No. 687,800. Patented Dec. 3, 1901.

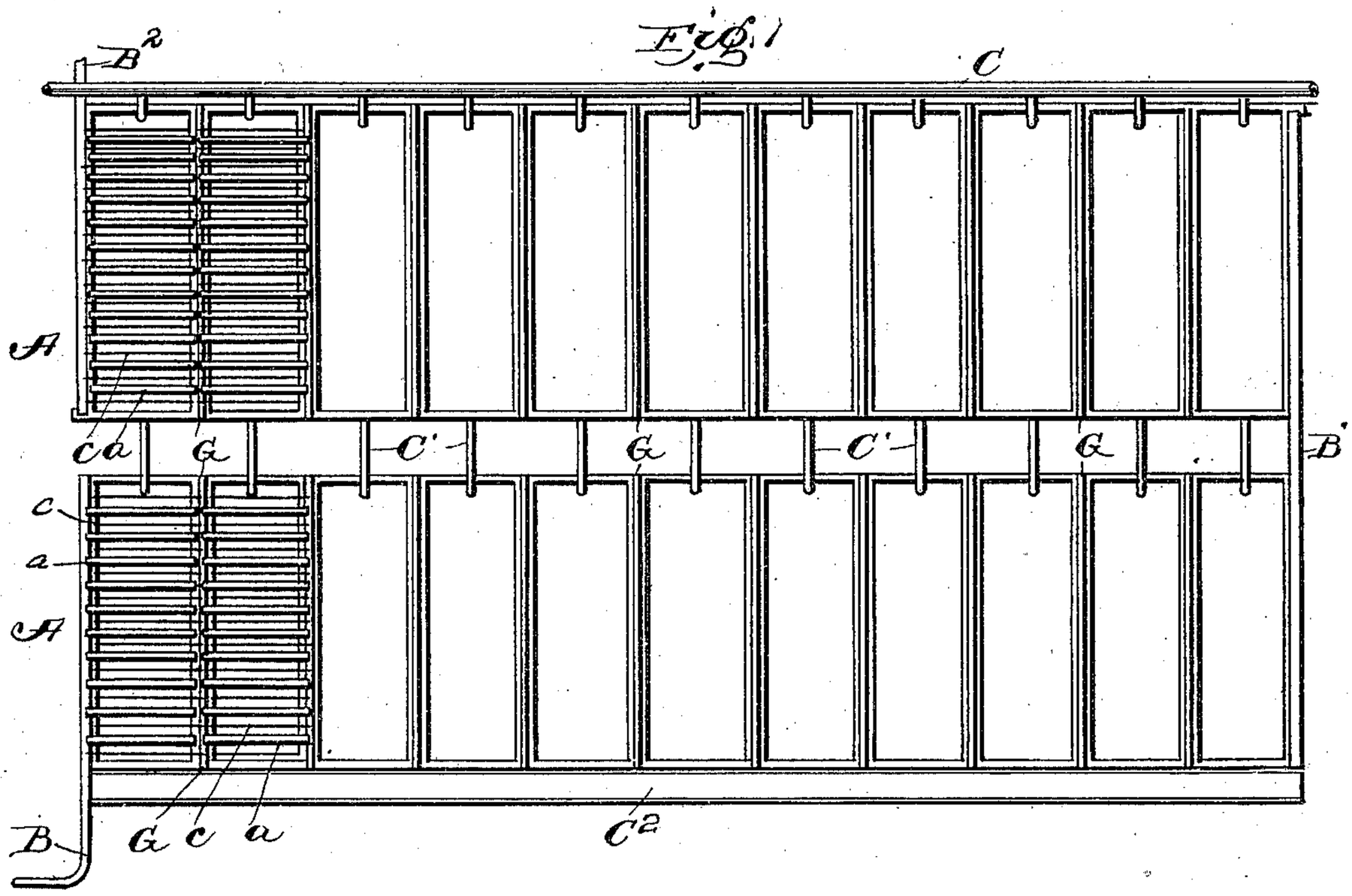
A. L. WALKER.

PLANT FOR THE ELECTRODEPOSITION OF METAL.

(Application filed Mar. 28, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1



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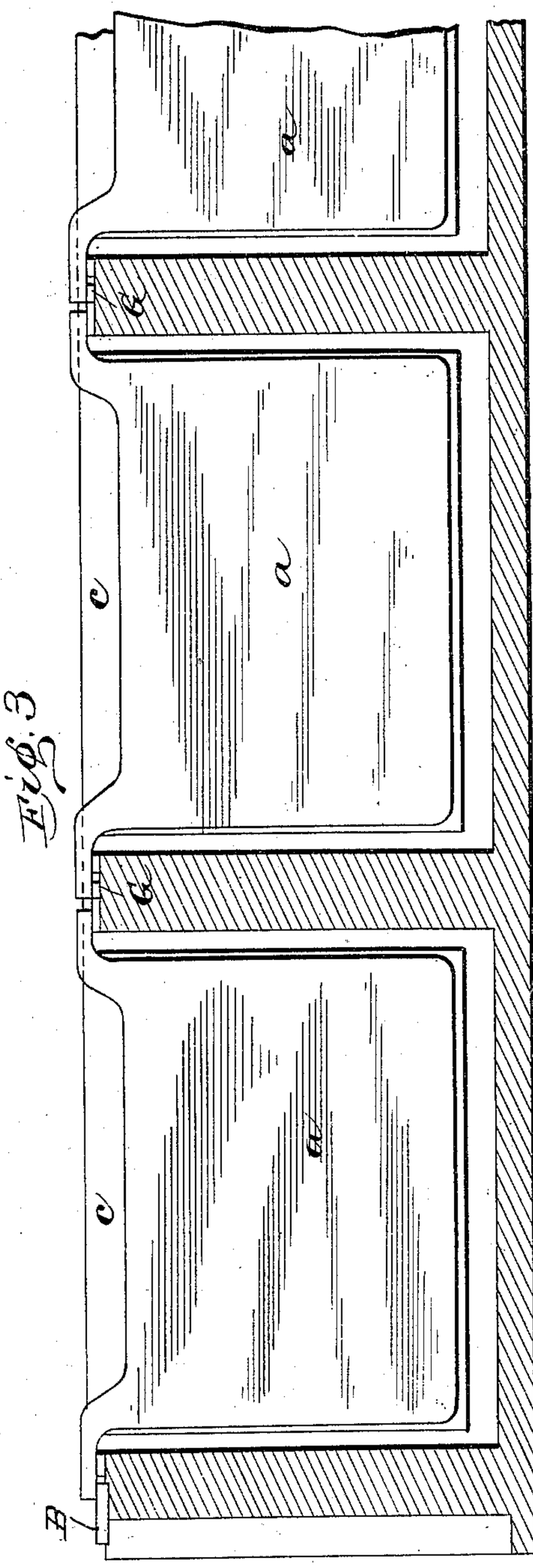

FIG. 3

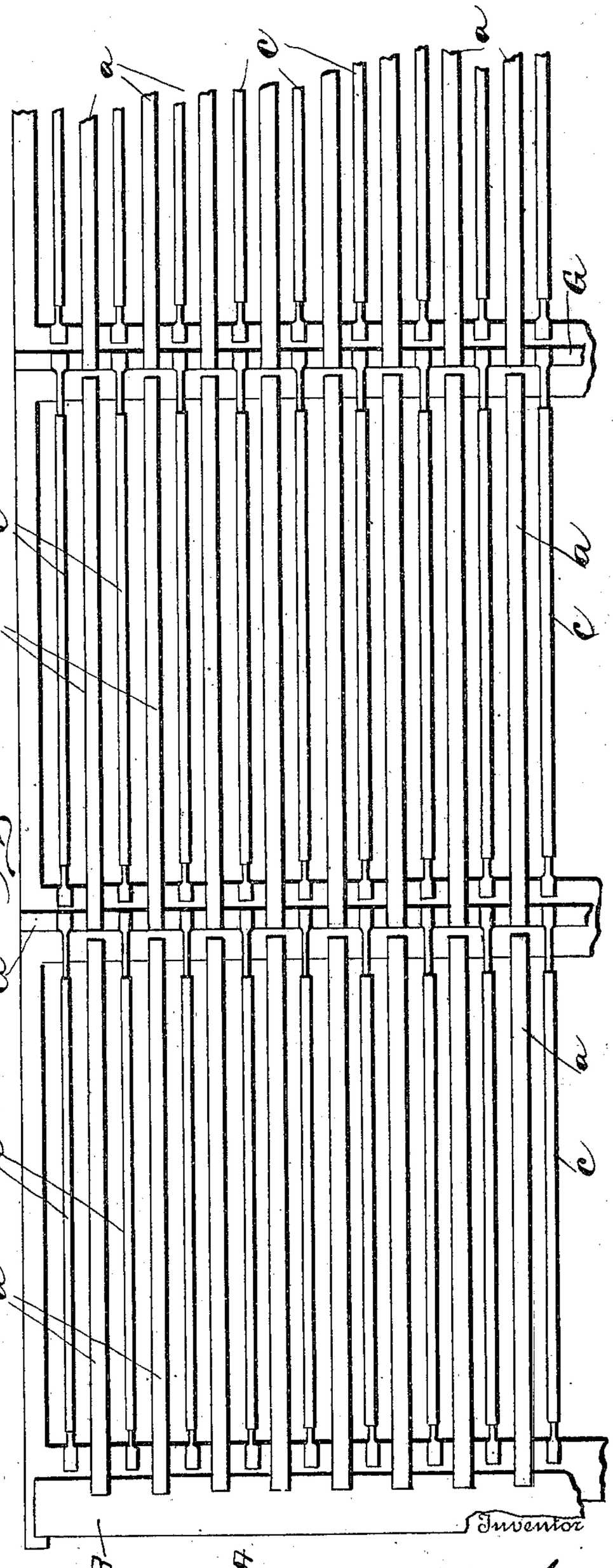

FIG. 2

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PLANT FOR THE ELECTRODEPOSITION OF METALS.

SPECIFICATION forming part of Letters Patent No. 687,800, dated December 3, 1901.

Application filed March 28, 1900. Serial No. 10,509. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR L. WALKER, a citizen of the United States, residing at Perth Amboy, in the county of Middlesex and State of New Jersey, have invented certain new and useful Improvements in Plants for the Electrodeposition of Metals; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the letters of reference marked thereon.

This invention relates to improvements in plants and apparatus such as are employed in metal-refining manipulations where the metal is separated from its impurities by electrodeposition, the object of the invention being to reduce so far as possible the cost of installing such a plant, to which ends it consists in an arrangement wherein the cost of the conductors for carrying the current between the several tanks is materially lessened. For illustration, in a plant adapted to operate on the multiple system as it has been heretofore installed the whole current is carried by conductor-bars between tanks, and if a four-thousand-ampere current is used it is necessary to employ bars of copper having a cross-sectional area of five square inches, which bars each extend the length of each tank plus the distance between tanks. With my present arrangement, however, heavy conducting-bars are entirely done away with between tanks and the current carried from tank to tank of the series by means of copper bars having only five per cent. of the area of the large conductors. Thus the saving in carrying the current through the series of tanks is enormous and including the terminal conducting-bars the saving of copper in my present arrangement will be at least eighty-three per cent. of the best former practice and in some cases much more than this.

In carrying the invention into practice the tanks are arranged in series in successive order and the tanks of each series in proximity to each other. Heavy conductor-bars such as are ordinarily employed constitute the leading-in and leading-out conductors, extending only, however, to the first and last tanks of the series, while the elements—*i. e.*, anodes and cathodes—constitute throughout practically the entire length of the series of tanks the conductors for the current, the cathodes in one tank being electrically connected directly with corresponding anodes in the next adjacent tank by electrical connections which individually carry only a fraction of the total current passing between tanks, but of course collectively carry the entire current. By arranging the tanks in proximity the cathodes and anodes may be connected by conductors each of relatively small cross-sectional area, or, in other words, only such conductors are necessary as have heretofore ordinarily been employed for constituting the electrical connection between the elements and the usual heavy conductor-bars employed for conveying the current from one tank to the next tank.

The invention is carried into effect by arranging distributing-bars of relatively small cross-sectional area parallel with and between adjacent tanks, and the cathodes of one tank and the anodes of the next succeeding tank may rest upon or make electrical contact with such distributing-bars, the said anodes and cathodes being equally distributed throughout the length of the distributing-bars, whereby at no one point in cross-section will said distributing-bars be required to carry more than a fraction of the entire current passing between tanks, for the reason that the current passing from each cathode to the distributing-bar will find its path of least resistance to be through one or more of the immediately adjacent anodes of the next tank, and thus the distributing-bar will have a current capacity in toto equal to that of a conductor-bar having a cross-sectional area equal to the sum of the cross-sectional areas of the distributing-bar between adjacent anodes and cathodes.

In the accompanying drawings, Figure 1 is a top plan view of two series of tanks adapted for carrying the invention into practice where distributing-bars are employed between tanks. Fig. 2 is a similar view of a section of three tanks, showing the arrangement on an enlarged scale. Fig. 3 is a vertical section of Fig. 2.

Like letters of reference in the several figures indicate the same parts.

The letter A indicates a series of tanks arranged side by side in proximity to each other or with integral abutting walls, if so desired. In Fig. 1 two series of such tanks are shown, the first tank being provided with a leading-in conductor B of sufficient cross-sectional area to carry the entire current utilized in the plant illustrated, while the last tank of the series is provided with a similar conductor for carrying off the current. Where two series of tanks are employed, the last tank of one series is connected with the first tank of the next series by a heavy conductor-bar B′, and the last tank of the second series is provided with a similar heavy conductor-bar, such as B^2. These are the only heavy conductor-bars employed in the arrangement unless a greater number of series of tanks are used in the plant, in which instance a corresponding arrangement is followed out. Where several series of tanks are employed, it is preferable to provide a means for flowing the liquor therethrough by gravity, for which purpose in the illustration a supply-pipe C is provided for discharging liquor into one series of tanks, and a series of connecting-pipes C′ are provided for conveying the liquor from this series of tanks into the second series of tanks, and a liquor-trough C^2 is provided for receiving the liquor from the latter series and carrying it back to the well for redistribution or for other suitable manipulation.

The anodes and cathodes are indicated, respectively, by the letters *a* and *c*, and it will be noted that in each tank the arrangement of anodes and cathodes is in accordance with what is known as the "multiple" system; but the several tanks are arranged in series. The anodes and cathodes in each series of tanks are arranged in alinement, and the supporting projections of the anodes of the first tank make electrical contact by resting freely on the leading-in main at one side of the tank, but at the opposite side of the tank rest freely on insulating-supports or directly on the side of the tank, which may be a sufficient insulator. The supporting projections of the cathodes of this first tank on one side are supported by insulating-supports or by the side of the tank and at the opposite side rest on a relatively light distributing-bar G, which distributing-bar is preferably arranged at a point intermediate the two tanks and equally distant therefrom, in such position that the anodes of the next succeeding tank may at one side rest thereon at points between the cathodes of the first tank. This arrangement is preserved throughout the entire series of tanks, and as a result the current distributed to the first series of anodes passes through the electrolyte to the cathodes and thence directly to the anodes of the next tank without being concentrated in a single part of the distributing-bar or caused to flow in its entirety through any cross-section of said bar. In other words, the current from the leading-in main is distributed and is provided with a series of paths corresponding in number to the number of anodes or cathodes and never unites in a single path again until it reaches the main at the opposite end of the series of tanks. The result of such arrangement is that no heavy conductor-bars are necessary between tanks, and the cost of the copper for such bars is consequently saved.

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

A plant for the deposition of metal electrically by means of heavy currents distributed through numbers of plates arranged in multiple in tanks arranged in series, embodying tanks arranged with the proximate walls substantially parallel and close together; leading-in and leading-out mains extending to the end tanks of the series, said mains being of large and sufficient cross-section to carry the entire current supplied to all the tanks, distributing-bars of small cross-sectional area supported between adjacent tanks, and anodes and cathodes arranged in the tanks and having supporting projections at the top, the supporting projections of the anodes and of the cathodes in adjacent tanks resting freely on the same distributing-bars whereby electrical connection between anodes and cathodes of adjacent tanks is established through connections individually of small and insufficient area to carry the total current but collectively of an area sufficient to carry said current, the supporting projections at one side of the anodes of the first tank and of the cathodes of the last tank resting freely on the leading-in and leading-out mains respectively; substantially as described.

ARTHUR L. WALKER.

Witnesses:
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