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Patented May 7, 1901.

J. M. HARTMAN.

IRON NOTCH FOR BLAST FURNACES AND MEANS FOR PLUGGING SAME.

(Application filed Sept. 15, 1899.)

(No Model.)

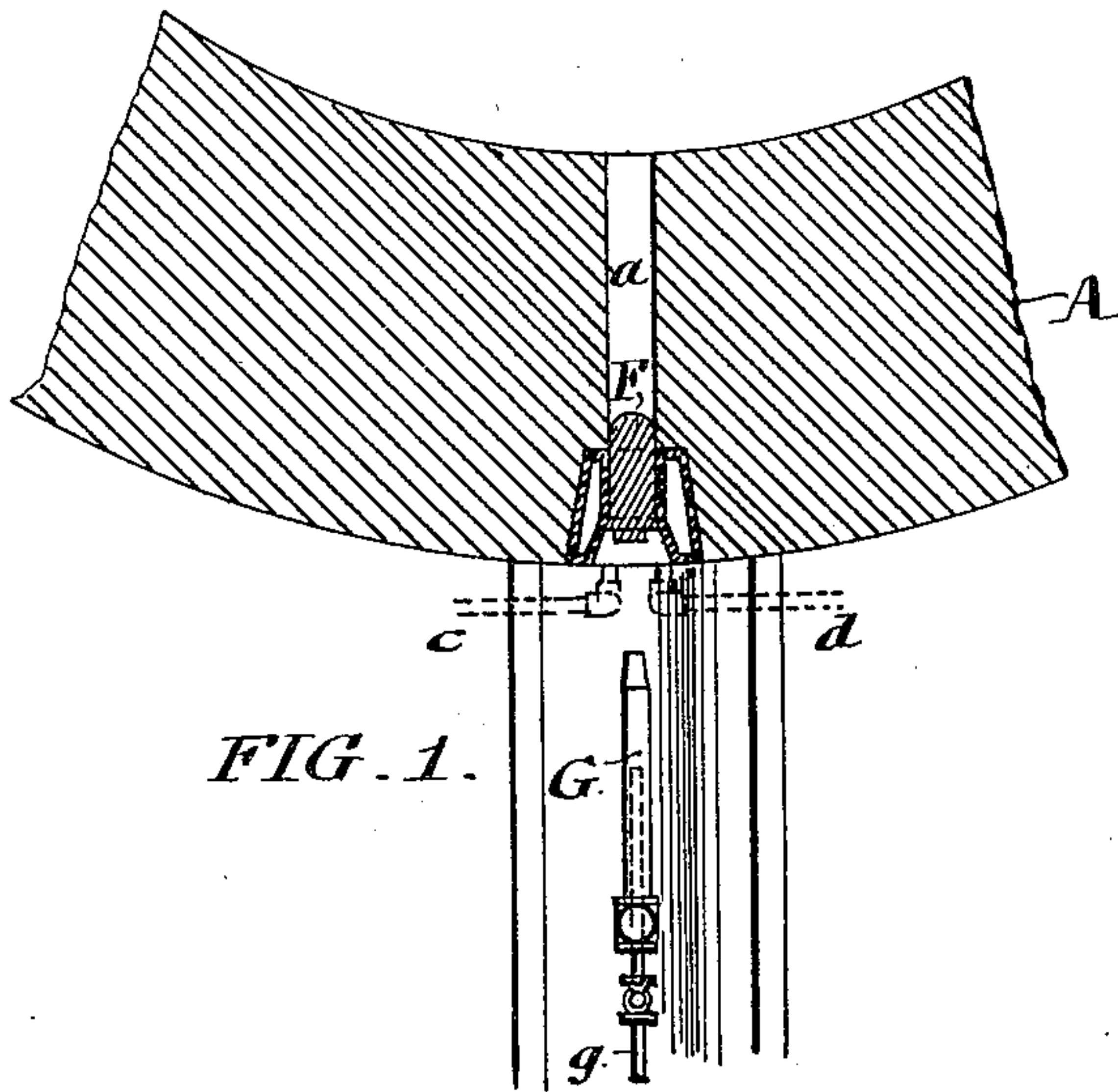


FIG. 1.

FIG. 2.

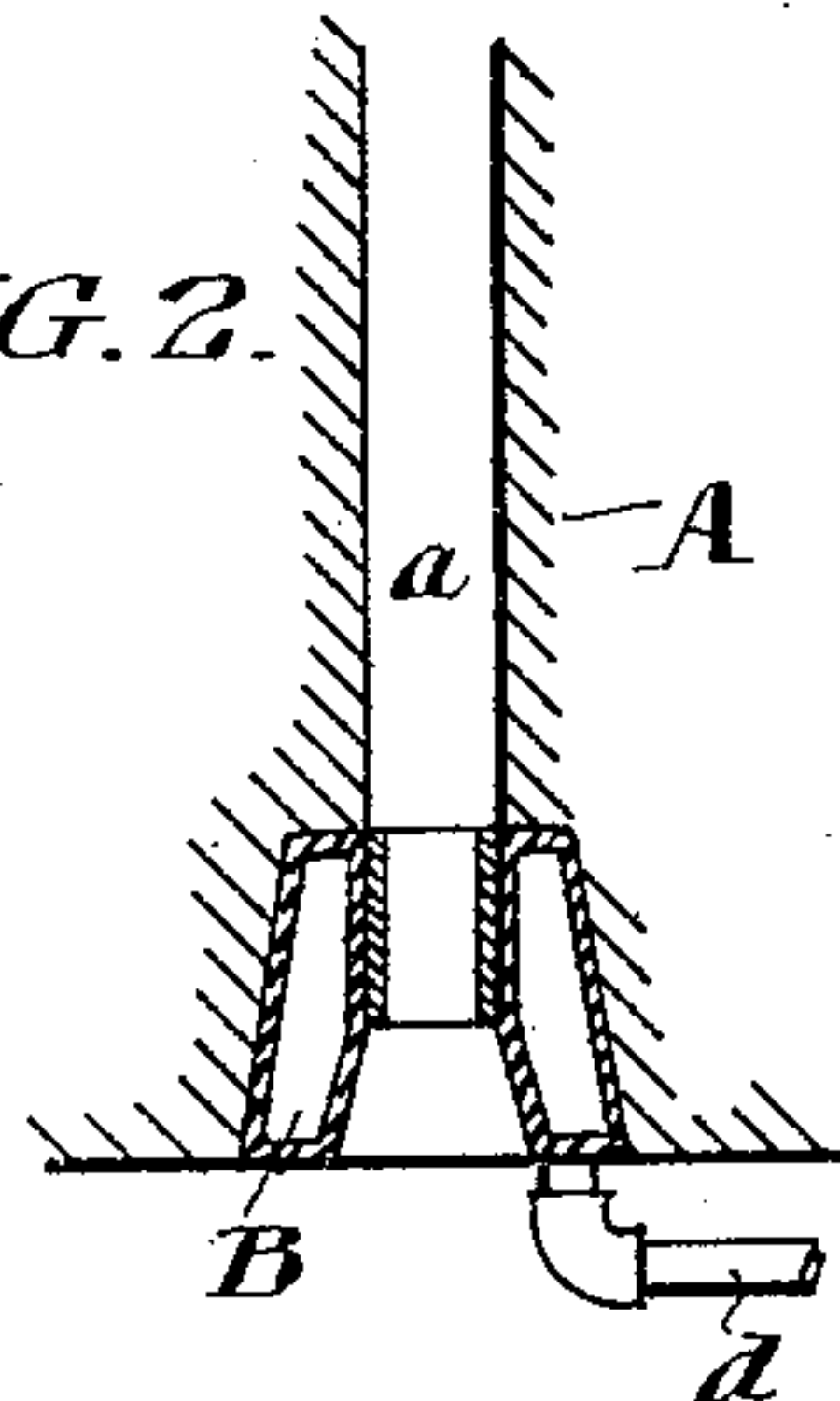


FIG. 3.

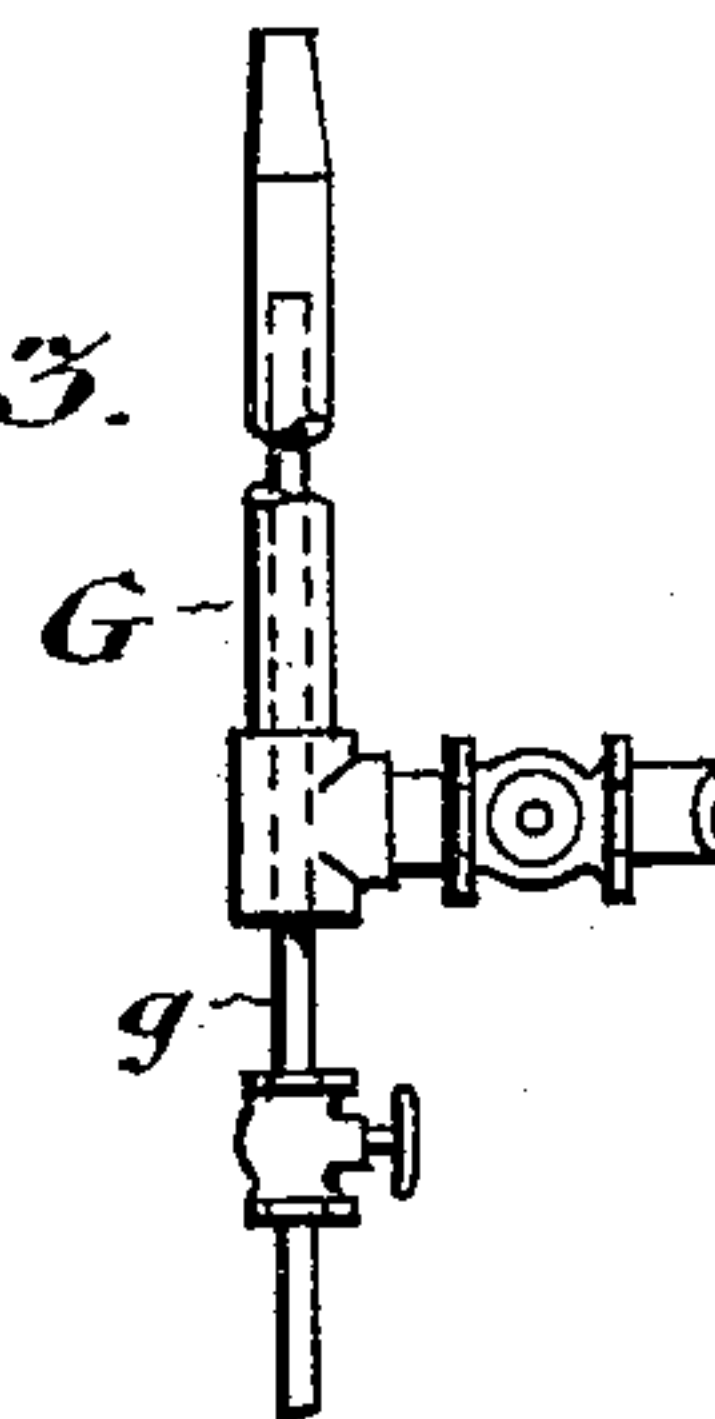


FIG. 5.

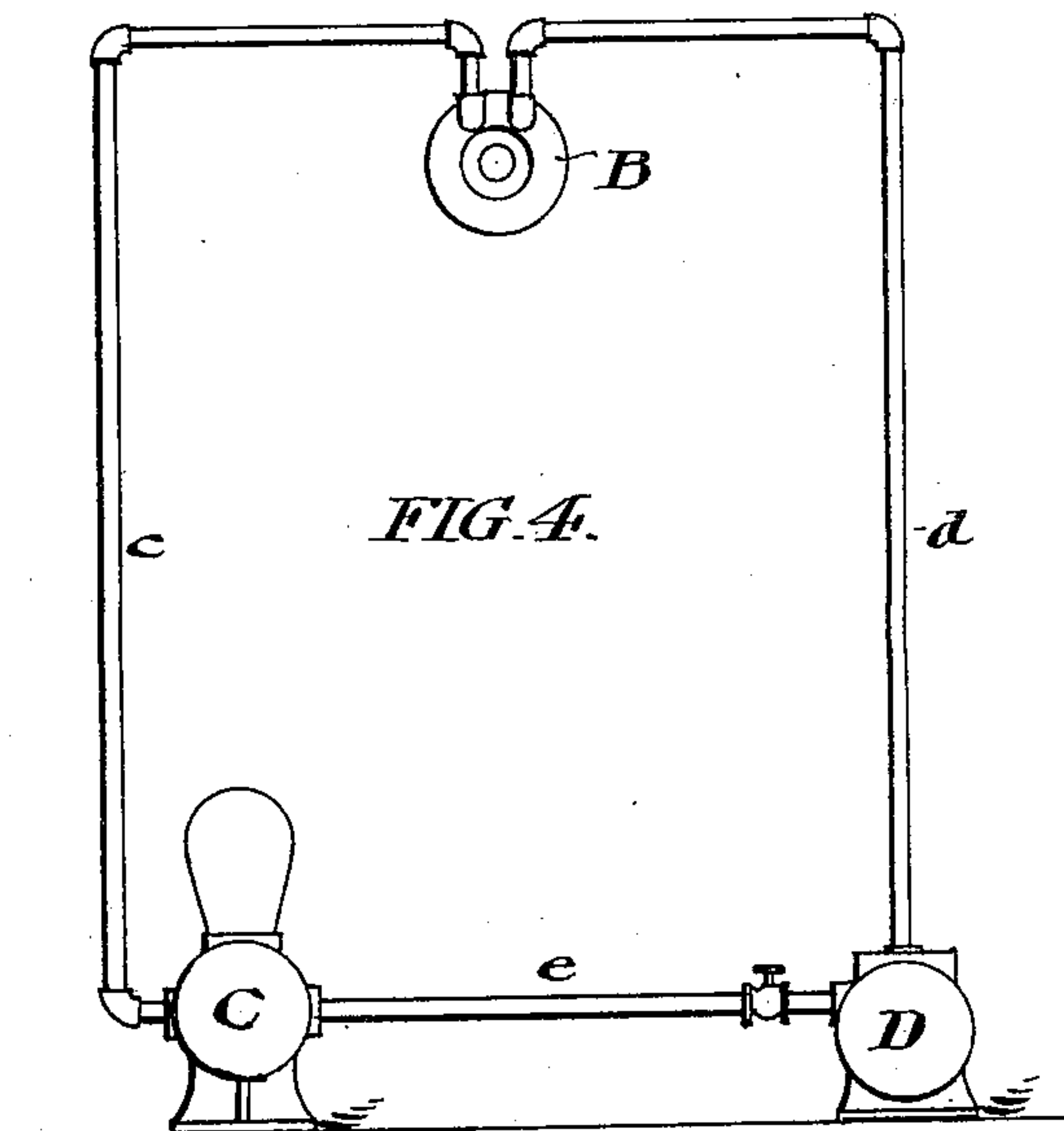
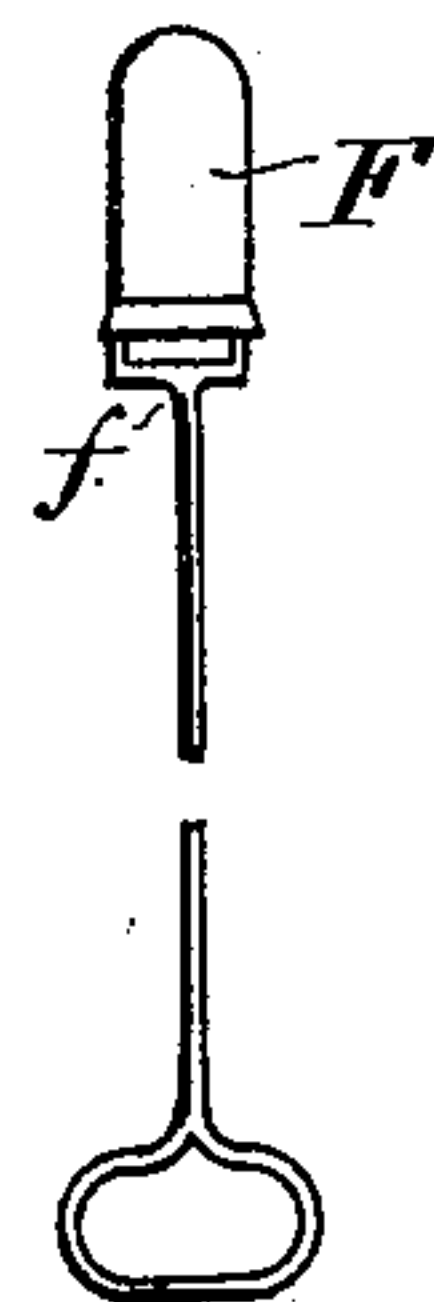


FIG. 4.

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IRON NOTCH FOR BLAST-FURNACES AND MEANS FOR PLUGGING SAME.

SPECIFICATION forming part of Letters Patent No. 673,556, dated May 7, 1901.

Application filed September 15, 1899. Serial No. 730,549. (No model.)

To all whom it may concern:

Be it known that I, JOHN M. HARTMAN, a citizen of the United States, residing on Gowen avenue, Mount Airy, in the city and county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Iron Notches for Blast-Furnaces, of which the following is a specification, reference being had to the accompanying drawings.

My invention has to do with a means of plugging and unplugging iron notches generally, but is especially applicable to iron notches which are surrounded by a hollow cooling-jacket. More particularly it consists of a plug of combustible material which in order to close the notch is inserted in it and which when the notch is to be opened is capable of being burned through.

My invention also comprises means consisting of a blowpipe, whereby the central axial portion of this combustible plug may be burned through, leaving within the notch an annular shell, which serves the function of protecting the notch, and particularly the cooling-jacket, from the destructive effects of the first rush of the molten metal when the notch is opened.

In the accompanying drawings, Figure 1 represents in horizontal section the portion of a blast-furnace immediately surrounding the notch, into which has been inserted a plug of combustible material in accordance with my invention. The same figure also shows the blowpipe in position for use to burn out the center of this plug. Fig. 2 is a slightly-enlarged similar view of the notch, showing the pierced plug *in situ*. Fig. 3 is a similarly-enlarged view of the blowpipe for piercing the plug. Fig. 4 is a diagrammatic view of a circulatory system for cooling such an iron-notch jacket as is shown in Figs. 1 and 2. Fig. 5 is a view of the handle for inserting the plug.

A is the wall of the furnace, and *a* the iron notch. The outer end of the notch is fitted with an annular hollow cooling-jacket B, although it will be understood that this jacket forms no part of my present invention, which is also applicable to notches not provided with such jackets. The interior of the jacket

flares toward the outside to admit the more ready insertion of the plug. Where the cooling-jacket is used, a suitable cooling liquid is circulated through the hollow walls of the jacket by means of pipe connections *c d*, a pump C, and a reservoir D, all shown in Fig. 4.

F, Fig. 5, is a plug of suitable shape to fit the inside of the notch. For this purpose it is made of a generally cylindrical or conical shape, which contour I will for the sake of convenience designate by the term "cork-shaped." It is made of combustible material, so that it is capable of being burned through when the notch is to be opened by means of a blowpipe, as is about to be described.

I have found powdered carbon compressed with a suitable binding material, such as silicate of alumina, a desirable substance from which to form the plug. Powdered carbon is particularly applicable for this purpose because it is not only combustible, but is comparatively non-heat-conducting, so that the shell of carbon which remains after burning through the core of the plug tends to protect the mouth of the iron notch from being burned away by the flow of molten metal. The plug is handled by means of a fork *f*, Fig. 5, and inserted in the notch, as seen in section in Fig. 1.

Fig. 3 illustrates a large blowpipe, which may be swung in front of the notch. It consists of the large tapering external sleeve G and the internal blast *g*. The sleeve may be fed with coal-oil or similar light oil by means of the pipe connections shown in Fig. 3, which should be flexible. This blowpipe is swung in place in front of the notch, and by means of the heat generated by the air-blast the center or axial portion of the carbon plug is burned through, leaving only an annular shell of carbon, through which the molten metal escapes, this condition being illustrated in Fig. 2. The heat thus generated in the notch prevents the molten metal from solidifying as the advance stream escapes, a contingency which otherwise sometimes happens through the sudden cooling of the small initial stream. The shell or lining of carbon thus serves the double purpose of preventing

too sudden cooling of the advance stream and too great heat of the mouth of the iron notch.

Having thus described my invention, I
5 claim—

1. A blast-furnace, the iron notch of which is fitted internally with a plug wholly composed of combustible material, substantially as described.
- 10 2. A blast-furnace, the iron notch of which is fitted internally with a plug wholly composed of combustible material united by a binding material, substantially as described.
- 15 3. A blast-furnace, the iron notch of which is fitted internally with a cork-shaped plug the axial portion of which is wholly composed of combustible material, substantially as described.
- 20 4. A blast-furnace, the iron notch of which is fitted internally with a cork-shaped plug, the axial portion of which is wholly composed of combustible material united by a binding material, substantially as described.
5. A blast-furnace, the iron notch of which

is fitted internally with a cork-shaped plug, 25 the axial portion of which is wholly composed of powdered carbon united by silicate of alumina as a binding material, substantially as described.

6. A blast-furnace, the iron notch of which 30 is fitted with a plug of combustible material and with a blowpipe, and means for swinging the same in front of said plug whereby the notch may be opened by burning the plug through, substantially as described. 35

7. A blast-furnace, the iron notch of which is fitted with a hollow cooling-jacket; a plug of combustible, non-heat-conducting material within the jacket, and a blowpipe with means for swinging the same in front of said 40 plug, whereby the iron notch may be opened by burning through the axial portion of said plug, substantially as described.

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Witnesses:

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