April 13, 1937. T. A. SALA 2,077,131

GAS MIXING UNIT

Filed April 6, 1934 2 Sheets-Sheet 1

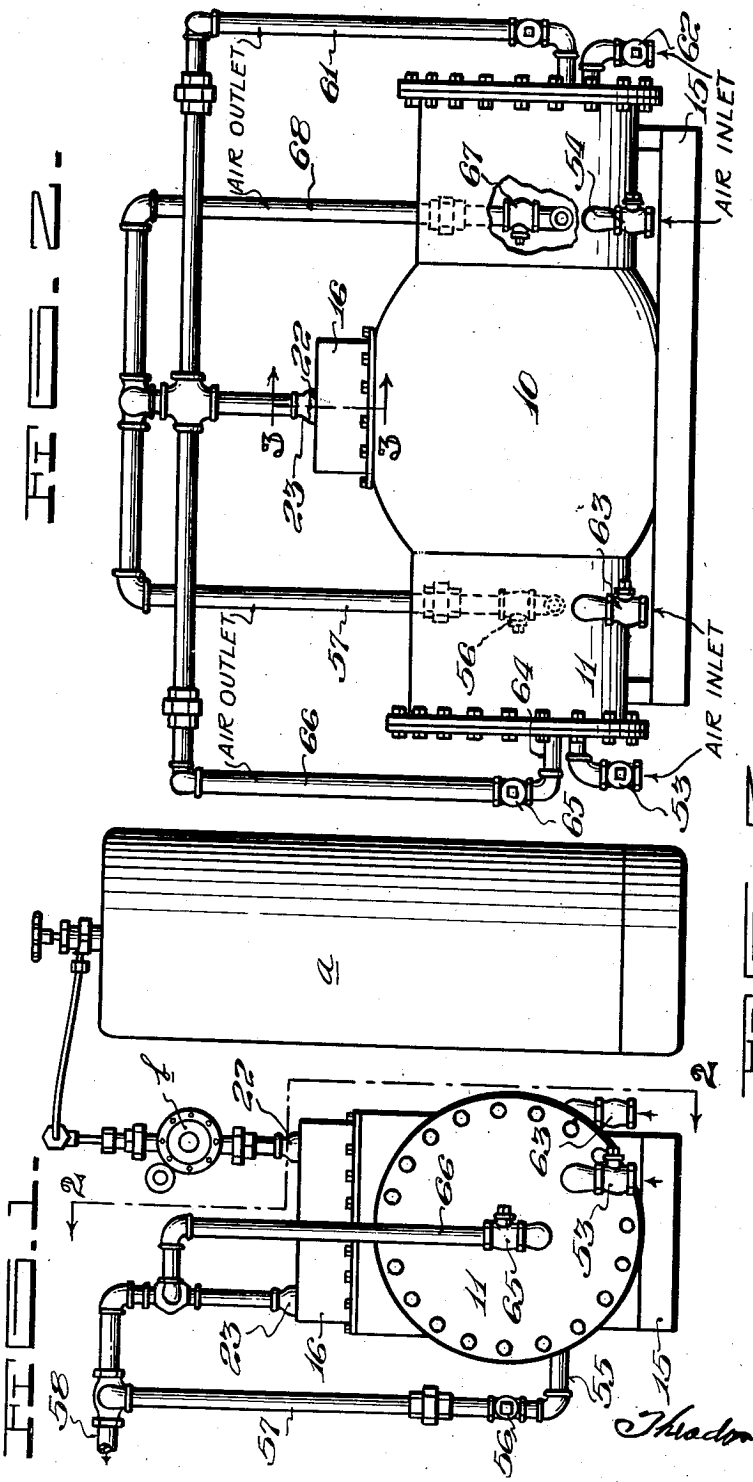

FIG. 2.

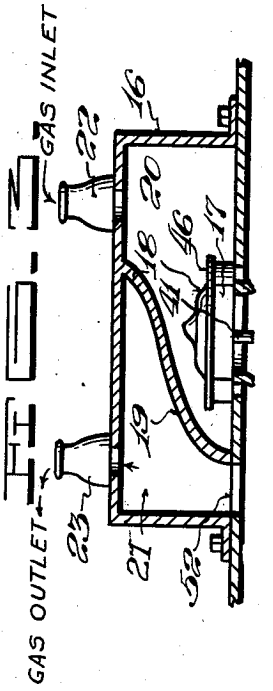

FIG. 3.

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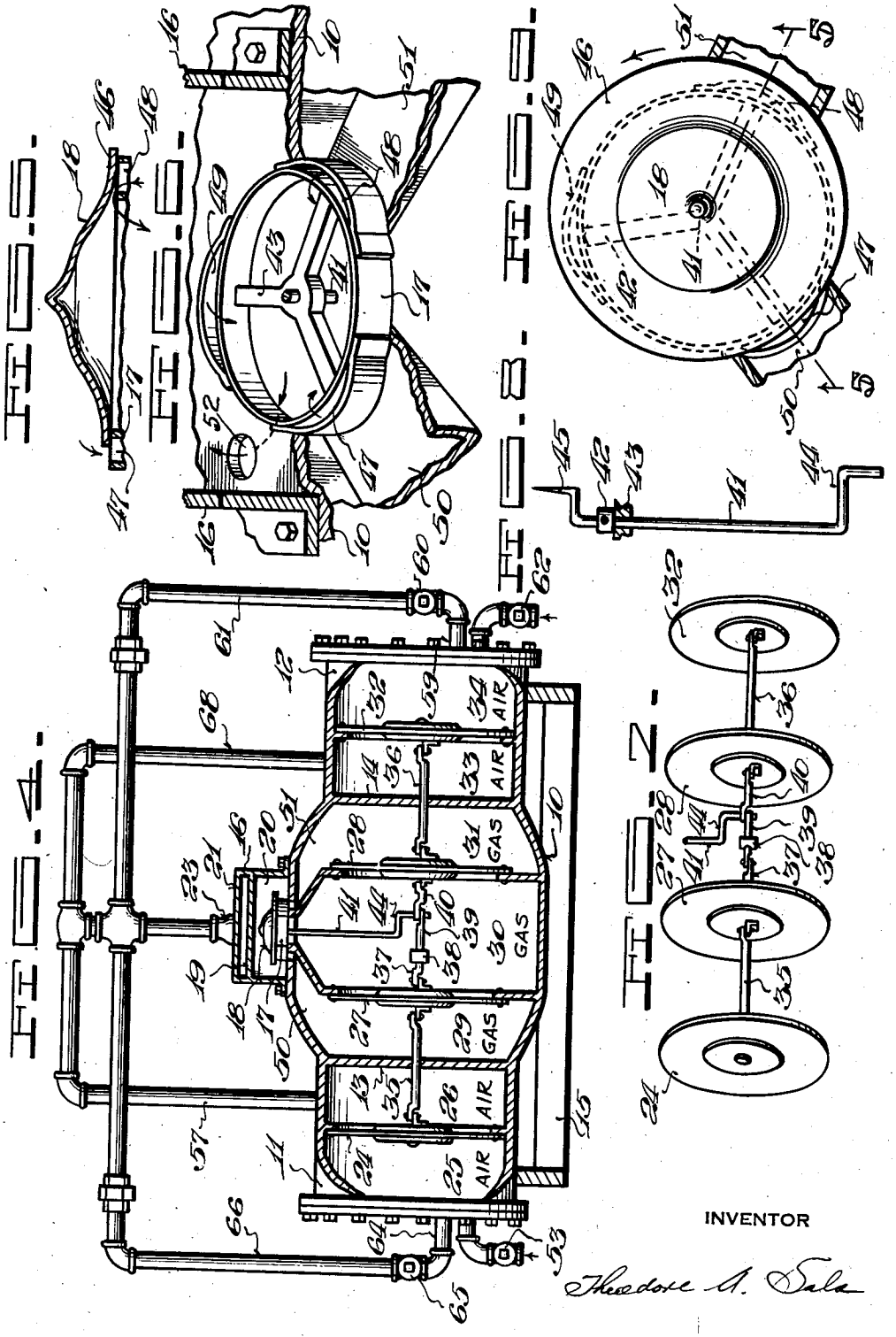

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GAS MIXING UNIT

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2 Claims. (Cl. 48—184)

This invention appertains to novel, serviceable and advantageous improvements in mixing devices and in such connection the invention relates more particularly to a device for mixing predetermined amounts of gas and air.

A primary object of the invention is the provision of means whereby combustible gas and air are continuously so commingled as to provide a uniform, combustible mixture which may be used for heating or illuminating purposes.

Another object of the invention is to provide a device which is actuated by the pressure of the gas delivered to the unit.

Another object of the invention is the provision of means whereby the device is rendered wholly automatic in its operation.

A further object is to provide an invention of the type described which is of simple and durable construction, of positive and accurate action, of inexpensive original cost, and which is thoroughly dependable in use.

A construction designed to effectuate the invention will be hereinafter described, together with other novel features of the invention.

The invention will be more readily comprehended from a perusal of the following detailed specification and by reference to the accompanying drawings, in which a suitable exemplification of the invention is depicted, and wherein:

Figure 1 is an end elevation of the invention shown connected to a gas container,

Figure 2 is a view taken on the line 2—2 of Figure 1,

Figure 3 is an enlarged view taken on the line 3—3 of Figure 2,

Figure 4 is a longitudinal view partially in elevation,

Figure 5 is a view on the line 5—5 of Figure 9,

Figure 6 is an enlarged perspective view of the base portion of the valve mechanism, showing the passageways to the gas chambers,

Figure 7 is a perspective view of the bellows, shown connected with component parts.

Figure 8 is an elevational view of the valve crank arm, and

Figure 9 is a plan view of the valve mechanism.

In the drawings, wherein like characters of reference are employed to designate corresponding parts or portions throughout the several views, the numeral 10 designates a central housing, which is provided with integral cylinders 11 and 12 respectively. Transverse partitions 13 and 14 serve to divide the interior of the unit into compartments as shown in Figure 4. The entire structure is supported upon a suitable base 15.

Suitably mounted upon the central housing 10 is a smaller housing 16, which serves to house the valve mechanism which is comprised of a base portion 17 and a valve cap 18. A partition or web 19 serves to divide the interior of the housing 16 into an inlet chamber 20 and an exhaust chamber 21. An inlet connection 22 communicates with the inlet chamber 20, and an exhaust connection 23 communicates with the exhaust chamber 21.

The space within the central housing 10 and the cylinders 11 and 12 are divided by a plurality of bellows, shown in Figures 4 and 7. A bellows 24 constructed of leather or other suitable material, serves to divide the space within the cylinder 11 into air chambers 25 and 26. Within the central housing 10 a pair of bellows 27 and 28 are positioned as shown in Figure 4. These bellows serve to define a gas chamber 29, a central gas chamber 30 and a gas chamber 31. A bellows 32 divides the space within the cylinder 12 into air chambers 33 and 34.

The specific bellows construction is best shown in Figure 7. The bellows 24 and 27 are connected by a rod 35, which is so connected to the bellows as to permit of alignment of the rod 35 with its opening in the partition 13.

Similarly the bellows 28 and 32 are connected by a rod 36. The bellows 27 and 28, however, are connected by a special linkage. Hingedly connected to the bellows 27 is a link 37 which is connected to a length adjusting unit 38. This unit, which may be internally threaded allows for adjustment of the length of the linkage within the chamber 30. A link 39 is connected to the unit 38 and a link 40 is hingedly connected to the bellows 28.

A valve crank arm 41, shown in detail in Figure 8 serves to hingedly connect the links 39 and 40. The arm 41 is constrained against downward movement by a collar 42 positioned above the web 43 within the valve base 17. It will be seen that the arm 41 is provided with a lower crank 44 and an upper crank 45 which is pointed as shown in Figure 8. The apex of the central portion of the valve cap 18 rests upon the point of the upper crank 45. The arm 41 is vertically adjusted so that the lower or horizontally flared portion 46 rests upon the upper periphery of the base 17.

Referring to Figure 6, it will be seen that equispaced around the circular base 17, three segmental ports 47, 48, and 49 are arranged. The port 47 communicates with the gas chamber 29 through the passageway 50, and the port 48 communicates with the gas chamber 31 through the passageway 51. The port 49 and the openings

within the circular base 17 all communicate directly with the central gas chamber 30. The exhaust chamber 21 also is open to the chamber 30 through the port 52, shown only in Figure 3.

The operation of the device is as follows: Combustible gas is delivered to the unit from a storage tank (a) or other source, through a pressure regulating valve (b), shown only in Figure 1. The gas enters the inlet chamber 20 through the inlet connection 22, as shown in Figure 3. Assume that the valve mechanism is in the position shown in Figure 9, that is with the valve cap 18 so displaced by the crank 45 that the port 47 is open, gas is then free to flow into the chamber 29 through the passageway 50. The gas pressure within the chamber 29 then forces the bellows assembly to the right, (Figure 4). The valve crank 41 is thereby rotated through the medium of the linkage arrangement. Referring to Figure 9 it will be seen that the valve cap 18 is always in eccentric relationship to the circular base 17, and moves thereover as constrained by the crank arm 45.

Referring to Figure 4 it will be seen that gas within the chamber 31 is free to flow into the exhaust chamber 21. Its travel is upward through port 48, over the upper rim of the base portion 17, downward and thence into the exhaust chamber 21 through port 52. As the cap 18 continues to rotate, port 48 is opened to the incoming gas, ports 47 and 49 being closed thereto. Gas then flows downward through port 48, through passageway 51 into chamber 31. Pressure within this chamber forces the bellows assembly to the left in Figure 4 thereby continuing rotation of the valve cap 18. Gas within chamber 29 now flows back through passage 50 upward through port 47, over the rim of the ring 17 and thence downward to the chamber 30, from which it is free to flow to the exhaust chamber 21.

The next port to be opened to the incoming gas is the port 49, which it will be remembered communicates with the chamber 30. The purpose of opening this port for a short period during each cycle is to smooth out the action of the mechanism.

The length adjusting unit 38 is for the purpose of so adjusting the relative lengths of the links 37 and 39 to the length of the link 40 that a dead center is eliminated, thereby always assuring the starting of the device as soon as gas pressure is applied thereto.

As the bellows mechanism reciprocates as above described, the bellows 24 and 32 are simultaneously moved, thus pumping a predetermined amount of air into the mixing line. This is accomplished as follows: As the mechanism moves to the right, air is drawn into chamber 25 through a check valve 53 and simultaneously into chamber 33 through a check valve 54. As this takes place, air within chamber 26 is expelled through pipe 55, check valve 56, pipe 57 and outlet 58. Also air in chamber 34 is expelled through pipe 59, check valve 60, pipe 61 and outlet 58.

On the return stroke air is drawn into chamber 34 through check valve 62, and into chamber 26 through check valve 63. At the same time air is expelled from chamber 25 through pipe 64, check valve 65, and pipe 66 and outlet 58. Also air is expelled from chamber 33 through check valve 67, pipe 68 and outlet 58.

As shown in Figure 1 the gas exhaust connection 23 is directly connected to the outlet 58, thereby enabling gas passing through the outlet 23 to be commingled with air pumped thereto in predetermined quantities as above described.

Manifestly, various changes in the size and shape of the different parts as well as modifications and alterations may be made within the spirit of the invention and the scope of the appended claims.

Having now described my invention and explained its uses and operation, what I claim for my invention and desire broadly covered and protected by United States Letters Patent is:

1. A gas and air mixing unit, including expansible gas and air chambers, valve means for admitting air to said chambers and axially aligned and interconnected bellows means for expelling air therefrom, a rotary valve in control of openings to said gas chambers, means actuated by the connections between said bellows for rotating said valve, and bellows means for expelling gas from said gas chambers, and means for commingling the air from said air chambers, with the gas expelled from said gas chambers.

2. A gas and air mixing unit comprising gas and air chambers, check valves for admitting air to said air chambers and axially aligned and interconnected bellows means for expelling air therefrom, a rotary valve in control of openings to said gas chambers, said valve being actuated by movement of the connections between said bellows means, bellows means for admitting gas into said gas chambers and for expelling the gas therefrom, and means for commingling the expelled air and gas.

THEODORE A. SALA.