July 7, 1925. 1,544,922

T. MIDGLEY, JR

FUEL MIXING APPARATUS

Filed Feb. 28, 1924 3 Sheets-Sheet 1

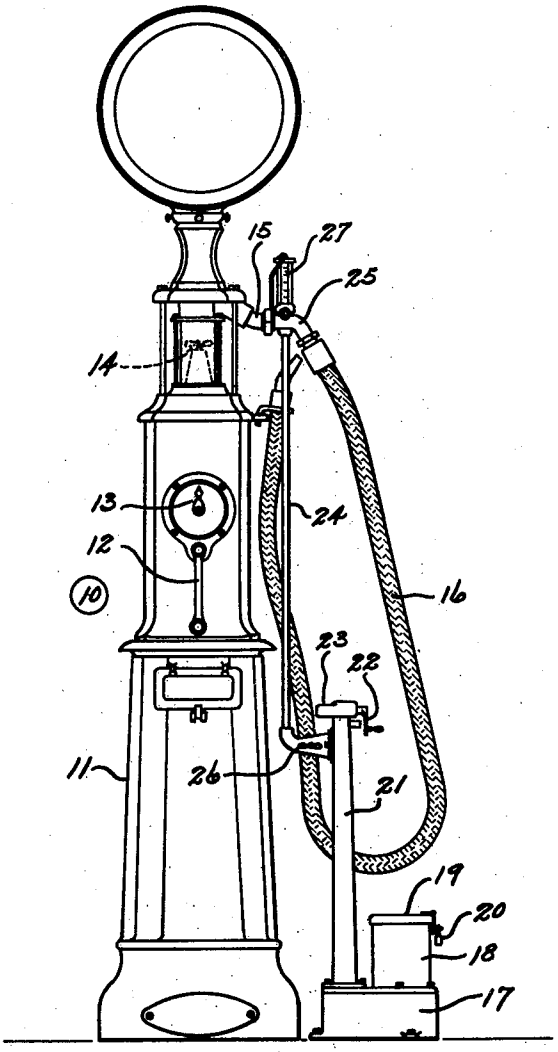



Fig. 1

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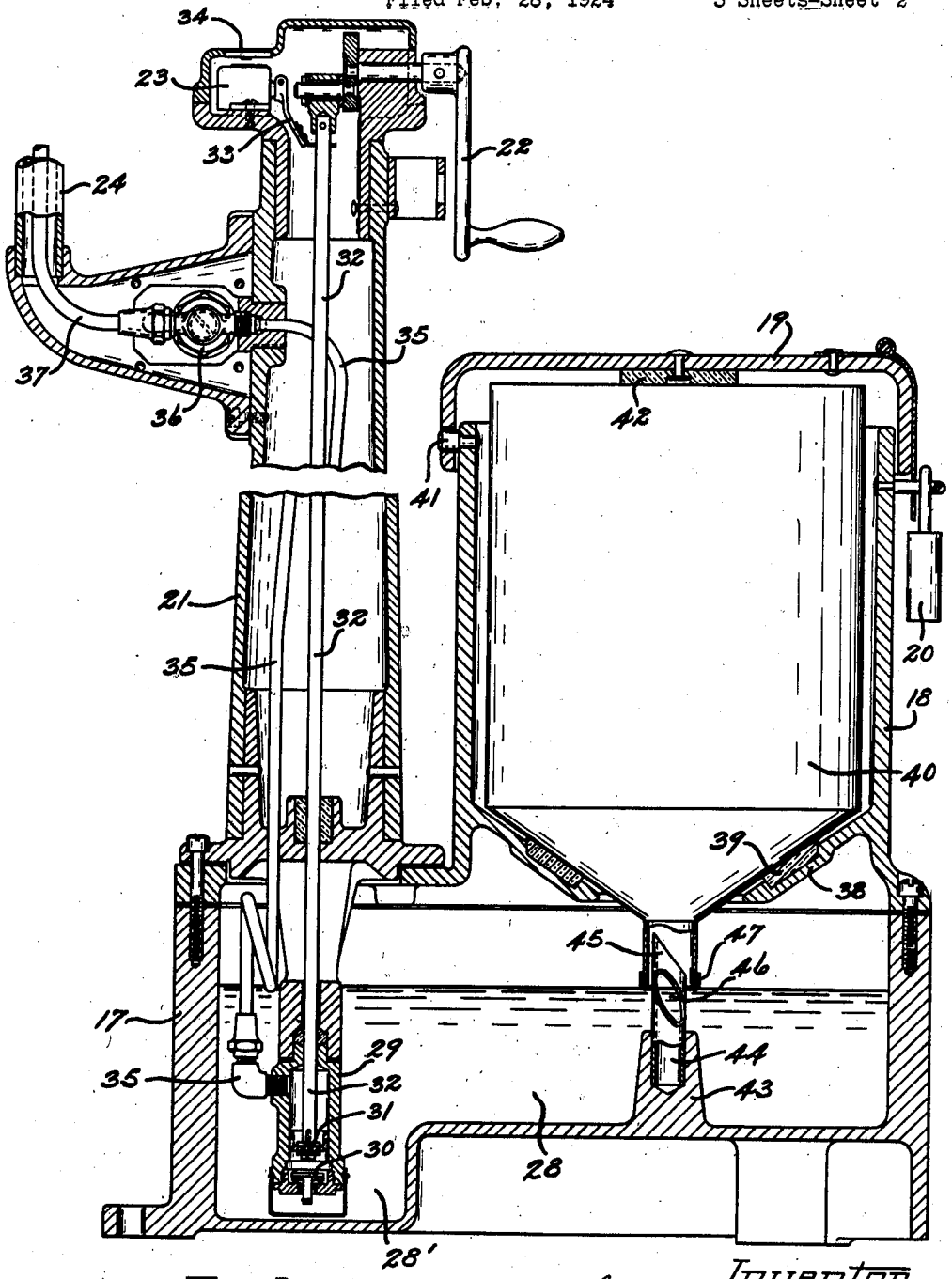



Fig. 2

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Filed Feb. 28, 1924 3 Sheets-Sheet 3

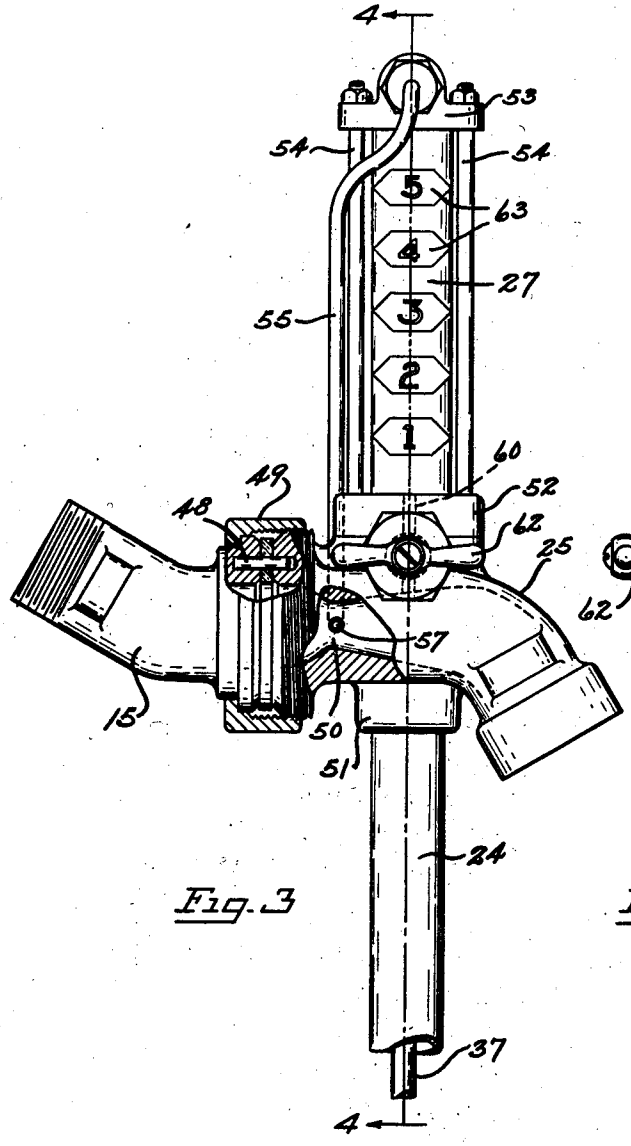



Fig. 3

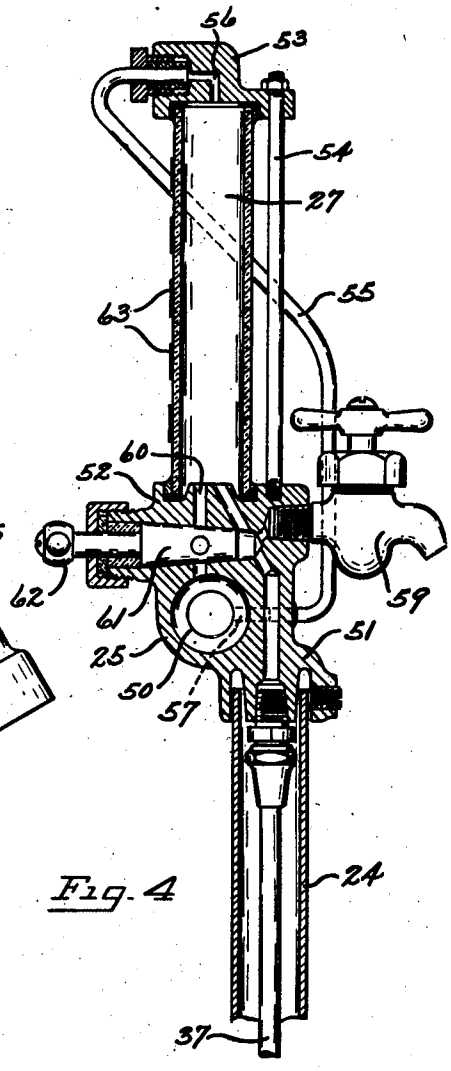



Fig. 4

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# UNITED STATES PATENT OFFICE.

THOMAS MIDGLEY, JR., OF DAYTON, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO GENERAL MOTORS CORPORATION, OF DETROIT, MICHIGAN, A CORPORATION OF DELAWARE.

## FUEL-MIXING APPARATUS.

Application filed February 28, 1924. Serial No. 695,846.

*To all whom it may concern:*

Be it known that I, THOMAS MIDGLEY, Jr., a citizen of the United States of America, residing at Dayton, county of Montgomery, State of Ohio, have invented certain new and useful Improvements in Fuel-Mixing Apparatus, of which the following is a full, clear, and exact description.

This invention relates to means for adding a relatively small amount of a fuel component, such as lead tetra ethyl or mixtures thereof to gasoline or kerosene at the time the fuel is sold at a filling station. The principal objects of the present invention are to provide an apparatus with which the fuel can be dispensed with or without the addition of an anti-knock substance added thereto, to provide an apparatus which indicates to the consumer the amount of anti-knock substance added, and to provide an anti-knock metering means capable of attachment to different forms of fuel pumps used at filling stations.

In the accompanying drawings which illustrate a form of apparatus embodying my invention and adapted particularly for large capacity installations—

Fig. 1, is a front view of a common form of fuel pump with an apparatus embodying the present invention connected therewith;

Fig. 2 is an enlarged vertical sectional view through the anti-knock pump and container;

Fig. 3 is an enlarged front view of that portion of the mechanism connected directly to the fuel pumping means and showing the means for indicating to the consumer the amount of anti-knock substance sold; and

Fig. 4 is a vertical sectional view taken substantially on the line 4—4 of Fig. 3.

In Fig. 1, 10 is a common form of fuel pump comprising a standard 11, pump handle 12, means 13 for indicating the number of gallons of fuel sold, filtering device 14, outlet pipe 15, and hose 16.

The anti-knock metering means as shown in this view comprises a hollow base 17, preferably formed separately from the standard 11, a casing 18 provided with a cover 19, normally sealed in closed position by lock 20, the casing resting on the base 17 and being adapted to hold in inverted position a container of anti-knock substance. 21 is a pump standard supporting a pump handle 22, an indicating device 23 for registering the number of turns of the handle. A pipe 24 connects the pump standard with a pipe section 25 joining the pump outlet 15 and hose 16. A cutoff valve within the pipe 24 is operated by handle 26. 27 is a graduated glass tube mounted on the pipe section 25 for visibly indicating the amount of anti-knock substance to be dispensed.

Referring particularly to Fig. 2, the hollow base 17 forms a reservoir 28 having a relatively deep sump 28′ into which projects a pump cylinder 29 supported by pump standard 21 and removable therewith. The pump shown is a simple form of single acting pump having an inlet valve 30, and piston head 31 provided with a lip packing and operated by a vertical piston rod 32 connected at its upper end to pump handle 22. An oscillating arm 33 connects the piston rod with a common form of counter 23 whose face is visible through a glass 34 in the top of the pump casing.

35 is a pipe leading from the top of pump cylinder 29 upwardly through the standard and then transversely through a wall thereof to a cutoff valve 36 operated by handle 26 (Fig. 1). The opposite side of the valve is connected to a tube 37 projecting upwardly through pipe 24.

Casing 18 is formed with a conical lower end wall 38 open in the center and provided with an annular packing 39 forming a seat for an inverted cylindrical container 40 from which the anti-knock substance is supplied. Cover 19 is hinged at 41 to the casing and supports a packing member 42 which presses the container against its seat when the cover is in closing position. A lug 43, projecting upwardly from the lower wall of base 17, supports a vertical pipe 44 pointed on its upper end 45 and provided with a lateral opening 46 communicating with reservoir 28. When a can of anti-knock substance is inverted and pressed downwardly on the pointed end 45 of pipe 44, the latter punctures a soft metal seal closing the outlet 47 of the container and the anti-knock substance flows into the reservoir until a level substantially as shown is attained. The container, pipe and reservoir form a constant level device of a form commonly known as the "chicken feeding type."

Referring to Figs. 3 and 4, pipe section 25 is secured in a predetermined position on

pump outlet 15 by a dowel pin 48 fitted in aligned openings in the two members which are connected by threaded sleeve 49. The bore of pipe section 25 is formed as a Venturi tube having its constricted opening 50 at the inlet side of the pipe section. This pipe section is formed with a hollow boss 51 to receive the upper end of the pipe 24 forming a protective casing about the conduit 37, and on the upper wall of the pipe section is formed a boss 52 recessed to receive the lower end of glass tube 27. The upper end of this tube is seated in a recess in a head 53 and the head, glass tube and boss 52 are clamped together by rods 54, the tube ends being packed in their recesses to prevent leakage. 55 is a small tube connecting a passageway 56 leading from the glass tube into the head 53, with a passageway 57 communicating with the bore of the pipe section 25 at Venturi throat 50.

The upper end of tube 37 is threaded into the lower boss 51 and communicates with an unobstructed passageway 58 leading upwardly to a spigot 59 and to the glass tube 27. 60 is a passageway leading from the lower end of the glass tube 27 to the bore of the pipe section 25 on the outlet side of the Venturi throat 50 therein.

Each of the index plates 63, marked from 1 to 5 and mounted on glass tube 27, indicate successive quantities of anti-knock fluid forced into the tube by each rotation of the pump handle 22. Five units of anti-knock substance forced into the glass tube is sufficient to treat five gallons of fuel dispensed and corresponds to an addition of 5 to the counter 23, this addition to the counter being effected by five oscillations of the counter operating arm 33 as the anti-knock substance is pumped from the reservoir 28 into the glass tube 27.

The normal position of the different parts is as shown in the drawings with the valve 36 open and the spigot 59 and valve 61 closed. When the glass tube 27 is empty the valve 61 may be open.

The operation of the apparatus is as follows: When a customer desires fuel which is not treated with an anti-knock substance, the apparatus is used as in common practice, i. e., the handle 12 is operated to pump the desired number of gallons of fuel into a container such as the fuel tank of a car. If during the operation the valve 61 is open, gasoline will flow into the glass tube and out again flushing the tube.

When a customer desires a number of gallons, for example, five of gasoline treated with the substance stored in the container 40, the valve 61 is closed, the pump handle 22 is rotated five times to elevate five units of the substance to the glass tube where the customer can see that he is getting the quantity he is paying for. As the single acting pump prevents backflow to the reservoir all of the substance in the glass tube is delivered to the customer. If the concentrated anti-knock or other substance supplied is desired it is drawn off through the spigot. When the operator adds this substance to the fuel dispenser it is usual practice to start pumping the fuel and then turn valve 61 to permit the substance, usually a mixture containing a lead alkyl compound, to flow by gravity into the fuel.

The connection of the vent pipe 55 to the Venturi throat in the pipe connection 25 causes some of the gasoline to flow through the passageway 60 into the sight glass 27 and flush the latter after the anti-knock substance has entered the hose 16.

The apparatus described is adapted particularly for attachment to fuel pump installations and to the dispensing of large quantities of an anti-knock or other substance in the fuel. The only connection necessary to a standard pump is the adding of the pipe section 25 to the fuel delivering means of the fuel pump. The base 17 of the anti-knock tank may be secured to a cement base and made as large as desired without adding weight to the fuel pump mechanism. The inlet to the pump 29 is near the bottom of a large reservoir 28 which serves as a primary source of supply when the container 40 is empty. The counter 23 shows the number of gallons of fuel treated or the number of units of the anti-knock substance sold.

I claim as my invention:

1. In an apparatus of the class described the combination of a fuel dispensing pump; a conduit connected therewith; a container adapted to discharge its contents into said conduit by gravity; and means for metering a substance into said container.

2. In an apparatus of the class described the combination of a fuel dispensing pump; a conduit connected therewith, a container adapted to discharge its contents into said conduit by gravity; a valve mechanism between the container and conduit; and means for metering a substance into said container.

3. In an apparatus of the class described the combination with a fuel metering device; an outlet conduit therefor; a sight glass adapted to discharge its contents by gravity into the conduit; and means for metering a substance into the sight glass.

4. In an apparatus of the class described the combination of a fuel dispensing pump; a conduit connected therewith, a container adapted to discharge its contents into said conduit by gravity; a valve mechanism between the container and conduit; a vent pipe connecting the container and conduit; and means for delivering a liquid to the container.

5. In an apparatus of the class described the combination of a fuel conduit; a graduated sight glass; a pumping mechanism discharging into the sight glass; means for recording the amount of substance pumped into the sight glass in terms of the unit of graduation on the sight glass; and means for discharging the contents of the sight glass into the conduit.

6. In an apparatus of the class described a fuel pump; an outlet conduit connected therewith; a graduated sight glass supported by the conduit above the latter and adapted to discharge its contents by gravity into the conduit; a valve mechanism between the sight glass and conduit; a vent connected to the top of the sight glass; and means for supplying a substance to the sight glass.

7. In an attachment for fuel metering devices having a discharge conduit and a hose; a pipe connection adapted to be inserted between the discharge conduit and hose, a container mounted on and having communication with the pipe connection, and means for delivering a substance to the container.

8. In an attachment for fuel metering devices having a discharge conduit and a hose; a pipe connection adapted to be inserted between the discharge conduit and hose, a container mounted on and having communication with the pipe connection, and a valve mechanism controlling the communication between the container and pipe connection.

9. In an attachment for fuel metering devices having a discharge pipe connected to a hose; a pipe connection adapted to be inserted between the discharge pipe and hose in a predetermined angular position relative thereto; a secondary reservoir mounted on top of the pipe connection and adapted to discharge its contents by gravity into the pipe connection; a primary reservoir; and means operated independently of the fuel metering device for delivering a substance from the primary reservoir to the secondary reservoir.

10. In an attachment for fuel metering devices having a discharge pipe; the combination of a primary reservoir and a removable inverted container discharging into the reservoir and adapted to maintain a substantially constant level therein; a pump located in the reservoir and having unit capacity; means for operating the pump and recording the number of units removed from the reservoir; a graduated sight glass adapted to be mounted on the outlet pipe of the fuel pump and to discharge its contents into the pipe by gravity; a valve mechanism between the sight glass and pipe; and an index on the sight glass adapted to show the number of said units therein.

In testimony whereof I hereto affix my signature.

THOMAS MIDGLEY, JR.