

March 9, 1965

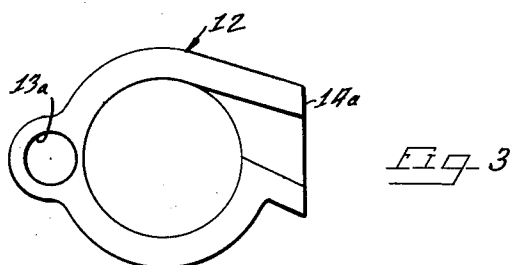
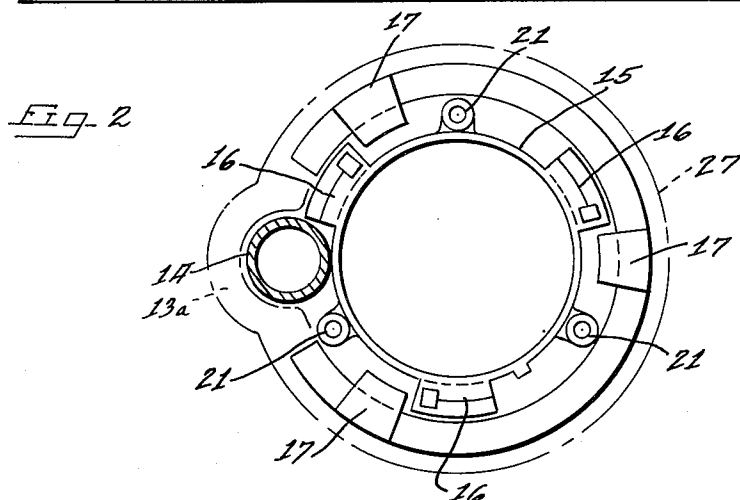
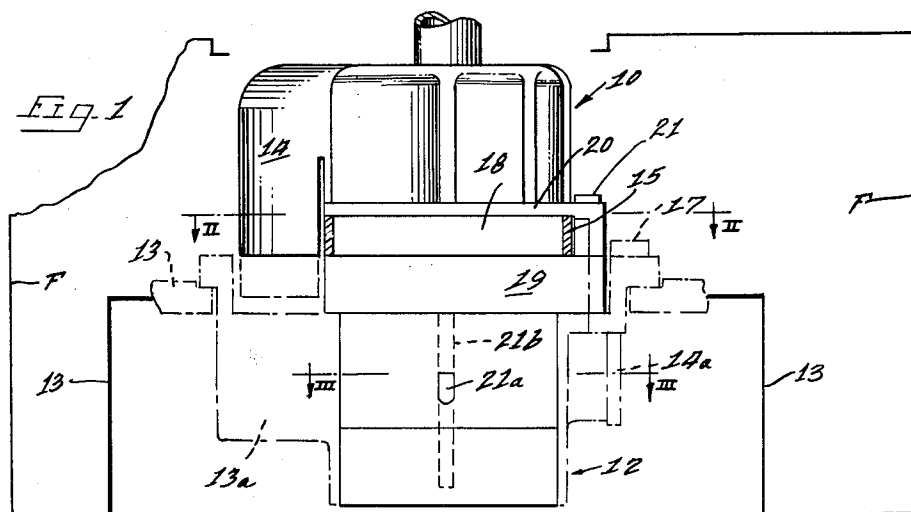
P. J. NASVYTIS

3,172,365

PLUG-IN TYPE FUEL PUMP

Filed Feb. 5, 1963

5 Sheets-Sheet 1



INVENTOR.

INVENTOR:
Pius J. Nasvytis

BY

Hill, Sherman, Merri, Gross & Singer
ATTORNEYS

ATTORNEYS

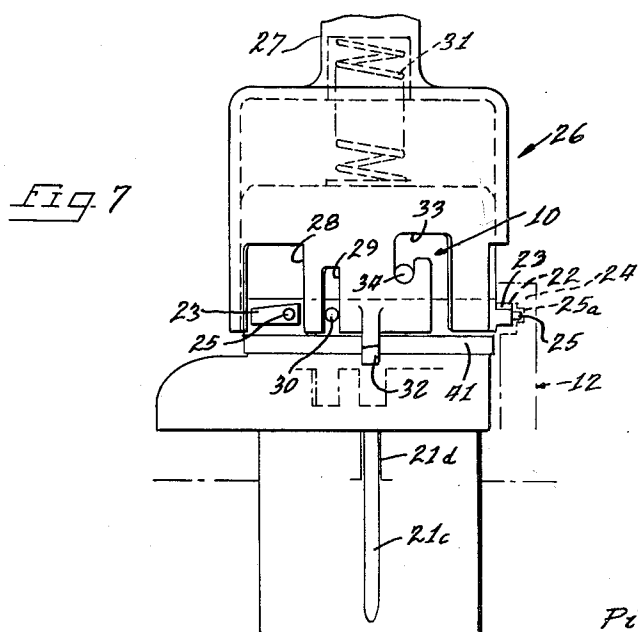
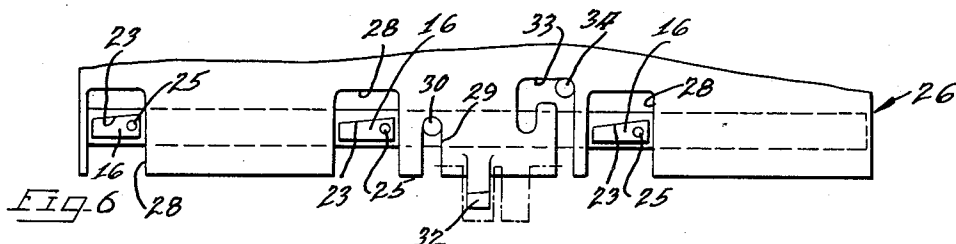
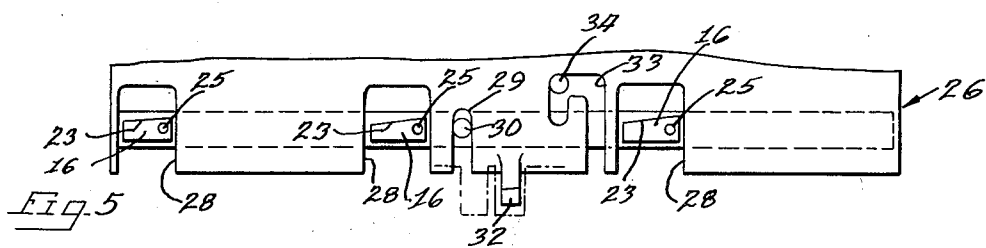
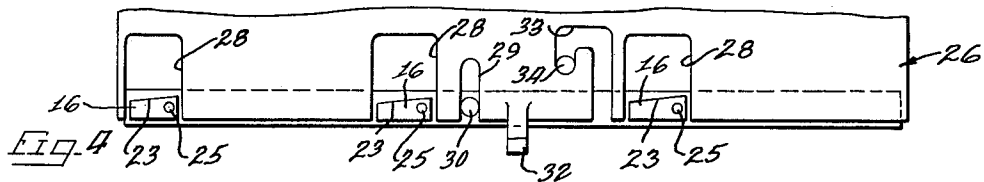
March 9, 1965

P. J. NASVYTIS
PLUG-IN TYPE FUEL PUMP

3,172,365

Filed Feb. 5, 1963

5 Sheets-Sheet 2



INVENTOR.

Pius J. Nasvytis

BY

Bill, Spence, Merani, Shaw & Simpson
ATTORNEYS

March 9, 1965

P. J. NASVYTIS
PLUG-IN TYPE FUEL PUMP

3,172,365

Filed Feb. 5, 1963

5 Sheets-Sheet 3

FIG. 8

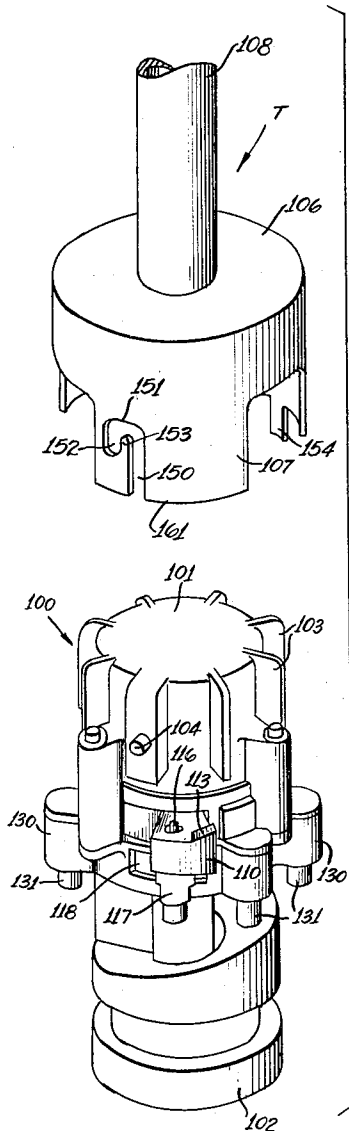
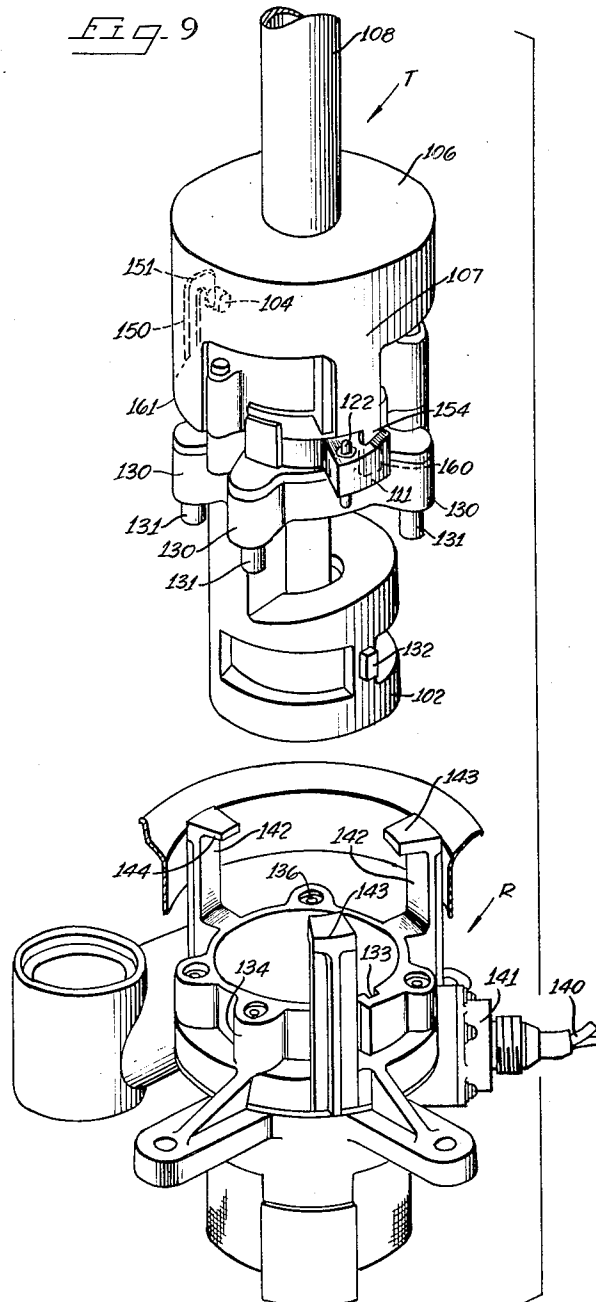


FIG. 9



INVENTOR.

Pius J. Nasvytis

BY

Hill, Sherman, Merani, Gaud v. Rempel

ATTORNEYS

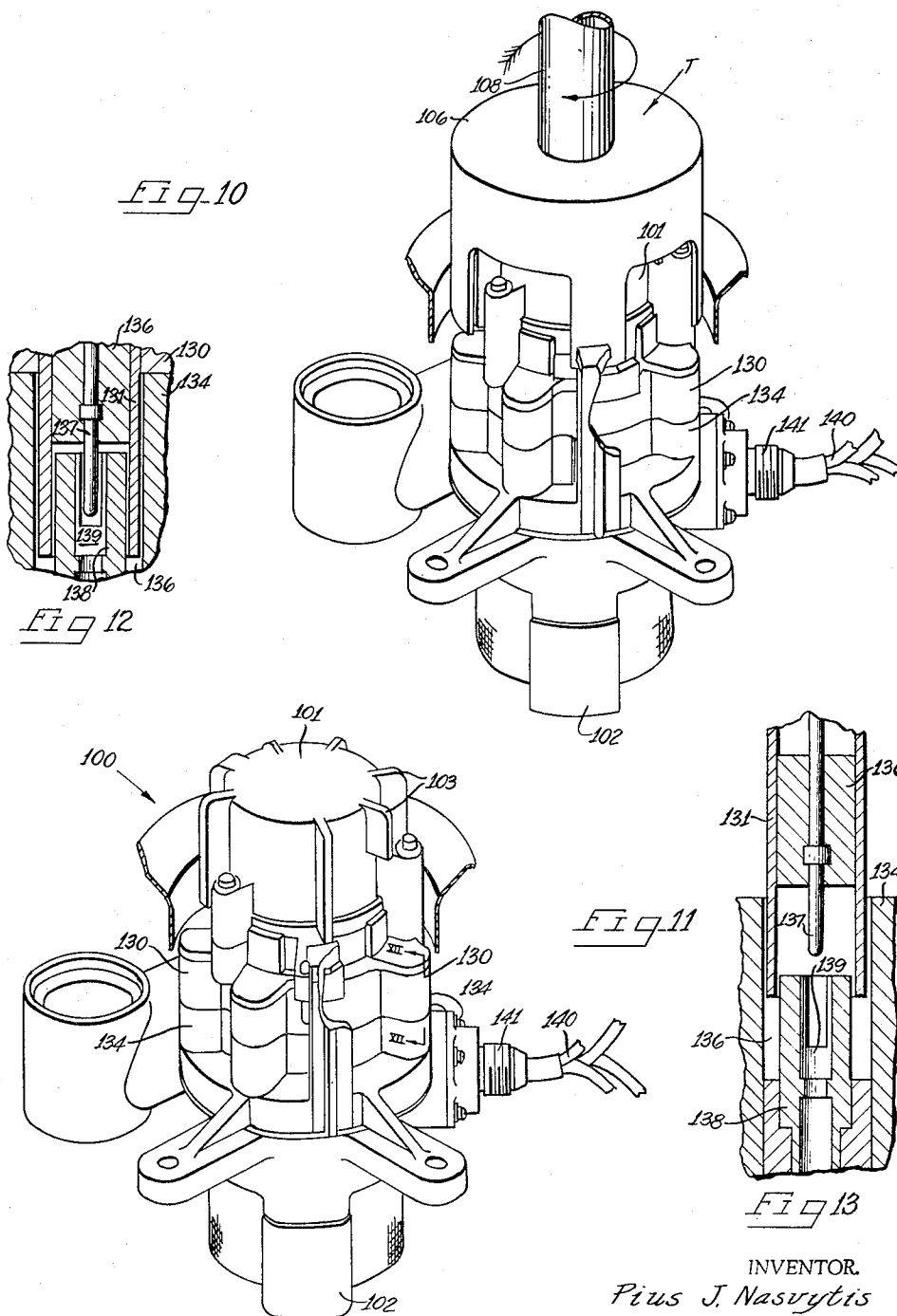
March 9, 1965

P. J. NASVYTIS
PLUG-IN TYPE FUEL PUMP

3,172,365

Filed Feb. 5, 1963

5 Sheets-Sheet 4



INVENTOR.

Pius J. Nasvytis

BY

Full, Sherman, Merri, Goss & Condon
ATTORNEYS

March 9, 1965

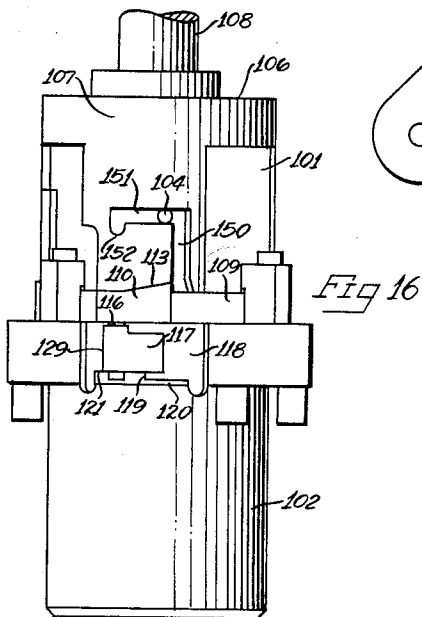
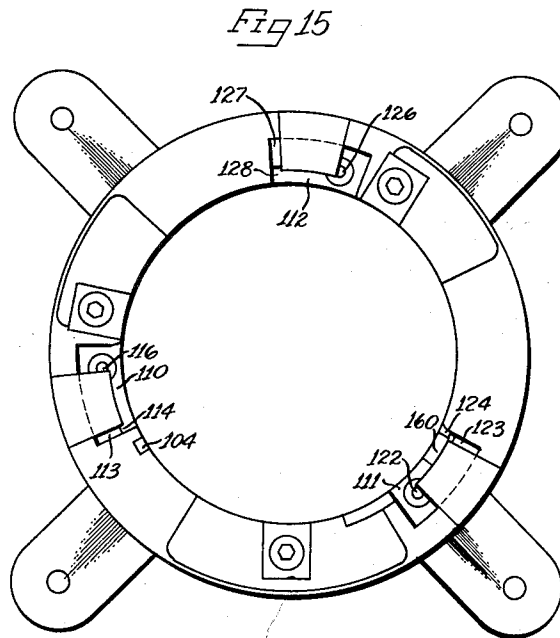
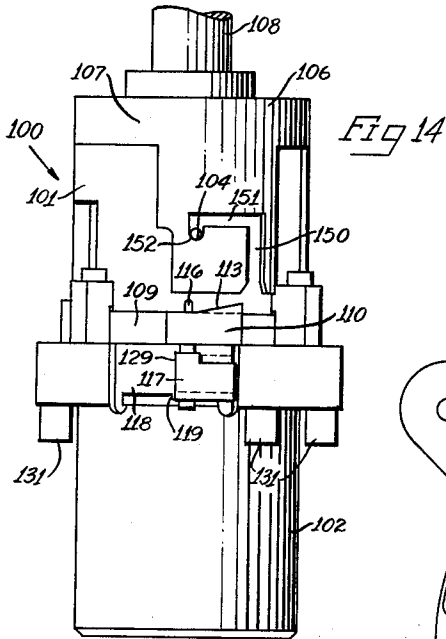
P. J. NASVYTIS

3,172,365

PLUG-IN TYPE FUEL PUMP

Filed Feb. 5, 1963

5 Sheets-Sheet 5



1

2

3,172,365

PLUG-IN TYPE FUEL PUMP

Pius J. Nasvytis, Cleveland, Ohio, assignor to Thompson Ramo Wooldridge Inc., Cleveland, Ohio, a corporation of Ohio

Filed Feb. 5, 1963, Ser. No. 256,359

17 Claims. (Cl. 103—87)

This invention relates to fuel pumps and the like and more particularly to a pump structure which can be plugged in by a straight line motion and tool means for accomplishing the same.

It has been a disadvantage of pumps for use in fuel tanks or similar applications that the pump has had to be rotated around its own vertical axis to secure it in position, with the result that the complex electrical connections have been required.

The present invention eliminates this problem and provides a plug-in-type fuel pump adapted to be connected in operative position without the use of any screws, bolts or the like and without the need of rotating the pump on its vertical axis.

In accordance with the invention, a straight downward motion is utilized in installing the pump in the housing therefor and a straight upward motion is similarly used in removing the pump for the housing. It will thus be seen that a plug-in or plug and socket type electrical connection can be used without difficulty.

In accomplishing these results, the invention provides a ring member rotatably mounted on the pump together with cam means thereon adapted to coact with cam members in the housing for the pump. In order to cam the cam means on the cam ring into operative holding relation with the cam members on the housing, a relatively simple tool is provided which engages the ring and rotates the same while effecting downward movement of the pump into the housing therefor.

Further, the tool is designed to prevent inadvertent dropping of the pump as it is being raised or lowered into the fuel tank, and means are also provided to prevent removal of the tool unless the pump is positively locked in its operating position.

Accordingly, it is an object of the present invention to provide a plug-in type fuel pump which can be inserted and removed in a straight line motion, as contrasted with previous devices requiring rotation of the pump around a vertical axis and consequent complexity in the electrical connections therefor.

Another object of the present invention is to provide a device as described which can be installed and removed by means of a simple mechanical tool, with the tool preventing any inadvertent dropping of the pump during installation or removal.

Another object of the invention is to provide a device as described which has a safety characteristic in that the tool cannot be removed from the pump unless the device is locked positively in operating position.

Other objects and advantages of the invention will become apparent as the description proceeds in accordance with the drawings in which:

FIGURE 1 is a front elevational view, partly broken away and partly in vertical section, of a pump, pump housing and tool according to the present invention;

FIGURE 2 is a horizontal sectional view taken along the lines II—II of FIGURE 1;

FIGURE 3 is a horizontal sectional view along the line III—III of FIGURE 1;

FIGURE 4 is a developed view showing a first step in a sequence of pump installation steps;

FIGURE 5 is a second step in the sequence of steps;

FIGURE 6 is a third step in the sequence of steps;

FIGURE 7 is a front elevational view showing safety means for the tool the invention;

FIGURES 8—11, inclusive, depict an arrangement devised to install a fuel booster or transfer pump from an opening in the top of a fuel cell, FIGURE 8 being an exploded view showing the securement of the tool on the pump, FIGURE 9 being an exploded view showing the pump being lowered into a receptacle, FIGURE 10 showing the pump being latched into the receptacle and FIGURE 11 showing the pump fully installed in the receptacle and the tool removed;

FIGURES 12 and 13 are schematics of electrical connectors between the pump and the receptacle, FIGURE 12 showing the connector fully seated with the contacts protected against contamination and FIGURE 13 showing the connectors partially mated and illustrating a labyrinth hazard protection;

FIGURES 14, 15 and 16 are somewhat schematic views simplified to show the operation of the parts but corresponding in general organization and function with the actual pump apparatus shown in FIGURES 8—11; FIGURE 14 is a side elevation with the tool locked on the pump; FIGURE 15 is a plan elevation with the tool removed and FIGURE 16 is a view similar to FIGURE 14 but with the tool rotated out of locked position.

As shown on the drawings:

Referring now to the drawings, a pump 10 is shown which, as seen in FIGURE 7, may be used with a tool element according to the present invention to install the pump in a housing 12. The housing may be disposed, for example, in a fuel tank F having a bracket 13 carried on the wall. The pump 10 may be provided with an energizing cell 14 as understood by those skilled in the art and received in the housing receptacle 13a of FIGURE 3. The top-mounted pump in this example is thus seen in operative position in the housing, and the housing has a discharge portion 14a therefor.

In accordance with the invention, and in order to afford straight line reciprocating motion of the pump into and out of electrically connected position in the housing 12, the pump carries a rotatable lock ring 15 having cam means 16 adapted to coact with stationary cams 17 on the housing 12, as hereinafter described.

The locking ring 15 is mounted for rotation on the pump in a suitable guideway 18, and roller means (not shown) may be carried thereby to assist in rotating the ring into locking relation with the housing. In the form shown, a lower pump support member 19 is secured to the pump flange 20 by bolt means 21.

The housing 12 may carry a guide lug or the like 21a for insertion in a guide slot 21b in the pump (or vice versa) if desired, to assure linear, angularly stable reciprocation of the pump into and out of the housing, though other means or none may be utilized. In FIGURE 7, for example, the pump carries an elongated vertical lug 21c slidable in a housing slot 21d.

In accordance with the invention, the locking ring cams or cam means 16, as seen in FIGURES 4, 5 and 6 of the developed representation of the structure, having upwardly inclined cam surfaces 23 affording engagement with cooperative downwardly disposed cam surfaces 22 in the stationary cam ring 24 of the housing 12.

The locked relationship may be seen in FIGURE 7, for example, and it will be noted that outer spring biased plungers 25 are provided for each of the cams 16 adapted to lock into recesses 25a in the stationary cam structure 24 when assembly is completed.

In order to effect the positively locked position of the pump relative to the housing, a tool 26 is used, which is substantially cup-shaped to fit over the pump as manipulated by a handle 27. The tool 26 in accordance with the invention, has cut away portions 28 to vertically re-

ceive the respective cams 16 on the ring 15 and permits relative vertical movement of the cams therein as shown in FIGURES 4 through 6. Also, in order to rotate the ring 15, the tool 26 has a slot 29 for receiving a lug or other holding element 30, the lug 30 being joined to the ring as shown.

As seen also in FIGURE 7, the tool 26 desirably carries a helical spring or other resilient mounting element 31 within the lower end of the handle 27 as shown in dot and dash. It will be appreciated that other resilient structures and mountings can be utilized to this end, but in any event this relationship permits a vertically manually directed linear action of the tool 26 relative to the pump 10 in assembling and disassembling the device, as hereinafter described. The tool 26 also carries a safety hook 32, which is engageable over a shoulder or the like 41 on the pump to prevent removal of the tool prior to locking of the ring.

Referring now to FIGURES 4, and 5 and 6, means are provided to prevent removal of the tool until such time as the ring is securely and positively locked in position relative to the housing. Such means desirably include a bayonet slot 33 in the tool receiving a nonrotating pin 34 on the pump. Thus the initial position of the tool shown in FIGURE 4 provides for carrying the pump by the tool after the slot fully receives the pin 34, and disposes the pin at the short leg of the slot so that any rotation of the tool is substantially prevented at such time. In the second position of FIGURE 5 the tool has been moved downwardly against the spring 31 and the pin 34 is therefore in the upper transverse portion of the slot. Accordingly, the ring can be rotated with the pin 34 moving into locked position (relatively) to the right of the slot. However, the width of the upper transverse section is such that the pin will not be in register with the long leg of the bayonet slot until such time as the ring 15 has been rotated sufficiently to fully lock the cams, and so that in the form shown the plungers or detents 25 are in the recesses 25a. When this has been accomplished, however, as seen in FIGURE 6, the pin 34 will be located so that the tool can be drawn from the pump with the device fully assembled as required.

There has thus been provided a pump assembly which is simple in construction and rugged and reliable in use, but which eliminates the complex arrangements in previous similar pumps resulting from the need to rotate the pump during insertion and removal relative to the housing or in effecting a connection therebetween. The device is installed with simple tool means as described, and also has the advantage that the pump will be held securely at all times during insertion and removal, and will assure a completed installation since the tool cannot be removed until fully locking position is achieved, in the preferred form of the device. Further, the invention may have application in a wide range of pumps and other equipment, where non-rotating installation is desired.

As shown in FIGURES 8-16, the motor has a housing 100 which includes an upper casing 101 and a lower casing 102. The upper casing 101 is particularly characterized by a plurality of radial ribs 103 and one of the ribs has projecting radially outwardly therefrom a fixed pin 104. All of the ribs 103 are of such an outer diameter as to be part of a cylindrical surface suitable for a telescopic fit within the tool shown generally at T and including a cup-shaped receiving portion having an upper wall 106 and a depending side wall 107. A handle 108 extends upwardly from the upper wall 106.

Between the upper and lower casings 101 and 102, there is provided a movable ring 109 which is shiftable in an angular direction.

Bosses extend radially outwardly from the ring 109 at three separate circumferentially spaced points and each respective boss is indicated by a separate reference numeral, namely, 110, 111 and 112.

The boss 110 is particularly characterized by a cam

surface 113 which inclines upwardly at an angle. The cam surface 113 is formed on that part of the boss 110 which is spaced radially outermost on the boss 110, thereby leaving a groove 114 at the radial innermost portion of the boss on its upper surface.

Projecting upwardly on the flat part of the surface of the boss 110 is a spring-biased pin 116.

Also carried by the lower part of the boss is a spring-pressed detent member 117 which moves from a full line position to a dotted line position as at FIGURE 14. The detent member 117 is arranged to cooperate with recess means 118 formed in the casing 102 and specifically including cam surfaces forming a stop shoulder 119 disposed between a lower surface 120 and an upper surface 121.

The boss 111 carries a spring-pressed pin 122 which projects upwardly from the upper surface of the boss 111 adjacent an upwardly inclined cam surface 123 formed on the radially outermost portion of the boss 111, thereby leaving an inner groove 124.

The boss 112 is similar in structure to the boss 110 and includes a spring-pressed pin 126 which projects upwardly from the top surface of the boss 112 adjacent an inclined upwardly extending cam surface 127 formed on the outside part of the boss, thereby to leave a groove 128.

The boss 112 also carries a latch or detent member 117 which cooperates with corresponding recess means formed in the pump housing similar to the surfaces 120 and 121 already described and engageable with a corresponding shoulder 119.

In this regard, it may be noted that the one edge of the latch or detent member 117 has a straight edge forming an abutment shoulder 129. It will be noted that the latch or detent member 117 is positioned in the recess means 118 so that the shoulder 129 will lock against the shoulder 119 when the detent member 117 is positioned on the lower surface 120. In this position, the ring 109 is prevented from turning angularly.

When both of the latch members or detent members 117, 117 are spring-pressed upwardly, for example, as shown by the dotted hand position in FIGURE 8, the shoulder 129 is cleared from the shoulder 119 and detent or latch member 117 is free to ride on the surface 121, thereby permitting angular rotation of the ring 109. Thus, the ring can be moved from the lock position as shown in FIGURE 14, for example, to a second position as shown in FIGURE 16. For effecting a release, of course, both latches or detent members 117, 117 must be engaged simultaneously.

The pump is further provided with a plurality of bosses 130 which are disposed approximately medially of the pump housing and each of which includes a connector for effecting a current continuing means. The connector is shown in each instance at 131 and since the parts are similar, like reference numerals will be applied where possible.

The lower casing 102 of the housing has a pilot lug 132 thereon which mates with a slot 133 formed in the side wall of a receptacle shown generally at R. The receptacle further includes a plurality of bosses 134 each of which has formed therein a socket 136 of an electrical connector for receiving the mating connector 131 on the pump.

FIGURES 12 and 13 illustrate enlarged cross-sections through the connector parts when they are separated and when they are joined thereby to illustrate the details of construction of the connectors. It will be noted the connector 131 has an insulator 136 carrying a male connector contact or pin 137. The socket 136 has an insulator 138 having a female contact member 139 for receiving the male pin 137.

The parts are proportioned so the male and female contact members will be separated as shown in FIGURE 13 before exposure of the contact members to the immediate environment, thereby rendering the connectors

explosion proof through quenching of any arc drawn between the separating contacts.

Electrical conduit means are shown at 140 and are connected by suitable coupling means 141 to the pump.

Extending upwardly around the well of the receptacle R are three standards forming a cage and each of the uprights is indicated at 142. At the top of each upright 142 there is a radially inwardly projecting lug 143 having an under surface 144 which provides a cam engaging surface for engaging the corresponding cam surface 113, 123 or 127 on the ring 109.

Referring now to the tool T it will be noted that the side wall 107 has a slot or vertical leg 150 which extends axially and terminates in an upper portion or horizontal leg 151 extending generally horizontally. A seating recess or enlargement 152 projects downwardly thereby leaving a portion 153 between the recess 152 and the groove 150.

The side wall 107 is further characterized by a downwardly projecting lug 154 which is spaced circumferentially from the slot or groove 150. Various additional clearance recesses are also provided in side wall 107 as will be apparent from an inspection of the drawings and the interrelationships of the parts.

In lining up the tool T for placement on the pump, the slot 150 is placed in register with the permanent pin 104 on the pump body. Before completing the operation, the lock ring 109 must be aligned with respect to the tool T because the boss 111 is provided with a special opening 160 (FIGURE 9 and FIGURE 15) in order to accommodate the downwardly projecting lug 154. Thus, the slot 150 and the pin 104 will meet and the tool T will pass downwardly over the top of the pump until the lower edge of the tool T shown at 161 engages against the spring biased upwardly projecting pins 116, 122 and 126.

By putting down the tool T against the bias of the pins 116, 122, and 126, the pin 104 comes in registry with the upper portion 151 of the slotted recess formed in the wall 107 of the tool T and it is then possible to relatively rotate the tool T together with the lock ring until the pin 104 is received in the seating recess 152.

When the lock ring 109 rotates with the tool T, the latches or detent members 117 snap down onto the lower surfaces 120, 120 and the shoulder 129 engages behind the shoulder 119, thereby locking the tool T to the pump.

Unless specifically disengaged by simultaneous depression of both latches 117, 117 the tool T cannot then be removed from the pump.

That relationship is illustrated in FIGURE 9 wherein the pump and tool T is shown ready for inserting the pump into the receptacle R. At this stage of the operation, the lug 132 is aligned with the slot 133 and the pump is lowered into the receptacle R.

In this position, the pins 116, 122, and 126 are all positioned on one side of the corresponding lugs 143 and project upwardly into blocking relation so that relative rotation of the pump ring 109 and the receptacle R is precluded. However, by depressing the tool T, the lower edge 162 of the tool T depresses each of the pins 116, 122 and 126 and then the pump ring R is rotated in the direction of the arrow as shown in FIGURE 10 so that the bosses 110, 111 and 112 start passing under the corresponding lugs 143.

The under surface 144 of each corresponding lug 143 then engages a corresponding ramp or cam surface 113, 123 and 127 as the lock ring 109 is rotated by the tool T. Further, since the tool T has been depressed to depress pins 116, 122 and 126, the tool T will also be moved relative to the stationary pin 104 on the pump housing, thereby placing the pin 104 in register with the horizontal slot 151. As the lock ring 109 is rotated until the pins 116, 122 and 126 are on the opposite sides of the lugs 143, the tool T will have rotated relative to the pump so the vertical slot 150 is in register with the pin 104.

Then, of course, the tool T can be simply lifted from the pump which is then locked firmly in place and in firm assembly with the receptacle R.

Further, when the pump was lowered into place as described hereinabove, the respective bosses 130 and 134 were in register with one another so that the connectors 131 entered the sockets 136 and the respective male and female contact members 137 and 139 effected electrical interengagement of the current continuing means.

There is thus provided a pump latching mechanism wherein all moving parts of the pump latching mechanism are incorporated on the pump. Further, no rotation of the pump is required for latching and the interlocking action provides a safe positive latching mechanism insensitive to direction of motor rotation. Since the pump is readily locked in place on the stemmed tool, insertion of the pump through a limited recess opening in the wall of a fuel cell containing the receptacle R is expedited.

The principles of the present invention permit pump installation from an opening in the top of a fuel cell. Thus pump removal and replacement can be effected without draining the fuel tank. Since receptacles are designed to be permanently mounted in the aircraft fuel tank and include the pump discharge fitting and the motor electrical connectors, the pump of the invention is a complete, self-contained unit dependent upon the receptacle only for mechanical positioning and electrical supply. All moving parts of the pump latching mechanism are incorporated on the pump. No rotation of the pump is required for latching. The interlocking action provides a safe positive latching mechanism insensitive to direction of motor rotation.

Although minor modifications might be suggested by those versed in the art, it should be understood that I wish to embody within the scope of the patent warranted hereon all such modifications as reasonably and properly come within the scope of my contribution to the art.

I claim as my invention:

1. A plug-in type assembly comprising a plug-in type pump,
 - a cam ring rotatably mounted on and circumscribing said pump in axial relation thereto,
 - a pump housing for receiving the pump in operative position and stationary cam means on said pump housing circumjacent said cam ring effective to releasably engage the rotatable cam ring upon rotation of said rotatable cam ring into predetermined locking relation therewith.
2. In the device according to claim 1,
 - a cup-shaped tool configured to adjustably engage the cam means on said cam ring and handle means on the tool affording selective rotation of the tool and the ring.
3. The device according to claim 2 wherein the tool is provided with means for supporting the pump during insertion of the pump into the housing and for preventing inadvertent release of the pump from the tool until completion of angular movement of the ring sufficient to effect said locking action.
4. The device according to claim 2 wherein said tool includes a lower hook member engageable with the pump to secure the tool in position during assembly and disassembly of the device.
5. The device according to claim 2 wherein said tool includes a resilient means at an upper portion of the cup engageable with the pump to resiliently control the movement of the tool into rotatable relation with the ring and to assist release of the tool from the pump upon completion of the ring rotation.
6. The device according to claim 2 wherein the tool includes a bayonet-slot of substantially inverted U-shaped configuration including a short inner leg,
 - a transverse upper section and a long outer leg open to the bottom of the tool,
 - said pump having an abutment member receivable in the slot and engageable in the short leg in an initial position of the tool for inserting the pump in the housing,

7

said abutment member being relatively movable along the upper transverse section during rotation of the tool to permit release of the tool by movement of the abutment member from the long leg only upon completion of rotation of the ring sufficient to effect said locking engagement of the cam means on said ring with the cam means on said pump housing.

7. A pump having a casing,
a ring having lugs carried on the peripheral surface of said casing,
means mounting said ring on said casing for angular shifting movement between locking and non-locking positions,

a receptacle receiving said casing and said ring,
said receptacle having lugs engageable with corresponding lugs on said ring when said ring is in locking position,
said casing having an electric motor housed therein,
said receptacle and said casing having electrical current-continuing connector means mating with one another when said casing is inserted into said receptacle,
thereby to connect said motor to a source of energy.

8. A pump and receptacle apparatus comprising a receptacle forming a vertical well and having plural locking lugs extending radially inwardly of said well,
a pump and motor casing inserted in said well and having an angularly shiftable ring,
and radially outwardly projecting lugs having cam and detent means engageable with said inwardly projecting lugs when in locking position,
said ring being shiftable between a non-locking position to permit insertion and a locking position to prevent withdrawal of the casing from the well.

9. A pump having a casing,
a ring carried on the peripheral surface of said casing,
means mounting said ring on said casing for angular shifting movement of said ring relative to said casing between locking and non-locking positions,
whereby said pump may be inserted into a receptacle and locked therein by shifting only said ring.

10. A pump having a casing,
a ring having lugs carried on the peripheral surface of said casing,
means mounting said ring on said casing for angular shifting movement between locking and non-locking positions,

a receptacle receiving said casing and said ring,
said receptacle having lugs engageable with corresponding lugs on said ring when said ring is in locking position.

11. A pump having a casing,
a ring carried on the peripheral surface of said casing,
means mounting said ring on said casing for angular shifting movement between locking and non-locking positions,
a receptacle receiving said casing and said ring,
said receptacle having lugs engageable with corresponding lugs on said ring when said ring is in locking position,
said casing having an electric motor housed therein,
said receptacle and said casing having electrical current-continuing connector means mating with one another when said casing is inserted into said receptacle,
thereby to connect said motor to a source of energy,
said connector means having male and female contact members and including surrounding sleeve-type housings for rendering said connectors explosion-proof when the contact members are mated and separated.

12. A pump having a casing,
a ring carried on the peripheral surface of said casing,
means mounting said ring on said casing for angular shifting movement between locking and non-locking positions,
a receptacle having lug means whereby said pump

8

may be inserted into the receptacle and locked therein by shifting said ring,

and a tool having portions embracing said casing,
said casing and said tool having pin and bayonet groove means for locking said tool to said casing,
said tool and said ring having lug and recess means for turning said ring after said casing has been inserted into the receptacle,

thereby to lock the casing in the receptacle by angularly shifting said ring.

13. A pump having a casing,
a ring carried on the peripheral surface of said casing,
means mounting said ring on said casing for angular shifting movement between locking and non-locking positions,

whereby said pump may be inserted into a receptacle and locked therein by shifting said ring,
and a tool having portions embracing said casing,
said casing and said tool having pin and bayonet groove means for locking said tool to said casing,
said tool and said ring having lug and recess means for turning said ring after said casing has been inserted into the receptacle.

thereby to lock the casing in the receptacle by angularly shifting said ring,

a receptacle receiving said casing in said ring,
said receptacle having lugs engageable with corresponding lugs on said ring when said ring is in a locking position.

14. In a pump latching apparatus,
a pump casing,
a ring rotatably mounted on said casing and having latching lugs spaced circumferentially from one another and projecting radially outwardly of the pump casing.

and detent means for locking said ring in adjusted angular positions including recess means in said casing adjacent said ring and having first and second axially separated surfaces separated by a shoulder,
a spring biased lug engageable with said surfaces to snap behind said shoulder,

thereby to lock said ring in one position and means for actuating said lug against the spring bias to clear the shoulder,

thereby permitting the ring to be shifted angularly.

15. In a pump latching apparatus,
a pump casing,
a ring rotatably mounted on said casing and having latching lugs spaced circumferentially from one another and projecting radially outwardly of the pump casing,

and detent means for locking said ring in adjusted angular positions including recess means in said casing adjacent said ring and having first and second axially separated surfaces separated by a shoulder,
a spring biased lug engageable with said surfaces to snap behind said shoulder,

thereby to lock said ring in one position and means for actuating said lug against the spring bias to clear the shoulder,

thereby permitting the ring to be shifted angularly,
a receptacle receiving said casing in said ring,
said receptacle having lugs engageable with the corresponding lugs on said ring when said ring is in a locking position.

16. A pump and receptacle construction whereby a pump can be installed through an opening in the top of a fuel cell comprising,

a pump casing having a laterally projecting stationary pin,

a ring carried by said pump casing which is angularly shiftable relative to said casing,

a stemmed tool having a cup-shaped portion forming side walls for slidably receiving said pump casing in telescoping relation,

9

said side walls having formed therein a latching recess for cooperating with said stationary pin and including a vertical leg opening out of the lowermost edge of said side walls,
 a horizontal leg at the top of said vertical leg,
 and an enlargement at the end of said horizontal leg, said ring having a plurality of bosses spaced circumferentially from one another,
 each of said bosses having spring-biased detent means including an upwardly projecting spring-biased pin, and a depending spring-biased safety latch member, said casing having recess means for each of said safety latch members formed therein providing first and second axially separated surfaces separated by a shoulder, each said safety latch member engageable with corresponding of said surfaces to snap behind said corresponding shoulder,
 thereby to lock said ring in one position,
 and means for moving said safety latch members against the spring bias to clear the respective shoulders, thereby permitting the ring to be shifted angularly, said safety latch members being actuatable to align said ring angularly with said tool,
 said tool engaging with said casing and with said sta-

10

tionary pin entering said vertical leg until said pin comes in register with said horizontal leg,
 and said side walls engage said upwardly projecting pins,
 whereby rotation of said tool will lock said tool to said pump.
 17. A pump and receptacle construction as defined in claim 16,
 and further characterized by a receptacle receiving said casing in said ring,
 said receptacle having lugs engageable with corresponding lugs on said ring when said ring is in a locking position.

References Cited in the file of this patent

UNITED STATES PATENTS

2,940,643	Olson	June 14, 1960
2,960,937	Wright et al.	Nov. 22, 1960
3,000,543	Paul	Sept. 19, 1961
3,018,925	Engleson	Jan. 30, 1962

FOREIGN PATENTS

652,423	France	Mar. 8, 1929
---------	--------	--------------