No. 865,980. PATENTED SEPT. 10, 1907.

G. D. GARLAND.

CARBURETER.

APPLICATION FILED AUG. 14, 1906.

Fig. 1.

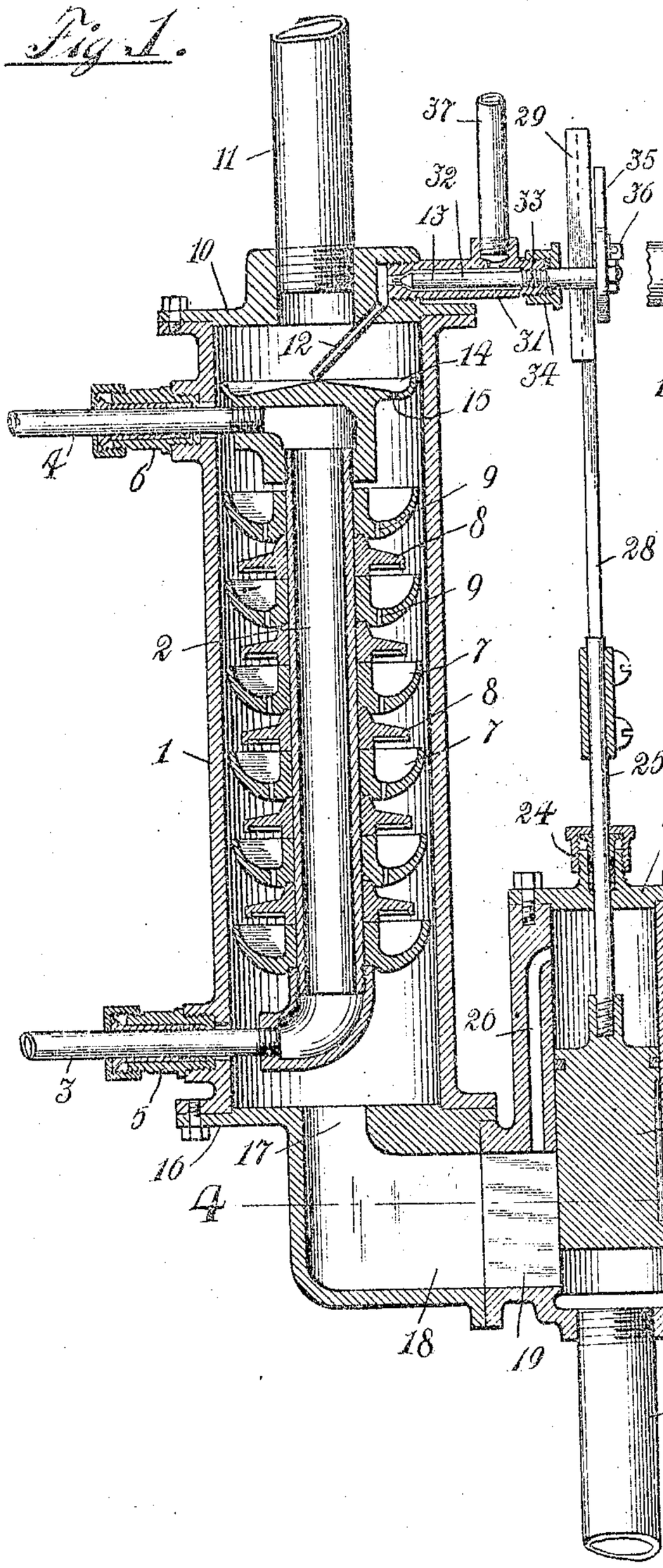
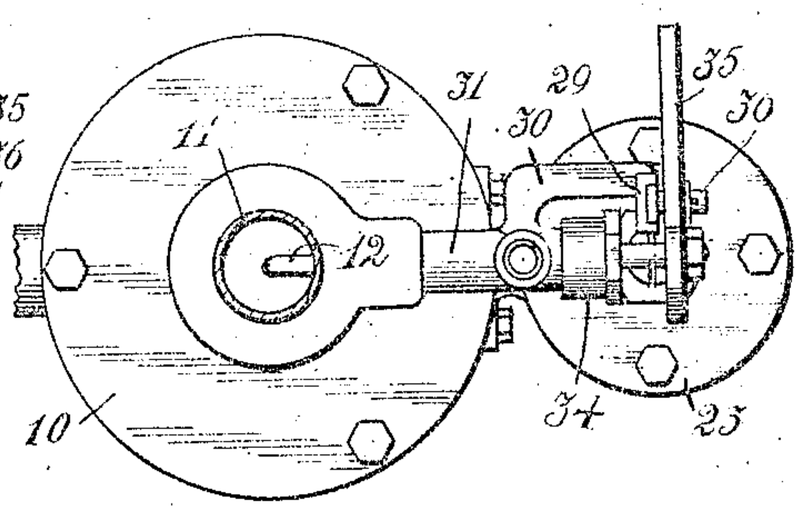



Fig. 2.



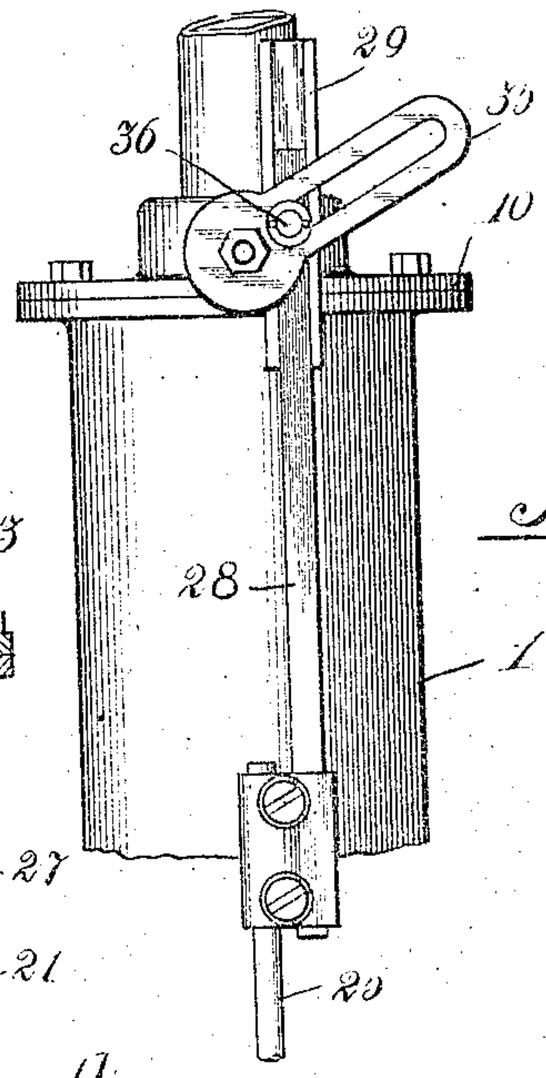
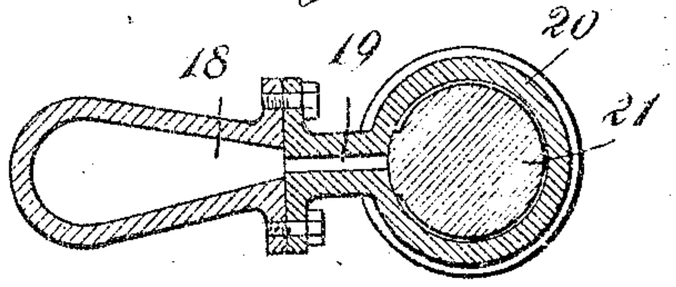




Fig 3.

Fig. 4.

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# UNITED STATES PATENT OFFICE.

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## CARBURETER.

No. 865,980. Specification of Letters Patent. Patented Sept. 10, 1907.

Application filed August 14, 1905. Serial No. 274,205.

*To all whom it may concern:*

Be it known that I, GEORGE D. GARLAND, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Carbureters; and I 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.

My invention relates to improvements in carbureters or devices for mixing atmospheric air with the vapors of volatile hydrocarbon oils.

The object of my invention is to produce an apparatus of this kind into which there is a continuous flow of hydrocarbon oil during its operation, and in which the quantity of hydrocarbon fluid so fed is regulated in exact proportion to the amount of air passing through the device, the amount of air varying with the amount of carbureted air which the device is called upon to produce, and consists in the features of construction and combinations of parts hereinafter fully described and claimed.

In the accompanying drawings illustrating my invention: Figure 1 is a vertical central section of a device constructed in accordance with my invention. Fig. 2 is a top plan view of same. Fig. 3 is a side elevation of a portion of same. Fig. 4 is a plan section on the line 4—4 of Fig. 1.

In said drawings 1 represents a vertical cylinder or cylindrical casing within which the hydrocarbon fluid and the air are mixed, the air entering at the lower end and passing up through the casing and the hydrocarbon fluid entering at the upper end and passing down through the casing and hence coming in contact with and being evaporated by the passing air. It is advisable, in order to use hydrocarbon fluids of low specific gravity, to add more or less heat to the fluid as the same is being mixed with the air, it is also desirable to retard the flow of the hydrocarbon fluid through the casing and to protect it from the direct current of the passing air, so that unevaporated particles or drops of the fluid will not be carried out of the casing with the air. To accomplish the above a vertical tube 2 is mounted within said cylinder and concentric with the same, its ends being connected by elbows to horizontal pipes 3 and 4 respectively, which pass horizontally out of said casing through stuffing boxes 5 and 6 and by means of which steam or other heating fluid may be admitted to said tube 2 and the condensation drawn from same in an obvious manner.

To retard the flow of the hydrocarbon fluid downward through the casing and protect the same from the direct blast or current of air, I provide a series of saucer shaped disks 7 mounted on and concentric with the said tube 2 and alternating with same on said tube 2, a series of inverted conical shaped disks 8. All of said disks 7 except the bottom one of the series are provided with a number of small drain holes 9 through which the hydrocarbon fluid may pass to the inverted conical disk below.

The casing 1 is closed at its upper end by means of a head 10 which is provided with a discharge pipe 11 through which the carbureted air passes from the casing. Upon said cover 10 and communicating with the interior of the casing by means of a small tube 12 is a small valve 13 adapted to control the supply of hydro-carbon fluid to said casing. Said tube 12 discharges the hydro-carbon fluid at the center of the upper end of said casing above the elbow at the upper end of said tube 2 upon the center of a shallow saucer shaped disk 14 mounted upon or forming a part of said elbow. The center of said disk is raised thus causing the hydro-carbon fluid to flow outwardly, and small drain holes 15 are provided adjacent its outer edge through which the fluid may be discharged to the first of the series of saucer shaped disks 7 below. The fluid then flows toward the center of said casing into said saucer and is discharged through the holes 9 on to the upper face of the first of the series of inverted conical disks 8. Said disks 8 are slightly smaller in diameter than said saucer shaped disks 7, and hence discharge the hydrocarbon fluid into the saucer shaped disks 7, and hence discharge next below and near the outer edge of the same, thus causing the fluid to travel in a zig-zag course from the center of said casing out toward the wall thereof and back to the center of the same as it flows down from one disk to another. The lower end of said casing is closed by means of the head 16 which is provided with a central passage 17 through which the air enters said cylinder. The air flows upward through said casing around the saucer-shaped disks 7, being brought intimately into contact with the descending fluid, and is thereby thoroughly charged with the vapors of the same. The lowermost disk 7 is not provided with any drain-holes and hence if any of the fluid should reach the same it will collect and remain there until evaporated. It is obvious that when steam or other heat conducting fluid is forced into or through the tube 2 that the fluid in said casing 1 will be heated and hence be more easily evaporated. Said passage 17 is connected by means of a horizontal passage 18 with a port 19 in the wall of a small vertical cylinder 20 rigidly mounted on said head, said port 19 communicating with the interior of said cylinder 20. Said port 19 is quite narrow and long and the long heavy piston 21 movably mounted in said cylinder 20 is adapted to control the opening of said port. The lower end of said cylinder 20 is connected by means of the

pipe 22 with a supply of air under pressure and the upper end is closed by means of the head 23, which is provided with a stuffing box 24 through which the piston rod 25 projects. In order to permit a comparatively free movement of said piston 21 when the air pressure in the cylinder 20 below the same changes, and at the same time to prevent the formation of an extra pressure, or on the other hand a partial vacuum above said piston on said cylinder, I provide a port 26, leading from the upper side of said port 19, to the upper end of said cylinder 20, said port 26 being of relatively small area, so that the formation of a partial vacuum above the piston 21 is prevented, but before an equilibrium is reached the piston 21 has taken its new position due to the change in the air pressure in said cylinder 20 below said piston 21. The upper end of said piston 21 is provided with a small packing ring 27 for an obvious purpose, and the body of said piston between said packing ring and the lower end of the same is cut away, except where it covers said port 19, for the purpose of reducing friction and permitting said piston to move as freely as possible in said cylinder. The lower end of said port 19 is a short distance above the lower end of said cylinder 20, so that when said piston 21 is at the lower limit of its movement it will completely cover said port 19 and thus prevent the passage of any air through the same. The upper end of said piston rod 25 is rigidly connected to the lower end of a rod 28 which is vertically movable in a guide 29 which is carried by an arm 30 integral with the valve casing 31 of the said valve 13, said valve casing being mounted on the cylinder head 10. The stem 32 of said valve 13 is screw threaded near its middle portion, and said threaded portion is received by the threaded portion 33 of said casing 31, thus adapting said valve to be opened or closed by revolving said stem. It has been discovered that the required maximum opening of said valve can be accomplished by turning said stem through about ninety degrees, also that the same number of degrees toward the end of the movement will allow a much larger than a proportionate amount of fluid to pass. To regulate the flow of fluid in proportion to the flow of air through the relatively large port 19 as the piston 21 is raised, I have devised the arrangement of mechanism therein illustrated. The valve stem 32 projects through the stuffing box 34, and a slotted arm 35 is rigidly secured on its outer end, said arm projecting in a horizontal direction when said piston 21 is at the lower limit of its movement. The rod 28 is provided with a horizontally projecting pin 36 adapted to project through the slot in said arm 35, so that as said piston 19 and rod 28 are raised said arm will be rotated and said valve stem turned in an obvious manner. Said arm 35 will be turned through about ninety degrees as said piston reaches the upper limit of its movement, but the arc through which said arm and valve will be rotated for a given movement of the piston, will depend upon the position of said piston, being a very much larger arc at the beginning of the upward movement of said piston than toward the upper limit of its movement on account of the relative movement of said pin 36 in the slot of said arm 35. Said valve casing 31 is provided with a pipe connection 37 by means of which hydro-carbon under pressure at least equal to the air pressure, may be supplied.

In the use of my device, as the carbureted air is drawn from the casing or permitted to escape, the air pressure in said casing 1 and consequently in said port 19, vacuum preventing port 26, and the upper end of said cylinder 20 will be reduced and the air pressure below said piston 21 will raise the same thus allowing a larger flow of air, and at the same time said valve 13 will be opened sufficiently to allow a proportionate increase in the flow of hydro-carbon fluid through said pipe 12 into the upper end of said casing 1.

The quality of carbureted air produced by this device is exceedingly uniform.

The device is substantial, very durable and entirely automatic in its action.

I claim as my invention:

1. In a carbureter, the combination with a carbureting chamber having means for supplying hydrocarbon thereto, means for supplying air to said chamber, a needle valve adapted to control the supply of hydrocarbon to said chamber, a cylinder associated with said chamber, a piston operating in said cylinder and adapted to control the supply of air thereto, an arm extending from said needle valve and provided with a longitudinal slot, a guide connected to said chamber, a rod movable in said guide and provided with a lateral pin engaging the slot in said needle valve arm, a piston rod connected to said piston, and means for coupling said piston rod and slidable rod.

2. In a carbureter, the combination of a carbureting chamber having means for supplying hydrocarbon thereto, means for supplying air to said chamber, a valve adapted to control the supply of hydrocarbon to said chamber, a cylinder associated with said chamber having a port extending longitudinally thereof at one end and communicating with said chamber, a relatively small port communicating between said cylinder at the other end and said chamber, a piston in said cylinder, a connecting means between said piston and valve.

In testimony whereof I have signed my name in presence of two subscribing witnesses.

GEORGE D. GARLAND.

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