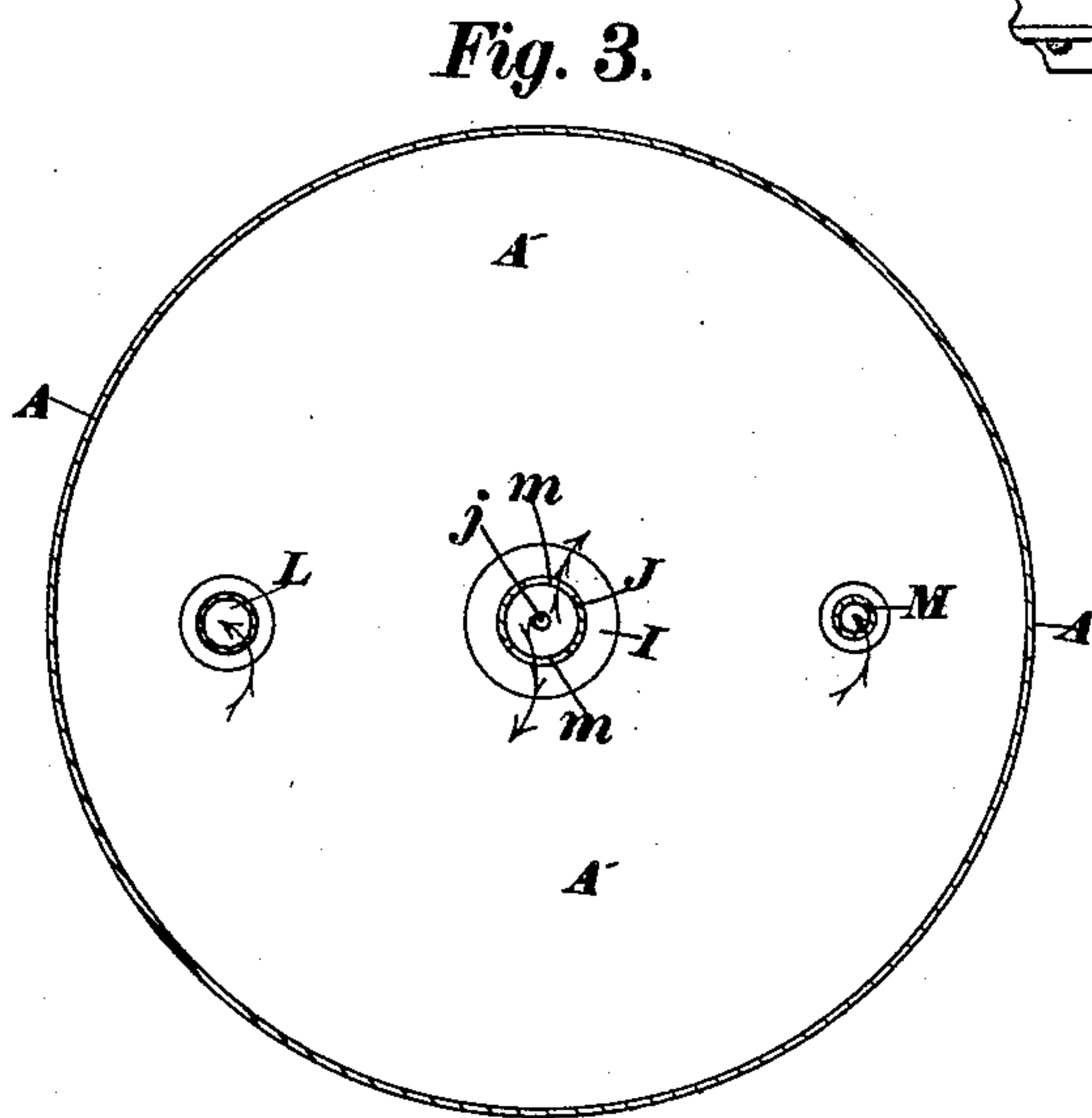
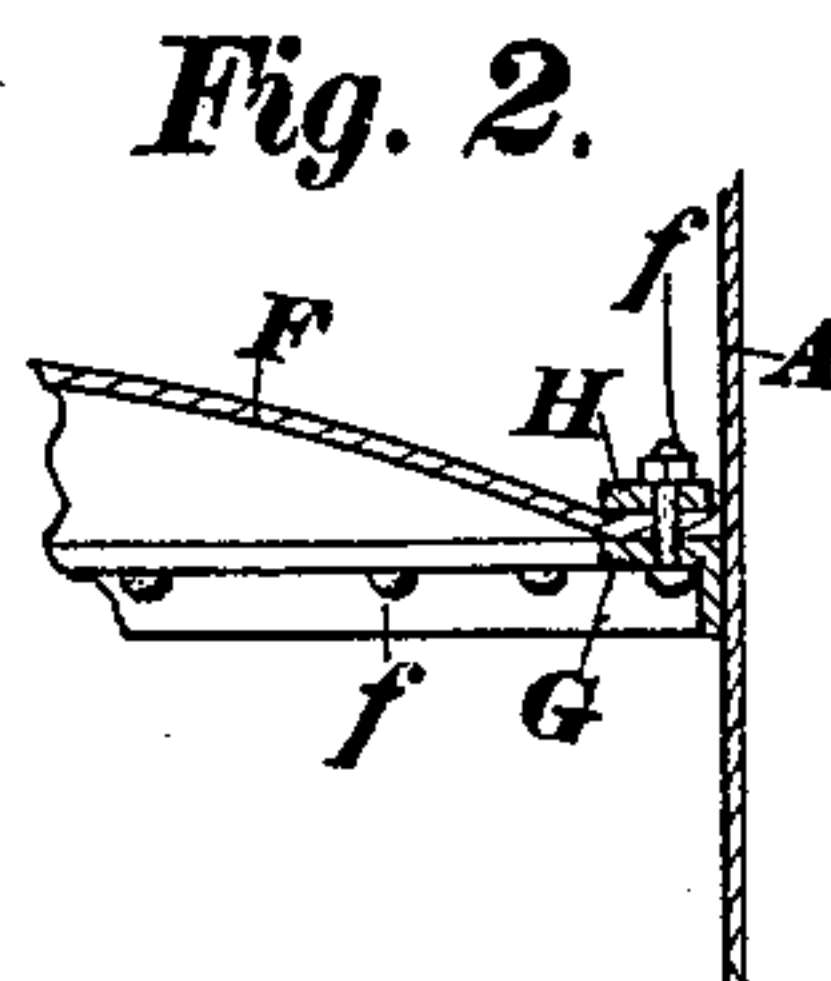
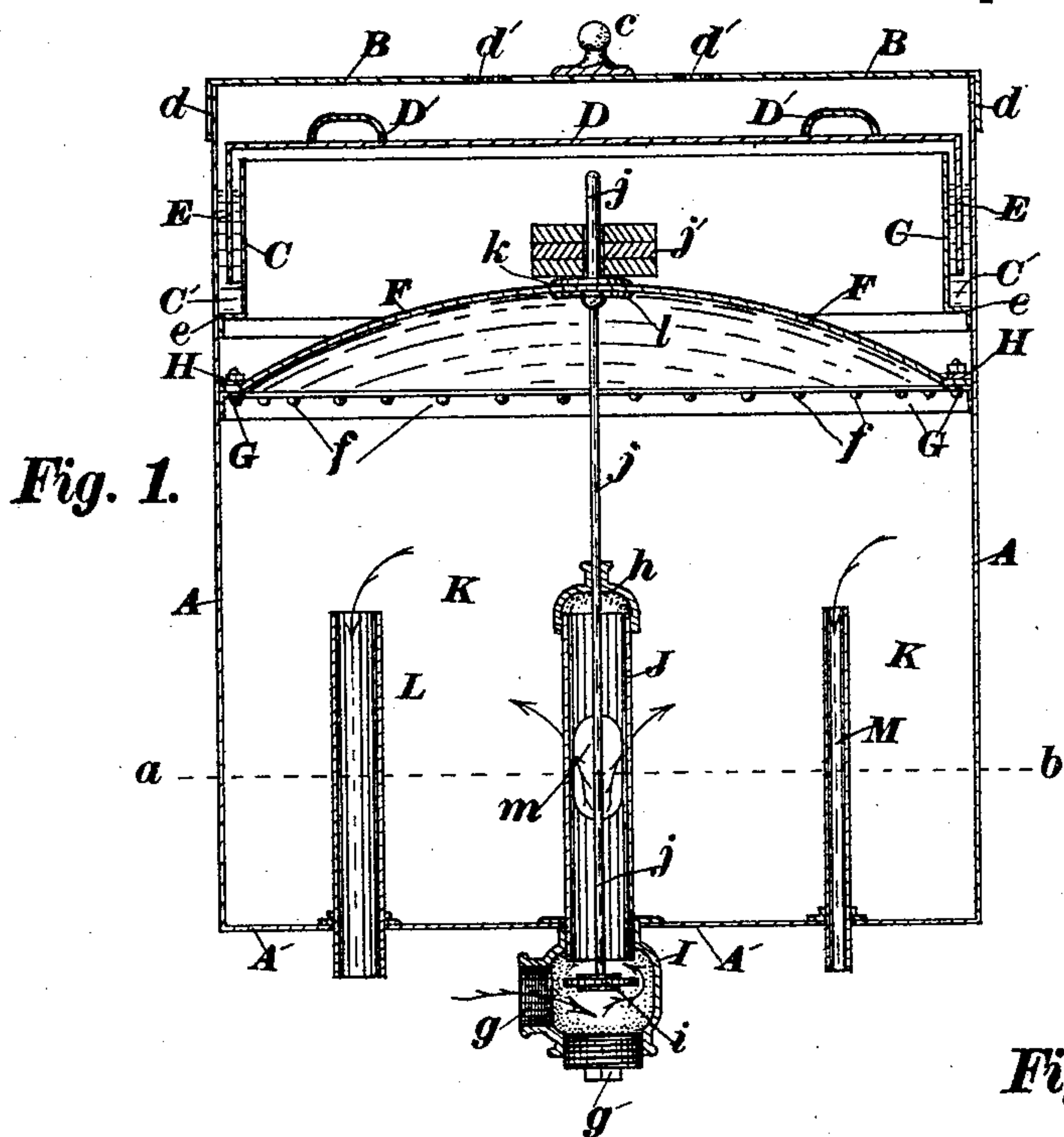


(No Model.)

G. HARRIS.  
PRESSURE REGULATOR.

No. 482,842.

Patented Sept. 20, 1892.



Witnesses  
Marion Garrison  
H. Spettmann

Inventor  
George Harris  
By his Attorney Oscar Snull

# UNITED STATES PATENT OFFICE.

GEORGE HARRIS, OF CHICAGO, ILLINOIS.

## PRESSURE-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 482,842, dated September 20, 1892.

Application filed March 21, 1891. Serial No. 386,912. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE HARRIS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Gas-Pressure Regulator, of which the following is a specification.

My invention relates to that class of gas-pressure regulators which are particularly adapted to use in regulating the supply of gas to gas-engines in substitution for the rubber bag, which is the source of much annoyance and which in practice fails to perfectly perform the duty assigned to it.

My objects are to not only perfectly supply a given pressure of gas to a gas-engine, so that an explosive mixture of known and invariable proportions can be continuously made, but also prevent the gas-pressure in the supply-pipes from being materially effected by the intermittent drafts of gas required in all gas-engines, and these objects I accomplish by the means illustrated in the accompanying drawings, in which—

Figure 1 is a vertical sectional view of a gas-holder, showing the several operative parts comprising my invention. Fig. 2 is a sectional view of a part of the side of the gas-holder and two rings, together with a piece of flexible material composing the diaphragm, to show how the diaphragm is secured to the gas-holder to prevent leakage. Fig. 3 is a sectional view of holder on line *a b* of Fig. 1.

Similar letters refer to like parts throughout the several views.

The casing A is a cylinder having a bottom A', secured permanently in position. At the top is a lid B, having a handle *c*. The rim B' of the lid projects downward all around casing A at *d*. Inside casing A, near the top, is a ring C, which is smaller in diameter than casing A, and the ring has a bottom part which turns outwardly and joins the casing A at *e*, where it is firmly attached and forms an annular space C' all around the inside of the casing to contain a sealing fluid. There is a cylinder E, which has a closed top D and handles D', which cylinder is larger in diameter than ring C and smaller in diameter than the inside of casing A and placed in position, as shown, with the lower

edge of its rim immersed in the sealing-fluid in space C', thus permitting the cylinder E to rise and fall without any gas escaping into the space under lid B should a slight leak occur in the diaphragm F. This diaphragm is circular in shape and made of a flexible material, and its periphery is attached around the inside of case A by means of two rings. The lower ring G is permanently attached to case A and has a position under diaphragm F, and the upper ring H is held at the top of the diaphragm by means of a series of bolts *f*, which pass up through both rings and the diaphragm, Fig. 2. Secured to the center of the bottom A' of casing A is a valve-casing I, which is provided with a screw-threaded opening *g* for the admission of gas from a pipe. (Not shown.) There is also an opening at the bottom of valve-casing I, into which is screwed a stop-plug *g'*. There is an opening at the top of the valve-casing, into which is secured the lower end of a vertical pipe J, which projects upward into the inside of the gas-chamber K and terminates in a reducing-coupling *h*. Pipe J projects down into the valve-casing I, and its end forms a seat for a valve *i*, which valve is secured to the lower end of a rod *j*, which passes upward through the center of pipe J and through the small part of reducing-coupling *h*, which serves as a guide, thence upward, its upper part being attached by means of two broad flanges *k* and *l*, gas-tight to the center of diaphragm F. The top of rod *j* projects above the diaphragm and serves to hold in position weights *j'* for increasing or decreasing the gas-pressure in the gas-chamber K.

On each side of the center of length of pipe J is an oblong orifice *m*, Fig. 3, which forms a communication from the inside of pipe J to the inside of gas-chamber K. There are two pipes L and M for the exit of gas, and these pipes are secured to the bottom A' of case A, and each have their end projecting below bottom A' for the attachment of pipes for carrying gas to the place where it is consumed.

In operation, when the apparatus contains no gas, the valve *i* rests upon the top of plug *g'* at the bottom of valve-casing I, which supports the weight of valve-rod *j*, diaphragm F, and the pressure-regulating weights *j'*. If when the parts are in this position gas is ad-



mitted from a pipe through orifice *g* of valve-case I, it will have free passage past valve *i* and up through pipe J and out into the gas-chamber K, and thence downward into and  
 5 through pipes L and M to the place of consumption, the gas continuing to flow until the pipes connected to L and M are filled and the pressure is gradually raised in gas-chamber K, which acting in all directions presses up-  
 10 ward upon diaphragm F, lifting its central portion, together with the weights *j'*, rod *j*, and valve *i* until valve *i* contacts with the lower end of pipe J, which cuts off a further supply of gas to chamber K. If now gas is turned  
 15 on at an engine or for illuminating purposes, the pressure is lowered in gas-chamber K, and a consequent descent of diaphragm F and an opening of valve *i* an exact amount to supply the demand at whatever pressure is  
 20 within the limits of the pressure of the supply to the valve-casing I, the pressure in gas-chamber K being in proportion as a greater or less number of weights *j'* are placed upon the top of diaphragm F.  
 25 The flexible material of which it is usual to make diaphragms by long use is liable to leak gas, and to prevent any loss of this kind the cylinder E has been specially added to this apparatus and acts in conjunction with  
 30 the diaphragm, rising and falling with the increase and decrease of pressure in the gas-

chamber, and, this action having a tendency to condense or rarefy the air in the space between top of lid B and top D of cylinder E, small holes are made at *d'* in the top of the  
 35 lid for permitting the air to pass into and out of said space without obstruction.

I claim as my invention—

In a gas-pressure regulator, the combination, with a casing provided with a cover and  
 40 having an inlet-pipe provided with a valve-seat and outlet-opening, of two rings secured to the interior thereof, the upper one of which is smaller in diameter than the casing and has its bottom turned outwardly and secured  
 45 to the casing and forms with said casing an annular space for the reception of a liquid and the lower ring is provided with bolt-holes, a cylindrical closed top cover within the upper ring, a loose ring provided with bolt-holes to  
 50 correspond with the holes of the lower ring, a flexible diaphragm between the two perforated rings, bolts through the perforated rings for securing the diaphragm and the rings together, and a rod secured to the diaphragm  
 55 having a valve at its lower end and weights upon its upper end on top of the diaphragm, substantially as set forth.

GEORGE HARRIS.

Witnesses:

F. L. BARNETT,  
 J. J. SMITH.