No. 699,357. Patented May 6, 1902.

J. WILKINSON, E. F. CHAPMAN & H. THORNTON.

CARBURETER.

(Application filed Jan. 21, 1901.)

(No Model.)

Fig. 2.

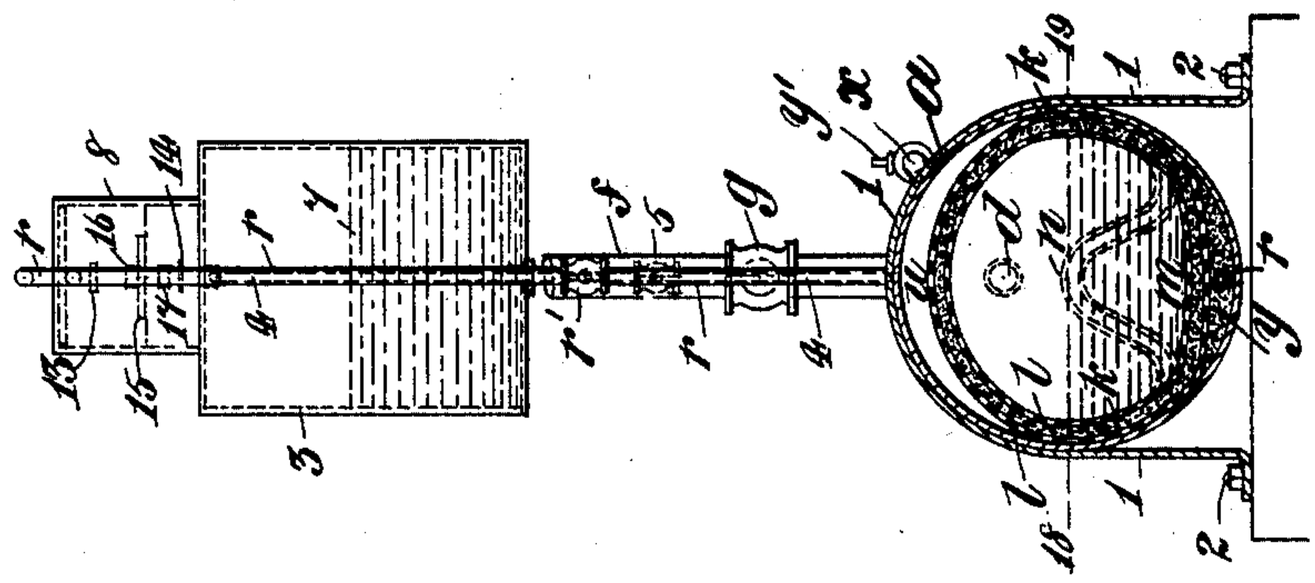


Fig. 1.

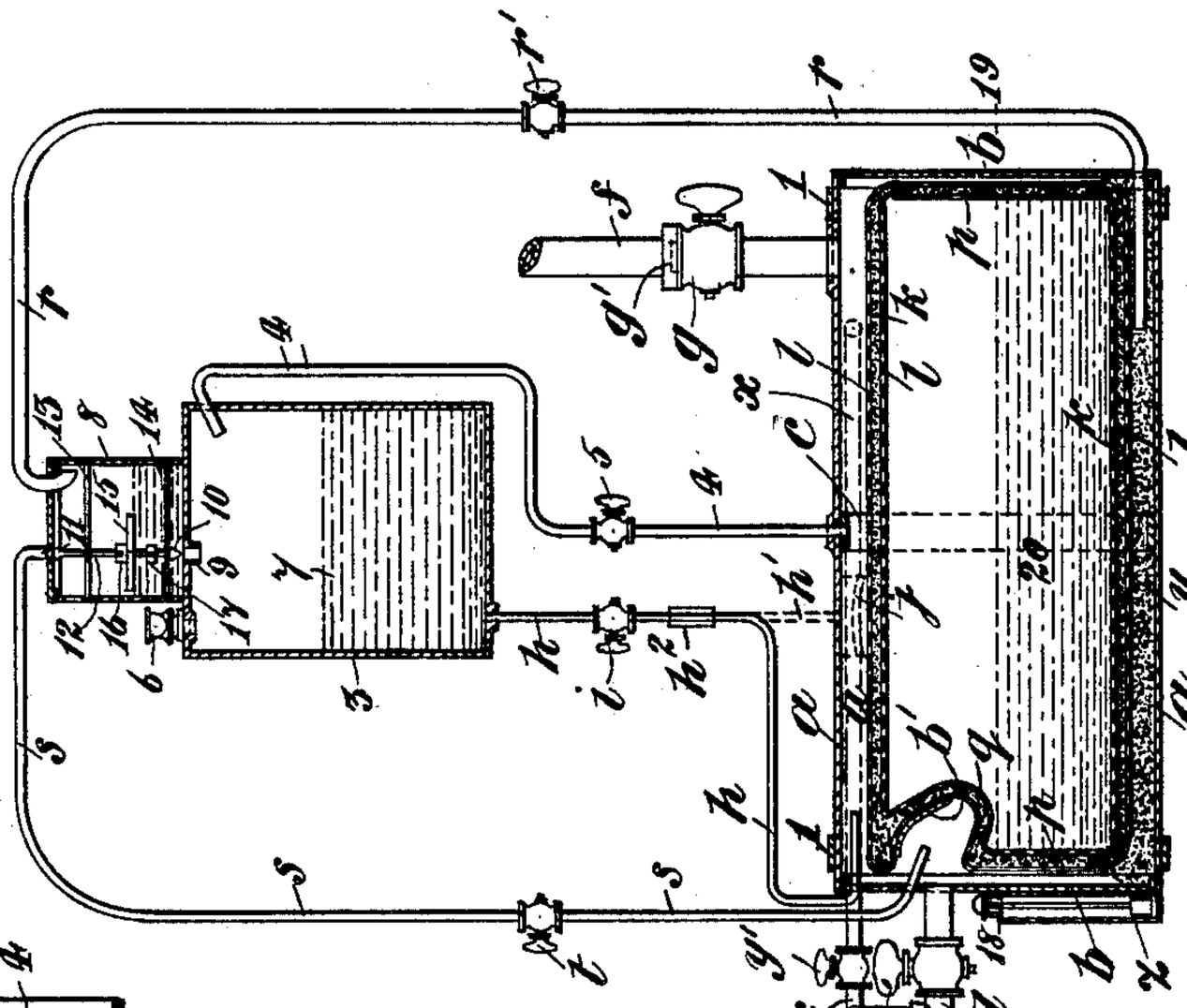
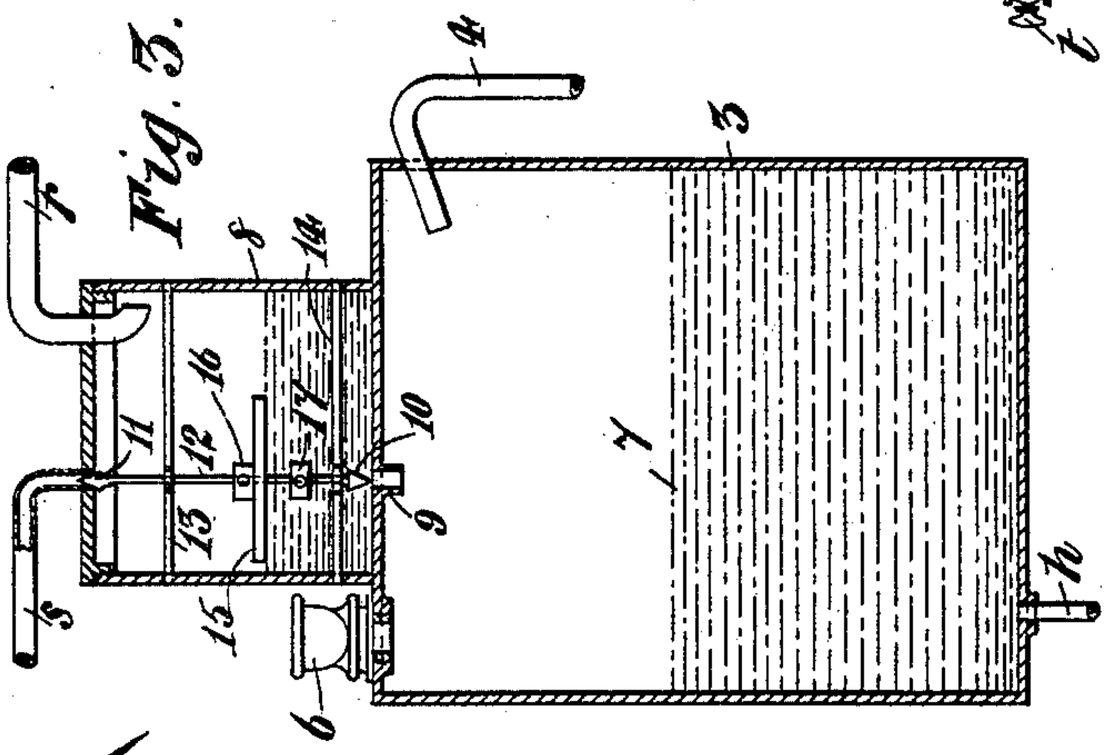


Fig. 3.



Witnesses.
William Ladler
Annie Park.

Inventors.
Joseph Wilkinson
Edward Forster Chapman
Harry Thornton
by
Fairbairn Hart
Attorneys.

UNITED STATES PATENT OFFICE.

JOSEPH WILKINSON, OF BURTON-IN-LONSDALE, AND EDWARD FORSTER CHAPMAN AND HARRY THORNTON, OF LEEDS, ENGLAND.

CARBURETER.

SPECIFICATION forming part of Letters Patent No. 699,357, dated May 6, 1902.

Application filed January 21, 1901. Serial No. 44,176. (No model.)

To all whom it may concern:

Be it known that we, JOSEPH WILKINSON, of Glen Mill, Burton-in-Lonsdale, EDWARD FORSTER CHAPMAN, of 3 St. Paul's street, Leeds, and HARRY THORNTON, of 103 Harehills Lane, Leeds, in the county of York, England, subjects of the Queen of Great Britain and Ireland, have invented new and useful Improvements in Carbureters, of which the following is a specification.

This invention relates to improvements in carbureters employed for producing the mixtures of vaporized oil and air for heating, lighting, and motor purposes described in the specification accompanying the application of the said Joseph Wilkinson for United States of America Letters Patent, filed the 30th day of November, A. D. 1900, Serial No. 38,277.

The objects of this invention are, first, to provide means for directing the inflowing air into the carbureter, so as to come in contact at once with the vapors of mixed oils; second, to afford facilities for maintaining a constant and automatic supply of mixed oils to the carbureter, thereby insuring the gas produced maintaining an even and regular illuminant, and, third, to prevent the mixed oils accumulating and solidifying at the bottom of the carbureter. We attain these objects by the apparatus illustrated in the accompanying sheet of drawings, in which—

Figure 1 is a part-sectional elevation of a plant for producing the mixtures of vaporized oils and air; Fig. 2, an end elevation of same; Fig. 3, an enlarged section of the oil-tank fitted with an automatic valve arrangement.

Similar letters refer to similar parts throughout the several views.

a is the carbureter, consisting of a cylinder made of metal or other convenient material, and it is closed at both ends. The ends *b* may be either permanently fixed to its body portion by any convenient means—such as, say, brazing or soldering or riveting—or they may be made detachable and removable therefrom, in which case the body portion of the cylinder will require to be flanged to receive the ends, which may be bolted thereto in such a manner to form a gas and oil tight joint.

In the drawings the cylinder *a* is shown with permanently-fixed ends *b* and also with an internal strengthening-ring *c*.

The cylinder *a* has a number of apertures arranged as follows: one above the center of one of the ends, which is fitted with a pipe *d* and a stop-cock *e*. This aperture is intended for the admission of air, as hereinafter described. On the inner surface of this end of the cylinder around the aperture is fixed a plate *b'* for arresting the flow of air and causing it to pass toward the bottom of the cylinder before passing through it. At the farther end of the cylinder and preferably at the top there is another similar pipe *f* and stop-cock *g*, intended to carry off the mixture of vaporized oil and air formed in the cylinder. A piece of wire-gauze *g'* may be inserted, if so desired, in the pipe *f* above the stop-cock *g* to prevent any liability of the gas flashing or firing back. A third opening may be put in any convenient place—such as, say, at the air-entrance end of the cylinder, above the air-pipe *d*, or on the top of the cylinder, in any position between the said end and the center of the cylinder—say as shown by the dotted line *h'*. This opening is provided with a pipe *h* and stop-cock *i*, which are employed for introducing fresh supplies of oil, as may be required from time to time. When the pipe *h* is made to enter the cylinder, as shown by dotted lines *h'*, then a plate *j* (shown in dotted lines) is fixed within the cylinder at a suitable distance below the last-named opening. The said plate is in the form of a convex disk and of a larger size than the said opening. It is employed for preventing the oil flowing directly into the cylinder, and it is employed for distributing it over a larger surface. The pipe *h* may also have a portion h^2 of its length formed of glass for sighting or inspection purposes. A fourth opening is made in the base of the farther or exit end of the cylinder, provided with a pipe *r* and stop-cock *r'*, the inner end of which is carried a suitable distance within the cylinder for the purposes to be presently described. A fifth opening is made in the air-admission end of the cylinder, immediately above the air-pipe *d*, and provided with a pipe *s* and stop-cock *t*, so arranged that the pipe will discharge its contents against the plate *b'*.

Inside the cylinder, and which may be made somewhat closely to its walls, as at Fig. 2, is an arch *k*, composed of a layer of cotton-wool or other suitable absorbent material of, say, about one-quarter of an inch in thickness, which is kept in position by wire-gauze *l*, arranged on each side thereof, as shown. The bottom of the arch *k* is made flat, as shown at *m*, Fig. 2, in which case what may be termed the "feet" of the arch are made to stand or impinge upon the bottom portion of the cylinder.

In some cases instead of the bottom portion *m* of the arch being flattened, as shown at Fig. 5, it may curve upward, as shown at *n*, Fig. 2, so as to provide a greater surface for absorbent purposes. The space *y* between the base of the arch and the inner periphery of the cylinder varies, according to circumstances, from, say, one inch in thickness at Fig. 2, to, say, about three inches at the feet of the arch at Fig. 2, and it is filled in either case with cotton-wool or other absorbent material, which also is made to wedge the arch in position. The object of this arch *k* of absorbent material is that it shall by capillary attraction absorb the oil at or near the bottom of the cylinder and present it in as large a surface as possible to the action of air traveling through the cylinder.

It is preferred to close the arch at each end *p* with similar absorbent material (thinner than for the arch) arranged between two layers of wire-gauze, the end at the air-entrance being suitably shaped to form a pocket-like recess *q* for the plate *b'* and pipe *s*, as shown, the object being that as the air is driven in and deflected downward it may first pass through a thickness of cotton-wool soaked with oil, then travel in the interior of the arch along the cylinder and through another thickness of cotton-wool before it can reach the space *u* above the arch *k*, which is in communication with the pipe *f* and stop-cock *g*, that carries it away.

An air-fan *v* of any ordinary and open construction is employed for supplying air to the cylinder through pipe *d*. Motion is imparted to fan *v* from any suitable source of power by, say, for example, an electric motor through pulleys and belting. (Not shown in the drawings.) Between the air-fan *v* and stop-cock *e* is provided an air-collecting chamber *w* to insure the air being delivered to the cylinder at or about a uniform pressure.

A pipe *x*, (of smaller diameter than pipe *d*, if so desired,) armed with a stop-cock *y*, may be in some cases provided and arranged to communicate at one end with the pipe *d* between the stop-cock *e* and the fan *v* and at the other end with the space *u* in the cylinder *a* above the arch *k* and at a suitable distance from the exit-pipe *f* and stop-cock *g*. The pipe *x* is employed as a by-pass for reducing the richness of the gas caused by an excess of vaporized oil within the cylinder when the flow of air ceases.

A gage *z* is provided at one end of the cylinder *a* for showing the height of the oil therein, and its bottom is in communication with the interior of the cylinder. The cylinder *a* may be fixed in position by metal bands 1, arranged to pass over it, as shown, and to be secured to a stand or foundation by bolts or set-screws 2.

A sixth opening is provided at the top of the cylinder *a* and about the center of its length. This opening is provided with a pressure-pipe 4 and stop-cock 5, which also communicate with the oil-tank to be hereinafter described. The pipes *h*, 4, and *r* vary in diameter in the proportion of, say, one, two, and three—that is to say, 4 is twice as large as *h* and *r* three times as *h*, while pipes 4 and *s* may be of the same diameter.

The mixed hydrocarbon oils are placed in a closed tank 3 of any suitable size and shape, arranged at a suitable distance above the carbureting-cylinder *a*. The tank is provided with any aperture at the top for the admission of the volatile hydrocarbon oils, through which the oil is poured. This aperture is shown in the drawings closed by a screwed cap 6; but it will readily be understood that in place thereof the aperture may, if so desired, be connected by a pipe or pipes with one or more oil-storage tanks. The upper end of pipe *h* is connected to the bottom of tank 3, while the lower end of the said pipe is arranged to deliver its contents into the space *u* within the cylinder *a* above the arch *k*. The lower end of the pressure-pipe 4 also communicates with the said space *u*, while the upper end of the said pipe is made to enter the tank 3 near its top and pass a suitable distance within it, as shown. The tank is filled with the oil up to or about, say, the level shown by the dotted lines 7.

On the top of the tank 3 is fixed a small closed tank or vessel 8, also of any suitable size and shape. The two tanks are arranged to communicate with each other by the short pipe 9, which is closed by valve 10. The upper ends of pipes *r* and *s* are arranged to communicate with the top of the tank 8 and to pass a suitable distance therein, as shown. The end of pipe *s* is closed by a valve 11. The valves 10 and 11 may be made in any suitable and convenient shape and of any light material, such as, say, cork or wood. The valves are arranged over each other and to be connected together by a vertical rod 12 of light metal, such as aluminium, or of wood, arranged to work in the bearings formed in the horizontal bearers 13 and 14. The length of the rod 12 is such that when valve 10 is closing pipe 9 valve 11 will have been drawn away from its seat and the end of pipe *s* opened to the interior of tank 8, or vice versa. The distance between the two valves requires to be such that neither of them will be withdrawn from their seats by any suction-like action that may occur within the tank 8, thus insuring their withdrawal

only being effected by the weight or action of the float. In order to automatically operate the valves 10 and 11, a float 15, formed, say, of cork or other suitable material, is mounted so as to slide freely upon the rod 12, between the bearers 13 and 14. The movement of the float 15 may be adjusted by means of the movable stops 16 and 17, that are mounted upon the rod 12 and fixed in position by any convenient means, such as, say, set-screws. The float is allowed a certain amount of free movement between the adjustable stops. The normal position of the valves is for valve 10 to be kept closed by the weight of the rod 12, float 15, and adjustable stops 16 and 17.

The only entrance for oil to the interior of tank 8 is through pipe *r*.

In some cases the pipe *s* may not be connected to the cylinder *a*, as shown in the drawings at Fig. 1, but simply be as shown at Fig. 3 and be used for allowing any excess pressure in the tank 8 to escape into the air. The smaller tank 8 and pipes *r* and *s* may be also dispensed with when an automatic supply is not required.

The apparatus may be used for benzolin, paraffin, or any other refractory hydrocarbon oil; but the volatile hydrocarbons we prefer employing are benzoline of about 0.650 to 0.680 (the flash-point of which is very low, being almost ordinary temperature of about 14° Fahrenheit) specific gravity and parafin-oil—say, American tea-rose oil—which has a specific gravity about 0.797. (Flash-point about 83° Fahrenheit or 28.3° centigrade.) These volatile hydrocarbons are mixed together in substantially the following proportions—namely, benzolin, seventy-five per cent.; paraffin-oil, twenty-five per cent. These may be either poured separately or already mixed through the aperture provided therefor into the tank 3 and from thence through pipe *h* into the cylinder *a* until it is partially filled with oil up to, say, about the level of lines 18 19, Fig. 1, and the absorbent material in the cylinder *a* and of the arch *k* become saturated therewith, and by capillary attraction the oil at the bottom of the cylinder is conducted to the crown of the arch as well as all around it, thus providing, as it were, an inner cylinder, the perimeter of which is saturated with oil. The stop-cock *i* is then closed and the tank 3 filled with oil up to, say, the level shown by dotted line 7. After this has been done and the screwed cap 6 placed in position air is driven by the fan *v* into the cylinder, as described, through pipe *d* at a pressure of approximately half an inch of water. The mixture of vaporized oil and air will after a few moments commence to flow from the pipe *f* at the opposite end of the cylinder to that at which the air enters. The air at first is driven through the end of the cylinder and also through the saturated end *p* of the arch *k* into its interior—that is, the central space 20—and then travels to the opposite end of cylinder, when it is made to pass through another thickness of the absorbent material forming the arch into space *u* before it reaches and escapes from the cylinder by pipe *f*. The air during its passage through the cylinder *a* and arch *k* thus becomes mixed with the vaporized oil. By this means a self-burning mixture, as hereinbefore described, can be readily obtained by regulating the stop-cocks *e* and *f* at each end of the cylinder as required. When the pressure in the cylinder *a* of the carbureter has become so great that the oil will not readily flow down the pipe *h*, then by opening valve 5 pressure from the cylinder may by the larger diameter of pipe 4 be carried into the tank 3 above the level of the oil therein and utilized for acting thereon, thus when this pressure is added to the head of oil in the tank overcoming the pressure in the smaller pipe *h* and obtaining the required flow of oil to the cylinder. On the pressure in the cylinder *a* becoming so great provision is made for oil at its bottom to be forced up the pipe *r* (the inner end of which is placed below the arch *k* or as near the bottom of the cylinder as possible) into the tank 8, the valve 10 therein then being closed and escape-valve 11 open. When sufficient oil has been carried into the tank 8 to raise the float 15 and lift the rod 12, thereby withdrawing the valve 10 from its seat and closing pipe *s* by forcing valve 11 against its seat, the oil in tank 8 will pass through pipe 9 (owing to pipe *r* being larger in diameter to pipe 4) into tank 3 until the float in its descent comes in contact with the stop 17 and closes valve 10. Should the pressure in the tank 8 during the time the valve 11 is closed become at any time equivalent to or of greater superficial pressure in tank 8 than that in the pipe *r* by, say, gas (vaporized oil and air) being conveyed thereto instead of oil, then the float 15 by such pressure will be forced downward, carrying with it the rod 12, closing valve 10, opening valve 11, and allowing the gas to escape through pipe *s* into the cylinder *a* with the inflowing air through pocket-like recess *q* or into the outer air. By this means the hydrocarbon oil is prevented collecting in sufficient quantities to congeal, and at the same time the quantity removed does not prevent the arch *k* performing its function efficiently of raising by capillary attraction the oil for vaporizing and mixing purposes.

From experiments that have been made with a cylinder two feet long and twelve inches in diameter, into which benzolin and paraffin have been poured in the above proportions, and with an open fan, say, sixteen inches in diameter and caused to revolve, say, at twelve hundred revolutions per minute and provided with an outlet-pipe one inch in diameter, which is connected to the end of the cylinder, it has been found that the flow of air to the cylinder was at the rate of about one thousand feet per minute, and after being driven into and through the arch *k* in

the manner herein described the flow of vaporized oil and air through pipe *f* was at the rate of two hundred and fifty feet per minute.

In order additionally to prevent any liability of the hydrocarbons becoming solid or frozen by the air passing through the cylinder *a*, a jet 21 of gas may be arranged under the pipe *d* or stop-cock *e* to slightly warm the inflowing air prior to entering the cylinder. The said jet may be supplied with gas from the pipe *f* by means of suitable piping armed with a stop-cock or from any other suitable source.

A self-burning mixture of vaporized oil and air produced as herein described may be used for incandescent lighting, for gassing silk and other fibers, for motors, and for heating purposes with great advantage and without danger of explosion so long as the whole mixture is caused to travel at a greater speed than the speed of propagation of flame, which may be done by maintaining a sufficient pressure of air in the cylinder *a*.

When the herein-described gas is employed for motors, it is delivered from, say, pipe *f* of the cylinder *a* to the cylinder of the engine, in which it is exploded, and being already supplied with required admixtures of air from the generating-cylinder thus dispenses with the necessity of mixing the charge in the cylinder of the engine, as when coal-gas and air are employed.

When the cylinder *a* is attached to a gas-engine, the fan *v* may in some cases and if so desired be dispensed with and the air drawn into and through the cylinder *a* by suction caused by the outward stroke of the piston of the gas-engine. The entrance for the air would under such circumstances be through pipe *d* and stop-cock *e*.

What we claim, and desire to secure by Letters Patent of the United States, is—

1. In apparatus for producing mixtures of vaporized oil and air, a carbureter consisting of a cylinder provided with closed ends and apertures for admission of air and of oil, and for the exit of the gaseous mixture as described, a deflecting-plate fixed to the interior of the air-admission end of said cylinder, an arch constructed as described and composed of absorbent material arranged between layers of gauze, and provided with end pieces similarly constructed, said arch being made to fit portions of the interior of said cylinder, and at other portions to leave spaces for the oil and gas, the air-admission pipe provided with an air-collecting chamber in communication with one end of the cylinder an exit-pipe at the opposite end of the cylinder and in communication with the gas-space, an oil-supply pipe at a suitable distance from the air-admission end of the cylinder, and an oil-distributing plate fixed to the interior of the cylinder under the said oil-pipe, all combined as set forth.

2. In apparatus for producing mixtures of vaporized oil and air, a carbureter consisting of a cylinder provided with closed ends and apertures for admission of air and of oil, and for the exit of the gaseous mixture as described, a deflecting-plate fixed to the interior of the air-admission end of said cylinder, an arch constructed as described and composed of absorbent material arranged between layers of gauze, and provided with end pieces similarly constructed, said arch being made to fit portions of the interior of said cylinder, and at other portions to leave spaces for the oil and gas, the air-admission pipe provided with an air-collecting chamber in communication with one end of the cylinder, an exit-pipe at the opposite end of the cylinder and in communication with the gas-space, an oil-supply pipe at a suitable distance from the air-admission end of the cylinder, an oil-distributing plate fixed to the interior of the cylinder under the said oil-pipe, a fan for causing a current of air to pass through the carbureter, a gas-jet for heating the air as it passes to the carbureter, tanks for receiving and mixing the oils, and pipes provided with valves for connecting the tanks with each other and with the carbureter, all in combination and substantially as described and illustrated herein.

3. In apparatus for producing mixtures of vaporized oil and air the combination with a carbureter of a closed oil-supply tank placed above the carbureter and provided with an oil-admission aperture, a pipe provided with a stop-cock connecting the bottom of said tank with gas-space in said carbureter, a pressure-pipe for connecting the said gas-space with the top of said tank, a smaller closed tank fixed to the top of the oil-supply tank, a pipe connecting the two tanks together, valves as described within the smaller tank and connected together by a rod, bearers for supporting said rod in position and pipes provided with stop-cocks for connecting the top of the smaller tank respectively with said gas-space, and with the base of the carbureter at its gas-exit end, all as set forth.

4. In apparatus for producing mixtures of vaporized oil and air, a carbureter consisting of a cylinder provided with closed ends and apertures as described, a deflecting-plate fixed to the interior of the air-admission end of said cylinder, an arch constructed as described and composed of absorbent material arranged between layers of gauze, and provided with end pieces similarly constructed, said arch being made to fit portions of the interior of said cylinder, and at other portions to leave spaces for the oil and gas, the air-admission pipe provided with an air-collecting chamber in communication with one end of the cylinder, an exit-pipe at the opposite end of the cylinder and in communication with the gas-space, an oil-supply pipe at a suitable distance from the air-admission end of the cylinder, an oil-distributing plate fixed to the interior of the cylinder under the said oil-pipe, a closed oil-supply tank placed above the carbureter and pro-

vided with an oil-admission aperture, a pipe provided with a stop-cock connecting the bottom of said tank with gas-space in said carbureter and a pressure-pipe for connecting the said gas-space with the top of said tank, substantially as set forth.

5. In apparatus for producing mixtures of vaporized oil and air, a carbureter consisting of a cylinder provided with closed ends and apertures for admission of air and of oil, and for the exit of the gaseous mixture as described, a deflecting-plate fixed to the interior of the air-admission end of said cylinder, an arch constructed as described and composed of absorbent material arranged between layers of gauze, and provided with end pieces similarly constructed, said arch being made to fit portions of the interior of said cylinder, and at other portions to leave spaces for the oil and gas, the air-admission pipe provided with an air-collecting chamber in communication with one end of the cylinder, an exit-pipe at the opposite end of cylinder and in communication with the gas-space, an oil-supply pipe at a suitable distance from the air-admission end of the cylinder, an oil-distributing plate fixed to the interior of the cylinder under the said oil-pipe, a closed oil-supply tank placed above the carbureter and provided with an oil-admission aperture, a pipe provided with a stop-cock connecting the bottom of said tank with gas-space in said carbureter, a pressure-pipe for connecting the said gas-space with the top of said tank, a smaller closed tank fixed to the top of the oil-supply tank a pipe connecting the two tanks together, valves as described within the smaller tank and connected together by a rod, bearers for supporting said rod in position and pipes provided with stop-cocks for connecting the top of the smaller tank respectively with said gas-space, and with the base of the carbureter at its gas-exit end, all as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JOSEPH WILKINSON.
EDWARD FORSTER CHAPMAN.
HARRY THORNTON.

Witnesses:
JOHN METCALFE,
RICHARD MATHER DEIGHTON.