Aug. 18, 1953 J. L. FERGUSON ET AL 2,649,231

AUTOMATIC CASE LOADING METHOD AND APPARATUS

Filed Dec. 22, 1948 5 Sheets-Sheet 1

Fig. 1.

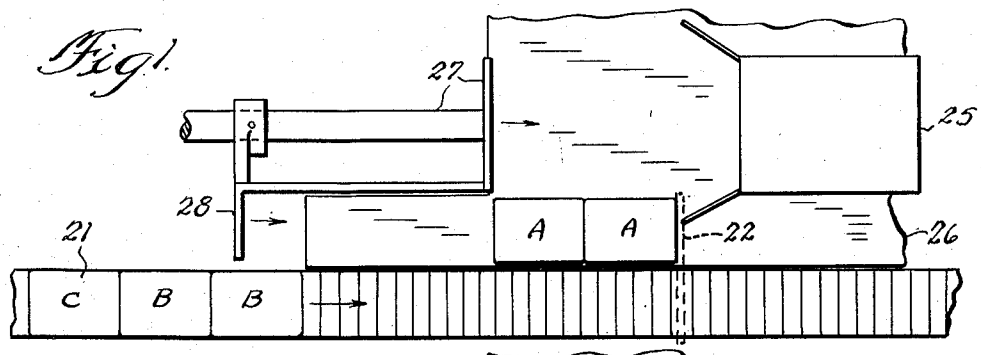


Fig. 2.

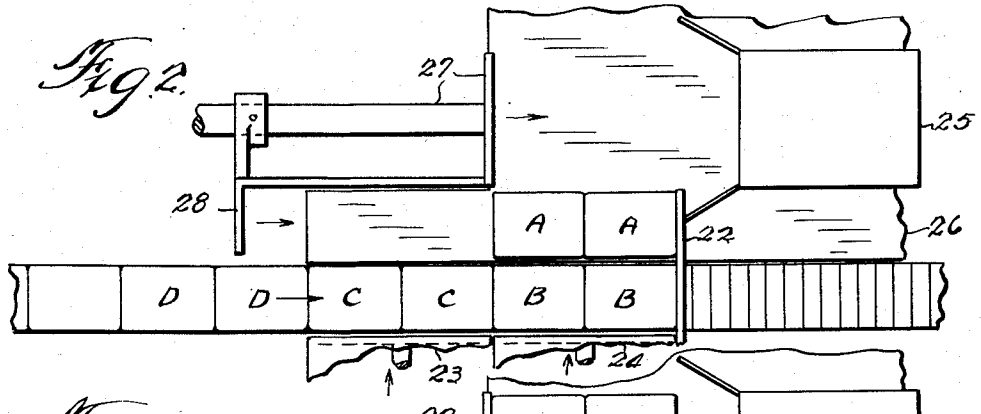


Fig. 3.

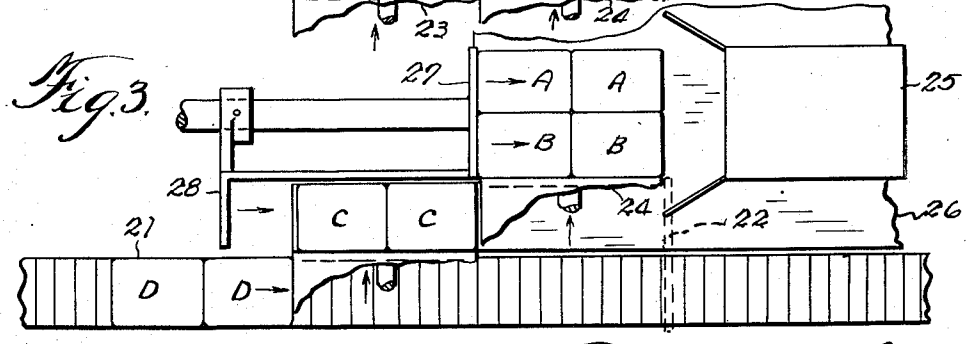
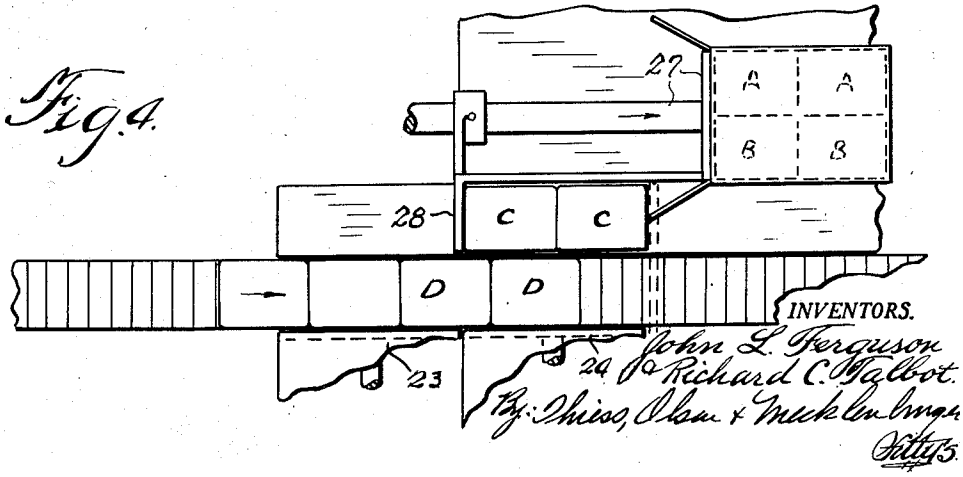


Fig. 4.



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AUTOMATIC CASE LOADING METHOD AND APPARATUS

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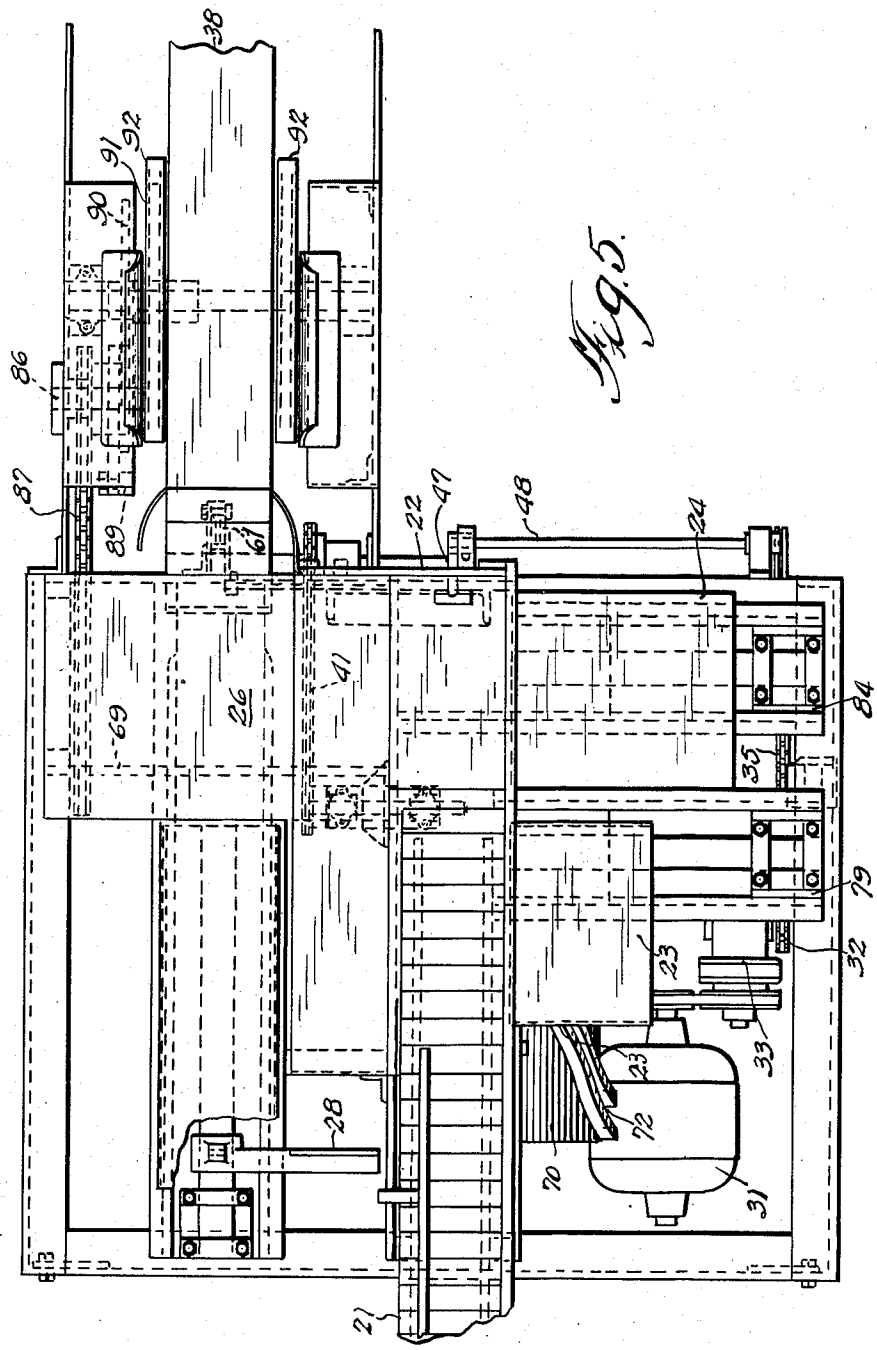

Fig. 5.

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AUTOMATIC CASE LOADING METHOD AND APPARATUS

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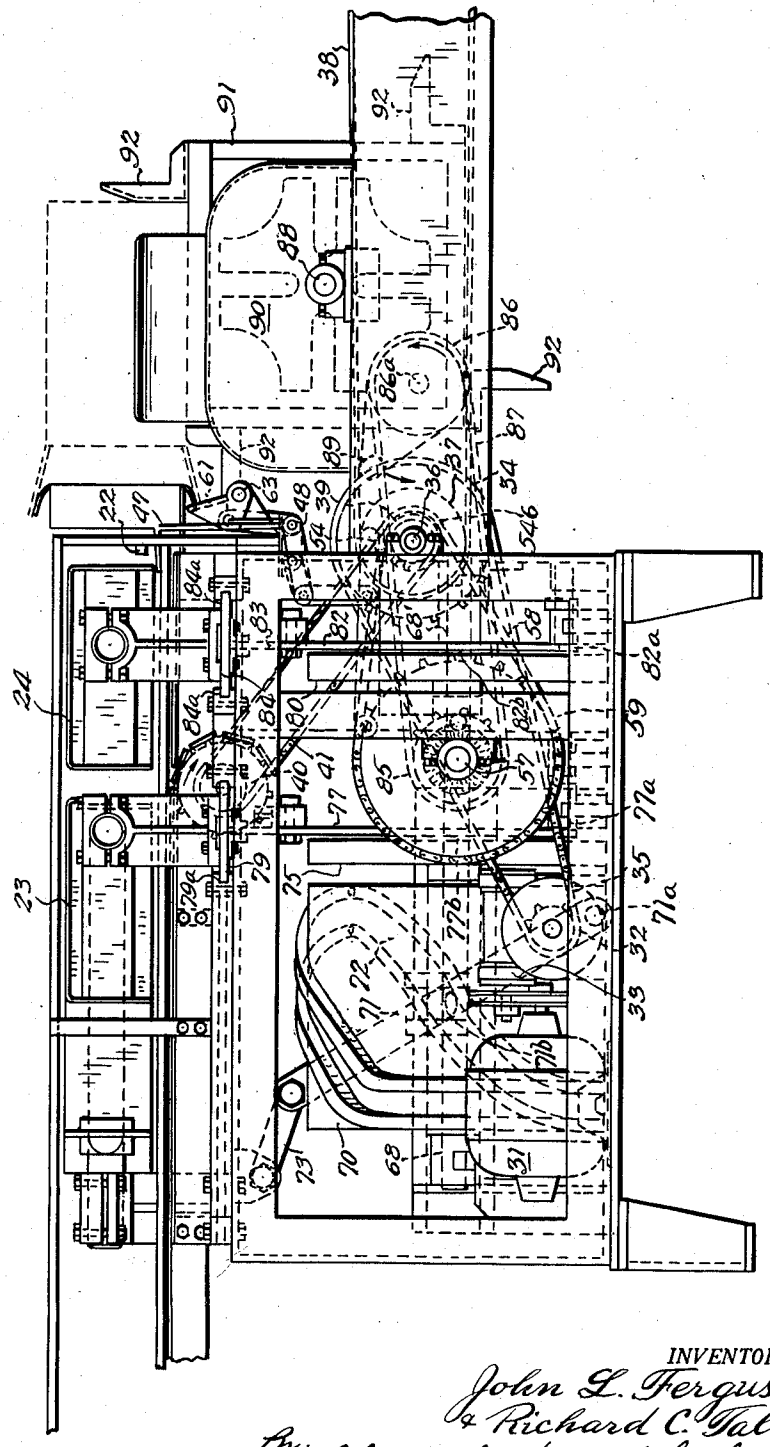

Fig. 6.

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AUTOMATIC CASE LOADING METHOD AND APPARATUS

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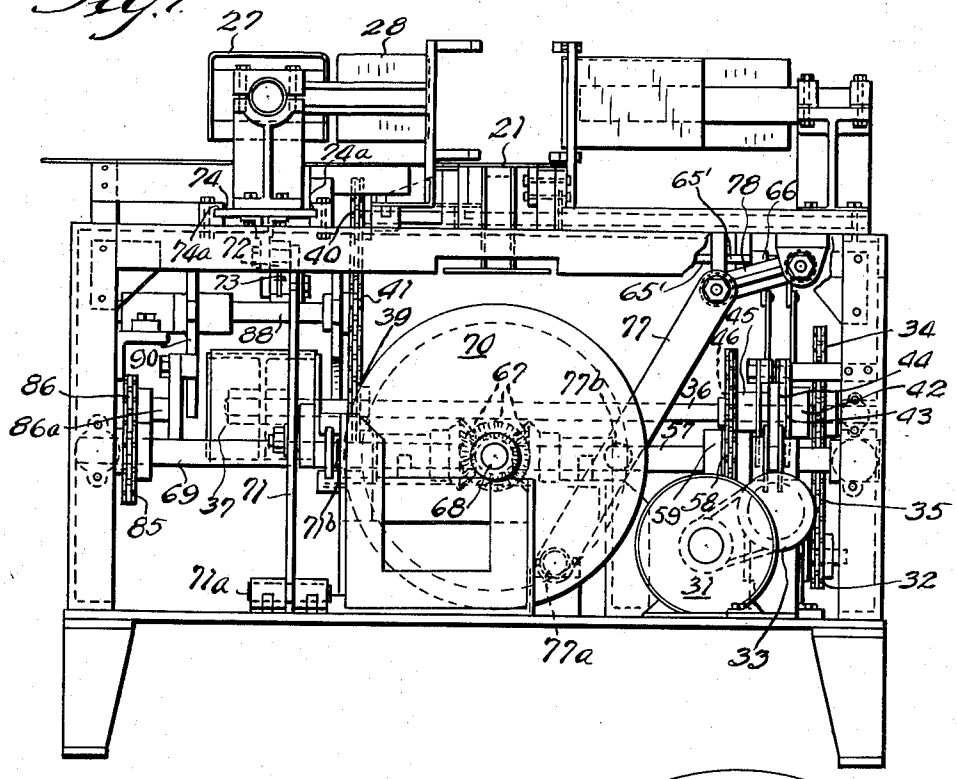
Fig. 7.



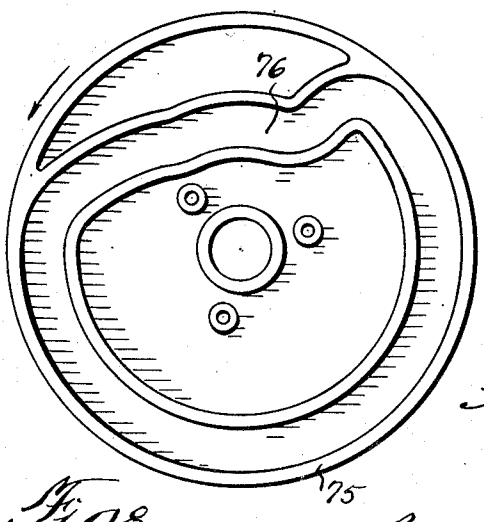


Fig. 8.

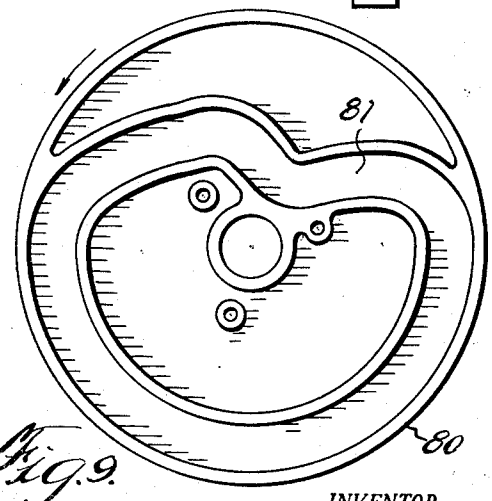


Fig. 9.

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AUTOMATIC CASE LOADING METHOD AND APPARATUS

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Fig. 11.

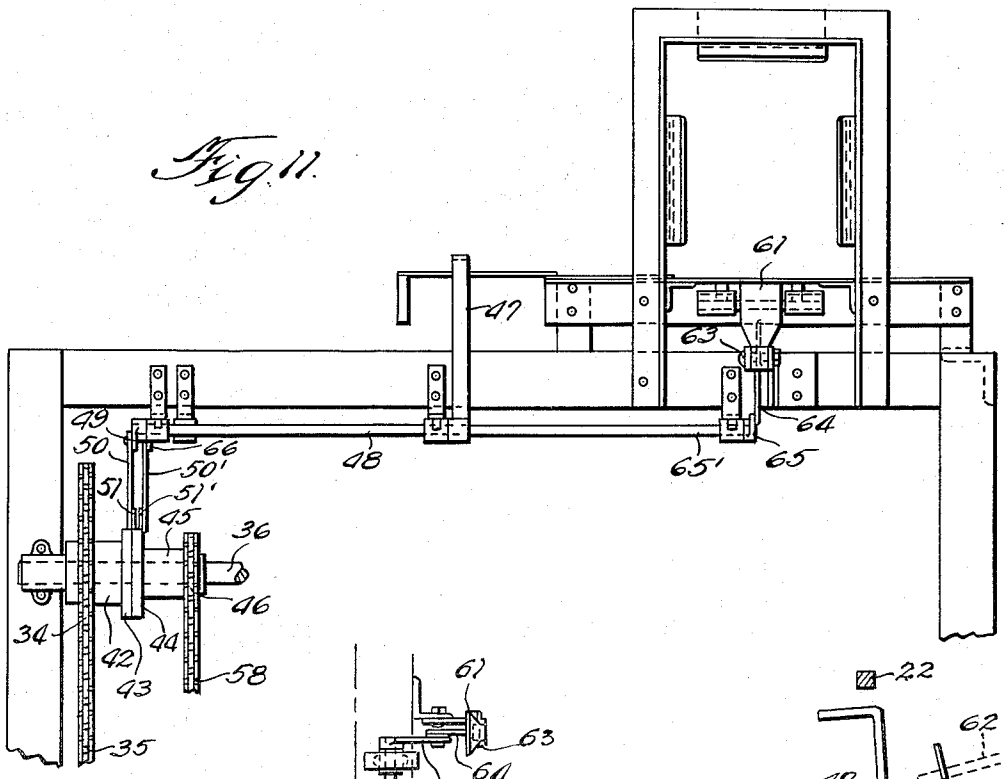


Fig. 10.

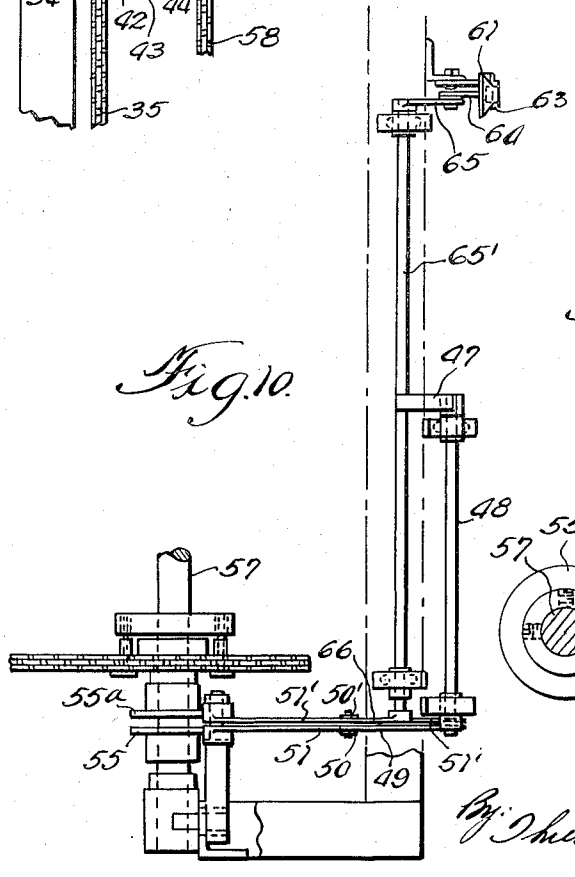
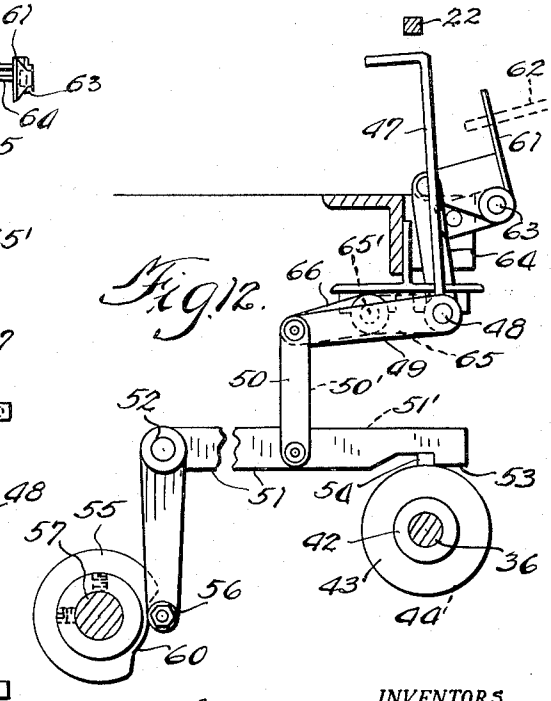


Fig. 12.



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Patented Aug. 18, 1953

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UNITED STATES PATENT OFFICE

2,649,231

AUTOMATIC CASE LOADING METHOD AND APPARATUS

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Application December 22, 1948, Serial No. 66,604

25 Claims. (Cl. 226—14)

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This invention relates to a method and apparatus for inserting a predetermined number of uniformly shaped articles, such as packaged goods, into a carton in a predetermined relationship. It is an object of this invention to provide improved method and apparatus of this nature.

In preparing goods for shipment, it is frequently desired that a specified number of articles be enclosed in a single container in an orderly manner. Various machines and methods have previously been devised for accomplishing this desired result, but there is need for improved method and apparatus which is accurate, reliable, and economical as to original cost, operating cost and maintenance. It is also desired that such apparatus be automatic to as great an extent as is practical in order to reduce labor expense in this step.

In a machine constructed in accordance with this invention, the following steps are accomplished automatically. First, a continuous line of uniformly shaped articles such as packaged goods are fed to the case loader proper by a conveyor belt. Before reaching the loading zone, a specified number of articles are removed from the conveyor belt, and are placed in a position parallel to and adjacent the conveyor belt. The next group of articles, equal in number to those previously removed from the belt, are then carried by the conveyor to the loading zone and the previously removed articles are advanced to the loading zone by another actuating means, the two groups of articles, then lying substantially side by side. The two groups are then moved into an open carton or other container which is of proper size to contain the two groups of articles and which is held in its proper position by other automatically controlled portions of the case loader. This last operation can be performed in either one or two steps. After the container has been filled, it is automatically removed from its loading position thereby permitting the manual or automatic insertion of another empty carton into the loading position.

Some of the steps outlined above are performed simultaneously in order to permit a more rapid operation of the machine. A more complete description of this and other features of the machine will be given subsequently.

Another object of this invention is to provide a method and apparatus for automatically loading articles into a container in a group, such group having a larger number of articles across its width than are conveyed abreast to the machine.

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Another object of this invention is to provide an automatic case loader in which the file of articles as fed to the machine is doubled before the articles are placed into a carton.

Another object of this invention is to provide a method and apparatus involving an automatic case loader wherein articles which are fed to the machine on a conveyor in single file are arranged two abreast, the double line of articles then being inserted into an empty container, and in which various of these steps are performed simultaneously.

This invention, together with further objects and advantages thereof, will best be understood by reference to the following description taken in connection with the accompanying drawings, and its scope will be pointed out in the appended claims.

In the drawings:

Figs. 1, 2, 3 and 4 are partial plan views of a machine constructed in accordance with this invention, these views showing the principal stages of the loading operation;

Fig. 5 is a more complete plan view of the same machine;

Fig. 6 is a side elevational view of the same machine with the side plates or outer covering of the machine removed;

Fig. 7 is an end elevational view of the same machine with the outer covering of the machine removed;

Fig. 8 is an elevational view of the face of a cam for operating one of the plungers;

Fig. 9 is an elevational view of the face of another cam for operating another of the plungers;

Fig. 10 is an enlarged plan view of certain clutch and clutch and control means mechanism;

Fig. 11 is an enlarged end elevational view of the mechanism shown in Fig. 10; and

Fig. 12 is an enlarged side elevational view of the same control mechanism.

In the embodiment shown in the drawings, the case loader is handling packaged goods, the various packages being designated by the letters A, B, C and D. For reasons which will later be apparent, it is desirable to start the machine in operation by manually placing cans A in the position shown in Fig. 1. Other cans B, C and D are located on conveyor belt 21. Movement of conveyor belt 21 now advances cans B, C and D to the position shown in Fig. 2, the advance of these cans being limited by a stop bracket 22. It will be noted that the pair of cans B are now parallel and adjacent the pair of cans A. At this time, a

pair of plungers 23 and 24 are actuated to move cans A, B and C to the positions shown in Fig. 3. Plunger 23 moves cans C to a position parallel to and adjacent the conveyor belt as a first step in preparing a double line of cans. Plunger 24 moves a distance substantially double that of plunger 23 and moves cans A and B to a position in line with the open side of container 25.

Plungers 23 and 24 are then withdrawn to the position shown in Figs. 2 and 4, leaving cans A, B and C standing on table 26 in the position shown in Fig. 3. A third plunger 27 is now actuated and pushes cans A and B into the awaiting container. At the same time an arm 28 suitably connected to plunger 27 moves cans C toward the right into the position shown in Fig. 4. In the meantime, conveyor 21 moves containers D as well as all subsequent cans to the right, this being the portion of the loading cycle shown in Fig. 1.

This procedure moves the cans into the container 25 in a double line while the cans are advanced to the case loader by conveyor 21 in single file. It should be noted that plunger 24 could push the four cans directly into carton 25 if the carton were located differently. For purely practical reasons relating to the shape of the container and the manner in which the cans are fed to the machine a second step is used involving plunger 27.

It should also be noted that each individual can shown in Figs. 1–4 could actually be two or more cans advancing in double file, in which case the cans would be thrust into the container four abreast or four deep, depending on the location of carton 25 and the direction of insertion of cans thereinto. Similarly, the cans could be three, four or more abreast on the conveyor. The significant point is that the cans or other articles are inserted into container 25 with double the number of cans abreast or double the number of cans deep as appear on conveyor 21. This permits a simpler manual or automatic loading of the cans on the conveyor belt while at the same time permitting the use of a container 25 which will receive twice the number of cans abreast or deep as appear on the conveyor.

The driving mechanism for accomplishing the desired movements of the conveyor and the various plungers will now be described. A motor 31 drives a sprocket wheel 32 through a speed reducing mechanism 33. Sprocket 32 in turn drives sprocket 34 through chain 35. Sprocket 34 is mounted on shaft 36 which serves as the power source for the entire machine. It will be noted that motor 31 as well as chain and sprocket drive 32—34—35 are located at the right-hand side of Fig. 7. In the interest of clarity, this will hereinafter be referred to as the right-hand side of the machine.

Directly connected to drive shaft 36 at the left-hand side of the machine is a pulley 37, whose function is to drive by direct contact therewith a second conveyor belt 38, seen in Fig. 5. Conveyor belt 38 is used to carry away from the case loader proper the filled cartons. This operation will subsequently be described in more detail. Also connected directly to drive shaft 36 is a sprocket 39 which drives sprocket 40 through chain 41. Sprocket 40 drives the previously mentioned conveyor belt 21, which feeds the cans, or other articles or packaged goods, to the case loader proper.

The two conveyors 21 and 38 are constantly driven as long as motor 31 is energized. All other operating portions of the machine are subject to a control system which interrupts the operation of such parts in the event that a carton 25 is not in the proper position to receive cans at the proper time or in the event that cans are not located in the position of cans B in Fig. 2 at the proper time. In other words, if for any reason cans are not so located at a certain phase of the machine's cycle, the control mechanism will function to interrupt the movement of all operating parts of the machine with the exception of the two conveyors, and if a carton 25 is not located in the receiving position during a certain phase of the machine's cycle, the operation of the machine with the exception of the conveyors will be interrupted.

The interruption of machine operation is effected by means of a clutch of conventional design. Mounted on shaft 36 is a hub 42 and a driving clutch plate 43. A driven clutch plate 44 is mounted on a hub 45 which rotates freely on shaft 36. Since the clutch may be any suitable interruptible drive means and may be of conventional design its detailed description is considered unnecessary.

Mounted on hub 45 is a sprocket 46 which constitutes the power source for all operating portions of the machine with the exception of the two conveyor belts, which, as previously explained, are driven directly by constantly rotating shaft 36.

Normally, clutch plate 44 rotates with clutch plate 43 because of its engagement therewith, but the rotation of clutch plate 44 will be interrupted in the event that there are no cans in the position occupied by cans B in Fig. 2 at that part of the operating cycle in which plunger 24 is about to move cans A and B to a position in front of container 25, as illustrated in Fig. 3. The mechanism for effecting this control is shown best in Figs. 10, 11 and 12. A can trip lever 47 extends into the space occupied by cans B in Fig. 2. When a can is moved into that position, lever 47 is moved outwardly and rotates shaft 48 to which it is connected. At the right-hand side of the machine, shaft 48 is rigidly connected to an arm 49, whose left-hand end, as seen in Fig. 11, will be raised when lever 47 is moved to the right. This will raise link 50 and bell crank 51 which is pivoted on a fixed shaft 52. At the right-hand end of bell crank 51, as seen in Fig. 12, there is a hook 53 adapted to engage a dog 54 on clutch plate 44.

It will be apparent now that whenever a can is in position to move lever 47 to the right in Fig. 12, the hook 53 will be raised out of engaging position with dog 54 on clutch plate 44 thereby permitting the movement of clutch plate 44 with clutch plate 43 by virtue of its engagement therewith. Hook 53 does not always, however, engage dog 54 when lever 47 moves to the left. This results from the fact that bell crank 51 is also under the control of cam 55 which acts against roller 56 mounted on the lower end of bell crank 51.

Cam 55 is mounted on shaft 57 which is driven directly by sprocket 46, chain 58 and sprocket 59, the latter being mounted on shaft 57. Since the various plungers are driven through their complete cycles by a single revolution of shaft 57, as will subsequently be explained in detail, the depressed portion 60 of cam 55 is always in a position to receive roller 56 at a given phase of the plunger cycles. Accordingly, hook 53 is free to fall into engaging position with dog 54 only in the event that lever 47 is free to move to the left during a certain phase of the plunger

cycle. Cam 55 is positioned on shaft 57 in such a way that hook 53 will not engage dog 54 when plunger 24 has just moved cans off conveyor 21, as in Fig. 3. However, in the event that cans D in Fig. 3 are late in reaching the position occupied by cans B in Fig. 2, recessed portion 60 on cam 55 will permit hook 53 to engage dog 54 and interrupt the operation of the plungers until some subsequent time when cans reach the loading station and actuate lever 47. It is obvious that this control mechanism is intended to prevent operation of the various plungers where there has been a delay in getting cans to the proper loading position, thereby preventing a jumbling of cans on conveyor 21 and table 26.

As stated above, a second control mechanism is employed to interrupt the operation of the various plungers in the event that a carton 25 is not located in the proper position during a certain phase of the machine's operating cycle. This control mechanism is also best seen in Figs. 10, 11 and 12. Case trip lever 61 is located in a position to be actuated by the presence of a carton in the loading position. When closing flap 62 is in the position shown by the dotted lines in Fig. 12, it will move case trip lever 61 to the left in Fig. 12 pivoting it about shaft 63 upon which it is mounted. Link 64 connected to lever 61 will move downwardly and will cause arm 65, to which it is connected, to rotate shaft 65'. This rotation of shaft 65' will cause arm 66 to rise.

Connected to the left end of arm 66 is a link 50' similar to link 50, and a bell crank 51' similar to bell crank 51. Bell crank 51' operates exactly as bell crank 51 it being adapted to engage the same dog 54 on clutch plate 44. However, bell crank 51' is under the influence of cam 55*a* rather than cam 55.

It will now be apparent that when a box is located in the loading position, the flap 62 will actuate this second control mechanism and will maintain bell crank 51' in a raised position. Also when a box is not so located, the bell crank 51' will not be maintained in its raised position by case trip lever 61 and associated links and arms and will be permitted to stop the movement of clutch plate 44, but only in the event that cam 55*a* is not holding the bell crank in its raised position. Bell crank 51' then will be permitted to stop the rotation of clutch plate 44 only in the event that a carton is absent from the loading position during a particular phase of the operating cycle of the machine. It will be apparent that the purpose of this control mechanism is to prevent plunger 27 from pushing cans into the position normally occupied by a carton when there is no carton in the loading position.

Assuming that cans and cartons are being fed to the machine in the proper manner, power will pass from shaft 36 to clutch hub and plate 42 and 43, to clutch plate and hub 44 and 45, and to sprockets 46 and 59. This results in rotation of shaft 57, and, through a system of bevel gears 67, shafts 68, 68' and 69. In the embodiment illustrated shafts 68 and 68' actually constitute a single, continuous shaft but in the interest of clarity they will be referred to herein as separate shafts.

Located on shaft 68 is a cylindrical cam 70. A lever 71 is mounted on a fixed pivot 71*a*, as seen in Fig. 6, and carries a pin 71*b* which is arranged to ride in groove 72 of the cam 70. This causes lever 71 to rock back and forth once during each revolution of cam 70, this action of lever 71 causing plunger 27 to push cans A and B into container 25, as illustrated in Figs. 3 and 4. This motion of the plunger is effected by lever 71 through the means of connecting link 73. It is noted in Fig. 7 that plunger 27 is mounted on a plate 74 which slides in grooves 74*a* to permit this longitudinal movement of the plunger.

Also mounted on shaft 68 is wheel 75 having a cam groove 76 on one side surface as seen in Figs. 7 and 8. A lever 77 is mounted on a fixed pivot 77*a* and carries a pin 77*b* which is arranged to ride in groove 76. This causes lever 77 to rock back and forth once during each revolution of wheel 75. This action of lever 77 actuates plunger 23 through link 78, plunger 23 being mounted on plate 79 which slides in grooves 79*a*.

Mounted on shaft 68' is crank wheel 80 having a cam groove 81 on one side surface as seen in Figs. 7 and 9. A lever 82 is mounted on a fixed pivot 82*a* and carries a pin 82*b* which is arranged to ride in groove 81. This causes lever 82 to rock back and forth once during each revolution of wheel 80. This action of lever 82 actuates plunger 24 through link 83, plunger 24 being mounted on plate 84 which slides in grooves 84*a*.

Shaft 69 has mounted thereon a sprocket 85, best seen in Figs. 6 and 7. Sprocket 85 drives a sprocket 86 by chain 87. Sprocket 86 and shaft 86*a*, on which the sprocket is mounted, drives shaft 88 by a Geneva movement of which the principal parts are roller 89 mounted on shaft 86*a*, and plate 90 mounted on shaft 88. A framework 91 rotates with shaft 88 carrying with it flanges 92. Framework 91 is a box like structure, as best seen in Fig. 5, having two square elements, one on each side of conveyor 38. These elements are spaced in such a way that edges of carton 25 will rest on the two elements. When the Geneva movement causes shaft 88 and framework 91 to rotate 90 degrees, a filled carton resting on top of framework 91 will be caused to fall to the right, in Fig. 5, onto conveyor 38, flanges 92 serving to prevent the carton from sliding off framework 91 until the carton contacts and rests on conveyor 38. Flanges 92 also serve to prevent movement of the carton to the right during the filling operation.

It should be noted that beveled gears 67 are of a one to one ratio and that each of the plungers 23, 24 and 27 are driven through one complete cycle for each revolution of shaft 68 or 68', also that sprocket 85 is of the same size as sprocket 86 with the result that framework 91 makes one 90 degree turn for each revolution of shaft 69. Accordingly, each of the plungers and the carton handling mechanism pass through one complete cycle for each revolution of drive shaft 57 on which is mounted cam 55.

It will be readily understood by those skilled in the art that the phase of the three plungers with respect to each other and with respect to the carton handling mechanism can be controlled by the position of cam 70 and the wheels 75 and 80 with respect to each other and with respect to sprocket 85. It will also be apparent to those skilled in the art that the operation of the two control mechanisms illustrated in Figs. 10, 11 and 12 can be made to have the proper phase relationship with these operating parts by virtue of the proper setting of cams 55 and 55*a* on shaft 57.

It is apparent that by using additional plungers

acting in parallel with plungers 23 and 24 and by adding additional stepped arms similar to arm 28 on plunger 27 it is possible to make the advancing file of cans on table 26 any desired multiple of the file of cans as fed to the machine on conveyor belt 21. It is also apparent that the protective controls and the means for actuating the various plungers and conveyors may be of numerous forms.

While particular embodiments of the invention have been shown, it will be understood, of course, that the invention is not limited thereto since many modifications may be made, and it is, therefore, contemplated to cover by the appended claims any such modifications as fall within the true spirit and scope of the invention.

The invention having thus been described, what is claimed and desired to be secured by Letters Patent is:

1. In an automatic case loader a conveyor system for advancing in file articles to be packaged, first plunger means for removing a first group of consecutive articles of predetermined number from such file to a position adjacent thereto, second plunger means having a plunger face for moving said first group of articles parallel to such file to a loading zone, said conveyor system being effective to move a second group of consecutive articles, equal in number to said first group, to such loading zone adjacent such first group, means for restraining such second group from movement beyond such zone, and third plunger means for moving such first and second groups of articles as a unit laterally of such file, said second plunger means having another plunger face for advancing such first and second groups of articles longitudinally of such file into a container.

2. In an automatic case loader a conveyor system for advancing in file articles to be packaged, first plunger means for removing a first group of consecutive articles of predetermined number from such file to a position adjacent thereto, second plunger means for moving said first group of articles parallel to such file to a loading zone, said conveyor system being effective to move a second group of consecutive articles, equal in number to said first group, to such loading zone adjacent such first group, means for restraining such second group from movement beyond such zone, third plunger means for moving such first and second groups of articles to a position away from said conveyor system and beyond said restraining means, and a fourth plunger means for moving such first and second groups of articles as a unit substantially parallel to said conveyor system and into a container.

3. In an automatic case loader a conveyor system for advancing in file articles to be packaged, first plunger means for removing a first group of consecutive articles of predetermined number from such file to a position adjacent thereto, second plunger means for moving said first group of articles parallel to such file to a loading zone, said conveyor system being effective to move a second group of consecutive articles, equal in number to said first group, to such loading zone adjacent such first group, means for restraining such second group from movement beyond such zone, third plunger means for moving such first and second groups of articles to a position away from said conveyor system and beyond said restraining means, and a fourth plunger means for moving such first and second groups of articles as a unit substantially parallel to said conveyor system and into a container, said first and third plunger means operating substantially simultaneously and said second and fourth plunger means operating substantially simultaneously.

4. In an automatic case loader a conveyor system for advancing in file articles to be packaged, first plunger means for removing a first group of consecutive articles of predetermined number from such file to a position adjacent thereto, second plunger means for moving said first group of articles parallel to such file to a loading zone, said conveyor system being effective to move a second group of consecutive articles, equal in number to said first group, to such loading zone adjacent such first group, means for restraining such second group for movement beyond such zone, third plunger means for moving such first and second groups of articles to a position away from said conveyor system and beyond said restraining means, a fourth plunger means for moving such first and second groups of articles as a unit substantially parallel to said conveyor system and into a container, said first and third plunger means operating substantially simultaneously and said second and fourth plunger means operating substantially simultaneously, and control means for preventing the operation of all of said plunger means in the event that said conveyor system fails to move such second group of articles to such loading zone at the proper time.

5. In an automatic case loader a conveyor system for advancing in file articles to be packaged, first plunger means for removing a first group of consecutive articles of predetermined number from such file to a position adjacent thereto, second plunger means for moving said first group of articles parallel to such file to a loading zone, said conveyor system being effective to move a second group of consecutive articles, equal in number to said first group, to such loading zone adjacent such first group, means for restraining such second group from movement beyond such zone, third plunger means for moving such first and second groups of articles to a position away from said conveyor system and beyond said restraining means, a fourth plunger means for moving such first and second groups of articles as a unit substantially parallel to said conveyor system and into a container, said first and third plunger means operating substantially simultaneously and said second and fourth plunger means operating substantially simultaneously, and control means for preventing the operation of all of said plunger means in the event that a container is not in position to receive such groups of articles at the proper time.

6. In an automatic case loader a conveyor system for advancing in file articles to be packaged, first plunger means for removing a first group of consecutive articles of predetermined number from such file to a position adjacent thereto, second plunger means for moving said first group of articles parallel to such file to a loading zone, said conveyor system being effective to move a second group of consecutive articles, equal in number to said first group, to such loading zone adjacent such first group, means for restraining such second group from movement beyond such zone, third plunger means for moving such first and second groups of articles to a position away from said conveyor system and beyond said restraining means, and a fourth plunger means for moving such first and second groups of articles as a unit substantially parallel to said conveyor

system and into a container, all of said plunger means being connected by positive drives to a common drive whereby all of said plunger means are positively maintained in the proper phase relationship.

7. In an automatic case loader a conveyor system for advancing in file articles to be packaged, first plunger means for removing a first group of consecutive articles of predetermined number from such file to a position adjacent thereto, second plunger means for moving said first group of articles parallel to such file to a loading zone, said conveyor system being effective to move a second group of consecutive articles, equal in number to said first group, to such loading zone adjacent such first group, means for restraining such second group from movement beyond such zone, third plunger means for moving such first and second groups of articles to a position away from said conveyor system and beyond said restraining means, a fourth plunger means for moving such first and second groups of articles as a unit substantially parallel to said conveyor system and into a container, all of said plunger means being connected by positive drives to a common drive whereby all of said plunger means are positively maintained in the proper phase relationship, said common drive being driven through interruptible drive means by a power source, and control means for interrupting the flow of power from said source to said common drive in the event that said conveyor system fails to move such second group of articles to such loading zone prior to that portion of the operating cycle of the various said plunger means at which said third plunger means is about to move such first and second groups away from said conveyor system.

8. In an automatic case loader a conveyor system for advancing in file articles to be packaged, first plunger means for removing a first group of consecutive articles of predetermined number from such file to a position adjacent thereto, second plunger means for moving said first group of articles parallel to such file to a loading zone, said conveyor system being effective to move a second group of consecutive articles, equal in number to said first group, to such loading zone adjacent such first group, means for restraining such second group from movement beyond such zone, third plunger means for moving such first and second groups of articles to a position away from said conveyor system and beyond said restraining means, a fourth plunger means for moving such first and second groups of articles as a unit substantially parallel to said conveyor system and into a container, all of said plunger means being connected by positive drives to a common drive whereby all of said plunger means are positively maintained in the proper phase relationship, said common drive being driven through interruptible drive means by a power source, and control means including a trigger lever resiliently positioned within and adapted to be moved out of said loading zone by the entrance therein of such second group of articles and a latch controlled by said lever and adapted to restrain the secondary portion of said interruptible drive means, said control means serving to interrupt the flow of power from said source to said common drive in the event that said conveyor system fails to move such second group of articles to such loading zone prior to that portion of the operating cycle of the various said plunger means at which said third plunger means is about to move such first and second groups away from said conveyor system.

9. In an automatic case loader a conveyor system for advancing in file articles to be packaged, a first plunger means for removing a first group of consecutive articles of predetermined number from such file to a position adjacent thereto, second plunger means for moving said first group of articles parallel to such file to a loading zone, said conveyor system being effective to move a second group of consecutive articles, equal in number to said first group, to such loading zone adjacent such first group, means for restraining such second group from movement beyond such zone, third plunger means for moving such first and second groups of articles to a position away from said conveyor system and beyond said restraining means, a fourth plunger means for moving such first and second groups of articles as a unit substantially parallel to said conveyor system and into a container, all of said plunger means being connected by positive drives to a common drive whereby all of said plunger means are positively maintained in the proper phase relationship, said common drive being driven through interruptible drive means by a power source, and control means including a trigger lever resiliently positioned within and adapted to be moved out of said loading zone by the entrance therein of such second group of articles, a cam driven by said common drive, and a latch controlled by said lever and said cam and adapted to restrain the secondary portion of said interruptible drive means, said control means serving to interrupt the flow of power from said source to said common drive in the event that said conveyor system fails to move such second group of articles to such loading zone prior to that portion of the operating cycle of the various said plunger means at which said third plunger means is about to move such first and second groups away from said conveyor system.

10. In an automatic case loader a conveyor system for advancing in file articles to be packaged, first plunger means for removing a first group of consecutive articles of predetermined number from such file to a position adjacent thereto, second plunger means for moving said first group of articles parallel to such file to a loading zone, said conveyor system being effective to move a second group of consecutive articles, equal in number to said first group, to such loading zone adjacent such first group, means for restraining such second group from movement beyond such zone, third plunger means for moving such first and second groups of articles to a position away from said conveyor system and beyond said restraining means, a fourth plunger means for moving such first and second groups of articles as a unit substantially parallel to said conveyor system and into a container, all of said plunger means being connected by positive drives to a common drive whereby all of said plunger means are positively maintained in the proper phase relationship, said common drive being driven through interruptible drive means by a power source, and control means for interrupting the flow of power from said source to said common drive in the event that a container is not in position to receive such groups of articles prior to that portion of the operating cycle of the various said plunger means at which said fourth plunger means is about to move such groups of articles toward the portion normally occupied by such a container.

11. In an automatic case loader a conveyor system for advancing in file articles to be packaged, first plunger means for removing a first group of consecutive articles of predetermined number from such file to a position adjacent thereto, second plunger means for moving said first group of articles parallel to such file to a loading zone, said conveyor system being effective to move a second group of consecutive articles, equal in number to said first group, to such loading zone adjacent such first group, means for restraining such second group from movement beyond such zone, third plunger means for moving such first and second groups of articles to a position away from said conveyor system and beyond said restraining means, a fourth plunger means for moving such first and second groups of articles as a unit substantially parallel to said conveyor system and into a container, all of said plunger means being connected by positive drives to a common drive whereby all of said plunger means are positively maintained in the proper phase relationship, said common drive being driven through interruptible drive means by a power source, and control means, including a trigger lever resiliently positioned within and adapted to be moved out of the position normally occupied by such container by the entrance therein of such container and a latch controlled by said lever and adapted to restrain the secondary portion of said interruptible drive means, said control means serving to interrupt the flow of power from said source to said common drive in the event that a container is not in position to receive such groups of articles prior to that portion of the operating cycle of the various said plunger means at which said fourth plunger means is about to move such groups of articles toward the portion normally occupied by such a container.

12. In an automatic case loader a conveyor system for advancing in file articles to be packaged, first plunger means for removing a first group of consecutive articles of predetermined number from such file to a position adjacent thereto, second plunger means for moving said first group of articles parallel to such file to a loading zone, said conveyor system being effective to move a second group of consecutive articles, equal in number to said first group, to such loading zone adjacent such first group, means for restraining such second group from movement beyond such zone, third plunger means for moving such first and second groups of articles to a position away from said conveyor system and beyond said restraining means, a fourth plunger means for moving such first and second groups of articles as a unit substantially parallel to said conveyor system and into a container, all of said plunger means being connected by positive drives to a common drive whereby all of said plunger means are positively maintained in the proper phase relationshp, said common drive being driven through interruptible drive means by a power source, and control means, including a trigger lever resiliently positioned within and adapted to be moved out of the position normally occupied by such container by the entrance therein of such container, a cam driven by said common drive, and a latch controlled by said lever and said cam and adapted to restrain the secondary portion of said interruptible drive means, said control means serving to interrupt the flow of power from said source to said common drive in the event that a container is not in position to receive such groups of articles prior to that portion of the operating cycle of the various said plunger means at which said fourth plunger means is about to move such groups of articles toward the portion normally occupied by such a container.

13. In an automatic case loader a conveyor system for advancing in file articles to be packaged, first plunger means for removing a first group of consecutive articles of predetermined number from such file to a position adjacent thereto, second plunger means for moving said first group of articles parallel to such file to a loading zone, said conveyor system being effective to move a second group of consecutive articles, equal in number to said first group, to such loading zone adjacent such first group, means for restraining such second group from movement beyond such zone, third plunger means for moving such first and second groups of articles to a position away from said conveyor system and beyond said restraining means, a fourth plunger means for moving such first and second groups of articles as a unit substantially parallel to said conveyor system and into a container, all of said plunger means being connected by positive drives to a common drive whereby all of said plunger means are positively maintained in the proper phase relationship, said common drive being driven through interruptible drive means by a power source, and control means including a first trigger lever resiliently positioned within and adapted to be moved out of said loading zone by the entrance therein of such second group of articles, a second trigger lever resiliently located within the position normally occupied by such container and adapted to be moved out of such position by the entrance therein of such container, cam means driven by said common drive, and latch means controlled by said trigger levers and said cam means and adapted to restrain the secondary portion of said interruptible drive means, said control means serving to interrupt the flow of power from said source to said common drive in the event that said conveyor system fails to move such second group of articles to such loading zone prior to that portion of the operating cycle of the various said plunger means at which said third plunger means is about to move such first and second groups away from said conveyor system or in the event that a container is not in position to receive such groups of articles prior to that portion of the operating cycle of the various said plunger means at which said fourth plunger means is about to move such groups of articles toward the portion normally occupied by such a container.

14. The method of automatically assembling a predetermined number of uniformly shaped articles in a predetermined arrangement of files and rows comprising, intermittently moving groups of said articles of predetermined equal numbers into alignment in a definite position to form a multiple file with at least one other group of articles in file and of lesser number than the number of articles in each of said first-mentioned groups, and intermittently moving all of the articles in said multiple file equal distances substantially parallel to said files, whereby an equal number of articles of each file of said multiple file is displaced longitudinally beyond one end of said definite position, the total number of articles so displaced equaling said predetermined number of articles in a complete group.

15. The method of automatically assembling a predetermined number of uniformly shaped articles in a predetermined arrangement of files and rows comprising, moving a first group of articles of predetermined number into file in a definite position, moving all of the articles of said group an equal predetermined distance longitudinally of said file and displacing thereby an integral number of said articles longitudinally beyond one extremity of said definite position, said integral number being evenly divisible into said predetermined number of articles in said group, displacing the remainder of said first group laterally of said definite position and replacing said remainder with a second group equal in number to said first complete group to form a multiple file, and moving all of the articles of said multiple file said predetermined distance longitudinally of said file and displacing thereby said integral number of articles of each of said first and second groups longitudinally beyond said extremity of said definite position.

16. The method of automatically assembling a predetermined number of uniformly shaped articles in a predetermined arrangement of files and rows in a repetitive cycle starting with a first group of articles of predetermined number located in file in a definite position, said method comprising, displacing said first group of articles laterally of said definite position, replacing said first group with a second group of articles of equal number and, at the same time, placing a supplemental group of articles in alignment with said second group immediately beyond a first extremity of said definite position, the number of articles in said supplemental group being evenly divisible into said predetermined number of articles in either of said first and second groups, said second group and said supplemental group forming a multiple file with said first group, moving all of the articles of said multiple file an equal distance parallel to said files to displace an equal integral number of articles of each of said first and second groups longitudinally beyond a second extremity of said definite position, said last-named integral number equaling the number of articles in said supplemental group.

17. The method of automatically assembling a predetermined number of uniformly shaped articles in a predetermined arrangement of files and rows comprising, advancing such articles to form a file at a loading station, intermittently moving groups of such articles of predetermined equal number laterally with respect to such file and to a predetermined position, and successively moving all of the articles of such groups an equal distance substantially parallel to such file to displace an integral number of said articles longitudinally beyond one extremity of said loading station, said integral number being evenly divisible into said predetermined number of articles in each of said groups, the remaining articles of each of said groups being moved further laterally by such lateral movements of subsequent complete groups to form a multiple file therewith and being moved equal distances longitudinally with said subsequent groups.

18. The method of automatically assembling a predetermined number of uniformly shaped articles in a predetermined arrangement of files and rows comprising, intermittently moving groups of said articles of predetermined equal numbers into alignment in a definite position to form a multiple file with at least one other group of articles in file and of lesser number than the number of articles in each of said first-mentioned groups, such movement forcing such other groups laterally with respect to said definite position, and intermittently moving all of the articles in said multiple file equal distances substantially parallel to said files, whereby an equal number of articles of each file of said multiple file is displaced longitudinally beyond one end of said definite position, the total number of articles so displaced equaling said predetermined number of articles in a complete group.

19. The method of automatically assembling a predetermined number of uniformly shaped articles in a predetermined arrangement of files and rows comprising; advancing such articles in line to an operating station; successively moving groups of such articles laterally with respect to such line to form a first file, the number of articles in each of said groups equaling the number of articles in said arrangement of files and rows, each such movement of such a group forcing fractional portions of at least one preceding group further laterally to form a multiple file with said first file; and moving all of the articles of such multiple file as a body in a direction parallel to such line, the distance of such movement equaling the length of the shortest of said files, whereby all of the articles in the shortest of said files and an equal number of articles from the other files are moved longitudinally beyond one extremity of said operating station.

20. The method of automatically assembling a predetermined number of uniformly shaped articles in a predetermined arrangement of files and rows comprising advancing such articles in a line to an operating station, successively moving groups of such articles of predetermined equal number laterally with respect to such line to form a first file, such movement forcing the remaining portion of at least one preceding group further laterally to form at least a second file of a lesser number of articles, moving all of the articles of such complete group and such portion of a group equal distances in a direction parallel to said files, said second-named movement displacing an equal number of articles of each of said files longitudinally beyond the limits of said operating station, the total number of articles so displaced equaling said predetermined number of articles in each complete group.

21. The method of automatically assembling a predetermined number of uniformly shaped articles in two files and a predetermined number of rows comprising, advancing such articles in line to an operating station, successively moving groups of such articles of predetermined equal number laterally with respect to such line to form a first file, said last-named number equaling twice said predetermined number of rows, such movement forcing a remaining one-half of a preceding group further laterally to form a second file, moving all of the articles of such complete group and such one-half group an equal distance in a direction parallel to said files, said distance equaling one-half the length of such complete group, such last-named movement displacing one-half of such complete group and the remaining half of such preceding group beyond the limits of said operating station and maintaining the articles of said first and second files in their original spatial relationship with respect to each other.

22. Apparatus for operating on a file of articles and rearranging such articles in a prede-

termined arrangement of files and rows, the number of articles abreast in such multiple file being an integral multiple of the number of articles abreast in such first-named file, said apparatus comprising, first and second conveyor means, said first conveyor means being adapted to intermittently move a group of articles of predetermined equal number into a file in a definite position with respect to said second conveyor means and to force a fractional portion of at least one preceding group laterally of said definite position to form a multiple file with said first-named group, said second conveyor means being adapted to intermittently move all of the articles in such multiple files as a body parallel to such multiple files and to cause displacement of an equal number of articles of each of said files longitudinally beyond one extremity of said definite position, each intermittent movement of said second conveyor means being of such magnitude as to so displace a total number of articles equal to said predetermined number of articles in each complete group.

23. Apparatus for operating on a file of articles and rearranging such articles in a predetermined arrangement of files and rows, the number of articles abreast in such multiple file being an integral multiple of the number of articles abreast in such first-named file, said apparatus comprising, an intermittently reciprocating loading plunger, and an intermittently reciprocating stacking plunger for moving a group of articles of predetermined equal number into a file in a definite position in front of said loading plunger and to force a fractional portion of at least one preceding group laterally of said definite position to form a multiple file with said first-named group, said loading plunger being reciprocable in a direction parallel to such multiple files and having a stepped face whereby said loading plunger is adapted to cause equal movement of all of the articles of such multiple file and to cause displacement of an equal number of articles of each of said files longitudinally beyond one extremity of said definite position, the stroke of said loading plunger being of such magnitude as to so displace a total number of articles equal to said predetermined number of articles in each complete group.

24. Apparatus for operating on a file of articles and rearranging such articles in a predetermined arrangement of files and rows, the number of articles abreast in such multiple file being an integral multiple of the number of articles abreast in such first-named file, said apparatus comprising, an intermittently reciprocating loading plunger, and an intermittently reciprocating stacking plunger for moving a group of articles of predetermined equal number into a file in a definite position in front of said loading plunger, said file being parallel to the direction of movement of said loading plunger, movement of said loading plunger in one direction causing equal movement of all of the articles of said group and the displacement of a predetermined portion of such articles longitudinally beyond one extremity of said definite position, the number of articles of said group so displaced being evenly divisible into said predetermined number of articles in the complete group, a second movement of said stacking plunger forcing a second group of articles into said definite position and forcing the remaining articles of said first-named group, and any remaining articles of any fractional preceding groups, laterally with respect to said definite position to form a multiple file, said loading plunger having a stepped face whereby it is adapted to move all of the articles of such multiple file equal distances, the number of articles of such multiple file displaced longitudinally beyond said one extremity of said definite position equaling said predetermined number of articles in each complete group.

25. Apparatus for arranging a predetermined number of uniformly shaped articles in a predetermined number of files and rows comprising, conveyor means for moving such articles in line to an operating station, an intermittently reciprocating stacking plunger for moving a group of articles of predetermined number from said loading station laterally of such line to a definite position with respect to said loading station, an intermittently reciprocating loading plunger having a first article-engaging face for successively moving each of said groups parallel to said line to displace an integral number of said articles longitudinally beyond one extremity of said definite position, said integral number being evenly divisible into said predetermined number of articles in each of said groups, said loading plunger having a second article-engaging face, laterally offset from said first face, whereby it is adapted to move, in conjunction with any one complete group of articles, the remaining articles of at least one preceding group displaced laterally of said definite position by movement of a complete group to said definite position by said stacking plunger, said second face of said loading plunger being longitudinally offset from said first face such a distance that said movement of such remaining articles of at least one preceding group is equal to the movement of such complete group whereby the number of such remaining articles displaced longitudinally beyond said definite position is equal to the number of articles in such succeeding group so displaced.

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