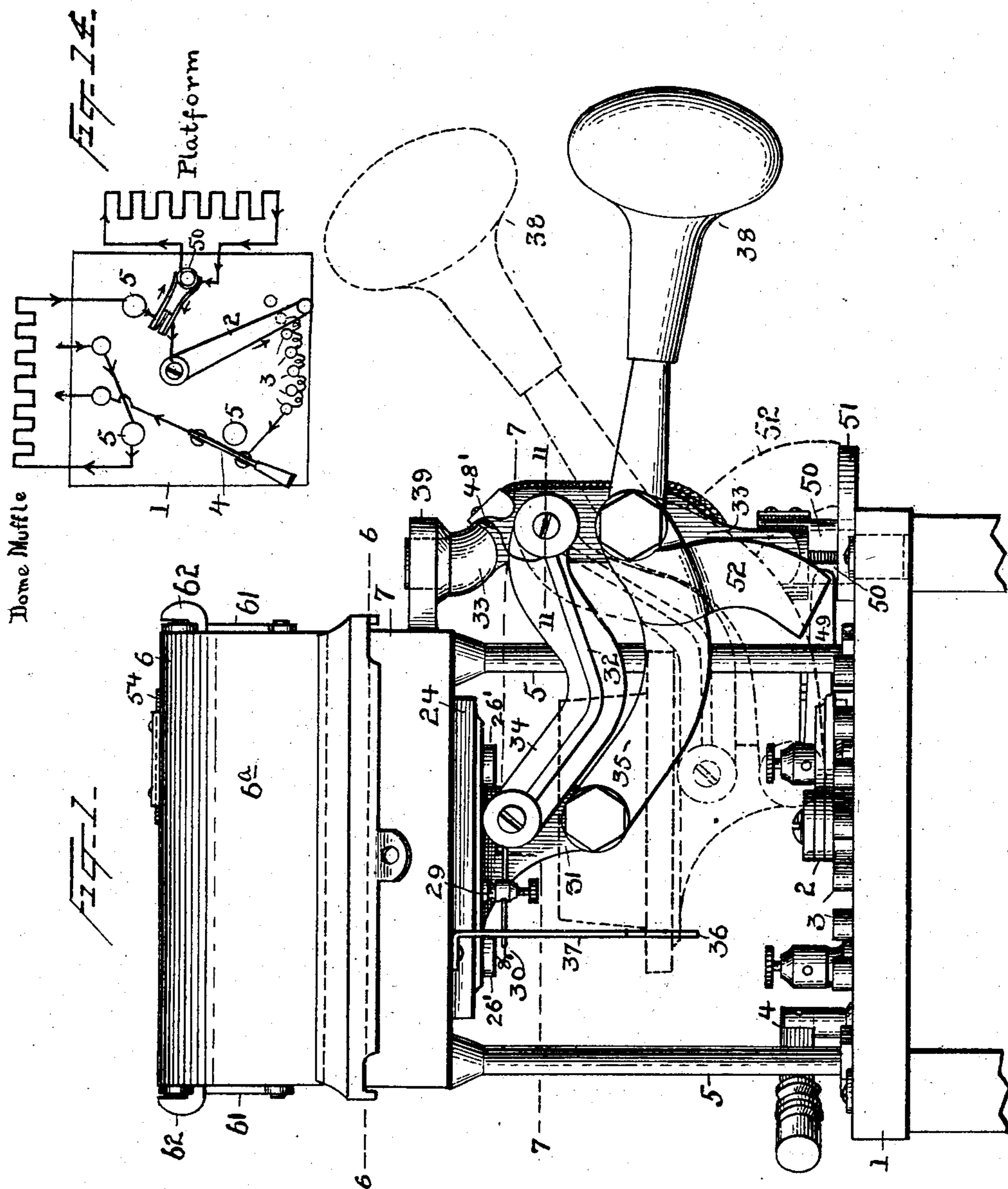


J. F. HAMMOND.
ELECTRIC FURNACE.
APPLICATION FILED FEB. 1, 1902.

NO MODEL.

6 SHEETS—SHEET 1.



Witnesses
M. H. Watkins.
J. MacDonald

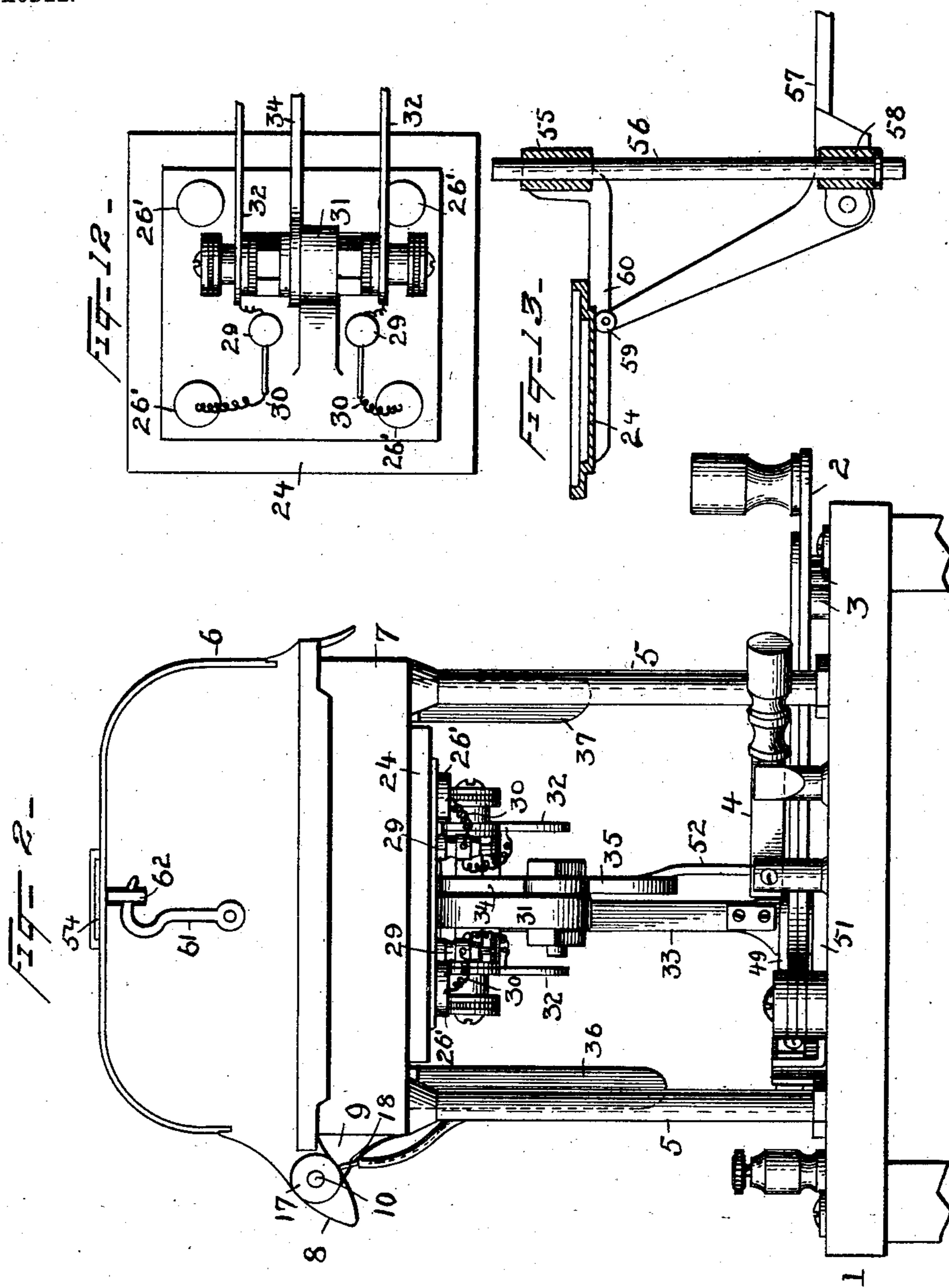
Inventor
John F. Hammond
by Louis A. Clark
his Attorney

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5 SHEETS-SHEET 2.



Witnesses

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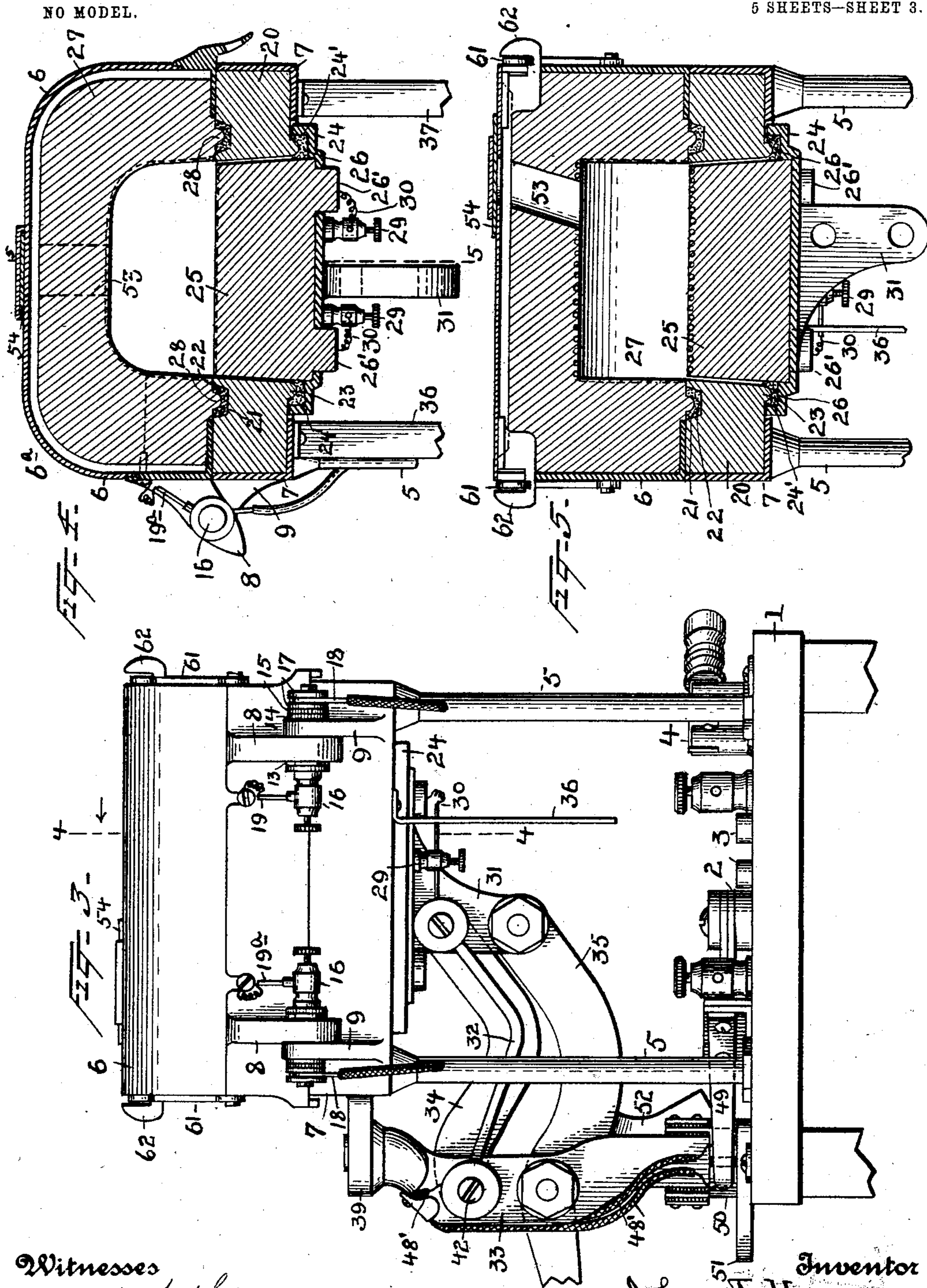
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5 SHEETS—SHEET 3.



Witnesses
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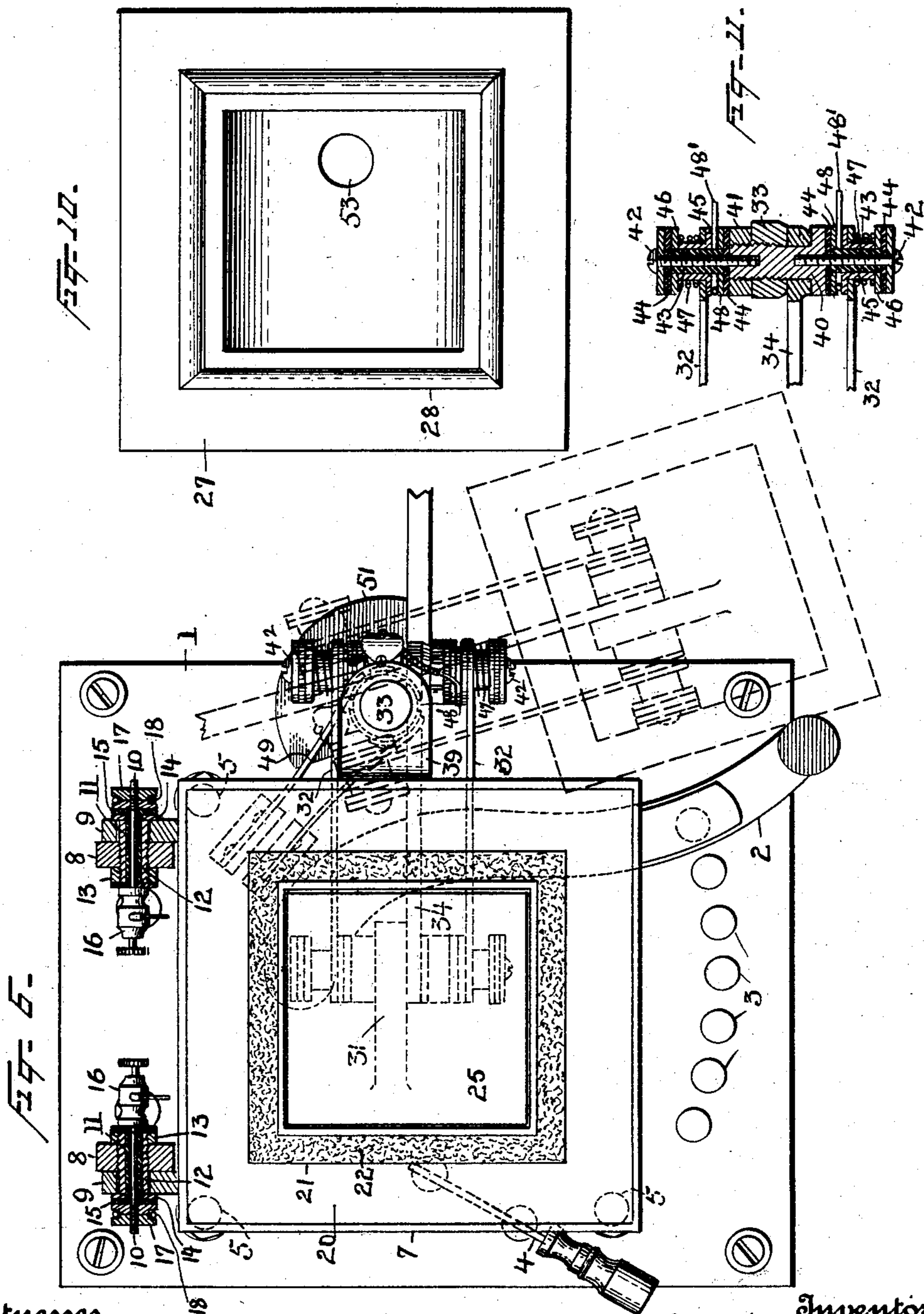
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5 SHEETS—SHEET 4.



Witnesses

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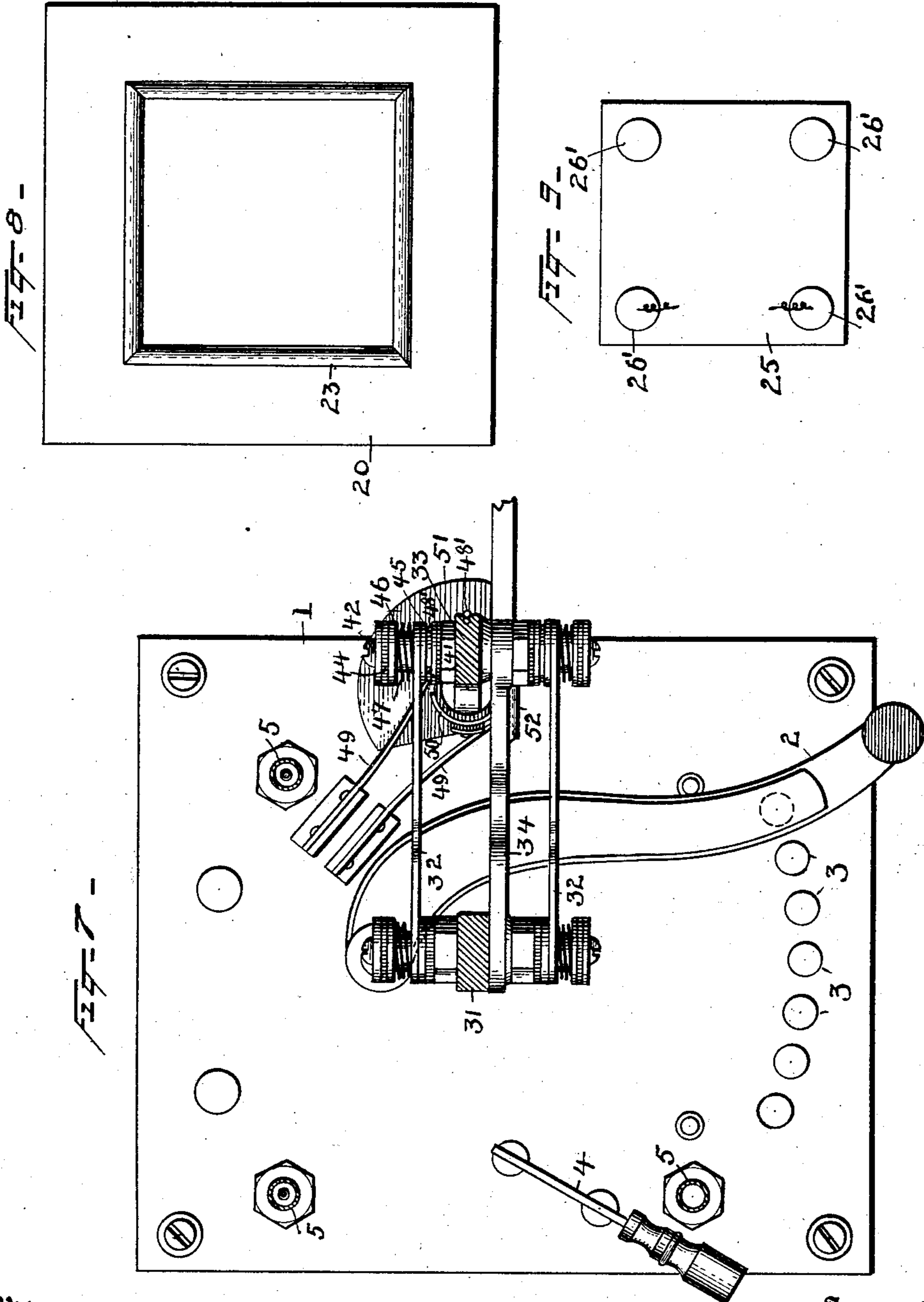
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NO MODEL.

5 SHEETS—SHEET 5.



Witnesses
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UNITED STATES PATENT OFFICE.

JOHN F. HAMMOND, OF NEW YORK, N. Y.

ELECTRIC FURNACE.

SPECIFICATION forming part of Letters Patent No. 720,024, dated February 10, 1903.

Application filed February 1, 1902. Serial No. 92,198. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. HAMMOND, a citizen of the United States, residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Electric Furnaces; and I do 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, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

This invention has relation to electric furnaces chiefly designed for dentists' use in continuous gumwork and such other work requiring a high temperature for baking.

The primary object of the invention is to utilize the heat to the best possible advantage and to provide for inspection of the work without exposing the same to injurious drafts.

The invention also has for its object to simplify the construction and admit of repairs being quickly and cheaply made and to admit of the work being conveniently handled upon the platform or base forming the bottom of the oven, both when placing it in position or removing it after being baked.

The invention consists, essentially, of the novel features and details of construction, which hereinafter will be more particularly set forth, illustrated, and finally embodied in the subjoined claims.

In the drawings hereto attached, forming a part of the specification, Figure 1 is a front elevation of an electric furnace constructed in accordance with and embodying the essential features of the invention, the bottom of the oven being lowered by dotted lines. Fig. 2 is a side view of the parts illustrated in Fig. 1. Fig. 3 is a rear view. Fig. 4 is a section on the line 4 4 of Fig. 3 looking in the direction of the arrow. Fig. 5 is a section on the line 5 5 of Fig. 4. Fig. 6 is a plan section on the line 6 6 of Fig. 1, the dotted lines showing the position of the oven-bottom when lowered and swung to one side. Fig. 7 is a plan section on the line 7 7 of Fig. 1. Fig. 8 is a view of the bottom side of the oven-base or sealing-slab. Fig. 9 is a view of the under side of the oven bottom or slab. Fig. 10 is a view of the dome-muffle as seen from the bot-

tom side. Fig. 11 is a longitudinal section of the hinge connection between the turn-post and upper link on the line 11 11 of Fig. 1. Fig. 12 is a view of the oven-bottom and adjuncts as seen from the under side. Fig. 13 is a modification. Fig. 14 is a diagrammatic view of the heating-circuit.

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 oven and coördinate parts are mounted upon a base 1 of any desired construction, inclosing a rheostat or other device for controlling the electric current passing to the wiring of the oven-walls. Upon the base 1 is mounted a switch-lever 2 and a series of electric contacts 3 for throwing sections of the rheostat into and out of circuit in the well-known manner.

The numeral 4 indicates a cut-out switch of ordinary construction for throwing the wiring of the oven into and out of circuit, as desired.

The oven is elevated above the base 1 and is connected thereto by posts 5, ample space being provided for the lowering of the oven bottom or platform to admit of conveniently placing the work in position or inspection of the work at stated intervals.

The oven comprises a metal casing and a lining of refractory material, preferably of fire-clay, the parts being readily separable to admit of substitution and replacement at a moment's notice. The casing consists of a cover 6 and a lower section 7, hingedly connected to admit of access being had to the interior of the oven when it is not desired to lower the oven bottom or platform. Lugs 8 project outwardly from the cover 6 and overlap corresponding lugs 9, projected from the lower portion 7, the two sets of lugs constituting hinge members and having openings in coincident relation to receive a pin 10 and adjunctive parts, such as insulation 11 and a metal sleeve 12, the latter screwing into the lug 8 and receiving a jam-nut 13. The opposite end of the metal sleeve 12 is fitted loosely in the lug 9, in which it is free to turn. A metal washer 14 is slipped upon an end portion of the pin 10 and is electrically insulated therefrom and comes between the lug 9

and an insulating-washer 15. The pin 10 is provided at one end with a binding-post 16, and its opposite end is threaded to receive companion clamp-nuts 17, grooved in their peripheries to receive a lead wire 18, by means of which the current is conveyed to the electric wiring of the dome-muffle. One end of the dome-muffle wiring has connection with one of the binding-posts by a wire 19, and the opposite end has connection with the other binding-post by means of a wire 19^a. The lower section 7 of the casing is of angle formation and is centrally apertured to receive the oven bottom or slab. This part 7 is bolted or otherwise secured to the upper ends of the posts 5. A slab or base 20 is fitted within the section 7 and is centrally apertured and is formed in its top side with a groove or channel 21 for the reception of asbestos or refractory packing 22. A rib 23 projects from the bottom side of the slab 20, adjacent to the opening therein, to enter a space near the outer edge of the plate 24, supporting the electrically-wired oven bottom or slab 25, and in which space is placed asbestos fiber 26 to make a tight joint between the parts 20 and 25 when the furnace is in operation. The plate 24 supports the slab 25 and is pierced to receive lugs 26', pendent from the bottom side of the part 25, whereby the latter is held from lateral displacement when the oven bottom or platform is lowered and swung to one side. The dome-muffle 27 is supported upon an inner flange of the cover 6 and has a pendent rib 28 to enter the groove 21 of the basal slab 20, so as to form a tight joint when the parts are properly assembled. The inner side of the dome-muffle 27 and the top side of the slab 25 are electrically wired, so as to effect a heating of the oven upon passage of the electric current, which passes from a binding-post *a* to and up one of the supporting-posts 5, by means of insulated wire 18, through the hinge member 8 and 9 into the dome-muffle. From its circuitous passage therein it passes out the opposite hinge member to a flat spring 49 of the circuit-closer plates 50, which are located on the base of the turn-post 33, thence up the post 33, by means of insulated wires 48', and across link 32 to the binding-post 29 and lugs 26' of the bottom 25, passing from the bottom 25 down through the lugs 26' to the opposite binding-post 29, thence to the opposite link 32 to the turn-post 33, thence by insulated wire 48' to the other side of the circuit-closer plates 50 and out the opposite spring-arm 49 to the switch-lever 2 and thence through the rheostat to the cut-out switch 4 and out to its source. The walls of the oven are wired upon all sides, so as to bake the work equally at all points.

The plate 24 constitutes, in effect, a platform and is movable vertically and laterally and is provided with binding-posts 29, to which wires 30 are connected for conveying the current to the wiring of the slab 25. The

outer edge portions of the platform project beyond the edges of the base 25 and are up-turned, so as to form the space 24', in which is placed the refractory packing 26. A bracket 31 is pendent from the plate or platform 24, and spaced links 32 have pivotal connection therewith at one end, the opposite end of the links being pivotally connected to the turn-post 33. The links 32 are located upon opposite sides of the turn-post and bracket to separate and more effectually insulate them from each other. A link 34 likewise connects the bracket 31 with the turn-post 33, and its office is to carry the weight of the platform, in conjunction with a counterbalance-lever 35, which has pivotal connection with the bracket 31 and turn-post 33, the connections 34 and 35 constituting elements whereby a parallel-grammatic movement is produced to cause the oven bottom or platform to move and always remain parallel to a given plane. The side links 32 constitute electric conductors for conveyance of the current to the wires 30, thence to the wiring of the slab 25. The platform is directed in its vertical movements by guides 36 and 37, pendent from the lower portion of the casing. The guide 37 is shorter than the guide 36 to admit of lateral swinging of the platform when lowered to the limit of its downward movement, the guide 36 preventing swinging of the platform in the opposite direction. The lever 35 is extended beyond the turn-post 33 and is weighted at its outer end, as shown at 38, to counterbalance the platform and any work that may be placed thereon, so as to normally hold the platform elevated, about as shown by the full lines in Fig. 1.

The turn-post 33 is vertically arranged and journaled at its upper end in a lug 39, projecting laterally from the oven-casing 7, and at its lower end in a bearing provided upon the base 1. Fig. 11 shows the pivot and electrical connections between the turn-post and the links 32 and 34. A pivot-stud 40 is threaded into the turn-post 33, and one end is headed and receives the link 34, and the opposite end is threaded and receives a clamp-nut 41. Screws or pins 42 are threaded into opposite ends of the pivot-stud 40, and each receives a sleeve 43 and washers 44 of insulating material. A headed thimble 45 and a washer 46 are slipped upon the sleeve 43 and are confined between the washers 44, the links 32 being mounted upon the thimbles 45 and confined between the heads thereof and the washers 46 by coil-springs 47. Other washers 48 are located between the headed ends of the thimbles 45 and the inner washers 44, and conducting-wires 48' are confined between the said washers 48 and the thimbles 45. As a result of this construction the electric conductors are held in firm contact and the current is maintained at all stages of movement of the platform or oven-bottom. A circuit-closer is located at the lower end of the turn-post and is peculiarly constructed

to prevent interruption of the current when turning the post to swing the platform laterally.

The circuit-closer consists of flat springs 49 and curved plates 50, attached to the lower part of the turn-post and insulated therefrom and having the lower ends of the wires 48' connected thereto. The springs 49 and plates 50 are in the same plane, and the said plates form parts of a ring which is split at diametrically opposite points, the split terminals being separated. The parts 49 and 50 are so disposed as to remain in contact at any stage of lateral adjustment of the platform without interruption of the current. The springs 49 constitute electric conductors and are included in the circuit embodying the wiring of the oven.

Means have been devised to prevent elevation of the platform when lowered and turned to one side, so as to obviate injury to the work and platform by elevating the oven-bottom when not in vertical alinement with the opening provided for reception of the platform. These means consist of a plate 51 and an arm 52, the plate 51 being preferably of segmental form and arranged parallel with the base 1 and the arm 52 being attached to or forming a part of the lever 35 and positioned so as to be projected into the path of the plate 51 when the platform is lowered, as shown most clearly by the dotted lines in Fig. 1. After the platform has been lowered a slight movement thereof laterally brings the arm 52 over the plate 51, so that the outer end of the lever 38 cannot be lowered to effect a lifting of the platform. The plate 51 is of a length to admit of the platform being swung laterally to the limit of its movement without carrying the arm 52 beyond the limit of the plate 51. Hence the platform cannot be elevated. When it is desired to replace the oven-bottom, it is necessary to swing the platform until the arm 52 clears the plate 51, after which the weighted end of the lever 35, moving downward, effects a corresponding elevation of the said platform and any work that may be placed thereon.

The furnace being constructed substantially as herein set forth and connected with any source for supplying an electric current, the platform may be lowered and swung to one side, as shown by the dotted lines in Fig. 6, thereby admitting of the work being conveniently and properly placed in position, after which the platform is swung to a vertical position beneath the oven and elevated by a lowering of the outer end of the lever 35. The circuit is closed by the switch 4 and the strength of the current regulated by shifting the switch 2 so as to cut out one or more sections of the rheostat. The work may be inspected by means of an observation-opening 53 in the top of the dome-muffle and cover 6 and closed at its outer end by a plate 54 of mica or other transparent heat-resist-

ing material. The work is accessible either by opening the cover 6 or by lowering the platform, the latter being preferable, as it avoids injury to the work from air-currents. After the work has been properly baked the oven is permitted to cool by shutting off the current, which is effected by throwing open the switch 4.

From the foregoing it will be understood that every part of the furnace is readily accessible for any desired purpose, and the parts, such as the dome-muffle and slabs of the oven-bottom, are readily removable and can be replaced by any one at a moment's time.

In the construction shown in Fig. 13 the platform 24 is provided at one side with a sleeve 55, slidably mounted upon a vertical post 56 and adapted to be raised and lowered by means of a lever 57, fulcrumed to a sleeve 58, likewise mounted upon the post 56, so as to turn thereon. The inner end of the lever 57 is provided with a roller 59, arranged to travel against the lower side of the platform 24 between ribs 60. This platform operates in substantially the same manner as the platform previously described, being adapted to swing laterally and move vertically. The cover 6 has its crown 6^a detachably fitted to the ends and sides of the lower portion and is held in place by hooks 61, pivoted to the ends of the part 6, and lugs 62, projected from the ends of the crown 6^a. These lugs 62 are of hook shape and project through openings in the upper edge of the end pieces of the cover. The lower edges of the crown 6^a are fitted snugly in recesses cut in the upper edges of the side pieces of the lower portion of the cover. This construction admits of the dome-muffle 27 being readily placed in position or removed.

Special stress is laid upon the provision of the packed joints 22 and 26, which seal the furnace from outside influence of air-drafts, which is essential to the efficiency of the furnace and its durability.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is—

1. In an electric furnace, an oven having a movable bottom, means for raising and lowering said bottom in a vertical direction, means whereby said bottom may be moved laterally, said before-mentioned means constituting means whereby said bottom is held in vertical position.

2. In an electric furnace, an oven comprising upper and lower sections, the lower section composed of an outer stationary base and an inner movable slab, guide-pieces secured to the outer base, for guiding said inner slab in its movements, means whereby said inner slab is raised and lowered, and means for turning said inner slab laterally.

3. In an electric furnace, an oven having a movable bottom, and means for raising and

lowering said bottom, and effecting a lateral swinging thereof when lowered, substantially as described.

4. In an electrical furnace, an oven comprising upper and lower sections, the lower section composed of an outer base and an inner slab, and means whereby an air-tight connection is made between the upper and lower sections and the inner and the outer portions of the lower sections, substantially as described.

5. In an electrical furnace, an oven comprising upper and lower sections, the lower sections having a vertically-movable and laterally-swinging central portion, and an air-tight joint between the movable and the stationary part of the said lower section, substantially as specified.

6. In an electric furnace, an oven comprising a casing formed of upper and lower parts, a dome-muffle removably incased in the upper part and supported thereby, separable slabs incased in the lower part, the middle slab being vertically movable, and means whereby an air-tight connection is made between the respective parts.

7. In an electric furnace, an oven composed of upper and lower sections, the lower section having a movable central portion, said movable central portion being electrically wired, and means whereby constant electrical current is carried thereto.

8. In an electric furnace, an oven provided with a vertically-movable bottom, and upper and lower links, carrying the said bottom and adapted to maintain it in parallel relation to a given position at any stage of its vertical adjustment, substantially as set forth.

9. In an electric furnace, an oven having a vertically-movable bottom, a pivotal support for said bottom, and a second support adapted to turn about a vertical axis to admit of lateral swinging of the pivotal support, substantially as set forth.

10. In an electric furnace, an oven having a vertically-movable bottom, a vertical turn-post, and a support pivotally connected with the turn-post and bottom to admit of vertical and lateral adjustment of the said bottom, substantially as set forth.

11. In an electric furnace, an oven having a vertically-movable bottom, a turn-post vertically arranged, and upper and lower supports having pivotal connection with the turn-post and oven-bottom, substantially as set forth.

12. In an electric furnace, an oven having a vertically-movable and laterally-swinging oven-bottom, guides of different lengths for directing the said oven-bottom in its vertical movements, and admitting of its swinging laterally in one direction only, substantially as specified.

13. In an electrical furnace, the combination of a vertically-movable oven-bottom, a counterbalance-lever for normally holding said oven-bottom in elevated position and adapted for use as a handle for manipulation therefor, and an arm on said counterbalance-

lever adapted to hold said oven-bottom in depressed position, substantially as specified.

14. In an electric furnace, having a vertically-movable and laterally-swinging oven-bottom, a turn-post, and a counterbalanced lever fulcrumed on said turn-post and having pivotal connection with the said oven-bottom, substantially as set forth.

15. In an electric furnace, having a vertically-movable and laterally-swinging oven-bottom, means for preventing vertical movement of the said oven-bottom when thrown out of vertical alinement with the opening of the furnace in which it fits when elevated, substantially as set forth.

16. In an electric furnace, having a vertically-movable and laterally-swinging oven-bottom, means for preventing elevation of the said bottom when lowered and thrown out of alinement with the opening in the bottom of the oven, said means consisting of a stop-plate and an arm, substantially as specified.

17. In an electric furnace, having a vertically-movable and laterally-swinging oven-bottom, a lever having pivotal connection with the said bottom for actuation thereof, a plate, and an arm connected for movement with the said lever and adapted to be projected into the path of the said plate when the oven-bottom is lowered and swung to one side, substantially as set forth.

18. In an electric furnace, an oven comprising a casing having its cover composed of a crown and a lower portion, the crown having its lower edges confined in recesses made in the upper edges of the lower part, and fastenings between the crown and lower portion of the casing, substantially as set forth.

19. In an electric furnace, an oven comprising a casing having a crown and lower part jointed, hook-shaped lugs extended from the crown and passed through openings in the upper edges of the lower part, and cooperating hooks, substantially as described.

20. In an electric furnace, an oven having a movable part, and a hinge-joint between the parts comprising lugs, a sleeve secured to one of the lugs and loosely fitted in the other lug, a pin passing through the sleeve and electrically insulated therefrom, and means for attaching wires to the ends of the pin, substantially as described.

21. In an electric furnace, an oven having a movable part, and a hinge-joint between the parts comprising lugs, a sleeve secured to one of the lugs and loosely fitted in the other lug, a pin passing through the sleeve and electrically insulated therefrom, a binding-post at one end of the pin and clamp-nuts at the opposite end of the pin, substantially as specified.

22. In an electrical furnace, a turn-post, curved plates attached to the turn-posts and forming electrical terminals, and means whereby constant electrical contact is made with the plates and the rest of the circuit, substantially as specified.

23. In an electrical furnace, an oven having a movable bottom, means for guiding said bottom in its vertical movements, and means for swinging said bottom laterally in one direction after it has passed said guiding means, and means for holding said bottom in its vertical position while swinging, substantially as described.

24. In an electric furnace, an oven having a movable part, and a swinging support, a joint for the swinging support comprising a pivot-stud, pins let into the ends of the pivot-stud, links mounted upon the pins and electrically insulated therefrom, springs exerting a lateral pressure against the links, and conducting-wires in electrical connection with the said links, substantially as specified.

25. In an electric furnace, an oven com-

posed of upper and lower sections, said lower section having a vertically-movable bottom, and an air-tight joint comprising tongue and groove and refractory packing.

26. In an electrical furnace, an oven having a movable bottom, a supporting-platform for said bottom, lugs on said bottom, and holes in said platform for receiving said lugs and preventing the lateral displacement of the bottom during its vertical movement, substantially as described.

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

JOHN F. HAMMOND.

Witnesses:

DAISY CLASEN,
EMMA WUERFEL.