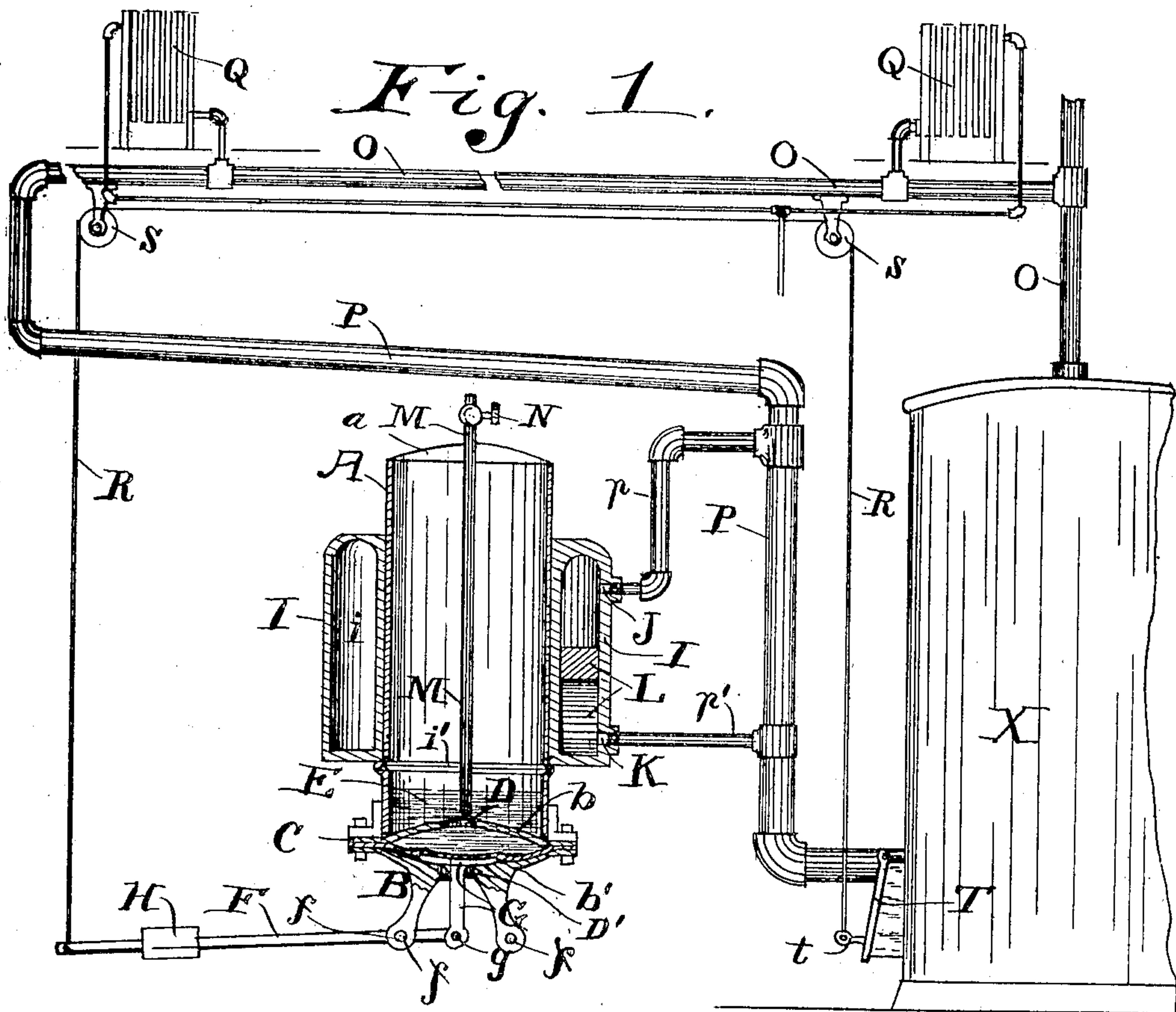


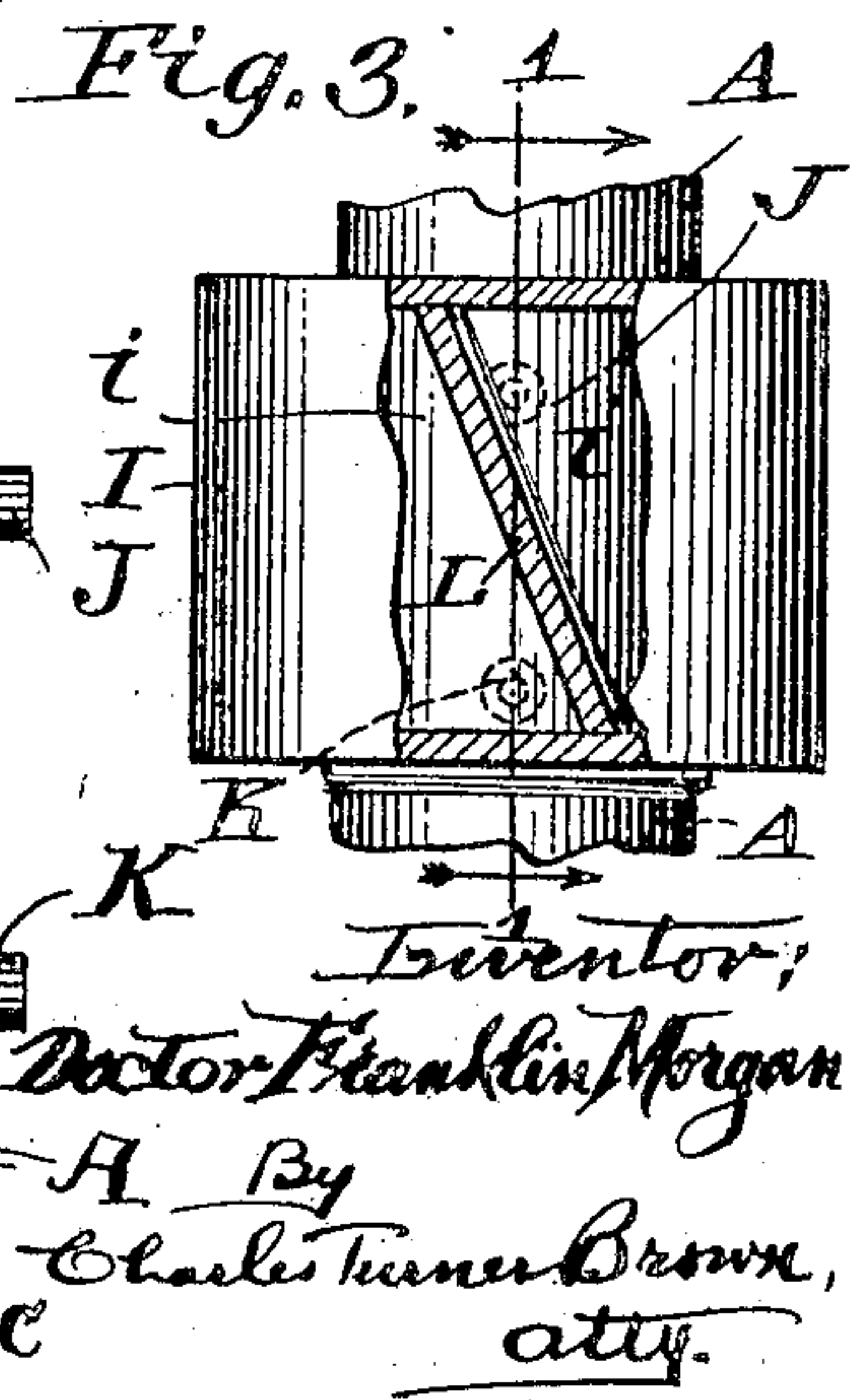
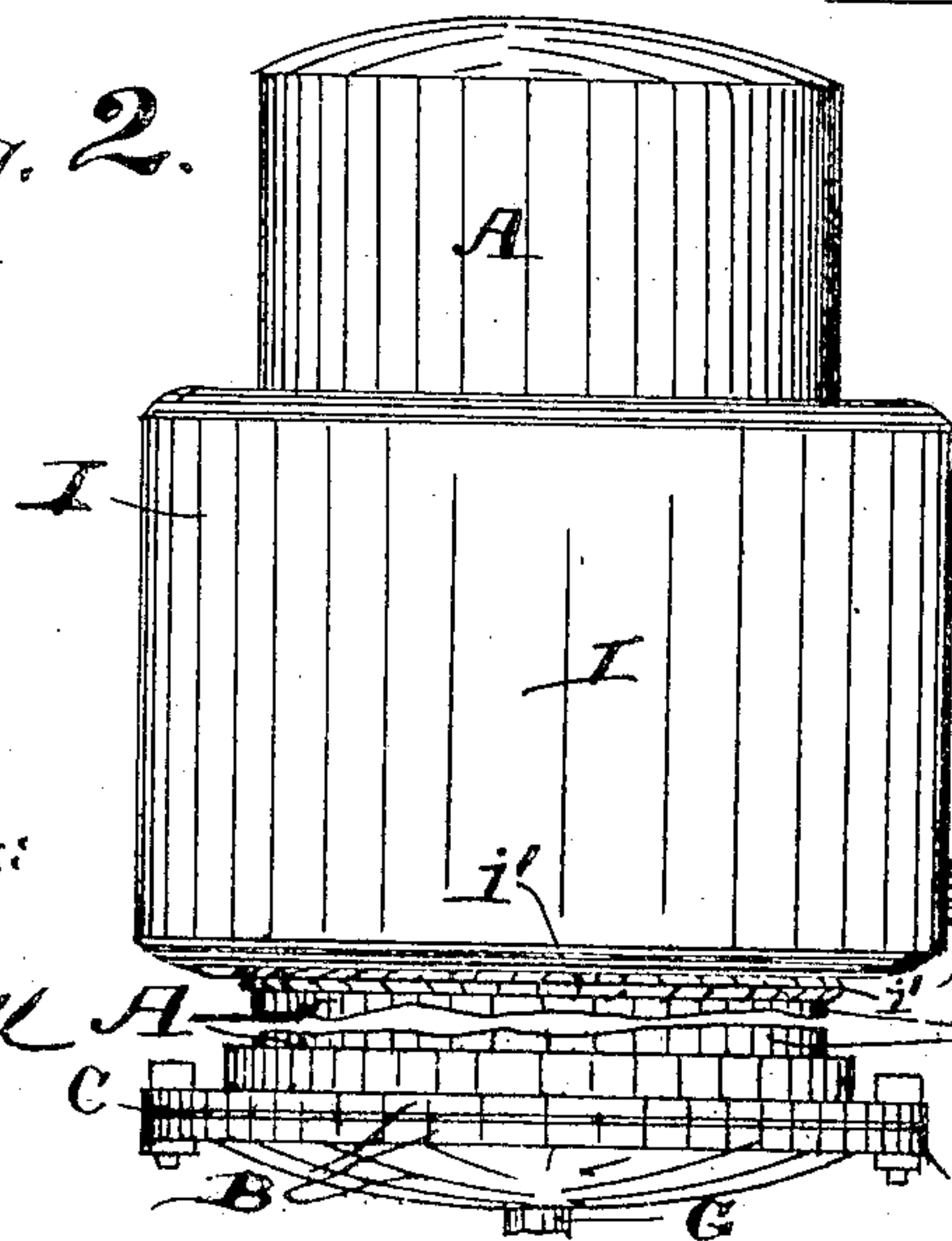
No. 887,417.

PATENTED MAY 12, 1908.

D. F. MORGAN.  
DAMPER REGULATOR.  
APPLICATION FILED DEC. 17, 1908.



*Fig. 2.*



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# UNITED STATES PATENT OFFICE.

DOCTOR FRANKLIN MORGAN, OF CHICAGO, ILLINOIS.

## DAMPER-REGULATOR.

No. 887,417.

Specification of Letters Patent.

Patented May 12, 1908.

Application filed December 17, 1906. Serial No. 348,285.

To all whom it may concern:

Be it known that I, DOCTOR FRANKLIN MORGAN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Damper-Regulators, of which the following, when taken in connection with the drawing accompanying and forming a part hereof, is a full and complete description, sufficient to enable those skilled in the art to which it pertains to understand, make, and use the same.

The apparatus embodying this invention relates to devices used in steam and hot water heating systems to automatically open and close the damper of the generator of the heating system; and the object of this invention is to obtain a damper regulator in which the expansible member of the apparatus may be air and the receptacle holding the air may easily be made "air tight"; and an apparatus in which the part or portion of the apparatus through which steam or hot water is conducted to vary the temperature of the expansible member may be easily made and readily adjusted relative to the remainder of the device and also relative to the steam pipes to which such member is connected in attaching it to the heating system.

A further object of the invention is to obtain a damper regulator which will be economical in construction and durable.

In the drawing referred to Figure 1 illustrates an apparatus embodying this invention in vertical sectional view, with an elevation of the front of a steam generator, with a connection between the apparatus embodying the invention and the damper, or movable cover, of the air supply pipes of the combustion chamber of the generator. Fig. 2 is an elevation, on an enlarged scale, of the apparatus embodying this invention. Fig. 3 is a front elevation of a portion of the cylinder of the device which contains expansible fluid, and of the casing thereon with a portion of such casing broken away to show the partition wall therein.

A reference letter applied to indicate a given part is used to designate such part throughout the several figures of the drawing, wherever the same appears.

A is a cylinder, closed at its upper end by head *a* and at its lower end by movable wall C in base B. The base B consists of parts *b* and *b'* between which the movable wall C is secured. Parts *b*, *b'* are, respectively pro-

vided with apertures therethrough, aperture D being in part *b* and aperture D' in part *b'*.

E is liquid, preferably water, in cylinder A and above the movable wall C in base B. 60

F is a lever pivotally mounted at *f*.

G is a connection between lever F and the under side of movable wall C.

*g* is a pivotal connection between the lever F and connection G. 65

H is a weight adjustably mounted on lever F.

I is a hollow casing through which steam or hot water is conducted to vary the temperature of the fluid contents of cylinder A. 70

*i* is the chamber or space in casing I.

J is the inlet to chamber *i*, and K is the outlet thereof.

L is a partition wall inserted in casing I to force steam or hot water which is admitted to chamber *i* around the chamber from the inlet to the outlet. Casing I is placed on the cylinder A to rest on the bead *i'*; and such casing fits the cylinder loosely so it can be turned around thereon. 80

M is a vertical pipe, extending through the upper end of cylinder A downward with the lower end thereof immersed in the liquid E.

N is a valve by means of which the upper end of pipe M is closed. 85

O is a steam pipe, (or hot water supply pipe).

Q is a radiator and P is a return pipe.

*p* is a pipe connecting return pipe with inlet J of the casing I, and *p'* is a pipe connecting outlet K of such casing with the steam return pipe P. 90

R is a flexible connection attached at one end to the lever F and at the other end to the damper T, passing over suitable pulleys as S, S. 95

X is a steam generator.

The apparatus is shown in the drawing with the air which constitutes the expansible member warmed and operating the device to close the damper T. *t* is the connection of flexible member R to damper T. Such expansible member, when expanded forces liquid in cylinder A into pipe M against closed valve N to prevent the escape of the fluid of such cylinder. By this arrangement the valve N is closed on to its seat with water adjacent thereto, and much less leakage occurs than would be the case if air, under pressure, were permitted to come in contact with such valve. Water may easily be added to the contents of the cylinder A through pipe M 100 105 110



when no pressure is in the cylinder; and air may be forced thereinto at any time by an ordinary bicycle pump.

To erect the damper regulator embodying this invention the cylinder A and lever F are properly put in place and secured, and the casing I is then turned on the cylinder A until the inlet J and outlet K are in position to be readily connected to the return pipe P by connections  $p, p'$ . Water is then poured into the cylinder A and thereafter, if desired, air is forced thereinto, under pressure, at climatic temperature.

I, hereinbefore described as a casing may, of course, be a forging or casting, the essentials being that such part I be a metallic casing, or metallic body provided with a chamber, and having an inlet and an outlet to the chambers and that such casing be adjustably mounted on the cylinder A so that when heating fluid be admitted to the chamber in the casing and such casing thereby warmed the heat thereof will, by conduction, be imparted to the cylinder and the contents thereof.

The operation of the device is,—when heating fluid flows through the chamber in casing I the temperature of the air in cylinder A is raised and the pressure thereof increased. The increased pressure of the air on the surface of the liquid E forces the diaphragm C down, thus forcing connection G, and the end of lever F to which it is attached, down and turning such lever on its fulcrum  $f$ , thereby raising the end thereof to which flexible connection R is attached. The raising of such end of lever F permits a corresponding fall or closing of damper T, to which the other end of such flexible connection R is attached. The lever F is balanced by weight H so that when the temperature of the heating fluid in casing I varies within determined limits lever F will move correspondingly; being actuated as last above described, by the increase of pressure of the air in cylinder A in one direction and moved in the other direction by such weight H.

Having thus described my invention, the construction and operation of an apparatus embodying the same, what I claim is new and desire to secure by Letters Patent is;—

1. In a heating system provided with a generator, a supply pipe, radiators and a return pipe, the combination of a damper regulator, comprising a metal cylinder adapted to contain an expansible fluid, a movable wall to the cylinder, a lever associated with

the movable wall to move correspondingly with the movement of the movable wall, a metallic casing provided with a chamber, such casing surrounding the cylinder and removably mounted thereon and comprising concentric cylindrical walls and end walls, the smaller one of the cylindrical walls fitting over the metal cylinder, such casing being provided with an inlet and with an outlet to the chamber, and connections between the inlet and the outlet, respectively, and the return pipe, such connections being arranged to obtain a variation of the temperature in the chamber to correspond with the variation in temperature of the contents of the return pipe; substantially as described.

2. The combination of a metal cylinder adapted to contain an expansible fluid, a movable wall to the cylinder, a lever associated with the movable wall to be actuated thereby, a metal casing provided with a chamber, constructed independently of the cylinder and adjustably mounted thereon, such casing comprising a cylindrical wall concentric with and fitting over the metal cylinder and such casing being provided with an inlet and with an outlet to the chamber, connections between the inlet and outlet, respectively, and the return pipe of a radiator system, and a partition in the chamber to conduct heating fluid passing from the inlet to the outlet the length of the chamber; substantially as described.

3. The combination of a metal cylinder provided with a movable wall, such cylinder being adapted to contain an expansible fluid, a lever associated with the movable wall to be actuated thereby, a pipe extending from near the movable wall to and through the opposite wall of the cylinder to supply fluid to such cylinder, a valve seat and valve co-acting therewith at the upper end of the pipe, and a metallic casing provided with a chamber and with an inlet and outlet to the chamber, such casing being made with an inner cylindrical wall fitting over and removably mounted on the cylinder, the pipe and valve being arranged to permit the passage of fluid into the cylinder and connections between the inlet and outlet, respectively, and the return pipe of a radiator system; substantially as described.

DOCTOR FRANKLIN MORGAN.

In the presence of—

CHARLES TURNER BROWN,  
CORA A. ADAMS.