PUBLISHED
MAY 11, 1943.
BY A. P. C.

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DIESELMOTOR
Filed Jan. 14, 1939

Serial No.
251,007

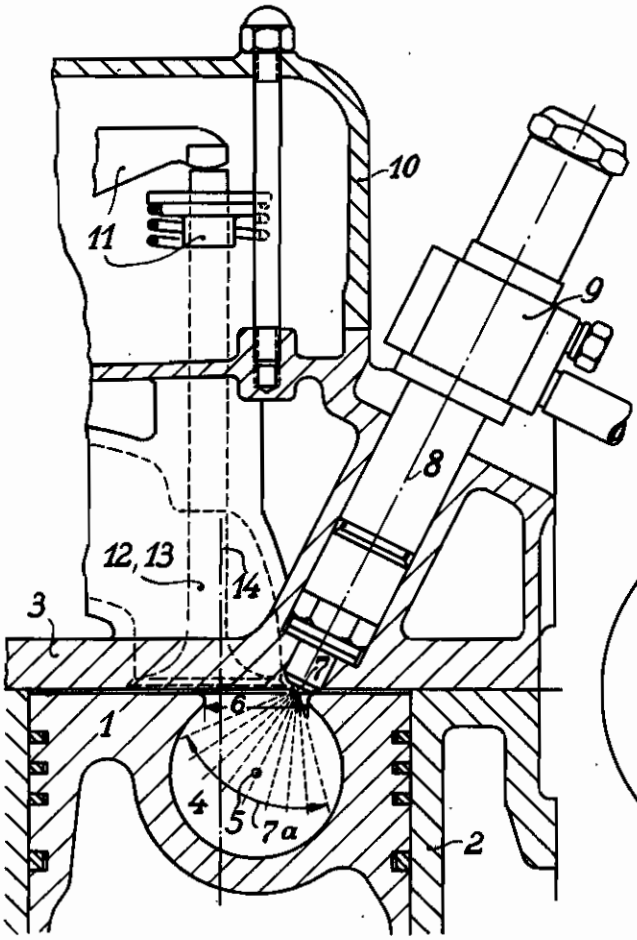


Fig. 1

Fig. 2

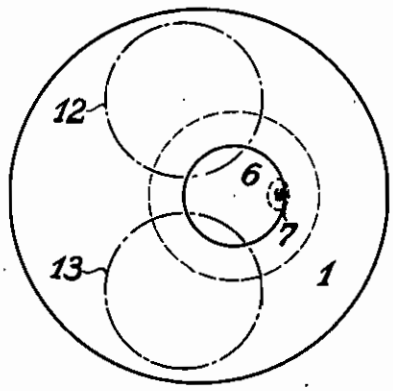


Fig. 3

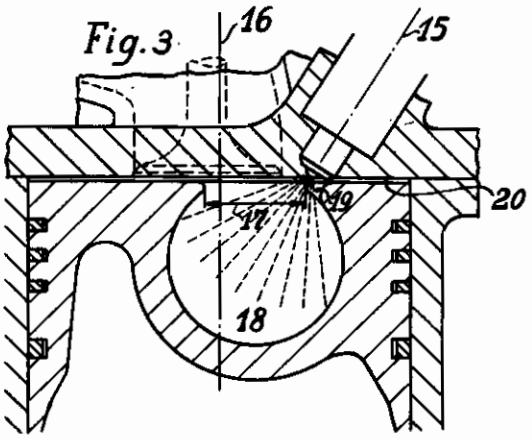
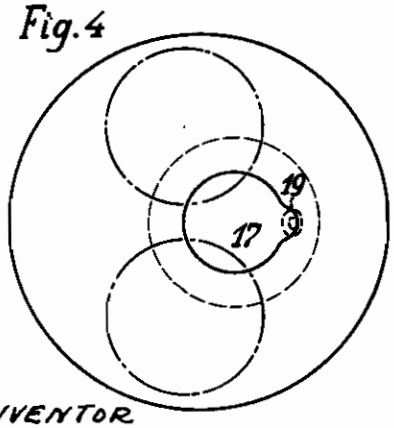


Fig. 4



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Published May 11, 1943 Serial No. 251,007

ALIEN PROPERTY CUSTODIAN

DIESELMOTOR

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Application filed January 14, 1939

This invention relates to a Diesel motor designed especially for freight motor-cars, railway motor-cars, and the like, and having, because of these purposes, cylinders with a small diameter and operating with a high number of revolutions. The present improved Diesel motor is characterised by the particular arrangement of the parts important for the injection of the fuel and the combustion thereof. The effect of that arrangement which is fully described hereinafter consists in an extremely low consumption of the fuel, a very good combustion of the same, and very easy and quick starting of the machine. The motor is, besides, distinguished by its simple construction, including a very practical arrangement of all members relatively to one another.

The characteristic features of the invention are the following: The aperture of the fuel nozzle is located about in the plane of that side or surface of the cover of the cylinder which is situated opposite the cylinder, and does not project, therefore, appreciably into the cylinder, nor is it located considerably far behind the said plane in a cavity of the cover. Furthermore, said nozzle aperture is located outside of the axis of the cylinder, and the axis of the nozzle forms an acute angle with the axis of the cylinder. Within the piston is a globular combustion space, the size or capacity of which is such that it is able to receive practically the entire amount of the combustion air in the upper dead-centre position of the piston; the centre of said globular combustion space lies about in the axis of the nozzle. The said combustion space communicates with the interior of the cylinder through a circular aperture, the diameter of which lies between 0,5 and 0,7 of the diameter of the combustion space. That side of the cylinder cover which is located opposite the piston and also the other side of said cover are plane. The axis of said communication, or of the large aperture respectively, which connects the combustion space with the cylinder space lies parallel to the axis of the cylinder and passes about through the centre of the said large aperture or communication.

I am aware of the fact that some of these features are singly known and have been employed in Diesel motors. Thus, for instance, the nozzle has already been arranged at an angle with respect to the cylinder axis in order to render possible to insert it easily into the cylinder cover from the outside of the same and in order to obviate removing the hood which covers the valve levers, as is the case also in the present new arrangement and combination of the parts. Also globular combustion spaces have been used and these spaces have already been provided in the pistons of Diesel motors, but these spaces in the pistons are not of globular shape and the globular spaces which have become known are not in the piston of the Diesel motor, in consequence whereof the favorable effect obtained with the present improved and new combination could not be attained with the older motors.

The characteristic feature also mentioned in the second paragraph of this specification that the combustion space can receive practically the entire amount of the air charge means that the piston approaches, in its upper dead centre position, the cylinder cover as near as possible so as to render the clearance as small as admissible, and that no by-spaces or secondary spaces shall exist which, perhaps, likewise might take up a certain amount of combustion air. The objects sought to be attained in these respects are attained best by employing a cylinder cover having a plane bottom surface and a piston having a plane top surface, as is the case with the present improved Diesel motor.

The diameter of the large aperture or communication mentioned, viz. between 0,5 and 0,7 of the diameter of the globular space is important for the good combustion and for the quick starting of the machine. If said aperture is too small, there then arise strong air currents and eddies when the compressed air enters into the combustion space, so that the temperature of the air contained in the combustion space is practically uniform which is, however, counter to what is desired, viz. that there is in the centre of the combustion space a hot core which arises and is maintained when the compressed air can be displaced from the cylinder into the combustion space without disturbing eddies. The more undisturbed the hot core of the compressed air in the combustion space is, the easier and quicker will the engine start, as the injected fuel will be ignited the more easily, the hotter the air is into which it is injected. If, on the other hand, the said aperture is too large, the eddies arising when the combustion gases escape from the combustion chamber and the speed of the current formed by said gases are too slight to mix the combustion gases with the oxygen of the air and to burn them quickly without any remainder. It has been ascertained by tests that the best effect is attained if the numeral limits stated are observed.

In order to maintain the said hot compression core in the combustion chamber it is also important that the aperture in question has circular shape and that its centre has the particular position stated. The nozzle shall fill the entire globular space with the fuel as uniformly as possible, and it is from this reason that its axis passes through the centre of the globular space when the piston is about in its upper dead-centre position, and that it is arranged about in the plane of the bottom surface of the cylinder cover. In this position the nozzle is very well protected from the heat of the combustion space, and is, nevertheless, located so near to the aperture of the ball that only a comparatively slight injection pressure for the fuel is requisite.

It is known, as regards four-stroke cycle motors with cylinders with a small diameter, to make use, preferably, of only one inlet-valve and only one outlet-valve whereby it is rendered possible to do with simple control members for the valves and with simple actuating means for the same. These advantages can be utilised in a particularly high degree if the nozzle and the combustion space are designed and arranged in accordance with this invention. For the rest, the invention is applicable also in connection with two-stroke cycle motors, as well as with four-stroke cycle motors, irrespective of whether they are controlled by valves or by other known means.

The invention is illustrated diagrammatically and by way of example on the accompanying drawing on which Figure 1 is a vertical longitudinal section through the upper part of a Diesel motor, all members not pertaining to the invention being omitted in this figure. Figure 2 is a plan of the piston of Fig. 1, the circular dotted lines indicating the valves provided in the cylinder cover, Figure 3 is a representation similar to the lower half of Fig. 1 and shows a somewhat otherwise arrangement of the nozzle in the cylinder cover and of the combustion space. And Figure 4 is a view similar to Fig. 2 and shows a plan of the piston of Fig. 4.

Referring to Fig. 1, 1 denotes the piston of the Diesel motor, 2 the cylinder thereof, and 3 the cover of this cylinder. In the piston 1 is the combustion space 4 which has globular shape; 5 denotes the centre of the space 4, and 6 denotes the large aperture in the top of the said space, viz. in the top surface of the piston. The nozzle aperture 7 lies in the plane of the bottom surface of the cylinder cover, and the ejected conical jet of fuel has a cone angle 7a which amounts to about 90°. The axis 8 of the nozzle is directed toward the centre 5 of the combustion chamber 4 and forms an acute angle with the axis 14 of the cylinder.

The advantage of this arrangement is that the entire nozzle body 9 lies outside of the hood 10 which covers the driving means 11 for the valves 12 and 13.

As the nozzle aperture lies laterally outside of the cylinder axis 14, it is possible to mount a large inlet valve 12 and a large outlet valve 13, as appears from Fig. 2.

From Fig. 1 appears that not only the nozzle aperture 7 lies one-sided outside of the cylinder axis 14, but this is true also of the centre 5 of the combustion chamber 4. Also this is important as this arrangement entails the favorable possibility to mount the two large valves 12 and 13 mentioned.

With the modification shown in Figs. 3 and 4 the angle between the axis 15 of the nozzle and the axis 16 of the cylinder is larger than with the constructional form illustrated in Figs. 1 and 2. Now, in order to provide that the fuel cone does not contact with the rim or edge of the aperture 17 of the combustion chamber 18, there is provided a small recess 16 below the nozzle aperture. Tests carried out with this arrangement have proved that said recess which interrupts the rim or edge of the large opening 17 has no detrimental effect. It can, in fact, even be assumed that the current of air streaming from the combustion chamber into the cylinder is more strongly compressed just at the place where there is said recess wherefrom an increased favorable effect results as that compression occurs in the proximity of the nozzle aperture.

In every case the gap 20 between the lower surface of the cylinder cover and the top surface of the piston must be as narrow as possible. With a cylinder diameter of 105 mm. it should have, if possible, no larger width than 0.9 mm. The lower surfaces of the valves (12 and 13, Fig. 1) shall lie so closely at the cylinder cover as the service conditions permit.

The tests carried out with a Diesel motor built according to this invention and having four cylinders with a diameter of 105 mm. and a piston stroke of 130 mm. have proved that the fuel consumption is at least by 25% lower than with the present Diesel motors of the same size. There is, thus, great progress and corresponding merit in the invention.

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