

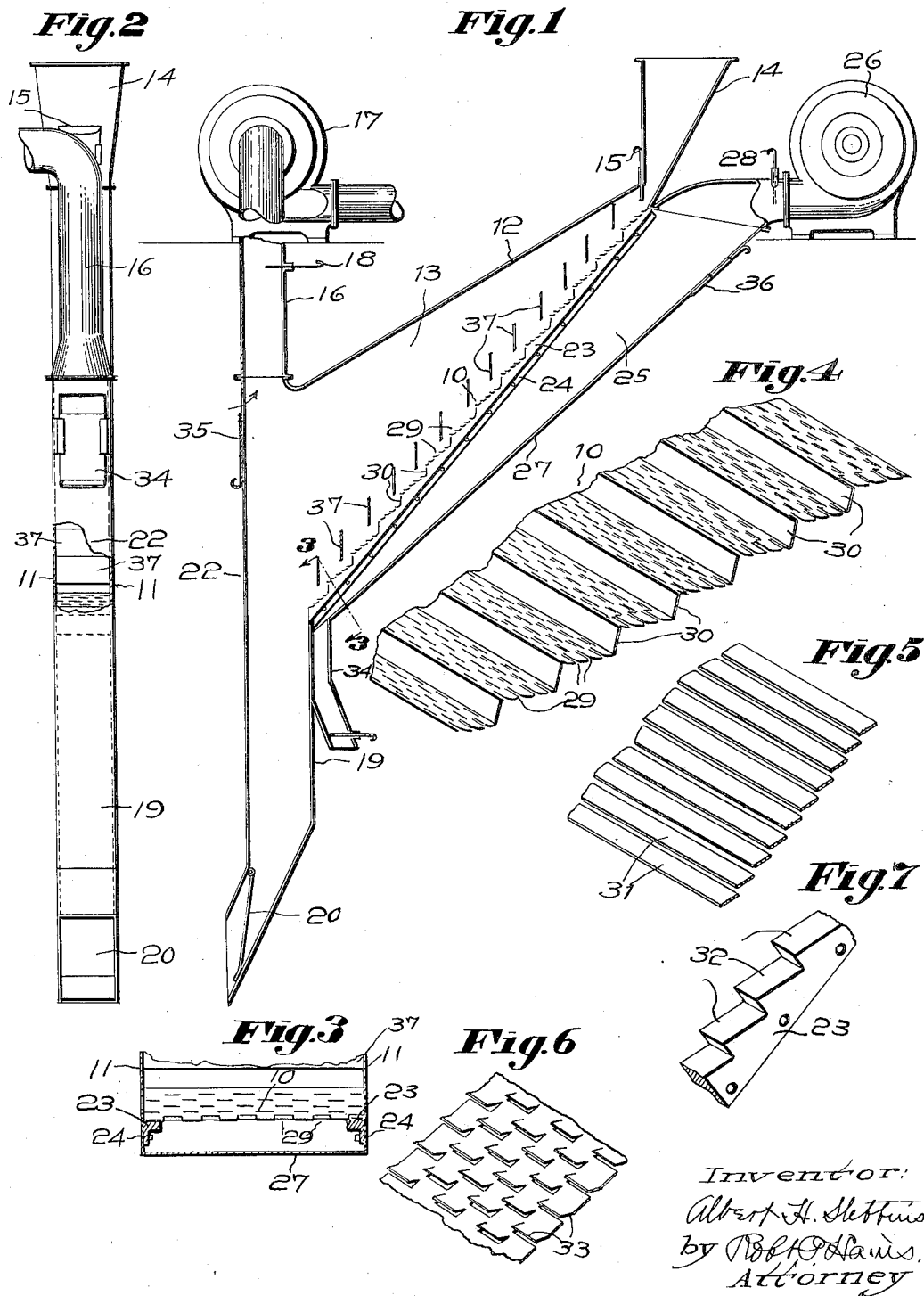
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A. H. STEBBINS

PNEUMATIC SIZER

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UNITED STATES PATENT OFFICE.

ALBERT H. STEBBINS, OF LOS ANGELES, CALIFORNIA.

PNEUMATIC SIZER.

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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 a pneumatic sizer or separator for separating materials in accordance with their size and specific gravity.

Heretofore the sizing of materials has been commonly accomplished by the use of screens, the materials to be treated being delivered to the upper surface of the screen so that the finer materials pass through the apertures of the screen and escape from the coarser materials.

In various fields of industry, and more particularly in the treatment of ores, it may be desired to separate the materials in accordance with their differences in size, and to produce a partial separation in accordance with the differences in specific gravity thereby to promote separation of the values from the foreign materials. This can not be done by the ordinary screen or screen clothing, because screens separate in accordance with size alone.

One important feature of the present invention, therefore, is to provide a sizer or separator which will separate materials in accordance with their differences in size, while at the same time it will produce a partial classification of the materials in accordance with their differences in specific gravity.

In carrying out the present invention, the materials to be separated may be passed over a supporting surface through which currents of air are passed so that the lighter particles will be removed by the air from the heavier particles. In thus effecting the sizing or separation of materials pneumatically, it is important that the air currents passed through the supporting surface and through the materials traveling over the surface be substantially uniform in strength so that uniform separation of the materials will be effected throughout the active length of the supporting surface.

Another feature of the present invention, therefore, consists in means for producing air currents passing through the supporting

surface throughout its length which are substantially uniform in strength.

It is also important that means be provided for regulating the strength of air passing through the supporting surface thereby to increase or decrease the proportion of light materials removed from the heavier materials. If only very light materials are to be removed in the separating operation, the air currents passing through the supporting surface should be correspondingly weak, but these weak currents may not serve to carry the lighter materials away after separating them from the heavier materials, and it may therefore be desirable to provide a second air current that will assist the separating air currents in carrying off the light materials.

Another feature of the invention, therefore, consists in means for producing an air pressure at one side of the supporting surface to force air through the surface and materials passing over the same, and in different means for producing a suction at the other side of the supporting surface.

Other features of the invention and novel combination of parts will be hereinafter described in addition to the above, and in connection 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 an end elevation of Fig. 1 viewed the same from the left.

Fig. 3 is an enlarged sectional view on line 3—3 of Fig. 1.

Figs. 4, 5 and 6 are perspective views of different types of material supporting surfaces adapted for use with the present pneumatic sizer; and

Fig. 7 is a fragmentary perspective view of a side bar adapted to support the surfaces shown in either Fig. 4 or 5.

The materials to be separated preferably move by gravity downwardly over a supporting surface 10 which may be variously constructed to permit air to pass through the surface and through the materials passing over the same.

In the embodiment of the invention illustrated, the supporting surface 10 is enclosed by a casing having side wall 11 and a top wall 12, and the casing forms a chamber 13 extending over the supporting sur-

face. In constructions where gravity is relied upon to advance the materials over the surface 10, this surface may be supported by the enclosing casing in an inclined position as shown, and a hopper 14 upon the casing may serve to deliver the materials to the surface. The hopper may be provided with a sliding gate 15 adjustable to control the flow of materials to the surface 10.

10 The separation of materials is effected by passing air through the materials as they travel over the surface 10, and to this end the surface is provided with apertures or opening through which currents of air may pass. Air may be passed through the apertures of the surface by creating a suction to one side of the surface so that air will be drawn through the apertures, or it may be forced through by increasing the air pressure at the lower side of the supporting surface, and in some cases it may be desirable to use both means to produce air currents passing through the apertures of the surface 10.

25 In cases where it is desired to draw air through the surface 10 an outlet conduit 16 is provided leading from the chamber 13, and the conduit is connected to a suction fan 17 or other means for exhausting air from the chamber. A sliding gate 18 within the conduit 16 serves to regulate the suction of air there through. At the lower end of the surface 10 may be provided a pipe 19 leading downward therefrom to discharge the heavier materials from the separating casing, and the pipe 19 may be provided with a swinging trap 20 that permits the discharge of materials without permitting air to enter the chamber 13.

40 As stated it is important that the air currents passing through the surface 10 be substantially uniform in strength, and to this end, the surface 10 is made relatively long and narrow, since difficulty is experienced in controlling the air currents through a relatively wide supporting surface. The walls 11 are disposed at the sides of the surface 10 and extend upwardly to form the side walls of the chamber 13, and the upper portion of this chamber is closed by the wall 12 while the end is closed by the wall 22. The mouth of the conduit 16 is shown as positioned above the lower end of the surface 10 and the walls 12 and 22 preferably converge toward this mouth so that air will be drawn toward the mouth with substantially equal force from all portions of the surface.

The upper wall 12 is shown as extending from adjacent the upper end of the surface 10 at an acute angle to the surface toward the mouth of the conduit disposed above the lower end of the apertured surface, the arrangement being such that the wall 12 extends over substantially the entire surface 10, and as a result of this construction the particles picked up by the air at the upper end of the surface 10 are required to travel a substantial distance in a more or less horizontal direction before reaching the mouth of the conduit. This is desirable because it increases the length of time afforded the heavier particles picked up by the air currents to settle within the chamber 13. The surface 10 may have side bars 23 secured thereto and adapted to rest upon strips 24 secured to the side plates 11.

The construction so far described constitutes a satisfactory sizer or separator, but in some classes of work it is desirable to obtain a flow of air through the surface 10 by producing air pressure below this surface, and to this end a chamber 25 may be provided at the lower side of the surface 10. This chamber may be formed as a part of the casing enclosing the surface 10, or it may be constructed as a separate casing that may be removed from the first casing, it being understood that the chamber 25 is not an essential feature of the present invention in all of its aspects, and if desired the lower face of the surface 10 may be exposed. Air may be forced into the chamber 25 from a fan 26 or other suitable means, and the lower wall 27 of this chamber preferably extends from one end of the surface 10 toward the air inlet or fan at an acute angle to the surface as shown, so that air will be delivered to the surface with substantially equal pressure throughout the length of the surface. The strength of the air delivered by the fan 26 may be controlled by an adjustable gate 28.

The construction of the supporting surface 10 may vary in accordance with the class of work to be done. If finely crushed materials are to be treated, a surface such as shown in Figs. 1 and 4 is desirable wherein the surface is given a stepped construction having the perforated portions 29 connected by angularly disposed portions 30, the arrangement being such that as the materials reach the lower edge of the portions 29 they fall to the next portion. This fall is desirable as it serves to release the fine particles of materials from the larger particles. When relatively large materials are to be treated the construction shown in Fig. 5 is desirable as the strips 31 may conveniently be made heavy to withstand the greater wearing effect of the larger materials. The ends of the strips 31 may be secured to the surfaces 32 of the bars 23. In many cases the surface shown in Fig. 6 will be desirable as it may be easily and inexpensively produced from sheet metal by forming the perforations having the upwardly bent lips 33, which lips assist in preventing materials from entering the perforations.

The supporting surface 10 should be so

constructed that materials are prevented, as far as practical, from passing through the air apertures. Such materials as may pass through these apertures will slide down the surface 27 into the discharge pipe 34.

In some cases it may be desirable to admit air to either the chamber 13 or the chamber 25 and to this end the doors 35 and 36 are provided. The air separation, it will be understood, may be supported in the position shown by any suitable frame.

In cases where the supporting surface has the stepped construction shown in Figs. 1 and 4, and has the apertures formed to face toward the wall 22 as shown, it may be desirable to provide baffle plates 37 extending across the casing in spaced relation to each step 29 of the surface 10 to arrest and direct downward the heavier materials that may be lifted from the steps by the air. The baffle plates 37 are spaced sufficiently from the surface 10 to clear the materials traveling downwardly along the same but arrest the heavier materials lifted from the surface by the air currents. The apertures of the surface 10 however need not, in all cases, face away from the direction in which the materials advance, since the air passing through the apertures may be of sufficient strength to prevent the materials from entering the apertures.

The operating of the present device is such that as the materials pass downwardly over the apertured surface 10, air currents will pass through the materials and will remove the dust and fine particles but will leave the materials which due to their size or specific gravity will not be picked up or carried off by the air.

What is claimed is:

1. A pneumatic sizer comprising in combination, a relatively long narrow casing

supported at a longitudinal inclination, an apertured surface mounted within the casing and extending diagonally thereof at an increased inclination and forming oppositely flaring air chambers at the opposite sides of said surface, means for delivering the materials to be treated to the upper end of the inclined casing for delivering air under pressure to the under face of the apertured surface, means at the opposite end of the casing for exhausting air from the space above said surface and adapted to draw air from the upper portion of the apertured surface in approximately a horizontal direction, and upstanding baffles within said casing near the upper face of said surface and arranged to arrest the heavier particles carried laterally by the air.

2. A pneumatic sizer comprising in combination, a relatively long narrow casing supported at a longitudinal inclination, an apertured surface mounted within the casing and extending diagonally thereof at an increased inclination and forming oppositely flaring chambers at the opposite sides of said surface, means for delivering the materials to be treated at the upper end of the apertured surface, means near the upper end of the apertured surface for delivering air under pressure to the under face of said surface, means above the lower end of the apertured surface for exhausting air from above the apertured surface and adapted to draw air from the upper portion of the apertured surface in approximately a horizontal direction to promote settling of the heavier particles out of the air.

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

ALBERT H. STEBBINS.