No. 842,170. PATENTED JAN. 29, 1907.

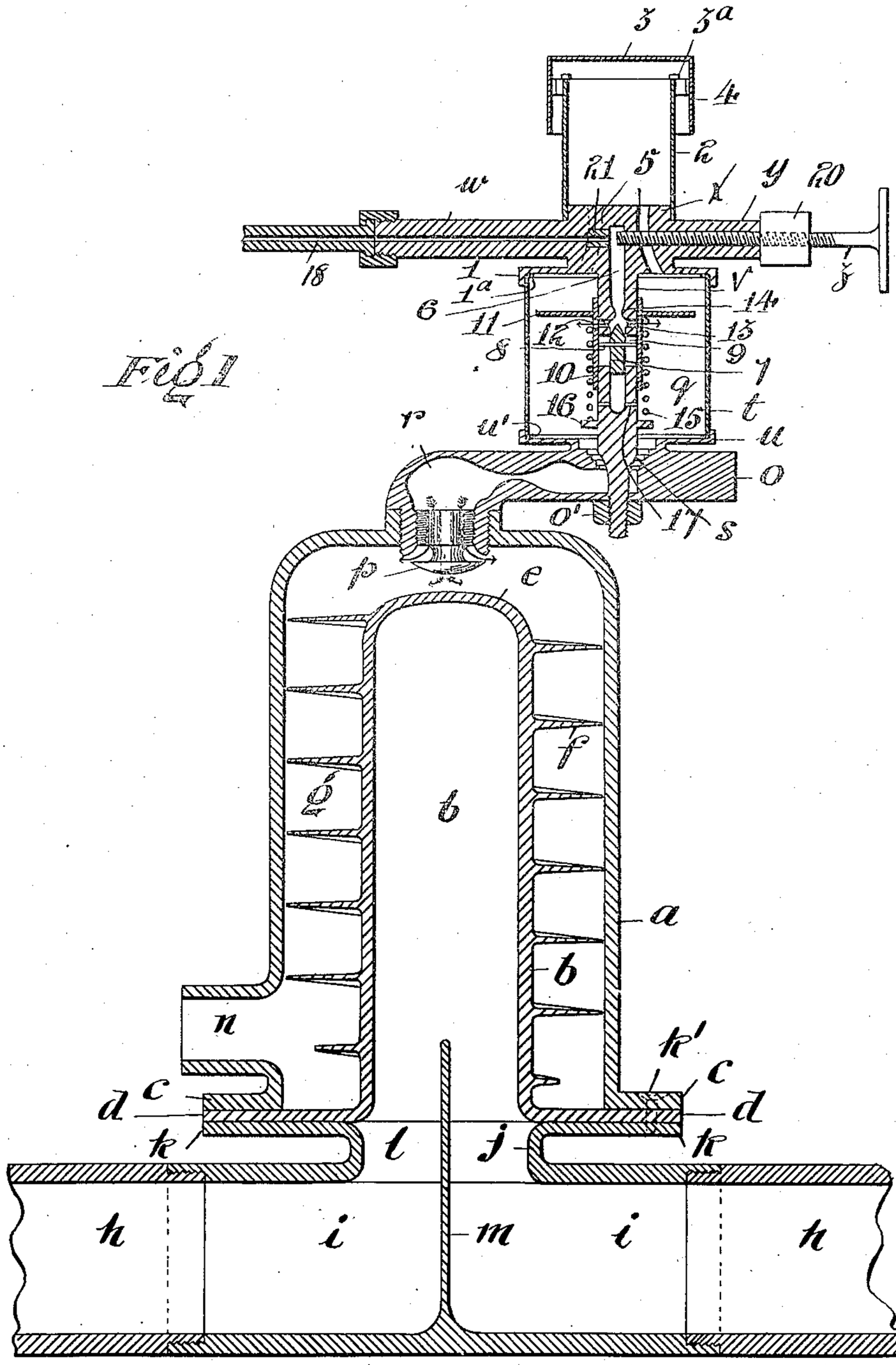
C. H. BRYANT & A. WATLING.

CARBURETER.

APPLICATION FILED MAY 10, 1905.

2 SHEETS—SHEET 1.

Fig. 1



Witnesses
W. M. Kinnie
John A. Percival.

Inventors:
Charles H. Bryant.
Arthur Watling
By Richards & Geo
Attorneys

No. 842,170. PATENTED JAN. 29, 1907.

C. H. BRYANT & A. WATLING.

CARBURETER.

APPLICATION FILED MAY 10, 1905.

2 SHEETS—SHEET 2.

Fig 2

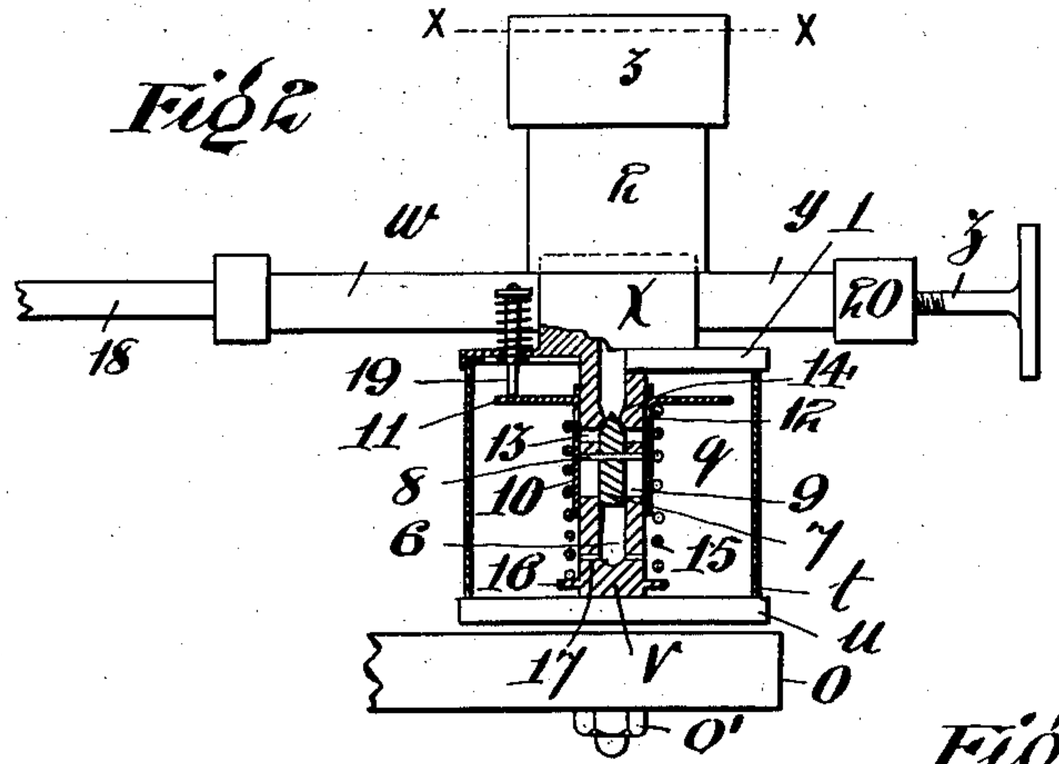
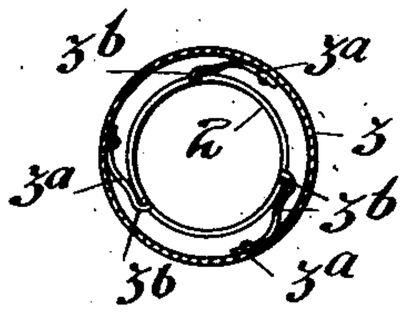


Fig 4

Fig 3



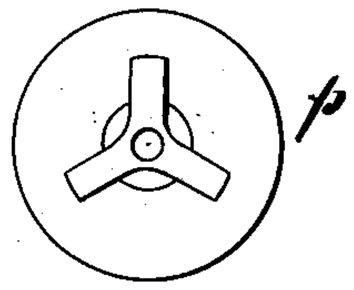


Fig 5

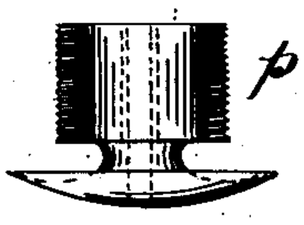
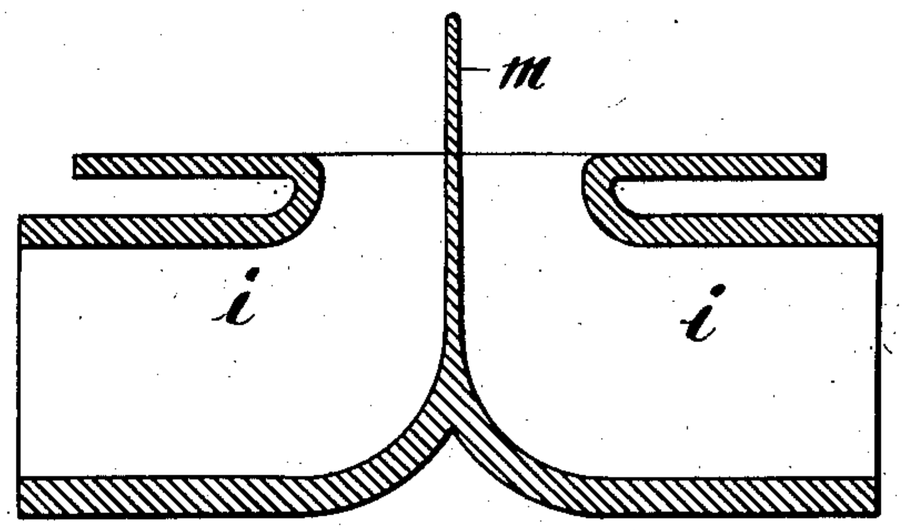


Fig 6



Witnesses
H. M. Kuehne
John A. Percival.

Inventors:
Charles H. Bryant
Arthur Watling
By Richards & Co
Attorneys

UNITED STATES PATENT OFFICE.

CHARLES HENRY BRYANT, OF TWICKENHAM, AND ARTHUR WATLING, OF LONDON, ENGLAND.

CARBURETER.

No. 842,170. Specification of Letters Patent. Patented Jan. 29, 1907.

Application filed May 10, 1905. Serial No. 259,830

To all whom it may concern:

Be it known that we, CHARLES HENRY BRYANT, a subject of His Majesty the King of Great Britain, and a resident of 12 The Embankment, Twickenham, in the county of Middlesex, England, and ARTHUR WATLING, a subject of His Majesty the King of Great Britain, and a resident of 9 Southampton street, High Holborn, London, W. C., England, have invented certain new and useful Improvements in Carbureters, (for which we have made application for patent in Great Britain, No. 20,899, dated September 28, 1904,) of which the following is a specification.

Our invention relates to apparatus for preparing a charge of mineral oils or other inflammable fluids for explosion in internal-combustion engines. Such apparatus (commonly known as "carbureters") as hitherto constructed work readily with the more volatile fluids but not with the less volatile, such as ordinary paraffin; and our invention has for its object to overcome this difficulty.

A successful utilization of heavy oils, such as ordinary paraffin, as the motive power in internal-combustion motors of automobiles and fixed internal-combustion motors is much needed on account of low cost and immunity from risk of fire as compared with the more volatile oils—such, for example, as gasolene. Many attempts have been made to render possible the employment of heavy oils, such as paraffin, for the purpose referred to; but so far such attempts have failed for the important reasons, either separately or collectively, that the oil has been decomposed and the tarry deposits resulting therefrom have after a short working period necessitated the carbureting apparatus and working parts of the motor being throughly cleaned the latter particularly, as the admission and exhaust valves and piston thereof have been found to quickly gum up. Furthermore, before it has been possible to start the motor the use of a blow-lamp or like means has been necessary to heat up the carbureting apparatus, as otherwise the latter could not perform its functions. The objections attendant to such necessity of heating up the carbureter for starting the motor in the case of automobiles, whether for pleasure or traction purposes, are obvious. Owing, moreover, to the unsatisfactory conditions in which the charges have been prepared by apparatus as previously devised, great loss of power has resulted.

By an apparatus constructed and arranged substantially as hereinafter described we are able to thoroughly burn ordinary paraffin in a motor, starting from the cold, without tarry deposit either in the apparatus itself or in the motor.

In the accompanying two sheets of drawings we have shown and will describe with reference thereto the form of apparatus which we have found the most successful in practice.

In the drawings, Figure 1 is a central vertical section of the entire apparatus. Fig. 2 is a part-sectional elevation of the valve chamber. Fig. 3 is a sectional plan view of the air-supply tube and cap, taken on the line X X of Fig. 2. Figs. 4 and 5 are plan and side views of the delivery-nozzle employed. Fig. 6 is a sectional view of a slightly-modified form of the pipe employed, as shown in Fig. 1, for connecting the apparatus to the exhaust-pipe of motor.

For the purpose of carrying our invention into effect we provide, preferably of yellow brass, a pair of bell-shaped casings *a* and *b*, one situated within the other and respectively provided at their lower ends with flanges *c* and *d*. The inner casing *b* is preferably domed at its upper end *e*, approximately as shown, and has cast integrally therewith an external spiral web *f* of a depth equal to the distance between the outer wall of the inner casing *b* and the inner wall of the outer casing *a* and extending from the upper to the lower portion of the former casing *b*, the final lower turns of the said web preferably decreasing in width, as indicated. By the provision of the spiral web *f*, as described, the upper and lower portions of the outer casing *a* are interiorly connected by way of the spiral passage *g*, formed by such web. The said inner casing *b* we internally connect with the exhaust-pipe *h* from motor. This may be effected in suitable manner. A convenient way which has been employed consists of providing a short length of pipe *i*, having connected thereto by a short neck *j* a flange *k*, to which is adapted to be securely fixed by screws *k* or by riveting, bolting, or otherwise the flanges *c* and *d* of the casing *a* and *b*, as

shown. The neck *j* forms the wall of an opening *l*, which is equal, or approximately equal, to the diameter of the inner wall of the casing *b* and connects the interior of the latter with the pipe *i*, which latter is suitably arranged to form part of the exhaust-pipe *h*, as, for example, shown. Centrally or thereabout of the opening *l* the pipe *i* has integrally formed therewith or otherwise provided a deflecting-web *m*, which may project upwardly from the bottom of the pipe *i* a distance sufficient for directing the flow of heated gas upon the inner surface of the casing *b*.

At its lower end the outer casing *a* is provided with an outlet-opening *n* for connection by a length of pipe (not shown) to the combustion-chamber of motor, while at the upper end of said casing, and preferably at the center thereof, is screwed or otherwise suitably fixed a horizontally-disposed tube *o*, one end of which opens into the outer casing *a* and has a suitable type of delivery-nozzle, such as *p*, Figs. 4 and 5, screwed or otherwise secured thereto, and the other or the outer end communicates with a valve-chamber *q*, through which oil and air, as hereinafter described, are supplied to it. The passage *r* in said tube *o* is suitably formed with a series of enlargements and restrictions of its bore for the purpose of perfecting the admixture of the air and oil, and the communication with the above-mentioned valve-chamber *q* is made by way of a stepped cone-shaped opening *s*, which connects the passage *r* with a preferably valve-chamber *q*, situated above and supported by a flange *u*, (having an upturned edge and packing-disk *u'*,) integrally formed with or otherwise connected to the tube *o*. Fixed in convenient manner to such tube *o*, as by a screw-nut *o'*, and projecting upwardly through the stepped cone-shaped opening *s* is provided a vertically-disposed tube *v*, which is formed into a plug and externally tapered at its lower end and integrally or otherwise connected at its upper end with an oil-supply tube *w*, having an enlarged portion or boss *x* situated centrally of said tube *v*, and an extension *y*, provided with a screw-valve *z*, said boss *x* being at its lower end provided with a flange *l*, having a downward-projecting rim and a packing-ring 1^a, which flange operates as a cover for the casing *t*, and when the nut *o'* is screwed tightly home, such cover 1 is drawn toward the flange *u*, and by means of the packing *u'* and 1^a the casing *t* is securely sealed. Upon such enlarged portion or boss *x* is fixed an air-supply tube 2, provided with a cap 3, having a depending flange 4 of sufficiently large diameter and provided with side springs 3^a, having projections 3^b for engaging with the tube 2, so as to leave a free passage for the air between the cap and the tube, as shown in Figs. 1 and 3. The air so admitted is arranged to be conducted by a number of passages 5, formed in the said enlarged portion or boss *x* into the valve-chamber *q*.

In the passage 6 of the vertical tube *v* is placed a suitable valve 7, which we term an "oil-supply" valve. This valve is connected by one or more pins 8, passing therethrough and through slots 9 in the tube, to a sleeve 10, mounted on and closely fitting the said tube *v* and provided with a circular disk or diaphragm 11 and a number of openings or slots 12, situated beneath the diaphragm 11 and adapted when the oil-supply valve 7 is opened to allow a supply of oil to issue therethrough from openings 13, formed in the vertical tube *v*, adjacent to the valve-seating 14 formed therein.

The oil-supply valve 7 is normally retained against its valve-seating 14 by a spiral spring 15, which at one end bears against the diaphragm 11 and at the other end bears against a collar 16, formed on the tube *v*. The lower closed end of the passage 6 of said tube *v* is vented by one or more holes 17 to permit escape of air and any possible collection of oil when the valve is opening. A pipe 18, suitably connected to the oil-tube *w*, conveys the oil fed by gravity or pressure from the oil-tank to said tube *w*, from whence it passes to the passage 6 of the tube *v*.

In operation the suction created through the apparatus by the induction-stroke of the piston of motor draws a supply of air through the air-tube 2 and air-passages 5 to the valve-chamber *q* and simultaneously causes a downward movement of the diaphragm 11 and sleeve 10 to take place against the force of the spring 15. The oil-supply valve 7, by reason of its connection to the sleeve 10, is thereby opened to an extent approximately as shown in Fig. 1 of the drawings, and a charge of oil is supplied through the passages 13 of the tube *v* and slots or openings 12 of the sleeve 10 into the valve-chamber *q*. As the diaphragm 11 is of less diameter than the casing *t*, the air passes beneath said diaphragm, and the charge of oil, together with the entering air, is drawn through the stepped cone-shaped opening into the tube *o* and by the delivery-nozzle *p* is sprayed over the top and dome *e* of the casing *b*, from whence it flows round the spiral passage *g* to be finally drawn therefrom into the cylinder, there to be mixed with a main supply of air to form an explosive mixture. It may here be observed that so far we have found it desirable to connect up the apparatus fairly close to the combustion-chamber of motor.

It will be seen that the air and oil first come into contact in the chamber *q* and are then together drawn into the expanding and contracting passage *r* of the tube *o* by way of the stepped cone-shaped opening *s*. By means of this stepped cone-shaped opening *s*

we commence the atomizing of the oil and admixture of the oil and air, which operation is continued by the passage of the oil and air through the expanding and contracting passage *r* of the tube *o*, wherein the oil and air are alternately restricted and expanded a number of times before being finally restricted and expanded by the delivery-nozzle *p* over the top or dome *e* of the casing *b*. The admixture of the air and oil (the latter now in finely-divided or atomized condition) is then fully perfected in and by the travel of the oil and air through the spiral passage *g*, where before it enters the combustion-chamber of motor it is heated (after the motor has been started) by the exhaust-gases directed into the casing *b*. The carburation of the air is, moreover, effected by finely dividing or atomizing the oil as described without decomposing same, and therefore in addition to the important result of enabling ordinary paraffin to be burned in motors starting from the cold there is also no possibility of any tarry deposit in either the carbureter or the motor occurring, and we therefore obtain practically perfect combustion.

With an apparatus constructed and arranged substantially as herein described we are able, by reason of the perfect admixture of the air and oil produced thereby, to readily burn ordinary paraffin in internal-combustion motors starting from the cold.

The object of the spring-controlled oil-supply valve 7 is to automatically cut off the supply of oil except when air is being drawn into the apparatus. To facilitate starting the motor from the cold, we may, however, provide a spring-controlled pin 19, Fig. 2, in the cover 1 of the chamber *q*, so that the diaphragm 11 may by hand be depressed to open the valve and allow the apparatus to be flushed with oil prior to starting the motor. The screw-valve *z* is provided for controlling the flow of oil to the passage 6 of the tube *v* and is to be adjusted so as to give the desired flow to attain the best results and need not then be further interfered with. To prevent leakage past the valve *z*, a stuffing-box 20 is provided, and as a seating for said screw in valve *z* we enlarge the passage in the tube *w* at its junction with the passage 6 and insert in such enlarged portion before screwing in the valve *z* a metal bush, as shown in Fig. 1.

We wish it to be understood that the height of the deflecting-web *m* or means equivalent thereto may be varied as in some cases it may not be necessary or desirable to direct the whole of the exhaust-gases upon the inner surface of the casing *b*, but only a portion of such gases, the regulation of which would be simply effected by reducing or increasing the length of said web *m* or like means. In this way the heating of the inner casing may be regulated so as to secure the best carbureting temperature with any given engine. It is also obvious that the exhaust-pipe *n* and pipe *i* may be integral, or, in other words, that the exhaust-pipe itself may be provided with a flanged opening *l* and deflecting means *m* for the purpose referred to in lieu of providing a separate short length of pipe *i*, as, for example, described, while in either case instead of providing an abrupt turn for the exhaust-gases when being directed into the casing *b* and when passing out therefrom, as shown in Fig. 1, we may form the pipe *i* or the exhaust-pipe itself at the opening *l*, substantially as shown in Fig. 6. Also notwithstanding that we have chosen to show and describe a short air-inlet tube 2 provided with a cap 3 such cap may be dispensed with by considerably lengthening said tube.

Having now described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In combination with an internal-combustion motor an inner and an outer casing having a spiral passage between communicating with the combustion-space, a tube for the mixture of air and oil discharging over the top of the inner casing, a stepped cone-shaped opening leading to said tube and means for delivering oil and air to said opening, substantially as described.

2. In combination with an internal-combustion motor, an inner and an outer casing having a spiral passage between, communicating with the combustion-space, a tube having a series of restrictions and enlargements of its bore for the mixture of air and oil discharging over the top of the inner casing, a stepped cone-shaped opening leading to said tube and means for delivering air and oil to said opening, substantially as described.

3. An apparatus for preparing ordinary paraffin or other like inflammable fluids for explosion in internal-combustion motors, said apparatus comprising a pair of casings one situated within the other, and having a spiral passage formed therebetween connecting the upper and lower interior portions of the outer casing, which latter at its lower end is provided with an outlet for connecting the apparatus to the combustion-chamber of motor, and its upper end is provided with a tube having a series of enlargements and restrictions of its bore, said tube opening at one end into the outer casing and being provided with a delivery-nozzle and at the other end leading by way of a stepped cone-shaped opening into a chamber wherefrom air and oil are supplied to said tube, the admixture of air and oil formed in passing through the apparatus being adapted to be heated by the exhaust-gases from the motor after starting, substantially as herein described.

4. In an apparatus for preparing ordinary

paraffin or other like inflammable fluids for explosion in internal-combustion motors, the combination of a pair of casings one situated within the other and having a spiral passage formed therebetween connecting the upper and lower interior portions of the outer casing, which latter at its lower end is provided with an outlet for connecting the apparatus to the combustion-chamber of motor, and at its upper end is provided with a tube having a series of enlargements and restrictions of its bore, said tube opening at one end into the outer casing and being provided with a delivery-nozzle, and at the other end leading by way of a stepped cone-shaped opening into a valve-chamber, centrally of which latter is situated a vertical tube passing down through the said stepped cone-shaped opening and fixed to the horizontal tube and provided at its upper portion with an oil-supply tube having an enlarged portion or boss and an extension carrying a screw in valve, said boss, in which a number of air-passages are formed, carrying an air-supply tube with or without being provided with a cap according to its length, and having a flange corresponding to a flange provided on the horizontal tube referred to, which flanges are adapted to retain between suitable packing a preferably transparent casing surrounding the vertical tube said vertical tube containing an oil-supply valve connecting to and adapted to be opened and closed by a spring-controlled sleeve provided with a disk or diaphragm arranged to be operated at starting by a spring-controlled pin and subsequently by the air drawn in by the suction of motor, the admixture of air and oil formed in passing through the apparatus being adapted to be heated by the exhaust-gases from the motor after starting, by connecting the apparatus to the exhaust-pipe and directing the flow of heated gas into the interior of the inner casing by suitable deflecting means, substantially as herein described and shown by the appended drawings.

In witness whereof we have hereunto set our hands in presence of two witnesses.

CHARLES HENRY BRYANT.
ARTHUR WATLING.

Witnesses:
HENRY CONRAD HEIDE,
ALBERT GEORGE BARNES.