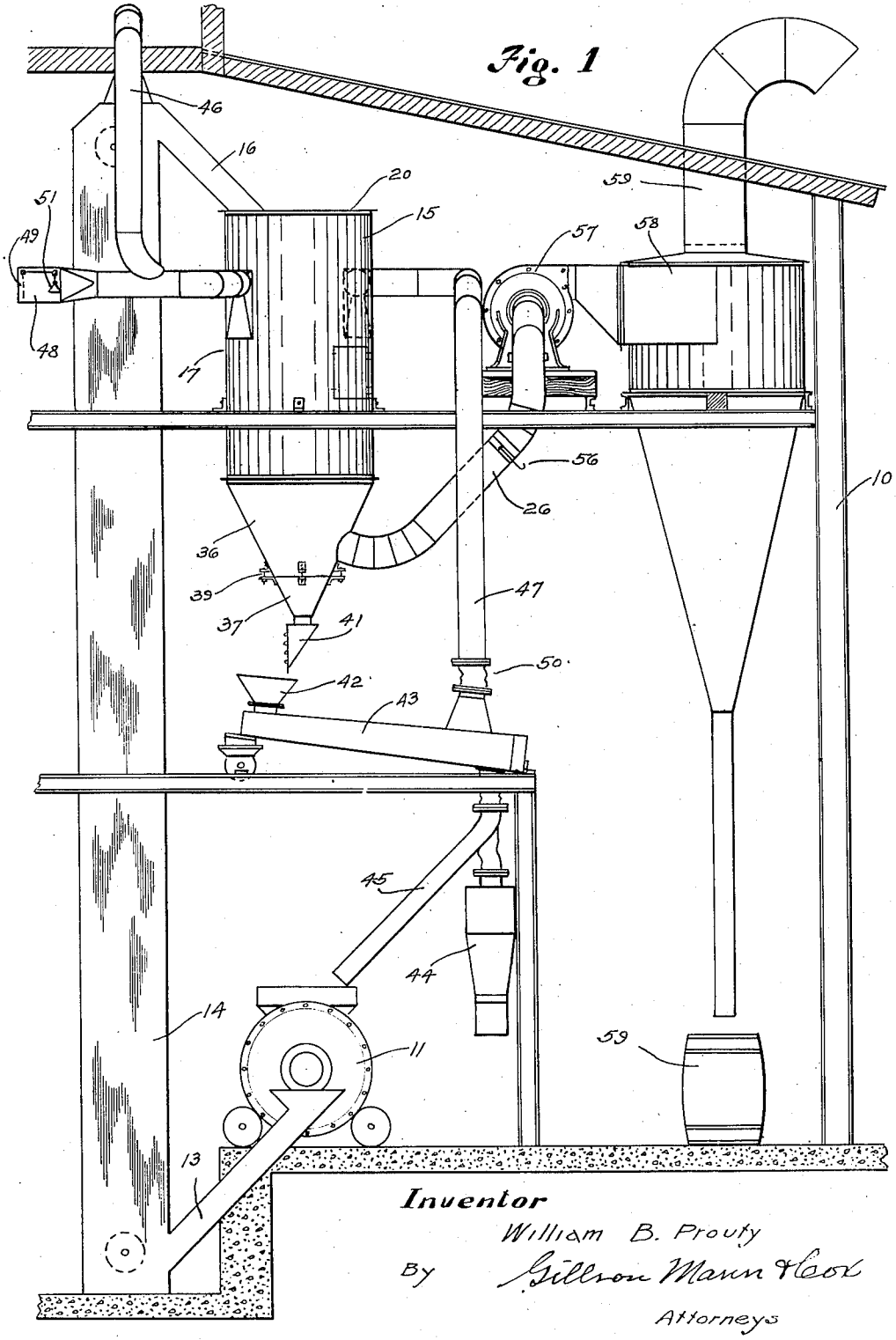
June 24, 1930. W. B. PROUTY 1,766,941

SEPARATING SYSTEM

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Fig. 1



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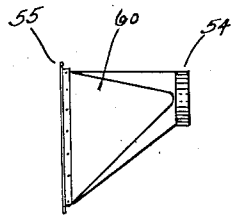


Fig. 4

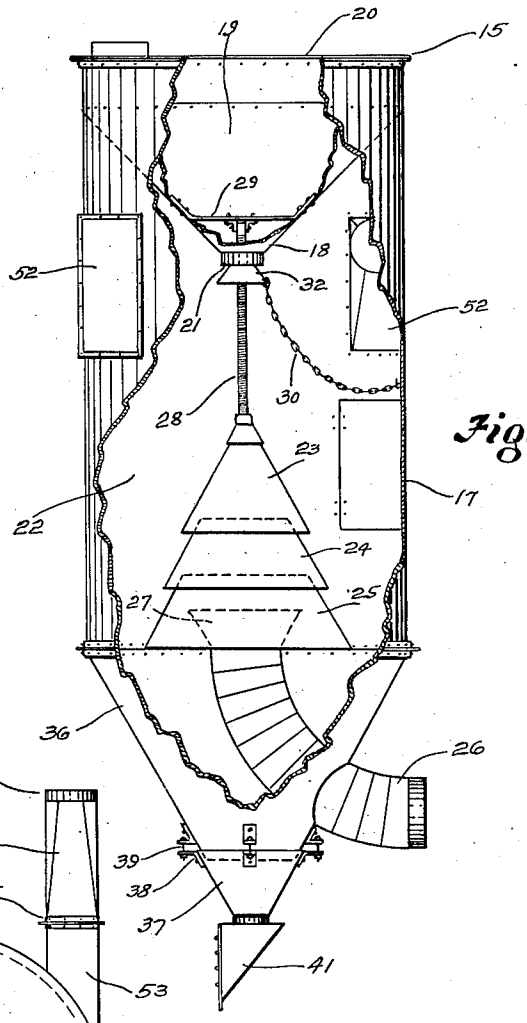


Fig. 2

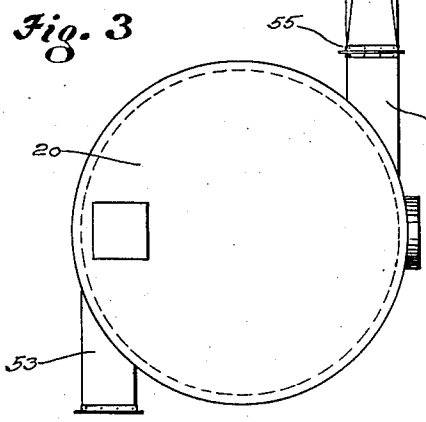


Fig. 3

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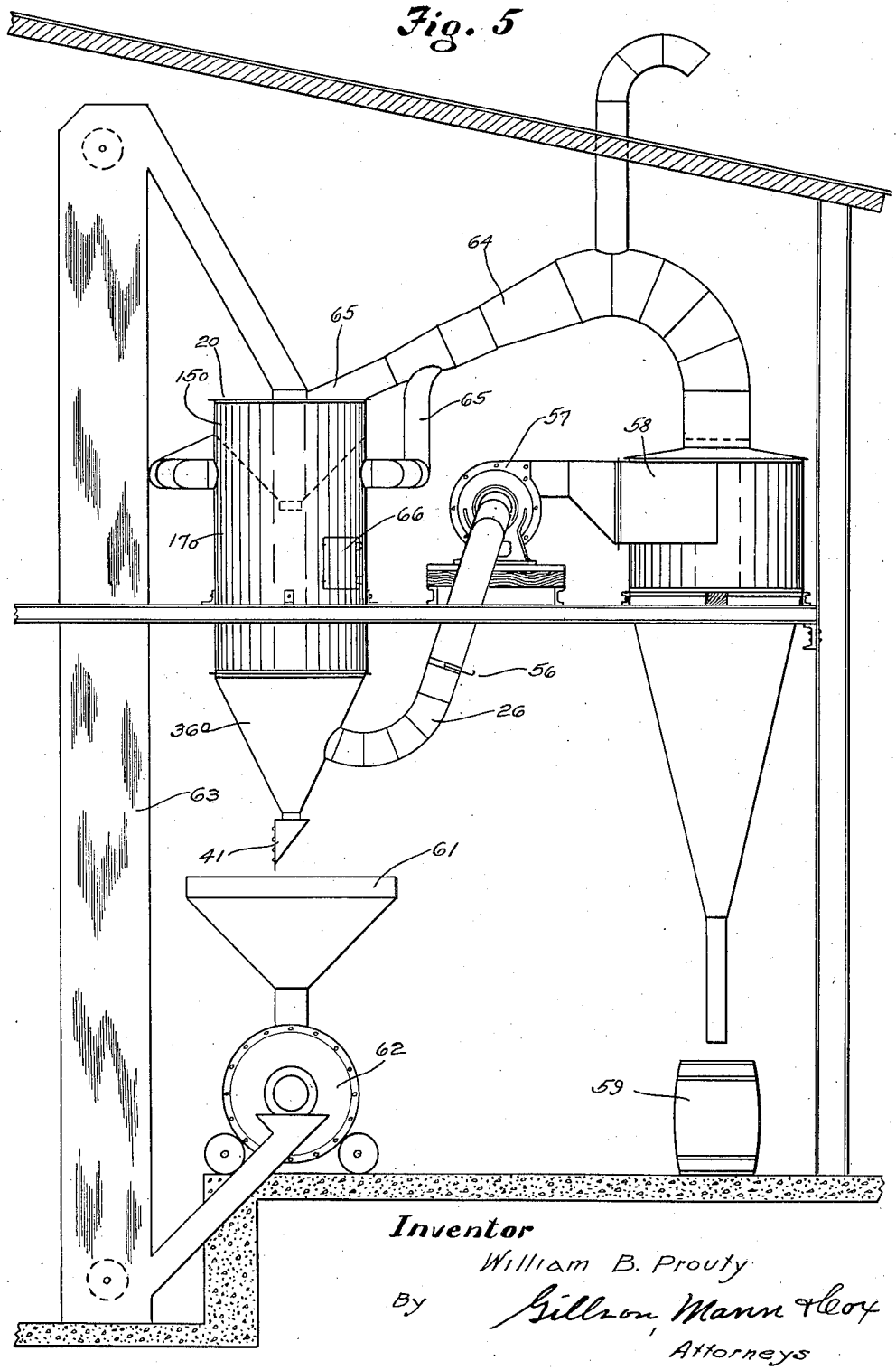
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SEPARATING SYSTEM

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Fig. 5



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1,766,941

UNITED STATES PATENT OFFICE

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SEPARATING SYSTEM

Application filed February 9, 1925. Serial No. 7,744.

This invention relates to separating devices, and more particularly to devices for separating ground material into different grades according to their different degrees of fineness.

One of the objects of the invention is the provision of a new and improved dust separator provided with a built-in material receiving hopper.

Another object of the invention is the provision of a new and improved adjustable spreader valve for built-in hoppers in dust separators.

Another object of the invention is the provision of a new and improved dust separator system for removing the dust from ground material at different stages of its treatment.

A further object of the invention is the provision of a new and improved dust separator and collector system for separating ground material into different grades according to their different degrees of fineness.

A still further object of the invention is the provision of a new and improved system of dust separators that is simple in construction, efficient in operation, composed of few moving parts, that is readily adjusted and when properly installed is automatic in its operation.

Other and further objects and advantages of the invention will appear from the following description, taken in connection with the accompanying drawings, in which

Fig. 1 is a vertical section of a building showing the system in position therein, the same being shown more or less diagrammatically;

Fig. 2 is an elevation of one of the separators, with parts broken away to show the internal mechanism;

Fig. 3 is a plan view of the same;

Fig. 4 is an elevation of a detail; and

Fig. 5 is a view similar to Fig. 1, showing a modified form of the system.

Referring to Fig. 1 which is employed for the purpose of illustrating one embodiment of the invention, the reference character 10 designates the building within which the system is installed. The system comprises a mill 11 which is adapted to reduce the material such as fuller's earth, carbon black, Portland cement, talc, gypsum, fertilizers, insecticides, chemicals or other material to a desired degree of fineness. The mill is supplied with the material to be ground in any suitable manner, as is usual in such constructions.

The ground material passes through the conduit 13 into an elevator 14 of any approved construction, such as the well known bucket type, and from there it passes into the separator 15 through the chute 16 which is secured to the top wall 20 of the casing.

The separator 15 comprises a casing 17, see Fig. 2, in the upper portion of which is secured a conical partition 18 which forms a hopper 19 into which the ground material from the elevator 14 is delivered. The partition 18 is provided with a central aperture 21 through which the ground material is fed to the body 22 of the separator.

Suitable mechanism is provided in the casing for separating the finer from the coarser particles of the ground material. Preferably a series of separator cones 23, 24 and 25 of increasing size from the uppermost down are mounted in spaced relation within the body 22 of the casing 17 with their apexes extending toward the hopper 19 and in axial alinement with the opening 21 in said hopper. A suction conduit 26 has its end 27 extending beneath the cone 25 for removing the finer particles of the material as the same cascades down over the cones 23, 24 and 25. These cones are adjustably mounted on a support 28 secured to a supporting member 29 mounted in the hopper 19 whereby they may be adjusted relatively to each other to vary the space between the same. Preferably they are screwed on the shaft 28 and are held from accidental turning by any suitable means. Since the construction and arrangement of cones 23, 24 and 25 are substantially that shown in my Patent No. 1,446,272, February 20, 1923, it is not thought necessary to further describe the details of the construction of the same. Suitable means are pro-

vided for delivering the material passing through the opening 21 in a uniform annular or conical stream onto the cones 23, 24 and 25. A conical or spreader valve 32 is employed for this purpose. The spreader valve 32 is conical in form with its apex extending upward in axial alinement with the opening 21 in the partition 18. It is adjustably mounted on the shaft 28 as by being threaded thereon, whereby it may be adjusted vertically to regulate the opening 21. It is held in adjusted position by any suitable means as the cable 30. By means of this arrangement the amount of material passing onto the separator cones 23, 24 and 25 may be properly regulated to deliver a steady, uniform and continuous hollow conical stream of ground material onto said cones. Without the valve for controlling the size of the opening 21 the material carried up by each bucket of the elevator would fall on the separator cones in a lump and would not be properly separated. Furthermore, the stream would be intermittent due to the intermittent action of the bucket discharges into the hopper 19.

The lower portion of the casing 17 terminates in a conical receptacle 36 in which the coarser material is adapted to be collected.

In order to check the momentum of the lighter particles of ground material as they pass downward so that the same may be removed by the suction of the fan through the conduit 26 an air opening or valve is provided through the bottom of the conical receptacle 36. As shown, a secondary cone 37 is telescoped over the lower end of the conical receptacle 36, suitable means, as lugs 38 and bolts 39 being provided for adjustably connecting the two together. By means of the bolts 39 the size of the annular opening about the lower end of the conical receptacle may be adjusted to admit the proper amount of air to obtain the desired result in separating the finer from the coarser material. A suitable trap 41 is provided on the lower end of the secondary cone 37 through which the coarser material collected in the conical receptacle may be automatically discharged from time to time into a suitable receptacle as the hopper 42 of a screening device 43.

The material of the desired sizes or grades will pass through the corresponding meshes of the screens of the screening device and will be collected in suitable receptacles as 44 according to size in the usual manner, the oversize being returned to the mill through the conduit 45.

In order to prevent the escape of dust into the building from different parts of the mechanism as from the elevator and also from the casing of the screening device 43, suitable conduits 46 and 47 are led from the elevator and screening device respectively into the separator beneath the hopper 19.

Any suitable number of conduits may be employed as desired. They may deliver the air radially or tangentially into the separator. As shown, means are employed for attaching the conduits so that the air enters tangentially whereby a more efficient separation of the pulverulent matter is obtained since the heavier particles of the lighter ground material will be thrown by centrifugal force adjacent to the wall of the casing away from the suction action beneath the cones.

Suitable means are provided for attaching the conduits 46 and 47 to the separator whereby the air may be directed tangentially in either direction as desired. As shown, the casing is provided with openings 52 over which is adapted to be secured a connector member 53 to which is connected an air inlet fitting 60. The fitting 60 is provided with a lateral extending projection 54 to which the conduit is adapted to be attached. The fitting 60 is provided with a perforated flange 55 by means of which the same may be detachably connected to the connector member 53. The parts of the connector are so arranged that by turning the same upside down and attaching it to the separator the air will be delivered tangentially but in the opposite direction.

The conduit 46 is preferably attached to the top of the elevator casing. By means of this conduit the pressure within the elevator casing will be maintained slightly below atmospheric, and consequently no dust will escape into the building from the elevator as air currents will flow into the casing at all crevices to equalize the pressure. The lower end of the conduit 47 is connected to the screening casing by means of a flexible conduit connection 50 for permitting shaking movement of the screening device in the usual manner.

In order to regulate the amount of air exhausted through the conduit 26 from the separator, the said conduit is provided with a valve 56. By properly adjusting this valve, the valve spreader 32, and the secondary cone 37, the grade of the pulverulent matter will be regulated at will.

Since the details of the screening mechanism constitute no part of the present invention the same need not be described.

In order to supply the necessary amount of air at all times to the separator, an extension conduit 48 is provided to the conduit 46 and the outer end of the same is provided with a valve 49 which has suitable means as the weight 51 for normally maintaining the valve in closed position, but which will open to permit the entrance of air when the pres-

sure is reduced in said extension beyond a predetermined amount.

The dust and finer particles of the material are exhausted through a conduit 26 by means of a suitable exhaust fan 57 which delivers the same to a well-known type of dust collector 58 where the dust is collected and is delivered to a proper receptacle 59 at the bottom of the collector. The air escapes in the usual manner through the vent 59. Since the details of the collector 58 form no part of the present invention it is not deemed necessary to illustrate and describe the same.

The system shown in Fig. 5 differs from that shown in Fig. 1 in that a single finely ground product is produced in the system shown in Fig. 5, while in that shown in Fig. 1 several products of varying degrees of fineness are obtained. The system in Fig. 5 also differs from that shown in Fig. 1 in that a closed system for circulating air through the separator 17 is employed. As shown, the fan 57 exhausts the air laden with finely ground material from the separator 150 through the conduit 26 in the manner described above and delivers the same into the collector 58 where the material is precipitated and collected in the receptacle 59 as in Fig. 1. The coarser material is returned to the hopper 61 of the mill 62 for regrinding, after which it is elevated by the elevator 63 and delivered again to the hopper of the separator 150. The internal mechanism of the separator 150 is the same as that disclosed in Fig. 1, and for that reason it is not thought necessary to show the same in this figure.

A suitable conduit 64 is provided for delivering the air from the collector 58 into the separator 150. The separator end of the conduit 64 may be divided into a plurality of conduits 65 which may be attached to the separator 150 either radially or tangentially as desired. The casing 170 of the separator may be provided with a door or closure 66 through which access may be had to the interior thereof for adjusting the spreader valve and the cones.

The conduit 26 may be provided with a valve 56 as in the previous construction. The conical receptacle 360 of the separator may be provided with a secondary conical member as in the previous construction, or the same may be omitted, as shown.

It is thought from the foregoing taken in connection with the accompanying drawings that the construction and operation of my device will be apparent to those skilled in the art, and that various changes in size, shape, proportion and details of construction may be made without departing from the spirit and scope of the appended claims.

I claim as my invention:

1. A separator comprising a casing, a conical partition within said casing, said conical partition having its apex extending downwardly and provided with an axial opening, a conical spreader valve suspended beneath said hopper with its apex extending upwardly in axial alinement with said opening, and means for vertically adjusting said valve.

2. A separator comprising a casing having a conical partition in the upper portion thereof for forming a hopper for receiving crushed material, said partition being provided with an axial opening, a conical spreader valve for said opening, means for vertically adjusting the spreader valve to and from said opening, dust separator mechanism beneath said valve, and means for providing an air inlet beneath said mechanism.

3. In a separator system, a casing, a partition for dividing said casing into a hopper and a separator chamber, the hopper being provided with an axial opening and a valve for said opening, said casing being provided with an air inlet exteriorly of said hopper, said air inlet being arranged to deliver air tangentially into said casing..

4. A dust separator comprising a casing, a conical partition for dividing said casing into a hopper and a separator chamber, the vertex of said conical partition extending downwardly and provided with an opening, a conial valve for adjusting the area of said opening and for spreading the material passing therethrough, and means for adjusting said valve.

5. A built-in dust separator comprising a casing, a partition in said casing forming a hopper in the upper portion of the casing, the upper edge of said hopper engaging the periphery of said casing, and means in the lower portion of the casing for separating the finer from the coarser portions of ground material fed by said hopper onto said means.

6. In a dust collecting and material separating system, a separator, a conduit leading outwardly from the lower portion of said separator, means for causing a stream of air to flow through said conduit, a valve in said conduit for controlling the movement of air therethrough, means for providing an air inlet into said separator at the lower portion thereof, and means for adjusting the size of said inlet.

7. A separator casing comprising a cylindrical upper section provided with a built-in hopper having a conical bottom provided with an opening, a spreader valve for said opening, means for vertically adjusting said valve, said casing being provided with a conical lower section having an axial opening therethrough, a valve for said opening, and means for vertically adjusting said last-named valve for regulating the amount of

air admitted to said casing through the bottom thereof.

8. A dust separator comprising a casing having a built-in feed hopper in its upper end, said hopper being enclosed within said casing, and means for supplying air tangentially into said casing independently of said hopper.

9. In a dust collecting and material separating system, a dust separator comprising a casing having a built-in feed hopper, a conduit extending into said hopper for conveying ground material thereto, said casing being provided with a conical lower section, a conduit leading outward from said lower section, means for providing an air intake passage into both the upper and lower portions of said separator, and means for controlling the amount of air entering said passages.

10. In a dust collecting and material separating system, a dust separator comprising a cylindrical casing having a conical lower portion, means for admitting air into said conical section, means for controlling the amount of air admitted, a conduit for admitting air to the upper portion of said casing, and valve means for automatically admitting an additional supply of air to the upper portion of said casing when the pressure in said casing falls below a predetermined minimum.

11. In a device for removing dust from granular material, in combination, a dust separator, a dust collector, means including a mechanial element and a gravity feed for delivering crushed material to said separator, a conduit between said separator and collector, a fan in said conduit for exhausting dust laden air from said separator and elevator and delivering the same under pressure to said collector, a screening device for receiving the coarsely ground material from said separator, and a conduit between said screening device and system for removing dust particles from said screening device and introducing the same into said system.

In testimony whereof I affix my signature.

WILLIAM B. PROUTY.