

No. 817,333.

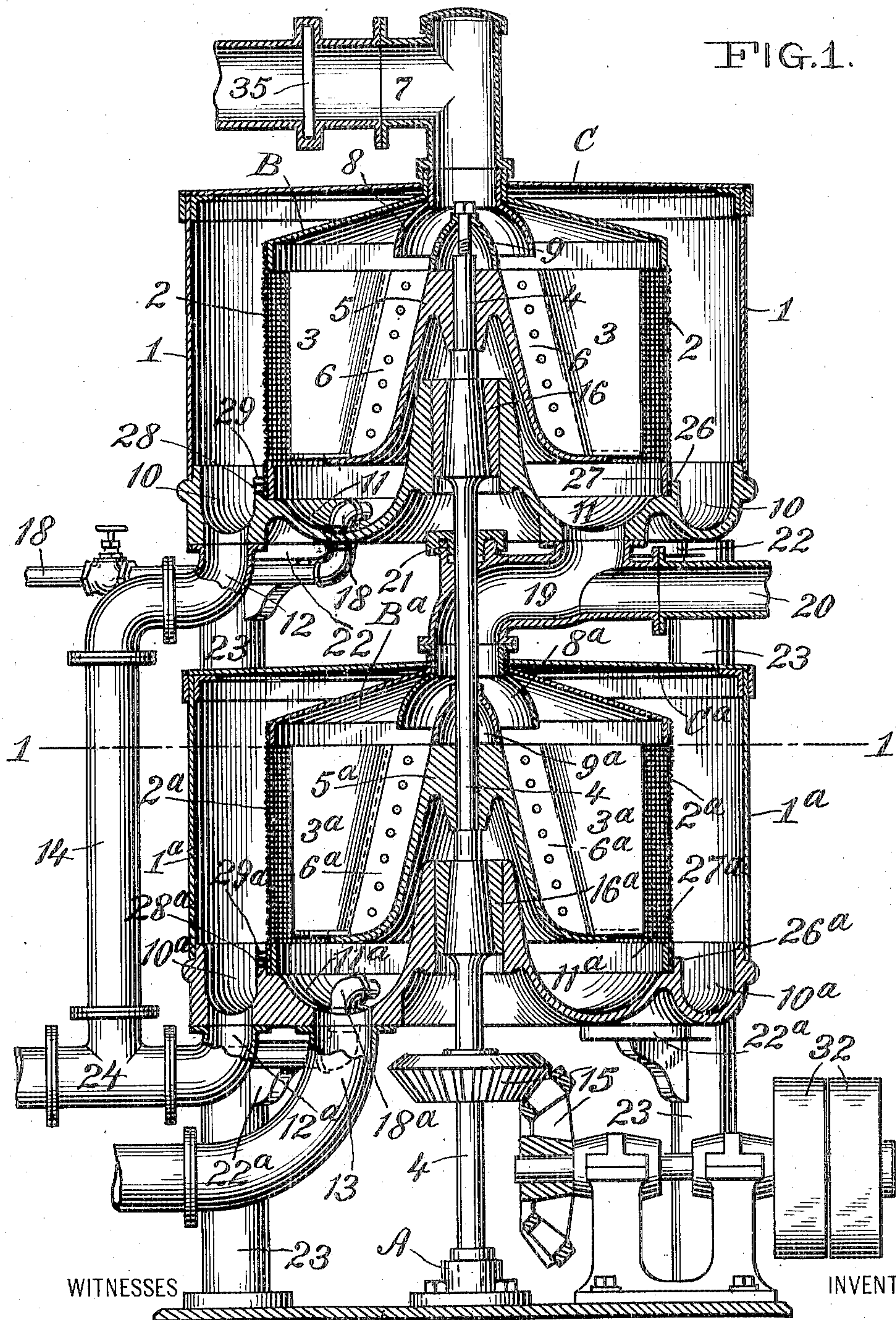
PATENTED APR. 10, 1906.

H. L. ORRMAN.
CENTRIFUGAL SIEVING APPARATUS.

APPLICATION FILED AUG. 7, 1905.

3 SHEETS—SHEET 1.

FIG. 1.



WITNESSES

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33

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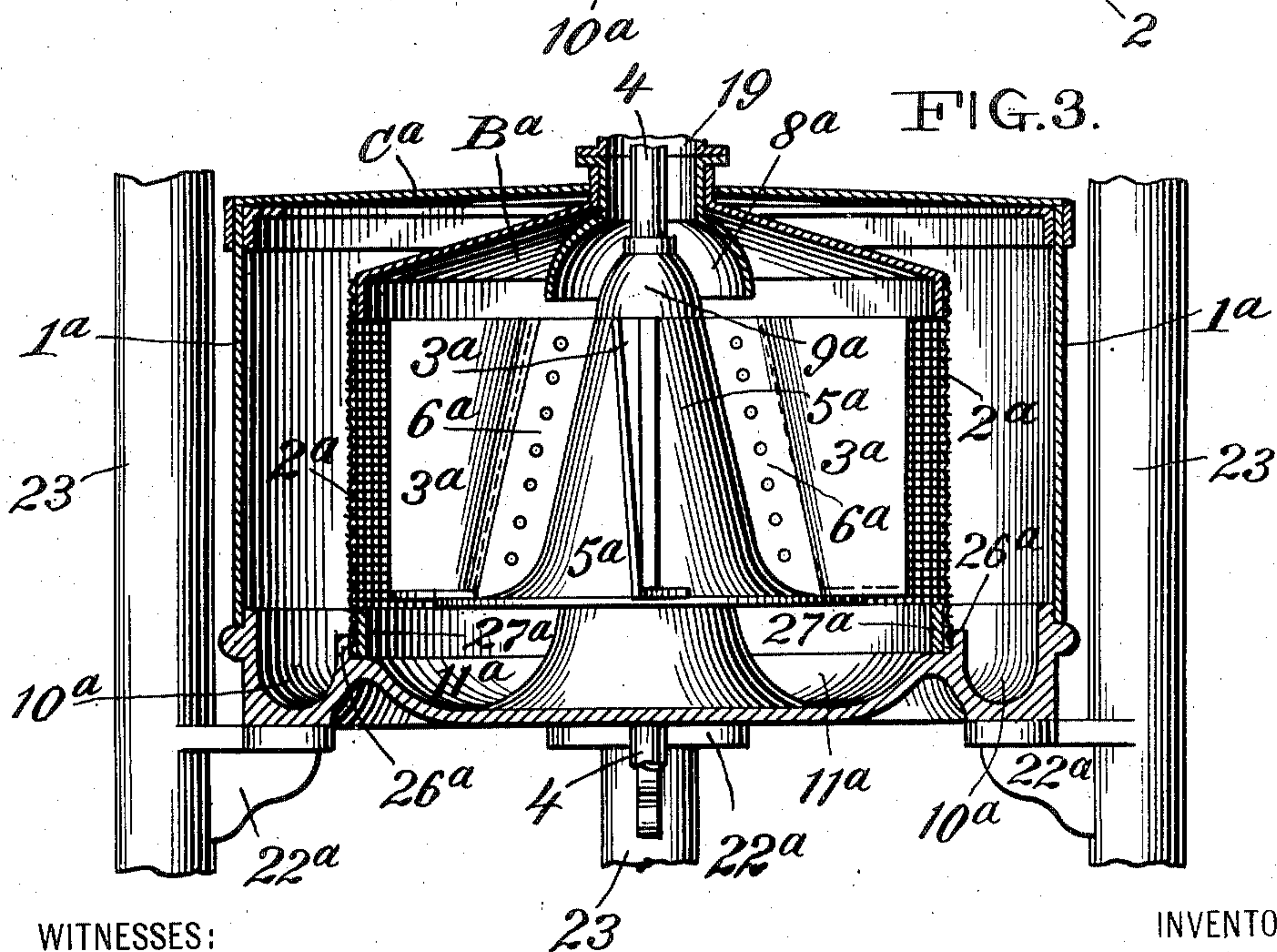
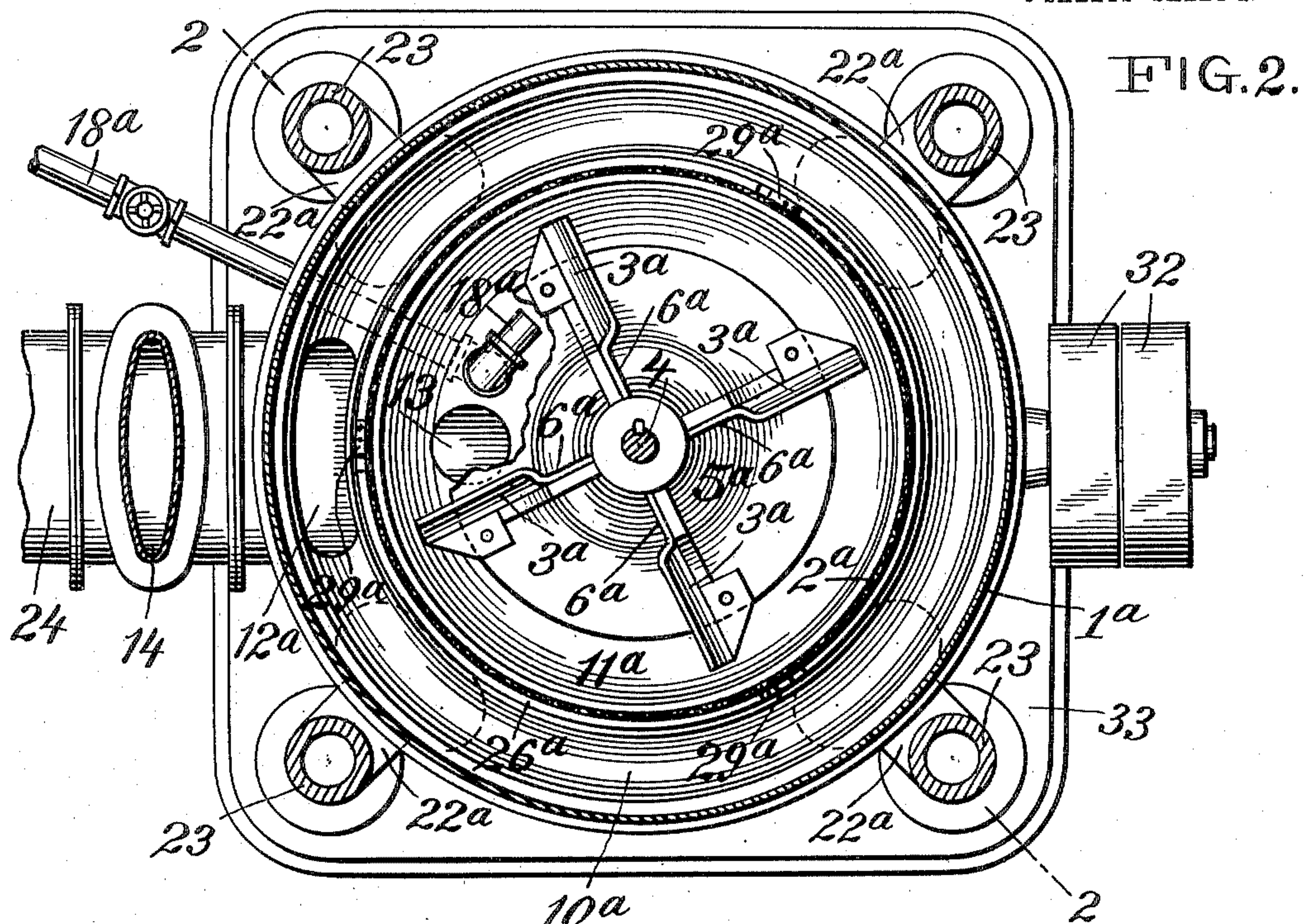
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3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

FIG. 4.

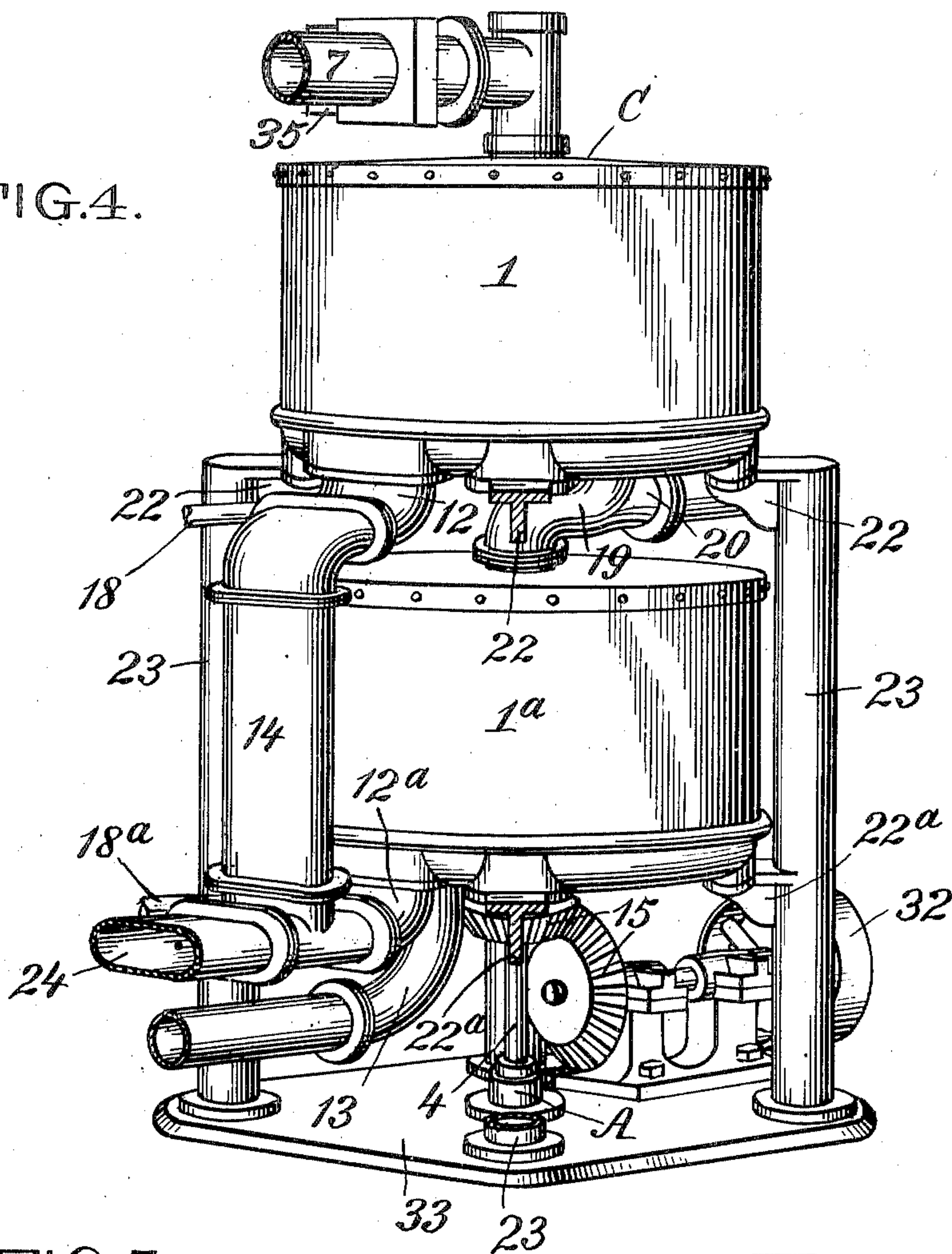
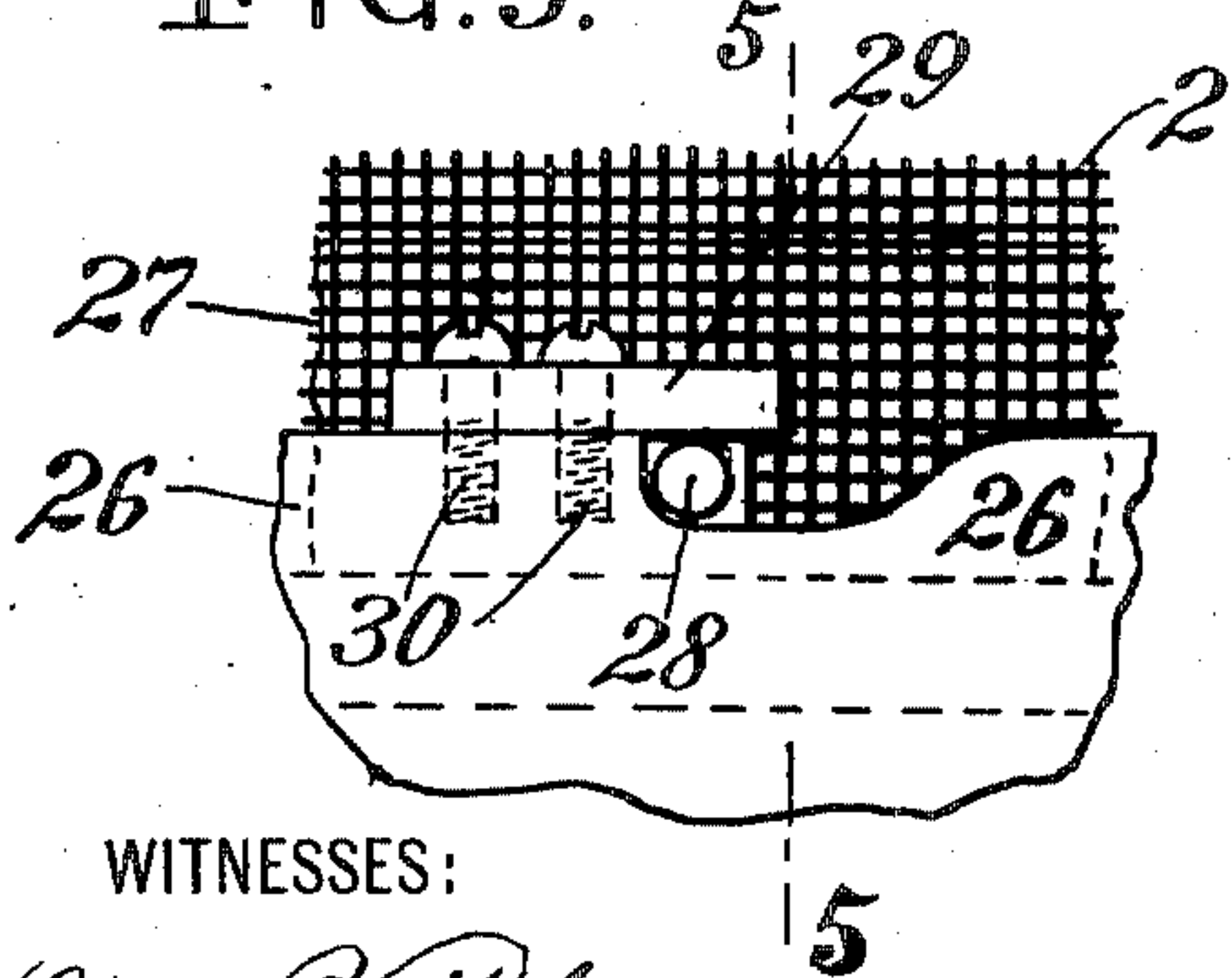


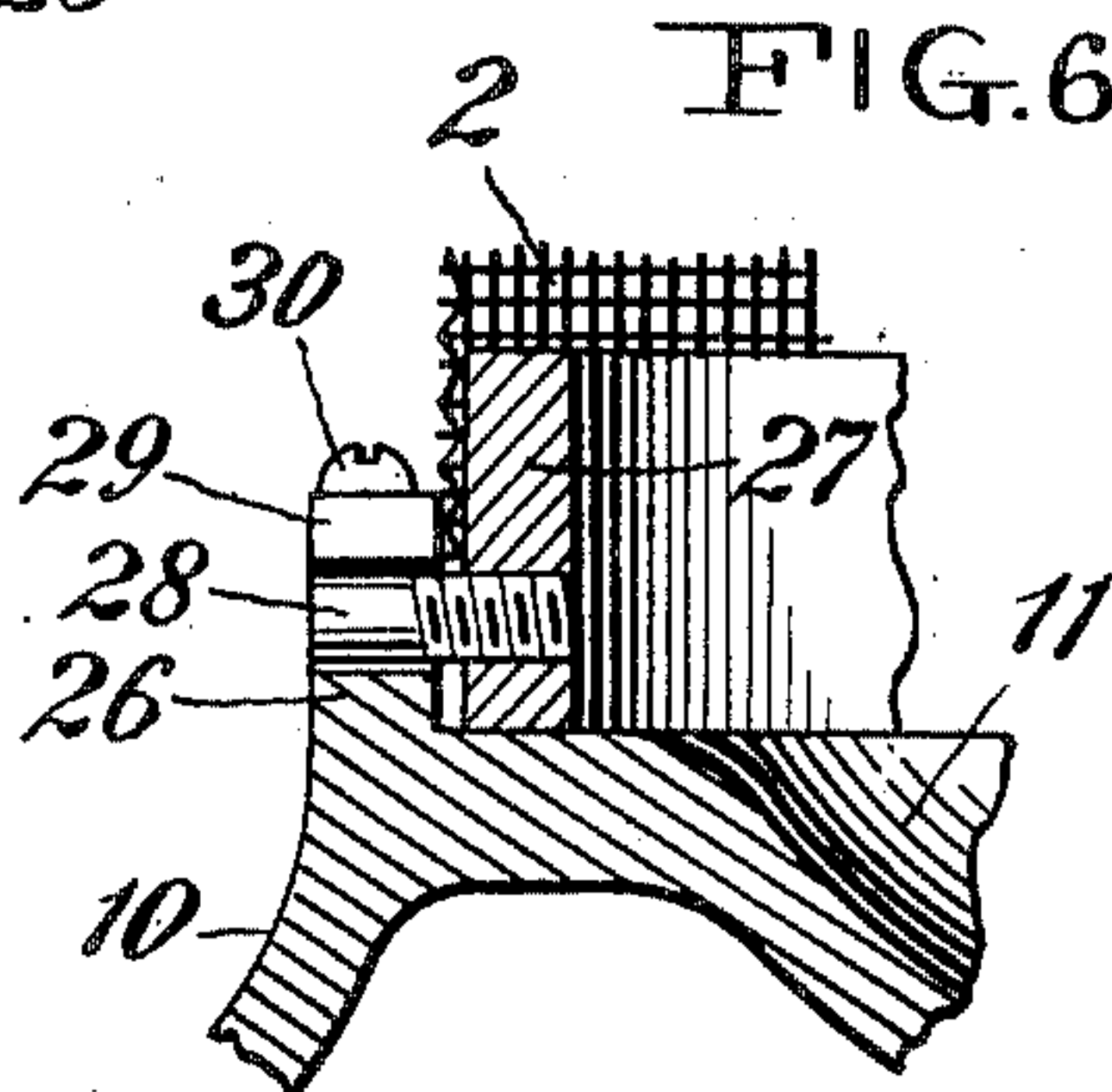
FIG. 5.



WITNESSES:

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FIG. 6.



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UNITED STATES PATENT OFFICE.

HJALMAR L. ORRMAN, OF DAYTON, OHIO.

CENTRIFUGAL SIEVING APPARATUS.

No. 817,333.

Specification of Letters Patent.

Patented April 10, 1906.

Application filed August 7, 1905. Serial No. 279,116.

To all whom it may concern:

Be it known that I, HJALMAR L. ORRMAN, a citizen of the United States of America, and a resident of Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Centrifugal Sieving Apparatus, of which the following is a specification.

My invention relates to that class of machines in which centrifugal force is employed to throw the material to be sieved upon a screen.

The invention is an improvement upon the Ruth machine as set forth in his Patent No. 781,097, of January 31, 1905, and assigned to me.

One of the objects of the invention is to provide a compact compound screening-machine that will not only efficiently serve for screening ground wood, sulfite, soda fiber, and cellulose, but will serve also for screening paper-stock just before it enters the paper-making machine. As usual, the material contains water during the operation of converting it into a liquid pulp.

Another object is to provide against loss of useful fiber that might be thrown away with the tailings.

By my invention also I am able to save space, piping, power, and attendance, and as a consequence of the objects gained there is reduced cost of manufacture and operation.

Without regard to the various scopes of novelty which are attended to in the claims the general nature of the invention comprises an arrangement by which the whole screening process is performed and repeated in one piece of apparatus, which consists, essentially, of a vertical shaft, rotary beaters in sets which are at different levels and attached to said shaft, troughs at each set of beaters for catching the screened material, a pipe connecting the said troughs to a common delivery-pipe, troughs for the tailings at the respective sets of beaters, a pipe connecting the upper one of the last-named troughs to the next lower beaters, and an outlet-pipe for the lowest tailings-trough.

The machine will now be described by reference to the accompanying drawings.

Figure 1 represents a general vertical central section. Fig. 2 is a horizontal section at about the line 1 1 of Fig. 1. Fig. 3 is a vertical section on the line 2 2 of Fig. 2, but with the beaters 3^a in a different position. Fig. 4 is a general outline of the machine

from the exterior, in elevation, with portions broken away. Fig. 5 is an enlarged view of the locking device for the sieve-drum. Fig. 6 is an enlarged view, from a different direction, of the locking device for the sieve-drum, being a vertical section about on the line 5 5 of Fig. 6.

As noticed, many elements in the upper part of the machine are like those in the lower part and are therefore numbered somewhat similarly by adding "a" after the reference-numerals applied to the lower part of the figures. I will describe the upper portion first.

The construction includes a casing 1, cylindrical in shape, the sieve-drum 2 therein, and inside of the drum radial beaters 3, supported upon a conical runner which in turn is keyed to the shaft 4, which is journaled in the bearings 16 and supported in a step-bearing A. Each beater 3 has nearest the conical runner a channel 6, which extends downward and outward along the whole length of the beater with about the same inclination relatively to the shaft as that of the surface of the conical runner 5. The channel 6 gradually lessens in depth from a maximum at the top to nothing at the bottom, owing to the slight inclination of the beaters 3 to the vertical bottom of the said channel, as most clearly seen in Fig. 3. At the top there is an inlet-pipe 7, which extends through the cover B of the sieve-drum and through the cover C of the casing 1. The lower end of the inlet-pipe 7 is spread out into a hood 8, central with which is a deflector 9, by which the inlet from the pipe 7 becomes annular and terminates just above the beaters 3 and directly opposite the upper ends of the channels 6. The radial dimension of this annular passage-way between the elements 8 and 9 is only a little less than the width of the channels 6, so that the pulp is delivered in a circular stream directly into the channels 6.

At the foot of the drum 2 are two troughs concentric to each other around the shaft 4. The trough 11 is on the inside of this drum 2, and the trough 10 is on the outside. These troughs 10 and 11 are all in a single casting and have a projecting rim 26, within which fits the sieve-drum 2, and a ring 27, so that the sieve is between the latter two parts. The ring 27 carries a screw-pin 28, which is held down by the locking-piece 29, which projects over the pin 28. The rim 26 is notched, so that the ring 27 by being turned may cause

the pin 28 to escape from said notch, and thus release the drum 2. Screws 30 hold the locking-piece 29 permanently across a part of said notch. Caution should be taken to have the notch in such a direction under the locking-piece 29 that any clogging of the pulp between the beaters 3 and the screen 2 will twist the screen in a direction opposite to that required for wholly removing the sieve-drum. Before I provided this locking device the sieve-drum 2 was occasionally lifted and displaced from its proper position by the action of the pulp. There are several such locking devices.

From the bottom of the trough 11 leads an outlet-pipe 19 horizontally and radially inward to such a distance that when it is bent down again vertically its vertical axis about coincides with the axis of the shaft 4. Accordingly there is a stuffing-box 21 on the upper side of the pipe 19 for the shaft 4. The lower end of the pipe 19 terminates in a hood 8^a, which surrounds a conical deflector 9^a, just above a conical runner 5^a for supporting radial beaters 3^a, having channels 6^a.

All the other parts having a reference-numeral followed by "a" are similar to those already described having the same reference-numerals without the letter "a."

The trough 10 is provided with an outlet-pipe 12, connecting with a pipe 14, which passes down to communicate with the pipe 24, which also joins the outlet-pipe 12^a of the trough 10^a. The trough 11^a has a final outlet-pipe 13.

The gear-wheels 15 drive the shaft 4 and are driven by the pulleys 32.

Pillars 23 have brackets 22 supporting the upper screening-machine by being located under the trough 10, while the brackets 22^a on said pillars are under the trough 10^a. The pillars 23 are on a base-plate 33.

If desired, a pipe 18 may be led into the trough 11 and 11^a for introducing water for washing out the tailings.

A valve 35 is provided in an extension of the pipe 7 for regulating the entrance of the pulp.

A pipe 20, opening into the pipe 19, is provided for adding more water to the tailings passing through the pipe 19, as otherwise they are liable to be too dry to properly re-screen.

Having described the construction, I will now set forth the operation and utility of the different parts. In the first place the paper-stock or any kind of pulp flows past the valve 35 into the pipe 7, then passes by an annular path between the deflector 9 and the hood 8, whereby the pulp is directed from an axial travel and is distributed in a circular stream to the various channels 6, which are rotating with the beaters through the action of the shaft 4, the pulp being thrown out against the screen 2 and spread thereon uniformly,

whence the pulp flows down both sides of the sieve-drum 2 into the troughs 10 and 11. The tapering channel 6 assists in effecting a uniform distribution of the pulp from the beaters 3 to the upper and lower portions of the screen 2. The screened material flows from the trough 10 through the pipe 12, the pipe 14, and the outlet-pipe 24. The tailings, which usually contain some useful paper-stock or good fiber, flow through the pipe 19 again to an axial direction and then outward radially between the deflector 9^a and the hood 8^a to the channels 6^a, and, finally, as before, to the troughs 10^a and 11^a. The tailings falling to the trough 11^a are now exhausted of good fiber and have their exit through the pipe 13, while the rescued useful pulp finds its way through the pipe 12^a, where it joins the material going out of the pipe 24.

In the single type of screening-machine there is the disadvantage existing that the tailings separated by the screening process carry with them a large amount of useful pulp or paper-stock, which must be lost or recovered by an entirely separate machine. By my invention the rotation of one shaft causes complete separation, thereby saving gearing connections, space, securing convenience, and producing a compound apparatus which may be manufactured and shipped as one article.

It is apparent that my invention may be modified in certain details without departing from the scope thereof as attended to in the claims.

I will now explain more particularly an advantage of the invention, especially with reference to the offset 20. In the first place all the pulp and paper-stock and the water connected with it go through the screens and should not be admitted to the paper-making machine except through the screens. On the paper-machine most of the water separates from the pulp, and this water is usually saved and called the "backwater." It usually contains some fiber, china-clay, size, &c., and as heretofore practiced is pumped up into a vessel placed on a higher level than the screens. From this vessel the backwater is run back to the screens in the proportion required to make the paper in question, and if there is more of this backwater than required it is run away or saved and used in some manner not connected with the screening process. Such is the usual method of operating independent of what kind of screens are employed.

By employing the connecting-pipe 19 and the offset 20 in the combination set forth it allows me to admit the backwater through the offset 20, so that I can regulate the flowage on the paper-machine. I am aware that it is old to use the backwater and the fiber it contains over again; but in my invention I admit the backwater exactly in the proper place. Without the pipe 19 the compound

screen could not be worked practically, and without the offset 20 it would not fulfil the proper requirements. The tailings from the upper screen need water to be first thinned out and then rescreened. Common fresh water would serve as well for that purpose; but paper-makers would not consent. They hold that the backwater must be used. As much as is required to secure the proper flowage in the paper-machine is admitted through the offset 20, and this amount of backwater is far in excess of what the tailings would require for thinning out and rescreening.

I claim as my invention—

1. A centrifugal sieving apparatus for paper-stock, wood-pulp, and other substances, consisting of a set of rotating beaters for receiving and discharging the material to be acted upon, a sieve-drum surrounding the beaters for receiving the material discharged from the beaters, troughs at the foot of said drum and located respectively inside and outside of the same for receiving respectively the tailings and screened portion of the material, a second set of beaters, a drum, and two troughs like the first named, a common delivery-pipe for the troughs that are for the screened material from the two drums, a pipe connecting the first-named trough for the tailings with the second-named set of beaters for feeding the tailings to these last-mentioned beaters, a discharge-pipe for the second-named trough for the tailings, a shaft for driving both sets of beaters which are rigidly connected to said shaft, and a driver for said shaft.

2. The combination of a vertical shaft, a driver therefor, an upper and lower set of beaters connected to and driven by said shaft, screens opposite the beaters for receiving any material thrown off by centrifugal action by said beaters, a pipe connection for conveying the tailings from the upper machine to the beaters of the lower machine, and a pipe for conveying the screened material from the upper machine to join the screened material from the lower machine.

3. The combination of a vertical shaft, a driver therefor, an upper and lower set of beaters connected to and driven by said shaft, screens opposite the beaters for receiving any material thrown off by centrifugal action by said beaters, a pipe connection for conveying the tailings from the upper machine to the beaters of the lower machine, a pipe for conveying the screened material from the upper machine to join the screened material from the lower machine, casings surrounding both machines, posts, and brackets on the posts supporting the respective machines.

4. The combination of a vertical shaft, a driver therefor, an upper and lower set of beaters connected to and driven by said shaft, screens opposite the beaters for receiving any

material thrown off by centrifugal action by said beaters, a pipe connection for conveying the tailings from the upper machine to the beaters of the lower machine, a pipe for conveying the screened material from the upper machine to join the screened material from the lower machine, sieve-drums for said machine, rings supporting said drums, castings having rims for holding one of said rings in each machine, and locking devices connecting said drums to said rims.

5. In a centrifugal sieving apparatus the combination of a casing having a bearing, a sieve-drum in said bearing, a pin fastened to the drum, said casting having a notch, a projection over a portion of the notch, and said pin extending into said notch.

6. In a centrifugal sieving apparatus, the combination of two castings, one directly above the other, a sieve-drum within each casing, a set of rotating beaters within each sieve-drum, for receiving the material to be acted upon and delivering the same by centrifugal action to the said sieve-drums respectively, a vertical shaft common to both sets of beaters, the said beaters being fixed upon and driven by said shaft, a frame common to and supporting both of said casings and having bearings for said shaft, an inlet in the top of the upper casing, for delivering the material to within the sieve-drum and to the upper set of beaters, a pipe for delivering the tailings from the upper sieve-drum to the beaters within the lower casing and sieve-drum, another pipe joining the first named, for supplying additional water to the tailings therein, a final outlet in the lower casing for the tailings from the lower sieve-drum, an outlet in the lower casing for the screened material, and a pipe for conveying the screened material from the upper casing and adding it to the screened material issuing from the outlet of the lower casing.

7. In a centrifugal sieving apparatus, the combination of a casing, a sieve-drum within the casing, a set of rotating beaters within the sieve-drum, a second group of elements like the above named, the two groups being located one above the other, a common shaft upon which said two sets of beaters are fixed and by which they are driven, a frame common to and supporting both said casings and having bearings for the said shaft, an initial inlet for supplying material to the upper set of beaters, a passage for conveying the tailings from the upper sieve-drum to the lower set of beaters, a final outlet for the tailings from the lower sieve-drum, means for conveying the screened material from the upper sieve-drum to join that from the lower sieve-drum, and a common delivery for the admixture of screened material from the two sieve-drums.

8. The combination of a shaft, a driver therefor, an upper and lower set of beaters

connected to and driven by said shaft, screens
opposite the beaters for receiving any mate-
rial thrown off by centrifugal action from
said beaters, a pipe for conveying the tailings
5 from the upper machine to the beaters of the
lower machine, an offset pipe from the first-
named pipe for receiving water to thin the
tailings, from the upper machine, and outlet-
pipes for the lower machine.
10 9. The combination of two screening-ma-
chines, rotating beaters for both machines, a
pipe for conveying the tailings from one ma-

chine to the beaters of the second machine,
and an offset from said pipe for receiving
water.

In testimony whereof I have hereunto
signed my name, in the presence of two sub-
scribing witnesses, this 2d day of August,
1905.

HJALMAR L. ORRMAN. [L. S.]

Witnesses:

ROBT. C. PATTERSON,
EDITH BANKER.