

No. 786,642.

PATENTED APR. 4, 1905.

K. GRUENEKLEE.  
SUGAR GRANULATOR.  
APPLICATION FILED MAR. 19, 1904.

2 SHEETS—SHEET 1.

Fig. 1.

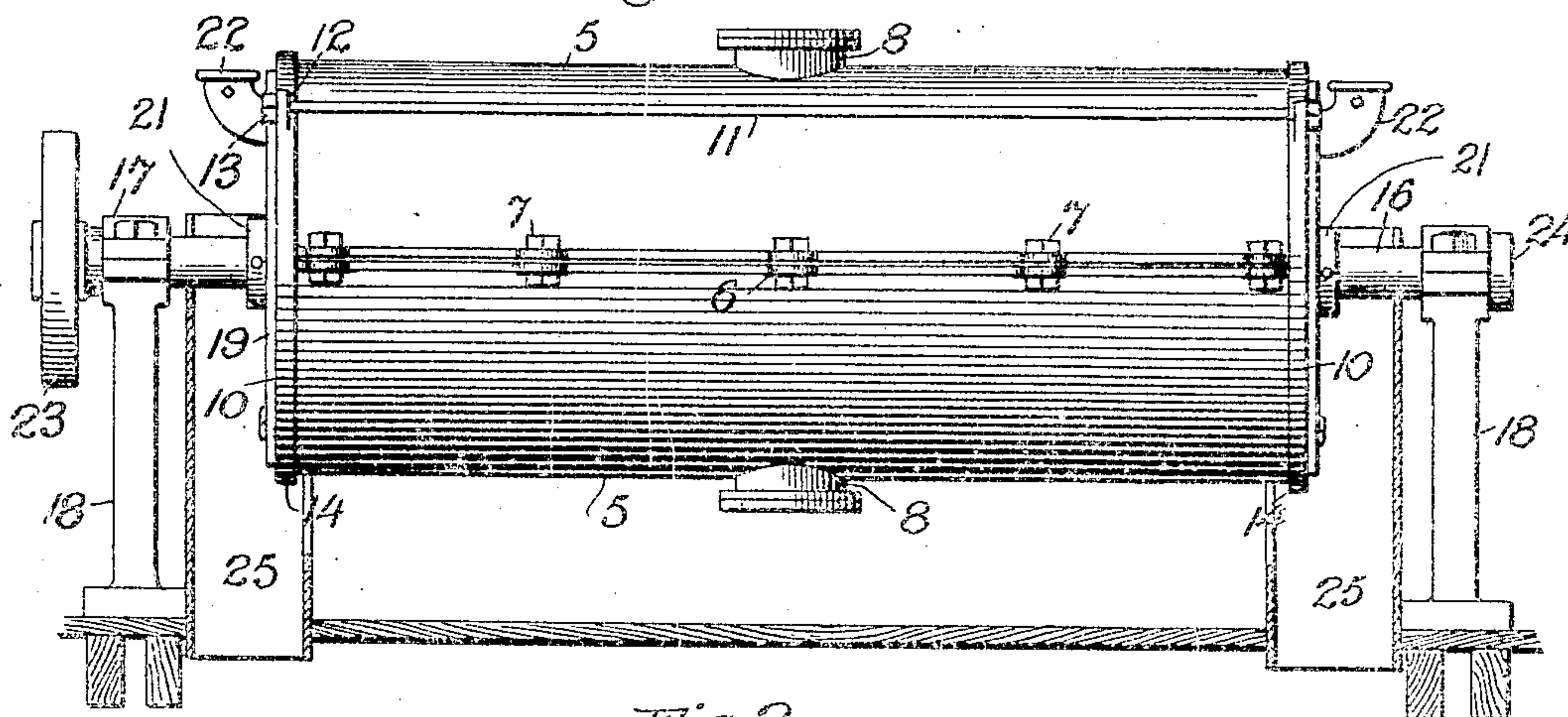


Fig. 2.

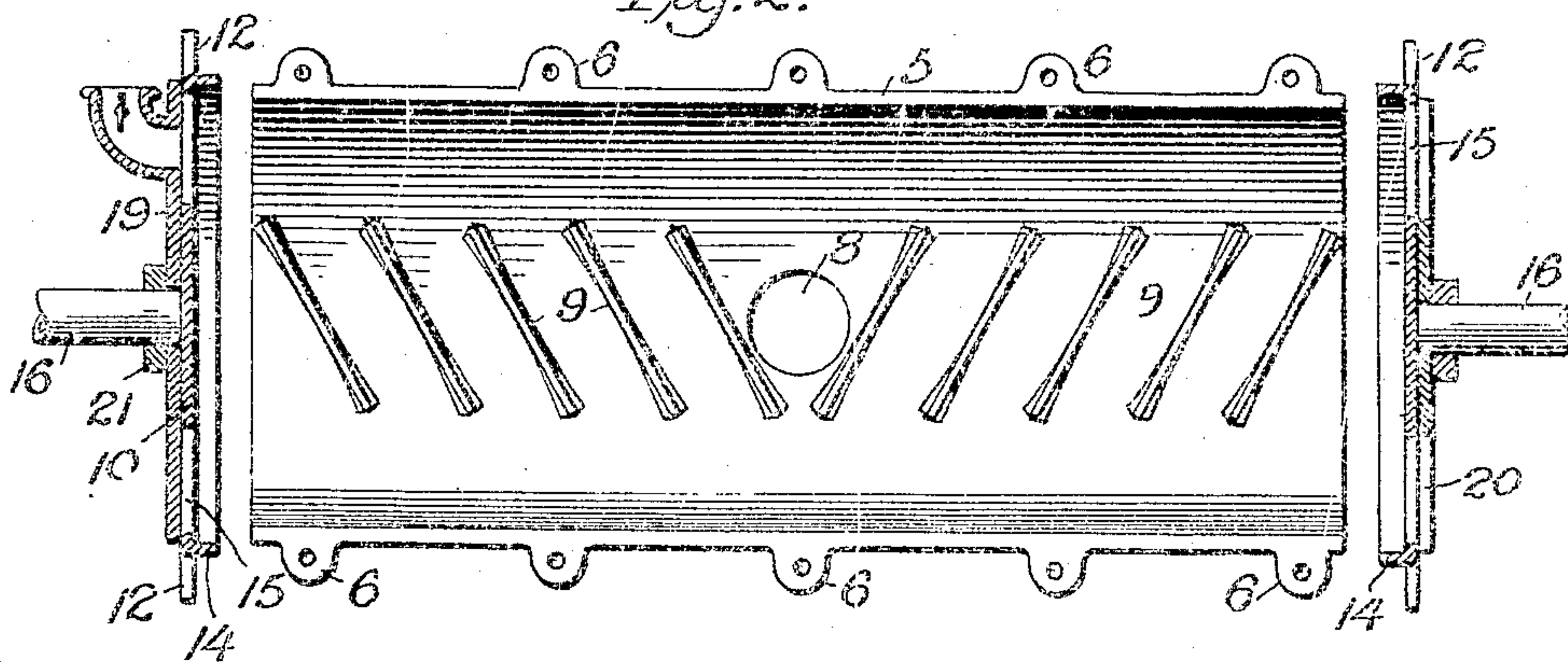


Fig. 3.

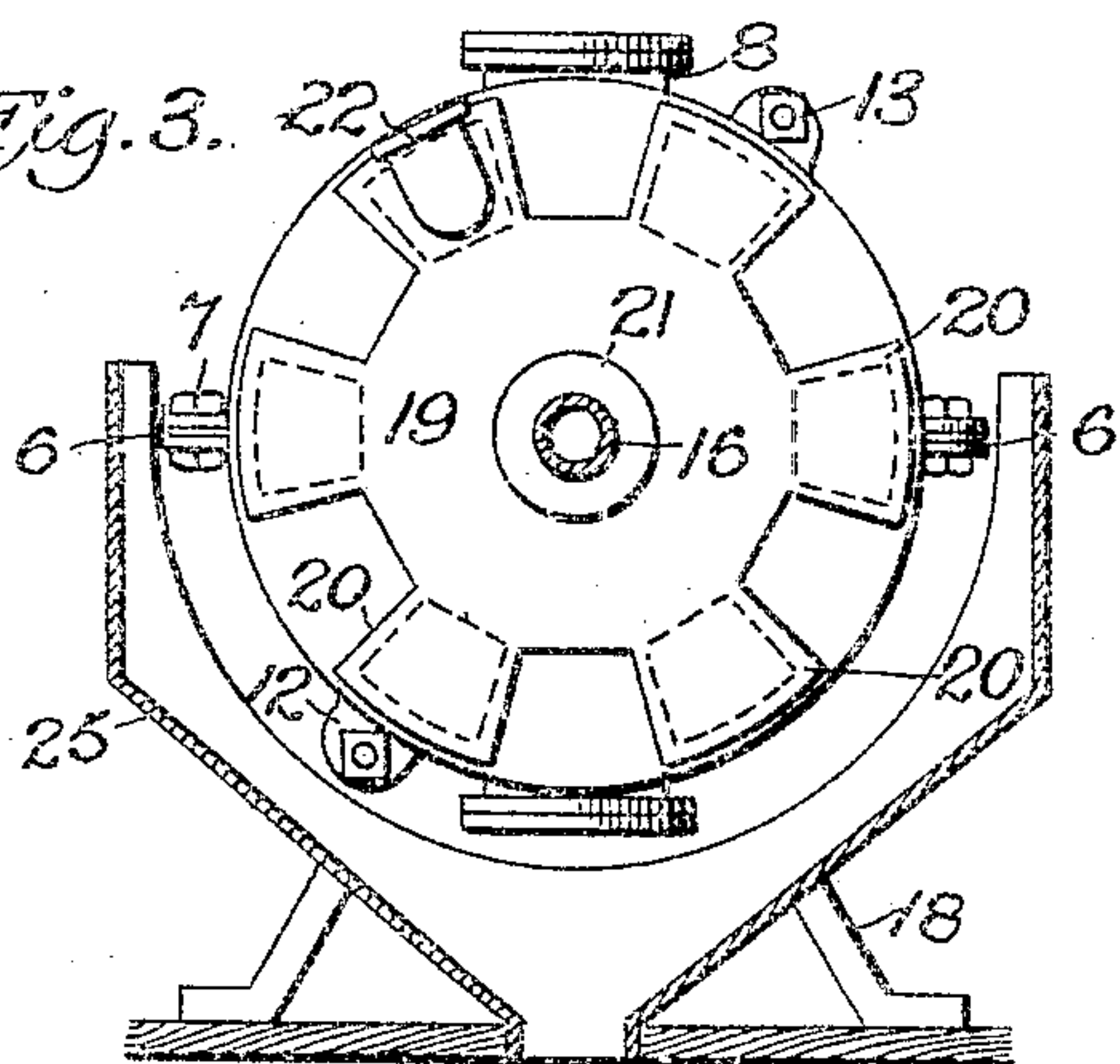
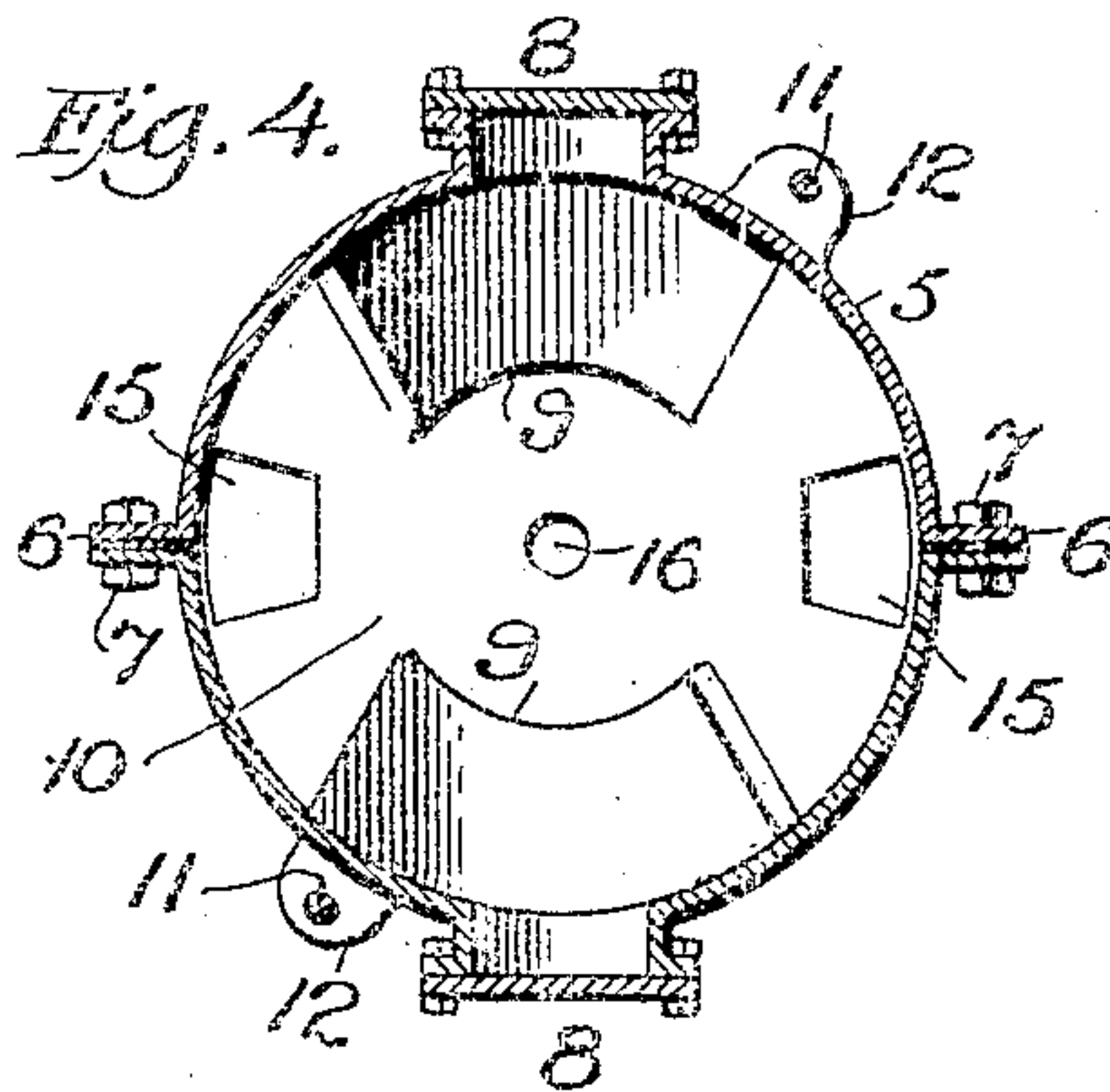


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 5.

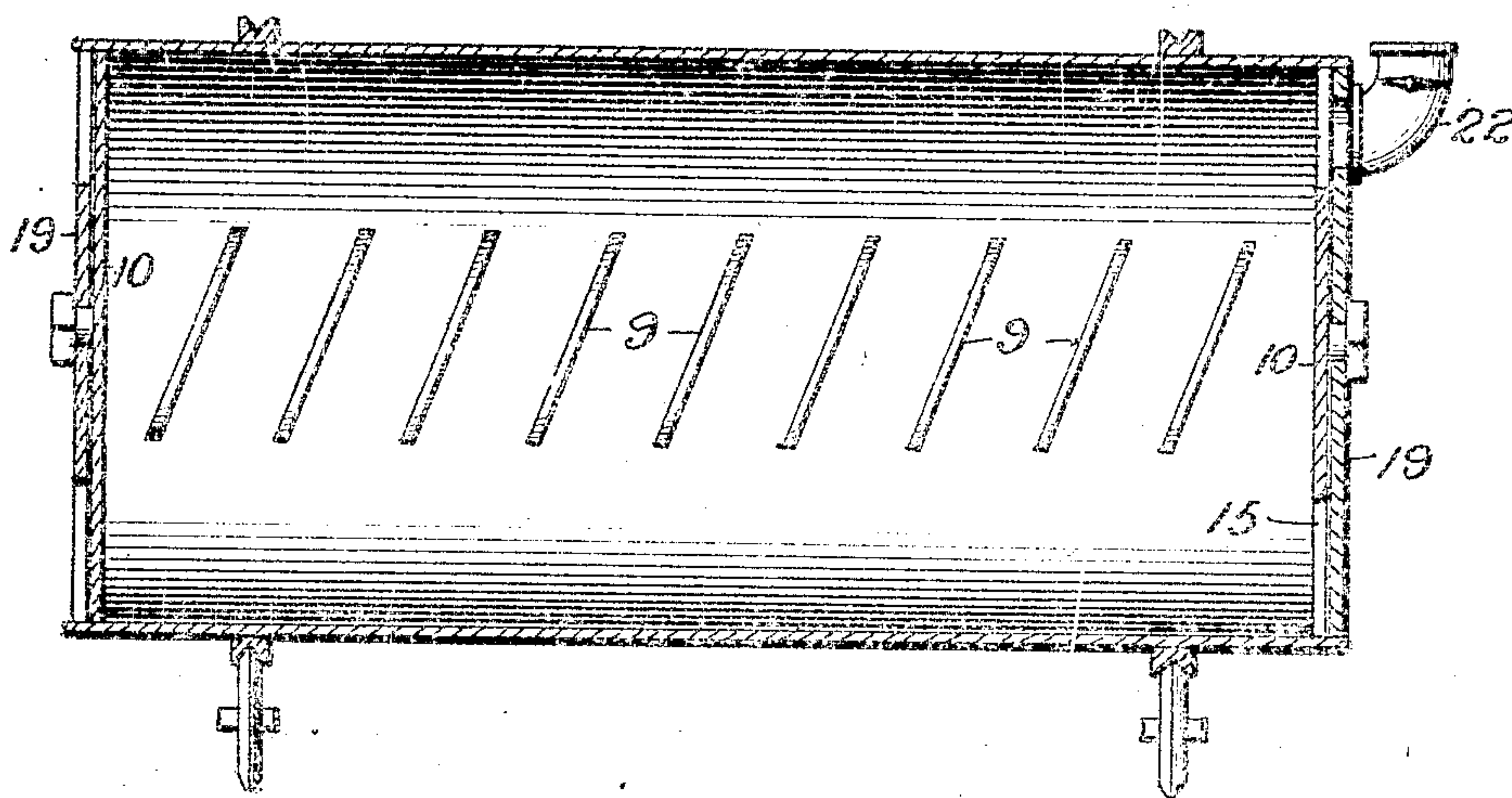
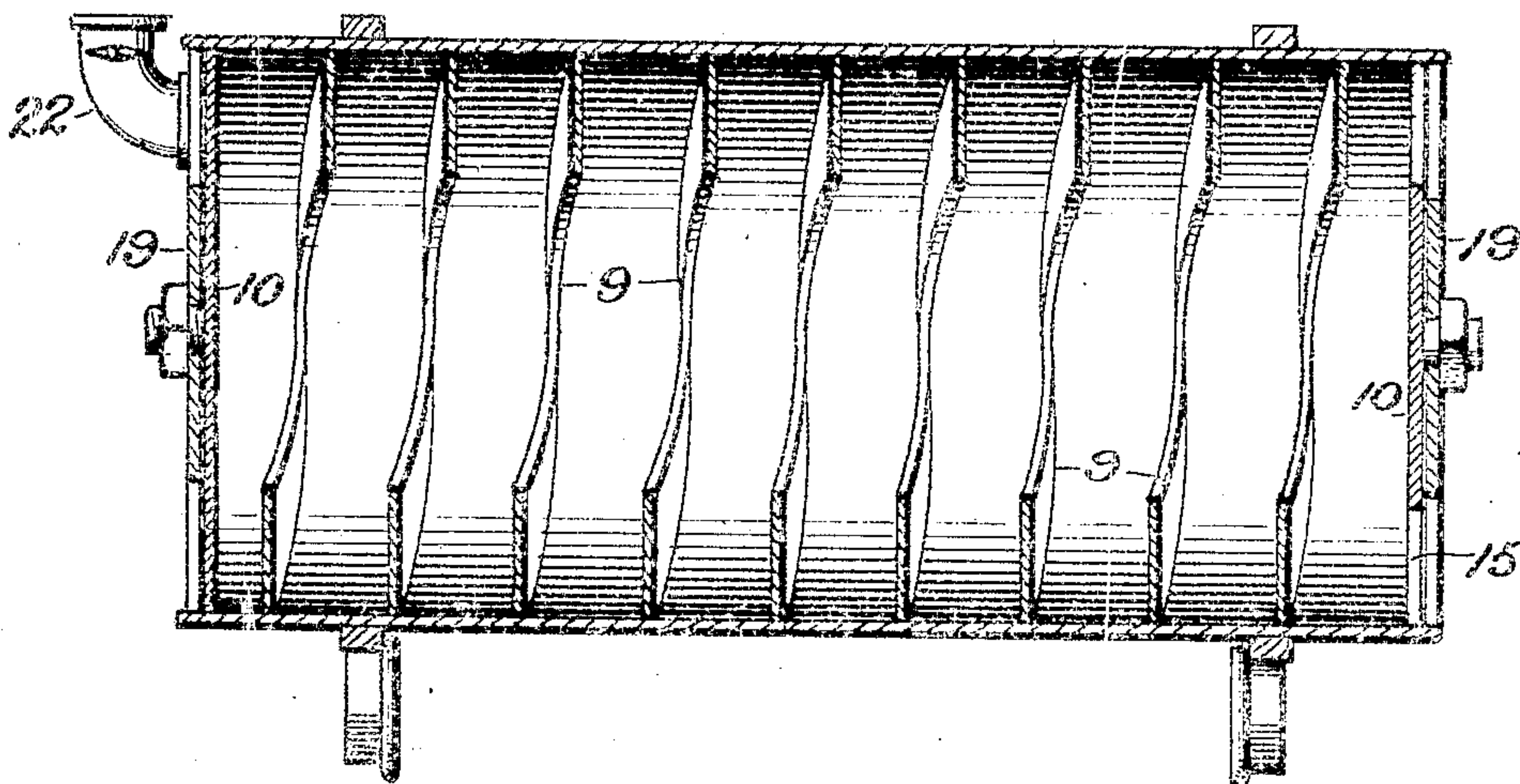


Fig. 6.



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# UNITED STATES PATENT OFFICE.

KARL GRUENEKLEE, OF NEW YORK, N. Y.

## SUGAR-GRANULATOR.

SPECIFICATION forming part of Letters Patent No. 786,642, dated April 4, 1905.

Application filed March 19, 1904. Serial No. 198,972.

*To all whom it may concern:*

Be it known that I, KARL GRUENEKLEE, a citizen of the United States, and a resident of the borough of Brooklyn, county of Kings, city and State of New York, have invented a certain new and useful Improvement in Separators and Granulators, of which the following is a specification.

My invention relates to separators and granulators used in the production of sugar or similar substances, and has for its object the rapid and effectual separation of the granular crystals of the material in the final stage of its manufacture, and to accomplish same I provide a rotating receptacle which as it revolves carries the substance under treatment toward the middle thereof, agitating it and subjecting it to cooling or heating agencies, if found necessary. After carrying the substance to its middle by suitable propelling means the rotation of the receptacle is reversed and the same propelling means returns the treated substance, now granular, to the ends of the receptacle, from which it is allowed an exit and collected. In case the material is sufficiently granulated and needs little further treatment the same may be fed into the receptacle at about its middle and fed outward toward the ends, from whence it is liberated and collected. These and other objects of my invention and the details thereof are more fully described in the following specification and more clearly pointed out in the appended claims.

In the drawings accompanying and forming a part of this specification, and in which the same reference-numerals designate similar parts in the various figures, Figure 1 is a side elevation of my invention, the discharge-hoppers being in section. Fig. 2 is a longitudinal sectional view of the same, the heads being removed from the lower half of the receptacle. Fig. 3 is an end view of the device, the discharge-hopper at that end being in section; and Fig. 4 is a cross-section of the cylinder at its middle. Figs. 5 and 6 are modified forms of my apparatus.

The apparatus consists of a cylinder, preferably made in two sections 5 5, having lugs 6 along the line of division, through which

pass bolts 7 to join the sections. Each section is identical in construction and has a manhole 8, and on its interior surface spirally-disposed flights 9, arranged on a reverse pitch at each side of the middle of the section or its manhole. Each end of the cylinder is provided with a head 10, which is drawn upon and held in place on the cylinder by the tie-rods 11 passing through ears or lugs 12 on the heads and having nuts 13 to draw them tight and cause the flanges 14 to fit closely over the ends of the cylinder. These heads 10 have openings 15 arranged at intervals around their outer edges, and each has a hollow trunnion 16 projecting from its outer face and which support the cylinder and rotate in journal-boxes 17 on the standards 18. The trunnions 16 loosely carry adjacent to the heads disks 19, having radial portions 20, which are adapted to act as doors for the openings 15 while the apparatus is in operation; but when the granulation of the material has been accomplished the disks 19 are turned on the trunnions so that the spaces between the radial portions register with the openings 15 and the cylinder so rotated as to cause the flights 9 to expel the material. Suitable clamping or locking means may be used to hold the disk in the desired relations with the heads; but ordinarily collars 21 are secured on the trunnions 16 against the disk and insure sufficient friction to retain the disk in the position to which it is set. One of the radial parts 20 carries an inlet-pipe 22 for supplying the material to be treated to the interior of the cylinder, and the pipe is closed by any desirable means. One of the trunnions 16 carries a driving-pulley 23, while the other has a collar 24, and these two retain the cylinder in its place between the standards.

The openings 15 are similar in size and equidistant, and the radial portions or doors 20 are of corresponding size and distance apart as these openings, so that any movement of the disk will cause an identical change of relationship between all the openings and all the parts 20 and open or close the openings at that end of the cylinder simultaneously.

At each end of the apparatus, within the standards 18, are arranged hoppers 25, adapted



to receive the material from the openings 15 and deliver it to any desired point. In Figs. 1 and 3 they are shown as delivering the material beneath the flooring which supports the apparatus.

The operation of my invention is as follows: The article—such as liquid sugar, salt, or similar material—is fed into the pipes 22 while the openings 15 are closed, and after a sufficient amount has been put into the cylinder the openings in the pipes are closed and the cylinder rotated in such a direction as will cause the flights to feed or convey the material to the middle of the cylinder at the same time the necessary cooling or heating means is applied to the exterior of the cylinder, and the granulating proceeds. If found advisable, an air-blast may be driven in one of the trunnions and allowed to escape through the other, quickly removing the heat or assisting the cooling. As the cylinder rotates it is obvious that the material being treated is agitated and thrown about, but continually tending toward the middle of the cylinder. This agitation not only assists in cooling the material, but also in breaking of lumps and effecting final granulation. When it is finally desired to empty the cylinder, the disk 19 is turned sufficiently to cause the parts 20 to clear the openings 15, the rotation of the pulley 23 is reversed, and the flights convey or feed the material toward the ends of the cylinder, from whence it escapes through the openings and into the hoppers 25.

There are occasions when it may not be desirable to feed the material in and out at the ends. In this case the same is fed through one of the manholes 8 and the rotation commences, causing the material to traverse the two halves of the cylinder and finally out at the ends, or it may be reversed and made to return to the manhole, through which it is then discharged.

I am aware that rotating conveyers have been used to carry materials to be treated through a stationary cylinder; but the apparatus here shown and described possess the advantage of carrying the material into the cylinder itself to be treated by the rotary action of said cylinder and elevating the material up on its sides until the lumps of the material when released fall in the path of the air-current and crush themselves on those lumps at the bottom of the cylinder, thus effecting more rapid cooling of the liquid material and complete granulation. The material is thus prevented from accumulating in any one part of the cylinder not desired and clogging the operating parts.

In constructing the cylinder of two identical halves, as shown in the drawings, I am enabled to build such an apparatus at a minimum cost and readily and cheaply replace either half which might become broken or

damaged. It is obvious that a half-cylinder with flights arranged indentically as that shown in Fig. 2 has only to be placed upon and bolted to the lower half, when the flights will be so related to each other as to effect the feeding or conveying power.

I do not limit myself to the arrangement of flights emanating from the center only, as it is evident that the results which are enumerated herein may be obtained by a continual spiral of flights throughout the length of the cylinder and the material being received at one end and fed out at the other. It may also be found desirable to arrange the wings or flights as one continuous spiral piece, like the thread of a screw, in order to afford a more positive movement of the material along the interior of the cylinder. Various other changes in the details of construction of the apparatus are possible and may be found desirable to adopt without departing from the broad idea here shown and described, and it is obvious that the support and rotation of the cylinders need not depend upon the trunnions, but the whole cylinder may be mounted on rollers and rotated by them. The arrangement of the outlets in the head may also be departed from, and any suitable closing means for the openings may be used.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A separator and granulator consisting of a cylinder adapted to rotate, and having on its interior surface spirally-arranged flights, those on each side of the middle of the cylinder being of a reverse pitch, in combination with means for rotating the cylinder.

2. In a separator and granulator the combination with a rotating cylinder having conveyer means on its inner surface, inlet means at one end of the conveyer, outlet means at the other end of the conveyer and means for rotating the cylinder.

3. In a separator and granulator, the combination with a rotating cylinder having internal conveyer means of reverse pitch on each side of its middle, of inlet or outlet means at the end of each series of conveyer means and means for rotating the cylinder.

4. In a separator and granulator, the combination with a rotating cylinder having internal spirally-disposed flights of reverse pitch on each side of the center of the cylinder, of heads with openings and doors, and having trunnions adapted to sustain and permit the rotation of the cylinder, and means for rotating the cylinder.

5. In a separator and granulator the combination with a rotating cylinder having internal flights adapted to convey the material toward the center of the cylinder and reverse the movement when the direction of rotation of the cylinder is reversed, of heads with open-



ings and doors, hollow trunnions secured to the heads and sustaining the cylinder and means for rotating the latter.

5 6. In a separator and granulator the combination with a rotating cylinder having internal flights and one or more manholes, of heads adapted to be clamped on the cylinder and having openings and follow-trunnions, means for closing the openings of each separate head simultaneously and means for rotating the cylinder.

7. In a separator and granulator the combination with a rotating cylinder having one or more manholes, spiral wings or flights within the cylinder and of reverse pitch on each side of the manholes, heads secured to the ends of the cylinder and having inlet and outlet openings, hollow trunnions on the heads communicating with the interior of the cylinder, rotating doors for the openings in the heads carried on the trunnions, standards supporting the trunnions and means for rotating the cylinder.

8. In a separator and granulator, the combination with a cylinder of two parts and having manholes and cooperating flanges, of spiral flights or conveyer-wings on the interior of the cylinder, means for securing the two parts

of the conveyer together, heads with ears or lugs and fitting over the ends of the cylinder, 30 the rods connecting the lugs, openings in the heads, hollow trunnions on the heads, disks carried by the trunnions and adapted to close the openings, inlet means connected with the disk, discharge-hoppers adjacent to the heads, 35 standards carrying the trunnions and means for rotating the disk.

9. In a separator and granulator the combination with a rotating cylinder having on its inner surface conveyer means of reverse pitch 40 on each side of the middle, inlet means, outlet means and means for rotating the cylinder.

10. In a separator and granulator the combination with a rotating cylinder having on its inner surface conveyer means of reverse pitch 45 on each side of its middle, an opening at a neutral point, openings at the ends of the cylinder, and means for rotating the cylinder.

In witness whereof I have hereunto signed my name, this 17th day of March, 1904, in the 50 presence of two subscribing witnesses.

KARL GRUENEKLEE.

Witnesses:

JOHN M. ASHTON,  
JAMES F. DUHAMEL.