

No. 694,420.

Patented Mar. 4, 1902.

J. N. RICE.
SEPARATOR FOR ORE, COAL, &c.

(Application filed May 22, 1901.)

(No Model.)

2 Sheets—Sheet I.

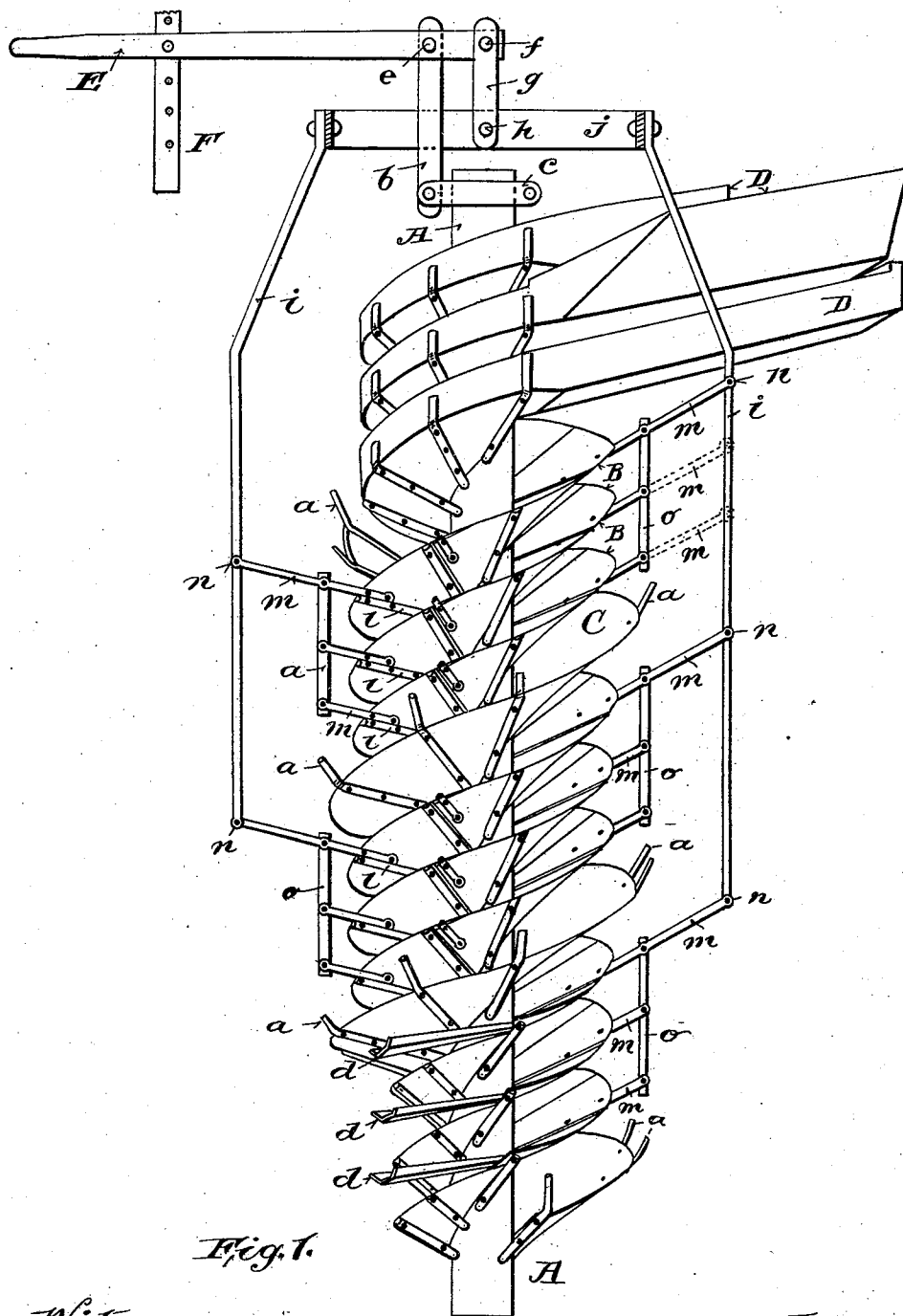


Fig. 1.

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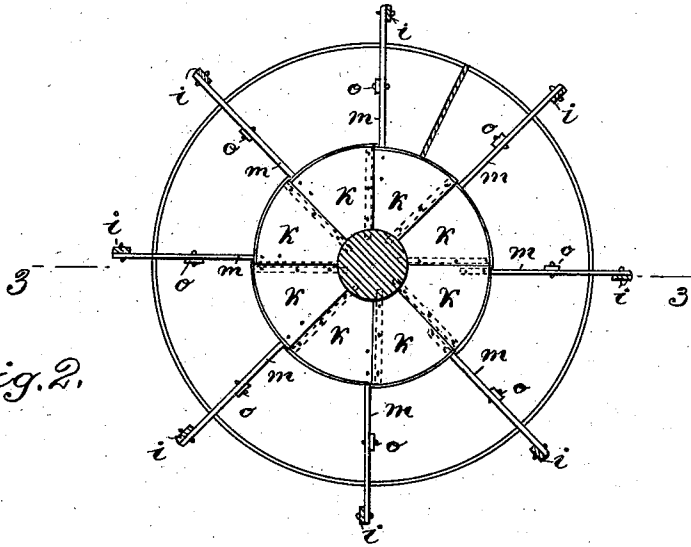


Fig. 2.

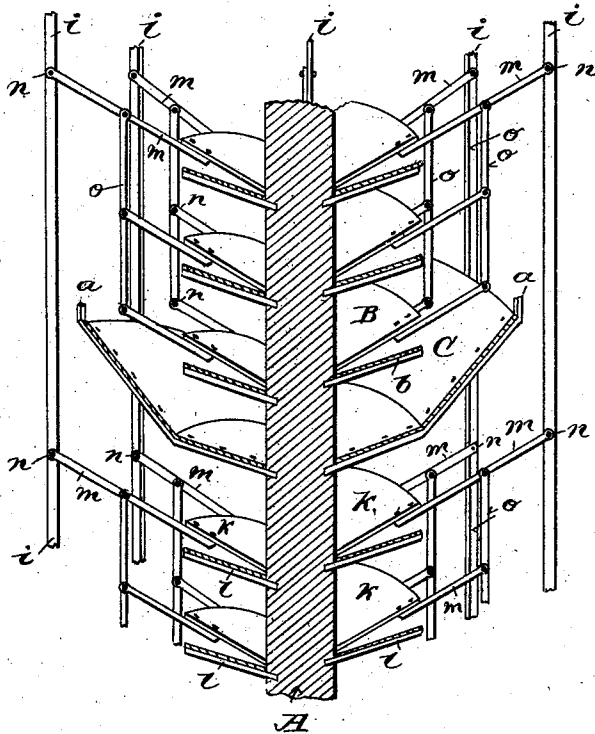


Fig. 3.

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UNITED STATES PATENT OFFICE.

JAMES N. RICE, OF SCRANTON, PENNSYLVANIA, ASSIGNOR TO ANTHRACITE SEPARATOR COMPANY, OF HAZLETON, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

SEPARATOR FOR ORE, COAL, &c.

SPECIFICATION forming part of Letters Patent No. 694,420, dated March 4, 1902.

Application filed May 22, 1901. Serial No. 61,428. (No model.)

To all whom it may concern:

Be it known that I, JAMES N. RICE, a citizen of the United States, and a resident of Scranton, in the county of Lackawanna and State of Pennsylvania, have invented certain new and useful Improvements in Separators for Coal, Ore, &c., of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

The invention relates to that class of spiral separators which act by centrifugal force and frictional resistance to separate substances differing in nature—as, for instance, coal and slate. In such apparatus the separation is effected during the passage of the mixed substances around a spiral or series of spirals or threads usually constructed around a central support.

The objects of the present improvements are to provide means for changing the pitch or angle of the spiral or the sections thereof, and thus divert or aid in diverting more readily than heretofore the substances having greatest frictional resistance, so that they pass inwardly, and to enable an attendant to change the pitch and flare of the jackets, so that the material moving on the spiral threads will have either an inclination to the center or to the circumference, according to the change made in the pitch.

The invention consists of a centrifugal separator for coal, ore, &c., having suitably-supported spirals in combination with lever connections adapted to act on the same and change the pitch or angle thereof; also, of lever connections in combination with the spirals and means for operating the levers at will, whereby the spirals may be so changed in angle and pitch that the substances to be separated may be retarded or accelerated in speed by more or less friction and gravity, as hereinafter more fully described, and pointed out in the claims.

In the drawings, Figure 1 is a vertical view of the principal parts of a separator embodying the improvements. This figure shows the

spirals as surrounding a central support in the form of a post, which in practice is properly secured at top and bottom to a base, floor, or beam or by other means. (Not shown.) In this figure three feed-chutes are shown for three spirals or threads, and usually the fourth thread is made to differ in diameter, so that the coal will pass over the smaller and be caught on the larger one. Fig. 2 is a horizontal section showing one circle of one of the spirals or threads as composed of eight segments or sections overlapping in the course of the descent, the lower edge of each segment resting loosely on the upper edge of the one next below, which is made fast, and this figure shows a connection for each segment with the rods connecting with the lever at the top, as shown in Fig. 1. Fig. 3 is a vertical section taken on the line 3 3 of Fig. 2, showing on a somewhat-exaggerated scale the manner in which the lever lifts the connecting-rods and lower edge of the several segments connected therewith.

In the drawings, A represents the support for the spirals, which may be a post, as shown, or some other structure. The separator or apparatus may be constructed with any desired number of spirals or threads having the same or different diameters, and in the drawings four such spirals or threads B B B and C are shown in full, Fig. 1, while the rods α are intended to support one still larger in diameter.

The feed-chutes D D D conduct the mixed substances to the threads or spirals, and in separating coal from slate the apparatus is usually located so as to receive the coal mixed with slate after it has been broken and passed through the sizer. In passing from the spirals or threads the separated substances are directed by outlet guides or chutes, as $d d d$, to whatever means there may be for receiving or conducting them away from the apparatus. The apparatus as thus described belongs to the class of separators shown in the patents of Frank Pardee, dated July 25, 1899, and numbered 629,590, 629,591, 629,592, 629,593,

and 629,594, the present invention being an improvement upon the same.

As shown, a lever-arm *b* is made fast to a clamp *c* at the upper end of the support *A*.
 5 The operating-lever *E* may be moved up or down and secured, as by pins, in a post or hanger *F*. This lever is fulcrumed at *e* to the arm *b* and pivoted at *f* to the upper end of the arm *g*, which takes the weight at *h* from
 10 the connecting-rods *i i i*, of which there may be any desired number, eight being shown in Fig. 2. The connecting-rod *g*, through which the operating-lever *E* acts to lift the connecting-rods *i i i*, which may be made fast to
 15 a cross-bar in a ring or hoop large enough to permit the upper ends of all connecting-rods to be secured thereto, or the arm *g* may be fastened to a bracket, which in turn is fastened to the connecting-rods, or the arm *g*
 20 may be secured to a spider over the central support and extending in different directions to the several connecting-rods.

As the form of the device by which connection is made between the operating-lever
 25 and the weight to be lifted or moved is immaterial, no stress is laid on the use of any special form; but the one shown and designated *j* in Fig. 1 may be regarded as a cross-bar for a ring or hoop, to which eight connecting-rods are made fast, one for each of
 30 the eight segments of the spiral, as shown by Fig. 2.

In Fig. 2 the smaller spiral is shown as being composed of eight segments *k k*, and each
 35 of these segments is secured at its upper radial edge to a rod or bolt *l*, entering the central support *A*. The spiral passes around the central support, and the rods which connect it to the post not only enter from a different
 40 point, but also at a different height. The upper radial edges of the segments being made fast are practically immovable; but the lower radial edge of each segment is made to overlap the upper radial edge of the next lower
 45 segment and rests loosely thereon, such edge being supported by the rod which enters the post. This leaves each segment free to move or change its angle if lifted at its lower radial edge.

In the several figures of the drawings the lower radial edge of the segments or sections forming one of the spirals is shown as being pivotally secured to the connecting-rods *i i*
 50 by means of arms *m*, made fast to the segments and pivoted to the rods *i i*, as shown at *n*. The arms *m* may extend directly from the segments to the connecting-rods, some of them being so shown and others dotted in
 55 Fig. 1; but the arms *m*, which extend from the segments to the connecting-rods, may have a connection, as *o*, with two or more segments on the same vertical but on different horizontal planes. This arrangement
 60 avoids a multiplicity of arms extending out to the connecting-rods and gives room for the

coils of a larger spiral between the connecting-rods and the small spirals. The connecting-rods may be carried up through a large outer flange; but in that case there would be
 70 a possibility of unduly checking the speed and changing the course of the substances thereon. In adapting the improvements, therefore, to a separator having spirals or threads of different diameters the connecting-rods are preferably placed outside of the
 75 largest flange, the brackets *a a* in Fig. 1 indicating the course that the flange would take and the means for securing it.

The operation is as follows: When the coal and slate are passing into the spirals through
 80 the feed-chutes shown, an attendant taking hold of the operating-lever *E* and bearing down upon the same can tilt or lift the lower radial edge of the segments with which connection is made at the outer corner. This
 85 movement is shown in an exaggerated form in Fig. 3. The pivotal connections of the arms *m* with the connecting-rod *i i* allows an adjustment of the rods to the changed position or contracted diameter of the spiral or
 90 threads when the lower radial edges of its segments are raised or lifted and the angle changed by a movement of the operating-lever. In practice the alteration in the angle
 95 and pitch of the jackets effected by the lever and various connections raising the lower edge of the jackets diverts the course of the slate from an outer to an inner circle or by
 lowering the lower edge of the jackets causes the coal to leave the outer circumference
 100 more freely and drop to the largest thread. The rapidity of the feed or a knocking by pieces of coal passing at greater speed is liable at times to interfere with the slate; but
 105 with this lever arrangement and loose overlap of the segments of the spirals the action of the separator may be placed under the control of the attendant.

The arrangement of the connecting-rods and attachments leading from the operating-lever to the spirals may be varied, and, if so
 110 desired, connections may be made for acting on the segments of all of the spirals, though differing in diameter, or only such segments may be acted on as shall be deemed necessary.
 115

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a separator for coal, &c., a suitably-supported spiral having loose overlapping
 120 segments in combination with means for changing the angle of the segments by tilting or lifting the overlapping radial edges thereof.
 125

2. In a separator for coal, &c., a suitably-supported spiral having overlapping segments in combination with arms connecting
 130 with the radial overlapping edges of such segments, and rods to which said arms are

pivotaly secured, said rods being movable and adapted by their movements to change the angles of the segments with which they are connected.

tions adapted to act on said segments and means for operating said connections at will, substantially as described.

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5 3. In a separator for ore, coal, &c., a suitably-supported spiral having overlapping segments in combination with lever connec-

Witnesses:

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