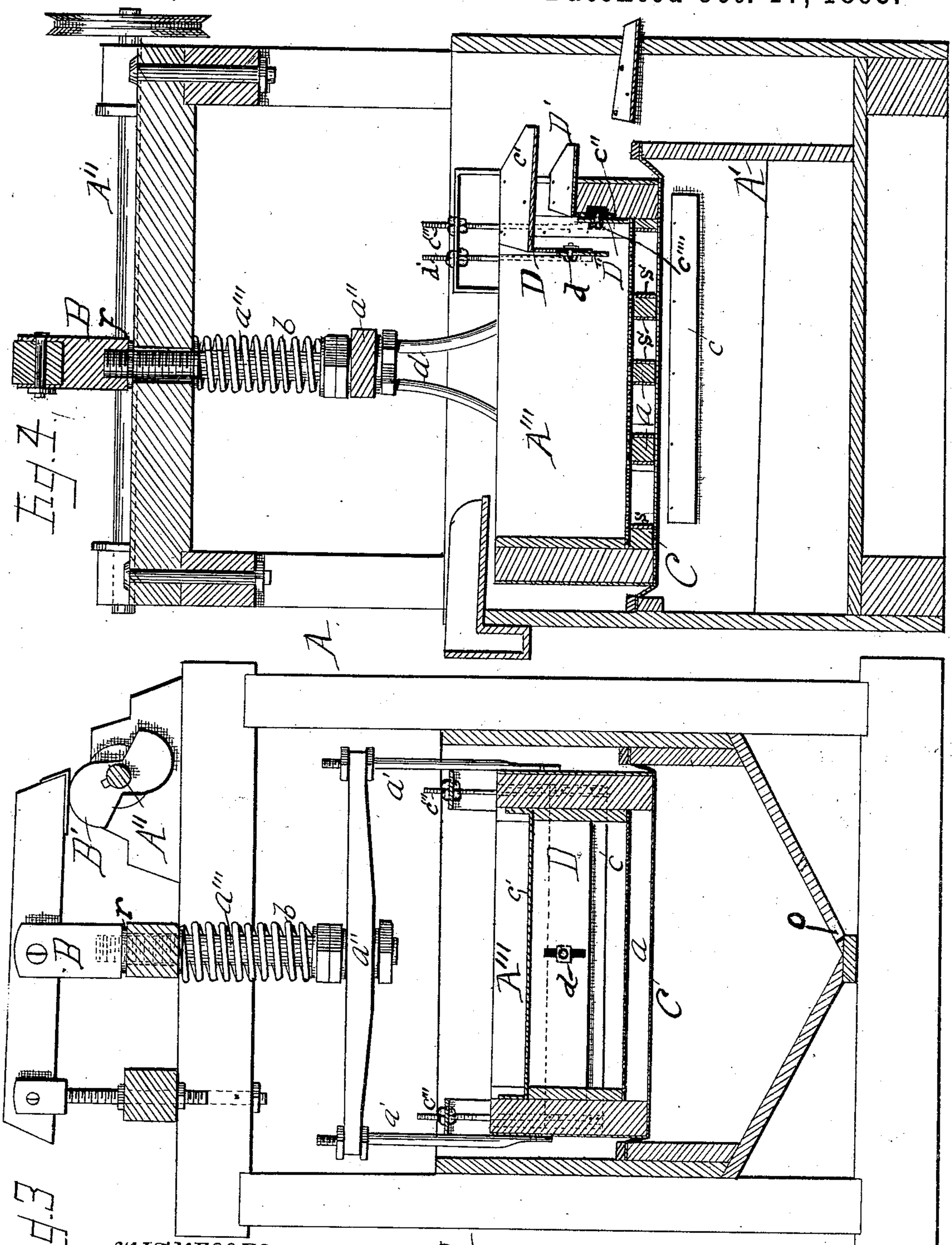
(No Model.) 2 Sheets—Sheet 1.

E. A. WALL.

ORE JIGGER OR CONCENTRATING MACHINE.

No. 506,751. Patented Oct. 17, 1893.



WITNESSES
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(No Model.)

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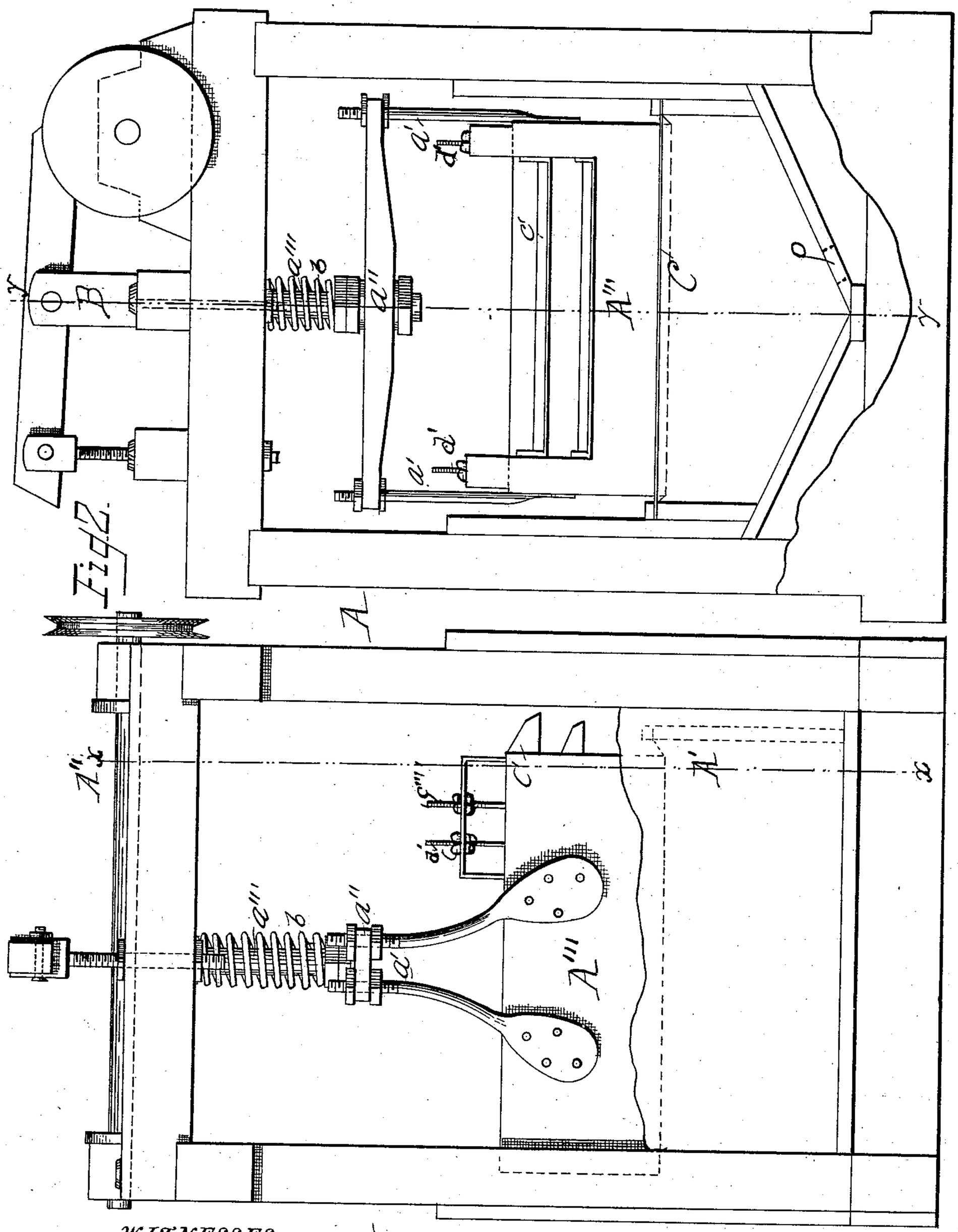

Fig. 2.

Fig. 1.

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UNITED STATES PATENT OFFICE.

ENOS A. WALL, OF OPHIR, UTAH TERRITORY.

ORE-JIGGER OR CONCENTRATING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 506,751, dated October 17, 1893.

Application filed February 24, 1893. Serial No. 463,582. (No model.)

To all whom it may concern:

Be it known that I, ENOS A. WALL, a citizen of the United States, residing in Ophir city, in the Territory of Utah, have invented certain new and useful Improvements in Ore-Jiggers or Concentrating-Machines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form part of this specification, in which—

Figure 1. is a side elevation of an ore-jigger, with the casing partially removed. Fig. 2. is a front view of the same with casing partially removed. Fig. 3. is a vertical section through the line *x—x* of Fig. 1. Fig. 4. is a longitudinal section through the line *y—y* of Fig. 2.

My invention relates to that class of ore-washing machines by which the heavier ore is separated from the lighter gangue or waste rock, according to relative specific gravity, upon and through a screen, by agitation produced by intermittent or pulsating currents of water forced up through the screen. But it relates more particularly to that class of ore-jiggers in which the screen is suspended in a frame, and moved up and down in a tank of water, thus producing pulsating currents and agitation by which separation of the ore from the gangue or waste is effected.

It is generally conceded that by means of the old so-called "Cornish" system of hand-jigging, in which the ores supported upon a screen are "dipped" or thrust down and up in the water a more complete separation and saving of the valuable ores can be achieved, than by any of the most perfect modern power machines. But owing to excessive labor, and extreme lack of capacity incident to the operation of machines of this character their abandonment has been enforced, the chief difficulty being found in the fact that, as heretofore constructed, the coarser waste and ore must be removed from the screens by hand, while the "fines" which pass through the screen called "hutch" work, is only partially cleansed, and must be rewashed by other methods.

In my machine I have adapted the "Cornish" system of dipping the screen, to a novel form of construction, whereby particles of ore greatly varying in size, viz. from forty mesh to four mesh can be treated at the same operation, and a perfectly clean product insured both of the fine and coarser particles, the entire process being in every respect automatic, and in the highest degree simple and efficient, exceeding in capacity the most perfect machines in common use, more than three fold, at the same time requiring less driving power, and not to exceed one half the volume of wash-water consumed by the best machines in common use.

My invention consists in a rectangular tank, A, with a V shaped bottom, and having a partition A′ placed transversely about four inches from one end, and extending from the bottom about half way up of the tank. The tank is inclosed in a main frame of heavy timbers adapted to support a driving-shaft A″ and screen-frame with attachments as hereinafter described.

The rectangular screen-frame A‴, is preferably about thirty-six inches wide, forty-eight inches long and about fourteen in depth, and is composed of sheet iron No. 14-wire gage, the inside being lined with wood of about one and one-half inches in thickness. On the inside and near the bottom is placed transversely at intervals of about three and one half inches space slats *a* of strong hard wood such as oak or hickory, about four inches wide by five-eighths of an inch thick, to form a support for the screen. These slats may be secured to the sides of the frames by means of short angle-plates S of thin strips of iron cut and placed so as to form a seat for the slats and secured to the wood lining of the frame by short nails or screws. The screen which is preferably of wire cloth is fastened upon the slats, by means of small nails driven through the screen into the slats.

The screen frame is suspended by four rods *a′* of about one inch round iron and about two feet long flattened at one end and securely riveted to the sheet iron casing of the frame at the opposite sides, and about ten inches from the respective corners, being placed obliquely across the iron frame so as to incline the other ends or tops of the two

rods on each side of the frame to meet near the center of the frame; the upper end of the rod is provided with thread and nuts, and bent up, perpendicular to the side of the frame, and passed through a cross-arm a'' extending across the frame, and adapted to receive the rods, whereby the frame is suspended to the cross arm, the nuts forming ready means for leveling and adjusting the frame. The cross arm is secured by nuts in the center to a large plunger rod a''', preferably two inches in diameter which passes down through a cross timber of the main frame, and the cross arm, and is supported by a large washer r fixed to the rod above the timber. To the top of the plunger rod a''' is attached a clevis B adapted to receive a lever, which is about three feet long, and is pivoted in the center by means of the clevis to the plunger rod a'''. One end of the lever is shod with a steel plate and is adapted to be lifted by a cam B′ on the driving shaft, while the other end is pivoted, by means of a clevis, to the end of a short rod, which passes down through a timber of the main frame, and is provided with a thread and jam nuts placed above and below the timber, by means of which the height to which the screen frame A''' will be lifted at each stroke of the cam, can be controlled, by simply raising or lowering the end of the lever B''' while the machine is in motion.

In order that the screen and its load shall fall with a force greater than its own weight, a spiral spring b is placed upon the plunger rod a''' and held up against the timber through which it passes by means of a movable nut on the rod, so that when the screen is lifted, it will be thrown down on its return with increased force, according to the strength and compression of the spring. The body of the tank on the inside, should be of the same form, as that of the outside of the screen-frame A''', but slightly larger, from the bottom up to the point at which the bottom of the screen-frame will rest when in proper position, which will be about on a level with the top of the partition A′ and this lower portion should be constructed of two thicknesses of two inch planks, but from this point up the thickness should be reduced to two inches leaving an offset from this point up. The screen-frame then is attached to the offset in the tank, and the top of the partition by a strip of raw hide C or other strong flexible material, closely fitted, and leaving a fold between points of connection, so as to admit of the necessary motion of the screen frame, and at the same time prevents the escape of water between the sides of the tank and the screen frame. The wash-water then being introduced into the tank through an opening in the side thereof (covered by a simple "flap" valve c) below the screen, it will be seen that, the tank being filled with water, as the screen drops into the water, at each down stroke, the valve c will be closed and a quantity of water forced up through the screen and flow off at the end of the frame provided with a discharge spout c', and as the screen is raised, the pressure of water upon the outside of the valve, from the source of supply will force open the valve c and fill the tank. The slow upward motion of the plunger will give ample time for this result, so that no water will fall back through the screen, which is a very important feature in the operation.

One end of the screen frame A''' through which the "tailings" are to be discharged is left open, down to within about four inches of the screen, or near the point at which the surface of the ore will be when it is of proper depth to insure best results; but as this point, *i. e.* the depth of the ore-bed to be carried on the screen, will vary according to the character of the material to be treated, which variation is often of daily occurrence, it is important that the height of the tail-way or point of over-flow, above the screen should be readily adjustable, while the jigger is in motion, and to accomplish this result, having first made the tail-way as low as would be required under any conditions, I provide a thin plate of iron c'' about three inches wide and of sufficient length to extend across the tail-way and into the wood lining of the screen frame, about one half inch on each side. To each end of the plate is securely fastened small rods c''' of about one-fourth of an inch round-iron, and about ten inches long, the reverse ends being provided with a screw thread and two thumb-nuts each. This plate is placed across the tail-way against the wood lining, on the inside of the screen frame A''' and is held to the wood in the center, by a bolt c'''' passed through a slot-hole and through the end of the frame, secured at the center with a nut loosely closed so as to admit of an up and down sliding movement of the plate, the ends of the plate and rods projecting into the wood on the sides of the frame in seats cut for the purpose. The ends of the rods projecting a couple of inches above the top of the frame, pass through a bent strap of iron attached to the top of the frame, the nuts being placed one on each side of the plate, by which means the rods and sliding plate may be raised or lowered at will, thus forming an adjustable sliding gate, whereby the point of over-flow and depth of ore-bed upon the screen, is kept under perfect control.

Now in treating ore without preliminary "sizing" *i. e.* fine and coarse grains at one operation, it is necessary to use a screen, with meshes, through which one third or more of the grains of the ore will not pass, the large particles will then form a bed, or "ragging" through which the fine particles will be strained, and cleansed of all light matter; but to insure uniform results, this bed must be kept at uniform depth upon the screen; and as the quantity of coarse particles will continually increase, the excess must

be withdrawn as rapidly as it accumulates. To accomplish this result I provide a plate of sheet iron D of the width of the tail-way with the edges turned up to form a trough for the discharge of the tailings, and of sufficient length to extend over the end of the jig-tank. This is secured to the sides of the screen frame by the upturned sides, and placed so as to leave an opening over the top of the inner sliding gate D′. The inner end of this plate or spout, is made to project inside of the inner sliding gate about one and one half inches, and has its end turned down at a right angle, so as to project down into the ore-bed about two inches, thus forming a bridge for the over-flow of tailings. Upon the angle face of this bridge-plate is attached another sliding gate D″ about two and one-half inches in width, secured in the middle by a short bolt *d* through slot-hole, and at the ends with adjustable rods *d′* in all respects similar to the "outside" gate first described. The purpose of this gate is to diminish or increase the space between the bottom of the angled bridge-plate or trough and the screen, in order to control the point in the bed at which the particles of coarser ore will pass under the gate to be carried over the inner gate. It is now evident that the particles of ore too coarse to pass through the screen, will form a bed, the top of which will be on a level with the top of the inner gate, and that any excess will rise and pass over this gate and fall into the small compartment formed by the partition at the end of the tank, and, that all lighter particles will be held up by the coarse ore-bed, and carried out by the bridge, over the end of the jig-tank. The coarse ore being discharged into the small compartment, is allowed to flow out continuously through an opening *o* near the bottom. These jigs should be built in sets of two, and in some cases three, all in the same frame but so constructed that the first will discharge its tails into the second and so on.

Adjustable gates and bridge-plates, as described above and adapted to treat ores without preliminary "sizing" may be attached to any ore-jigger of the common pattern in which a stationary screen is used; but in such cases the jig-tank must be provided with a separate compartment or narrow chamber, near the discharge end, as shown in the drawings Fig. 2.

From the foregoing description taken in connection with the accompanying drawings the advantages of my invention will be apparent. The material to be acted upon is deposited into the screen frame and water supplied to the tank. The frame is then caused to reciprocate up and down and at each down stroke the water is forced upwardly through the mass and escapes through one of the gates carrying with it the finer particles of material thus separating them from the coarser particles which are discharged into a compartment and from thence led away.

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

1. In an ore-jigger, the combination with a tank adapted to contain water, of a vertically reciprocating screen frame provided with a gate D having a chute *c′* and with a second chute D′ each of which is vertically adjustable, substantially as herein described.

2. In an ore-jigger, the combination with a tank adapted to contain water, of a screen frame vertically movable in said tank having one of its sides cut away, a compartment at one side of the tank, a chute D′ vertically adjustably secured to the cutaway portion and adapted to discharge into the compartment, a bridge D^2 vertically adjustably secured in the screen frame above the bottom thereof and a distance inward from the chute, and a chute secured to the bridge and projecting over and beyond the first named chute, substantially as herein described.

3. In an ore-jigger, the combination with a tank adapted to contain water, of a vertically reciprocating spring frame, provided with gates D having a chute *d′* and with a second chute D′, and a flexible connection between the marginal edges of the screen frame and the sides of the tank, substantially as herein described.

4. In an ore-jigger, having a movable or plunging screen, and a screen frame suspended by a cross arm and side adjusting rods to a larger plunger rod, passed through a timber of the main frame and supported in position upon the timber by a fixed washer upon the rod, in combination with a spiral spring upon said plunger rod, held in position by an adjustable nut against said timber of the main frame, and adapted to give impact to the downward thrust of the rod and screen, a lever pivoted near the center to the upper end of the plunger rod, and having one end adapted to be raised by the arms of a cam on driving shaft, and the other end pivoted to a rod passed through a timber of the main frame, and having a screw-thread, and nuts placed on each side of the timber and adapted to raise or lower the end of the lever, and thereby control the height to which the rod and screen will be raised at each lift of the cam, all constructed and arranged substantially as shown, and for the purpose set forth.

ENOS A. WALL.

Witnesses:
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WM. B. SPRAGUE.