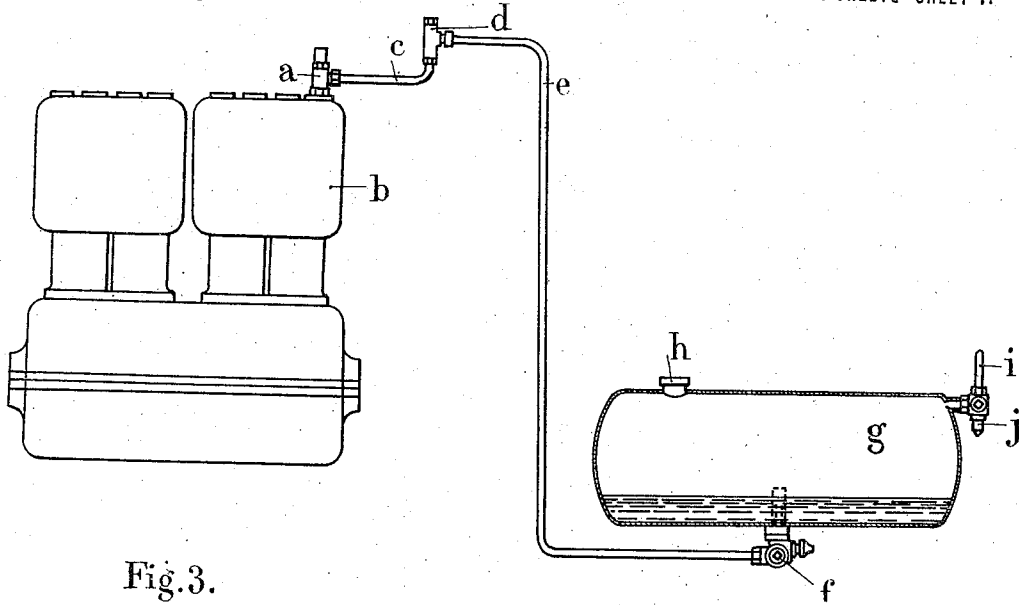
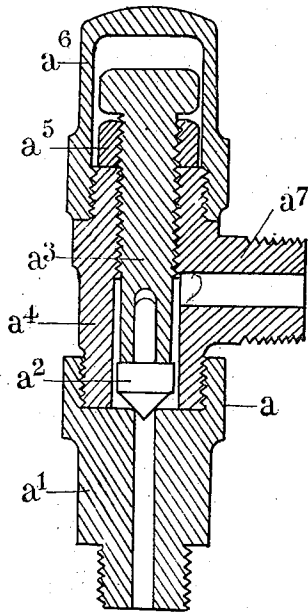
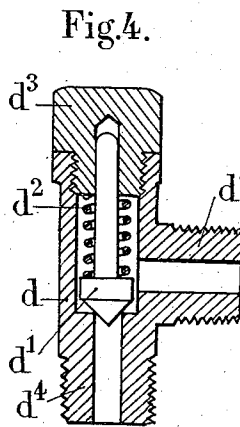
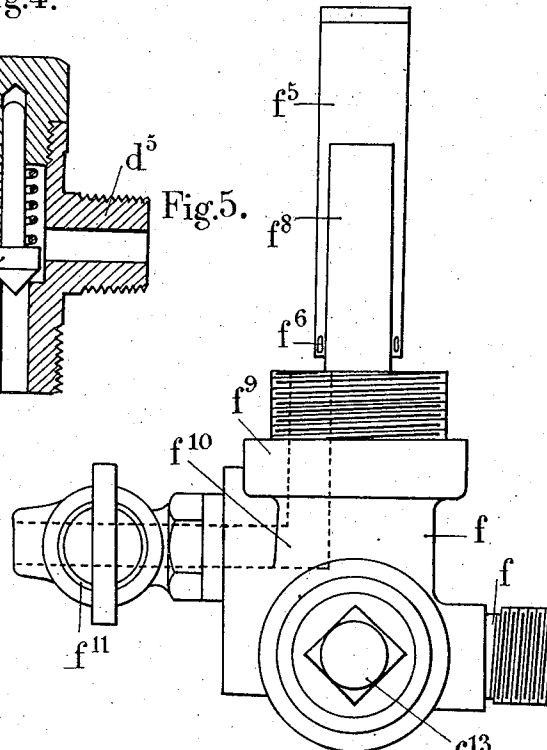


E. E. MOLAS.
 APPARATUS FOR PREPARATION OF INERT GASES.
 APPLICATION FILED JULY 2, 1918.

1,327,769.

Patented Jan. 13, 1920.

4 SHEETS—SHEET 1.



Inventor:
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 per H. W. Plucke
 Attorney.

1.327,769.

4 SHEETS--SHEET 2.

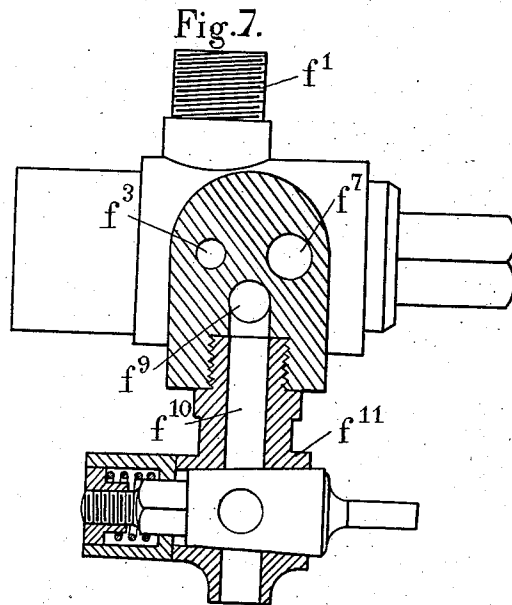
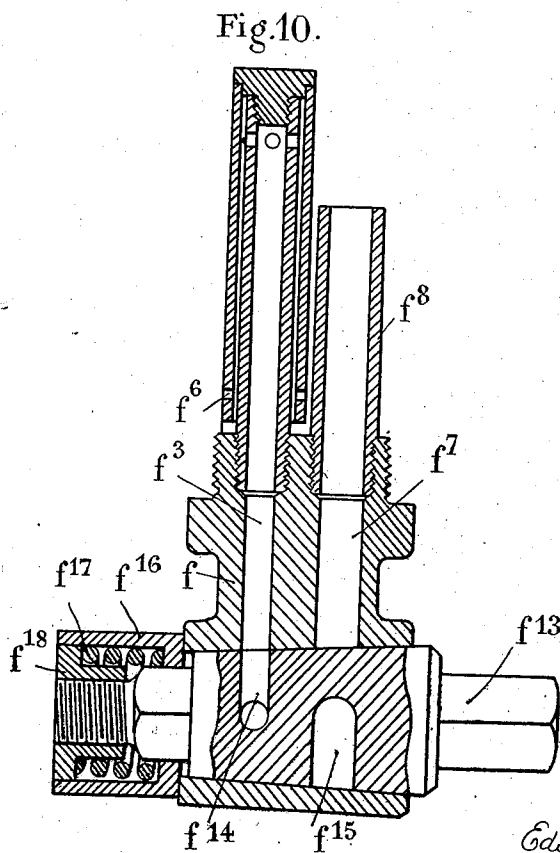
Fig. 6.

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 4 SHEETS—SHEET 3.



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 4 SHEETS—SHEET 4.

Fig.8.

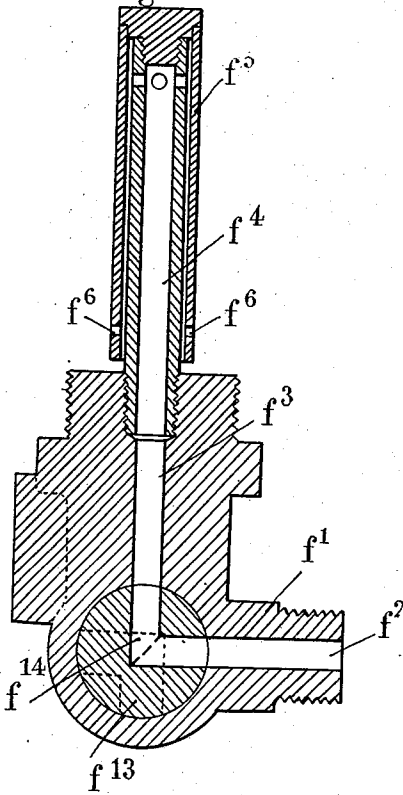


Fig.9.

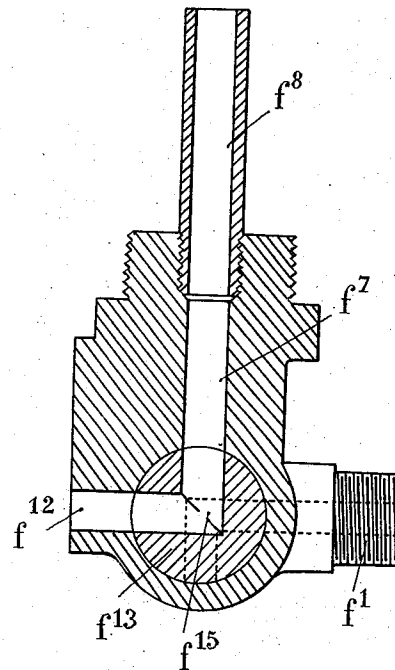


Fig.11.

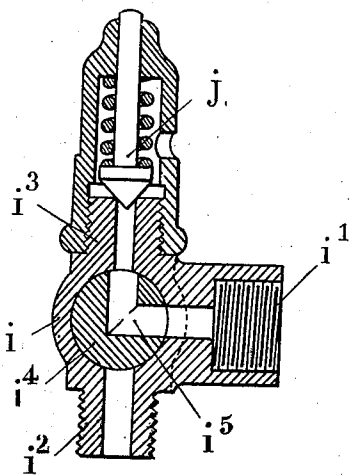
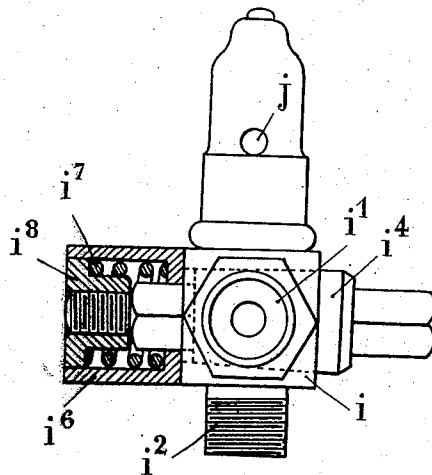


Fig.12.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR PREPARATION OF INERT GASES.

1,327,769.

Specification of Letters Patent.

Patented Jan. 13, 1920.

Application filed July 2, 1918. Serial No. 243,085.

To all whom it may concern:

Be it known that I, EDOUARD ELIE MOLAS, of No. 22 Rue des Cendriers, Paris, France, have invented an apparatus for the preparation of inert gases from the burnt gases of explosion-motors, particularly for the purpose of inflating pneumatic tires, of which the following is a full, clear, and exact description.

10 This invention has for its object to produce from the burnt gases of internal combustion engines an inert gas under pressure adapted to be used for various purposes and, in particular, for inflating pneumatic tires.

15 A further object is to provide means whereby such gas may be manufactured and stored during the normal operation of the engine, when used, for example, on a motor car, without substantially affecting the power of said engine.

Another object is to produce such gas by means of an apparatus which will be efficient, light and simple both in structure and in operation.

25 With these and other objects in view, which will be apparent from the detailed description of the preferred embodiment of my invention, I provide a connection between the explosion chamber of the engine and a storage tank containing a suitable liquid reagent, and control the passage of the gas through such connection by means of two valves, one being adapted to respond only to the explosion pressure in the engine and the other adapted to vary the amount of gas admitted to said connection. I further provide a cock for discharging the gas beneath the level of the liquid in the tank and for controlling such level and draining the liquid when required.

By way of example the invention will now be described with reference to the accompanying drawing, in which:

Figure 1 shows diagrammatically the application of the apparatus to an automobile motor.

Fig. 2 shows the reservoir separately in section.

Fig. 3 shows separately in section a needle valve forming part of the apparatus

Fig. 4 shows a flap valve which forms part of the apparatus.

Figs. 5, 6, 7, 8, 9 and 10 show a multiple cock forming part of the apparatus.

Figs. 11 and 12 show a gas intake cock and the safety valve forming part of the apparatus.

Referring to Fig. 1 of the drawing it will be seen that the apparatus comprises a needle cock *a*, permanently fixed on to the valve plug of one of the cylinders of the motor *b* and connected by means of piping *c* to a check valve *d*.

The latter is in communication by means of piping *e* with a multiple cock *f* fixed to the reservoir *g*. The latter is provided with a filling nozzle *h* and with a gas outlet cock *i* upon which the safety valve *j* is mounted.

The tank *g* (Fig. 2) is constructed of sheet iron of a suitable strength to be able to support easily the explosion pressure of the motor and also to be perfectly fluid-tight.

In order to obviate the necessity of constructing a large number of unions and joints, members having multiple functions are used in connection with the apparatus.

The needle cock *a* (Fig. 3) comprises a steel base *a'*, adapted to be fixed on to the motor. Since the expansions of the two elements, the plug and the base, are of the same order of magnitude, perfect fluidtightness is insured.

The base *a'* serves as a seating for a needle *a²*, which may be made of nickel or steel, for the purpose of preventing oxidation.

The movements of the needle *a²* are limited by a screw *a³* located in the body *a⁴* which is preferably made of bronze (or gun-metal).

A lock nut *a⁵* keeps the needle *a²* in the adjusted position. A bronze cap *a⁶*, screwed on to the body of the cock, insures the fluidtightness of the whole. A screw threaded union *a⁷*, branched on to the body of the cock, serves for the passage of the gases passing from the needle cock to the non-return flap valve *d*.

The needle cock remains constantly open, but at each explosion it only allows a very small quantity of gas to pass in order not to weaken appreciably the power of the motor and throw the working thereof out of equilibrium.

The said needle cock enables either the

tank or the tires to be filled rapidly if required by opening the needle wide enough, provided it is closed at ordinary times.

The check valve *d* (Fig. 4) comprises a bronze casing upon the seat of which rests a nickel steel valve body *d'*, loaded by a spring *d²* in such a way as to let pass only gases arising from explosion and not those of compression. A bronze cap *d³* insures the fluid-tightness of the arrangement and provides a point of support for the spring *d²*. A screw-threaded union *d⁴* is adapted to be coupled to the piping that brings the gases under the valve body *d'*. Another screw-threaded union *d⁵* is adapted to be connected to the piping which terminates at the multiple cock *f*.

The multiple cock *f* (Figs. 5 to 10) comprises a bronze casing provided with a screw-threaded union *f¹* having a passage *f²* therein. The upper part of the multiple cock *f* is adapted to be fixed into the bottom of the tank *g*. The said cock has several passages (Figs. 7 to 10). In the passage *f³* is fitted a brass tube *f⁴* open at the top and covered by a cap *f⁵* the bottom of which is pierced with small holes *f⁶*. In the passage *f⁷* is fitted a tube *f⁸* open at the top. This tube is of a suitable length for only retaining in the tank *g* the quantity of water that is strictly necessary. The passage *f⁹* opens at right angles into a passage *f¹⁰* located at the side and closed by a drain cock *f¹¹* which serves for the draining of the tank *g*. Moreover the casing of the said multiple cock *f* has a passage *f¹²* formed therein intended for the escape of the overflow.

The plug *f¹³* (Fig. 10) is provided with a passage *f¹⁴*, bent at right angles, which, when suitably turned (Fig. 8), puts the gas inlet *f²* into communication with the passage *f³* and the tube *f⁴*, in such a way that the gases passing through the cap *f⁵* and the small holes *f⁶* bubble up through the water in the tank *g* (Fig. 2).

The said plug is provided with a second passage bent at right angles *f¹⁵*. Fig. 9, located to the right, each part of this passage forming an angle of 180° with that part of the passage *f¹⁴* which is in the same plane and this passage, when suitably turned, puts the passage *f⁷* and the tube *f⁸* into communication with the passage *f¹²*, thus enabling the excess water contained in the tank *g* to escape.

The plug *f¹³* (Fig. 10) is resiliently held in its seat by the hollow washer *f¹⁶*, the spring *f¹⁷* and the nut *f¹⁸*.

The arrangement of these latter members is so constituted as to prevent mud and grit from causing deterioration of the rubbing surfaces and thereby impairing the fluid tightness of the multiple cock *f*.

The gas cock *i* (Fig. 11 and 12) is provided with a screw threaded union *i'*, for

the purpose of fixing the said gas cock on to the tank *g*, a screw threaded union *i²* serving for the exit of the gas and a screw threaded union *i³* provided with the safety valve *j*.

The plug *i⁴* is pierced with a passage *i⁵* bent at right angles, which puts the inside of the tank *g* into communication either with the outlet union *i²* or with the valve *j* alternatively.

A hollow washer *i⁶* (Fig. 12), a spring *i⁷* and a nut *i⁸* insure resilient tightening and the protection of the plug *i⁴* under the same condition and for the same reasons as those already indicated. The apparatus being permanently installed on an automobile, as in Fig. 1, a certain quantity of lime water is poured into the tank *g* through the nozzle *h*. The multiple cock *f* having been placed in the position indicated in Fig. 9, the excess water will flow away through the passages *f⁹*, *f⁷*, *f¹²*. This being done, the nozzle *h* is closed and then the cock *f* is brought into the position indicated in Fig. 8. The needle *a* is then opened, and the cock *i* placed in the position in which it is open toward the valve, as indicated in Fig. 11. When the apparatus is in order all that is necessary for the preparation of an inert gas suitable for inflating pneumatic tires is to start the motor.

At each explosion in the cylinder in question, a certain quantity of the burnt gases passes under the needle *a²*, flows through the union *a⁷*, arrives under the needle *d'*, which thus lifts, and then these gases pass through the union *d⁵* and through the piping *e* to the multiple cock *f* which they traverse by passing through the passages *f²*, *f¹⁴*, *f⁸*, *f⁴* and the cap *f⁵*.

These gases, on leaving through the small holes *f⁶*, in the form of fine streams and bubbles of small volume (Fig. 2), give up their heat to the water, at the same time liberating the small quantities of oil or petrol or other impurities that they contain and are then separated from the carbon dioxide, which precipitates a certain quantity of carbonate of lime.

The explosion gases have in this way produced almost pure nitrogen, cold and under pressure, ready to be employed for the inflation of the tires.

The operation is completed when the pressure in the tank *g*, added to the load on the spring *d²* of the check valve, is equal to that developed by the explosion in the cylinder. From that moment the needle *a²* and the cock *f*, although remaining open, do not let any gas pass therethrough.

When the water contained in the tank *g* is required to be changed, all that is necessary is to open the drain cock *f¹¹* and then refill the tank with the water.

When it is desired to inflate a tire the

union $\frac{1}{2}$ may be connected to the tire valve by means of flexible pipe in a well-known manner.

The compressed gas contained in the tank 5 g may be utilized for the following apparatus: starters, hooter whistle, oil tank or the like.

The forms, details, accessories, materials and dimensions of this apparatus may of 10 course be varied, without departing in any way from the principle of the invention.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be per- 15 formed, I declare that what I claim is:

1. In combination with an internal combustion engine, an apparatus for preparing an inert gas from the burnt gases of said engine comprising a pipe, an adjustable in- 20 take valve connecting said pipe with the explosion chamber of said engine, a check valve inserted in said pipe and adapted to be actuated by the force of the explosion, said check valve being unaffected by the 25 compression pressure in the engine, a storage tank containing a liquid having a basic character, and a cock connecting said pipe with said receptacle and adapted to discharge the gases beneath the level of the 30 liquid in said tank.

2. In combination with an internal combustion engine, an apparatus for preparing an inert gas from the burnt gases of said engine comprising a pipe, a check valve be- 35 tween said pipe and the explosion chamber of said engine, means for regulating the movements of said check valve, another check valve inserted in said pipe, a spring for controlling the movements of the latter

check valve, said spring being so tensioned 40 that the valve controlled thereby will only be actuated by a pressure greater than the compression pressure in the engine, a storage tank containing a liquid having a basic character, a cock connecting said pipe with 45 said receptacle and adapted to discharge the gases beneath the level of the liquid in said tank, and means operatively connected with said cock for defining the level of the liquid in said tank. 50

3. In combination with an internal combustion engine, an apparatus for preparing an inert gas from the burnt gases of said engines comprising a storage tank containing 55 a liquid having a basic character, a connection between said tank and the explosion chamber of said engine, means for defining the level of the liquid in the tank, means for discharging gas from said connection be- 60 neath the level of said liquid, means for draining the liquid from said tank, a single cock for operating said means in the desired sequence, a check valve in said connection adapted to be operated only by a pressure 65 greater than the compression pressure in the engine, and an adjustable check valve adapted to control the amount of gases admitted through said connection.

The foregoing specification of my apparatus for the preparation of inert gases from 70 the burnt gases of explosion motors particularly for the purpose of inflating pneumatic tires, signed by me this 26th day of April, 1918.

EDOUARD ELIE MOLAS.

Witnesses:

CHAS. P. PRESSLY,
FRANÇOIS WEBER.