

Jan. 22, 1952

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2,583,181

AIRPORT SERVICE STATION

Filed April 26, 1946

4 Sheets-Sheet 1

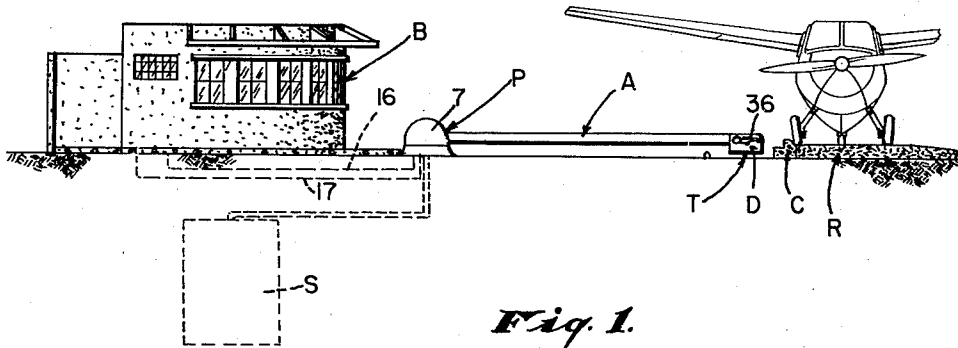


Fig. 1.

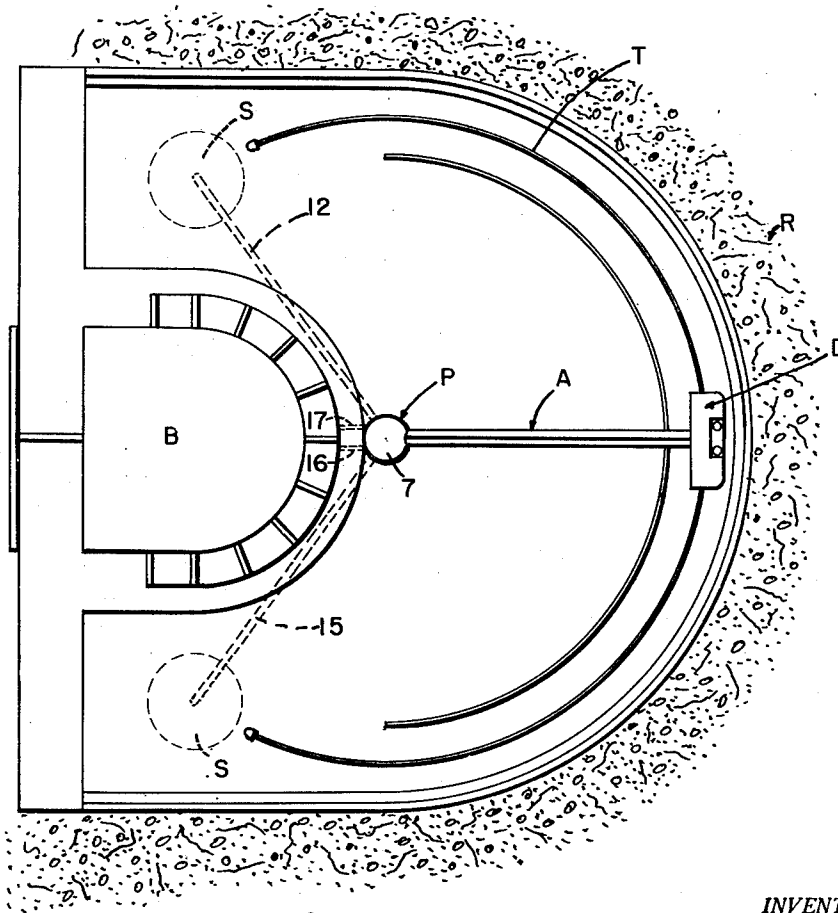


Fig. 2.

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4 Sheets-Sheet 2

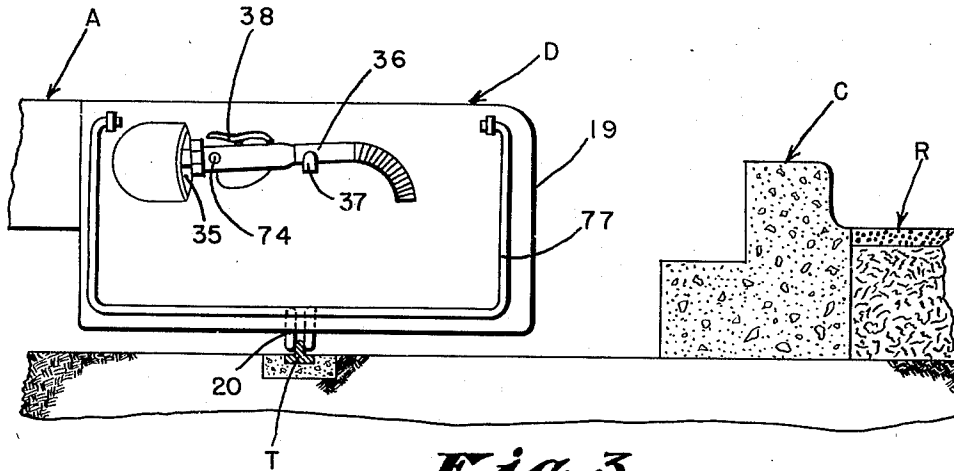


Fig. 3.

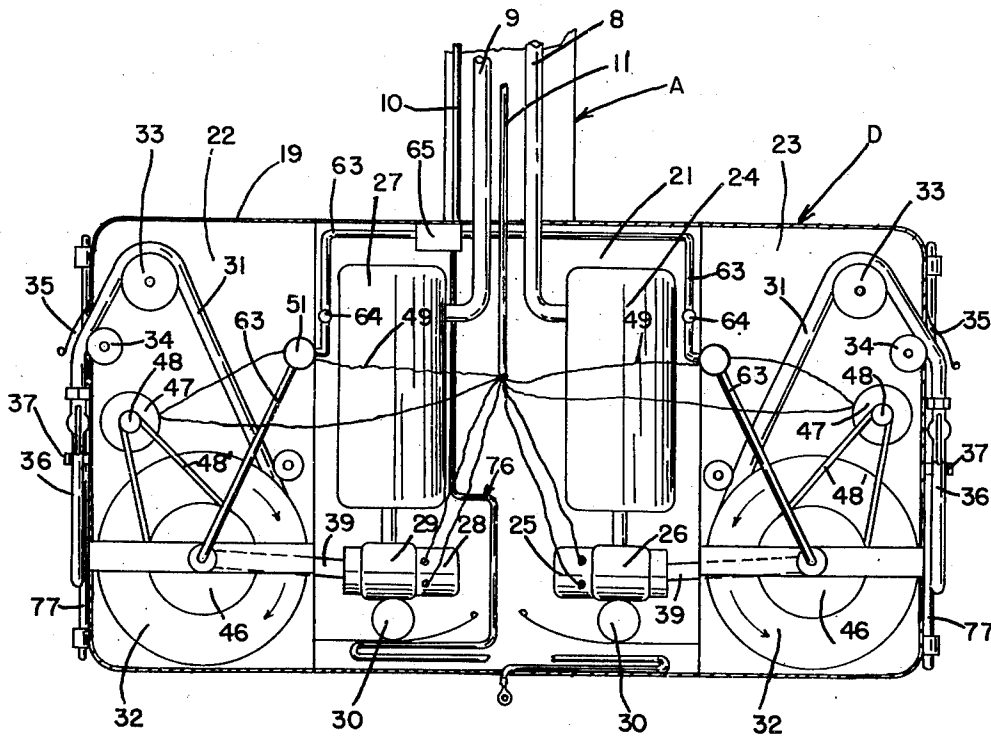


Fig. 4.

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4 Sheets-Sheet 3

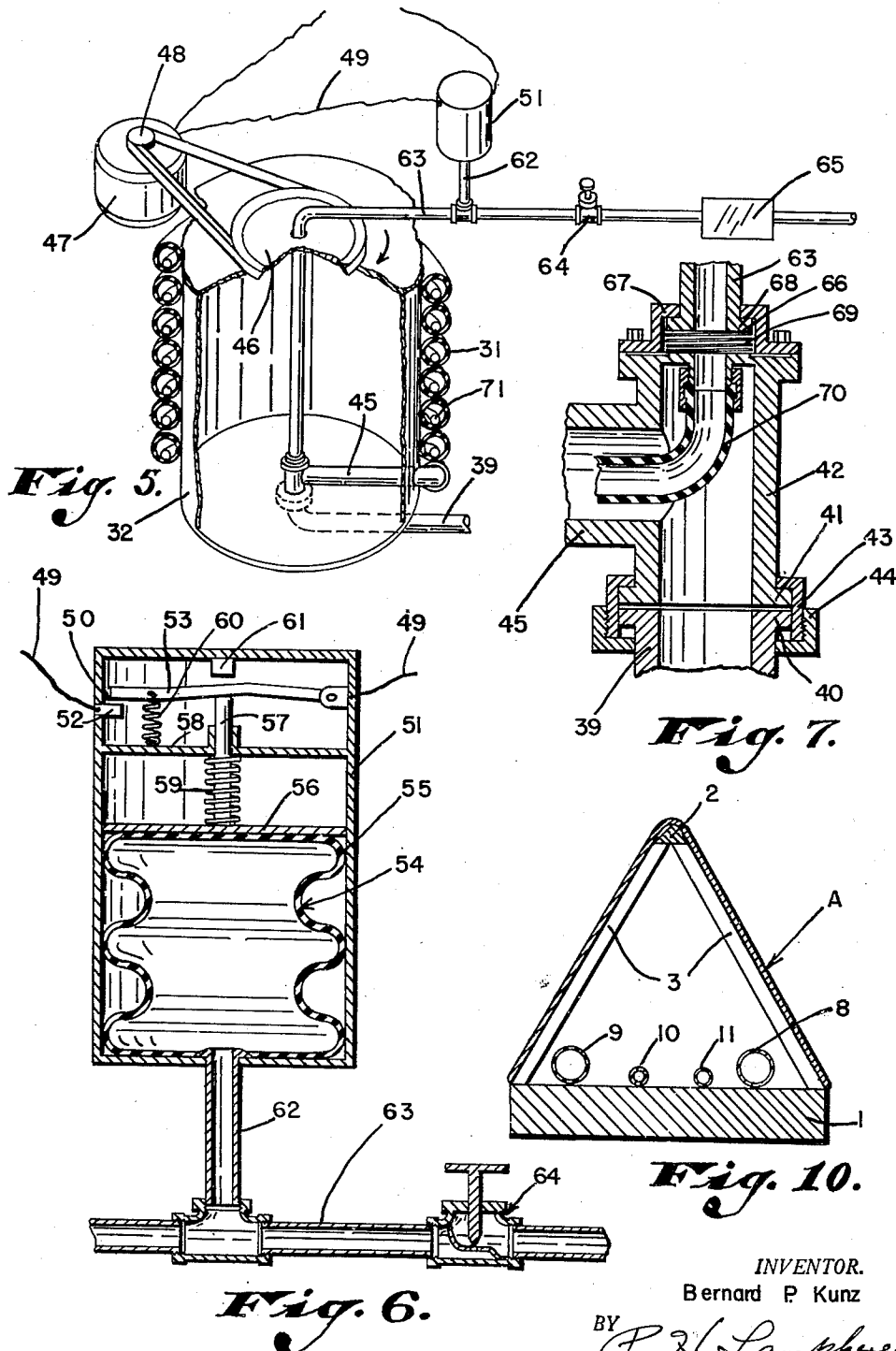


Fig. 7.

Fig. 10.

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UNITED STATES PATENT OFFICE

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AIRPORT SERVICE STATION

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14 Claims. (Cl. 222-75)

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This invention relates to service stations and more particularly to a service station for installation at airports for the servicing of airplanes.

One of the objects of my invention is to produce an improved airport service station that will permit an airplane to be quickly and efficiently serviced.

Another object is to produce an airport service station that will permit a plurality of airplanes to be serviced from a single dispensing unit without the necessity of moving one parked plane to make space for another.

Yet another object is to produce an airport service station having a single dispensing unit movable in an arcuate path about a parking ramp adjacent said path to thereby permit rapid servicing of planes parked at different places on the ramp.

A further object is to produce a servicing system for airplanes that will embody a dispensing unit on the outer end of a pivoted arm which will permit the unit to be moved to different positions on an arc to thereby service airplanes parked along said arc and also permit the dispensing unit to be supplied from a single point without the necessity of dragging cumbersome and lengthy hoses and conduits as the unit is moved from one point to another.

A further object is to produce an improved dispensing unit for servicing an airplane.

A still further object is to provide improved control mechanism for a hose of a dispensing unit which will permit a hose to be reeled into the unit by means controllable from the nozzle end of the hose.

Another object is to produce an airport service station that is attractive in appearance, economical to construct and install, efficient in rapid servicing of airplanes and one which will be above ground but not interfere with maneuvering an airplane or present obstructions that can be hit and cause airplane damage.

Other objects of my invention will become apparent from the following description taken in connection with the accompanying drawings showing a preferred embodiment.

In the drawings:

Figure 1 is an elevational view of an airport service station;

Figure 2 is a plan view;

Figure 3 is an end view of the dispensing unit or box on the movable arm;

Figure 4 is a plan view of the dispensing unit or box;

Figure 5 is a schematic view of the gasoline hose reel and related parts showing the hose wound thereon;

Figure 6 is a section view of the control switch for the hose reel;

Figure 7 is a longitudinal sectional view show-

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ing the connection of the air and gasoline conduits to the gasoline and air hoses;

Figure 8 is an enlarged sectional view through the hose and the nozzle showing the hand control valve for the air hose;

Figure 9 is a view with parts broken away showing the structure at the pivoted end of the arm; and

Figure 10 is a cross section view of the arm and the conduits extending therethrough.

Referring to the drawings in detail and first to the elevation and plan views of Figures 1 and 2, my improved service station has as one of its essential components an arm A pivoted at one end, as at P, so as to swing in an arc in a horizontal plane above the ground. At the outer end of the arm is a dispensing unit D which is arranged to be supported for movement on a track T. The arm can be of any desired length, depending upon what radius of curvature is desired for the movement of the dispensing unit. For a small service station the arm length could be somewhere around 25 feet and for larger service stations it could be a greater length. Outward of the track T is a ramp R which has an arcuate edge or curb C in concentric relation to the track. The ramp R is flat adjacent the curb and inclines downwardly from this flat portion so that when airplanes are run up on the ramp and parked alongside the curb, they will be on an approximately level surface. At the back of the pivot point of the arm there can be provided a servicing building B of any suitable construction wherein machinery and supplies can be kept. This building can also be arranged to have suitable comfort stations at its rear end as indicated. Also shown as a part of the service station are the fuel storage tanks S which may be situated on opposite sides of the service building and in a convenient location so that they can be readily filled by driving a truck on an end of the ramp.

As is best shown in Figures 9 and 10, the arm A is constructed of a flat base piece 1 upon which reinforcing structure is built comprising a ridge piece 2 and suitable angular braces 3 between it and the base piece. The ridge piece is enclosed by a suitable cover 4. The pivot P for the arm comprises a post 5 journaled at its bottom in a foundation structure 6, having secured to its top the base piece 1. Thus it is seen that the arm A can swing around a pivotal axis determined by the post 5. A suitable dome shaped cover 7 can be placed over the foundation structure to enclose the pivoted end of the arm including the post.

The arm A is shown as carrying two fuel conduits 8 and 9 extending throughout its length for supplying different qualities of gasoline to the dispensing unit D at the outer end of the

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arm. Also carried by the arm and extending throughout its length is an air conduit 10 and an electric conductor conduit 11 so as to supply air under pressure and electricity to the dispensing unit D. The fuel supply conduit 8 is arranged to be connected to one storage tank S by a conduit 12 extending under ground from the storage tank to the foundation of the arm pivot post. Between the conduits 8 and 12 is a flexible conduit section 13. In a similar manner the conduit 9 of the arm is connected by a flexible conduit section 14 with a conduit 15 positioned under ground between the other storage tank S and the foundation structure 6. The air conduit 10 is arranged to receive air from a suitable source positioned in the building B and this is accomplished by an under ground conduit 16 leading from the building to the pivot foundation. Conduit 16 is connected to the conduit 10 by a flexible conduit portion 17. In a similar manner the electrical conduit 11 is connected with the foundation by a flexible conduit portion 18 and from the foundation portion an under ground conduit 17 leads to the service building for connection with the incoming electrical line. By employing the various flexible conduit portions between the foundation and the various conduits carried by the arm, there will be no interference with the free swinging movement of the arm about the pivot post.

The dispensing unit D mounted at the outer end of the arm A is arranged to be enclosed in a box type casing 19 which is attached securely to the outer end of the arm structure. The box has a wheel or wheels 20 by which it is supported on the track T and which facilitates the moving of the box along the track when the arm is swung about its pivot. The casing of the dispensing unit is arranged to be very low as, for example, about eighteen inches above the ground level so that there will be no obstruction presented to an airplane wing and propeller when the airplane is parked on the ramp adjacent the curb thereof.

Within the box D, as best shown in Figure 4, are two fuel dispensing mechanisms for dispensing the two qualities of fuel. The box is divided into a central compartment 21 and end compartments 22 and 23. Within the central compartment is the usual gasoline pumping structure for each fuel supply. The fuel conduit 8 leads to air eliminator 24 and from there the fuel is pumped by an electric motor 25 and a pump 26 to the end compartment 23 which is arranged to hold one of the dispensing hoses. In a similar manner the fuel conduit 9 leads to an air eliminator 27 and by means of an electric motor 28 and pump 29 the fuel is conducted to the dispensing hose arranged to be held in the other compartment 22. In connection with each pump there can be provided the usual meter 30 arranged to be viewed from the exterior of the box.

The dispensing hose and associated structure in each end compartment 22 and 23 is of identical construction and, therefore, only one will be described in detail with the same reference numerals being used for indicating like structures. The dispensing hose 31 is arranged to be wound upon a reel 32 in the form of a drum as best shown in Figure 5. The drum is mounted vertically in the end compartment and the hose coming from the drum is guided over pulleys 33 and 34 with the outer extending through an opening 35 in the outer end wall of the end

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compartment. The dispensing end of the hose has a nozzle 36 which remains on the outside of the dispensing box when the hose is wound on the reel. A suitable holding clip 37 is provided for the nozzle. The nozzle may be of any well known construction and is provided with an outlet valve within its housing which can be operated by a hand lever 38.

A pipe 39 leads from the fuel pump for each hose and is connected to the bottom of the drum at its axis by a suitable swivel connection so as to permit the drum to rotate relative to the pipe 39. In Figure 7 a suitable swivel connection is shown. The pipe 39 is provided with an end flange 40 which cooperates with an end flange 41 on a coupling member 42 carried by the drum to rotate therewith. Suitable threaded annular nuts 43 and 44 hold the flanges 40 and 41 in engagement, yet permit the coupling to rotate relative to the flange of pipe 39. A pipe 45 leads from the coupling 42 to the outer surface of the drum where it is connected to the inner end of the hose 31. With this arrangement it is seen that the drum is free to rotate and yet a connection is provided between the supply pipe 39 and the hose. The hose may be unreeled from the drum by merely grasping the nozzle at its outer end and pulling on the hose.

It is well known with this type of hose holding means that some means must be provided for returning the hose to the drum. Of course this could be done manually, as is usual practice, but such is very inconvenient as the person who is dispensing the fuel in the plane must go back to the dispensing unit and wind in the hose. This means laying the hose down on the ground and dragging it to the dispensing box as it is pulled in. When long lengths of hose are employed, as are required in the servicing of an airplane, it will be found that this is far from being satisfactory. Furthermore, it might result in dragging the nozzle end of the hose over parts of the plane where it can be caught with resulting damage. To overcome all of these undesirable results and inconveniences, I have devised an improved system for reeling in the hose which is controlled at the nozzle end of the hose by the person dispensing fuel from the hose. With such an arrangement the operator can continue to keep hold of the nozzle end and at the same time control the reeling in of the hose. Thus there will be no hose dragging. Also the "reeling in" control does not require the operator to maintain a pulling force to hold the hose out while using it.

Referring now to Figures 4, 5, 6 and 7, my improved hose controlling means for reeling in the hose will be described. The upper end of each drum 32 carries a pulley 45 and positioned in the same compartment is an electric motor 47, also carrying on its driving shaft a pulley 48. The pulleys are connected together by a V-belt 49 so that the motor can rotate the drum in its "reeling in" direction which is indicated by an arrow in Figure 5. The motor 48 is connected in a circuit 49 which receives its current from the source of electricity leading into the box through the electrical conductor conduit 11 by way of the arm. In the circuit 49 is a controlling switch 50 which is housed in the upper part of a cylindrical casing 51. This switch comprises a fixed contact element 52 and a movable contact arm 53 pivotally connected to the wall of the casing. The contacts have suitable terminals for connecting

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the switch in the circuit. When the switch is closed the motor will be operated to turn the drum in the direction of the arrow. When the switch is open the motor will be idle. With the idle condition of the motor the hose can be unwound from the drum by pulling on the hose at the nozzle end. The belt connection between the motor and the drum will provide a resistance to unreeling which will be such as to permit the unwinding of the hose with a reasonable amount of pulling force.

The switch is adapted to be controlled by a fluid motor 54 situated in the bottom of the casing 51. This motor has a bellows 55 secured at one end to the bottom wall of the casing and at its upper end to a piston member 56 guided in the casing. This piston member 56 has an extending piston rod 57 which extends through a partition 58 into the switch compartment and is arranged to engage the underneath side of the switch contact arm 53. A spring 59 surrounds the piston rod and is interposed between the piston 56 and the partition 58 so as to normally bias the piston downwardly so that the switch can be closed under the action of a light spring 60 attached to the movable switch arm 53. The open condition of the switch arm is limited by a stop 61 carried by the top of the casing.

Air pressure is employed to move the piston 56 upwardly to open the switch and to accomplish this the lower end of the bellows is connected by a pipe 62 to a pipe 63 which extends from the air pressure conduit 10 of the arm to the drum. This pipe 63 has inserted therein an adjustable flow control valve 64 and a single reducing valve 65 is provided to serve each pipe 63 of the two systems. The reducing valve 65 controls the amount of air pressure which can be effective in the bellows to open the switch 50 and should be set for a low air pressure of approximately three to five pounds per square inch. The conduit 63 beyond the fluid motor is arranged to extend downwardly through the axis of the hose drum and is connected into the previously referred to coupling 42 situated at the base of the drum through which fuel is conducted to the hose. As shown in Figure 7, the conduit 63 is connected to the upper end of the coupling 52 by a suitable swivel joint 66 which may be of any suitable construction. As shown, the upper end of the coupling 42 is provided with a cap 67 against which the flange 68 at the end of the conduit 63 engages under the action of a light spring 69. This arrangement will permit the coupling 52 to rotate relative to the conduit 63 and yet provide a seal, the sealing action being accomplished by the spring 66 and also air pressure which will be passing through the connection.

The upper end of the coupling 42 is connected to a tube 70 in such a manner that air under pressure coming through the conduit 62 will pass to the tube without entering the fuel supply which is passing through the coupling 42 to the hose. This tube 70 is of smaller diameter than the pipe connection 45 and extends through this pipe connection to the interior of the fuel hose where it is connected to a smaller diameter hose 71 positioned within the hose and extending throughout its length. The outer end of the smaller hose 71 adjacent the nozzle of the fuel hose is joined to a tube 72 carried by the rear end of the nozzle housing and places said hose 71 in communication with atmosphere through the nozzle housing wall. The outlet end 73 of the tube 72 is arranged to be controlled by a small

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push button type of valve 74 which is normally held closed by a spring 75. If it is desired to connect the air hose with the atmosphere, the valve 74 need only be pressed downwardly by hand. Whenever the hand releases the valve, the air hose will automatically be closed.

With the control mechanism for the motor switch just described, it is seen that if the valve 74 in the nozzle housing is closed, air under a low pressure will be effective in the pipe 63 and the air hose 71 and also in the bellows 55. This will result in the piston 56 being pushed upwardly against the spring 59 and the switch 50 opened. The electrical motor thus will not be energized for operation. However, if the valve 74 should be opened, the air under pressure in the bellows will be connected to atmosphere and thus the air pressure in the bellows will fall. This will permit the spring 59 to move the piston 56 and the piston rod 57 downwardly, as viewed in Figure 6, and as a result the switch 50 will be closed. The electrical motor will then be energized and the drum rotated to wind in the hose. At any time it is desired to stop the winding of the hose inwardly, the hand valve 74 will be permitted to be closed by removing the manual pressure therefrom and consequently air under pressure will again be built up in the bellows which will result in the motor switch 50 being opened. When the valve 74 is opened, an outlet area should be produced which is sufficient to allow rapid escape of air from the bellows so that the motor will be quickly started. To obtain this proper exhausting of air from the bellows, suitable adjustment of the flow control valve 64, previously referred to, can be made. The setting of the valve 64 should be such that the flow of air therethrough will be slightly less than the flow of air through the valve 74 when open.

By providing this control mechanism for motor of the drum, it is readily seen that the hose can be reeled in at will by the person dispensing the fuel through the hose and nozzle. The return of the hose to the drum is solely under the control of the person at the nozzle and it is not necessary for him to drop the hose and nozzle in order to accomplish the "reeling in" of the hose. He can reel it in at any rate he desires, merely by controlling the hand operated valve 74 at the nozzle. Thus all necessity for dragging the hose across ground as it is reeled is eliminated, as is also any possibility of dragging the nozzle over parts of the airplane.

The source of electricity which is connected to the dispensing box D through the electric conduit 11 also provides current for operating the pump motors 26 and 29 as indicated in Figure 4. The air pressure which is supplied to the dispensing unit box through the air conduit 10 extending through the arm can also be employed to supply air for inflating the tires on the airplane. To accomplish this an air hose 76 can be employed which will also be of considerable length. It can be held in the central compartment of the dispensing box in any suitable manner. In Figure 4 this hose is merely shown coiled up in the box.

With an airport service station of the type shown and described, it is seen that an airplane can be very quickly and efficiently serviced. There is no necessity for the use of dispensing units in pits at every point where it is desired to service an airplane. As many as three airplanes can be easily parked at one time around

my improved service station for servicing. An airplane can be positioned at the front of the service station and one at each side, and each of these planes can be brought in to parked position and moved away without the necessity of moving any of the other planes already parked. With one plane parked for servicing, say for example, at the front of the service station, another plane can be parked alongside of the service station for service without the necessity of moving the plane already parked. To service the last parked plane, all that need be done is to swing the arm on its pivot and move the dispensing unit around the track to that side of the service station adjacent the newly parked plane. To assist in this pivoting of the arm and moving of the dispensing box, suitable handles such as those shown at 77 (see Figure 3) may be provided at the ends of the box. These handles are arranged to drop down alongside of the box when not being used. It is to be particularly noted that with the use of this service station there are no obstructions presented to propellers or the wings of the plane, yet the entire dispensing unit is above ground. Very quick service can be given in the servicing of an airplane and the servicing of additional planes can be carried on without the necessity of moving the previously serviced plane from its parked position. Only one dispensing box is necessary and it is so arranged, as shown, that two different qualities of fuel can be dispensed. Of course, if it is desired to dispense more than two qualities of gasoline, the box only need be slightly enlarged so as to provide for the additional equipment to dispense the additional quality of fuel. It is also to be noted in connection with the improved airport service station that no conduits or conductors are dragged around when the dispensing unit is moved from one dispensing point to another. All of the conduits and conductors coming to the dispensing box are carried by the arm. The service station eliminates all necessity for employing tank trucks with resulting hazards to incoming and outgoing planes.

Being aware of the possibility of modification in the particular structure of my improved airport service station shown and described without departing from the fundamental principles of my invention, I do not intend that the scope of the invention be limited in any manner except in accordance with the appended claims.

What is claimed is:

1. In a fluid dispensing apparatus, a flexible dispensing conduit having a nozzle, holding means for the conduit permitting the conduit to be withdrawn therefrom to dispense fluid at a remote point, an electric motor connected for operating the holding means to cause the conduit to be returned thereto, an electric circuit for the motor including a switch, and means including a manually operated control element remote from the switch and positioned on and adjacent the nozzle end of the conduit to move therewith and operatively connected for closing said switch at will.

2. In a fluid dispensing apparatus, a fluid conveying hose of considerable length having a dispensing nozzle, a reel upon which the hose is wound and from which it can be withdrawn to dispense fluid at a remote point, an electric motor operatively connected to rotate the reel to wind the hose thereon, and means for controlling the operation of the motor from a point adjacent the nozzle including a fluid motor, a source of fluid pressure, a second hose connected to the fluid

motor and extending therefrom to the nozzle end of the fluid conveying hose, and a control valve for the second hose positioned adjacent the nozzle of the fluid conveying hose.

3. In a fluid dispensing apparatus, a fluid conveying flexible conduit of considerable length having a dispensing nozzle, means for holding the conduit and permitting it to be removed from said holding means so that said nozzle end can be at a remote point therefrom, an electric motor operatively connected to the holding means for returning said conduit to its holding means, a circuit for said motor including a switch, fluid pressure operated means for maintaining said switch open, and means for releasing said fluid pressure for closing of the switch including a manually controlled element adjacent the nozzle end of the flexible conduit and operable independently of conduit manipulation.

4. In a fluid dispensing apparatus, a fluid conveying flexible conduit of considerable length having a dispensing nozzle, means for holding the conduit and permitting it to be removed from said holding means so that said nozzle end can be at a remote point therefrom, an electric motor operatively connected to the holding means for returning said conduit to its holding means, a circuit for said motor including a switch, fluid pressure operated means for maintaining said switch open, and means for releasing said fluid pressure including a second smaller flexible conduit positioned in the first flexible conduit and extending to a point adjacent the nozzle and a hand controlled valve for opening the second conduit to atmosphere.

5. In fluid dispensing apparatus, a fuel dispensing hose of considerable length having a nozzle on its dispensing end, a reel upon which the hose can be wound when not in use, means for supplying fluid to the hose, power means operatively connected to the reel for rotating the reel to wind the hose thereon after it has been removed from the reel to dispense fluid at a remote point from the reel, and means for operating said power means including a control element, a fluid pressure operated motor for causing the control element to be inoperative when fluid pressure is applied to the motor, a source of fluid pressure connected to the motor, and means for releasing fluid pressure from the motor so as to permit the control element to be operative and comprising a flexible exhaust tube extending through the hose to a point adjacent the nozzle and a manually controlled valve for opening the flexible exhaust tube to atmosphere at will, said valve being positioned adjacent the nozzle.

6. In a ground installed airport service station for servicing several airplanes while simultaneously parked and each from a point within the tip of a wing or equivalent structure and close to the fuselage, an arm of substantial length, means for pivoting the arm for swinging movement in a horizontal plane about one of its ends, means for supporting the arm from the ground at its other free swinging end, an airplane parking ramp outward of the arc of swing of the free end of the arm, a dispensing unit mounted to move with the free end of the arm, said swinging end of the arm and dispensing unit being of a height less than the height of an airplane wing, and means for supplying fuel to the unit from a storage chamber at a fixed remote point.

7. In a ground installed airport service station for servicing several airplanes while simultaneously parked and each from a point within

the tip of a wing or equivalent structure and close to the fuselage, an arm of substantial length, means for pivoting the arm for swinging movement about one of its ends and in a plane parallel with the ground and closer thereto than the height of an airplane wing, a dispensing unit mounted to move with the outer end of the arm, means for supporting the outer end of the arm and the dispensing unit from the ground adjacent said outer end, and means for supplying airplane fuel to the unit from a remote storage place including a conduit carried by and extending along the arm.

8. In a ground installed airport service station for servicing several airplanes while simultaneously parked and each from a point within the tip of a wing or equivalent structure and close to the fuselage, an arm structure of substantial length, means for pivoting the arm to a foundation at one end so as to permit the other end to be swung in an arc, a fuel dispensing unit at said other end, means for supporting the dispensing unit and other end from the ground adjacent the said other end, said dispensing unit and adjacent portion of the arm having a supported height less than the height of an airplane wing so it can pass thereover, and means for supplying said dispensing unit with fuel from a source of supply including a conduit carried by the arm and having a connection with the foundation adjacent the pivot.

9. In a ground installed airport service station for servicing several airplanes while simultaneously parked and each from a point within the tip of a wing or equivalent structure and close to the fuselage, an airplane ramp having an arcuate edge portion, an arm, means for pivoting one end of the arm at substantially the axis of the arc for swinging movement, said arm being substantially the length of the radius of the arc, and means including a dispensing unit mounted to swing with the outer end of the arm so that said unit can be moved to different points adjacent the arcuate edge of the ramp to service airplanes which may be parked at different positions on the ramp around said arcuate edge, said arm and dispensing unit being of a height lower than an airplane wing so that it can pass thereover.

10. In a ground installed airport service station for servicing several airplanes while simultaneously parked and each from a point within the tip of a wing or equivalent structure and close to the fuselage, an arcuate track supported by the ground, an arm of a length substantially the same as the radius of the arc of the track, means for pivoting the inner end of the arm at the axis of the arcuate track, and a fluid dispensing unit on the outer end of the arm provided with a wheel for supporting it on the track.

11. In a ground installed airport service station for servicing several airplanes while simultaneously parked and each from a point within the tip of a wing or equivalent structure and close to the fuselage, an arcuate track, a ramp having an arcuate edge spaced outwardly of the track, said ramp surface being of higher elevation than the track, an arm pivoted at one end at the axis of the arcuate track and of a length to reach substantially to the track, and a fluid dispensing unit carried on the outer end of the arm and provided with a wheel for supporting it on the track.

12. In a ground installed airport service station for servicing several airplanes while simult-

taneously parked and each from a point within the tip of a wing or equivalent structure and close to the fuselage, an arm structure, means for pivoting the arm at one end, said arm being of substantial length so that its outer end can be moved in an arc having a substantial radius of curvature, a dispensing unit attached to the outer end of the arm to move therewith, said dispensing unit and adjacent portion of the arm being of such low height that an airplane wing can pass thereover, fuel and air pressure conduits and electrical conductors carried by the arm and extending from adjacent its pivot to the dispensing unit, and means adjacent the pivot for connecting the conduits and conductors to other conduits and conductors leading from sources of fuel, air pressure and electricity, said connecting means permitting free pivotal movement of the arm through an angle greater than forty-five degrees.

13. In a ground installed airport service station for servicing several airplanes while simultaneously parked and each from a point within the tip of a wing or equivalent structure and close to the fuselage, an arm horizontal with the ground pivoted at one end and arranged to have its other end swing in an arc, a fuel dispensing unit carried by the said other end to move therewith, and means for supplying fuel to the unit from a storage source and comprising a conduit extending along the arm and movable therewith, said dispensing unit comprising a flexible dispensing hose carried by the unit and provided with a nozzle, a reel for the hose, and means operatively connected to said reel and operable at will from a point adjacent the nozzle for reeling in the hose after it has been unreeling to dispense fuel at a remote point from the unit.

14. In a ground installed airplane service station for servicing several airplanes while simultaneously parked and from a point within the tip of a wing or equivalent structure and close to the fuselage, an airplane parking ramp of such size that the simultaneous parking of a plurality of airplanes can be accomplished, a track co-extensive with one edge of the ramp so as to be adjacent the several positions of parked airplanes, a fuel dispensing unit mounted for movement on the track, said dispensing unit having such a low height when mounted on the track that a wing of a grounded airplane can pass thereover, and means comprising conduit means for conveying fuel from a remote point, said last named means allowing for free movement of the dispensing unit on the track at will so that the unit can be placed close to any parked plane on the ramp for purposes of fueling.

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