

W. H. HARRIS.
Hot-Air Furnace.

No. 133,096.

Patented Nov. 19, 1872.

Fig. I.

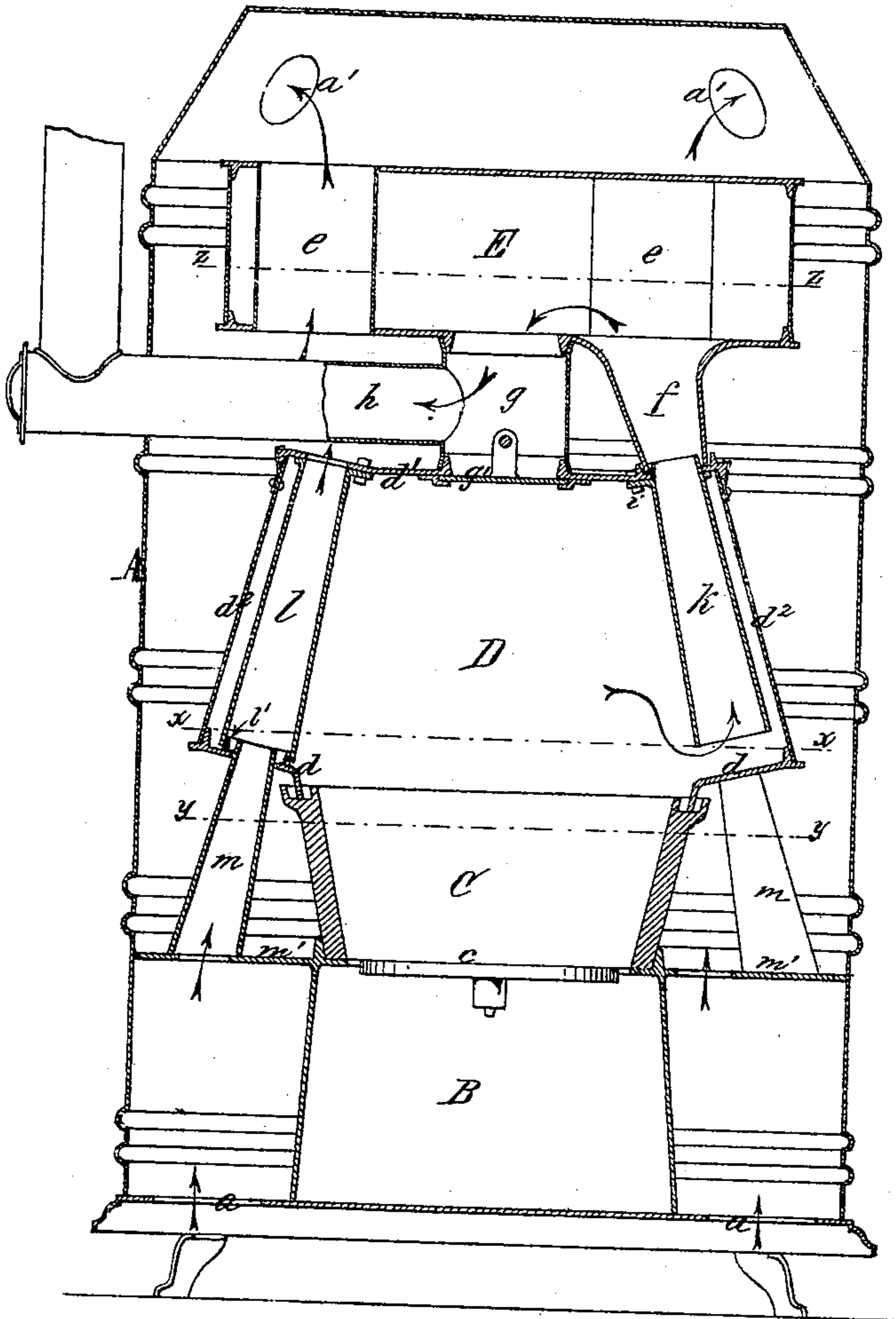


Fig. II.

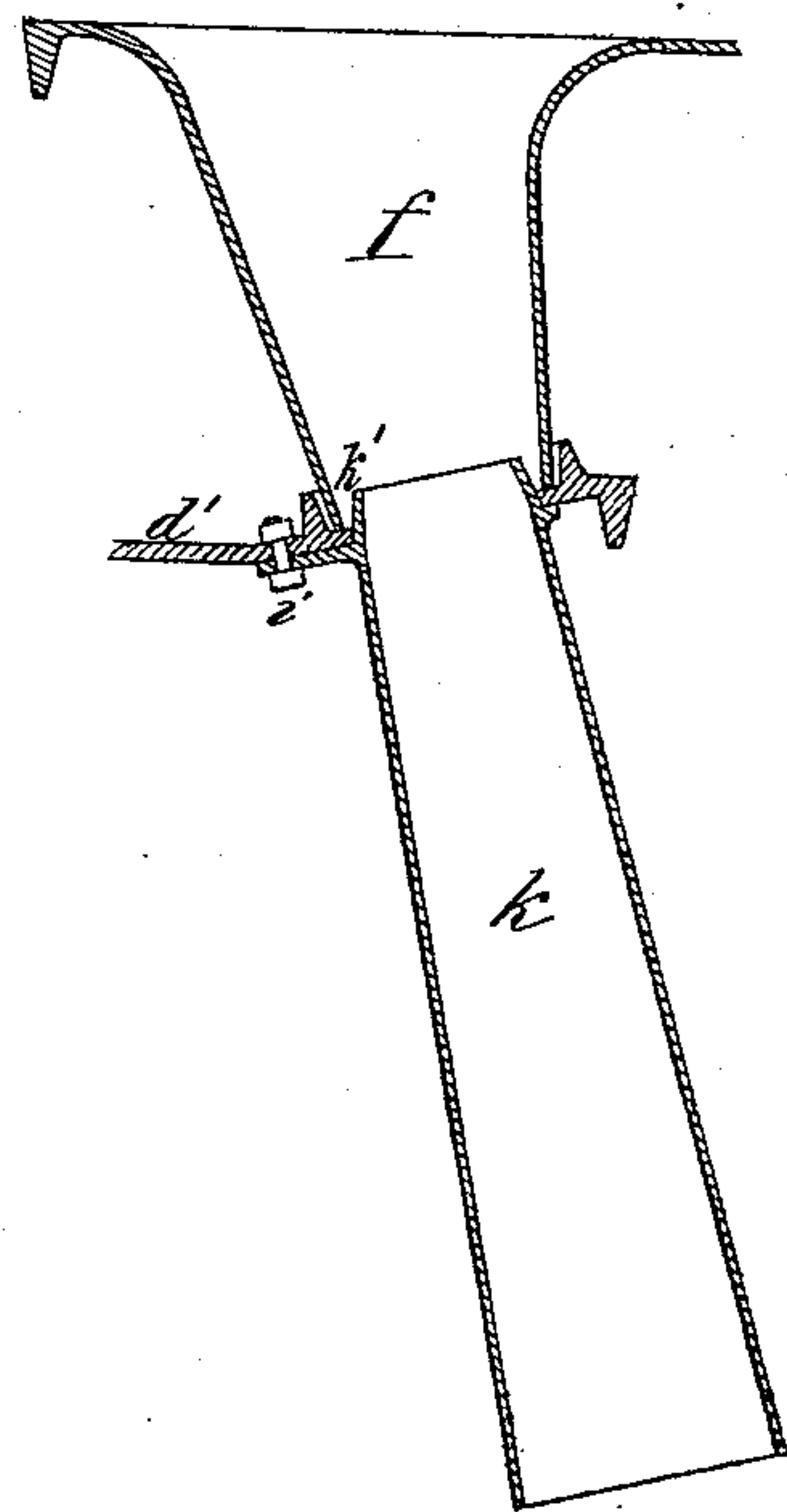


Fig. III.

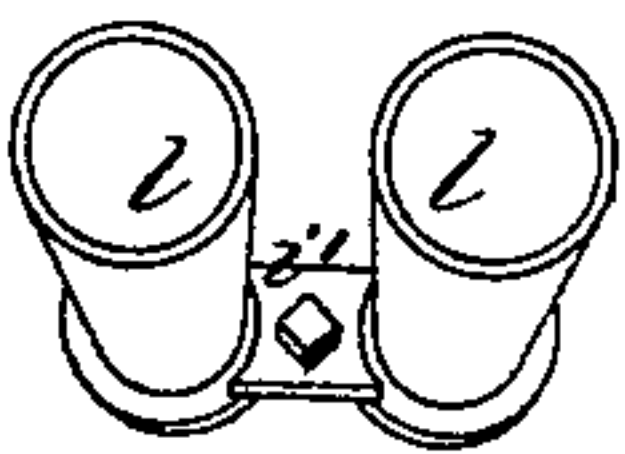


Fig. IV.

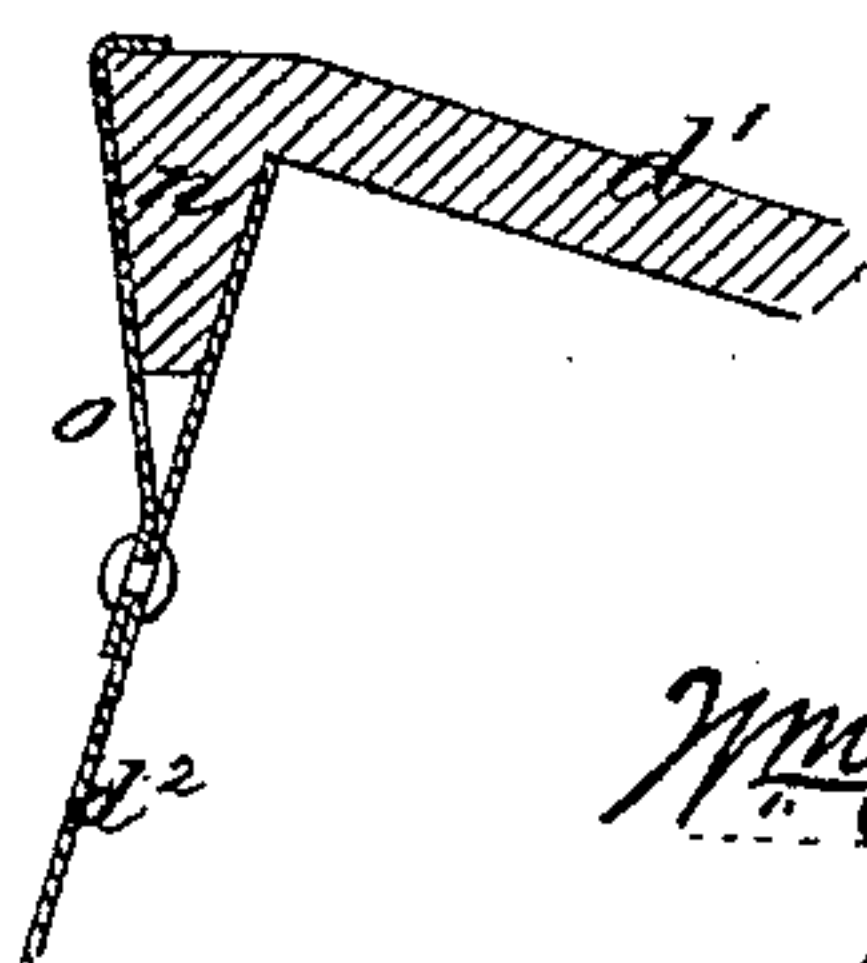
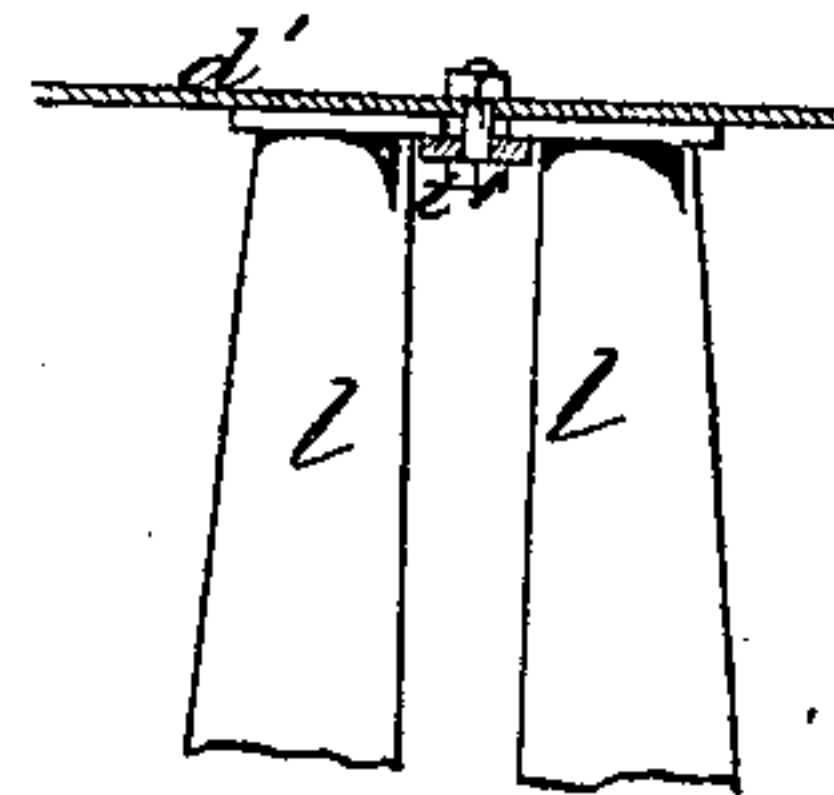


Fig. V.



John J. Bennett,
Edward Wilhelm,
Witnesses

Wm. H. Harris, Inventor
by Jay Hyatt
Att'y.

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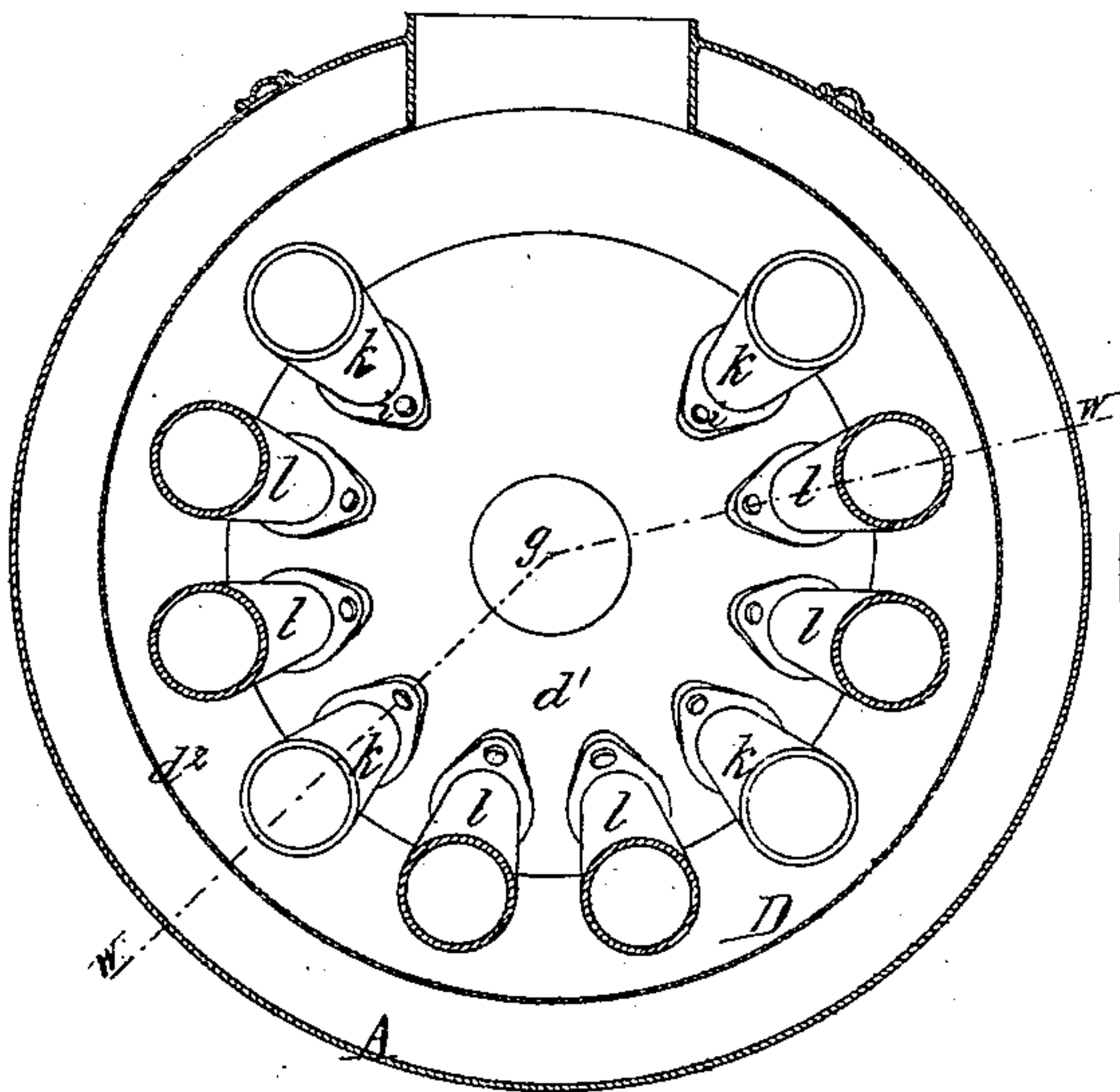


Fig. III.

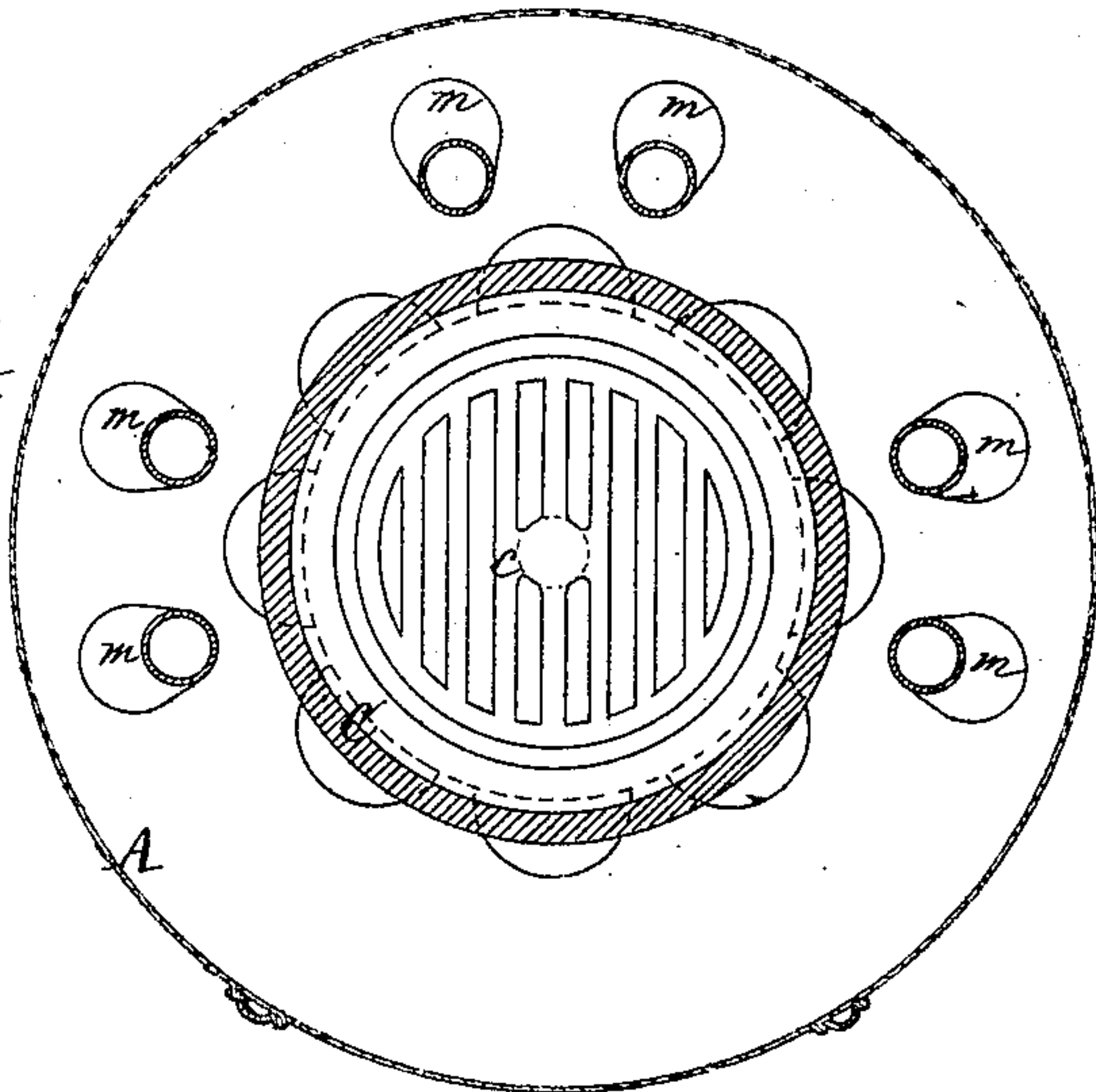


Fig. IV.

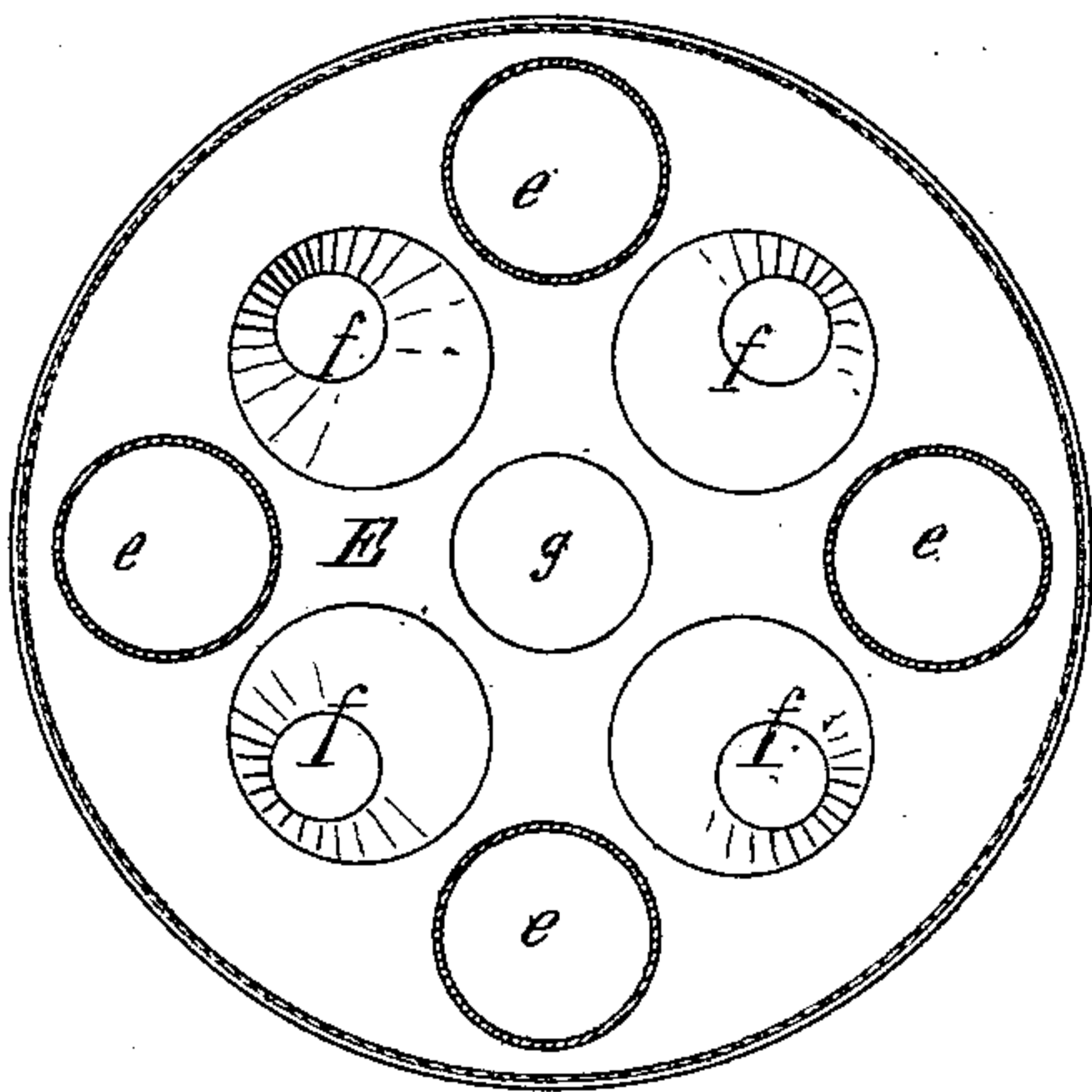
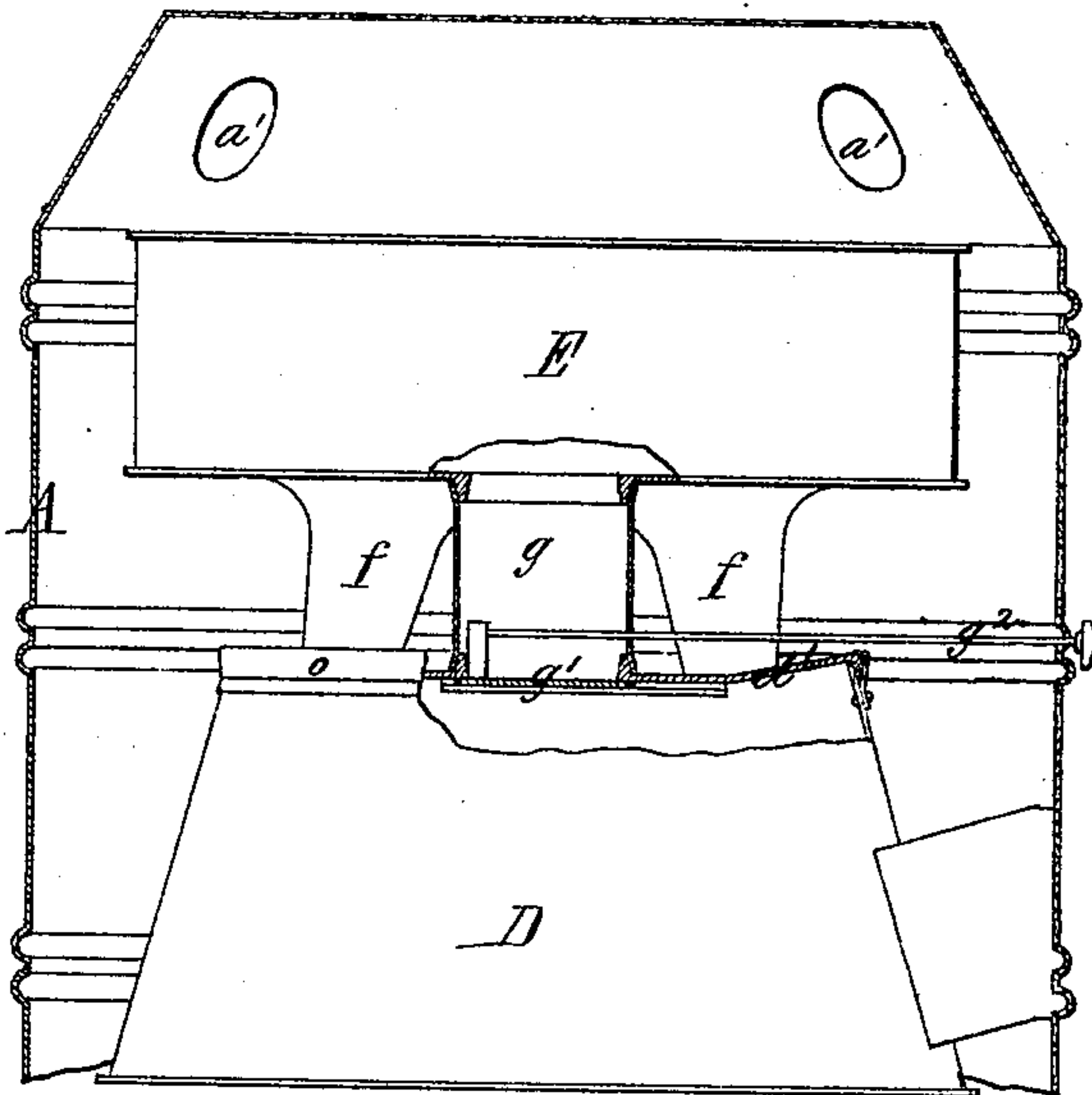


Fig. V.



John J. Donner
Edward Wilhelm } Witnesses

Wm H Harris, Inventor
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Atty.

UNITED STATES PATENT OFFICE.

WILLIAM H. HARRIS, OF BUFFALO, NEW YORK, ASSIGNOR TO CHARLES VALLETTE KASSON, OF SAME PLACE.

IMPROVEMENT IN HOT-AIR FURNACES.

Specification forming part of Letters Patent No. 133,096, dated November 19, 1872.

To all whom it may concern:

Be it known that I, WILLIAM H. HARRIS, of the city of Buffalo, in the county of Erie and State of New York, have invented certain Improvements in Hot-Air Furnaces, of which the following is a specification:

My improvements relate to ordinary hot-air furnaces provided with air-heating pipes arranged in the combustion-chamber and surrounded by a metallic case or brick-work, from which the hot air is conducted by suitable pipes to the apartments to be heated. Prior to my invention such furnaces have also been constructed with a supplemental radiating-chamber provided with air-pipes and arranged above the combustion-chamber, from which the products of combustion were conducted through flues arranged on the outside thereof to said supplemental chamber. My invention consists, first, in the combination, with the combustion-chamber and outer connecting-flues, of revertible flue-pipes made pendent from the lower end of said connecting-flues, by which the products of combustion are made to descend within the combustion-chamber before they enter said connecting-flue; second, in the arrangement of the pendent revertible flue, with the flue with which it communicates at the joint thereof, in such manner that the end of the pendent flue will project upward into the flue above so as to leave a V-shaped annular space, into which cinders or ashes collect, and thereby form a self-packing joint; third, in the arrangement in the combustion-chamber of the air-heating pipes, with the upper ends secured to the top plate thereof so as to be pendent therefrom, while their loose lower ends fit over a projecting sleeve or collar of the bottom plate, leaving a space between the latter and the end of the pipe, which allows the pipes to freely expand without tending to force apart the top and bottom plates of the combustion-chamber, thereby preventing the partial separation of the joints formed by the junction of the sheet-iron sides with the top and bottom plates, and the consequent escape of the gas into the surrounding air-space; fourth, in the combination, with the sheet-iron sides and top plate of the combustion-chamber, of a ring of sheet-iron riveted to the sides near the top and overlapping the upper end

of the top plate, thereby securing the sides and plate together, at the same time forming a suitable space for receiving and holding the material for packing the joint.

In the accompanying drawing, consisting of two sheets, Figure I is a sectional elevation on line *w w*, Fig. II; Figs. II, III, and IV are horizontal sections, respectively, on lines *x x*, *y y*, and *z z*, Fig. I; Fig. V is a partly-sectional elevation of the upper portion of the furnace, showing the damper; Fig. VI is a detached sectional view on an enlarged scale of one of the revertible pendent flues and connecting-flue; Fig. VII is a detached sectional view of the joint of the sides of the combustion-chamber with the top thereof; and Figs. VIII and IX are views representing a modified mode of attaching the air pipes and flues to the top plate of the combustion-chamber.

Like letters designate like parts in each of the figures.

A represents the outer case of the furnace, provided in the bottom, in the usual manner, with apertures *a* for the admission of the cold air, and in the top with air-escape apertures *a'*, with which the hot-air conduit-pipes connect. B is the ash-pit, and C the fire-pot, provided with the grate *c*, all of ordinary construction. D represents the combustion-chamber, composed of the bottom plate *d*, resting in a groove formed in the top of the fire-pot, a top plate, *d'*, both constructed of cast-iron, and a sheet-iron shell, *d''*. E is the supplemental radiating-chamber arranged above the combustion-chamber D. It is provided with vertical air-pipes *e*, open at both ends. *f* are flues leading from the combustion-chamber into the space surrounding the air-pipes *e*. *g* is the central vertical flue connecting the combustion and radiating chamber with the exit-pipe *h*, and *g'* the damper arranged below the latter in the flue *g*, and operated by a rod, *g''*, or in any other suitable manner. *k* represents the pendent revertible flues arranged below each of the connecting-flues *f*, and extending to within a short distance from the bottom plate *d*, so as to leave sufficient space below said flues for the free entrance of the products of combustion. They are secured to the under side of the top plate of the combustion-chamber by means of a bolt or bolts, *i*,

passing through an ear or flange cast with the pendent flue, or in any other suitable manner. The upper end of the revertible flue k extends upward to the flue f , whereby an annular space, or V-shaped groove, k' , is formed between both, as clearly shown in Fig. VI, which is gradually filled with ashes and cinders, thereby forming a self-packing joint. The flues f are held in place by a concentric sleeve or collar cast on the upper side of the top plate d' , in the usual manner.

When a direct draft is required the damper g^1 is opened, which permits the products of combustion to pass from the combustion-chamber directly to the exit-pipe h . By closing the damper, as shown in the drawing, the products of combustion are made to descend within the combustion-chamber, in order to enter the revertible flues k , in which they ascend, passing thence through the flues f , enter the radiating-chamber E , from whence they dive, and pass through the central flue g into the exit-pipe h , as indicated by arrows in Fig. I. The heated gases are in this manner retained longer in their course to the final escape-pipe, which permits the greater portion of heat to be absorbed therefrom by the air which enters the pipes e , and that surrounding the radiating-chamber. l represents the air-heating pipes, arranged within the combustion-chamber, and rigidly secured to and suspended from the under side of the top plate thereof. These pipes may be fastened to the top plate in the same manner as the pendent flues k , or as represented in Figs. VIII and IX. A plate, i' , may be fitted between two of the pipes so as to overlap the top flanges thereof, which plate, being bolted to the top plate, will secure two pipes or the sides of two pipes in place. The pipes l extend to within a very short distance of the bottom plate d , so as to leave sufficient space for expansion between the latter and the end of the pipe, and fit snugly over a projecting sleeve or collar, v , formed around the air-inlet aperture of the bottom plate. Hitherto these pipes have been arranged in contact with both the top and bottom plates, the pipes resting on the bottom plate while the top plate rested on the upper ends of the pipes. With this arrangement I have found from experience that the greater heat to which the air-pipes are subjected, would cause them to lengthen by expansion more than the sheet-iron case, and thus force open the joints, and cause a leakage of the gas. Upon the pipes cooling and contracting a space would be left between the

upper ends of the pipe and the top plate, through which the gas would escape into the air-pipes. My improved arrangement by which the pipes are suspended, and the joint and the top of the pipes made rigid, I have found, after a thorough test and use for over a year, to be an effectual remedy for these defects. m represents air-conduit pipes, preferably arranged below each of the air-heating pipes l , so as to communicate therewith, and resting on a horizontal plate, m' , surrounding the ash-pit B , for the purpose of insuring a supply of cold air to the air-pipes l , to prevent overheating the same. n , Fig. VII, represents a downwardly-projecting flange formed on the outside of the top plate d^1 of the combustion-chamber, so as to fit over the upper edge of the shell d^2 thereof. o is the connecting-ring secured to the outside of the shell d^2 below the flange n , by riveting or otherwise, and overlapping the latter with its bent upper edge, as clearly shown in Fig. VII. This not only secures the shell and plate together, but also forms a space between the ring o and shell d^2 , which is filled with a suitable cement or packing material, thereby insuring a gas-tight joint.

What I claim as my invention is—

1. The combination, with the combustion-chamber, supplemental radiating-chamber and connecting-flues f , of the pendent revertible flues k within the chamber D , substantially as hereinbefore set forth.

2. The arrangement of the pendent revertible flues k , with the connecting-flues f , so as to leave an annular space, k' , at their junction, forming a self-packing joint, as hereinbefore set forth.

3. The arrangement in the combustion-chamber of a hot-air furnace, of the air-pipes l , suspended at their upper ends from the top plate d , to which they are rigidly secured, while their lower ends fit over upwardly-projecting sleeves of the base-plate, between which and the ends of the pipes sufficient space is left for the expansion of the pipes, substantially as hereinbefore set forth.

4. The combination, with the sheet-iron shell d^2 , of the combustion-chamber and top plate d^1 thereof, provided with a flange, n , of the connecting-ring o , secured to the shell d^2 , and overlapping the outer edge of the plate d^1 , so as to connect both and form a packing space, substantially as hereinbefore set forth.

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Witnesses:

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EDWARD WILHELM.