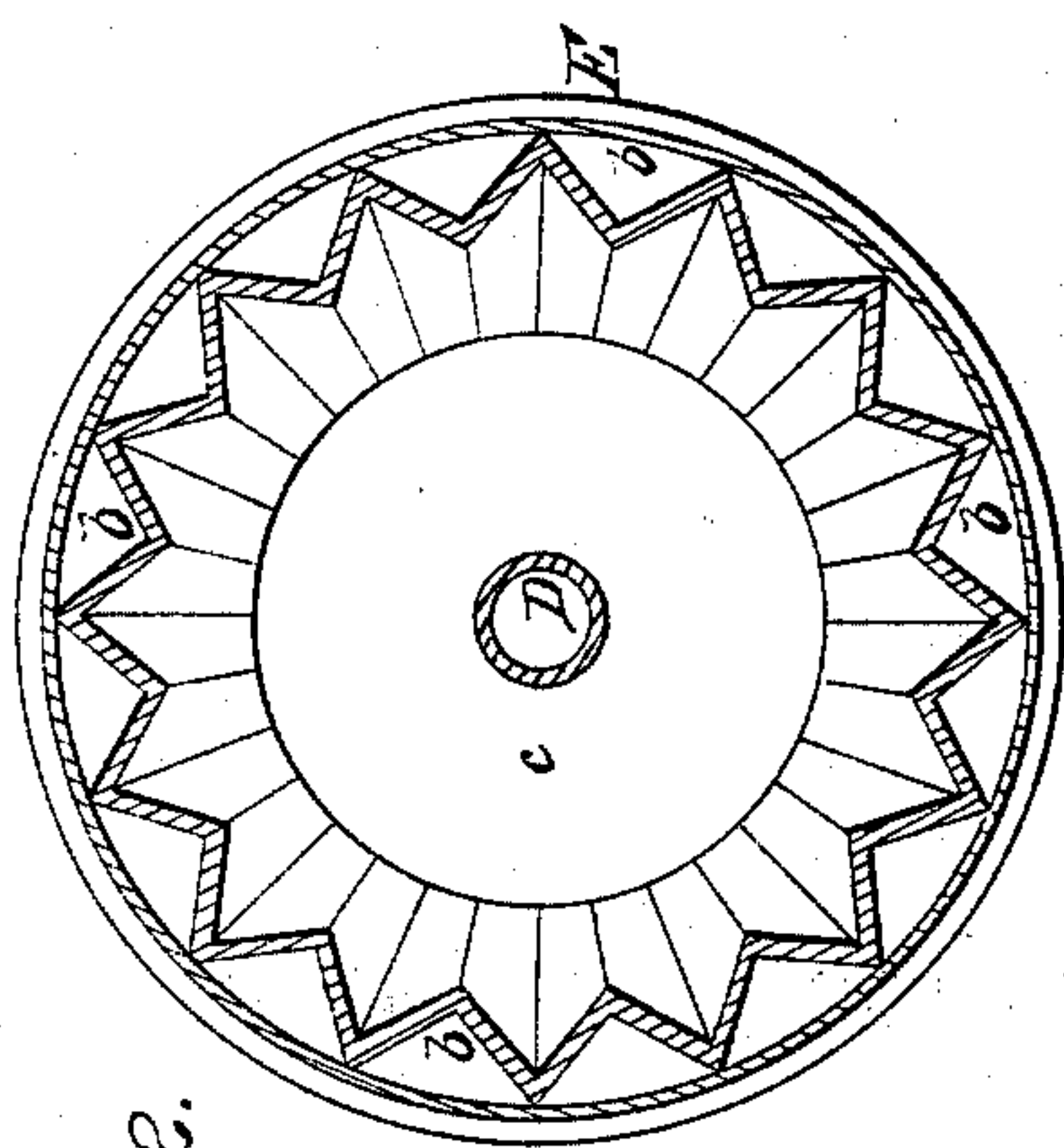
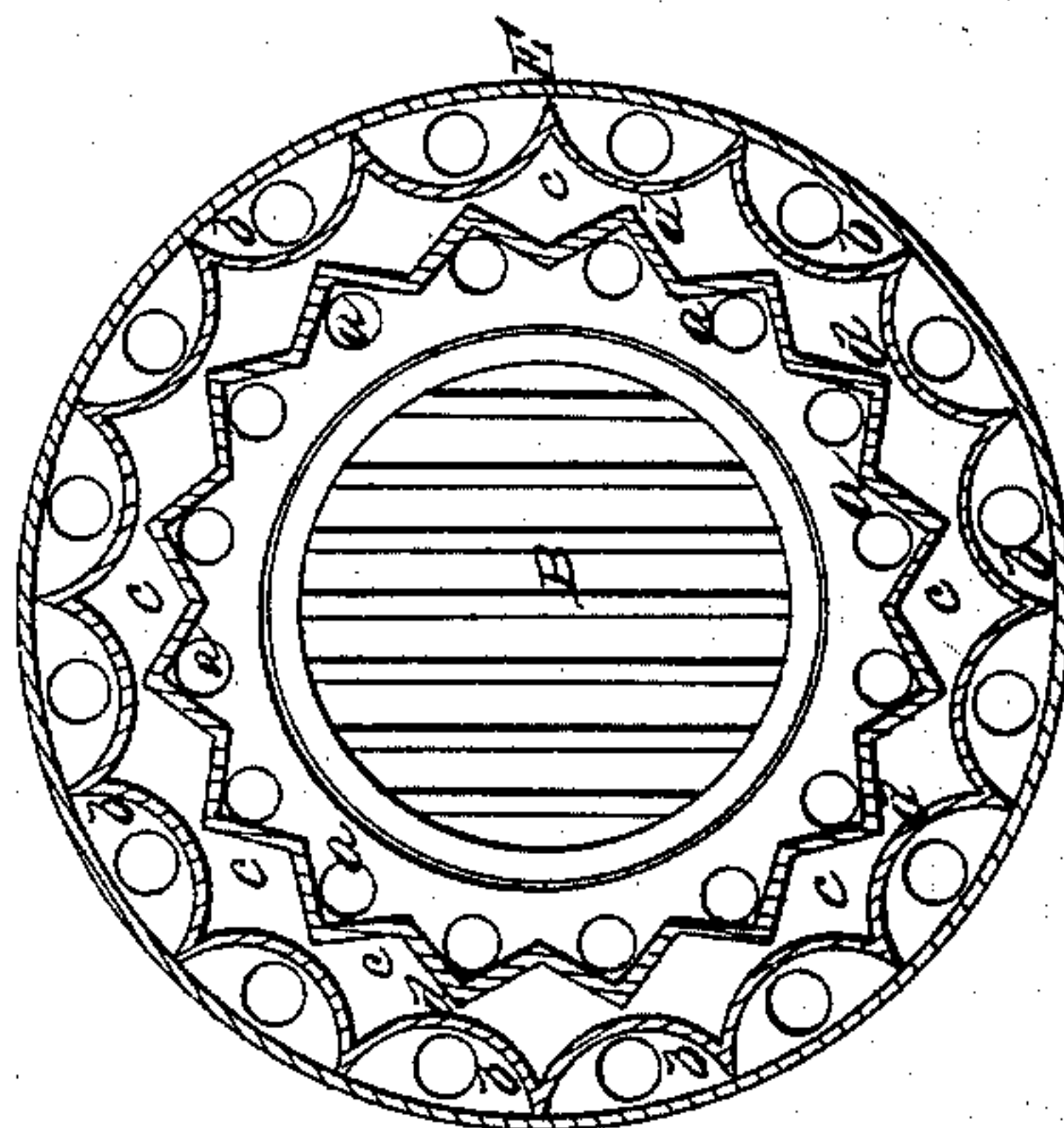


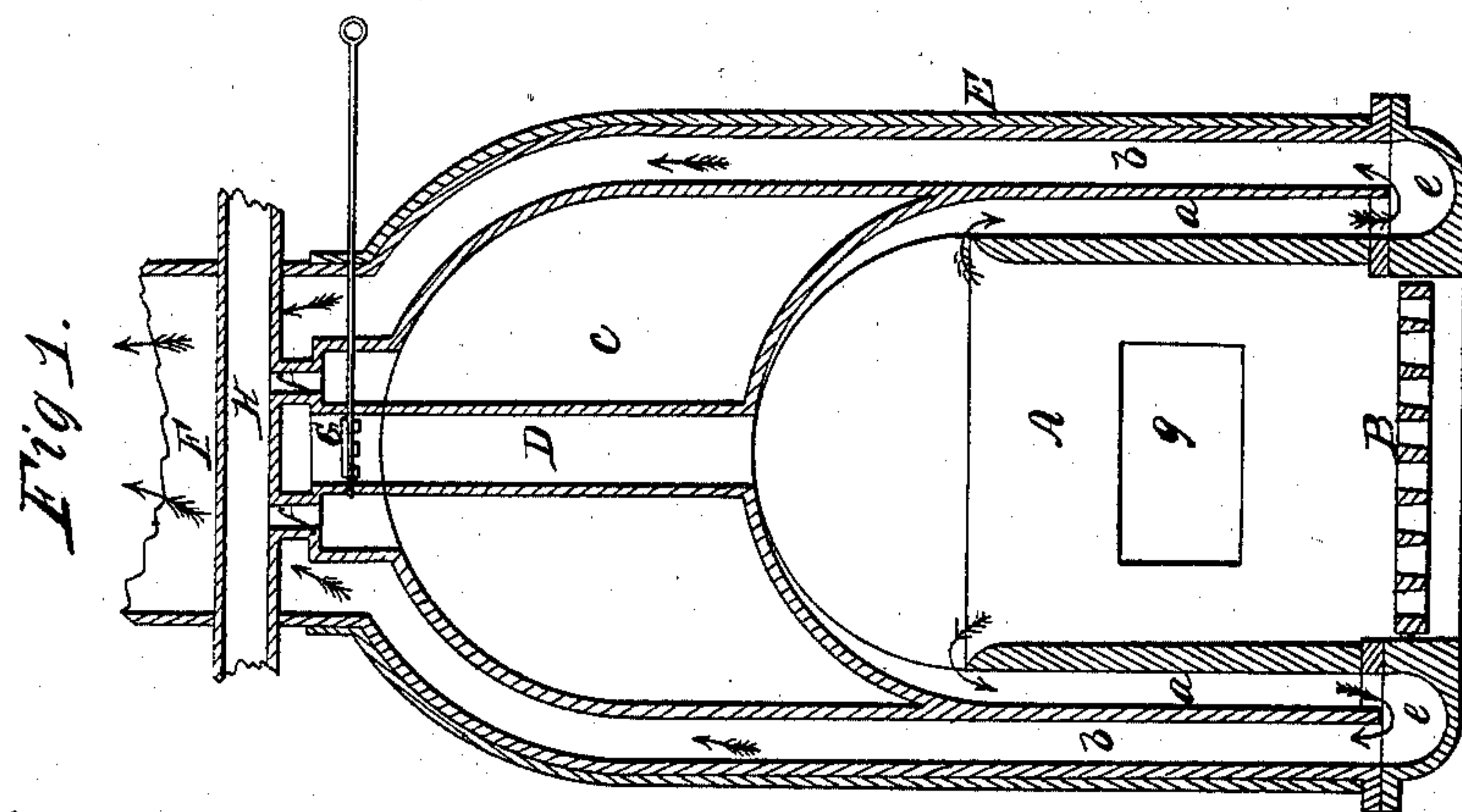
*J. S. Barden,*  
*Steam-Boiler Fire-Tube.*  
*N<sup>o</sup> 62,308.      Patented Feb. 26, 1867.*



*Fig. 2.*



*Fig. 3.*



*Fig. 1.*

*Witnesses.*  
*Samuel O. Piper*  
*George Andrews*

*Inventor.*  
*John S. Barden.*  
*by his attorney*  
*R. W. H. H.*



# United States Patent Office.

JOHN S. BARDEN, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO A. J. PERRY & COMPANY, OF BOSTON, MASSACHUSETTS.

*Letters Patent No. 62,308, dated February 26, 1867.*

## IMPROVEMENT IN STEAM GENERATOR.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL PERSONS TO WHOM THESE PRESENTS SHALL COME:

Be it known that I, JOHN S. BARDEN, of the city and county of Providence, and State of Rhode Island, have invented an improved Steam Boiler or Generator, and do hereby declare the same to be fully described in the following specification, and represented in the accompanying drawings, of which—

Figure 1 is a vertical section; and

Figures 2 and 3 are horizontal sections of such boiler.

In such drawings, A denotes a cylindrical fire-place, open at top, and formed with a grate, B, at its lower part. The said fire-place is surrounded by a series of upright flues, *a a a*, each of which is triangular in its horizontal section, and is open at top, so that the smoke from the fire-place may pass into such top and down the flue. Each of the flues *a*, by means of an elbow or curved channel, *c*, is made at its bottom to open into one of a series of upright flues *b b*, arranged with respect to the flues *a a*, as represented. Each of the two sides of each flue *a* is an extension of one of the sides of a flue, *b*, the same being so as to form a series of quadrilateral passages, *c c c*, arranged between the two series of flues *a b*. Each flue, *c*, is closed at its bottom, but at its top opens into a water and steam chamber, C, arranged directly over the furnace or fire-place A, and being provided with a dome-shaped bottom, to constitute the crown of the furnace. A smoke pipe or conduit, D, leads from the furnace up into and through the water and steam chamber C. The several water passages are made to communicate with each other by conduits, *d d*, leading from one into the other at or near their bottoms, the same being so that there may be a percolation through such passages *c c*. The smoke flues *b b* are completed by means of a hollow drum or casing, E, which encompasses the whole boiler, and terminates at top in a chimney or discharge pipe, F. A damper, G, should be arranged at the upper part of the pipe D, the operative handle of such damper being carried through and beyond the casing E. A steam-education pipe, H, to open into the steam chamber C by one or more vertical pipes, *f f*, and being arranged as represented in fig. 1, serves to lead steam from such chamber. The fire-place is to have a throat or fuel-supply opening, *g*. It is intended that the whole or nearly the whole of this boiler, with the exception of the outer casing E, shall be cast or formed in one piece of metal.

When the boiler is in operation, the heat and smoke from the furnace pass into and down through the flues *a a a*, thence into and up through the flues *b b b*, and thence into the discharge flue F. The water in the passages *c c c* will be exposed to the heat radiated from the flues *a b*. The water and steam chamber C derives its heat from the flues *b b b*, the crown of the furnace, and from the pipe D. When the damper G is open, the smoke escapes directly through the pipe D into the flue F, without going around through the flues *a b*.

I claim the arrangement as well as the combination of the series of flues *a*, the series of flues *b*, the connections *c*, the water-holding spaces *c*, the furnace A, and the water and steam chamber C.

I also claim the arrangement as well as the combination of the escape pipe D and damper G, the series of flues *a*, the series of flues *b*, the connections *c*, the water-holding spaces *c*, the furnace A, and the water and steam chamber C.

I also claim the arrangement as well as the combination of the conduits *d*, the series of water spaces *c*, the series of flues *a*, the series of flues *b*, the furnace A, and the water and steam chamber C, the whole being substantially as specified.

JOHN S. BARDEN.

Witnesses:

SAMUEL N. PIPER,  
F. P. HALE, Jr.