

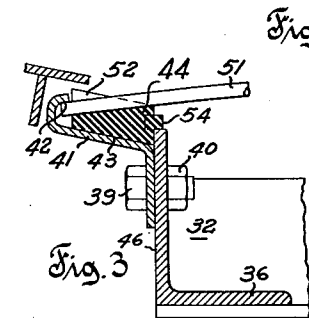
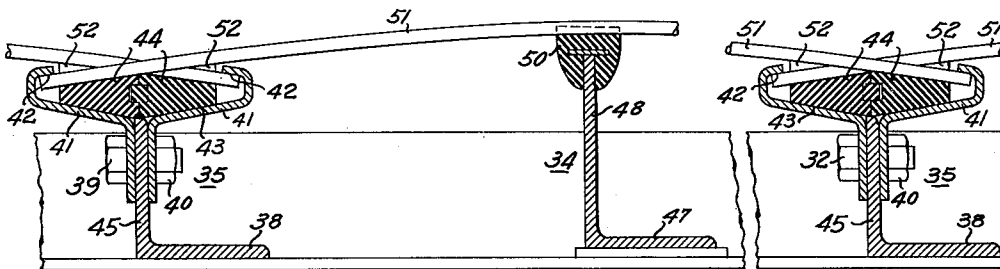
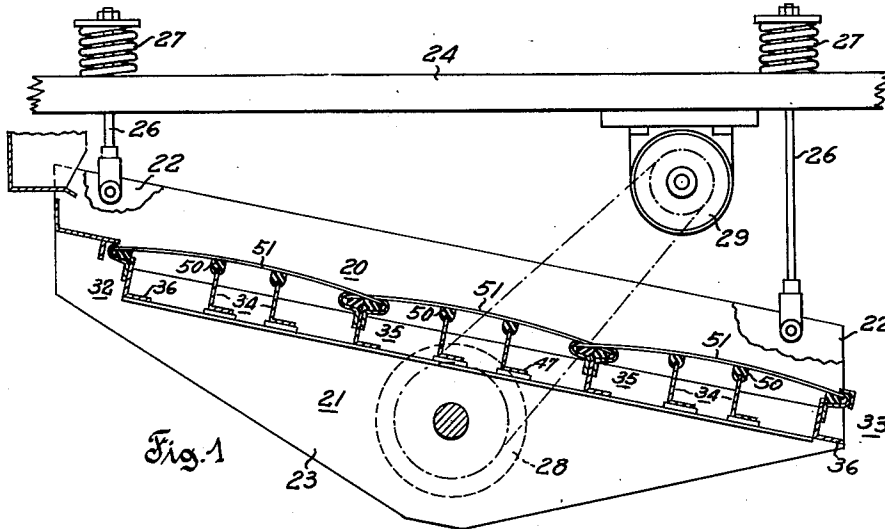
April 28, 1953

A. J. ROUBAL
ROD DECK SCREEN

2,636,607

Filed April 12, 1949

2 SHEETS—SHEET 1



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A. J. ROUBAL
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2 SHEETS—SHEET 2

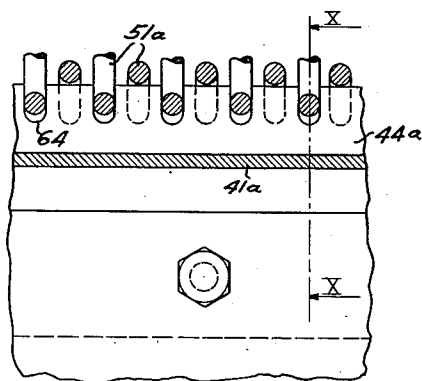


Fig. 11

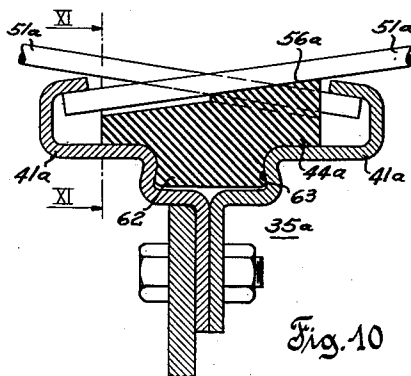


Fig. 10

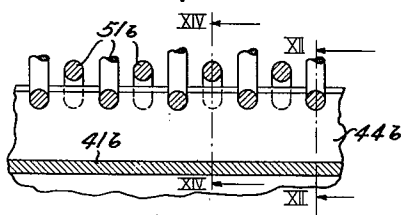


Fig. 13

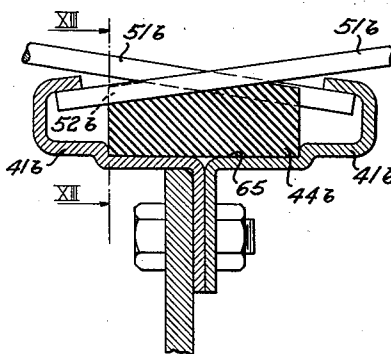


Fig. 12



Fig. 14

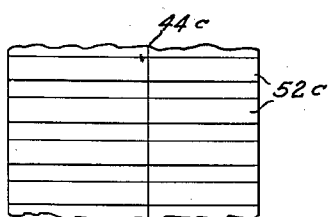


Fig. 16

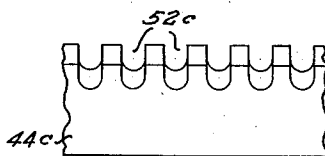


Fig. 17

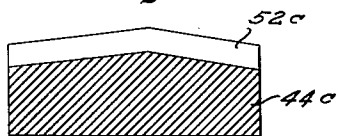


Fig. 15

Inventor
Alexander J. Roubal
by George W. Albrecht
Attorney

UNITED STATES PATENT OFFICE

2,636,607

ROD DECK SCREEN

Alexander J. Roubal, Milwaukee, Wis., assignor to
Allis-Chalmers Manufacturing Company, Milwaukee, Wis., a corporation of Delaware

Application April 12, 1949, Serial No. 87,036

8 Claims. (Cl. 209—395)

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This invention relates to screens, specifically to the vibratory type employing a rod deck structure, and more particularly to the means for supporting the ends of the rods. The principal object of the invention is to provide new and improved screens of this type.

Heretofore it had been customary to support the ends of rods by some means that necessarily protruded above the screening surface. The protruding supports were subjected to the continual action of the material flowing over them, and therefore evidenced rapid wear, which not only required frequent replacement of the worn parts, but also caused considerable delay by reason of shutdowns for repairs. Furthermore the protrusions presented obstructions in the path of the flow of the material which retarded screening operations, and hence decreased the efficiency of the unit. Accordingly, a principal object of this invention is the provision of new and improved rod deck screens which obviate these undesirable results.

Another object of the invention is to provide a simple and efficient means for supporting screening rods.

Other objects will appear hereinafter as the description of the invention proceeds.

The novel features of the invention and how the objects are attained will appear from this specification and the accompanying drawings forming a part of this application, and all these novel features are intended to be pointed out in the claims.

In the drawings:

Fig. 1 is a side elevational view of a screen embodying the invention with the major portion of the right side plate removed;

Fig. 2 is an enlarged broken view of the center portion of the screening deck;

Fig. 3 is an enlarged detail view of the feed end of the deck;

Fig. 4 is an enlarged detail view of the discharge end of the deck;

Fig. 5 is a partial plan view showing the rods in interdigitated supported position;

Fig. 6 is a cross section of a rod end spacer block taken along the line VI—VI of Fig. 7;

Fig. 7 is a sectional side elevation taken along the line VII—VII of Fig. 6;

Fig. 8 is an enlarged section of an intermediate spacer block for supporting portions of rods, and taken along the line VIII—VIII of Fig. 9;

Fig. 9 is a side elevation of the intermediate spacer block shown in Fig. 8;

Fig. 10 is another embodiment of a double support cross member;

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Fig. 11 is a sectional side elevation of Fig. 10 taken along the line XI—XI of Fig. 10;

Fig. 12 is another embodiment of a double support cross member, taken along the line XII—XII of Fig. 13;

Fig. 13 is a sectional side elevation of Fig. 12 taken along the line XIII—XIII of Fig. 12;

Fig. 14 is a cross section of a rod end spacer block taken along the line XIV—XIV of Fig. 13 with the rods omitted;

Fig. 15 is another embodiment of a rod end spacer block wherein the rod receiving grooves are continuous;

Fig. 16 is a plan view of Fig. 15; and

Fig. 17 is a side elevation of Fig. 15.

Similar parts shown in the various embodiments of the invention are indicated by like numerals with the suffix *a*, *b* or *c* added thereto.

Referring generally to Fig. 1, the screen 20 preferably, but not necessarily, comprises three rod deck sections disposed on a straight line slope to the horizontal. Each deck section is secured in longitudinal spaced sets within a screen body 21 characterized by right and left hand side members 22, 23, respectively, looking in the direction of flow, which is suspended from an overhead structure 24 by suspension cables 26 and compression springs 27. A vibratory mechanism 28 is mounted under the center rod deck section, but may be positioned at other points in the screen body 21 to impart a motion most desirable for the type of material being screened. A driving means 29, of any suitable type, may be secured to the overhead structure 24 as shown, for transmitting actuating power to the vibratory mechanism 28.

Rigidly connected to the right and left side members 22, 23, respectively, at spaced intervals, are cross members comprising a feed end member 32, discharge end member 33, intermediate members 34, and double support members 35.

The feed end member 32 and the discharge end member 33 are each provided with a transversely extending angle 36 having an upright leg 46 to which is secured in parallel relation thereto by suitable means, such as a bolt 39 and nut 40, a ledge 41 having the outer edge thereof inwardly turned to form a downwardly faced supporting surface 42. The ledge 41 is slightly inclined with respect to the straight line slope of the rod deck sections for receiving complementary inclined surfaces 43 of rod end spacer blocks 44. The rod end spacer blocks 44 are aided in retaining their position ledge 41 by a portion of the upright leg 46 extending beyond the adjacent portion of the ledge 41.

The double support members 35 include angles 38 having upright legs 45 to which are secured by some suitable means such as a bolt 39 and nut 40, ledges 41 which have their outer portions thereof inwardly turned and projecting toward each other to form downwardly facing supporting surfaces 42. The ledges 41 are slightly inclined to the straight line slope of the rod deck sections, and hence form a broad V for receiving complementary surfaces 43 of the rod end spacer blocks 44 thereon in a wedge retaining manner.

The intermediate members 34 are characterized by lateral angles 47 longitudinally spaced between the feed member 32 or discharge member 33, and the respective nearest double support member 35, and between adjacent double support members 35. The end of the upright leg 48 of the lateral angles 47, receives an intermediate spacer block 50 which will hereinafter be more fully described.

The screen 20 comprises a plurality of rods 51 which when held in flexed condition form a crown screening surface. Normally, the rods 51 are initially rectilinear but may be initially slightly flexed or bent. The degree of final flexure is determined by the relative difference in height between the downwardly faced supporting surfaces 42 and the intermediate spacer blocks 50.

The end portions of the rods 51 are received in grooves 52 formed in the rod end spacer blocks 44 desirably of yieldable compressible material, such as rubber. The grooves 52 are spaced in parallel relation and inclined at an angle generally equal to the angle of flexure the rods 51 assume. The extreme ends of the rods 51 are supported against the downwardly faced supporting surfaces 42 of the inwardly turned portions of the ledges 41. By reason of the fact that the extreme ends of the rods 51 are supported by the surfaces 42, and as shown in the drawings, the spacer blocks 44 are spaced from said extreme ends, insertion and removal of the respective rods is made very easy. The downwardly faced supporting surfaces 42 are preferably but not necessarily inclined at the same angle to which the rods 51 are flexed, in order to insure parallel surface contact with the rods and thus reduce excessive wear.

Referring more particularly to Figs. 5, 6 and 7, it is seen that the rod end spacer blocks 44 are provided with recesses 53, alternating with nipples 54 integral therewith. The recesses 53 are directly under grooves 52, whereas the adjacent nipples 54 are in alignment with recesses 53 and are positioned, respectively, between the grooves. The rod end spacer blocks 44 lying on the inclined ledges 41 of the double support members 35 are interengaged with each other through the means of the nipples 54 and recesses 53 to maintain cooperative transverse alignment between the respective oppositely inclined grooves 52.

Figs. 8 and 9 illustrate the intermediate spacer blocks 50, also desirably of yieldable compressible material, such as rubber, which are provided with laterally spaced indentations 57 for receiving portions of the rods 51 between their ends. Each intermediate spacer block 50 may be reinforced by a suitable material, here shown as a strip of metal 58 vulcanized to the block to prevent lateral stretching. The effect of the vibrating forces upon the rods 51 would have the tendency to otherwise distort the intermediate spacer block 50 to an extent where close separation of different sized particles would not be had. Fig. 8

shows the original shape of a slot 59 cut into the block 50 which when positioned over the end of the transverse leg 48 of the intermediate member 34 causes block 50 to clampingly engage the leg and hence fastens itself thereto.

The vibrating screen 20 herein described discloses a structure in which the rods 51 are individually inserted in parallel relation to each other to form the deck proper. For example, one end of a rod 51 is first positioned in a groove 52 of the rod end spacer block 44 carried by the feed end member 32, and sufficiently flexed to permit the opposite end to be inserted in a cooperating inclined groove of a rod end spacer block 44 disposed nearest the discharge end of the screen on a double support member 35 closest the feed end member.

The rods 51 may be similarly inserted in another of the two remaining rod deck sections, for example, as follows. One end of a rod 51 may be inserted in a groove 52 of the rod end spacer block 44 carried by the discharge end member 33, and adequately flexed to permit the other end of the rod to be received in a cooperating groove of a rod end spacer block 44 disposed nearest the feed end member 32 on a double support member 35 closest the discharge end member.

The remaining or center rod deck section may be completed by receiving rods 51 in a manner such that the rod ends are inserted in the grooves 52 of rod end spacer blocks 44 which are farthest apart and mounted or carried by the double support members 35.

Apparently the rods 51 comprising the screening surface may be inserted in various other ways than that above described and hence the description herein is not to be construed as a limitation upon the invention. It is also readily apparent that the ends of the rods 51, when accordingly positioned, will bear upwardly against the downwardly faced supporting surfaces 42 of the ledges 41 of the members 32, 33 and 35, whereas sections of the rods between the ends will bear downwardly in the spaced indentations 57 of the intermediate spacer blocks 50 secured to the intermediate members 34.

The finally assembled rods 51, having their end portions in upward bearing relationship with the downwardly faced supporting surfaces 42 of ledges 41 of the double support members 35, are related analogously to freely, loosely interdigitated fingers of two hands. The term is used herein in that sense, and hence the rod end portions lie beneath the screening surface of the rods 51. The inwardly turned portions of the ledges 41 bearing the end portions of the rods 51 also lie beneath the screening surface, and thereby any obstruction to the flow of material over the rods is eliminated. It is to be noted also that the end portions of the rods 51 lying beneath the screening surface rest not only in the bottom of the grooves 52, but also upon the segmented surface 56 which forms an inclined surface generally parallel to the angle of flexure of the rods. That is to say the surface portions between grooves 52 of each block 44 form an inclined plane to provide a resting surface for rods disposed in the grooves of the adjacent block 44.

In operation, the material flows smoothly over the rods 51 without passing over any obstruction, other than at the discharge end, and hence a reduction in the cost of maintenance is experienced since no supports are subject to wear from the material being screened. Furthermore, the rod end and intermediate spacer blocks 44, 50,

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respectively, are firmly held in place by the spring tension in the rods 51 themselves, without the aid of other permanent supporting means.

Another embodiment of the invention is shown in Figs. 10 and 11. Here a rod end spacer block 44a receivable on a double support member 35a, is comprised of one piece of yieldable compressible material. It is provided with a dovetail portion 62 which is carried in a complementary groove 63 formed by outward oppositely extended ledges 41a. The ends of the rods 51a rest upon an inclined plane 56a slightly elevated from the arcuate portion 64 of the groove 52a in which it is receivable. Hence the rod 51a is not as restricted in its vibratory motions as the rods 51 are in the first embodiment of the invention, which may be more advantageous for the screening of certain types of material.

Still another embodiment of the invention is illustrated in Figs. 12, 13 and 14, wherein the rod end spacer block 44b is received on a plane 65 of outwardly extended ledges 41b. The rods 51b rest in grooves 52b having a depth no greater than the diameter of the rods themselves, and upon inclined planes 56b, relatively shorter than the inclined planes 56, 56a of the first two embodiments of the invention, lying between the grooves receiving the rods of the next longitudinal section. This rod end spacer block 44b functions similarly to the preferred embodiment of the invention and differs merely in affording slightly less resting surface on the inclined plane 56b.

Still another embodiment is illustrated in Figs. 15, 16 and 17, wherein a rod end spacer block 44c is provided with continuous inclined grooves 52c and hence differs from all other embodiments herein described in that the rods are not provided with inclined resting planes.

It is readily understood that all of the variants of the preferred embodiment will function substantially in the same manner as the preferred embodiment, and accordingly further detailed description is unnecessary.

From the foregoing it will be apparent to those skilled in the art that the illustrated embodiments of the invention provide new and improved rod deck screens and accordingly accomplish the objects of the invention. On the other hand, it will also be obvious to those skilled in the art, that the illustrated embodiments of the invention may be variously changed and modified, or features thereof, singly or collectively, embodied in other combinations than those illustrated, without departing from the spirit of the invention, or sacrificing all of the advantages thereof, and that accordingly the disclosure herein is illustrative only, and the invention is not limited thereto.

It is claimed and desired to secure by Letters Patent:

1. A screen structure, comprising: a frame extending longitudinally from a feed end to a discharge end; a plurality of parallel rods extending longitudinally of said frame, said rods being positioned in longitudinally spaced sets, each set comprising a plurality of rods spaced laterally from each other to provide a screening surface, and end portions of the rods of a first set and end portions of the rods of a second set adjacent to said first set being interdigitated so that the upper surfaces of said end portions lie beneath the screening surfaces of said adjacent sets; and means for holding said rods positioned as aforesaid on said frame.

2. A screen structure, comprising: a frame ex-

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tending longitudinally from a feed end to a discharge end; a plurality of parallel rods extending longitudinally of said frame, said rods being positioned in longitudinally spaced sets, each set comprising a plurality of rods spaced laterally from each other to provide a screening surface, and end portions of the rods of a first set and end portions of the rods of a second set adjacent to said first set being interdigitated so that the upper surfaces of said end portions lie beneath the screening surfaces of said adjacent sets; and means for holding said rods positioned as aforesaid on said frame, said means including parts in engagement with said upper surfaces.

3. A screen structure, comprising: a frame extending longitudinally from a feed end to a discharge end; a plurality of parallel rods extending longitudinally of said frame, said rods being positioned in longitudinally spaced sets, each set comprising a plurality of rods spaced laterally from each other to provide a screening surface, and end portions of the rods of a first set and end portions of the rods of a second set adjacent to said first set being interdigitated so that the upper surfaces of said end portions lie beneath the screening surfaces of said adjacent sets, the rods of each set being in upwardly flexed conditions relatively to said frame; and means for holding said rods positioned as aforesaid and in said flexed condition on said frame.

4. A screen structure, comprising: a frame extending longitudinally from a feed end to a discharge end; a plurality of parallel rods extending longitudinally of said frame, said rods being positioned in longitudinally spaced sets, each set comprising a plurality of rods spaced laterally from each other to provide a screening surface, and end portions of the rods of a first set and end portions of the rods of a second set adjacent to said first set being interdigitated so that the upper surfaces of said end portions lie beneath the screening surfaces of said adjacent sets, the rods of each set being in upwardly flexed conditions relatively to said frame; and means for holding said rods positioned as aforesaid and in said flexed condition on said frame, said means including parts in engagement with said upper surfaces of said end portions.

5. A screen structure, comprising: a frame extending longitudinally from a feed end to a discharge end; a plurality of parallel rods extending longitudinally of said frame, said rods being positioned in longitudinally spaced sets, each set comprising a plurality of rods spaced laterally from each other to provide a screening surface, and end portions of the rods of a first set and end portions of the rods of a second set adjacent to said first set being interdigitated so that the upper surfaces of said end portions lie beneath the screening surfaces of said adjacent sets, the rods of each set being in upwardly flexed conditions relatively to said frame; and means for holding said rods positioned as aforesaid and in said flexed condition on said frame, said means including parts in engagement with said upper surfaces of said end portions of the rods of said sets respectively, and parts forming ledges spaced from said end portions of the rods of said sets respectively, and resilient material interposed between the underside of the respective end portions of the respective sets of rods and the respective said ledges.

6. A screen structure, comprising: a frame extending longitudinally from a feed end to a

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discharge end; a plurality of parallel rods extending longitudinally of said frame, said rods being positioned in longitudinally spaced sets, each set comprising a plurality of rods spaced laterally from each other to provide a screening surface, and end portions of the rods of a first set and end portions of the rods of a second set adjacent to said first set being interdigitated so that the upper surfaces of said end portions lie beneath the screening surfaces of said adjacent sets, the rods of each set being in upwardly flexed conditions relatively to said frame; and means for holding said rods positioned as aforesaid and in said flexed condition on said frame, said means including parts in engagement with said upper surfaces of said end portions of the rods of said sets respectively, and parts forming ledges spaced from said end portions of the rods of said sets respectively, and resilient material interposed between the underside of the respective end portions of the respective sets of rods and the respective said ledges, said resilient material having two sets of grooves receiving said respective sets of end portions.

7. In a screen structure comprising a frame and a plurality of parallel rods spaced laterally from each other to form a screening surface; means, mounted on said frame, for releasably holding said rods on said frame, said holding means including a metallic portion extending transversely over corresponding extreme ends of said rods and in engagement therewith, and a metallic portion extending underneath corresponding end portions of said rods and forming a ledge spaced from said end portions; and spacing means for spacing said end portions laterally from each other comprising a body of resilient

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material interposed between and in engagement with the under side of said end portions and said ledge and spaced from said extreme ends.

8. In a screen structure comprising a frame and a plurality of parallel rods spaced laterally from each other to form a screening surface; and means, mounted on said frame, for releasably holding said rods on said frame, said holding means including a metallic portion extending transversely over corresponding extreme ends of said rods and in engagement therewith, and a metallic portion extending underneath corresponding end portions of said rods and forming a ledge spaced from said end portions; and spacing means for spacing said end portions laterally from each other comprising a body of resilient material interposed between and in engagement with the under side of said end portions and said ledge, said body being spaced from said extreme ends and having grooves receiving said end portions of said rods, said grooves having their axes in a plane inclined with respect to the general plane of said frame.

ALEXANDER J. ROUBAL.

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