

C. F. MERRITT.

DRIER.

APPLICATION FILED FEB. 26, 1910.

991,871.

Patented May 9, 1911.

2 SHEETS—SHEET 1.

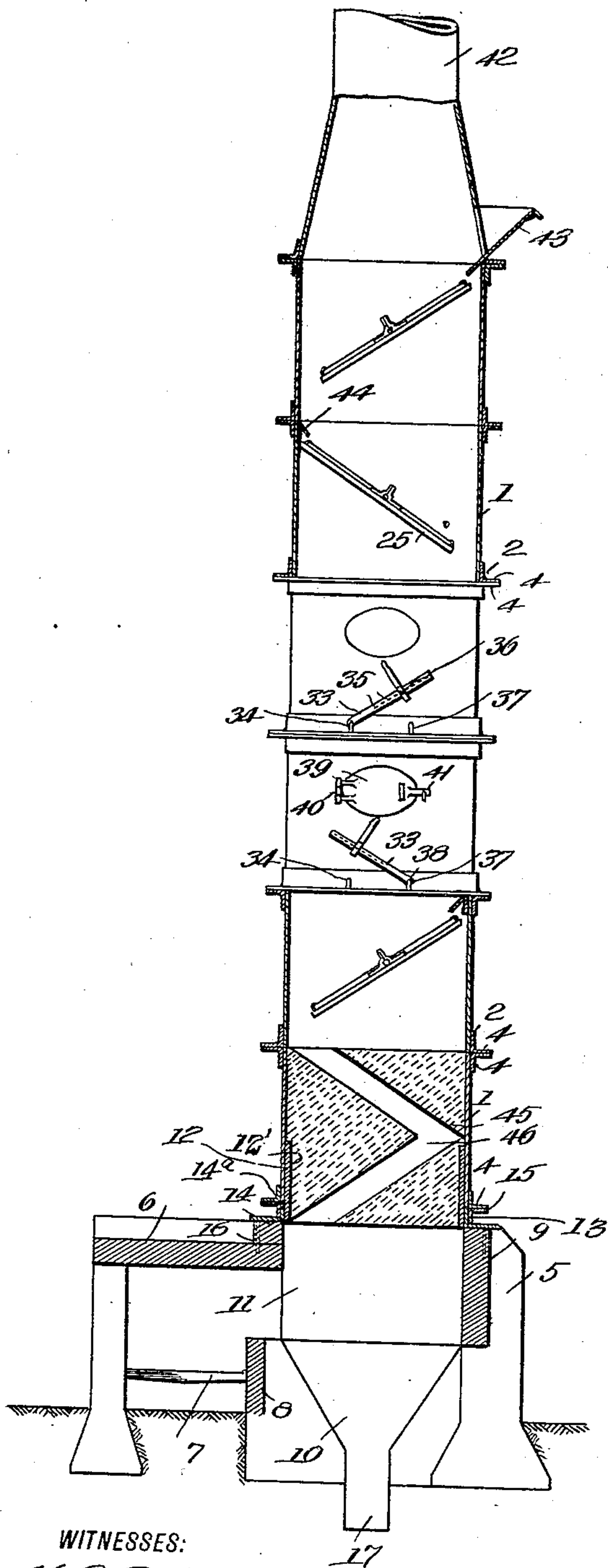


Fig. 1.

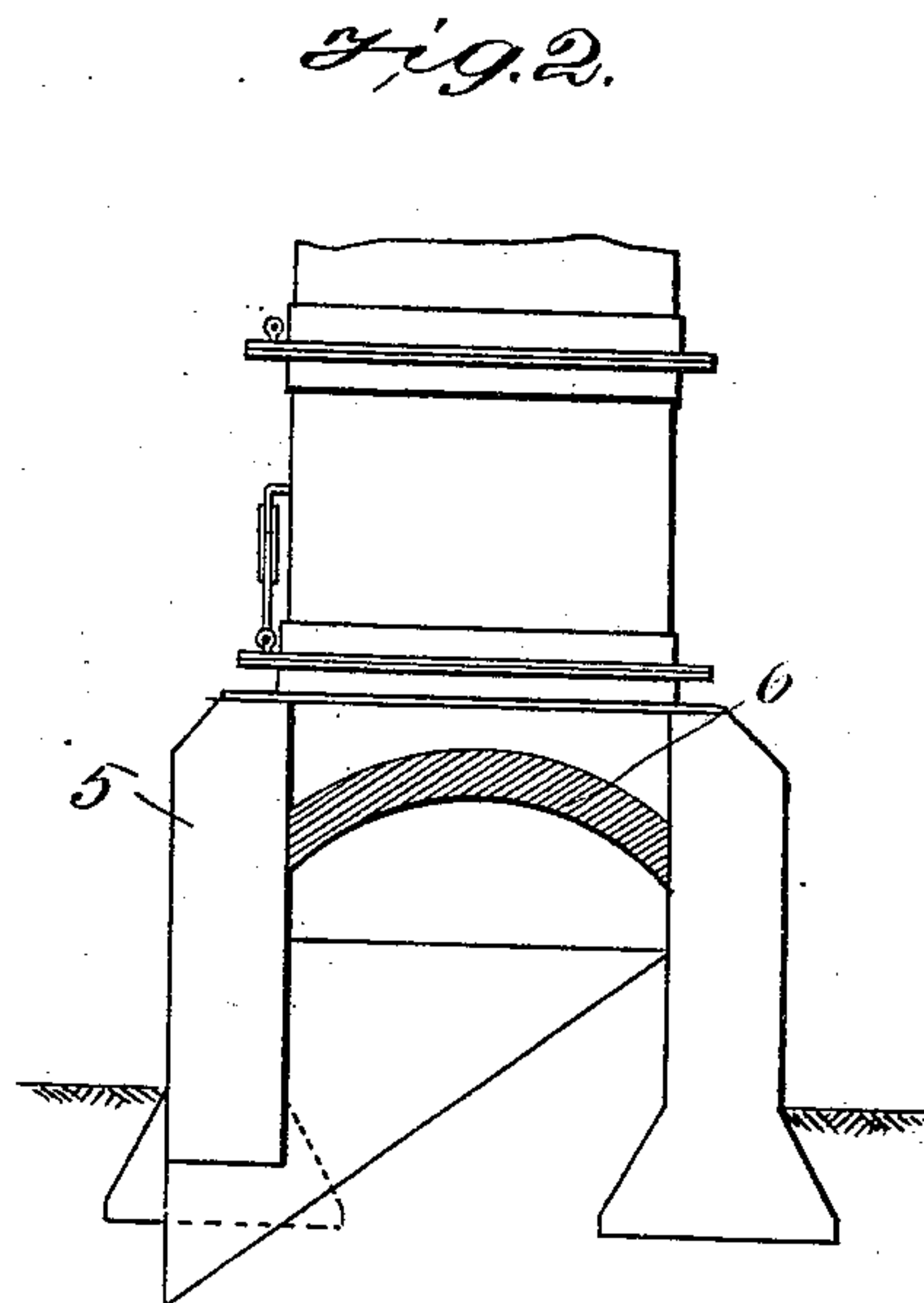


Fig. 2.

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2 SHEETS-SHEET 2.

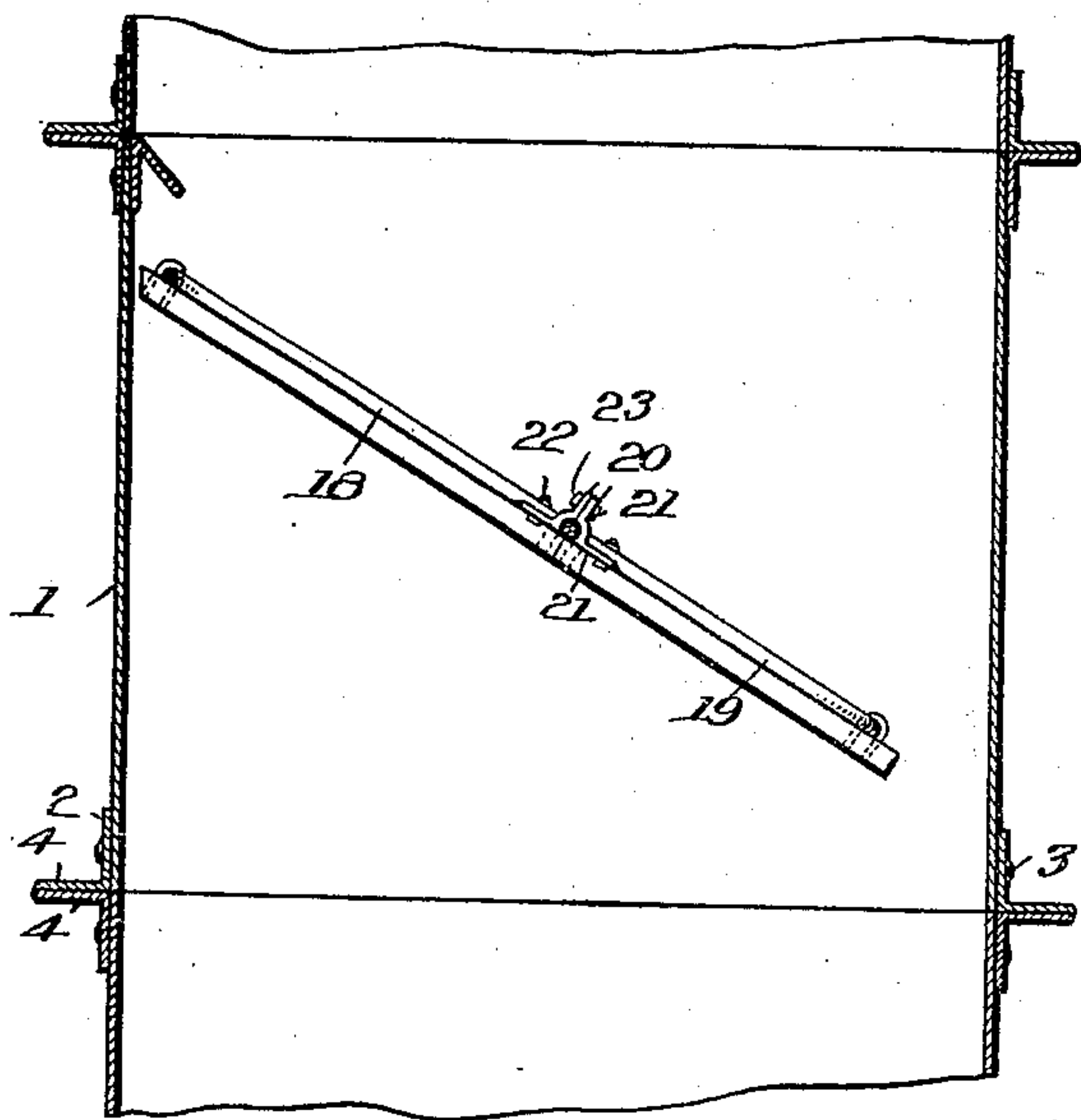


Fig. 3.

Fig. 4

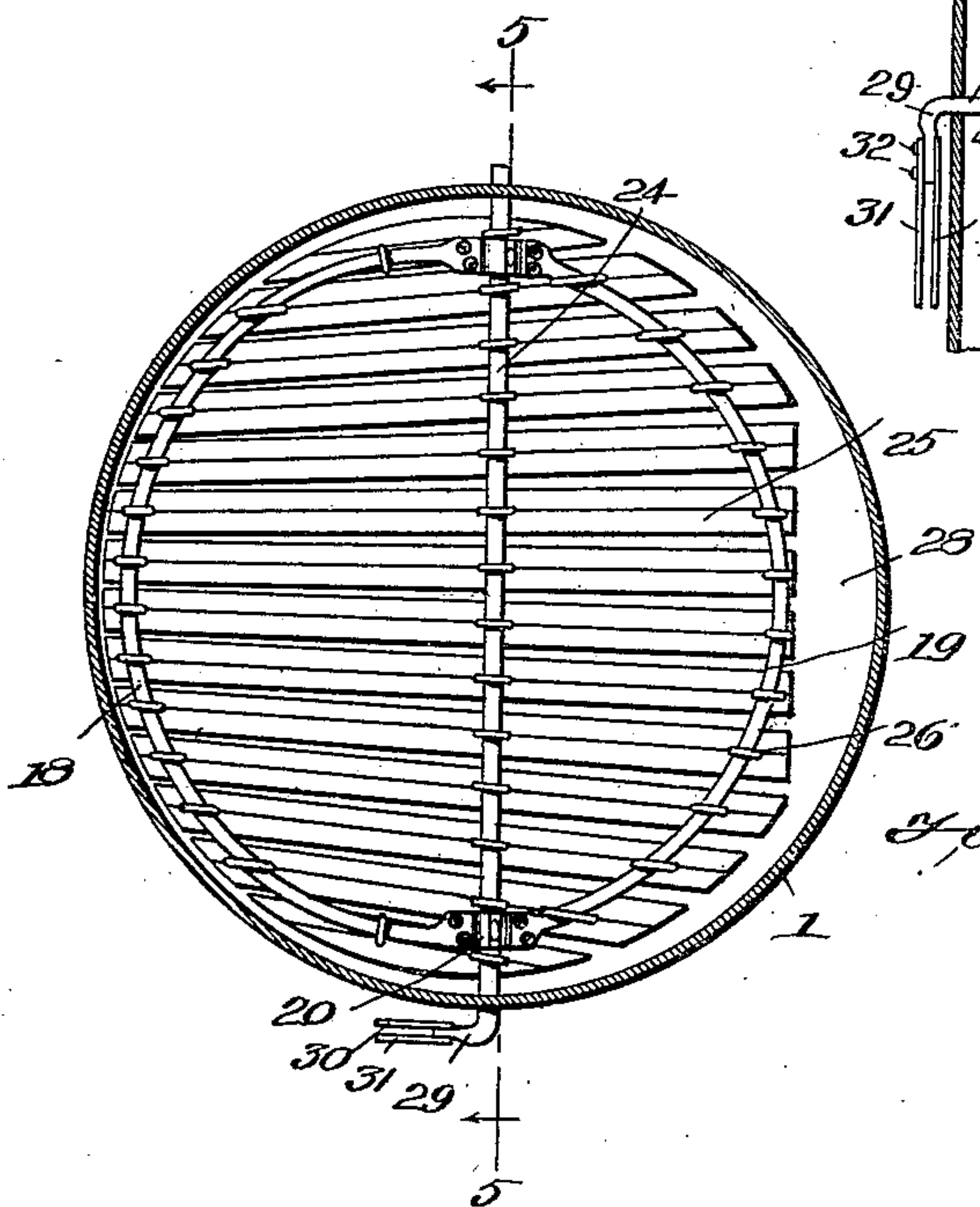
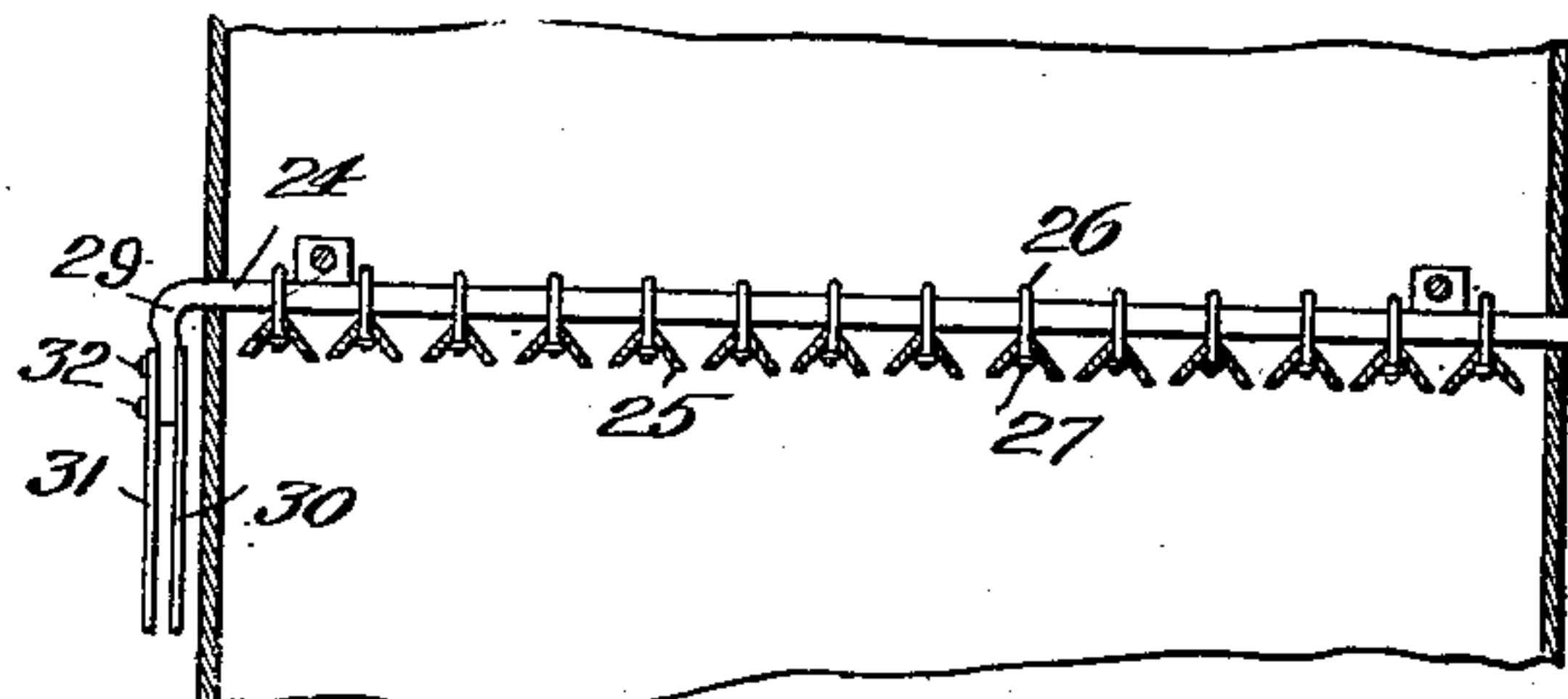


Fig. 5.

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DRIER.

991,871.

Specification of Letters Patent.

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Application filed February 26, 1910. Serial No. 546,071.

To all whom it may concern:

Be it known that I, CLAUDIUS F. MERRITT, a citizen of the United States, and resident of Lakeland, in the county of Polk and State of Florida, have invented certain new and useful Improvements in Driers, of which the following is a specification.

My invention is an improvement in driers, and consists in certain novel constructions and combinations of parts, hereinafter described and claimed.

The object of the invention is to produce a device of the character specified, especially suited and adapted for drying phosphates, graphite, cement, and other like materials, by passing the material through a substantially perpendicular tube, provided at intervals with transverse inclined screens, while subjected to a current of heated air, arising through the tube.

A further object is to provide a device operating as specified, which may be cheaply constructed with respect to efficiency, easily operated and maintained in efficient condition, with the smallest possible outlay for operation and maintenance.

Referring to the drawings forming a part hereof, Figure 1 is a vertical section of the improvement, Fig. 2 is a similar view of the furnace and lower part of the tube, at right angles to Fig. 1, Fig. 3 is a transverse section of the tube showing a plan view of a grate or screen, Fig. 4 is a transverse section of the tube, and Fig. 5 is a partial vertical section of the tube, showing the mounting of the screen, and taken on the line 5—5 of Fig. 4.

The embodiment of the invention shown in the drawings consists of a shaft or tube preferably composed of a plurality of similar sections, each comprising a shell 1, having secured to the outer face thereof at each end, an annular angle plate 2, one of whose sides is secured by rivets 3 to the shell, and the other 4 extends laterally and forms a flange which is superposed on the adjacent flange of the next section, and secured thereto in any suitable manner.

The tube is supported by and passes through a furnace, consisting of a casing 5, provided at its front end with an arch 6 of fire brick, and a grate 7 below the arch supported between a bridge wall 8, and the front wall of the casing. The rear end of the furnace is also provided with a lining 9 of fire brick, at its upper part, and a fun-

nel shaped casing 10 is supported behind the bridge wall.

Above the funnel 10 is a cylindrical shell 11, whose upper edge is flush with the top of the casing of the furnace, and the tube or shaft joins with the end of the shell. A circular opening is provided in the top of the furnace, and the opening is encircled by a fire ring 12 preferably of cast iron. A base ring 13 encircles the fire ring, and is provided with an annular flange 14, resting on the furnace.

A second ring 14^a encircles the base ring and is provided with an annular lateral flange 15, upon which rests the flange 4 of the lowermost section. The base ring is secured to the furnace casing by anchor bolts 16 and the opening 17 of the funnel is below the furnace, delivering the material at this point after it is dried.

Each of the sections is provided with an adjustable screen or grate, shaped to fit the cross section of the shaft, and capable of taking various transverse positions with respect thereto. Each screen is composed of a ring, consisting of half sections 18 and 19, and each section of the ring is provided at its ends, with the half 20 of a sectional bearing. Each bearing section is provided with a lateral lug 21 which is secured to the flattened end of the ring section by bolts 22.

The corresponding bearing sections of the ring sections are secured together by bolts 23, on a shaft 24, which is arranged transversely of the shaft and journaled in the walls thereof, the ends of the shaft extending beyond the walls as shown in Fig. 5. A plurality of slats 25 are arranged transversely of the shaft 24 and ring, each consisting of an angle plate arranged with its apex upward and in contact with the shaft, and the slats are substantially parallel with each other.

The slats are secured to the shaft and to the ring by means of the U-shaped hangers or stirrups 26, the arms of the hanger straddling the shaft or ring and passing through the slat, and being engaged by nuts 27, threaded onto the arms. The slats extend beyond the ring at both ends as shown in Fig. 5, and at one side of the tube are cut away as shown at 28 on a line parallel with the shaft 24, to form a passage, even when the screen is horizontal.

One end of each shaft is bent laterally to form a crank arm 29, and a pair of links 30

and 31 are connected with the arm, one being arranged on each side of the arm and riveted thereto by rivets 32. A lever 33 is pivoted to the flange 4 at the lower end of the tube sections, on an eye bolt 34 secured to the flange, and the other end of the lever is passed between the links.

The lever is provided with a longitudinal series of openings 35, one of which is adapted to register with alined openings in the link and a pin 36 is passed through the openings to hold the screen in adjusted position. It will be evident that when the pin is withdrawn, the screen may be inclined at different angles with the horizontal, and held in this position by reinserting the pin.

A second eye bolt 37 is arranged on the opposite side of the shaft 24 from the first named bolt, and the lever may be engaged with either eye bolt, in order to incline the screen in either direction, the said lever having a hook 38 engaging the eyebolt. Sundry of the tube sections are provided with manholes, closed by a door 39 hinged to the wall of the section as at 40, and provided with a catch 41 to retain it closed.

At its top the tube is provided with a reduced chimney section 42 and at one side of the same with a feed hopper 43, to permit the material to be fed to the tube, and an inclined plate 44 is arranged above each screen, on the inner face of the tube forming a shield to direct the material inwardly onto the screen. The shaft 24 and the ring are preferably of wrought iron, and the slats of cast iron.

In operation the screens are adjusted to the proper inclination in accordance with the character of the material to be dried, and held in this adjusted position. The alternate screens are inclined in one direction and the intermediate screens in the opposite direction, as indicated in Fig. 1. The furnace having been ignited the material is delivered through the hopper into the tube. As the material passes down the tube, it passes through the ascending column of heated air, and as it strikes each screen or grate, it is checked in its descent, and deflected to one side of the tube. The apexes of the angle plates forming the slats of the screens, divide and subdivide the material into small masses of sufficient smallness to permit the heated air to act with efficiency thereon. Each grate changes the direction of movement of the material, and also further subdivides it. The grates also increase the extent of travel of the material through the heated air, and pass it back and forth through the same, thoroughly mixing it, and exposing every part thereof to the air, so that when the bottom of the tube is reached, all of the moisture has been extracted. As the material runs downward it meets air constantly increasing in temperature, thus pass-

ing through a medium exactly adapted to the conditions. When the material first enters the tube, the moisture is plentiful and is given up to air, already partially loaded with moisture. The farther the material advances, the less moisture it contains to give up, and the drier the air should be to extract it. The material finally passes through the furnace, and at this point no screens are found, so that it passes rapidly through and is delivered from the funnel. There is no possibility of burning as it passes through the furnace, since the passage is so rapid. The screens are preferably arranged with gradually decreasing inclination.

It will be evident that the improved drier is practically automatic in action, requiring only the feeding of the material, and the keeping up of the fire. But little fuel is required, since the heat is utilized to the best advantage, and the speed of the material may be regulated to expose it to more or less heat as may be required. For this reason it is not necessary to carefully regulate the fire, and a small amount of heat may be made to dry a large amount of material.

The improvement is extremely simple, and there is but little liability of breakage or of failure to act from getting out of order. The screens may be easily removed and replaced, and the screen itself is easily assembled and disassembled. The shields insure that all of the material will pass over the screens, and the manholes permit access to the interior of the tube if desired.

The lower portion of the stack is preferably formed with a filling of fire brick 45, through which is a tortuous passage 46. This lining will extend a suitable distance to protect the grates from the direct intense heat of the fire, and will save radiation.

I claim:

1. A device of the character specified, comprising a furnace, a stack for the furnace, comprising a sectional tube extending below the same, and having a delivery opening at the bottom thereof, the sections having lateral marginal flanges at their ends abutting the flanges of the adjacent sections, a screen arranged transversely of each section, each screen comprising a ring, a shaft arranged transversely of the ring, the ends of the shaft being journaled in the side wall of the tube and one of said ends extending outside of the same and being bent laterally to form a crank arm, angle plates arranged transversely of the ring and shaft with their apexes upward, U-shaped hangers straddling the shaft and ring and passing through the plates, and nuts threaded onto the arms of the hangers below the plates, a lever pivoted to the flange at the lower end of the tube section and provided with a longitudinal series of openings, and a pin passing through

one of said openings and engaging the crank arm for retaining the screen in adjusted position.

2. A device of the character specified, comprising a furnace, a stack for the furnace, comprising a sectional tube extending below the same, and having a delivery opening at the bottom thereof, the sections having lateral marginal flanges at their ends abutting the flanges of the adjacent sections, a screen arranged transversely of each section, each screen comprising a ring, a shaft arranged transversely of the ring, the ends of the shaft being journaled in the side wall of the tube and one of said ends extending outside of the same and being bent laterally to form a crank arm, angle plates arranged transversely of the ring and shaft with their apexes upward, and means engaging the crank arm for holding the screen in adjusted position.

3. A device of the character specified, comprising a furnace, a stack for the furnace, comprising a sectional tube extending below the same and having a delivery opening at the bottom thereof, the sections having lateral marginal flanges at their ends abutting the flanges of the adjacent sections, a screen arranged transversely of each section, each screen comprising a ring, a shaft arranged transversely of the ring, the ends of the shaft being journaled in the side wall of the tube, and one of said ends extending outside of the same and being bent laterally to form a crank arm, angle plates arranged transversely of the ring and shaft with their apexes upward, means for detachably connecting the angle plates to the ring and shaft, and means for holding the screen in adjusted position.

4. A device of the character specified, comprising a furnace, a stack for the furnace, comprising a sectional tube extending below the same and having a delivery opening at the bottom thereof, the sections having lateral marginal flanges at their ends abutting the flanges of the adjacent sections, a screen arranged transversely of each section, means for supporting the screen for swinging movement on an axis transverse to

the tube, and means for holding the screen in adjusted position.

5. A device of the character specified comprising a furnace, a sectional tube arranged vertically and passing through the furnace and having a feed hopper at its upper end, and having a delivery opening therebelow, screens approximately fitting the tube and arranged transversely thereof at spaced intervals, each screen comprising a ring, a shaft arranged transversely of the ring and journaled in the tube walls, said shaft having on one end a crank arm, and angle bars arranged transversely of the ring and shaft in spaced relation and with their apexes upward, and means for holding each screen in adjusted position.

6. A device of the character specified comprising a furnace, a sectional tube arranged vertically and passing through the furnace and having a feed hopper at its upper end, and having a delivery opening therebelow, screens approximately fitting the tube and arranged transversely thereof at spaced intervals each screen comprising a ring journaled on a transverse axis in the tube, slats arranged in spaced relation transversely of the ring, and means for holding each screen in adjusted position.

7. In a device of the character specified, a screen comprising a ring, angle plates arranged transversely of the ring with their apexes upward, hangers straddling the ring and engaging the plates, and a shaft arranged transversely of the ring and plates.

8. In a device of the character specified, a screen comprising a ring, angle plates arranged transversely of the ring with their apexes upward, and hangers straddling the ring and engaging the plates.

9. In a device of the character specified, a screen comprising a ring, angle plates arranged transversely of the ring with their apexes upward, and a shaft arranged transversely of the ring and plates.

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Witnesses:

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