

(No Model.)

2 Sheets—Sheet 1.

W. J. McALEENAN.  
STEAM BOILER.

No. 475,409.

Patented May 24, 1892.

Fig. 1

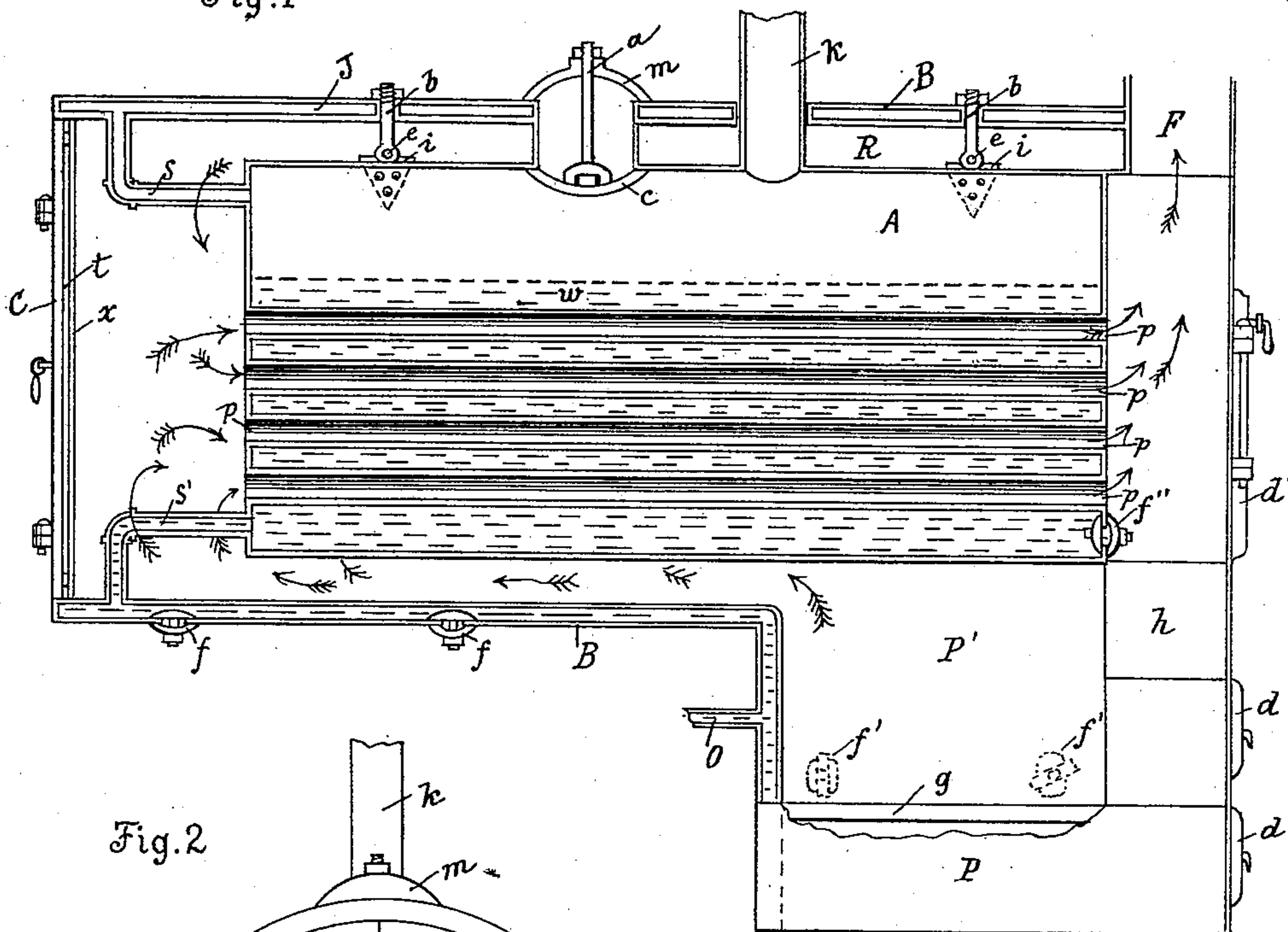


Fig. 2

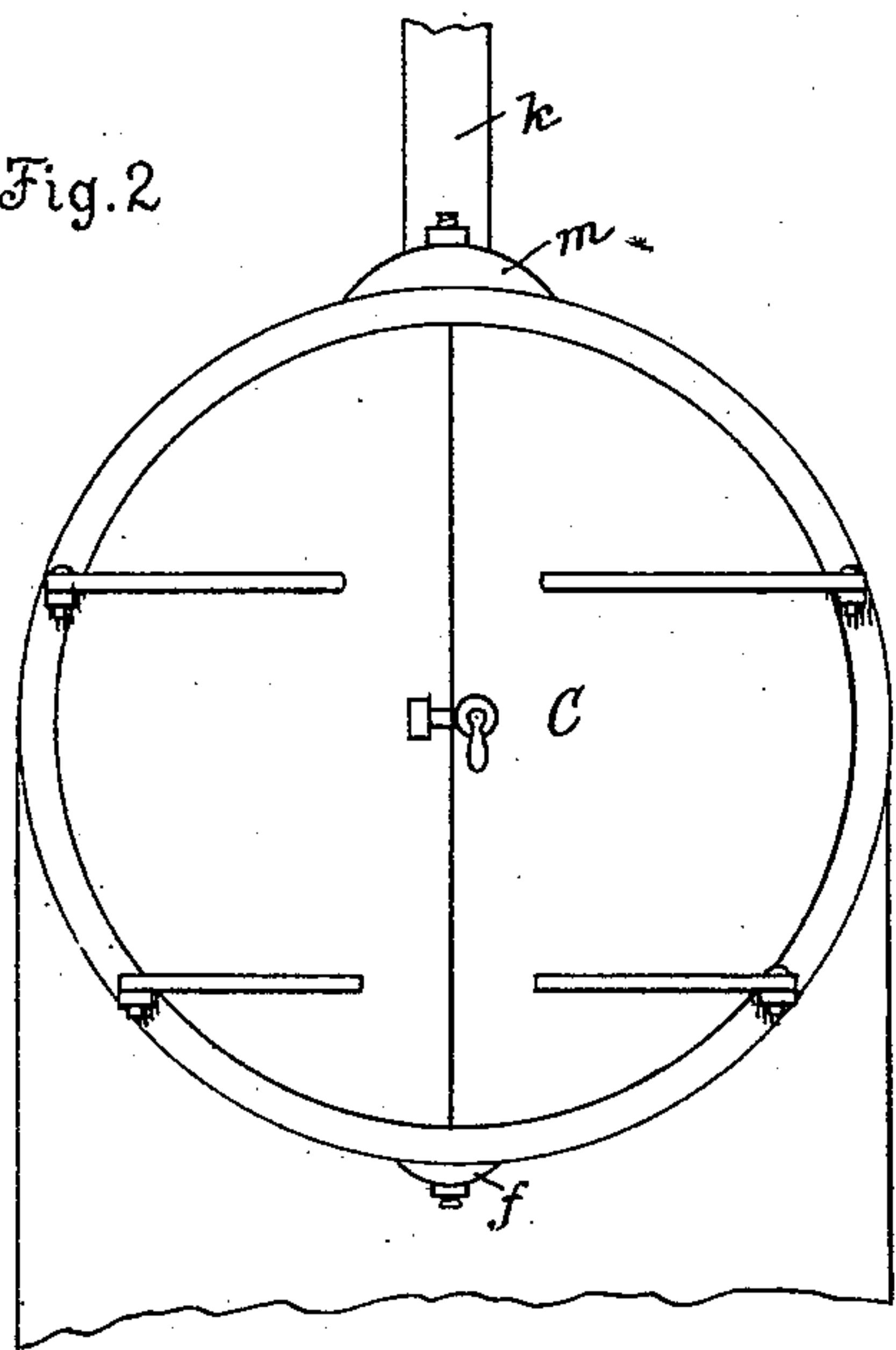
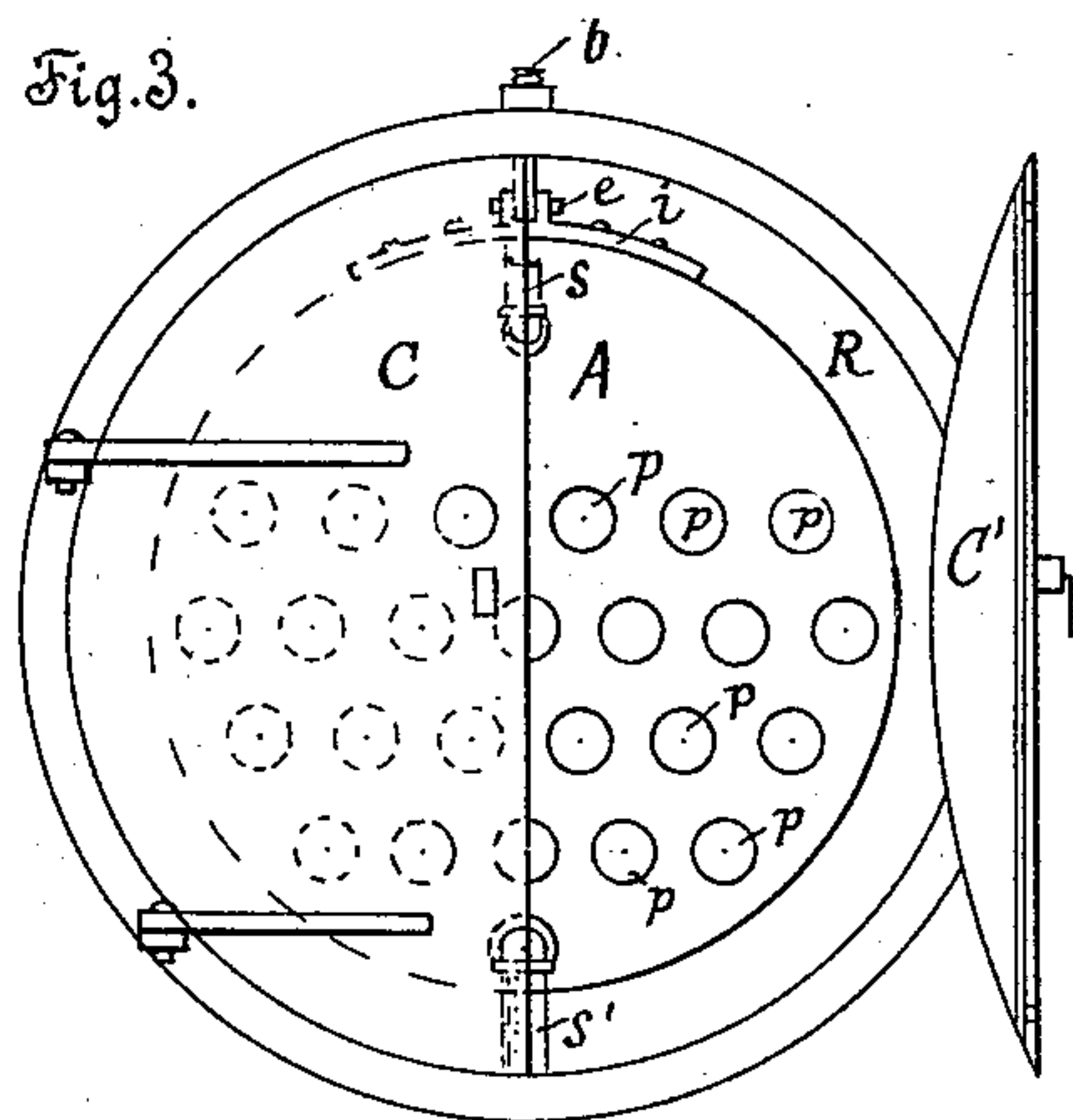


Fig. 3.



Witnesses:

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Inventor:

William J. McAleenan,  
by W. V. Tefft, Atty.

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Fig. 4.

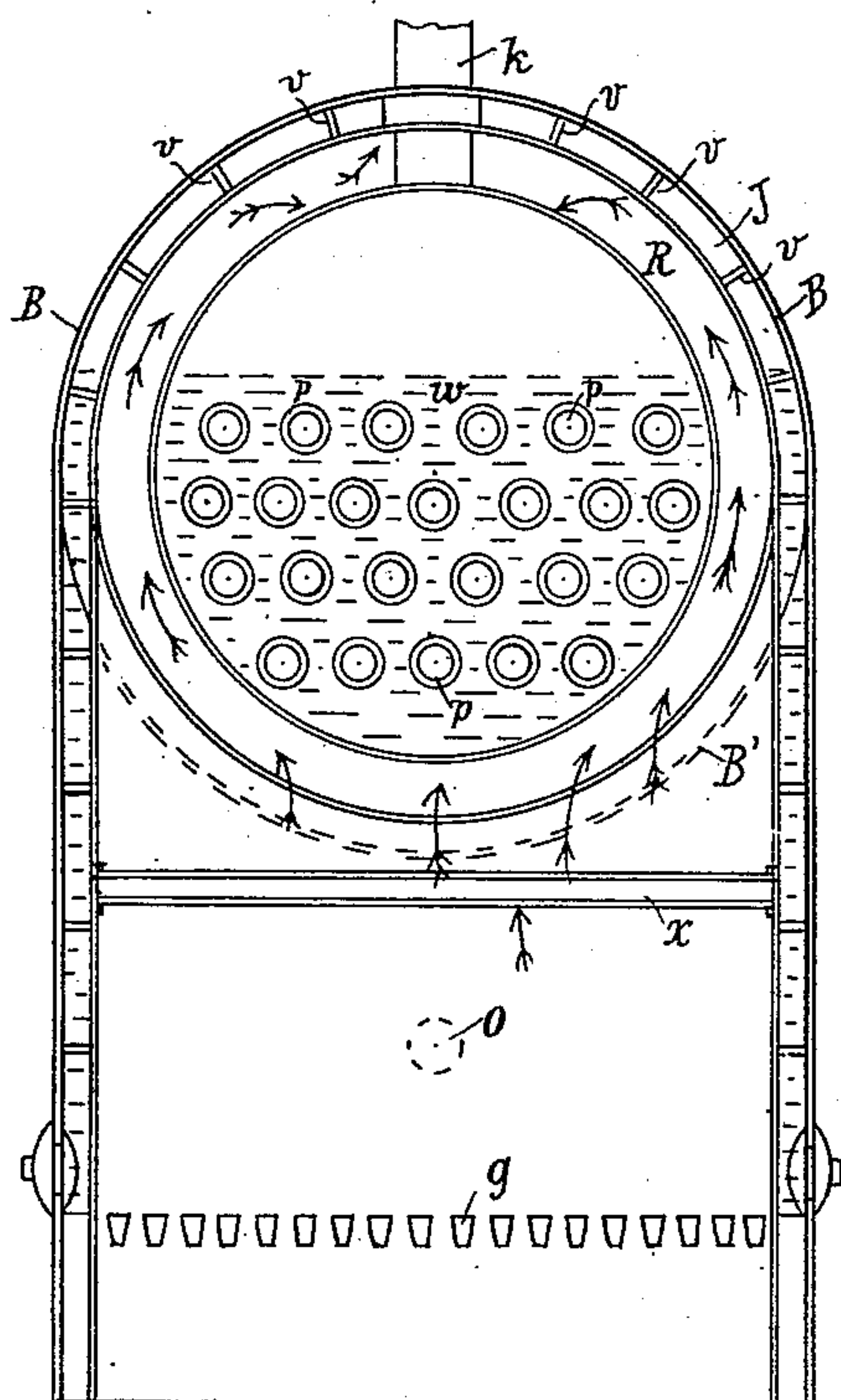
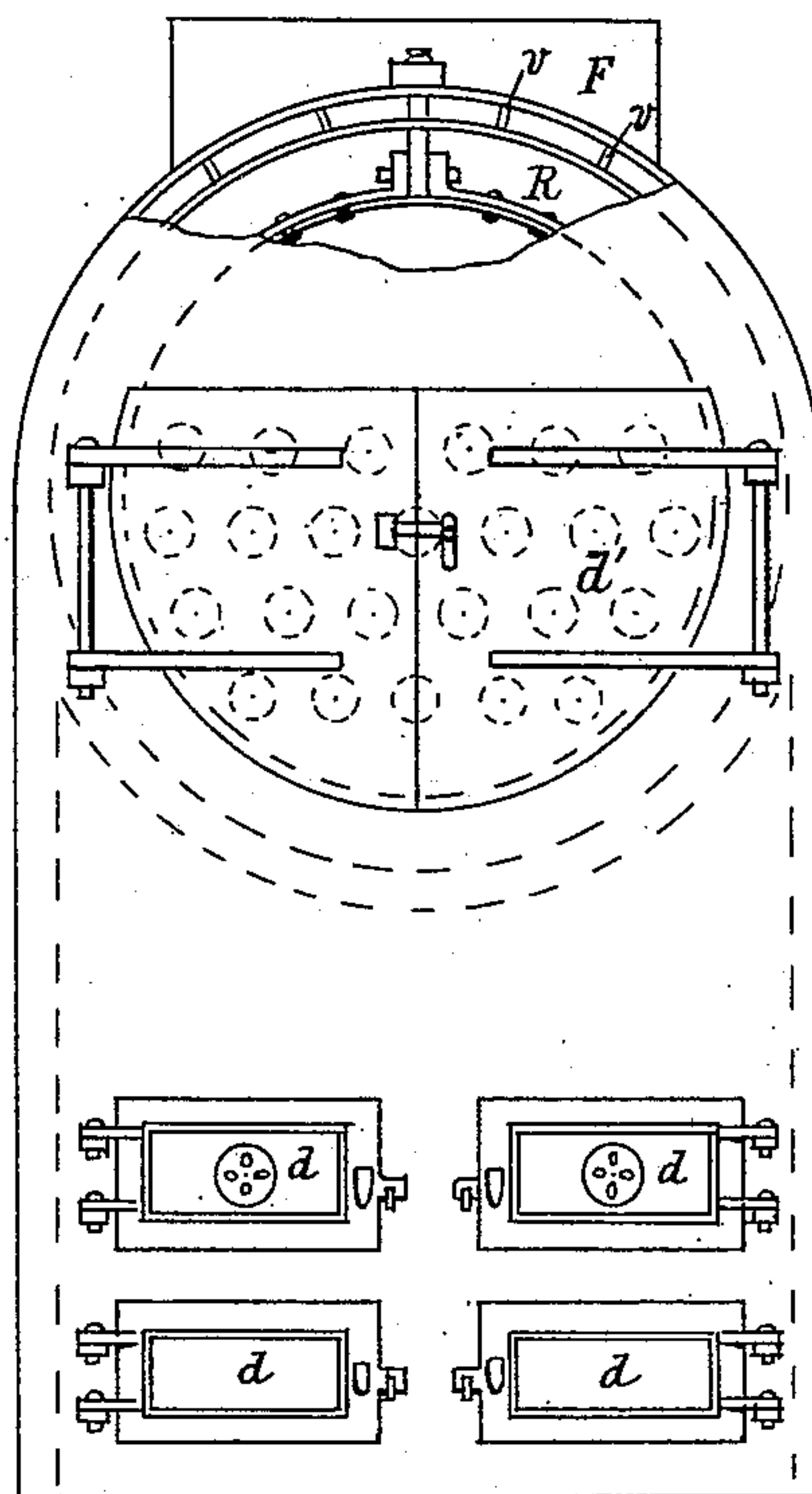


Fig. 5.



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# UNITED STATES PATENT OFFICE.

WILLIAM J. McALEENAN, OF PEORIA, ILLINOIS.

## STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 475,409, dated May 24, 1892.

Application filed January 19, 1892. Serial No. 418,604. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM J. McALEENAN, a citizen of the United States, residing at Peoria, in the county of Peoria and State of Illinois, have invented certain new and useful Improvements in Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to certain new and useful improvements in steam boilers or heaters by means of which a steam boiler or heater is provided which is simple in construction, durable, and effective in operation for the purpose designed.

More particularly my invention relates to a steam-boiler adapted to utilize all of the heat from the fire-box by being provided with inner and outer surfaces to receive and conduct the heat that none may be wasted, thus presenting a great expanse of heating-surface or conducting-surface, thus enabling the production of the greatest amount of heat possible from any degree of combustion and with the least consumption of fuel.

My invention consists, essentially, of the usual steam-boiler provided with the necessary flues and having all the necessary appointment of parts in the construction of the same and having as a part thereof or being connected therewith a combined water and steam jacket or inclosing case consisting of hollow walls vertical at the sides of the fire-box and meeting in an arch above, and with the backward end thereof constructed in a circular form and forming a continuous circular case hollow as in the vertical sides and arched top, as shown hereinafter, and having a positive circulation from outer casing with the boiler by means of suitable connecting-pipes and with the inner boiler suspended within the outer casing, leaving a sufficient circulating-space for heat and smoke around the entire boiler.

My invention has for its objects generally to improve upon prior devices of this character in the appointment of its elemental parts and the arrangement thereof to attain the best results possible.

That my invention may be more fully un-

derstood reference is had to the accompanying drawings, in which—

Figure 1 is a central longitudinal section. Fig. 2 is a rear elevation showing doors which provide access for cleaning flues. Fig. 3 is also a rear elevation showing one of the doors open. Fig. 4 is a transverse section, and Fig. 5 is a front elevation.

In the figures, A represents the boiler proper, provided with the flues *p p p p*, &c.

B is the outer hollow wall or water-jacket, within which the boiler A is suspended by means of the eyebolts *b b*, provided with suitable pins, plates, and nuts for properly securing the same, as shown.

*k* is an outlet-pipe for the steam from the boiler A.

*c m* are plates connected by means of the bolt *a*, adapted to close the manhole, as shown.

*f''* is a hand-hold adapted in location to facilitate the cleaning or freeing the boiler A from foreign matter or sediment.

J indicates the hollow space between the hollow wall B, which extends entirely around the boiler, and the said wall is made firm and strong by means of the stay-bolts or stays *v v*, &c.

P is an ash-pit immediately below the fire-box P' and separated therefrom by means of the grate *g*.

*d d* are doors provided for opening into the respective compartments, and *d'* is a door provided to give access to the boiler A for the purpose of cleaning the flues, the doors C at the rear end of the boiler being provided for the same purpose.

F is the smoke-stack.

R is the circulating-space for smoke and heat between the boiler A and the water-jacket or inclosing hollow walls B B.

*f f'* are hand-holds at the base of the vertical hollow walls and are provided to facilitate the cleaning or the freeing of the said walls from accumulated foreign matter or sediment. *f' f'* are hand-holds provided for the same purpose.

S' is a circulating-pipe connecting the water-jacket at a point below the water-line with the boiler.

s is a steam-equalizing pipe connecting the water-jacket at a point above the water-line



with the boiler at a point above the water-line, which acts as an equalizer to keep the water level in both shell and boiler.

The arrows indicate the course of the heat, smoke, or products of combustion in their course through the compartments and flues until their final escape through the smoke-stack, thus performing the office of superheating the steam, rendering the same perfectly dry before leaving the boiler.

The operation of my improved heating apparatus is very simple and apparent. The combustion of materials upon the grate producing heat, the same is carried upward and around the sides of the boiler, over the top, and beneath the same, as is indicated by the arrows, and in its vibration contacts with and is absorbed by the iron walls of the boiler A or the inner wall of the water-jacket B and readily conducted to the water within the respective compartments, with the effect of producing steam from the heating of the water in each, and the heat, having circulated around the boiler within the open space R, finally escapes at the rear end of the boiler through the flues *p p p*, thus still further aiding in the heating of the water within the boiler, and finally through the smoke-stack at the forward end of the heating structure, thus utilizing all of the heat produced by the combustion.

It will be seen from the general structure and arrangements of the various parts of the device that it is the very simplest form and best adapted for absolute and effective draft and for such a circulation of the heat as to adapt it to bring forth the best possible results.

The operation of the heating device proper in the production and circulation of steam is apparent. The water heated in the boiler A rises to the top portion of the boiler and is there superheated, as previously described, and rendered perfectly dry, and is carried upward through the pipe *h* through the various radiators, and the water resulting from the condensing of the steam is returned to the boiler, entering through the return-pipe O into the lower portion of the water-jacket B, where it is immediately reheated and returned to the boiler through the circulating-pipe S', thus making a complete and positive circulation with comparatively no loss resulting therefrom, and the steam resulting from the heating of the water in the water-jacket rising to the top of the said water-jacket is superheated therein and returned to the upper part of the boiler through the steam-circulating pipe S, thus rendering it impossible for any interference from water, as would result were the steam-pipe below the water-line, as is the case in all other structures. It will be seen from the structure that the outer shell is provided with doors both at front and rear, which renders the same accessible for the purpose of cleaning the flues, and also for clean-

ing the chamber or space between the boiler A and the water-jacket, thus enabling it to be entirely freed from soot and other products of combustion very quickly and with little inconvenience and without taking the boiler apart or any part thereof. It will further be seen from this structure that it is not necessary that any brick should be used in connection therewith, as the only space that is necessary to be other than steel or where filling is required is that represented by *h*, which may be filled with a composition of fire-clay and gravel, which is practically a non-conducting substance, thus preventing the loss of any heat; but to effectually quarantine against such escape the outer shell may be covered with packing, thus rendering it practically non-conducting and effectual by preventing the escape of any heat. In the old forms where brick walls were used fully half the heat was lost. In this structure it will be seen that there are no opportunities for the weakening of any part thereof or the opening up of any joint or crevice to provide an inlet for air, and the escape of the general structure both of boiler and outer compartment being circular all points thereof assist to resist any pressure brought thereon, and it might here be stated that this boiler is adapted only for low-pressure steam-boilers and that it is the only boiler that can be cleaned between the boiler and shell.

The particular features of advantage possessed by my improved steam-boiler are that there is positively no brick-work essential to its structure; that it has a positive circulation of water; that the maximum amount of heat is produced and utilized by the minimum amount of combustion; that it is so constructed that it will free itself from soot by the burning of the same, thus preventing it from clogging up and retarding circulation; that it is just as safe with one hundred pounds of steam as with ten; that it may all be made of steel, no cast-iron being necessary in its structure; that it has ample openings to provide access, both external and internal, for the cleaning of boiler, jacket, or flues.

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

1. In a steam-boiler, the combination, with the boiler A, having the flues *p p*, &c., and the hand-hole *f''*, of the water-jacket B, formed by two walls with the hollow space J and formed with the vertical walls at the sides of the fire-box and meeting to form an arch above, and with the backward end thereof constructed in a circular form and with the said water-jacket provided with the doors C *d'* and with the hand-holes *f f' f' f'* and with the stay-bolts *v v*, &c., the circulating-pipe S', connecting the water-jacket B and boiler A at points below the water-line, and the equalizing-pipe *s*, connecting the boiler and water-jacket above the water-line and provided with



smoke-flue *F*, steam-outlet pipe *k*, and man-hole closed by plates *c m*, all substantially as described and set forth.

2. In a steam-boiler, the combination, with  
5 the water-jacket *B*, formed of two walls with hollow space *J* and formed with the vertical walls at the sides of the fire-box, which meet in the form of an arch above, and with the rear end thereof constructed in a circular form, of  
10 the said water-jacket being provided at the forward and rear end with the doors *d C*, as shown, and having the hand-holes *f f' f''*, with the boiler *A* suspended within the said water-jacket by means of the bolts *b b* and  
15 provided with the flues *p p*, &c., and hand-hole *f''*, the water-jacket *B* and boiler *A* be-

ing connected at points below the water-line by means of the circulating-pipe *S'* and being connected at points above the water-line by means of the equalizing-pipe *s*, there be- 20  
ing further provided the smoke-flue *F*, the steam-outlet pipe *k*, and with a suitable man-hole opening out from boiler through the water-jacket and closed by means of the plates *c m* and suitable bolt, all substantially as de- 25  
scribed and set forth.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM J. MCALEENAN.

Witnesses:

JOSIE TEFFT,

R. N. MCCORMICK.