

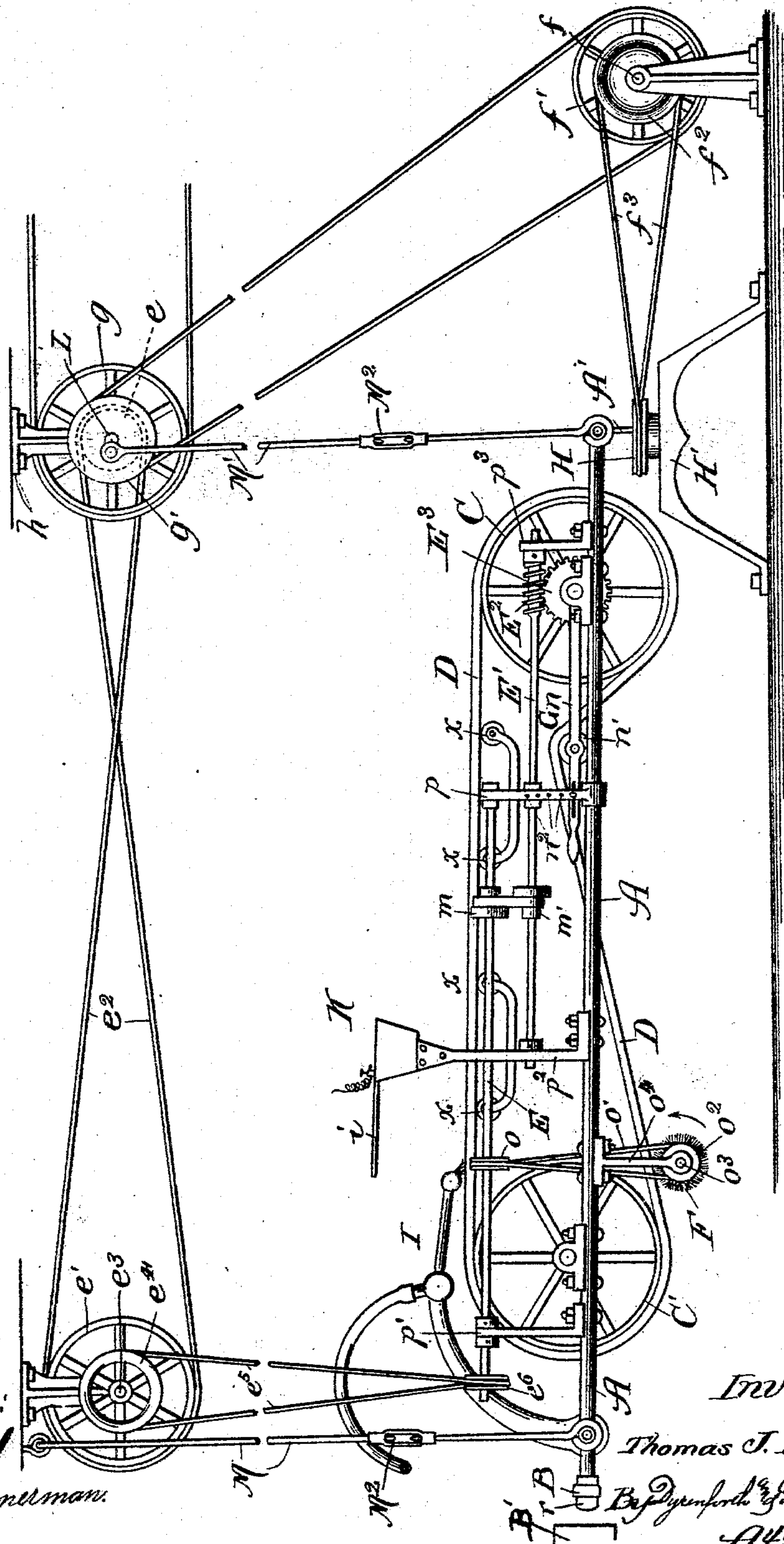
(No Model.)

3 Sheets—Sheet 1.

T. J. LOVETT.
ORE CONCENTRATOR.

No. 515,495.

Patented Feb. 27, 1894.



Witnesses:

E. G. Gaylord.
 E. G. Zimmerman.

Inventor:

Thomas J. Lovell,
Bazelynsforth & Dymforth,
Attys -

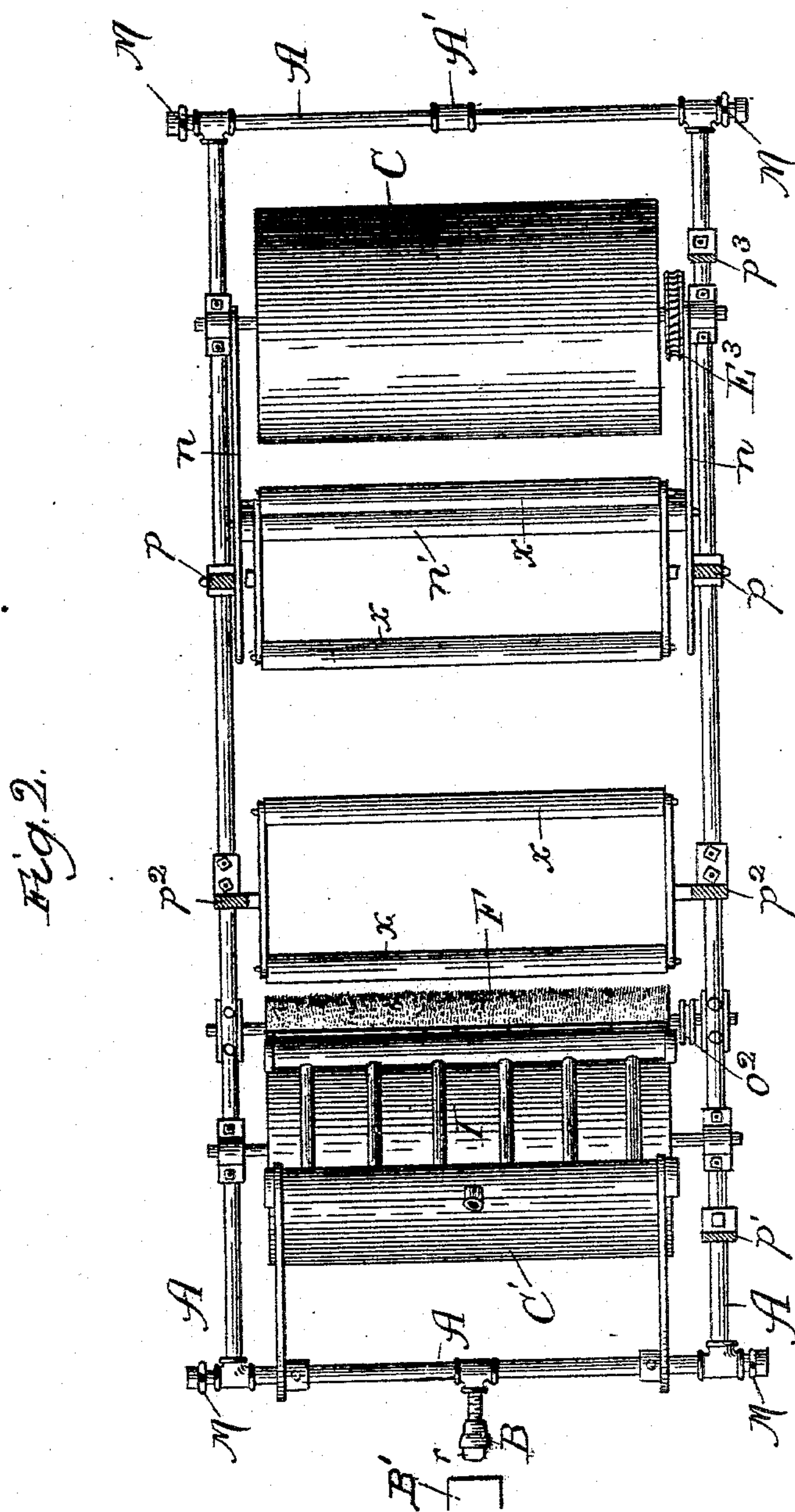
(No Model.)

3 Sheets—Sheet 2.

T. J. LOVETT.
ORE CONCENTRATOR.

No. 515,495.

Patented Feb. 27, 1894.



Witnesses:
E. Gaylord,
C. J. Zimmerman.

Inventor:
Thomas J. Lovett,
By Dyrenforth and Dyrenforth,
Attys.

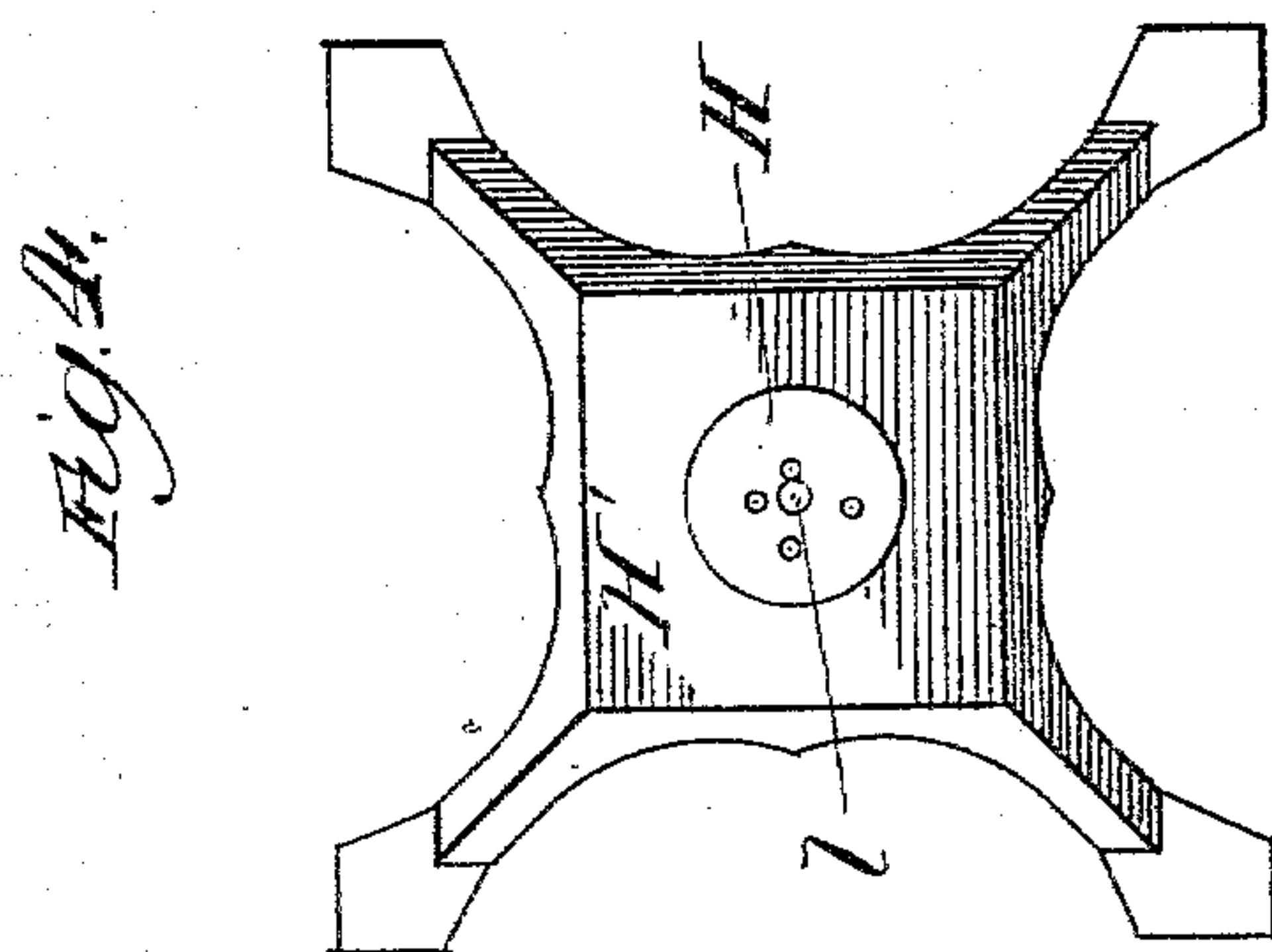
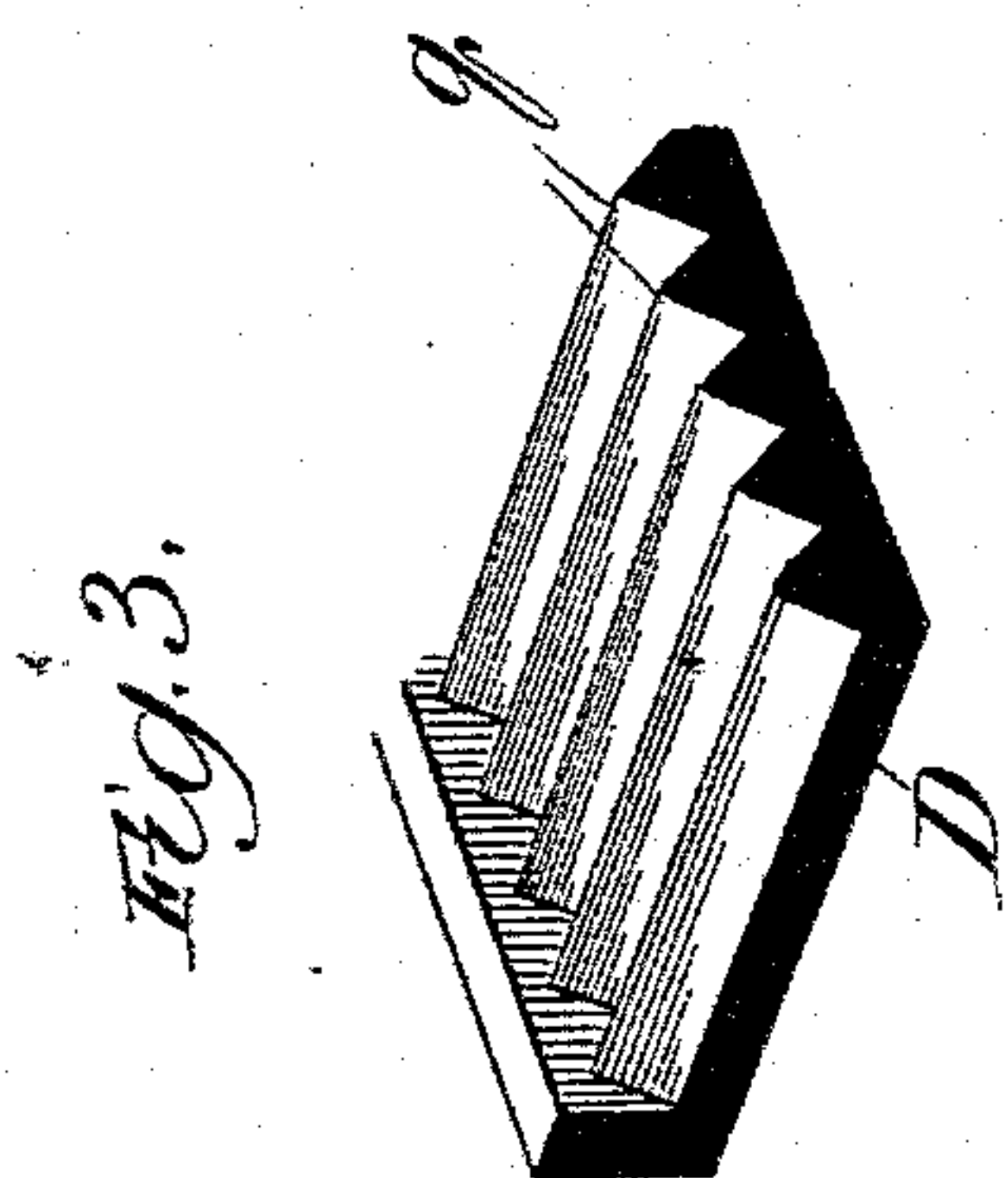
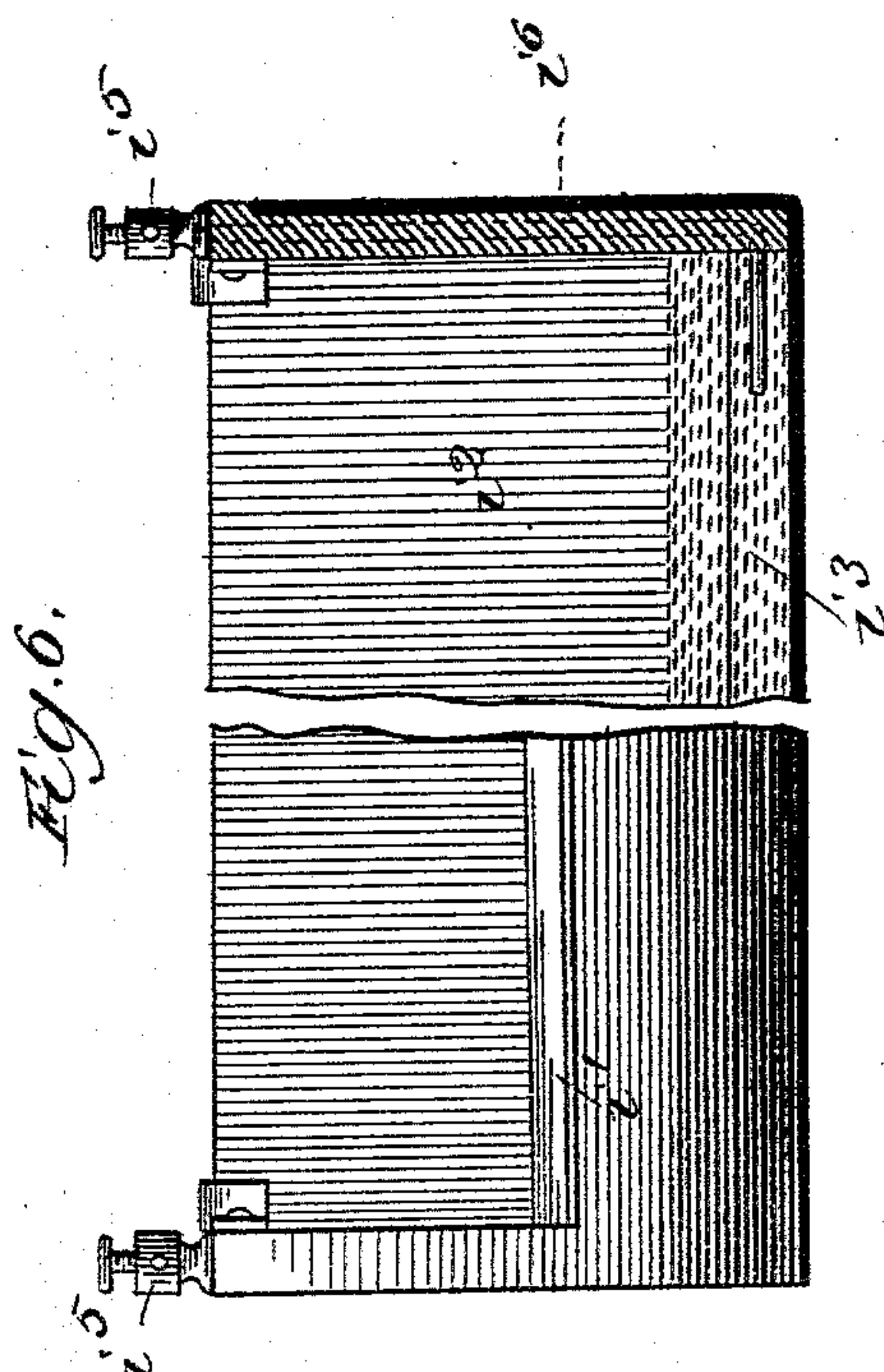
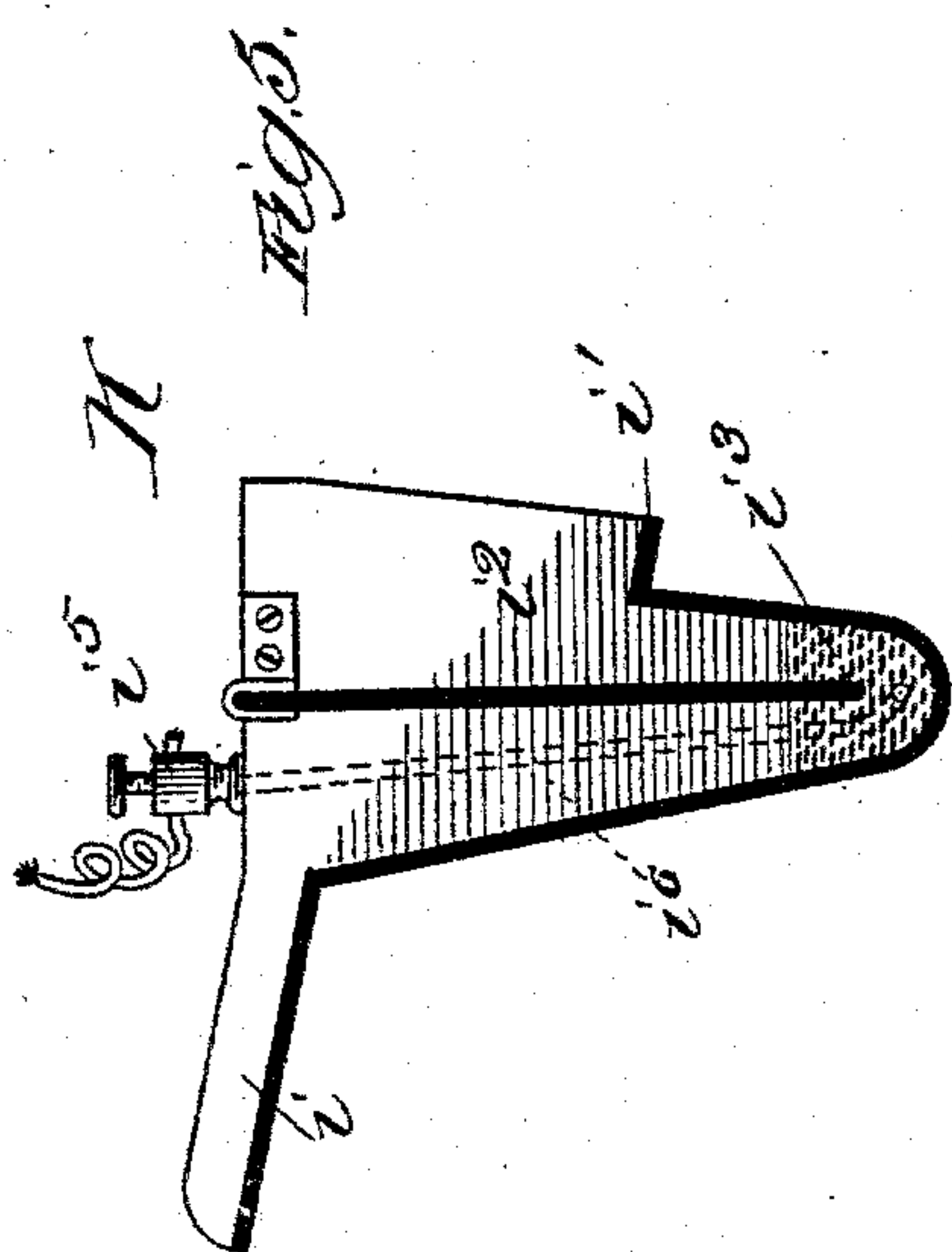
(No Model.)

3 Sheets—Sheet 3.

T. J. LOVETT.
ORE CONCENTRATOR.

No. 515,495.

Patented Feb. 27, 1894.



Witnesses:
E. J. Gaylord,
C. J. Timmerman.

Inventor:
Thomas J. Lovett,
By *Dynenforth* *Dynenforth*,
Attys.

UNITED STATES PATENT OFFICE.

THOMAS J. LOVETT, OF CHICAGO, ILLINOIS.

ORE-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 515,495, dated February 27, 1894.

Application filed April 24, 1893. Serial No. 471,657. (No model.)

To all whom it may concern:

Be it known that I, THOMAS J. LOVETT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Ore-Concentrators, of which the following is a specification.

My invention relates to an improvement in the class of concentrators in which a ribbed apron is supported on a frame and caused to travel, the frame being provided with means for agitating it and, with it, the apron, for the purpose of producing a species of agitation of the apron resembling, and to produce the effect of, the so-called hand-pan motion.

The objects of my improvement are to provide a concentrator which shall, in operation, have motions resembling and producing the effect of the desired hand-pan motion in an exceptionally high degree; and to provide a concentrator of peculiar efficiency, due to my improvement as to the general construction of the device as well as to details thereof.

Referring to the accompanying drawings—
Figure 1 is a view in side elevation of my improved concentrator. Fig. 2 is a plan view of the vibratory frame with the apron removed. Fig. 3 is a broken view in perspective of a section of the apron. Fig. 4 is a plan of the rotary eccentric guide for one end of the apron-frame; and Figs. 5 and 6 are sections of an ore-feeding attachment for the concentrator.

A is the frame shown as rectangular in form and which I prefer to make of cylindrical metal tubing. A bumper B, terminating in an elastic head r , extends backward from one end of the frame to be caused by one of its movements to strike a stationary obstruction B' for jolting the ore to be concentrated on the apron. Near the opposite ends of the frame are journaled, to extend between its sides, the drums or cylinders C and C', about which passes the endless apron D, composed, by preference, of a canvas body with a rubber facing, the facing being formed with ribs q extending transversely of the apron.

E is a counter-shaft journaled near its opposite ends in bearings p and p' on the frame A and carrying a pulley o having a belt-connection o' with a pulley o^2 on a shaft o^3 journaled in rigid hangers o^4 depending from op-

posite sides of the frame, the shaft carrying, to rotate with it and against the adjacent surface of the apron, a cylindrical brush F. A worm-shaft E' is journaled in bearings p^2 and p^3 to extend parallel with the shaft E and has its worm E² engaging a worm-wheel E³ on the axis of the apron-cylinder C. The shaft E' receives motion from the shaft E, by gearing the two together at the cone-pulleys m and m' , carried by them, respectively; and for supporting the upper section of the apron D, I provide underneath it a desired number of bearing-rollers x .

For taking up slack in the apron D I provide a tightening device G shown as a lever n journaled at one end on the shaft of the cylinder C and carrying between its ends one end of a roller n' (the opposite end of the roller being similarly supported) beyond which, where the lever coincides with the bearing p , it is adapted to have a pin passed through it, as indicated in Fig. 1, to enter any one of a vertical series of perforations n^2 in the bearing according to the requirement in adjusting the device G to accomplish its purpose.

At the forward end of the frame A, or that opposite the one provided with the bumper B, is a depending stud A' which enters one of the eccentric sockets l in a horizontally rotating head H, shown as a pulley, journaled on a base H'. Several of these sockets l are shown at different distances from the center of rotation of the head H, into either of which the stud may be inserted to vary, according to desire, the degree of eccentric motion of the frame.

I denotes a flush-water or sprinkling attachment surmounting the apron D and which may involve any suitable or well-known construction of such devices for concentrators; and K is a feeding attachment for the ore to the ribbed apron.

While various forms of ore-feed may be used with my improved construction of concentrator, I prefer the construction of that illustrated in Figs. 5 and 6, whereby it is rendered an amalgamating feeder, which operates best by providing means for passing an electric current through the mercury to energize it and thus increase its amalgamating efficiency. The amalgamating ore-feeder

comprises a trough, suitably supported (as on the bearings p^3), to extend transversely across the frame A above the apron D, and having an inclined spout or pan i leading downward to the upper edge of one (the supply) side of the trough, and an overflow i' at the opposite side at a desired elevation from the base of the trough, which contains, furthermore, a vertical partition i^2 , preferably of hard rubber, extending across the trough between the inlet i and discharge-overflow i' and which reaches short of the base of the trough, though below the surface of the supply of mercury i^3 therein. On the trough are binding-posts i^5 for connection with an electric generator and from which lead conducting-wires i^6 , at opposite ends of the trough, into the mercury, which forms the circuit-connection between the two conductors.

The frame A and parts carried by it are suspended in a manner to permit it to swing with the required freedom to provide for the several desired co-operative motions of the apron hereinafter described. L is the main driving shaft journaled in overhead hangers h and carrying the pulley g , which is suitably geared with the driving power (not shown), and pulleys g' , one at each end of the shaft and of which one is geared with a pulley f' on a lower counter-shaft f carrying also a pulley f^2 having a belt-connection f^3 with the rotary head H. The shaft L also carries near its center a pulley e having a twisted belt connection e^2 with an overhead pulley e' on a rotary shaft e^3 carrying another pulley e^4 , which is connected by a belt e^5 with a driving pulley e^6 on the adjacent end of the counter-shaft E.

The frame A is flexibly suspended at one end preferably by hanger-rods M containing turn-buckles M^2 by means of which readily to adjust that end of the frame and apron with relation to the opposite end carrying the stud A' , at which last-named end the frame is suspended by rods M' , adjustable as to length by turn-buckles M^2 and eccentrically pivoted at their upper ends to the pulleys g' on the shaft L.

The concentrator, when set in motion by rotating the shaft L, undergoes various motions. The eccentric connection of the frame A through the suspension-rods M' with the overhead pulleys g' vibrates that end of the frame (and, consequently, of the apron) vertically, while the rotary movement of the head H, produced by its gear-connection with the shaft L, causes, by the eccentric engagement of the stud A' with the rotary head, a longitudinal vibratory motion of the frame and apron, thereby striking the bumper and jarring the apron; and the rotary motion of the head H furthermore produces, by its eccentric engagement with the stud A' , a slight laterally swinging motion of the frame (and apron) from the end suspended by the rods M, where the frame has, practically, a pivotal connection with its overhead support, (thus

affording, as it were, the center on which the frame is laterally vibrated,) to the end suspended by the rods M' . These vertical, longitudinal and lateral vibratory motions of the frame thus produce a compound motion of the apron which is practically the same as the hand-pan motion referred to.

Besides producing the aforesaid vibratory motions of the frame, the rotating shaft L, by its connection with the counter-shaft E, drives the latter, which in turn drives the rotary brush F, to remove the concentrates thoroughly from the apron, while traveling at any desired rate of speed, regulated by the cone-pulley gears m, m' .

By the adjustable (turn-buckle) construction of the suspending media for the frame (rods M, M') they may be relatively lengthened and shortened, at will, to adjust the direction of extension of the frame, and with it the apron, thus to produce any desired inclination thereof from the horizontal, either lengthwise, or laterally, or diagonally, or any two of these combined, or to extend the same horizontally, according to the requirements of any particular ore to be concentrated.

While the apparatus is being actuated, the pulverized ore to be concentrated is fed on the apron and water from the device I, which should be impelled against the apron contrary to the direction of the motion of its upper side, that is toward the cylinder C' , flushes the surface of the apron to wash off the tailings, the concentrates being intercepted by the ribs q and sinking into the interstices between them, whence they fall off when carried underneath the frame by the apron, from which they are thoroughly removed by the brush.

The efficiency of the concentrator is greatly enhanced by employing with it the amalgamating feed K, into which the pulverized ore, with water, is introduced at the spout i , and only the residuum, after the amalgamable portion of the ore has been intercepted by the mercury, rises to the top thereof at the farther side of the diaphragm i^2 and escapes at the overflow i' onto the apron D, to be concentrated.

What I claim as new, and desire to secure by Letters Patent, is—

1. In an ore-concentrator, the combination of a frame carrying a traveling concentrating apron and flexibly suspended at its opposite ends, a bumper for the frame, a rotary overhead shaft carrying a vertically disposed pulley with which the suspending medium of one end of the frame is eccentrically connected, and a rotary head eccentrically connected with said frame, substantially as and for the purpose set forth.

2. In an ore-concentrator, the combination of a frame A having a stud A' at one end and a bumper at its opposite end and carrying an endless apron D, overhead shafts L and e^3 carrying pulleys and geared together and with the driving power and with the apron-driving mechanism, means, substantially as

described, flexibly suspending the frame from overhead near its opposite ends, the suspending means for one end being eccentrically connected with pulleys on the adjacent overhead shaft, and a rotary head H engaged eccentrically by the stud A' and geared to the shaft L, substantially as and for the purpose set forth.

3. In an ore-concentrator, the combination of a frame A having a stud A' at one end and a bumper B at its opposite end and carrying an endless transversely ribbed traveling apron D, overhead rotary shafts L and, e^3 , geared together and with the driving power and apron-driving means, a rotary head H supported in horizontal position near one end of the frame and engaged eccentrically by the stud A', and geared to the shaft L, rods M flexibly suspending the frame at one end from overhead and containing turn-buckles, pulleys g' on the shaft L, and rods M' connecting the frame from its opposite end eccentrically with the pulleys g' , substantially as described.

4. An ore-concentrator comprising, in combination, a frame A having a stud A' at one

end, a bumper B at its opposite end and carrying cylinders C and C' about which extends the transversely ribbed apron D, a rotary head H supported in horizontal position near one end of the frame and engaged eccentrically by the said stud, an overhead driving shaft L geared with the said head and carrying pulleys g' , rods M flexibly suspending the frame at one end from overhead and containing turn-buckles, rods M' connecting the frame from its opposite end eccentrically with the pulleys g' and containing turn-buckles, a rotary shaft E on the frame, geared with the said driving-shaft, and a rotary shaft E' thereon geared to the shaft E and having a worm-gear connection with the shaft of cylinder C, a tightener for the apron, a rotary brush F geared with the shaft E, and flushing means I for the belt, the whole being constructed and arranged to operate substantially as described.

THOMAS J. LOVETT.

In presence of—

M. J. FROST,

W. N. WILLIAMS.