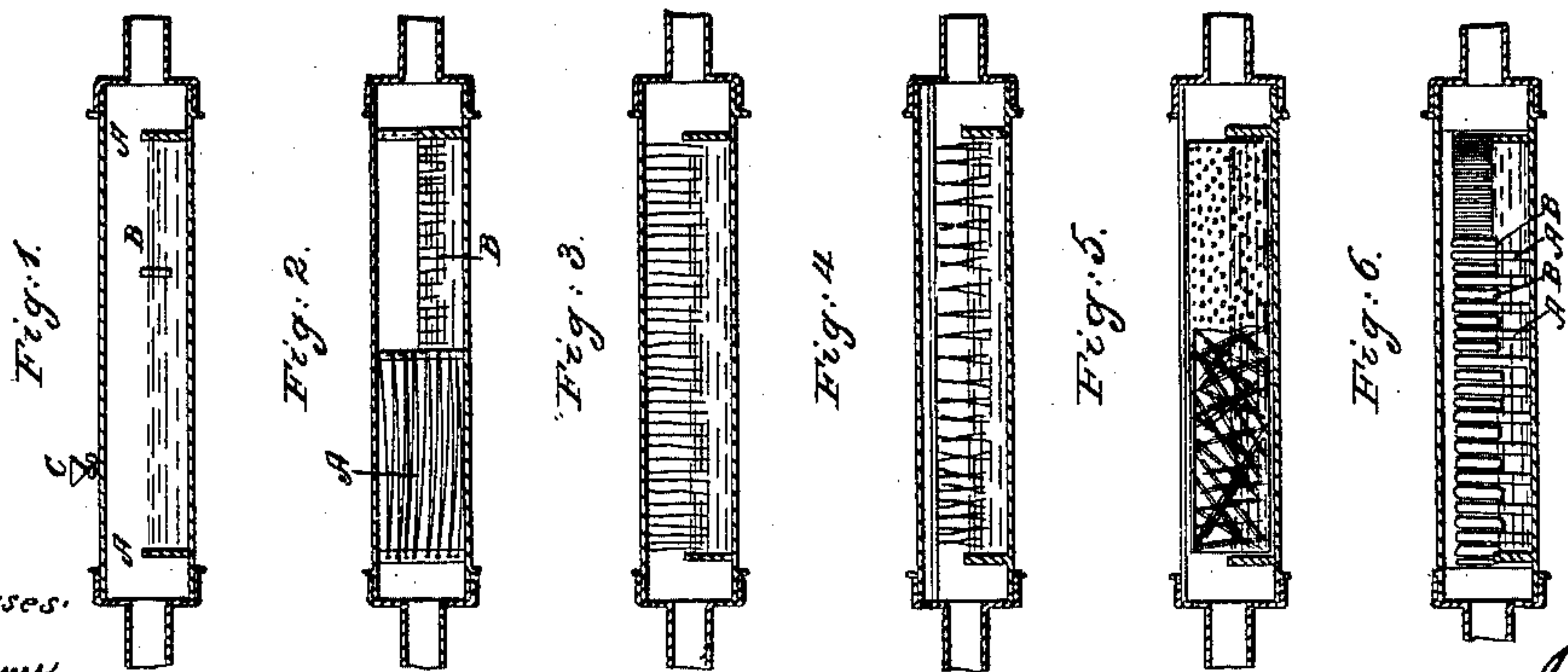
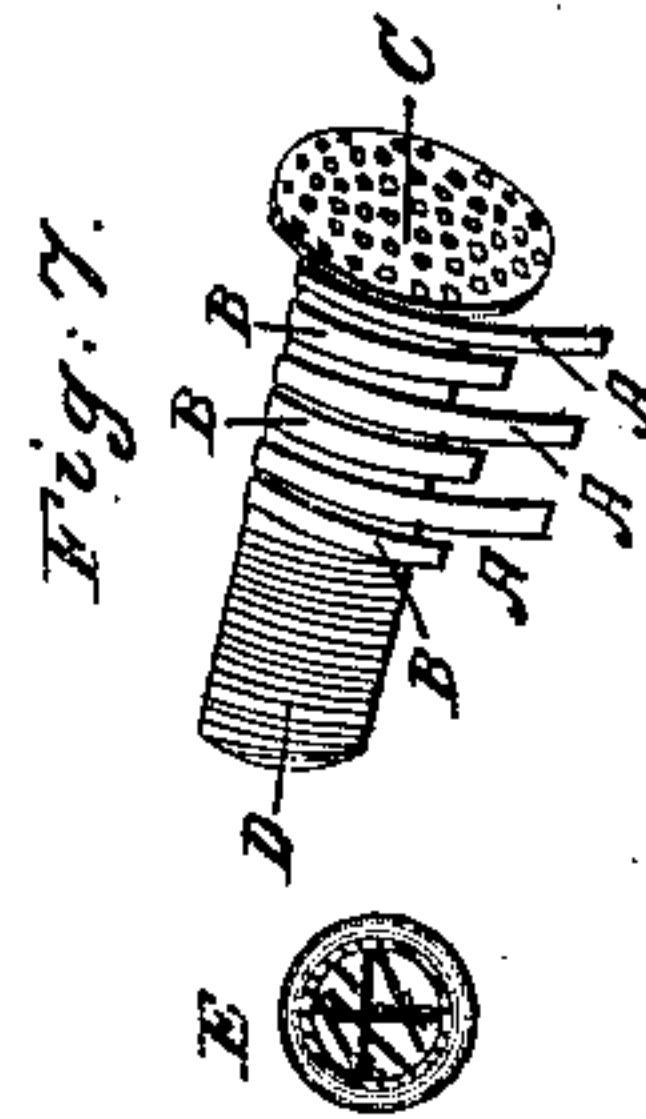
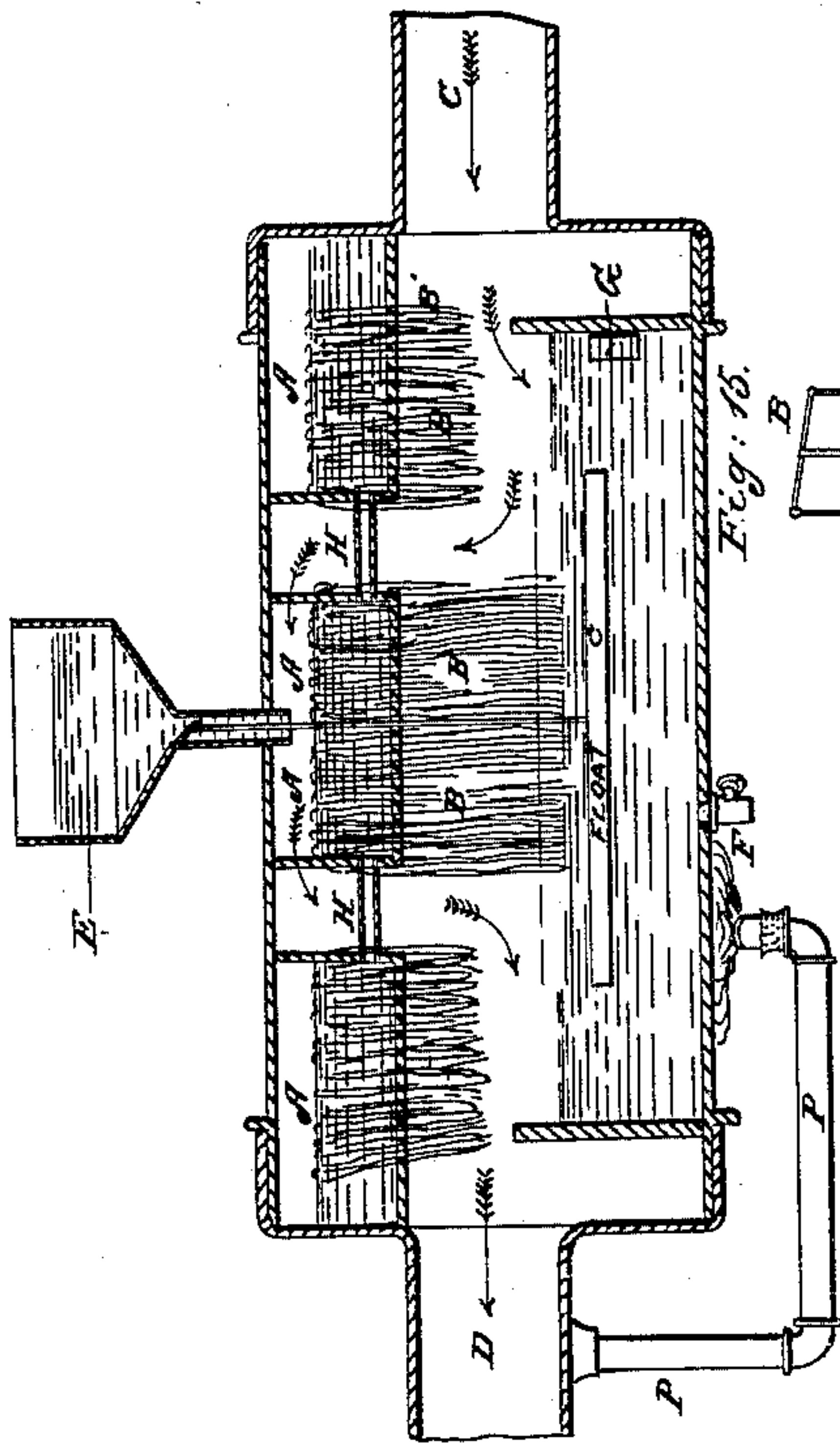
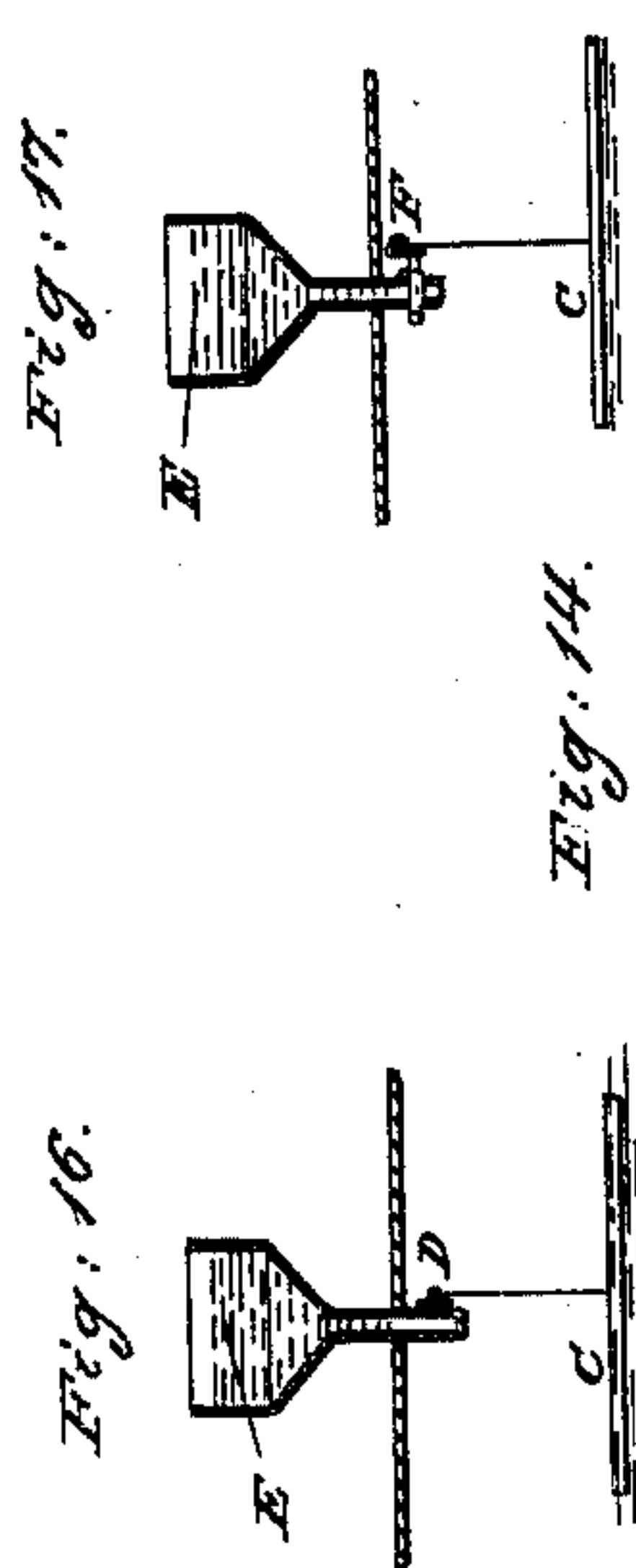
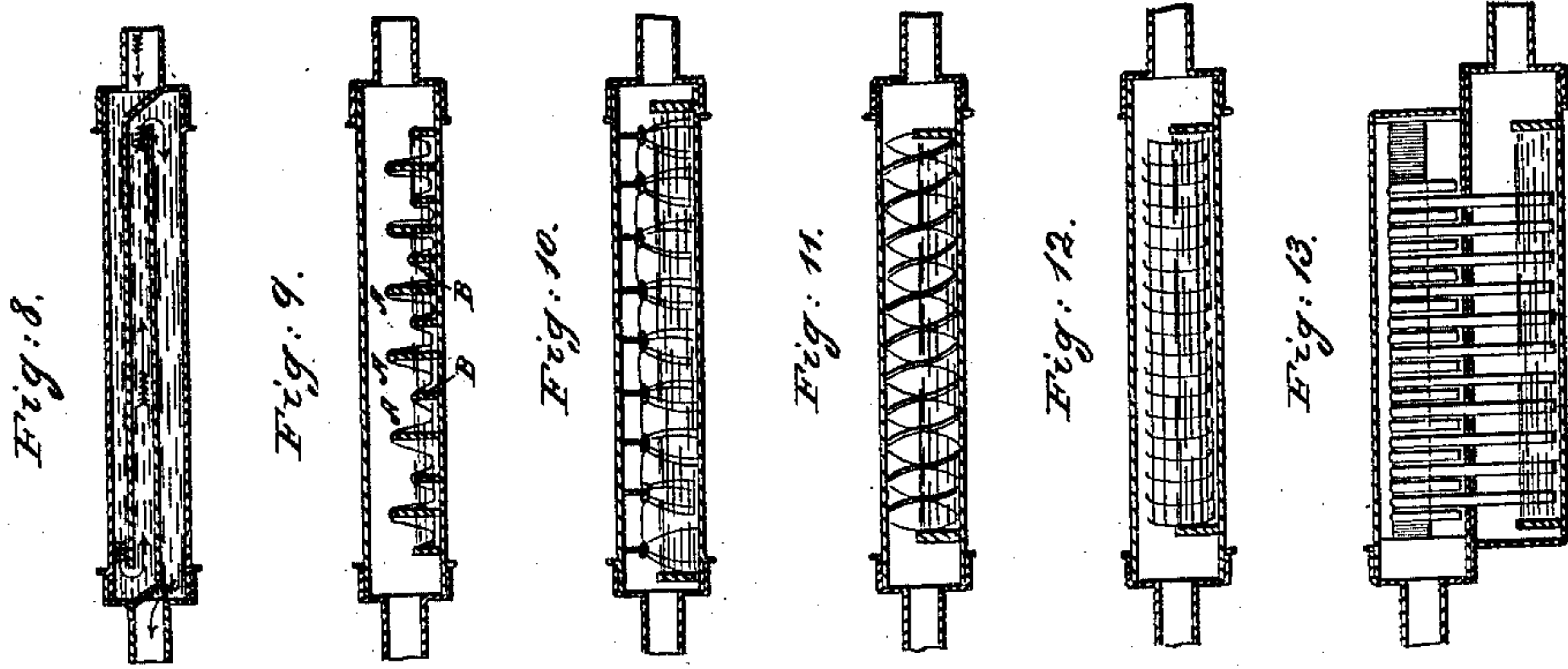


T. D. WORRALL.

Gas Carbonizer.

No. 57,812.

Patented Sept. 4, 1866.



Witnesses:  
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A. Hornum.

Inventor:  
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# UNITED STATES PATENT OFFICE.

THOMAS D. WORRALL, OF NEW YORK, N. Y.

## IMPROVED APPARATUS FOR CARBURETING GAS.

Specification forming part of Letters Patent No. 57,812, dated September 4, 1866.

*To all whom it may concern:*

Be it known that I, THOMAS D. WORRALL, of the city and county of New York, in the State of New York, have invented certain new and useful Improvements in the Method of Carbureting ordinary Gas, water-gas, or air for lighting, heating, steam-generating, and other purposes; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked therein.

My entire invention consists in certain arrangements and devices in and with gas-pipes, as ordinarily constructed, or as they may be constructed, for the purpose of enriching ordinary heating and illuminating gas, and purifying and economizing the same; also, for enriching, purifying, and economizing water-gas or ordinary air.

Up to the present time carbonizers have been made of separate vessels, through which the air or gas to be impregnated has been forced.

My inventions consist in supplying the gas-pipe itself with the necessary material, and of so arranging that material that no further vessel or chamber will be required.

The general principle of using carbon spirit, naphtha, or any carbonaceous fluid in an ordinary gas-pipe once established, a large number of devices will readily occur as suitable for the purpose. A few of them are herewith presented in the usual drawings.

Figure 1 is an ordinary gas-pipe, with simple flanges or partitions A A, designed to form a chamber to contain the carbonizing-fluid and prevent its running into the joints. The fluid being introduced, the gas is simply permitted to pass over it, and thence to the pipe and burner to be consumed. B is a glass gage, introduced for the purpose of indicating the amount of spirit in the pipe. C is a funnel for the convenient introduction of the fluid.

Fig. 2 is a pipe constructed in the same way, and having holes through the walls of the partitions, or pins set in their top for the purpose of stretching across the whole length of the pipe cotton-wicking, or any other fibrous material, which material is also connected with some of the same kind suspended in the fluid

in the chamber below, so as to suck up the fluid by ordinary capillary attraction and distribute it upon the fabric or cotton running horizontally along the pipe, and over which or through which the gas must pass. One-half of this figure in the drawing shows the manner in which the wicking may be drawn over the pins or through the holes, as seen at A; the other the manner in which the fiber drops down from the above into the fluid, as seen at B. These fibrous materials, thus saturated, will give off the vapors of the carbon spirit to the gas or air as they pass through and over them.

Fig. 3 is a pipe of the same general construction, with holes drilled in the top, and from which cotton or other suitable material may be suspended, with the lower end dropping into the fluid, up which the said fluid would run and its vapors be cast off to mingle with the gas or air passing among them.

Fig. 4 is a similar pipe, with wire or strips of wood running horizontally through it near to the top, and to which fibrous threads may be tied and permitted to hang with one or both ends dropping into the carbon spirit or fluid for the purposes before specified. By permitting only one end of each wick or thread to drop into the fluid while the other hangs suspended, there would be a circuit formed, and the fluid would be thus constantly kept in motion.

Fig. 5 is a pipe containing an inner perforated pipe, with numerous holes through which the fibrous material is drawn, horizontally, perpendicularly, diagonally, and in every conceivable direction, so as to form a perfect retina or net-work through which the gas or air must pass. The lower part of each thread communicating with the liquid or spirit below it would throw up and give off its proportion of vapor as the gas or air passed through it or near it. In this figure one-half, in section, shows the manner in which the threads are drawn; the other half shows the whole of the inner tube, with its perforations, before the cotton is drawn through it.

Fig. 6 is a small perforated tube suspended in the center or near the top of a larger one, and through which cotton or other fiber is drawn, and over which it is loosely wound, so as to form a connection with the thread on the



inside. After this has been placed in its proper situation I throw over it a cloth or apron made of broad wicking, with each alternate wick made long enough to dip into the spirit or fluid, and on its opposite end short enough to insure that it shall not touch the fluid, as seen at A B A B. By this arrangement on both sides—the long end on one side, the short one on the other—a more perfect circulation of the fluid is secured, and the fiber running around the small tube and through it is supplied with the spirit or fluid for rapid evaporation. On the inside of the large pipe, against the end of the small one, I place a piece of perforated tin or wire gauze, for the purpose of distributing the gas and insuring that a part shall pass through the small pipe while the other is passing over and around the apron, thus coming in contact with every portion of the evaporating-surfaces. These last devices are seen in perspective in Fig. 7, in which A B A B are the different sections of the cloth or apron, C the perforated tin or wire gauze, D, the manner in which the cotton is wound around the inner tube, and E a detached figure or end view of the small tube, showing the manner in which the cotton or other fibrous material is drawn through its center.

Fig. 8 is a longitudinal section, seen from the top, in which, inside of a gas-pipe, are seen partitions of wood or other suitable material, covered with any suitable fibrous material, and so arranged that the gas entering at the feed-pipe will pass, in the direction of the arrows, round the partitions and escape by the pipe. In the middle of each chamber loose wicking or other fibrous substance may be suspended and made to dip into the carbonizing-fluids, as in other devices. I do not confine myself to any particular number of these partitions, but will use as many as the size of the pipe will admit.

Fig. 9 is a pipe in which any desired number of chambers may be made by partitions running across the bottom, and over which fibrous material may be fastened or loosely hung, and into which it may dip, and also into the fluid. A A A A are the partitions; B B B B, the fibrous material dipping into the carbonaceous liquids.

Fig. 10 is a pipe supplied with loop-holes, through which round or other cotton may be drawn, and from which it may dip into the fluid, as in other cases.

Fig. 11 is a pipe containing an inner spiral or screw shaped pipe to be lined and covered with fibrous material, and through which the gas must pass for the purposes set forth.

Fig. 12 is a pipe containing a skeleton-pipe by combined circular and longitudinal wires, so as to make a sort of circular sieve, over the meshes of which fibrous material may be placed for the purposes set forth. In some cases it may be necessary to have two pipes running together, the one to form a reservoir,

and so constructed that it may communicate, by means of openings in the top, with like openings in the bottom of the other.

Fig. 13 is a view of such an arrangement, in the top of which an inner tube, as seen in Fig. 6, is suspended, and the cloth wicking or other fibrous material is seen to descend to the reservoir or lower gas-pipe. The gas may pass into the lower pipe, over the fluid, then up and out of the upper by means of partitions of wood, iron, or fibrous material, or any two or more combined, or directly through the upper pipe, arranged as any of the devices before given. It may also be necessary to cast pipe with chambers in the top, or separately to construct and insert chambers, from which the liquid to be used may be drawn and deposited in the lower chamber by means of fibrous material, or some other device, as seen in Fig. 14. In the figure A A A A are chambers filled with carbon spirit or other carbonaceous fluid. B B B B are pieces of any suitable fibrous material, with one end in the chambers and the other running in any desired direction about the inside of the pipe. The walls of the upper part of the middle chamber are so constructed that the gas may pass through them, so that on its passage into the pipe C it will find an obstruction in the hanging material B', and would thus descend to the fluid, thence under the fiber and up to C', through the middle chamber, and down again in the direction of the arrows, until it found its way out of the pipe at the exit D. A vessel, E, may be attached to the top of the pipe over the reservoir, filled with the fluid desired. This may be supplied with cocks or valves for the purpose of regulating the quantity of spirit to be used, and these cocks or valves may be connected with pieces of wood, cork, or other suitable material floating on the top of the spirit in the lower reservoir, so that when the spirit is in excess it may raise the floating substances, close the valves, and thus cut off the supply until it is again needed, or by means of the cock F in the lower part of the pipe the liquid may be drawn off and returned to the vessel E. A glass gage-pipe, G, will at all times indicate the depth of the fluid in the bottom of the pipe. The fluid is conveyed from the center reservoir A to all the rest by small tubes H H, connecting the whole of the chambers together.

Figs. 15, 16, and 17 are several devices for valves for the vessel E. A is a plug or cock-valve connected with the lever B and the float C. D is a slide-valve operating on the pipe of the vessel E, and connected with the float C. F is a cock passing through the pipe of the vessel E and also connected with the float C. The supply of fluid to the chambers can be regulated by either of these devices. When it is desired to heat the pipes or chambers in which the carbonizing-fluids are contained. I conduct a small pipe, with burner, from the



escape-pipe under or near the chamber, so that the gas itself shall serve for the purpose, as seen in Fig. 14 at P P.

It will readily be seen by the above description that the object in each case is to produce vapor from the carbonizing-fluid, and to suspend the same in the pipes, so that air or any kind of gas passing into it must be enriched or carbonized before passing through the exit-pipe for use.

Having thus described my invention, its objects, and the mode of its operation, what I claim as new, and desire to secure by Letters Patent, is—

1. Introducing into a gas-pipe carbon spirit for the purpose of enriching, purifying, or increasing the quantity of common gas, water-gas, or common air.

2. Introducing into a gas-pipe fibrous material of any desired or suitable kind, for the purpose of drawing up or letting down carbon spirit, so as to vaporize said spirit, for the purposes set forth.

3. The use of a large gas-pipe, into which smaller ones conduct, or out of which they convey any kind of gas, so as to form a reservoir in which said gas can be detained for a long time while being enriched by the vapors of carbon spirit or other carbonizing-fluid.

4. Inner casings of gas-pipe of any desirable device, made to hold carbon spirit or other carbonizing-fluids, and also to contain fibrous material for holding in suspension and vaporizing the same while ordinary gas, water-gas, or common air is passing through, over, or under them.

5. The gas-pipe, Fig. 1, with chamber in the bottom for holding any carbonizing material, for the purposes described.

6. The gas-pipe No. 2, with chamber and fibrous material stretched horizontally along it, and from which the ends of other fibrous material drop into the carbonizing-fluids and convey them by capillary attraction to those stretched along it, for the purposes set forth.

7. The gas-pipe No. 3, with holes drilled in or through the top for the purpose of suspending wicking or other fibrous material, that shall hang in carbon spirit, and drawing up said spirit, for the purposes set forth.

8. The gas-pipe No. 4, in which strips of wood or wire run along the top of the pipe on the inside, either across or in a longitudinal direction, for the purpose of holding wicking or other fibrous material while the lower ends of the same are immersed in the spirit or fluid, for the purpose set forth.

9. The gas-pipe No. 5, in which is inserted an inner casing or tube, perforated with numerous holes, and through which cotton-wicking or other suitable material is drawn, so as to form a perfect retina or net-work, in which the carbon vapors are thrown off, and

through which any kind of gas may at the same time pass, for the purpose of being enriched or multiplied thereby.

10. The gas-pipe No. 6, in which is contained a smaller perforated pipe or tube, around which and through which cotton or other fibrous material is passed, and over the whole of which a series of broad bands of wicking or a continuous apron is passed, for the purpose set forth.

11. The perforated tin or wire gauze inserted in a gas-pipe, for the purpose of distributing the gas to any or all parts of the pipe, as set forth.

12. Gas-pipe, Fig. 8, with longitudinal partitions, with or without coverings of fibrous material, to insure that the gas to be enriched may run back and forth, for the purposes set forth.

13. Gas-pipe, Fig. 9, in which a series of partitions or chambers, each separate, or all connected by apertures, is formed, and over which fibrous material is laid, in the manner and for the purpose described.

14. Gas-pipe, Fig. 10, with loop-holes suspended from the top, through which cotton or other fibrous material may pass and be suspended in carbonaceous fluid, for the purposes set forth.

15. Gas-pipe, Fig. 11, in which is a spiral or screw shaped pipe, cased or surrounded with fibrous material, around which gases and the vapor of carbonizing-fluids may pass, for the purposes set forth.

16. Gas-pipe, Fig. 12, inside of which is a wire tube, around, along, and across which fibrous material may be stretched, and from which it may hang suspended, for the purposes set forth.

17. The compound gas-pipe, Fig. 13, two or more in any way connected together, for the purpose set forth.

18. Gas-pipe, Fig. 14, in which several chambers are cast or otherwise constructed, so as to contain carbon spirit or other carbonaceous fluid, and in which said fluids may be transmitted from chamber to chamber, by means of fibrous material, or in which, in any other way, the fluids may be vaporized, for the purpose described.

19. The arrangement, in combination with any of my devices, of a gas-burner that can be turned and lighted under the reservoir, for the purpose set forth.

20. The use of each of the devices seen within the gas-pipes, Figs. 5, 6, 9, 10, 11, and 14, for use in any other box or chamber, as well as in gas-pipes.

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Witnesses:

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