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AIRCRAFT MOTOR
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Fig.1

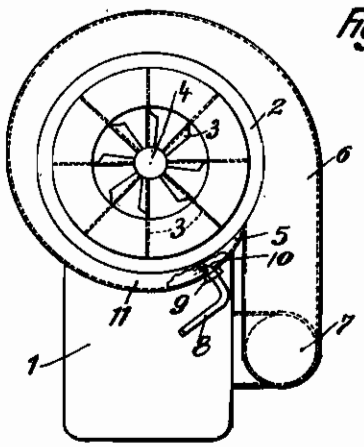
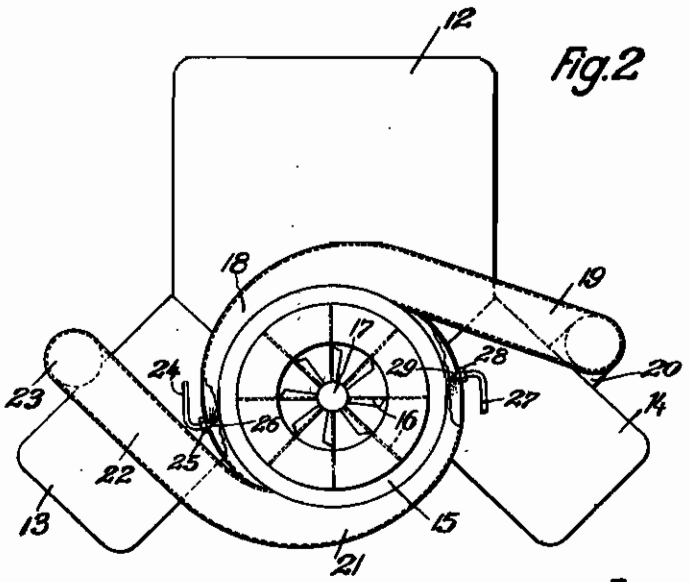


Fig.2



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ALIEN PROPERTY CUSTODIAN

AIRCRAFT MOTOR

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vested in the Alien Property Custodian

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The present invention relates to internal combustion engines and more particularly refers to an aircraft motor provided with a charging device and a device for producing the mixture of fuel and air.

In internal combustion engines of this kind known hitherto the spray nozzle for the fuel is arranged in front of or behind the charging device, that is to say, in the suction- or pressure pipe. This arrangement for instance has the advantage that the use of a single fuel pump is sufficient and, moreover, relatively small injection pressures only are required.

Apart from these advantages, the known internal combustion engines of the kind characterized above, have some disadvantages also. If the spray nozzles are so arranged as to discharge in front of the charging device, they show the drawback, that due to the vaporization of the fuel the air is strongly cooled, whereby the humidity may be separated from the air which eventually may be accompanied by formation of ice. Damages of the charging device and the motor as well as other break-downs may then be caused. For this reason, means for preheating the air had to be provided which, however, have the drawback, that by the device for preheating the weight of the internal combustion engine is considerably increased. Moreover, the provision of a device for preheating substantially reduces the output of the engine owing to a decreasment of the admission.

A further disadvantage consists in this, that at a small number of revolutions of the motor, for instance if the motor is running idle, the formation of the mixture of fuel and air is relatively bad, because, at such working orders the velocity of the air is rather small.

Moreover, there is the further drawback, that drops of fuel are thrown out by the charging device which drops are deposited at the walls of the charging pipe, whereby the composition of the mixture of fuel and air is altered in an inadmissible manner.

If the device for injecting the fuel is arranged behind the charging device, i. e. discharges behind the charging device, care is to be taken, that at small outputs also sufficiently great velocities of the air are available for producing the mixture aimed at and for distributing same. For this purpose, an additional regulatable throttle member is required which must be controlled in dependence on the output and on the altitude in which the motor is to operate. This drawback proves in particular to be rather important when using a plurality of separated charging pipes, because then a special throttle member is required for each pipe which throttle members all must be very exactly adjusted with respect to each other.

Now, it has been found, that in a very simple manner all the above described drawbacks may be obviated.

Therefore, if a charging device of the kind of a centrifugal blower is used, then to this end the fuel spray pipe is, according to the invention, so arranged, as to discharge into the spiral member of the blower.

In connection with carburettors provided with rotating blades, it is known already to feed fuel, by way of openings in the revolving shaft, into the interior of the blade rim. This known construction, however, has for instance the drawback, that the shaft of the wheel of the centrifugal blower must be provided with special means for guiding the fuel and, moreover, sealing means must be provided to prevent fuel flowing out at undesirable points.

With internal combustion engines according to the invention the spray nozzle preferably is arranged directly behind the runner or rotor wheel of the centrifugal blower. Preferably, the construction of the blower and the arrangement of the spray nozzle is so chosen, that the discharge opening of the spray pipe lies near the end of smallest cross section of the spiral member of the casing of the centrifugal blower.

This arrangement of the spray nozzle according to the invention has the advantage, that in the spiral member serving to collect the air leaving the runner as well as serving to convert the velocity-energy into pressure-energy, the air is already so strongly heated, that troubling separation of water or even formation of ice may no longer take place. At the characterized points of the spiral member the velocity of the air is relatively great and only a little smaller than that at the circumference of the runner. Also when running idle and with the number of revolutions then prevailing, the available velocity is sufficient for a satisfactory atomizing of the fuel. The effect of the whirling is still increased by the fact, that on the way to the outlet opening of the spiral member permanently fresh air is blown into the mixture of air and fuel and is mixed with the latter by whirling. Hereby a throwing out of fuel drops cannot be caused, as would probably to be feared for the points situated in the runner. By injecting fuel into the spiral member a relatively strong cooling of the

charge is effected, so that thereby the so-called pressure ratio of the charging device is increased.

Near the end of smallest cross section of the spiral member of the casing of the centrifugal blower, a device for injecting a cooling medium also may be provided. The cooling medium and the fuel may, however, be injected simultaneously. An additional regulatable throttle member is no longer required.

If a plurality of charging pipes are provided, a plurality of spiral members, each having a special nozzle, also must be provided which preferably are of same size and of same construction and are commonly supplied with fuel.

In the accompanying drawing two embodiments according to the invention are shown diagrammatically by way of example.

In this drawing

Fig. 1 shows in elevation an internal combustion engine with a charging device, the motor being arranged below the charging device, and

Fig. 2 represents a modification of the internal combustion engine with cylinders set in V-fashion.

As shown in Fig. 1, the motor with suspended cylinder block is designated with 1. Above this block the casing 2 of the charging device is provided, the blade wheel of which is designated with 3. The wheel 3 is rotatably mounted on the shaft 4. Connected to the charging device 2 is the spiral pipe 5, 6; 5 designating the part of smallest cross section of the spiral and 6 the outlet socket. Connected to this outlet socket 6 is an elbow 7 or the like which discharges into the fuel mixture pipe of the cylinders of the motor.

Near the end of smallest cross section of the spiral member, i. e. about at the point 5, the nozzle for injecting fuel is provided according to the invention. The pipe leading to this nozzle is designated with 8. This pipe 8 and the nozzle are detachably connected to the wall of the spiral pipe by means of a screw connection 9. The nozzle itself is designated with 10. The outlet openings of the nozzle 10 discharge into the part 11 of the spiral pipe.

According to the modification shown in Fig. 2, two charging pipes are provided. The motor 12 has two rows of cylinders 13 and 14 which are obliquely arranged in a downward direction. In the casing 15 of the centrifugal blower or compressor, the bladed wheel 16 is arranged. The wheel 16 is rotatably mounted upon the shaft 17. Connected to the casing 15 is a spirally extending pipe 18 which continues in a rectilineal pipe 19 discharging, by way of a connecting socket 20, into the mixture pipe of the one row 14 of cylinders.

Besides the spirally extending pipe 18, a second spirally extending pipe 21 is provided which is arranged about symmetrically to the first pipe. The pipe 21 continues in a rectilineal part 22 which is connected, by way of an intermediate member 23 to the mixture pipe of the cylinder row 13.

The supply pipe, leading to a nozzle 28 is designated with 24. The pipe 24 and the nozzle 26 are detachably connected to the wall of the pipe 18 by means of a screw connection 25.

A second nozzle discharging into the spirally extending pipe 21 is designated with 29, whereas the appertaining pipe itself is designated with 27. Here also the pipe and nozzle are, by way of a screw connection 28, detachably connected to the wall of the pipe into which the nozzle discharges.

According to the construction shown in Fig. 2 also the two nozzles are arranged in the range of the end of smallest cross section of the spirally extending pipes.

Besides the arrangements of the nozzles described other arrangements at the spiral member also are possible. Moreover, the outlet direction of the fuel jet may be chosen as desired.

Finally in connection with a throttle flap at any desired point of the suction- and pressure pipe, a device for idle running may be provided. Such devices are formed as means for injecting fuel and are caused to actuate if strong throttlings are effected. When using such devices for idle running preferably with a corresponding nozzle, the production of a favorable mixture is warranted. The nozzle for idle running preferably is connected to the member for regulating the motor and to the device for injecting fuel.

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