

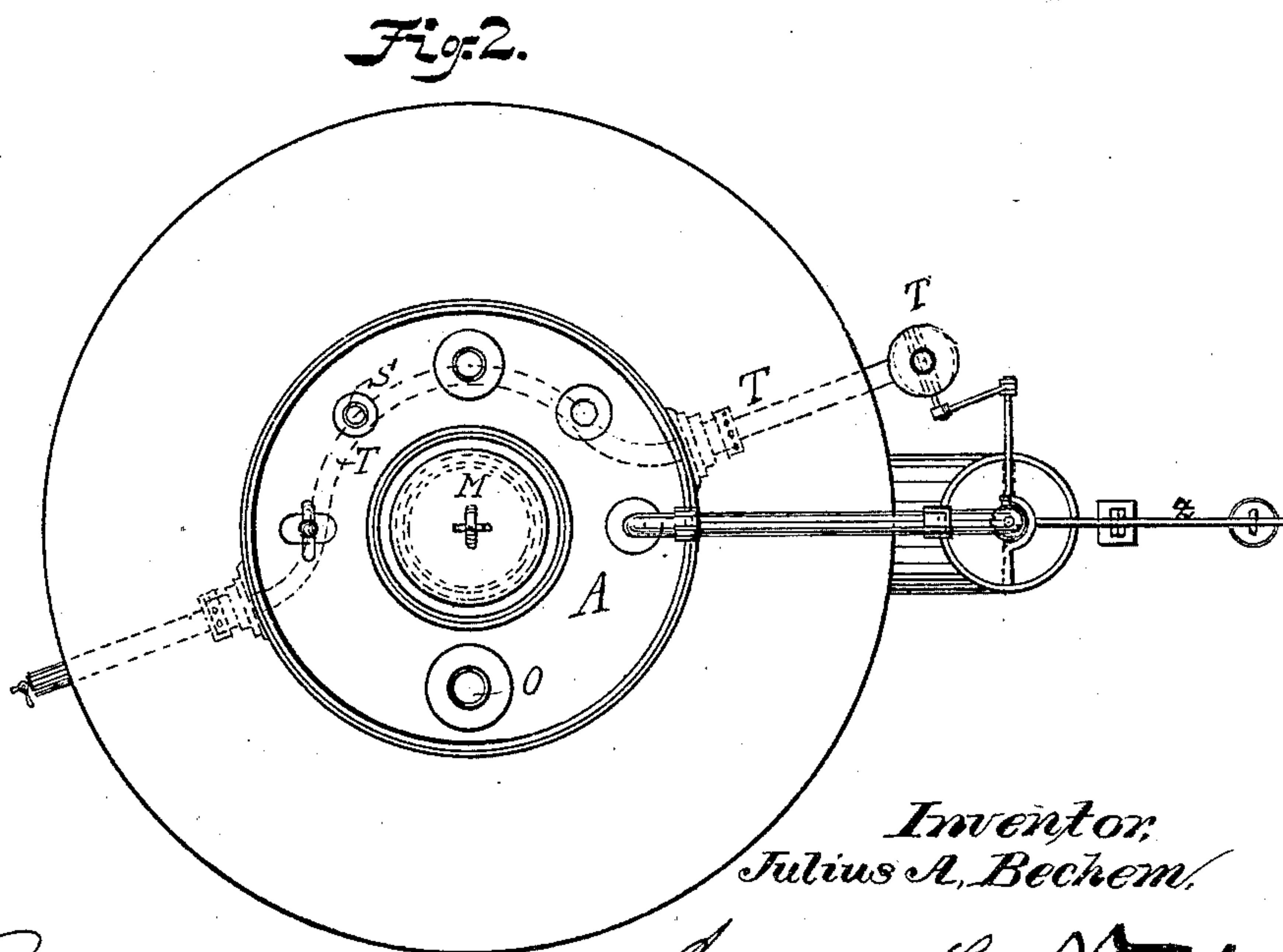
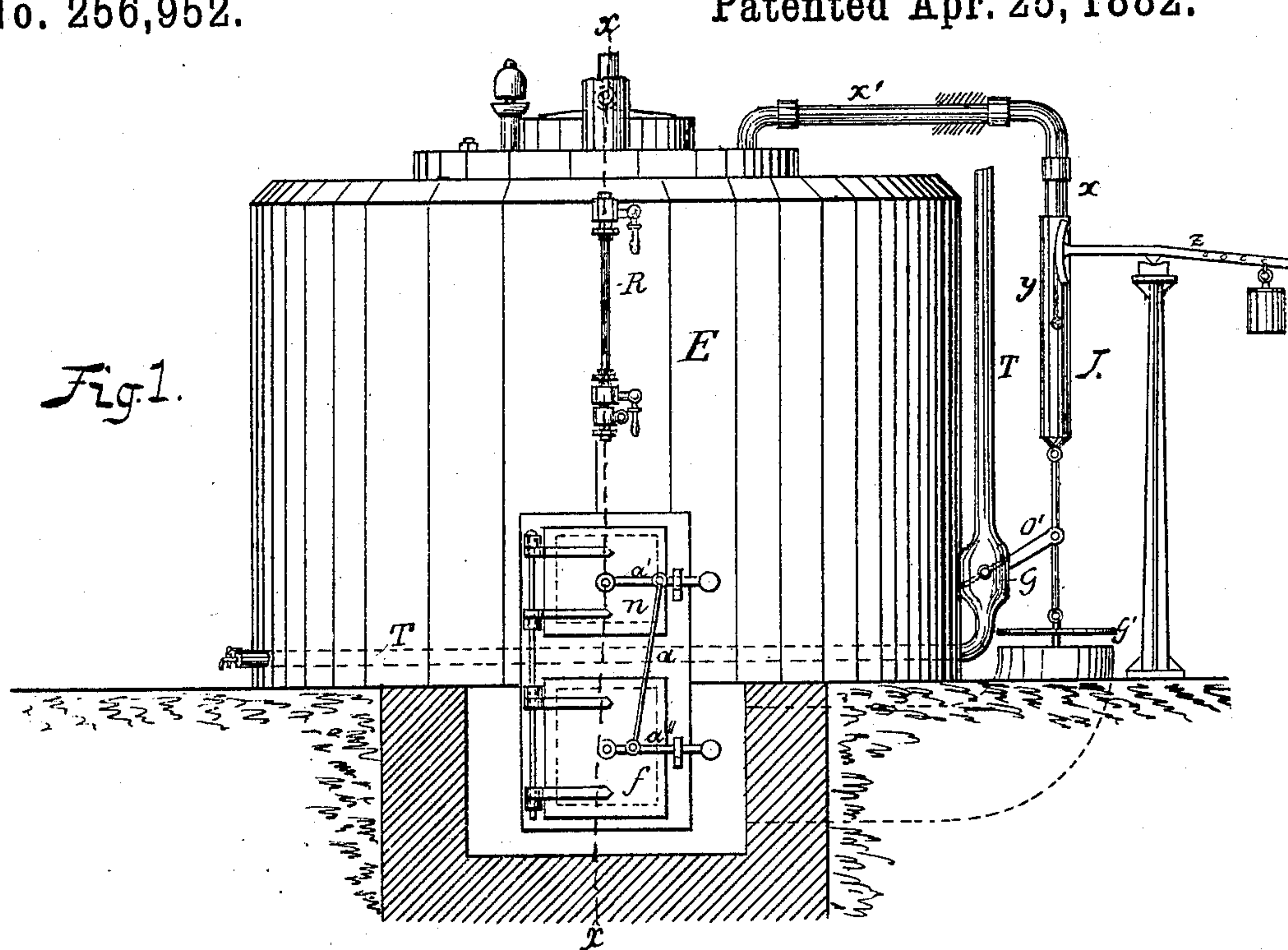
(No Model.)

3 Sheets—Sheet 1.

J. A. BECHEM.  
APPARATUS FOR HEATING BUILDINGS.

No. 256,952.

Patented Apr. 25, 1882.



Witnesses.

A. H. Galh  
Robert Everett

Inventor,  
Julius A. Bechem.

By James L. Norris,  
Att'y.

(No Model.)

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J. A. BECHEM.

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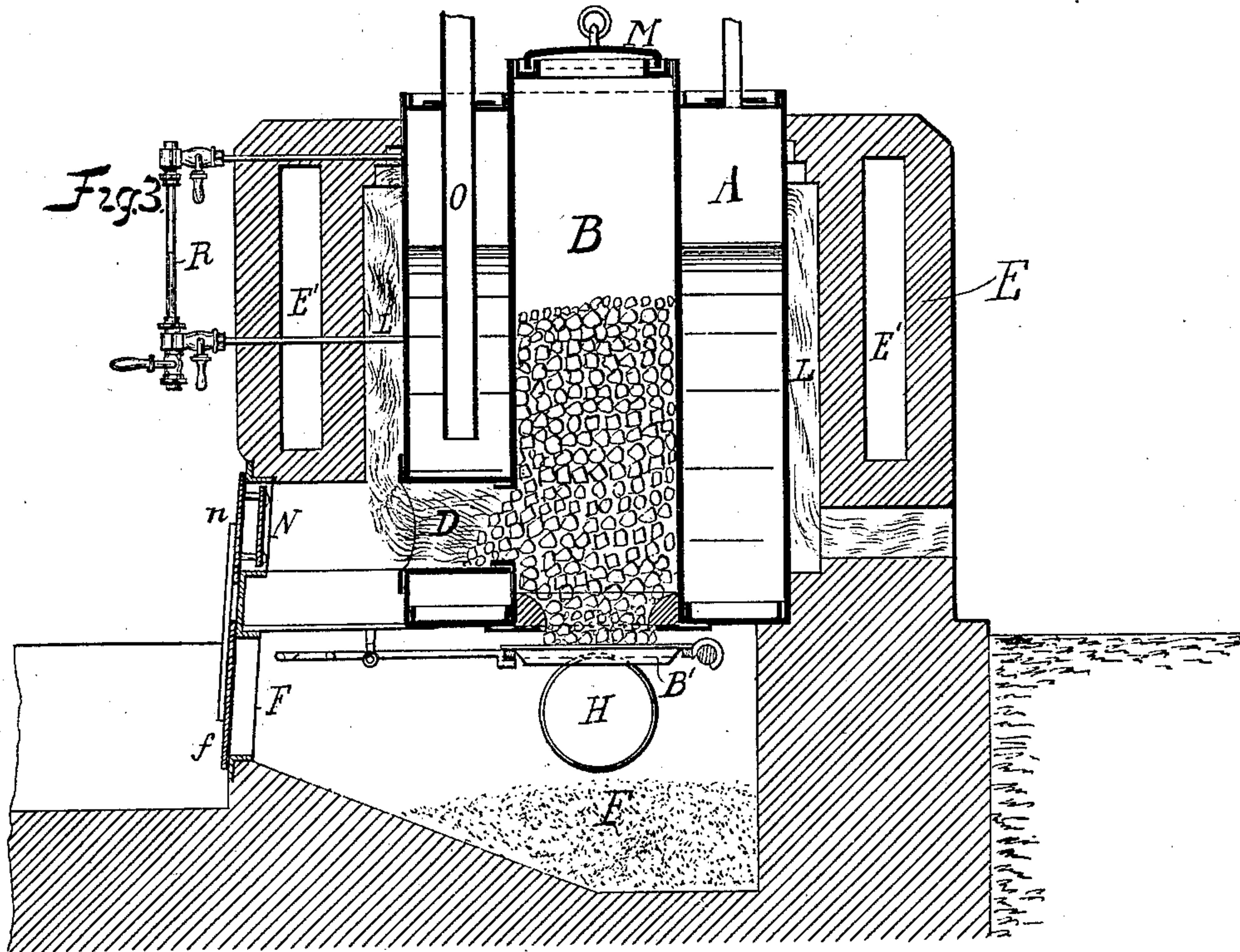
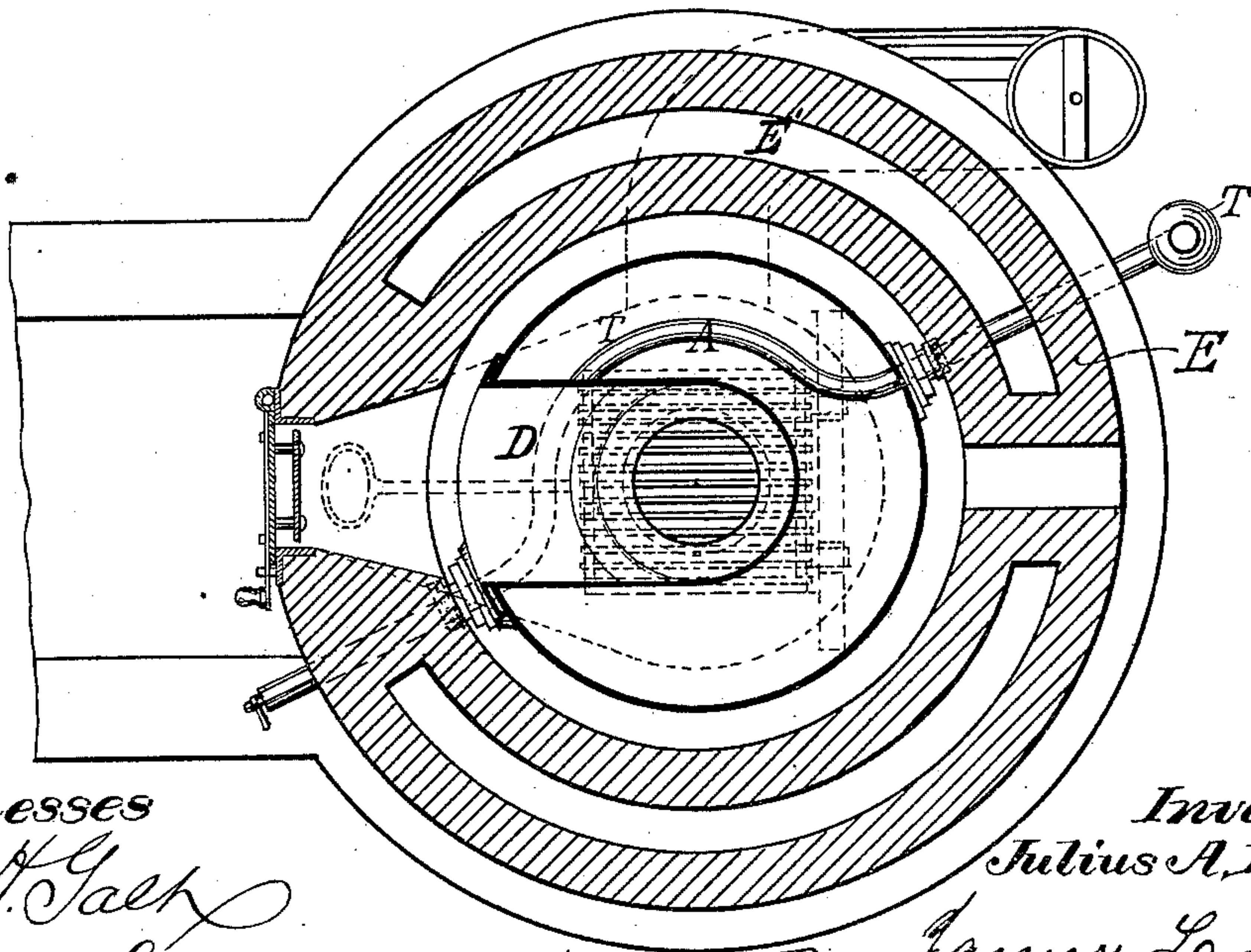


Fig. 4.



*Witnesses*

A. H. Gach  
Robert Everett

*Inventor:*

*Julius A. Bechem.*

By James L. Norris,



(No Model.)

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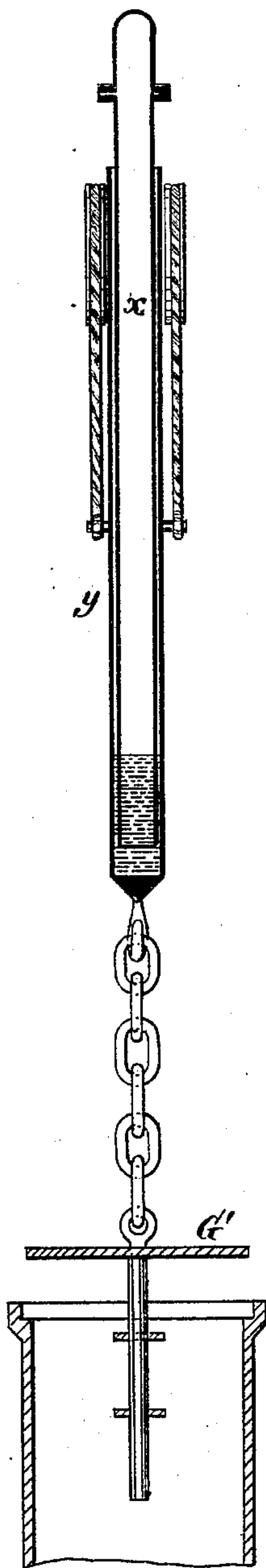
J. A. BECHEM.

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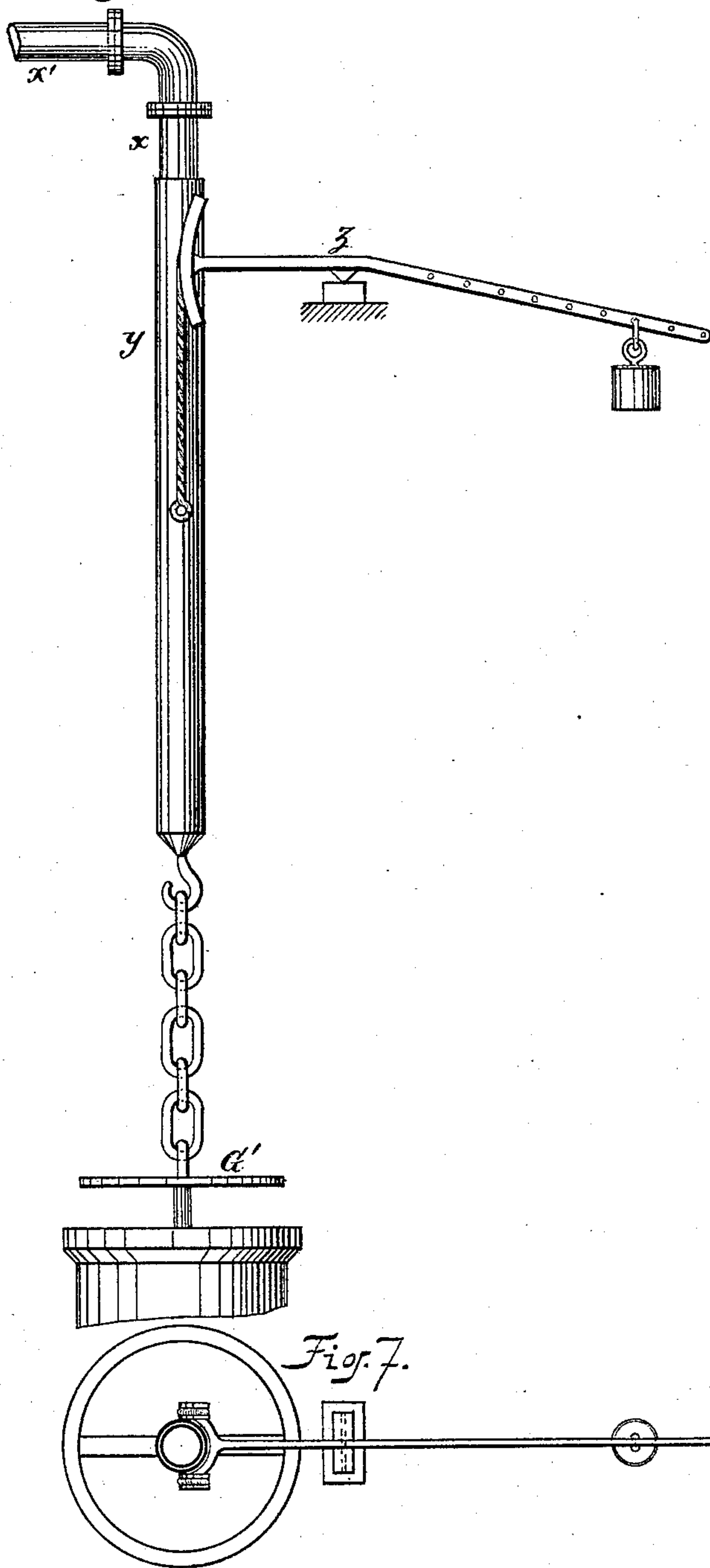
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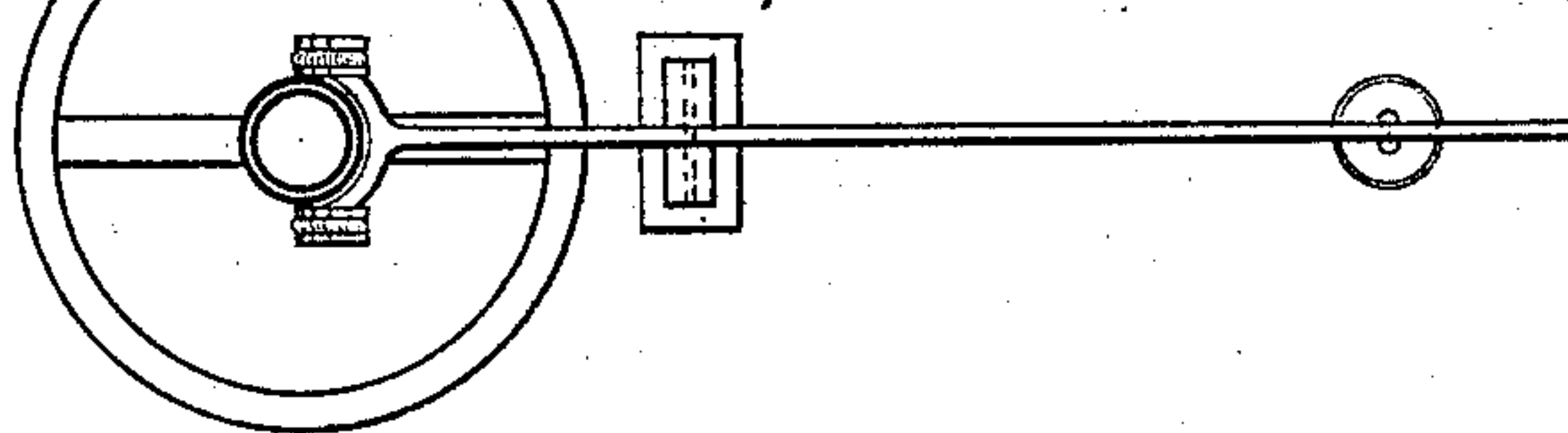
*Fig. 5.*



*Fig. 6.*



*Fig. 7.*



*Witnesses.*

*A. Galt*

*Robert Everett*

*Inventor.*

*Julius A. Bechem.*

*By James L. Norris.*  
*Atty.*

# UNITED STATES PATENT OFFICE.

JULIUS ADOLPH BECHEM, OF HAGEN, WESTPHALIA, GERMANY, ASSIGNOR  
OF ONE-HALF TO CARL JOHANN DIEDRICH WILHELM POST, OF SAME  
PLACE.

## APPARATUS FOR HEATING BUILDINGS.

SPECIFICATION forming part of Letters Patent No. 256,952, dated April 25, 1882.

Application filed March 3, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, JULIUS ADOLPH BECHEM, a subject of the King of Prussia and German Emperor, residing at Hagen, in the Province of Westphalia and German Empire, have invented a new and useful Improvement in Apparatus for Heating Buildings, of which the following is a specification.

My invention relates to improvements in apparatus for heating buildings in which steam is generated at a common source, and thence is distributed throughout the building and conducted to the rooms to be heated by means of steam-conduits; and the objects of my improvements are, first, to provide automatically a continuously equal pressure for the steam generated at the common source and contained in the said steam-conduits by combining said source with a self-acting device for regulating said pressure; second, to afford facilities for the proper generation of steam in the apparatus when using coke for fuel, and for applying high-pressure steam in generating steam within the apparatus when dispensing with the coke; and, third, to provide means for calling the attending servant in case of the boiler running short of water. I attain these objects by the apparatus illustrated in the accompanying drawings, in which—

Figure 1 is a view of the entire apparatus; Fig. 2, a top view of the same; Fig. 3, a vertical section of the apparatus on the line *xx*, Fig. 1; Fig. 4, a horizontal sectional view of the same; and Figs. 5, 6, and 7 are detailed views of the regulator for regulating the pressure in the boiler.

Similar letters refer to similar parts throughout the several views.

I preferably arrange the generator in the basement of the building to be heated. Said generator consists of an upright boiler, A, of cylindrical form, having a concentric funnel, B, extending throughout the entire length of said boiler, and serving for the reception of fuel, which falls down through it upon a grate composed of wrought-iron sharp-edged fire-bars

pivoted underneath the boiler A in any suitable manner. Said funnel B, at its upper end, is closed by means of a removable cover-plate, M, the latter shutting up the funnel B entirely air-tight, it being provided with ground faces and an intermediate packing of any convenient form and material.

D is the fire-tube, arranged a short distance above the bottom of boiler A.

The brick wall E, in order to insure more perfect radiation, is provided with an air-case, E', and is so constructed as to leave an intermediate space, L, between the said wall E and the boiler A, said space L, near the bottom of wall E, connecting with the flue at a point opposite to the fire-tube D.

The ash-hole F connects with the air-conduit H, which is made to be shut off by means of a disk-valve, G, applied to the pressure-regulator J, constructed and operating as will be hereinafter described.

N is the stoke-hole, which, like the ash-hole F, is constructed so as to allow of its being closed in an air-tight manner by means of a door with ground face. The stoke-hole door *n* is coupled to the ash-hole door *f* by means of a connecting-rod, *a*, pivoted to their respective latches *a'* *a''*, for the purpose hereinafter specified.

O is a vertical pipe, open at either end, and provided near its top with a safety-valve. (Not shown in the drawings.) Said pipe O extends into the boiler A, and is inserted in the cover of the latter so as to form a steam-tight connection with the same.

R is the water-gage, of the usual form, and S the alarm-pipe, provided near its upper end with a steam-whistle of any known form. (Not shown in the drawings.)

T is a high-pressure steam-conduit running through the lower part of the water-space of the boiler A. Said conduit T serves to heat the water, and thus generate steam within the boiler A, by means of steam obtained from any suitable outside source. The pipe T is bent so as to offer a large heating-surface, and is



educted from the boiler at a point nearly opposite to its point of entrance, said pipe T being provided near its outlet end with any convenient means for allowing the condensed water to flow off. Steam can be prevented from entering the bent part of the said conduit-pipe T, inclosed in the water-space of the boiler A, by closing the throttle-valve G', which is operated upon by means of levers o', connecting with the pressure-regulator J, hereinafter described.

J is the pressure-regulator. The same consists of a fixed pipe, x, open at its lower end, connecting with the boiler A by means of a common steam-conduit pipe, x'. Said fixed pipe x is inserted in another pipe, y, open at its top, said pipe y being made to slide up and down on the pipe x. The outer or sliding pipe, y, is suspended at one end of an adjustable weighted lever, z, in any convenient manner, and is connected to the valves G and G', regulating the pressure of steam by controlling the means for producing such steam within the boiler A. The pipe y is partially filled with mercury, so that air is prevented from entering the pipe x in any of the positions of the latter.

The operation is as follows: After the funnel B has been filled with coke it is closed by fastening the cover-plate M, whereupon the fire is lighted and the coupled doors of F and N are closed. The weighted lever z, having been so adjusted as to leave open the inlet of the air-conduit H when there is no steam (or respectively but the required quantity of steam) in the boiler A, allows of a lively combustion of the fuel on the grate B', and consequently of a quick generation of steam within the boiler; but as soon as said steam exceeds the required pressure it will depress the pipe y, owing to its action upon the mercury in the latter and to the adjusting of the weighted lever z, and thereby shut off the air from entering the conduit H, the valve G having closed the inlet of the latter. As a consequence, the combustion of the fuel will abate and less steam will be generated than before, which causes the pipe y to rise and the valve G to set free again the inlet of air-conduit H, causing thereby a renewed intense combustion of fuel and vivid generation of steam until the latter exceeds its stipulated pressure again, whereupon the former operation is repeated. The same action of the pressure-regulator J takes place with reference to the high-pressure steam-conduit T, shutting off the heating-steam from the heating part of said conduit by closing the throttle-valve G' when the steam in the boiler A exceeds its normal pressure, and opening said valve G' when the pressure has abated sufficiently, all of which is well understood and need not further be described.

The door of the ash-hole F is coupled to the door of stoke-hole N, as hereinbefore described. The object of such coupling is in cleaning the said ash-hole F to prevent the combustion from

becoming more intense, owing to the draft caused by opening the ash-hole door, such draft being compensated by the cold air entering the stoke-hole, the door of the latter always opening simultaneously with the ash-hole door by means of the coupling-rod a, connecting the respective latches of the said doors. Consequently the air causing the combustion of the fuel can enter through the air-conduit H only, the quantity of such air being regulated by means of the pressure-regulator J strictly in accordance with the steam consumed in the boiler A, as above described.

The open vertical pipe O is applied to exclude all danger from explosion; but in order to prevent the steam in the boiler from blowing off, said pipe O, at its end, may be provided with a safety-valve opening at a fixed maximum pressure.

The products of combustion from the grate B' enter the fire-tube D, and thence pass into the space L, as indicated by the arrows, entering the flues at a point opposite to the fire-tube D, said arrangement of fire-tube D and space L insuring a most perfect distribution of heat around the boiler A. The steam from the latter, by means of the steam-conduit, may be conducted to the highest part of the building to be heated, and thence be distributed within the latter by means of branches in the usual manner. The condensed water from the steam-conduits may be returned into the boiler A by means of suitable conduits of any known form and construction. It is evident that with this arrangement the boiler A requires but very seldom—say once a week—to be fed with fresh water, as of the latter that part only evaporating in the heated rooms is necessarily lost. The waste of fuel will be the least possible, the same being regulated just exactly in proportion to the consumption of heat required. It is therefore not necessary to employ an engineer to attend to the operation of my improved apparatus, said operation being provided for entirely in an automatic manner and with perfect safety. Consequently the apparatus may be attended to by any servant of the household, the latter being aroused in the event of the neglect to feed the boiler with fresh water at the proper time by the sounding of the whistle of the pipe S.

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

1. In steam-heating apparatus, the combination of the coupled doors n and f, for closing and opening simultaneously the stoke-hole N and ash-hole F, the air-conduit H, regulator J, and steam-pipe x', for the purpose of maintaining a uniform pressure of steam within the boiler A, substantially as herein set forth.

2. In combination, the coupled doors f and n, air-conduit H, regulator J, steam-pipe x', fire-tube D, and intermediate space, L, arranged between the boiler A and the wall E, provided with air-case E', as set forth.

3. The combination, with the boiler of a steam heating device, of the regulator J and the high-pressure steam-conduit T, having the valve G, connected by the lever *o'* to the regulator J, substantially as and for the purpose specified.

In testimony whereof I have signed my name

to this specification in the presence of two subscribing witnesses.

JULIUS ADOLPH BECHEM.

Witnesses:

CARL FÉRIÉ,

EDUARD KNEISEL.