

[54] **ELEVATOR-HOPPER-FEEDER-ASSEMBLY**

[75] Inventor: **Charles Frederick Bross, Chicago, Ill.**

[73] Assignee: **Pennwalt Corporation, Philadelphia, Pa.**

[22] Filed: **Mar. 27, 1972**

[21] Appl. No.: **238,597**

[52] U.S. Cl. **198/54, 187/24, 198/126, 198/233, 214/512**

[51] Int. Cl. **B65g 65/44**

[58] Field of Search **214/17 D, 512; 222/160, 199; 198/220 BA, 54, 126; 187/24, 25**

[56] **References Cited**

UNITED STATES PATENTS

3,305,067	2/1967	Mayer	198/220 BA X
1,325,437	12/1919	Dertouzos	222/160
3,568,804	3/1971	Olson	214/512
1,566,223	12/1925	Manor	187/25

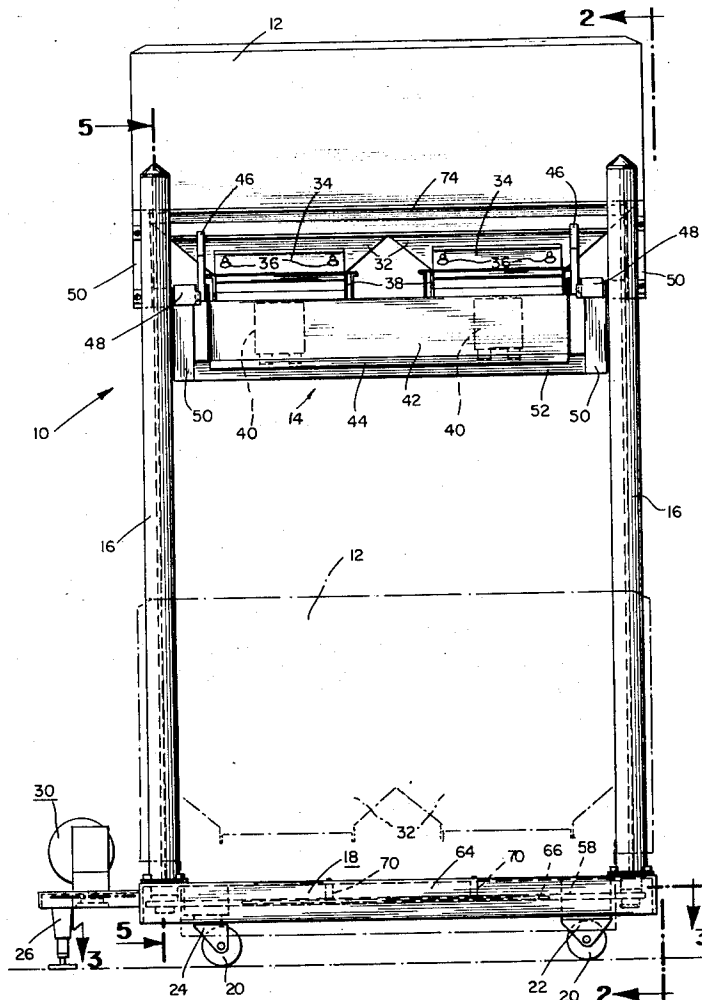
Primary Examiner—Robert G. Sheridan

Attorney—Edward A. Sager

[57] **ABSTRACT**

An elevator-hopper-feeder assembly has a hopper-feeder subassembly which is guidably supported for vertical movement by four hollow corner posts. Each corner post has a jack-screw rotatably mounted therein, each of the jack-screws being threadably connected to the subassembly by means of brackets extending through a vertical slot formed in each post. A prime mover mounted to the frame of the assembly is utilized to turn the jack-screws by means of a roller chain supported within the frame, and consequently raise or lower the subassembly. The subassembly includes a hopper which discharges articles onto a feeder pan, and a vibrator which vibrates the toward the to move the articles toward an inclined feed chute, the latter guiding the articles into a receptacle. To prevent any of the articles from becoming accidentally lodged or trapped within the posts during operation of the assembly, the structure confined within the posts is formed to have inclined surfaces which permit any articles entering the posts to slide outwardly toward the slots.

6 Claims, 6 Drawing Figures



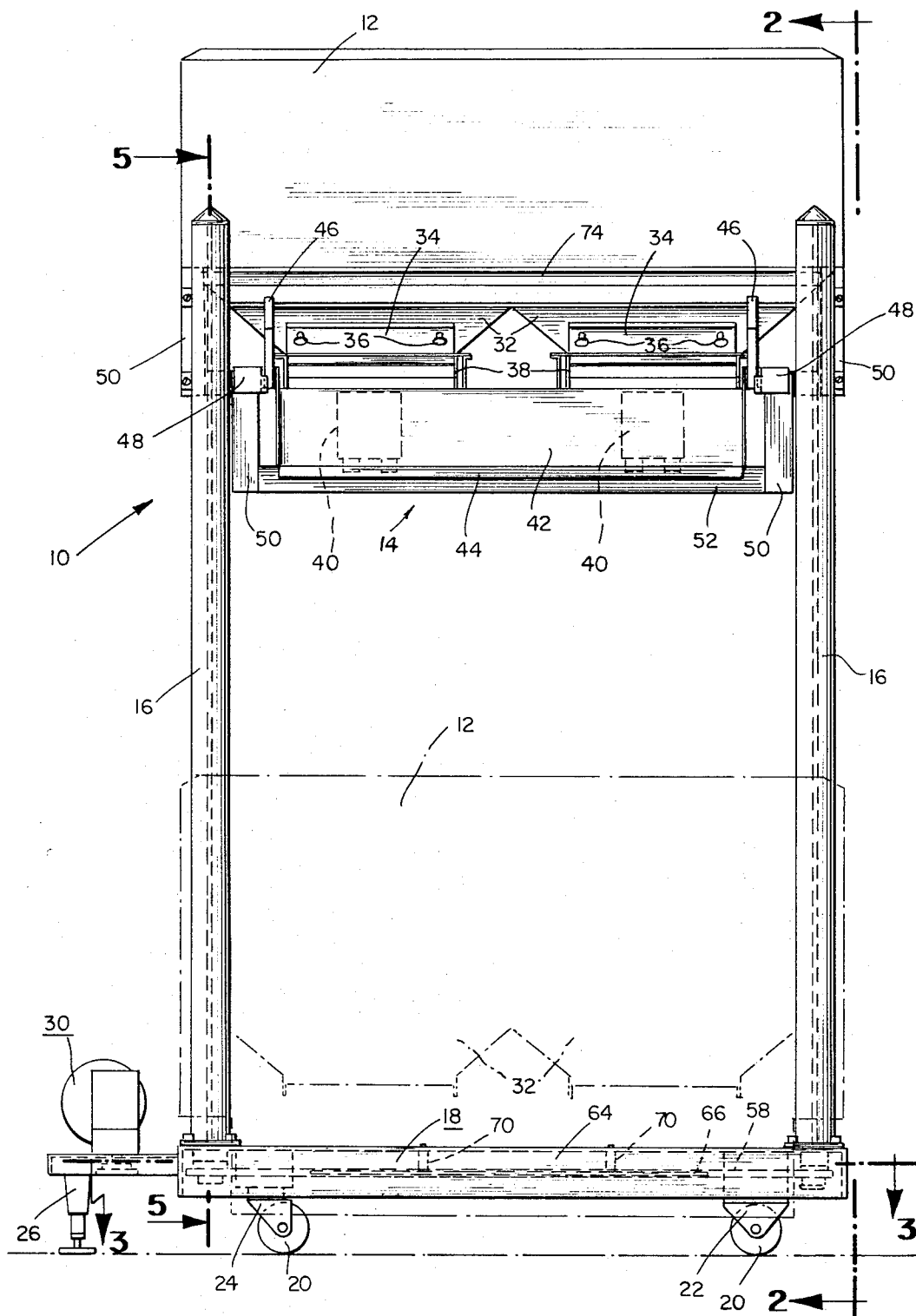


Fig. 1

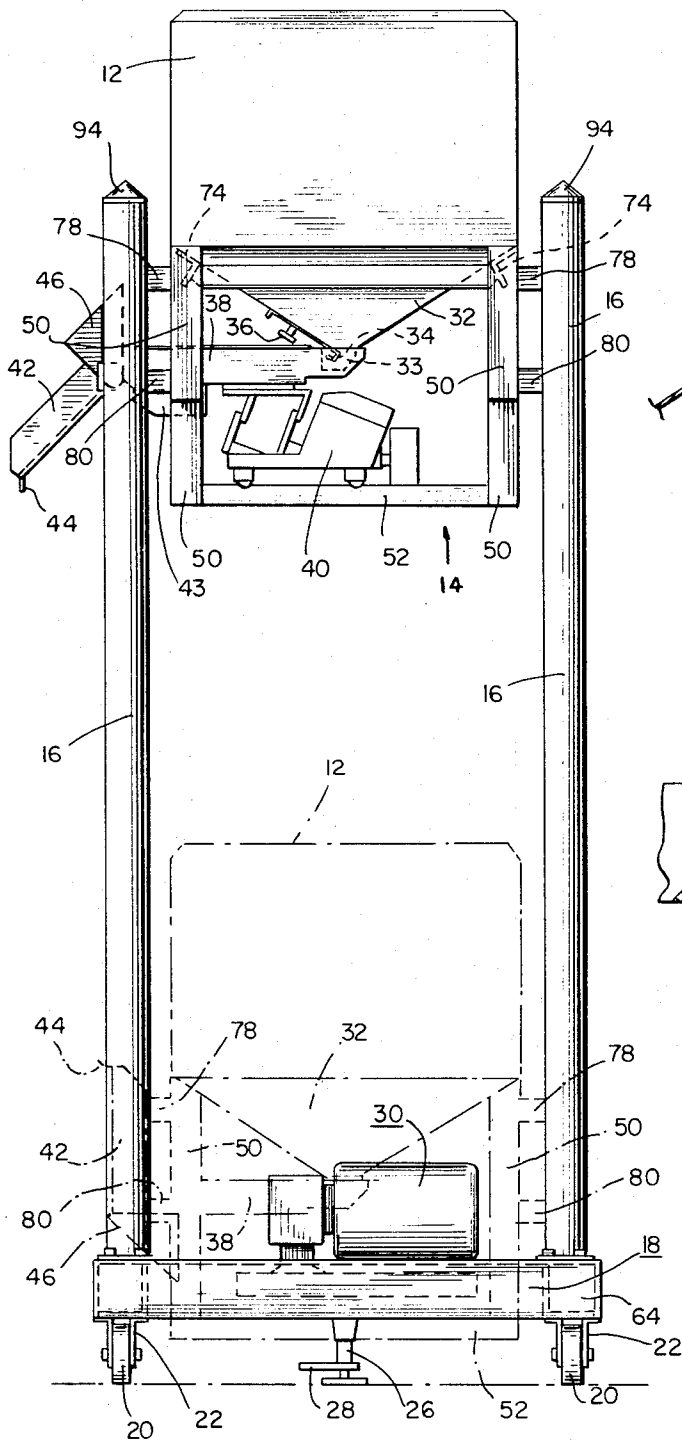


Fig. 2

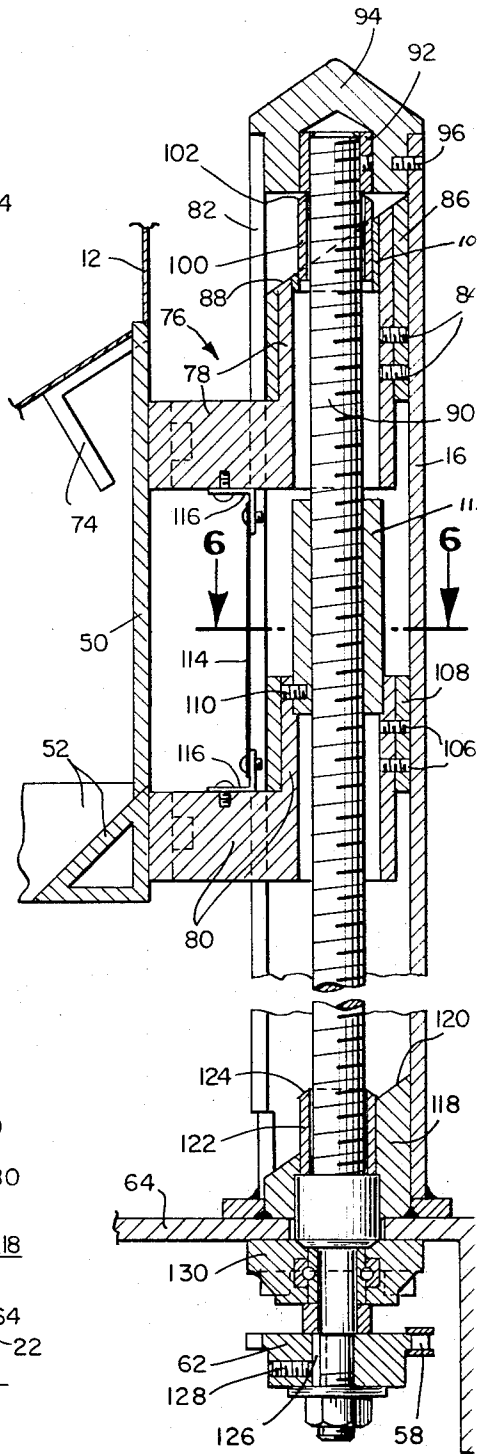


Fig. 5

ELEVATOR-HOPPER-FEEDER-ASSEMBLY**BACKGROUND OF THE INVENTION**

This invention relates to an elevator-hopper feeder assembly having elevator means for raising and lowering the hopper-feeder-subassembly per se being designed so as to minimize the possibility of articles from one batch of load of articles from becoming lodged within the assembly, and subsequently becoming loosened and mixed with a subsequent batch of different articles placed in the subassembly.

While not so limited, the present assembly is described for use in conjunction with tablet counting machinery (i.e., a tablet counter), wherein the assembly is utilized to feed tablets into the counter. The assembly is generally located adjacent the counter, and periodically feeds tablets into the hopper of the tablet counter during the operation of the latter.

Up to the present time, in order to feed tablets to the counter, it has been necessary to either mount an auxiliary hopper adjacent the counter on a stationary structure, or mount an auxiliary hopper on a conventional fork-lift truck, so that the auxiliary hopper can be conveniently raised and lowered for refilling and cleaning, and can be moved about more conveniently. With a conventional fork-lift truck, however, the size of the hopper is limited by what can be placed upon the fork-lift. If it is desired to utilize a larger capacity hopper, the fork-lift mechanism must necessarily be redesigned or modified to support the larger hopper. In addition, a reconsiderable amount of floor space is required to accommodate the fork-lift truck with the hopper mounted thereon, and even though the fork-lift truck is mobile it is somewhat limited in the directions in which it can move.

In addition, with this latter arrangement the hopper per se is not always fixedly connected to the fork-lift mechanism, thus increasing the danger of the hopper falling. Also, a fork-lift truck is not particularly designed for supporting a structure such as the hopper, and consequently numerous crevices, flat surfaces, etc., exist, where tablets from a first batch may become lodged and later mixed with a subsequent batch which is placed into the hopper.

BRIEF DESCRIPTION OF THE INVENTION

This invention relates in general to an elevator-hopper-feeder assembly wherein the hopper-feeder subassembly per se is removably but securely supported, on an elevating mechanism for raising and lowering the subassembly.

In particular, the assembly includes a frame comprising a rectangular base, the latter having four hollow upright posts or tubes mounted on the corners thereof. Each of the hollow posts has a jack-screw rotatably mounted therein.

The hopper-feeder subassembly is supported by a plurality of brackets which extend through vertical slots formed in the posts, the brackets being threadably connected to the jack screws and guidably mounted within the posts.

A gear motor is mounted on the frame of the assembly and is utilized to rotate the jack-screws by means of a sprocket and roller chain mechanism, this mechanism being supported within the rectangular base; depending upon the direction of rotation of the jack screws, the hopper-feeder subassembly is either raised or lowered.

The lower end of the hopper includes a generally funnel-shaped portion, the latter having a valve controlled discharge opening formed in the bottom thereof. Tablets are discharged from the hopper onto a feeder pan, the subassembly further including a vibrator which vibrates the feeder pan to feed the tablets toward an open end thereof where the tablets drop onto an inclined chute, and consequently are fed to the counter or other desired location.

Numerous inclined surfaces both within the posts and exterior thereof, so prevent tablets from becoming accidentally lodged within the assembly, as does a cover plate which extends between the upper and lower brackets on each post and covers the vertical slot between these brackets.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of an elevator-hopper-feeder assembly incorporating the present invention.

FIG. 2 is an end elevational view of the elevator-hopper-feeder assembly.

FIG. 3 is a transverse cross-sectional view taken through line 3—3 of FIG. 1 showing the base (lower frame), and the sprocket and roller chain mechanism supported therein.

FIG. 4 is a cross-sectional view taken through line 4—4 of FIG. 3, and showing the means for supporting and guiding the roller chain within the base.

FIG. 5 is a cross-sectional view taken through line 5—5 of FIG. 1, and showing the jack screw and brackets mounted within one of the posts.

FIG. 6 is a transverse sectional view taken through line 6—6 of FIG. 5 showing the cover plate utilized for covering the slot between upper and lower brackets so as to prevent tablets from entering the slots during the operation of the assembly.

DETAILED DESCRIPTION OF THE INVENTION

Referring to FIG. 1, an elevator-hopper-feeder assembly 10 is shown, the assembly including a hopper 12, the latter being part of a hopper-feeder subassembly 14 for delivering tablets, capsules, or other articles from hopper 12 to a desired location. Hopper-feeder subassembly 14 is mounted for vertical movement within four upright tubes or posts 16, the latter being part of the overall frame 18 of the assembly. Frame 18 is mounted on wheels 20, the two rear wheels being connected to the frame by means of two stationary casters 22 (see FIG. 2 and 3 also). The two front wheels 20 are connected to frame 18 by means of two swivel casters 24, thus allowing the assembly to be moved sideways as well as in forward and rearward directions.

Mounted to the frame 18 is a floor-lock 26, the latter being a commercially available item. Floor-lock 26 is utilized to lock a hold assembly 10 in place once it has been moved to the desired location. Floor-lock 26 includes a pad which is moved downwardly by pedal 28 until contacting the floor, at which point the pad is held by an internal spring mechanism until released once again by stepping on pedal 28 to release the spring mechanism.

The elevator mechanism used to raise and lower subassembly 14 includes a gear motor 30, a conventional commercially available item available from the Reliance Electric Co. a corporation of Delaware. As will be more fully explained later, this gear motor is utilized to

operate a sprocket and roller chain mechanism which in turn rotates jack screws mounted within vertical posts 16. Referring to FIG. 1, hopper 12 is shown in its uppermost position (as indicated by the solid lines), and in its lowermost position (as indicated by the phantom lines). Subassembly 14 is lowered to its lowermost position when it is desired to refill and/or clean hopper 12. Although not shown, means are provided for removably mounting hopper 12 on subassembly 14 so that the hopper can be removed therefrom if desired.

As can be seen in FIGS. 1 and 2, the lower end of hopper 12 contains two funnel shaped portions 32 having discharge openings 33 which allow the tablets or other articles to be discharged from the bottom thereof. The discharge of tablets from openings 32 is controlled by a gate 34 which is slidably mounted within each of the funnel shaped portions 32, each gate being manually controlled by a knob 36. Gates 34 control the rate at which tablets are discharged from hopper 12 into feeder pan 38. The less the gates 34 are opened, the less the depth of tablets that will be contained within each of the feeder pans 38, there being one feeder pan mounted beneath each discharge opening 33.

Although not shown in the drawings, each feeder pan 38 has a screen mounted in the bottom thereof, over which the tablets pass. Each feeder pan 38 and the screen contained therein, is vibrated by a conventional commercially available vibratory feeder 40; a suitable vibrating feeder is the Model F-010 vibrator feeder, available from the Syntron Division of the FMC Corporation, this Division being located in Homer City, Penna.

As tablets are discharged from hopper 12 into feeder pan 38, vibratory feeder 40 serves to vibrate feeder pan 38 so as to move the tablets outwardly toward an open end thereof and onto a feed chute 42, from which the tablets slide into the hopper of a tablet counter or other receptacle.

It can be seen in FIGS. 1 and 2 that chute 42 extends completely across both feeder pans 38, and has a downwardly extending lip 44; during operation, this lip extends over the tablet counter or other receptacle in which it is desired to discharge the tablets. On each end of chute 42, a control weight or counterweight 46 is fixedly connected thereto, brackets 48 being used to connect the chute and counterweights to vertical members 50 of the subassembly. Extending between vertical members 50 where needed, are horizontal members 52, these latter members supporting vibratory feeders 40. In the event that subassembly 14 is inadvertently lowered while the lip 44 is located over a tablet counter or other receptacle, chute 44 will pivot clockwise about its pivot point as viewed in FIG. 2, and upon reaching a predetermined position, the counterweight 46 will serve to move the chute to its retracted vertical position (indicated by phantom lines).

Referring to FIG. 3, it can be seen that gear motor 30 is utilized to drive a sprocket 56 in a clockwise direction, thus moving roller chain 58 in the direction indicated by arrows 60. Roller chain 58 is guided around the interior of the frame 18 by means comprising a plurality of guiding sprockets 61 and 62, the latter mentioned sprockets being connected to the jack-screws and disposed beneath frame members 64 (see FIG. 5 also).

The generally L-shaped frame members 64 serve to protect the operator while the elevating mechanism is in operation by acting as a shield for the moving roller chain 58 and sprockets 62.

Roller chain 58 is supported within a groove formed by two plates, (see FIG. 4), the first plate 66 being welded to the vertical flange of member 64 while a second plate 68 is connected to a support rail 70 which is secured to the horizontal flange of frame member 64 by a screw 72. Thus, it can be seen that as the chain 58 moves around within frame members 64 during the operation of the elevating mechanism, the chain will be prevented from sagging or dropping below the frame members by riding or moving within the groove or channel formed between plates 66 and 68.

Referring to FIG. 5, it can be seen that the hopper 12 rests on a plurality of angles 74, the latter being fixedly connected to elevating mechanism 76. This latter mentioned mechanism includes upper bracket 78 and lower brackets 80, these brackets being fixedly connected to vertical and horizontal members 50 and 52 respectively. As can be seen, upper and lower brackets, 78 and 80 respectively, extend through a vertical groove or slot 82 formed in each post 16. Upper bracket 78 is connected by means of set screws 84 to an annular bearing 86 which is guidably supported or mounted within post 16. As can be seen, the upper surfaces of bracket 78 and bearing 86 form a continuous inclined surface 88 to prevent any tablets from passing through the slot 82, and becoming lodged within post 16. Extending through bracket member 86 is a jack-screw 90, the latter having a bearing 92 fixedly connected thereto by means of a set screw (unnumbered). Bearing 92 is rotatably supported within cap 94, the latter being connected to the upper end of post 16 by means of set screw 96. It should be noted that the upper surface of cap 94 is inclined, this inclined surface again serving to prevent any tablets from becoming accidentally lodged within the assembly. Surrounding the jack-screw 90, is an annular sleeve 100, there being a slight annular space between the sleeve and jack-screw to permit rotation of the latter. The upper end of sleeve 100 is also inclined as indicated by the numeral 102, to prevent tablets or any other foreign materials from becoming lodged within post 16. An annular sleeve 100 is surrounded by a second annular sleeve 104, both of these sleeves being non-rotatably mounted within upper bracket 78.

Lower bracket 80 is connected by means of set screws 106 to a lower bracket bearing 108 which is guidably mounted within post 16. Bracket 80 is also secured by means of a set screw 110 to a ball nut 112, the latter having internal threads which cooperate with those on the jack-screw. Extending between the upper and lower brackets 78 and 80 respectively, is a cover plate 114, which is secured to the latter mentioned brackets by means of a bracket 116; this cover plate serves to prevent tablets and other foreign materials from entering the interior of post 16 via that portion of slot 82 disposed between bracket 78 and 80.

Within the lower end of post 16 is an annular sleeve 118 having an upper inclined surface 120, and contained within sleeve 118 is a second annular sleeve 122, there being a slight annular clearance between the latter mentioned sleeve and jack-screw 90 to permit rotation of the latter. The upper end of sleeve 122 is inclined as indicated by the numeral 124. Thus, it can be

seen that the present assembly is constructed throughout with numerous inclined surfaces to prevent tablets or other foreign materials from becoming accidentally lodged within the assembly. Although not so shown, it may also be desirable to have the upper surfaces of brackets 78 and 80 inclined.

The lower end of each jack-screw 90 is rotatably mounted to frame 18 by means of bearing 130. Each sprocket 62 is keyed to the jack-screw by means of a key 126 the latter being retained in place by set screw 128. Consequently as gear motor 30 is actuated in the desired direction, roller chain 58 will be moved accordingly over sprockets 61 (rotatably mounted to frame 18) and sprockets 62, thus simultaneously rotating each of the jack-screws 90. As each jack-screw rotates, the ball nut moves upwardly or downwardly, consequently raising or lowering hopper-feeder subassembly 14.

I claim:

1. An elevator-hopper-feeder assembly for feeding a plurality of articles to a desired location, said assembly having a frame comprising a plurality of upright posts, each of said posts being hollow and having a vertical slot formed therein; a hopper-feeder subassembly comprising a hopper having a discharge opening formed therein, a generally horizontally disposed feeder pan having an open end, said feeder pan being mounted beneath said opening, means for vibrating said pan whereby articles discharged through said opening and onto said pan are moved along said pan toward said open end, and bracket means fixedly connected thereto, said bracket means extending through said slots and being quidably mounted within said posts; means including a prime mover mounted on said frame for raising and lowering said subassembly, said raising and lowering means including a rotatably mounted jack-screw disposed within each of said posts, and means operatively connecting each of said jack-screws with said bracket means, whereby upon rotation of said jack-screws, said subassembly is vertically moved; said assembly being mounted on a plurality of rollable members to permit movement of said assembly; and means for preventing said articles from becoming accidentally lodged within said vertical posts.

2. An elevator-hopper-feeder assembly according to claim 1 wherein said hopper includes a generally funnel-shaped portion formed on the lower end thereof, said opening being located at the bottom of said portion, and further including valve means for controlling the discharge of said articles through said opening and onto said pan.

3. An elevator hopper-feeder assembly according to

claim 2, wherein said subassembly includes a feed chute disposed adjacent the open end of said feeder pan, said chute being pivotly mounted to said frame so as to be movable to either an inclined feed position in which it is disposed so as to receive the articles moving over the open end of said feeder pan, or to a retracted upright position, and counterweight means fixedly connected to said chute to assist in moving said chute to said retracted position.

4. An elevator-hopper-feeder assembly according to claim 3 wherein there are four said upright posts, said raising and lowering means including a roller chain operatively connecting said prime mover to each of said jack-screws.

5. An elevator-hopper-feeder assembly for feeding a plurality of articles to a desired location, said assembly having a frame comprising a plurality of upright posts, a hopper-feeder subassembly comprising a hopper having a discharge opening formed therein, said subassembly being quidably mounted to said posts, means including a prime mover, mounted on said frame for raising and lowering said subassembly, said assembly being mounted on a plurality of rollable members to permit movement of said assembly; each of said posts being hollow and having a vertical slot formed therein, said subassembly mounting means including bracket means fixedly connected thereto, said bracket means extending through said slots and being quidably mounted within said posts, said raising and lowering means including a rotatably mounted jack-screw disposed within each of said posts, means operatively connecting said jack-screws to said bracket means, and means for preventing said articles from becoming accidentally lodged within said posts.

6. An elevator-hopper-feeder assembly according to claim 5, wherein the lower end of said hopper includes a plurality of generally funnel-shaped portions, there being one of said discharge openings at the bottom of each funnel-shaped portion, said sub-assembly including a generally horizontally disposed feeder pan having an open end, said feeder pan being mounted beneath said opening, means for vibrating said pans so as to move said articles toward said open ends, a single feed chute disposed adjacent the open ends of said feeder pans, said chute being pivotly mounted so as to be movable to either an inclined feed position in which it is disposed so as to receive the articles moving over said open ends, or to a retracted generally upright position, and counterweight means fixedly connected to said chute to assist in moving said chute to said retracted position.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,768,628 Dated October 30, 1973

Inventor(s) Charles Frederick Bross

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 5, line 33, "quidably" should read -- guidably --

Column 6, line 20, "quidably" should read -- guidably --

Column 6, line 28, "quidably" should read -- guidably --

Signed and sealed this 14th day of May 1974.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents