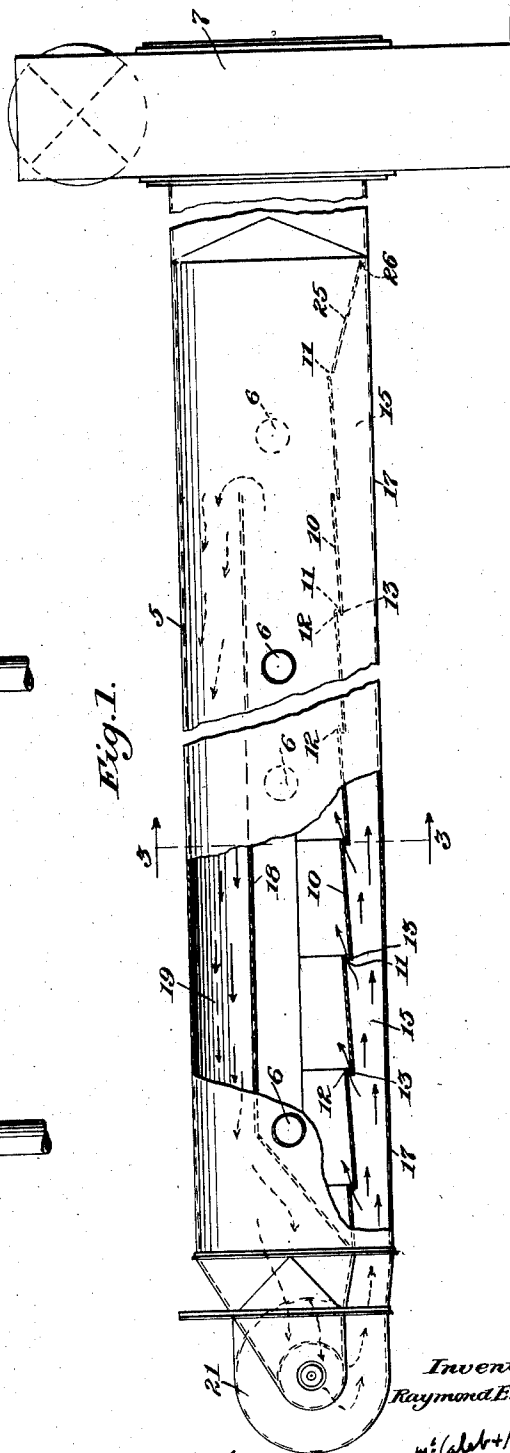
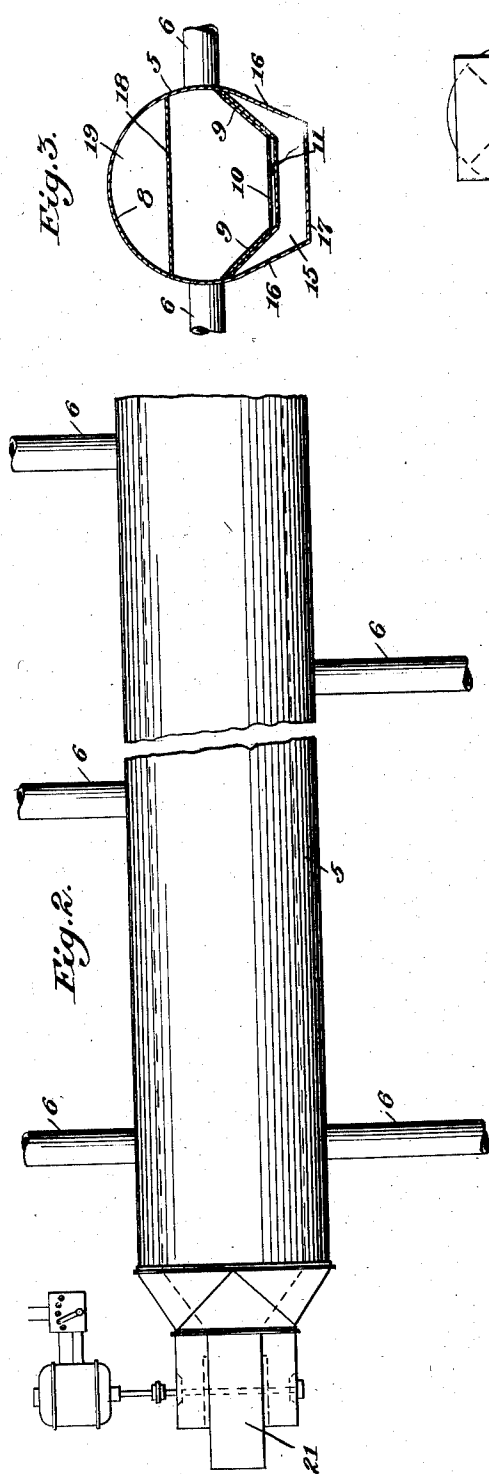


Feb. 9, 1932.

R. E. CALLER
DUST HANDLING SYSTEM
Filed May 3, 1929

1,844,635



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UNITED STATES PATENT OFFICE

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DUST HANDLING SYSTEM

Application filed May 3, 1929. Serial No. 360,281.

My invention relates to dust handling or dust collecting systems.

It will be explained as applied to the handling or collection of the machine refuse of a woodworking plant although it is by no means limited to this field. Thus it is applicable to the handling or collection of other refuse of similar character capable of being transported through piping by flowing air, such, for example, as the refuse of shoe making establishments and the like. However, since the application to woodworking plants offers, at least at present, the greatest field of use for the invention, and its adaptation to other fields will be readily understood from a knowledge of how it is applied in one field, the embodiment selected for illustration and description will be of this variety.

The machine refuse of a wood working establishment usually includes a heterogeneous mixture of small chips and blocks of wood, splinters, shavings, sawdust and wood powder and it is a problem of no mean proportions to collect this refuse from the individual machines producing it and transport it collectively to some point of disposal, such as the steam boiler furnaces, where it may be burned to generate steam or to storage bins where it may be held until it can be burned, sold or otherwise disposed of.

For years it has been a common practice to utilize high velocity air streams to convey the refuse from the hoods at or near the machine heads, saws or cutters thence through small individual pipes from each hood, called branch pipes, into larger pipes or ducts, usually called mains, and through the mains to dust collectors where the refuse and transporting air are separated, the air escaping to atmosphere and the refuse, usually falling by gravity, to the furnace fuel-hopper or storage bins.

Refuse handling or collecting systems of this general character are extensively used but they are prone to partial or total clogs and stoppages because of the tendency of the heavier particles to settle along the bottom of the piping, particularly the mains.

One of the objects of my invention is to

provide an improved dust or refuse handling or collecting system.

Another object is to provide a system whereby the difficulties heretofore mentioned may be minimized.

Another object is to provide an improved system operating exclusively by air.

Another object is to provide a system that will improve the results heretofore obtained and be relatively simple and inexpensive to install and maintain.

Other objects and advantages will hereinafter appear.

In the accompanying drawings, illustrating a typical installation of a part of a refuse or dust handling or collecting system,

Fig. 1 is a side elevation and partial section of a duct or main embodying my invention.

Fig. 2 is a top plan of part of the system shown in Fig. 1, and

Fig. 3 is a section on the line 3—3 of Fig. 1.

In general, my invention comprehends the forcing of auxiliary streams of air, preferably at intervals and at a velocity above that of the main conveying air stream, into and more or less along the bottom of the conveying pipe or duct. This auxiliary air may be and preferably is obtained from the pipe or duct itself and then reinjected or recirculated at increased velocity.

The system chosen for the purpose of illustration has a main or trunk duct or pipe 5 to which are connected the usual branch or feeder pipes 6 from one or more machines. A main exhaust fan 7, driven in any suitable and approved manner, has its suction side connected to main 5 while its delivery side is piped preferably to a dust collector. The dust collector is not shown because it forms no part of the present invention and may be of any suitable type or, if conditions require or permit, dispensed with entirely.

The main duct may be of any appropriate shape and formed from any suitable material but I believe the cross-sectional shape shown most clearly in Fig. 3 will ordinarily give the best results. Also I prefer to fabricate the duct or pipe from telescopically jointed sections of sheet metal, the standard length of such sections being about three feet with

an end overlap of about two inches at the section joints. Of course, to minimize the obstruction to the passage of air and the refuse carried thereby, the telescopic joint between sections should be overlapped in the direction of travel.

As shown more particularly in Fig. 3, the preferred form of main duct has a cross-section with a substantially semicylindrical upper portion 8, two downwardly converging side walls 9 and a relatively narrow horizontal bottom 10. This shape, I believe, is the best because it restricts the cross-section and therefore tends to increase the air velocity in the region where the heavier material is prone to collect and it offers less opportunity for the material to gather and lodge in regions where the air velocity is less. But where conditions permit or require other cross-sectional shapes may be employed.

The bottom or floor 10 of the duct is provided at suitable intervals with air inlet slots or air injection nozzles 11 whose size and number will depend more or less upon the character of the refuse and the service required. For convenience these slots may be located at the joints between sections, the overlapping at the junctions of the sections providing a ready arrangement for forming them. Thus the bottom wall or floor of each section, at the end farthest from the main exhaust fan, may be bent or formed somewhat lower and, at the opposite end, somewhat higher than would be the case if a tight fit were to be made. The gaps or spaces thus produced readily constitute the desired slots which, because of the overlap constitute, in effect, nozzles through which air may be forced into the duct as will be hereinafter described. The superposed or inner lapping forward edge 12 of the floor of one section and the outer lapping rear edge 13 of the floor of the adjacent section may be bent or formed so as to vary the size of the opening or slot therebetween and alter, to a certain extent, the angular direction relative to the bottom or axis of the main of the jet of air forced therethrough. Thus there is provided a simple and readily adjusted arrangement for varying the volume and velocity of the injected air streams and the angle at which they are injected into and along the floor or bottom of the main whereby different conditions may be dealt with as occasion may require.

In order that air may be forced or injected through these slots or nozzles they are placed in suitable communication with an auxiliary source of air under pressure. This end may be attained by suitable piping interconnecting the slots or nozzles with an auxiliary fan or other appropriate source delivering air in the desired quantity, pressure and velocity. I prefer, however, to provide an auxiliary air supply duct 15 common to all of the slots

or nozzles of the main. This end can be readily attained by adding an extra and outer envelope about part of and spaced from the walls of the main proper to provide an auxiliary air duct throughout such length of the main as conditions may require.

This partial envelope is provided by attaching an extra or intermediate bottom to each pipe section, such bottom having two sloping side walls 16 and a lower wall 17. Longitudinally the intermediate or extra bottom may be secured to the walls of the main by soldering or riveting or in any other approved manner that will afford a sufficiently tight joint to prevent excessive escape of air from the auxiliary air duct. This arrangement permits of the supply of the necessary auxiliary air to the slots or nozzles along the main without requiring extraneous piping and affords a uniform, compact and neat appearance.

The air to be supplied to and forced through the nozzles or slots distributed along the main may be taken from any desired place outside of the system but I prefer to obtain it from the main itself. Such an arrangement has advantages that may be of more or less importance depending upon the local conditions of each installation.

The auxiliary air may be readily obtained from the system by adding a partition 18 across the upper portion of the main. The partition may be extended along the main to the point where, for any particular installation, it is desired to remove the auxiliary air. Thus there is provided an auxiliary-air source duct 19 within the main and opening to the main so that the auxiliary air may be taken therefrom.

Opposite its open end auxiliary air duct 19 is connected to the suction side of the auxiliary fan 21, the discharge end of fan 21 being connected to supply duct 15. In this way fan 21 takes the auxiliary air from the main and forces it back into and along the floor or bottom of the main through duct 15 and nozzles 11. Among the advantages of such an arrangement are that the removal of the auxiliary air from the main refuse conveying duct assists the main exhaust fan in maintaining the necessary air velocity through the main, the quantity of air that the main exhaust fan must handle is less than if the auxiliary air were taken outside of the system and the entire system is well balanced because the auxiliary air is removed and re-injected or recirculated under the same conditions because it comes from and goes to the same region.

Usually it will not be necessary or desirable to provide for the supply of auxiliary air clear to the main exhaust fan because the suction from the fan can be depended upon to keep the main free for some distance adjacent its exhaust side. Consequently the

auxiliary air supply duct 15 is provided with an end wall 25 some distance from the main exhaust fan, and any tendency of the main to clog between the end of this auxiliary air duct and the fan can be overcome by providing a small slot or nozzle 26 adjacent the bottom of the main and the end of the air duct.

Briefly the operation of the system is as follows:

The main exhaust fan induces a current of high velocity air through all of the branch pipes and the main duct, carrying the refuse from the machines and through the branch pipes and main duct. This main air current is the principal vehicle for transporting the refuse through the system. The auxiliary fan forces sheets of auxiliary air through jets into the main duct through the slots or nozzles distributed along the intermediate bottom, the direction of such jets being in the direction of flow of the material and also more or less upwardly depending upon the adjustment heretofore mentioned. This auxiliary air, preferably taken from the main duct, is forced or injected into the main duct at a velocity somewhat above that of the main air current so that it serves as a number of upwardly and forwardly directed high velocity streams that tend to clear the bottom of the main and prevent accumulations of material from forming thereon.

Having thus illustrated and described the nature and one embodiment of my invention, what I claim and desire to secure by United States Letters Patent is as follows:

1. A dust collecting system comprising a main conveyor duct, a plurality of passageways arranged therein one above the other, air pressure means for inducing a forward flow of air in the lowermost passageway, the roof of said passageway being slotted to allow air to enter the passageway above, a plurality of dust conveying pipes entering said intermediate passageway and said air pressure means arranged to induce air to flow back to the means through said upper passageway.

2. A dust collecting system comprising a main conveyor duct having an upper, a lower, and an intermediate passageway therein, branch pipes connected to said intermediate passageway at intervals, and a blower having its discharge end connected to said lower passageway and having its suction side connected to said upper passageway.

3. A dust collecting system comprising a main conveyor duct having an upper, a lower, and an intermediate passageway therein, branch pipes connected to said intermediate passageway at intervals, a blower having its discharge end connected to said lower passageway for forcing a forward flow of air through said lower passageway and by means of slots in the roof of said passageway into

the intermediate passageway, said blower having its suction side connected to said upper passageway, and capable of drawing air back through said upper passageway into said blower through an opening between said intermediate and said upper passageways.

4. A dust collecting system comprising a main conveyor duct having an upper, a lower, and an intermediate passageway therein, branch pipes connected to said intermediate passageway at intervals, a blower at one end of said conveyor duct having its discharge end connected to said lower passageway for forcing a forward flow of air through said lower passageway and by means of slots in the roof of said passageway into the intermediate passageway, said blower having its suction side connected to said upper passageway and capable of drawing air back through said upper passageway into said blower through an opening between said intermediate and said upper passageways at the opposite end of said conveyor duct.

5. A dust collecting system comprising a main conveyor duct having an upper, a lower, and an intermediate passageway therein, branch pipes connected to said intermediate passageway at intervals, a blower at the rear end of said conveyor duct for sucking materials forward in said intermediate passageway, a primary blower at the upper end of said conveyor duct having its discharge end connected to said lower passageway for forcing a forward flow of air through said lower passageway and by means of slots in the roof of said passageway into the intermediate passageway, said blower having its suction side connected to said upper passageway and capable of drawing air back through said upper passageway into said blower through an opening between said intermediate and said upper passageways situated at the rear end of said conveyor duct.

6. A dust collecting system comprising a main conveyor duct having an upper, a lower, and an intermediate passageway therein, branch pipes connected to said intermediate passageway at intervals, a blower at the front end of said conveyor duct having its discharge end connected to said lower passageway for forcing a forward flow of air through said lower passageway and by means of slots in the roof of said passageway into the intermediate passageway, said lower passageway having its rear end closed and said blower having its suction side connected to said upper passageway and capable of drawing air back through said upper passageway into said blower through an opening between said intermediate and said upper passageways.

7. A dust conveying system comprising a main conveyor duct, a main suction fan for inducing a dust conveying current of air through the main duct, branch ducts connected to the main duct and through which

air and dust are delivered thereto, and auxiliary air duct opening at intervals to the main duct in the region of the bottom thereof, and an auxiliary fan for withdrawing air from the main duct and forcing the same through the auxiliary duct and the openings back into the main duct.

In witness whereof, I have hereunto subscribed my name this 1st day of May, 1929.
RAYMOND E. CALLER.

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