Feb. 2, 1932. A. J. SPRAGUE 1,843,522

CONVEYER

Filed June 22, 1929 3 Sheets-Sheet 1

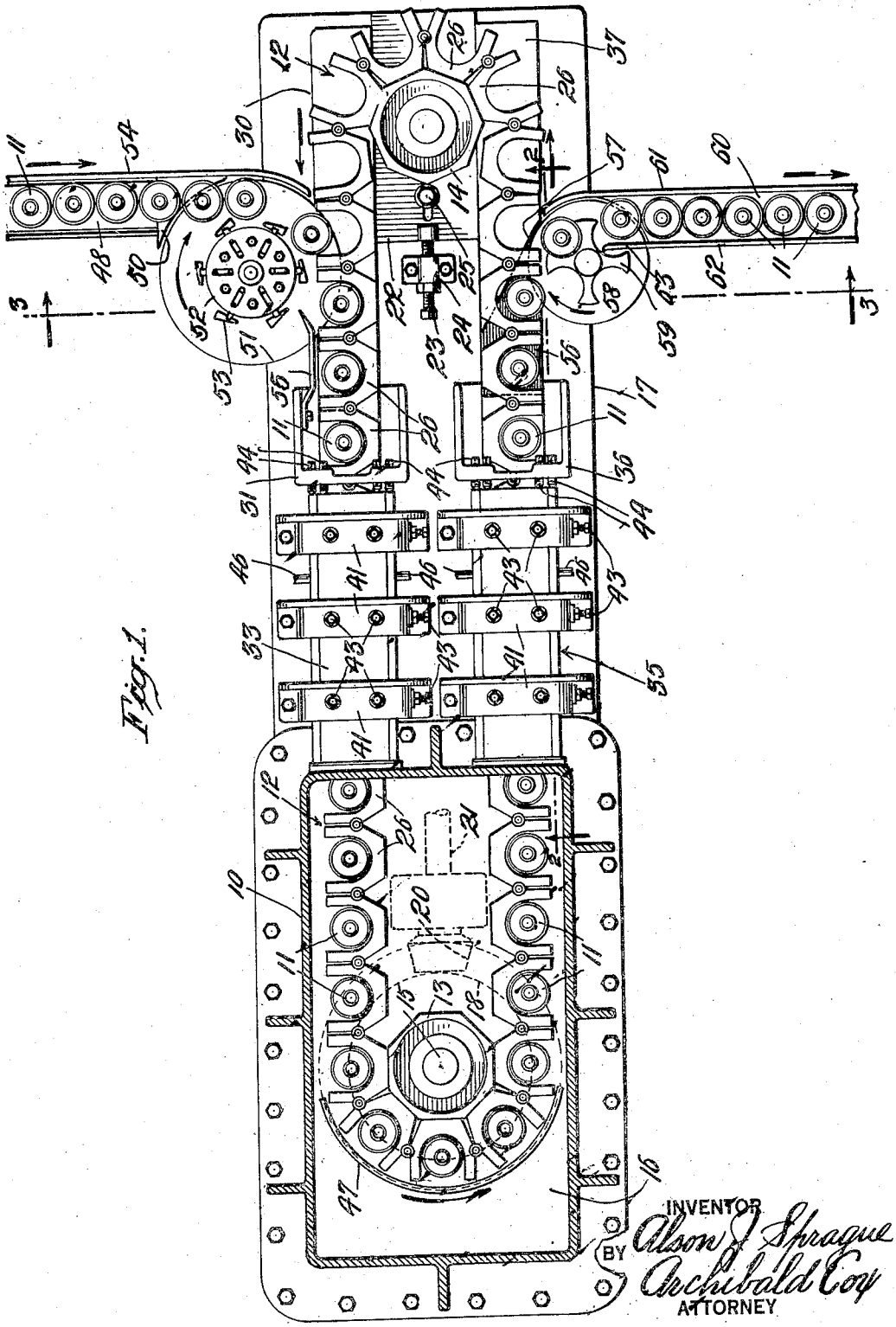


Fig. 1.

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Filed June 22, 1929 3 Sheets-Sheet 2

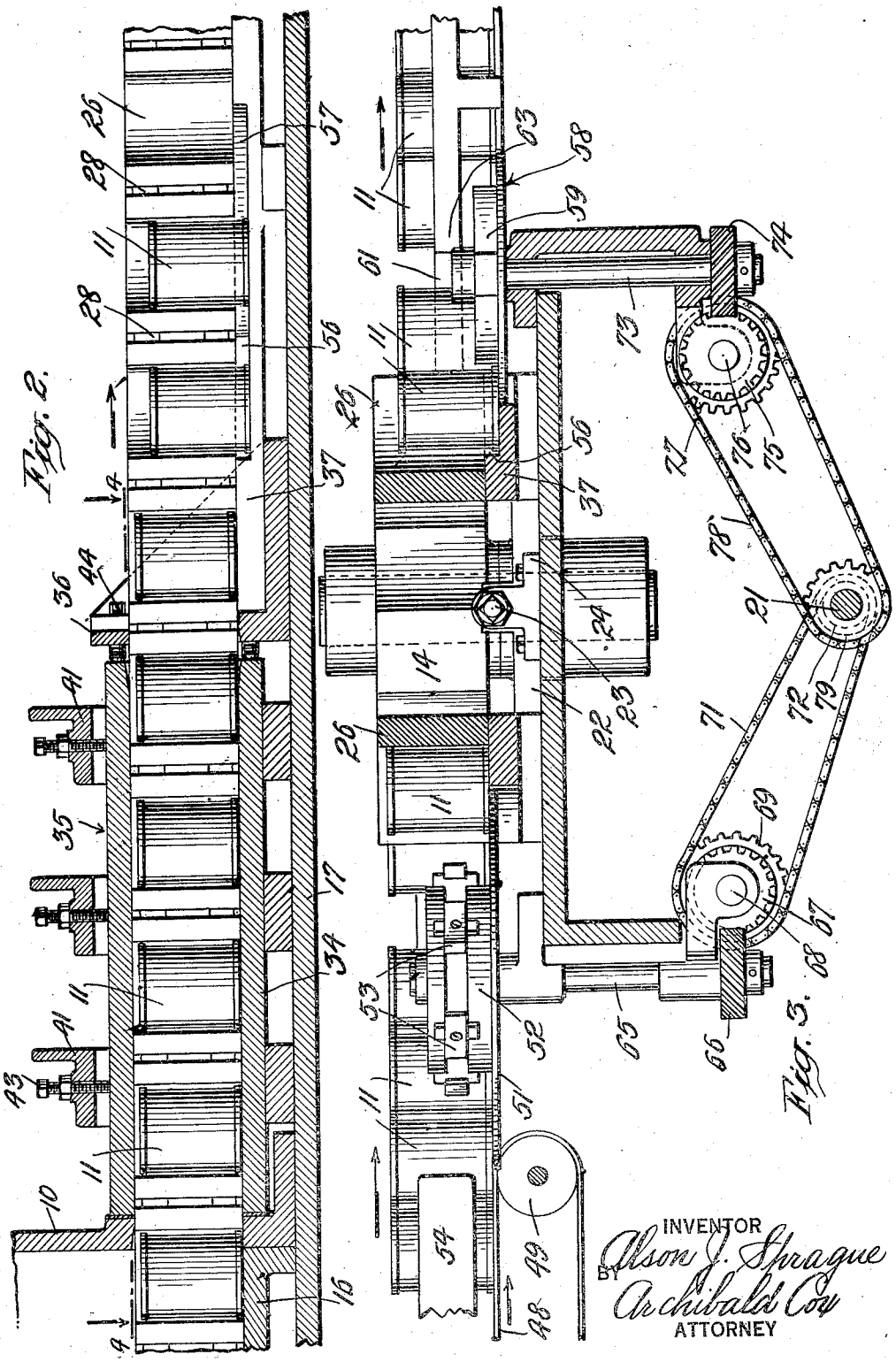


Fig. 2.

Fig. 3.

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CONVEYER

Filed June 22, 1929. 3 Sheets-Sheet 3

Fig. 4.

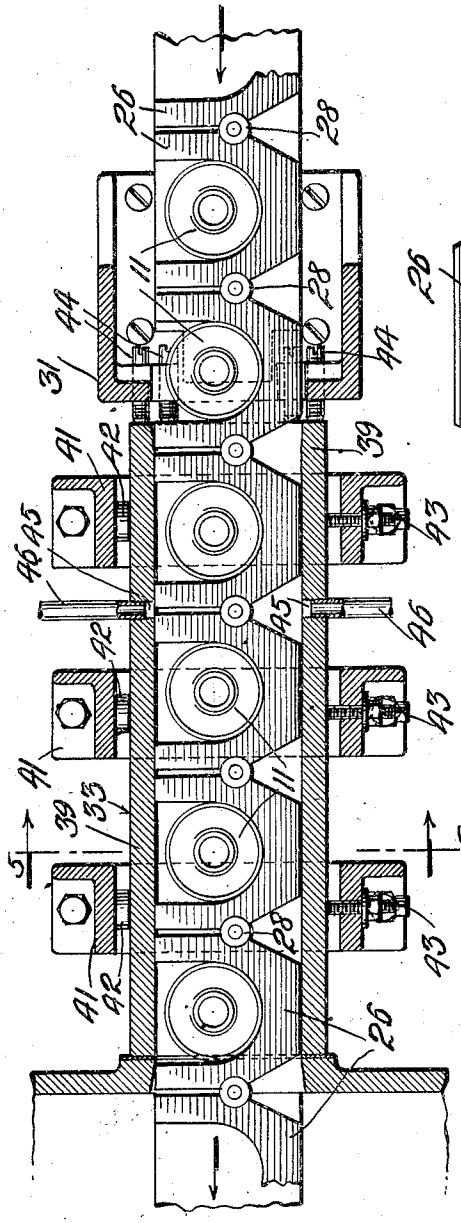


Fig. 7.

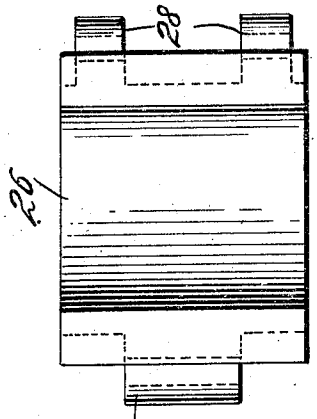


Fig. 6.

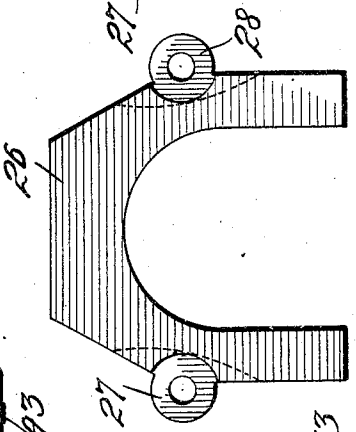
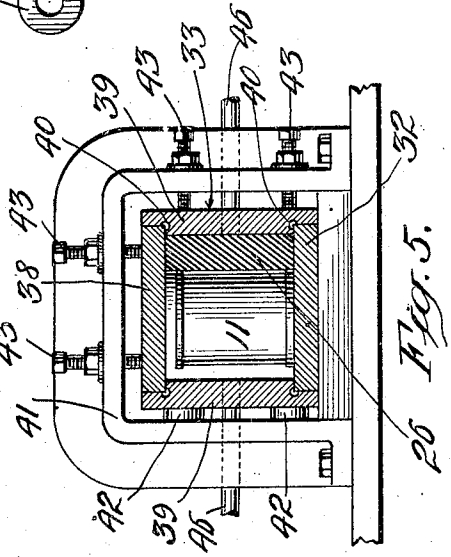


Fig. 5.



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UNITED STATES PATENT OFFICE

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CONVEYER

Application filed June 22, 1929. Serial No. 372,842.

The invention relates to an improvement in machines in which articles are passed into and out of a vacuum chamber without breaking the vacuum, and more particularly to an improvement in conveyers for that class of machines in which cans or containers filled with food are introduced into a vacuum chamber to exhaust the air from the cans which are then hermetically sealed, and the sealed cans removed from the vacuum chamber.

The object of the invention is to provide an improved air lock conveyer for such machines, especially adapted for conveying cans filled with condensed milk and the like. In accordance with this object, one feature of the invention is the provision of a continuous conveyer adapted to receive within the cross sectional limits thereof the articles to be conveyed, and so formed as to fit closely in the inlet and outlet passages connected with the vacuum chamber. Another feature of the invention is the provision of air locks through which the conveyer enters and leaves the vacuum chamber without breaking the vacuum therein. Other features of the invention relates to the construction and arrangement of parts whereby the apparatus is rendered effective to convey cans automatically, successively and at high speed through a vacuum chamber without breaking the vacuum.

In the accompanying drawings illustrating the invention, Fig. 1 is a plan view, partly in section, of the preferred form of apparatus; Fig. 2 is a vertical section on an enlarged scale taken on the line 2—2 of Fig. 1; Fig. 3 is a vertical section on an enlarged scale taken along the line 3—3 of Fig. 1; Fig. 4 is a horizontal section taken along a plane passing through the line 4—4 of Fig. 2; Fig. 5 is a detail section taken along the line 5—5 of Fig. 4; Fig. 6 is a plan view of a single link of the conveyer; and Fig. 7 is a side elevation of a conveyer link looking toward the open side thereof.

The improved apparatus as illustrated in the drawings, comprises a conveyer, with its associated parts, for moving articles, such as filled cans into and out of the vacuum chamber without breaking the vacuum. The apparatus in its illustrated embodiment comprises a conveyer in the form of a chain provided with links, each capable of receiving one of the articles; two driving members or sprocket wheels, one of which is located within and the other without the vacuum chamber; air locks at the inlet and exit passages of the vacuum chamber, said air locks being adapted to fit closely around said links and being connected with suction means whereby a vacuum is maintained within the locks; means for supplying articles to the conveyer for advancement into the vacuum chamber; means for withdrawing the articles from said chain after passing out of said vacuum chamber, and means for actuating the conveyer.

More specifically the improved machine includes a vacuum chamber 10 having separate entrance and exit openings through which articles 11, such as cans, are conveyed by means including a conveyer chain 12 passing around sprocket wheels of regular polygonal cross-section, one of which, indicated at 13, is located in the chamber 10 and the other 14 is located outside of the chamber. The wheel 13 is the driver and is mounted on a vertical shaft 15 which projects downwardly through the floor 16 of the vacuum chamber and through the base 17 of the machine. Mounted on the shaft 15 below said base 17 is a bevel gear 18 which meshes with a bevel gear 20 on a horizontal shaft 21 connected with any suitable source of power. The sprocket wheel 14 is rotatably mounted on a carrier or block 22 which is slidably mounted on the base 17 and is adjusted to regulate the tension of the chain 12 by means of a set screw 23 threaded in a fixed bracket 24 and engaging a portion of said carrier 22, which is secured in any position to which it has been adjusted, by means of a cap screw 25 extending downwardly through a slot in the carrier and threaded into the base 17.

The chain 12 is made up of links 26 of U-shape arranged with the openings therein facing outwardly, such openings being of such size as to receive wholly therein the cans or other articles to be conveyed. Pref-

erably each of these links is provided at one end with a single perforated ear 27 and at the other end with two ears 28 so that the single ear at one end of each link fits between the two ears at the adjacent end of the next link and may be connected therewith by means of a hinge pin. The top and bottom of each link have parallel horizontal plane surfaces and the bottom of the U and the ends of the branches have parallel, vertical surfaces so that the links may be made to fit closely in a passage of rectangular cross section. Each link is cut away at opposite sides at the bottom of the U so as to enable the conveyer to bend around the sprocket wheels 13 and 14. As seen in Fig. 1, the sprocket or chain wheels 13 and 14 rotate in counter-clockwise direction and the links, after leaving the wheel 14 travel along a support 30, which also serves as a guide for one side of the carrier 22. This support 30 rests at its forward end in a notch in the base of a bracket 31 which is secured to the base 17, and serves to pass the links of the chain through an opening in the bracket and along the upper plane surface of a member 32 serving as the bottom or base of an air lock 33, to be described hereinafter. The chain then passes through the entrance opening of the vacuum chamber in which the cans are supported by the floor 16. From the point of exit of the chamber the chain passes along the upper surface of the base or bottom 34 of a second air lock 35, through a passage in a bracket 36, of substantially the same form as bracket 31, and along a support 37 which extends far enough to guide the chain to the wheel 14, and serves as a guide for the other side of the carrier 22.

The air locks 33 and 35 are of substantially the same construction and it will therefore be sufficient to describe air lock 33 in detail. This air lock includes, in addition to its base 32, a top member 38 of substantially the same size as the base, two side members 39 having at their inner edges grooves to receive the adjacent edges of the base 32 and the top member 38. It should be understood that the inner and cooperating surfaces of the member 32, 38 and 39 and the surfaces of the links 26 are so accurately finished that the joints between the members 32, 38 and 39, when these members are properly clamped together, are substantially air-tight and that the links 26 have a substantially air-tight fit in the casings thus formed.

According to the preferred form of the invention, the members 32, 38 and 39 form an air lock casing and extend through arched brackets or yokes 41 which are rigidly secured to the base 17. One of the side members 39 is engaged by spacers 42 positioned between it and one side of each of the yokes 41, and the other side member 39 is engaged by set screws 43 threaded through the adjacent sides of the yokes and held in adjusted position by suitable means such as lock nuts. The top 38 is also clamped in position by set screws 43 threaded through the top of said yokes. The casings just described should make a substantially air-tight joint with the wall of the vacuum chamber around the inlet and exit and for this purpose packing may be positioned at these points and the casings forced towards the vacuum chamber by means of set screws 44 threaded through the upright portion of the brackets 31 and 36 and engaging all of said members 32, 38 and 39 at their outer ends. Although the links 26 have a substantially air-tight fit in the casings or air locks, some air will leak past the links into the casings and in addition some air will be trapped in the article receiving openings of the links and in the spaces between the links. To prevent air from being carried into the vacuum chamber the casings are connected with means for removing such air by producing a vacuum in the inner end of the casings adjacent to the vacuum chamber, as, for example, by providing ports 45 connected with tubes or conduits 46 and through such conduits with suitable means for producing a vacuum.

The cans to be conveyed through the vacuum chamber may be fed to the links 26 at any suitable place along the support 30 on which they will rest. They will then be advanced through the air lock 33, the vacuum chamber 10, and the air lock 35, to the support 37. During the movement of the cans in straight lines along the floor 16 there will be no marked tendency for the cans to work out of the openings in the links 26, but during their movement around the sprocket wheel 13 there will be a tendency to work out of the openings, and accordingly the curved rail or guard 47 is provided.

The cans 11 may be fed to the conveyer chain at any point along the support 30, and, in the preferred form of the invention such feeding is effected by means including a conveyer belt 48 extending to a point adjacent to said chain and passing around a rotary support 49 at that point, a plate 50 receiving the cans from said belt and a transfer device which may be of the rotary type and include a circular plate or disc 51 fitting against said plate 50 and receiving cans therefrom, and a drum portion 52 above the disc 51 and carrying members 53 which are yieldably supported to prevent damage to the cans and are adapted to take the cans one by one from the plate 50 and to move them into the recesses of links 26 as the latter are brought one by one into the proper position. During such movement of the cans they are guided on their outer sides by a member or guide 54 arranged tangentially with respect to the rotary transfer device and extending around to a point adja-

cent to the chain 12. In order to assure proper positioning of the cans in the links, there is provided, at a point just in advance of the point where the cans are delivered to the conveyer chain, a finger 55 secured to the bracket 31 and extending rearwardly therefrom at the outer edge of the path followed by the chain, the rear end of the finger being turned outwardly to assure entry of the cans into the recesses in the conveyer chain.

After the cans 11 have passed from the air lock 35, they may be removed from the conveyer chain in any suitable manner as, for example, by providing in the support 37 a depression 56 (into which the cans in the links 26 drop) and which is provided with an inclined forward edge 57 which cams the cans out of the links 26 and places them upon a revolving table or disc 58 forming part of a rotary transfer device including a star wheel 59 to receive the cans and transfer them to a guideway through which they pass to any desired point and which includes a bottom 60 fitting around part of the disc 58 and positioned with its upper surface at the same level as the surface of the disc, an outer guide 61 extending tangentially of the disc 58 and curving around the edge thereof to a point adjacent to the support 37, and an inner guide 62 having a stripping finger 63 which extends inwardly over the star wheel and is provided at its inner end with a turned back inner surface to assure a proper stripping action.

The disc 51 and drum 52 are fixed on a vertical shaft 65 rotated by means of a gear 66 thereon meshing with a gear 67 on a shaft 68 perpendicular to the shaft 65 and parallel to the shaft 21, a sprocket wheel 69 on said shaft 68, and a chain 71 connecting the sprocket wheel 69 with a sprocket wheel 72 on the main shaft 21. The disc 58 and star wheel 59 are mounted on a vertical shaft 73 provided with a gear 74 meshing with a gear 75 on a shaft 76 parallel to the main shaft 21 and having thereon a sprocket wheel 77 connected by means of a chain 78 with a sprocket wheel 79 on the main shaft 21.

In recapitulation, the operation of the apparatus is substantially as follows: The cans 11 are fed by means including conveyer belt 48 to a point within range of the fingers 53 which insert cans 11 into the openings or pockets of successive links 26, which are accurately finished and as they pass through the air lock 33 cooperate with accurately finished surfaces at the interior of the air lock to produce an air-tight fit. Air in the pockets of the links and between said links will be prevented from being carried into the vacuum chamber by the provision of means such as pipes 46 connecting ports 45 at the opposite sides of the air lock 33 with suitable suction or vacuum producing means. Each can, after leaving the air lock 33 is moved along the upper surface of the floor 16 and then will be conveyed to and through the air lock 35 to the support 37. To guard against the leakage of air into the vacuum chamber through the air lock 35, this air lock is also connected by tubes 46 with suction or vacuum producing means. As each can is advanced along the support 37, it will drop into depression 56 and, by engagement with the inclined forward edge 57 will be cammed to one side and shifted to the revolving table 58 of a transfer device including the star wheel 59 which transfers the cans one by one to a guide way along which they pass to any desired point.

Having thus described the invention what I claim as new is:

1. In a machine for treating material in cans, the combination with a vacuum chamber having an entrance opening for the admission of cans and a separate opening for the removal of cans, of a can feeding conveyer moving inwardly through said entrance opening and outwardly through the other opening, an air lock at each of said openings to cooperate with said conveyer and prevent the breaking of the vacuum, and vacuum connections for said air locks to remove air entering the same.

2. In an air lock conveyer for moving articles into a vacuum chamber through one opening and out through another, the combination with an air lock casing at each of said openings, of a conveyer chain including links in the general form of blocks fastened together to pivot about vertical axes at the middle points of their sides each having at its outer face an opening to receive one of said articles with a relatively close fit and being shaped at its sides so that when a plurality of successive links are arranged in a straight line the parts of the side towards the outer faces of said blocks will fit closely together, the parts of said sides adjacent to the inner faces of said blocks being cut away sufficiently to permit bending of the chain about the pivotal connections between the blocks.

3. In an air lock conveyer for moving articles through one opening into a chamber in which the pressure is different from the outside and out through another opening, the combination with an air lock casing at each of said openings, of a conveyer extending through both of said openings including members which have a substantially air-tight fit in said casings, and means for maintaining substantially the same pressure conditions in said locks as in said chamber.

4. In a machine for subjecting articles to withdrawal of air therefrom, the combination with a vacuum chamber having an entrance opening for the admission of articles and a separate exit opening for the removal of the articles, of a conveyer for conveying

articles into and out of said chamber through said openings and including air sealing members adapted to have an air-tight fit in passages of rectangular cross section, and air locks at said openings each air lock including four members having accurately finished surfaces and assembled to provide a passage of rectangular cross section therethrough and in which the air sealing members of the conveyer will fit, and separate means associated with said former members for pressing the inner ends against the wall of said chamber.

5. In a machine for subjecting articles to withdrawal of air therefrom, the combination with a vacuum chamber having an entrance opening for the admission of articles and a separate exit opening for the removal of the articles, of a conveyer for conveying articles into and out of said chamber through said openings and including air sealing members adapted to have an air-tight fit in passages of rectangular cross section, air locks at said openings including casings each consisting of four members having accurately finished surfaces and assembled to provide a passage of rectangular cross section therethrough and in which the air sealing members of the conveyer will fit; and suction means connected with the entrance air lock to withdraw air entering with the conveyer and thereby preventing such air from being carried into the vacuum chamber.

6. In a machine for subjecting articles to withdrawal of air therefrom, the combination with a vacuum chamber having an entrance opening for the admission of articles and a separate exit opening for the removal of the articles, of a conveyer for conveying articles into and out of said chamber through said openings and including air sealing members adapted to have an air-tight fit in passages of rectangular cross section, and air locks at said openings including casings rectangular in cross section, each casing consisting of four members having accurately finished inner surfaces and grooves at corresponding edges of opposite members to receive the edges of one of the other members, and means for clamping said members together.

7. In a machine for subjecting articles to withdrawal of air therefrom, the combination with a vacuum chamber having a entrance opening for the admission of articles and a separate exit opening for the removal of the articles, of a conveyer for conveying articles into and out of said chamber through said openings and including air sealing members adapted to have an air-tight fit in passages of rectangular cross section, and air locks at said openings including casings of rectangular cross section, each casing consisting of four members having accurately finished inner surfaces and grooves at corresponding edges of opposite members to receive the edges of one of the other members, and means for clamping said members together including a plurality of yokes enclosing the same, and set screws passing through said yokes.

8. In a machine for subjecting articles to withdrawal of air therefrom, the combination with a vacuum chamber having an entrance opening for the admission of articles and a separate exit opening for the removal of the articles, of a conveyer for conveying articles into and out of said chamber through said openings and including air sealing members adapted to have an air-tight fit in passages of rectangular cross section, and air locks at said openings including casings of rectangular cross section, each casing consisting of four members having accurately finished inner surfaces and grooves at corresponding edges of opposite members to receive the edges of one of the other members, means for clamping said members together, and means for clamping said air locks against the wall of said chamber including set screws engaging the outer ends of the air lock casing members.

9. In a machine for treating material in cans, the combination with a vacuum chamber having an entrance opening for the admission of cans and a separate opening for the removal of cans, of a can feeding conveyer moving inwardly through said entrance opening and outwardly through the other opening, an air lock at each of said openings to cooperate with said conveyer and prevent the breaking of the vacuum, and vacuum connections for the entrance lock to remove the air entering the same.

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