Aug. 16, 1932. H. C. KELLER ET AL 1,872,000

CONVEYER SYSTEM

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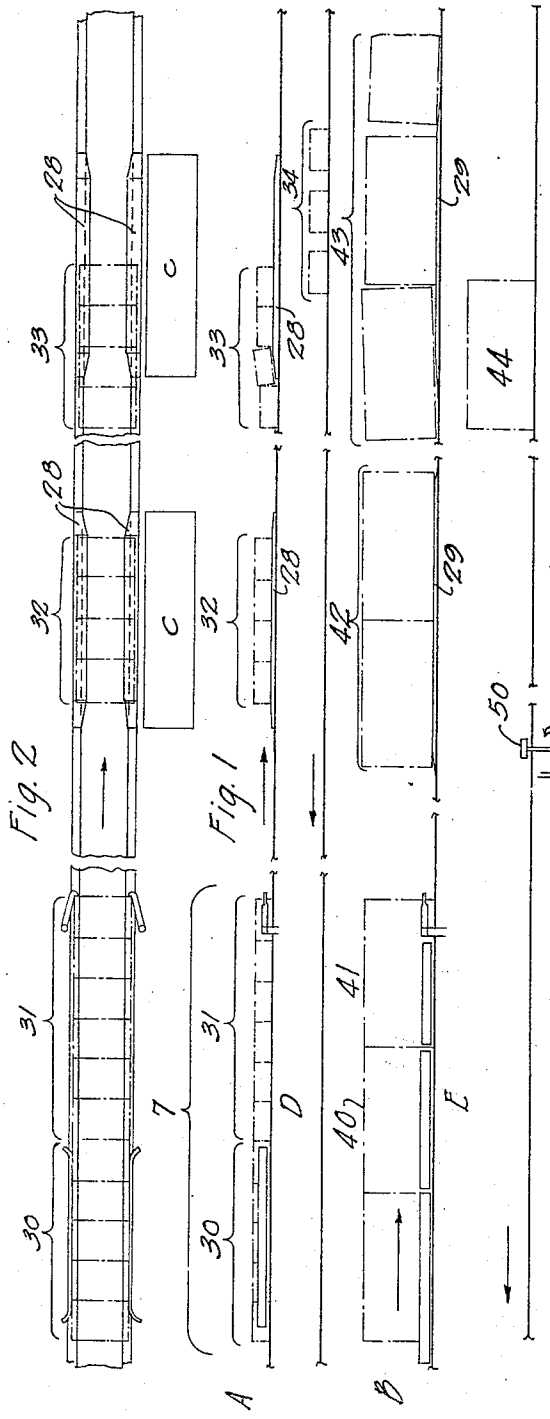


Fig. 2

Fig. 1

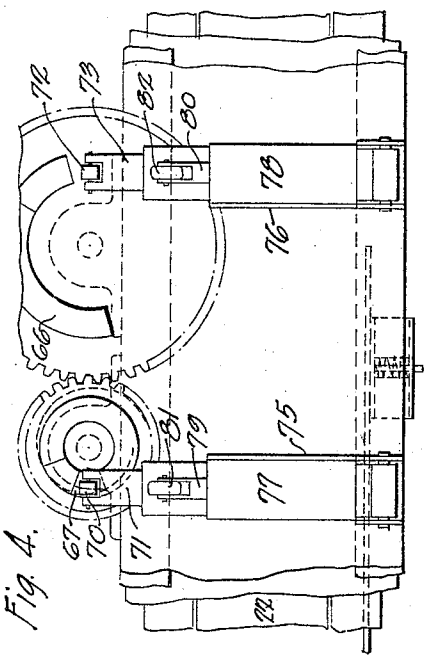


Fig. 4.

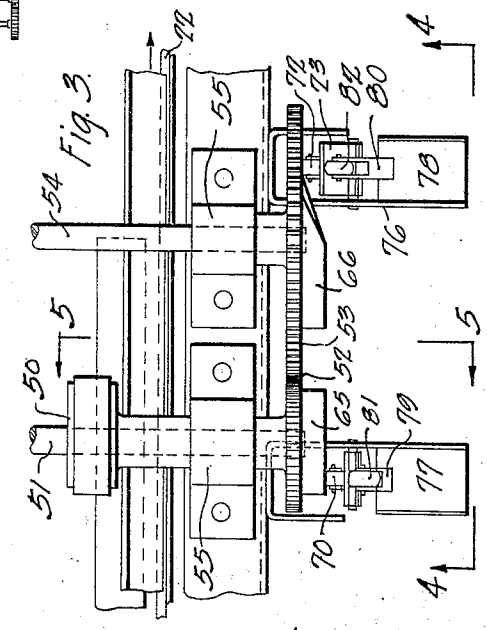


Fig. 3.

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CONVEYER SYSTEM

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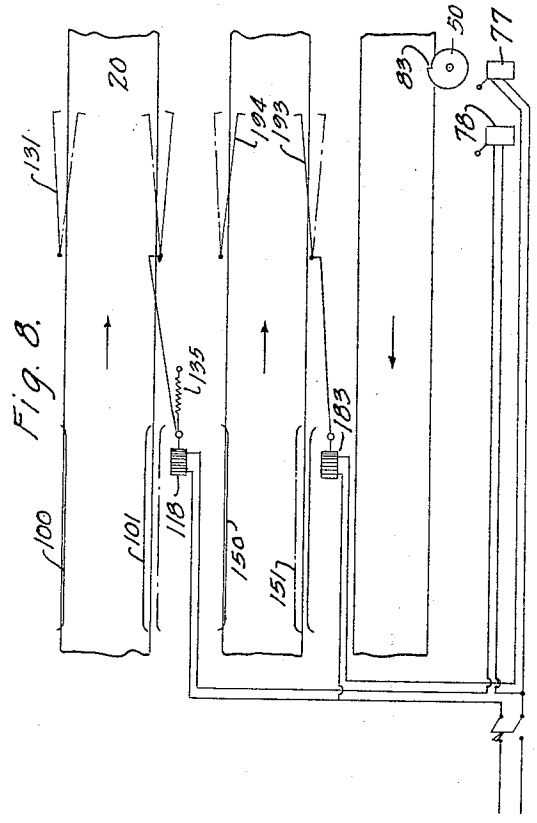


Fig. 8.

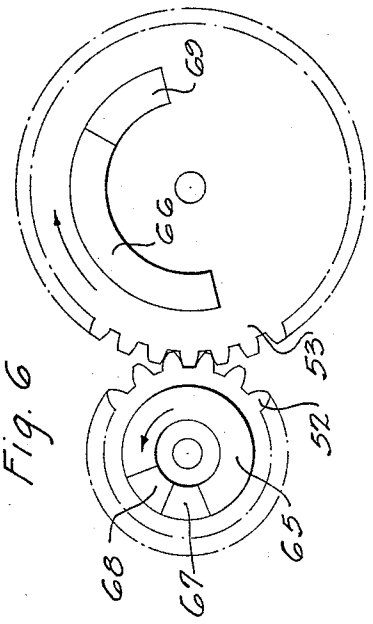


Fig. 6

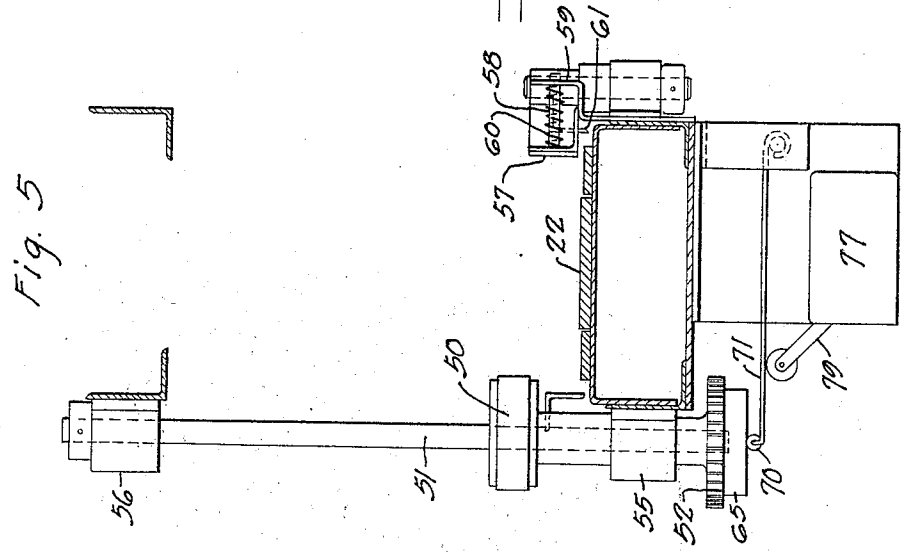


Fig. 5

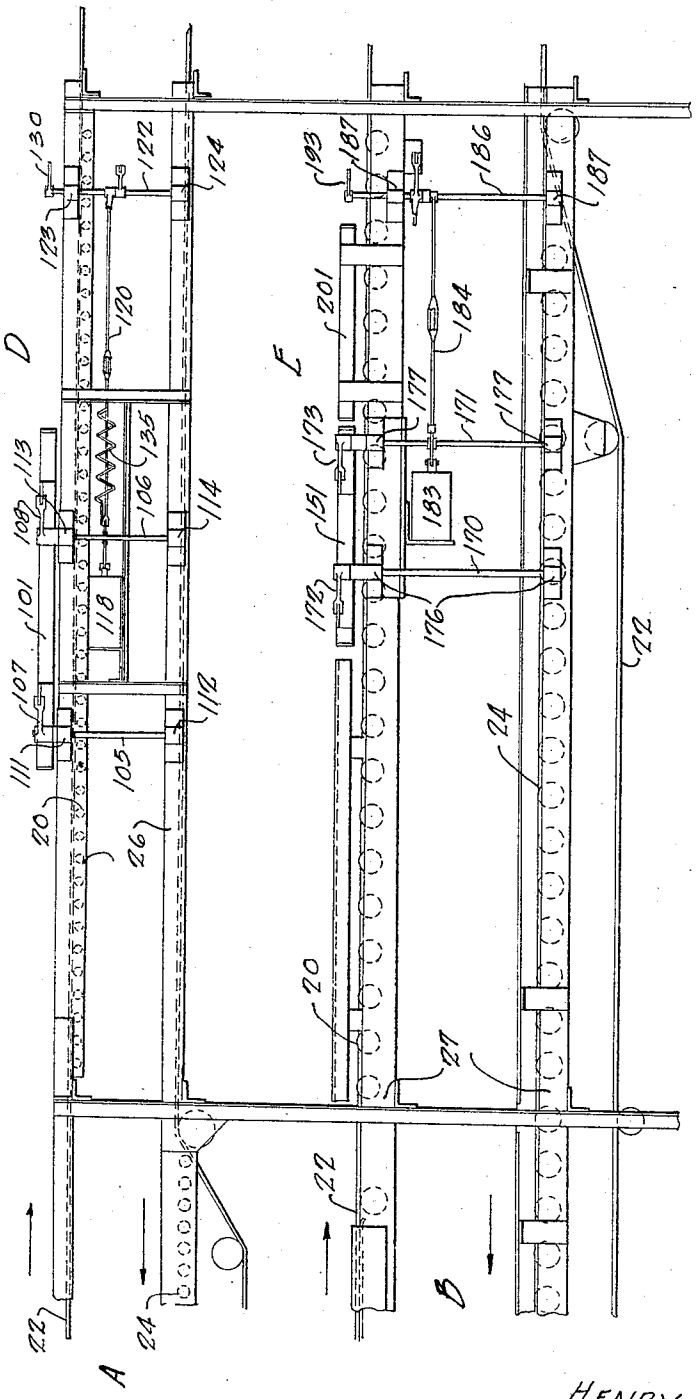
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CONVEYER SYSTEM

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Fig. 7.



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CONVEYER SYSTEM

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Fig. 9

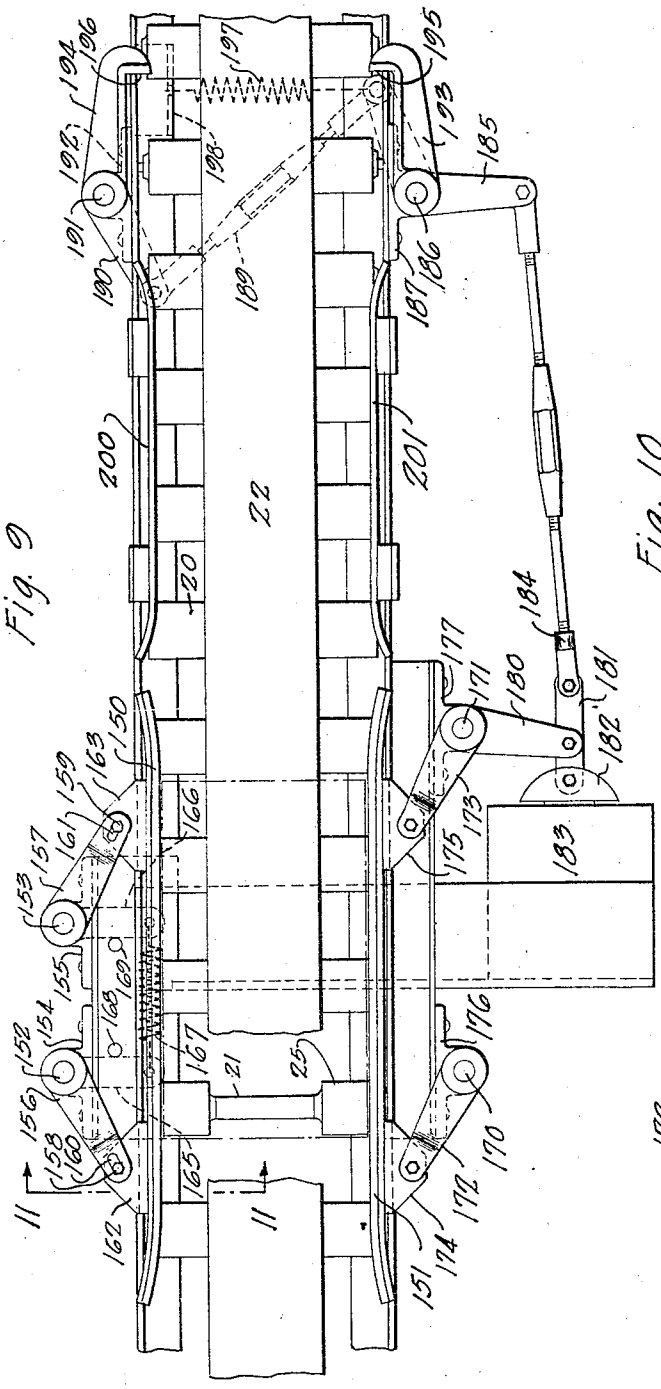
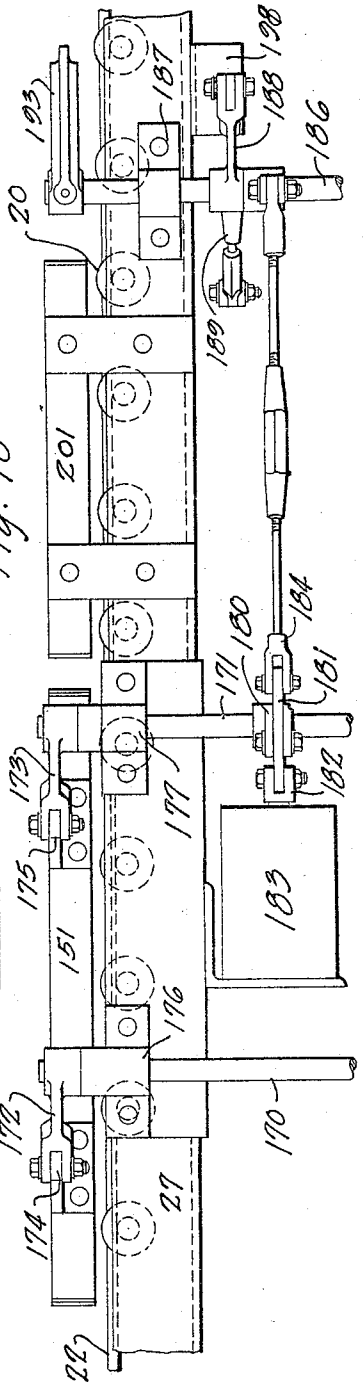


Fig. 10



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CONVEYER SYSTEM

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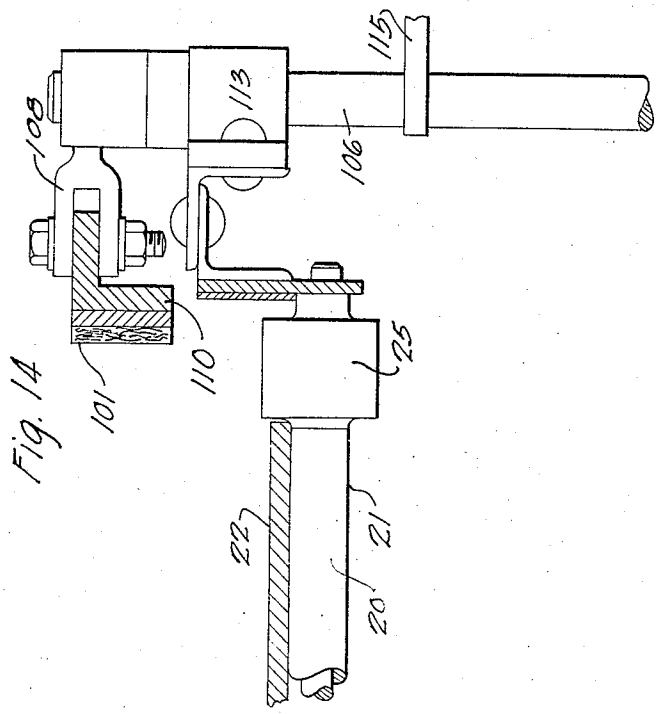


Fig. 14

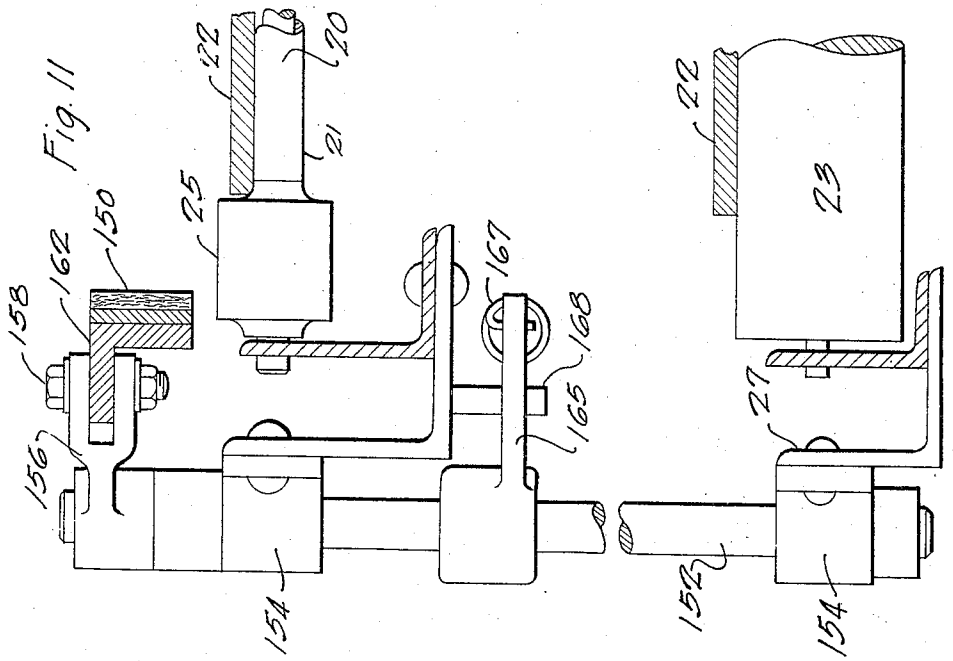


Fig. 11

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CONVEYER SYSTEM

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Fig. 12

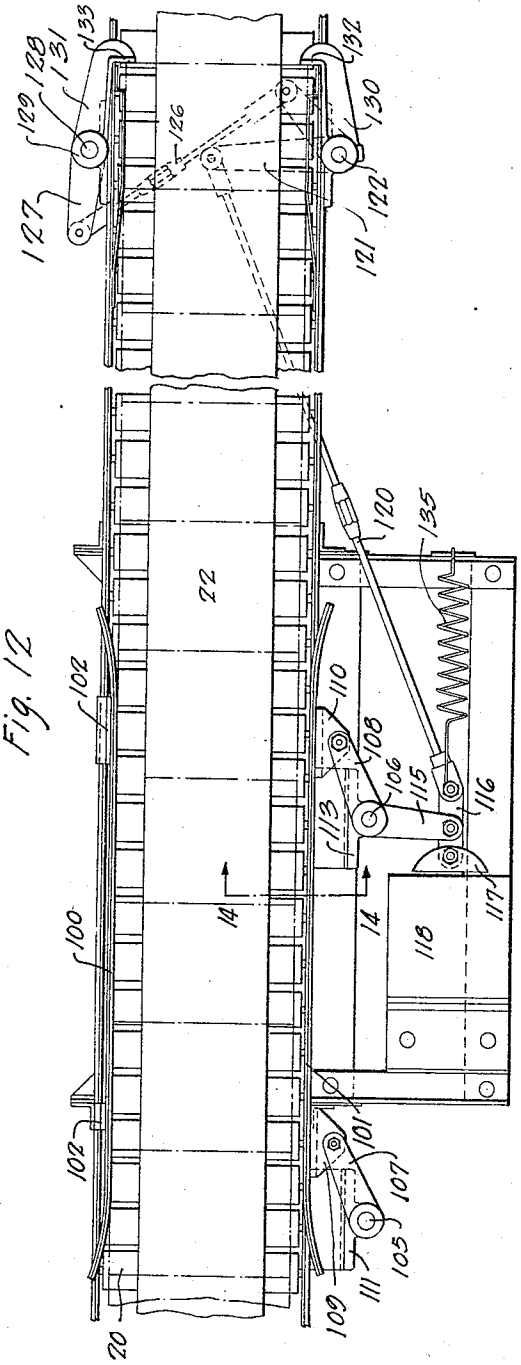
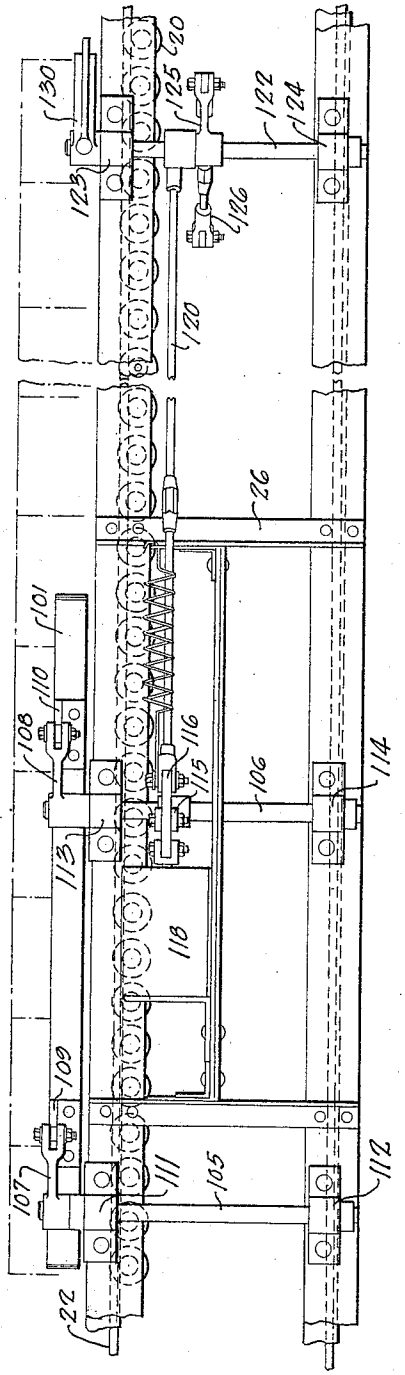


Fig. 13



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UNITED STATES PATENT OFFICE

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CONVEYER SYSTEM

Application filed June 20, 1930. Serial No. 462,454.

This invention relates to an improvement in conveyer systems and more particularly in mechanism for controlling automatically the feeding of articles and insuring the supply of articles in groups of a predetermined number of units.

The primary object of this invention is to provide means for feeding articles by a conveyer, which means includes a control device actuated when the need for a supply of articles arises, a stop mechanism by which the feed of articles is checked at intervals and a release mechanism whereby a predetermined number of articles are assembled in groups to be fed when the stop mechanism is inoperative, and more particularly to provide means whereby the control device above-mentioned is actuated by the return travel of articles.

A further object of this invention is to provide in conjunction with a conveyer having upper and lower reaches, a control device associated with one reach of the conveyer and stop and release mechanism associated with the other reach whereby the travel of articles in one direction upon the first-named reach actuates the control device and thereby operates the stop and release mechanism permitting the travel of articles in the other direction upon the second-named reach.

Another object of this invention is to provide in conjunction with a conveyer system including more than one conveyer, means operated by the travel of articles upon one conveyer for controlling the feed of articles upon all or upon certain conveyers of the system.

Other objects will appear from a consideration of the following description of a system embodying this invention, and of the drawings illustrating such system, and in which,

Fig. 1 is a diagrammatic view in side elevation of a conveyer system embodying this invention, and including two conveyers;

Fig. 2 is a plan view of one conveyer of the system illustrated in Fig. 1;

Figs. 3 and 4 are a side elevation and a bottom plan view of the control device;

Fig. 5 is an elevation of such device illustrating its relation to other elements of the system;

Fig. 6 is an elevation illustrating the relative position of the cams which form a portion of the control device;

Fig. 7 is an enlarged side elevation of the portion of the conveyer system shown in Fig. 1 designated by the bracket 7;

Fig. 8 is a schematic view illustrating one form of wiring circuit that might be employed in the operation of this invention, and the normal positions of the stop and release mechanisms;

Figs. 9 and 10 are enlarged plan and side elevational views respectively of the stop and release mechanism associated with one of the conveyers;

Fig. 11 is a sectional view of a detail of such mechanism taken along the line 11—11 of Fig. 9;

Figs. 12 and 13 are enlarged plan and side elevational views respectively of the stop and release mechanism associated with the other conveyer; and

Fig. 14 is a sectional view of a detail of such mechanism taken along the line 14—14 of Fig. 12.

The particular embodiment selected for the purpose of illustrating this invention is employed in a cigar factory for supplying cigars and empty boxes to the banders, foilers and packers. Such embodiment includes two conveyers A and B by which empty boxes and filled trunks containing cigars are fed to operators at various stations C. Two such stations only are indicated in Figs. 1 and 2, but it will be understood that any desired number may be provided. Each trunk contains enough cigars to fill three boxes, and one purpose of this embodiment is to supply the boxes in groups of six upon one conveyer for every two filled trunks supplied upon the other conveyer.

The trunks and boxes travel upon the upper reaches of the conveyers A and B and come to rest in front of the first operator's station who removes from the conveyers the trunks or boxes needed. The trunks and boxes not needed remain upon the conveyer

and are delivered thereby to the other operator's stations in turn. After a trunk has been emptied it is placed upon the lower reach of conveyer B and returned thereby to the proper destination. Associated with the upper reaches of the conveyers A and B are stop and release mechanisms D and E respectively by which the feed of the boxes and trunks are regulated. The operation of these mechanisms is controlled by a control device F associated with the lower reach of conveyer B and actuated by each empty trunk on its return from the operators' stations.

Upon the actuation of the control device F by each empty trunk the stop and release mechanism E of conveyer B is operated and one filled trunk is permitted to travel to the operators' stations. The control device F is so constructed that the stop and release mechanism D of conveyer A is operated only after two actuations to permit the travel of six boxes in a group to the operators' stations.

The conveyers A and B may be of any well known type and are shown in the drawings as comprising an upper reach consisting of live rollers 20 having a central depression 21 in which travels a belt 22 and a lower reach consisting of cylindrical rollers 23 on which the belt rests and a section 24 of freely rotating rollers which may be horizontal or inclined.

The articles travelling on the upper reach are supported upon and driven by the end portions 25 of the rollers 20 (see Figs. 11 and 14) while on the lower reach they are supported first upon the belt 22 and later upon the section 24 to which they are delivered and which acts as a receiving or dwell station. The various rollers are suitably supported upon the frames 26, 27 of the conveyers A and B.

The upper reach of each belt travels at each operator's station C between stationary guides 28, 29 by which the articles are raised above and out of contact with the rollers 20 so that they will remain at rest until removed by the operator. It will be understood that if the articles are not removed at the first operator's station, they will be pushed off the guides onto the rollers by the arrival of the succeeding articles advanced by the conveyers.

Referring to Fig. 1, the empty boxes are shown divided into four groups designated as 30, 31, 32 and 33 upon the upper reach of the conveyer A, the first two groups being at the stop and release mechanism D and the others at the operators' stations C. After the boxes are filled they are placed by the operators upon the lower reach of the conveyer A (see group 34) by which they are returned to the roller section 25 without further attention.

The filled trunks are similarly shown divided into four groups upon the upper reach of conveyer B, trunks 40 and 41 being at the stop and release mechanism E and groups 42 and 43 being at operators' stations C. An empty trunk 44 is shown on the lower reach of the conveyer B, where it had been placed by an operator, travelling toward the control device F and the delivery section 25.

The control device F is shown particularly in Figs. 3, 4, 5 and 6 and comprises a rotary counter 50 mounted upon a shaft 51 and carrying at its lower end a gear 52 which meshes with a gear 53 supported at the lower end of a shaft 54. These shafts, as shown particularly in Fig. 5, extend upwardly and are supported in bearing journals 55, 56 carried by the frame 27 of the conveyer B. Each empty trunk as it advances upon the belt 22 is brought into contact with the counter disk 50, being guided into such position by a guide plate 57 supported by pins 58 reciprocable in one of the side walls 59 of the lower conveyer frame and advanced normally by springs 60 which surround the pins 58, a stationary stop 61 being provided to limit the movement of the plate 57 when retracted by a trunk.

The gear 52 is made in this particular embodiment with one-half the number of teeth as the gear 53 and as a result the gear 52 and its shaft 51 will make two complete rotations for each complete rotation of the gear 53 and its shaft 54. Supported on the lower face of the gear 52 is a cam 65, while a cam 66 is supported on the lower face of the gear 53. The cam 65 extends substantially a complete circle, being interrupted at the space 67 and provided at one end with an incline 68. The cam 66, however, extends through a half-circle only terminating at one end in an inclined portion 69. The direction of rotation of these gears is indicated by the arrows on Fig. 6. Coacting with the cam 65 is a roller 70 carried at one end of a pivotally supported arm 71 (see Fig. 5). A similar roller 72 carried by a pivotally supported arm 73 coacts with the cam 66. Fixed on brackets 75, 76 carried by the conveyer frame 27 are circuit control devices 77, 78 which are here shown as of the usual type having trip arms 79, 80 carrying rollers 81, 82, which rollers normally bear against the plates 71, 73. The control device 77 is a circuit breaker, while the control device 78 is a circuit maker, these terms being used in the sense that a "circuit breaker" normally closes the circuit and opens the circuit when tripped, while a "circuit maker" normally opens the circuit and closes the circuit when tripped. The roller 50 is similar to that shown in the copending application of Henry C. Keller, filed November 4, 1930, under Serial No. 493,291, being provided with a shoulder 83 with which the empty trunk 41 contacts, and having its periphery of such length that the

roller will be given one complete rotation upon the passage of a trunk.

The stop and release mechanism D employed in connection with the conveyer A for controlling the travel of the boxes is shown in Figs. 12 to 14 inclusive. Arranged at either end of the rollers 20 are plates 100 and 101, the former being supported on uprights 102 carried by the upper platform of the conveyer frame 26. The plate 101 is mounted upon shafts 105, 106, being connected thereto by links 107, 108, which engage brackets 109, 110 fixed upon the outer face of the plate 101 adjacent the ends thereof. The shaft 105 is pivotally supported in journal bearings 111, 112 carried by the upper and lower platforms of the conveyer frame. The shaft 106 is similarly supported in journal bearings 113, 114 carried by the upper and lower platforms and from it projects an arm 115, the outer end of which is pivotally connected to a bar 116 intermediate its length. The position of the shafts 105, 106 and the dimensions of the links 107, 108 are such that when the shaft 106 is rotated by means to be described later, the plate 101 is advanced bodily toward the plate 100 and any boxes on the rollers 20 therebetween are yieldingly clamped against movement.

One end of the bar 116 is pivotally connected to a core or plunger 117 of a solenoid 118 suitably supported on the conveyer frame. To the other end of the bar 116 is pivotally connected one end of the link 120, the other end of which is joined to one end of an arm 121 carried by an upright shaft 122. The shaft 122 is pivotally supported in journal bearings 123, 124 on the conveyer frame and is provided intermediate its length with an arm 125 connected by a link 126 to an arm 127 fixed upon a shaft 128 parallel to the shaft 122 and suitably supported in bearings 129 upon the conveyer frame. At the upper end of each of the shafts 122, 128 are secured dogs 130, 131 respectively. These dogs are parallel and terminate in fingers 132, 133, which, as shown in full lines in Fig. 8, are normally out of the path of travel of the boxes on the conveyer, being urged into that position by a spring 135 attached to one end of the bar 116 when the solenoid 118 is deenergized.

In Figs. 12 and 13 the parts are shown in the position which they will occupy when the solenoid 118 is energized. At that time the core 117 is retracted causing the dogs 130, 131 to be swung toward each other with the fingers 132, 133 in the path of travel of the boxes. The plate 101 is at the same time moved away from the ends of the boxes on the rollers 20 so that they are free to advance into contact with the fingers 132, 133 of the dogs 130, 131. The distance between the plates 100, 101 and the dogs 130, 131 is so chosen that as shown in Fig. 2, the seventh and succeeding boxes of the group stopped by the dogs will be between the plates 100, 101. On the other hand when the solenoid 118 is deenergized the spring 135 will advance the core 117 to the right, swinging the plate 101 into contact with the seventh and succeeding boxes (group 30) and at the same time separating the dogs 130, 131 so that the group 31 of six boxes are free to be advanced by the conveyer to the first operator's station C.

The mechanism E by which the travel of the trunks on conveyer B is controlled is shown particularly in Figs. 9, 10 and 11 and is similar in many respects to the mechanism D. It includes a pair of plates 150, 151 between which a trunk may be gripped. The plate 150 is supported upon shafts 152, 153 carried in journal bearings 154, 155 on the conveyer frame 27. The shafts 152, 153 are connected to the plate 150 by arms 156, 157 carrying at their forked outer ends pins 158, 159, which extend through slots 160, 161 in brackets 162, 163. Projecting from each of the shafts 152, 153 are arms 165, 166, which are connected by a spring 167 and normally bear against stops 168, 169, in which position the arms 165, 166 are parallel and the plate 150 is in its advanced position. The plate 151 is carried by shafts 170, 171 through arms 172, 173, which engage brackets 174, 175 on the plate 151. The shafts 170, 171 are supported in suitable bearings 176, 177 on the conveyer frame in the usual manner. Fixed upon the shaft 171 below the arm 173 is an arm 180 pivotally secured at its outer end to a bar 181 intermediate its length.

One end of the bar 181 is connected to a core or plunger 182 of a solenoid 183, while the other end is pivotally connected by a link 184 to an arm 185 on a shaft 186. The shaft 186 is suitably supported by journal bearings 187 on the conveyer frame and carries an arm 188 connected by a link 189 to an arm 190 carried by a shaft 191. The shaft 191 is parallel to the shaft 186 and is suitably supported in journal bearings 192 on the conveyer frame. Fixed at the upper ends of the shafts 186 and 191 are dogs 193, 194 which terminate in fingers 195, 196. The dogs 193, 194 are yieldably held in the path of travel of the trunks by means of a spring 197 attached at one end to the arm 188 and at the other end to a bracket 198.

The solenoid 183 when energized holds the parts in the position shown in Fig. 9 with the dogs 193, 194 retracted from the path of travel of the trunks and the plates 150 and 151 bearing against the ends of a trunk so that no movement of the trunk is permitted. The normal position of the parts is when the solenoid 183 is deenergized, whereupon, the spring 197 acts to swing the dogs toward each other and at the same time to retract the plate 151 so that the trunks are free to advance passing between the guide plates 200 and 201 into contact with the fin-

gers 195, 196 of the dogs 193, 194. The distance between the dogs and plates is such that upon the retraction of these dogs by energizing of the solenoid 183 the leading trunk will be free to advance to the operator's station and the second trunk will be clamped between the plates 150, 151.

The operation of the stop and release mechanisms D and E by the control device F will now be described in connection with Fig. 8 of the drawings. It will be noted that the circuit breaker 77 is associated with the solenoid 183, while the circuit maker 78 is associated with the solenoid 118. The circuit breaker 77 is controlled by the cam 65 and by reason of the construction of that cam the circuit is normally open and is only closed at that point in the rotation of the shaft 51 at which the roller 70 enters the space 67. The circuit maker 78 is controlled by the cam 66 and, as shown in Fig. 6, this cam only extends around practically one-half the circumference. The cams 65 and 66 are so positioned relative to each other that the circuit maker 78 will not be tripped during the first rotation of the shaft 51 so that no movement of the boxes will take place at that time. When, however, the second rotation of the shaft 51 takes place the circuit maker 78 will be tripped by the cam 66, energizing the solenoid 118, whereupon the dogs 130, 131 are swung into position to stop the travel of the boxes, and the plate 101 is retracted to allow the boxes to advance to the dogs. Upon the completion of the second rotation of the shaft 51 the circuit maker 78 will be released from the cam, breaking the circuit, deenergizing the solenoid 118 and allowing the parts to take the normal position shown in full lines in Fig. 8, in which the plate 101 clamps the boxes against the plate 100 while the dogs 130, 131 release the six boxes in advance of the plates 100, 101.

In Fig. 8 the stop and release mechanisms D and E are shown by full lines in their normal positions and by dotted lines in the positions taken upon tripping of the circuit control devices upon the rotation of the counter 50 by the empty trunks. Thus the trunks are normally held against advancing by the dogs 193, 194 and are released at each rotation of the shaft 51 whereupon the leading trunk advances while the succeeding trunks are held stationary by the plates 150, 151. The boxes, however, are normally held against advancing by the clamping plates 100, 101 and are released at every second rotation of the shaft 51 so that the line of boxes will advance to the dogs 130, 131 by which they are held until the normal positions of the parts are assumed and the six boxes between the plates and dogs advance to the operators' stations.

Hence one filled trunk advances to the operator's station every time the counter 50 is rotated by a returning empty trunk while six empty boxes advance upon every second rotation of the counter. The number of trunks and boxes advanced may be varied as desired by any suitable means, as for instance by altering the distances between the plates and dogs of the stop and release mechanisms.

While one embodiment of this invention has been shown and described it will be understood that this embodiment was selected for the purpose of illustrating and not of limiting the invention, and that not only can changes be made in the details of the illustrative embodiment but also that other embodiments can be made without departing from the spirit and scope of the invention as set forth in the following claims.

We claim:

1. In a conveyer system comprising at least two conveyers by which articles are transported, stop and release mechanism associated with each conveyer for regulating the movement of articles thereon, and a device for controlling the operation of such mechanisms whereby the articles upon one conveyer is permitted to move in predetermined time relation to the articles upon another conveyer, said stop and release mechanisms being operable upon articles transported by one reach of each conveyer and said control device being actuated by articles transported upon the other reach of one conveyer.

2. In a conveyer system comprising at least two conveyers by which articles are independently transported to an operator's station, stop and release mechanism associated with each conveyer for positively engaging the articles thereon and regulating the movement of the articles thereby, and a device for controlling the operation of such mechanisms whereby the articles upon one conveyer are permitted to move in predetermined time relation to the articles upon another conveyer, the stop and release mechanism of one conveyer being operated by said control device at more frequent intervals than the stop and release mechanism of another conveyer.

3. In a conveyer system comprising at least two conveyers by which articles are transported, stop and release mechanism associated with one conveyer for regulating the movement of articles thereon, and a device for controlling the operation of such mechanism whereby the articles upon the conveyer are permitted to move in predetermined time relation to the articles upon another conveyer, the stop and release mechanism of one conveyer being operable upon articles transported by one reach of the conveyer and the control device being actuated by articles transported by the other reach of another conveyer.

4. In a conveyer system comprising at least two conveyers by which articles are transported, stop and release mechanism as-

sociated with one conveyer for regulating the movement of articles thereon, and a device for controlling the operation of such mechanism whereby the articles upon the conveyer are permitted to move in predetermined time relation to the articles upon another conveyer, the stop and release mechanism of one conveyer being operable upon articles transported by one reach of the conveyer and the control device being actuated by articles transported by the other reach of another conveyer, the actuation of the device by a predetermined number of articles causing the stop and release mechanism to permit the travel of a predetermined number of articles.

5. In a conveyer system, a conveyer by which articles are transported and stop and release mechanism associated with said conveyer for regulating the movement of articles thereby, said mechanism including a pair of clamping plates and a pair of dogs, and means for moving said plates and dogs into functioning position dissimultaneously whereby when the clamping plates hold the articles against travel the dogs permit the travel of the articles and vice versa.

6. In a conveyer system, a conveyer by which articles are transported and stop and release mechanism associated with said conveyer for regulating the movement of articles thereby, said mechanism including a pair of clamping plates, a pair of dogs in advance of said plates a predetermined distance, and means for moving said plates and dogs into functioning position dissimultaneously whereby when said dogs prevent the travel of the articles a certain number of articles will collect on the conveyer between the plates and the dogs, and when the plates hold the articles against travel the certain number of articles are free to travel in a unit.

7. In a conveyer system, a conveyer by which articles are transported and stop and release mechanism associated with said conveyer for regulating the movement of articles thereby, said mechanism including a pair of clamping plates, a pair of dogs, a solenoid, the core whereof is connected to one of said plates and to said dogs, and means for controlling the electrical status of the solenoid whereby when said dogs prevent the travel of the articles a certain number of articles will collect on the conveyer between the plates and the dogs, and when the plates hold the articles against travel the certain number of articles are free to travel in a unit.

8. In a conveyer system, a conveyer by which articles are transported and stop and release mechanism associated with said conveyer for regulating the movement of articles thereby, said mechanism including stopping means comprising a pair of clamping plates, a pair of dogs, a solenoid, means for controlling the electrical status of the solenoid and connections between the core of the solenoid and one of said plates, and said dogs, whereby upon the energizing of the solenoid one of the stopping means is held in an operative position to stop the travel of the articles and the other stopping means is in an inoperative position and upon the deenergizing of the solenoid, the positions of the stopping means are reversed.

9. In a conveyer system a conveyer having upper and lower reaches by which articles are transported, stop and release mechanism associated with one reach for regulating the movement of articles thereon, and a device associated with the other reach for controlling the operation of such mechanism, said device being actuated by the articles transported on said other reach.

10. In a conveyer system, a conveyer by which articles are transported, and a device associated therewith, such device including a freely rotatable shaft at one side of said conveyer, a roller upon said shaft with which articles transported by the conveyer contact and thereby rotate the shaft, a circuit control device and means actuated by the shaft for tripping said control device.

11. In a conveyer system, a conveyer by which articles are transported, and a device associated therewith, such device including a freely rotatable shaft at one side of said conveyer, a roller upon said shaft with which articles transported by the conveyer contact and thereby rotate the shaft, a second shaft connected with and rotated by the first shaft, circuit control devices, and means actuated by the shafts for tripping said control devices.

12. In a conveyer system, a conveyer by which articles are transported, and a device associated therewith, such device including a freely rotatable shaft at one side of said conveyer, a roller upon said shaft with which articles transported by the conveyer contact and thereby rotate the shaft, a circuit control device and a cam carried by said shaft for tripping said control device.

13. In a conveyer system, a conveyer by which articles are transported, and a device associated therewith, such device including a freely rotatable shaft at one side of said conveyer, a roller upon said shaft with which articles transported by the conveyer contact and thereby rotate the shaft, a second shaft connected with and rotated by the first shaft, cams carried by each shaft and two circuit control devices, one adjacent each shaft, said control devices being tripped by said cams.

14. In a conveyer system, a conveyer by which articles are transported, and a device associated therewith, such device including a freely rotatable shaft at one side of said conveyer, a roller upon said shaft with which articles transported by the conveyer contact and thereby rotate the shaft, a second shaft, gears carried by said shafts, which gears intermesh so that the shafts rotate simultane-

ously, a circuit control device adjacent each shaft, and a cam on the gear carried by each shaft and by which the circuit control devices are tripped.

15. A conveyer system comprising a conveyer, one reach of which transports articles to an operator's station, and the other reach of which transports articles away from said station and means actuated by articles transported away from said station for regulating the transportation of articles to the station.

16. A conveyer system comprising a conveyer, one reach of which transports articles to an operator's station, and the other reach of which transports articles away from said station and means actuated by each article transported away from said station for permitting the transportation of an article to the station.

17. A conveyer system comprising at least two conveyers, one reach of each conveyer transporting articles to an operator's station, the other reach of each conveyer transporting articles away from said station and means actuated by articles transported away from said station for regulating the transportation of articles to the station by both conveyers.

18. A conveyer system comprising at least two conveyers, one reach of each conveyer transporting articles to an operator's station, the other reach of each conveyer transporting articles away from said station and means actuated by each article transported away from said station by one conveyer for regulating the transportation of articles to the station by both conveyers.

19. A conveyer system comprising at least two conveyers, the upper reaches of which transport articles toward an operator's station, and the lower reaches of which transport articles away from said station, and means actuated by each article transported by the lower reach of one conveyer for regulating the transportation of articles upon the upper reaches of the conveyers.

20. A conveyer system comprising at least two conveyers, one reach of one conveyer transporting trunks filled with articles to an operator's station, and one reach of another conveyer transporting empty boxes to the station for filling, said boxes after filling being transported from the station upon the other reach of one conveyer and said trunks when empty being transported from the station upon the other reach of another conveyer, and means actuated by each empty trunk for regulating the feeding of empty boxes and filled trunks to the station.

21. A conveyer system comprising at least two conveyers, one reach of one conveyer transporting trunks filled with articles to an operator's station, and one reach of another conveyer transporting empty boxes to the station for filling, said boxes after filling being transported from the station upon the other reach of one conveyer, and said trunks when empty being transported from the station upon the other reach of another conveyer, and means actuated by each empty trunk for permitting the feeding of a filled trunk to the station and the feeding thereto of a group of empty boxes concomitantly with every second filled trunk.

22. A conveyer system comprising at least two conveyers, the upper reach of one conveyer transporting trunks filled with articles to an operator's station, and the upper reach of another conveyer transporting empty boxes to the station for filling, said boxes after filling being transported away from the station upon the lower reach of one conveyer, and the empty trunks being transported away from the station upon the lower reach of another conveyer, and means actuated by each empty trunk as it is transported away from the station for regulating the feeding of empty boxes and filled trunks to the station.

23. A conveyer system comprising at least two conveyers, the upper reach of one conveyer transporting trunks filled with articles to an operator's station, and the upper reach of another conveyer transporting empty boxes to the station for filling, said boxes after filling being transported away from the station upon the lower reach of one conveyer and the empty trunks being transported away from the station upon the lower reach of another conveyer, and means actuated by each empty trunk as it is transported away from the station for permitting the feeding of a filled trunk to the station and the feeding thereto of a group of empty boxes concomitantly with every second filled trunk.

Signed by HENRY C. KELLER at Syracuse, N. Y., this 16th day of June, 1930 and by MAYNARD VAN BILLIARD at Syracuse, N. Y., this 18th day of June, 1930.

HENRY C. KELLER.
MAYNARD VAN BILLIARD.