

(No Model.)

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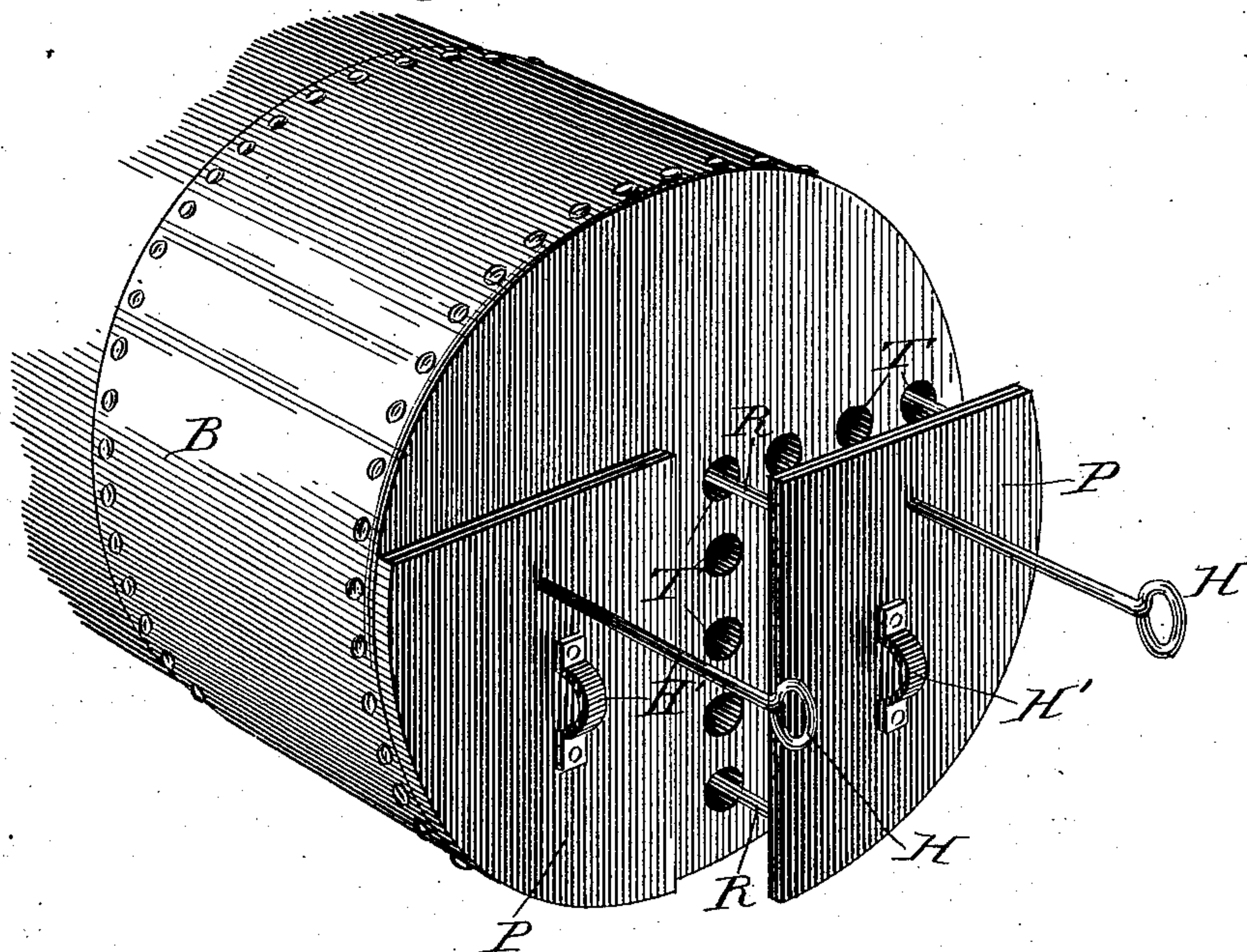
G. C. HICKS.

METHOD OF AND MEANS FOR RETAINING HEAT IN STEAM BOILERS.

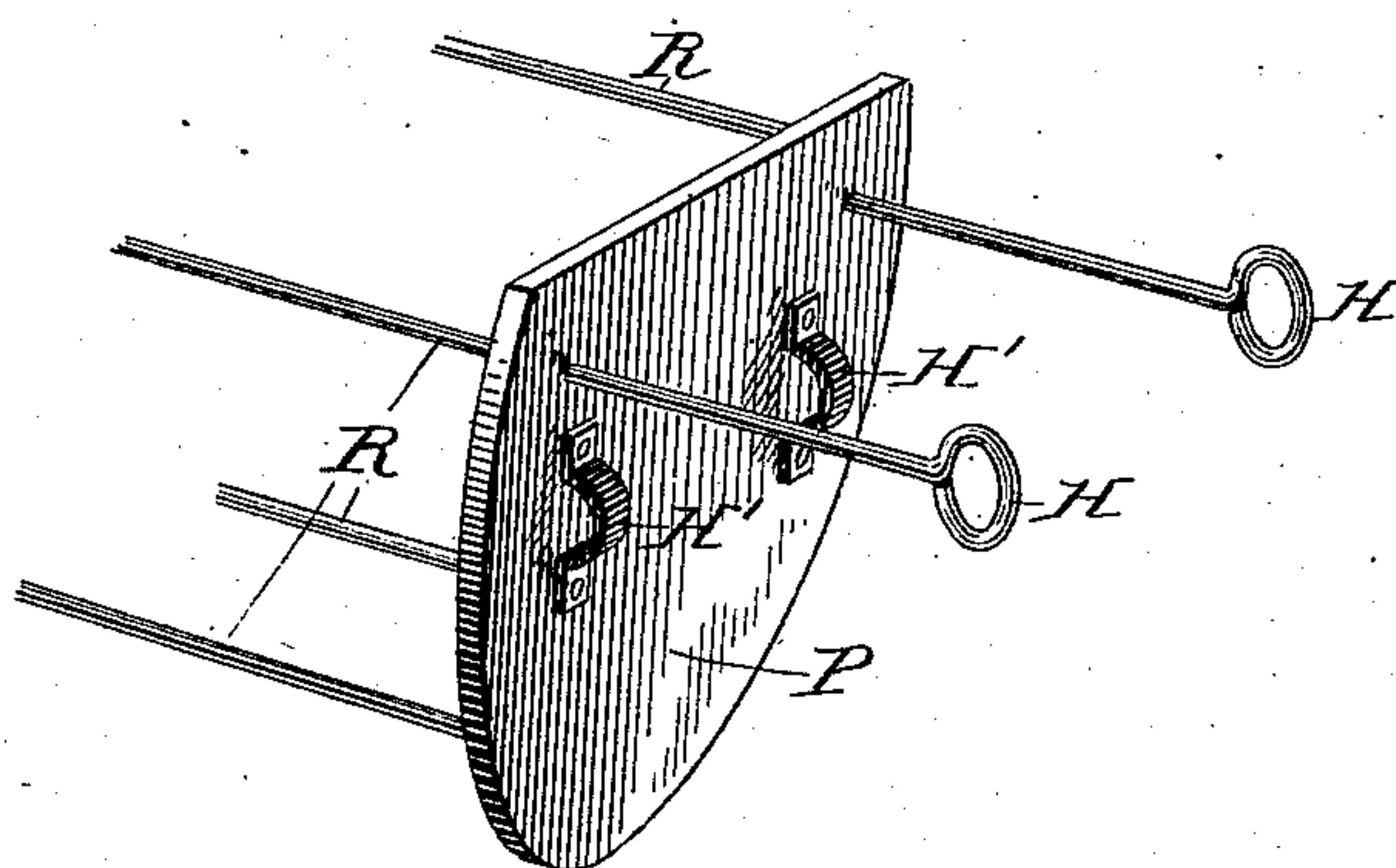
No. 287,829.

Patented Nov. 6, 1883.

*Fig. 1*



*Fig. 2.*



*Witnesses:*

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(No Model.)

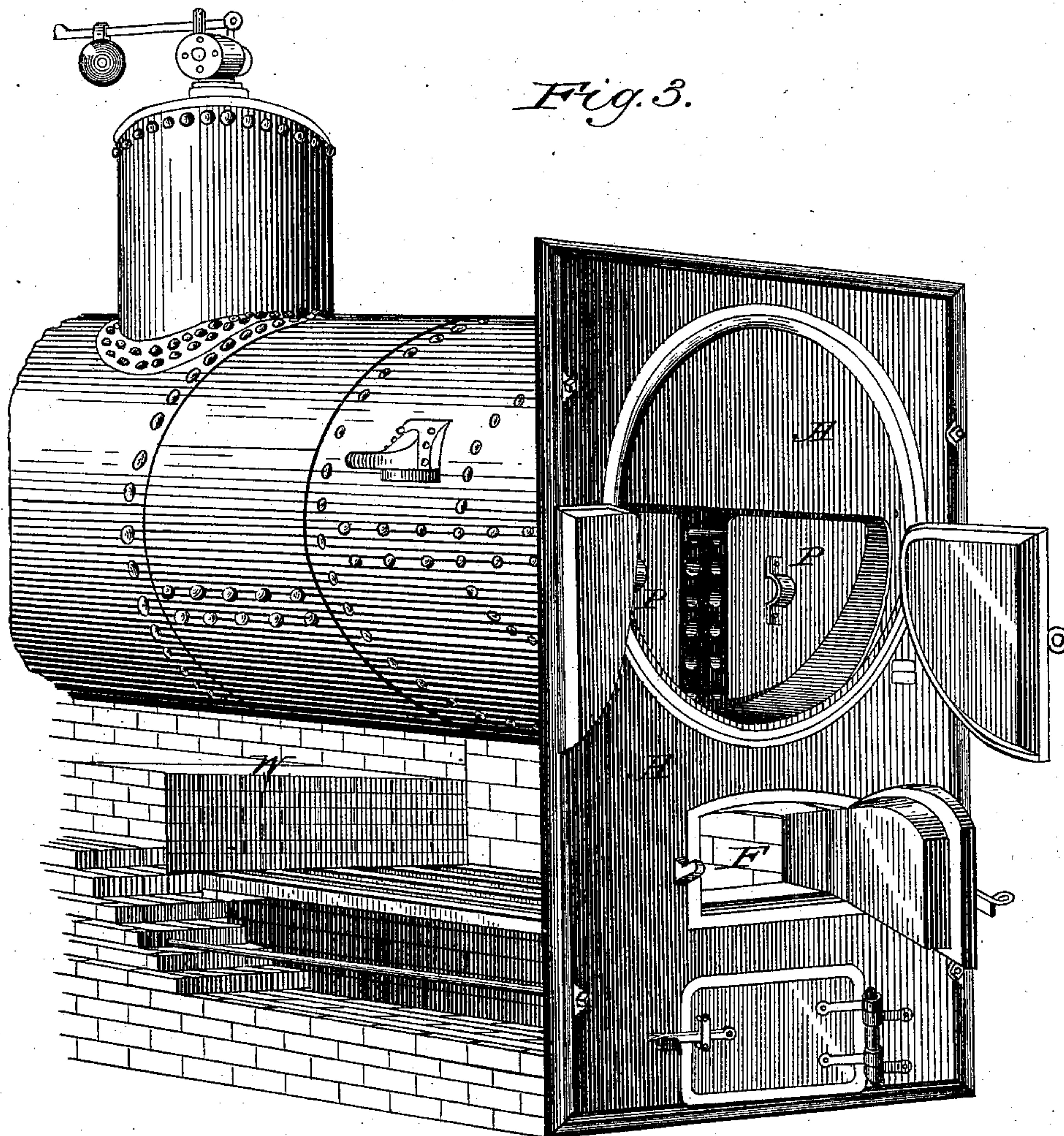
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*Witnesses.*

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# UNITED STATES PATENT OFFICE.

GEORGE CLEVELAND HICKS, OF CHICAGO, ILLINOIS.

METHOD OF AND MEANS FOR RETAINING HEAT IN STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 287,829, dated November 6, 1883.

Application filed February 14, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE CLEVELAND HICKS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Methods of and Means for Retaining Heat in Steam-Boilers; and I do hereby declare the following to be a full, clear, and exact description of the improvements, sufficient to enable others skilled in the art to make and use the same.

When steam-boilers are in temporary disuse at the close of the working day or over Sunday, or at other times, there is a large amount of heat stored in the water and steam of the boiler, which heat it is highly desirable should be retained as much as may be, since the fuel and time necessary to raise the steam again to requisite pressure are by such saving of the heat greatly lessened. Whether the practice be to bank the fires on the grates or to draw them entirely and begin afresh, it is plain that to discontinue the furnace-fire for any long period—such as, for example, during the twelve hours overnight, when, generally, steam-boilers are in disuse—must, and in fact does, reduce the temperature of the water very greatly. Direct radiation of the heat from the boiler is usually assigned as the cause of this reduction in temperature and pressure; but I have found that a serious source of loss results from certain local convection-currents established between the tubes or flues of the boiler and chimney-stack. The gases or air, in passing through said tubes or flues, rob the water of a portion of its heat, only to lose it again when in contact with the cooler walls of the exit-passages and chimney-stack, whereupon said gases or air descend and return again to the boiler tubes or flues, to absorb fresh portions of heat, thus making a complete circuit, and so continuing until the water of the boiler is cold. The local convection-currents exist, and loss of heat consequent thereupon continues, whether the chimney-damper be closed or open, for however tight and well-fitting the damper may be the walls of the exit-passages below it are enough cooler than the air or gases to absorb their excess of heat and to cause their return again in circuit to the boiler, whereas if the damper be open, or there be none, the draft through the fur-

nace will speedily reduce the temperature of the water, and in the end fresh accessions of cold air from the mouth of the stack will pass into the interior, to commingle with the local gaseous currents established therein, and to still further absorb the heat.

My invention is designed to retain the heat of steam-boilers while in temporary disuse; and it consists, specifically, in a method of and means for suppressing the aforesaid local convection-currents, all as hereinafter described, and more particularly pointed out in the claims following.

In the accompanying drawings, designed to illustrate the manner of applying my invention in practice, like letters of reference indicate like parts.

Figure 1 shows a steam-boiler having a tube-closer in two parts attached thereto. Fig. 2 is a perspective view of the tube-closer. Fig. 3 shows a return-flue boiler with the tube-closer applied thereto.

Within the casing of a boiler, B, of any usual construction, and at the front thereof, where the gases emerge from the boiler tubes or flues into the bonnet or exit-passage leading to the chimney-stack, is arranged a tube-closer, P, which may consist of a metal plate having a fire-resistant lining, of asbestos, fire-clay, or the like, or may be made of any other material suitable to resist the action of the highly-heated gases. In the present instance the tube-closer P is provided with the rods R, to sustain the same, extending therefrom into the tubes T of the boiler, and with an adjusting-rod, H, which passes through the boiler-casing to the exterior, and has a handle, H', by means whereof the position of the closing-plate P with respect to the exit ends of the boiler tubes or flues may be adjusted. The tube-closer P should be large enough to completely cover the front ends of the boiler flues or tubes opening into the bonnet or stack when said closer is forced against the educts or ports; and for convenience the closer may be in two parts, as shown in Fig. 1, each section being designed to effectually close the ports or educts that are in position opposite thereto.

In the return-flue boiler shown in Fig. 3 F designates the fire-box, W the bridge-wall, and A the boiler-front, with its doors opened, so that the tube-closers P may be seen in position.



While the boiler is in full use the tube-closer P will be drawn away from the ends of the tubes or flues, so as not to interfere with the draft; but when the furnace-fires are banked or drawn during any period of temporary dis-  
 5 use of the boiler, then, in order to maintain the water of the boiler in highly-heated condition, the ash-pit doors may be closed and the tube-closer P is pushed against the ends  
 10 of the flues or tubes, so that the objectionable local circulation of the gases is prevented.

Whatever may be the special construction of the boiler or of the tube-closer, and however the same may be supported in place, it is  
 15 obvious that the essential point to be observed is that the closer shall be in such relation to the educts of the boiler tubes or flues as to effectually check the establishment of local convection-currents in the air or gases, which  
 20 otherwise would abstract the heat from the water of the boiler, to lose it again in the cooler-passages or stack, and then return to the boiler flues or tubes, to take up fresh portions of heat. If the furnace-fires are banked on the grates,  
 25 it will be found desirable to make the tube-closer in two parts, as shown, because by this means the lower section thereof may be tightly shut against the educts of the flues or tubes, to check the cold convection-currents while the  
 30 upper section may be left slightly open, to allow moderate ventage for the gases evolved from the coals, until such time as the smothered fire has cooled so far that evolution of the gases practically ceases, whereupon the upper section  
 35 of the tube-closer may be shut down entirely, to arrest all further circulation, and this, too, without risk of any obnoxious gases being forced out into the furnace-room. Where the fires are drawn at the outset, it is obvious that no  
 40 such precaution need be observed, and the closer can be made in one piece, or in sections, as desired.

Practical experience has demonstrated that in boilers having the local convection-currents  
 45 suppressed, as described, the water of the boiler is maintained in a highly-heated condition much more effectually than where no such precaution is taken. In the morning the gage shows but little reduction in steam-pressure,  
 50 and not more than one-fourth of the time or fuel need be consumed in bringing the boiler to standard working-pressure that was usual

prior to the adoption of the invention. Again, where the fires are banked, the closer not only  
 arrests the convection-currents, but checks the  
 55 draft, so that the risk of excessive pressure on the boiler, due to any unguarded freshening of the fire, is avoided.

It is plain that the heat and pressure being kept within more equable limits by the use of  
 60 the invention reduces the severe strains on the boiler plates and rivets, to which the extreme changes in temperature heretofore customary made the boiler singularly liable. The security of the boiler-structure is consequently  
 65 increased.

I am well aware that tube-stoppers to permanently plug up defective flues in steam-boilers have been used, and that it is old to  
 provide adjustable dampers, valves, or plates  
 70 at the ends of the boiler flues or tubes for the purpose of regulating the draft through the flue-passages, or for directing the gases through some portions of the tubes or flues more than  
 through others, so that the heat shall be evenly  
 75 distributed; but these objects are wholly foreign and without analogy to any had in view by me. They pertain to the use of the boiler in full working condition, and while it is being  
 constantly fired, whereas my invention is  
 80 designed to save the heat stored in the water of the boiler while the furnace is temporarily at rest, and is intended to check and suppress a class of local gaseous currents, which are of  
 no moment, if, indeed, they can be said to exist,  
 85 save at such periods of temporary disuse.

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

1. The method of retaining the heat of  
 90 steam-boilers when in temporary disuse, which consists in suppressing the circulation of local gaseous currents between the boiler tubes or flues and the cooler-escape passages or chimney-stack, substantially as described. 95

2. The combination, with the boiler B, having the tubes T, of the adjustable plate tube-closer P, provided with the rods R and H, to sustain the same in front of the exit-flues, substantially as described.

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Witnesses:

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