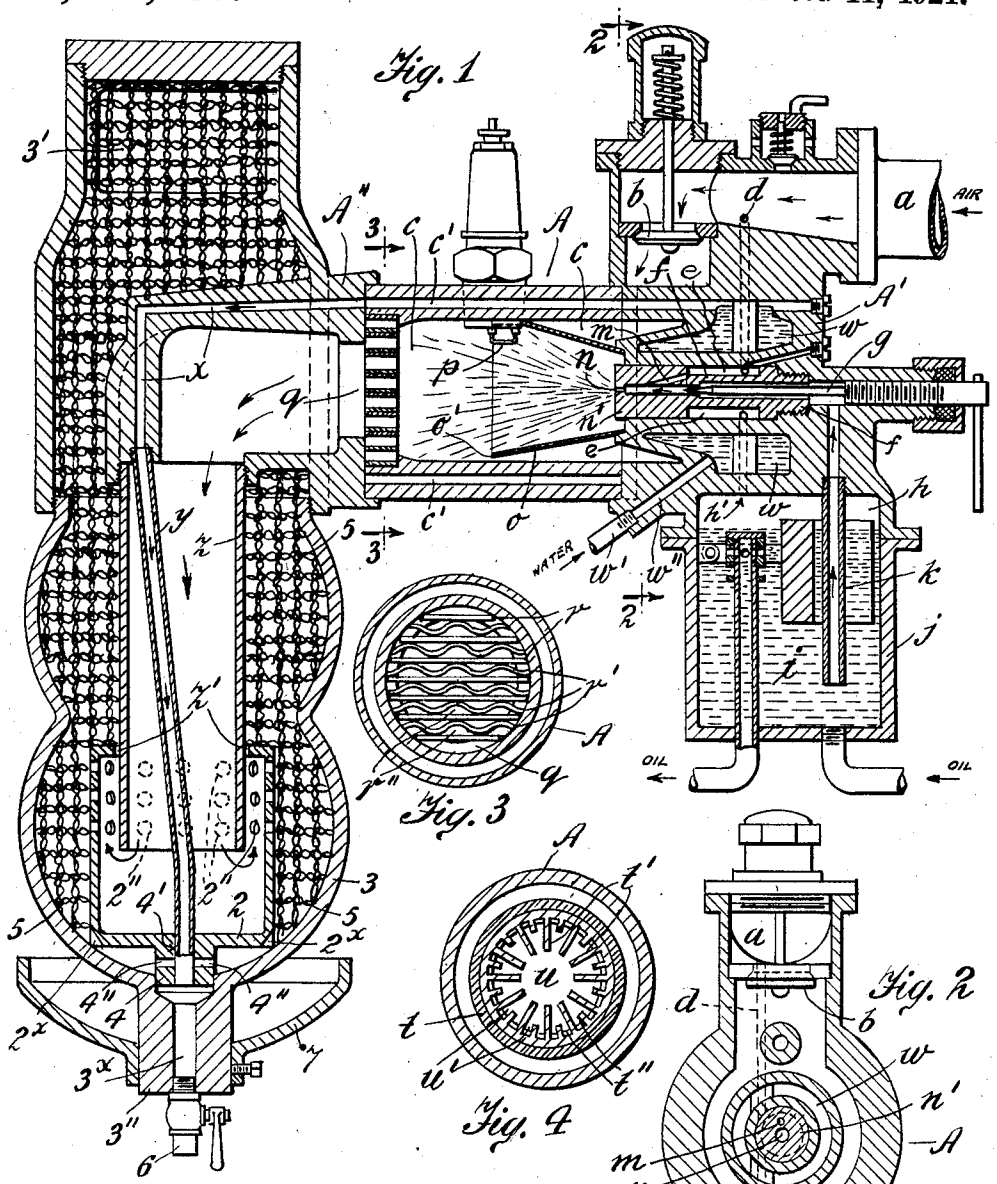
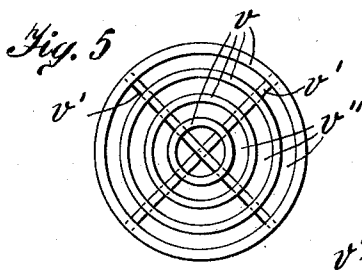
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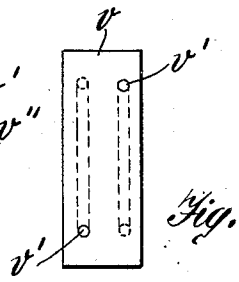
FLAME MAINTAINING DEVICE.

APPLICATION FILED MAR. 31, 1919.

1,392,948. Patented Oct. 11, 1921.







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FLAME-MAINTAINING DEVICE.

1,392,948. Specification of Letters Patent. Patented Oct. 11, 1921.

Original application filed March 19, 1918, Serial No. 223,264. Divided and this application filed March 31, 1919. Serial No. 286,372.

To all whom it may concern:

Be it known that I, OTTO KRAUS, a citizen of the United States of America, residing at the borough of Manhattan, in the city, county, and State of New York, have invented certian new and useful Improvements in Flame-Maintaining Devices, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to improvements in flame-maintaining contrivances for use in combustion-chambers of furnaces wherein hydrocarbon oil is burned and the products of combustion are mingled with water vapor or steam to form a working fluid for motors. Such contrivances have also been called reignition devices. An object of this invention is to provide a contrivance of the kind just mentioned which will be simple in construction, and comparatively cheap in manufacture, and which will prove efficient and durable in operation and use, and low in cost of first installation and of repairs.

In the drawings illustrating the principle of this invention and the best mode now known to me of applying that principle, Figure 1 is a central, longitudinal section of a furnace equipped with the flame-maintaining apparatus; Fig. 2 is a section on the line 2—2 of Fig. 1; Fig. 3 is a section on the line 3—3 of Fig. 1; Fig. 4 is a view similar to Fig. 3 and shows a modified form of the reignition device; and Figs. 5 and 6 are front and side elevations, respectively, of a second modified form.

Compressed air flows through the conduit *a*, past the valve *b*, and into the combustion-chamber *c* of the furnace A (Figs. 1 and 2). Some of the compressed air flows from the conduit *a* through the air-passage *d* into the annular chamber *e* that surrounds the casing *f* of the needle-valve *g*. Through the air-passage *h'*, the annular chamber *e* communicates with the air-space *h* above the level of the liquid hydrocarbon *i* in the oil-tank *j*, whereby the oil *i* is subjected to the pressure of the compressed air and is thereby forced upwardly through the pipe *k* and past the needle-valve *g*. The oil meets a stream of compressed air flowing through the inclined air-passage *m* from the annular chamber *e* and issues from the orifice *n* in the form of a spray, as is indicated in Fig. 1. Surrounding the orifice *n* is a mouthpiece *o*, in the discharge end of which, near its top, there is mounted an electric igniter *p*. Air flowing past the valve *b* escapes through the narrow interval *o'* that separates the edge of the discharge end of the mouthpiece *o* from the inner wall of the combustion-chamber *c*, and there results a mingling of the air with the stream of atomized hydrocarbon to form a combustible mixture, which is ignited by the hot filament of the electric igniter *p*.

Beyond the mouthpiece *o*, there is mounted, in the combustion-chamber *c*, the flame-maintaining contrivance *q* in the form of a grating consisting of a series of straight bars *r* that are held spaced apart by means of bars *r'* of wavy or serpentine form (Fig. 3 and Fig. 1). The burning oil flows through the openings *r''* in the grating *q*, which thus becomes heated to a high temperature. Should the flame from the oil die down or become extinguished, the great heat from the grating *q* would serve to reignite the oil, so that the flame is maintained at all times. In the modified form shown in Fig. 4, the reignition device *t* consists of a circularly-arranged series of bars *t'* that project radially inwardly and are seperated by a similar series of shorter, radially-extending bars *t''*. The stream of hot gases flows through the central opening *u* in the grating *t* and through the openings or spaces *u'* between the radial inwardly-extending bars *t'*, *t''*, whereby these bars are raised to and maintained at a high temperature, and impart some of their heat to the gases, should the temperature of the latter fall, at any instant, below that of the bars themselves.

Fig. 5 illustrates in front elevation and Fig. 6 in side elevation a second modified form of flame-maintaining contrivance, which consists of a series of concentric short cylinders *v* which are held in spaced relation to one another by means of diametrically-extending bars *v'*, which run at right angles to each other and one of which is disposed in front of the other. The burning gases traverse the spaces *v''* by which the rings *v* are separated and the same store up heat, which is later given off again, whenever the temperature of the gases tends to fall substantially below that of the concentric cylinders *v*, so that there is a constant interchange of heat energy between them and the hot gases flowing therethrough. Thus the gases are kept burning.

In the front wall A′ of the furnace A, there are formed water-chambers *w* the water in which absorbs the heat from, and thereby keeps cool, the walls bathed by it. To these water-chambers *w*, water that has, in any suitable manner (*e. g.*, by being exposed to hot exhaust gases from an engine), been preheated but is yet comparatively cool, is led through the water-pipe *w′* and water-passage *w″*. From these water-chambers *w*, the water flows to the water-jacket space *c′* between the walls of the combustion chamber *c* of the furnace A. In the rear wall A″ of the latter, there is formed an L-shaped water-passage *x* the front end of which communicates with the water-jacket space *c′* and the other end of which communicates with the upper end of a water-pipe *y* that is mounted in a flue *z*, which is vertically disposed and into and through which pass the products of combustion, after the same have gone through the reignition grating *q*. The lower end of the flue *z* passes through an opening *z′* formed in the top of a box or drum 2 that is set in the bottom of the generator-chamber 3. From the bottom of the drum 2, there projects a nipple or boss 4 formed with an inlet water-passage 4′ and with lateral discharge or outlet passages 4″. Into the inlet end of the passage 4′, there fits the lower end of the water-pipe *y*. In the steam-generator chamber 3, there are hung chains 5 the links of which present an extensive surface. The upper part of the side-wall of the drum 2 is formed with outlet-openings 2″ and its lower edge is formed with cuts 2ˣ to permit the passage upwardly of the water issuing from the outlet-passages 4″. The products of combustion rush from the drum 2 through the outlets 2″ and take up some of the water that has flowed through the water-pipe *y* into the bottom of the steam-generator chamber 3. In flowing upwardly to the outlet opening 3′ of the generator-chamber 3, the stream of heated gases with its entrained moisture contacts with the extensive surface of the links 5 and there results an interchange of heat between the hot gases and the moisture, resulting in the conversion of the moisture into steam. The lower end of the generator-chamber 3 is formed with a boss 3″ through which extends a passage 3ˣ that lies in prolongation, practically speaking, of the passage 4′ and is closed at its discharge end by means of a drain-cock 6. To the boss 3″, there is fastened a starting-cup 7, which is filled, at starting, with alcohol or the like combustible, the combustion of which produces heat sufficient to generate steam in the chamber 3.

The operation of the reignition or flame-maintaining grating *q* may be briefly described as follows: The pressure of the air in the air-space *h* of the oil-reservoir *j* forces the oil *i* therein to flow upwardly through the pipe *k* and past the needle-valve *g*, whereupon the stream of oil is struck by the stream of air flowing through the air-passage *m* and is thereby atomized and issues as a spray from the discharge-orifice *n* of the atomizer *n′*. Air flowing past the spring-controlled valve *b* into the combustion-chamber *c*, escapes through the interval *o′* between the outer edge of the mouthpiece *o* and the inner wall of the combustion-chamber *c*, and mingles with the oil-spray flowing through the mouthpiece *o*, whereby there is formed a combustible mixture of oil and air. This mixture is ignited by the hot filament of an electric igniter *p*. The burning gases rush rearwardly through the combustion-chamber *c* and, in their course, pass over the bars *r*, *r′*, of the flame-maintaining contrivance *q*, which thereby becomes highly heated. Should the flame from the burning mixture of oil and air die out momentarily, combustion of the mixture would be revived by the heat from the grid *q*.

This application is filed as a divisional application under my pending application, Serial No. 223,264, filed March 19, 1918.

I claim:

An oil-burning furnace provided with a re-ignition device that fits closely to the walls thereof and that is in the form of a grating having a central opening for the passage of the heated products of combustion and provided with a series of spaced, substantially ring-shaped elements arranged at varying distances from the central opening, whereby all portions of the stream of combustion products are exposed to the action of said elements.

Signed at the borough of Manhattan, in the city, county and State of New York, this 28th day of March, 1919, in the presence of the two undersigned witnesses.

OTTO KRAUS.

Witnesses:

G. H. LIPPINCOTT,

A. MENDELSOHN.