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INCLOSED COMBUSTION APPARATUS.

APPLICATION FILED AUG. 28, 1917.

1,379,179. Patented May 24, 1921.

Fig. 1

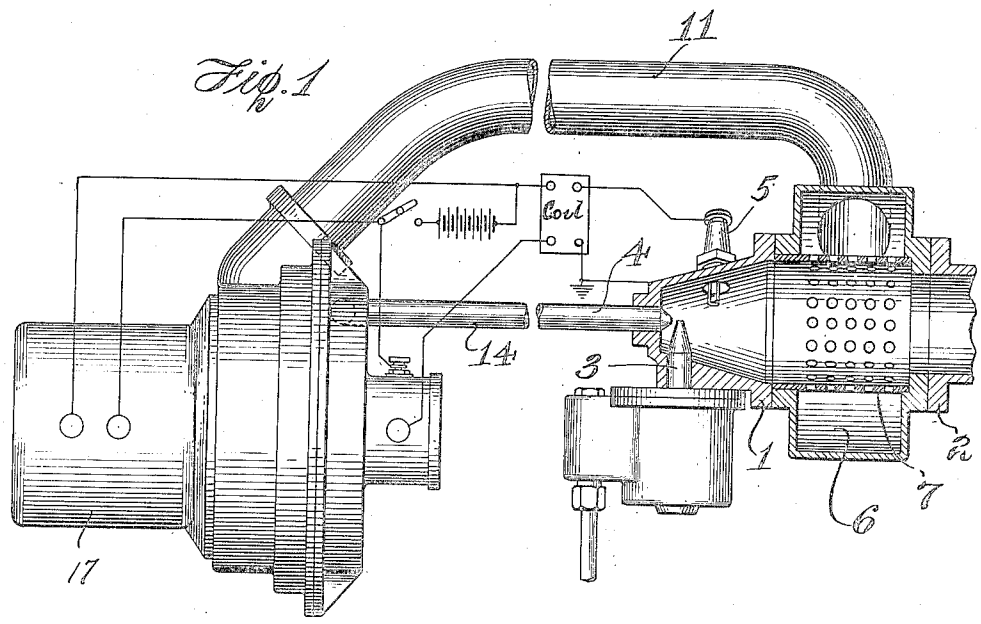
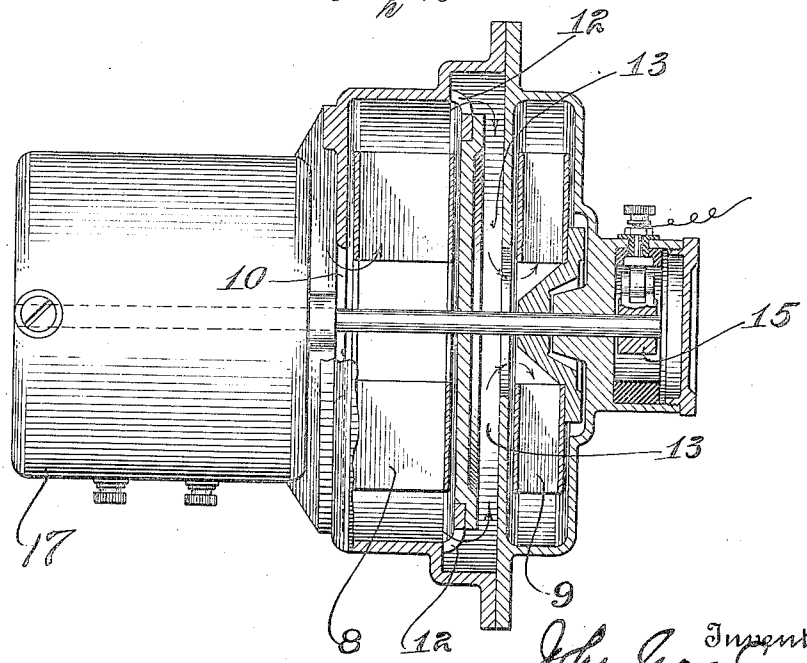


Fig. 2



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INCLOSED COMBUSTION APPARATUS.

1,379,179. Specification of Letters Patent. Patented May 24, 1921.

Application filed August 28, 1917. Serial No. 188,583.

To all whom it may concern:

Be it known that I, JOHN GOOD, a citizen of the United States, residing in the borough of Brooklyn, county of Kings, city and State of New York, have invented the following described Improvements in Inclosed Combustion Apparatus.

The invention is an improvement on the inclosed combustion apparatus set forth in my Patent No. 1231152 granted June 26, 1917, and consists in the use of fan type air compressor mechanism exclusively for supplying the air to the burner heads of such apparatus, which diminishes the cost and size and also improves the action of the apparatus, as hereinafter explained.

In the drawings,

Figure 1 is a general elevation showing the burner head in section, and the electric wiring; and

Fig. 2 is a larger scale elevation partly in section, of the air compressor mechanism.

The burner head 1 is connected with a flame pipe 2, and contains fuel spraying means in the form of a liquid fuel nozzle 3 and an air jet nozzle 4 in aspirating and atomizing relation thereto; also a spark igniter 5 intercepting the spray, an air admission chamber 6, and a perforated air-distributing shell 7, all arranged and operating as described in the patent referred to. The burner head and flame pipe together form an inclosed combustion passage of small compass and having an open exhaust outlet for the products of combustion, the whole being of such general size as to be suited for use in automobiles. The atomized fuel spray encounters the spark and is ignited thereby before it has an opportunity to mix so intimately with the combustion supporting air from the distributer 7 as to form an explosive mixture, which fact gives a quiet non-explosive ignition and continuous and complete combustion. The prompt establishment of steady combustion is essential in apparatus of this kind and is due largely to the correct relationship of the separate streams of air and spray and the location of the spark with reference thereto, and such result is likely to be prevented or impaired by any disturbance of the said relationship, especially by any irregularity in the rate of air supply. The present invention assures uniformity in this respect and thereby improves the reliability and certainty of action of apparatus of the kind referred to.

The air supply to the nozzle 4 and chamber 6 is produced by the operation of an electric motor 17, and two rotary fans 8 and 9, both mounted fast upon the motor shaft. The fan 8 draws in air from the atmosphere through the air entrance space or passages 10 between its casing and the motor casing and expels a portion of its delivery into the low pressure air pipe 11 and a portion through the peripheral openings 12 to the air passage 13, wherein this portion of the air flows radially inward to the center of the fan 9 for further compression thereby, being delivered from the periphery of the latter's casing at a higher pressure into the air pipe 14. The sizes of the fans 8 and 9 are related to the particular burner illustrated so as to give air to the admission chamber 6 at the correct rate to support complete combustion in the closed flame passage and an air jet velocity at the nozzle 4 which aspirates or discharges and atomizes the liquid fuel at a suitable rate and with the necessary degree of fineness to insure ignition even though cold. The spark plug 5 is energized by a spark coil of any common type supplied with current from the same source as the motor and preferably controlled by the same switch, through circuit connections clearly diagrammed in Fig. 1. The primary of the spark coil is or may be positively interrupted by a mechanical interrupter 15 mounted on the end of the motor shaft or any other revolving member. In the present case it is inclosed in a casing which may be an extension of the casing of fan 9 or of the shaft bearing. This interrupter is not different in principle from those commonly used in automobile engine ignition systems and therefore requires no explanation. The casings of the fans and the interrupter are compactly built together with the motor casing, and the spark coil also might be incorporated in or on the motor casing if desired and according to the common practice in magneto-generators.

The fan structure, represented by the double fans runs free of contact with the casing wall and hence encounters no appreciable frictional resistance to rotation, the friction of the shaft bearings being negligible. The air delivery is thus always in constant pro-

portion to the speed of rotation of the fan structure, which is the same as that of the motor. The correct proportioning of the spraying and combustion-supporting air is thus always maintained and the adequate velocity to produce the results above alluded to is always promptly reached notwithstanding that the driving motor may be of small size and low power. This condition is to be distinguished from other burner systems, such for example as shown in the patent referred to, which employs an air compressor mechanism depending for its action upon the condition or amount of lubrication inside of it. These systems are intended to be set in action, igniting instantly and automatically, on the pressing of a switch button, but after long periods of idleness sometimes become irregular and fail to ignite as promptly as required on the closing of the switch and on such occasions they are apt to become smoky and ill-smelling. The cause of this defect I have ascertained to be due entirely to slight changes in the viscosity or amount of lubrication in the pump mechanism. Such lubrication is depended upon not only to reduce friction but to seal the joint or crevice between the rotor or piston and the casing wall. When it becomes depleted or when it changes its viscosity as by change in temperature, the delivery of air is correspondingly affected, and though the difference is very slight and probably such as would not be noticeable in ordinary uses of such pumps, a slight change has a very perceptible effect on the action of burners intended to ignite automatically and instantly on the closure of a switch. This is especially true when the pumps are driven by electric motors, which, for commercial reasons are of no greater power than necessary to supply the requisite air when running at full rated speed. Increased viscosity or increased friction in such cases retards the air delivery to the burner and in very cold weather may prevent ignition. The use of free running non-sealed or fan-type apparatus for creating the air current in burners of the closed type, is found to produce the critical condition necessary for ignition more promptly and with practical certainty and the combination of such apparatus with burners of the kind stated represents the principal feature of the present invention as herein claimed. There is additional and independent advantage also in the use of a double fan structure to supply the air in such burners inasmuch as the atomizing air may be thereby compressed in two stages and hence to a higher pressure than would otherwise be practical or economical, and such high pressure gives finer atomization and by so much tends to facilitate the ignition of coal fuel, while the greater portion of the air supply is compressed only to such degree as is necessary to produce an adequate rate of delivery and mixing effect through the distributer 7.

I claim:

1. In inclosed combustion apparatus, a closed flame passage in which liquid fuel is sprayed by an air nozzle in atomizing relation to a fuel orifice and ignited by an electric igniter intercepting the spray and supported in combustion by air introduced into contact with said spray without making an explosive mixture therewith in the region of the spark, in combination with said electric igniter located in said passage, an electric motor, a rotary fan-type air-current-creating mechanism driven thereby and supplying the air to said flame passage for spraying the fuel and completing the combustion thereof, and means for coincidently energizing said motor and igniter.

2. Apparatus as set forth in claim 1, comprising a double rotary fan structure, one fan supplying the combustion-supporting air and the other the atomizing air, and having its intake connected to the discharge from the first mentioned fan.

3. In inclosed combustion apparatus, the combination with a rotary fan-type mechanism for creating an air current, of a closed combustion space supplied with air thereby in quantity sufficient to complete the combustion in said space and provided with means whereby the required fuel is discharged and atomized into said space by the effect of and in proportion to the air supplied thereto, an igniter within said space, a motor adapted to drive said fan type mechanism at a speed predetermined to permit the immediate initiation of steady combustion in said space, and means for coincidently operating said motor and igniter.

4. The combination of a two-stage air compressor, a combustion space having a fuel-atomizing nozzle connected to the high pressure delivery of said compressor, and an entrance for combustion-supporting air connected to the low pressure delivery of said compressor.

5. The combination of a two-stage rotary air compressor, a closed combustion space having a fuel-atomizing nozzle connected to the high pressure delivery of said compressor, an air entrance connected to the low pressure delivery thereof and an igniter between said nozzle and air entrance.

6. In combustion apparatus, a closed combustion space containing a high pressure air nozzle and having an air entrance, a rotary fan-type air-compressor supplying air under pressure to said entrance, and means for further compressing a portion of said air and conducting the same to said high-pressure nozzle.

7. In forced draft combustion apparatus

the combination with a closed combustion space supplied with air at different pressures, of a combined motor and fan casing and a two-stage fan structure contained in said casing and driven by the motor therein.

8. In inclosed combustion apparatus, a closed combustion space and two-stage rotary air compressor mechanism, a passage connecting the low pressure stage of said mechanism with said combustion space, and a perforated air-distributing shell forming the communication of said passage with said space, fuel atomizing means in said space and a passage connecting the same to the high pressure stage of said mechanism.

In testimony whereof, I have signed this specification.

JOHN GOOD.