

No. 607,263.

W. McCLAVE.

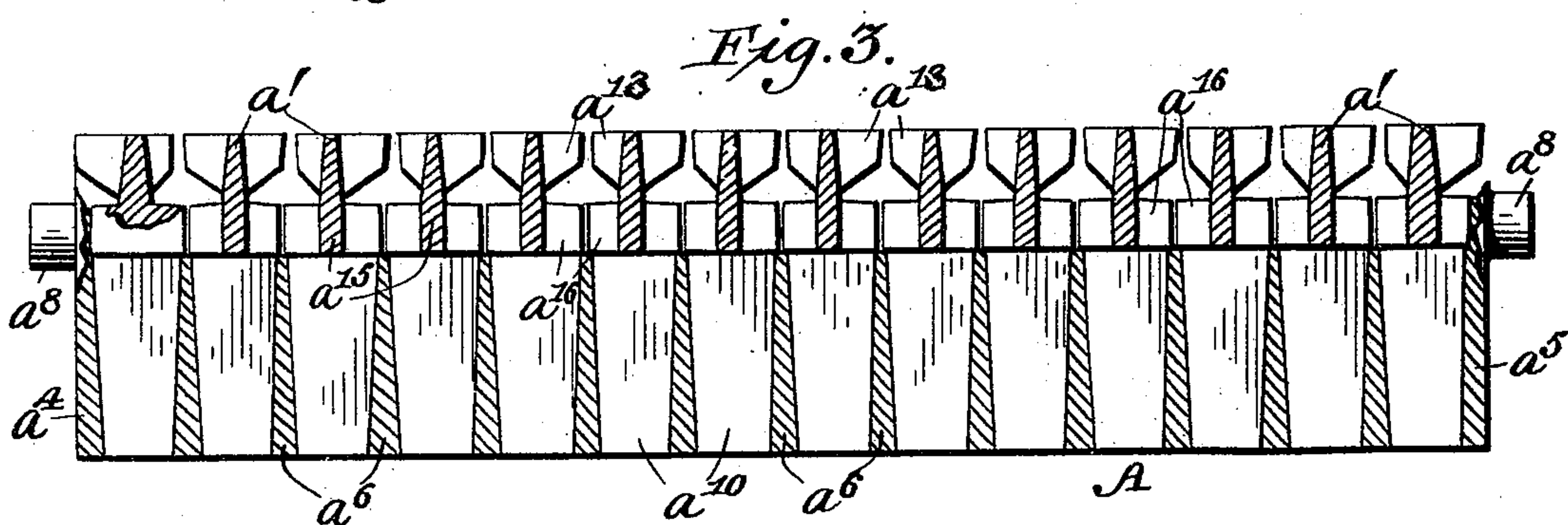
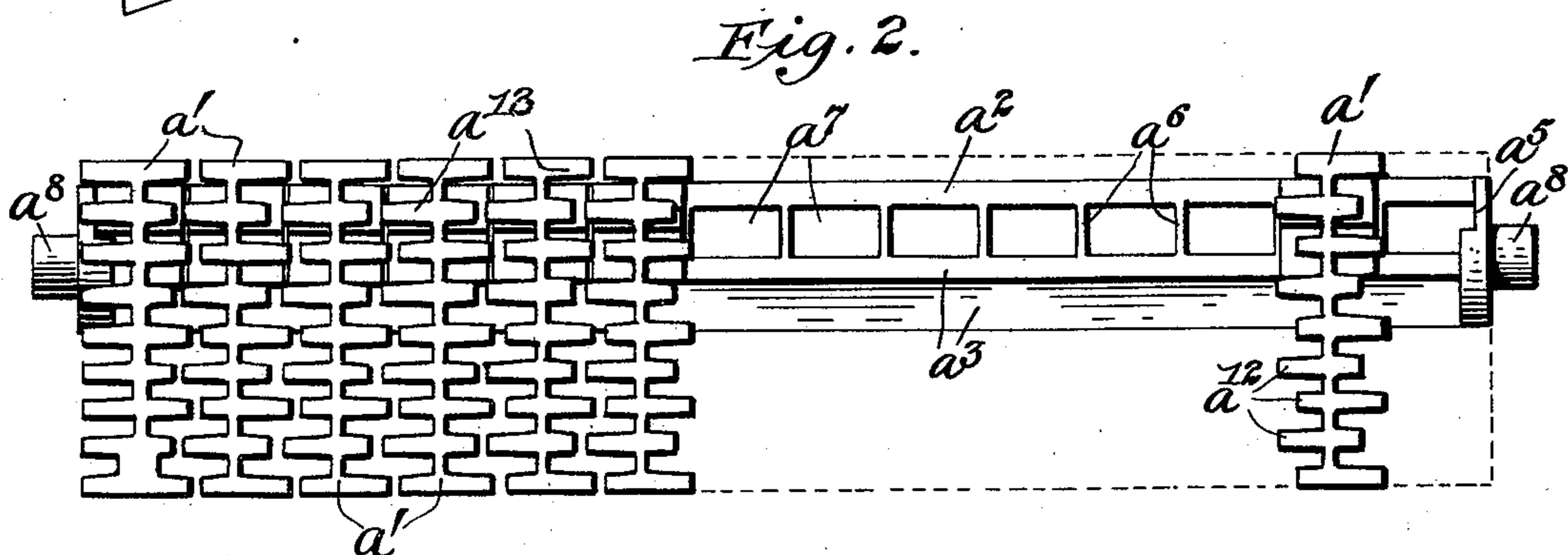
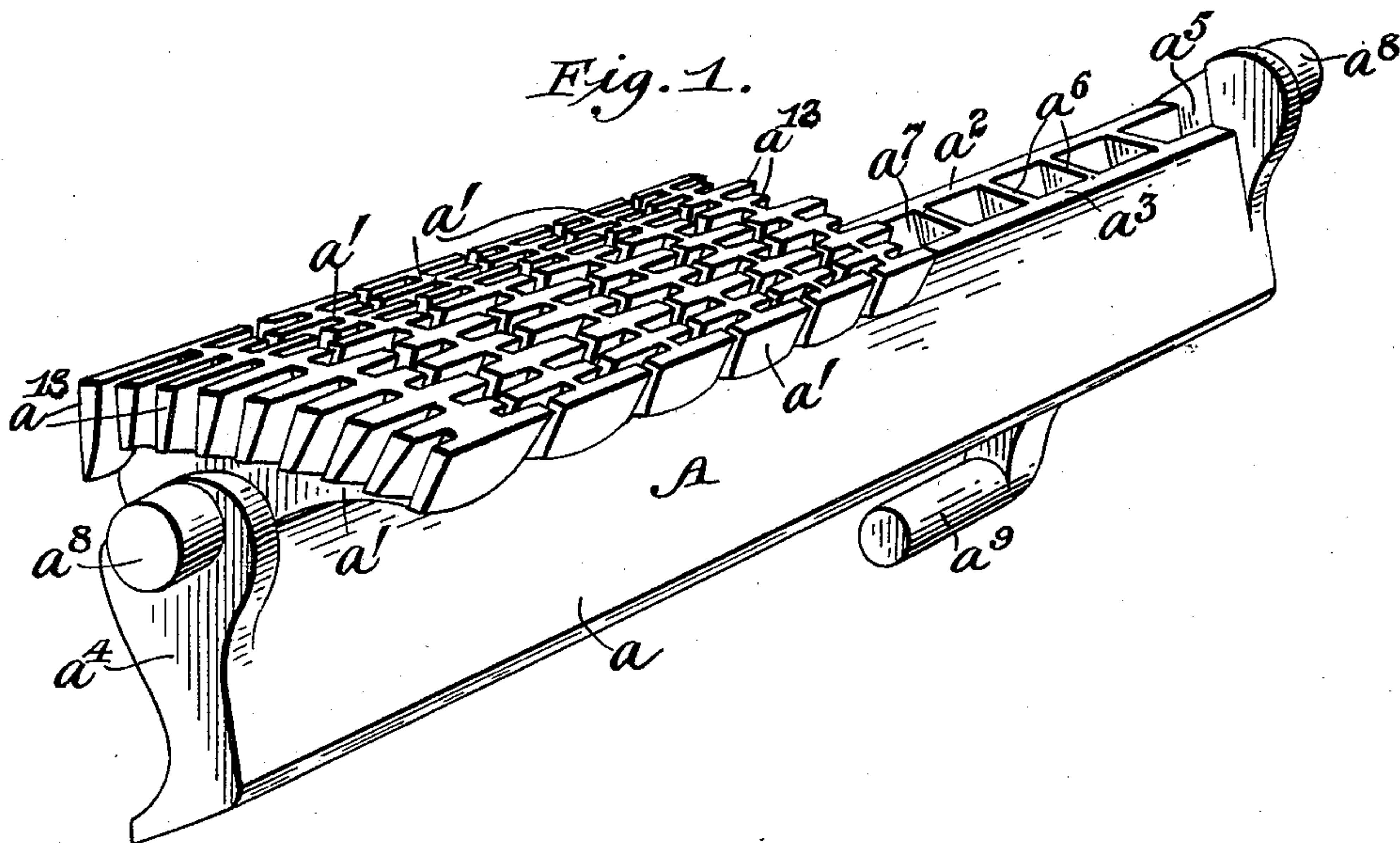
Patented July 12, 1898.

GRATE BAR AND GRATE FOR BOILER OR OTHER FURNACES.

(Application filed Nov. 10, 1897.)

(No Model.)

5 Sheets—Sheet 1.



WITNESSES

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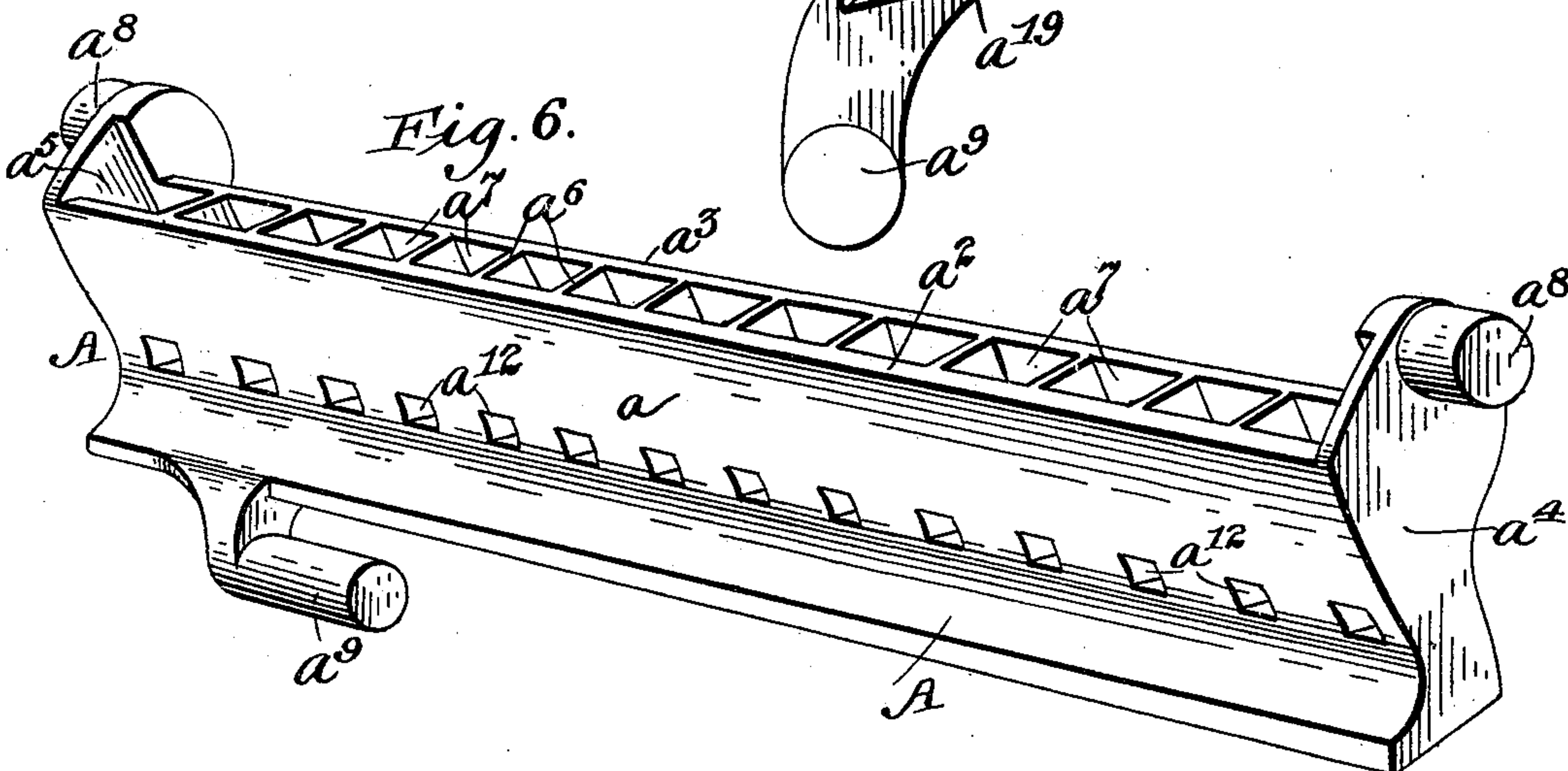
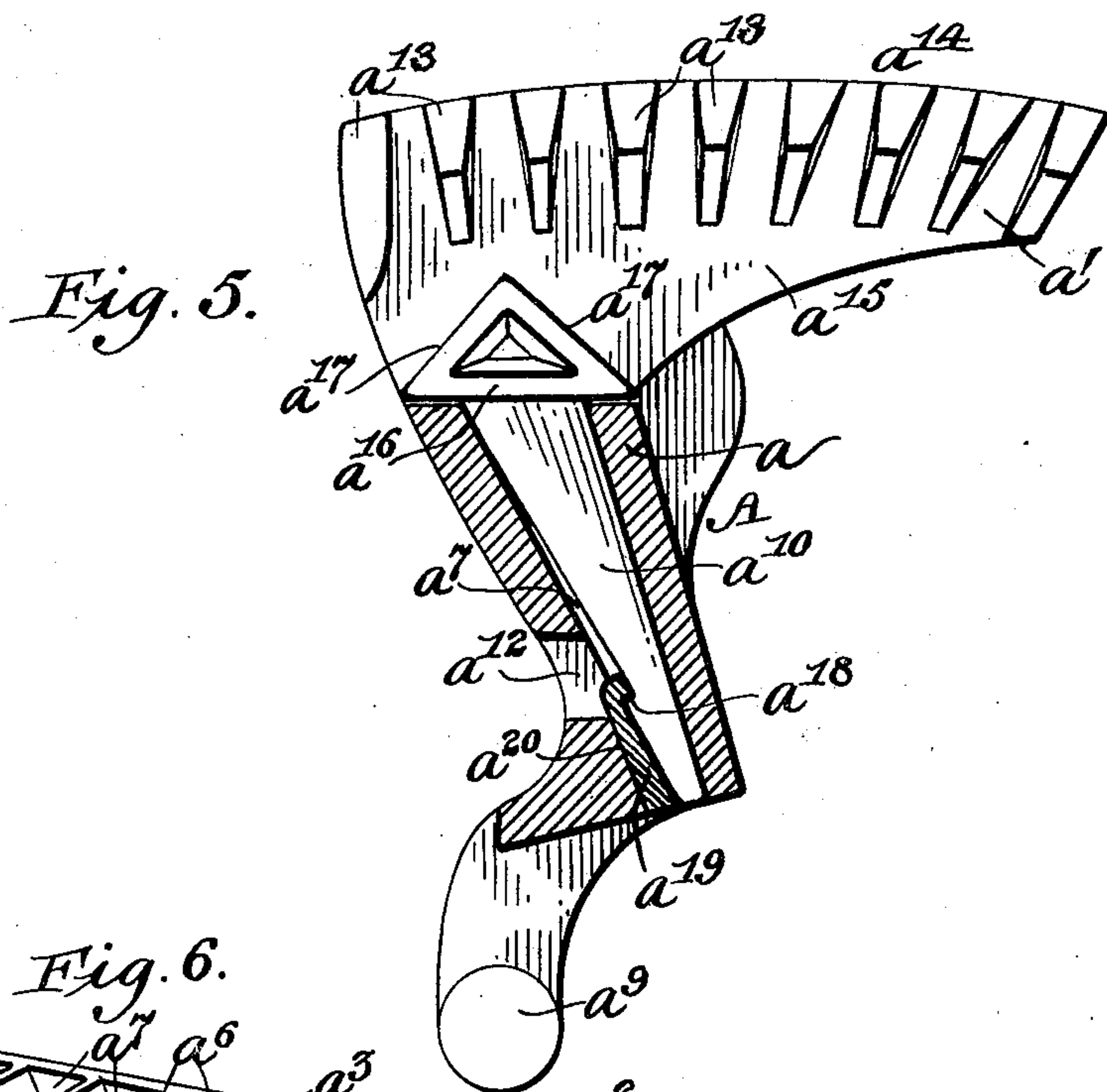
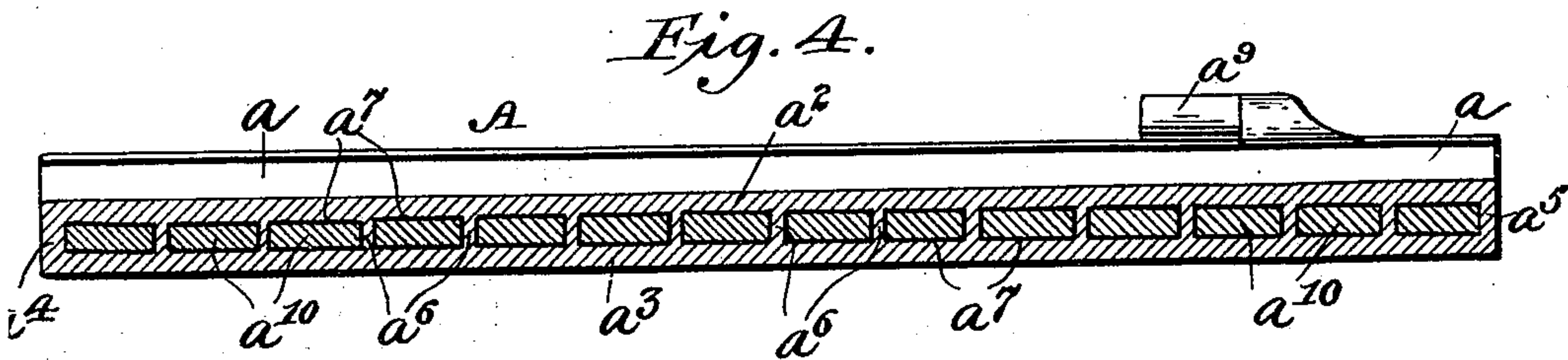
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5 Sheets—Sheet 2.



WITNESSES

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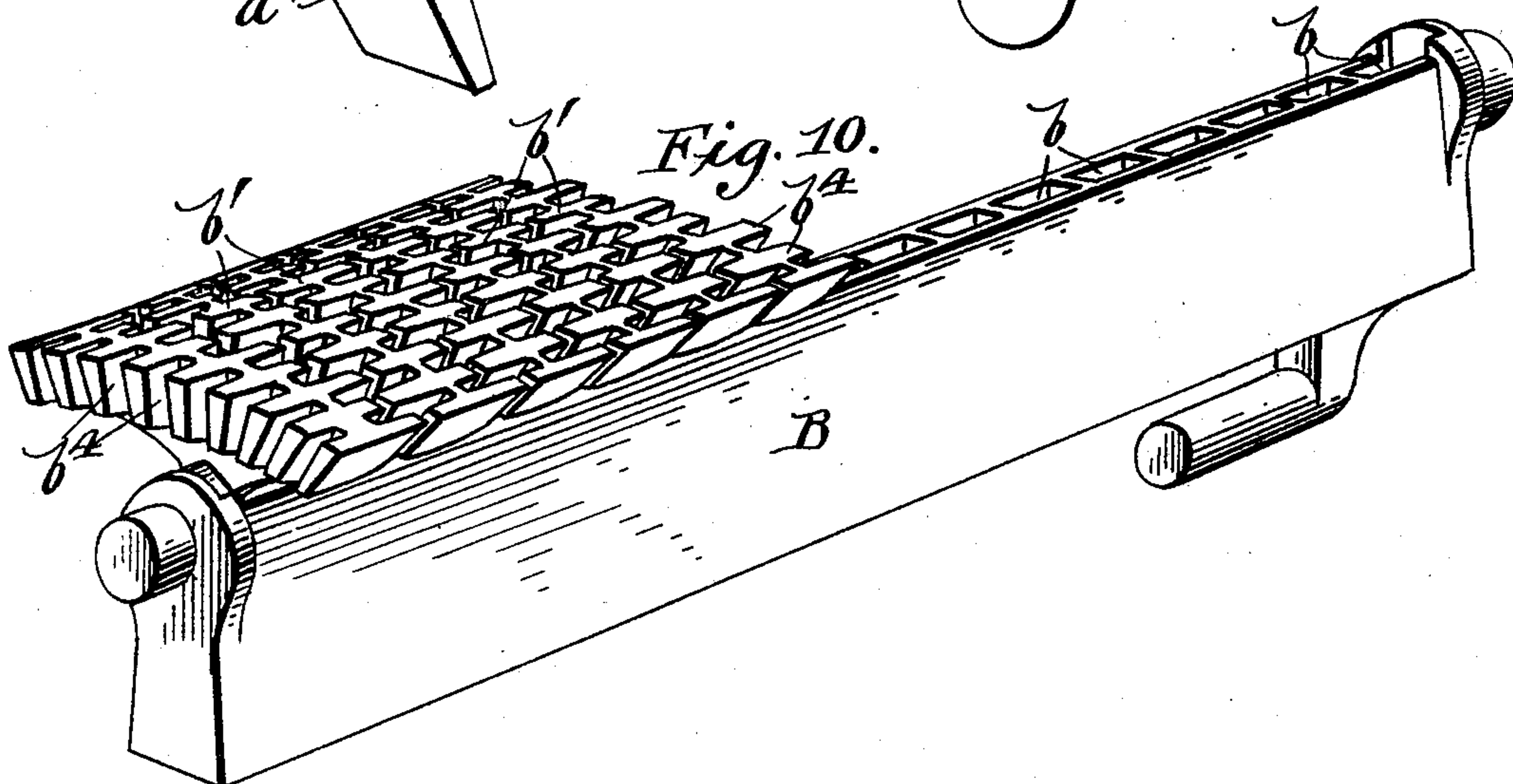
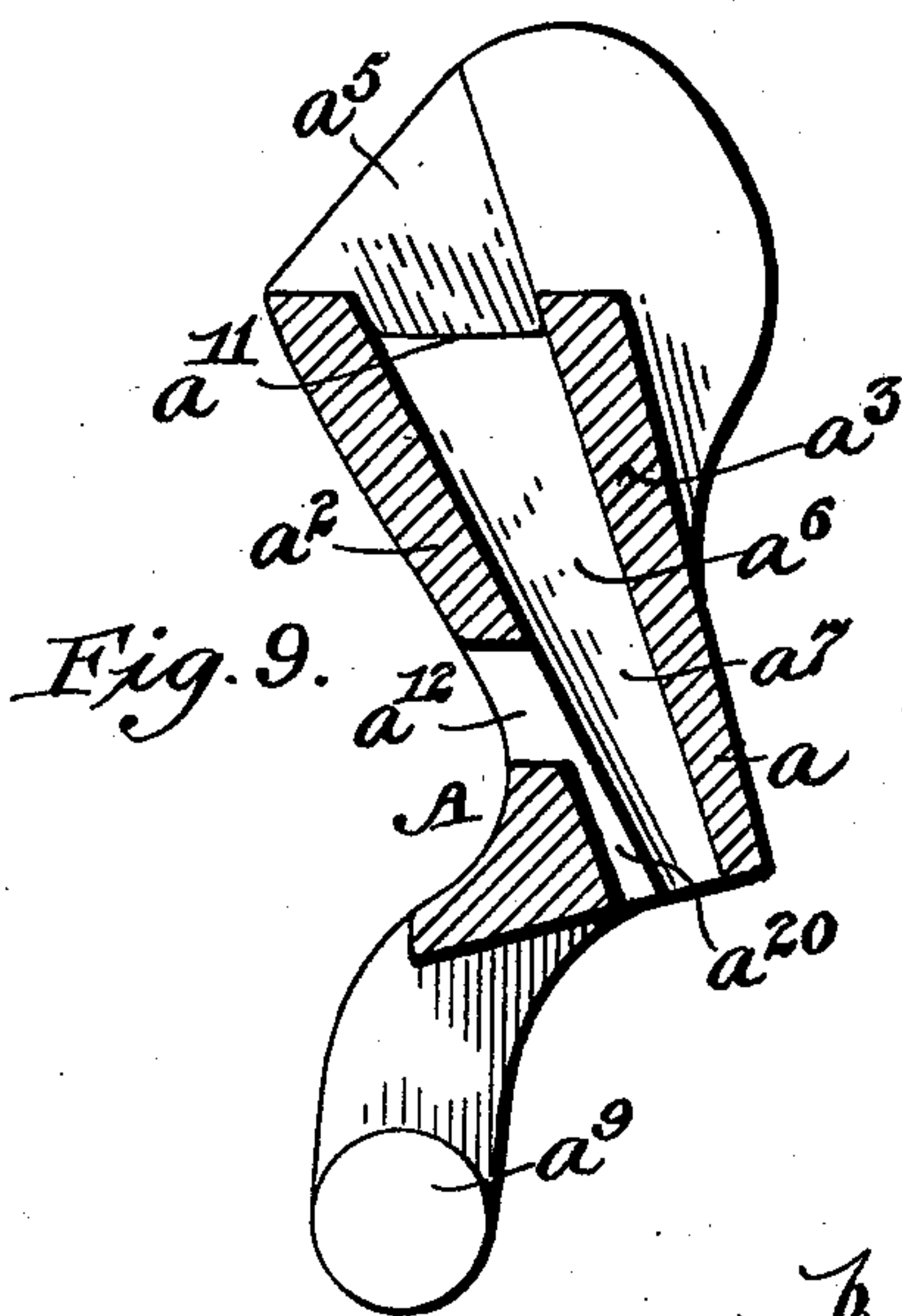
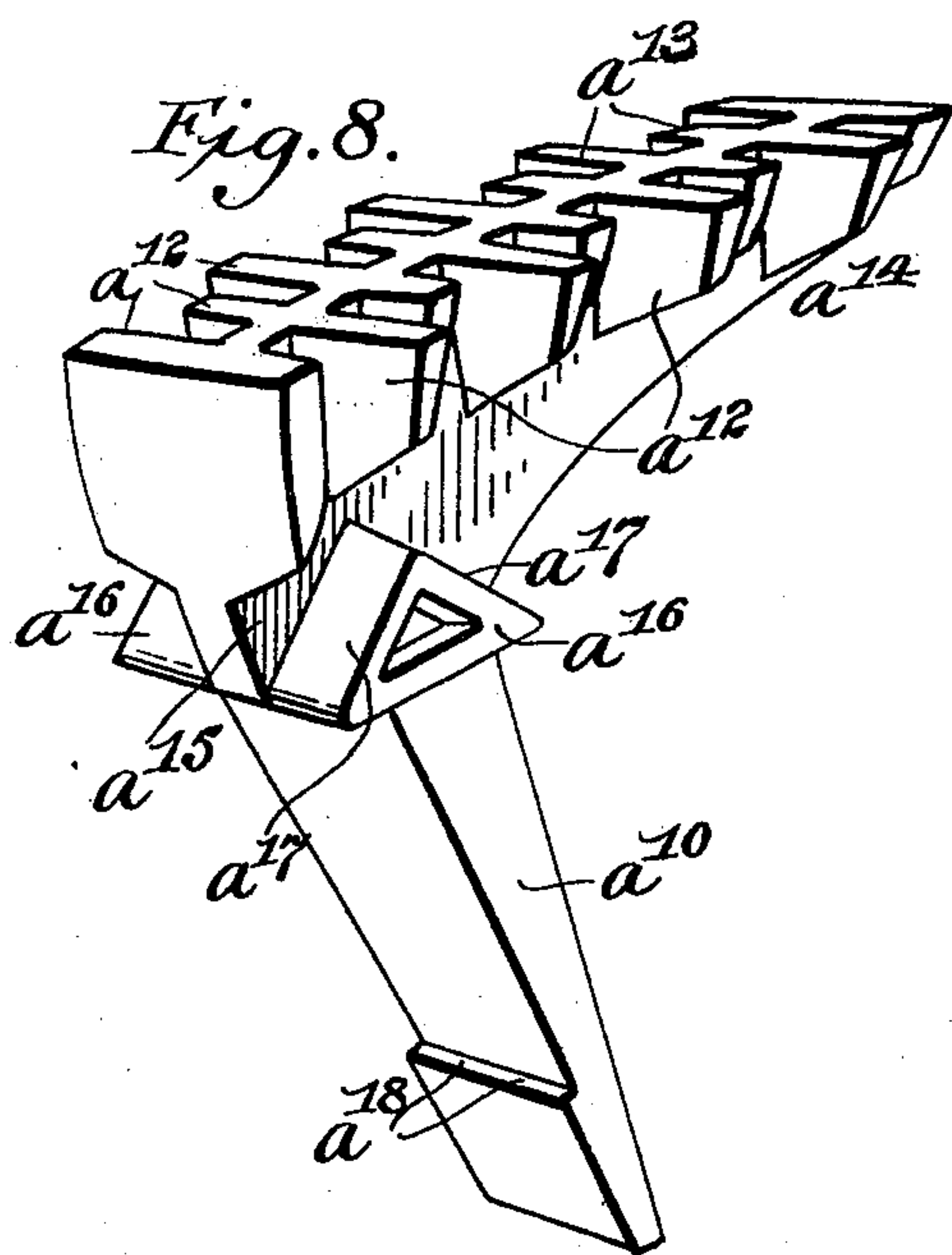
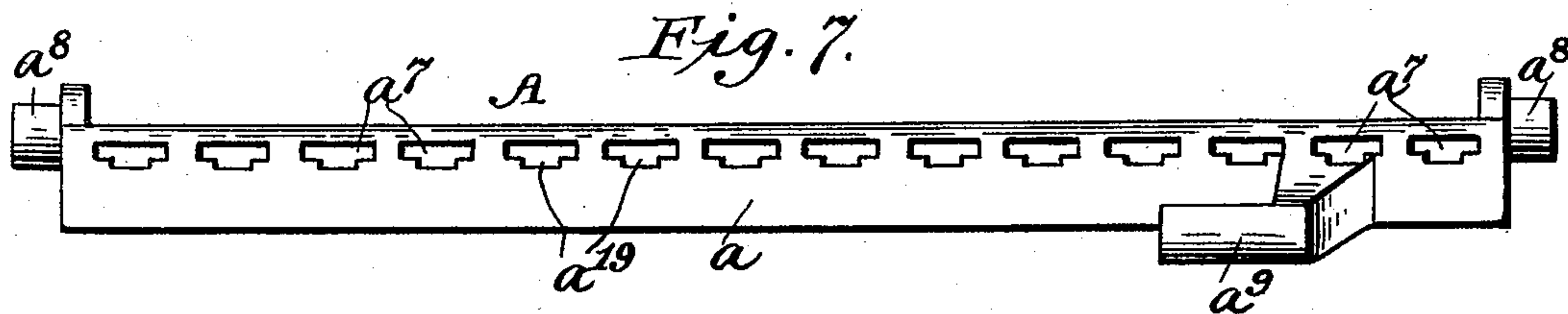
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(No Model.)

5 Sheets—Sheet 3.



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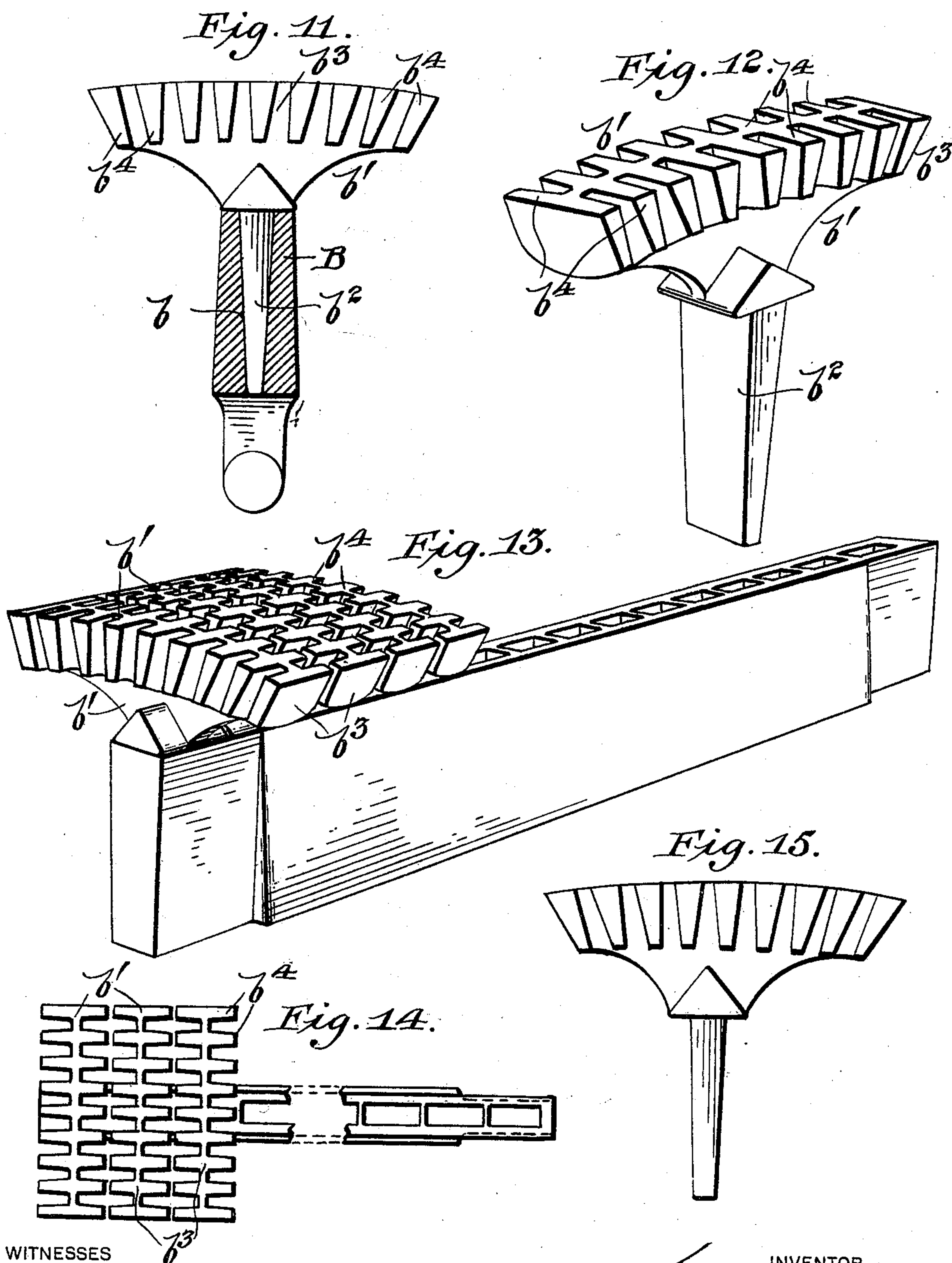
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5 Sheets—Sheet 4.



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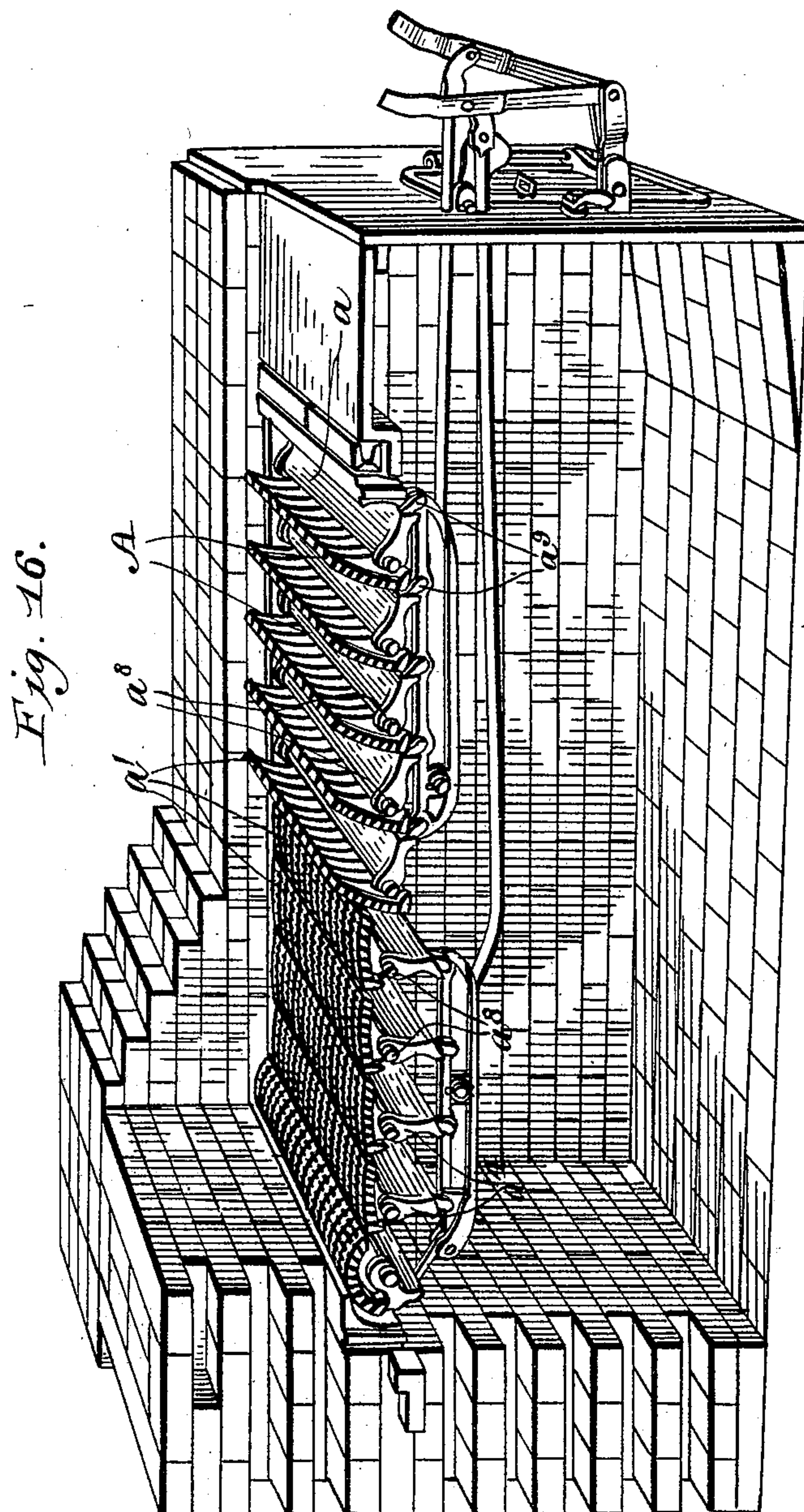
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(Application filed Nov. 10, 1897.)

(No Model.)

5 Sheets—Sheet 5.



WITNESSES

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UNITED STATES PATENT OFFICE.

WILLIAM MCCLAVE, OF SCRANTON, PENNSYLVANIA.

GRATE-BAR AND GRATE FOR BOILER OR OTHER FURNACES.

SPECIFICATION forming part of Letters Patent No. 607,263, dated July 12, 1898.

Application filed November 10, 1897. Serial No. 658,064. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM MCCLAVE, a citizen of the United States, residing at Scranton, in the county of Lackawanna and State of Pennsylvania, have invented certain new and useful Improvements in Grate-Bars and Grates for Boiler or other Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to the construction of grates and grate-bars for boiler and other furnaces, which bars for certain styles of grates may be stationary, while for other styles they may be so constructed as to have a rocking motion; and it consists, first, in the novel construction of removable fingers, which, with the body portion of the grate-bar, constitute the grate-bar proper; second, in a grate composed of a series of such bars, and, third, to novel means for securing the fingers in place within the body portion of the grate-bar, whereby numerous advantages are secured, as will be hereinafter described.

In the accompanying drawings, Figure 1 is a perspective view of my invention as applied to an approximately inverted-L-shaped rocking grate-bar. Fig. 2 is a top plan view of the same. Fig. 3 is a vertical longitudinal section through the same. Fig. 4 is a horizontal section through the body portion of the bar. Fig. 5 is a vertical transverse section through the bar. Fig. 6 is a perspective view of the body portion of the bar with the fingers removed. Fig. 7 is a view showing the under side of the body portion of the grate-bar. Fig. 8 is a detail perspective view of an approximately inverted-L-shaped finger. Fig. 9 is a vertical transverse section through the body portion of the bar, showing the partitions forming the sockets as cut away slightly below the upper edge of the same. Fig. 10 is a perspective view of my invention as applied to an approximately T-shaped rocking grate-bar. Fig. 11 is a vertical transverse section through the same. Fig. 12 is a perspective view of an approximately T-shaped finger. Fig. 13 is a perspective view of my invention as applied to a stationary grate-bar. Fig. 14 is a top plan view of the same, but in this instance the outer edges on both ends of the teeth of the fingers

are in the same vertical plane longitudinally of the fingers and not arranged in a zigzag manner; and Fig. 15 is a side elevation of a slightly-modified form of finger, the shank being located to one side of the center of the head longitudinally of the same. Fig. 16 is a perspective view of a rocking grate constructed in accordance with my invention.

A in the drawings represents a rocking grate-bar, which is composed of a body portion a and removable approximately L-shaped fingers a' . The body portion consists, preferably, of a single casting having spaced side walls $a^2 a^3$ and end walls $a^4 a^5$. Vertical partitions a^6 , extending, preferably, the entire depth of the body portion of the bar, are formed between the side walls and form a series of open-ended sockets a^7 for the reception of the shanks a^{10} of the removable fingers a' . In cross-section the body portion may be of any suitable shape. Journals a^8 are formed on the end walls $a^4 a^5$ of the body portion at any suitable point, and a connecting-bar journal a^9 is formed on the under side of the bar at any suitable point.

In Fig. 9 I have shown the partitions forming the sockets in the body portion with their upper edges cut away, as at a^{11} , below the upper edge of the body portion proper. This will be found an advantageous construction under certain conditions. The sockets are made preferably tapering outwardly from bottom to top, and one side wall of the body portion is formed with passages $a^{12} a^{12}$ for the insertion of a tool for securing the fingers in place, as will be hereinafter described.

The fingers a' , which are used in the style of grate-bar now being described, are of the same shape, though the teeth a^{13} , instead of being arranged in a zigzag manner, may have all of their outer edges on both ends in the same vertical plane longitudinal of the finger. The teeth are preferably beveled on their under surfaces, as shown. The head a^{14} of the finger extends a considerable distance above the upper edge of the body portion proper of the grate-bar, and this is accomplished by forming it with a thinned web a^{15} transverse to the body portion. The back lower end of this web portion is formed with abutment-lugs $a^{16} a^{16}$, extending on both sides of the web, which also serve to support the finger

on the upper edge of the body portion of the bar. These lugs are beveled on their upper surfaces downwardly and outwardly in both directions, as at a^{17} a^{17} , so as to prevent any
 5 ashes which may fall between the teeth of the fingers lodging on the same and clogging the ventilation through the grate, but will discharge the same into the ash-pit below. The shank a^{10} is flattened and preferably wedge-
 10 shaped and extends downwardly and inwardly from the web portion a^{15} and at right angles to said web portion. By constructing the finger with a comparatively high vertical web transverse to the grate-bar and forming it
 15 with a shank at right angles to said web the intense heat is not only removed farther away from the body portion of the grate-bar, but the heat-line by conduction is broken to a large extent. The back of the shank a^{10} is
 20 formed with a shoulder a^{18} for receiving the bent end of a locking-key, as will now be described. When a finger is placed in position in one of the sockets a^7 and is forced down, it is held in place by a wedge-shaped key a^{19} ,
 25 which is inserted in a key-seat a^{20} on the under side of the grate-bar and is of sufficient length to project sufficiently above the shoulder a^{18} on the shank of the finger and to be turned over against said shoulder by means
 30 of a suitable tool, which is inserted through the passages a^{12} . In removing the fingers for the purpose of inserting new ones it is simply necessary to force the same out from the under side of the bar by the use of an ordinary
 35 "set."

Thus far the description has had reference to a grate-bar constructed of approximately inverted-L-shaped fingers. I will now proceed to describe the construction of a grate-
 40 bar composed of approximately T-shaped fingers. In many respects they are the same in construction as the grate-bars just described, but they differ in the following particulars: The body portion of the grate-bar proper
 45 where the inverted-L-shaped fingers are employed slants downwardly and forwardly, and the back wall of the same is made on a cyma-reversa curve in order to facilitate one of the rocking movements peculiar to this construc-
 50 tion of bar and the movements of said bars with respect to each other and to the formation of deep pockets between the respective grate-bars without a large space being formed between the same for the accidental discharge
 55 of fuel, as shown and described in my Letters Patent No. 318,007. Where T-shaped grate-bars B are employed, as shown in Fig. 11, the sockets b in the body portion are arranged vertically and preferably diverge from bot-
 60 tom to top, the largest part of the opening being at the top. The construction of the fingers b' is practically the same as the inverted-L-shaped fingers, except that the shank b^2 is arranged centrally of the length of the head
 65 portion b^3 and extends downwardly from the same in a vertical manner. With this construction a key to secure the fingers in place

is not absolutely required, as there is not the same tendency for the fingers to draw out as there is in the inverted-L-shaped construc- 70
 tion. The teeth b^4 may be arranged in a zig-zag manner, as shown in Fig. 2 of the drawings, or they may be arranged to have their outer ends come in the same vertical plane longitudinally of the fingers, as shown in 75
 Fig. 14.

In Fig. 13 I have shown the invention applied to a stationary grate-bar. The construction of the parts is practically the same as in the T-shaped bar, with the exception 80
 that it is not provided with journal ends or a connecting-bar journal, and the shank on the fingers may be arranged vertically a little to one side of the center longitudinally of the head for the purpose of making the fin- 85
 gers break spaces between the bars.

In Fig. 16 I have shown a rocking grate constructed in accordance with my invention and composed of a series of grate-bars and fingers, as herein described. The manner 90
 of connecting the grate-bars and operating the grate forms no part of my present invention, the same being covered by my Letters Patent No. 529,291, and dated November 13, 1894. 95

The advantages of the different constructions are obvious from the foregoing description and produce a grate which admits of perfect ventilation to the fuel from below, the fingers of which can be conveniently re- 100
 moved when they have become burned out and new ones substituted therefor.

A grate constructed with grate-bars in accordance with my invention, as above described, is adapted to burn fuel of any size, 105
 as the openings between the outer ends of the adjoining grate-bars and the meshes formed between the teeth of the fingers can be made relatively larger or smaller without departing from my invention, according to the size of 110
 fuel it may be desired to burn.

The constructions described and shown may be slightly varied without departing from my invention.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is— 115

1. As an improved article of manufacture, a finger for a rocking grate-bar composed of a single piece of metal, and comprising in its 120
 construction a head having laterally-extending teeth and a downwardly-extending flattened shank, a thin vertical web connecting the same, the shank extending at right angles to the web and parallel with the teeth, and an 125
 abutment-lug at the upper end of the shank to form a seat for the finger on the top of the body portion of the grate-bar, the said lug having outwardly and downwardly divergent top surfaces which prevent the collection of 130
 ashes on the lug, the finger being so constructed that a strong shank is secured which does not necessitate a socket portion on the bar so large as to materially obstruct the draft

and to also materially diminish the depth of the pockets formed between the grate-bars, when the grate-bars are rocked to cut out clinkers and ashes, substantially as described.

5 2. As an improved article of manufacture, a finger for a rocking grate-bar composed of a single piece of metal, and comprising in its construction a head having laterally-extending teeth, which are beveled on their under
10 surfaces and arranged in a zigzag manner, a downwardly-extending flattened shank, a thin vertical web connecting the same, the shank extending at right angles to the web and parallel with the teeth, and an abutment-lug at
15 the upper end of the shank to form a seat for the finger on the top of the body portion of the grate-bar, said lug having an outwardly and downwardly divergent top surface which prevents the collection of ashes on the lug,
20 substantially as described.

3. A rocking grate-bar comprising in its construction a body portion proper provided with spaced elongated sockets, fingers inserted in
25 said sockets, each of said fingers comprising a head having laterally-extending teeth and a downwardly-extending flattened shank, and a thin vertical web connecting the same, the shank extending at right angles to the web and parallel with the teeth, whereby a strong
30 shank is secured which does not necessitate a socket portion so large as to materially obstruct the draft and to also diminish the depth of the pockets when the bar is used in cutting out clinkers and ashes, substantially as described.
35

4. A rocking grate comprising in its construction a plurality of grate-bars, each of which comprises in its construction a body
40 portion proper provided with spaced elongated sockets, and fingers inserted into said

sockets, each of said fingers comprising a head having laterally-extending teeth and a downwardly-extending flattened shank, and a thin vertical web connecting the same, the shank
45 extending at right angles to the web and parallel with the teeth, whereby a strong shank is secured which does not necessitate a socket portion so large as to materially obstruct the draft and to also diminish the depth of the
50 pockets when the grate is rocked to cut out clinkers and ashes, substantially as described.

5. A grate-bar comprising in its construction a body portion proper provided with spaced sockets, transverse openings formed in the side of the bar and extending into the
55 sockets, fingers inserted in the said sockets, each of said fingers comprising a head having laterally-extending teeth and a downwardly-extending shank formed with a shoulder, and a key driven into the bar from its under side
60 and bent over to engage the shoulder on the finger, substantially as described.

6. A grate comprising in its construction a plurality of grate-bars, each of which comprises in its construction a body portion proper
65 provided with spaced sockets, transverse openings formed in the side of the bar and extending into the sockets, fingers inserted in the said sockets, each of said fingers comprising a head having laterally-extending teeth and a
70 downwardly-extending shank formed with a shoulder, and a key driven in the bar from its under side and bent over to engage the shoulder on the finger, substantially as described.

In testimony whereof I hereunto affix my
signature in presence of two witnesses.

WILLIAM MCCLAVE.

Witnesses:

HENRY A. KNAPP,
W. M. BUNNELL.