May 1, 1951 H. G. ALLEN ET AL 2,551,080

WORK STATION CONVEYING MECHANISM

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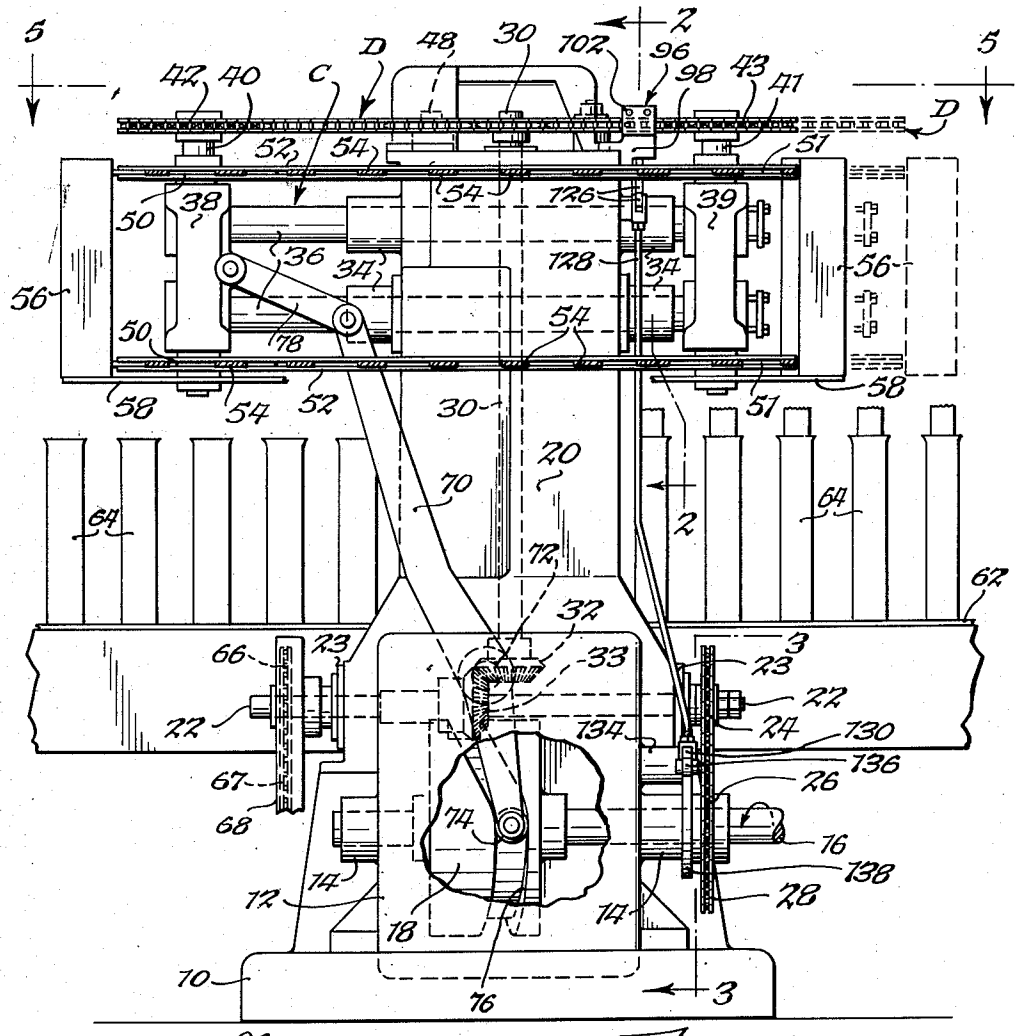


Fig. 1.

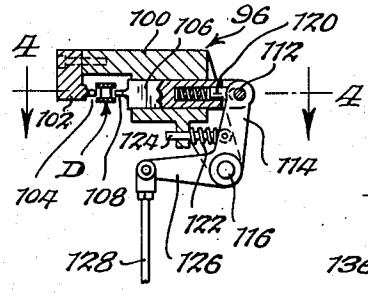


Fig. 2.

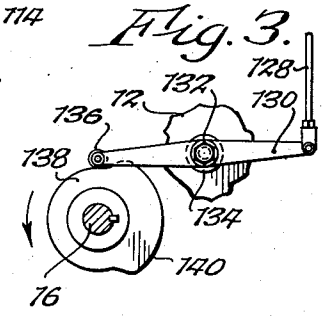


Fig. 3.

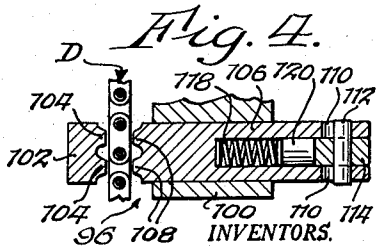


Fig. 4.

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Fig. 5.

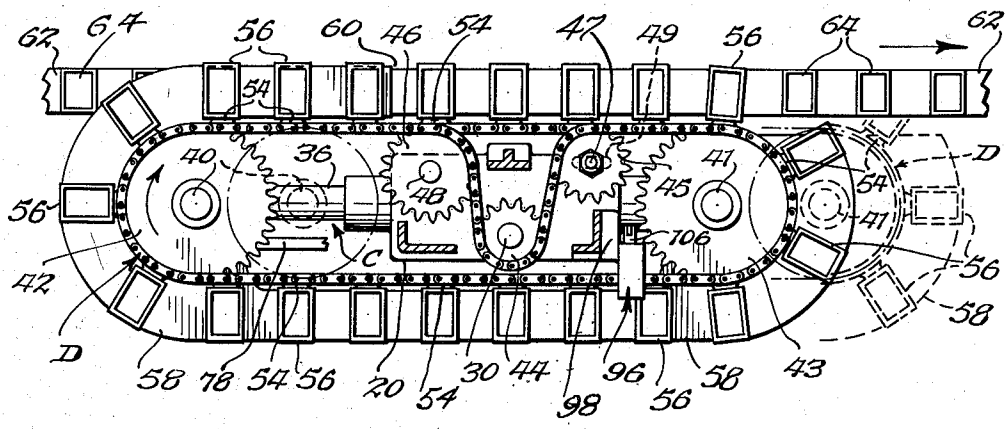
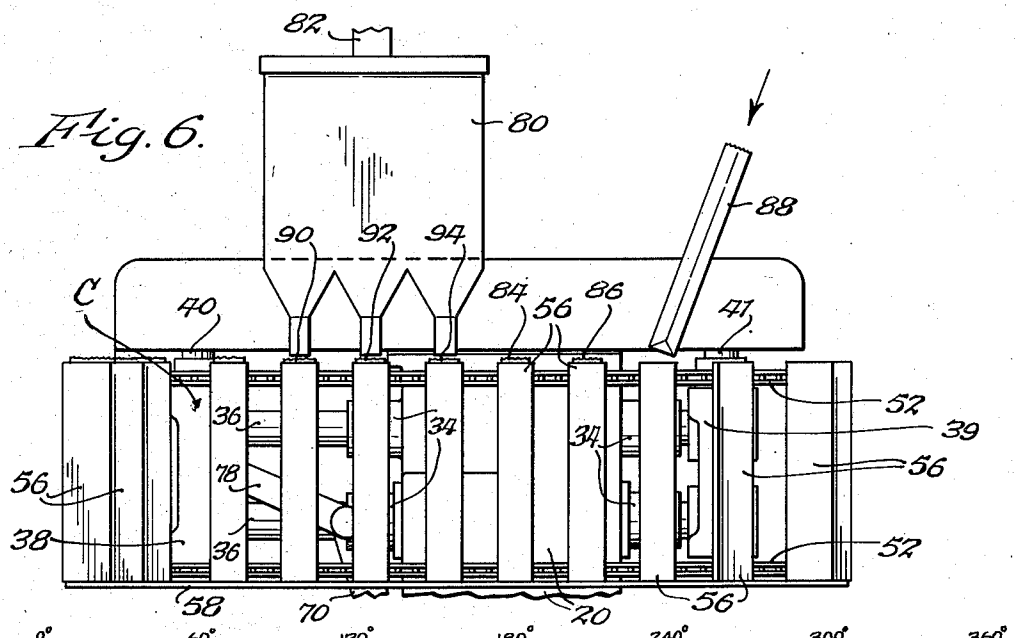


Fig. 6.



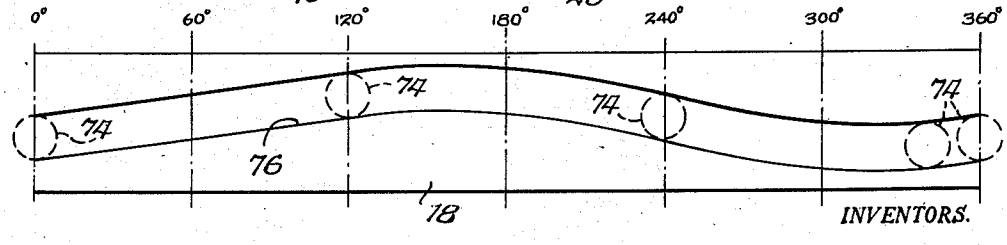


Fig. 6a.

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WORK STATION CONVEYING MECHANISM

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Fig. 7.

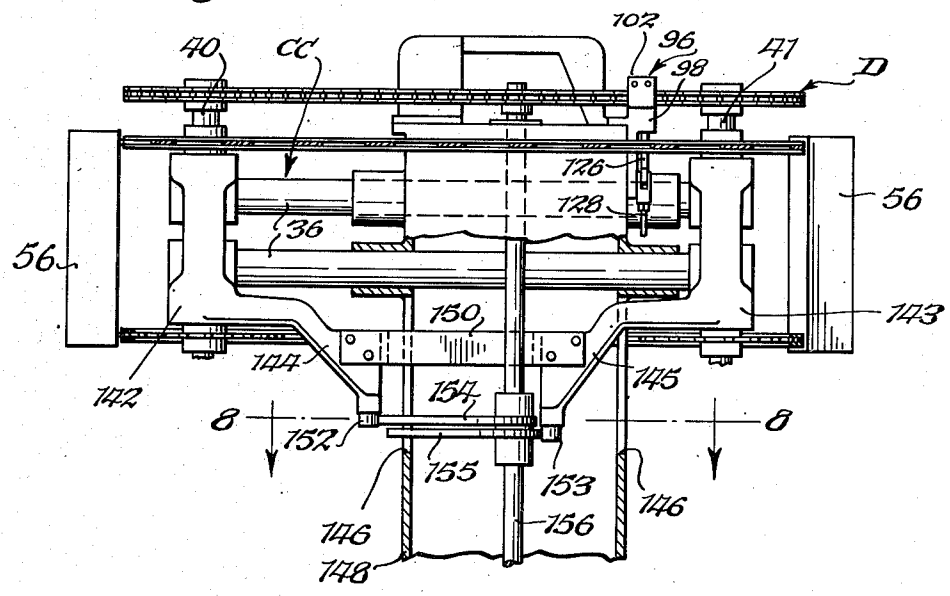
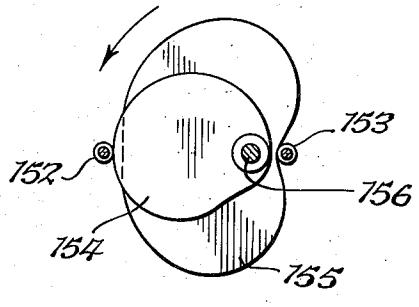


Fig. 8.



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WORK STATION CONVEYING MECHANISM

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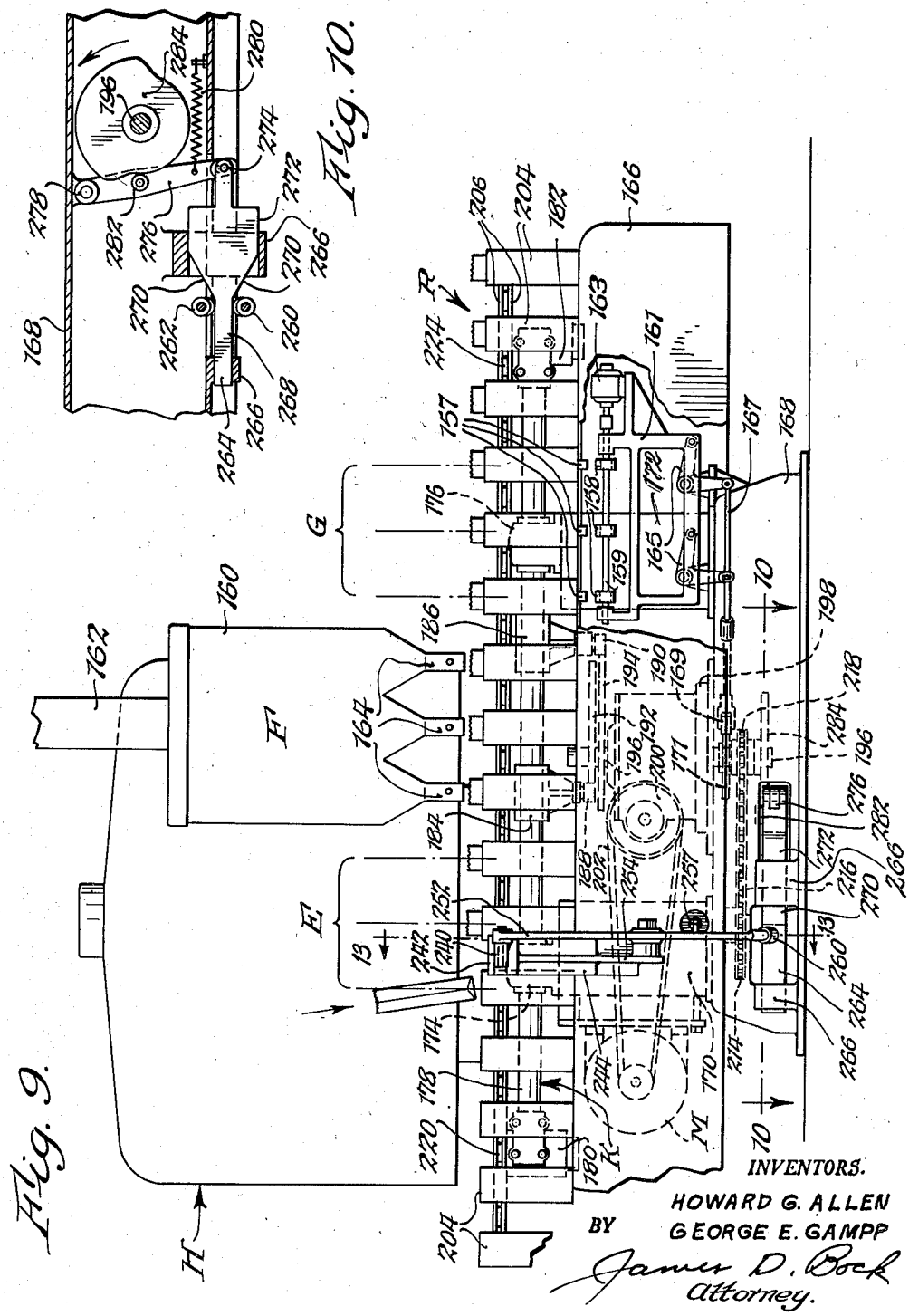


Fig. 9.

Fig. 10.

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WORK STATION CONVEYING MECHANISM

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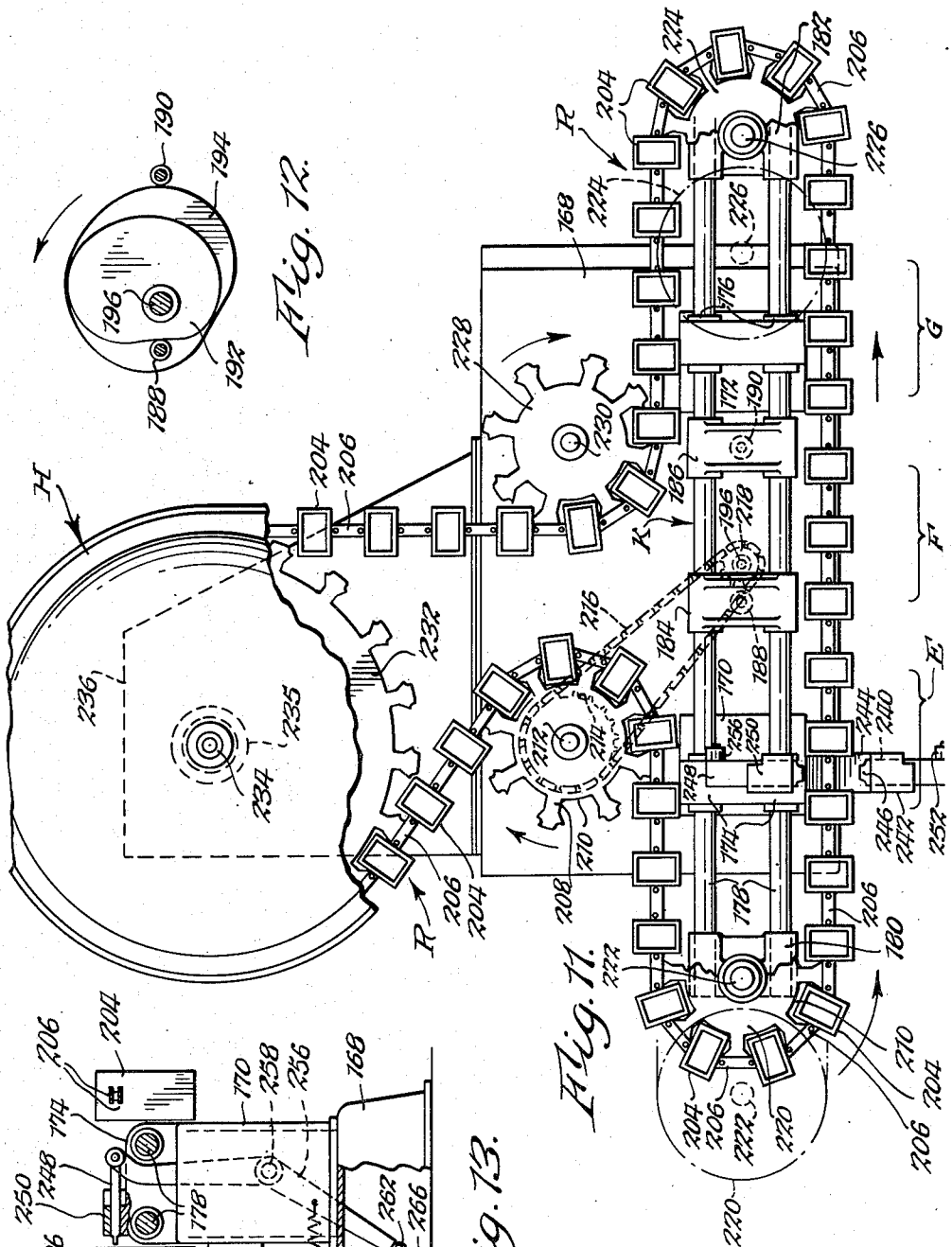


Fig. 11.

Fig. 13.

Fig. 12.

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WORK STATION CONVEYING MECHANISM

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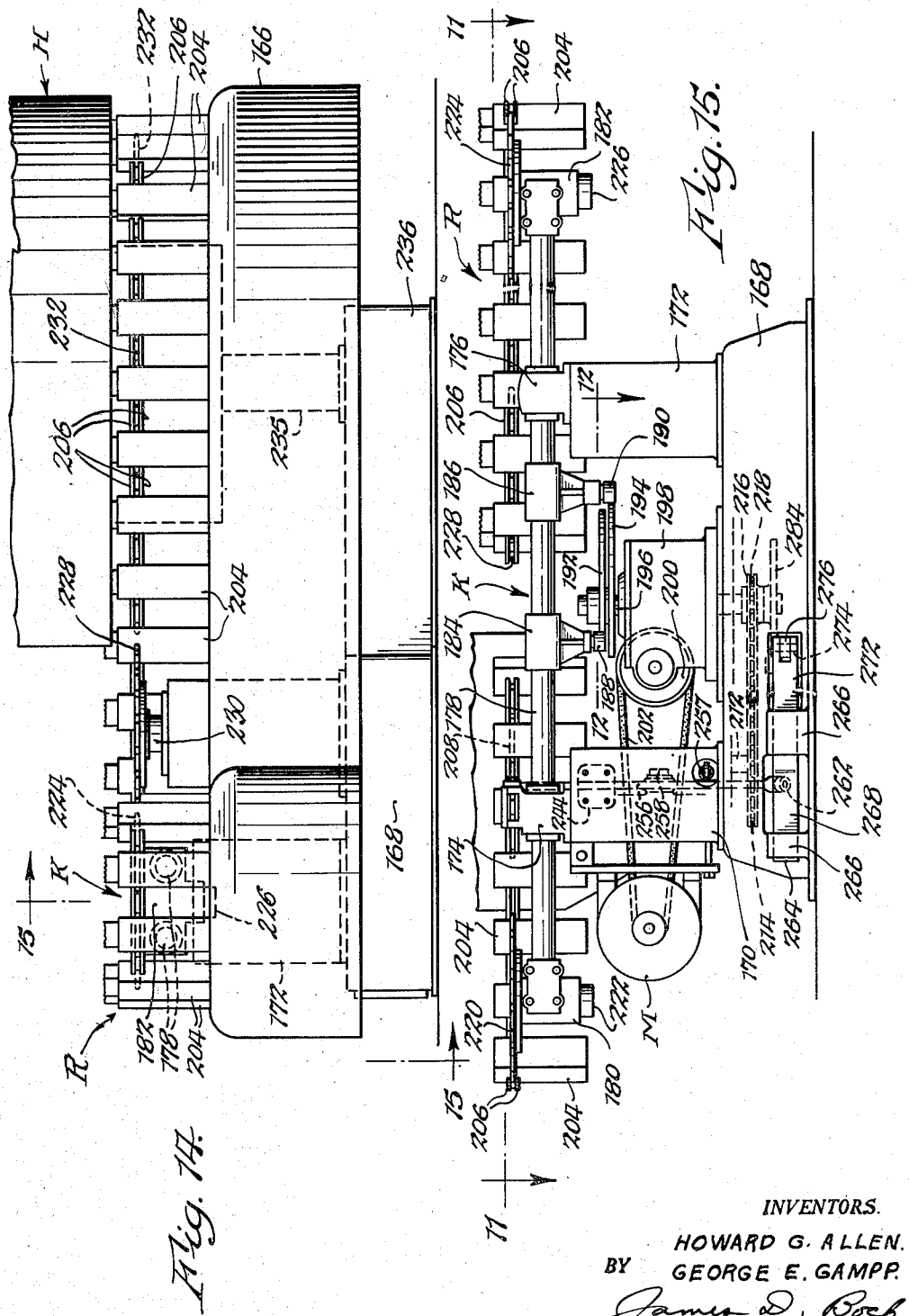


Fig. 15.

Fig. 17.

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UNITED STATES PATENT OFFICE

2,551,080

WORK STATION CONVEYING MECHANISM

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Application June 28, 1946, Serial No. 680,242

6 Claims. (Cl. 198—19)

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The present invention relates to article handling devices of the general type in which articles are carried by a conveyor through successive stations in which different operations take place.

The general object of the present invention is to provide in apparatus of the type described a novel construction in which article carrying devices on a conveyor may be presented in constantly moving relationship to certain stations in a machine and may be presented intermittently to other stations in the machine in successive groups traveling at a reduced speed or held temporarily stationary. To this end a unitary conveyor of the endless, flexible type is so mounted in the machine that portions thereof may be driven for linear movement at a constant speed and another portion may be driven intermittently at varying speeds and may be held temporarily stationary if so desired.

An example of the type of apparatus in which the present invention may be used to great advantage is apparatus for filling and closing receptacles, such as cartons or bags. In such apparatus the receptacles may be stored in a magazine from which they must be removed, opened and placed in an article carrier on a conveyor. The receptacles are then advanced to a filling station where they are filled, usually from a hopper or the like. The filled receptacles are then advanced to one or more successive stations in which they may be closed, or evacuated and closed, or otherwise operated upon either before or after closing. In such apparatus it is usually desirable that the magazine and the filling hopper, at least, be stationary and it is therefore necessary for the article carriers on the conveyor to come to rest in such stations. Other stations, such as closing an devacuating stations, for example, may be so designed as to operate upon moving receptacles and in fact may be more rapid and efficient in operation if the receptacles are moving. Thus, in many instances apparatus of this type is limited in its overall speed of operation by the relatively slowly operating magazine and filling stations and is further limited by the loss of time involved in starting and stopping the conveyor.

Many other types of automatic machinery include certain stations which are relatively slow in operation or which require that the conveyor be slowed or stopped during operation thereof and include other stations which are relatively much faster in operation or which may operate during relatively rapid movement of the conveyor.

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According to the present invention, the overall capacity of many machines of the type discussed above may be increased several times by providing stations having several identical operating units of the slower type and arranging such units to operate simultaneously while a corresponding number of article carriers are held stationary in proper position relative to the station. When the operation of the several identical units is complete, the conveyor may be advanced in a single step of sufficient length to bring another group of carriers into operative relationship with the station. Another portion of the same conveyor is driven at a constant linear speed equal to the average linear speed of the intermittently driven portion. The more rapidly operating stations, or those stations which may be operated during movement of the article carriers, may be positioned along the path of the conveyor in that portion which moves at constant linear speed. Thus it is possible to design such machines so that the production rate is limited only by the speed of rotation of the faster stations therein and at the same time to deliver articles individually at a constant rate to such other machinery as may be provided in a given installation.

Other and further objects of the present invention will become apparent upon a consideration of the following detailed description of preferred forms of the invention taken in connection with the drawings accompanying and forming a part of the present specification.

In the drawings:

Fig. 1 is an elevational view with certain parts omitted of one form of apparatus embodying the present invention;

Fig. 2 is a fragmentary sectional view along the line 2—2 in Fig. 1;

Fig. 3 is a fragmentary sectional view along the line 3—3 in Fig. 1;

Fig. 4 is a sectional view along the line 4—4 in Fig. 2;

Fig. 5 is a horizontal sectional view along the line 5—5 in Fig. 1;

Fig. 6 is an elevational view corresponding to Fig. 1 and showing parts omitted from Fig. 1;

Fig. 6a is a diagrammatic illustration of a cam used in the apparatus shown in Fig. 1;

Fig. 7 is a fragmentary elevational view with parts in section showing a modified form of the apparatus shown in Fig. 1;

Fig. 8 is a sectional view along the line 8—8 in Fig. 7;

Fig. 9 is an elevational view of another modi-

fied form of apparatus embodying the present invention;

Fig. 10 is a sectional view taken along the line 10—10 in Fig. 9;

Fig. 11 is a somewhat diagrammatic plan view of the apparatus shown in Fig. 9 and taken in the plane 11—11 in Fig. 15;

Fig. 12 is a sectional view taken along the line 12—12 in Fig. 15;

Fig. 13 is a fragmentary side elevational view, with parts in section, generally along the line 13—13 in Fig. 9;

Fig. 14 is an elevational view of the right-hand end of the apparatus shown in Fig. 9; and

Fig. 15 is an elevational view corresponding to Fig. 9 and in which certain parts have been omitted.

Referring now to the drawings, the form of the invention shown in Figs. 1 through 6 will first be described. This form of the invention is applied to a machine for filling containers, such as paper bags, and, in particular, for filling relatively long, narrow bags with some fragile material, such as potato chips. The machine constructed in accordance with the present invention includes an endless flexible conveyor having carriers for the bags and which is driven intermittently on one side of the machine and continuously on the other. Empty bags are positioned by groups in carriers on the intermittent side, the empty bags are moved as a group to a filling station in which all of the bags within the group are filled simultaneously, and the filled bags are carried away from the filling station. Thereafter the filled bags are conducted to the continuously moving side of the conveyor into registry with spaced individual receivers moving continuously along a second conveyor and are released by the carriers for transfer to the receivers. The second conveyor then may carry the filled bags to other apparatus (not shown), such as closing devices and the like.

In Fig. 1 there is shown a base 10 having a housing 12 supported thereon. The housing 12 has journalled therein in bearings 14 a main drive shaft 16 to which is fixed a barrel cam 18. The drive shaft 16 is driven at a relatively slow rate of speed by a suitable source of power, such as a motor and speed reducer unit (not shown).

The base 10 also supports a standard 20 which serves as the main vertical support for the machine. A horizontally disposed shaft 22 is journalled in suitable bearings 23 carried by the standard 20. At the right-hand end of the shaft 22 there is mounted a sprocket 24 connected to a sprocket 26 on the main drive shaft 16 by a suitable chain 28. As shown in the drawings, the sprocket 26 is larger in diameter than the sprocket 24, whereby the shaft 22 is driven at a greater angular speed than that of the main drive shaft 16.

A vertically disposed rotatable shaft 30 is carried in the standard 20 and is drivingly connected at its lower end by bevel gears 32 and 33 to the shaft 22.

The upper portion of standard 20 is provided with vertically spaced pairs of bearings 34 which slidably support two horizontally disposed rods 36, the free ends of which are connected by opposed tie members 38 and 39. The rods 36 and the tie members 38 and 39 thus form a horizontally reciprocable carriage C slidable in the bearings 34. The carriage C serves as a movable support for the conveyor mechanism now to be described.

The tie member 38 rotatably supports a vertically disposed shaft 40 having fixed to its upper end a sprocket 42. The tie member 39 rotatably supports a vertically disposed shaft 41, having fixed to its upper end a sprocket 43 located in the same horizontal plane as the sprocket 42. A sprocket 44 is fixed to the upper end of the vertical shaft 30 and is located in the plane of the sprockets 42 and 43.

Referring now to Fig. 5, it will be observed that a suitable driving chain D passes around the sprockets 42, 43 and 44, there being a direct run of chain D between the sprockets 42 and 43 at the front of the machine. At the rear of the machine the chain D extends along a path parallel to the run at the front of the machine from the sprocket 42 to an idler sprocket 46 rotatably carried by a vertically disposed stub shaft 48 in the standard 20. The chain D then loops around the drive sprocket 44 and an idler sprocket 45 rotatably carried by a vertically disposed shaft 47 horizontally adjustable in a suitable slot 49 formed in the standard 20. The chain D then extends from the idler 45 to the sprocket 43 in a direction parallel to the run of the chain on the front of the machine. The idler 45 may be adjusted along the slot 49 to take up slack in the driving chain D.

Referring back to Fig. 1, the shaft 40 has secured thereto a pair of vertically spaced sprockets 50 and the shaft 41 has secured thereto a similar pair of sprockets 51. Two endless article carrier supporting chains 52 pass respectively around the upper and lower sets of sprockets 50 and 51. As shown in Fig. 5 the front and rear runs of the chains 52 are parallel.

The chains 52 are provided with lugs 54 (see Fig. 1) to each vertically aligned pair of which is secured an article carrier 56. The carriers 56 are disposed at equally spaced intervals throughout the length of the chains 52. In the construction chosen for illustration herein, the carriers 56 may comprise elongated rectangular open-ended boxes of suitable proportions to receive the particular bags or other containers to be filled. It will be noted that several of the carriers 56 have been omitted from Fig. 1.

Referring now to Figs. 5 and 6 there is shown a horizontal plate 58 with U-shaped or curved end portions supported on the carriage C beneath the lower open ends of the carriers 56 along the run of the conveyor at the front of the machine. The plate 58 extends beneath the carriers 56 around the sprockets 50 and along the rear run of the conveyor to a termination point 60. The plate 58 is provided to support the bottoms of the containers positioned within the carriers 56 until they reach the point 60. Beyond the point 60 the containers may gravitate or be otherwise removed from the carriers to a straightaway conveyor 62 having receivers 64 positioned therealong at intervals corresponding to the intervals between the carriers 56.

The straightaway conveyor 62 is only partially shown in the drawings, it being understood that such conveyor may take any suitable form. For use with the elongated bags chosen for illustration herein, the receivers 64 will be essential if it is desired to hold the bags in definite upright positions on the straightaway conveyor, as would be likely when such straightaway conveyor is to conduct the filled bags through a closing device. In such event it will be essential that the linear speed of the receivers 64 match that of the carriers 56 in the rear run of the carrier conveyor.

Accordingly, there has been shown in Fig. 1 a sprocket 66 secured to the shaft 22 which drives a chain 67 within a guard 68. The chain 67 may be connected in any suitable manner with the straightaway conevyor 62.

In many instances the straightaway conveyor 62 will form a part of another machine or of previously installed equipment in a user's plant. In such cases the driving mechanism 66, 67 may be used if feasible, and, if not, any other suitable arrangement may be made to secure proper synchronization between the carriers 56 and receivers 64.

Referring again to Fig. 1, there is shown mechanism for reciprocating the carriage C within the bearings 34. This mechanism includes the barrel cam 18, which will be described in greater detail hereinbelow, and a lever 70, pivoted at 72 in the housing 12. At its lower end the lever 70 carries a roller follower 74, which rides in the track 76 of cam 18. At its upper end the lever 70 is pivotally connected to a link 78, which is, in turn, pivoted to the tie member 38 of the carriage C. Rotation of the cam 18 will therefore be transmitted through the linkage described to produce horizontal reciprocation of the carriage C The track 76 of cam 18 is so laid out as to move the carriage C in the particular manner desired for any given installation.

In the present illustration, the relationship between the time taken for filling the containers and the time necessary for closing the filled containers is such that it is desirable to fill three containers at a time Obviously, this is merely illustrative and smaller or larger groups may be selected, in accordance with any particular set of circumstances Also, in the present illustration there are two operations disclosed which most desirably may be performed while the article carriers 56 are held stationary. In other installations it may be desirable to perform additional operations on the intermittent side of the conveyor. The operations performed on the intermittent side of the conveyor in the embodiment shown in Figs. 1 through 6 are those of positioning empty bags in the article carriers 56 and of filling such bags.

In Fig. 6 there is shown a filling station 80 having three spouts or filling units and which may include any suitable arrangement for the supply of filling material thereto, as for example, a chute 82. The filling station 80 may also include automatic weighing devices, if desired, in order that charges of predetermined weight may be delivered to each of the three bags positioned beneath the spouts.

In Fig. 6 the article carriers move toward the left and, accordingly, the bag positioning station is located to the right of the filling station 80. No apparatus has been shown for the positioning of empty bags in the article carriers 56 and it will be understood that the bags may be inserted by hand, as indicated in Fig. 6, wherein two bags 84 and 86 are shown in their respective carriers 56, while a third bag 88 is shown in a position adjacent a carrier 56 ready to be positioned therein. Thus, it may be assumed that the bags 84, 86 and 88 have been manually and consecutively placed within their respective carriers. Obviously, however, any suitable automatic means may be provided for performing this operation, and in any installation wherein such expedient is adopted, it is most likely that three bags will be inserted simultaneously. Thus, the automatic bag feeding apparatus would include three magazines and three units for opening the bags and inserting the open bags in the article carriers. Mechanism of this latter type is old and well-known and forms no specific part of the present invention.

In order to bring the bags 84, 86 and 88 into position occupied by bags 90, 92 and 94 beneath the three filling spouts of the station 80, it is necessary for the article carrying conveyor to move a distance to the left equal to three times the center-to-center spacing between the article carriers 56. Desirably this movement is performed as rapidly as possible in order that a maximum amount of time be available for holding the conveyor stationary for operation of the positioning and filling stations. In the event that smaller or larger groups of bags are to be handled simultaneously, the movement of the conveyor in each instance should be a distance equal to the sum of the distances between a plurality of article carriers 56 greater by one than the number of bags within the group.

The horizontal reciprocation of the carriage C is made use of to move the article carriers 56 in an intermittent manner while on the front side of the machine, and, as a result of the particular design of the machine, such reciprocation of the carriage C will have no effect upon the continuous movement of the carriers 56 along the rear side of the machine.

In Fig. 6a there is shown a development of a barrel cam 18 which is appropriate for producing the carriage movements required for containers in groups of three. In said Fig. 6a the follower roller 74 is shown at the extreme left-hand end of the view and the position there illustrated corresponds with the position of the follower 74 in the cam 18, when the carriage C occupies the position shown in Fig. 1. When the cam 18 rotates in the direction indicated by the arrow associated with shaft 16 in Fig. 1, the straight portion of the cam track lying between 0° and 120° in Fig. 6a will move the follower 74 and through the linkage provided will move the carriage C from the position shown in full lines in Fig. 1 to the right and substantially into the position indicated in broken lines in said Fig. 1. Since this portion of the cam track 76 inclines in a straight line, the movement of the carriage C will be uniform in speed. The speed of such movement is equal to the linear speed of the outer surfaces of the chains 52 as they pass around the sprockets 50 and 51. Thus, during such movement of the carriage C, the run of chains 52 lying between the sprockets 50 and 51 on the front side of the machine will remain stationary. The run of chains 52 on the rear side of the machine will continue its linear travel with no change in speed.

When the cam follower 74 enters the portion of cam track 76 lying between 120° and 360°, the reverse curve of such cam track will bring the carriage C gently to a stop and then move it toward the left as viewed in Fig. 1. Such movement will be gently accelerated at the beginning and then more rapidly accelerated to a point approximately midway (240°) of this portion of the cam track. Thereafter the cam track is so shaped as to decelerate, first slowly and then rapidly until it comes to rest at about the 340° position thereof. Between 340° and 360° the carriage C may be accelerated to the speed at which it moved toward the right in the 0° to 120° portion of the cam track.

It will be recognized that the speed of move-

ment of the carriage C toward the left is necessarily such that the article carriers **56** will move rapidly enough to catch up or, stated otherwise, the average speed of the carriers **56** must be equal within both runs of the conveyor chains **52**.

It will be recognized from the foregoing description that it is possible to so lay out the cam **18** that the article carriers **56** will be held truly stationary during the major portion at least of the travel of the carriage C to the right, as viewed in Fig. 1. However, the manufacture of a barrel cam in accordance with such a layout may require such tolerances as to render the machine unduly expensive to manufacture. Furthermore, wear on the cam track and the bearings in the linkage would be very likely to result in irregularities such that a slight weaving of the carriers **56** will occur during the time they are supposed to remain stationary. Expense in manufacturing the machine and upkeep expense thereof during use may be greatly reduced by providing the locking means for the article carrier conveyor now to be described.

In Figs. 1 and 5 the chain locking mechanism is associated with the driving chain D and is generally indicated at **96**. This mechanism is supported on a suitable bracket **98** attached to the standard **20**. Referring now to Fig. 2, it will be observed that the mechanism includes a frame **100** fixed to the bracket **98** (not shown in Fig. 2) and which is so shaped as to straddle the driving chain D. The portion **102** of the frame **100** has formed thereon a plurality of teeth **104** (see Fig. 4) of such pitch as to mesh with the chain D. The teeth **104** are so positioned as to lie outside the normal path of the chain D during operation of the machine. On the opposite side of the chain D the frame **100** has mounted thereon a slide **106** having teeth **108** on the inner end thereof similar to the teeth **104**. At the outer end of slide **106** there is formed a horizontal slot **110** which receives a pin **112** carried by one arm **114** of a bell crank lever pivoted at **116** to the bracket **98**. An expansive spring **118** is mounted in the slide **106** and through a plunger **120** serves to urge the slide to the left as viewed in Fig. 2 or Fig. 4 to the extent permitted by the pin and slot **112**, **110**. The spring **118** serves merely as a relief spring.

An expansive spring **122** carried by a plunger **124** slidably mounted at one end in a suitable lug formed on the frame **100** and pivoted at its other end to the arm **114** of the bell crank lever serves to hold the slide **106** to the right as shown in Fig. 2. In this position the chain D is free of engagement with the teeth **104** and **108**. When the bell crank lever arm **114** is rocked in a counterclockwise direction against the spring **122**, the slide **106** is moved to the left to bring the teeth **108** into mesh with the chain D and to displace the chain into engagement with the teeth **104**, as shown in Fig. 4.

Suitable mechanism may be provided to lock the chain D as described above in proper timed relation with the reciprocation of carriage C. For example, an arm **126** of the bell crank lever previously mentioned may have pivotally attached thereto a link **128** extending downwardly of the standard **20** and pivotally connected to one end of a lever **130** pivoted at **132** to a boss **134** on the housing **12**. The other end of lever **130** carries a roller follower **136** for cooperation with a cam **138** fixed to the shaft **16** and having a high portion **140**. The return spring **122** (see Fig. 2) serves to press the follower **136** into engagement with the periphery of the cam **138**. The low and high portions of the cam **138** correspond respectively with the unlocked and locked positions of the mechanism **96**. It will be understood that the high portion **140** will be of such extent and so located as to lock the chain D substantially throughout the time in which the carriage C is moving to the right as viewed in Fig. 1. Thus the high portion **140** in the particular device illustrated here in will have an extent of approximately 120° corresponding with the positions 0° to 120° in Fig. 6*a*.

From the foregoing description it will be apparent that the front run of the driving chain D and of the conveyor and carriers **56** will be held stationary during operation of the positioning and filling stations. The locking mechanism just described may be used where the carriers **56** must be held truly stationary and where it is not desired to manufacture the machine to extremely close tolerances.

The modification illustrated in Figs. 7 and 8 includes a different form of cam for reciprocating the carriage, but is otherwise identical with the machine illustrated in Figs. 1 through 7. In this modification, the carriage CC is provided with tie members **142** and **143**, having extensions **144** and **145**, respectively, projecting into a suitable opening **146** in the standard **148**, corresponding to the standard **20** in Fig. 1. The extensions **143** and **144** are rigidly joined by a brace **150** and carry respectively roller cam followers **152** and **153**.

The roller follower **152** is arranged to follow the periphery of a plate cam **154** secured to the vertical shaft **156**, which corresponds to the shaft **30** in Fig. 1 and which may be rotated by the means illustrated in said Fig. 1. The roller follower **153** is arranged to follower the periphery of a plate can **155** fixed to the shaft **156** just beneath the plate cam **154**.

The plate cams **154** and **155** are complementary in that the distance is constant across the center of shaft **156** from any point on the periphery of one of the cams to the corresponding point on the other cam. Thus, since the roller followers **152** and **153** are diametrically opposed with respect to the center of shaft **156**, they each will bear constantly upon the periphery of the cam which they are designed to follow.

The cams **154** and **155** are so laid out as to move the carriage CC exactly as the carriage C is moved in the machine illustrated in Fig. 1. Obviously the plate cams **154** and **155**, just as cam **18** in Fig. 1, may be designed to move the carriage through such distances and at such speeds as to produce any desired change in movement of the article carrier conveyor on the front side of the machine without disturbing the constant-speed linear movement of the conveyor on the rear side of the machine.

In Figs. 9–15 there is shown a machine embodying the present invention and which includes a single endless flexible conveyor for presenting article carriers intermittently in groups to a bag-positioning station, a bag-filling station and a settling station on the front side of the machine and continuously to evacuating, sealing and discharging stations on the rear side of the machine.

Referring first to Fig. 9, which comprises a front view of the machine, the article carriers progress intermittently from left to right in groups of three to a bag-inserting station E, a filling station F, and a settling station G. No mechanism has been shown in the inserting sta-

tion E, inasmuch as the bags may be inserted by hand or by any desired form of automatic device. The filling station F has been shown as a hopper 160 having an inlet chute 162 and three bag-filling spouts or units 164. It will be understood that this station may include any desired form of automatic weighing devices or measuring devices for delivering a suitable net quantity of material to the bags in proper timed relation to the movement of the carriers. The mechanism in the settling station G will vary widely in accordance with the particular commodity being packaged.

If the commodity is coffee, for example, a high speed vibratory mechanism will be arranged to operate simultaneously upon the filled bags during the period of time they remain in the station G.

As shown in Fig. 9 three plungers 157 are supported for limited vertical motion within the top of the shield 166. The plungers 157 are so spaced from each other as to lie respectively beneath the three carriers 204 in the settling station G and the upper surfaces of the plungers 157 are normally flush with the upper surface of the shield 166. An eccentric cam 158 is provided for each of the plungers 157 and suitable means may be employed to rotate the cams 158 and to move them into engagement with the plungers 157 when the carriers 204 are at rest within the station G. For example, the cams 158 may be fixed to a shaft 159 mounted for rotation in a frame 161. A motor 163, carried by the frame 161, is connected to the shaft 159 to rotate the cams 157 at desired speed. The frame 161 is carried by a pair of bell-crank levers 165 pivoted on the base of the machine. The free arms of the bell-crank levers 165 have pivoted thereto an operating rod 167 having a cam-follower 169 on the free end thereof. A cam 171 is fixed to the main drive shaft of the machine which will be described in greater detail hereinbelow. The cam 171 is so contoured that the operating rod 167 will be moved toward the right and the frame 161 will be elevated to a position in which the eccentric cams 158 engage the plungers 157 when so desired. It is preferred that the plungers 157 shall be reciprocated only when the carriers 204 are at rest and for this reason it will be understood that the frame 161 will be elevated and lowered in proper timed relation with the intermittent movement of the front run of the conveyor.

Referring next to Fig. 11, there is shown an enclosed rotary turret H through which the article carriers are conducted at a uniform linear speed. The turret H may be equipped with any suitable devices for operating upon the articles carried by the carriers, as for example evacuating, bag sealing and package discharging stations.

In Fig. 9 the machine is shown with shields in place and it will be observed that the shield 166 conceals the driving mechanism. In Fig. 15 the lower portion of the machine is shown with shields removed. In Fig. 15 the base 168 carries two standards 170 and 172, which carry respectively pairs of bearings 174 and 176 (also see Fig. 11) for slidably receiving rods 178 forming a part of a reciprocating carriage K. The opposite ends of the rods 178 are joined by tie-members 180 and 182. Additional tie-members 184 and 186 are provided intermediate the bearings 174 and 176. The latter tie-members are provided not only to rigidify the carriage K but also to carry cam followers 188 and 190, which cooperate respectively with plate cams 192 and 194 secured to a vertical shaft 196.

The shaft 196 extends through a speed reducer 198 mounted on the base 168 and is connected by the mechanism therein with a pulley 200, belt 202 and main driving motor M, suitably supported on the standard 170.

The article carrying conveyor is indicated at R and in the present modification is made up of article carriers 204 and spacing links 206 articulated therewith. As shown in Fig. 13 the links 206 may comprise upper and lower spaced plates connected by vertically disposed pins and it will be understood that the article carriers 204 may be provided with perforated lugs to receive the link pins.

The conveyor R passes around a drive sprocket 208 (see Fig. 11), which has formed therein suitably shaped recesses 210 to receive the article carriers 204 and through them to drive the conveyor R. The sprocket 208 is fixed to a vertical shaft 212 having a sprocket 214 on the lower end thereof, which meshes with a chain 216 passing around a sprocket 218 fixed on the main drive shaft 196 (also see Fig. 15).

Referring again to Fig. 11, the conveyor R extends from drive sprocket 208 to an idler sprocket 220 mounted on a vertical shaft 222 carried by the member 180 of the carriage K. The conveyor R then extends from idler 220 across the front of the machine to an idler sprocket 224 mounted on a vertical shaft 226 carried by the tie-member 182 at the opposite end of the carriage K. From the idler 224 the conveyor extends to an idler sprocket 228 mounted on a suitable vertical shaft 230 carried by the base 168.

The conveyor R extends from the idler 228 to a large diameter idler sprocket 232 mounted on a vertical shaft 234 carried by a standard 235 resting upon a rearward extension 236 of the base 168. The large sprocket 232 is located beneath the turret H and serves to carry the articles on conveyor R into operative relationship with the mechanism in said turret. It will be understood that if so desired the sprocket 232 may be fixed to the shaft 234 whereby rotation of the shaft 234 may be availed of to drive the mechanism in turret H.

The conveyor R extends from the idler 232 to the drive sprocket 208 to complets its circuit.

From the foregoing description, it will be apparent that the entire length of conveyor R is driven by the sprocket 208. Since the sprocket 208 is positioned on the rear side of the machine, the run of conveyor across the front of the machine may be caused to move intermittently by proper reciprocation of the carriage K in the manner fully discussed in connection with the preceding modifications.

The plate cams 192 and 194 may be laid out to move the carriage K in such manner as may be desired. In the present instance, the cams are laid out to reciprocate the carriage K from the full line position in Fig. 11 to the broken line position therein at such speed as to hold the carriers 204 stationary across the front of the machine for a suitable period of time. The carriage is then moved back to the full line position as quickly as possible, having due regard for proper acceleration rates. The extent of movement of the carriage K is such that on the movement thereof from left to right (viewed from the front of the machine), the carriers are advanced a distance equal to three times the center-to-center spacing of the carriers 204. This results in the

movement of three carriers 204 away from a given station and the movement of the succeeding three carriers into such station. As in the preceding modifications, if it is desired to operate simultaneously upon a number of carriers 204 less than or greater than three, it is merely necessary to design the cams 192 and 194 in such manner as to move the conveyor R step by step in increments equal to the sum of the distances between a number of carriers greater by one than the selected number.

As in the preceding modifications, it may be desirable to provide means for positively locking the intermittently moving portion of the conveyor R during periods of rest. The present modification does not include a drive chain separate from the conveyor itself and it is therefore preferable to provide a locking mechanism for acting directly upon the conveyor R. A locking mechanism suitable for this purpose will now be described, it being recalled that the full line position of the carriage K in Figs. 9–15 is that occupied just prior to movement thereof to the left to effect stopping of the front portion of conveyor R.

In Fig. 11 there is shown a slide 240 mounted in front of the conveyor R in a guide 242 carried by a bracket 244 (Fig. 13) secured to the standard 170. The slide 240 is movable within the guide 242 in a direction transverse to the path of travel of the conveyor R from the full line position in which it is clear of the conveyor to a position in which the end 246 thereof is projected into a link 206. The end 246 is so shaped as to enter between the upper and lower plates and between the pins making up the link 206. A similar slide 248 is mounted in a guide 250 supported by the bearing block 174 to the rear of the conveyor R. The slide 248 is movable into and out of locking engagement with a link 206 in the same manner as, and preferably simultaneously with the slide 240.

Movement of the slides 240 and 248 in proper timed relation with movement of the carriage K may be effected in any suitable manner. For example (Fig. 13), a lever 252 may be pivoted at one end to the slide 240 and intermediate its length to an extension 254 of the bracket 244. A similar lever 256 may be pivoted at one end to the slide 248 and intermediate its length at 258 upon the standard 170. A contractile spring 257 extends between the levers 252 and 256 tending to move the locking slides away from locking position. The lower ends of levers 252 and 256 are equipped with roller followers 260 and 262 respectively, which bear on opposite vertical faces of a sliding cam 264 mounted in a slideway 266 carried by the base 168.

Referring now to Fig. 10, it will be observed that the sliding cam 264 includes a narrow portion 268, a wide portion 272 and inclined portions 270 extending therebetween. When the sliding cam 264 is in the position shown in Fig. 10, the roller followers 260 and 262 are relatively close together and the locking mechanism is in unlocked position, as shown in Fig. 13. When the sliding cam 264 is moved to the left as viewed in Fig. 10, the roller followers 260 and 262 will gradually be forced apart as they ride upon the inclined surfaces 270 and will reach a final position determined by the width of the wide portion 272. In this final position the locking mechanism is moved against the spring 257 into locking engagement with the conveyor R.

The sliding cam 264 has loosely pivoted thereto at 274 one end of a lever 276, the other end of which is pivoted at 278 to the base 168. A spring 280 is stretched between the lever 276 and the base 168 to urge the lever and the sliding cam 264 to the right, as viewed in Fig. 10. The lever 276 carries a roller follower 282 intermediate its length for cooperation with a plate cam 284 fixed upon the main vertical drive shaft 196. The plate cam 284 is provided with a low portion for positioning the sliding cam 264 as shown in Fig. 13 and a high portion for moving the sliding cam 264 to the left to cause locking of the conveyor R. As shown in Fig. 13 the high portion of the plate cam 284 is about to engage the follower 282 and thus to move the locking slides 240 and 242 into engagement with the conveyor R. The extent of the high portion of plate cam 284 is such that the conveyor R will be unlocked just prior to termination of leftward movement of the carriage K.

The operation of the various modifications of the present invention has been set forth in the course of the detailed description of such modifications. The use of the conveyor which has intermittently and continuously moving portions is obviously not confined to mechanism for filling and closing bags. The value of the invention lies in the ability to present articles stationarily in groups to certain operating units of a machine and to move the articles continuously through other portions of the machine where they may be manipulated in any desired manner while moving. From the detailed description it will be apparent that various mechanisms have been provided embodying and accomplishing the objects of the present invention. The terms used are intended to be descriptive rather than limiting and it will be understood that modifications and variations may be adopted by those skilled in the art without departing from the scope of the appended claims.

We claim:

1. In an article handling device, an endless flexible conveyor movable for carrying a succession of articles along a predetermined path, a plurality of article manipulating units arranged in spaced relation lengthwise along a zone of said conveyor path, means for driving a portion of said conveyor step by step through said zone to stationarily present successive groups of articles on said conveyor in operative relation to the units in said zone for simultaneous operation upon the articles at said units and for driving another portion of said conveyor and the articles thereon continuously and uninterruptedly through a second operating zone of said article handling device, and means movable into and out of engagement with said conveyor for locking said said first-named portion of said conveyor against movement during operation of said units upon the articles presented thereto.

2. In an article handling device, an endless flexible conveyor movable for carrying a succession of articles along a predetermined path, a plurality of article manipulating units spaced lengthwise along a zone of said conveyor path, said units being divided into groups each having a plurality of units therein and each group comprising an operating station, means for driving a portion of said conveyor step by step through said zone to stationarily present successive groups of articles on said conveyor to the stations within said zone in operative relation to the units within said station for simultaneous operation upon the articles at said units and for driving another portion of said conveyor and the articles thereon continuously and uninterrupted-

ly through a second operating zone of said article handling device, and means movable into and out of engagement with said conveyor for locking said first-named portion of said conveyor against movement during operation of said units upon the articles presented thereto.

3. In an article handling device, an endless flexible conveyor movable through a closed path, a plurality of article carriers carried by said conveyor in positions equally spaced throughout the length thereof, a plurality of units in a first zone of said article handling device for performing identical operations simultaneously upon the articles carried by a plurality of said carriers, said units being spaced lengthwise along a portion of the path of said conveyor and the spacing between adjacent units being equal to the spacing between adjacent article carriers on said conveyor, means for driving the portion of said conveyor extending adjacent said units step by step in increments equal to the sum of the distances between a plurality of said article carriers greater by one than said plurality of units and for maintaining said portion of said conveyor stationary during operation of said units, said driving means driving another portion of said conveyor continuously through a second zone of said article handling device, and means movable into and out of engagement with said conveyor for locking the portion of said conveyor within said first zone against linear movement relative to the units within said zone during operation of said units.

4. In an article handling device, a main frame; a carriage mounted for reciprocation relative to said main frame; a conveyor including an endless flexible chain and movable through a closed path, at least a part of said conveyor being carried by and movable with said carriage; a plurality of article carriers carried by said conveyor in positions equally spaced throughout the length thereof; a plurality of units in a zone of said article handling device for performing identical operations simultaneously upon the articles carried by a plurality of said carriers, said units being spaced lengthwise along a portion of said conveyor carried by said carriage and the spacing between adjacent units being equal to the spacing between adjacent article carriers on said conveyor; means for reciprocating said carriage in directions parallel to the path of travel of the portion of said conveyor within said zone; means for driving said conveyor; locking means mounted on said main frame and movable into engagement with said chain to hold the portion of said conveyor within said zone against linear movement relative to said main frame; and means for moving said locking means into locking engagement with said chain in timed relation to the reciprocation of said carriage.

5. In an article handling device, a main frame, a carriage mounted for horizontal reciprocation relative to said main frame, sprockets carried by said carriage, a driving chain extending around said sprockets, a driving sprocket carried by said main frame, means for rotating said driving sprocket at constant angular speed, said driving chain extending from said first-named sprockets into driving engagement with said driving sprocket, an endless flexible conveyor carried by said carriage, said conveyor having a portion of its path extending parallel to the directions of reciprocation of said carriage, means drivingly connecting said conveyor with said driving chain, and means for reciprocating said carriage for altering the linear speed of said portion of said conveyor.

6. In an article handling device, a main frame, a carriage mounted for horizontal reciprocation relative to said main frame, power means carried by said main frame, a vertical shaft carried by said main frame and driven by said power means at a constant angular speed, a sprocket fixed to said vertical shaft, a pair of vertical idler shafts rotatably mounted in said carriage, a sprocket fixed to each of said idler shafts, a driving chain extending around said first-named sprocket and said second-named sprockets, said second-named sprockets being so arranged that a straight run of chain from one of said sprockets to the other lies parallel to the direction of reciprocation of said carriage, an endless flexible conveyor carried and driven by said idler shafts and having two straight runs parallel to the direction of reciprocation of said carriage, and means for reciprocating said carriage whereby one run of said flexible conveyor will move at a variable linear speed while the other run thereof will move at a constant linear speed.

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