

JAMES H. McKERNAN.

Improvement in Blast Furnaces.

No. 123,035.

Patented Jan. 23, 1872.

FIG. 3

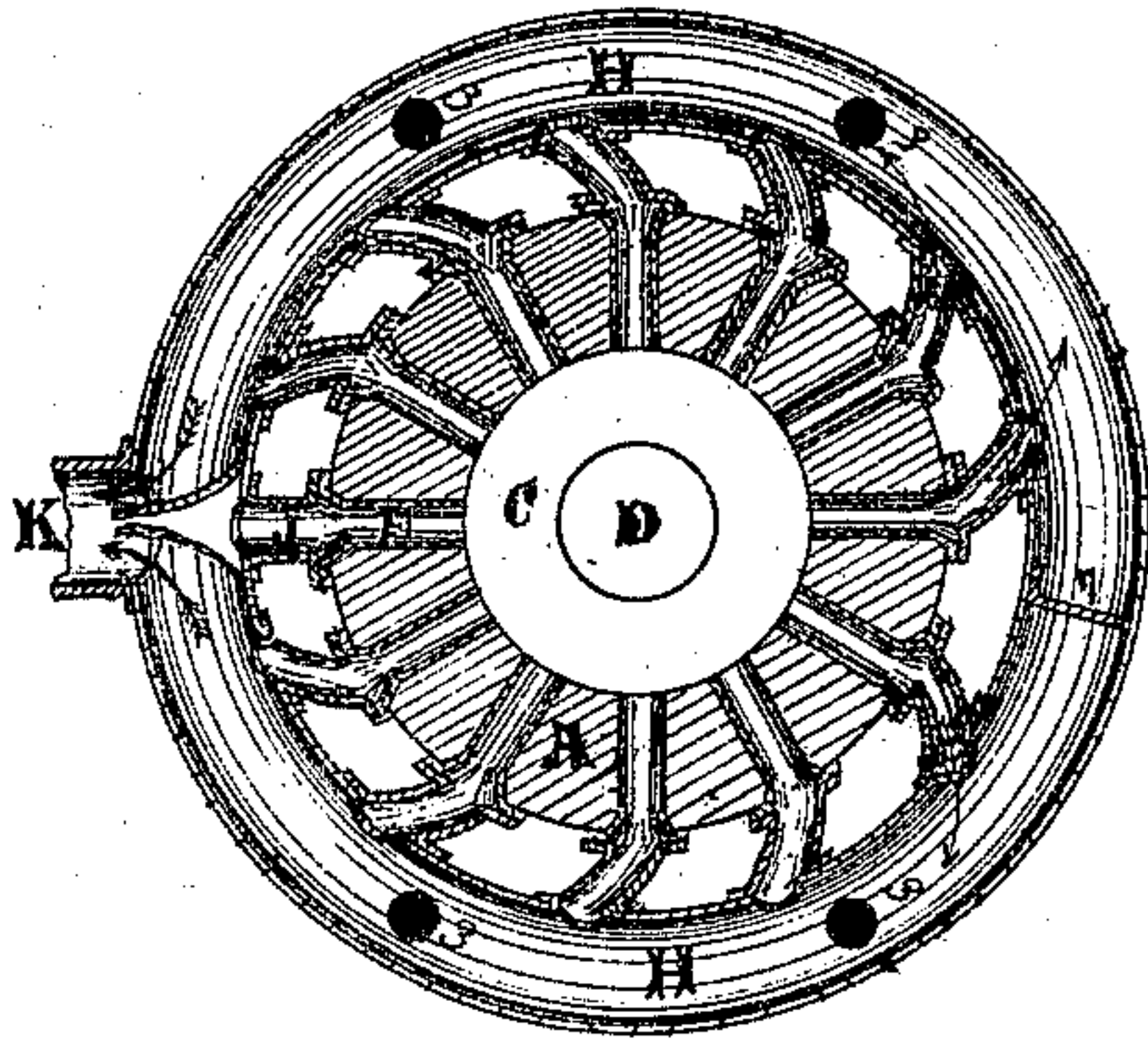


FIG. 4

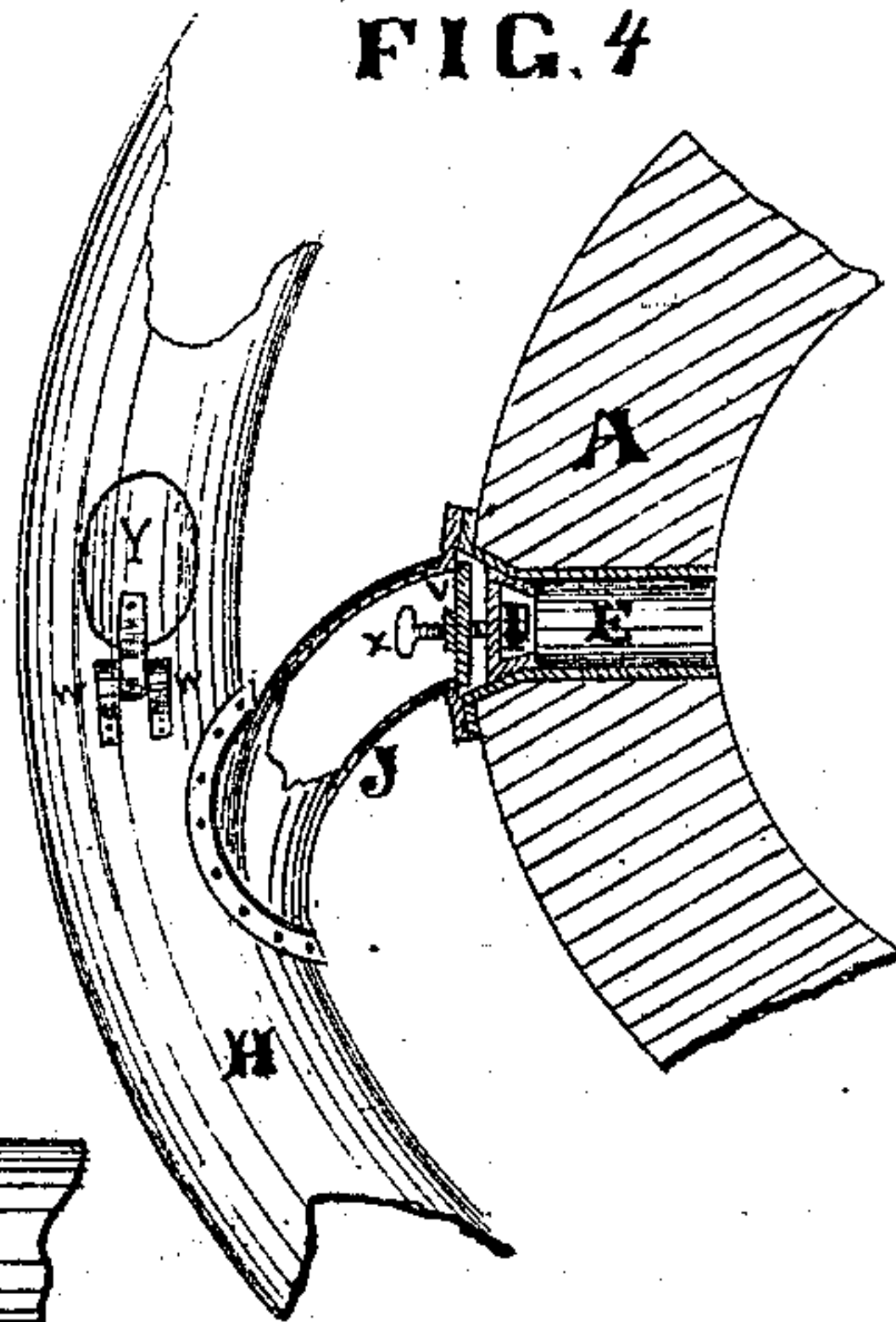


FIG. 5

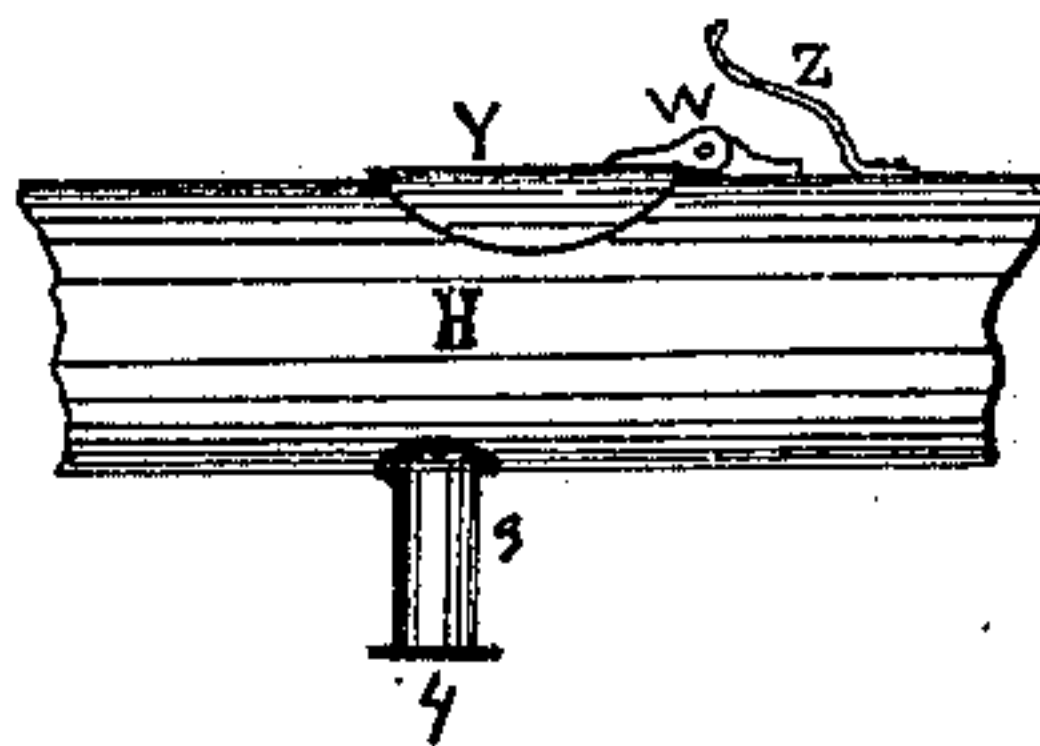


FIG. 1

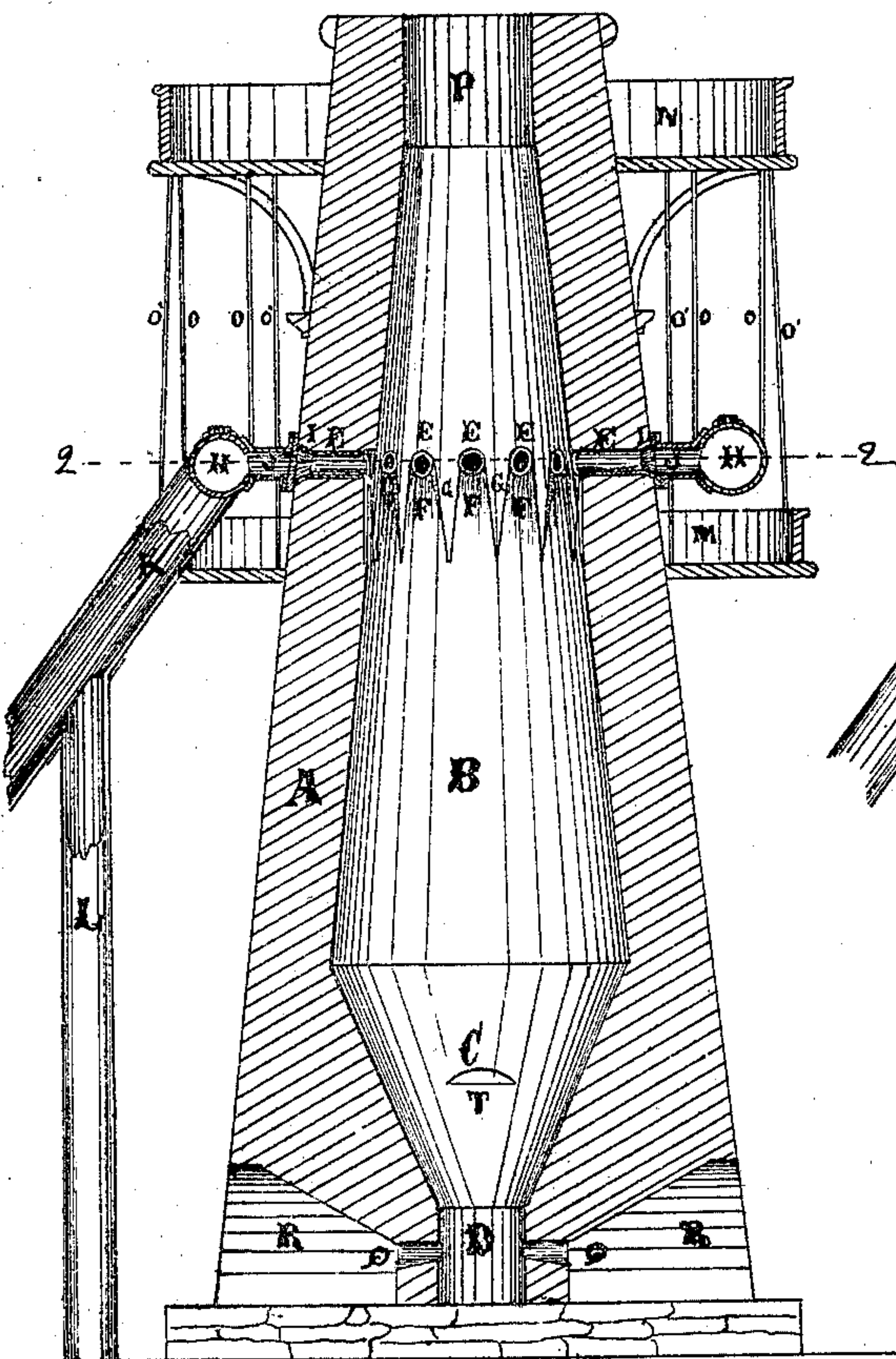
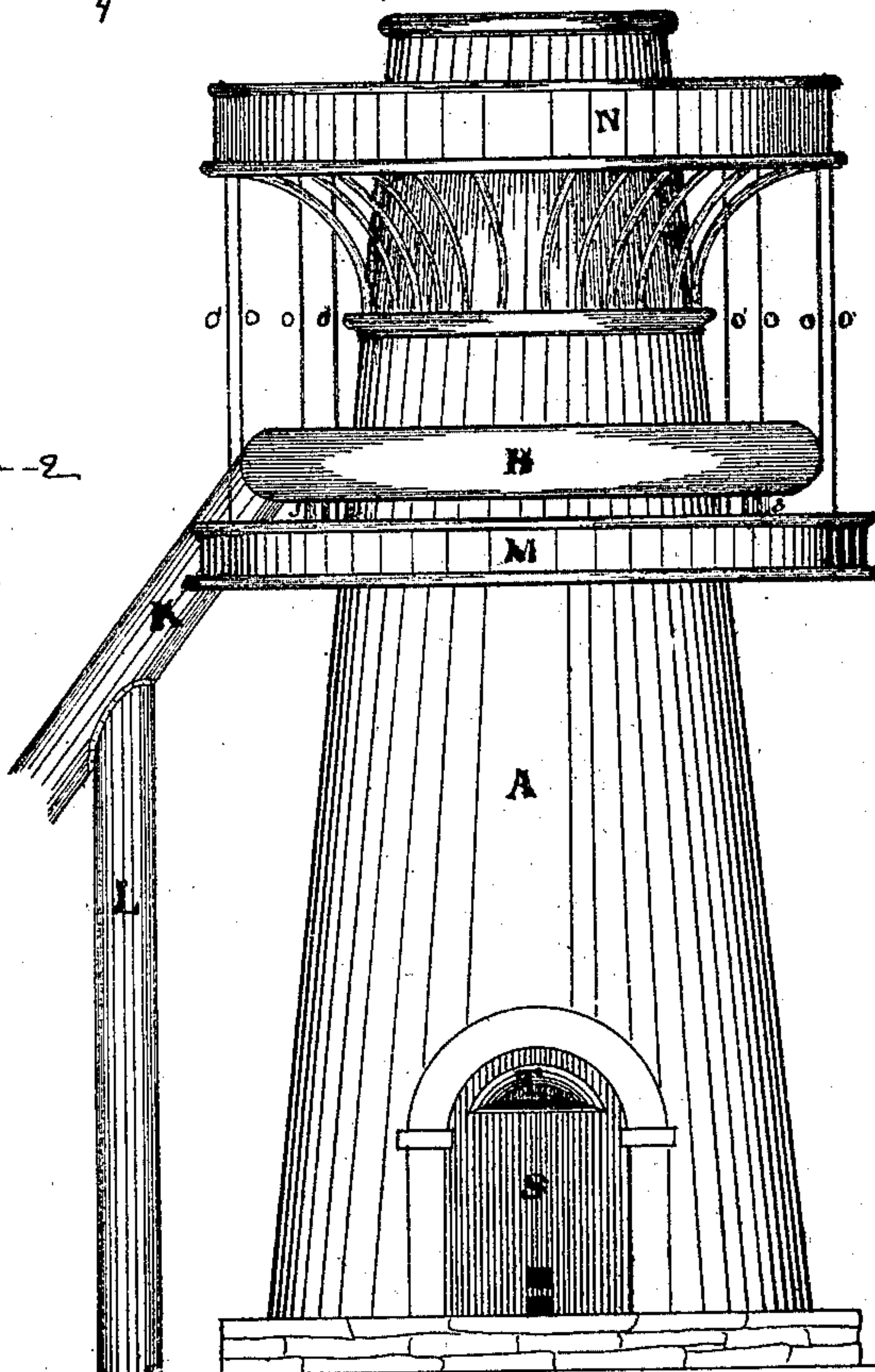


FIG. 2



WITNESSES

Wm H A Dell

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UNITED STATES PATENT OFFICE.

JAMES H. McKERNAN, OF INDIANAPOLIS, INDIANA.

IMPROVEMENT IN BLAST-FURNACES.

Specification forming part of Letters Patent No. 123,035, dated January 23, 1872.

Specification describing certain Improvements in Blast-Furnaces, by J. H. McKERNAN, of Indianapolis, county of Marion and State of Indiana.

My improvement consists in the arrangement of certain parts of a blast-furnace in such a manner that dust that accumulates in the furnace from soft coal, which cuts off the free passage of the blast through the stock, can be removed; also, to remelt any iron that may become chilled on the hearth.

Figure 1 represents a vertical transverse section of a blast-furnace embodying my invention. Fig. 2 is an elevation of the same. Fig. 3 is a horizontal section through the line 2 2, Fig. 1. Fig. 4 is an enlarged section of the pipe E, connecting-pipe J, and outside pipe H. Fig. 5 is an enlarged section of the pipe H, showing the gas-vent *y* and drop-pipe.

Description of the Blast-Furnace.

A blast-furnace consists of two truncated cones, B C, joined at their bases. The bottom of the furnace D is called the hearth, and the lower part of the lower cone C is called the boshes, and is constructed of fire-brick, or of a very refractory material called fire-stone. This part of the furnace is subjected to a very intense heat, and it is necessary to construct it of such material as may be sufficiently durable. The upper cone B or body of the furnace is formed of an internal lining of fire-brick, which is again enveloped in a casing made up of broken scoriæ or refractory sand, whereby the internal lining or shirt of the furnace is separated from the external coating of fire-brick, which is supported by a mass of masonry, composed of stone and common stock brick, or an iron casing. The opening P at the top of the furnace is called the throat or tunnel-head, in which there are openings called filling-doors, used to supply the furnace with fuel, ore, and flux. Air is supplied to the furnace by tuyeres, which enter the furnace at Q, through which the blast is forced.

The height of the stack is about sixty feet, with a hearth six feet high. The bosh is fourteen feet in diameter at the intersection of the upper cone or body of the furnace, and is eleven feet from the top of the hearth to the top of the bosh. The height of the tuyeres is

forty-seven inches from the bottom of the hearth, and there are twenty-five inches from the tuyeres to the top of the hearth or bottom of the bosh. About four feet above the top of the hearth is an opening or arch, T, in the bosh, and extends through the masonry to the outside. This opening is shown over the tapping-hole in the shafts, but may be placed at any convenient place around the stack, (as at the side or back.) This opening or arch is used to inject fuel in case where the stock hangs in the furnace, which is caused by the stock bridging over near the bottom of the bosh, and prevents the blast from passing up through the stock, and causes the furnace to become cold for want of the necessary fuel in the bottom of the furnace. To relieve this difficulty I use the arch T for the purpose of injecting the necessary fuel; then put in a large quantity of scrap and a small quantity of pig-lead to facilitate the purpose of cutting out the chill below. This gives vitality to the furnace. In the upper cone B of the body of the furnace, and about twenty feet below the top, is a series of twelve holes and twelve spaces of equal size, the holes radiating from the inside of the furnace to the outside, and are then connected to the outside pipe H by the pipes J J, which are curved in the proper way to enable the blast to carry the dust and gas without any obstruction to the outlet-pipe K. In lining the furnace about four feet below the holes E E, the spaces F F are carried up plumb to the bottom of the holes, and leaves the spaces G G tapered from the holes E E to their point, four feet below these spaces G G, having the same taper as the inside of the furnace. This arrangement leaves a recess, F, between the tapered space G G and under the openings E E. This allows the dust and gas to pass out of the furnace and, through the connecting-pipes J J, into the main pipe H, which encircles the furnace. Here the dust and gas are parted in the center at 7, Fig. 3, and one-half goes to the right and the other half to the left, and leaves the pipe H at the place where the pipe K is placed. The dust that does not get around to the pipe K is received in the drop-pipes 3 3, which are placed at convenient distances apart, and have drop-doors at their bottom end, and from these can be let out at

pleasure by any one passing around the platform M for that purpose.

The effect of the above arrangement of recesses and openings in the upper cone B of the furnace is this: The blast has a powerful centrifugal force, which sends everything in the shape of dust and dirt from the center, and will keep stock in a good clear condition, while the supply of oxygen at the bottom will keep the fire in good condition. When it becomes necessary to stop up the furnace for want of stock or any other cause, the plugs U U, shown in Fig. 4, which are made of iron and fire-clay, are passed through the gas-vents in the pipes J J, and inserted into the pipes or openings E E; and a bar of iron, V, having a screw, X, through its center, is inserted and the ends placed against the flange of the pipe J J, or against the inside of the iron casing that sur-

rounds the furnace, and the screw X is tightened up against the rear end of the plug U, thus securing it in its proper position.

Claim.

I claim—

The furnace in its novel combination of the recesses F F, holes or pipes E E, in connection with the outside pipe H and drop-pipes 3 3, substantially as and for the purposes hereinbefore set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES H. MCKERNAN.

Witnesses:

S. C. FRINK,
WM. H. A. DELL.