A. VOGT.

INTERNAL COMBUSTION ENGINE.

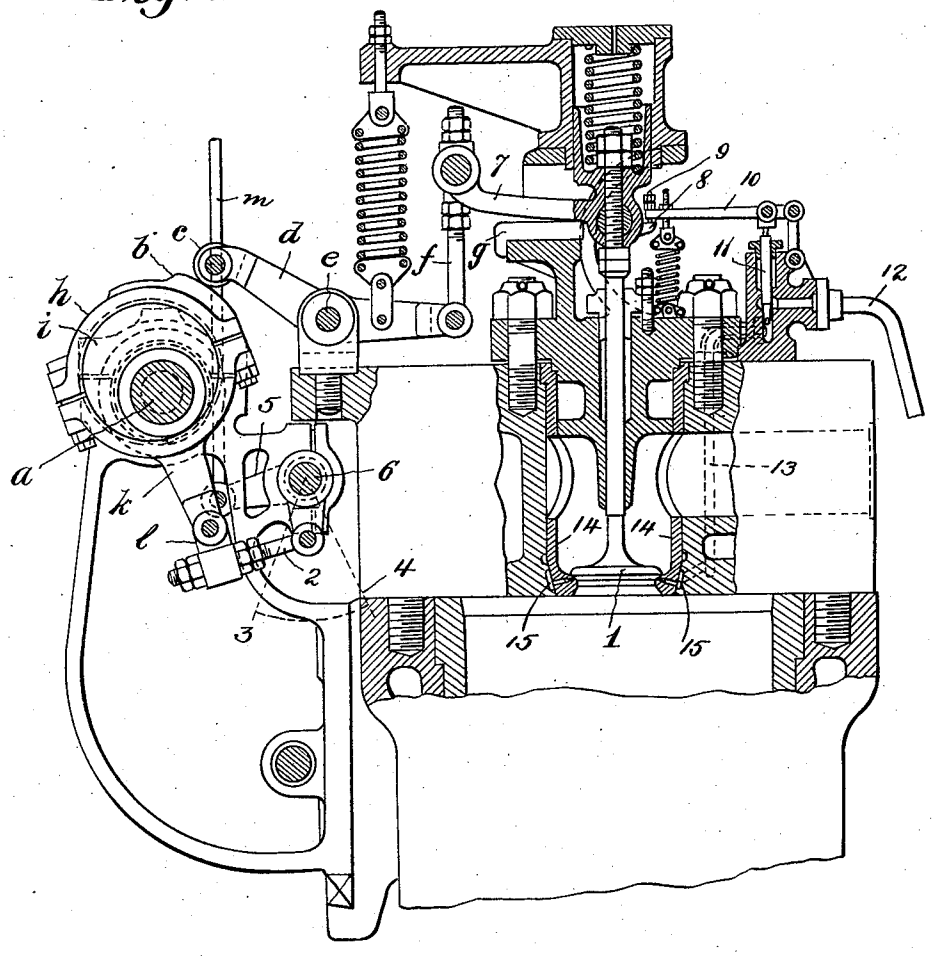
APPLICATION FILED MAY 18, 1906.

1,012,769.

Patented Dec. 26, 1911.

3 SHEETS—SHEET 1.

Fig. 1.



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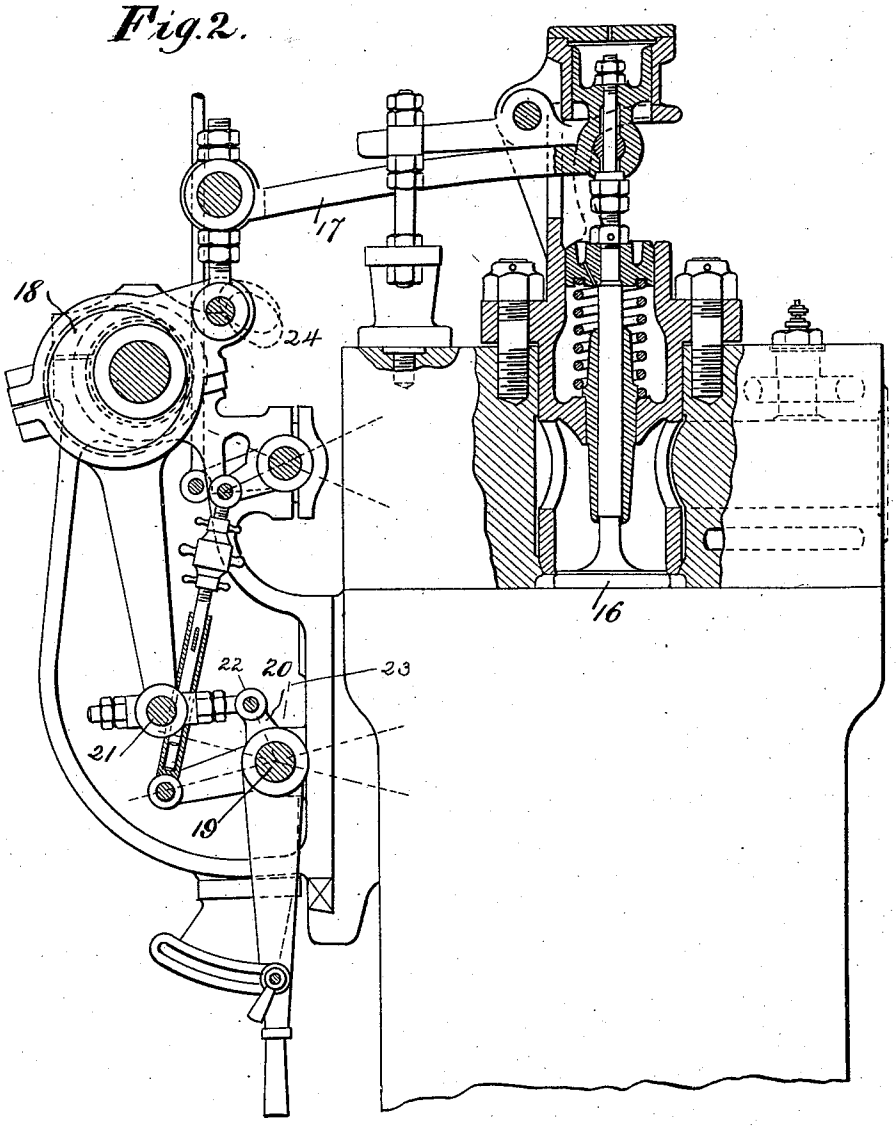
3 SHEETS—SHEET 2.

Fig. 2.



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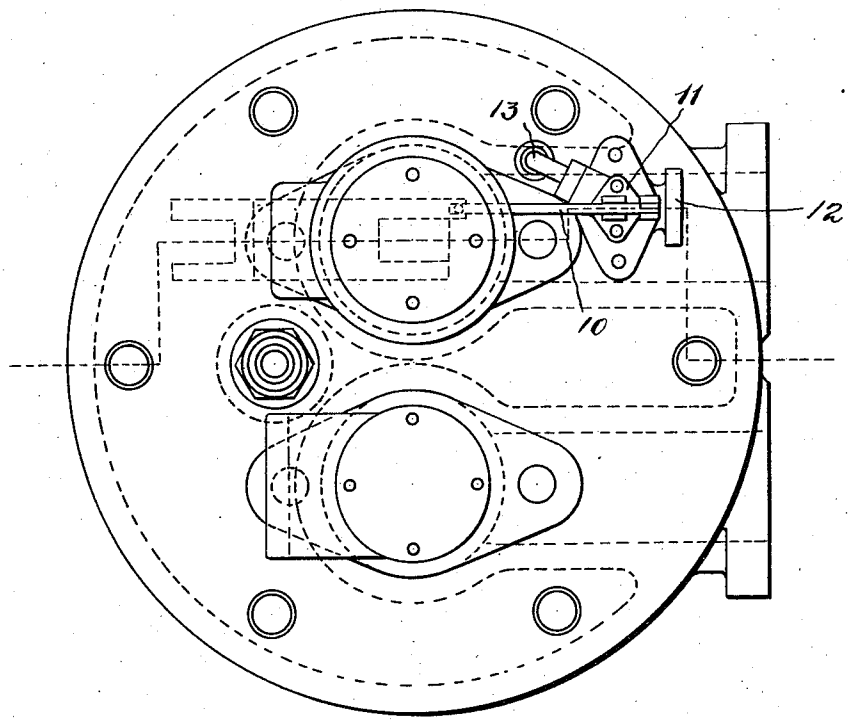
3 SHEETS—SHEET 3.

Fig. 3.



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UNITED STATES PATENT OFFICE.

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INTERNAL-COMBUSTION ENGINE.

1,012,769. Specification of Letters Patent. Patented Dec. 26, 1911.

Application filed May 18, 1906. Serial No. 317,591.

To all whom it may concern:

Be it known that I, ADOLF VOGT, a citizen of Austria-Hungary, residing at 149 Tulse Hill, in the county of Surrey, England, civil engineer, have invented certain new and useful Improvements in and in Connection with Internal-Combustion Engines, of which the following is a specification.

My invention has for its object the construction of an internal combustion motor in which the ignition of the combustible charge is normally effected by the compressed residues of the previous charge when a combustible mixture of gas or combustible liquid spray and air is forced into this compressed gaseous body. The burned gases are compressed up to 20—30 atms. about 35 per cent. of the cylinder volume being sufficient to obtain the required degree of compression. In order to obtain a satisfactory combustion at an approximately, or perfectly, equal pressure, it is essential that the residues should always be compressed to a pressure corresponding to the pressure of the admitted air or charge. It is also important to mix the combustible with air or other oxygen containing gas at a point between the cylinder and the admission conduit, preferably within the admission valve itself, and to provide for the mixture being always maintained in a condition ready to burn. These objects are obtained according to the present invention by the arrangement of an admission valve in which the mixture of the combustible with air takes place at the point of juncture of the admission conduit and the cylinder, and by an arrangement of the exhaust valve by which the latter is adapted to be closed before the end of the expelling stroke at such a moment as to insure the burned residues of the combustion to be compressed to a degree sufficient to effect the ignition of the fresh charge. The time of closing of the valve is arranged to be adjustable either by hand or automatically in such a manner that the maximum compression always corresponds with the pressure at which the combustible charge is forced into the motor.

It is important, especially at the beginning of the stroke, that the mixture should be easy to ignite so that a satisfactory ignition and combustion may result within the compression space. The first ignition may be effected by any known igniting device in the cylinder or exhaust conduit, or by increasing all the pressures on starting the engine to such a degree that the ignition is effected by the compression of air admitted into the cylinder by a separate valve. After the initial ignition has been effected the igniting device may be put out of action.

The oxygen carrier, preferably air in most cases, may be supplied by a pump driven directly by the engine or otherwise. Similar means may be used for supplying the combustible to the engine.

The accompanying drawings show by way of example a motor engine with a single working cylinder in which,

Figure 1 is a vertical section through the working cylinder of an engine worked with liquid combustible. Fig. 2 is a section through the exhaust valve and its actuating gear. Fig. 3 is a plan view of the upper end of the engine cylinder showing the location of 13.

The general arrangement of the engine will be readily understood from the drawings. The admission valve 1, (Fig. 1) is operated by a valve gear of the known Zvonick type, in which *a* is the cam shaft driven from any suitable moving part of the engine, *b* the cam for controlling the valve when running forward (there being a similar cam, not shown, for use when the engine is reversed) which cam acts on a roller *c* mounted in one end of the two-armed lever *d* pivoted at *e* and whose opposite end is connected by the adjustable rod *f* to the curved valve lever 7 performing in a well known manner a combined rolling and rocking movement on plate *g* whereby a great leverage is obtained on first opening the valve. The lever 7 is pivotally connected to the stem of the inlet valve 1 and projects beyond this connection in a beak 8. The cam *b* is secured to or forms part of an eccentric strap *h* operated by an eccentric *i* on the shaft *a*. This strap has a projecting arm *k* connected by a link *l* to a lever 2 on the controlling shaft 6 to which is connected a lever 5 connected to the rod *m* raised and lowered by the governor, not shown. When the lever 2 is in the position 3 (Fig. 1) the cylinder receives no charge, while in the position 4 over 50 per cent. filling can be admitted. The governor acts upon the lever 5 which shifts the shaft 6 and consequently the lever 2 and the eccentric strap connected therewith. The spring-closed valve 11 for supplying liquid combustible is opened by

the beak 8 of the lever 7 acting upon the adjusting screw 9 of the lever 10. The lever 7 is operated by the cam surface of the eccentric on the valve motion shaft.

The liquid combustible is supplied from a reservoir or other suitable source, not shown, in which a pressure higher than the working pressure of the cylinder is maintained, it being sufficient for the purposes of this invention that the fuel be supplied at a pressure higher than working pressure by a pipe 12 to the supply valve 11. From the valve 11 leads a channel 13 to the space 15 surrounding the valve casing 14. From the space 15 small perforations lead to the admission valve 1.

When liquid combustible is used the valve 11 for measuring the liquid fuel supply is absolutely necessary. The supply of combustible must be exactly measured as otherwise owing to the admission valve 1 being opened in advance, considerable quantities of liquid combustible might enter the cylinder without air. The valve 11 is also required when the engine is worked with very heavy gas, *e. g.* light, oil, or natural gas, in order to prevent the admission of an excessive quantity of gas during the first moment and the advance opening of the air-valve. The valve 11 should throttle the admission of combustible at the beginning and at the closing of valve 1 so as to maintain always the required proportion of combustible and air.

Fig. 2 shows the actuating gear of the exhaust valve 16. This valve is opened by means of the eccentric 18 operating the lever 17. By means of the lever 20 fixed on the shaft 19, the end 21 of the eccentric rod can be adjusted within certain limits, determined by the two end positions 22 and 23 of the lever 20, whereby the moment of closing of the exhaust valve can be varied. The curves 24 correspond to the two end positions.

I claim:—

1. A two-cycle or two stroke internal combustion engine having a cylinder and piston, and in which the charge is ignited by the heat of the re-compressed residual gases and in which the maximum pressure in the cylinder does not exceed the admission pressure of the incoming combustible mixture, comprising an admission valve, in which the mixture of air and combustible is effected, at the point of junction of the admission conduit and cylinder, the flame extending from the valve into the cylinder on the working stroke during the entire time of admission, an exhaust valve closed before the end of the expelling stroke of the piston, and means to control said exhaust valve, and thereby control the compression pressure of the re-compressed residual gases.

2. A two-cycle or two stroke internal combustion engine having a cylinder and piston, and in which the charge is ignited by the heat of the re-compressed residual gases and in which the maximum pressure in the cylinder does not exceed the admission pressure of the incoming combustible mixture, comprising an admission valve, in which the mixture of air and combustible is effected at the point of junction of the admission conduit and cylinder, the flame extending from the valve into the cylinder on the working stroke during the entire time of admission, an exhaust valve closed before the end of the expelling stroke of the piston, means to control said exhaust valve, and thereby control the compression pressure of the re-compressed residual gases, and means to ignite the initial charge upon starting the engine.

3. In an internal combustion engine in which the ignition is normally effected by the compression of the residues, the combination with the cylinder and piston thereof; of an admission valve in which the mixture of air and combustible is effected at the point of juncture of the admission conduit and cylinder, a separate valve controlling the supply of combustible and arranged to open and close simultaneously with an air admission valve, an exhaust valve operated to close before the end of the expelling stroke to retain a portion of the combustion gases of a previously burned charge in the cylinder and which are compressed to a degree sufficient to effect the ignition of the next charge, and hand operated means for varying the time of closing of the exhaust valve to vary the volume of the retained gases.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ADOLF VOGT.

Witnesses:
JOSEPH MILLARD,
WALTER J. SKERTEN.