

Jan. 30, 1962

L. J. CZERWONKA ETAL

3,018,846

ELECTROSTATIC PRECIPITATORS

Filed March 3, 1958

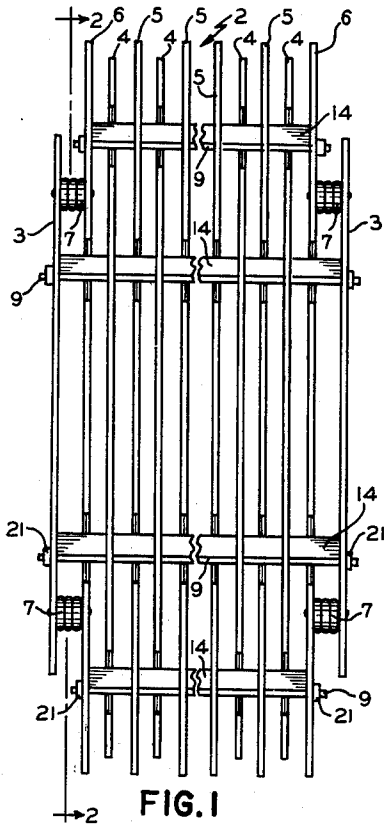


FIG. 1

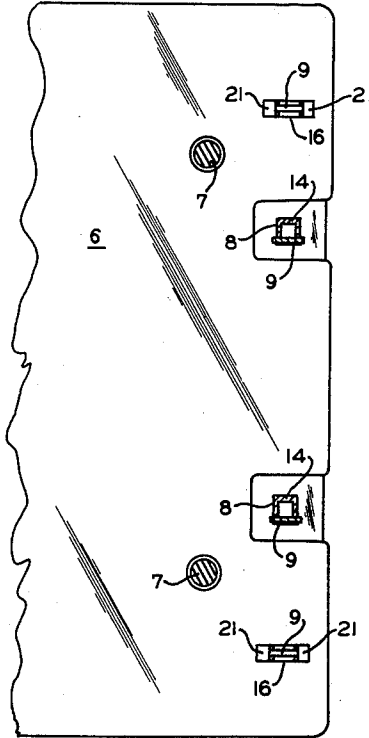


FIG. 2

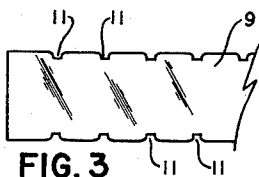


FIG. 3

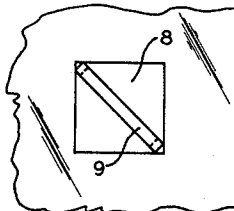


FIG. 4

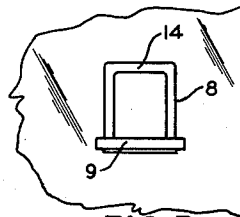


FIG. 5

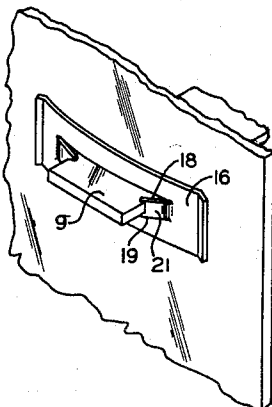


FIG. 6

INVENTORS
RICHARD D. RIVERS
&
LAWRENCE J. CZERWONKA

BY

Ralph S. Brisk
ATTORNEY

1

3,018,846

ELECTROSTATIC PRECIPITATORS

Lawrence J. Czerwinka and Richard D. Rivers, Louisville, Ky., assignors to American Air Filter Company, Inc., Louisville, Ky., a corporation of Delaware

Filed Mar. 3, 1958, Ser. No. 718,646

2 Claims. (Cl. 183—7)

This invention relates to electrostatic precipitators and more particularly to an improved plate electrode assembly for electrostatic precipitators. The present invention comprises a further modification of the improved plate electrode assembly set forth in assignee's co-pending application, Serial Number 718,647, filed March 3, 1958 by Richard D. Rivers.

In this co-pending application it is pointed out that, in electrical precipitators of the type wherein electrostatically charged dust particles are passed into collector chambers, such as in Dahlman Patent No. 2,486,521, it has been the practice to arrange the collector plates into plate electrode assemblies with the plates of the assemblies spaced from each other by individual tubular spacer segments positioned between the plates and supported on rods which pass through openings in the plates.

The present invention, like that set forth in the co-pending application, provides an improved plate electrode assembly which includes all of the desirable features of past electrode assemblies and which, in addition, can be manufactured and assembled more economically, rapidly and efficiently with a minimum of operating steps and with fewer materials. Further, the electrode assembly of the present invention has a construction which assures effective electrode contact, which is light in weight, and which lends itself to ready installation, removal and replacement for cleaning and servicing when the same is necessary.

Various other features of the present invention will become obvious to one skilled in the art upon reading the disclosure set forth hereinafter.

More particularly, the present invention provides an improved plate electrode assembly for an electrostatic precipitator comprising a plurality of plates, the plates having openings therein, flat sheet-like spacer bars extending through the openings, the spacer bars having transverse slots therein into which the plates extend, and key bars extending through the openings to hold the plates in the transverse slots of the flat sheet-like spacer bars and lock the plate assembly into desired position.

It will be obvious to one skilled in the art that various changes can be made in the arrangement, form and construction of the apparatus set forth herein without departing from the scope or spirit of the present invention.

Referring to the drawings:

FIGURE 1 is a partial face elevation of a plate assembly arrangement which embodies the modification of the present invention;

FIGURE 2 is a partial side elevation taken in a plane passing through line 2—2 of FIGURE 1;

FIGURE 3 is a plan view of a portion of a spacer bar, disclosing the transverse slots therein for spacing the plates of an assembly;

FIGURE 4 is a schematic side elevation, disclosing the notched spacer bar inserted into the assembly;

FIGURE 5 is a further schematic side elevation, disclosing the notched spacer bar resting on a side of an opening and a key bar in the form of a channel member inserted in the opening to hold the spacer bar in proper position; and,

FIGURE 6 is a schematic perspective view disclosing

2

a means for fastening the ends of the spacer bar to the end plates of an assembly.

Referring to FIGURES 1 and 2 of the drawings, plate assembly 2, which embodies the present invention, includes charged end plates 3 from which are supported, intermediate thereto, charged plates 4. The charged plates 4 are arranged in spaced parallel relationship to each other and have positioned in alternate arrangement therewith spaced, parallel grounded electrode plates 5. Plates 5 are supported from grounded end plates 6 which, in turn, are attached to the housing of the precipitator (not shown) and which support end plates 3 by means of insulators 7.

One of the principal features of the present invention is the modified structure used for supporting the intermediate electrode plate arrangement from their respective end plates. Referring to FIGURES 3 through 5, details of this modified embodiment of such structure is disclosed. As can be particularly seen in FIGURES 4 and 5, each electrode plate is provided with rectangular support openings 8 therein. It is to be understood that in one advantageous embodiment of the present invention, four such support openings can be provided in each plate. The plates 4 are loaded in a jig for proper parallel spacing and for proper alignment of corresponding support openings. When the plates are properly set in the jig, spacer bars 9 are inserted into aligned sets of openings. As can be seen in FIGURES 4 and 5 of the drawings, the spacer bars 9 are of a flat, sheet-like contour having a breadth slightly less than the distance between diagonally opposite corners of the rectangular opening in order to permit snug diagonal insertion of the spacer bars into the openings 8 (FIGURE 4). Spacer bars 9 are provided with a plurality of spaced transverse slots 11 on either side thereof into which the plates 4 extend to insure proper plate spacing as will be seen hereinafter.

Designed to cooperate with each spacer bar 9 is a key bar 14. The key bars 14 have a U-shaped cross-sectional contour to thus provide a channel type key bar member. With such an arrangement, the key bar is light in weight and can be readily handled during installation and removal, requiring a minimum of orientation.

In assembling the electrode plate structure, spacer bars 9 are positioned at a 45° angle to the horizontal so that they can be inserted into the rectangular openings 8 of the plate. When the transverse slots 11 of the spacer bars are in proper alignment with their respective plates 4, the spacer bars are rotated through a 45° angle into a horizontal position to rest on the sides of the rectangular openings with slots on either side of the bars engaging the plates to insure proper spacing and alignment of such plates. At this point, the easily handled key bar channel type members 14 are passed through the openings to hold the plates in the transverse slots of the spacer bars and to lock the plate assembly into desired position.

To fasten spacer bars 9 to end plates 3 an arrangement is provided wherein the ends of the spacer bars pass through openings in the end plates 3. These end plate openings are of a contour corresponding to the cross-sectional contour of the spacer bars and are so positioned as to permit the ends of the spacer bars to pass snugly therethrough when the spacer bars are in a horizontal or resting position on the sides of the openings 8 of the intermediate plates. Once the ends of spacer bars 9 pass through the openings in the end plates, fastening clips 16 are attached to the ends of the spacer bars. The fastening clips 16 comprise flat plate-like members having disposed therein openings of a breadth slightly less than the breadth of the spacer bars 9. The openings of the clips

3

16 are slitted at 18 and 19 to form spring tabs 21, the inner edges of which tabs 21 clamp against the sides of the spacer bar when it passes therethrough to permit tight passage of the ends of the bar through the openings in the clips and to hold the ends of the bar in place. From this foregoing description it will be obvious to one skilled in the art, that these clips can be easily and readily assembled to the ends of the bars once the ends are passed through the opening in end plates 3.

With the spacer bar and key arrangement above-described, it is possible to assemble the entire electrical plate assembly in a rapid and facilitous manner since both the spacer bars and the key bars are light in weight, can be easily inserted into the openings 8 of the intermediate end plates of the electrode assembly and then can have their ends quickly clipped into position in the end plates 3.

The invention claimed is:

1. A collector plate electrode assembly for an electrostatic precipitator wherein charged particles are removed from a gaseous stream comprising a plurality of plates, said plates having rectangular openings therein, flat, thin sheet-like spacer bars extending through said rectangular openings, said spacer bars having an overall breadth slightly less than the distance between diagonally opposite corners of said rectangular openings to permit snug diagonal insertion of said spacer bars in said openings with the planes determining the flat sheet surfaces of said spacer bars at an angle to the sides of said rectangular openings, said spacer bars having transverse slots therein into which said plates extend when said bars are turned, said slots having sufficient depth to permit said bars to be turned through an angle to rest on the sides of said rectangular openings with the plates extending into the slots of said bars, and thin U-shaped key bars extending through said openings to hold said plates in the transverse slots of said spacer bars and lock the plate assembly into desired position.

2. A collector plate electrode assembly for an electrostatic precipitator wherein charged particles are removed from a gaseous stream comprising end plates, a plurality of intermediate plates between said end plates, said inter-

4

mediate plates having rectangular openings therein, flat sheet-like spacer bars extending through said rectangular openings, said spacer bars having an overall breadth slightly less than the distance between diagonally opposite corners of said rectangular openings to permit snug diagonal insertion of said spacer bars in said openings with the planes determining the flat sheet surfaces of said spacer bars at an angle to the sides of said rectangular openings, said spacer bars having transverse slots therein into which said plates extend when said bars are turned, said slots having sufficient depth to permit said bars to be turned through an angle to rest on the sides of said rectangular openings with the plates extending into the slots of said bars, key bars in the form of lightweight thin U-shaped members extending through said rectangular openings to hold said plates in the transverse slots of said spacer bar and lock the intermediate plate assembly into desired position, said end plates having rectangular openings therein of a contour corresponding to the cross-sectional contour of said spacer bars and positioned to permit the ends of said spacer bars to pass snugly therethrough when resting on the sides of said openings, and fastening clips for the ends of said spacer bars, said fastening clips comprising flat plate members having disposed therein openings of breadth slightly less than the breadth of said spacer bars bounded by spring tab sides to permit tight passage of the ends of said spacer bars therethrough.

References Cited in the file of this patent

UNITED STATES PATENTS

856,131	Canda	June 4, 1907
1,697,316	Horny	Jan. 1, 1929
2,542,262	Richardson	Feb. 20, 1951
2,616,142	Tinnerman	Nov. 4, 1952
2,642,952	Landgraf	June 23, 1953

FOREIGN PATENTS

385,508	Great Britain	Dec. 29, 1932
773,867	France	Sept. 10, 1934
893,555	Germany	Oct. 15, 1953