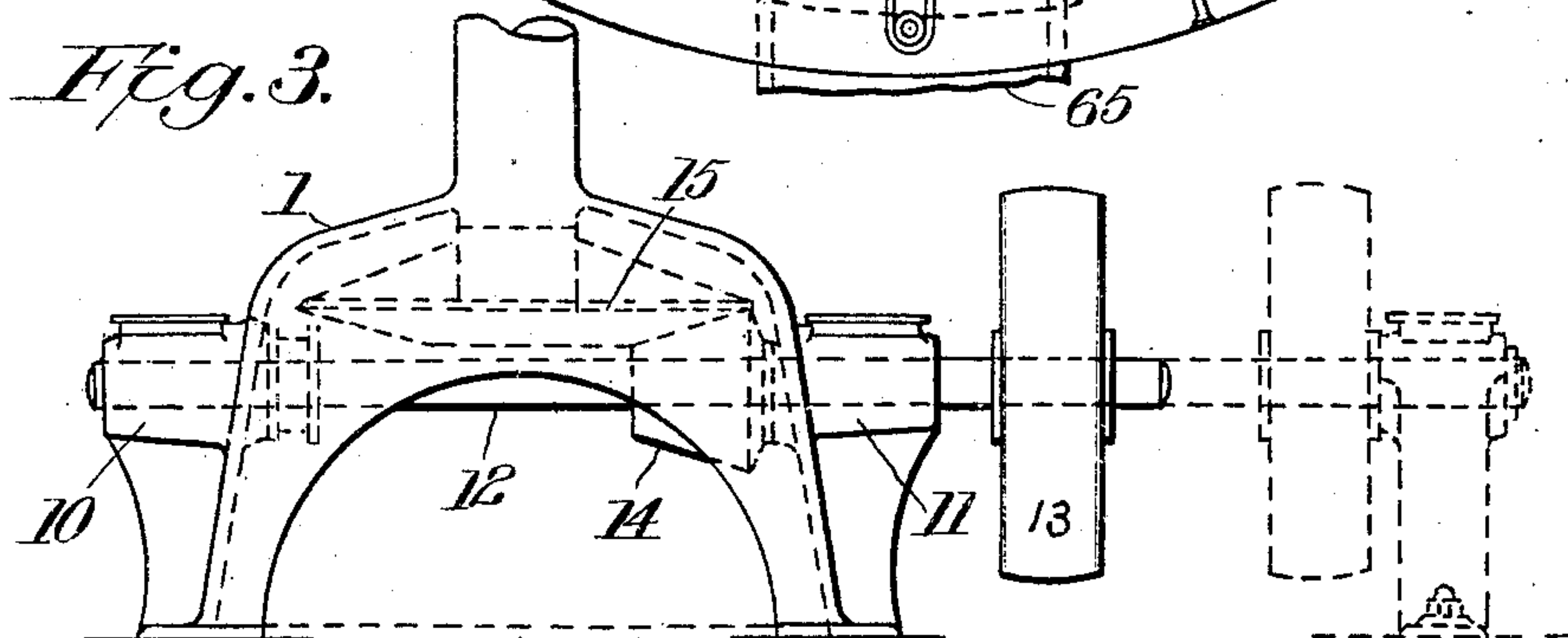
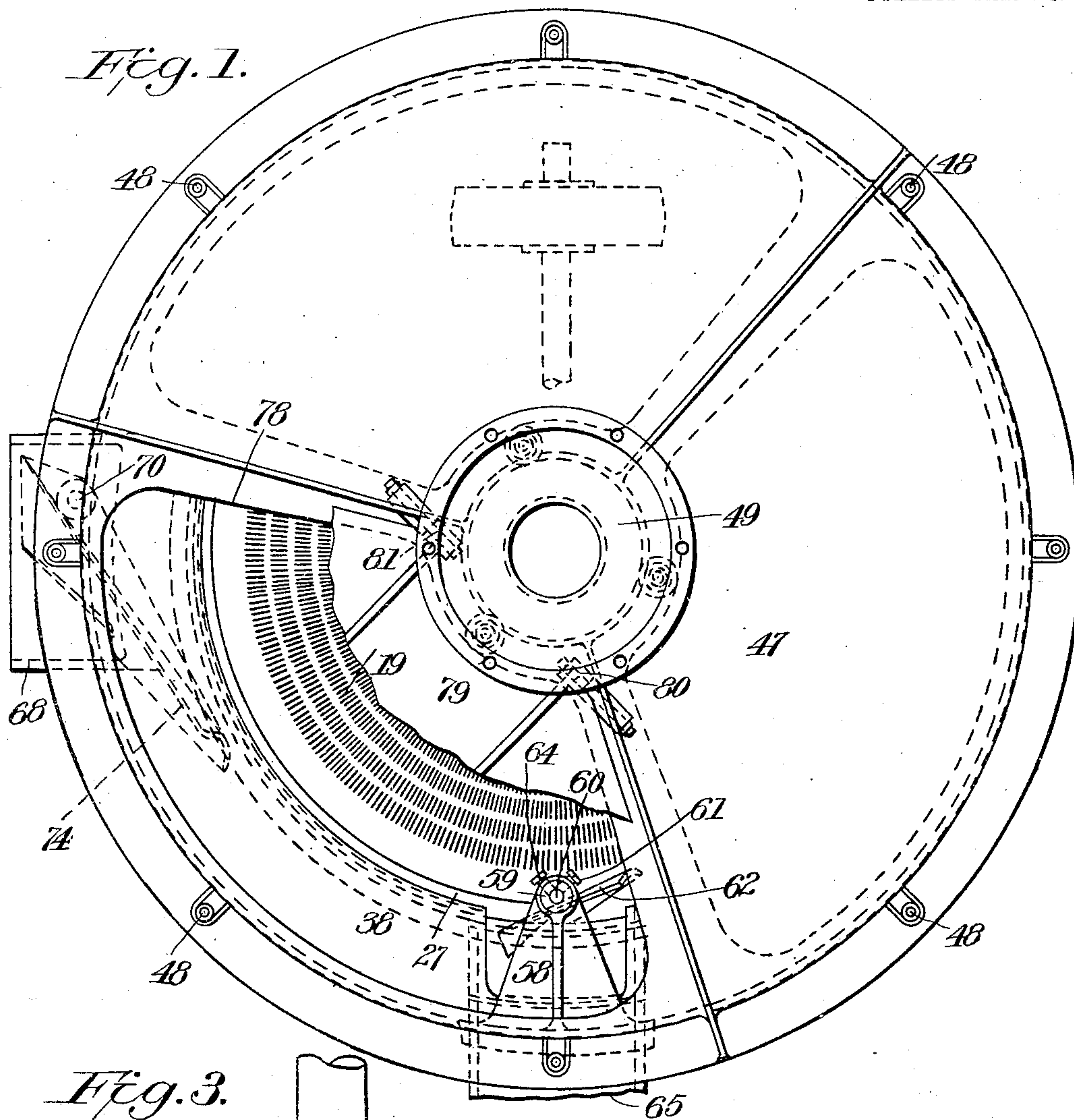


W. R. CUNNINGHAM.  
CENTRIFUGAL SCREEN.  
APPLICATION FILED AUG. 14, 1908.

931,280.

Patented Aug. 17, 1909.

2 SHEETS—SHEET 1.



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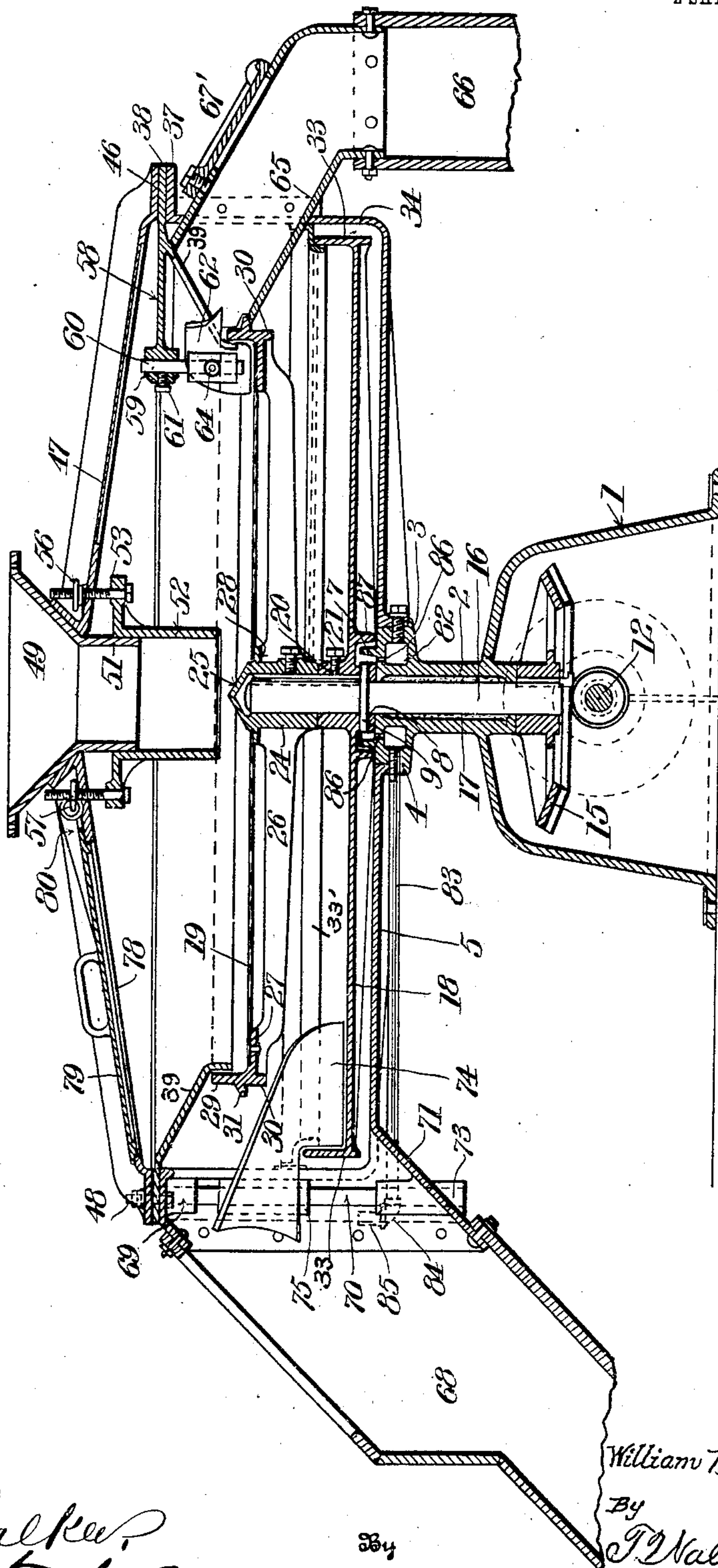
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Fig. 2.



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# UNITED STATES PATENT OFFICE.

WILLIAM R. CUNNINGHAM, OF BUCYRUS, OHIO, ASSIGNOR TO THE AMERICAN CLAY MACHINERY CO., OF BUCYRUS, OHIO, A CORPORATION.

## CENTRIFUGAL SCREEN.

No. 931,280.

Specification of Letters Patent.

Patented Aug. 17, 1909.

Application filed August 14, 1908. Serial No. 448,483.

*To all whom it may concern:*

Be it known that I, WILLIAM R. CUNNINGHAM, a citizen of the United States, residing at Bucyrus, in the county of Crawford and State of Ohio, have invented certain new and useful Improvements in Centrifugal Screens, of which the following is a specification.

My invention relates to certain new and useful improvements in screens designed particularly for the screening of clay for use in the manufacture of brick and tiles, and it has special reference to what are known as centrifugal screens.

One of the most annoying features of a brick-yard, as is well known by those engaged in the manufacture of brick, is the immense amount of dust that is deposited through the plant by reason of the use of the construction of machines now employed for the screening of the ground clay. This dust gathers upon the machinery and causes excessive wear thereof and entails extensive repair bills. It is also annoying and more or less injurious to the workmen.

An essential object of the present invention is to provide a screen that is entirely incased, making it dust-proof, and one that insures the ground material passing off of the screen only at the proper place for discharge into a delivery chute.

A further object of the invention is to save the manufacturer of clay-products, the expense of high buildings, and to provide a screen which can be placed or located in the plant where it is under the close observation of the operators.

With the above and other objects in view, the invention consists of the parts and the constructions and novel combinations of parts hereinafter fully described, illustrated in the accompanying drawing and pointed out in the claims hereto appended: it being understood that various changes in the form, proportion, size, and minor details of construction, within the scope of the claims may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawing forming part of this specification and in which similar reference characters indicate like parts in the several views:—Figure 1 is a top plan view of a centrifugal screen embodying the salient features of my invention, with a part

of the cover broken away to show the arrangements of the plows, and also the screen plates. Fig. 2 is a vertical sectional view on the line A—A of Fig. 1. Fig. 3 is a detailed view of the driving shaft and driving pulley, showing the manner or position the pulley is placed under different conditions.

In carrying out my invention I construct a suitable centrally located base-frame, 1, with an upward extension or neck-portion, 2, the upper end of which is enlarged by being formed with an upwardly extending flanged portion, 3, said portion having a circumferential flange or collar, 4, forming a seat for the lower portion of an appropriate pan or casing, 5, said pan or casing having a central hub portion adapted to fit over the upper end of the neck, 2, of the base-frame so that its under portion will rest in contact with the shoulder formed by the flange or collar, 4, it being held to the latter by suitable bolts, which pass through the hub of the casing, 5, and through the upper extension of the neck, 2, as shown in Fig. 2.

Surmounting the upper end of the neck, 2, is an upwardly-extending annular-flange, 7, which forms a chamber or reservoir adapted to hold a lubricant for lubricating the thrust-washers, 8 and 9, one of these washers being shown in section and the other in elevation, in Fig. 2.

As shown in Fig. 3, the base, 1, is constructed or formed with bearings, 10 and 11, through which bearings passes the horizontal shaft, 12, having a driving-pulley, 13, on its outer end. On the shaft, 12, inside of the bearing, 11, and suitably contained within the base, 1, is a bevel-pinion, 14, adapted to mesh with a bevel-gear, 15, suitably keyed to the lower end of a vertical central shaft, 16, said shaft passing through the neck or upper end, 2, of the base and said neck forming a bearing for the shaft and being bab-bitted or provided with a bushing or lining, 17, in which the shaft operates.

Mounted on the vertical shaft, 16, is a circular plate, 18, which is designed for the purpose of catching the screened-material after it passes through a superposed screen, 19; said plate, 18, being secured to the shaft, 16, by means of a key, 20, and set screw, 21, which latter passes through an upwardly extending hub formed at the center of the catch-plate, 18, and which receives the upper portion of the vertical shaft.



Above the catch-plate and suitably mounted on the shaft, 16, is a circular frame composed of radial arms, 26, and a flanged rim, surrounding the outer ends thereof, said circular frame being also designed with a central hub-portion 24, having an integral or rigid cap, 25, at its upper end and inclosing and preventing the entrance of grit to, the upper end of the vertical shaft. The arms, 26, of this circular frame form a part of the hub, 24, thereof and extend radially therefrom a suitable distance, and the exterior surrounding rim, 27, has a horizontal portion extending inwardly and adapted to form a seat for the outer edge of an appropriate horizontal screen-plate, 19; the upper end of the hub, 24, of the circular frame, is also provided with a horizontal flange, 28, which is designed to form a seat for the inner end or center of the screen plate, as shown in Fig. 2.

The ring, 29, at the outer end of the radial-arms, 26, of the circular frame stands vertically, that is, there is a flanged-portion which extends above the horizontal seat-portion, 27; a second flanged portion, 30, which extends below the flange, 27, is for the purpose of adding additional strength to this flange. That portion of the rim, 29, which extends above the horizontal flanged-portion, 27, is designed for the purpose of preventing the material from being carried over the edge of the screen plate and the outer edge of the circular frame by centrifugal force, thus insuring the retention of the material on the screen until it reaches the proper point of discharge, as I will hereinafter indicate. In addition to the foregoing, the annular rim, 29, is provided mid-way of its height with a horizontal flange, 31, which is designed to form a sort of apron or shelf to prevent the clay or other ground material from falling onto the underlying catch-plate, 18, without passing through the screen, said flange, 31, extending over and covering the joint between the flange, 30, and the upper portion of the delivery chute, which I will hereinafter describe.

In order that the circular catch-plate may hold the screened material against passing over the outer edge of the plate by centrifugal force, I construct said plate with an annular rim, 33, vertically-disposed and surrounding the outer edge of said plate. This circular plate, 18, with its surrounding rim is suitably contained in the lower portion of the pan or annular-casing, 5, which latter has an up-turned flange surrounding its outer edge forming a vertical wall or rim, 34, and extending around and inclosing the catch-plate, 18, and the screen frame, 26, before described, said rim of the casing serving as a housing for inclosing all the aforesaid parts so as to prevent dust from passing to the exterior of the machine.

As shown in Fig. 2, there is secured to the

inner surface of the vertical wall, 34, of the casing, 5, an annular ring 33' of substantially Z-shape in cross section, said ring having one of its flanges vertically-disposed and secured to the wall of the casing and having its central portion horizontally-disposed and extending over the top of the rim, 33, of the catch-plate and then bent down over the inner edge of said rim, this arrangement being designed to prevent the screened-material from passing over the rim, 33, and down upon the underlying catch-plate, 18.

The upper end of the rim or vertical wall of the casing, 5, is formed or provided with a horizontal, outwardly extending flange, 37, upon which rests a horizontal or flat rim or ring, 38, the inner portion of which is formed with a portion 39 which extends downwardly and inwardly at an angle to the rim and has its lower edge turned to form a vertically-disposed annular flange or rim which is concentric with and located just interior to the upper end of the vertical ring, 29, of the circular frame, 23, whereby the coarser material as it passes over the screened plate is prevented from being carried over the edge of the rim, 29, and falling onto the catch-plate, 18, below.

The cap, 25, at the top of the vertical shaft, 16, and before described, is designed to prevent the clay from entering and working around this shaft, 16, if it should have a tendency to do so.

In order that the parts described may be properly incased from above I provide a cover, 47, around the outer edge of which is formed a flat ring or flange, 46, which rests in contact with the ring 38; the cover, 47, the ring, 38, and the flange, 37, of the vertical rim or wall, 34, are secured together by bolts, 48, passing through holes, as shown.

From the foregoing description, it will be seen that the casing, 5, with its surrounding rim and the cover, 47, cooperate to form a dust-proof housing for the screen, and thus prevent the dust working from the interior screen to the outside of its inclosing casing.

As shown in Fig. 2, the material enters the machine from above and through a suitable hopper, 49, disposed vertically above the center of the screen and in line with the axis of the vertical shaft, this hopper being let into an opening formed in the center of the cover, 47. The hopper is provided with a tubular-extension 51, from its lower end, which extension is adapted to telescopically fit within the upper end of an adjustable tube, 52, vertically-disposed in line with said extension and having its lower end terminating a short distance above the upper end of the cap, 25, which surmounts the upper end of the shaft, 16. At its upper end the adjustable tube, 52, is provided with a horizontal annular-flange, 53, and through this flange and the cover, 47, extend suitable vertical bolts, said



bolts being threaded and having their outer portions above the cover provided with appropriate hand-adjusting nuts, 56 and 57, which are designed to cause the tube, 52, to be raised and lowered to regulate the size of the feed outlet at the lower end thereof and the delivery of the material upon the central portion of the screen plate, 19.

As shown at the right hand side of Fig. 2, the ring, 38, and the downwardly and inwardly inclined plate, 39, are formed rigid with a flange or rim, 58, the outer end of which extends to a point just interior to the outer rim of the screen-frame and is enlarged to provide a hub-portion, 59, adapted to receive a vertical rod or shaft, 60, having a scraper or shovel, 62, secured to its lower end by means of a set screw, 64, or other appropriate fastening-means, said shaft being adjustably held to the hub, 59, by means of a set screw, 61, whereby the shovel may be raised or lowered or set at any desired angle for the purpose of removing the coarser material after it passes over the screen-plate, 19, and lifting this material over the rim, 29, and through an opening in the inclined plate, 39, and depositing it on a suitable apron, 65, of a discharge chute, 66, and which apron is suitably secured to the rim, 34, of the pan or casing, 5. This chute, 66, is designed to receive the tailings delivered from the screen and the apron, 65, forms one of the walls of the chute, one of the other walls of said chute, being provided with a pivoted door, 67', controlling an opening through which the operator is permitted to witness the operation of this part of the screen.

To permit the upper end of the screen to be brought into operative relation with the surrounding flange, 29, of the screen frame and to properly receive the tailings delivered over this rim, the vertical flange, 34, has an opening cut in it to receive the upper end of the chute, as shown at the right-hand side of Fig. 2.

On the opposite side of the screen from the chute, 66, is a chute, 68, which forms a part of the dust-casing, 5, the surrounding flange, 34, of this casing being provided with the necessary openings to form the inlet to said chute.

I also construct the upper flange, 37, of the rim, 34, of the dust-casing, 5, with a hub, 69, as shown at the left-hand side of Fig. 2 and I pass through this hub a vertical shaft, 70, which is held in position by set-screws or other fastenings, not shown, the lower end of which shaft passes through a hub, 73, which is cast or otherwise made rigid with an annular flange, 71, which forms a part of the dust-proof casing, 5, and which acts as a bottom for the chute, 68.

Suitably mounted on the vertical shaft, 70, between the opposite hubs, 69 and 73, is a scraper or plow, 74, having a hub, 75,

through which said shaft passes, this scraper being for the purpose of removing the screened-material from the plate, 18, over the rim, 33, thereof and delivering it into the chute, 68.

It will be noticed that in Fig. 2, the chutes, 66 and 68, are shown as being on opposite sides from each other while in Fig. 1, they are arranged substantially at right angles. I show the chutes in this manner as it is evident that these chutes can be located relative to each other to suit conditions. It will also be noticed in Fig. 2 that the cover, 47, is provided with an opening 78, controlled by an appropriate door or closure, 79, and which is herein shown as held by hinges, 80 and 81, Fig. 1.

The upper end of the neck or extension, 2, of the base, 1, is provided with a chamber or cavity, 82, from which leads a pipe, 83, which extends to the outside of the rim, 34, of the casing, 5, said pipe connecting by means of an elbow, 84, with a vertical pipe, 85. The pipes, 83, and 85, are designed to connect with some suitable supply of lubricant and to lead this lubricant therefrom to the cavity, 82, from which latter the lubricant passes through suitable holes, 86, into the space between the thrust-collars, 8 and 9, and the vertical flange, 7, which surrounds the upper end of the neck or extension, 2, thereby lubricating the thrust-collars and the bearing, 17, of the vertical shaft, 16.

There is also cast to the under side of the central portion of the catch-plate, 18, a ring, 87, said ring inclosing the ring or flange, 7, and the two rings affording means to prevent the dust or fine ground-material from working in between the thrust-plates, 8 and 9, and the bearing, 17.

The general operation of the machine is substantially as follows: The clay is fed into the hopper, 50, and passing through the tube, 51, and telescoping tube, 52, it descends between the screen and the lower end of said tube, 52, which latter regulates the feeding capacity. The clay passes out onto the screen, the finer particles passing through the opening in the screen plate and falling onto the catch-plate, 18; the coarser particles pass over the screen-plate and are removed by the scraper, 62, which delivers them into the chute, 66. The fine material passing through the screen by centrifugal force is carried to the outer periphery of the catch-plate, 18, and is removed by scraper, 74, which lifts it over the rim, 33, of the plate and delivers it into the chute, 68. The screen-frame being attached to the upper end of the shaft, 16, and the plate, 18, being also attached to said shaft, and the shaft being driven by bevel-gear, 15, which is in turn driven by the bevel-pinion, 14, mounted on shaft, 12, which is in turn revolved by the pulley, 13, driven from the motive-power of



the plant, revolves said screen-plate, 19, causing it to slide under the material as it passes from the hopper onto the screen. As the finer material passes through the screen-plate and falls onto the pan or catch-plate, 18, the weight of the material in the hopper crowds the material onto the screen. The coarser material that will not pass through the screen-plate passes by centrifugal force to the outer flange or rim of the screen-plate to be removed as set forth above; the screened material is caught by the plate, 18, and by centrifugal force is moved to the outer rim thereof, so that scraper or plow, 75, can engage and remove it and deliver it to the chute 68.

From the foregoing, it will be apparent that the essential object of the invention is to provide a dust-proof casing and means to prevent the ground material from working out of the machine, except at the properly positioned chutes; also, in the provision of a telescoping-hopper whereby when the clay is delivered into the same it starts from at rest and spreads gradually over the central part of the screen, 19, until it reaches a point on the screen where the centrifugal force carries the material to the outer edge of the screen, from which point it is removed by the scraper, 62, and delivered into the chute, 66.

By the arrangement described the dust which has heretofore escaped from the existing screening machines and been allowed to deposit throughout the plant to the great damage of machinery, is prevented from escape and retained within the screening machine.

When the machine is driven from below, the driving pulley, 13, is preferably placed as shown in the full-line position in Fig. 3; when conditions are such that the machine must be driven from above, it is designed with the pulley and outer bearing as shown by dotted lines, in Fig. 3.

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

1. A centrifugal screen comprising a horizontally-revoluble screen-plate, an underlying revoluble pan or casing, said pan having a surrounding vertical flange and having a shallow depth and a diameter in excess of that of the screen plate, a stationary casing below the pan and having a surrounding vertical flange which incloses the screen plate and pan, and a cover overlying the screen plate, and fixed to said stationary casing, said cover and casing forming a dust-tight inclosure or housing for the screen plate and pan, a feed-inlet to the screen, and a stationary scraper operating over the bottom of the pan for discharging the screened material over the vertical flange of the pan.

2. A centrifugal screen comprising a horizontally-revoluble screen-plate, an under-

lying revoluble pan or casing, said pan having a surrounding vertical flange and having a shallow depth and a diameter in excess of that of the screen plate, a stationary casing below the pan and having a surrounding vertical flange which incloses the screen plate and pan, and a cover overlying the screen plate, and fixed to said stationary casing, said cover and casing forming a dust-tight inclosure or housing for the screen plate and pan, a feed-inlet to the screen, and a stationary scraper within the pan and extending over the vertical flange for discharging unscreened coarse-material over the top of said flange.

3. A centrifugal screen comprising a horizontally-revoluble screen-plate, an underlying revoluble pan or casing, said pan having a surrounding vertical flange and having a shallow depth and a diameter in excess of that of the screen plate, a stationary casing below the pan and having a surrounding vertical flange which incloses the screen plate and pan, and a cover overlying the screen plate, and fixed to said stationary casing, said cover and casing forming a dust-tight inclosure or housing for the screen plate and pan, a feed-inlet, a stationary scraper for discharging the screened material over the top of the vertical flange of the pan, and stationary scraper for discharging unscreened coarse material which is carried to the edge of the screen plate by centrifugal action.

4. In a centrifugal screen, the combination with a horizontally-revoluble screen-plate, of a revoluble pan below the same and adapted to catch the fine material passing through the screen-plate, said pan being of shallow depth and having a diameter in excess of that of the screen plate, a stationary casing having a vertically-extending rim around its outer portion and inclosing the screen-plate and pan, said screen-plate and pan having surrounding rims concentric with each other and with the rim of the stationary casing, and a cover above the screen-plate, said cover and the upper edge of the rim of the casing having coincident flanges and means by which said flanges may be fitted together, means for directing material upon the central portion of the screen plate, and a fixed scraper for directing unscreened material upwardly over the rim of the screen plate.

5. In a centrifugal screen, the combination with a horizontally-revoluble screen-plate, of a revoluble pan below the same and adapted to catch the fine material passing through the screen-plate, a stationary casing having a vertically-extending rim around its outer portion and inclosing the screen-plate and pan, and a cover above the screen-plate said cover and the upper edge of the rim of the pan having coincident flanges, and means by which said flanges may be fitted



together, means for directing material upon the central portion of the screen plate, a scraper at the outer edge of the screen-plate for directing unscreened coarse material thereover, a scraper at the outer edge of the pan for directing screened material thereover, and suitable separate discharge chutes into which the scrapers deliver the screened and unscreened material.

6. In a centrifugal screen, the combination with a horizontal screen-plate, and a revoluble pan thereunder, said screen plate and pan having surrounding vertical rims; stationary scrapers operating in the angles included between the rims of the screen plate and pan and the bottoms thereof, for directing the material upwardly over said rims, of a stationary casing of greater diameter than the pan having a circumferential vertically standing rim adapted to surround the screen-plate and pan, a cover overlying the screen-plate and supported by the rim of said casing, said cover and casing forming a dust-tight inclosure for the screen, and a feed hopper opening through the cover and directing the material to be screened onto the central portion of the screen plate.

7. In a centrifugal screen, the combination with a horizontal screen-plate having a flange or rim surrounding its outer edge, a pan underlying the screen-plate and having a surrounding rim or flange, a stationary casing below the pan and having a surrounding rim which circumferentially incloses the screen-plate and pan, a cover above the screen plate and having its outer edge supported by the upper end of the rim of the casing, said cover and casing forming a dust-tight inclosure for the screen, a feed-hopper connecting with the screen-plate, means for revolving the screen-plate and pan in unison to carry material thereover by centrifugal force, means located at the rims of the pan and screen-plate for directing the material thereover, and inclosed chutes for the discharged material.

8. In a centrifugal screen, the combination with a dust-proof inclosing housing comprising a casing and a cover removably fixed thereto, said casing having an opening in its side, and a chute having its inlet end entering said opening, of a horizontally revoluble screen-plate having a surrounding vertical rim operable adjacent to the inlet end of the chute, said rim having an annular horizontally projecting flange which overlaps the upper end of the floor or bottom of said chute, and a scraper fixed relative to the screen-plate and extending over the top edge of the vertical rim thereof and adapted to direct material passing over the screen, over said rim and into said chute.

9. In a centrifugal screen, the combination with a stationary dust-proof housing composed of a lower casing with surrounding rim, and a cover supported thereon, said rim hav-

ing openings in its sides, and suitable discharge chutes having their upper ends entering said openings, of a horizontally-revoluble screen-plate, a horizontally-revoluble pan below the same, said screen-plate and pan each having a surrounding rim operable adjacent to the inlet end of one of said chutes, and the rim of said screen-plate having a horizontally-projecting flange which overhangs the upper end of the floor of the adjacent chute, and a scraper for directing the material over the rim of the screen plate and into the adjacent chute.

10. In a centrifugal screen, the combination with a stationary and dust-proof housing composed of a lower casing with a surrounding rim, and a cover supported thereover, said rim having openings in its sides, and suitable discharge chutes having upper ends entering said openings, of a horizontally-revoluble screen-plate, a horizontally-revoluble pan below the same adapted to catch the material passing through the screen-plate, said screen-plate and pan each having a surrounding flange or rim, an angle member or flange secured to the rim of the lower casing and overhanging the upper edge of the rim of revoluble pan, to prevent the screened material passing over the rim of the pan and falling into the casing, and stationary scrapers positioned near the inlet ends of the chutes and operable over the outer portions of the revoluble screen-plate and pan, and adapted to direct material over the rims thereof into respective chutes.

11. In a centrifugal screen, the combination with a dust-proof casing closed on all sides except for a feed inlet and discharge openings, of a revoluble screen inclosed by the casing, said screen comprising a frame having radial arms, a central hub having a horizontal flange, a rim at the outer ends of the arms having vertical and horizontal portions, and a screen-plate having its outer and inner edges secured respectively to the horizontal flanged portions of the rim and hub and a vertical, revoluble shaft to which the hub of the screen-frame is fixed, said hub having a cone-shaped cap at its upper end over the end of the shaft and adapted to direct the material outwardly from the center of the screen, and a fixed scraper operable in the screen and adapted to deliver the unscreened material over said rim.

12. In a centrifugal screen, the combination with a horizontally-revoluble screen having a surrounding rim, and a dust-proof inclosure for the screen, said inclosure comprising a stationary casing having a surrounding rim, and a cover, said cover and the rim of the casing having coacting horizontal flanges, of a horizontal rim interposed between the horizontal flanges of the casing and cover and having an annular portion which extends inwardly and downwardly to-



ward the rim of the screen and has its inner edge turned downwardly over the interior of the rim thereof.

13. In a centrifugal screen, the combination with a horizontally-revoluble screen having a surrounding rim, a horizontally-revoluble pan below the screen, a dust-proof inclosure for the screen and pan, and an inclined apron member above and surrounding the screen and having its lower edge overhanging the edge of said rim and turned downwardly over the interior thereof to prevent coarse material passing over the rim of the screen into the pan below.

14. In a centrifugal screen, the combination with a horizontally-revoluble screen having a surrounding rim, a horizontally-revoluble pan below the screen, a dust-proof inclosure for the screen and pan, and an inclined apron-member above and surrounding the screen and having its lower edge overhanging the edge of said rim and turned downwardly over the interior thereof to prevent coarse material passing over the rim of the screen into the pan below, a discharge chute having its inlet end adjacent to the rim of the screen, and a scraper operable over the screen and adapted to deliver over the rim thereof and into the chute, said horizontal rim having an inward extension with a hub at the inner end, and a shaft fitted to said hub and having the scraper adjustably secured to its lower end.

15. In a centrifugal screen, the combination with a horizontally-revoluble screen, a pan below the same and revoluble therewith, and a dust-proof housing for the screen and pan and including a cover and a casing having a surrounding rim with a horizontal flange at the top, said flange having a hub and the casing having a side opening with an angular flange at the bottom thereof and having a hub, a vertical shaft mounted in said hubs, a scraper operable over the pan and having a hub portion fixed to said shaft, and a discharge chute into which the scraper delivers the screened material.

16. In a centrifugal screen, the combina-

tion with a horizontally revoluble screen and a dust-proof inclosure therefor said inclosure comprising a stationary casing with surrounding rim, and a cover supported on the casing, of a feed-hopper piercing the cover and having a tubular lower end, a tube in line with and telescopically receiving the lower end of the hopper tube, and having a flanged upper end, adjusting-means connecting with the second-named tube and operable from outside the cover for vertically adjusting the second tube relative to the surface of the screen.

17. In a centrifugal screen, the combination with a stationary dust-proof casing, a horizontally revoluble screen therein and an underlying catch-pan for screened material, of a supporting base, having a neck-extension from its end, a vertical driving-shaft mounted in said extension and to which the screen and pan are fixed, concentric annular flanges on the bottom of the pan and the upper end of the neck-extension respectively, and thrust-collars on said shaft and inclosed by the annular flange on the neck-extension, said neck-extension being enlarged at its upper end and provided with a lubricant-containing chamber and with means for directing the lubricant therefrom into the chamber which incloses the thrust-collars.

18. A centrifugal screen comprising a stationary dust-proof housing which includes a lower casing and a cover therefor, a horizontally-revoluble screen, an underlying horizontally-revoluble catch-pan of greater diameter than the screen, and a feed hopper entering the housing and discharging at the center of the screen, said hopper being formed of telescopic tubular members adjustable one relative to the other and to the receiving surface of the screen.

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

WILLIAM R. CUNNINGHAM.

Witnesses:

SAMUEL E. AUCK,

JOHN S. DE LASHMUTT.