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FEEDING MECHANISM FOR INTERLOCKING OBJECTS

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3 Claims. (Cl. 222—161)

This invention relates to a vibratory dispensing device for the progressive discharge of objects which are of an interlocking nature.

In the manufacture of objects such as nails, screws, bolts, nuts, washers and other equivalent small parts, it is common practice to tumble the parts in a large drum for the purpose of removing any burrs or surface unevennesses which may result from certain stages in the manufacturing process. Commonly, the articles are removed from the tumbling drum in rather large batches and it is then necessary to convey the articles to a remote point for packaging. Since the batch which is removed from the tumbling drum is, almost invariably, too large to be placed in one package it is necessary to provide some means for breaking up the batch. It has been found convenient to attempt to convey the batch from the tumbling drum to the packaging point in a continuous stream carried by a conveyor belt or other suitable means. In attempting to accomplish this end a difficult problem is encountered in that there is a very strong tendency on the part of the individual objects to interlock with one another when they are dumped from the tumbling drum in a large pile. This tendency to interlock and to resist the formation of a continuous stream is particularly noticeable in articles such as nails, screws and bolts.

It is therefore, an object of the present invention to provide a vibratory dispensing device in the nature of a pan which can receive a relatively large batch of articles from a tumbling drum and which will dispense them from the pan in a continuous and relatively uniform stream.

A preferred embodiment of the invention is illustrated in the accompanying drawings in which like reference numerals denote like parts in the various views and in which:

Figure 1 is a perspective view of one form of the invention;

Figure 2 is a side elevation of the device shown in Figure 1, and

Figure 3 is a side elevation similar to that of Figure 2 showing the contents of the device in a different position.

Referring now to the drawings it will be seen that the vibratory dispensing device comprises a pan 10 defined by a bottom wall 11, two side walls 12 and 13 and one end wall 14, the pan 10 being open at the end opposite to the end wall 14. The bottom wall 11 flares outwardly from the end wall 14 towards the open end and, accordingly, is of a greater width at end 15 than at end 15a. Each of the walls 12, 13 and 14 comprises a lower vertically extending portion designated 12a, 13a and 14a which rises from the margins of the bottom wall 11. Extending upwardly from the upper edge of the lower vertical portion 12a is an outwardly flaring portion designated as 12b, 13b and 14b.

The purpose of providing the side walls of the pan with the configuration described is to prevent compacting of the contents of the pan when it is loaded with material. It will be observed that with the configuration

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shown there is less tendency for the material adjacent the bottom wall 11 to be tightly compacted into place than would be the case if the walls 12 and 13 were straight and flared outwardly continuously from their point of juncture with the margins of the bottom wall 11. Similarly, the walls 12a and 13a flare outwardly from their connection with the end wall 14 to the open end 15 of the pan so that material moving along the bottom wall 11 of the pan from the end wall to the open end is given progressively more space in which to vibrate and, as a result, the individual articles are more readily separated from each other.

A pivot mount is provided for the pan 10 adjacent the end wall 14 and comprises a pair of downwardly extending lugs 16, only one of which is shown, through which extends a pivot shaft 17 having a horizontal axis so that the pan 10 may pivot about a horizontal axis adjacent its end wall 14. Means are provided to adjust the pivot shaft 17 in a vertical direction, such means being shown schematically at 18 in Figure 1.

Adjacent the open end 15 of the pan 10 there is provided a downwardly extending lug 19 to which a link 20 is pivotally secured by one end. At the other end, the link 20 is pivotally secured to an eccentric 21 mounted on a shaft 22 which, in turn, is driven by a pulley 23 through a belt or similar power transmitting mechanism 24 connected, at some point along its length, to a prime mover (not shown). It will be seen accordingly, that rotation of the pulley 23 will cause rotation of the eccentric 21 which will cause the link 20 to reciprocate the open end of the pan 10 in a substantially vertical direction through an arc about the pivot arm 17.

Extending outwardly from the open end 15 of the pan 10 and secured to the bottom wall in substantially parallel relationship thereto is a substantially flat resilient plate 25 which, in the embodiment illustrated, extends outwardly from the open end 15 of the pan 10 in a cantilever fashion, being secured to the bottom surface of the bottom wall 11 by means such as rivets 26. As can be seen in Figures 1, 2 and 3 reciprocation of the open end 15 of the pan 10 in a vertical direction about the pivot 17 will set the resilient plate 25 in vibration.

The plate 25 is of a width which is approximately one half the width of the open end 15 of the pan 10 and, accordingly, particles flowing over the plate 25 may fall from the plate along both edges 25a as well as off the end 25b.

Having now described the construction of the device, the mode of operation will now be discussed.

Referring to Figures 2 and 3 the pan 10 will be seen to contain a batch or pile of objects of an interlocking nature which, as described above, may include such objects as nails, screws, bolts. The pile of objects is indicated by the reference character 27 and, for the purposes of the present discussion, let it be assumed that the center of gravity of the pile 27 lies at the point indicated by the dot 28.

When the eccentric 21 is set in rotation by the associated mechanism, the open end 15 of the pan will reciprocate in a vertical direction and means are provided associated with the prime mover to vary the speed of rotation of the eccentric 21 so that the violence of the vibratory action of the pan 10 may be adjusted. Under the influence of the vibration and reciprocation of the pan 10 the batch 27 of interlocking objects will tend to flatten out and separate into discrete particles and, during the course of this separation will flow toward the open end 15 of the pan. It is to be noted that the violence of the vibration experienced by the material within the pan will be greatest at the open end 15 of the pan 10 and, accordingly, that material which lies almost vertically above the pivot 17 will be, for the moment, relatively unaf-

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fectured by the vibration imparted to it by the pan. That portion of the material lying at the point indicated by reference character 27a, however, will experience sufficient vibration that it will move from the position shown in Figure 2 towards the position shown in Figure 3 and, at the same time, there will be a tendency for the entire pile to flatten out and, as seen in the two figures the center of gravity 28 has moved an appreciable distance to the right in the condition shown in Figure 3. The outward flare of the bottom wall 11 enables the pile 27 of material to spread out in both a lateral as well as a longitudinal direction during the movement towards the open end 15 of the pan. As the material of the pile 27 moves towards the open end 15 of the pan 10, a portion will move onto the resilient plate 25 which, as seen in the drawings, oscillates or vibrates through a much greater distance than that through which the open end 15 of the pan 10 may move. As a result the material leaving the open end 15 of the pan 10 is subjected to a final vibration which is more violent than it has previously experienced and since this violent vibration imparted to it by the plate 25 is applied only to the leading edge of the forwardly flowing pile, the plate 25 will efficiently and effectively separate the discrete particles which compose the pile and fling them from its surface as individual articles rather than as interlocked groups of articles.

As more material is moved from the forward edge 27a of the pile 27, the pile will flow towards the open end 15 of the hopper and as it does so it will progressively be reduced in density and will finally be broken down into discrete particles due to the fact that the amplitude of the vibration which it experiences increases as it moves towards the open end. The vertical position of the pivot shaft 17 is, preferably, adjusted so that the bottom wall 11 of the pan 10 is, at all times, slightly inclined to the horizontal to promote the flow of material from the end wall 14 towards the open end 15. The vertical position of the pivot shaft 17 will be adjusted for various types of material with which the device may be used as will the speed of rotation of the eccentric 21.

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The invention has been described with reference to a particular preferred embodiment and the above description is intended to be construed as illustrative of the inventive features rather than as limiting them to the embodiments disclosed. The invention is susceptible of all modifications comprehended within the scope of the appended claims.

What I claim as my invention is:

1. A vibratory dispensing device comprising a bottom wall, two side walls and one end wall defining a pan open at one end and closed at the other, a pivot mount for the pan adjacent its closed end so that the pan may pivot about a horizontal axis, an eccentric beneath the open end of the pan and connected to the pan by a link pivotally secured to the bottom of the pan, means to drive the eccentric so that the open end of the pan may be reciprocated in a vertical direction about the pivot mount, and a substantially flat resilient plate secured to the bottom wall at the open end of the pan, said plate extending forwardly of the open end of the pan in cantilever fashion substantially parallel to the bottom wall and capable of being set in vibration with an amplitude greater than that of the open end of the pan as a result of the reciprocation of the open end of the pan by the eccentric.

2. A vibratory dispensing device as claimed in claim 1 in which each side wall and the end wall comprise a lower vertical portion extending upwardly from the margins of the bottom wall and an upper, outwardly flaring portion extending from the upper edge of the lower vertical portion.

3. A vibratory dispensing device as claimed in claim 1 in which the resilient plate is of a width less than the width of the open end of the pan.

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