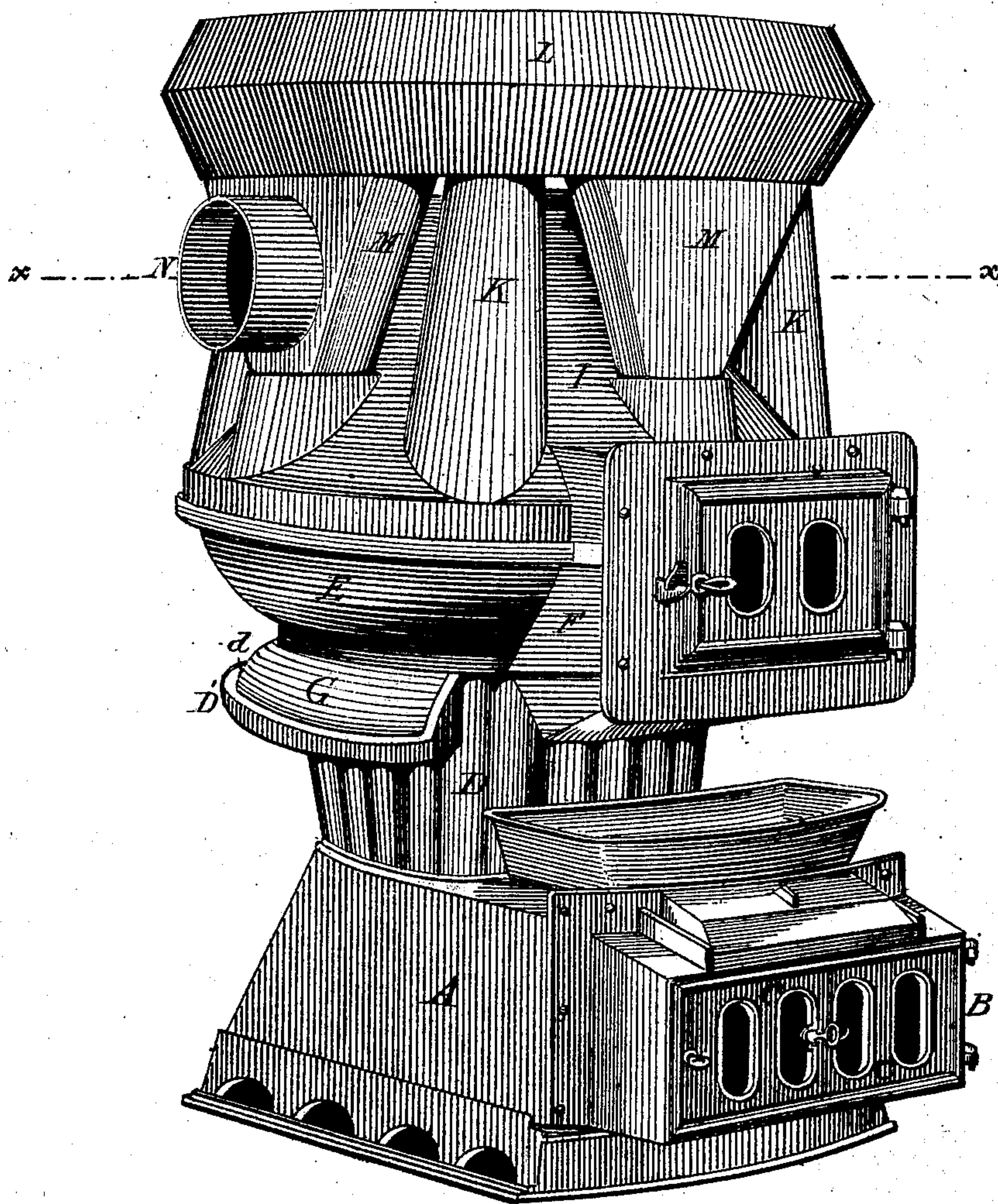


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Impt in Heating-Furnaces.

116723

Fig. 1.

PATENTED JUL 4 1871



Witnesses.

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Fig. 2.

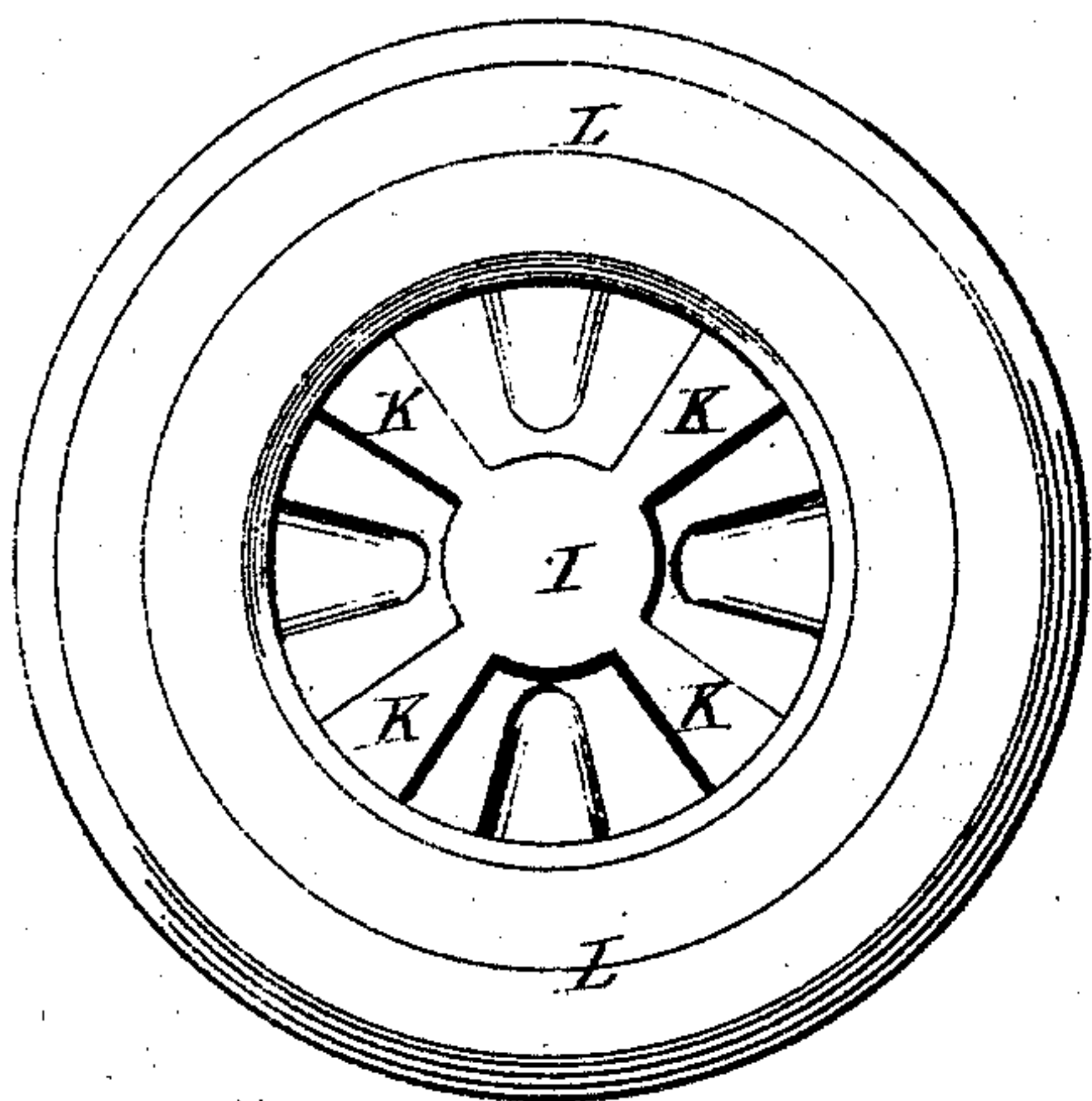


Fig. 3.

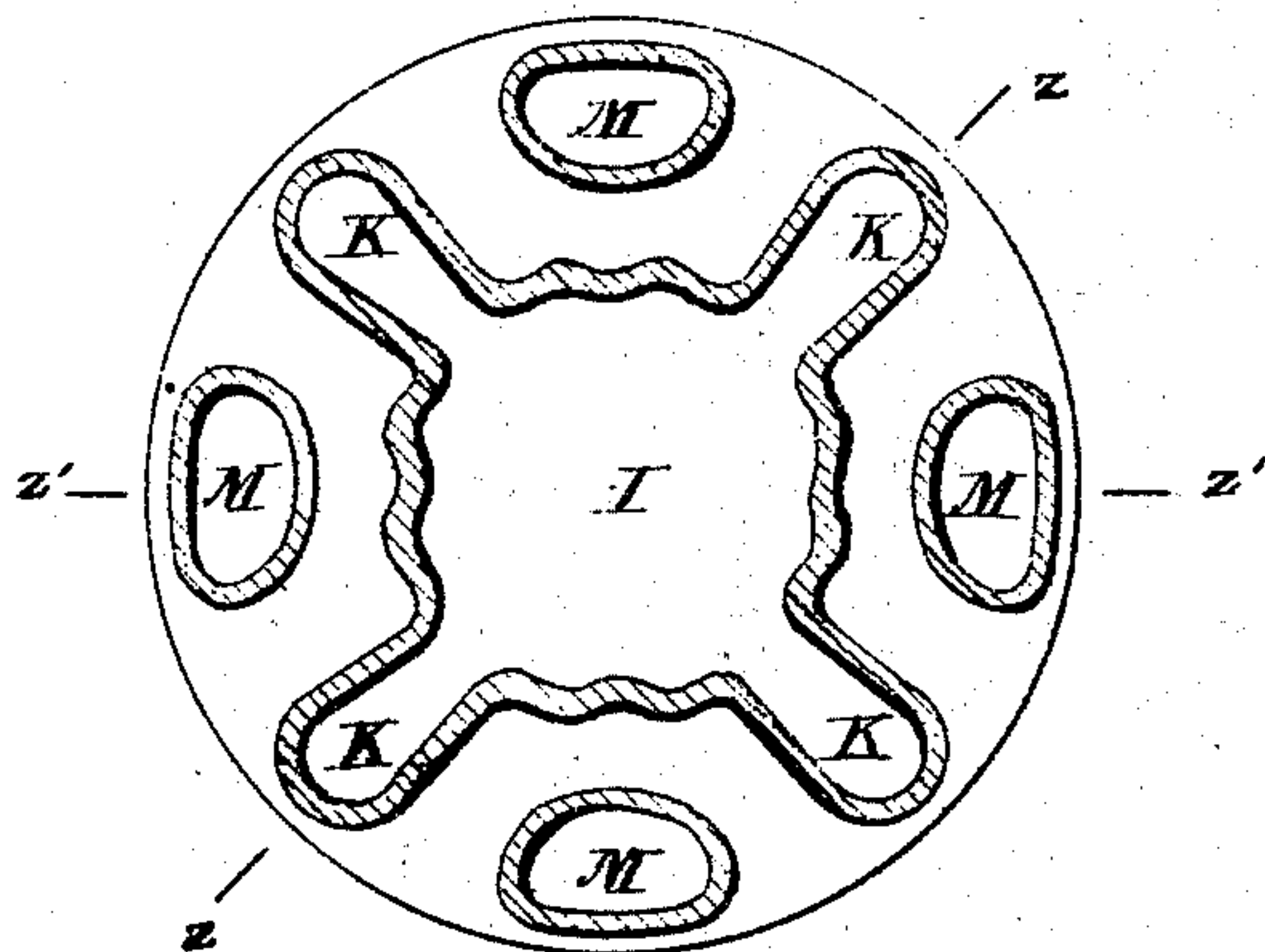


Fig. 4.

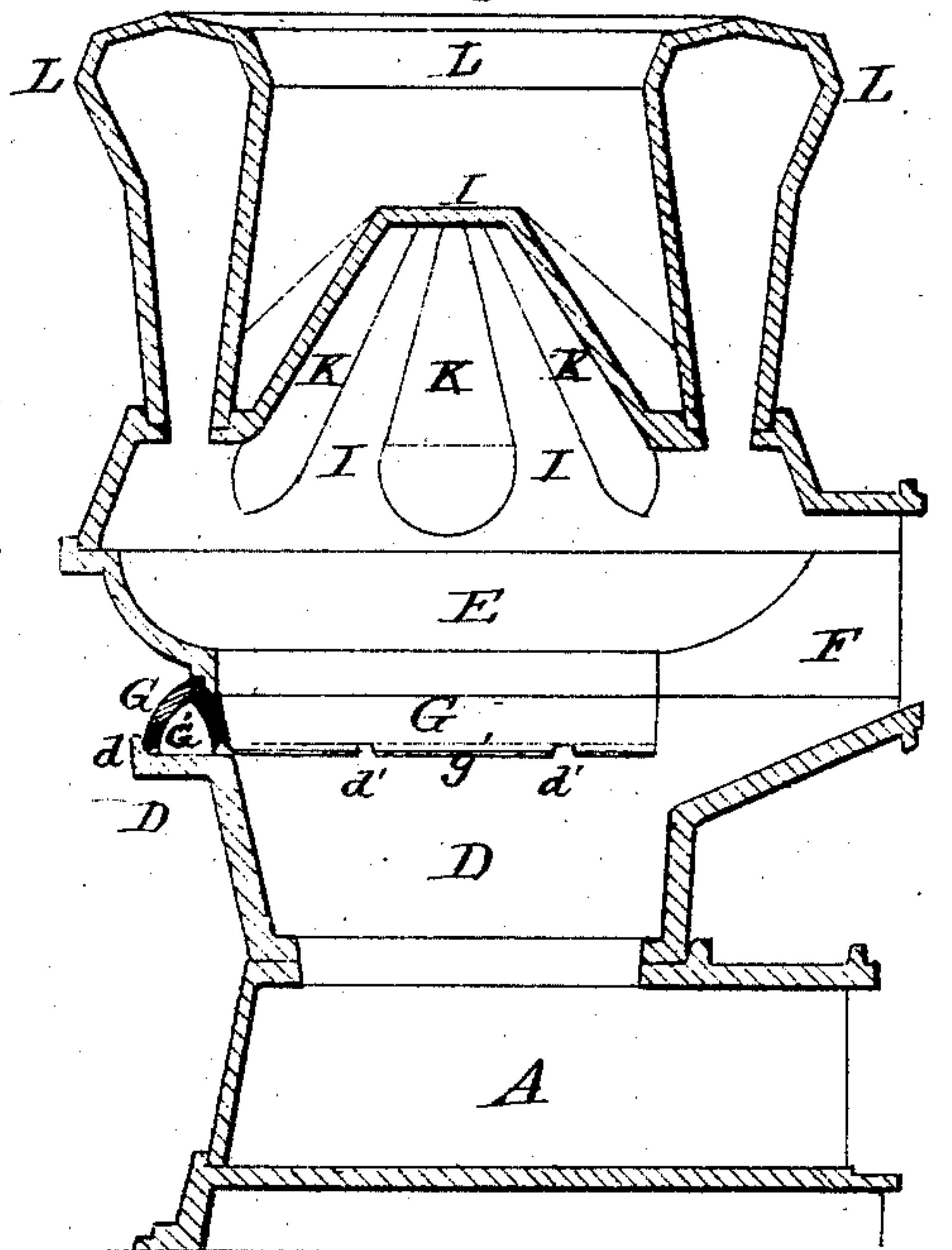
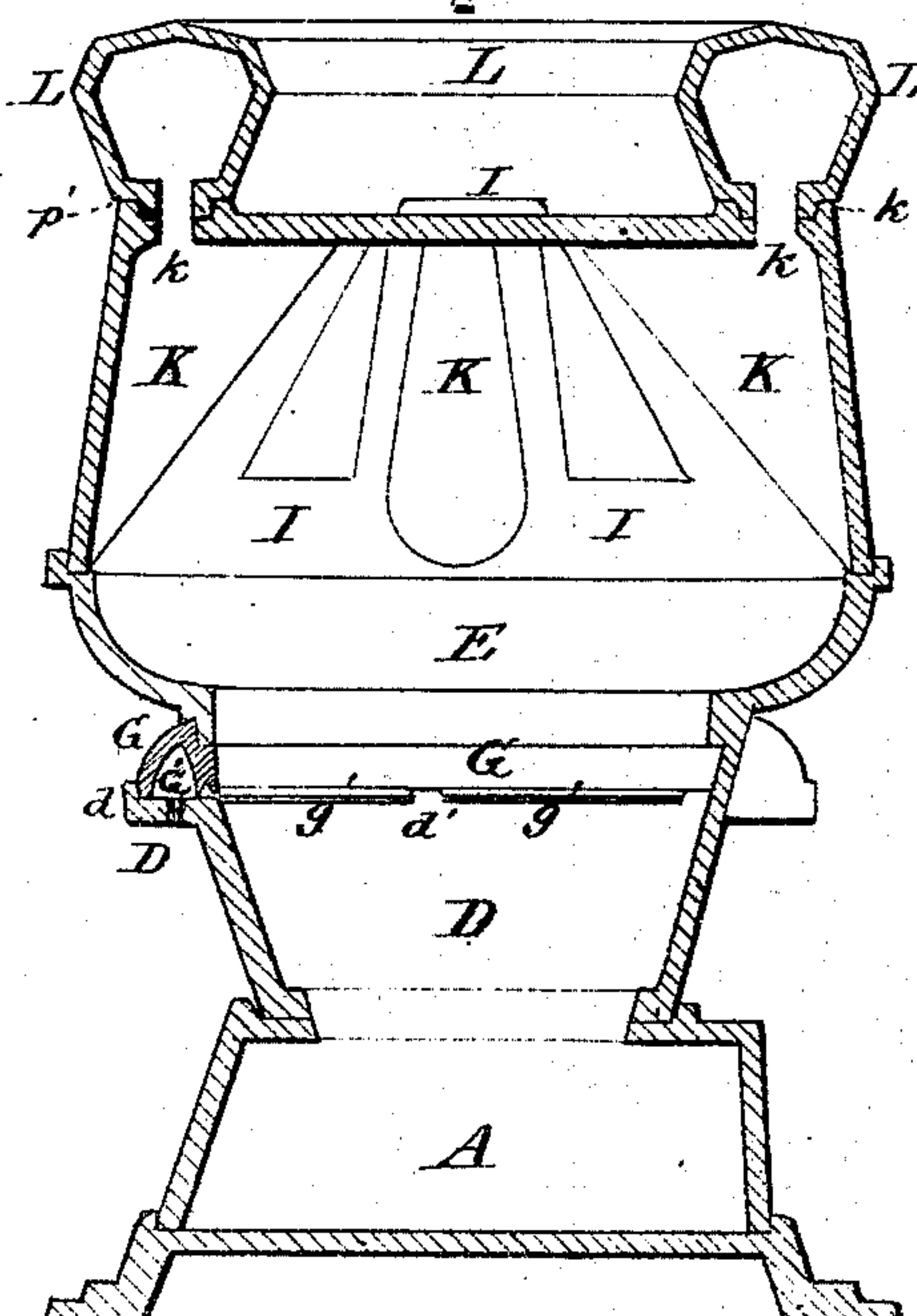


Fig. 5.



Witnesses.

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Fig. 6.

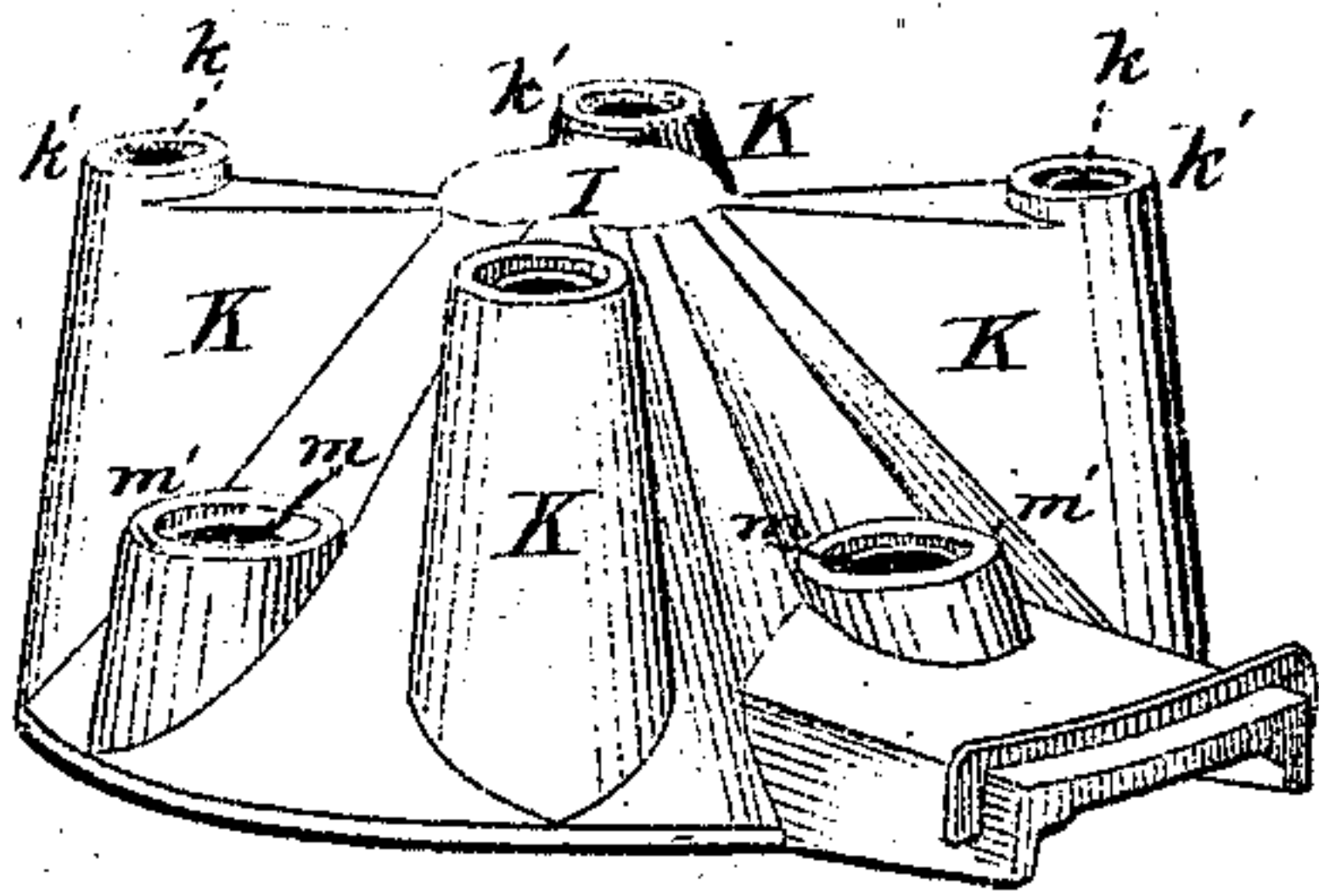


Fig. 7.

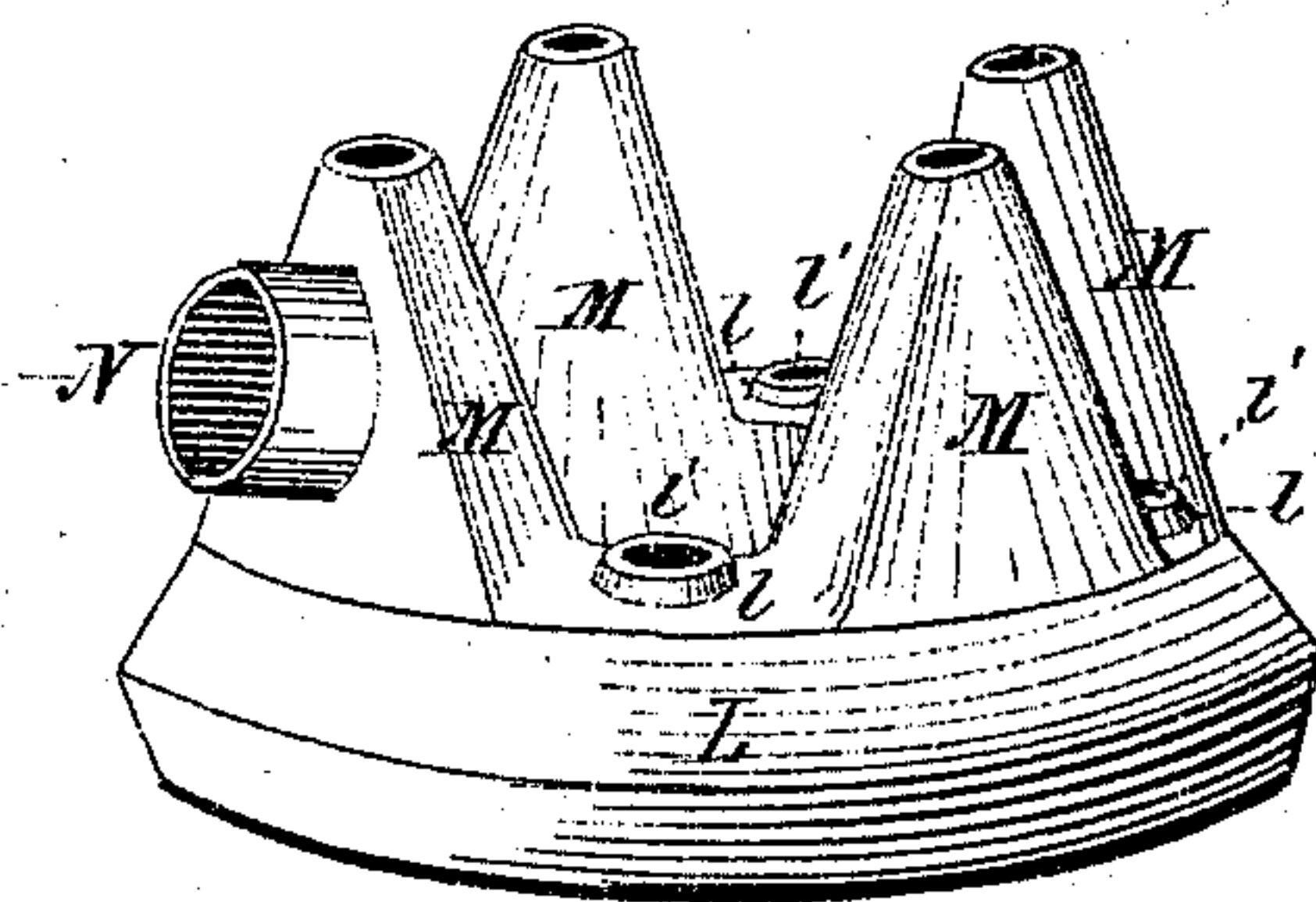


Fig. 8.

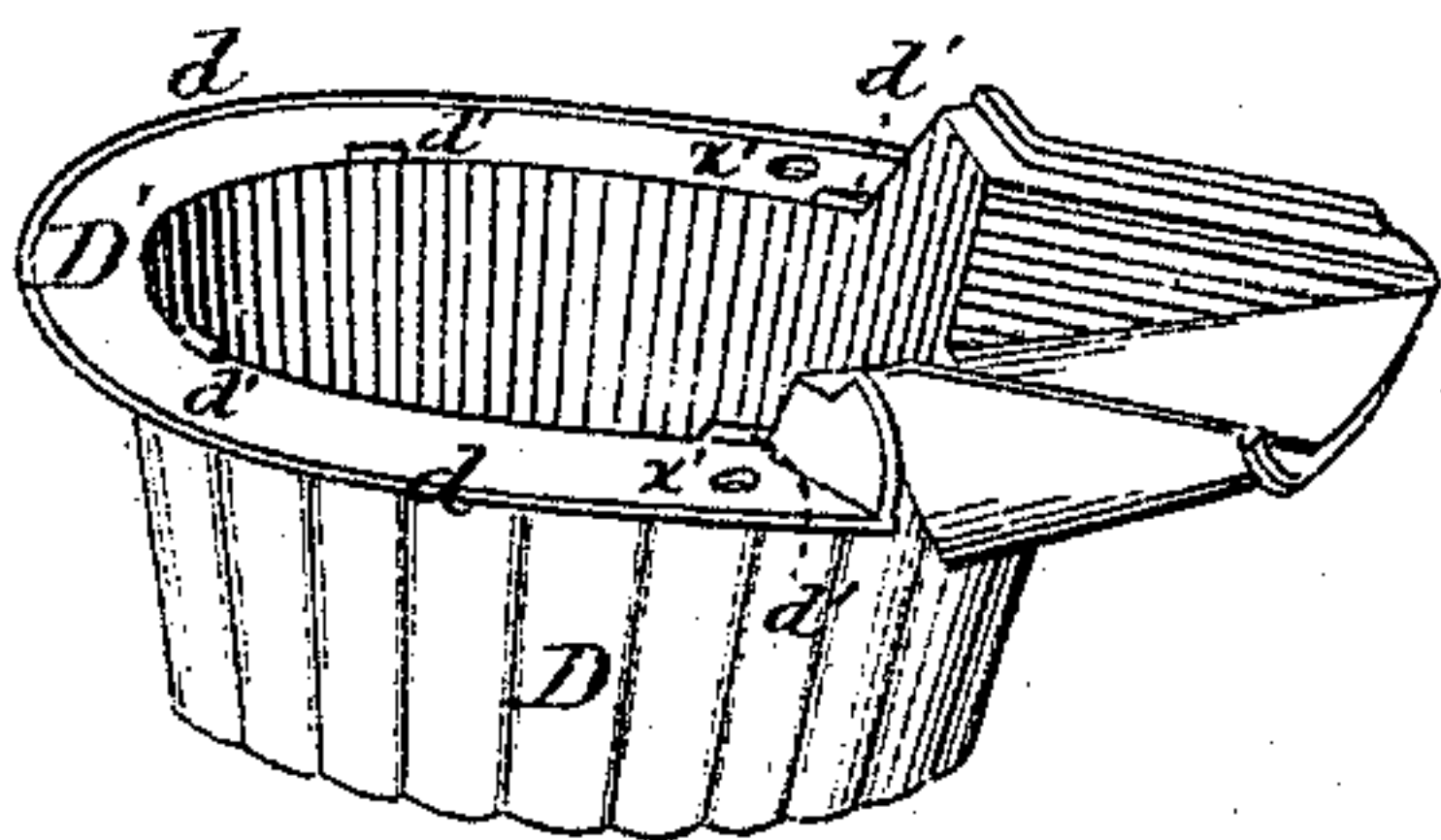
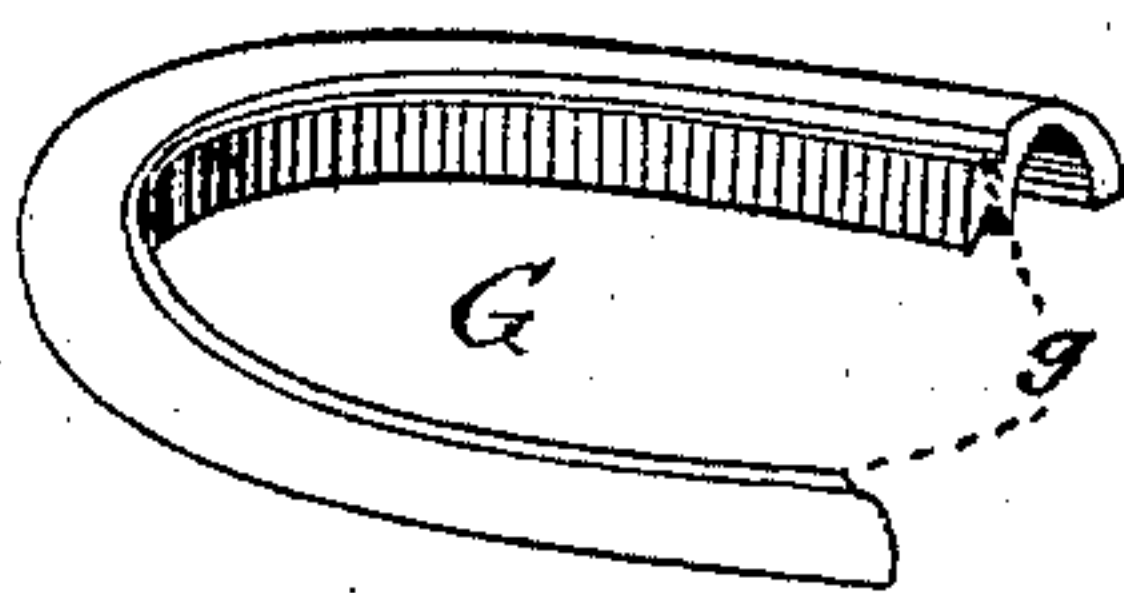


Fig. 9.



Witnesses.

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Fig. 10.

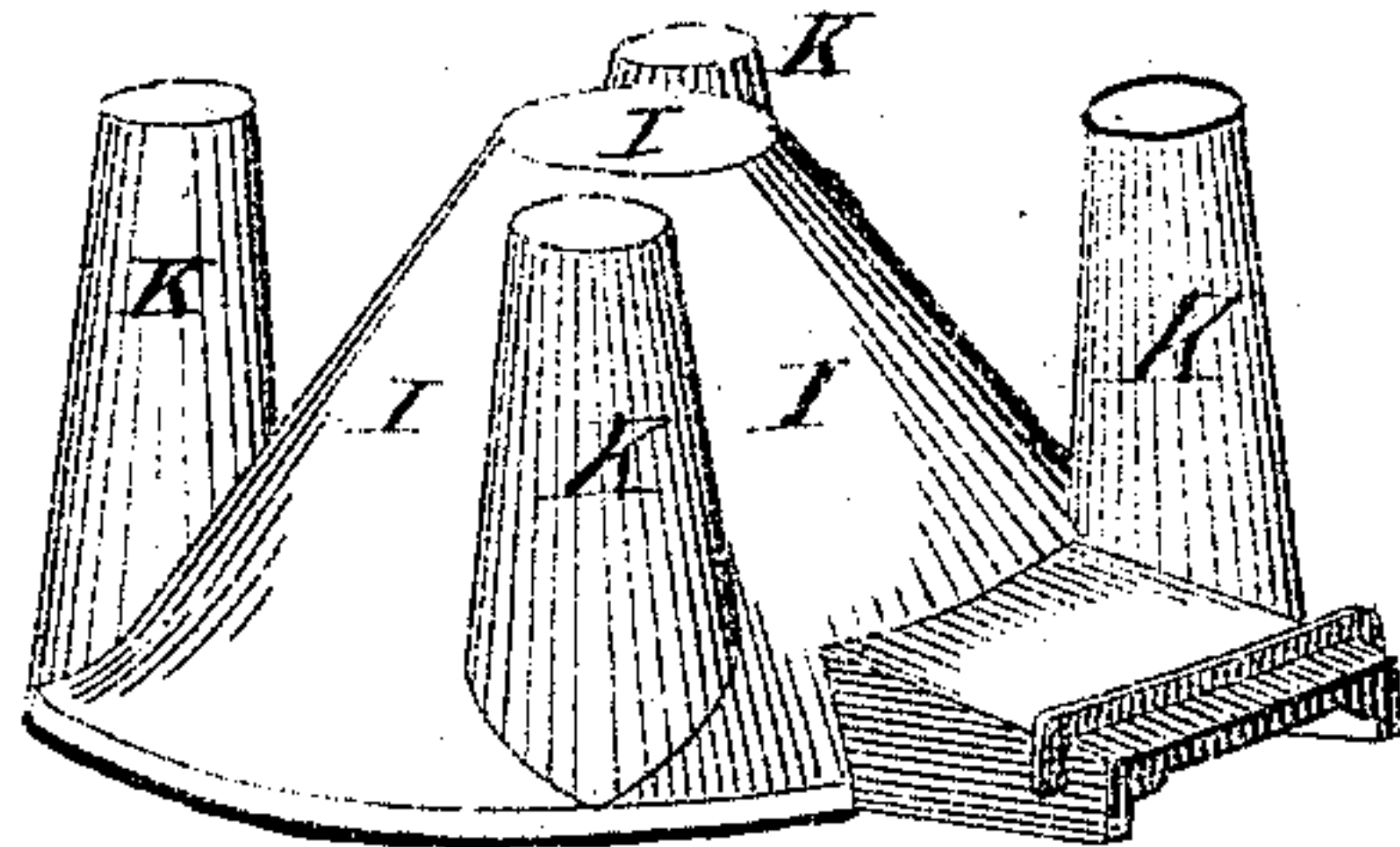


Fig. 11.

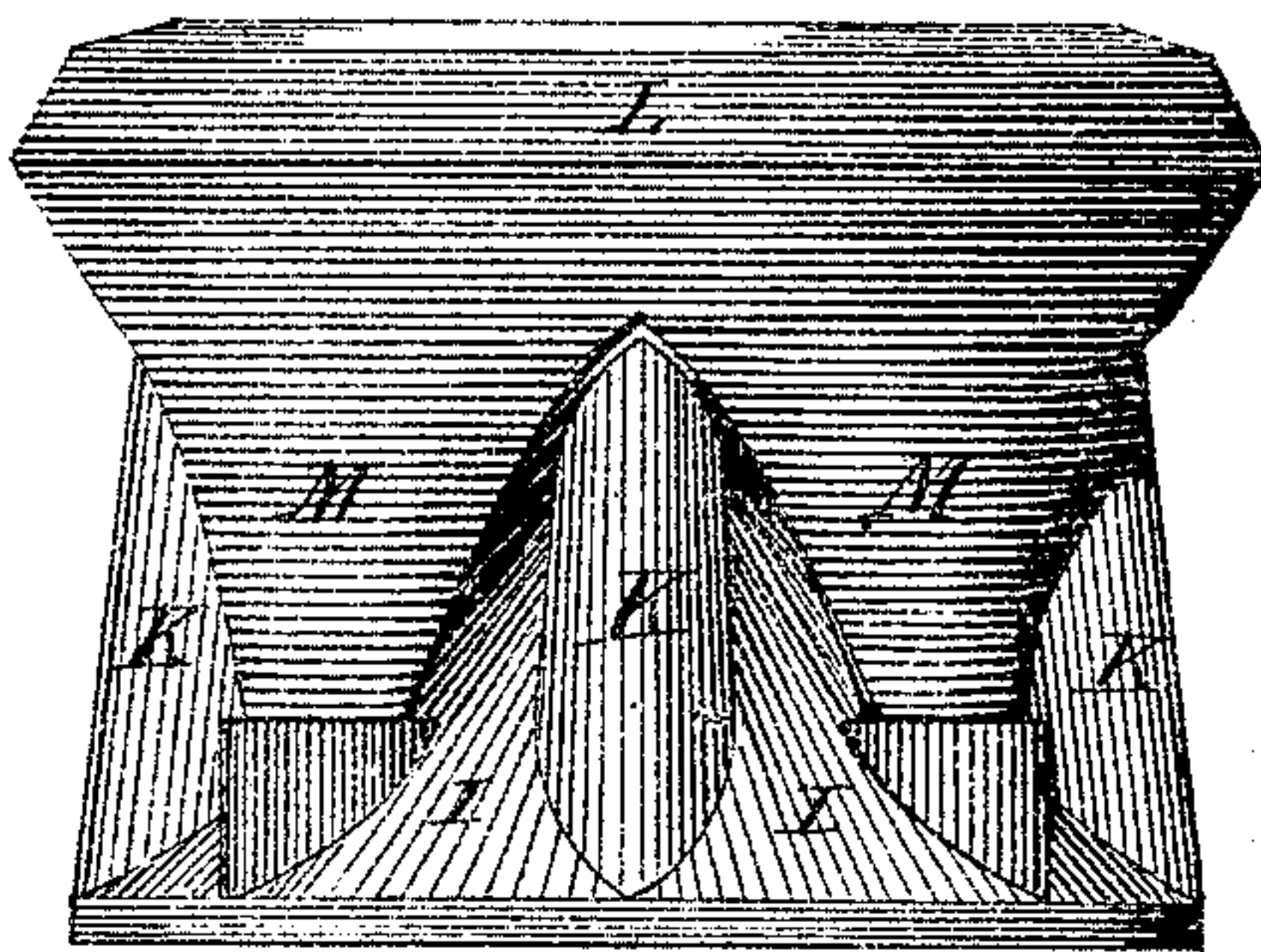
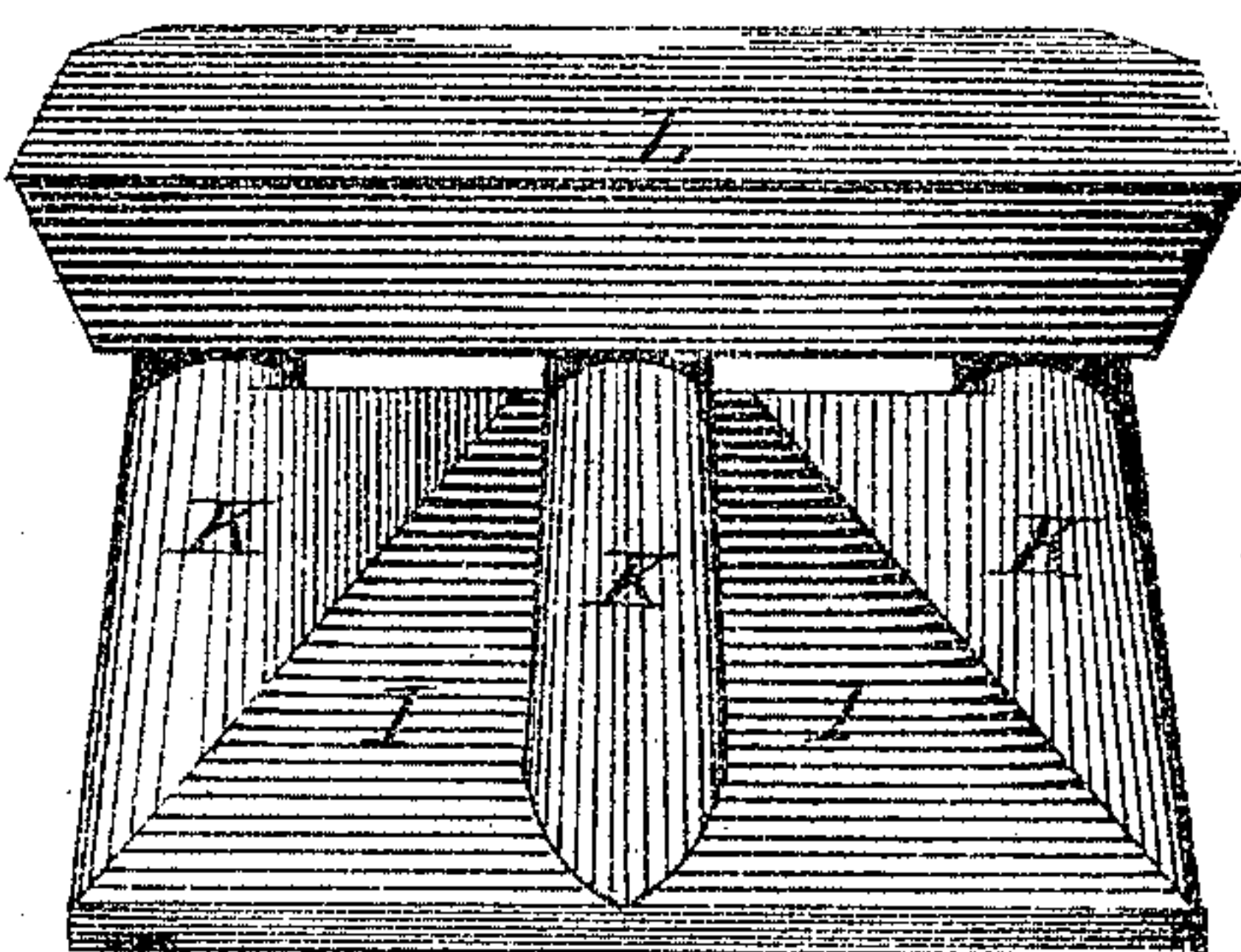


Fig. 12.



Witnesses.

C. H. Poole
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UNITED STATES PATENT OFFICE.

JAMES A. LAWSON, OF TROY, NEW YORK.

IMPROVEMENT IN HOT-AIR FURNACES.

Specification forming part of Letters Patent No. 116,723, dated July 4, 1871.

To all whom it may concern:

Be it known that I, JAMES A. LAWSON, of Troy, in the county of Rensselaer and in the State of New York, have invented certain new and useful Improvements in Heating-Furnaces; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing making part of this specification, in which—

Figure 1 is a perspective view of my improved heater. Fig. 2 is a plan view of the upper side of the same. Fig. 3 is a horizontal section on the line *xx* of Fig. 1. Figs. 4 and 5 are vertical central sections on the lines *zz* and *z'z'*, respectively, of Figs. 2 and 3. Fig. 6 is a perspective view of the upper portion of the inverted dome or covering of the combustion-chamber. Fig. 7 is a like view of the lower side of the annular flue surmounting said dome. Figs. 8 and 9 are similar views, respectively, of the lower section of the fire-pot and of the gas-ring or flue that rests upon said section, between the same and the upper portion of said fire-pot. Fig. 10 is a perspective view of a modification in the construction of the dome, in which the wings are dispensed with and vertical flues substituted in place thereof; and Figs. 11 and 12 are side elevations of said dome and the flue as modified.

Letters of like name and kind refer to like parts in each of the figures.

The object of my invention is to render a furnace in which bituminous coal is employed entirely safe from all liability to an accumulation and explosion of gases within the combustion-chamber; to strengthen and render more durable the dome or covering of said combustion-chamber; and to insure the combustion of the gases given off from the burning-fuel, so as thereby to prevent the formation of smoke; and it consists, principally, in the peculiar construction of the dome and annular ring or flue, and in their combination, by means of a series of vertical flues, substantially as and for the purpose hereinafter shown and described. It further consists in the means employed for admitting air to the combustion-chamber immediately above the fire-pot, for the purpose of insuring the combustion of the gases given off from the burning fuel, substantially as is hereinafter set forth.

In the annexed drawing, A represents the ash-pit of the heater, provided at its front side with

a suitable door, B, within which is arranged a draught-damper, C, all constructed in the usual manner. Resting upon the upper side of the ash-pit is a fire-pot, composed of a lower and an upper section, D and E, respectively, divided horizontally, as shown in Figs. 1, 4, and 5, and united by means of an ordinary joint. From a point immediately in rear of the throat of the feed-opening F to its rear side the upper edge of the lower section D is reduced in height and provided with an outward-projecting flange, D', having around its outer edge an upward-projecting rim, *d*, and at suitable intervals around its inner edge three or more lugs, *d'*, having preferably a Λ -shape. Fitted to or upon the flange D' is a section of a metal ring, G, which corresponds therewith in horizontal size and shape, and is constructed with a concave lower and a convex upper side. Around the lower interior edge of said ring is provided a Λ -shaped groove, which, when said ring is placed in position upon the flange D' and within the rim *d*, fits over the lugs *d'* and secures the relative positions of the parts. The upper edge of the ring G being on a line horizontally with the forward portion of the section D, a groove, *g*, is formed therein for the reception of the lower edge of the upper section. As thus arranged, it will be seen that, as the ring at its inner edge comes into contact with the lower section only at the lugs *d'*, a narrow opening, *g'*, is left between said ring, the upper edge of said section, and said lugs, through which communication is had between the combustion-chamber and the space G' within said ring, so that if suitable openings *x'* be made through the flange D' external air will be admitted through said space G' and the openings *g'* into said combustion-chamber, where it will strike the ascending column of gases from the burning fuel in a broad thin sheet, and, intermingling therewith, insure their perfect combustion. By inclosing the openings *x'* with a suitable damper the inward flow of air may be regulated at pleasure. Resting upon the upper edge of the fire-pot is a dome, I, forming a cover for the combustion-chamber, which dome has a general conical shape and is provided with three or more hollow wings, K, that extend radially outward with their exterior vertical edges on a line with the exterior of said dome and their upper edges on a line with the upper side of the same. Within the upper outer corner of each wing K is provided a circu-

lar opening, k , surrounded by a packing-flange, k' , while midway between said wings and in a circular line with said openings k are provided similar openings m , surrounded in a like manner by means of packing-flanges m' . Resting upon the wings K is an annular flue, L , provided at its points of contact therewith with suitable annular collars l , which, inclosing corresponding openings l' , fit into the packing-flanges k and furnish a means of communication between the interiors of said flue and the upper portion of the dome, while a like communication between the lower part of said dome and said flue is furnished by means of a number of hollow legs or pipes, M , which extend downward from the latter between the wings and have their lower open ends resting immediately over the openings m and within the packing-flanges m' . The upper ends of the legs M are extended laterally, so as to nearly fill the space between the contiguous wings and prevent an accumulation of ashes within the annular flue, there being but a small portion of the lower side of the latter not occupied by said legs or the openings l' . The openings between the upper side of the dome and the annular flue are considerably smaller in size than those at the lower end of said dome, so as to cause the greatest draught from the latter point, while their united areas are about equal to that of the exit-flue N , which opens horizontally outward from one of the legs, so that the heated escaping products of combustion are caused to pass equally through each opening, and thereby insure an equal distribution of heat through the dome and annular flue.

As thus constructed, it will be seen that the heated escaping products of combustion, which would naturally strike against the center of the dome, are drawn rapidly outward and discharged into the annular flue so as to prevent too great an accumulation of heat at that point, whereby the durability of said dome is largely increased, while from the peculiar position of the openings from the wings on a line with the upper portion of said dome the inflammable gases, that would otherwise accumulate therein and explode whenever a sufficient quantity of air was admitted by opening the feed-door, or from other sources, are allowed free passage to the exit-pipe and harmlessly escape through the same. Another advantage of this arrangement of the upper openings between the dome and annular flue is that by it the heated gases are withdrawn from beneath a

small radiating-surface and thrown into the large annular flue, through the walls of which the heat passes readily into the surrounding air and is utilized, instead of being in a great degree wasted, as has heretofore been the case.

As one of the effects of the radial wings upon the dome is to largely increase its strength and durability, it will be seen that this advantage would be fully secured if said wings were closed at their upper ends and communication between the dome and annular flue had only through the lower part of the former; but in this case it would be necessary to construct the legs in the form shown in Fig. 11, with their contiguous sides meeting in the form of a pointed arch, (so as to prevent an accumulation of ashes within the annular flue,) and to correspondingly point or arch the upper ends of said wings so as to cause them to conform to the space between said legs.

If desired, the legs of the annular flue may be omitted, as shown in Fig. 12, and the only connection between said flue and the dome obtained through the wings; and in order to still further simplify said parts the wings may be omitted and vertical pipes substituted in place thereof, as shown in Fig. 10. These modifications are, however, believed to be much inferior to the construction hereinbefore shown and described.

Having thus fully set forth the nature and merits of my invention, what I claim as new is—

1. In a heating-furnace, a dome, provided with upper and lower outlets for the heated escaping products of combustion, when said outlets are at or near the outer side of said dome and within the line vertically of its base, substantially as and for the purpose shown.

2. The dome I , provided with the openings k and m , in combination with the annular flue L , provided with the openings l and legs M , substantially as and for the purpose set forth.

3. The means employed for admitting air to the combustion-chamber, consisting of the concave metal ring G , resting upon the flange D' , provided with the lugs d' and openings x' , when said parts are combined with the sections D and E , substantially as and for the purpose shown and described.

In testimony that I claim the foregoing I have hereunto set my hand this 1st day of June, 1871.

JAS. A. LAWSON.

Witnesses:

GEO. A. WELLS,

CHAS. H. HAZARD.