(No Model.) 3 Sheets—Sheet 1.

G. O. DICKINSON.

CONCENTRATING AND AMALGAMATING MACHINE.

No. 406,635. Patented July 9, 1889.

Fig. 1.

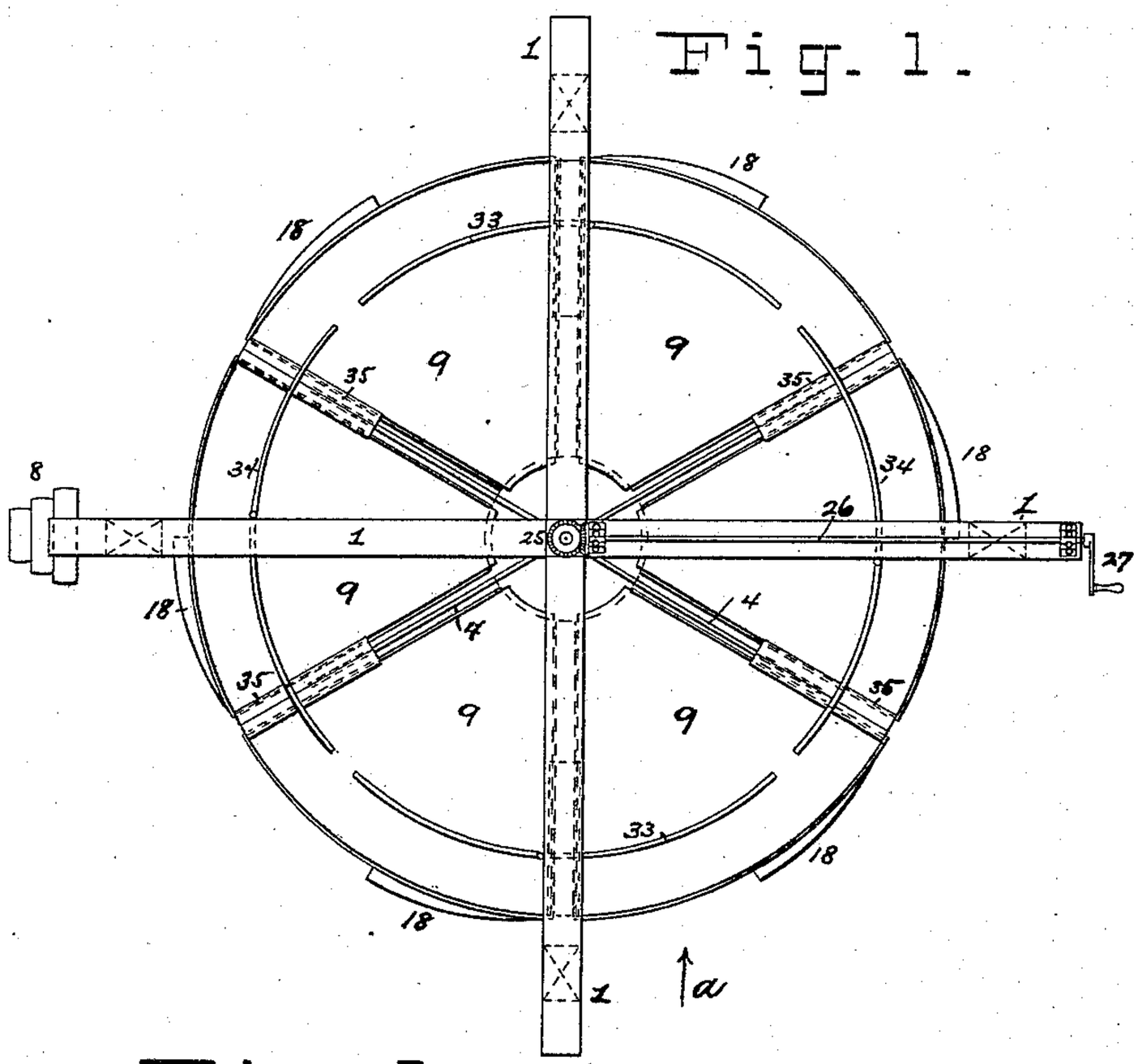

Fig. 2.

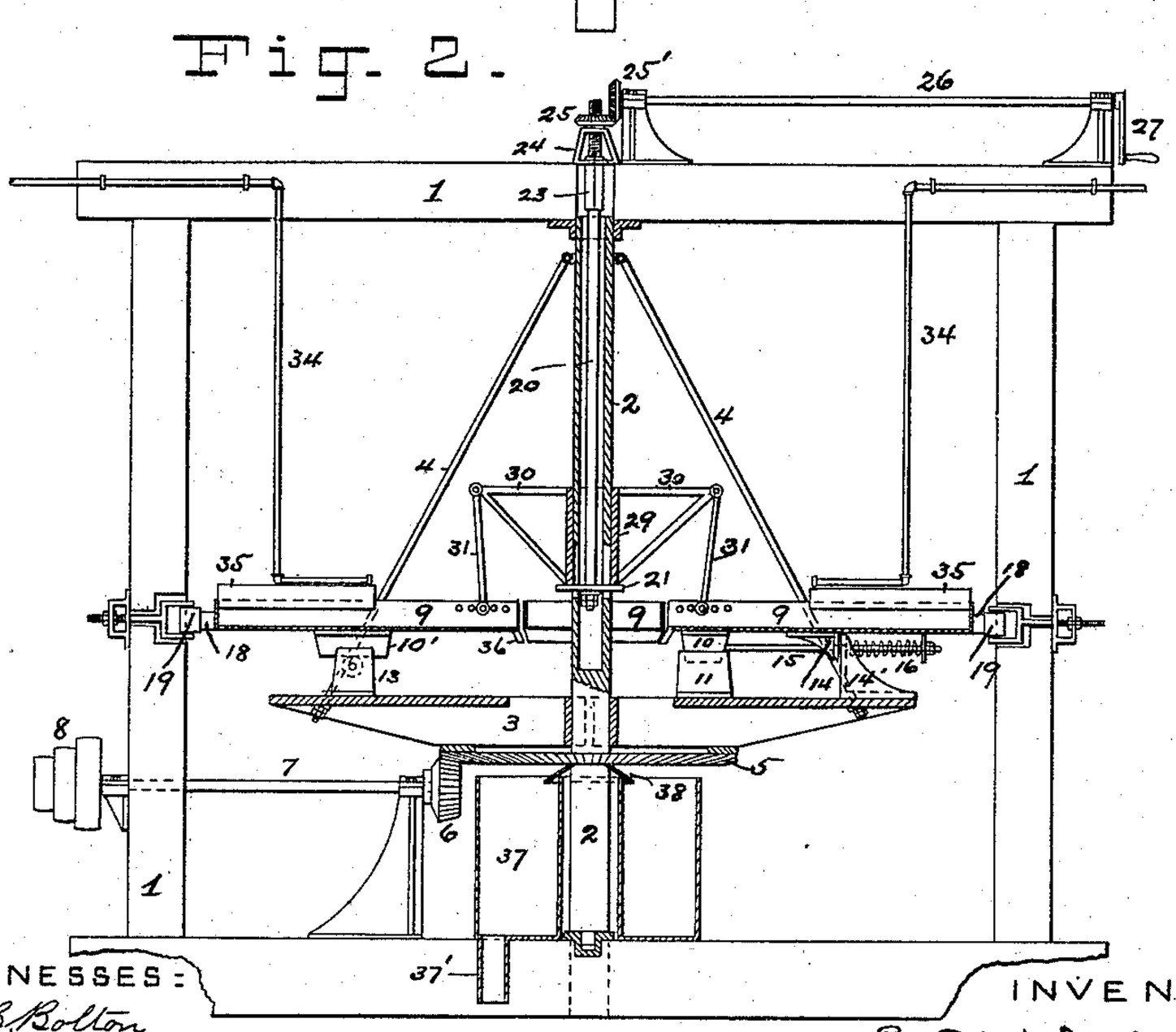

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Fig. 8.

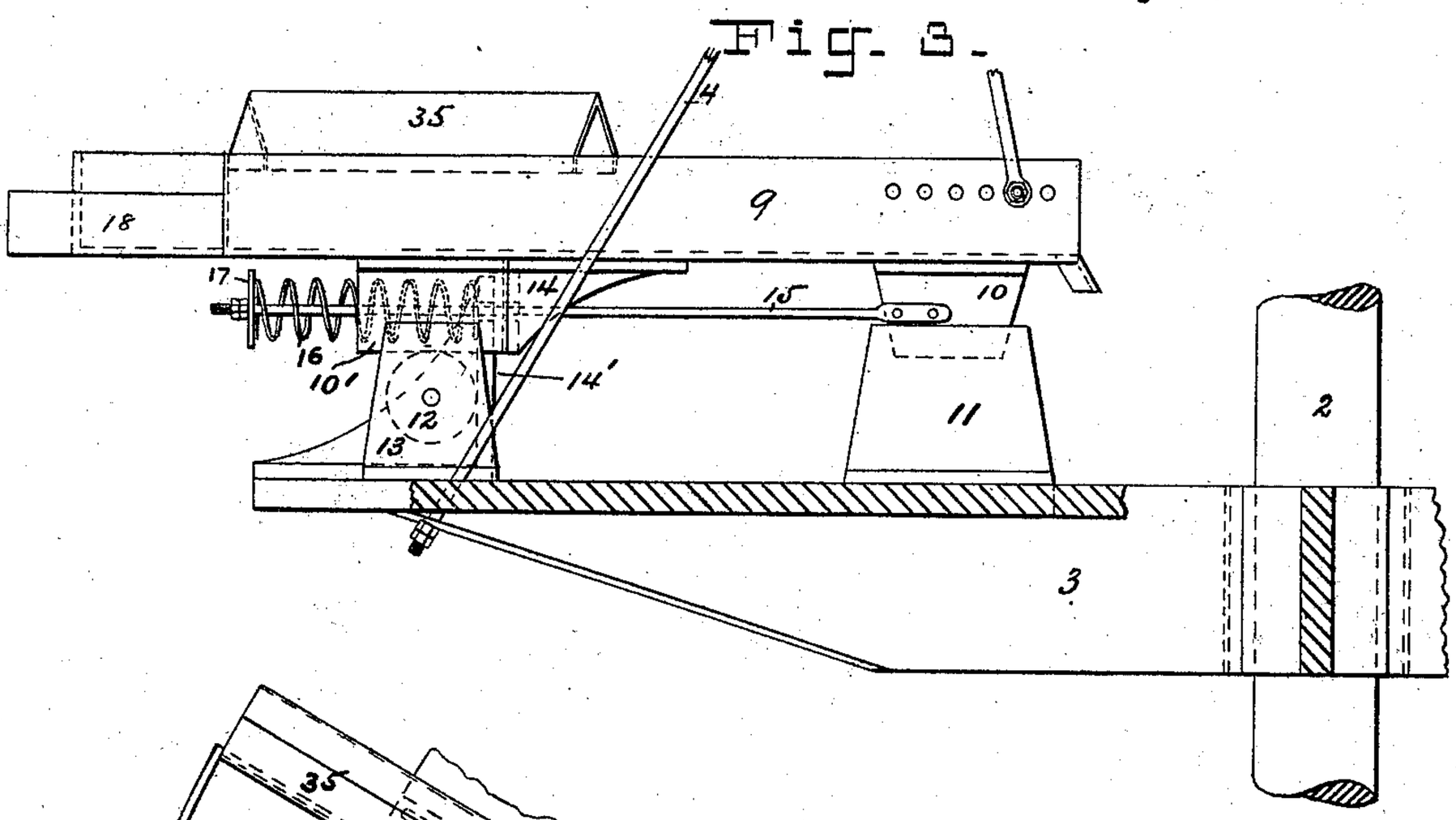

Fig. 4.

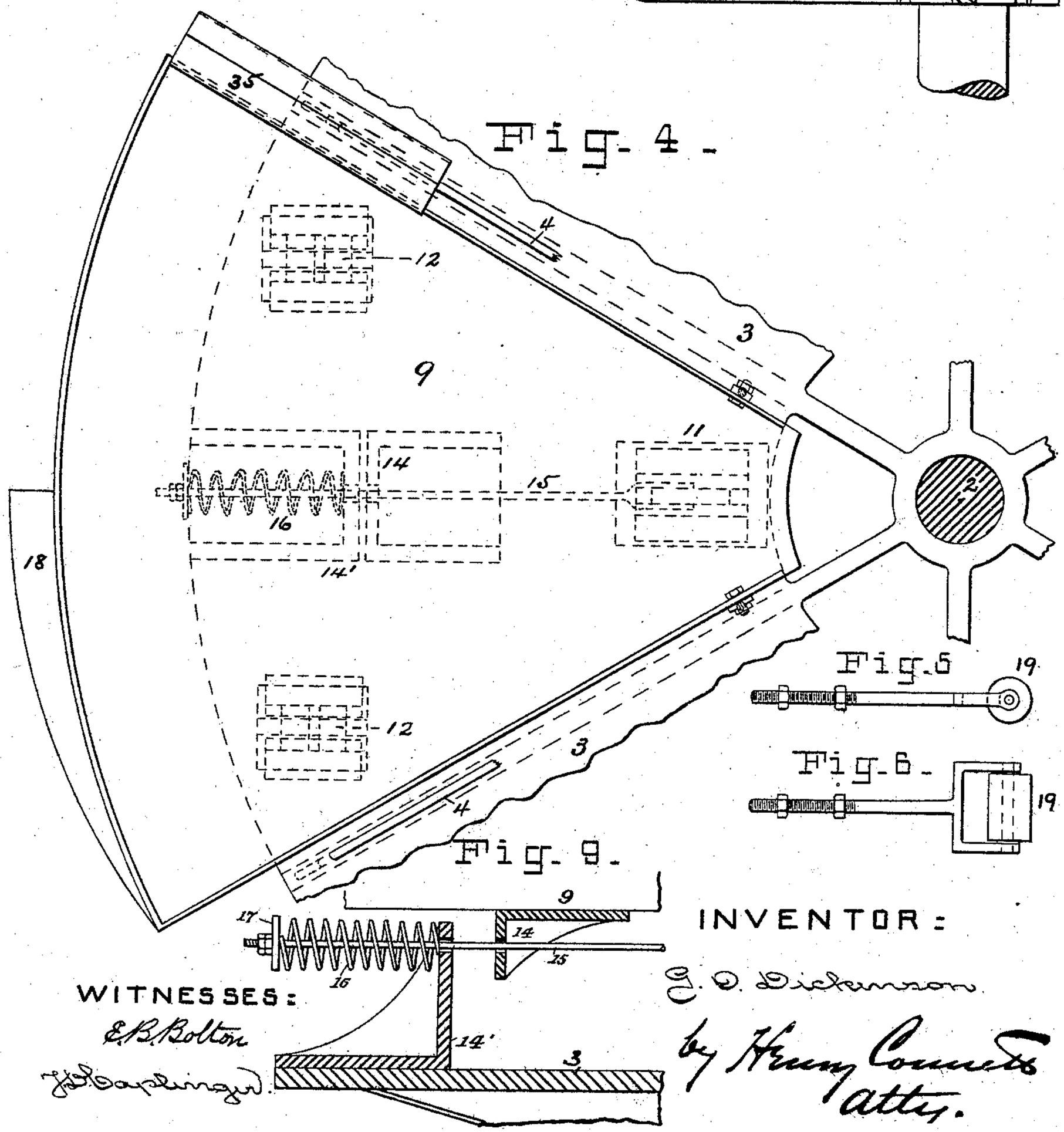

Fig. 5.

Fig. 6.

Fig. 9.

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Fig. 7.

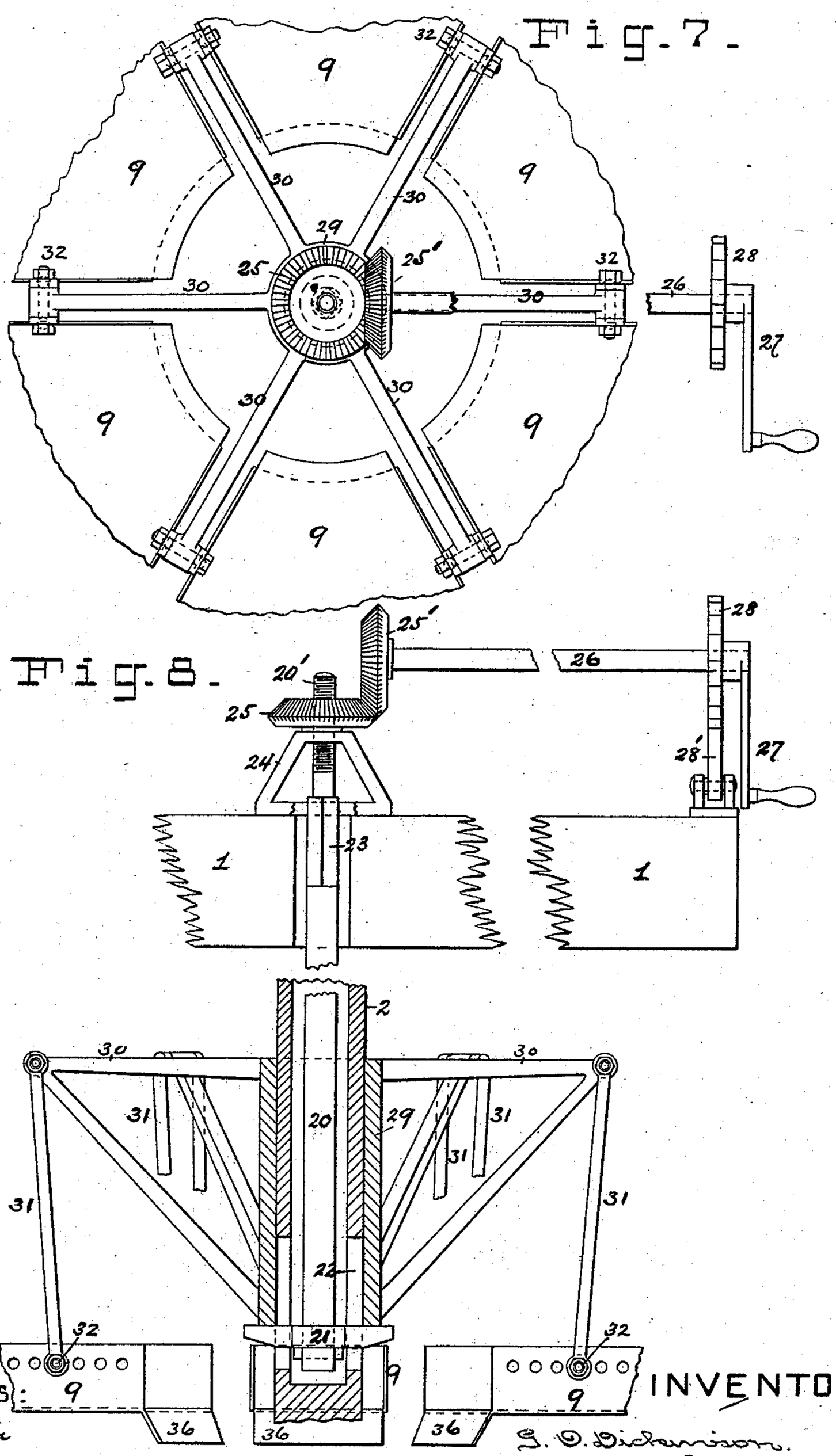

Fig. 8.

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UNITED STATES PATENT OFFICE.

GEORGE O. DICKINSON, OF STOCKTON, UTAH TERRITORY.

CONCENTRATING AND AMALGAMATING MACHINE.

SPECIFICATION forming part of Letters Patent No. 406,635, dated July 9, 1889.

Application filed May 28, 1887. Renewed May 28, 1889. Serial No. 312,354. (No model.)

To all whom it may concern:

Be it known that I, GEORGE O. DICKINSON, a citizen of the United States, and a resident of Stockton, Toole county, Utah Territory, have invented certain new and useful Improvements in Concentrating and Amalgamating Machines, of which the following is a specification.

My invention relates to improvements in that class of machines employed for separating gold, silver, lead, and other metals from sand, earth, and similar substances containing such metals, and also amalgamating the metals thus separated.

My invention will be fully described hereinafter, and its novel features carefully defined in the claims.

In the drawings which serve to illustrate my invention, Figure 1 is a plan or top view of a machine embodying my improvements, and Fig. 2 is a sectional elevation of the same as seen from arrow *a* in Fig. 1. These views are on a small scale and show the entire machine. Fig. 3 is a side view, and Fig. 4 is a plan on a much larger scale than Figs. 1 and 2, showing only a part of the machine—namely, the pan, its spring, and its supports. Figs. 5 and 6 are respectively a side view and a plan of one of the friction-rollers and its frame. Figs. 7 and 8 are respectively a fragmentary plan and a fragmentary sectional view of the mechanism for lifting the inner ends of the pans. Fig. 9 is a sectional detail of the buffers and spring.

1 is the main frame, here shown as in the form of a cross in plan.

2 is the upright shaft arranged vertically in the center of the frame. This shaft is tubular at its upper part, as best seen in Figs. 2 and 8.

3 is the supporting-table or "spider" mounted on shaft 2 and supported by stays 4 4.

5 is a horizontal ring-like bevel-wheel on the lower face of spider 3.

6 is a pinion on the driving-shaft 7, said pinion meshing with wheel 5, and 8 are the pulleys on shaft 7 to receive the driving-belt. (Not shown.)

9 9 are the concentrating and amalgamating pans. These pans are of sector-like form, and when assembled serve to substantially complete the circle. Each pan is free to move within limits radially, or in and out toward or from the axis of the machine independently of the others. The pan has a shoe 10 on its under side near its inner end, and this shoe plays in a slotted or grooved guide or keeper 11 on the spider 3. At its outer wider end it has two similar shoes 10′, which ride or play over bearing-rollers 12 in guides 13 on the spider. The positions of these bearing-rollers are indicated in dotted lines in Figs. 3 and 4.

Referring especially to Fig. 9, 14 is a buffer on the bottom of pan 9, and 14′ is a buffer on the spider 3.

15 is a spring bar or rod coupled at one end to shoe 10. This rod passes through apertures or slits in the buffers, and has embracing it a spring 16, forming a retractor for the pan, arranged between an adjustable collar 17 on the rod and the buffer 14′ on the spider.

On the outer face of each pan 9 is a cam 18, which when the pans are carried around comes in contact, successively, with rollers 19, (seen detached in Figs. 5 and 6,) mounted adjustably in the frame 1, as seen in Fig. 2. These rollers, by their action on the inclined face of the cam, serve to press or push the pan in toward the axis of the machine. Thus the cams and roller form pushers, and when the cam passes the roller the spring 16 suddenly retracts the pan, or moves it outward again until the buffer on the pan strikes that on the spider. Thus when the pans are being rotated they have imparted to them a radial reciprocating movement, together with repeated jars or jolts as the buffers come together.

I will now describe the mechanism, which I denominate a "lifter," for simultaneously raising or lowering the inner ends of the pans, referring particularly to Figs. 7 and 8, in connection with Fig. 2, for illustration.

I have said that the upright shaft 2 is tubular at its upper part. In the hollow of said shaft is a rod 20, on the lower end of which is rotatively mounted a cross-piece 21, the ends of which project through and play in slots 22 in the walls of hollow shaft 2. At its upper end rod 20 has a square 23, (or a spline,) and this square plays in a corresponding aperture in a metal pillow-block 24 on the top of the

machine-frame. Thus rod 20 is prevented from rotating, while cross-piece 21 is carried around with shaft 2. The upper end of rod 20 has a screw-thread 20′, on which screws a miter-wheel nut 25, which meshes with a miter-wheel 25′ on a shaft 26, rotatively mounted on frame 1 and provided with a crank 27. By means of this crank and the intermediate mechanism the cross-piece 21 may be raised and lowered at will. In Figs. 7 and 8 I have shown a notched wheel 28 on the shaft 26 and a pivoted dog 28′ on the frame, whereby said shaft 26 may be locked against rotation; but this device is not absolutely essential and is not shown in Figs. 1 and 2. On the shaft 2 is a sliding sleeve 29, the lower end of which rests on cross-piece 21, and this sleeve is furnished with arms 30, one for each pan. From the end of each arm 30 depends a pair of links or rods 31, the ends of which are coupled to the sides of two adjacent pans by a pin 32. There may be a number of pin-holes in the sides of the pans, as shown, so that the coupling can be effected at different points. It will be obvious that when crank 27 is turned and cross-piece 21 is raised the inner ends of the pans will be raised correspondingly.

There are two pipes 33 33 to feed the pans with the ore or mineral, and two water-pipes 34 34 to feed water to the pans for washing, the said feed and water pipes being arranged in alternate order, as indicated in Fig. 1. Under the curved portions of the pipes, where they extend over two adjacent pans, are arranged ∧-shaped shields 35, which bridge the spaces between the pans and deflect into the pans the water and mineral that would otherwise fall between them. Each of these shields is attached to only one of the pans.

On the inner end of each pan 9 is a tailing spout or chute 36, from which the tailings descend into the tailing-pan 37, which has an outlet-spout 37′. On the shaft 2, at the mouth of the tailing-pan, is a deflector 38 to prevent the tailings from falling into the space around the shaft.

I will now describe the operation of the machine. When the shaft 2 is set rotating through the medium of the shaft 7 and gears 5 and 6, the pans 9 are carried around with it. The cams 18 on the pans act on rollers 19 on the frame to push the pans in toward the axis of the machine, and the springs 16 act to throw them out suddenly, the buffers stopping them quickly, so as to produce percussion and jar. The water and mineral are fed into the pans through pipes 33 and 34, and the jarring motion in connection with the centrifugal force generated by rotation tends to draw or drive the heavier precious metal toward the outer ends of the pans, while the worthless material, in suspension, flows off at the tailing-chutes 36 at the inner ends of the pans. The mechanism for manipulating the inner ends of the pans enables the same to be raised or lowered in order to properly regulate the discharge of the tailings. It will be observed that the inner end of the pan may be raised considerably and sufficiently without disengaging the shoe 10 from its keeper 11, which latter is quite deep. When a sufficient quantity of the precious metal has accumulated at the outer ends of the pans, the machine may be stopped and the accumulation removed with shovels, &c. When the precious metal is of such a character or in such a condition as to permit it, the inner ends of the pans can be raised and mercury poured into the outer ends of the pans to effect the amalgamation of the metal in the pans. The shaking and jarring motion of the pans will serve to bring the mercury into contact with all the particles of the metal to be amalgamated and will accelerate materially the process of amalgamation.

In working some sands containing gold I have found it advantageous to cover the bottom of the pans with amalgamated copper plates and to place mercury on said plates, for the purpose above described.

The feed and water pipes 33 and 34 are mounted to slide in their bearings on the frame 1, (see Fig. 2,) so that their delivery ends can be set in or out, and thus deliver at different points in the pans to adapt the machine for the treatment of different materials. The feed-pipes have their curved lower ends perforated to distribute the better in delivering. In some cases I find it desirable to dispense with the water-feed, and in this case I feed the material from a hopper into the pans and use an air-blast to assist in separating the valuable from the waste material, the air-blast being so placed as to produce the same effect as the water-feed.

The tension of springs 16 may be regulated by nuts on rods 15 back of collars 17 in a well-known way, and the amount of "throw" of cams 18 may be regulated by means of nuts on the shanks of the frames which carry rollers 19. The construction of these roller-frames is well illustrated in Figs. 2, 5, and 6.

I do not wish to limit myself to the particular construction of all the parts, as herein shown, as these may be changed somewhat without materially departing from my invention—as, for instance, the cams 18 might be mounted on the frame and the anti-frictional rollers 19 on the pans. This would produce the same effect as the construction shown. On the other hand I do not wish to be understood as claiming, broadly, the use of cams, springs, and buffers for reciprocating and jarring an amalgamating-pan, as such have before been used, but not in the manner employed by me. Concentrating-pans provided with vibrating mechanism have also been provided with means by which the end of the pan may be raised and lowered. My pans, however, are arranged around and carried by a vertical revolving shaft, and are provided

with a lifter that acts simultaneously on all of the pans, and is constructed in such a manner that the ends of all the pans may be raised or lowered to a like extent while the pans are being carried around. This is the limiting characteristic of this part of my invention.

Having thus described my invention, I claim—

1. The combination, with a vertical shaft provided with a support for the pans, of the said pans having the form of sectors, whereby they form a circle when assembled, and each pan provided with sliding bearings on its support, and mechanism comprising a cam, a cam-roller, buffers, and spring for imparting to each pan a radial sliding and jarring movement as it is carried around by the shaft.

2. The combination, with a vertical shaft 2, provided with a suitable support 3 for the pans, said support having buffers 14′, of the mechanism for imparting rotation to said shaft, the pans 9 9, each provided with shoes 10 10′, a buffer 14, a cam 18, a spring-rod 15, and a spring 16, and the rollers 19 on the machine-frame, arranged to strike said cams on the pans.

3. The combination, with the tubular slotted shaft 2 and the pans 9, of the rod 20 in the hollow of the shaft, the cross-piece 21, loose on said rod and engaging the slots in shaft 2, the sleeve 29 on shaft 2 and resting on cross-piece 21, said sleeve having arms 30, the links 31, connecting arms 30 with the pans, respectively, and means, substantially as described, for raising and lowering said rod 20.

4. The combination, with the main frame and the rollers 19, mounted adjustably therein, of the shaft 2, rotatively mounted in said frame and provided with a support for the radially-sliding pans, the said pans each provided with a cam 18, adapted to bear on said rollers as the shaft revolves, and the springs that return or retract the pans, substantially as and for the purposes set forth.

5. The combination, with the independently-moving pans arranged around the shaft, of the said shaft, the feed-pipes arranged over the pans, and the deflecting-shields 35, arranged over the spaces between the pans under said feed-pipes, and means for operating said pans, substantially as set forth.

6. The combination, with the pans and hollow shaft 2, of the mechanism for simultaneously lifting the inner ends of said pans, consisting of the non-rotative lifting-rod 20 in said hollow shaft 2, cross-piece 21, rotatively mounted on the rod 20, sleeve 29 and its arms, coupling-links 31, nut 25, and mechanism for rotating said nut.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

GEORGE O. DICKINSON.

Witnesses:
WILLIAM E. JACOBS,
PHILIP BRIGGS.