

E. B. DENNY & C. H. PIERSON.
Air-Carbureters.

No. 155,297.

Patented Sept. 22, 1874.

FIG 1

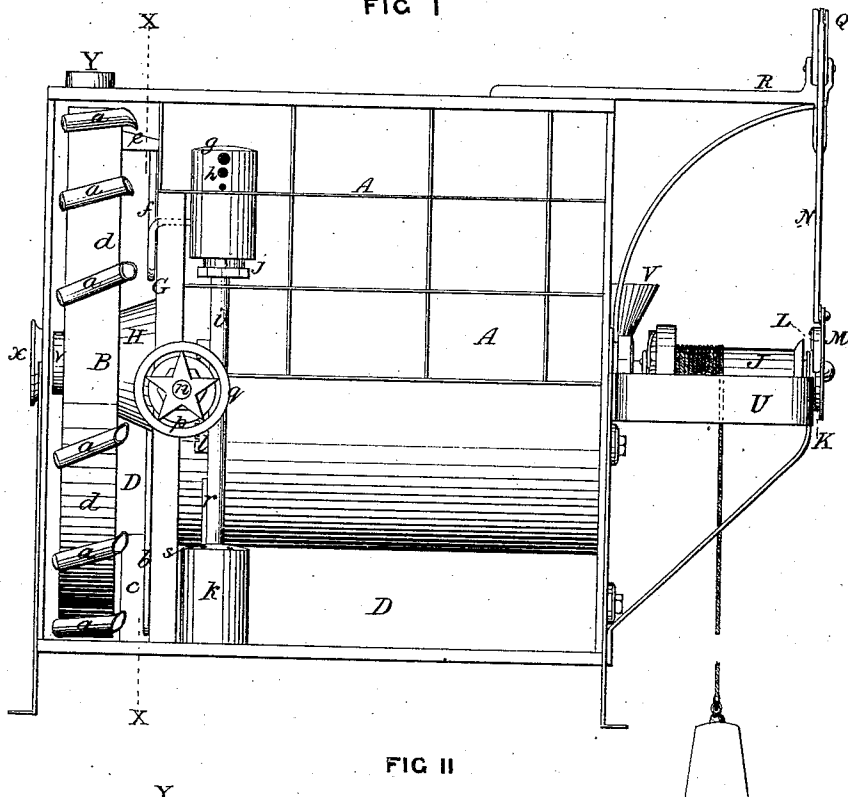
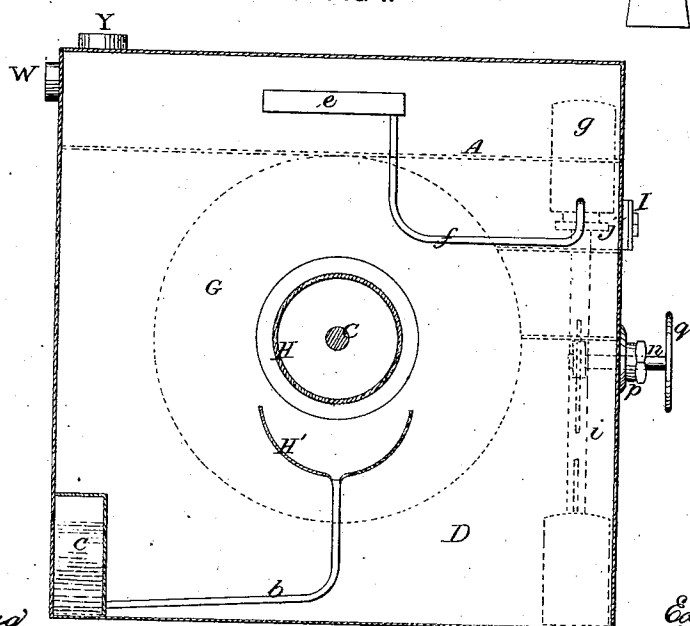


FIG II



WITNESSES

John E. Laing
Geo. D. Patton

INVENTORS

Edward B. Denny
Charles H. Pierson
by Johnson and Johnson
their Attys

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FIG III

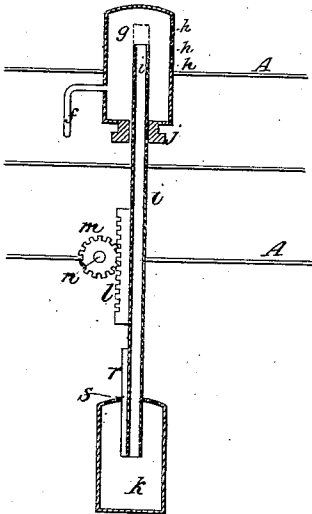


FIG IV

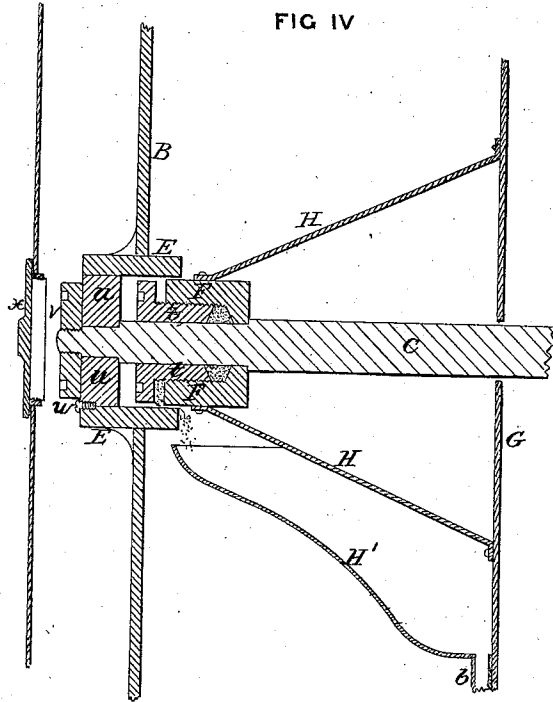


FIG V

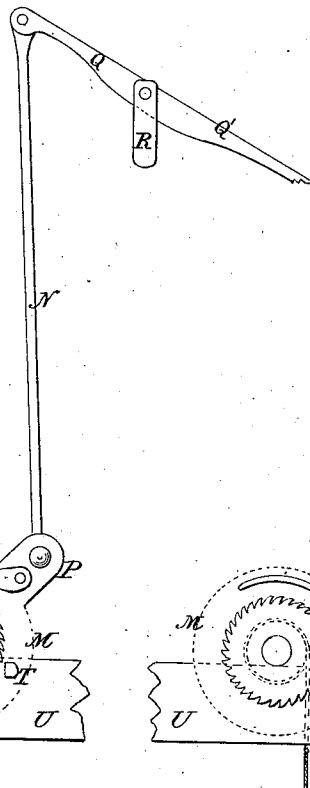


FIG VI

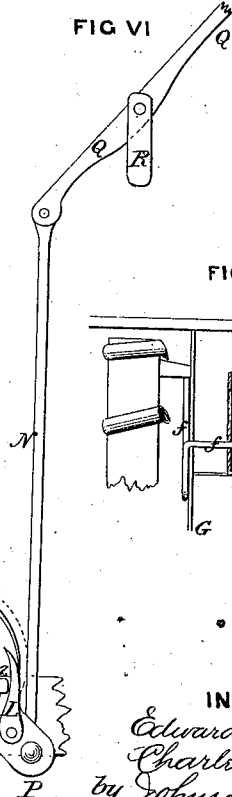


FIG VII

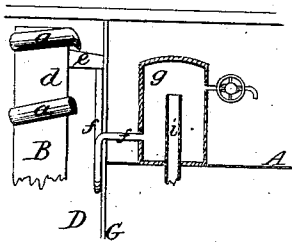
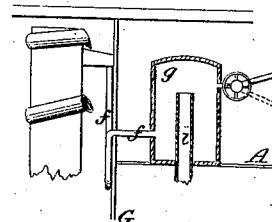


FIG VIII



WITNESSES

John C. Laing
John D. Patten

INVENTORS

Edward B. Denny
Charles H. Pierson
by *Johnson & Johnson*
their Attys

UNITED STATES PATENT OFFICE

EDWARD B. DENNY AND CHARLES H. PIERSON, OF NEWARK, NEW JERSEY,
ASSIGNORS TO DENNY MANUFACTURING COMPANY, OF NEW YORK CITY.

IMPROVEMENT IN AIR-CARBURETERS.

Specification forming part of Letters Patent No. **155,297**, dated September 22, 1874; application filed August 5, 1874.

To all whom it may concern:

Be it known that we, EDWARD B. DENNY and CHARLES H. PIERSON, of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Air-Carbureters; and we do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

Our invention relates to apparatus for carbureting atmospheric air, in which devices are used for feeding the gasoline from one department to another department thereof; and consists of a perforated regulating well device combined with the feed device, a sealing-tube, an overflow-pipe, and the carbureter, in a way to intercept the passage of the gasoline from one to the other, and regulate the quantity supplied to the carbureter, as may be required, and in proportion to the quantity of air forced into the carbureter by the air-wheel, and, at the same time, and by the same means, effect the return of the surplus gasoline into the chamber of the feed-wheel, thus preventing the entrance into the carbureter of any more of the gasoline than is required, and, at the same time, preserve the surplus gasoline from deterioration by contact with the air; also, in the means for removing the feed device back out of the way to give access to the stuffing-box for renewing the stuffing; also, of a funnel, in combination with the stuffing-box and the driving-shaft, the funnel being arranged to inclose both, whereby the stuffing-box may be placed at a distance from the air-wheel chamber, and near the outer case, and thereby made easy of access; also, in means for winding up the driving-weight and releasing the connection of the winding device from the spool which drives the air and feed wheels, and effecting both these operations by a rod and lever, which, in connection with a pawl, puts the latter either in or out of gear.

In the accompanying drawings, Figure 1 represents an elevation of a carbureting-machine embracing our invention, the side of the

casing being removed to expose the interior feed and regulating devices; Fig. 2, a transverse section taken through the line *x x* of Fig. 1; Fig. 3, a sectional view of the feed-regulating devices; Fig. 4, a vertical section of the feed-wheel and the inclosing-case for the stuffing-box, with which it is connected; Fig. 5, an end view of the winding apparatus in the position for winding up the weight; and Fig. 6, a similar view, with the pawl of the winding device shown out of gear.

The form of the apparatus is immaterial, and the arrangement of the carbureting-boxes A and the feed device B may be as shown in the drawings, or any other that may be best adapted for use with our invention. In the example shown, however, the feed device B is mounted upon the same shaft C with the air-wheel, and the feed is effected by means of pipe-buckets *a*, fixed upon the perimeter of a wheel, *d*, at an angle to the axis thereof, so that as the wheel revolves the buckets *a* will dip, elevate, and empty the gasoline into a receiving-tray, *e*, from whence it is conducted to the carbureting-boxes. The air-wheel and the feed device revolve in separate compartments of the case, the compartment D being the gasoline-chamber, and extending beneath the air-wheel chamber. These parts may, however, occupy any suitable relation to each other, as our invention consists in new features employed in connection therewith. The tray *e*, for receiving the gasoline from the feeding device, is arranged in this chamber, with said device at a point above the level of the surface of the upper carbureters, which are arranged at the top of the case above the air-wheel chamber. The communication between this tray and the carbureter is not direct, but a sealing-pipe, *f*, of peculiar form, leads from the tray *e* into a receiving-vessel, *g*, which occupies a vertical position in the carbureting-chamber, and extends above the upper carbureting-surface A, so that the top of this vessel *g* shall be on a level, or thereabout, with the receiving-tray *e*, for a purpose to be presently stated, while the sealing-pipe *f* enters the receiving-vessel *g* at or near the bottom thereof. This conducting-pipe *f* is of U shape, as shown in Fig. 2, to produce a seal between the re-

ceiving-vessel *g* and the tray *e*—that is to say, the bend of the pipe *f*, being filled with gasoline, will seal the communication between the carbureting and the gasoline chambers, so that the pressure from the carbureting-chamber will not drive back or interfere with the flow of the gasoline.

The receiving-vessel *g* is closed at both ends, and that portion extending into the carbureting-boxes *A* is provided with a series of openings, *h*, through which the gasoline enters the carbureter. These holes *h* are arranged one above the other, in order that the flow of gasoline therethrough may be increased or diminished in proportion to the amount of air passing through the air-wheel. To effect this variable supply of gasoline to the carbureters we employ and combine with the said receiving-vessel *g* a regulating-pipe, *i*, the upper end of which enters the bottom of said vessel *g* through a stuffing-box, *j*, to maintain a close joint at the passage of the pipe into the vessel. The lower end of this pipe *i* enters a seal overflow-cup, *k*, in the gasoline-chamber, and this overflow-pipe is made adjustable vertically, to project its end to a greater or less extent into the receiving-vessel, and thereby regulate the flow of the gasoline from the vessel into the carbureter, in proportion as it allows more or less of the gasoline supplied by the feeding device to escape back into the gasoline-chamber; for, it will be seen, if the pipe *i* be raised so that its end shall be above the top exit-hole *h* of the vessel *g*, a greater proportion of the gasoline would flow into the carbureter than if the pipe *i* were lowered below the lowest exit-hole *h*, and the amount which would flow into the carbureter would be in exact proportion as the pipe is raised or lowered.

In an air-carbureting apparatus using a meter-wheel pump for supplying the air, and at the same time producing a uniform pressure, each revolution of the wheel will supply a definite quantity of air.

Now, having a given quantity of air to carburet at each revolution of the wheel, a feed is used by which a given quantity of gasoline shall also be supplied at each revolution of the wheel. This quantity of gasoline must, of course, be sufficient to perfectly carburet the given quantity of air under any circumstances; but it is often desirable that the quantity should be diminished. In a cold temperature the proportion of gasoline supplied to carburet a given quantity of air must be less than in a warmer temperature, and vice versa. If gasoline of a light specific gravity be used a smaller quantity will be sufficient to perfectly carburet a given quantity of air than if gasoline of a heavier specific gravity were used. In order to make a good illuminating-gas by a mixture of air and gasoline the proportions must be right. If there be too much gasoline (which is nearly all carbon) the light produced will be lurid and smoky; if not enough the light will be dim. It is impossible

for the manufacturer to know what gravity of gasoline will be used in each apparatus made, or what will be the temperature of the vault or house wherein it shall be placed. He therefore has to make his feed device capable of supplying enough gasoline to the carbureters under any circumstances. Now, when it is remembered that gasoline is a heterogeneous liquid, the particles composing it not being of a uniform specific gravity, and that when exposed to the evaporating action of the air it rapidly deteriorates, and increases in density, it will at once be apparent that a useful and desirable object is attained by regulating to a nicety the quantity of gasoline supplied to the carbureters at each revolution of the air-wheel, and returning to the gasoline-chamber in its pure condition the surplus supplied by the feed-wheel, which would otherwise remain unevaporated in the carbureter, or, if conducted back to the gasoline-chamber after passing through the carbureter, would be of a specific gravity too heavy for use in an air-carbureting machine.

This regulation of the gasoline to the carbureting-surfaces is effected in its transit to the carbureter, and all that does not enter the latter passes back into the gasoline-chamber through the regulating-pipe *i*, which, opening into the receiving-vessel *g*, becomes an escape or overflow pipe to said vessel, and thereby gives the advantage of preventing the surplus gasoline from coming in contact with the air by being returned through the carbureter; but, by this regulating overflow-pipe, the surplus gasoline is intercepted on its way to the carbureter, and discharged directly into the chamber whence it was taken. This return of the gasoline through the regulating-pipe *i* requires that both ends of the latter must communicate with the gasoline-chamber, and this circuit is sealed by combining the U-pipe *f* with the upper end and the overflow-cup *k* with the lower end of the regulating-pipe.

The means for effecting the adjustment of the regulating-pipe consists of a cogged rack, *l*, on the outer side of the regulating-pipe *i*, and a pinion, *m*, on the inner end of a short shaft, *n*, matching with the cogged rack. Any suitable means may be used for adjusting this pipe. The pinion-shaft *n* passes through a stuffing-box, *p*, in the side of the casing, and is provided with a hand-wheel, *q*, on its outer end, so that turning said wheel to the right or left raises or lowers the regulating-pipe, to graduate its extension into the gasoline-receiving-vessel. A fin or rib, *r*, on the regulating-pipe *i* fits into a notch, *s*, in the top of the overflow-cup *k* at the bottom of the gasoline-chamber, to maintain its cogged connection with the pinion. The feed-wheel is mounted by a hub-band, *E*, upon the end of the shaft *C*, which projects within the gasoline-chamber, and a screw-plug, *t*, enters the stuffing-box *F* through this open hub-band *E*, which, being fitted loosely upon the stuffing-box *F*, is secured to the shaft by a head-piece, *u*, clamped

against a shoulder on the shaft C by a screw-nut, *v*, on the end of the latter, while the hub-band E and its head-piece *u* are secured together by a screw, *w*, or other device, as shown in Fig. 4. By this construction the feed-wheel is made removable, in order to remove the screw-plug *t* of the stuffing-box to replenish the stuffing, by removing the outer clamp-nut *v* and the fastening-screw *w*, and then sliding the feed-wheel back upon the stuffing-box, which leaves the packing screw-plug *t* free to be removed for access to the packing. The end of the casing is provided with an opening fitted with a screw-tap, *x*, to give access to these parts for the purpose stated. As the shaft C of the air-wheel passes through the division-plate G of the water and gasoline chambers, and in order that the stuffing-box shall be easy of access, we inclose this portion of the shaft in a funnel-case, H, which projects from the division-plate G, and is fastened to the stuffing-box. The drip from the stuffing-box is caught in a suitable trough, H', extending beneath its outer edge, and is carried off by a pipe, *b*, leading therefrom, with its end sealed in an overflow-cup, *c*. Access is had to the stuffing-box *j* of the receiving-vessel through an opening in the side of the case, provided with a tap-nut, I. The air-wheel shaft C extends outside of the opposite end of the case, through a stuffing-box, to receive the spool J for the driving-weight, and the necessary ratchet-pawl.

These machines are expected to be placed in vaults under the ground, and considerable danger and inconvenience would be incurred if it were necessary to go into the vault whenever the weight was to be wound up. We have, therefore, improved the devices for winding the weights, so that it may be done above and outside the vault, and these devices are so arranged that their connection with the spool may be easily released. This consists of a ratchet-wheel, K, fixed on the end of the axis of the spool J, and into which a pawl, L, is arranged to take. This pawl L is carried by a plate, M, fixed upon and turning freely on the axis of the spool. A rod, N, is pivoted to an arm, P, of this plate, and, extending upward, connects, by a pivot-joint, to a handle-lever, Q, pivoted to a standard or bracket, R, so as to be above the surface of the ground, the machine itself being located within a vault beneath the ground. The pawl L is kept in gear with the ratchet by a spring, S, and when the rod is worked up and down the spool J is turned to wind up the weight. We have provided the lever Q, so that the rod may be raised and lowered by a vibrating motion, the same as a pump-handle. When the weight has been wound up the spool must be left free to unwind, so that the weight will drive the air and feed wheels, and we employ the winding-rod and lever to disengage the ratchet-pawl L from its connection with the spool J, and for this purpose a projection, T, is arranged upon the spool yoke or support U, so as to be

in range with the movement of the pawl L, to allow its pivoted end to pass thereover, to bring its inner curved slide *z* in contact therewith, and, by elevating the handle Q' of the lever beyond the height required to operate the pawl, press out the acting end of the latter away from the ratchet K, and leave it free to turn with the unwinding movement of the spool when the apparatus is in operation, as shown in Fig. 6. This position of the pawl over the fixed projection T holds it out of gear, and the depression of the handle Q' of the lever at once releases the pawl from its hold, and puts it again in gear with the ratchet of this spool, as shown in Fig. 5. By this device a simple pump-handle movement winds up the weight, and a single down thrust of the connecting-rod N puts and holds the winding device out of gear.

The water is introduced into the air-wheel chamber by means of a flaring chute, V, which also serves as a gage to indicate when the water requires to be introduced to keep it above the level of the air-wheel shaft, and to seal this inlet with the air-space. The gasoline is introduced into the feed-wheel chamber through a pipe, *y*, at the top of the case, and the gas-pipe leading to the house connects directly with the top carbureting-chamber, as shown at W, Fig. 2.

As the leading feature of our invention consists in means for regulating the fluid after it leaves the feed device, it will be seen that our invention is not confined to any specific arrangement for carrying it out, so long as a perforated intercepting-vessel is used for the fluid in connection with an overflow-pipe, whether the latter be fixed or adjustable, for, in Figs. 7 and 8, the overflow-pipe is shown as stationary and the vessel closed and provided with a faucet, Fig. 7, worked from the outside of the machine by a hand-wheel. In proportion as the faucet is turned on will be the feed of the gasoline into the carbureter, and the surplus will return into the gasoline chamber through the overflow-pipe. In Fig. 8 the closed vessel is fitted with a jointed feed-pipe, which can be raised or lowered, so as to bring its outer end above or below the level of the fixed surplus overflow-pipe. In this jointed pipe the regulation will be in the height of the outer end of the feed-pipe, which is raised and lowered by a hand-wheel. In these modifications the intercepting-vessel is used both closed and perforated, and with an overflow-pipe both fixed and adjustable; but in either plan the feed of the gasoline to the carbureter from the receiving-vessel and the overflow-pipe for the surplus gasoline are the same in design and operation.

We claim—

1. In a gas-carbureter, the combination of the perforated receiving-vessel *g*, located within the carbureting-chamber, with a tray, *e*, into which the gasoline is discharged from the feed device B, located on a level, or nearly so, with the top of the perforated vessel, and a

U-shaped conduit, *f*, connected, respectively, with the bottom of the tray *e* and the vessel *g*, below the perforations thereof, whereby the gasoline is discharged through the U-shaped sealing-conduit directly into the carbureter.

2. The combination, with the perforated receiving-vessel *g*, located within the carbureting-chamber *A*, with an overflow-pipe, *i*, communicating at its lower end with the gasoline-chamber, and a sealing-conduit, *f*, connected with the tray *e*, whereby any gasoline passing through the sealing-conduit not discharged into the carbureter is intercepted in its circuit, and carried back into the gasoline-chamber without coming in contact with the air.

3. The combination, with the perforated receiving-vessel *g*, located within the carbureting-chamber *A*, with an adjustable overflow-pipe *i*, communicating therewith and with the gasoline-chamber *D*, whereby the quantity of gasoline issuing from the perforations in the vessel *g* is increased or diminished by adjusting said pipe or overflow to make the outlet from the vessel through a greater or less number of the perforations therein.

4. The combination, with the pipe for regulating the supply of gasoline to the carbureter, of means for adjusting said pipe vertically, to project its upper open end to a greater or less extent within the perforated vessel.

5. The feed-wheel *B*, provided with a hub-band, *E*, in combination with the stuffing-box

F, the head-piece *u*, clamp-nut *v*, and fastening-screw *w*, whereby the hub-band may be unfastened and moved back upon the stuffing-box for access to and removal of the packing.

6. The combination of the shaft *C* and the stuffing-box thereon with the funnel-cover inclosing the end of the shaft within the gasoline-chamber, and secured to the stuffing-box, whereby the air-wheel chamber is extended for the purpose specified.

7. The combination of the hand-lever *Q* with the connecting-rod *N*, pawl *L*, ratchet-wheel *K*, and the winding and driving spool *J*, whereby the weight may be wound up by a pumping movement of the hand-lever.

8. The combination of the hand-lever *Q*, connecting-rod *N*, ratchet-wheel *K*, and the pawl *L* with the fixed projection *T* on the spool-frame, whereby the pawl may be disengaged and held out of winding-gear for the operation of the machine, and again put into winding-gear by a single up-and-down thrust of the hand-lever.

In testimony that we claim the foregoing as our own, we have affixed our signatures in presence of two witnesses.

EDWARD B. DENNY.
CHARLES H. PIERSON.

Witnesses:

J. W. DENNY,
GEO. H. LLOYD, Jr.