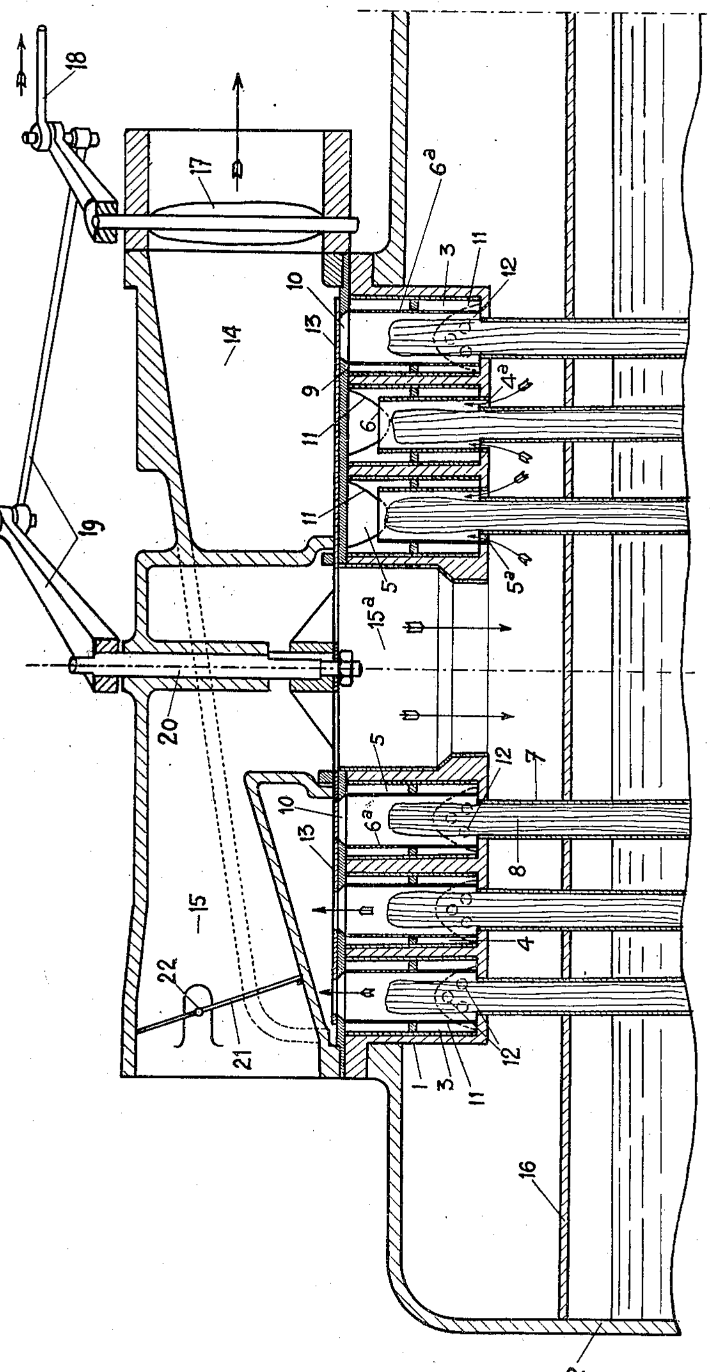
Aug. 16, 1938. E. L. STOKISS 2,127,238

APPARATUS FOR INTEGRAL CARBURETION FOR MOTORS

Filed Sept. 14, 1936 3 Sheets-Sheet 1

Fig. 1



INVENTOR
EDMOND L. STOKISS
BY
Richards & Geier
ATTORNEYS

Aug. 16, 1938. E. L. STOKISS 2,127,238

APPARATUS FOR INTEGRAL CARBURETION FOR MOTORS

Filed Sept. 14, 1936 3 Sheets-Sheet 2

Fig. 2

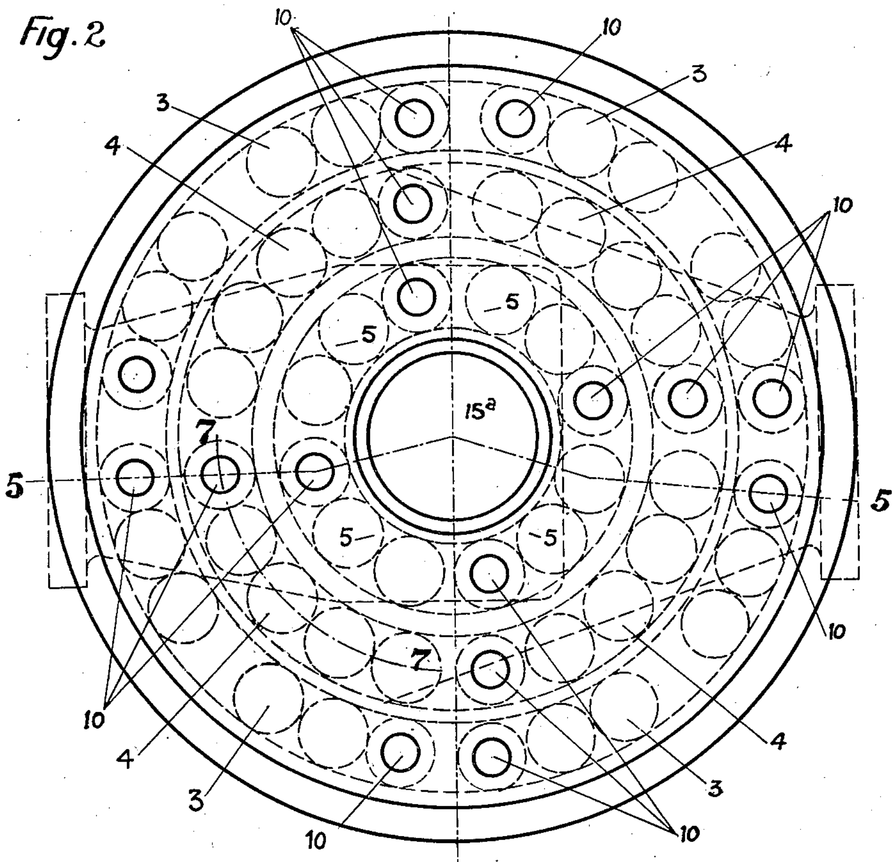
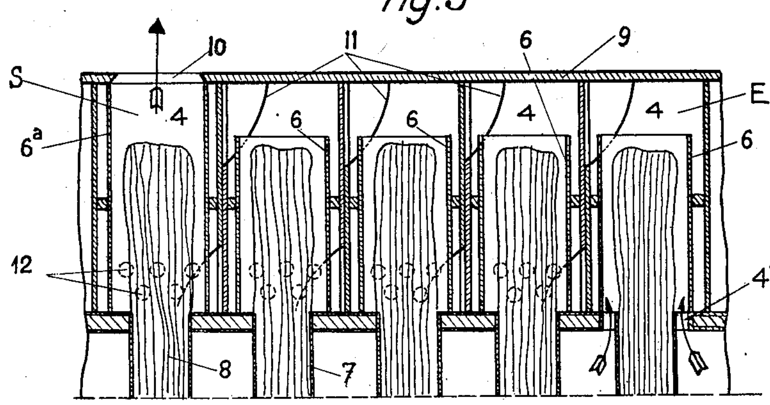


Fig. 3



INVENTOR
EDMOND L. STOKISS
BY
Richards & Geier
ATTORNEYS

Aug. 16, 1938. E. L. STOKISS 2,127,238

APPARATUS FOR INTEGRAL CARBURETION FOR MOTORS

Filed Sept. 14, 1936 3 Sheets-Sheet 3

Fig. 4

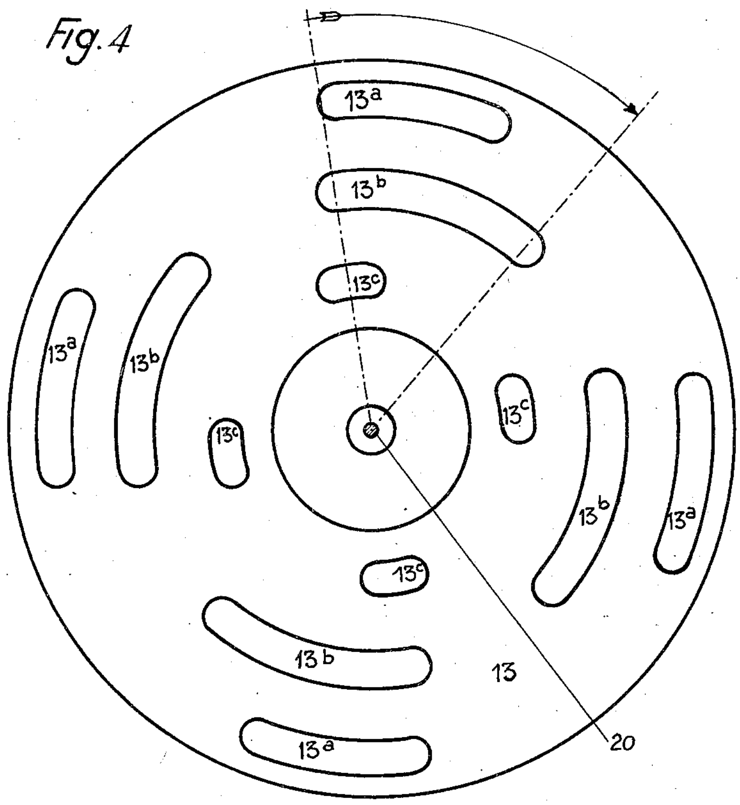
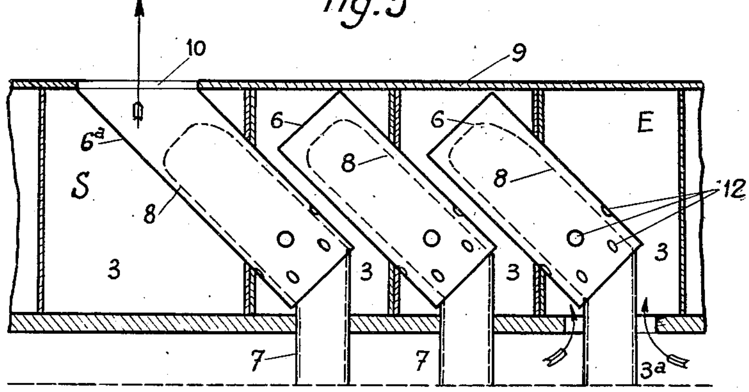


Fig. 5



INVENTOR
EDMOND L. STOKISS
BY Richards & Geier
ATTORNEYS

UNITED STATES PATENT OFFICE

2,127,238

APPARATUS FOR INTEGRAL CARBURETION FOR MOTORS

Edmond Lucien Stokiss, Paris, France

Application September 14, 1936, Serial No. 100,656
In France November 13, 1935

5 Claims. (Cl. 261—99)

This invention relates to an apparatus of carburetion which allows the integral and complete carburetion of air by means of light or heavy hydrocarbons designed for feeding explosion or combustion motors.

Said apparatus is based upon the principle of contact and characterized by the great number of contact surfaces used, as well as by the progressivity of the extent of the surfaces brought in action according to the required volume of gaseous mixture and the power to be supplied.

The apparatus is characterized by the utilization of wicks or similar devices of pervious material contained in special wick-carriers dipping in the hydrocarbon used as fuel and provided with inlet orifices suitably arranged so as to present upon the interior wicks, the greatest possible contact surface to the air.

The apparatus for the execution of the present system comprises a large number of wick-carriers arranged for example in double, threefold or multiple series which may be actuated successively in order to proportionate the volume of gaseous mixture which is produced relatively to the motive power to be supplied by means of a suitable distributor which is preferably combined with the motor inlet valve.

Said apparatus may be mounted upon the carburetant receiver or upon an independent receiver or supply device, the gaseous mixture which is produced passing directly from said receiver to the motor inlet pipe. It thus takes the place of the usual carburettor as well as of the feeding pump.

The gaseous mixture produced by the above mentioned carburetion method is homogeneous and stable at all working temperatures, it does not produce any deposit or condensation in the pipes, it is well carburetted, even on starting and thus allows an instantaneous starting without requiring the use of supplementary apparatus such as starters and enrichment devices. Moreover the present system may be utilized with both light and heavy hydrocarbons.

In the appended drawings Figs. 1 to 5 illustrate a form of the device in which numerous and successive contact surfaces are provided for enriching the gaseous mixture which has been produced.

Fig. 1 is a vertical sectional view of the device on line 5—5, Fig. 2 which is a plan view of same, the upper air and gaseous mixture tubes and the rotary distributor not being shown.

Fig. 3 is a sectional detail view on line 7—7, Fig. 2.

Fig. 4 is a plan view of the rotary distributor.

Fig. 5 is a diagrammatic view similar to that of Fig. 3 of a modified mode of execution.

The improved apparatus shown in Figs. 1 to 5 is composed of a ring shaped casing 1 which is positioned upon an opening suitably formed in the upper wall of the fuel receiver 2. Said casing is divided around its periphery in a certain number of series of ring shaped cells 3, 4, 5, three in the present case in which the wick carriers are contained. The latter are constituted by an upper tubular part 6—6^a which is provided at the bottom with a tubular extension 7 of smaller diameter which contains the wick 8 and dips with the latter in the liquid contained in the receiver 2. The upper portions 6—6^a of the wick carriers in which the wicks 8 rise have a diameter which is calculated so that the air or the gaseous mixture may circulate in the form of a thin sheet around said wicks.

The casing 1 is closed by a covering plate 9 presenting numerous orifices 10 (sixteen in the present case) to correspond with the outlet cells for the gaseous mixture. The upper tubular enlarged parts 6^a of the wick carriers occupy the entire depth in said outlet cells and in the other cells the upper tubes 6 of the wick carriers end at a short distance from the plate 9. Every series of cells is distributed in a certain number of groups as shown, for example eight groups in the series of cells designated by 3, four groups in that designated by 4 and four groups in the series of cells designated by 5. Each group of cells comprises an outlet cell S and an inlet cell E, the latter being provided at the bottom with a circular air inlet opening 3^a, 4^a, 5^a around the lower tubular wick carrier 7.

The cells 3, 4 and 5 in the different groups are provided at their opposite lower and upper corners with connecting slots 11; on the other hand the upper tubes 6, 6^a of the wick carriers are provided at the bottom with air passages 12 in such a manner that the air admitted in the inlet cell E in each group may thus be laden with hydrocarbon atomized by its passage around the upper portion of the wick in said cell, so that the gaseous mixture thus produced may be progressively enriched by its passing successively along the wicks of the intermediary cells, and lastly so that the correct gaseous mixture may flow out from the outlet cell S through the orifice 10 in the stationary upper covering plate 9. The successive contacts of the wicks with the thin annular sheet of gaseous mixture produce the thorough atomization of the hydrocarbon and consequently a perfectly homogeneous gas.

The wick carriers may also be inclined at their upper part in the direction of the forward movement of the gaseous mixture, as shown in Fig. 1, so as to avoid as much as possible loss of charge and sudden bends in the passage of the gaseous mixture from the inlet cell to the outlet cell in each group.

The wick carriers may also be inclined as a whole and not be provided with an enlarged upper tubular element, the top of the wick thus being left free so that the carbureting air as it proceeds may come successively in contact with the top of the wicks which are impregnated with hydrocarbon thus getting progressively enriched.

A plan revolving distributor **13** provided with three series of openings **13**^{a}, **13**^{b}, **13**^{c} (Fig. 4) which respectively correspond to the three series of cells **3**, **4** and **5**, may rotate above the covering plate **9**.

Above the case **1** and the revolving distributor **13** are mounted an upper covering body comprising a gaseous mixture tube **14** which ends above the distributor and leads to the motor to be fed, and the air inlet tube **15** which opens to the exterior and ends in a middle well **15**^{a} leading to the upper or air compartment of the fuel receiver **2** which is divided from the so called receiver proper by a partition **16**.

A throttle valve **17** is mounted at the outlet of the gaseous mixture tube **14**; it is driven by a system of rods **18** connected with the accelerator. A rod and lever system **19** connects the driving means of the gas throttle valve with a vertical shaft **20** to which the revolving plane distributor **13** is suitably fixed. In this case a balanced air inlet valve **21** is mounted in the air inlet tube **15**, the shaft **22** of said valve is pivoted off-center in order to ensure its automatic closure when there is no depression and its automatic opening to the desired degree by the action of depression produced by the working of the motor.

It will be evident that the air inlet valve instead of being self acting as above described could be actuated by means of a system of rods combined with the driving means of the accelerator.

The mode of operation of the device illustrated in Figs. 1 to 5 is as follows:

The motor being started by the opening of the throttle valve **17**, said opening causes the rotation of the distributor **13** whose openings **13**^{b} come opposite the orifice **10** of the outlet cells S in the intermediate cell series **4** which in the arrangement shown by way of example are the cells for the reduced speed. During this period the strong depression acting upon the wick carriers inside the cells of this series causes the air admitted at **4**^{a} to flow upon the wicks of the five successive cells in said group, thus ensuring a perfect enrichment of the mixture and allowing the direct starting of the motor with a gaseous mixture that has been enriched to the highest possible extent. A secondary branch (not shown) formed upon the gas nozzle **14** may be preferably provided for the passage of the gases when the motor works at reduced speed, the gas throttle valve being then closed.

When the throttle valve **17** is more fully opened, the openings **13**^{a} of the distributor **13** come opposite the orifices **10** of the outlet cells in the series of outer cells **3**, the outlet cells in the intermediate series **4** always remaining open owing to the elongated shape of the distributing orifices **13**^{b}. In this manner the gaseous mixture is provided simultaneously by the series of intermediate cells **4** and half the groups of the series of outer cells **3**, the first acting with five successive enrichments and the others with three enrichments. Normal working at slow speed is thus obtained.

When the gas throttle valve **17** is still more fully opened the distributing orifices **13**^{c} then uncover the orifices of the outlet cells in the inside series **5**, the cells of the intermediate series **4** which have been previously uncovered and those of the outer series **3** remain also uncovered owing to the elongated shape of the distributing orifices **13**^{b} and **13**^{a}. The gaseous mixture is then produced by the whole of the intermediate cells **4** working with five successive enrichments, the whole of the inner cells **5** and half the groups of the outer cells working with three successive enrichments. Normal working at full speed is thus obtained.

When the throttle valve **17** is more fully opened the distributing orifice **13**^{a} uncovers the outlet cell of the second group of the outer series, all the other cells already uncovered remaining also uncovered. At that moment all the cells of the device are working to produce the gaseous mixture. The working at full regime in overload is thus obtained.

Due to the multiple and successive passages of the carbureting air and of the gaseous mixture as a thin annular film along the upper part of the wicks **8** which are impregnated with hydrocarbon, a complete atomization of the liquid fuel is obtained and consequently a successive enrichment of the gaseous mixture in such a manner as to ensure the greatest possible efficiency of the motor fed by the apparatus whatever the changes of depression may be. On the other hand the adequate distribution of the groups of cells which comprise a varying number of units, and of the orifices of the distributing plate will allow of bringing into operation at any desired moment a number of elements corresponding to the desired enrichment and motive power with the object of always suitably adapting said power to the required effect.

It will be advantageous to utilize an arrangement similar to that shown diagrammatically in Fig. 5 by giving to the upper part of the wick carriers or to the whole of them considered as a unit a sufficiently strong incline so as to minimize the loss of charge in passing from one cell to the other and to thus realize the most efficient depression upon the wicks or other elements having a capillary property.

It will be obvious that the details of execution as above described and illustrated have been disclosed merely for the purpose of exemplification and that the invention may be embodied in various other forms. Thus the number of series of cells and the number of groups and elements in each series as well as their distribution may evidently vary according to the requirements. Also the wicks may be replaced by any other porous device having capillary properties which make it liable to act in the same manner. Furthermore the special arrangement of the carriers for the wicks or other capillary elements may be varied at will whilst ensuring the same effect from the contacting surfaces.

On the other hand, the distributor instead of being rotary (Figs. 5 to 9) or revolving (Figs. 5 to 9) as shown could be of any other kind, it may consist for example of a set of vertically movable valves either independent or combined which may be actuated by means of a driven plate which causes said valves to operate successively so as to cause them to open and close in a predetermined order suited to the distributing conditions.

What I claim and desire to secure by Letters Patent of the United States is:

1. A carbureting apparatus for combustion motors which comprises a plurality of cells, wicks of pervious material, wick carriers containing said wicks and placed in said cells which are distributed in series, each series being divided into independent groups, the first cell in each group forming an inlet cell and comprising an air inlet, the last cell forming the outlet cell, all the cells in each group communicating together; a liquid fuel receiver in which the wick carriers dip with their wicks, said receiver comprising an upper compartment formed therein for the air admitted to the wick carrier of the outlet cell in each group, a distributor, and means driving said distributor to successively and progressively uncover the various groups of cells.

2. A carbureting apparatus for combustion motors which comprises a plurality of cells, wicks of pervious material, wick carriers containing said wicks and placed in said cells distributed in concentric annular series in which they form independent groups, means forming a central air inlet in the middle of said series of cells, a liquid fuel receiver in which the wick carriers dip with their wicks, said receiver having an upper compartment formed therein which is connected with the central air inlet, air inlet orifices being formed in the first cell in each group, communicating orifices being formed in the cells and in the wick carriers for the successive passage of the air and the gaseous mixture through the various cells in each group, and a rotary distributor controlling the discharge of the gaseous mixture from the last cell in each group.

3. A carbureting apparatus for combustion motors which comprises a plurality of cells, wicks of pervious material, wick carriers containing said wicks placed in said cells distributed in circular series and in independent groups in each series, means forming a central air inlet in the middle of said series of cells, a liquid fuel container in which the wick carriers dip with their wicks, said container comprising an upper air compartment formed therein in which the central air inlet ends, air inlet orifices being formed in the first cell in each group, orifices being formed in the cells and in the wick carriers for the successive passage of the air and of the gaseous mixture through the various cells in each group; a rotary distributor controlling the discharge of the gaseous mixture from the last cell in each group, a gas nozzle receiving the gaseous mixture coming out of the groups of cells uncovered by said distributor, and a throttling device for the gases coming out of said nozzle.

4. A carbureting apparatus for combustion motors which comprises a plurality of cells, wicks of pervious material, wick carriers containing said wicks placed in said cells which are distributed in circular series and in groups in each series, means forming a tubular air inlet ending in the middle of said series of cells, an air admission device in said inlet tube; a liquid fuel receiver in which the wick carriers with their wicks dip, said receiver having an upper compartment formed therein in which the air inlet tube ends, air holes being formed in the first cell in each group in communication with said compartment in the receiver, passage openings being formed between the various cells and the various wick carriers in each group, a rotary distributor controlling the discharge of the gaseous mixture out of the various groups of cells, a gaseous mixture nozzle above the series of cells and the distributor, a gas throttling device in said nozzle, and means driving said gas throttling device in predetermined relation to the rotation of the rotary distributor.

5. A carbureting apparatus for combustion motors which comprises a fuel receiver, wicks of pervious material, tubular wick carriers containing said wicks and dipping at their lower part in said fuel receiver, the upper part of said wick carriers being of enlarged diameter and being inclined in the direction of the forward movement of the gaseous mixture, intercommunicating cells in which the upper parts of said wick carriers are disposed, the whole of the cells forming a group having a single air inlet in the first cell in the group, a distributor controlling the discharge of the gaseous mixture from the last cell in the group, and means for discharging the gaseous mixture which has been produced.

EDMOND LUCIEN STOKISS.