

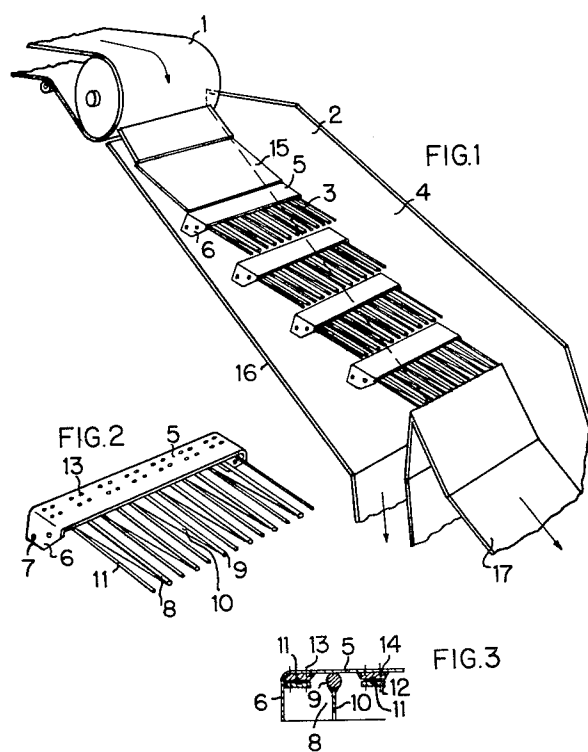
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BAR SCREEN

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BAR SCREEN

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8 Claims. (Cl. 209—314)

The present invention relates to a screen with screen bars clamped on the side of the feed only.

Screens of this type are used for screening material containing particles of widely divergent grain size, such as run-of-mine coal. The object is to separate off a considerable portion of the fine material quickly and in a simple way, so that the classifying screens, handling the coarse material, are less heavily loaded.

The known screening devices have the drawback that the slots between the bars frequently get obstructed by particles of about equal size being pressed into the slots between the bars by the large lumps sliding over the screen deck. As a result, the capacity of the screening device decreases, in consequence of which a large portion of the fine material is not separated off and the screen has to be frequently stopped for cleaning. It is true that some improvement can be achieved by the use of shaker screens or vibrating screens. However, this renders the screening device complex and expensive. Furthermore, it has already been suggested to use bars which are so designed that the slot-width increases in the direction of flow of the material to be screened. However, owing to the length of the screen bars, the slots can diverge to a small degree only, so that these screens, too, frequently get obstructed.

This invention has for its primary object the provision of a device for screening material of widely divergent grain size, which does not get obstructed and can be built as a stationary screen.

This has been achieved in that according to the invention bars of low and high elasticity are alternately arranged beside each other in such a way that the upper surface of the bars having a low elasticity is at a higher level than that of the bars having a high elasticity.

The size to which the cut is made is substantially determined by the distance between the elastic and the more rigid bars. When a particle gets jammed between these bars, the material sliding over the surface of the screen will exert such a force on this particle that the elastic bar is bent or deflected sideways. As a result, the slot between the bars will widen and diverge towards the discharge end. The particle jammed between the bars will now fall through the screen or be pushed forwards by the material sliding over the screen and fall through the screen at a point where the slot is sufficiently wide. In this way, the screen keeps itself clean, so that it can no longer be obstructed. As the upper surface of the elastic bars is at a lower level than that of the more rigid bars, the big heavy lumps are carried by the latter, so that the elastic bars, which are of course weaker, are not loaded by them.

By preference, the elastic bars are circular in section so as to enable them to deflect to the same extent in all directions. The other bars are strengthened vertically, so that their stiffness in this direction suffices for carrying the weight of the big lumps present in the material to be screened. These bars preferably consist of a bar of circular section and a bar of rectangular section having its shorter side welded onto the undersurface of the first-mentioned bar, the horizontal centerlines of the circular section part and of the elastic bars being at the same level. In this way, it is achieved that bending of an elastic bar is always attended with an increase of the slot width

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between the bars. If desired, the rigid bars may be clamped or supported on both ends, while they may furthermore be designed so as to be capable of deflecting sideways if necessary.

The invention is further explained with reference to the embodiment shown in the drawing, in which:

FIG. 1 is a perspective view of a screen according to the invention;

FIG. 2 is a perspective view of a screen section drawn to a larger scale; and

FIG. 3 shows a cross-sectional view of the screen bar attachment.

The material to be screened, for instance run-of-mine coal, is supplied to a pre-grading screen 2 by a belt conveyor 1. The pre-grading screen is provided with a number of stepped screen sections 3 mounted between two side walls 4, only one of which is shown in the drawing to allow a better view of the construction.

Each of the screen sections comprises a bridge 5 with downwardly flanged edges 6 in which holes 7 are drilled for fastening the bridges to the side walls 4. The ends of screen bars 8 are welded to the undersurface of the bridges at regular intervals. Each of the screen bars consists of a round bar 9 and a flat bar 10. Each flat bar 10 is rectangular in cross section and right triangular in longitudinal section with its shorter side being welded onto the undersurface of the associated round bar 9, so that the screen bar is stiffened vertically. Near the bridge the height of the bar 10 is greater than near the free end. Between the bars 8 thin bars 11 of circular cross-section are provided. One of the ends of these bars is fastened to the undersurface of the bridge by means of a clamping plate 12 and bolts 13, so that the bars can be quickly replaced when worn. Welded against the undersurface of the bridge at the points where the thin bars 11 are to be mounted are filling plates 14 so that, after the bars have been clamped into position, the upper surface of these bars is at a lower level than that of the bars 8. The thickness of the filling plate is such that the horizontal centerlines of the bars 9 and 11 are at the same level. If the bar 11 bends, the slot between the two bars widens, so that a particle which has got jammed between the bars cannot remain there, but falls through the screen.

Via a feed plate 15 the material supplied slides onto the bridge 5 of the first screen section. The bars attached to this bridge are set at such an angle that the material will slide along the screen deck by its own weight. A suitable angle of slope for dry-screening is 20 to 25°. The distance between the bars 8 and 11 in the embodiment is 60 mm., the elastic bars 11 having a diameter of 16 mm. and a length of 600 mm. Owing to the elasticity of the bars 11 the effective size to which the cut is made exceeds the actual slot width. When four screen sections with a width of 1 m. were arranged in series and operated under a load of 2000 t./h., the under-size delivered into chute 16 was found to contain 90% of the particles with a size smaller than 90 mm. Via a chute 17 the oversize is fed from the screening device to a moving screen which has to perform a high precision separation at 90 mm. The load of this screen is considerably reduced by the application of the pre-grading screen according to the invention, so that a small and, consequently, cheap screen will suffice. The load of the screen described in the example was found to be only 20% of the weight of the material supplied to device 2.

As the length of the bars is limited, and the amount of material supplied is rather large, only part of the fine material will have been separated off after the material has passed the first section. Consequently, a number of sections are arranged in series, in such a way that mate-

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rial flowing over the lower end of a preceding section falls onto the bridge of a following section, for example the bars ends clamped to this bridge underlie the free ends of the bars of the preceding screen section. This bridge not only partly underlies the upstream bar free ends, but also partly overlaps the downstream bars, i.e., the bridge projects or extends somewhat forwardly of the point where the bars are clamped on the underside of the bridge, as the elasticity of the bars at a short distance from the clamped ends is still too low to produce the desired effect. Furthermore, the height of the free ends of the bars over the following bridge is such that particles hanging between the bars at this point cannot be arrested by the bridge and get stuck there.

What is claimed is:

1. A device for screening and sizing material comprising a stationary screen having a plurality of screening bars secured only at their material feed end and extending beside each other in the material feed direction, said bars being alternately of high and low elasticity, and means for securing said bars at their material feed ends and for causing the upper surface of the bars of low elasticity to be at a higher level than the upper surface of the bars of high elasticity throughout the lengths of the respective bars.

2. A device as in claim 1 wherein said bars of high elasticity are circular in section.

3. A device as in claim 1 wherein each of the bars of low elasticity include a respective circular section and secured to the undersurface thereof a rigidizing rectangular section.

4. A device as in claim 3 wherein the axes of the high elasticity bars and of the low elasticity circular sections are at the same level.

5. A device as in claim 3 wherein said bars of high elasticity are circular in section.

6. A device as in claim 1 wherein said securing means

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includes a bridge to the underside of which all of said bars are clamped at their said material feed ends, said bridge extending in the material feed direction beyond the point where the bars are clamped a predetermined distance sufficient for desired screening.

7. A device as in claim 6 including a plurality of screens each as recited therein disposed in series with the clamped ends of the bars of each screen being under the free ends of the bars of the preceding screen.

8. A device as in claim 7 wherein each of the said bars of high elasticity are circular in section, each of the bars of low elasticity having a first portion of circular cross section and a second portion of rectangular cross section and a generally triangular longitudinal cross section with its shorter side being welded onto the undersurface of the respective first portion so that the longer end of the second portion is adjacent the bridge to which the bar is clamped, the horizontal centerlines of the circular section of the low elasticity bars being at the same level.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,221,877

December 7, 1965

Jacob de Koning

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

In the heading to the printed specification, lines 3 and 4 "75 Frans Erenslands, Geleen, Netherlands" should read -- Gelee Netherlands, assignor to Stamicarbon N.V., Heerlen, Netherlands --.

Signed and sealed this 3rd day of March 1970.

(SEAL)

Attest:

Edward M. Fletcher, Jr.

Attesting Officer

WILLIAM E. SCHUYLER, JR

Commissioner of Patents