounted in a truck, boat or plane, and extended through a common cable for quick servicing, they have a flexibility not attainable heretofore. Then such services are not fixed to definite locations but can follow with seasonal variations the most traveled paths other than the usual highway, dock and airport locations. Of military significance also is this mobile nature of concentrated servicing for quick maintenance of tanks, torpedo boats and planes.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose by way of example, the principle of the invention and the best mode, which has been contemplated, of applying that principle.

In the drawings:

Figure 1 is a perspective view of all elements of the novel servicing system.

Figure 1*a* is a perspective view of the adapter for converting an unattended self service station into an attended service station.

Figure 2 is a sectional elevation view of the station housing containing the service elements, the means for feeding them, and the electrical controls therefor. It also contains the counterweight, radio and camera devices and controls.

Figure 3 is a perspective view showing the dispensing head with the coin receiver and coin chute which is part of the tubing cable.

Figure 3*a* is a perspective view of the two merging gas tubes for bringing either high test or regular gasoline to a common dispensing head valve.

Figure 4 is a plan view of the receiving port with a latching means for the cover and the dispensing head, the locking means therefor, and the manual and automatic ejection release devices.

Figure 5 is a front elevation view of the instrument panel.

Figure 6 is a sectional elevation view of the cooperating dual valve construction in each port opening and related dispensing head tube.

Figure 6*a* is a detail sectional e'evation view of a valve with a prop operated by a split solenoid plunger.

Figure 7 is a wiring diagram of the entire system.

It may be observed that in all three sheets of drawing there is presented a similar left to right sequential order of the elements of the system. In Figure 1, the service station S, is at the left, and the next element towards the right is the sensing head H, followed by the port P, on the car C and then with the instrument panel I, of the car. So also, on the second sheet, Figures 2, 3, 4, and 5, relate respectively to the station, the head, the port, and the panel. Even in the wiring chart, Figure 7, the relative placement is maintained with the station controls at the left of the dot dash line **20**, the head controls next, the port controls divided therefrom by the line of contact **21**, and finally at the right of line **22**, the instrument or meter gage contacts.

General description

The invention is shown applied to a system for servicing automobiles. In Figure 1, it is seen that an automobile C, is provided with an instrument panel I and an outer service port P. On the panel are the indicators of gages and meters for all the supply and service elements such as gas, oil, water, electric charge, etc., which go towards the running, maintenance and repair of a motor car. These meters not only indicate the state of supply of the various elements, but they also have electrical contacts and valve operating connections to the service port P for controlling the entry selectively of some or none of the elements. At the port are tubes and wires for conducting the various elements to the proper repositories such as the gas tank, oil pan, battery, tires, etc.

The indicators on panel I are directly in front of the driver and the service port P is on the cowl and just in front of the windshield and the left window and within reach of the driver. Therefore, all observations and actions on the part of the driver, to fill the service needs of the car, may be taken without leaving the driving position. When he sees the need for gas or service he merely drives into a self service station, unlatches the cover **23** of the service port, reaches outside the car window, attaches a service head H and deposits coins.

As a means for preventing tampering with the service port, the latched cover **23** is provided with a hidden latch and a latch release knob HE inside the car. Therefore, with the car locked, access is denied to the service port

P in the same fashion that motor is protected by a latched hood.

A service station S, Figure 1, is shown to be mobile with wheels 27 and in a similar way may have propelling means for travel in water or by air to accompany tanks, boats or planes. In the station are the sources of supply and feeding means for all service elements for a particular service need. In the illustrated case of a motor car, the supply elements are electrical energy, compressed air, water, distilled water, oil, grease and gasoline. To take care of other machine needs, other elements such as steam, fuel oil, diesel grade oil, a refrigerant, radioactive or fissionable matter, or any gaseous, liquid or solid elements for the use, service or maintenance of an operating object may be dispensed and vended as disclosed.

Extending from the locked station S is a common flexible cable 28 containing tubes and wires for all of the service elements. On the outer end of the cable 28 is a control terminal or dispensing head H which contains not only the coin receiver 29, but also the valves and contacts for all tubes and flexible tube ends for making tight connections to the tubes in the service port P on the car. A counterweight wire 30 holds the head lifted and makes it easy to move it down on the port with one hand of the driver. As the head is attached it is accurately located by posts on the port registering with holes in the head. Latches hold the head down when it is fully depressed, and there it is locked as soon as a coin is deposited so that it cannot be raised while material is flowing through it. Unlocking and unlatching of the head is automatic upon termination of selected dispensing. Then the head is ejected, i.e., forcibly thrown upward and outward away from the car port. The service port P is intentionally slanted slightly at an angle away from the car to insure that the head is shifted to the side of the car after ejection and thereby causes any drippings to fall on the ground. If, at any time before depositing a coin, the driven wishes to change his mind about wanting service, he merely pulls the same release knob HE used for the port cover 23 and this also releases the head for ejection and he can drive off.

When coins are deposited in the slots in head H to select small or large amounts of gasoline and oil, circuits are established for not only causing the delivery of gas or oil but also for dispensing all of the free services and supplies afforded by the station. Some of the free services such as the supply of a small amount of grease, the taking of a picture and the switching on of a radio receiver are invariable. Other free services such as water, distilled water, air and battery charge are selective and dispensed only when needed as called for automatically by the gages and meters of the car.

By means of the adapter A of Figure 1*a* the desirable features of dispensing station S Figure 1 are made available to old fashioned cars not having the handy service port P and its connections to all service element repositories. When the head H is clamped on the adapter port 31 the service elements are directed therethrough selectively and manually by operation of demand levers 32 (which takes the place of the automatic gage controls of panel I, Figure 1) and operation of quantity levers 33 (which take the place of the automatic coin or token releases of coin receiver 29, Figure 1). An attendant observes and measures the needs of the car and operates levers 32 to select dispensing of gas, oil, grease, water, etc., and he also operates certain of the four money value levers 33 according to the quantity of gas and oil desired by the car owner. The elements are conducted through separate tubes 35—41 and at the ends of certain tubes are hand valves such as the gas and grease valves 42 and 43 for direct control of dispensing by the attendant at the point of application. Thus, by means of adapter A, the service station S, which is available at night for unattended self service use by cars of the modern type as in Figure 1, is converted to attended daytime use for cars of all ages and styles.

Detailed description

Although no specific showing of a liquid level meter is shown, one of the type illustrated in U.S. Patents 1,827,525 or 2,484,690 is applicable.

The substance delivery means for propelling elements in measured quantities is completely disclosed but substitutions may be made in the form of the pump mechanisms as in U.S. Patents 2,008,460 or 2,438,698; and the clutch devices may be of the change speed variety as in U.S. Patent 1,941,963 but magnetically tripped as shown in Patent 958,710. The motor drive to the pump could be opened after a predetermined number of revolutions as shown in Patent 1,001,409.

It is understood that behind the panel I (Figures 1 and 5) are gages or meters with controls reaching to the radiator R, battery B, oil pan O, tire valves T and gas tank G. In the case of the gages for water, distilled water, gas and oil they are of the liquid level indicating type and shows the state of supply of the liquid contents. The air pressure gage is of a different type with an indicator shifted by pressure on a piston. And the battery charge meter is electrical and shiftable on the galvanometer principle. However all six gages are of standard types and are shown diagrammatically at the right in the wiring diagram Figure 7. Also shown there and in Figure 5 are the indicator needles or pointers 45 which when pointing toward the right, as shown are indicative of full or optimum conditions of state of supply and are out of contact with the electrical arcuate strips 46 (Figure 7) which are parts of demand circuits for automatic replenishing controls. As example of air pressure gages, reference may be made to U.S. Patents Reissue 20,351, 1,851,978 and 2,492,450. Types of battery charge meters are shown in U.S. Patents 2,096,131 and 2,432,068–9.

Turning again to Figure 5 it is noted that on instrument panel I the six gage pointers are labeled as relating to the water, battery charge, distilled water, air, gas and oil supply gages. Also at the lower left corner of panel I is the head ejector button HE which when pulled draws on a wire 48 to trip latches for either opening the port cover 23 or ejecting the head H. A spring 49 pressing between the back of panel I and an extension on wire 48 tends to hold the wire retracted and the button HE down on the panel.

In Figure 1 it is seen that all the supply element holders or repositories have tubing leading thereto from the separate openings in the service port P on the cowl. For purpose of conducting and conveying water from the left side of port P there is provided a tube 50 leading into the top of radiator R. Another tube 51 conducts distilled water from the top opening of the port P into the top of the battery B. A tube 52 with four or five branch tubes is the one which conducts air under pressure from the inlet valve of the port to the tires of the car. Because of the movement of the tire, the air tube connection is not direct to the tire valve T but is to a stationary inner portion of a hollow axle 54 having a radiating portion 55 out to the tire tube valve T. A centralized construction such as shown in patent application Serial No. 793,901, filed on December 26, 1947 and issued as Alvistur Patent 2,505,821, on May 2, 1950, is applicable.

Extending downward from a port opening at the right is a tube 57 for conducting oil down into the top of the oil pan or crank case O. A tube 58 projects downward from a lower middle port opening to convey grease down into a common grease can GC out of which radiates other tubes to conduct grease to other points of friction in the car. A long tube 59 conducts gasoline from the lower right port opening to the gas tank G at the rear of the car.

It is noted that the port P is mounted on a slant on the part of the cowl where it comes off the horizontal

and dips down towards the mud guard. More of the details of port P are about to be pointed out with reference to Figure 4.

The port P shown generally in Figure 1 is exposed in greater detail in Figures 4, 6 and 6*a*. There it is seen that the cowl 60 has an opening into which is fastened a triangular and dished out casting 61 with a raised outer rib 62. Casting 61 is formed with seven circular holes into which are fastened the annular valve holders 1DW, 1W, 1B, 1OL, 1A, 1GR and 1G and, as can be gathered by the nomenclature, relate, respectively, to conductors for distilled water, water, battery charge current, oil, compressed air, grease and gasoline.

The central holder 1B does not contain a valve but has a set of multiple contact blades 63–74 and the structure is of the kind sometimes referred to as a "Jones Plug." The blades are positioned to make a wiping contact with a similar set of blades 75–86 in the central opening 2B of the head H, Figure 3, when the head is snapped onto the port. The two sets of contacts 63–74 and 75–86 are shown diagrammatically in the wiring diagram Figure 7 as contacting at the theoretical dividing line 21.

The other six holders 1DW, 1W, 1OL, 1A, 1GR and 1G, Figure 4, all have valves 88, Figure 6, normally closing the individual ports but responsive to solenoids such as solenoid GS to open for entry of a service element as explained further hereinafter.

A drainage opening 89, Figure 4, is provided just inside the rib 62 at the lower end of the port P and a tube 90 therefrom is carried along the inside of the left front mudguard. This opening 89 is convenient for cleaning and washing purposes as well as to carry off excess and overflow of materials.

A pair of posts 91 are fastened in the casting 61, Figure 4, and project upwardly as guides and locators for the head H. In Figure 3 is seen that head H is formed with a pair of holes 92 agreeing in size and position with the posts 91. When the head is to be assembled on the port, it must first be positioned so that the ends of posts 91 enter into holes 92. Then it can be pushed down and latched thereon with the assurance that all the contact leafs 63–86 in ports 1B, 2B make proper contact and all the six other valve ports are fitted together tightly.

Coiled around each pin 91 and fastened to casting 61 is a conical compression spring 94 with a free upper end extending to engage the face of the head H. These two springs 94 are compressed when the head H is pressed down and latched onto the port P. They also serve to eject the head; i.e., they throw it upward and outward as soon as the latches release it.

Associated with port P, Figure 4, are means for latching the head H onto the port as dispensing is taking place. Under the port casting 61 and pivotally mounted at 17 and 19 under the cowl 60 are two latch levers 16 and 18. The first is provided with an upwardly extending shoulder stud 96 projecting through a hole in casting 61 near the cover hinge and the second has a similar stud 97 projecting upward through a ribbed opening near the bottom of the casting. Springs tend to rock lever 18 clockwise and lever 16 counterclockwise so that studs 96 and 97 are urged inward towards the center of the port.

The casting 105, Figure 3, of head H is shaped to cooperate with the latching studs 96 and 97. Notches 106 and 107 in casing 105 are formed with slanted entering surfaces and latching shoulders which are positioned and proportioned to fit with a latching action against the latching shoulders cut into studs 96 and 97, respectively, of port P.

When the head H is properly located on the port P and pressed down to overcome springs 94, the notch formations 106 and 107 first swing the levers 16 and 18 outward, and then, as all port joints are properly fitted, the latching ledges meet and the studs 96 and 97 snap inward to latch the head on the port. This action is shown graphically by the normal and phantom positions of pins 14 and 15 on the outer ends of levers 16 and 18. As shown by full lines the pins are at the right in the normal position. As the head is being forced on, the levers 16 and 18 are rocked so that the pins are shifted to the left to the dotted line positions at the extreme left. Then as the latches snap into engagement, the pins move outward slightly into the central dotted line positions. These pins 14 and 15 are used for locking purposes to hold the head H locked in place as long as service elements are passing therethrough and as long as a port valve is open.

A locking lever 100, Figure 4, is formed with an arcuate extension 13 which is designed to pass to the left of the central positions of pins 14 and 15 and thus prevent them and the levers 16 and 18 from being shifted to release the head H. In order to release the head the pins 14 and 15 must be shifted to the extreme left phantom position wherein lever 16 is rocked clockwise and lever 18 is rocked counterclockwise sufficiently to disengage the shoulders of studs 96 and 97 from notch shoulders 106 and 107, Figure 3.

Locking lever 100 prevents such head release operation during dispensing because it is then rocked in a counter clockwise direction by an associated head lock magnet HL. The magnet attracts the horizontal arcuative portion of lever 100 to overcome the normalizing spring and swing the arcuate extension 13 around to the left of pins 14 and 15 so that they and the attached levers 16 and 18 are locked and prevented from unlatching the head.

After dispensing is completed, magnet HL is deenergized and lever 100 is released to be returned by the spring clockwise to the home position wherein extension 13 is out of the path of the pins 14 and 15.

The restoration of lock lever 100 is used as an automatic trigger to cause ejection of the head H. Pivoted on the side of lever 100 is a flipper 110 which has a unidirectional action against an insulation button on the underside of a lower leaf of a pair of contacts 111 fastened by insulation to the inside of the cowl. On the counterclockwise locking motion of lever 100, flipper 110 is ineffective against the contacts because it rocks idly under the contact button. However, on the final clockwise releasing movement of lever 100 (i.e., when the head lock magnet HL is deenergized) flipper 110 acts as a positive cam portion of lever 100 and presses upward on the button to close contacts 111. Since it is at a time after completion of automatic dispensing, and since the head is unlocked and ready to be unlatched, contacts 111 are timed to cause automatic ejection of the head by means about to be described.

Provisions are made to release and eject the head by both automatic and manual means. Pivotally mounted on the underside of the cowl 60 is a three armed lever 102 with a spring holding it retracted clockwise to a normal position. An upper vertical arm is proportioned to swing counterclockwise against the two pins 14 and 15 in order to rock the levers 16, 18 and studs 96, 97 to release the head. Articulated on a short horizontal arm of lever 102 is the upper end of a solenoid plunger 113 in an eject solenoid ES. Solenoid ES is in series with eject contacts 111 so that when they are closed automatically at the end of dispensing to cause head release action, solenoid ES is energized and the plunger therein is lifted and it rocks lever 102 in a counterclockwise direction to operate the latch levers 16 and 18 to release the head.

As part of the manual head release, lever 102 is formed with a lower vertical arm on the end of which is pivotally connected one end of the link or rod 48 the other end of which projects through panel I, Figure 5, and has thereon the head eject button HE. Thus, from the inside of the car, button HE may be grasped and pulled to rock lever 102 and release the head for ejection. However, such manual operation is ineffective during dispensing because at that time, lock lever 100 is rocked with arcuate portion 13 to the left of pins 14 and 15 and therefore lever 102

cannot be fully rocked either electrically or manually. Spring 49 presses between the back of panel I and a projection on rod 48 to hold down the button HE. If it is desired to prevent movement of button HE when lever 102 is operated automatically, then the lower end of lever 102 may be formed with a slot to the left of the center where the left end of rod 48 is articulated thereon.

When the head H is released by outward movement of studs 96 and 97 either automatically or manually, then it is suddenly and forcibly ejected upward and outward by the reaction of conical springs 94 which were pressed almost flat by the assembly of the head.

Electrical interlocks are provided for use in the dispensing control circuits to insure that dispensing does not start until the head H is properly assembled and all tubing and contact connections are matched and tight. Three pairs of contacts are closed as the head H is fitted on the port P. Two outer contacts 98 and 99, Figure 4, are closed by levers 16 and 18 when the studs 96 and 97 thereon are cammed outward by the shoulders of notches 106 and 107, Figure 3, as the head is in position to be latched. A third pair of contacts are centralized in port opening 1B, Figure 4, and are closed or bridged electrically by an insulated contact projection 95, Figure 7, extending in the head portion 2B, Figure 3. The insertion of contact 95 between the two related wiping contacts, Figure 7, is accomplished only when the head H is all the way down and fully latched. The three contact pairs 98, 99 and 95 are seen to be in series in a dispensing control circuit which is described hereinafter.

Although the three contact pairs 95, 98 and 99 are operated by means spaced to detect differences in leveling and improper assembly of the head, it is realized that further and additional interlock control may be accomplished by providing other similar contacts in different places. For example, three sets of contacts such as 95 or 98 may be placed at the three corners of the port P to be operated by the three corners of the assembled head H either directly by wiping action or indirectly through motion magnifying levers rocked by the depression of the head to the latching position in the three corners.

When the car C, Figure 1, is in use it is desirable to have the port P covered and locked to keep the outer port parts clean, as well as to prevent theft or tampering with the service elements. For such a purpose there is provided the cover 23 which is hinged at 103, Figure 4, and formed triangular with an outer flange making a tight fit around the outside of rib 62 of the port. A spring 104 coiled around the hinge rod 103 tends to make the cover fly open but it is normally latched down and locked by engagement of a shouldered inwardly projecting stud 115, Figure 1, therein with the stud 97, Figure 4, of the latch lever 18 already noted.

When dispensing is finished and after the head H is ejected, the driver reaches out of the car window and grasps the free end of cover 23 and presses it down on the port. Then the stud 97 yields outward and a latch shoulder thereon snaps in behind a shoulder on the cover stud 115 and the cover 23 is locked on the port. It cannot be raised from the outside of the car C, and therefore when the car is locked the port is protected just as the motor is protected by a locked hood.

The port cover 23 may be unlatched at any time by the driver from the inside of the car. Since the latch stud 97 for the cover is the same as that used for latching the head, an economical use is made of the same parts for opening the cover and ejecting the head. By merely grasping head eject button HE, Figure 5, and pulling on it, the cover 23 is unlatched so that spring 104 can swing it open. Movement to the right of the manual eject rod 48, Figure 4, causes counterclockwise rocking of lever 102 and it in turn strikes against pin 15 to rock lever 18 and shift stud 97 outward to open the cover.

Before describing the head H, Figure 3, it is believed best to describe the service station S from which the various service elements are conducted to the head.

The service station S, Figures 1 and 2, may be of a fixed or mobile variety and therefore the walls 118 and 119 are part of a building, truck, boat or airplane. Housed inside station S are the sources of all the service elements and controls. As much as possible of the equipment is stored inside locked station S not only to prevent tampering with supplies and controls but also to lighten as much as possible the main tube 28 and the head H.

At the lower right portion of station S, Figure 2, it is seen that the main tube or cable 28 extends through an opening in the wall to carry out to the head all the tubes and control wires for conveying out all the elements about to be mentioned separately.

Stored in an elevated tank D is a supply of distilled water which is conducted to and through main tube 28 to the head H by means of a tube 120 connected to the bottom of tank D. Gravity supplies the force which tends to eject the distilled water through the head when the related valve is opened.

Plain water is brought in through a water tap WT and conducted by a hose 121 to and through the main tube 28 and the head. When the station S is of a mobile variety then the water can be stored in an elevated tank as in the case of distilled water.

The air for tire inflation is compressed in the air compressor AC and conducted therefrom by a tube 122 leading to and through the main tube 28 to the head. Inflator devices and controls are shown more fully in U.S. Patents 1,513,740, 2,010,062 and application Ser. No. 7,036, filed on Feb. 9, 1948 and issued as the patent to Wallin, No. 2,501,801, March 28, 1950.

The electric current or power source PS is illustrated as passing through rectifiers RC and IG, the purpose of the first being to supply D.C. current for the relay controls, and the second being to provide a quick battery charging current by the devices of the kind set forth in U.S. Patents 2,114,827 and 2,488,711.

Other electrical controls illustrated to the left of the line 20 in Figure 7 are also stored within station S. A cable 123, Figure 2, contains all the wires from the rectifiers and the controls and it is led into and through main tube 28 up to the centralized opening 2B, Figure 3, within the head and terminating in contacts 75–86 as seen in Figure 7.

In the case of the service elements gasoline, oil and grease, since they are relatively expensive, they are dispensed in carefully measured quantities. For illustration, a common type of screw feed 124, 125 and 126 is used for all three elements. A tube 127 conveys gasoline from a storage tank to the screw feed tank 124 through which it is pushed by the screw in a measured number of turns and ejected through a tube 130 leading into and through the main cable 28 to the head. In a similar fashion, oil is brought by tube 128 to the feed device 125 and conducted to the head through tube 131 encased in the cable 28 outside the station. Similarly, grease is brought from a drum by tube 129 and forced to the right by screw 126 and out through tube 132 which leads into and through the cable 28 to the head.

A common form of drive and measuring control is used for all three feed devices 124, 125 and 126. They all have separate motors and controls but they are of similar type. The drive motors GM, OM and GR are used respectively to operate the feed and regulating devices for the gasoline, oil, and grease deliveries.

Taking the gasoline drive and measuring devices as an example, it is seen that the motor GM works through a speed reduction gear box GRE with gears for reducing the r.p.m. Next come two clutch mechanisms 25C and 50C under control of magnets 25M and 50M for selecting the number of screw feed turns according to the size of the coin or token deposited. These clutches each have a proportioned gear drive 25G and 50G to the shaft of

the screw feed 124 to get the desired differential number of revolutions. The plural clutches may be of the kind with gear selection as shown in U.S. Patent 1,941,963 but controlled magnetically as shown in U.S. Patent 958,710 already noted.

As explained further in connection with the wiring diagram, Figure 7, the motor GM for gasoline dispensing is energized under joint control of the gas gage showing a shortage and the deposit of a coin for a certain quantity of gasoline, and such energization is sustained to insure complete dispensing.

The clutches 25C and 50C are proportioned so that if 25C permits a half revolution of the drive gear then 50C allows a full revolution of the drive. These extents of drive of the clutches are magnified by gears 25G or 50G to produce the required number of turns of screw 124 to dispense about one gallon of gasoline for 25¢ and double that quantity for 50¢.

The oil feed drive mechanism including motor OM is similar to that of the gasoline feed. Between the motor OM and the two clutches 136 and 137 is the gear reduction unit 135. The 50¢ clutch 136 is controlled by magnet 50L and the 25¢ clutch 137 is controlled by magnet 25L. Clutch drive gears 139 produce twice the extent of feed as that produced by action of the gears 138 called in by magnet 25L and clutch 137 to drive the shaft of feed screw 125.

The grease feed drive mechanism involving motor GR is also similar to that of the gasoline feed. However, since the amount of grease dispensed is at times small because it is a free invariable service as an accompaniment to automatic self service, the magnet 5R and its clutch 142 operate for only a fraction of a revolution. Magnet 5R is called into operation automatically along with every self service sale of gas or oil no matter how small.

The other grease drive selecting clutch magnet 50R is called into action manually by closure of a contact by a lever 32, Figure 1*a*, on adapter A when operated by an attendant for a paid service. Because magnet 50R represents an appreciable cash service it calls into action a clutch 141 for a full revolution of the drive gears. Between the motor GR and the two clutches 141 and 142 is a speed reduction unit 140. Clutch drive gears 143 produce about ten times the amount of grease dispensing action as that produced by the action of gears 144 for a free greasing as called in by magnet 5R and clutch 142 to drive the shaft of the grease feed screw 126.

A camera CM, Figure 2, is operated under control of either the dispensing controls or the counterweight contacts CWC to take a picture of the objects related to each sale or disturbing influence outside the station S.

Fastened inside the station opposite a wall opening 147 is the 8 mm. or 16 mm. moving picture camera CM with a "single frame" exposure button. The camera is pointed toward the area where the rear of a car being serviced is bound to be located with the rear license plate exposed. It also covers the area in which the main cable 28 and head H extends from the station. It is optional whether a picture is to be taken when the head is pulled down or when a coin is deposited. In either event a camera solenoid CS is energized and the plunger thereof pushes against and operates the "single frame" button so that a single frame picture is taken of the objects relating to the disturbance of the head and a sale.

A radio receiver RD is fastened inside station S near a grill opening 149 in the wall 119. The receiver is tuned to a station specializing in news and weather reports. In series with the "on" control switch is a pair of normally open contacts 148 which are closed by a magnet RM during each sale. A standby filament circuit not shown may be employed to keep the receiver ready for instantaneous reporting at the instant that the relay magnet RM is operated by the dispensing controls as pointed out hereinafter.

It was noted with reference to Figure 1, that the cable 28 is supported by a counterweight wire 30. Turning to Figure 2 it is seen that wire 30 extends through an opening 151 in the station wall and passes around a pulley wheel 150 on a fixed bearing fastened to the inside of the wall 119. On the inner end of the wire 30 is attached the counterweight CW which is heavy enough to counterbalance the head H and the free end of cable 28.

Also fastened to the inside of wall 119 but insulated therefrom is a pair of counterweight contacts CWC. The inner blade of the contacts has fastened thereon a conical insulation button which extends into the path of the sloping side of the counterweight when it is lifted by a depression of head H for a sale, or by any tampering with the elevated extending service cable; contacts CWC are closed and a picture may be taken or other controls exercised therefrom.

In Figure 3 is shown the head H and its connections. A main casing 105 is formed with a coin receiver extension 152 as well as with seven tubular contact and valve openings 2DW, 2OL, etc., better shown in Figure 6. It is already noted that the casing 105 Figure 3 is formed with openings 92 and notches 106, 107 for locating and latching purposes. To the rear of the head is fastened a widened portion of the flexible main cable 28. Within the cable and fastened behind the face of the head to separate circular openings as noted in Figure 6 are the several tubes 120, 121, 122, 123, 130 etc., Figure 2 which conduct the service elements from the station to the head. In Figure 3*a* it is shown that the gas conducting tube 130 may be of a split formation to convey either regular or high test gas from two feed devices, such as feed means 124, Figure 2, controlled by motor GM to the gas outlet valve 2G Figures 3 and 3*a* on the head.

The rectangular coin receiver extension 152, Figure 3, is formed with six coin or token receiving openings. These are for 25¢ and 50¢ denominations for oil and for 25¢ and 50¢ coin sizes for regular or high test gasoline. Although illustrated in connection with 25¢ and 50¢ coins, it is believed that operation by tokens of one, two and three dollar values would also be appropriate.

Behind the coin openings are blocking levers 154 and 155 Figure 7, for preventing insertion of coins until the related oil and gas gage contacts 45, 46 call for supplies, and until the head H is properly assembled on the port P as evidenced by the closure of all three contacts 95, 98 and 99.

Leading downward from the coin openings in coin receiver 152 Figure 3 are coin channels such as channels 157 and 158, Figure 7 and they lead the coins past related control contacts to close them and initiate dispensing of the proper element in the selected amount. The four coin operated contacts 159, 160, 161 and 162 are related, respectively, to the 50¢ oil, and 25¢ oil, 50¢ gas and 25¢ gas, channels. The right blade of each pair of contacts is formed with a slanted projection which is cammed to the left by the passage of a coin and the contacts are closed momentarily.

The coin channels such as 157 and 158, Figure 7 lead into a common chamber and into a common gravity conduction tube 164, Figures 2 and 3, which carries the coins or tokens along the bottom of main cable 28 and into a locked coin box CB on the inside of the station S. Tube 164 may be an integral part of main tube 28 or merely attached thereto.

Since tube 164 is exposed it is subject to cutting in an effort to divert the coins passing through it. However, provisions are made to prevent operation of the dispensing system when the cable and especially tube 164 is tampered with. Laced around tube 164 as shown, Fig. 3, and optionally also laced in cable 28 directly under the surface are a criss cross pattern of wires W which are the conductors of current for the main controls of dispensing such as wires to and from the power source and wires to the magnets 165 and 166, Figure 7, for operating the levers to unblock the coin openings. Therefore if

anyone cuts an opening in tube **164** or cable **28**, Figure 3 in an effort to divert the coins to the outside, or to tap the system, the electric controls are broken and coins cannot be inserted. The tubes could also carry parallel camera control wires leading to solenoid CS, Figure 2, so that when bridged by a knife, a picture is taken of the culprit.

The reasons for conducting the coins and tokens into the locked coin box CB are not alone to prevent theft but also to lighten the head H and to prevent tampering with it.

The interior construction of the six port openings 1DW, 1W, 1OL, 1A, 1GR and 1G, Figure 4, and the related head openings 2DW, 2W, 2OL, 2A, 2GR and 2G, Figure 3, are shown in Figures 6 and 6*a*. In Figure 6, for purposes of illustration, the gasoline valving controls are shown within openings 1G and 2G, but all other connections are similar.

In Figure 1 the tube **59** leading to the gas tank G is noted to be attached to the underside of port P. In Figure 6 it is seen that threaded onto the end of flexible tube **59** is a valve pipe **170** further affixed by a circular clamp **171**. Pipe **170** has a flange **172** which is riveted to the underside of the casting **61** of the port P.

The port opening 1G is normally closed by a valve **88** the head of which is seated in an annular valve seat **173** which is threaded into the upper end of pipe **170**. The valve seat is formed with four radial prongs **174** similar to four lugs **175** extending inward from pipe **170**. Suspended between the sets of prongs and lugs is a valve operating solenoid GS the casing of which is quite smaller in outside diameter than the inside diameter of pipe **170**. Thus, there is provided an annular space for the passage of the gasoline downward around the solenoid GS when the valve **88** is opened. The stem **176** of valve **88** is formed of an upper non-magnetic portion and a lower magnetic portion with an enlarged stopping head to which is attached the upper end of a spring **177** that is stretched from a crossbar **178** extending across the lower end of pipe **170**.

Spring **177** tends to hold the valve **88** down and seated normally to close the port. However, upon energization of solenoid GS, and since valve stem **176** is loosely guided as a plunger therein, the stem and valve are lifted against the tension of spring **177** and held open for the flow of gasoline into pipe **170** and tube **59** leading to the gas tank.

It is seen in Figure 6 that the upper outer periphery of seat **173** and pipe **170** are tapered slightly to form a tight fit within a short length of soft rubber or flexible plastic ring **183** fixed to the end of the gasoline tubing **130** and projecting beyond the face **105** of the head H. In Figure 3 it is seen that seven such flexible snouts or rings **183** project from the head. These rings must be flexible enough to yield and stretch outward to conform with and fit snugly on the taper of the port pipe **170**, Figure 6 when the head is pressed on the port. But they must be inflexible enough to resist the escape of the liquid and air supply elements conducted therethrough under pressure.

The upper inside portion of ring **183** is threaded to fit on the end of threaded valve seat ring **184** which is screwed into the end of the gasoline conduction tube **130** leading from the pump **124**, Figure 2. A clamping band **185** holds the three parts securely together but the end of ring **183** projects as a flexible snout. A flange **186** near the end of tube **130** is riveted to the inside of head casing **105** and in such a fashion all the tubes in the end of the main cable **28** are secured to the head.

Valve seat **184** is shaped to contain valve **181** and provide a smooth tight tapered seat for the tapered head of the valve. Extending upwardly in tube **130** is a thin ring portion of seat **184** which is formed with inwardly extending radial prongs **187** for guiding the upper end of the valve stem **188** of valve **181**. The prongs **187** also acts as an upper stop for a compression spring **189** which presses against the back of the valve head and tends to keep valve **181** closed.

Head valve **181** is formed with an extension **180** which is centralized and in alinement with a similar extension **179** on the port valve **88**. When solenoid GS is energized and valve **88** is lifted, extension **179** abuts upward against extension **180** and lifts valve **181** to open it along with opened valve **88**. However, there is a slight lag in the operation due to the space between the two extensions. This lag space is important for two specific purposes in addition to others. It prevents excessive pressure on the ring **183** because valve **88** is opened before the onrushing gas is released by the opening of valve **181**. And this lag space also serves during restoration because then when spring **177** pulls valve **88** away from **180** valve **181** is closed first and pressure is taken off ring **183** and the residual gas in the outer space is drained through the valve opening around valve **88** in the moment that it remains open after valve **181** is closed. The lag also permits a build up of momentum for the sudden action on valve **181** to overcome spring **189** and lift it.

Although in Figure 6 the gasoline valve devices are taken as an example for purposes of illustration, it will be understood that the same type of valve and solenoid construction is applicable for the controlled delivery of distilled water, water, oil, air, grease and any other gaseous, liquid, viscous or valvable material. The outer construction of pipe **170**, ring **183** and tube **130** is also applicable to the contact holders 1B, Figure 4, and 2B, Figure 3, but in those instances the inside of the tube ends are furnished with contacts embedded in, and separated by, insulated holders.

In the case of grease and air, or any other material delivered at considerable pressure, it is at times advisable to furnish a prop for holding the receiving valve **88'** open as shown in Figure 6*a*. There it is noted that the inlet port valve for grease is provided with a valve **88'** having a stem **176'** with an extra, relatively movable, stem section **190**. This stem section is keyed to stem **176'** but movable vertically relatively thereto to take up the separating space **191** as soon as the grease receiving solenoid GRS is energized. On the side of stem section **190** is a notch into which is fitted the ball end of a horizontal arm of a prop crank **193** pivoted at **194** inside the valve seat **173'**. The top of the vertical arm of prop **193** is formed in two levels with the right level lower and permitting the valve head **88'** to be lowered to the closed seated position. However the left level is higher and acts as a cam surface in cooperation with the underside of the valve head to pass under the head as it is lifted and be placed as a prop almost on dead center against the lifted valve. Then the incoming grease under pressure cannot overcome spring **177** and close the valve **88'** because it has a positive resistance in the prop **193**. When the solenoid GRS is deenergized a separate spring **177'**, (not shown) first pulls down section **190** to again widen space **191** and rock crank **193** to knock the prop from under valve **88'** so that it may also be restored and closed by its spring.

In order to prevent dust and dirt from accumulating on the head H, Figure 3, a plastic bag may be fastened around it with a lower draw string giving quick access to the dispensing tubes.

The adapter A, Figure 1*a*, is a portable converting device which is brought out of station S when an attendant comes on day time duty to convert the select modern car night time self service station to general attended day time service.

A tripod frame **195** has a platform upon which rests the adapter port structure **31**. The platform is hollowed out so that a curved main cable **196** can extend downward and to the right where all the tubes and wires passing through the cable are supported on a bracket rod **197** extending from frame **195**. The seven tubes and conduits **35–41** are identified for their purpose in Figure 1*a* and

they may be applied separately to the radiator, battery wells, oil pipe, grease nipples, battery terminals, gas tank and tire valves of a car and separately controlled by manual spout valve buttons and levers such as 42 and 43 for direct controlled dispensing.

It will be understood that the adapter A of Figure 1*a* has all the port features of the car port P of Figure 4. It has all seven port openings with pipes, valves and solenoid controls such as pipe 170, valve 88 and solenoid GS of Figure 6. Thus it is suited to receive the head H, Figure 3, and control the valves therein just as they were controlled by the devices of Figures 4, 6 and 6*a*.

Adapter A also has all the locating, latching, locking and ejecting parts of port P. In addition thereto it has the value levers 33 for gas, oil and grease and the demand levers 32 for all free and paid services. These levers 32, 33 and the contacts operated thereby take the place of the gage contacts 45, 46, Figure 7, and the coin contacts 159–162, respectively, and thus involve a greater number of contact connections in the plug opening 1B' Figure 1*a*, than port opening 1B, Figure 4, as shown along line 21 in Figure 7.

In box 198, Figure 1*a*, are the change over wiring connections for the adapter as well as the contacts such as contacts 220–223 operated by levers 32, 33 as shown in Figure 7. A hinged cover 199, Figure 1*a*, is provided to swing over all the manipulative controls and be locked closed when desired to prevent unauthorized operation of dispensing. The attendant while on duty has the cover unlocked and after determining the needs of a car, and the quantities of gas, oil and grease desired by the driver, operates the levers 32 and 33 which are effective only when the head is properly seated on the adapter. The levers may be operated one at a time when the related hose is associated with the car element receiver.

Ejection of the head H from the adapter may be automatic as by solenoid ES, or semi automatic by a contact button also under cover 199 with wires to solenoid ES, or it could be manual by a button HE, Figure 5, and a rod 48 extending inside adapter case 31, Figure 1*a* to a latch release lever such as lever 102, Figure 4.

The cover 23', Figure 1*a*, is similar to the port cover in purpose and operation to keep the port openings clean and inaccessible, but in addition to the ordinary swinging, latching and locking features of such a cover it has a key operated lock for making it independently inaccessible.

In the wiring diagram, Figure 7, it is shown by lines 20, 21 and 22 that the controls and wires may be divided into four general groups according to whether they are located in the station, head, port or adapter, and car, from left to right. However they are all properly connected by contacts 63–74 in the port and contacts 75–86 in the head when the head is assembled on the car or the adapter.

The power source PS at the lower left is assumed to be regular A.C. current which is rectified in rectifier RC for low and high relay and motor control voltages and rectified in IG for quick battery charging current. The rectifier RC could be a motor generator set or an electronic rectifier with four type (83) full wave rectifier tubes. At least two voltages are tapped out of RC, one for initiating control and the higher value for relay and motor operation.

Since there is a chance that fingers will be inserted into the contact opening 2B, Figure 3, of the head, it is advisable to avoid having direct open high voltage contacts at that point. Instead a low voltage relay circuit is provided to pick up the higher voltage operating circuits only when the head is assembled and latched and all the contacts are covered. The low voltage circuit includes relay 225, resistance RS, wire 226, contacts 81, 69, touching only when the head is assembled, wire 204, contacts 95 bridged only when plug sockets 1B, Figures 4 and 2B, Figure 3, are properly joined, contacts 99 and 98, Figure 7, of the head latches 16 and 18, Figure 4, wire 203, Figure 7, resistance R2, line 202, contacts 70, 82 and line 201 to battery BT and wire 227 back to relay 225. Instead of battery BT a low voltage tap may be used. Relay 225 operates on a normally open pair of contacts 200 which is in the higher voltage line 201 for the operating controls. Since the operating voltage lines such as 201 and 226 are normally opened at 200 as well as at contacts 81 and 82 it is obvious that no serious shock can be experienced by fingering the exposed contacts 81 and 82. Instead a mild shock is experienced there from battery BT of about 6 volts and full current is on thru contacts 200 only when the head is assembled on the port.

At the right, Figure 7 it is seen that the common line 202 is connected to all six of the arcuate strips 46 of the various meters or gages. However the six pointers 45 thereof are individually connected to the battery solenoid BS and the valve control solenoids WS, DWS, OS, GS and AS. The other solenoid GRS is independent of gage control because it is usually a free invariable service.

When a gage shows related element supply to be less than full to a desired degree, pointer 45 makes contact with arcuate strip 46 and a demand or pickup circuit is established dependent upon proper assembly of the head and deposit of a coin or token. Taking the gas supply circuit as an example, a pickup circuit may be traced as follows; power source PS, rectifier RC, contacts 200 assumed closed by proper head assembly, wire 201, contacts 82, 70, line 202, wire 214, gas gage contacts 46, 45, wire 215, gas valve solenoid GS; and at this point the circuit has two branches, the one through wire 218, contacts 65, 77, wire 219, magnet 166 and line 213 is for the purpose of rocking coin blocking lever 155 to allow the insertion of a gas demand token of 25¢ or 50¢ to complete the pickup circuit, and the other is for the pickup circuit. Assuming that a 50¢ coin is deposited and dropped thru chute 158 to close contacts 161, then the gas pickup circuit continues from solenoid GS through the cuprous oxide or crystal diode type 1N34 rectifier 216 (to prevent back circuits), wires 217 and 203, head assembly contacts 98, 99 and 95, wire 204, contact 69, 81, wire 226, pickup coil 1, wire 205, coin contacts 161, wire 209, clutch magnet 50M, wire 230, switch 210 or grease selection contacts 212 and grease clutch magnet 5R and wire 213 to the rectifier RC. From the foregoing it is evident that pickup coil 1 is energized as the result of many connections beginning with the demand shown by the gas gage, the subsequent proper assembly of the head and the insertion of a coin. It is also evident that along with the energization of the pickup coil 1 there is the energization of the gas valve solenoid GS the coin release magnet 166, the related paid service clutch magnet 50M, and the free service grease clutch magnet 5R. Switch 210 may be thrown over to terminal 211 to cut out the free grease supply if desired.

When the pickup coil 1 is energized it attracts the armature lever 3 which is pivoted at 11 and formed with a right hand extension as part of a contact 5 closed in a momentary hold coil circuit. The circuit for hold coil 2 includes rectifier RC, closed contacts 200, wire 229, contacts 5, armature lever 3 and a wire to coil 2, resistor R3 and wire 228 to the rectifier RC. Then coil 2 acts as a solenoid and lifts the plunger of a dash pot DP which is adjustable and set for a time interval slightly more than sufficient to dispense the largest amount of gas or oil. As the plunger of dash pot DP is raised, an insulation ring thereon closes the hold contacts 8 and then another extension 6 on the plunger engages the end of a rod 4 which is pivoted at 10 on the pickup armature lever 3. By lifting rod 4 and rocking armature 3 in a clockwise direction, contacts 5 are opened to break the momentary hold circuit through coil 2 as soon as the dash pot hold circuit is established through contacts 8. A coil spring 7 on the plunger between the extension 6 and coil 2 presses down and tends to restore the dash pot parts and open contacts 8, but such restoration is comparatively slow and timed to the proper interval.

The hold circuit includes rectifier RC, contacts **200**, line **201**, the gage contacts, valve solenoid and head contacts already traced to wire **226** and a wire to dash pot lever **9**, contacts **8**, wire **232** to the three dispenser operating motors GM, OM and GR, wire **233**, contacts **76**, **64**, head lock magnet HL, contacts **63**, **75**, wires **234** and **235**, radio magnet RM and wire **213** to the rectifier RC. By means of the foregoing, for the interval that the dispensing motors are active, the head is locked on the port by magnet HL, and the radio receiver is made effective by magnet RM. In addition thereto, if the camera switch CSW is thrown to the right, the camera single frame solenoid CS is called in through wire **237** and switch CSW between wires **234** and **213** of the hold circuit.

If camera switch CSW is in central position the camera solenoid is put out of operation. When thrown to the left, switch CSW puts the camera solenoid CS under control of the counterweight contacts CWC. Then any disturbance of the main cable or head causes operation of the camera independently of any other dispensing circuit. The counterweight camera circuit includes rectifier RC, wire **238**, contacts CWC, switch CSW, solenoid CS, and wire **213** to the rectifier.

When the hold circuit is broken by the descent of the dash pot plunger and the opening of contacts **8**, then the head lock magnet HL is deenergized. This causes the release of lock lever **100**, Figure 4, to swing clockwise with flipper **110** and it closes contacts **111** which are seen to be in series with the eject solenoid ES, Figure 7. The eject circuit includes rectifier RC, contacts **200**, wire **201**, contacts **82**, **70**, line **202**, resistance R2, solenoid ES, contacts **111**, wire **239**, contacts **63**, **75**, wires **234**, **235**, magnet RM, and wire **213** to rectifier RC. The energized solenoid ES, Figure 4, rocks the latch levers **16** and **18** so that they release the head to be thrown off by springs **94**.

Hereinbefore it was assumed that a measure of gasoline was dispensed by the deposit of a 50¢ coin. Now it will be assumed that there is a shortage of oil, the head is affixed and a 25¢ coin is deposited in the small "oil" slot. Before the coin can be deposited, the following circuit is closed to swing the oil coin blocking lever **154**, Figure 7, out of blocking position by the energization of magnet **165**. The circuit can be followed through rectifier RC, contacts **200**, wire **201**, contacts **82**, **70**, line **202**, wire **214**, oil gage contacts **46**, **45**, wire **240**, oil valve solenoid OS, a wire to contacts **66**, **78**, wire **241**, magnet **165**, and wire **213** to the rectifier. There is also the other branch of the circuit from solenoid OS to pick up and hold the valve open and the pump motor going. This is initiated by the deposit of 25¢ in the channel **157** and the closure of contacts **160**. Thus the oil selection circuit continues through the unidirectional rectifier **242**, wires **217** and **203**, head contacts **98**, **99** and **95**, wire **204**, contacts **69**, **81**, wire **226**, pickup coil **1**, wire **205**, contacts **160**, wire **206**, the short cycle oil clutch magnet **25L**, switch **210**, grease clutch magnet **5R** and line **213** to rectifier RC.

At the instant the clutches are tripped, and the valves are opened by OS, the invariable grease solenoid GRS, the motors GR, GM and OM are called into operation, and the valves are held open by the transfer of the circuit from the momentary basis of the closure of contacts **160** to the lengthened closure of dash pot contacts **8**.

Because of the normally closed contacts **243** in series with solenoid GRS between line **202** and wire **203**, the grease valve is opened with every coin controlled operation selecting gas or oil or both. In the same fashion, the grease clutch magnet **5R** being normally in series with wire **230** is called in with every gas or oil dispensing operation.

From the foregoing it is apparent that in one form of use, the dispensing of grease is a free, invariable and unselected service, while oil and gas are paid, selected and measured services. And then there is the third class of service involving water, distilled water, air and battery charge which although free is selected or withheld to prevent overflow or too much pressure. The circuit for these free selected services are in some respects similar to gas and oil controls in that they pass through the respective gage contacts **45**, **46** and valve solenoids WS, DWS, AS and relay BS, but they do not require pump motors or clutch controls because of the sufficiency of gravity feed or inherent pressure. An example of such a control circuit may be traced through the water valve solenoid WS as follows: rectifier RC contacts **200**, wire **201**, contacts **82**, **70**, line **202**, water gage contacts **46**, **45**, wire **245**, water valve solenoid WS, wires **217** and **203** and then through the head contacts, coil **1** and the coin contacts of any paid service. It is also held by contacts **8** along with any paid operation. In a similar fashion the other free service solenoids and relays are called in and held. At any point where an overflow threatens, the gage contacts **45**, **46** separate to deenergize the solenoid. Such contacts **45** and **46** may be other than direct as shown, i.e. they may be of an electronic photocell following form wherein the needle merely blocks or exposes light to a photocell and thereby controls circuit closers.

Unidirectional rectifiers such as **216** and **242** may be placed wherever there is a chance for a back circuit to cause improper operation.

The battery charge control relay BS is in series with the charge meter contacts **45**, **46** and a wire **217** to wire **203** in the same fashion as all the solenoid controls. It serves to close contacts **246** and connect the battery B of the car to a quick charging rectifier IG. The charging circuit includes IG (which may be of the quick charge kind shown in U.S. Patents 2,114,827 and 2,488,711) contacts **246**, wire **247**, contacts **85**, **73**, battery B, relay **249**, contacts **74**, **86**, and wire **248** to IG. Relay **249** serves to open contacts **251** and break the battery metering circuit through lines **253** and **254** while charging. This is made optional by switch **252**.

A pair of contacts **250** are shown to be opened by a wedge of insulation. The insulation is in head opening **2B**, Figure 3, and coacts with contacts **250** in port **1B**, Figure 4, for the purpose of either cutting off or preventing a circuit through the ignition of the car and thus preventing operation or starting of the motor as soon as the head is perched over the port.

When the adapter A, Figure 1*a*, is to be used it is understood that there are no meter control contacts in effect. Instead the levers **32** take the place of the meter demand controls and the levers **33** take the place of the coin controls. This is shown diagrammatically in Figure 7 by showing a sample contact **223** arranged in series around gas contacts **162** and closed by a lever **33**. Contacts **162** remain in the head for adapter control but they are shunted as shown.

The other adapter contacts **220**, **221**, and **222** are for demand of oil, water and grease, respectively, and are operated by levers **32** to take the place of the various meter contacts **45**, **46**. Broken lines **301**, **302** and **303** lead to similar adapter contacts (not shown) for lever operated demand of distilled water, air and gasoline, respectively. It is understood that the meters or gages of Figure 7 are not in the circuits of the adapter but their counterparts such as contacts **220**, etc., are and also the lines **202**, **203**, **217** and the valve solenoids.

When the adapter is used it is desired to change the free grease service to a paid service and for that reason the contacts **243** which are normally closed to call in grease solenoid GRS invariably, are opened mechanically by the assembly of the head on the adapter. Then the grease solenoid GRS is dependent for its operation on the closure of contacts **222** which are manually controlled by a lever **32**. With such control, switch **210** is put on terminal **211** to short magnet **5R** for independ-

ent operation, or switch 210 is put "off" (i.e. in an intermediate position) and then the grease clutch magnet 5R is not called in invariably but is dependent on solenoid GRS for the closure of contacts 212 in series therewith. By means of a contact such as 223 another grease clutch magnet 50R, Figure 2, of ample length of cycle control may be employed for a full paid greasing operation.

It is to be realized that the circuits and controls shown in Figure 7 are only illustrative and that further ramifications are in order. For example, each valve solenoid and relay could have its own pickup and holding circuits, thus making it independent of the others as to the time of action.

So also, each motor could have its own pickup and holding circuits. But of course all would be still subject to all the interlock controls shown.

For clearness of illustration, only one of the four or six levers 33 is shown, but it is obvious that the other lever contacts would be in shunt with the other coin contacts.

Although all the contacts along line 21 are assumed to be in one pair of plugs 1B, 2B it is apparent that three such sets of plugs at the three corners of the head and port would accomplish distribution and interlock control at the same time.

A separate trip circuit may be provided for the eject magnet ES instead of the connection through contacts 63, 75 and radio magnet RM now used for convenience. That and other circuits may be operated by separate batteries or by the car battery B and thus be isolated and controlled independent of the head connections and circuits.

In my copending patent application for Food Preparing and Vending Devices, Serial No. 107,591, filed on July 29, 1949, now Patent No. 2,810,652, issued October 22, 1957, for "Continuous Forming of Containers of Gelatinous Food," I show elevated food and merchandise dispensers available from automobile windows without leaving the car. In Figure 1 at V and V' it is shown that such vending devices may be in or adjacent the station S and thus coordinated with automobile servicing so that a car may be serviced and food or merchandise bought on the highway without the occupants of the car having to get out.

In my copending application Serial No. 648,319, filed on March 25, 1957, I disclose food bar processes and elements designed for vending purposes.

In my copending divisional application Serial No. 635,255, filed on January 22, 1957, I disclose means for blending fuel elements and manual and automatic dispensing thereof.

In my copending divisional application Serial No. 812,323, filed on May 11, 1959, I disclose electrical controls associated with automotive self service.

In my copending divisional application Serial No. 848,410, filed on October 23, 1959, I disclose automobile chassis designs arranged for self service and automatic vending purposes.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to preferred embodiments, it will be understood that various omissions and substitutions and changes in the form and details of the devices illustrated and in their operation may be made by those skilled in the art, without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. In a machine servicing device, repositories of service elements for said machine, gages for said repositories to indicate the state of supply of said elements, electrical devices operated by said gages according to a less than full condition of supply, separate conducting means with outwardly converging ends for conducting replenishment elements to said repositories, normally closed port means for each of said conducting means, and means under control of said electrical gage devices for operating related port means to permit ingress of replenishment elements, whereby servicing with all elements is focused at outer converging conducting means ends.

2. A device of the kind set forth in claim 1 wherein said machine has a common replenishment terminal means for holding the outwardly converging ends of said conduction means all on said common terminal means.

3. A machine of the kind set forth in claim 2 with a cover for said common terminal means, flexible means tending to open said cover, a latch for holding said cover closed, a lock for locking said cover closed, and remote manipulative means with connections to said latch for operating it to allow said cover to open.

4. A machine of the kind set forth in claim 3, and supply sources with conductors to a common supply head, said head fitting on said terminal means in communication with all conducting means and latched thereon by said latch for the cover.

5. In an automobile, storage facilities for service elements such as gas, oil, water, compressed air, electric current and distilled water, meters for measuring the state of supply of said elements, said meters having means for determining a less than full condition of said storage facilities, conductors extending from said storage facilities to the exterior of the automobile to provide access for replenishment elements, closure means at the outer ends of said conductors, and means under control of said determining means for operating said closure means when a condition is less than full to provide ingress for replenishment elements.

6. An automobile as set forth in claim 5 with a common terminal port structure, and means for converging and fastening the ends of said conductors to said port structure.

7. An automobile as set forth in claim 6 with a cover for said port structure, a spring tending to open said cover, and a latch for holding said cover closed.

8. An automobile as set forth in claim 7 with an outer body structure windshield adjacent the driving seat said port structure being on the outside of said automobile body structure near the lower left part of the windshield and within reach of the driver when at the driving position to close said cover, a manipulative means inside said automobile, and means under control of said manipulative means for operating said latch to allow the cover to open.

9. In servicing devices for an automobile having element repositories in a battery, air pressure ducts, radiator, grease holder, oil pan and gas tank, a common servicing port structure on the outside of said automobile and near the lower left corner of the windshield and within reach of the driver, wires from said battery to said port structure, a series of tubes fastened inside said port structure and radiating to related element repositories for conveying distilled water, compressed air, water, grease, oil and gas respectively, to said battery, air ducts, radiator, grease repository, oil pan and gas tank, valves in said tubes, solenoids for operating said valves, electrical control means for energizing said solenoids selectively to control servicing with certain elements, a cover for said port structure, a spring tending to hold said cover open, guides on said port structure for receiving a supply head, ejection springs on the port structure to throw off said head, latching means in said port structure to hold said head on the port, said latching means also serving to normally hold said cover closed, means for locking said head on said port, means for automatically unlocking said locking means when servicing is finished, a manipulative release means inside said automobile, con-

nections from said release means to said latching means for releasing said cover or said head, interlock contacts closed by said head when fully seated and latched on said port structure, and a series of gages for said element repositories for operating said electrical servicing control means for selective service when a repository is less than full.

10. In a combined attended and unattended service device with free and paid services, means for dispensing paid service elements, token controlled device for controlling operation of said dispensing means, means for dispensing free service elements automatically upon operation of any said paid service dispensing means, an adapter for taking the place of said token controlled devices, and means on said adapter for controlling operation of all free and paid element dispensing means.

11. The combination of claim 10 with a series of gages for determining service element states of supply, means under control of said gages for automatically controlling operation of said free and paid element dispensing means jointly with said token devices, said adapter taking the place of said automatic gage means, and means on said adapter for manually controlling the damand as well as the selected quantity dispensed by control of operation of all free and paid element dispensing means.

12. In a coin controlled dispensing device, a source of dispensed element, a locked housing for said source, a coin receiver, a coin blocking member in said receiver to prevent insertion of coins, an electric circuit and electrical means for controlling shifting of said member to an unblocking position when conditions are favorable for dispensing, a tube leading from said source and through said locked housing to the outside, a coin box inside said housing, another tube leading from said box and outside said housing to said coin receiver, said tubes having outer layers in which are embedded wires, said wires forming part of said electric circuit.

13. In a service apparatus involving the dispensing of invariable free service and selective free service along with paid service, a plurality of service elements some free and others requiring payment, separate means for dispensing said elements in combinations of paid and free service, value token controlled means for causing the operation of one or more of said paid service dispensing means, means under control of said causing means for invariably operating the dispensing means of certain invariable free service elements, means for selecting the need of one or more of other free service elements, and means under control of said causing and selecting means for operating the dispensing means of certain selected elements of the selective free service elements.

14. In a machine service apparatus, a plurality of sources of free service elements, a plurality of sources of paid service elements, a plurality of conductors for conveying said elements separately from said sources, means for dispensing said elements from said sources and through said conductors, token operated means for controlling the operation of the dispensing means for the paid service elements, and means for causing invariable separate operation of the dispensing means of the free service elements every time a paid service element is dispensed.

15. In a servicing device, means for supplying service elements to a machine, a radio receiver, means for selecting operation of said receiver, and means under control of said supplying means for operating said receiver selecting means to provide radio reception while the machine is being serviced.

16. In a token controlled self service servicing station for automobiles having a service receiving port, a series of containers of service elements, a flexible cable with tubes for conducting said elements from the containers to said port, a service head on said cable and adapted to be held on said port, counterweight means for supporting said cable and head in a normal position above said port, contacts closed by said counterweight means when said head is pulled down on the port, token controlled devices for governing the dispensing of said elements, other contacts closed by said token devices, a camera for picturing a serviced automobile, and electrical means optionally controlled by either one or the other of said contacts to operate said camera to picture the service area when the head is pulled down or a token deposited.

17. In a coin controlled self service automobile service station, a power source with two rectifiers, a locked housing containing said power source, other sources of gas, oil, water, distilled water, and compressed air also in said housing, a coin box, a camera and a radio receiver also inside said housing, service element delivery apparatus also in said housing, said apparatus including gas, oil and grease motors, reduction gearing, separate feeding means for each motor, and a series of clutch devices between the motors and feeding means, there being a plurality of different value clutches for the gas and oil feed and a single clutch for grease feed, a flexible cable with a series of eight tubes therein extending from said housing and serving to convey water, distilled water, compressed air and power from the sources, a passage to the coin box, and gas, oil and grease from the respective feeding means, a dispensing head to which the outer end of said cable is attached with said eight tubes having individual outlets in said head, a counterweight means for elevating said head, a coin receiver on said head, said receiver having a plurality of different sized coin slots for gas orders and a plurality of different sized coin slots for oil orders, a series of pairs of electrical contacts one for each coin slot and operated by a deposited coin, a common coin passage in said receiver beyond said contacts and leading into the coin tube passage to the coin box, a series of sliding contacts in the power source tube, valve devices associated with the other six tubes, means under control of said coin contacts for selectively operating certain oil and gas clutch devices and also operating the grease clutch device and operating said valve devices to selectively dispense measured quantities of oil and gas and along therewith needed supplies of water, distilled water, grease, compressed air, means for operating said camera and radio receiver as an incident to dispensing, means under control of said coin contacts for operating said motors during dispensing, and a dash pot for sustaining the operation of the motor operating means.

18. In a mobile machine servicing apparatus, sources of service elements, a housing for said sources, devices in said housing for feeding said service elements, a common flexible cable extending from said housing and containing a series of tubes extending back separately to said element feeding devices, an attachable service head on the outer end of said cable, and electrical control devices connected to said head for controlling selectively and automatically the dispensing of elements through said head.

19. In an automobile service device, repositories of service elements, a dispensing head, a series of tubes for conducting said elements separately to said head, a valve in the end of each tube at said head, and a flexible snout extending from said head at the end of each tube.

20. A machine servicing system comprising; supply element sources and conductors, means for uniting said conductors in a common dispensing head, machine service element repositories and conveyors leading thereto, means for uniting said conveyors in a common receiving port, means for joining said head and said port, and cooperating valve means in said head and port for controlling the conduction of said elements from the sources, through the conductors and conveyors, and into the respective repositories.

21. In a service device, sources of service elements, a

series of tubes for conveying said elements, said tubes being joined into a common cable, means for feeding said elements through said tubes, a common head on said tubes, a common receiving port upon which said head is attached, a series of tubes converged in said port and extending therefrom, individual valves in said port tubes and related cooperating valves in said head tubes at the head, means for selecting feeding of any of said elements in said tubes, and means under control of said selecting means for opening any of said pair of related valves to conduct fed elements, whereby a combination of service elements are controlled at the point of juncture of the head and port.

22. In a machine servicing apparatus, a machine with a plurality of supply element repositories, a supply receiving port structure, conductor means from said port to said repositories, meters for said repositories with electrical gage contact means for determining the state of supply of all elements, a plurality of normally closed valve means, one such valve means in each of said conductor means, means for operating selected ones of said valve means to provide for ingress of needed supply elements, and means under control of said gage contact means for preventing valve operation by said operating means when a related repository is full.

23. The combination set forth in claim 22 with token control devices for said valve operating means.

24. The combination set forth in claim 23 with a plurality of different sized token receiving means for said token devices, and measuring devices controlled thereby, whereby a plurality of different elements can be purchased in a plurality of different measured amounts.

25. In an automobile servicing device, a service station housing with a supply of a service element, means for selectively dispensing said service element, a dispensing control circuit therefor a portion of which is in said service station housing and another portion of which is in the automobile, means for connecting the service housing and the automobile to convey the element thereto, said connecting means also serving to join said circuit portions.

26. In an auto drive-in station for combined dispensing of car service elements and vending of beverages, foods and articles, housing means with elevated dispensers alined with the car windows, and a flexibly projecting service head alined with the cowl of the car when the dispensers are at the windows, coin controlled means for dispensing articles out of said dispensers, car service element receiving means on the cowl, and coin controlled means for sending selected car service elements from said housing through said head and into the car through the cowl, whereby the occupants of the car may purchase articles and control servicing of the car without leaving the car.

27. In a machine servicing apparatus, a machine with a plurality of supply element repositories, a supply receiving port structure, conductor means from said port to said repositories, meters for said repositories with electrical gage contact means for determining the state of supply of all elements, a plurality of normally closed valve means, one such valve means in each of said conductor means, means for operating selected ones of said valve means to provide for ingress of needed supply elements, means under control of said gage contact means for preventing valve operation by said operating means when a related repository is full, token controlled devices for said valve operating means including a plurality of different sized token receiving means, measuring devices controlled by said token devices, sources of supply for said supply elements, a feed motor for each source of supply, reduction gearing therefor, an element feed device and conductor to each related valve means in said port structure, said measuring devices including a plurality of clutches between each of said gearing and a related feed device to determine different extent of feed, and a plurality of sets of release control magnets for said clutches for different elements, and different token controlled circuits for said magnets, whereby the size and place of deposit of a token determines the kind and measure of an element dispensed.

28. In an automotive self-service station, a locked housing, a plurality of sources of auto supply elements within said housing, a plurality of related conductors for conveying from said sources said elements to a compact converging point outside said housing, a common portable and manipulative dispensing head structure, means for attaching to said head structure the outer ends of said conductors at said converging point, means for delivering said elements separately from said sources, said head structure leaving a separation plate for keeping said conductors divergent in and beyond the head structure whereby the elements are delivered separately through and beyond said head structure, valve devices for controlling the conduction of said elements, means for controlling the operation of said delivering means and said valve devices, token operated means for controlling the operation of said controlling means, said delivery controlling means including a plurality of element delivery controls for limiting the delivery of each element, and separate electrical controls in said token operated means for each delivery control, whereby tokens of different value effect delivery of different measured quantities of said elements.

29. In an automotive self-service station, a locked housing, tanks of oil and gas in said housing, tubes for conducting said oil and gas out of said tanks, delivery means for forcing said oil and gas out of the tanks and through said tubes, said tubes being assembled outside said housing, a common compact portable and manipulative tube end connector, separation means for attaching divergent the outer ends of said tubes to said connector in spaced relationship to conduct separately beyond the connector, electrical control devices for said delivery means, valve devices in said tubes, other electrical controls for said valve devices, a coin receiver outside said housing, contacts in said receiver and operated by deposited coins, and means under control of said contacts for operating said electrical devices and controls to dispense measured quantities of oil and gas.

30. A station as set forth in claim 29 with a locked coin box inside said locked housing, and a coin delivery tube extending from said box through said housing and to said coin receiver, said receiver being on said connector for manipulation therewith.

31. A station as set forth in claim 30 wherein said coin delivery tube has an outer layer of material with laced wires, said wires being part of said electrical control devices, whereby cutting of said coin tube causes disablement of dispensing.

32. In a machine servicing apparatus, a machine with a plurality of supply element repositories, a common supply receiving port structure, conductor means from said port to all of said repositories, meters for all of said repositories to indicate the state of supply of all elements, a valve means in each of said conductor means, means under control of said meters for operating said valve means when a related repository is other than full, an element supply device having a common supply head, services of supply of said elements, conveying means to carry said elements from all of said services to said common head, individual attaching means in said head for each conveying means to attach it to a related conductor means, latching means for keeping said head on said port, means for ejecting said head from said port, automatic and manual means for operating said latching means to release the head for ejection, means for locking said latching means to hold the head on during dispensing, means for unlocking said locking means after dispensing is over, means for locating said head on said

port, and means for determining when said head is properly located and latched on said port.

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