

(No Model.)

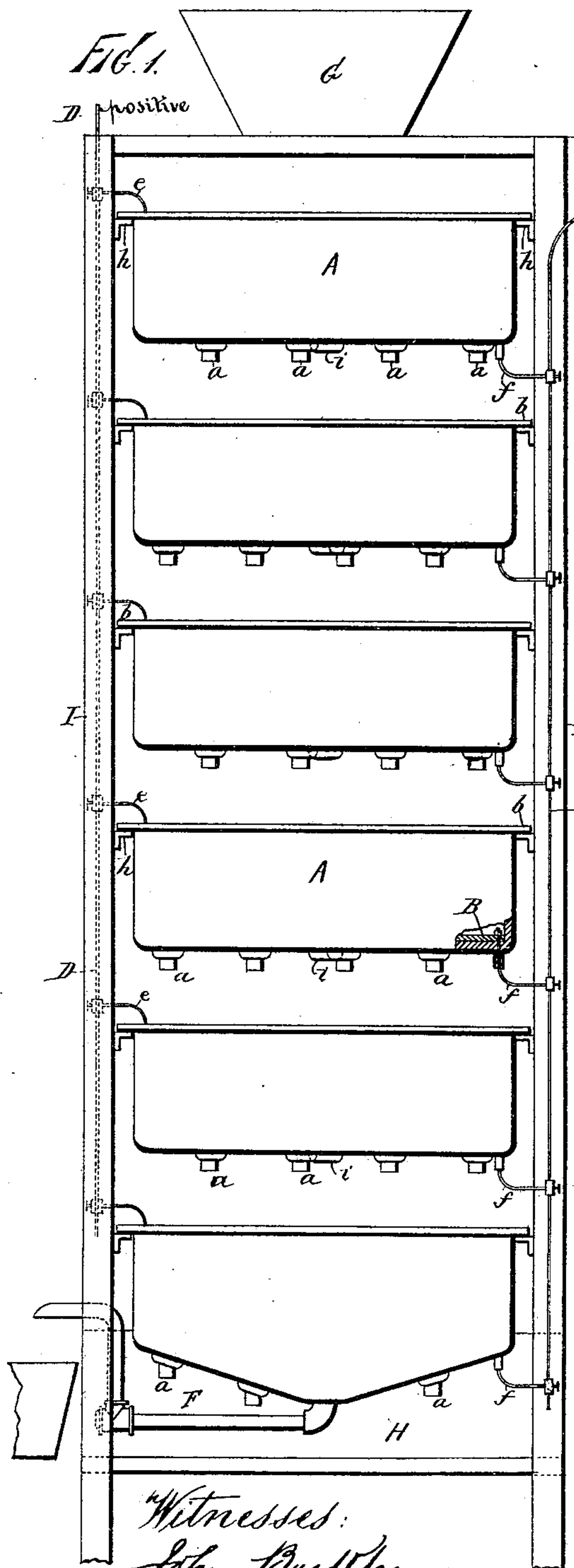
2 Sheets—Sheet 1.

J. A. SPERRY.

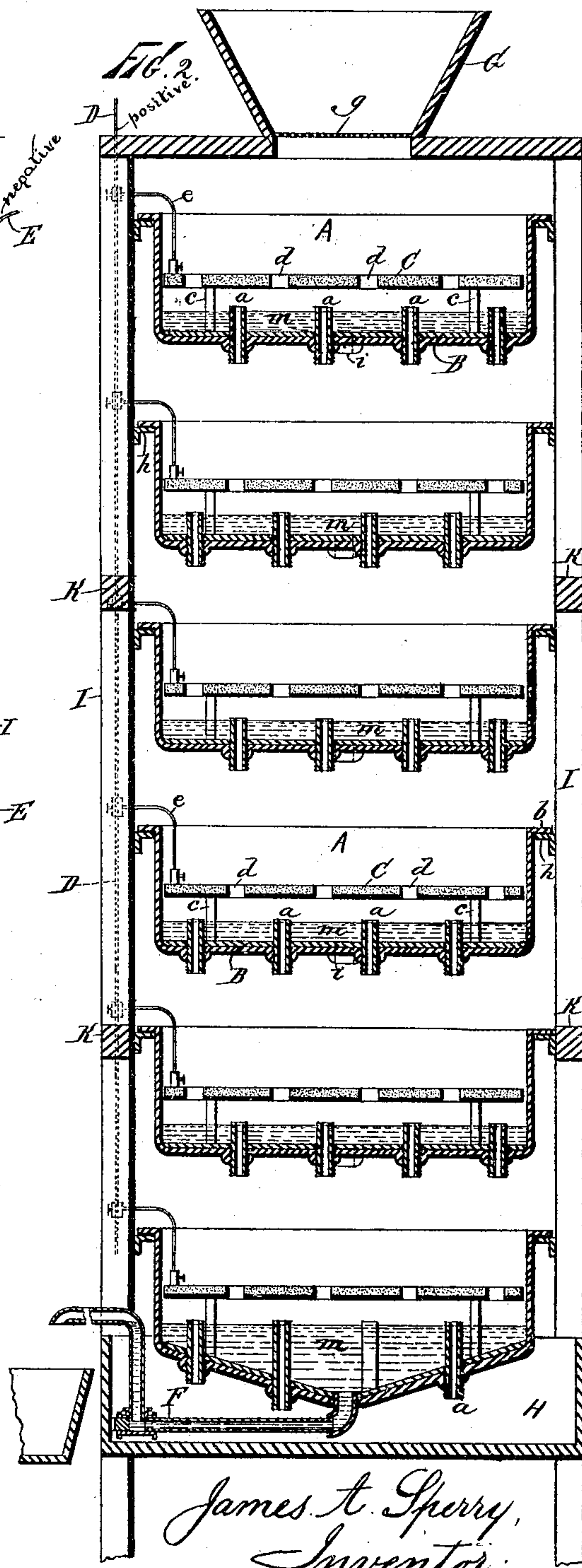
AMALGAMATOR.

No. 371,523.

Patented Oct. 11, 1887.



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L. H. Osgood,



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FIG. 3.

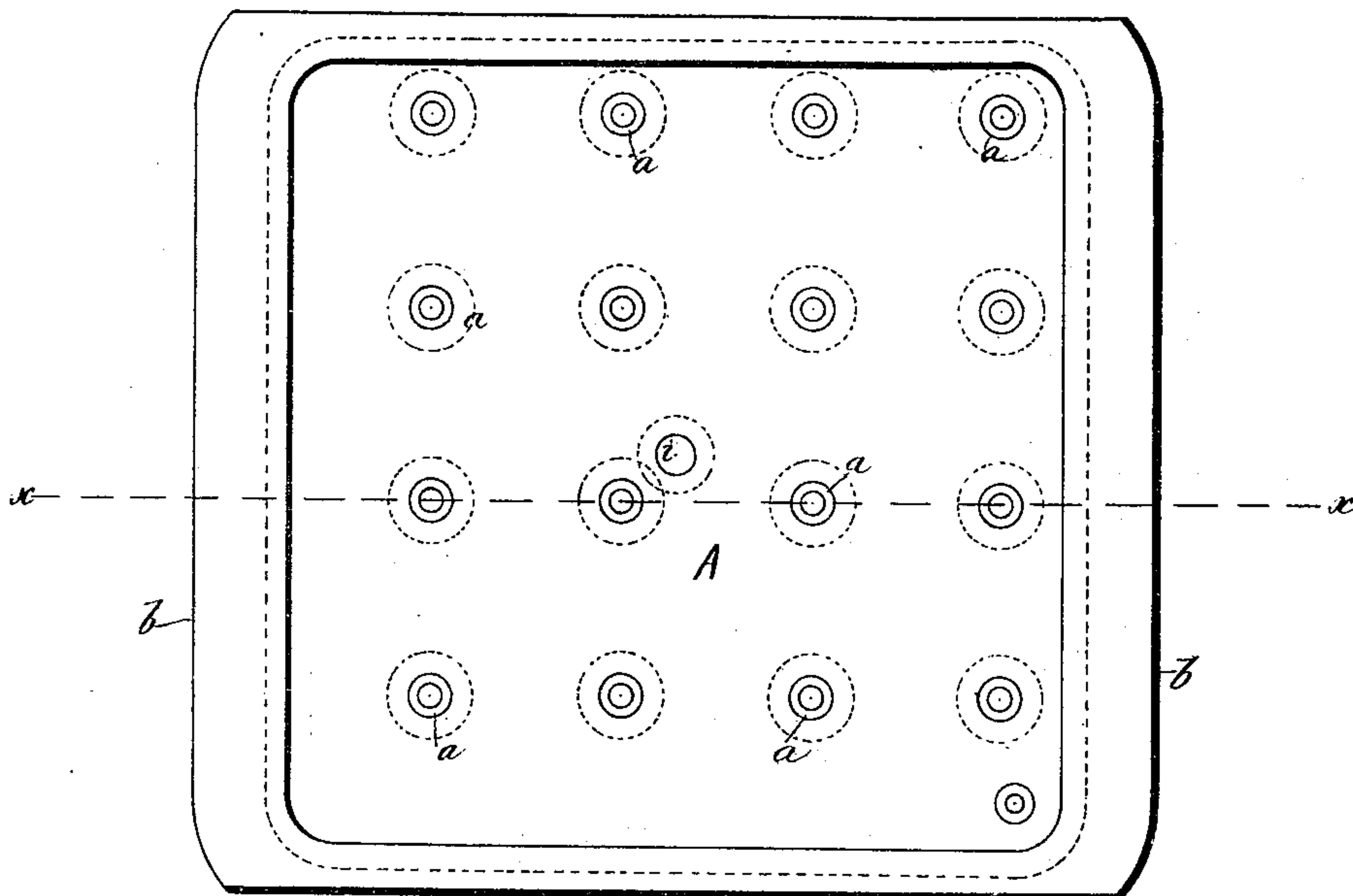


FIG. 4.

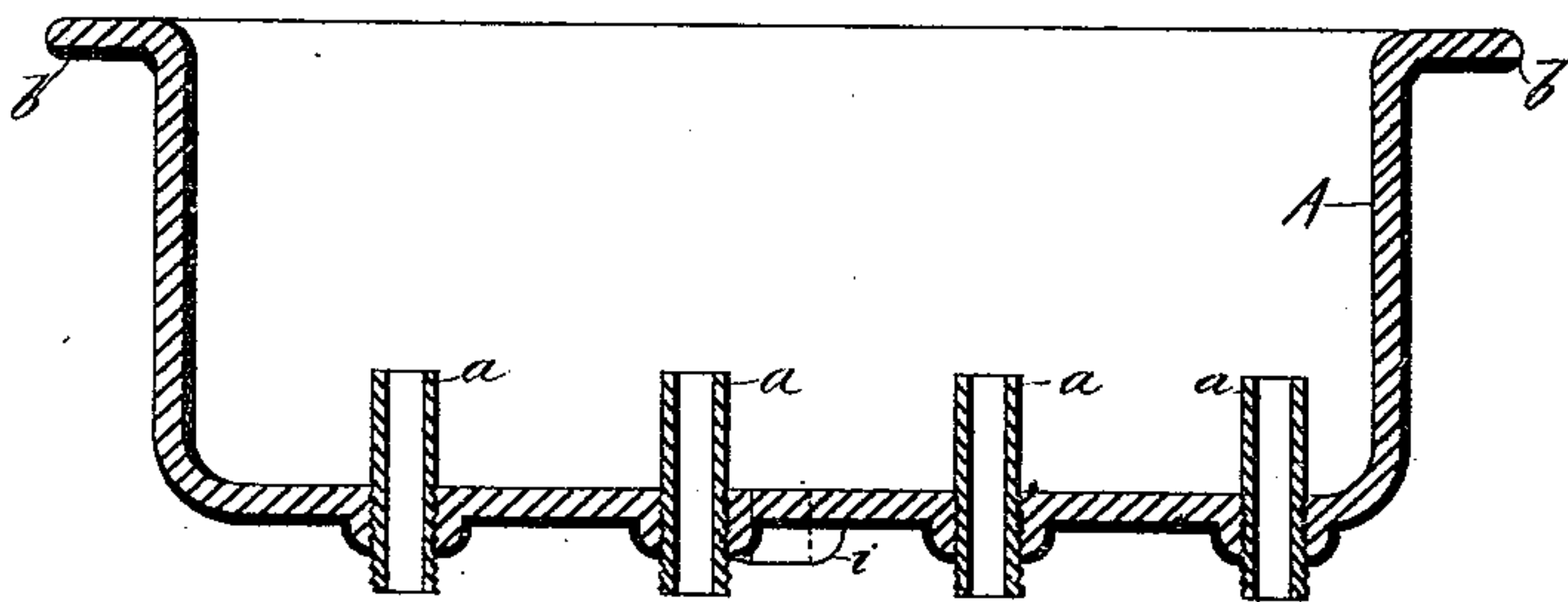
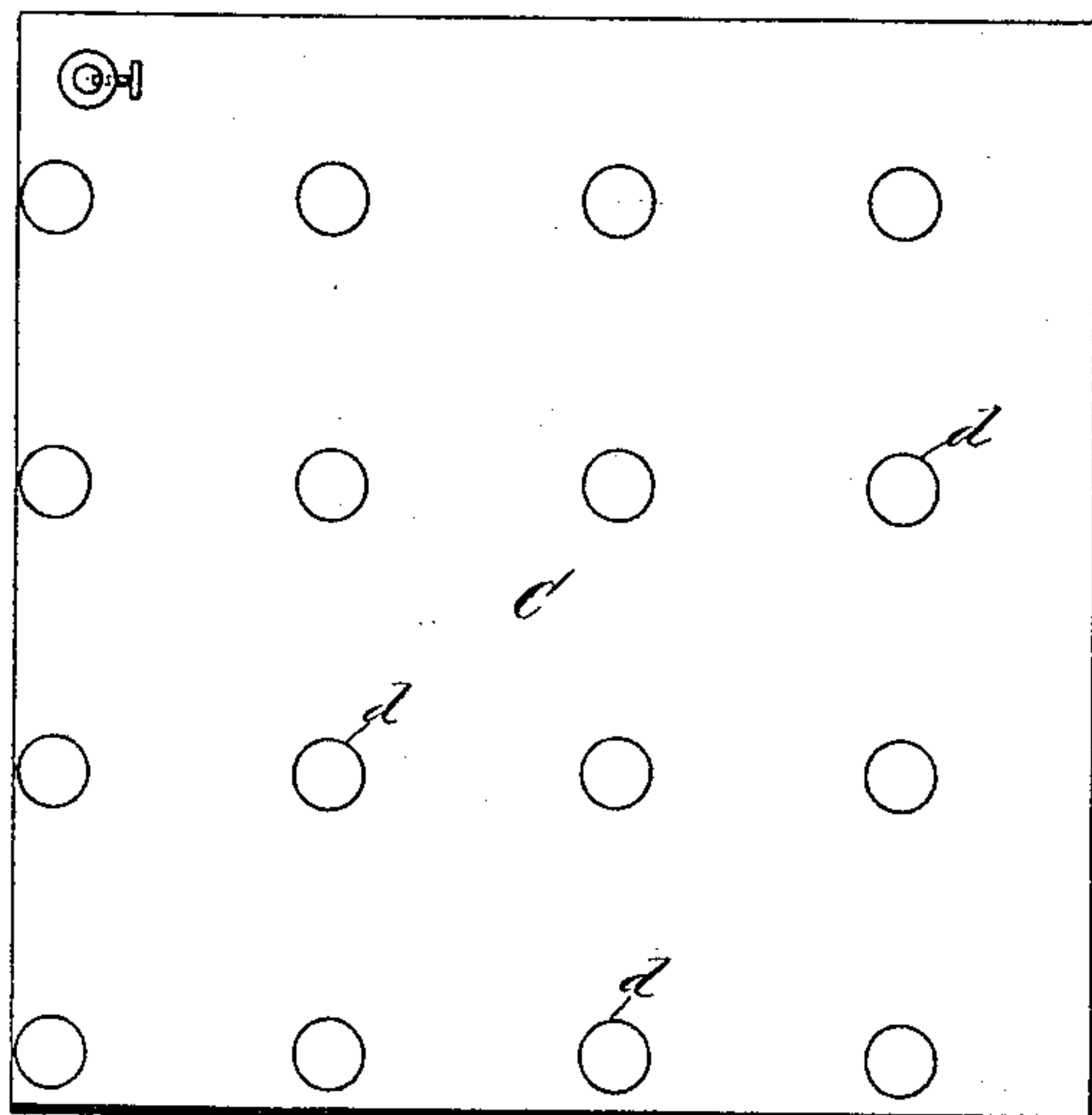


FIG. 5.



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# UNITED STATES PATENT OFFICE.

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## AMALGAMATOR.

SPECIFICATION forming part of Letters Patent No. 371,523, dated October 11, 1887.

Application filed November 18, 1886. Serial No. 219,271. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES A. SPERRY, of Brooklyn, county of Kings, and State of New York, have invented certain new and useful  
5 Improvements in Amalgamators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

10 My invention has relation to that class of devices or apparatus employed for extracting gold and silver from their ores by amalgamation, and commonly known as "amalgamators" or "amalgamating apparatus;" and the  
15 object of my said invention is to produce a simple, cheap, and effective apparatus wherein all the material to be operated upon is brought into contact with the mercury in a forcible, uniform, and thorough manner,  
20 wherein the mercury or quicksilver may be prevented by application of electricity from "flowing," "sickening," "breaking," or otherwise deteriorating or losing its quickness, wherein no mechanically-moving parts  
25 of the apparatus are employed to effect the contact of ore and mercury or to effect the passage of the ore through the amalgamator, and which apparatus may be easily and cheaply operated in connection with all grades  
30 of ores, which is not liable to get out of order, and which will secure the thorough extraction of precious metals and insure other advantages, as will hereinafter appear.

To accomplish all of this my improvements  
35 involve certain new and useful peculiarities of construction, relative arrangements or combinations of parts, and principles of operation, as will be herein first fully described, and then pointed out in the claim.

40 In the accompanying drawings, forming part of this specification, Figure 1 is an elevation, and Fig. 2 a vertical section, of an apparatus, including a number of trays, arranged for operation in accordance with my invention and  
45 involving the principles thereof. Fig. 3 is a plan of one of the trays detached, and Fig. 4 a vertical sectional view thereof. Fig. 5 is a plan view of one of the perforated carbon plates detached from its tray.

50 In all the figures like letters of reference,

wherever they occur, indicate corresponding parts.

A is a tray, of metal, wood, or any suitable material and of any desired size, and through the bottom of this are inserted a series of tubes, 55 as *a a*, of any desired dimensions. I find that for one ton of ore per hour a tray fourteen inches square, having forty-nine discharge-tubes, each with an eighth-inch orifice, answers very well; but I do not limit myself to 60 any dimensions or to any number of discharge-tubes. The tray is of suitable depth and formed with projecting side flanges, as *b b*, to facilitate mounting and moving it when necessary. 65

The tubes *a a* extend above the bottom of the tray and through and a short distance below the bottom and serve to discharge the water and pulp from the tray. The object in having them extend above the bottom is to 70 form a receptacle for a body of mercury, and they extend below the bottom, so that they will deliver solid or unbroken streams and prevent dripping from the bottom except at the point of delivery from the tubes. The tray so constituted may be used singly, if desired. 75 The water and ore or pulp being delivered upon the top of the mercury flows thereon or in contact therewith, and passes out through the series of discharge-tubes to any receptacle below the streams, in no way interfering with each other; but I prefer to employ the trays in a series, one above the other, so that the material discharged from one tray will enter the next one below and be also 85 brought in contact with the mercury therein. This series may consist of two or any desired number.

In Figs. 1 and 2 I have shown the apparatus as containing six trays, which will generally 90 be found amply sufficient, though more may be used, if desired. When the trays are arranged in vertical series, the discharge-tubes of one tray are so located or disposed that they will not be in line with those of the tray above 95 or of the tray below, and, preferably, as indicated, about over the middle of the space between the tubes in the next tray. The material discharged from one tray cannot then pass through the tubes of the next without coming 100



in contact with the mercury therein, and if the tubes be arranged in the preferable manner the material, after descending from one tray, must take the longest paths over the surface of the mercury in the next tray before it can find an exit, thus remaining a sufficient time in contact with the mercury and exposing all its particles to contact therewith.

The distance between the trays of the series is varied according to circumstances. It is desirable that the material shall strike the mercury forcibly to insure perfect contact, and at the same time that the stream be not broken.

I find that a fall of from three to seven inches will insure the desired result, though a greater or less distance may be perfectly practicable.

In each tray the mercury rests upon a copper or equivalent plate, as B, and in each tray and at a distance above the mercury is a carbon or equivalent plate, C, sustained as upon rubber or equivalent standards *c c*, and made slightly smaller than the interior of the tray, so that there will be no metallic connection between B and C. Any other means of insulating these two plates may be adopted. The plate C is located at such a distance above the mercury that it will admit of the free passage of the water and pulp between the two, the water and pulp just touching the under side of this plate on its way to the discharge-tubes. Each plate C is perforated, as at *d d*, and these perforations are arranged so that they will lie in line with the discharge-tubes of the tray above, or over the spaces between the discharge-tubes of the tray in which the plate is located, and the perforations are large enough to permit the fall of the material through them without interference by striking the plate.

The insulated carbon plate is to be connected with the anode or positive pole of a battery or electric machine or source of electricity, and the plate under the mercury with the cathode or negative pole. Thus the carbon is positively electrified and the mercury negatively, and the water, pulp, and chemicals serve as the electrolyte through which the current passes downwardly to the mercury.

The electric connections are made in any suitable way. When the trays are mounted in series, it will probably be found most advantageous to connect the carbon plates with one conductor, as D, and the copper plates with another conductor, as E, these two conductors running to the battery or machine. For the convenient connections I supply the movable sections, as *e e* and *f f*.

The lowermost tray of the series has an inclined bottom, from which a pipe, F, leads off to one side, its discharge-orifice being located on a level with the top of the mercury in this tray when the apparatus is being used. The mercury may be drawn off from the lower tray by turning the mouth of this pipe downwardly, as will be readily understood.

The series may be charged with mercury by turning it in at the top. As each tray is filled

to the tops of the tubes therein, mercury descends to the next tray below, and so on until discharge takes place at the mouth of F, when the supply should be arrested. Thus the trays may be quickly and properly charged.

G is an ordinary hopper having a grating, *g*, through which the pulp or material is originally delivered to the apparatus. It may or may not be used.

H represents any suitable receptacle or conduit for the tailings or products delivered from the apparatus.

I I are suitable uprights, and K K horizontal pieces forming a convenient frame-work for sustaining the series. The flanges *b b*, if employed upon the trays, may rest upon strips *h h*, which are secured to the frame-work. The amalgamated material and mercury may be drawn from the trays through suitable perforations in the bosses *i i*. The body of mercury is represented at *m*.

The electric current, as is well understood, preserves the quickness and prevents flowering or fouling of the mercury by sulphur, arsenic, &c., and may aid in the amalgamating process by producing a decomposition of water evolving hydrogen gas, or, in the presence of chloride of sodium in the electrolyte, may by the decomposition of this salt produce chlorine gas and sodium, also aiding in amalgamation.

The apparatus above described is intended especially to effect the amalgamation of rebellious ores. It is very simple in all its parts, has no mechanically-moving parts to get out of order, or subject to wear, requires no particular attention or special power to operate it, and is well calculated to answer the purpose or object of the invention, as previously stated.

I am aware that it is not broadly new to employ a current of electricity for the purpose of preventing flowering or sickening of the mercury, and I am also aware that the pulp has heretofore been delivered from one tray to another through a series of short tubes. By my improved apparatus I am enabled to pass the several streams of pulp through the perforated carbon-plate, compelling forcible contact of the pulp with the mercury and at the same time making the pulp operate as an electrolyte through which the electric current passes from the carbon plate into and through the mercury and to the copper plate below it. In previous forms of amalgamators wherein electricity has been employed either the upper surface of the mercury has not been left free for contact of the pulp therewith or some mechanical means have been employed for agitating the pulp and mercury. Over these former constructions my improved device has the advantages of simplicity and certainty of action as well as the saving of power required for its operation.

I am also aware that a movable or adjustable discharging-tube has been employed in connection with an amalgamator; but such tube



has not, to my knowledge, been employed in connection with a series of trays arranged to be filled from the top.

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

10 In an amalgamator, two or more trays arranged one above the other, each having a series of discharge tubes passing through its bottom and maintaining a body of mercury in the lower part of the tray, a copper plate located beneath the mercury, a perforated and insu-

lated carbon plate located at a distance above the mercury and having its perforations in line with the discharge tubes of the tray above, 15 and electric connections, substantially as and for the purposes set forth.

In testimony that I claim the foregoing I have hereunto set my hand in the presence of two witnesses.

JAMES A. SPERRY.

Witnesses:

JOHN BUCKLER,

WORTH OSGOOD.