

No. 629,043.

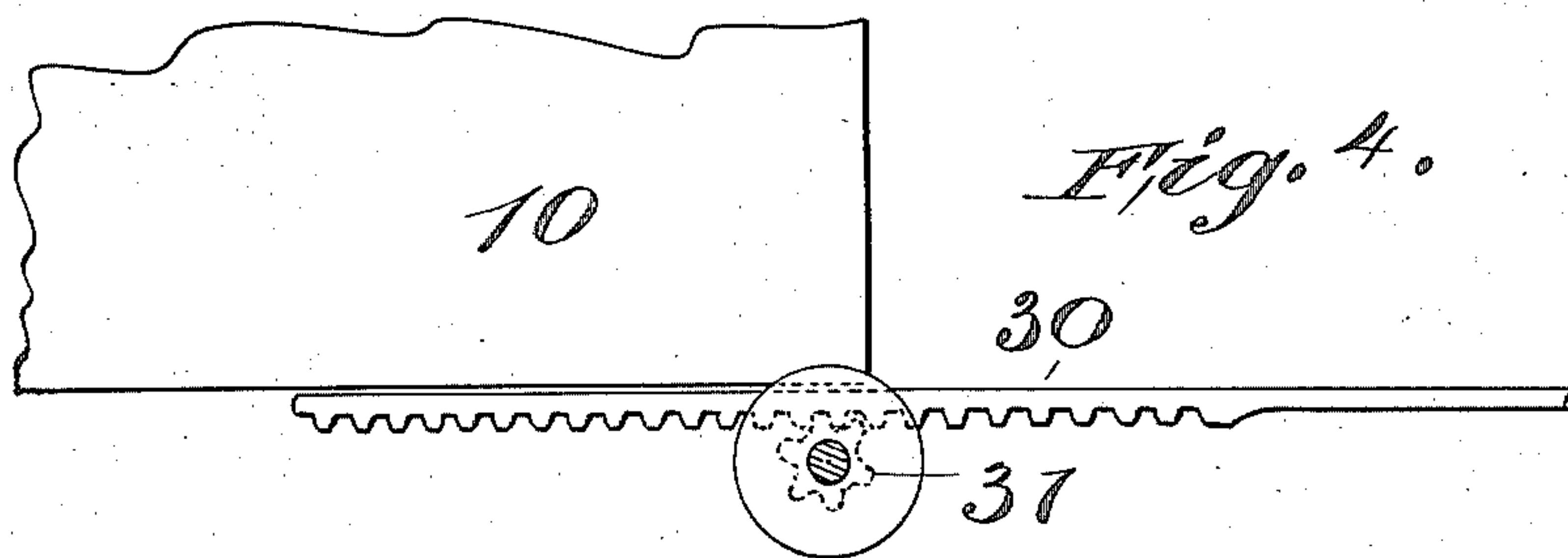
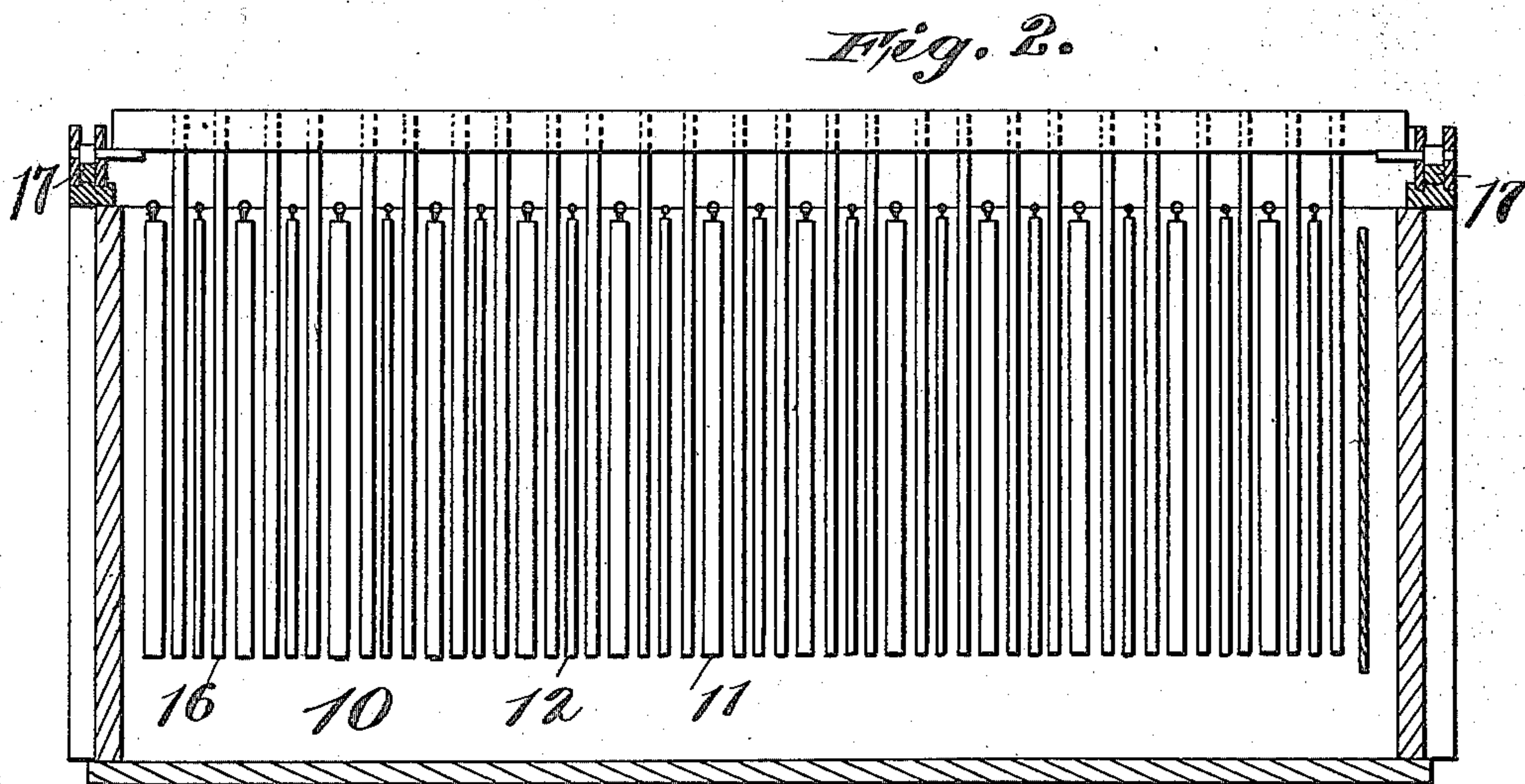
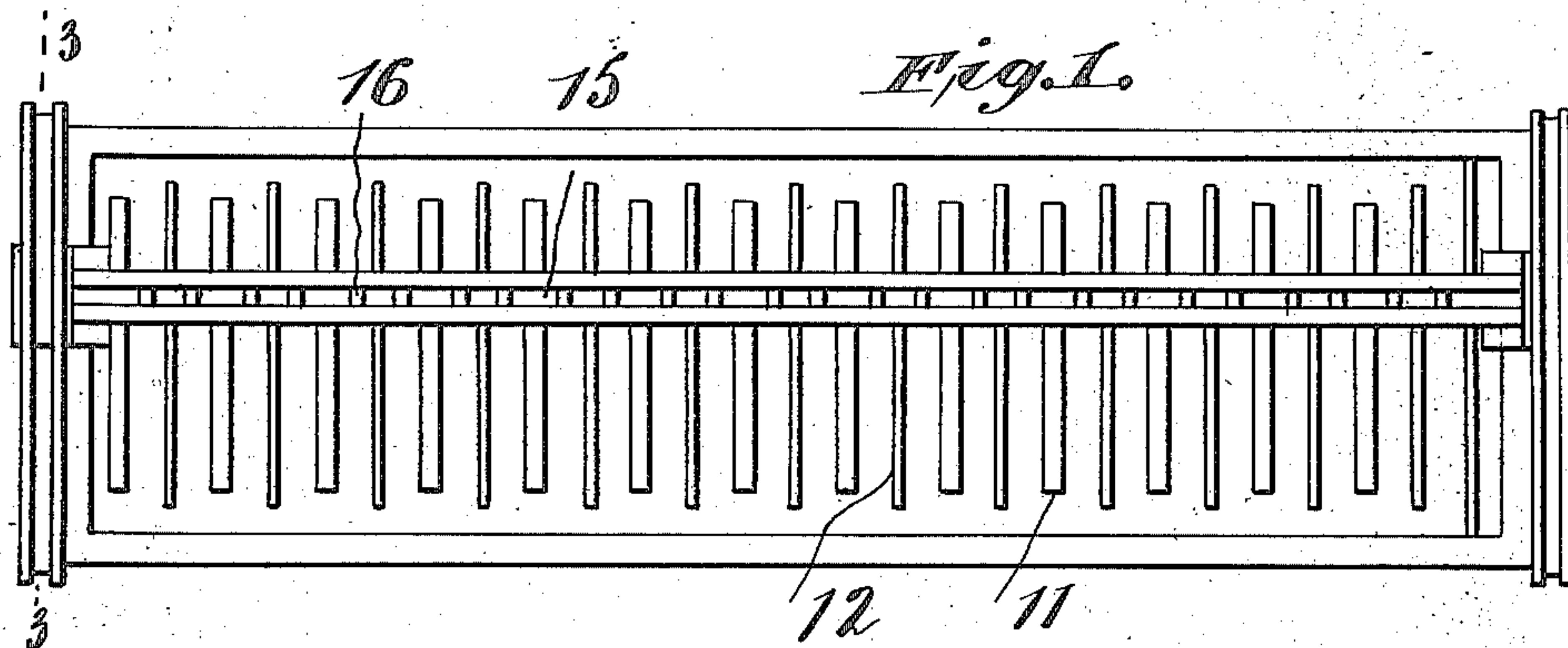
Patented July 18, 1899.

J. T. MORROW.
APPARATUS FOR ELECTROLYSIS.

(Application filed July 16, 1898.)

(No Model.)

4 Sheets—Sheet 1.



WITNESSES
C. W. Benjamin
George H. Sommers

INVENTOR
John T. Morrow
BY *Harold R. May*
ATTORNEY

No. 629,043.

Patented July 18, 1899.

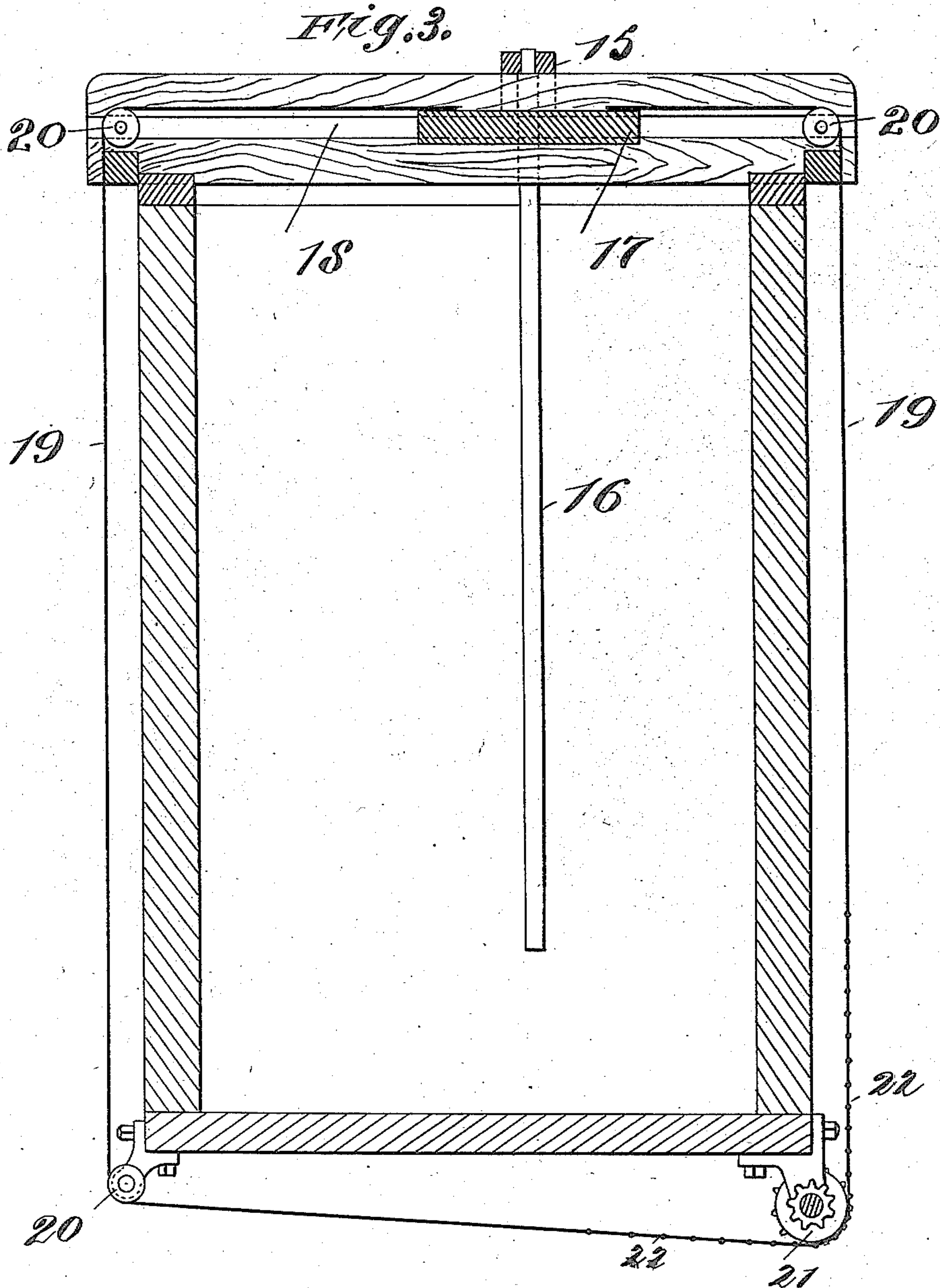
J. T. MORROW.

APPARATUS FOR ELECTROLYSIS.

(Application filed July 16, 1898.)

(No Model.)

4 Sheets—Sheet 2.



WITNESSES

C. W. Benjamin
George H. Sonneborn

INVENTOR

John T. Morrow

BY

Harold R. P. [Signature]

ATTORNEY

No. 629,043.

Patented July 18, 1899.

J. T. MORROW.
APPARATUS FOR ELECTROLYSIS.

(Application filed July 16, 1898.)

(No Model.)

4 Sheets—Sheet 3.

Fig. 5.

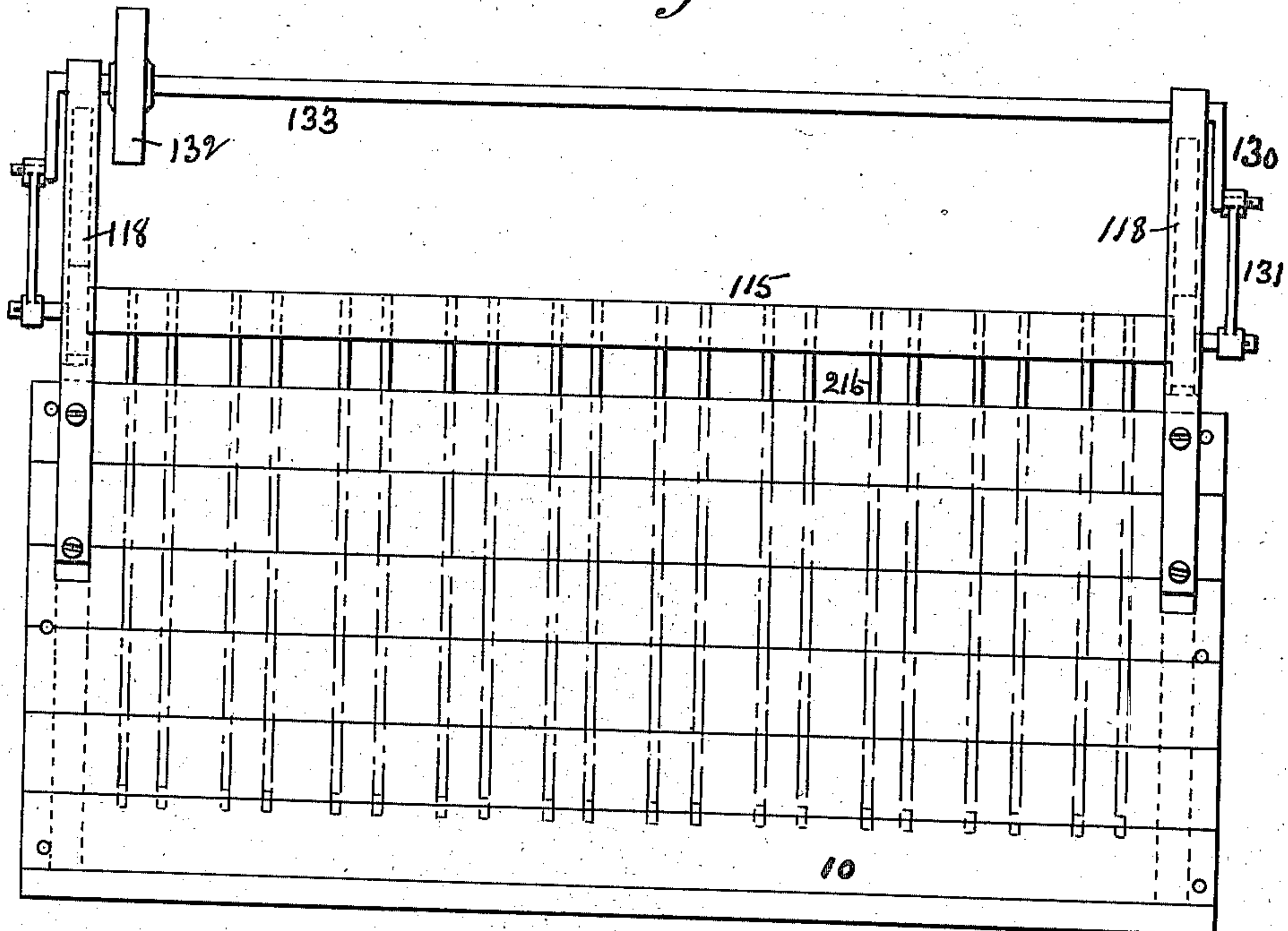
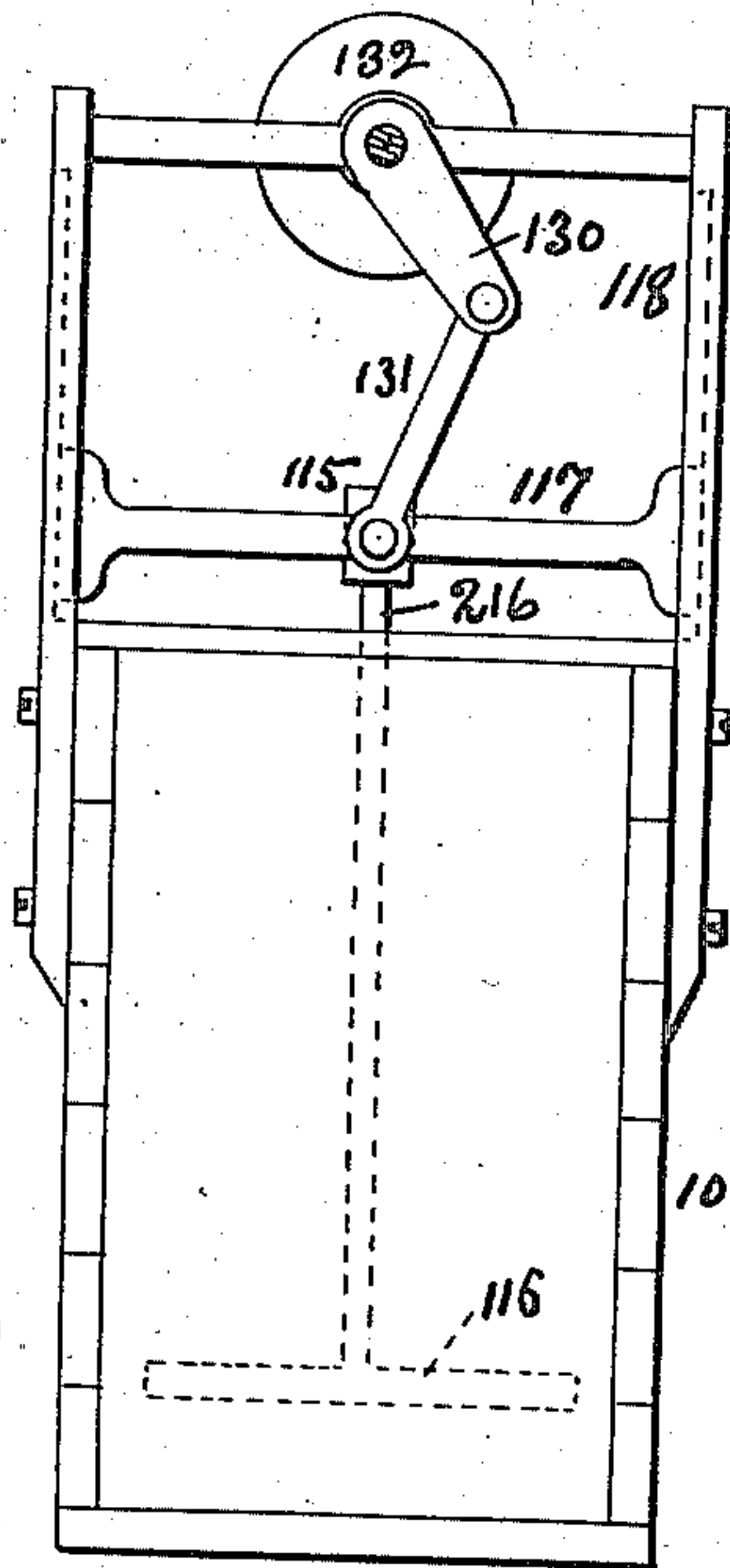


Fig. 6.



WITNESSES
C. W. Benjamin
George H. Lorneborn.

INVENTOR
John T. Morrow
BY *Sheldon H. Hines*
ATTORNEY

No. 629,043.

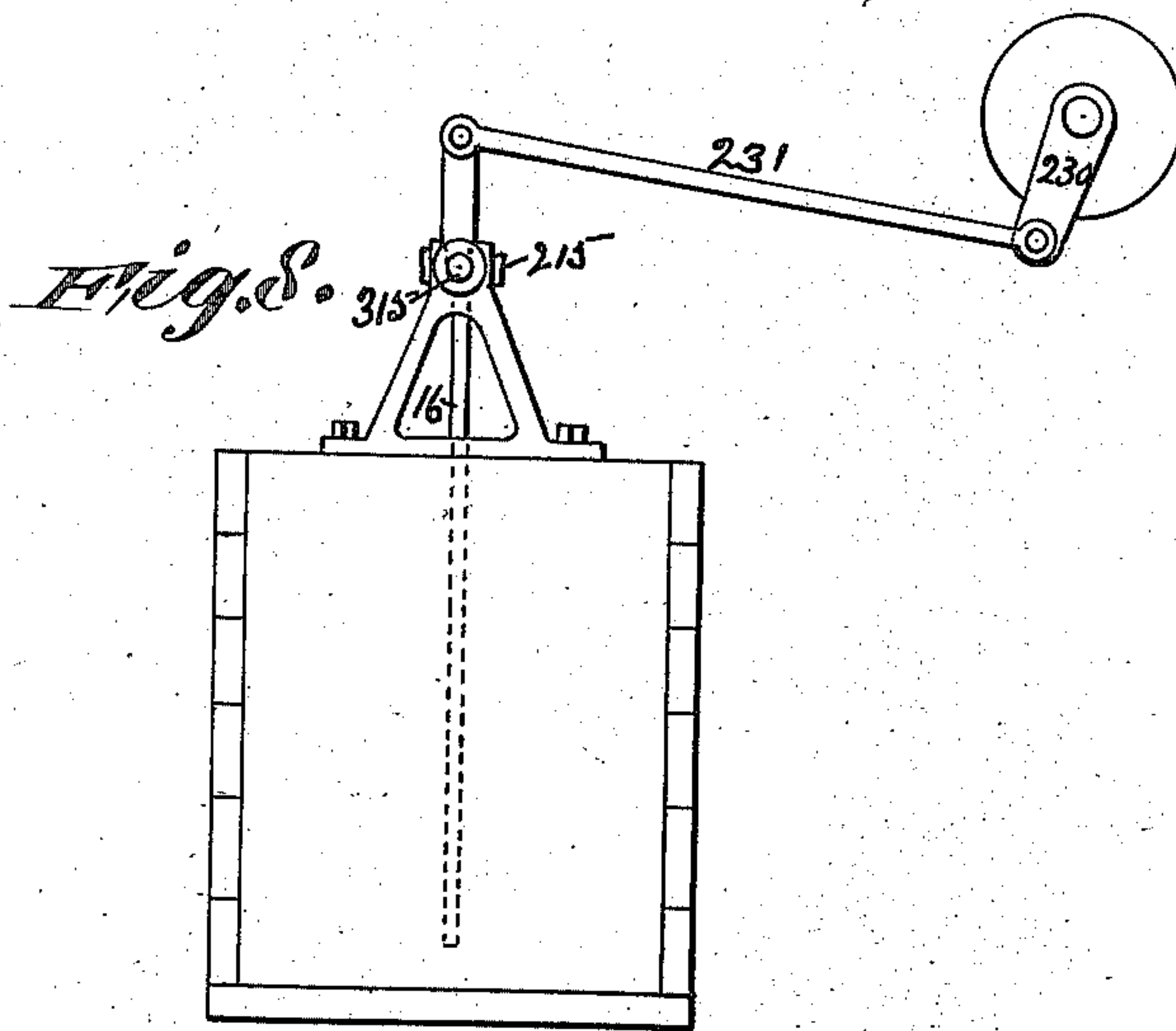
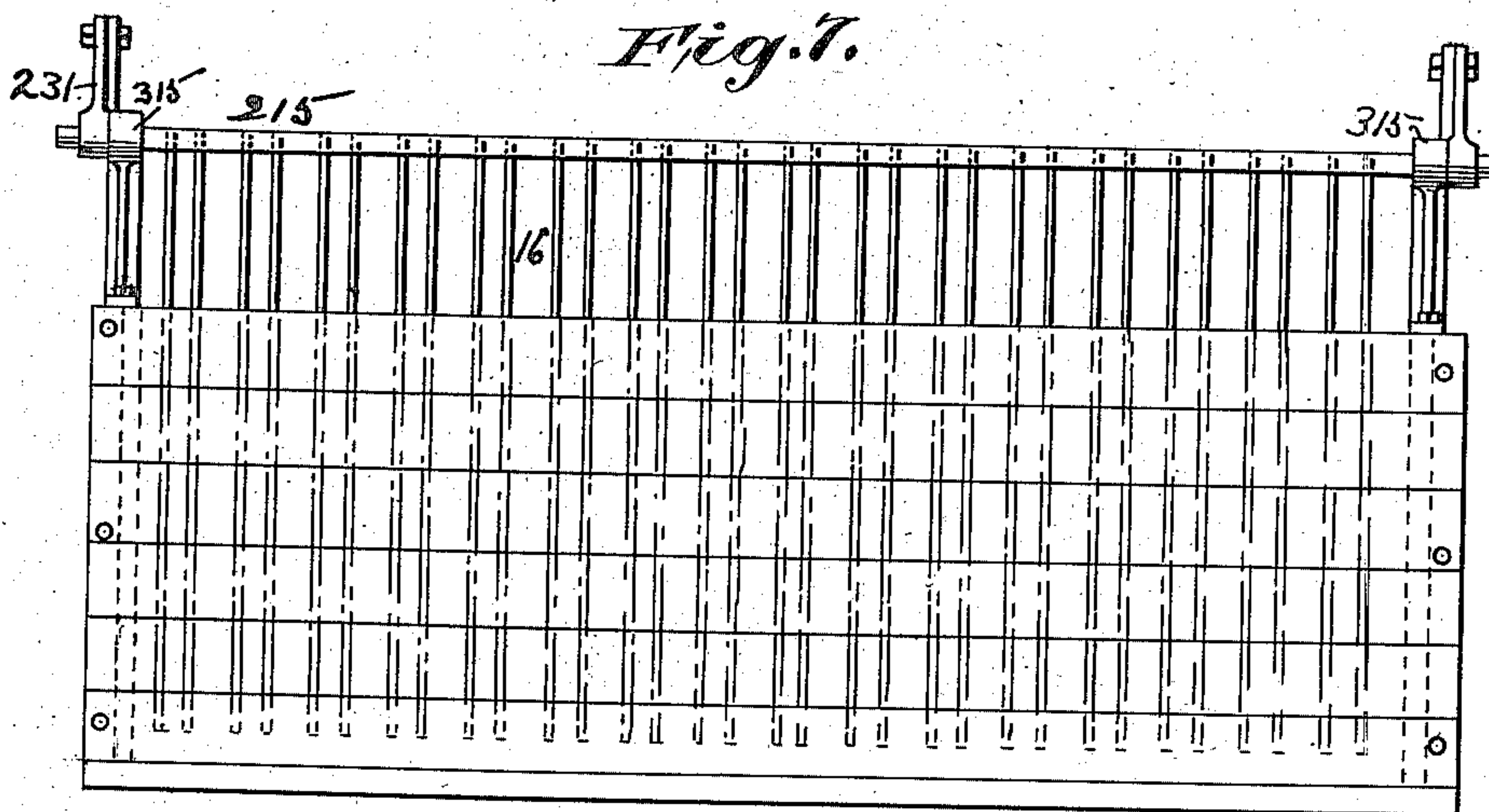
Patented July 18, 1899.

J. T. MORROW.
APPARATUS FOR ELECTROLYSIS.

(Application filed July 16, 1898.)

(No Model.)

4 Sheets—Sheet 4.



WITNESSES

C. W. Benjamin
George H. Sonneborn

INVENTOR

John T. Morrow

BY

Harold W. Stoney

ATTORNEY

UNITED STATES PATENT OFFICE.

JOHN T. MORROW, OF GREAT FALLS, MONTANA.

APPARATUS FOR ELECTROLYSIS.

SPECIFICATION forming part of Letters Patent No. 629,043, dated July 18, 1899.

Application filed July 16, 1898. Serial No. 686,100. (No model.)

To all whom it may concern:

Be it known that I, JOHN T. MORROW, electrical engineer, of Great Falls, in the State of Montana, have invented certain new and useful Improvements in Apparatus for Electrolytic Processes, of which the following is a description, referring to the accompanying drawings, which form part of this specification.

10 The invention relates particularly to solution-stirring apparatus applicable to electrolytic tanks for refining metals.

It is well known that a vigorous circulation of the electrolyte in the refining or plating tank is a desirable feature, as it tends to produce smooth and even deposition upon the cathode. With high densities of current it is inconvenient and expensive to obtain a vigorous circulation between the electrodes by means of a constant inflow and discharge of the solution. The present invention contemplates a mechanical apparatus for stirring the solution in a simple, cheap, and extremely effective manner.

25 The nature of the invention will be clearly understood from a description of the accompanying drawings, wherein—

Figure 1 is a plan view of an electrolytic tank provided with the improvement. Fig. 30 2 is a side elevation, partly in cross-section, at right angles to the anodes and cathodes. Fig. 3 is a cross-section on the plane 3 3 of Fig. 1. Fig. 4 is a detail of one form of vibrating mechanism for the improvement, and Figs. 5 and 6 and 7 and 8 are side and end views of two modifications.

Throughout the figures like reference-numerals refer to like parts.

40 The tank is numbered 10, and the anodes and cathodes are shown, respectively, at 11 and 12. These are usually suspended in parallel planes close to each other, as shown in the figures. The means of suspension of the anodes and cathodes and the electrical connections to them are omitted from the figures, as they form no part of my invention.

50 The stirring mechanism preferably consists, as shown in Figs. 1, 2, 3, and 4, of the following elements: a reed-board 15, supported at each end, so as to reciprocate precisely, provided with reeds 16, which extend

down between and parallel with the electrodes. The reed-board is supported by means of sliding heads 17, which travel in guideways 18 and are reciprocated therein 55 by means of cords or chains 19, running over rollers 20 and wheel 21. Preferably the wheel 21 is a sprocket-wheel which engages a sprocket-chain 22, secured to the cords or chains 19. The sprocket-wheel 21 is turned 60 first in one direction and then in the other by means of a rack 30 and pinion 31. The reciprocation or vibration of the rack 30 turns the sprocket-wheel 21 in alternate directions, causing the heads 17 and reed-board 15 to vibrate or reciprocate. By this means the reeds 65 16 violently stir the electrolyte in the immediate vicinity of the surface of the electrodes. Preferably there is one such stirring-reed on each side of every electrode or of all excepting the outer sides of the electrodes at the extreme ends. By this means stagnation of the solution is effectually prevented, also lumpy and loose deposits on the cathode as well as impure deposits. A very fine cathode-75 surface is deposited and the anode is consumed in a remarkably regular and uniform manner. A great saving of scrap is effected and short circuits, likely to form by the accumulation of solid particles bridging across 80 the space between neighboring anodes and cathodes, are positively prevented owing to the continual passage of the reeds to and fro.

In Figs. 5 and 6 the anodes and cathodes are omitted for clearness. The reeds 116 85 are horizontal and vibrate or reciprocate vertically. They are supported by rods 216, which extend downward from the reed-board 115. The reed-board 115 is provided at each end with a slide 117, which vibrates vertically in the slideway 118 and is actuated by one or more cranks 130 and pitman 131. A pulley 132 may be employed to turn the crank-shaft 133.

In Figs. 7 and 8 the reed-board 215 rocks in 95 bearings 315 instead of reciprocating. The reeds 16 therefore are vibrated or reciprocated transversely to their length angularly about the reed-boards 215 as an axis. A crank 230 and pitman 231 serve to rock the reed-board and actuate the stirring-reeds, as 100 shown.

Having thus fully set forth my invention, I claim as the essential novelties thereof the following points:

- 5 1. In combination with an electrolytic tank and with the anodes and cathodes thereof, a reed-board, a series of reeds supported therefrom, and mechanical means for moving the said reed-board to and fro transversely, substantially as set forth.
- 10 2. In combination with an electrolytic tank, and with the anodes and cathodes thereof, a reed-board, a series of reeds mounted therein, guideways and guides for transverse move-

ment of the said reed-board, one or more cords or other tension mechanism and rollers 15 20, and means for actuating the said cords or tension mechanism in alternate directions, substantially as set forth.

In testimony whereof I have hereunto set my hand, at Great Falls, Montana, this 28th 20 day of May, A. D. 1898.

JOHN T. MORROW.

Witnesses:

EMIL HENSEN,
WM. B. ROLL.