(No Model.)

4 Sheets—Sheet 1.

J. LOVE.

CARBURETOR.

No. 440,486. Patented Nov. 11, 1890.

Fig. 5.

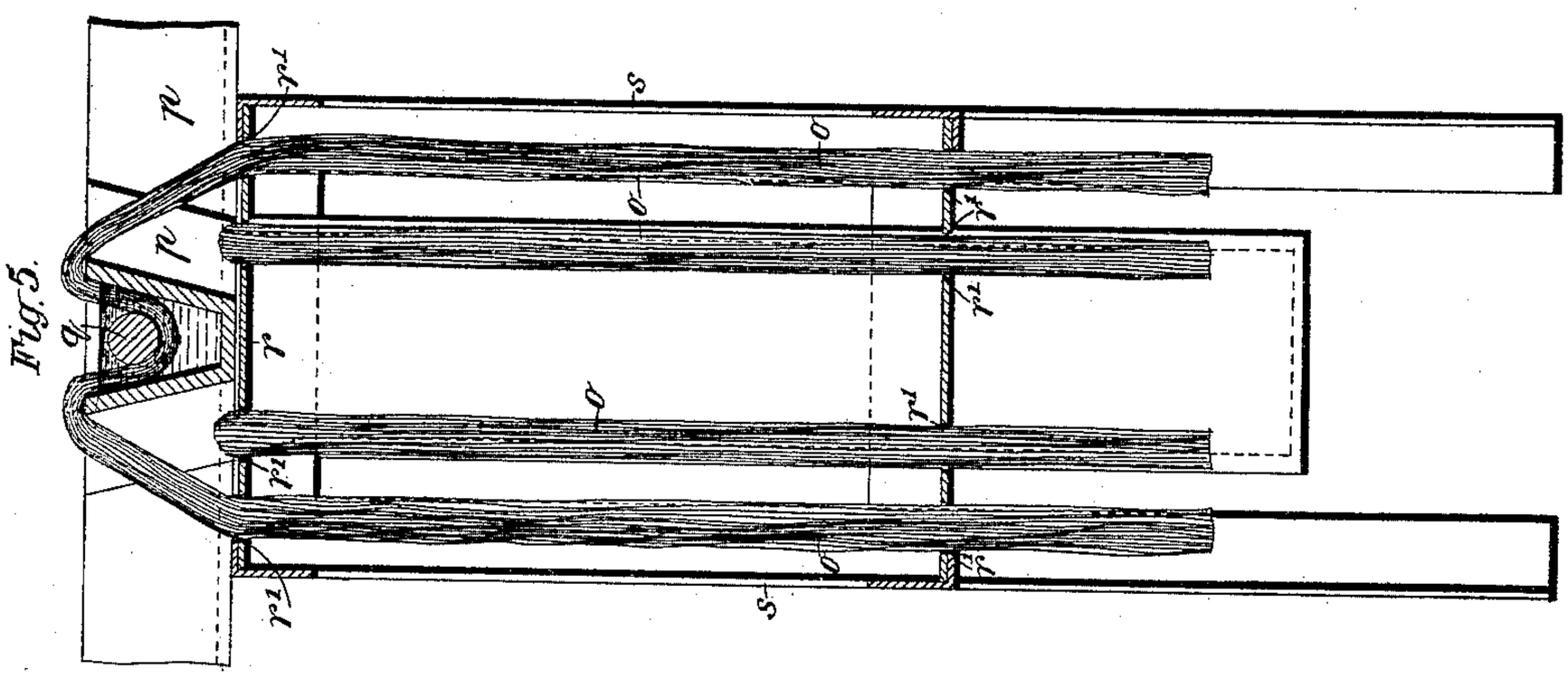
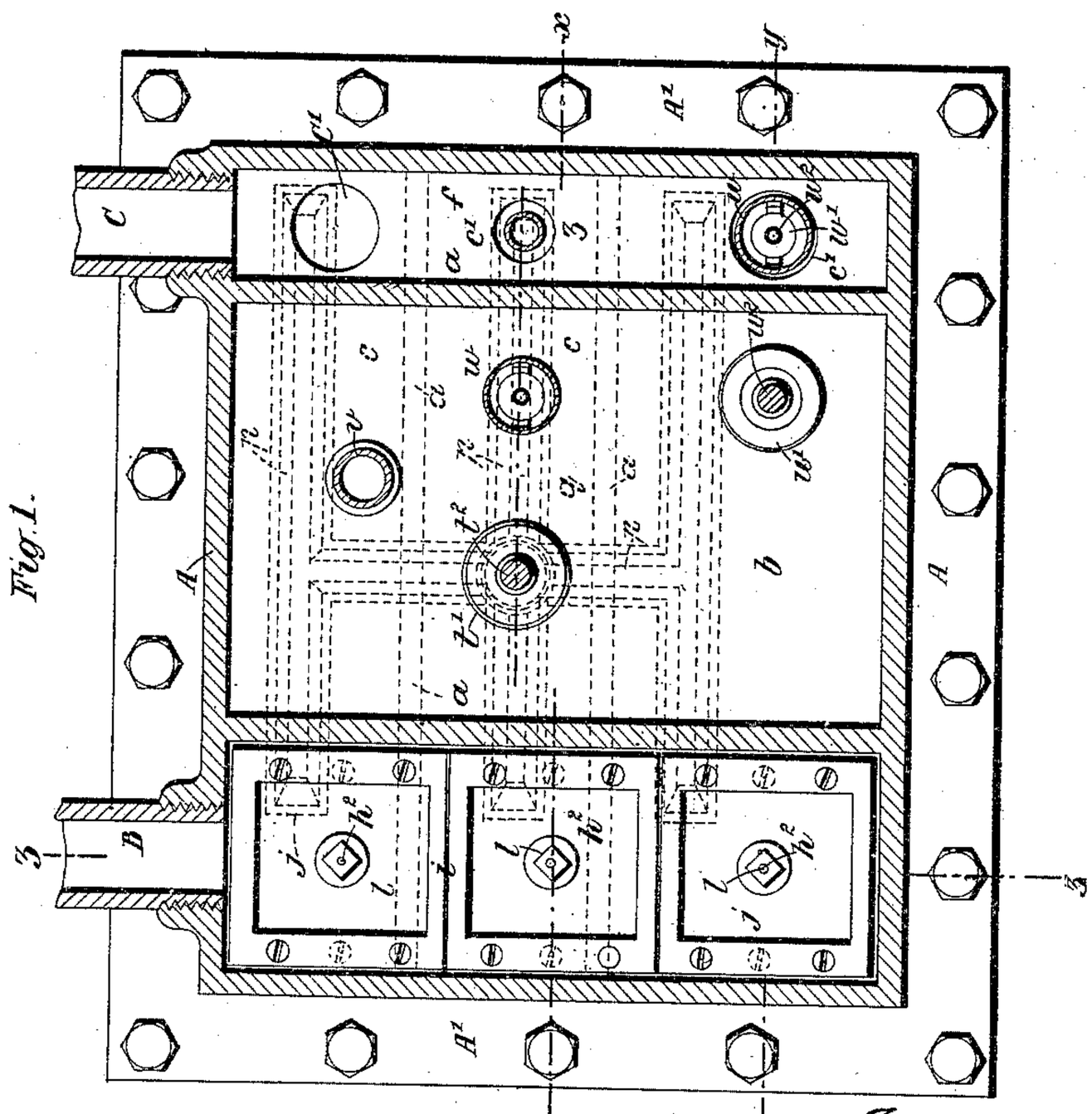


Fig. 1.



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(No Model.)

4 Sheets—Sheet 2.

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CARBURETOR.

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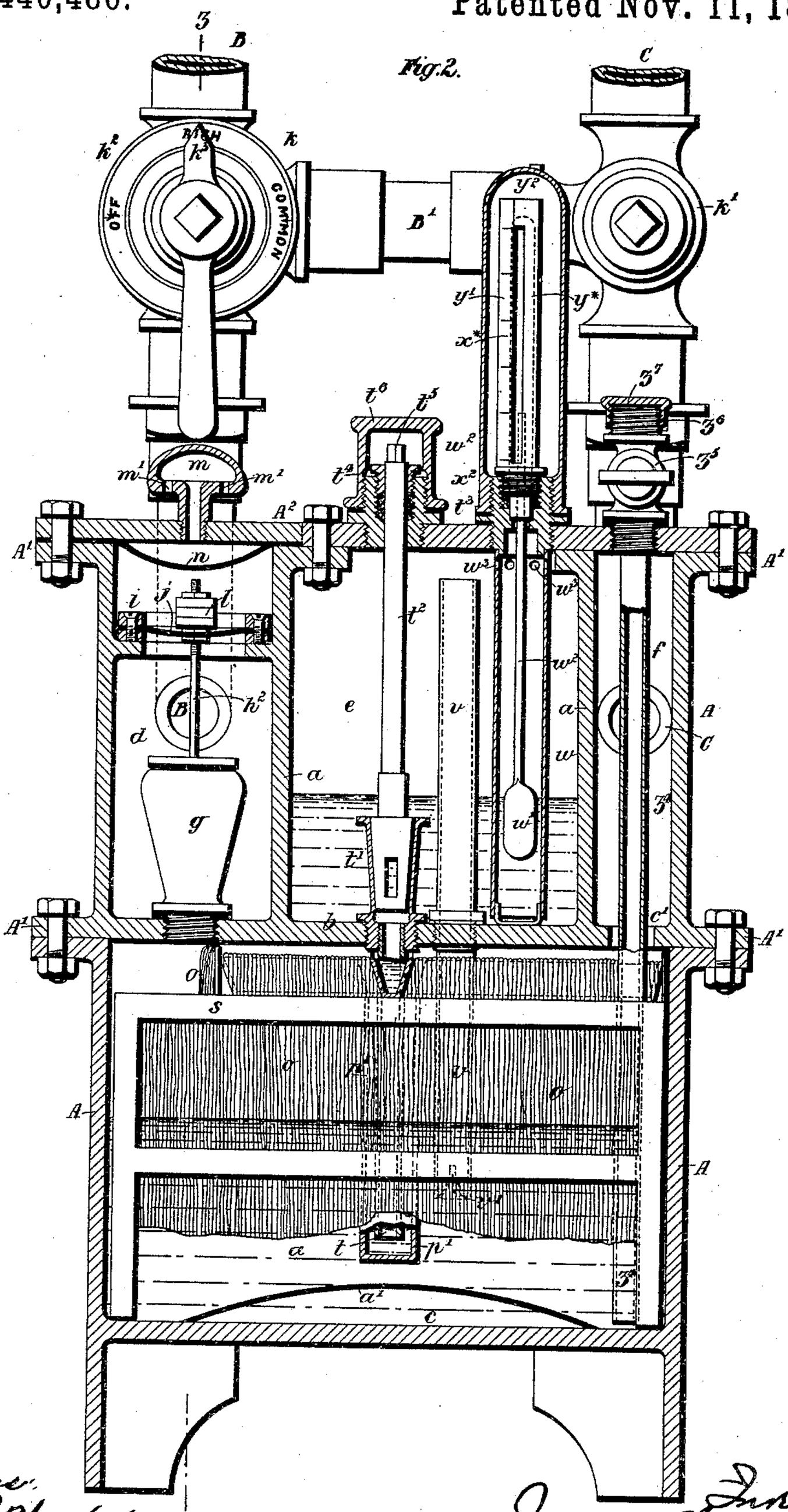
Fig. 2.



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(No Model.) 4 Sheets—Sheet 3.

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CARBURETOR.

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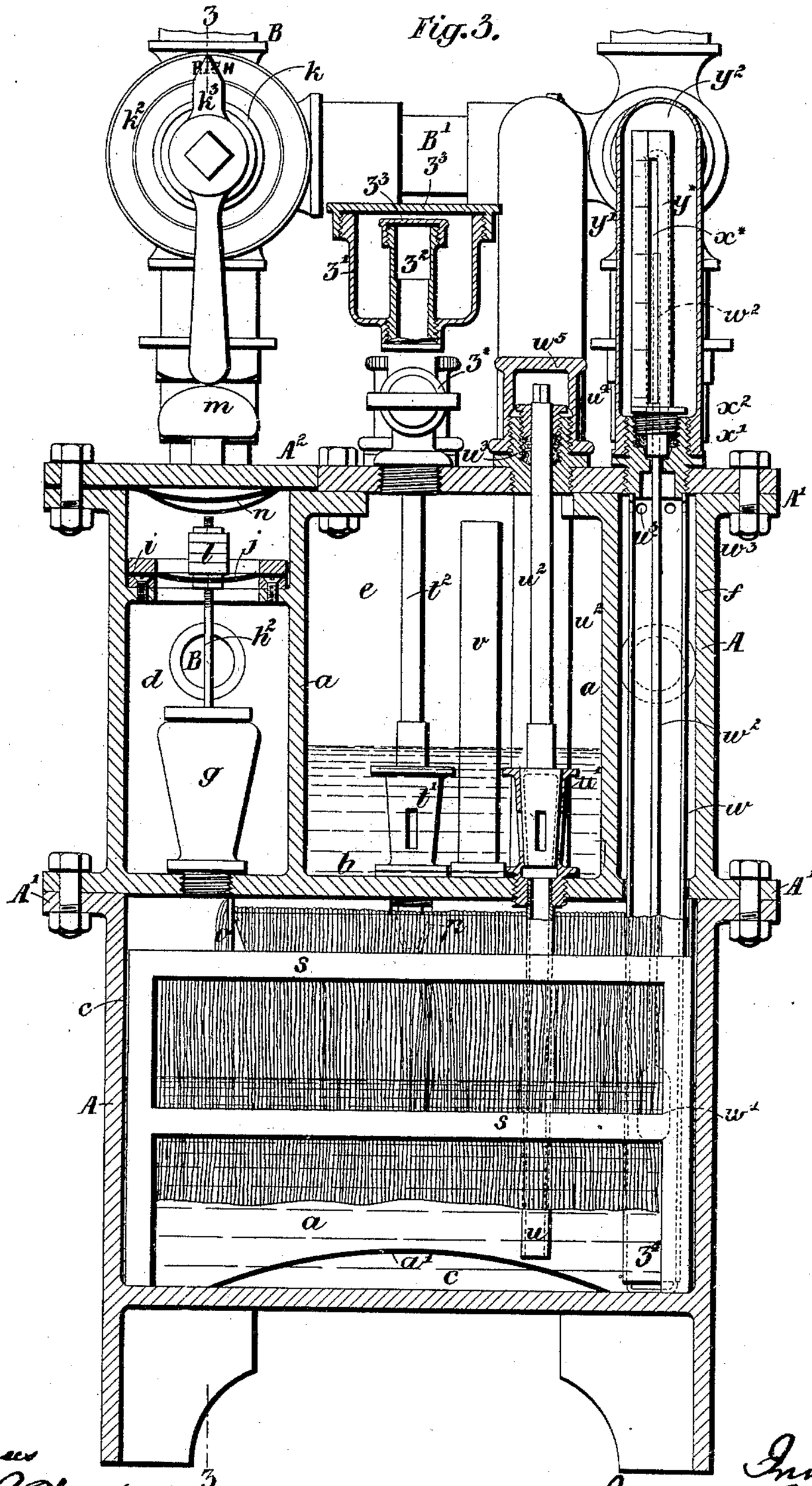
Fig. 3.



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No. 440,486.

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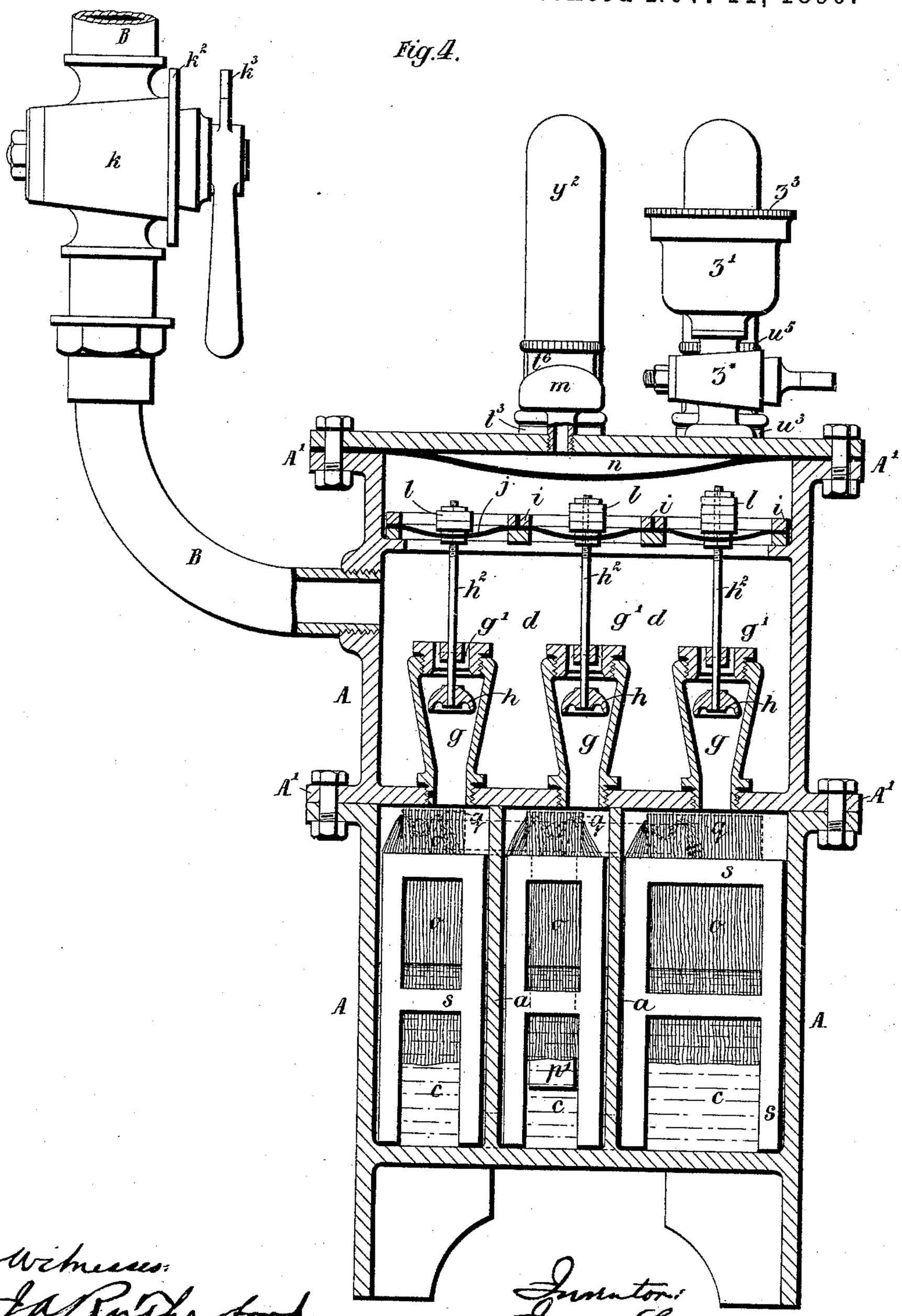
Fig. 4.



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UNITED STATES PATENT OFFICE.

JAMES LOVE, OF STRATFORD, ENGLAND.

CARBURETOR.

SPECIFICATION forming part of Letters Patent No. 440,486, dated November 11, 1890.

Application filed November 4, 1889. Serial No. 329,162. (No model.)

To all whom it may concern:

Be it known that I, JAMES LOVE, engineer, a subject of the Queen of Great Britain, and a resident of Stratford, England, have invented new and useful Improvements in Carburetors, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to apparatus for enriching or carbureting gas or air, and is designed to improve the construction of the same.

My said invention relates more especially to carbureting apparatus wherein a chamber or reservoir for the hydrocarbon or other carbureting liquid and one or more carbureting-chambers provided with cottons or wicks are employed, situated in the same box or case.

In apparatus of this kind or class as hitherto usually constructed it has been necessary for an attendant to regulate the proportion between the supply of gas to be carbureted and the consumption of the carbureted product by means of a main valve or by means of a subsidiary valve to each carbureting-chamber. By this arrangement, however, neither accuracy nor uniformity of adjustment could be obtained in practice. By my said invention I obviate this defect and provide means for automatically controlling the supply of gas to the carbureting chamber or chambers in proportion to the number of burners to which gas has to be supplied; or when the carbureted gas is used for heating or other purposes for automatically varying the supply to the carbureting chamber or chambers in proportion to the heat required or to the demand for the carbureted gas, so that the carbureted gas will be maintained at an approximately uniform density.

Another important feature of my said invention is the provision of means for controlling more efficiently than heretofore the supply of liquid hydrocarbon or other carbureting-liquid to the chamber or reservoir and from the latter to the carbureting-chambers, and for indicating the quantities or levels of the said liquid contained therein.

Another feature of my said invention consists in the provision of means for periodically and automatically flushing the cottons or wicks, and thus preventing them from becoming clogged by deposits of gummy or viscous matter from the hydrocarbon or other carbureting liquid.

My said invention comprises, moreover, various other improvements, hereinafter set forth.

In the accompanying drawings I have shown how my said invention may be conveniently and advantageously carried into practice.

Figure 1 is a plan, partly in section. Fig. 2 is a vertical longitudinal central section on the line *x x*, Fig. 1. Fig. 3 is a vertical longitudinal section on the line *y y*, Fig. 1, and Fig. 4 is a transverse section on the line *z z*, Figs. 1, 2, and 3, showing a carbureting apparatus with my improvements applied thereto. Fig. 5 is a vertical section, drawn to an enlarged scale, showing a detail of construction hereinafter described.

Like letters indicate corresponding parts throughout the drawings.

A is the box or case of the apparatus.

B is the gas inlet or supply pipe.

C is the outlet or delivery pipe.

The box or case A may be of rectangular or other suitable shape. It is preferably constructed of cast-iron or other suitable metal, and in two or more parts which, are provided with flanges A′, by means of which they are bolted or otherwise firmly secured together. A^2 is a lid or cover which is secured to the upper flange A′ in such a manner as to form a tight joint.

In the box or case A, I provide vertical partitions *a* and a horizontal partition *b*, which divide it into carbureting chambers or compartments *c*, a receiving chamber or compartment *d* for the gas to be carbureted, a chamber or reservoir *e* for the carbureting-liquid, and an accumulation or condensing chamber *f*. The carbureting-chambers *c* communicate through apertures *c′* with the chamber or compartment *f*, and through valve chambers or casings *g*, secured in any convenient manner to the horizontal partition *b*, with the receiving chamber or compartment *d*. The said carbureting-chambers *c* communicate, moreover, with each other through apertures *a′*, provided in the lower portions of the vertical partitions *a*. The apertures *a′* are nominally

sealed by the liquid contained in the said chambers, and by their means the same level of liquid is maintained in all the said carbureting-chambers.

The valve-chambers *g* are provided with suitable valves *h*, arranged to open downward, and with seatings *g'* in the said valve chambers or casings *g*.

At a suitable distance above the horizontal partition *b*, and directly over the above-mentioned valve chambers or casings *g*, is provided a frame or frames *i*, fitted with a flexible diaphragm or diaphragms *j*, made of india-rubber or other suitable material, the number of the said diaphragms being equal to that of the valves *h*. The diaphragm or diaphragms *j* are so secured in the frame or frames *i* as to make the space in the chamber *d*, intervening between the said diaphragm or diaphragms and the horizontal partition *b*, carrying the valve chambers or casings *g*, air-tight, and it is into this space that the main supply of gas to be carbureted is delivered through the inlet or supply pipe B. The admission of gas through the inlet or supply pipe B is controlled by the three-way cock or valve *k*. The inlet or supply pipe B is connected, moreover, to the outlet-pipe C by another pipe B', and is provided with another three-way cock or valve *k'*. The pipe B' thus forms a by-pass, through which more or less of the air or other gas may be delivered, if required, without having been carbureted or enriched.

k^2 is a dial, and k^3 a finger or pointer adapted to indicate upon the said dial in which direction the three-way stop cock or valve *k* is opened. The stop cock or valve *k'* is sometimes provided with a similar dial and pointer.

The valves *h* are formed of such an area as to insure their admitting the proper supply of gas to the carbureting-chamber *c*, in accordance with the quantity of carbureted or enriched gas being consumed or delivered, and are provided with spindles h^2, by means of which they are secured to the flexible diaphragms *j*. The valve-stems h^2 are, moreover, provided with weights *l*, the number of which is so regulated that they will permit the diaphragms *j* to rise one after the other as the pressure of gas increases in the chamber or compartment *d* by reason of any reduction in the quantity of gas consumed or withdrawn from the apparatus, and thus also successively raise or close the valves *h*. The admission-apertures to the carbureting-chambers are thus shut off automatically one after the other and only sufficient gas to meet the demand is admitted thereto, the said gas being thus prevented from becoming over-carbureted when the consumption or demand is small. The weights *l* upon the diaphragm *j*, which is arranged to rise last under the pressure of the gas, are so arranged that they will not permit the said diaphragm to rise and entirely close the valve *h* with which it is connected so long as there is any gas being withdrawn from the "accumulation" or condensing chamber *f*. In order to permit the escape of the air contained in the space in the chamber or compartment *d* above the said diaphragm *j*, I provide in the cover or lid A^2 a vent *m*, which is preferably formed in the shape of a mushroom, the air-holes *m'* being situated upon the under side of the head thereof, thus obviating any liability of the same becoming choked by dirt or the like. To prevent the passage through the said vent-holes *m'* of any noxious smells that may permeate through the said diaphragm or diaphragms *j*, I prefer to provide a second diaphragm *n*, which may be inserted between the cover or lid A^2 and the upper flange A' of the box or case A, and arranged to bulge or sag downward in the manner shown in the drawings into the said space above the first or lower diaphragm or diaphragms *j*.

o o are the cottons or wicks. For securing the said cottons or wicks *o* in the carbureting-chambers *c* and supplying liquid hydrocarbon thereto, I employ the following devices—that is to say, I provide an H or other suitably shaped trough or tray *p*, which is channel-shaped, half-round, or of other suitable form in transverse section, and which has dependent vertically from the center or cross portion thereof a suitable tube or well *p'*. The cottons or wicks *o* are secured in the trough or tray *p* by means of brass or other rods *q*, under which they pass, and the extremities thereof are passed or threaded through suitable holes *r'*, provided in perforated plates *r*, secured to the basket or frame *s*, supporting the said tray, as more clearly shown in Fig. 5

For supplying the hydrocarbon or other carbureting liquid to the trough or tray *p*, I provide in the above-mentioned tube or well *p'* a dip-pipe *t*, extending nearly to the bottom thereof. The dip-pipe *t* communicates through a suitable stop cock or valve *t'* with the liquid-hydrocarbon chamber or reservoir *e*, situated above. The valve stem or rod t^2 of the said stop cock or valve *t'* extends up through a suitable stuffing-box t^3 and gland t^4, provided in the lid or cover A^2, and has a square or other suitably shaped portion t^5 provided thereon, so that the said stop cock or valve *t'* can be opened or closed, when desired, by means of a suitable key.

t^6 is a cap or guard arranged to screw upon the stuffing-box t^3 so as to cover the said projecting extremity and prevent the said stop cock or valve *t'* from being tampered with, accidentally or otherwise. I sometimes provide another dip-pipe *u*, extending to near the bottom of one of the carbureting-chambers *c*, and communicating with the liquid-hydrocarbon chamber or reservoir *e* by means of a stop cock or valve *u'*, having a rod or stem u^2, a stuffing-box u^3, a gland u^4, and a cap or guard u^5, similar to those above described.

For supplying the hydrocarbon or other carbureting liquid automatically to the above-

described trough or tray p at predetermined intervals, I provide a vent-pipe v, extending from a short distance below the ordinary level of the liquid in the bottom of the carbureting-chambers to a short distance above the highest level of the said liquid in the said liquid-hydrocarbon chamber or reservoir e. When the level of the liquid in the bottom of the said carbureting-chamber c passes below a notch v', provided in the lower extremity of the said vent-pipe v, gas will pass up the latter and into the space in the chamber or reservoir e above the liquid, and by increasing the pressure upon the surface of the said liquid in the said chamber or reservoir cause a flow to take place through the valve or stop-cock t' and dip-pipe t, and consequently up the vertical tube or well p' and into and over the trough or tray p, so as to flush the cottons or wicks o. When the level of the liquid in the carbureting-chamber again rises and the notch v' at the extremity of the said dip-pipe v becomes submerged, the gas is prevented from passing to the chamber or reservoir e, and the pressure upon the surface of the liquid, and consequently the flow through the stop cock or valve t', ceases. When desired, the liquid may be periodically automatically fed to the bottom of the carbureting-chambers c in a similar manner through the dip-pipe u by closing the stop cock or valve t' and opening the stop cock or valve u'. The said dip-pipes t and u are very efficiently sealed by the liquid which always remains in the vertical tube or well p' and in the carbureting-chambers c. I provide, moreover, for easily ascertaining at any time the exact heights or levels of the hydrocarbon or other liquid in the carbureting-chambers c and in the liquid-hydrocarbon chamber or reservoir e. For this purpose I employ suitable vertical tubes w, open at their lower extremities. In the tubes w are provided floats w', formed of glass or other suitable material, the stems w^2 of which pass up through holes provided in the lid or cover A^2 into glass tubes x^* of somewhat larger diameter than the said stems, and the upper extremities whereof are closed or sealed and the lower extremities whereof are open. The outer tubes x^* are secured to the said lid or cover A^2 and provided with stuffing-boxes x' and glands x^2, or other suitable means for forming tight joints round the same. Cut-away tubes or shields y^*, having suitably-graduated scales y' attached thereto or forming part thereof, are, moreover, provided around the said outer glass tubes x^*. To prevent accidental breakage or damage to these gages, I provide caps or guards y^2, adapted to fit over the tubes or shields y^* and secured to the stuffing-boxes x' by means of screw-threads or in any other convenient manner.

w^3 w^3 are holes or apertures provided in the upper parts of the said vertical tubes w to permit the escape of any gas or air that may be contained therein when the floats w' are rising and its admission thereto when they are falling, and to thus produce an equilibrium.

For charging or filling the apparatus with liquid hydrocarbon or other carbureting liquid, I provide upon the cover or lid A^2 a suitable stop cock or valve z^*, having upon its upper extremity a cup z', in which is provided a vertical pipe z^2, communicating through the said stop cock or valve with the liquid-hydrocarbon chamber or reservoir e. The pipe z^2 extends to within a short distance of the upper extremity of the said cup z', and the upper extremity of the latter and of the said pipe z^2 are screw-threaded in order to receive suitable caps or covers z^3.

z^4 is a pipe extending to within a short distance of the bottom of one of the carbureting-chambers c for purging, purifying, or emptying the said carbureting-chambers. The pipe z^4 is provided upon its upper extremity with a stop cock or valve z^5, having an externally-screw-threaded nozzle z^6 and a cap or cover z^7. When it is desired to charge the apparatus or to purge or purify the carbureting-chambers c, the screw-threaded extremity of the pipe z^2 or of the pipe z^4 is connected by means of a suitable pipe to a tank or receptacle and supplied in any desired manner.

The operation of the apparatus is as follows—that is to say: The liquid-hydrocarbon chamber or reservoir e is first charged or filled with suitable carbureting-liquid in the above-described or in any other suitable manner. The stop cock or valve k is then opened so as to admit a supply of gas to the chamber d through the inlet or supply pipe B and the stop cock or valve k' to permit the required gas-supply to be withdrawn from the condenser or accumulating chamber f through the outlet or delivery pipe C. The gas delivered to the chamber d will pass through the valve chambers or casings g to the carbureting-chambers c, the valves h remaining open so long as the full or nearly the full amount of gas delivered through the inlet or supply pipe B is being consumed or withdrawn through the outlet or delivery pipe C. The gas passing through the said carbureting-chamber c circulates through and among the cottons or wicks o, which are saturated with hydrocarbon or other suitable carbureting-liquid, and becoming carbureted or enriched thereby passes to the condenser or accumulating chamber f, from which it is removed for consumption or other purposes by means of the said outlet or delivery pipe C. The cottons or wicks o take up the liquid from the trough or tray p by capillary attraction, and it passes down the said cottons or wicks, that portion not taken up by the gas being deposited in the bottom of the carbureting-chamber c. When all the said liquid contained in the tray p has been sucked up and passed down the cottons or wicks o, it begins to rise

in the said cottons or wicks *o* by capillary attraction from the supply contained in the bottom of the said carbureting-chambers *c*. This action continues until the level of the liquid falls below the notch *v'* in the pipe *v*, when gas is admitted up the latter to the space in the chamber or reservoir *e*, above the liquid, as hereinbefore described, and a fresh supply is forced through the stop cock or valve *t'*, down the pipe *t*, into the well *p'* and trough or tray *p*. The said liquid runs over the edges of the trough or tray *p* and flushes the cottons or wicks *o*, the said flushing action continuing until the level of the said liquid in the carbureting-chamber *c* again rises above the notch *v'* in the pipe *v*. By periodically flushing the said cottons or wicks, as above described, they are kept clean and free from any sticky or gummy matter that might otherwise accumulate thereon. This periodical automatic feeding and flushing continues so long as any gas is passing through the apparatus. Should the consumption of gas be sufficiently reduced, the diaphragms *j* will rise, as hereinbefore mentioned, one after the other, according to the number of the weights *l*, and close or partially close the valves *h*, so as to reduce the supply of gas to the carbureting-chambers *c*, in accordance with the demand or consumption thereof.

It is obvious that any convenient number of the hereinbefore-described carbureting-chambers may be employed, and also that the said apparatus may be worked either by supplying the hydrocarbon or other carbureting liquid to the cottons or wicks in the manner hereinbefore described, or in the usual manner—viz., by permitting the said hydrocarbon or other carbureting liquid to pass only up the said cottons or wicks by capillary attraction from the supply of liquid in the bottom of the carbureting chambers. In this case the stop valve or cock *t'* is closed and the stop valve or cock *u'* is open, the periodical automatic feed taking place through the said stop cock or valve *u'* and pipe *u* in a similar manner. The first of these methods is, however, far more advantageous in practice, as it completely obviates or very much reduces the objection experienced in the latter method—that is to say, the clogging of the cottons or wicks by gummy or viscous matter, and their being consequently rendered rapidly useless.

Although I have hereinbefore described a convenient and advantageous method of carrying my said invention into practice, it is obvious that I can somewhat modify the construction of my improved apparatus without departing from the nature of my said invention. For example, in order to maintain a constant supply from the liquid-hydrocarbon chamber or reservoir to the carbureting-chambers, the valve communication may be set so as to permit any desired constant flow or supply of liquid; or a small by-pass may be provided to insure a constant supply of liquid to the said carbureting-chambers. One or more vent-tubes, the lower extremities of which terminate a little below the usual levels of the liquid in the said chambers, and which project upward into the liquid-hydrocarbon chamber or reservoir, so that their upper extremities will just clear the lid or cover, are, moreover, sometimes provided. These vent-tubes permit the air displaced by the falling liquid to enter the said chamber. When, however, their lower extremities become submerged the supply of liquid will cease.

What I claim is—

1. In a carburetor, the combination, with the carbureting-chamber, of a gas-supply chamber located above it and having valve-connections therewith, said valves regulated by a flexible diaphragm and weights to shut off the supply of gas as the carbureting-chamber becomes charged, substantially as described.

2. In a carburetor, the combination, with the gas-supply and carbureting chambers, of one or more valve-chambers connecting them and provided with valves, the stems of which are secured to diaphragms and are variably weighted, substantially as described.

3. In a carburetor, the combination, with liquid-containing troughs and a series of cottons or wicks suspended from said troughs at their middle portions, of the rods *q*, located longitudinally in said troughs and between which and the said troughs the cottons or wicks are passed, substantially as described.

4. In a carbureting apparatus, the combination of an equalizing or gas-supply chamber *d*, valve chambers or casings *g*, valves *h*, weighted rods or stems h^2, diaphragms *j* and *n*, and vent *m*, having holes *m'*, substantially as described.

5. In a carbureting apparatus, the combination of a liquid-hydrocarbon chamber or reservoir *e*, stop-cocks or stop-valves *t'* and *u'*, supply-pipe z^2, cup *z'*, and cover z^3, substantially as described.

6. In a carbureting apparatus, an improved gage or means for ascertaining the height or level of the liquid in the carbureting chamber or chambers or in the liquid-hydrocarbon chamber or reservoir, consisting of the tube *w*, having holes w^3, float *w'*, having a stem w^2, glass tube x^*, stuffing-box *x'*, gland x^2, cut-away tube or shield y^*, graduated scale *y'*, and cap or guard y^2, substantially as described.

7. In a carbureting apparatus, the combination of a liquid-hydrocarbon chamber or reservoir *e*, carbureting-chambers *c*, baskets or frames *s*, trough or tray *p*, tube or well *p'*, dip-pipe *t*, wicks or cottons *o*, and notched vent-pipe or dip-pipe *v*, substantially as described.

8. In a carbureting apparatus, the combination of carbureting-chambers *c*, a liquid-hydrocarbon chamber or reservoir *e*, accumulation or condensing chamber *f*, and a purging, purifying, or emptying pipe z^4, having a stop-cock z^5, externally-screw-threaded noz-

zle z^6, and cap or cover z^7, substantially as described.

9. In a carbureting apparatus, the combination of a carbureting-chamber having vertical partitions *a*, apertures *a'*, baskets or frames *s*, a trough or tray *p*, tube or well *p'*, dip-pipe *t*, rods *a*, and perforated plates *r*, substantially as described.

10. In a carbureting apparatus, the combination of a box or case A, equalizing or gas-supply chamber *d*, liquid-hydrocarbon chamber or reservoir *e*, carbureting-chambers *c*, accumulation or condensing chamber *f*, inlet or supply pipe B, outlet-pipe C, connecting-pipe or by-pass B', and three-way cocks or valves *k* and *k'*, substantially as described.

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

JAMES LOVE.

Witnesses:
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