

(Model.)

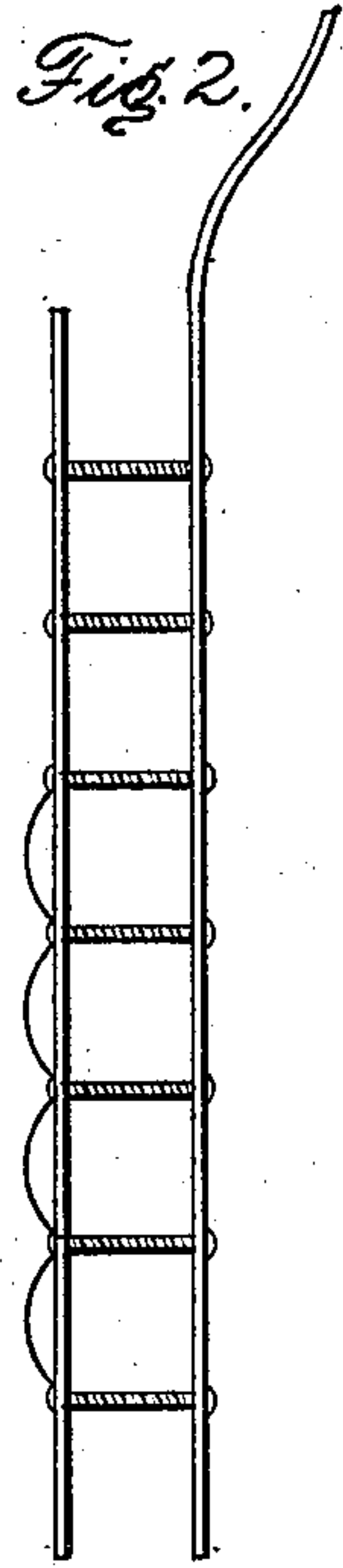
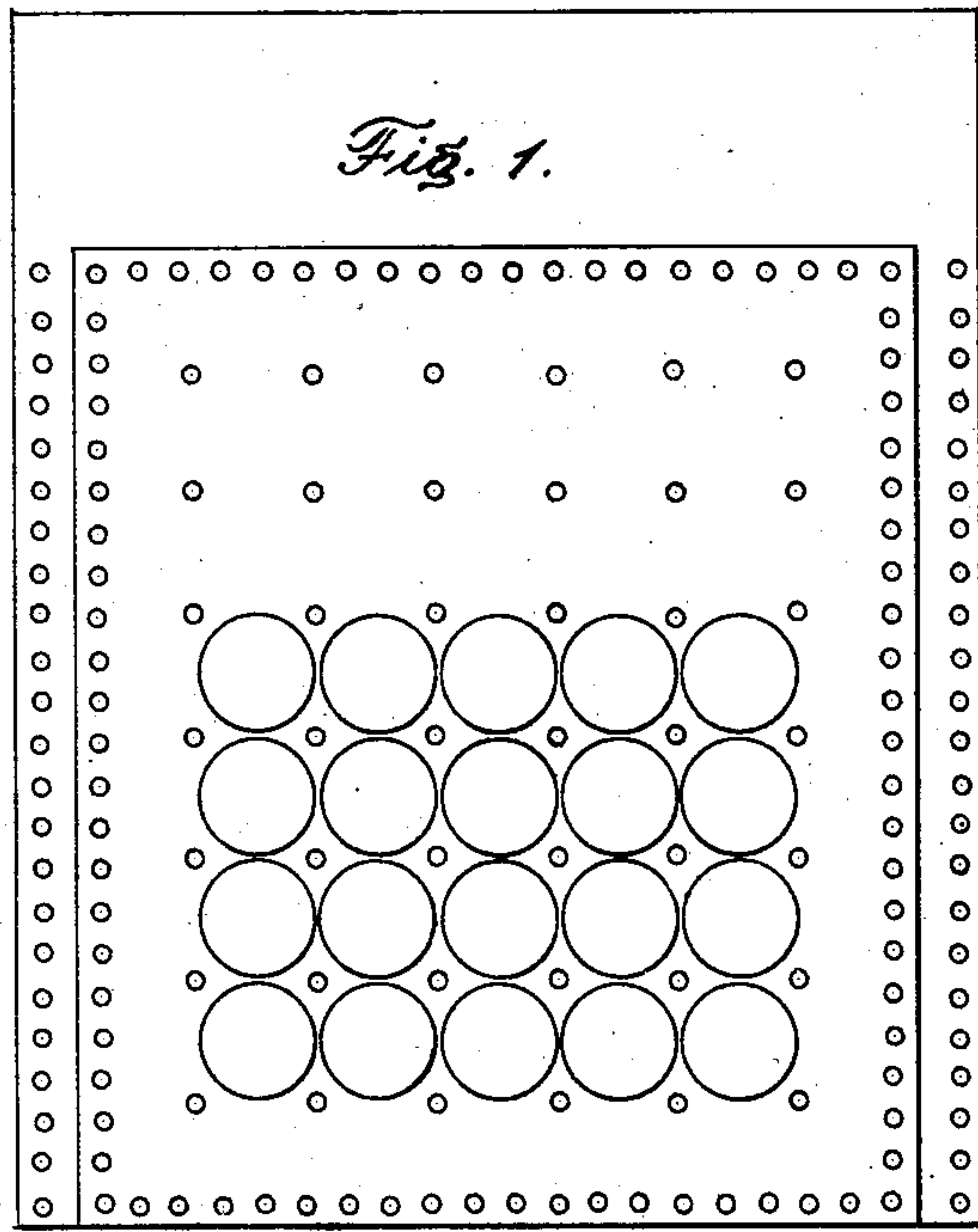
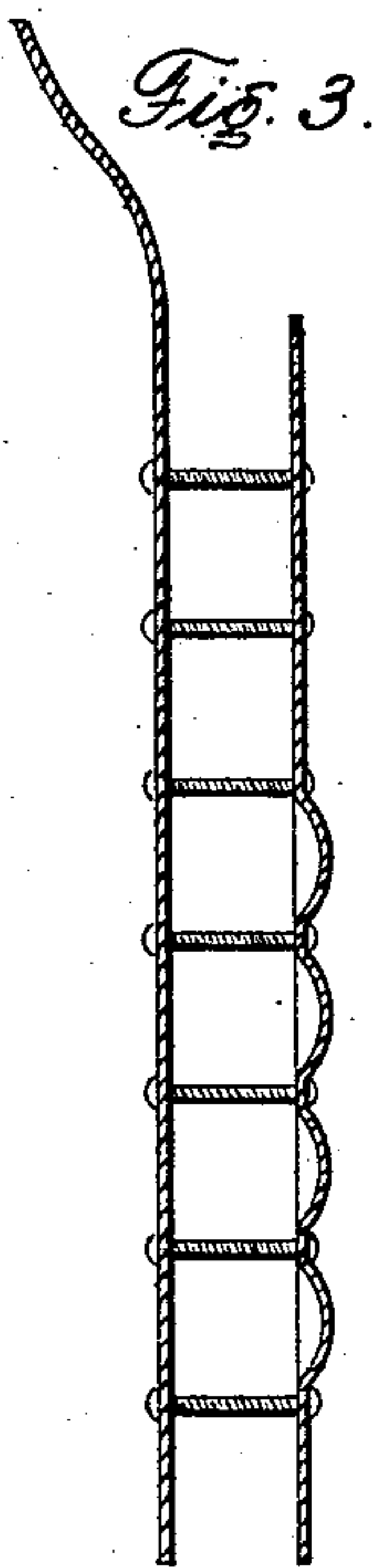
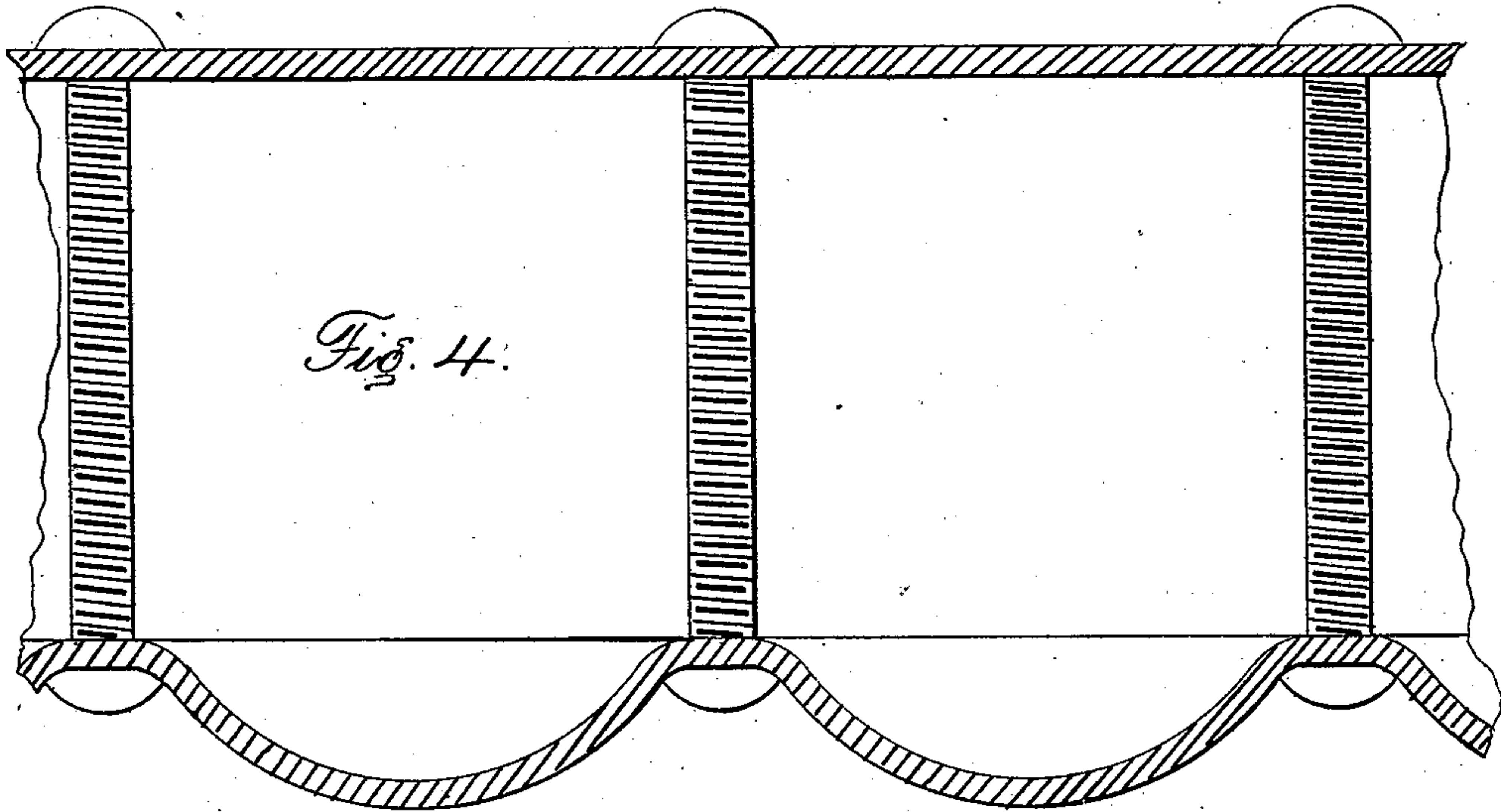
2 Sheets—Sheet 1.

H. C. DARBY.

FURNACE SHEET FOR STEAM BOILERS.

No. 253,516.

Patented Feb. 14, 1882.



Witnesses;
James D. Kuitel
Jas L. Martin

Inventor;
Henry C. Darby
per William J. Smith
Attorney

(Model.)

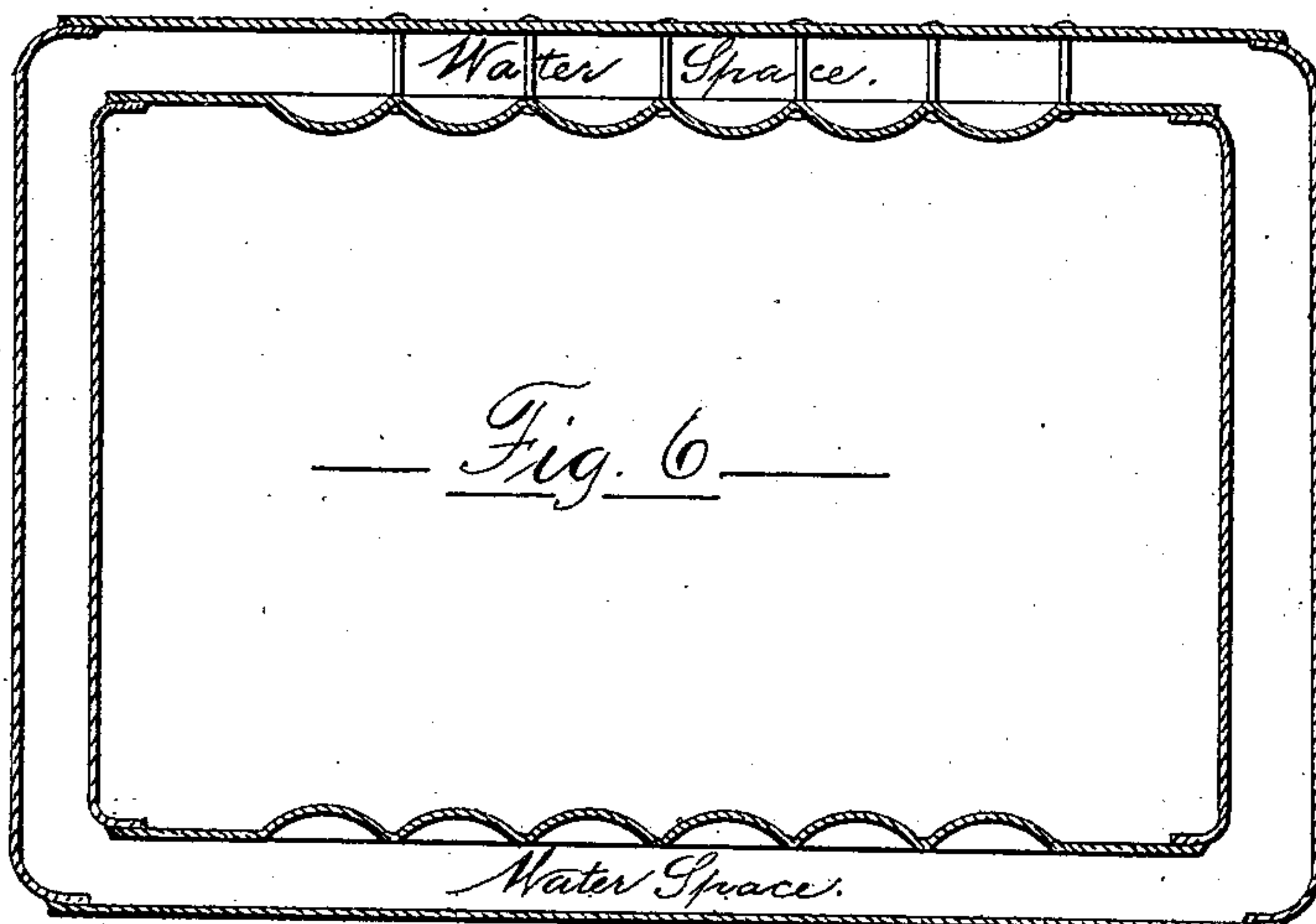
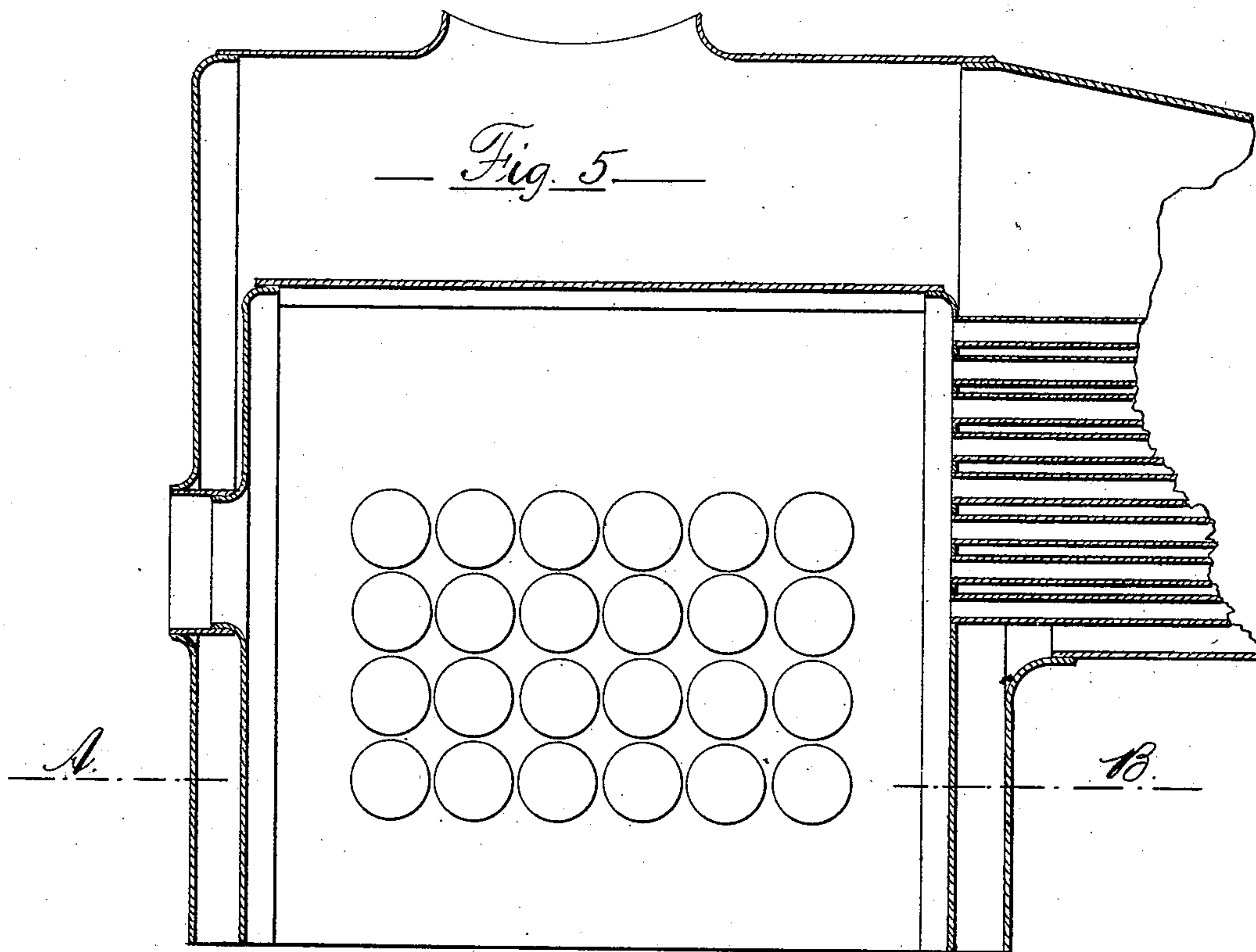
2 Sheets—Sheet 2.

H. C. DARBY.

FURNACE SHEET FOR STEAM BOILERS.

No. 253,516.

Patented Feb. 14, 1882.



Witnesses:
W. B. Duncanson
J. H. Gadd

Inventor:
Henry C. Darby
per William J. Gadd
att'y.

UNITED STATES PATENT OFFICE.

HENRY C. DARBY, OF WYANDOTTE, KANSAS.

FURNACE-SHEET FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 253,516, dated February 14, 1882.

Application filed January 23, 1881. (Model.)

To all whom it may concern:

Be it known that I, HENRY C. DARBY, of Wyandotte, county of Wyandotte, and State of Kansas, have invented a new and useful Improvement in Furnace-Sheets for Steam-Boilers, of which the following is a specification.

The invention relates to the construction of furnace-sheets, and has for its object the means of so distributing and localizing the tension due to expansion and contraction of metal by changes in temperature as to relieve stay-bolts from lateral strain and prevent cracking and destruction of sheets.

The improvement consists in a series of shallow spherical depressions or pockets rolled or hammered into that part of furnace-sheet subject to the most violent temperature. These depressions present on the opposite side of sheet corresponding spherical projections. They are arranged in series at right angles to each other, and are placed as close to one another as may in practice be found compatible with the easiest curve to which the material of the sheet can be molded at their junction. Central and intermediate to each group of four projections a stay-bolt passes through furnace-sheet, connecting it with the outside shell of boiler, as shown on drawings. The size of the elevations is governed by the distance of the stay-bolts from center to center. The sheets are so placed in boiler that the depressions or pockets face the water-space, while the elevations on its opposite side face the fire of the furnace.

In the drawings, Figure 1 shows a plan of my furnace-sheet with a series of elevations, central to each four of which a stay-bolt is placed, joining the furnace and outside sheet together. Fig. 2 is a side elevation of same, and Fig. 3 is a vertical section through the elevations. Fig. 4 is an enlarged sectional view of the sheet, showing stay-bolts in position. Fig. 5 is a longitudinal section of a locomotive-boiler with device applied to the side sheets, and Fig. 6 is a horizontal section on line A B, showing relative position of the sheet to the water-space and furnace.

The object of the spherical projections herein described is to form elastic centers for taking

up the expansion and contraction of metal immediately confined by stay-bolts surrounding it.

The advantages I claim for my furnace-sheet are its elasticity for taking up the expansion of metal by heat and equalizing the strain on the surrounding stay-bolts; secondly, its superior strength due to its structure. This renders less bracing necessary than formerly, whereby stay-bolts may be placed at greater intervals from each other with perfect safety.

The elevations on sheet being arranged in lines running at right angles to each other form, so to speak, a system of vertical and horizontal corrugations which perfectly equalize the strain on stay-bolts by taking up the expansion of metal, thus preventing their becoming loose, and avoiding the destruction of sheet by cracking.

I would, in this connection, remark upon the difference between my improvement and such known under the name of "corrugated sheets." In the corrugated sheets the grooves cannot be so disposed as to compensate for the opposing forces of expansion and contraction equally in all directions. The strain or tension is relieved either in vertical or horizontal lines, according to the direction of the corrugations, and as a symmetrical disposition of the two systems of corrugations—i. e., vertical and horizontal—such as would equalize the strain in all directions is impractical, it follows that in such a combination of the two, as specified in Patent No. 7,519, Reissue, unequal local strain must result, due to the unequal distribution of the corrugations. Such local lateral strain will be exerted to a great extent in diagonal lines.

I desire also to state that I lay no claim to sheets provided with "cup-formed projections" which "open into the fire-box," such as substantially described in English Patent No. 41 of 1852. Such a device would be entirely impractical for my purpose. Both in object and manner of construction, as well as in application, marked differences exist between my improvement and that of Patent No. 41, mentioned. In the one case heating-area is the sole object in view, and the construction of the

sheet is subordinated to that idea alone. In the other the increased heating surface is merely an incidental and unimportant result of the main object. In the one the recesses are very
5 deep and pronounced; they are separated by large intervals and the projections are presented to the water-space, thus contracting its capacity. In the other the recesses are shallow or saucer-shaped, such as may be produced by
o rolling or hammering the sheet on suitable patterns without subjecting the metal to an undue amount of strain. The depressions are closely grouped in lines at right angles to each other, and being presented to the water-space of
5 boiler increase its capacity. These are the differences in the construction. In the application the differences are even more pronounced, for, owing to the marked intervals between the

depressions, the sheets are practically rigid and unyielding, affording no relief to the strain on
the stay-bolts whatever. 20

What I desire to claim as my invention is—

A furnace-sheet for fire-boxes, presenting on its anterior surface, or that side facing the water-space, a series of shallow spherical de- 25
pressions or recesses closely grouped in lines at right angles to each other, and on its posterior surface, or that presented to the furnace, a series of raised or projecting surfaces corresponding to the depressions first mentioned, 30
for the purposes and objects named, and substantially as described.

HENRY C. DARBY.

Witnesses:

WILLIAM JANDUS,
JAMES D. KUSTAL.