This invention concerns a conveyor chute comprising a housing, an upper box section and a lower box section, separated by an air permeable partition whose edges are clamped together with and between outwardly projected flanges of the upper and lower box sections.
PNEUMATIC CONVEYER CHUTE

CROSS REFERENCE TO RELATED APPLICATION

The priority of the corresponding German Pat. Application: P 2,021,493.1 filed May 2, 1970 is claimed under the convention.

BACKGROUND OF THE INVENTION

1. Field of the Invention
The design construction and assembly of pneumatic conveyors for conveying solid fluid comminuted materials in suspension, having along its ducts means for com mingling them with air, so as to keep them in suspension during their transportation through the chute.

2. Description of the Prior Art
In the commonly known structures of pneumatic conveyor ducts, partitions, and their components; assembly and installation is generally effected by bolting together with bolts or screws, riveting or extensive welding. The manufacture and assembly and cleaning of the partitions and ducts is often complicated, time consuming, and expensive. The prior art most pertinent is represented by U.S. Pat. No. 2,527,488 to H.R. Schemm, issued Apr. 10, 1950 (class 302-29) which employs two separate boxes and bolts them together with the partition.

SUMMARY OF THE INVENTION
Among the primary objects of the invention are: to avoid the expensive methods of the prior art of manufacturing, assembling, installing and cleaning conveyors chutes and their component upper and lower box sections and air permeable partitions;

to provide the conveyor chute of the invention with an air-permeable partition, which can be mounted as dividing wall between the upper and lower box sections securely and leak-proof, dismounted for cleaning and repair services easily and quickly;

to provide the upper and lower box sections with outwardly projecting flanges and with outer spring clamps mating with the outer flanges, to hold the edges of the partitions removably within the flanges, and optionally to provide the above means in combination with an additional partition bearing body, mating with inside of the flanges and permitting easy and quick permanent welding thereof with the chute into an integral unit;

Optionally to provide the above means in combination with a chute having its wall open alongside the flanges, the opposite flanges forming a U form body and prestrained into a straddled position of its U legs in crosssection prior to assembly, whereby after one edge of the partition is inserted into this open U body, the opposite flanges are simply brought together with the opposite edge of the partition between them, and clamped into position;

optionally to provide the upper and lower box sections separated along their flanges, the flanges provided with cooperating means to snap them together with the partition into assembly;

optionally to provide the spring clamps as H bars, with one side thereof acting as the clamping means of the partition and of the flanges, and the opposite outward side functioning as a spreader, when a wedge is driven there into.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a basic embodiment of the invention in its simplest form, employing outwardly projecting flanges functioning simultaneously as the partition bearing means and means to hold the partition securely and in a leak-proof position;

FIG. 2 is a perspective view similar to that of FIG. 1 with the partition clamped into place;

FIG. 3 is an optional variation of the embodiment shown in FIG. 1, having the flanges longitudinally separated, whereby one set of the flanges, the upper or the lower, simultaneously function as spring clamps, integral with the respective walls of the chute;

FIG. 4 is a view similar to that of FIG. 3, showing the flanges longitudinally separated and provided with external spring clamps, holding the two sets of flanges with the edges of the partition between them clamped into position.

FIG. 5 is a view similar to that of FIG. 4, showing a modification of the clamping member;

FIG. 6 is a modification of the embodiment of FIG. 4, showing an intermediate insert between the outer flanges provided with clamping means to join them into position for welding without any subsequent adjusting;

FIG. 7 is a view similar to that of FIG. 1, showing the cross-sectional shape thereof in a different geometrical form to emphasize that a particular shape configuration is not essential to the spirit and scope of this invention;

FIG. 8 is an optional improvement over the embodiment shown in FIGS. 1 to 7, showing the chute box and partition in perspective view in partial assembly;

FIG. 9 is a view same as that of FIG. 8, showing the assembly completed; only one of different shapes of clamps is shown in FIG. 9 it is obvious and anticipated that different type shapes of the clamping means may be substituted;

FIG. 10 is a view similar to that of FIG. 3, showing a different embodiment of the clamping means;

While only a single type of clamping means has been shown with reference to each above Figure of the drawings, it is to be understood, that either side of the upper and lower box chute combination may be provided with a clamping means different from the other side and selected and interchanged among the other embodiments, shown in the remaining Figures.

FIGS. 11, 12 and 13 show in perspective and geometric views different embodiments of chute connections similar to FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 shows a piece construction of the conveyor chute. The opposing walls have, between the upper and lower box section area, a U form like outward projection comprising sides 2,3, and connection 4, which are crimped together, so that at locations 5 there exists a space, which after insertion of the air permeable partition, is increased to effect positive clamping of said partition. (see also FIG. 2). Said partition may, for example, be constructed of a perforated sheet metal plate superimposed by a permeable textile material. It should be understood, that said partition may also comprise, for example, a permeable ceramic or synthetic plastic sheet like material, or a stiff, sheet-like air permeable textile material.
In another embodiment of the invention, the outwardly formed flanges of the two box sections, together with the edges of the air permeable partition, are clamped together by a U form like clamp rail. To secure the position of the clamp rail against accidental shock forces, it may be held in place, for example, by bolts or screws, which serve no function in clamping. Said bolts or screws may, however, optionally aid in the clamping function.

The clamp rail may, for example, comprise a tube slotted on one side. The width of the slot may be narrower than the combined thickness of the two flanges of the upper and lower box sections plus the thickness of the air permeable partition, so that the spring action of the slotted tube will effect the proper clamping pressure when assembled; or said tube may be cramped together at assembly.

In another embodiment of the invention, the upper and lower box sections of the conveyor chute are formed as a single piece. In the area of transition from the upper to the lower box section, a U form like projection is formed outwardly, whose sides are the flanges, which serve to clamp the edges of the air permeable partition. In practical and suitable lengths of such formed conveyor chutes the air permeable partition may be inserted longitudinally in such arrangement; the opening of the U form like projection may be narrower than the thickness of the air permeable partition and is spread apart by suitable means, such as a wedge, while said partition is inserted, and then released, to clamp said partition securely; or the U form like projection may be wide enough to receive said partition and then is cramped together by suitable means such as pliers to clamp said partition leak proof and securely.

Similar in principle is still another embodiment of the invention, where the crosssection of the U form like flanges of either the upper or the lower box section envelops the single flange of the respective opposite box section and the edges of the air permeable partition. Here again the U form like flanges may be so constructed and preformed to clamp the edges of said partition and the respective single flange with a springlike action or may be cramped together after insertion of said partition and the respective single flange to clamp them in a leak proof and secure manner.

In another embodiment of the invention the flanges of the upper and lower box section and the edges of the air permeable partition are held together and clamped securely by a spring clamp rail of the following construction: the profile of the clamp rail resembles an "H." One open side of said rail receives the flanges of the upper and lower box sections and the edges of the air permeable partition. Into the opposite open side of the H section a spreader bar is inserted, which narrows the space on the opposite side and effects the clamping. Of course, it is understood that the two sides of the H section are stiffer than the center connecting member. A clamping rail of this latter design is easier to assemble than those, with only a single clamping slot, because after inserting said flanges and edges of said partition to be clamped into one side of the "H" section clamp rail, the spreading member can be inserted simply between the opposite sides of the H section, and thus positively clamping said flanges.

In a variation of the above embodiment the clamp rail is made up of shorter sections, clamping said flanges in the same manner as above.

In another variation of the above embodiment, the "H" type clamp rail may be constructed of several pieces where the center section is rigidly connected with one side of the "H" section and where the other long side of the H section is connected hingelike, and where the center section is of suitable strength to sustain the tension which develops during the clamping.

The invention also includes an embodiment where the opposing edges of the air permeable partition are clamped in U form like rails, which are welded together at assembly with the flange edges of the upper and lower box sections. The configurations of the three elements, namely the U form like rails and the upper and lower flanges are so selected and designed that only one welding seam on each side of the conveyor chute is required to unite all three elements to form a secure and leak proof assembly. In this assembly, for example, the U form like rail may be formed to have one edge which projects outwardly to match up with the flanged edges of the upper and lower box sections to be joined in welding. The flange edge of the lower box section is preferably formed with an extended width and after insertion of the air permeable partition is cramped into a groove of the U form like rails. Said rails and the flanges of the upper and lower box section are shaped to coincide and cause proper alignment at assembly without further adjustment and fitting.

The pneumatic conveyor chute according to the invention does not only have the advantage of easy assembly and installation, but also the methods of manufacture are simple and economical.

The premise for the manufacture of the pneumatic conveyor chute is economically long sections according to this invention is that adjacent sections which may be cut to length at time of installation may be connected without flanges by means of suitably grooved connectors. These frame like connectors may be constructed in every embodiment shown in the manner illustrated, for instance, in FIG. 2. A specific optional construction available is shown in FIGS. II-IV of the German patent application P 20 078244. Said frame like connectors contain grooves in opposing sides to receive the trough ends of the upper and lower box sections, their flanges and also the end projections of the lower air permeable partition. The conveyor upper and lower trough sections may be connected to said connector by means of adhesives for example. Further, said adjacent conveyor trough sections may be connected with each other by said connectors and in addition by other positive means, for example, overlapping flanges which will relieve the stresses on said connectors.

In another embodiment according to the invention said connectors may be produced of comparatively soft synthetic materials, which for reason of their softness effect a leak proof and tight connection of the adjacent said conveyor trough ends.

In another embodiment, several different embodiments of the flange connections and clamps may be applied in the construction of a pneumatic conveyor chute, according to the invention. For example, flange connection and clamping according to FIGS. 1 and 2 may be applied to one side, and clamping and connecting according to FIGS. 5 and 6 may be applied to the
other side of the conveyor trough, or a customary bolt type assembly and connection method may be used on one or the other side.

As an embodiment, for example, the flange 2 and 3 according to FIG. 1, formed on one side only, may be opened in such a manner, that the walls may be angularly disposed to each other, for easy insertion of partition 6 and 7 of FIG. 2, and flanges 11 and 12 on the opposite side may be formed according to FIG. 5. When bending the sides of the two box sections together, flanges 2 and 3 are brought together, effecting the desired clamping. After this, the open side can be fastened together for example according to FIGS. 4 and 5 or by other known methods, such as by intermittent welding or bolting.

FIG. 7 shows an embodiment of the invention where the conveyor chute is of essentially circular configuration and where U form like outward projections on opposing sides are means to hold the clamp said air permeable partition. It can be readily understood that the outwardly U like projection may also be constructed as shown in FIGS. 3, 4, 5, & 6 to hold said air permeable partition.

FIGS. 8 and 9 illustrate an embodiment of the conveyor chute according to this invention where the upper and lower sector are of one piece, open on one side, construction, but where the walls of the chute are angularly disposed to each other, as shown in FIG. 8, for easy insertion of said air permeable partition, and where after insertion of said partition said open side is closed, clamping said partition securely in place as shown in FIG. 9.

It is readily discernable that the flange configuration and clamping means on the open side of FIGS. 8-9 may also be in accordance with FIGS. 3, 5, and 6.

FIG. 10 shows still another embodiment of the invention where the assembly of the conveyor chute is effected by a snap lock action of one of the flanges of the conveyor chute.

We claim:

1. An air conveyor channel assembly comprising in combination:
   a caisson-like, closed channel profile of substantially rectangular cross section which includes two side walls, a top wall and a bottom wall;
   two generally U-shaped, laterally outwardly protruding groove profiles in the side walls in horizontal alignment with each other;
   an air-permeable, horizontal partition panel so arranged inside the channel profile that its longitudinal edge portions are received inside the groove profiles, thereby subdividing the channel space into an upper channel compartment and a lower channel compartment; and
   a resilient deformation in each of the two U-shaped groove profiles in the sense of a vertical closing action of the flanks of the groove against the upper and lower surfaces of the edge portions of the partition panel so as to provide a substantially evenly distributed clamping pressure along the edge portions of the partition panels.

2. An air conveyor channel assembly comprising in combination:
   an upper channel portion in the general shape of an inverted "U";
   a lower channel portion in the shape of an upright "U," facing the upper channel portion and cooperating with the latter to define a substantially rectangular, closed channel profile;
   an air permeable, horizontal partition panel so arranged between the upper and lower channel portions that its longitudinal edge portions form an overlap with the side walls of the channel portions, thereby subdividing the overall channel space into the upper channel compartment inside the upper channel portion and a lower channel compartment inside the lower channel portion; and
   a flange interlock between the cooperating side walls of the upper and lower channel portions in the area of the partition panel overlap portions which includes, on each side of the channel profile:
   an outwardly extending, substantially horizontal longitudinal flange on one of the cooperating channel portion side walls corresponding in width approximately to the partition panel overlap; and
   a generally C-shaped, outwardly protruding longitudinal profile portion on the other cooperating channel portion side wall, the C-shaped profile portion including, in succession, a first horizontal leg which extends from the side wall, an outer vertical leg, and a second horizontal leg, the latter being so arranged that the partition panel overlap portion and the flange of the first cooperating channel portion side wall are received between the two legs of the C-shaped profile portion with a vertical clamping action against said overlap portion and flange which provides a substantially evenly distributed clamping pressure along the length of the channel profile.

3. An air conveyor channel assembly comprising in combination:
   an upper channel portion in the general shape of an inverted "U";
   a lower channel portion in the shape of an upright "U," facing the upper channel portion and cooperating with the latter to define a substantially rectangular, closed channel profile;
   an air-permeable, horizontal partition panel so arranged between the upper and lower channel portions that its longitudinal edge portions form an overlap with the side walls of the channel portions, thereby subdividing the overall channel space into an upper channel compartment inside the upper channel portion and a lower channel compartment inside the lower channel portion;
   an outwardly extending, substantially horizontal flange on each of the channel portion side walls, the flange width corresponding approximately to the partition panel overlap; and
   a clamping member extending along the length of the conveyor channel and engaging the flanges of cooperating channel portion side walls in the manner of a continuous C-clamp, thereby exerting a vertical clamping action against said flanges and against the partition panel overlap portions received therebetween which provides a substantially evenly distributed clamping pressure along the length of the conveyor channel.

* * * * *