H. G. KING.

ROTARY SCREEN FOR ORES AND OTHER MATERIALS.

APPLICATION FILED NOV. 15, 1907.

905,325. **Patented Dec. 1, 1908.**

5 SHEETS—SHEET 1.

Fig. 1.

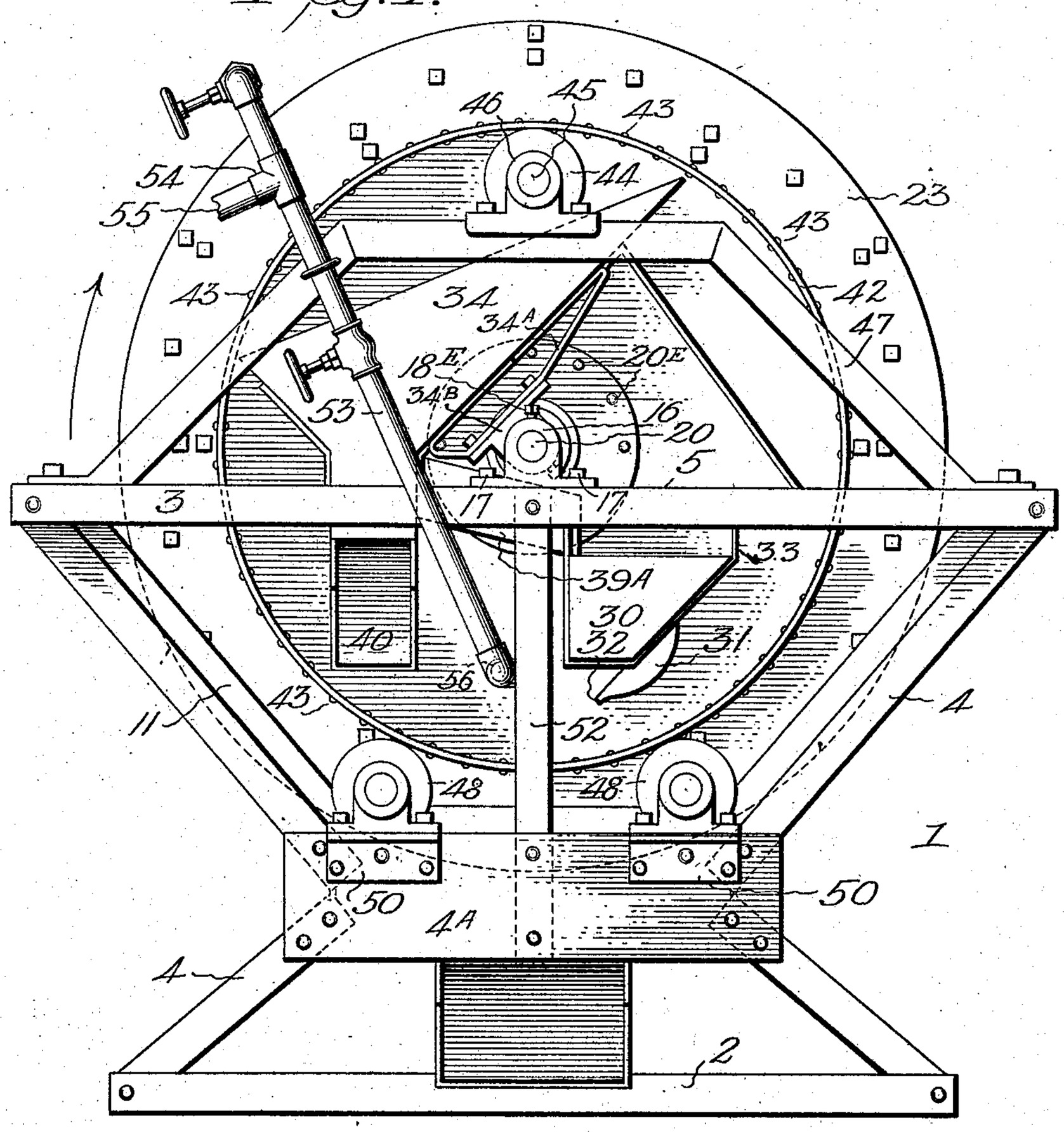
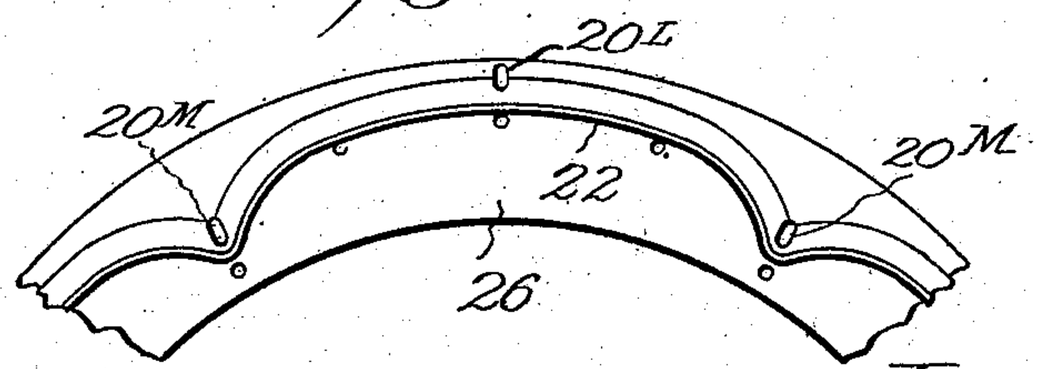


Fig. 9.



Witnesses:
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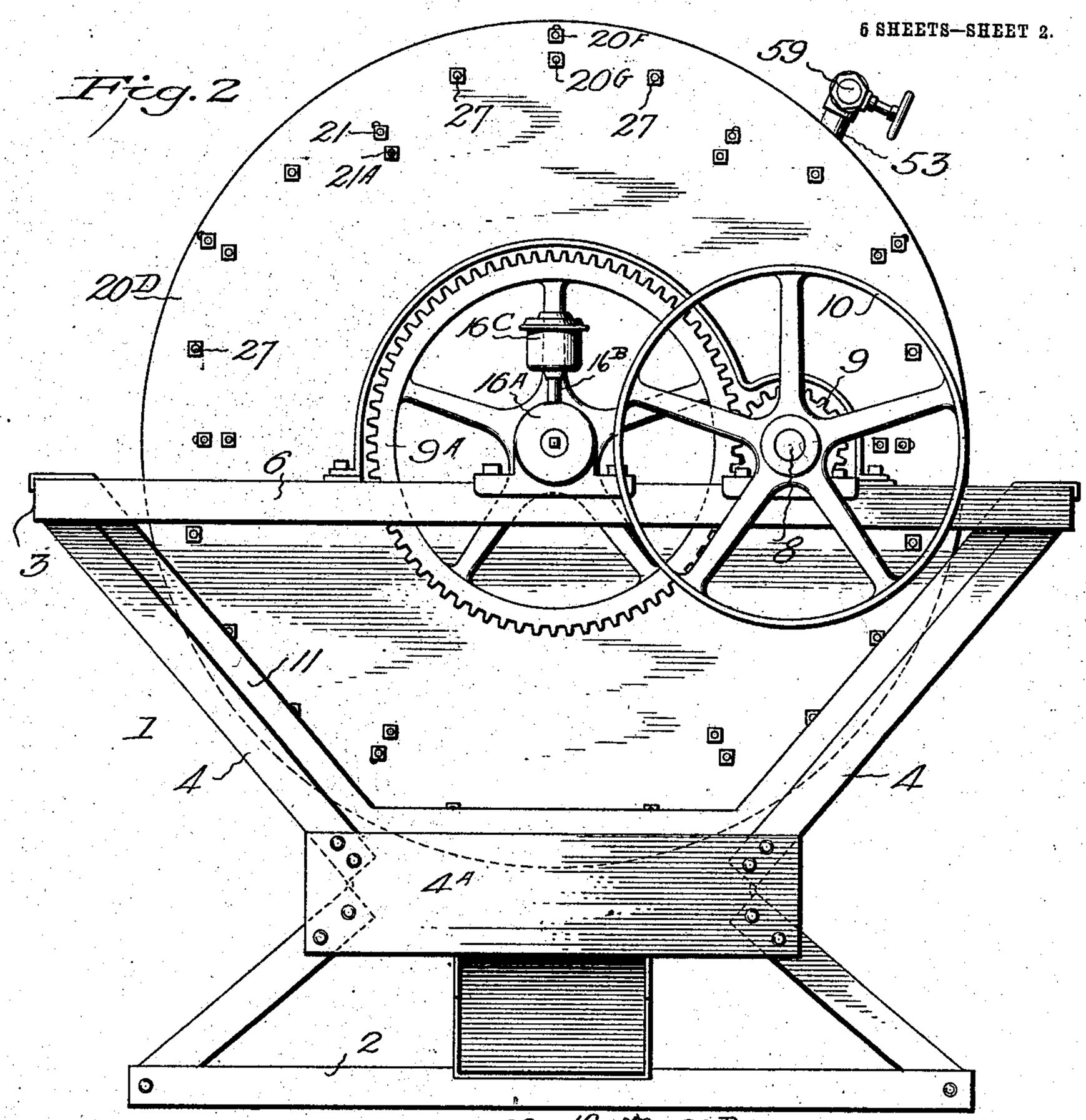
6 SHEETS—SHEET 2.

Fig. 2



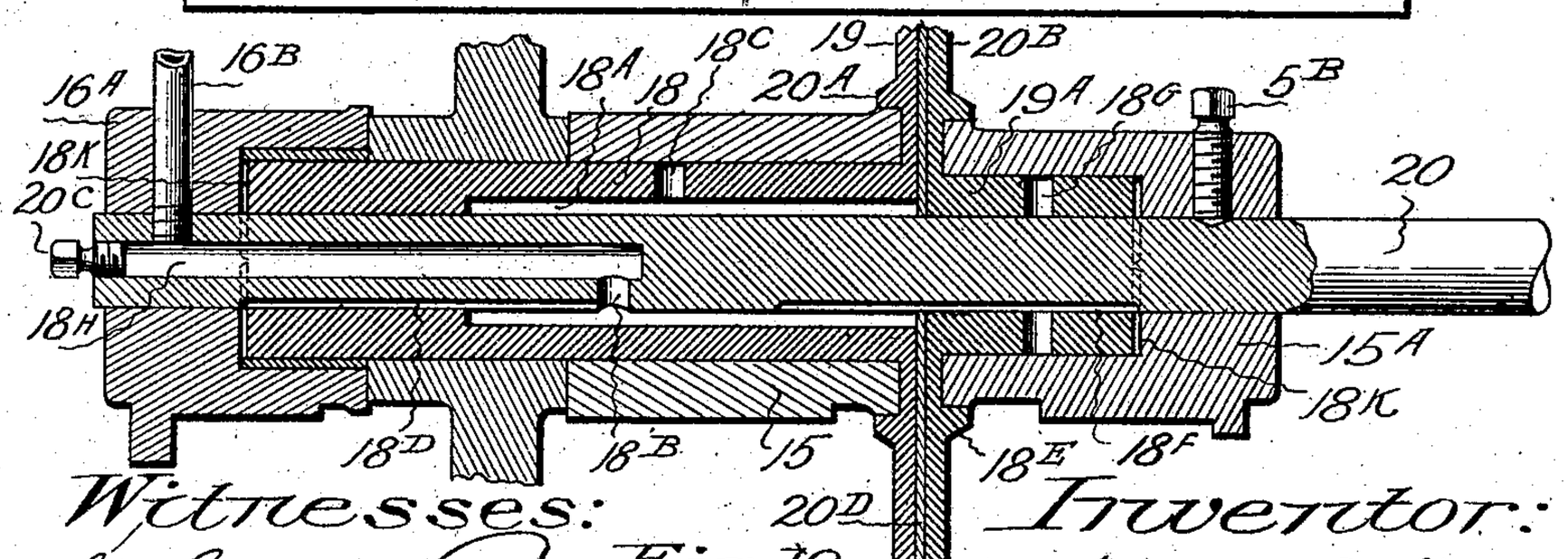


Fig. 10.

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5 SHEETS—SHEET 3.

Fig. 3.

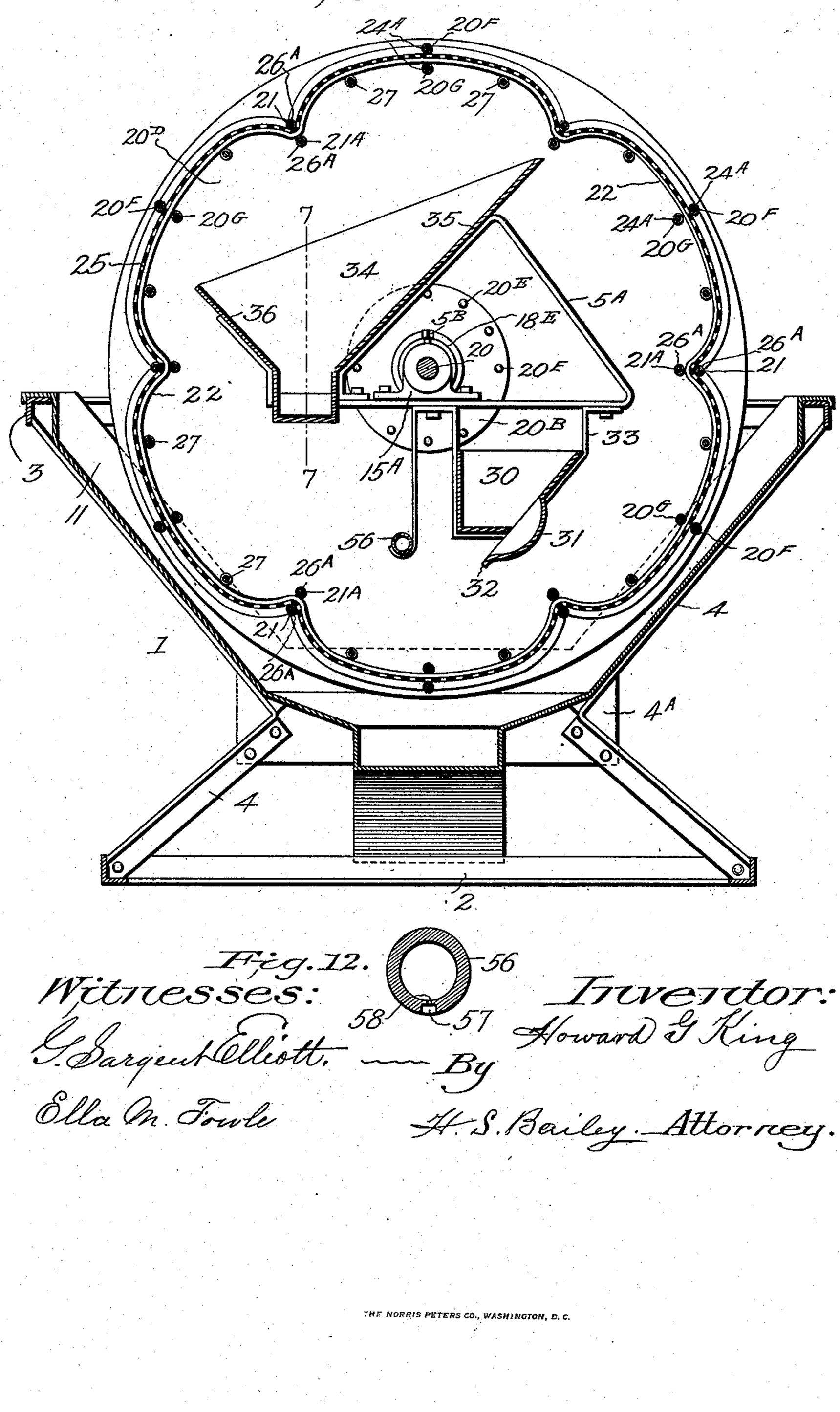

Fig. 12.

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6 SHEETS—SHEET 4.

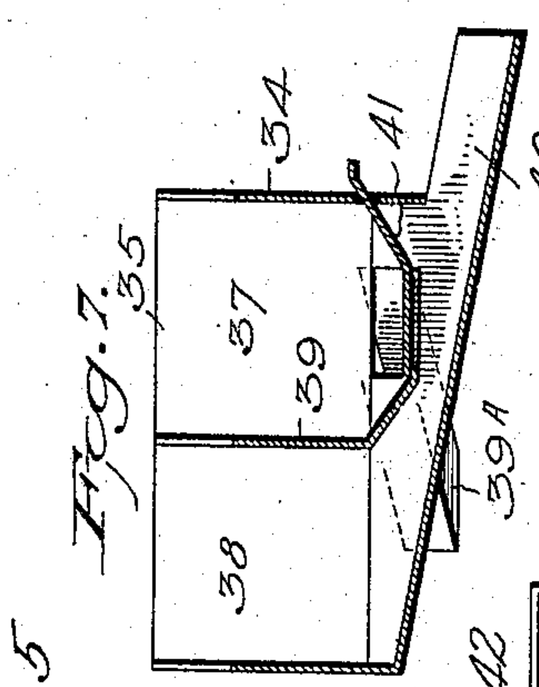

Fig. 7.

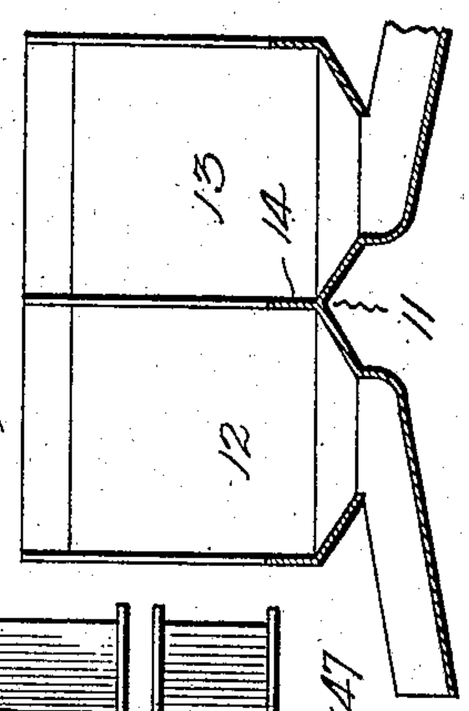

Fig. 6.

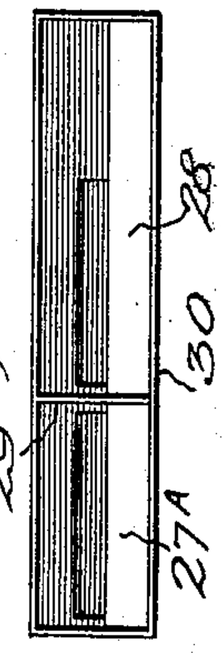

Fig. 8.

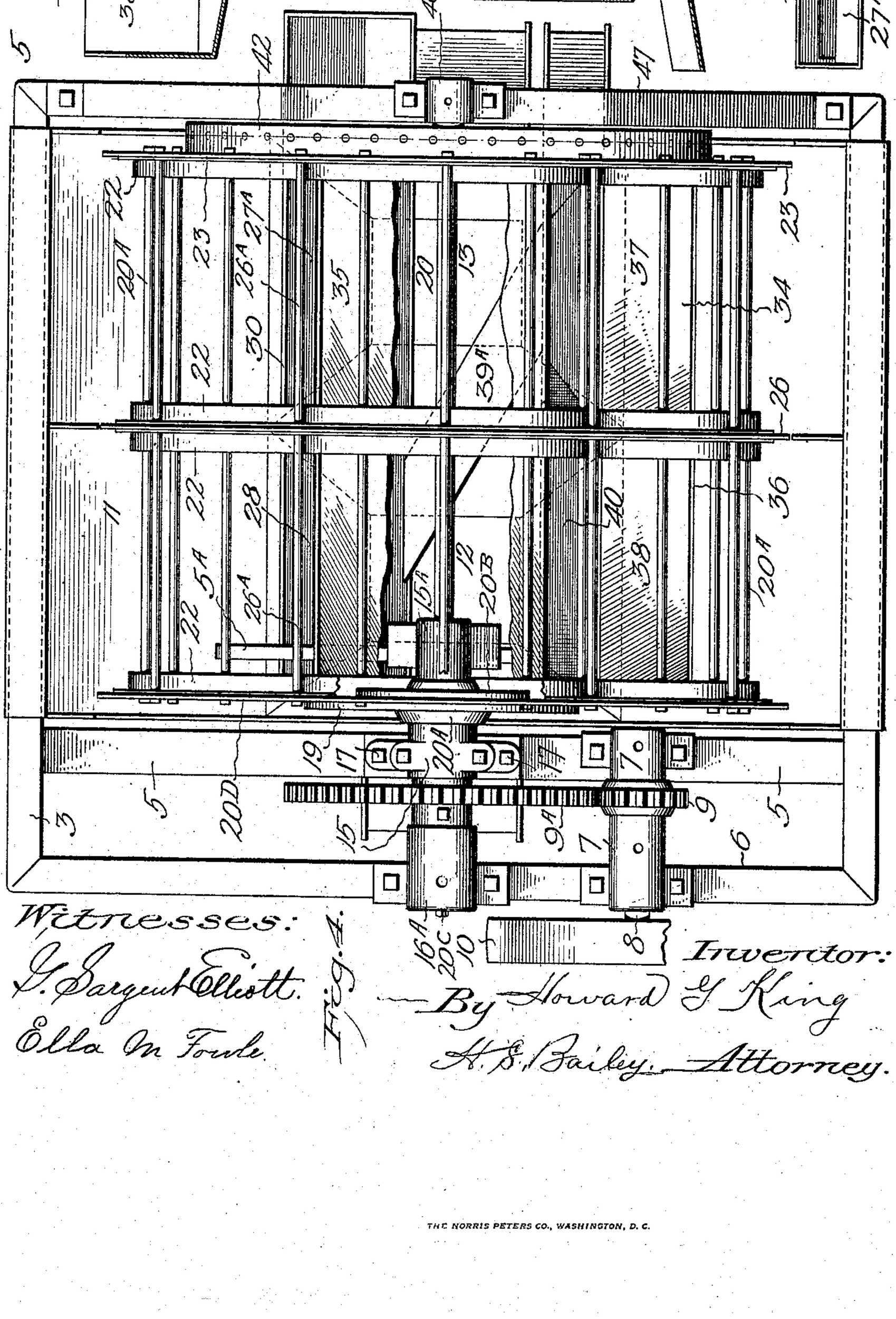

Fig. 4.

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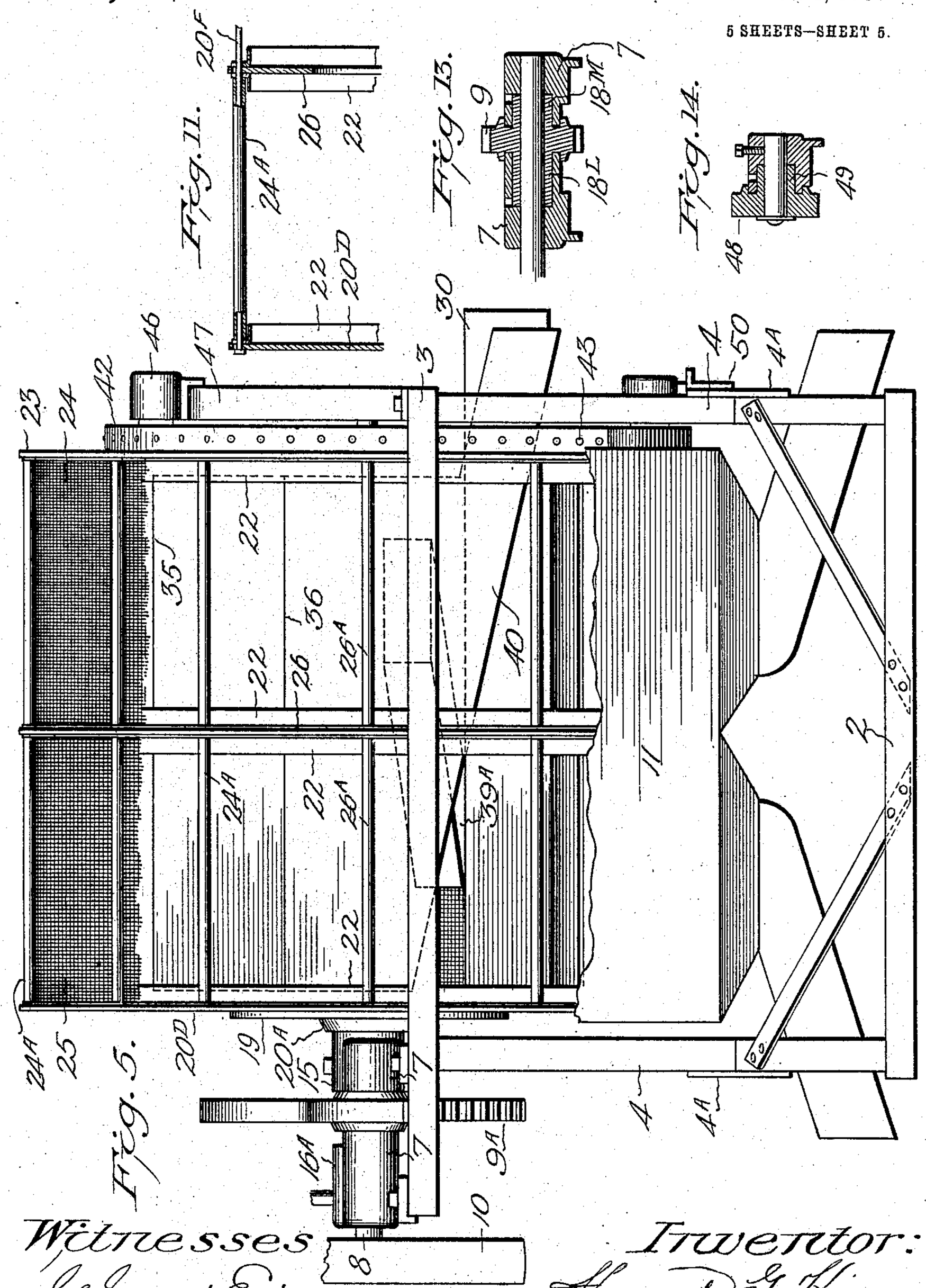
5 SHEETS—SHEET 5.



Witnesses
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Ella M. Fowle.

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UNITED STATES PATENT OFFICE.

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ROTARY SCREEN FOR ORES AND OTHER MATERIALS.

No. 905,325. Specification of Letters Patent. Patented Dec. 1, 1908.

Application filed November 15, 1907. Serial No. 402,273.

To all whom it may concern:

Be it known that I, HOWARD G. KING, a citizen of the United States of America, residing in the city and county of Denver and State of Colorado, have invented a new and useful Rotary Screen for Ores and other Materials, of which the following is a specification.

My invention relates to a new and improved rotary screen for ore and materials, and the objects of my inventions are: First, to provide a simple, continuously rotating cylindrical screen that is arranged into a plurality of semi-elliptical shaped concave screen surfaces. Second, to provide a rotating ore screening machine provided with a reciprocatory vibrating, shaking, and bumping movement. Third, to provide a rotary screen in which the over-size and the screenings are discharged from different spouts. Fourth, to provide a rotating drum-shaped screen, provided with a plurality of internally arranged semi-elliptical shaped concave screen surfaces that are adapted to receive ore upon their internal elliptical surfaces and discharge the screened product from their external surfaces, and that are arranged to carry the over-size upward and over as they move rotatably upward and over far enough to fall from the lower inner corner surface of each elliptical screen section into a hopper arranged within the cylindrical screen which is adapted to lead this over-size product to another section of the machine that is of a coarser mesh of screen, or to lead it to waste, as desired. Fifth, to provide a revolving drum-shaped screen, composed of a plurality of elliptical screen surfaces, having a rapid intermittent short vibratory reciprocal movement of its screen surfaces, and that is adapted to be used singly or in tandem side by side, to screen ore and other materials. Sixth, to provide a revolving screening machine for ore or other material, provided with a combined feeding in and over-size hopper, and that is adapted to use a continuous circumferential band of screen cloth, and to divide said screen cloth into a series of independent concave elliptical screen surfaces arranged to receive and screen ore on their internal surfaces. And seventh, to provide a simple, durable revolving screen drum type of screening machine, that does not require much floor space, is of very large capacity, and that is adapted to screen wet or dry ores or other material, and that when wet ores are screened is arranged to clean its inner screening surface and its outer discharging surface automatically. I attain these objects by the mechanism illustrated in the accompanying drawings, in which:

Figure 1, is a front elevation of my improved rotary screen. Fig. 2, is a rear elevation of the same. Fig. 3, is a transverse vertical section taken centrally through the machine. Fig. 4, is a plan view of the machine, the screen cloth being removed, and the over-size hopper being broken away to disclose parts beneath the same. Fig. 5, is a side view of the machine partly broken away. Fig. 6, is a sectional view through the outlet or discharge hopper. Fig. 7, is a sectional view through the over-size hopper, on line 7—7 of Fig. 3. Fig. 8, is a plan view of the feed hopper. Fig. 9, is an elevation of a portion of the middle ring of the drum, showing the screen supporting flange, and the circular and elongated openings through which the rods pass, which bind the heads of the drum together. Fig. 10, is a sectional view through the bearing by which the drum is revolubly supported, and a portion of the stationary shaft upon which the said bearing is mounted. Fig. 11, is a fragmental sectional view showing the manner of clamping the heads of the drum together. Fig. 12, is a transverse sectional view through the water distributing pipe. Fig. 13, is a sectional view through the pinion bearings. And Fig. 14, is a similar view through one of the tread wheel bearings.

Similar letters of reference refer to similar parts throughout the several views.

The numeral 1, designates the supporting frame of my revoluble ore screen. This frame is preferably constructed of angle and bar iron or steel, although any other suitable material may be used, if desired. This supporting frame comprises a rectangular base or foundation frame portion 2, and a top bearing frame portion 3, which is supported above the base portion by upright brace bars 4. The several pieces of angle and bar iron are riveted or otherwise secured together to form an open lattice work form of frame. The two oppositely arranged bars 4, at each end of this frame, are inclined convergingly inward to near the bottom of the frame, and are then bent divergingly outward to the outer corners of the base frame, and each pair of bars are

connected together by a plate 4^A, which is securely riveted to them. The two bars on each side of the frame, are suitably connected by brace rods, which give to the frame additional strength and rigidity. The top bearing frame 3, extends beyond the top side rails 5, far enough to form a side bar 6, and a pair of shaft boxes 7 are secured to the side rails 5 and 6, in which a shaft 8 is journaled, upon which a pinion 9 is mounted and secured. This shaft 8 I term the driving shaft, and it extends beyond the outside box, and a belt pulley 10 is secured to its outer end.

The supporting frame contains a screenings hopper 11, which is supported within the frame by bearing against the end portions, the upper end of the hopper being provided with extending portions at its ends, which lap over and rest on the end pieces of the top portion of the frame. This hopper converges from the top end portions of the frame to a narrow discharging portion, which terminates at a short distance above the floor line of the frame at the narrowest portion of the frame, and thus allows room enough between it and the bottom of the frame for one or more spouts to be placed to convey the screenings away from the hopper.

I preferably divide the hopper into two equal compartments 12 and 13, by a central partition 14. I preferably illustrate two screenings discharging spouts in the bottom of the hopper, extending from the central portion of each compartment of the hopper, and preferably extend them in opposite directions towards and slightly beyond the opposite sides of the supporting frame. Upon the central portion of each of the side rails 5 of the frame, I secure journal boxes 15 and 16, by bolts 17. The journal box 15 is adapted to receive the hub portion 18, of a flange 19, and the hub is provided with an axial bore by which it is revolubly mounted on a shaft 20, which extends through the flange and hub, and across the frame into and through the journal box 16. A circular projecting lip or hub 20^A on the flange 19, projects over and surrounds the adjacent end of the journal box 15, and acts as a dirt and dust guard for the bearing between the inside surface of the hub of the flange and the outside surface of the journal box. Upon the extended part of the frame 3, and in line with the box 15, is secured a box 16^A, having a bore of two diameters, into the larger of which the outer end of the hub 18 projects. The shaft 20, extends beyond this end of the hub, and through the smaller bore of the box 16^A.

Upon the shaft 20, a flange 20^B is mounted at the side of the flange 19, and this flange is provided with a hub portion 19^A, which extends into and rotates in a box 15^A, that is mounted on and is secured to the shaft 20. These two flanges are adapted to support between them a thin sheet iron imperforate circular disk shaped head 20^D, which is rigidly clamped between the flanges by rivets or bolts 20^E, which extend through both flanges and head and rigidly clamp the flanges to the disk. The shaft is secured to the box 16^A by an oil tube 16^B, which is screwed down through the box and into the shaft, and the box 15^A is secured upon the shaft by a set screw 5^B as shown. An oil cup 16^C is secured at the upper end of the tube 16^B. The tube 16^B is threaded into the shaft and intersects an oil-receiving chamber 18^H, which is formed in it from its adjacent end along its length to the box 15. The outer end of the boxes 15^A and 16^A, are provided with a bored portion that fits the shaft closely, while the remaining portion of each of these boxes is counterbored to fit over the hubs of the flanges, so that they will rotate within the two boxes 15^A and 16^A. A dust guard flange ring 18^E is also provided on the flange 20^B, which extends over the end of the box 15^A. Each of these shaft supporting flanges and the supporting boxes 15^A and 16^A, are thus provided with a double journal bearing for the rear drum head, which is the heaviest part of the drum, and in order to thoroughly oil the two hub bearings of the flanges, the hub 18 is counterbored to form an oil reservoir 18^A, which extends in from the rear end of the hub to a point beyond the rear end of the oil chamber 18^H in the shaft 20. An opening 18^B connects the shaft chamber 18^H with the hub reservoir 18^A, and an opening 18^C leads from the reservoir 18^A to the periphery of the hub 18 within the box 15. A groove 18^D is formed in the under side of the shaft, from the opening 18^B, to a point corresponding with the outer end of the hub 18, and a similar groove 18^F in the under side of the shaft extends from a point within the reservoir 18^A to the end of the hub 19^A of the plate 20^B, and openings 18^G extend through the said hub 19^A from its axial bearing to its periphery within the box 15^B. Thus, oil entering the shaft chamber 18^H, through the tube 16^B, passes into the reservoir 18^A through the opening 18^B, and from the reservoir is fed to the box 15, through opening 18^C, to box 16^A, through the groove 18^D, and to box 15^A, through groove 18^F and openings 18^G. The ends of the hubs 18 and 19^A, are grooved, as shown at 18^K, in order that the oil may freely work over the entire surfaces of the hubs.

The oil chamber in the shaft 20 is closed by a screw plug 20^C as shown. The two journal boxes that support the driving pinion's shaft are also made with two bores, one for the ends of the pinion shaft and the other for two hub portions 18^L and 18^M, that

are formed on opposite sides of the pinion, and each box is provided with an oil cup to oil the bearings of the hubs and of the pinion shaft. This thin disk-shaped head 20^D forms one side of the screen supporting drum of the machine, and this head varies in diameter in screening machines of different capacities, being made about three feet in diameter for a machine of a capacity of about twenty tons per day. This head forms what I term the screen-drum's supporting head, and it forms the rear side of the screen drum, and through it adjacent to its peripheral edge four circumferential rows of cross bolts 20^F, 20^G, 21, and 21^A extend, which are arranged into two pairs of bolts each, the two bolts of each pair of bolts being positioned in radial alinement with each other, and placed close to and on opposite sides of a semi-elliptical shaped narrow flange 22. The outer circumferential row of bolts 20^F, preferably consists of six bolts, which are spaced at equal distances apart in a circle concentric with the axis of the head, and at a few inches from its peripheral edge. These circular rows of bolts are adapted to support on their opposite ends a thin disk-shaped ring 23, which is provided with holes through which the ends of the bolts extend. A piece of pipe or tubing 24^A, is placed on each bolt of each pair of bolts, between the two disk heads, and the lengths of these pieces of pipe represent the width of the space between the heads of the drum and the width of the ore and other material screening screen of the drum. I find in practice that a screen eighteen inches in width gives better practical results of equal and even feed throughout its width, and the best results as to screening area and to wear, than wider screens, and I have preferably illustrated a drum wide enough to receive two independent circumferential bands of screen cloth 24 and 25, which I separate from each other by a central partition 26, which consists of a thin sheet iron disk-shaped ring that is mounted on the two pairs of bolts half-way between the heads of drums 20^D and 23, and the drums are made long enough to receive screen cloth eighteen inches in width on each side of the central partition ring 26, but of course the drums may be made wide enough to receive wider screen cloths if desired.

The ring head 23, is mounted on the ends of these bolts, and is clamped against them by nuts, which thus rigidly clamp the ring head to the disk head. The ring head and the partition ring are thus supported entirely by the supporting head through the medium of the bolts 20^F—21^A. They and the partition ring are provided with a central aperture of large enough diameter to permit an ore feeding and an ore oversize feeding hopper to be inserted and positioned within the screen drum, as will be presently described.

The circumferential row of bolts 20^G, is positioned in radial alinement with the bolts 20^F, and at a short distance from them, and are adapted to form the inner supports for the central portions of a series of semi-elliptical concave sections of screen cloth. These bolts are also preferably covered by a piece of pipe that extends over them between the heads of the drum.

The two circumferential rows of bolts 21 and 21^A are positioned in alinement with each other, and at a short distance apart sufficient to pass the screen cloth and its binding and supporting members between them; and are positioned in alternate order centrally between the bolts 20^F and 20^G, and they are positioned farther from the peripheral edge of the disk and form the supports for the terminal portion of each semi-elliptical concave section of the screen. I preferably use six semi-elliptical concave sections of screening cloth surface in the drum, although more or less may be used if desired; consequently, I use six bolts in each of the circular rows of bolts 21 and 21^A, and both of these rows of bolts are preferably covered by pipes 26^A. In addition to the bolts 20^G and 21 and 21^A, each semi-elliptical concave section of screen surface is supported in its concave position by two bolts 27, which are positioned inside of the screen cloth centrally between the bolts 20^G and 21^A on the edge of the true curve the semi-elliptical curve of the concave sections are adapted to form. These bolts 27 in addition to supporting the screen sections in their true form, prevent them from sagging inward.

Each semi-elliptical concave section of these flanges may be covered by a separate and independent piece of screen cloth of any desired mesh, if desired, and be independently keyed or otherwise secured between the bolts 21 and 21^A and 20^F and 20^G. I preferably however, use a piece of screen cloth long enough to extend entirely around the drum, threading it between and around and over the bolts, and their pipe coverings, and over the semi-elliptical flange sections, and thus form a continuous circular screen composed of a plurality of independent semi-elliptical concave screening sections, and tighten and secure the ends of the circumferential band of screen cloth at its ends, and also at the opposite ends of each semi-elliptical section of the screen cloth, in the following manner: The bolt holes 20^L and 20^M in the disk head 20^D and in the disk ring head 23 and in the partition ring 26, through which the bolts 20^F and 21 extend, are elongated or slot-shaped holes, which are each elongated in a radial line from the axial center of the drum heads towards its periph-

ery, and these elongated holes are made long enough to permit these bolts to be moved easily in them far enough to and from the surface of the narrow screen bearing flanges 22. A piece of screen cloth long enough to reach around the drum is inserted against the surface of the flanges, by first loosening the nuts of the bolts and moving them outward from the flanges, which leaves sufficient space between them and the flanges to easily insert one end of the screen under the bolts, around the drum, and one end is laid under the bolt where the two ends meet, and the other is wound around the same bolt once or twice. The nuts of all of the bolts are then tightened enough to clamp the bolts and their surrounding pipes to the heads of the drum; then the bolts are all driven down to the bottom of their oblong slots, which forces the screen against the surface of the semi-elliptical flanges and thus stretches and tightens it against the semi-elliptical shaped flanges, and gives to each screen section a true semi-elliptical shape and form, and at the same time secures it very securely to the flanges and bolts. The two ends of the screen are also tightly secured to the drum, as the screen is made long enough to allow their ends to overlap each other about an inch under some one bolt, and I preferably cut the screens large enough to allow one end to be wrapped once or twice around some one bolt and to allow the opposite end to extend under the same bolt about an inch; then when the bolt the end is wrapped on is driven down, it clamps the free end of the screen against the flange and between it and the flange, and thus prevents the end that is wound around it from unwinding, as it is also clamped between the bolt's pipe and the other end of the screen and the flange.

In order to support the screen at its edges in the true curvature of the semi-elliptical shaped segments, I secure to the inside of both of the heads, between the bolts 20^{F}, 20^{G}, 21 and 21^{A}, the concaved semi-elliptical projecting flanges 22, which are preferably formed of right angled strips of thin galvanized iron, one angle of which is riveted or otherwise secured to the sides of the heads. These concave flanges are of true semi-elliptical curvature and form, and project from the heads only far enough to form a firm resting support for the opposite side edges of the screen cloth. The screen cloth, which may be of any desired mesh, from about a half inch to about one hundred, and by means of the radially movable bolts, is very firmly mounted on the drum, and is very tightly and safely secured thereto, and in a manner that enables them to be easily and quickly removed therefrom whenever it becomes necessary to remove and replace them with new ones.

As my revolving screen receives the ore or other material and screens it on and from the inside of its internal surface through to the outside, it is necessary to provide an ore feeding and distributing hopper 30, that will feed the ore into and distribute it over the width of the screen, and also an oversize or tailings receiving and discharging hopper that will convey the oversize from the first to the second screen. Separate feeding in and oversize discharging hoppers are employed for this purpose.

The ore or other material feeding in hopper is preferably divided into two compartments 27^{A} and 28, which are so arranged that the ore is fed into the first compartment from a source of supply through a spout and it flows from this compartment into the screen and discharges from the bottom of the hopper onto the inner surfaces of the semi-elliptical screen sections and falls onto them from the hopper at right angles to the direction of movement of the bottom portion of the screen drum as it rotates; and the oversize is carried and fed upward by the upwardly rotating side of the screen drum and falls over into another hopper, which I term the oversize hopper, from which it is led into a second ore feeding compartment of the ore feeding hopper, and is fed onto the second screen, the oversize of which falls into a second compartment of the oversize hopper and flows through a spout formed in it to the front end of the screen drum, and is led to another and coarser screening machine or to waste, as desired.

The ore feeding and the oversize feeding hoppers comprise rectangular shaped boxes made preferably of thin sheet galvanized iron, or plain iron, which are made of a size in width and depth to fit loosely through the ring head on opposite sides of the drum's shaft. The ore feeding hopper is positioned below the horizontal center of the shaft and drum, and the oversize hopper is placed above it. They both are made enough longer than the length of the drum to extend through it to the rear head and to project beyond its front head far enough to receive and discharge the ore clear of the revolving drum and its supporting frame. The partition 29 dividing the ore feeding hopper into its two compartments 27^{A} and 28, is preferably made removable and is positioned in line with the partition 26 between the two screens. The inclined side of the hopper 30 terminates a short distance above its bottom, and a curved chute 31 extends from this point below and beyond the edge of the hopper bottom, and terminates in a downwardly curved lip 32. The ore feeds from the hopper bottom to the curved chute 31, and flows in a downward curve over it, and falls straight down upon and strikes the screen at right angles to the direc-

tion of the rotative movement of the drum. The bottom of the hopper thus forms a distributing shelf upon which the ore falls as it leaves the feed spout. This ore feeding hopper is supported in stirrups 33, which surround its opposite ends. The rear stirrup is bolted to the lower member of a triangular strap iron support 5^A, which is secured to the under side of the box 15^A, which is mounted on the hub portion of the inner flange 20^B of the rear head, the hub of the flange being arranged to rotate in the box, which is secured to the main shaft of the drum by a set screw 5^B, and the main shaft is rigidly secured in its boxes by set screws, as before mentioned.

The ends of the front stirrup are bolted to the front side rail 5 of the frame.

The oversize hopper 34, which is above and to one side of the feed hopper, is secured at its inner end to one side of the triangular support 5^A, while its outer end is supported by a strap iron bracket 34^A, which is bolted to a box 34^B, which is rigidly secured upon the shaft 20. This oversize hopper comprises a triangular shaped trough, which comprises a long angular back portion 35, and a front side portion 36, that is much shorter than the back. The back extends up to the top portion of the interior of the drum far enough to catch the oversize ore that is carried up by the screen as it rotates and falls down from the screen just before it reaches the screen's top portion, and guides it into the body of the hopper. This oversize hopper is also preferably divided into two compartments 37 and 38, which are separated by a partition 39. The compartment 37 is provided with a bottom portion intermediate of its top portion, and its bottom discharging spout portion, from which an oversize feed spout 39^A extends to the compartment 27^A of the feeding-in hopper, and the oversize ore from the screen 24, is fed from the compartment 27 of the feeding-in hopper onto the screen 25, which is preferably of coarser mesh than the screen 24, and the oversize of the screen 25 is carried by the upward rotative movement of the drum and falls into the compartment 38 of the oversize hopper, in the bottom of which a discharge spout 40 is formed, which extends under the bottom of the compartment 37, to and beyond its front end and beyond the front end of the supporting frame of the drum far enough to discharge the oversize from the screen 25 into another screening machine of still coarser mesh screens or into a chute that will carry it to waste.

I have described the screening action of the screen drum when two screens are used of different meshes, but I desire both screens may be of the same mesh, and the supply of ore may be fed into the first compartment 27 of the ore feeding hopper in about twice the volume or speed required for the first screen 24; then the oversize of the screen 24 and the additional volume of ore is carried up into the oversize hopper and is fed through its feed spout into the second compartment 27 of the ore feeding hopper, and is fed by it onto the second screen 25, and the oversize from this screen is carried up and discharged into the second compartment of the oversize hopper and is discharged out of the screen drum through the discharge spout of the oversize hopper. This discharge spout of each screening machine is arranged high enough to discharge into the ore feeding hopper of another machine; consequently a second screening machine can be placed at the side of the first one and the discharging oversize from the first machine can be run into the second machine, which should be provided with a coarser screening cloth than the first machine. Consequently if desired two or three or more of my rotary screening machines may be placed in tandem and one or other material may be sized or graded into several different sizes or mesh of ore.

The first compartment 37 of the oversize hopper is provided with a slide 41, which forms a removable end and bottom portion above this hopper's discharge spout, and if desired this slide can be removed and the oversize from the first screen 24, when it is carried up and drops into the compartment 37 of the oversize hopper, will fall directly into its discharge spout portion and discharge from the machine, and if the partition of the ore feeding hopper, which is preferably detachably secured by bolts or screws, be removed, the ore can feed from the supply spout along the whole length of the ore distributing shelf or bottom of this hopper, and feed directly into both of the screens 24 and 25. Consequently these hoppers can be arranged to feed ore to first one screen and then to the other or to both screens at the same time.

In order to facilitate the screening of such ores as have a tendency to clog in the meshes of the screen, I provide the screen with a slight vibratory movement at right angles to the axial center of its shaft, and as one end of the screen drum is mounted on the driving shaft, this vibratory movement is necessarily imparted to the free end of the drum. There are many ways in which a vibratory movement can be imparted to the screen drum, and my invention contemplates any means by which this may be accomplished. I preferably carry out this feature of my invention in the following manner: To the outer end of the ring-shaped head 23 of the drum, I secure a short cylindrical band 42, in any suitable manner, and this band is provided with a circumferential row of small convex projections 43, which prefer-

ably consist of rivets, the heads of which project beyond both faces of the band. These projections or rivet heads are spaced at equal distances apart around the band at preferably a few inches apart, and at the top central portion of this band a tread wheel 44 is placed, which is supported on a shaft 45, in the plane of the band, which shaft is supported in a journal box bearing 46, secured upon a bracket 47, which is bolted to the frame 3. The wheel 44 bears against the inside of the uppermost portion of this band in the path of the projections 43, and also supports the free end of the drum. In addition to this top tread wheel two additional tread wheels 48 are journaled to bear on the outside of this cylindrical band at its lower side on each side of it, and on the projections 43, and assist in supporting the weight of the free end of the drum. The tread of these wheels engages the projections, and as they pass over treads of the wheels the drum is raised, but falls as the smooth portion of the band falls back against the treads of the wheels as the projection passes over the wheel, and as the drum rotates continuously, a succession of rapid vertical vibrations are imparted to the free end of the drum, and as the opposite end of the drum is secured to the shaft these short vertical reciprocal movements practically oscillate the drum on its axle bearing on the shaft, which operates to impart a continuous series of short longitudinal vibratory shakes or bumping movements to the drum, as well as the vertical shake and bump imparted by each projection 43 as it passes over the wheel. These tread wheels are mounted in the following manner: A short shaft is journaled in a box which is secured to the supporting frame of the machine. These boxes are provided with two bores, the outer one of which fits the outer end of the shaft, to which it is secured by set screw; consequently the shaft is fixed to the box. The tread wheel is mounted on the inner end of the shaft and is retained there by any suitable means, preferably by a washer secured to the end of the shaft, against which the inside of the tread wheel bears. The outside of each tread wheel is provided with a hub portion 49, which fits revolubly in the larger bore of the box, into which it extends the greater portion of the length of the box, and the box is provided with an oil cup and nipple, which is threaded to the box in a position to oil the bore of the box and the outside of the hub of the tread wheel, from which the oil works down onto the fixed shaft and oils it and the bore of the hub, which rotates on the shaft; consequently these tread wheels have each a double bearing. The two lower boxes rest on flanges 50, which are secured to the cross plate 4^A of the end frame, and these lower boxes are provided with oblong bolt holes, which permit them to be moved and adjustably set to support the free end of the drum as desired.

In the treatment of wet ores or other material, it is necessary to apply water to the outside of the surface of the screen to wash away the screened ore or material that adheres to it. To this end, I secure between the upper side rail 5 and the side plate 4^A of the frame, a vertical strip 52, to which is secured the lower end of a water supply pipe 53, which extends at an oblique vertical angle across the open end or feed side of the frame. This water supply pipe is provided with a water inlet tee 54, from which a pipe 55 leads to a supply of water under pressure. To the lower end of the supply pipe 53, I connect an elbow, to which is connected a water distributing pipe 56, which extends into and across the screen above its lower portion. This lower distributing pipe on its outer surface is provided with a longitudinal groove 57, which extends partially through the pipe, and from which a plurality of perforations 58 extend into the pipe in position to discharge jets of water against the inner peripheral surfaces of the semi-elliptical sections of the screen as it rotates, or moves by it, and this water washes the finer ore particles through the meshes of the screen and they fall into the two compartments of the screenings hopper in the frame. The groove 57 reduces the thickness of the metal through which the perforations 58 are formed, and thereby lessens the liability of their becoming clogged, as will be understood by reference to Fig. 12. To an elbow at the opposite and upper end of the water supply pipe 53, I also connect a water distributing pipe 59, which I extend over and across the top of the screen. This pipe is also formed with a groove and water distributing perforations similar to the pipe 56, and is adapted to wash any particles of ore or other material lodged in the meshes of the screen back into the interior of the screen, and thus clean out the meshes of the screen, as the screen drum revolves by it, and as this outside water distributing pipe is positioned above that part of the screen where the material is feeding continuously into the screen, the jets of water from it wash the ore and ore sand particles that stick in the meshes of the screen back into the interior of the screens.

The opposite ends of the water distributing pipes 56 and 59 are closed by plugs. The large opening in the front end portion of the ring head of the screen drum, may be closed by a hood or shield, which may be supported in position by being secured to the top rail of the frame. I do not illustrate a hood or shield for this purpose, as it is not used for wet screening, but is useful to pre-

vent the escape of ore dust when screening dry ore. The screen drum may be rotated by any suitable means by which rotative movement may be imparted to it, but I preferably mount and secure the spur gear 9[A] to the hub 18 of the outer flange of the rear head of the drum between its supporting boxes, which meshes with the pinion 9, which is mounted on the shaft 8 that is journaled in the boxes 7 as above described, and the pinion 9 is driven by pulley 10, which may be connected by a belt to a source of rotative power.

The operation of my rotating screen is as follows: The screen is rotated in the direction of the arrow at a moderate speed, and the ore or other material is fed into the ore feeding hopper from a spout which is connected to a supply of properly crushed and pulverized ore, and flows into the ore feeding hopper onto its ore distributing shelf, along which it works, and it feeds off of the entire length of the edge of the shelf onto the discharging chute 31 from the curved lip of which it drops onto the first screen 24, onto the inner surfaces of the semi-elliptical screen sections at the bottom portion of the screen drum, striking the screen at right angles to its surface and direction of movement, and as the semi-elliptical concave screen sections travel upward the ore or other material rolls and falls over and over itself on them, and is tossed about by the vertical reciprocal vibratory shaking and bumping movement of the drum as it runs over the drum's free end supporting wheel, and the finer particles of the ore or other material which will pass through the meshes of the size of the first screen in use will pass through the screen and fall into the first compartment of the screenings hopper in the frame, and may flow out of its discharge spout in the bottom of this hopper into a launder which is arranged to allow it to flow away from the machine; while the ore or material that is fed into the screen drum that is too coarse to pass through the screen and which is called the oversize or tailings, is carried up close to the top of the drum by the concave section, which as they move upward hold the ore in them until they reach the upper portion of the drum, when it falls over into the lower end portion of each semi-elliptical screen section, and thence into the first compartment 37 of the oversize hopper, from which it flows either into the second compartment of the ore feeding hopper and is fed onto the second screen 25, which is a coarser mesh screen, and is rescreened, and the oversize is carried up into the second compartment of the oversize hopper out of the machine through its discharge chute to another screening machine, or to waste.

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

1. In a rotary screen, a suitable supporting frame, a screen supporting circular drum revolubly mounted in said frame, a circular screen surface mounted on said drum and arranged in the form of a succession of concaved semi-elliptical segments, means including bolts arranged on opposite sides of said screen and extending through said drum, the outside set of which is radially adjustable on said drum to and from said inside set for securing said concaved screen sections and said screen to said drum, and means for imparting a reciprocating vibratory shaking and bumping movement to said drum and screen.

2. In a rotary screen, a suitable supporting frame, a screen supporting cylindrical drum revolubly mounted in said frame, a plurality of cylindrical screen surfaces mounted on said drum and arranged in the form of a succession of independently operating semi-elliptical concaved screen segments, means including radially sliding bolts positioned at the ends and central of each semi-elliptical segment of screen for securing said concaved semi-elliptical screen segments and said screen to said drum.

3. In a rotary screen, the combination with a supporting frame, of a disk drum head revolubly mounted on said frame, a plurality of bolts extending from said disk head, pipes on said bolts, a ring-shaped disk drum head secured on said bolts against said pipes, a partition ring on said bolts positioned centrally between said drum head disk and said ring head and adapted to divide said drum into two screen supporting sections, a plurality of outwardly radiating concaved and semi-elliptical shaped sections of screen arranged between said drum heads and partition ring on said bolts, and extending around the two screen receiving surfaces of said drum in a circular row of successive sections, and means including concaved semi-elliptical shaped flanges on the inside surfaces of said drum heads and said partition head for supporting said outwardly radiating semi-elliptical shaped screen sections on said drum.

4. In a rotary screen, the combination of a suitable supporting frame, with a screen drum provided with a head end at one end revolubly mounted in said frame, a plurality of independent cylindrical screens comprising a continuous circle of semi-elliptical concaved screen sections, said drum and screens having an open free opposite end, a circular tread-way on the free end of said drum, and a roller or wheel revolubly mounted on said frame in bearing contact with the inner peripheral surface of said circular tread-way, and a pair of rollers journaled to bear on

the outside of the bottom portion of said tread-way, said three rollers being adapted to support the free end of the drum, means for rotating said drum, means including hoppers for operatively feeding material to and for discharging the oversize from the inner peripheral surfaces of said semi-elliptical screen sections.

5. In a rotary screen, the combination of the screen supporting drum, comprising the disk and ring shaped heads, provided with the semi-elliptical shaped projecting screen supporting flange portions, and the screen supporting and securing bolts and pipes, with the screens adapted to extend across and surround said drum between said disk and ring shaped heads, the radial bolt slots in said disk and ring heads, and the circumferential row of screen clamping bolts in said slots and their surrounding pipes.

6. In a rotary screen, the combination with a supporting frame, of journal boxes on opposite sides thereof, each of which has a bore of two diameters; a shaft mounted in the smaller bore of said boxes, means for securing said shaft in the smaller bore of said boxes against rotary movement, a circular disk-shaped head on said shaft and disks on said shaft between which said disk-shaped head is clamped, each of said disks being provided with a hub portion which projects into the larger bore of said journal boxes, and with an annular lip which extends over and around the adjacent end of each of said journal boxes, an oil chamber in said shaft provided with passages registering with the hub portions of said disks, ring-shaped heads in axial line with said circular disk-shaped head and secured thereto at a suitable distance therefrom to form a drum, a cylindrical row of semi-elliptical shaped screen supporting flanges on said drum, screen cloths mounted on said drum's semi-elliptical shaped flanges and arranged to form a plurality of independent semi-elliptical concavo-convex screen surfaces, a feeding and discharging hopper projecting within said drum and screen, and means for rotating said drum and screens.

7. In a rotary screen, a screen drum provided with a supporting disk head having a flange provided with a hub portion having an axial bore, with a journal box having a journal bearing of two diameters, in the larger of which is journaled the hub of said disk, a shaft journaled in the axial bore of said disk's hub portion and extending through the smaller bore of said journal box, an oil chamber in said shaft, an oil cup in said journal box extending to the oil chamber of said shaft, and oil passages in said shaft leading to the journal bearing between the hub portion of said drum's supporting disk and said shaft.

8. The combination of the shaft and the journal box provided with a bore of two diameters, with a flange having a hub fitting rotatably in the larger bore of said journal box, said hub being provided with an axial bore fitting rotatably on said shaft, and a cylindrical lip or flange projecting over the adjacent end of said journal box, said shaft extending into the smaller bore of said journal box, and means for oiling the bearing between said hub and the larger bore of said journal box and between said shaft and the axial bore of said hub.

9. In a rotary screen, the combination of the supporting frame and the rotary drum, with a feed hopper extending in the drum, provided with a discharging aperture at its bottom portion, a distributing shelf in said hopper adjacent to its discharging aperture, and a downwardly inclined side curved outwardly around and below said shelf and provided with a downwardly curved discharging terminating lip.

10. In a rotary screen, the combination with a drum, comprising a pair of circular heads, a ring centrally located between the heads; bolts connecting said heads, having sleeves which hold the middle ring in position, a stationary shaft extending through said drum, a frame and bearings on said frame for supporting said drum, of concavo-convex semi-elliptical screen pockets arranged around said drum upon said bolts; a feed hopper having two compartments, extending into said drum below its horizontal center line; an oversize hopper having two compartments, one of which leads without the drum; a spout connecting the other compartment with the compartment of the feed hopper farthest from the feed end, and a hopper below said drum having two separate compartments, and spouts leading from said compartments.

In testimony whereof I affix my signature in presence of two witnesses.

HOWARD G. KING.

Witnesses:
G. SARGENT ELLIOTT,
BESSIE THOMPSON.