SCREEN HAVING PARALLEL SLOTS AND
METHOD OF MAKING SAME

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163.5; 245/11

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ABSTRACT
A screen having parallel slots therethrough comprises
a plurality of rods supported in spaced parallel relation
by transversely extending support members. The
support members comprise spaced side walls having
upper edges upon which the rods rest and arches ex-
tending upwardly between the rods to connect said
side walls as one piece. The arches project into the re-
gion of minimum spacing between the rods and by en-
gaging the sides of the rods accurately determine the
spacing between rods. The arches are designed to
snugly interfit the rods and cooperate with the rods to
provide a smooth nonblinding screen surface.

5 Claims, 9 Drawing Figures
SCREEN HAVING PARALLEL SLOTS AND METHOD OF MAKING SAME

This is a continuation of application Ser. No. 35,186 filed May 6, 1970, now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention
This invention relates to screens of the type used for drainage, sizing, dewatering and washing of coal and ores, and for sand recovery and the like.

2. Description of the Prior Art
It is known to fabricate screens for the above described purposes by supporting rods in spaced parallel relation to define slots of predetermined size therebetween. In the known constructions the screen rods are equipped with depending flanges which project into slots of a transverse support member, the slots being spaced along the length of the support member to accurately establish the spaces or slots between the screen rods. For such construction, the flanges are made vertically large enough to project downwardly through portions of the support members a sufficient distance that transverse lock pins can be passed through suitably located holes in the flanges and under the support members to lock the rods to the support members. For purposes of economy, the depending flanges are relatively thin compared to the width of the rods which define the screen slots and make no contribution to the operation of the screen other than the function of maintaining the desired spacing between the parallel rods of the screen. The relative thinness of the depending flanges precludes reliable welding and hence the aforementioned lock pins are required in lieu of welding.

SUMMARY OF THE INVENTION

In accordance with the present invention the depending flanges which enter slots in transverse support members and the lock pins which lock the depending flanges to the support members have been eliminated. To accomplish this, the slots in the screen support members are made wide enough to receive the screen rods themselves, rather than the depending flanges, and shallow enough that the screen rods continue to project at least to some extent above the support members. This construction allows the screen rods to be directly welded for the support members and eliminates the need for the lock pins previously described. This construction also allows the slots which will receive the lower surfaces of the screen rods to be conformal to such lower surfaces, thus allowing a smooth and non-blinding screen construction. The particular construction to be described allows all welding to occur in areas shielded from the active surfaces of the screen and thus in areas not disruptive to the smoothness of the active screen surfaces.

It is an object of the present invention to provide a new and improved parallel slot screen construction.

Another object of the present invention is to provide a parallel slot screen construction in which rods spaced apart to define the slots of the screen are seated in slots or cradles of a support member to which the rods may be directly welded.

A further object of the present invention is to provide transverse support members for a parallel slot screen in which the support members have slots or cradles to receive the screen rods and in which said cradles are configured to interfit the lower surfaces of the rods received thereby.

Other objects and advantages reside in the construction of parts, the combination thereof, the method of manufacture and the mode of operation, as will become more apparent from the following description.

DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of a screen panel constructed in accordance with the present invention.
FIG. 2 is a fragmentary plan view of a perforated sheet used to construct the screen support members of the FIG. 1 embodiment.
FIG. 3 is a fragmentary side elevation view of the FIG. 1 embodiment.
FIG. 4 is a perspective view of a first modification.
FIG. 5 is a fragmentary plan view of a perforated sheet member used to form the support members of the first modification.
FIG. 6 is a fragmentary side elevation view of the first modification.
FIG. 7 is a fragmentary side elevation view of a second modification.
FIG. 8 is a fragmentary perspective view of a perforated sheet used to form the support members of the second modification.
FIG. 9 is a fragmentary side elevation view illustrating an intermediate stage in the manufacture of the third modification.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawing, the reference number 10 in FIG. 1 designates a screen panel comprising parallel rods 12 seated on transverse support members 14. While FIG. 1 illustrates only two support members and seven screen rods, it is to be understood that the screen panel may be several feet long with the transverse support members located periodically such as every three inches along the length of the support rods and with the screen panel having a conveniently manageable width, such as 2 feet. The closest approach between the rods 12, i.e., the slot dimension, is typically in the range of one-eighth of an inch to 1 inch, or greater.

FIG. 2 illustrates a flat elongated metal sheet or plate 16 which has perforations 18 disposed at spaced intervals along the length thereof. Webs 20 separate the perforations 18. This sheet is in readiness for bending of the webs 20 along the longitudinal center of the sheet to form an elongate support member 14. The perforations 18 in the sheet 16 are oblong and have a largest width dimension which is only slightly larger than the diameter of the rods 12. The arcuate end margins 26 of these perforations are circularly curved at a radius only slightly larger than the radius of the rods 12.

As previously indicated, the sheet 16 is bent along the longitudinal axis thereof to form a support member 14. As this bending is accomplished, the webs 20 which separate the perforations of the sheet 16 are curved to form arches 22 which connect the upper portions of divergent perforate side walls 24.

Those skilled in the art will recognize that as this bending occurs, the longer side margins of the perforations 18 will bend without spreading as the arcuate end margins of the perforations swing downwardly to form arcuate recesses at the upper edges of the walls 24 upon which the support rods 12 can rest. Since the
longer side margins of the perforations remain generally parallel and have a maximum spacing only slightly larger than the diameter of the rods 12, the rods 12 readily slide downwardly between the arches 22 to seat snugly against the arcuate end margins of the perforations. Since the arcuate end margins of the perforations were cut to substantially the same curvature as the rods 12, the fit between the rods 12 and the margins of the perforations 18 will permit the rods 12 to fully close the perforations 18 to a degree of perfection limited only by inaccuracies in the design of the somewhat elliptically shaped perforations 18.

As best appears in FIG. 3, the perforations 18 are so sized in relation to the amount of bending that occurs in forming the support members 14 that only approximately the lower halves of the rods 12 enter the perforations 18. This assures that the rods 12 can be effectively close to the perforations 18. Thus, if appreciably more than one-half the diameter of the rods 12 were permitted to enter the perforations 18, the largest dimension of the rods 12 would be below the apices of the arches 22 so as to create openings between the arches and the rods 12 within which material being screened could snag so as to clog or blind the screen. It is also preferred that the perforations 18 be so sized with respect to the arches 22 therebetween that the perforations will not receive appreciably less than one-half the diameter of the rods 12. This assures that the portions of the rods 12 which project above the apices of the arches 22 will be spaced apart a distance at least as great as the slot width and will not tend to snag or entrap material above the arches 22.

As appears in FIG. 3 the rods 12 are anchored to the support members 14 by depositing a layer 28 of weld material on the undersides of the rods 12 where these rods are exposed by the perforations 18. The weld material is deposited initially as a blob of molten weld material and as the blob is deposited on the exposed area of the rod 12, a current of electricity sufficient to locally heat the rod 12 to a high temperature is passed through the area of contact with the rod 12. This heats the rod in the area contacted by the blob of weld material to a temperature sufficient to allow the weld material to flow throughout most, if not all, of the area of the rod 12 which has been exposed by the perforation 18 through which the blob has been deposited. This flow of weld material over the exposed surface of the rod 12 allows the weld material to contact the edge margins of the perforations 18, i.e., the arches 22. This gives rise to two forces which allow the support members 14 to retain the rods 12. The first force is the retentive power resulting from a fusion of the weld material to the edge margins of the perforations. The second force resides in a type of interference fit that forms between the weld layers 28 and the edge margins of the perforations. Thus, even should a fracture develop between a weld layer 28 and the adjacent edge margin of a perforation 18, the rod 12 will not be released from the support member 14.

This method of welding is desirable for the reason that the welding gun which is used to deposit the aforementioned blob of weld material is not brought into contact with the support members 14. Should one attempt to weld directly to the support members 14, which are relatively thin in comparison to the rods 12, the welding operation could damage or destroy the strength of the support member 14. By depositing the weld material onto the rods 12 rather than the support members 14, the welding can be accomplished without damage to the structural strength of the support members.

As clearly appears in FIG. 3, the side walls 24 for the support members 14 diverge so as to readily admit a welding gun therebetween and will allow free travel of the welding gun longitudinally along the length of the support member. The described weld layers are easily deposited by assembling the screen panels upside down from what appears in FIG. 1 and depositing the weld material inside of the support members 14.

While the embodiment of FIGS. 1-3 has been illustrated as having perforations 18 which are initially somewhat elliptical so as to closely fit the cylindrically curved undersides of the rods 12, those skilled in the art will recognize that oblong perforations which have substantially straight margins at their longer sides and rounded end margins will in all but extreme cases produce an acceptable, although not perfect, nonbinding fit with the rods 12.

FIGS. 4, 5 and 6 illustrate a first modification of the present invention utilizing elongate support members 30 which have the general shape of longitudinally truncated cylindrical tubes. A perforated sheet 32 suitable for forming the support members 30 is illustrated in plan view in FIG. 5. As clearly shown in FIG. 5, the perforations 34 in the sheet 32 have a greater elongation in the direction transverse to the length of the sheet 32 than was required for the previously described embodiment. The reason for this difference in the perforations is that the sheet 32 will be cylindrically curved whereas the preceding embodiment was arched to a substantially smaller radius of curvature. Due to the relatively gentle cylindrical curvature of the support members 30, the perforations 34 require greater elongation so that desired proportions of the screen rods 12 can ultimately be received within the perforations 34. Construction lines 36 appearing in FIG. 5 depict the approximate point at which the side margins of the sheet 32 are folded back upon themselves so as to double the thickness at the sides of the support members 30. The construction lines 36 are located approximately midway between the extreme side edges of the sheet 32 and the closest end margins of the perforations 34 so that when the sides of the sheet are folded back as described, the original side edges of the sheet 32 will be substantially tangent to the curved end margins of the perforations 34. When the sheet 32 is thereafter curved to the truncated cylindrical shape appearing in FIG. 6, there is a double thickness of the sheet 32 in position to support the support rods 12 which will be placed thereabove.

It will be understood that when the sheet 32 is formed to the truncated cylindrical shape appearing in FIG. 6, the webs between the perforations 34 will form arches 35. The construction of a screen panel with the resultant support members 30 is substantially as described in the preceding embodiment. Thus, the rods 12 are merely seated between the arches 35 against the margins of the perforations 34 and affixed in position by weld layers 38 which spread on the sides of the arches 35 and lock the rods 12 to the support members 30 as previously described with reference to the layers 28.

As described in reference to the FIG. 1 embodiment, the perforations 34 have their end margins curved to
substantially the curvature of the rods 12 and have their longer side margins at a maximum separation which only slightly exceeds the diameter of the rods 12.

FIG. 7, 8 and 9 illustrate the second modification of the present invention. In this modification an elongated perforated sheet 40 is first formed along its side margins to provide generally semicircular channel portions 42 along the side margins. This leaves a perforated web 44 between the channel portions 42. The web 44 is then curved about its longitudinal axis to an approximate semicircular shape, to form a support member 41, as appears in FIG. 9. The perforations 46 in the web 44, which are approximately elliptical before the web 44 is curved, adjust to a proper shape as the web 44 is curved to receive or cradle the support rods 12. After this curving, the sheet 40 has approximately the cross sectional shape illustrated in FIG. 9, with arches 45 connecting the channel portions 42.

At this point in the screen construction, the support rods 12 may be nested between the arches 45 and affixed thereto by weld layers 48 placed thereunder in the manner previously described. With reference to FIG. 9, it will be noted that the condition of the support member 41 is such as to allow ample room for insertion of a welding gun to apply the layers 48.

A screen device of the type described with reference to FIG. 9 is suitable for many industrial purposes. However, where the screen will encounter exceptionally heavy duty, it is preferred to reinforce the screen support members 41 with a sturdy beam. The construction of FIG. 9 is well suited to heavy duty applications which will require a support beam. Thus, the channel portions 42 which curve outwardly, each from the other, form a somewhat circular opening which can receive a transverse support beam such as the beam 50 illustrated in FIG. 7. The beam 50 is conveniently secured in position by first squeezing the channel portions 42 one toward the other in a suitable press mechanism so as to partially close the gap between their bottom edges. The beam 50 is then slid axially between the channel portions 42. The edge gap between the channel portions is not completely closed in the foregoing squeeze operation so that sufficient heat can be applied to the beam 50 and to the side edges of the channel portions 42 to weld the beam 50 to the channel portions 42 as appears at 52 in FIG. 7.

While the drawing of the present application infers that the screen panels are intended to be planar in the sense that the upper surfaces of the rods 12 would all contact a common plane, it will be apparent to those skilled in the art that the rods 12 are readily curved in the direction of their length and therefore the screen panel may be cylindrically or otherwise curved as the user may require.

While the preferred embodiments of the present invention have been described with reference to cylindrical rods 12, it is to be understood that the screen rods may have other cross sectional shapes such as triangular or square or rhombic. Such shapes are readily accommodated within the teachings of the present invention by merely redesigning the perforations, particularly the end margins thereof, so that the webs therebetween, when ultimately curved or arched, will snugly fit the contour of the screen rods, thus allowing the support members to cooperate with the screen rods to present a smooth nonsnagging surface to the material which will be moved across the upper surface of the screen.

In the preferred constructions of the present invention the rods 12 and the transverse support members may be fabricated from any material suitable to the job to be performed. As examples, the screen panels may be made of steel, stainless steel, bronze and brass alloys, or aluminum.

Although the preferred embodiment of the device has been described, it will be understood that within the purview of this invention various changes may be made in the form, details, proportion and arrangement of parts, the combination thereof and mode of operation, which generally stated consist in a device capable of carrying out the objects set forth, as disclosed and defined in the appended claims.

Have thus described our invention, we claim:

1. A screen device of the type comprising a plurality of spaced and generally parallel rods and a support member underlying said rods, said support member comprising an elongate sheet member having spaced apart longitudinal side edges and arched to a crest between said edges, said crest extending along the length of said sheet member, said sheet member having perforations through its thickness at said crest, said perforations spaced from said side edges and spaced apart along the length of said crest, there being one perforation for each rod, said rods extending transverse to the length of said sheet member, each rod crossing over a different one of said perforations and cradled between margins of the perforation crossed thereby which are spaced apart along the length of said crest, the improvements wherein said rods are cylindrical rods, the diameter of each rod exceeding the thickness of said sheet member, and wherein each rod is secured to said sheet member by a single weld layer fused to said rod, said weld layer extending under said rod to contact and interference fit each of the spaced apart margins between which said rod is cradled.

2. The screen device of claim 1 wherein said perforations are sized to admit approximately one-half of the diameter of said rods below the elevation of said crest, the remaining portion of the rod diameter at said crest projecting above the elevation of said crest.

3. The screen device of claim 1 wherein the portions of said sheet member disposed between said perforations and said side edges comprise generally confronting walls disposed below said rods, said walls curved each away from the other to define a generally circular opening extending along the length of said support member and under said rods.

4. The screen device of claim 3 wherein said sheet member is folded back upon itself at each of said walls to double the thickness of said sheet member below said rods.

5. In the method of making a screen device, the steps comprising: cutting a plurality of spaced apart perforations through the thickness of a generally flat sheet member, bending said sheet member about an axis passing through all of said perforations whereby the margins of said sheet member surrounding said perforations define recesses in the convex side of said sheet member, positioning a plurality of cylindrical rods, one for each perforation, adjacent and across the convex side of said sheet member and against said margins to close said perforations, the diameter of each rod being greater than the thickness of said sheet member, deposition
iting weld material onto each of said rods from the concave side of said sheet member through the perforation closed by said rod, and heating each of said rods where contacted by said weld material to a temperature sufficient to allow the weld material to flow across the area of the rod closing the perforation through which the weld material has been deposited, thus to contact a margin of said sheet member surrounding such perforation.
UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,805,955 Dated April 23, 1974

Inventor(s) Leon C. Bixby and Anthony J. Martino

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

In Column 1, line 47, "for" should read---to---.
(page 3, line 4 of the specifications)

Column 5, line 33, "support" should read---supporting---.
(page 11, line 7 of the specifications).

IN THE CLAIMS

Column 6, line 23, insert---side---after "said".
(Page 1 (of Amendment) line 5)

Signed and sealed this 19th day of November 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR. C. MARSHALL DANN
Attesting Officer Commissioner of Patents
UNITED STATES PATENT OFFICE
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