

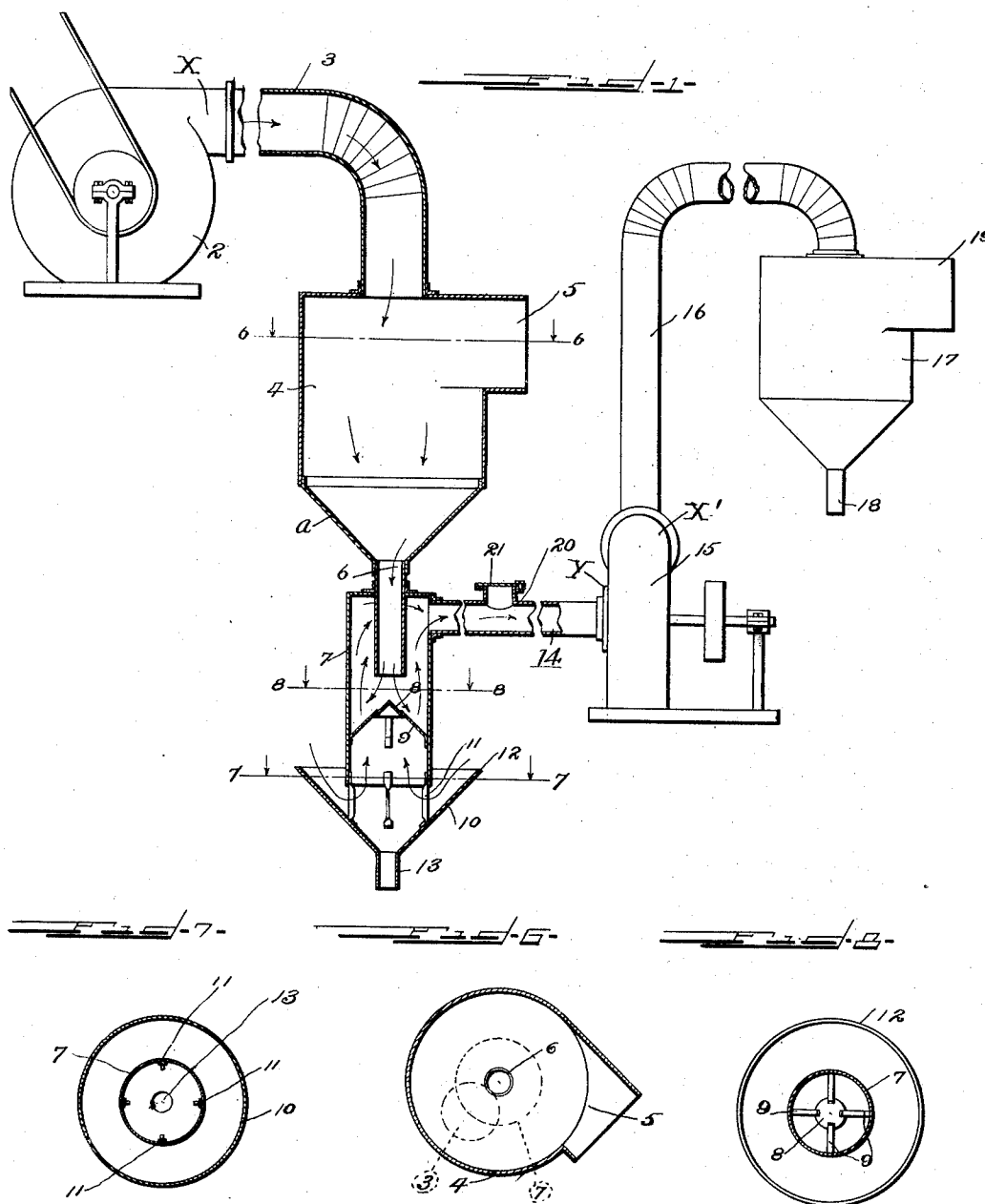
No. 868,675.

PATENTED OCT. 22, 1907.

L. LOCKWOOD.
SCREENING COLLECTOR AND SEPARATOR.

APPLICATION FILED MAR. 18, 1901.

3 SHEETS—SHEET 1.



~~Witnesses~~
J. E. Weir
Robert Lewis Amos.

~~Inventor~~
Lee Lockwood
By Chas. C. Buckley

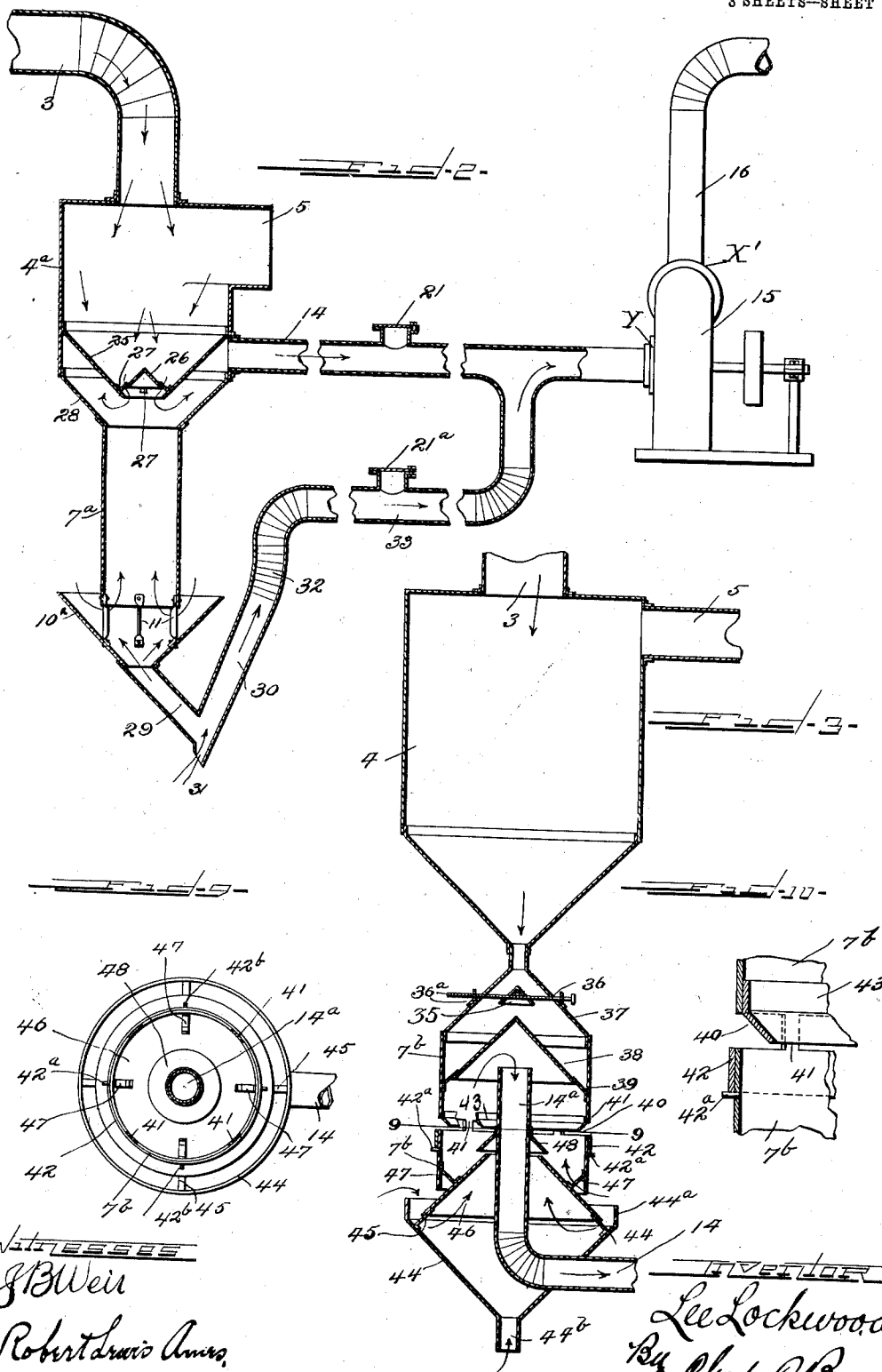
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3 SHEETS—SHEET 2.



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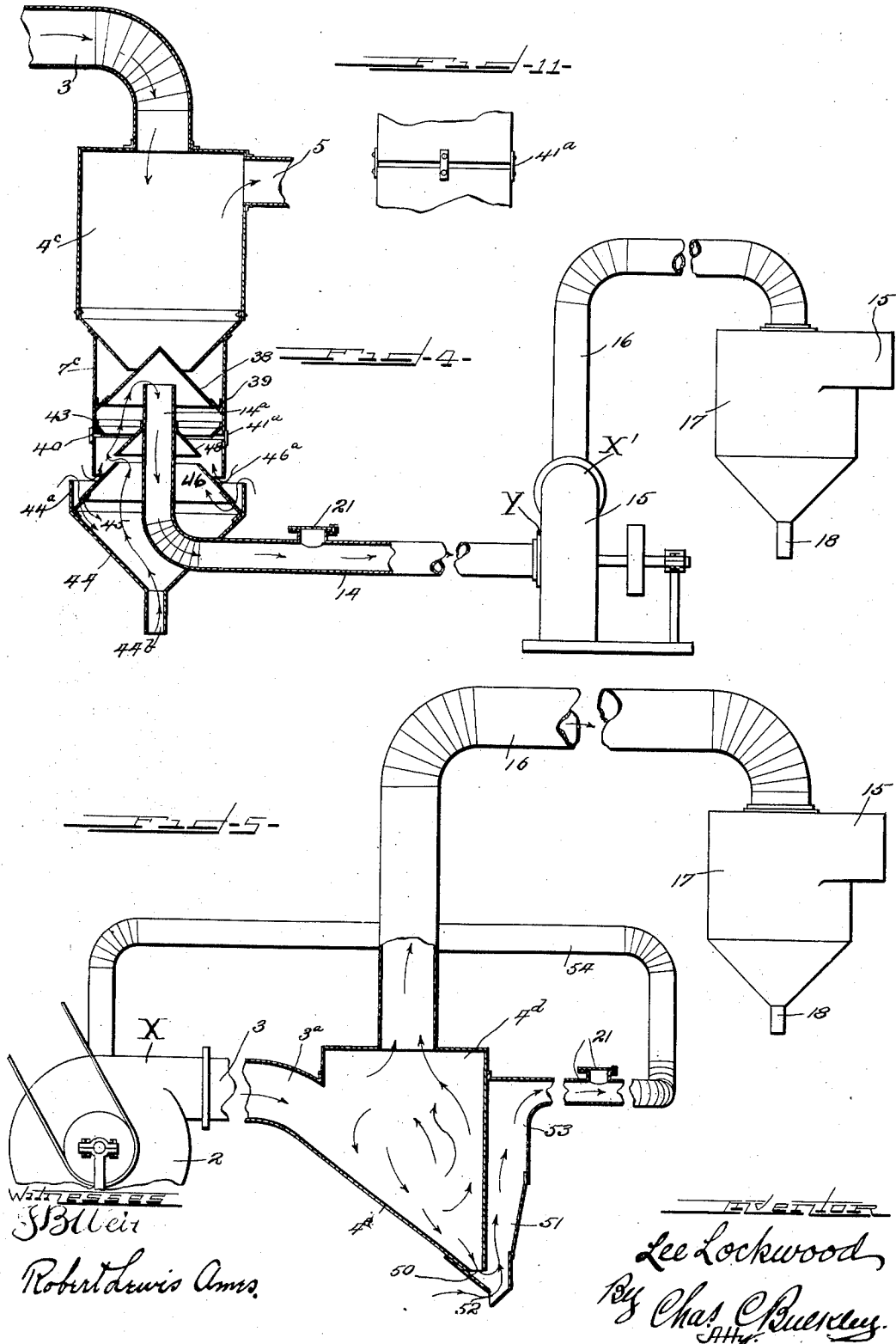
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3 SHEETS—SHEET 3.



UNITED STATES PATENT OFFICE.

LEE LOCKWOOD, OF DES MOINES, IOWA.

SCREENING COLLECTOR AND SEPARATOR.

No. 868,675.

Specification of Letters Patent.

Patented Oct. 22, 1907.

Application filed March 18, 1901. Serial No. 51,659.

To all whom it may concern:

Be it known that I, LEE LOCKWOOD, a citizen of the United States, residing at Des Moines, county of Polk, and State of Iowa, have invented certain new and useful Improvements in Screenings Collectors and Separators, of which the following is a specification.

My invention relates to improvements in devices generally for separating light and heavy material from each other, when mixed together, and it has special reference to devices used for separating the valuable matter or screenings from the dust, refuse and other matter collected by the ordinary and usual dust collecting systems in use in elevators, or other grain handling establishments.

It has been found in such establishments that a considerable amount of valuable grain is blown away with the dust and refuse in the process of cleaning, clipping and otherwise handling grain in elevators or similar places, and methods of saving this waste have been sought, but so far as I am aware no satisfactory solution of the problem has been discovered.

My invention seeks to accomplish the desired result and has for its object the provision of improved means for automatically saving the valuable matter, grain or screenings from the whole amount of dust, dirt and refuse, when the elevator or mill is running, and to do this without the aid of workmen.

To the accomplishment of these and such other objects as may hereinafter appear, the invention consists in providing an improved dust collecting system of the kind mentioned or any other similar device, with a separator or collector to separate or collect the screenings or heavy particles from the chaff, dust, and lighter particles.

The invention further consists in the novel parts and construction of parts hereinafter fully described, and later pointed out in the claims, reference being had to the accompanying drawings forming a part hereof, in which the same reference letters designate like parts throughout the several views, and in which

Figure 1 is a sectional diagrammatic view showing one form of my invention applied to an ordinary dust-collecting system; Fig. 2 is a similar view of another form of the invention in which the screening collector is combined with a cyclone or other dust collector; Fig. 3 is another diagrammatic sectional view of a further modification of the invention; Figs. 4 and 5 are like views of other arrangements of the same; Figs. 6, 7 and 8 are cross-sectional views on the lines 6-6, 7-7 and 8-8 of Fig. 1; Fig. 9 is a sectional view on the line 9-9 of Fig. 3; Fig. 10 is a detail view of the horizontal slot in the collecting cylinder, and Fig. 11 is a detail view of the horizontal slot in the collecting chamber.

Referring to Fig. 1, the fan 2 is the usual collecting fan employed in dust collecting systems which are

utilized in mills, elevators, etc., for collecting the dust, clippings and refuse generally about the mill or elevator. The term "dust collecting system" is hereinafter employed in the ordinary sense, that is, to mean a system where all such refuse matter about the building is collected, as well as the dust alone. It will be understood that this fan 2 is connected with the spouting of such a system. It is extended by the blast spout 3 into the dust collecting or settling chamber 4 of the usual or any desired construction, in which the dust or refuse passes to the bottom of the chamber while the purified air passes out at the opening 5. So far, the arrangement is the usual one in dust collecting systems, and the action in the cylinder 4 is also well understood and results, as stated, in separating the purified air from the remainder, the said opening 5 (see Fig. 6) being at a tangent to the cylinder while the inlet blast spout 3 is connected therewith at a point opposite, all in the usual way. A cyclone collector could be used in place of the collector 4 if preferred.

The lower end of the collecting or settling chamber 4 is restricted by the inverted conical bottom *a* to such an extent as to just allow the dust to pass therethrough without crowding. At the lower end of the chamber 4, and connected with the restricted opening, a spout 6 is connected, through which the dust, screenings, etc., pass into a separating or collecting cylinder 7 connected with said pipe which extends into the cylinder a considerable distance, and said cylinder 7 containing a small cone 8 located a little beneath the lower end of the pipe or spout 6 and centrally thereof, and supported from the sides of the cylinder 7 by the braces 9 or in any desired manner. This cylinder 7 extends below the cone 8 a suitable distance and at the bottom thereof an inverted conical bottom or hood 10 is suspended therefrom by the narrow braces, bars or rods 11, its upper edge 12 extending above the lower end of the cylinder and a spout 13 being provided at the lower or small end of the cone. A suction pipe 14 is connected with the upper end of the cylinder 7 through which air is drawn by the fan 15 which connects by means of the spout 16 with another settling chamber 17 similar in construction to the chamber 4, a spout 18 leading from the bottom thereof through which the dust passes, and the purified air escaping from the opening 19. An opening 20 is provided in the upper side of the spout 14 over which a slide valve 21 is placed. The fan 15 withdraws the air from the cylinder 7 creating a partial vacuum therein, which causes air to enter said cylinder at its various openings, a small per cent being drawn in through the spout 6 with the collected matter, a larger amount flowing in between its lower end and the inverted cone 10, and some through the spout 13. This air, owing to natural causes, passes through the said cylinder 7 with a rapid

gyratory or rotary motion and passes upward between the cone 8 and cylinder 7. When the dust is blown into the settling chamber 4 from the blast pipe 3, the purified air escapes through the opening 5 in the usual way, while the other matter that is separated therefrom passes down through the spout 6, striking first upon the cone 8 centered therebeneath and evenly spreads about and through the cylinder 7. As soon as this matter leaves the spout 6 and after it passes off of the cone 8, and in fact all the way through the cylinder 7 until it leaves the lower end of spout 13, it encounters the currents of air at all these points including that entering beneath the lower end of the cylinder 7, all of which serve to carry the lighter particles of the dust upwardly to the spout 14, the heavier material being thrown to the sides of the cylinder by the rapid rotation of the ascending column of air, and passes through the spout 13 where it may be taken care of as desired. The lighter matter from the spout 14 is drawn off by the fan 15 and sent through the spout 16 to the settling chamber 17 when the dust passes through the spout 18 and may be taken care of as desired, while the purified air escapes at the opening 19.

The space between the cone 8 and the lower end of the spout 6, and that between the lower end of the cylinder and the inverted cone 10, as well as the size of cone 8 and the location of spout 14, and the other proportions of the apparatus, should be designed to best accomplish the purposes desired, though I have obtained good results with substantially the relative proportions shown. The draft or suction in the cylinder 7 may be regulated by the slide valve 21; the dust and lighter matter may be taken care of at the spout 18 of the settling chamber 17, and, as before stated, the heavier matter, such as the screenings may be taken care of at the spout 13.

By arranging the parts as above indicated when the device is in operation, the spout 6 will be constantly kept open and prevented from choking, owing to the fact that the fan 15 not only causes the air to be drawn upwardly through the lower end of the separating chamber, but also causes it to be drawn down through the spout 6 with the collected material. If the spout 6 at any time becomes partially choked, it is only necessary to close the valve 21 and the fan 15 will create sufficient suction to open the passage-way through the spout 6. In devices of this character, it is very essential to keep the passage-ways open, throughout the entire operation of the devices, and this is accomplished in my construction by adjustment of the valve 21 when starting the device into operation.

Fig. 2 illustrates a somewhat different arrangement of the invention as applied to dust collecting systems, and involves, in this case, a re-construction of the first settling chamber 4. In other words, a combined settling and collecting cylinder is provided. The same blast or supply spout 3 leads to the settling chamber 4^a of this cylinder; the latter being provided with the same opening 5 as before for the outlet of the purified air, with its bottom portion, partition, or false bottom 25 sloping inwardly and downwardly like a funnel. A cone 26 is located within the chamber 4^a near its lower end and is supported therefrom preferably by braces 27, and around the edge of which the dust and screenings are adapted to pass. The cylindrical portion of

this chamber 4^a is extended, as shown, below the bottom portion of partition 25 and is inclosed by an inverted funnel like part 28, of substantially the same form as the said bottom portion or partition 25, and parallel therewith, from which, at a desired point, the suction spout 14 leads to the fan 15, as in the former instance, the pipe 16 leading therefrom to an additional settling chamber, not shown, but the same as the chamber 17 of Fig. 1. The pipe 14 is provided in this case also with the slide valve 21, to regulate the draft from the separator or collector 7^a. The portion of the chamber 7^a between the conical parts 25 and 28 constitute an extended opening for the pipe 14 and should be of such size or said parts 25, 28 should be of such a distance apart as to create an even draft therein about the opening in the bottom portion 25 of the settling chamber 4^a. To the lower edge of the conical part 28, the cylinder 7^a is secured, the inverted cone 10^a being attached to its lower end by the braces 11, as in Fig. 1. Instead, however, of the spout 13 (Fig. 1) attached to the lower end of this inverted cone, a spout 29 is connected therewith which leads into and joins another spout 30 which is tapering at its lower end and has an opening 31, and is widest at its upper end 32 where it connects with the exhaust spout 14 through the medium of the pipe 33, a slide valve 21^a being also provided in this spout 33.

In the operation of this system, the fan 15 causes a slight suction of air from the settling chamber 4^a between the cone 28 and bottom portion or partition 25, and a stronger draft between the lower end of cylinder 7^a and the inverted cone 10^a, and also at the entrance 31 of the pipe 30. When, therefore, the dust and refuse pass from the settling chamber, the lighter particles are caught by the upward currents of air in the cylinder 7^a and are carried out through the spout 14, the heavier particles consisting principally of screenings being hurled to the sides of the cylinder 7^a and which drop to the bottom. This matter is again met by the current of air through the spouts 29 and 30, and at the openings 31, which serve to carry off, through either the pipe 33 or 14, the light matter still remaining mingled with the heavier, the heavy and valuable matter passing out at the opening 31 to be taken care of as desired. It should be noted in this connection that the air passes through the cylinder 7^a with a whirling and cyclonic motion, instead of in a straight current, which has the effect of better separating the light from the heavy particles.

Fig. 3 is similar to Fig. 1, in that a settling chamber 4 of ordinary construction may be used, and the screening collector attached thereto, as shown. This collector consists of a cylindrical portion 7^b, having a conical top joined with the restricted opening at the bottom of the settling chamber 4, and has in addition a cone 35 supported by rods 36 at right angles to each other, passing therethrough and through the conical top 37 of the cylinder 7^b, where they are provided with supporting brackets 36^a on the outside thereof. These rods are threaded in their supports in order to be able to adjust the position of the said cone beneath the opening from cylinder 4, to evenly distribute the matter falling therefrom. A larger cone 38 is placed a suitable distance beneath the small cone 35, and is rigidly supported by braces or brackets 39 from the

sides of the cylinder 7^b. A horizontal opening or slot 40 is provided in the cylinder 7^b, the parts of which above and below the slot are united preferably by narrow integral portions 41 which are not cut away by the slots. This slot is adapted to be covered by a band or ring 42 which fits around the cylinder and is adapted to slide up or down in order to increase or decrease the size of the opening, pins 42^a projecting from the cylinder to prevent it from sliding too far down. A deflecting band or ring 43 extending inwardly and downwardly is attached to the inside of the cylinder at the upper edge of the slot, to deflect the falling dust on to the cones below, and to direct the inward current of air downward. The suction pipe 14 leading to the exhaust fan is in this case extended up the center of the cylinder 7^b to a point above the lower edge of the cone 38, where it is supported in any desired manner, as by the inverted conical bottom 44 of the cylinder 7^b, which is supported by brackets 45 from the lower edge of another conical part 46, the latter being in turn supported from the sides of the cylinder 7^b by interior braces or brackets 47. The upper end of the latter cone surrounds the extended vertical portion 14^a of the pipe 14, a small space being left therebetween. A small hood or conical cap 48 is attached to the pipe 14^a with its lower edge above and outside of the upper end of the cone 46. A space is thus left between the cylinder 7^b and the edges of the cones 38 and 46, and between the cones 46 and 48, and also between 46 and 44. The latter is provided with a vertical edge 44^a as shown. The exact distances between the various parts is not essential but substantially those shown will produce good results and accomplish the desired ends.

When the dust is blown into the settling chamber 4, the purified air, as before explained, passes out at the opening 5, while the other matter passes into the cylinder 7^b, striking first the small cone 35 around which it spreads, then falling upon the larger cone 38 passes down through the remainder of the cylinder, striking in turn the deflecting ring 43, possibly the hood 48, the cone 46, bottom 44, and on out at the spout 44^b. The light particles of this matter, however, during this journey, meet the exhaust currents of air flowing to the pipe 14^a between the cone 38 and the cylinder 7^b, at the slot 40, between the cones 48 and 46, at the lower edge of the cone 46, and at the spout 44^b, at the lower end of the cone 44. This causes the lighter particles to be drawn to the pipe 14 where they are sent on to the other settling chamber 17, as above explained, the heavier particles, such as the screenings, passing out at the lower end 44^b of the bottom portion 44 of the cylinder, 7^b.

In Fig. 4, a slightly different arrangement from that shown in Fig. 3 is illustrated, but the same general principles are embodied. A slight remodeling of the settling chamber 4^a is necessary, the collecting cylinder 7^c being secured to the lower portion of the collecting chamber 4^a, as shown, with the cone 38 supported from the sides of the cylinder 7^c projecting upward thereinto, the bottom opening of the chamber being made large enough for this purpose, but the remainder of the apparatus is substantially the same as in the previous figure.

The proportions and relative locations of the parts

also differ slightly; for example, the cone 48 is entirely above cone 46, slot 40 is not as high, and so on; but the parts are substantially the same. The upper and lower parts of cylinder 7^c may be joined across the slot 40 by means of the pieces 41^a riveted thereto instead of the integral parts 41 before described. When the dust is blown into the settling chamber 4^a, it passes first to the cone 38 and then on down through the cylinder, as before described, meeting the inward currents of air between the several parts and through the several openings, as before explained, which carry with them the lighter particles of the dust through the spout 14^a, 14 to the fan 15, and on to the settling chamber 17, as in the apparatus shown in Fig. 1, the heavier particles passing out at the spout 44^b, as first explained.

In Fig. 5, a somewhat different arrangement of the apparatus is shown. The collecting fan 2 is here connected with a form of settling chamber 4^d, which has a pipe 16 leading from its upper portion to the settling chamber 17. The lower end 4^e of the chamber 4^d forms substantially an extension of the downward turn 3^a of the blast pipe 3. At the lower corner of the chamber a smaller opening 50 is provided leading into a pipe 51, which is provided with a restricted opening or spout 52, and is expanded at its upper end 53, into the pipe 54, which is provided with a slide-valve 21, said pipe being extended back to the fan 2, or spouting connected with fan 2, where its contained matter joins that in the pipe 3, and is again blown through the settling chamber 4^d.

The operation is as follows: the dust from the collecting system is blown through the blast pipe 3 into the chamber 4^d, while the heavier particles pass out at the opening 50 and the lighter particles pass upward through the spout 16 to the settling chamber 17. The heavier matter passes out of the opening 50 and into a pipe 51, at both of which points it strikes an upward current of air through the openings 52 and 50 which carries with it the lighter particles of matter, some going up the pipe 16 and the remainder passing up the pipe 53 and through the pipe 54 back to the fan 2 where it is again blown through the pipe 3 and into the chamber 4^d, the process being repeated over and over until the heavy particles all pass out of the openings 50 and 52 and the lighter are carried away by the pipe 16 and into the settling chamber 17. The draft in the pipes 53 and 54 is regulated by the slide valve 21.

While the material of which the device is composed is immaterial as long as it is suitable for the purpose, I find it convenient to construct it mainly of light weight galvanized iron.

It will be understood that the method of connecting spout 14 with the cylinder 7^a, Fig. 2, may be applied to the device of Fig. 1, or to the other devices.

While the apparatus illustrated by the different figures varies somewhat as to construction and arrangement, it will be observed, however, that the arrangement of the essential features is practically the same, and that the principle and mode of operation are also substantially the same in each case. In Fig. 1, for example, the collected materials to be treated or separated are discharged into the collecting chamber 4, and these materials are then allowed to fall through the separating chamber inclosed by the cylinder 7. While thus under the influence of gravity in the separating cham-

ber, the materials are subjected to the action of opposing air currents, the opposition or conflict between gravity and the force of the air currents operating to separate the relatively light particles of matter from the relatively heavy portions or particles.

It will be understood that the force of the air is so regulated that the air currents are capable of overcoming the momentum of the lighter particles, and of carrying the same upward and out through the discharge opening located near the top of the separating chamber. The force of the air is, however, not sufficient to overcome the momentum of the relatively heavy particles, and consequently these relatively heavy particles or materials continue to fall and are allowed to pass out of the separating chamber by way of the discharge spout 13. The relatively light particles or materials pass on with the draft of air currents, and are drawn through the blower and into the secondary settling chamber 17. In this way, the relatively light particles or materials are effectively separated from the relatively heavy particles or portions, and at the same time this separation is of such character as to permit collecting and final disposition of said materials. This collecting or separating action is substantially the same as in Fig. 2, the materials to be separated being discharged into the primary settling chamber 4^a, and allowed to fall from the latter through the separating chamber inclosed by the cylinder 7^a. The fan 15, in this particular arrangement, creates an upward draft through the cylinder 7^a, thereby subjecting the falling materials to opposing air currents, and thereby causing the desired separation of the relatively light particles from the relatively heavy particles. The relatively light particles pass on with the draft or currents of air, and are drawn through the pipe 14, thence through the blower, and discharged from the latter through the pipe 16. It will be observed, however, that in this case the relatively heavy particles are subject to further treatment or separating action by being allowed to fall or descend from the lower end of the separating cylinder 7^a through the pipe 29, and out through the opening 31. In thus passing downwardly and outwardly through the said opening 31, the relatively heavy particles are subject to the incoming draft or current of air, due to the suction through the pipe 32, which, it will be observed, is also connected with the in-take opening of the fan or blower 15. Thus in the arrangement shown in Fig. 2, there is more or less separation of the relatively light and heavy particles in the separating chamber 7^a, and there is also a further separating action at the discharge opening 31. Like the previous arrangement, however, the process involves the discharge of materials into a settling chamber, the further discharge of such materials through a separating chamber, the creation of an upward draft in opposition to the falling materials, the discharge of the relatively heavy materials through one opening, and the passage of the relatively light materials together with the air currents through another opening, and the final passage of the relatively light materials into a secondary settling chamber. The same process and mode of operation are involved in the arrangement shown in Figs. 3, 4 and 5. In each case, the arrangement involves primary and secondary settling chambers, and a separating chamber associated with the primary set-

ling chamber. Preferably, the discharge opening through which the relatively light particles pass from the separating chamber, is located at a point more or less above the opening through which the materials are admitted to the said separating chamber. This is shown in Figs. 1 and 2, and in Fig. 3 it will be seen that this is also practically true, inasmuch as the upper end of the discharge pipe 14^a is located somewhat above the lower edge of the cone 38, it being observed that the circular opening between the lower edge of this cone and the side walls of the cylinder B constitutes the inlet opening through which the materials are admitted to the separating chamber—that is to say, no separating action occurs above the cone. The same is true of Fig. 4, the upper end of the off-take or suction pipe 14^a being located above the lower edge of the cone 38. This is also practically the case with the arrangement shown in Fig. 5, wherein the opening 50 through which the materials are discharged into the separating passage is preferably slightly below the passage or opening leading into the pipe 14. Thus in all of the arrangements, there is an opening through which the relatively heavy particles are discharged from a separating chamber or passage, and through which there is also an inflow of air caused by the suction of the draft producing means. In each case, there is a primary settling chamber and a secondary settling chamber, with suitable connecting passages between. The draft is from the primary to the secondary settling chamber, and a lateral opening intermediate of the two chamber permits, as stated, an inflow of air which opposes the downward movement or passage of the particles or materials. In this way separation of the relatively light and heavy particles is secured by subjecting the materials to the opposing action of gravity and air pressure.

From the above description it will be apparent that I have provided a simple, convenient, and automatic screening collector or separator to a dust collecting and separating system, in some forms being capable of a simple connection in an ordinary dust collecting system already installed, and in others requiring a re-construction of some of the parts of such a system.

With further respect to the construction and arrangement of the draft producing apparatus, it will be seen that the fan 2 in Fig. 1 has its off take X, or outlet, connected with the primary settling chamber 4 through the medium of the pipe 3. Also in Fig. 1 the fan 15 has its offtake x¹ connected with the inlet of the secondary settling chamber 17 through the medium of the piping or passage 16. The intake Y, or lateral inlet opening, of the fan 15 is connected with the separating chamber 7 through the medium of the piping or passage 14. A similar arrangement is, it will be seen, adhered to in the construction shown in Fig. 2, and with the addition that the intake Y is also connected with the bottom portion of the separating chamber through the medium of the branch pipe 33. In Fig. 11 the intakes and offtakes of the fans are connected in a manner similar to that shown in Fig. 1. In Fig. 5, however, the fan has its offtake X connected with the primary settling chamber by the pipe 3, while its intake (not shown) is connected with the separating chamber through the medium of the piping or passage 54. Also, in Fig. 5, there is communication between the offtake

X of the fan and the inlet opening of the secondary settling chamber 17 through the medium of the piping or passage 16, as shown in the drawings.

While I have described my invention with reference to the details of the construction, I would have it understood that it is not to be limited thereto, as many changes, alterations, substitutions and modifications may be made therein and still come within its scope, and principle; but

What I do claim and desire to secure by Letters-Patent is:

1. A dust or refuse collecting and separating apparatus, comprising primary and secondary settling chambers, each of said settling chambers being provided with an inlet and two outlets, said inlet being adapted in each case to admit dust-laden air, one of said outlets in each case being adapted to permit the escape of the purified, or comparatively purified, air, the other outlet in each case being adapted to permit the escape of matter separated from the air, and suitable conducting and draft producing means, said draft producing means being adapted to blow dust-laden air through said inlets into both of said settling chambers said conducting means comprising a series of chambers, said draft producing means including a fan or blower having its intake connected to produce an inflow of air in opposition to the matter allowed to escape through the outlet from said primary settling chamber, whereby the heavier portions of such matter are permitted to discharge from the apparatus while the lighter portions are sucked through said fan or blower, and the said conducting means including a suitable passage communicating between the offtake of said fan or blower and the inlet of the secondary settling chamber, whereby the relatively light portions of the dust or refuse first blown into the primary settling chamber are ultimately blown into the secondary settling chamber, and an adjustable controlling valve controlling a lateral opening in the passage leading to the intake of said fan or blower.

2. A dust and refuse collecting and separating apparatus, comprising primary and secondary settling chambers, each of said settling chambers being provided with an inlet and two outlets, the inlet in each case being adapted to permit the admission of dust-laden air, one of said outlets in each case being adapted to permit the escape of purified, or comparatively purified, air, the other of said outlets in each case being adapted to permit the escape of matter separated from the air, and suitable conducting and draft producing means, said draft producing means being adapted to blow dust-laden air through said inlets into both of said settling chambers, said conducting means including a separating chamber associated with said primary settling chamber, and the said draft producing means including a fan or blower having its intake suitably connected with said separating chamber, whereby a draft of air is produced in the separating chamber in opposition to the matter escaping from the primary settling chamber, so as to permit the heavier portions of such matter to discharge from the apparatus while the lighter portions are sucked through said fan or blower, and said conducting means including also a suitable passage communicating between the offtake of said fan or blower and the inlet of said secondary settling chamber, whereby the relatively light portions of the dust or refuse first blown into the primary settling chamber are ultimately blown into the secondary settling chamber.

3. A dust or refuse collecting and separating apparatus, comprising primary and secondary settling chambers, each of said settling chambers being provided with an inlet and two outlets, said inlet being adapted in each case to admit dust-laden air, one of said outlets in each case being adapted to permit the escape of the purified, or comparatively purified, air, the other outlet in each case being adapted to permit the escape of matter separated from the air, and suitable conducting and draft producing means, said draft producing means being adapted to blow dust-laden air through said inlets into both of said settling chambers, said conducting means including a separating

chamber associated with said primary chamber, said draft producing means including a fan or blower having its intake connected to produce an inflow of air in opposition to the matter allowed to escape through the outlet from said primary settling chamber, whereby the heavier portions of such matter are permitted to discharge from the apparatus while the lighter portions are sucked through said fan or blower, and the said conducting means including a suitable passage communicating between the offtake of said fan or blower and the inlet of the secondary settling chamber, whereby the relatively light portions of the dust or refuse first blown into the primary settling chamber are ultimately blown into the secondary settling chamber, and an adjustable valve controlling a lateral opening in the passage leading to the intake of said fan or blower.

4. A dust or refuse collecting and separating apparatus, comprising primary and secondary settling chambers, each of said settling chambers being provided with an inlet and two outlets, the inlet in each case being adapted to permit the admission of dust-laden air, one of said outlets in each case being adapted to permit the escape of purified, or comparatively purified, air, the other of said outlets in each case being adapted to permit the escape of matter separated from the air, and suitable conducting and draft producing means, said draft producing means being adapted to blow dust-laden air through said inlets into both of said settling chambers, said conducting means including a settling chamber associated with said primary settling chamber, and the said draft producing means including a fan or blower having its intake suitably connected with said separating chamber, whereby a draft of air is produced in the separating chamber in opposition to the matter escaping from the primary settling chamber, so as to permit the heavier portions of such matter to discharge from the apparatus while the lighter portions are sucked through said fan or blower, and said conducting means including also a suitable passage communicating between the offtake of said fan or blower and the inlet of said secondary settling chamber, whereby the relatively light portions of the dust or refuse first blown into the primary settling chamber are ultimately blown into the secondary settling chamber, and an adjustable valve controlling a lateral air intake opening leading through the side of the passage leading to the intake of said fan or blower, together with a cone-shaped spreader arranged in said separating chamber at a point somewhat below the point where the latter communicates with the intake of said fan or blower.

5. A dust or refuse collecting and separating apparatus, comprising primary and secondary settling chambers, each of said settling chambers being provided with an inlet and two outlets, said inlet being adapted in each case to admit dust-laden air, one of said outlets in each case being adapted to permit the escape of the purified, or comparatively purified, air, the other outlet in each case being adapted to permit the escape of matter separated from the air, and suitable conducting and draft producing means, said draft producing means being adapted to blow dust-laden air through said inlets into both of said settling chambers, said draft producing means including a fan or blower having its intake connected to produce an inflow of air in opposition to the matter allowed to escape through the outlet from said primary settling chamber, whereby the heavier portions of such matter are permitted to discharge from the apparatus while the lighter portions are sucked through said fan or blower, and the said conducting means including a suitable passage communicating between the offtake of said fan or blower and the inlet of the secondary settling chamber, whereby the relatively light portions of the dust or refuse first blown into the primary settling chamber are ultimately blown into the secondary settling chamber, the said primary settling chamber being provided with a discharge spout extending downwardly to a point somewhat below the opening of the passage leading to the intake of said fan or blower, and the said draft producing means including also a second fan or blower adapted to primarily receive the dust-laden air and having its off-take connected with the inlet of said primary settling chamber.

6. A dust or refuse collecting and separating apparatus,

comprising primary and secondary settling chambers, each of said settling chambers being provided with an inlet and two outlets, said inlet being adapted in each case to admit dust-laden air, one of said outlets in each case being adapted to permit the escape of the purified, or comparatively purified, air, the other outlet in each case being adapted to permit the escape of matter separated from the air, and suitable conducting and draft producing means, said draft producing means being adapted to blow dust-laden air through said inlets into both of said settling chambers, said draft producing means including a fan or blower having its intake connected to produce an inflow of air in opposition to the matter allowed to escape through the outlet from said primary settling chamber, whereby the heavier portions of such matter are permitted to discharge from the apparatus while the lighter portions are sucked through said fan or blower, and the said conducting means including a suitable passage communicating between the offtake of said fan or blower and the inlet of the secondary settling chamber, whereby the relatively light portions of the dust or refuse first blown into the primary settling chamber are ultimately blown into the secondary settling chamber, and the said conducting means also including an upright cylinder serving as medium of connection between the primary settling chamber and the intake of said fan or blower, said cylinder having its open lower end provided with a funnel-shaped receiving device.

7. The combination of the fan or blower 2, the primary settling chamber 4 provided with a discharge spout 6, the separating chamber 7 enclosing the said discharge spout and provided with a conical spreader, the funnel-shaped receiving device 10 secured to the lower end of said separating chamber, the fan or blower 15 having its intake connected by a pipe 14 with the upper end of said separating chamber, the adjustable valve 21 for controlling a lateral opening in the side of said pipe 14, and the secondary settling chamber 17 connected with the offtake of the fan or blower 15, substantially as shown and described.

8. In a device of the class described, a settling chamber, a separating chamber open at its lower end, a discharge pipe leading from the settling chamber into the separating chamber having its outlet some distance below the upper portion of the separating chamber, an off-take pipe leading from the upper end of the separating chamber and above

the outlet of the discharge pipe, a fan or blower for sucking air through the separating chamber and the off-take pipe in opposition to the material to be discharged from the separating chamber through the discharge pipe, means in the upper portion of the off-take pipe for controlling the velocity of the upward current of air through the separating chamber to establish the weight of the material to be discharged at the lower end of the separating chamber.

9. A settling chamber, an air and dust outlet opening in its upper portion, means for collecting material and blowing it into the settling chamber, a separating chamber to discharge the heavier particles of material and to admit air, an off-take opening in the upper portion of the separating chamber, a discharge pipe leading from the lower end of the settling chamber into the separating chamber, having its lower or discharge end some distance below the opening into the off-take pipe, a fan or blower for creating a suction to cause an upward current of air through the separating chamber and the off-take pipe and to increase the ease and speed of discharge through the discharge of the settling chamber.

10. A settling chamber, an air and dust outlet opening in its upper portion, means for collecting material and blowing it into the settling chamber, a separating chamber to discharge the heavier particles of material and to admit air, an off-take opening in the upper portion of the separating chamber, a discharge pipe leading from the lower end of the settling chamber into the separating chamber, having its lower or discharge end some distance below the opening into the off-take pipe, a fan or blower for creating a suction to cause an upward current of air through the separating chamber and the off-take pipe and to increase the ease and speed of discharge through the discharge of the settling chamber and a regulator in the off-take pipe for controlling the velocity of the upward current of air through the separating chamber and the amount of downward draft through the discharge of the settling chamber.

Signed by me at Des Moines Polk county Iowa, this twelfth day of March 1901.

LEE LOCKWOOD.

Witnesses:

ANNA WOODEN,
W. L. FERREL.