No. 681,419. Patented Aug. 27, 1901.

C. J. HODGE.

ADJUSTABLE ECCENTRIC OF MINERAL OR ORE WASHING JIGS.

(Application filed May 13, 1899.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

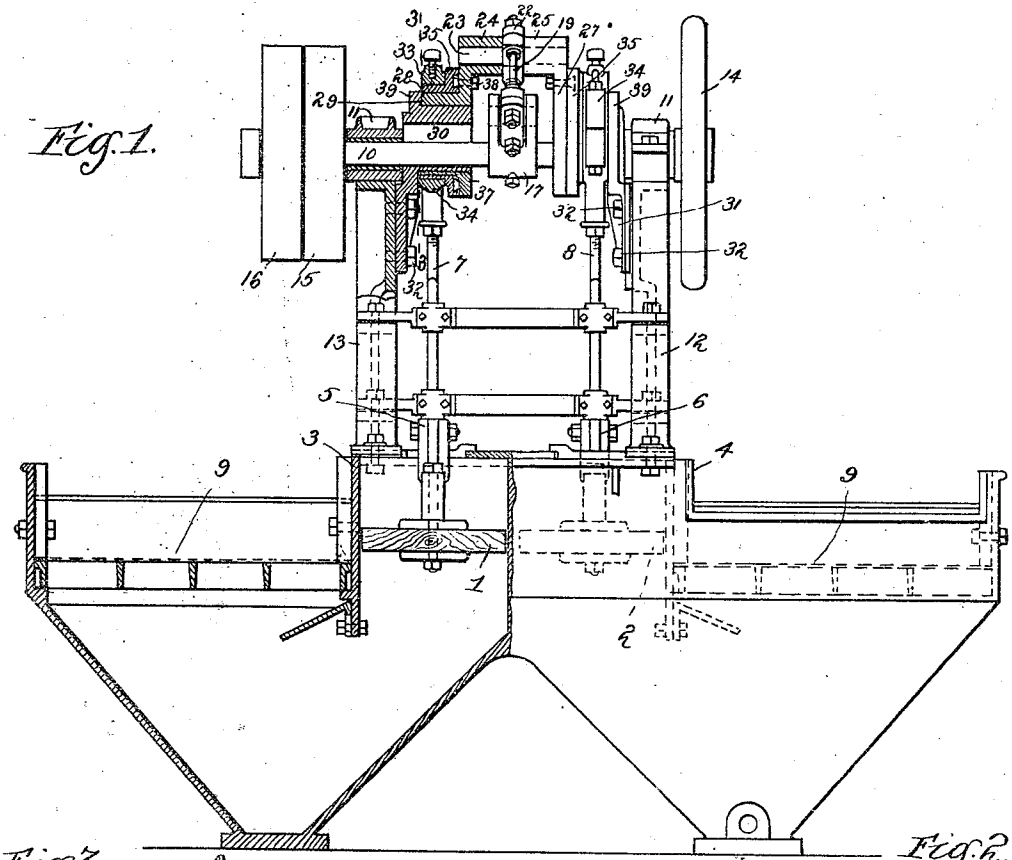


Fig. 3.

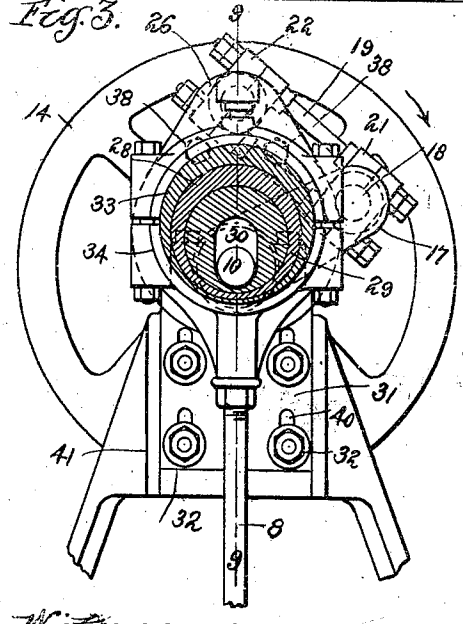
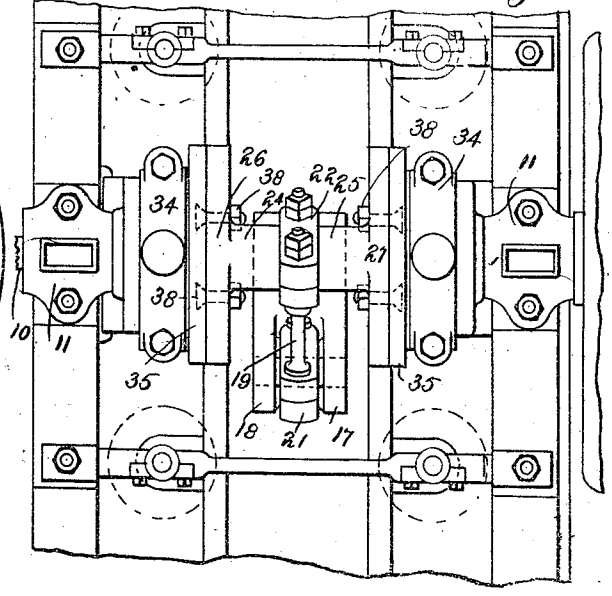


Fig. 2.



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Fig. 4.

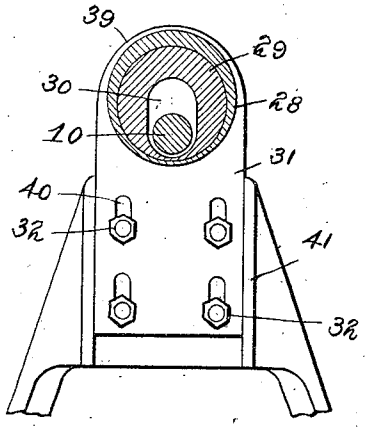
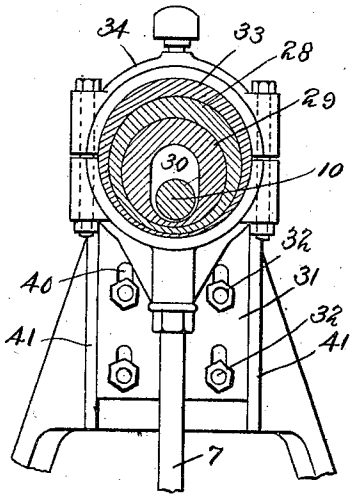
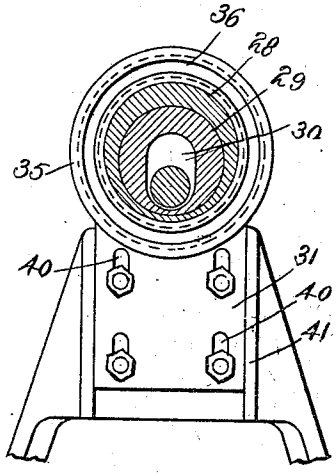


Fig. 5.



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Fig. 6.



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Fig. 7.

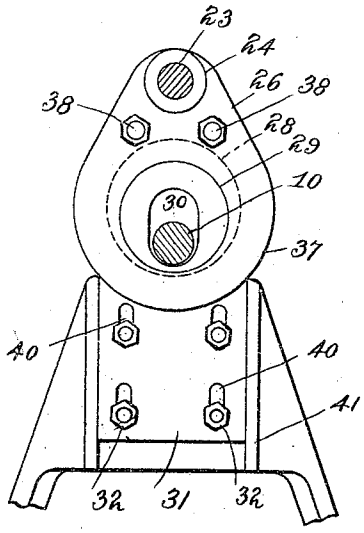


Fig. 8.

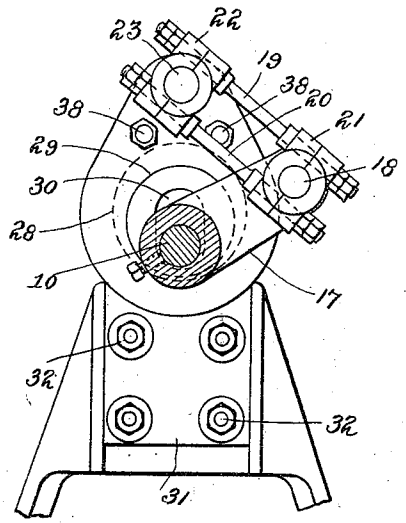


Fig. 9.

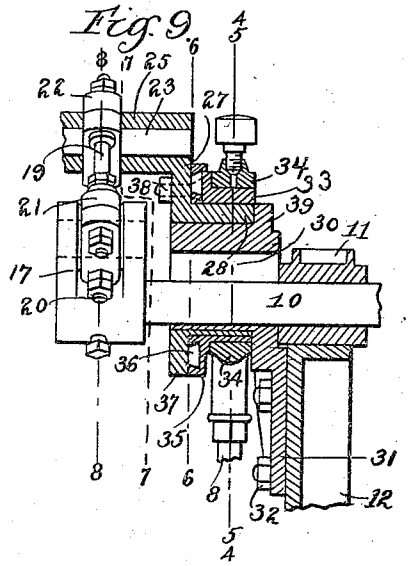
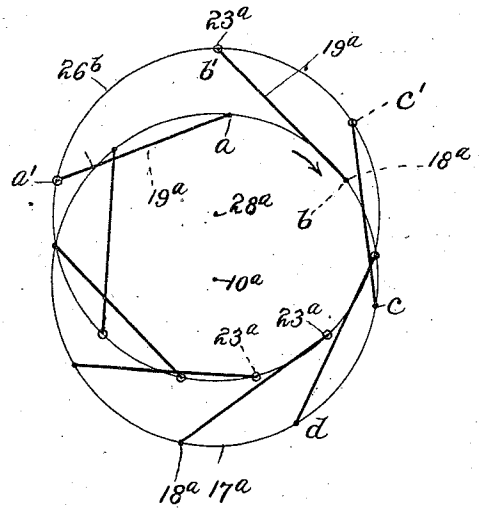


Fig. 10.



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UNITED STATES PATENT OFFICE.

CHARLES J. HODGE, OF HOUGHTON, MICHIGAN.

ADJUSTABLE ECCENTRIC OF MINERAL OR ORE WASHING JIGS.

SPECIFICATION forming part of Letters Patent No. 681,419, dated August 27, 1901.

Application filed May 13, 1899. Serial No. 716,692. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. HODGE, a citizen of the United States, residing at Houghton, in the county of Houghton and State of Michigan, have invented certain new and useful Improvements in Adjustable Eccentrics of Mineral or Ore Washing Jigs, of which the following is a full, clear and exact specification.

My invention relates to mineral or ore washing jigs in which one or more vertically-reciprocating plungers are employed for agitating the water and mineral being treated, and it has more especial reference to the mechanical movement for imparting a fast and slow motion to the plunger or plungers, it being desirable in such machines to cause the plunger to descend rapidly and rise slowly.

The primary object of my invention is to provide an improved mechanical movement for thus reciprocating the plungers that may be attached to the shaft at a point between its bearings, so that the strain on the bearings when two plungers are employed will be equally distributed, a further object being to provide a mechanical movement capable of nice adjustment, whereby the relative positions of the two plungers may be varied and the degree of variation between the fast and slow movements also changed at will.

With these ends in view my invention consists in certain features of novelty in the construction, combination, and arrangement of parts by which the said objects and certain other objects hereinafter appearing are attained, all as fully described with reference to the accompanying drawings and more particularly pointed out in the claims.

In the said drawings, Figure 1 is a side elevation of a jig, partly in vertical section, provided with my improvements. Fig. 2 is a plan view thereof partly broken away. Fig. 3 is an enlarged detail transverse sectional view taken on the line 3 3, Fig. 1. Fig. 4 is a detail transverse sectional view taken on the line 4 4, Fig. 9; and Figs. 5 and 6 are similar sections taken on the lines 5 5 and 6 6, Fig. 9, respectively. Fig. 7 is a detail transverse section taken on the line 7 7, Fig. 9. Fig. 8 is a transverse section taken on the line 8 8, Fig. 9. Fig. 9 is an enlarged section on the line 9 9, Fig. 3, and Fig. 10 is a diagrammatic view showing the movements of certain parts hereinafter described.

In illustrating my invention I have shown it as applied to a mineral or ore washing jig. This is the greatest field of usefulness for the invention at present known to me; but at the same time it will be understood that my invention is not limited to this particular use, but may be applied wherever the characteristics of the device are required or desirable.

1 2 represent the plungers of the jig, located, as usual, in their respective plunger-compartments 3 4 and connected by yokes 5 6 or by any other suitable means to their respective operating-pitmen 7 8, so that as the pitmen reciprocate the plungers will rise and fall in their plunger-compartments and force the water upwardly through the screens 9, as usual.

In devices of this character it is desirable that the downward movement of the plunger be more or less rapid, so as to set up an energetic circulation of water upwardly through the screens; but the upward movement of the plunger should be slow. I will now describe the mechanical movement or device by which this fast-and-slow motion is imparted to the plungers from the driving-shaft 10.

The driving-shaft is mounted in suitable bearings 11 on two standards 12 13, arranged near the outer ends of the shaft, and between which standards the pitmen 7 8 are located, the shaft being provided on one end with the usual balance-wheel 14 and on the other end with the driving and idle pulleys 15 16. Secured on the shaft 10 at a point preferably midway between the bearings 11 is a crank-arm 17, which is shown as being formed with a bifurcated end, (see Figs. 1 and 2,) in which is pivoted on a pin 18 a connecting link or arm composed, preferably, of two rods 19 20, whose ends pass through journal-box members 21, which embrace the pivot-pin 18. The opposite ends of the rods 19 20 are likewise provided with two box members 22, which embrace a pivot-pin 23, and the opposite ends of this pivot-pin 23 pass through or are secured in two inwardly-projecting wrists 24 25, formed on or secured to crank-arms 26 27, respectively, which impart motion to the eccentrics for operating the pitmen 7 8, respectively, and as this pitman-operating

mechanism is the same in construction and operation for both pitmen, the mechanism being duplicated on opposite sides of the crank 17, a description of the mechanism on one side of such crank will suffice for both. The crank-arms 26 27 are each secured to or formed on an eccentric 28, which in turn is journaled on a trunnion 29, having an aperture 30, through which the driving-shaft 10 passes and being provided with a downwardly-extending bracket 31, secured by bolts or screws 32 to the side frame or standard 13 on one side and 12 on the other, and journaled on the eccentric 28 is another eccentric 33, surrounding which is an eccentric-strap 34. The strap 34 on one side is connected to the pitman 7 and that on the other side to the pitman 8. The eccentric 33 is provided with a flange 35, in the face of which is formed an annular dovetailed groove 36 or groove having other salient edges, and the eccentric 28 is provided with a flange 37, through which projects a number of bolts 38, having dilated heads seated in the annular groove 36 of the eccentric 33, whereby the two eccentrics 28 33 are rigidly connected together and compelled to revolve in unison with capability of rotary adjustment with relation to each other. The brackets 31, which are located between the bearings 11, are each provided on their outer sides with flanges 39, against which the ends of the eccentrics 28 abut, thereby holding the eccentrics against longitudinal movement, while the eccentric-strap 34 on each of the eccentrics 33 is held in place on one side by the flange 35 and on the other side by the flange 39 or the face of the bracket 31. The aperture 30 in the trunnion 29 is vertically elongated to permit the trunnion to be vertically adjusted, the holes 40, through which the bracket-securing bolts 32 pass, being similarly elongated to permit of the vertical movement of the bracket 31, the face of the standard or frame 12 on one side and 13 on the other side being provided with vertical guideways 41, between which the bracket 31 is seated. With the mechanical movement thus described it will be seen that as the shaft 10 revolves in the direction of the arrow the crank 17 thereon will impart a rotary movement to the crank-arms 26 of the eccentrics 28, which, being connected to the eccentrics 33, will also cause the rotation of the latter and the consequent vertical reciprocation of the plungers, and the center of rotation of the eccentric 28 being eccentric to the center of the shaft 10 it necessarily follows that while the crank 17 will revolve at a uniform rate of speed the crank 26 will revolve in a different circle and at a differential speed, gradually growing less as the center of the pin 23 nears the center of the shaft 10. This may be best understood from the diagram shown in Fig. 10. In this view, 17^a represents the circle described by the crank 17, and 26^b represents the circle described by the crank 26, while 10^a represents the center of the shaft 10 and 28^a the center of the eccentric 28, the line 19^a representing the connecting rod or link 19 20, 18^a the pin which connects said rod to the crank 17, and 23^a the pin which connects the rod to the crank 26. Assuming the shaft 10 to be revolving in the direction of the arrow, it will be seen that while the pin 18^a is traveling in the circle 17^a from the point a to the point b the pin 23^a will have traveled in the circle 26^b nearly twice the distance, or from the point a' to the point b', where the pin 23^a is at substantially the farthest point from the center 10^a. From this point on until the pin 33^a arrives at the place diametrically opposite the point b', where it is nearest the center 10^a, the motion of pin 23^a decreases relatively to the motion of pin 18^a. Thus in traveling from the point b to the point c the pin 18^a causes the pin 23^a to travel only from the point b' to the point c', and from the point c to the point d the motion of the pin 18^a is still further decreased in the pin 23^a, and so on until the pin 23^a arrives at a point diametrically opposite the point b' and substantially in line with the centers 10^a 28^a, where the motion of the pin 23^a is at its minimum, and from this point on begins to gain on the motion of the pin 18^a until it exceeds it in its maximum degree at the point b'. It will therefore be seen that inasmuch as this variation in the movement of the pin 23^a is dependent upon the distance between the centers 10^a 28^a the degree of difference between the fast and slow movements of the plungers may be readily varied with a nicety by the vertical adjustment of the brackets 31, by which the center of the eccentrics 28 33 (indicated by the reference character 28^a in the diagram) may be raised or lowered with reference to the center of the shaft 10, (indicated at 10^a in the diagram.) It is also obvious that the length of stroke of the plunger is dependent upon the distance of the center of the eccentrics from the center of the trunnion 29. For the purpose of varying this distance with a nicety the additional eccentric 33, adjustably secured to the eccentric 28, is employed, it being apparent that by loosening the bolts 38 and rotating the eccentric 33 with reference to the eccentric 28 the length of throw of the outer eccentric may be varied by bringing the center of the strap nearer to or farther from the center of the trunnion 29, and it is further apparent that by means of this compound adjustment the length of stroke and the character of stroke of the two plungers may be varied independently.

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

1. The combination of the plungers, a driving-shaft having supporting-bearings, two eccentrics having eccentric-straps, one eccentric being connected with each of said plungers and eccentric to said shaft, and a crank

connected to the shaft and having operative connection with both of said eccentrics, substantially as set forth.

2. The combination of a shaft having a crank, an eccentric-strap having a pitman, an eccentric embraced by said strap and being independent of said shaft and adjustable bodily transversely thereof and a connection between said crank and eccentric, substantially as set forth.

3. The combination of a shaft, a crank thereon, a trunnion adjustable transversely of the shaft, an eccentric on said trunnion, an eccentric-strap embracing said eccentric and having a pitman and a connection between said eccentric and crank, substantially as set forth.

4. The combination of a shaft, a crank thereon, a trunnion having a slot through which said shaft passes and being adjustable transversely of the shaft, an eccentric on said trunnion, an eccentric-strap embracing said eccentric and having a pitman and a connection between said eccentric and crank, substantially as set forth.

5. The combination of a shaft, a crank thereon, an eccentric-strap having a pitman, an eccentric in said strap, a second eccentric arranged in said first eccentric and being adjustably secured thereto and a connection between said eccentrics and crank, substantially as set forth.

6. The combination of a shaft, a crank thereon, an eccentric-strap having a pitman, an eccentric in said strap, a second eccentric arranged in said first eccentric, one of said eccentrics being provided with an annular dovetailed groove and the other with a tightening-bolt engaging in said groove whereby said eccentrics may be rotatably adjusted with reference to each other and a connection between one of said eccentrics and crank, substantially as set forth.

7. The combination of a shaft, a crank thereon, an eccentric-strap having a pitman, an eccentric in said strap, a second eccentric arranged in said first eccentric and having a crank-arm, said eccentrics being adjustably secured together and a link connecting said crank-arm with the crank on said shaft, substantially as set forth.

8. The combination of a shaft, a trunnion having a vertically-elongated passage through which said shaft passes, a support for said trunnion, a bracket secured to said trunnion and being vertically adjustable on said support, an eccentric on said trunnion, an eccentric-strap operated by said eccentric, a crank-arm on said shaft and a connection between said crank-arm and eccentric, substantially as set forth.

9. The combination of a shaft, a trunnion having an elongated passage for said shaft and being provided with the flange 39, an eccentric journaled on said trunnion and abutting against said flange and being provided with the arm 26, a second eccentric journaled on said first eccentric and being adjustably secured thereto, an eccentric-strap having a pitman, embracing said second eccentric, and a crank-arm on said shaft connected with said arm 26, substantially as set forth.

10. The combination of a shaft, a journal-bearing therefor at or near each end thereof, a crank secured to said shaft between said bearings, two trunnions one on each side of said crank and through which trunnions said shaft passes, an eccentric journaled on each of said trunnions, a connection between each of said eccentrics and said crank, an eccentric-strap having a pitman, operated by each of said eccentric-straps, substantially as set forth.

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Witnesses:
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