PUBLISHED

JUNE 1, 1943.

BY A. P. C.

O. MICHELMANN

RESERVE SUPPLY SYSTEM FOR MOTOR VEHICLES

Filed Sept. 17, 1941

Serial No. 411,177

3 Sheets-Sheet 1

Fig. 1

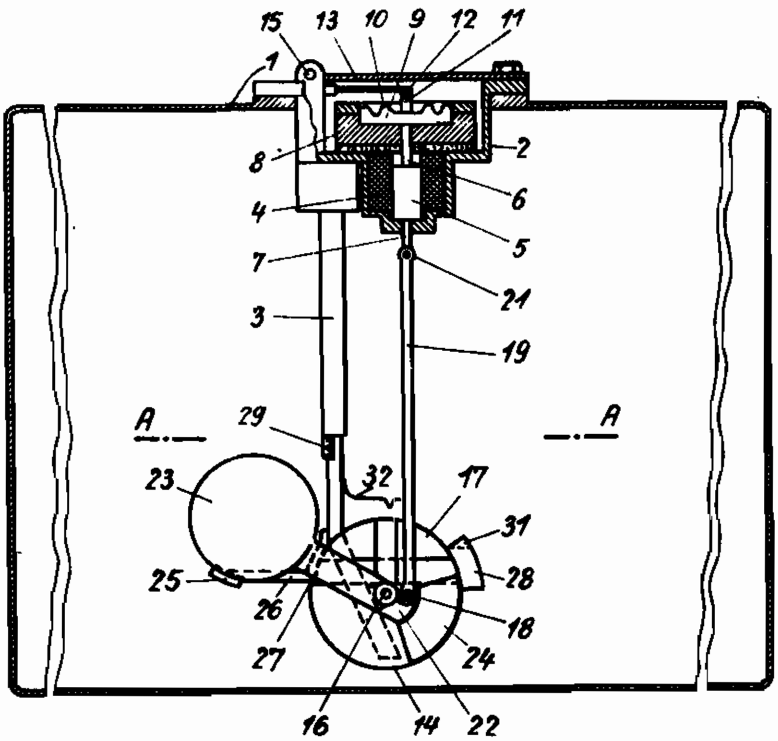
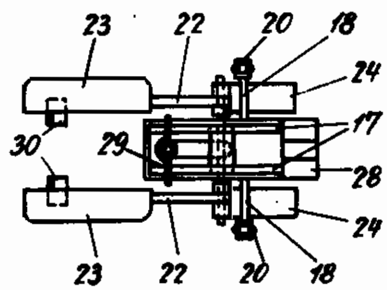


Fig. 2



Inventor Otto Michelmann,

Attorneys

PUBLISHED JUNE 1, 1943. BY A. P. C.

O. MICHELMANN

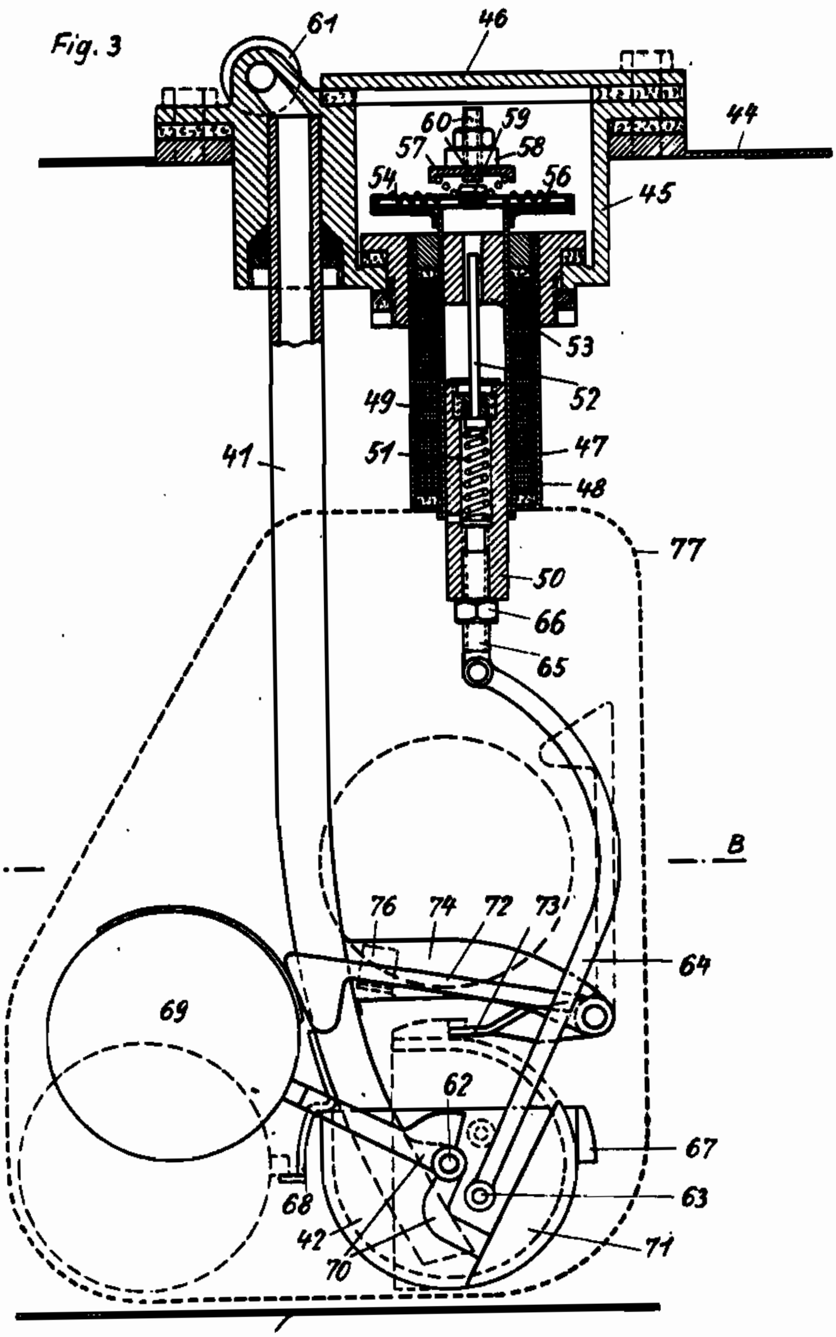
RESERVE SUPPLY SYSTEM FOR MOTOR VEHICLES

Filed Sept. 17, 1941

Serial No. 411,177

3 Sheets-Sheet 2

Fig. 3



Inventor Otto Michelmann

Attorneys A. A. Wicks
Mewell Ramsey

PUBLISHED JUNE 1, 1943. BY A. P. C.

O. MICHELMANN

RESERVE SUPPLY SYSTEM FOR MOTOR VEHICLES

Filed Sept. 17, 1941

Serial No. 411,177

3 Sheets-Sheet 3

Fig. 4

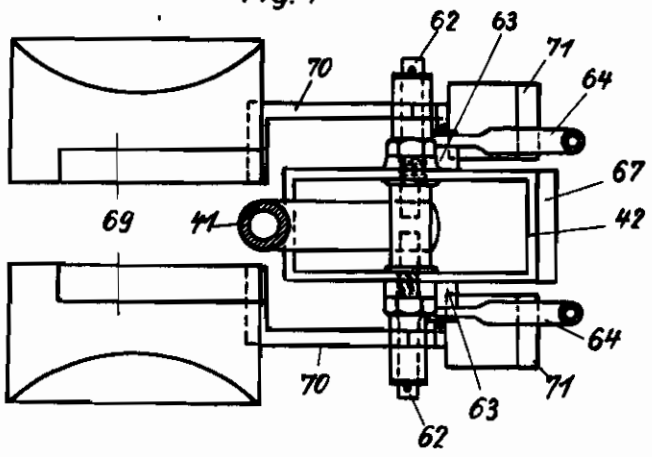


Fig. 5

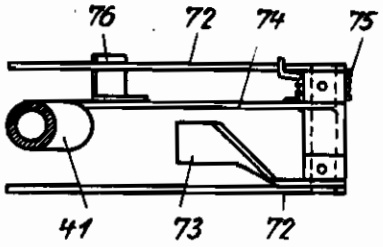


Fig. 6

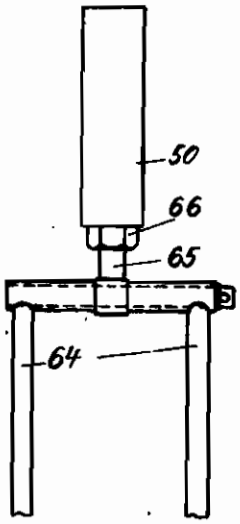
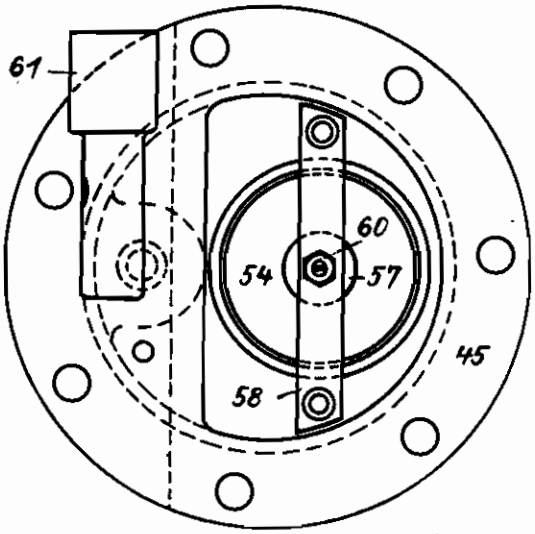


Fig. 7



INVENTOR Otto Michelmann

Attorneys: A. A. Klieber

Published June 1, 1943 Serial No. 411,177

ALIEN PROPERTY CUSTODIAN

RESERVE SUPPLY SYSTEM FOR MOTOR VEHICLES

Otto Michelmann, Eisenach, Germany; vested in the Alien Property Custodian

Application filed September 17, 1941

The invention relates to an improvement of such devices avoiding the complete emptying of the fuel tank of motor vehicles by providing that the drain pipe of the fuel pump is not discharging directly into the tank but into the tipping cup rockably mounted in the tank, which tipping cup in its horizontal position prevents the fuel rest below its upper edge from being consumed, so that the engine is missing after the tipping cup being emptied by suction. By moving the tipping cup into a vertical position, the operator will be able to effect the dipping of the drain pipe into the remainder of the fuel thus permitting its consumption.

The present invention resolves the problem in a remarkably more reliable and safer way, particularly as to the operation of the device and the automatic return, than the previous devices of the above mentioned type.

Special importance has been attached to the arrangement of the elements of the electric switch system from reasons of safety outside the easily inflammable fuel and to the possibility of an easy mounting and removal of the device into or from the fuel tank as a self-contained unit.

The forementioned favourable result is obtained e. g. by the fact that the fuel drain pipe with the tipping cup is mounted on a casing forming the cover for the opening for the insertion of the device into the fuel tank, which casing contains in a potlike recess also the electromagnet for the tipping cup, said recess having another cylindrical extension into which through a bore the contact plug of the magnet armature is projecting and which is closed outwardly by an flexible fuel-tight diaphragm. The diaphragm has on its outside the counter-contact for a leading-in contact attached to the casing for an electric indicating device and is capsuled with the contacts by a cover closing the potlike recess in the casing. The floating members which serve to return the tipping cup into the position for retaining reserve fuel are mounted on levers arranged to swing about the bearing axle of the tipping cup. When replenishing the tank with fuel with the cup tipped up a torque is exerted on the tipping cup owing to the lifting action on the floating members caused thereby, so that the said cup is again returned into its initial position. The floating members can bear in their end positions against limiting stops and the tipping cup can be held tipped up by a catch spring, a pawl or the like.

Two forms of embodiment of the invention are shown in the drawing in which

Fig. 1 is a side elevation of one form of embodiment of the system and

Fig. 2 is a top view of the tipping cup and of the floating members after cutting away the upper part by a section along the line A—A of Fig. 1.

Fig. 3 is a side elevation of another form of embodiment of the system.

Fig. 4 is a top view of the tipping cup and the floating members after cutting away the upper part by a section along the B—B of Fig. 3 and after removal of the pawl levers.

Fig. 5 is a top view of the pawl levers of Fig. 3.

Fig. 6 is another view of the lower part of the magnet armature from which the bifurcation of the connecting elements is to be seen.

Fig. 7 is a top view of the upper part of the device after removal of the cover.

With the device represented in Fig. 1 the tank wall 1 has an opening for the insertion of the potlike casing 2 serving for the reception of the fuel drain pipe 3—which can be connected at 15 with the conduit leading to the engine resp. to the carburetor—and for housing the electromagnet 4. The electromagnet 4 has internally and externally a fuel tight cover. The magnet armature 5 has above a contact plug 6 and below a pin with which it can be guided within the magnet casing 8. The magnet casing has above a cylindrical recess 9 which may be concentrically to the passage boring for the contact plug 6 and which is tightly closed by a flexible diaphragm 10. In the center of the diaphragm a countercontact 11 is provided opposite to the leading-in contact 12 which is elastically secured to the casing 2. The potlike recess of the casing 2 can be closed by a cover 19 so that both the diaphragm 10 as well as the contacts 11, 12 are protected. Secured to the fuel drain pipe 3 is the axle 16 on which the tipping cup 14 is rockably suspended. The tipping cup 14 can be so counterbalanced by counterweights 17 that the latter ones have a slight overweight. Eccentrically at the tipping cup 14 there are two lateral arms 18 with which e. g. the bifurcated connecting elements 19 to the magnet armature 5 are engaging in eyes 20 and 21. Independently of the tipping cup 14 there are still the levers 22 mounted for rotation about the axle 16, which levers carry at one end the floating members 23 and at the other counterweights 24. The counterweights 24 are so dimensioned that they do not completely balance the weight of the floating members 23 which will cause them with a corresponding low fuel level to bear against stops 25 attached at the fuel drain pipe. The levers 26 carrying the stops 25 are so designed that they

are providing at the same time the stops 27 for the edge of the tipping cup 14 which is held in place under the influence of the weight 28 put on its edge. A transverse member secured to the fuel drain pipe 3 and corresponding sheet metal lugs 30 on the floating members 23 are serving as abutment for the latter in their topmost position. The weight 28 may have a recess 31 for the reception of the fuel drain pipe when the tipping cup 14 is tipped up and further serve in cooperation with a catch spring 32 to hold the tipping cup 14 in this position.

The mode of operation of the device is the following:

If the fuel level has sunk to the upper edge of the tipping cup 14, the engine will stop after having consumed the quantity still in the tipping cup 14. The operator now closes the circuit of the electromagnet 4 thus effecting an attraction of its armature 5 and simultaneously by means of the linkage 19 a movement of the tipping cup 14 of *abt* a right angle. This will cause the contact plug 6 to press the diaphragm 10 upwards and the closing of the contacts 11, 12 upon which a indicating device, a flashing light or the like will enter in action. The tipping cup 14 is held in this position by the catch spring 32 snapping in behind the weight 28. Owing to the low fuel level, the floating members 23 bear against the stops 25. In consequence of the lifting of the arms 18 when tipping the cup, said arms reach to the other side of the center of rotation into the vicinity of the double-armed lever 22. If now fuel is replenished, the floating members 23 are lifted from its supports 25, so that the levers 22 carry with them the arms 18 and therewith the tipping cup, which causes the weight 28 to snap out of the catch spring 32 and the tipping cup 14 to fall back into its initial position. The floating members 23 will raise simultaneously with the fuel level until the sheet metal lugs 30 abut against the transverse member 29.

One form of embodiment with a slight modification of that described hereinbefore is represented by the device shown in Figs. 3 to 7.

Compared with the form of embodiment described above the composition of the single elements of the device to form a constructional unit has remained unchanged, for also in this case it is possible to insert the device as a whole into the aperture provided therefore in the fuel tank. The upper part of the device including the electric installation and the lower one arranged near the bottom 40 of the fuel tank are interconnected by the fuel drain pipe 41 which is rigid enough for being able to carry the lower part with the tipping cup 42 and the floating members 69 and to resist the forces occurring in consequence of the operation of the device and following the movement of the fuel in the tank.

The upper part of the switch system is comprising the potlike casing 45 inserted into the aperture of fuel wall 44, which casing can be closed by the cover 46. Through the bottom of the casing a hollow cylinder 47 provided with an attachment flange is projecting which serves as casing for the field coil 48 and is provided with a guide bushing 49 within which the magnet armature 50 is slidably arranged. The field coil 48 is in connection with the battery of the motor vehicle or another source of current in the vehicle and may be put in circuit e. g. by a switch or push button on the instrument board of the car.

In the hollow interior of the magnet armature 50 is arranged the pin 52 and guided in the bush 53 under the pressure of a spring 51 consisting of a stainless material. The guide bushing 49 is enlarged at its upper end for the reception of the diaphragm 54 which tightly closes the guide bushing 48 but nevertheless permits a certain movability of the closure. In the enlargement is arranged the disc 56 supporting the diaphragm 54 against the pressure of the spring 55, a bore being provided in said disc for the passage of the pin 52. The spring 55 bears against the disc 57 of insulation material and against the bridge 58 which is secured to the casing 45 and electrically insulated from the remaining parts.

Centrically provided on the diaphragm 54 is the contact 59, to which the adjustable leading-in contact 60 secured to the bridge 58 is opposed. The contacts 59 and 60 are enclosed in the circuit of an indicating device, e. g. provided on the instrument board and fed from a source of current existent in the car. This indicating device may be a signalling disc, a incandescent bulb, a flashing light or the like. The spring 55 is so dimensioned that it will separate the contacts 59 and 60 with safety also with the highest liquid pressure that will occur. Leakage of fuel through the guide bushing 49 is prevented by means of the diaphragm 54 and all other points that may possibly permit leakage are made tight by packing rings or the like. In the same way also the field coil 48 is protected from access of fuel. In this manner the electric installation of the system is completely insulated from the easily inflammable fuel.

The fuel drain pipe 41 which is secured to the casing 45 and connected through the connection piece 61 of the casing with the fuel pipe conducting to the engine resp. to the carburetor is so dimensioned as to its length that it terminates adjacent the bottom 40 of the fuel tank. In the vicinity of the lower end of the fuel drain pipe 41 there is secured to it the axle 62, on which the tipping cup 42 is journaled in such a way, that the slightly curved lower part of the drain pipe 41, the cup edge being in horizontal position, terminates near the lowest point of the cup, but after the provided tipping of *abt* 90° it is no longer prevented from taking the remainder of the fuel in the tank.

The tipping cup 42 which, according to the desire to retain more or less reserve supply in the fuel tank is more or less high carries on both of its front faces an eccentrically arranged journal pin to which the fork-shaped linkage 64 (see Fig. 6) connecting the tipping cup 42 with the magnet armature 50 is hingedly connected. The length of the linkage 64 is made adjustable by means of the threaded member 65 connected therewith, which capable of being screwed into the magnet armature 50. The fixing nut 86 serves to maintain the adjusted length.

The weight of the linkage 64 together with that of the magnet armature 58 draws the tipping cup 42 into the position for retaining reserve fuel. Particular counterweights or balance weights—similar to those employed with the form of embodiment described in the first place—are not provided for this purpose with this form of embodiment. Only a projection 67 arranged at the edge of the tipping cup 42 will somewhat increase the weight, which is pressing the cup edge opposite the projection 67 against the stop 68 secured to drain pipe 41. There is perfect liberty how-

ever to use additional weights also with this form of embodiment, in case the pressure of the tipping cup **42** against the stop **68** is not sufficient to hold the tipping cup **42** with safety in this position.

Besides the tipping cup **42**, but independently of it, the floating members **69** are mounted for rotation about the axle **62** by means of the double-armed lever **70**. The floating members **69** are so counterbalanced by the counterweights **71** secured to the other arm of the levers **70**, that the weight of the floating members **69** plus the pressure on the floating members **69** exerted by the pawl operating levers **72** on the way, on which the floating members **69** release the pawl **73**, have together a slight overweight over the weights **71**. The lowermost position of the floating members **69** is likewise predetermined by the stop **68** correspondingly designed for this purpose. The topmost position of the floating members **69** is determined by their pivotal connection by means of the levers **70** e. i. the position which they occupy in the vertical position of these levers. To prevent the floating members **69** from coming into contact with the linkage **64**, this must be correspondingly curved. The turnover of the floating members **69** to the wrong side is prevented by the pawl operating levers **72**, which are under spring pressure. The pawl operating levers **72** and the pawl **73** rigidly connected therewith are hingedly connected to the bracket **74** attached at the fuel drain pipe **41**. A torsion spring **75** presses the pawl operating levers **72** on the floating members **69** so that when the floating members have trespassed a predetermined low position and the tipping cup **42** are tipped up by the magnet, the pawl will snap in behind the projection **67** and the tipping cup **42** remain in this position. The pawl **73** is prevented from falling too low as long as the tipping cup **42** not yet tipped up by the stop **76** secured to the bracket **74**.

The mode of operation of the form of embodiment described in the last place differs only slightly from the form of embodiment described in the first place. If the operator closes the circuit of the magnet, after the fuel level in the fuel tank has fallen as low that there is only just the emergency supply in it, the magnet armature **50** will be drawn into field coil **48** and consequently the tipping cup **42** tipped up so that the fuel drain pipe **41** can take up the emergency supply. The tipping cup **42** is held in this position by the pawl **73** till the fuel level in the tank when replenishing is so far up, that the floating members **69** release again the pawl **73** with the help of the pawl operating levers **72** and permit the tipping cup **42** to fall back into its initial position. From this arrangement results that during the tipping up of the tipping cup **42** it is necessary to lead the current only temporarily through the field coil **48**. There is no need of current for holding the cup in the tipped up position. The electric signalling device will operate however until the tipping cup **42** is again returned to its initial position in order to remember the operator all the time during which fuel is taken from the emergency supply that the fuel tank must be replenished at the first opportunity offering itself.

This mode of operation of the signalling device is realized by the fact that the spring loaded pin **52** inserted into the magnet armature **50** will bring the contacts **59** and **60** into contact with each other by pressing from below against the diaphragm **54** when the magnet armature **50** is drawn into the field coil **48**. The stronger spring **51** in this case will overcome the weaker spring **55**. Owing to the spring loaded arrangement of the pin **52** the connection of the contacts **59** and **60** will rest assured also in the case of changes in the length of stroke. The contacting pressure and the deflection of the diaphragm **54** too will always remain almost equal.

The shocks of the fuel waves that may eventually occur on the parts of the device submerged by the fuel can be prevented from doing any harm by surrounding the tipping cup **42**, the floating members **69** and eventually also the linkage **64** with a screen or lattice **77**, which e. g. may consist of two halves of a box joined together. In this case the aperture for the insertion of the device and the cover **45** should be made somewhat larger than shown in the drawing in order to permit the insertion of the device into the fuel tank.

OTTO MICHELMANN.