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G. S. EMERICK.

AIR SEPARATOR.

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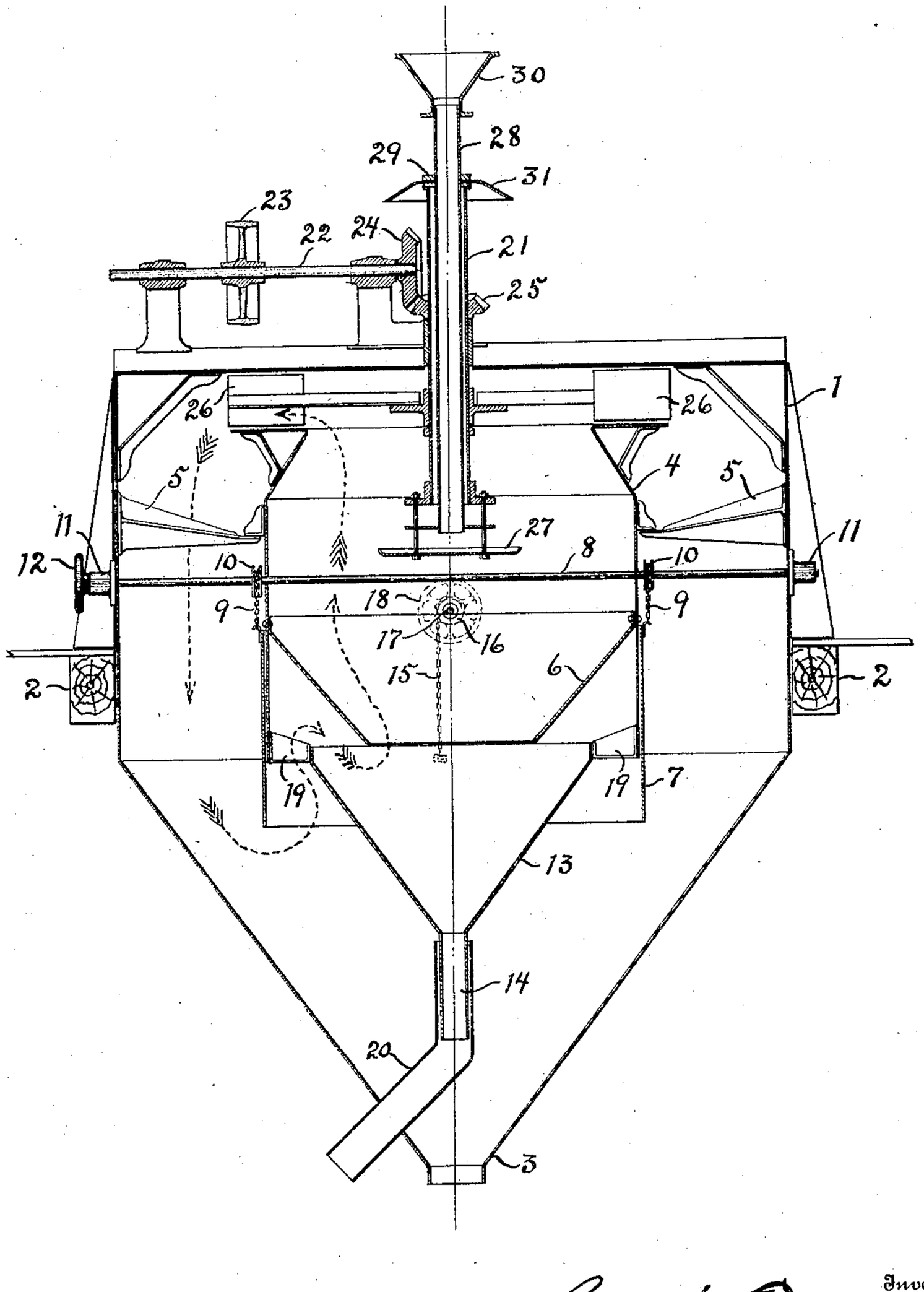

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AIR-SEPARATOR.

No. 877,557. Specification of Letters Patent. Patented Jan. 28, 1908.

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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 certain new and useful Improvements in Air-Separators, of which the following is a specification.

My invention relates to devices whereby the finer particles of previously ground or comminuted material are separated from the mass and, particularly, to that class of separators wherein the separation is obtained by subjecting the mass of material centrifugally discharged within an inner casing to the weighing or winnowing action of an ascending air current which carries the finer particles into a separate outer casing where they may be collected.

In separators of this class it is preferable to secure a continuous circulation of the air current within the apparatus rather than to draw the air supply from outside, as the latter method gives rise to back pressure and is otherwise objectionable. But the difficulty hitherto experienced in using a continuous return circulation of air within the casings has been that the opening from the outer into the inner casing is located in such proximity to the fan which creates the air current that the descending current in the outer casing loaded with the fine separated particles of material is prematurely drawn again into the inner casing. This causes a re-winnowing of the already separated material with consequent waste of power and loss in the output of the separator, due to the same material being, so to speak repeatedly re-separated.

My object is to obviate the above-mentioned defect in this class of separators by so arranging and adjusting the casings as to increase or decrease at will the path traversed by the return current of air within the casings. This I accomplish by the means herein described and shown in the accompanying drawing in which—

Figure 1 is a view, in vertical section, of the entire separator. This consists of the outer casing 1 mounted upon suitable supports 2 and provided with the discharge outlet 3. The inner casing 4, supported upon the brackets 5 secured to the outer casing 1, is cylindrical in form and is provided with the auxiliary truncated cone-shaped deflector 6. The adjustable sleeve 7, fitting closely around the lower portion of the inner casing 4, is suspended from the horizontal shaft 8 by the chains 9 and drums 10. The shaft 8 is mounted in the outer casing 1 by the bearings 11 and is rotated by the hand wheel 12.

The funnel 13, terminating in the outlet 14, is suspended within the lower portion of the inner casing 4 by means identical in character with those above described for suspending the adjustable sleeve 7, the means for suspending the cone-shaped casing 13 being indicated by the chain 15, drum 16, shaft 17, and hand-wheel 18. The brackets 19, extending inwardly from the lower edge of the casing 4, serve as guides to assist in maintaining the funnel 13 in position when at its lowest point of adjustment. The cylindrical outlet 14 of the funnel 13 fits into the sleeve of the discharge pipe or outlet 20, which serves to maintain communication between the outlet 14 of the casing and the discharge pipe 20 while at the same time allowing vertical adjustment of the funnel 13.

The hollow rotary shaft 21 extends vertically downward through the top of the outer casing 1 into the upper portion of the inner casing 4 and is actuated by any suitable means, such as the horizontal shaft 22, pulley 23 and gears 24 and 25. The shaft 21 carries the fans 26, adapted to rotate in the space between the top of the inner and outer casings. The discharge plate 27 is secured to the lower end of the shaft 21. The feed pipe 28 is mounted within the rotary hollow shaft 21 by the bearing 29 at the top of the latter and extends downward to a point a little above the discharge plate 27. The feed pipe 28 is provided with the hopper 30 and the shield 31, the function of the latter being to protect the gears 24 and 25 from any overflow from the hopper.

The mode of operation of my improved air-separator is as follows: The material to be separated, having been previously crushed or reduced to a relatively fine state, is fed into the hopper 30 and passing thence down the feed pipe 28 to the discharge plate 27 is distributed horizontally by the rotation of the latter, in a thin film or shower. The rotation of the fan 26, the blades whereof may be given a slight pitch, causes an updraft of air within the inner casing 4 which picks up the finer particles of material so distributed by the action of the discharge plate and carries them over the top of the

inner casing into the annular space between the inner and outer casings where they settle to the bottom of the outer casing and are drawn off at the outlet 3. Those particles of the distributed mass which are not of sufficient fineness to be thus carried by the air current fall downward through the circular opening in the bottom of the deflector 6, and thence through the adjustable conical casing 13 to the discharge pipe 20, from whence they may be collected, reground and re-introduced into the hopper 30.

The path of the air current is indicated by the dotted arrows in the drawing. The adjustable sleeve 7 is then shown raised about to its highest point. If this is now lowered by the rotation of the hand-wheel 12 and shaft 8 unwinding the chains 9 upon their drums the length of the inner casing is, in effect, increased, correspondingly increasing the distance between the discharge plate and the point at which the air from the outer casing reënters the inner casing and begins its upward movement. Not only can the length of the path traversed by the circulatory air current be thus increased, but also the volume of air drawn into the inner casing from below may be regulated by the same means. For as the sleeve 7 is lowered its lower lip or edge approaches the inwardly sloping lower portion of the outer casing, diminishing the annular opening through which the air is drawn.

Another means for modifying both the path and the volume of the ascending air current is supplied in the suspended, adjustable funnel 13. This is shown in the drawing adjusted at its lowest point. By manipulation of its hand wheel, shaft, drums and chains it may be raised until its upper edge approximates more or less to the inwardly sloping deflector 6. Either of these means for controlling the path and volume of the air current may be separately employed, or they may, if desired be used in conjunction, by lowering the sleeve 7 and raising the funnel 13 to any requisite extent. Any suitable well-known form of ratchet and pawl mechanism (not shown) may be employed in connection with the shafts 8 and 17 to maintain the sleeve 7 and funnel 13 at the desired point.

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

1. In combination, an outer casing with tapered outlet, an inner cylindrical casing arranged within said outer casing and provided with the truncated cone shaped deflector 6, an adjustable sleeve fitting said inner cylindrical casing, means for raising and lowering said sleeve, a funnel adjustably suspended beneath the deflector 6, and means for raising and lowering said funnel, substantially as described.

2. In combination, an outer casing with tapering base, an inner cylindrical casing of less diameter than said outer casing and mounted therein, a truncated cone shaped deflector secured within said inner cylindrical casing, an adjustable sleeve inclosing the lower portion of said inner cylindrical casing, means for raising and lowering said sleeve, a funnel adjustably suspended beneath said deflector, means for raising and lowering said funnel, a rotary hollow shaft, a fan and a discharge plate secured thereto and actuated thereby, a feed pipe, and means for actuating said rotary hollow shaft, substantially as described.

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

GEORGE S. EMERICK.

Witnesses:
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