Dec. 1, 1964 D. BUCCICONE 3,159,398

SHEET PILER WITH AIR FLOW SIDE GUIDES

Filed Jan. 22, 1962 2 Sheets-Sheet 1

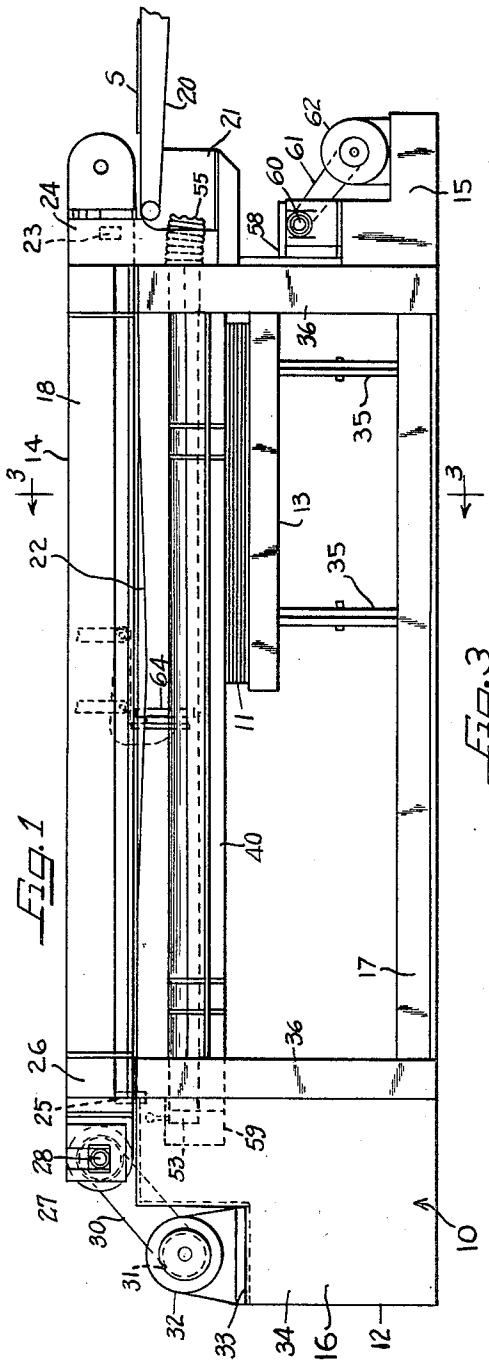


Fig. 1

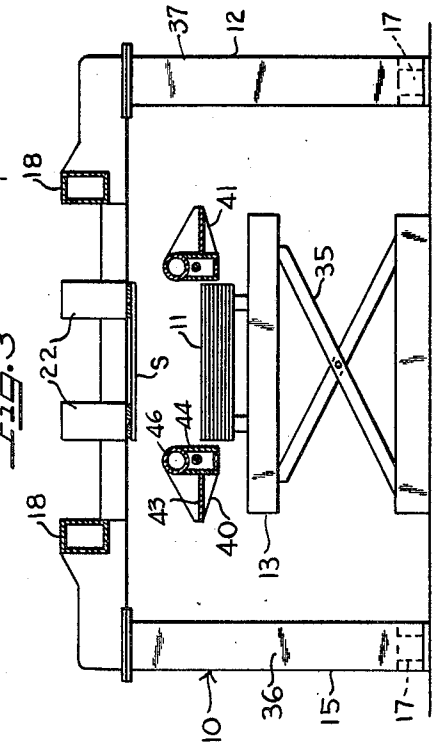


Fig. 3

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Fig. 2

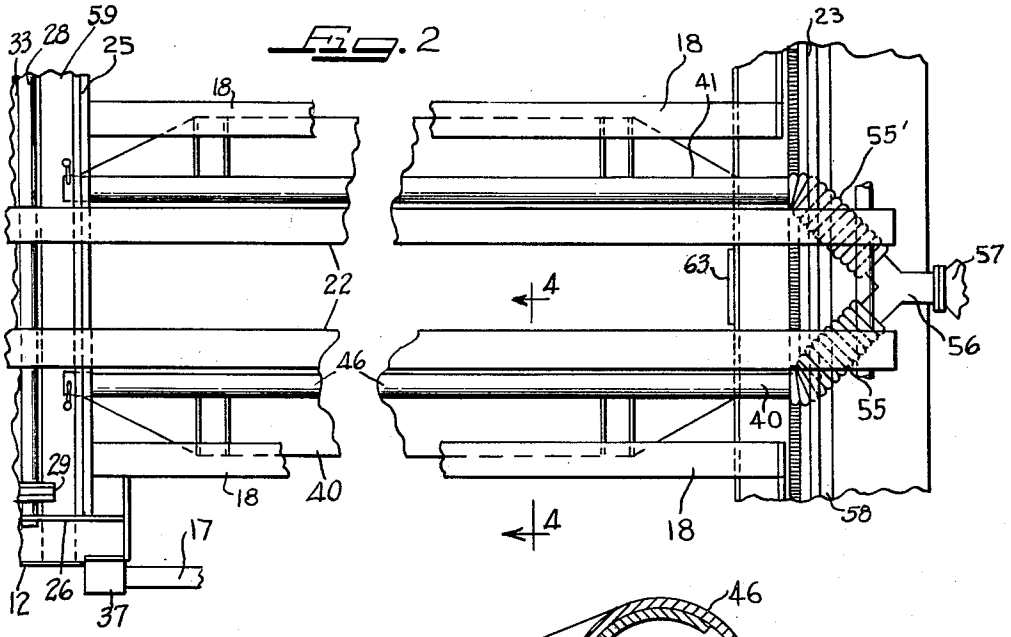


Fig. 4

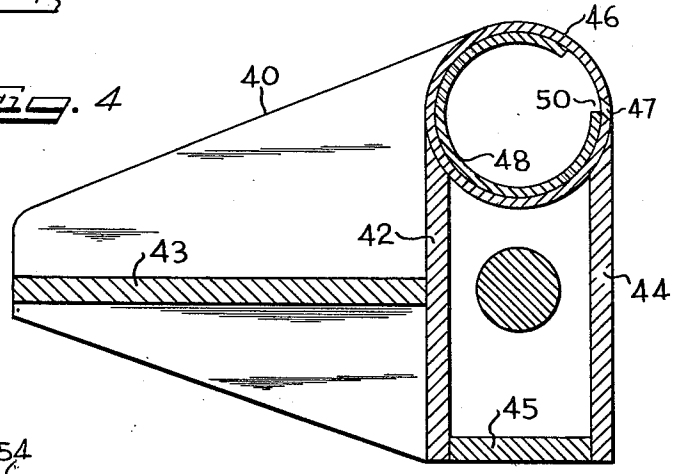


Fig. 5

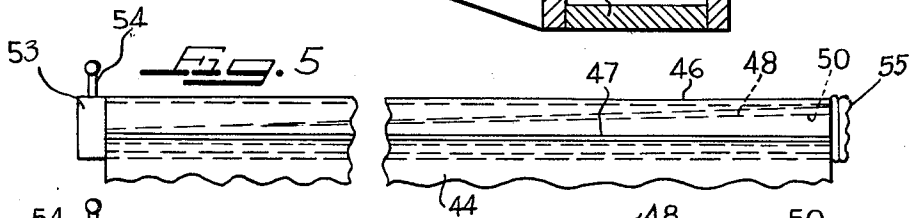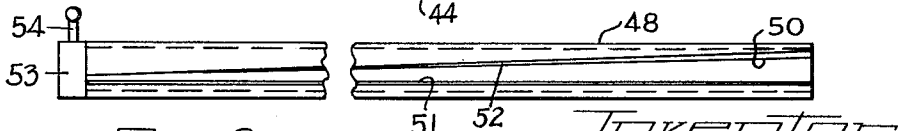


Fig. 6



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SHEET PILER WITH AIR FLOW SIDE GUIDES

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Filed Jan. 22, 1962, Ser. No. 167,663
6 Claims. (Cl. 271—68)

This invention relates to apparatus for piling sheets of material and is more particularly concerned with improvements in side edge aligning devices for such apparatus.

In the handling of sheet material, such as sheets of metal, where the sheets are delivered from a high speed processing line, apparatus has heretofore been provided for accumulating the sheets in a pile on an elevator or other suitable support beneath an overhead delivery conveyor. Such apparatus generally includes mechanism for stopping the forward movement of the sheet and allowing the same to drop onto the pile beneath the conveyor, and mechanism for guiding the side edges of the sheets as they settle onto the pile. While apparatus of this type has operated satisfactorily for most sheet material problems have arisen in piling some materials due to the trapping of air between the sheets as they are deposited in rapid succession into the boxlike enclosure formed between the usually solid side guides above the pile supporting platform. The problem of trapped air varies with the nature of the sheet which is being handled and its size relative to the size of the piler box. The trapped air, of course, acts as a cushion for the falling sheets and for very heavy sheets this can be an advantage. In the case of very thin sheets air trapped under the falling sheets does not always provide an advantage. The trapped air between the solid guides, if it has no way to escape, frequently causes the mid portion of a thin sheet to hold up longer than the ends so as to give a parachuting effect. It has been found, therefore, to be advantageous to provide for controlling the amount of air which is trapped between the sheets and it is a general object of the present invention to provide a piler apparatus which permits the amount of trapped air in the piler box to be increased or decreased at the will of the operator.

It is a more specific object of the invention to provide a sheet piler having sheet edge aligning or guiding devices which have associated therewith mechanism for supplying air to the area between the guides or for withdrawing air from the same.

It is another object of the invention to provide a sheet piler having overhead conveyors and side edge aligning devices which have incorporated therein air passageways and means for connecting the same to air supply or exhaust lines so as to permit the volume of air betwen the guides to be varied.

It is a further object of the invention to provide a sheet piler having overhead conveyor mechanism and a piler box which includes side guide members with air passageways, valves for controlling the movement of air into or out of the area in the piler box between the side guides, and mechanism connecting the air passageways with a vacuum line or an air pressure line.

It is still another object of the invention to provide a sheet piler having a piler box including laterally spaced side guides with the side guides having air chambers therein, openings from the air chambers into the piler box between the side guides, valve mechanism for controlling the size of the openings and conduits connecting the air chambers with air pressure and vacuum lines so as to permit the volume of air between the side guides to be controlled.

These and other objects and advantages of the invention will be apparent from a consideration of the piler apparatus which is shown by way of illustration in the accompanying drawings wherein:

FIGURE 1 is a side elevation of a sheet piler having incorporated therein the principal features of the invention, with portions broken away and other portions omitted;

FIGURE 2 is a plan view of the piler with portions broken away and with other portions omitted;

FIGURE 3 is a cross section taken on the line 3—3 of FIGURE 1;

FIGURE 4 is a cross section, to an enlarged scale, taken on the line 4—4 of FIGURE 2;

FIGURE 5 is a fragmentary elevation showing the uppermost portion of one of the side guides; and

FIGURE 6 is a detail view of one of the valve forming tubes removed from the side guide in which it is mounted.

A piler apparatus 10 is illustrated in the drawings which has incorporated therein the principal features of the invention and which is designed to receive individual metal sheets S from a processing line or the like and deposit the sheets one by one on a stack or pile 11 for removal from the apparatus.

The apparatus comprises an upright supporting frame structure 12 (FIGURES 1 to 3) on which there is mounted a horizontally disposed, vertically reciprocal bed structure or elevator 13 for receiving a stack or pile 11 of metal sheets S and an overhead magnetic conveyor 14, the latter being operable to deposit successive sheets S in stacked relation on the elevator bed 13. The supporting frame structure 12 comprises longitudinally spaced end frames 15 and 16 which are connected at the bottom by parallel, laterally spaced, longitudinally extending side beams 17 and at the top by similar longitudinally extending side beams 18.

The sheets S are delivered to the bottom run of the conveyor 14 of the apparatus by a feed conveyor 20 which is supported on a suitable bracket member 21 on the end frame 15. The conveyor 14 comprises a series of transversely spaced, conveyor rail units 22 which rail units are of the magnetic type, for example, as disclosed in my Patent No. 2,642,174, dated June 16, 1953. The rail units 22 are supported at the receiving end of the apparatus on a cross beam 23 extending between vertical support brackets 24 on the upper portion of the end frame 15. At the other end of the apparatus the rail units 22 are supported on a cross beam 25 which extends between the upright brackets 26. The belt driving drums or sheaves 27 at one end of the rail units 22 are mounted on a cross shaft 28 which is journaled at its ends in an upstanding side bracket 26 and carries the pulley 29 which is connected by a drive belt 30 with an output sheave 31 on a motor reduction unit 32, the latter being supported on the top plate 33 on the end frame 16 which top plate 33 extends between spaced upright side plates 34.

The stack or pile supporting platform or table 13 may be provided with raising and lowering mechanism such as the mechanically operated linkage 35 which is shown in the drawings. Another suitable arrangement for raising and lowering the table 13 is disclosed in my pending application Serial No. 692,319, filed October 24, 1957, now abandoned, wherein the table is connected at its four corners to nut carrying bracket members which are mounted for vertical travel on upright pivot screws. In the present apparatus the table elevating screws would be housed in the corner posts 36 and 37 on the end frames 15 and 16. Also, a hydraulic type lift may be employed.

The apparatus is provided with a pair of longitudinally extending, parallel side guide devices 40 and 41 (FIGURES 1 to 3) which are identical except for being rights and lefts and which may be mounted on the frame structure 12 in an identical manner. Only the side guide 40

will be described, it being understood that the other side guide 41 is constructed and mounted in an identical manner.

The side guide 40 is made up of a vertically disposed back plate 42 and an outwardly extending, horizontally disposed reinforcing web plate 43 which is secured at its edge to the back plate 42 intermediate its top and bottom edges. A face plate 44 is spaced from the back plate 42 and the two plates are connected at their bottom edges by a bottom plate 45. The back plate 42 and the face plate 44 are connected at the top edges by a tube member 46 of cylindrical cross section. The diameter of the tube member 46 corresponds to the distance between the oppositely directed faces of the two vertical plates 42 and 44. The tube member 46 has a longitudinally extending slot 47 which provides an inwardly and downwardly inclined passageway from the interior of the tube immediately above the inside surface of the face plate 44 and forms an elongate nozzle for directing air into the area in front of the face plate 44 or for withdrawing air from this area. A valve forming tube 48 is telescoped within the tube 46. The valve tube 48 has an air slot 50 with one side 51 parallel to the axis of the tube and the other side 52 inclined thereto so that the slot increases in width from one end of the tube toward the other as shown in FIGURE 6. The valve tube 48 has a closure disc 53 at one end thereof which is provided with a handle 54 for manually rotating the tube 48. At the other end of the side guide 40, both tubes 46 and 48 are open and connect with one end of a flexible hose or conduit 55. The flexible conduit 55 is connected at its other end to a Y 56 which forms a connection with a like conduit 55' connecting the same to the other side guide 41. The Y 56 has a connection with an air blower 57 or a vacuum pump as desired. Alternatively, the flexible conduits may be connected to air or vacuum lines, or to a valve which may be adjusted to connect the same to either air or vacuum supply lines as desired.

The side guides 40 and 41 are preferably mounted at their opposite ends on cross supports indicated at 58 and 59 for lateral adjustment so as to accommodate sheets of varying width. The one cross support preferably includes an adjusting shaft 60 connected by a belt drive 61 with a motor 62 for operating the same. A suitable mounting for the side guides is disclosed in my copending application Serial No. 770,969, filed October 31, 1958, now Patent No. 3,061,305.

The piler is provided with a back stop 63 at the entrance end and also an end stop mechanism 64. The end stop mechanism 64 is preferably adjustable lengthwise of the conveyor units 22 so as to accommodate sheets of different lengths. A suitable end stop mechanism is disclosed in my Patent No. 3,061,305, and also in my Patents Nos. 2,918,852 and 2,821,391.

In the operation of the piler the end stop and side guide members are adjusted to the proper position for handling the size sheet which is to be piled. The valve tubes 48 are then rotated in the side guide members 40 and 41 to position the slots 50 so as to leave open the slots 47 for the length thereof corresponding approximately to the length of the sheets S. The flexible conduits are connected through the Y 56 with an air pump 57 or a suitable vacuum pump or vacuum line, as required, depending largely upon the weight and thickness of the sheets S. The piler is then ready for operation. The operator observes the effect on the falling sheets of the air or vacuum conditions in the piler box between the side guide members and makes whatever changes appear to be necessary in the control of the air through rotation of the valve tubes 48 and/or the air pressure or vacuum supply, so as to obtain the most effective air conditions in the piler box for the piling operation.

While particular materials and specific details of construction have been referred to in describing the illustrated form of the piler apparatus, it will be understood that other materials and equivalent details of construction may be resorted to within the spirit of the invention.

I claim:

1. A sheet piler comprising box forming members for receiving sheets in superimposed pile forming relation, a conveyor mounted above said box forming members and having a bottom sheet carrying surface, means to operate said conveyor for advancing sheets to a predetermined position above said box forming members and said conveyor having means for releasing the sheets for deposit on a pile between said box forming members, said box forming members including a pair of parallel oppositely disposed internal surfaces for guiding the downward movement of the sheets as they are released by the conveyor, means forming tubular air chambers adjacent said guide surfaces and outside the piling area, means forming downwardly and inwardly directed passageways connecting the air chambers with the piling area beneath the bottom of said conveyor, and valve means extending the length of said tubular air chambers for controlling the passage of air through said passageways whereby to control the air trapped beneath successive sheets as they fall onto the pile.

2. A sheet piler comprising an upright supporting frame, an overhead conveyor mounted on said frame for advancing successive sheets on the bottom face thereof to a piling area and releasing the same for deposit by gravity on a pile, laterally spaced side guide members mounted on said frame and having parallel, vertical faces defining a guide path for opposite side edges of the sheets as they drop onto the pile, said guide members having longitudinally extending tube forming portions, said tube forming portions having openings into the piling area between the guide members and beneath the bottom face of said conveyor, and an elongate valve in each said tube forming portion for closing said openings whereby to control the passage of air between said tube forming portions of said guide members and said piling area along the length of said tube forming portions so as to vary the volume of air trapped beneath the sheets.

3. A sheet piler comprising an upright supporting frame, a conveyor mounted on said frame for advancing successive sheets to a piling area and releasing the same for deposit by gravity on a pile, laterally spaced guide members mounted on said frame and having parallel, vertical faces defining a path for opposite side edges of the sheets as they drop onto the pile, each said guide member having a tube forming portion extending longitudinally thereof, said tube forming portion having a longitudinally extending slot opening into the piling area beneath said conveyor and between the guide members, and an elongate valve member co-extensive with said slot mounted in said tube forming portion for progressively closing said slot whereby to control the passage of air between said tube forming portions of said guide members and said piling area so as to vary the volume of air trapped beneath the falling sheets.

4. A sheet piler comprising an upright supporting frame, a conveyor mounted on said frame for advancing successive sheets to a piling area and releasing the same for deposit by gravity on a pile, laterally spaced guide members mounted on said frame and having parallel, vertical faces defining a path for opposite side edges of the sheets as they drop onto the pile, said guide members having longitudinally extending tube forming portions, said tube forming portions having longitudinally extending slots opening into the piling area between the guide members, and a valve forming tube member rotatably mounted in each said tube forming portion for closing said slot whereby to control the passage of air between said tube forming portions of said guide members and said piling area so as to vary the volume of air trapped beneath the sheets.

5. A sheet piler as recited in claim 4 and said valve

forming tube member having a longitudinally extending slot adapted in one position thereof to align with the slot in the tube forming portion of the guide member and having one side edge thereof extending in diverging relation to the other side edge so that axial rotation of said valve forming tube member progressively closes the slot in tube forming portion of the side guide member.

6. A sheet piler comprising an upright supporting frame, an overhead conveyor mounted on said frame and having a downwardly facing sheet carrying surface for advancing successive sheets to a piling area and releasing the same for deposit by gravity on a pile beneath the conveyor, spaced side guide members having parallel vertical faces defining a path for opposite edges of the sheets as they drop onto the pile, means forming

air chambers extending the length of said side guide members and having passageways along the length of said air chambers which open into the piling area beneath said sheet carrying conveyor surface and between the guide members, valve means extending in said chambers and operative to close said passageways, and means connecting said air chambers selectively with an air pressure line or a vacuum means.

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