

Nov. 22, 1932.

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1,888,636

SCREENING AND CONCENTRATING APPARATUS

Filed Feb. 5, 1929

3 Sheets-Sheet 1

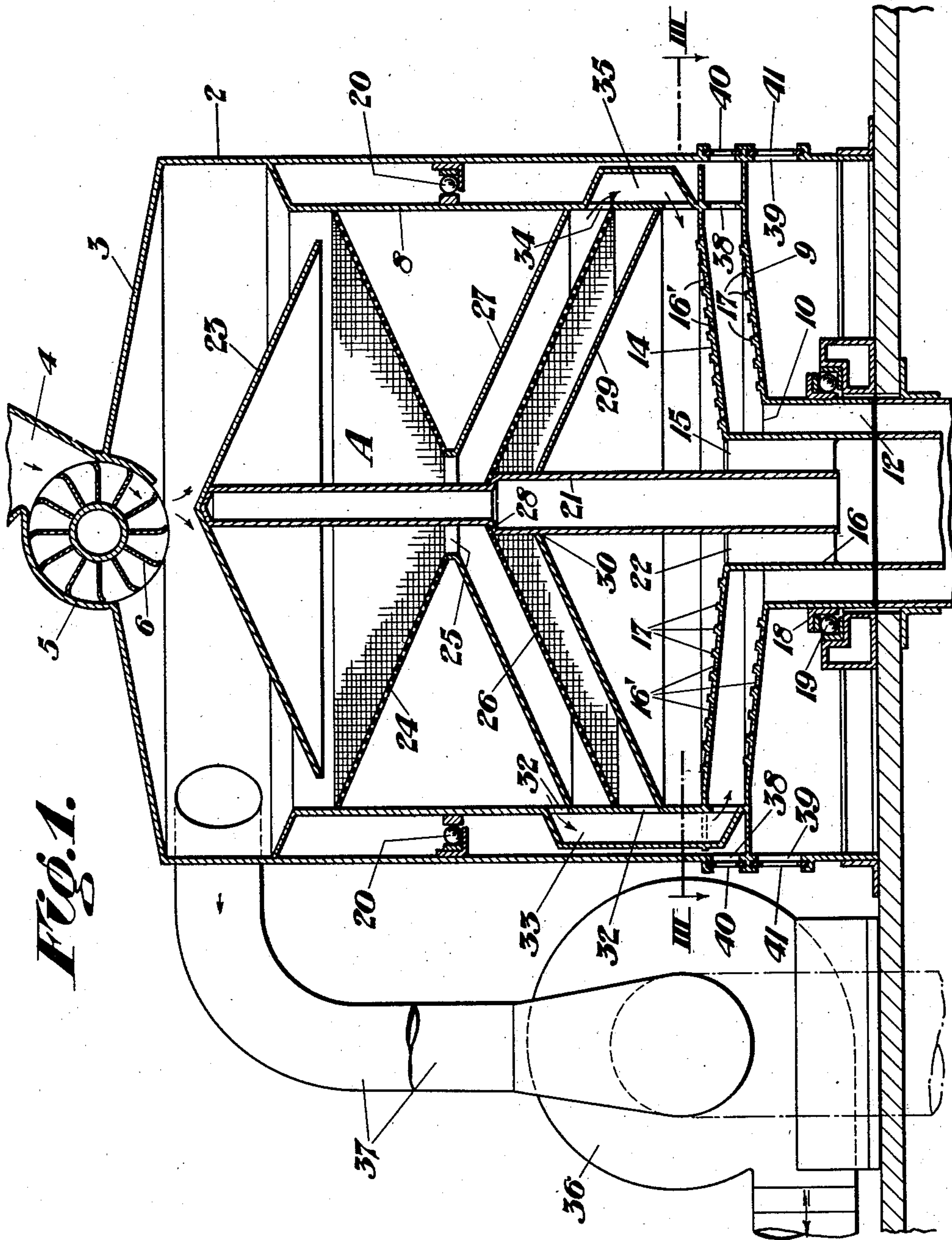


FIG. 1.

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3 Sheets-Sheet 2

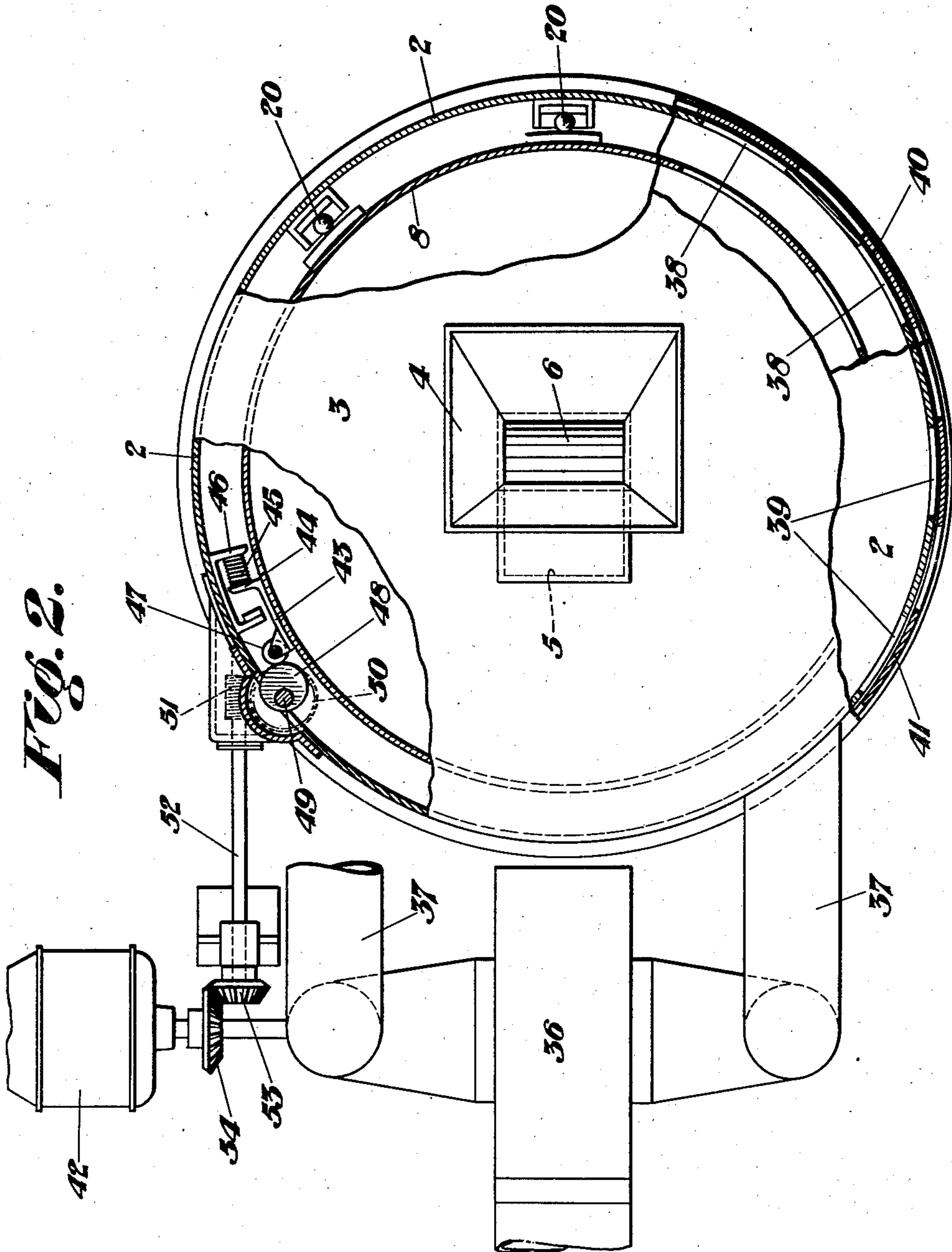


Fig. 2.

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3 Sheets-Sheet 3

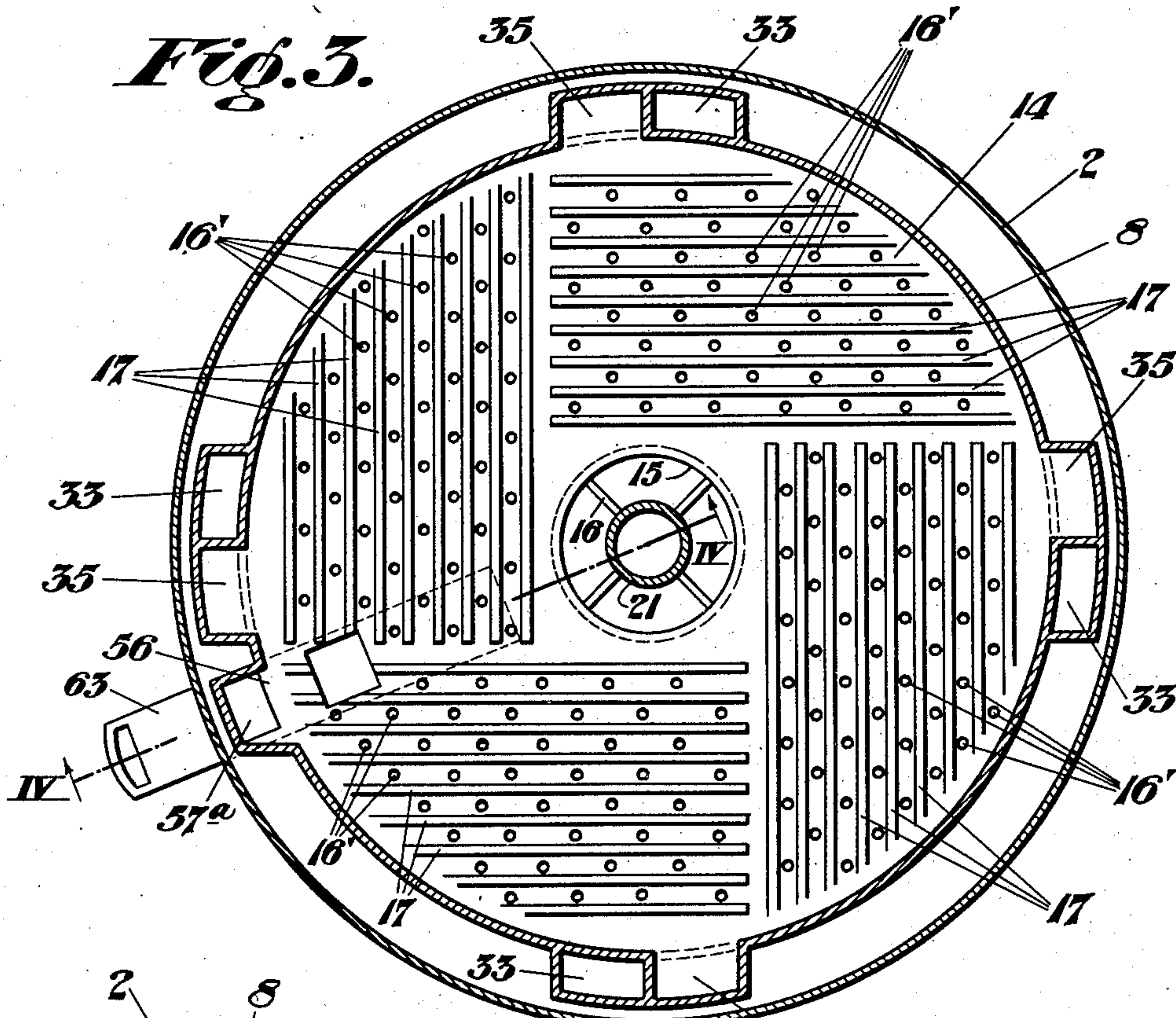


Fig. 3.

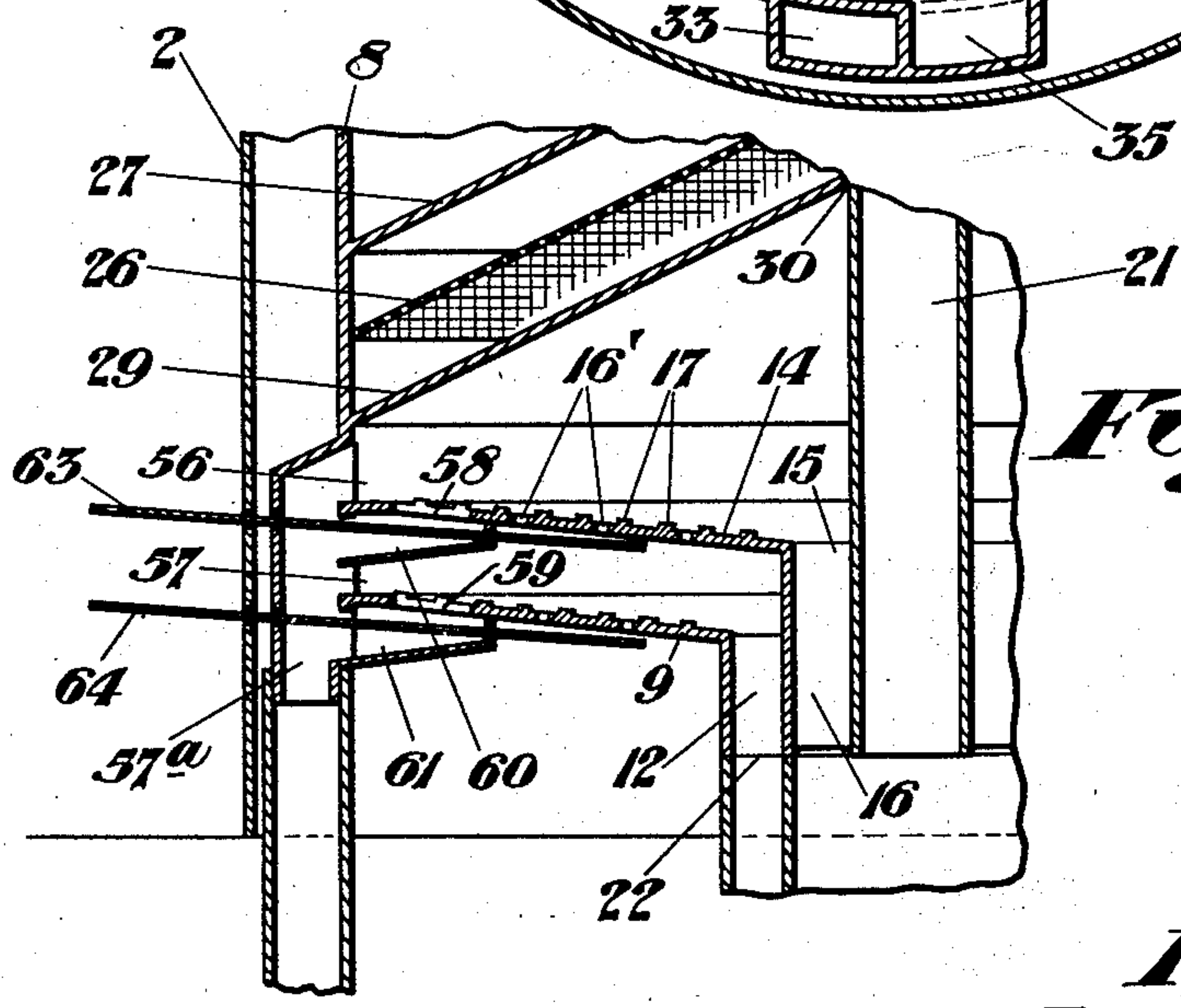


Fig. 4.

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UNITED STATES PATENT OFFICE

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SCREENING AND CONCENTRATING APPARATUS

Application filed February 5, 1929. Serial No. 337,668.

This invention relates to screening and cleaning apparatus and, while not limited thereto, relates more particularly to apparatus for screening and cleaning coal, ores and similar materials, and has for its object the provision of a novel dustproof, large capacity screening apparatus having both low construction and operating costs.

Another object is to provide an apparatus of this class which will be strong and durable and is, therefore, suitable for the rough usage to which it is subjected.

In the drawings:

Figure 1 is a vertical sectional view through a screening apparatus constructed in accordance with this invention.

Figure 2 is a plan view of the apparatus partly broken away to show the screen rotating apparatus.

Figure 3 is a sectional plan on the line III—III of Figure 1.

Figure 4 is a sectional view taken on the line IV—IV of Figure 3.

Referring more particularly to the drawings, the numeral 2 designates the outer cylindrical casing of the apparatus having a top wall 3 provided with a supply hopper 4 which communicates with the interior of the casing through a port 5, in which a multi-vaned feed-wheel 6 is mounted. The wheel 6 is adapted to be operated by the gravity feed of the material being screened and the vanes of the wheel are adapted to closely fit the walls of the port 5 so as to prevent the free inflow of air through the port 5.

A screening unit A is rotatably mounted in the casing 2 and comprises a cylindrical open-top shell 8 having its lower end closed by a downwardly and inwardly inclined cleaning table wall 9 having its central portion cut away to form an outlet port 10 which communicates with an outlet conduit 12. A second cleaning table 14 is spaced above the table 9 and has the same inclination. The table 14 also has its central portion cut away to provide an outlet port 15 which communicates with an outlet conduit 16 mounted within the conduit 12. The tables 9 and 14 are of the air flotation type and, therefore, are provided with perforations 16' and riffles 17.

The conduit 12 is provided with an annular bearing ring 18 adapted to be supported on an anti-friction bearing 19 so as to take up the end thrust of the screening unit.

The shell 8 of the screening unit A has its side walls supported for rotary movement by an anti-friction bearing ring 20.

A central post 21 is mounted within the shell 8 and is supported at its lower end by a spider member 22. A downwardly and outwardly inclined deflector plate 23 is fixedly mounted on the upper end of the post 21 and terminates short of the side walls of the shell 8. The deflector plate 23 is adapted to receive the material delivered by the wheel 6 and distribute it at a point adjacent the shell 8.

A downwardly and inwardly inclined screen member 24 is mounted below the plate 23 and has its outer edge secured to the shell 8 while its central portion is cut away to form a port 25 leading to a second screen 26. The inner edge of the screen 24 is secured to a collecting plate 27 which is inclined inversely to the screen 24 and has its outer edge secured to the shell 8.

The screen 26 is inclined inversely to the screen 24 and has its inner edge or central portion secured to a shoulder 28 on the post 21 while its outer edge is secured to the shell 8.

A collecting plate 29 is mounted below the screen 26 and is inclined in the same direction as the screen 26. The plate 29 has its inner edge or central portion fixedly secured, as at 30, to the post 21 while its outer edge is secured to the shell 8.

The material passing through the screens 24 and 26 onto the collecting plates 23 and 29, respectively, is discharged through ports 32 into conduits 33 which deliver it onto the lower table plate 9.

The upper screen 24 delivers its screened material through the port 25 onto the screen 26 which, in turn, delivers its screened material through ports 34 and conduits 35 onto the upper cleaning table 14.

Air is adapted to be drawn through and exhausted from the apparatus by a fan 36 and conduits 37. Inlet ports 38 and 39 having closures 40 and 41, respectively, are provided

for admitting air below the cleaning tables 9 and 14.

The fan 36 is adapted to be operated by a motor 42 and the same motor is used to operate the screening unit A.

The shell 8 is provided with a bracket-like casting 43 having an arm 44 engaged with a spring 45 mounted in a U-shaped spring holder 46 secured on the inside of the casing 2. A roller 47 is journaled on the casting 43 and is adapted to be engaged by a cam 48 carried by a vertical shaft 49. The shaft 49 is provided with a worm-wheel 50 which is meshed with a worm 51 on a shaft 52 which is driven through gears 53 and 54 by the fan motor 42. The cam 48 is adapted to bear against the roller 47 so as to move the screening unit A bodily clockwise and compress the spring 45, and then to permit a sudden or quick return or counterclockwise movement of the screening unit by means of the spring 45, thus causing a rotary jiggling action of the complete screening unit and causing the material being screened to move around the unit.

The refuse or heavy matter is caused to move to the outer edge of the tables 9 and 14 and is adapted to enter and be discharged through discharge ports 56 and 57, respectively, and conduit 57^a. When screening and cleaning coal and slate, which is materially heavier than the coal, will be separated from the coal by the tables 9 and 14.

The tables 9 and 14 are provided with outlet ports 58 and 59, respectively, leading to discharge conduits 60 and 61, respectively, both of which connect with and are adapted to deliver the material passing therethrough into the conduit 57^a. The ports 58 and 59 spaced inwardly from the outer periphery of the tables 9 and 14 and are adapted to permit the discharge of a product termed middlings. The ports 58 and 59 are adapted to be controlled by slide valves 63 and 64, respectively.

The operation of the apparatus will be readily understood by those skilled in the art. The material will be first screened and then will be cleaned on the tables 9 and 14. The jiggling action of the screening unit A will aid the screening operation and will serve to move the material around the cleaning tables. The air drawn up through the tables 9 and 14 by the fan 36 will serve to remove the dust from the whole apparatus, and will also serve to float the lighter material on the tables so as to cause it to move over the riffles toward the center discharge ports of the tables while the heavier material moves outwardly.

While I have shown and described one specific embodiment of my invention, it will be understood that I do not wish to be limited thereto, since various modifications may be made without departing from the scope of my invention as defined in the appended claims.

I claim:

1. A screening and cleaning apparatus for

coal and the like comprising a cylindrical casing provided at its top with an inlet for the material to be treated, a cylindrical screening unit mounted for oscillatory movement within said casing, said unit comprising an outer cylindrical shell, a conical deflector plate mounted at the top of said shell and terminating short of the inside face of said shell and disposed beneath the inlet of the casing, a plurality of reversely inclined screens fixedly mounted in said shell below said deflector plate, an inclined collecting plate fixedly mounted in said shell below each of said screens and adapted to catch the material passing through the respective screens, means for delivering the material passing over one screen to the next succeeding screen, a pair of cleaning tables fixedly mounted in vertical spaced relation within the lower end of said shell below the screens and deflector plates, means for receiving the material passing over said screens and delivering said material onto one of said cleaning tables, means for receiving the material from said collecting plates and delivering said material to the other of said cleaning tables, said tables being adapted to separate the lighter and heavier particles of material delivered thereon, separate outlet ports for the heavy and light material separated by said tables, and means for causing an oscillatory jiggling action of said screening unit within said casing.

2. A screening and cleaning apparatus for coal and the like comprising a cylindrical casing provided at its top with an inlet for the material to be treated, a cylindrical screening unit mounted for oscillatory movement within said casing, inlet means for feeding the material in a measured flow through said casing to said screening unit, said unit comprising an outer cylindrical shell, a conical deflector plate mounted in cooperative relation with the inlet casing at the top of said shell and terminating short of the inside face of said shell, a plurality of reversely inclined screens fixedly mounted in said shell below said deflector plate, downwardly and outwardly inclined collecting plates fixedly mounted in the shell below each of said screens and adapted to catch the material passing through the respective screens, means for delivering the material passing over one screen to the next succeeding screen, a pair of downwardly and outwardly inclined cleaning tables fixedly mounted in vertical spaced relation within the lower end of said shell, means for receiving the material passing over said screens and delivering said material onto one of said cleaning tables, means for receiving the material from said collecting plates and delivering said material to the other of said cleaning tables, said tables being adapted to separate the lighter and heavier particles of material delivered thereon, separate outlet ports for the heavy and light material

separated by said tables, and means for causing an oscillatory jiggling action of said screening unit within the casing:

3. A screening and cleaning apparatus for coal and the like comprising a cylindrical casing provided at its top with an inlet for the material to be treated, a cylindrical screening unit mounted for oscillatory movement within said casing, an inlet port in the upper end of said casing through which the material to be screened is fed, a feeding wheel journaled in said inlet port and adapted to control the feed of material through said port to said screening unit and to prevent the free inflow of air through said port, said unit comprising an outer cylindrical shell, a downwardly and outwardly inclined conical deflector plate mounted within the top of said shell beneath and in cooperative relation with the inlet port and terminating short of the inside face of said shell, a plurality of reversely inclined screens fixedly mounted in said shell below said deflector plate, downwardly and outwardly inclined collecting plates fixedly mounted within the shell below each of said screens and adapted to catch the material passing through the respective screens, means for delivering the material passing over one screen to the next succeeding screen, a pair of cleaning tables fixedly mounted in vertical spaced relation within the lower end of said shell, means for receiving the material passing over said screens and delivering said material onto one of said cleaning tables, means for receiving the material from said collecting plates and delivering said material to the other of said cleaning tables, said tables being adapted to separate the lighter and heavier particles of material delivered thereon, separate outlet ports for the heavy and light material separated by said tables, and means for causing an oscillatory jiggling action of said screening unit.

4. A screening and cleaning apparatus for coal and the like comprising a cylindrical casing, a cylindrical screening unit mounted for rotary movement within said casing, said unit comprising an outer cylindrical shell, a conical deflector plate mounted at the top of said shell and terminating short of the inside face of said shell, a plurality of inclined screens fixedly mounted in said shell below said deflector plate, inclined collecting plates fixedly mounted below each of said screens and adapted to catch the material passing through the respective screens, means for delivering the material passing over one screen to the next succeeding screen, a pair of cleaning tables fixedly mounted in vertical spaced relation at the lower end of said shell, means for receiving the material passing over said screens and delivering said material onto one of said cleaning tables, means for receiving the material from said collecting plates

and delivering said material to the other of said cleaning tables, said tables being adapted to separate the lighter and heavier particles of material delivered thereon, separate outlet ports for the heavy and light material separated by said tables, means for causing a rotary jiggling action of said screening unit, and means for exhausting air from said screening unit and casing, said means being adapted to cause an upflow of air through said cleaning tables and screens.

5. A screening and cleaning apparatus for coal and the like comprising a plurality of concentric reversely inclined conical screens, ranging one above the other, means for delivering material passed over one screen to the next lower screen, a conical collecting plate concentrically disposed below each of said screens to catch the material passing through said screens, a pair of cleaning tables concentrically disposed below the lowermost screen, means for delivering the material passing over said screens to one of said tables, means for delivering material from the collecting plates to another of said tables, said tables being adapted to separate the lighter and heavier particles of material delivered thereon and separate outlets for the lighter and heavier particles.

6. A screening apparatus comprising a casing, a screening unit mounted within the casing and comprising an open-topped shell, a conical deflector mounted concentrically within the top of the shell and having its outer periphery spaced from the walls of the shell, the casing having an inlet delivering to the deflector, a vertical series of conical screens and collector plates mounted within the shell concentrically beneath the deflector plate, a vertical series of cleaning tables mounted concentrically within the shell and below the series of screens and collector plates, means for delivering material from the screens and collector plates to the respective cleaning tables, separate delivery means for the tables, and means for exhausting air through the shell and from below the tables upwardly through the screens and out of the upper portion of the casing.

In testimony whereof, I have hereunto set my hand.

EDWARD O'TOOLE.