Oct. 6, 1942. G. R. W. MATHESON 2,297,969

BAKING OVEN

Filed Aug. 26, 1939 4 Sheets-Sheet 1

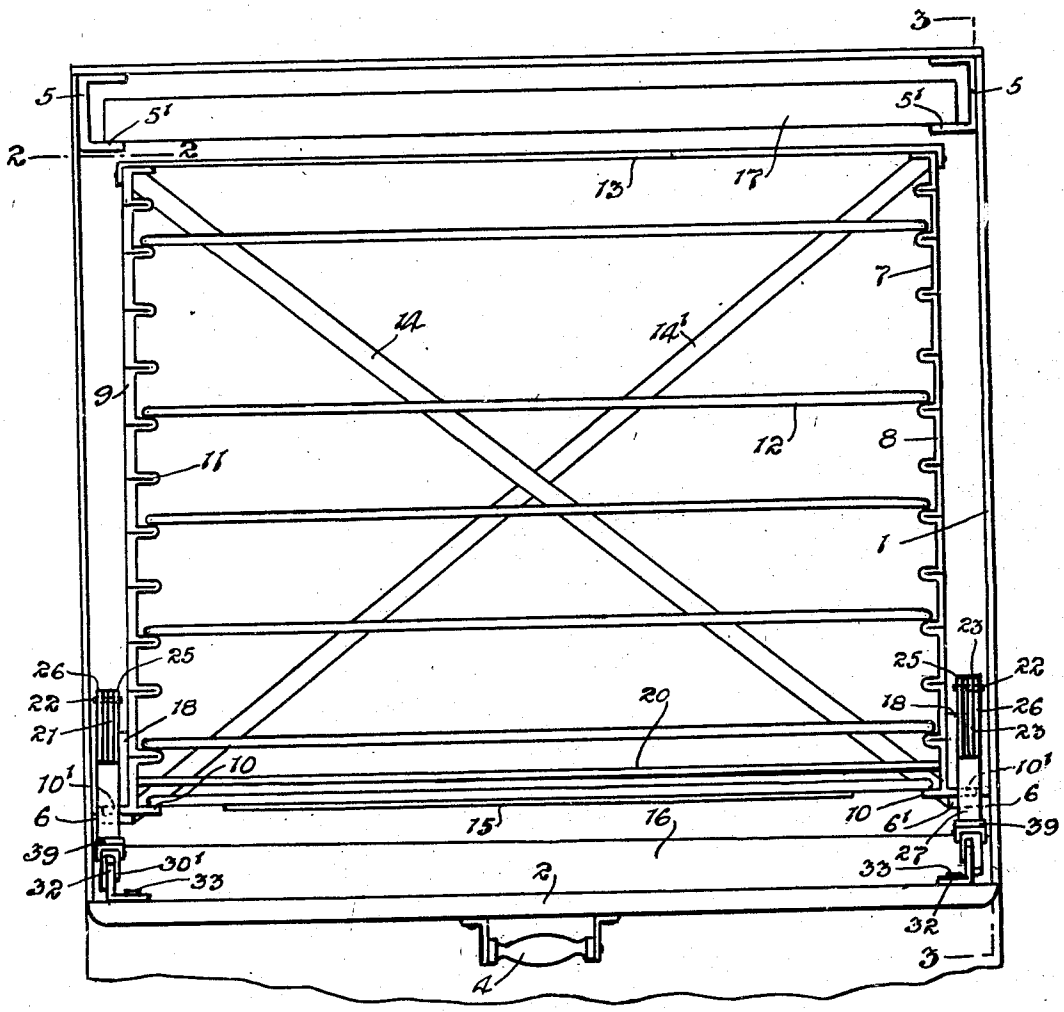


Fig. 1

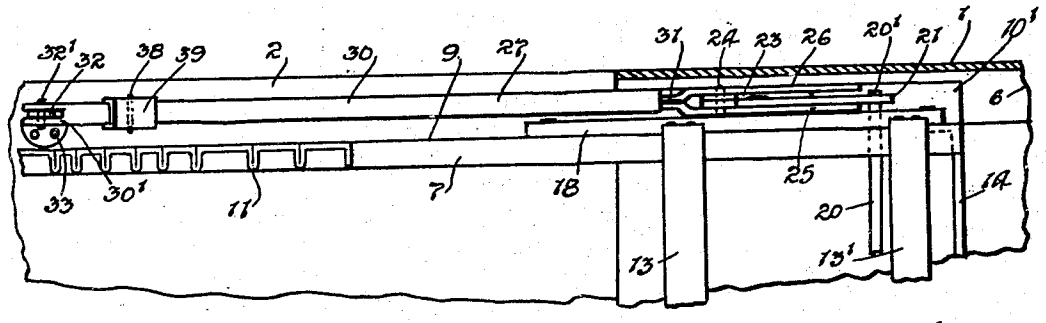


Fig. 2

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BAKING OVEN

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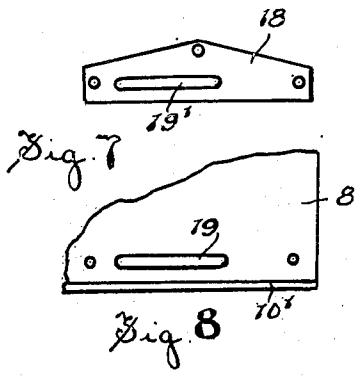


Fig. 7

Fig. 8

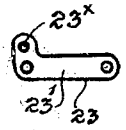


Fig. 9

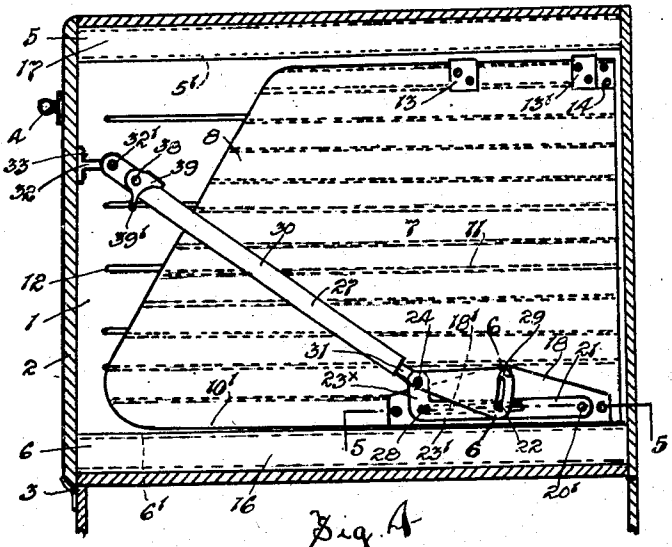


Fig. 4

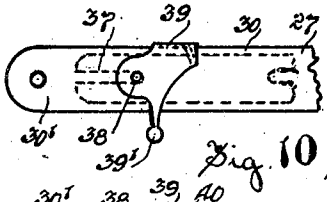


Fig. 10

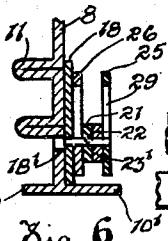


Fig. 6

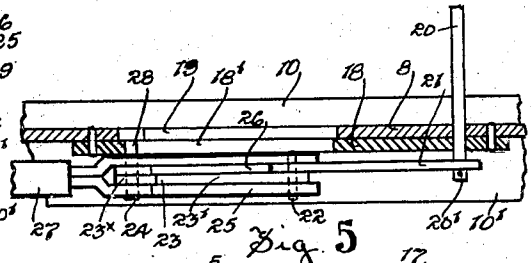


Fig. 5

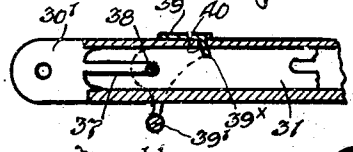


Fig. 11

Fig. 3

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BAKING OVEN

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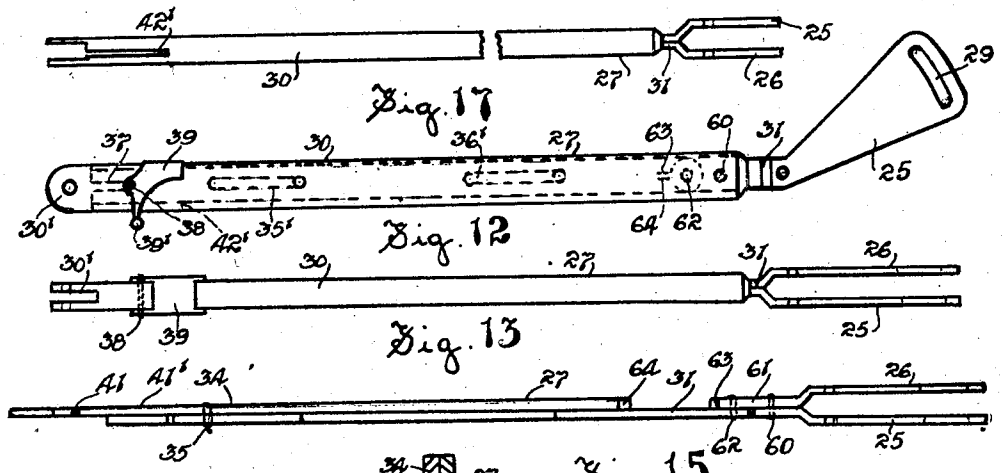


Fig. 17

Fig. 12

Fig. 13

Fig. 15



Fig. 16

Fig. 14

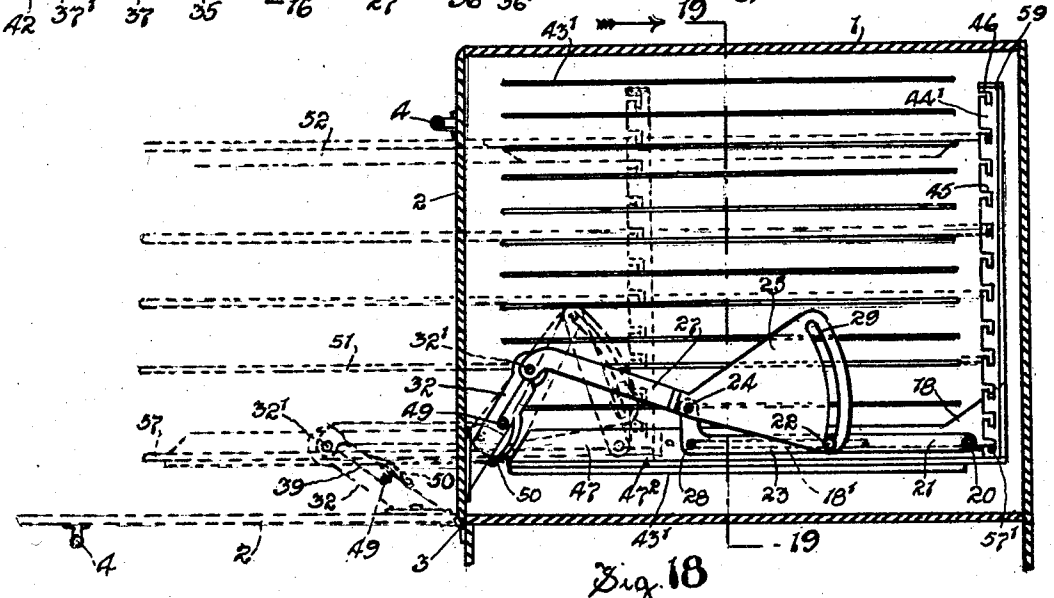


Fig. 18

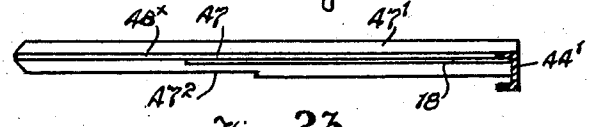


Fig. 23

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BAKING OVEN

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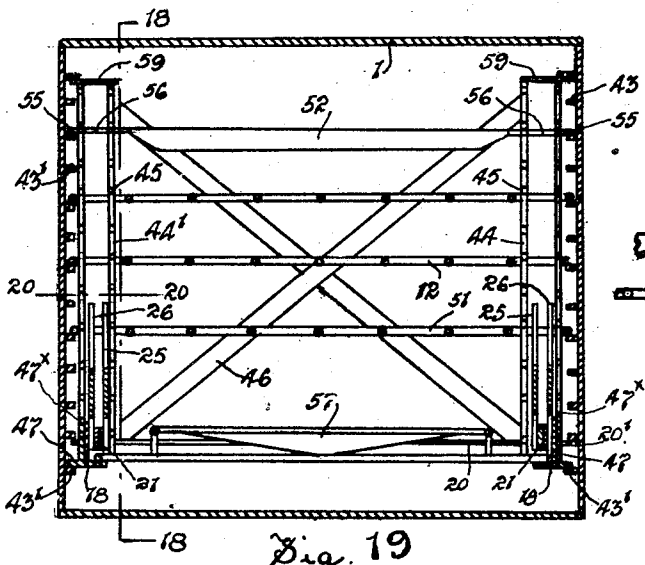


Fig. 19

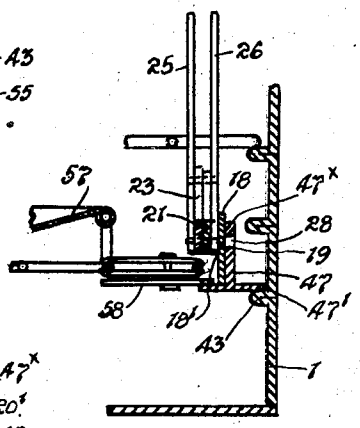


Fig. 21

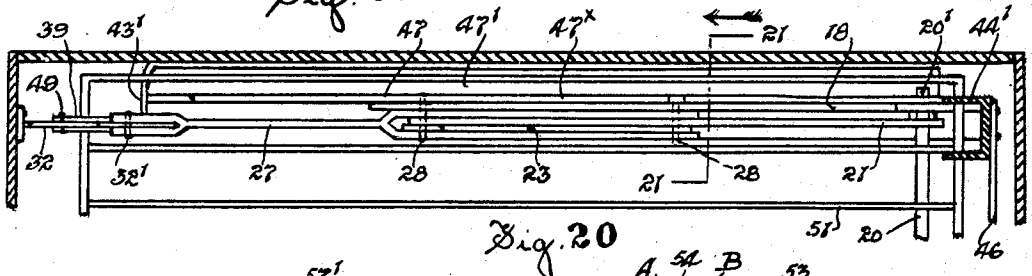


Fig. 20

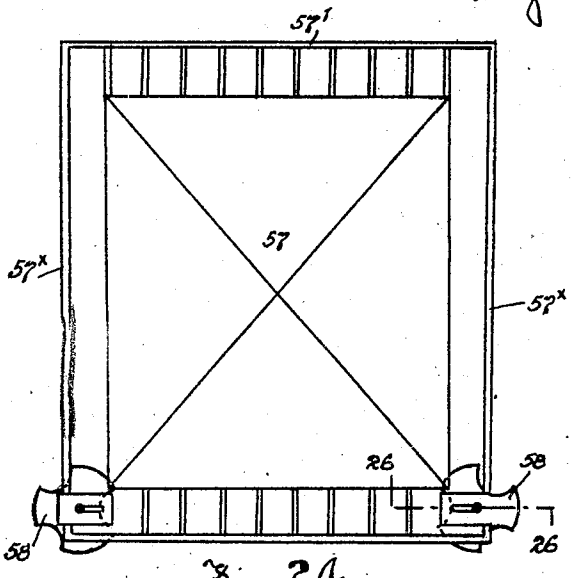


Fig. 24

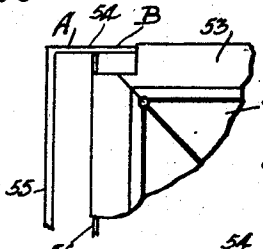


Fig. 27



Fig. 28

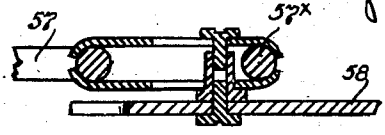


Fig. 26

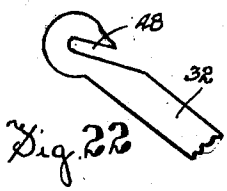


Fig. 22

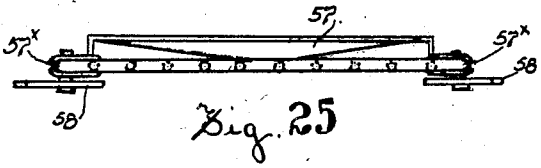


Fig. 25

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Patented Oct. 6, 1942 2,297,969

UNITED STATES PATENT OFFICE

2,297,969

BAKING OVEN

Gilbert R. W. Matheson, Winnipeg, Manitoba, Canada

Application August 26, 1939, Serial No. 292,092

3 Claims. (Cl. 126—340)

The invention relates to baking ovens and an object of the invention is to provide a device which will act to automatically project the oven trays forwardly from the oven, when the oven door is opened, such allowing of the ready and convenient inspection or treatment of the cooking material customarily carried by the trays and which will thereafter, in the closing movement of the door, return the trays and material carried thereby to their original position within the oven.

A further object of the invention is to construct one form of the device as a complete unit which can be easily and quickly installed and serves to carry and actuate the various oven trays in the manner above stated.

A further object is to provide a slightly modified form of the device which can be readily installed in the existing oven and which serves to actuate the trays while the same are slidably carried by the customary tray guides supplied on the opposing sides of the existing oven.

A further object is to construct all parts in a simple and inexpensive manner and such that the only connection required to be made, in so far as the oven is concerned, is that to the oven door.

A further object of the invention is to construct the device so that the oven door can be easily and quickly disconnected therefrom to allow of the subsequent opening and closing of the door without actuating the trays.

With the above more important and other minor objects in view, which will become apparent as the description proceeds, the invention consists essentially in the arrangement and construction of parts hereinafter described, reference being had to the accompanying drawings in which:

Fig. 1 is a front view of an oven equipped with my invention and showing the oven door in the open position.

Fig. 2 is a horizontal sectional view at 2—2, Fig. 1.

Fig. 3 is a vertical sectional view taken at 3—3, Fig. 1, and showing the parts in reduced scale and with the door in open position.

Fig. 4 is a view similar to Fig. 3 but with the parts shown as they appear when the door is in closed position.

Fig. 5 is an enlarged detailed horizontal sectional view at 5—5, Fig. 4.

Fig. 6 is an enlarged detailed sectional view at 6—6, Fig. 4.

Fig. 7 is a side view of the slotted plate.

Fig. 8 is a side view of a portion of one of the side plates of the tray carrier.

Fig. 9 is a side view of the bell crank.

Fig. 10 is an enlarged detailed side view of the forward end of one of the operating arms.

Fig. 11 is a vertical sectional view through the front end of the forward section of the operating arm and showing the front end of the inner section in side elevation.

Fig. 12 is an enlarged side view of the operating arm.

Fig. 13 is a plan view of the operating arm.

Fig. 14 is a side view of the inner or rear section of the operating arm.

Fig. 15 is a plan view of the parts appearing in Fig. 14.

Fig. 16 is an enlarged vertical sectional view at 16—16, Fig. 14.

Fig. 17 is an inverted plan view of part of the inner or rear section of the operating arm.

Fig. 18 is a vertical sectional view at 18—18, Fig. 19, and showing a modified construction of the device.

Fig. 19 is a vertical cross sectional view at 19—19, Fig. 18.

Fig. 20 is an enlarged horizontal sectional view at 20—20, Fig. 19.

Fig. 21 is a vertical sectional view at 21—21, Fig. 20, and looking in the direction of the applied arrow.

Fig. 22 is an enlarged detailed side view of the upper end of the slotted bracket used.

Fig. 23 is a plan view of the runner.

Fig. 24 is a plan view of the heat deflector and drip tray.

Fig. 25 is an end view of the parts appearing in Fig. 24.

Fig. 26 is an enlarged vertical section at 26—26, Fig. 24.

Fig. 27 is a plan view of one corner of the combination roaster and broiler tray.

Fig. 28 is a side view of the parts appearing in Fig. 27.

In the drawings, like characters of reference indicate corresponding parts in the several figures.

The oven 1 is of the customary rectangular form and is provided with the customary closure door 2 which is hinged at 3 to swing from the opened position shown in Figs. 1 and 3 to the closed position shown in Fig. 4. A handle 4 is supplied for manipulating the door.

Usually ovens are provided on their side walls with spaced horizontal permanent guides to slidably receive and carry the various removable

trays but in the arrangement shown in Figs. 1 to 4 no such guides are supplied on the oven, but are provided elsewhere, as will be apparent as the description proceeds.

The side walls of the oven, at top and bottom, each have horizontal channel irons 5 and 6 secured thereto and extending from front to back, the upper flanges of the lower channel irons forming guides 6' for a tray carrier now described and generally indicated by the reference character 7.

The tray carrier presents similar opposing parallel side walls or vertical plates 8 and 9 each of which has its lower edge terminating in an inverted T to provide an inside flange 10 and an outside flange 10', the outside flange slidably engaging the guides 6'. The inner faces of the plates are provided with suitably spaced horizontal ledges or guides 11 for slidably receiving and supporting the inserted trays 12. The plates are connected at the top by a pair of brace bars 13 and 13' and at the rear by crossed braces 14 and 14'.

It will be observed that the upper edges of the plates 8 and 9 underlie and are slightly spaced from the undersides of the flanges 5' of the bars 5. This permits free movement of the tray carrier when passing from the fully contained position within the oven as shown in Fig. 4 to the forward or fully extended position as shown in Fig. 3 and also positively prevents any upsetting or tilting action of the carrier, under load, when it is in the forward position.

The inside flanges 10 serve to support the customary heat deflector 15 located directly over the lower oven heater 16. The upper oven heater is indicated at 17 and both are of the conventional type whether gas or electric.

I provide means for automatically advancing the tray carrier from the rear to the forward position when the door is opened and for returning it to the original position when the door is closed. Further I supply an arrangement which permits one to dispense with the automatic feature when desired, such then allowing of the door being opened or closed at will without moving the tray carrier from its rear position.

The normally automatic means supplied for controlling the tray carrier movement by the door movement is now described and in this connection it will be understood that there are duplicate parts at each side of the tray carrier connecting it with the oven door.

To the outer side of each side wall of the tray carrier and directly overlying the flange 10' thereof, I secure rearwardly and permanently an action plate 18 which has a forward horizontal slot 18' therein, such slot being directly opposite a similar, slightly wider horizontal slot 19 provided in the side wall of the carrier. A tie rod 20 passes across the carrier and the ends thereof protrude beyond the plates 18 and form at each end pivots 20' for one end of a link 21. The other end of the link is pivotally connected by a pin 22 to the long arm 23' of a bell crank 23 and the short arm 23x of the bell crank is pivotally mounted on a pivot pin 24 carried by the spaced parallel angularly disposed forks 25 and 26 of the operating arm 27 shortly described in detail. The bell crank at the bend, is pivotally mounted on a pin 28 which is constrained to freely slide in the slots 18' and 19. The forks 25 and 26 are both slotted at 29 concentric to the pin 24 and the projecting ends of the pin 22 are slidably received in such slots 29.

The operating arm is formed from inner and outer or rear and front sections, the rear sections 31 telescoping slidably within the front sections 30. The rear section carries the forks and the front end of the front section is forked at 30' to receive the head of a bracket 32 to which it is pivotally attached by a pin 32'. The base of the bracket is securely bolted to the oven door by bolts 33.

The rear section 31 of the arm has an extension leaf or bar 34 slidably attached to the front end thereof, by pins 35 and 36 which are received in slots 35' and 36' formed in the arm. In the non-extended position of the bar the pins are in the rear ends of the slots and the front end of the bar is directly opposite the front end of the section 31 of the arm. At this time the end slots 37 and 37' provided in the said arm section and bar are in registration and are adapted to receive a cross pin 38 carried by the front end of the arm section. This pin pivotally carries a latch 39 fitted with a finger grip 39' and with a toothed dog 39x, the dog being concentric to the said pin and adapted to pass through a slot 40 (see Fig. 11) formed in the arm section 30 and into mating slots 41 and 41' supplied in the arm section 31 and the bar 34, it being understood that the latter slots are mating when the bar 34 is non-extended. According to this latter arrangement, when the dog of the latch is fully in the slots it serves to lock the front and rear sections of the operating arm together so that they directly transmit any movement of the door to the other moving parts with which they are connected.

The front end of the bar 34 is supplied with a downwardly projecting catch 42 which operates in a lengthwise extending slot 42' (see Figs. 14 and 17) provided in the underside of the front end of the arm section 30.

The operation of the device above described is as follows, assuming that the oven door is closed and the arm sections are locked together by the dog of the latch, at which time the various parts are in the positions shown in Fig. 4. As the door initially opens, the tray carrier advances at approximately the same speed as the door, being pulled initially ahead by the arms which during the movement are swaying very slightly on the pins 24. When the arms, in the subsequent opening movement of the door, have turned sufficiently to cause the knuckle joints at 22 to be buckled upwardly, by the lower ends of the slots 29, the pins 28 and 20' proceed to approach one another, slowly at first and then more rapidly, the pins 28 moving backwardly in the slots 18'. The joints at 22 are caused to be broken at the time the front edge of the lowermost tray in the carrier (or the carrier itself) is about to foul or strike the opening door and this immediately causes a retarded movement of the carrier for a period sufficient to positively avoid fouling and when the fouling hazard position is passed there is an accelerated movement of the carrier, the carrier reaching its fully advanced position when the door is fully open.

When the door is subsequently closed a reverse movement takes place in the parts above referred to and it will be seen that the arrangement provided causes an initial quick backward movement of the tray carrier, this being necessary to avoid the oven door striking the tray carrier as it initially moves up from the horizontal position.

It will be particularly noticed that all the operating parts are connected to the tray carrier and not to the oven. This permits ready installation,

as the only connection is that of the brackets to the oven door, in their proper locations.

If it is desired to let the tray carrier remain in the oven when the door is opened, one has to raise the latches **39** to withdraw the dogs from the locking slots. Naturally this can only be done when the door is in an open or partially open position. Assuming it is in the fully open position when this is done, then the pins **38** which are at such time in the rear ends of the slots **37** and **37'** act in the closing movement of the door to cause the arms to move the tray carrier back into the oven. Subsequently when the door is opened the tray carrier remains in the oven as the released sections of the arms slide freely one within the other, and during such movement the stops **42** engage with the rear ends of the slots **42'** and cause the bars **34** to extend in relation to the arm sections **31** as permitted by the pins **35** and **36** sliding in the slots **35'** and **36'**.

Later when one wishes the automatic tray feature, it is only necessary to open the door and manually pull the tray carrier ahead to its forward position at which time the dogs of the latches can be re-entered in the slots of the arm sections and the arm sections so locked together for subsequent operations.

As herein before intimated, most ovens on the market, are supplied on their opposing side walls with spaced horizontal guides for carrying the various trays inserted in the oven and I will now proceed to describe a modification of my invention which can be used where such type of ovens are to be equipped and in the description thereof will refer to Figs. 18 to 28 of the drawings wherein such modified structure is shown. Further in the description of the modified structure I will utilize the same reference numbers as applied to corresponding parts appearing in the foregoing disclosure.

The oven **1** in the modified arrangement presents spaced opposing horizontally extending guides **43** and **43'** on which the inserted oven trays are customarily carried. The device corresponding to the tray carrier previously described is in this instance somewhat differently constructed and comprises the parts now described. Similar vertical anchor posts **44** and **44'** for the trays are supplied, these being herein shown as of channel iron cross section and as having the flanges thereof provided with opposing inner and outer bayonet slots **45** which are adapted to receive and anchor the rear cross members of the trays resting on the several guides **43** and **43'**. The posts are connected by crossed reinforcing braces **46** and are positioned just to the inner sides of the guides **43** and **43'**. The lower end of each post has a horizontally extending runner **47** permanently secured thereto, the runner being of an inverted T shaped cross section and having the outer part of the horizontal flange **47'** thereof slidably resting on the lowermost side guide of the oven. The vertical flange **47x** of the runner, in each instance, is aligned with the outer flange of the post and to the said flanges I permanently fasten at their inner sides a vertical plate **18**. The said plate has a horizontal slot **18'** therein which is slightly wider than the opposing slot **19** provided in the vertical flange of the runner.

A tie rod **20** connects the vertical flanges of the runners and passes also through the plate **18** and forms at each end a pivot **20'** for one end of a link **21**. The link is associated, in the same manner as previously described, with a bell crank **23**, a forked operating arm **27** and a bracket **32** bolted to the door. The bell crank pin **28** is constrained to operate in the slots of the runner and the plate and the pin **22** connecting the bell crank and link operates in the slot **29**. It will be observed that the operating arm in this instance is comparatively short, and is not formed of sections as before.

The forward end of the arm is forked to span the bracket head to which it is pivotally connected by the pin **32'** and the said bracket is supplied with a slot (see Fig. 22) and indicated at **48** and which receives the latter pin. The pin is normally retained in the slot by a latch or keeper **39** pivotally attached to the arm at **49** and held normally in pin retaining position by the spring **50**. The bracket is secured to the door near the door hinge and extends angularly outwardly and upwardly when the door is in the open position.

It will be observed that the bracket, operating arm, link and bell crank are all contained in each instance, between the vertical planes containing the side flanges of the post and that in the closed position of the door, the posts and runners are all in their rear positions as are also the various trays and the brackets are positioned to the rear side of and clear of the front portion of the lowermost wire tray **51**. In order to accommodate the brackets, in the closed position of the door, the front inner side portions of the runners are partially cut away as best shown at 47^2 in Fig. 23.

The customary wire trays **51** have their rear ends caught in both the flanges of the respective posts and their sides resting on the guides **43** and **43'** of the oven on which latter they slide when the posts are advanced.

Ovens are usually supplied with a combination roaster and broiler tray **52** and in this arrangement the corners of such tray are made as shown in Fig. 27 where it will be observed that the metallic body **53** of the tray is fashioned to expose the wire frame **54** so that the latter frame can be caught at approximately the points A and B in the bayonet slots of the posts and further such that there will be no metallic part between the side wires **55** and **56** of the said tray to interfere with the free movement of the brackets, operating arms, bell cranks and links, should the said tray be placed in a lower position in the oven.

Ovens are also supplied with a combination heat deflector and drippings tray **57** and in the latter arrangement of the invention the said tray in the closed position of the oven door has its rear end **57'** caught in the lowermost bayonet slots of the inner flanges of the posts only and the rear portions of the side wires **57x** thereof slidably engaging the flanges of the runners.

As the front end of the latter tray is projected considerably beyond the brackets when the door is opened, and must therefore clear the brackets as it is being projected, it is necessary to provide the front corners of the said tray with means which will support it from the front ends of the flanges of the runners, when it is being projected and which will automatically clear the brackets during the movement. To this end I have provided each forward corner of the latter tray with a rotatable three toothed gear or wheel **58** which lies horizontally underneath the tray corner and is adjustably clamped in any suitable manner to the said tray. One of these teeth rests on the flange of the runner and in so doing supports the front corner of the tray from runner flange. In the opening movement of the door the brackets

enter the spaces between the teeth as the said tray advances and as the brackets move past the gears, they rotate them so that as one tooth is passing off the flange, in the advancement of the tray, the next tooth is passing onto the flange with the result that the gears pass the brackets while continuing to support the front corners of the tray. Accordingly at no time during the tray movement is it unsupported.

The upper ends of the posts are provided with striker plates **59** which underlie the uppermost oven guides **43** and **43'** and insure that the carrier cannot tilt when in its forward position.

The design of the various parts is such that the trays are all simultaneously advanced to the position indicated in dot and dash lines in Fig. 18 when the door is opened, and are effectively supported at such time and such that in the closing movement of the door the trays are all simultaneously moved back fast enough at all times to keep them clear of the closing door.

If it is desired in the latter arrangement to have the door open without actuating the trays, one simply disconnects the brackets from the actuating arms. This is done by first partially opening the door and then holding it in that position with one hand while the other hand shoves the trays backwardly into the oven. When this is done the pins **32'** are withdrawn from the slots **48** as the pressure developed will force the latches **39** back against the pressure of their springs. Once the pins are released the trays are shoved fully into the oven and will remain there in the subsequent opening and closing movement of the door.

The foregoing description has been directed to my invention as used in connection with ovens. It will however be understood that the invention can with equal facility be applied in any other location, where it is desirable to have interior members advanced from a containing chamber, upon the opening of the closure door of the chamber. Further it will be observed that the arrangement which I provide can be used in connection with a closure member or door swinging in a horizontal direction. In such a case the operating arms, instead of being at the sides of the chamber or oven as shown herein, will be at the top and bottom of the chamber or oven and will be attached to the associated parts in the same manner as herein disclosed.

I might now mention that the angularly extending forks **25** and **26** can be rigidly associated with the rear ends of the rear sections **31** of the operating arms or pivotly secured thereto.

Where they are rigidly attached to the said sections and the door is being opened or closed without producing any movement of the tray carrier, there is an idle movement of the mechanism parts in the oven, due to the fact that the operating arms are at such time rotating around the pins **24**.

When they are pivotly attached to the rear sections of the arms this idle movement is done away with. In this latter arrangement the forks **25** and **26** are permanently riveted together at number **60** and the fork **26** is supplied with a front extension **61** which is attached by a pivot pin **62** to the rear end of the arm section **31**. The extension **61** is supplied with a locking finger or dog **63** adapted to be received in a mating slot **64** provided in the rear end of the bar **34**. The dog is in the slot **64** in the non-extending position of the operating arm and so positively locks the forks **25** and **26** against rotation around the pin **62**.

According to the above, when the latch **39** is in its closed or locking position, there can be no pivotal movement of the forks **25** and **26** around the pins **62** and the tray carrier is advanced and receded in the opening and closing movement of the door in the same manner as previously described.

However, upon the latch **39** being released, the idle movement hereinbefore referred to of the parts immediately associated with the forks **25** and **26** is avoided for the reason that in the initial, partial opening movement of the door the tubular front section **30** of the operating arms slide in relation to the interior parts **31** and **34**, and at approximately the time the front ends of the extensions **61** have escaped from the rear ends of the tubular sections **30**, the catches **42** have been engaged with the rear ends of the slots **42'**, with the result that in the immediate, subsequent further opening movement of the door, the bars **34** are shifted to withdraw the dogs **63** from the slots **64**. The slots **35'** and **36'** allow for the movement of the bars **34** in relation to the sections **31** when the latter are actuated by the catches and such slots also accommodate the full opening movement of the door to horizontal position.

Obvious then, in the early opening movement of the door, the dogs **63** are automatically cleared from the tubes **30** and released from the slots **64**, and the forks are thereafter free to turn on the pivot pins **62** so that there is no idle movement of the parts associated with the forks during the further opening movement of the door to fully open position.

What I claim as my invention is:

1. The combination with an oven and the closure door thereof, of a tray carrier insertible as a unit within the oven and slidably carried by the sides of the oven, a pair of operating arms having their forward ends each pivotally attached to the door at selected locations and their rear ends extending into the oven to the outer sides of the tray carrier, and terminating in inclined upturned spaced forks, a pivoted bell crank operating between the forks of each arm and having the pivot point thereof slidable in a receiving slot provided in the adjacent side of the carrier, a pivot pin connecting one arm of each bell crank to the adjacent operating arm, a pin carried by the other arm of each bell crank and slidable in slots provided in the arm forks, said slots being concentric to the former pins, and a link pivotally connected to each side of the carrier and pivotally connected, between the forks to the pin operating in the fork slots.

2. The combination with an oven and the upswinging hinged door thereof, of a tray carrier insertible as a unit within the oven and slidably carried by the side walls of the oven, said carrier presenting opposing side walls spaced from the oven side walls and provided on their inner sides with tray supporting ledges, similar operating arms having their forward ends pivotally attached to the door and their rear ends entering the spaces between the side walls of the carrier and oven and terminating in inclining upturned spaced forks, horizontally slotted action plate permanently secured to the outer side of each side wall of the carrier, a pin mounted for forward and rear sliding movement in each horizontal slot, a bell crank pivotally mounted on

each pin and having one end pivotally attached by a pivot pin to the forks of the adjacent arm and the other end provided with a cross pin slidably received in slots formed in the said arm forks, said latter slots being concentric to the former pin connecting the bell crank to the forks, and a link having one end pivotally mounted on the cross pin and the other end pivotally connected to the adjacent action plate.

3. In combination with a container having a pivoted closure door, a carrier mounted within the container for forward and backward movement and an actuating link mechanism pivotally attached, only, to the door and to the carrier, and embodying a knuckle joint adapted to be automatically broken by the initial opening movement of the door and producing in its subsequent breaking movement under the influence of the opening door an initial retarded movement of the carrier and a subsequent accelerated movement thereof.

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