Sept. 15, 1931. W. L. McLAUGHLIN ET AL 1,823,693

FABRIC SEPARATOR

Filed July 16, 1927

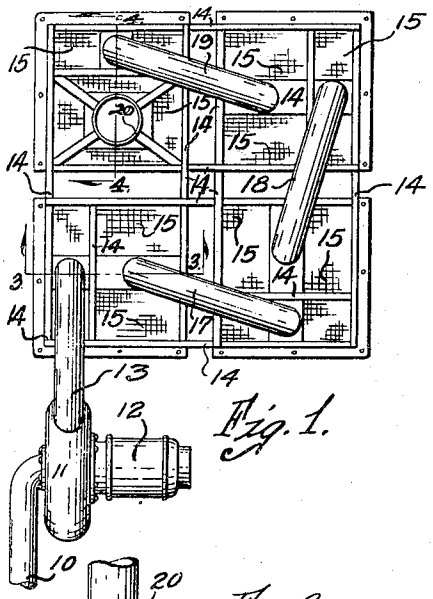

Fig. 1.

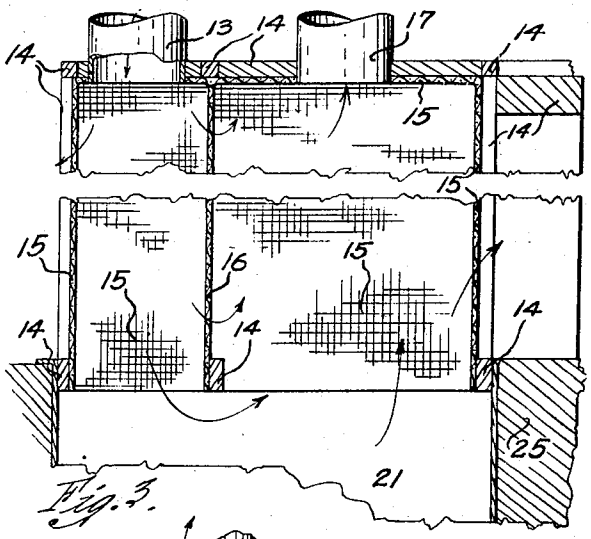

Fig. 3.

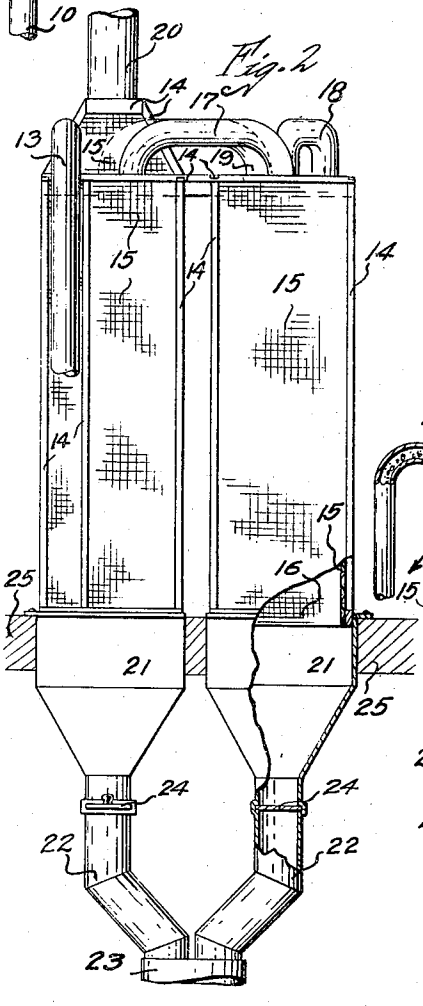

Fig. 2.

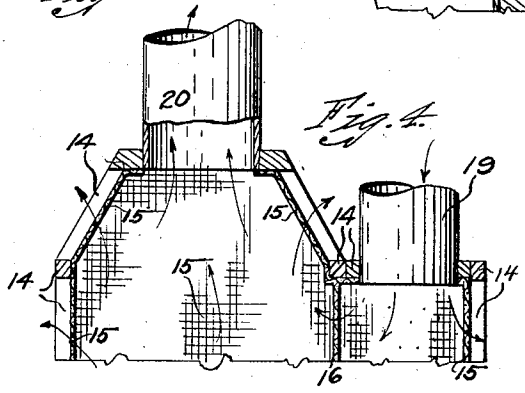

Fig. 4.

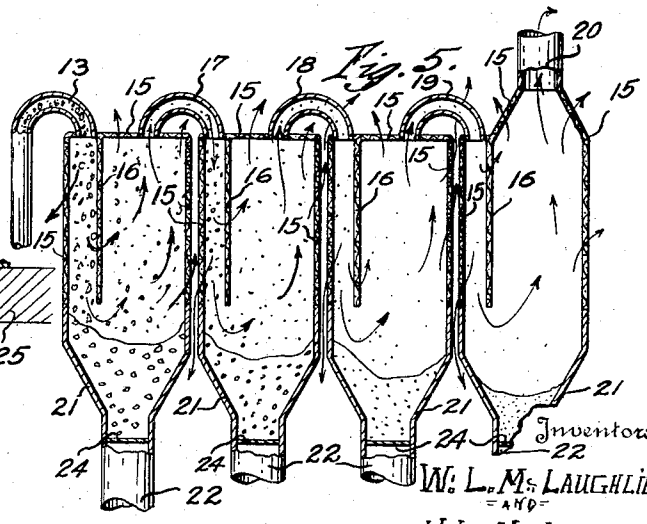

Fig. 5.

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UNITED STATES PATENT OFFICE

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FABRIC SEPARATOR

Application filed July 16, 1927. Serial No. 206,354.

The principal object of our invention is to provide an efficient device for separating powdered material from air or gas.

A further object of this invention is to provide a fabric separator for separating powdered material from air or gas that has very little if any back pressure.

A still further object is to provide a separator for separating powdered material from air or gas that is capable of grading the powdered material according to its degree of fineness.

More specifically the object of this invention is to provide a fabric separator, comprising a plurality of fabric chambers, into which the air mixed with the powdered material is serially introduced, each of said chambers having a downwardly extending fabric baffle wall to cause the inwardly coming air and powdered material to be restricted on its downward course in the chamber, and a passageway of relative large area for its course upwardly, thereby reducing the speed of the upwardly passing air to such an extent that the particles of powdered material will not easily be held in suspension therein and will settle in the receiving bin communicating with the lower end of that chamber.

A further object of this invention is to provide a fabric separator that is economical in manufacture and durable in use.

These and other objects will be apparent to those skilled in the art.

Our invention consists in the construction, arrangement and combination of the various parts of the device, whereby the objects contemplated are attained as hereinafter more fully set forth, pointed out in our claims and illustrated in the accompanying drawings, in which:

Fig. 1 is a top plan view of our fabric separator ready for use.

Fig. 2 is a side view of the separator mounted on a platform with a section cut away to more fully illustrate its construction.

Fig. 3 is a side sectional view of our separator taken on line 3—3 of Fig. 1, and illustrates the interior of one of the fabric chambers.

Fig. 4 is a side sectional view of the last fabric chamber of the series and is taken on line 4—4 of Fig. 1.

Fig. 5 is a diagrammatical side view of our device.

Many machines for the pulverizing of material such as coal and the like, use a current of air to remove the particles that have been finely ground from the machine. When this method is used, the current of material impregnated air must be passed through a separator to remove the comminuted material from the air. Perhaps the most common of the various types of separators, are the bag separator and the centrifugal separator. The bag separator is very costly to use as its only air outlet is through the fabric of the bag. This limiting of the air outlet causes not only back pressure which means the expending of much horsepower to force the air into and out of the bag, but the forcing of the air through the fabric carries with it much of the valuable material. This material and air continually passing through the bag soon wears the fabric to such an extent that the bag becomes inefficient as a separator. The centrifugal type of separator does separate much of the heavier material from the air, but much of the very fine material passes out with the air and is an economic loss. We have overcome these disadvantages as will be appreciated by those skilled in the art.

We have used the numeral 10 to designate a pipe having one end leading from a pulverizing machine, not shown, and its other end communicating with the centrifugal fan 11. This fan is actuated by the electric motor 12 and causes a current of air to pass through the pulverizing machine and gather with it the material reduced to impalpability. From this fan the air with its burden of powdered material passes through the pipe 13 into the first of the series of fabric chambers. Any number of fabric chambers desired may be used, however in the drawings we show four complete units. Each of these units has a frame which we have designated by the numeral 14 and are spaced and held apart one from the other by some of

the bracing of the frames being used for more than one unit, as shown in Fig. 1 and Fig. 2. Inclosing the four sides and the top of each unit is suitable fabric which we have designated by the numeral 15. Dividing each fabric chamber into two compartments is a vertical baffle wall 16 of suitable fabric, permanently secured in the chamber by suitable means. It should here be noted, that this fabric wall divides each chamber into two compartments, one of which is much smaller than the other, the purpose of which will hereinafter be understood. It is into the smaller compartment of the first of the series of fabric chambers that the pipe 13 discharges its air and pulverized material. The air that is not lost through the fabric sides and tops of the chambers, first passes downwardly around the fabric wall 16 in the first chamber, then up and into the pipe 17 that discharges it into the smaller compartment of the second fabric chamber. In the second chamber the air passes down and around the fabric wall in that chamber, and then up and into the pipe 18 which discharges it into the smaller compartment of the third chamber. In the third chamber the air again passes downwardly and around the fabric wall in that chamber, and then up and into the pipe 19 which discharges it into the smaller compartment of the last of the series of fabric chambers. In the last chamber the air passes downwardly and around the fabric wall 16 in that chamber, and then what is left of it, passes upwardly into the pipe 20 that leads to the outside atmosphere. Secured to the bottom of each chamber and communicating with the same is a material receiving bin 21. Each of these bins has an outlet pipe 22 leading to a common pipe 23. The numeral 24 designates a gate valve slidably mounted in each of the outlet pipes 22. The numeral 25 designates a platform upon which our separator is mounted.

The practical operation of the device is as follows:

The powdered material impregnated air is discharged into the first of the series of fabric chambers. Its downward movement will be comparatively fast, due to the relatively small area of the smaller compartment, but when it starts on its upward movement in each of the chambers, its speed will be much retarded, due to the relatively large area of the larger compartment. This retarding of the current of upwardly moving air will greatly reduce its capacity to carry the powdered material, and as the air passes through the plurality of chambers, this material will settle into the receiving bins at the bottom of each chamber. Much of this current of air will pass through the sides and tops of the fabric chambers as it passes through the separator thereby reducing its volume and further encouraging the powdered material to settle in the receiving bins. Some of this air passes through the fabric baffle walls 16 thereby retarding the main column of air that passes around the bottom of this wall. By the time the air reaches the last of the fabric chambers it is moving so slowly that the most minute particles will settle in the last receiving bin. As the speed of the current of air determines the amount and size of the particles of material settling in the receiving bins, the material will be found to be decreasing in degree of fineness from the first receiving bin. Because of this fact, any desired degree of fineness may be obtained by the use of the gate valves 24. If all of the gate valves are open, all of the powdered material will pass into the common pipe 23.

As the air entering the fabric separator may normally run its course and pass out through the pipe 20 into the outside atmosphere, little resistance is encountered, which means practically no back pressure to resist the incoming material impregnated air through the pipe 13.

By having the fabric chambers spaced apart one from the other, the air can escape from all four sides and the top of each fabric chamber.

Some changes may be made in the construction and arrangement of our improved fabric separator without departing from the real spirit and purpose of our invention and it is our intention to cover by our claims, any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

We claim:

1. In a device of the class described, a fabric chamber having its bottom open, a receiving bin inclosing the bottom of said chamber, a downwardly extending baffle wall from the top of said chamber and completely extending from one side of said chamber to the other side thereof, thereby forming a small compartment open at its bottom and a relatively large compartment open at its bottom, an inlet pipe communicating with the top of the small compartment, an outlet pipe communicating with the top of the large compartment, said baffle wall being so positioned that the powdered material impregnated air entering through the said inlet pipe will travel rapidly through the said smaller compartment due to its relatively small area and will travel very slowly upwardly through the said larger compartment due to its relatively large area, thereby permitting the material to settle in the receiving bin.

2. In a device of the class described, a fabric chamber having its bottom open, a receiving bin inclosing the bottom of said chamber, a downwardly extending fabric baffle wall from the top of said chamber and completely extending from one side of said chamber to the other side thereof, thereby forming a

small compartment open at its bottom, an inlet pipe communicating with the top of the small compartment, an outlet pipe communicating with the top of the large compartment, said baffle wall being so positioned that the powdered material-impregnated air entering through the said inlet pipe will travel rapidly through the said smaller compartment due to its relatively small area and will travel very slowly upwardly through the said larger compartment due to its relatively large area, thereby permitting the material to settle in the receiving bin.

3. In a device of the class described, a plurality of fabric chambers having their bottoms open, a receiving bin inclosing the bottom of each of said chambers, a downwardly extending fabric baffle wall from the top of each of said chambers and completely extending from one side of the chamber in which it is located, respectively, to the other side thereof, thereby forming a small and large compartment open at their bottoms in each of said chambers, pipes connecting said fabric chambers in series and of such character that the top of the small compartment of a fabric chamber will be in communication with the top of the large compartment of the fabric chamber adjacent to it, an inlet pipe communicating with the top of the smaller compartment of the first chamber in the series, an outlet pipe communicating with the top of the large compartment of the last chamber of the series; said baffle walls in said chambers being so positioned that the powdered material impregnated air entering the small compartments will travel rapidly through the same due to their relatively small area and will travel very slowly upwardly through the larger compartments, due to their relatively large area, thereby permitting the material to settle in the receiving bins.

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