To all whom it may concern:

Be it known that I, LOUIS CHARLES REESE, residing at Saginaw, in the county of Saginaw and State of Michigan, have invented new and useful Improvements in the Charging and Discharging of Automatic Ovens, Proofing-Chambers, and the like, of which the following is a specification.

This invention relates to automatic baking ovens, proofing chambers and like apparatus through which the articles to be subjected to the process worked therein, are passed in a certain, predetermined time and in a circuitous—partly horizontal, partly more or less vertical—route by endless chains, and consists in novel means of charging and discharging these apparatus.

The object of this invention is to perform these operations automatically and without stopping the apparatus, in a most simple, effective and economic manner.

To this end, I place the articles to be treated or the containers holding them on trays which may also be formed by joining rows of these containers by suitable means as iron bands, and suspend these trays from the chains carrying them through the apparatus by devices consisting of two parts automatically engaging with and disengaging from each other, one part of these suspending devices being connected to the tray and working together with the other part attached to the chains. The suspending devices used in the example described in this specification are composed of hooks attached to the trays and of rods or bars (herein called "crossrods") connecting the chains and adapted for the hooks to catch over. These crossrods are preferably mounted rotatably in the chains or in blocks or the like attached thereto.

The loaded trays are conveyed into the apparatus by automatic means, usually an ordinary endless-band-conveyor, to a point so determined and arranged that the crossrods connecting the chains, while passing upward in close proximity to the tray on the conveyor, are bound to engage with the hooks attached to the tray, and thus the tray will be picked up from the conveyor, lifted upward and then carried through the apparatus.

The trays are discharged from the latter by depositing them on their downward passage on automatic means for carrying them away, usually an endless-band-conveyor, passing underneath at a point so determined and arranged that the hooks attached to the tray are bound to disconnect themselves from the crossrods connecting the chains, while traveling downward, whereupon the chains with the empty crossrods and the disconnected trays are quickly removed in different directions, the conveyor taking away the trays being so constructed and traveling with such velocity that they cannot interfere with the chains, their appendices or any other obstacles. At the charging and discharging points of the apparatus preferably sprocket wheels are installed for the chains to run over in order to give to the latter, to the suspending devices and to the trays just picked up or to be disconnected, ample stability and the proper direction.

The feeding devices used hitherto for this kind of apparatus made it necessary that the chains were stopped while the trays were charged or discharged, and the unavoidable consequences were jerks and shocks liable greatly to damage the more or less soft goods in appearance, shape and size. This was especially the case in automatic baking ovens of this class.

The accompanying drawings, which serve for more fully explaining the novel features and devices and the working of the invention, show the arrangement in its application to a proofing and baking apparatus used for pan bread.

Fig. 1 is a side elevation of a tray, in which double-hooks attached to the trays are so arranged as to be able to catch over the crossrods connecting the chains carrying the trays, and to thus suspend the latter from the former.

Fig. 2 represents a longitudinal section of a tray showing the same hook arrangement as in Fig. 1, the connection to the chains and the wheel-supports of the crossrods.

Fig. 3 represents an arrangement for transferring trays provided with double-hooks as in Fig. 1 and Fig. 2, from a proofing chamber to an oven, and Fig. 4 an arrangement for discharging the same from the latter.

The tray A consists of two rows of pans, $a_1$ containing the dough pieces to be proofed or baked. The pans are connected by iron bands, $a_2$, arranged at their longer sides and $a_3$ at their shorter sides. The crosspiece $a_4$...
(Fig. 2) serves to stiffen the structure. In Figs. 1, 2, 3, and 4 the tray A is provided at each narrow side with the stays B and B', bearing the double hook C adapted with either downward-bent arm, c1 or c2, to catch over the crossrod D connected at each end to the endless chains H and H', carrying the trays through the apparatus. The stays B and B', are fixed to the iron bands c and d, and the circular plates b and b', provided with the stops b1 and b2. The pin b2 passing through the center of the circular plates b and b', holds the stays B and B', together, leaving sufficient room between them for the ring c0 of the hook C to turn and thus to regulate the position of the hook C in regard to the tray A so that the latter is kept horizontal, may either arm, c0 or c2, be used to suspend the tray from the crossrod D connecting the chains H and H'. In order to prevent the tray from moving more freely than is necessary to obtain the result described and to avoid any possibility of its being overturned, the bases of the stem c of the hook C are limited by the stops b1 and b2.

The arms c1 and c2 of the hooks C are arranged opposite to each other and vertical to the tray A and the crossrod D. Both the arms c1 and c2 and the crossrod D are so constructed that the former turn easily around the latter when the same is turned in its circuitous travel through the apparatus, the trays thus remaining always in a horizontal position.

The crossrod D is rotatably mounted in the chains H and H', which it connects, and rests between the latter and the hooks C, C', leaving sufficient play for the tray—on the loose wheels E and E', which revolve freely around D and run in the grooves f for E and f, for E', of the rails F and F'. The latter are supported by the brackets G and G', fixed to the walls or structure of the apparatus.

The rails F and F', carry in this way the crossrod D and with it the chains H and H', and the tray A', while these chains travel more or less horizontally. When the direction of the chains is altered more or less to the vertical, or from the latter to the horizontal again, the crossrods, wheels and trays are carried by the chains H and H', running over and supported by the teeth of sprocketwheels in the well known manner of apparatus of this kind.

In Fig. 3, O represents diagrammatically the sprocketwheel around which the chains H travel inside an oven before its charging opening, and P the sprocketwheel for the chains H before the discharging opening in a proofing chamber situated alongside the oven. The sprocketwheel O revolves around the axle o, and the sprocketwheel P around the axle p, both moving in the same direction as shown by the arrows. I is a horizontal endless-band-conveyor driven by the rollers K and K', rotated around the axles k and k', in the direction of the arrows by suitable driving means, the carrying surface of the conveyor traveling from the proofing chamber toward the oven. The roller K is arranged within the proofing chamber well underneath the sprocketwheel P, and the roller K', within the oven underneath the sprocketwheel O. Adjacent to the roller K', reaching still farther into the oven, preferably a rest is arranged for the trays arriving there; it consists of the parallel, loose rollers L, L', turning easily around their axes l, l', supported by the bracket M. The carrying plane of the rollers L, L', is slightly inclined from the conveyor I in a downward direction so that the trays arriving there from the latter easily slip down against the crossbar N and thus attain the correct position for the arms c1 of the hooks C to slip over the crossrods traveling upward toward the same.

In the proofing chamber the chains H carrying the trays containing the fully proofed dough pieces ready for the oven, travel at first vertically downward, and then around the sprocketwheel P, where the trays are deposited on the conveyor I underneath, whereupon the chains take the empty crossrods to the charging place of the proofing chamber, to be Reloaded with fresh trays. In order that the crossrods easily disengage from the hooks C when the trays reach the conveyor I, the trays are suspended from the crossrods by the arms c2 of the hooks C.

When in its downward passage in the proofing chamber the tray A', reaches the position I of its crossrod D', the preceding tray A, with its crossrod D, has just attained the position II and is being dropped on the conveyor I, and the empty crossrod D, has reached the position III of the proofing chamber. The tray A', which, while in the proofing chamber, has been attached to the crossrod D', has at the same time reached the position I within the oven, and resting on the roller platform L against the support N, is just being picked up by the crossrod D, engaging the arms c2 of the hooks C of the tray. The tray A', which entered the oven previously to the tray A', has been lifted by the crossrod D, traveling upward onto the position II in the oven, while the empty crossrod D, is moving toward the platform L, ready to pick up and lift the tray A', as soon as it has arrived from the proofing chamber at the position I in the oven.

This cycle of operations is repeated continuously. For the exact working of the arrangement it is—of course—essential that the conveyor I travels with the correct speed for the rays coming from the proofing chamber to be picked up by the crossrods in the
oven, a result which easily can be attained by well known means.

The trays can only be attached to the crossrods which have to carry them, when the opening of the hooks to engage with these crossrods, is turned toward the same, and the latter move in an upward direction toward the said hooks. After having been lifted from the conveyor or roller platform, the trays are at once carried upward to be out of the path of the following crossrods and trays. The conveyor bringing the trays to the charging point and the empty crossrods ready to engage the hooks of the trays travel always in opposite direction to each other.

As the crossrods and hooks turn during their travel through the apparatus in order to keep the trays always upright and horizontal, the openings of the hooks will always point in the same direction as that in which they were placed over the crossrods.

In order to discharge the trays, the chains and crossrods from which the trays are suspended, must travel downward, not only until the trays have been deposited on the conveyor underneath, but until the crossrods are quite out of reach of the hooks.

If, as in Fig. 3 showing the discharge of the trays from the proofing cabinet, the arms of the hooks which connect the descending trays to the crossrods, point toward the interior of the discharging sprocketwheel, the disengaged crossrods travel at once in opposite direction to that of the conveyor taking the disengaged trays away, and the exact velocity of this conveyor is immaterial as long as it runs quickly enough to obtain the desired result. But, when, as in Fig. 4, the arms of the hooks which connect the descending trays to the crossrods point outward the discharging sprocketwheel, the disengaged crossrods and the conveyor taking the disconnected trays away, move in the beginning in the same direction, and in this case the arrangement and movements of the conveyor must be such as to prevent the trays, its accessories and the crossrods from interfering with each other.

Fig. 4 shows the latter arrangement. O, represents diagrammatically the discharging sprocketwheel of the oven, revolving around its axle o, The chains H travel in the direction of the arrows, downward at the right hand side of the sprocketwheel where the trays containing the baked bread ready to leave the oven, arrive, then around the lower part of the sprocketwheel O, and upward at the left hand side where the crossrods are empty. The conveyor carrying away the disconnected trays from underneath the sprocketwheel O, consists of two parts—a quickly moving endless-band-conveyor Q worked in the ordinary way by rollers of which in the drawing that near-est to the sprocketwheel, R, rotated around its axle r by suitable driving means, is shown, and a stationary gravity conveyor formed by the loose rollers Q, revolving around their axles q and supported in the bracket like staging g,. The carrying surfaces of the two conveyers are arranged in such a manner that the trays leaving the roller conveyor Q, easily slip over onto the quickly moving band conveyor Q. The trays are suspended from their crossbars by means of the arm c, of the double hooks C as they were charged into the oven, see Fig. 3.

When the upmost, arriving tray A, suspended from the crossrod D, is at the position I, the preceding tray A, suspended from the crossrod D, is in the position II, just settling down on the roller conveyor Q. At the same time the tray A, which preceded A,, has been disconnected from the crossrod D,, is in position IIIc on the band conveyor Q, being quickly carried away, and the crossrod D, is in position III on the sprocketwheel, while the preceding empty crossrod D, is at the position IV, traveling upward to the charging point of the oven.

The carrying surfaces of the conveyers Q and Q, are arranged at such a distance underneath the discharging sprocketwheel O, and the endless-band-conveyor Q is rotated at such a speed that the empty crossrods passing on the chain H around the lower part of the sprocketwheel Q, cannot interfere with the trays A or their hooks C moving on the conveyers in the same direction.

When in the position II on the sprocketwheel the tray A, had settled on the roller conveyor Q, and, traveling along the same, pushed by its disconnected crossbar D,, arrived at the position IIIc on Q, the crossbar D, was in the position III on the sprocketwheel and completely free from the hook C in any position of its arms c, and c, as shown in dotted lines. The tray A, then entered at once the conveyor Q which quickly moved into the position IIIa there-on, thus leaving far behind at the position III the disconnected crossbar D, which has the last chance of interfering with the hooks of the tray A, when at the position IIIc.

When the crossbar D, was at the position IIIc on the sprocketwheel, the previously disconnected crossbar D, was at the position IVc thus beyond any possibility of colliding with the tray A, or its hooks. The same result may be obtained by other means; for instance the gravity conveyor may be omitted, the endless-band-conveyor prolonged accordingly instead and arranged to travel with two speecls slowly—with the same velocity as the crossbars move on the sprocket wheel between the positions II and IIIc, and quickly when the latter point has
been reached so that the tray is in position III on the conveyer when the crossbar has arrived at the position III on the sprocket-wheel.

5 I do not limit myself to the exact construction and arrangement of the devices shown in Fig. 4 or in any other of the accompanying drawings, as the same may be varied without leaving the principles of their construction and arrangement as defined in the claims attached to this specification.

When a single apparatus is to be charged and discharged, a single hook will serve both operations; but when a tray is to be transferred from one apparatus to another one adjoining it, as shown in Fig. 3, a double hook is the most suitable device.

I claim:

20 1. In devices for charging and discharging apparatus of the kind described, the combination with the trays holding the articles to be treated, of crossrods connecting the chains moving the said trays through the apparatus, of hooks attached to the ends of these trays, of crossrods rotatably mounted in and connecting two parallel endless chains moving the trays through the apparatus, and adapted and arranged to engage with and disengage from the hooks of the said crossrods when suspended from same, thus always keeping the said trays in a horizontal position, and of conveyers arranged in the apparatus at points, where the hooks of the trays situated on the said conveyers are bound to engage with and disengage from the said crossrods.

2. In devices for charging and discharging apparatus of the kind described, the combination with the trays holding the articles to be treated, of hooks attached to each end of the trays and adapted to automatically engage with and disengage from crossrods rotatably mounted in and connecting the two chains traveling in the same direction and at the same speed through the apparatus, and conveyers arranged therein at points, where the hooks of the trays situated on the said conveyers are bound to engage with and disengage from the said crossrods.

3. In devices for charging and discharging apparatus of the kind described, the combination with the trays holding the articles to be treated, of hooks attached to each end of the trays, of crossrods rotatably mounted at their ends in and connecting two chains traveling through the apparatus in the same direction and at the same speed, the said crossrods being so adapted and arranged that the hooks of the said trays engage with the said crossrods, when the latter pass by in an upward direction, and that the hooks of the said trays disengage from the said crossrods, when the latter pass by in a downward direction.

4. In devices for charging and discharging apparatus of the kind described, the combination with the trays holding the articles to be treated, of hooks attached to the said trays, of crossrods rotatably mounted in and connecting the chains moving the trays through the apparatus, of loose wheels rotatably mounted on the said crossrods, of rails supporting these wheels and so arranged in the apparatus as to secure to the chains the right direction of travel and stability, and of conveyers arranged in the apparatus at points where the hooks of the trays, when on the said conveyers, are bound to engage with the said crossbars passing by in an upward direction, and to disengage from the said crossbars passing by in a downward direction.

5. In devices for charging and discharging apparatus of the kind described, the combination with the trays holding the articles to be treated, of hooks attached to the ends of these trays, of crossrods rotatably mounted in and connecting two parallel endless chains moving the trays through the apparatus, and adapted and arranged to engage with and disengage from the hooks of the trays, of loose wheels rotatably mounted on the said crossrods and running in the grooves of rails supported by brackets fixed to the framework of the apparatus and thus carrying the chains, crossbars and trays, and of sprocket wheels over which the chains run, when changing their direction, and then carrying the crossrods, loose wheels and trays, one or several of these sprocketwheels being rotated by suitable driving means and thus propelling the chains through the apparatus, one sprocket-wheel being arranged at the charging point of the apparatus for leading the empty crossrods upward in order to engage with the hooks of the trays carried into the apparatus by a conveyer, and another sprocket-wheel being placed at the discharging point of the apparatus for leading the trays holding the treated articles downward, in order to disengage their hooks from the crossrods of the chains and to deposit the trays being disconnected on the conveyer taking them out of the apparatus.

6. In devices for charging and discharging apparatus of the kind described, the combination with the trays holding the articles to be treated, of hooks attached to the ends of these trays by stays, of crossrods rotatably mounted at their ends in and connecting two chains traveling in the apparatus in the same direction and at the same speed, and adapted and arranged to engage with and disengage from the hooks of the said trays, and of conveyers carrying the articles to be treated into and the treated articles out of the apparatus and consisting of two parts one being an endless-band-conveyer, and the other being composed of loose rollers placed in alinement at a point of the apparatus where the crossrods and chains...
pass by, when the trays are to be connected to the said crossrods, in an upward direction, and when the trays are to be disconnected from the said crossrods, in a downward direction.

7. In devices for charging and discharging apparatus of the kind described, the combination with the trays holding the articles to be treated, of stays fixed—two to each end of these trays and ending in circular plates, of double hooks consisting of two opposite equal arms and provided with a circular opening at the end of their stem, of pins, each connecting two of the said stays and carrying between the latter the said hook by the opening in its stem, of stops provided at the circular top-plates of the hooks to limit the play of the latter to that necessary for keeping the trays in a horizontal position, may one or the other of the arms of the said hooks be used, and of crossrods rotatably mounted at their ends in and connecting two endless parallel chains carrying the trays through the apparatus, and adapted and arranged to engage with or disengage from either arm of the said double hooks.

8. In devices for charging and discharging apparatus of the kind described, the combination with the trays holding the articles to be treated, of hooks attached to the trays, of crossrods rotatably mounted in and connecting two parallel, endless chains moving the trays through the apparatus, of sprocketwheels driven by suitable means and propelling the chains, of means for supporting the trays to be charged into the apparatus, of a sprocketwheel arranged above the said support at such a point that the empty crossrods led upward by the said sprocketwheel engage with the hooks of and thus pick up the trays on the said support, of a conveyor taking the trays holding the treated articles out of the apparatus and of a sprocketwheel arranged above the said conveyor at such a point that the crossrods with the trays suspended therefrom led downward by the said sprocketwheel disengage from the hooks of the trays settling on and carried away by the said conveyor.

9. In devices for transferring articles from one apparatus to another apparatus of the kind described, the combination with trays holding the articles, of two systems—one for each apparatus—of parallel endless chains propelled by sprocketwheels at the required speed and carrying the trays through their respective apparatus, of crossrods rotatably mounted in and connecting the said chains, of hooks attached to the trays, of a sprocket-wheel leading the crossrods carrying the trays with the treated articles downward before the outlet of the first apparatus, of a sprocket-wheel arranged inside the second apparatus before its charging opening and leading the empty crossrods upward, and of a conveyor traveling in the direction from the first to the second apparatus and arranged at one end underneath the discharging sprocketwheel of the first apparatus at such a point that the hooks of the trays settling on and carried away by the conveyor disconnect from the crossrods move away in a downward direction and are unable to interfere with the said trays, and at the other end underneath the charging sprocketwheel of the second apparatus at such a point that the hooks of the trays on the said conveyor engage with the empty crossrods traveling upward, the trays thus being lifted upward into the second apparatus for being treated therein.

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