

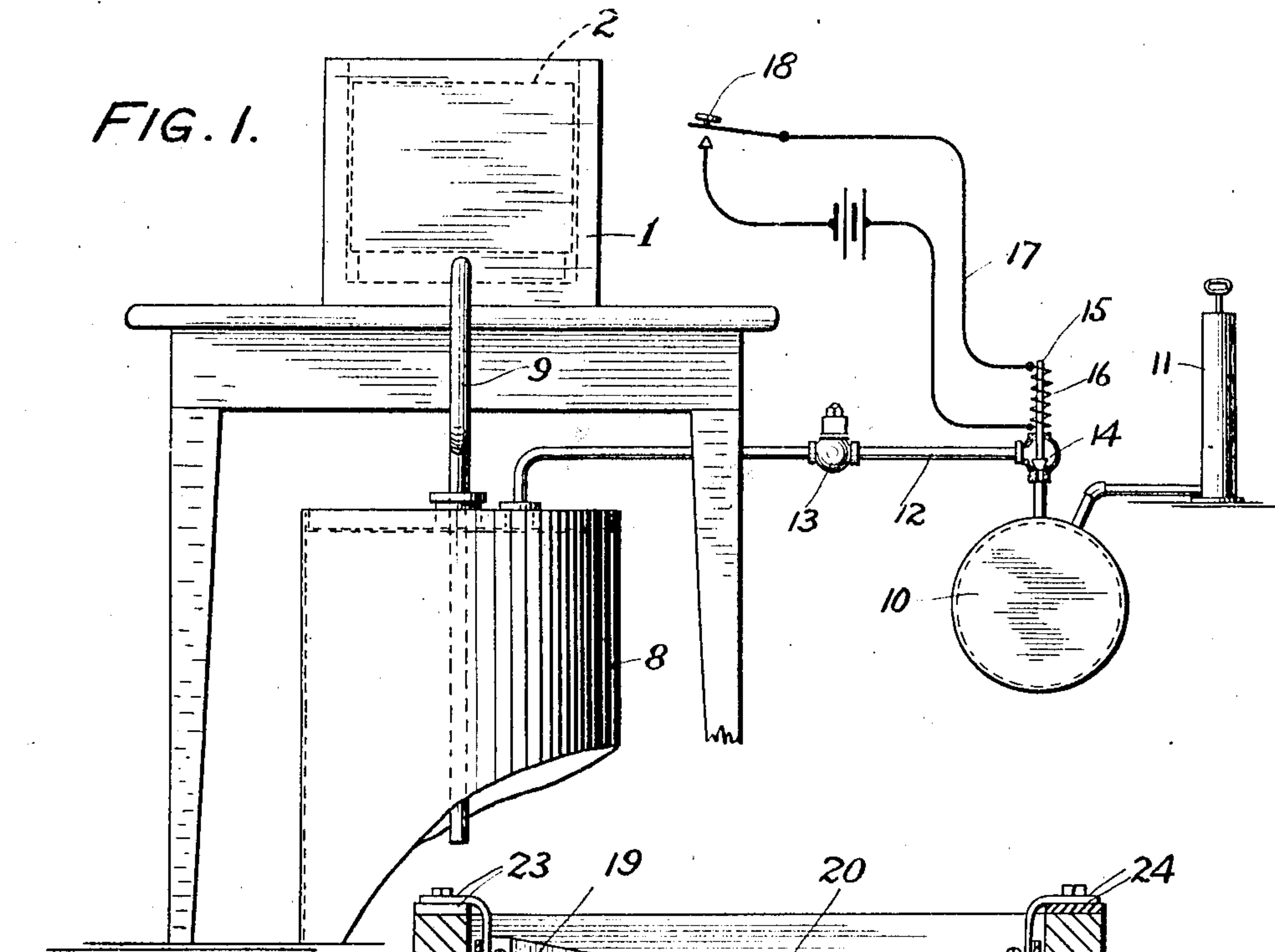
F. A. DECKER.  
ELECTRIC BATTERY.

APPLICATION FILED JUNE 20, 1907. RENEWED NOV. 11, 1909.

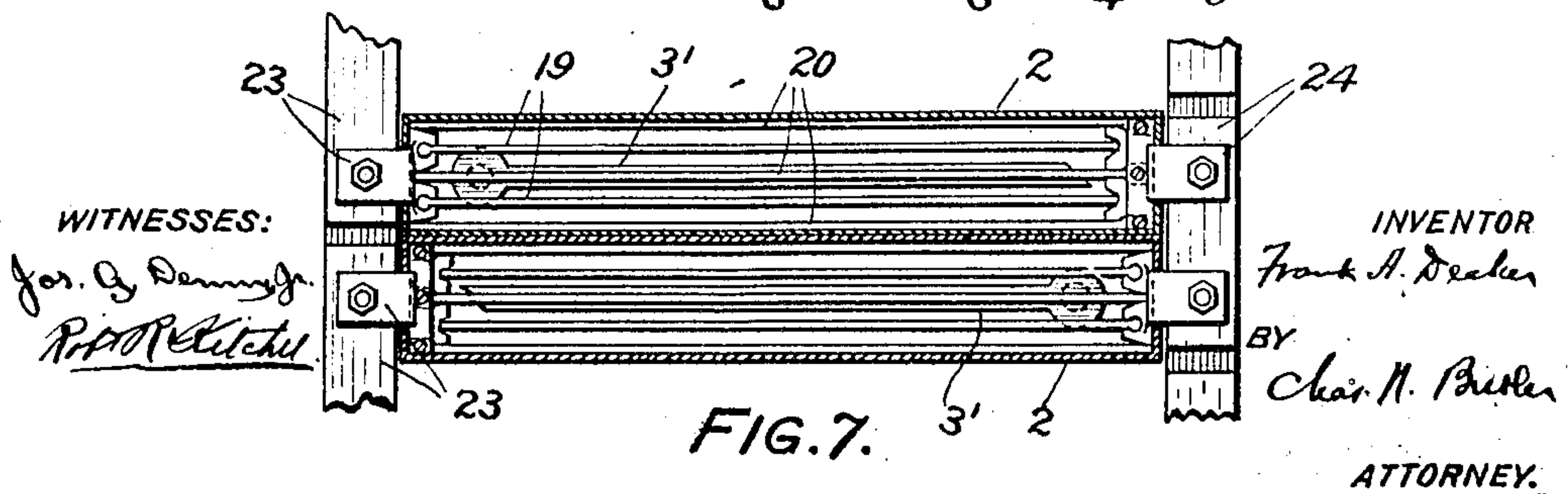
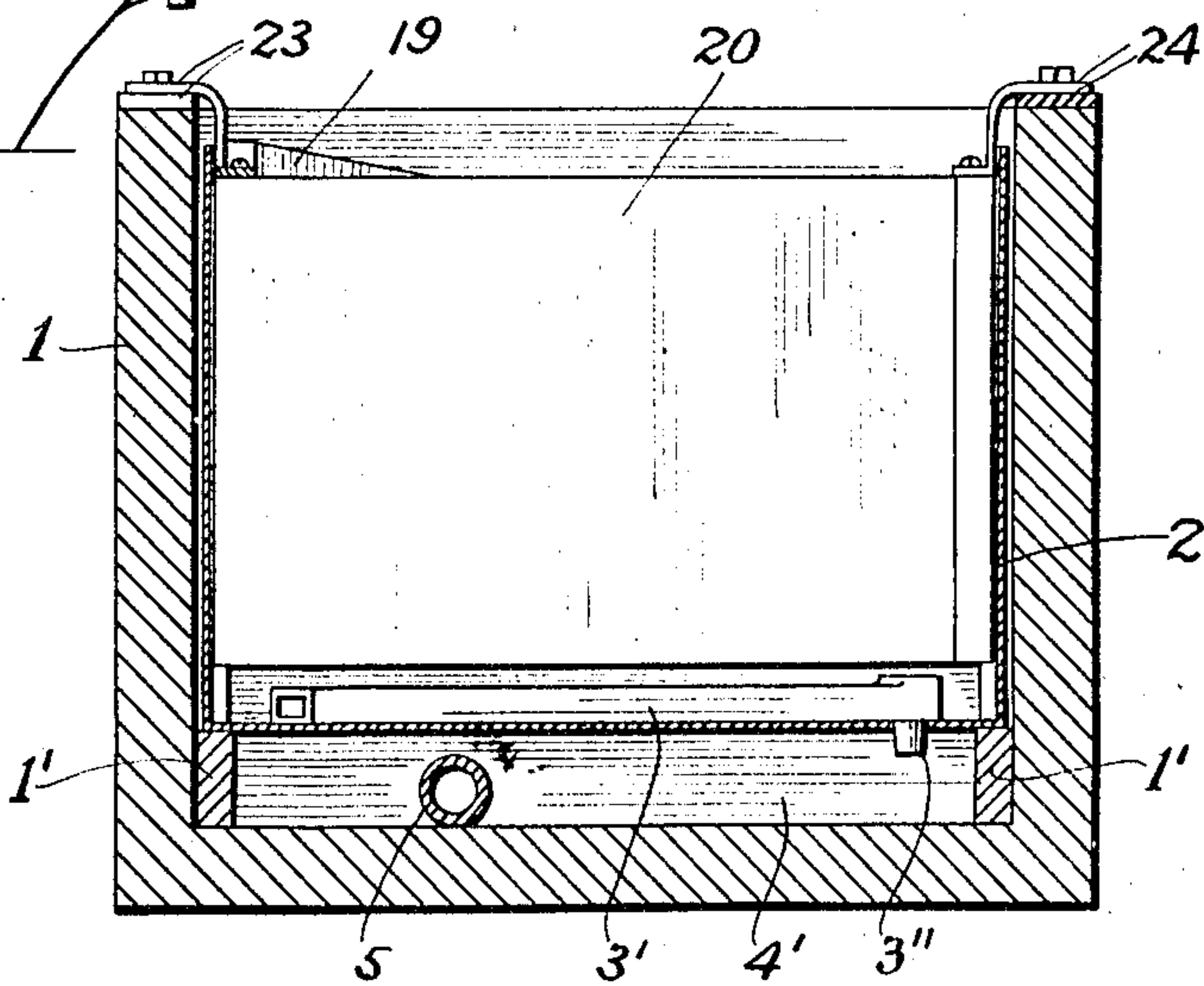
944,079.

Patented Dec. 21, 1909.

2 SHEETS—SHEET 1.



**FIG. 6.**



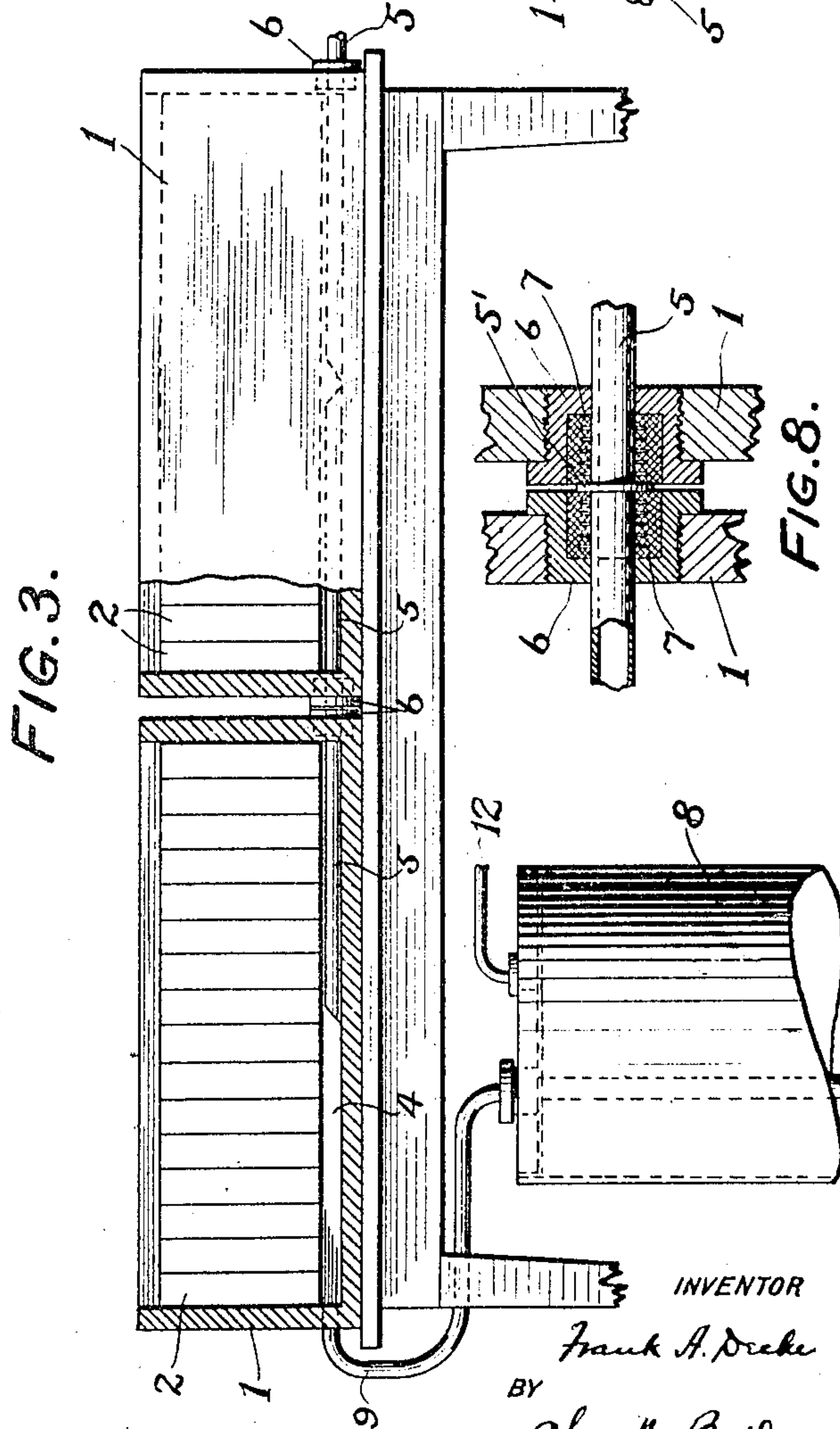
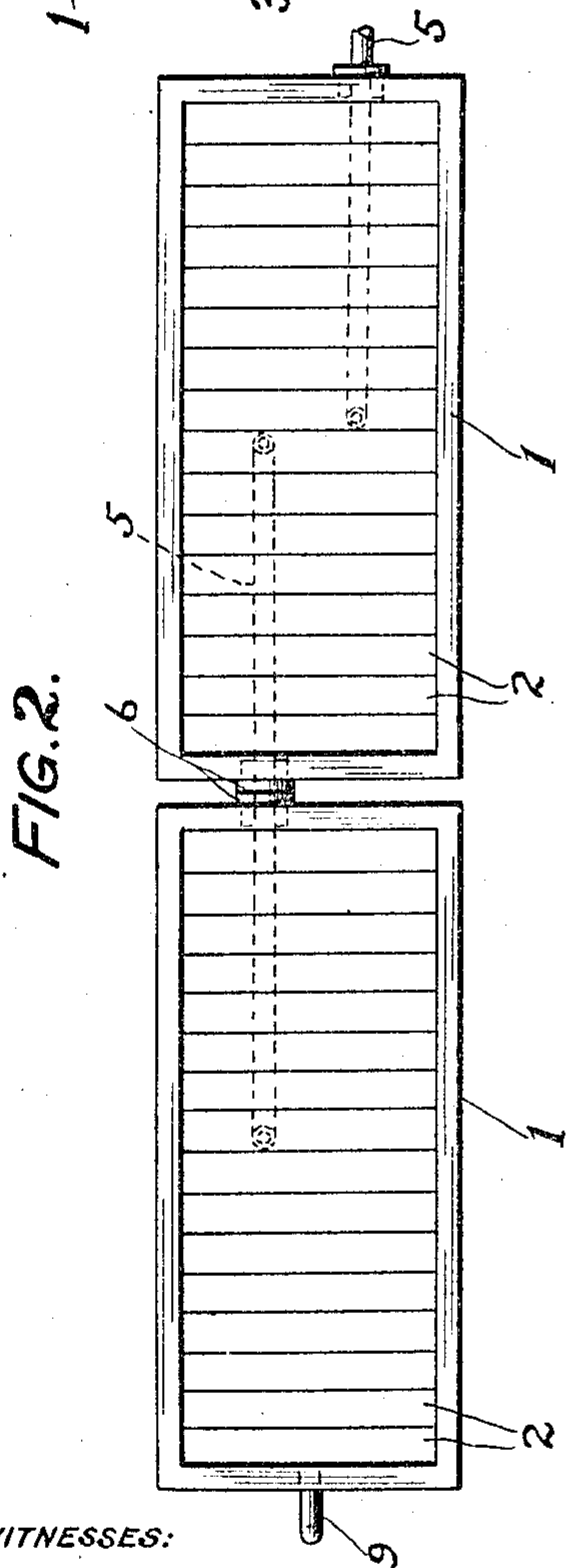
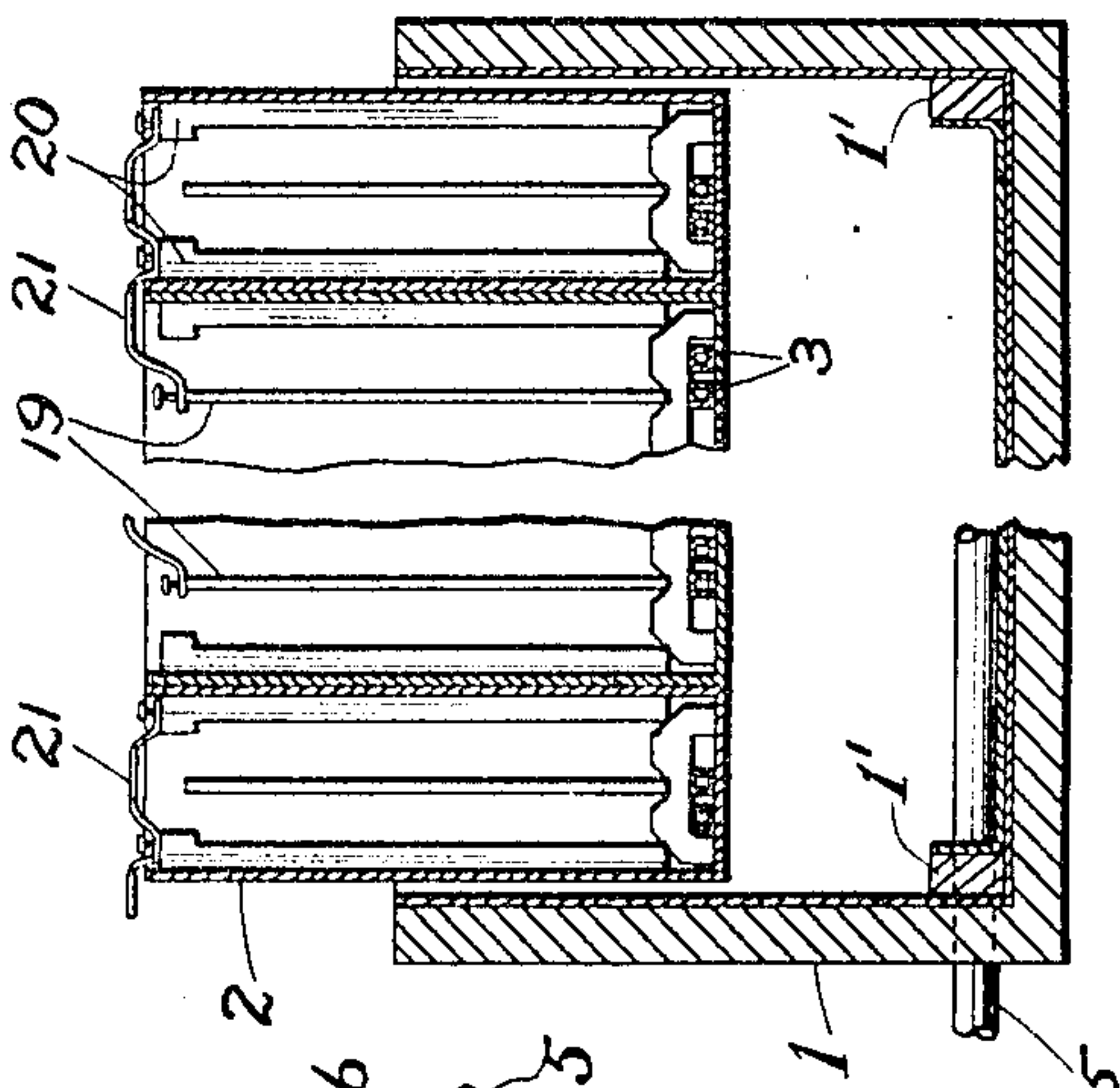
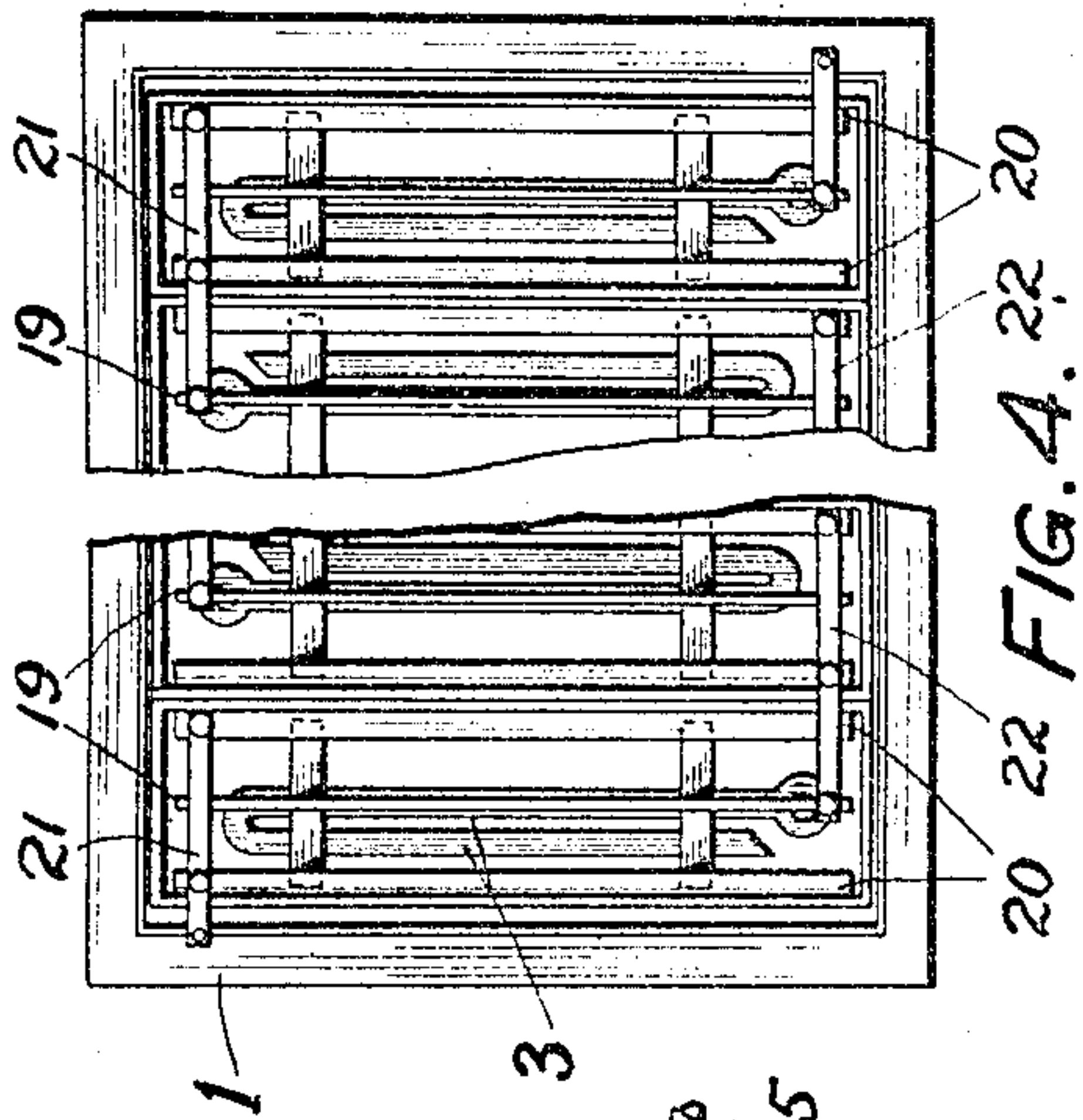
# ELECTRIC BATTERY.

APPLICATION FILED JUNE 20, 1907. RENEWED NOV. 11, 1909.

944,079.

Patented Dec. 21, 1909.

2 SHEETS—SHEET 2:



**WITNESSES:**

Jos. G. Deming, Jr.  
Robt R Ketchel

***INVENTOR***

Frank A. Drake

BY

Chas. H. Butler

**ATTORNEY.**



# UNITED STATES PATENT OFFICE.

FRANK A. DECKER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO DECKER ELECTRICAL MANUFACTURING COMPANY, OF WILMINGTON, DELAWARE, A CORPORATION OF DELAWARE.

## ELECTRIC BATTERY.

944,079.

Specification of Letters Patent.

Patented Dec. 21, 1909.

Application filed June 20, 1907, Serial No. 379,834. Renewed November 11, 1909. Serial No. 527,569.

*To all whom it may concern:*

Be it known that I, FRANK A. DECKER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain Improvements in Electric Batteries, of which the following is a specification.

This invention relates to an electric battery having one or more units, respectively comprising a vessel containing cells having resistance ducts by which their interiors communicate with a common compartment, with the compartments of the several units used connected by resistance ducts, by which electrical leakage between the several cells and several compartments may be prevented and the cells of one or more units may be filled from a supply tank from which liquid is forced by the admission thereto of air from a compressed air reservoir controlled by suitable valve mechanism.

The leading object of the invention is to provide, in a single fluid battery of either the ordinary or plunge type, a convenient construction by which any desired number of units can readily be connected, disconnected, charged and discharged and short circuiting between the cells and units prevented.

The nature and characteristic features of the invention will more fully appear by reference to the following description and the accompanying drawings in illustration thereof, of which:

Figure 1 is a diagrammatic view of the invention showing the battery in end elevation; Fig. 2 is a diagrammatic view showing a plan of the battery with several connected units; Fig. 3 is a diagrammatic view showing a sectional side elevation of the battery with several connected units; Fig. 4 is a detail view showing a plan of a vessel containing cells and connections comprised in the battery unit; Fig. 5 is a detail view showing a vertical longitudinal section of the construction represented in Fig. 4 with the cells elevated; Fig. 6 is a detail view showing a vertical transverse section of the battery with features of the construction modified; Fig. 7 is a detail view showing a plan of features of the construction shown in Fig. 6, and Fig. 8 is a detail view showing a longitudinal section of a coupling for connected vessels.

As shown in the drawings, the battery units comprise the vessels 1 containing the cells 2 resting upon supports 1', each cell having therein a resistance duct 3 as shown in Figs. 4 and 5, or 3' as shown in Figs. 6 and 7. In each unit these resistance ducts provide a fluid connection between each cell and a compartment 4 beneath them in the vessel, tapering nipples 3'' on the ducts passing through the bottoms of the cells and forming tight joints therewith. The ducts, composed of suitable insulating material, have such small bore and considerable length that no considerable current will leak through the solution contained therein.

The several battery units have their compartments 4 connected by the resistance ducts 5, of suitable insulating material, which provide passages affording liquid connections between the compartments, and preventing any considerable leakage of current by reason of the small bore and considerable length of the passage. To provide a tight joint between the vessels 1 and the ducts 5, the externally threaded boxes 6 containing the rubber packing 7 having channels filled with graphite are sleeved on the ducts, and the boxes screwed into the end walls of the vessels through which the ducts pass; the vessels being drawn together so that the packings are pressed by flanges 5' on the ducts. The battery compartments 4 being thus connected together and with their respective cells, are filled and emptied by means of a tank 8 and a conduit 9 which extends into the tank and is connected with an end compartment. The tank is preferably placed below the level of the compartments so that the battery may discharge its solution into the tank by gravity. A compressed air reservoir 10, charged by means of a pump 11, is connected with the tank 8 by a conduit 12 containing a reducing valve 13 and a controlling valve 14. The latter is preferably operated by connecting it with a stem 15 forming the core of a solenoid 16 in an electric circuit 17, which is controlled by a switch 18, the valve being lifted to open the conduit when the solenoid is excited by closing the switch and dropping to close the conduit when the circuit is broken.

It is to be understood that in the foregoing construction the relation of the cells



to the containing vessels is such as to provide for their use as a plunge battery, the cells being filled through their ducts by lowering them into the vessels when charged with the desired amount of solution and emptied by lifting.

In the cells are the positive electrodes 19 and the negative electrodes 20 having serial connections 21 and 22 as shown in Figs. 4 and 5, or 23 and 24 as shown in Figs. 6 and 7.

For moderate voltages, up to say thirty volts, it is sufficient to use one unit of twenty cells or less. But for higher voltages, say one hundred and ten volts, it is desirable to employ several units, to facilitate handling and to limit the leakage of current between the cells. It is therefore to be understood that the particular number as well as the arrangement of units and cells may be varied as required by varying conditions.

The term resistance duct or passage is to be understood as meaning a duct or passage of such length and cross section as will provide the necessary resistance to electric leakage through the solution contained therein. The proportions of such ducts will be varied with varying conditions and will depend upon the number of cells and the conductivity of the solution employed.

Having described my invention, I claim:—

1. In an electric battery, a vessel and in said vessel a plurality of removable cells each having a resistance duct connecting its interior and the interior of said vessel, said vessel and cells being adapted for holding a solution communicating from one to the other through said ducts.

2. In an electric battery, a vessel containing a plurality of cells each having a resistance passage, a liquid compartment communicating with said passages, a liquid reservoir connected with said compartment, and a fluid pressure reservoir connected with said liquid reservoir.

3. In an electric battery, a plurality of units, each comprising a compartment and a plurality of cells having resistance ducts communicating with said compartment, means for connecting said compartments, and means for filling and emptying said cells through said compartments.

4. In an electric battery, a plurality of units, each comprising a bottom compartment and a plurality of cells having resistance ducts connecting them with said compartments, resistance ducts connecting said compartments, and means connected with said compartments for filling and emptying said cells therethrough.

5. In an electric battery, a pair of vessels,

a resistance duct connecting said vessels and in each of said vessels a set of removable cells each having a resistance duct connecting its interior and the interior of the vessel containing it whereby intercommunication is effected between the respective vessels and the cells contained therein.

6. In an electric battery, a vessel containing a liquid compartment, a resistance duct communicating with said compartment, and a box containing a packing sleeved on said duct and set in said vessel.

7. In an electric battery, a pair of units each comprising a plurality of cells and a liquid compartment communicating therewith, a resistance duct connecting said compartments, and a box containing a packing sleeved on said duct and screwed into the wall of each compartment.

8. In an electric battery, a vessel, in said vessel a set of cells each having a resistance duct for effecting intercommunication between the interiors of said vessel and cells, a liquid reservoir connected with said vessel, a fluid pressure reservoir connected with said liquid reservoir, a reducing valve for regulating the pressure communicated from said fluid pressure reservoir to said liquid reservoir, and a valve for opening and closing the connection between said reservoirs.

9. In an electric battery, a set of cells each having a resistance duct, a compartment communicating with said cells by said resistance ducts, a liquid reservoir connected with said compartment, a fluid pressure reservoir connected with said liquid reservoir, a valve for controlling the communication between said reservoirs, and an electric circuit containing a switch and a solenoid for operating said valve.

10. An electric battery comprising a vessel for holding solution and a plurality of cells adapted to be raised and lowered in said vessel, each cell having a resistance duct through which it can be filled and emptied by lowering and raising it in the solution contained in said vessel.

11. An electric battery comprising a vessel for holding solution and a plurality of cells adapted to be raised and lowered in said vessel, each cell containing a tube communicating through the bottom thereof with said vessel and having such length and caliber as to prevent short circuiting between the cells by way thereof.

In witness whereof I have hereunto set my name this 13th day of June, 1907, in the presence of the subscribing witnesses.

FRANK A. DECKER.

Witnesses:

FRANCIS B. CROCKER,  
CHARLES N. BUTLER.