No. 791,783. PATENTED JUNE 6, 1905.

E. E. HENDRICK.

SCREEN.

APPLICATION FILED DEC. 17, 1902

Fig. 1

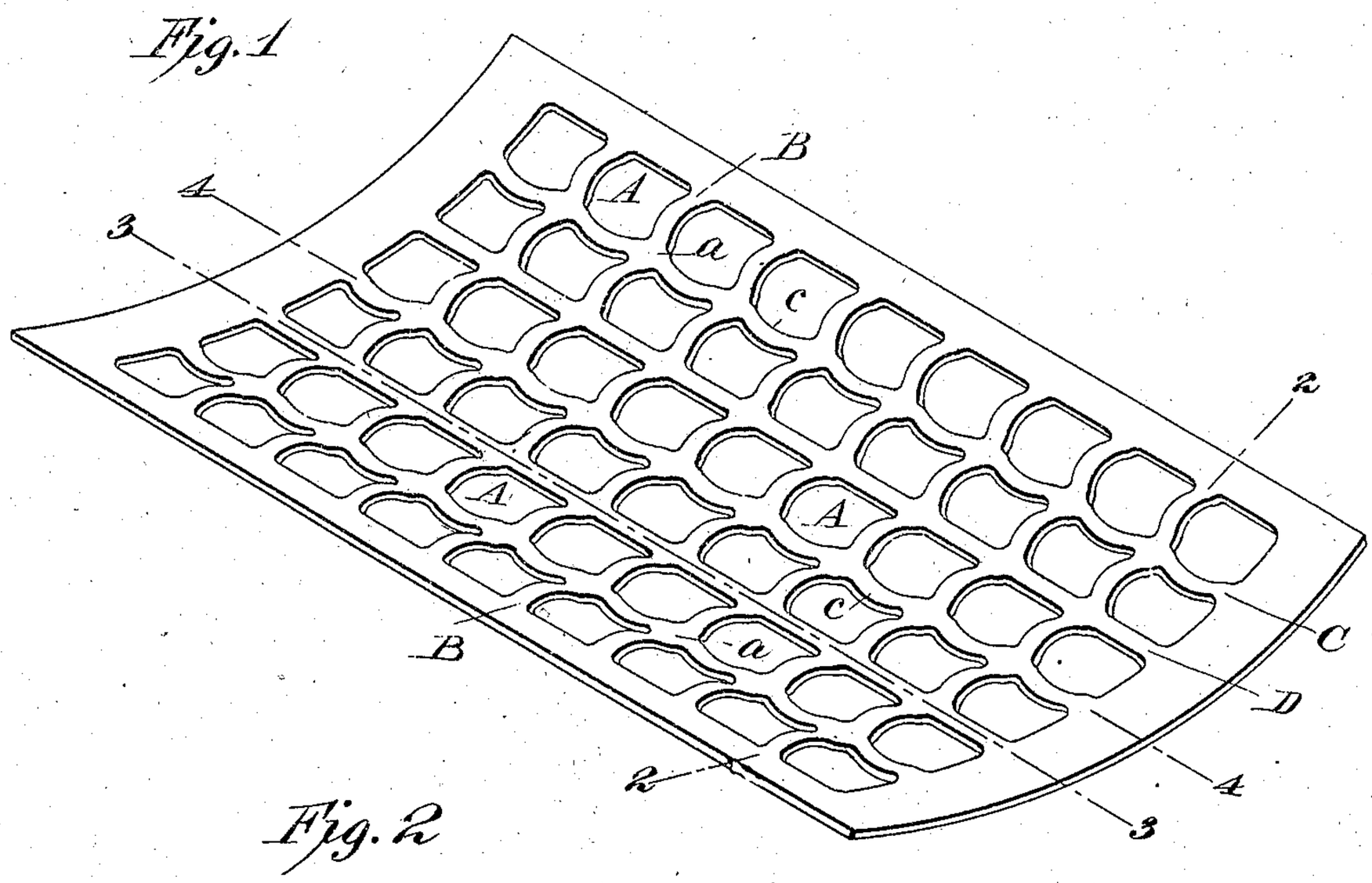



Fig. 2

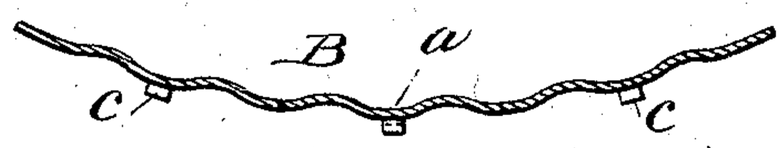



Fig. 3

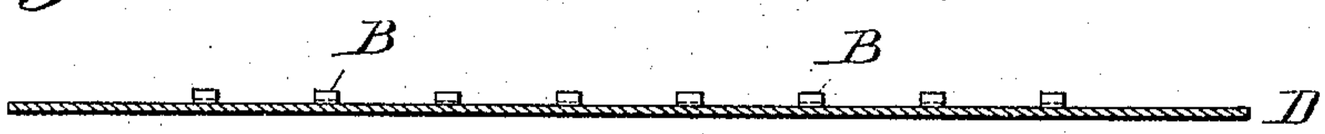



Fig. 4

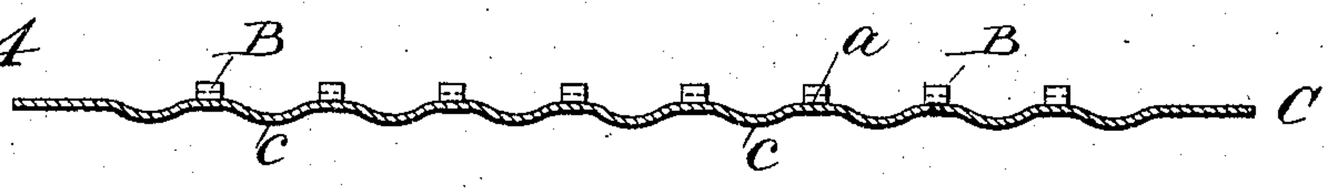
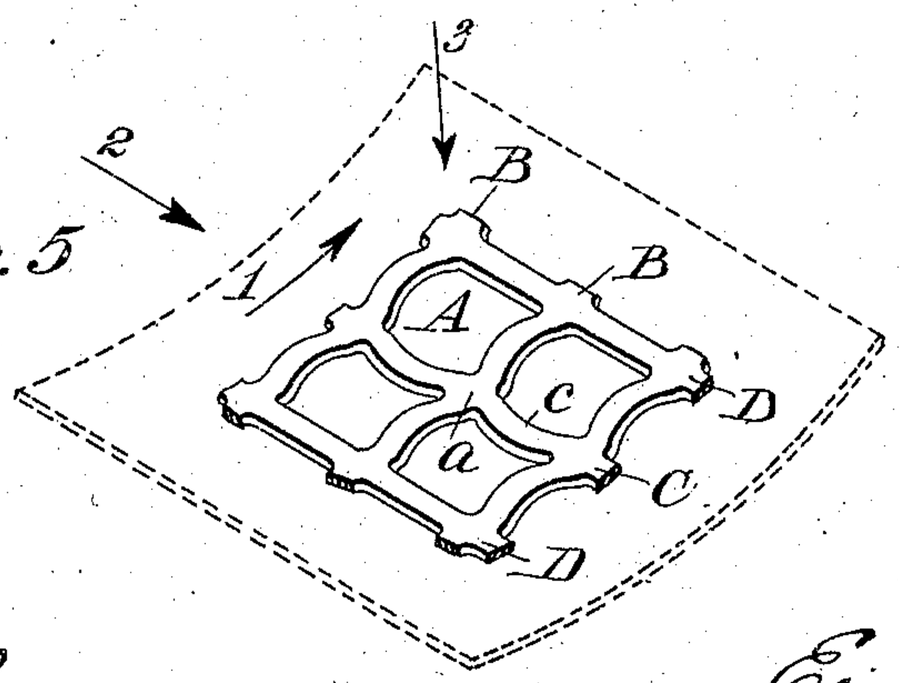



Fig. 5

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No. 791,783. Patented June 6, 1905.

# UNITED STATES PATENT OFFICE.

ELI E. HENDRICK, OF CARBONDALE, PENNSYLVANIA.

## SCREEN.

SPECIFICATION forming part of Letters Patent No. 791,783, dated June 6, 1905.

Application filed December 17, 1902. Serial No. 135,474.

*To all whom it may concern:*

Be it known that I, ELI E. HENDRICK, a citizen of the United States, residing at Carbondale, in the county of Lackawanna and State of Pennsylvania, have invented a certain new and useful Improvement in Screens, of which the following is a description.

This invention has for its object the production of a screen of the character commonly employed in the separation of coal into various sizes, and has for its object the production of a more durable structure than any heretofore devised and one which shall attain maximum efficiency through the utilization of the entire perforated surface over which the mass of coal is designed to travel.

The invention relates particularly to that class of coal-screens in which the surface or "mesh" is crimped or curved between interstices with a view to tumbling or agitating the coal in its passage over such surface. Screens of this character are divisible generally into two classes, those of "opposite" mesh, in which the interstices are in line both longitudinally and transversely, and those of "staggered" mesh, in which the interstices are in line in one direction, but only the alternate interstices are in line at right angles to such direction. The present invention concerns particularly screens of the opposite-mesh class. Crimped screen-surfaces of this general description are shown in Patents numbered 513,890, 545,056, 27,114, (design,) and 597,245. All of these patents illustrate and describe screen elements known in the art as "crimped segments." They differ from one another chiefly with respect to the direction of curvature given the various webs surrounding the interstices.

Experience and observation have shown that the crimping of a screen-surface gives it an efficiency in excess of that of screen-surfaces of plain punched plate, the curvatures of the webs between the interstices exercising a tumbling or agitating effect upon a mass of coal and having a tendency, therefore, to prevent the same from sliding in bulk, under which operation particles of such size as to pass through the interstices are permitted to travel beyond such interstices and to finally pass through the screen at a point designed for the separation of particles of other and different sizes. While the crimping of a screen-surface, therefore, is of value in the practice of the art, yet it should not be carried beyond a certain point, for here the element of durability in operation intervenes, and this becomes of even greater importance in view of the corroding and destructive action of the mine-water found in certain localities in the coal regions. As will be readily understood, in the use of a screen having a crimped surface those webs which lie above the general plane of the plate receive the greatest amount of wear. The crimping or curving of these webs therefore must be done in view of two things: first, the tendency to break at or adjacent to the junctions between the webs or at the highest point of the curves, and, second, the destructive tendency not only of mine-water, but also of friction of the particles of coal therewith. Another consideration constituting a refinement in the art of crimping screen-surfaces is that such curvature should be given the webs as not only to sufficiently tumble or agitate the coal, but also to prevent too rapid passage of the coal over such surface (if of such size as to be passed therethrough) and to facilitate the passage through the interstices of particles of proper size. Having these considerations in mind, I have devised a screen-surface in which separating efficiency has not been sacrificed to durability; but these two essential elements of an ideal structure are combined in a novel and highly-useful manner.

In the patents above referred to all of the webs bounding the interstices in the screening-surface are crimped or curved. In my improvement upon these devices but a portion of these webs are raised or lowered out of the plane of the margins of the plate, the remaining webs being left in the original plane undisturbed, and therefore contributing their strength to the structure as a whole. In view of the course followed by the coal in its passage through the screen the transverse webs, which have a tendency to oppose this movement of the coal, are crimped or elevated above the plane of the plate, each line

of transverse webs being undulatory and presenting a convexity opposite each interstice; but the junctions between two such convexities being depressed to about the plane of the margins. Of the longitudinal webs only the alternate webs are affected in the crimping operation, the remaining webs being untouched and allowed to remain in the plane of the margins of the plate. Those longitudinal webs which are curved are, however, like the transverse webs, continuously undulatory, presenting opposite each interstice not a convexity, as in the case of the transverse webs, but a concavity, the junctions between two adjacent convexities of the transverse webs being in approximately the same plane as the longitudinal webs not crimped or curved. By this construction of the screening-surface not only is the tendency to breakage during the crimping operation minimized, but strains are equalized and the efficiency of the screen promoted in manner hereinafter to be described.

It is evident that the improvements herein referred to may be embodied either in a segmental plate designed for attachment to the barrel of a revoluble screen or in an approximately level or flat plate designed for use in what is known as a "shaker-screen." For convenience, however, I shall describe the invention as embodied in a screen element of the former character.

The invention is illustrated in the accompanying drawings, in which —

Figure 1 is a perspective view of a screen-segment having its mesh curved or crimped in the manner hereinbefore described. Fig. 2 is a transverse section on the line 2 2 of Fig. 1. Figs. 3 and 4 are longitudinal sections on the lines 3 3 and 4 4 of Fig. 1, respectively; and Fig. 5 is a diagrammatic view hereinafter to be referred to.

Referring to the drawings, in which similar letters denote corresponding parts, it will first be noted that I have illustrated the invention (as above stated) as employed in a screen-segment and that this has imperforate margins on all four sides. The end margins may, if desired, be perforated for attachment of the segment to the spider-bands of a revoluble screen, and the segment is preferably given a general curvature of a degree commensurate with the diameter of the screen-barrel.

A designates a series of interstices, here shown as square, although the corners thereof are preferably somewhat rounding to avoid weakening the surface. These interstices, as will be seen, are formed in rows both longitudinally and transversely, characterizing the surface thereby as of "opposite" mesh, as above referred to. Each of said interstices is bounded by four webs, two of which, B B, are transverse, while the other two, C D, at right angles to the webs B B are longitudinal. All of the transverse webs B are continuously undulating from one side of the plate to the other, that portion of the web which is opposite an interstice being convex, as clearly shown in Figs. 1 and 2, but the junctions *a* being left in substantially the original plane. By reason of this construction all the transverse webs extending over the entire surface of the plate are raised above the plane of the plate, and therefore in position to catch and receive the wear of the particles of coal passing over the surface of the screen. The longitudinal webs are alternately straight and undulating, one of the latter, C, being preferably located next to the straight marginal edge of the plate. As will be seen, the webs C are exactly the reverse of the webs B—that is to say, although continuously undulating from one end of the screen-plate to the other those portions of the longitudinal webs opposite each of the rectangular interstices are curved downwardly at *c*, presenting, therefore, a concavity where the adjacent transverse webs present convexities. As in the case of the junctions between two adjacent transverse webs, however, the junctions between two adjacent longitudinal webs are left in approximately the original plane of the screen-surface, the latter junctions and those between the transverse webs being, in fact, the same. The next adjacent longitudinal web D to the continuously-undulating web C, just described, is under my improvement left in the original plane of the screen-plate, as clearly shown in Figs. 1 and 3. In other words, the crimping and curving and what subsequent tendency there may be toward web-weakening are confined to but a portion of the surface of the plate, the remainder of such surface being left intact and undisturbed.

Turning now to the operation of the screen-surface above described and referring in this connection to the diagrammatic view Fig. 5, the direction of rotation of the screen is indicated by the arrow 1. The longitude of the screen-barrel (commonly pitched more or less from end to end) is indicated by the arrow 2. Obviously, however, and because of the pitch and rotation of such screen-barrel the arrow 2 does not indicate the direction of travel of the coal. This is indicated by the arrow 3. Now the principal object of the convex transverse webs B is to partially retard the passage of the particles of coal, but more particularly to turn these particles over to guard against the passage of such particles as are of suitable size to pass through the perforations. Without this provision more or less of these particles would ride upon the top of the mass, being supported by particles too large to pass through the mesh. Were the adjacent longitudinal webs also convex, the action of the transverse webs upon the particles of coal in contact therewith would be

insufficient, in my belief, to assure the passage of the proper particles through the mesh at that point, although farther along upon the screening-surface such particles might be passed through the screen. By providing a concavity next adjacent to a convexity operating to turn the coal this tendency to excessive travel is counteracted. Thus, referring again to Fig. 5, a particle of coal caught and turned by the first convex transverse web B would be presented with a new face to the two interstices next adjacent to said first webs B, the second transverse webs also presenting convexities, and therefore opposing further travel of the particle, and the web C presenting a concavity and the particle therefore being guided into one or the other of the two first interstices shown in said figure. Part of this guiding effect is due to the straight and level longitudinal webs D. If these were concave, like the longitudinal webs C, the particle in question might be permitted to skip from one concave web to another, and so pass over the screening-surface considerably farther than is here designed. Lying, however, in the level plane of the screen-surface, the passage of the particle through one or the other of the two interstices which lie between the straight longitudinal webs is practically assured, provided always, of course, that the particle in one or another direction is of the proper size to pass therethrough.

The importance of the invention will be realized when it is borne in mind that revoluble screens commonly run from ten to thirty-five or forty feet in length. This, in my belief, is due largely to the fact that a considerable portion of the screening-surface is ineffective for separating purposes, and particles of coal of proper size to be screened at a certain point are permitted to travel a considerable distance beyond that point before being separated from the mass and dropped into the bins below. In this connection it is to be noted that what is accomplished by the invention above described, therefore, is economy of screening-surface, as well as economy of the space within which the screening operation must be carried on.

What I claim, and desire to secure by Letters Patent, is—

1. An integral screen-surface of opposite mesh, the web-bars of which, running in one direction, are alternately straight and sinuous, the latter presenting a concavity opposite each interstice, while the web-bars running in a direction at right angles thereto are all sinuous, presenting a convexity opposite each interstice, substantially as set forth.

2. An integral screen-surface of opposite mesh having substantially quadrilateral interstices, each interstice throughout the screen-surface being bounded by two parallel and convex transverse webs and by two longitudinal webs, one of which is straight and the other of which is concave, substantially as set forth.

This specification signed and witnessed this 4th day of December, 1902.

ELI E. HENDRICK.

Witnesses:
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J. R. VANDERFORD.