

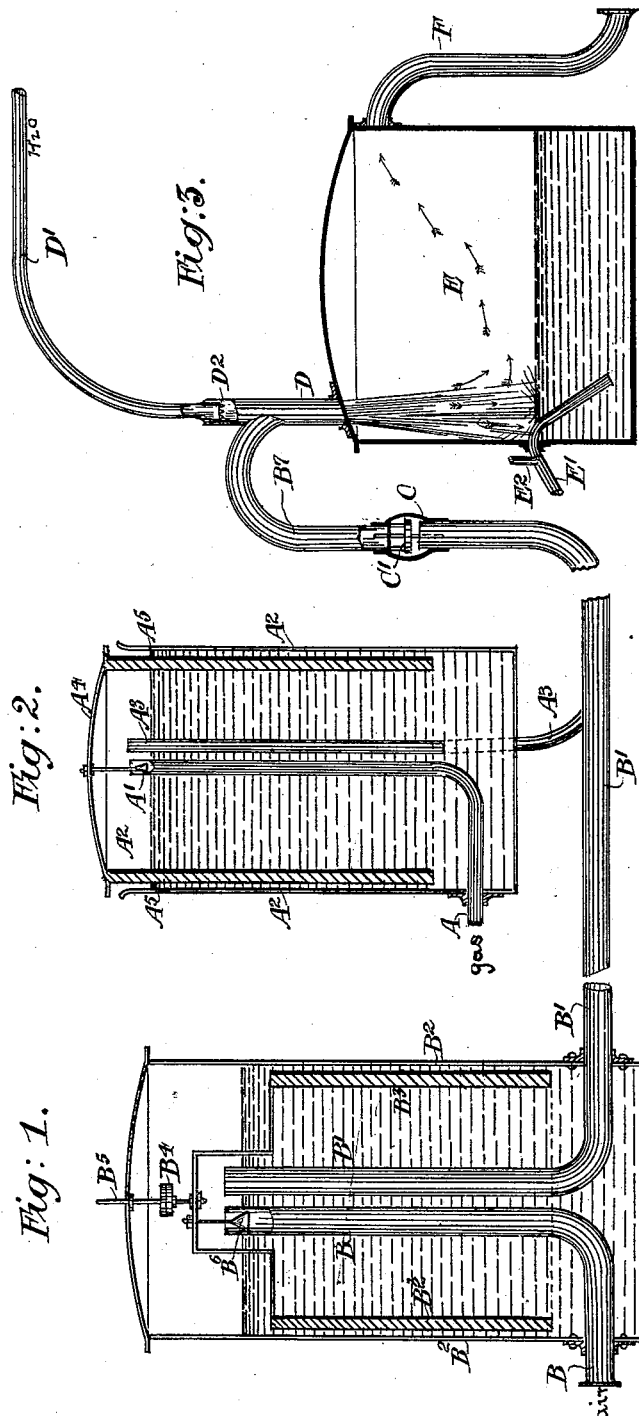
(No Model.)

2 Sheets—Sheet 1.

T. SMITH.  
APPARATUS FOR MIXING AIR AND GAS.

No. 491,060.

Patented Jan. 31, 1893.



Witnesses:  
1) Wm. A. Schoenborn.  
2) F. Dittmar

Inventor: Thomas Smith  
per G. Dittmar  
Attorney

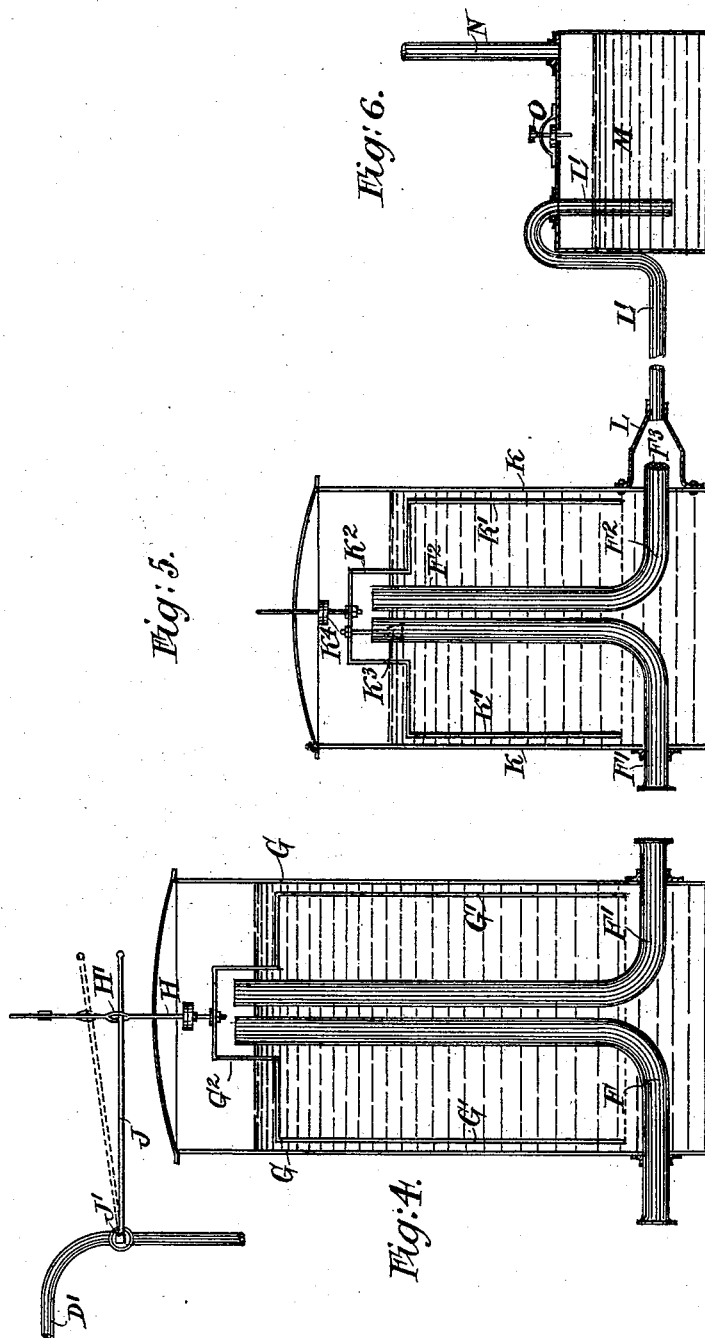
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# UNITED STATES PATENT OFFICE.

THOMAS SMITH, OF MELBOURNE, VICTORIA, ASSIGNOR TO BENJA DE LISSA  
AND JOHN ALSTON WALLACE, OF SAME PLACE.

## APPARATUS FOR MIXING AIR AND GAS.

SPECIFICATION forming part of Letters Patent No. 491,060, dated January 31, 1893.

Application filed November 5, 1892. Serial No. 451,089. (No model.) Patented in Victoria October 29, 1891, No. 9,183.

### *To all whom it may concern:*

Be it known that I, THOMAS SMITH, gas-engineer, a citizen of Melbourne, and a subject of the Queen of Great Britain, and a resident of Hanover Street, Windsor, in the Colony of Victoria, have invented a certain new and useful Apparatus for Mixing Air and Gas, (for which Letters Patent have been granted in Victoria, No. 9,183, and dated October 29, 1891,) of which the following is a specification.

This invention consists of an improved apparatus for mixing atmospheric air with any inflammable gas thereby increasing its bulk and efficiency and the employment of novel appliances to obtain the desired result and in the mechanism being so arranged as to automatically govern the motive power employed to work the apparatus.

In order that the invention may be clearly understood the apparatus is shown in sectional elevation in the accompanying drawings which with the specification hereunder will serve to describe the manner in which the invention is to be performed that is to say—

Figure 1 is a vertical section through the air tank. Fig. 2 is a vertical section through the gas tank. Fig. 3 is a vertical section through the mixing tank. Figs. 4, 5, and 6 are vertical sections through the several tanks for storing the mixture of air and gas.

From the source of gas supply a pipe A is led to a small water sealed chamber A<sup>2</sup> (Fig. 2) in which it rises vertically and terminates in an automatically worked governor valve A'. The gas is allowed to proceed from the said pipe into the chamber A<sup>2</sup>. From this chamber a small pipe A<sup>3</sup> descends and meets a larger air supply pipe B'. This pipe B' comes from an apparatus constructed as follows.— (See Fig. 1.) In an upright tank B<sup>2</sup> is a floating ponton B<sup>3</sup> made somewhat of a gasometer form and shaped at the top with a hood and weighted to any required pressure with weights B<sup>4</sup> set on a spindle B<sup>5</sup> and on which is also affixed a hanging valve B<sup>6</sup> placed in an upright air supply pipe B and so arranged that when the ponton rises or falls the valve correspondingly shuts or opens. The interior of the tank B<sup>2</sup> is filled to a convenient height with water thus forming a seal. From within

the hood of the ponton the air supply pipe B' is led and after being joined with the gas pipe A<sup>3</sup> terminates in a retention valve box C in which is set a lift valve C' arranged to prevent any return of fluid. The said valve box is connected in its turn by means of a pipe bend B' with a vertical water blast tube or tromp D through which a jet or shower of water is made to fall from a pipe D' having a rose or nozzle end D<sup>2</sup> which is attached to the said tube. This tube terminates at its bottom in a tank E which forms the mixing chamber for the gas and air. Near the bottom of this tank is provided a small escape pipe E' and air tube E<sup>2</sup> arranged to allow the water at the bottom of tank to retain a constant level and thus prevent any escape of gas. From the top of this mixing chamber of tank E the mixed gas and air is led away by a tube F into a larger receptacle G in the interior of which is a balanced gasometer G' shaped at the top with a hood G<sup>2</sup> to cover the inlet and exit pipes F and F' respectively (as before) and so designed as to prevent as far as possible any large quantity of gas from collecting therein. To the top of the hood G<sup>2</sup> is affixed a weighted rod H having a loop H' formed in it through which a lever J operating a cock J' provided in the pipe D' is passed in such a manner that when the water gasholder G' rises or falls the lever is simultaneously raised or lowered and the cock opened or closed so that if too much gas accumulates in the gasometer the lever will be actuated and will cut off the motive power working the blast.

Referring now to Fig. 5 the pipe F' before mentioned enters the hood K<sup>2</sup> of another ponton gasometer K and K' somewhat similar to and weighted at K<sup>4</sup> as in the former case (see Fig. 1) and from which another pipe F<sup>2</sup> descends and terminates outside the tank K and is closed in with wire gauze F<sup>3</sup> and surrounded with an enlarged closed chamber L. From this latter chamber the gas is again led away through a pipe L' either direct to the point of consumption or first and preferably through a small water tank M (see Fig. 6). In this tank the gas enters at the bottom and after bubbling up through the water in same escapes into a lead away pipe N to be consumed. On the top of tank M is a weighted

safety valve O which can be set to any predetermined resistance. A floating ring of oil may be placed on the water at A<sup>5</sup> (Fig. 2) in the ponton to prevent evaporation.

5 The method of mixing the air with the gas and the working of the apparatus hereinbefore specified is as follows:—The water blast in pipe D is set going thus causing a rush of air to take place in pipes B and B' and causing a vacuum in the small pipe A<sup>3</sup> and chamber A<sup>2</sup> thus bringing down the cover A<sup>4</sup> of same. The cover in its turn opens the valve A' thus permitting a rich gas to flow into the chamber A<sup>2</sup> thence down by pipe A<sup>3</sup> into and to mingle with the air in pipe B' aforesaid. 10 The mixture of air and gas which will now be termed mixed gas proceeds under the lift valve C' thence onward by pipe B<sup>7</sup> and thence downward through tube D into the mixing chamber or tank E. Here the water falls to the bottom and runs away from a predetermined height by the pipe E' (the small air supply tube E<sup>2</sup> preventing it acting as a siphon). The mixed gas on the other hand rises to the top of the mixing chamber E and proceeds through pipe F (see Fig. 3) into the governing gasometer G and G' and fills in the space in the hood G<sup>2</sup> and proceeds down along and up the pipe F' into the gasometer K and up the pipe K' (Fig. 5) and makes its exit through the valve K<sup>3</sup> into the hood K<sup>2</sup>. From thence it again escapes through pipe F<sup>2</sup> and through the wire gauze mouth F<sup>3</sup> into the chamber L. From there it can be led by pipe L' to be consumed or it can enter into and through the water in tank M (see Fig. 6)—which answers the dual purpose of bathing and cleansing the mixed gas and preventing any flame or sparks finding their way toward the gasometer—and be led away by pipe N to wherever desired. Should an undesirable pressure of gas accumulate in the tank M from any unforeseen cause the safety valve O will come into operation and permit its escape. It will be seen that the inlet pipe B<sup>7</sup> of the mixing chamber or tank E forms substantially a part of said mixing tank, and consequently the production of the vacuum in said inlet tube is equivalent to the production of a vacuum in said mixing tank itself. 50

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed I declare that what I claim is.

55 1. In an apparatus for mixing air and gas, the combination with an air and a gas supply tank, each having an outlet pipe said outlet pipes being connected together beyond the respective tanks forming a single passage 60 whereby the air and gas to be mixed flows

through a single passage of a mixing tank, to which said single air and gas supply pipe forms the inlet, and a tromp arranged in said supply pipe and adapted to draw the air and gas from their respective tanks and to force 65 them into said mixing tank, substantially as set forth.

2. In an apparatus for mixing air and gas, the combination with the mixing tank and the respective air and gas supply tanks of a 70 pipe communicating between the air supply tank and the mixing tank a check valve in said pipe a second pipe leading from the gas supply tank and opening into the said air supply pipe between the valve therein and the air supply tank, and means for drawing 75 said air and gas into said mixing tank, substantially as set forth.

3. In an apparatus for mixing air and gas, the combination with a mixing tank having 80 an inlet tube for the gas and air and a water supply pipe having a nozzle arranged in said inlet tube beyond the mixing tank, of a gas holder comprising a liquid containing vessel and a movable hood inclosing the gas inlet 85 and outlet of said gas holder a valve in the water supply pipe whereby the flow of water therethrough may be regulated and a lever connected to said valve whereby the same is operated, the free end of said lever being 90 connected to the movable hood of the gas holder, substantially as set forth.

4. In an apparatus for mixing air and gas the combination with a gas holder, comprising a liquid containing vessel having a gas 95 inlet and a gas outlet and a movable hood inclosing said inlet and outlet, of a mixing tank having a gas and air inlet pipe and a gas outlet pipe, an air supply pipe communicating with the inlet pipe of the mixing tank, a check 100 valve arranged in said pipe, a gas supply pipe communicating between the outlet of the gas holder and said air supply pipe beyond said check valve, a water supply pipe communicating with said gas and air inlet pipe 105 between said check valve and the mixing tank, said water supply pipe having a nozzle arranged inside said inlet pipe and an outlet pipe for leading away the water from said mixing tank, substantially as set forth. 110

In witness whereof I have hereunto set my hand, at Melbourne, this 13th day of September, 1892, in presence of two witnesses.

THOS. SMITH.

Witnesses:

A. O. SACHSE,  
C. E., Melbourne.  
C. W. WADE,  
Clerk, Melbourne.