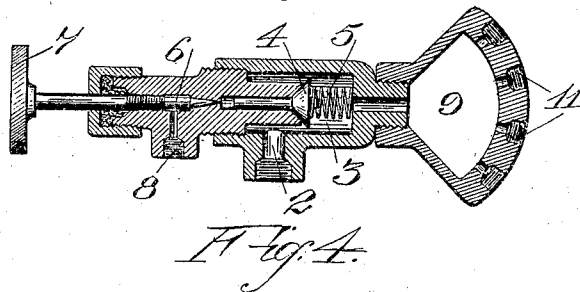
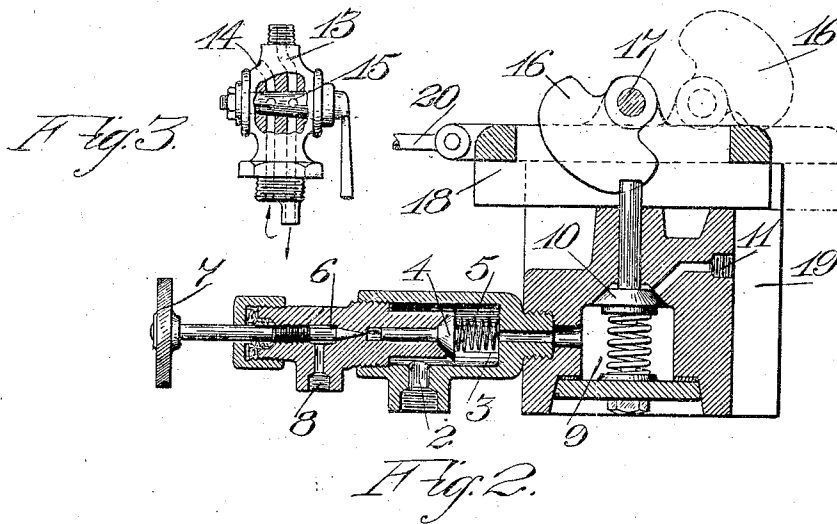
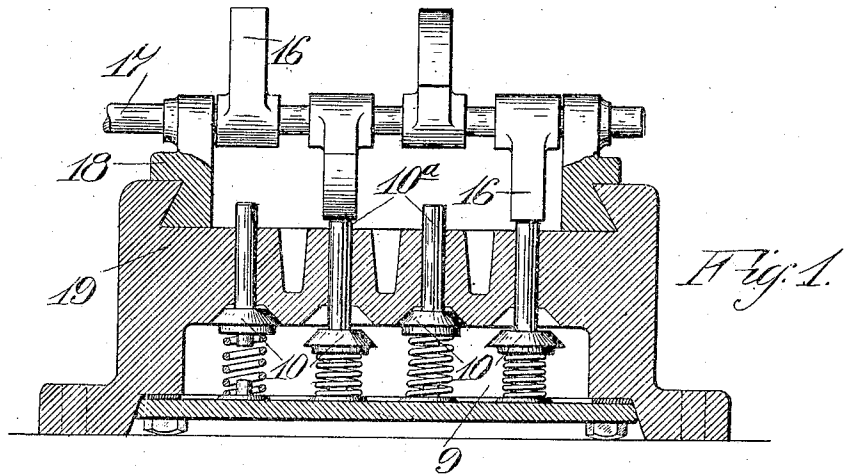


W. A. HANSEN.
 SELF STARTING DEVICE FOR GAS ENGINES.
 APPLICATION FILED NOV. 16, 1907.

929,588.

Patented July 27, 1909.

2 SHEETS—SHEET 1.



WITNESSES

J. Eastberg
Geo. Source

INVENTOR

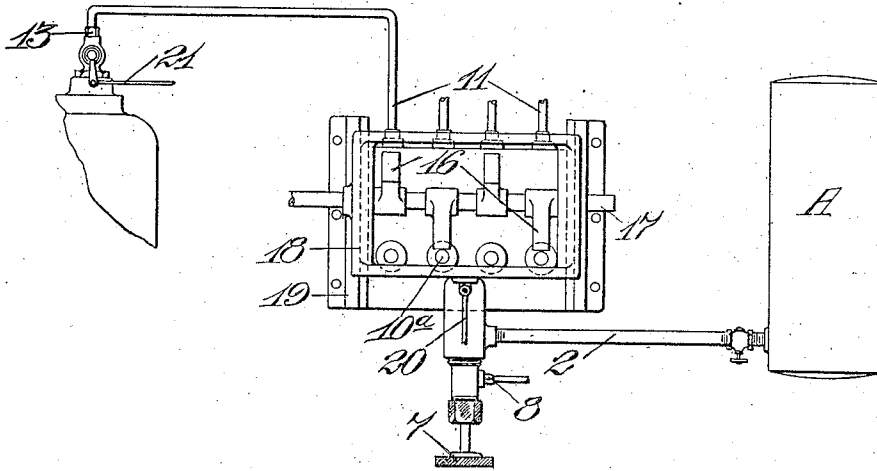
William A. Hansen.
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 ATTORNEY

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Fig. 5.



WITNESSES

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UNITED STATES PATENT OFFICE.

WILLIAM A. HANSEN, OF SAN FRANCISCO, CALIFORNIA.

SELF-STARTING DEVICE FOR GAS-ENGINES.

No. 929,588.

Specification of Letters Patent.

Patented July 27, 1909.

Application filed November 16, 1907. Serial No. 402,377.

To all whom it may concern:

Be it known that I, WILLIAM A. HANSEN, a citizen of the United States, residing in the city and county of San Francisco and State of California, have invented new and useful Improvements in Self-Starting Devices for Gas-Engines, of which the following is a specification.

My invention relates to devices which are especially applicable for the starting of internal combustion engines without a preliminary cranking or other starting mechanism.

It consists in the combination of parts, and in details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a longitudinal section through the valve-box. Fig. 2 is a cross section of same. Fig. 3 shows a modification of construction. Fig. 4 shows the double cock. Fig. 5 is a diagrammatic view showing the different parts assembled.

For the purpose of the preliminary starting of internal combustion engines using an explosive mixture, it is necessary to charge one or more of the cylinders with the explosive. This is usually effected by means of a hand-crank which may be temporarily connected with the main crank shaft for the purpose of turning the latter over and introducing one or more charges of explosive mixture into the engine cylinders.

My invention is designed to provide a means for substantially scavenging a cylinder or cylinders of the burned gases which may remain therein when the engine stops, and introducing into the cylinders a charge or charges of air or explosive mixture in readiness to be ignited when the switch is turned on, or an elastic fluid under pressure.

In carrying out my invention I employ a tank or receiver A, into which a charge of air may be pumped, either by direct connection with some moving part of the engine, or by hand or other means, said receiver being thus constantly charged to a light pressure. This receiver is connected by a pipe to an inlet passage 2 which opens into a chamber 3, within which is seated a valve 4, this valve being normally closed by a light spring 5. In line with this valve is a needle valve 6 with a hand-wheel or other controlling device 7, by which said valve may be opened to the proper degree, and when once set it will remain in that condition.

8 is an opening or passage connecting with a source of gasoline, or other hydrocarbon liquid supply; this passage opening into the chamber behind the seat of the needle-valve 6 so that when the connection at 15 has been opened, and air from the tank A is allowed to enter, the pressure of this air will be sufficient to open the valve 4, and the suction caused by the rush of air past this valve will draw in a sufficient amount of gasoline to form with the air, the proper explosive mixture which is delivered into a chamber 9 having spring-pressed valves 10 controlling its outlet.

A passage 11 from the chamber 9 is normally closed by the valve 10, and when the valve 10 is opened, the compressed explosive mixture within the chamber 9 is allowed to pass through the proper passage or passages to the cylinders of the engine.

Each cylinder is provided with a double cock having an inlet passage 13, and an outlet passage 14, both opened and closed in unison by the cock 15.

The inlet passage 13 conducts the gas which is received from the chamber 9 and passage 11 directly into the cylinder, in the form of a jet which will act to scavenge the cylinder, and clean out any burned or useless gas which may remain therein; this gas being forced out through the passage 14 which, as before stated, is opened simultaneously with the passage 13.

The valves 10, as shown in Fig. 1, are opened by cams 16, of which there may be one for each of these valves. These cams are mounted upon a shaft 17, which shaft is so connected as to revolve in unison with the shaft of the cams which actuate the main valves of the engine, so that in whatever position the engine may have stopped, some of the valves 10 will be in position to admit a charge into the cylinders as previously described. This cam shaft 17 is here shown as mounted upon a frame 18 which is guided and slidable upon that portion of the device 19 which contains the valves 10; the stems 10^a of these valves projecting upward through the part 19 so as to be in line with the cams 16 when the latter are in position. This position of the cams and their shaft is only required in order to start the engine, and when the engine has been started, the slidable frame 18 carrying the cam shaft and cams may be moved out of line with the valve stems 10^a and the starting mechanism

will then become inert after the engine has been started.

The connection between the shaft 17 and the main cam shaft may be made by the usual well known flexible shafts not here shown, or by any suitable equivalent mechanism, and the frame 18 may be moved to bring the cams into proper relation by a foot or hand-lever acting through a connecting rod 20. The cocks 15 are opened and closed in unison with the movements above described, by means of an operating rod 21 or other appropriate means.

In some cases it may be found convenient or desirable to dispense with the valves 10 and their actuating mechanism, in which case the passages 11 extending to each of the cylinders as previously described, will all receive a charge of impelling mixture supplied through the passages 2 and 8, and the valve 4, and a portion at least of the mixture will thus be delivered to a cylinder or cylinders which are in position to have their charge ignited, and to thus start the engine, in which case it will only be necessary to open the valve or cock from the compressed air-cylinder A without the use of the mechanism heretofore described.

By this apparatus I am enabled to not only supply a perfect explosive mixture to the cylinders of the engine, but to also scavenge or clear the cylinders of any burned gases remaining therein which might interfere with the proper starting.

It will be understood that when some of the engine pistons will stand in a position to be started by simple pressure, compressed air alone will be sufficient to start the engine.

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

1. In a starting device of the character described, the combination with an internal combustion engine, of a compression tank, a chamber into which air is admitted, a normally closed spring-actuated valve connecting with said chamber, a hydrocarbon supply, and a needle-valve controlling the admission of hydrocarbon, said valves being arranged

substantially in line, said hydrocarbon mixing with the air in said chamber and said chamber having passages leading from it to the engine cylinders, means for temporarily opening communication with the engine and closing it after the engine has started, and a coacting inlet and outlet scavenging cock.

2. In an apparatus of the character described, the combination with an internal combustion engine, and a compression tank, of a mixing chamber having means connecting it with said tank, a valve in said chamber and against which the air impinges, said valve being spring seated, means for admitting hydrocarbon to the chamber, a needle-valve controlling the admission of hydrocarbon, said air operating to unseat the first-named valve to thereby admit the hydrocarbon to mix therewith and form an explosive mixture, connections between the mixing chamber and the engine cylinder said connections including spring-pressed valves and means for opening the same, and combined admission and discharge cocks whereby the engine cylinders may be simultaneously scavenged and supplied with an explosive mixture.

3. In an apparatus of the character described, a mixing chamber, valves admitting air under pressure and proportional mixing values of gasoline, valve-controlled passages leading from the mixing chamber to each of the engine cylinders, cams set in unison with the main valve actuating cams, a carriage upon which the shaft of said supplemental cams is mounted, said carriage being movable to bring the cams into position to open the valves from the mixing chamber or to allow them to remain closed, and a cock with co-acting inlet and discharge passages, and means actuating said cock in unison with the supplemental cams.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WILLIAM A. HANSEN.

Witnesses:

GEO. H. STRONG,
C. A. PENFIELD.