No. 701,859. Patented June 10, 1902.

W. G. DODD.

ORE CONCENTRATOR.

(Application filed Feb. 3, 1902.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

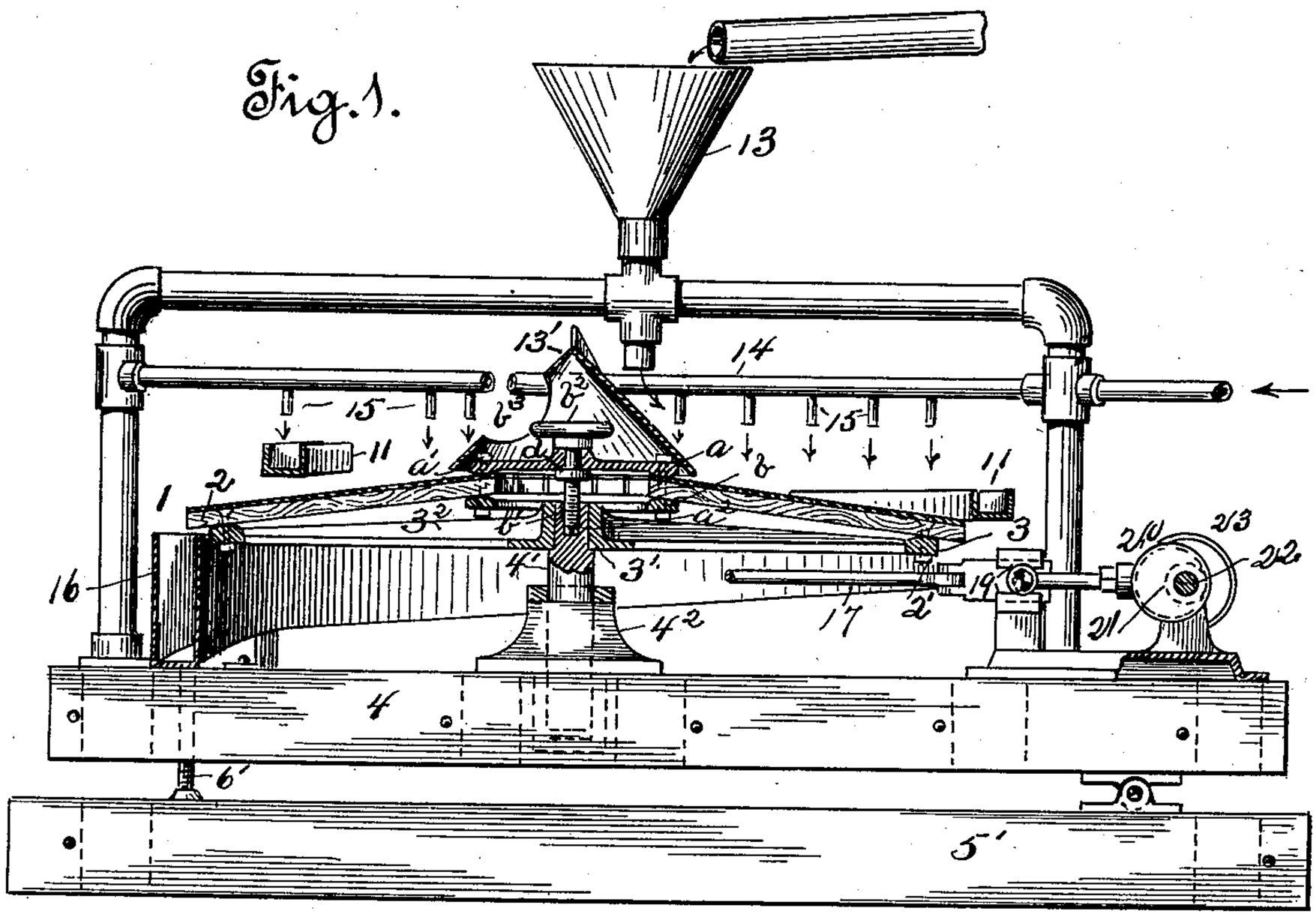

Fig. 2.

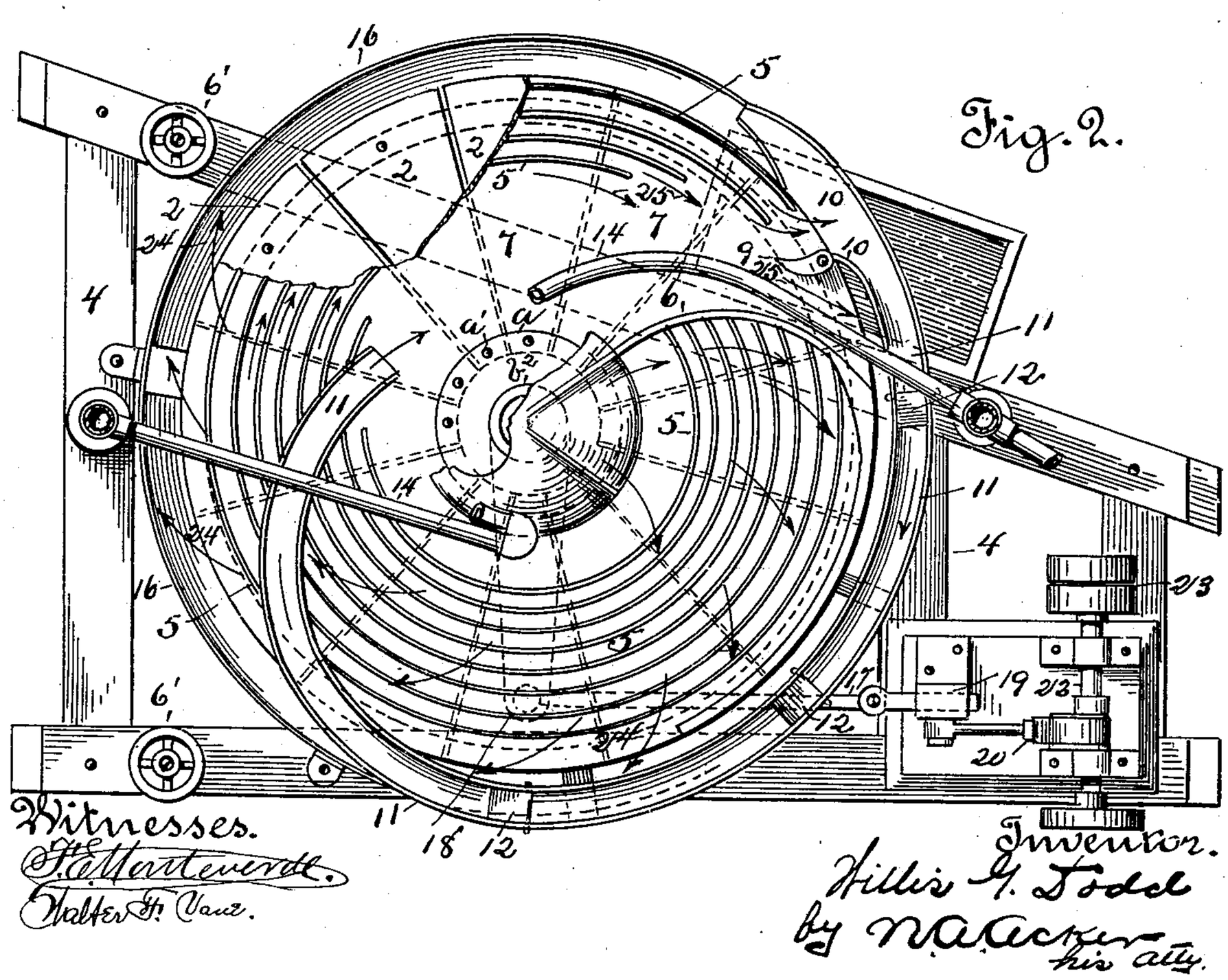

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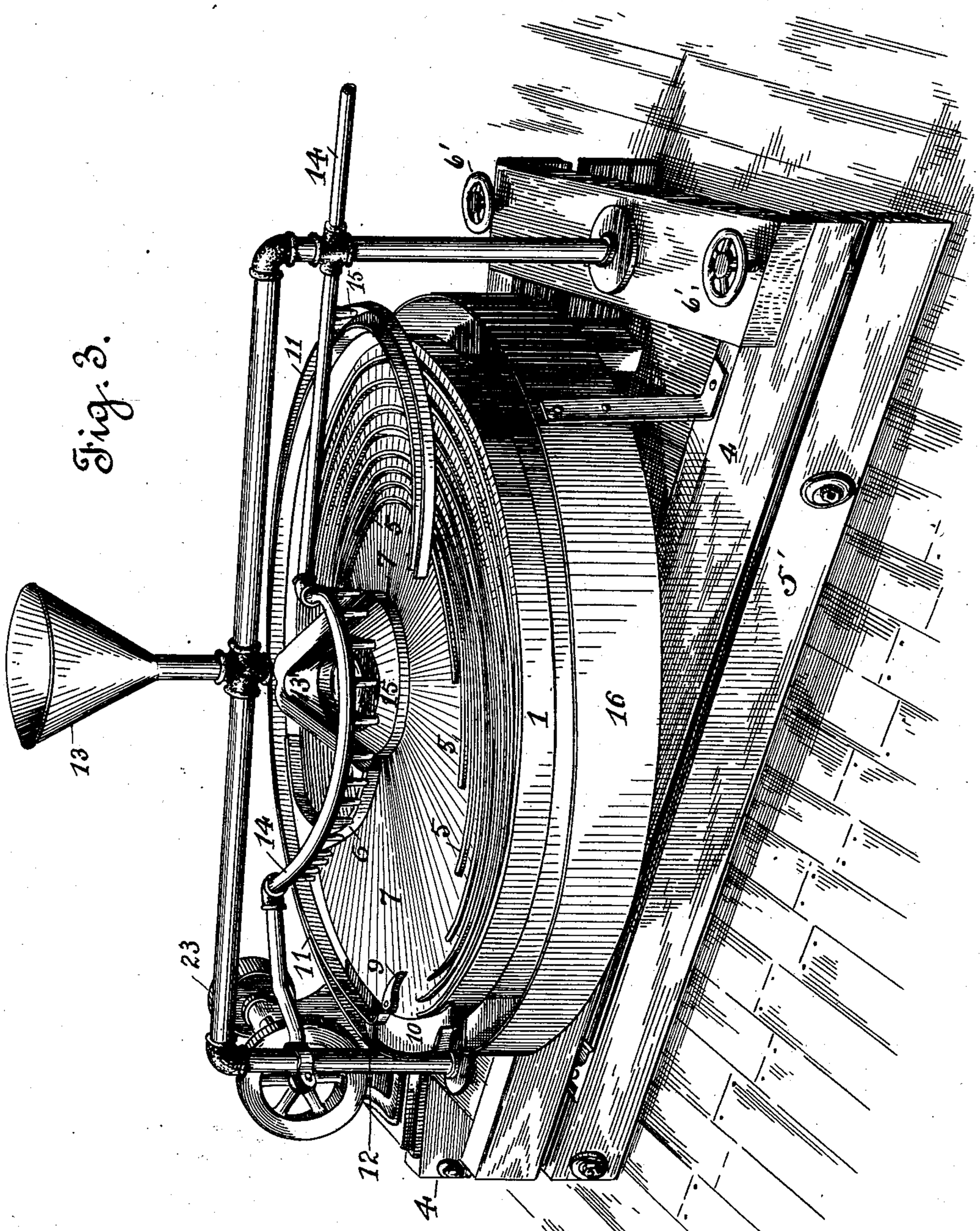
Fig. 3.



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UNITED STATES PATENT OFFICE.

WILLIS G. DODD, OF SAN FRANCISCO, CALIFORNIA.

ORE-CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 701,859, dated June 10, 1902.

Application filed February 3, 1902. Serial No. 92,230. (No model.)

To all whom it may concern:

Be it known that I, WILLIS G. DODD, a citizen of the United States, residing in the city and county of San Francisco, State of California, 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 same.

The present invention comprises an oscillating table having a plain or unriffled portion adjacent its discharge, the working surface of the table being provided with a series of curved riffles, each riffle extending from the feed portion of the table onto the plain or unriffled surface and the terminal of each riffle being in advance of the preceding riffle, or, in other words, the riffles have advanced terminals onto the plain or unriffled portion of the table.

In an application now pending in the United States Patent Office, Serial No. 51,619, filed by me on the 18th day of March, 1901, the advantages resulting from the use of curved riffles on the working face of a circular table, the riffles having advancing terminals, are fully set forth, hence need not be repeated in the present application.

The invention also resides in so constructing the frame or body portion of the table as to permit of the inclination of the working surface of the table being increased or decreased to meet the requirements of the material to be treated.

The invention also comprises means whereby the "middlings" are returned to the table for reworking.

In order to comprehend the invention, reference should be had to the accompanying sheets of drawings, wherein—

Figure 1 is a side view in elevation of the concentrator, the table being in section. Fig. 2 is a top plan view of the concentrator, the surface of the table being partly broken away; and Fig. 3 is a perspective view of the apparatus.

In the drawings the numeral 1 is used to indicate a circular inclined concentrating-table, Fig. 1 of the drawings, which consists of a series of segments or segmental pieces 2. These pieces are attached near their lower edge to a circular plate 3 by bolts 2′, which ring or circular plate is connected to hub 3′ by arms 3^2. The hub 3′ is fitted to a central shaft 4′, working in bearing-box 4^2, secured to an adjustable frame 4. This frame is of triangular form and hinged at one end to the base 5′, the opposite end of the frame being raised or lowered by adjusting-bolts 6′. The upper ends of the segmental plates are held between rings *a b* by bolts *a*′. Through the upper ring-plate *a* works the adjusting-screw *b*′, which is operated by hand-wheel b^2. The lower end of said adjusting-screw works in a screw-threaded seat a^2 in the upper end of the vertical shaft 4′, the screw being prevented from moving out of ring-plate *a* by means of a collar *d*, secured thereon. As thus connected the rings *a b* and the segment plate or pieces are raised and lowered as the adjusting-screw is screwed out of or into the vertical shaft 4′, the openings for the bolts 2′ being of such size as to permit of slight movement of the segment plates or pieces 2. These pieces constitute the body of the concentrating-table.

The working surface of the table comprises a layer of linoleum or other suitable material, the face of which is provided with a series of curved riffles 5. Each riffle springs or starts from a curved portion or radial division 6 and are run, preferably, in a regular curve described around the center of the table. The discharge end of each riffle extends a slight distance beyond the discharge end of the riffle immediately above, or, in other words, the riffles have advancing terminals onto a plain or unriffled portion 7. Each riffle discharges onto said smooth or unriffled portion for final washing or treatment the valuable particles of mineral they have collected.

There is hinged to the unriffled portion of the table a deflecting-finger 9, which serves to cut out and deflect into a pan 10 that portion of the concentrated product consisting of mineral mixed with a small quantity of gangue and commonly termed "middlings." From the pan 10 extends a circular upwardly-inclined return launder or elevator 11, which returns the middlings to the table to be again subjected to treatment. This return launder or elevator is attached to the table by

means of suitable brackets. The said return launder or elevator is concentric to the center of the table, and the middlings are discharged therefrom onto the table at approximately its head. As the middlings are received into pan 10 they are gradually forced into and up the return launder or elevator by reason of the impulses to which the material is subjected by the action of the table. To aid the material in its travel into and through the said launder or elevator, there is arranged therein one or more inwardly swinging or movable valves 12. These valves open to admit a forward movement of the material into and through the launder or elevator, but remain closed against backward movement thereof.

There is supported above the table a feed-hopper 13, of any suitable construction, which receives the pulp or material to be treated and discharges same onto the cone 13′, which delivers the material upon the table at the head of the riffles. This cone covers the hand-wheel b^2 and ring-plate a. A hand-opening b^3 is formed in said cone 13′, Fig. 1 of the drawings, which permits of insertion of the hand for operating the hand-wheel. A water-supply pipe 14 is also arranged above the table. From this water-supply pipe depends a series of cocks or outlets 15, through which clear water is sprayed or discharged onto the plain or unriffled portion 7 of the table as desired.

A circular waste-trough 16 is located beneath the lower edge of the table, into which waste-trough the gangue is discharged and allowed to escape.

Any suitable mechanism may be employed for imparting to the table the proper oscillatory movement necessary to feed or carry the material upon the table forward from the head of the riffles toward their discharge ends. In the present case the table is illustrated as being operated through the medium of the jointed connecting-rod 17, which is attached at one end to the outer end of an arm 18, projecting from the vertical shaft 4′. The free end of the connecting-rod works through the guide-bearing 19 and is attached to the eccentric-strap 20, surrounding cam 21, secured to the drive-shaft 22. Motion is imparted to the drive-shaft from any suitable source of power by means of a power-belt working over belt-wheel 23, attached to the drive-shaft.

The operation of the machine is as follows: Power by any suitable means is applied to the drive mechanism, which imparts an oscillatory movement to the table. Finely-crushed ore, consisting of particles of mineral mixed with water, designated as "pulp," is conveyed by any suitable means into the feed box or hopper 13, from which it is discharged onto the table at the head of the riffles 5, as before described, and, due to the inclination or cone shape of the table, flows down radially toward the circumference and spreads throughout the riffles, within which the valuable particles of mineral settle and, due to the oscillatory motion given the table, are carried around by the riffles and discharged upon the smooth or unriffled portion 7 of the table, where they are subjected to a final washing with clear water discharged upon the table from the water-pipe. This final washing eliminates any gangue that may have been discharged from the riffles, enabling the concentrates to continue their travel to their discharge-point and to escape into the receptacle A, placed to receive same. Should a portion of the concentrates near the periphery of the table contain a small quantity of gangue, it is cut out by finger 9 and deflected into the pan 10, from which, by means of the inclined return-elevator 11, it is redelivered to the table to be again treated. The mineral being eliminated, the gangue flows downward over the periphery or lower edge of the table into the circular waste-trough 16 and is permitted to escape. The flow of the gangue is indicated by arrows 24, and that of the mineral by arrows 25. It will be observed that the path of the gangue, while transverse of the table, is at an oblique angle to the path of the mineral at the intersection of the paths, which causes little, if any, disturbance at such point.

By reason of the oscillating movement imparted to the table a variable agitation is given to the pulp fed thereon. The agitation is gentle or slight near the center of the table, where the pulp is first introduced, causing the valuable particles of mineral to quickly settle, which agitation rapidly increases toward the periphery of the table.

By the described construction of table the same may be adjusted or its inclination changed to meet the requirements of the varying material to be treated thereon. The linoleum cover for the table will give as the inclination of the table is changed to increase or decrease the pitch thereof.

Any suitable form of supporting base or frame may be used for mounting the machine, and, if desired, any well-known means may be employed for changing the inclination of the table.

Having thus described the invention, what I claim as new, and desire to protect by Letters Patent, is—

1. An ore-concentrator comprising an inclined circular table having an unriffled or plain portion adjacent its discharge for the mineral, a series of curved riffles extending from approximately a radial division of the table onto the plain or unriffled portion thereof, means for imparting an oscillatory motion to the table, and an inclined launder or trough attached to and carried by the table, said launder or trough arranged to receive the middlings from the table and to discharge same thereon for reworking.

2. An ore-concentrator comprising an inclined circular table having an unriffled or plain portion adjacent its discharge for the

mineral, a series of curved collecting-riffles arranged on the working face thereof and discharging onto the plain or unriffled portion of said table, means for imparting an oscillatory motion to the table, and a valve-controlled return launder or trough attached to and carried by the table, said launder or trough arranged to receive the middlings discharged from the table and to return the same thereto at its head.

3. The combination with an inclined circular concentrating-table, a series of curved riffles arranged on the working face thereof, means for imparting an oscillating motion to the table, and an inclined launder or trough attached to and carried by the table, said launder or trough arranged to receive the middlings from the table and discharge same thereon for reworking.

4. A circular concentrating-table comprising a body portion composed of a series of adjustable pieces, a cover therefor, a series of curved riffles arranged thereon and discharging onto a plain or unriffled portion of the table, and means for imparting vertical adjustment to the pieces composing the body portion of the table.

5. The combination with an inclined circular concentrating-table, of a series of curved riffles on the working surface thereof, the terminals of said riffles extending and discharging onto a plain or unriffled portion of the table, and means whereby the inclination of the table may be increased or decreased.

6. The combination with an oscillatory inclined circular concentrating-table having a plain or unriffled portion, of a series of curved riffles arranged on the working face thereof and discharging onto the plain or unriffled portion, the riffles having increasing terminals, and means for increasing or decreasing the inclination of the table.

In witness whereof I have hereunto set my hand.

WILLIS G. DODD.

Witnesses:
N. A. ACKER,
D. B. RICHARDS.