

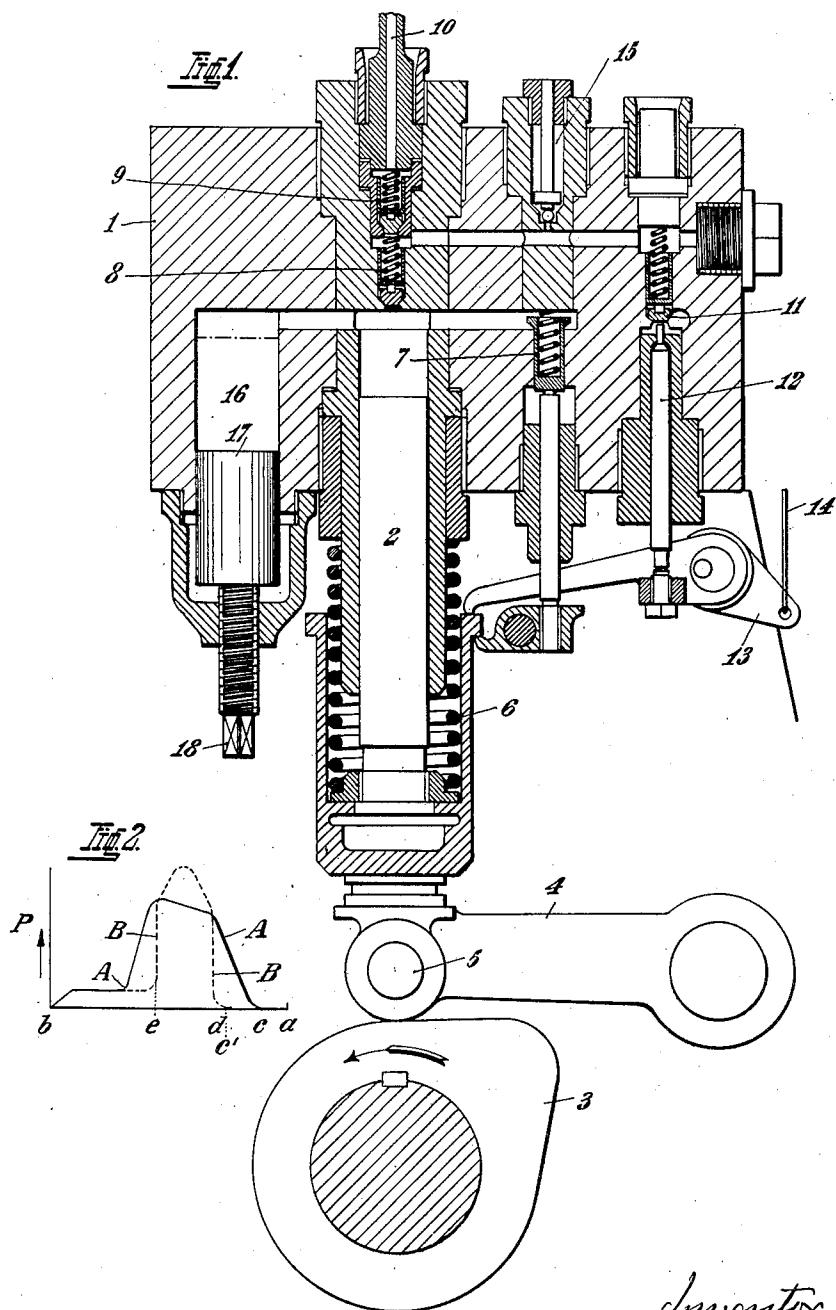
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FUEL PUMP FOR DIESEL ENGINES

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UNITED STATES PATENT OFFICE

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FUEL PUMP FOR DIESEL ENGINES

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The present invention relates to pumps for injecting fuel into the cylinders of Diesel engines in which the fuel is introduced under high pressure into the combustion chambers. 5 The invention consists in the provision of a fuel receiver or chamber the capacity of which including the capacity of the connecting conduits is a multiple of the volumetric capacity of the stroke of the pump with the 10 object of avoiding a sudden forcible increase of pressure at the beginning of the delivery stroke, by utilizing the compressibility of the liquid fuel which exists at high pressure, and at the same time ensuring more equable 15 pressure during the pumping stroke and a slower fall of pressure at the end of the same. The aforesaid chamber may be provided with a device by means of which its capacity can be varied in order to adapt the working to 20 the prevailing conditions.

A construction according to the invention is illustrated by way of example in the accompanying drawing, in which:

Figure 1 is a central longitudinal sectional view through the present pump; and

Figure 2 is a diagram illustrative of the operation of the present pump.

In Figure 1, 1 is the pump which is intended for injecting the fuel into a Diesel engine. 2 is the piston of the said pump which, during the delivery stroke, is moved upwardly by the cam disc 3 by means of the rod 4 and its roller 5, and during the suction stroke is moved downwardly by the action of the spring 6. 7 is the suction valve of the pump, 8 the first and 9 the second delivery valve. 10 is the delivery pipe of the pump which conveys the fuel to the combustion chamber. 11 is the regulating valve which is operated from the governor by means of the rod 12, lever 13 and rod 14. 15 is the safety valve of the pump.

According to this invention there is provided a fuel receiver or chamber 16, the capacity of which in the construction illustrated is three times as large as the volumetric capacity of the stroke. This chamber is closed by the piston 17, the position of 50 which can be varied by turning the square

end 18 so that the volume of the chamber 16 can be increased or reduced.

The operation of the pump according to the invention will be clear from the diagram in Figure 2. *a-b* represents the stroke of the piston 2. At the point *c*, the suction valve 7 closes and the fuel previously contained in the chamber 16 is compressed. As this chamber is very large, and the change of contents by the compressibility increases with the increase of pressure, a relatively slowly rising curve A will be obtained. From *d* to *e* there takes place delivery into the combustion chamber and at the same time the pressure during this period is well equalized by the elastic reaction of the large quantity of fuel contained in the pump chamber. At the point *e*, the regulating valve 11 opens, and owing to the elastic reaction of the fuel, the pressure again drops slowly in accordance with the curve A to a given back pressure in order to fall completely at the end of the delivery stroke.

The dotted curve B in Figure 2 given by way of comparison is the pressure curve of an ordinary pump which is not provided with the fuel receiver according to this invention. In such a pump, the pumping or delivery only begins at the point *d* or *c'* and the pressure rises so to say suddenly to a maximum during the injection period and then drops with equal rapidity to the back pressure on the opening of the regulating valve 11. The real delivery stroke *c'-e* is, it is true, shorter than in a pump according to this invention. At the beginning of the flow there will occur violent shocks and also during the injection of the fuel into the cylinder, there will be a variable pressure. On the contrary, in the pump according to this invention, no shocks will occur at the beginning of the delivery stroke, and during the injection of fuel the pressure will be very uniform.

I claim:

A fuel pump for airless Diesel engines, comprising a pump cylinder, an operating piston therein, valve controlled means for the supply of fuel to and the discharge of fuel from said cylinder, means providing a fuel chamber adjacent to and in communication

with said pump cylinder, an adjustable plug within said fuel chamber to vary the capacity of the latter, the fuel chamber being located to one side of the pump cylinder so that adjustments of the plug do not affect the flow of fuel to and from the cylinder, said plug being inherently rigid and its position within said fuel chamber being adapted to remain unchanged during normal operation of the pump and engine whereby the effective capacity of said chamber remains normally unchanged, and means for adjusting said plug to vary the effective capacity of said chamber in accordance with the compressibility of the fuel, said adjusting means serving to hold said plug normally against movement.

Signed at Zurich, Switzerland, this 19th day of April, 1930.

In testimony whereof I affix my signature.

20. EUGEN WÜTERICH.

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