(No Model.) 6 Sheets—Sheet 1.

B. BAYLISS, Jr.

APPARATUS FOR MANUFACTURING IRON AND STEEL.

No. 332,475. Patented Dec. 15, 1885.

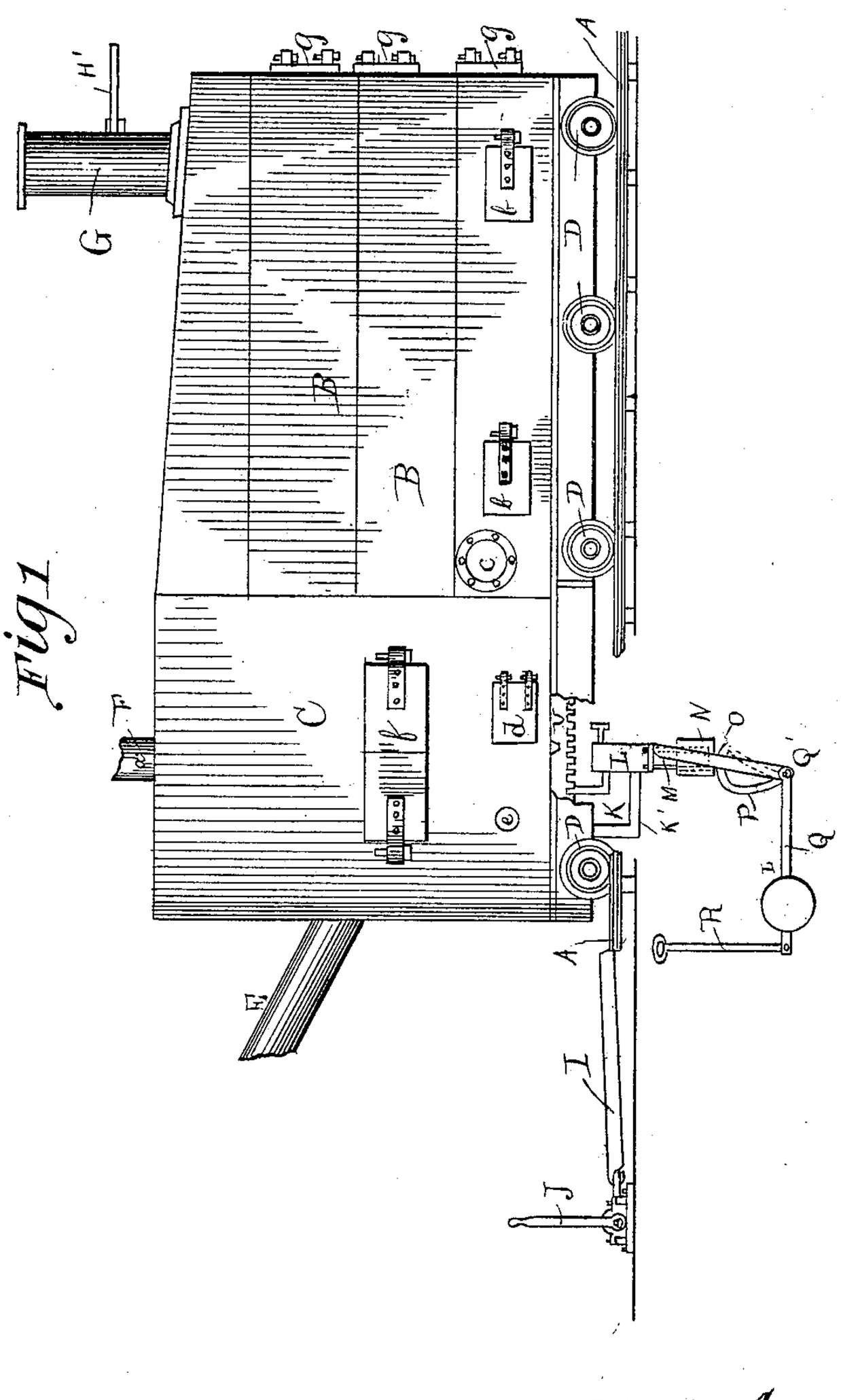

Fig 1

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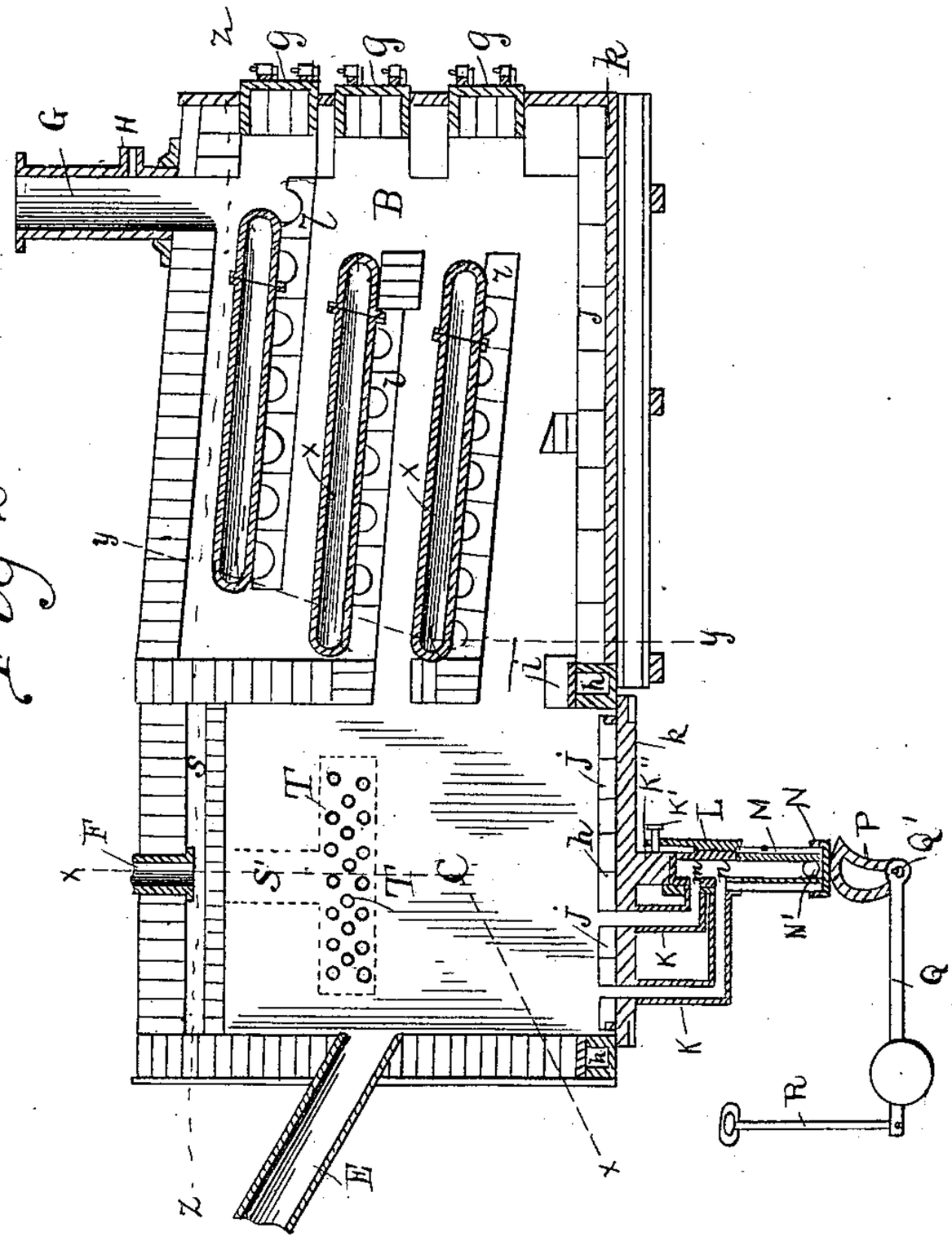
Fig 2



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(No Model.) 6 Sheets—Sheet 3.

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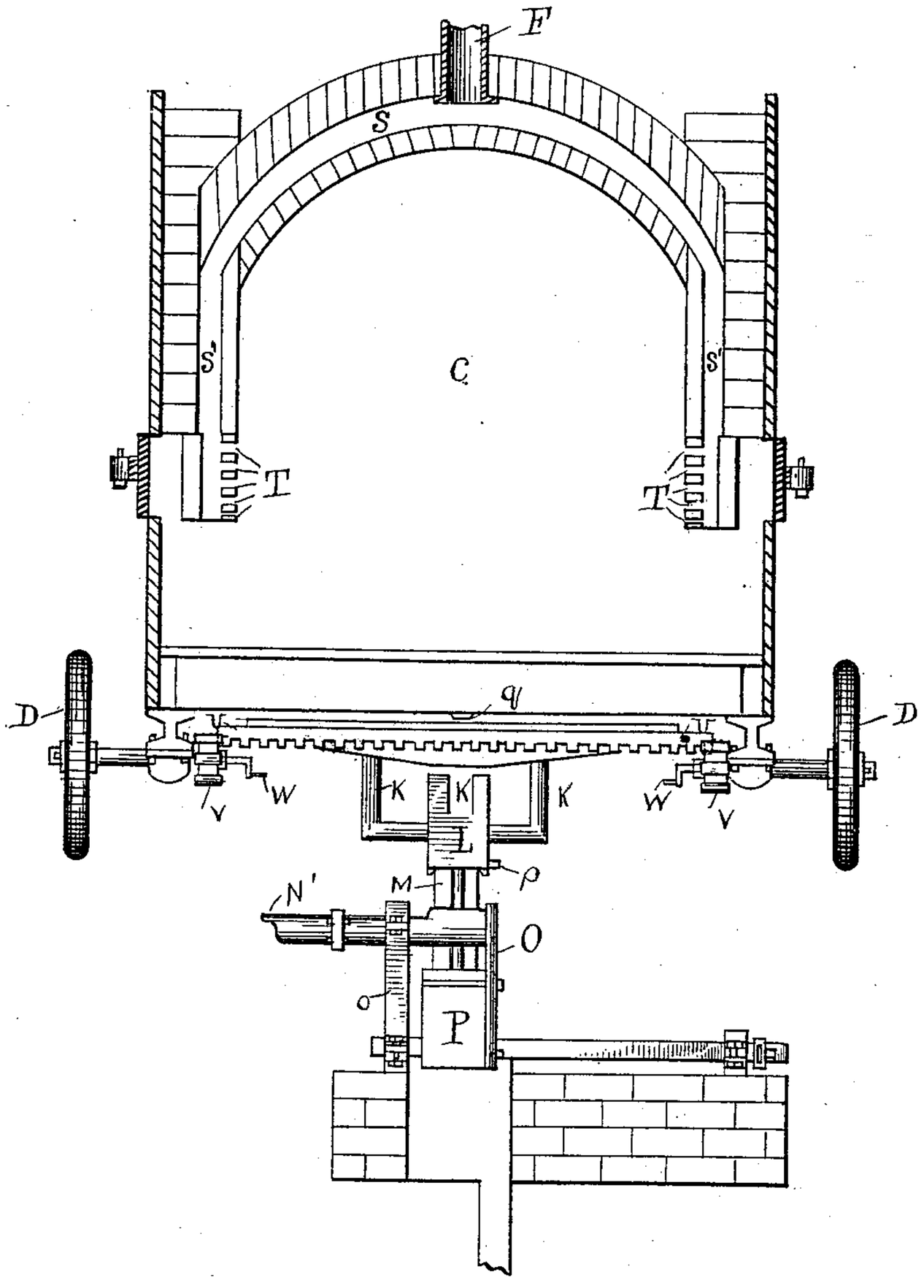
Fig 3



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APPARATUS FOR MANUFACTURING IRON AND STEEL.

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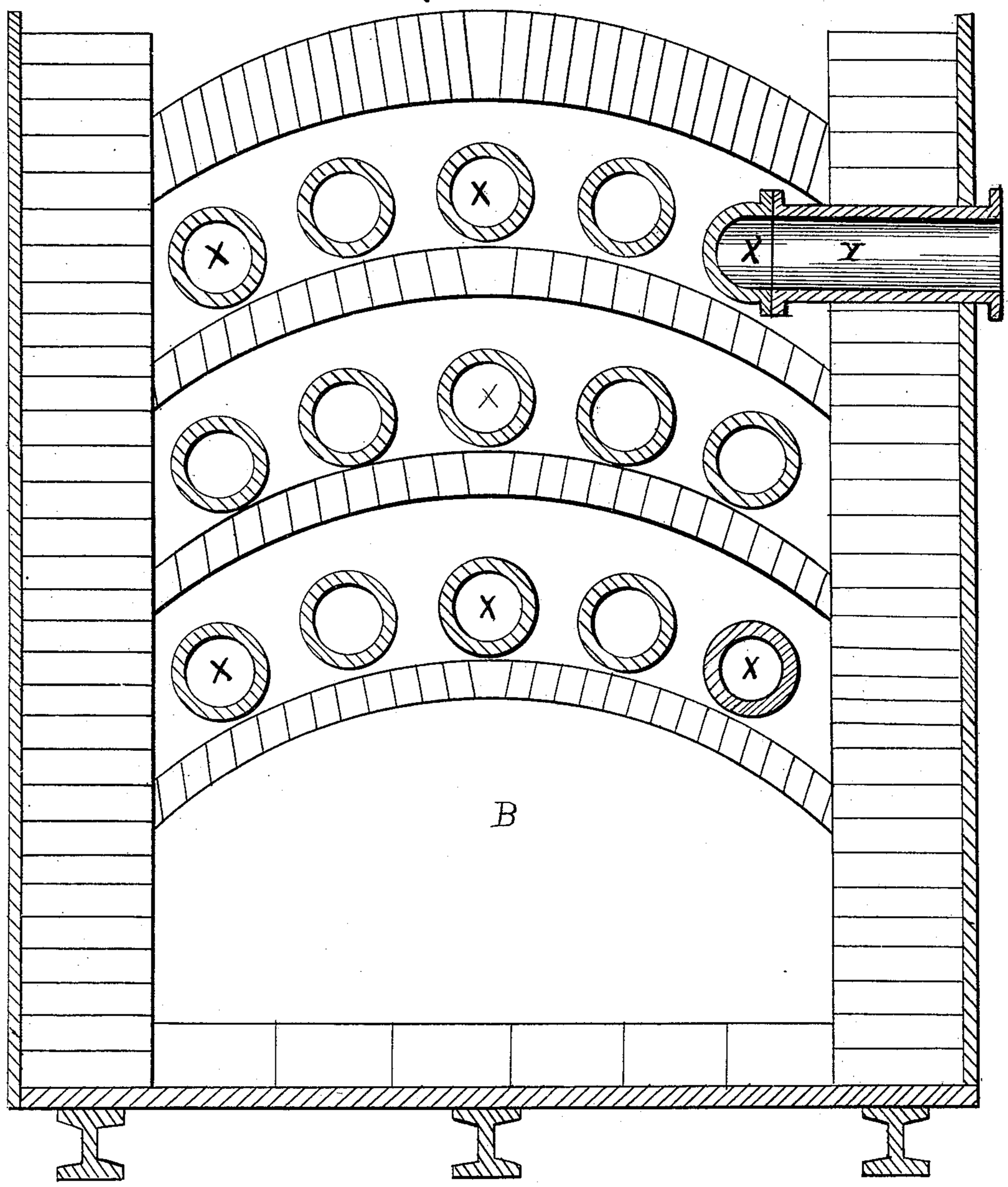
Fig 4



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APPARATUS FOR MANUFACTURING IRON AND STEEL.

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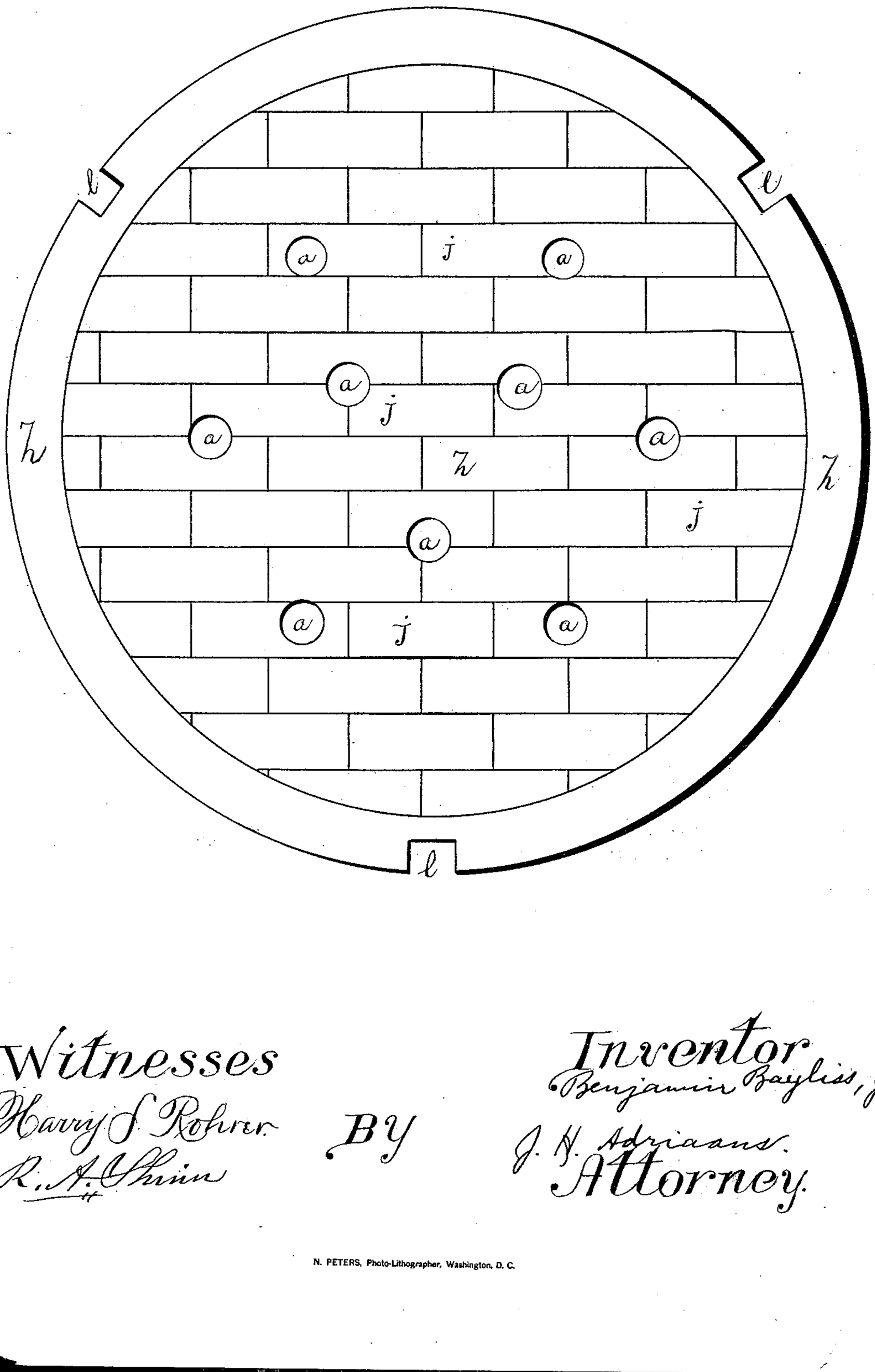
Fig 5



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(No Model.) 6 Sheets—Sheet 6.

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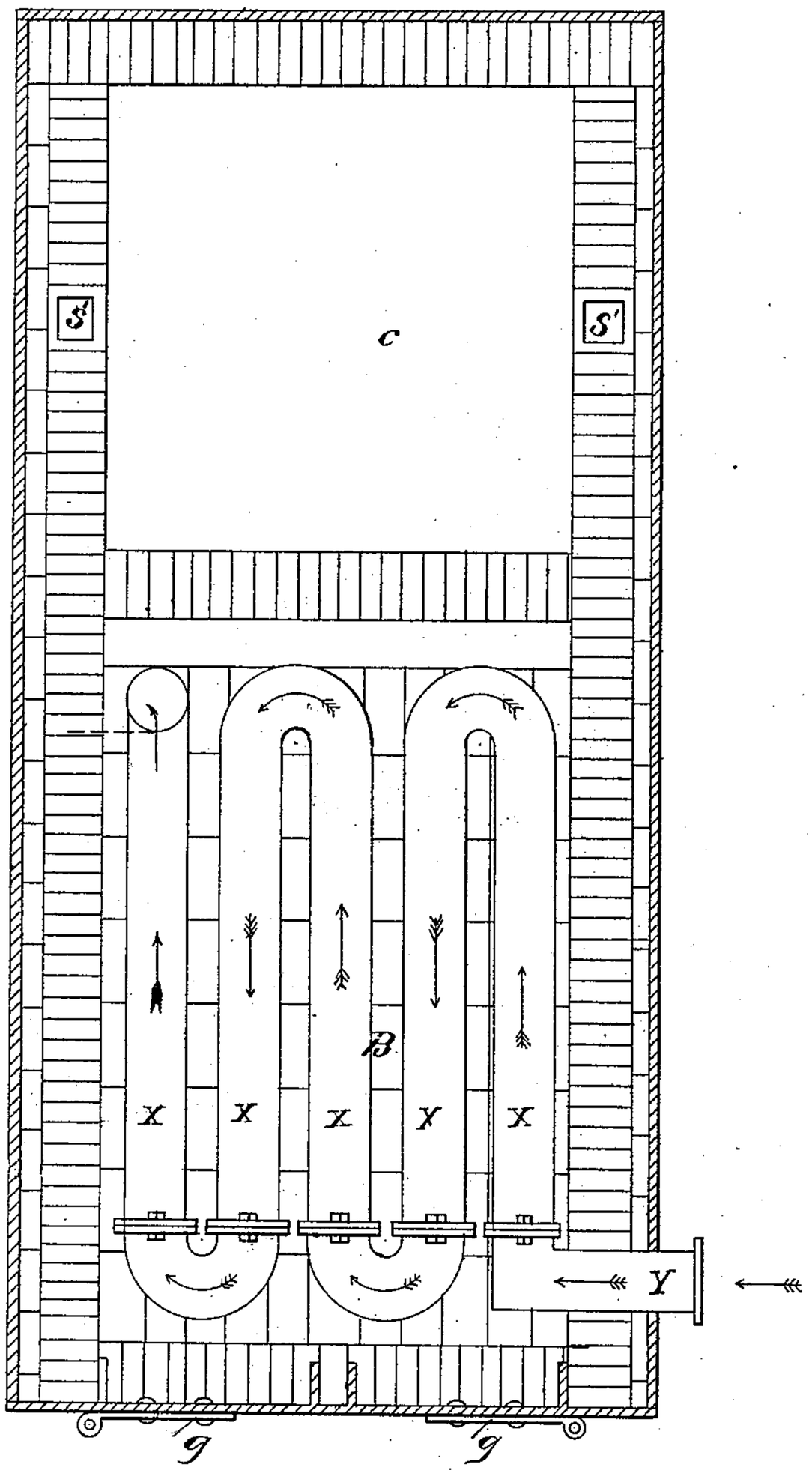
Fig. 6.



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UNITED STATES PATENT OFFICE.

BENJAMIN BAYLISS, JR., OF BELTZHOOVER, PENNSYLVANIA.

APPARATUS FOR MANUFACTURING IRON AND STEEL.

SPECIFICATION forming part of Letters Patent No. 332,475, dated December 15, 1885.

Application filed March 18, 1885. Serial No. 159,256. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN BAYLISS, Jr., of Beltzhoover, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Manufacturing Iron and Steel; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

My invention relates to improvements in apparatus for manufacturing iron and steel; and its objects are, first, to obviate the necessity for grate-bars in furnaces incident to such plants; second, to attain approximately perfect combustion of the fuel; third, to accomplish the automatic and timely charge of the fuel to the furnace; fourth, to increase the temperature of the evolved gases by preheating the top air-supply; fifth, to secure the automatic discharge of clinkers and the passage of the gaseous flame over the incandescent fuel by providing a rotary, perforated, removable furnace-bed; sixth, to automatically charge a blast only when the rotary furnace-bed is in proper position, and yet maintain the constant correlation of the furnace and tuyeres; and, seventh, to attain these ends with economy and simplicity of plant. I attain these objects by the apparatus illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of the portable furnace embodying the principles of my invention. Fig. 2 is a vertical section of the same, except as to the slide-valve-operating lever. Fig. 3 is a transverse section of the furnace on the line *x x* of Fig. 2. Fig. 4 is a transverse section of the regenerative chamber on the line *y y* of Fig. 2. Fig. 5 is a plan detail view of the rotary perforated furnace-bed, and Fig. 6 is a plan sectional view on the line *z z* of Fig. 2.

Similar designations indicate corresponding parts.

Upon suitable rails, A, is mounted the portable furnace C, and the regenerative chamber B upon wheels D D. A chute, E, delivers the fuel to the furnace, and a pipe, F, furnishes the cold air.

G is the stack, having a slotted projection, H, thereon, to accommodate a damper, H'. A connecting-bar, I, attached, respectively, to the rotary bed Z and the weight end of the lever J, serves, upon operating said lever, to withdraw said bed thereout for repairs, &c. This bar is not permanently attached to said bed, but is secured removably thereto by ordinary nuts and bolts, so as not to interfere with the rotation of the latter. Tuyeres K K are integral with a sleeve, L, which is held on a projection, K'', from the furnace-bottom *k* by the frictional contact of a pin, K', therewith.

M is a pipe, having one aperture at the bottom, (not shown,) connecting with the blast-pipe N', and two apertures, *m n*, at the top, registering with the tuyeres K K. This pipe constitutes a slide-valve within the pipe N, which is open at the bottom, and is reciprocated by cam P, actuated by a weighted lever, Q, manipulated by a handle, R, and additionally adjusts by such action the position of the rotary bed Z. On the same shaft, Q', serving as an axis for the cam, is a bar, O, operating to steady the sleeve L, and permit by its withdrawal of taking these elements apart.

S S' are passages connecting the discharge-apertures T with the air-pipe F, to intensify the temperature of the furnace, because the air is gradually heated in transit through said passages.

U is a cog-wheel, integral with the bottom of the furnace, which meshes with pinions V V, actuated either by cranks W W or pulley-wheels, or any other power-transmitting media, and operates to rotate the bed Z.

X X are pipes in the chamber B. The atmospheric air enters through tube Y, passes through the top tier of pipes, X, then through the middle series, and finally is discharged from the bottom tier into the furnace C, to serve as an additional heated blast therefor, or may be conveyed from the furnace for exterior uses by pipe C.

Z is the rotary bed, composed of fire-brick *j*, and having apertures *a* therein, to admit the blast coming through tuyeres K.

b b are doors to the heating or regenerative chamber, and *c* is a pipe conducting the hot air from the furnace for any purpose whatever.

d is a door permitting clinkers to be withdrawn from the furnace.

e is a poke-hole.

f f are doors to permit examination of the air-holes T, whereby they may be cleaned from the inside.

g g are doors to afford access for any necessary repairs.

h is an annular water-bosh.

i is the fire or center bridge.

j j are the fire-bricks composing the rotary bed Z and the furnace and chamber bottoms.

k is the bottom plate of the furnace.

l l are radial recesses in the bed Z, to accommodate its different relative positions to the tapering square lug *q*, which normally prevents the rotation of said bed until disengagement therefrom.

m n are apertures in the tube M, which are usually in alignment with the tuyeres K K, affording a continuous passage for the air-current; but when the tube is raised or depressed by the revolution of the cam P the current is automatically cut off.

o is a strap maintaining the blast-pipe N′ in position.

p is a flange projecting from the sleeve L, serving to raise or lower said sleeve, according as the bar O on the shaft Q′ is oscillated in either direction.

r r are arches to hold the blast-pipes X X in position.

It will be understood that in operating my plant the fuel is charged through a chute, E, the cold air supplied through a tube, F, air-passages S S′, and holes T. The blast is conducted through pipe N′, and thence, by the pipe M and tuyeres K, to the furnace. The heat so generated is utilized in the reducing or regenerative chamber B.

The rotary bed Z can either be revolved by the pinions V V or entirely withdrawn by the lever J and connecting-bar I.

The tuyeres K, the sleeve L, and the pipe M can all be removed by disengaging the lever O from the flange *p* and revolving the cam P by the weighted lever Q R.

From the fact that the cold air is admitted from the top, a desirable preheating of the supply is secured, which greatly enhances the economical and utilitarian operation of the furnace.

On account of the construction of the furnace with a rotary removable perforated bed, Z, the necessity for grate-bars is dispensed with and the combustion of the fuel perfected; and by reason of the slide valve or tube M the blast can be admitted or cut off without affecting the relation of the tuyeres. It is also apparent that the flames can be deflected to the bottom series of the tubes X, and thus the temperature of the air-current therein varied at will.

I am aware that heretofore rotary removable grates have been employed in furnaces of this character; but the objects thereof have not been attained with the simplicity and superior results attending the use of the apparatus covered by my invention.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. The tuyeres K, in combination with the blast-pipe N′, tube M, and cam P, actuated as shown.

2. The sleeve L, having flange *p*, in combination with the bar O, the cam P, and the means, substantially as shown and described, for operating the same.

3. The bed Z, having radial recesses *l*, in combination with the furnace-bottom, having a square tapering lug, *q*.

4. The portable furnace C, having a top air-pipe and a side angular fuel-pipe, in combination with the chamber B, pipes X X, arranged in series, as shown, and tube Y.

5. The portable furnace C, having a top air-pipe and a side angular fuel-pipe, in combination with the bed Z, the cog-wheel U, pinions V V, connecting-bar I, and lever J, whereby the correlation of said furnace and bed may be varied.

6. The portable furnace C, in combination with the bed Z, the tuyeres K, sleeve L, reciprocating tube M, blast-pipe N′, cam P, and the means shown and described for actuating the same, the whole co-operating in the manner and for the purpose set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

BENJAMIN BAYLISS, JR.

Witnesses:
O. R. TOUDY,
JOSEPH BLACKSHAW.