

May 30, 1933.

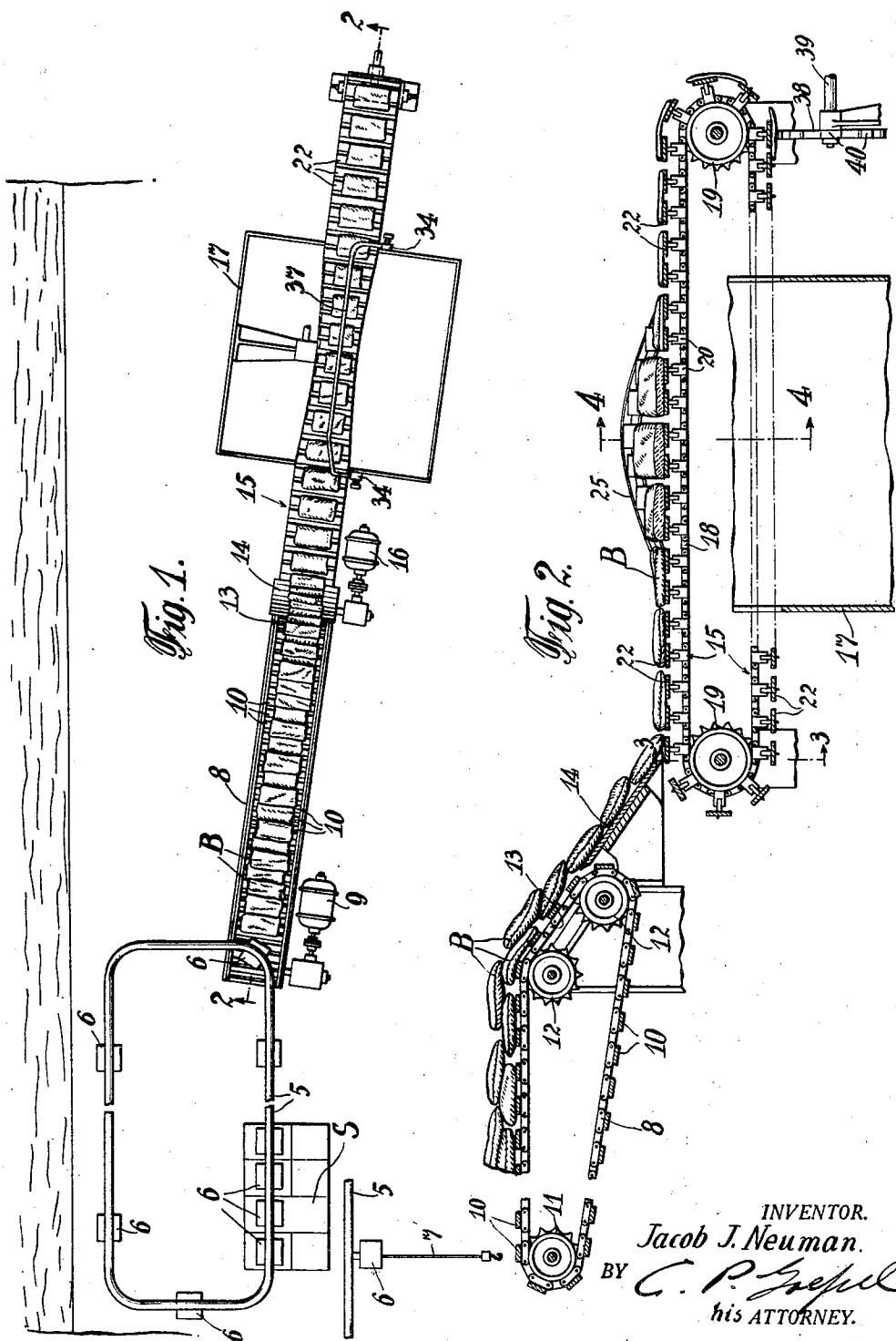
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MATERIAL HANDLING APPARATUS

Filed Aug. 22, 1931

2 Sheets-Sheet 1



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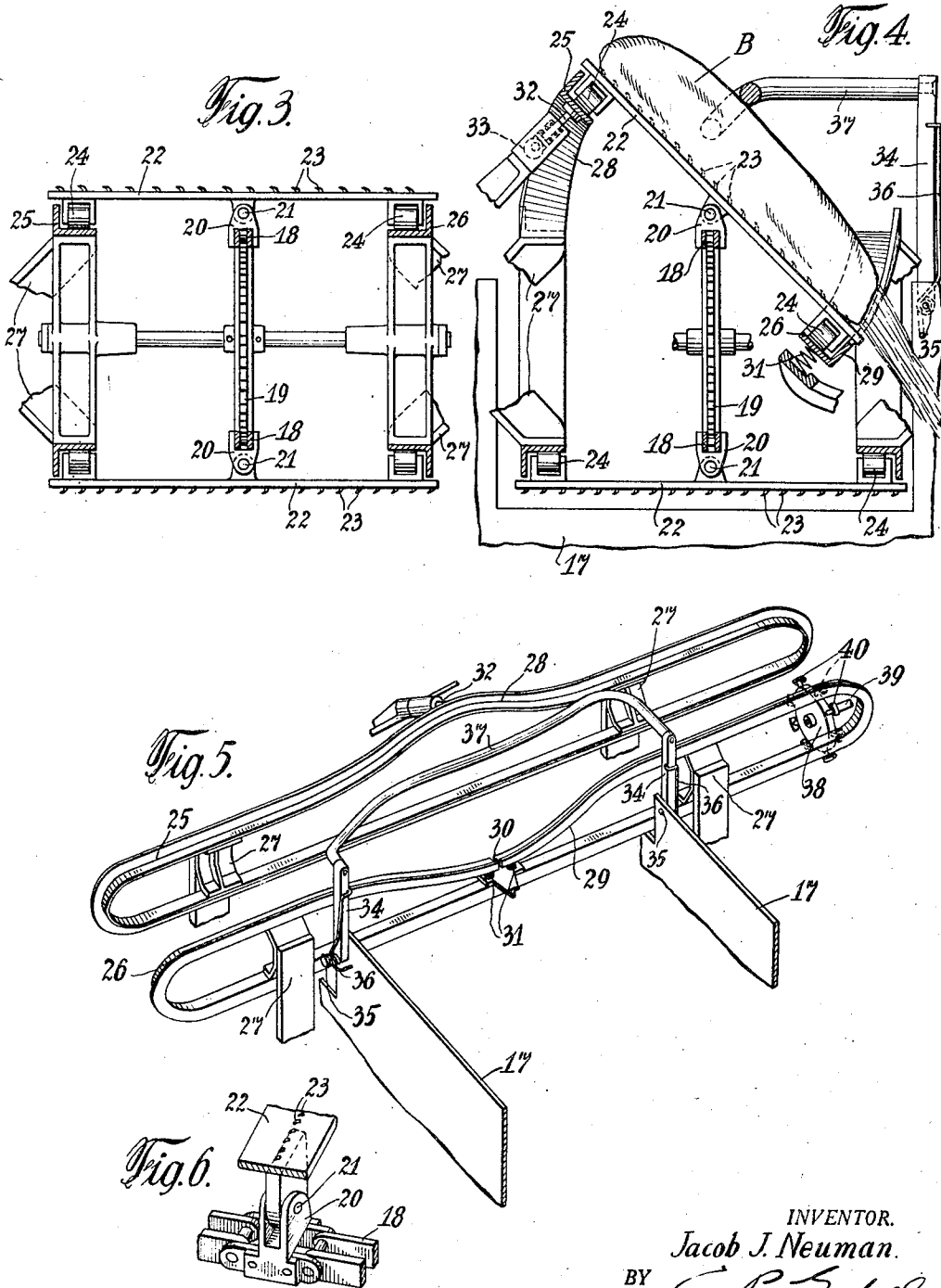
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MATERIAL HANDLING APPARATUS

Application filed August 22, 1931. Serial No. 558,689.

This invention relates to material handling apparatus, and has for its primary object and purpose to provide means whereby the unloading of commodities from a vessel, and the transportation thereof to a storage elevator, conveyor or other device may be greatly expedited, and the manual labor incident to the handling of such materials, reduced to a minimum.

It is a more particular object of my invention to provide apparatus for the above purpose which is particularly designed for handling sugar or similar commodities which are packed in bags or like containers and which embodies automatically operating means for dumping or discharging the contents of each bag during the conveyance of the bags between spaced points into a hopper leading to a crusher, elevator, or storage bin.

In a practical embodiment of my invention, I provide low and high speed conveyors arranged in alignment, and means interposed between said conveyors for effecting the distribution of the bags received from the low speed conveyor in properly spaced relation on the high speed conveyor, said high speed conveyor having bag gripping and holding means, and means for automatically manipulating said high speed conveyor to position the bags at a vertical inclination, whereby the contents thereof are discharged by gravity through the open ends of the bags.

It is another detail object of my invention to provide means for jarring or agitating the bags while in their inclined positions and loosening the contents thereof so that its free flow through the open end of the bag is assured.

It is a further general object of my invention to provide material handling apparatus for the above purpose, which is relatively simple in its construction so that the installation and maintenance cost thereof will be comparatively low.

With the above and other objects in view, the invention consists in the improved material handling apparatus, and in the form, construction and relative arrangement of

its several parts, as will be hereinafter more fully described, illustrated in the accompanying drawings, and subsequently incorporated in the subjoined claims.

In the drawings, wherein I have illustrated one simple and practical embodiment of my present improvement, and in which similar reference characters designate corresponding parts throughout the several views,—

Figure 1 is a plan view illustrating one installation of my present invention and showing the essential features thereof arranged in combination with traveling hoists adapted to receive the bags as they are unloaded from the hold of the vessel;

Fig. 2 is a longitudinal sectional view taken substantially on the line 2—2 of Fig. 1;

Fig. 3 is an enlarged transverse sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is a similar sectional view taken on the line 4—4 of Fig. 2;

Fig. 5 is a perspective view of the guide tracks for the high speed conveyor, and

Fig. 6 is a detail perspective view of a part of the latter conveyor.

Referring in detail to the drawings, and more particularly to Fig. 1 thereof, for the purpose of illustrating one use of my present invention, I have shown a continuous mono-rail track 5 suitably supported upon the water front dock upon which the cargoes of vessels are to be unloaded. A number of electric hoists indicated at 6 travel upon the rail 5, each hoist having a cable 7 provided with suitable means at its end for attachment to the sling or carrier for a number of the bags indicated at B containing raw sugar or other commodity of a similar character. The hoists 6 first carry the sugar bags to a weighing station indicated at S where the sugar is weighed on the Government and merchants' scales. Thereafter, the sugar is delivered to the refinery, and it has heretofore been the practice to transport the sugar bags in trucks, the bags of sugar being manually loaded upon and unloaded from the trucks. Since these bags are quite heavy, this transportation of the bags from

the weighing station to the refinery in addition to consuming a great amount of time, necessarily calls for an expenditure of much physical energy. It is the purpose of my invention to expedite this operation and to also reduce the manual labor heretofore required in the transportation of the bags and emptying the contents thereof to a minimum.

To the above end, I provide a low speed conveyor 8 driven by the motor 9. This conveyor consists of spaced chains connected at intervals by the parallel slats 10, said chains at one of their ends passing around suitable sprockets 11 fixed to the drive shaft and at their other ends around the vertically and laterally spaced sprockets 12. Thus, at this end of the conveyor, the upper stretch thereof moves in an inclined plane between the spaced sprockets 12 as indicated at 13. Arranged below and substantially in alignment with this inclined section 13 of the conveyor 8, a guide chute 14 is arranged which guides and directs the sugar bags B upon the upper stretch of the high speed conveyor 15 which is preferably arranged in longitudinal alignment with a conveyor 8. This high speed conveyor is driven by a separate motor 16 and the intermediate portion thereof extends over or across the unloading station which, in the present instance, is indicated as a hopper 17 into which the contents of the individual bags are adapted to be emptied or discharged to be directed thereby to an elevator or crusher.

The high speed conveyor comprises a single endless link chain 18 passing around the spaced sprockets 19. Spaced links of this chain are provided with the lugs indicated at 20 for pivotal connection as at 21 with the conveyor slats 22 intermediate the ends thereof. The outer surface of each of these slats is provided with a longitudinally extending series of spaced inclined teeth or prongs 23 which are adapted to engage the canvas or other flexible material of the bag B to hold the latter against sliding movement in one direction relative to the conveyor slats.

Each slat 22 at its opposite ends carries an anti-friction bearing roller 24 for engagement upon the inwardly extending flanges of the spaced guide rails 25 and 26 respectively. These guide rails are each in the form of a substantially continuous elongated loop shaped track mounted upon the spaced supports indicated at 27. The upper longitudinal portion of the track rail 25 has its central section upwardly and inwardly curved as shown at 28, while the corresponding section of the upper portion of the other track rail 26 is downwardly and inwardly curved as at 29. Thus, as most clearly seen from reference to Fig. 4 of the drawings, the roller engaging flanges of these sections

of the track rails are positioned at an inclination of substantially 45° in alignment with each other. Accordingly, it will be understood that as the endless conveyor moves over these sections of the rails, the slats 22 thereof will be successively positioned at a corresponding vertical inclination to the track rail section. Preferably, this curved section 29 of the track rail 26 is centrally split transversely thereof as indicated at 30 and suitable cushioning springs 31 are arranged beneath these separated ends of the rail sections. Thus, it will be understood that said end portions of the rail section 29 may have a certain amount of relative yielding movement.

The sugar contained in the bags due to the penetration of moisture through the bag material is frequently caked or hardened, and in order to loosen this caked sugar and insure its release and discharge through the open end of the bag, I provide means for jarring and agitating the conveyor and the sugar bags while in the inclined position. To this end, I have shown a plunger member 32 having one end thereof bearing against the section 28 of rail 25 at its center. This plunger is yieldingly held at its other end by means of a suitable spring in contact with an operating cam 33. It will thus be understood that as this cam is rotated, the section 28 of the rail will be intermittently sprung from its normal position. This movement is transmitted to the conveyor slats 22 whereby said slats are oscillated upon their pivots 21 against the action of the cushioning springs 31.

Adjacent the rail 26 longitudinally spaced uprights 34 are pivotally mounted at their lower ends as at 35 and yieldingly held in vertical position against pivotal movement in one direction by means of the springs 36. The upper ends of these uprights 34 are connected by a rod 37, the intermediate portion of which extends longitudinally above the conveyor and between the guide rails 25 and 26. Thus, it will be apparent from reference to Fig. 4 that as the conveyor slats with the bags thereon are successively tilted to the dumping position, the upper sides of the bags are brought into contact with this rod 37, the latter being displaced from normal position against the action of springs 36. Thus in the rocking movements of the conveyor slats the rod intermittently applies pressure against the bag and its contents which further serves to loosen the latter and facilitate its discharge from the lower open end of the bag.

After the contents of the bags have been discharged or emptied, the empty bags may be removed from the conveyor either manually or by suitable automatically operating means. Such means may consist in a rotating disc such as that indicated at 38 po-

sitioned below one end of the conveyor and driven by the shaft 39, said disc being provided upon its periphery with spaced radially projecting bag engaging members 40. This disc is rotated in proper direction so that after the empty bags are carried around the end of the conveyor, the members 40 will engage said bags and move the same longitudinally on the conveyor slats in the direction of inclination of the prongs 23, thus readily detaching the bags from said prongs.

From the above description considered in connection with the accompanying drawings, the operation of the apparatus will be readily understood. The sugar bags are lifted in slings by the usual derrick on the vessel and lowered to the dock, where the slings are attached to the hoist cable 7. The hoists carry the loads of sugar bags to the weighing station 5 where the weight is recorded by means of the Government and merchants' scales. The hoists then continue their movement along the mono-rail track 5 until the sugar bags are positioned above the end of the low speed conveyor 8 where the bags are released from the sling and drop upon the upper stretch of said conveyor. When the bags reach the inclined section 13 of this conveyor, the upper bags fall downwardly thereon over the lower bags in direct contact with the conveyor slats and are guided by the chute section 14 to the high speed conveyor. In this manner, the bags are received upon the latter conveyor in a more or less spaced separated relation, owing to the relatively high speed of travel of the conveyor 15. As heretofore explained, when the upper stretch of this conveyor reaches the track sections 28 and 29, the individual conveyor slats are successively tilted and also oscillated upon their pivots while in the tilted position to jar or loosen the contents of the bags. As the bags are received upon the high speed conveyor, the closure cord or lace at one end of the bag is removed by an operator. Thus, when the conveyor slats with the bags thereon are vertically tilted, the contents of the bags will be discharged or emptied into the hopper 17. The conveyor slats as they move off of the sections 28 and 29 of the guide rails are then returned to the horizontal position, and at the end of the conveyor, the empty bags are removed in the manner above explained. It will be evident that by means of such an apparatus, the handling of sugar or other loose materials packed in bags or similar containers is greatly facilitated and much of the manual labor heretofore incident thereto is eliminated.

Of course, it will be understood that the conveyors 8 and 15 may be of any desired length, in accordance with the dock space available, and the distance from the storage

warehouse or refinery and the mono-rail 5. Also, it will be apparent that my invention as herein illustrated, is disclosed in a more or less diagrammatic manner, and that the essential features thereof might be incorporated in various other alternative structural forms. Accordingly, the privilege is reserved of resorting to all such legitimate changes in the form, construction and relative arrangement of the various detail parts of the present disclosure, as may be fairly embodied within the spirit and scope of the invention as claimed.

I claim:

1. In apparatus of the character described, an endless conveyor embodying a drive chain and spaced transverse slats pivoted intermediate of their ends to said chain, means on each slat for holding a package against shifting movement longitudinally thereof in one direction, and relatively stationary means cooperating with said slats to vertically tilt the same transversely of the conveyor and effect the gravity discharge of the contents from the packages carried thereby.

2. In apparatus of the character described, an endless conveyor embodying a drive chain and spaced transverse slats pivoted intermediate of their ends to said chain, means on each slat for holding a package against shifting movement longitudinally thereof in one direction, relatively stationary means cooperating with said slats to vertically tilt the same transversely of the conveyor and effect the gravity discharge of the contents from the packages carried thereby, and means for vibrating said conveyor slats while in their tilted positions to loosen the contents of the packages.

3. In apparatus of the character described, an endless conveyor embodying a drive chain and spaced transverse slats pivotally connected with said chain intermediate of their ends, means on each slat for holding a package against shifting movement longitudinally thereof in one direction, relatively stationary means cooperating with said slats to vertically tilt the same transversely of the conveyor and effect the gravity discharge of the contents from the packages carried thereby, means for vibrating said conveyor slats while in their tilted positions to loosen the contents of the packages, and additional relatively stationary means exerting intermittent yielding pressure upon the packages in response to vibratory motion thereof.

4. In apparatus of the character described, an endless conveyor having spaced transverse slats and spaced prongs projecting from the surface of each slat adapted to grip the wall of a flexible bag or container, means for vertically tilting the conveyor slats at a predetermined point in the move-

ment of the conveyor to discharge the contents of the bags, and means for vibrating the conveyor slats while in the tilted position.

5 5. In apparatus of the character described, an endless conveyor having spaced transverse slats and spaced prongs projecting from the surface of each slat adapted to grip the wall of a flexible bag or container,
10 means for vertically tilting the conveyor slats at a predetermined point in the movement of the conveyor to discharge the contents of the bags, and means arranged at one end of the conveyor to disengage the
15 empty bags from the prongs on the conveyor slats.

6. In apparatus of the character described, an endless conveyor having spaced transverse slats and spaced prongs projecting from the surface of each slat adapted to
20 grip the wall of a flexible bag or container, means for vertically tilting the conveyor slats at a predetermined point in the movement of the conveyor to discharge the contents of the bags, means for vibrating the
25 conveyor slats while in the tilted position, and a yieldably supported presser member engaging the wall of the bag to loosen the contents of said bag and facilitate the discharge thereof.
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7. In apparatus of the character described, a horizontally traveling conveyor having spaced transverse slats, means on each slat for holding a bag thereon against
35 shifting movement relative to the conveyor, guide means cooperating with the conveyor to dispose the same during a portion of its movement at a vertical inclination and effect the gravity discharge of the contents
40 of the bags, and means for vibrating said inclined portion of the conveyor.

8. In apparatus of the character described, an endless horizontally traveling conveyor having spaced transverse rows of
45 upstanding prongs to engage and hold flexible bags or containers against movement relative to the conveyor, guide means cooperating with the conveyor at one point in the movement thereof to dispose the conveyor in a vertically inclined position and
50 effect the gravity discharge of the contents of the bags, and means for vibrating said inclined part of the conveyor.

In testimony that I claim the foregoing as
55 my invention, I have signed my name hereto.

JACOB J. NEUMAN.