

(No Model.)

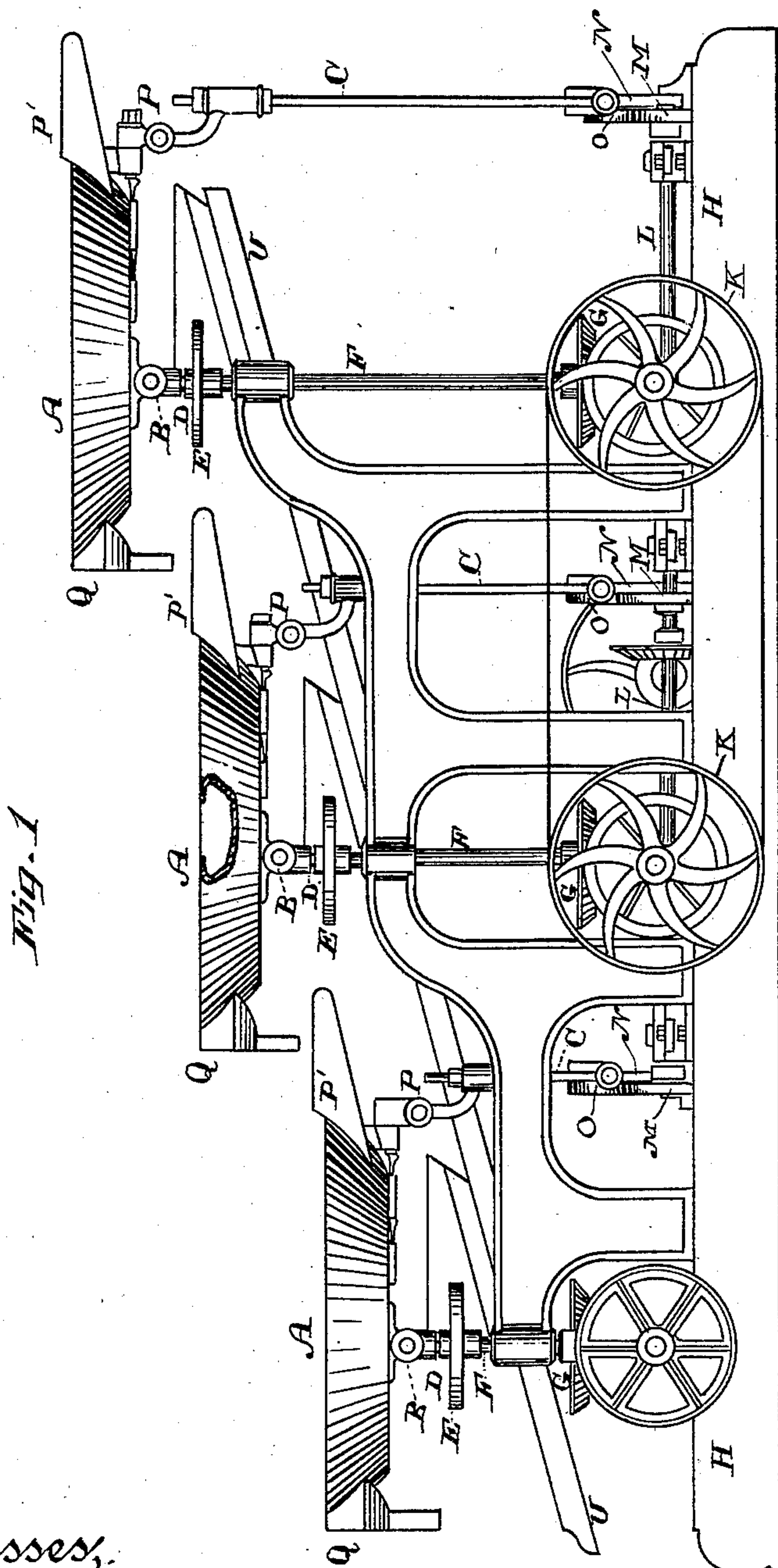
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D. H. ANDERSON.

CONCENTRATOR.

No. 285,098.

Patented Sept. 18, 1883.



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(No Model.)

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Fig. 3.

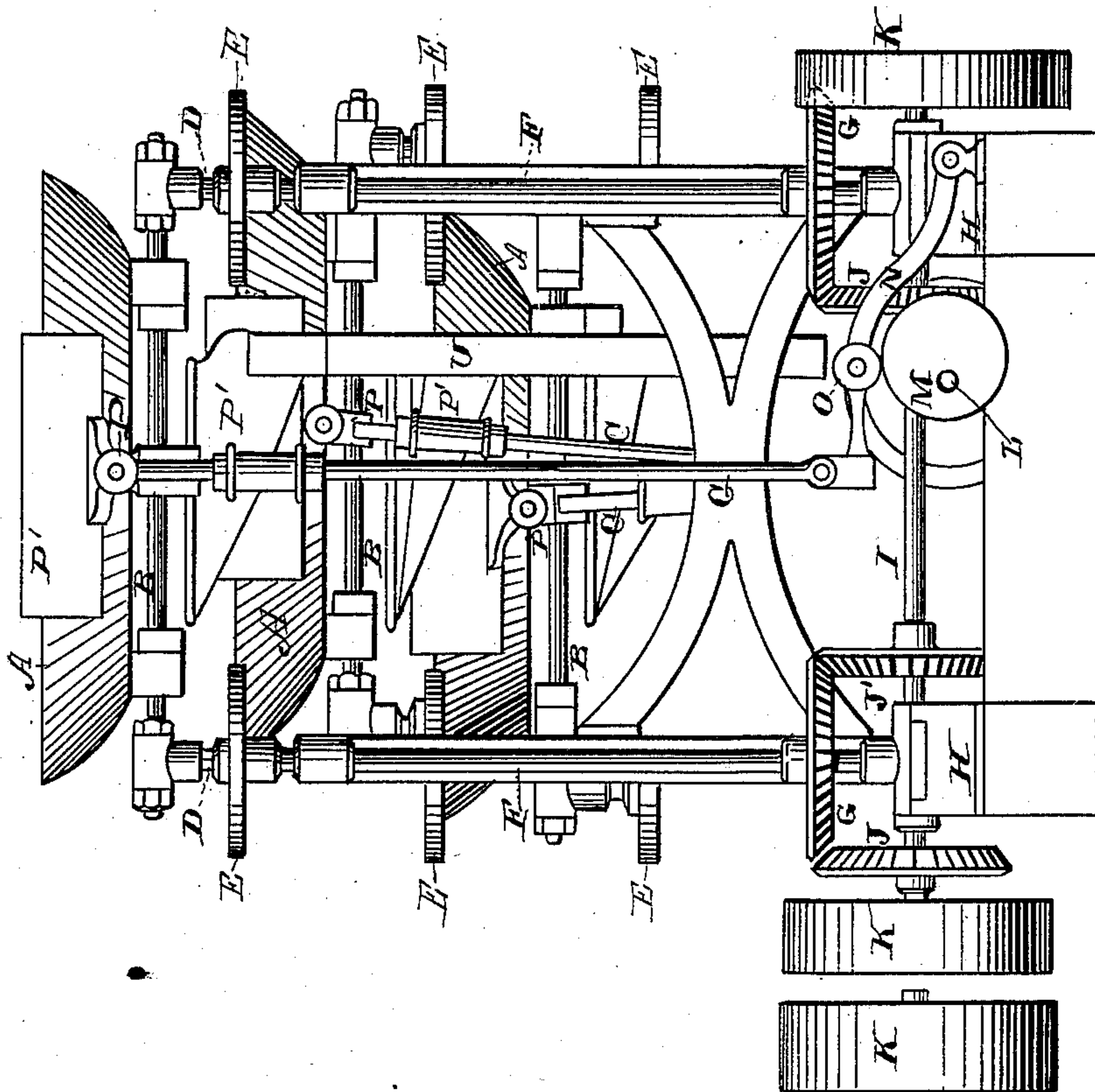
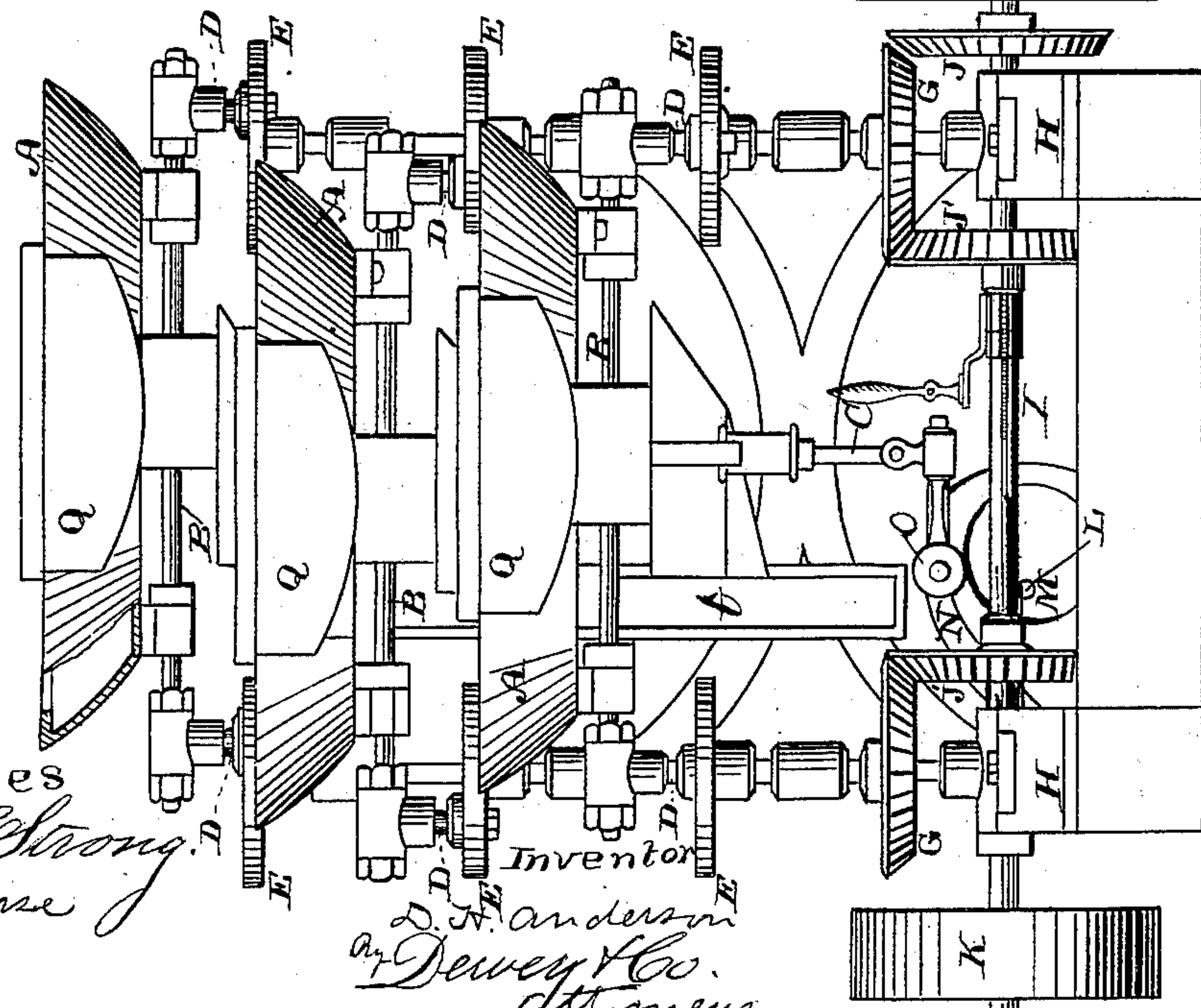


Fig. 2.



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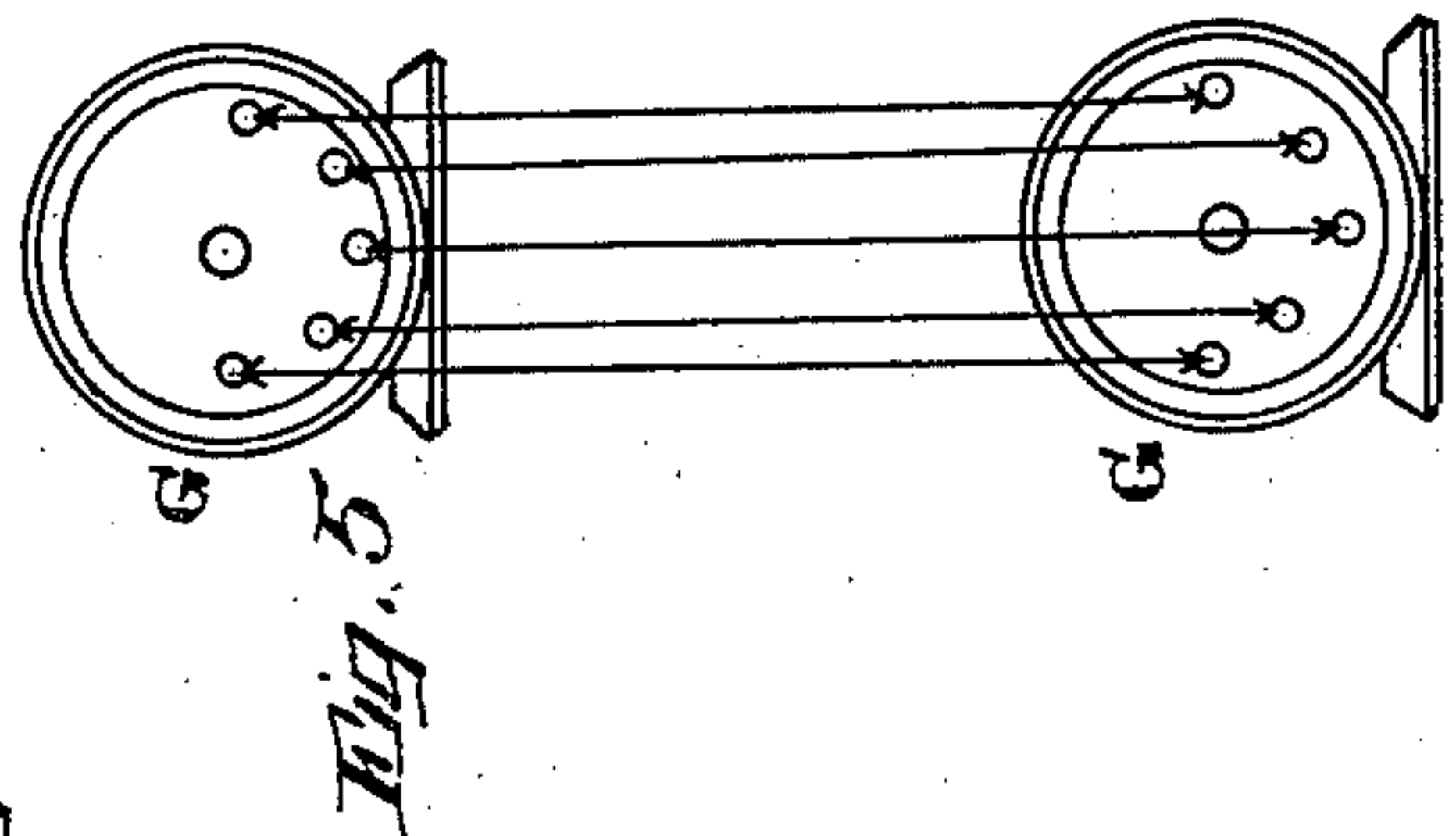
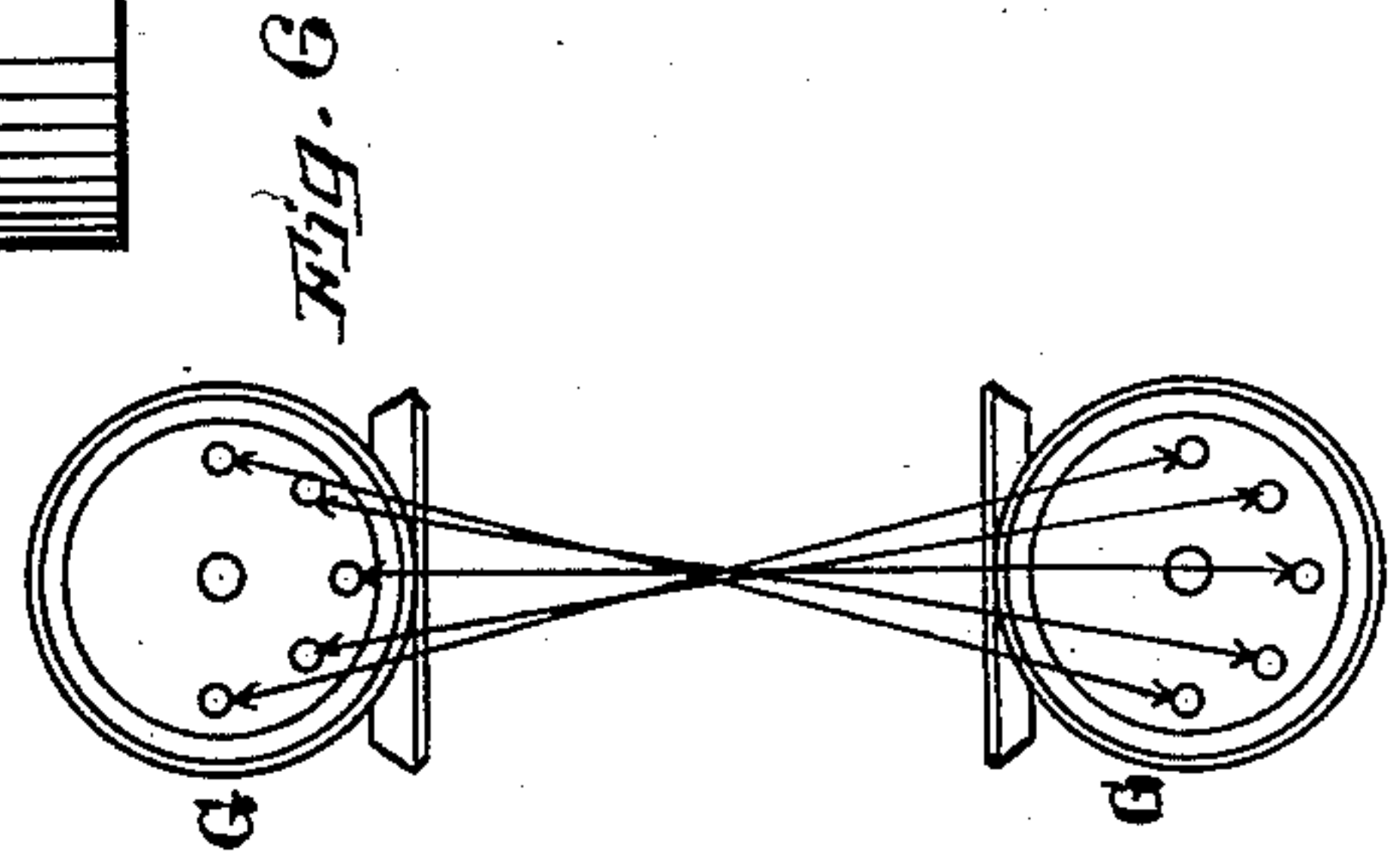
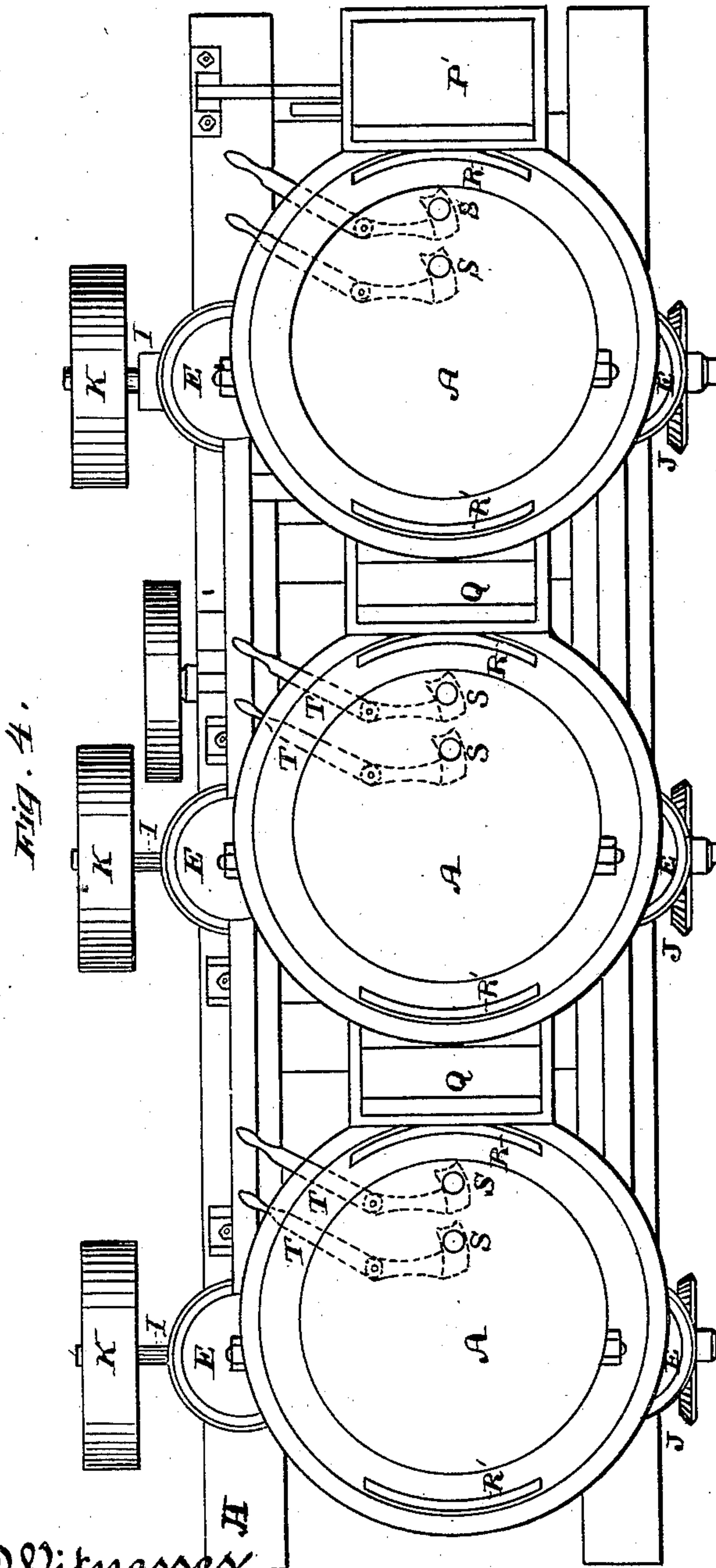
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(No Model.)

4 Sheets—Sheet 4.

D. H. ANDERSON.
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Patented Sept. 18, 1883.

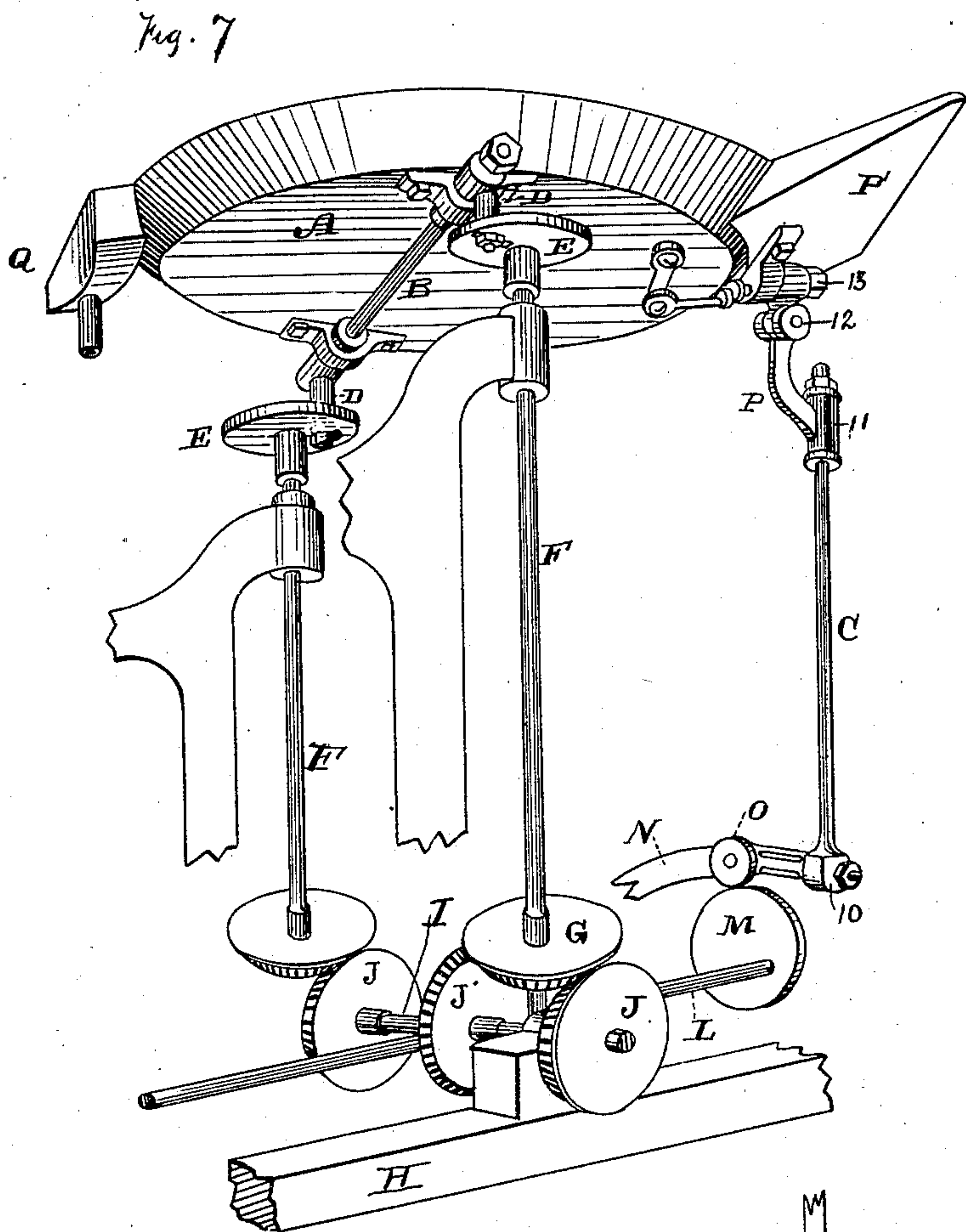


Fig. 8



Fig. 9

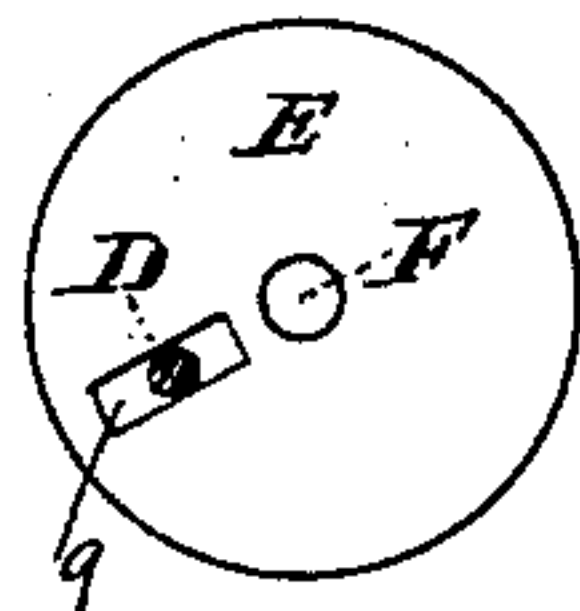
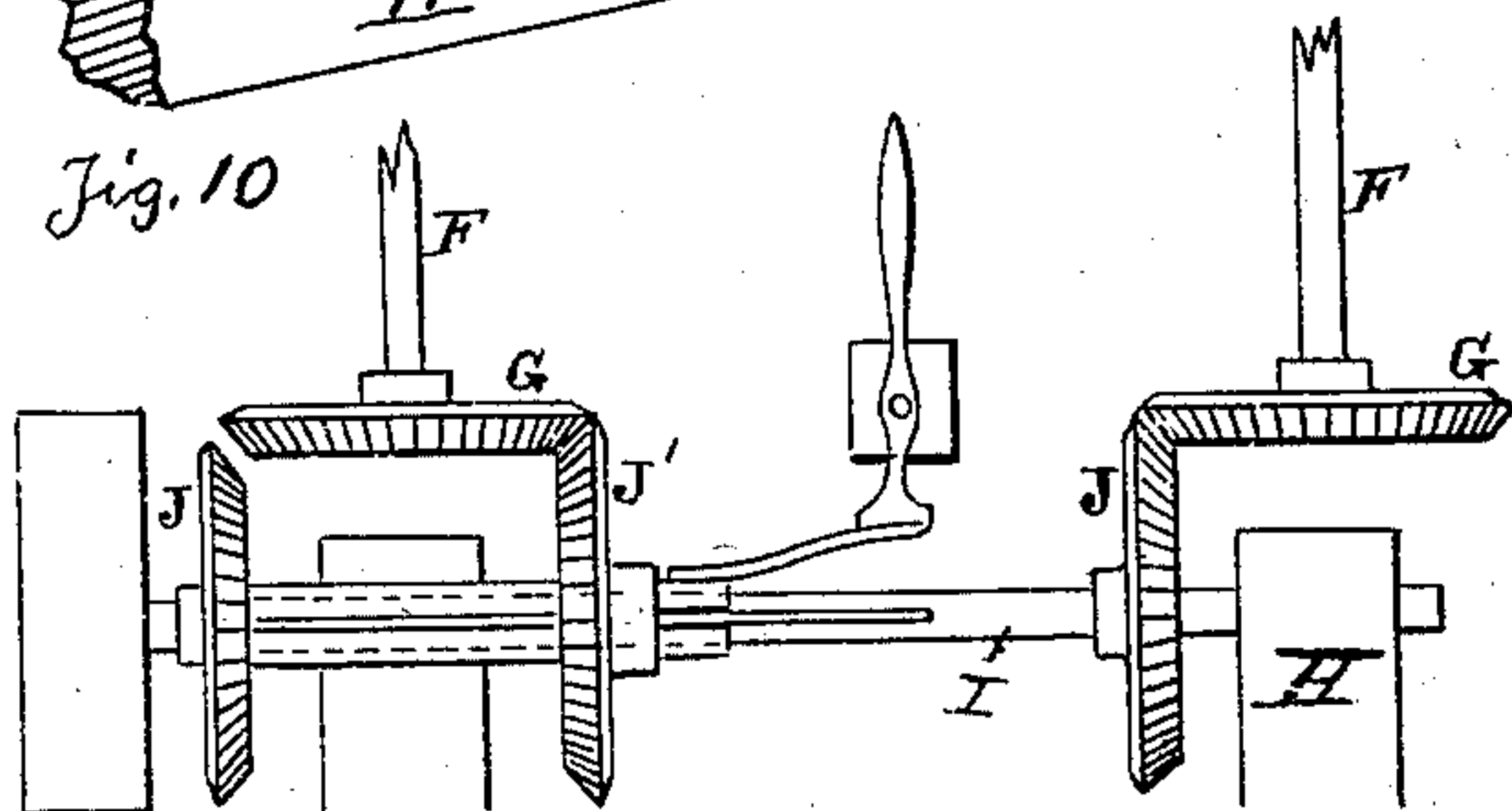


Fig. 10



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UNITED STATES PATENT OFFICE.

DAVID H. ANDERSON, OF BUTTE CITY, MONTANA TERRITORY, ASSIGNOR
OF ONE-HALF TO WILLIAM H. YOUNG AND HEZEKIAH RONDEBASH,
BOTH OF SAME PLACE.

CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 285,098, dated September 18, 1883.

Application filed October 21, 1882. (No model.)

To all whom it may concern:

Be it known that I, DAVID HENRY ANDERSON, of Butte City, county of Silver Bow, Territory of Montana, have invented an Improved Concentrator; and I hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to an apparatus for the amalgamation or concentration of valuable metals or sulphurets, and for separating them from the lighter metals, ores, sands, or débris with which they may be mixed.

It consists of a series of circularly moving and rocking pans placed in descending steps, each one receiving the discharge from that above it through suitable gates, chutes, and receivers, and in connection with these I employ suitable mechanism by which to operate them, all of which will be hereinafter fully described, specifically pointed out in the claims, and explained by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of my apparatus. Fig. 2 is a front view of the series of pans. Fig. 3 is a rear view of same. Fig. 4 is a plan or top view. Figs. 5 and 6 are diagrams illustrating different motions of the pan, either parallel or compound, caused by the gearing. Fig. 7 is a perspective view of one of the pans from below, showing also the actuating-gears and cam. Fig. 8 is a section of one edge of the pan, showing the rims. Fig. 9 is a bottom view of one of the disks E, showing the adjusting-slot for the crank-pin D. Fig. 10 is a view showing the pan-driving gears and means for throwing them into or out of gear.

A A A are pans or bowls, of any desired or suitable size, to receive the material to be worked, and having, preferably, rims projecting inwardly, (see Fig. 8,) to prevent the splashing of the pulp by the motions of the pans. These pans are supported upon transverse shafts B, which extend across beneath them just forward of the center, and their rear sides are supported by vertical rods C, the operation of which will be described hereinafter. The shafts B are secured in boxes beneath the pans, and their ends project so as to be con-

nected with the wrist-pins D. The shafts F support on their ends and rotate disks E, the said disks being provided with slots 9, through which project the wrist-pins D. The wrist-pins are intended to be adjusted by means of nuts to or from the center of the disks, to give a longer or shorter throw to the crank thus formed, and by their movement the pans are given a curvilinear reciprocating motion.

The vertical shafts F, to which the disks E are fixed, extend down to the lower part of the apparatus, and have bevel-gears G fixed near their lower ends, their ends in steps turning upon the frame-work H, which supports the apparatus. Transverse shafts I extend across this frame-work, and these carry bevel-gear wheels J J', which mesh with the wheels G, and thus rotate the vertical shafts F and the disks E in a manner hereinafter described. These shafts may be driven by belt-pulleys K and belts from any suitable source of power. Another shaft, L, extends longitudinally from end to end of the frame, and has cam-wheels M fixed to it beneath the rear portion of each pan. These cams serve to give the vertical rods C an up-and-down movement, and through them the pans are caused to rock upon their horizontal supporting-axes, as will be hereinafter described. In the present case I have shown the vertical movement imparted to the rods C by means of transverse levers N, one end of each of which is pivoted to the frame to form a fulcrum, while the other end has the rod C connected with it by a pivoted joint, 10.

A roller, O, is journaled upon the side of each lever N in such a position as to be acted upon by the cam M as it rotates, and the reciprocating motion thus imparted to the levers is transmitted to the rods C and through them to the pans. The rods C are attached to the rear of the pans by a swiveling connection, P, at 11, 12, and 13, as particularly seen in Fig. 7. These swivel connections allow the rods C to raise and lower the rear of the pan without interfering with any of its outer movements.

Each of the vessels A has a chute or receiver, P', upon its upper side and a distributor, Q,

upon its lower side. The receiver upon the first pan is supplied from the battery or other crushing or pulverizing apparatus through suitable connecting-chutes, and the receivers of the following pans are supplied from the distributors of those preceding them. Long slots R open from the receivers into the pans, and similar slots, R', open from the opposite sides of the pans into the distributors. As the material passes from the receivers to the pans through these slots, it is evenly distributed over the bottoms of the pans, and the slots also serve to check the current of water as it enters the pans.

Each pan is provided with one or more valves or gates, S, in the bottom, through which to discharge the concentrations. In the present case I have shown these valves sliding to and fro over the discharge-openings and operated by levers T, by which the amount of opening and the rate of discharge may be accurately governed.

Beneath the discharge-openings is an inclined trough or chute, U, extending beneath all the pans, so that the concentrations may be led to any desired point for discharge and collection.

The operation is as follows: The pulp is let into the upper pan and distributed and settled by the peculiar motions imparted to it, the heavier particles settling to the bottom, and the lighter arranging themselves above and flowing through the openings at the side into the distributor, and thence into the next pan, as before described.

If it be desired to amalgamate the free gold and silver at the same time that the concentration is being accomplished, mercury may be placed in one or more of the pans. The heavier metals—gold, silver, and mercury—will thus remain at the bottom of the first pan, and the lighter metals, if there be any—sulphurets, sand, loam, and other débris—will be discharged through the distributor Q into the next pan, where the heaviest will be again settled, and so on to the end of the series, so that all the different grades and values will be separated at one operation.

In some cases it may be desired to give the pans a parallel circular motion, as seen in Fig. 5, and in others a compound circular motion, as seen in Fig. 6, by means of the horizontal disks and crank or wrist pins. The latter movement is effected by means of another set of gear-wheels, J', upon the transverse horizontal shafts I, and upon the opposite sides of the gears G from J. Both gears J and J' move upon feathers upon the shafts, so that by means of suitable operating-levers (shown in Fig. 10) either one may be thrown into gear and the other disengaged. When the gears upon the same side relatively mesh with their corresponding gears G, the movement of the gears G will be in the same direction, as shown in Fig. 5, and the pan will

be given a simple circular motion about the centers of wheels G; but if the two inside gears are engaged with G, it will produce a movement of these gears in opposite directions, as shown in Fig. 6, and give the pan a compound motion.

The object of the parallel circular motion is to move the vessel equally in all directions, thereby imparting to the pulverized ore, sand, and débris an even movement as they pass over or through the vessel.

The object of the compound circular motion is to agitate the passing material mostly in a sidewise or oscillatory manner around the center of the pan, while creating but little motion in the direction in which the material flows across the vessel. This movement is especially useful for saving the lighter metals, and gives the machine a better settling action than what I term the "parallel motion."

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

1. The pans or bowls A and the transverse shafts B, in combination with the horizontal disks E, adjustable crank-pins D, the vertical and horizontal driving-shafts F I, and the gear-wheels G J, substantially as herein described.

2. The combination of the pans A, shafts B, crank-wheels E, shafts F I, gears G, and the gear-wheels J J', moving upon feathers upon the shaft I, so that either may be engaged with the gears G to drive them in the same or opposite directions, substantially as herein described.

3. The pans A and the transverse shafts B, in combination with the vertical rods C, jointed to the rear sides of the pans, the cams M, levers N, and rollers O, substantially as herein described.

4. The pans A, the horizontal shafts B, the cranks D E, and their driving mechanism at opposite ends of the shafts, in combination with the vertical rods C, having universal joints, and the cams M, substantially as herein described.

5. The pans A, having discharge-openings, in combination with the horizontally-sliding valves S, levers T, the inclined discharge-chute U, and means for producing a shaking motion of the pans, substantially as set forth.

6. The pans A, arranged in a descending series, and having the horizontal slots R' R', receiving-chambers P', and distributors Q, in combination with mechanism for producing a shaking motion of the pans, substantially as described.

In witness whereof I hereunto set my hand.

DAVID HENRY ANDERSON.

Witnesses:

JOHN F. FORBIS,
JAS. W. FORBIS.