

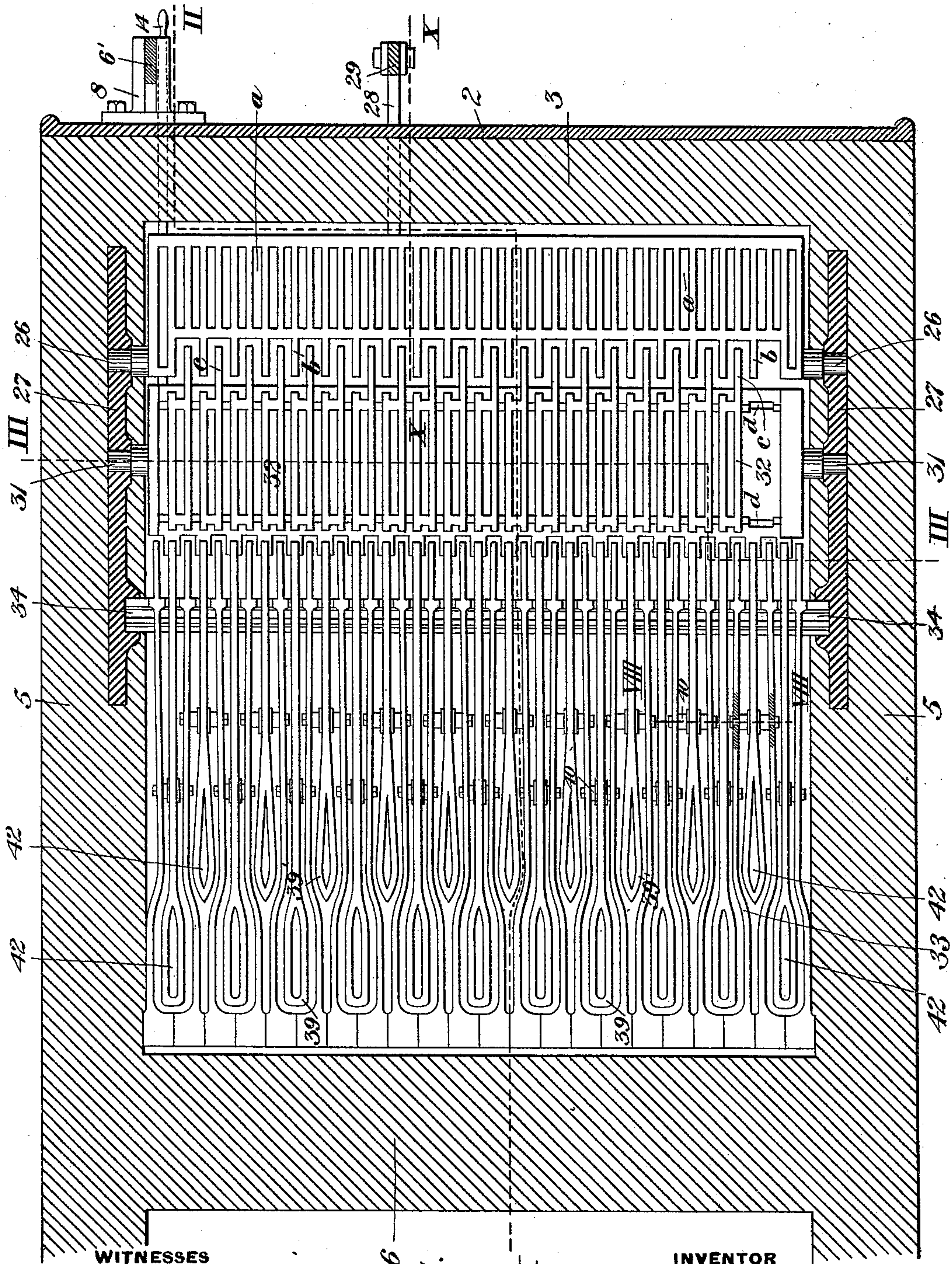
(No Model.)

3 Sheets—Sheet 1.

A. BRYCE.
GRATE.

No. 529,242.

Patented Nov. 13, 1894.



WITNESSES

Wm A Way
O M Clarke

INVENTOR

Andrew Bryce,
by his Attorney,
Wm L Pierce.

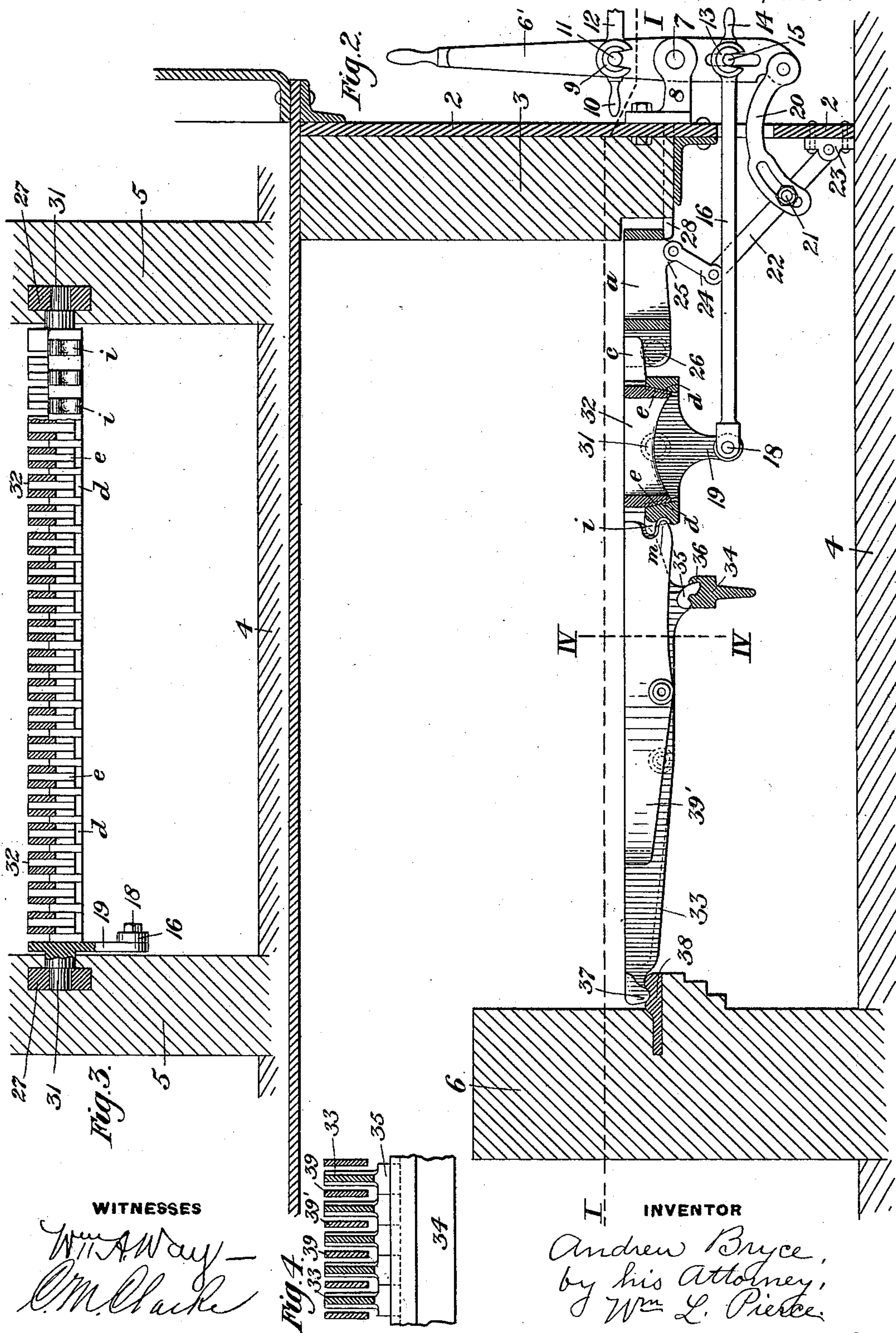
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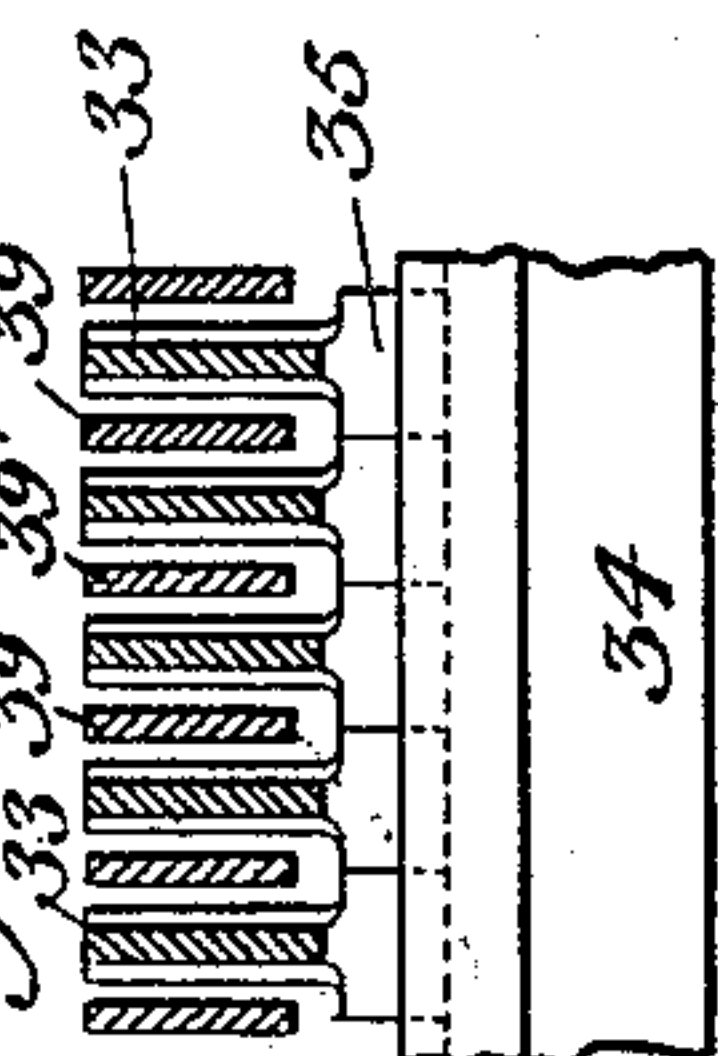
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Fig. 1.



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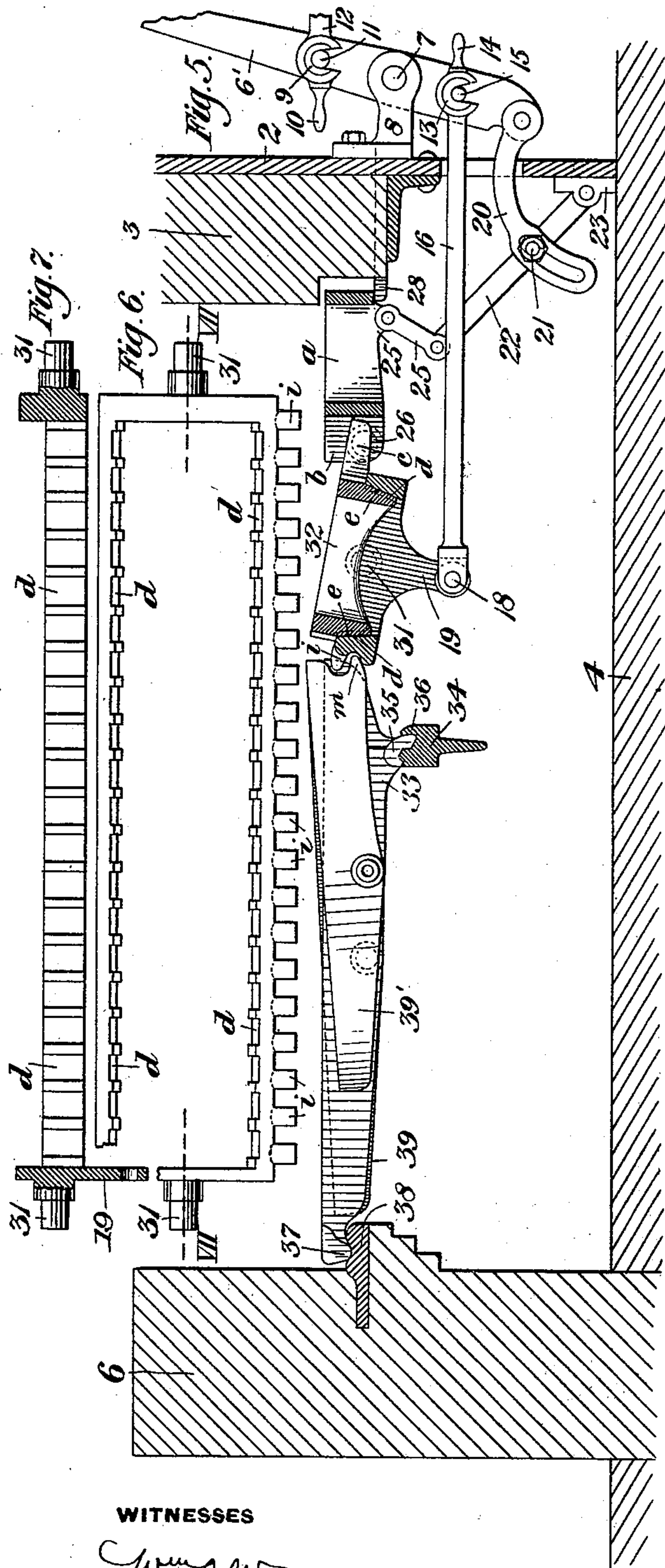
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UNITED STATES PATENT OFFICE.

ANDREW BRYCE, OF ALLEGHENY, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE BRYCE UNIVERSAL FUEL FIRING APPARATUS COMPANY, OF PITTSBURG, PENNSYLVANIA.

GRATE.

SPECIFICATION forming part of Letters Patent No. 529,242, dated November 13, 1894.

Application filed January 28, 1893. Serial No. 459,778. (No model.)

To all whom it may concern:

Be it known that I, ANDREW BRYCE, a citizen of the United States, residing at Allegheny, in the county of Allegheny and State of Pennsylvania, have invented or discovered new and useful Improvements in Grates, of which the following is a specification.

In the accompanying drawings which make part of this specification, Figure 1, is a horizontal section through the furnace walls on line I—I of Fig. 2, showing grate in plan with one grate bar removed from middle section. Fig. 2, is a vertical section on line II—II of Fig. 1 showing the grate bars lying flat; Fig. 3, a like section on line III—III of Fig. 1; Fig. 4, a vertical section on line IV—IV of Fig. 2; Fig. 5, a longitudinal vertical section and partly in elevation on line II—II of Fig. 1, showing grate bars of middle and inner section tilted up in the act of shaking. Fig. 6, is a broken plan of frame of middle section. Fig. 7, is a section on line VII—VII of Fig. 6. Fig. 8, is a section of grate bars of inner section on line VIII—VIII of Fig. 1; Fig. 9, a perspective of one of the removable double grate bars of the middle section, and Fig. 10, a section on line X—X of Fig. 1, showing one form of device for supporting front side of clinker grate.

The purposes of my invention generally stated, are a grate which can be effectively shaken, which is simple and strong in its construction, and readily and economically repaired should one of the grate bars be burned out.

The particular features of my invention are explicitly set forth in the annexed claims.

In the accompanying drawings which make part of this specification, 2, is the front plate of the furnace; 3, the refractory lining thereof; 4, the floor; 5, 5, the side walls, and 6, the bridge wall of the fire box.

I have shown my grate used in the furnace of a stationary steam generator, but it is obviously adapted to all the purposes for which a shaking grate is ordinarily applied.

6 is a rock shaft for agitating the shaking grate. It is pivoted at 7 to a lug 8 on the front plate 2 of the furnace.

9 is a hook clutch with handle 10 which

may be dropped over the wrist 11 to move the rock shaft by power when desired. Any suitable power devices may be connected with the broken lever 12. 13 is a like clutch hook with handle 14 dropped over wrist pin 15. This clutch is upon the forward end of connecting rod 16 which is pivotally connected at 18 with the lug 19 cast on the under side of the frame of the middle section grate.

20 is a slotted link at lower end of rock shaft 6, being an idler (except when dumping the clinker grate) on wrist 21 on lever 22 pivoted to a lug 23 on front plate 2, and to a lever 24 connected with lug 25 on frame of clinker grate.

The clinker grate which occupies the front of the fire box is a casting having the usual slotted openings *a—a*, therein and in addition the rearward projecting slice bars *b—b*, alternating with the forward projecting slice bars *c—c* on the middle section of the grate. The clinker grate is pivotally supported at its ends on the rear by the journals 26, 26, resting in the metal bearing plates 27, 27, set in the side walls of the furnace.

The grate is kept from dropping down at the front by any support. One form is shown in Fig. 10, where a supporting arm 28 projects from a rocking hand lever 29 pivoted to lug 30.

The middle section of the grate consists of a frame best seen in Fig. 6. This frame has journals 31, 31, in which it turns in the bearing plates 27, 27. The frame is also provided on the inside of its long sides with seats *d, d*, tapering inwardly to receive the tapering ends *e—e* of removable grate bars 32—32, one of which is shown in Fig. 9. Along the rear outer side of the frame is a row of cogs *i—i*. The removable grate bars 32—32, are preferably double-barred as there shown.

The inner section of the grate is composed of alternating stationary and movable bars, and the latter of two lengths so as to agitate the fuel more uniformly. The outline in plan of these bars is seen in Fig. 1, while the elevations are found in Figs. 2 and 5 and the connections of the stationary and movable bars in Fig. 8. It requires four patterns to cast the bars of this inner section—a right and

a left hand pattern for the stationary bars and a short and a long pattern for the movable bars. The stationary bars, 33—33, are supported near the outer ends by the transverse bar 34, resting on the side plates, 27, 27. A foot 35, cast on the lower side of said stationary bars locks into a shoe 36 on the transverse bar 34, in such a manner that the grate bar can only be removed by lifting the inner end and drawing out the foot, and longitudinal movement is thus prevented. The inner end has a toe, 37, cast thereon which rests on a plate 38 set in the bridge wall. The inner ends of both the right and left hand stationary bars are curved outwardly to receive between them the shaking bars. When the short length shaking bar is used this curve occurs nearer the outer ends of the stationary bars. The long shaking bars 39 and the short shaking bars 39' are both provided with a projecting spur *m* to engage with the cog *i*, on the middle section.

As shown in Fig. 8, the movable bars have a distance piece 40 cast thereon to separate them from the stationary bars.

As shown in Fig. 4, the lower edges of the stationary bars extend down below the movable bars when level and are curved inwardly to form a guide for the movement of the shaking bars.

In Fig. 8, the method of connecting up a set of three bars is shown. Two bolts, 41, 41, pass through the stationary bars and have their threaded ends jammed together in the distance piece 40. Where the bolts pass through the stationary bars their shanks are not threaded, so the motion of the moving bars is not communicated to the stationary bars. The heads of the bolts also are not jammed down tight upon the stationary bars, and there is play between the stationary bars and the moving bars for the same reason, viz: to prevent communication of movement. The bars clear across the grate are thus connected in sets of three and each set with each other set. The connections are spaced alternately, or staggered, as seen in the plan.

The inner ends of the shaking bars are swelled out and cast with an oval slot, 42, to admit air more freely. This form enables me to make a stronger bar, since by this means I am enabled to get a slot of sufficient size, without increasing the size of the balance of the bar, but only of the head. Again, these enlarged heads more effectually agitate the fire, than would otherwise be possible without making a bar so large that its weight would be prohibitory.

Very little explanation will now explain the operation of the grate. Commencing with the clinker grate, when it is desired to clinker

out the fire, the clinkers are raked toward the front. Instead of removing them by the door which is usually rather high, and therefore inconvenient, I throw off the shaking clutches and throw back the rock shaft until the lower end of the slotted link engages the wrist pin, 21. I then pull out the support 8 at the front of the grate, and holding the rock shaft let the grate dump slowly by gravity. The parts are then returned to their normal position. By putting slice bars on the inner edge of the clinker grate frame, I lessen the amount of dead surface in the grate. To shake the grate either the power clutch is dropped on or the power clutch lifted and the rock shaft moved by hand. Through the medium of the connecting rod 16, the middle section of the grate is rocked, and the cogs, *i*—*i*, on said middle section communicate the motion to the spurs *m*—*m*, on the inner section, thus agitating the pivoted shaking bars of this section. Meantime the slotted link rides idly on wrist pin 21, and the dumping grate is unaffected.

I do not restrict myself to the combination of a clinker grate with a two sectioned shaking grate, as obviously the clinker grate could be omitted, and also each of the sections of the shaking grate could be advantageously used or alone, or each of them duplicated, triplicated, or increased in size.

It will be observed that the parts of the sections of the shaking grate are easily and cheaply replaced if destroyed as they are made separable.

I claim—

1. In a shaking grate the combination of shaking bars with enlarged slotted heads, and stationary bars curved outwardly to receive said heads, substantially as described.

2. In a shaking grate the combination of a shaking bar provided with a distance piece and stationary bars connected thereto by jam bolts threaded where they pass through said distance piece, substantially as described.

3. In a shaking grate the combination of shaking bars with enlarged heads and stationary bars curved outwardly to receive said heads, substantially as described.

4. In a shaking grate the combination of shaking bars of alternate lengths and enlarged heads and stationary bars curved outwardly opposite to said heads, to receive the same, substantially as described.

In testimony whereof I have hereunto set my hand this 21st day of January, A. D. 1893.

ANDREW BRYCE.

Witnesses:

WM. L. PIERCE,
WM. BEAL.