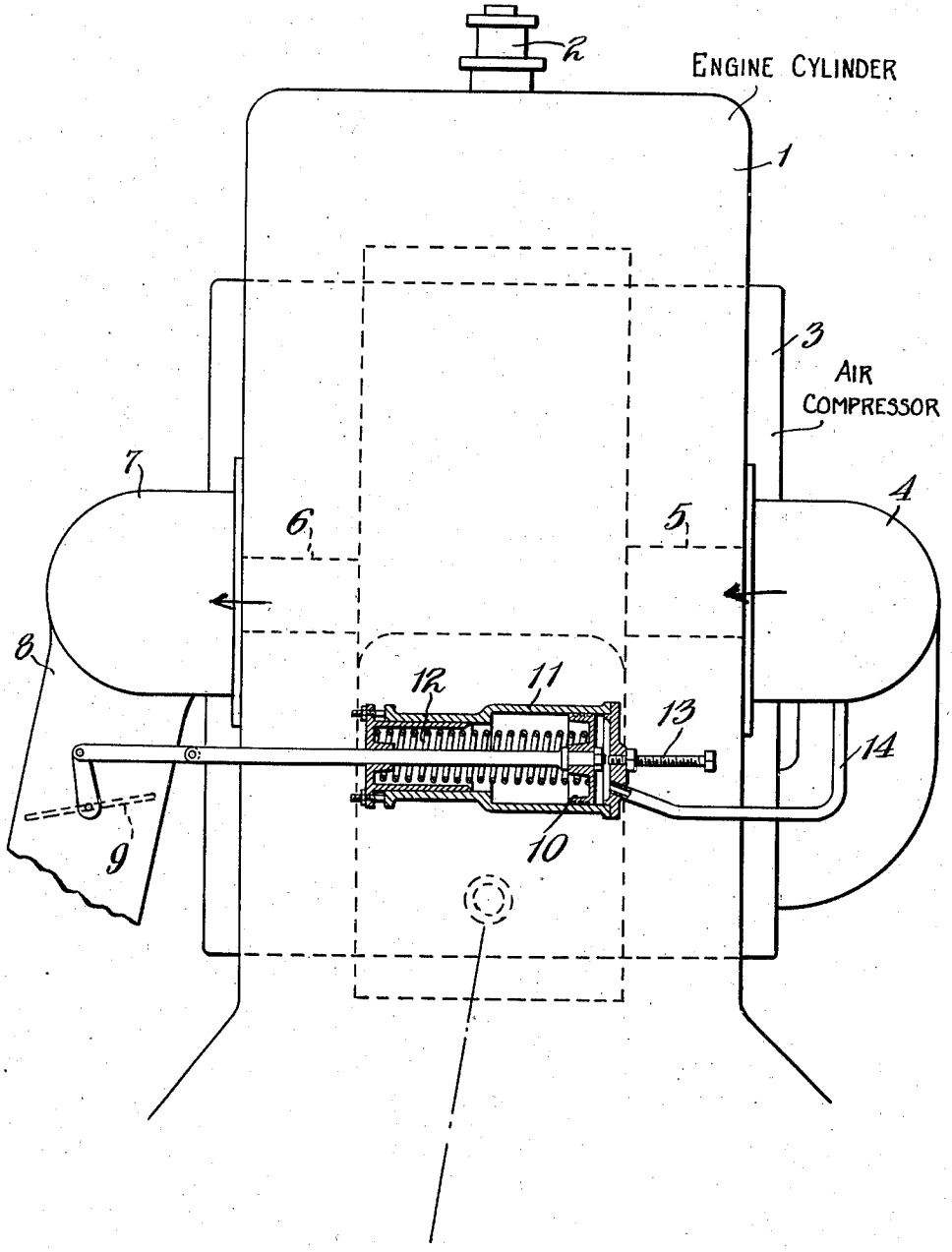
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TWO-CYCLE ENGINE

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TWO-CYCLE ENGINE

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1 Claim. (Cl. 123—65)

The invention relates to compression-ignition, two-cycle combustion engines, the object being the improvement of general efficiency gained from an automatic control of the scavenging air pressure as herein disclosed. In engines of the kind referred to the scavenging air is commonly derived from a pump usually directly driven by the engine and is accumulated in a receiver or manifold from which it passes to the engine cylinders through piston-controlled air inlet ports, escaping thence to the exhaust. Air pressure is built up in the receiver by virtue of the resistance to the outflow of the air through the cylinders and, with a constant volume ratio of scavenging air, such resistance is lower at lower engine speeds because of the longer periods for which the ports are open. In consequence the weight of the air charge left in the cylinder at the conclusion of scavenging may not be enough to produce an ignition temperature for the injected fuel on the ensuing compression. On the other hand, if the air system is designed to supply adequate air for lower speeds, the pressure is then unnecessarily high at the higher speeds. This results in waste of power in compressing a larger volume of air to a higher pressure as well as possibly dangerous firing pressures in the combustion cylinder. Low engine speeds occur while the engine is being started and, in the case of variable speed engines, occur of course during the low speed operating range.

This invention overcomes the objection referred to by automatically increasing the pressure of the scavenging air at starting or low engine speed without affecting its pressure at full engine speed, while not unnecessarily increasing the size of the scavenging system.

According to this invention these advantages are accomplished by means of an automatically variable resistance in the exhaust conduit which increases or decreases the back pressure of the exhaust and therefore of the scavenging air in accordance with the decrease or increase of the pressure of the scavenging air itself in the receiver.

In the accompanying drawing which will be recognized as wholly diagrammatic, 1 designates an engine cylinder which may be taken to be one of a line or row of two-cycle cylinders all working on a common crank shaft. The fuel injection valve is marked 2. Scavenging air is supplied by an air pump 3 (shown in its usual place back of the engine cylinder) to the intake manifold or receiver 4, from whence it passes by air ports 5 to the several cylinders and, during the scavenging and exhaust periods, from the latter through the exhaust port 6, thence into the exhaust manifold 7 and exhaust flue 8.

The variable resistance member is indicated as an ordinary butterfly damper 9 in the exhaust outlet. It is linked to the piston rod 10 of a piston working in the cylinder 11 which may be mounted at any convenient point on the intake. The piston is pressed to one end of the cylinder by a spring 12 and against the end of an adjustment screw 13, in which position it closes the exhaust damper to a position less than completely closed. It is actuated in the opposite direction by air pressure admitted to it through a pipe 14 directly from the air receiver 4.

At starting and at low engine speeds, when the scavenging air pressure would be otherwise low, the spring partially closes the exhaust damper. As pressure builds up in the scavenging receiver it overcomes the pressure of the spring and gradually opens the damper, thus by degrees reducing the restriction to the exhaust. For example, if the desired fuel speed conditions are attained with scavenging air pressure to say 5 lbs. and this is obtained with the minimum resistance in the exhaust conduit, the air pressure, at low speed and without any resistance, might be only 1 lb., while a pressure of 2½ lbs. may be essential to the proper ignition of the injected fuel. This 2½ lbs. would automatically be obtained at low speed by the partial closing of the exhaust damper to such an extent that the scavenging pressure would become 2½ lbs. The spring in the cylinder is adjusted so that when the piston is at its full inward position the exhaust damper is closed to the desired degree. The abutment screw is provided in the head of the cylinder to fix the maximum closing of the damper and therefore the maximum degree of throttling of the exhaust.

I claim:

In a two-cycle compression-ignition engine, the combination of its fuel injection means, scavenging pump, air receiver and exhaust conduit, with a damper in said conduit, means operable by and increasing the air pressure in said receiver for operating said damper and means for limiting the closing movement of said damper to a degree of exhaust restriction suited to maintain compression ignition of the injected fuel.

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