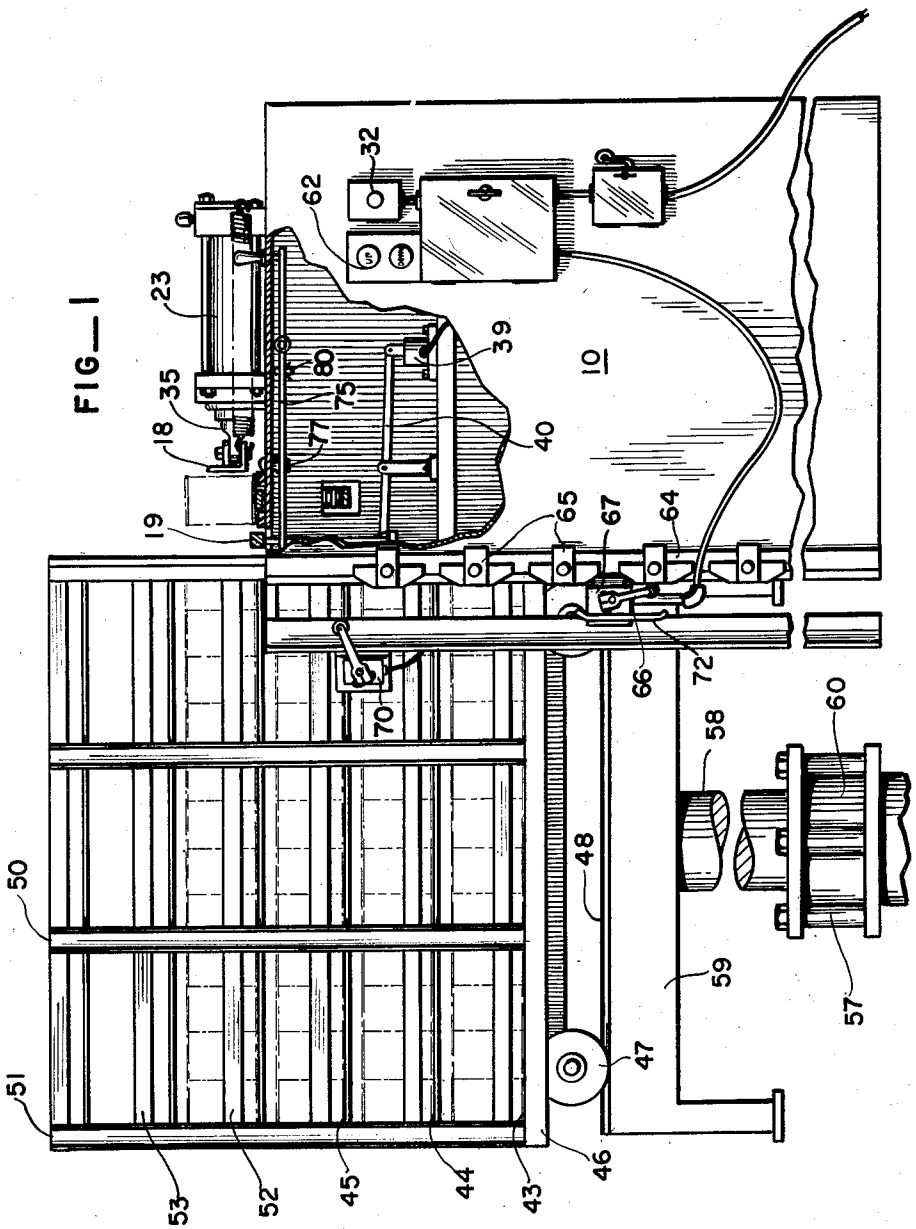
Jan. 2, 1951 W. G. TYRRELL 2,536,672

CAN HANDLING MEANS

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FIG_1



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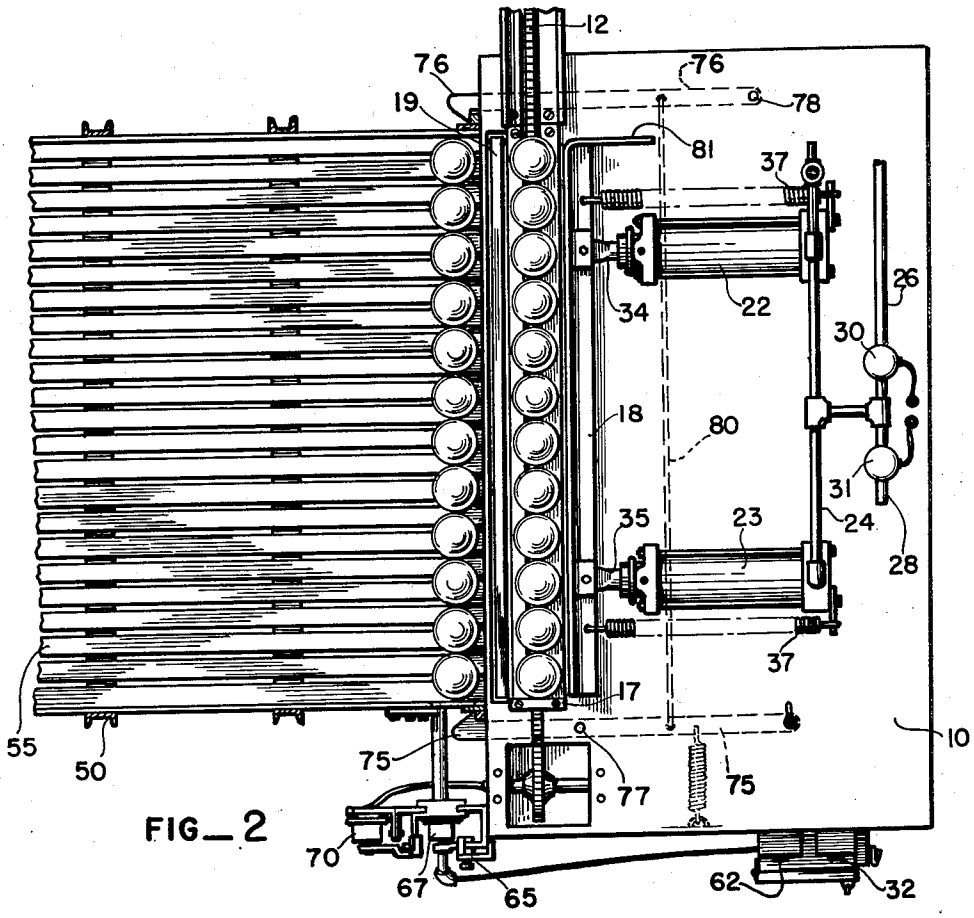


FIG_2

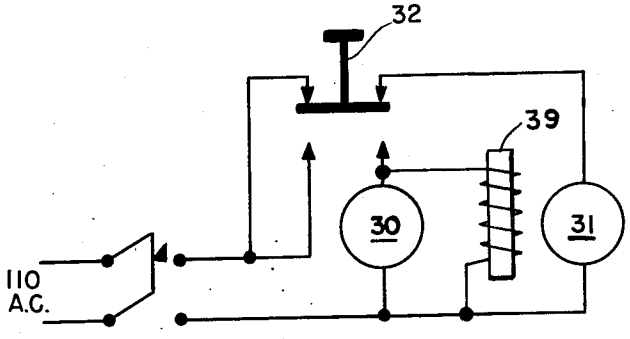


FIG_3

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CAN HANDLING MEANS

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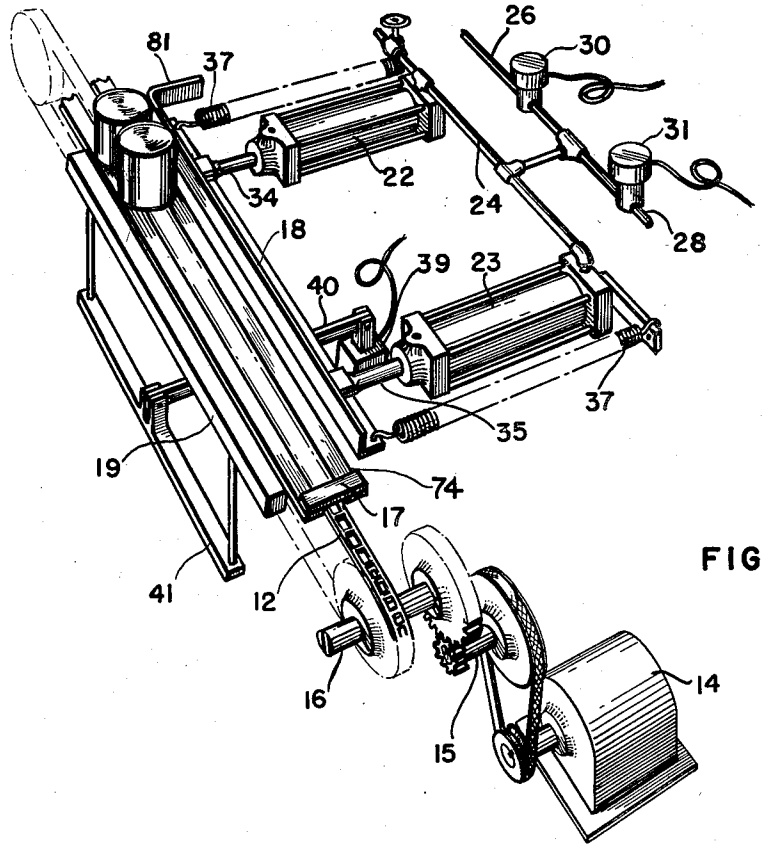


FIG_4

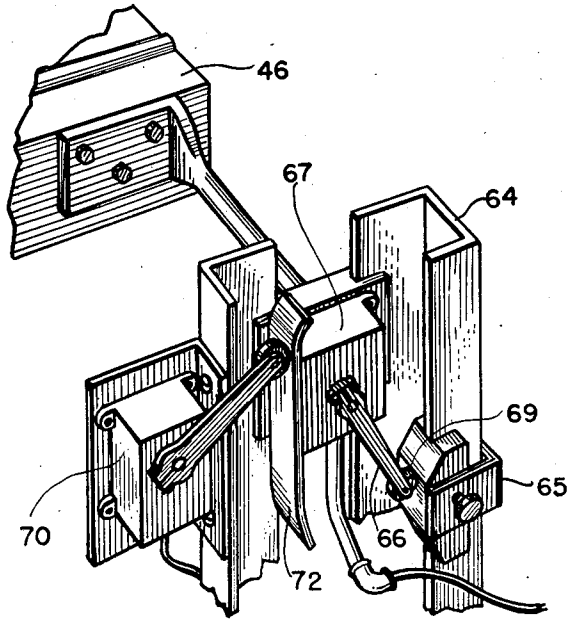


FIG_5

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CAN HANDLING MEANS

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Application December 17, 1946, Serial No. 716,797

3 Claims. (Cl. 214—8)

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My present invention relates to the general art of canning equipment and, more particularly to a can handling means.

The handling of tin cans in the average cannery has always involved an extensive amount of hand labor. This is particularly true in canneries having to do with food products which must be cooked at high temperatures in order to kill such bacteria as may be present and also in many instances to actually cook the food products. In the past, in the more advanced canneries, it has been customary to employ a metal frame known as a cooler, in which were stacked on end and by hand usually several cases of cans and the cans were handled in this cooler as a handling unit during the transportation to the cooking retorts and the return from there, and of course the cans rested in these coolers during the actual cooking operations. This type of arrangement, while a great advantage over the handling of individual cans, still required the hand-charging of the coolers and the hand removal of the cans from the same after processing was completed.

With my present can handling equipment, I provide a plurality of vertically disposed shelves, made as a unit, with vertical connecting and supporting members so that six or eight tiers of stacked cans can be loaded at one general operation, and then be transported for processing, still as a unit, and after processing, can then be again unloaded by mechanical equipment so as to facilitate the easy stacking for storage or for placement in the transportation cases or cartons.

With my present equipment it is possible for one person, in general overseeing charge of the operation, to charge the various trays making up my tray-rack or unit by means of my improved mechanical means in but a fraction of the time that it formerly took a number of persons to perform the same operation. I further provide that the weight of the upper tiers of cans is not resting on the lower tiers, as this often has produced many damaged cans. It is therefore the principal object of my present invention to provide mechanical means for taking cans off a conveyor chain or belt and putting them on the processing trays.

A further object of my invention is to provide a plurality of trays superimposed one upon the other and banded together by vertical supporting members so that a height of trays, up to the capacity of the processing unit, may be employed and which can be successively charged with cans from a conveyor solely by mechanical means.

A further object of my present invention is to

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provide mechanical transfer means that will make it possible for a single operator to remove the cans from a continuous feed conveyor and place them in convenient processing trays.

A further object of my invention is to provide a can handling rack composed of a plurality of spaced-apart can supporting shelves, each shelf being a practical substitute for the can cooler trays as formerly employed in canneries.

A further object of my present invention is to employ electro-mechanical switches for the accurate positioning of the various shelves in my can-handling frame or tray assembly.

A further object of my present invention is to provide means for removing the cans from the conveyor means and placing them on one of the shelves of my can-handling rack by means so timed that it does not cause a stoppage in the delivery of cans to the loading device.

A further object of my invention is to provide a plurality of pneumatic, electric and mechanical devices so integrated as to produce a complete workable and fool-proof can-handling machine.

Other objects will no doubt be apparent after a study of the specification and the annexed drawings.

In the drawings:

Fig. 1 is a side elevation showing my can-handling equipment with a can loading and handling rack, as made after the teachings of my present invention;

Fig. 2 is a top plan view of the equipment shown in Fig. 1;

Fig. 3 is a diagrammatic view showing the essential electric operating means for the pusher bar and guide bar of my can handling equipment;

Fig. 4 is a perspective view, with many of the supporting parts removed for the sake of illustration, showing my collecting table and the various associated parts which are used in effecting the transfer of the cans from the conveyor means to my can handling rack;

Fig. 5 is a perspective view of one corner of the bed of the tray assembly shown as broken away together with two of the electro-mechanical switches that are used in the positioning of my tray assembly.

Referring to the drawings, throughout which like characters indicate like parts, the numeral 10 designates the main supporting table for my equipment. This is preferably formed of structural shape with metal decking so that the various parts may be held in fixed relationship to each other and will be provided with the requisite firmness to insure their efficient operation.

Passing over the top of the table is the conveyor belt or chain 12. This may be driven by any convenient reduction gear-drive as illustrated in Fig. 4, where an electric motor 14 is connected to a secondary shaft 15 by a V-belt and from here a reduction by gears is effected so as to drive the shaft 16 at the requisite speed for proper handling of the cans. In order that proper functioning may be obtained, it is necessary that a given number of cans be unloaded from the conveyor at each successive operation. To insure this, I provide a stop member at 17 so that the cans as they come along the conveyor will come to rest at this stop and then build up until the cans are one continuous touching row. However, the pressure of the cans on each other tends to make them assume a staggered relationship and, to prevent this, I provide on one hand the pusher bar 18 and on the other the retractible guide bar 19, which normally I space apart sufficiently so that the cans may form only a single row between the two.

Referring particularly to Figs. 1 and 2, it will be noted that my equipment is arranged so that the pusher bar 18 will engage and move an entire row of cans. There is further a requirement that this operation be performed quickly in order that the flow of cans coming down conveyor 12 will not be arrested and the entire operation thus slowed. While it is conceivable that many forms of operating means might be employed, I have found that in order to start the cans easily and thus gradually overcome their inertia so that they can be moved quickly without danger of denting, air cylinders appear to be the best means. In this respect it is to be noted that air entering a cylinder through a relatively small feed line, does not build up adequate pressure immediately to snap the pistons out, but rather the build-up is gradual, an ideal means for achieving gradual acceleration to speedy operation.

In my preferred form of construction, therefore, I provide two air cylinders as 22 and 23. These are supplied by a common air line 24 which in turn communicates to the supply line 26 and the exhaust line 28. For control I provide the air supply valve 30 and the exhaust valve 31. These valves are best electrically controlled so that their timing can be easily effected. This is achieved by electrical means and a diagram of this circuit is shown in Fig. 3. It will be noted that switch 32 has two closed positions; in other words, it either completes the circuit through the air exhaust valve, as shown, or in its other position, completes the electrical circuit through the air supply valve. With such an arrangement, overlapping of functioning is impossible and timing can be accurately determined so as to perform the operation most effectively. The air cylinders have pistons as 34 and 35 which are connected directly to the pusher bar 18. As soon as the cans have been moved off the conveyor onto the handling rack the return of the pusher bar, and also the return of the pistons to their normal position is achieved by the return springs 37, one being disposed at each end of the pusher bar.

A necessary step in the functioning of the can transfer is that the guide bar 19 must be retracted at exactly the proper time. This is achieved by employing a solenoid 39 which is connected as by lever 40 to the lift bar 41. Thus it will be seen that an upward thrust on the right hand end of lever 40 as viewed in Fig. 1, will produce a downward movement of the guide bar and thus accomplish its retraction. It is however essential that this retraction be carefully timed in step with the operation of the pusher bar. Consequently, it too is included in the circuit as shown in Fig. 3 in which the solenoid is shown at 39.

The one construction that most greatly assists in achieving an overall efficiency in can handling is my rack or tray assembly which is probably best shown in Fig. 1. Here I have provided a plurality of can receiving shelves as 43, 44, 45, etc. Each of these shelves I normally provide to have about the capacity of the can handling cooler as formerly used in canneries. The entire assembly rests on the assembly bed 46 which must be of substantial structure in that the total weight of cans when the rack is filled is considerable. To bed 46 are secured axles which in turn support a plurality of flanged wheels 47 which operate on trackage 48. Rising above bed 46 are a plurality of vertically disposed structural members as 50, 51, etc. These are fixedly secured, as by welding, to horizontally disposed structural members as 52 and 53, etc. By thus welding the entire unit together great rigidity is obtained without excess weight.

It is very desirable in building this rack of trays that the floors or can supporting members as 55 are disposed at right angles to the feeding conveyor, so that successive rows of cans, as they are being transferred, will slide along these supporting bars with a minimum of friction. The friction of course begins to mount to considerable proportions when the tray is substantially filled, as the new line of cans coming off the conveyor must not only be moved but all the other cans that have been previously placed upon the trays must also be moved, in order that space be provided for the new row of cans. It is for this reason that the air cylinders have been found so successful in their operation in that, in the final stages of loading the trays, considerable force is required to actually move the entire mass of cans for the placement of the last row in each tray.

In order that successive trays can be filled it is necessary that an elevator be used to raise the entire multitray assembly or rack to the successive levels of the can receiving platforms 55. I have found this is most easily achieved by the use of a hydraulic elevator of the type shown at 57, in this instance, a piston member 58 is fixedly secured to a platform as 59 upon which tracks 48 are secured. Surrounding piston 58, in a manner quite well understood in this line of work, is cylinder 60 and the various valving means that are normally employed to control the functioning of this arrangement. In my present equipment I have found it most practical to employ electrical means to, in turn, control the valve supplying the water to cylinder 60. This electric switch I have shown at 62.

While it would be possible to position the tray vertically by means of the push button 62, it has been found that this calls for a very exacting degree of judgment on the part of the operator and in order, therefore, to overcome the necessity for a specially trained operator and to insure quick and exact functioning I prefer to use the electro-mechanical switches, probably best shown in Figs. 1, 2, and 5. On the vertical standard 64 I have positioned a plurality of adjustable cams 65. These should be provided one for each tier of shelves and to have a cam surface so arranged

as to timely engage the operating arm 66 of the switch 67 which is in turn secured to and movable with the bed of the multi-tray assembly. It will be apparent, it is believed, that as the switch arm roller 69 is moved off of one cam, switch 67 will be operated, and then as it moves onto the successive cam the switch will again be caused to function at the same relative position. It has been found, however, that due to various weights in the tray assembly, depending upon whether it is filled or empty, that the spacing of cams 65 may not correspond accurately to the spacing of the shelves. Therefore they should be made adjustable in that by trial the unit can be calibrated and the final setting of these cams effected.

At 70 I have provided an overall limit switch which in turn has its own cam surface 72. This cam surface, in order to be responsive to the position of the tray assembly, is preferably secured, as indicated in Fig. 5, directly to the switch housing of the successive level switch 67.

Method of operation

In operating my device, it is normally under the control of a single operator, who first of all lowers the entire assembly so that the upper shelf is in adjusted position with respect to the conveyor collecting table 74. This he normally achieves by merely pressing the down button of switch 62 and when the unit is in its lowermost position, the switch 67 will stop the top tray in its proper position. With the tray in position, the tray securing latches 75 and 76 in turn engage the vertical ribs on the tray assembly and hold the same in position. The necessity for these latches will be apparent when it is realized that the entire assembly rests upon tracks and the wheels 47 and, as the effort required to move the cans sideways and along the trays until the tray is filled, is considerable, some means is required to hold the tray assembly in accurate position. It will be noted that latch 75 is pivoted at 77 and that latch 76 is pivoted at 78. Thus a single connecting bar 80 insures that the two latches can be simultaneously operated by the movement of either one.

Assuming that the upper level of the tray assembly is accurately aligned with the collecting table level, the next operation is the actual transverse movement of the row of cans by the pusher bar 18.

Actually before this can be effected the solenoid 39 must operate to retract or depress guide bar 19 and then, in quick succession, cylinders 22 and 23 must be energized to move the pusher bar to the left, as viewed in Figures 1 and 2, so as to place the entire row of cans that has formerly been on the conveyor well onto the tray platform. It will naturally follow, it is believed, that successive rows of cans thus moved off the conveyor and onto the tray will move those cans previously placed on the tray one can-space further to the left. This sequence of operation is continued until the entire tray is filled with cans, at which time the operator goes to the next level. In this connection, it is desired to point out that it is desirable to have a bent end portion on the pusher bar 18, as is indicated at 81, so that if two cans are actually touching each other on the conveyor 12 as they come into the table the rear can will be momentarily arrested while the pusher bar separates them and completes its cycle of operation.

As soon as the operator has entirely filled all the tray levels in the tray assembly, the entire assembly can then be moved and handled as a unit and the cans left in place thereon until they have been fully processed. The size of the tray assembly normally is predicated upon the size of the retort in which the final curing or cooking is achieved. It will be apparent, it is believed, that the platform 59 can be lowered until its feet engage the floor, at which time it should be in registry with other trackage so that the entire assembly can be easily moved by a single person to the various positions where it may be used. This includes not only the cooking operation but also includes such operations as cleaning and the like, and also the cooling of the cans after they have been processed and before they are packed. This same tray assembly admits of very convenient unloading by mechanical means, which is the subject matter of a separate application.

This equipment has demonstrated its ability to achieve the objects stated in the preamble to the specification, in that it provides means for handling cans during the processing stages in a most efficient manner which makes for a minimum of wastage both in labor and in, what is often quite critical, the available space in the canneries to handle the large number of cans that are normally processed in even a single day.

It is believed that it will be clearly apparent from the above description and the disclosure in the drawings that the invention comprehends a novel construction of can handling means.

Having thus disclosed the invention, I claim:

1. In a can handling machine, the combination of a multi-tray assembly wherein a plurality of can-receiving trays or shelves are provided one above the other in a complete consolidated unit, a power elevator for said assembly, a conveyor feed means, a collecting table, supporting means for said table, a retractable guide bar disposed on the side of said collecting table adjacent said multi-tray assembly, an electric solenoid operating means adapted to operate said guide bar, a pusher bar disposed on the opposite side of said collecting table, air cylinders disposed for operating said pusher bar, electric valve operating means adapted to energize said cylinders, which said air cylinder operating means is synchronized with the operating means for said guide bar to sequentially time the retraction of said guide bar and the transverse movement of said pusher bar, an electric switch secured to said multi-tray assembly, a plurality of adjustable cam members, secured to said table supporting means, adapted to co-act with said switch to control said power elevator and to successively position the multi-tray assembly.

2. In a can handling machine, the combination of a multi-tray assembly wherein a plurality of can-receiving trays or shelves are provided one above the other in a complete consolidated unit, a power operated elevator for said tray assembly, a conveyor feed means, a collecting table, a retractable guide bar disposed on the side of said collecting table adjacent said tray assembly, operating means for said guide bar, a pusher bar disposed on the opposite side of said collecting table, means for operating said pusher bar during the time the guide bar is retracted, which said pusher bar operating means is synchronized with the operating means for said guide bar to effectively time the sequence of operations, an electric switch secured to said multi-tray assembly, a plurality of adjustable cam members adapted to co-act with said switch to control said elevator

and to successively position the multi-tray assembly.

3. In a can handling means of the type used to position cans during their processing, the combination of; a multi-shelf rack, a can collecting table, means for successively bringing the shelves of said rack in vertical registry with said table top, means on said table adapted to collect a row of cans, said means having a guide bar and a pusher bar adapted to arrange said cans in a straight line and abutting each other, electro-pneumatic means, having an inlet valve and an exhaust valve adapted to move said pusher bar sideways from said table top, to one of the shelves of said rack, electro-magnetic means adapted to retract said guide bar so that said row of cans can move across the space normally occupied by said guide bar, and a two position switch adapted in one position to energize the electro-pneumatic inlet valve and the electro-magnetic means and in the second position to energize the electro-

pneumatic exhaust valve to synchronize the movement of said pusher bar and said guide bar so that the guide bar will not interfere with the movement of the pusher bar or any of the cans the pusher bar may be moving.

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