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1,441,302.

E. SCHNEIDER.

APPARATUS FOR DISTRIBUTING THE COMBUSTIBLE FLUID AND AIR IN EXPLOSION ENGINES.

FILED JULY 21, 1920.

2 SHEETS—SHEET 1.

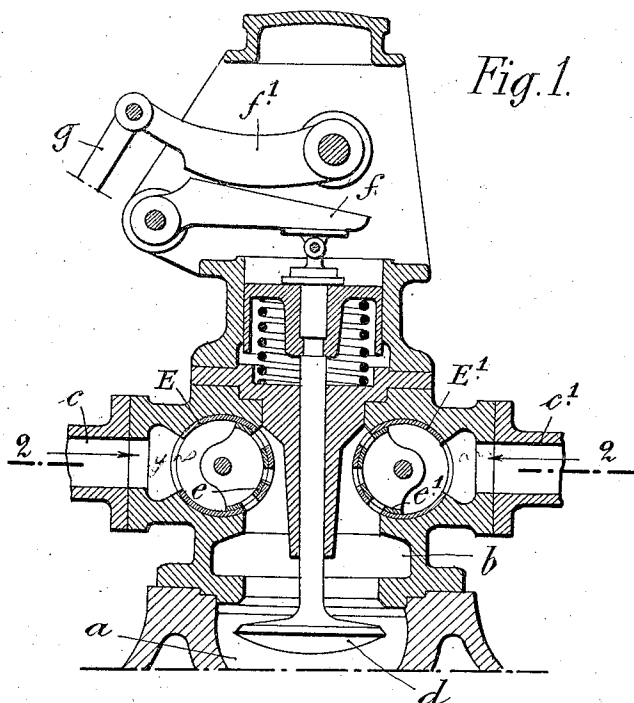


Fig. 1.

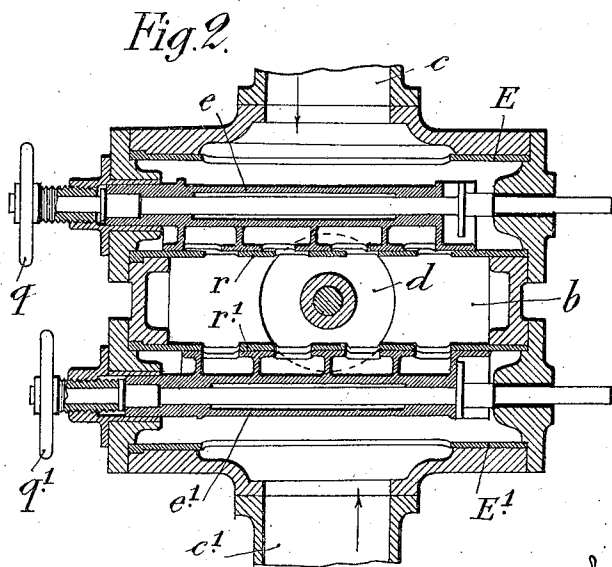


Fig. 2.

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2 SHEETS—SHEET 2.

Fig. 3.

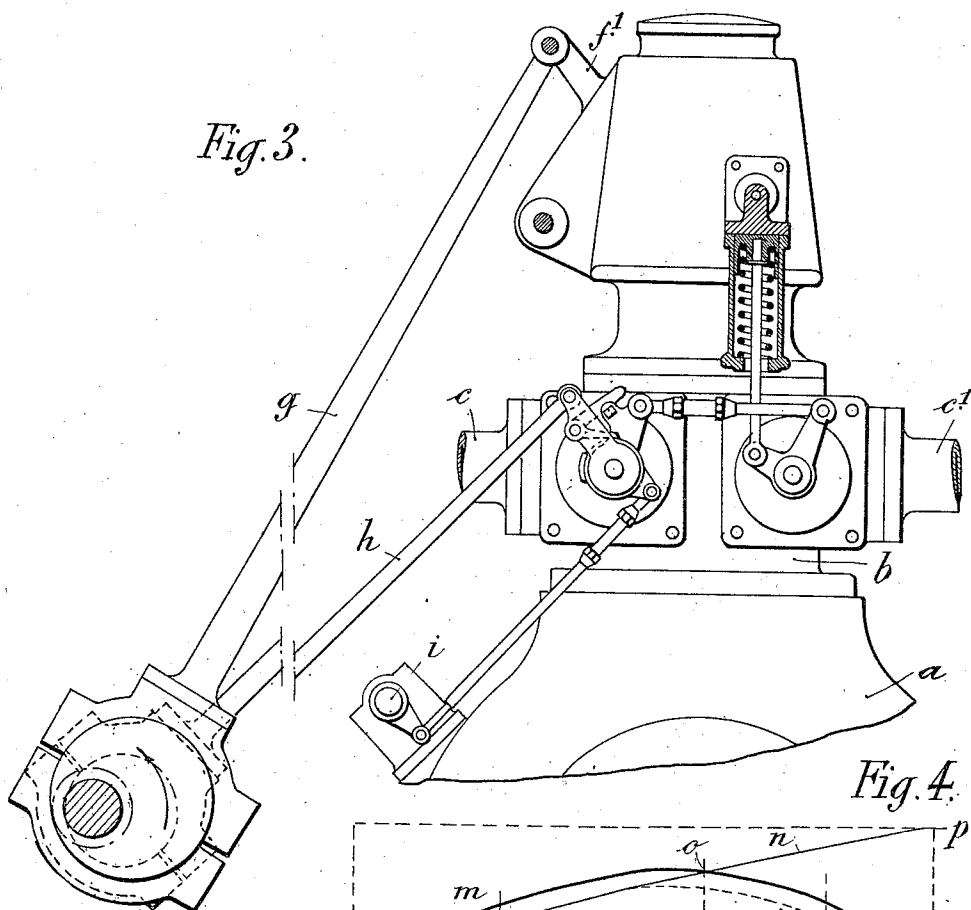


Fig. 4.

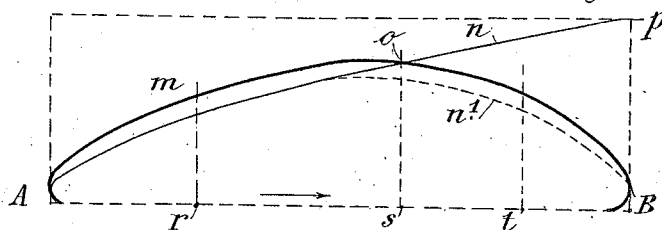


Fig. 5.

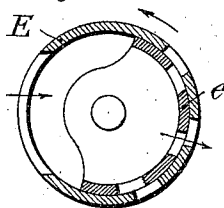


Fig. 6.

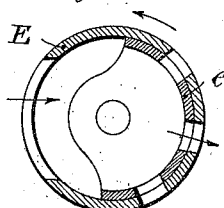
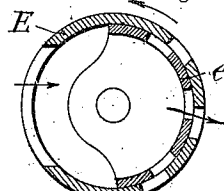


Fig. 7.



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UNITED STATES PATENT OFFICE.

EUGÈNE SCHNEIDER, OF PARIS, FRANCE, ASSIGNOR TO SCHNEIDER & CIE., OF PARIS, FRANCE, A LIMITED JOINT-STOCK COMPANY OF FRANCE.

APPARATUS FOR DISTRIBUTING THE COMBUSTIBLE FLUID AND AIR IN EXPLOSION ENGINES.

Application filed July 21, 1920. Serial No. 397,954.

To all whom it may concern:

Be it known that I, EUGÈNE SCHNEIDER, a citizen of the Republic of France, resident of Paris, France, have invented new and useful Improvements in Apparatus for Distributing the Combustible Fluid and Air in Explosion Engines, which invention is fully set forth in the following specification.

The various apparatus employed for distributing combustible fluid and air in engines worked by an explosive mixture, generally comprise a mixing valve, a cylindrical slide valve fixed or sliding on the valve stem for admitting the air and gas into the mixing box, and external regulating devices (throttles, sliding valves or lifting valves).

The present invention consists in improvements in apparatus of this kind comprising a mixing valve and two rotary cocks for admitting the gas and air into the mixing box.

The invention is illustrated in the accompanying drawings in which:—

Fig. 1 is a vertical axial section of the mixing box.

Fig. 2 is a horizontal section on the line 2—2 of Fig. 1.

Fig. 3 is an elevation of the mechanisms for operating the valve and cocks.

Fig. 4 is a diagram of the working of the distribution.

Figs. 5, 6 and 7 are horizontal sections, showing different positions of the cocks, corresponding respectively to the points *r*, *s* and *t* of the diagram.

In the improved distributing apparatus shown, the mixing valve is operated by means of rolling-contact levers from an eccentric fixed on the distribution shaft. The air and gas cocks connected together by rod-
ding, are actuated likewise from an eccentric fixed on the distribution shaft, but are controlled by means of an escapement under the control of a centrifugal governor. At the commencement of the suction stroke the mixing valve lifts and the air and gas cocks operated by their actuating mechanism, uncover the admission ports, thus allowing air and gas to enter the cylinder.

When the admitted charge corresponds to the power required from the engine, which is determined by the position of the governor, the escapement acts; the cocks moved back suddenly by any suitable auxiliary mo-

tor (generally of the spring type) serving as a damping device, cover again the admission ports; and the introduction of the mixture into the cylinder ceases. The mixing valve, whose lift and duration of lift are always the same, closes when the piston is on its dead centre, at the end of the suction stroke, or preferably a little after this point, so as to assure, if necessary, a maximum possible admission, and thus produce, in case of an overload, a corresponding great power.

The improved apparatus thus allows of assuring variable admissions, and consequently variable compressions of explosive mixtures of constant richness.

In Figs. 1 and 3, *a* is the engine cylinder; *b* the mixing box; *c* the gas inlet pipe; *c*¹ the air inlet pipe; *d* the mixing valve; *e* the gas cock; *e*¹ the air cock; *f* *f*¹ are rolling-contact levers for actuating the mixing valve; *g* is the rod of the eccentric that actuates the said rolling-contact levers; *h* is the eccentric that actuates through an escapement, the air and gas cocks; *i* is a shaft driven by the governor.

The essential characteristic feature of the invention consists in a special construction of the gas and air cocks *e* and *e*¹, whereby they are converted into real devices for regulating the explosive mixture without it being necessary for this purpose to provide external devices, such as throttles, slide valves or lift valves; the cocks constructed according to this invention having moreover the exactness of action which is impossible to be achieved by means of external devices.

With this object, the air and gas cocks are so constructed that the total sections of their orifices uncovered at any given point of the suction stroke, is always less than the section formed at that said point by the opening of the admission valve. If it were otherwise, the gas which is under pressure would form a "packing" in the mixing box and would render the explosive mixture defective as has been proved by experience.

In the diagram of Fig. 4, the line A B represents the suction stroke of the engine piston, this suction taking place in the direction of the arrow. The curve *m* represents the law of the lift of the mixing valve *d* with its slight lead on opening and its lag on closing.

The curve n in the portion np illustrates the working of the air and gas cocks as heretofore practiced. Since the cross-sectional openings are proportional to the lifts, it will be immediately perceived that from the point o onwards, when the valve closes, the path traversed by the cocks increases, and that, consequently, in the region $o-p$ the cross-sectional opening determined by the valve will be less than the total cross-section uncovered by the cocks, causing a "packing" of the gas in the mixing box as above referred to and resulting in a defective explosion mixture.

This drawback is avoided by the fact that the cocks which move in the sleeves E , E' fitted into the mixing box and provided with multiple ports, comprise orifices equal in number to the number of the ports in the sleeves and of the same width as the last mentioned ports, with laps so arranged that the ports are uncovered gradually from the beginning of the suction stroke to the point O and from this time onwards, are covered gradually to the end of the suction stroke.

The positions of the cocks shown at the points r , s , t of the suction stroke of the piston indicate the degrees of opening of the orifices for these points.

The consequence is that the curve determining the cross sections of the orifices will follow the line n' slightly below the line m representing the cross sections of the mixing valve. The speed of the gas and air being thus a maximum in the orifices that are uncovered by the cocks, their regulation can be assured in a perfect manner by the latter.

With this object, a hand mechanism allows of displacing the cocks longitudinally in their lodgment during the working of the engine, by causing them to slide along

their actuating axles in such a manner as to modify in a suitable sense the effective length and consequently the cross section of the gas and air orifices, and thereby producing an explosive mixture having a composition adapted for the best combustion.

Fig. 2 illustrates by way of example a mechanism of this kind; the small hand wheels q , q' allow of pulling or pushing back the cocks e e' so as to lengthen or shorten the effective length of the uncovered orifices.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

In apparatus for distributing combustible fluid and air to internal combustion engines, the combination of a gas mixing chamber having a valve-controlled discharge port and inlet ports one of which admits combustible gas and the other of which admits air, rotary valve members in said inlet ports, means for operating said valve members during the suction stroke whereby the total section uncovered by said valve members is always less than the section uncovered by said discharge valve, and means for effecting the longitudinal displacement of said valve members during the working of the engine for varying the proportions of air and combustible gas in the explosive mixture.

In testimony whereof I have signed this specification.

Dated this 21st day of May 1920.

EUGÈNE SCHNEIDER.

Witnesses:

ANDRÉ MOSTICKER,
CLEMENT S. EDWARDS.