

H. J. E. HENNEBUTTE.

CARBURETER.

APPLICATION FILED DEC. 22, 1903.

Fig. 1.

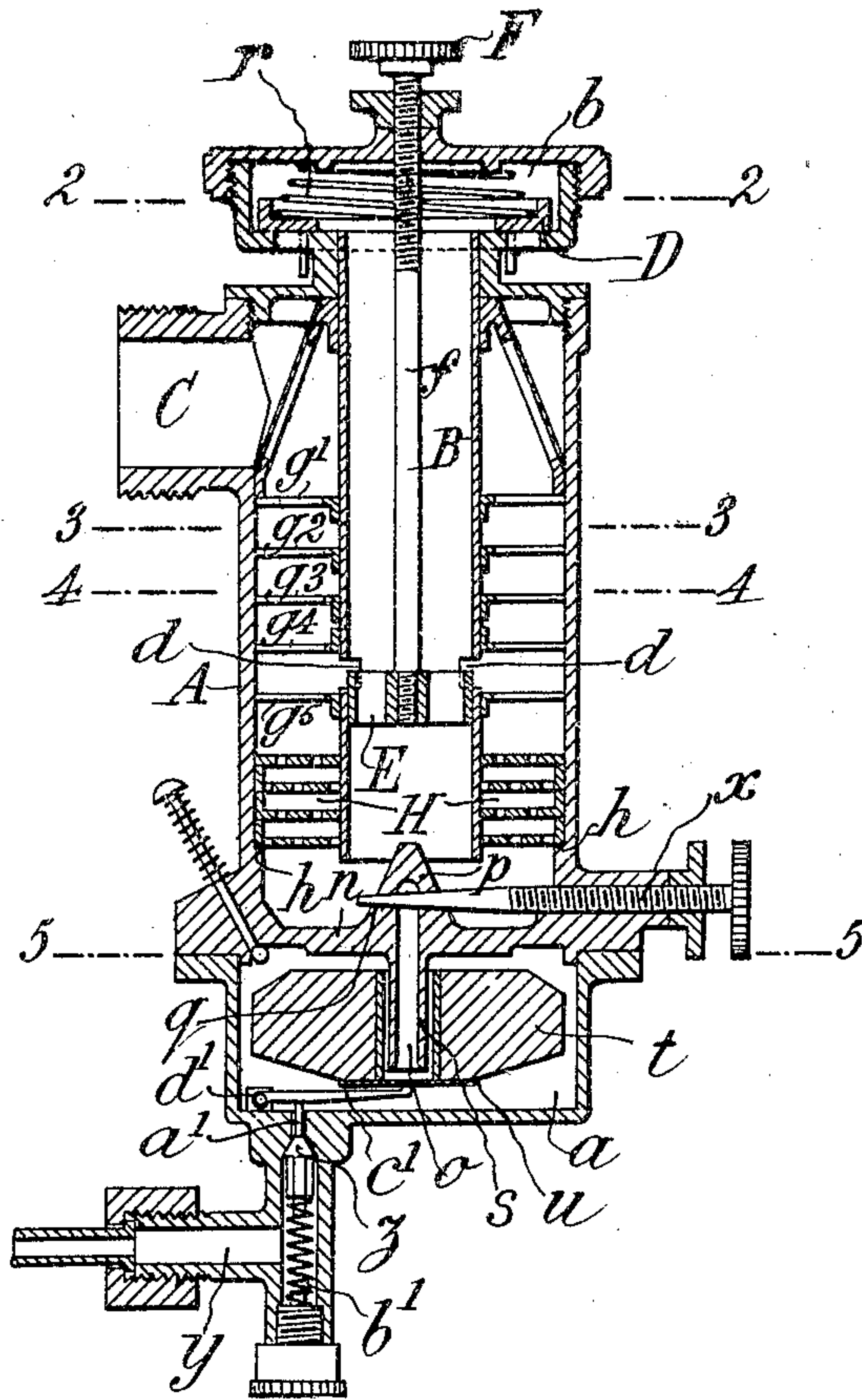


Fig. 2.

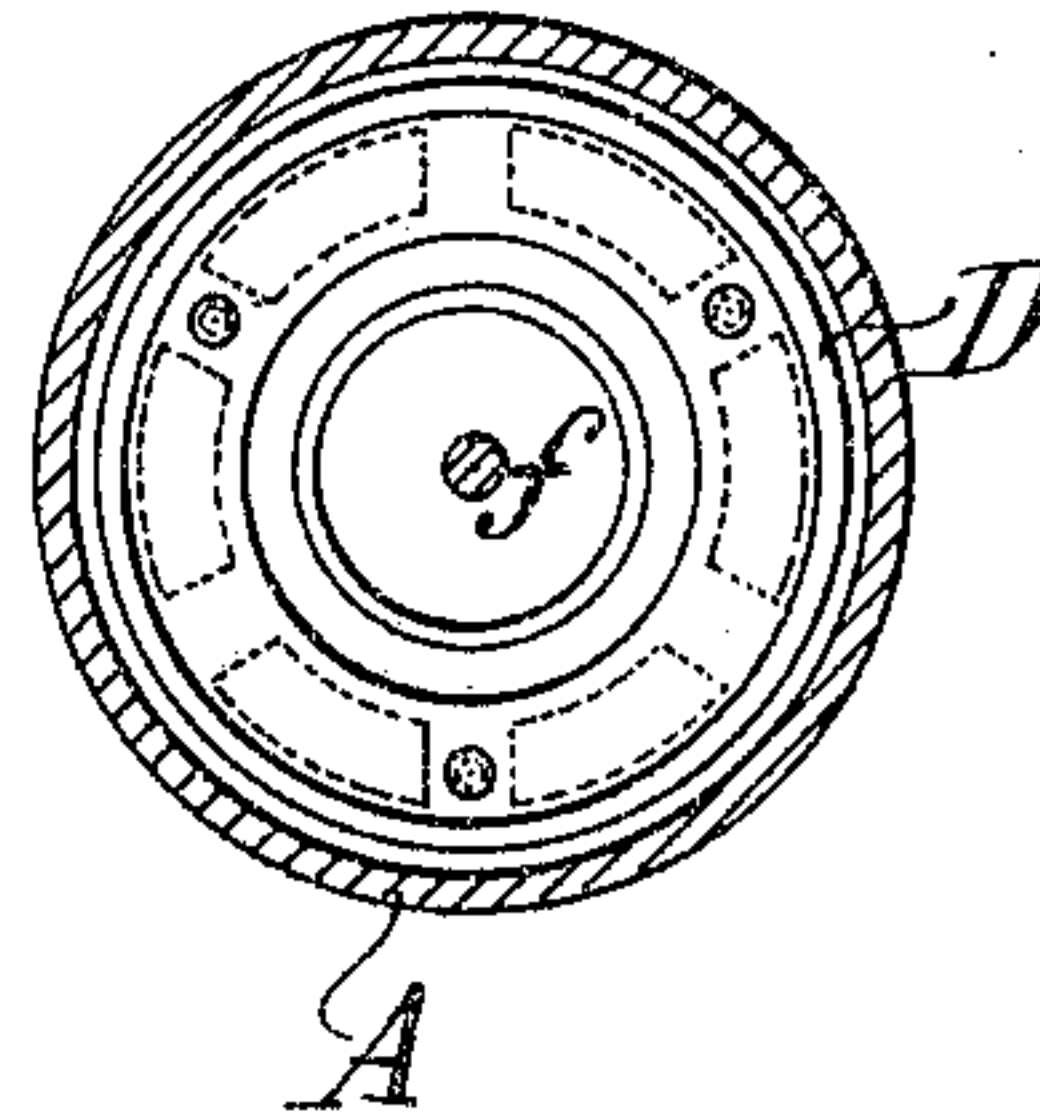


Fig. 3.

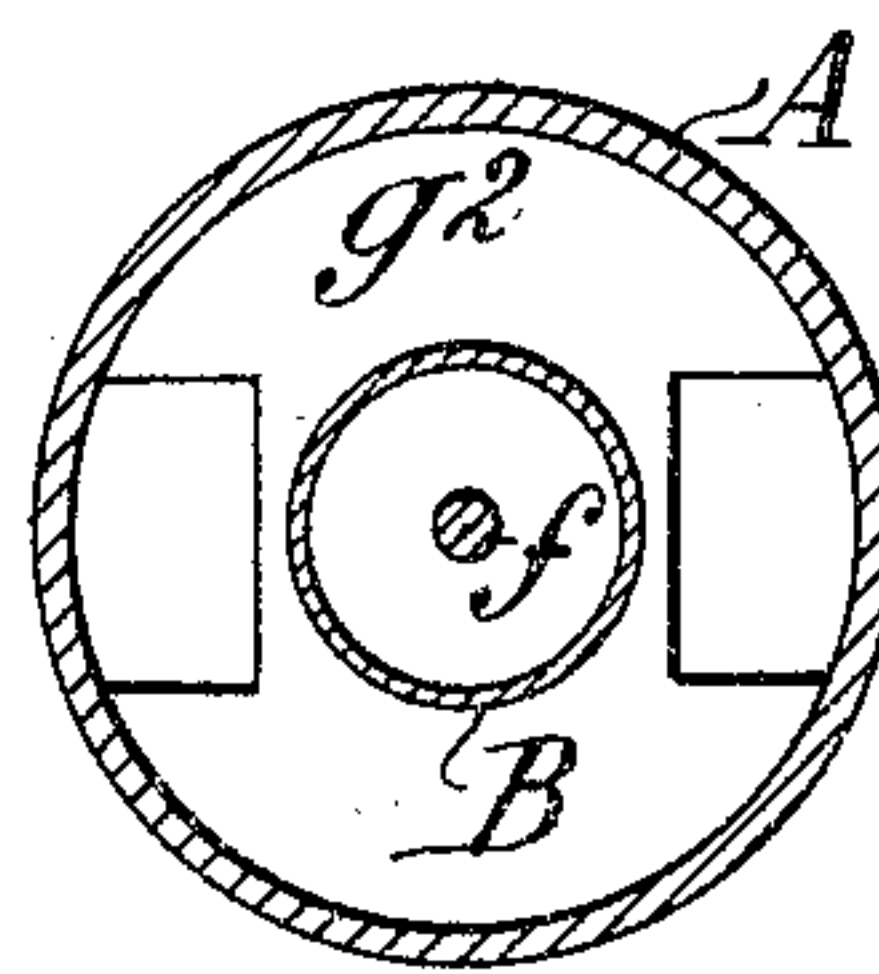


Fig. 5.

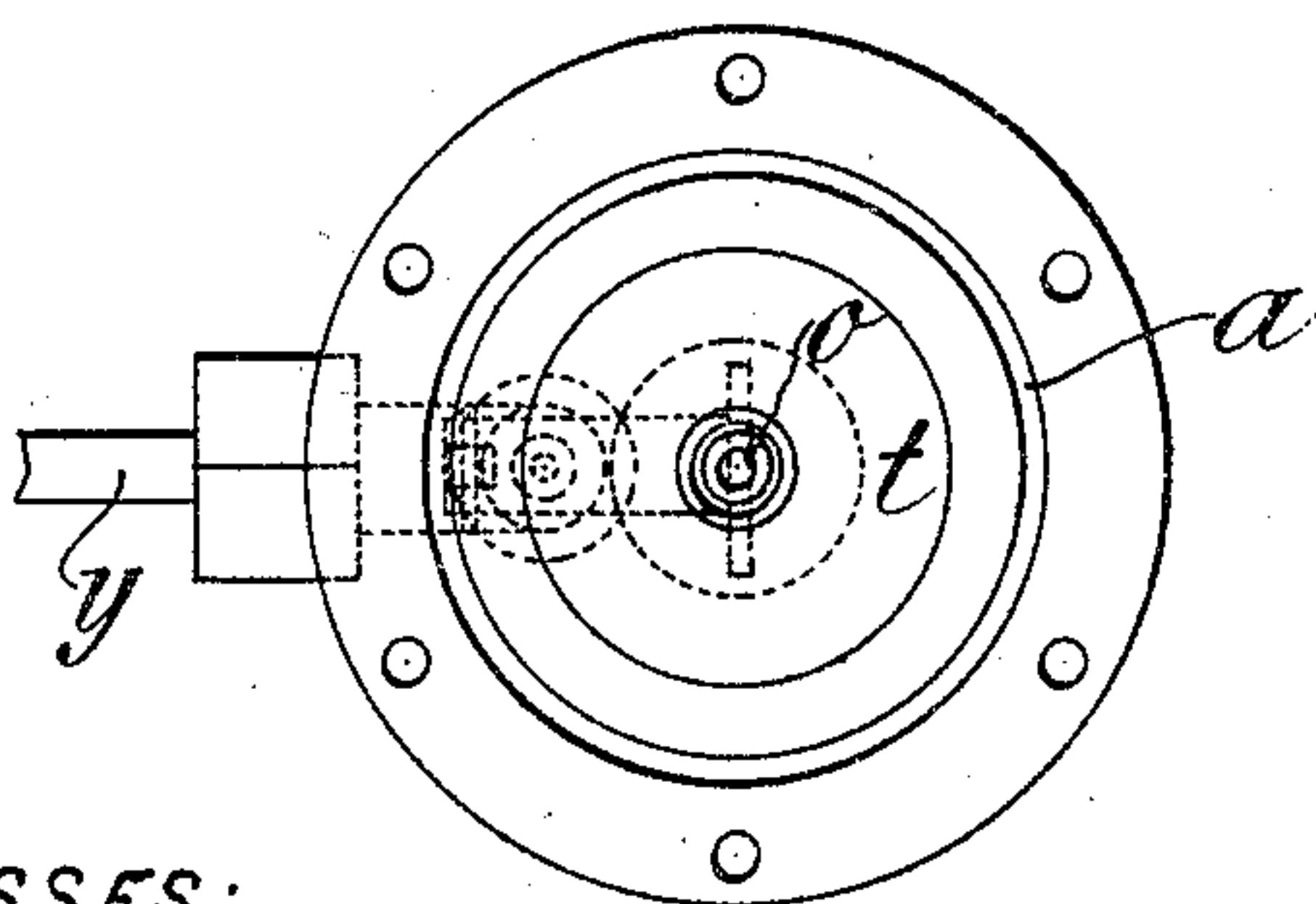
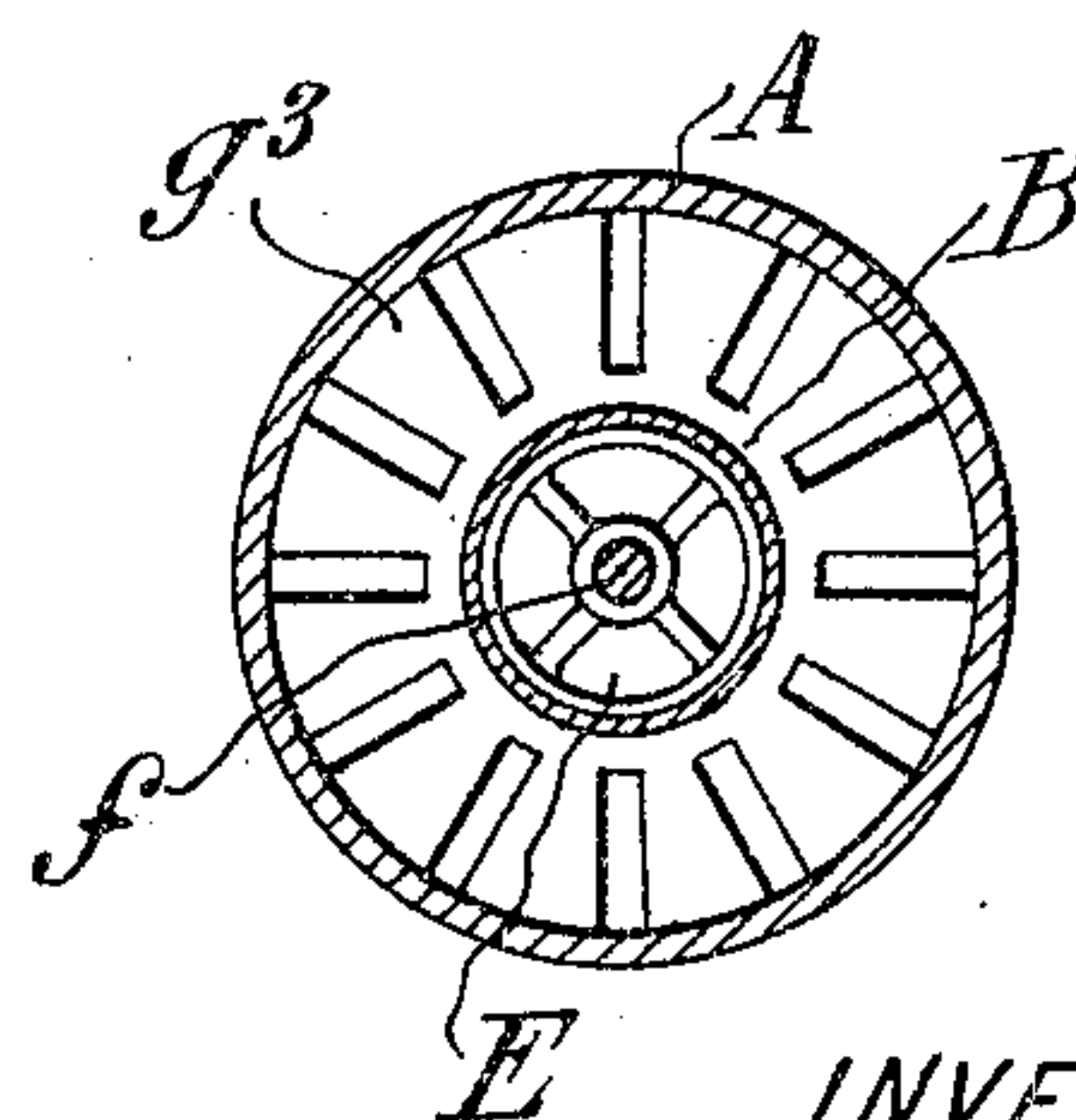


Fig. 4.



WITNESSES:

Ired White  
Rene Duine

INVENTOR:

Henri Joseph Ernest Hennebutte,  
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# UNITED STATES PATENT OFFICE.

HENRI JOSEPH ERNEST HENNEBUTTE, OF PARIS, FRANCE.

## CARBURETER.

SPECIFICATION forming part of Letters Patent No. 794,502, dated July 11, 1905.

Application filed December 22, 1903. Serial No. 186,203.

To all whom it may concern:

Be it known that I, HENRI JOSEPH ERNEST HENNEBUTTE, civil engineer, of 127 Rue de la Tour à Passy, Paris, in the Republic of France, have invented certain new and useful Improvements in Carbureters, of which the following is a specification.

The conditions which a really practical carbureter should fulfil may be summarized generally as follows: first, possibility of using hydrocarbons of different degrees of volatility; second, obtainment of carbureted air of homogeneous composition and sufficiently rich without supersaturation. The result is (a) perfect combustion; (b) a minimum consumption of combustible liquid for a given useful effect; (c) suppression, at least relatively, of the smell of the exhaust.

The apparatus which I have devised realizes the aims just stated. Its arrangement will be well understood from the following description with reference to the annexed drawings.

*Description of the carbureter.*—My carbureter is represented in the accompanying drawing in vertical section, Figure 1. Figs. 2, 3, 4, and 5 are respectively sections on lines 2 2, 3 3, 4 4, and 5 5 of Fig. 1.

The carbureter is composed of two concentric tubes A and B. The outer tube A is closed at top and carries laterally a suction-union C. It is terminated at its base by a chamber *a* of rather larger diameter and which serves as a reservoir. The inner tube

B or dipping-tube is provided at top with an air-admission chamber *b*, in which is an annular lift-valve D, which is simply kept on its seat by a light spring *r* and insures tightness of the apparatus after the periods of suction. This dipping-tube B extends down to a suitable depth in the body A, and at a certain point of its height it is formed with holes *d*, which can be masked or partially uncovered by a ring E, operated by a milled thumb-piece or button F, which actuates the screwed rod *f*. By turning this button in one direction or the other this ring is raised or lowered to more or less uncover the holes *d*.

Outside the dipping-tube B are superposed at a suitable distance apart a series of five annu-

lar plates, which I call "drier-mixers," *g'* to *g*<sup>5</sup>. Of these plates *g'*, *g*<sup>3</sup>, and *g*<sup>5</sup> have a number of small radial openings. The others, *g*<sup>2</sup> *g*<sup>4</sup>, have only two large openings. At the bottom is a supporting ring or shelf *h*, formed with slots or openings and upon which are disposed a certain number of metal pieces H of any desired shape, which are interposed with each other in such manner as to form baffles. This portion of the apparatus is intended to serve as a mixing-chamber. As to these drier-mixers *g'* to *g*<sup>5</sup>, as well as regards the openings existing in the mixing-chamber H, the total section which has to be provided for the passage of the carbureted air should be equal to that of the dipping-tube B. The plates *g'* to *g*<sup>5</sup> thus superposed subdivide the annular capacity of A into a series of chambers, which I call "mixing" or "blending" chambers.

*n* is a partition forming a reservoir at its lower part and carrying at its center a nipple *p*, perforated horizontally at *q*.

Perpendicularly to the conical horizontal passage *q* is a conduit *o*, formed in a cylindrical prolongation *s*, which serves at the same time as a guide for the regulating-ring *t*, which is immersed in the liquid contained in the reservoir *a*. The density of the said ring *t* is greater than that of the liquid in which it is immersed. The said ring is terminated at its base by a disk or plate *u*. A slightly conical needle-valve *x* passes horizontally into the passage *q* of the nipple *p* and serves to retard at will the entrance of the liquid drawn through the depending tube *o*. By screwing the said needle-valve more or less forward in the passage *q* the two leakage or escape orifices are more or less reduced. It is unnecessary to state that any other analogous means could be employed without inconvenience to increase or retard the leakage or escape of the combustible liquid at the exit-orifices of the passage *q*.

Into the bottom of the carbureter and at the side opens a union or junction-piece *y*, in which is fitted a valve *z*, provided with a spindle *a'* and which closes very hermetically, since the liquid supplied, which enters under pressure from the external reservoir and



comes upon the under face of said valve, tends to keep it shut by forcing it against its seat. A very light spring *b'*, which supports this valve, has simply the object of preventing it from falling when the external reservoir becomes empty. Further, a small lever *c'*, pivoted at *d'*, bears upon the spindle *a'* of the said valve, the extremity of this lever bearing against the bottom of the regulating-ring *t*. It must be added that the weight of the regulating-ring *t* in relation to its volume should be such that it can overcome the pressure of the liquid entering under pressure from outside the apparatus when said ring forces the hydrocarbon-admission valve *z* down through the medium of the lever *c'*, but only when the combustible liquid is in insufficient quantity in the reservoir of the carbureter—that is to say, when the said ring *t* is only partly immersed. The regulating-ring *t* being supposed immersed, when its relative weight becomes less the valve *z* insures absolute tightness. On the contrary, as the downward pressure exerted by the feed-ring increases the valve is pushed back and allows the combustible liquid to pass.

*Conditions of working of the carbureter.*—First, admixture or blending effected first of all in contact with combustible liquid, preferably by way of emulsion; second, energetic admixture or blending of the motive fluid or gaseous mixture, this resulting from the successive modifications which the ascending gaseous column undergoes as it circulates from chamber to chamber through the plates, the current being divided several times into thin layers or streams, which are then united into voluminous pencils or columns, and simultaneously mechanical drying of this motive fluid by draining or dripping on the walls of the plates; third, methodical graduation of the carburization by entry of fresh air or external air before admixture or blending.

*Operation of the apparatus.*—The stop-valve of the liquid combustible reservoir being opened, automatic operation of the regulating-ring *t* takes place, and the reservoir *a* always contains the proportion of hydrocarbon necessary for proper working of the apparatus. At this moment it is desirable to see that the openings *d d'*, serving for the entrance of fresh or external air, are closed by the ring *E*. This precaution being taken, as soon as the piston of the motor creates suction the reduction of pressure produced in the mixing-chamber is communicated to the interior of the dipping-tube *B* and the lift-valve *D* of the upper chamber allows the external air to enter for the full section of the valve-opening. In descending through the dipping-tube this fresh air following the course indicated by the arrows carries the liquid oozing from the nipple *p* through the mixing-chamber *H*, where supersaturation takes place—that is

to say, the air takes up all the moisture which it is capable of carrying. Then the air, carbureted to the maximum degree, undergoes an energetic mixing or blending in its passage from plate to plate, while at the same time it deposits by contact the small drops, which are carried mechanically with it, and nothing but a homogeneous gaseous mixture reaches the cylinder of the motor. It remains to determine the degree of carburization strictly necessary. For this purpose the ring *E* is moved gradually by means of the thumb-piece or button *F* to uncover the openings *d*, which admit fresh air until the explosion in the motor ceases to be produced normally, which is a certain sign of insufficiency of hydrocarbon. Finally, this addition of fresh air is regulated, according to the nature of the combustible employed, once for all to the conditions which insure regular working with a minimum consumption.

I claim as my invention my carbureter, realizing in a practical manner the aims above stated and comprising as means of accomplishment—

1. A carbureter for regulating and homogeneously mixing air and combustible liquid, including, in combination, an outer tube, a chamber for containing liquid hydrocarbon being formed by the lower end of said outer tube, means for maintaining such liquid at a constant level, an inner tube extending at its open lower end into said chamber, baffle-plates arranged close together around the lower end of said inner tube for saturating the air as far as possible with the liquid hydrocarbon, and more widely separated baffle-plates above said saturating-plates for homogeneously mixing the air and liquid, the alternate widely-separated plates having relatively small radial oblong openings and larger openings alternately, said inner tube having supplementary openings at a point above the lower end and above the saturating baffle-plates for admitting additional fresh air to the saturated air before the latter reaches the upper mixing baffle-plates to insure a homogeneous mixture of the already-saturated air, and means for regulating the area of said openings to suitably proportion the mixture according to the atmospheric or hygrometric conditions of the air.

2. A carbureter for regulating and homogeneously mixing air and combustible liquid, including, in combination, an outer tube, an inner tube having an upper end in communication with the atmosphere and having an open lower end extending into a chamber formed by the lower end of said outer tube, a central nipple *p* extending upward from the base of said chamber, said nipple having a central downward prolongation *s*, a lower chamber into which said prolongation extends, a weight in said lower chamber guided



on said prolongation, and means for admitting the liquid to said lower chamber, said means being controlled by said weight.

3. A carbureter for regulating and homogeneously mixing air and combustible liquid, including, in combination, an outer tube, a chamber being formed by the lower end of said outer tube, an inner tube having an upper end in communication with the atmosphere and having an open lower end extending into said chamber, baffle-plates arranged close together around the lower end of said inner tube for saturating the air, more widely separated baffle-plates above said saturating-plates for homogeneously mixing the air and liquid, said inner tube having supplementary openings of regulable area for admitting additional fresh air to the saturated air before the latter reaches the upper mixing baffle-plates, and means for admitting liquid through a passage of regulable cross-section into said chamber.

4. A carbureter for regulating and homogeneously mixing air and combustible liquid, including, in combination, an outer tube, an inner tube having an upper end in communication with the atmosphere and having an open lower end extending into a chamber formed by the lower end of said outer tube, a central nipple *p* extending upward from the base of said chamber, said nipple having a central downward prolongation *s*, a lower chamber into which said prolongation extends, a weight in said lower chamber guided on said prolongation, and means for admitting the liquid to said lower chamber, said means being controlled by said weight, said nipple *p* being provided with horizontal valved openings.

5. A carbureter for regulating and homogeneously mixing air and combustible liquid, including in combination an outer tube ter-

minating at its base in a chamber for containing liquid hydrocarbon, an inner tube extending at its open lower end into said chamber, a central conical nipple *p* extending upward from the base of said chamber, upon which the combustible liquid oozes in a thin film, said nipple having a central downward tubular prolongation *s*, a lower chamber *a* into which said prolongation *s* extends, a weight in said lower chamber, a valve *z* closed by a spring and controlling the admission of the liquid into said chamber, and a lever *c* on which said weight bears and which is in engagement with said valve.

6. A carbureter including, in combination, a central air-admission tube through which the air passes from the atmosphere to the lower end, through a mixing-chamber and thence up outside of the tube, said tube having an opening of regulable area at an intermediate point to admit a supplementary supply of fresh air.

7. A carbureter for regulating and homogeneously mixing air and combustible liquid, including in combination an outer tube terminating at its base in a chamber for containing liquid hydrocarbon, means for saturating air therewith, a central tube within the outer tube and having openings for admitting fresh air to said outer tube for mixture with the saturated air, and a piston in the interior of the central tube having its operating-stem extending through the end of the tube, whereby the position of the piston may be adjusted to more or less close said openings.

In witness whereof I have hereunto signed my name, this 11th day of December, 1903, in the presence of two subscribing witnesses.

HENRI JOSEPH ERNEST HENNEBUTTE.

Witnesses:

JULES ARMENGAUD, Jeune,  
HANSON C. COXE.