

No. 896,519.

PATENTED AUG. 18, 1908.

E. DANKELMANN.
APPARATUS FOR MIXING GAS AND AIR.
APPLICATION FILED SEPT. 17, 1904.

Fig. 1.

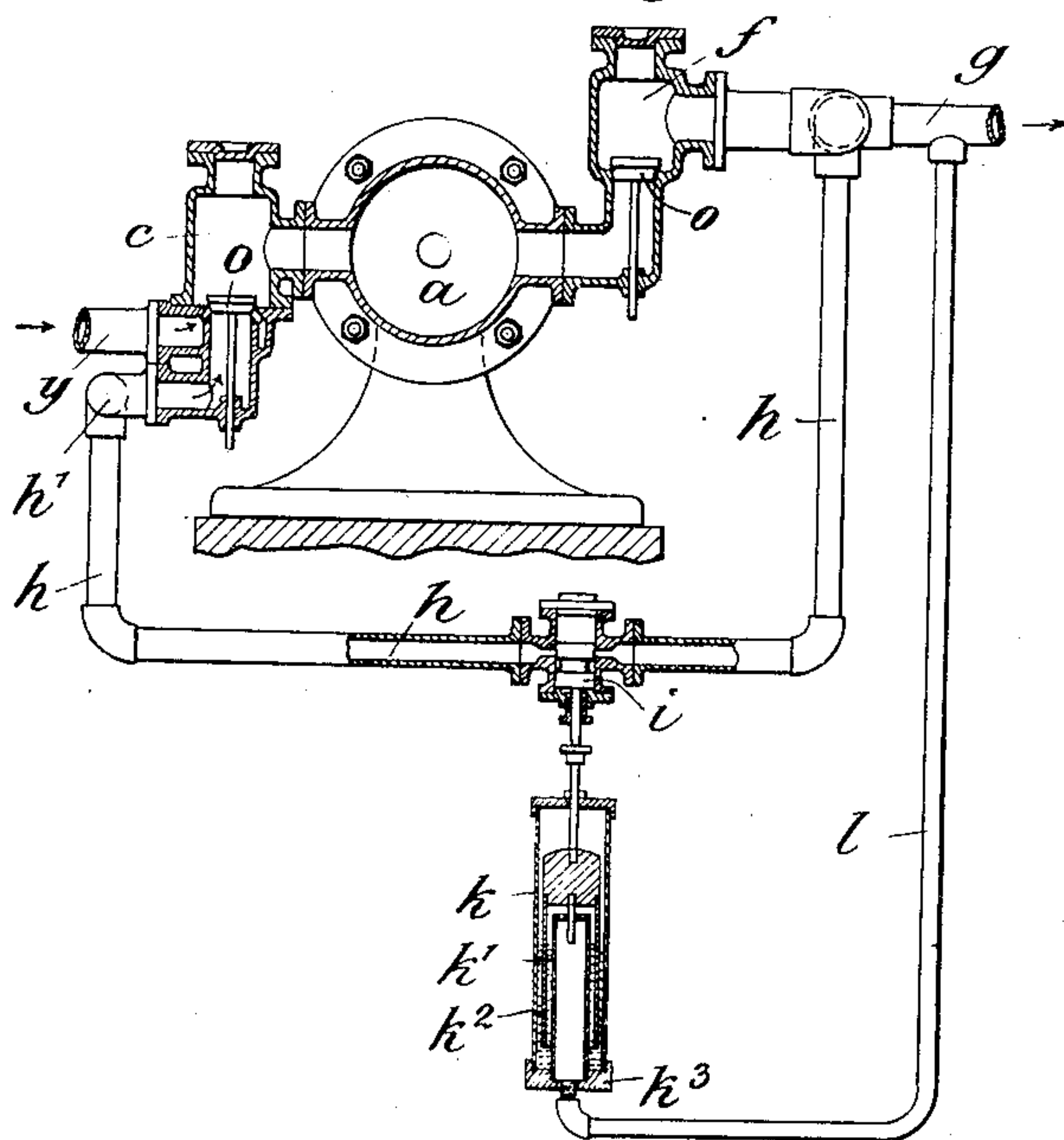


Fig. 2.

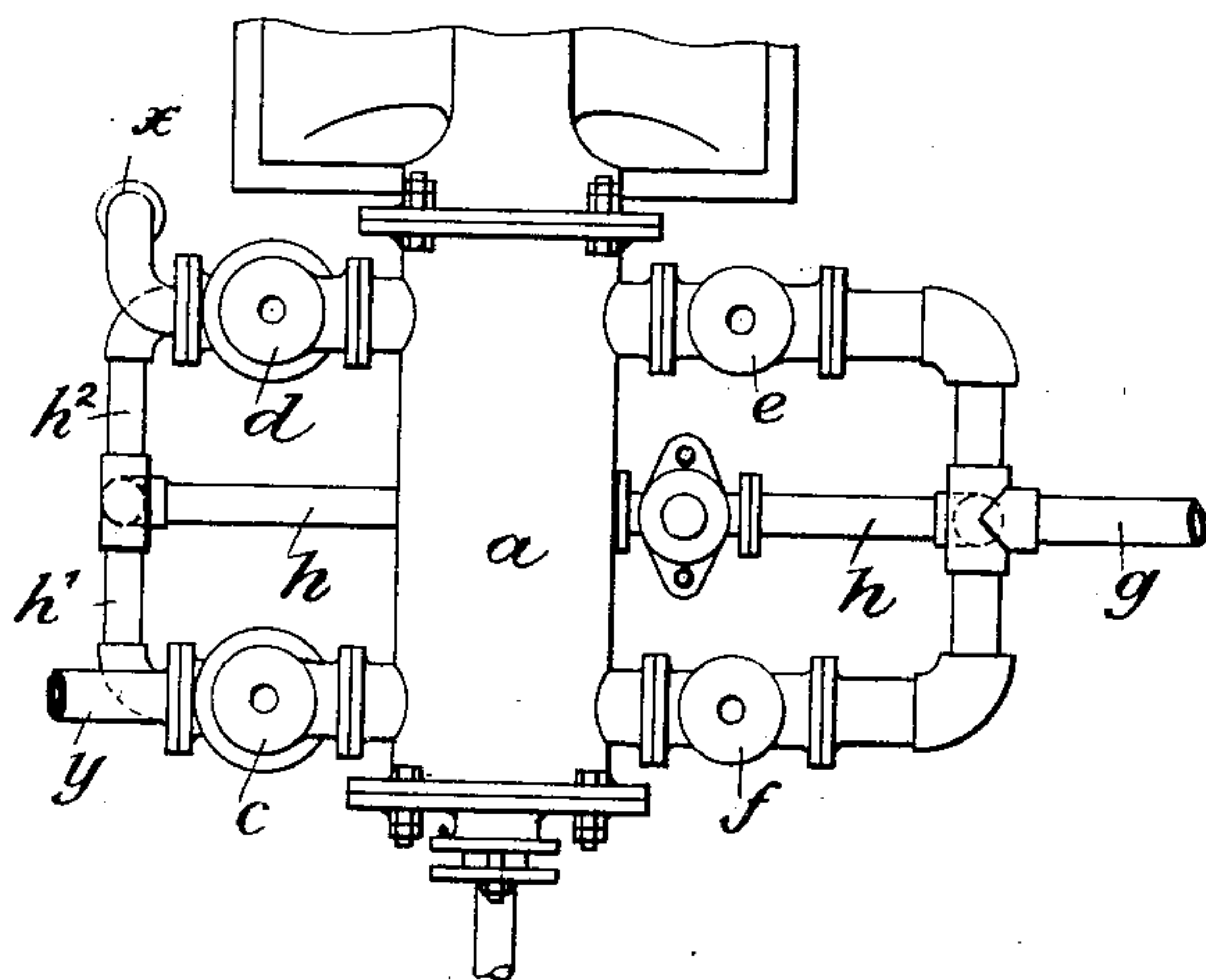
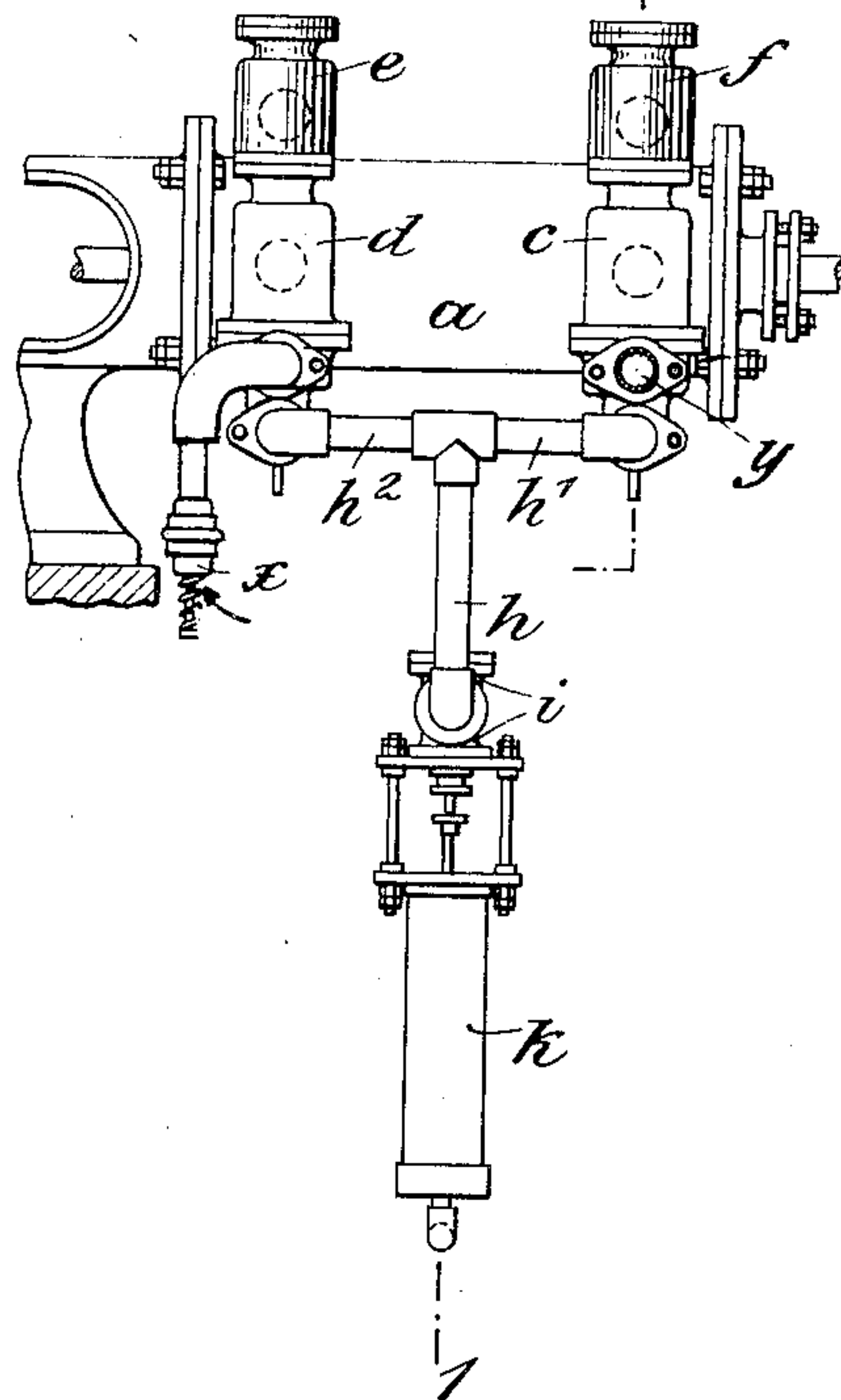


Fig. 3.

WITNESSES :

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ERICH DANKELMANN, OF BERLIN, GERMANY, ASSIGNOR TO THE FIRM OF SELAS GESELLSCHAFT MIT BESCHRÄNKTER HAFTUNG, OF BERLIN, GERMANY.

APPARATUS FOR MIXING GAS AND AIR.

No. 896,519.

Specification of Letters Patent.

Patented Aug. 18, 1908.

Application filed September 17, 1904. Serial No. 224,863.

To all whom it may concern:

Be it known that I, ERICH DANKELMANN, a subject of the Emperor of Germany, residing at Berlin, in the Empire of Germany, 6 Helgoländer Ufer, manager, have invented certain new and useful Improvements in Apparatus for Mixing Gas and Air, of which the following is a specification.

In admixing gas and air for general use, 10 and more particularly for illuminating purposes, I find it desirable in employing separate suction and forcing dampers for the gas and air respectively to make provision against excessive pressure in the service pipe 15 for causing the flow of the admixture through a circulation conduit, and in doing this I seek to remedy evils which might arise from the fluctuations in the pressure. In employing back suction or return conduits their efficiency may be increased by providing them 20 with special suction valves in such manner that upon each stroke of the suction apparatus two inlets for gas or air on the one hand and for an admixture of gas and air on the 25 other hand are opened, but are closed during the forcing operation.

A constructional form of apparatus for carrying this invention into practice is illustrated in the accompanying drawings, in 30 which

Figure 1 is a central cross section, partly in elevation, of the apparatus showing the location of the various non-return valves and parts associated therewith; Fig. 2 shows the 35 apparatus in side elevation; Fig. 3 is a plan view showing the pump, valve chambers, and various conduits.

A suction and force pump *a* is provided which supplies air on one side of the piston 40 and gas on the other side. In accordance with Fig. 2 the suction of the gas takes place through the valve chamber *c* and the air through the valve chamber *d*. The gas flows through the conduit *y*, while the air is sucked 45 through the conduit *x*. The valve chambers *c* and *d* are arranged symmetrically. Further constructional details of the valve chambers are shown in Fig. 1, in which the valve chamber *c* is represented in section. In this 50 figure also is illustrated the construction of one of the two valve chambers *e* and *f* through which gas and air and also the mixture of gas and air which is sucked back are supplied to the service pipe *g*. The service 55 pipe *g* is in communication with the cylinder

k by means of the conduit *l*, and the valve *i* for the passage of the gas, which is mounted in the back suction conduit *h*, is positively connected with the governor.

Concentric with the cylinder *k* and located 60 within it is a smaller cylinder *k'*. Both of these cylinders are rigidly connected with a cap *k³*, the inner cylinder being also in communication with the conduit *l*. A floating member *k²* is provided with a cylindrical 65 lower end which is loosely interposed between the cylinders *k* and *k'* so that when a small quantity of mercury is placed intermediate of the cylinders *k* and *k'*, the floating member 70 by resting upon the mercury not only forms a seal but floats thereupon, so that pressure of the admixture of air and gases, acting through the conduit *l* increases and decreases the buoyancy of the floating member *k³* according to the pressure within the conduit *l*. 75 The result is that the slide valve *i*, which normally closes the regulation conduit *h* maintains the same partially open or altogether open, according to the degree of pressure in the service pipe *g* through the conduit *l* upon 80 the float. In the example here illustrated, two conduits *h'* and *h²* branch off from the back suction conduit *h* behind the flow regulator *i* (Fig. 2), one of these leading to the 85 gas suction valve *c* and the other to the air suction valve *d*.

As shown in Fig. 1, the same obturating member *o* serves both for obturating the gas supply pipe and also for obturating the back suction conduit *h'*. Accordingly at each suction operation by the lift of the obturating 90 member *o* both the gas suction conduit and the back suction conduit are simultaneously opened, and vice versa during the supply or forcing phase they are maintained closed by 95 the pressure in the work chamber. In this arrangement the back suction conduits act only during the suction period, and not during the forcing period also, whereby the advantages previously mentioned are obtained. 100 The valve *o* is also a non-return valve and prevents retrogression of either air or gas from the service pipe.

The operation of my device is as follows: When the pump *a* is actuated air and gas 105 pass in through the respective suction conduits *x*, *y*, and are carried into the pump and thence forced outwardly into the service pipe or main *g*. The float contained in the receptacle *k* is buoyed by an excess of the admix- 110

ture of gas and air passing through the conduit *l*, and in rising lifts the valve *i* so as to partially open the circulation conduit *h*. The valve *i* remains partially open and allows a limited quantity of the admixture to pass through the circulation conduit *h*, the extent of the opening of the valves being inversely proportional to the amount of gas being used from the service pipe *g*. That is to say, if a little or no gas is being used from the service pipe, the valve *i* remains constantly open to its fullest capacity, and if one-half of the gas passing into the service main *g* is used the valve *i* remains one-half open, whereas if all of the gas passing in the service main *g* is used as fast as supplied, the valve *i* remains closed.

What I claim and desire to secure by Letters Patent of the United States is:

In an apparatus of the character described, the combination of a pump chamber, a piston movably mounted therein, an inlet disposed at one end of said pump chamber, and communicating with a gas supply, an inlet disposed at the other end of said pump chamber and opening directly into the atmosphere, an outlet pipe connected with said pump chamber, a circulation conduit

connected with said outlet pipe and branching into two separate pipes, one communicating with said pump chamber at a point adjacent to said inlet for admitting air, the other being connected to said pump chamber at a point adjacent to said inlet for admitting gas, a valve disposed between said pump chamber and the inlet for admitting gas, said valve being controllable by gas pressure for the purpose of opening into said pump chamber, another valve disposed intermediate said pump chamber and said inlet for admitting air, said last-mentioned valve being controllable by air pressure for the purpose of opening into said pump chamber, each of said valves being closable by back pressure from said pump chamber, and means controllable automatically by pressure from said outlet pipe for regulating the carrying capacity of said circulation conduit.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses this 26th day of August, 1904.

ERICH DANKELMANN.

Witnesses:

HENRY HASPER,
WOLDEMAR HAUPT.