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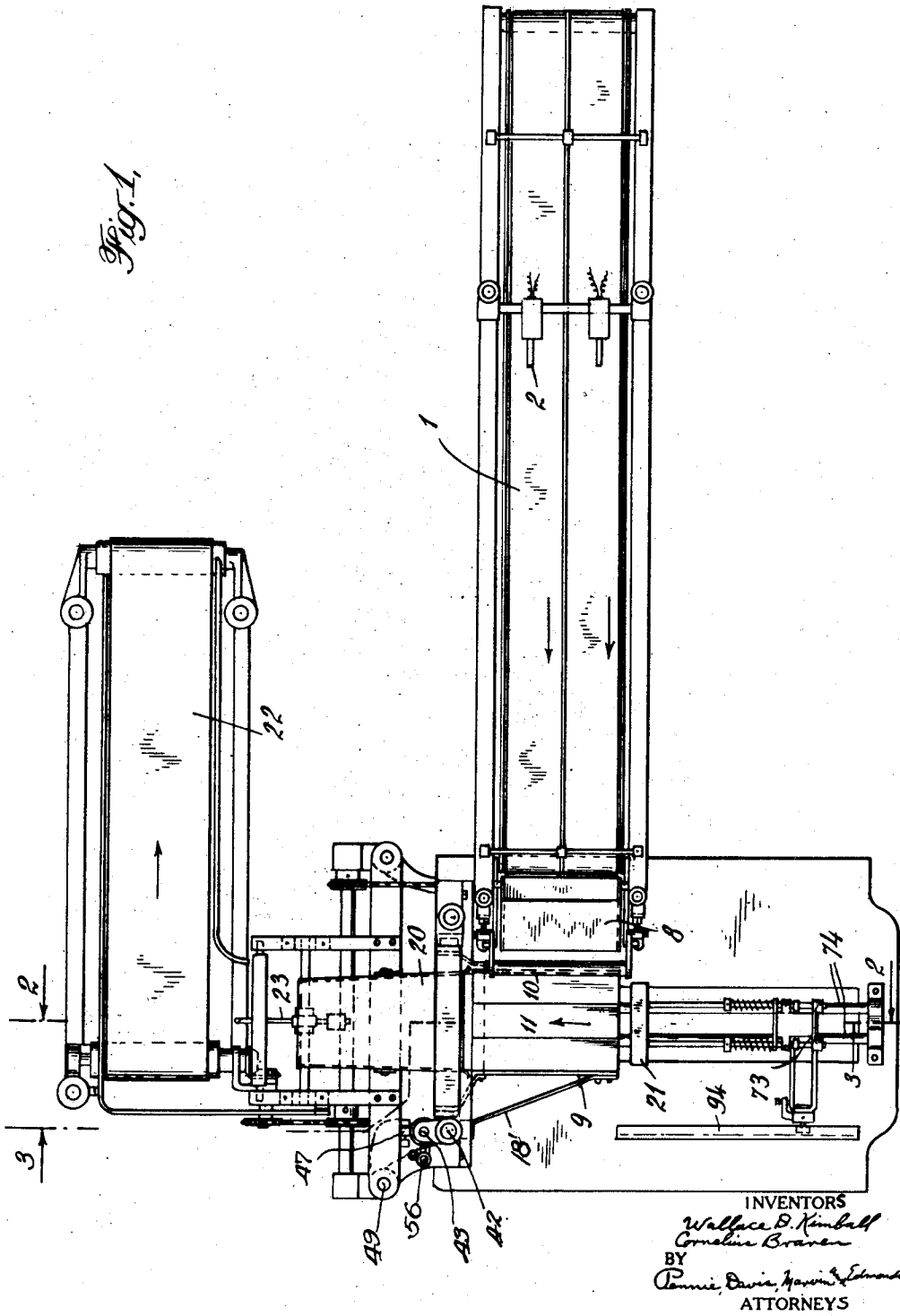
W. D. KIMBALL ET AL

1,942,555

MACHINE FOR PACKING ARTICLES INTO BOXES

Filed Feb. 28, 1930

11 Sheets-Sheet 1



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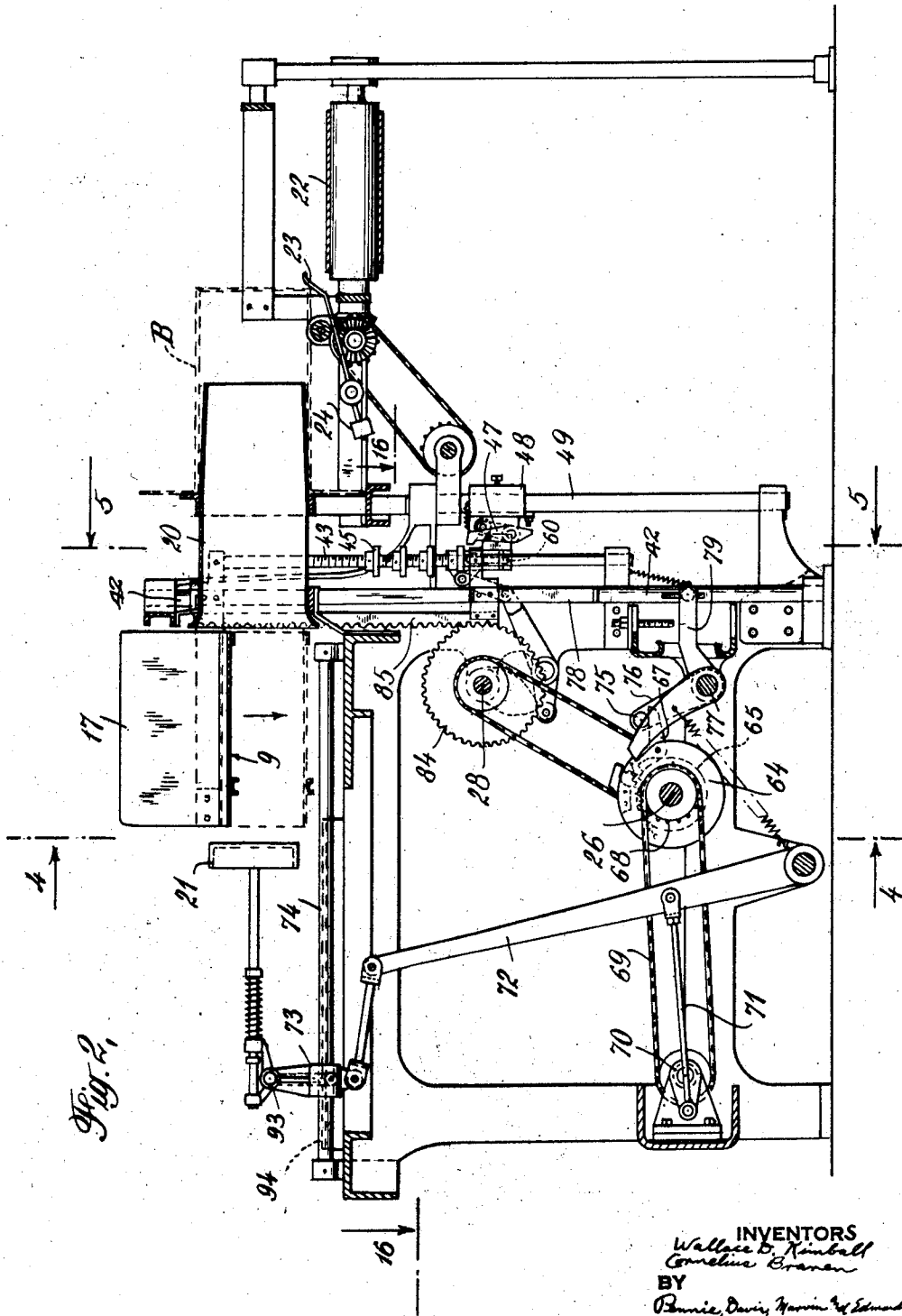
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11 Sheets-Sheet 2



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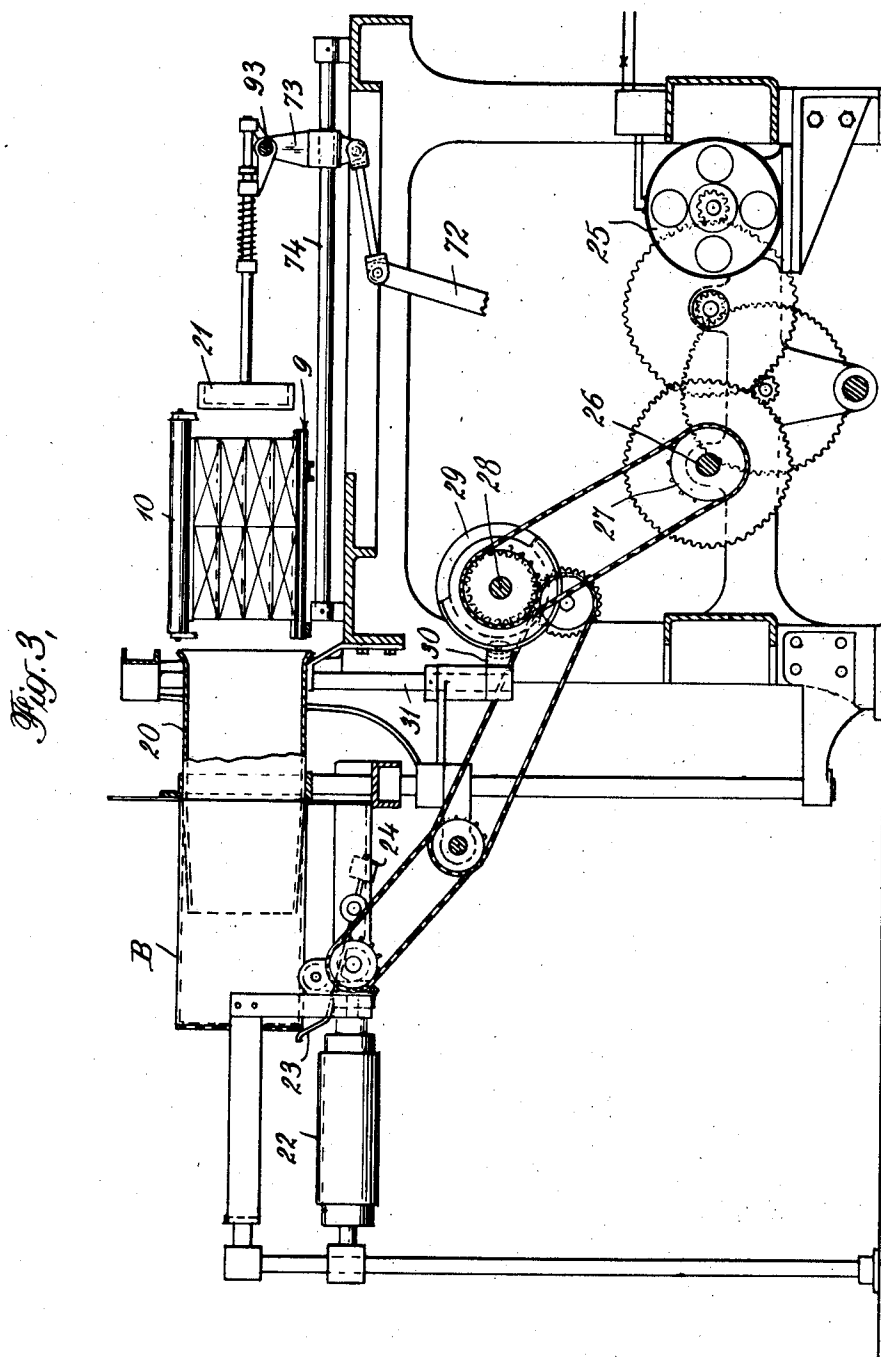
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MACHINE FOR PACKING ARTICLES INTO BOXES

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11 Sheets-Sheet 3



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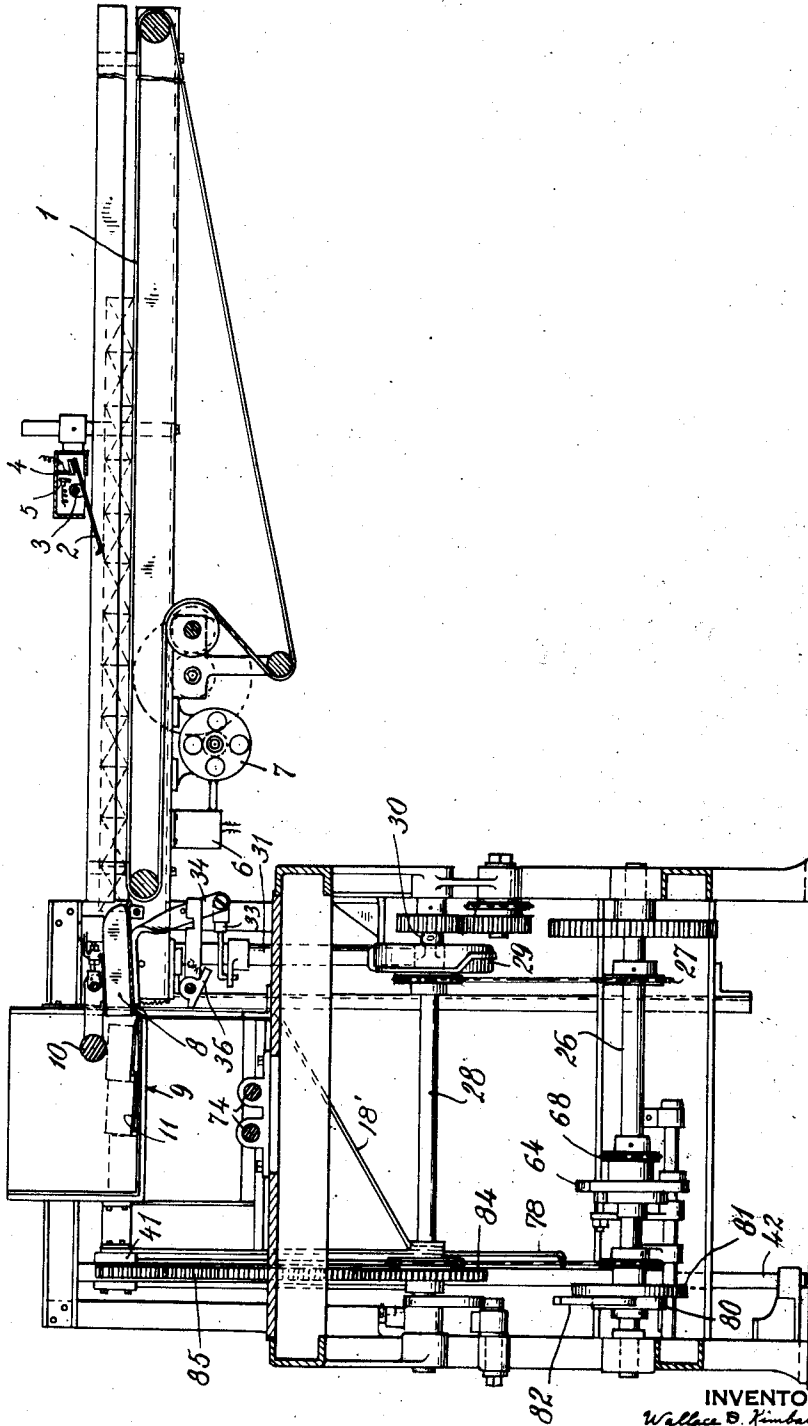
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Fig. 4.



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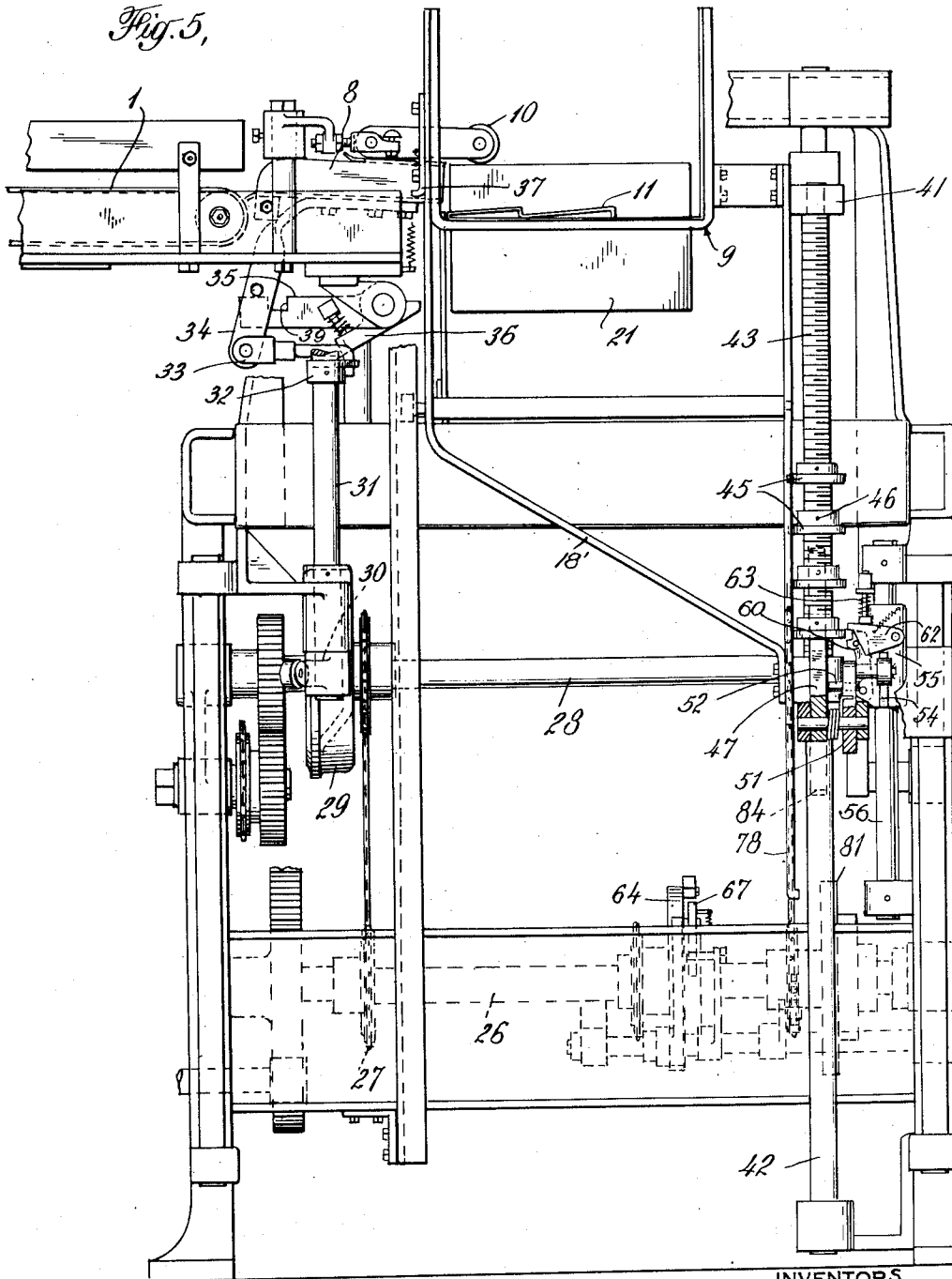
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Fig. 5,



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MACHINE FOR PACKING ARTICLES INTO BOXES

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Fig. 6,

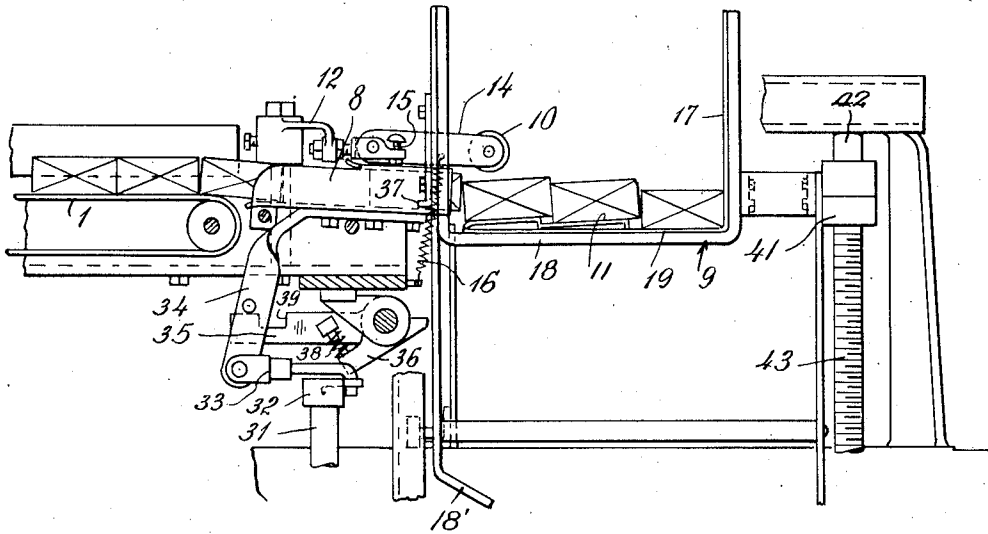
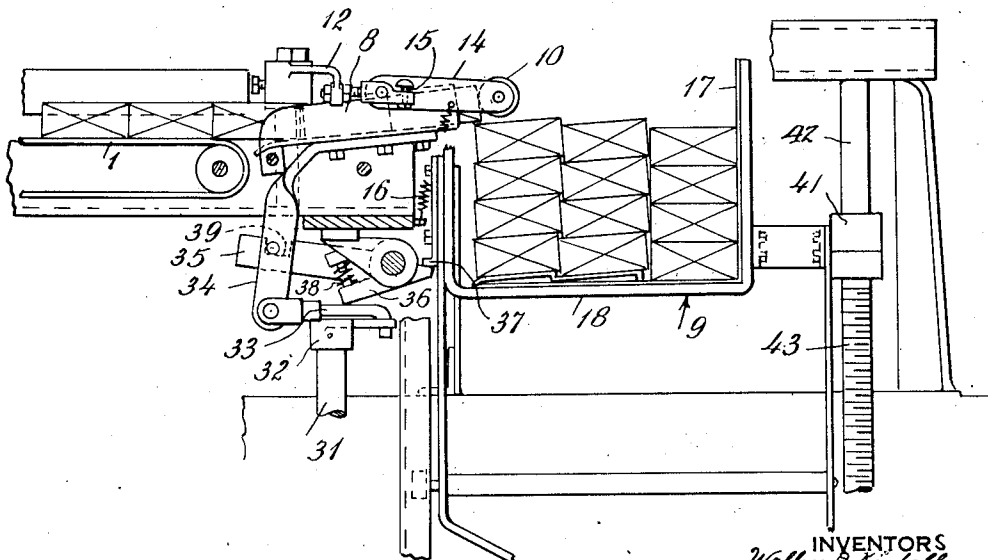


Fig. 7,



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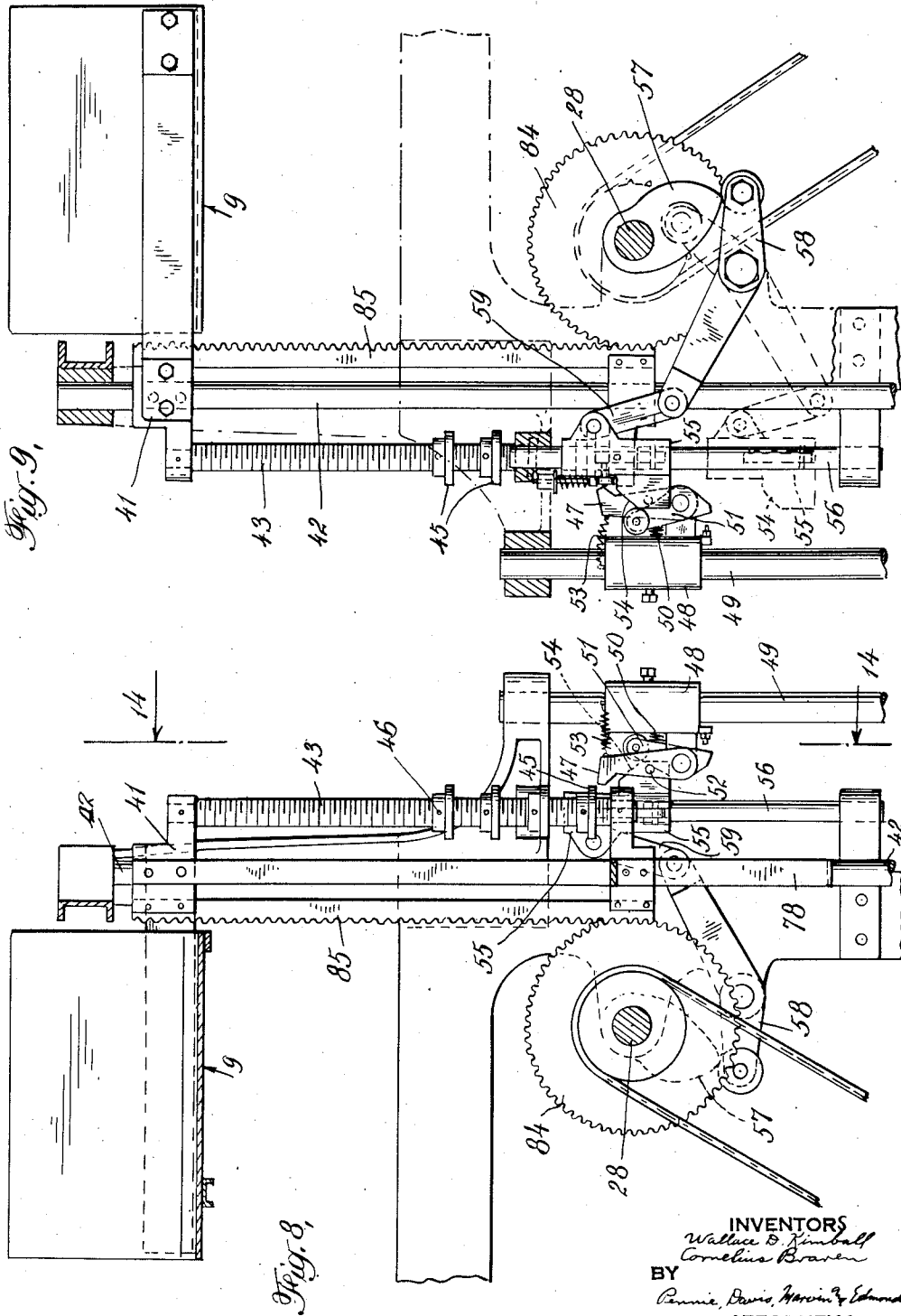
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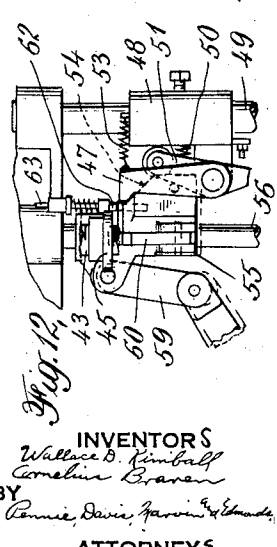
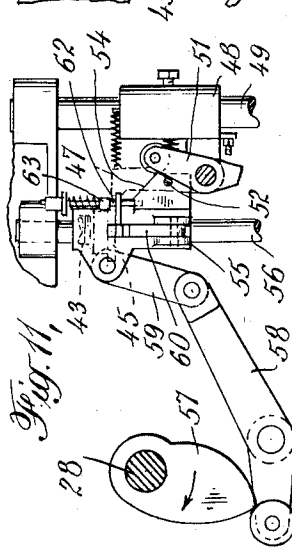
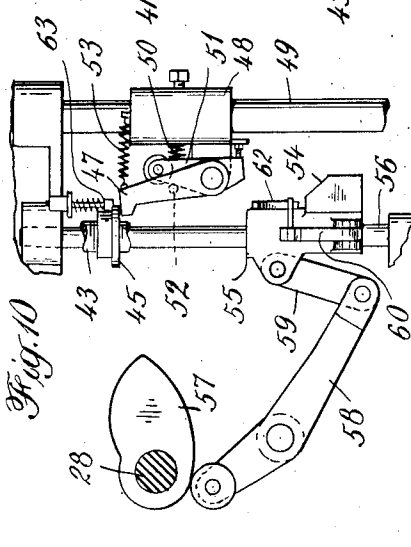
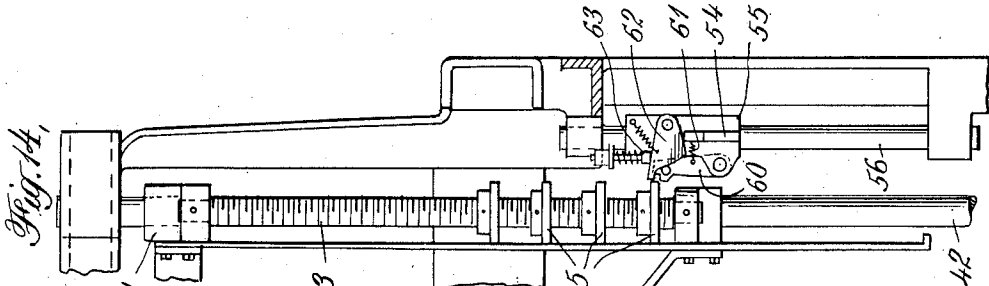
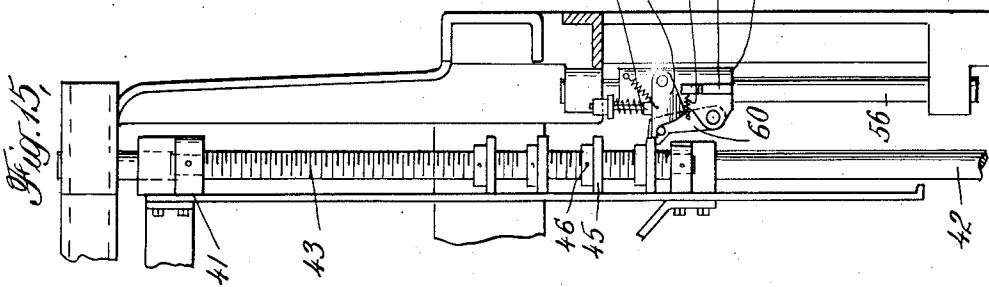
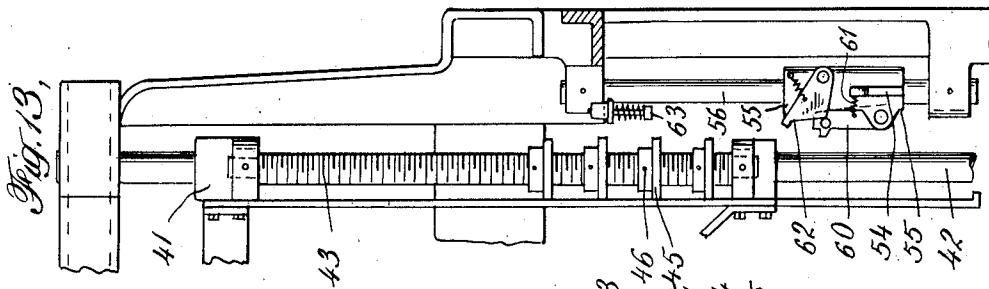
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MACHINE FOR PACKING ARTICLES INTO BOXES

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11 Sheets-Sheet 8



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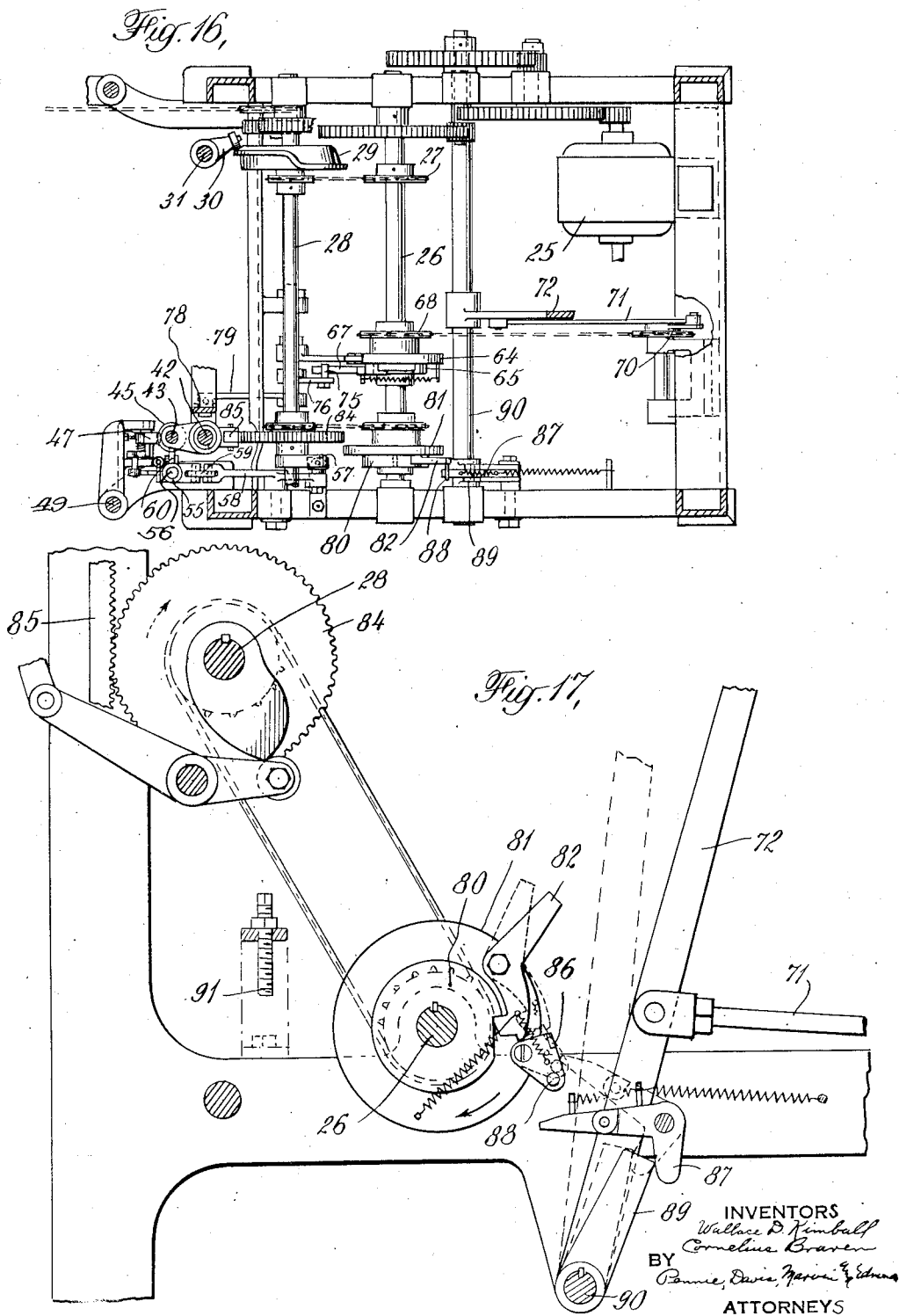
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MACHINE FOR PACKING ARTICLES INTO BOXES

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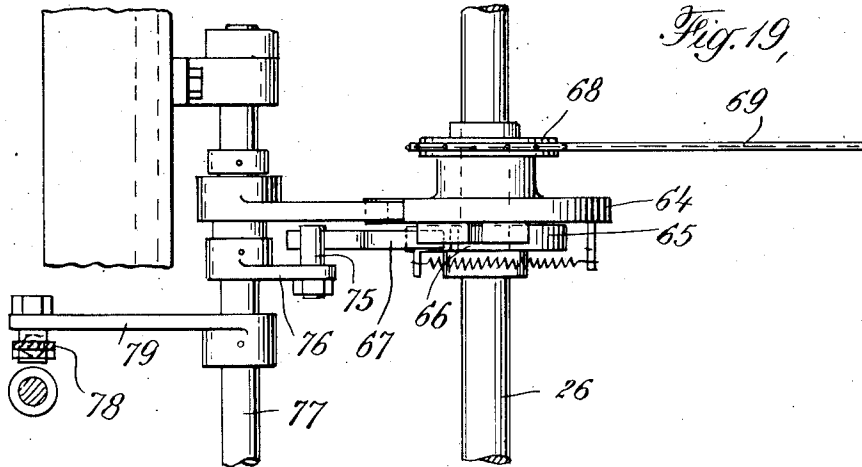
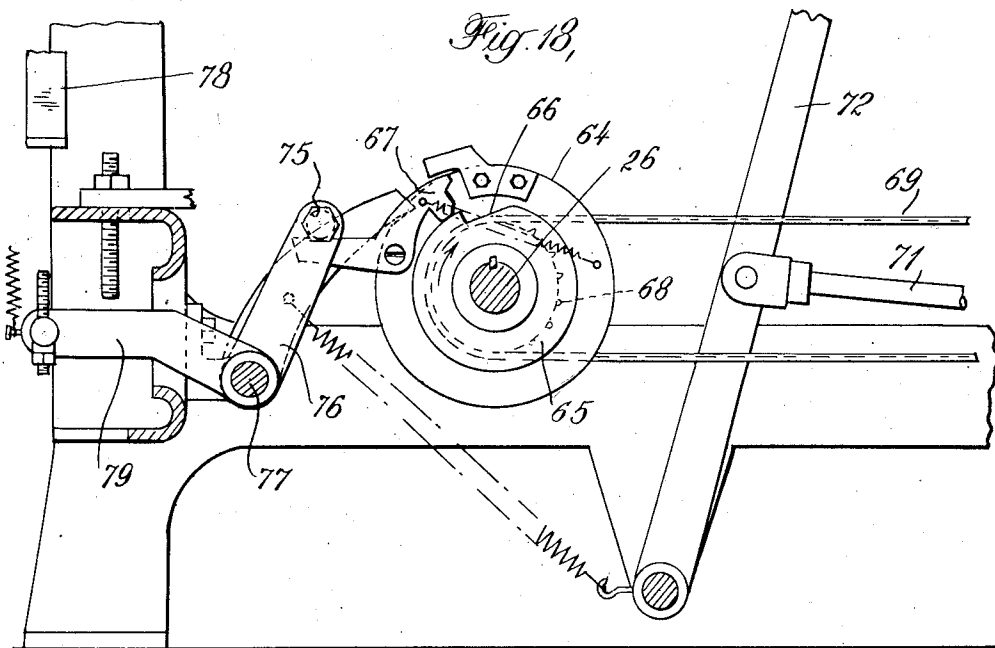
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MACHINE FOR PACKING ARTICLES INTO BOXES

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11 Sheets-Sheet 10



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MACHINE FOR PACKING ARTICLES INTO BOXES

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Fig. 20

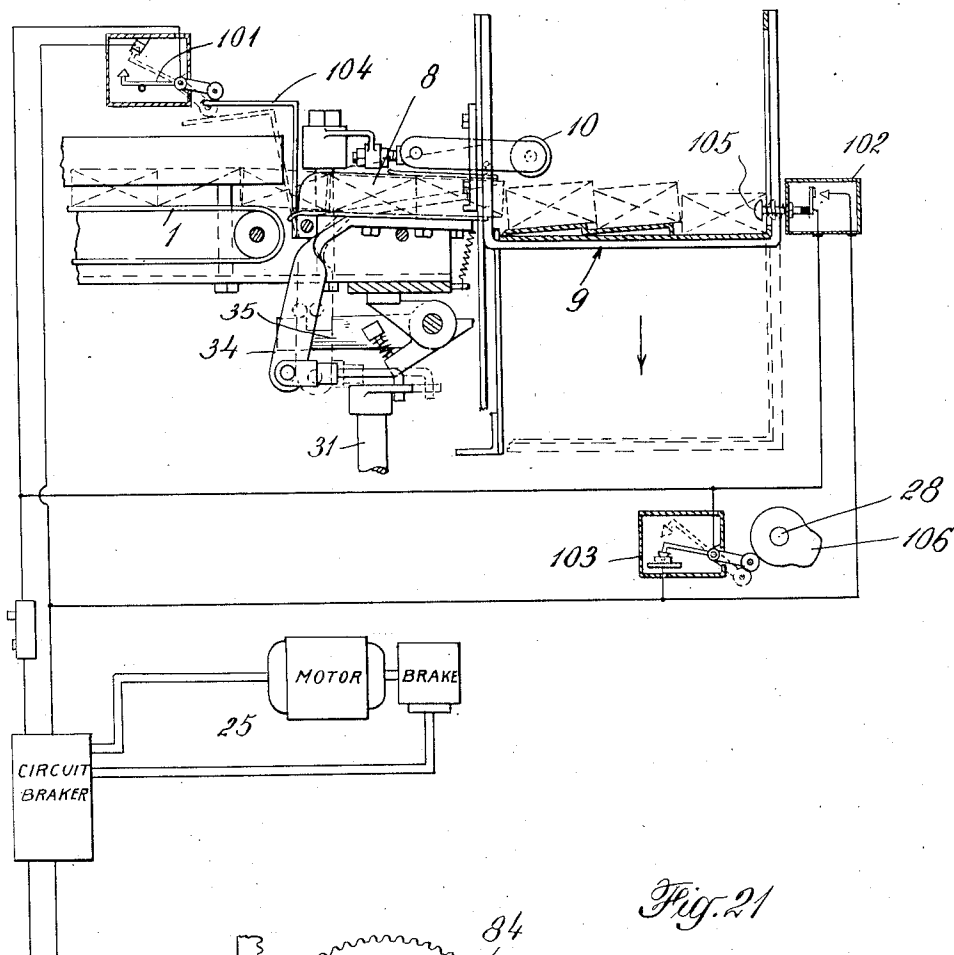
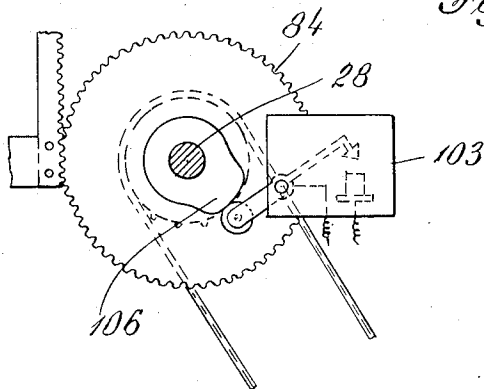


Fig. 21



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UNITED STATES PATENT OFFICE

1,942,555

MACHINE FOR PACKING ARTICLES INTO BOXES

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Application February 28, 1930. Serial No. 432,181

14 Claims. (Cl. 226—16)

This invention relates to machines for packing articles in cartons or packing cases, and has for its object to provide a machine of this class which will successfully handle all kinds of articles of generally rectangular configuration which are commonly shipped in fibreboard or corrugated board cartons. Specific articles of the kind in question are soap, sardine cans and other "square" cans, and particularly small cartons or packages of all kinds of commodities such as cereals, starch, soap powder and the like.

Various machines have heretofore been devised for packing articles of this kind, but until recently such machines have not been in extensive use for the reason that a machine designed to handle one particular commodity was seldom found to be suitable for any other type of commodity, thereby so limiting the field of utility of each particular machine as not to warrant the expense of design and manufacture.

The machine of the present invention is designed to handle all the various kinds of articles above mentioned.

The machine is also so designed that it may be readily adjusted to articles of different dimensions.

In the accompanying drawings we have illustrated a preferred embodiment of our invention and one which has been found successful in commercial operation.

In the said drawings:

Figure 1 is a plan view of our improved machine;

Fig. 2 is a vertical section on line 2—2 of Fig. 1;

Fig. 3 is a similar section on line 3—3 of Fig. 1 looking in the direction of the arrows;

Figs. 4 and 5 are vertical sections on line 4—4 and 5—5, respectively, of Fig. 2;

Figs. 6 and 7 are detail views showing the operation of the mechanism for stacking the articles on the receiving table;

Figs. 8 and 9 are detail views partly in section of the mechanism for effecting the vertical movement of the receiving table;

Figs. 10—15 inclusive are detail views of parts of the same mechanism showing the parts in different positions of movement;

Fig. 16 is a horizontal sectional view on line 16—16 of Fig. 2 showing the power transmitting connections for operating the various parts in sequence;

Figs. 17, 18 and 19 are enlarged detail views showing the timing connections between the article-stacking, load-shifting, and table-elevating mechanisms; and

Figs. 20 and 21 are detail views showing an

electrically operated mechanism for controlling the machine so as to insure a full charge of packages in each carton.

As will be seen from Figs. 1—4 inclusive, the machine comprises a feed belt 1 arranged to receive two lines of articles from the article-collecting conveyors leading from the supply of articles, for example, the labeling machine or other machine which performed the last operation on the packages to be packed into the carton. The articles are supposed to be received on the belt 1 in two continuous lines, as illustrated in Fig. 4. As, however, there may occur a gap in one or the other, or both, lines of articles through a failure of the labeling machine, article-collecting device or whatever apparatus may be the source of supply of the articles, means are provided for stopping the feed belt 1 in the event that a gap occurs in either line of articles. This mechanism is shown in Fig. 4 and comprises a light sheet metal finger 2 swung on a pivot 3 so as to rest lightly on top of the packages as they are moved into the machine. This finger is made very light so as not to impede the movement of the packages. The finger 2 projects rearwardly from its pivot and mounted on the rear end of the finger is a contact member 4 adapted to engage the stationary contact 5 upon a tilting movement of the finger, such as will occur when there is a break in the line of articles.

The closing of the current through the contacts 4 and 5 energizes a circuit breaker 6 which cuts off the flow of current to the driving motor 7 of the feed belt 1 so that no further articles will be fed to the machine until the lines are again complete. In order that the machine will not continue to operate idly when the supply of articles is stopped, a circuit breaker is also provided for the main driving motor 25 as indicated in Fig. 16. With this arrangement the machine will not start again until the attendant opens the contacts 4—5.

If desired the circuit controlled by the finger 2 may control the circuit breaker for the motor 25 only. In such case the feed belt will continue in operation, slipping under the packages on the belt beyond the finger 2 until sufficient packages have been fed into the machine to complete the lines and raise the finger 2 when the machine will be restarted. In Figs. 20 et seq., there is illustrated a modified arrangement of electrical control to avoid unnecessary stopping of the machine when the break in the line of articles is of too short duration to interfere with the opera-

tion of the machine. This mechanism will be later described.

The feed belt 1 delivers the articles to a tilting guide 8 which serves the double purpose of guiding the articles onto the receiving table 9 and also stopping the movement of the articles during the downward movement of the table to bring it into position to receive a second layer of articles superimposed over the first layer, and so on, until the desired number of layers are assembled on the table.

The guide 8 is periodically tilted as shown in Figs. 6 and 7 to bring the forward ends of the lines of articles opposite a fixed stop roller overlying the adjacent edge of the receiving table 9. The mechanisms for operating the various parts of the machine in the usual sequence of operations will be described later after the construction of the machine as a whole and its mode of operation is explained.

In its normal position when serving as a guide for the packages entering the receiving table, the guide is inclined slightly downward at its outer end so that the movement of the packages will not be impeded. The end of the guide adjacent the table stands slightly above the surface of the table so that the line of packages advancing onto the receiving table will be sure to clear the forward edge of the table. The surface of the table 9 is provided with a stepped bottom 11 as shown in Fig. 6, whereby the rear edge of each article on the table will drop below the forward edge of the next adjacent articles, thereby insuring that the next layer of articles when advanced onto the table will not strike against any protruding corners of the articles in the layer below. This stepped bottom 11 is preferably made of a piece of sheet metal detachably secured to the bottom of the table so that different numbers of steps may be provided to accommodate articles of different size, as will be obvious.

To adapt the machine to articles of different thickness the mechanism for lowering the table 9 is so designed that the amplitude of movement of the table may be adjusted to any desired value. Also, the number of movements for each cycle of the machine may be varied as desired, whereby a charge of packages of any number of layers may be assembled on the table. The mechanism for effecting the movement of the table is illustrated in Figs. 9-15 inclusive. The mechanism operates on the same principle as that described in the patent to McKaig, No. 1,555,225, September 29, 1925, with certain modifications and improvements which will be later described.

The stop roller 10 is also mounted for vertical adjustment to accommodate packages of different size, this adjustment being secured by mounting the brackets 12 from which the roller is supported, on posts 13 attached to the machine frame on each side of the feed belt 1. The roller 10 is not fixedly attached to the brackets 12 but is carried by arms 14 which in turn are pivoted on the brackets. The arms 14 are normally held by a spring 16 in the lowermost position permitted by the adjustable stop 15 and in the normal operation of the machine the roller remains in this lowermost position. If, however, the packages on the tilting table should, through any faulty operation, get under the roller as the tilting guide is elevated, the spring 16 will yield and thereby avoid breaking the machine or crushing the package. The arms 14 are preferably adjustably connected to the brackets 12 so that the po-

sition of the roller with respect to the edge of the receiving table may be accurately adjusted.

In the normal operation of the machine the parts are positioned as in Fig. 6 when the first layer of packages is to be delivered to the receiving table 9, the packages being advanced thereon by the movement of the feed belt 1 which operates continuously so long as there are no gaps in the lines of packages. When the outermost package reaches the rear wall 17 of the feed table the movement of the packages will be stopped, the feed belt, however, continuing to move, slipping under the line of packages resting thereon. When the bottom layer is complete the tilting guide 8 is elevated thereby raising the articles which are in the guide adjacent the receiving table a distance sufficient for the lower edge of the articles in the guide 8 to clear the top edge of the outermost articles of the layer. The roller 10 serves as a stop for the advancing articles and holds them in the position shown in Fig. 7 while the table 9 is being lowered a sufficient distance to receive the next layer. The tilting guide 8 is then dropped back to the position shown in Fig. 6 so that the articles will clear the rollers 10, thereby permitting a second layer to be advanced onto the table 9.

These operations are continued until the desired number of layers are assembled on the table.

The table 9 is supported on a U-shaped bracket 18 carried by a cross-head mounted for vertical movement in the frame of the machine. The table comprises an L-shaped piece of sheet metal 19 having its bottom co-extensive with the area of the layer of articles to be formed and its vertical wall co-extensive with the side of the assembled load of articles. The table is attached at one end to the U-shaped bracket 18 and is supported at its free end by an arm 18' extending outwardly from the cross-head, as shown in Fig. 1.

After the desired number of articles has been assembled on the table the load of articles as a whole is shifted at one operation off the table through a guide funnel 20 in the carton B which has been previously assembled on the guide funnel. This shifting movement is accomplished by means of a plunger 21 which is operated by a suitably timed mechanism when the table 9 completes its downward movement to move across the table, engage the charge of articles and move them into the funnel and clear of the edge of the table. Upon the return movement of the plunger the table is elevated to its original position and the sequence of operations is repeated. The movement of the plunger which ejects the articles from the table onto the funnel also serves to eject the previously filled carton from the funnel, allowing it to drop onto the discharge belt 22 mounted in position to receive the cartons.

The discharge belt may be arranged to deliver the cartons to a carton-sealing machine or to any other desired point of delivery. The attendant of the machine stands adjacent the funnel 20 and as each loaded carton is pushed off the funnel by the action of the plunger 21 he replaces it with an empty carton to receive the next charge. The cartons are usually provided with their bottom flaps unsealed. The attendant folds the bottom flaps into overlapping position, in which position they will be held while the carton is being loaded by means of a pivoted arm 23 having a counterweight 24 for holding it

against the closed flaps, while the carton is on the receiving funnel. As the filled carton is discharged from the funnel the operator will hold the flaps closed and up-end the carton onto the receiving belt so that the open ends of the cartons will be uppermost as the cartons are fed into the carton-sealing machine.

It is believed the construction and operation of the individual parts of the machine will be readily understood in view of the foregoing description. These various mechanisms and the operating connections therefor will now be described in detail.

As stated above, the feed belt is operated by its individual motor 7 while the other parts of the mechanism are operated by a main driving motor 25 supported on the base of the machine and operating through a suitable reducing gear to continuously rotate the main driving shaft 26.

The shaft 26 has fast to it a driving sprocket 27 which serves to drive through a suitable chain and sprocket, a shaft 28 mounted across the machine frame under the table 9 in a position such that its end underlies the rocking guide 8. Mounted on this end of the shaft 28 is a cam 29 which co-operates with a cam arm 30 on a vertical shaft 31 mounted in suitable bearings in a position such that its upper end terminates beneath the guide 8, as more particularly shown in Figs. 5 and 6. The cam 29 is shaped so as to oscillate the shaft 31 once in each revolution of the shaft 28, thereby holding the guide 8 elevated throughout a portion of each revolution of the shaft and depressed during the remaining portion of the revolution. The connections for effecting this movement consist of the crank arm 32 on top of the shaft 31 connected by a link 33 with the depending arm 34 attached to the under side of the guide 8.

The mechanism for dropping the table 9 effects one movement of the table for each rotation of the shaft 28. Hence for each movement of the table the guide 8 will be elevated from the position shown in Fig. 6 to that shown in Fig. 7 and then returned after the table has moved to its lowered position, to thereby release the packages so that the next layer can be projected over the table onto the first layer of packages. This action of the guide 8 continues for each movement of the table until the desired number of layers of packages is assembled on the table, that is, until after the table reaches its bottom position and the top layer of packages has been delivered thereto.

Upon the next action of the cam 29 after the table reaches its lowermost position, the guide 8 will be elevated, but on the continued movement of the cam will not be lowered, but will instead be held in its uppermost position until the table is returned to its elevated position to receive the first layer for a new charge of packages. This operation is accomplished by means of a pivoted stop arm 35 carried on a bracket attached to the machine frame underlying the guide 8. Also mounted on the pivot of the arm 35 is a trip 36 adapted to be engaged when the table reaches its lowermost position by a lug 37 carried by the adjacent side of the table. The trip 36 and arm 35 are connected by a spring 38. Ordinarily the arm 35 extends in substantially horizontal position as shown in Fig. 6, and does not interfere with the free movement of the arm 34 which operates the guide. When, however, the trip 36 is elevated by the action of the stop 37 the spring 38 will be put under compression

and when the guide 8 is next elevated the pin in the arm 34 will move over a notch 39 in the top of the arm 35, allowing the arm 35 to be pushed upwardly by the spring and thus prevent the downward movement of the tilting guide 8 when the cam 29 releases the cam arm 30. The parts will remain in this position until the upward movement of the table 9 removes the lug 37 from contact with the trip 36.

The parts of the machine are so timed that the cam 29 will operate to lower the guide 8 just as the table 9 reaches its uppermost position and is ready to receive the first layer of the charge of packages. The escapement for effecting the descent of the table 9 is also operated from the shaft 28. The table 9 is supported for vertical movement on a cross-head 41 mounted to slide vertically on a guide rod 42 fixed in the machine frame. The head 41 is supported by means of a threaded rod 43 attached thereto and extending downwardly therefrom in parallelism with the rod 42. The rod 43 is threaded to permit the accurate adjustment of a series of stop collars 45 threaded thereon, the collars being clamped in adjusted position by setscrews 46. The number and position of the collars 45 determine the number of layers of packages forming each charge and the distance between the collars determines the extent of movement of the table upon each operation of the machine.

The lowermost collar is positioned to support the stepped top of the table in proper position to receive the first layer of articles from the conveyor belt. The table is held in raised position by means of a pawl 47 supported on a pivot carried by a head 48 adjustably mounted on a guide-rod 49 supported in the machine frame adjacent the guide-rod 42. The pawl 47 is normally held in a position to underlie the collars 45 by means of a spring 50 acting against a cam arm 51 which in turn engages a pin 52 on the pawl. The pawl is provided with a second spring 53 which is not so strong as the spring 50 and serves to withdraw the pawl from under the collar 45 when the cam arm 51 is pushed back against the tension of the spring 50 to release the pin 52. This position of the parts is shown in Figs. 8 and 9.

In Fig. 10 the pawl is shown in the position which it occupies when in engagement with the collars. The pawl is caused periodically upon each revolution of the shaft 28 to release the collar with which it is engaged and project under the next collar to thus allow the table to move the distance between the two adjacent collars. The table, however, is too heavy to be allowed to drop from one position to the next, and means are provided for lowering the table gradually so as to avoid jar and damage to the machine and material being packaged.

The cam 54 which serves to operate the cam arm 51 is carried by a cross-head 55 mounted for vertical reciprocation on a guide rod 56 carried by the machine frame. This cross-head is operated its full extent of movement upon each revolution of the shaft 28 by means of a cam 57 which engages a bell crank 58 connected by a link 59 to the cross-head. Also carried by the cross-head is a pawl 60 which is normally held by its spring 61 in a position to clear the collars 45. At the upper end of the movement of the cross-head 55 this pawl is forced downwardly by a cam 62 also pivoted on the cross-head and which engages a spring-held pin 63 supported on the machine frame adjacent the pawl 47.

Figs. 10-15 inclusive show the parts in their various positions of movement, Figs. 13, 14 and 15 looking at right angles to Figs. 10, 11 and 12.

Fig. 14 shows the position of the parts just before the cross-head reaches the upper limit of its movement. The cam member 62 has engaged the spring stop 63 and as the upward movement of the cross-head continues the pawl 60 is forced outwardly to engage under the collar resting on the pawl 47. The pawl 60 is forced outwardly in a position to engage under the collar 45 just before the cross-head reaches the upper limit of its movement, so that as the cross-head 55 continues to move to its extreme upward limit of movement the collar 45 will be raised, thereby of course also raising the table 9. This movement is, however, but a fraction of an inch in amplitude, just sufficient to take the weight of the table off of the pawl 47, thereby permitting the latter to be withdrawn by its spring 53 out of engagement with the collar 45, as shown more particularly in Fig. 12.

This movement of the pawl 47 takes place by virtue of the fact that the cam 54 on the cross-head has engaged the cam arm 51, as shown in Figs. 11 and 12, forcing the cam arm out of engagement with the pin 52, thereby relieving the pawl 47 from the pressure of the spring 50.

As the cross-head 55 descends the table descends with it, the rate of movement of the table thus being determined by the cam 57 which can be shaped so as to avoid the movement of the table being too abrupt. Also, of course, as the cross-head descends the cam 54 moves out of engagement with the cam arm 51, allowing the pawl 47 to be forced over by the spring 53 into position to engage under the next collar 45 on the rod 43, thereby stopping the table in the proper position to receive the second layer of articles.

This movement of the table is repeated for each revolution of the shaft 28 until the topmost layer of articles has been advanced onto the table and the charge is ready to be delivered to the carton. The plunger 21 is then operated as stated above, to push the assembled charge of articles from the table 9 onto the guide funnel 20, at the same time forcing the previously delivered charge fully into the carton, simultaneously forcing the carton off the end of the plunger onto the delivery belt 22.

The mechanism for operating the plunger is illustrated in Figs. 18 and 19. This mechanism comprises a one-revolution clutch supported on the main drive shaft 26. This clutch is normally open, the driven member 64 of the clutch being stationary, in which condition it remains until the table 9 actually reaches its lowermost position, regardless of the number of operations of the cross-head 55.

The driving member 65 of the one-revolution clutch consists of a disk keyed to the shaft 26 for rotation therewith, the disk having a notch 66 adapted when the clutch is thrown, to engage a pawl 67 carried by the driven member 64 to thereby rotate the driven member until the pawl is withdrawn from engagement with the notch. The driven member 64 of the clutch is provided with a sprocket wheel 68 which through its chain 69 operates a short crank shaft 70 mounted in suitable brackets in the machine frame, as shown in Fig. 2. The pitman 71 connects the crank of the shaft 70 with a plunger-operating lever 72 fulcrumed at its lower end in the base of the machine, and connected to the carriage 73 of the

plunger 21. The carriage 73 is mounted for reciprocation on guide rods 74 supported on the top of the machine frame and the movement of the plunger is sufficient to move the charge of packages off the table 9 into the funnel 20.

The pawl 67 is normally held out of engagement with the notch in the disk 65 by means of a pin 75 carried in the end of a crank arm 76 attached to a rock-shaft 77 supported in the machine frame beneath the table 9 and adjacent the path of movement of a bracket 78 depending from the head 41 which supports the table 9.

When the table reaches the lowermost position the bracket 78 engages a pin adjustably mounted in the end of a crank arm 79 also attached to the rock-shaft 77 whereby the shaft 77 will be rocked to the left, or counter-clockwise, as shown in Fig. 18, thereby moving the pin 75 out of engagement with the tail of the pawl 67, allowing its tooth to be drawn into engagement with the disk 65, thereby causing the driven member 64 of the clutch to be rotated in unison with the shaft 26. The rotation of the member 64 effects the operation of the plunger in the manner described.

In order to release the clutch at the completion of one revolution, it is essential that the table be elevated at least sufficiently for the bracket to disengage the pin and crank arm 79, thereby allowing the pin 75 to move into position to engage the tail of the pawl. Also, obviously, the table should not be appreciably elevated until the plunger has completed its return movement. To accomplish this sequence of operations we provide a table-elevating mechanism controlled by the movement of the plunger and set in operation just prior to the completion of the return stroke of the plunger. This mechanism is shown primarily in Figs. 16 and 17 and comprises a one-way clutch supported on the shaft 26. The driving member of the clutch consists of a notched disk 80 keyed to the shaft and rotated continuously therewith. The driven member consists of a disk 81 carrying a pawl 82 adapted to engage the notch in the driving member 80 of the clutch when the pawl is released by the plunger-operating lever 72. The member 81 is provided with a sprocket wheel and sprocket chain connected with a gear wheel 84 loose on the shaft 28 and meshing with a rack-bar 85 carried by the head 41 which supports the table 9.

The pawl 82 is normally held out of engagement with the notch in the disk 81 by means of a pivoted latch 86 also carried by the member 81, as shown in dotted lines in Fig. 17. When the latch is turned on its pivot in the position shown in full lines it releases the pawl, allowing the spring of the pawl to draw the same into position to engage the notch in the disk. The latch 86 is tilted on its pivot by means of a bell crank 87 mounted for oscillation on a fixed pin set in the machine base. One arm of the bell crank projects into position to engage a pin 88 on the projecting end of the latch and rock the latch to release the pawl in the manner described. The bell crank 87 is operated by means of an arm 89 fast to the rock-shaft 90 on which the plunger-operating lever 72 is attached. The arm 89 engages the depending arm of the bell-crank as the plunger reaches the end of its return movement, thereby rocking the bell-crank from its dotted line position to its full line position, thereby releasing the latch and allowing the

pawl to move in position to be engaged by the notch in the disk 81. As soon as the pawl engages the notch, the driven member of the clutch will be rotated in a clockwise direction as shown in Fig. 17, thereby rotating the gear 84 and elevating the table 9 to its original position.

The arm of the bell-crank which engages the pin 88 is jointed as indicated, so that the bell-crank can move from its full line to its dotted position above pin 88 at the next advance of arm 72 and plunger 21.

The clutch is released by means of a pin 91 carried by a bracket fixed to the base of the machine in position for the pin to engage the tail of the pawl and shift it out of engagement with the disk 80 when the table has been fully elevated.

The engagement of the pawl with the pin 91 serves to stop the rotation of the disk 81 and with it the gear 84 through which the table is elevated. The pin is threaded in its support so that the position to which the table is elevated may be accurately adjusted. This movement of the table restores the parts to position for another charge of articles to be assembled and the operations of delivering articles to the table and lowering the table will be repeated with both clutches on the shaft 26, disengaged. As the table is lowered the gear 84 will be rotated in the reverse direction by the rack attached to the table and through the sprocket chain connection will rotate the disk 82 in a direction reverse to the direction of rotation of the shaft 26, this movement being permitted by the latch 86 which holds the pawl out of engagement with the disk 80. During this reverse movement the bell-crank 87 remains in the position shown in full lines in Fig. 17, in which position the pin 88 carried by the latch clears the end of the jointed arm. When the table 9 again reaches its bottom position the disk 81 will have returned to a position such that the pin 88 on the latch 86 will be in the path of movement of the end of the bell-crank arm and will be operated as described at the end of the movement of the plunger 21.

The machine has been found thoroughly practical in the packing of heavy, dense articles, such as bars of soap, as well as light, fragile articles, such as boxes of popcorn. The articles packed do not have to be uniform in size, nor are close adjustments of the machine required. So long as the table is adjusted at each operation to bring the top of the stack of articles already assembled on the table below the edge of the tilting guide 8, the machine will function satisfactorily.

One important advantage of the machine is that the successive layers of articles are advanced over the articles beneath by the feed belt and consequently the belt will merely slip beneath the articles on the belt. Should there be any interference with the movement of the articles, neither the machine nor the articles being packed will be damaged. This is a distinct advantage over prior machines wherein each layer of articles is fed positively by a plunger or other mechanical element. The only positive feed of the articles effected by the machine is the movement of the assembled stack of articles by the plunger 21. There is little opportunity for interference in this operation but the plunger nevertheless may be provided as shown, with a spring interposed between the plunger and its carriage so that it may yield on engaging an obstruction.

The plunger is made so that it may be tilted

out of horizontal position should occasion require. To this end the plunger is pivoted to the carriage as shown at 93, and is provided with a depending arm which moves under a track 94 mounted on the machine frame adjacent the path of movement of the plunger carriage. The arm and track normally hold the plunger in its normally adjusted position but in case it should be necessary to stop the machine with the plunger partially advanced over the table, the attendant may release the arm from under the track and turn the plunger back out of the way to get access to the machine.

In Figs. 20 and 21 I have illustrated a safety stop mechanism for the machine whereby should there be any interruption in the operation of the machine the machine will stop at the desired point in the cycle of operations. This mechanism comprises three switches 101, 102, 103, respectively, connected in parallel across the control circuit for the driving motor 25, whereby if any one of the switches are closed the machine will continue in operation.

Switch 101 is adapted to be actuated by the movement of the tilting guide 8. To this end the guide is provided with an upwardly and rearwardly extending arm 104 which engages under the end of the switch and operates to hold the switch closed when the tilting guide is elevated and to release the switch when the guide is lowered. The switch 102 is fixedly supported adjacent the rear wall of the table 9 and its movable contact consists of a sliding member 105 projecting into the path of movement of the articles as they are projected onto the table, the switch being closed by the pressure of the articles and opened by its spring when no articles are present on the table at the level of the switch. The third switch 103 is opened and closed by a cam 106 carried by the shaft 28. This cam is shaped and positioned to open the switch at the desired point in the cycle of operations of the machine. Current through the three switches controls the circuit breaker of the driving motor 25 and also an electric brake whereby the machine will be positively stopped at the desired point as determined by the cam.

As long as the supply of articles continues without interruption the machine will remain in operation. Whenever the table 8 is tilted upwardly the switch 101 will be closed to thereby maintain the machine in operation and whenever the table is tilted downwardly and articles are projected across the table 9 the switch 102 will be closed to maintain the machine in operation. If, however, there is a failure of articles the switch 102 will not be closed when the table 8 tilts downwardly opening the switch 101. Consequently when the high point of the cam 106 next engages the arm of the switch 103 that switch will also be opened, thereby stopping the machine and maintaining it stopped until the supply of articles is again replenished, when the switch 102 will be closed and the machine will automatically resume operation.

We have described our improved machine in considerable detail for the reason that the specific machine shown and described has been found satisfactory in actual practice in the packaging of widely differing articles. It is to be understood, however, that the invention is not limited to the details of construction shown and described except insofar as set forth in the appended claims.

We claim:

1. In a machine of the class described, the com-

- combination of means for advancing articles to be packed into the machine, means for arranging the articles into a stack of predetermined dimensions, said means comprising a table positioned in the line of movement of the articles as they are advanced into the machine, means for lowering the table step by step, and means controlled by the movement of the table for effecting the discharge of the stack of articles therefrom.
2. In a machine of the class described, the combination of means for advancing articles to be packed into the machine, means for arranging the articles into a stack of predetermined dimensions, said means comprising a table positioned in the line of movement of the articles as they are advanced into the machine, means for lowering the table step by step, means for interrupting the movement of the articles at a point adjacent the said table, and means controlled by the movement of the table for effecting the discharge of the stack of articles therefrom.
3. In a machine of the class described, the combination of means for advancing articles to be packed into the machine, means for arranging the articles into a stack of predetermined dimensions, said means comprising a table positioned in the line of movement of the articles as they are advanced into the machine, means for lowering the table step by step, means controlled by the movement of the table for effecting the discharge of the stack of articles therefrom, and means controlled by the stack-discharging means for elevating the table to a position substantially in line with the path of movement of the articles into the machine.
4. In a machine of the class described, the combination of a feed belt for feeding articles to the machine, a table mounted for vertical reciprocation and arranged to receive articles from the feed belt, and means interposed between the feed belt and the table for periodically interrupting the movement of the articles onto the table, said means comprising a stop overlying the table and a movable guide for periodically elevating the articles immediately adjacent the table into position to be engaged by the stop.
5. In a machine of the class described, the combination of a feed belt for feeding articles to the machine, a table mounted for vertical reciprocation and arranged to receive articles from the feed belt, means interposed between the feed belt and the table for periodically interrupting the movement of the articles onto the table, said means comprising a stop overlying the table and a movable guide for periodically elevating the articles immediately adjacent the table into position to be engaged by the stop, and means operating when the guide is elevated to lower the table a distance approximately equal to the thickness of the articles being packed.
6. In a machine of the class described, the combination of a feed belt for feeding articles to the machine, a table mounted for vertical reciprocation and arranged to receive the articles from the feed belt, means interposed between the feed belt and the table for periodically interrupting the movement of the articles onto the table, said means comprising a stop overlying the table and a movable guide for periodically elevating the articles immediately adjacent the table into position to be engaged by the stop, means operating when the guide is elevated to lower the table a distance approximately equal to the thickness of the articles being packed, and means for shifting the assembled articles as a unit from the table.
7. In a machine of the class described, the combination of means for advancing articles to be packed into the machine, means for arranging the articles into a stack of predetermined dimensions, said means comprising a table positioned in the line of movement of the articles as they are advanced into the machine, means for lowering the table step by step, means for interrupting the movement of the articles at a point adjacent the said table, means controlled by the movement of the table for effecting the discharge of the stack of articles therefrom, and a carton support adjacent said table arranged to maintain a carton in position to receive articles discharged from said table.
8. In a machine of the class described, the combination of a vertically movable table for receiving successive layers of articles, a plunger for shifting an assembled stack of articles from said table, and means for moving said table comprising an escapement mechanism acting periodically to lower the table a fraction of its total vertical movement, means for varying the number and extent of fractional movements, and means for operating when the table is fully lowered and irrespective of the number of fractional movements to effect the operation of the plunger.
9. In a machine of the class described, the combination of a vertically movable table for receiving successive layers of articles, a plunger for shifting an assembled stack of articles from said table, means for moving said table comprising an escapement mechanism acting periodically to lower the table a fraction of its total vertical movement, means for varying the number and extent of fractional movements, and means operating when the table is fully lowered and irrespective of the number of fractional movements to effect the operation of the plunger, said means comprising a normally open clutch, a trip therefor, and means carried by the table for engaging the trip and closing the clutch as the table reaches its lowermost position.
10. In a machine of the class described, the combination of a vertically movable table for receiving successive layers of articles, a plunger for shifting an assembled stack of articles from said table, means for moving said table comprising an escapement mechanism acting periodically to lower the table a fraction of its total vertical movement, means for varying the number and extent of fractional movements, means operating when the table is fully lowered and irrespective of the number of fractional movements to effect the operation of the plunger, said means comprising a normally open clutch, a trip therefor, means carried by the table for engaging the trip and closing the clutch as the table reaches its lowermost position, and means controlled by the plunger-operating mechanism for elevating the table to its original position.
11. In a machine of the class described, the combination of a feed belt for feeding articles to the machine, a table mounted for vertical reciprocation and arranged to receive articles from the feed belt, means interposed between the feed belt and the table for periodically interrupting the movement of the articles onto the table, said means comprising a stop overlying the table and a movable guide for periodically elevating the articles immediately adjacent the table into position to be engaged by the stop, means operating when the guide is elevated to lower the table a distance approximately equal to the thickness of the articles being packed, means for discharging

ing the assembled articles from the table, means for elevating the table after the discharge of the articles, and means for maintaining the movable guide in elevated position while the table is being raised.

12. In a machine of the class described, means for feeding articles to be packed in a continuous line into the machine, means for stacking the articles in successive layers to form a charge for a carton, and means controlled by the articles as they enter the machine for stopping the machine in the event that the line of articles entering the machine is not continuous, said means operating to stop the machine at a predetermined point in its cycle of operations, and comprising a plurality of electrical switches one of which is controlled by the articles and the other of which is controlled by a movable part of the machine.

13. In a machine of the class described, the combination of means for advancing articles to be packed into the machine, means for arranging

the articles into a stack of predetermined dimensions, said means comprising a table positioned in the line of movement of the articles as they are advanced into the machine, means for lowering the table step-by-step, means for interrupting the movement of the articles at a point adjacent the said table, and means controlled by the stacking mechanism for effecting the discharge of the stack of articles therefrom.

14. In a machine of the class described, means for feeding articles to be packed in a continuous line into the machine, means for stacking the articles in successive layers to form a charge for a carton, and means controlled by the articles as they enter the machine for stopping the machine in the event that the line of articles entering the machine is not continuous, said means operating to stop the machine at a predetermined point in its cycle of operations.

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