B. H. REDDY.

SEPARATING DEVICE.

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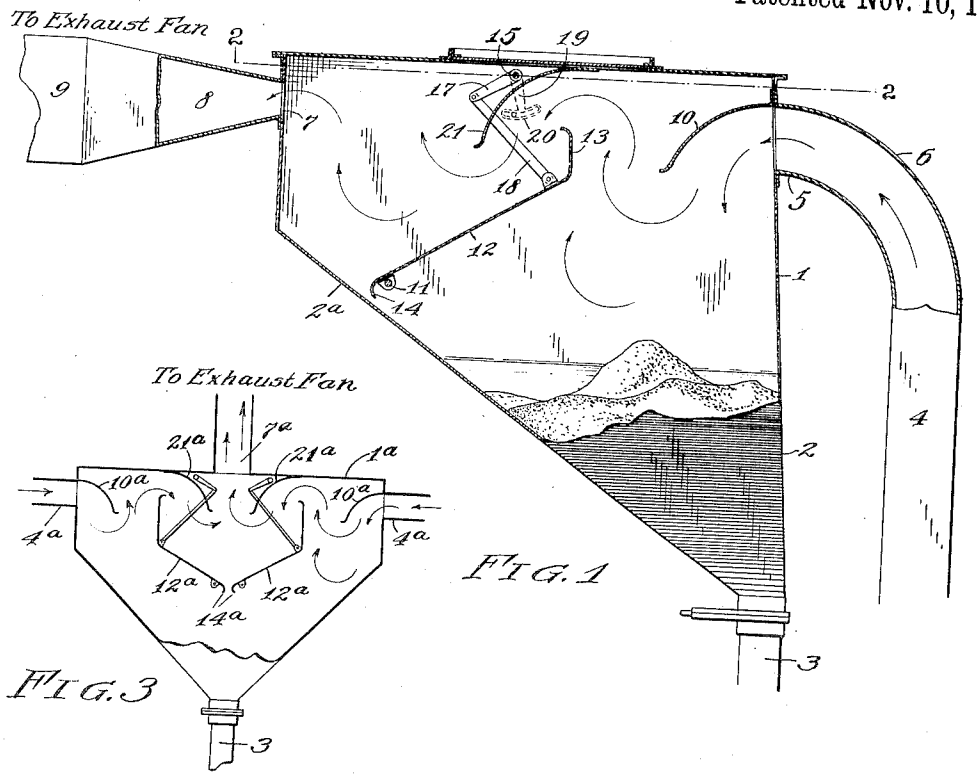
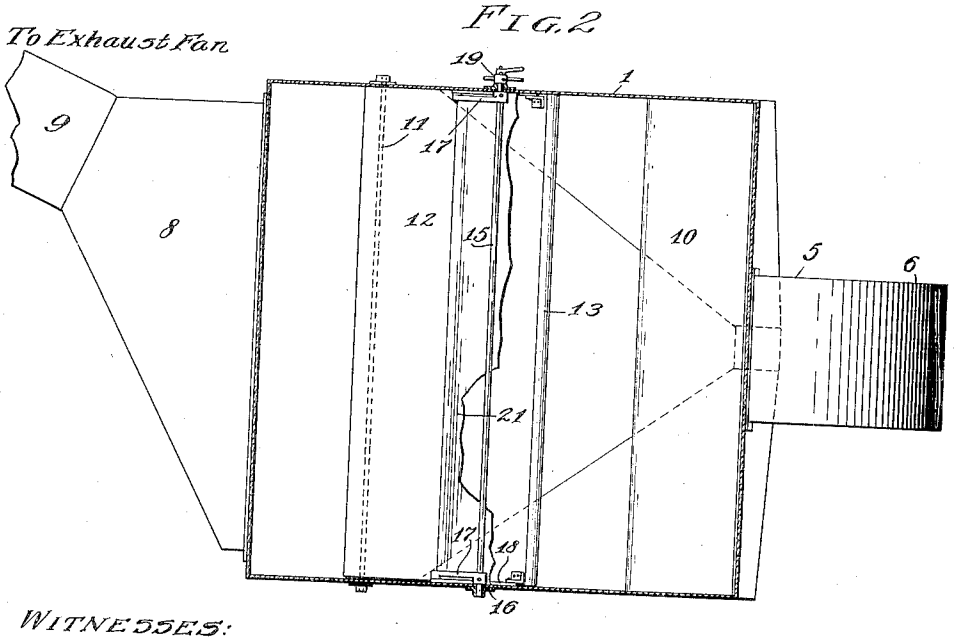


FIG. 1

FIG. 3

FIG. 2



WITNESSES:

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UNITED STATES PATENT OFFICE.

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SEPARATING DEVICE.

1,116,485. Specification of Letters Patent. **Patented Nov. 10, 1914.**

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To all whom it may concern:

Be it known that I, BYRON H. REDDY, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Separating Devices, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to devices for separating granular solids from gases, and particularly to that class of devices known as sand separators, which are used in connection with sand-blast systems for recovering the sand which has been previously used for abrading purposes, but which remains coarse enough for further use. This sand is generally picked up after use and returned to a higher level by means of a current of air, from which it must thereafter be separated and deposited in a suitable receptacle from which it may be conveniently introduced again into the sand-blast system. The dust and fine particles of broken sand should, however, be discarded so that the good sand will not be clogged or hampered thereby.

The objects of the invention are to provide a device of this character which is of simple design and substantial construction; wherein gravity and inertia contribute to the effectual separation of the sand from the air stream; wherein the aforesaid contributing agencies result naturally from the design of the device and not from the effect of moving parts or baffle plates which would be objectionable because of wearing action of the sand thereon; wherein an adjustment is provided for the purpose of causing the separator to select sand of varying degrees of coarseness; and generally to produce a device whereby particles above a certain weight and size will be collected and particles of smaller weight and size rejected with rapidity and certainty.

With these objects in view, the invention may be defined as consisting generally of the combination of elements set forth in the claims annexed hereto and illustrated in the drawings accompanying and forming a part hereof, in which—

Figure 1 is a sectional side elevation of a separator constructed in accordance with my invention; Fig. 2 is a horizontal section taken substantially on line 2—2 of Fig. 1, and Fig. 3 is a view, similar to Fig. 1, of a modified form of my invention.

Describing the parts by reference characters, 1 represents the casing or shell of the device which is preferably of substantially rectangular form and has its lower portion converging toward the bottom as at 2 where is communicates with an outlet spout 3. An air conduit 4 communicates with the interior of this casing at a point near the top of one of its upright walls, the portion of the conduit nearest the casing being preferably disposed substantially horizontal as shown at 5. The body of this conduit is usually located in an upright position from the fact that the object of the air stream is to elevate the sand from the foundry floor or scouring room so as to deliver it a second time to the air-blast nozzle or other device and permit it to be used again, although the particular mode of installation will depend upon the arrangement of the plant. It is merely essential that this conduit be formed with the smallest possible number of bends and that what bends are necessary be made with wide radius as indicated at 6 so as to prevent the formation of eddies and the consequent deposition of the sand. The other side wall of the casing is preferably formed with an elongated horizontal port 7 which communicates with the mouth 8 of a suction conduit 9, which suction conduit communicates with an exhaust fan (not shown) whereby a current of air is induced in the whole system. The port 7 preferably extends substantially the full width of the casing as shown in Fig. 2 so that the air stream is expanded within the casing and its velocity decreased, thereby lessening its carrying power.

Mounted within the casing above the mouth of the conduit 4 is a downwardly curved deflecting plate 10 whereby the incoming air and sand is deflected toward the bottom of the casing as shown by the curved arrows. Pivoted upon an axis 11 adjacent to the farther side of the casing is a septum plate 12 having at its forward edge an upturned portion 13 which, together with the edge of the plate 10, defines an upwardly

extending passageway through which the air must pass to reach the port 7. The plate 12 preferably extends from one end of the casing to the other as shown in Fig. 2 and its rearward edge is downturned as at 14 and lies closely adjacent to the casing wall so as to prevent any great amount of air from passing therebetween. In the embodiment illustrated in Fig. 1 this lip 14 lies adjacent to the slanting bottom 2^a of the casing, but it is obvious that the particular shape of the casing wall at this point is entirely a matter of design.

A rock shaft 15 traverses the upper part of the casing above the plate 12 and is journaled in the end walls thereof as shown at 16. This shaft carries an arm 17 adjacent to each of the ends of the casing and to the end of each of these arms is articulated a link 18 the opposite end of which is pivoted to the plate 12. The projecting end of this shaft is provided with a handle 19 coöperating with a sector 20 or like device whereby it may be secured in position and the inclination of the plate 12 fixed.

Carried by the top of the casing above the plate 12 is a second deflecting plate 21 also curved downwardly similar to the plate 10. The plate 21 preferably extends from end to end of the casing and is suitably slotted at its ends for the passage of the links 18. The free edge of the plate 21 extends downwardly below the level of the outlet port 7 a sufficient distance to necessitate an abrupt change in the direction of the air stream.

The operation of the device is as follows: Sand-laden air delivered to the casing by way of the conduit 4 is first thrown downwardly by the plate 10 so as to be pocketed in the space beneath the plate 12. From this pocket it escapes in an upward direction through the long passageway defined by the edge of the plate 10 and the side of the upturned portion 13. The greater inertia of the sand, together with its greater weight causes it to be thrown downwardly out of the air stream and to lodge in the lower portion of the casing, this result being also aided by the decrease in the velocity in the air caused by the increase in the area of the space through which it passes. The air which passes around the edge of the portion 13 is deflected downwardly a second time by the plate 21 after which it is forced to swerve upwardly again in order to pass through the outlet port 7. By this time its velocity will have become much diminished and the vertical dimension of the moving portion of the air stream will have become very small. For both these reasons its carrying power will be greatly diminished, and more sand will be dropped upon the upper surface of the plate 12. This sand will flow downwardly along the inclined side of this plate and be discharged through the narrow slot between the lip 14 and the casing wall. The air which passes through the port 7 will carry nothing but dust, although the fineness of this dust can be regulated by adjusting the inclination of the plate 12, since the greater the elevation of this plate, the more abrupt will be the turning of the air stream in the first chamber of the casing and the greater the decrease in speed and carrying power of the air.

In Fig. 3 I have illustrated my improved separator as formed with a double inlet so as to accommodate two conduits at one time. In this modification the casing 1^a, inlets 4^a, 4^a, deflecting plates 10^a, 10^a, 12^a, 12^a, and 21^a, 21^a are the same as before. The lips 14^a, 14^a of the plates 12^a, 12^a, instead of being disposed adjacent to a wall of the casing, are disposed adjacent to each other so as to define therebetween a narrow slit for the discharge of the finer sand which is deposited upon the upper surface of these plates. The outlet 7^a is found located at the top of the casing between the plates 12^a, 12^a.

It will be seen that this device is entirely free from moving parts or from any fixed parts or plates against which the stream of air and sand can impinge directly. Such arrangements have been tried but are objectionable because of the wearing action of the sand thereon. The deflecting plates employed in this device are arranged so that the air stream will strike them substantially tangentially so as to have its direction changed gradually and with a minimum of wear. These plates are so disposed with reference to each other that several abrupt changes in the direction of the air stream may take place in a downward direction and in the open space in the interior of the casing so that the sand may be thrown out of the air stream without danger of abrading any part of the separator. In fact the bottom part of the casing and the top of the plate 12 will generally be covered with a layer of the sand already deposited which will receive the newly separated sand without any wear whatever.

Although I have described my invention as adapted particularly for the separation of granular abrasive material such as sand from a stream of air and although the device as illustrated is particularly useful for this purpose owing to the arrangement whereby erosion of the parts is avoided, it will be obvious that it can be employed with good results for separating grain, sawdust and shavings, or any such material from a stream of moving air.

While I have necessarily described my invention in detail and pointed out at length the features of construction of the preferred embodiment thereof, it will be obvious that these details may be varied

widely and the features of construction and design varied greatly without departing from the scope of my inventive idea.

Having thus described my invention, what I claim is:

1. In a device for separating granular abrasive solids from a moving gas stream, the combination with a conduit, of a hollow casing with which said conduit communicates, said casing being of greater internal dimensions in every direction than said conduit and having separate outlets for gases and granular solids, the outlet for granular solids being in the lower portion thereof, of a deflecting plate within said casing and arranged more horizontal than otherwise and located between said solids outlet and said gas outlet and having its forward edge spaced from said inlet, and means for directing the inflowing stream away from said deflecting plate, said means defining in conjunction with said deflecting plate a narrow elongated passageway, such passageway being disposed at a point removed from the course of said inflowing stream whereby the direction of flow of the gases will be changed abruptly without causing the granular solids to impinge upon said plate.

2. In a device for separating granular solids from a moving gas stream, the combination, with a casing having substantially vertical walls, one of said walls having an inlet and the opposite wall an outlet, of a curved deflecting plate within said casing and located above said inlet and adapted to change gradually the course of the inflowing stream and direct it toward the lower part of said casing, a second deflecting plate within said casing between said inlet and said outlet and located above and at one side of and out of the direction of such inflowing stream, said second deflecting plate extending into close proximity with but spaced from the side of the casing opposite to said first deflecting plate and with the ends of said casing and having its edge nearest to said first deflecting plate spaced therefrom and from the top of the casing to define an elongated upwardly opening passageway.

3. In a separating device for heavy granular particles mixed with air, the combination, with a casing having at one side an inlet opening for mixed air and granular particles and at the other side a horizontally elongated, vertically narrowed outlet opening, of means for deflecting downwardly the inflowing stream, a septum plate projecting from the side of the casing opposite said inlet and overlying the bottom of the casing so as to define a chamber, the forward edge of said septum plate being substantially horizontal and spaced from the inlet side of the casing, so as to define an upwardly opening elongated passageway extending from end to end of the casing, a deflecting flange carried by the forward edge of said septum plate and extending upwardly to a point adjacent to the top of the casing, and a second deflecting plate carried by the casing and overlying said septum plate, and having its lower edge located below the plane including the edge of said flange and the edge of the outlet opening.

4. In a separating device for heavy granular particles mixed with air, the combination, with a casing having at one side an inlet opening for mixed air and granular particles and at the opposite side a horizontally elongated outlet opening, the lower portion of said casing being formed with a sand receptacle, of a curved deflecting plate within said casing and located above said inlet and adapted to change gradually the course of the inflowing stream and direct it toward the lower part of said casing, an inclined septum plate in said casing, and running from end to end thereof, the upper edge of said septum plate being located adjacent to and above the edge of said deflecting plate and spaced therefrom to define a passageway for gas, the opposite edge of said septum plate being located adjacent to the opposite side of the casing, and spaced therefrom a short distance so as to define a comparatively narrow discharge opening for granular material, and a deflecting plate mounted above said septum plate and adapted to direct downwardly the air flowing through said passageway, the edge of said second deflecting plate being disposed lower than the plane including the uppermost edge of said septum plate and a side of said outlet opening.

5. In a separating device for heavy granular abrasive particles mixed with air, the combination, with a casing having at one side an inlet opening for mixed air and granular particles and at the opposite side an outlet opening, the lower portion of said casing being formed as a sand receptacle, of means for directing the inflowing stream downwardly toward the lower part of said casing, a septum plate within said casing and overhanging said sand receptacle, said septum plate extending from a point beneath said outlet opening to a point adjacent to said directing means, whereby the air stream will be directed sharply upwardly and conducting the same to the upper part of the casing, means for deflecting said air stream successively downwardly and upwardly after its passage by the edge of said septum plate, and means for conveying the granular particles deposited from the air stream upon said septum plate directly to the lower portion of the casing without permitting the direct passage of air in the opposite direction.

6. In a device for separating granular solids from gases, the combination with a

closed casing having an inlet and an outlet, said inlet being substantially horizontal and facing said outlet, and the lower portion of said casing being formed as a receptacle for granular material, of a conduit for mixed granular solids and gases communicating with said inlet, a deflecting plate adjacent to said inlet and adapted to divert downwardly the gases and solids entering therethrough, a septum plate interposed between said outlet and the lower portion of said casing and running substantially from end to end thereof, the portion of said septum plate adjacent to said deflecting plate being turned upwardly and spaced from said deflecting plate to define an elongated passageway for said gases, a second deflecting plate mounted in said casing at the opposite side of said septum plate from said first deflecting plate and adapted to divert downwardly the gases passing through said passageway, the edge of said second deflecting plate being disposed below the outlet opening, and means for conveying to the lower portion of said casing the granular material deposited on the upper surface of said septum plate without permitting any material flow of gas.

7. In a device for separating granular solids from gases, the combination with a substantially closed casing having therein an inclined septum plate whereby the same is divided into lower and upper compartments, the upper edge of said septum plate being substantially horizontal and defining an elongated passageway for gases, and the remaining edges of said plate being so located with reference to the parts of the separator as to prevent the passage of any material amount of gas thereby, the side wall of said casing adjacent to the free edge of said septum plate being formed with an inlet opening for mixed granular solids and gases, means for deflecting downwardly into the lower chamber the gases and solids entering through said inlet, the portion of the chamber above said septum plate being in communication with a horizontally extending elongated outlet, and means in such upper chamber for deflecting downwardly the air stream passing therethrough, said deflecting plate being arranged between the free edge of said septum plate and said outlet.

8. In a device for separating granular solids from gases, the combination, with a casing having at one side an inlet opening for mixed air and granular particles and at a point removed from said inlet opening a horizontally elongated outlet opening, of a depending deflecting plate mounted in said casing between the inlet and the outlet, the lower edge of said plate being substantially horizontal and spaced from all parts of the casing and the remaining edges of said plate being connected to the casing walls so as to prevent the passage of gas therearound, a septum plate interposed between the edge of said deflecting plate and said outlet, said septum plate having at its forward edge a substantially vertical upturned portion whose upper edge is spaced from the top of the casing to form a passageway, the remaining edges of said septum plate disposed closely adjacent to the walls of the casing so as to prevent any material flow of gas therearound, and means for varying the height of the forward edge of said septum plate so as to vary the width and direction of said passageway.

9. In a device for separating granular solids from a moving gas stream, the combination, with a casing having an inlet and an outlet located at spaced points of its upper portion and a conduit for mixed granular solids and gases communicating with said inlet, there being an outlet for granular solids formed in the lower part of said chamber, of a plurality of depending deflecting plates located within said casing between said inlet and said outlet and having free, substantially horizontal lower edges, the remaining edges of said deflecting plates extending into close proximity with the walls and top of the casing so as to prevent any material flow of gas therearound, a septum plate located between the top and bottom of said casing and dividing the same into upper and lower compartments, said septum plate having its forward edge upturned and interposed between a pair of said first plates to form a narrow, elongated, tortuous passageway, the opposite edge of said septum plate extending to a point adjacent said outlet and the side edges extending into close proximity with the walls of the casing so as to prevent any material flow of gas therearound and means for varying the height of the forward edge of said septum plate so as to vary the width and tortuousness of said passageway.

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

BYRON H. REDDY.

Witnesses:

HAROLD S. SMITH,

BRENNAN B. WEST.