

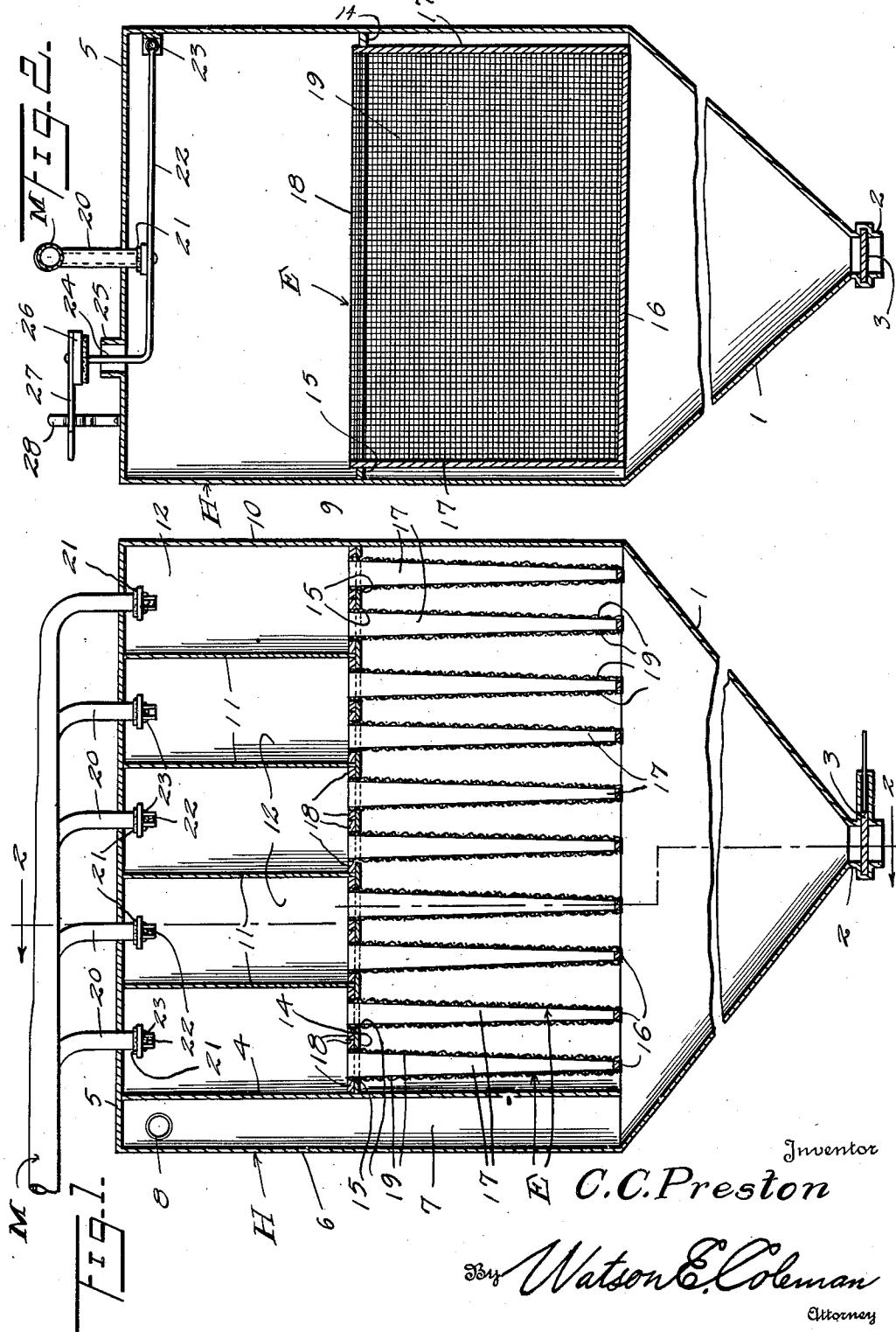
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SEPARATING APPARATUS

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SEPARATING APPARATUS

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This invention relates to a separating apparatus of a type particularly adapted for use in separating solids from a fluid, such as air.

It is a particular object of the invention to provide an apparatus of this kind for collecting dust, such as is created in the handling of coal.

The invention also has for an object to provide an apparatus of this kind which operates to collect dust in a manner whereby indiscriminate spreading of such dust is prevented.

The invention has for a further object to provide an apparatus of this kind of a vacuum type and wherein provision is made for the reverse flow of air to effect such abrupt action upon the screening medium to effectively clean such medium when desired.

An additional object of the invention is to provide an apparatus of this kind comprising a plurality of separating units together with means whereby the separating medium of each unit may be readily cleaned independently of the remaining units and without requiring closing down of the other units and in a manner whereby the use of a mechanical striker is eliminated.

The invention consists in the details of construction and in the combination and arrangement of the several parts of my improved separating apparatus whereby certain important advantages are attained and the device rendered simpler, less expensive and otherwise more convenient and advantageous for use, as will be hereinafter more fully set forth.

The novel features of my invention will hereinafter be definitely claimed.

In order that my invention may be the better understood, I will now proceed to describe the same with reference to the accompanying drawing, wherein:

Figure 1 is a vertical sectional view taken lengthwise through an apparatus constructed in accordance with an embodiment of my invention;

Figure 2 is a sectional view taken substantially on the line 2—2 of Figure 1 looking in the direction of the arrows.

As disclosed in the accompanying drawing, H denotes a housing of desired dimensions and configuration and which has its bottom part formed to provide a hopper 1 having a discharge 2. This discharge 2 is under control of a valve 3 illustrated in the accompanying drawing as of a sliding type. However, I do not wish to be understood as limiting myself to any particular structure of valve as obviously there can be employed

any type of valve capable of performing the service required.

The housing H is of a structure whereby the same is airtight and at one end portion said housing H is intersected by a partition 4 extending down from the top wall 5 of the housing to a point substantially coplanar with the lower hopper-like portion 1 of the housing. This partition 4 is spaced from the adjacent end wall 6 of the housing whereby is provided a vertically disposed material receiving chute or flue 7. As is clearly illustrated in Figure 1, the lower end of this chute or flue 7 opens into the lower hopper-like portion 1 of the housing. The upper portion 15 of the chute or flue 7 is provided with an inlet opening 8 herein disclosed as being disposed through a side wall 9 of the housing H. This inlet opening 8 has suitable communication with the source of material to be treated.

The upper portion of the housing H between the partition 4 and the end wall 10 remote from the partition 4 is intersected by the partitions 11. These partitions 11 extend entirely across the housing and depend from the top wall 5 thereof and are preferably equi-distantly spaced. These partitions 11 do not extend all the way down to the bottom of the housing H although they do terminate a material distance below the top wall 5 of the housing H to provide a series 30 of vacuum chambers 12. The lower ends of these chambers 12 are closed by a bottom wall 14. The bottom wall 14 for each of the chambers 12, as herein embodied, is provided thereacross with two elongated openings or slots 15. As illustrated 35 in Figure 2, each of these slots 15 extends from substantially one side of the housing H to the other.

In the present embodiment of my invention there is insertable from above through each of 40 the openings 15 a cleaning element E. This cleaning element E comprises a bottom bar 16 suitably secured to the lower extremities of the end bars 17. These bars 17 are of a tapered or wedge-like formation with the narrow ends secured to the bar 16. The upper or wide ends of the end members or bars 17 are tied or connected by the top bars 18. The upper ends of these end members or bars 17 are between the top bars 18 so that said bars 18 by contact from above 45 with the bottom wall 14 of a chamber 12 provide effective means whereby the element E is effectively suspended in working position. The bottom bar 16, the end members or bars 17 and the top bars 18 have secured thereto the filtering fabrics 19 preferably of woven material of a rela-

tively fine mesh. This material may be of glass threads when it is desired to offset any acid that may be given off by the material being treated although in many operations this fabric need only be of cotton. It is to be understood, however, that I am not limiting myself to any particular material for the fabric as this will depend upon the requirements and necessities of practice.

Positioned above and extending lengthwise of the housing H is a manifold M. This manifold leads to a suction or vacuum pump of desired capacity. This manifold M is provided with the branch pipes 20 of a number equal to the number of chambers 12 with a single pipe 20 extending within the upper portion of each of said chambers 12.

The material to be treated, as hereinbefore stated, is delivered within the upper portion of the chute or flue 7 through the inlet opening 8. The material passes down this chute or flue 7 within the lower hopper-like portion 1 of the housing H. This portion 1 constitutes a settling chamber wherein the heavier particles of the material, such as coal, will drop to the bottom while the dust or lighter particles will rise as is well known. The suction, however, created in the several chambers 12 will draw upwardly the air with the intermingled dust within the hopper-like portion 1 and as the air passes through the screening fabrics 19 the collected dust will build up on the outer surfaces of the screening fabrics 19 and from time to time drop therefrom down into the collecting chamber. In course of time the dust as separated by the fabrics 19 will have a tendency to choke such fabrics and thereby reduce the efficiency of the same as a filtering or separating medium. However, by quickly reversing the flow of air through such fabrics the same are readily cleaned.

As is particularly illustrated in the accompanying drawing, the receiving end of each of the pipes 20 within a chamber 12 is adapted to be closed by a valve 21 carried by an elongated arm 22. As is illustrated in Figure 2, one end portion of this arm 22 is hinged or pivotally mounted, as at 23, on a side wall 9 of the housing H so that the arm 22 may have swinging movement toward or from the top wall 5. The outer or free end portion of this arm 22 is continued by an upwardly disposed extension arm 24 which extends above the top wall 5 of the housing H through a vent 25 of desired diameter in communication with the outside atmosphere. This extension arm 24 outwardly of the vent 25 carries a valve 26 which, when in one position, effectively closes the vent 25. The upper portion of this extension arm 24 also carries a laterally disposed operating arm 27 to provide means whereby the valve 26 may be readily moved, when desired, into its raised or open position as illustrated in Figure 2.

It is to be particularly noted that when the valve 26 is raised into open position, the valve 21 moves into close contact with the receiving end of the associated pipe 20 whereby the suction action through such pipe 20 is effectively closed.

Normally, however, the valve 26 is in its closed position with the valve 21 in its open position and in order to prevent the suction from reversing such positions of the valves, the arm 27 when the valve 26 is closed and the valve 21 is open is engaged by a latch 28 carried by the top wall 5 of the hopper 1 and which latch is herein disclosed as being of a spring type.

When during the operation of the apparatus the screening fabrics 19 of the elements E associated with any one of the chambers 12 becomes unduly clogged, it is only required that the arm 22 be swung upwardly to move the valve 26 into open position and the valve 21 into closed position. These positions of the valves need only be maintained momentarily. The opening of the valve 26 together with the closing of the valve 21 results in an abrupt return flow of air down through the vent 25 and out through the fabrics 19. This abrupt return flow effects sufficient agitation or vibration of the fabrics 19 to throw off the dust adhering to the outer surfaces thereof and which may be clogging the fabrics.

In practice it has been found that the fabrics 19 will be effectively cleaned by holding the valve 26 in open position and the valve 21 in closed position for a period of time approximating two seconds. However, when conditions require this period of time may be varied.

It is believed to be obvious that the construction of my improved apparatus as herein embodied is such that the cleaning of the fabrics 19 of the elements E associated with any one of the chambers 12 may be readily accomplished without interfering with the cleaning operation of the elements E of the other chambers. This, of course, is essential as it is the continued suction through such other chambers that effects the desired abrupt reverse flow down through the chamber in connection with which the fabrics 19 are being cleaned.

From the foregoing description it is thought to be obvious that a separating apparatus constructed in accordance with my invention is particularly well adapted for use by reason of the convenience and facility with which it may be assembled and operated, and it will also be obvious that my invention is susceptible of some change and modification without departing from the principles and spirit thereof and for this reason I do not wish to be understood as limiting myself to the precise arrangement and formation of the several parts herein shown in carrying out my invention in practice except as herein-after claimed.

I claim:

1. In combination, a fluid tight housing, means for dividing the interior of the housing into a lower settling chamber, an upper vacuum chamber and a chute for delivering material to the settling chamber, a wall of the vacuum chamber having an opening affording communication with the settling chamber, a screening element for such opening including a filtering fabric, a suction line in communication with the vacuum chamber, a wall of said chamber having a vent in communication with the atmosphere, a valve for closing the suction line, a valve for closing the vent, and a member common to both valves, one of said valves being in open position when the other is in closed position.
2. In combination, a fluid tight housing, means for dividing the interior of the housing into a lower settling chamber, an upper vacuum chamber and a chute for delivering material to the settling chamber, a wall of the vacuum chamber having an opening affording communication with the settling chamber, a screening element for such opening including a filtering fabric, a suction line in communication with the vacuum chamber, a wall of said chamber having a vent in communication with the atmosphere, a valve

for closing the suction line, a valve for closing the vent, a member common to both valves for simultaneously moving both valves, one of said valves being in open position when the other is in closed position, said member having a portion extending exteriorly of the housing, and means engageable with said extended portion of the member for holding said valves against movement when the valve for the suction line is open and the valve for the vent is closed.

3. In combination, a fluid tight housing, means for dividing the interior of the housing into a lower settling chamber, an upper vacuum chamber and a chute for delivering material to the settling chamber, a wall of the vacuum chamber having an opening affording communication with the settling chamber, a screening element for such opening including a filtering fabric, a suction line in communication with the vacuum chamber, a wall of said chamber having a vent in communication with the atmosphere, a valve for closing the suction line, a valve for closing the vent, and a rock arm mounted within the housing and having an end portion extending exteriorly thereof through the vent, the valves being carried by said rock arm, said valves being positioned on the arm to bring the valve for the suction line into closed position and the valve for the vent into open position upon swinging movement of the arm in one direction and vice versa.

4. In combination, a fluid tight housing, means for dividing the interior of the housing into a lower settling chamber, an upper vacuum chamber and a chute for delivering material to the settling chamber, a wall of the vacuum chamber having an opening affording communication

with the settling chamber, a screening element for such opening including a filtering fabric, a suction line in communication with the vacuum chamber, a wall of said chamber having a vent in communication with the atmosphere, a valve for closing the suction line, a valve for closing the vent, a rock arm mounted within the housing and having an end portion extending exteriorly thereof through the vent, the valves being carried by said rock arm, said valves being positioned on the arm to bring the valve for the suction line into closed position and the valve for the vent into open position upon swinging movement of the arm in one direction and vice versa, and releasable means for holding the rock arm against movement when in its second position.

5. An apparatus of the character described comprising a fluid tight housing, means for dividing the interior of the housing into a lower settling chamber, a plurality of vacuum chambers in the upper portion thereof, and a chute for delivering material within the settling chamber, the vacuum chambers being in communication with the settling chamber, filtering elements for the communications between the vacuum chambers and the settling chamber, suction lines extending within the vacuum chambers, a wall of each of said vacuum chambers having a vent in communication with the atmosphere, and a single member common to both valves to provide means for simultaneously closing the suction line and opening the vent and vice versa of each of the chambers independently of the remaining vacuum chambers.

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