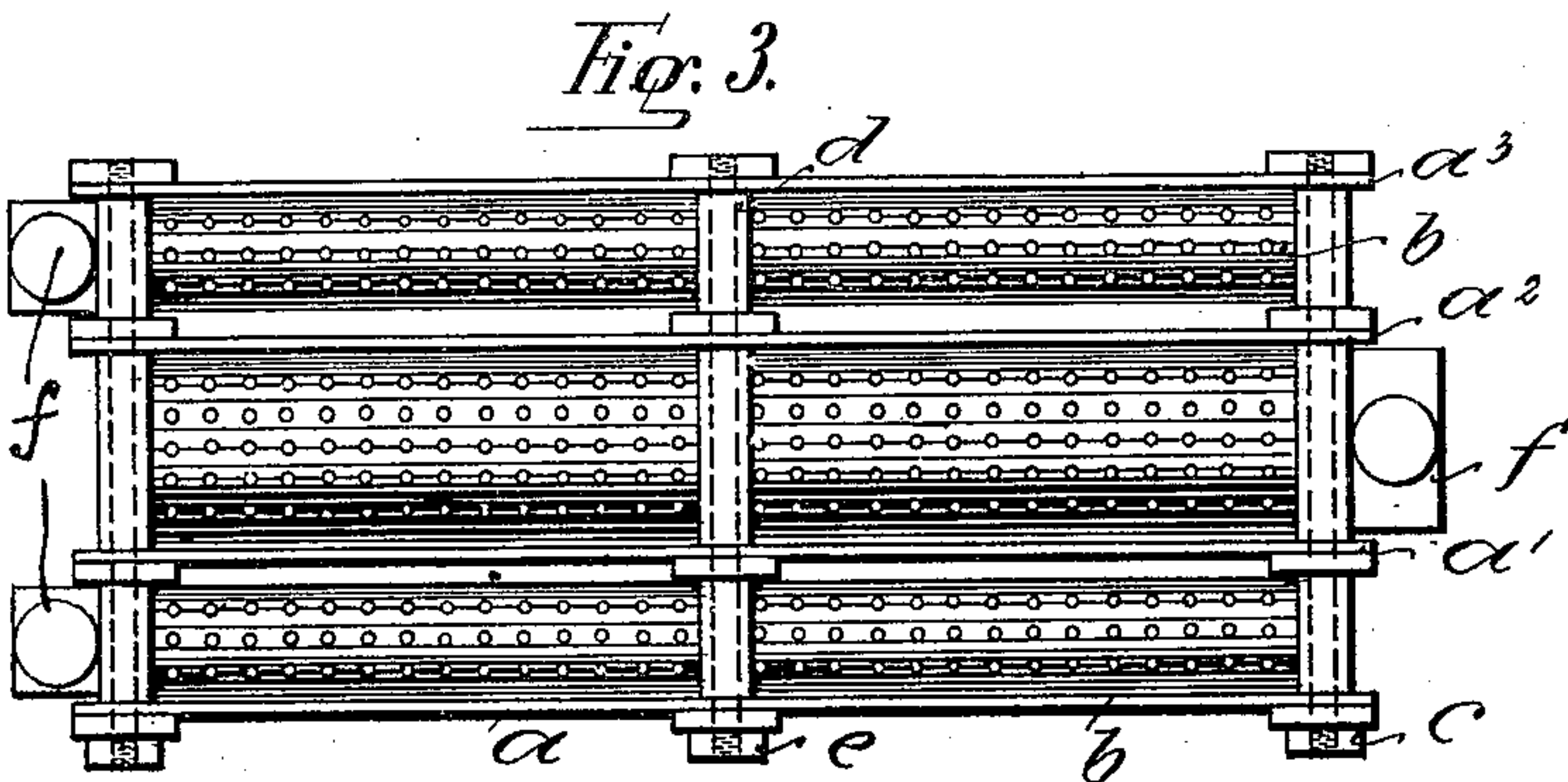
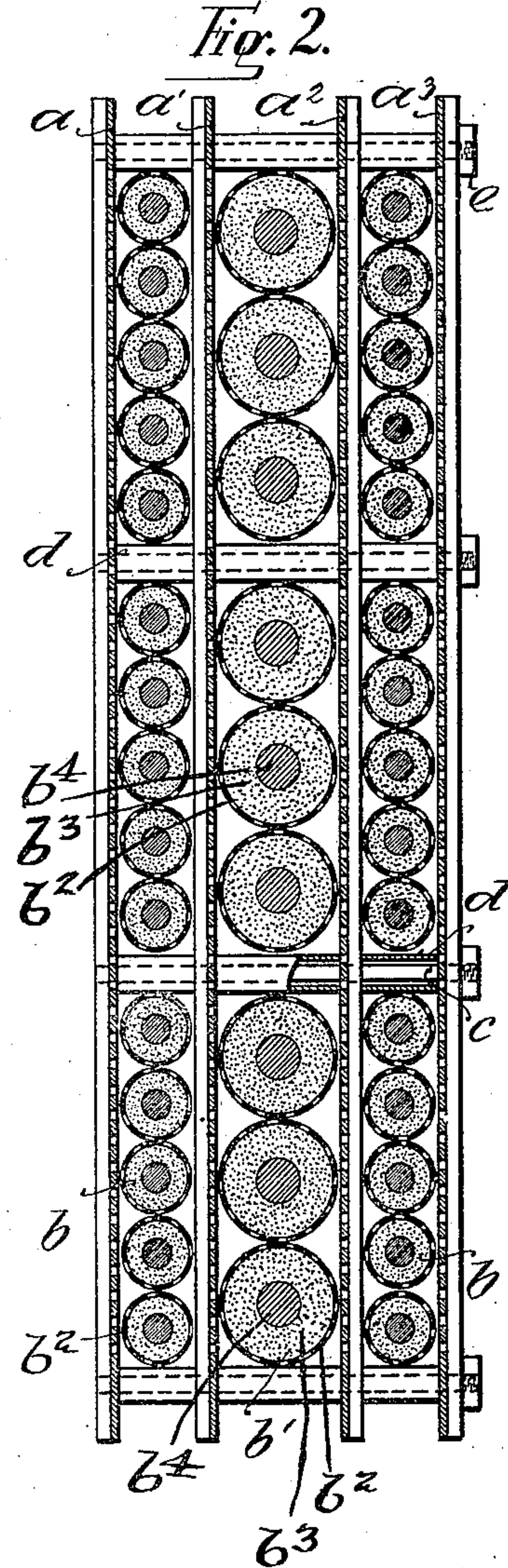
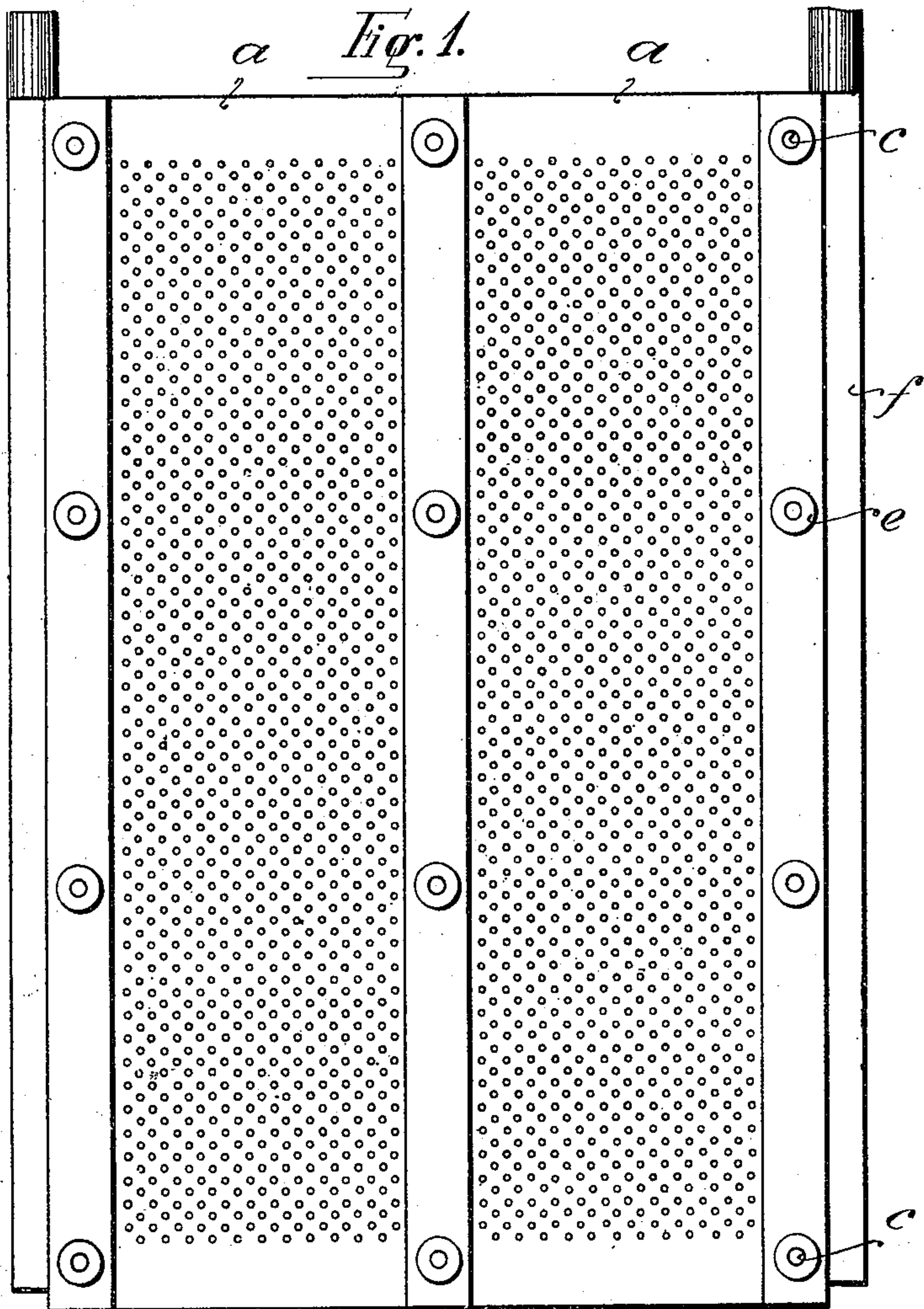


(No Model.)

F. W. SCHNEIDER.
SECONDARY BATTERY.

No. 602,172.

Patented Apr. 12, 1898.



Witnesses.

Otto Munn
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UNITED STATES PATENT OFFICE

FRIEDRICH WILHELM SCHNEIDER, OF TRIBERG, GERMANY, ASSIGNOR
TO THE ELECTRICITÄTS-GESELLSCHAFT TRIBERG, GESELLSCHAFT
MIT BESCHRÄNKTER HAFTUNG, OF SAME PLACE.

SECONDARY BATTERY.

SPECIFICATION forming part of Letters Patent No. 602,172, dated April 12, 1898.

Application filed June 10, 1897. Serial No. 640,204. (No model.)

To all whom it may concern:

Be it known that I, FRIEDRICH WILHELM SCHNEIDER, a subject of the Grand Duke of Baden, residing at Triberg, in the Grand Duchy of Baden, German Empire, have invented certain new and useful Improvements in Secondary Batteries, of which the following is a full, clear, and exact specification.

My invention relates to an insulating and supporting frame especially adapted for horizontal—for instance, tubular or trough-shaped—secondary batteries, the particular purpose of which is to reduce the weight of the battery as much as possible, to shape the construction of the battery more favorably, to increase the durability of the battery, and to allow of the individual electrodes being rapidly exchanged when necessary.

The accompanying drawings illustrate a mode of execution of the present frame with electrodes adjusted.

Figure 1 is a front view; Fig. 2, a section, and Fig. 3 a top view.

The frame consists of insulating-plates a a' a^2 a^3 , suitably made of hard rubber and perforated, every two of which inclose a row of superposed tubular or trough-shaped electrodes b b' . All of the perforated plates are mutually connected by ties or cross-bolts c , which serve at the same time as carriers for the electrodes b b' , arranged in groups over each other. In the mode of execution illustrated b are the negative and b' the positive electrodes, said electrodes consisting of lead, lead composition, or other suitable material. The construction of the apparatus exemplified is, with the aid of this supporting-frame, performed, for instance, as follows: The cross-bolts c are screwed in or secured in some similar manner to one of the end plates a of the frame, hard-rubber tubes d of the same width as the electrodes b b' to be inserted being shoved over said bolts. These tubes d regulate the distance between the plate a , and the nearest perforated plate a' , which is provided with suitable perforations, is likewise shoved over the bolts c . After this another set of hard-rubber tubes d is inserted as supports for the third plate a^2 , &c., until the apparatus has the desired size. The last plate, designated as a^3 in the mode of execu-

tion exemplified, is secured by small nuts e , screwed on the bolts e' . Between every two plates a a' a^2 a^3 the electrodes b b' , filled with active material, are now inserted and laterally connected together by a strip of lead f , serving as a conductor, in such a manner as to form vertical rows. This lateral connection of the single electrodes by means of a strip f is usually effected by soldering said strip to the front or head side of the electrodes.

By the application of the above-described supporting-frame the weight of the battery is considerably diminished, because—

Further, the present supporting-frame enables me to bring the individual electrodes much nearer to one another than heretofore and no short circuits in the element can arise. This circumstance permits of the volume and weight of the electrolytes being reduced to the theoretically requisite measure.

Finally, it should be noticed that the present frame enables me to unite elements of any desired size to a compact body and permits of the individual electrodes or rows of electrodes being at all times removed with the greatest ease for the purpose of exchanging or cleaning them.

On account of its above-mentioned properties the new insulating and supporting frame is especially suited for transportable batteries, such as are chiefly used for tractional purposes. The durability of batteries made after this construction is exceptionally high.

Both the positive and negative electrodes consist of a perforated tube b^2 , preferably of lead or lead composition, said tube being filled with the active mass of well-known composition b^3 and having a central core or rod b^4 , also of lead or lead composition, serving for strengthening the said tube and favoring the current conduction to the filling.

I claim—

1. In combination the supporting-frame consisting of the parallel perforated plates with the spacing-tubes d and connecting-bolts, and the electrodes consisting of the perforated tubes containing active material, said tubes being piled in the spaces between the plates and resting upon the spacing-tubes, substantially as described.

2. In combination the supporting-frame

consisting of the parallel perforated plates of
insulating material with the spacing-tubes *d*
and connecting-bolts, and the series of elec-
trode elements piled in the spaces between
5 the plates and resting upon the spacing-tubes,
substantially as described.

In testimony whereof I have signed this

specification in the presence of two subscrib-
ing witnesses.

FRIEDRICH WILHELM SCHNEIDER.

Witnesses:

FRANZ CONRAD,
H. I. GREINER.