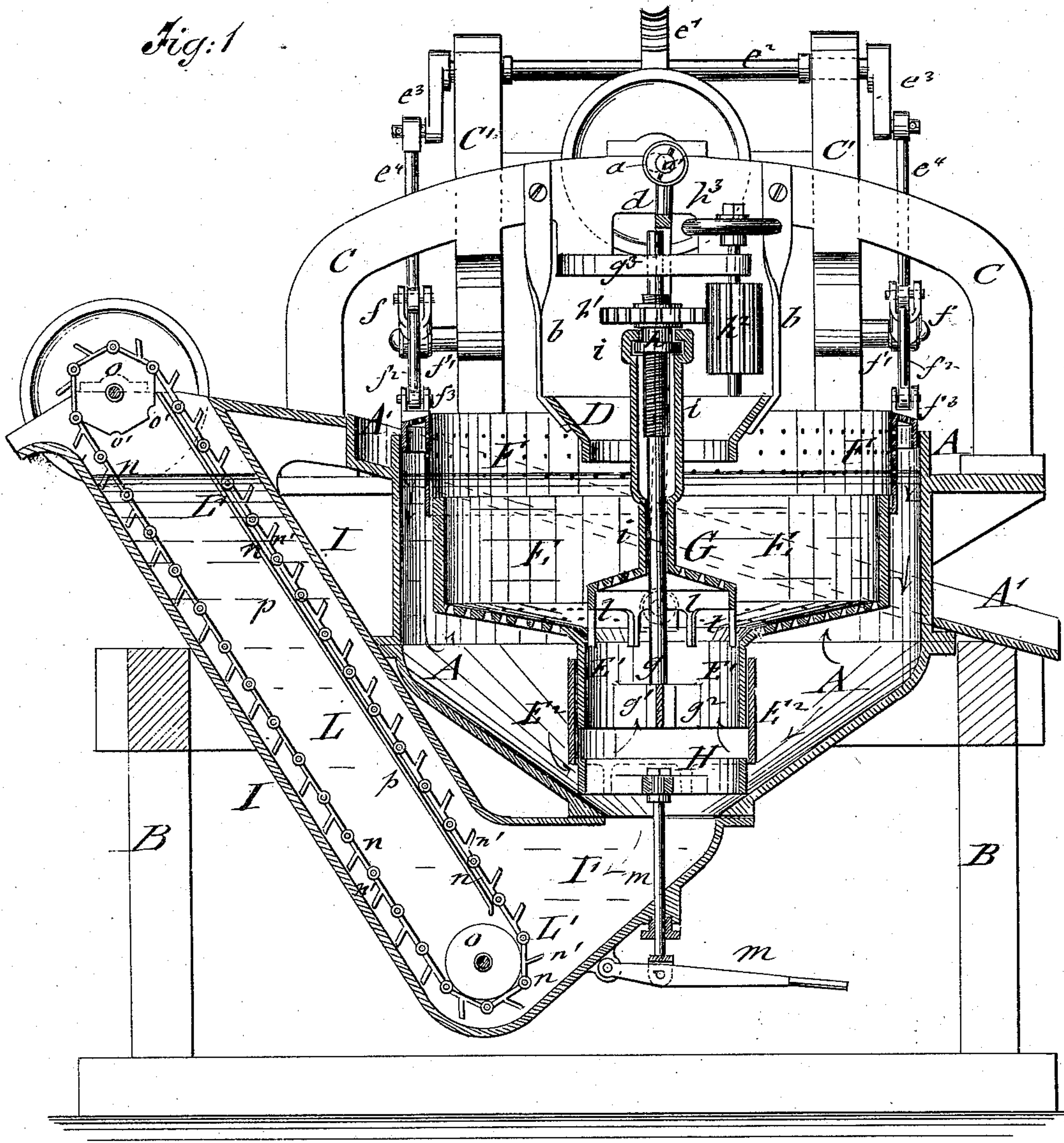


**W. H. PLUMB.**  
**Jiggers for Separating Ores.**  
 No. 152,810. Patented July 7, 1874.



WITNESSES:

*Chas. Viola*  
*Edgwick*

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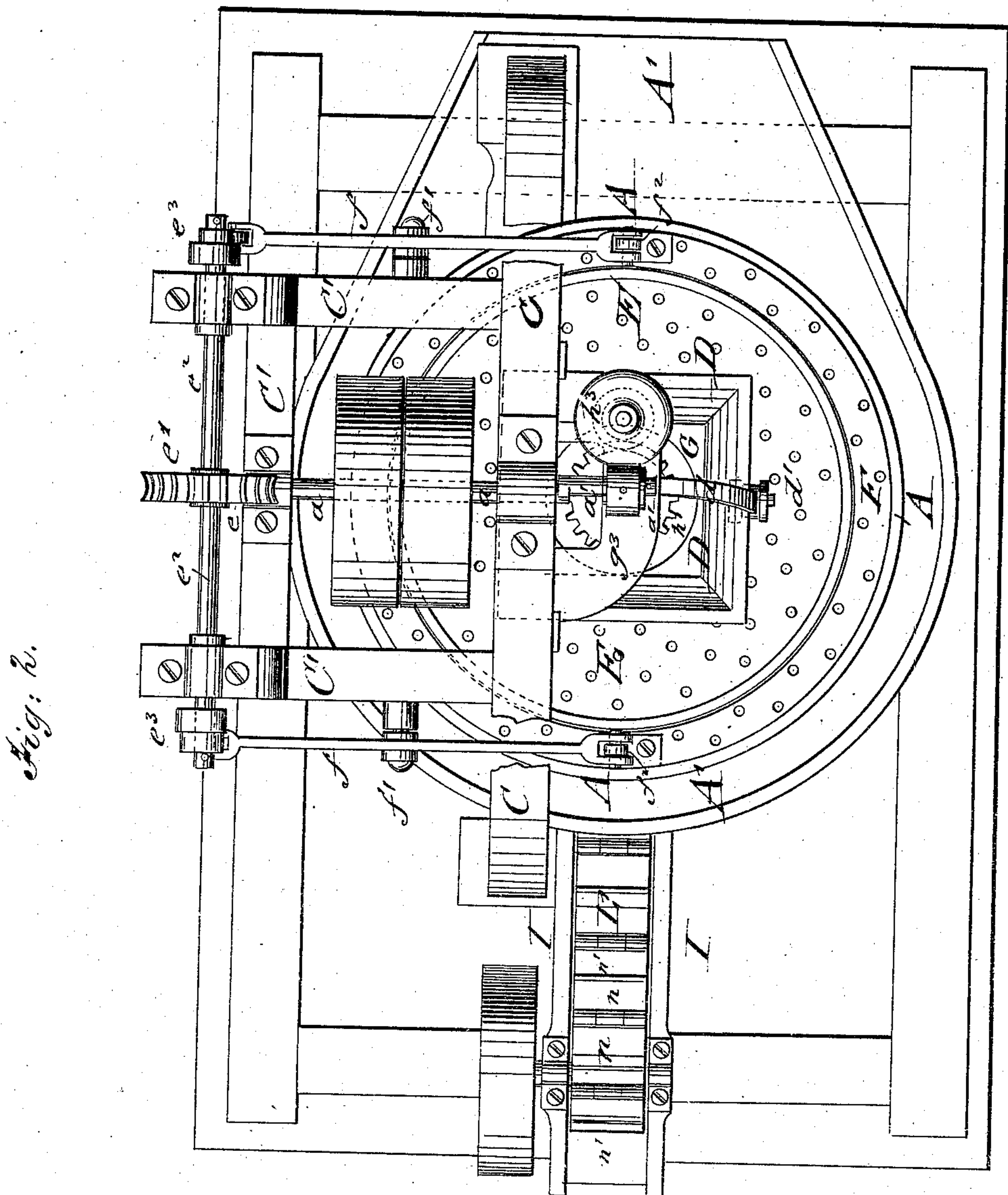
ATTORNEYS.

**W. H. PLUMB.**

## Jiggers for Separating Ores.

No. 152,810

Patented July 7, 1874.



**WITNESSES:**

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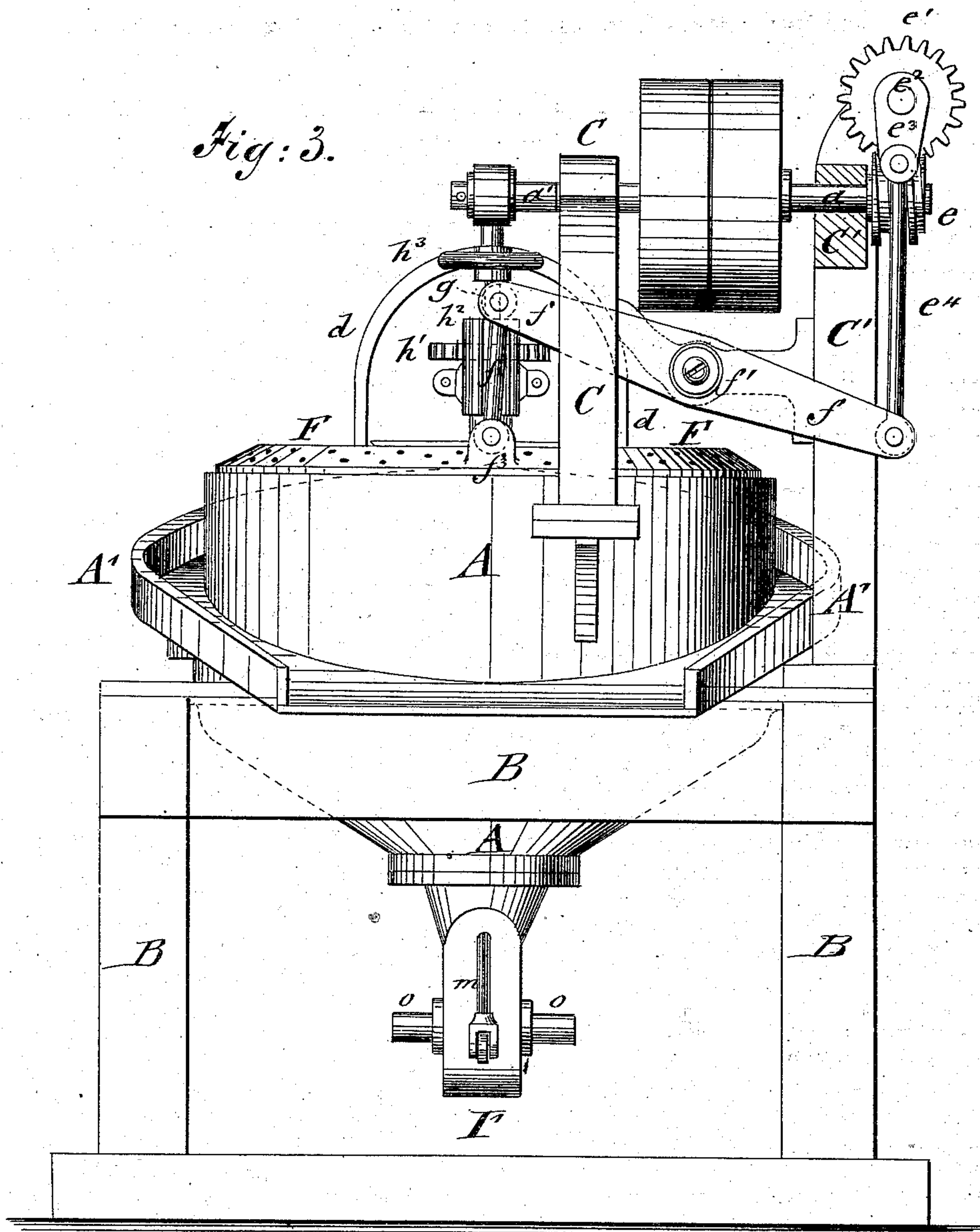
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Fig: 3.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

WILLIAM H. PLUMB, OF MAUCH CHUNK, PENNSYLVANIA.

## IMPROVEMENT IN JIGGERS FOR SEPARATING ORES.

Specification forming part of Letters Patent No. **152,810**, dated July 7, 1874; application filed May 23, 1874.

*To all whom it may concern:*

Be it known that I, WILLIAM H. PLUMB, of Mauch Chunk, in the county of Carbon and State of Pennsylvania, have invented a new and Improved Jigger for Separating Ores, of which the following is a specification:

In the accompanying drawing, Figure 1 represents a vertical longitudinal section on the line *c c*, Fig. 2, of my improved jigger for separating ores, coal, &c. Fig. 2 is a top view, and Fig. 3 a side elevation, of the same.

Similar letters of reference indicate corresponding parts.

The object of my invention is to furnish, for collieries, mines, and similar purposes, an improved jigger for the separation of coal, ore, and other mineral products, by which large quantities thereof can be rapidly and economically worked off in a complete manner, based on the difference of the specific gravity of the minerals.

My invention consists, mainly, in the arrangement of an ore-receiving receptacle with inclined perforated bottom and central tubular extension, which is vibrated rapidly by suitable mechanism in connection with a central perforated disk, being inclined in opposite direction to the bottom of the receiving-receptacle, provided with vertical downward-extending guide-lugs, and a mechanism for adjusting the relative position of the perforated parts. The central bottom extension of the receiving-receptacle is guided in its motion by a sleeve or casing, while the upper part of the same is guided in a surrounding perforated cylinder with similarly reciprocating but considerably slower motion, which slides up and down in the upper wall of the main casing, and discharges intermittently the lighter part of the ores when its perforated inclined rim rises above the upper rim of the casing, conducting the lighter parts off to a chute of suitable inclination, extending around the main casing. The ore or coal is fed through a suitable hopper to the center of the receiver and kept continually submerged in the water in the tank and acted upon by the currents of the same. A piston-valve serves, in connection with the bottom extension of the receiver round the conical base of the main casing or tank, for the regulation of the flow of water

from the extension to the interior part of the tank where the heavier particles are discharged. An inclined casing connects with the bottom of the tank and incloses the ore-elevator for carrying up the heavy particles and discharging them above the water-level of the tank.

In the drawings, A represents the main casing or tank, preferably of cylindrical shape, and cast-iron or other suitable material, supported on a frame, B, of corresponding strength. An arched top standard, C, extends centrally over the tank, and carries, in connection with rear standards C', the driving-shaft *a*, which connects, by pulleys and belt, with suitable motive-power. The hopper D is suspended by bands *b* from the arched standard C, being centrally to and at about the height of the upper edge of tank A. The front end of driving-shaft *a* connects, by a short crank, *a'*, with the forked levers *d*, which are pivoted to the crank-pin and lugs *d'* at diametrically-opposite points of the inclined bottom of the ore-receiving receptacle E. A worm-wheel, *e*, at the rear end of driving-shaft *a*, gears with intermeshing-wheel *e'* of a lateral shaft, *e''*, having end cranks *e'''*, which are pivoted, by intermediate rods *e''''*, to reciprocating levers *f*, fulcrumed to suitable bearings *f'*, and connected by pivoted lever-rods *f''* at the front ends thereof with pivot-lugs *f'''* at opposite points of the inclined discharge-rim of the cylinder F, which surrounds and slides along the upper part of ore-receptacle E. The motion of the receiving-receptacle is preferably proportioned by a corresponding construction of the transmitting-cranks and gear-wheels in such a manner that the stroke of the same is about half the size of the material to be separated, being in the case of stove-coal about one inch, and making about one hundred and eighty revolutions of the crank-shaft and strokes of the ore-receiver, while the discharge-rim makes but eight to twelve at the same time. This produces separate vibrations of the receiving and discharging parts, and gives, therefore, a constant and steady discharge of the heavier product at the bottom, while that of the lighter product at the top is intermittent. The outwardly-inclined discharge-rim, as well as the side wall of the vibrating cylinder F, is perfor-



ated with a series of holes for the passage of the water in tank A. The water causes such currents that the separation of the heavier and lighter portions of the ores or coal is considerably facilitated. A continuous supply of water may be introduced into the tank at any convenient point, but preferably through a circular pipe perforated with small holes placed directly above the discharge-rim of the cylinder F, so as to shower a spray of clean water on the coal as it leaves the dirty water in the tank. The inclined bottom of receiver E is provided with similar perforations for the passage of the tank-water during the strokes of the same, and constructed with a central vertical extension, E<sup>1</sup>, which is guided in a sleeve or casing, E<sup>2</sup>, of the tank. The connection of inclined bottom and vertical extension is made by a short but steeper part for accelerating the motion of the heavy portions in their discharge from the inclined bottom to the extension-tube. A central vertical shaft or rod, g, is supported in a central socket, g<sup>1</sup>, of radial arms g<sup>2</sup> of extension E<sup>1</sup>, and guided in a horizontal top plate, g<sup>3</sup>, of standard C. Shaft g is provided at the upper part with a screw-thread, on which a flanged screw-nut, h, keyed to a horizontal cog-wheel, h<sup>1</sup>, is turned in up and downward direction by a vertical pinion, h<sup>2</sup>, with hand-wheel h<sup>3</sup>.

To the flange of adjustable screw-nut h is hung the correspondingly-grooved end of tubular sleeve i of the central disk G, which has the same motion as receptacle E, but is adjustable to a greater or lesser height above the bottom of the same for making the space between the disk and bottom larger or smaller, according to the amount of heavy product to be discharged. The disk G is inclined in a downward direction from the center toward the bottom of ore-receptacle E, being perforated in similar manner, and provided at the circumference with a suitable number of triangular vertical bars, l, between which the settled ore passes to the discharge extension-tube in a regular and uniform manner. The vibrations of the receiving-receptacle and top cylinder produce alternating currents of the water in the tank, which pass up through the inclined bottom and the extension-tube against the coal or ore, and toward the circumference, assisting the lighter particles to rise and separate themselves from the heavier, until, by the descent of the discharge-rim, they are placed over the same, and carried by the upward motion above the edge of the tank and dropped over the same into an inclined chute, A', extending circumferentially around the casing or tank A. The separated coal or ore is then transferred by suitable conveying-tubes to the place of storage. A piston-valve, H, operated by a closely-packed rod, and lever m, at the outside of tank A, slides in the lower end of guide-sleeve E<sup>2</sup>, and regulates, in connection with the conical bottom of the tank, the flow of water from the exterior to the interior where the heavier particles are dis-

charged. An inclined elevator-casing, I, is tightly attached to the central bottom aperture of the tank. The connecting-part I' of the elevator-casing is tangential to the elevator L, which is rotated therein for taking up and conveying the heavier products from the tank to a point above the level of the water therein. The elevator L consists of an endless chain or belt, L', constructed in strong and substantial manner of cast-iron plates n, which are hinged together, the central axis of each hinge being in line with the back of the plates. The hinges have shoulders with beveled ends, by which the chain is permitted to turn readily on the drums o. Each plate n, or every other plate, is provided with a projecting shelf, n', placed under right angle or other suitable inclination to the body of the plate or link, by which the material to be conveyed is taken up. The chain L' is set in motion by the upper drum o, which is arranged with grooves o' and guide-flanges, while the lower round drum o serves to guide and stretch the same. The side walls of the casing I have projecting ribs p for the ascending charged buckets or shelves, so as to prevent the sagging of the same. The distance between the upper or top wall of the casing I and the ascending shelves is greater than that of the descending shelves from the lower wall, so that thereby the charged shelves may be easily carried up without getting choked or otherwise obstructed in their passage through the casing.

The water drips off sidewise, so that the material is conveyed to the conducting-chute without carrying off too great a quantity of water, and lowering thereby the water-level in tank and elevator-casing.

The coal is in this manner separated from its heavier parts of slate or other minerals by being passed over the discharge-rim; while in the case of ores the opposite course takes place, the ores settling as the heavier part, and conducting the useless lighter material over the discharge-rim, accomplishing the separation with great rapidity, certainty, and economy.

This invention is believed to be an improvement on the subject-matter of patent granted to me May 6, 1873.

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

1. In a jigger for separating ores, coal, and other mineral products, the combination of outer main casing or tank, slowly-vibrating perforated cylinder, with inclined discharge-rim, with the rapidly-vibrating interior ore-receiver with inclined perforated bottom, extension discharge-tube, and central perforated regulating-disk and piston-valve, for regulating flow of water, the whole being constructed and operated substantially in the manner and for the purpose set forth.

2. The vibrating receiving-receptacle, provided with inclined perforated bottom, inter-



mediate steeper-part, and central extension discharge-tube, in combination with an adjustable central perforated disk, being inclined toward the bottom, and arranged with vertical downward-extending bars for producing the uniform and regular passage of the heavy particles through the discharge-tube, substantially as specified.

3. The central perforated disk, combined, by tubular shaft and grooved sleeve-end, with screw-nut of threaded guide-shaft, and adjusting gear-wheels, for regulating height of disk above inclined bottom of receptacle, and the discharge of heavy particles between the same, as set forth.

4. The combination of rapidly-vibrating ore-receiver with surrounding slowly-vibrating perforated cylinder, constructed with outwardly-inclined perforated discharge-rim, for the purpose of transmitting and discharging the lighter products over the upper edge of tank, as described.

5. The main casing or tank, provided with inclined flanged chute, extending around its circumference, for conducting off the discharged lighter particles, substantially as described.

6. The combination of the guide-casing of extension-tube and conical base of main tank with an adjustable piston-valve, for regulating flow of water from the exterior to the interior part of tank, substantially as set forth.

7. The combination, with the discharge-tube of the ore-receptacle and the bottom aperture of the main tank, of an inclined elevator-casing and elevator for carrying up the heavy material to a point above the water-level in tank and casing, as set forth.

WILLIAM H. PLUMB.

Witnesses:

T. B. MOSHER,  
ALEX F. ROBERTS.