(No Model.) 2 Sheets—Sheet 1.

T. H. PHILLIPS & J. E. EVANS.

COAL SEPARATOR.

No. 413,416. Patented Oct. 22, 1889.

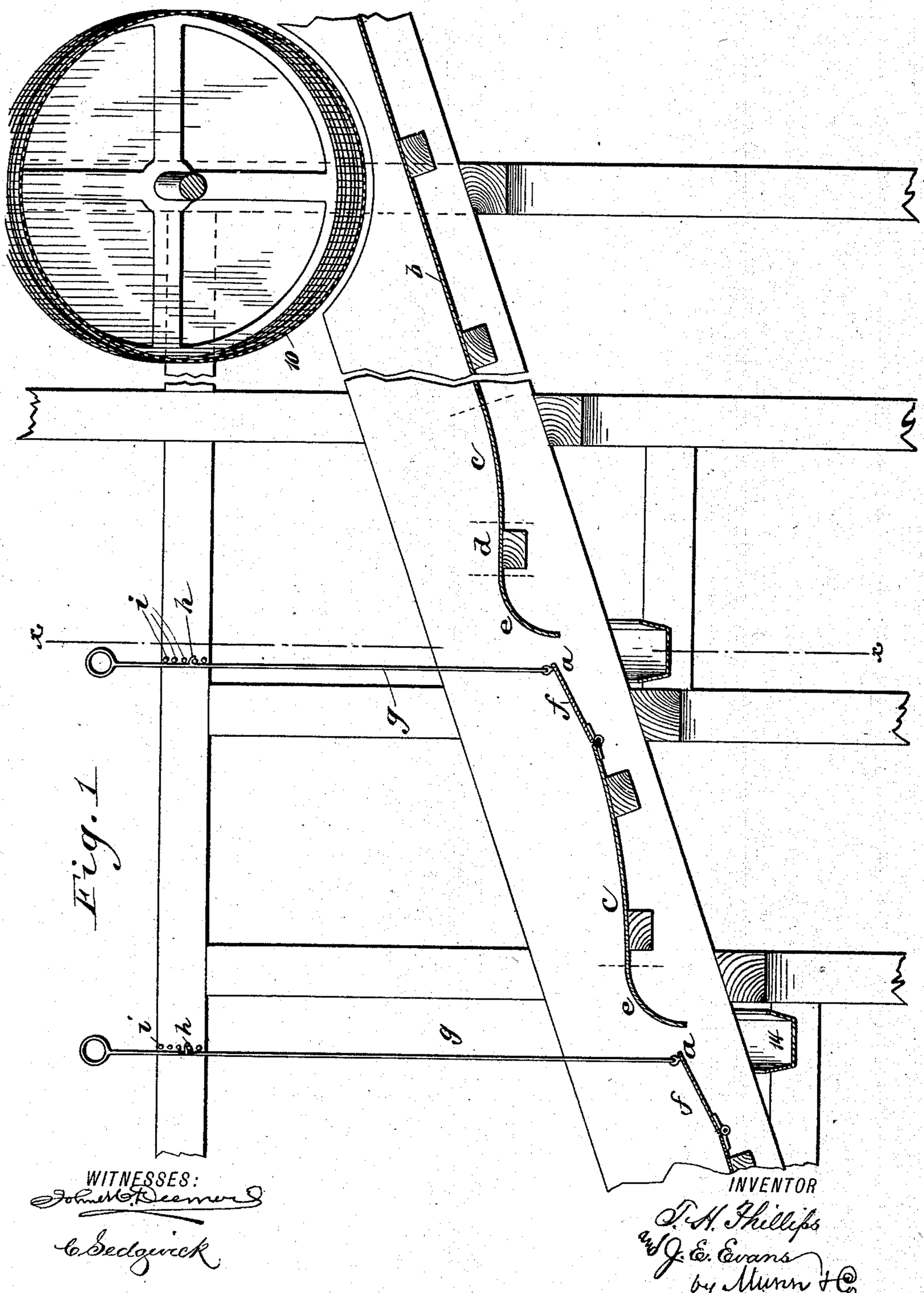

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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COAL SEPARATOR.

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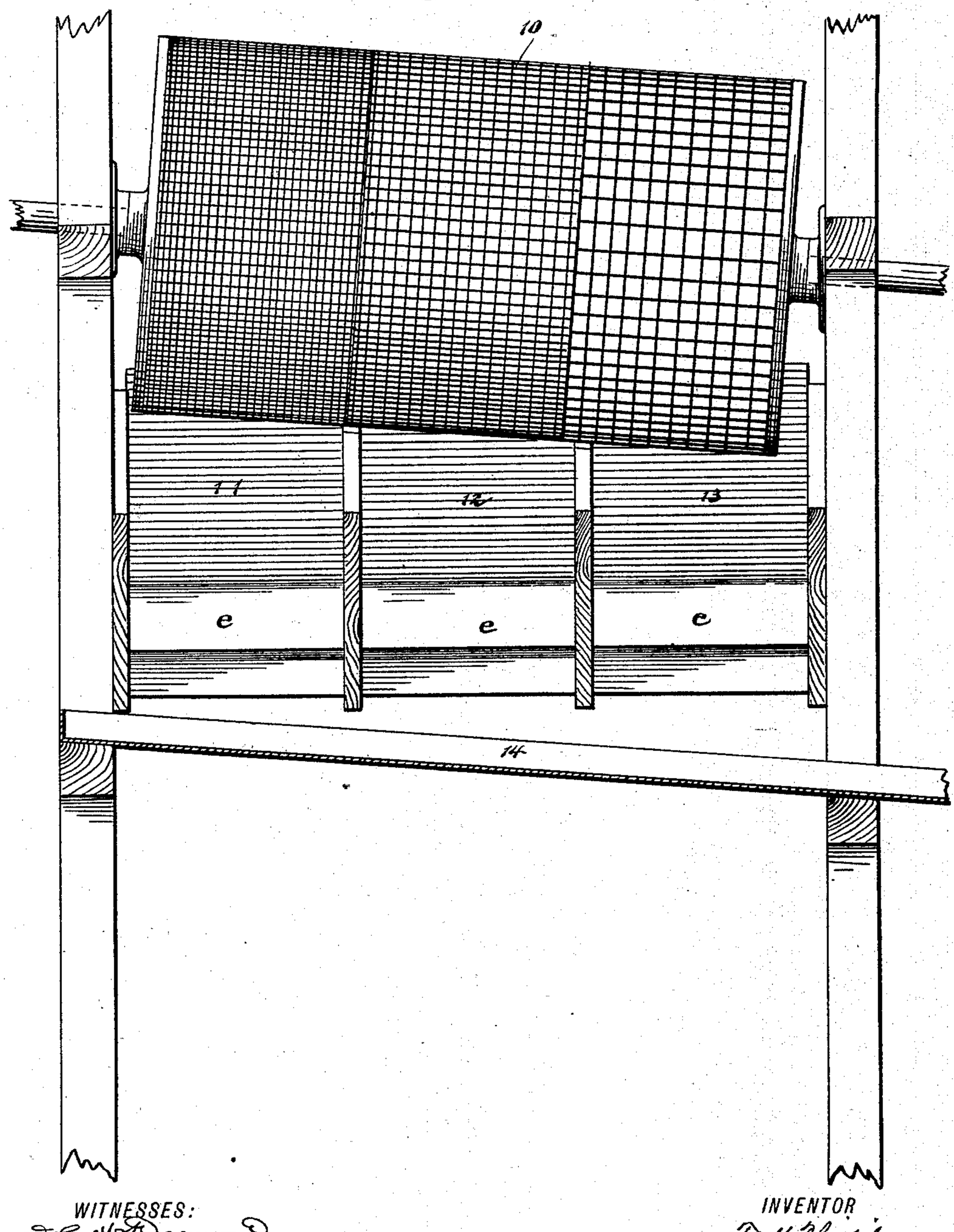
Fig. 2.



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THOMAS H. PHILLIPS AND JOHN E. EVANS, OF WILKES-BARRÉ, PENNSYLVANIA.

COAL-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 413,416, dated October 22, 1889.

Application filed February 12, 1889. Serial No. 299,585. (No model.)

To all whom it may concern:

Be it known that we, THOMAS H. PHILLIPS and JOHN E. EVANS, both of Wilkes-Barré, in the county of Luzerne and State of Pennsylvania, have invented a new and Improved Coal-Separator, of which the following is a full, clear, and exact description.

This invention relates to that class of machines that are employed to automatically separate coal from slate and other like impurities, the object of the invention being to obviate the use of water and to provide a machine which may be used where the conditions are such that jigs working on the principle of difference in specific gravity would not be permissible, or where the specific gravity of the coal and slate is nearly the same.

To the ends above set forth, the invention consists of novel constructions, arrangements, and combinations of elements, hereinafter more fully described, and specifically pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures and letters of reference indicate corresponding parts in both views.

Figure 1 is a central longitudinal sectional view of a portion of a separator constructed to embody our invention; and Fig. 2 is a cross-sectional view thereof, taken on line *x x* of Fig. 1.

In the drawings, 10 represents a circular screen, the circumference being covered with wire-cloth of mesh varying in size. This screen is so hung that one end is lower than the other, the fall being usually about one inch to the foot. As the screen revolves the mixed sizes of coal which are delivered at its higher end are gradually worked forward, the smaller mesh of the screen being first encountered and the smaller sizes of coal being first removed. As the sizes of coal fall through the mesh they drop on inclined chutes or troughs 11, 12, and 13, one such chute being provided for each size of coal. The bottoms of the chutes 11, 12, and 13 are lined with metal, and a proper incline is given to the chutes, so that the coal will gravitate toward the lower ends of the chutes to the bins where it is to be stored previous to being loaded in the cars for shipment to market.

The slate and other impurities contained in the coal have usually been removed therefrom by boys or men arranged at intervals upon opposite sides of the chute, the impurities being picked out by hand as the coal passes the operators. This method of purifying the coal is not only slow, but is exceedingly expensive, especially in winter, when higher-paid labor is necessarily employed. By means of our improved separator, however, human pickers are dispensed with, the separation being brought about entirely by mechanical means.

It is a well-known fact that coal has a smoother fracture than slate, so that when a piece of coal and a piece of slate are placed side by side in an inclined trough—such as those shown at 11, 12, and 13—and started at the same time, the coal will travel faster than the slate, because there is less adhesion, and therefore less friction, between the coal and the metallic bottom of the chute than there is between the slate and the said metal bottom. These facts are utilized in the embodiment of our invention.

In order that the coal and slate may be separated, we provide each of the chutes with transverse openings *a*, above which the chute-bottom *b* is bent to constitute a concave curve *c*, beyond which there is a tangential section *d*, and still farther beyond a convex curve *e*, to which the section *d* is also tangential. The opening *a* is partially closed by an apron *f*, that is hinged to the sheet-metal bottom of the chute immediately below the opening, and to this lid or apron there is connected an adjusting-rod *g*, by means of which the lid or apron may be raised or lowered to the required position, as will be hereinafter set forth, the rod being provided with a claw *h*, which may be brought into engagement with any one of a number of pins *i*, or any other proper lid or apron adjusting attachment might be employed.

As the object sought to be attained by our invention is not to tumble the coal or to make it jump or roll after it leaves the screen, but to keep it sliding, we avoid all angles at the

bottom of the chute and use curves where a change of direction takes place.

In operation the coal and slate, after dropping from the screen 10, slide over the bottom of the upper section of the chute to which they are delivered, passing the concave section *c*, the tangential section *d*, and finally reaching the convex section *e*. In the course of this descent the coal is constantly gaining in velocity over that of the slate, and it leaves the curve *e* on a higher tangential line than the slate, and is carried across the opening *a* and onto the lid or apron *f*, passing thence on downward to the bin. The slate, however, not having acquired the same momentum as the coal, is carried farther around on the convex surface *e*, and leaves this curve at a lower tangential point and falls through the opening *a*, below the lid or apron, into a trough 14, which is set at a proper angle to deliver the said slate from its discharging end.

In setting the apron *f*, it is adjusted so that its upper edge shall be about midway between the tangential lines formed by the coal and slate in leaving the curve *e*, the coal, as before stated, passing above and the slate beneath the apron. The apron also permits us to regulate within certain limits the size of the openings *a*, and by raising the apron suddenly and then lowering it to place we are enabled to release any large pieces which might otherwise choke the opening *a*.

Any number of chute-sections provided with concave curves *c*, tangential sections *d*, convex curves *e*, openings *a*, and aprons *f* might be employed, so that if any slate should be carried over the first opening it would be removed at the second or third opening.

In practice it may be found advisable in some instances to dispense with the tangential section *d*, connecting the curved sections *c* and *e* directly, as shown upon the left in Fig. 1, thus forming a simple reverse curve.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. A chute for coal-separators, having its bottom formed in sections each having reverse curves, the convex portion being at the lower end, and provided with an opening adjacent to the said convex portion, substantially as described.

2. A chute for coal-separators, having its bottom formed in sections each having reverse curves, the convex portion being at the lower end, and provided with an opening adjacent to the said convex portion and with an adjustable apron hinged below the plane of the convex portion and partially closing the said opening, substantially as herein shown and described.

3. A chute for coal-separators, having its bottom *b* formed with the concave curve *c* and the convex curve *e*, and provided with the opening *a*, in combination with the apron *f*, the rod *g*, connected to the apron, and means for locking the rod in position, substantially as herein shown and described.

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JOHN E. EVANS.

Witnesses:
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ROGER MCGARRY.