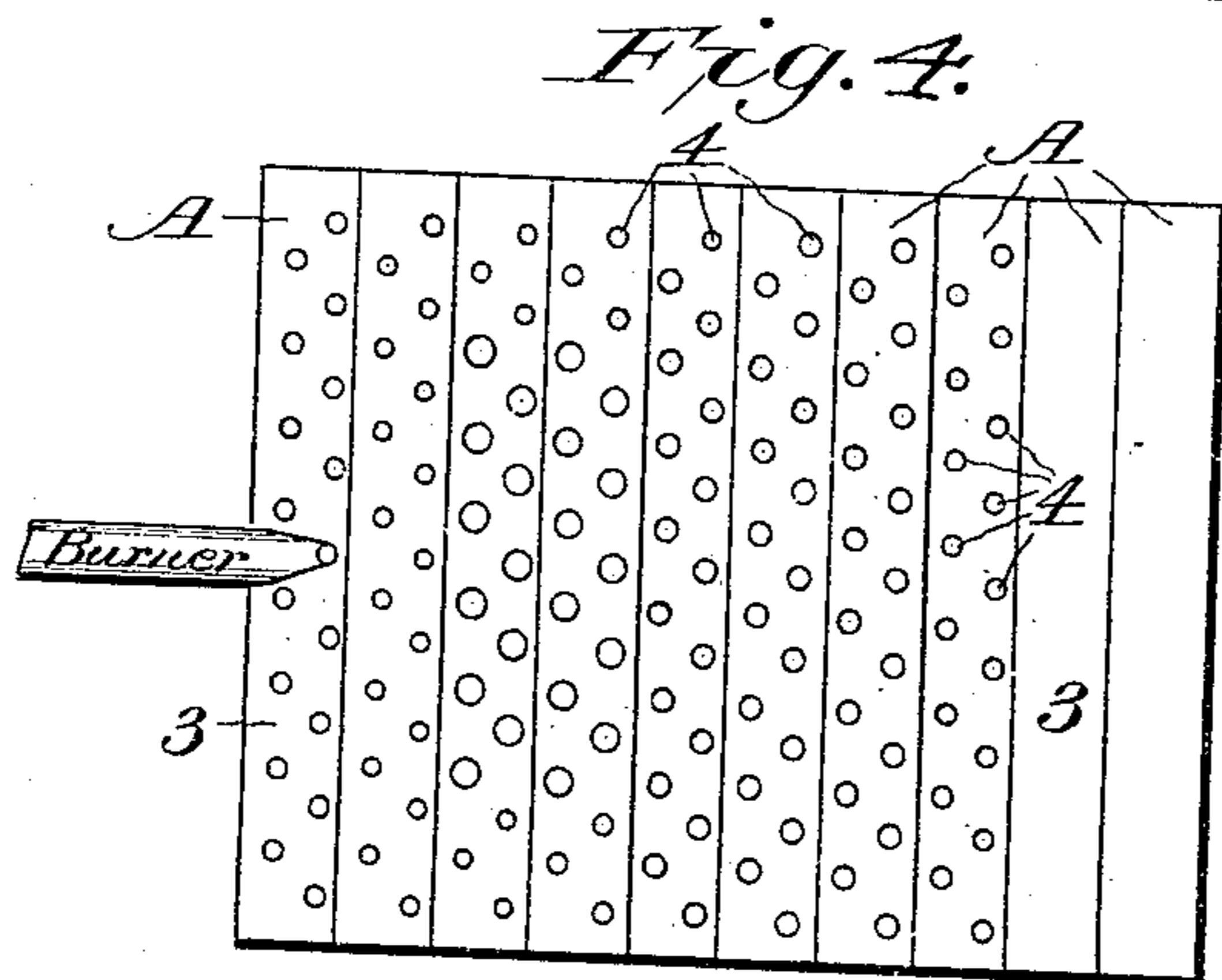
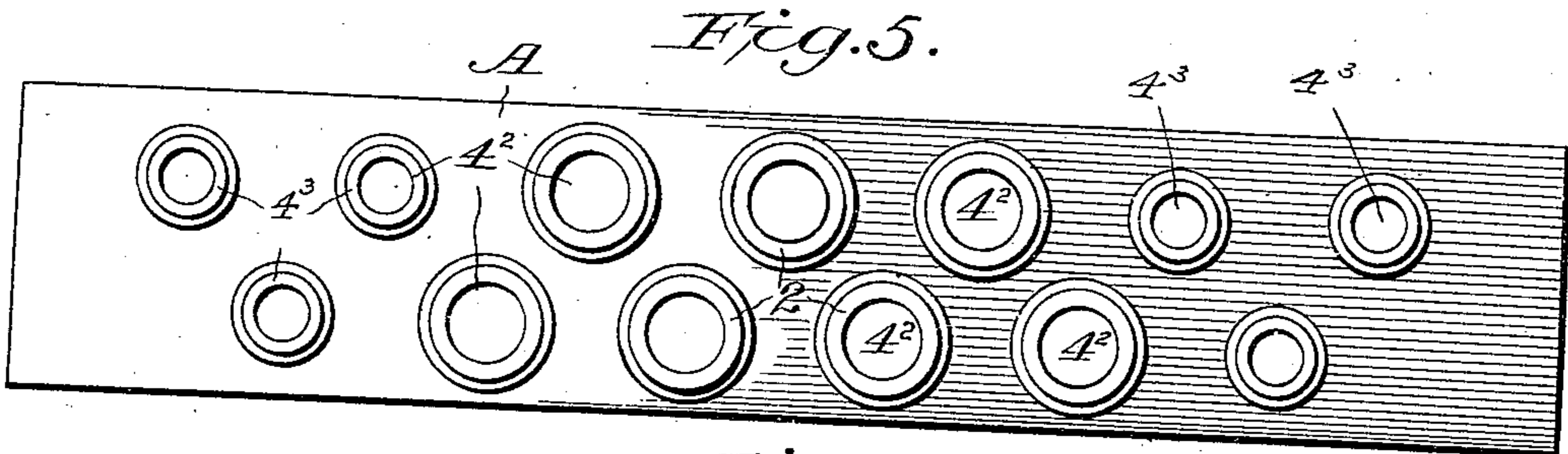
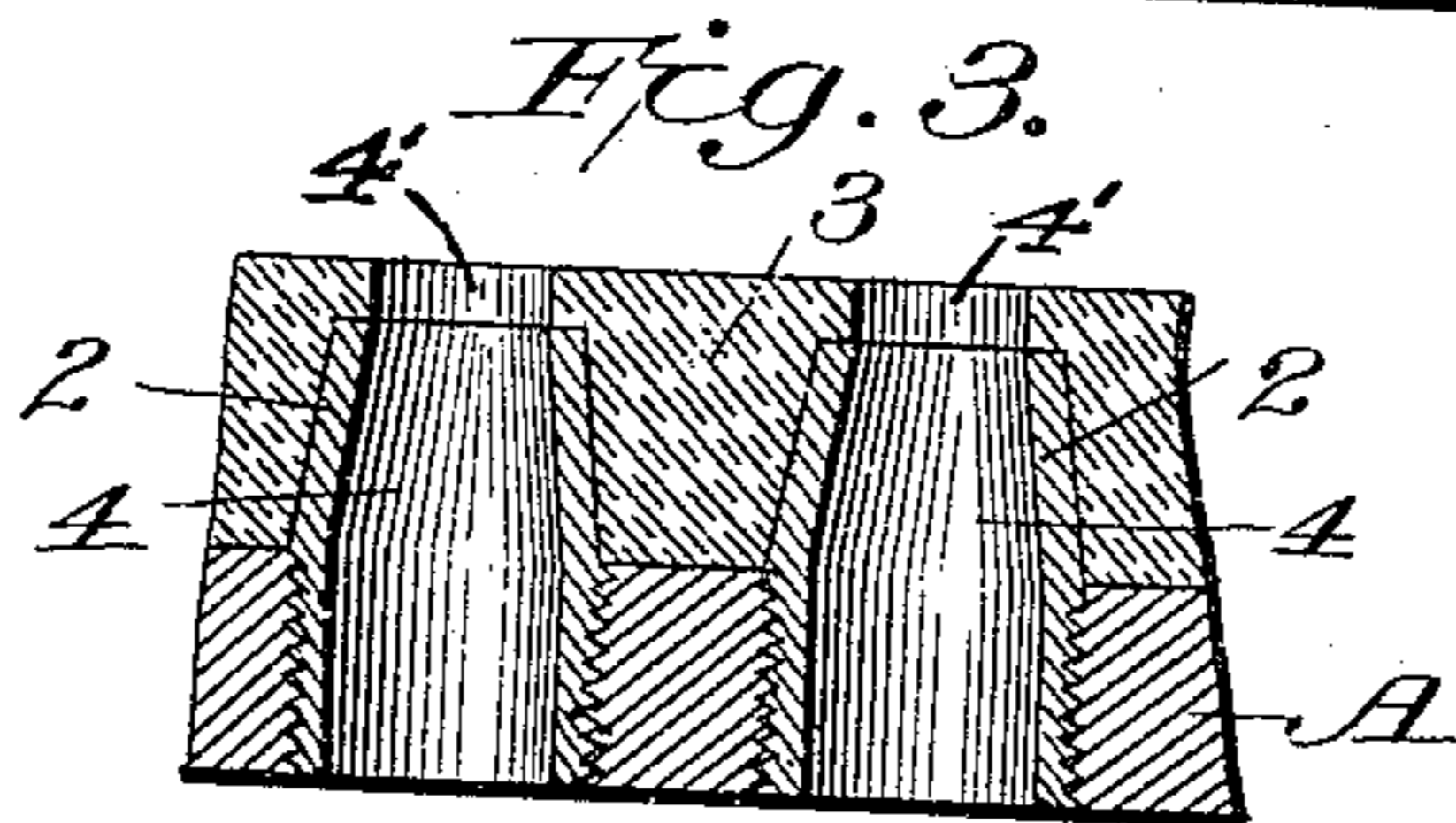
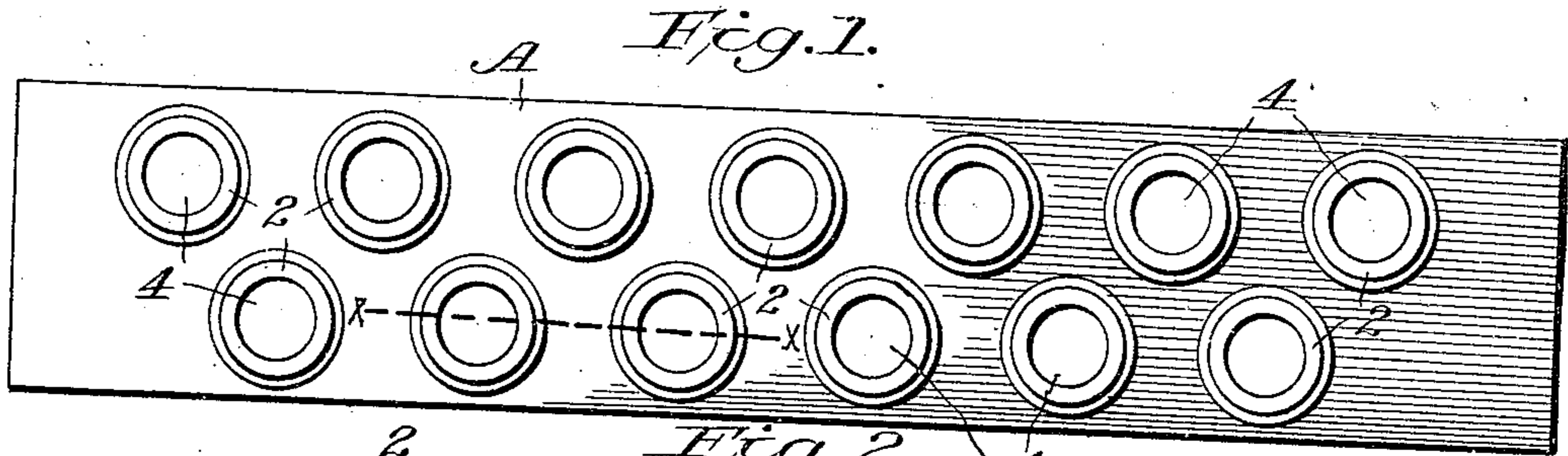


No. 841,498.

PATENTED JAN. 15, 1907.

J. C. FITZSIMMONS.
PROTECTED GRATE BAR.
APPLICATION FILED NOV. 23, 1905.



Witnesses

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UNITED STATES PATENT OFFICE.

JAMES C. FITZSIMMONS, OF SAN FRANCISCO, CALIFORNIA.

PROTECTED GRATE-BAR.

No. 841,498.

Specification of Letters Patent.

Patented Jan. 15, 1907.

Application filed November 23, 1905. Serial No. 288,685.

To all whom it may concern:

Be it known that I, JAMES C. FITZSIMMONS, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented certain new and useful Improvements in Protected Grate-Bars, of which the following is a specification.

My invention relates to an improved grate-bar; and its object is to provide a simple, durable, practical, protected grate-bar which is especially designed for use in liquid or vapor fuel burning furnaces.

My invention consists of the parts and the constructions and arrangement of parts which I will hereinafter describe and claim.

In the accompanying drawings, which form part of this specification, Figure 1 is a plan view of my improved grate-bar with the refractory material omitted. Fig. 2 is a side elevation of the same. Fig. 3 is a section of a fragment of the bar on the line *xx* of Fig. 1, but showing the refractory material in place. Fig. 4 is a plan view of a grate, showing the use of a number of my bars with different size perforations. Fig. 5 is a grate-bar of modified form.

A represents a grate-bar embodying my invention, said bar being in the form of a metal plate with a series of nipples 2, screwed into the plate, as shown in Fig. 3, to provide a perforated bar or grate with suitable means for receiving and retaining on its surface which is exposed to the flames, a plaster of cement, asbestos, magnesia, fire-clay, or other refractory and adhesive material, as shown at 3. The perforations 4 in the nipples 2 are tapered, the enlarged end of the perforations being at the bottom, so that the perforations will be less liable to clog and more likely to free themselves, especially where the grate-bar is used for burning coal or wood. The number and sizes of the perforations 4 depend on circumstances, such as the style, character, and size of the boiler or furnace. The bars may be of any suitable length, width, shape, or weight, depending on the boiler under which or the furnace in which they are used.

In Fig. 4 I illustrate the grate as made up of narrow straight bars, each having one or more rows of perforations; but other arrangements of bars may be used, according to the character of furnace or boiler with which the grate is used.

The main feature of the invention is the perforated bar with suitable removable nipples having threaded lower portions to screw into engagement with the threaded perforations, said nipples having their upper ends tapering and the coating of refractory material upon said bar end inclosing the tapered ends of the nipples and extending over said ends and having openings 4' in line with the passage through the nipples. Such an arrangement leaves no part, not even the end of the nipple, exposed to the intense heat of the fuel, the only part that is exposed to the action of the heat being the refractory material, which material has the openings through it in line with and forming continuations of the nipple-openings.

A grate-bar of the character described is practically indestructible. The bars may be furnished in stock already protected, and the same bars may be taken out of a furnace and put back again and used.

If desired, grate-bars with different size perforations may be used together in the same furnace so as to give the most air where most needed, as shown in Fig. 4, or the grate-bars may be made with larger perforations 4² in the middle which will be under the flame and with smaller perforations 4³ near the ends which will be at the sides of the fire-box where there is less unconsumed carbon, as in Fig. 5. The construction shown in Fig. 4 is designed for use on locomotives and like furnaces.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

An improved grate-bar having screw-threaded openings, removable nipples having threaded lower portions to fit said openings, and having their upper ends tapering, and a coating of refractory material upon said bar and inclosing the tapered ends of the nipples, and extending over said ends, said material having openings in line with the passage through the nipples.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JAMES C. FITZSIMMONS.

Witnesses:

L. H. NOURSE,
E. J. WATERS.