Oct. 18, 1949. W. A. WEAVER 2,485,423

PRIMING DEVICE FOR STARTING ENGINES

Filed July 10, 1947

Fig. 1.

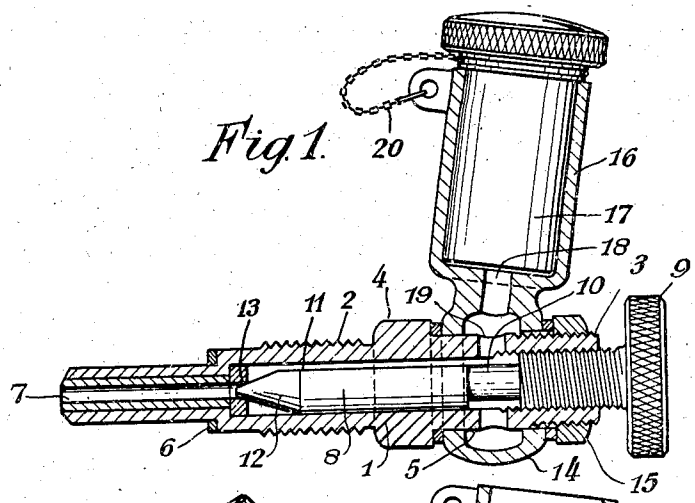


Fig. 2.

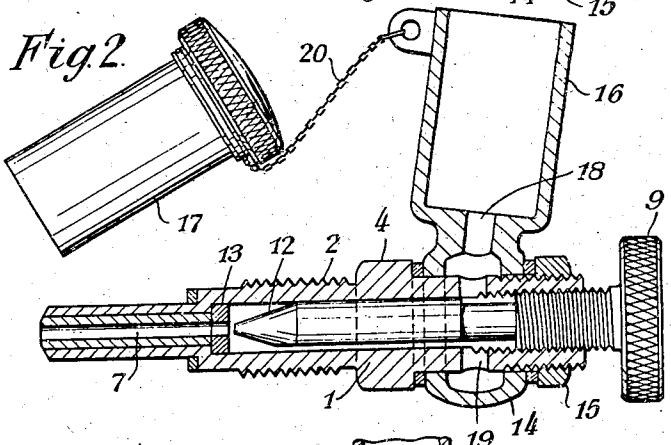


Fig. 3.

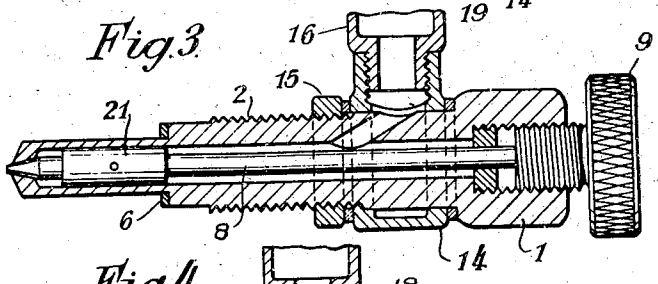
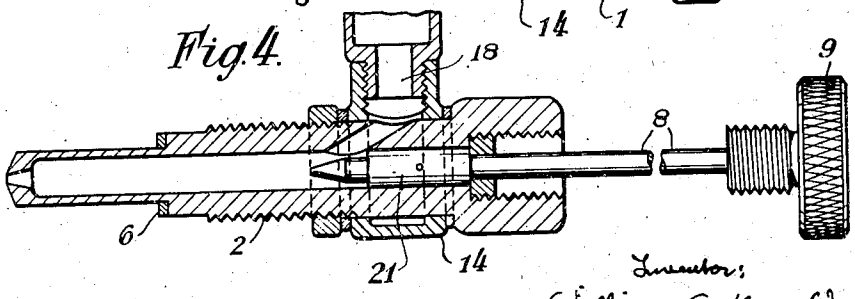


Fig. 4.



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PRIMING DEVICE FOR STARTING ENGINES

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7 Claims. (Cl. 123—187.5)

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This invention relates to a means for facilitating the starting of internal combustion engines, by injecting a primary charge and/or a viscose sealing fluid into the cylinder. The invention may operate merely to inject a quantity of a volatile combustible fluid into a cylinder of an engine from the exterior, to provide an initial explosive charge; or may operate to inject a quantity of a viscous sealing fluid into the cylinder to seal the piston and cylinder and thereby increase the initial compression, or may operate to inject a mixture which will serve both these purposes. In the case of compression-ignition engines, the invention may operate further to coat the interior walls of the combustion space and/or the air cell and Venturi passage with an oily heat-insulating liquid, to minimise the dissipation of heat through those walls during the initial compression strokes.

According to this invention, a starting device for an internal combustion engine comprises an open-topped holder for a measured quantity of the liquid to be injected, an outlet from such holder terminating in a jet or nozzle which projects forwardly from the holder, a manually-operable piston fitting the holder to squirt the liquid through the jet or nozzle, screw means for closing the holder at the said jet or nozzle, and means to mount the device exteriorly on an engine or other support so that the projecting jet or nozzle is directed as required within the interior of the engine combustion space. In use, the engine will be provided with an aperture to receive the improved starting device, and the device will screw into that aperture for its position on the engine.

The invention is capable of modification within the limits of the above definition. For instance, where the amount of liquid to be squirted on is not large, the piston and the means for closing the jet may be combined in a single member, whereas in other cases a separate piston may be employed.

Instead of the body of the device being mounted directly on the engine, the device may be mounted elsewhere in the immediate locality and be connected with the jet or nozzle by suitable tubing. In such case, a non-return valve or other closure device will be provided at the nozzle end of the tubing to avoid loss of pressure and reduce the risk of leakage.

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For multi-cylinder engines, a group of the devices may be mounted together for co-ordinate operation, each being in communication with the jet or nozzle in its respective cylinder.

In convenient practical forms of the invention the device consists of a body part formed for screwing into a threaded aperture, a nozzle formed in the forwardly-projecting engine-ward end of the body part, a screwed plunger in the body part for opening and closing the nozzle, an open-ended receiver for the liquid to be injected, rotatable around the body part, means for locking the receiver in set angular positions on the body part, the body part having passages formed in it to establish communication between the receiver and the nozzle, and a piston for applying pressure to the liquid to force it through the nozzle (when open). The piston may in some forms, be adapted to co-operate with the receiver, or may in some other forms co-operate with one of the passages in the body-part, in which last connection it may be carried by the said screwed plug, the plug having initial sliding movement for the injection of the liquid by the piston, and a final screwing movement to close the nozzle. The positive closing of the nozzle prevents leakage backwards through the device from the combustion spaces.

In the accompanying drawing two embodiments of the invention are illustrated:

Fig. 1 is a longitudinal sectional elevation of one embodiment of the invention, with the parts in the normal position such as they would occupy during running of the engine;

Fig. 2 is a like view to Fig. 1 but showing the parts in a position such as they would occupy immediately prior to the injection operation;

Figs. 3 and 4 are views corresponding to Figs. 1 and 2 but showing another embodiment of the invention, and having some parts broken owing to limitations of space on the sheet.

Referring to Figs. 1 and 2 the improved device comprises a body part 1, screwed exteriorly at 2 and 3, having an enlargement 4 shaped to receive a spanner for screwing purposes, and having a machined outer surface 5. The body part is adapted to be screwed into an internally-threaded housing in the engine body (not shown) by means of the screwed portion 2, and is provided with a packing washer 6 to bed against the bot-

tom of that housing. The smaller end of the body part 1 is fitted with a lining 7 and constitutes a nozzle, being directed against the inner walls of the combustion space or air cell, as desired, when the body part 1 is screwed into position on the engine.

The main length of the body part 1 is formed with an internal recess or housing, internally screwed at the outer end, into which recess screws a plug 8 having an enlarged head 9 to form a finger grip, having an annular recessed part 10, having a flat side at 11 forming a longitudinal passage between the plug and the wall of the recess, and having a coned end 12 adapted to close the nozzle as a screw-down valve by entrance into and engagement with the seating member 13 at the bottom of the housing.

Encircling the body part 1, around the machined portion 5, is a "banjo" fitting 14 adapted to be locked in set angular positions with respect to the body part 1 by means of the lock nut 15 which screws onto the part 3 of the body part, suitable packing washers being provided as shown. The "banjo" fitting 14 is shaped at its outer end to form a receiver or chamber 16 for the liquid, and such chamber receives a piston 17 slidably therein. At the bottom of the receiver is a through hole 18 leading to a cavity around the body part, and further openings 19 in the body part give access from the receiver 16 to the said longitudinal passage between the plug 8 and the inner wall of the housing. The piston 17 is connected to the receiver 16 by a short length of chain 20 to prevent its loss.

In use, the liquid to be injected is first poured into the receiver, the piston having been removed, as shown in Fig. 2, the piston is replaced, and the screwed plug 8 is then screwed back to open the nozzle. The recessed portion 10 of the plug 8 ensures communication between the ports 19 and the longitudinal passage in all rotary positions of the plug. The piston 17 is now pressed down to force the liquid through the openings 18 and 19 along the longitudinal passage, through the orifice in the seating 13, and out through the nozzle. After the injection, the screwed plug 8 is screwed home to close the nozzle by re-entering the seating 13.

Referring now to Figs. 3 and 4, there is a substantially similar arrangement, except that instead of there being a free piston, the plug 8 is made to serve as a piston also. In this case the screwed plunger 8 is of smaller diameter, and is formed at the nozzle end with an enlargement 21 to serve as a piston in the inner bore of the body part 1. The body part 1 in this case has only one exteriorly-screwed part, which serves both to receive the locking nut 15, and to mount the device on the engine. In this embodiment after the unscrewing of the plunger 8, it is necessary to draw the plunger back as shown in Fig. 4 to allow the liquid from the receiver 16 to enter the body part 1, after which the piston is returned and after having passed the opening 19 exerts a pressure on the liquid to force it through the nozzle. The plunger 8 is then screwed home to re-close the nozzle.

In either of the arrangements shown, any suitable means may be provided for locking the screwed plunger 8 in the closed position to prevent tampering by unauthorised persons.

It will be seen that, in either case, if and when the body part 1 is screwed home in the engine, the receiver 16 is not in a vertical position, it may be brought to the vertical position by slackening

the nut 15 and rotating it bodily about the body part 1, after which the nut 15 is re-tightened.

In a modified form, the body of the fitting may have an external thread and the gland nut may be provided with an internal thread, thus enabling the valve spindle to remain parallel and so tending to cheapen manufacture.

The screwed plunger 8 may be graduated so as to indicate the degree of opening of the nozzle, and the receiver 16 may be calibrated to indicate the volume of liquid in it. The container will be of a size to suit the particular engine to which it is attached.

One or more charges may be injected, as required by local conditions, and the engine then started in the usual way.

What I claim is:

1. A priming device for starting an engine comprising in combination a body part for screwing into a threaded aperture, a projecting nozzle formed on the engine-ward end of the body part, a screwed plunger in the body part for opening and closing the nozzle, an open-ended receiver for a liquid to be injected into the combustion space or air cell of an internal combustion engine, the receiver being rotatable around the body part, means for locking the receiver in set angular positions on the body part, passages formed in said body part to establish communication between the receiver and the nozzle, and a piston for applying pressure to the liquid to force it through the nozzle when open.

2. A priming device according to claim 1, wherein the piston and the plunger for closing the jet or nozzle are combined in a single member.

3. A priming device according to claim 1 wherein the piston co-operates with the receiver as a cylinder.

4. A priming device according to claim 1 wherein the piston co-operates with a housing within the body part as a cylinder.

5. A priming device for starting an engine, comprising in combination a tubular body part, inlet and outlet ports therein, the outlet port being in a projecting end of the body part so as to communicate with the combustion space or air cell in an internal combustion engine, a fluid receiver mounted around the body part and communicating with the inlet port, and a combined piston and needle valve slidable in the body part, closing the inlet part by its initial inward sliding movement, forcing a liquid through the outlet port by its further sliding movement, and closing the outlet port by a final screwing movement to bind the needle valve on the outlet port.

6. A priming device according to claim 1, wherein the screwed plunger is formed with a flat side and with an annular recess, to establish communication between the said passages in the body part and the nozzle, the piston co-operating with the open-ended receiver as a cylinder.

7. A priming device for starting an engine comprising in combination a tubular body part, a valve seating formed around the outlet port, a fluid receiver mounted around the body part, an elongated member slidable in the body part, the said elongated member being formed as a needle valve in its front portion, and as a piston in its intermediate portion and having a screw thread at its rear portion, an inlet from said fluid receiver to the body part provided in an intermediate portion of the body part, an outlet provided in a forward portion of the body part, a screw thread provided at a rear portion of the body part, the said screw thread cooperating with said

screw thread of said elongated member whereby the inlet port may be closed by initial inward sliding movement of the elongated member and whereby a liquid may be forced through the outlet port and into the combustion chamber or air cell of an internal combustion engine by further sliding movement of the elongated member and whereby the outlet port may be closed and the needle valve may be locked on the valve seating by final screwing movement of the elongated member.

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