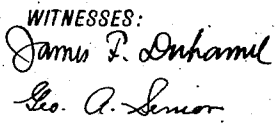


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3 SHEETS—SHEET 1.

Fig. 1.

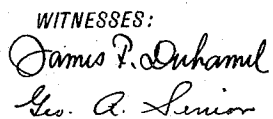


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3 SHEETS-SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 3.

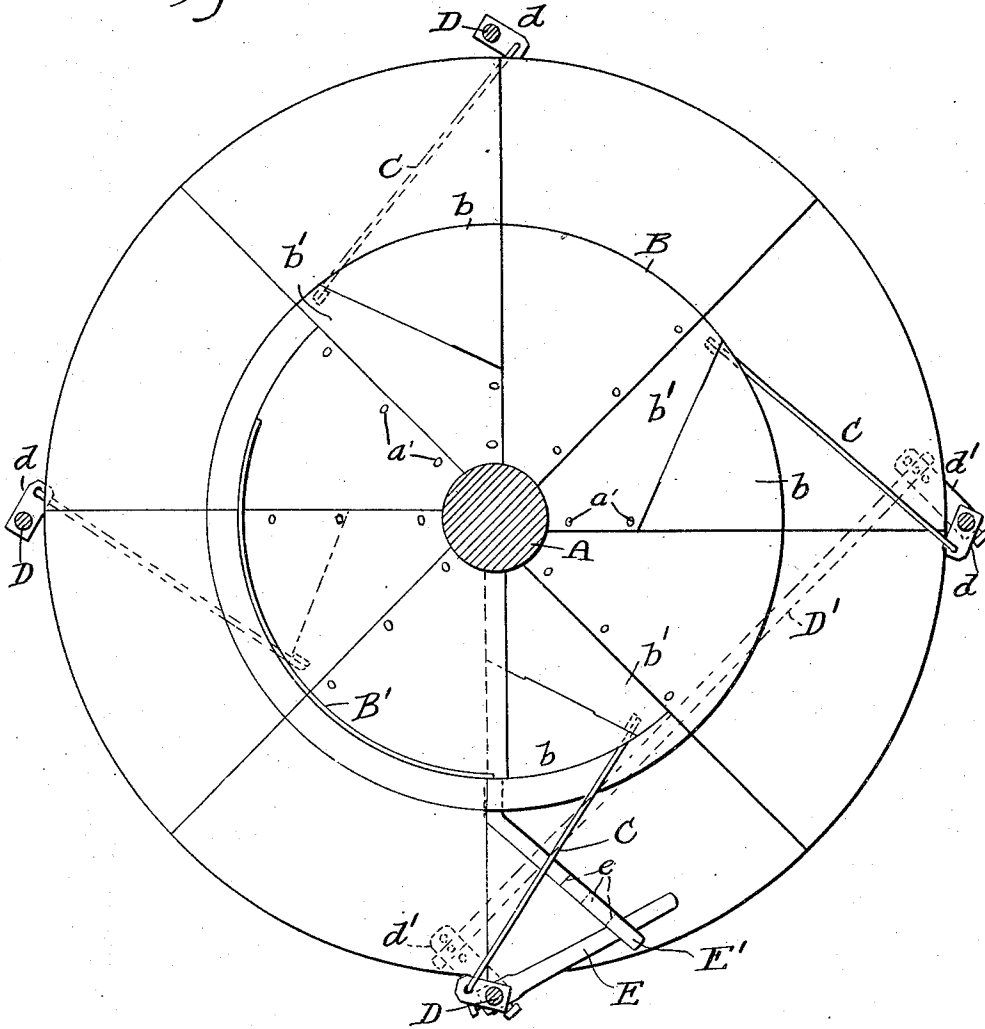
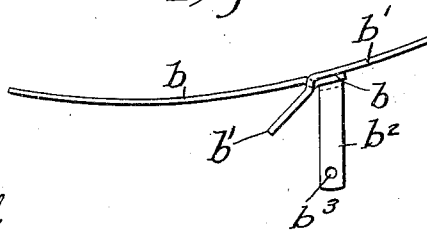


Fig. 4.



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SPIRAL SEPARATOR.

976,980.

Specification of Letters Patent.

Patented Nov. 29, 1910.

Application filed April 11, 1910. Serial No. 554,882.

To all whom it may concern:

Be it known that I, FRANCIS H. BLATCH, a citizen of the United States, residing in Hazleton, in the county of Luzerne and State of Pennsylvania, have invented certain new and useful Improvements in Spiral Separators, of which the following is a specification, reference being had to the accompanying drawings.

The invention relates to that class of separators which are used for removing impurities, such as slate and bone, from the coal. Spirals for this purpose, are composed of a series of jackets or plate elements having a downward and inward pitch.

The materials coming from different veins in the same or different mines vary in their constituents and also in their condition, as to being wet or dry during the processes of sizing and cleaning the coal in the breakers. Some coal operators order special spirals with provision for a quick adjustment of the flare of the plates at will, or according to their own judgment or to that of the foreman or of the attendant.

In the patent issued to James N. Rice on March 4th, 1902, No. 694,420 a spiral was shown and described which had segments or plates with loose overlapping lower edges, connected with rods arranged to have an up and down movement, which raised or lowered the plates and changed the angle or flare. The rods of the Rice patent were connected at the top with an operating lever, fulcrumed to an arm made fast, by a clamp, to the central support near its upper end. As shown and described in that patent the operating lever took up space and its location was not the most convenient for the attendant, when a change of flare was needed. The mode of applying and transmitting the power was such as to impose the weight of the mechanism and materials on the operating lever which required a long free arm in order to avoid great effort upon it in lifting the rods and plates.

The object of my invention is to make a spiral separator adjusting attachment, so as to operate by shafts adapted to have a partial rotation and impart a tilting movement to the plates or adjustable parts.

The invention consists of suitably supported, or supported and connected shafts, means for imparting a partial rotation thereto, and means for transmitting motion from

the shafts for adjusting the plates, in the combinations hereinafter more fully described, and pointed out or indicated in and by the claims.

Figure 1, of the drawings shows, in elevation, a spiral having two slate-threads and one coal-thread, along with the connections for adjusting the flare of the slate-jackets or plates which appear in a normal position. Fig. 2, is a similar view of the same spiral and adjusting connections, showing the flare of the slate jackets changed by a partial rotation of the four shafts and connections from them to the adjustable plates. Fig. 3, is a section on the line 1, 1, of Fig. 1, giving a plan view, of the plates and connections, below the line of the section. Fig. 4, is a lower edge-view of an adjustable slate jacket or plate detached.

The several threads of the spiral shown by the drawings, are supported by the same central post A, on rods *a*, which flare outwardly and upwardly. The plates B, have a radial incline or pitch toward the axis and also a forward or downward pitch, and the top slate jacket and the plates of the coal-thread have an outer flange B¹. It is usual to make some provision by constructive features and other means, for changing the angle or inward and downward pitch of the plates by adjustment.

The various parts are made in shops, where the plates are assembled in spiral form on the supporting rods *a*, which are driven into holes bored in the central post A, and the plates are secured by screws or bolts *a*¹, which pass through the rods *a*. The completed spirals, or separators, are set up and connected with chutes or conveyers leading to and from them in coal breakers, and the machine is then started, or allowed to operate automatically on the descending mixed coal, slate and bone. When this is done, it can soon be determined whether the plates require adjustment for regular use and to what extent. Adjustment of the plates is often made by the use of wedges or other simple devices, and spirals will run continuously in collieries which have no occasion for any other or different kind of adjusting devices.

The adjunct which my invention makes to a spiral adapted for it, is designed to meet a want for a quick change of flare, now and then felt, at some collieries having

mines which produce materials changing from wet to dry or vice versa, or materials which become slimy owing to their peculiar constituents and condition.

5 The plates B, of the slate-threads are shown as being adapted for a flare adjustment of an outer section or part *b*, but may be adapted to an adjustment in their entirety, or merely to the adjustment of a
10 flange at the outer edge; and, wherever plate elements are mentioned as being adapted for flare adjustment, or an adjusting idea is conveyed, all such expressions may be taken as indifferently relating to the whole plate or
15 some part of it which is adjustable. As shown, the adjustable section *b*, forms a sort of hinge connection with the inner, or stationary, section *b*¹, which is secured to the supporting rods.

20 The hinge, pivotal or rocking connection of the outer with the inner parts of the plates, may be formed in several ways, but is illustrated, Figs. 3 and 4, as being produced by a slot in the section *b*¹, through
25 which a part of the section *b*, projects and is secured to a strip of flat metal having one end bent down, to form an arm *b*², having a hole *b*³, for receiving one of the bent ends of a rod C, which operates to give a thrust,
30 or push and pull movement, to the arm *b*², and thereby tilt and adjust the flare of the plate or the part with which it is connected.

The rod C is connected at its other bent end *c*, to a short arm *d*, fixed to an upright
35 shaft D, and the shaft D, connects with another by a link D¹, and by arms *d*¹, slitted or forked to receive the ends of the link or bar D¹, which is pivotally secured in place. Four upright shafts D, are shown at quarter
40 turns from each other, the first being connected with the second, the second with the third, and the third with the fourth in the link fashion stated. The shafts D, pass through and are kept in alinement by
45 brackets *d*², secured to the coal flange of the coal-thread, and the shafts stand outside of the periphery of the machine. One of the brackets *d*², is shown at the lower and another at the upper ends of each shaft D, the
50 ends of which pass through a suitable hole in each bracket, and there is also a middle bracket *d*², above which each shaft is provided with a supporting fixed collar *d*³.

The motion, or partial rotation, of one
55 shaft is transmitted to the others and they all act through the rods C, and arm *b*², to adjust the plates. The spiral shown has eight plates in one turn, or circle around the post, and to adjust all these plates requires each
60 shaft to act on two of them, which is conveniently done by transmitting motion through the rod C, to the arm *b*², of another plate connected by a second rod C¹, having bent ends which pass through the arm *b*²,

of the first actuated plate and a like arm on 65 the next plate adjacent thereto, as shown.

A suitable operating device is used for partially rotating the shafts, and any one or all of them may have a connection for that purpose. A suitable operating means 70 is a hand lever E, fixed to one of the shafts D, and a locking bar E¹, secured to the coal-thread or flange and provided with notches *e*, so that it may be set on the lever at different points of partial rotation, or 75 adjustment, and lifted off the lever when changing the adjustment.

The operating lever E is preferably secured low enough down on one of the shafts D, to bring it within easy reach of the fore- 80 man or attendant at the time of inspecting the output at the lower end of the spiral. The outlet connections for the separated materials mark what are known as the slate-end, bone-end, and coal-end of the machine. 85 An inspection of the materials at the slate-end will show whether any bone or coal is mixed with the slate, and an inspection of the bone and coal ends will show a purity or mixture of materials, according to the 90 efficiency of the machine. If the result of inspection indicates any need for an adjustment of the plates, it can readily be made.

Frequent changes of flare on the jackets is not the rule, but at some collieries an inspection is made every morning and the 95 flare adjusted, if need be, for the day. In all spirals it is important to guard against a development of centrifugal force which will so far dominate the bone or slate as 100 to carry it over to the coal-thread, and the chief advantage of having means for a quick change of flare is to enable the attendant to deal instantly with contingencies.

The measure of the utility of adjuncts of 105 this kind, finds its best expression on the occasions which arise at collieries working on materials the character or condition of which may be termed anomalous, as compared with other materials on which spirals 110 can be made to operate uniformly with excellent results.

Having thus described my invention what I claim as new and desire to secure by Let- 115 ters Patent is:

1. A spiral separator plate having fixed and adjustable portions, in combination with suitably supported rotatable shafts, lever-connections from said shafts to the adjustable features, and means for partially rotating said shafts whereby a movement may be imparted to the adjustable features. 120

2. A spiral separator having plate elements provided with an adjustable portion whereby the plate is adapted for flare adjustment, in combination with suitably connected and supported rotatable shafts, an operating lever connected with one of said 125

shafts, and lever connections from the shafts to the adjustable parts, whereby a partial rotation of one shaft imparts a like motion to the others and exerts a leverage by which
5 the flare and pitch is changed.

3. A spiral separator having plate elements with an adjustable portion and provided with arms, in combination with suitably supported and connected rotatable
10 shafts with fixed arms, push and pull means connecting the arms of the shafts with the arms of the plates, and means for partially rotating said shafts, whereby the flare and pitch may be changed.

4. A spiral separator having plate elements with an adjustable portion and provided with arms, in combination with push and pull means connecting the arm of one plate with the arm of another, suitably connected and supported rotatable shafts, means
15 connecting each rotatable shaft with the arm of one plate, and means for partially rotating said shafts, whereby the flare and pitch may be changed. 20

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