

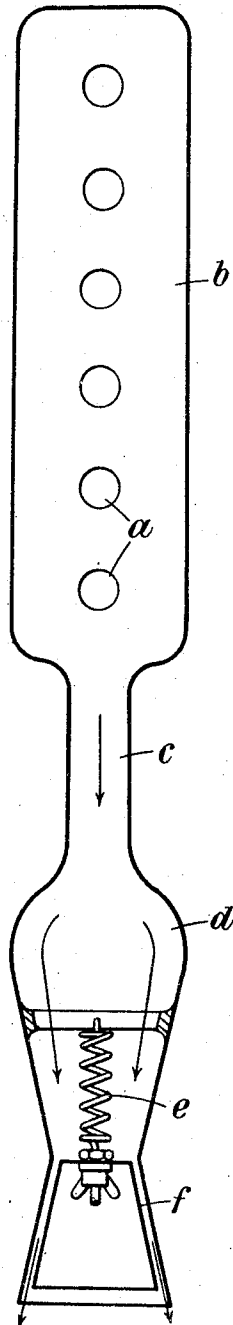
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F. FEYENS

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INTERNAL COMBUSTION ENGINE

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UNITED STATES PATENT OFFICE

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INTERNAL-COMBUSTION ENGINE

Application filed April 9, 1928, Serial No. 268,541, and in Belgium April 15, 1927.

This invention relates to a device for minimizing or nullifying the disturbing effects upon the working of internal combustion engines, which may be caused by variations of pressure of the surrounding atmosphere, such as may be met with by aviation engines operating at different altitudes, this pressure generally decreasing the higher the altitude reached. To this end the device is designed to oppose to the discharge of the outgoing gaseous products of combustion, a counter-pressure which can be varied to suit the different atmospheric pressures to which the engines are likely to be subjected when operating at different altitudes.

The foregoing desirable result is attained by discharging the gases from the engine into a chamber whence they reach the atmosphere through a discharge outlet controlled by a valve held to its seat by an adjustable spring.

The invention is of particular importance when used in connection with certain two-stroke engines wherein the volume of air compressed within the engine casings may very largely exceed the capacity of the combustion chambers of said engines, the excess of air beyond that which is required for the charging of the cylinders with the proper explosive mixture being utilized for efficiently scavenging the cylinders, the relative capacities of the casings and the cylinders being designed to secure this result when working with normal external atmospheric pressure. When, however, the external pressure is below normal, as at high altitudes or when the exhaust is located in a position in which it is subjected to reduced pressure arising from the motion of aircraft on which the engine is being used, excessive discharge from the exhaust will result in an inefficient charging of the cylinders. The present invention, however, overcomes this difficulty by providing means for establishing a constant counter pressure which will prevent any such excessive discharge.

One constructional form of the invention suitable for a six-cylinder engine is diagrammatically illustrated in longitudinal section in the accompanying drawing.

As here shown, the exhaust pipes *a* all open into a common chamber *b* having a much larger capacity than that of the engine cylinders, so that a certain pressure will be produced in the said chamber.

From this chamber *b* the gases pass through a relatively restricted pipe or neck *c* of suitable diameter to act as a check on the free discharge of the gas into an outlet chamber *d* provided with a control valve *f*. The resistance of a spring *e* and of the external pressure is then overcome by the pressure of the gases within the chamber *d*, and the surplus gases are discharged past the valve *f*. By increasing the tension of the spring *e* to accord with a decrease in the external pressure, it is possible to maintain the counter-pressure normal in the exhaust chamber *b*, and consequently constant in each cylinder.

The function of the outlet *c*, which is of restricted area both in relation to the chamber *b* and the outlet chamber *d*, is to cause a check to the discharge of the escaping gases before allowing their expansion into the second checking chamber *d*, the outlet *c* thus acting as a static checking means, the action of which precedes the regulable checking means at the outlet of the chamber *d*.

Having described my invention, I declare that what I claim and desire to secure by Letters Patent is:—

1. In combination with an internal combustion engine having an exhaust pipe leading from the engine cylinder, an exhaust chamber connected with said pipe and of greater capacity than that of the cylinder, an outlet chamber, a neck of reduced cross-sectional area connecting the exhaust chamber with the outlet chamber and constituting a primary medium for checking the outward flow of the exhaust gases, an outlet opening to the atmosphere from the outlet chamber, and an outwardly opening valve in said outlet operated by the pressure of the out-flowing gases and affording a restricted outlet passage constituting a secondary medium for checking the outward flow of the exhaust gases; whereby a counter pressure is created which is opposed to the discharge of the exhaust gases, which counter

pressure may be controlled to prevent excessive exhaust discharge.

2. In combination with an internal combustion engine having an exhaust pipe leading from the engine cylinder, an exhaust chamber connected with said pipe and of a capacity greater than that of the cylinder, an outlet chamber, a neck of reduced cross-sectional area connecting the exhaust chamber with the outlet chamber and constituting a primary medium for checking the outward flow of the exhaust gases, an outlet opening to the atmosphere from the outlet chamber, an outwardly opening valve in said outlet operated by the pressure of the outflowing exhaust gases and affording a restricted outlet passage, said valve constituting a secondary medium for checking the flow of the exhaust gases, a spring acting on said valve and tending to close the same, and means for adjusting the tension of the spring; whereby a counter pressure is created which is opposed to the discharge of the exhaust gases, and which counter pressure can be varied to suit different atmospheric pressures at different altitudes.

3. In combination with an internal combustion engine having a plurality of exhaust pipes leading from a plurality of engine cylinders, an exhaust chamber into which all of said pipes discharge, said chamber having a capacity greater than the combined capacities of all of the cylinders, an outlet chamber, a neck of reduced cross-sectional area connecting the exhaust chamber with the outlet chamber and constituting a primary medium for checking the outward flow of the exhaust gases, an outlet opening to the atmosphere from the outlet chamber, and an outwardly opening valve in said outlet operated by the pressure of the outflowing gases and affording a restricted outlet passage constituting a secondary medium for checking the outward flow of the exhaust gases; whereby a counter pressure is created opposed to the discharge of the exhaust gases, which counter pressure may be controlled to prevent excessive exhaust discharge.

4. In combination with an internal combustion engine having a plurality of exhaust pipes leading from a plurality of engine cylinders, an exhaust chamber into which all of said pipes discharge, and having a capacity greater than the combined capacities of all the cylinders, an outlet chamber, a neck of reduced cross sectional area connecting the exhaust chamber with the outlet chamber and constituting a primary medium for checking the outward flow of the exhaust gases, an outlet opening to the atmosphere from the outlet chamber, an outwardly opening valve in said outlet operated by the pressure of the outflowing gases and affording a restricted outlet passage constituting a second medium for checking the flow of the exhaust

gases, a spring acting on said valve and tending to close it, and means for adjusting the tension of the spring; whereby a counter pressure is created opposed to the discharge of the exhaust gases, which counter pressure is adapted to be varied to suit different atmospheric pressures at different altitudes. In witness whereof I have affixed my signature hereto.

FRANÇOIS FEYENS.