

No. 706,546.

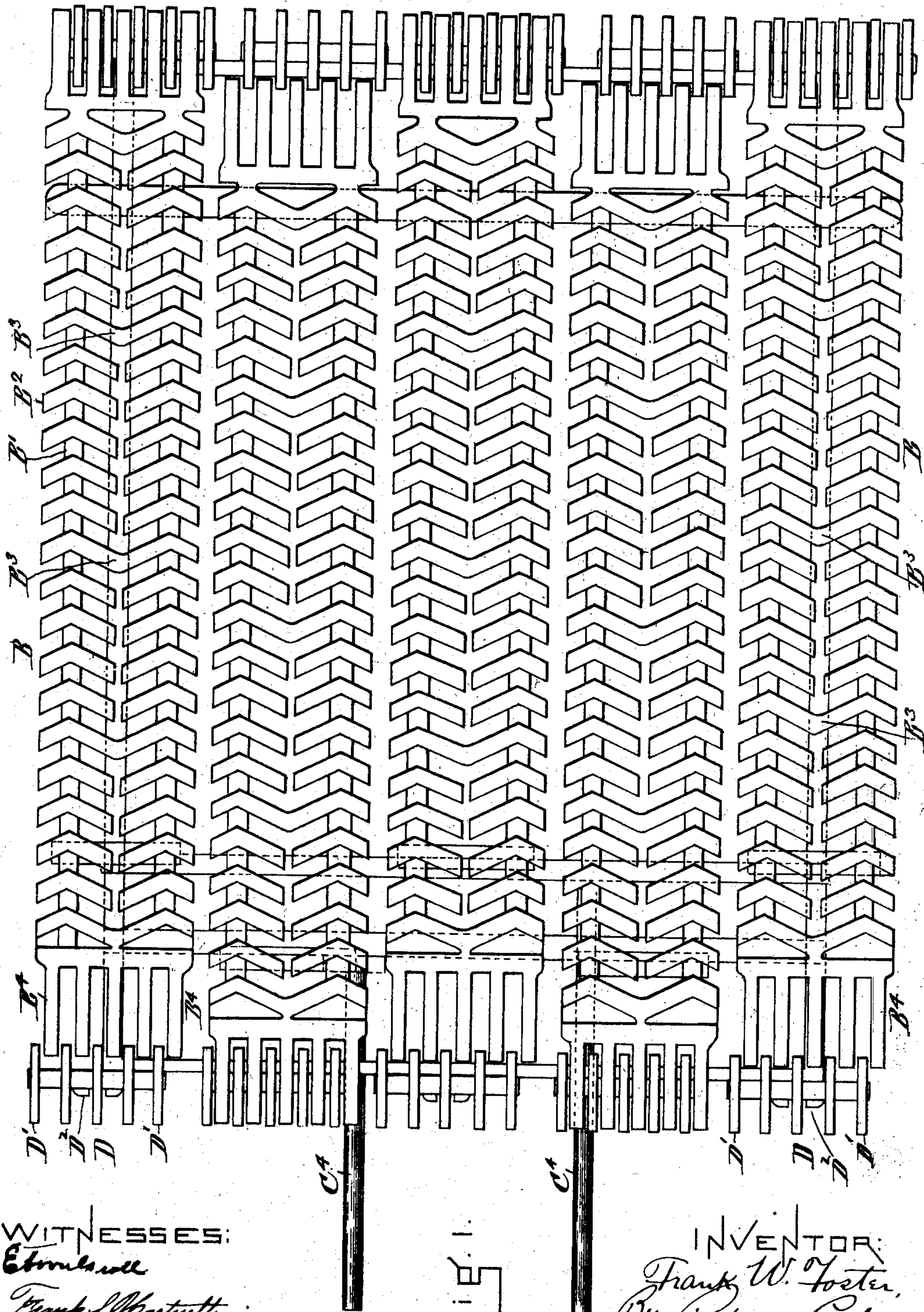
Patented Aug. 12, 1902.

F. W. FOSTER.
SQUARE SHAKING GRATE.

(Application filed Dec. 2, 1901.)

(No Model.)

5 Sheets—Sheet 1.



WITNESSES:

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FIG. 1.

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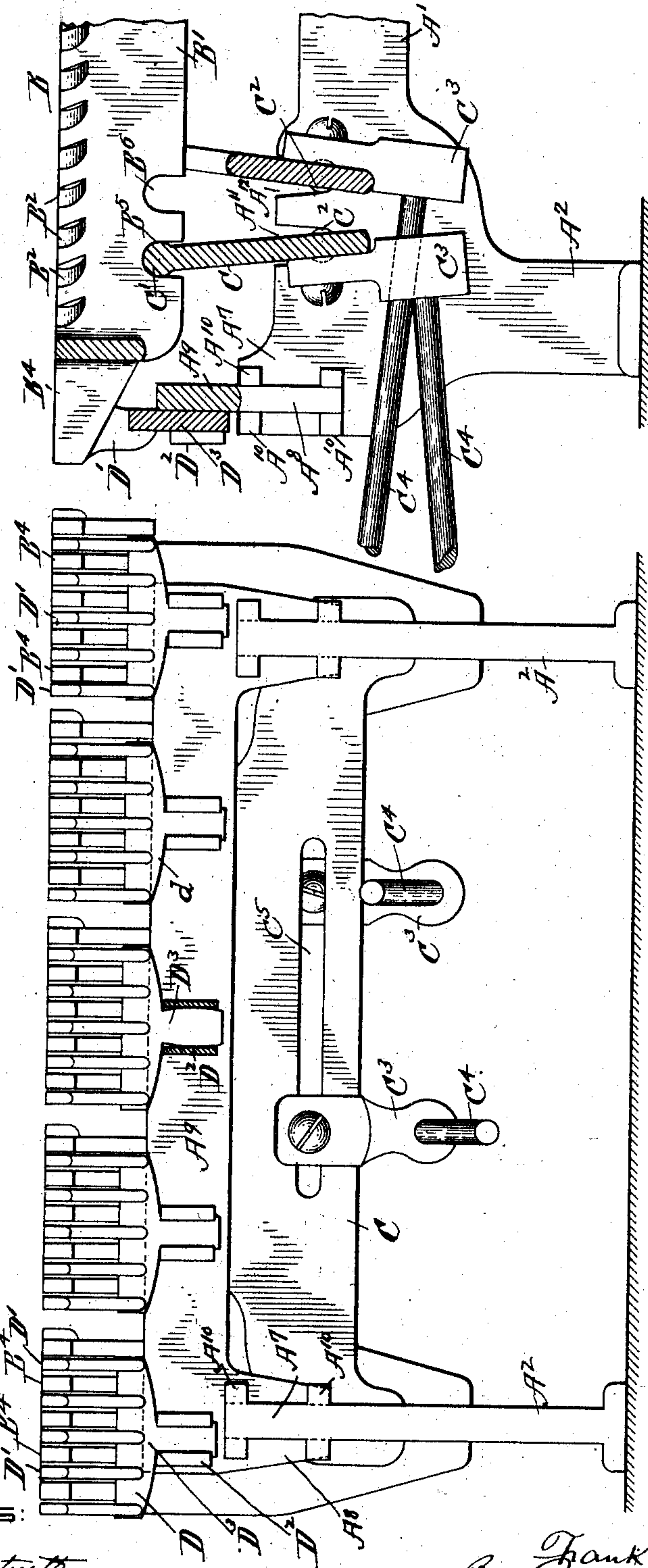
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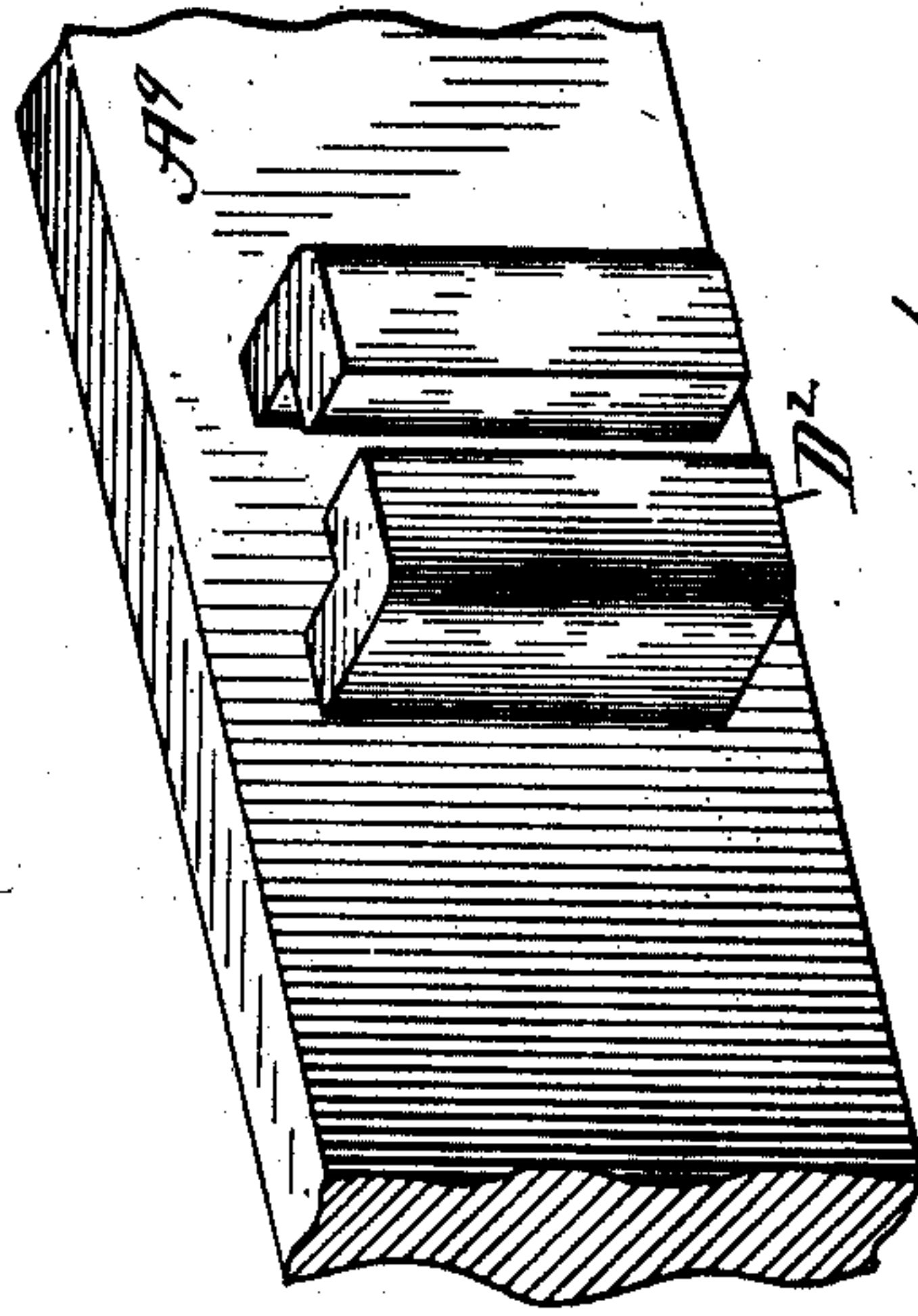
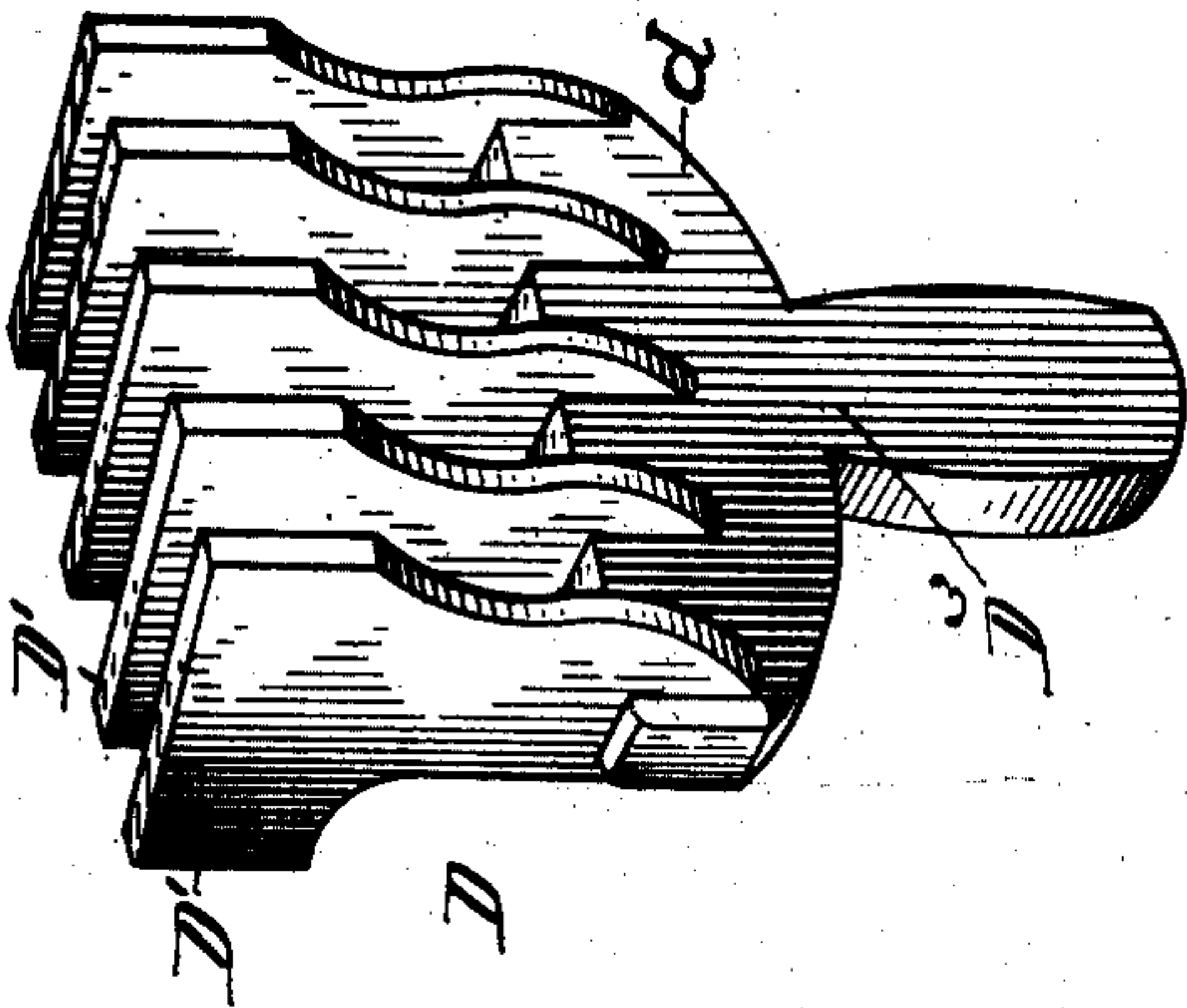


Fig. 4.

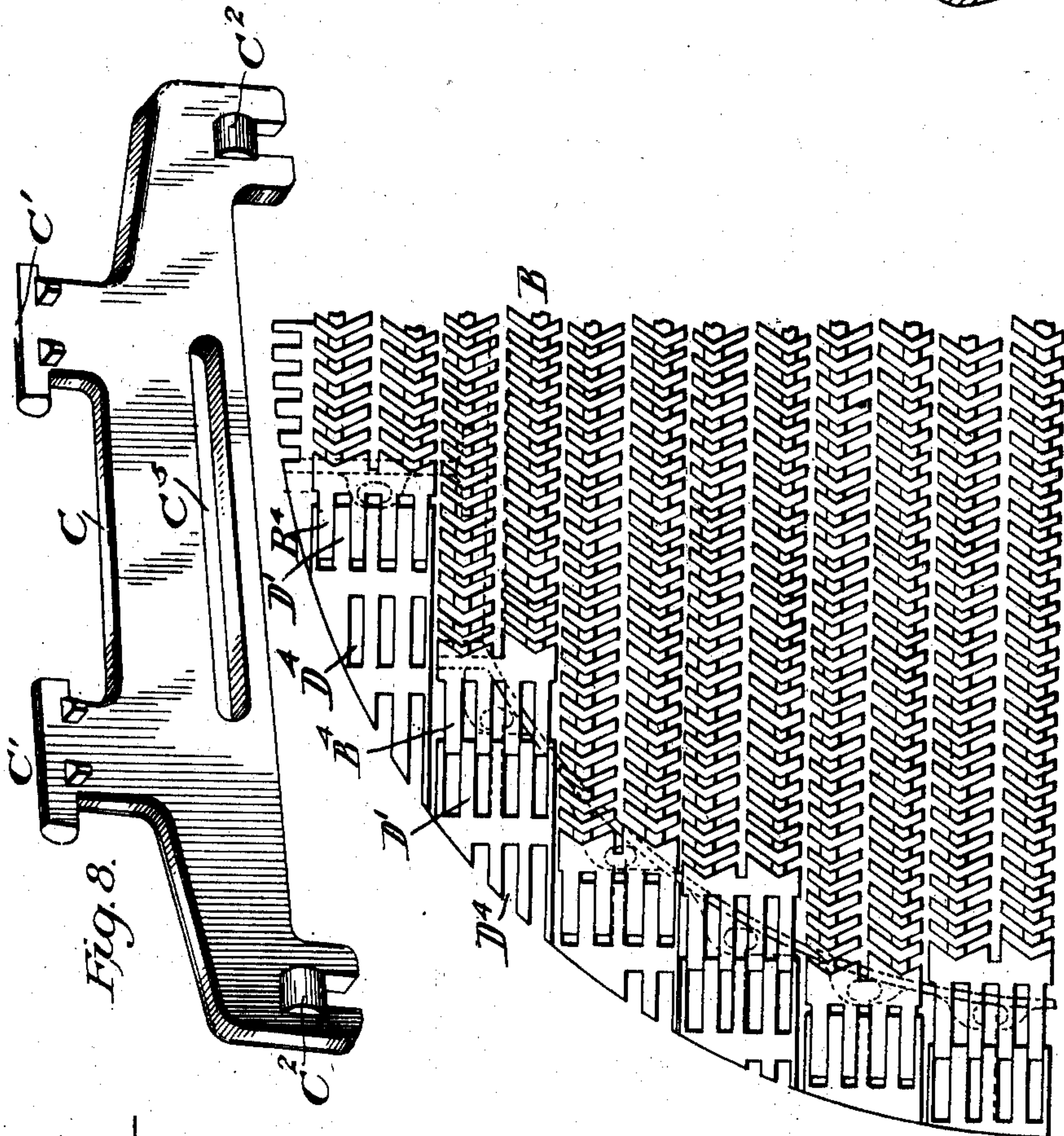


Fig. 7.

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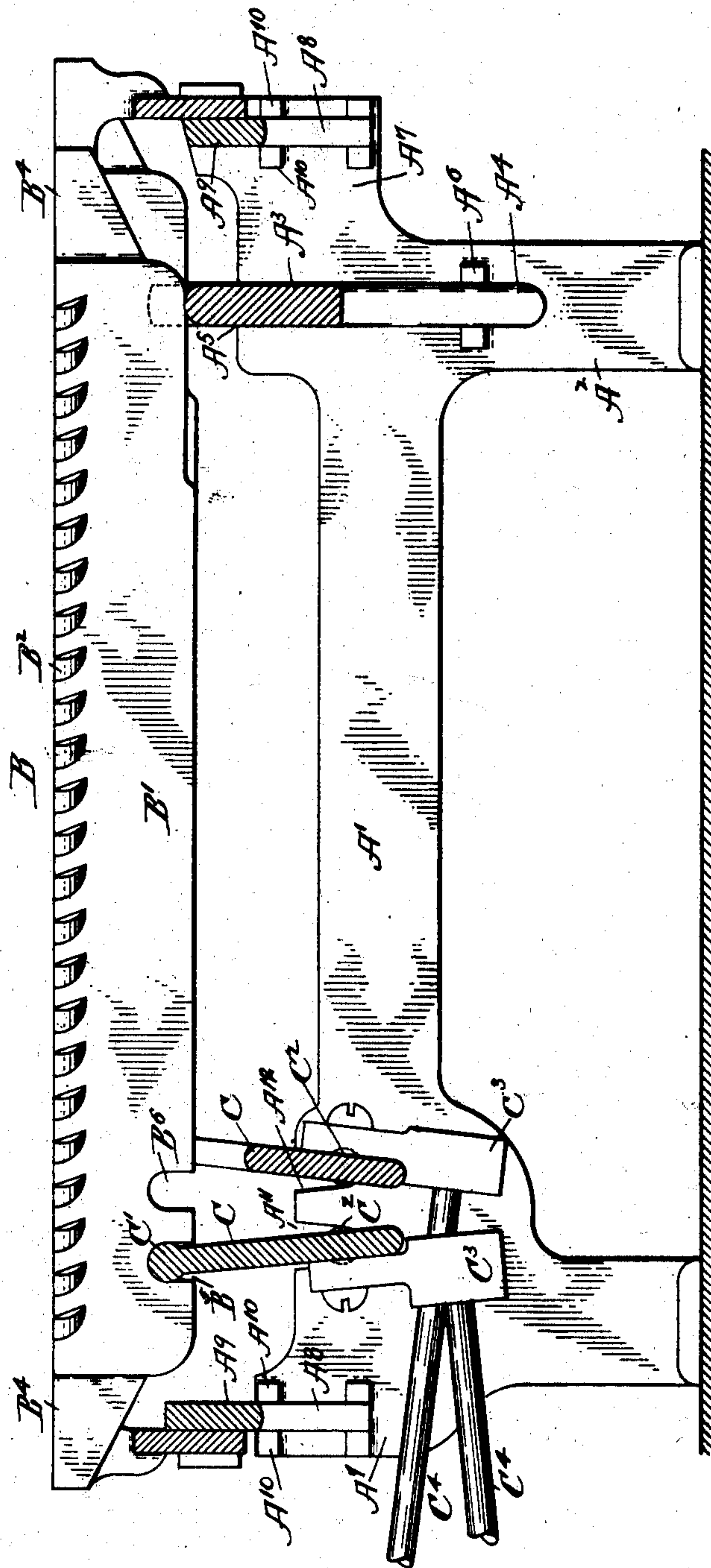
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UNITED STATES PATENT OFFICE.

FRANK W. FOSTER, OF MELROSE, MASSACHUSETTS.

SQUARE SHAKING-GRATE.

SPECIFICATION forming part of Letters Patent No. 706,546, dated August 12, 1902.

Application filed December 2, 1901. Serial No. 84,358. (No model.)

To all whom it may concern:

Be it known that I, FRANK W. FOSTER, a citizen of the United States, and a resident of Melrose, in the county of Middlesex and State of Massachusetts, have invented new and useful Improvements in Square Shaking-Grates, of which the following is a specification.

My invention consists in improvements in shaking-grates for boilers and furnaces, whereby the grate is constructed in such manner as to make all its parts readily interchangeable and susceptible of quick renewal or repair, while preserving every advantage necessary to strength and solidity of construction. By my improvements all the effective grate-surface is conserved and stationary surfaces are furnished which prevent gaps from being formed in the fire-supporting surface during the agitation of the movable grate-bars.

In the drawings which illustrate an embodiment of my invention, Figure 1 is a top plan view of a square shaking-grate. Fig. 2 is an end view of the grate shown in Fig. 1 viewed from the left. Fig. 3 is a partial vertical longitudinal section showing the disposition of the rocker-bars, grate-bars, and end extension-pieces in their relationship to the frame of the grate. Fig. 4 is a detail in perspective showing one of the end extension-pieces and the means for securing the same in place on the grate. Fig. 5 is a vertical cross-section of the grate, showing the rear portion thereof. This section is viewed from the left of Fig. 1 and is taken at the left of the legs A^2 , which are at the right-hand end of Fig. 6. Fig. 6 is a full vertical longitudinal section, and Fig. 7 illustrates the application of some of my improvements to a round grate. Fig. 8 shows one of the rocker-bars of Fig. 6 detached and in perspective.

The frame of my improved grate is put together without bolts or rigid fastenings, the several component portions of the grate-frame being constructed so that they slide into interlocking relationship with each other and so that the grate may be dismantled and taken down at a moment's notice and without the aid of even the simplest tools. The grate rests upon side frames A' , whereof one is shown in side elevation in Fig. 6. Each

of these side frames has legs A^2 , preferably cast as an integral part of the frames. The cross-beam A^3 , which supports the rocking and sliding grate-bars B at their rear ends, has at its two ends the downwardly-projecting tongues A^4 , between which lie the slots A^5 at each end of the beam A^3 . These slots, Fig. 5, are of sufficient width to admit the side frames A' . Thus the beam A^3 can be slipped over the frames A' , the tongues A^4 embracing the frames. In order to prevent the beam A' from rocking or slipping, I provide lugs A^6 on each side of the frames A' or on the legs A^2 , Figs. 5 and 6, which lugs are spaced apart sufficiently to admit and confine the tongues A^4 . At the front and rear ends of the side frames A' brackets A^7 are provided, upon which lugs A^{10} , similar to the lugs A^6 , are secured or cast integrally, the lugs A^{10} furnishing the interlocking means whereby the end beams A^9 are secured to the side frames A' . The end beams A^9 are provided with tongues A^8 , which slip over the brackets A^7 and between the lugs A^{10} . It will be seen from this description that the frame of my improved grate can be at once assembled without the aid of tools merely by setting up the side frames A' and slipping the cross-beam A^3 and end beams A^9 into the places provided for them, when the entire rectangular frame will be properly and rigidly secured together. Redistribution of these parts is accomplished as readily as their assemblage.

In the side frames A' are located the tapering notches A^{11} A^{12} , which are preferably round at the bottom. These notches serve as rocker-bearings for the rocker-bars C . The rocker-bars C are notched or slotted at their ends, so as to slip over the side frames A' , and just above the said notches filler-lugs C^2 are formed upon the sides of the rocker-bars and are of such proportion as just to fill the notches A^{11} A^{12} at the bottom thereof, these notches A^{11} A^{12} being wider than the main body of the rocker-bar is thick. (See Figs. 3, 6, and 8.) The filler-lugs C^2 thus engage with the notches A^{11} A^{12} in such manner as to constitute a pivot-bearing on the frames A' for the rocker-bars, and the notches A^{11} A^{12} being wider than the rocker-bars are thick permit a rocking movement of these bars upon

their pivots, which rocking is, however, limited by the size of the top openings of the notches A¹¹ A¹². Each of the rocker-bars C carries the upwardly-extending rocker-heads C'. The grate is provided with a plurality of rocker-bars, such as C, whereon the rocker-heads C' are so placed that the rocker-heads in one bar stand opposite the gaps between the rocker-heads of the other rocker-bar. Each rocker-bar is slotted at C⁵, (see Fig. 2,) so as to permit the securement of the shaker attachments C³, to which are joined the shaking-handles C⁴.

The fire-supporting surface in my improved grate consists of a plurality of longitudinally-removable grate-bars B. These grate-bars rest at their front ends upon the rocker-heads C' of the rocker-bars, the longitudinal webs B' of the grate-bars being notched at B⁵ and B⁶ to receive the said rocker-heads and are supported at their rear ends upon the cross-beam A³, which is provided with suitable bearings A¹³, Fig. 5, which, receiving the lower edges of the webs B', retain the grate-bars in alinement and guide them in their movements. The longitudinal webs B' give the grate-bar the requisite stiffness and sustain the fire-supporting surface, which consists of the branches B², which extend laterally on either side of each web B' and are set at an acute angle to the said webs. As the grate-bars extend back from the front to rear of the grate, the action of a slice-bar or hoe in the hands of a fireman will be back and forth along the length of the grate-bars. By placing the branches B² at an angle to the webs B', I prevent the slice-bar from slipping between the branches, as it would if they stood at right angles to the webs. By this means and for this reason breakage of the branches B² is avoided. At intervals along the length of each grate-bar the opposite branches are integrally joined, as at B³, so that the two portions of each grate-bar are securely tied at intervals along its length. The grate-bars B are provided with longitudinally-extending fingers B⁴ at each end, and these fingers cooperate with the extension-pieces D. These end extension-pieces D are secured to the stationary end beams A⁹ on the frame by means of the sockets D², which receive the stems D³ of the extension-pieces. The extension-pieces are provided, further, with flat-topped fingers D', which are symmetrically disposed with relation to the stem D³. The fingers D' are wholly separated at their upper ends and are integral with the cross-head d', from which depends the stem D³. The sectional construction of the end extension-pieces avoids the dangers due to warping, which is likely to occur in a larger casting. The symmetrical arrangement of the fingers D' also provides a safeguard against warping of the individual sections. The tops of the fingers D' when the end extension-pieces D are in place extend to sub-

stantially the same level as the tops of the grate-bars B, and the fingers D' and the end fingers B⁴ of the grate-bars dovetail or mesh together as the grate-bars are agitated. As shown in Fig. 1, the movement of the grate-bar away from one of the end extension-pieces D causes no gap to be formed in the fire-supporting surface, the overlapping length of the fingers B⁴ and D' being a trifle greater than the length of movement of the grate-bars. The grate-bars B are arranged in alternation, so that the agitation of any one rocker-bar causes alternate grate-bars to be vibrated. The construction, however, of the grate-bars with relation to the rocker-bars is such that any one of the grate-bars may change position with another and be equally well adapted to its new position. Each grate-bar B is provided with as many rocker-head-engaging notches as there are rocker-bars. Thus, as in the illustration herein shown with reference to the rocker-bars C, each grate-bar B is provided with notches B⁵ and B⁶, so that the grate-bars which are supported by one of the rocker-bars are interchangeable with those of the other rocker-bars, in one case the notch B⁵ engaging with the rocker-head while the notch B⁶ is idle and in the other case the notch B⁶ doing duty instead of the notch B⁵.

All of the parts of this grate are assembled without the aid of bolts or similar fastenings, the sliding and fitting joints forming a perfectly secure and rigid mode of erecting the structure.

The arrangement of sectional end extension-pieces and grate-bars provided with projecting end fingers can be applied to a round grate as well as to a square grate, and I have illustrated such application in Fig. 7, where the end fingers B⁴ of the grate-bars interlock with the fingers D' of the end extension-pieces. In this case the end extension-pieces are necessarily segmental in shape to suit the circular form of the grate and are provided with apertures D⁴, which provide air-spaces in those portions of the end extension-pieces which fill out the grate-surface to its circumference.

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

1. In a rocking grate, the combination of notched side frames, a notched rocker-bar, the side frames and rocker-bar mutually embraced by the notches in the rocker-bar and side frames, respectively, the side-frame notches being wider than the rocker-bar is thick, to give play to the rocker-bar to rock in the side-frame notches, the sides of said notches serving as stops to the rocker-bar motion.

2. In a rocking grate, the combination of notched side frames, a rocker-bar, notched to embrace the side frames, the rocker-bar embraced by the side-frame notches, said notches being wider than the rocker-bar is thick, to give play to the rocker-bar, the rocker-bar

held from lateral movement by the side frames in the rocker-bar notches, substantially as described.

3. In a rocking grate, the combination of 5
notched side frames, a rocker-bar, the rocker-bar embraced by the side-frame notches, which are wider than the rocker-bar is thick, to give play to the rocker-bar, the rocker-bar provided with filler-lugs which occupy sub-
stantially the entire width of the said notches 10
at the bottom thereof.

4. In a rocking grate, the combination of 15
notched side frames, a notched rocker-bar, the side frames and rocker-bar mutually embraced, each by the notches of the other, the side-frame notches being wider than the rocker-bar is thick, to give the rocker-bar play to work, the rocker-bar provided with filler-lugs which occupy substantially the en-
tire width of the side-frame notches at the 20
bottom thereof.

5. In a rocking grate, the combination of a plurality of parallel grate-bars, mounted to reciprocate longitudinally, means for longi-
tudinally agitating the grate-bars, end fin- 25

gers on the grate-bars, stationary sectional extension-pieces each consisting of a cross-head from which project upwardly fingers which dovetail with the end fingers of the grate-bars, and provided with a depending 30
stem, and a support for the said sectional extension-bars provided with sockets for the said stems.

6. In a grate, the combination of side frames, front and rear end beams, both ver- 35
tically slotted to slide over the side frames, grate-bars, rocker-bars, and a stationary cross-beam whereon the grate-bars rest and slide, said cross-beam provided with vertical slots to embrace the side frames, and lugs on 40
the side frame to confine the front and rear end beams and cross-beam when in position on the side frames, substantially as described.

Signed by me at Boston, Massachusetts,
this 25th day of November, 1901.

FRANK W. FOSTER.

Witnesses:

ROBERT CUSHMAN,
FRANK S. HARTNETT.