Dec. 1, 1959 L. McGIHON 2,914,899

END CARTON FILLER

Filed Jan. 3, 1957 5 Sheets-Sheet 1

FIG_1A

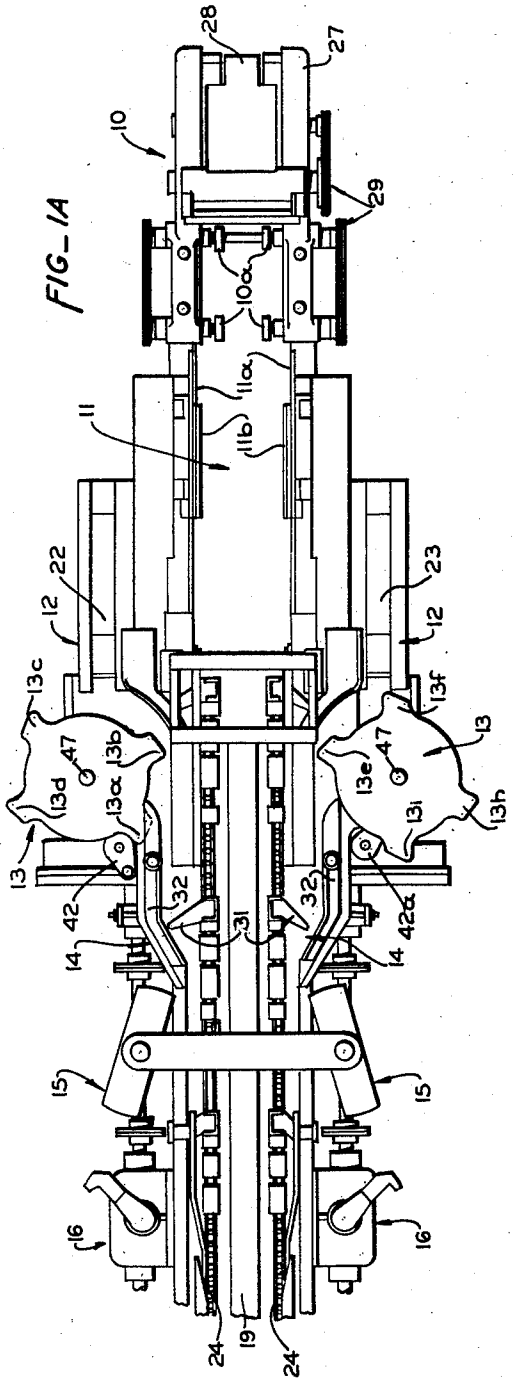
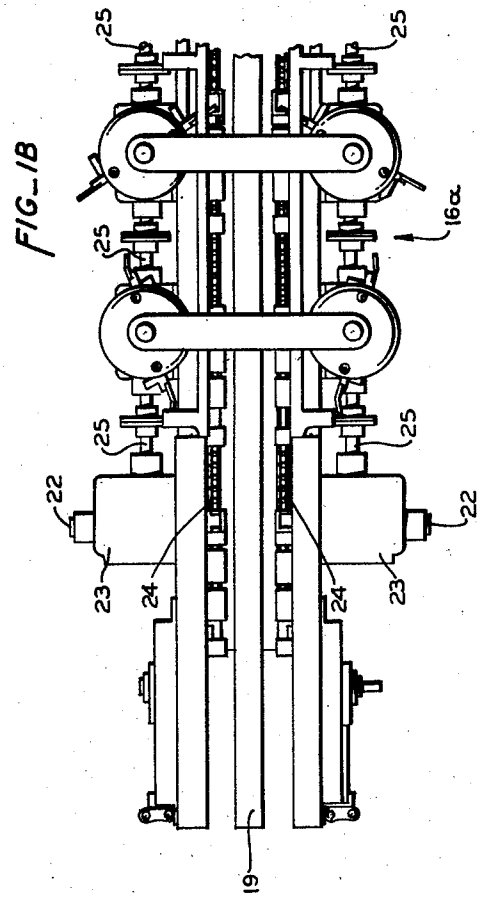


FIG_1B



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Dec. 1, 1959 L. McGIHON 2,914,899

END CARTON FILLER

Filed Jan. 3, 1957 5 Sheets-Sheet 2

FIG_2A

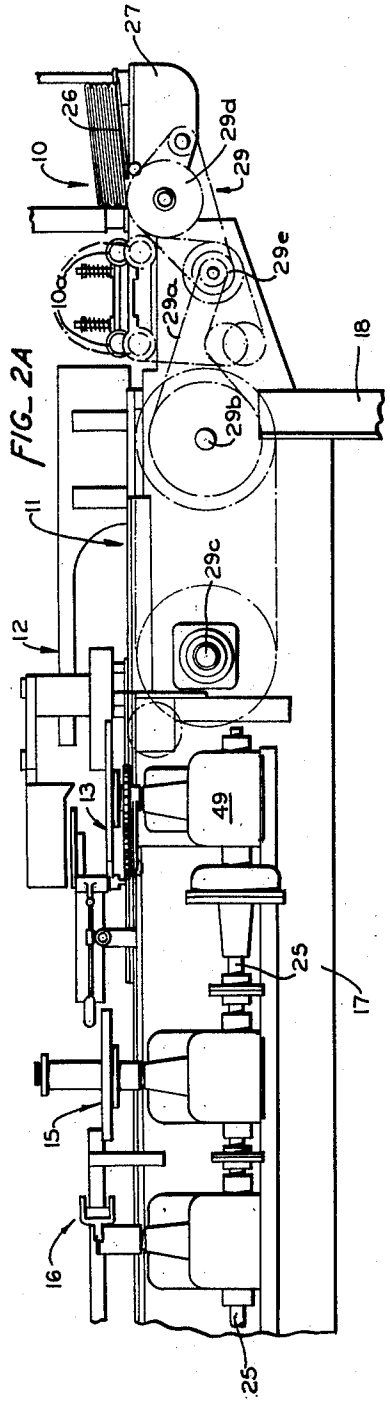
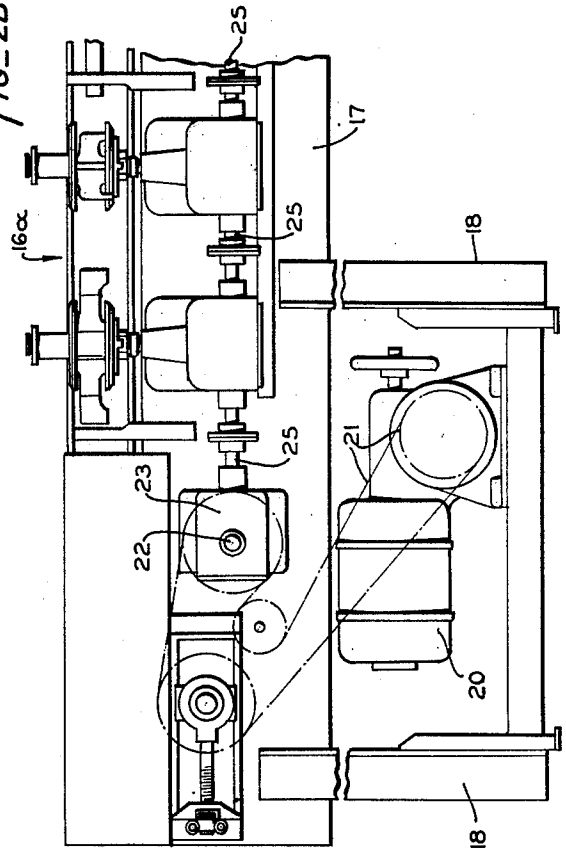


FIG_2B



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Dec. 1, 1959 L. McGIHON 2,914,899

END CARTON FILLER

Filed Jan. 3, 1957 5 Sheets-Sheet 3

FIG_3

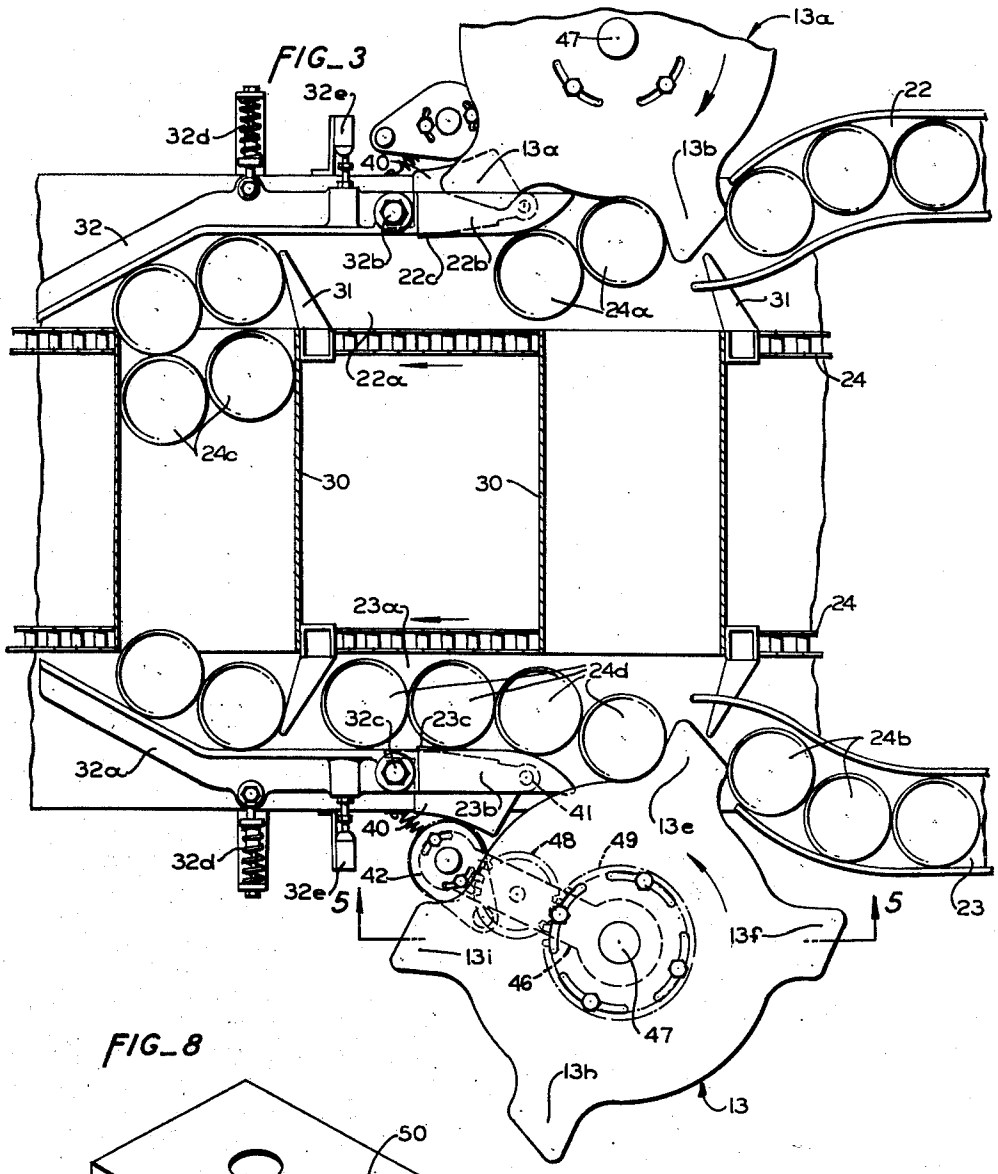
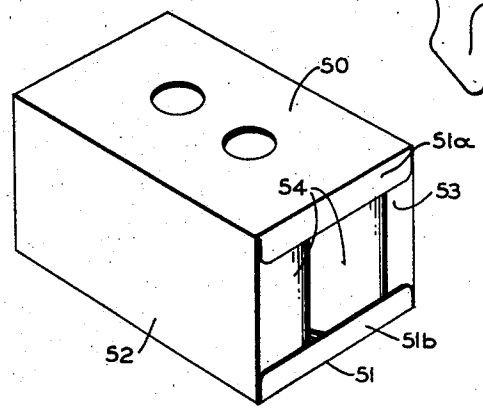


FIG_8



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Dec. 1, 1959 L. McGIHON 2,914,899

END CARTON FILLER

Filed Jan. 3, 1957 5 Sheets-Sheet 4

FIG_4

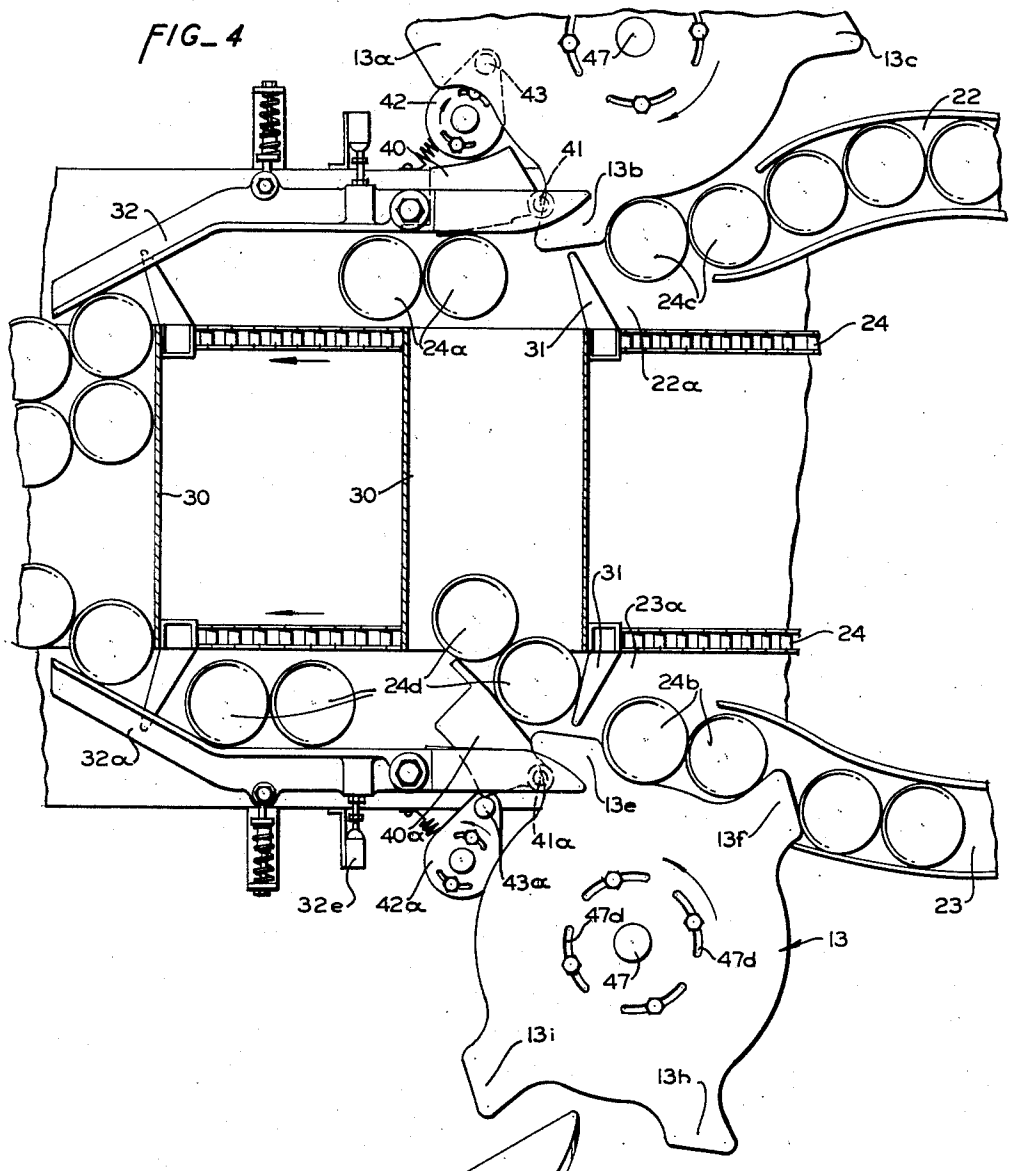
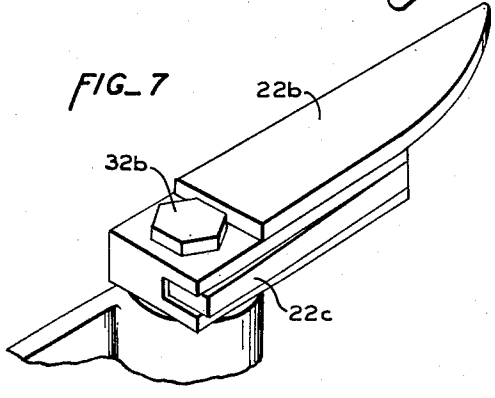


FIG_7



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Dec. 1, 1959 L. McGIHON 2,914,899

END CARTON FILLER

Filed Jan. 3, 1957 5 Sheets-Sheet 5

FIG_5

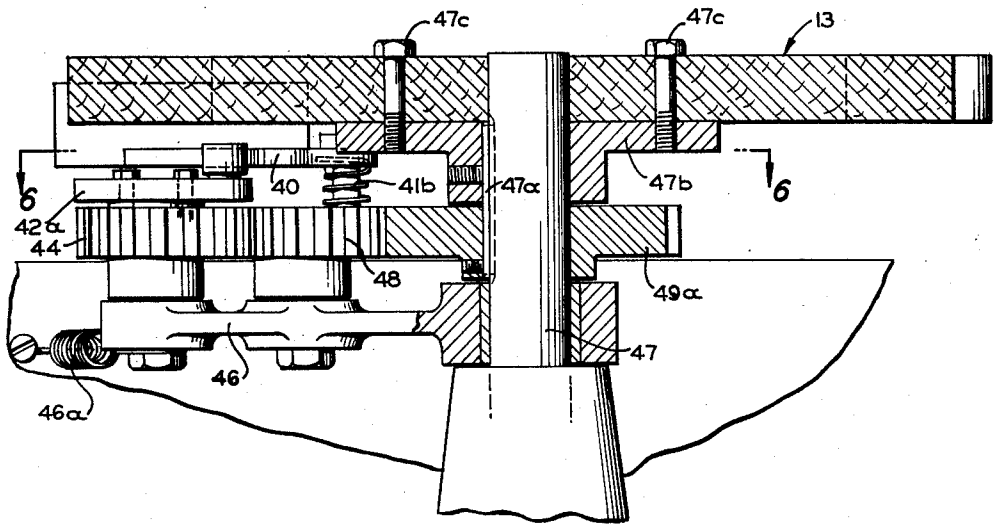
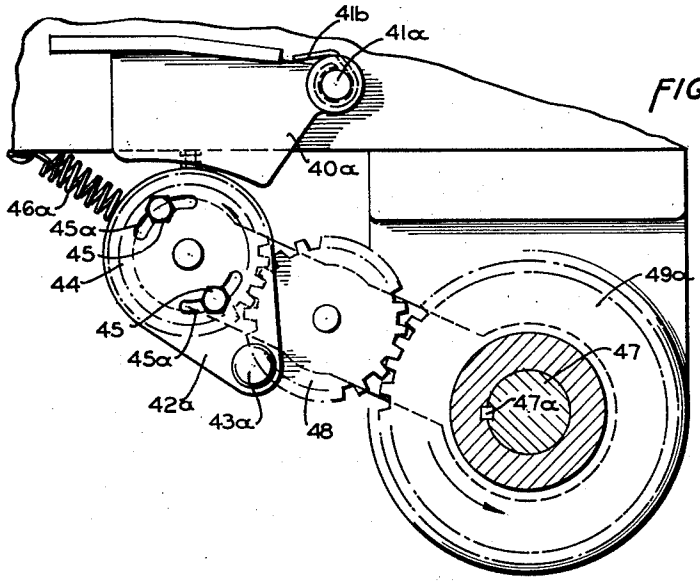


FIG_6



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United States Patent Office 2,914,899 Patented Dec. 1, 1959

2,914,899

END CARTON FILLER

Leonard McGihon, San Leandro, Calif., assignor, by mesne assignments, to King-O-Matic Equipment Corp., San Francisco, Calif., a corporation of California

Application January 3, 1957, Serial No. 632,379

8 Claims. (Cl. 53—160)

This invention relates to an apparatus for filling cartons with a plurality of containers.

An object of this invention is to provide an improved carton filling apparatus in which different numbers of containers are inserted into opposite open sides of the carton while the carton and containers are moved along by a conveying system.

Another object of this invention is to provide an improved carton filling apparatus in which the containers to be placed into the carton are divided into alternate groups of different numbers of containers such that two of the groups are sufficient to fill the carton.

Still another object of this invention is to provide an improved carton filling apparatus in which the carton is filled through the narrow open sides which are wide enough to permit a group of containers to be shifted into the carton laterally and in which another group of containers must be shifted laterally into the carton to move the first group to the central part of the carton so that this centrally disposed group is flanked on the sides thereof by similar groups of containers.

A further object of this invention is to provide an improved carton filling apparatus for filling a carton through the narrow open sides which are wide enough to receive two containers simultaneously, said apparatus having means for laterally shifting two of the containers into one side of the carton and for laterally shifting two groups each of two containers into the carton from the other side.

Other and further objects of this invention will be apparent to those skilled in the art to which it relates from the following specification, claims and drawing:

In accordance with this invention there is provided an improved carton filling apparatus in which a plurality of containers are placed into the carton through the open sides thereof. For this purpose the carton is placed upon a moving conveyer and it is moved along between a pair of single file container conveying means. Each of the container conveying means is equipped with container segregating devices which are in the form of rotatable disc members. These disc members are arranged so that they alternately segregate the containers into groups of two and four containers. The container segregating devices are operated in timed relation so that the device on one side of an open carton segregates a group of two containers while the device on the other side segregates a group of four containers. Accordingly, a group of two containers will be placed into the carton from one side thereof and a group of four containers is placed into the carton from the other side thereof, thus filling the carton with six containers. The next open carton that is presented to the device is supplied with a group of four containers from the first device and a group of two containers from the second device. The segregating devices thus alternately supply two and four containers to the open sides of the cartons as the filling operation continues.

Further details of this invetnion will be set forth in the following specification, claims and drawing in which briefly:

Figs. 1*a* and 1*b* together form a plan view of an embodiment of this invention;

Figs. 2*a* and 2*b* together form a side view of an embodiment of this invention.

Fig. 3 is a detail plan view of the apparatus showing the segregation of the containers in the pair of single files of containers into groups which are shifted into the open sides of the cartons being filled therewith;

Fig. 4 is a view similar to Fig. 3;

Fig. 5 is a sectional view taken along the line 5—5 of Fig. 3;

Fig. 6 is a sectional view taken along the line 6—6 of Fig. 5;

Fig. 7 is a detail view of a container guiding member employed in accordance with this invention; and

Fig. 8 is a view of one of the cartons.

The apparatus of this invention which is of the type illustrated and described in my co-pending application, Serial No. 485,943, filed February 3, 1955, to which the modified form of carton filling apparatus forming the subject matter of the present invention has been applied, is illustrated generally in Figures 1*a*, 1*b*, 2*a* and 2*b* in which Figures 1*a* and 1*b* are plan views and Figures 2*a* and 2*b* are side views.

In general this machine comprises a carton feed station **10** (Figures 1*a* and 2*a*) which is adapted to receive a stack of folded cartons, and inject these cartons one by one to a carton erecting mechanism **11** which is the next mechanism in the line of operation. From the carton erecting mechanism **11**, the erected cartons are fed between can feed stations **12**. These can feed stations supply single files of cans to the segregating devices **13** which divide the cans into groups and these groups are supplied to station **14** where the cans are shifted laterally into the open sides of the carton. The carton with the cans therein is then carried past station **15** wherein the cans are pushed all the way into the carton and thereafter the carton is carried past a carton flap closing station **16**, which performs a preliminary folding of the side flaps to prepare them for the subsequent tucking operation. The cartons are next fed to a flap tucking station **16***a* where the tucking of the flaps completes the carton-closing operation.

These various mechanisms will be described in sequence following the description of the frame and the drive mechanism.

Frame and drive mechanism

The frame comprises side members **17** (Figures 2*a* and 2*b*) which are joined to and supported by a plurality of legs **18** along their length. The side members of the frame are connected together by cross members that are provided with a raised central pad portion on which the longitudinal track member or plate **19** is secured.

The drive for the machine includes a motor **20** shown in Fig. 2*b*, that is connected by a suitable chain and sprocket mechanism **21** with a transverse shaft **22** suitably journaled in housing members **23** attached to the respective side members of the frame. The shaft **22** is connected by suitable chain and sprocket mechanism, such as shown in my co-pending application, Serial No. 485,493, with a drive shaft carrying suitable sprockets thereon to drive the two main conveyer chains **24** for a purpose later described. The shaft **22** is also connected at either side of the frame by a set of bevel gearing positioned in the housings **23** with longitudinal shafting **25** which extends through the flap tucking mechanism, the flap folding mechanism, and the can feeding mechanism previously mentioned.

Carton feed mechanism

The carton feed mechanism includes a platform **26** carried by an auxiliary frame member **27** that is attached to the main side frame members. This platform is provided for the purpose of supporting a stack of collapsed cartons that are positioned so that the lowermost carton of the stack may be engaged by the feed slide **28** which is of conventional construction and which is connected to be driven by the sprocket **29***d* of the chain and sprocket drive **29**. The sprocket **29***e* is driven by the chain **29***a* from a sprocket that is mounted on the shaft **29***f* of the carton erecting mechanism **11**, which is described in detail in the aforesaid application, Serial No. 485,943. The mechanism **11** also includes a shaft **29***c* which is provided with suitable sprockets for engaging the conveyer chain of the carton erecting mechanism and also the chains **24**.

The slide **28** once for each revolution of the sprocket **29***d* will move the lowermost carton from the stack in the carton feed station **10** and bring this carton into engagement with a set of ejecting or draw out rubber rolls **10***a*. These rubber rolls **10***a* are carried by suitable shafts and they are arranged in opposed pairs so as to grip a carton therebetween and move it rapidly from underneath the stack once the carton feed is initiated by the feed plate **28**. The shafts carrying the lower sets of rolls are driven from the sprocket **29***e* as shown in Fig. 2*a*.

A carton ejected by the rollers **10***a* is fed between a pair of side rails **11***a* and beneath respective inclined bars or guides **11***b* on the rails **11***a* to hold the carton down and to direct it into engagement with respective progressing and erecting means of the carton erecting means (not shown).

The can feed mechanism **12** comprises generally a pair of opposite single file can conveyers **22** and **23** as shown in Figs. 3 and 4, which may be mounted and driven in any suitable manner, on which the cans **24***b* and **24***c* are progressed in two parallel files at opposite sides of the carton erecting mechanism **11** until they are seperated into groups and introduced as groups into the open sides of the cartons, such as, carton **30**.

At the end of each of the respective single file conveyers **22** and **23**, a can segregating member or disc **13** is provided. Each disc or can segregator **13** is carried by a shaft **47** journaled in a housing **49** as shown in Fig. 2*a* and these shafts **47** are driven through suitable gear mechanism from the shafting **25**. Each disc **13** has four can receiving pockets or sections which are separated by can separating projections **13***a*, **13***b*, **13***c* and **13***d* in the case of the upper disc **13** shown in Figs. 1*a*, 3 and 4 and projections **13***e*, **13***f*, **13***h* and **13***i* in the case of the lower disc **13** also shown in these figures. These projections all have inclined outer surfaces. The pockets between the projections **13***a*—**13***b* and **13***c*—**13***d* of the upper disc **13** (Fig. 1) serve to segregate the single file of cans from conveyer **22** into sets of two cans each and the projections **13***e*—**13***f* and **13***h*—**13***i* of the lower disc **13** segregate the cans from conveyer **23** into sets of two cans each. On the other hand the projections **13***b*—**13***c* and **13***d*—**13***a* of the upper disc **13** serve to segregate the single file of cans from the conveyer **22** into sets of four cans each and the projections **13***f*—**13***h* and **13***i*—**13***e* of the lower disc **13** serves to segregate the single file of cans from the conveyer **23** into sets of four cans each.

As the discs **13** are rotated by the shafts **47** supporting these discs, the leading or forward end of each of these projections enters between adjacent cans fed on the single file conveyers and retards the cans following the group of cans segregated. Because of the inclined can engaging edge of each projection a slow progressing action of the following file of cans continues, so that no abrupt stopping and starting thereof is involved. It is therefor seen that the similar can segregating discs **13** operate similarly on the two files of cans so that each disc alternately segregates groups of two and four cans which travel over platforms **22***a* and **23***a* in timed relation such that a group of two containers **24***a* is segregated by the upper disc **13** while the lower disc **13** segregates a group of four containers **24***d* and vice versa, as shown in Figs. 3 and 4. These containers are then moved along by the progressing fingers **31** projecting out at either side of the carton conveyer chains **24**. The cans separated and conveyed by the discs **13** are carried out over the platforms **22***a* and **23***a* and they are attracted to the side members **22***b* and **23***b* by permanent magnets **22***c* and **23***c* attached to these members **22***b* and **23***b*, respectively, as shown in Fig. 7. These members **22***b* and **23***b* are supported by the bolts **32***b* and **32***c* at the forward ends of the guide rails **32** and **32***a*, respectively. The rails **32** and **32***a* are pivotally supported by the bolts **32***b* and **32***c*, respectively, and each of these rails are spring urged inwardly by the springs **32***d*. These yieldable rails serve to introduce the upright cans sidewise into the open sides of the carton **30**, and if a jam should occur, outward movement of the rail involved in the jam will open a limit switch **32***e* which controls the power circuit of motor **20**.

The groups of cans are propelled by projections on the discs **13** and **13***a* as described above and by the fingers **31** and **31***a* along a converging course leading to the cartons **30** carried by the conveyer chains **24**.

The operation comprising the segregation of the containers is accompanied by another operation whereby the last two containers in a group of four are laterally shifted into the open side of a carton. For this purpose there is provided a mechanism including the members **40** and **40***a* which are pivotally supported by the pivots **41** and **41***a* adjacent to the rotatable container segregating devices **13** and **13***a*. The members **40** and **40***a* are pivotally positioned below the side members **22***b* and **23***b* and they are adapted to be swung on their pivots by the rotatable members **42** and **42***a*, which are provided with rollers **43** and **43***a*, that engage the members **40** and **40***a*, respectively, and cause these members to swing across the platforms **22***a* and **23***a*, respectively, for the purpose of shifting the last two containers of a group of four into the side of an open carton. The shifting of two such containers **24***d* is shown in Figure 4 where the member **40***a* is shown swung out across the platform **32***a* in the act of shifting the last two containers in a group of four containers **24***d* into the carton **30**.

Each of the rotatable members **42** and **42***a* is mounted on a shaft as shown in Figures 5 and 6 wherein the drive for one of these members is illustrated in detail. This drive includes a pair of gear wheels **44** and **48** which may be of equal size and which are supported on the swingable arm **46** in meshing relation. The gear **44** is attached to the rotatable member **42***a* by the bolts **45** which engage this member in the slots **45***a* so that it may be rotatably adjusted to the extent permitted by the slots **45***a*, with respect to the gear **44**. The arm **46** is rotatably supported by the shaft **47** and this arm is provided with a spring **46***a*, one end of which is attached to the free end of the arm, and the other end of which is attached to the frame of the machine. This spring places tension on the arm **46** so that this arm supports the rotatable member **42** in position adjacent to the pivoted member **40***a* whereby during the course of rotation of the member **42***a*, the roller **43***a* is caused to engage a surface of the pivoted member **40** and swing this member on its pivot **41***a* against the tension of the spring **41***b* which surrounds the pivot.

In order that the rotatable member **42***a* may be rotated as described above, the apparatus is provided with a pair of gears **44** and **48** also described above. The gear **48** is arranged to mesh with the gear **49***a* that is supported by the shaft **47** and is keyed thereto by the key **47***a* which also serves to key the flange member **47***b* to

this shaft. The disc **13** is attached to the flange member **47***b* by means of bolts **47***c* that are positioned in slots **47***d* cut into this disc. In this way the disc **13** may be adjusted with respect to the flange member **47***b* to an extent determined by the length of these slots. The disc **13** and the gear **49***a* are accordingly rotatable together by means of the shaft **47** which is driven by the shaft **25** through a gearing arrangement that is positioned in the gear box **49**. The operation of the container segregating disc **13** and the container shifting member **40** is thus timed so that the last two containers of each group of four containers segregated by the device **13** are laterally shifted by the shifting member **40** as shown in Figure 4.

In this way the last two containers of a group of four are directed into the open side of a carton **30** by the combined action of a container progressing member **31** and the container shifting member **40***a* as shown in Fig. 4. These two containers are thus directed into the open carton and as this carton is moved along by the conveyor chains **24**, the progressing members **31** move forward and cause the first two containers of the group of four to engage the angularly disposed rail **32***a* which guides these two containers toward the open side of the carton **30** and shifts them into this carton when it is opposite to the free end of the angularly disposed rail **32***a*. Thus all four containers of the group of four are placed into the carton from one open side thereof and the last two containers so placed push the first two containers into the central part of the carton. While these last two containers are being shifted into the carton **30** from one side thereof, the group of two containers **24***a* are shifted into the open carton from the other side by the angularly disposed rail **32** which cooperates in this respect with the container progressing member **31** approaching this rail.

The above operation is repeated and the next open carton is also filled with six containers; however, in this case, the group of four containers is placed into the open carton from the opposite side since this group of four is segregated by the device **13***a*, and the group of two containers which is segregated by the device **13** is placed into the carton from the side corresponding to this latter device. Accordingly, these devices **13** and **13***a* alternate in segregating groups of two and four containers. The filled cartons are then carried by the conveyer chains **24** to the next stations which perform the functions required to position the side tabs of the carton so that they function to retain the containers in the carton.

The cartons adapted to be employed with this apparatus may be of the type disclosed in my co-pending application, Serial No. 402,872, filed January 8, 1954, for "Carton." This carton includes a top panel **50**, a bottom panel **51** and two end panels, such as, panel **52** and top and bottom side tabs **51***a* and **51***b* on both of the open sides thereof. This carton when erected forms a substantially rectangular structure having open sides through which the containers **54** adapted to be placed therein are inserted. These containers engage side tabs such as tab **53** which is tucked between the end containers and the carton end walls so as to hold the top and bottom tabs **51***a* and **51***b* erected for holding the containers in the carton as described in detail in the aforesaid application, Serial No. 402,872.

While I have shown a preferred embodiment of the invention it will be understood that the invention is capable of variation and modification from the form shown so that its scope should be limited only by the scope of the claims appended hereto.

I claim:

1. Carton filling apparatus comprising a conveyer for progressing an open carton along a path, a pair of single file container conveying means for supplying a single file of containers on each side of said conveyer substantially parallel to the direction of movement of said conveyer, a pair of rotatable container segregating devices, one of said devices being positioned on one side of said conveyer and cooperating with one of the single file container conveying means and the other of said devices being positioned on the other side of said conveyer and cooperating with the other of the single file container conveying means, means for rotating said segregating devices, each of said segregating devices having means for segregating the single file containers into alternate groups of equal numbers of containers with adjacent groups of different numbers to provide larger groups and smaller groups, means for laterally guiding the smaller of said groups from one of said devices into one end of an open carton, means for dividing the larger of the container groups from the other of said devices into two equal subgroups and for laterally shifting one of said subgroups into the other end of said last mentioned open carton and additional means for laterally shifting the other of said subgroups into said open carton to push the first one of said subgroups toward the center of the open carton.

2. Carton filling apparatus as set forth in claim 1, further characterized in that said rotatable container segregating devices each comprise a horizontal disc having container receiving recesses formed in the circumference thereof.

3. Carton filling apparatus as set forth in claim 1, further characterized in that said means for dividing the larger container group into subgroups comprises a pivotally supported swingable member and means for swinging said swingable member laterally against the containers of the larger container group to divide this larger group into subgroups.

4. Carton filling apparatus as set forth in claim 3, further characterized in that said means for swinging said swingable member is provided with means mechanically connecting it to one of the rotatable container segregating devices to be operable in step therewith.

5. Carton filling apparatus as set forth in claim 3, further characterized in that said conveyer includes means for urging the last of the subgroups of containers away from the swingable member and into the open side of a carton aligned by the conveyer with said swingable member.

6. Carton filling apparatus as set forth in claim 2, further characterized in that alternate ones of the container receiving recesses of each of the horizontal discs are shaped to receive the same number of containers and said discs are arranged so that they alternately segregate the same number of containers whereby alternate open cartons progressed by said conveyer are filled with the same number of containers from the same side.

7. Carton filling apparatus comprising a conveyer for progressing an open carton along a path, single file container conveying means for supplying respective single files of containers in a direction substantially parallel to the direction of said conveyer on either side thereof, a pair of container segregating devices, one of said devices being positioned on one side of said conveyer and the other of said devices being positioned on the other side of said conveyer, means for operating said segregating devices adjacent to said single file container conveying means, each of said segregating devices having means for segregating the single file containers into alternate groups of equal numbers of containers with adjacent groups of different numbers to provide larger groups and smaller groups, means for laterally guiding the smaller of said groups from one of said devices into one end of an open carton, means for dividing the larger of the container groups from the other of said devices into two subgroups and for laterally shifting one of said subgroups into the other end of said last mentioned open carton and means for laterally shifting the other of said subgroups into said open carton.

8. Carton filling apparatus as set forth in claim 7, further characterized in that said means for dividing the larger container group into subgroups comprises a member supported for movement adjacent the path of the containers, and means for operating said member to move it toward said containers and push one subgroup toward the carton.

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