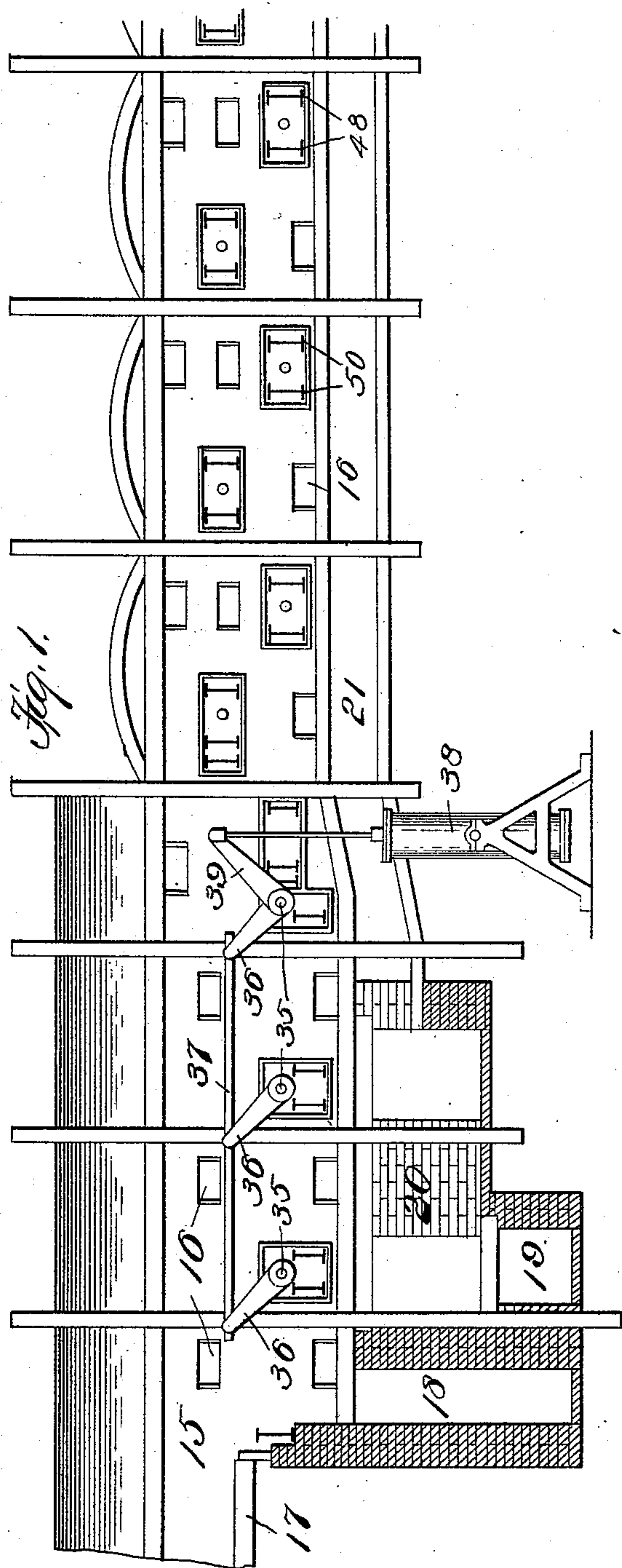
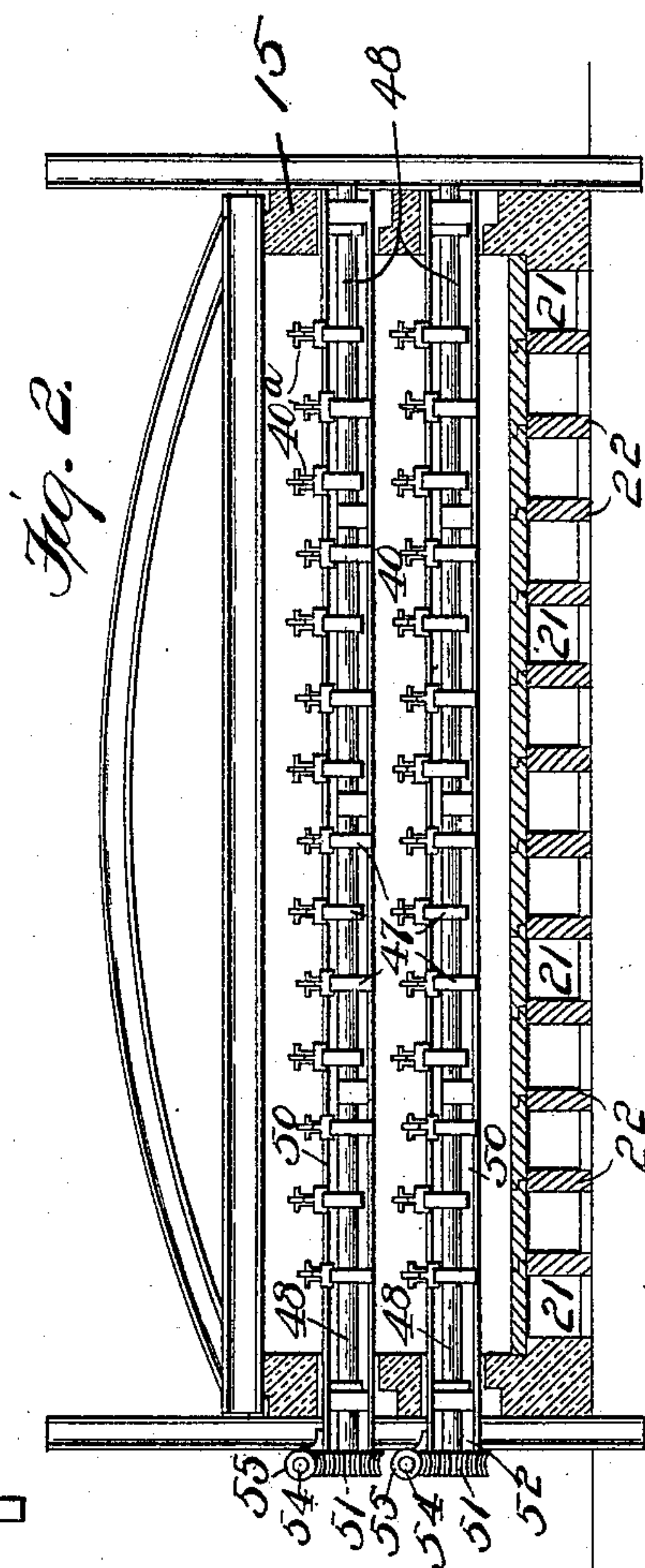


No. 578,378.

Patented Mar. 9, 1897.



Witnesses:
F. R. Cornwall.
Hugh S. Wagner.



Invertor
Edward Watch Jr.
By Paul Bakewell
his atty.

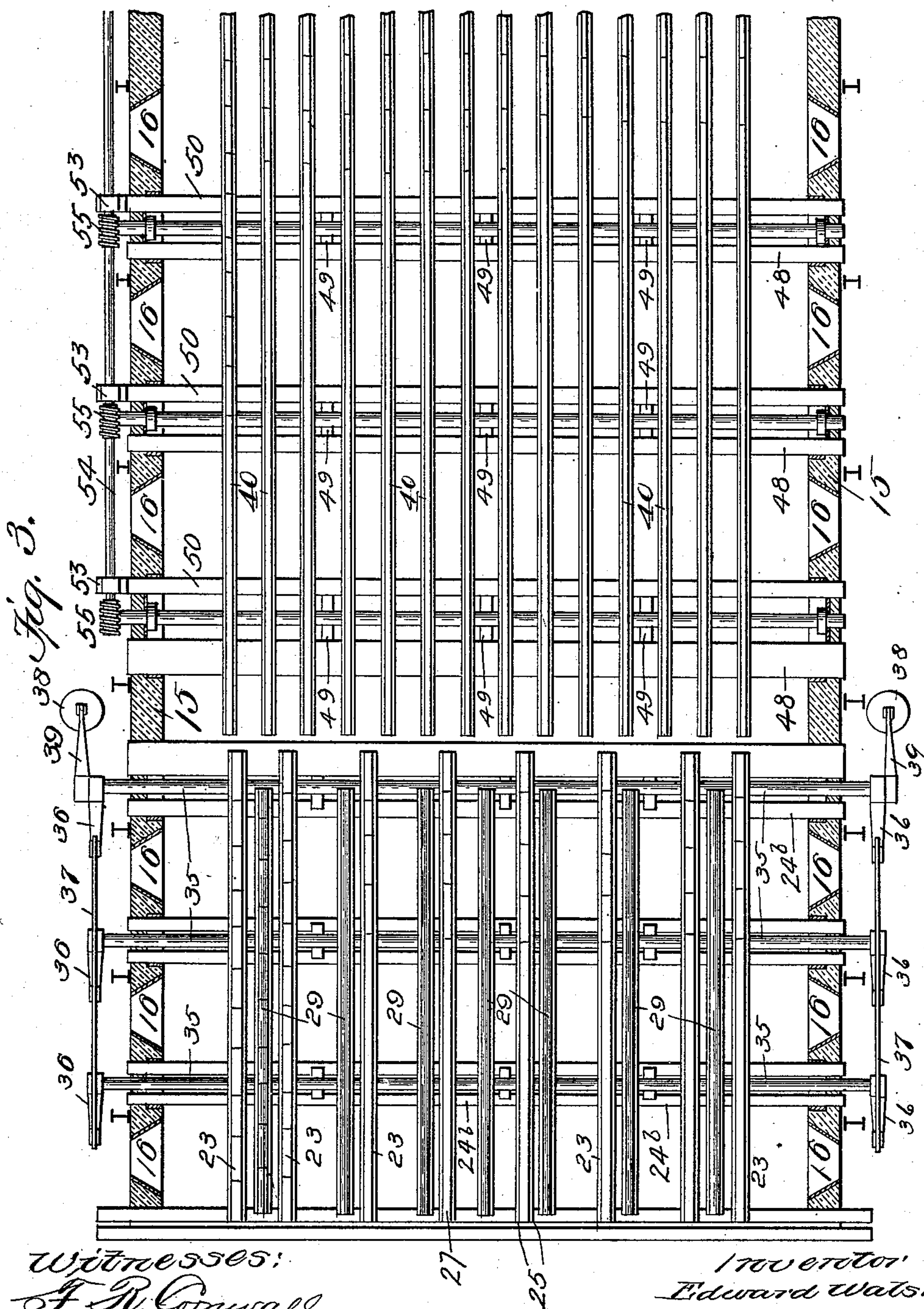
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E. WALSH, Jr.
ANNEALING KILN.

No. 578,378.

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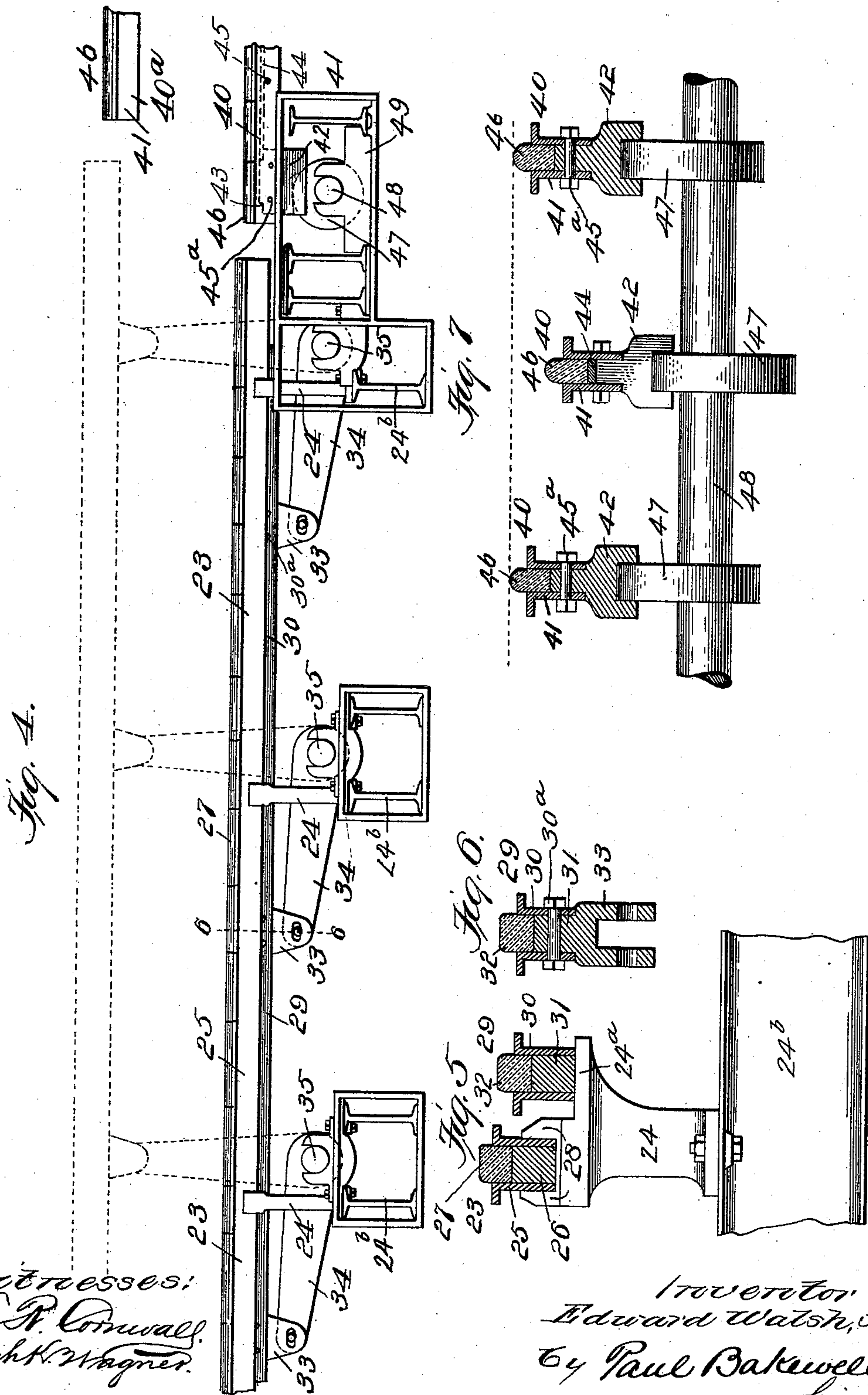
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4 Sheets—Sheet 3.

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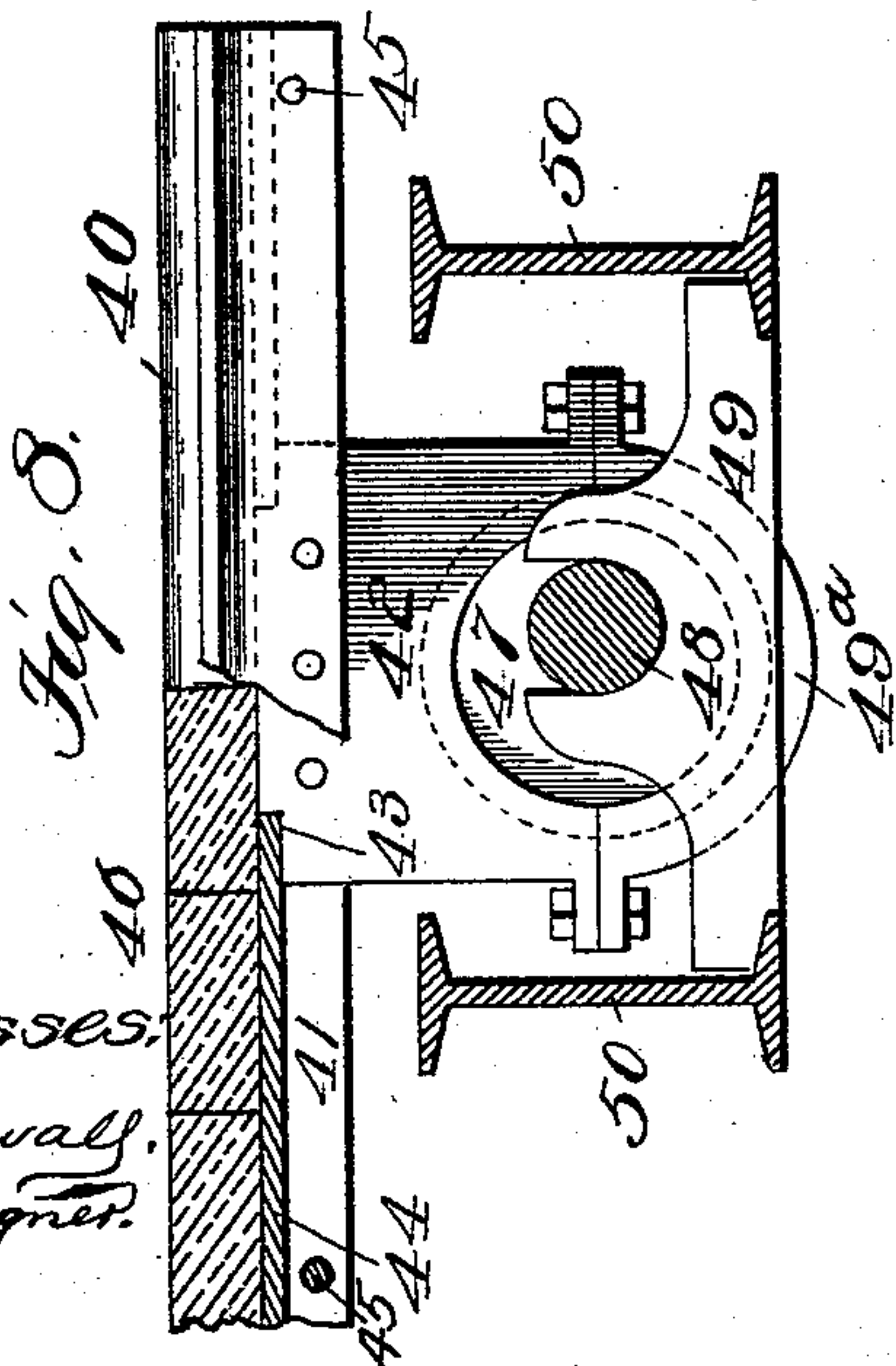
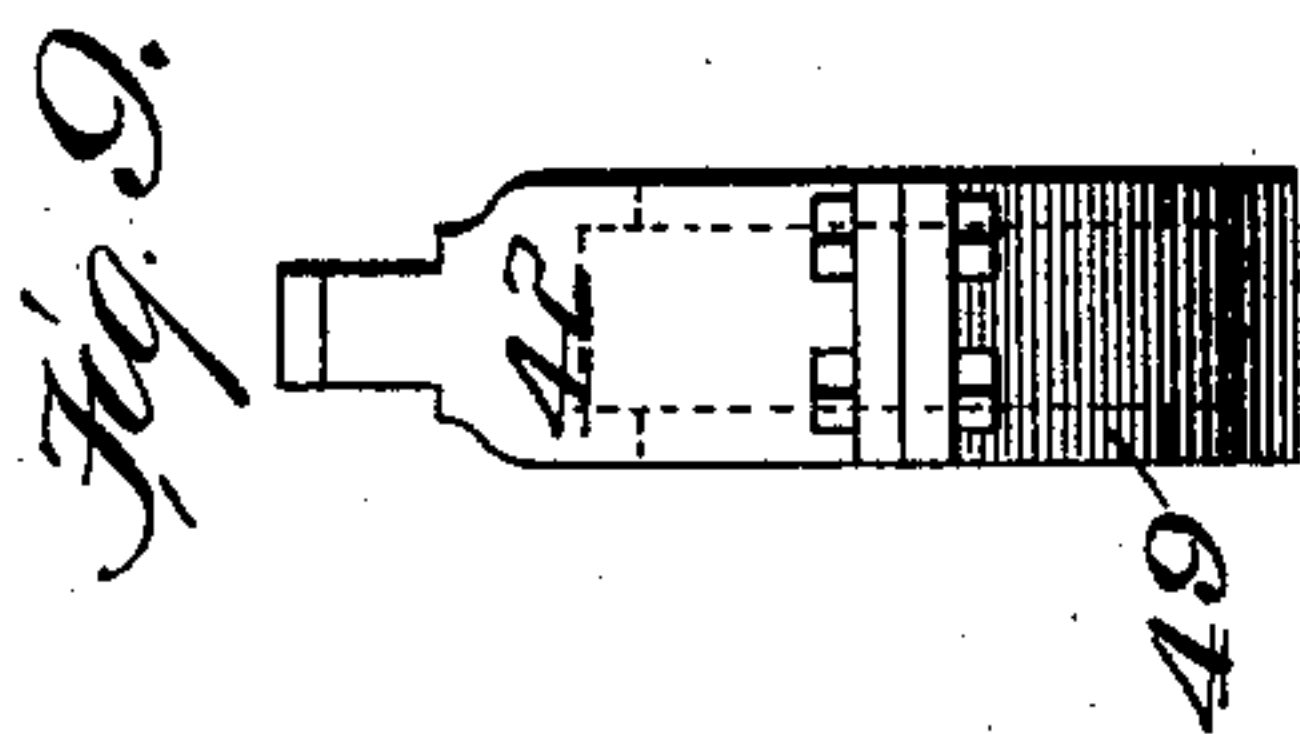
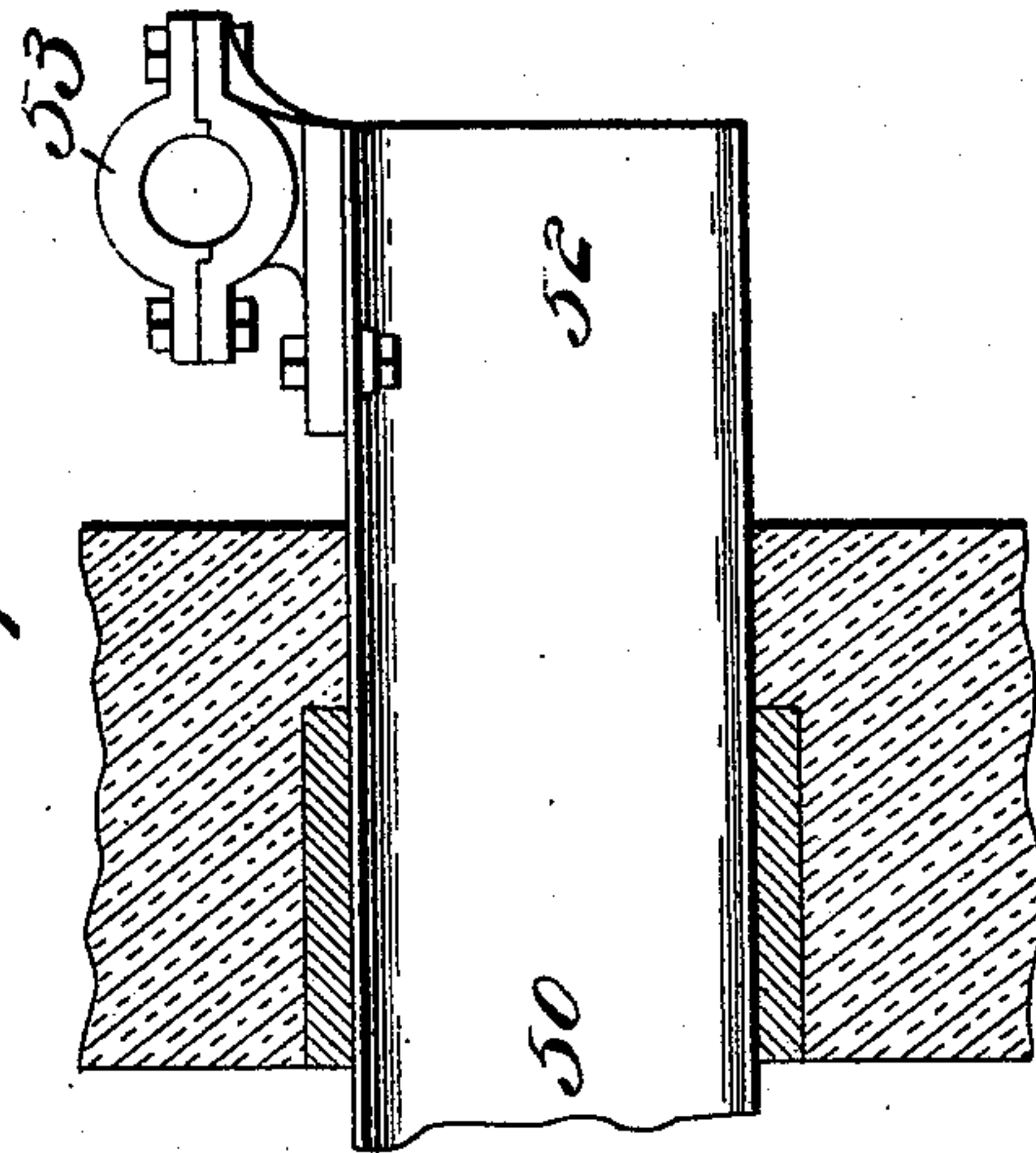
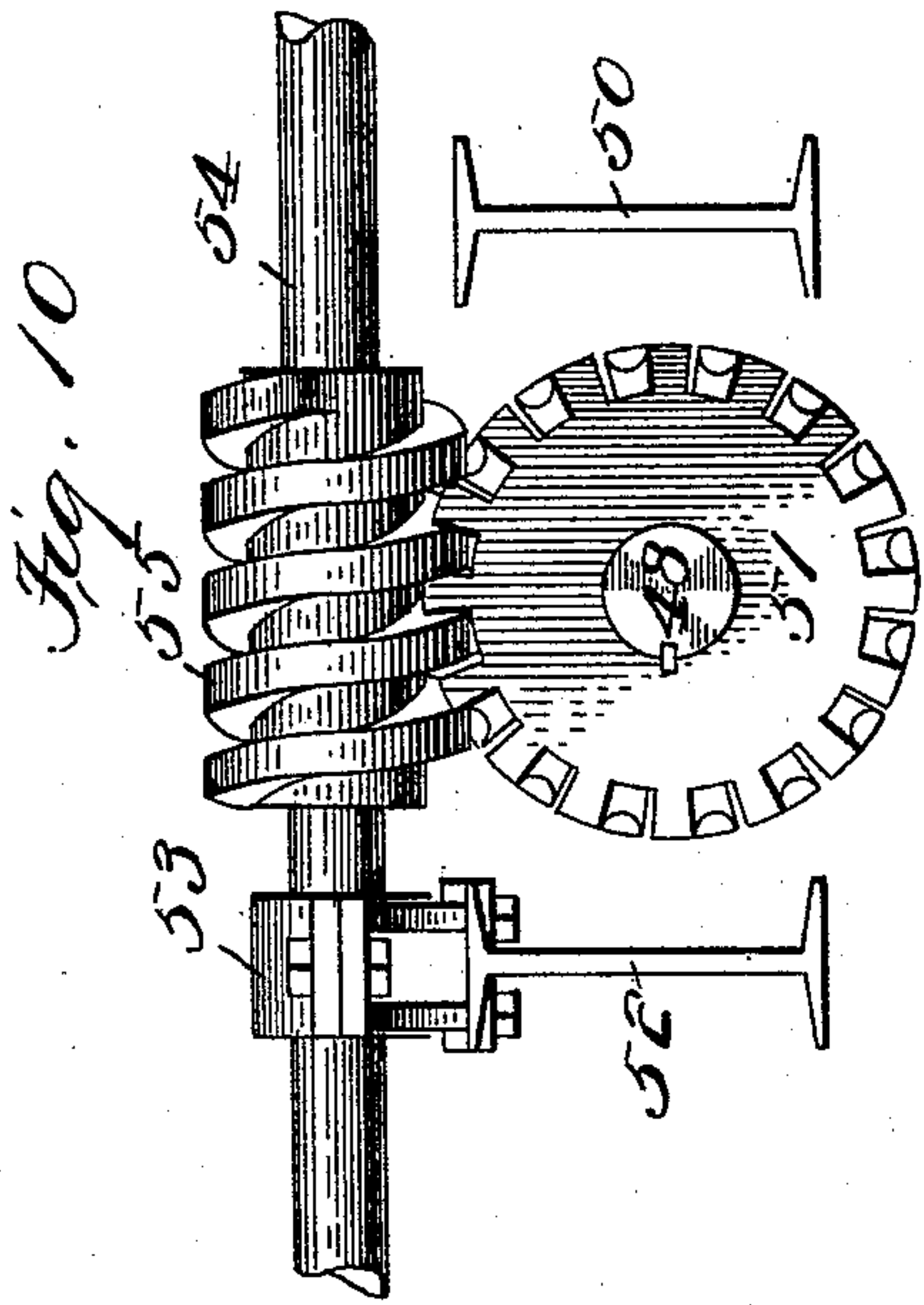
(No Model.)

4 Sheets—Sheet 4.

E. WALSH, Jr.
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Patented Mar. 9, 1897.



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UNITED STATES PATENT OFFICE.

EDWARD WALSH, JR., OF ST. LOUIS, MISSOURI.

ANNEALING-KILN.

SPECIFICATION forming part of Letters Patent No. 578,378, dated March 9, 1897.

Application filed May 14, 1895. Serial No. 549,287. (No model.)

To all whom it may concern:

Be it known that I, EDWARD WALSH, Jr., a citizen of the United States, residing in the city of St. Louis, State of Missouri, have invented a certain new and useful Improvement in Annealing-Kilns, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, wherein—
Figure 1 is a side-elevational view, partly in section. Fig. 2 is a cross-sectional view on line 2-2, Fig. 1. Fig. 3 is a horizontal sectional view showing the plan of the elevator and traveling bars. Fig. 4 is a side-elevational view of the elevator, somewhat enlarged. Fig. 5 is an enlarged sectional view through the elevator and stationary bars, looking from the end of the kiln. Fig. 6 is a cross-sectional view through the elevator-bars on line 6-6, Fig. 4. Fig. 7 is a cross-sectional view through the traveling rods. Fig. 8 is a side-elevational view of the end of the traveling rods. Fig. 9 is an edge view of the cam-sleeve. Fig. 10 is a side-elevational view of the means for operating the cam-rods. Fig. 11 is a sectional view through the side wall of the kiln, showing one of the I-beams projecting, which beam forms a support for the bearing of the screw-rod.
This invention relates to a new and useful improvement in annealing-kilns for plate-glass; and it consists in the construction, arrangement, and combination of the several parts, all as will hereinafter be described and afterward pointed out in the claims.

In the drawings, 15 represents the kiln-walls, which are provided with peep or operating holes 16 at convenient points, through which the operator may see and manipulate the plates of glass.

Just to the rear of the floor 17 at the front of the kiln, upon which the plates are first placed in introducing them into the kiln, is an elevator-pit in which is located an elevator, hereinafter more fully described.

Beneath the elevator-pit are arranged the air and gas flues 18 and 19, respectively, and the combustion-chamber 20. The products of combustion pass rearwardly through the flues 21, arranged beneath the floor of the kilnway and which are formed by the partitions 22, to a stack. (Not shown, but which is located at the rear end of the kilnway.)

In line with the floor 17 are stationary bars 23, which are mounted in bar-rests 24, arranged on suitable supports, preferably in the form of I-beams 24^b, which extend transversely the elevator-pit and are mounted in boxes arranged in the side walls of the kiln.

Bars 23 are composed of two side plates 25, which are preferably in the form of angle-irons, between which is arranged a rod 26, which is of less height than the angle-irons, but which spaces the angle-irons for the reception of non-heat-conducting material in the form of fire-bricks 27, which are arranged thereabove and between the angle-irons. Bars 23 are loosely seated in jaws 28 of the bar-rests 24, and this connection permits longitudinal expansion without unduly cramping the bars.

The elevator consists of a series of bars 29, which are composed of side angle-irons 30, an interposed rod 31, to which the side angle-irons 30 are attached by bolts 30^a, and non-heat-conducting material in the form of fire-bricks 32, which are supported on the rods 31 and clamped between the angle-irons 30, said bricks extending above the upper edges of the angle-irons. Rods 31 have projections or extensions 33 arranged along their length and which are preferably slotted longitudinally to receive pins on the elevating-arms 34. In a position of rest these elevator-bars are supported on table-like extensions 24^a of a stationary bar-rest 24, as shown in Fig. 5, so that the elevator-bars will be slightly below the plane of the stationary bars 23, whereby when glass is placed upon the bars 23 it may be pushed back onto the bars 40 without contacting with the elevator-bars, or the elevator-bars being raised will elevate the glass so that it can be pushed back onto the traveling bars 40^a, as shown by the dotted lines in Fig. 4.

Elevating-arms 34 are mounted upon rock-shafts 35, journaled in suitable bearings, which shafts are transversely disposed across the elevator-pit and project out beyond the side walls of the kiln, where they have mounted upon their ends rock-arms 36. The ends of rock-arms 36 are connected by a link 37. The elevator is operated by a cylinder 38, one preferably being on each side, the pitmen of which cylinders are connected to rock-arms 39. Suitable valves and supply and exhaust pipes are provided for the cylinders, (not

shown,) and the cylinders are preferably pivoted in a frame so as to have an oscillating movement for obvious reasons.

Upon admitting pressure above the piston the elevator rises, and the plate of glass may be shoved on the upper tier. Gradually exhausting the pressure from above and admitting it at the lower end of the cylinder will restore the elevator to its normal position.

The kiln shown in the drawings is provided with two tiers of traveling bars 40 and 40^a, which extend from the elevator-pit to the rear end of the kiln. The traveling bars of these tiers consist of two plates 41, preferably in the shape of angle-irons, which confine between them, at suitable distances apart, cam-blocks 42, secured in place by through-bolts 45^a. These cam-blocks are recessed, as at 43, at their upper ends, in which recesses are supported strips 44, extending from block to block. To support these strips between the blocks, through-bolts 45 are arranged beneath them, said bolts passing through the angle-plates 41 and serving the dual function of supporting the strips 44 and clamping said strips and fire-bricks between the angle-plates. Above the strips and cam-blocks fire-bricks 46 are placed, the upper edges of which extend above the angle-irons.

The traveling bars, through the medium of their cam-blocks, rest loosely upon oppositely-centered cams 47, mounted upon transversely-disposed shafts 48, with the exception that at their extreme ends, preferably the rear ends, the cam-blocks inclose the cams by straps 49^a. In this manner the alternate bars of a series have an opposite cyclical movement in the same direction, *i. e.*, one set being up when the other is down, said movement being directed from one end only, the free end following, but being permitted to expand and contract independently of the cams. This construction permits varying expansions and contractions of any of the bars without affecting the others, which expansion would cause the bars to warp or buckle, tending to bind their movement.

The cam-shafts 48 are mounted in suitable bearings 49, which are arranged between I-beams 50, said bearings being located at different points along the shaft, as shown in Fig. 3. These cam-shafts extend out beyond the wall of the kiln at one side and have mounted upon their ends worm-wheels 51. One of the I-beams 50 also extends out beyond the side wall of the kiln, as at 52, and affords a support for a bearing 53, in which is mounted a shaft 54, running the length of the kiln, upon which shaft are mounted worm-screws 55, gearing with the wheels 51. In this manner the cam-shafts are operated, it being of course understood that the two tiers are independent of each other, in order that they may be run at different speeds.

Any suitable power may be employed to rotate the worm-shaft 54.

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

1. In an annealing-kiln, the combination with cams which are alternately oppositely centered, and the means for revolving said cams, of traveling bars which rest upon the cams through the medium of cam-blocks, and a strap on some of said blocks for connecting one end only of said bars to the cams; substantially as described.

2. In an annealing-kiln, the combination with a series of traveling bars, of means for imparting a cyclical movement to said bars, said means comprising a series of oppositely-centered revolving cams to which are imparted complete revolutions, said bars being connected at one of their ends only to a set of cams; substantially as described.

3. The combination with side plates, of cam-blocks arranged between said plates at different points, strips which are supported by the blocks, and non-heat-conducting material which is arranged above the strips and between the side plates continuously the length of the strips; substantially as described.

4. The combination with angle-irons forming side plates, of cam-blocks arranged therebetween at different points, strips which are supported at their ends by the blocks, bolts passing through the side plates and under the strips for supporting the middle portion of the strips, and non-heat-conducting material between the side plates and on the strips; substantially as described.

5. In an annealing-kiln, the combination with the stationary bars 23, of bar-rests 24 for supporting the same, elevator-bars 29, which normally rest upon table-like extensions 24^a extending from said bar-rests, below the plane of the supports for the stationary bars 23 and means for operating the elevator-bars; substantially as described.

6. In an annealing-kiln, the combination with the stationary bars, of bar-rests therefor which permit expansion and contraction of said stationary bars, elevator-bars which normally rest upon table-like extensions extending from said bar-rests below the plane of the supports for the stationary bars, slotted projections extending down from said elevator-bars, and elevating-levers having pins in the ends which pass through said slots for permitting expansion and contraction of said bars, and at the same time forming a connection which permits the elevating-levers to swing and raise the elevator-bars; substantially as described.

7. The combination with stationary bars which consist of two side plates, a rod, and non-heat-conducting material between the plates, of bar-rests provided with jaws to receive said bars and having an independent support for the movable elevator-bars in a plane below the jaws for the stationary bars,

and elevator-bars which are supported in their normal positions upon said independent supports; substantially as described.

5 8. The combination with cam-shafts which extend transversely the kiln, of cams mounted on said shafts, traveling bars which are actuated by said cams, bearings for said shafts, worm-wheels on the ends of the shafts, I-beams for supporting bearings, said beams
10 extending out beyond the side wall of the kiln, bearings on said projecting ends, and a worm-shaft mounted in said bearings; substantially as described.

9. In a kiln, the combination with the walls,

of beams which extend from wall to wall and project outside, traveling bars arranged in the kiln, and means for actuating said traveling bars, said means being mounted upon the projecting ends of the beams; substantially
15 as described.

In testimony whereof I hereunto affix my signature, in presence of two witnesses, this
20 10th day of May, 1895.

EDWARD WALSH, JR.

Witnesses:

F. R. CORNWALL,
HUGH K. WAGNER.