

April 20, 1948.

F. J. KENDLE

2,439,977

TABLET PACKAGING MACHINE

Filed Feb. 8, 1947

5 Sheets-Sheet 1

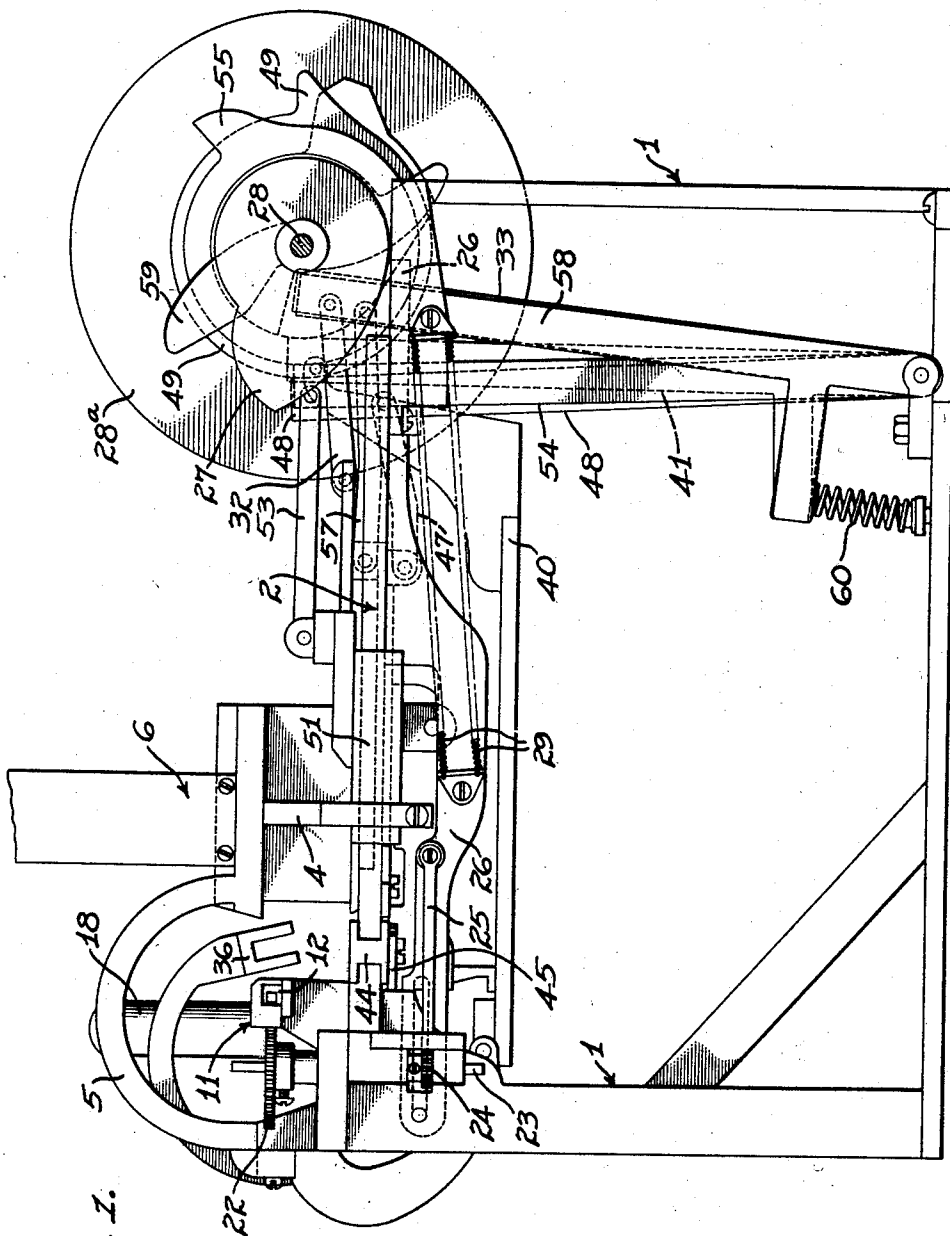


FIG. 1.

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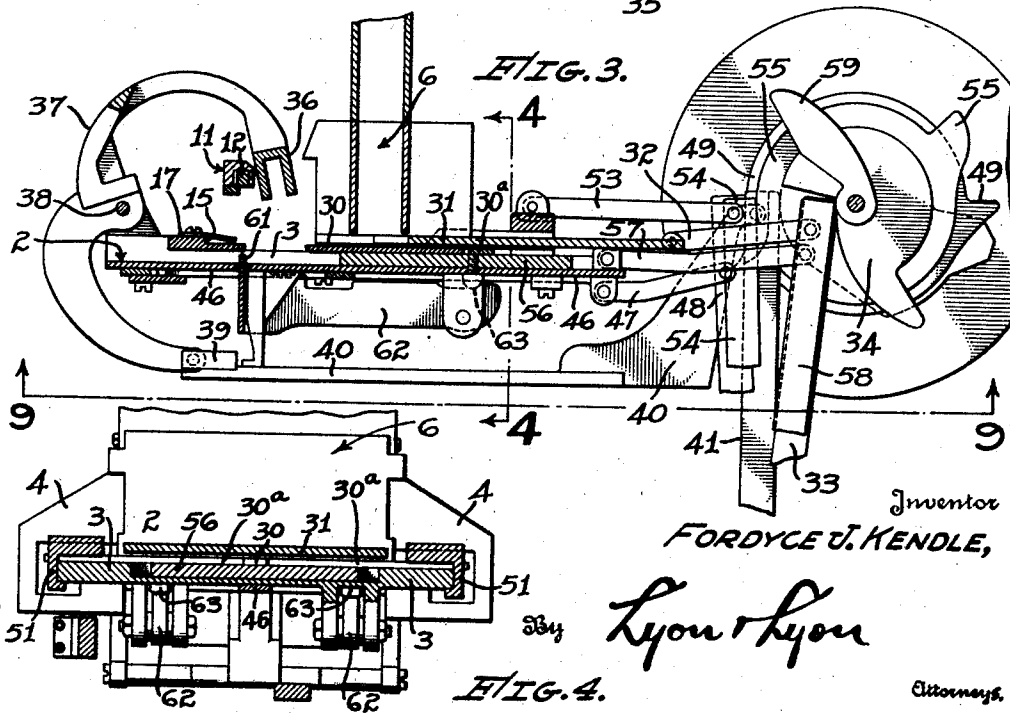
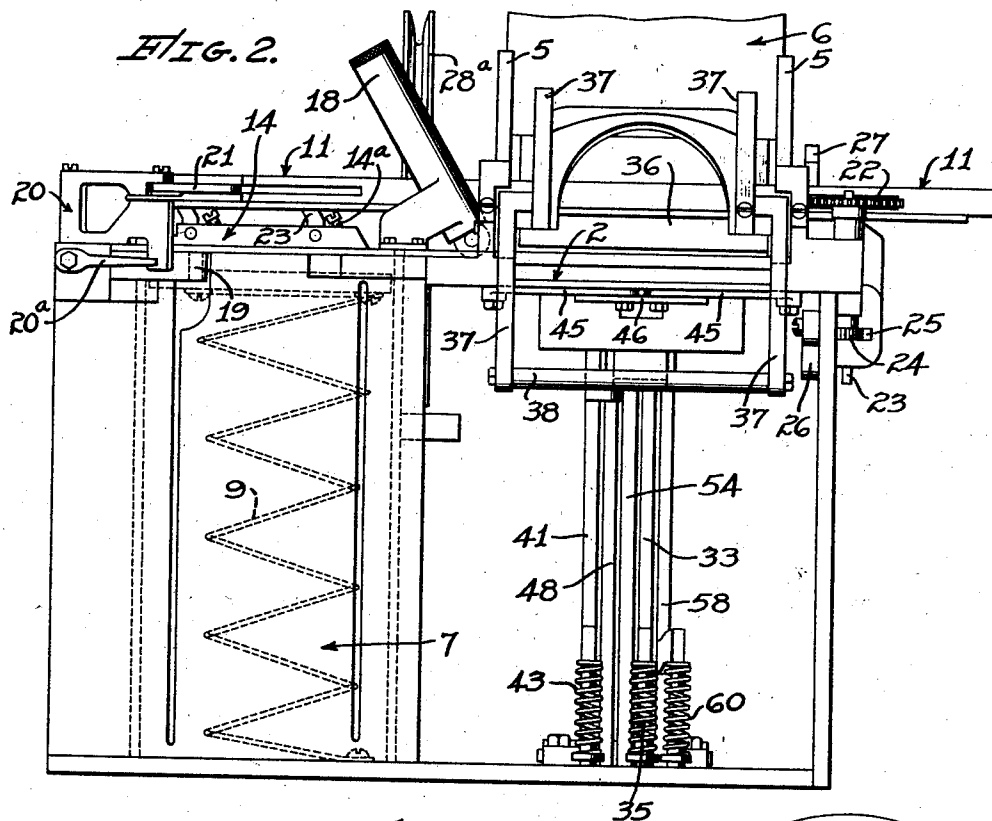
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TABLET PACKAGING MACHINE

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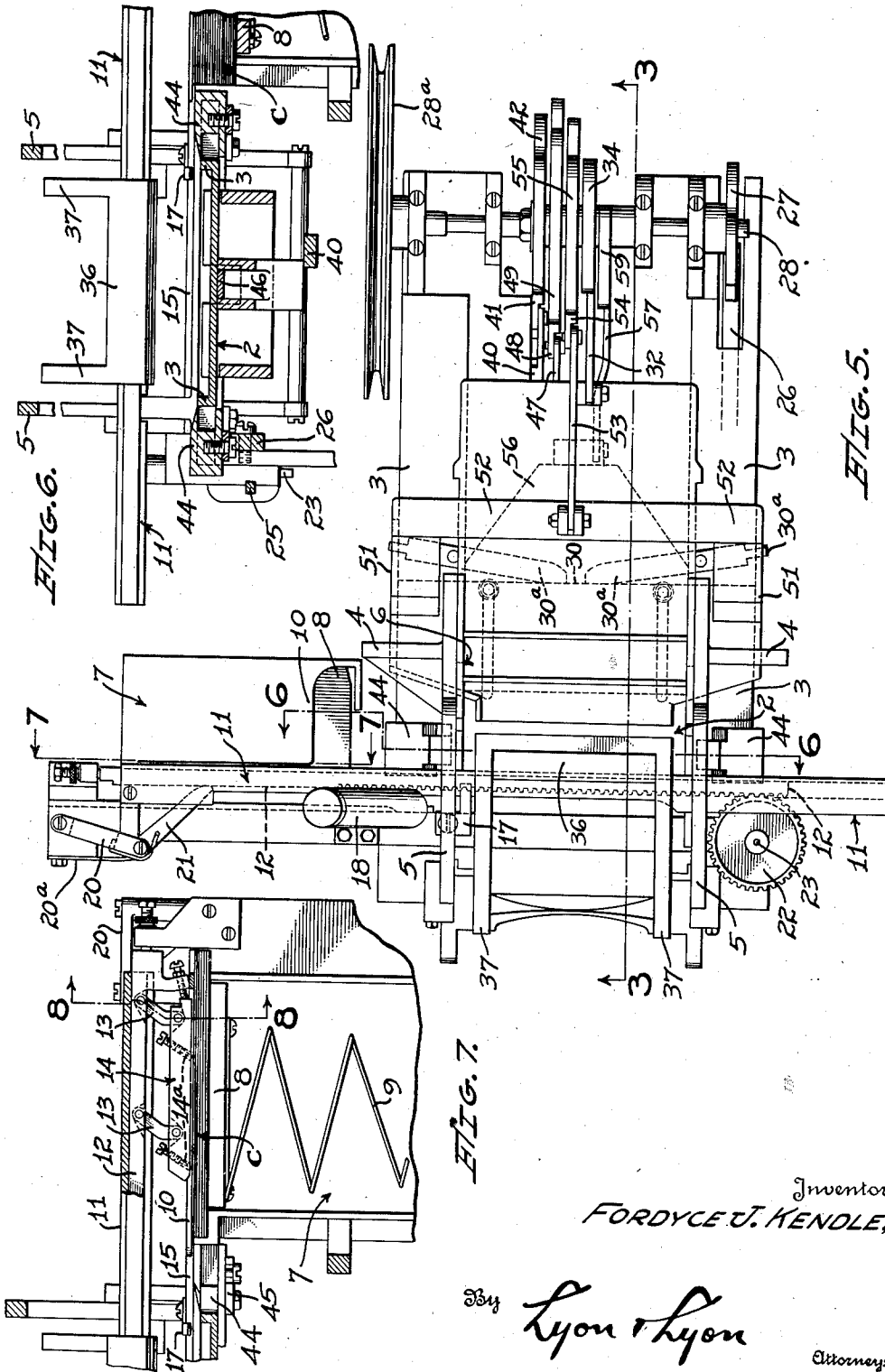
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TABLET PACKAGING MACHINE

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5 Sheets-Sheet 3



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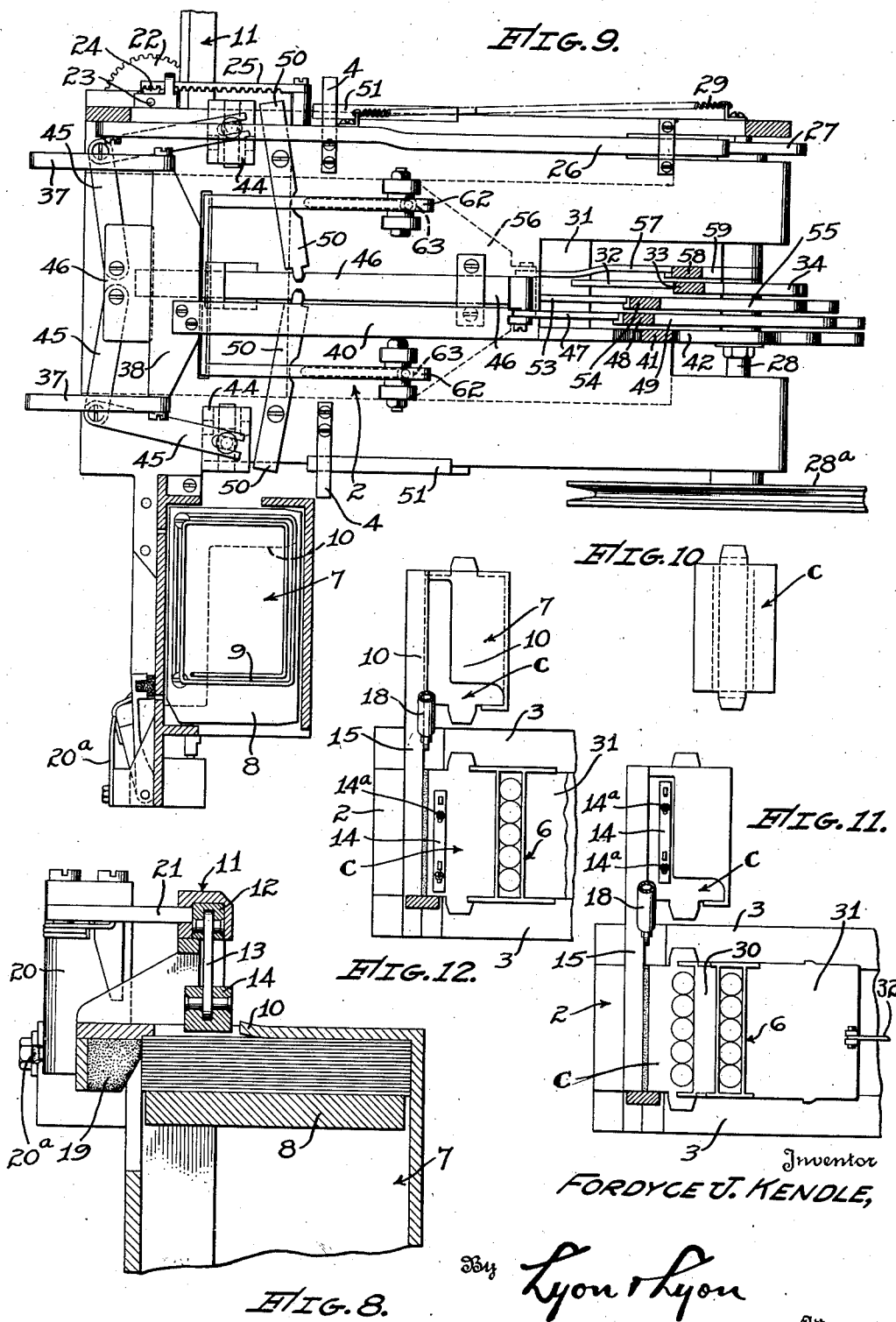
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TABLET PACKAGING MACHINE

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5 Sheets-Sheet 4



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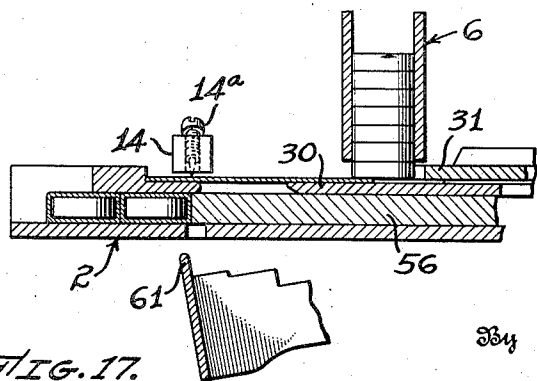
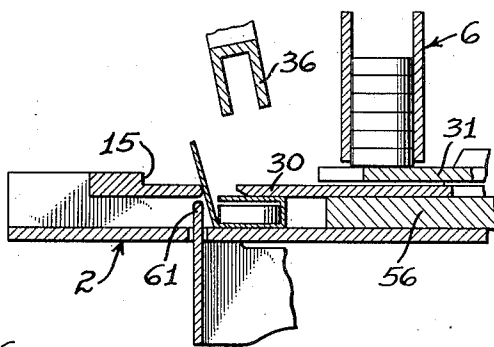
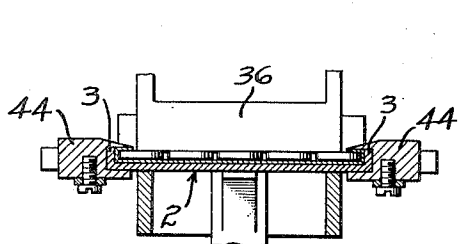
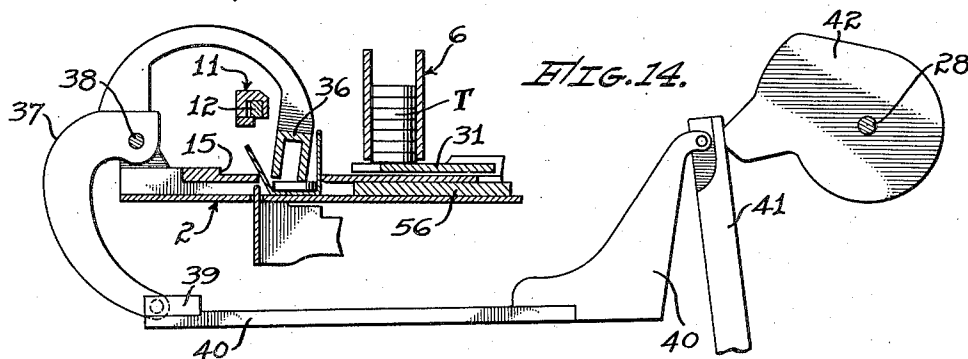
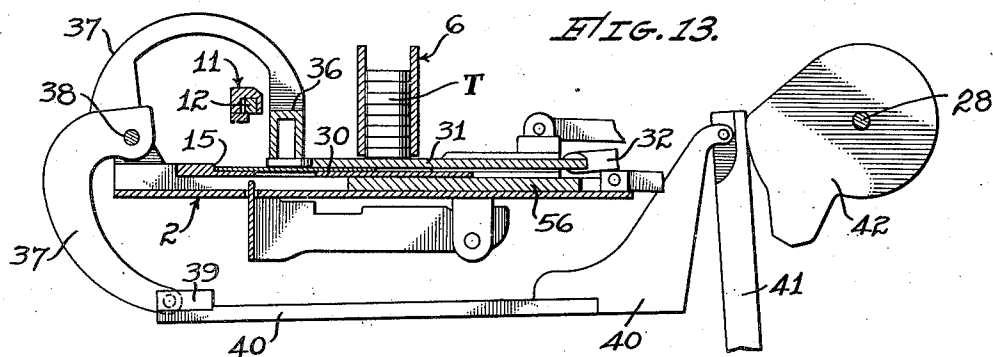
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TABLET PACKAGING MACHINE

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5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

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TABLET PACKAGING MACHINE

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Application February 8, 1947, Serial No. 727,455

11 Claims. (CL 93—2)

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My invention relates to table packaging machines, and included in the objects of my invention are:

First, to provide a tablet packaging machine whereby a carton blank is folded over and completely encases a row of tablets in an expeditious and efficient manner.

Second, to provide a tablet packaging machine which is relatively simple of construction when considered in reference to the complex operations required to fold a carton blank into box form.

Third, to provide a tablet packaging machine which is particularly compact, and which is so arranged that all parts are readily accessible for servicing.

Fourth, to provide a tablet packaging machine which is completely automatic in its operation.

With the foregoing and other objects in view, reference is directed to the accompanying drawings in which:

Figure 1 is a side view of the tablet packaging machine with the parts in the positions assumed at the beginning of a packaging operation.

Figure 2 is an elevational view of the discharge side of the tablet packaging machine the parts being in the same position as in Figure 1.

Figure 3 is a longitudinal sectional view of the tablet packaging machine taken substantially along the line 3—3 of Figure 5, the parts being in the same position as in the preceding figures.

Figure 4 is a transverse sectional view of the tablet packaging machine taken through 4—4 of Figure 3.

Figure 5 is a plan view of the tablet packaging machine.

Figure 6 is a fragmentary sectional view of the tablet packaging machine taken through 6—6 of Figure 5 showing particularly the region in which the packaging operation takes place.

Figure 7 is a fragmentary sectional view of the tablet packaging machine taken through 7—7 of Figure 5 showing the carton blank feeding mechanism.

Figure 8 is an enlarged detail view of the tablet packaging machine taken through 8—8 of Figure 7 showing parts of the carton blank feeding mechanism.

Figure 9 is a sectional view of the tablet packaging machine looking upwardly from approximately the line 9—9 of Figure 3.

Figure 10 is a top view of one of the carton blanks.

Figure 11 is a reduced fragmentary plan view with intervening or extraneous parts omitted to show the relationship of the carton blank and a

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load of tablets under the initial conditions depicted in the preceding figures.

Figure 12 is a similar fragmentary plan view showing the subsequent operation; namely, movement of a load of tablets onto the carton blank.

Figure 13 is a sectional view essentially in the plane of Figure 3 with intervening or extraneous parts omitted showing the operation subsequent to Figure 12 in which the load of tablets are engaged by a depressor head.

Figure 14 is similar to Figure 13 showing the subsequent operation of depressing the load of tablets and effecting the initial folding movement of the carton blank.

Figure 15 is a fragmentary sectional view essentially through 15—15 of Figure 14 with intervening or extraneous parts omitted and showing the subsequent operation of folding the end tabs of the carton blank.

Figure 16 is an enlarged fragmentary sectional view in the plane of Figures 3, 13 and 14 showing the next operation; namely, folding the first side flap of the carton.

Figure 17 is a view similar to Figure 16 showing the final step of folding and sealing the carton blank and ejecting the packaged unit as well as illustrating the delivery of a new carton blank for repetition of the packaging cycle.

My packaging machine includes a frame structure 1 which supports a plate or table 2 having side walls 3 which define a channel in which the folding or packaging operations take place as will be described hereinafter. Supported by brackets 4 and 5 above the table 2, is a tablet feed hopper 6 adapted to contain stacks of tablets to be packaged. In the particular embodiment illustrated, the hopper contains five such stacks of tablets.

Mounted at one side of the table 2 is a carton blank magazine 7 adapted to contain a stack of carton blanks C which rest on a plate 8 backed by a feed spring 9. A stop plate 10 is provided at the upper end of the magazine, and is so located as to place the uppermost carton blank slightly above the upper surfaces of the side walls 3 of the table 2 so that the carton blank may be moved laterally over the table.

Mounted above the table 2 and extending laterally over the magazine 7 is a track and guide member 11. A slide bar 12 is mounted in the track and guide and a portion of the slide bar is provided with rack teeth. Suspended from the slide bar 12 by means of parallel links 13 is a transfer bar 14 which carries a pair of pins 14a adapted to engage the uppermost carton blank

and move it from the magazine 7 to a position over the table 2. In such movement of the carton blank, one edge rides along a guide wall 15 which extends continuously from the magazine over the table 2 and is provided with an extension or shelf 16 which extends under the corresponding margin of the carton blank and bridges the space between the side walls 3. Extending from the guide wall is a catch finger 17 located and arranged to permit movement of the carton blank into position over the table 2 but to prevent return movement thereof when the transfer bar returns to its normal position over the magazine 7.

Located at a suitable point between the magazine 7 and the table 2 in position to engage the margin of the carton blank which contacts the guide wall 15 is an adhesive applicator 18.

In order to move one carton blank at a time, several upper carton blanks contained in the magazine are engaged at one corner by a yieldable retainer pad 19 carried by a lever structure 20 backed by a spring 20a. A finger 21 extends from the lever structure 20 and is momentarily engaged by the slide bar 12 as it returns the transfer bar 14 to its normal position. Such momentary engagement effects momentary release of the retainer pad 19 allowing the uppermost carton blank to move against the stop 10.

The rack portion of the slide bar 12 is engaged by a drive gear 22 mounted on a vertical shaft 23 located at the far side of the table from the magazine 7. The shaft 23 is provided with a pinion gear 24 which is engaged by a drive rack 25 secured to a drive bar 26 which is mounted below the table and suitably guided by the table and frame structure. The drive bar is engaged by a carton transfer cam 27 mounted on a main drive shaft 28 supported from the framework at the far side of the table from the track and guide 11. The shaft is horizontally mounted and substantially parallel with the guide track and driven by any suitable means, not shown, operatively connected to a pulley wheel 28a secured to the shaft 28. Springs 29 are employed to hold the drive bar 26 in one extreme position unless engaged by the cam 27. This position corresponds to the normal position of the transfer bar 14 over the magazine 7.

Slidably mounted on the side walls 3 and extending over the table 2 is a combined hopper bottom plate and flap folding plunger 30 which underlies the tablet feed hopper 6. The normal position of the plunger 30 is such that the margin of the carton blank opposite from the guide wall 15 moves over the end of the plunger and partially under the tablet feed hopper 6.

Slidably mounted above the plunger 30 is a tablet ejector plunger 31 which moves under the hopper 6. The thickness of the plunger 31 is, in the embodiment of my invention, illustrated approximately the thickness of the tablets contained in the hopper although this thickness may be altered to include two or more tablets if desired. The movement of the tablet ejector plunger 31 is so regulated that it has an intermediate position extending partially under the stacks of tablets, a retracted position clearing the stack of tablets and an extended position sufficient to transfer a row of tablets from the hopper to the central portion of a carton blank lying on the extension or shelf 16 and the flap folding plunger 30.

Movement of the tablet ejector plunger 31 is accomplished by means of a connecting link 32 which joins the plunger to a vertically disposed

cam lever 33 which engages a tablet ejector cam 34 mounted on the main drive shaft 28. A return spring 35 maintains the cam lever in engagement with the cam 34.

A depressor bar 36 is employed to press downward on a row of tablets resting on the carton blank between the shelf 16 and the plunger 30 so as to force the tablets and the carton downwardly to the table 2 and cause the margins of the carton to fold upwardly by engagement with the side walls 3, the edge of the shelf 16 and the edge of the plunger 30. The depressor bar 36 is supported by a lever structure 37 having curved arms which extend upwardly and then downwardly over the track guide 11. The lever structure is pivoted intermediate its ends on journals 38 carried by the frame structure. The lever structure includes downwardly curved arms which are connected by a cross bar 39 located under the table 2. The cross bar is joined to a connecting bar 40 which extends toward the main drive shaft and is pivotally connected to a cam lever 41 adapted to engage a depressor cam 42 mounted on the main drive shaft. A spring 43 urges the lever 41 against its cam.

Located and guided in slots formed in the side walls 3 between the shelf 16 and plunger 30 is a pair of end folding fingers 44. The fingers are connected to bell cranks 45 located under the table. The remaining ends of the bell cranks 45 confront each other and are pivotally connected to a thrust bar 46 which extends under the table toward the main drive shaft 28 and is connected through a link member 47 to a cam lever 48 located beside the previously mentioned cam levers. The cam lever 48 engages a carton folding cam 49 mounted on the cam drive shaft 28.

Inward movement of the fingers over the table 2 is effected by the thrust bar 46; return movement, however, is effected by return levers 50 which have confronting ends pivotally engaging the thrust bar 46 and extending laterally therefrom to the sides of the table 2. The side margins of the flap folding plunger 30 rest upon and are guided by the side walls 3 and include side flanges 51 positioned to engage the remote extremities of the return levers 50 so that as the plunger 30 folds its corresponding margin of the carton over the load of tablets, the flanges 51 cause the end flap folding fingers to retract.

The side flap folding plunger 30 is provided with a cross bar 52 which extends over and clears the tablet ejector plunger 31 and is connected by a thrust link 53 to a main lever 54 located alongside the previously described cam levers. The cam lever 54 engages a side flap folding cam 55 mounted on the main shaft 28.

Located under the side flap folding plunger 30 is an ejector plunger 56 which rides in the channel between the side walls 3. The ejector plunger 56 is adapted after the end flaps and a side flap of the carton has been folded to force the carton under the shelf 16 and cause the edge of the shelf to fold the remaining flap of the carton. This flap, it should be observed, has been previously coated with an adhesive so that as the carton moves under the shelf the folding and sealing operation is completed.

The ejector plunger is connected by a link 57 to a cam lever 58 located alongside the previously described cam levers. The cam lever 58 engages an ejector cam 59 mounted on the main drive shaft 28. A return spring 60 main-

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tains the cam lever 58 in engagement with the ejector cam.

Movement of the ejector plunger 56 is employed to effect retracting movement of the side flap folding plunger 30. This is accomplished by opposed levers 30a, the remote extremities of which are pivotally connected to the side flanges 51 of the side flap folding plunger 30 and the adjacent extremities of which are positioned for engagement by a shoulder formed on the ejector plunger 56.

In order to prevent premature movement of the carton under the shelf 16, a stop 61 extends upwardly through a slot provided in the table 2. The stop is supported by a pair of levers 62 pivotally suspended by brackets under the table 2. These levers are engaged by lugs 63 protruding downwardly from the ejector plunger 56 and so located that the stop is held in its upper position when the ejector plunger 56 is retracted, but drops to permit ejection of the completed package as the ejector plunger is moved towards its extended position.

The sequence of operations of my packaging machine is as follows:

Starting with the machine in the position shown in Figures 1, 2, 3, 4, 5, 6, 7, 8 and 9, the transfer bar has just carried a carton blank to a position over the depression defined by the shelf 16, side walls 3 and plunger 31. One side margin of the carton blank underlies the stacks of tablets T contained in the hopper 6, the tablets however rest on the plunger 31. Immediately after positioning the carton blank, the plunger 31 retracts, dropping a row of tablets onto the margin of the carton and the plunger 30. The plunger 31 then pushes the row of tablets toward the shelf 16 until centered over the depression. During this movement, the depressor head 36 moves downwardly and engages the row of tablets to press the tablets and the carton blank downwardly into the depression. This movement is depicted in Figures 13 and 14.

Depression of the tablets causes the margins of the carton blank to fold upwardly. As soon as the carton has been moved downwardly against the table 2 forming the bottom of the depression, the end folding plungers 44 move inwardly over the walls 3 to fold the end flaps of the carton, as depicted in Figure 15.

The depressor head then raises and simultaneously the plunger 30 moves toward the shelf 16 to fold one of the side flaps of the carton as depicted in Figure 16. As the plunger 30 withdraws, the ejector plunger 56 moves forwardly to push the carton through the slot defined by the shelf 16 and the table 2. This action folds the remaining side flap of the carton as shown in Figure 17. The ejector plunger during its initial movement, operates the stop 61 to move it from the position shown in Figure 16 to the position shown in Figure 17.

Simultaneously with movement of the plunger 56, the transfer bar 14 withdraws the uppermost carton blank from the magazine 7 and moves it to position over the depression, then returns to its normal position over the magazine as shown best in Figures 11 and 12. During transfer of the carton blank from the magazine to the folding mechanism, adhesive is wiped across the margin which overlies the shelf 16. This is accomplished by means of the applicator 18. It is this flap of the carton which is last folded by the plunger 56.

Many other embodiments of the invention may

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be resorted to without departing from the spirit of the invention.

I claim:

1. A tablet packaging apparatus comprising:
5 a hopper for supplying predetermined loads of tablets juxtaposed in rows; means for feeding an initially flat carton blank in a receiving position in which an edge thereof underlies a load of tablets; means for advancing said load to the central portion of said carton blank; and means for folding the margins of said carton blank over said load of tablets.

2. A tablet packaging apparatus comprising:
15 a hopper for supplying predetermined loads of tablets juxtaposed in rows; means for feeding an initially flat carton blank in a receiving position in which an edge thereof underlies a load of tablets; means for advancing said load to the central portion of said carton blank; means defining a depression located under the central portion of said carton when said carton is in its receiving position; means for engaging said load of tablets to force said carton into said depression thereby to cause the margins thereof to fold upwardly; and means for folding the extremities
25 of said margins over the load of tablets.

3. A tablet packaging machine, comprising:
30 a hopper adapted to contain stacks of tablets arranged in a row; a feeding plunger adapted to pass under said hopper and move a predetermined load of said tablets laterally; feeding means for disposing a carton blank in position to receive said load of tablets; means for depressing said load of tablets and carton blank; means cooperating with said depressing means to fold upwardly the margins of said blank around said load of tablets; means for folding the end margins of said carton over said load of tablets; a carton folding plunger located under
40 said feeding plunger and forming a stop limiting movement of said tablets from said hopper, said carton folding plunger movable after depression of said carton blank to fold a side margin thereof over said load of tablets; an ejector plunger
45 located under said carton folding plunger for moving the partially folded carton and load of tablets laterally; and means operable upon such lateral movement to complete the folding of said carton blank over said load of tablets.

4. A tablet packaging machine, comprising:
50 a hopper adapted to contain stacks of tablets arranged in a row; a feeding plunger, a carton folding plunger and ejection plunger underlying said hopper in the order named; the carton folding plunger also forming a stop limiting movement of tablets from said hopper; means for delivering a carton blank in position for receiving a load of tablets fed laterally from said hopper by said feeding plunger; and means for folding
55 the carton blank over said load of tablets, said means employing in part said carton folding plunger and said ejector plunger.

5. A tablet packaging machine, comprising:
60 means defining a recess for the reception of a carton blank and a load of tablets thereon; means for forcing said carton blank and its load of tablets into said recess to cause the walls thereof to fold the margins of said carton blank upwardly; a wall of said recess being defined by a side folding plunger movable over the load of
70 said tablets, and an ejector plunger therebelow; the wall of said recess opposite said ejector plunger having a slot to accommodate the folded carton blank and its contents and including

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means cooperating with said ejector plunger to complete the folding of said carton blank.

6. A packaging machine, comprising: a means for supplying the articles to be packaged; a feeding plunger, a carton folding plunger and an ejection plunger underlying said hopper in the order named, the carton folding plunger also forming a stop limiting movement of said articles from said supply means; means for delivering a carton blank with one edge underlying said articles and positioned to receive a load of said articles delivered thereon by said feeding plunger; means defining a depression to accommodate said articles and underlying said carton blank; means for pressing said articles into said depression to cause the margins of said carton blank to fold upwardly; said one side wall depression being defined by said carton folding plunger and said ejector plunger, and the opposite wall having a slot to accommodate the folded carton blank and its contents, said carton folding plunger movable over said articles to fold one side of said carton blank, said ejector plunger adapted to force said carton blank through said slot and effect folding of the opposite side of said carton blank.

7. A packaging machine, comprising: a means for supplying the articles to be packaged; a feeding plunger, a carton folding plunger and an ejection plunger underlying said hopper in the order named, the carton folding plunger also forming a stop limiting movement of said articles from said supply means; means for delivering a carton blank with one edge underlying said articles and positioned to receive a load of said articles delivered thereon by said feeding plunger; end folding members at the ends of said depression to fold the ends of said carton blank over said articles; one end wall of said depression being defined by said carton folding plunger and said ejector plunger, and the opposite wall having a slot to accommodate the folded carton blank and its contents, said carton folding plunger movable over said articles to fold one side of said carton blank, said ejector plunger adapted to force said carton blank through said slot and effect folding of the opposite side of said carton blank.

8. A packaging machine, comprising: a carton folding means including means defining a depression adapted to accommodate the central portion of a carton blank and a load of articles placed thereon; a rocker bar movable downwardly to engage said articles and depress said carton blank into said depression, the sides of said depression causing the margins of said carton blank to be folded upwardly; means bordering three sides of said depression to operably fold three margins of said carton blank over said articles; the remaining side of said depression having a lateral slot; and an ejector plunger for urging said carton blank and its contents through said slot and effect folding of the remaining side margin over said articles.

9. A packaging machine, comprising: means defining a depression adapted to accommodate the central portion of a carton blank and a load of articles placed thereon; a carton blank supply means at one side of said depression defining means; an article supply means at another side of said depression defining means; means for

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transferring said carton blanks from said supply means over said depression defining means with one edge of said carton blank underlying said article supplying means; means for transferring a load of articles from their supply means to the central portion of said carton blank; means for engaging said articles to urge them into said depression and effect upward folding of the margins of said carton blank; means bordering three sides of said depression to operably fold three margins of said carton blank over said articles; the remaining side of said depression having a lateral slot; and an ejector plunger for urging said carton blank and its contents through said slot and effect folding of the remaining side margin over said articles.

10. A packaging machine, comprising: a frame structure including a bottom plate, side walls and shelf defining a channel and a discharge slot under said shelf; a superposed series of plungers slidable in and above said channel to and from said shelf; means for positioning a carton blank over said channel with its margins overlapping the sides of said channel, said shelf and certain of said plungers; an article supply means mounted above said plungers, the uppermost plunger forming a feeding means to move a load of articles from said supply means to the central portion of said carton blank, and the next plunger forming a stop for limiting discharge of said articles from said supply means and a margin folding means for said carton blank; means for pressing the load of articles and said carton blank into said channel and cause the margins of said carton blank to engage said cross bar, said side walls and said margin folding plunger; means movable over said articles from said side walls to fold the corresponding margins of said carton blank over said articles, said margin folding plunger thereupon operable to fold a side margin of said carton blank over said articles; the lowermost plunger forming an ejector to urge said carton and its contents through said discharge slot, said shelf forming means for folding the final side margin of side carton blank as said carton is ejected.

11. A packaging machine, comprising: means defining a rectangular depression, said means including a plate, end walls, a shelf bridging between said end walls to form a side wall and defining thereunder a discharge slot, and a series of plungers forming the other side wall of said depression opposite from said shelf; means for feeding a carton blank over said depression, its side margins overlying the boundary walls of said depression; an article hopper disposed over said plungers, certain of said plungers cooperating to feed predetermined loads of articles onto said carton blanks and in centered relation with said depression; means engageable with said articles to force said articles and said carton blank into said depression to fold upwardly the margins of said carton blank; means for in-folding the end margins of said carton blank; and certain of said plungers and said shelf co-operable to effect in-folding of the side margins of said carton blank and ejection of the folded carton and its contents through said slot.