No. 848,170. PATENTED MAR. 26, 1907.

C. O. HEDSTROM.

CARBURETER.

APPLICATION FILED JULY 14, 1905.

Fig. 1.

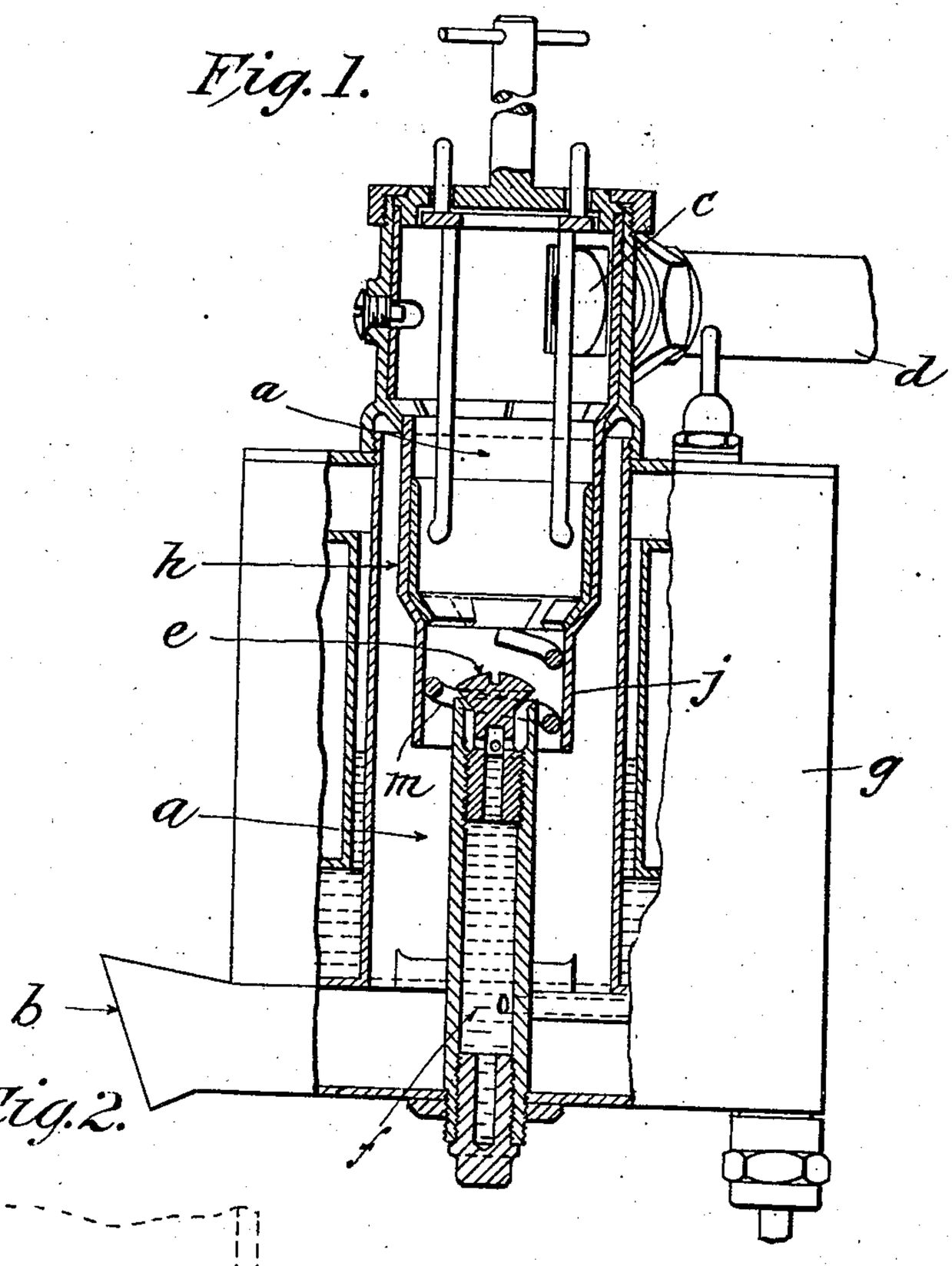


Fig. 2.

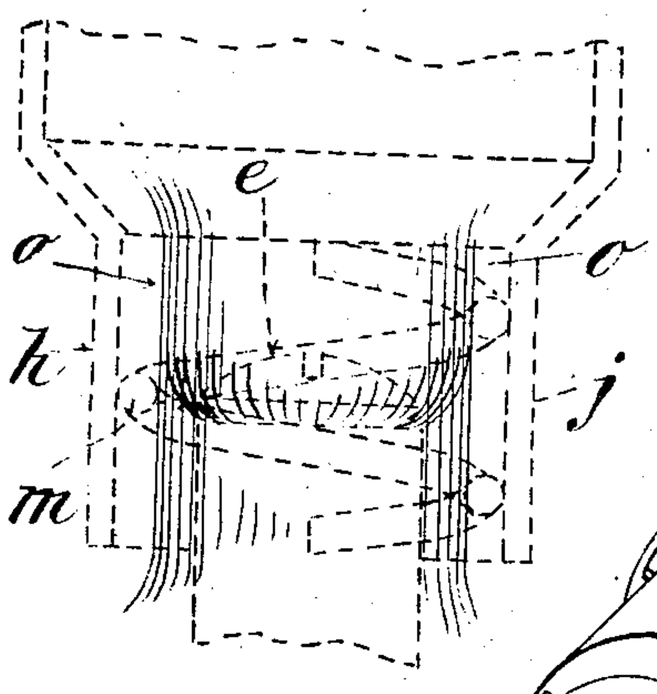


Fig. 4.

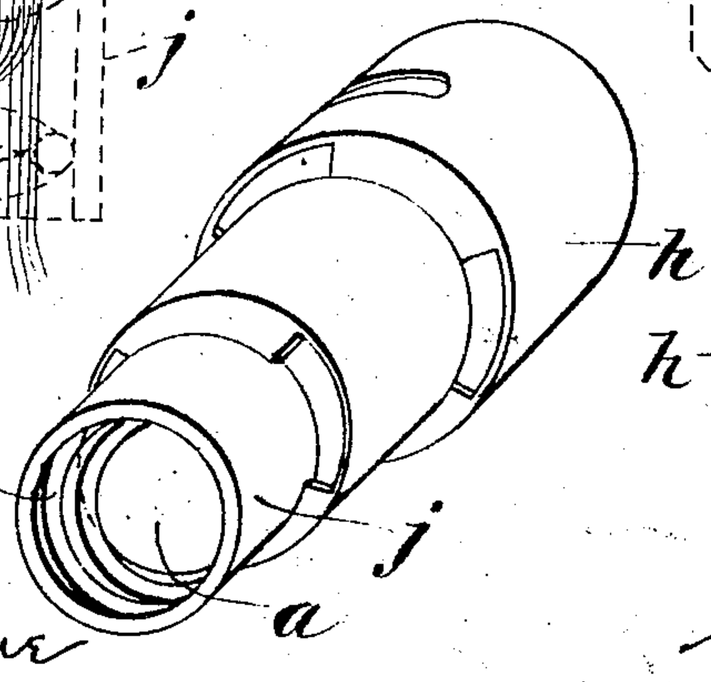
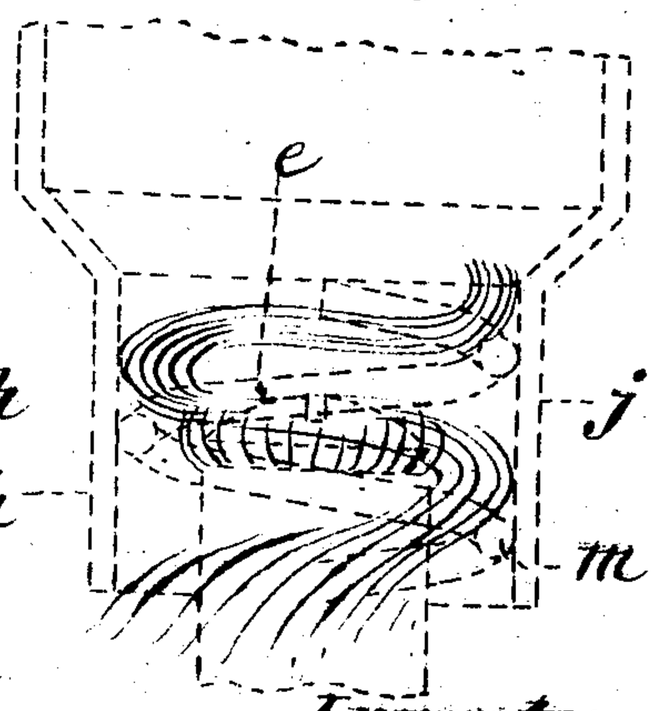


Fig. 3.



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UNITED STATES PATENT OFFICE.

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CARBURETER.

No. 848,170. Specification of Letters Patent. Patented March 26, 1907.

Application filed July 14, 1905. Serial No. 269,747.

To all whom it may concern:

Be it known that I, CARL O. HEDSTROM, a citizen of the United States of America, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Carbureters, of which the following is a specification.

This invention relates to carbureters such as are adapted for use in connection with internal-combustion engines for the purpose of supplying thereto the combustible elements with such a proportionate admixture of air as to permit the combustion thereof to be effected under the most favorable conditions; and the particular object of the invention is to provide a carbureter for this purpose having the characteristic of what is known as "flexibility." In explanation of this term in the sense in which it is used in this application it should be stated that as at present generally constructed, in the carbureters which are used for the atomization or volatilization of a liquid fuel (which is that generally employed in internal-combustion engines) a regulated supply of fuel is delivered from a nozzle located in an air-passage one end of which is open to the atmosphere and the other of which is connected with the cylinder of the engine, the suction effect of the piston drawing air through the carbureter serving to draw from the nozzle the required supply of combustible in the form of a spray or vapor, which mingling with the air passes on to the engine. In throttling down the engine if the area of the air-passage through the carbureter be contracted or expanded the volume of air which can be drawn therethrough on the suction-stroke will of course be varied, but there will be no variation of the area of the supply-nozzle. By thus varying the area of said passage-way the velocity of the air moving through said passage-way will vary. Therefore there will be a variation in the suction effect on the supply-nozzle, the result being a variation in the proportion of combustible to a given volume of air. If the supply of combustible be increased or diminished, whereby the speed of the piston is varied, the suction effect of the piston likewise varies according to variation of the piston speed. A flexible carbureter in the sense used herein is therefore one which may be adjusted to normal conditions of operation of the engine, but in which under abnormal conditions (as, for example, when it is desired to run the engine either above or below its normal speed) the volume of the air will be automatically increased or diminished relative to the quantity of the combustible.

The invention is clearly illustrated in the accompanying drawings, in which—

Figure 1 is an elevation, partly in section, of a carbureter to which the invention has been applied. Fig. 2 is a diagrammatic view illustrating the action of the air when the latter is moving through the carbureter at relatively low velocity. Fig. 3 is a similar view to Fig. 2, showing the action of the air when it is moving through the carbureter at a relatively high velocity. Fig. 4 is a perspective view of that part of a carbureter to which the invention is applied.

It is to be noted that the particular form or type or carbureter shown in the drawings accompanying this application forms no part of the invention whatever, and it is shown herein merely as illustrative of a carbureter embodying the general features of nearly all carbureters in so far as the vaporizing or atomizing action thereof is concerned whereby the fuel is mixed with air. For the purpose of this application, however, it may be considered that *a* indicates an air-passage through the carbureter, having an inlet *b* open to the atmosphere and an outlet-opening *c*, which through a suitable pipe *d* is connected with the cylinder of an internal-combustion engine. In this passage is an atomizing-nozzle *e*, located at the end of a pipe *f*, which extends into the air-passage *a*, preferably axially thereof, said pipe *f* being connected with a suitable reservoir *g*, containing liquid fuel, so arranged that the fuel will be maintained at a constant level somewhat below the orifice of the atomizing-nozzle, as usual in this class of constructions.

The air-passage *a* at that point immediately surrounding the fuel-supply nozzle is preferably circular in cross-section, and Fig. 4 shows this feature, this figure illustrating a cylindrical member *h* of the carbureter located in the air-passage therethrough and forming a part thereof and in which the atomizing-nozzle is located, the internal diameter of the lower end *j* of this cylindrical member, less the space therein occupied by the axially-located atomizing-nozzle, deter-

mining the maximum diameter of a column of air which may be drawn therethrough on a full suction-stroke of the engine.

The essential feature of this invention consists in applying to the internal wall of that part *j* of the member *h* a rib *m*, which extends inwardly from said wall and preferably is in the form of a continuous spiral extending from below to a point above the orifice of the atomizing-nozzle.

It has been determined in practice that a wire in the form of a coil with relatively wide spaces between the convolutions thereof is one of the most convenient ways of applying this rib *m*, the coil being soldered to the inner wall of said part *j*, as shown in the various figures of the drawing. This construction, however, is to be understood merely as the preferred embodiment of the invention, and, if desired, the inwardly-extending rib *m* may be applied to or formed on the wall of the air-passage surrounding the atomizing-nozzle in any way.

In operation it has been determined that when the engine is run below its maximum speed and the velocity of the column of air moving through the carbureter is therefore below the maximum the capacity of the air-passage through that part of the carbureter which is occupied by the inwardly-extending rib *m* is determined by the area thereof measured from the inner edge of the rib *m* on one side to the inner edge thereof on the other, this action being clearly illustrated in Fig. 2, in which the diameter of the air-current is indicated by lines *o o*. In other words, the inwardly-extending ribs will choke said air-passage to the extent of their inward extension from the walls of the part *j* when the engine slows down to a certain degree below the normal speed. This slowing down of the engine implies, obviously, the need of less fuel, and a reduction of the quantity of fuel implies, of course, a smaller volume of air with which it is to mix if the relative proportions of air and fuel are to be maintained. On the other hand, when the engine is running at its maximum or somewhat above its normal speed the suction effect produced by the quicker stroke of the piston will cause the column of air drawn through the air-passage at a higher velocity to move through the part *j* of the air-passage in a more or less spiral path, as indicated in Fig. 3, which will permit it to fill said air-passage through the part *j* to the extent of the entire diameter thereof measured from one wall to the other, and thereby enlarging the capacity of the air-passage at that point to the extent of the inward extension of the rib *m* into said passage, and the volume of air which may be drawn through the part *j* of the air-passage when a higher speed is required is consequently greater than will be delivered through the same passage at a lower speed, and the greater velocity of the air will draw a larger quantity of fuel from the nozzle *e*. Furthermore, the spiral movement of the air around the supply-nozzle operates to effect the delivery of a larger quantity of combustible than would naturally result merely from its increased velocity.

It is thus seen that the speed of the engine automatically effects a variation in the area of the air-passage through the carbureter according to the demands of the engine, the carbureter thereby acquiring the characteristic of flexibility above referred to, which is essential to the production of a uniformly-burning combustible mixture.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. A carbureter consisting of a body portion having an air-passage therethrough, a fuel-supply nozzle in said passage, and a spiral rib extending for a short distance from the inlet end of said body portion into said passage at an angle to the axis thereof, the spiral rib being secured to the inner wall of the body portion and circular in cross-section whereby the inlet area of the body under normal suction is reduced, and under abnormal suction is increased.

2. A carbureter consisting of a body portion having an air-passage therethrough, a fuel-supply nozzle axially arranged in said passage with relation to the body portion, and spirally-arranged ribs in the passage whereby the effective cross-sectional area of said passage will be varied by a variation of the velocity of the air-current moving through said passage.

3. A carbureter consisting of a body portion having an air-passage therethrough and a spirally-disposed rib secured to the inner wall of the air-passage and extending into said passage at an angle to the axis thereof, whereby the effective area of the air-passage depends upon the velocity of air therethrough

4. A carbureter consisting of a body having an air-passage therethrough, a fuel-supply nozzle in said passage, a rib spirally disposed on the inner wall of said passage at an angle to the axis thereof, said rib occupying a comparatively small portion only of the air-passage when considered transversely of the axis of the body.

5. A carbureter consisting of a body having an air-passage therethrough, a fuel-supply nozzle in said passage and concentric with the air-passage, a rib spirally disposed on the inner wall of the latter and extending above and below the delivery-orifice of said nozzle, the rib occupying a small portion only of the air-passage when considered transversely of its axis.

6. A carbureter consisting of a body having an air-passage therethrough, a fuel-sup-

ply nozzle arranged in the axis of the air-passage, a spirally-disposed internal rib at the lower end of the air-passage whereby the effective area of the passage-way is varied in proportion to the velocity of air therethrough.

7. A carbureter consisting of a body portion having an air-passage therethrough, a spirally-disposed rib on the interior portion of the air-passage and adjacent the outlet of the fuel-supply but leaving a free unobstructed passage-way between the same and the fuel-supply nozzle.

8. In a carbureter of the class described, a body portion having an air-passage extending therethrough, a liquid-fuel supply located in the air-passage, a spiral rib on the interior of the air-passage and extending toward the axis of the air passage-way but leaving a free unobstructed passage-way therethrough between the rib and the fuel-supply whereby a rotary effect proportional to the velocity of air is given to the fuel admixture of air and liquid.

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