

No. 635,157.

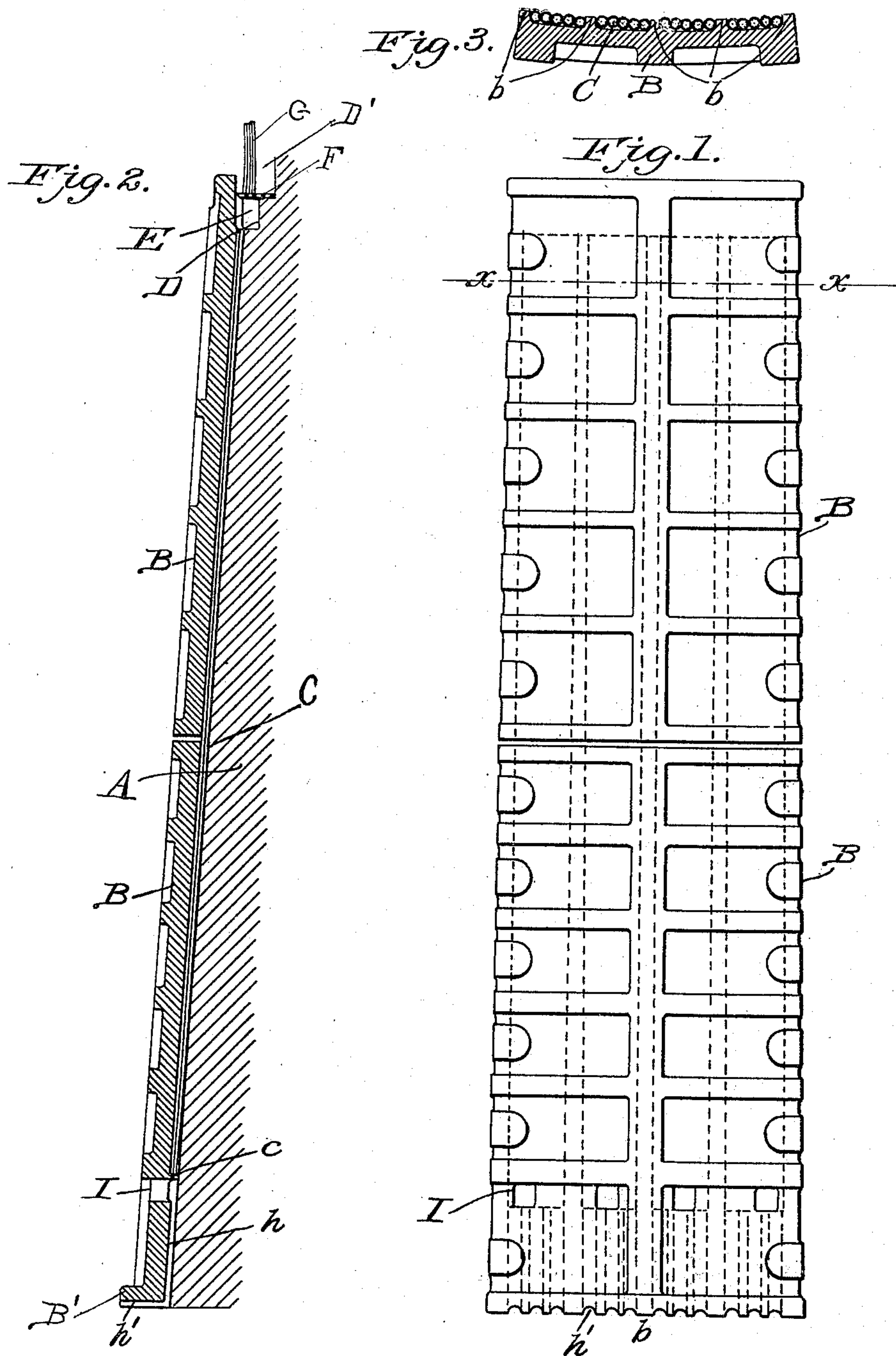
Patented Oct. 17, 1899.

M. M. SUPPES.
BLAST FURNACE.

(Application filed Apr. 8, 1899.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES:

M. E. Sharpe.
A. M. Moore.

INVENTOR
Max. M. Suppes
BY
Richard L. Linn
ATTORNEY.

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3 Sheets—Sheet 2.

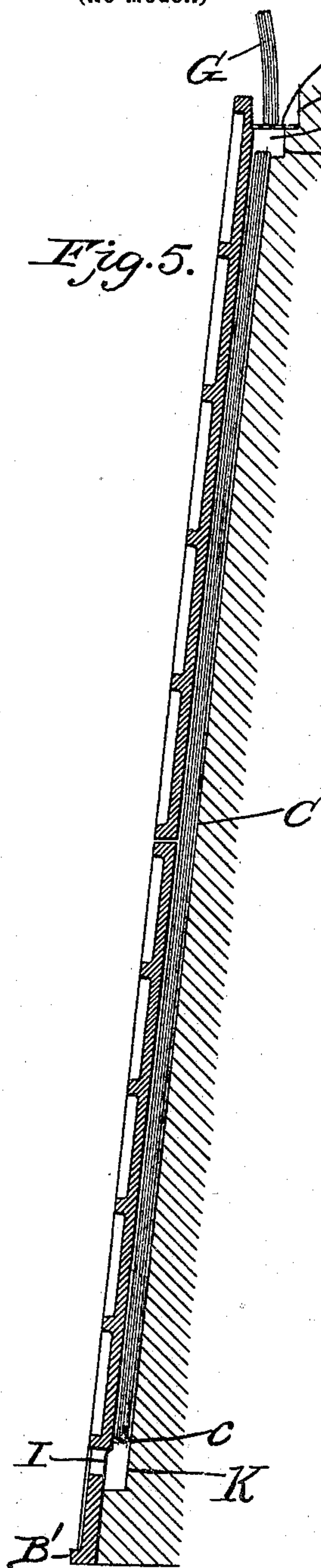


Fig. 5.

Fig. 4.

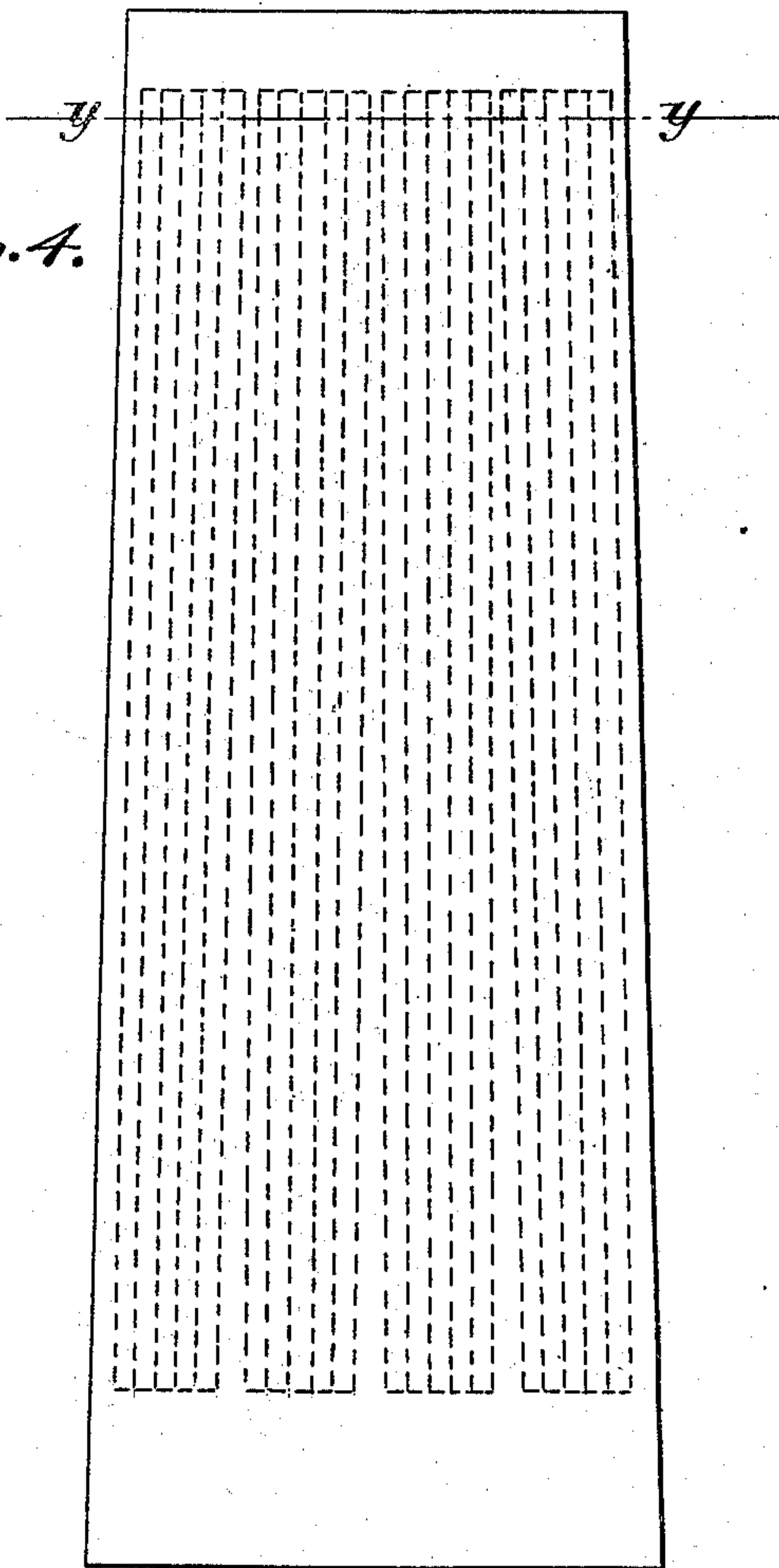
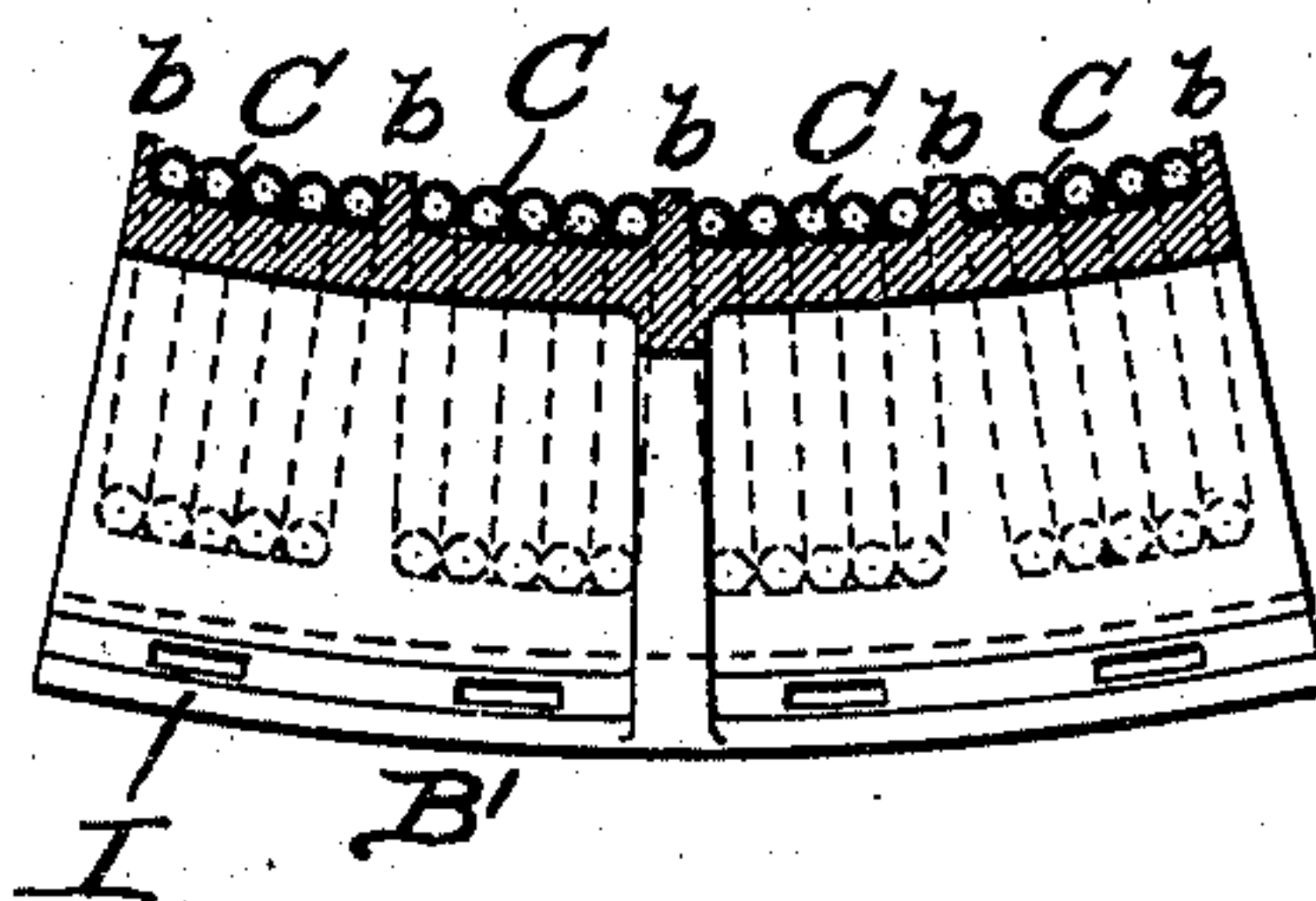


Fig. 6.



WITNESSES:

M. E. Sharpe.
A. M. Mason.

INVENTOR
Max. M. Suppes
BY
Richard L. Lyn.
ATTORNEY.

No. 635,157.

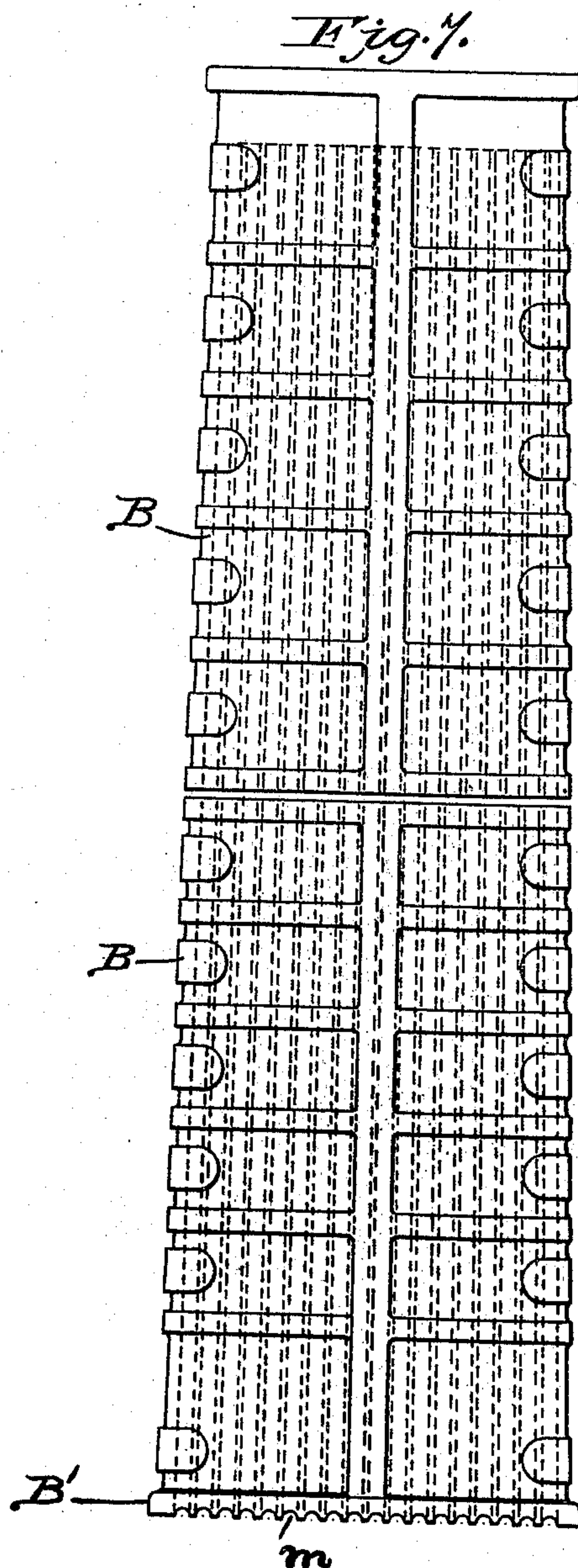
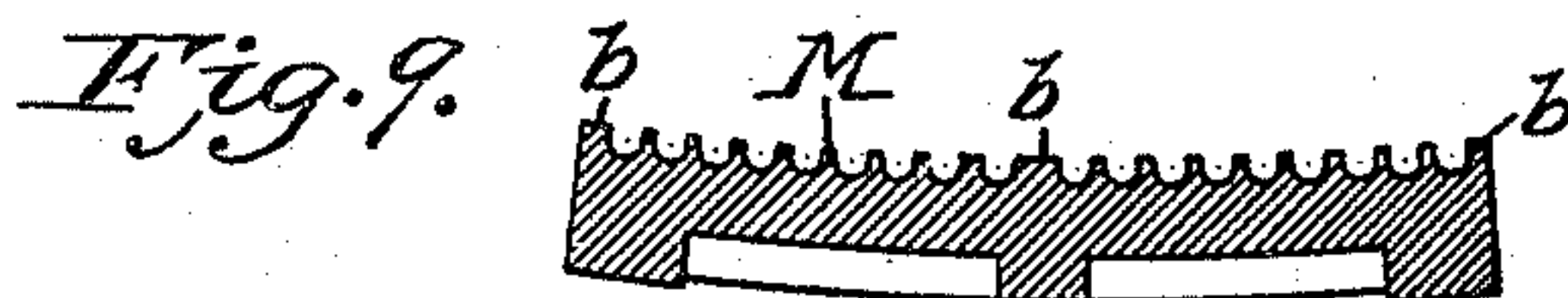
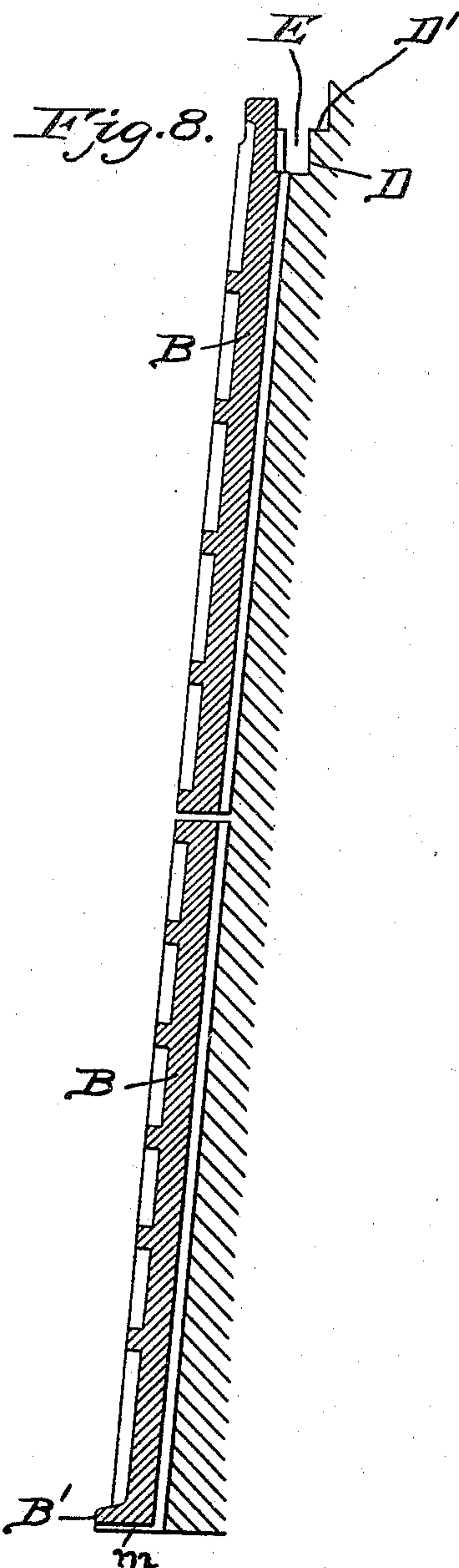
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3 Sheets—Sheet 3.



WITNESSES:
M. E. Sharpe.
A. M. Moore.

INVENTOR
Max. M. Suppes
BY
Richard Lynn
ATTORNEY.

UNITED STATES PATENT OFFICE.

MAXIMILIAN M. SUPPES, OF ELYRIA, OHIO.

BLAST-FURNACE.

SPECIFICATION forming part of Letters Patent No. 635,157, dated October 17, 1899.

Application filed April 8, 1899. Serial No. 712,247. (No model.)

To all whom it may concern:

Be it known that I, MAXIMILIAN M. SUPPES, of Elyria, in the county of Lorain and State of Ohio, have invented a new and useful Improvement in Blast-Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to blast-furnaces, and more particularly to means in connection with such furnaces for circulating water for the purpose of cooling the hearth-walls thereof.

The objects of the invention are mainly to provide a water-circulating system which has a maximum area of cooling-surface, which will effect a circulation in proximity to the hearth-wall, which is comparatively inexpensive to construct and maintain, and in which a defect in any part may be readily removed or repaired and will not affect the balance of the system.

With these objects in view my invention consists in providing intermediate the hearth-wall and its surrounding metallic jacket a space or spaces which form or are designed to contain a plurality of independent water conduits or channels; also, in means for supplying water to said conduits or channels at one end and for carrying off the water discharged therefrom at the opposite ends.

My invention also consists in certain novel features of construction and arrangement of parts, which will be hereinafter described, and pointed out in the appended claims.

Referring to the accompanying drawings, Figure 1 is a front elevation showing sections of the hearth-jacket. Fig. 2 is a vertical section through the same, showing a portion of the hearth-wall. Fig. 3 is a transverse section on the line X X of Fig. 1. Fig. 4 is a plan or diagram showing the arrangement of the water-circulation pipes of a section of the jacket. Fig. 5 is a view similar to Fig. 2, but illustrating a modification. Fig. 6 is a section on the line Y Y, Fig. 5, looking downward. Figs. 7, 8, and 9 are views, respectively, similar to Figs. 1, 2, and 3, but showing a second modified construction.

In the drawings the letter A designates a portion of the hearth-wall, and B the hearth-jacket, which is shown as being of the char-

acter and construction described and claimed in my pending application, Serial No. 692,238, filed September 29, 1898, and consisting of a series of metallic sections arranged in upper and lower tiers or layers contacting to form a circular jacket and provided with means for coupling the sections together, such as the semi-oval projections B', which abut similar projections on adjacent sections and over which are slipped fastening devices, as described in said application. My invention, however, is not limited in its application to this particular form of jacket.

The inner faces of the jacket-sections B are provided at intervals with vertical ribs b, which hold said jacket away from the hearth-wall and form a series of vertical spaces, which I utilize to receive the flowing water intended to cool the hearth-walls.

The preferred form of water circulation (shown in Figs. 2 and 3) is arranged as follows:

A short distance above the lower end of the lower layer of the jacket-sections I provide said sections with horizontal ribs c, which project into the spaces between the vertical ribs b and form shelves or ledges between the hearth-jacket and the hearth-wall. On these shelves or ledges rest a circle of independent open-end vertical pipes C, which are held in place in sets (five being shown in each set, although the number is immaterial) by the vertical ribs b.

A shelf D is formed on the outside of the hearth-wall at the upper ends of the pipes C, thereby providing between said wall and the upper portion of the hearth-jacket an annular trough or conduit E, with which the open upper ends of all the pipes communicate. I also prefer to employ a screen F, sustained by a second shelf D' in the hearth-wall and the upper ends of the ribs b. This screen serves to prevent small particles of extraneous matter—such as cinder, broken pieces of bricks, &c.—from entering and choking the pipes C.

G designates a water-supply pipe which discharges into the trough E and which may be in connection with the waste water from the furnace or with any suitable or convenient source of water-supply.

Below the lower ends of the pipes C the

jacket is formed with vertical grooves or channels *h*, and the lower layer of the jacket-sections is formed with foot portions *B'*, which are grooved on the under side to form communicating channels *h'*.

The water discharged into the trough *E* from the pipe *G* divides and flows through the circle of pipes and escapes by way of the channels *h h'* into an outer trough of the furnace, (not shown,) from which it is carried to the sewer in any desired manner.

I designates openings in the jacket just below the lower ends of the pipes. When desired, the channels *h'* may be dammed up, leaving the spaces in the grooves *h'* filled with water, the overflow passing out of the holes *I*.

It will be observed that by the construction described there is only the inappreciable thickness of the walls of the pipes *C* between the hearth-wall and the flowing water. It will also be noted that a strong water-pressure is not required, inasmuch as the water is not obliged to pass through any great length of pipe, but divides between all the pipes of the system. In case any pipe becomes defective the system as a whole is not disturbed. The construction also provides a cooling-surface in contact with substantially the entire surface of the hearth-wall. It also provides for the water circulation in a manner which does not prevent the jacket from forming a perfect support for the brickwork. This is of considerable importance for the reason that if the jacket is constructed or arranged in a manner to allow movement enough to cause the brickwork to crack the iron will follow the crack and cause a break-out.

In the modification shown in Figs. 3 and 4 the hearth-wall is formed with an annular recess *K* below the ends of the pipes, forming a surrounding chamber or trough, into which the lower ends of the pipes open and from which also leads the outflow - openings *I*. The grooves or channels *h h'* are omitted in this construction.

Figs. 7, 8, and 9 show another modification, wherein the pipes *C* are dispensed with and the surfaces of the jacket-sections are formed with a series of alined vertical grooves *M*. When the jacket-sections are seated against the hearth-wall, these grooves form a series of vertical channels or conduits, which perform the same function as the pipes *C* in the first two constructions described, their open upper ends communicating with the trough *E* and their lower ends communicating with grooves or channels *m* in the bottom of the foot portion of the jacket. In this construction the water is in direct contact with the surface of the hearth-wall.

Other modifications might be obviously made without departing from the spirit and scope of my invention as pointed out in the appended claims, and I do not therefore wish to be limited to the constructions and arrangements which I have shown and described.

Having thus described my invention, what

I claim as new, and desire to secure by Letters Patent, is—

1. The combination with the hearth-wall of a blast-furnace, of a metallic jacket surrounding the same, a plurality of independent conduits or channels between the adjacent faces of the said wall and jacket and contacting with both wall and jacket, and means for supplying and discharging water to and from said conduits or channels said jacket having portions of its inner surface intermediate of said conduits or channels bearing against and supporting the hearth-wall.

2. The combination with the hearth-wall of a blast-furnace, of a metallic jacket surrounding the same, a plurality of open-end, independent vertical conduits or channels between the opposed surfaces of said wall and jacket and contacting with both wall and jacket, a water-supply receptacle with which the upper ends of said conduits or channels communicate, and means for carrying off the water discharged at their lower ends.

3. The combination with the hearth-wall of a blast-furnace, of a metallic jacket surrounding the same, a series of contiguous independent, open-end, vertical water conduits or channels intermediate the said wall and jacket, and surrounding the former, an annular trough between said wall and jacket, with which said conduits or channels communicate at their upper ends and means for carrying off the water discharged at their lower ends.

4. The combination with the hearth-wall of a blast-furnace, of a metallic jacket surrounding said wall, a series of vertical open-end water conduits or channels intermediate the wall and jacket and surrounding the former and in contact with the latter, a water-supply with which said conduits or channels communicate at their upper ends, a screen guarding the said ends, and an outlet communicating with the lower ends of said conduits or channels.

5. The combination with the hearth-wall of a blast-furnace, of a metallic jacket surrounding the same, and having a foot portion formed with grooves or channels on its under side, a series of water-conduits intermediate said wall and jacket and surrounding the former, and an annular water-containing space or trough above the upper ends of said conduits and with which they communicate, said conduits also communicating with the said grooves or channels.

6. The combination with the hearth-wall of a blast-furnace, of a metallic jacket surrounding and spaced from said wall, a plurality of independent vertical pipes inclosed in the intervening space in contact with both wall and jacket, a water-inlet communicating with said pipes at one end, and an outlet for the water at the opposite end of said pipes.

7. The combination with the hearth-wall of a blast-furnace, of a metallic jacket seated around said walls and flanged or ribbed on its

inner face, a circle of independent vertical pipes seated in the spaces between the flanges or ribs of said jacket, means for supplying water to said pipes at their upper ends and
5 for discharging the same at their lower ends.

8. The combination with the hearth-wall of a blast-furnace and its surrounding metallic jacket, of a water-circulation system therefor, comprising a plurality of straight, open-
10 end pipes intermediate the said wall and the hearth-jacket and in contact with both wall and jacket, a supply-trough with which the upper end of said pipes communicate, and outlets for the water discharged at the lower
15 ends of said pipes.

9. The combination with the hearth-wall of a blast-furnace, of a metallic jacket surrounding and separated from the same, an inwardly-projecting shelf on said jacket a plurality of
20 independent vertical pipes resting on said shelf an inlet from a source of water-supply above the said pipes, and an outlet for the water below said shelf.

10. The combination with the hearth-wall
25 of a blast-furnace, of a metallic hearth-jacket surrounding the same, and partially separated therefrom by intervening spaces, an inwardly-projecting shelf near the bottom of said jacket, a plurality of vertical pipes resting on
30 the said shelf within the said spaces, a screen

resting between the top of the hearth-jacket and an adjacent portion of the hearth-wall, a water-supply system, and inlet and outlet communications between the same and the
said pipes.

11. The combination of the hearth-wall of a blast-furnace, a metallic jacket surrounding the same and having vertical ribs which bear against the hearth-wall, shelves on said
jacket between the said ribs, independent,
40 open-end vertical pipes secured between said ribs and resting on said projections, a water-supply trough above the upper ends of said pipes with which they communicate, and outlet-openings in said jacket below the pipes.
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12. The combination with the hearth-wall of a blast-furnace, of a metallic jacket surrounding the same, and having a foot portion provided with grooves or channels and a shelf
above the same, a plurality of independent
50 open-end vertical pipes between said wall or jacket and supported by said shelf, and a means of water-supply with which said pipes communicate at their upper ends.

In testimony whereof I have affixed my signature in presence of two witnesses.

MAXIMILIAN M. SUPPES.

Witnesses:

FRED W. WATERMAN,
D. W. LAWRENCE.