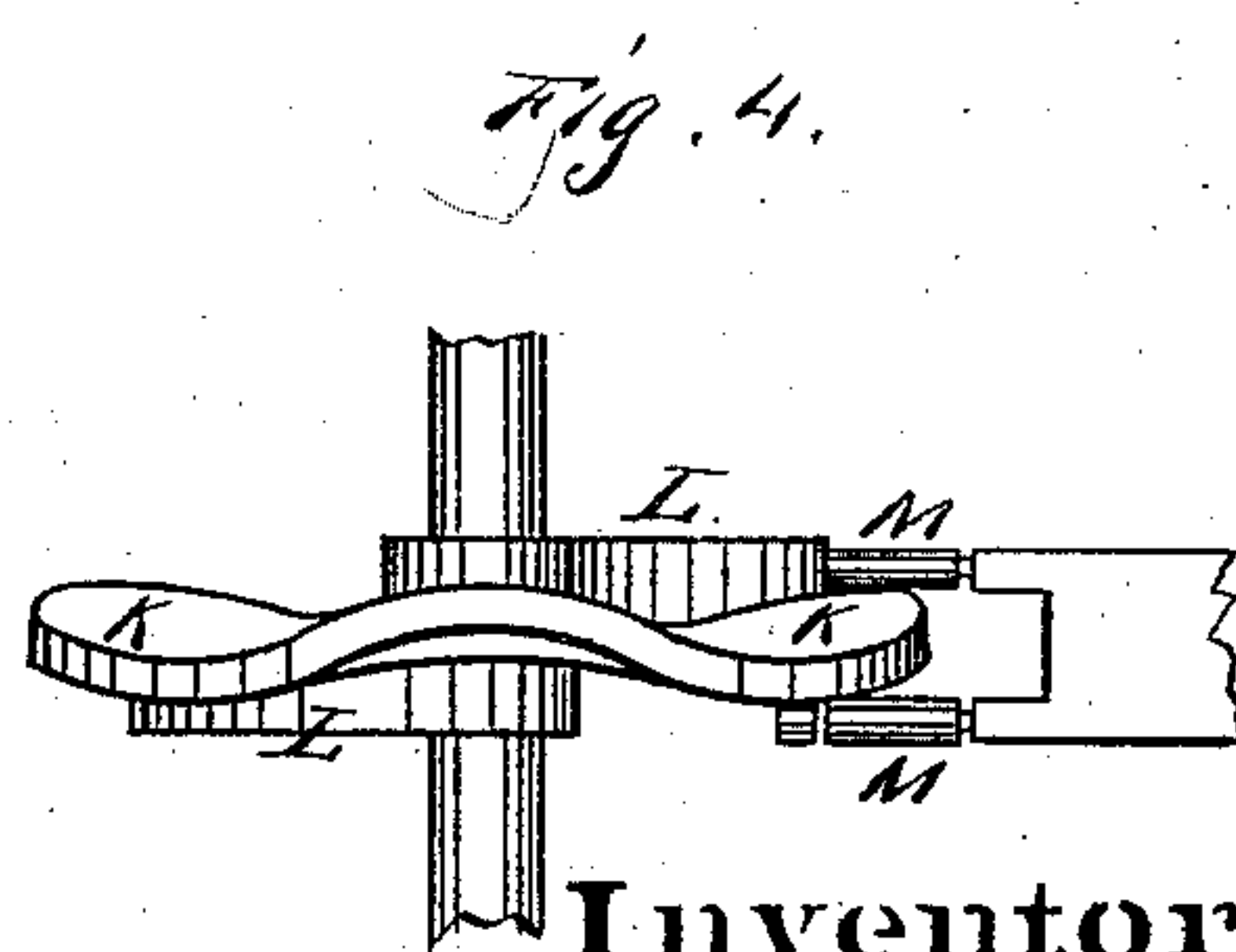
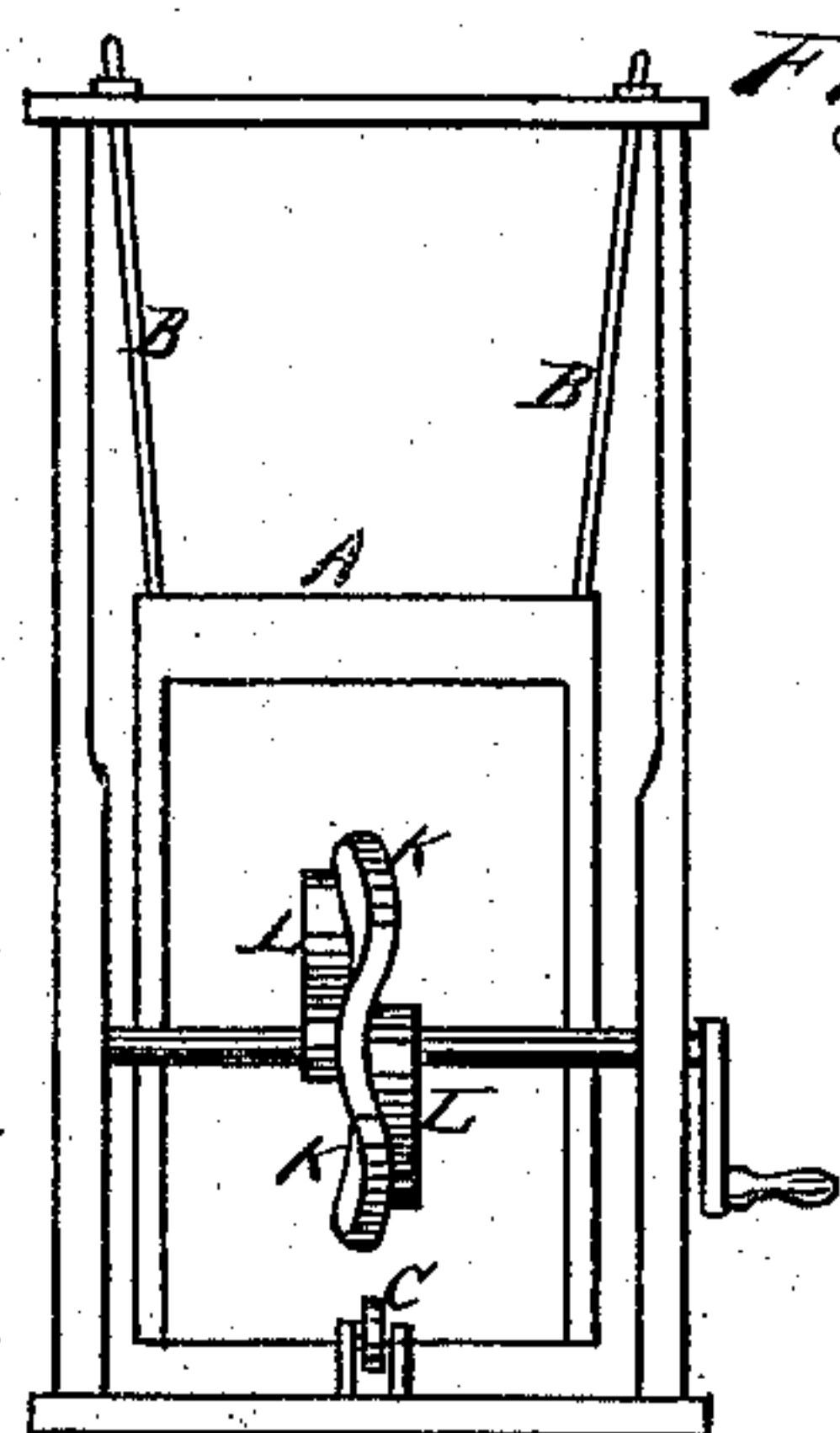
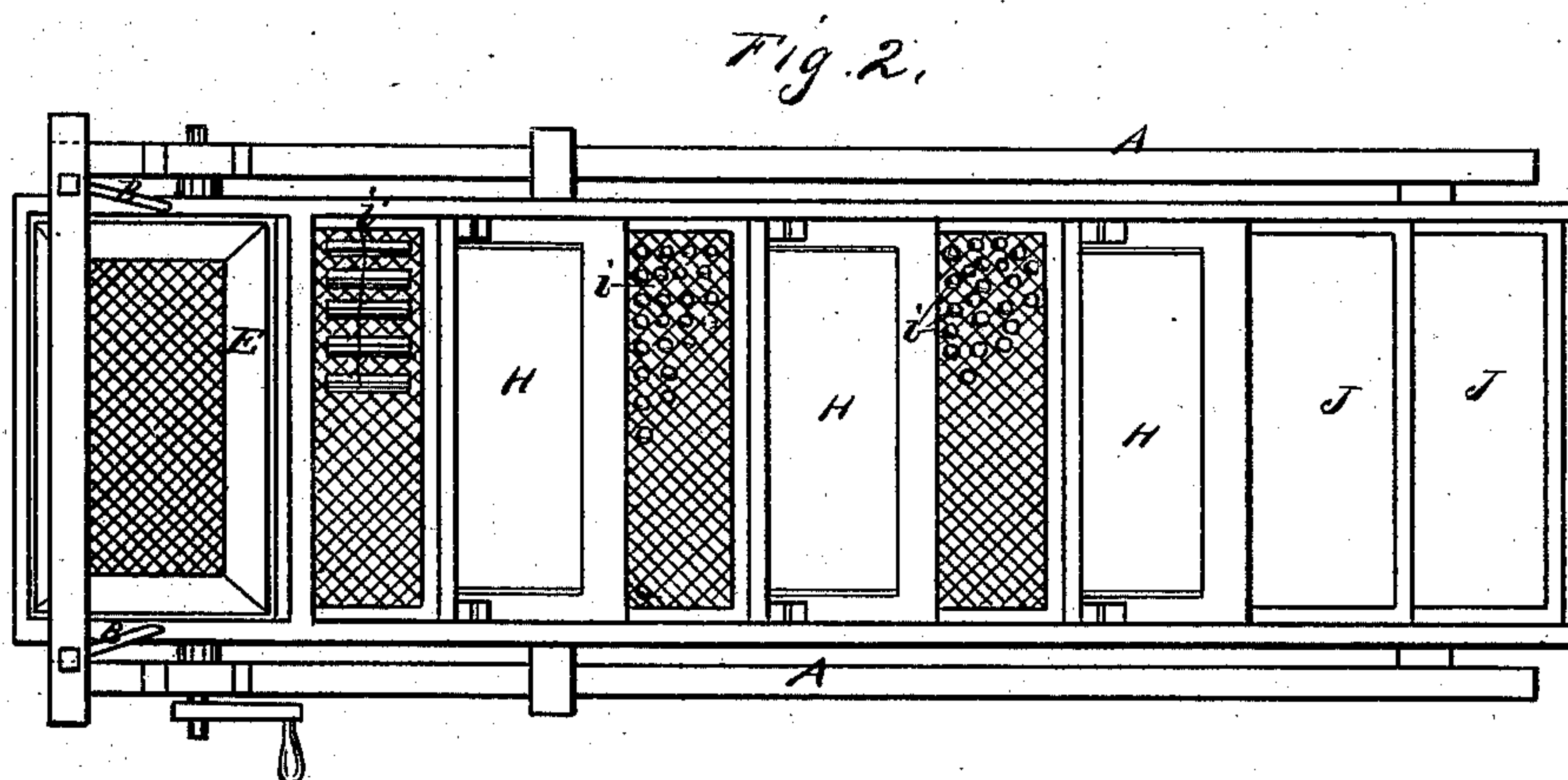
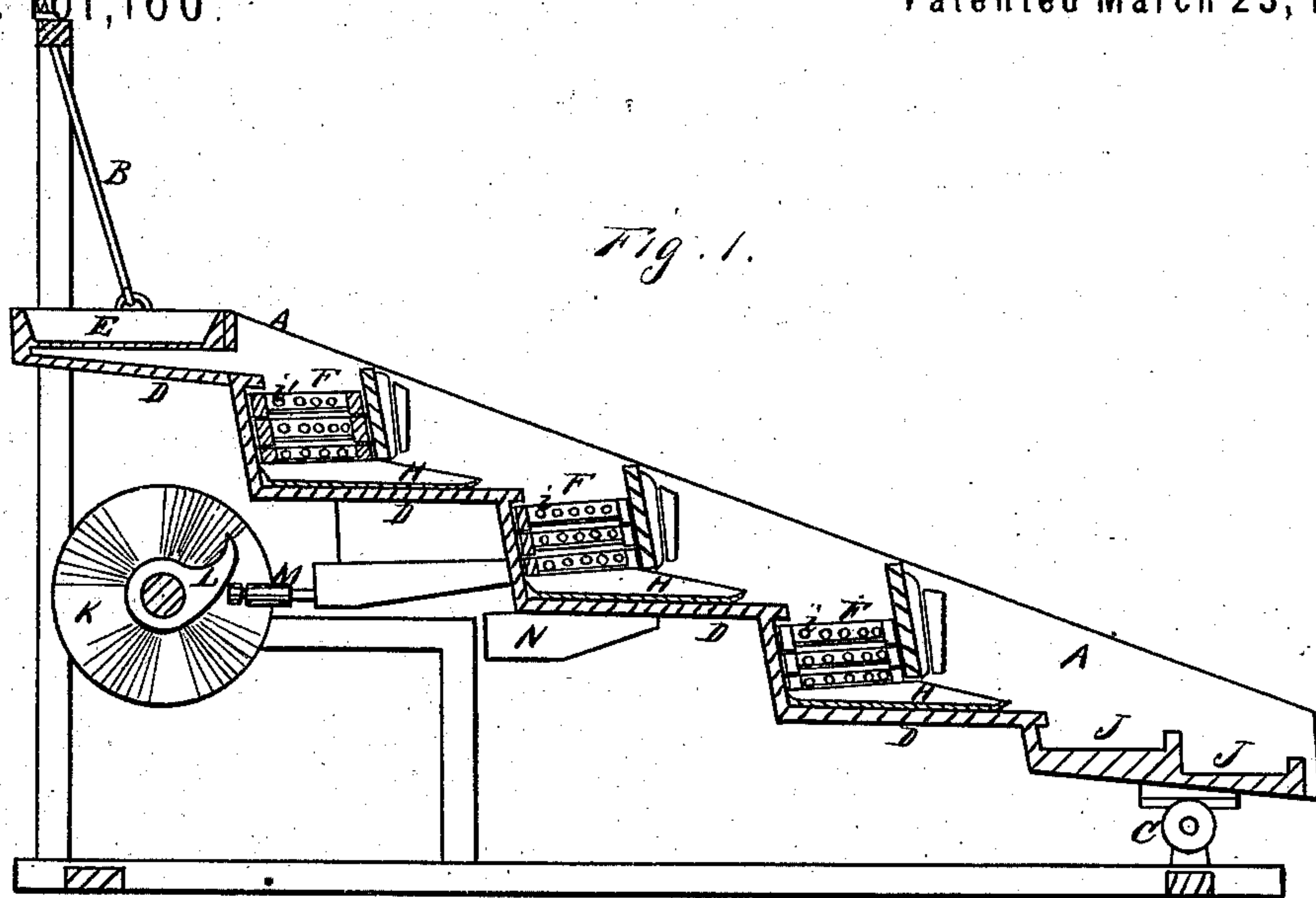


J. RUTHERFORD.
Amalgamator.

No. 161,160.

Patented March 23, 1875.



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UNITED STATES PATENT OFFICE.

JOHN RUTHERFORD, OF SAN FRANCISCO, CALIFORNIA.

IMPROVEMENT IN AMALGAMATORS.

Specification forming part of Letters Patent No. 161,160, dated March 23, 1875; application filed February 4, 1874.

To all whom it may concern:

Be it known that I, JOHN RUTHERFORD, of San Francisco city and county, State of California, have invented an Amalgamator and Separator; and I do hereby declare the following description and accompanying drawings are sufficient to enable any person skilled in the art or science to which it most nearly appertains to make and use my said invention without further invention or experiment.

My invention relates to an amalgamator and separator for precious metals and other valuable substances; but it is more especially valuable for saving gold from the auriferous and magnetic sands, and gold, silver, and amalgam from the tailings or pulp of quartz-mills. It consists of a series of steps or levels, one below the other, in an inclined frame, and the pulp or sand is made to pass from the upper level, upon which it is fed, alternately through a series of screens, which are provided with amalgamated balls or cylinders of copper or other metal, and from these screens over amalgamated plates, until the mass reaches the lower end.

An alternate shaking and concussive movement is given to the frame holding these screens and plates, by which the balls or cylinders are kept in motion all the time, and, being amalgamated, a thorough and complete separation of the precious metal will be accomplished.

In the drawings, Figure 1 is a longitudinal section of my machine. Fig. 2 is a plan or top view. Fig. 3 is a back-end view. Fig. 4 is an enlarged view of the cams and corrugated disk.

A is a suitably-shaped box or frame, which is made to stand in an inclined position, as shown, its upper end being suspended by links B B, and its lower end being supported by a roller, C, so that the upper end can receive motion in any direction, and the lower end will have a forward and backward movement at the same time. The box A is provided with a series of steps, D D, one below another from top to bottom. Upon the upper step is placed the receiving-hopper and screen E, into which the sand or pulp is first placed, and through this screen it passes with a considerable quantity of water upon the upper step or floor D,

from which it falls into the first of a series of screen boxes or trays, F. Any number of these boxes or trays may be placed one above the other upon each step, in such a position as to receive the discharge from the step above. These trays are each provided with a screen at the bottom, and upon these screens I place balls of copper, lead, or silver, or other suitable metal.

In some cases I employ rollers, as at *i'*; but these are not as serviceable as the balls, which are amalgamated, and are kept in constant motion by the peculiar shaking and concussive motion of the inclined trough or box A, which will be hereafter described.

A small space is left below each of these series of trays, so that an amalgamated plate, H, can be placed upon the step D, above which the trays are situated. This plate receives the discharge from the lowest of the trays, and catches some portion of the metal, which may have escaped from amalgamation by the balls in the trays. The edges of these plates H may be slightly turned up, and so prevent the escape of the amalgam and quicksilver to the plates below. From the last plate H the whole mass falls into one or more boxes, J, which serve to settle and retain the amalgam and precious metal, while the residue will pass off.

In order to give the most efficient motion to my amalgamator, I employ a sort of compound cam, of which the part K forms a spiral or crimped flange, with the cams L L upon opposite sides, as shown in the patent granted to John A. Peer, September 9, 1873, the whole being secured to a driving-shaft.

Two bars, M M, are secured to the under part of the trough A, and may be provided with friction-rollers, which clasp the edge of the flange K, so that when the shaft and cams are rotated, the flange K will cause the trough to be oscillated from side to side, while the cams L, alternately striking the ends of the arms M, will force them and the trough back. When released the trough will swing forward, and a block, N, or other suitable device receives the shock of the returning trough.

In the present case I have represented the flange K as only crimped enough to give three side movements to one percussive motion; but it will be manifest that by a variation in the

flange, and in the number of cams L, the proportion of the different motions can be easily varied.

I am aware that variations of my machine may be employed; but I find that the use of the amalgamated balls, in constant motion upon the surface below, serves to stir up the sand and gold, and to wear any rusty gold bright, so that it will all be amalgamated, while a certain electric action consequent upon the use of the copper balls and iron screens will assist in saving the gold and any amalgam or quicksilver from the pulp of mills.

It is, however, in working the magnetic or black gold sands that my invention is chiefly valuable, as these sands have already been naturally subjected to the action of water to such an extent that there is no appreciable difference in the specific gravities of the different constituents, and it is almost impossible to save the gold by any means at present known.

By my machine such a thorough rubbing and separation of particles takes place that all the gold is brought into contact with quicksilver under such circumstances that it will be almost certain to amalgamate.

I do not claim the crimped flange K, in combination with the cams L, operating the amalgamator in such a manner as to give a series of side and longitudinal movements; but

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

1. The inclined box A, suspended as shown, and provided with the steps D, for holding the screens and plates, substantially as herein described.

2. The trays or boxes F, provided with screens and placed in nests upon the steps, as herein described.

3. The amalgamated copper balls or rollers *i*, placed upon a surface and kept in constant agitation as the pulp or sand passes, substantially as and for the purpose described.

4. In combination with the boxes F, with their screens, as shown, the balls or rollers *i*, substantially as and for the purpose herein described.

5. An amalgamator consisting of a series of offsets, each of which is provided with one or more boxes, F, with perforated bottoms, and provided with the balls or rollers *i*, together with the amalgamated plates H beneath, the whole being given a constant shaking motion, substantially as and for the purpose herein described.

JOHN RUTHERFORD. [L. S.]

Witnesses:

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