

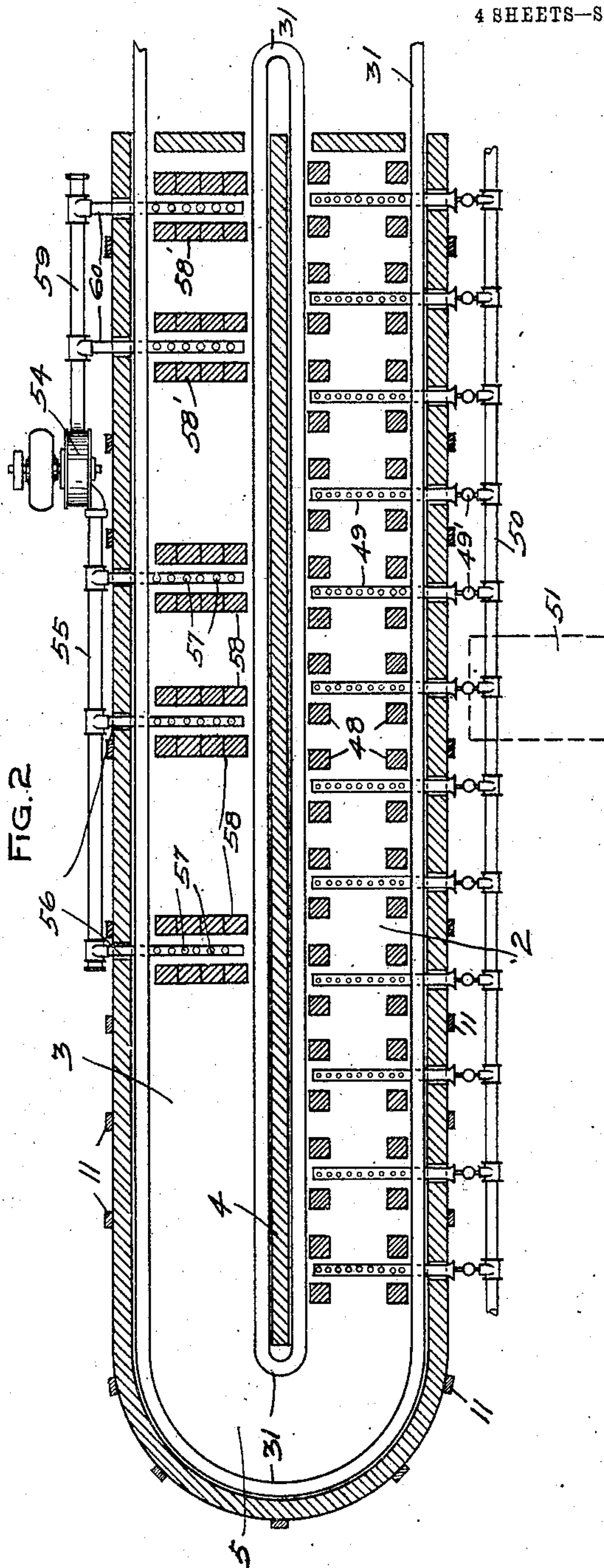
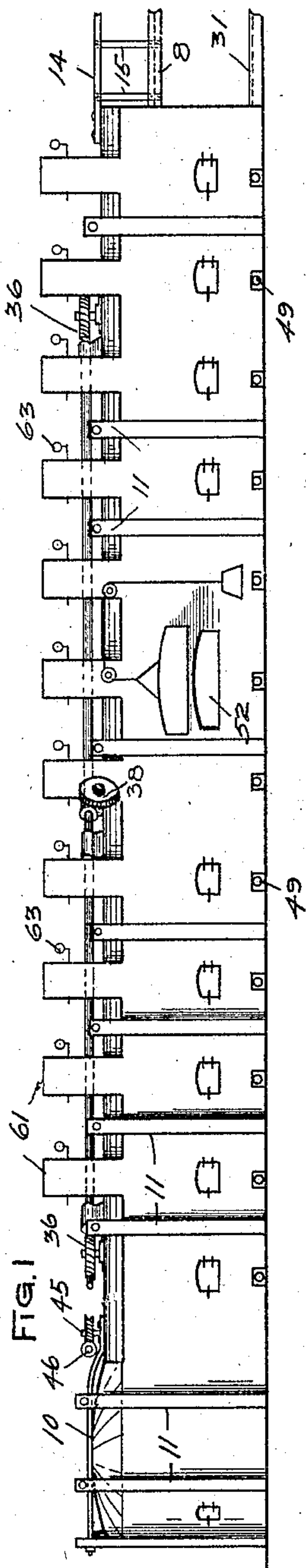
No. 785,506.

PATENTED MAR. 21, 1905.

M. M. MAHER.
PLATE GLASS ANNEALING LEER.

APPLICATION FILED MAR. 23, 1903.

4 SHEETS—SHEET 1.



WITNESSES:

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Chas. Johnson

INVENTOR.

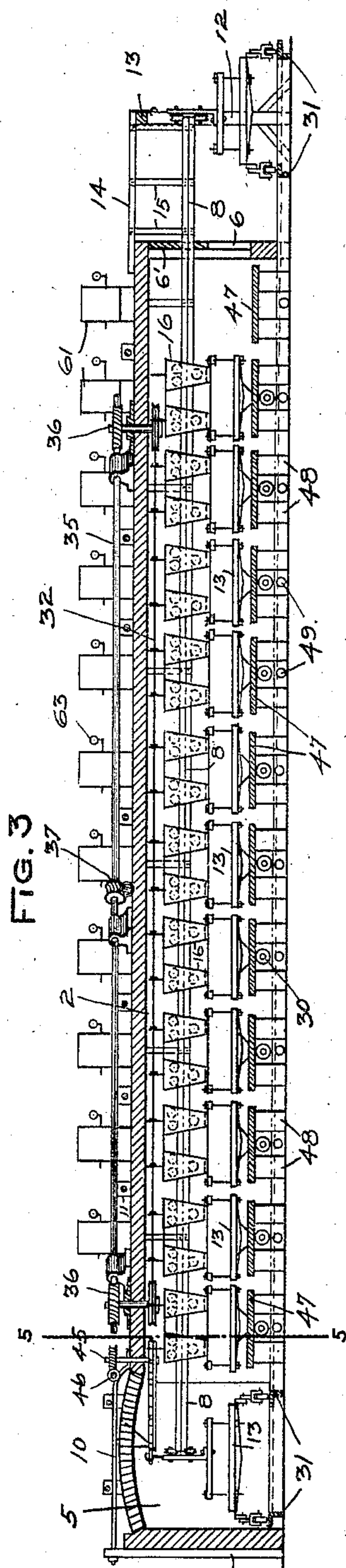
M. M. Maher.
By J. W. Kerbit
att'y.

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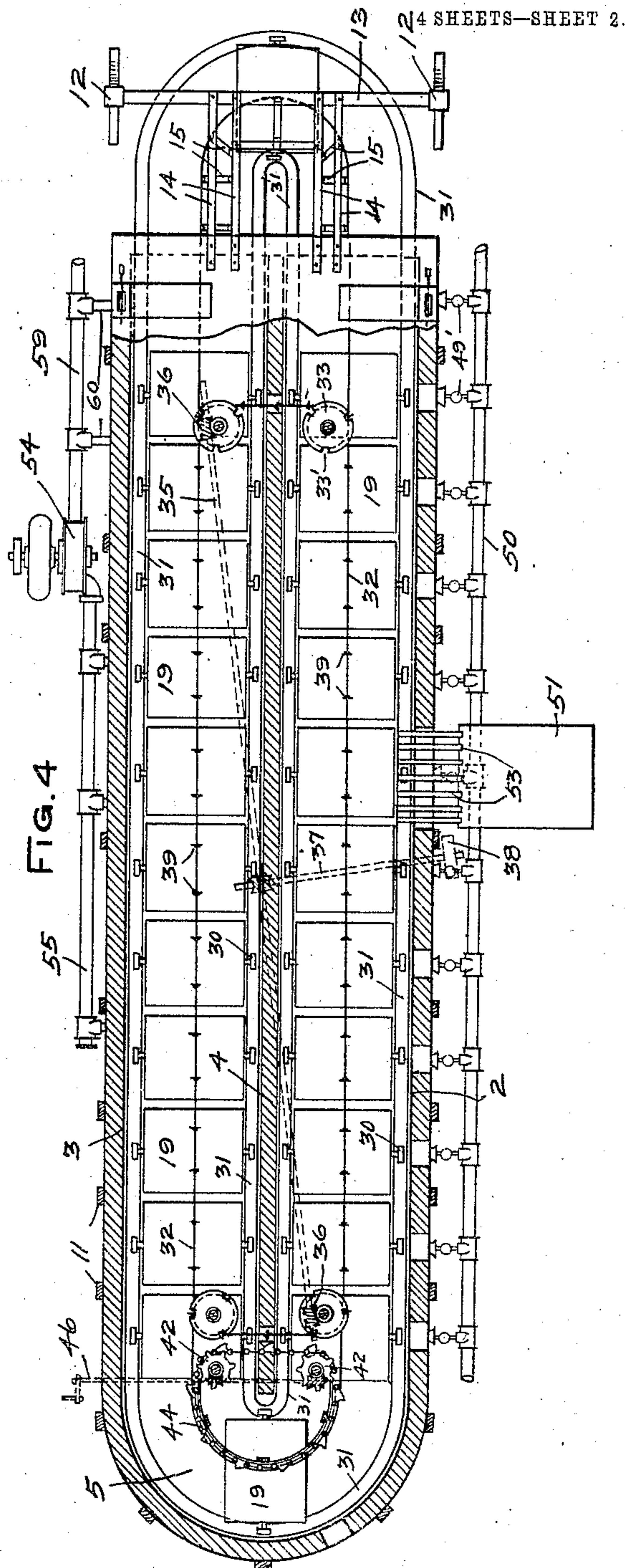
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APPLICATION FILED MAR. 23, 1903.



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24 SHEETS—SHEET 2.

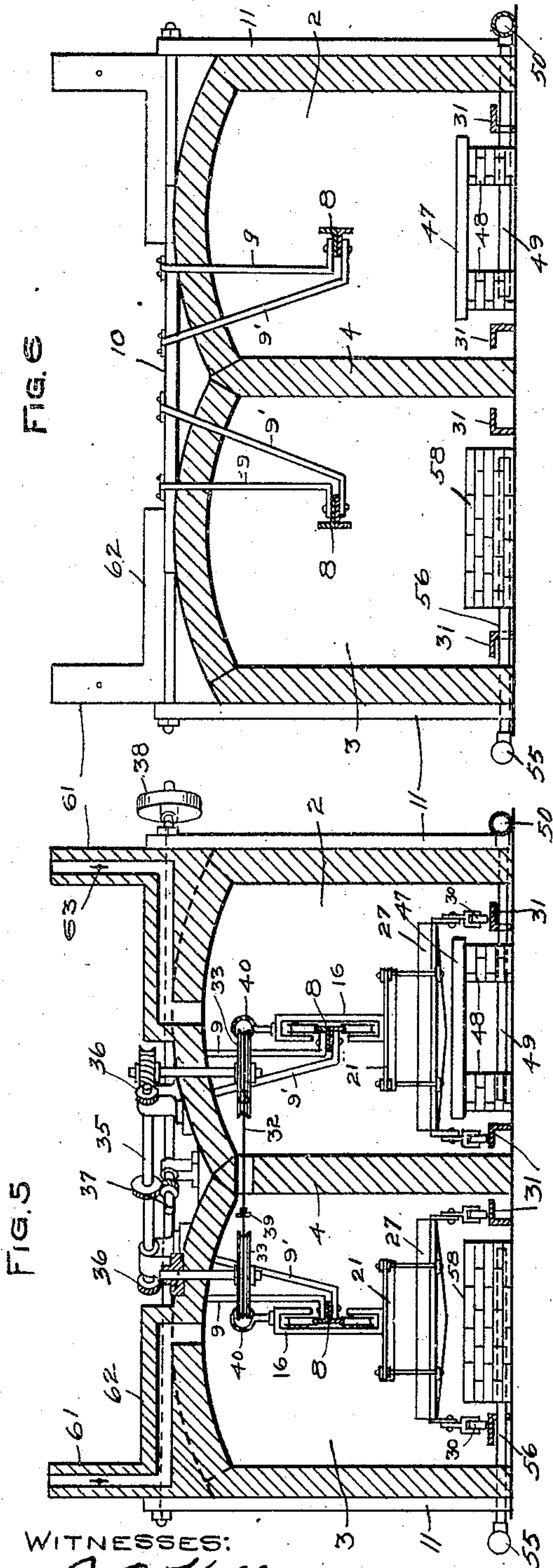
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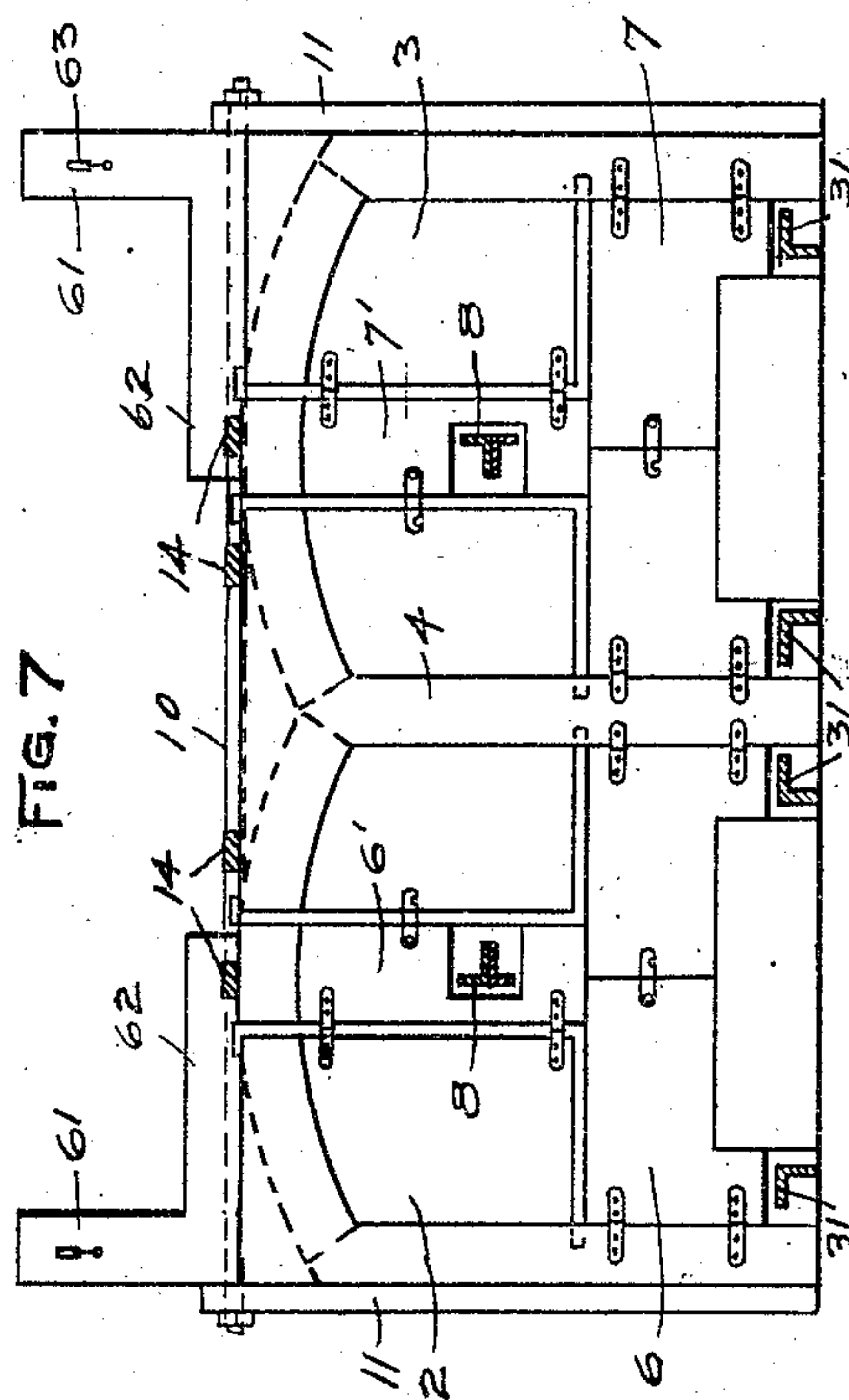
APPLICATION FILED MAR. 23, 1903.

4 SHEETS—SHEET 3.



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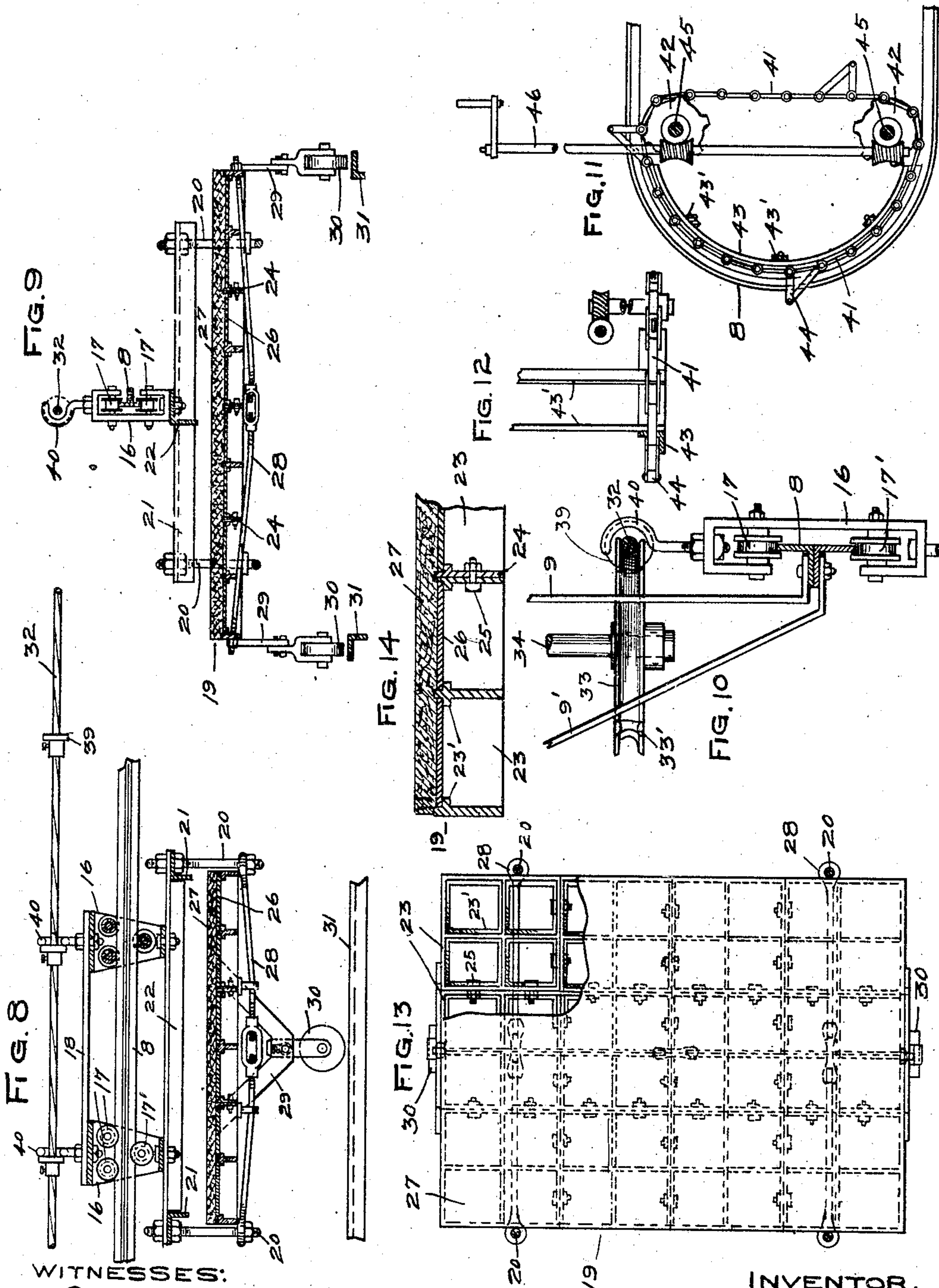
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4 SHEETS—SHEET 4.



WITNESSES:

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UNITED STATES PATENT OFFICE.

MICHAEL M. MAHER, OF EAST BRADY, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO ROBERT BARNER, OF KITTANNING, PENNSYLVANIA.

PLATE-GLASS-ANNEALING LEER.

SPECIFICATION forming part of Letters Patent No. 785,506, dated March 21, 1905.

Application filed March 23, 1903. Serial No. 149,075.

To all whom it may concern:

Be it known that I, MICHAEL M. MAHER, a citizen of the United States, residing at East Brady, in the county of Clarion and State of Pennsylvania, have invented certain new and useful Improvements in Plate-Glass-Annealing Leers, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to that type of glass-annealing leers wherein the plates are conveyed on a succession of separate carriers; and one object thereof is to provide carriers of improved construction and to provide improved means for sustaining and actuating the same.

A further object is to improve the general construction of the leer and also to provide novel heating means.

Another object of the invention is to provide means for withdrawing heated air from the leer and for reëntering the withdrawn air adjacent the leer discharge.

In the accompanying drawings, Figure 1 is a side elevation of a leer constructed in accordance with my invention. Fig. 2 is a ground plan of the same. Fig. 3 is a vertical longitudinal sectional view. Fig. 4 is a plan view, partly in section, the carriers being merely shown in outline and with all operating mechanisms omitted save the endless driving cable and chain. Fig. 5 is a cross-sectional view taken on line 5 5 of Fig. 3. Fig. 6 is a view similar to Fig. 5 with the operating parts removed. Fig. 7 is an end elevation. Figs. 8, 9, and 10 are detail views of the plate-carriers and attendant mechanism. Figs. 11 and 12 are detail views of the mechanism for moving the carriers from one chamber to the other. Figs. 13 and 14 are detail views illustrating the construction of the plate-carrier bodies.

In the present adaptation of the invention the leer is constructed with two parallel chambers 2 and 3, separated by partition-wall 4, said wall, however, stopping short of one end of the leer where said chambers are in open communication, as indicated at 5. At the opposite end of the leer the plate-carriers are introduced into chamber 2 and discharged from

the corresponding end of chamber 3, said inlet and discharge ends being normally closed by doors 6 and 6' for chamber 2 and corresponding doors 7 and 7' for chamber 3.

It is characteristic of my invention to provide an endless trackway throughout both chambers of the leer, said trackway being curved at the communicating ends 5 of the leer, whereby the carriers may be moved from one chamber to the other, and also curved on the exterior of the leer at its opposite end, so that after the carriers discharge the annealed plates they may be conveniently returned and reheated for a fresh operation. The trackway preferably consists of an overhead rail 8, extending centrally through the leer-chambers and sustained by hangers 9 and braces 9', depending through the leer-crown from tie-bars 10, which connect buckstays 11. Rail 8 is here shown of T-section and sustained wholly on its inner side, the lower extremities of hangers 9 and braces 9' being turned to embrace the horizontal web of the rail, as clearly shown in Figs. 6 and 10, leaving the main or vertical portion of the rail free of obstructions and clear on its outer side for the passage of the carriages, presently to be described. For supporting track 8 where it extends beyond the end of the leer posts 12 sustain bar 13, and resting on this bar and on the leer-crown are bars 14, from which depend hangers 15, to which rail 8 is secured, as shown in Figs. 3 and 4.

Mounted on rail 8 are the trolley-carriages 16, each carriage being preferably provided with two rollers 17, which bear on the upper edge of the rail, and a single roller 17' for the under edge thereof. Two of these carriages are preferably employed for each plate-carrier, being connected at their upper ends by bar 18. 19 designates the body of the carrier, and in the preferred construction four threaded bolts or rods 20 are projected upwardly from said body, two on opposite sides, the bolts or rods of each side being connected by angle-bars 21, and these two bars 21 are connected by the transverse bar 22, which in turn is secured to the lower ends of the frames of carriages 16, as shown in Figs. 8 and 9.

Referring to Figs. 13 and 14, each of carrier-bodies 19 is made up of a series of cast-iron frames 23, formed with depending flanges or webs 24, these frames or sections being secured together by bolts 25, as shown. Laterally-projecting flanges 23' are cast on frame-sections 23, slightly below their top surfaces, and support the flat plates 26, which close the frame-sections and form a level top surface on which is placed a level covering or deposit of fire-clay 27, upon which the glass plates rest. Trusses 28 span the under sides of the carriers and not only serve to strengthen them, but also afford means for leveling or truing the tables in case they become warped or otherwise distorted.

Depending from opposite sides of the carriers are vertically-adjustable arms 29, carrying at their lower ends rollers 30, which are adapted to roll on trackways 31, arranged in the bottom of the leer-chambers, said trackways being continuous and curved at the ends of the leer-like rail 8. Said rollers and lower trackways are not designed primarily for sustaining the weight of the carriers, being intended simply to form guides for preventing irregular movement. The rollers are preferably so arranged that those on both sides of a carrier do not touch trackways 31 at the same time, but merely engage the same according to the direction in which the carriers may tip.

For moving the carriers in the straight parallel portions of chambers 2 and 3 I preferably employ an endless cable 32, arranged above and parallel with rail 8 on the four sheaves 33, partition-wall 4 being formed with suitable openings to pass the cable from one chamber to the other, said sheaves being secured to the lower ends of vertical shafts 34, suitably journaled on the leer-crown and depending therethrough. These shafts or any of them may be actuated in any suitable manner for driving the cable, the means here shown consisting of a long diagonal drive-shaft 35, suitably journaled on top of the leer and geared at its ends at 36 to the upper ends of two of shafts 34. Power may be imparted to shaft 35 through the medium of cross-shaft 37, geared to the center thereof, said shaft carrying a driving-pulley 38 or other power-receiving means.

Secured to cable 32 at regular intervals are heads 39, and sheaves 33 are formed with peripheral notches 33', spaced so as to receive said heads as they pass therearound, thus giving the sheaves a positive hold or grip on the cable which they drive. Projecting upward from carriage-frames 16 are the hooks 40, which are in the plane of and embrace the cable and are engaged by heads 39 to propel the plate-carriers. Each carriage is provided with two of these hooks and they are spaced the same distance apart as heads 39, thereby giving the cable a double hold on each carriage.

The hooks are arranged with their open sides inward or toward partition-wall 4 and are of such form as to readily pass over sheaves 33. The cable thus arranged serves to propel the carriers throughout the greater portion of the parallel chambers 2 and 3; but at curved end 5, where the chambers communicate and in which the cars turn around the sharp curve in track 8, it is necessary to provide additional actuating means, and the same is here shown consisting of an endless chain 41, mounted on sprockets 42, one in each chamber, and passing around the curved guideway 43 above and corresponding exactly with the curvature in track 8, said guideway being sustained by hangers 43'. Chain 41 is provided with projections 44, which engage hooks 40 as they are advanced out of engagement with cable 32, said chain thus serving as an auxiliary propelling means for moving the cars around the sharply-curved end of the leer out of chamber 2 and into chamber 3. Upon reaching the straight portion of chamber 3 hooks 40 are again brought into the path of the cable and are automatically engaged by heads 39, and thus advanced toward the discharge end of the leer and in direction opposite to that traveled in chamber 2.

Sprockets 42 are here shown secured to the lower ends of vertical shafts 45, depending through the leer-crown, said shafts at their upper ends being geared to the hand-propelled crank-shaft 46. In the form of leer herein shown it is not practicable to propel the carriers around the sharp bend or curve by cable 32, and while I have found a separate and distinct actuating means necessary my invention is not confined to the specific mechanism herein shown. In the disclosed construction the cable stops considerably short of the combined inlet and discharge end of the leer, it being only necessary to provide means for propelling the carriers within reach of the inlet and exit doors, where they can be readily moved in direction desired by the attendant's working at said end. If desired, however, the cable may extend to the end of the leer.

My preferred form of heating means, located in the bottom of chamber 2, consists of a series of hearth-stones 47, supported on piers 48, with open spaces between the piers at the sides and ends of the stones for free upward circulation of heat generated by gas-burners 49, one burner beneath each stone and separately controlled by valve 49', all of the burners being connected to the gas-manifold 50. Stones 47 are of approximately the same size or outline as carrier-bodies 19 and are of such height that the carriers are immediately thereabove, there being only sufficient room for necessary clearance, with the roller-carrying arms 29 extending downward past opposite ends of the hearths to trackways 31. The hearths are separated by intervening spaces corresponding approximately to the spaces between the

carriers. The carriers are moved intermittently by means of the cable, gearing, and shafting above described, the extent of each movement being the width of a carrier, and the hearth-stones are preferably so arranged that they are directly beneath the carriers when the latter are at rest. I here show the hearth-stones arranged the whole length of chamber 2; but it will be understood that a less number may be employed, if desired, or, on the other hand, they may be extended around curved portion 5 and into chamber 3, as circumstances may require.

The casting-table 51 is arranged, as shown, adjacent the leer some distance from the inlet end thereof and directly opposite door or opening 52, through which the cast plates are introduced. Removable bridge-bars 53 may be employed for spanning the space between the casting-table and the carrier which receives the plate. Between opening 52 and doors 6 and 6', which admit the carriers into chamber 2, there is room for several carriers, five being here shown, and in this space the temperature is highest for the purpose of reheating the cars and conditioning them for receiving the glass. From the point where the plates are introduced a gradually-diminishing temperature is maintained until, as here shown, the hearths or heating means cease altogether where chamber 2 communicates with chamber 3. After each plate is cast and moved onto the carrier opposite opening 52 the series of carriers is advanced a distance equal to the width of a carrier, which brings a freshly-heated one in position to receive the next cast. Meantime a carrier is being conveyed around the curved end 5 by the mechanism above described, and in the same interval of time the end carrier in chamber 3 is withdrawn through doors 7 and 7' and around the exposed portion of track 8 in convenient position for removing the annealed plate resting thereon, and as soon as the plate has been discharged the empty carrier is moved through doors 6 and 6' into the reheating portion of chamber 2, where it is placed in position to receive in turn a freshly-cast plate, as above described.

It is very desirable that the temperature of the plates as they emerge from the leer shall as nearly as possible approximate that of the outer air, and thus avoid sudden changes in temperature, which cause great injury and loss, as is well known in the art. It is difficult to reduce or disseminate the large volume of highly-heated air in that portion of the leer wherein the last stages of cooling are effected, and under the most favorable conditions there is a marked difference in temperature on the inner and outer sides of the discharging-door, so that when the latter is opened there is a sudden inflow of cooler air. Hence I have found it desirable to devise means for withdrawing heated air in any de-

sired amount without injuring the glass and also to arrange for reëntering or discharging the withdrawn hot air into the leer adjacent its outlet to counteract the chilling effect of the inflowing outer air when said outlet is open. For these purposes I provide a fan or blower 54, with its inlet connected to manifold 55, from which several pipes 56 may be projected into the lower portion of chamber 3, said pipes being provided with air-inlet openings 57, whereby heated air in any desired amount may be withdrawn from said chamber. I prefer to arrange pipes 56 between the short and low transverse walls 58, which prevent drafts longitudinally of the chamber. The heated air thus withdrawn may be discharged outside the leer, or the outlet of blower 54 may be connected with manifold 59, having the perforated pipes 60 extending into chamber 3 adjacent the end or discharging-door 7 and 7', whereby the heated air withdrawn may be reintroduced into chamber 3 adjacent the carrier-outlet for counteracting the chilling effect of the outer air when said doors are open. Additional transverse walls 58' are preferably provided on opposite sides of pipes 60 to preclude injurious drafts and to effect a more direct circulation of the heat in the immediate portion of the chamber in which it is desired to introduce it.

While I consider it desirable to provide means for both withdrawing and reintroducing heated air into the leer, the invention is not limited thereto, and the same may be either used or dispensed with, as circumstances may require. As the principle underlying this portion of the invention may be applied to many different forms of leers, I do not confine myself to the type of leer herein shown. At intervals on the leer-walls are stacks or chimneys 61, which are preferably constructed at their lower ends with transverse bottom ducts 62, leading to the centers of chambers 2 and 3, as shown in Fig. 5. Each chimney is provided with a damper 63, which dampers may be adjusted throughout the leer as conditions may require. The arrangement is preferably such that there is one of these dampered chimney-outlets above each point or station where the carriers pause in their intermittent movement through the leer-chambers, and particularly is this so in respect to chamber 2, where there is a dampered chimney connection central over each hearthstone 47. These dampered outlets operate in conjunction with the separately-controlled burners beneath stones 47 to provide a succession of stations of either increasing or decreasing temperature, according to location. Thus from the inlet end of chamber 2 to the casting-table the stations will be of gradually-increasing temperature, while those forward from the casting-table will be of gradually-decreasing temperature. It will be under-

stood that the burners and chimney-outlets of the several stations may be so manipulated as to secure a very accurate graduation of the successive temperatures through which the carriers pass. While the carrier-space throughout the leer-chambers is continuous, the heating means and dampered chimneys serve to divide the same into a succession of zones, which may in an appreciable and effective manner be controlled independently of each other. For that portion of the leer in advance of the carrier-outlet, which in the present embodiment of the invention comprises the whole of chamber 3, the dampered chimney-outlets are preferably arranged at regular intervals, as in chamber 2, and may be so adjusted as to secure either a gradual or rapid reduction of temperature as the outlet is approached, dependent on the condition and requirements of the glass.

In those leers wherein the carriers move on two parallel tracks the latter are liable to become distorted and uneven owing to the intense heat, and the jolting and straining of the carriers occasioned thereby is liable to injure many of the plates. With a one-rail track, as herein proposed, while it may not be possible to entirely eliminate twists and irregularities nevertheless the carriers may pass thereover without being subjected to bodily twists or strains, as they are sustained each at substantially one point only. The slight swaying or oscillating occasioned the carriers by such track irregularities will not injure the plates so long as the carrier-bodies remain perfectly rigid and free from distorting strains. Furthermore, with the single overhead track I am enabled to locate the driving mechanism in the unobstructed upper portion of the leer and to apply the power to the carriers in close proximity to their supporting-track.

I claim as my invention—

1. A leer having an overhead way extending therethrough, glass-carriers, and carrier-suspending means movable over the way and constructed and arranged to permit the carriers to oscillate.

2. A leer having an overhead way extending therethrough, glass-carriers, carrier-suspending means movable over the way and constructed and arranged to permit the carriers to oscillate, and guides for limiting said oscillating movement.

3. A leer having an overhead way extending therethrough, glass-carriers, carrier-suspending means movable over the way and constructed and arranged to permit the carriers to oscillate, fixed guides within the leer, and rollers on the carriers adapted to engage the guides and limit said oscillating movement.

4. A leer having an overhead way extending therethrough, glass-carriers, and suspending means movable over the way and having central or balanced connection with the carriers.

5. A leer having an overhead way extending therethrough, and glass-carriers suspended at their centers from said way.

6. A leer having an overhead way extending therethrough, glass-carriers suspended at their centers from the way, and carrier-actuating means adjacent the overhead way.

7. The combination of a leer chamber or tunnel, burners within the lower part of the chamber, heat-deflectors positioned above the burners, and plate-carriers movable through the chamber above said deflectors.

8. The combination of a leer chamber or tunnel, hearthstones within the chamber and elevated from the bottom thereof, burners beneath the hearthstones, and plate-carriers movable through the chamber above said stones.

9. An improved glass-annealing leer having a single elevated track, and glass-carriers suspended therefrom and movable thereon.

10. An improved glass-annealing leer having a single elevated track extending through the center thereof, glass-carriers, and a suspension device extending upward centrally from each carrier and adapted to travel on the track.

11. The combination of a leer-chamber, plate-carriers, a driving-cable movable through the chamber and having a lateral turn at the end thereof, projections at intervals on the cable, and devices on the carriers adapted to be engaged by the cable projections, said devices being open on one side whereby they are automatically disengaged from the cable projections when the cable turns laterally.

12. The combination of a leer, a succession of glass-carriers of uniform size movable therein, a series of evenly-spaced separately-controlled heating devices over which the carriers move, and a dampered chimney in the leer-crown above each heating device.

13. A glass-carrier for leers comprising a series of iron frames arranged side by side and having vertical abutting faces, means for securing the frames together with said faces in engagement to form a rigid carrier-body, and a refractory top covering for the body.

14. A glass-carrier for leers comprising a series of iron frames arranged side by side and having vertical abutting faces, means for securing the frames together with said faces in engagement to form a rigid carrier-body, truss-rods beneath and secured to opposite portions of the body thus formed for holding the same level, and a refractory top covering for the body.

15. A glass-carrier for leers comprising a series of iron frames secured together side by side to form a carrier-body, a refractory top covering therefor, and means for sustaining the carrier from above.

16. A glass-carrier for leers comprising a body, and a suspension device arranged centrally thereover and secured to opposite edges thereof.

17. A glass-carrier for leers comprising a body, two horizontal bars above the top plane of the body and secured to opposite edges thereof, a cross-bar connecting the first-mentioned bars, and a suspension device secured to the cross-bar.

18. An improved leer having communicating chambers arranged side by side, glass-carriers movable therein, an endless carrier-actuating cable common to the chambers, and separate actuating means for moving the carriers from one chamber into the other.

19. An improved leer having communicating chambers arranged side by side, glass-carriers movable therein, a cable operating to move the carriers through each chamber, and separate means for moving the carriers from one chamber to the other.

20. An improved leer having straight communicating chambers connected by a curved trackway, glass-carriers movable in the chambers over said trackway, and actuating means operating to automatically engage the carriers and move them over said curved trackway.

21. An improved leer having communicating chambers connected by a trackway, glass-carriers movable in the chambers over said trackway, and endless actuating means operating at the ends of the chambers to move the carriers from one chamber to the other.

22. An improved leer having chambers communicating at one end, glass-carriers movable in the chambers and from one chamber to the other, means for moving the carriers in the chambers, and mechanism at the chamber ends adapted to automatically engage and move the carriers from one chamber to the other.

23. An improved leer having chambers arranged side by side which communicate at one end, glass-carriers in the chambers, an endless cable operative in both chambers between the ends thereof for moving the carriers, and mechanism operative at the connected ends of the chambers for receiving the carriers from the cable in one chamber and delivering them to the cable in the other chamber.

24. An improved leer having movable plate-carriers, equally-spaced cable-engaging devices on the carriers, and a power-cable in the

leer carrying equally-spaced devices adapted to automatically engage and disengage said devices on the carriers.

25. An improved leer having two chambers arranged side by side and communicating at one end, glass-carriers provided with cable-engaging devices, an endless cable operative in both chambers between the ends thereof to actuate the carriers, devices on the cable for engaging said devices on the carrier, and endless mechanism at the communicating ends of the chambers operating to automatically engage the carriers at the end of one chamber and deliver them into the end of the other chamber.

26. The combination of a leer, glass-carrying means, heating means, and means for withdrawing heated air from the leer and forcing the same air into the leer adjacent the discharge thereof.

27. The combination of a leer, glass-carrying means, heating means, and means for forcing hot air into the leer adjacent its discharge.

28. The combination of a leer having two elongated chambers arranged side by side and having, respectively, inlet and discharge ends adjacent each other and communicating at their opposite ends, glass-carrying means, heating means, and means for withdrawing heated air from the leer and for returning the same air into the leer adjacent its discharge end.

29. The combination of a leer, hearthstones arranged at intervals and supported in elevated position above the floor thereof, and heating means beneath each stone.

30. The combination of a leer, a succession of evenly-spaced glass-carriers of uniform size movable intermittently therein, and a series of evenly-spaced separately-controlled hearths in the lower portion of the leer-chamber and of substantially the same size as the carriers, and over which the latter stop between their intermittent movements.

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

MICHAEL M. MAHER.

Witnesses:

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ROBERT BARNER.