

Nov. 28, 1967

E. E. LAKSO

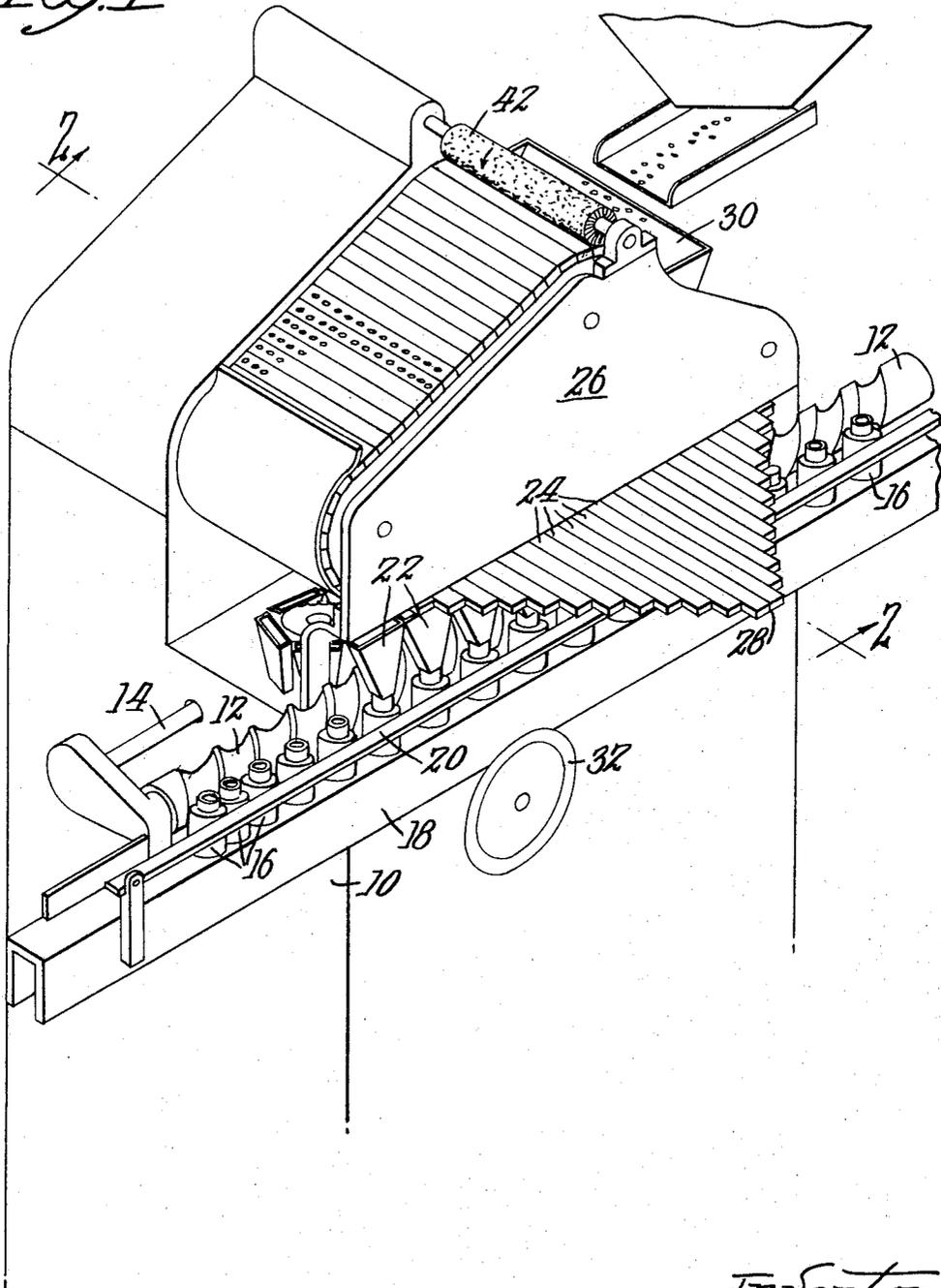
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SLAT TYPE COUNTING AND FILLING MACHINE

Filed May 20, 1965

4 Sheets-Sheet 1

*Fig. 1*



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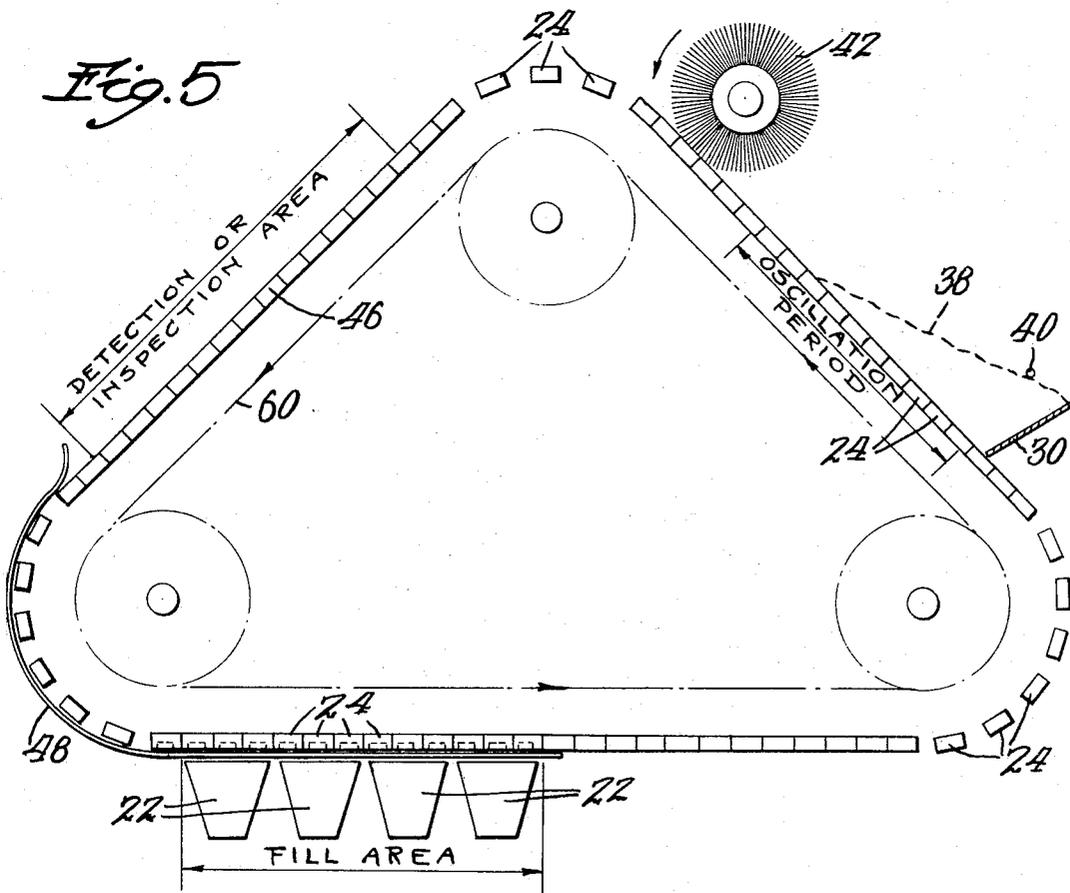
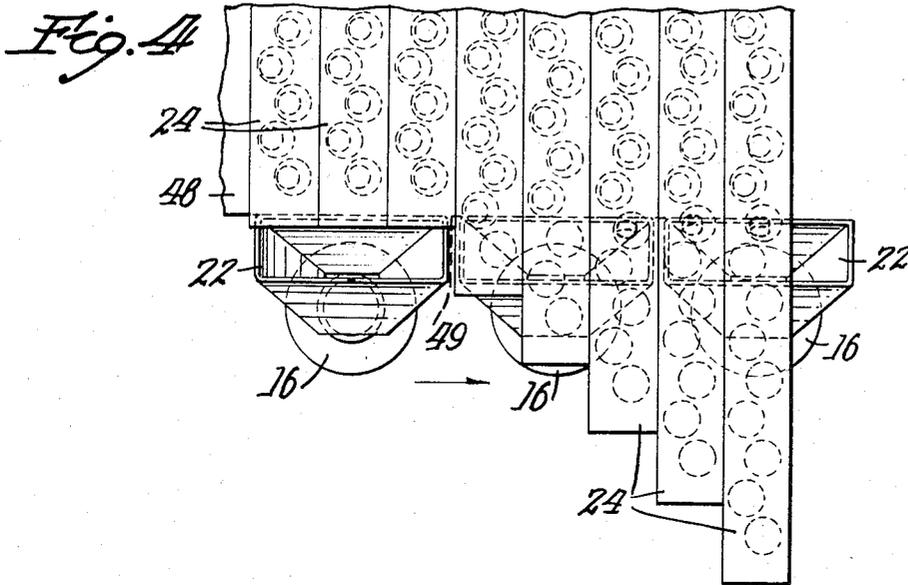
E. E. LAKSO

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Nov. 28, 1967

E. E. LAKSO

3,354,607

SLAT TYPE COUNTING AND FILLING MACHINE

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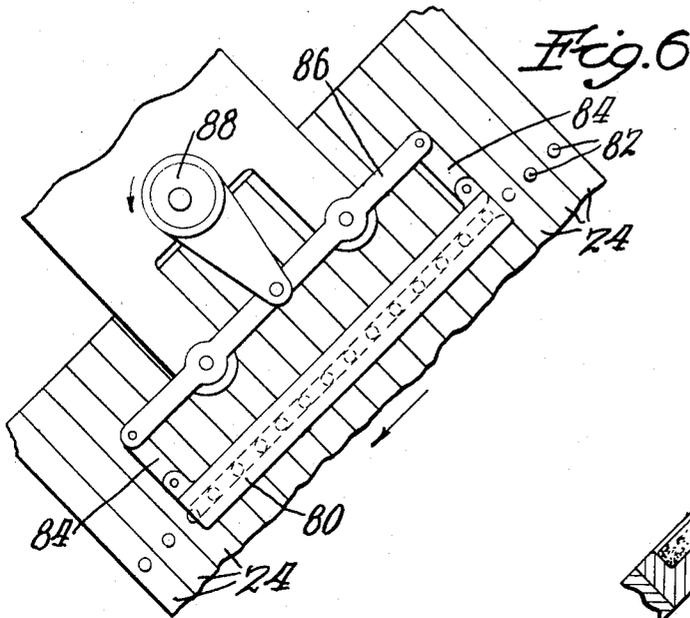


Fig. 6

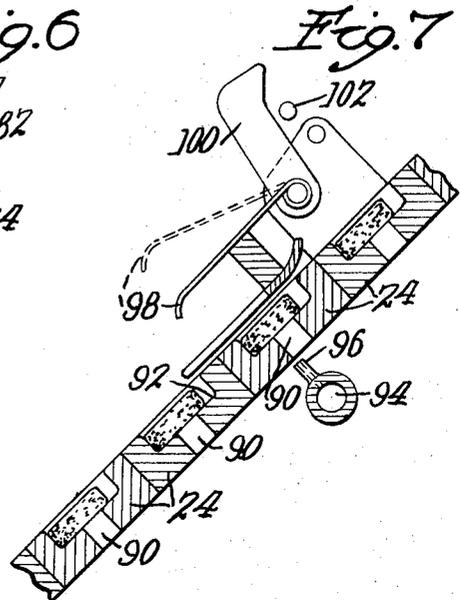


Fig. 7

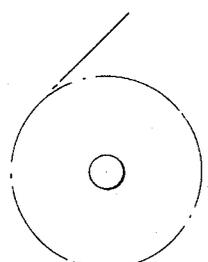


Fig. 8

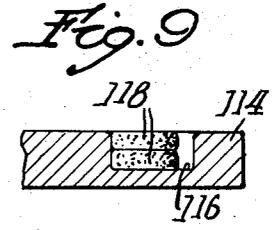
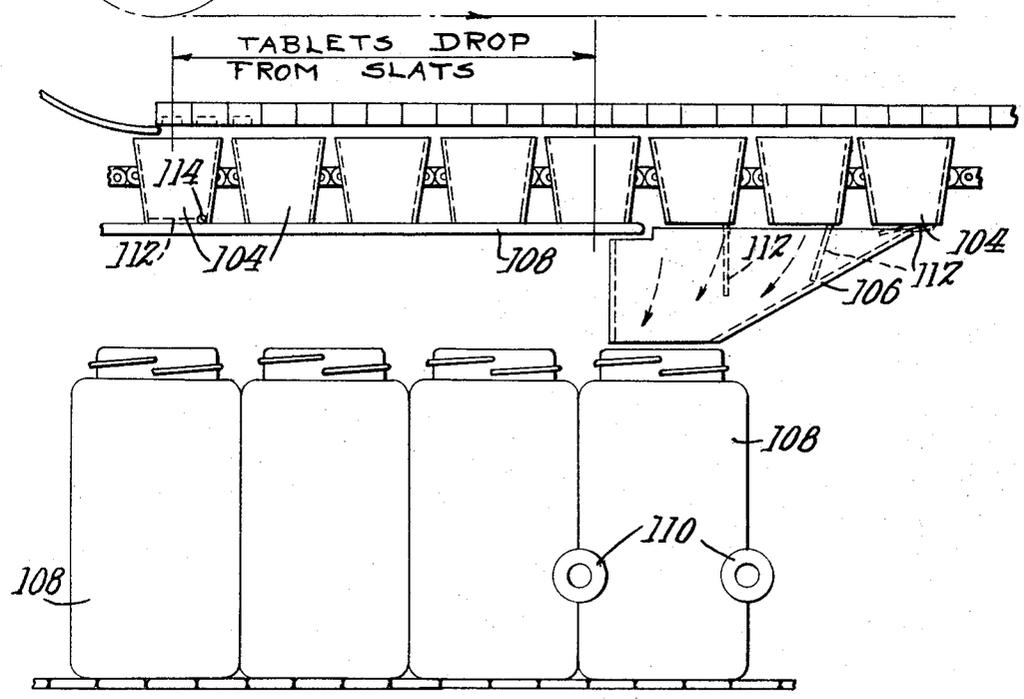


Fig. 9



TABLETS DROP FROM SLATS

1

2

3,354,607  
**SLAT TYPE COUNTING AND FILLING MACHINE**  
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 Fitchburg, Mass. 01420  
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 17 Claims. (Cl. 53—78)

**ABSTRACT OF THE DISCLOSURE**

A machine for counting and filling relatively small discrete articles comprising a series of generally parallel slats and means moving said slats in a closed path transverse to the lengths thereof, each slat being provided with a series of cavities at the same sides thereof, together with means placing articles in the cavities at one area of the path and means retaining the articles in the cavities during the travel of the slats to an area containing means moving a series of containers in an endwise relationship parallel to the direction of the motion of the slats, there being a series of chutes, with means supporting the chutes in position above the moving containers, the chutes moving in concert with said containers, the slats being emptied into the chutes by moving the slats lengthwise thereof, so that a series of articles, say for instance one in each cavity, is moved into a single chute and also a series of slats may deposit their articles into a single chute so as to count and fill the containers as they move along in the relationship stated above.

This invention relates to a new and improved slat type counting and filling machine particularly adapted for small discrete articles and providing a new and improved means for the rapid counting and filling of such articles in relatively small containers. The principal object of the invention resides in the provision of an extremely flexible machine which can count the articles and fill containers extremely rapidly and in any amount. For instance, aspirin tablets are ordinarily counted and filled in amounts of one hundred, and ordinarily it is highly desirable to have these containers filled at a fast pace to maintain the speed of the line, i.e., other machines such as labeling, capping, cottoning, etc. It has been found that the slat type of machine can be utilized for greater speed in filling but in the present case the machine is adapted for other counts and speeds so as to make it very flexible as compared to the prior art types of machines including inclined and vertical chutes, rotary heads, etc.

One of the principal objects of the present invention is to provide a slat type of machine which is continuously operative, rather than step-by-step, and which accurately counts the articles placed in the containers. This novel machine comprises a series of parallel slats which have cavities in their wide surfaces and which move in an endless path in a direction transverse to the lengths of the slats, through a charging area, an inspection area, a container filling area, and return.

Another object of the invention resides in the provision of a slat type of machine as aforesaid in which the slats are individually movable during the filling period both in the general direction of motion of the slats, and laterally thereof, the slat motion being synchronized with reference to the container motion, so that as each slat is moved laterally of its general line of advance over a container, it deposits all of its articles held therein into a single container, the slats then being retracted into their normal path to once more be charged.

Another object of the invention resides in the provision of the slat type of machine as aforesaid having a synchronized motion with the containers to be filled and

including certain new and improved traveling funnel-like chutes which move with the containers; further, these chutes extend the distance of the width of several slats to receive articles from more than one slat, each chute being aligned with a single container; and the provision of chutes as aforesaid which are elongated in the direction of normal travel of the slats for the purpose of accepting tablets from a plurality of slats as they move laterally over the chutes, in combination with means continually feeding the containers and increasing the space therebetween so that there is no interference between the various parts of the mechanism but at the same time each chute accommodates a single container and a plurality of slats.

Other objects of the invention include modifications for bulk filling to any amount which may be desired, depending upon relatively simple changes over the mechanism above referred to, and including relatively large bucket-like containers which receive the articles from the slats and which themselves are fed to a depositing position for single larger containers.

Other objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawings in which:

FIG. 1 is a perspective view illustrating the new machine from the bottle in-feed end thereof;

FIG. 2 is a section on line 2—2 of FIG. 1;

FIG. 3 is a perspective view in diagrammatic form illustrating the relationship between the bottle conveyor, the chutes and the slats;

FIG. 4 is an enlarged plan view illustrating the relationship of slats and chutes;

FIG. 5 is a diagrammatic view illustrating the general operation from the charging of the slats to the container filling area;

FIG. 6 is a view illustrating the slat oscillating mechanism;

FIG. 7 is a detail view showing an empty cavity detection apparatus;

FIG. 8 shows a modification for bulk filling, and

FIG. 9 is a detail of a way to double the capacity of the machine.

As an illustration of the present invention, attention is directed first to FIG. 1 wherein the machine is shown looking from the bottle in-feed end toward the filled bottle or container out-feed end.

Such framework, guards and covers as desired may be of course used in any way convenient. However, mounted on a framework 10 or the like there is a horizontal screw 12 continuously driven as by a shaft or the like 14 through gearing shown in FIG. 3. This screw 12 travels containers 16 through the machine and at its in-feed end close to the observer, it has a lead to receive containers and travel them along a path defined by a support or under-conveyor 18 in close contacting relationship, these containers 16 coming from any source of supply. The lead of the screws 12 then gradually enlarges, i.e., the distance between threads increases, thus spacing the containers for a purpose which will become apparent hereinafter. The containers are moved continuously and are held against the screw 12, which may conveniently be made of some elastomeric or hard fiber material, by a guard rail or guide 20. They pass under continually advancing chutes 22 arranged to be positioned one chute over each container, the chutes traveling synchronously with the containers.

The chutes are themselves filled by inverted cavity-type slats 24 which gradually move outwardly laterally from the machine framework 26 in the container filling area, and by so doing deposit their articles in the chutes and containers. As will be described, several slats accommo-

date a single chute so that a required relatively high count of articles may be deposited in each container.

The slats move outwardly in a smooth continuous motion until the peak which is indicated at 28 is reached, at which point the slats are empty. Then they are retracted once more to come in line with the feeding hopper 30 which fills them once more as they are re-inverted to present their cavities in an upward position. At the out-feed end, the bottles are transferred to the cottoning machine or other succeeding operation. If desired, a hand wheel 32 can be utilized to check the action of the machine before starting the motor.

Mounted within the framework and under the slats there is provided a power takeoff as at 34 to drive a continuous conveyor 36 on which are mounted the individual chutes 22 and they are driven simultaneously and at the same speeds with the containers in a closed continuous path.

Referring now to FIG. 5 the filling hopper is shown at 30 and this hopper is fed by any kind of supply desired, to a certain level as indicated at 38, controlled by mechanism not shown operated by a photoelectric cell or the like 40, so that the proper weight or amount of articles is provided to rest upon the traveling slats in the cavity-charging period. The filled slats then pass under a brush 42, the principal purpose of which is to brush off excess articles. It will be noted that the area of the machine where the charging of the slats takes place extends upwardly or on an incline, thence over a peak and down into a detection or inspection area at 46 where an operator can remove defective articles. From the detection area the slats then pass over a guard sheet 48 so that as the slats invert, the articles are held in the cavities without falling out, but when they arrive at the area where the chutes 22 are located, the slats start to move laterally from sheet 48, as shown in FIG. 1, and over the respective chutes 22, thus discharging the articles from the cavities simply by gravity as the slats leave the sheet 48.

Referring now to FIG. 2, it will be seen that each slat 24 has mounted in extension thereof an elongated supporting rod 50. Each rod 50 is mounted in an element 52, each of which has a pair of spaced bearings 54, 54 thereon to hold the rods 50 rigidly with the respective slats extending outboard thereof. Each shaft or rod 50 has a cam follower 56 for cooperation with a flat cam 58. As the slats approach the container filling station, this cam bears on the cam followers 56 and pushes the slats gradually from a retracted position, at the top of FIGS. 1 and 2, as at the detection or inspection area, to the most fully laterally advanced position thereof shown at the filling area, FIGS. 1 and 2 at the bottom. This cam also causes retraction of the slats from their most extended condition at 28 back to a condition in line with the filling hopper 30 once more. The cam 58 may be simply a groove that receives the cam followers 56.

Also referring to FIGS. 2 and 5, it will be seen that the bearing members 52 are attached to sprocket chains or the like 60, 60 and driven by sprockets 62, 62 in the continuous closed path mentioned above and particularly clear from an inspection of FIG. 5.

It is believed that the operation of the machine will be clear from the description given above. The power set-up can be as desired but it will be clear from FIG. 3 to be relatively simple and all being driven by a single main drive 70 as from a sprocket or pulley 72 from a motor not shown.

Now referring to FIG. 6, there is here shown a means for oscillating the shaft endwise to a very short degree during the loading operation as indicated by the hopper at 30 in FIG. 5. There is an open-ended channel 80 which receives a series of pins 82 on the bottom surfaces of the slats and this channel is oscillated through the linkages 84 and bars 86 from a constantly driven eccentric 88. This insures that all of the cavities are filled from the feeding device 30 and as stated there may be excess articles on the

tops of the slats but these are brushed backward by the brush 42.

FIG. 4 shows the relationship of the articles in the cavities in the slats with the chutes and the containers. It will be seen that each slat moves farther outwardly, as it progresses, and moves from a position where the articles are held against falling by the guard sheet 48 to a position where they ride off of the sheet at its edge 49. Thus the articles are dropped into the elongated rectangular chutes which then lead all of the articles from one chute, i.e., from three slats, into single containers. Because of the fact that the chutes are elongated in the direction of travel of the containers 16 it is necessary to space the containers as by the gradually increasing lead of screw 12.

Also, it is to be noted that the cavities are staggered in each slat and thus allows more cavities per slat than would be otherwise possible. In any event, the effect is that the articles cascade into the chutes a few at any instant as the slats pass over and across the tops of the chutes. This prevents fouling or piling up in the chutes and allows a smooth easy operation.

Referring now to FIG. 7 there is shown an apparatus for detecting whether or not there are any empty cavities. This detecting means could be used to shut the machine off or merely to energize a signal to cause the operator to watch out for cavities. Also it can be applied where desired, preferably at the beginning of the inspection and detection area.

In the form shown in FIG. 7, each slat 24 is provided with small apertures 90 in communication with the cavities as indicated at 92. There can be provided an air chamber 94 having a nozzle or jet 96 which continuously blows in the direction of the slats. As the slats pass over the jets, its force is interdicted by the articles themselves. If there were an empty cavity 92, then the air jet impinges on and moves a sensitive paddle member 98 which in turn actuates a contact, or a shutter member 100 in cooperation with a photoelectric cell at 102, causing a signal to be transferred to any location or device desired. This signal shuts off the feed or otherwise indicates that there is an empty cavity which must be filled prior to the filling operation.

Now referring to FIG. 8 there is here shown a modification of the device. In this case in general the article charging and discharging may be the same as before but instead of using the advancing chutes there are provided a series of relatively large bucket-like containers 104. These containers could receive say one hundred, two hundred, five hundred articles. These containers are open at both ends, and when filled they pass over a fixed chute 106, a fixed container 108 can be filled. The articles in the bucket-like members 104 are prevented from dropping out by the stop plate 108 or the members 104 may be provided with bottoms 112, which can be hinged as at 114 so that when the buckets pass off of stop plate 108, the bottoms drop into the dotted line position as shown in this figure at the right-hand end thereof. With this construction the articles will not be tumbled about in the bottom of the buckets.

In this case it is preferable that the containers 108 should be moved along together in step-by-step relation and to this end a conventional air cylinder operated stop means 110 can be used to momentarily stop the containers while they are being filled. Suitable conventional, synchronizing mechanism and the fact that three slats can be used to serve each bucket, makes it possible to obtain practically any count per cycle that is desired.

FIG. 9 illustrates one cavity in a slat where the articles to be counted and filled have a rather wide diameter but are correspondingly narrow. This slat is indicated at 114 and the cavity at 116. The articles are shown at 118 and it will be observed that the cavity is large enough to accept two of these articles.

Therefore when they are being emptied into the containers, there will be two articles from each cavity. Nat-

urally if the articles are thin enough, more than two could be accommodated in a cavity.

This construction is particularly adapted for use in tablets that are overly large in diameter which would therefore require an overly long slat in order to provide for the counts of one hundred in each container by the use of three slats.

Among the advantages of the present invention are the facts that the present production is much faster than that of any previous slat machine because all slat machines heretofore have been step-by-step, filling the containers while the containers are stopped; whereas in the present case, no time is lost in shifting the containers but the entire operation is smooth and continuous. Furthermore there is a very short drop from the inverted slats through the chutes into the containers as compared with the very long path of drop of prior art slat machines where the articles drop by gravity as the slats are inverted over a pulley or the like. The mechanism lends itself to fast and accurate counting and filling as well as bulk filling as exemplified by the construction of FIG. 8 even though here the feed of the containers is intermittent. By mounting the slats on rods, the same can be oscillated in order to ensure all of the cavities being filled as opposed to the prior art construction of mounting the slats directly on chains so that the slats are not able to be oscillated from side to side as in the present case although of course they can be very slightly diverted by conventional vibration devices. In the present invention there is plenty of room for inspection, the machine is compact and relatively inexpensive to manufacture and yet at the same time it operates at high rates of speed smoothly and continuously.

None of the dust from the articles can get into the mechanism or at least to a minor degree because the traveling mechanism for the slats is housed as shown in FIG. 1 and if desired an outboard fixed guideway may be provided for the ends of the slats opposite from the rods which support them. Little maintenance is needed and as illustrated in FIG. 9, certain kinds of articles may be processed at a double or even triple capacity, depending upon the size and thickness of the articles.

There is no pause of the slat action at all nor are there any blank slats, nor is any gating needed, and one hundred counts through even borderline small neck diameters of containers is possible due to the smooth even tablet flow. The speed is adjustable and the magnitude of lateral tablet oscillation is adjustable to provide for optimum conditions of different sizes and shapes of tablets, and simply by changing the slats there is provided a simple and quick changeover from one kind of tablet to another.

Variations of the number of tablets to be placed in a container are almost endless. In some cases three or four rows of tablets can be placed in a single slat, or a container can receive a single row of tablets from a single slat; or several slats may be utilized for a single container. It will be clear that if a single row of tablets is to be utilized to be placed in a single container, it will not be necessary to utilize the chutes which are elongated in the direction of travel of the chutes and containers but a single straight tube would suffice. In some cases it is derived to have a small amount of tablets in a container as for instance samples.

Having thus described my invention and the advantages thereof, I do not wish to be limited to the details herein disclosed, otherwise than as set forth in the claims, but what I claim is:

1. An article counting and filling machine comprising a series of slat-like members, means supporting said members, means moving said members in a closed path in a direction generally transverse to the lengths thereof, each slat being provided with a series of cavities therein,

means to place articles in the cavities at one area of said path, means to invert the slats, means retaining

the articles in the cavities during the inversion of the slats,

means moving a series of containers in an in-line relationship generally parallel to the direction of motion of the slats,

and a series of chutes at another area of said path, means supporting said chutes in position above the containers, means moving said chutes in concert with said containers, and means providing for the emptying of the articles from said cavities into said chutes and thence into said containers while the slats are inverted.

2. The article counting and filling machine of claim 1 wherein said slats, containers and chutes move together in the same direction.

3. The article counting and filling machine of claim 1 wherein said slats, containers and chutes move together in the same direction and the slats also move transversely of said direction during the container filling operation, passing across a respective chute.

4. The article counting and filling machine of claim 1 wherein said slats, containers and chutes move together in the same direction, and means moving said slats longitudinally of their lengths as the tablets drop into the chutes.

5. The article counting and filling machine of claim 1 wherein said slats, containers and chutes move together in the same direction, and means moving said slats longitudinally of their lengths off of the tablet retaining means, allowing the tablets to drop by gravity into the chutes.

6. The article counting and filling machine of claim 1 wherein the cavities are arranged in staggered relationship along the slats.

7. The article counting and filling machine of claim 1 including a cam for moving the slats longitudinally of their lengths, there being a cam follower on each slat, said cam followers being engaged with the cam.

8. The article counting and filling machine of claim 1 wherein each chute is elongated in the direction of travel of the slats.

9. The article counting and filling machine of claim 1 wherein each chute is elongated in the direction of travel of the slats, and including means for spacing the containers so that each container accommodates a single chute, the dimensions of the chutes in the direction of elongation being greater than the size of the containers.

10. The article counting and filling machine of claim 1 wherein the chutes are elongated in the direction of the travel of the slats, each chute being longer than a single slat and receiving articles from more than one slat.

11. The article counting and filling machine of claim 1 including an empty cavity detector comprising a continuous jet of air arranged in fixed relation arranged to direct a jet of air into the cavity and to be there interdicted by an article in the cavity, a paddle, said paddle being moved by the jet of air only when a cavity is passing the paddle and is empty, and signal means controlled by the movable paddle.

12. An article counting and filling machine comprising a generally endless conveyor means, a plurality of rods, a series of supports on the conveyor, each support slidably holding therein a rod extending transversely to the direction of motion of the conveyor, a slat mounted on each rod, said slats extending laterally of the conveyor, and each slat being provided with a series of cavities therein at like surfaces thereof, said slats being traveled by the conveyor in an endless path,

means filling the cavities with articles when the cavities are presented substantially upwards, means inverting the slats at a predetermined area after filling the cavities, means retaining the articles in the cavities in a part of the area of inversion of the slats,

a guideway, means moving containers to be filled along the guideway, a series of open-ended chutes, means moving the chutes in conjunction with and above the

containers, said guideway and chutes being located in a position laterally spaced from the general path of the slats in the area of inversion, means moving the slats endwise as they approach the area of the chutes, said slats passing from the area of the article retaining means as they move endwise, and said chutes and containers being positioned to receive articles from the cavities thereof as the slats leave the article retaining means.

13. The article counting and filling machine of claim 12 wherein said rods are movable laterally of the conveyor on which they are mounted to so also move the slats in the chute and container area.

14. The article counting and filling machine of claim 12 wherein said rods are movable laterally of the conveyor on which they are mounted to so also move the slats in the chute and container area, and means including a cam which periodically moves the rods and thereby the slats from the normal position relative to the conveyor to the position wherein they leave the article retaining means, the slats thereby gradually passing over the open top ends of the chutes and depositing by gravity the articles in the cavities into the chutes and thus into the containers.

15. The article counting and filling machine of claim 12 wherein said rods are movable laterally of the conveyor on which they are mounted to so also move the slats in the chute and container area, and means including a cam which periodically moves the rods and thereby the slats from the normal position relative to the conveyor to the position wherein they leave the article retaining means, the slats thereby gradually passing over the open top ends of the chutes and depositing by gravity the articles in the cavities into the chutes and thus into the containers, said chutes being elongated in the direction of travel of the slats, a plurality of slats overlying each chute in the container filling position.

16. The article counting and filling machine of claim 12 wherein said rods are movable laterally of the conveyor on which they are mounted to so also move the slats in the chute and container area, and means including

a cam which periodically moves the rods and thereby the slats from the normal position relative to the conveyor to the position wherein they leave the article retaining means, the slats thereby gradually passing over the open top ends of the chutes and depositing by gravity the articles in the cavities into the chutes and thus into the containers, said chutes being elongated in the direction of travel of the slats, a plurality of slats overlying each chute in the container filling position, and means maintaining the containers spaced apart in conformance to the chutes.

17. An article counting and filling machine comprising a series of slats, means moving said slats in a direction transverse to the lengths thereof in a continuous path, each slat having a series of cavities therein at corresponding side surfaces thereof,

means to charge the cavities at one area of the machine and means causing deposit of the articles from the cavities at a filling area of the machine,

in combination with a series of bucket-like members which receive the tablets from the slats, means moving said bucket-like members in conformance with the slats, a fixed chute, means supporting said bucket-like members in container-filling position at the chute and discharging the articles from the bottoms thereof through the chute to a container,

and means feeding containers along a line parallel to the line of advance of the bucket-like members, means for stopping the forward motion of the line of containers so that the leading container is located under the fixed chute to receive the articles from a plurality of the bucket-like members as they pass over the chute.

#### References Cited

#### UNITED STATES PATENTS

2,094,460	9/1937	McBean et al.	
3,139,713	7/1964	Merrill et al.	53--78 X

TRAVIS S. MCGEHEE, *Primary Examiner*.