

C. W. SIEMENS.  
Rotative Regenerative Furnace.  
No. 218,326. Patented Aug. 5, 1879.

FIG. 1.

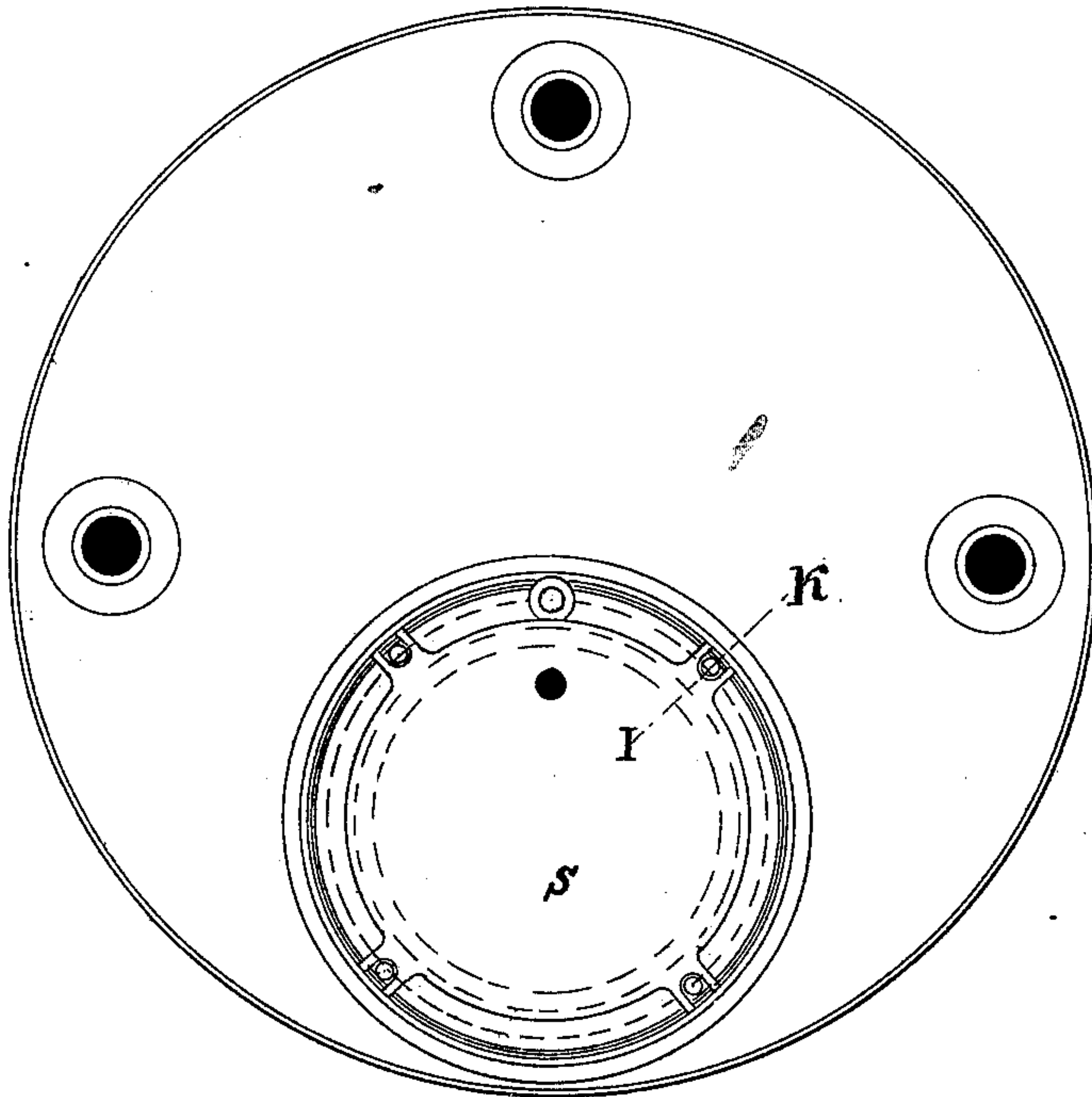
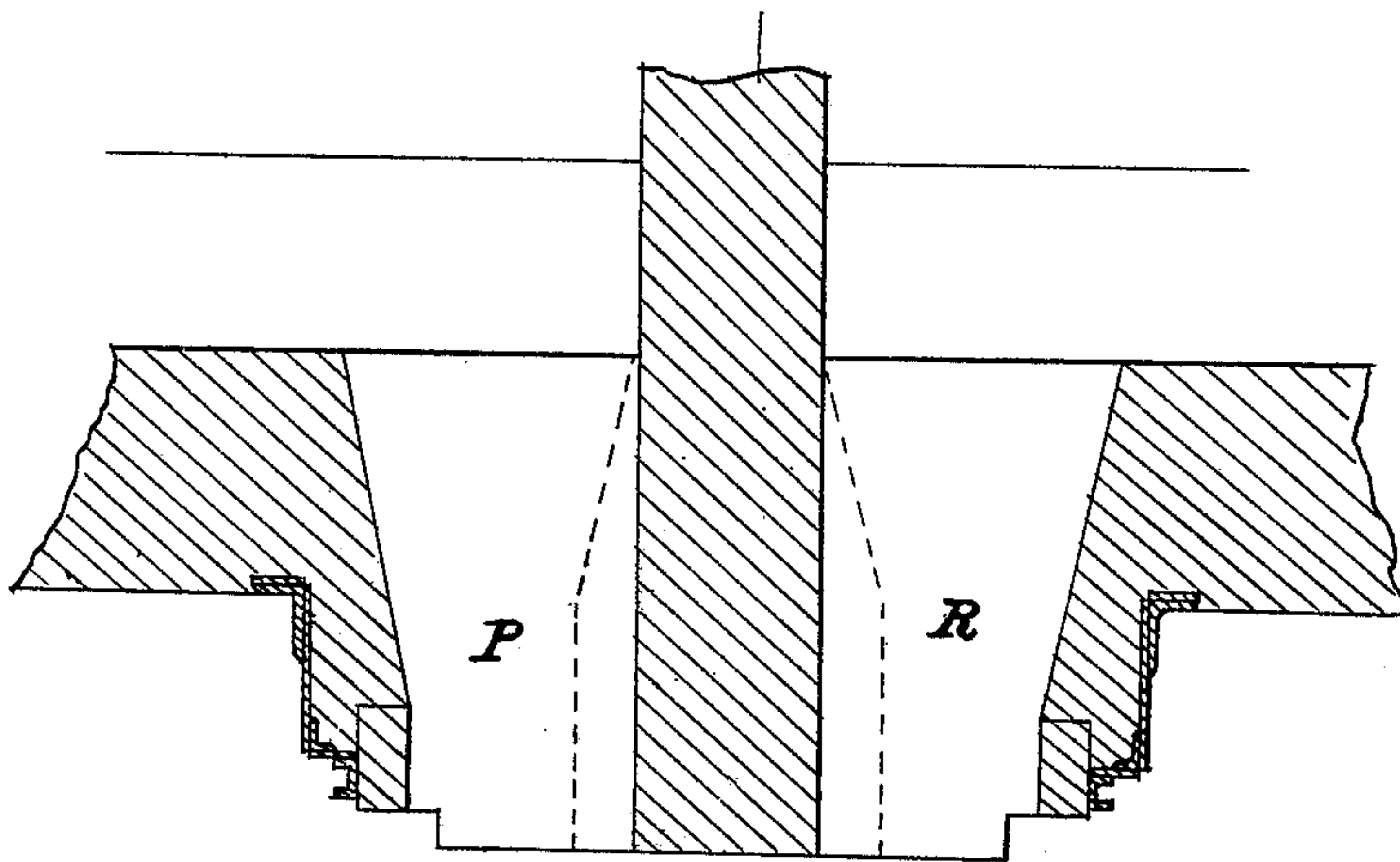


FIG. 4.



WITNESSES

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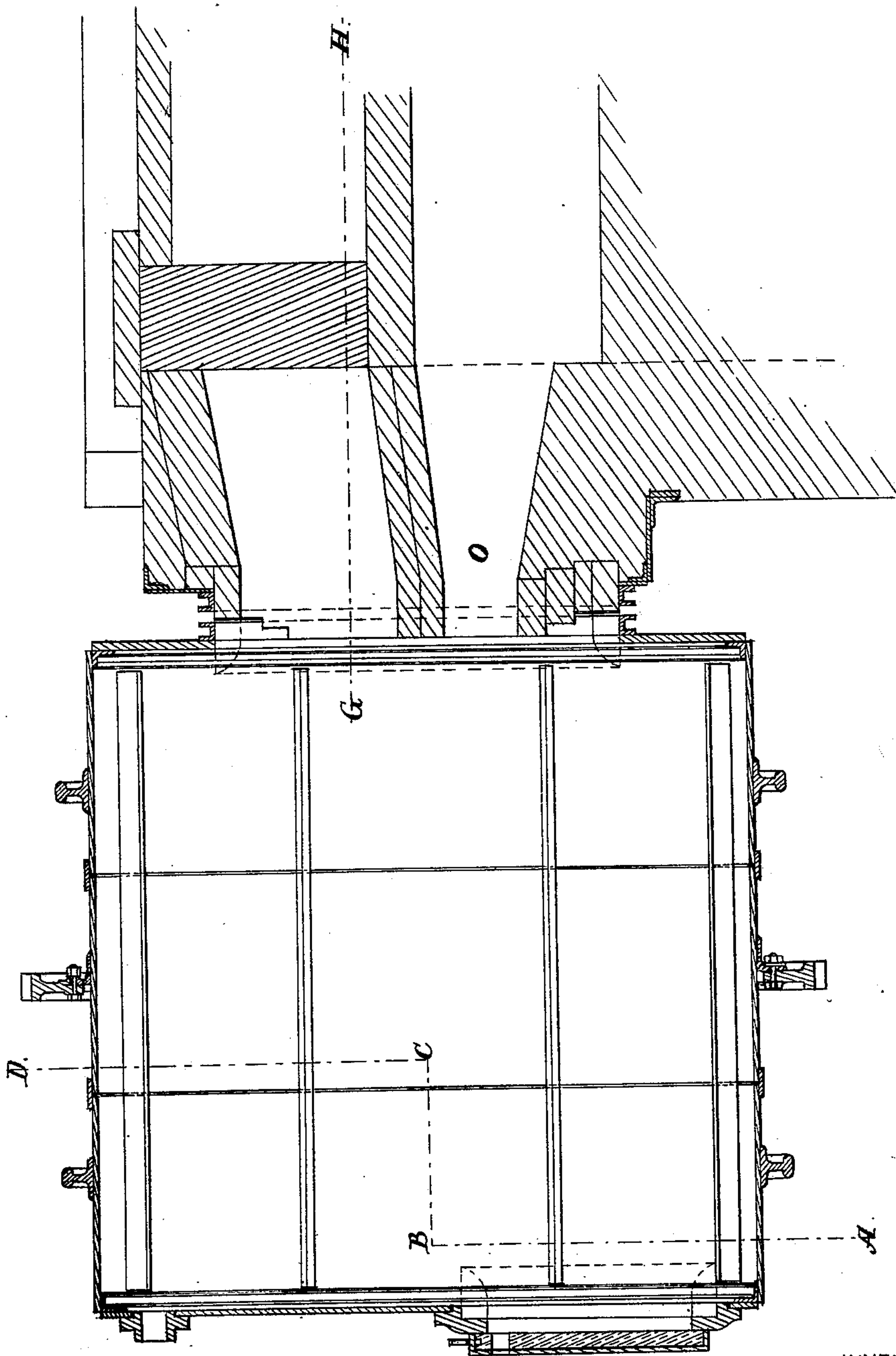
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FIG. 2.



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FIG. 3.

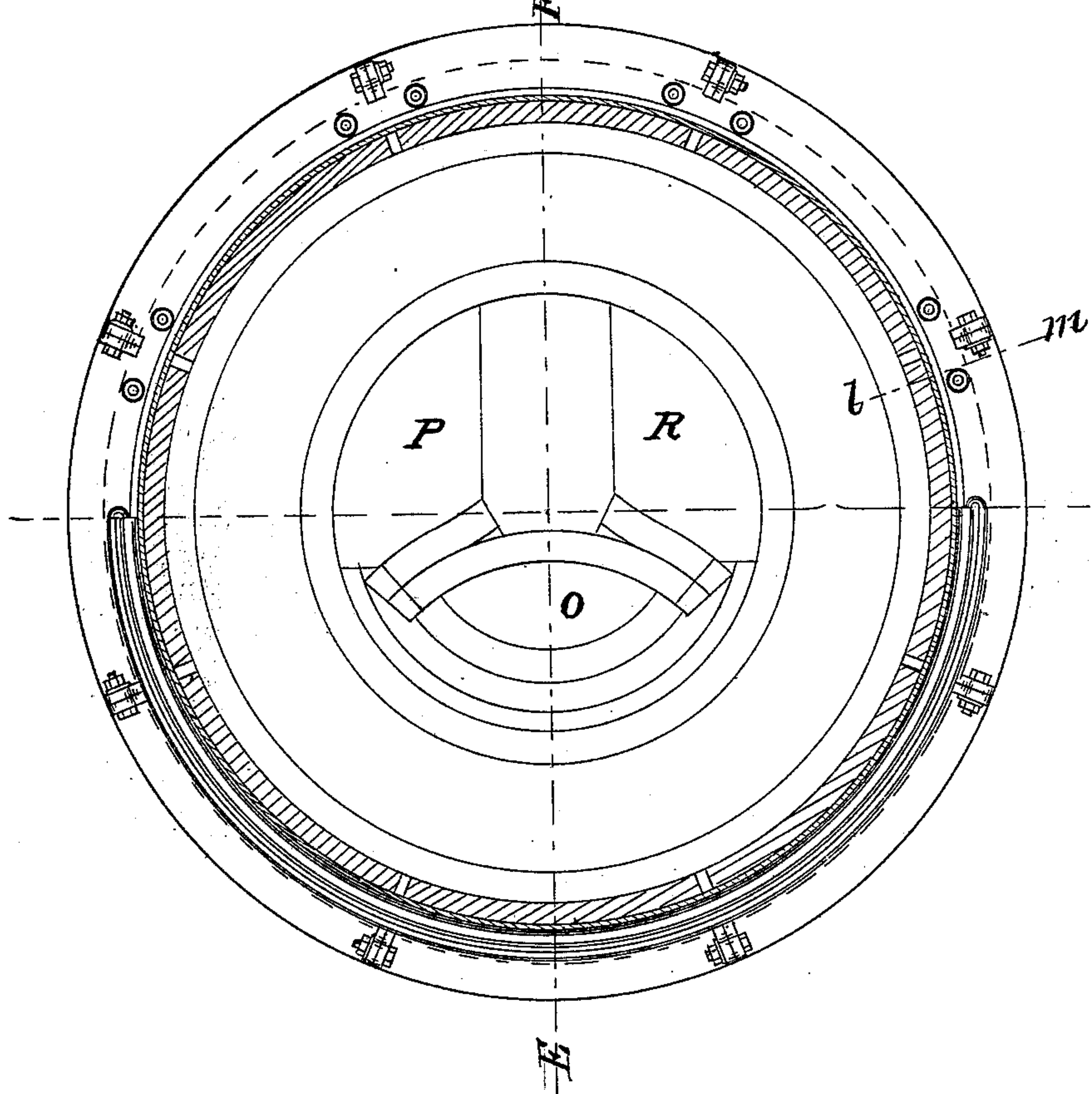


FIG. 5.

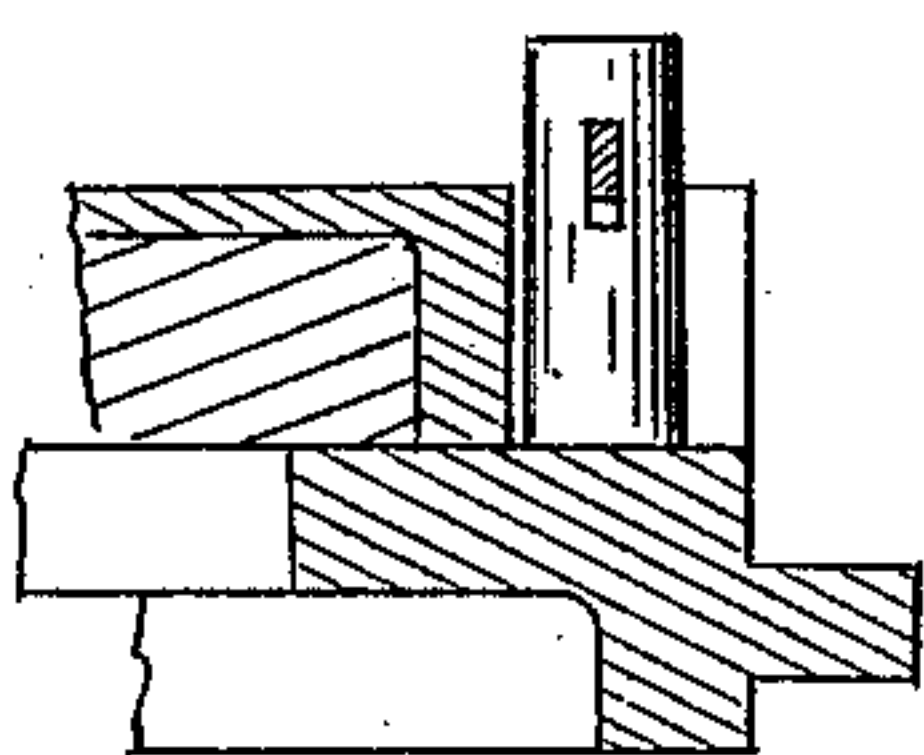


FIG. 6.

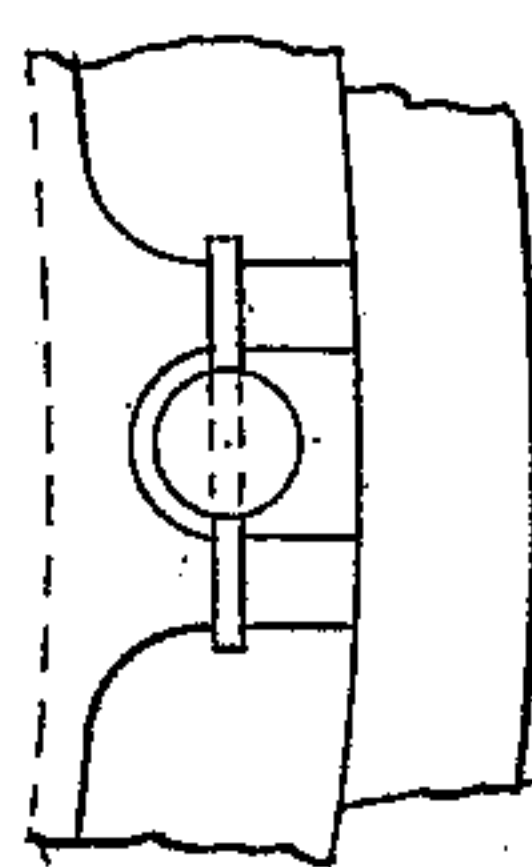
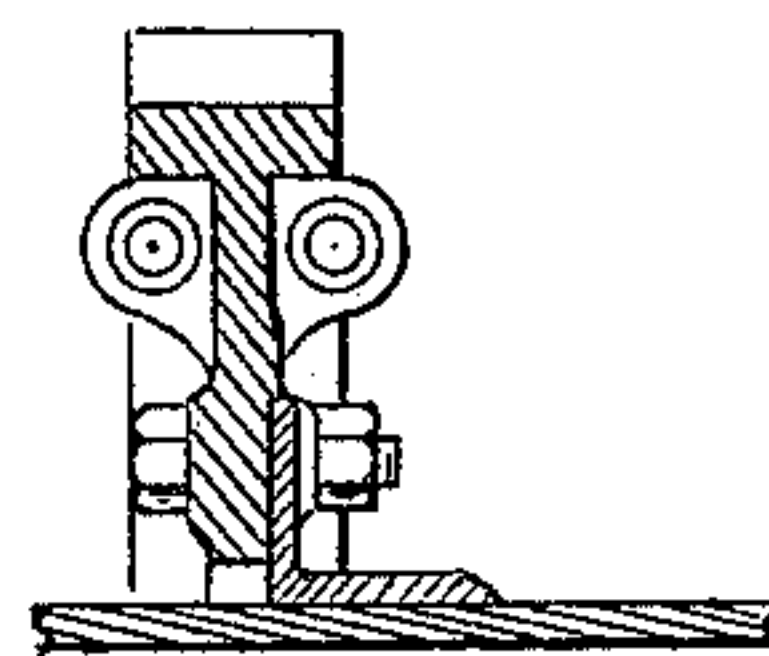


FIG. 7.



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FIG. 9.

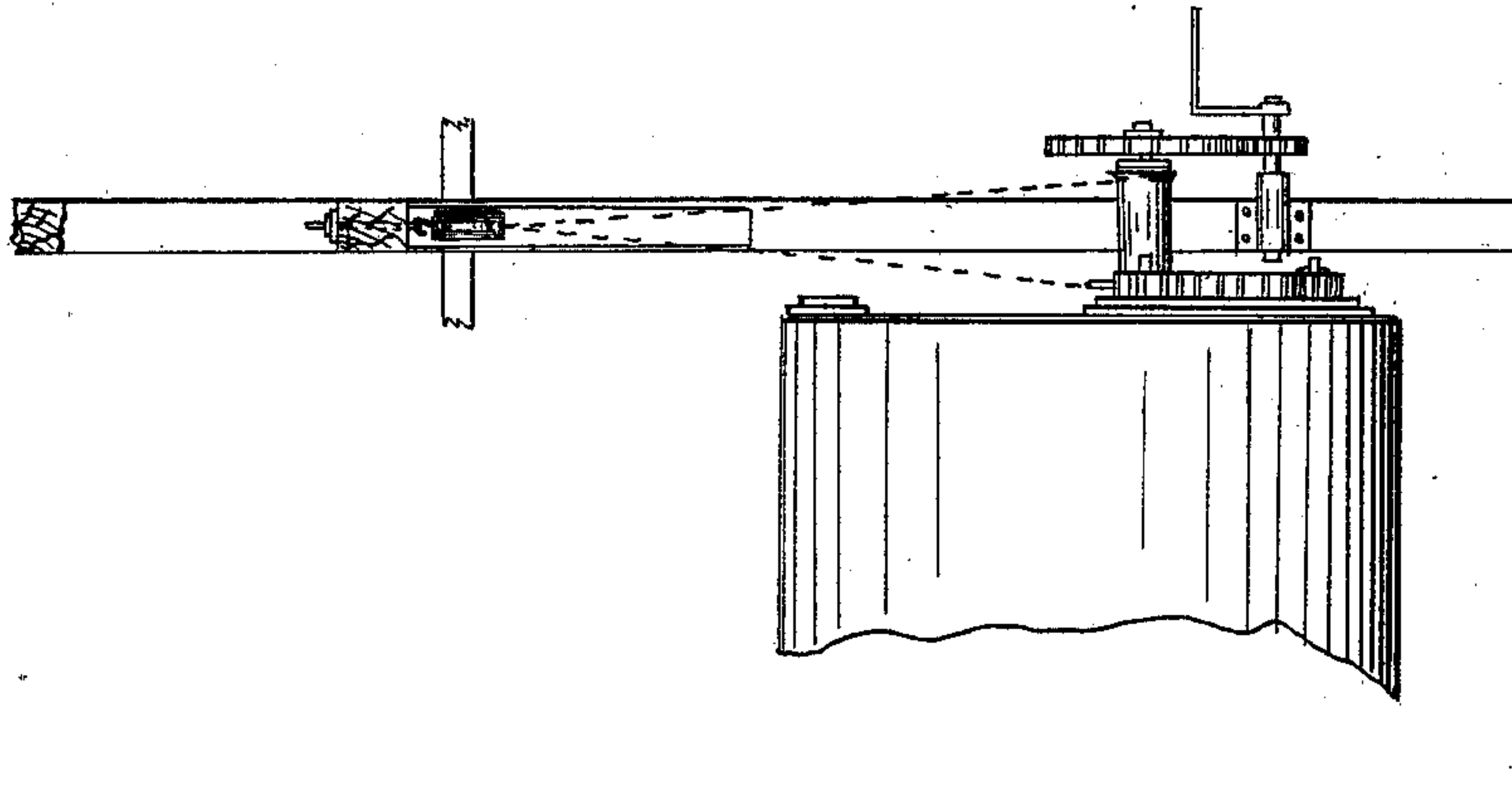
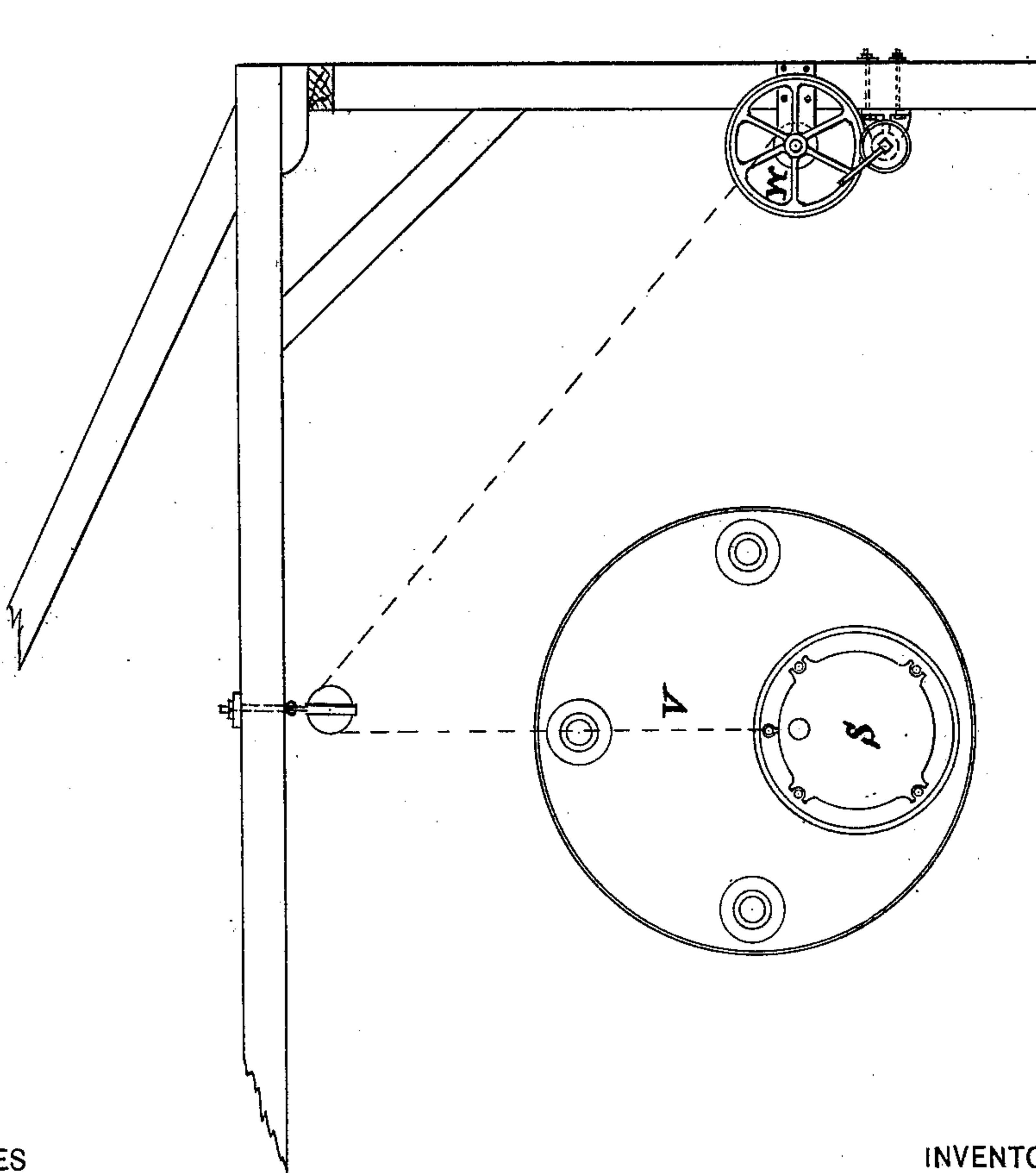


FIG. 8.



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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN ROTATIVE REGENERATIVE FURNACES.

Specification forming part of Letters Patent No. **218,326**, dated August 5, 1879; application filed  
March 28, 1879.

*To all whom it may concern:*

Be it known that I, CHARLES WILLIAM SIEMENS, of the city of Westminster, in the county of Middlesex and Kingdom of Great Britain, have invented certain new and useful Improvements in Rotative Regenerative Furnaces; and I do hereby declare that the following description, taken in connection with the accompanying plate of drawings, forms a full and exact specification, wherein are set forth the nature and principles of my invention.

My invention relates to that class of furnaces in which the flame enters and the products of combustion leave at the same end of the heating-chamber; and the nature thereof consists in certain modifications in the details of the construction of the same, hereinafter shown and described, whereby the powerful flame from the intermingled gas and air is caused to sweep entirely around the interior of the furnace, and penetrate all parts thereof before passing to the exit-passage.

It also consists in the arrangement of the gas-inlet and the passages communicating with the regenerative chambers, whereby the gas from the generator is caused to expand laterally beneath the air-currents, for the purpose of rendering the combustion within the rotative chamber more perfect.

It also consists in proportioning the length and width of the combustion-chamber in such a way that the horizontal section of the chamber is approximately square, so that the flame entering and leaving on one side may easily reach the opposite side.

It also consists in arranging the door of the furnace on one side of the cylindrical axis thereof, or in an eccentric relation to the circular front of the rotator, for the purpose of charging the furnace from an elevated platform, and also enabling the operator to discharge the iron balls without being obliged to lift them.

In employing the rotative regenerative furnace heretofore patented by me for the purpose of manufacturing iron and steel, the ore, flux, and reducing material are introduced and the balls are extracted through a central door opposite the throat of the furnace; and in removing the agglomerated iron for the purpose of

subjecting it to the action of squeezers hammers, or rolls for the production of wrought-iron, or to a bath of pig metal for the production of cast-steel, it is necessary to lift the balls a considerable distance.

The throat or neck of this furnace is in communication with three flues, the lower of which is for gas only, which is brought direct from the producers. The two lateral ports communicate with the regenerators, which are used for heating air only. The air flows in on one side of the flap into one regenerator, while the products of combustion coming from the furnace pass from the other regenerator to the other side of the flap, and thence to the chimney-flue. When one regenerator is heated sufficiently by the issuing products of combustion and the other is cooled by the incoming air, a reversal of the flap effects a change in the direction of the currents, and the heat accumulated is returned to the furnace in the usual manner. The gas rises from the producers and flows out hot through the regulating slide-valve into the gas-flue, along which it passes to the rotative chamber. Thus the gaseous fuel flows in continuously through the lower part, while the lateral ports alternately give ingress and egress to the air and products of combustion.

The improvements forming the subject-matter of my present invention are illustrated in the accompanying plate of drawings.

Figure 1 is a front elevation of the rotative regenerative furnace. Fig. 2 is a longitudinal vertical section of the same. Fig. 3 is a transverse section at A B C D, Fig. 2. Fig. 4 is a horizontal transverse section at the line G H, Fig. 2. Fig. 5 is a detailed section at the line I K of Fig. 1. Fig. 6 is an enlarged detail view of a portion of the front of the furnace. Fig. 7 is a section at the line L M, Fig. 3. Figs. 8 and 9 illustrate the appliances made use of for raising the door of the furnace.

The gas-inlet or lower port, O, through which the gaseous fuel flows continuously from the producer, is extended laterally until its width is more than double its height, for the purpose of spreading the gas over the area of the rotator beneath the air from the regenerators, which enters alternately through ports P and



R. This relative arrangement of the gas-inlet and passages communicating with the regenerative chambers, whereby the gaseous fuel is caused to expand horizontally beneath the air-current, greatly facilitates combustion within the rotative chamber.

The rotative chamber is constructed of wrought-iron plates, bound together by strips and angle-iron, riveted on and secured by two rings of rails, which also serve to support the chamber on the rollers.

For the purpose of giving ample scope for the flame to play about the interior and complete its combustion before it is withdrawn through the exit-passages, and so that the flame entering and leaving on one side may easily reach the opposite side, the drum or shell of the rotator has a diameter of not less than nine feet six inches, while the length thereof does not exceed the said diameter. In other words, the diameter of the drum should be equal to or greater than its length.

The door S of the furnace is arranged on one side of the cylindrical axis of the rotator, or in an eccentric relation to the circular front thereof, for the purpose of facilitating the operation of charging the furnace with material from an elevated platform, and enabling the operator to discharge the iron balls without lifting them. When the furnace is charged the door is made to occupy its uppermost position; but when it is necessary to remove the agglomerated iron for the purpose of subjecting it to the action of squeezers, hammers, or rolls, or to a bath of pig metal, for the production of cast-steel, the door is caused to assume its lowest position.

The appliances for raising the door are illus-

trated in Figs. 13 and 14. A chain, V, is provided with a hook, ring, or other proper device, by means of which it may be made fast to the door when it is desired to raise the same, or disengaged with facility when the rotator is in motion. The said chain is rove over a sheave, W, secured above, and thence led downward and clear of the rotator to a winch or other proper power.

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

1. In a rotative regenerative furnace, the gas-inlet, of a width more than double its height, in combination with and actuated below and between the passages communicating with the regenerators, as and for the purposes described.

2. In a rotative regenerative furnace, the combination, with the laterally-extended gas-inlet and passages communicating with the regenerative chamber, of a cylindrical revolving drum, the diameter of which is equal to or greater than its length, as and for the purposes described.

3. The rotative combustion-chamber of a regenerative furnace, provided with a door at one end eccentric to the axis of the rotator, said door serving for charging and discharging, substantially as set forth.

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