

(No Model.)

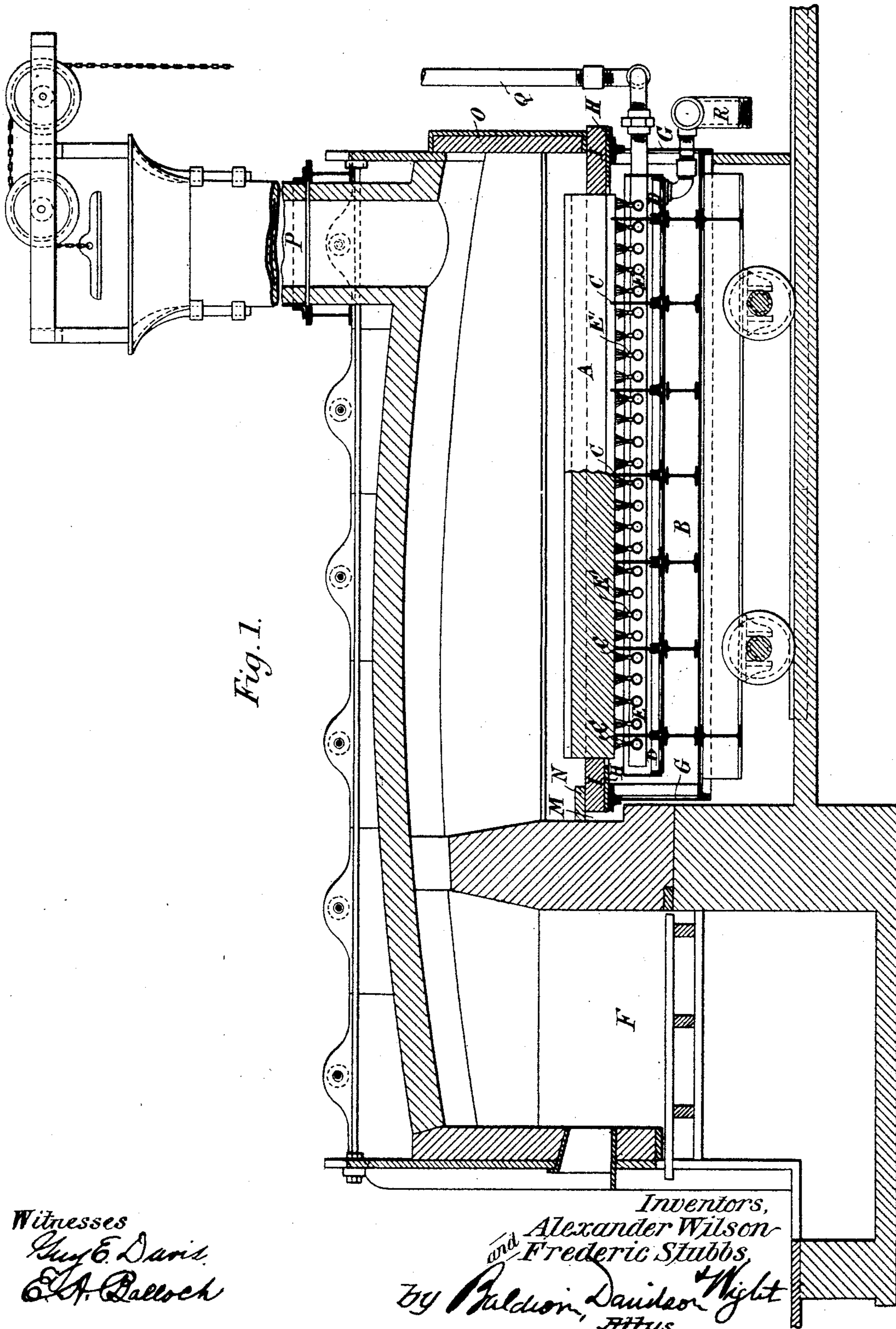
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A. WILSON & F. STUBBS.

APPARATUS FOR MANUFACTURING ARMOR PLATES.

No. 572,590.

Patented Dec. 8, 1896.



Witnesses
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(No Model.)

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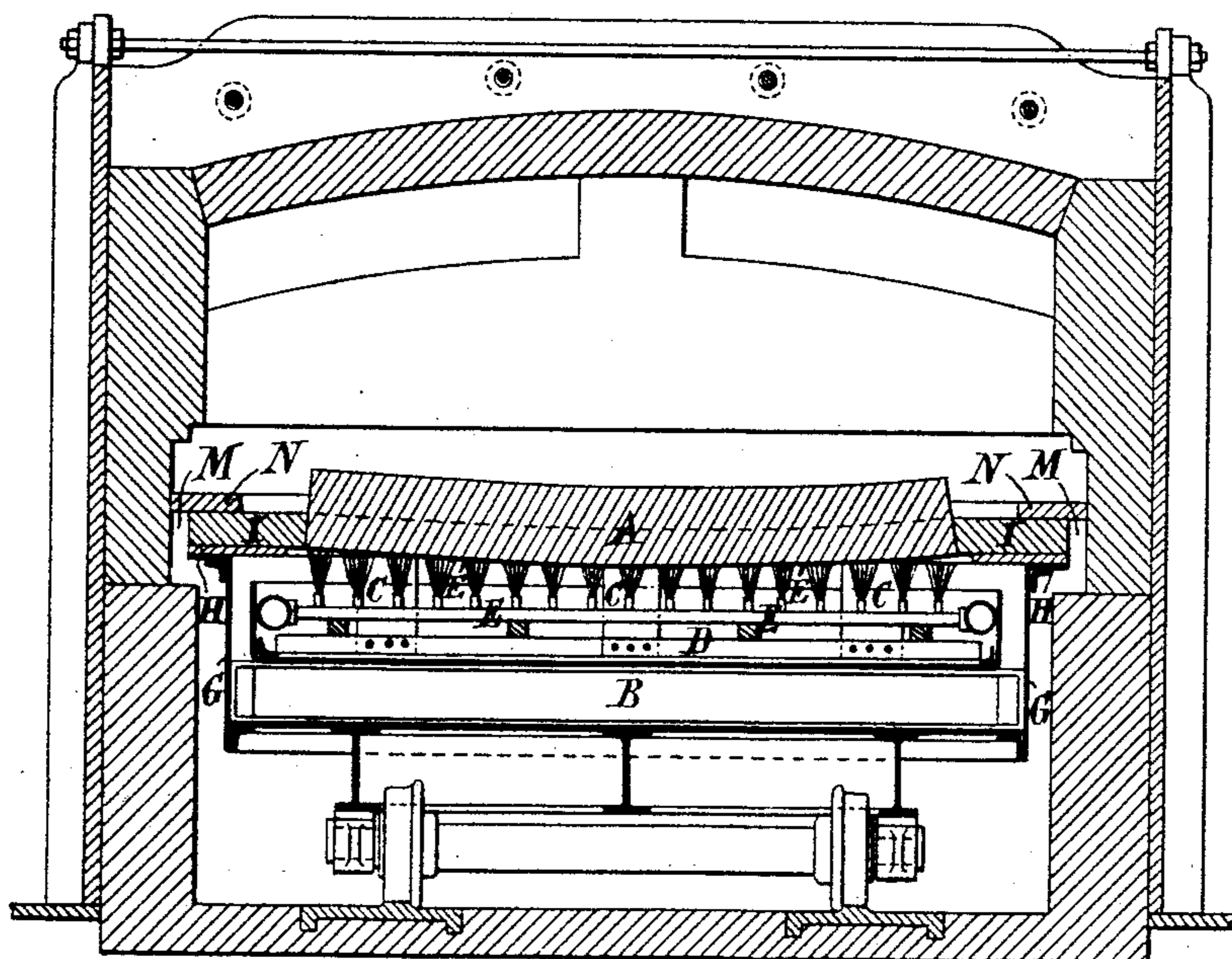
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Fig. 2.



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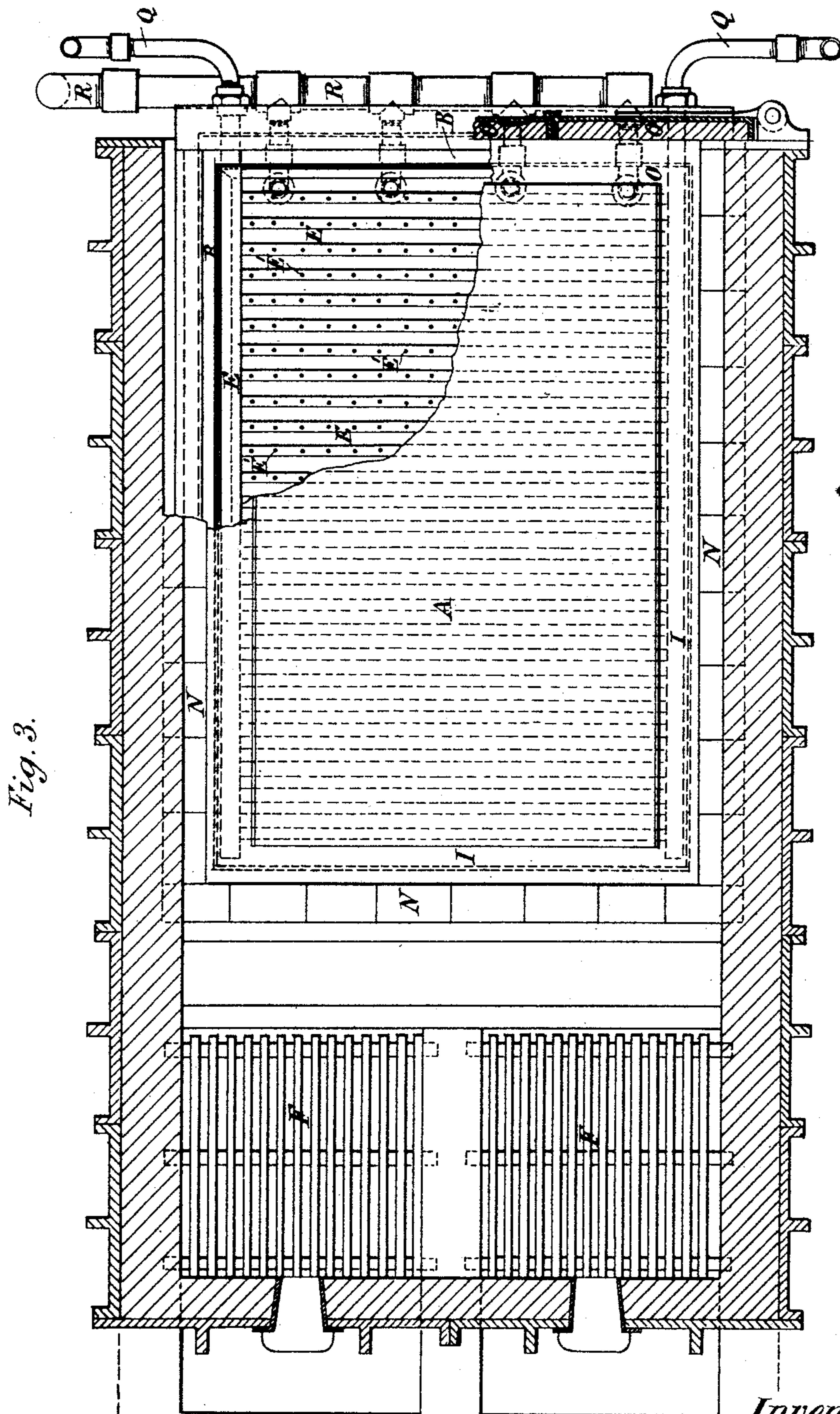
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UNITED STATES PATENT OFFICE.

ALEXANDER WILSON AND FREDERIC STUBBS, OF SHEFFIELD, ENGLAND.

APPARATUS FOR MANUFACTURING ARMOR-PLATES.

SPECIFICATION forming part of Letters Patent No. 572,590, dated December 8, 1896.

Application filed December 13, 1895. Serial No. 571,991. (No model.)

To all whom it may concern:

Be it known that we, ALEXANDER WILSON, steel manufacturer, and FREDERIC STUBBS, steel-works manager, both residing at the
5 Cyclops Steel and Iron Works, Sheffield, in the county of York, England, subjects of the Queen of Great Britain, have invented certain new and useful Improvements in and Apparatus for the Manufacture of Armor-Plates,
10 of which the following is a specification.

Armor-plates are now commonly made with the face hardened, but the process of hardening the face has the disadvantage of also to some extent hardening the back.

15 The object of this invention is to remedy this defect. This is done by placing the plate after it has had its face hardened in any ordinary way in a furnace in such a manner that while the back is exposed to the heat
20 thereof and is then annealed the face is kept cool and therefore retains its hardness. For this purpose a chamber is formed on one side, generally the bottom, of the furnace and another chamber immediately under the roof
25 of the furnace, there being an opening between the two of such a size that it is closed with the armor-plate. In the lower chamber there are cooling appliances, such as water-jets, or for flat plates a tank of water, into
30 which the hard face dips, may be employed.

There are various ways of forming the heating-chamber and also that in which the cooling apparatus is placed.

35 Figure 1 is a longitudinal vertical section of the furnace. Fig. 2 is a transverse vertical section, and Fig. 3 a sectional plan with the roof removed. In these figures an armor-plate is shown in position ready to undergo the process of our invention.

40 The armor-plate A is placed with its hard face downward on a traveling carriage or bogie B and is supported at a convenient height above the body of the bogie on the edges of plates C, which are formed to fit the
45 curved or straight face of the plate. Supported on the body of the bogie and between it and the face of the armor-plate is an iron water-tank D. In this latter is fixed a "water-grid" E, formed by a series of pipes. In
50 the cross-pipes of this grid are screwed a number of jet-pipes E' for the purpose of directing the streams of water against the face of

the plate to prevent its being heated and to keep it cool during the time that the back of the armor-plate, which is now uppermost, is
55 being annealed by the action of the flame and heat passing over it, such heat and flame being derived from the fire on the grates F of the furnace.

On the sides and ends of the bogie is a frame 60 G, attached thereto, which carries an overhanging shelf H for the purpose of supporting a dividing-floor I, made of any refractory material, such as fire-brick or ganister. This floor is carried around and along the four
65 edges of the armor-plate, but leaving about the upper half of all the edges exposed to the action of the annealing heat, and in order to allow for the expansion of the plate when its upper side is hot this floor is so arranged that
70 although it is firmly embedded against the edges of the armor-plate it does not touch the side walls and front end of the furnace. The small space M caused thereby is covered by loose slabs N of fire-brick. It will therefore
75 be seen that by means of the armor-plate and the surrounding floor a horizontal division is made in the furnace, the upper portion being the one in which the back of the armor-plate is heated and the lower portion be-
80 ing that in which the face of the armor-plate is kept cool. This division prevents the products of combustion passing from the upper chamber into the lower, and it also prevents the cooling medium passing from the lower
85 chamber into any portion of the upper one.

It will also be seen that the whole of the divisional structure can be built up on the traveling carriage or bogie at any convenient
90 place, which can afterward be drawn and withdrawn into and out of the furnace at will.

Doors O are formed at the open end of the furnace and when open will admit of the bogie traveling into it and when closed will prevent the products of combustion from passing out
95 of the furnace otherwise than by the damped chimney P, arranged for that purpose.

The iron tank D, which is fixed on the bogie, is required for the purpose of catching the water after it has been impelled from the jets
100 of the grid against the face of the armor-plate. It can also be used for keeping cool the face of a flat armor-plate without the use of the grid. Water is conveyed to and from

the grid and tank by means of pipes Q and R, which can be connected and disconnected at pleasure.

It is well known to steel-makers and others
5 that the heating of a bar or plate of hard steel to a dull red heat or thereabout and afterward allowing it to cool very slowly and gradually will cause such bar or plate to become very much softer, and although its tensile
10 strength is reduced its ductility is correspondingly increased.

It will now be seen and readily understood that by the means we employ we can heat the back of an armor-plate to any desired temperature, say from 1,000° to 1,400° Fahrenheit,
15 and can also keep the face of the plate cool during the whole time it is necessary to carry out our annealing process and do the same for the purpose intended, the time occupied

being about sixty hours for a plate nine inches 20 in thickness and correspondingly more or less with other plates in accordance with their respective thicknesses.

What we claim is—

The combination of a furnace having an 25 opening at one end, rails on the floor of the furnace, a car running on the rails, a platform on the trolley dividing the furnace into two chambers, an opening in the platform of suitable size to receive an armor-plate and 30 jets arranged to supply water to the under side of the plate.

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Witnesses:

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