United States Patent

[11] 3,572,503

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[21] Appl. No. **773,248**
[22] Filed **Nov. 4, 1968**
[45] Patented **Mar. 30, 1971**
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[54] **TRASH SEGREGATION APPARATUS**
10 Claims, 2 Drawing Figs.

[52] **U.S. Cl.** **209/120,**
209/135, 209/138, 209/147
[51] **Int. Cl.** **B07b 4/00**
[50] **Field of Search** 209/115,
120, 134, 135, 143, 146, 147, 138, 139, 141

[56] **References Cited**

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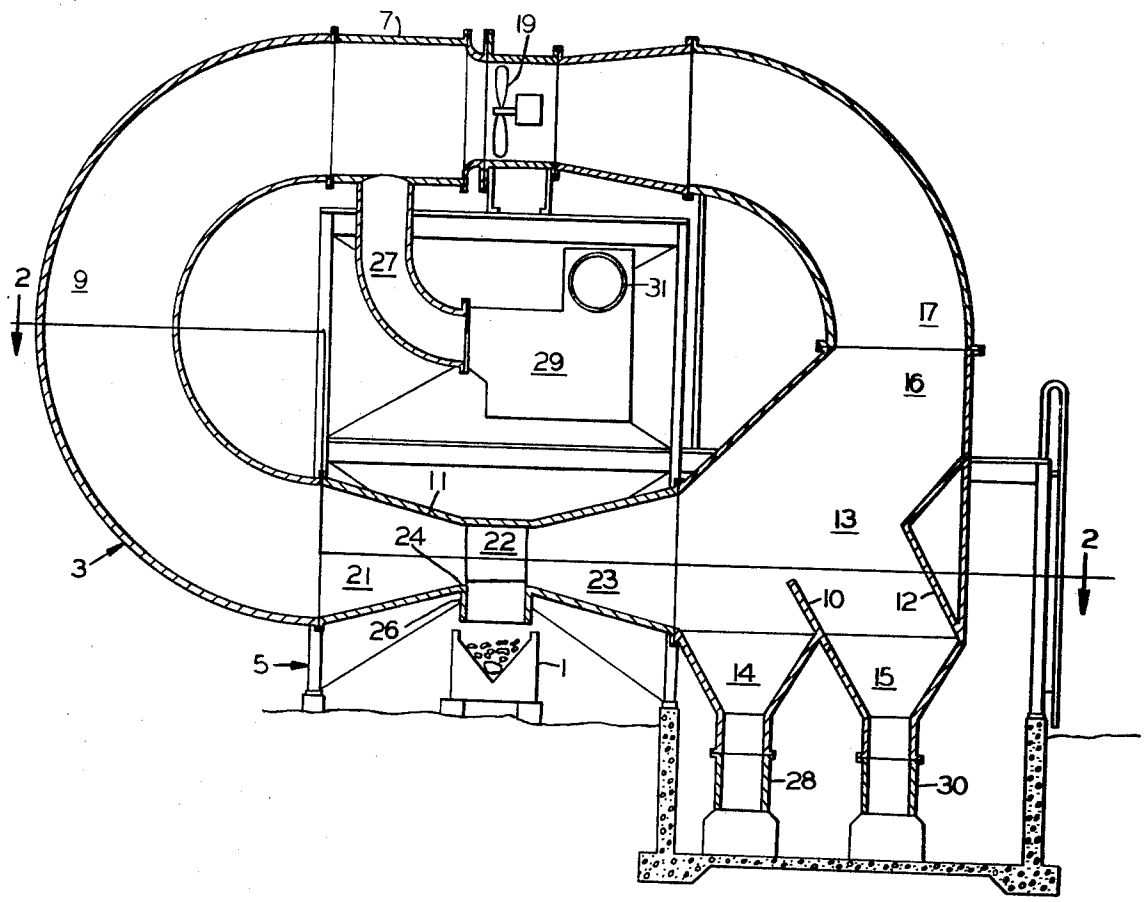
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ABSTRACT: Apparatus for segregating trash in accordance with its specific gravity, comprising a vibratory conveyor which causes large or heavy pieces of material such as metal or wood to settle to the bottom and lighter material such as paper and cardboard to remain at the top, and a closed circuit conduit having a venturi above the conveyor with an opening in its throat directly over the conveyor, a blower anterior to the venturi in the conduit for producing a flow of air through the venturi whereby to create a pressure reduction at the venturi throat sufficient to lift the lighter materials, i.e., paper and cardboard, off the conveyor and into the venturi and to propel the material received therein through the venturi, a plurality of upwardly open hoppers communicating with the conduit ductwork posterior to the venturi whereby the heavier materials will be caused to fall, by their specific gravity into the first hopper and lighter materials will be caused to fall by their relative specific gravities into the succeeding hopper or hoppers. For discharging excess air down into the system through the venturi throat opening, from the system, a lateral discharge conduit including an air filter is provided posterior to the blower.



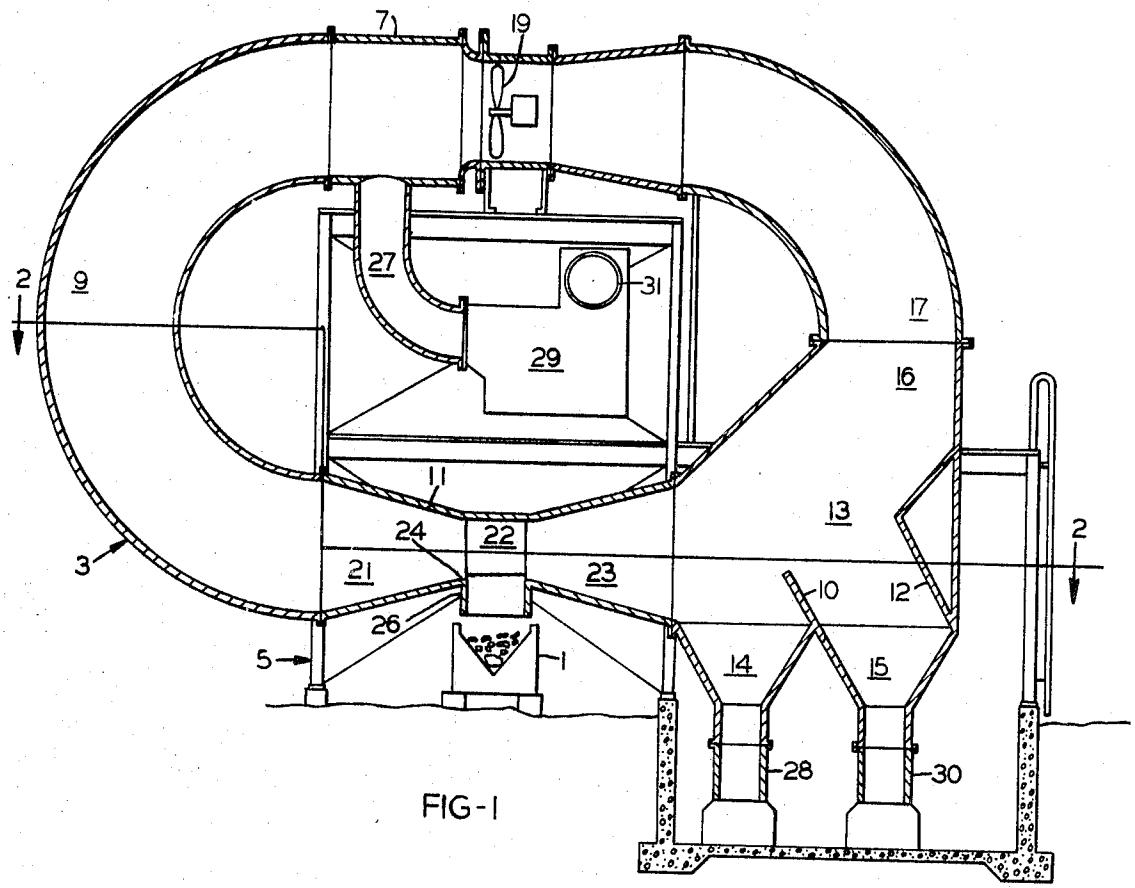


FIG-1

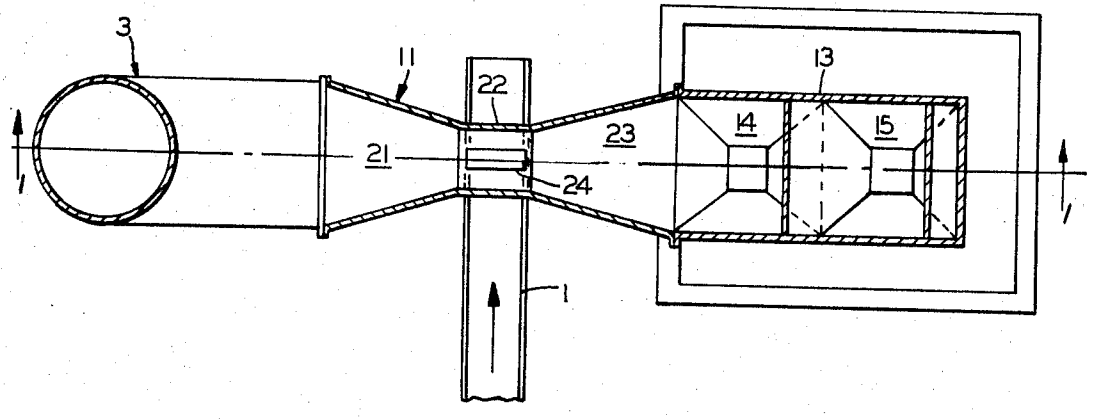


FIG-2

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TRASH SEGREGATION APPARATUS

FIELD OF THE INVENTION

The invention relates to apparatus for classifying and segregating trash, particularly paper trash, of different specific gravities.

DESCRIPTION OF THE PRIOR ART

The prior art discloses the use of vertical ducts with suction blowers at their upper ends to raise mine tailings and the like from an opening in the bottom of the duct to a point in the duct where they can be permitted to fall by their specific gravity into classifying hoppers, all air in the systems being discharged directly into the atmosphere.

SUMMARY OF THE INVENTION

The invention provides a closed circuit system for segregating various types of trash from each other according to their specific gravity, utilizing a vibratory conveyor for making the initial segregation between heavy materials such as metal and wood and lighter materials such as paper and cardboard, a closed circuit conduit including a venturi with its throat communicating with the conveyor for lifting the lighter trash from the conveyor into the venturi and propelling it through the conduit to a series of classification hoppers arranged successively longitudinally of the conduit posterior to the venturi whereby the heavier trash will be caused to drop into the first hopper and lighter elements of trash successively into succeeding hoppers. Posterior to the hoppers a filter communicates with the conduit by means of a lateral passage so that excess air which cannot be reused by the system will be filtered before being discharged into the atmosphere.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a longitudinal vertical sectional view taken along line 1–1 of FIG. 2 of apparatus embodying the invention.

FIG. 2 is a horizontal sectional view of the apparatus taken along line 2–2 of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The numeral 1 generally indicates a vibratory conveyor mounted at ground level and arranged for receipt at its one end of unsegregated trash which may include ferrous and nonferrous metallic pieces, pieces of rock, brick, wood, glass, as well as paper and cardboard, of various densities and qualities. Conveyor 1 is of conventional construction, so that through its vibration, the heavier items of trash are caused to settle to the bottom while being conveyed and the lighter elements of trash remain in the top layers. The detailed construction of the conveyor may be conventional and forms no part of the present invention.

For separating the cardboard from paper in the top layers on the conveyor, a closed conduit system, generally indicated at 3, extends transversely over conveyor 1. Conduit system 3 is supported on rectangular upright framing, generally indicated at 5, and includes a substantially horizontal upper portion 7 extending transversely of the conveyor and substantially spaced vertically thereabove, a semicircular anterior end portion 9, a bottom horizontal section 11 extending transversely of and in close proximity to the upper surface of conveyor 1, a trash discharge conduit section 13 including a pair of outlet hoppers 14 and 15 communicating successively with the bottom of section 13 posterior to conveyor 1. Upwardly and rearwardly inclined baffle plates 10 and 12 are positioned across section 13 immediately posterior to hoppers 14 and 15, respectively, to assist the material to drop into the proper hopper. An upwardly curved posterior end section 17 connects an upwardly extending portion 16 of discharge section 13 with horizontal top member 7.

Intermediate the ends of top member 7, a blower 19 is positioned therein, and is arranged to blow toward the left, i.e., in a direction counterclockwise of the conduit system 3.

Immediately above conveyor 1, conduit bottom section 11 is gradually narrowed as at 21 to form a venturi throat 22 directly above the conveyor posterior to which section 11 is gradually broadened as at 23 to the normal cross-sectional area of the conduit. Throat 22 is provided at its bottom, directly over the conveyor, with an aperture 24 surrounded by a depending hood 26 terminating in close proximity to the top of conveyor 1 so that when blower 19 is operating, airflow which it produces through conduit top section 7, anterior curved conduit section 9 and bottom section 11 will produce a substantial reduction in pressure in venturi throat 22, thereby causing paper and cardboard scraps in the conveyor upper strata to rise through hood 26 and aperture 24 into venturi 22, and the corollary increase in air velocity through the venturi throat will cause this material to move to the right through venturi outlet 23. As the air current bearing these elements passes over hoppers 14 and 15 and begins to move upwardly therefrom through conduit section 17, the heavier, denser pieces such as cardboard scraps in the lower strata of the air current will be caught by baffle 10 and drop first into hopper 14, while lighter pieces such as paper scraps will move past hopper 14 and, caught by baffle 12, will drop into hopper 15. The hopper outlets preferably feed directly, respectively, into cardboard and paper balers 28 and 30. After paper and cardboard have been removed from the air current, it continues to flow upwardly through posterior curved section 17 and past blower 19. It will be appreciated that posterior to venturi 22 the system will have more air in it than anterior to the venturi because of the air drawn in through opening 22 in the venturi throat. To permit escape of such excess air, posterior to blower 19 a lateral duct 27 leads from upper section 7 to a conventional air filter 29 which discharges into the atmosphere through outlet 31 so that excess air discharged into the atmosphere will be filtered before its discharge to remove elements of dust and other impurities which it picked up during flow through the conduit system.

Operation of the system is as follows: Unsegregated trash is loaded on conveyor 1, where through vibration it is stratified according to its specific gravity, heavier pieces such as iron, wood, glass and the like being at the bottom, and lighter material such as paper and cardboard being in the upper strata. When the material on the conveyor passes beneath the venturi, subatmospheric pressure in the venturi will cause paper and cardboard to rise into the venturi where the increased airspeed will propel it to the right. As the air containing paper and cardboard is propelled at high speed to the right, its speed reduces when it enters the enlarged cross-sectional area of discharge section 13, and the heavier elements such as cardboard drop into hopper 14, while lighter elements such as paper continue in the airstream and fall into the second hopper 15. From both hoppers the paper and cardboard respectively drop into balers 28 and 30 where they are baled for disposal to users of the material. Dust and material too light to fall into the hoppers continue through conduit section 17 past blower 19 and the excess air passes through duct 27 into filter 29 where it is purified and from which it is discharged through outlet 31 into the atmosphere.

Details of the apparatus may be modified substantially without departing from the spirit of the invention and the exclusive use of such modifications as come within the scope of the appended claims is contemplated.

I claim:

1. Apparatus for segregating materials of different specific gravities from each other comprising conduit means, a venturi formed in said conduit means, a material inlet aperture formed in the bottom of said conduit means below said venturi, means for forcing air through said venturi, and a plurality of downwardly directed openings in said conduit means posterior to said venturi, said openings being arranged successively longitudinally of said conduit means whereby materials of different specific gravities drawn upwardly into said conduit means through said aperture by the suction created by said venturi and propelled past said venturi by the accelerated air

current therein are caused to drop selectively through said openings in accordance with their relative specific gravities.

2. Apparatus according to claim 1 wherein said conduit means forms a closed circuit, there being means communicating with said conduit means for discharging excess air into the atmosphere.

3. Apparatus according to claim 2 wherein said discharge means includes air filters means for removing impurities from the excess air before its discharge into the atmosphere.

4. Apparatus according to claim 1 including a vibratory conveyor beneath said aperture for stratifying various materials according to their specific gravity and conveying such materials to said aperture.

5. Apparatus according to claim 4 wherein a hood surrounds said aperture and depends from said conduit means to a level close to the material level on said conveyor.

6. Apparatus according to claim 3 wherein said means for forcing air through said venturi is a blower disposed in said conduit means posterior to said openings and anterior to said venturi.

7. Apparatus according to claim 6 wherein said air discharge means communicates with said conduit means posterior to said blower and anterior to said venturi.

8. Apparatus according to claim 7 wherein the general axial plane of said closed circuit conduit means is vertical with said venturi and said openings located in the bottom portion of said conduit means.

9. Apparatus according to claim 8 wherein said blower is located in the top portion of said conduit means.

10. Apparatus according to claim 9 wherein said air discharge means comprises a conduit depending from the upper portion of said conduit means close proximity to said blower.