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PRESSURE SPRAY OIL BURNER

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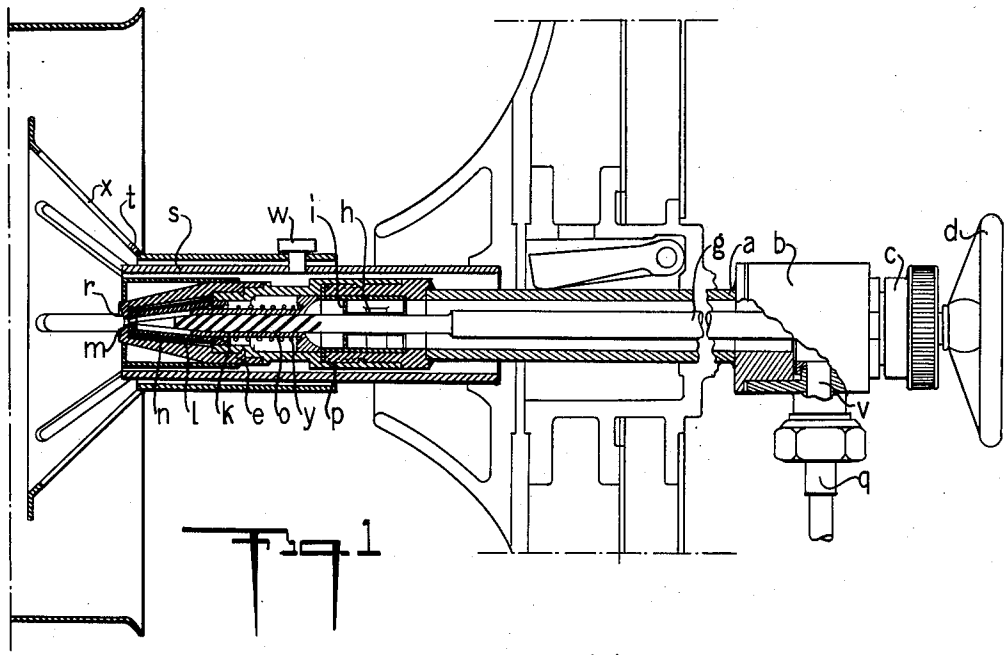


Fig. 1

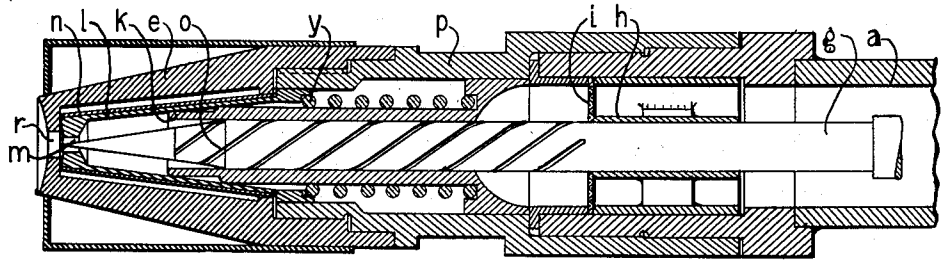


Fig. 2

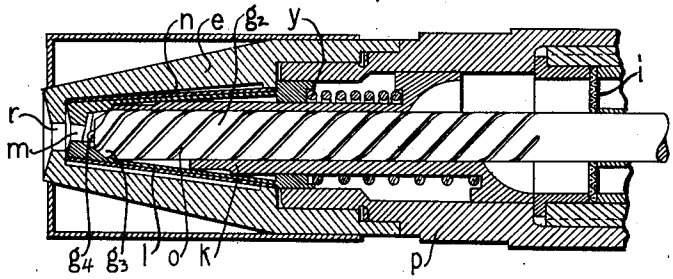


Fig. 3

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PRESSURE SPRAY OIL BURNER

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4 Claims. (Cl. 299—118)

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This invention relates to a pressure spray oil burner for boilers, glow furnaces, large cooking stoves, and the like. To burn fuel oil it is necessary to spray the oil into a mist and to supply the combustion air in such a manner as to achieve the most complete combustion possible. In the burner according to the present invention a nozzle takes over, in manner known per se, the operation of mechanically finely spraying the oil supplied under high pressure while the air is supplied from outside to the oil mist and surrounds the fine oil particles so that a complete combustion is obtained.

The finer the spraying the more perfect the combustion and the greater the energy output. Since for each size of nozzle orifice and for a determined oil pressure there is an optimum spraying, with variable oil pressure, that is with varying oil consumption, but constant nozzle orifice size, satisfactory burner efficiency cannot be obtained, apart from other operating disadvantages.

The present invention therefore is based on the principle that with varying oil pressure there must be varying nozzle aperture size. According to the invention a pressure spray oil burner is so constructed that a needle valve is arranged in front of the burner nozzle aperture consisting of a needle and an expansible sleeve member built into the nozzle head of the burner and providing the valve opening into which member extends a coaxial elastic expander member slidable responsively to the oil pressure and provided with a restoring spring, the movement of which expander member varies the size of the valve opening in such a manner that with increasing oil pressure the expander further expands the expansible sleeve and enlarges the oil outlet opening, and vice versa.

Thereby the amount of oil issuing from the spray burner is automatically regulated in non-stepwise manner.

Referring to the drawing,

Fig. 1 is a longitudinal cross-section of a pressure spray oil burner;

Fig. 2 is a longitudinal cross-section showing the end portion of the burner on an enlarged scale, and

Fig. 3 is a longitudinal cross-section showing a modified form of the nozzle needle.

The burner comprises essentially an oil supply pipe *a*, on the boiler space end of which are mounted the oil supply head *b* with manually operable oil admission and cut-off means *c*, such as a ring valve, and a hand wheel *d* for closing

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the nozzle. On the furnace space end of pipe *a* is the nozzle head *e* provided with a heat shield cap. Within the pipe is guided a nozzle needle g^1 adjustable by means of the hand wheel *d* and supported in a guide member *h* which has an oil screen *i*. An axially slidable expander member *k*, loaded by a spring *y*, bears against the guide member *h*, which is conical or stepped, and expands an expansible sleeve *l* consisting of a split metal member and having an end converging to a nozzle aperture *m*. An elastic sheath *n* of resilient material, e. g. Buna rubber, surrounds the sleeve *l*. The nozzle needle g^1 extends to the orifice *m* and its rear end preferably lying inside the expander member *k* is provided with rifling or spiral grooves *o*. A nozzle head nut *e* and *p*, is mounted on the expansible sleeve *l* and screwed onto the rear end of the pipe or an extension thereof. The rear conical end of the nozzle head *e* is provided with a sharp edged oil issue opening *r* close to and aligned with the nozzle aperture *m*. The spray nozzle is housed in a tubular mantle *s* on which is slidably mounted an air funnel *t* provided with slots *x*, and which can be fixed in adjusted position by a clamp screw *w* engaging a slot in the neck of the funnel.

The fuel oil is supplied through a fixed or flexible pipe *q* into the burner and flows through the inlet aperture *v* of the ring valve *c* into the interior of the burner and around the nozzle needle to the end of the burner. After passing through the screen *i* the oil presses against the expander member *k* and pushes it into the expansible sleeve *l* by an amount corresponding to the oil pressure, the front end of which sleeve is then correspondingly expanded whereby the nozzle orifice *m* is enlarged. The oil arrives at the same instant under pressure through the rifling grooves *o* of the nozzle needle, to the aperture where it encounters the sharp edges of the discharge opening *r* of the nozzle head *e*, and is sprayed into a mist, whirled and blown into the combustion space. The parts *g*, *l*, *m* thus form a needle valve regulating the oil issuing from the nozzle, the nozzle needle serving for coarse adjustment of the amount of oil and the expansible sleeve *l* with variable outlet orifice *m* and expander member *k* forming means for fine adjustment of the amount of oil.

When the oil pressure diminishes, as by the action of an automatic regulator, the expander member *k* is correspondingly relieved, the restoring spring retracts it from the sleeve *l*, and the latter contracts owing to the action of the spring sleeve *n* and the orifice *m* becomes smaller.

To shut down the burner, the cut-off valve c is turned to close the oil supply opening o. The nozzle needle is then screwed backwards by means of the handwheel d to prevent dripping of oil into the fire space.

In the construction shown in Fig. 3 the nozzle needle g^2 is of cylindrical cross-section up to its rear end, where it has a blunt conical or paraboloid formed head g^3 with a small central nipple g^4. The rifling grooves o are continued up to the paraboloid g^3.

This shape has the advantage that the oil receiving space in front of the nozzle orifice m becomes vanishingly small compared with the structure of Figs. 1 and 2 having a conical nozzle needle point. Consequently the oil, at each adjustment of the needle, is pressed through the orifice m without loss of pressure. This is clearly seen from Fig. 3 which in the upper section half shows the nozzle fully open, and in the lower section half fully closed.

I claim:

1. A spray oil burner comprising a burner nozzle having an oil outlet orifice, a needle valve arranged in front of the orifice, said valve including an adjustable needle and an expansible sleeve provided in the nozzle and forming the nozzle oil outlet orifice, a coaxial expander member extending into the expansible sleeve and provided with a restoring spring, and means for adjusting the expander member to automatically vary the expansible valve opening so that with increasing oil pressure the expander member further expands the expansible sleeve and thus the oil outlet opening between the sleeve and the needle will be adjusted.

2. A spray oil burner comprising a burner nozzle having an oil outlet orifice, a needle valve arranged in front of the orifice, said valve including an adjustable needle and an expansible sleeve provided in the nozzle and forming the nozzle oil outlet orifice, a coaxial expander member extending into the expansible sleeve and

provided with a restoring spring, the means for adjusting the expander member to automatically vary the expansible valve opening, and a casing of elastic material provided around the expansible sleeve.

3. A spray oil burner comprising a burner nozzle having an oil outlet orifice, a needle valve arranged in front of the orifice, said valve including an adjustable needle and an expansible sleeve provided in the nozzle and forming the nozzle oil outlet orifice, a coaxial expander member extending into the expansible sleeve and provided with a restoring spring, means for adjusting the expander member to automatically vary the expansible valve opening, and a casing of elastic material provided around the expansible sleeve, the nozzle needle being of cylindrical form up to the combustion end and being provided with spiral grooves and ending in a blunt-shaped head provided with a central nipple.

4. A spray oil burner according to claim 3, in which the blunt-shaped head of the nozzle needle is in the shape of a parabola.

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