Jan. 24, 1967 J. T. DONER 3,299,879

DOOR STOP MECHANISM

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Fig. 1

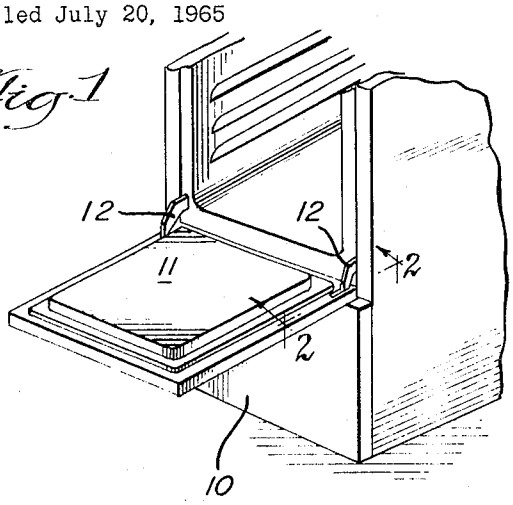


Fig. 7

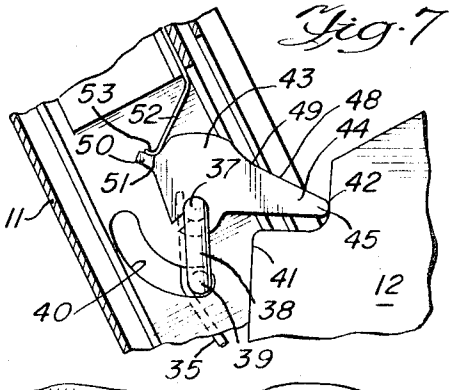


Fig. 2

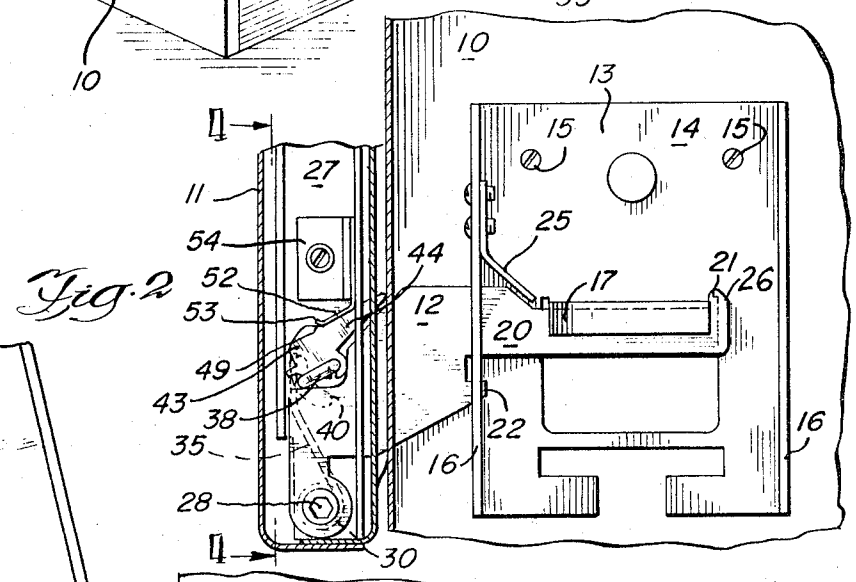
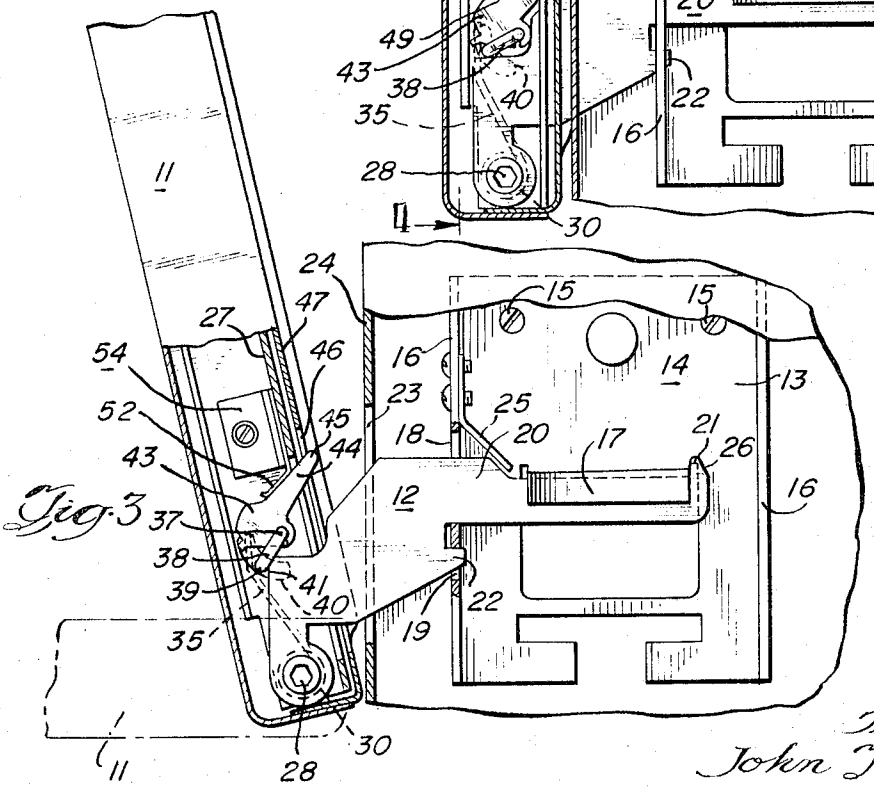


Fig. 3



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Fig. 4

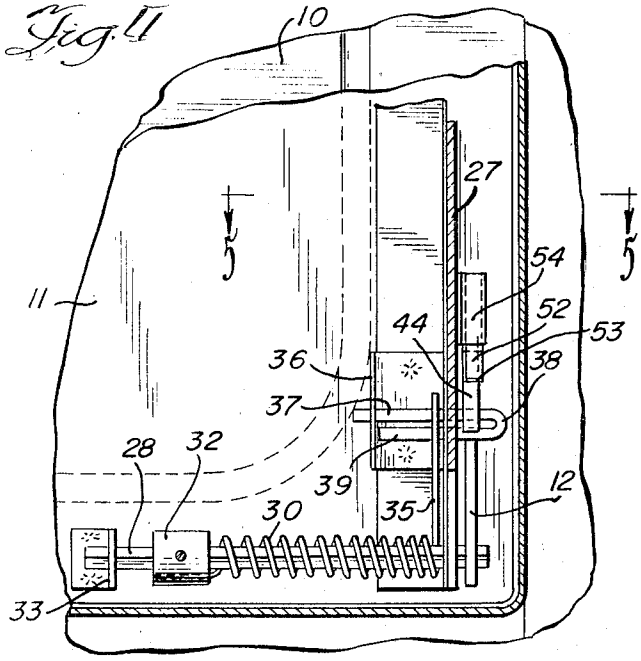


Fig. 5

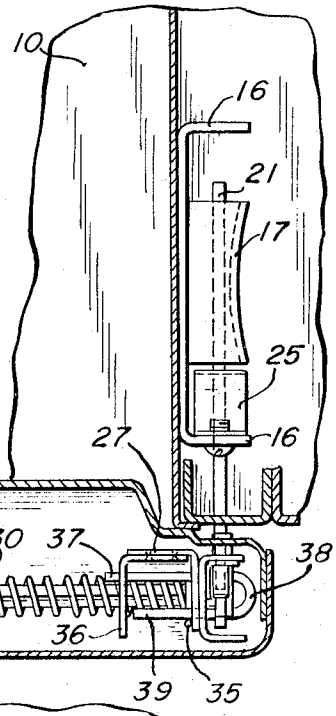
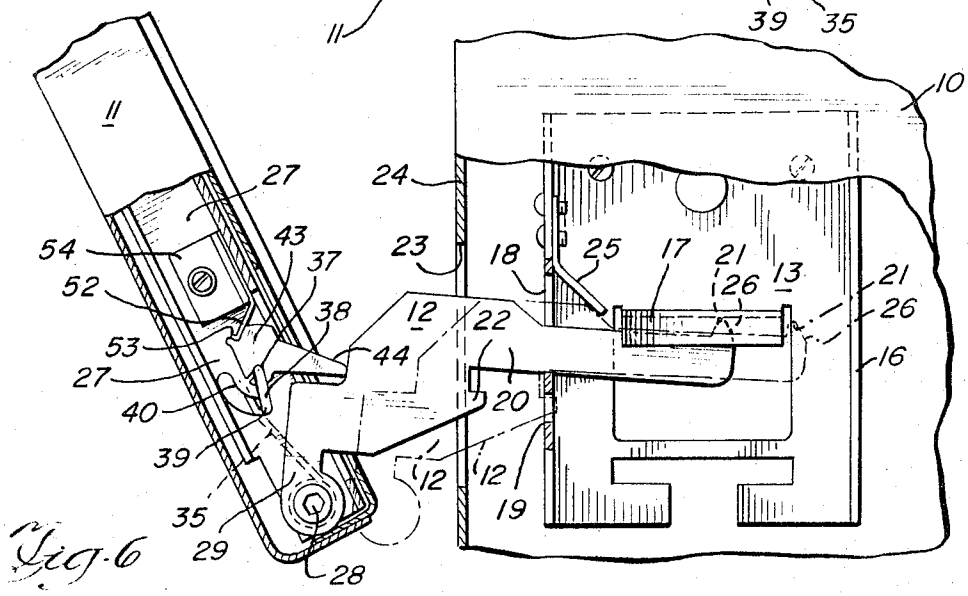


Fig. 6



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DOOR STOP MECHANISM

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This invention relates to stop mechanism for automatically stopping and holding doors such as oven doors in partially open position.

An important object of the invention is to provide stop mechanism for a door including crank means movable between a first stop position and a second free position whereby the door is stopped and held in a partially open position but is yieldably movable into closed position.

Another object of the invention is to provide hinge means cooperable with a door stop mechanism for retaining a door in a partially open position.

Another object of the invention is to provide a removable door for an oven or the like wherein a broil stop mechanism is associated with the door removal mechanism.

Other objects, features and advantages of the invention will be apparent from the following description of one embodiment thereof taken in conjunction with the accompanying drawings. Of the drawings:

FIGURE 1 is a fragmentary perspective view of an oven including a hinge structure embodying the invention.

FIGURE 2 is a fragmentary enlarged sectional view taken substantially along line 2—2 of FIGURE 1.

FIGURE 3 is a view similar to FIGURE 2 but showing the door in solid lines in partially open position and in broken lines in fully open position.

FIGURE 4 is a fragmentary sectional view taken substantially along line 4—4 of FIGURE 2.

FIGURE 5 is a fragmentary sectional view taken substantially along line 5—5 of FIGURE 4.

FIGURE 6 is a sectional view similar to FIGURES 2 and 3 but illustrating the removal of the door and hinge member from the mounting means for the hinge member and thus for the door.

FIGURE 7 is an enlarged detail view of a portion of FIGURE 6.

In the illustrated embodiment of the drawings there is disclosed an oven 10 having an arcuately movable door 11 mounted thereon by means of a pair of side hinge members 12. Each hinge member 12 is releasably retained by a bracket 13 mounted on the oven 10 and this bracket is of the type shown in Patent 3,072,117 assigned to the same assignee as the present application.

The mounting member bracket 13 in each instance includes a metal member 14 attached to the oven 10 as by screws 15. The member 14 includes a pair of parallel vertically extending edge flanges 16. Also forming a part of the metal member 14 is an inverted U-shaped bracket portion 17.

Located in the front flange 16 of the metal member 14 is an opening 18 and immediately beneath this opening is a second opening 19. As is shown in FIGURES 2 and 3, the opening 18 is adapted to receive a horizontal part 20 of one of the hinge members 12 with this horizontal part having an end projection 21 engaging the rear edge of the bracket portion 17 when the hinge member 12 is in position. The lower opening 19 in the front flange 16 is adapted to receive a rearwardly extending stabilizing spur 22 on the hinge member 12 that is spaced beneath the horizontal part 20 of the hinge member.

As is shown in FIGURE 6, each hinge member 12 may be inserted into and removed from its retaining bracket 13 by manipulating the hinge member through an opening 23 in the front 24 of the oven.

As an aid in guiding the projecting end 21 of the hinge member 12, there is provided for each hinge member a sloped guide bar 25 immediately rearwardly of the top of the upper opening 18 with this guide bar being engageable with a similarly sloped upper forward edge 26 of the hinge member 12 in guiding the end projection 21 to beneath the attaching bracket portion 17.

The door 11 includes a door frame 27 that has a hinge pin 28 mounted for rotation on opposite sides thereof near the bottom of the door, one such pin 28 being shown in FIGURES 4 and 5. Each hinge member 12 is fixedly mounted on the outer end of a hinge pin 28. Each hinge member 12 is in generally the shape of an L with the short leg 29 extending downwardly with the corresponding hinge pin 28 attached adjacent the lower end thereof and the horizontal long leg constituting the horizontal part 20 of the hinge member.

Surrounding each hinge pin 28 is a torsion spring 30 which has one end 31 attached to its hinge pin 28 by a mounting block 32. The hinge pin is rotatably mounted in a bracket 33 at one end and has its opposite end similarly rotatably held in door frame 27.

The end of the torsion spring 30 that is opposite the fixed end 31 is free and extends upwardly within the door as indicated at 35.

Attached to the frame 27 is a bracket 36 which forms a short channel therewith. This channel retains the fulcrum portion 37 of a generally U-shaped crank 38 (FIGURE 5). This fulcrum portion 37 of the crank is retained for rotational movement. Also forming a part of the crank 38 is a movable portion 39 with the two portions 37 and 39 being essentially parallel. The movable portion 39 of the U-shaped crank 38 is arcuately movable in a slot 40 in the frame 27. This movable portion 39 of the crank is engaged by the free end 35 of the spring 30 to urge the portion 39 in a counterclockwise direction, as viewed in FIGURES 2, 3, 6 and 7, toward the right-hand end of the slot 40 as viewed in these same figures to thus exert a closing bias to the door through frame 27. This right-hand end portion is identified herein as the first position of the crank member 38 as shown in FIGURE 7. A position forwardly thereof, as shown in FIGURE 2, is identified as the second position.

Each hinge member 12 is provided with a first stop 41 (FIGURE 7) in the form of an edge corner and a second stop 42 in the form of a vertical leg of an angle. The first stop 41 is so positioned with respect to the arcuate slot 40 and the movable portion 39 of the crank 38 that as the door 11 is moved toward closed position about its two aligned but oppositely located hinge pins 28 under the constant urging of the springs 30 the movable portion 39 of the crank engages the first stop 41 at an intermediate point in the path of movement from fully open position, as shown by the broken lines in FIGURE 3, toward the fully closed position as shown in FIGURE 2.

When this movable portion 39 engages the first stop 41, as shown in FIGURE 3, the door 11 under the urging of the spring 30 is held in its partially open position as shown in this figure. This occurs because the force of the spring 30 acting on the crank 38 by way of the spring end 35 engaging the crank is now taken up by the first stop 41 instead of the door frame 27, with the result that the door 11 is held at equilibrium. All that is necessary to close the door to the position in FIGURE 2 is to apply closing force on the door 11 which causes the crank 38 to slide over the corner which includes the stop 41, thereby displacing the free end 35 of the spring to the left as shown in FIGURE 2. When this has occurred, then the full force of both springs 30 acting through the two cranks 38 retain the door in closed position.

Mounted on the crank 38 at the fulcrum portion 37

thereof is a catch **43** which functions as a stop member. This catch **43** has a projecting finger **44** which even in retracted position, as shown in FIGURES 2 and 3, has an end **45** extending through an opening **46** in the rear wall **47** of the door.

As is shown most clearly in FIGURE 7, the catch **43** is provided with an upper surface **48** bounded on the inner end by a detent **49**. Located rearwardly of this detent **49** and extending generally in an opposite direction to the finger **44** is a projection **50** on the catch which is bounded on one side by a second detent **51**.

The catch **43** is mounted on the fulcrum portion **37** of the crank **38** for arcuate movement about this portion. When the catch is in its retracted position in this arcuate movement, as shown in FIGURES 2 and 3, the upper surface **48** of the projecting finger **44** bears against a resilient retaining member **52** mounted on a bracket **54** attached to frame **27**. In this position the free end **53** of the member **52** is located substantially at the first detent **49**.

The catch **43** is normally in its retracted position as shown in FIGURES 2 and 3 when the oven **10** is in normal use with the door being generally between the open position of FIGURE 1 and the closed position of FIGURE 2. This movement also includes the partially open position of FIGURE 3 as previously described. When, however, it is desired to remove the door from the two side mounting brackets **13**, the two catches are then used.

In such instances, the door is rotated to open position and the projecting end **45** of each catch **43** is then grasped by the user and the two catches **43** moved in a clockwise direction, as viewed in FIGURES 2 and 3, until the end **53** of each resilient retaining member **52** engages a detent **51** adjacent the projection **50**. In these positions the two catches **43** project from the door **11**, as shown in FIGURES 6 and 7, so that when the door is permitted to move toward closed position under the urging of the torsion springs **30**, as previously described, the projecting end **45** of the catch finger **44** engages the second stop **42** on each hinge member. This limits further arcuate movement of the door **11** toward closed position and because of the urging of the relatively strong springs **30** effectively prevents further relative movement between the door **11** and hinge members **12**. Then, the door can be easily removed from the retaining brackets **13** by manipulating the door and hinge unit in the manner shown in FIGURE 6. Similarly, the door may be remounted on the oven by an opposite movement. In effect, because the two springs **30** have strong urging forces, the hinge members **12** and door **11** can be manipulated as a rigid unit.

Having described my invention as related to the embodiment shown in the accompanying drawings, it is my intention that the invention be not limited by any of the details of description, unless otherwise specified, but rather be construed broadly within its spirit and scope as set out in the accompanying claims.

The embodiment of the invention in which an exclusive property or privilege is claimed is defined as follows:

1. In an oven apparatus including an oven cooking cavity and a door movable between open and closed positions relative to said cavity, the improvement of a stop mechanism comprising: a crank member mounted on said door for limited arcuate movement between first and second positions relative to said door; yieldable means biasing said crank member toward said first position and, through said crank member, said door toward closed position; and stationary stop means positioned to engage said crank member when in said first position and when said door is in a partially open position between said open and closed positions for retaining said door in said partially open position, said crank member being movable against the bias of said yieldable means into said second position wherein said crank member is free of said stationary stop means and may be moved into said closed position.

2. In an oven apparatus including means forming an oven cooking cavity and a door movable between open and closed positions relative to said cavity, the improvement of a stop mechanism, comprising: a crank member mounted on said door for limited arcuate movement in a path; urging means urging said crank member toward one end of said path; and stop means positioned on said oven apparatus engaged by said thusly urged crank member when said door is in partially open position, said urging means acting through said crank member for urging said door toward closed position to hold said crank member against said stop means and retain said door in said partially open position, said crank member being movable against the urging of said yieldable means by closing force applied to the door to remove the crank member from said stop means.

3. In an oven apparatus including means forming an oven cooking cavity and a door movable between open and closed positions relative to said cavity, the improvement of a stop mechanism, comprising: a crank member mounted on said door for limited arcuate movement in a path; yieldable means urging said crank member toward one end of said path; stop means positioned on said oven apparatus engaged by said thusly urged crank member when said door is in partially open position; urging means urging said door toward closed position to hold said crank member against said stop means and retain said door in said partially open position, said crank member being movable against the urging of said yieldable means by closing force applied to the door to remove the crank member from said stop means; second stop means positioned on said oven apparatus; and a catch mounted on said crank member selectively movable into position to engage said second stop means and retain said door in partially open position against the urging of said urging means.

4. The stop mechanism of claim **3** wherein means are provided for releasably retaining said catch in retracted position.

5. In an oven apparatus including means forming an oven cooking cavity and a door movable between open and closed positions relative to said cavity, the improvement of a stop mechanism, comprising: a crank member mounted on said door for limited arcuate movement in a path, said crank member having a fulcrum portion; yieldable means urging said crank member toward one end of said path; stop means positioned on said oven apparatus engaged by said thusly urged crank member when said door is in partially open position; urging means urging said door toward closed position to hold said crank member against said stop means and retain said door in said partially open position, said crank member being movable against the urging of said yieldable means by closing force applied to the door to remove the crank member from said stop means; second stop means positioned on said oven apparatus; a catch mounted on said fulcrum portion selectively movable into position to engage said second stop means and retain said door in partially open position against the urging of said urging means; and spring means bearing against said catch when in retracted position releasably to retain said catch in said retracted position.

6. In an oven apparatus including an oven cooking cavity and a door movable between open and closed positions relative to said cavity, the improvement of a stop mechanism comprising: hinge means on which the door is mounted for arcuate movement between open and closed positions and including a first stop portion; a crank member mounted on said door for movement in a path; and spring means operatively engaging said door and said crank member for urging said door toward closed position by force applied to said door through said crank member, said crank member at one point

in its said path engaging said first stop portion on said hinge means to retain said door in partially open position, said crank member being movable against the urging of said spring beyond said first stop portion by a closing force applied to said door.

7. In an oven apparatus including an oven cooking cavity and a door movable between open and closed positions relative to said cavity, the improvement of a stop mechanism comprising: a hinge member on which the door is mounted for arcuate movement; a crank member having a fulcrum portion mounted on said door and a movable portion movable through a path; and spring means operatively engaging said door and said crank member movable portion for urging said door toward closed position by force applied by said spring to said door through said movable portion, said crank member movable portion at one point in its said path engaging a first stop on said hinge member to retain said door in partially open position under the urging of said spring, said crank member being movable against the urging of said spring beyond said first stop by a closing force applied to said door.

8. In an oven apparatus including an oven cooking cavity and a door movable between open and closed positions relative to said cavity, the improvement of a stop mechanism comprising: a hinge member on which the door is mounted for arcuate movement; a crank member having a fulcrum portion mounted on said door and a movable portion movable through a path; spring means operatively engaging said door and said crank member movable portion for urging said door toward closed position by force applied by said spring to said door through said movable portion, said crank member movable portion at one point in its said path engaging a first stop on said hinge member to retain said door in partially open position under the urging of said spring, said crank member being movable against the urging of said spring beyond said first stop by a closing force applied to said door; means for releasably mounting said hinge member on said base member; a catch on said fulcrum portion movable from retracted position into position for engaging a second stop on said hinge member to limit the extent of movement of said door and hinge member toward each other under the urging

of said spring preparatory to inserting said hinge member in said mounting means and removable therefrom; and means for selectively releasably retaining said catch in said retracted position.

9. In an oven apparatus including an oven cooking cavity and a door movable between open and closed positions relative to said cavity, the improvement of a stop mechanism comprising: a door frame; a hinge pin mounted on said door frame for relative pivotal movement therebetween; a hinge member fixedly mounted on said hinge pin and having first and second stop portions; torsion spring means and crank means for imparting and transferring a biasing force alternately to said door frame and to said first stop portion of said hinge member, said crank means being mounted on said door frame and having a free arm movable between positions of engagment and disengagement with said first stop portion of said hinge member, said torsion spring means being mounted on said hinge pin and engaging said free arm of said crank means for imparting a biasing force thereto; and a door removal stop member mounted on said crank means and movable into and out of engagement with said second stop portion of said hinge member for locking said hinge member and said oven door in fixed relation for removal of said oven door from said oven, whereby in normal operation of said oven door a door closing biasing force is exerted on said door frame by said torsion spring means until said free arm of said crank means engages said first stop portion of said hinge member whereupon the biasing force of the torsion spring means is transferred to said hinge member to releasably retain said oven door in a partially open position.

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