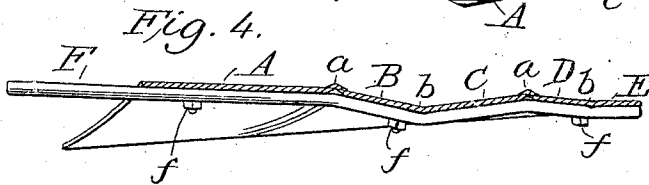
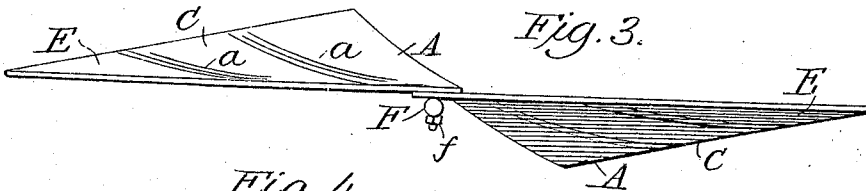
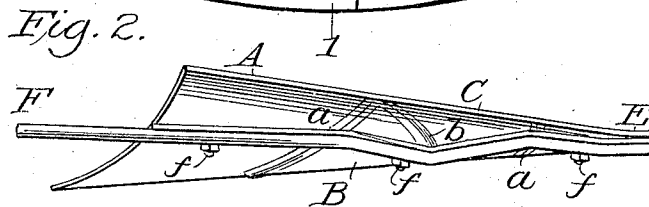
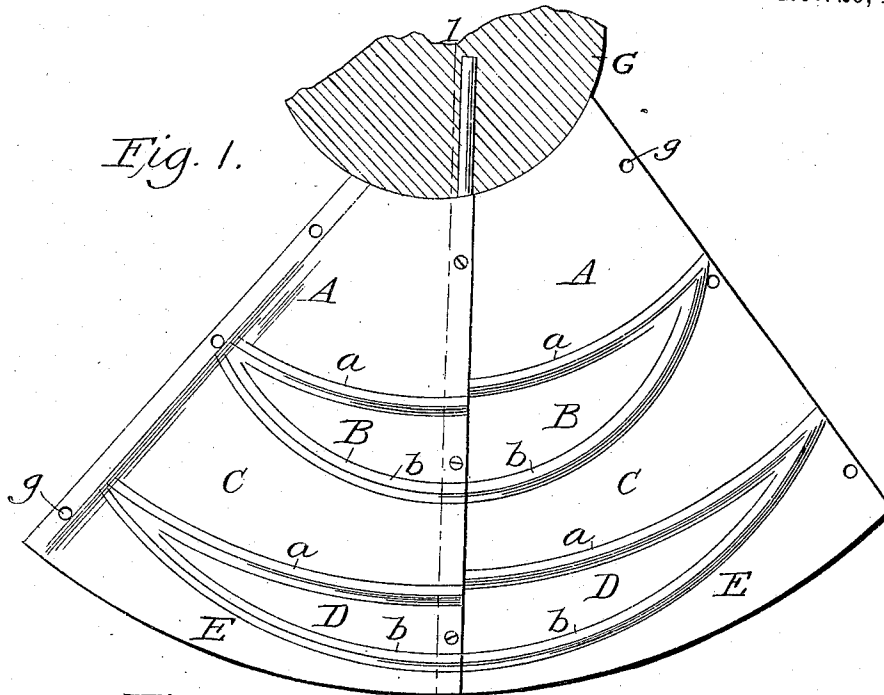


F. PARDEE.
 PLATE FOR SPIRAL SEPARATORS.
 APPLICATION FILED APR. 11, 1910.

977,034.

Patented Nov. 29, 1910.



WITNESSES:

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PLATE FOR SPIRAL SEPARATORS.

977,034.

Specification of Letters Patent.

Patented Nov. 29, 1910.

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To all whom it may concern:

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

10 The improvement, or invention, relates to spiral separators used chiefly in removing slate and "bone" from coal, the class or type of separator being shown and described in certain patents issued to me on July 25th, 15 1899. The spirals are composed of a series of plates or jackets having a pitch toward the axis and also downwardly toward the outlet of the machine, and operate on the different substances by gravity, centrifugal force and frictional resistance. The 20 differential action of the operative forces is accentuated by the inward pitch and by various retarding surfaces. These constructive features, and the length of the spiral 25 have been relied on for giving the slate the inside course, the "bone" a middle course, and the coal the outside course.

The objects of the present improvements, or invention, are to construct a plate or 30 jacket for spiral separators, which will have surfaces adapted to form runways for the materials over a longer contact sweep and with less abrupt changes than in other forms of plate; to construct a spiral separator in 35 which one or more of such plates are used, and to provide means for continuing the sweep on plates, in pairs; and, the invention consists in the structural features herein- 40 after more fully described and pointed out in the claims.

In the drawings Figure 1, is a plan view of a pair of plates and one of the supporting rods and shows curved creases some of which are helical and others elliptical for 45 continuing the course from one plate to the next. Fig. 2, is a side edge view, Fig. 3, a peripheral edge view, and Fig. 4, a section on the line 1, 1, of Fig. 1.

50 The plates are shown in pairs, and for purposes of illustration, as well as description, the two plates or a pair, may be regarded as a unit or a jacket. So considered the surface of the plate is varied and graded according to the parts designated A, B, C,

D, and E, and these surfaces vary in degree 55 of axial inclination along radial lines. The inner, the middle, and the outer surfaces designated as A, C, and E, are warped surfaces rising outwardly, on an incline or pitch of a proportion about four and one- 60 half inches to the foot. The second and fourth surfaces B, and D, may be plane surfaces rising outwardly, on an incline of a proportion, about one and one-half inches to the foot. The supporting rod, F, is adapted 65 to the varying inclinations of the plate by suitable bends as shown, and it enters the central post G as indicated in Fig. 1. The plates are secured to the rod F by screws or bolts with nuts *f* passing through holes 70 *g*, the lower edge of one plate overlapping the upper edge of the next lower plate.

The boundaries between the plane and the warped surfaces are formed by helical creases *a*, and elliptical creases *b*. The heli- 75 cal crease *a*, is preferably formed from the under side of the metal, while the elliptical arc or creases *b*, *b*, are preferably formed from the upper side of the metal. In this formation the helical arcs *a*, *a*, are shorter 80 and when formed as stated, they present a ridge with which the materials must come in contact and when the outer and longer elliptical crease *b* is reached by the materials, they come in contact with a steeper 85 warped surface. The shorter curves *a*, being nearer the axis than the curves *b*, aid in keeping the slate near the post from working outward. The lighter materials such as bone and coal readily pass outwardly beyond the 90 inner arcs or curved formations, and the coal passes beyond the larger elliptical formations, and the interruptions caused by the creases and the included surfaces of the plate slow up the bone and slate when on them. 95 The sweep, which is in part tangential, turns inwardly and its length permits a retardation which gives to the force of gravity an action equal to or greater than that of the centrifugal force on the passing heavier ma- 100 terials.

The creases *a*, and *b*, converge near the upper edge of the upper plate of the pair, and have the greatest divergence at the lower edge of the upper plate of the pair. 105 At this point the creases also have their greatest divergence on the lower unit or jacket, and converge again at the lower

edge of the same as shown. While this arrangement is preferred it is not essential. It however gives a free passage of materials from one pair of plates to the surfaces A, C, and E, receiving materials from a plate above. The intervening surfaces B, and D, bounded by the helical and elliptical creases *a* and *b* retard moving materials not too much affected by centrifugal force, and the interruptions are especially applicable to the slate and "bone," which are made to continue their movement in a curve and the tendency is to keep them along the runways A, B, for the slate, and C, D, for the "bone."

The coal may pass to a separate coal-thread not shown, the plate, as shown, being intended for what is known as a slate-thread in a spiral separator. But the surface E, may, if desired, be widened and provided with a flange so as to form a coal-run on the same thread.

In a plate having formations as stated, the several materials are given a lengthened sweep by the guiding action of the curved edge contours of the retarding surfaces, B and D. Each kind of material will be led to the course needed for separating purposes, and if "bone" or slate gets beyond the runway to which it belongs, the curved outer edge or contour of the retarding surfaces will guide the material inwardly so that it will soon be returned to its proper place by a change of direction. While the outer and inner edge contours of the retarding surfaces B and D are shown as being curved, variations may, nevertheless, be made within reasonable limits by substituting retarding surfaces having angular edge contours so disposed as to perform the same or equivalent functions. The coal being lighter and less subject to frictional resistance and retardation than either slate or "bone" will develop sufficient centrifugal power to carry it over or around or between the retarding surfaces

until it passes beyond the slate and "bone" runs.

I do not herein claim broadly a plate having graduated runway surfaces with varied degrees of axial inclinations, nor such a plate comprising plane and warped surfaces as the same are subject-matter of another application executed by me on even date herewith and filed herewith as Serial Number 554,870; but,

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

1. In a spiral separator, a suitably supported plate, said plate being graduated with varied degrees of axial inclination along radial lines and comprising retarding surfaces forming runways for the heavier materials, said surfaces having creased curved perimeters whereby the heavier substances may be retarded and guided helically and inwardly.

2. A spiral separator plate, said plate being graduated with varied degrees of axial inclination along radial lines whereby the general inclination of said plate is varied thereby forming runways for different materials, said plate also comprising retarding surfaces having creased curved perimeters by which the heavier substances may be retarded and guided helically and inwardly.

3. In a spiral separator, a suitably supported pair of plates, said plates comprising runways for different materials and with curved creases diverging on one of said plates and converging on the other for neutralizing the centrifugal force, and whereby the heavier materials may be retarded and guided helically and inwardly.

FRANK PARDEE.

Witnesses:

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