

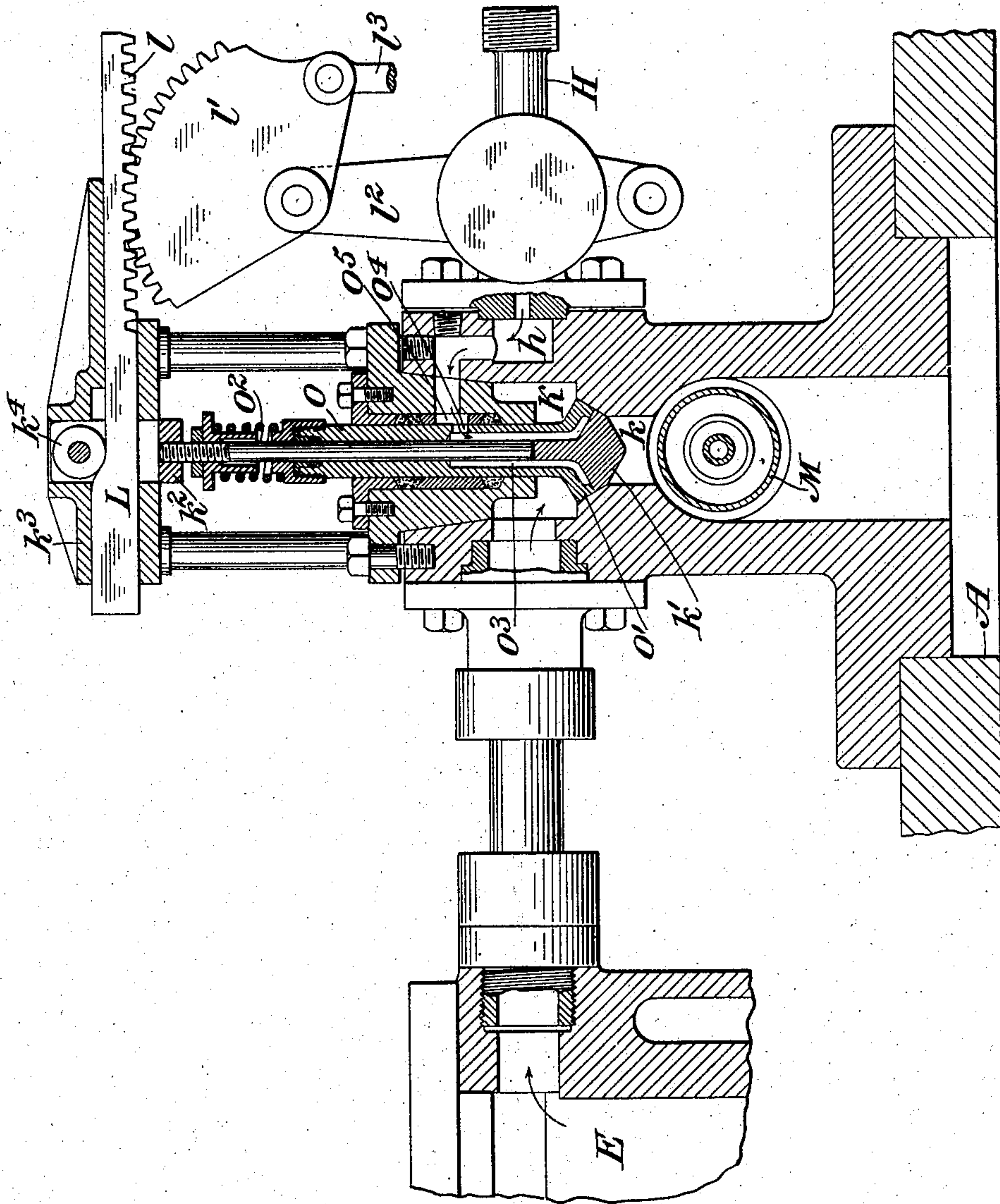
No. 827,303.

PATENTED JULY 31, 1906.

A. B. GOODSPEED.

VALVE GEAR FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED APR. 8, 1905.



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UNITED STATES PATENT OFFICE.

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VALVE-GEAR FOR INTERNAL-COMBUSTION ENGINES.

No. 827,303.

Specification of Letters Patent.

Patented July 31, 1906.

Application filed April 8, 1905. Serial No. 254,427.

To all whom it may concern:

Be it known that I, ARTHUR B. GOODSPEED, a citizen of the United States, residing in Roseville, in the State of New Jersey, have invented certain new and useful Improvements in Valve-Gear for Internal-Combustion Engines, &c., of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

This invention relates generally to internal-combustion engines of the type of that shown in application for Letters Patent of the United States, Serial No. 202,720, filed April 12, 1904, and more especially to the construction of the valves of such engines through which the fuel-oil is admitted to the combustion-chamber. In the engine shown in said application the fuel-oil is admitted to a chamber above the inlet-valve, to which is also admitted the air under pressure, so that when the valve is opened by the means provided for the purpose the oil is carried into the combustion-chamber by the inrushing air. Obviously it is impossible in such a construction to vary the admission of the fuel-oil with respect to the admission of the air.

One object of the present invention is to so construct the valve as to permit the admission of the oil to be regulated independently of the admission of the air, while at the same time provision is made for the complete shutting off of both of these elements of combustion.

Another object is to provide for a more thorough atomization of the oil as it is admitted and directed upon the igniter, and therefore for a better mixture of the oil and the air, while the oil, nevertheless, does not lose its physical identity until combustion begins. Both parts of the improved valve are operated together by the valve-opening means, while that part which controls the admission of oil is capable of operation independently of the other part to provide for the independent regulation of the admission of oil.

Other features of improvement will be more particularly described hereinafter with reference to the accompanying drawing, in which the invention is illustrated as embodied in a convenient and practical form.

The single figure of said drawing represents, partly in elevation and partly in vertical central section, the improved valve in position

in an internal-combustion engine, enough of which is shown to enable the nature and application of the invention to be understood.

In the drawing a portion of the working cylinder of the engine is represented at A. The air which forms one element of the combustible mixture in the working cylinder is admitted under pressure, as from a compression-cylinder (represented at E) to a valve-chamber K, which communicates, through a valve-port *k*, with the working cylinder, a vaporizer and igniter M being interposed between the valve-port and the working cylinder. The fuel-oil, which forms the other element of the combustible mixture, may be supplied through a suitable pipe H from an oil-pump, (not shown in the drawing,) but adapted to supply the oil under pressure. In the present case the oil is not admitted to the valve-chamber K, as described in said former application, but is admitted between the members of the double valve, as hereinafter described. The valve *k'*, which closes the port *k*, has its stem secured to a block *k*², guided in a suitable bracket *k*³ and provided with a roller *k*⁴, which coöperates with a slide-cam L. The latter is also guided in the bracket *k*³ and may be operated by a rack *l*, engaged by a gear-segment *l'*, mounted on a suitable bracket *l*², secured to the cylinder. The gear-segment may be connected, as by a link *l*³, with slide-rod of the engine. The means just described for operating the valve *k'* are the same as those shown in said application, Serial No. 202,720; but any other suitable means may be employed so far as concerns the present invention.

Surrounding the stem of the valve *k'* is a sleeve *o*, which carries at its lower end a valve *o'* to rest upon the valve *k'* and to coöperate with the valve-port *k*, being pressed normally to its seat upon the valve *k'* and upon the valve-port by a spring *o*², interposed between the sleeve *o* and the block *k*² or a collar secured on the stem of the valve *k'*. The valve-seat *k* is preferably conical, as shown, and the faces of the valves *k'* and *o'* are shaped to conform thereto. Near its lower end the sleeve *o* is chambered, as at *o*³, about the stem of the valve *k'* and is provided with a port *o*⁴ to communicate with an elongated port *o*⁵, formed in the bushing in which the sleeve moves. A suitable channel *h* is pro-

vided in the casting, which forms the cylinder-head to conduct the fuel-oil from the supply-pipe H to the port o^5 .

In operation the valve k' is lifted to open the port k at the proper instant by the means shown or by some other means suitable for the purpose. The lifting of the valve k' carries with it the valve o' , thereby opening the port k for the admission of air under pressure from its source of supply. The valve o' , which is held to its seat on the valve k' by the spring o^2 , is lifted from its seat by the pressure of the oil from its source of supply, and the time of the lifting will in general be determined by the action of the pump or the valve which regulates the supply of oil. The exact instant of opening may, however, be regulated, as by the substitution of a different spring o^2 or by the variation of its tension, as by adjusting the collar or the cap between which it is confined. In this manner the valve o' may be arranged to open in advance of the lifting of the valve k' or at the same instant or later. It will be evident that when the valve o' is lifted from its seat the oil will be distributed radially in a thin film upon the valve-seat and will be instantly taken up by the inrushing air, which is also distributed in a conical sheet and also completely atomized and mixed with the air, so that immediately upon contact with the vaporizer and igniter M it will be thoroughly vaporized. The valve-seat, as will be noted, acts as a baffle-plate against which the oil is discharged, and the relation of the oil to the air-current is such that the atomization of the oil is facilitated, while at the same time the physical condition of the oil is unchanged until vaporization and combustion take place. Moreover, through the regulation of the instant of discharge of the oil, as already described, the character of the mixture can be varied as may be required under the particular conditions of operation.

It will be understood, of course, that various changes in the form and construction of parts may be made without departing from the spirit of the invention, and it is not intended to limit the invention to the precise construction and arrangement shown and described herein.

I claim as my invention—

1. In an internal-combustion engine, the combination with an inlet-port, of a two-part valve to cooperate therewith and comprising a central part and an outer, annular part seated upon the said central part and movable independently thereof, and said central part cooperates directly with said port to close the same and means to supply air and

fuel for admission by said parts respectively, substantially as described.

2. In an internal-combustion engine, the combination with an inlet-port, of a two-part valve to cooperate with said port and comprising a central part and an outer, annular part seated upon said central part and movable independently thereof, said outer part being chambered internally and provided with a port, and said central part cooperates directly with said inlet-port to close the same, substantially as described.

3. In an internal-combustion engine, the combination with an inlet-port having a conical valve-seat, of a two-part valve to cooperate with said valve-seat and comprising a central part and an outer, annular part seated upon said central part and movable independently thereof, substantially as described.

4. In an internal-combustion engine, the combination with an inlet-chamber having an inlet-port, of a two-part valve to cooperate with said port and comprising a central part and an outer, annular part having a chambered sleeve surrounding the stem of the first-named part and provided with a port, and means to supply the elements of the combustible mixture separately to said valve-chamber and said last-named port, substantially as described.

5. In an internal-combustion engine, the combination with an inlet-valve port, of a two-part valve to cooperate with said port and comprising a central part having a stem and an outer, annular part seated upon the first-named part and having a chambered sleeve surrounding said stem, valve-operating devices operatively connected with said stem, and means to supply the elements of the combustible mixture separately to said valve-port and to said chambered sleeve, substantially as described.

6. In an internal-combustion engine, the combination with an inlet-valve port and a valve-chamber, of a two-part inlet-valve to cooperate with said valve-port and comprising a central part having a stem and an outer, annular part seated upon the first-named part and having a chambered sleeve surrounding said stem, means cooperating with said stem to lift the valve and means to supply the elements of the combustible mixture separately to said valve-chamber and to said chambered sleeve, substantially as described.

This specification signed and witnessed this 5th day of April, 1905.

ARTHUR B. GOODSPEED.

In presence of—

ANTHONY N. JESBERA,
W. B. GREELEY.