March 25, 1947. G. S. WEINBERGER 2,418,061

CENTRIFUGAL AIR SEPARATOR AND SCREENING DEVICE FOR COMMINUTED MATERIAL

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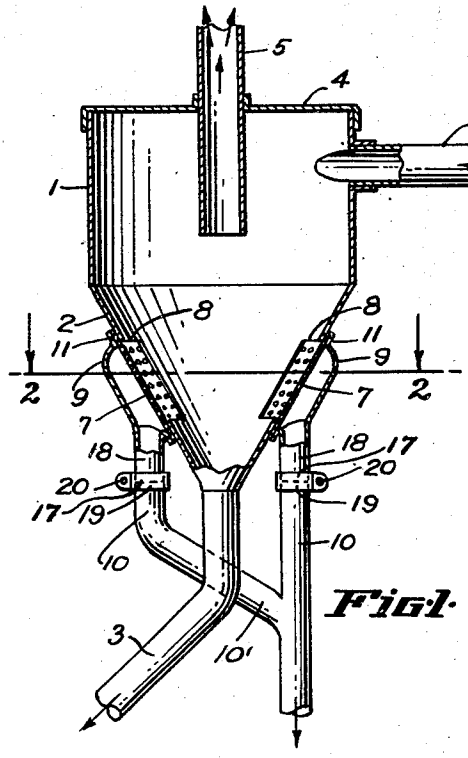
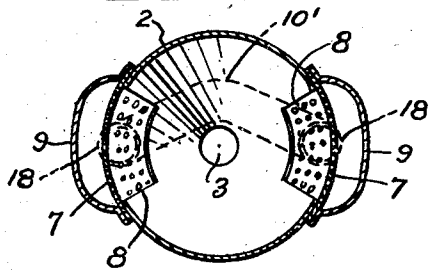


Fig. 1.

Fig. 2.



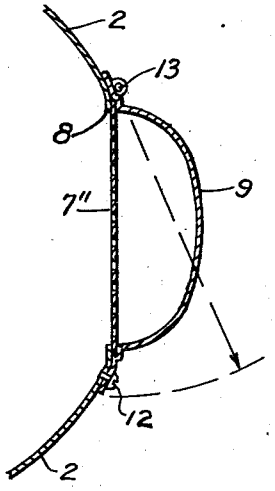


Fig. 5.

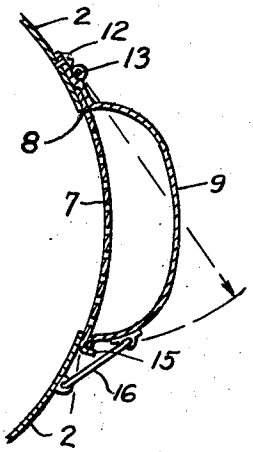


Fig. 4.

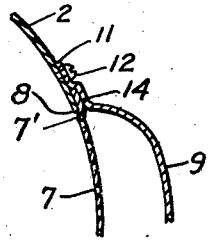


Fig. 3.

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CENTRIFUGAL AIR SEPARATOR AND SCREENING DEVICE FOR COMMINUTED MATERIAL

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5 Claims. (Cl. 209—21)

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This invention relates to centrifugal air separators or dust collector or "separators" as they are generally called, and the invention has for its principal object improvements in such a separator which will make it possible to quickly and easily change screens so as to determine the best size or type of screen to yield the particular grade of product desired.

Special features and advantages of the invention will appear in the following description and accompanying drawings.

In the drawings:

Fig. 1 is a vertical central cross section of a conventional type of centrifugal air separator as used for separating dust and fines from various ground or crushed materials, and equipped with my improvements.

Fig. 2 is a horizontal cross section of Fig. 1 as seen from the line 2—2 of Fig. 1.

Fig. 3 is an enlarged fragmentary horizontal cross section taken at the line 2—2 of Fig. 1.

Fig. 4 is a cross section similar to that of Fig. 3 but showing a modification.

Fig. 5 is another cross section similar to that of Fig. 3 but showing another modification.

Before describing the improved features of my construction it may be stated that centrifugal air separators are usually upright cylindrical chambers, generally provided with a conical lower portion with an outlet at the bottom, and into the upper portion of which chamber, the material to be treated is blasted tangentially with air under pressure so as to spin around in the container and settle along the walls to pass out of the bottom while the air and dust passes out centrally through an upwardly extending exhaust pipe. Sometimes a cylindrical or conical screen is arranged within the chamber and spaced inward from the outer casing wall or shell so as to provide a grade separation of the collected material which passes out at the bottom from a separate outlet or pipe. Such a separator is shown in old Patent No. 526,334 of September 18, 1894, and from a consideration of which it will be seen that it would be very difficult and totally impracticable to change the screen to try out the effect of different mesh screens on a given product, and it is this difficulty which it is the principal object of my invention to overcome and meet a requirement in modern farm operations, where mobile power driven mechanical equipment for grinding farm products, such as corn, alfalfa, etc., is brought to the farm by jobbing contractors to do the work required and taken away to the next farm as soon as the grinding work on one farm is completed.

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Such portable mechanical equipment comprises a motor truck mounting a hammermill or other mill driven by the truck motor and screening apparatus generally of the air separator type, and as each farmer wants certain grading or sizing of his different farm products as he may require for poultry and stock feed, etc., the difficulties of the equipment operator to meet the requirement are ordinarily very great, but easily done with my improved construction.

The main feature of my improvement is the provision of easily changeable screens applied to the air separator outer casing wall from the outside, so that the effect of different size screen openings may be observed with one screen after another, and if desired, with concurrent changing of the speed of the hammermill and/or feed of the mill.

In the drawings, the air separator chosen wherewith to show my improvements comprises a sheet metal casing forming a chamber having a cylindrical upper portion 1 joined to a conical lower portion 2 terminating in a discharge pipe 3, a cover 4 over the top of the chamber with a central upwardly extending exhaust pipe 5 for air and dust which is led away to any point desired.

The ground, crushed, or otherwise comminuted material to be separated of dust and graded is blasted into the upper portion of the chamber (generally from the mill not shown) in an air stream from a pipe 6 tangentially or close to the wall of the chamber so as to cause the material to spin around the chamber as indicated by the arrows. The course material will of course hug the wall of the chamber and gradually descend spirally to the outlet pipe 3 while the air and fine dust will be forced centrally of the whirling mass to ascend through pipe 5.

My improvements comprise the provision of one or more screen plates or sections 7 fitted over one or more openings 8 in the side or outer wall of the separator chamber, preferably, though not necessarily at the lower half or conical portion of the chamber as indicated in the drawings.

Preferably the screens are of perforated sheet metal, tho they may be of woven wire, and they are shaped to the curve of the chamber walls so as to virtually form a substantially flush continuation of the wall as indicated at 7' in Fig. 3, while spaced outwardly from the screen plate is a sheet metal chute 9 arranged to receive all materials passing through the screen and direct it downwardly to a separate discharge pipe 10. If there are two or more screens 7 and chutes

9, their discharge pipes 10 may be joined as by a transverse pipe or pipes 10' if desired.

The chute 9 is flanged as at 11 to overlap the screen plate 7 and is preferably removably secured to or hinged to the wall of the separator as by screws 12 of Fig. 3 or hinged along one edge as by the pivot pins 13 of Fig. 4, all so that the chute can either be bodily removed, or swung outwardly to renew the screen plate which manifestly may be first placed against the separator wall, or placed in the flange recess 14, and if desired first temporarily secured in either of these positions as by a few screws not shown, or held in place by friction or the hand while positioning the chute and securing the latter in place.

With the construction shown in Fig. 4 the screen plate 7 is formed with a grasping lip 15 so that it may simply be arcuately slid into place or similarly removed for quickly changing the screens to various meshes, or the chute may be swung open on its hinged joint 13 to change the screen by simply releasing the marginal hooks 16 which hold the chute snugly in place against the screen plate 7 and clamping same against the outerside of the separator wall 2. Of course any suitable packing or joint sealing (not shown) may be used if required to make the joints sufficiently tight.

To facilitate the bodily removal or outward swinging of the chutes, the juncture 17 of their necks 18 with pipes 10 are made easily separable, as by clamping straps or collars 19 which embrace the joints while overlapping both margins and are clamped in place as by bolts 20 so that these bolts need only be loosened and the collars slid up or down to free the joints.

While I prefer that the screen plates be curved substantially the same as the chamber wall so that the whirling material will pass over the screen surface without change of direction, excepting as to such material as goes through the screen to chutes 9, still, it is possible to use flat and straight screen plates as indicated in Fig. 5 at 7'' if desired.

Also, it is obvious that while I show and prefer the screen openings and screens to be in the lower part of the separator walls so as to screen or classify the material after all dust has been removed, yet for material having little or no dust the screens may be higher up, or on the cylindrical portion of the separator, or there may be some screens higher up in addition to those below. Also the screens, instead of being but two at opposite points in the diameter of the separator as shown may be of any number or size and may substantially or entirely surround the separator if desired, as long as the important feature of my invention, i. e. that of exterior quick changing of the screens is preserved.

Also to be noted is that while most centrifugal air separators of the character considered have conical lower portions, or are conical from top to bottom, some are entirely or substantially cylindrical, and my invention is equally applicable to any such separators, as will be evident to anyone practically skilled in this art and to whom its outstanding usefulness and time saving advantages will at once appeal.

It is also evident that my exteriorly removable

screens as described may additionally be used with such separators as may already have a relatively coarse inner fixed screen shell as shown in Patent No. 526,334 before mentioned, and any such use of the invention is intended to be covered in my appended claims.

Having thus described my invention and the manner of its operation and use, what I claim is:

1. In a centrifugal dust separator of the character described having an imperforate outer casing wall forming the separator chamber, the improvement which comprises a screen plate applied to an opening formed in said outer casing wall together with means to direct the discharge of material after passing from the chamber outwardly through said screen plate, comprising a chute embracing the outer side of said screen plate and provided with securing means facilitating outwardly removal of said chute and screen plate from said outer casing wall.

2. In a centrifugal dust separator of the character described having an imperforate outer casing wall forming the separator chamber, the improvement which comprises a screen plate applied to an opening formed in said outer casing wall together with a chute embracing the outerside of said screen plate to direct the discharge of material after passing from the chamber outwardly through said screen plate, and means slidably receiving said screen plate between said chute and said outer casing wall and permitting withdrawal or inserting of said screen plate from without said outer casing wall.

3. In a centrifugal dust separator of the character described having an imperforate outer casing wall forming the separator chamber, the improvement which comprises a screen plate applied to an opening formed in said outer casing wall together with a chute embracing the outer side of said screen plate to direct the discharge of material after passing outwardly from said chamber through said screen plate, and means hingedly connecting said chute to said outer casing wall for swinging outwardly to facilitate removal and replacing of said screen plate from without said outer casing wall.

4. In a construction as set out in claim 1, said separator having a conical lower casing wall portion, and said opening formed in the side of said conical wall portion.

5. In the construction set out in claim 1, said separator having a conical lower casing wall portion, and there being a plurality of the screen plates applied respectively to openings formed in the side of said conical wall portion.

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