D. J. CAMPBELL.

CARBURETER.

APPLICATION FILED JULY 26, 1916.

1,273,030.

Patented July 16, 1918.

4 SHEETS—SHEET 1.

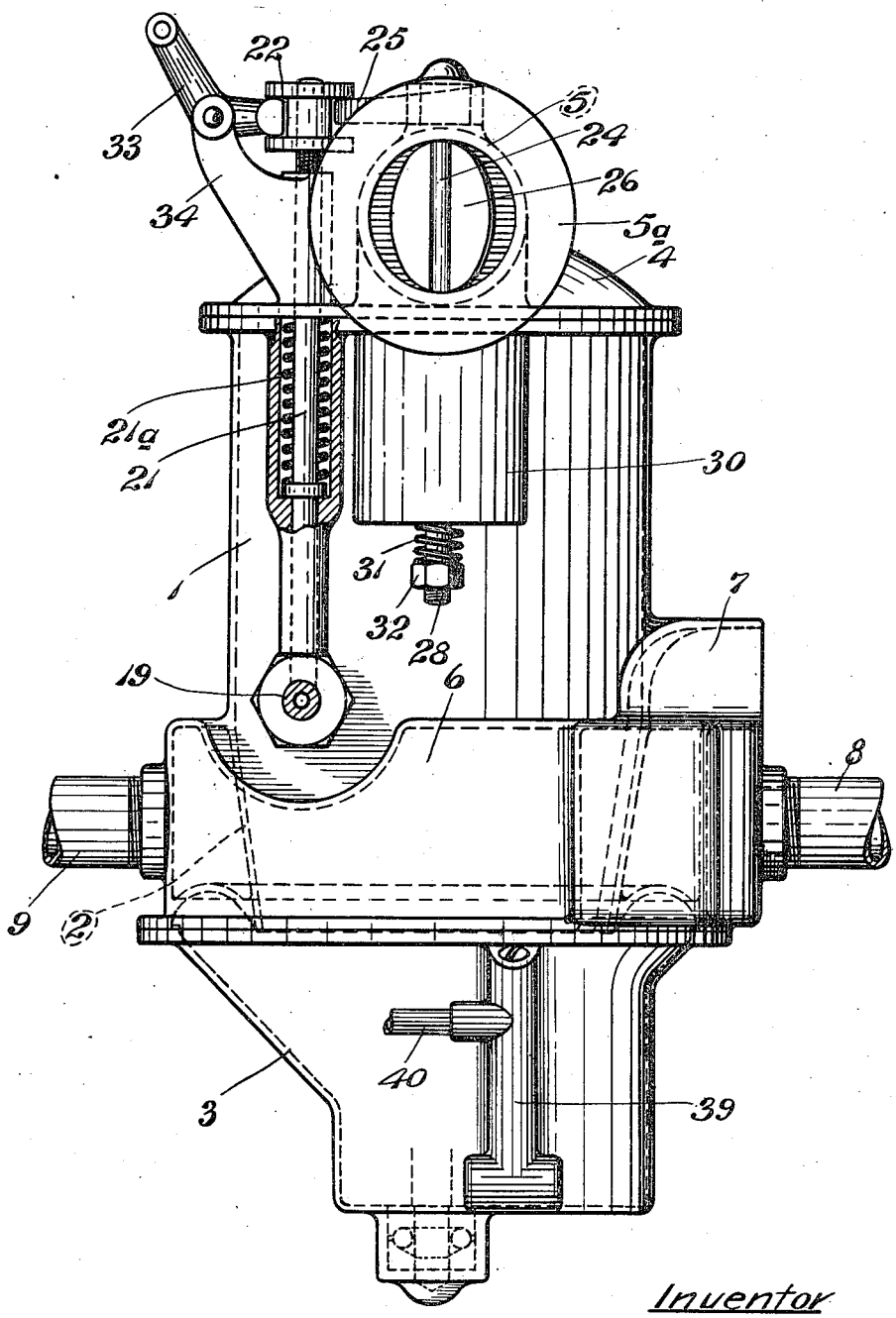


Fig. 1.

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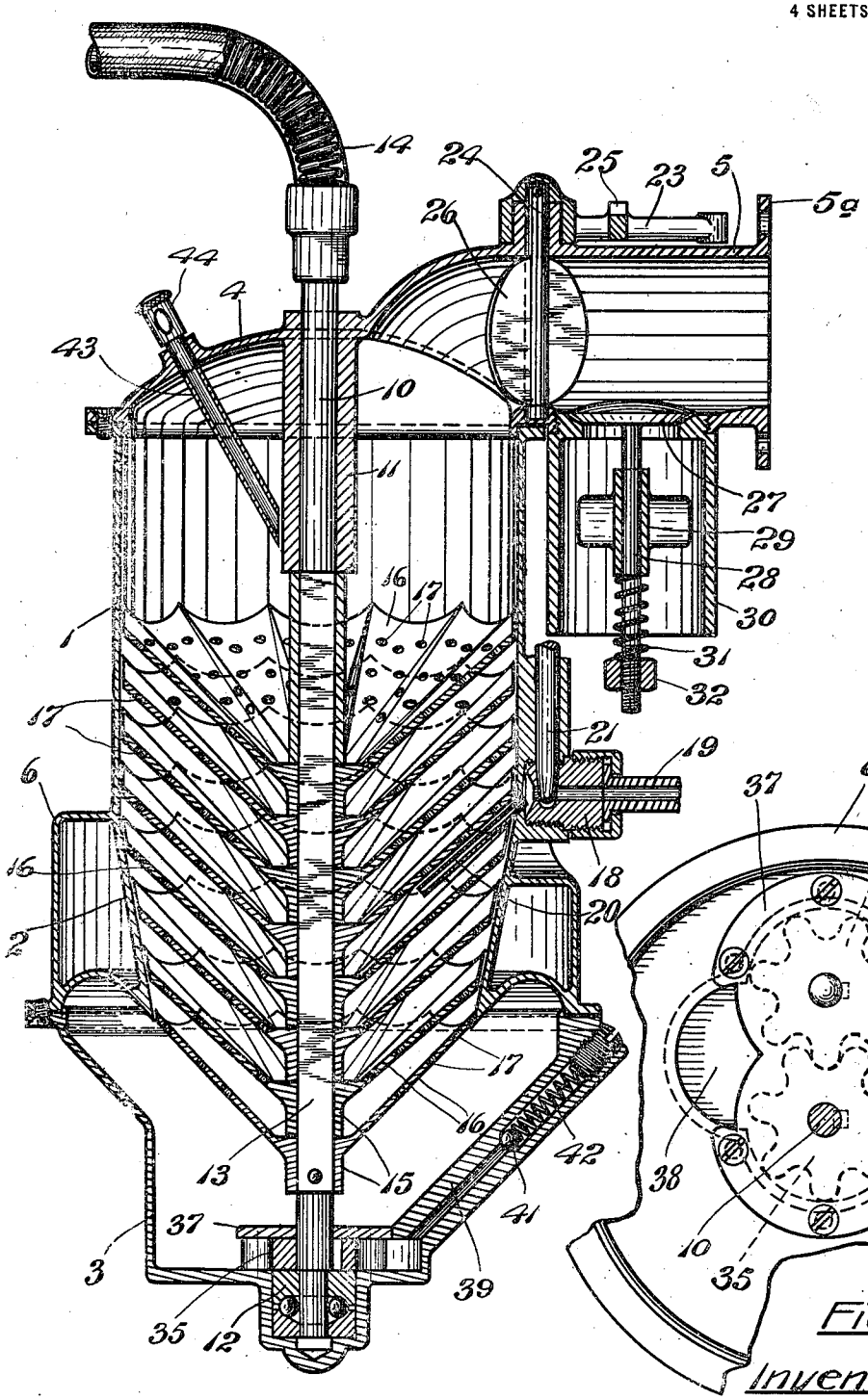


Fig. 2.

Fig. 3.

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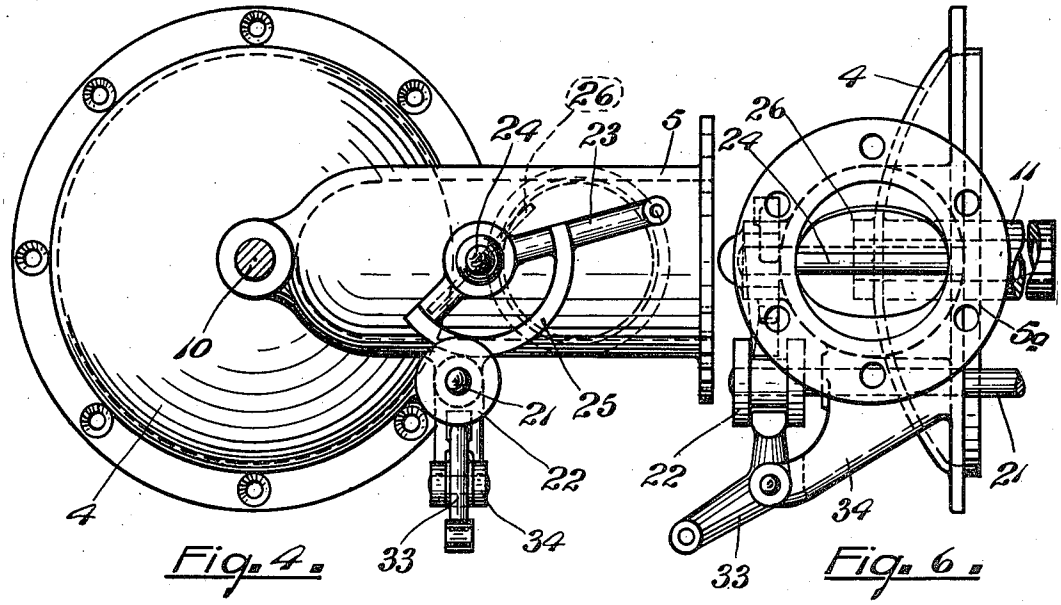


Fig. 4.

Fig. 6.

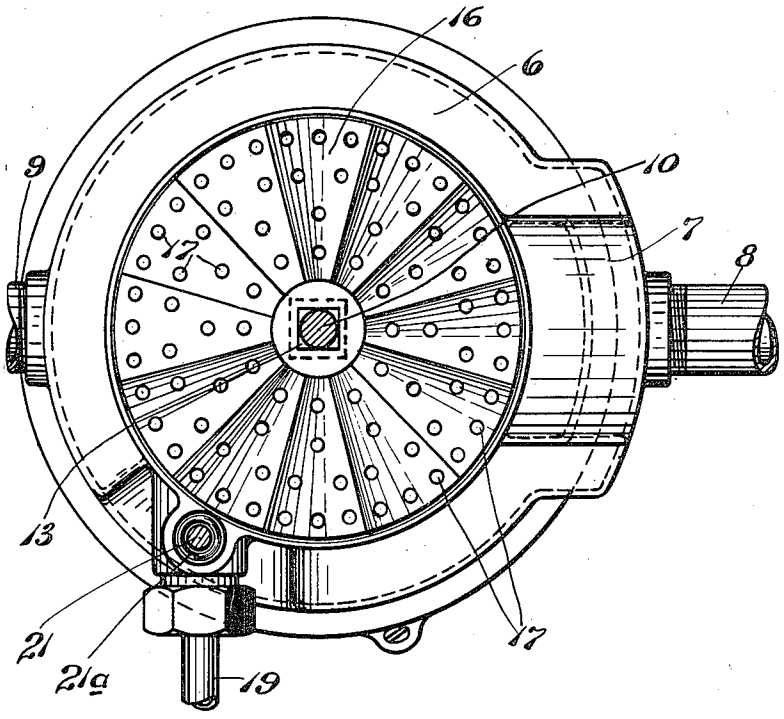


Fig. 5.

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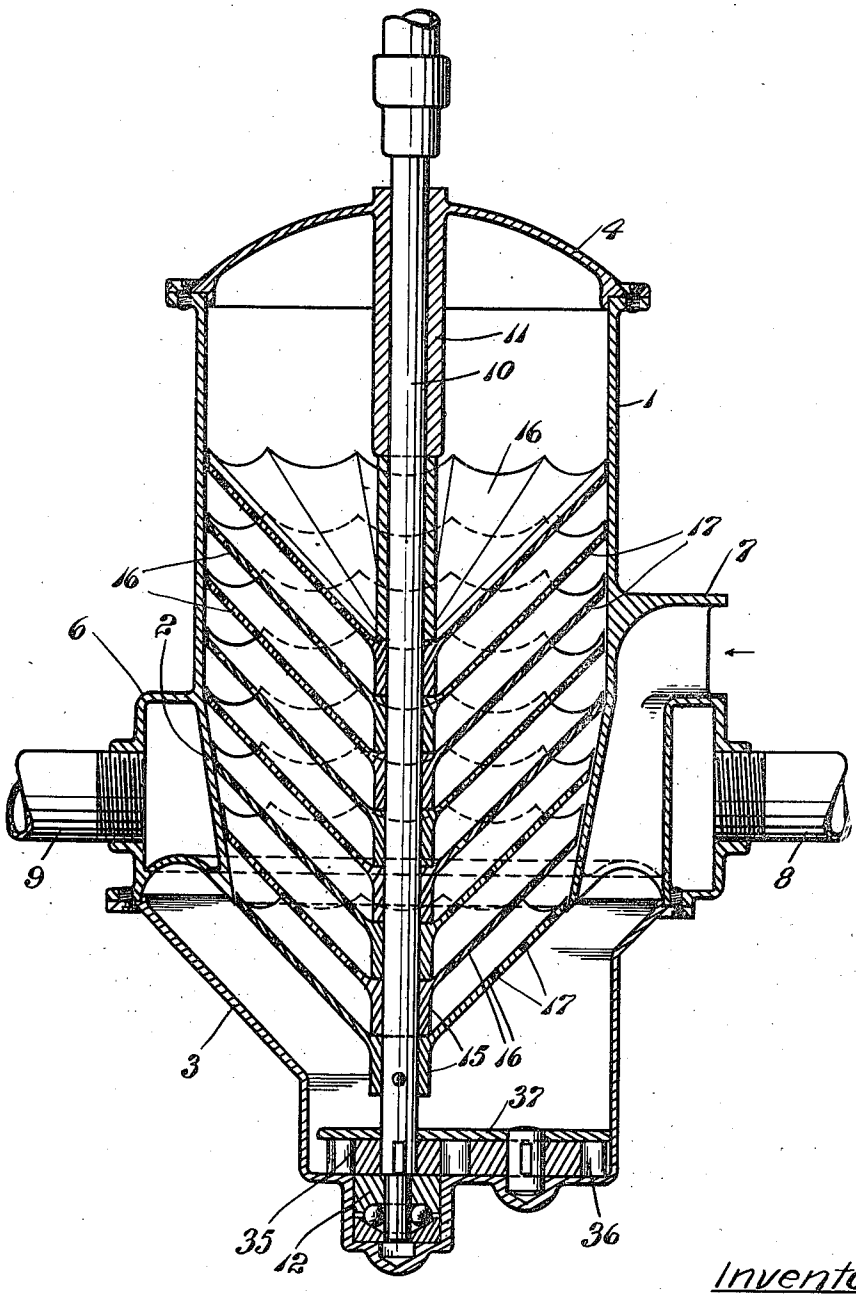


Fig. 7.

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UNITED STATES PATENT OFFICE.

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CARBURETER.

1,273,030. Specification of Letters Patent. Patented July 16, 1918.

Application filed July 26, 1916. Serial No. 111,334.

To all whom it may concern:

Be it known that I, DONALD J. CAMPBELL, a citizen of the United States of America, residing at Muskegon Heights, in the county of Muskegon and State of Michigan, have invented certain new and useful Improvements in Carbureters; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to a carbureter adapted to be used with internal combustion engines and said invention is particularly directed to the provision of a novel construction whereby fuels having a comparatively high vaporizing temperature such as kerosene or the like may be made capable of efficient mixing with air for the creation of an explosive mixture such as is necessary to be entered into the cylinders for successful working of an internal combustion engine. A further object of the invention consists in the provision of a device of this character in which the fuel is agitated and practically atomized by mechanical means whereby when air is drawn through such agitating mechanism, it readily mixes with the divided fuel so as to make an explosive mixture. Still further objects of the invention consist in novel means for returning any fuel which is not vaporized and taken into the engine to the supply tank. from which it is originally drawn; in a novel construction of carbureter casing in which is included a surrounding housing adapted to receive hot exhaust gases from the engine whereby the vaporization of the fuel is aided by the heat obtained from said gases; in a novel means for introducing and holding a quantity of gasolene or other fuel of similar character in the carbureter casing for starting a cold engine; and in many other novel features of construction and operation not specifically enumerated all of which will appear in detail as the description of the preferred embodiment of my invention progresses, reference being had to the accompanying drawings, in which;

Figure 1 is an elevation of a carbureter, parts being broken away and shown in section to more clearly disclose the structure.

Fig. 2 is a central vertical section therethrough.

Fig. 3 is a plan view of the lower part or well of the carbureter, parts being broken away for economy of space.

Fig. 4 is a plan view of said carbureter.

Fig. 5 is a plan view of the carbureter with the cover and parts attached thereto removed, and

Fig. 6 is an end view of the construction shown in Fig. 4.

Fig. 7 is a vertical section through the carbureter substantially at right angles to that shown in Fig. 2.

Like reference characters refer to like parts throughout the several views of the drawings.

In the construction of the carbureter a cylindrical casing 1 is provided the lower end of which tapers inwardly making inclined walls 2 as shown in Fig. 2. Secured to and closing the lower end of the casing is a well 3 while similarly the upper end of the casing is closed by the cover 4. Parts 3 and 4 may be attached by screws as shown or by use of any other equivalent connections. A tubular outlet or pipe 5 is formed integral with the cover 4 terminating in a flange 5^a by means of which the carbureter may be attached in the usual manner to the intake manifold of an internal combustion engine. There is also formed integral with the casing an outer surrounding housing 6 the inner walls of which are provided by the inclined sides 2 heretofore described. An air inlet 7 is formed directly above the housing 6 and adjacent the inlet 8 to the housing, and air passes through said inlet downwardly through a suitable passageway in the housing 6 to the well 3 thence upwardly through the casing 1 and through the pipe 5 to the intake manifold, it being mixed as hereafter described with fuel before it reaches the outlet pipe. An outlet 9 to the housing 6 is provided and it is designed that exhaust gases from the engine may be entered through the inlet 8, circulate in the housing 6 and pass outwardly through the outlet 9, heat being imparted by said gases to the mixing chamber within the casing 1 and its lower tapered extension.

A shaft 10 is mounted vertically in the carbureter in a bearing 11 at its upper end formed integral with and depending from the cover 4, and in the bearing 12 at its lower end formed in the base of the well 3, The upper and lower ends of the shaft are

circular in cross section, but the intermediate portion 13 is preferably square in cross section. This shaft is rotated in any suitable manner and I have shown a flexible shaft 14 connected therewith which may be driven by any suitable motor such, for instance, as a small electric motor, or it may be driven by the engine with which the carbureter is used. A plurality of substantially conical disks, each including a central boss 15 having an opening square in cross section through which may pass the squared portion 13 of the shaft and a body 16 of thin metal, are provided each of the disks being formed into a plurality of scallops as shown, and having a large number of openings 17 therein. The disks are mounted one above the other on the square section 13 of the shaft the lower disk being fixed to said shaft. It is of course necessary that the lower disks shall be of smaller diameter than the upper disks owing to the inclination of the sides 2.

The fuel is entered in the casing through a plug 18 threaded in one side thereof and having an opening for the passage of the fuel. A tube 19 is connected to this plug leading to the supply tank. A short tube 20 as shown in Fig. 2 is fastened in the side of the casing 1 and passes downwardly and inwardly between two of the disks 16. The passage through plug 18 is stopped by the lower end of a rod 21 which is mounted for vertical movements along the side of the casing 1. A spring 21^a normally holds the rod in lower position where it completely closes the passage through plug 18 and stops the flow of fuel into the casing. A flanged head or collar 22 is secured to the upper end of the rod 21. A lever 23 is pivotally mounted on a vertical rod 24 carried by and passing through pipe 5 heretofore described and an arc-shaped cam 25 is carried by the lever 23, said cam passing between the upper and lower flanges of the collar, its upper surface bearing against the under surface of the upper flange of the collar as best shown in Fig. 1. By rotating the lever 23 about the rod 24 it is apparent that the rod 21 may be lifted to permit the passage of fuel while if rotated in the opposite direction the spring 21^a carries the rod 21 to its lower position to cut off the supply of fuel. Mounted on the rod 24 within pipe 5 is a plate 26 acting substantially as a throttle to control the passage of the mixed air and fuel through the pipe 5 this throttle automatically and progressively opening as fuel is passed into the carbureter and similarly closing as the fuel is decreased.

A valve 27 carried at the upper end of a rod 28 is mounted in the under side of pipe 5 between the plate 26 and the end of the pipe. Rod 28 is slidably mounted in a bracket 29 secured to a sleeve 30 which may be threaded in the under side of pipe 5. A coil spring 31 surrounds the rod 28 and is interposed between the bracket 29 and a nut 32 threaded on the end of the rod 28, the tension of the spring 31 being adjusted by turning the nut 32. Valve 27 is an auxiliary valve for the entrance of unheated air into the pipe 5. If at any time it is desired to enter fuel in the casing 1 without at the same time turning the damper 26 the rod 21 may be lifted by operating a bell-crank lever 33 which is mounted on the bracket 34 cast integral with the cover 4, one arm of this lever passing between the upper and lower flanges of the yoke 22.

Fuel entered into the carbureter casing 1 is caught by the disks 16 and, as they are rapidly rotated, is thrown outwardly and upwardly along the upper sides of the disk. Some of the fuel passes through the openings 17 and air entering under all of the disks, with the operation of the engine, is carried upwardly through said openings. The rapid rotation of the disks has the effect of separating and finely dividing the fuel whereby it may readily mix with the air. Furthermore such fuel as does not pass through said openings to the lower disks is carried to the outer edges of the disks and runs down the inner sides of the casing 1 and along the lower tapered sides 2 which being heated to a high degree of temperature by the exhaust gases which pass through the housing 6 help to vaporize the fuel. It is apparent that the combined effect of the agitation and atomizing of the fuel in conjunction with the heat imparted thereto serves to vaporize it so that when air passes upwardly through the disks a mixture is made which when carried to the cylinders of an internal combustion engine is of the explosive character desired and necessary for the operation of such engines.

Fuel which is not vaporized and carried to the engine drops through the disks into the well below the casing 1. At the lower end of shaft 10 a gear 35 is keyed it meshing with an idle gear 36 indicated in dotted lines in Fig. 3. These gears are located beneath a plate 37 and the excess fuel enters below the plate through an opening 38 shown in Fig. 3 coming in this manner to the gears. Rotation of the gears serves to force the excess fuel upwardly through the passage shown in the rib 39 on the under side of the well member. A conductor pipe 40 communicates with said passage and leads to the fuel supply tank whereby the excess fuel not vaporized is returned and may be used over again. A check valve in the shape of a ball 41 operated by a spring 42 is used to check the return of the fuel to the well member of the carbureter.

For starting an engine when it is cold it is desirable that some provision be made for

the use of gasolene until sufficient exhaust gases have been passed through the housing 6 to thoroughly heat the sides 2 of the casing. Accordingly I have provided an inlet tube 43 through the cover 4 it having the usual cap 44 with an opening therein whereby the gasolene to any desired or required amount may be passed in the carbureter. A number of the upper disks are not provided with openings close to the shaft and accordingly a considerable amount of gasolene may be held by such disks sufficient to start the engine and supply heat to a housing 6 for the vaporization of the heavier fuel, when it is used. Of course it may not be necessary when the shaft 14 is driven by an independent motor to use any priming or starting fuel at all, the agitation and atomizing of the fuel through the rotation of the disk being sufficient in most instances to make a proper mixture of the air and fuel for starting the engine.

I claim:—

1. In a carbureter, an upright casing having inlet and outlet openings at the lower and upper parts of the casing respectively, a vertical shaft positioned lengthwise of and mounted for rotation in the casing, a plurality of nested conical disks each provided with a plurality of openings mounted on and rotatable with the shaft, a fuel inlet in the side of the casing to deliver fuel to an intermediate disk and means for rotating the shaft.

2. In a carbureter, an upright casing, a shaft positioned lengthwise thereof and mounted for rotation in the casing, a plurality of perforated disks mounted one above the other on the shaft, an outlet pipe at an end of the casing adapted to be connected to the intake of an internal combustion engine, an air inlet conduit at the opposite end of the casing, means to deliver fuel to an intermediate disk, and means at the lower end of the shaft and operated thereby for returning excess unvaporized fuel to the fuel supply, substantially as described.

3. In a carbureter, an upright hollow casing having open ends, a cover connected to and closing the upper end of the casing, a well member connected to and closing the lower end of said casing, a pipe extending from the cover adapted to be secured to the intake manifold of an internal combustion engine, a housing adapted to receive exhaust gases from said engine surrounding the lower part of the casing, an air inlet conduit having its entrance above said housing and leading therethrough to the interior of said well member, a vertical shaft mounted in the casing, a plurality of perforated disks on said shaft, each having upwardly and outwardly inclined sides terminating closely adjacent the walls of the casing, means to rotate the shaft, and means to enter fuel into the casing and deliver it to an intermediate disk, substantially as described.

4. In a carbureter, an upright casing, a cover for the upper end of the casing, an outlet pipe on the cover adapted to be attached to the intake manifold of an internal combustion engine, a well member closing the lower end of the casing, a shaft positioned lengthwise of the casing and mounted for rotation, means to rotate the shaft, a plurality of upwardly and outwardly inclined perforated disks mounted on the shaft and extending to closely adjacent the walls of the casing, means for delivering fuel to an intermediate disk, means for supplying heat to the casing, a conduit leading away from the bottom of the well member, and a pump directly operated by the shaft to pump fuel into the conduit whereby fuel dropping into the well member may be pumped out of the carbureter by said pump.

5. In a carbureter, an upright casing, a cover for the upper end of the casing, an outlet pipe on the cover adapted to be attached to the intake manifold of an internal combustion engine, a well member closing the lower end of the casing, a vertical shaft mounted for rotation in the casing, a plurality of perforated disks on the shaft mounted one over the other and formed with upwardly and outwardly inclined sides, means to enter fuel through the side of the casing to an intermediate disk, means to enter another fuel to the upper disk through the cover, and an air conduit provided on the casing and leading into the well member below all the disks.

6. In a carbureter, an upright cylindrical casing, means closing the ends of the casing, inlet and outlet conduits to the casing at opposite ends thereof, a plug secured in the side of the casing having a passageway for the passage of fuel, an upright rod mounted on the casing with its lower end passing into the plug across said passageway, means tending to force said rod downwardly, a member at the upper end of said rod, a second rod mounted vertically in the outlet conduit, a throttle on the rod within the conduit, a lever secured to the upper end of said rod, an arc shaped cam on said lever engaging with said member on the first rod to thereby elevate said rod on movement of the lever in one direction, a bell-crank lever having one end engaging with said member pivotally mounted on the casing whereby fuel may be entered into the casing without affecting the position of the throttle in the outlet conduit, and a mechanically operated agitating and atomizing means within the casing to which the fuel is delivered.

7. In a carbureter, an upright casing, a plurality of disks mounted one above the other in the casing, between its ends, each disk formed with upwardly and outwardly

inclined sides having a plurality of perforations therein, an outlet pipe at the upper end of the casing adapted to connect with the intake of an internal combustion engine, an air inlet conduit for entrance of air into the casing below the disks, means to deliver fuel to the disks, and means to simultaneously rotate all of the disks.

8. In a carbureter, a hollow upright casing having the lower portion of its walls inclined downwardly and inwardly, a hollow housing adapted to receive exhaust gases from an internal combustion engine positioned around the casing at said lower portion thereof, a plurality of disks mounted one above the other within the casing, each having upwardly and outwardly inclined sides formed with a plurality of perforations therein, an upper outlet and a lower inlet conduit to the casing, means to enter fuel into the disks between the upper and lower disks, and means for simultaneously rotating the disks about a vertical axis.

In testimony whereof I affix my signature.

DONALD J. CAMPBELL.