

No. 639,920.

Patented Dec. 26, 1899.

H. H. CRAMER.
ORE CONCENTRATOR.

(Application filed June 30, 1898.)

2 Sheets—Sheet 1.

(No Model.)

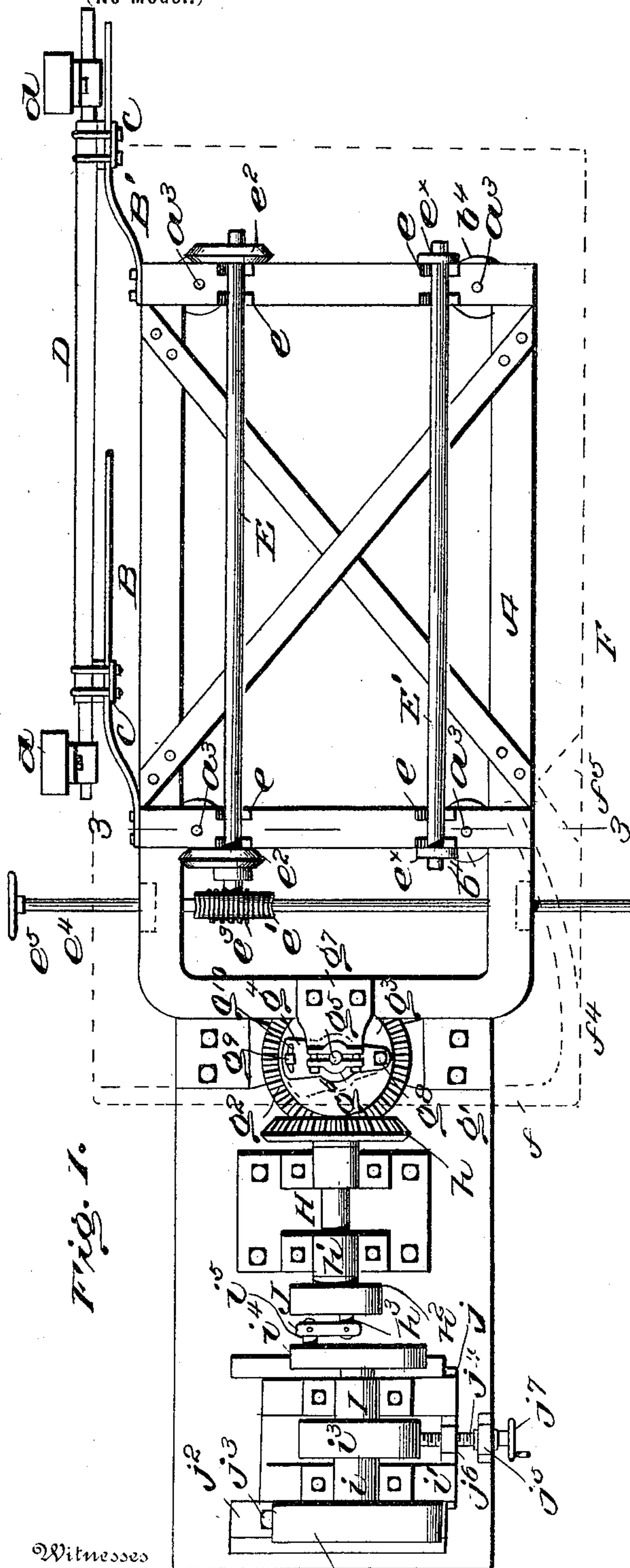


Fig. 1.

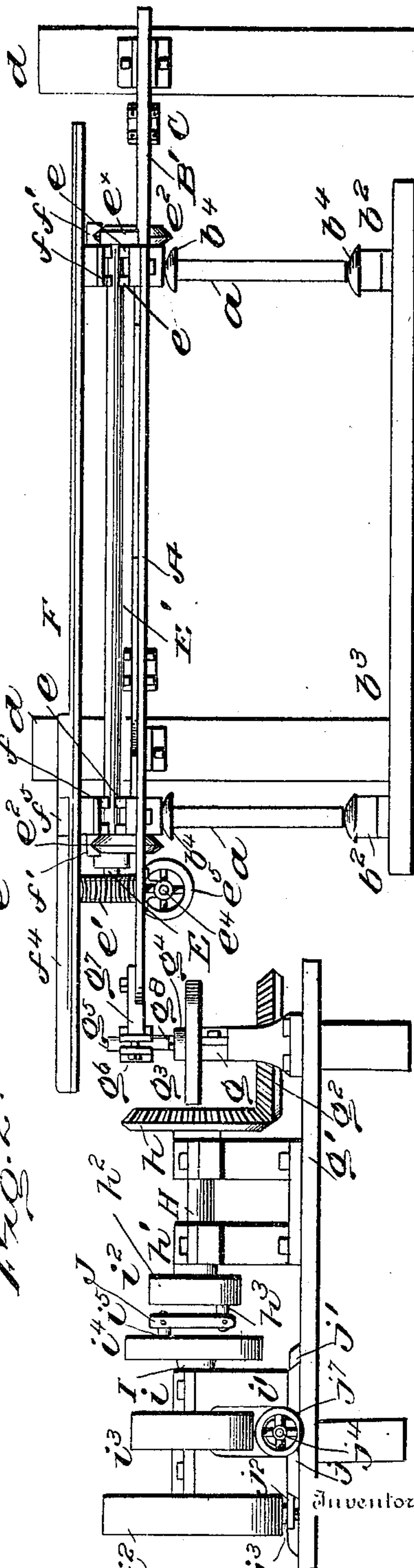


Fig. 2.

Witnesses

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2 Sheets—Sheet 2.

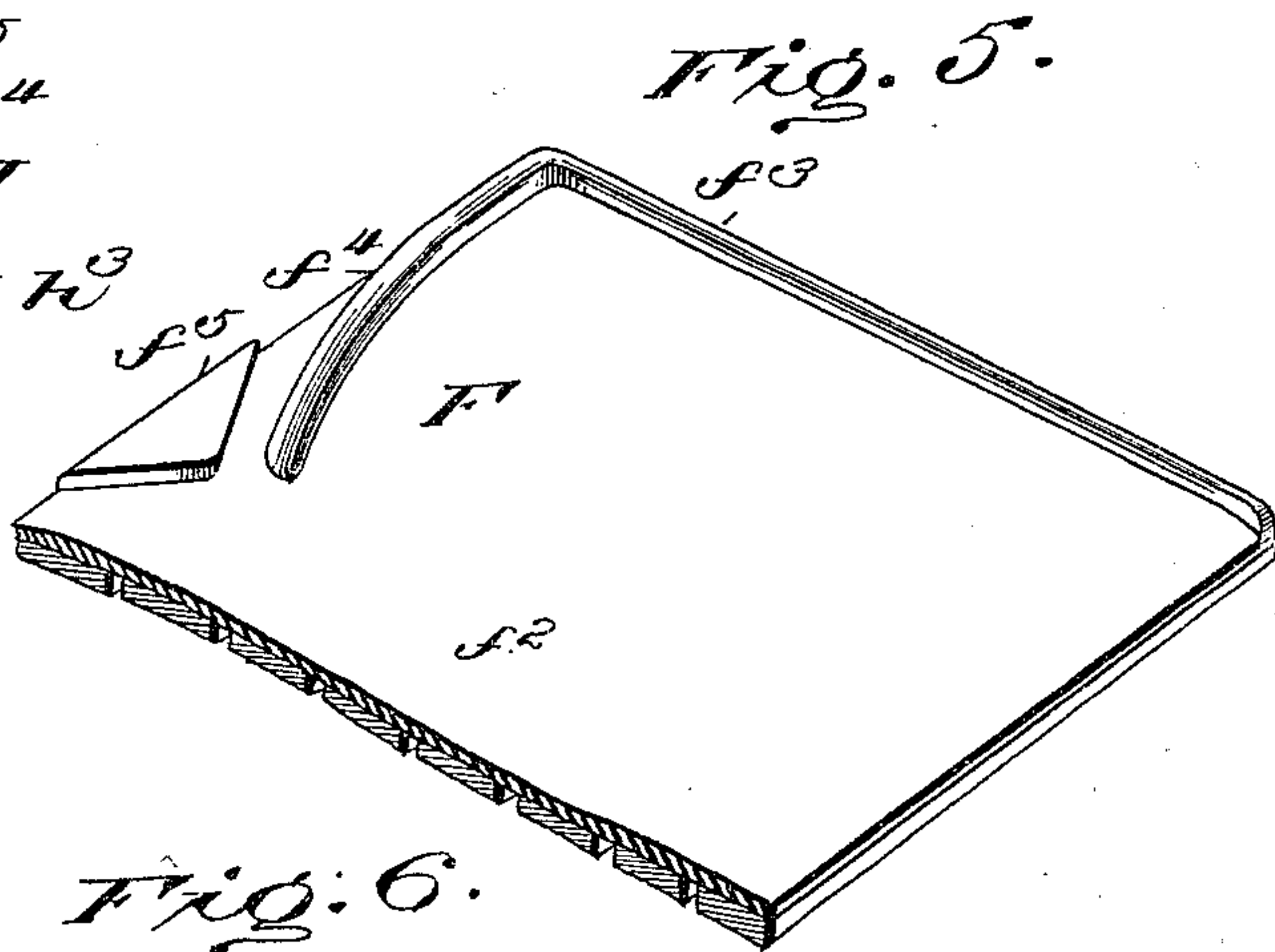
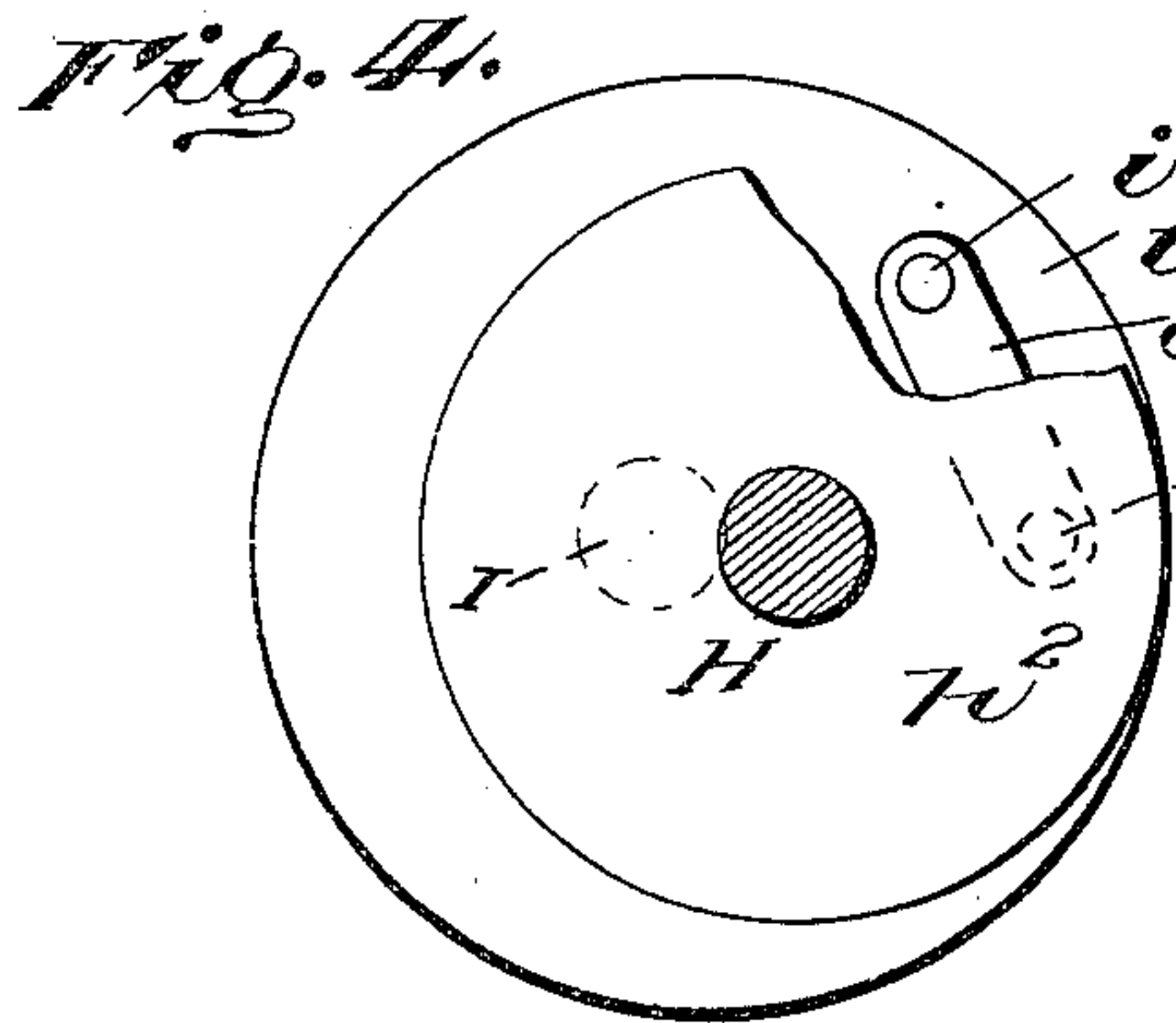
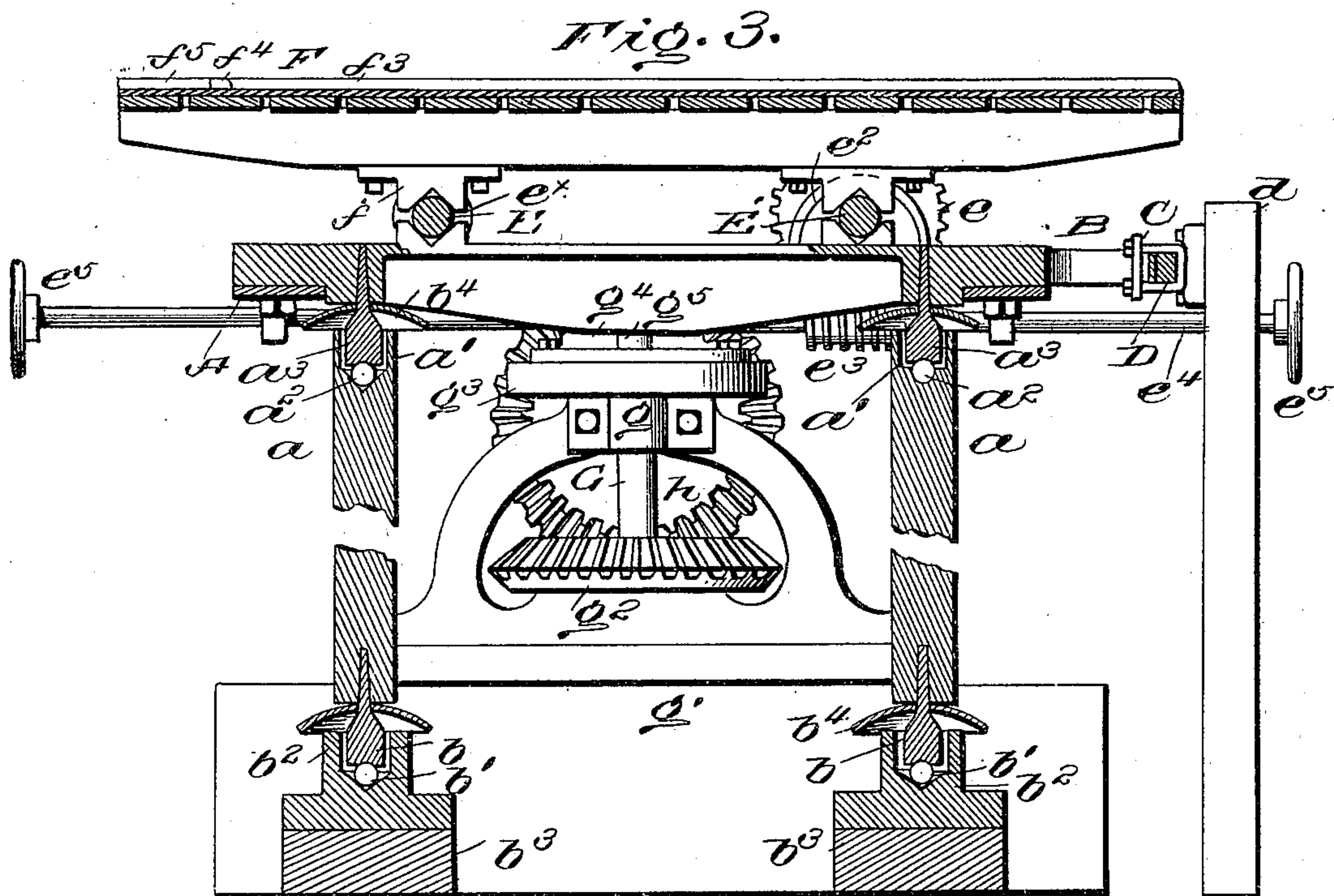
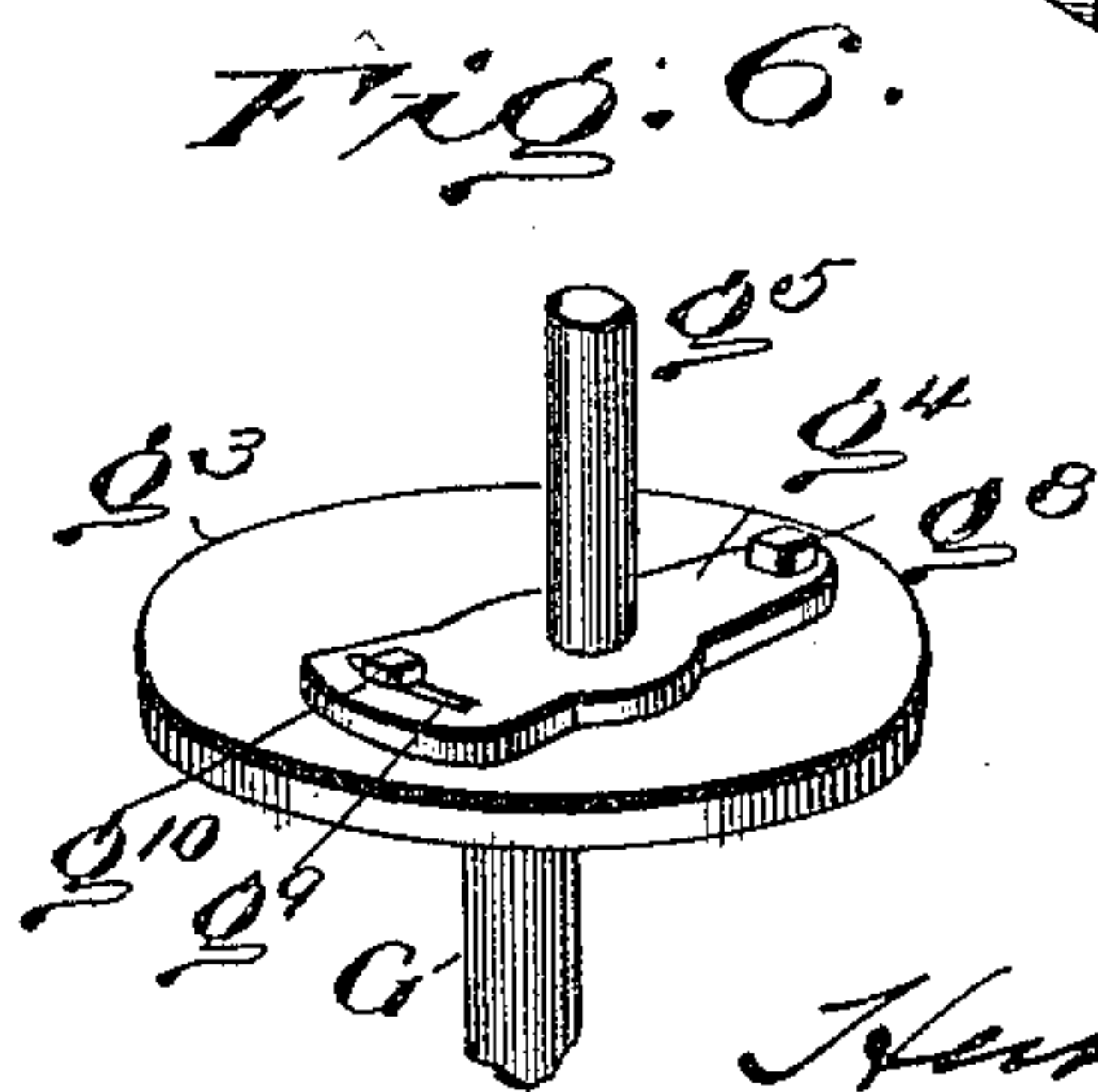
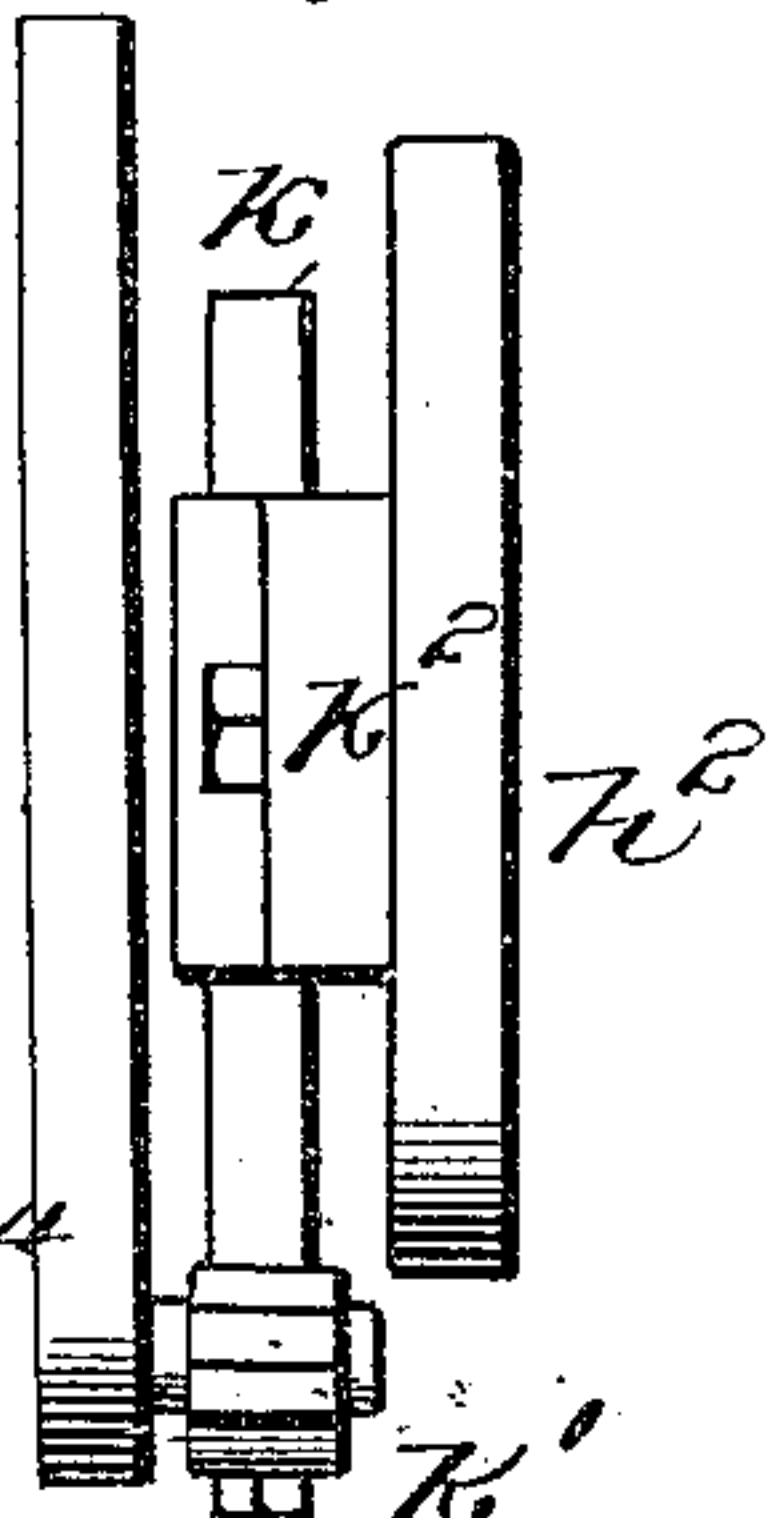


Fig. 7.



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UNITED STATES PATENT OFFICE.

HERBERT H. CRAMER, OF ASPEN, COLORADO.

ORE-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 639,920, dated December 26, 1899.

Application filed June 30, 1898. Serial No. 684,852. (No model.)

To all whom it may concern:

Be it known that I, HERBERT H. CRAMER, of Aspen, in the county of Pitkin and State of Colorado, have invented certain new and useful Improvements in Ore-Concentrators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention contemplates certain new and useful improvements in ore-concentrators.

The primary object of the invention is to so construct and operate the ore-table that all the concentrates will pass therefrom at one point and all the waste and tailings will pass from another point, the waste being separated from the tailings. This I accomplish by giving to the table a continuous rotary motion, which is increased or accelerated at certain points—that is, the table is given a rotary motion as it is moved back and forth longitudinally, and in portions of its rotary movement the speed of rotation is so increased as to cause the concentrates to travel over the inclined table, as against the flow of the water, to the discharge end. The water will carry the waste and tailings to one side of the table. A deflector guides the waste and tailings into separate receptacles.

A further object of the invention is to simplify the construction of the machine and render the same strong and durable.

The invention will be hereinafter fully set forth, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a plan view, the table being indicated in dotted lines. Fig. 2 is a side elevation. Fig. 3 is an enlarged vertical sectional view on line 3 3, Fig. 1. Fig. 4 is an enlarged detail view of portions of the operating mechanism. Fig. 5 is a view in perspective of the table with portions broken away. Fig. 6 is a view in perspective of a detail of the operating mechanism. Fig. 7 shows a slight modification.

Referring to the drawings, A designates a horizontally-disposed frame of rectangular form. This frame is supported by four legs a , each of which at its top has an oil-cup a' ,

in which are balls or spherical bodies a^2 , upon which rest pins a^3 . The pins a^3 are tapered above the legs a and fit snug within openings in frame A. From the lower end of each leg projects a similar pin b , which rests on balls b' , located in oil-cups b^2 , permanently secured on base-boards b^3 . By this construction the frame is provided with universal bearings and may be moved in any desired direction, the legs as well as the frame being free to swing on the ball-bearings. Dirt and stones are prevented from entering the upper and lower cups by caps b^4 , which consist of plates of concavo-convex form secured on the several pins above the cups, said plates having central openings for said pins. To one side of this frame are secured spring-arms B B', which consist of flat strips of metal bolted at one end to the frame and slightly bent outward. The outer straight portions of these spring-arms are held by adjustable clamps C to a guide-bar D, paralleling the side of the frame A. This guide-bar has its ends reduced and loosely supported by bearings attached to posts d . The bar D is free to move longitudinally in its bearings as the table is operated. By adjusting the clamps C the throw or side motion of the frame at one end may be increased or diminished. In practice the spring-arm B is preferably designed to have greater play than the spring-arm B', so as to accommodate the movement of the adjacent end of the frame, which is moved laterally a greater distance than the outer end.

E E' designate two shafts longitudinally disposed upon frame A and having their bearings in V-shaped blocks e , in which they are held as against sliding, the shaft E' having collars e^x . The shaft E has keyed thereon a worm-wheel e' and a short distance inwardly therefrom and also at its other end cams e^2 . With the worm-wheel e' meshes a worm e^3 , fast on a transversely-disposed shaft e^4 , mounted on said frame. On the ends of this shaft are hand-wheels e^5 .

F designates the table, which is located above frame A and, as shown in dotted lines, Fig. 1, projects beyond the ends and sides thereof. This table is composed of suitable timbers, and to its under side are secured V-blocks f , which rest upon the shafts E E'.

Adjacent to the blocks above shaft E are secured plates f' , which have V-grooves in their under sides which conform to the peripheries of the cams e^2 , which latter work in said grooves. By turning the worm-carrying shaft e^4 the shaft E may be rotated the desired extent to cause cams e^2 to raise or lower the table F at one side, whereby the latter will assume the desired inclination to insure the flow of the water which is introduced along the elevated side thereof. The table is provided with a cover f^2 of any suitable material, either rubber or metal being preferred. Along its inner edge this cover is provided with a raised portion forming a rib or flange f^3 , which from one corner of the table is prolonged inward over the surface of the cover to form a curved deflector f^4 . In operation the water will carry the waste or light particles over this deflector, whence the same will fall into any suitable stationary receptacle. (Not shown.) Adjacent to the inner end of this deflector is a raised surface f^5 , of approximately V shape in plan view, the purpose of which is to prevent the tailings and waste from falling into other than the respective receptacle therefor, a suitable stationary receptacle for the tailings (not shown) being positioned adjacent to that for the waste. As the table is rotated this V-shaped deflector is not moved in any direction beyond the receptacles noted, thus insuring the discharge of both the waste and tailings into the proper receptacles therefor.

G is an upright shaft located near the inner end of frame A beneath table F and mounted in bearings g on a base g' . On this shaft, near its lower end, is a beveled wheel g^2 , while fast on its upper end is a circular disk g^3 . This disk carries a plate g^4 , from the center of which projects a short shaft g^5 , which is extended upwardly through a loose-fitting boxing g^6 , attached by a plate g^7 to the adjacent end of frame A. This shaft g^5 is designed to be set eccentrically relative to disk g^3 , so as to impart to frame A and table F bodily a rotary or circular motion. Hence plate g^4 is pivoted at one end to disk g^3 by a bolt g^8 , and through a curved slot g^9 in its other end is passed a binding-bolt g^{10} . When the latter is loosened, the plate may be swung in either direction on its pivot until the desired position of shaft g^5 eccentrically to disk g^3 is obtained, whereupon it will be secured fast to said disk by tightening said bolt. Thus it will be seen that while the disk g^3 always travels in a truly circular course the short shaft g^5 , mounted thereon, will have an eccentric movement in relation thereto when its plate is adjusted so as to throw it out of the center of said disk.

With the beveled wheel g^2 gears a second beveled wheel h , which is fast on a horizontally-disposed shaft H, mounted in bearings h' , stationary on base g' . On the outer end of shaft H is a concentrically-mounted wheel h^2 , carrying a crank-pin h^3 .

I is a second horizontally-disposed shaft

mounted in bearings i , supported by a frame i' , resting on base g' . This shaft is not in axial line with shaft H, but if extended would be parallel thereto. On it is a fly-wheel i^2 and a pulley i^3 , to which the driving-belt (not shown) is applied, while on its inner end is a concentrically-mounted wheel i^4 , carrying a crank-pin i^5 . This wheel i^4 is of greater diameter than the wheel h^2 , the opposed faces of which wheels are parallel. The crank-pins of these wheels are connected together by a pitman J, in openings in which said crank-pins loosely fit. By this connection the shaft H is caused to rotate with shaft I, and at certain points in the revolutions of the crank-wheels the former shaft will rotate at an accelerated speed equal to that of shaft I—that is, as arcs of the peripheries of the two crank-wheels are on line with each other (see Fig. 4) the smaller wheel will be revolved at the same speed as the larger wheel; but as soon as this relation ceases the smaller wheel and its shaft H will travel slower than the shaft I and its wheel i^4 . As the two shafts travel in unison the table F and its frame are given an accelerated movement. The shaft g^5 is so set that this will occur when the table has reached the outer limit of its movement and continues during the return movement of said table. This return movement is in the direction of the lowered side of the table toward the inner lowered corner thereof. The effect of this accelerated movement is to pull the table, so to speak, from beneath the ore. When the latter is first placed on the table, it will tend to fall down to the deflector f^4 ; but the accelerated motion imparted to the table, occurring on the return movement of the latter, forces the ore longitudinally over the inclined table as against the downward flow of the water and to the extreme outer end of said table, at which point the concentrates are discharged, while the light portions, including the waste and tailings, will be moved downward by the flow of water to the lowered side of the table. To regulate this accelerated or differential movement, I provide means for adjusting the frame i' on base g' . The bottom plate j of this frame has its longitudinal edges beveled to conform to an overhanging flange j' at one side and a binding-bar j^2 at the other. This bar is held to base g' by bolts j^3 . When the latter are loosened, the frame may be adjusted so as to increase or diminish the space between the axial centers of the two shafts H and I by a threaded rod j^4 , having its bearing j^5 fast on base g' and engaging a threaded opening in an ear j^6 , projecting from the plate j . By turning a handled wheel j^7 on the outer end of rod j^4 the frame i' can be easily moved.

In lieu of connecting the inner wheels of the two shafts H and I by a pitman the same result may be obtained by means of a piston-like rod k , mounted at one end on the crank-pin k' of wheel i^4 and movable in a bearing k^2 on the opposed face of wheel h^2 .

In practice the shaft I is set relatively to shaft H, and the cam-plate g^4 is adjusted on disk d^3 to give to the table and its supporting-frame the desired differential movement.

5 The shaft e^4 is rotated to cause cams e^2 to give to the table the desired tilt or inclination. The water is fed over the table from the elevated side thereof, and as the table is rotated so that its speed will be increased on the return stroke or line of movement the concentrates will be forced to the outer end of the table, while the waste will be carried by the water over the deflector and the tailings will pass from the table beyond the end of said deflector. As the operating mechanism throws the inner end of the table and frame toward the bar D in the accelerated movement described, the force of the jar is received upon the spring-arms B B'. This quick or accelerated rearward stroke or movement causes the material on the table to move in opposition to the lines of movement of said table, and thus the several classes of material, aided by the washing, are quickly moved in the directions specified.

By means of my improvements the treatment of ores by washing is quickly and effectively accomplished. The means employed is simple and not liable to readily get out of order or become deranged.

I claim as my invention—

1. An ore-concentrator comprising a table, a support therefor having universal bearings, means for imparting a differential rotary movement to said table, springs connected to said support, and a longitudinally-movable bar at one side of said table and to which said springs are also connected, as and for the purpose stated.

2. An ore-concentrator comprising a table, a support therefor having universal bearings, a longitudinally-movable guide-bar paralleling one side of said table, stationary supports for said guide-bar, spring-arms connected at their ends to said guide-bar and support, and means for imparting a differential rotary movement to said table and support, substantially as set forth.

3. An ore-concentrator comprising a frame having universal bearings, a longitudinally-movable guide-bar, paralleling one side of said frame, having yielding connections with said frame, stationary supports for said guide-bar, a table mounted on said frame, and means connected to said frame for imparting a rotary and periodically-accelerated movement to said frame and table, substantially as set forth.

4. An ore-concentrator comprising a frame having universal bearings, a longitudinally-movable guide-bar paralleling one side of said frame, spring-arms secured to said frame and adjustably held to said guide-bar, stationary supports for said guide-bar, a table mounted on said frame, and means connected to said frame for imparting a rotary and pe-

riodically-accelerated motion to said frame and table, substantially as set forth.

5. An ore-concentrator comprising a frame having universal bearings, a table mounted on said frame, means on said frame for tilting said table, spring-arms secured at their inner ends to one side of said frame, a longitudinally-movable guide-bar paralleling one side of said frame and to which said spring-arms are connected, and means, connected to said frame, for imparting to said frame and table a rotary and periodically-accelerated motion, substantially as set forth.

6. An ore-concentrator comprising a frame, pivotally-mounted bearings therefor, a longitudinally-movable guide-bar paralleling one side of said frame, yielding connections between said guide-bar and said frame, a table mounted on said frame, a shaft on said frame having cams designed to engage said table, means for rotating said shaft, and means for imparting to said frame and table a rotary and accelerated motion, substantially as set forth.

7. In an ore-concentrator having a table and means for imparting a rotary movement thereto, a frame on which said table rests, legs loosely mounted at their lower ends, and loosely supporting said frame at their upper ends, and a longitudinally-movable guide-bar paralleling one side of, and having a yielding connection with, said frame, and stationary bearings for said guide-bar, substantially as set forth.

8. In an ore-concentrator having a table and means for imparting a rotary movement thereto, a frame on which said table rests, legs for said table, universal bearings between said frame and said legs, a longitudinally-movable guide-bar paralleling one side of said frame, and yielding connections between said frame and said guide-bar, substantially as set forth.

9. In an ore-concentrator having a table, and means for imparting a rotary movement thereto, a frame on which said table is mounted, legs for said table, universal bearings for the lower ends of said legs, a longitudinally-movable guide-bar paralleling one side of said frame, and yielding connections between said frame and said guide-bar, substantially as set forth.

10. In an ore-concentrator having a table, and means for imparting a rotary movement thereto, a frame on which said table is mounted, legs for said table, universal bearings for the lower ends of said legs, and universal bearings between the upper ends of said legs and said frame, a longitudinally-movable guide-bar paralleling one side of said frame, and yielding connections between said frame and said guide-bar, substantially as set forth.

11. In an ore-concentrator having a table and means for imparting a rotary movement thereto, a frame on which said table rests having depending pins, legs having balls at their upper ends forming bearings for said pins,

pins projecting from the lower ends of said legs, cups having balls therein for said lower pins, a longitudinally-movable guide-bar paralleling one side of said frame, and yielding connections between said guide-bar and said frame, substantially as set forth.

12. In an ore-concentrator having a table and means for imparting a rotary movement thereto, a frame on which said table rests having depending pins, legs having balls at their upper ends forming bearings for said pins, pins projecting from the lower ends of said legs, cups having balls therein for said lower pins, deflector-plates mounted on said upper and lower pins, a longitudinally-movable guide-bar paralleling one side of said frame, and yielding connections between said guide-bar and said frame, substantially as set forth.

13. An ore-concentrator having a table, means for inclining the same, and a covering for said table having at one end a rib or flange

along its edge, said rib or flange being extended inward over the cover from one corner thereof, forming a deflector, substantially as set forth.

14. An ore-concentrator having a table, means for inclining the same, and a covering for said table having at one end a rib or flange along its edge, said rib or flange being, from one corner of the covering, extended inward thereover, forming a deflector, and a second deflector of V shape on said covering adjacent the inner end of said rib or flange, and means for reciprocating said table, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

Witnesses: HERBERT H. CRAMER.
J. NOTA MCGILL,
GRAFTON L. MCGILL.