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T. R. IRWIN ETAL

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CARROUSEL SEALING APPARATUS FOR TOWER PACKING BUNDLES

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2 Sheets-Sheet 1

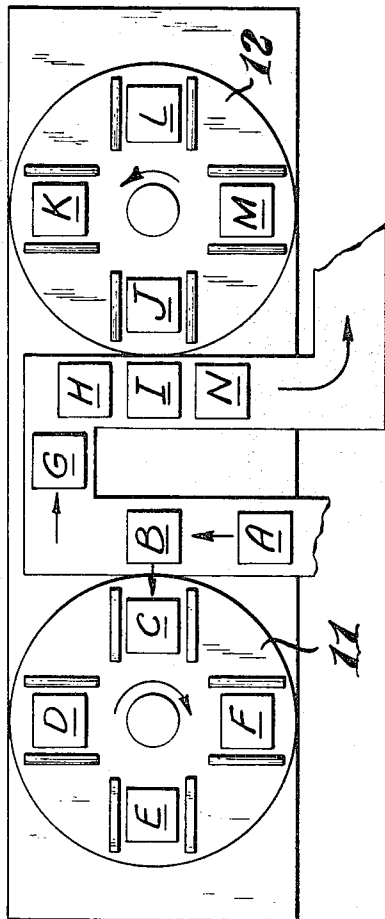


Fig. 1

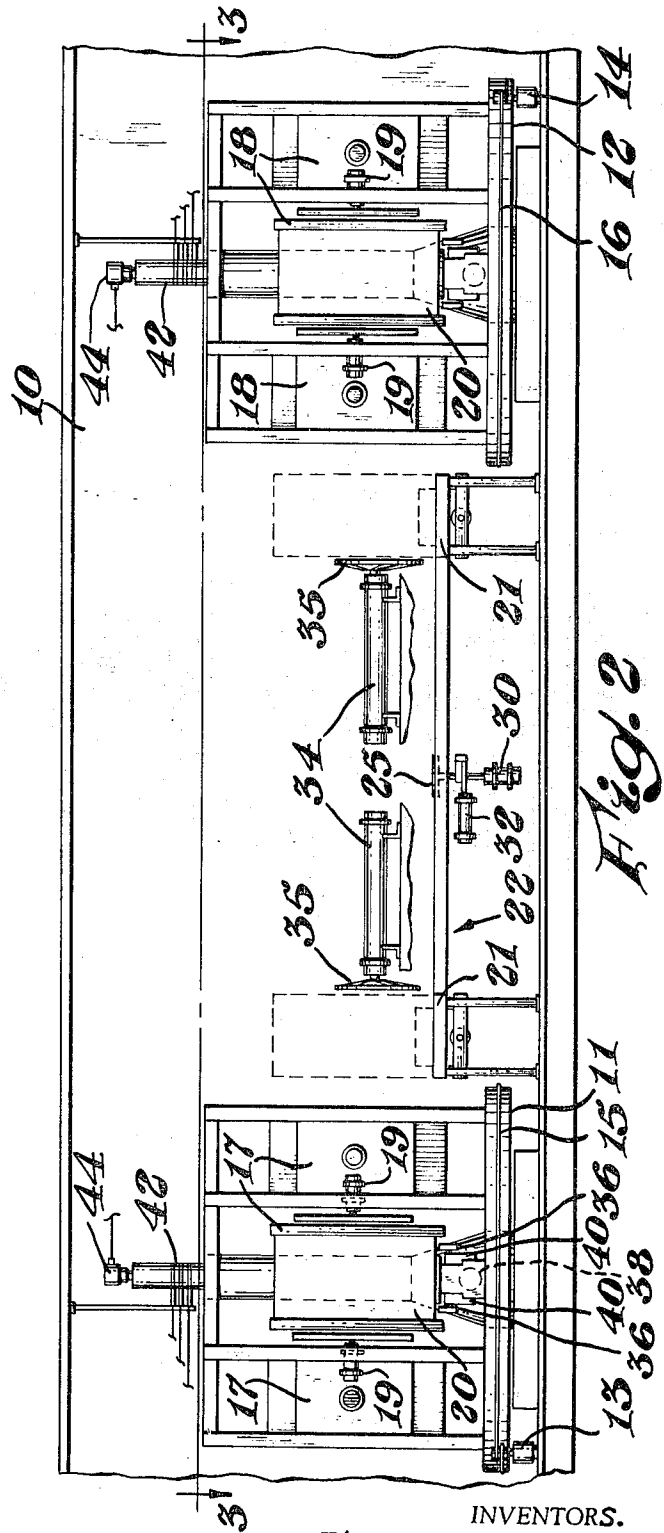


Fig. 2

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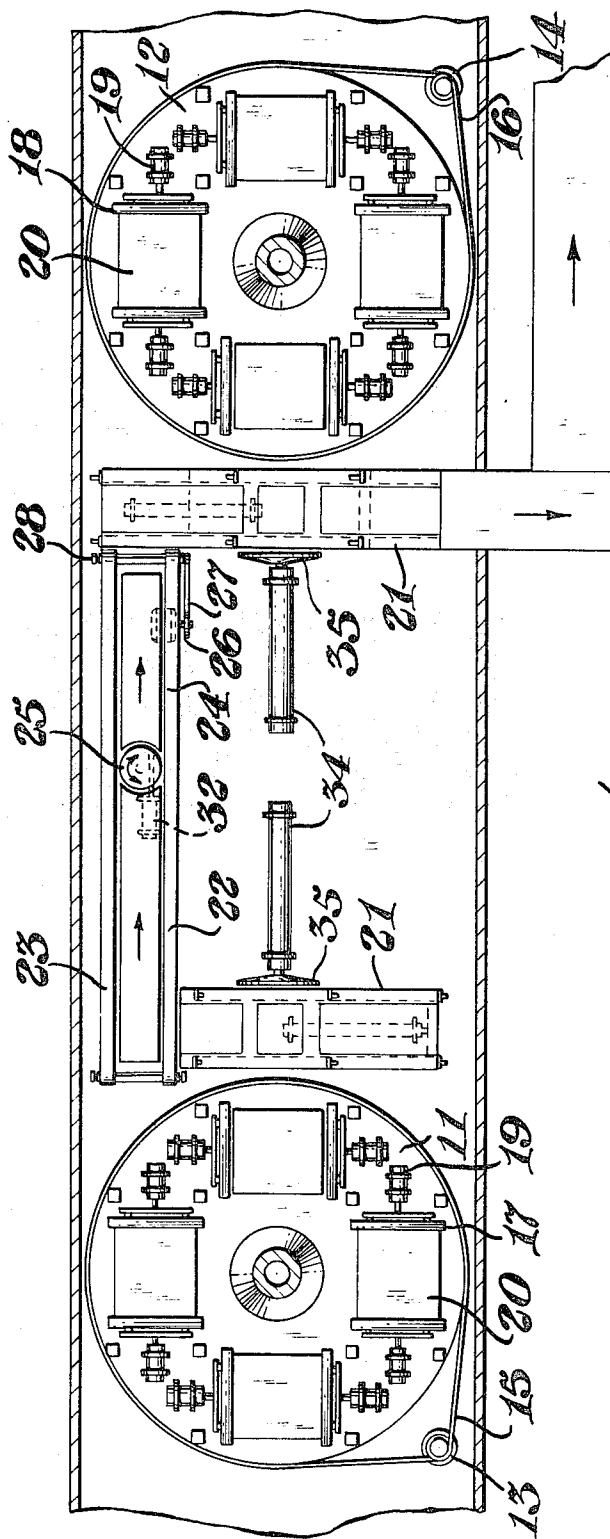


Fig. 3

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CARROUSEL SEALING APPARATUS FOR TOWER PACKING BUNDLES

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U.S. Cl. 156—567

2 Claims

ABSTRACT OF THE DISCLOSURE

An apparatus is described for assembling and flanging convoluted sheets into tower packing bundles employing opposed heated platens which are mounted on a rotatable disc and which engage a stacked bundle of sheets on opposite sides and simultaneously flange and fuse adjacent edges together while the disc is rotating and other bundles are being inserted and removed.

CROSS REFERENCES TO RELATED APPLICATIONS

This application describes and claims an apparatus which is an improvement over the apparatus described and claimed in U.S. Ser. No. 628,953, filed Apr. 6, 1967 in the names of E. V. Dettmer and A. L. Leasher.

BACKGROUND OF THE INVENTION

In the treatment of waste water, it is often desirable to pass the water over a generally vertically disposed support and permit it to come into contact with air. Oftentimes, it is desirable to utilize synthetic resinous thermoplastic sheets bonded together to form rigid bundles usually of a rectangular nature which can be readily installed within a gas-liquid contact tower. Generally, such packing is prepared from a plurality of corrugated sheets or sheets having a variety of convolutions therein, the sheets secured in adjacent relationship in such a manner that water or liquid being treated is provided with a maximum surface. Conveniently the number of such bundles or sheets are stacked within an enclosure to provide a suitable water treatment apparatus. It is extremely undesirable to ship such bundles in fabricated form as the volume per unit weight is very high. It is much more convenient to ship a plurality of sheets, to field assemble the bundles at the field site of construction and rapidly install the bundle within the tower or enclosure. Various means have been employed for sealing together bundles or sheets to provide a unitary structure. Some techniques have employed a plurality of corrugated strips which are passed between hot platens to seal and flange the edges. Heated probes have been passed through assembled bundles to fuse the individual sheets to adjacent sheets and provide a structural and functional unit. However, in order to provide a tower packing bundle of maximum strength and minimum weight, it is desirable that the bundle be flanged and fused on four sides.

The apparatus described in the above mentioned Ser. No. 628,953 has two sets of platens placed side by side in a trailer van. The unwelded bundle is placed in the first set of platens by a slide mechanism and the two sides welded. It is next placed in a station between sets of platens and turned 90°. After it is turned 90°, it is inserted into the next set of platens and the other two sides welded. When the weld is completed, the bundle exits out the back of the welding assembly. As a bundle moves through the unit, another bundle is behind it such that three bundles are in process at one time. One being welded in the first set of platens, another being turned 90° and the third being welded in the second set of platens.

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The positioning of the platens and the fact that they are stationary will generally allow only four sets of platens in a trailer van. As commonly used, generally only two sets of platens are provided, allowing only one welded bundle per minute. Also because of the required room for this welding arrangement and the position at which an unwelded bundle enters and a welded bundle exits, an operator cannot, without leaving his position at the infeed and going to the back of the unit, check the quality of his work.

SUMMARY OF THE INVENTION

In accordance with this invention these difficulties are overcome and a significantly improved apparatus is provided which comprises in cooperative combination means to convey a bundle of unconnected sheets, the bundle having a first and second face and four sides, a plurality of sets of opposed heating means positioned on a rotatable disc or turntable, means to rotate said disc, means to sequentially position a bundle between each of said opposed heating means, the heating means adapted to engage opposed sides of said bundles, heat the side of said bundles to a thermoplastic state, thereby fusing the sheets together at selected locations while said disc is rotated, preferably through 360°, means to disengage the heating means from the bundle and return said bundle to said conveyor means, means to rotate the bundle about 90° and convey said bundle to a second rotatable disc having a plurality of sets of opposed heating means, means to sequentially position a bundle between each of said opposed heating means wherein opposed edges of the bundles are heated to a thermoplastic temperature to fuse adjacent edges of adjacent sheets together while said second disc is rotated, preferably through 360°, means to disengage the heating means from said bundle and return said bundle to said conveyor means and means to convey the so-formed bundle from the bundle forming apparatus.

BRIEF DESCRIPTION OF THE DRAWING

This invention will be further understood by reference to the accompanying drawings, wherein, wherever possible, like numbers denote like parts and wherein:

FIG. 1 is a schematic representation of the operation of the apparatus of the invention;

FIG. 2 is a side elevation of one embodiment of the apparatus as set up in operating condition in a mobile housing, and

FIG. 3 is a plan view of the apparatus, taken along the line 3—3 of FIG. 2.

Referring to FIG. 1, an unwelded bundle is stacked and in position A; by conveyor mechanism, it is moved to position B. The bundle is then inserted between platens in position C on a rotary joining and indexing unit hereinafter called a carousel. The platens close and the welding cycle starts and continues through the rotation of 360°. The carousel turns 90° and position D is now at the in/out feed position. The same procedure is followed as above and position D now has a bundle between the platens and the welding cycle begins for position D. Positions E and F are also loaded in this same manner. When position C returns to the in/out feed position, the bundle, now welded on two sides, is pushed out from between the platens to position B. As a stacked unwelded bundle is moved from position A to position B, the bundle welded on two sides in position B also moves along the conveyor to position G. A new bundle is now moved from position B into position C and the welding cycle continues at the first carousel. When the bundle which has been welded on two sides is in position G, it is turned 90° so that when it reaches the second carousel, the other two sides which are unwelded can be welded. The procedure at the second carousel is identical to that at

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the first carrousel. When a bundle reaches position I, it is inserted into position J and the platens close and begin the welding operation. The carrousel turns 90° and position K is loaded, after which positions L and M are loaded in a similar manner. When position J returns to the in/out feed position, the bundle is pushed out to position I and is now completely welded on all four sides. Once at position I, the bundle is conveyed to position N and on out to the tower as another bundle from position H is moved to I and then into the carrousel and position J to begin a welding cycle which continues with movement through positions K and L to M.

Referring now to FIGS. 2 and 3, apparatus in accordance with one embodiment of this invention, designated generally by the numeral 10, comprises carrouseles 11 and 12, which are driven by motors 13 and 14 through belts 15 and 16 respectively, and which carry sealing units comprising electrically heated and pneumatically operated opposed sets of platens 17 and 18 respectively. Pneumatic cylinders 19 are employed for opening and closing the platens. A bundle of sheets 20 is positioned between opposed pairs of platens. Reciprocating conveying means 21 (operating mechanism not shown) serve to convey the bundles to and from the carrouseles 11 and 12 and to and from conveying means 22. Conveying means 22 advantageously comprises two endless belts 23, 24 which are positioned on either side of turntable 25 and are driven by motor 26 through a pulley and drive shaft 27 and 28 respectively. Turntable 25 is employed to rotate each bundle 90° while it is in transit between the carrouseles. Turntable 25 is adapted to be raised and lowered through operation of pneumatic cylinder 30. Thus, as a bundle of sheets is moved along on belts 23 and 24, turntable 25 is in a recessed position. As the bundle is passing over the turntable, the turntable 25 is elevated or raised by means of pneumatic cylinder 30, turned 90° by operation of pneumatic cylinder 32, and thereafter lowered to the belts 23 and 24 to continue movement toward carrousel 12.

The bundles are moved from the conveying means into position on the carrouseles 11 and 12 by means which advantageously comprises an air cylinder 34 and attached foot 35 and are returned to the reciprocating conveying means 21 from the carrouseles by ejector means which advantageously comprise a pair of slide bars 36, and an air cylinder 38 in operative engagement with an L-shaped ejector tongue 40 positioned between the slide bars and adapted to engage the bundle and move said bundle from between the platens out to and on the reciprocating conveying means 21.

Power to heat the platens is advantageously carried to the carrouseles and platens through commutator 42, and the air supply to cylinders 19 is advantageously provided through a means such as rotary joint 44.

Advantageously, the sealing units comprising platens 17 and 18 may be constructed and operated as illustrated in copending application Ser. No. 628,953 mentioned above.

With the apparatus as described, four welded bundles can be produced per minute, in contrast to the one bundle per minute produced by apparatus of the prior art. In addition, with the apparatus of this invention, a single operator is in position to check the completed first weld, and, without moving, check the finished weld while still controlling the process. Thus this invention provides higher productivity and better utilization of manpower while reducing scrap and loss.

We claim:

1. An apparatus for the fabrication of a plurality of tower packing bundles from a plurality of sheets, the apparatus comprising in cooperative combination means to convey a bundle of unconnected sheets, the bundle having a first and second face and four sides, a plurality of sets of opposed heating means positioned on a rotatable disc, means to rotate said disc, means to sequentially position a bundle between each of said opposed heating means, the heating means adapted to engage opposed sides of said bundles, heat the side of said bundles to a thermoplastic state, thereby fusing the sheets together at selected locations while said disc is rotated, means to disengage the heating means from the bundle and return said bundle to said conveyor means, means to rotate the bundle 90° and convey said bundle to a second rotatable disc having a plurality of sets of opposed heating means, means to sequentially position a bundle between each of said opposing heating means wherein opposed edges of the bundle are heated to a thermoplastic temperature to fuse adjacent edges of adjacent sheets together while said second disc is rotated, means to disengage the heating means from said bundle and return said bundle to said conveyor means and means to convey the so-formed bundle from the bundle forming apparatus.

2. Apparatus of claim 1 wherein the rotatable disc is rotated through 360°.

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