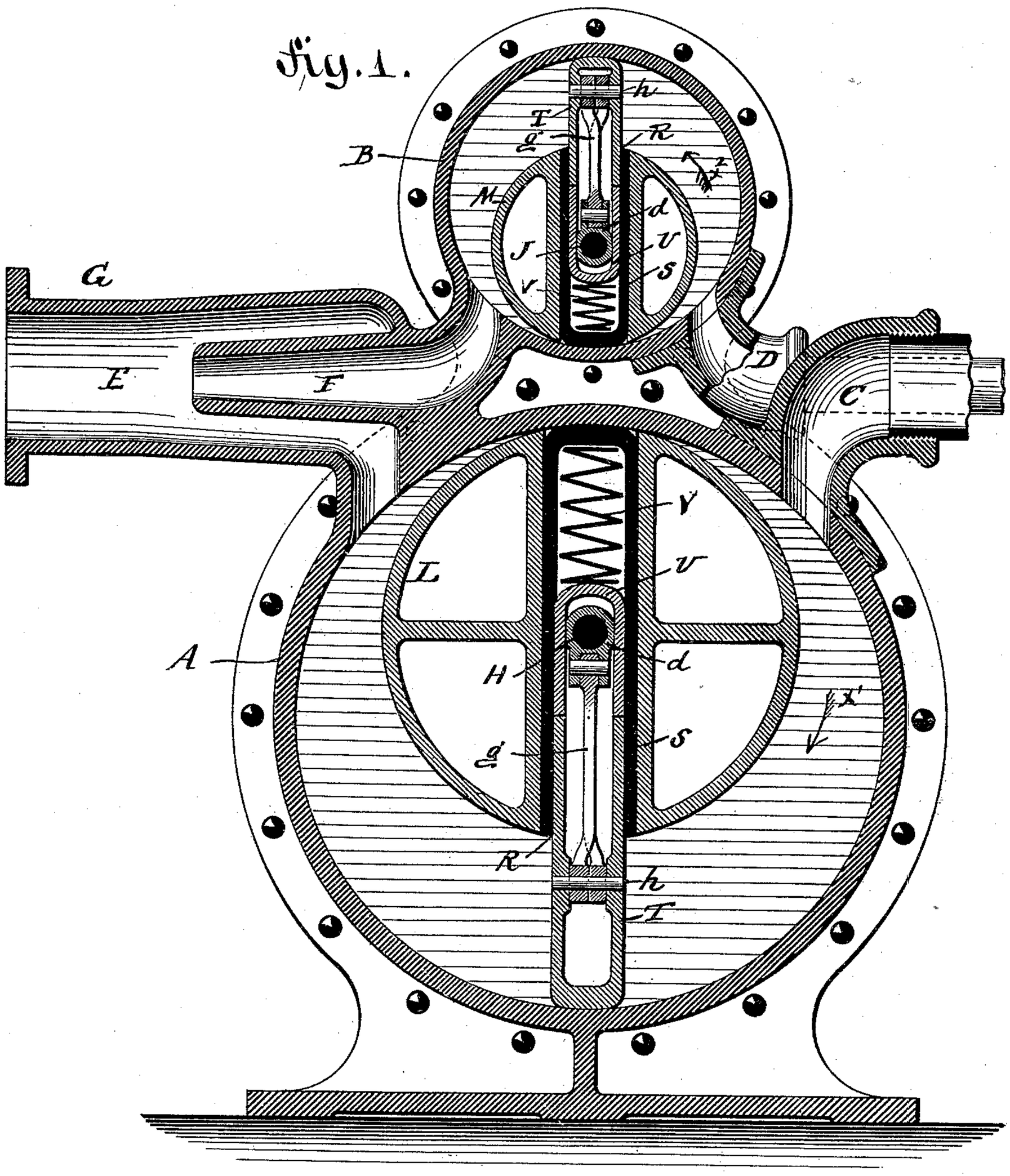
(No Model.) 2 Sheets—Sheet 1.

L. B. WHITE.

GAS AND AIR MIXING MACHINE.

No. 409,719. Patented Aug. 27, 1889.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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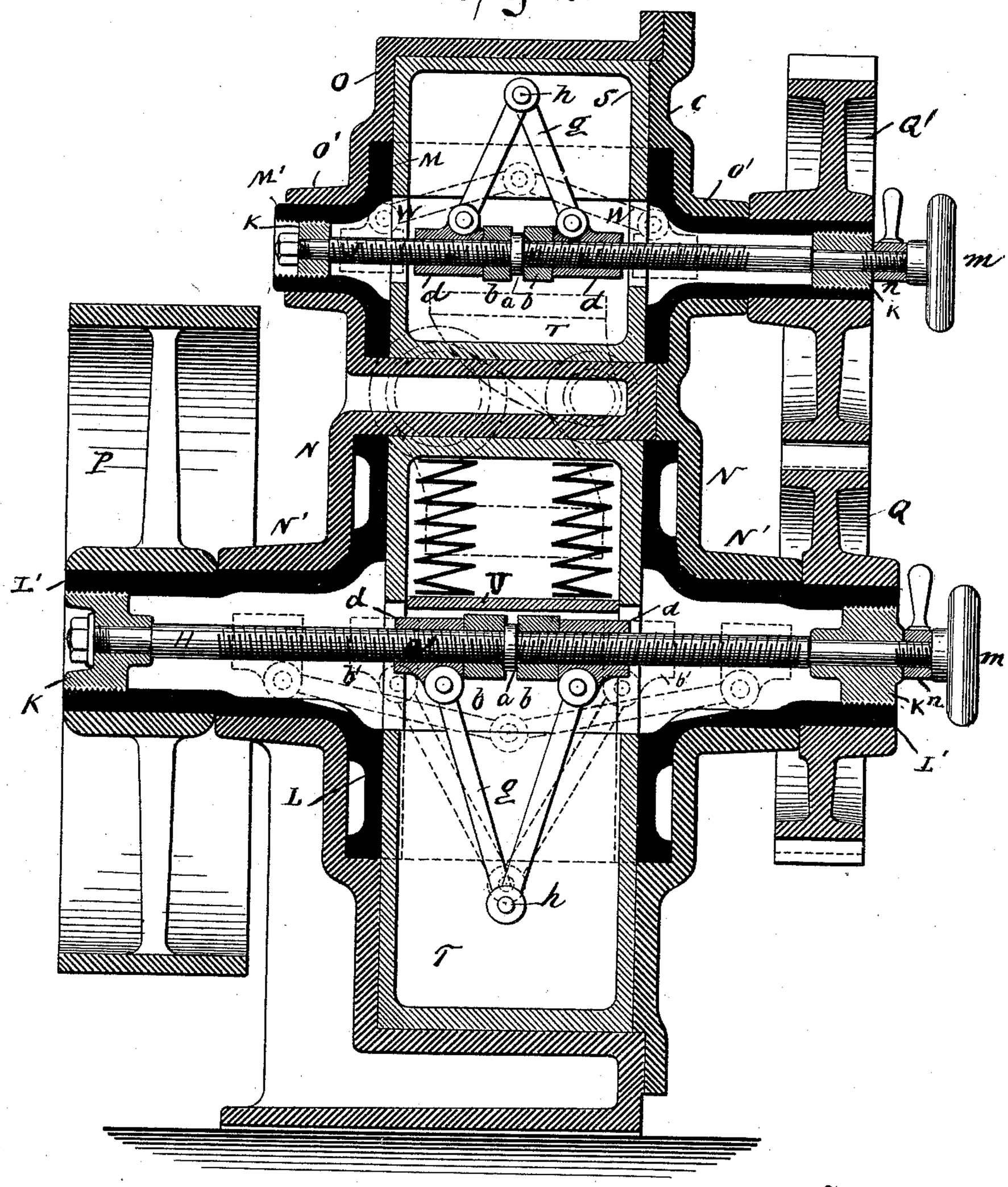
Fig. 2.



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UNITED STATES PATENT OFFICE.

LEWIS B. WHITE, OF NEW YORK, N. Y.

GAS AND AIR MIXING MACHINE.

SPECIFICATION forming part of Letters Patent No. 409,719, dated August 27, 1889.

Application filed June 28, 1888. Serial No. 278,398. (No model.)

To all whom it may concern:

Be it known that I, LEWIS B. WHITE, of the city, county, and State of New York, have invented certain new and useful Improvements in Gas and Air Mixing Machines, of which the following is a specification.

This invention relates to that class of machines used for mixing combustible gases—such as ordinary illuminating-gas, natural gas, hydrocarbon vapors, &c.—with air for the purpose of forming a combustible mixture which can be used as fuel.

The object of my invention is to provide a new and improved machine of this kind which is simple in construction, effective in use, and capable of adjustment, so that a mixture of any desired proportion of gas and air can be produced.

The invention consists in the construction and combination of parts and details, as will be fully described and set forth hereinafter, and finally pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical transverse sectional view of my improved machine for mixing gas and air. Fig. 2 is a vertical longitudinal sectional view of the same.

Similar letters of reference indicate corresponding parts.

The cylinder A, for pumping and compressing air, and the smaller cylinder B, for pumping and compressing gas, are cast integral. The air-cylinder A has the air-inlet neck C, and the gas-cylinder B the gas-inlet neck D. The air-cylinder A has the air-outlet neck E opposite the neck C, and within said outlet-neck E the tapered outlet-neck F of the gas-cylinder B is provided, said necks E and F forming an injector G. The two outlet-necks E and F, forming the injector, are cast integral with the cylinders. Suitable conducting-pipes for air and gas are connected with the necks C and D, and a pipe for conducting off the mixture of gas and air is to be connected with the outlet-neck E.

In the cylinders A and B the two shafts H and J are journaled eccentrically, said shafts being mounted to turn in bearing-nuts K, screwed into the necks K′, L′, and M′ of the two cylindrical pistons L and M, the ends of which are mounted to turn in eccentric recesses in the inner surface of the heads N and O of the two cylinders A and B, the necks L′ and M′ being mounted to rotate in the necks N′ and O′, respectively, of the cylinder-heads N and O. The cylindrical pistons L and M are mounted concentric with the shafts H and J.

One neck L′ of the cylindrical piston L carries the driving-belt pulley P, and on the opposite neck L′ the gear-wheel Q is mounted, which engages a like gear-wheel Q′ on the corresponding neck M′ of the cylindrical piston M. The cylindrical pistons L and M are each provided with a longitudinal slot R, in each of which the two trough-shaped wings S and T are provided, and mounted to slide in the direction of the diameter of the piston, the wings T being mounted to slide in a like direction in the wings S.

Stirrups U, straddling the shafts H and J, rest upon the inner edges of the wings T, and between the closed ends of the wings S and said stirrups springs V are provided for pressing the two wings S and T of one cylindrical piston from each other and pressing the closed ends of said wings against the inner sides of the cylinders. The closed ends of the wings S and T rest against the inner faces of the heads of the cylinders A B, and the wings S are provided with the slots W. The shafts H and J are each provided at the central longitudinal plane of each cylinder with a collar *a*, and at each side of the collar the shafts are threaded in opposite direction, as at *a′*. A nut *b* is mounted on the shafts H and J at each side of the fixed collar *a*, the stirrup U preventing the nuts from turning. Adjacent to the outer side of each nut *b* a smooth-bore sleeve *d* is mounted loosely on the threaded part *a′* of each shaft H and J, and said sleeves are connected by two links *g* with the wings T by means of the pivots *h*, said pivots *h* passing through the outer ends of two links *g*. Each shaft H and J is provided with a hand-wheel *m* at one end, and adjacent to the same with a lock-nut *n*.

The operation is as follows: As shown in Fig. 2, the machine is adjusted for its greatest capacity—that is, for drawing in and compressing the greatest possible quantity of air and the greatest possible quantity of gas. The cylindrical piston L rotates in the direction of the arrow *x′*, Fig. 1, and the cylindrical

piston M in the direction of the arrow x^2. As shown, the wing T of the cylindrical piston L projects the greatest possible distance from said cylindrical piston and the wing S is entirely within said piston. In passing from the neck C toward the bottom of the cylinder A the cylindrical piston L and its wing T have created a vacuum at the right-hand side of the cylinder and compressed the air at the left-hand end toward the outlet-neck E. As the cylindrical piston continues to revolve, the wing T is forced into the piston and into the wing S, and as said piston T is connected with the sliding sleeves *d* by the links *g* said sleeves are moved from each other, as shown in dotted lines in Fig. 2. At the same time the wings S are forced out of the cylindrical piston by the action of the springs V, so that the closed end of the wing S rests against the inner surface of the cylinder. When the cylindrical piston has made one-half of a revolution from the position shown in Fig. 1, the wing T is within the cylinder and the wing S is pressed out of the same, and so on alternately. The cylindrical piston and wings of the smaller cylinder B operate in the same manner. The gas is drawn into the cylinder B, is compressed, and is ejected through the nozzle or outlet-neck F into the nozzle or outlet-neck E of the ejector, through which neck E air is forced, whereby a thorough and permanent mixture of the gas and air is produced, which mixture can be used very advantageously as fuel.

According to the nature of the gas used, it may be necessary to mix a greater or less quantity of gas with the air, and for this reason it may be necessary to adjust the machine to draw in a certain quantity of gas or a certain quantity of air for each rotation of the pistons. When it is desired, for example, to draw in a smaller quantity of air, the wing T of the piston L must be so adjusted that its closed end cannot come in contact with the inner side of the cylinder—that is, there will be a small space between the closed end of the wing and the inner surface of the cylinder during part of the revolution, and neither the suction nor compression will be perfect. In order to adjust the machine in this manner, the shaft H is turned, by means of its hand-wheel *m*, in such a manner as to move the nuts *b b* from each other—for example, so that the sleeves *d* will be at *b'*, as shown in dotted lines in Fig. 2. When the nuts are in this position, they prevent the sliding sleeves *d* from approaching each other as closely as they could if the nuts *b* rested against the collar *a;* but when said sleeves are prevented from approaching each other they also prevent the wing T from moving outward sufficiently to come in contact with the inner surface of the cylinder during part of the revolution. The farther the nuts *b b* are held from each other the greater will be the distance between the pivot *h* and the inner circumference of the cylinder, and as said pivot is held in the wing T it is evident that the closed end of the wing must be a greater or less distance from the inner surface of the cylinder. After the wings have been adjusted the shaft is locked in place by means of the lock-nut *n*, to prevent the shaft turning independently of its bearing. In this manner the machine can be adjusted to draw in and compress any desired quantity of air. In the same manner the piston and wings of the gas-cylinder can be adjusted, and I am thus enabled to regulate my machine to make any desired mixture of gas and air, as circumstances may require.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, with a cylinder, of an eccentric shaft passing longitudinally through the same, a cylindrical piston mounted centrally on the same and in contact along one longitudinal line of its circumference with the inner circumference of the cylinder, which piston is provided with a longitudinal slot, wings within said slot mounted to slide in the direction of the diameter of the cylindrical piston, sliding sleeves on the shaft, links connecting the one wing with said sliding sleeves, and means, substantially as set forth, for adjusting the sliding sleeves, substantially as shown and described.

2. The combination, with a cylinder, of an eccentric shaft passed longitudinally through the same, said shaft being threaded, a cylindrical piston mounted centrally on said shaft, which piston is provided with a longitudinal slot, sliding wings in the slot, sliding sleeves on the shaft, nuts on said shaft against which the sleeves can rest, and links connecting the sleeves with one wing, substantially as shown and described.

3. The combination, with a cylinder, of a shaft passed longitudinally through the same, a cylindrical piston mounted centrally on the shaft, said shaft being provided with a right and left hand screw-thread at opposite sides of the central plane of the cylindrical piston, nuts on the left and right hand thread of the shaft, sliding sleeves on the shaft, sliding wings in the cylindrical piston, and links connecting the sleeves on the shaft with one wing, substantially as shown and described.

4. The combination, with a cylinder having eccentric necks on its ends, of a cylindrical piston within the cylinder, necks on the piston mounted to rotate in the necks of the cylinder, bearing-nuts in the piston-necks, a shaft mounted in the bearing-nuts, said shaft having a right and left hand screw-thread at opposite sides of its center, nuts on said shaft, sleeves sliding on the threaded part of the shaft, sliding wings in the piston, and links connecting the sleeves with one of the wings in the piston and a hand-wheel on one end of the shaft, substantially as herein shown and described.

5. The combination, with a cylinder having eccentric necks on its ends, of a cylindrical pis-

ton within the cylinder, necks on the piston mounted to rotate in the necks of the cylinder, bearing-nuts in the piston-necks, a shaft mounted in the bearing-nuts, said shaft having a right and left hand screw-thread at opposite sides of its center, nuts on said shaft sliding on the threaded part of the shaft, sliding wings in the piston, and links connecting the sleeves with one of the wings in the piston, and a hand-wheel on one end of the shaft, and a lock-nut on the shaft adjacent to the hand-wheel for the purpose of locking the shaft in place, substantially as shown and described.

6. The combination, with a cylinder, of a cylindrical eccentric piston in the same, a sliding wing mounted and positively adjustable in said eccentric piston to project a greater or less distance from the same, substantially as shown and described.

7. The combination, with a cylinder, of a cylindrical eccentric piston in the same, having a slot extending in the direction of the length of the piston, and a sliding wing in said slot extending from one end of the piston to the other, and positively adjustable, as set forth, to project a greater or less distance from said piston, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

LEWIS B. WHITE.

Witnesses:
OSCAR F. GUNZ,
JOHN A. STRALEY.