

G. S. EMERICK.

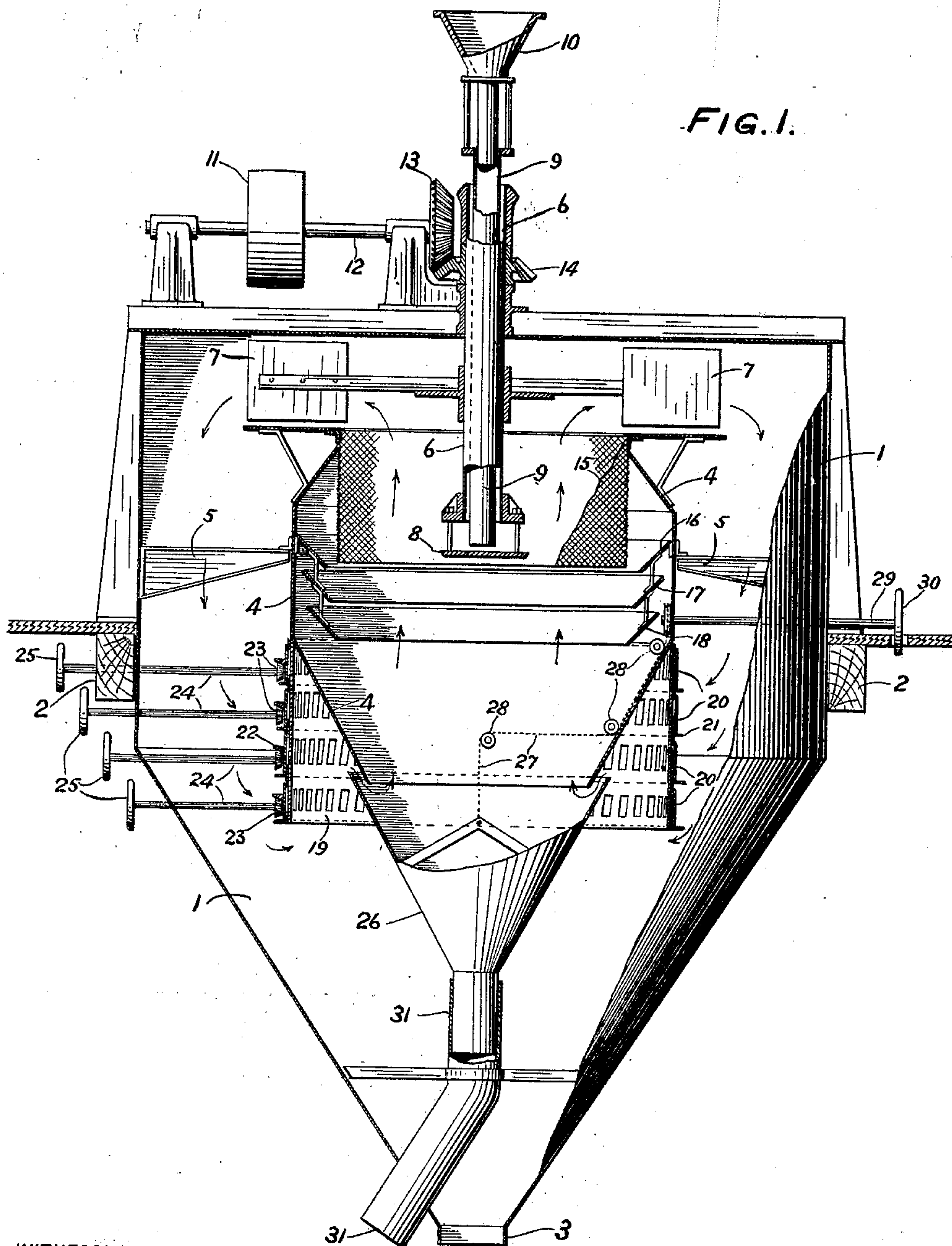
AIR SEPARATOR.

APPLICATION FILED JUNE 17, 1908. RENEWED JUNE 11, 1909.

928,953.

Patented July 27, 1909.

2 SHEETS—SHEET 1.



WITNESSES:

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2 SHEETS—SHEET 2.

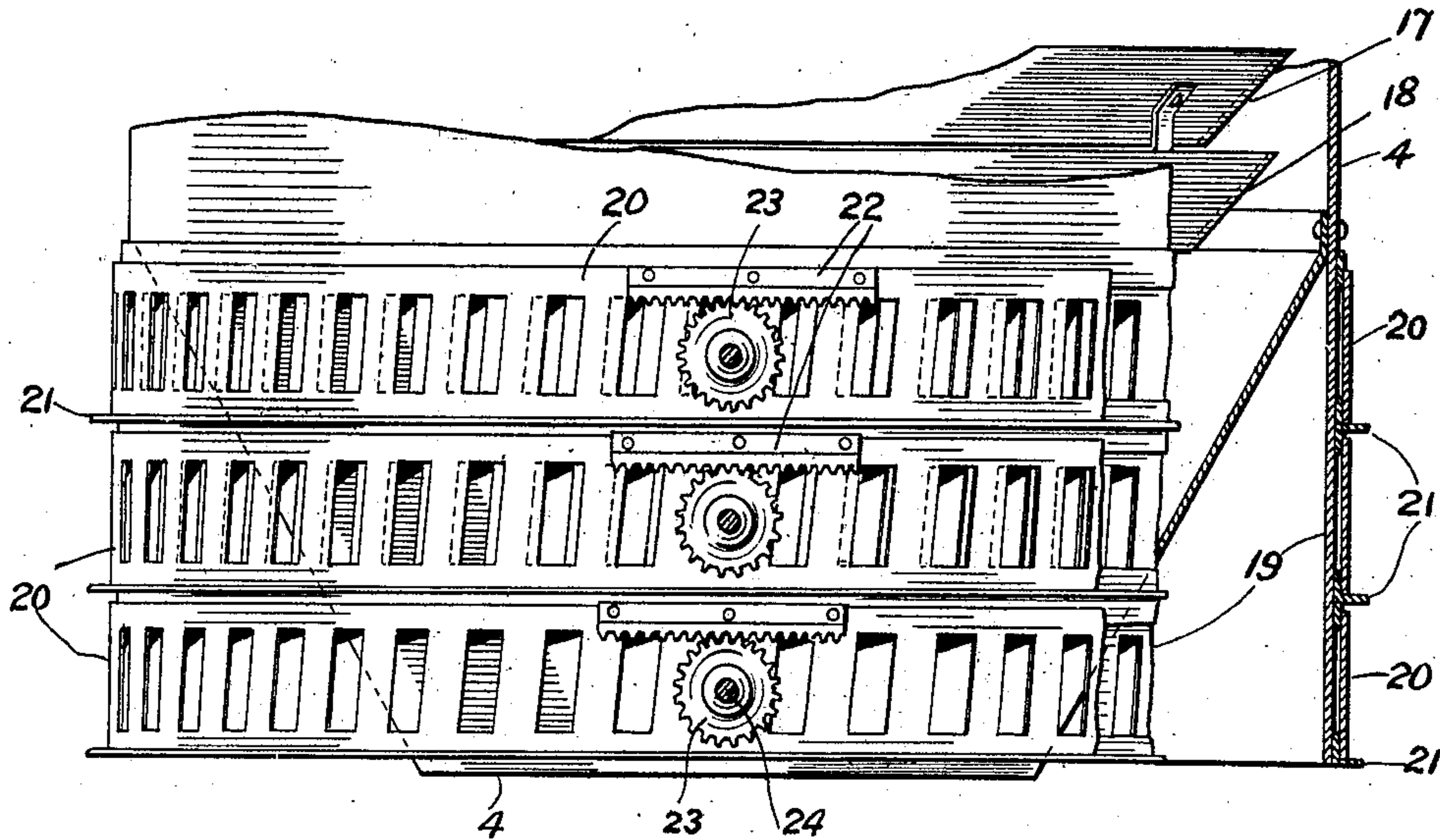


FIG. 2.

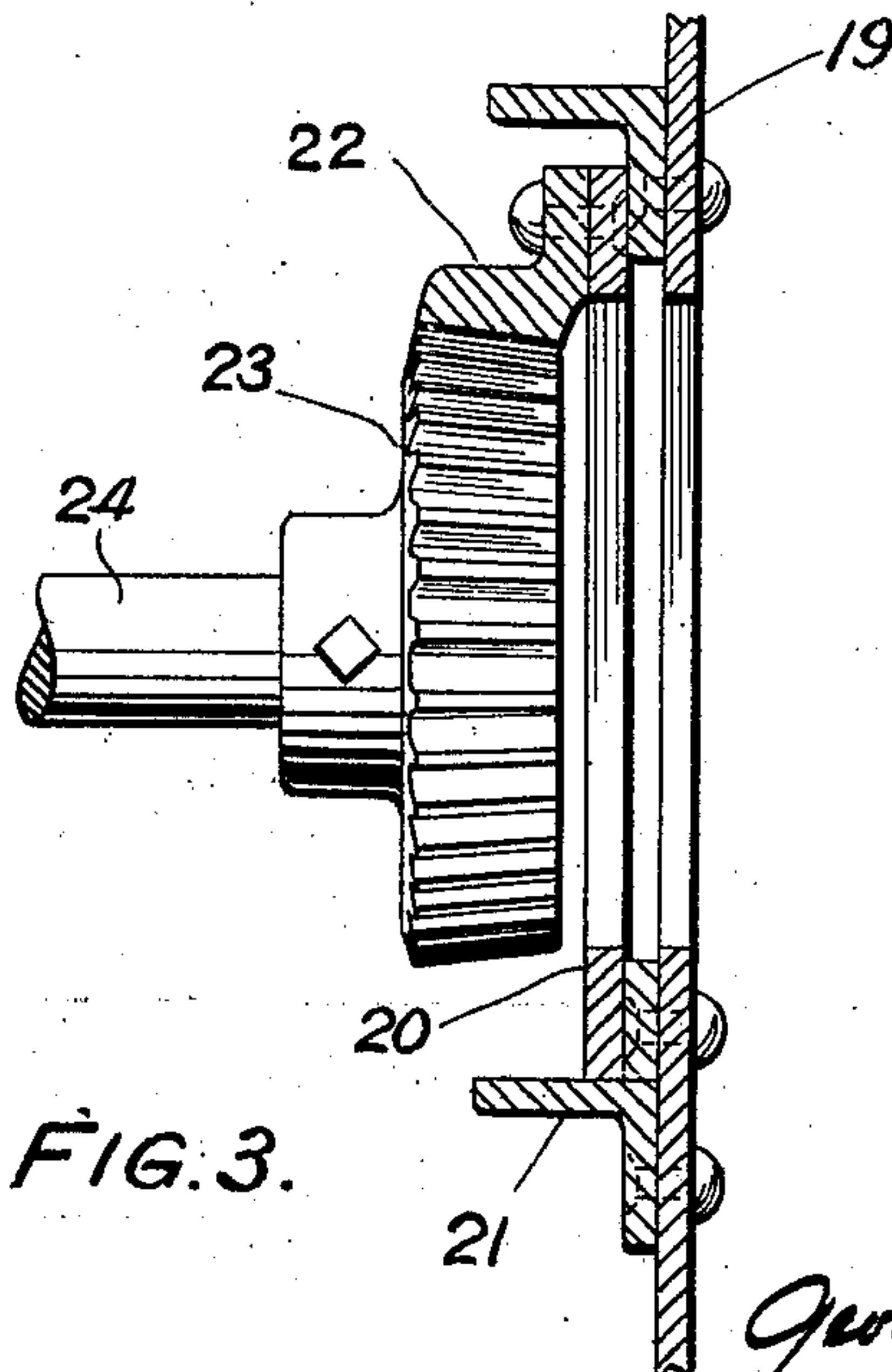


FIG. 3.

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AIR-SEPARATOR.

No. 928,953.

Specification of Letters Patent.

Patented July 27, 1909.

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To all whom it may concern:

Be it known that I, GEORGE S. EMERICK, a citizen of the United States, residing at Nazareth, in the county of Northampton and State of Pennsylvania, have invented a new and useful Improvement in Air-Separators, of which the following is a specification.

My invention relates to devices for separating the finer particles of pulverized or comminuted matter from the residue thereof, and, particularly, to the class of devices wherein this result is accomplished by the winnowing action of ascending air currents operating upon the material as it is discharged by centrifugal action.

In apparatus of this character, which I term air separators, my present object is to provide a mechanism employing air currents in the dry separation of ground cement clinker and cognate materials, and, in connection therewith, to provide a means for effectively controlling the volume, velocity and direction of the air currents so employed. This object I accomplish by the means hereinafter described, and shown in the accompanying drawings, in which—

Figure 1 is a view, in vertical section, of the entire separator, including the means for regulating the air current therein, Fig. 2 is a detail view, in perspective and upon an enlarged scale, of the means for regulating the air current, and Fig. 3 is a detail view on an enlarged scale of a portion of the mechanism for actuating the shutters in the air regulating means.

In Fig. 1, the outer casing 1, the upper portion of which is cylindrical and the lower portion cone-shaped or tapering, is mounted upon suitable supports, as at 2, 2, and is furnished with the outlets 3. Within the outer casing 1 is arranged the inner casing 4, concentric therewith and supported by brackets as at 5, 5. The inner casing 4 is open at the top and the lower portion thereof is in the form of a truncated cone, open at the bottom. The rotary hollow shaft 6 is mounted upon the top of the outer casing 1, descending vertically through the latter into the upper portion of the inner casing 4. The fans 7 are secured to the rotary hollow shaft 6 and are adapted to rotate in the space between the tops of the inner and outer casings. To the lower end of the rotary hollow shaft 6 is secured the discharge-plate 8. Within the rotary hollow shaft 6 is mounted the non-rotary feed pipe 9, the upper end of which is

provided with the hopper 10. The rotary hollow shaft may be rotated by any suitable means, such as the pulley 11, shaft 12 and bevel gears 13 and 14 mounted upon the top of the outer casing 1.

Within the upper portion of the inner casing 4 is arranged the cylindrical screen 15, preferably of wire mesh, depending from the top of the inner casing and extending downward to about the level of the discharge plate 8. Within the central portion of the inner casing 4 are arranged a series of annular deflectors 16, 17 and 18, depending one from another, the topmost being secured to the inner casing.

Around the lower truncated-cone shaped portion of the inner casing 4 is located the cylindrical drum 19 which forms practically an extension of the middle cylindrical portion of the inner casing 4 and which is formed with perforations or openings arranged in horizontal series extending entirely around the drum. Each series of openings is provided with a shutter 20 adapted to slide around the drum and retained in position thereon by the flanges 21 on the exterior of the drum, as shown in Fig. 2. The shutters 20 are furnished with openings corresponding to those in the drum 19 and are adapted to be semi-rotated from without the outer casing 1 so as to open or close the perforations in the drum, by means of the racks 22 secured to said shutters, actuated by the gears 23, rods 24 and hand wheels 25. The funnel 26 is suspended beneath the open bottom of the inner casing 4 and is adapted to be raised or lowered relatively thereto by means of the chain 27, pulleys 28, rod 29 and hand wheel 30. The lower end of the funnel 26 fits easily into the pipe 31, which forms the discharge outlet for the inner casing 4.

Having thus set forth the component parts of my improved air separator, I will now describe its mode of operation. The material to be separated, having first been reduced to a relatively fine or granular condition, is fed into the hopper 10, whence it passes down the non-rotary feed pipe 9 to the discharge plate 8. The fans 7 and discharge plate 8 being secured to and rotated by the rotary hollow shaft 6 as hereinabove described, the material, on reaching the discharge plate 8 is, by centrifugal action spun outward from the latter in a fine shower and the finer particles of said material are picked up by the ascending air current created by the fans 7 and are

carried out of the inner casing 4 over into the annular space between the inner and outer casings; said finer particles settling to the bottom of the outer casing and ultimately passing off through the outlet 3. The object of the wire mesh screen 15 and the annular deflectors 16, 17 and 18 is to keep the material fed from the discharge plate 8 in the effective path of the ascending air currents or, in other words, to prevent the material from being thrown to the sides of the inner casing 4 where it would less effectively be separated by the air current. Those particles of material whose size or specific gravity is too great to allow of their being thus separated by the air current ascending against them fall through the inner casing 4 into the funnel 26 and pass off through the pipe 31 whence they may be re-ground and re-introduced into the feed hopper 10 to be again passed through the separator.

It will be observed that my arrangement of parts admits of a circulation of the air current employed in separation entirely within the inner and outer casings, thus obviating the necessity for screened openings in the outer casing with their accompanying disadvantages of back pressure. The path traversed by the air current in its circulation is indicated by the arrows in Fig. 1.

It is essential to the successful operation of this class of separators, that the velocity and volume of the air current be capable of ready and precise adjustment and control. This I accomplish by several means which may be employed to that end either severally or conjointly. In the first place the velocity of the up-draft of air within the inner casing may be increased or diminished by a corresponding increase or diminution in the rate of revolution of the fans 7. In the next place, the ingress of air into the bottom of the inner casing takes place through the annular space formed between the bottom of said casing and the top of the auxiliary funnel 26, which is of slightly greater diam-

eter than the bottom of the inner casing. By lowering the funnel 26 by the means hereinabove described, this space may be increased, and by raising the same it may be diminished, until, when the funnel 26 is drawn up to fit closely around the base of the inner casing, the air supply may be almost entirely shut off. My third means for controlling the inflow of air into the inner casing consists of the perforated drum 19 with its movable shutters 20, which latter are operated from without the outer casing. By opening or closing these shutters the flow of air into the annular space between the bottom of the inner casing and the top of the funnel 26 may be to a great extent controlled.

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

The combination with a separator having a feed-pipe, a fan and a discharge-plate, of an outer casing with tapered outlet for the discharge of the finer material, an inner casing concentrically supported within said outer casing and having a tapered outlet for the discharge of the coarser material, a reticulated screen depending from the top of said inner casing and surrounding said discharge-plate, a plurality of deflecting-rings arranged within said inner casing, the uppermost being secured to the wall of said casing and the remaining members of the series depending from the uppermost member without contact with said wall of said casing, and means for controlling the flow of air into the inner casing, said means consisting of a drum surrounding the tapered outlet of said inner casing, said drum being provided with a plurality of rows of slots or openings circumferentially arranged, each row of openings being controlled by a shutter independently actuated from without the outer casing, substantially as described.

GEORGE S. EMERICK.

Witnesses:

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