

[54] METHOD FOR INSTALLING MULTIPLES OF DUST COLLECTOR PLATES

2,542,262	2/1951	Richardson	55/143
2,704,135	3/1955	Marriott et al.	55/154
3,483,669	12/1969	Glaeser et al.	55/112
3,520,111	7/1970	Revell et al.	55/156

[75] Inventors: Bartholomew F. Quintilian, Baltimore; Robert J. W. Williams, Lutherville, both of Md.

Primary Examiner—Bernard Nozick
Attorney—Boyce C. Dent, Oscar B. Brumback and Olin E. Williams

[73] Assignee: Koppers Company, Inc., Pittsburgh, Pa.

[22] Filed: Jan. 25, 1971

[57] ABSTRACT

[21] Appl. No.: 109,323

A plurality of dust collector plates are secured together to form a bundle of such plates. The bundle is introduced into the shell of an electrostatic precipitator. Supports are provided within the shell for supporting the secured bundle of plates, prior to installation, and for supporting the plates after the bundle is unsecured and each plate is installed in its respective position.

[52] U.S. Cl.29/592, 55/112, 55/145, 55/156

[51] Int. Cl.H01s 4/00

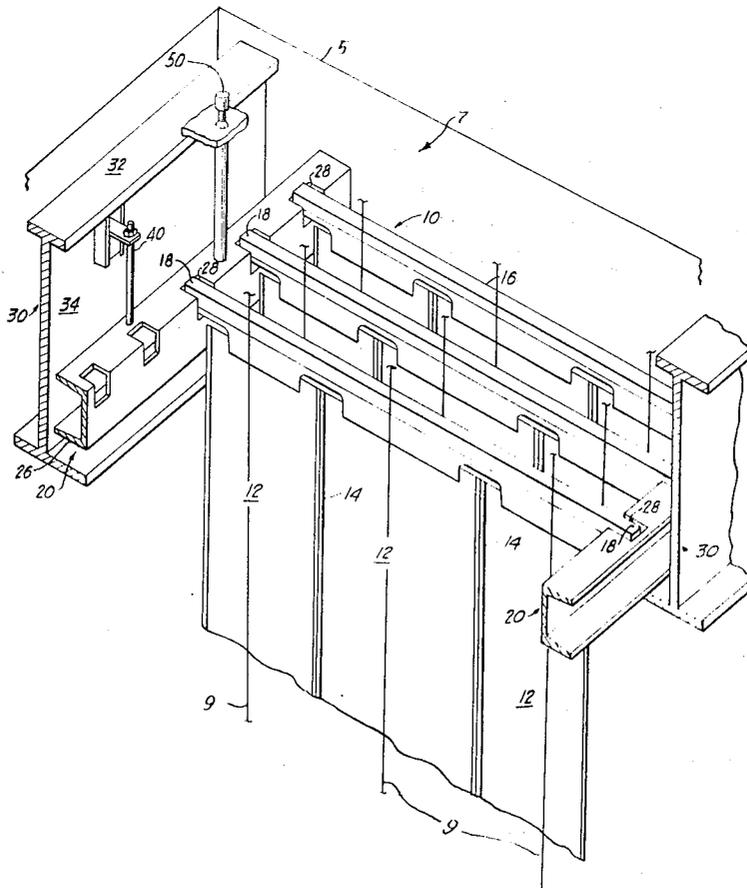
[58] Field of Search55/112, 113-115, 55/149, 148, 140-143, 145, 154-157, 442-444, 440; 29/592; 52/741, 173

[56] References Cited

3 Claims, 9 Drawing Figures

UNITED STATES PATENTS

2,040,378 5/1936 Hedberg et al.55/112



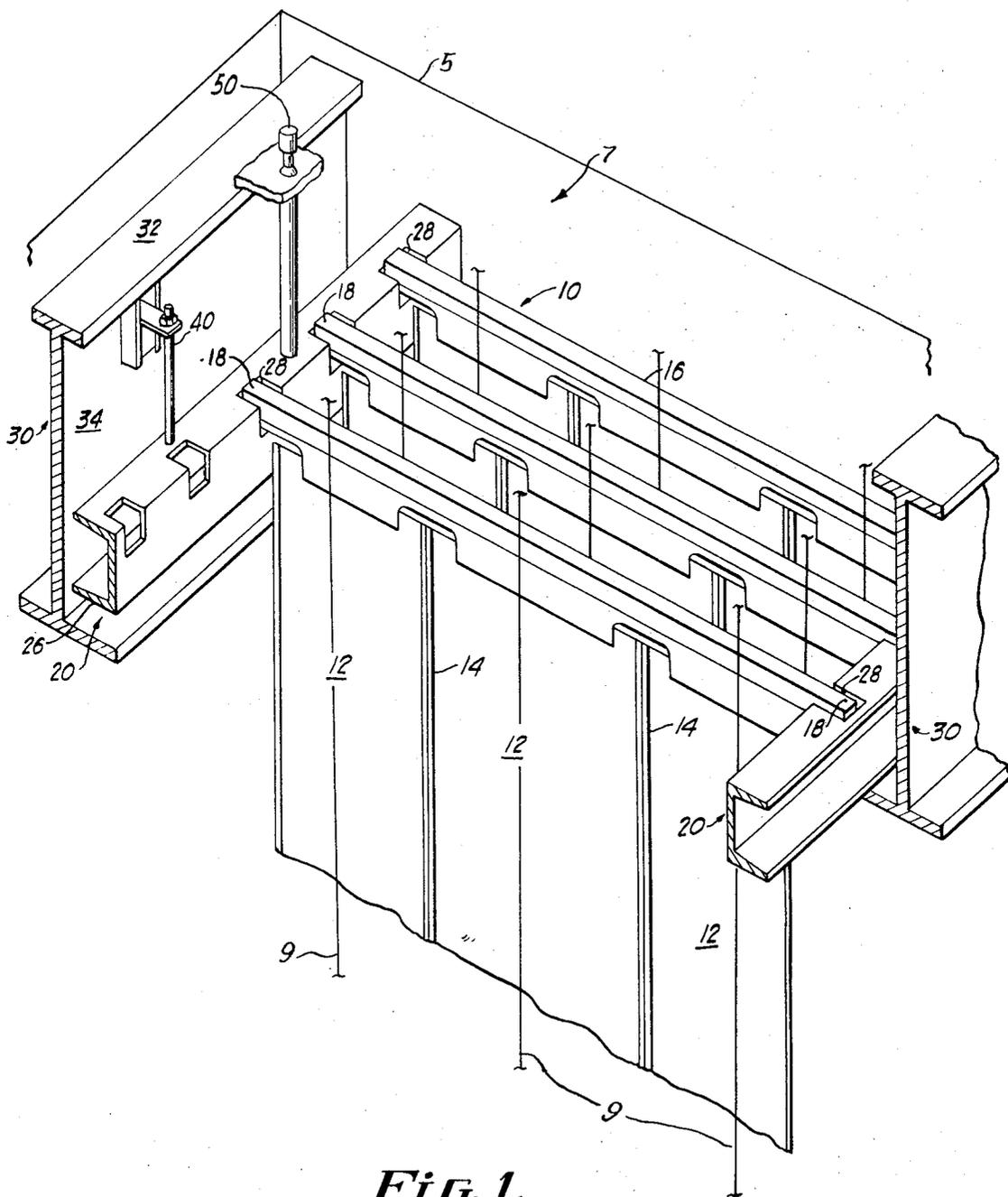


FIG. 1.

INVENTORS.

BARTHOLOMEW F. QUINTILIAN &
ROBERT J.W. WILLIAMS.

BY

Boyer C. Dent
Attorney

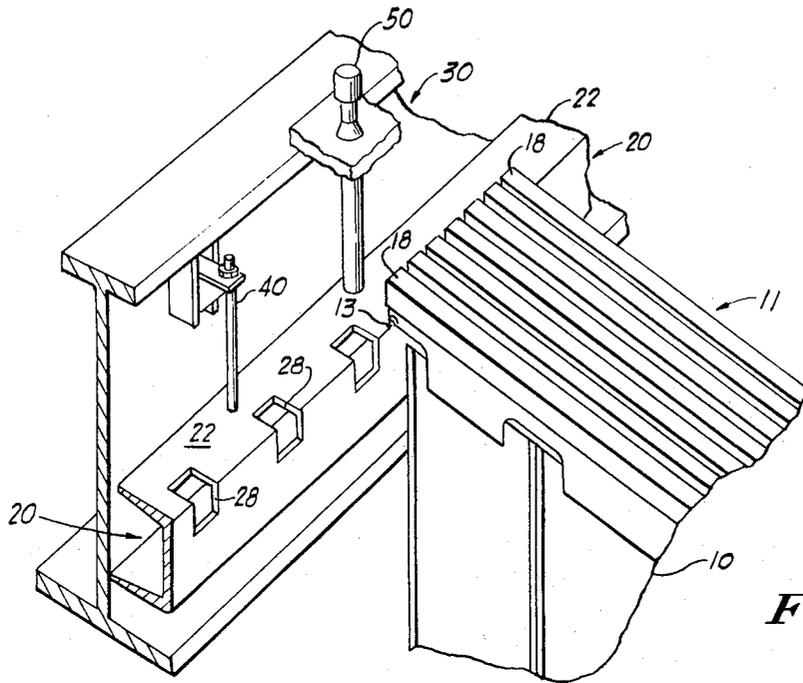


FIG. 2.

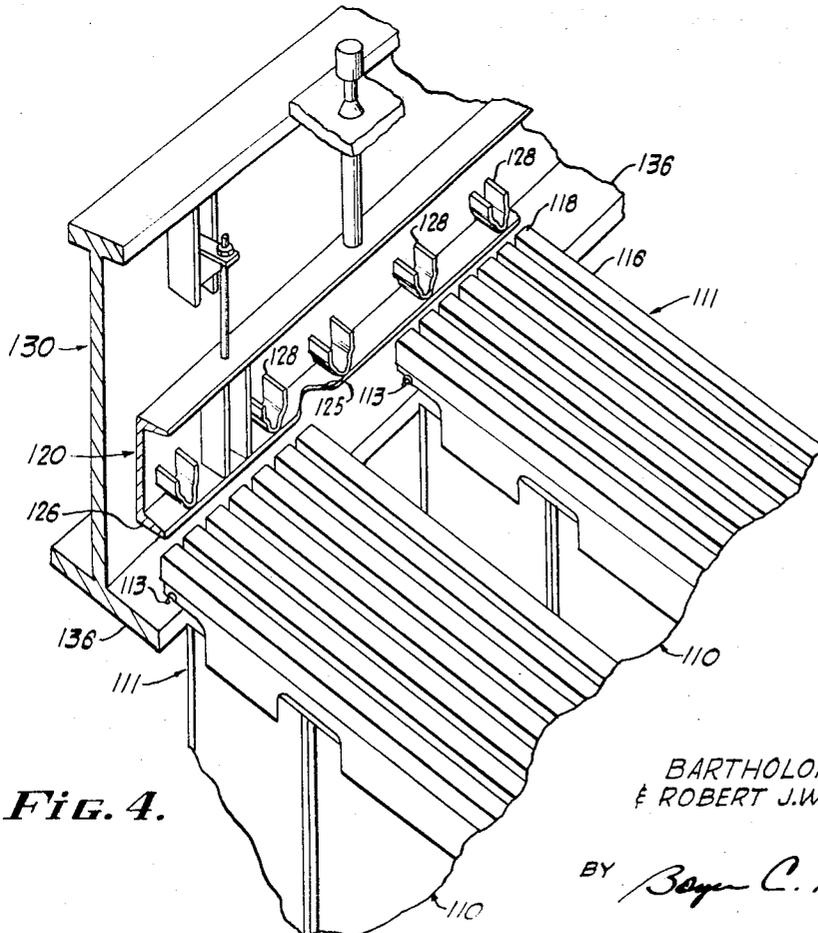


FIG. 4.

INVENTORS.
BARTHOLOMEW F. QUINTILIAN
& ROBERT J.W. WILLIAMS.

BY *Boyer C. Dent*
ATTORNEY

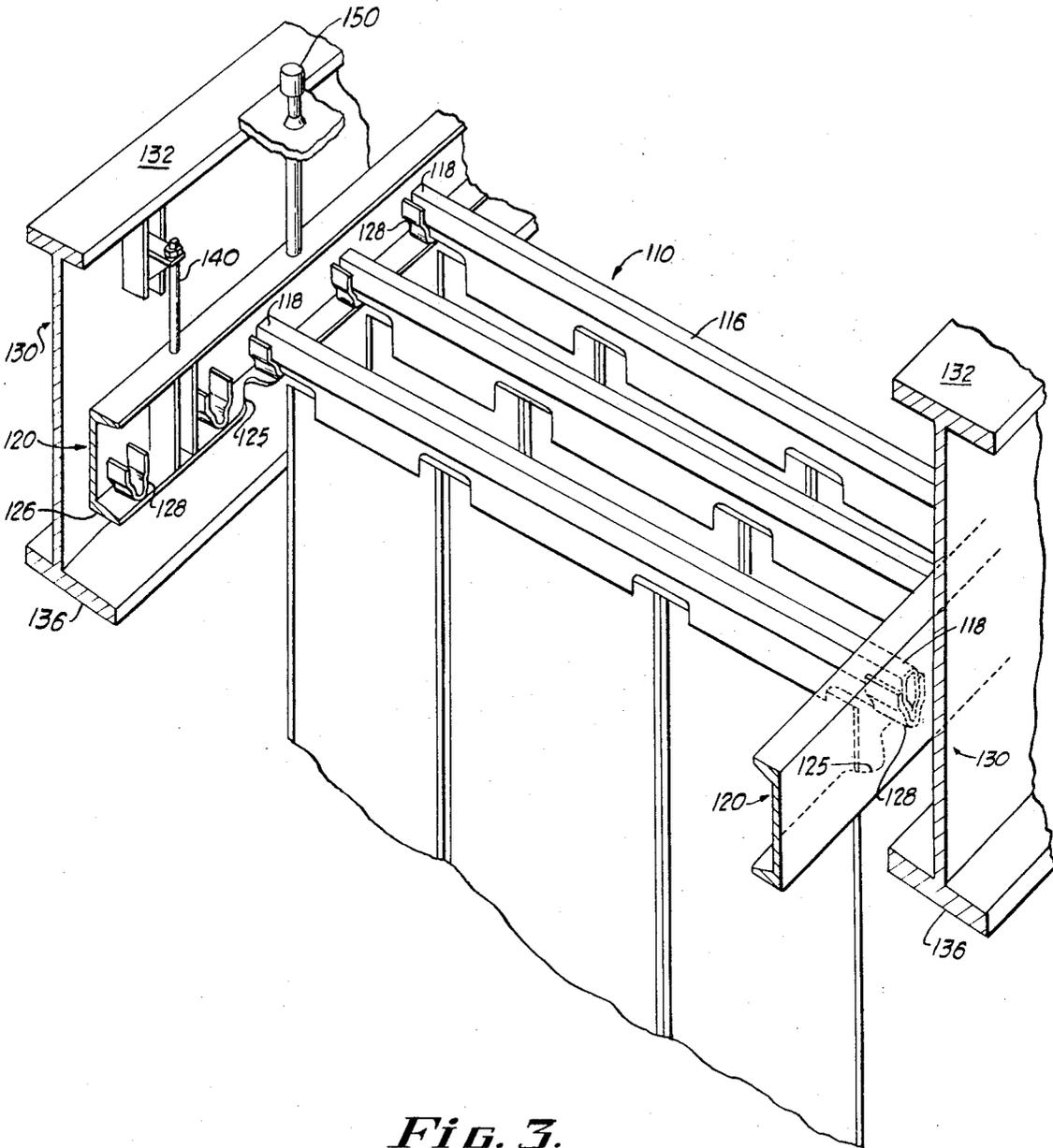


FIG. 3.

INVENTORS.
BARTHOLOMEW F. QUINTILIAN &
ROBERT J.W. WILLIAMS.

BY *Bayan C. Dent*
ATTORNEY

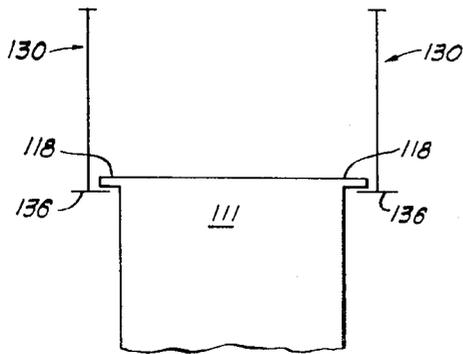


FIG. 7.

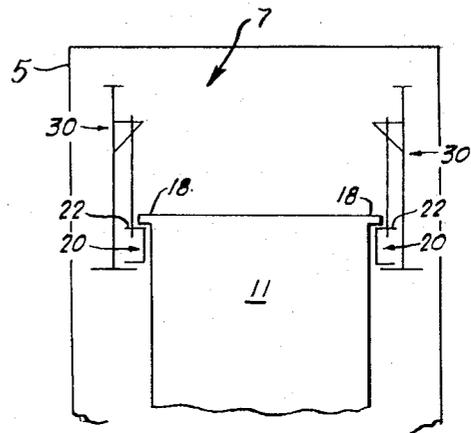


FIG. 5.

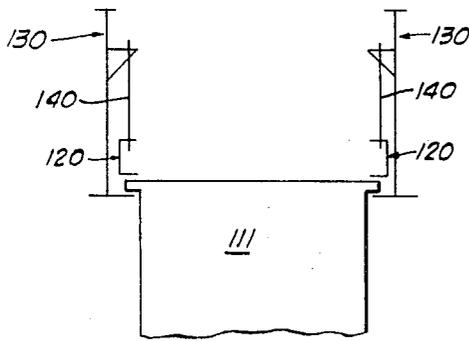


FIG. 8.

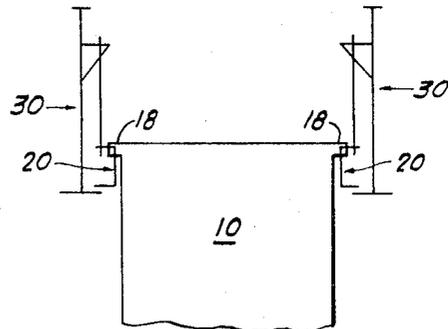


FIG. 6.

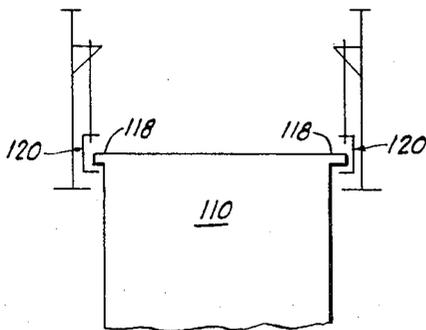


FIG. 9.

INVENTORS
BARTHOLOMEW F. QUINTILIAN &
ROBERT J.W. WILLIAMS.

BY *Raymond C. DeLoof*
ATTORNEY

METHOD FOR INSTALLING MULTIPLES OF DUST COLLECTOR PLATES

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to gas separation devices of the electrostatic precipitator type having specific collector means such as multiple similar elements or sections.

2. Description of the Prior Art

Electrostatic precipitators generally include a shell through which a stream of gas is passed. Various apparatus within the shell, provide for the removal of dust particles from the gas. Such apparatus usually includes support structure in the upper portion of the shell for supporting alternating lanes or rows of discharge electrode wires and dust collector plates. Conventionally, the collector plates include several smaller plate sections joined together to form a modular plate, or, in some instances the plates are large single units which include reinforcing members. The various means used to join the smaller plate sections together also aid in reinforcing the large, elongated and rather cumbersome plates. One such means of joining plate sections together is disclosed in Quintilian et al U.S. Pat. No. 3,418,792.

During installation, a plurality of plates is usually introduced into the precipitator shell by lowering the large plates through the top of the shell until they rest on the ground in a vertical or upright position, or in some cases, until they rest upon a temporary staging area provided near the bottom of the shell. Therefore, the bottom of the plates rest either on the ground or upon the temporary staging area as the plates sit vertically within the shell awaiting installation into their respective positions.

Workmen, inside the shell, install each individual plate by using a hoist to raise each plate vertically upwardly from the ground or the staging area to the individual respective positions provided within the shell. Installation of the plates is tedious, time consuming and expensive. Therefore, an improvement over conventional means for installation of the plates into precipitator shells would be of substantial benefit to the art.

SUMMARY OF THE INVENTION

Accordingly, the present invention contemplates apparatus for introducing a plurality of plates into the shell. The plates are secured together to form a bundle which is suspended from supports which also provide support for each individual plate when installed in its respective position.

Each plate includes a horizontal reinforcing member attached along its top edge. The reinforcing member has opposed end portions extending beyond the widths of the plates. The extending portions are adapted to engage opposed support members provided near the top of the shell.

Each bundle comprises several plates arranged in single file and secured together so that a frontal view of the bundle will reveal only a single plate. The width dimensions of a bundle are substantially the same as the width dimensions of an individual plate.

Therefore, the plates are suspended within the shell both in bundle form and individually due to the engagement of the extending portions of the plates and the op-

posed support members of the shell. When the bundle is suspended within the shell, workmen remove the securing means from the bundle and each plate is installed in its respective position within the shell. Installation, therefore, requires moving the individual plates a relatively short distance from the bundle support position to the individual plate support position.

In the preferred embodiment, support means may be provided for supporting the plates both in bundle form and individually in their respective positions. The bundle is initially supported on the same support which provides individual positioning means for each plate.

In an alternate embodiment, a bundle is introduced into the shell and supported on a main support. Subsequently, a plate support is installed within the shell. The securing means are then removed from the bundle and each individual plate is installed in its respective position provided along the plate support.

A method for installing a plurality of plates in the precipitator shell includes introducing a secured bundle of the plates into the shell and supporting the bundle prior to installation. The securing means are removed to permit the movement of each individual plate which is then installed in its respective position.

In this manner, the need for hoisting each plate from the ground or from a temporary staging area is avoided and installation does not involve the movement of individual plates over a substantial distance.

The above and further objects and novel features of the invention will appear more fully from the following detailed description when the same is read in connection with the accompanying drawings. It is to be expressly understood, however, that the drawings are not intended as a definition of the invention but are for the purpose of illustration only.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partial perspective view illustrating the preferred embodiment for supporting collector plates within a precipitator shell;

FIG. 2 is a partial perspective view of the preferred embodiment illustrating bundles being supported prior to being installed in their individual respective positions;

FIG. 3 is a partial perspective view illustrating an alternate embodiment for supporting collector plates within a precipitator shell;

FIG. 4 is a partial perspective view illustrating bundles being supported by main supports prior to the installation of each individual plate;

FIG. 5 is a graphical representation of the preferred embodiment illustrating a bundle of plates supported within a precipitator shell prior to installation;

FIG. 6 is a graphical representation of the preferred embodiment illustrating the support of FIG. 5 and an individual plate installed in its respective position;

FIG. 7 is a graphical representation of an alternate embodiment illustrating a bundle of plates supported by main supports within the precipitator shell prior to installation;

FIG. 8 is a graphical representation illustrating the bundle and main supports of FIG. 7 and the subsequent installation of plate supports; and

FIG. 9 is a graphical representation illustrating the main supports and plate supports of FIG. 8 and an in-

dividual plate installed in its respective position along the plate supports.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Bundles of plates generally designated by numeral 11, FIG. 2, comprise a plurality of collector plates secured together and introduced into a precipitator shell 5. Plate supports, generally designated 20, support bundle 11 within the precipitator shell. After the securing means 13 are removed from the bundles, the plates may be individually moved for installation to their respective positions provided along supports 20, see FIG. 1 thereafter, discharge electrode wires 9 are installed in the customary manner.

Numeral 10, FIG. 1, generally designates collector plates supported in their individual positions in the preferred embodiment. Horizontal reinforcing members 16 engage individual receptacles 28 provided along plate supports 20 which are secured to the main supports, generally designated 30, by rods 40. Rappers 50 impart rapid vibrations to plate supports 20. Vibrations are transmitted to plates 10 to loosen dust particles collected by the plates.

FIGS. 5 and 6 graphically illustrate the sequence used in the installation of plates in the preferred embodiment of FIGS. 1 and 2. A bundle 11 of plates 10 is introduced into a shell 5 and supported by plate supports 20, see FIGS. 2 and 5. The securing means are then removed from each bundle and the individual plates 10 are installed in their respective positions along plate supports 20, see FIGS. 1 and 6.

The preferred method of installing plates 10 in the precipitator includes introducing secured bundle 11 into the shell; supporting bundle 11 within the shell; removing securing means 13 from bundle 11 to permit each individual plate 10 to be moved for installation; and installing each plate 10 in its respective position along the plate supports.

An alternate embodiment shows collector plates generally designated 110 in FIG. 3, supported in their individual positions. Horizontal reinforcing members 116 engage individual receptacles 128 provided along plate supports generally designated 120 which are secured to main supports, generally designated 130, by rods 140. Rappers 150 impart vibrations to plate supports 120 in the manner previously described.

Bundles of plates generally designated 111, FIG. 4 comprise a plurality of collector plates secured together and introduced into a precipitator shell. Main supports generally designated 130 support bundle 111 within the precipitator shell. After the securing means 113 are removed from the bundles, the plates are individually moved from main supports 130 through slots 125 and placed into their respective positions along plate supports 120. Slots 125, FIG. 3, provided to accommodate extended portions 118 of reinforcing members 116, permit plates 110 to be moved from the bundle support position along main supports 130 to their respective positions along plate supports 120.

FIGS. 7, 8 and 9 graphically illustrate the sequence used in installing the plates in the alternate embodiment of FIGS. 3 and 4. A bundle 111 of plates 110 is introduced into a shell and supported by flanges 136 of main supports 130, see FIG. 7. Subsequently, plate sup-

ports 120 are affixed to main supports 130, see FIG. 8. The securing means are then removed from each bundle and the individual plates 110 are installed in their respective positions along plate supports 120, see FIG. 9.

The alternate method of installing plates 110 in the precipitator includes introducing secured bundle 111, FIG. 4, into the shell; supporting bundle 111 by main supports 130; installing plate supports 120 within the shell; removing the securing means 113 from bundle 111 to permit each individual plate 110 to be moved for installation; and installing plates 110 in their respective positions provided along supports 120.

Collector plates 10, FIG. 1, may be either reinforced unitary plates or they may comprise several smaller plate sections joined together to form a modular plate. Preferably, plates 10 include plate sections 12 joined together by reinforcing members 14. At the top of each modular plate 10, as shown in the drawings, is a horizontal reinforcing member 16 including opposed, end portions 18 which may extend equally beyond the width of each plate 10.

Main supports 30 comprise opposed I beams or girders and are part of the main structural supports provided near the top of the precipitator shell for supporting the electrode systems associated with the precipitator.

Plate supports 20 include opposed channels affixed to first supports 30 by any desirable means including, for example, suspending channels 20 by rods 40 which may be attached to upper flange 32 of support 30 by means well-known in the art. However, if desired, channels 20 may be welded to web 34 of support 30.

Receptacles 28 comprising slots notched out of support 20, are provided at preselected intervals along supports 20 and are adapted to receive extended portions 18 for suspending plates 10 from the upper portion of the precipitator shell. If desired, equivalent receptacles and extended portions having slightly different configurations may be used rather than those shown in the drawings; the principal function being to suspend plates 10 from the upper portion of the precipitator shell.

Rapper 50 imparts rapid vibrations to channel 20. The vibrations are transmitted to plates 10 to loosen the collected dust particles during activation of the electrode system as is well-known in the art.

Bundles 11 of plates 10 are secured together in a single file arrangement as shown in FIG. 2. Preferably, bolts 13 may be placed through holes provided in the extended portions 18 at opposite sides of plates 10. However, if desired, securing means for the bundles may include other bolts, clamps, steel straps, or any combination of them.

When the bundles are initially introduced into the shell, usually by lowering them through the open top 7, they are arranged so that extended end portions 18, engage the upper flange 22 of opposed plate supports 20, FIG. 2. In this manner, the plates are suspended within the shell along plate supports 20 in close proximity to their respective positions as represented by receptacles 28 recessed within supports 20. When all of the bundles are in place, securing means 13, or the like, may be removed and each individual plate may be moved from its position along flange 22 and into its respective posi-

tion accomplished by the engagement of extended portions 18 and receptacles 28, see FIGS. 1 and 2.

For example, referring now to FIGS. 5 and 6, it is graphically shown that a bundle 11 may be supported by opposed supports 20 due to extended portions 18 engaging upper flanges 22, FIG. 5. After the securing means are removed, each individual plate 10 may be moved along support 20 and installed in its respective position. Receptacles 28 receive corresponding extended portions 18 of plates 10. Thus, plates 10 are supported along supports 20 either individually or in bundles.

Alternately, in FIG. 3, utilizing substantially the same environment as shown in FIG. 1 including main support 130, connecting rods 140 and rappers 150, modified support 120 may be used instead of support 20. Support 120, as shown, represents a channel principally supported by first support 130. However, receptacles 128 are adapted to be superimposed upon support 120 rather than recessed within it such as receptacles 28 relative to support 20. In this manner, when the bundles are initially introduced into the shell, usually by lowering them through the open top 7, they are arranged so that the extended end portions 118, engage the opposed bottom flanges 136 of supports 130, FIG. 4. Therefore, the bundles are suspended within the shell in close proximity to their respective positions along supports 120 as represented by receptacles 128. When all of the bundles are in place, the securing means 113, or the like, may be removed and each individual plate may be moved from its position along flange 136 of main support 130, through openings 125 provided in bottom flange 126 of plate supports 120, and into its respective positions to be engaged by receptacles 128, see FIGS. 3 and 4.

Referring now to FIGS. 7, 8 and 9, it can be seen graphically that when a bundle 111 is lowered into the

shell, extended portions 118 engage the bottom flange 136 of main support 130, FIG. 7. Subsequently, plate supports 120 are installed and affixed to main supports 130 by rods 140 or the like, FIG. 8. Finally, after the securing means have been removed from the bundles, the individual plates are moved to their respective positions along plate supports 120, FIG. 9. Receptacles 128 receive corresponding extended portions 118 of plates 110, better shown in FIG. 3.

It can be seen from the foregoing, when used in accordance with the methods described therein, that a substantial improvement is advantageously represented over conventional means for installing collector plates into precipitator shells.

Having thus described the invention in its best embodiment and mode of operation, that which is desired to be claimed by Letters Patent is:

1. A method of installing collector electrode plates in an electrostatic precipitator comprising:
 - forming a bundle of said plates secured in side-by-side contiguous positions;
 - supporting said bundle within said precipitator;
 - removing a bundle securing means from said bundle; and thereafter
 - separating each of said plates from said bundle to an operating position within said precipitator.
2. The method of claim 1 and in addition:
 - inserting support means on each of said plates into receptacles for receiving said support means.
3. The method of claim 1 wherein supporting said bundle comprises:
 - supporting said bundle at a first level within said precipitator; and
 - separating each of said plates comprises:
 - separating each of said plates from said bundle and raising the same to an operating position above said first level.

* * * * *

40

45

50

55

60

65