T. J. DISTURNAL.

CARBURETER.

APPLICATION FILED APR. 28, 1916.

1,277,705.

Patented Sept. 3, 1918.

3 SHEETS—SHEET 1.

Fig. 1.

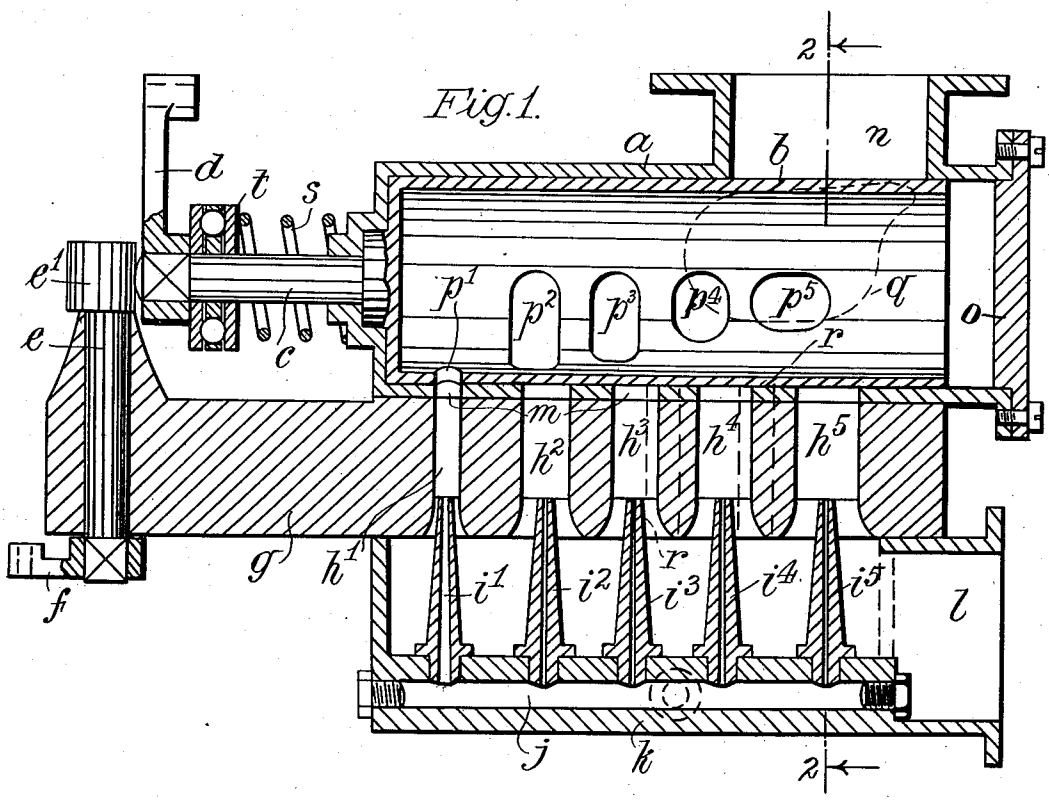
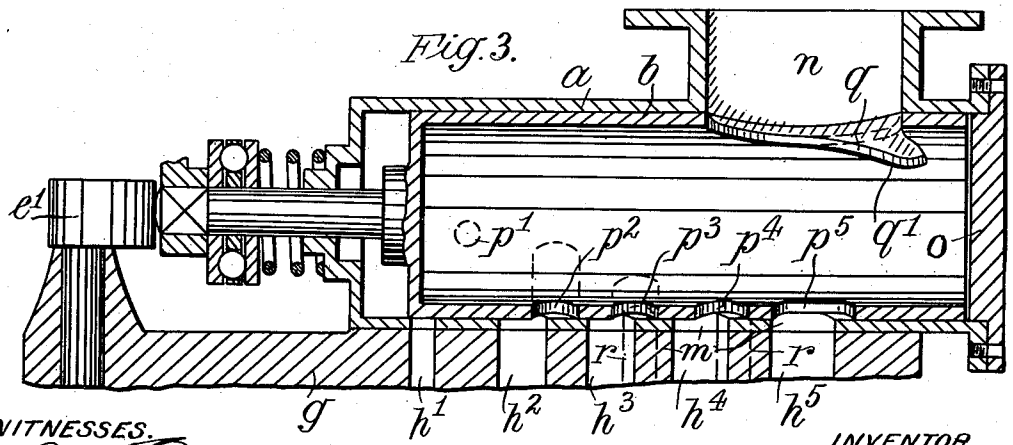


Fig. 3.



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3 SHEETS—SHEET 2.

Fig. 2.

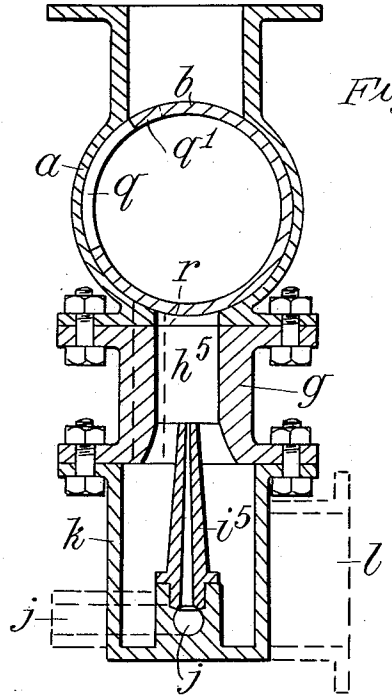
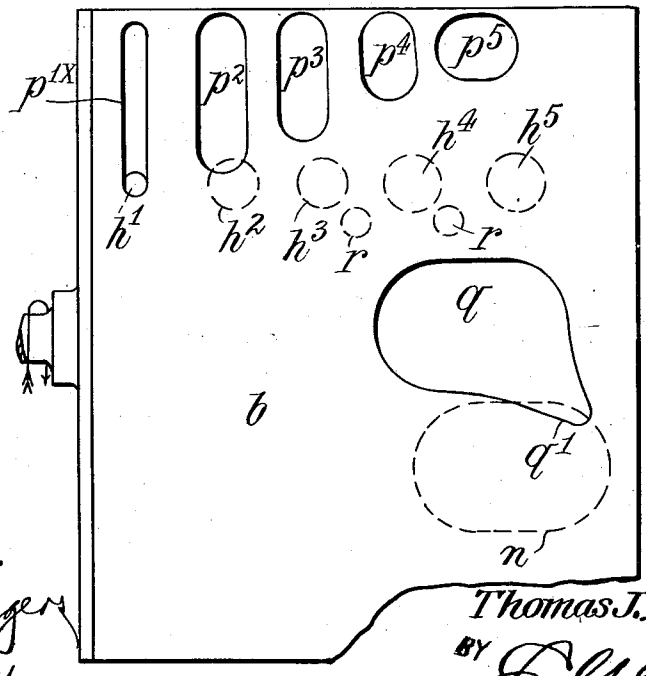


Fig. 5.



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3 SHEETS—SHEET 3.

Fig. 6.

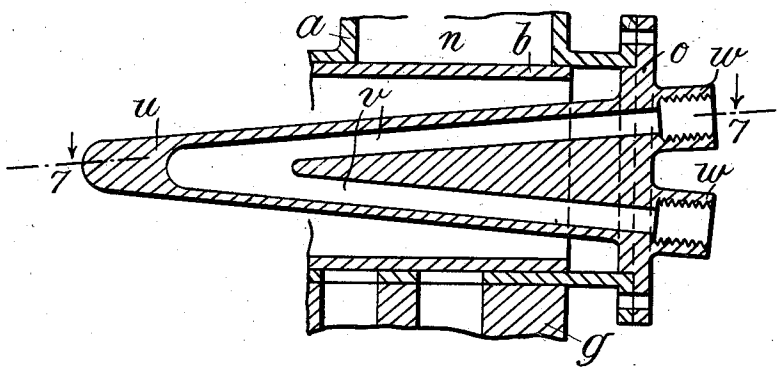


Fig. 7.

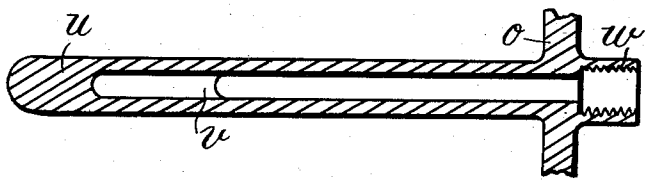
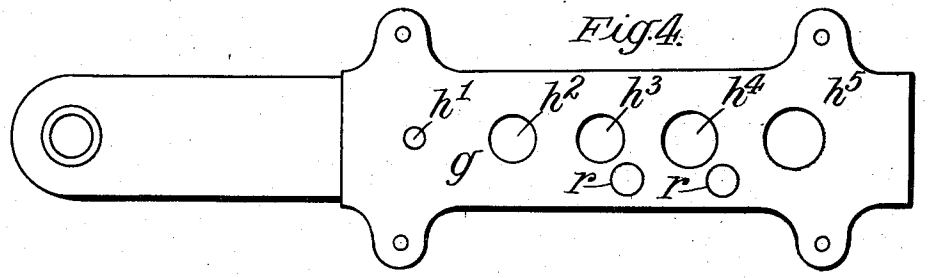


Fig. 4.



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UNITED STATES PATENT OFFICE.

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CARBURETER.

1,277,705. Specification of Letters Patent. Patented Sept. 3, 1918.

Application filed April 28, 1916. Serial No. 94,213.

To all whom it may concern:

Be it known that I, THOMAS JOHN DISTURNAL, a subject of His Majesty the King of England, residing at Belmont, in the county of Kings, Ireland, have invented certain new and useful Improvements in Carbureters, of which the following is a specification.

This invention relates to improvements in or connected with carbureters for internal combustion engines.

The object of the invention is to provide a carbureter of improved and simple construction by means of which the quantity and quality of explosive or induction mixture for a petrol or other internal combustion engine can be easily and accurately varied and regulated within wide limits according to the required speed of the engine and the power to be developed by the latter.

According to the invention a carbureter having a plurality of fuel nozzles and choke tubes, all of which nozzles are connected to a common source of fuel supply, is fitted with a slotted drum or sleeve valve which is adapted to be moved longitudinally and to be rotated to open and close one or more of the said choke tubes or apertures and vary the effective area of same. The invention also embodies improved features of construction hereinafter described and claimed.

In order that the said invention may be clearly understood and readily carried into effect I will proceed to describe the same with reference to the accompanying drawings which show a convenient construction of the improved carbureter, the feed chamber for maintaining a constant level of fuel in the jets being omitted which chamber may be of the float or any other type and be situated in any position as desired.

In the drawings:—

Figure 1 is a longitudinal vertical section of a complete carbureter showing the sleeve valve in its full back or normal position to provide a very rich mixture to the engine for starting or slow running.

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

Fig. 3 is a fragmentary longitudinal vertical section showing the sliding sleeve valve advanced to its full position, that is, its position when required to give its weakest mixture and at the same time a large volume of same.

Fig. 4 is a plan showing the tops of the choke tubes and air mixing tubes in the aluminium block.

Fig. 5 is a plan of the inner sleeve valve or drum shown as though opened out on the flat, and looking at it from the inside.

Fig. 6 is a detail longitudinal vertical section showing an explosive mixture heating device suitable for use in the improved carbureter, and

Fig. 7 is a horizontal section on the line 7—7 of Fig. 6.

The upper portion *a* of the carbureter is bored out a neat fit for the sleeve valve or drum *b* which has a spindle *c* formed or fitted on one end thereof for operating same by means of a lever *d* and a spindle *e* and cam *e'*, which spindle *e* and cam *e'* are operated by a lever *f*.

The central portion *g* of the carbureter, which portion may be made or built up of any suitable material or metal preferably a block of aluminium, is faced on its upper surface and made an air tight fit with the upper portion *a*, and choke tubes are formed in this block by drilling and shaping holes h' to h^5 therein, or by any other convenient method.

Jets or nozzles i' to i^5 are screwed or otherwise fitted on a fuel channel *j*, and the said jets or nozzles may each be supplied with one orifice or spray hole as shown, or a number of orifices or spray holes in any well known manner. The fuel channel *j* may be formed in the base portion *k* of the carbureter and be connected to any convenient or well known arrangement for supplying the fuel to the jets and maintaining said fuel at a constant level. This base portion *k* is provided with one or more air inlet ports *l*, which may be valve controlled or otherwise, for admitting hot or cold air.

The upper cylindrical portion *a* has its lower surface faced and is bolted or otherwise fixed in an air tight manner to the middle portion *g;* and the middle portion is bolted or otherwise fixed to the base portion *k* to form a complete carbureter.

In the upper cylindrical portion *a* holes *m* are formed so as to exactly coincide or come into juxtaposition with the choke tubes h'—h^5 and form a continuation of the latter. Also, the upper portion *a* has an explosive mixture outlet, such as at *n*, for connection to the engine, and a cap, such as *o* fitted in an air tight manner at its extreme end and secured in place by

screws or the like. If required, however, this end of the portion *a* may form the mixture outlet and be bolted direct to the engine; or the outlet may be situated in any other convenient position on the carbureter portion *a*. As it is customary in carbureters to provide throttling means between the carbureter and the engine intake, such arrangement may be provided in the device of this invention, but, being a common expedient, is not shown. In the inner sleeve or valve *b* are formed port holes or slots p' to p^5, as shown more particularly in Fig. 5, for coöperation with and shutting off or opening the different choke tubes h' to h^5 by rotating the sleeve axially by the attached operating lever *d*. These port holes or slots p' to p^5 may be varied in length, shape and position to suit the requirements of different engines. It will be noticed in Figs. 1 and 5 that the first or small choke tube h' is normally fully open, and that the second choke tube h^2 which is really the first working choke tube, is slightly uncovered; this would be the normal position for starting when cold, as the first jet i' preferably contains a large jet orifice for giving a very rich mixture to facilitate starting when cold. As hereinafter described the jet i' is adapted to serve as an emergency jet. As the sleeve *b* is turned and pushed by means of its operating levers *d* and *f* the small choke tube h' may be cut off completely and the other choke tubes h^2 to h^5 are consecutively and conjointly opened until the levers *d* and *f* are turned to their extreme working positions, when all the choke tubes except the first will be fully exposed to the suction of the engine.

In the sleeve *b* near one end as shown, or it may be in any other convenient position, is preferably formed an outlet port *q* which controls the mixture outlet *n* and acts as a main throttle for the engine. Thus, when the sleeve *b* is at its extreme closed position (Figs. 1 and 5), the outlet *n* is covered and closed by the sleeve except for a lead provided by a prolongation q' of the port *q*, as shown in Fig. 5, but as the sleeve is turned to uncover the choke tubes h^2—h^5 the port *q* opens the interior of said sleeve to the depression created by the engine and so enables the latter to draw explosive mixture through the choke tubes thus uncovered. The outlet port *q* is formed in such a way that when the sleeve *b* is moved backward longitudinally it gives a larger opening to the outlet *n* than when the sleeve is moved partly or fully forward longitudinally.

As the engine warms up to its work the explosive mixture is usually required to be of a weaker strength, viz., more air is required to be admitted, and it is one of the principal objects of the invention to produce an adequate mixture for this purpose. The principle upon which the carbureter is built is that it contains an excessive choke tube area, that is, at normal speed, and until the engine has thoroughly warmed up, the choke tube area would be too great for the engine to give the best results, therefore the last choke tube h^5 would preferably not be required to be brought into operation, but as the engine warms up, the sleeve *b* may be gradually pushed fully forward longitudinally by the spindle *e*, cam e' and the operating lever *f*, and thus reduce the suction on the first choke tubes, the last choke tube being left fully exposed owing to the size of its port p^5, and the extra air holes or tubes *r*, which are drilled or formed in the block *g*, being fully or partly exposed, so preventing any increased depression. Thus a much weaker mixture is obtained than was the case before the sleeve was fully advanced longitudinally, and at the same time, if the sleeve is rotated back to the first working choke tube h^2 the outlet port *q* is very nearly closed and reduces the action of the depression upon this choke tube to a very small degree. It will therefore be seen that the explosive mixture can be varied in richness or quality to a very large degree by advancing or retracting the sleeve *b* longitudinally.

A spring *s* interposed between the casing *a* and the lever *d* may be of such a tension that if the engine is racing the suction thus created, especially if the latter choke tubes were shut off, would tend to pull the sleeve *b* inward and automatically reduce the strength and volume of the explosive mixture. A ball thrust washer *t* is preferably provided to reduce somewhat the friction of the spring *s* and to render the operation of the lever *d* easier.

The spring *s*, ball thrust washer *t*, spindle *e* and cam e' may, if desired, be entirely dispensed with, and any other convenient device be substituted for moving the sleeve *b* longitudinally, such as a collar and forked lever, or a universal ball and socket joint, or other well known device.

In Figs. 1 and 3 of the drawings, the port p' in the sleeve *b*, which port coöperates with the first or smallest choke tube h', is shown as a round hole only, and quickly goes out of action whether the sleeve is turned axially or moved longitudinally. This port may be made in the form of a slot as shown at $p'^{\times}$ in Fig. 5, so as to insure a supply of petrol or fuel from the jet i' if any of the other jets should become choked from some inadvertent cause. For instance, in the case of engines used for aerial craft, it is imperative to insure a wide range of safety in regard to fuel supply. Thus, if two of the main or working jets became choked it would be possible, by retracting the sleeve

longitudinally to its full back position, Fig. 1, to bring the first or small choke tube h' into constant operation with its attendant large orifice jet i' in combination with some of the other choke tubes, and so maintain a good explosive mixture and at the same time a fairly large volume of same.

The number, sizes and shapes of the choke and air tubes and of the slots in the valve and the extent to which said valve can be moved longitudinally, may be varied or modified as desired.

It will be noticed that in the construction shown when the sleeve b is fully advanced longitudinally, Fig. 3, it cuts off the first choke tube h' completely, cuts off two-thirds of the second tube h^2, cuts off one half of the third tube h^3, cuts off less than half of the fourth tube h^4 and leaves the last tube h^5 fully open, and when said sleeve is also turned to its full open position, Fig. 3, opens the air holes r through the slots p^3 and p^4. Also, when the sleeve is being advanced longitudinally the exposed portion of the main outlet port is reduced in area on the early choke tubes, but when all of the choke tubes are brought into action said port is then opened to its fullest extent.

As illustrated in Figs. 6 and 7, the cap o may be formed or fitted with a tapered extension u to project well into the interior of the sleeve valve b, in which extension is provided connected channels or tubes v ending in screw-threaded nipples w on the exterior of the cap. One of these nipples is adapted to be connected to the exhaust of the engine, to the water circulating system or to any other suitable source of hot gas, water or air, so that the hot gases, water or air can circulate through the extension u and heat the same. By these means fuel sucked from the nozzles or jets i'—i^5 and impinging against the extension would be heated and thus would more readily vaporize, and this arrangement renders it possible to use heavy oils in the carbureter. The extension also heats the explosive mixture within the valve b and facilitates thorough mixing of the air entering said valve through the tubes h'—h^5 and r with the fuel from the nozzles or jets. With this addition the carbureter is suitable for use in cold climates.

What I claim is:—

1. A carbureter comprising a casing, a plurality of choke tubes including a pilot choke tube, a plurality of fuel nozzles, including a pilot fuel nozzle, coöperating with said choke tubes and connected to a source of fuel supply common to them all, an extra air tube to supplement the choke tubes, a slotted hollow sleeve valve mounted within said casing and adapted to operate to cover and uncover the choke tubes and said extra air tube, an explosive mixture outlet in the casing, an explosive mixture outlet port and a lead prolongation of said port formed in said sleeve valve and adapted to coöperate with said casing outlet, means for rotating the valve, and means for sliding the valve longitudinally.

2. A carbureter comprising a casing, a plurality of choke tubes including a pilot choke tube, a plurality of fuel nozzles, including a pilot fuel nozzle, coöperating with said choke tubes and connected to a source of fuel supply common to them all, an extra air tube to supplement the choke tubes, a slotted hollow sleeve valve mounted within said casing and adapted to operate to cover and uncover the choke tubes and said extra air tube, an explosive mixture outlet in the casing, an explosive mixture outlet port and a lead prolongation of said port formed in said sleeve valve and adapted to coöperate with said casing outlet, means for rotating the valve, means for sliding the valve longitudinally, and a spring operatively connected with the spindle of the valve.

3. A carbureter comprising a plurality of choke tubes including a pilot choke tube, a plurality of fuel nozzles, including a pilot fuel nozzle, coöperating with said choke tubes and connected to a common source of fuel supply, extra air tubes to supplement the choke tubes, a slotted hollow sleeve valve adapted to operate to cover and uncover the choke tubes and said extra air tubes, means for rotating the valve, means for sliding the valve longitudinally, and means whereby the strength and volume of the explosive mixture are reduced automatically if the engine tends to race, which pilot choke tube and fuel nozzle can be entirely covered by the movements of the valve and while the other choke tubes and fuel nozzles are uncovered.

4. A carbureter comprising a plurality of choke tubes including a pilot choke tube, a plurality of fuel nozzles, including a pilot fuel nozzle, coöperating with said choke tubes and connected to a common source of fuel supply, extra air tubes to supplement the choke tubes, a slotted hollow sleeve valve adapted to operate to cover and uncover the choke tubes and said extra air tubes, means for rotating the valve, means for sliding the valve longitudinally, and a heating device extending into the interior of the valve and into the path of the explosive mixture passing through the latter.

In testimony whereof, I have hereunto signed my name to this specification.

THOMAS JOHN DISTURNAL.