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INJECTION DEVICE

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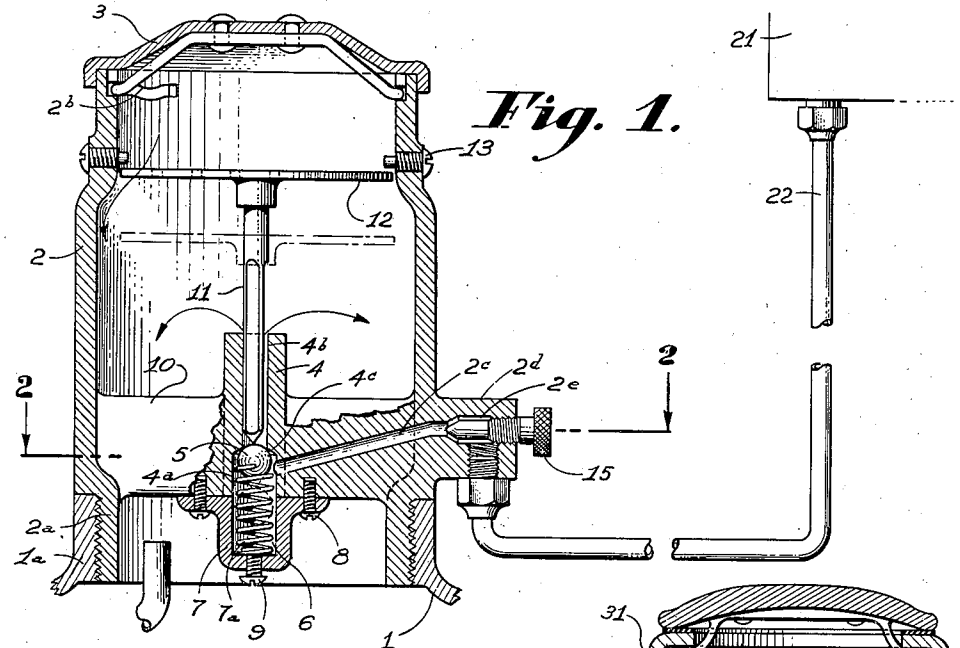


Fig. 1.

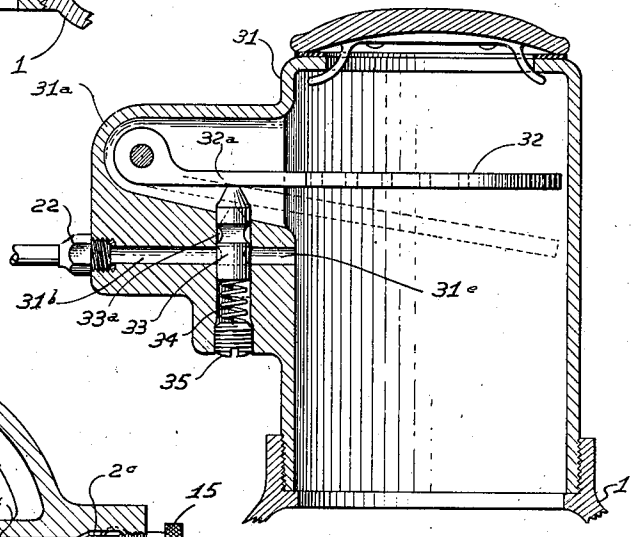


Fig. 3.

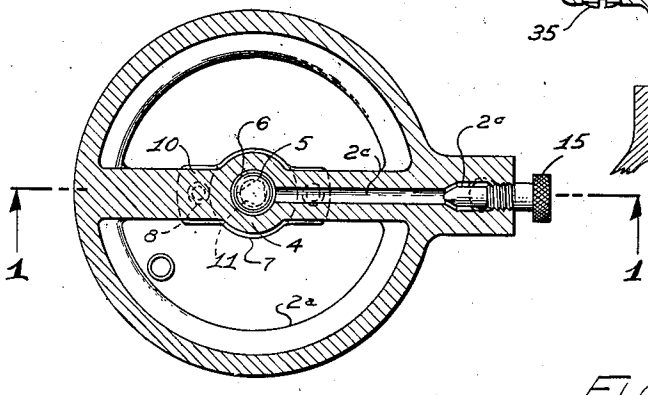


Fig. 2.

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INJECTION DEVICE

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10 Claims. (Cl. 210—30)

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My present invention relates to an injection device for adding a reacting agent to a liquid, and particularly to an apparatus for adding a water-softener to a water receiver, and more particularly to cooling radiators of internal combustion engines.

One of the principal objects of this invention is to provide means for supplying a reacting agent, such as a water-softener, to a liquid receiver, such as a cooling radiator, as the receiver or radiator is replenished with liquid or water contained therein.

Another important object of this invention is to provide a head, for the upper end of a cooling radiator for internal combustion engines, to which is adapted to be connected a supply of water softening liquid under pressure, and in which the connection of the latter to the head is made when the radiator is replenished with cooling water through the head, either by physical contact of the nozzle of the water supply means with a controlling valve, or by reason of the weight or force of the water from said water supply means.

An important object also of this invention is to provide means of this class whereby the proportional amount of the water softening liquid to the replenishing water for the radiator, may be readily varied, and also in which the force required for opening the valve connecting the water softening liquid to the radiator may be also readily varied, to compensate for varying engagement by the nozzle of the water supply means, or the force of water issuing from said nozzle.

A further important object of this invention is to provide means of this class which may be readily connected to various styles and types of water receivers or radiators, and which may be readily installed on various types of vehicles.

A still further important object of this invention is to provide a means of this class which is relatively simple and economical of construction proportionate to its functions, and which will not readily get out of order.

With these and other objects in view, as will appear hereinafter, I have devised an injection device having certain novel features of construction, combination, and arrangement of parts and portions, as will be hereinafter described in detail and particularly set forth in the appended claims, reference being had to the accompanying drawings and to the characters of reference thereon, which form a part of this application, in which:

Fig. 1 is a fragmentary side elevation of an injection device, incorporating my invention, for

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adding a water softening agent to the radiator of an internal combustion engine, the principal part of the injection device being shown in section and taken substantially on the line 1—1 of Fig. 2.

Fig. 2 is a transverse sectional view thereof taken through 2—2 of Fig. 1; and

Fig. 3 is a sectional view through the median portion of the principal part of the injection device in a slightly modified form.

In the drawings, 1 designates the upper portion of a cooling radiator of an internal combustion engine, such as used on automobile trucks. On the neck 1^a at the top of the radiator, over which is usually secured the radiator cap, is secured the principal portion of my injection device. The injection device may be directly secured thereto by screwing the lower portion 2^a of the receptacle or head 2 thereof into the neck. If necessary, a suitable adapter (not shown) may be used for connecting the head to the top of the radiator.

The head or receptacle 2 is cylindrical and is here shown as contracted at its lower and upper ends. The upper end is open, as indicated by 2^b, the latter providing a filling opening for the radiator. The usual radiator cap, designated 3, is removably secured over the filling opening 2^b.

Conveniently arranged on the vehicle is a water softener supply means, which in this instance consists of a tank 21, and this tank is connected by a tube 22 to the side of the receptacle 2. The discharge end of the tube 22 is connected through a passage 2^c to a chamber 4^a at the lower end of a valve cage 4. This valve cage is located at the axial portion of the cylindrical receptacle 2. The chamber 4^a communicates with the upper end of the valve cage through a coaxial bore 4^b. Between the chamber 4^a and the bore 4^b is a valve seat 4^c against which is seated a ball valve 5, the ball valve being forced against the seat by a compression spring 6 contained in a well 7^a of a spring retainer 7. The spring retainer is held against the lower end of the valve cage by screws 8. The tension of the spring 6 may be adjusted by a screw 9 from the lower end of the spring retainer.

The valve cage 4 is supported centrally within the receptacle by a spider 10, the passage 2^c extending from the wall of the receptacle 2 through one of the arms of the spider.

Into the upper end of the bore 4^b extends the lower end of the valve stem 11, the cross-section of the lower end being fluted or of polygonal

cross-section to allow passage of the water softening fluid from the passage 2^c into the bore 4^b.

To the upper end of the valve stem is secured a baffle 12 which is preferably of a diameter slightly less than the opening 2^b. Through the wall of the opening 2^b extend retaining screws 13 which hold the baffle and the valve stem in position. This baffle is preferably perforated as shown.

As water is added to the radiator 1 through the inlet opening 2^b, by means of a nozzle (not shown) of the water supply means, the nozzle may engage the baffle 12 and depress the same to facilitate the discharge of water through the head or receptacle 2 into the radiator. At the same time the stem 11 unseats the valve 5 and allows the water softening liquid to be forced upwardly to the top of the bore 2^b to allow the water softening liquid to be directed into the stream of water flowing into the radiator.

If the stream of water from the above mentioned discharge nozzle is of sufficient force, this force will cause depression of the baffle 12 in the manner above stated.

The baffle 12 may also be located a sufficient distance below the neck end of the top of the receptacle 2 so that the weight of the water on the baffle unseats the valve 5.

At the side of the receptacle or head 2 is a boss 2^d to which the discharge end of the tube 22 may be connected. This boss has preferably an enlarged recess 2^e which connects the tube 22 to the passage 2^c. In the end of the boss I have shown a needle valve 15 for adjusting the opening from the recess 2^e to the passage 2^c, thereby controlling the flow of water softening liquid into the passage 2^c.

In the modified structure, shown in Fig. 3, the head or receptacle, designated 31, has a baffle 32 which is pivoted at one end 32^a within a recess in a laterally offset portion 31^a at one side of the receptacle or head. In the offset portion, providing the pivotal support for the baffle, is reciprocally mounted a cylindrical valve 33, the upper end of which engages the lower side of the pivoted baffle 32 near its pivoted end. A spring 34 is provided at the lower end of the valve and retained by a screw 35. Intermediate the ends of the valve 33 is a reduced portion 33^a which, when the valve is forced downwardly by the baffle 32, connects the passages 31^b and 31^c and allows water softening liquid to flow from the supply tube 22 into the interior of the head or receptacle 31.

I claim:

1. In a means of the class described, a water receiver, a water inlet receptacle, open at its upper end, positioned at the upper portion of the receiver, a reacting agent supply means connected to the receptacle, a valve within said receptacle for controlling the flow of reacting agent from said supply means to said inlet receptacle, and means for normally and yieldably holding the valve in a closed position and the stem in a raised position said valve having a stem extending toward the open end of the receptacle and so constructed and located so as to be capable of being engaged by a water supply means capable of discharging water into the receptacle for unseating the valve.

2. In a means of the class described, a water receiver, a water inlet receptacle, open at its upper end, positioned at the upper portion of the receiver, a reacting agent supply means connected to the receptacle, a valve within said receptacle for controlling the flow of reacting agent from said supply means to said inlet receptacle, and means for normally and yieldably holding the valve in a closed position and the stem in a raised position said valve having a stem extending toward the open end of the receptacle and so constructed and located so as to be capable of being engaged by a water supply means capable of discharging water into the receptacle for unseating the valve, the discharge of the reacting agent supply means being directed into the path of water through the receptacle.

3. In a means of the class described, a water receiver, a water inlet receptacle, open at its upper end, positioned at the upper portion of the receiver, a reacting agent supply means connected to the receptacle, a valve within said receptacle for controlling the flow of reacting agent from said supply means to said inlet receptacle, and means for normally and yieldably holding the valve in a closed position and the stem in a raised position said valve having a stem provided at its upper end with a baffle positioned near but below the open end of the receptacle and so constructed and located as to be capable of being depressed by the water issuing from a water supply means capable of discharging water into the receptacle for unseating the valve.

4. In a means of the class described, a water receiver, a water inlet receptacle, open at its upper end, positioned at the upper portion of the receiver, a reacting agent supply means connected to the receptacle, a valve within said receptacle for controlling the flow of reacting agent from said supply means to said inlet receptacle, and means for normally and yieldably holding the valve in a closed position and the stem in a raised position said valve having a stem provided at its upper end with a baffle positioned near but below the open end of the receptacle and so constructed and located as to be capable of being depressed by the water issuing from a water supply means capable of discharging water into the receptacle for unseating the valve, the discharge of the reacting agent supply means being directed into the path of water through the receptacle.

5. In a means of the class described, a radiator having an open hollow head at its upper end, a water-softener supply means connected to the head, a valve within the head for controlling the flow of water-softener from said supply means to said head, and means for normally and yieldably holding the valve in a closed position and the stem in a raised position said valve having a stem extending toward the opening of the head and so constructed and located so as to be capable of being engaged by a water supply means capable of discharging water into the head through the opening thereof for unseating the valve.

6. In a means of the class described, a radiator having an open hollow head at its upper end, a water-softener supply means connected to the head, a valve within the head for controlling the flow of water-softener from said supply means to said head, and means for normally and yieldably holding the valve in a closed position and the stem in a raised position said valve having a stem extending toward the opening of the head and so constructed and located so as to be capable of being engaged by a water supply means capable of discharging water into the head through the opening thereof, the discharge of the supply means being directed upwardly around the stem into the stream of water flowing through the head from the opening thereof for unseating the valve.

7. In a means of the class described, a radiator having an open hollow head at its upper end, a water-softener supply means connected to the

head, a valve within the head for controlling the flow of water-softener from said supply means to said head, and means for normally and yieldably holding the valve in a closed position and the stem in a raised position said valve having a stem provided at its upper end with a baffle positioned near the opening of the head and so constructed and located as to be capable of being depressed by the water issuing from a water supply means capable of discharging water into the head through the opening thereof for unseating the valve.

8. In a means of the class described, a radiator having an open hollow head at its upper end, a water-softener supply means connected to the head, a valve within the head for controlling the flow of water-softener from said supply means to said head, and means for normally and yieldably holding the valve in a closed position and the stem in a raised position said valve having a stem provided at its upper end with a baffle positioned near the opening of the head and so constructed and located as to be capable of being depressed by the water issuing from a water supply means capable of discharging water into the head through the opening thereof, the discharge of the supply means being directed upwardly around the stem into the stream of water flowing through the head from the opening thereof for unseating the valve.

9. In an attachment for automobile radiators having a filling opening, an inlet receptacle attachable over the opening of the radiator and open at its upper end, a reacting agent supply means connected to the receptacle, a valve within said receptacle for controlling the flow of reacting agent from said supply means to said inlet receptacle, and means for normally and yieldably holding the valve in a closed position and the stem in a raised position said valve having a stem extending toward the open end of the receptacle and so constructed and located so as to be capable of being engaged by a water supply means capable of discharging water into the receptacle for unseating the valve.

10. In an attachment for automobile radiators having a filling opening, an inlet receptacle attachable over the opening of the radiator and open at its upper end, a reacting agent supply means connected to the receptacle, a valve within said receptacle for controlling the flow of reacting agent from said supply means to said inlet receptacle, and means for normally and yieldably holding the valve in a closed position and the stem in a raised position said valve having a stem provided at its upper end with a baffle positioned near but below the open end of the receptacle and so constructed and located as to be capable of being depressed by the water issuing from a water supply means capable of discharging water into the receptacle for unseating the valve.

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