C. W. THOMAS.

CENTRIFUGAL PULP SCREEN.

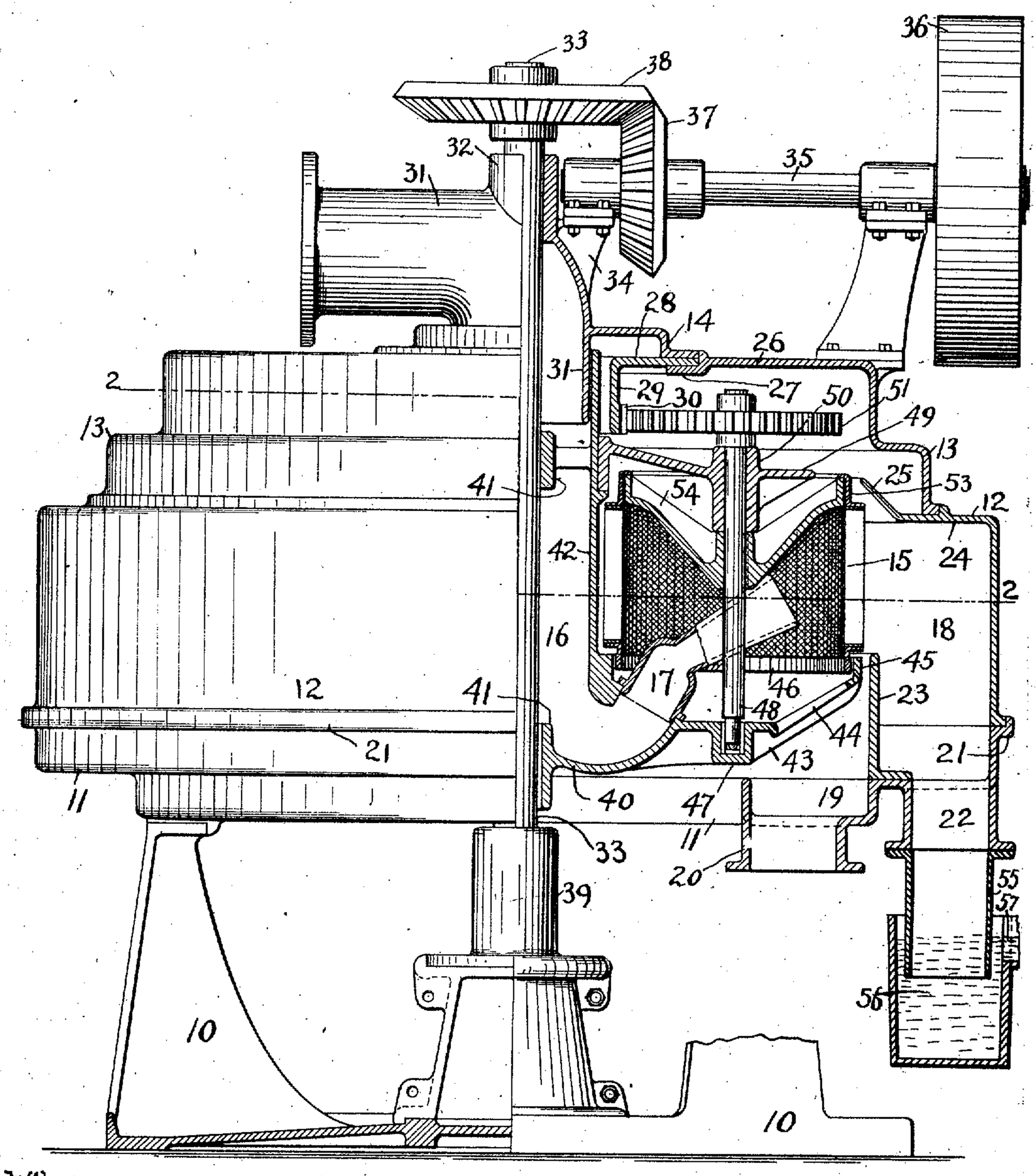
APPLICATION FILED SEPT. 3, 1909.

975,178.

Patented Nov. 8, 1910.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
Herman Gustow.
Arthur Marion.

Inventor:
Charles W. Thomas
By Chas. C. Gill
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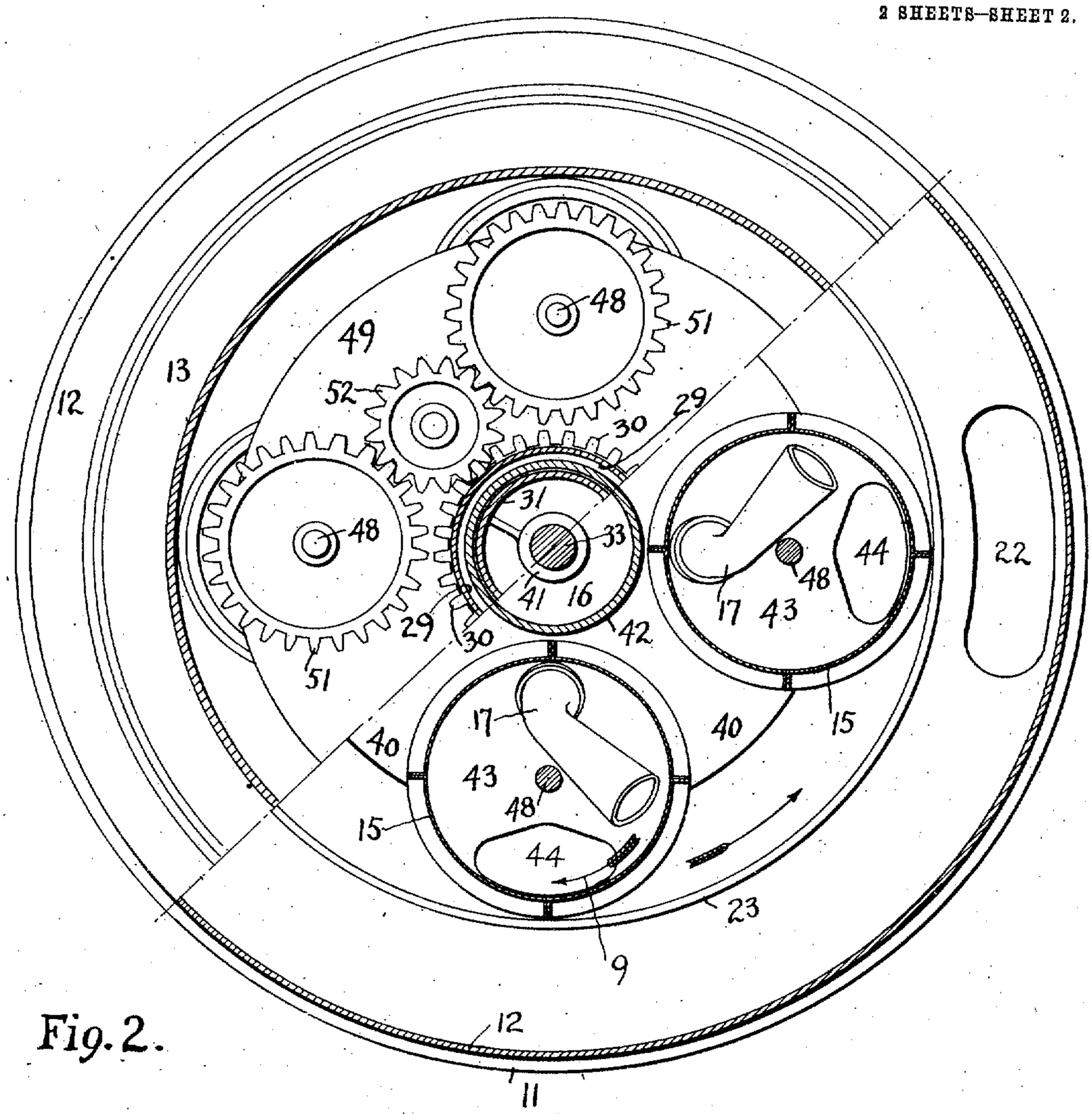

Fig. 2.

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UNITED STATES PATENT OFFICE.

CHARLES WALTER THOMAS, OF EDGEWATER, NEW JERSEY, ASSIGNOR OF ONE-HALF TO CHARLES SMITH, OF BELLEVILLE, NEW JERSEY.

CENTRIFUGAL PULP-SCREEN.

975,178 Specification of Letters Patent. **Patented Nov. 8, 1910.**

Application filed September 3, 1909. Serial No. 516,124

To all whom it may concern:

Be it known that I, CHARLES W. THOMAS, a citizen of the United States, and a resident of Edgewater, in the county of Bergen and State of New Jersey, have invented certain new and useful Improvements in Centrifugal Pulp-Screens, of which the following is a specification.

The invention relates to improvements in centrifugal screens for ground-wood pulp, sulfite, and other materials, and it consists in the novel features, arrangements, and combinations of parts hereinafter described, and particularly pointed out in the claims.

The present invention comprises improvements on machines of the class indicated in Letters Patent No. 809,642 granted January 9, 1906 to Charles W. Thomas, and its object is to produce a machine of greatly increased capacity and efficiency and of improved mechanical construction.

The invention will be fully understood from the detailed description hereinafter presented, reference being had to the accompanying drawings, in which:

Figure 1 is a side elevation, partly broken away and partly in section, of a machine embodying my invention, and Fig. 2 is a horizontal section, on the dotted line 2—2 of Fig. 1, of the same.

In the drawings, 10 designates a suitable supporting base frame for the operative parts of the machine.

I prefer to make the body of the machine of a series of castings mounted and secured one upon another, the lower one of said castings which is directly supported upon the base-frame 10 being designated by the numeral 11, the adjacent higher casting by the numeral 12, the next higher casting by the numeral 13 and the top casting by the numeral 14. These castings form the stationary inclosing shell or casing of the machine and in addition are constructed to perform certain duties hereinafter specified.

Within the casing of the machine are mounted a series of vertical cylindrical screens or baskets 15 into which the stock to be screened is delivered from a central rotary feed hopper 16 through nozzles 17 leading therefrom and into said screens and which screens or baskets in the usual operation of the machine have imparted to them a rotary motion on their own independent axes and at the same time a planetary or revolving motion around the central vertical axis of the machine in a direction reversely to that of their rotary motion. The good stock passing through the screens enters an annular chamber 18 and is conducted away, while the slivers and refuse descend through the open bottoms of the screens and enter a trough 19, whence they are conducted away by any suitable piping, not shown, connected with the discharge 20 from said trough.

The bottom casting 11 is of cylindrical or ring outline, being open at its central vertical portion, and in it is formed the trough 19. The casting 11 at its outer sides extends upwardly beyond the horizontal plane of the trough 19 and is flanged at its upper edges, as at 21, to receive the lower flanged edges of the outer sides of the casting 12. The casting 11 is formed integrally with the discharge 20 from the trough 19 and with the discharge 22 from the annular chamber 18.

The casting 12 is of annular shell formation and within its outer portions and the outer vertical portions of the casting 11 is formed the chamber 18. The casting 12 is seated on the casting 11 and is formed with an inner annular vertical partition 23 which defines the inner side of the lower portion of the chamber 18 and extends upwardly to about the horizontal plane of the lower ends of the screens or baskets 15. At its upper end the casting 12 extends inwardly on a horizontal plane, as at 24, and thence flares upwardly and inwardly, as at 25, to about the horizontal plane of the upper ends of the screens or baskets 15.

The casting 13 is seated on the upper horizontal portion 24 of the casting 12 and has a top portion 26 which is open at its vertical center and formed around the opening with a flange 27, upon which is seated a casting comprising a disk-portion 28 open at its center and a depending tubular portion 29 having gear teeth formed around its lower edge to constitute a stationary gear wheel 30.

The casting 14 is seated on the outer portions of the disk 28 and comprises an integral elbow 31 which leads to the hopper 16 and to which will be connected the piping, not shown, for directing the ground wood and water, or other materials to be treated, to the machine. The elbow 31 is formed

with a vertical bearing-sleeve 32 for the upper end of the vertical actuating shaft 33 and with a bracket 34 as a support for the bearing for the inner end of the driving shaft 35.

The shaft 35 may be driven from a belt-wheel 36 thereon, and is provided with a beveled gear-wheel 37 in mesh with a beveled gear wheel 38 on the upper end of shaft 33. The shaft 33 is driven from the shaft 35, and said shaft 33 extends downwardly through the vertical center of the machine and at its lower end is stepped in a bearing 39.

Within the general casing of the machine is a casting 40 which carries the screens or baskets 15 and is secured, at the sleeves 41, to the vertical shaft 33, which carries said casting. The central portion 42 of the casting 40 is in the form of a vertical cylinder concentric with the shaft 33 and forms the rotary hopper 16 for the material to be screened.

The casting 40 below each basket 15 is formed with a bottom cup-section 43 having at its outer portion a discharge opening 44 and along its upper edges an annular flange or shoulder 45 to snugly encompass, without binding, the vertical portion of the angular band 46 on the lower edges of the basket. The sections 43 also afford bearings 47 for the lower ends of the vertical shafts 48 to which the screens or baskets are connected. The lower ends of the screens or baskets 15 are open and the material to be treated is fed upwardly into the baskets through their open lower ends by nozzles 17 which connect with the hopper 16 and are carried by the casting 40. The nozzles 17 incline upwardly and outwardly from the lower end of the hopper 16 for a suitable distance and then turn laterally and upwardly and outwardly along one side of the shafts 48 and terminate in reasonably close relation to the inner face of the screens. I also preferably form the nozzles 17 with discharge portions of gradually increasing cross-section so as to spread the discharging material over a reasonably large area of the screens. The nozzles 17 incline upwardly, and this is a feature of advantage since by reason thereof the material will be discharged upwardly against the screens and have a more extended travel over the same than would be the case if the material were projected on a direct horizontal line against the screens. When the screens 15 are arranged to rotate to the left as indicated by the arrow 9 in Fig. 2, the nozzles 17 should extend to the right of the shafts 48, otherwise said nozzles would deliver the stock at points on the screens which had passed beyond the field of greatest centrifugal action.

Upon the central tubular portion 42 of the casting 40 is secured a plate 49 which affords vertical tubular bearings 50 for the upper portions of the shafts 48. Upon the upper ends of the shafts 48 are secured the gear-wheels 51 in mesh with idlers 52 which are carried by the plate 49 and engage the stationary gear wheel 30. During the rotation of the casting 40 carrying the baskets or screens 15, the idlers 52 are carried against the stationary gear wheel 30 and thereby caused to rotate and impart rotary movement to the gear wheels 51, shafts 48 and baskets or screens 15, with the result that while the baskets or screens are revolving around the axis of the shaft 33 they have imparted to them rotary movement on their own axes in a direction reversely to that of their planetary movement. I prefer to so time the parts of the machine that with each planetary movement or revolution of the screens or baskets 15, said screens or baskets will have one rotation on their own axes.

The baskets or screens 15 are preferably formed of perforated sheet metal and sustained and strengthened at their lower and upper ends by the angle-iron encompassing bands 46, 53, respectively. Within the upper end of each basket or screen is secured a cover-plate 54, which is preferably in the form of a casting of inverted cone shape, the apex of the cone extending downwardly into the basket or screen and being formed with a tubular opening to receive the shaft 48. I close the upper ends of the baskets or screens 15 to prevent the unscreened or undesirable stock or slivers from working up over the sides of the screens and passing into the chamber 18 for screened stock. In my aforesaid Letters Patent 809,642 the tops of the baskets are partly closed, while in the present instance the baskets are wholly closed at their upper ends. The inverted cone-shape of the cover plates 54 enables the bearings 50 to extend downwardly a considerable distance along the shafts 48 and effectually maintain said shafts against centrifugal action tending to force them outwardly. The lower ends of the shafts 48 are held in the bearings 47, and the lower ends of the baskets are within the annular flanges or shoulders 45 which materially aid in resisting centrifugal action tending to force the baskets outwardly. The arrangement of the casting 40 and plate 49 enables me to very effectually secure the baskets and to place the gear wheels 51, 52 above the baskets instead of below them.

In the use of the machine for screening, for example ground wood, power is applied to the shaft 35 and the stock (ground wood and water) is fed through the elbow 31 to the hopper 16 and nozzles 17, which direct the same upwardly against the inner surface of the screens 15, the latter at the same time being in rotation and also carried on a path around the central axis of the machine.

The stock which passes through the side of the screens or baskets and is thereby relieved of slivers and the like, enters the annular chamber 18 and thence escapes or is led away through the discharge 22. The stock which fails to pass through the sides of the screens descends through the open lower ends of the screens and enters the cup-sections 43, whence it escapes through the openings 44 in said sections and descends into the annular trough 19 and finally passes through the discharge 20. The rotary and planetary movements of the baskets or screens 15 are the same as the movements described for the baskets or screens in my aforesaid Letters Patent and therefore require no further detailed description.

The present invention comprises a new construction of machine employing the rotary and revolving baskets or screens whereby greater durability, convenience, efficiency and capacity are attained. A further novel feature of the present machine resides in connecting to the discharge 22 a pipe 55 whose lower end enters a receptacle 56 which receives the screened stock and from which said stock flows away through a pipe 57, which is above the level of the lower end of the pipe 55. The screened stock forms a seal within the receptacle 56 for the lower end of the pipe 55, and the purpose of this seal is to deaden, as far as possible, the air within the main chamber of the machine, so that there may be as little interference as possible from air currents and eddies, to the passage of the stock through the screens, and also so that the casting 40 and parts carried by it may during their movement be enabled to travel in a dead air-chamber or a chamber in which the air will simply be churned up by said parts during their movement. When the casting 40 and parts carried by it move in a dead air-chamber much less power is required to rotate them, their movement is smoother and there is less wearing on the machine and the screens with less air interference are enabled to screen the stock with greater efficiency and capacity. The sealing of the pipe 55 prevents the creation of strong air currents within and through the main chamber of the machine, the air ordinarily heretofore having been driven with great force into the discharge for screened stock as an outlet.

What I claim as my invention and desire to secure by Letters Patent, is:

1. In a centrifugal screening machine, a central vertical shaft, a series of individual vertical cylindrical screens mounted upon and revoluble on the axis of said shaft, vertical shafts extending through the individual screens and connected therewith, gear wheels on the upper ends of said shafts above said screens, idlers in mesh with said gear wheels, and a stationary gear in mesh with said idlers for imparting independent reverse rotary motion to said gear wheels and screens during the revoluble motion of the screens; substantially as set forth.

2. In a centrifugal screening machine, a central vertical shaft, a series of individual vertical cylindrical screens mounted upon and revoluble on the axis of said shaft, vertical shafts extending through the individual screens and connected therewith, gear wheels on the upper ends of said shafts above said screens, and a stationary gear for imparting independent rotary motion to said gear wheels and screens during the revoluble motion of the screens, the said screens each having a cover closing its upper end, combined with a feed hopper and discharge nozzles extending therefrom to within the screens, substantially as set forth.

3. In a centrifugal screening machine, a central vertical shaft, a series of individual vertical cylindrical screens mounted upon and revoluble on the axis of said shaft, vertical shafts extending through the individual screens and connected therewith, gear wheels on the upper ends of said shafts above said screens, and a stationary gear for imparting independent rotary motion to said gear wheels and screens during the revoluble motion of the screens, the said screens each having a cover closing its upper end, combined with a feed hopper and discharge nozzles extending therefrom upwardly on inclined lines through the open lower ends of the screens; substantially as set forth.

4. In a centrifugal screening machine, a central vertical shaft, a frame secured thereon, a series of vertical cylindrical screens carried by said frame, means for rotating said shaft and frame, vertical shafts extending through said screens and having a bearing in said frame and connected with the screens, means for rotating said screen-shafts and screens on their own axes, and means for feeding the stock to be screened to the interior of said screens, said frame having portions in close relation to the lower outer edges of said screens to resist centrifugal action tending to force the screens outwardly; substantially as set forth.

5. In a centrifugal screening machine, a central vertical shaft, a frame secured thereon, a series of vertical cylindrical screens carried by said frame, means for rotating said shaft and frame, vertical shafts extending through said screens and having a bearing in said frame and connected with the screens, means for rotating said screen-shafts and screens on their own axes, and means for feeding the stock to be screened to the interior of said screens, said frame having cup-sections below said screens closely encompassing the lower ends of the same and receiving the lower end of the

screen-shafts and having openings for the escape of stock which fails to pass through the screens; substantially as set forth.

6. In a centrifugal screening machine, a central vertical shaft, a frame secured thereon affording a rotary feed hopper at its center and at its lower portion extending outwardly to form screen-supporting sections, a series of vertical cylindrical screens mounted over said sections, vertical shafts extending through said screens and having a bearing at their lower ends in said sections, a plate (49) above said screens and affording bearings for the upper ends of said screen-shafts, gearing above said plate for rotating said screen shafts and screens on their own axes, means for rotating said central shaft and frame connected therewith, and nozzles leading from said hopper to the interior of said screens; substantially as set forth.

7. In a centrifugal screening machine, a central vertical shaft, a series of individual vertical cylindrical screens mounted upon and revoluble on the axis of said shaft, vertical shafts extending through the individual screens and connected therewith, gear wheels on the upper ends of said shafts above said screens, and a stationary gear for imparting independent rotary motion to said gear wheels and screens during the revoluble motion of the screens, the said screens each having an inverted cone-shaped cover closing its upper end and each cover at its inverted apex having a tubular opening for the screen shaft, combined with a plate above the screens affording vertical bearings for the upper portions of said screen-shafts, a feed-hopper, and nozzles extending therefrom to within the screens; substantially as set forth.

8. In a centrifugal screening machine, a vertical cylindrical screen entirely closed at its upper end, means for rotating said screen upon its own axis and revolving it about the central axis of the machine, and a rotary feed hopper having a discharge nozzle projected upwardly through the bottom of said screen, combined with means in close relation to the lower outer edge of the screen to resist centrifugal action tending to force the screen outwardly; substantially as set forth.

9. In a centrifugal screening machine, a central vertical shaft, a series of vertical cylindrical screens mounted upon and revoluble on the axis of said shaft, means for rotating said screens on their own axes, means for feeding the stock to be screened to the interior of said screens, an inclosing casing forming a chamber for said screens and having a discharge for the stock which passes through the screens and a separate discharge for the stock which fails to pass through the screens, and means tending to deaden the air within said chamber and prevent any strong flow of air through the same with the outgoing stock; substantially as set forth.

10. In a centrifugal screening machine, a central vertical shaft, a series of vertical cylindrical screens mounted upon and revoluble on the axis of said shaft, means for rotating said screens on their own axes, means for feeding the stock to be screened to the interior of said screens, an inclosing casing forming a chamber for said screens and having a discharge for the stock which passes through the screens and a separate discharge for the stock which fails to pass through the screens, a pipe leading from the discharge for screened stock, and a liquid seal for said pipe to check the flow of air with the stock and deaden the air in said chamber; substantially as set forth.

Signed at New York city, in the county of New York and State of New York, this 1st day of September A. D. 1909.

CHARLES WALTER THOMAS.

Witnesses:
ARTHUR MARION,
CHAS. C. GILL.