No. 689,814. Patented Dec. 24, 1901.

F. F. DOW.

BURNER.

(Application filed Feb. 4, 1901.)

(No Model.)

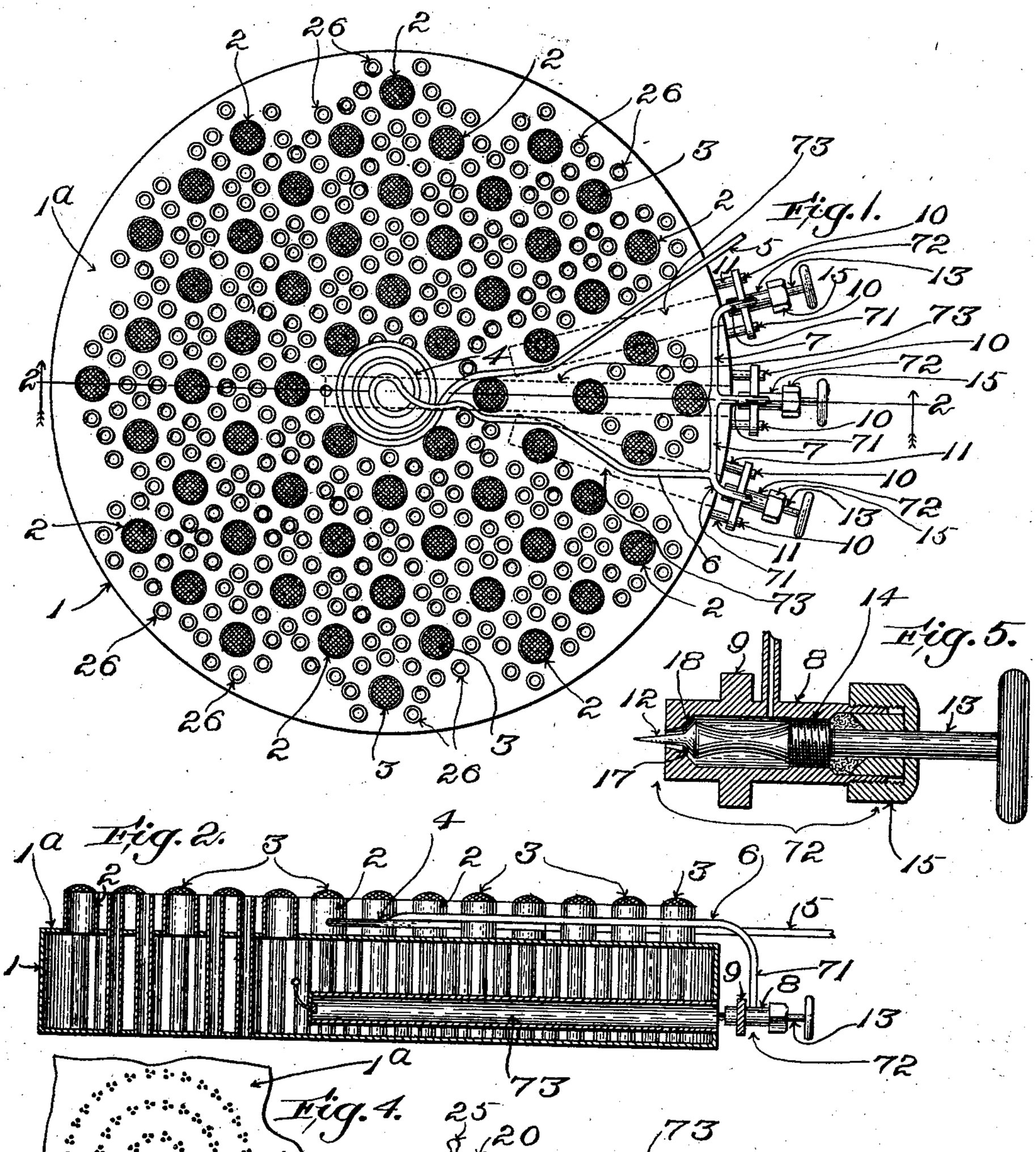

Fig. 1.

Fig. 5.

Fig. 2.

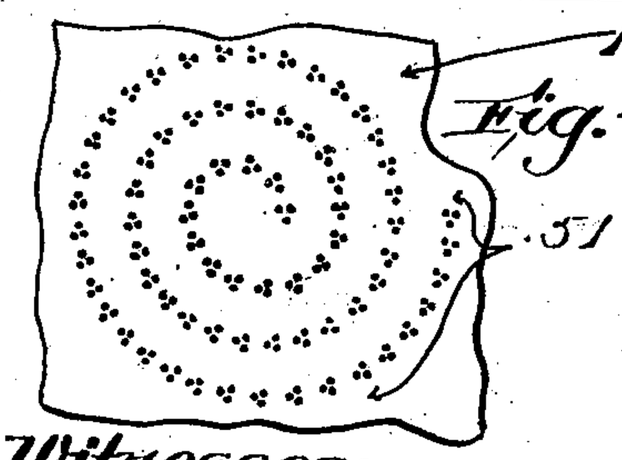

Fig. 4.

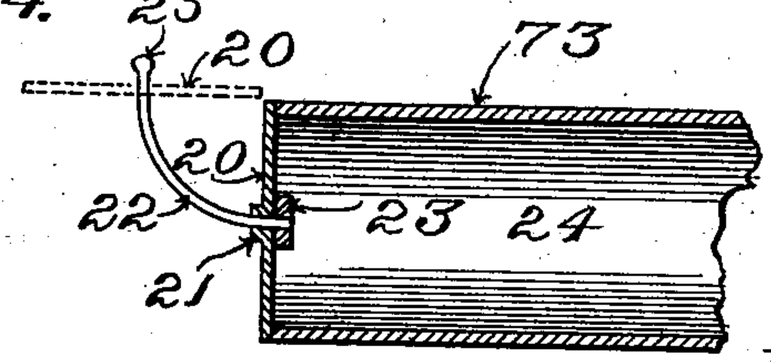

Fig. 3.

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UNITED STATES PATENT OFFICE.

FRED F. DOW, OF FREDERICTON, CANADA.

BURNER.

SPECIFICATION forming part of Letters Patent No. 689,814, dated December 24, 1901.

Application filed February 4, 1901. Serial No. 45,891. (No model.)

To all whom it may concern:

Be it known that I, FRED F. DOW, a citizen of the United States, residing at Fredericton, in the county of York, New Brunswick, Canada, have invented a certain new and useful Improvement in Burners, of which the following is a specification, reference being had therein to the accompanying drawings.

The general aim of the invention is to provide an efficient and powerful heater which shall be especially adapted for use in connection with self-propelled vehicles (automobiles) and boats and also adapted for general use—as, for instance, in furnaces and otherwise for household purposes and the like; also, to produce a large heater of practically unlimited capacity which at the same time may have the flame thereof completely and conveniently regulated, and if need be reduced in volume so as to barely make itself perceptible, while remaining continuously alight.

The accompanying drawings show the invention embodied in the best form thereof which I have yet devised.

In the drawings, Figure 1 shows in plan an embodiment of my invention. Fig. 2 shows the same in vertical transverse section on the plane indicated by the dotted line 2 2, Fig. 1, looking in the direction indicated by the arrows adjacent the ends of such line. Fig. 3 is a sectional view of the inner end of one of the mixing-pipes on an enlarged scale. Fig. 4 is a detail view in plan of a portion of the top plate or sheet of the burner, showing mainly the holes therein of the pilot-burner. Fig. 5 is a sectional view of the injector-valve on an enlarged scale.

Having reference to the drawings, the body 1 of the burner is in the shape of a flat cylindrical shell. In the top plate or sheet 1^a thereof, except in the central portion thereof, are set the required number of burners 2 2, &c., each being preferably in the shape of a short tube screwed into a hole in the said plate or sheet and capped with wire-gauze, as at 3 3, &c. Above the central portion of the said top plate or sheet 1^a is located the spiral gas-generating coil 4. With the said gas-generating coil is connected the fuel-supply pipe 5. Inasmuch as liquid hydrocarbons—for instance, kerosene—will most generally be employed in practice as fuel, I designate the pipe 5 for convenience the "oil-supply" pipe, although it will be borne in mind that on occasion the character, &c., of the fuel-supply will be varied as deemed desirable. Ordinarily the oil passing through the oil-supply pipe 5 to the gas-generating coil 4 will be maintained under moderate pressure to insure a proper and sufficient feed thereof to the lamp. This pressure may conveniently be secured in practice by the well-known means of maintaining a pressure of air or gas within the supply receptacle or reservoir, (not shown,) with which the pipe 5 communicates. The oil or other fuel reaching the gas-generating coil 4 becomes highly heated in the said coil, as in a retort, and thereby converted into a gas or vapor of high tension. Beneath the said coil a series of holes 51 51 is formed in the top plate or sheet 1^a, through which holes issue a number of fine streams of mixed air and gas from the interior of the heater, the flames produced by the combustion of these streams serving to maintain the required high temperature of the coil. From the coil 4 the gas generated therein travels through a portion of pipe 6 and also through the distributing-pipe 7 and the three branches 71 71 71 thereof. Each branch connects with an injection-valve 72.

Three mixing pipes or chambers 73 73 73, located within the body 1 of the burner, have their outer ends secured within the outer wall of the said body and open to the outside air. Each of the said mixing pipes or chambers has an injection-valve 72 located adjacent the outer end thereof, and into the latter the fine jet or stream of gas discharging from the said injection-valve 72 is projected or driven by the force with which it issues from the small delivery-hole of the valve 72. In consequence of the fact that the said outer end is open to the outer air a considerable volume of air is permitted to flow into the pipe or chamber 73 and is carried through the latter by the moving stream of gas. The interior space of the body 1 constitutes a gas-chamber, within which is received the volume of mixed air and gas flowing through the mixing pipes or chambers, and from which gas-chamber the mixture issues through the

burners and through the small holes 51, beneath the gas-generating coil 4. The mixing-pipes extend transversely across the body 1 of the burner. The middle one is longer than the others and in the illustrated embodiment of the invention passes clear beyond the center of the body of the burner, the other two being of only about two-thirds the length of the long one. The two short pipes or mixing chambers 73 are converged or inclined somewhat toward the opposite sides of the long middle one. By having the mixing pipes or chambers of different lengths and the short ones inclined toward the long one the inflowing streams naturally assist one another, and the pressure is equalized throughout all portions of the interior space of the body of the burner, a uniform supply of the mixture of gas and air to all the burner-openings being assured.

A convenient form of injection-valve is shown in the drawings, more particularly Fig. 5. The body 8 thereof has attached thereto the plate 9, which has the opposite ends thereof secured by screws 10 to the projections 11, extending from the exterior of the body 1. The needle 12 of the said valve is formed on or carried by the stem 13, the latter having formed on a portion of its length an external screw-thread 14, which works in the internal screw-thread of the bore of the said body 1. The nut 15, applied to the body 8 of the injection-valve, serves to compress the packing that is applied to the stem 13. The inner end of the stem 13 is formed with a tapering shoulder 17, that seats itself against a corresponding tapering shoulder or surface 18 of the bore of the body 8 when the stem 13 is turned all the way in, and thereby stops the flow of gas through the valve.

At the inner end of each mixing pipe or chamber 73 there is provided an automatic or self-closing valve, which is held open by inward pressure so long as the latter exists within the mixing-pipe 73, but which closes when such pressure ceases. The drawings show a simple form of valve comprising a disk 20 of a size to fit against and close the opening at the inner end of the mixing-pipe 73. This disk has a central hole 21, in which is received the stem of a curved guiding-pin 22, that is affixed to the support 23, carried by the pipe, the said pin projecting inwardly into the gas-chamber 24. The disk is free to slide back and forth upon the pin, the latter having a head 25 or other enlargement to prevent the disk from passing off the pin 22. The pin is curved upward toward its free end. An inwardly-directed current flowing through the pipe 73 acts to force the disk 20 backwardly and upwardly into the elevated substantially horizontal position that is indicated by dotted lines in Fig. 3. If for any reason the inward flow through a given mixing-pipe should terminate, the valve 20 would descend from the dotted-line position. The pressure within the body of the burner, due to flow through the other mixing pipes or chambers, would then act to press the disk 20 against its seat, as in full lines in Fig. 3, thereby closing the mixing-pipe 73 against backflow. The use of the automatic or self-closing valves 20 in connection with the respective mixing pipes or chambers enables me to control the volume of flame that is produced by the burner more completely and effectually through the manipulation of the respective injection-valves. I am not only able to vary the results by opening or closing more or less the respective injection-valves; but when deemed desirable I may wholly close one or more of the latter. I am thereby enabled to utilize one or more thereof, as required, and at any time the particular injection-valve which for the time being is closed is adapted to be brought into action instantly at the full capacity thereof. Three pipes having a given volume of vapor distributed among them will carry in three times the amount of air that one pipe would with the same volume of vapor. Again, the use of a plurality of injection-valves and mixing-pipes enables me to regulate at will the volume of mixed air and gas that is caused to enter the gas-chamber within the body of the burner without varying the relative proportions of air and gas. When one or more of the injection-valves is closed, the volume of mixture supplied to the burner is reduced, but without change in the relative proportions of its ingredients. Combustion remains as perfect as before; but the volume of flame is diminished.

At 26 are shown air-supply pipes extending vertically through the body of the burner and having their upper ends in proximity to the upper ends of the burner-tubes 27. These air-tubes are arranged so that a number thereof, preferably arranged in a circular series, is adjacent each of the burner-tubes, in order that a full supply or air may be delivered to the latter. The circular arrangement just mentioned affords the best supply of air, the updraft from the flame of each individual burner acting most efficiently to draw up the outer air. In consequence of the fact that the air-tubes extend vertically through the burner-body 1 from below the air entering at the lower ends thereof, below the said burner-body, and passing upwardly therethrough is warmed by the heat of the gaseous contents of the gas-chamber 24, as well as by that transmitted from the flames of the burners through the material of the said air-tubes 26. It therefore is in a state to assist in combustion without chilling the flames and detracting from the economy of the burner. The upper ends of the air-tubes are continued up above the top sheet of the burner-body to the same height as the upwardly-projecting burner-tubes. This secures an improved draft.

The described burner operates without either odor or deposit from the flame thereof, and while various kinds of liquid or gaseous

fuel may be employed therein it has more especially been designed for use in connection with kerosene.

What I claim is—

1. The improved burner, comprising, essentially, the gas-chamber provided with the burner-tubes, the plurality of mixing-pipes discharging into said gas-chamber, automatic or self-closing valves applied to the said mixing-pipes to prevent backflow therethrough from the gas-chamber, means for introducing gaseous fuel under pressure through the mixing-pipes, and provisions for independent control of the inflow of such fuel in connection with the respective mixing-pipes, substantially as described.

2. The improved burner, comprising, essentially, the gas-chamber provided with the burner-tubes, the plurality of mixing-pipes discharging into said gas-chamber, automatic or self-closing valves applied to the said mixing-pipes to prevent backflow therethrough from the gas-chamber, and a plurality of injection-valves discharging gaseous fuel into said mixing-pipes, substantially as described.

3. The improved burner comprising, essentially, the gas-chamber provided with the burner-tubes, the plurality of mixing-pipes discharging into the said gas-chamber, extending different distances into the said gas-chamber, and forming a converging group with the farthest-extending one in the middle of such group, and means for supplying gaseous fuel under pressure to the said mixing-pipes, substantially as described.

4. The improved burner comprising, essentially, the gas-chamber provided with the burner-tubes, the plurality of mixing-pipes discharging into said gas-chamber, the said mixing-pipes forming a converging group, automatic or self-closing valves applied to the said mixing-pipes to prevent backflow therethrough from the gas-chamber, and means for introducing a regulated flow of gaseous fuel into the mixing-pipes, substantially as described.

5. The improved burner comprising, essentially, the gas-chamber provided with the burner-tubes, the plurality of mixing-pipes discharging into the said gas-chamber, extending different distances into the said gas-chamber, and forming a converging group with the farthest-extending one in the middle of such group, automatic or self-closing valves applied to the said mixing-pipes to prevent backflow therethrough from the gas-chamber, and means for introducing a regulated flow of gaseous fuel into the mixing-pipes, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

FRED F. DOW.

Witnesses:
CHAS. F. RANDALL,
WILLIAM A. COPELAND.