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ELECTROSTATIC SEPARATOR FOR THE SEPARATION OF FINE GRAINED MIXED MATERIALS

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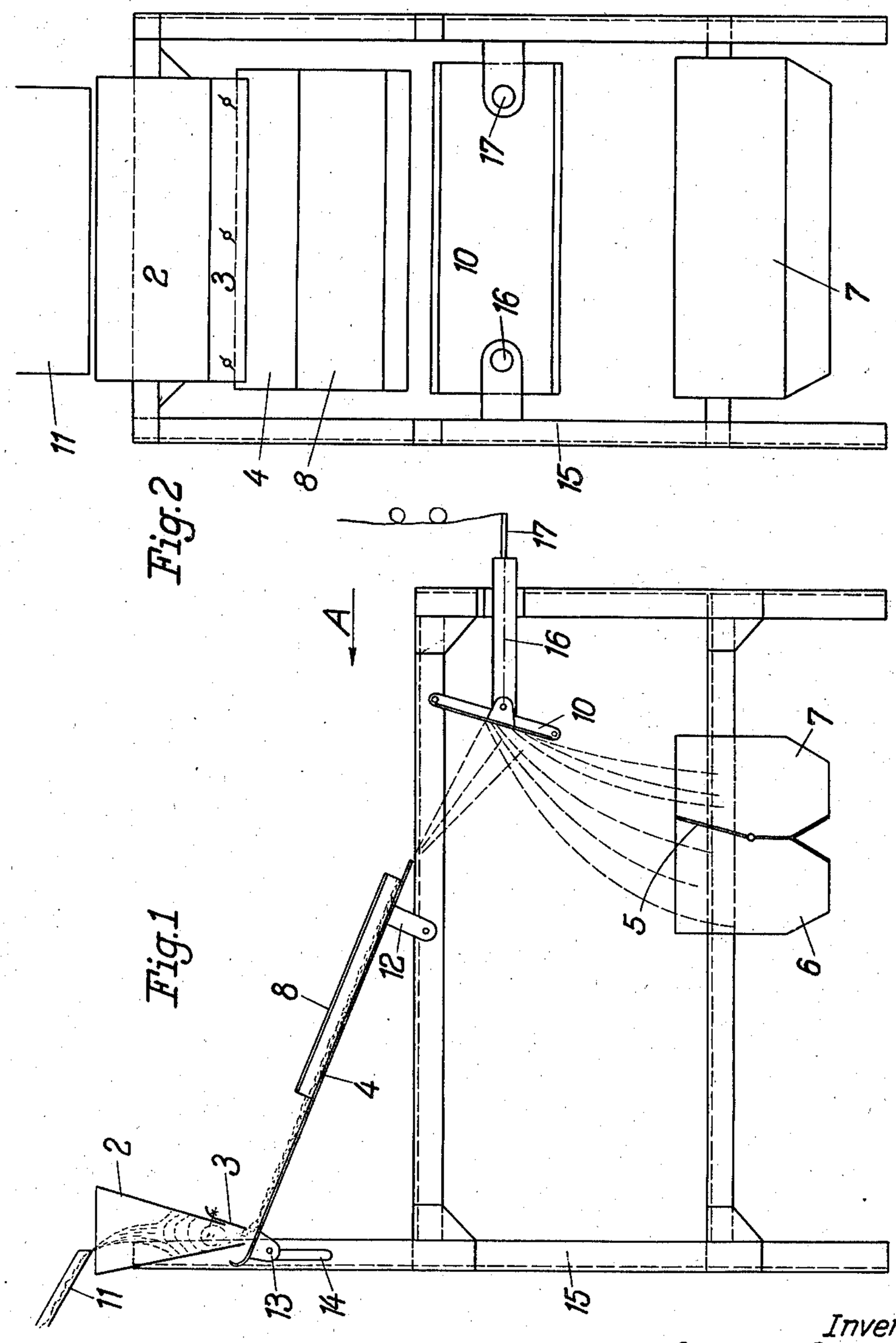

Fig. 2

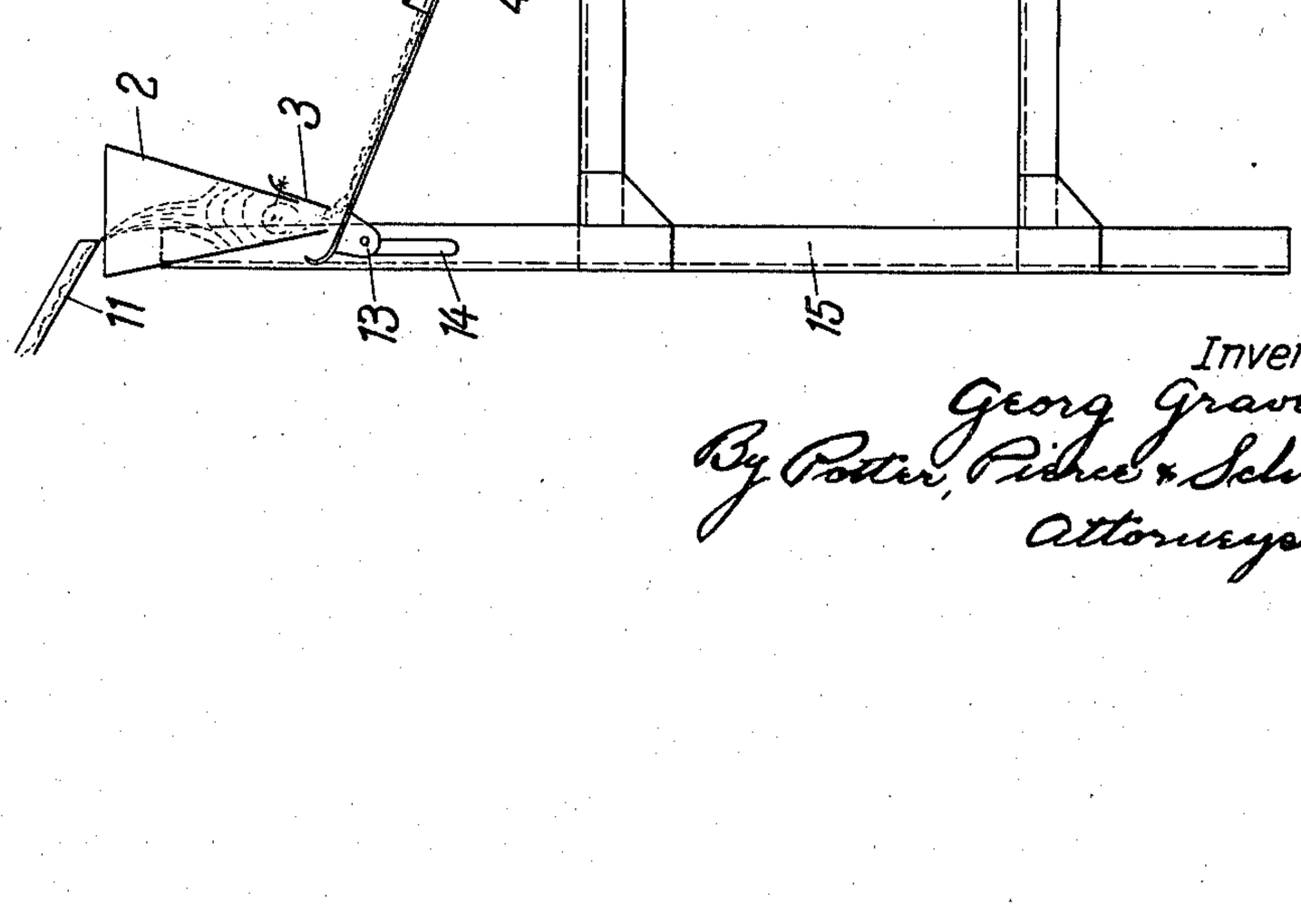

Fig. 1

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ELECTROSTATIC SEPARATOR FOR THE SEPARATION OF FINE-GRAINED MIXED MATERIALS

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6 Claims. (Cl. 209—128)

This invention relates to an electrostatic separator for the separation of fine-grained mixed materials, said separator having an uncharged chute surface over which the materials slide and from the lower edge of which they are caused to drop at different velocities. According to the present invention there is provided in the rear of said surface and opposite its discharging edge, an electrically charged separating surface which serves as a deflector for the entire material and from which the material rebounds along separate distinct paths. The result obtained thereby is that the angles of dispersion of the particles of the mixture (which have already become separated to some extent in falling from the chute) are increased and the separating operation is improved. The effect of the impact against said deflector can be modified, depending upon the particular circumstances, by altering the angle at which the deflector is inclined, or the distance at which it is mounted from the edge of the chute.

The separator of the present invention differs fundamentally from known arrangements with an electrically charged chute and a serially disposed ejecting surface of the same polarity. In consequence of this identical charge in the ejecting surface, the material—in contrast to the action of the deflector of the present invention—does not rebound. On the contrary, the sole purpose of the known ejecting surface, which is designed as a sieve, is to allow the less powerfully energized particles of the material to drop through between the ejecting surface and the chute, whilst allowing the more powerfully charged particles to pass onwards. This operation has nothing in common with the object of the present invention, namely to increase, through the rebounding action, the angle of dispersion of the particles of the mixture that have already dropped, in a separated condition, from the chute.

In order more clearly to understand the invention, reference is made to the accompanying drawing, which illustrates diagrammatically and by way of example one embodiment thereof;

Fig. 1 being a side elevation; and

Fig. 2 an end elevation viewed in the direction of the arrow A.

The fine-grained material to be separated passes from the feed channel 11 into the distributing hopper 2, from which it is delivered, through an adjustable slide 3, on to the oblique chute 4. This chute is movably mounted on the frame 15, at 12, and its slope can be adjusted by means of the bolt 13 adapted to be guided and tightened in the groove 14 of the frame 15. An earthed protective surface 8 may be provided above the chute 4.

Opposite the bottom edge of the chute 4 is a deflector 10, facing the oncoming material and adapted to be adjusted in respect of its distance from, and angle in relation to the chute 4. It will be seen that the deflector 10 is positioned in the path of the material leaving the chute where the material has a substantial horizontal component of travel. Said deflector 10 is insulated in relation to the frame 15, and therefore to earth as well, by means of insulators 16, and is connected with a source of high-tension current by a conductor 17. The electrode 10 may be charged with direct or alternating current, or by surge current.

As the result of the induction exerted by the charged plate 10 on the lower edge of the chute 4, the particles dropping, at different velocities from the chute 4 receive an additional electrostatic charge and impinge on the plate 10 in a different condition in respect of their electrostatic charge, as indicated by the broken lines. The different velocities of the particles leaving the chute is due to differences in various properties of the materials to be separated, such as differing susceptibilities to being charged by friction, differing sizes, weights, shapes and other differing properties of the particles. They rebound from the plate 10, along the separate distinct paths, into the receptacles 6 and 7, the catchment areas of which can be varied, according to requirements, by means of an adjustable tongue 5 located between the receptacles. In consequence of the different angles at which the particles impinge—according to their specific electrostatic charge—on the plate 10, and under the influence of the reversal of the charge occurring on the plate 10 (which takes up more or less time according to the electrical conductivity of the particles), a separation into very wide angles of dispersion is effected, which results in efficient separation of the material.

I claim:—

1. An electrostatic separator for the separation of fine-grained materials, comprising in combination, an electrically uncharged inclined chute, means for feeding materials to be separated to said chute, an electrically charged separating surface positioned facing the lower edge of the chute across the plane thereof at a position in the path of all the material leaving the chute where the material has a substantial horizontal component

of travel to serve as a deflector for all of the material leaving the chute whereby particles leaving the chute at different velocities are caused to rebound in separate distinct paths, and separate receptacles positioned in said separate paths.

2. An electrostatic separator for the separation of fine-grained materials, comprising in combination, an electrically uncharged inclined chute, means for varying the inclination of the chute, means for feeding materials to be separated to said chute, an electrically charged separating surface positioned facing the lower edge of the chute across the plane thereof at a position in the path of all the material leaving the chute where the material has a substantial horizontal component of travel to serve as a deflector for all of the material leaving the chute whereby particles leaving the chute at different velocities are caused to rebound in separate distinct paths, and separate receptacles positioned in said separate paths.

3. An electrostatic separator for the separation of fine-grained materials, comprising in combination, an electrically uncharged inclined chute, means for feeding materials to be separated to said chute, an electrically charged separating surface positioned facing the lower edge of the chute across the plane thereof at a position in the path of all the material leaving the chute where the material has a substantial horizontal component of travel to serve as a deflector for all of the material leaving the chute whereby particles leaving the chute at different velocities are caused to rebound in separate distinct paths, means for varying the inclination of the separating surface, and separate receptacles positioned in said separate paths.

4. An electrostatic separator for the separation of fine-grained materials, comprising in combination, an electrically uncharged inclined chute, means for varying the inclination of the chute, means for feeding materials to be separated to said chute, an electrically charged separating surface positioned facing the lower edge of the chute across the plane thereof at a position in the path of all the material leaving the chute where the material has a substantial horizontal component of travel to serve as a deflector for all of the material leaving the chute whereby particles leaving the chute at different velocities are caused to rebound in separate distinct paths, means for varying the inclination of the separating surface, and separate receptacles positioned in said separate paths.

5. An electrostatic separator for the separation of fine-grained materials, comprising in combination, an electrically uncharged inclined chute, means for feeding materials to be separated to said chute, an electrically charged separating surface positioned facing the lower edge of the chute across the plane thereof at a position in the path of all the material leaving the chute where the material has a substantial horizontal component of travel to serve as a deflector for all of the material leaving the chute whereby particles leaving the chute at different velocities are caused to rebound in separate distinct paths, means for varying the distance between the separating surface and the lower edge of the chute, and separate receptacles positioned in said separate paths.

6. An electrostatic separator for the separation of fine-grained materials, comprising in combination, an electrically uncharged inclined chute, means for feeding materials to be separated to said chute, an electrically charged separating surface positioned facing the lower edge of the chute across the plane thereof at a position in the path of all the material leaving the chute where the material has a substantial horizontal component of travel to serve as a deflector for all of the material leaving the chute whereby particles leaving the chute at different velocities are caused to rebound in separate distinct paths, separate receptacles positioned in said separate paths and means for varying the catchment areas of said receptacles.

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