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METHOD AND APPARATUS FOR SEPARATING MATTER OF DIFFERENT SPECIFIC GRAVITIES

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Fig.1

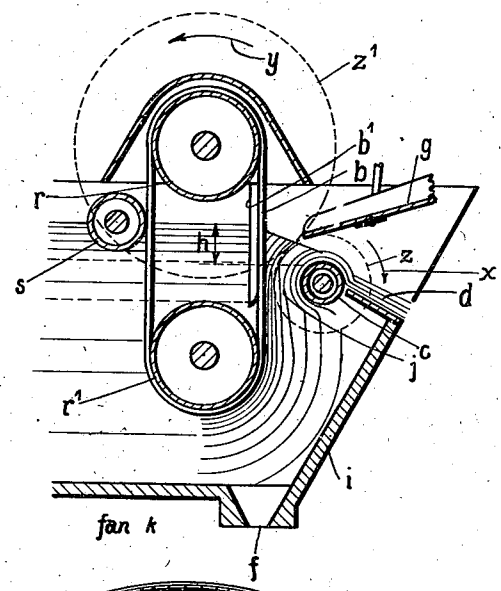
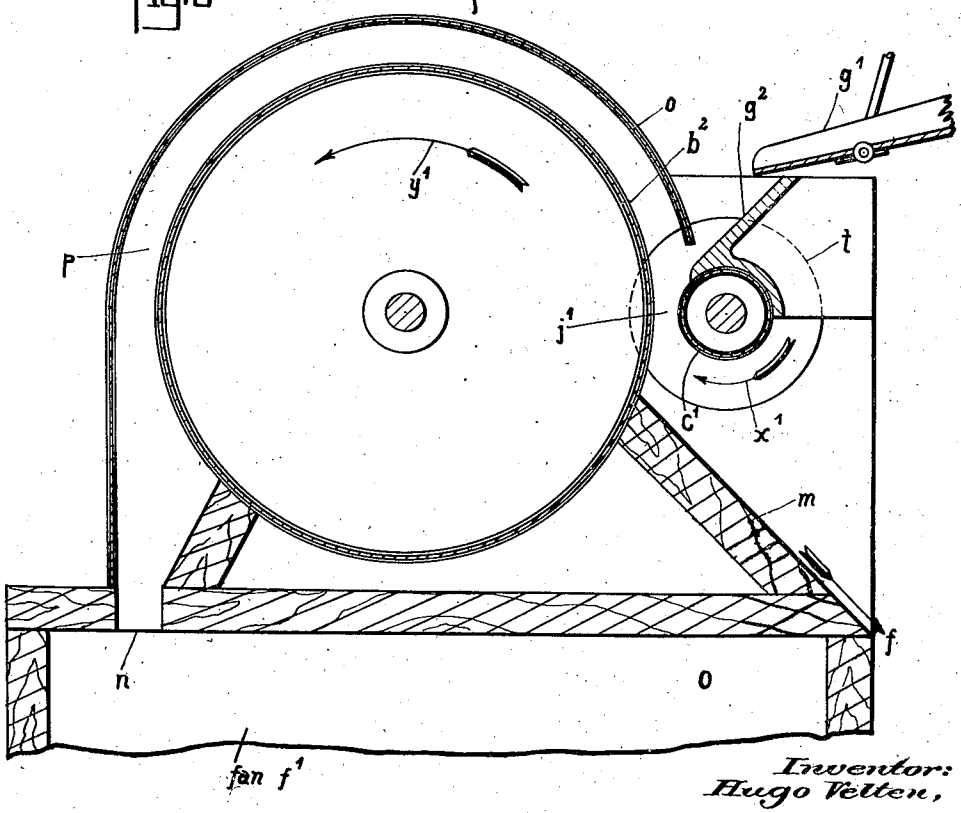


Fig.2



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UNITED STATES PATENT OFFICE.

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METHOD AND APPARATUS FOR SEPARATING MATTER OF DIFFERENT SPECIFIC GRAVITIES.

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My invention relates to improvements in method and apparatus for separating matter of different specific gravities, such for example as grain and chaff, and more particularly in apparatus in which separation is effected by means of a current of a suitable liquid, air or gas, moving upwardly through a narrow passage, the matter to be separated being introduced into the said current, so that the particles of high specific gravity fall downwardly in opposition to the current, while the light material is carried upwardly by the current. In apparatus of this type the current is retarded by friction at the parts near the walls of the narrow passage, which retardation of the velocity causes whirls interfering with the accuracy of the separation. The object of the improvements is to provide an apparatus in which the said retardation of the fluid and whirls are avoided, and with this object in view my invention consists in constructing the walls of the said narrow passage so that they are moved in the direction of the movement of the fluid and substantially at the same velocity. Thus, there is no friction of the fluid on the walls, so that the fluid is not retarded.

For the purpose of explaining the invention two examples embodying the same have been shown in the accompanying drawing, in which,

Fig. 1, is a somewhat diagrammatical elevation showing my improved separator, and

Fig. 2, is a similar elevation showing a modification.

In the example shown in Fig. 1 my improved separator consists of a box i in which a vertical or substantially vertical passage j is provided, and which is connected with suitable means such as a fan k for producing a current of a suitable fluid upwardly through the said passage. As shown, the passage j is provided between the end walls of the box i, a roller c adapted to be rotated in the direction of the arrow x by means of a gear wheel z, and an endless tape or belt b trained on rollers r and r^1 and adapted to be moved in the direction of the arrow y by means of a gear wheel z^1, the diameters of the gear wheels z and z^1 being such that the circumferential velocity of the roller c and the tape b are the same. At the rear of the branch b providing the wall of the passage j there is a board b^1 providing a support for the tape b, and the tape is adapted to be put under tension by means of a roller s. Above the passage j there is a chute g for passing the matter to be separated into the passage, and at the rear of the roller c there is an inclined wall d.

In the operation of the apparatus the matter to be separated is thrown into the current of fluid moving upwardly through the passage j, the opposite end walls provided by the roller c and the tape b moving upwardly substantially at the velocity of the current of the fluid. The heavy particles fall downwardly in opposition to the current of the fluid, and they are removed through an outlet f. The light particles are carried away by the current of the fluid and over the top part of the roller c and delivered to the inclined wall d from which they are discharged away from the box i.

In the modification shown in Fig. 2 the separating apparatus consists of a frame m mounted on a box O, a roller b^2 of comparatively large diameter, a roller c^1 of comparatively small diameter, a chute g^1, g^2 for delivering the matter to be separated into the passage j^1, a fan f^1 adapted to produce a vacuum within the box O and to remove the air therefrom, and a wall o surrounding the roller b^2 thus producing a passage p communicating with the box O through an opening n. As shown the roller c^1 is provided at its opposite ends with flanges t engaging the end faces of the roller b^2 thus closing the passage j^1 at its ends. The rollers c^1 and b^1 are rotated by suitable means in the direction of the arrows x^1 and y^1.

In the apparatus shown in Fig. 2 a current of air or gas is used as a separating medium, while in the example shown in Fig. 1 a suitable liquid may be used for this purpose.

In the operation of the apparatus shown in Fig. 2 a current of air is produced by means of the fan f^1, the said air flowing upwardly through the passage j^1, and through the passages p and n into the box o. The rollers c^1 and b^2 are rotated in the direction of the arrows x^1 and y^1, the circumferential velocity of the rollers being equal or substantially equal to the velocity of the current of air. The matter to be separated is thrown into the passage j^1 over the chute g^1, g^2, and the heavy particles move downwardly and are removed from the apparatus

in the direction of the arrow *f*. The light particles are carried away by the current of air and through the passage *p*, whereupon they are delivered into the box *o*.

I wish it to be understood that the current of air may also be produced by means of a compressor.

While in describing the invention reference has been made to particular examples embodying the same I wish it to be understood that I do not limit myself to the construction shown in the drawing, and that various changes may be made in the general arrangement of the apparatus and the construction of its parts without departing from the invention.

As shown in the drawings, the passages *j* and j^1 are vertically disposed, but I wish it to be understood that my invention is not limited to this construction, and that in some cases the said passage may be slightly inclined, provided that the heavy particles have the possibility of moving through the passage in opposition to the current of fluid. In the claims I have stated that the passage is directed upwardly, which term is intended to include a structure in which the passage is inclined more or less. The passage may even be disposed horizontally or substantially horizontally, in which case however means must be provided for throwing the matter to be separated in horizontal direction through the said passage.

I claim:

1. An apparatus for separating matter composed of particles of different specific gravities, comprising a frame having an upwardly directed passage having a movably mounted side wall, means for moving said side wall upwardly, means for causing a current of fluid upwardly through said passage, means to supply the matter to be separated to said passage from the top thereof and means for separately discharging the particles suspended by the current and those which sink therein.

2. An apparatus for separating matter composed of particles of different specific gravities, comprising a frame having an upwardly directed passage having a movably mounted side wall, means to cause a current of a fluid upwardly through said passage, means to move said side wall upwardly substantially at the velocity of the current of fluid through the passage, means to supply the matter to be separated to said passage from the top end thereof and means for separately discharging the particles suspended by the current and those which sink therein.

3. An apparatus for separating matter composed of particles of different specific gravities, comprising a frame having an upwardly directed narrow passage having opposing movable broad side walls and opposing narrow end walls, means to cause a current of a fluid upwardly through said passage, means to move said movable side walls upwardly substantially at the velocity of the current of fluid flowing through said passage, means to supply the matter to be separated to said passage from the top thereof and means for separately discharging the particles suspended by the current and those which sink therein.

4. An apparatus for separating matter composed of particles of different specific gravities, comprising a frame having an upwardly directed passage having a side wall consisting of the upwardly movable branch of an endless belt, means to cause a current of a fluid upwardly through said passage, means to move said belt substantially at the velocity of said current, and means to supply the matter to be separated to said passage from the top thereof.

5. An apparatus for separating matter composed of particles of different specific gravities, comprising a frame having a passage formed within a movable wall, means to cause a current of fluid through said passage, means to move said movable wall in the direction of said current, means to deliver matter to be separated to said passage in a direction opposite to said current of fluid and means for separately discharging the particles suspended by the current and those which sink therein.

6. A method of separating granular materials by an air current comprising providing a fluid current of constant velocity in a passage, moving the walls of the passage in the same direction as said fluid current and approximtely at the same speed, scattering the granular material in said current and separately discharging the particles suspended in the current and those which sink therein.

In testimony whereof I have hereunto set my hand.

HUGO VELTEN.