Jan. 3, 1933. I. E. ASKE ET AL 1,892,825

ELECTROMAGNETIC VALVE

Filed April 15, 1929

Fig. 1.

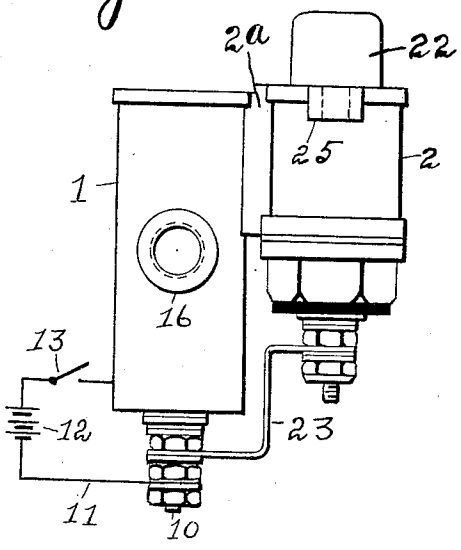


Fig. 2.

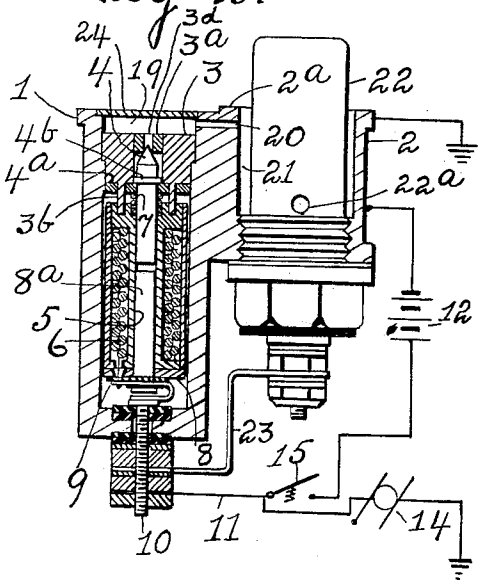


Fig. 3.

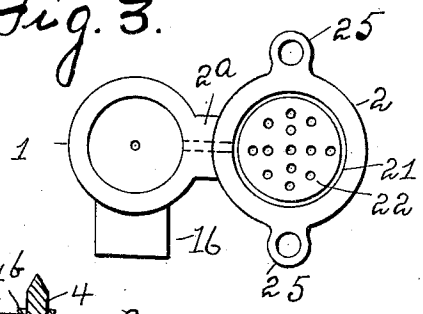
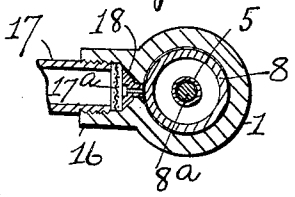
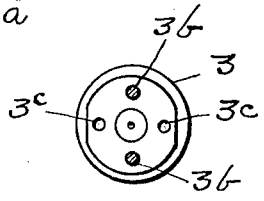


Fig. 4.





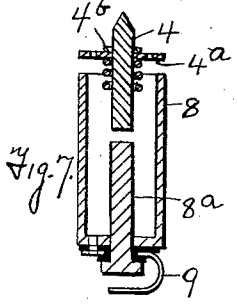


Fig. 7.

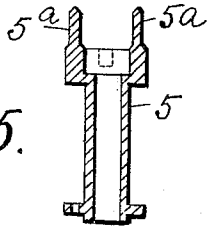


Fig. 5.

Fig. 6.

Witnesses

Ida Josephine Watson

Sarah E. Paulson

Irving E. Aske

William F. Aske

Leonard E. Aske

INVENTORS

BY James E. Watson

ATTORNEY

Patented Jan. 3, 1933 1,892,825

UNITED STATES PATENT OFFICE

IRVING E. ASKE, WILLIAM F. ASKE, AND LEONARD E. ASKE, OF MINNEAPOLIS, MINNESOTA

ELECTROMAGNETIC VALVE

Application filed April 15, 1929. Serial No. 355,362.

Our invention relates to electro-magnetic valve and has for its object the provision of a compact, convenient, efficient and cheap electro-magnetic valve for governing the flow of fuel oil from any suitable source of supply to a vaporizer for vaporizing said oil or converting it into fumes for combustion in the cylinder or cylinders of an internal explosion engine. With this and other objects in view, it consists of the structures, combinations and arrangements of parts hereinafter described and shown.

In the drawing, Fig. 1 is a side elevation of our said invention and of a vaporizer served thereby. Fig. 2 is a central vertical transverse section of our said invention and of a vaporizer, showing an electric vaporizer in elevation positioned in said cup. Fig. 3 is a top plan view of said valve and cup. Fig. 4 is a central horizontal section through our said invention, omitting said vaporizer. Fig. 5 is a central vertical section of an electric-coil spool, forming part of our said invention, and Fig. 6 is a top plan view of a valve seat forming part of said invention. Fig. 7 is a central vertical section through the hereinafter described coil sheath and core, and of the hereinafter described valve plunger, collar and spring, omitting said spool.

In the drawing, 1 is a valve casing which is preferably cast integral with a vaporizer cup 2, said casing and cup being connected by a web portion 2^a. In one end of said casing is positioned a valve seat 3 which is provided with an outlet or valve port 3^d adapted to be closed by a valve plunger or pin 4. Said seat preferably embodies an apertured bushing 3^a positioned in the outlet or valve aperture of said seat. Said seat is also preferably provided with downwardly extending spacing or guide pins 3^b adapted to extend loosely through suitable apertures in a tight or loose collar 4^a encircling said valve plunger 4, and said valve seat is also preferably provided with recesses 3^c adapted to receive spacing or guide pins 5^a extending from a tubular spool 5 loosely through other apertures in said collar, by which pins 3^b and 5^a said seat and spool are spaced from each other, within which space said collar may rise and fall. Said plunger 4 preferably has formed thereon a shoulder 4^b against which said collar, if loose on said plunger, is adapted to bear. Upon said spool is coiled an insulated electric wire 6. The spool and valve seat are preferably held together by depressing a portion of the metal of the valve seat against the sides of the pins 5^a which may be done with a prick punch, thus obviating the use of screws or nuts for the purpose, and making the labor of assembly simple and cheap.

Said spool is enlarged at its upper end and is preferably counter-bored at said upper end to receive one end of a spring 7 which is adapted to bear at its opposite end against said collar to force said plunger 4 into closing position against said seat. The lower end of said plunger extends into the bore of said spool and is adapted to form the armature of a solenoid or equivalent electro-magnet, comprising said spool coil and a core of stop 8^a extending into the opposite end of said spool from the lower end of a coil sheath 8, which sheath is pressed over said coil and is adapted to form a ground for any outer turn of the coil in which the wire insulation may accidentally become abraided in course of assembly, or otherwise. Said sheath and its core is made of magnetism conducting metal and is adapted to form a section of the magnetic field of said electro-magnet.

Said coil is preferably wound from one end to the other of said spool and back again, both ends of the wire terminating at or near the same end of the spool. One end of said wire is preferably grounded in any suitable manner on the spool itself and the opposite end is preferably passed through an aperture in the foot of the spool, being insulated therefrom by any suitable sheath or bushing of insulating material in any suitable manner, and through an aperture in the lower end of said sheath, being insulated therefrom in any suitable manner, and is electrically connected to a spring contact piece 9 which is insulated from said spool and sheath 8 and adapted to bear against the head of an electric wire binding post 10, which post is adapted to be connected by any suitable means, as by a wire 11, with any suitable source of electricity, as

a battery 12. In the circuit of said battery and electro-magnet any suitable switch may be interposed, as the switch 13, which may if desired be located on the instrument board of an automobile and may be arbitrarily operated by hand; or said circuit may include or be arranged in parallel with the circuit of a starting motor 14 and a switch 15 therefor, whereby said valve will be operated whenever the switch 15 is closed to start the motor, and will be discontinued when the switch is opened to cut out the starting motor.

An outwardly extending boss 16 is formed on the side of said valve casing which is preferably recessed to receive the delivery end of a pipe 17 leading from any suitable source of supply of fuel oil under any suitable means of feeding pressure, as gravity. The wall of said casing has formed therein an intake port leading from the recess in said boss, and adapted to receive a metering screw 18, which is adapted to govern the amount or rapidity of flow of oil into said casing when said valve is opened.

It will be observed that said valve seat extends entirely across the chamber in said valve casing so as to cut off any flow of oil between its sides and the wall of said casing, but that there is a slight space between said coil sheath and the wall of said casing through which oil may flow upward from the intake port in the casing and thence into the space between the head of said spool and said collar, and thence through the pin holes in said collar—or additional holes therethrough if desired—and thence around the valve plunger and its shoulder in the recess of the valve seat to the discharge port of said valve. A screen 17^a is preferably interposed between the discharge end of said pipe 17 and the intake end of said metering screw.

The upper end of said valve casing extends above said valve seat and forms an oil passage 19 communicating with a connecting port 20 extending from said passage 19 through said web 2^a to the interior face of said cup, whence it may flow downward in a space 21 between said vaporizer and said cup and enter the vaporizer 22 through an aperture 22^a in its side wall. Said vaporizer may be of any suitable structure.

In operation, when the starting switch is closed, the coil of the electro-magnetic valve is energized, thus magnetizing the core, which attracts said plunger armature and thus opens said valve. At the same time the electric vaporizer is energized and electrically heated by means of a parallel circuit including said battery switch and a strap conductor 23. Said vaporizer is preferably connected in any suitable manner or by any suitable means, as by bolts (not shown) extending through ears 25, to the air-horn (not shown) of the carbureter of an internal explosion engine as is well known to the art, and to supply dense fumes for starting such engine, and is not believed necessary to be further described here.

The upper end of said valve casing may be closed and sealed in any suitable manner or by any suitable means, as by a plug 24, pressed into position.

What we claim is—

1. An electro-magnetic valve comprising a casing provided with intake and exhaust ports; a valve seat extending across said casing between said ports; a tubular spool; a reciprocable valve plunger adapted to extend at one end into said spool and adapted at its opposite end to close the port in said valve seat; a magnetizable collar encircling said plunger; a resilient means interposed between said collar and the adjacent end of said spool to force said plunger into closing position; spacing pins positioned between said valve seat and said spool and extending loosely through said collar; an electric circuit including an insulated electric coil wound on said spool, a switch and a source of electricity; a magnetizable electric conductor coil sheath positioned between said coil and said casing and extending across one end of said spool; said sheath being provided with a magnetizable core extending into the bore of said spool and adapted to limit the descent of the valve plunger therein; a binding post extending into said casing and insulated therefrom; a spring contactor electrically connected to one terminal of said coil and adapted to bear against said post, said contactor being insulated from said sheath and casing; means extending across said casing above said valve seat and spaced from said seat for forming and closing a chamber above said valve seat, said exhaust port extending through the wall of said casing from the space between said valve seat and said chamber closing means.

2. An electro-magnetic valve comprising a casing provided with intake and discharge ports; a valve seat extending across said casing between said ports; a tubular spool; an electric circuit wire wound on said spool; a magnetizable valve plunger adapted at one end to close the valve port in said seat and extending at the opposite end into the bore of said spool and adapted to reciprocate therein; a magnetizable sheath spaced from the wall of said casing and adapted to closely surround said coil and provided with a magnetizable core adapted to extend into the opposite end of said spool and to limit the movement of said plunger in one direction therein, means for spacing said spool from said seat, and a cover extending across said casing above said seat and discharge port to form a conduit chamber communicating with said valve and discharge port.

3. An electro-magnetic valve, comprising a casing provided with intake and discharge

ports; a valve seat extending across said casing between said ports; a tubular spool; an electric circuit wire wound on said spool; a magnetizable valve plunger adapted at one end to close the valve port in said seat and extending at the opposite end into the bore of said spool and adapted to reciprocate therein; a magnetizable sheath spaced from the wall of said casing and adapted to closely surround said coil and provided with a magnetizable core adapted to extend into the opposite end of said spool; said core extending below said sheath and being provided with a terminal foot; a circuit wire binder post extending through said casing and insulated therefrom, a spring contactor mounted upon said core and insulated from said sheath and core and adapted to contact with said post, said contactor being adapted to form one terminal for said coil.

4. An electromagnetic valve comprising a casing provided with intake and exhaust ports, a valve seat extending across said casing between said ports, a tubular spool, an electric circuit wire wound on said spool, a magnetizable valve plunger adapted at one end to close the valve port in said seat and extending at the opposite end into the bore of said spool and adapted to reciprocate therein, a magnetizable sheath spaced from the wall of said casing and adapted to closely surround said coil and provided with a magnetizable core adapted to extend into the opposite end of said spool, means for spacing said spool from said seat, and a cover extending across said casing above said seat and discharge port to form a conduit chamber communicating with said valve and discharge port.

In testimony whereof, we hereunto affix our signatures.

IRVING E. ASKE.
LEONARD E. ASKE.
WILLIAM F. ASKE.