

J. O. BLACKBURN.
 ROTARY ORE EXTRACTOR.
 APPLICATION FILED NOV. 28, 1908.

923,319.

Patented June 1, 1909.
 3 SHEETS—SHEET 1.

Fig. 1.

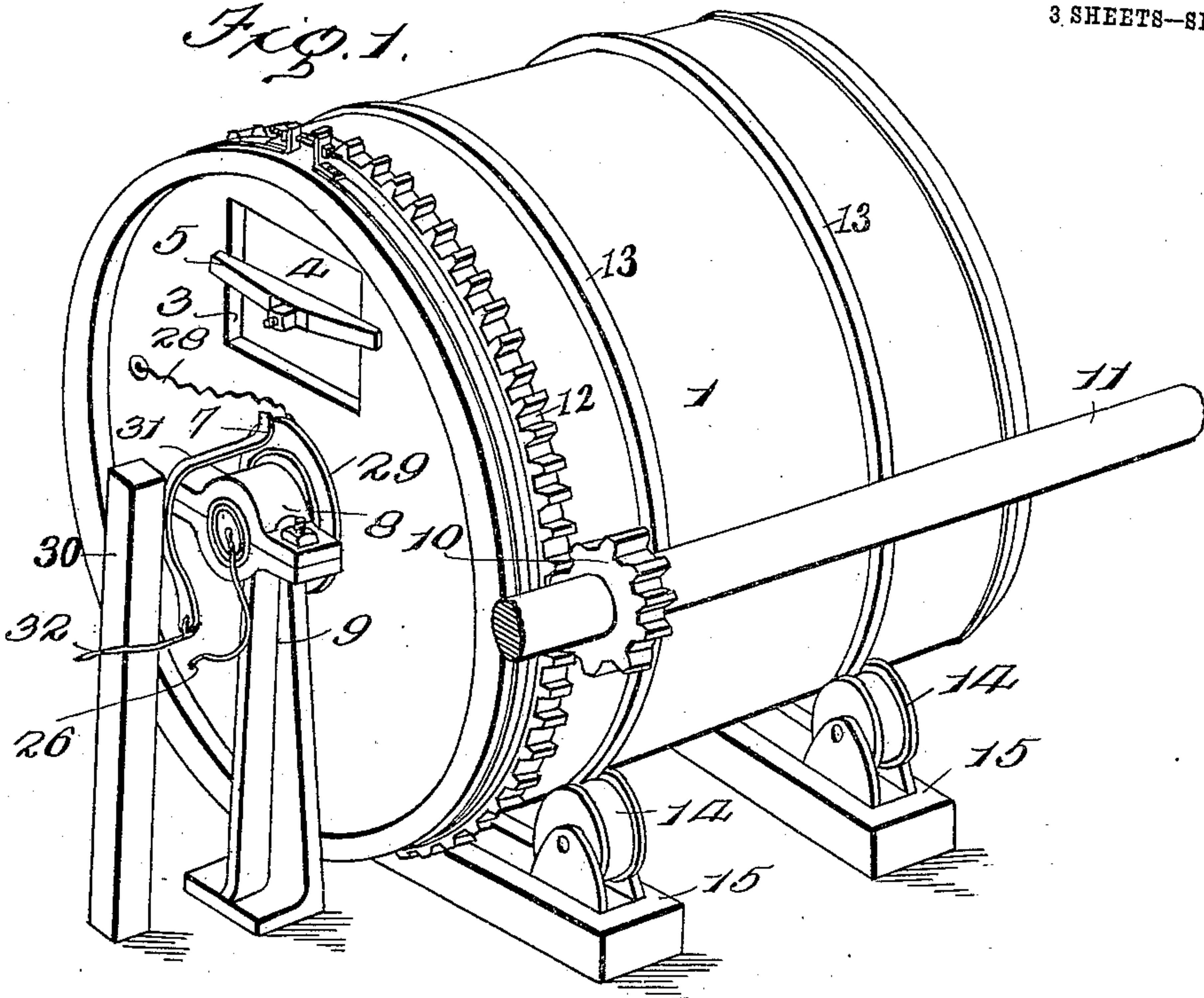
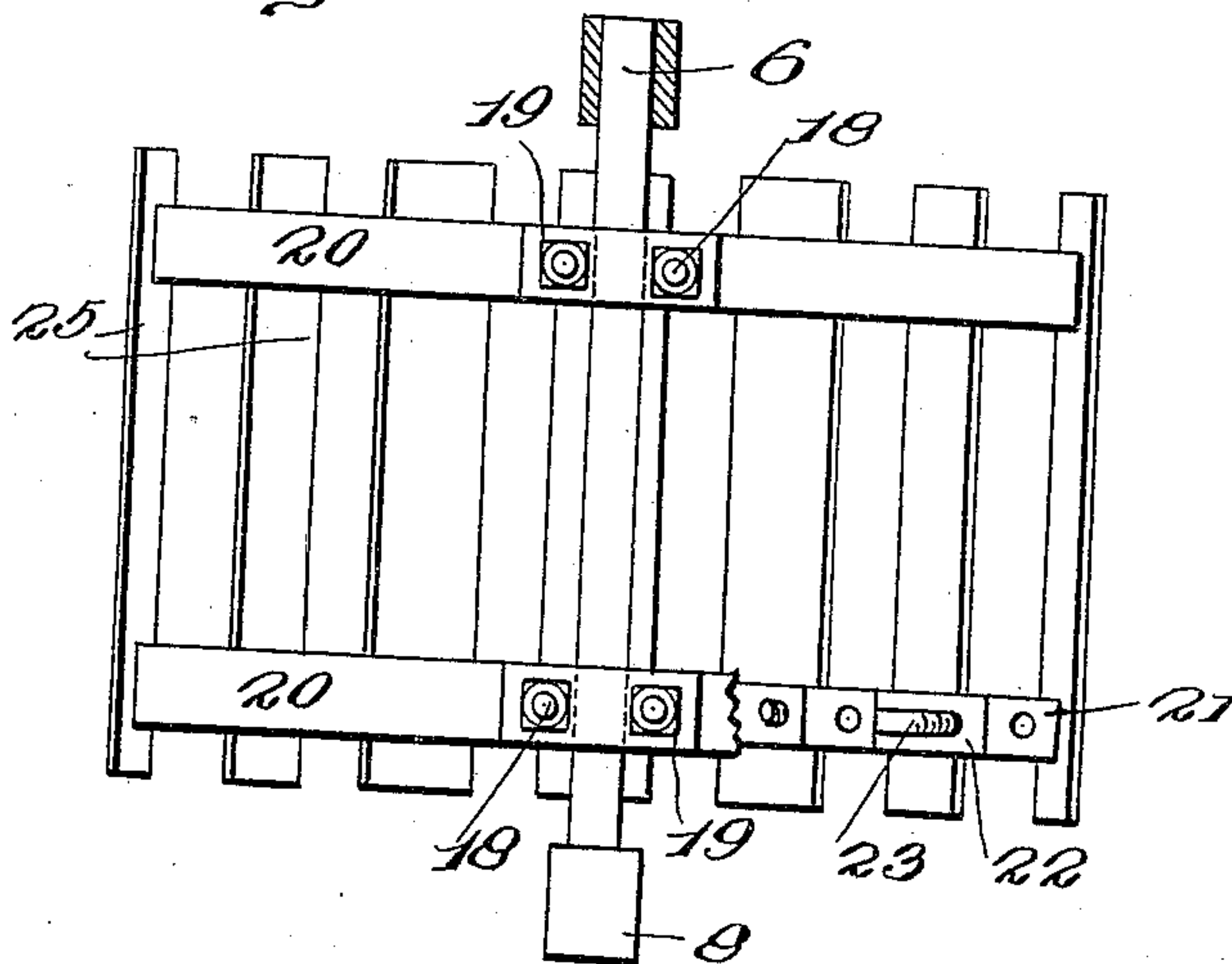


Fig. 2.



Witnesses

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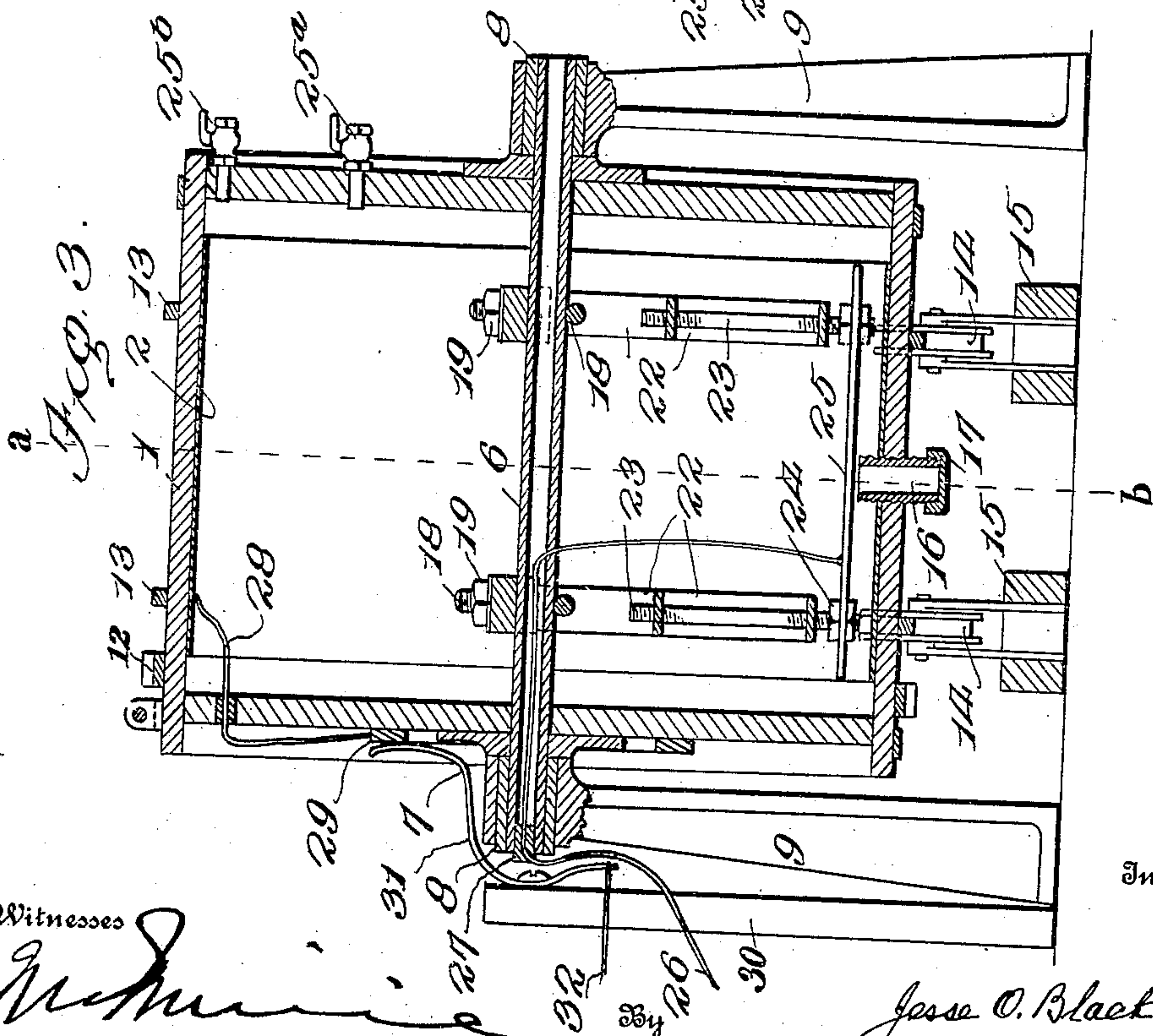
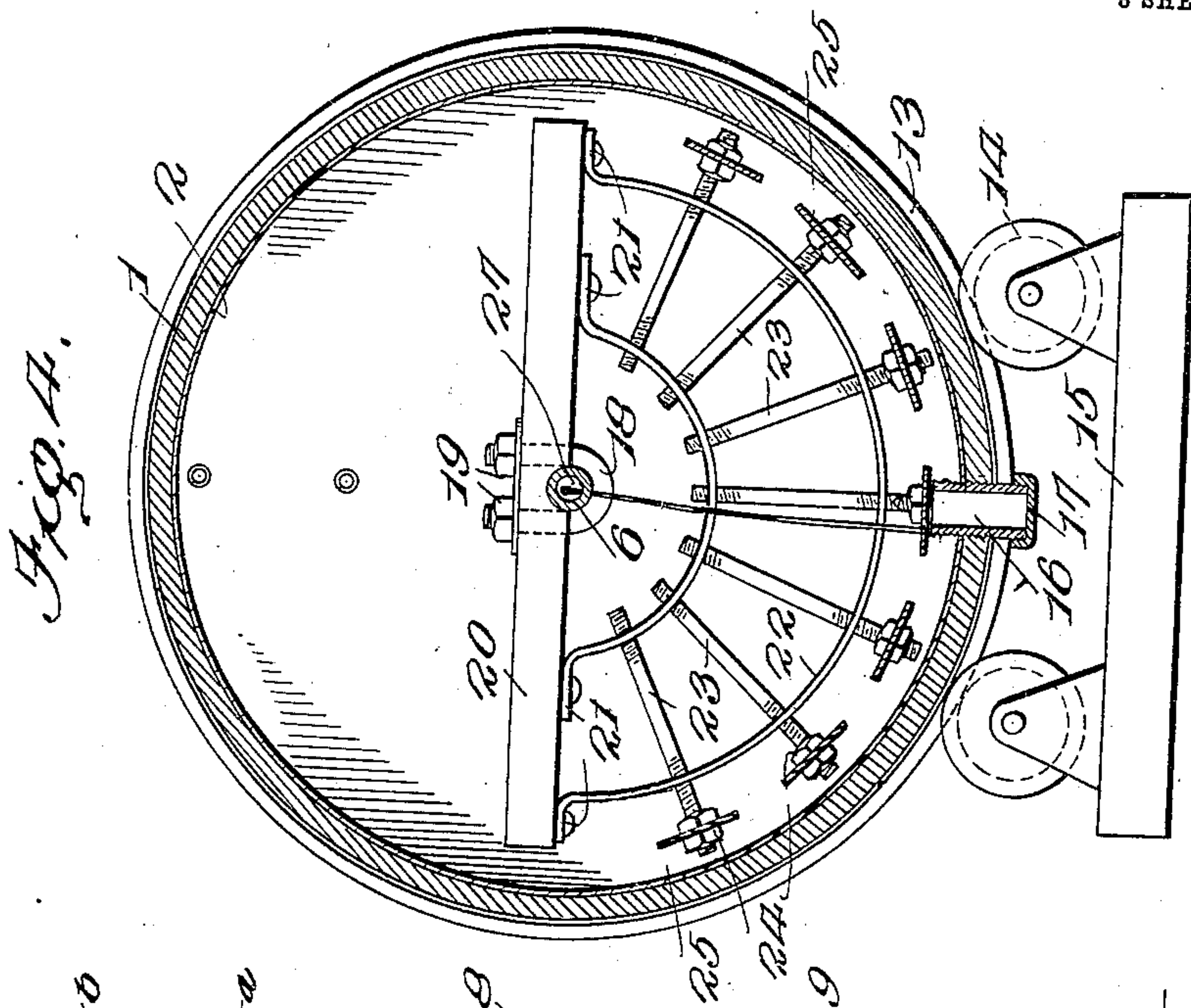
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3 SHEETS—SHEET 3.

Fig. 6.

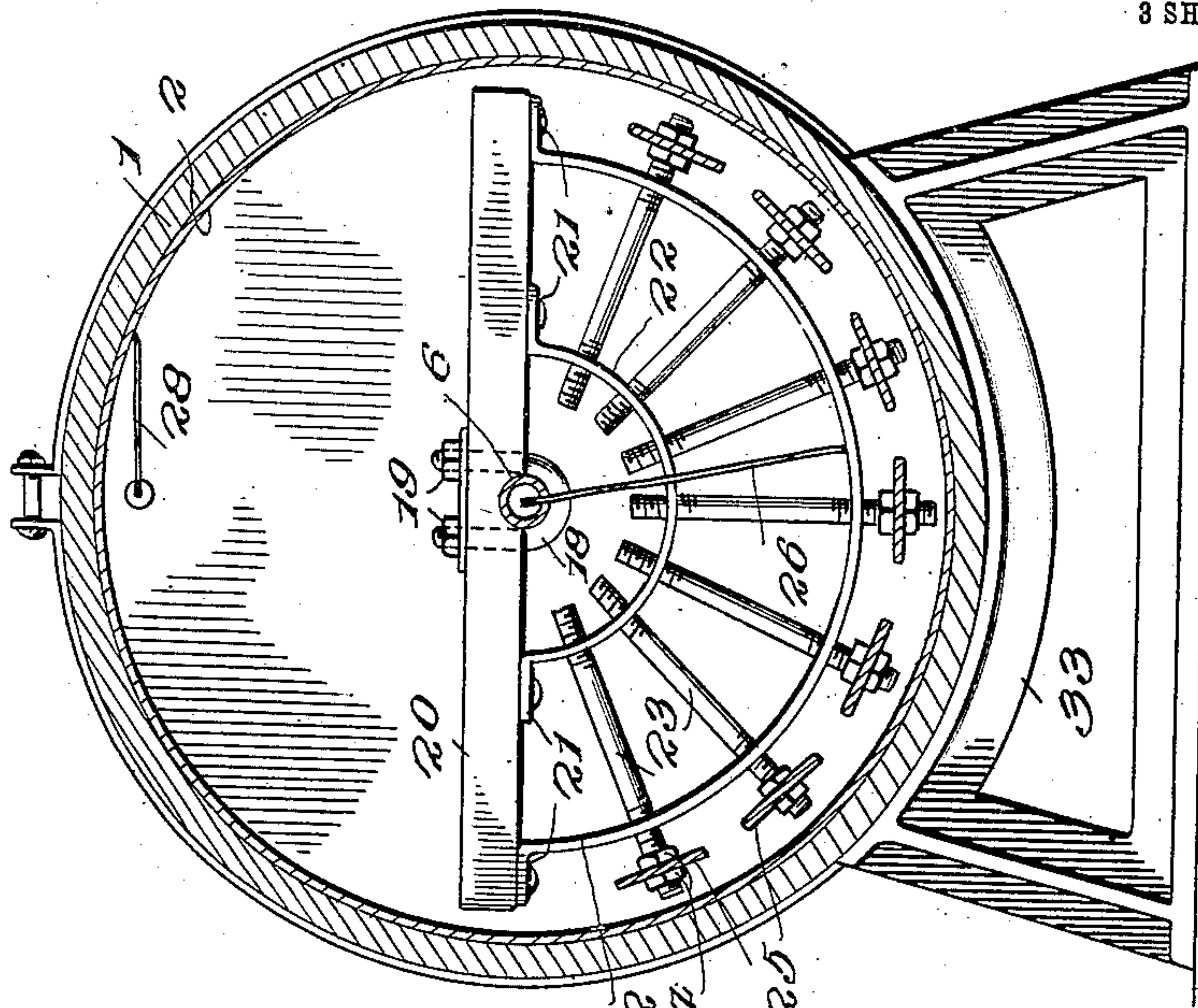
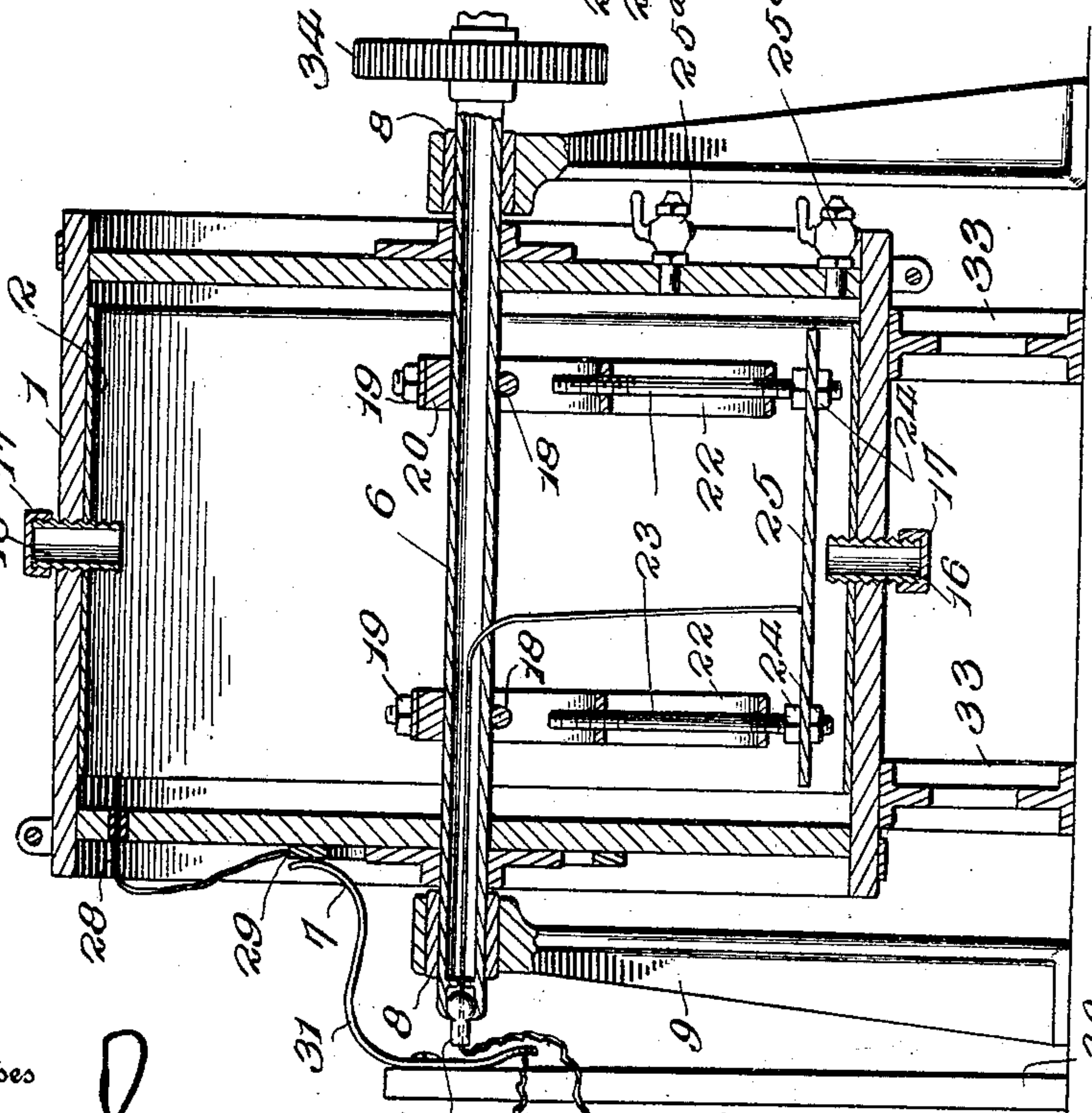


Fig. 5.



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UNITED STATES PATENT OFFICE.

JESSE O. BLACKBURN, OF CHLORIDE, ARIZONA TERRITORY.

ROTARY ORE-EXTRACTOR.

No. 923,319.

Specification of Letters Patent.

Patented June 1, 1909.

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To all whom it may concern:

Be it known that I, JESSE O. BLACKBURN, a citizen of the United States, residing at Chloride, in the county of Mohave and Territory of Arizona, have invented certain new and useful Improvements in Rotary Ore-Extractors; 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.

My invention relates to certain new and useful improvements in machinery for treating by electrolysis ores and slimes and extracting from the same gold and silver and depositing the same in mercury from which the gold and silver may be readily recovered.

My invention has for its object to provide an apparatus which shall be simple and economic of construction, readily operated and effective for the purpose designed and with these objects in view my invention consists in the details of construction and arrangement hereinafter more fully set forth.

In order that those skilled in the art to which my invention appertains may know how to make and use my improved rotary extractor I will proceed to describe the construction and operation of the same referring by numerals to the accompanying drawings in which,

Figure 1 is a perspective view of the same. Fig. 2 is a top or plan view of the metal bars and their supports removed from the rotary cylinder and showing their relation with the shaft upon which the cylinder rotates. Fig. 3 is a central longitudinal section of the apparatus as shown at Fig. 1, and Fig. 4 is a transverse or cross section taken on the line *a-b* of Fig. 3. Fig. 5 is a view similar to Fig. 3 but showing a construction by which the cylinder may remain stationary and the interior metal bars may be rotated within the cylinder, and Fig. 6 is a transverse section of the construction shown at Fig. 5.

Similar reference numerals indicate like parts in the several figures of the drawings.

1, is a cylinder of any preferred proportions lined with an amalgamating plate 2, which may be integral or preferably composed of sections adapted to be removed for cleaning, and returned or others substituted. One end of this cylinder is provided with a manhole 3, which is closed by a suitable door 4, and clamping means 5.

The cylinder is mounted upon a hollow stationary shaft or axis 6, which passes through suitable metal bearings 7, secured to each head or end of the cylinder, and stuffing boxes 8, are provided to make watertight joints between the hollow shaft and its bearings, which latter are bolted to suitable pedestals or supports 9.

The cylinder 1, is rotated around the stationary shaft 6, by means of a pinion 10, fixed upon a suitable driving shaft 11, and which meshes with a circumferential rack 12, secured upon the cylinder as clearly shown at Fig. 1, and the driving shaft 11, may be driven by any suitable motor. In lieu of these details of construction for securing the rotation of the cylinder the same may be driven by a belt passing around the cylinder and a pulley on the shaft 11, or by any other suitable mechanism.

As an additional means for supporting the cylinder in rotative position or in lieu of the means already described, the cylinder is provided near each end with circumferential tracks 13, adapted to travel upon double flanged wheels 14, mounted upon parallel rigid supports 15. These wheels 14, are arranged equidistant from the vertical axis of the cylinder as clearly shown at Fig. 4.

16, is a pipe provided with a threaded cap 17, and through this pipe when by the rotation of the cylinder it is on top it is utilized for charging the cylinder with any suitable electrolytic solution, and on the other hand when the cylinder is turned to bring it at the bottom it is employed as a discharge.

Having described generally the cylinder and its supporting and rotating devices I will now describe the special means employed for recovering gold and silver from the crushed ore with which it is loaded.

Secured to the stationary hollow shaft 6, by suitable yokes 18, and nuts 19, are two parallel and diametric timbers 20, to the underside of which are secured by bolts 21, two concentric semicircular flat metallic supports 22, from which radiate downwardly a series of metallic rods 23, which as clearly shown at Fig. 4, are secured to the supports 22, by screw threads so that they may be readily adjusted therein.

To the lower or outer extremities of these rods 23, are attached by clamping nuts 24, longitudinal metallic bars 25, adjacent to which the amalgamating plate or sections 2, traverse as the cylinder is rotated. The dis-

tance between these bars and the amalgamating plate or sections may be such as desired by the adjustment of the rods 23, in an obvious manner. The charging and dis-
 5 charging pipe 16, being threaded through the side or body of the cylinder 1, may be so adjusted as to secure a proper clearance between its inner extremity and the plane of the bars 25, and so that it shall terminate
 10 above the horizontal plane of the mercury employed and which will be hereinafter referred to.

A cock or valve 25^a, is provided by means of which the ore and solution may be sam-
 15 pled, and 25^b, is a valve or cock through which the mercury may be drawn off.

Having now described all of the mechanical features of my improved extractor I will proceed to describe the means by which I
 20 secure combined electrolytic and amalgamating action.

26, is a positive wire extending from any suitable generator (which it is unnecessary to show) and this positive wire enters the end
 25 of the hollow shaft 6, at which point it is sealed by any suitable means such as a paraffined or waxed plug 27, (a similar plug or equivalent being employed to close the opposite end of said shaft), and radially through
 30 an orifice of the shaft it is electrically connected with one of the metallic bars 25.

A negative wire 28, is electrically connected with the amalgamating plate 2, passes through the end of the cylinder and is
 35 properly sealed therein and has its outer and opposite end electrically connected with a metallic ring 29, secured to the end of the cylinder.

30, is a post or upright secured in fixed
 40 position adjacent to the end of the cylinder and is equipped with a spring 31, one end of which is always in contact with the metallic ring 29, the outer end being connected by a wire 32, with the negative pole of the gener-
 45 ator. In using my improved machine for the extraction of gold and silver from ore, a suitable quantity of mercury is introduced to produce what may be termed a lake with its level just below the inner end of the
 50 charging and discharging tube 16, when in its lower position; ore crushed to a satisfactory degree of fineness is then introduced through the manhole 3, which is then closed, and the cylinder rotated so as to bring the charging
 55 tube 16, on top; an electrolytic solution is then introduced through such tube and the cap 17, screwed in place.

The machine being thus properly charged and the connections with the generator
 60 made, power is applied to the driving shaft 11, and the cylinder caused to rotate at a speed of about one hundred feet a minute or just fast enough to prevent the ore from settling by gravity, and the rotation of the cyl-
 65 inder continued until the ore shows by sam-

pling and assaying, that a satisfactory amount of its values has been extracted and have been precipitated into the mercury.

The action of the electric current between the bars 25, and the amalgamating plate 2, 70 causes the precious metals to precipitate from the solution and it is picked up and held by the mercury which when laden is drawn off and retorted and then returned to the cylinder. It will of course be under- 75 stood that it is necessary to employ a volt meter and a suitable instrument to measure the amperage. Just enough current is required to decompose water.

It will of course be understood by those 80 skilled that different ores will require different lengths of time to be satisfactorily treated.

When the values have been extracted from the ore and precipitated into the mer- 85 cury the electric current is turned off and the mercury is drawn off through the discharge cock or valve. The cylinder is then rotated to bring the discharge pipe 16, at the top and the cap 17, is then removed and the 90 cylinder rotated until its remaining contents are discharged into a Y-shaped trough or launder, extending upward each side of the cylinder.

The object of rotating the machine to 95 cause the discharge of its contents is to prevent the ore from packing under the longitudinal bars 25.

While I have heretofore described the manner of charging the cylinder with the 100 ore and solution, it will be understood that I do not wish to be confined in this particular and that if thought desirable and as an economy in time, successive charges may be made from a revolving cylinder of substan- 105 tially the same capacity as the extractor, arranged above the latter and adapted to discharge its contents through a suitable chute into the manhole of the extractor cylinder.

It will of course be understood that I do 110 not wish to be limited as to the material of which the cylinder is constructed, but if constructed of metal the positive wire passing through the hollow shaft should be insulated to prevent the current passing to the 115 cylinder.

While the foregoing description relates to the construction particularly shown in Figs. 1, 2, 3 and 4, and in which the cylinder 1 is rotated while the interior mechanism re- 120 mains stationary, this condition may be reversed as shown in Figs. 5 and 6 wherein the cylinder is shown as mounted in fixed position upon suitable supports 33, and the hol- 125 low shaft 6 is provided with pinion or band-wheel 34, adapted to be driven by a gear-wheel or belt. When thus constructed the shaft 6 and the parts attached to and carried by the same are rotated within the cyl- 130 inder, and in such case the positive wire 26

is connected with the generator by a suitable swivel joint, and the cylinder is provided at the upper side with a charging tube 35, similar to the tube 16, shown in Figs. 3 and 4.

5 Having described the construction and operation of my improved apparatus, what I claim as new and desire to secure by Letters Patent is:

1. In combination with an ore containing
10 cylinder having an interior amalgamating surface; and a hollow shaft axially located with reference to the cylinder; diametric parallel timbers secured in fixed relation to the shaft; concentric metallic supports se-
15 cured to the timbers; adjustable radial rods secured to the concentric metallic supports; metallic bars adjustably connected with the outer ends of the radial arms; a positive wire connected to a generator and
20 passing through the hollow shaft and to one of the metallic bars upon the radial arms; a negative wire connected with the generator and with the amalgamating lining of the cylinder; and means for changing the rela-
25 tion between the cylinder and its interior devices, whereby the ore contained within the cylinder is agitated, substantially as hereinbefore set forth.

2. In an ore extractor such as described,
30 embodying a cylinder having an amalgamating lining and mounted upon a hollow shaft supporting radial metallic arms provided at

their outer ends with adjustable metallic bars; a positive wire extending from a gen-
erator through the hollow shaft and to one 35 of the metallic bars; a negative wire connected at one end to the amalgamating lining of the cylinder and its opposite end connected with a metallic ring secured to one head of the cylinder; a post adjacent to the 40 head of the cylinder, a metallic spring connected with the post and having one end in contact with the metallic ring on the head of the cylinder and the opposite end connect-
ed with a wire leading to the generator, sub- 45 stantially as hereinbefore set forth.

3. In an ore extractor such as described and embodying an ore-containing cylinder mounted upon a hollow shaft; means for agitating the ore within the cylinder, con- 50 sisting of parallel timbers fixed to the shaft; concentric semicircular supports secured to the timbers and radial arms adjustably connected with the supports and carrying at their outer extremities parallel longitudinal 55 metallic bars, substantially as and for the purpose set forth.

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

JESSE O. BLACKBURN.

Witnesses:

J. R. LIVINGSTON,
JOHN H. WARE.