

No. 646,584.

Patented Apr. 3, 1900.

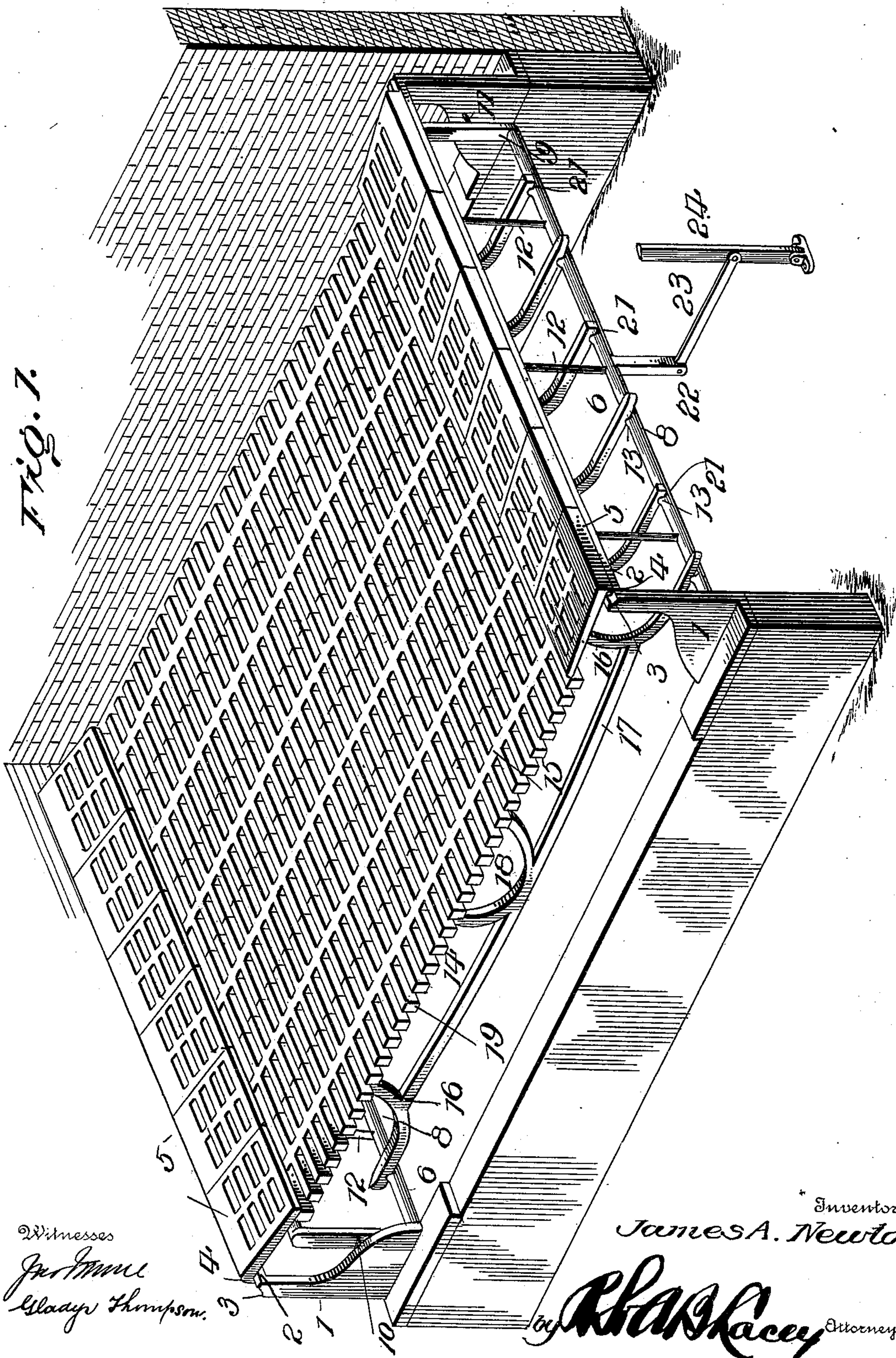
J. A. NEWTON.

RECIPROCATING GRATE BAR.

(Application filed Mar. 10, 1899. Renewed Mar. 7, 1900.)

(No Model.)

3 Sheets—Sheet 1.







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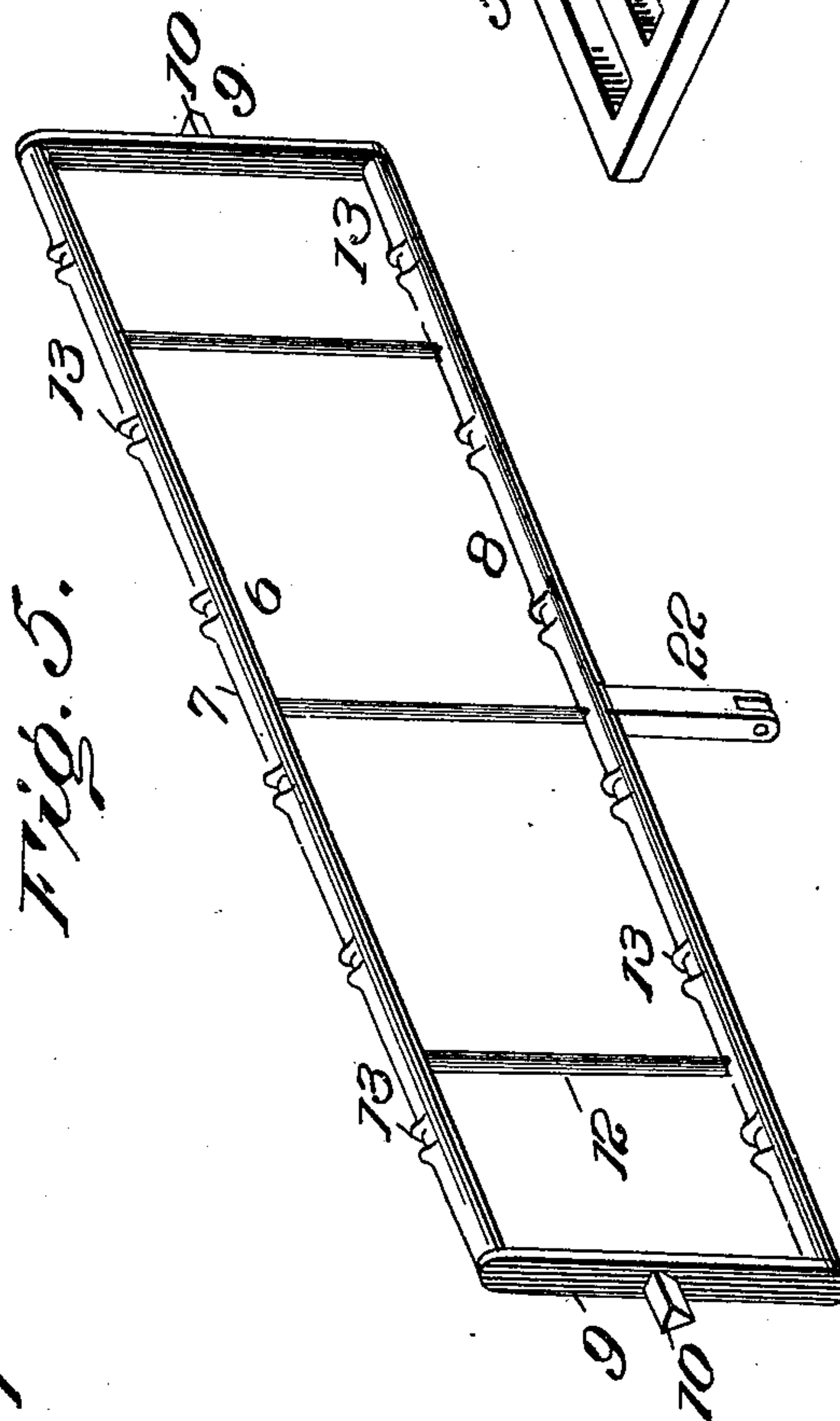
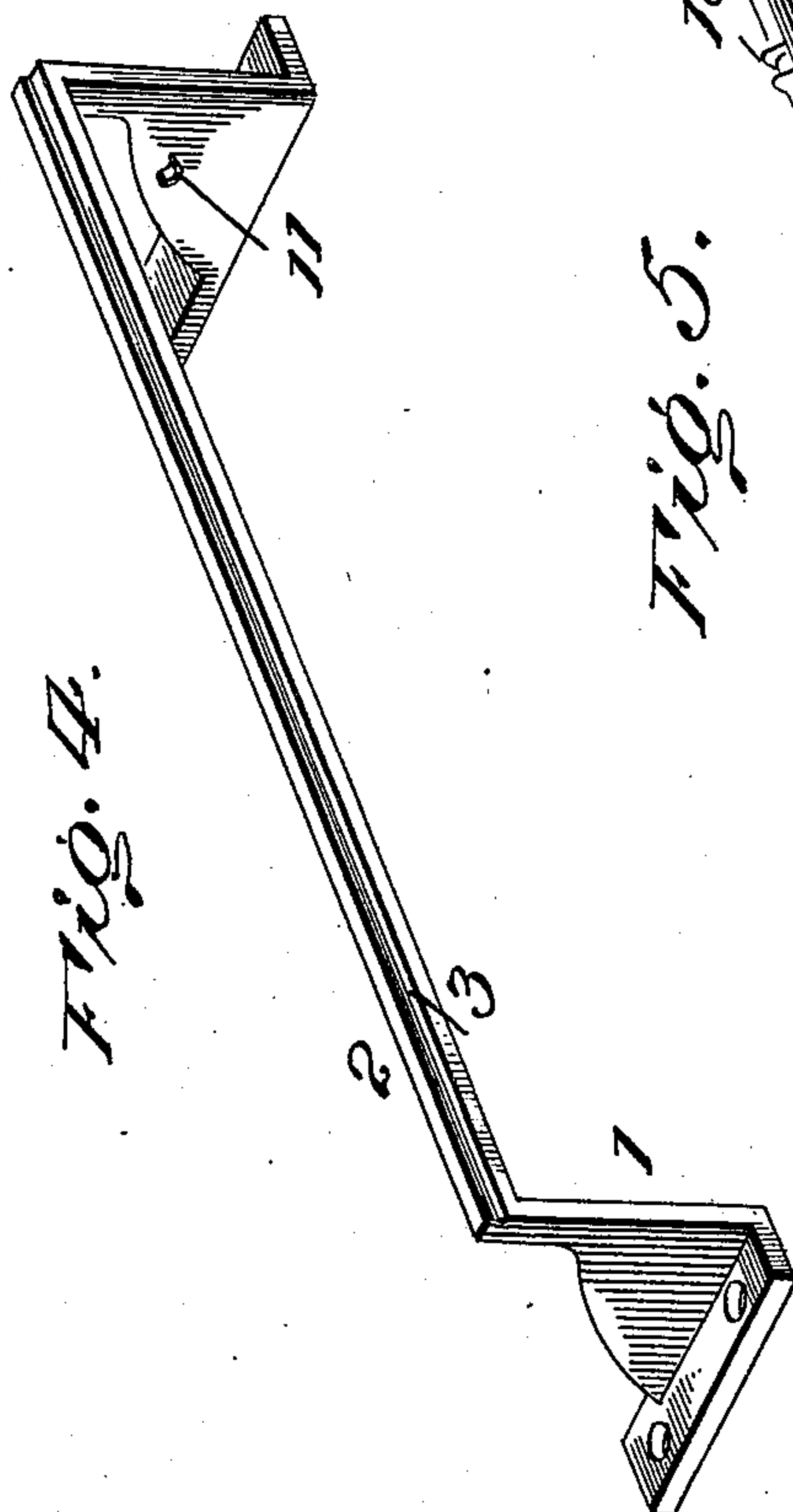
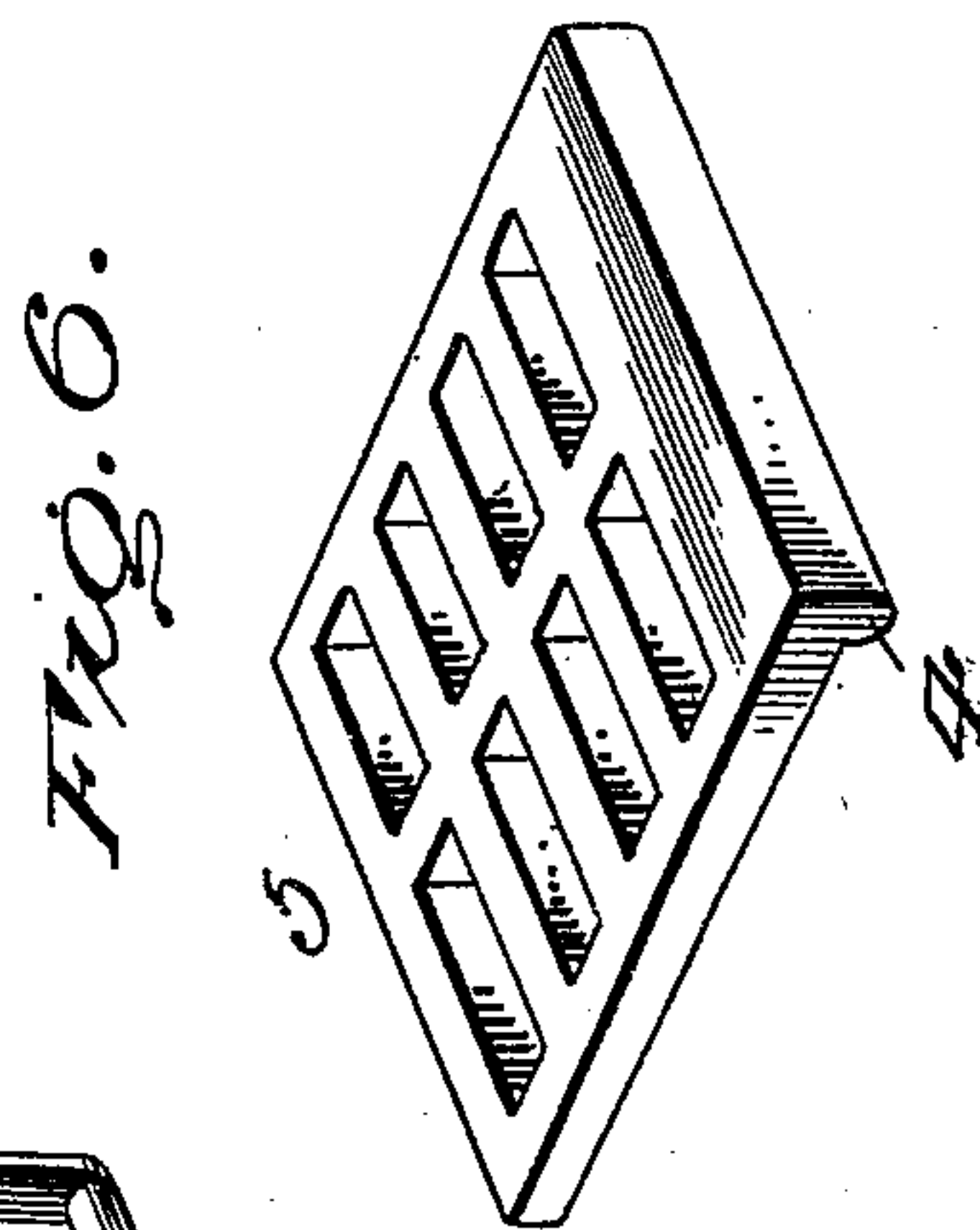
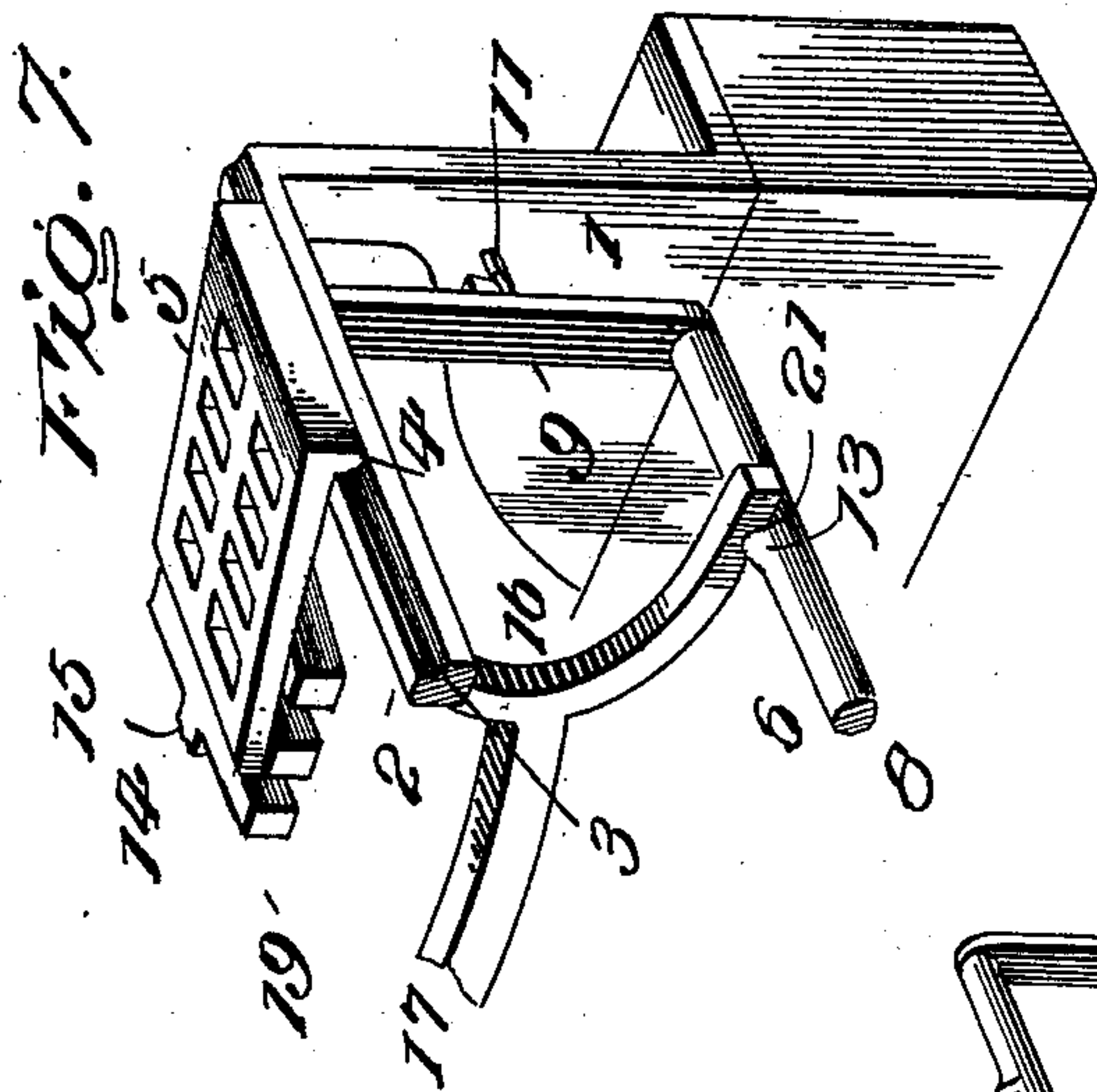
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Witnesses

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# UNITED STATES PATENT OFFICE.

JAMES A. NEWTON, OF GASTONIA, NORTH CAROLINA.

## RECIPROCATING GRATE-BAR.

SPECIFICATION forming part of Letters Patent No. 646,584, dated April 3, 1900.

Application filed March 10, 1899. Renewed March 7, 1900. Serial No. 7,749. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES A. NEWTON, a citizen of the United States, residing at Gastonia, in the county of Gaston and State of North Carolina, have invented certain new and useful Improvements in Reciprocating Grate-Bars; 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.

This invention belongs to that class of grates, chiefly designed for steam-boiler furnaces, which are adapted to have a reciprocating motion imparted to the fuel or grate bars, and aims to improve the general construction, to prolong the period of usefulness, and to increase the efficiency of this character of grate.

In perfecting the present invention due regard has been had to economy of manufacture, lightness of structure, strength, durability, ease of placing in position, as no parts are required to be built into brickwork of furnace, maximum amount of draft-space, prevention of choking by ashes and cinders, economy in the consumption of fuel, evenness of heat, provision for contraction and expansion, so as to obviate cracking, breaking, buckling, and the like, avoidance of burning of the grate-bars and rest, and adaptability for general use in all kinds of furnaces and heaters.

While the drawings illustrate an embodiment of the invention, it is to be understood that the grate may be variously applied. In other positions and relations it is to be further understood that such changes in the form, proportion, and minor details of construction may be resorted to as may be found necessary to the particular adaptation of the invention without departing from the spirit or sacrificing any of the advantages thereof.

In the drawings, Figure 1 is a perspective view of a furnace-grate constructed in accordance with the invention. Fig. 2 is a longitudinal section showing the end portions of a grate-bar notched and interlocked with the upper cross-bar of the rocker-frame. Fig. 3 is a view similar to Fig. 2, showing the ends of the arms of a grate-bar notched to make interlocking connection with the lower cross-bar of the rocker-frame. Fig. 4 is a detail view of a rest for a rocker-frame and the sec-

tional apron. Fig. 5 is a detail view in perspective of a rocker-frame. Fig. 6 is a detail view of a section of the apron. Fig. 7 is an enlarged detail view of an end portion of a grate-bar, the apron, and the support for the apron.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

The rest is composed of pillow-blocks 1 and a connecting cross-bar 2, the latter having the upper rear portion depressed, forming a seat 3 to receive the half-round bead 4, pendent from the outer end of the apron 5. This seat 3 is a half-round channel or groove extending from end to end of the cross-bar. The pillow-blocks 1 and cross-bar 2 form a supporting structure, and one of these structures is located at each end of the fire-chamber to support the ends of the grate-bars.

A rocker-frame 6 is located at each end of the fire-chamber and is of oblong and rectangular form and consists of an upper cross-bar 7, lower cross-bar 8, and end bars 9, having centrally-disposed offstanding gudgeons 10 of V-form and obtaining bearings in flanges 11, projecting from the inner faces of the pillow-blocks 1. Stays 12 connect the bars 7 and 8 at intermediate points and brace and strengthen them. Pairs of lugs 13 extend upwardly from the bars 7 and 8 and receive between them the ends of the grate-bars and their arms. The rocker-frames 6 normally occupy a vertical position—i. e., with their bars or elements 7 and 8 in vertical relation, whereby they are best adapted to support the grate-bars.

The grate-bars 14 are similarly formed and consist of a central bar 15, downwardly and outwardly curved arms 16, a truss-brace 17, attached at its ends to the arms 16, and a centrally-disposed curved strut 18, the parts being integrally cast. Studs 19 project from opposite sides of the central bar 15 and support the fuel and are spaced apart a sufficient distance to admit of a plentiful supply of air to the fire for supporting combustion when the furnace is in operation. The grate-bars are subdivided into two series, the bars of one series being disposed alternately with the parts of the other series. One set of bars has the



terminal portions of the parts 15 notched, as shown at 20, to interlock with the upper cross-bar 7 of the rocker-frames, and the bars of the other set have the end portions of the arms 5 16 notched, as shown at 21, to make interlocking engagement with the lower cross-bars 8 of the said rocker-frames. When the grate-bars occupy a normal position—that is, with the rocker-frames in a vertical position—both 10 the bars 15 and the arms 16 obtain bearings upon the bars 7 and 8. When it is remembered that the bars 7 and 8 are disposed above and below the axial line of oscillation of the rocker-frames and that the grate-bars are 15 provided in two series or sets interlocking in alternation with the upper and lower cross-bars 7 and 8, it will be readily understood that the two sets of grate-bars reciprocate simultaneously in opposite directions, which is 20 of material advantage in dislodging cinders and ashes and keeping the grate perfectly free from such accumulations, so that the air can have a free passage through the fuel and fire. The disposition of the parts 16, 17, and 25 18 results in the provision of a rigid and light structure and enables a minimum amount of metal being used in the construction of the grate-bars.

The terminals of the grate-bars constitute 30 upper arms which correspond to the lower arms 16 and nearly rest upon the upper elements of the rocker-frames. The upper arms of the alternate grate-bars interlock with the upper elements or portions of the rocker-frames, whereas the lower arms of the intermediate grate-bars interlock with the lower 35 portions of said rocker-frames. As the rocker-frames oscillate the grate-bars receive a combined vertical and longitudinal movement 40 which will thoroughly and effectively loosen the coals, dislodge the ashes and cinders, and break up the clinkers. When the grate is at rest, the rocker-frames will assume a vertical position, and the terminal portions of the 45 grate-bars will have four points of contact and rest upon the rocker-frames, two at each end, one above and the other below the axes of said frames, which results in prolonging the life of the grate, since the points of support of the grate-bars are separated and the 50 lower supports are removed from the influence of the fire and are not liable to be burned or warped.

The grate-bars are disposed longitudinally 55 of the fire-chamber in parallel relation, and the spaces formed between their ends and the front and the back walls are closed by aprons 5, which are supported at their inner ends upon the terminal portions of the grate-bars 60 and at their outer ends upon the cross-bars 2 of the supporting structures. The aprons 5 may be formed of a single piece or subdivided into sections, the latter having any required width, which in the preferable construction 65 corresponds with the width of the grate-bars, so that a section may be provided for each of the grate-bars. When shaking the grate, the

bars receive a compound movement and the inner ends of the aprons or sections thereof move up and down in conformity with the 70 vertical movements of the grate-bars, which latter support their inner ends. The rounded portions 4 of the aprons obtain a bearing in the curved seats 3, move in said seats, and permit the inner ends of the aprons to rise 75 and fall without offering any obstruction to the free movement or play thereof. The aprons have an open construction, so as to admit of the passage of the air therethrough and provide escapes for ashes, cinders, and 80 the like.

Any suitable means may be employed for imparting an oscillatory or rocking movement to the parts 6, and, as shown, an arm 22 is 85 formed with or applied to the lower cross-bar 8 of the front rocker-frame, and a link 23 connects it with a lever 24, fulcrumed to the front of the furnace and extending within convenient reach for operation when it is required to shake the grate to free it from ashes, clink- 90 ers, and like residue resulting from combustion.

Having thus described the invention, what is claimed as new is—

1. In a furnace-grate of the type described, 95 rocker-frames disposed in vertical and parallel relation and journaled intermediate of their upper and lower horizontal edges, grate-bars, each normally supported at its ends by the rocker-frames at points above and below 100 the axes of the said frames, said grate-bars having positive interlocking connection in alternation with the upper and lower portions of the rocker-frames, and means for imparting an oscillatory movement to one of the 105 rocker-frames.

2. In a furnace-grate of the type described, rocker-frames disposed in vertical and parallel relation and journaled intermediate of 110 their upper and lower horizontal edges, grate-bars having outwardly-extending terminal arms engaging with the rocker-frames above and below their axes, the upper arms of the alternate grate-bars interlocking with the 115 upper portions of the rocker-frames and the lower arms resting upon the lower portions of said rocker-frames, and the lower arms of the intermediate grate-bars interlocking with the lower portions of the rocker-frames and the 120 upper arms resting upon the upper portions of said frames, and means for imparting an oscillatory movement to the rocker-frame.

3. In combination with longitudinal grate-bars, and means for imparting a simultaneous longitudinal and vertical reciprocating 125 movement thereto in alternation, of transverse seats at the ends of the grate-bars, and aprons made in sections corresponding to the grate-bars and each section being supported at its outer end upon a seat and at its inner 130 end upon a grate-bar and movable vertically therewith, the series of apron-sections having simultaneous movement in alternation corresponding with the grate-bars.



4. In combination, rocker-frames of oblong and rectangular form having their horizontal bars connected at intermediate points and formed with pairs of upwardly-extending lugs in vertical alinement, said frames being vertically disposed in parallel relation and journaled midway of their upper and lower edges, and grate-bars having terminal spaced arms normally engaging with the upper and lower bars of the frames and interlocking therewith in alternation, said arms being confined between the respective lugs of the pairs, substantially as described.

5. A furnace grate-bar having spaced terminal upper and lower supporting-arms, a truss-brace connected at its ends with the lower arms about midway of their extremities, and a strut between the middle portion of the truss-brace and the grate-bar, substantially as specified.

6. In combination, pillow-blocks provided with bearings, cross-bars connecting the pillow-blocks and formed upon their top sides with curved seats, rocker-frames having centrally-disposed end gudgeons journaled in the bearings of the pillow-blocks and com-

prising upper and lower cross-bars formed at intervals in their length with upwardly-extending pairs of lugs, grate-bars having outwardly-extending terminal arms and normally supported by direct engagement with the upper and the lower, cross-bars of the rocker-frames, the intermediate grate-bars having their end portions notched to receive the upper cross-bars of the rocker-frames, and the alternate grate-bars having their arms notched to interlock with the lower cross-bars of the rocker-frames, sectional aprons having their inner ends resting upon the terminal portions of the grate-bars and having their outer ends formed with pendent ribs which obtain bearings in and interlock with the seats of the aforementioned cross-bars, and means for imparting an oscillatory movement to the rocker-frames, substantially as set forth.

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

JAMES A. NEWTON. [L. S.)

Witnesses:

F. W. BRAWLEY,  
T. A. HENRY.