Feb. 6, 1923.

1,444,547

A. T. KASLEY

INLET MANIFOLD

Filed Nov. 20, 1920

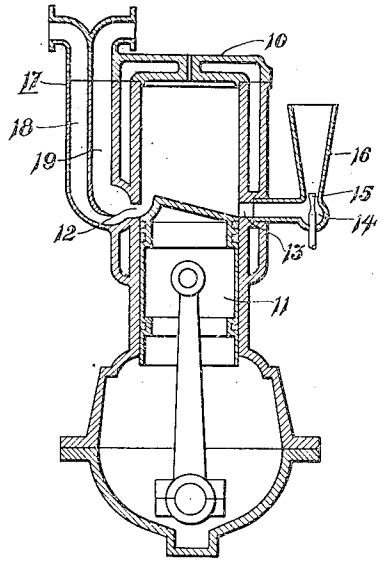


Fig. 1.

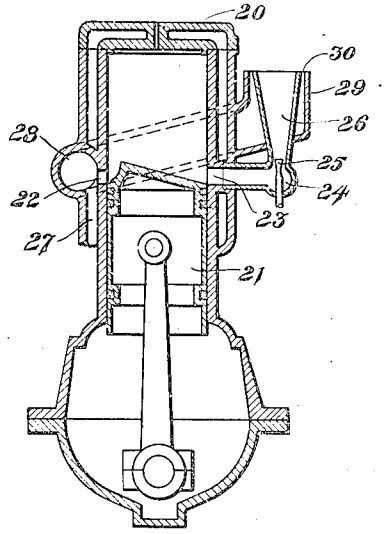


Fig. 2.

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UNITED STATES PATENT OFFICE.

ALEXANDER T. KASLEY, OF ESSINGTON, PENNSLYVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

INLET MANIFOLD.

Application filed November 20, 1920. Serial No. 425,498.

To all whom it may concern:

Be it known that I, ALEXANDER T. KASLEY, a citizen of the United States, and a resident of Essington, in the county of Delaware and State of Pennsylvania, have invented a new and useful Improvement in Inlet Manifolds, of which the following is a specification.

My invention relates to internal combustion engines and it has particular reference to a construction of inlet manifolds to be employed in connection with Diesel engines and it has for an object to provide a new and effective means for supplying air to the inlet ports of internal combustion engines, especially of the character designated.

It is well known that the efficiency of an internal combustion engine, particularly of the Diesel type, is increased by thorough scavenging, and that the new charge of air to be compressed on the return stroke of the piston should be as free as possible from burned gases of the preceding charge. It frequently happens in the operation of two-cycle engines that the burned gases in the engine cylinder are, at the first opening of the air port, under a higher pressure than that of the air in the inlet manifold, a condition which produces a rush of burned gases into the air inlet manifold. These burned gases are mixed with the incoming air and drawn into the cylinder, materially decreasing the power of the succeeding stroke.

I am enabled, by my invention, to prevent this disadvantageous back flow of burned gases by providing a constant flow of pure air past the inlet ports so that if any burned gases are forced into the inlet manifold during the early opening of the air ports, they are carried away by the air current and hence are prevented from reentering the engine cylinder.

In the accompanying drawing, Figure 1 is a diagrammatic sectional view of an engine cylinder equipped with an air inlet arrangement constructed in accordance with my invention and Fig. 2 is a similar view, illustrating another embodiment of my invention.

In Figure 1 of the drawing, I show an internal combustion engine of the usual two-cycle type, comprising a cylinder 10 in which a piston 11 is arranged to reciprocate and provided with a piston-controlled inlet port 12 and exhaust port 13. The exhaust port 13 open into a chamber 14 from which the burned gases are discharged by any suitable evacuating device. As illustrated, an ejector 15 extends into the chamber 14 and is arranged to discharge the exhausted gases through a diffuser 16.

An air inlet manifold is provided to supply a constantly moving stream of air past the inlet port 12. It may be of any conformation suitable to produce the desired flow of air and as shown comprises a U-shaped conduit 17 having a down-flow passage 18 and an up-flow passage 19. The up-flow passage 19 is contiguous to the engine jacket and is consequently maintained at a higher temperature than the down-flow passage 18, due to heat transmitted from the engine. As a result of this construction, a constant flow of air is produced within the U-shaped conduit in accord with the well known thermo-siphon principle.

Having thus described the arrangement of a device constructed in accordance with my invention, the operation thereof is as follows: Upon the outward or power stroke of the piston of an internal combustion engine, it is customary, especially when the engine is running at high speeds, that the air port be opened at a time when the pressure in the cylinder is higher than the pressure of the air in the inlet manifold. Under these conditions, exhaust gases rush outwardly through the air port into the inlet manifold. The relation of the inlet manifold to the engine cylinder is such that the heat transmitted from the cylinder to the manifold causes a continuous stream of air to flow past the inlet port and to carry away any burned gases that may escape through the inlet port. This mode of operation insures that, when the pressure within the cylinder has been reduced below atmospheric pressure by the suction scavenging means, only pure air is drawn into the engine cylinder.

Referring to Figure 2, 20 indicates a cylinder of an internal combustion engine in which a piston 21 is adapted to reciprocate. The cylinder 20 is provided with an air inlet port 22 and with an exhaust port 23, the latter communicating with an exhaust chamber 24. The burned gases are discharged

by any suitable evacuating device and, as shown in the drawing, an ejector 25 is extended into the chamber 24 and is arranged to discharge the exhaust gases through a diffuser 26.

An air inlet manifold 27 communicates with the inlet port 22 and is so constructed as to lead a current of air continuously upwardly past the inlet port. The manifold 27 extends upwardly and communicates with a horizontally inclined conduit 28, which may be semicircular to conform to the contour of the engine jacket and, if desired, may be arranged in close contact therewith. The upper end of the conduit 28 opens into a chamber 29 which surrounds the diffuser 26 of the exhaust mechanism of the engine. This arrangement permits heat from the engine jacket and from the exhaust gases to be communicated to the air within the conduit 28 and the chamber 29 and, as a result, a current of air flowing upwardly through the manifold 27, the conduit 28 and the chamber 29 is produced. The chamber 29 communicates with the atmosphere through the annular opening 30 formed between the walls of the diffuser 26 and those of the chamber 29. The respective walls may be so positioned with relation to each other that the discharge of the exhaust gases through the diffuser 26 produces an ejector action upon the air in the chamber 29, thus increasing the flow of air through the manifold 27.

The operation of the device disclosed in Figure 2 is similar to that described above with relation to apparatus of Figure 1. As has been already pointed out in the above description of Figure 2, when the engine is in operation, air is continuously drawn through the manifold 27 due to the heating of the air in the conduit 28 and in the chamber 29, and an added current of air may be induced through the manifold by associating the exhaust of the burned gases with the discharge of air from the chamber 29 so as to produce an ejector action. It is obvious that under certain conditions, it may not be necessary or desirable to utilize all three of the means above recited for producing a current of air past the air inlet port. It may be, under certain conditions of operation, that any one or the combination of any two of the current producing means will provide an ample current of air past the air ports. In cases, however, where the temperature of the surrounding atmosphere is relatively high, as in engine rooms of marine power plants, it may be desirable to utilize all of these means, viz; the heat of the engine jacket, and kinetic and heat energy of the exhaust gases for maintaining a suitable current through the air passages.

It is apparent that other means than those described herein for carrying a circulation of air past the air inlet ports may be employed with equal advantage. For example, the use of a fan blower within the air inlet manifold would accomplish the results obtained by applicant's structure. The specific structures shown are, however, simple, compact, and efficient and may be attached to any standard engine without material modification of the engine structure.

My improved construction is also capable of use with other types of engines than that illustrated. Internal combustion engines of various types, including those in which mechanically-operated valves are employed, may be equipped with my improved air inlet mechanism with equally beneficial results.

While I have shown my invention in two forms, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art or as are specifically set forth in the appended claims.

What I claim is:—

1. In an internal combustion engine, a cylinder having an inlet port, and thermosiphon means for maintaining a current of air past the inlet port, whereby gases exhausted through said inlet port are carried away and are not drawn back into the cylinder.

2. In an internal combustion engine, a cylinder having an air inlet port, and means for utilizing heat generated in the engine for maintaining a current of air past the inlet port, whereby gases exhausted through said inlet port are carried away and are not drawn back into the cylinder.

3. In an internal combustion engine, a cylinder having an air inlet port, a conduit supplying air to said port and means for utilizing the waste heat of the engine for maintaining a current of air past the inlet port whereby gases exhausted through said inlet port are carried away and are not drawn back into the cylinder.

4. The combination with an internal combustion engine, a cylinder having an air inlet port, of an inlet manifold comprising an up-flow passage into which the air port opens, and means for maintaining a current of air through the up-flow passage and past the air inlet port for the purposes set forth.

5. The combination with an internal combustion engine, a cylinder having an inlet port, of an inlet manifold into which the air port opens, means for utilizing a part of the heat energy of the engine for maintaining a current of air through the manifold and past the air inlet port for the purposes set forth.

6. The combination with an internal combustion engine, a cylinder having an air inlet port, of an inlet manifold comprising an

up-flow passage into which the air port opens, the up-flow passage being contiguous to the engine cylinder, whereby a current of air is maintained in the up-flow passage and past the air inlet ports for the purposes set forth.

7. The combination with an internal combustion engine comprising a cylinder, having an air inlet port and an exhaust gas port of a manifold for supplying air to the inlet port, a manifold for carrying away the burned gases from the exhaust port, and means for utilizing the heat of the exhaust gases within the exhaust manifold for maintaining a current of air through the inlet manifold and past the air inlet port.

8. The combination with an internal combustion engine comprising a cylinder having an air inlet port and an exhaust gas port, of a manifold comprising a conduit into which the air port opens, a manifold for carrying away the burned gases from the exhaust port, and means for utilizing the heat of the exhaust gases within the exhaust manifold for maintaining a current of air through the conduit and past the air inlet port.

9. The combination with an internal combustion engine comprising a cylinder having an air inlet port and an exhaust gas port, of a manifold comprising a conduit into which the air port opens, a manifold for carrying away the burned gases from the exhaust port, a chamber surrounding at least a portion of the exhaust manifold and in communication with the conduit, the chamber and the conduit being so arranged that a current of air is maintained in the conduit and past the air inlet port for the purpose set forth.

10. The combination with an internal combustion engine comprising a cylinder, having an air inlet port and an exhaust gas port, of a manifold for supplying air to the inlet port, a manifold for carrying away the burned gases from the exhaust port, and means for utilizing the kinetic energy of the gases in the exhaust manifold for maintaining a current of air through the inlet manifold and past the air inlet ports.

11. The combination with an internal combustion engine comprising a cylinder having an air inlet port and an exhaust gas port, of a manifold comprising a conduit into which the air port opens, a manifold for carrying away the burned gases from the exhaust port, a chamber surrounding at least a portion of the exhaust manifold, the chamber being in communication with the conduit, the exhaust manifold and chamber being so arranged that the gases discharged from the exhaust manifold produce an ejecting action upon the air within the chamber and thus create a current of air through the conduit and past the air inlet port for the purpose set forth.

12. The combination with an internal combustion engine comprising a cylinder having an air inlet port and an exhaust gas port, of a manifold for supplying air to the inlet port, a manifold for carrying away the burned gases from the exhaust port, and means for utilizing both the kinetic energy and the heat of the exhaust gases within the exhaust manifold for maintaining a current of air through the inlet manifold and past the air inlet port.

13. The combination with an internal combustion engine comprising a cylinder having an air inlet port and an exhaust gas port, of a manifold comprising a conduit into which the air port opens, a manifold for carrying away the burned gases from the exhaust port, a chamber surrounding at least a portion of the exhaust manifold, the chamber being in communication with the conduit, a portion of the conduit between the inlet manifold and the chamber lying contiguous to engine cylinder, the chamber and the conduit being so arranged that some of the kinetic and heat energy of the exhaust gases and the heat energy of the engine cylinder may be utilized for maintaining a current of air through the conduit and past the air inlet port.

In testimony whereof, I have hereunto subscribed my name this 17th day of November, 1920.

ALEXANDER T. KASLEY.