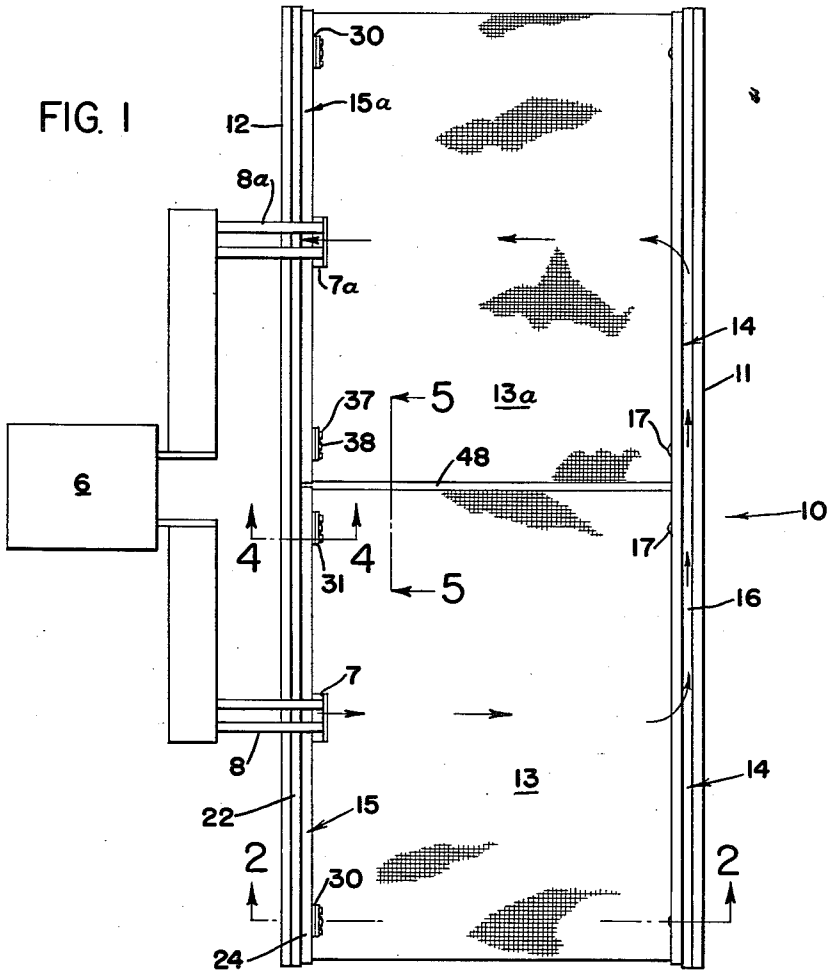
March 5, 1963 LA VERNE J. RIESBECK 3,080,055

ELECTRICALLY HEATED SCREENING APPARATUS

Filed Aug. 5, 1959

2 Sheets-Sheet 1

FIG. 1



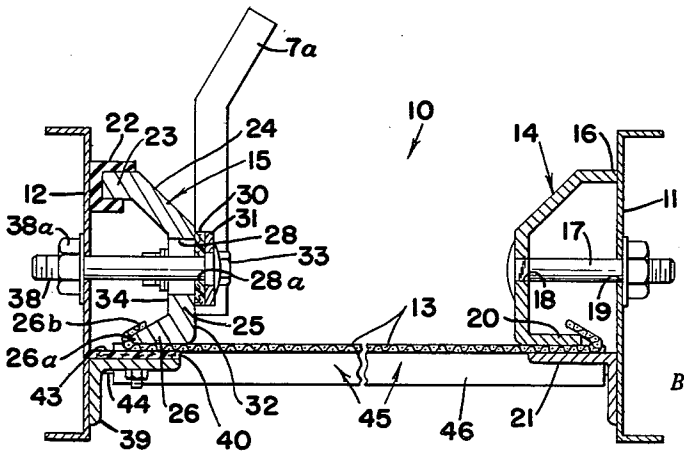


FIG. 2

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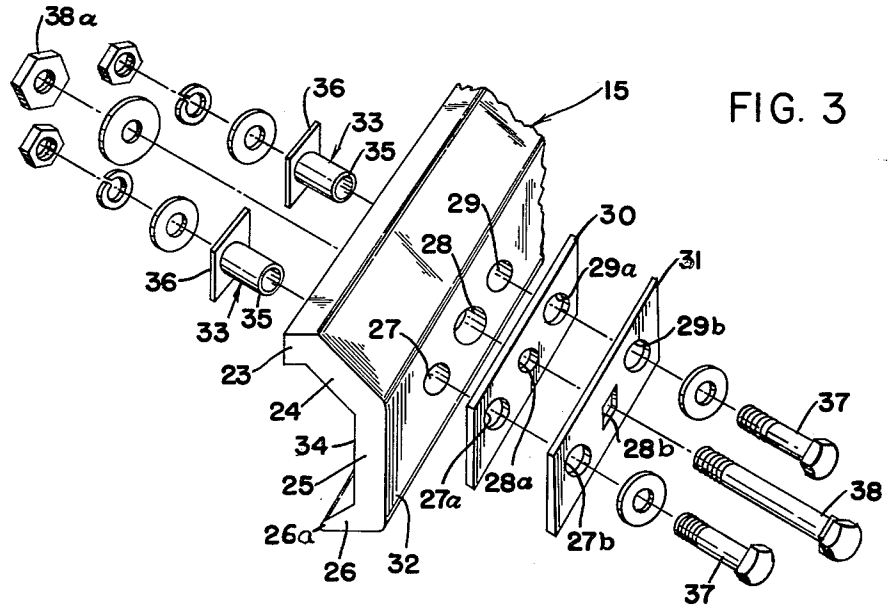


FIG. 3

FIG. 4

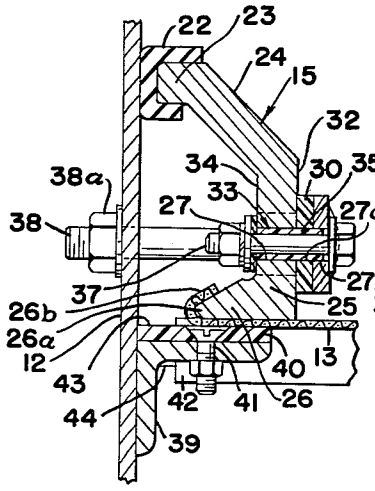
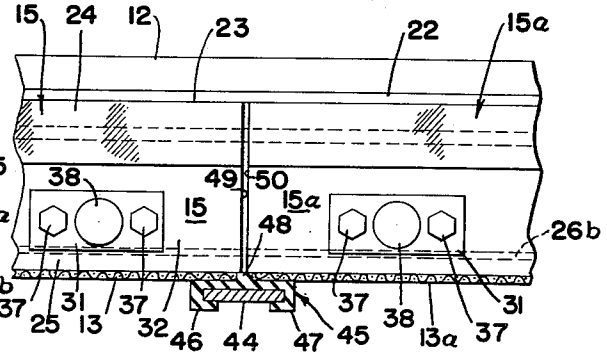


FIG. 5



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3,080,055
ELECTRICALLY HEATED SCREENING APPARATUS

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Filed Aug. 5, 1959, Ser. No. 831,828
5 Claims. (Cl. 209—238)

The present invention relates generally to improvements in electrically heated screens. More particularly, the invention relates to an improved grounded series connected screening arrangement.

It is well known in the art that electrically heating a screen by using the wires of the screen as the resistance means reduces clogging by reducing the moisture content of the material at the screen and extends the work life of the screen by preventing corrosion and chemical action thereon. In certain previous designs, wooden frames have been used, but it has been proposed to use steel for accomplishing rigid framing and, in such cases, elaborate insulative methods have been designed to insulate the electrically heated screen from the steel framework upon which the rig is mounted. Experience taught that better results could be attained if the screen were not allowed to sag and consequently tensioning means were evolved. These were combined with the electrical contacts through which the current was imparted to the screen. This improvement also allowed easier replacement of the screen when sufficiently worn and increased the operating efficiency by reducing the shut-down time for that machine.

These tensioning means employed, at least on the screen contacting section, bars or side rails of highly conductive material, such as copper or aluminum, in order to lower the resistance of the bus and tensioning bar combination and hence, not only reduce the heating thereof but also assure an even heating throughout the screen. The rails, or at least the bus portion thereof, on both sides of the screen always have been well insulated from the steel frame. The Hannon Patent No. 2,812,062 is an excellent example of the final result.

This inventor, however, has found that a grounded series connection works just as well and is far cheaper. By using a grounded circuit only one of the side rails need be made of a highly conductive material; only this rail need be insulated from the steel framework; the other side rail may be steel in direct contact with the steel framework—allowing a savings as to the cost of material, and affording greater life by not deteriorating from the abrasion caused by the constant contact with the material being screened; the combination permits an extremely quick and inexpensive conversion to electrical screening for an installation employing only a mechanical or some vibratory method, and also gives a design which is less expensive to manufacture initially.

Specifically, then, it is an object of this invention to design an electrically heated series-connected screening apparatus using highly electrically conductive side rails on one side only of a plurality of screen sections in conjunction with a side rail of a less highly conductive and less expensive material such as moderately conductive steel on the opposite side.

Another object is to provide an electrically heated series-connected screening apparatus requiring less insulating material than other types of screen heating, thus minimizing installation and maintenance costs.

A further object is to provide an electrically heated series-connected screening apparatus inexpensive to produce.

A further object is to provide an inexpensive conversion unit whereby purely vibratory apparatus can be

readily adapted to include electrically heated series-connected screens.

A further object is to provide a simplified method of insulating the highly conductive side rails from the steel frame.

A still further object is to provide a simplified device for insulating one screen from the other.

These and other objects which will become apparent to the reader of the following specifications are accomplished by improved means hereinafter described and claimed.

One preferred embodiment is shown by way of example in the accompanying drawings and hereinafter described in detail without attempting to show all of the various forms and modifications in which the invention might be embodied; the invention being measured by the appended claims and not by the details of the specification.

Referring to the drawings:

FIG. 1 is a schematic plan view showing an electrically heated screening apparatus embodying the invention.

FIG. 2 is an enlarged sectional view on line 2—2 of FIG. 1, showing both the highly conductive, insulated side rail or tensioning bar and the standard steel side rail or tensioning bar.

FIG. 3 is an exploded perspective view of the tensioning bolt insulation assembly in conjunction with the highly conductive rail.

FIG. 4 is an enlarged sectional view of the highly conductive side rail or tensioning bar taken substantially along line 4—4 of FIG. 1.

FIG. 5 is a longitudinal sectional view taken substantially along line 5—5 of FIG. 1.

Referring to FIG. 1, the screening device, designated generally by the numeral 10, comprises the steel framework of side walls 11 and 12 to which are attached screens 13 and 13*a* by side rails 14, 15 and 15*a*, respectively. Rails 15 and 15*a* are connected to the terminals of transformer 6 through terminal plates 7 and 7*a*, respectively, by flexible connectors 8 and 8*a*. Flexible connectors 8 and 8*a* may be any of the types well known in the art. The design of the terminal plates 7 and 7*a* is also not critical and may be any type of low resistance bar as shown in FIG. 2. The device 10 can be vibrated by suitable means (not shown).

Referring now to FIG. 2, the side rail or tensioning bar 14 is preferably of a low cost, relatively moderately conductive material such as steel and pivotally or rockably contacts frame wall 11 at its upper edge 16. Substantially displaced below upper edge 16, a tightening bolt 17 connects side rail 14 to wall 11 through registering holes 18 and 19 in rail 14 and wall 11, respectively. Lower edge 20 of side rail 14 is disposed in a plane parallel to the plane of screen 13 and grips screen 13 by suitable means depending upon the nature of the screening material, as well disclosed in the art—here shown as engaging the hooked end of screen 13. A support angle 21 may be attached to frame wall 11 by suitable means (not shown). Such an angle 21 assists the side rail 14 in gripping the screen 13, and is especially useful when the screen 13 is of a fine gauge. A tightening of bolt 17 levers the rail 14 about point 16 and effects a horizontally outward movement of lower edge 20, and thereby assists in tightening or stretching screen 13 into operative position.

Side rail 15 is formed from a relatively highly conductive material such as aluminum and is rockable relative to wall 12, but is not permitted contact therewith—being separted therefrom by insulative cap 22 which is formed from an insulative material such as rubber. The rail 15 is designed in such a fashion as to permit ease of manufacture, having an easily extruded cross section. From the upper portion 23, the body of rail 15 extends diagonally

downwardly and inwardly from portion 23 in what may be termed the lever portion 24. This ends in the vertical tightening portion 25. The tightening method and insulation design therefor are hereinafter more fully described. This tightening portion 25 terminates in the outturned gripping portion 26 which consists of a substantially triagular section, the innermost apex 26*a* of which inserts into the hooked portion 26*b* of screen 13, thereby effecting a connection for tensioning and electrical contact.

The perspective schematic view in FIG. 3 best shows the insulative method used at the tightening locations along the length of side rail 15. Three holes 27, 28 and 29 are located through tightening portion 25 of bar 15. Registering with these are holes 27*a*, 28*a* and 29*a* through insulation plate 30, which may be made of a dielectric such as Fiberglas, and holes 27*b*, 28*b* and 29*b* through force distribution plate 31, which may be made of steel. Although plate 31 may be made with rectangular cross section, it has been found to give a better force distribution over portion 25 when rail 15 is used to tension screen 13 if the vertical sides converge upwardly at an angle of about 9½ degrees. Plates 30 and 31 are attached on the inner side 32 of tightening portion 25 furthermost from the frame wall 12 (FIG. 2) to which the rail 15 is to be secured.

Two bolt insulators 33 are inserted from the outer side 34 of tightening portion 25, one through registering holes 27, 27*a* and 27*b*, and the other through registering holes 29, 29*a* and 29*b*. These insulators 33 preferably consist of two parts, a sleeve section 35 which is perpendicularly fixed to a plate section 36. The sleeve 35 has an outer diameter which permits it to be inserted into and through holes 27 (or 29) and is of sufficient length to completely insulate the interior surface of said holes, but not so long as to extend outwardly beyond hole 27*b* (or 29*b*) when plates 30 and 31 are tightened against portion 25. The inner diameter of sleeves 35 and the registering holes through plate 36 are of sufficient diameter to permit bolts 37 to be inserted and tightened, firmly securing the plates 30 and 31 to rail 15. Hole 28 is medially located between holes 27 and 29 and is of sufficiently large inside diameter that the tensioning bolt 38 will not contact any of its inner surface when positioned—thus effecting freedom from electrical contact. The diameter of hole 28*a* is not critical; it must merely permit insertion of bolt 38. Hole 28*b* is shown as being rectangular to be used with a carriage bolt 38 to facilitate tightening of the screen by means of a nut 38*a* on the outside of the frame side wall 12, without having manual access to the head of bolt 38.

Referring now to FIG. 4, the assembled tightening means readily shows that a tightening of bolt 38 levers or rocks bar 15 about its upper end 23 and forces the apex 26*a* of gripping portion 26 toward wall 12; this action in conjunction with the tightening of bolt 17 and the corresponding of bar 14 (FIG. 2) results in a tensioning of screen 13.

If an angle support 39 is connected to wall 12 (by means not shown) to be used with rail 15, it must be provided with an insulative material 40, which may be a dielectric such as Fiberglas, to prevent electrical contact between screen 13 and angle 39. Insulator 40 may be attached to angle 39 by a flat head bolt 41 which attaches through countersunk hole 42 and lies beneath the upper surface 43 of insulator 40.

Referring now to FIG. 5, the two screens 13 and 13*a* which are series-connected through rail 14 (FIG. 2) must be electrically separated along their adjacent edges to properly effect the desired connection. A support bar 44, preferably of steel, is connected between frame walls 11 and 12 (FIG. 2) to give vertical support to these edges. An insulator strip 45 fits partially around bar 44 and electrically separates the screens 13 and 13*a* from each other and from bar 44. Insulator 45 is preferably a rubber extrusion shaped so that lipped flanges 46 and 47 grip bar 44 and hold the insulator 45 in position. A rib 48 projects from the top surface and provides the electrical separation of the screens 13 and 13*a*, one from the other. Rib 48 should be at least ¼" wide.

The rails 15 and 15*a* must also be electrically separated. This can be accomplished by leaving a sufficient gap between their adjacent ends 49 and 50, or by using an insulative material between ends 49 and 50 (not shown).

By connecting one terminal 7 of the power source 6 to rail 15 and the other terminal 7*a* to rail 15*a*, both of which are highly conductive and completely insulated from the frame and each other, we have the circuit completed through the screens 13 and 13*a* and the frame to which each is grounded. The great surface area of rail 14, together with the frame (wall 11 and those portions not shown), provides ample conduction for the heating current from one screen to the other, but does not consume an undesired amount as would the steel rail alone if insulated from the frame. Therefore, an economical and efficient way is provided to electrically heat series-connected screening.

What is claimed is:

1. An electrically heated series-connected screen apparatus comprising, a metal frame, two screens mounted within said frame in side-by-side relation, a conductor rail electrically connected to said screens at one end thereof, tensioning means connecting said conductor rail to said frame and electrically grounding said rail to said frame, separate conductor rails connected to the opposite ends of said screens, insulative means mounting said separate rails on said frame, insulative means separating said screens, and an electric power source having separate terminals connected to said separate conductor rails.

2. An electrically heated series-connected screening apparatus comprising, a metal frame, two screens mounted within said frame in side-by-side relation, an electrically moderately conductive side rail electrically connected to said screens at one end thereof, tensioning means connecting said rail to said frame and electrically grounding said rail to said frame, separate electrically highly conductive side rails connected to the opposite ends of said screens, tensioning means dielectrically attaching each of said separate rails to said frame, insulative means separating screens, and an electric power source having separate terminals connected to said separate rails.

3. An electrically heated series-connected screening apparatus comprising, a metal frame, two screens mounted within said frame in side-by-side relation, an electrically moderately conductive side rail electrically connected to said screens at one end thereof, tensioning means connecting said rail to said frame and electrically grounding said rail to said frame, separate electrically highly conductive side rails connected to the opposite ends of said screens, said separate rails having one edge portion rockably mounted against said frame, insulative caps on said edge portions of said rails to prevent electrical contact thereof with the frame, tensioning means dielectrically attaching each of said separate rails to said frame, insulative means separating said screens, and an electric power source having separate terminals connected to said separate rails.

4. An electrically heated series-connected screening apparatus comprising, a metal frame, two screens mounted within said frame in side-by-side relation, a moderately conductive side rail electrically connected to said screens at one end thereof, tensioning means connecting said rail to said frame and electrically grounding said rail to said frame, separate electrically highly conductive side rails connected to the opposite ends of said screens, the ends of said separate rails being adjacent, insulative means separating the adjacent ends of said separate rails, said separate rails having one edge portion rockably mounted on said frame, insulative caps on said edge portions of said rails to prevent electrical contact thereof with the frame, tensioning means dielectrically

attaching each of said separate rails to said frame, insulative means separating said screens, and an electric power source having separate terminals connected to said separate rails.

5. An electrically heated series-connected screening apparatus comprising, a metal frame, two screens mounted within said frame in side-by-side relation, a moderately conductive side rail electrically connected to said screens at one end thereof, tensioning means connecting said rail to said frame and electrically grounding said rail to said frame, separate electrically highly conductive side rails connected to the opposite ends of said screens, the ends of said separate rails being adjacent, insulative means separating the adjacent ends of said separate rails, said separate rails having one edge portion rockably mounted on said frame, insulative caps on said edge portions of said separate rails to prevent electrical

contact thereof with the frame, tensioning means dielectrically attaching each of said separate rails to said frame, support means beneath the adjacent ends of said screens, insulation on said support means to electrically separate the screens from said support means and the screens, one from the other, and an electric power source having separate terminals connected to said separate rails.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,080,055 March 5, 1963

La Verne J. Riesbeck

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 54, for "depending" read -- dependent --; column 3, line 7, for "triagular" read -- triangular --; lines 54 and 55, after "corresponding" insert — action --; column 4, line 23, for "screen" read -- screening --; line 44, before "screens" insert -- said --.

Signed and sealed this 24th day of December 1963.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWIN L. REYNOLDS
Acting Commissioner of Patents