(No Model.) 2 Sheets—Sheet 1.

J. R. CAMERON.

APPARATUS FOR CREATING A VACUUM FOR MOTIVE POWER.

No. 395,690. Patented Jan. 8, 1889.

Fig. 1.

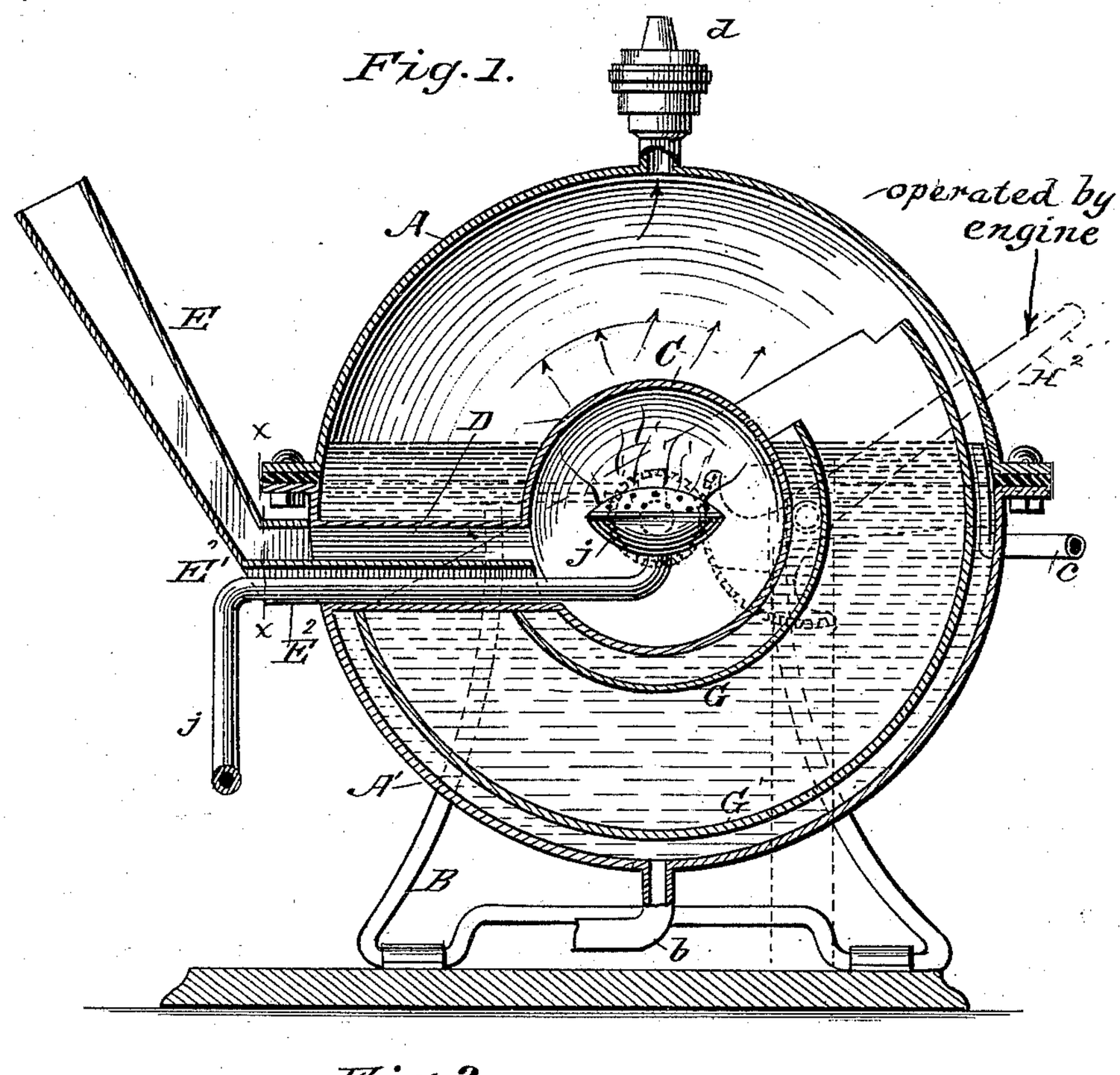
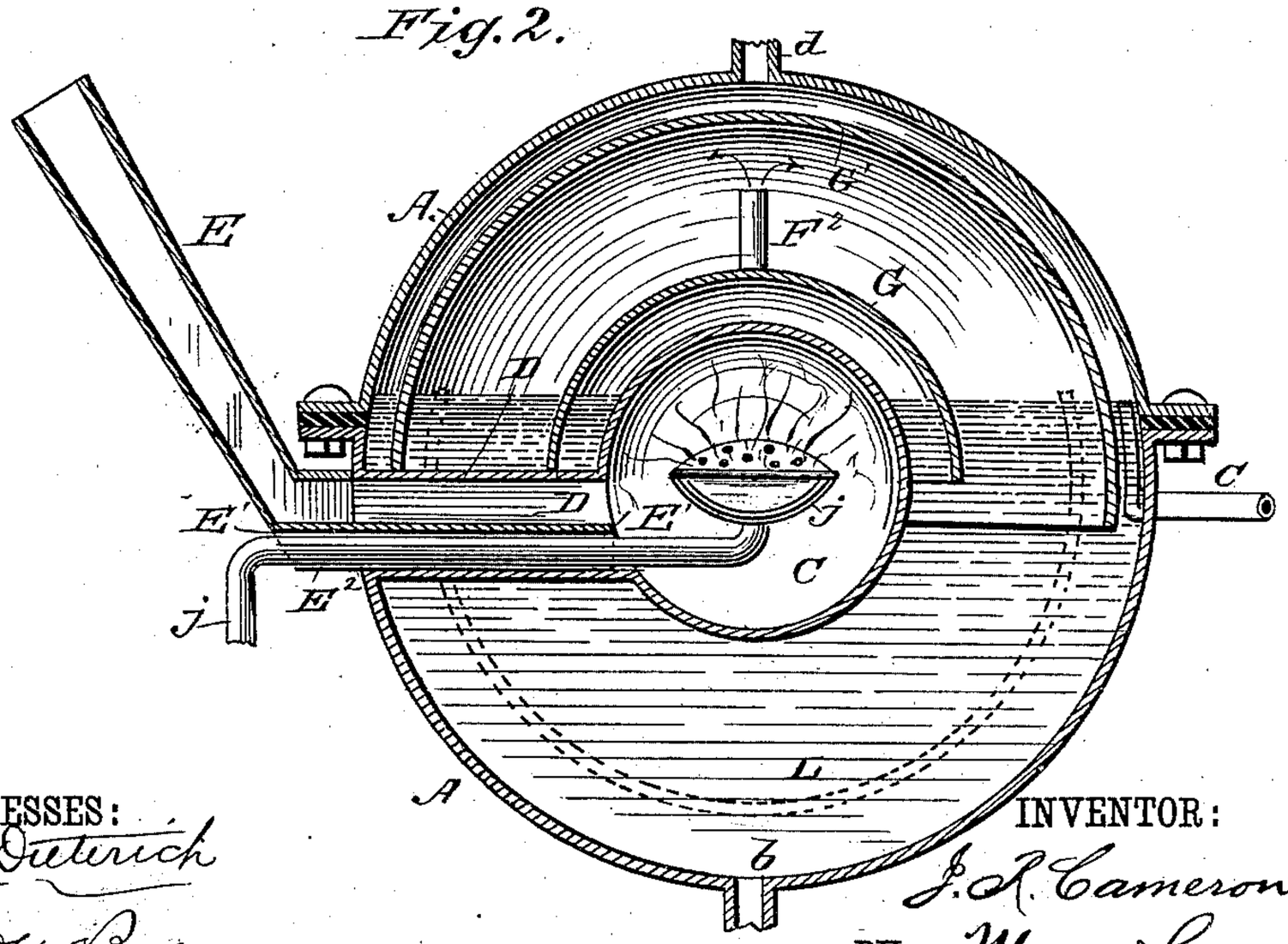


Fig. 2.



WITNESSES:
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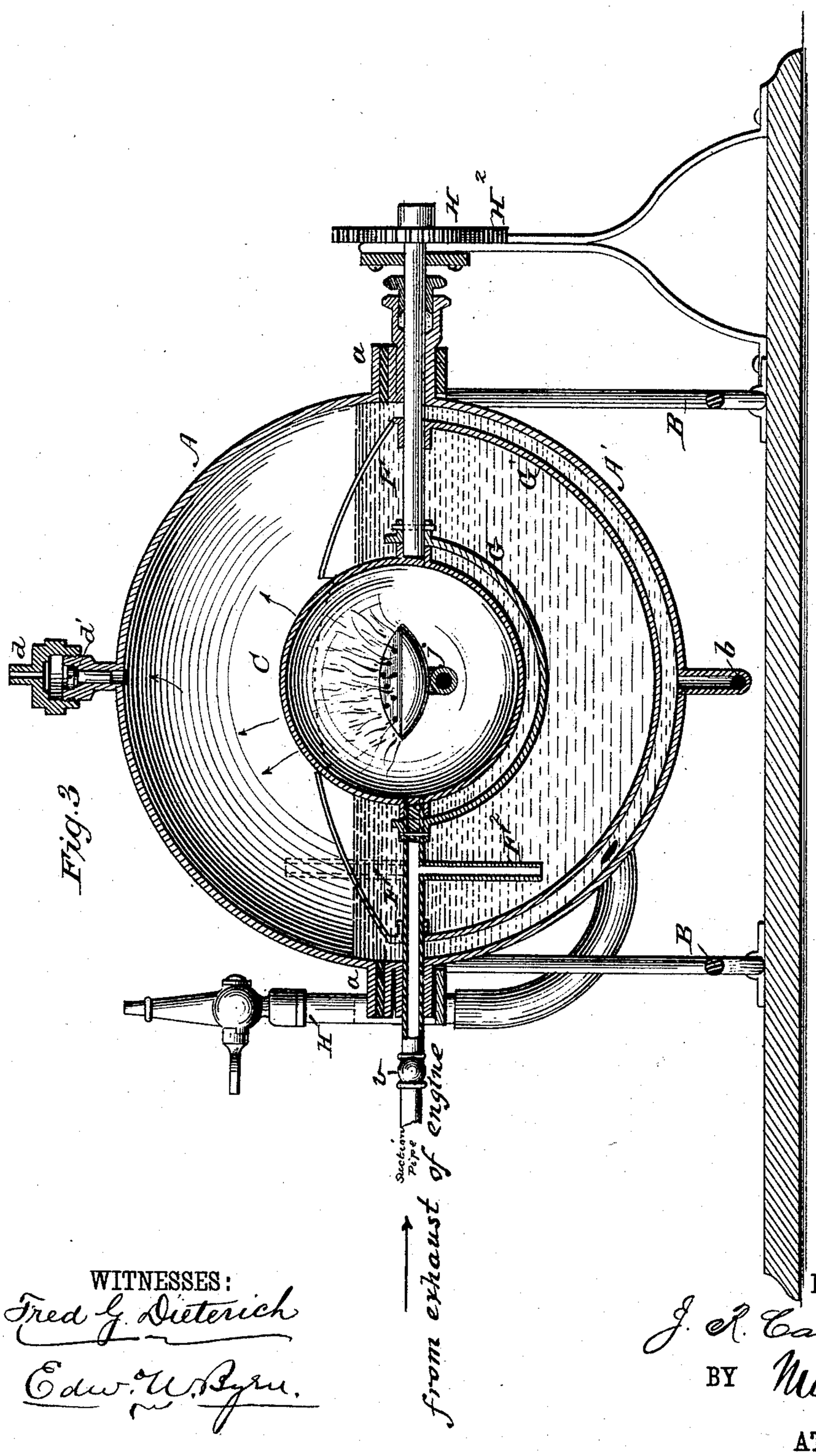

Fig. 3

Fig. 4.

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UNITED STATES PATENT OFFICE.

JOHN R. CAMERON, OF PITTSBURG, PENNSYLVANIA.

APPARATUS FOR CREATING A VACUUM FOR MOTIVE POWER.

SPECIFICATION forming part of Letters Patent No. 395,690, dated January 8, 1889.

Application filed June 2, 1887. Renewed June 11, 1888. Serial No. 276,671. (No model.)

To all whom it may concern:

Be it known that I, JOHN R. CAMERON, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Creating a Vacuum for Motive Power, of which the following is a specification.

My invention is in the nature of an apparatus for operating machinery by the formation of a vacuum and the utilization of the pressure of the air; and it consists in the peculiar construction and arrangement of parts, whereby a given body of air is rarefied by heat and allowed to escape as it expands, and the remaining body of air then suddenly cooled to create a partial vacuum, which affords means for operating a piston within a cylinder, as hereinafter fully described.

Figures 1 and 2 are vertical central sections showing the two positions of the apparatus. Fig. 3 is a vertical central section taken at right angles to the views shown in Figs. 1 and 2, the position of the parts being the same as those shown in Fig. 1. Fig. 4 is a cross-section through line *x x* of Fig. 1.

In the drawings, A A′ are two hemispherical metal shells, which are flanged and bolted together upon a gasket to form a tight joint for the outer casing. This casing is supported upon legs or frames B by means of hollow trunnions *a*.

C is a globe or spherical metal chamber, which is supported in the center of the hollow casing by means of a horizontal sheet-metal flue, D, attached to the walls of the lower section of the outer casing, and opening at its inner end into the central spherical chamber and at its outer end into the open air. This central spherical chamber is a heating-chamber, within which a fire is maintained in any manner, as by a lamp or by gas-jets *j*, which are introduced through the flue D. To support the combustion of the gas, oil, or other fuel within the central chamber, fresh air is taken in along the bottom of the flue, and the smoke and products of combustion are taken out along the upper edge of the flue, and for this purpose a detachable pipe, E, is provided with an angular extension-plate, E′, at its lower end, having downwardly-bent flanges E^2 E^2 on the sides, which slide like runners into the outer end of the flue. (See Fig. 4.) The space below the plate E′ forms an inlet for the fresh air and the space above it forms the escape-flue or smoke-pipe.

F F′, Fig. 3, is an axial rock-shaft, made in two sections which extend through stuffing-boxes in the hollow trunnions, and are rigidly connected to two hemispherical metal cups, G G′, one of which, G, is just large enough to fit closely to the central heating-globe, C, while the other, G′, is made much larger and lies closely to the outer casing.

One section, F, of the rock-shaft is extended through its stuffing-box in the hollow trunnion, and is provided with a gear-wheel, H, with which engages a segment-headed lever, H^2, by moving which the shaft bearing the hemispherical cups may be rocked and said cups moved from a position below the central globe, as in Fig. 1, to a position above it, as in Fig. 2. The other section, F′, of the rock-shaft is made hollow and has a branch pipe, F^2, communicating with the same.

The operation of the apparatus is as follows: The central globe is maintained at a high heat by means of a lamp, gas-jets, or furnace within it, and in the lower section of the outer casing is placed a body of water, which is renewed from time to time, or is replaced by a constant stream, which enters an inlet, *b*, at the bottom and escapes through an outlet, *c*, at the top. In the top of upper section, A, of the outer casing is a vent-pipe, *d*, having in it a relief spring-valve, *d′*, Fig. 3, opening outwardly, and the end of hollow rock-shaft section F′ opens through branch F^2 into the space of the main chamber alternately above and below the water, and its other end communicates through a check-valve with the cylinder of the engine to be worked by the vacuum; or it may communicate with a general vacuum-chamber, to which several of my devices may be applied. Now, whenever the cups G G′ are in their lowest position, Fig. 1, they are immersed in the water and are kept cool, while the surface of the central globe radiates its heat into the air imprisoned in the outer casing and expands it, causing a large portion of the air to be forced out of the relief-valve *d′* (see Figs. 1 and 3) in the top of upper section, A, of the casing. The rock-shaft F F′ is then turned (through the gear and segment-headed lever) by the

automatic action of the engine until the two hemispherical cups G G′ rise to their position above the central globe, as in Fig. 2. In this position it will be seen that the smaller cup covers and cuts off the radiating heat of the central globe, and the larger cup, G′, rising cold out of the water, instantly cools the remaining body of air in the outer casing and produces a partial vacuum of considerable power, and this sucks the air through the hollow section of the rock-shaft F′ and its branch F^2 from the exhaust side of the engine-cylinder or from a main vacuum-chamber. The cups G G′ are then turned under water again, and the air previously sucked into the chamber being imprisoned in the same by a check-valve, *v*, in the pipe connected to the hollow rock-shaft, the heat of the now uncovered globe and the upper section, A, again expands the air and drives it through the relief-valve in the said upper section, A. It will therefore be seen that it is only necessary to keep the lower section, A′, of the casing charged with cool water and to connect the piston of the engine-cylinder with the reversing mechanism of the rock-shaft to secure a continuous automatic action and an automatic vacuum engine of good working power.

H′ is a water-gage to determine the height of the water in the casing A A′.

To lighten the weight of the apparatus I may in some cases not find it necessary to fill the entire space of the lower casing, A′, with water, but may arrange an inner stationary hemispherical cup, as shown in dotted lines at L, Fig. 2, so as to leave only a thin jacket of water, into which the cup G′ dips.

The motor thus described may be used for any of the various industrial purposes requiring a motive power, and while free from complication is practically non-explosive.

Having thus described my invention, what I claim as new is—

1. A vacuum apparatus consisting of an outer casing adapted to receive water and provided with valved inlet and outlet pipes, a central heating-chamber, and a rock-shaft provided with a pair of invertible cups adapted to pass from the lower part of the casing to a position above the central heating-chamber, substantially as and for the purpose described.

2. The combination, with the outer casing, of a central heating-chamber having flue D, and a pipe-section, E, having a partition-plate, E′, for separating the cold fresh air from the escaping products of combustion, substantially as shown and described.

3. The combination of the outer casing, A A′, made in globular form in two sections, and having outwardly-opening relief-valve *d*′, the central heating-globe, C, with flue and smoke-pipe, as described, the hollow rock-shaft F F′, with gears for reversing it, and an inwardly-opening branch, F^2, and the two hemispherical shells G G′, rigidly fixed to the rock-shaft and adapted to be inverted, as described.

The above specification of my invention signed by me in the presence of two subscribing witnesses.

JOHN R. CAMERON.

Witnesses:
SOLON C. KEMON,
CHAS. A. PETTIT.