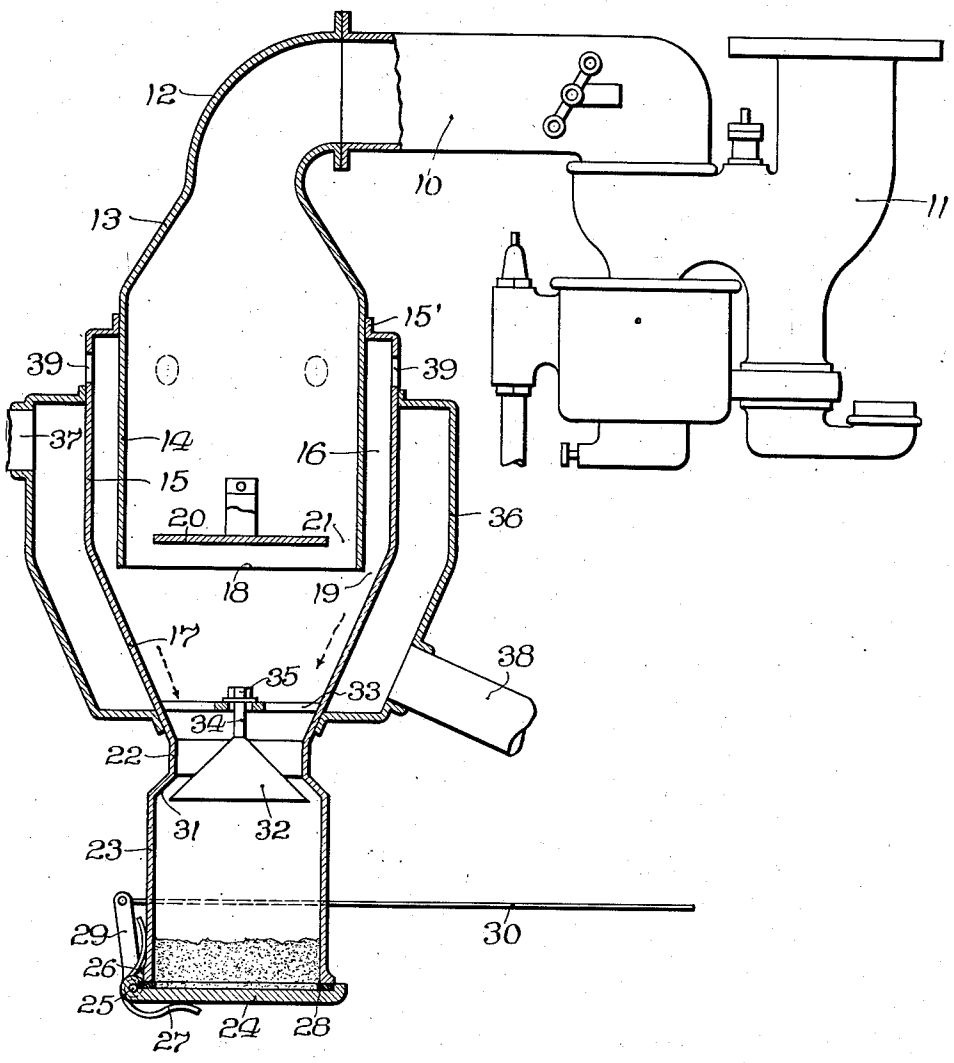
Apr. 24, 1923. 1,452,699

W. L. O'NEILL

CARBURETING APPARATUS FOR INTERNAL COMBUSTION ENGINES

Filed June 27, 1917



Inventor
William L. O'Neill
By Brown, Hanson & Bethke
Attorneys.

Patented Apr. 24, 1923. BEST AVAILABLE COPY 1,452,699

UNITED STATES PATENT OFFICE.

WILLIAM L. O'NEILL, OF CHICAGO, ILLINOIS, ASSIGNOR TO STROMBERG MOTOR DEVICES COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

CARBURETING APPARATUS FOR INTERNAL-COMBUSTION ENGINES.

Application filed June 27, 1917. Serial No. 177,160.

To all whom it may concern:

Be it known that I, WILLIAM L. O'NEILL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Carbureting Apparatus for Internal-Combustion Engines, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to carbureting apparatus for internal combustion engines, and is concerned more particularly with means for purifying the entering air which constitutes one of the elements of the combustible mixture.

Where internal combustion engines are used under conditions in which there is considerable dirt, sand, mineral matter, and other solid impurities in the atmosphere, as in the cases of automobile and truck engines on dusty roads and tractor engines on dusty fields, the air going into the carburetor in response to the suction of the engine will be charged with such solid impurities, unless means is provided to clean it preliminarily. The harmful effect of such "loaded" air in the engine cylinders is well known and devices have heretofore been provided to clean the air, some by screening it and others by gravity separation. The devices of the former class are not satisfactory, since the screens interfere with the free flow of air, particularly when they become clogged. My invention relates to devices of the latter class and has to do with improved means for "dumping" the collected solid impurities. It is the object of my invention to provide means for securing this "dumping" action in a more simple and effective manner than has heretofore been the case and in such a way that it does not entail the necessity of stopping the engine, or even the vehicle, for the purpose or cause even a temporary harmful flow of solid impurities to the engine even though the engine operates during such dumping action. In addition, I also provide a structure in which the dumping action may be be secured by actuation from a distance from the carburetor, as from the driver's position of a vehicle, or some other convenient place, in a simple and effective manner, and in which the accumulation may be automatically discharged directly to the ground or to any other desired point.

I also provide means for heating the air simultaneously with the purifying action. This relationship is important not only because of the fact that both functions may be performed in a single structure, but also because the agitation of the air during the cleaning action makes it especially susceptible to the efficient and uniform absorption of heat.

The purifying action is accomplished by providing a casing forming a chamber and intake passageways entering and leaving said chamber in such a manner that a dead air space is formed in one part of the chamber, and the air currents directed through the passageways will make a sharp turn away from said dead air space in passing to the carburetor. The solid impurities are thus separated out of the air current and into the dead air space where they come to rest and accumulate, and from which said accumulation may from time to time be discharged.

My invention is illustrated in the accompanying drawing which illustrates an embodiment thereof in side elevation.

As illustrated, a portion of the intake pipe 10 of the carburetor 11 may be extended, as indicated at 12, into an expanded funnel-shaped chamber 13, from which depends a cylindrical portion 14. In the form of the device shown the portion 14 has secured thereto a cylindrical casing 15 of such size that a passageway 16 is left between the inner wall of said casing 15 and the outer wall of the cylindrical portion 14. The casing 15 is extended downwardly in a conical portion 17 which passes the lower edge 18 of the cylindrical portion 14 so as to leave a narrow annular passageway 19 entirely between said lower edge 18 and the inner wall of the conical portion 17. The portion 14 is open at the bottom but has mounted therein a disk 20 which is of a size smaller than the interior of cylindrical portion 14 so as to leave an annular passageway 21 between the edge of said disk and the inner walls of the portion 14. The conical portion 17 may be further extended, as indicated at 22, to form an outlet pipe 23 which forms a collecting pocket. At the bottom the outlet pipe 23 is normally closed by the valve 24 which thus completes the collecting pocket. This valve

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24 is pivoted at 25 in a suitable bracket 26. A strong spring 27 tends to hold the valve closed and a suitable gasket 28 may be provided on the valve face in order to secure adequate closing of the outlet pipe. The valve 24 is also provided with an operating lever 29, whereby the valve may readily be opened manually from a distance, as from the position of the driver of a vehicle, through the intervention of the operating wire 30.

Air is admitted into passageway 16 through apertures 39 in the casing 15 just below the flange 15'. In operation, the air at maximum velocity will pass through the annular passageway 19, and in its further travel will be compelled to make a short turn about the lower edge 18 of the cylindrical portion 14 from which it will pass through the annular passageway 21 and on into the inlet pipe 10 and 12. The particles of dirt, grit, etc., will travel with the air as far as the annular passageway 19, at that point in a direction parallel to the conical wall 17 from which point said particles will continue under the momentum gained from their movement with the air, taking the direction of the dotted arrows and passing into the dead air space of outlet pipe 23 where said particles will come to rest. These particles will thus be separated from the incoming current of air and the air promptly purified.

It will now be seen that it is a simple matter to discharge the collected solid impurities by pulling the wire 30 (to the right), thus swinging down the valve 24 and allowing the collection to drop out. In such action, however, it is desirable that there be no flow, or at least any appreciably harmful flow of air upward through the outlet pipe 23 and to the engine, since such a flow of air would not only be impurified but would carry with it a large amount of the undesirable collection of solid impurities, defeating the very purpose of the device. It will be seen, of course, that such undesirable action could be avoided by stopping the engine so that there will be no suction, but it is obviously undesirable also to stop the engine. I have, therefore, provided the following arrangement:

The outlet pipe 23 is expanded at between the conical portion 17 and the valve 24 in order to form the annular valve seat 31. A valve 32 is arranged to cooperate with this seat, this valve being hung loosely from a suitable cross bar 33 by means of the stem 34 and the nut 35.

When the valve 24 is closed the valve 32 remains open, as shown, of its own weight, the pressure on opposite sides thereof being equal. When, however, the valve 24 is opened, as in the discharging action, atmospheric pressure is admitted to the under side of the valve 32, immediately closing it, due to the suction on the opposite side thereof. Thus, even though the valve 24 is opened momentarily, while the engine is running, to discharge the collected impurities, the outlet pipe is closed above the collected impurities, thus preventing an inward flow through the outlet pipe with its consequent disadvantages, as above pointed out.

As just described, the operation of the valve 32 is entirely automatic. It should be closed whenever air comes in past the valve 24, and it will be noted that it is precisely that occurrence which effects the closing. Therefore the maintenance of the outlet pipe in closed condition, by one valve or the other, is always assured. It will be understood, of course, that the precise forms of the two valves are not important so long as their functions are performed.

However, I do not contemplate a broader aspect, also, in that it may be desirable to substitute a manually operated valve for the automatic valve 32. Of course its operation would then be elective but it will be seen that with such a valve and the valve 24 the collected impurities could be discharged without opening the outlet pipe. Thus the upper valve would be closed first and then the lower valve would be opened and closed, and then the upper valve would be opened again.

It will appear that the distance between the valves 32 and 24 is optional. Of course, when the valve 24 is closed, the annular space around the valve 32 is open and is entirely adequate to allow the dropping impurities to pass by and collect on top of the valve 24. It is merely required that there be such capacity between the two valves as not to require discharge too often. There may also be quite a considerable distance between the two valves; the pipe 23 may, in fact, be lengthened and fashioned to lead to any desirable discharge point. It will be clear that the valve 24 is held on its seat not only by spring pressure but by suction as well.

It will be noted that I provide a heating jacket 36 surrounding the chamber, in which purification takes place. This jacket has the inlet 37 and the outlet 38, the former being connected with the engine exhaust so that the chamber and its contents may be heated by the exhaust gases simultaneously with the purification of the contents.

I claim:

1. The combination with a carburetor having an inlet pipe and adapted to be connected to an internal combustion engine so that air will be caused to pass through said pipe in response to the suction of the engine, of a casing connected with said pipe and embodying a separating compartment and a dead air compartment for the reception of

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solid impurities, an outlet for said dead air compartment, a normally closed valve for said outlet, and means between said compartments permitting the passage of impurities to said dead air compartment when said valve is closed and automatically operable when said valve is opened to prevent the return of said impurities to said separating compartment.

2. The combination with a carburetor having an inlet pipe and adapted to be connected to an internal combustion engine so that air will be caused to pass through said pipe in response to the suction of the engine of a casing connected with said pipe and embodying a separating compartment and a dead air compartment for the reception of solid impurities, an outlet for said dead air compartment a normally closed valve for said outlet, and means between said compartments permitting the passage of impurities to said dead air compartment when said valve is closed and automatically operable when said valve is opened to prevent the return of said impurities to said separating compartment.

3. The combination with a carburetor having an inlet pipe and adapted to be connected to an internal combustion engine so that air will be caused to pass through said pipe in response to the suction of the engine of a casing connected with said pipe and embodying a separating compartment and a dead air compartment for the reception of solid impurities, an outlet for said dead air compartment, a normally closed valve for said outlet, and a check valve normally open to permit the passage of impurities to said dead air compartment when said outlet valve is closed and automatically operable to close upon opening said outlet valve to prevent return of said impurities to said separating compartment.

4. The combination with a carburetor having an inlet pipe and adapted to be connected to an internal combustion engine so that air will be caused to pass through said pipe in response to the suction of the engine, of a casing connected with said pipe and embodying a separating compartment and a dead air compartment for the reception of solid impurities, an outlet for said dead air compartment, a normally closed valve for said outlet, and a normally open inwardly closing check valve between said compartments automatically operable to close when said outlet valve is opened.

5. The combination with a carburetor having an inlet pipe and adapted to be connected to an internal combustion engine so that air will be caused to pass through said pipe in response to the suction of the engine of a casing connected with said pipe and embodying a separating compartment and a dead air compartment for the reception of solid impurities, an outlet for said dead air compartment, a normally closed, spring-pressed, outwardly opening valve for said outlet, and a second normally open valve between said compartments for permitting the passage of impurities to said dead air compartment when said outlet valve is closed and automatically operable to close off said dead air compartment from said separating compartment when said outlet valve is opened.

6. In combination, an air intake pipe for connection to the carburetor of an internal combustion engine, a chamber connected therewith through which air in response to the engine suction is adapted to pass, means providing a dead air space below said chamber and normally in communication therewith, said dead air space being adapted to receive and collect solid impurities contained in the air passing through said chamber, automatic means for controlling communication between the dead air space and said chamber, and means for normally closing the bottom of said dead air space, said means being adapted to be manually opened to discharge the contents of said dead air space.

7. In combination, an air intake pipe for an internal combustion engine connected to the carbureter thereof, a separating chamber connected with said pipe through which air in response to the engine suction is adapted to pass a dead air space below the chamber and normally in communication therewith, an automatically suction operated valve between the dead air space in said chamber normally permitting communication therebetween, a valve in the bottom of said dead air space normally in closed position, and manual means for opening said latter valve for discharging the contents of the dead air space.

8. The combination with a source of suction, of a casing embodying a separating compartment and a dead air compartment for the reception of solid impurities, an outlet for said dead air compartment, a normally closed valve for said outlet, and means between said compartments permitting the free passage of impurities to said dead air compartment when said valve is closed and automatically operable to prevent the return of said impurities to said separating compartment when said valve is opened.

9. The combination with a source of suction, of a casing embodying a separating compartment and a dead air compartment for the reception of solid impurities, an outlet for said dead air compartment, a normally closed valve for said outlet, and a normally open check valve between said compartments automatically operable to close when said outlet valve is opened to prevent the impurities returning to said separating compartment.

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10. The combination with a source of suction, of a casing embodying a separating compartment, and a dead air compartment, an outlet for said dead air compartment, a normally closed manually operated valve for said outlet, and a second normally open suction closed check valve for forming when closed, a partition across said dead air compartment.

11. In a separator for use with an internal combustion engine the combination of a separating chamber adapted to be subjected to engine suction, a dead air chamber normally communicating therewith for receiving impurities therefrom, a normally closed outlet for said dead air chamber, a closure for said outlet and a suction controlled means for preventing return of said impurities to said separating chamber when said closure is opened.

12. The combination with a carbureter having an inlet pipe and adapted to be connected to an internal combustion engine so that air will be caused to pass through said pipe in response to the suction of the engine, a casing connected with said pipe and embodying a separating compartment and a dead air compartment for the reception of solid impurities, means for isolating said compartments at times, and a heating jacket for the separating compartment only.

13. The combination of a carbureter having an inlet pipe and adapted to be connected to an internal combustion engine so that air will be caused to pass through said pipe in response to the suction of the engine, a casing connected with said pipe and embodying a separating compartment and a dead air compartment for the reception of solid impurities, means for isolating said compartment at times, and a heating jacket for the separating compartment only and connected to the exhaust manifold of the engine.

14. The combination with a carbureter having an inlet pipe and adapted to be connected to an internal combustion engine so that air will be caused to pass through said pipe in response to the suction of the engine, a casing connected with said pipe and embodying a separating compartment and a dead air compartment for the reception of solid impurities, an outlet for said dead air compartment, a normally closed valve for said outlet, said valve being mounted to open outwardly from said outlet, a member having angular movement operatively connected with said valve, connecting means for swinging said member from a remote point, and a second normally open valve for forming, when closed, a partition across said dead air compartment.

15. In combination with a carburetor having an inlet pipe and adapted to be connected to an internal combustion engine so that air will be caused to pass through said pipe in response to the suction of the engine, a casing connected with said pipe and embodying a separating compartment and a dead air compartment for the reception of solid impurities, an outlet for said dead air compartment, a pivotally swinging flap valve for closing said outlet and arranged to open outwardly therefrom, a member having angular movement operatively connected with said valve, connecting means for swinging said member from a remote point, and a second normally open valve for forming, when closed, a partition across said dead air compartment.

In witness whereof, I hereunto subscribe my name this 25th day of June, A. D. 1917.

WILLIAM L. O'NEILL.