April 22, 1924. 1,491,429

A. H. STEBBINS

PNEUMATIC SIZER

Filed April 8, 1922

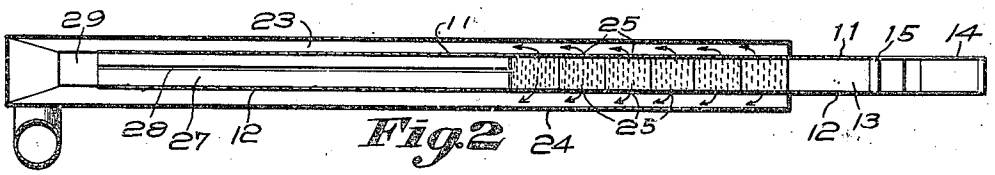


Fig. 2

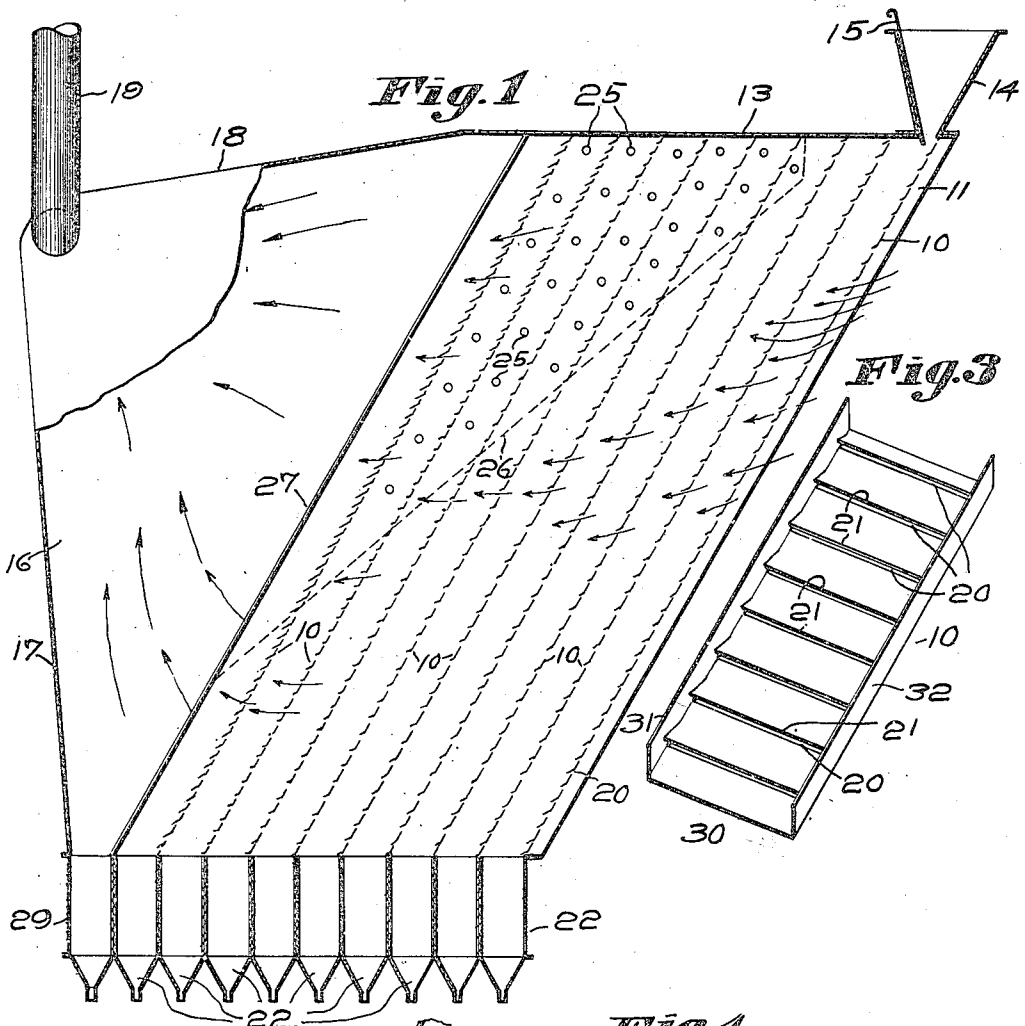


Fig. 1

Fig. 3

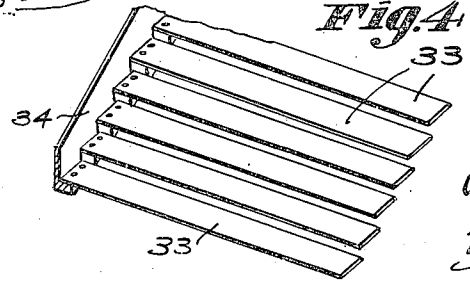


Fig. 4

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Patented Apr. 22, 1924. 1,491,429

UNITED STATES PATENT OFFICE.

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PNEUMATIC SIZER.

Application filed April 8, 1922. Serial No. 550,874.

To all whom it may concern:

Be it known that I, ALBERT H. STEBBINS, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented an Improvement in Pneumatic Sizers, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

The present invention relates to pneumatic sizers or separators for separating materials in accordance with their size and specific gravity.

The sizing of materials has been commonly accomplished heretofore by the use of screens or screening surfaces upon which the materials are delivered that the finer materials may pass through the apertures of the screen and escape from the coarser materials.

In different fields of industry, and more particularly in the treatment of ores, it may be desirable to separate the materials in accordance with their differences in size and also in accordance with their differences in specific gravity to promote the separation of the values from the foreign materials. This can not be done by the ordinary screen, because screens separate in accordance with size alone.

The present invention therefore contemplates a pneumatic sizer or separator constructed to effect the passage of air through the materials to be treated as these materials travel along a supporting surface. In the present construction provision is made for separating materials into a number of different grades, and to this end a plurality of apertured surfaces are provided in spaced relation so that air currents may be passed successively through the spaced surfaces to carry with them the lighter particles of the materials. The different surfaces serve to remove different materials from the air currents and the surfaces serve also to direct the different materials which they separate out into different receptacles.

One feature of the present invention resides in a series of apertured surfaces arranged one in front of the other so that air currents may be passed successively through these surfaces, and drop the lighter materials thereupon.

Another feature of the invention resides in means for reducing the strength of the air currents as the air passes through the successive surfaces.

Still another feature of the invention resides in the construction of the inclined apertured surfaces over which the materials pass whereby the materials are prevented from falling through the apertures.

Other features of the invention and novel combination of parts will be hereinafter described in addition to the above, and in connecting with the accompanying drawings which show one good practical form of the invention, wherein:

Fig. 1 is a vertical sectional view through a pneumatic sizer constructed in accordance with the present invention.

Fig. 2 is a top plan view of Fig. 1, the upper wall of the casing being removed throughout the greater portion of its length.

Fig. 3 is a perspective view of a portion of one of the apertured surfaces within the sizer; and

Fig. 4 is a perspective view of a modification of the perforated surface shown in Fig. 3.

In the embodiment of the invention shown, a series of relatively long, narrow apertured surfaces 10 are provided arranged in spaced relation one in front of the other, and these surfaces preferably are supported at a relative steep inclination as shown. The surfaces 10 are mounted in a casing having the side walls 11 and 12, and the upper ends of the surfaces are covered by the upper wall 13. The materials to be separated are delivered to the first apertured surface 10 of the series by a hopper 14, preferably provided with a gate 15 for controlling the flow of materials to the surface.

The separation of the materials is effected by subjecting the materials passing downwardly over the first surface 10 to air currents passing successively through the series of inclined surfaces. These air currents may be variously produced, and one satisfactory means for this purpose consists in a hood 16 extending over the last surface 10 of the series and having its end walls 17 and 18 converging towards the apex of the hood, which apex has a conduit 19 leading therefrom. Air is exhausted from the hood 16 by connecting the conduit 19 with an exhaust fan or other exhaust means, and as air is removed from the hood 16 a suction is produced through the apertured surfaces 10 which causes air currents to pass through

these surfaces as indicated by the arrows. The end of the separator casing adjacent the first apertured surface 10 is open to permit air to pass freely therethrough.

The apertured surfaces 10 may be variously constructed, and since it is desirable that the finer materials be carried through a number of the surfaces 10 by the air currents passing therethrough, the apertures 20 should be made sufficiently large to facilitate the passage of the finer materials therethrough. It is desirable to prevent the materials passing downwardly over the inclined surfaces 10 from falling through the apertures 20, and to this end each aperture may be provided with an overhanging lip 21 that deflects the materials from the adjacent aperture.

The air currents passing through the apertures 20 preferably are strong enough to carry with them all but the heavier materials passing downwardly over the first apertured surface 10. The strength of the air should be such that materials of different weight or size will be arrested by different surfaces 10, so that each surface in the series will direct materials to its lower end that are finer than the materials separated out by the preceding surfaces. Each surface 10 may have a receptacle 22 at its lower end to receive the materials delivered thereto by the surface.

It is desirable to reduce the strength of the air currents as they progress through the different surfaces 10 so that the air will progressively release the finer particles carried thereby, and to this end, means is provided for removing the air laterally from between adjacent surfaces. In the present instance this is accomplished by providing the chambers 23 and 24 secured to the walls 11 and 12 of the casing, and the walls 11 and 12 are provided with apertures 25 leading into these chambers. The chambers 23 and 24 communicate with the exhaust pipe 19 so that air may be drawn from these chambers and from the spaces between the surfaces 10 as indicated by the arrows in Fig. 2. Since it is desirable to reduce the strength of the air by successive steps as it passes through the surfaces 10, the apertures 25 between adjacent surfaces are increased in a corresponding order as will be apparent from Fig. 1. To accommodate this disposition of the apertures 25, the chambers 23 and 24 need not extend over the entire walls 11 and 12 but may terminate along the inclined line 26.

In order to produce air currents of substantially the same strength throughout the length of a surface 10, it is desirable to make these surfaces relatively narrow, and, to further equalize the strength of the air, a wall 27 is provided extending approximately parallel to the last apertured surface 10 and having a relatively narrow slot 28 extending throughout the length of the apertured surface for the passage of air through the slot. In this manner the slot 28 provides a long narrow throat which causes the air to spread out lengthwise as it passes through the throat. The lighter materials that settle in the hood 16 will slide down the wall 27 into the container 29, and the materials that settle in the chambers 23 and 24 will slide down the incline surfaces 26 toward the container 29.

Each apertured surface 10 may be constructed from a single sheet of metal 30 having the bent up sides 31 and 32 (see Fig. 3) between which the apertures 20 and lips 21 extend, and the sides 31 and 32 may be secured to the side walls 11 and 12 of the casing. In come cases it may be desirable to construct the apertured surfaces of transversely extending slats 33 supported in spaced relation as shown in Fig. 4 by the side members 34.

The air currents passing successively through the apertured surfaces 10 will remove the dust and lighter materials from the coarser materials traveling downward over the first surface 10, and these lighter materials will find their way into the different receptacles 22 as they are released by the air.

What is claimed is:

1. A pneumatic sizer comprising, in combination, a series of inclined apertured surfaces arranged in spaced relation one in front of the other, and extending in the same general direction, a casing enclosing said surfaces, means for delivering materials to the first inclined surface of the series to pass downwardly along the upper face of said surface, means for producing air currents passing successively through the spaced surfaces to carry the lighter particles through the different surfaces, and means for reducing progressively the strength of the air passing through said surfaces that different materials will be deposited by the air upon different surfaces.

2. A pneumatic sizer comprising, in combination, a series of long narrow apertured surfaces arranged one in front of the other and supported at a steep inclination, a casing inclosing the series of surfaces, means for delivering materials to be separated to one of the surfaces to pass downwardly over the same, means for producing air currents passing successively through the surfaces to carry the materials to be separated through the different surfaces, means for removing air from between some of the surfaces to progressively reduce the strength of the air currents passing through the surfaces, and means for receiving the materials from the different inclined surfaces.

3. A pneumatic sizer comprising, in com-

bination, a series of inclined apertured surfaces arranged in spaced relation one in front of the other, means for delivering materials to be separated to one of the surfaces to pass downwardly over the same, means for producing air currents passing through the series of surfaces to carry the lighter materials through the different surfaces, a casing for the surfaces having walls provided with apertures to permit air to escape from between some of the surface to thereby reduce the strength of the air current, and means for receiving the materials directed downwardly by the different surfaces.

4. A pneumatic sizer comprising, in combination, a casing, a series of inclined apertured surfaces within the casing, means for delivering materials to be separated to one of said surfaces to pass downwardly over the same, means for drawing air currents successively through the surfaces to carry the lighter materials through the different surfaces, auxiliary means for drawing air from between some of the surfaces to reduce the strength of the air passing successively through the surfaces, and means for receiving the materials passing down the different surfaces.

5. A pneumatic sizer comprising in combination, a series of inclined apertured surfaces arranged in spaced relation one in front of the other, a casing enclosing the series of surfaces, means for delivering materials to be separated to one of the surfaces to pass downwardly along the same, means for drawing air currents successively through said surface including a hood extending over the last surface and connected with exhaust means, air equalizing means for equalizing the currents of air produced through the apertures of the inclined surfaces comprising a slotted member providing a long narrow slot extending throughout the length of said last surface and in spaced relation thereto, and means for receiving the different materials released by the air currents between the different surfaces.

6. A pneumatic sizer comprising in combination, a series of inclined apertured surfaces arranged in spaced relation one in front of the other, a casing enclosing the series of surfaces, means for delivering materials to be separated to one of the surfaces to pass downwardly along the same, means for exhausting air from the casing to draw air successively through the apertured surfaces from the lower to the upper face of each surface to lift the lighter materials and carry them successively through the different surfaces so that materials of different specific gravity will be deposited upon different surfaces to slide down the same, and air equalizing means for equalizing the currents of air passing through the apertures of the surfaces comprising a narrow throat through which the air passes and extending lengthwise of and in spaced relation to the last apertured surface of the series.

7. A pneumatic sizer comprising in combination, a series of long narrow apertured surfaces supported in an inclined position and spaced one in front of the other, a casing enclosing said surfaces, means for delivering materials to the first inclined surface of the series to pass downwardly along the upper face of said surface, overhanging lips adjacent the apertures of the surfaces to prevent materials from falling through the apertures as they pass downwardly over the surface, means for producing air currents passing successively through the spaced surfaces from the lower to the upper face of each surface to lift the lighter materials successively through the surface, means for decreasing the strength of the air as it passes successively through the different surfaces so that materials of different specific gravity will be deposited upon different inclined surfaces, and means for receiving the materials that are deposited upon the different inclined surfaces.

In testimony whereof, I have signed my name to this specification.

ALBERT H. STEBBINS.