

FERRIE'S BLAST FURNACE

116698

PATENTED JUL. 4 1871

FIG. 1

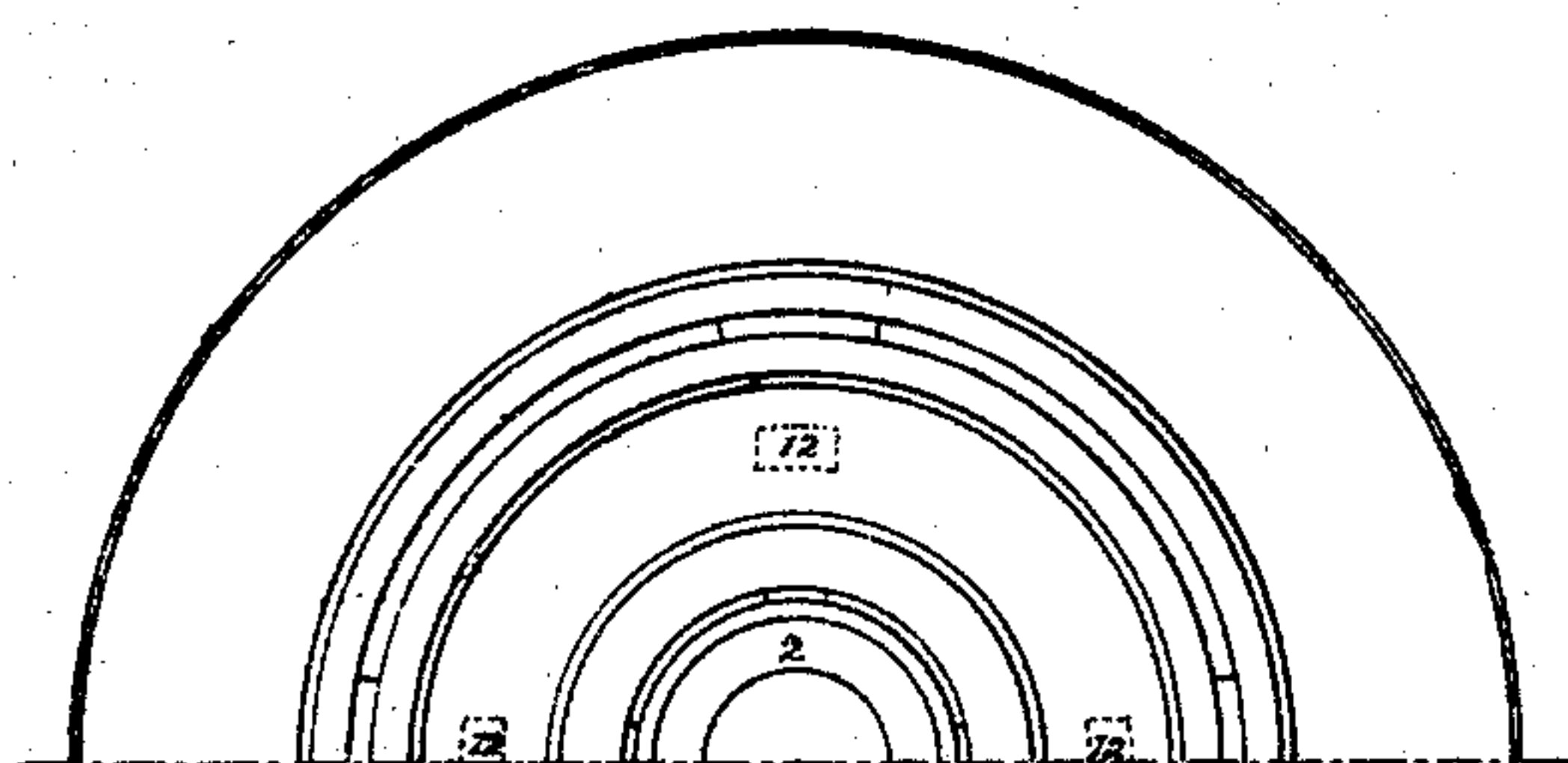


FIG. 2

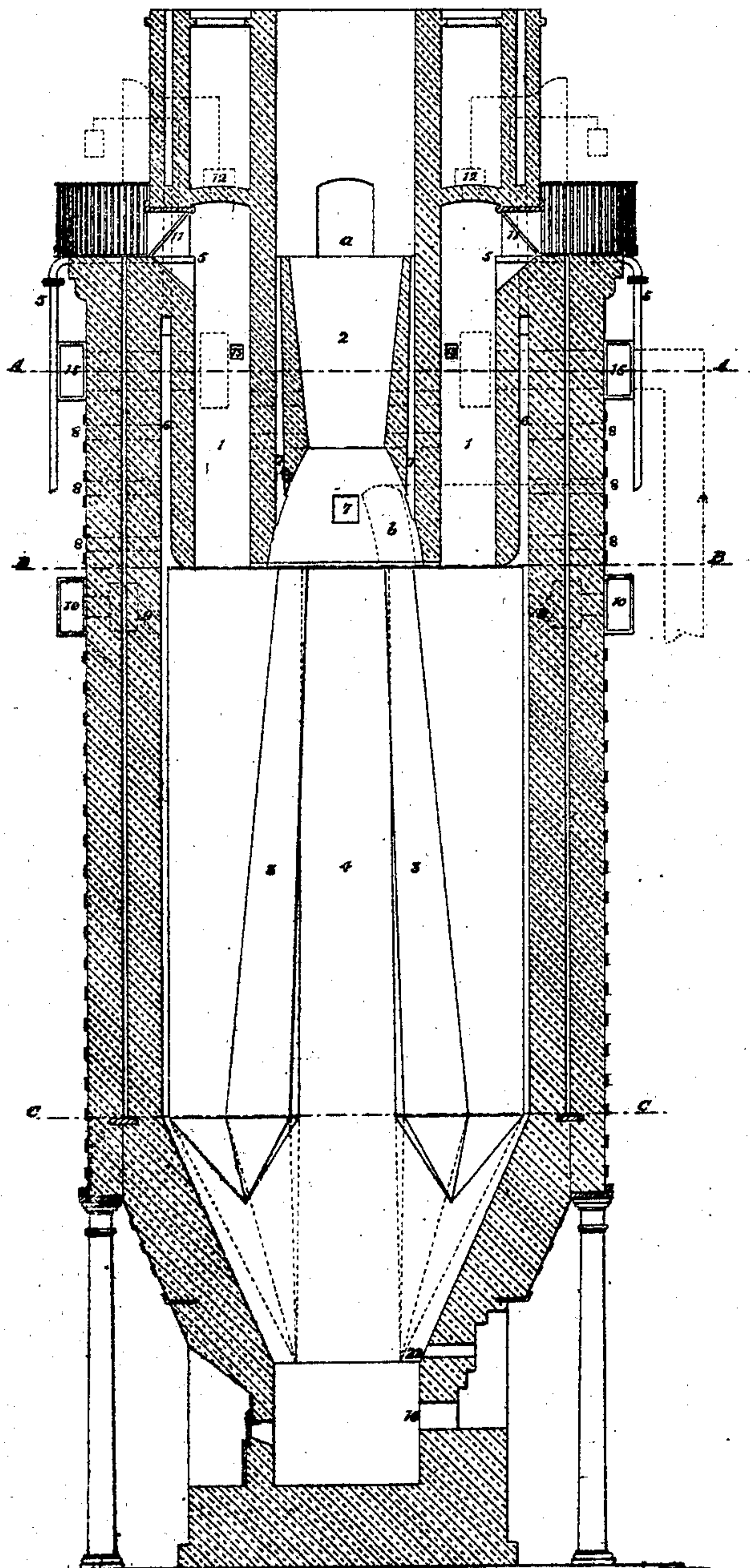


FIG. 3.

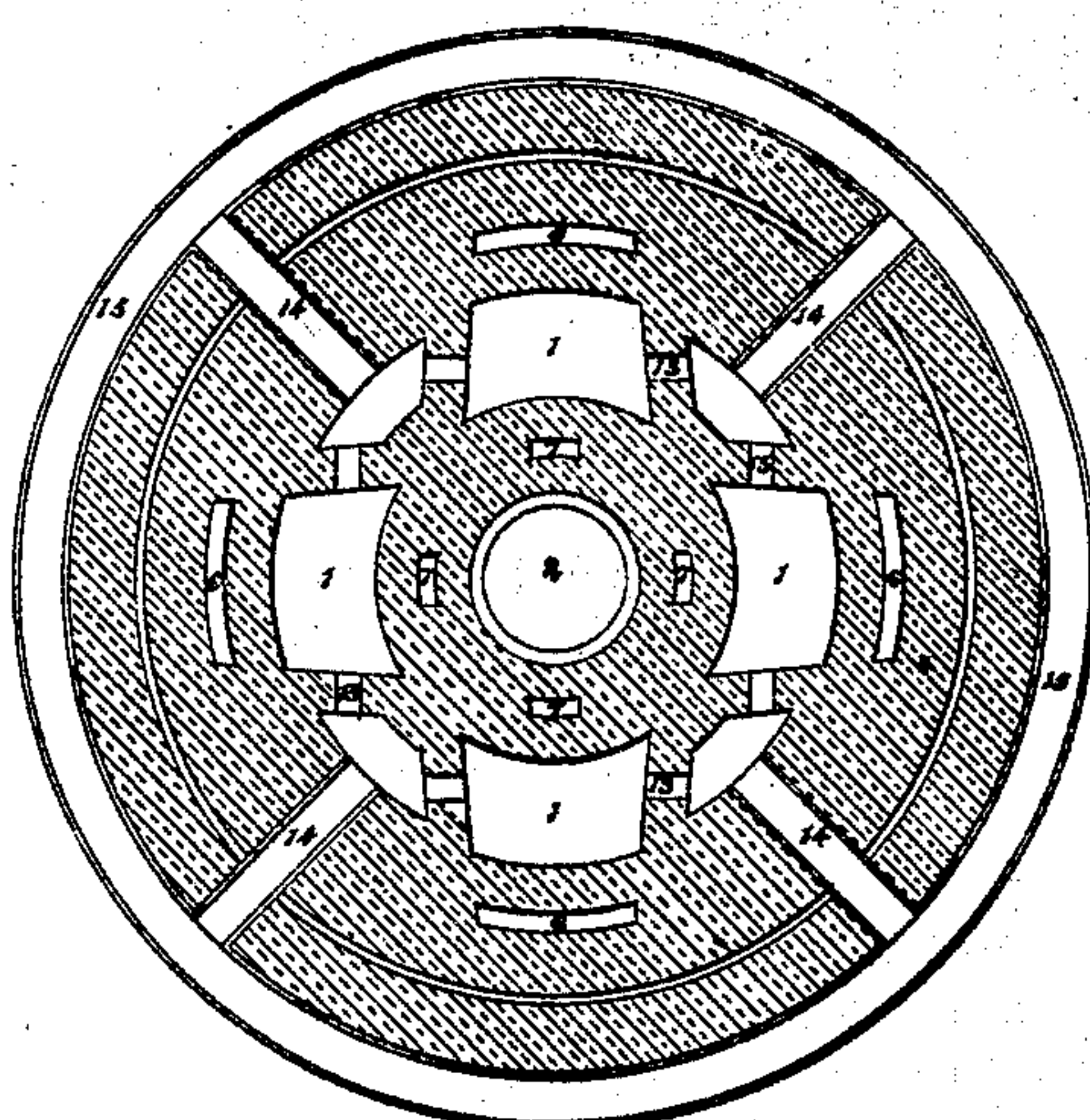


FIG. 4.

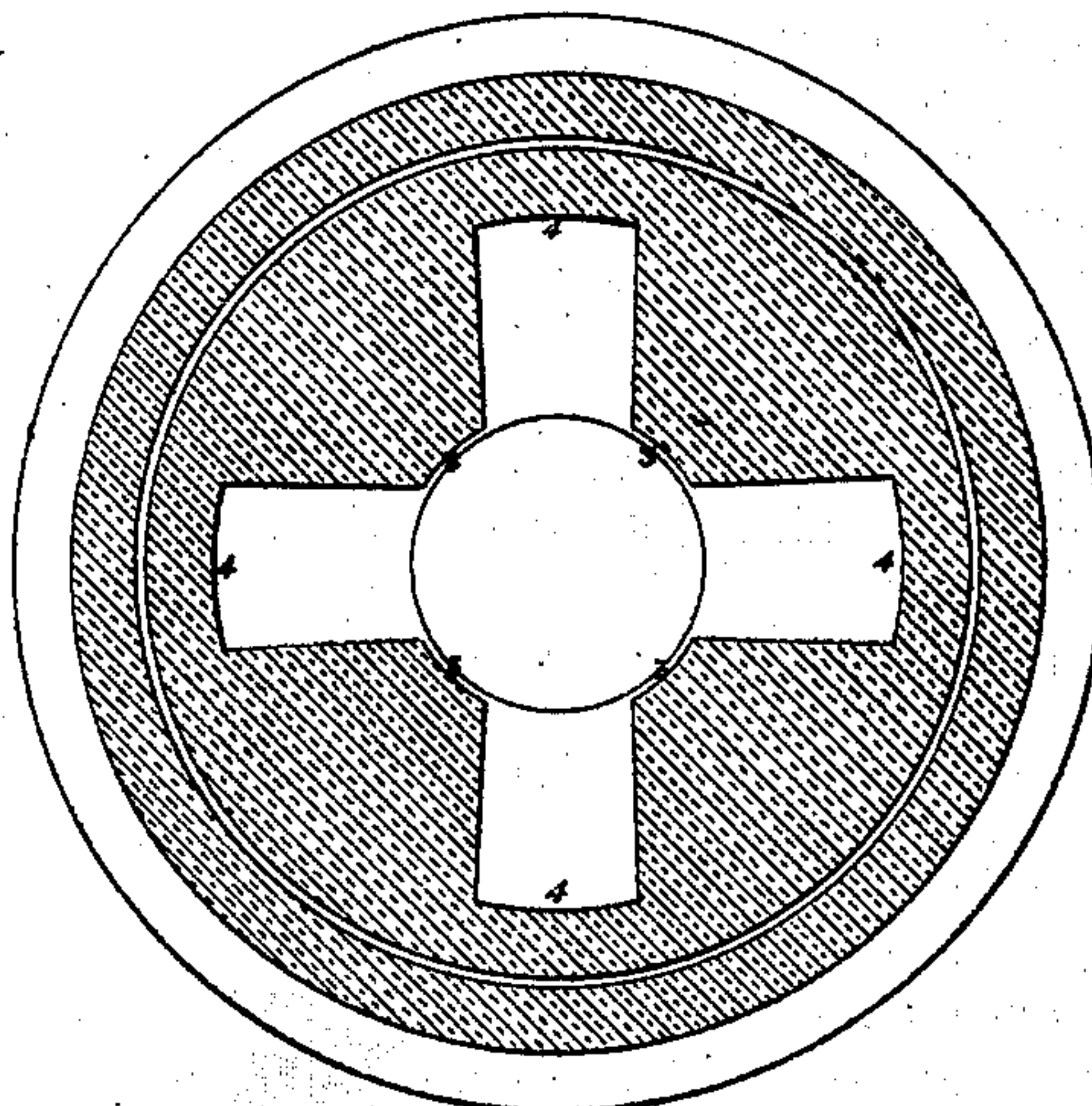
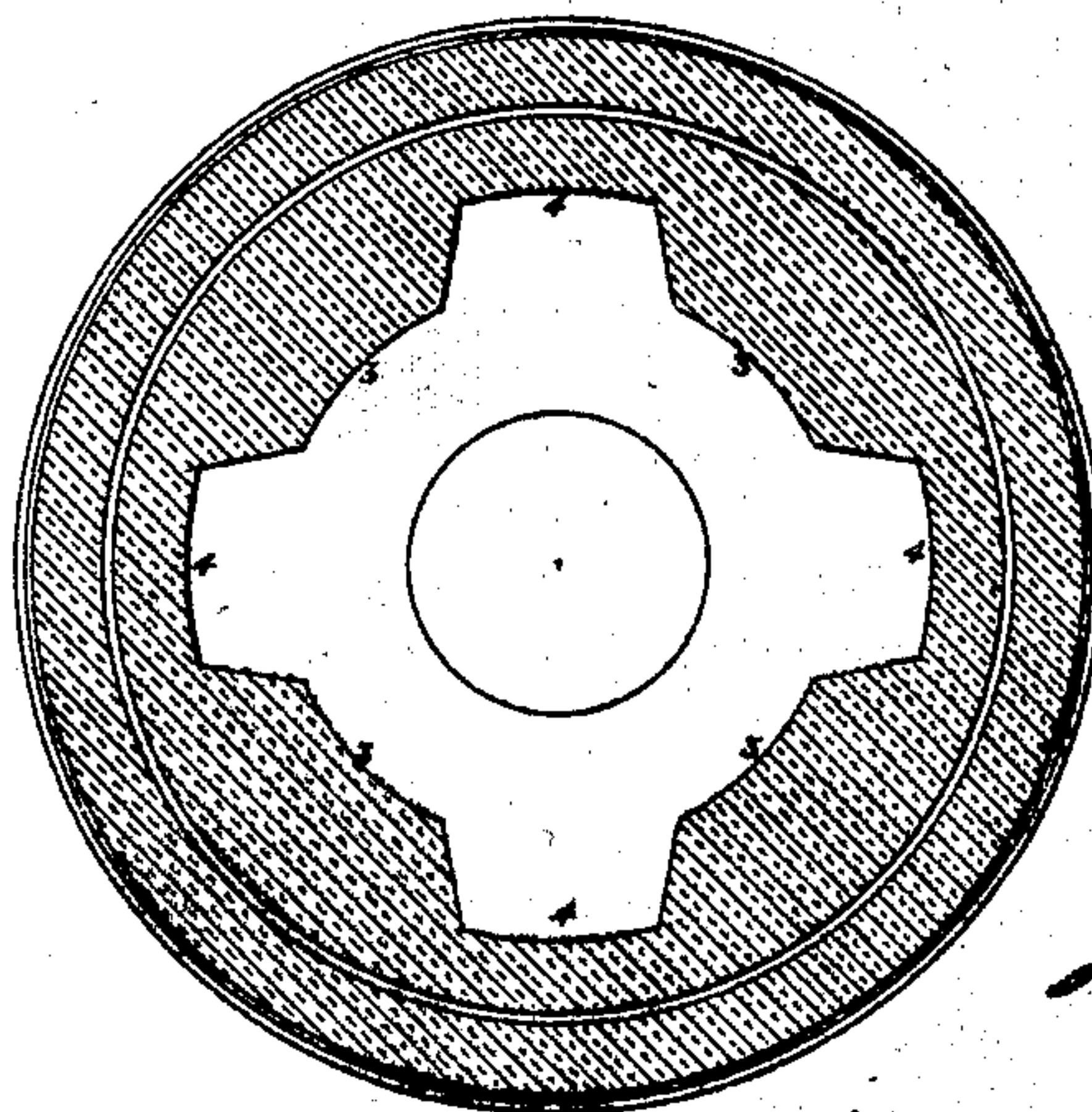


FIG. 5.



SCALE 1/8"

*Witnessed*  
*Gordon T. Perkins*  
*Geo. P. Floyd*

*Witnessed*  
*William Ferris*  
*by B. F. Jones*  
*his atty*



# UNITED STATES PATENT OFFICE.

WILLIAM FERRIE, OF MONKLAND IRON AND STEEL WORKS, GREAT BRITAIN.

## IMPROVEMENT IN SMELTING OR BLAST-FURNACES.

Specification forming part of Letters Patent No. 116,698, dated July 4, 1871.

*To all whom it may concern:*

Be it known that I, WILLIAM FERRIE, of the Monkland Iron and Steel Works, in the county of Lanark, Kingdom of Great Britain and Ireland, have invented certain Improvements in Smelting or Blast-Furnaces, of which the following is a specification:

My invention relates to the formation of a series of retorts, chambers, or spaces around the upper part of the furnace, for coking coal supplied to the furnace, so as to save the expense of separate coking, and so as to diminish the waste of coal which ordinarily takes place at the top of a blast-furnace in which raw coal is used. The said chambers also have the advantageous effect of causing coke (either formed therein or supplied in the form of coke) to descend through the lower part of the furnace, on the outside of the ores and flux. My invention also comprises the formation of flues in the upper sides of the furnace, for the introduction and combustion therein of otherwise waste gases withdrawn from the furnace, for the purpose of aiding the operation of coking the coal, or for heating the coke and thereby economizing fuel.

Figure 1 is a half plan or top view of the furnace; Fig. 2, a vertical section; Fig. 3, a horizontal section as at the line A A in Fig. 2; Fig. 4, a horizontal section as at the line B B; and Fig. 5 is a horizontal section as at the line C C.

A series of retorts or long vertical chambers, 1, (there being four in the modification delineated,) is constructed around the throat or top 2 of the furnace, with its bottom ends opening into the furnace. Buttresses 3, projecting into the furnace, are built beneath and between the retorts 1, and from long vertical channels 4 below the retorts. These buttresses 3 may terminate at the boshes, as shown by the full lines; or they may be continued further down, as indicated by the dotted lines. The raw coal is charged separately into the retorts 1, while the iron-stone ores and limestone or flux (with a small proportion of coke or coal, if necessary) are charged into the center 2, in the ordinary way, either by a door, *a*, at the level of the gallery, or by a lower door, as indicated by dotted lines at *b*. The air necessary to support combustion and for carrying on the coking process

I proposed to introduce near the lower end of each retort 1; but I find that it is better to introduce it at the top by a pipe, shown at 5. In order that the retorts 1 may be sufficiently heated flues or passages 6 7 are constructed to pass up vertically alongside of them, both on their outer and inner sides; and passages, indicated by dotted lines at 8, are made to admit air to burn the gases passing up the flues. The gases passing up the flues 6 7 in this way are portions of the ordinary waste gases of the smelting-furnace, and the flues serve the double purpose of outlets for them and of means for utilizing them. The portions of the ordinary waste gases which do not pass off by the flues 6 7 may be allowed to escape by the central throat 2; or they may be drawn off by passages, indicated by dotted lines at 9, into a circular duct, 10, whence they may be led away by ducts for utilization. Doors 11, counterbalanced so as to close of themselves, are fitted to the sides of the retorts or coke-chambers 1 at their upper ends, and valves may be fitted in the tops of the retorts, as indicated at 12, to be opened for the escape of watery vapors when these are given off from the coal. The combustible gases formed in the retorts pass off, by outlets 13 in the sides of the retorts and by passages 14, to an external circular duct, 15, whence they may be led away for utilization.

The coke made in the retorts 1 descends through the furnace uniformly with the ores and flux in the center, and continues in contact with the sides of the furnace in the channels 4 down to the level 16 of the tuyeres, by which the main blast is introduced, and greatly facilitates the reduction of the ores.

The retorts or chambers 1 may be continued lower down than as shown in the drawing, if preferred.

The gas produced in the process of coking the coal is much purer and more combustible than that from an ordinary furnace in which raw coal is mixed with the ores and flux.

Instead of coking raw coal in the chambers 1, coke made in the ordinary way may be supplied into those chambers, so as to take advantage of the hereinbefore-described arrangements, whereby it will be kept separate from the ores and flux until reaching the lower part of the furnace.

The same arrangements for supplying the fuel

may be adapted to various kinds of blast-furnaces, and whether these are used for smelting or for melting merely.

I claim as my invention—

1. The forming of retorts, chambers, or spaces 1 in the upper part of a smelting or blast-furnace, substantially as and for the purposes hereinbefore set forth.

2. The forming of flues 6 7 in the upper sides of the furnace and of inlets for air into such flues, substantially as and for the purposes hereinbefore set forth.

WILLIAM FERRIE.

Witnesses:

EDMUND HUNT,  
ALEXANDER CALDERHEAD.