United States Patent [19]

McLean

[11] **3,831,580**

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[54] **LOCKABLE OVEN DOOR LATCH**

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[73] Assignee: **Corning Glass Works,** Corning, N.Y.

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[52] U.S. Cl. **126/197,** 292/64, 292/109, 292/110

[51] **Int. Cl.** **F24c 15/02**

[58] **Field of Search** 126/197; 292/109, 110, 292/64

[56] **References Cited**

UNITED STATES PATENTS

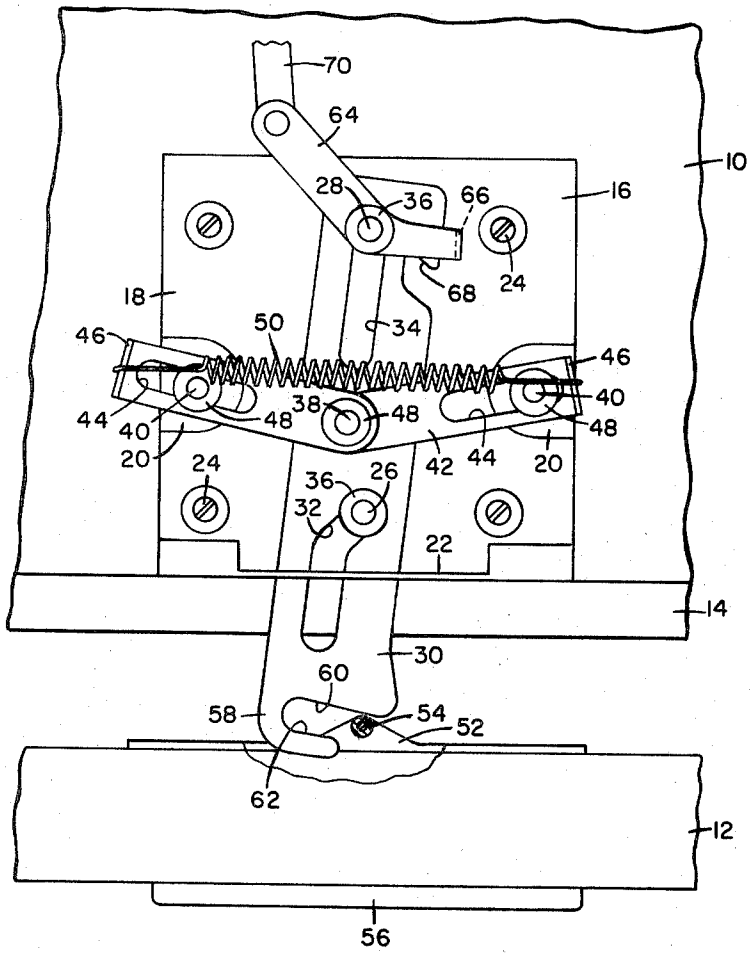
2,679,427	5/1954	Johnson	292/64
2,714,751	8/1955	Stuart et al.	292/109
3,540,767	11/1970	Siegel	126/197

Primary Examiner—Carroll B. Dority, Jr.
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Attorney, Agent, or Firm—Burton R. Turner; Clarence R. Patty, Jr.

[57] **ABSTRACT**

A mechanical latch mechanism, positioned adjacent the front wall of an oven, is provided with a latch arm having an outer end for engaging a roller on the oven door as the door is moved toward a closed position. The roller initiates an inward or backward movement of the latch arm and the arm is cammed during its backward travel from a canted or skewed position to a position substantially perpendicular to a vertical plane passing through the oven door, so as to facilitate the engagement of the door roller with a hook portion on the forward end of the latch arm. A pair of spring-loaded pivot arms, which initially function to retain the latch arm in its forward position, provide a rearward force to the latch arm after being pivoted passed dead center to urge the latch arm toward its backward most position and thereby retain the oven door in a closed and sealed position. The latch arm is also provided with a locking recess for operatively receiving a flanged end of a pivotal locking arm, which prevents the latch arm from moving forward and thereby locks the oven door in a closed and sealed position.

10 Claims, 5 Drawing Figures



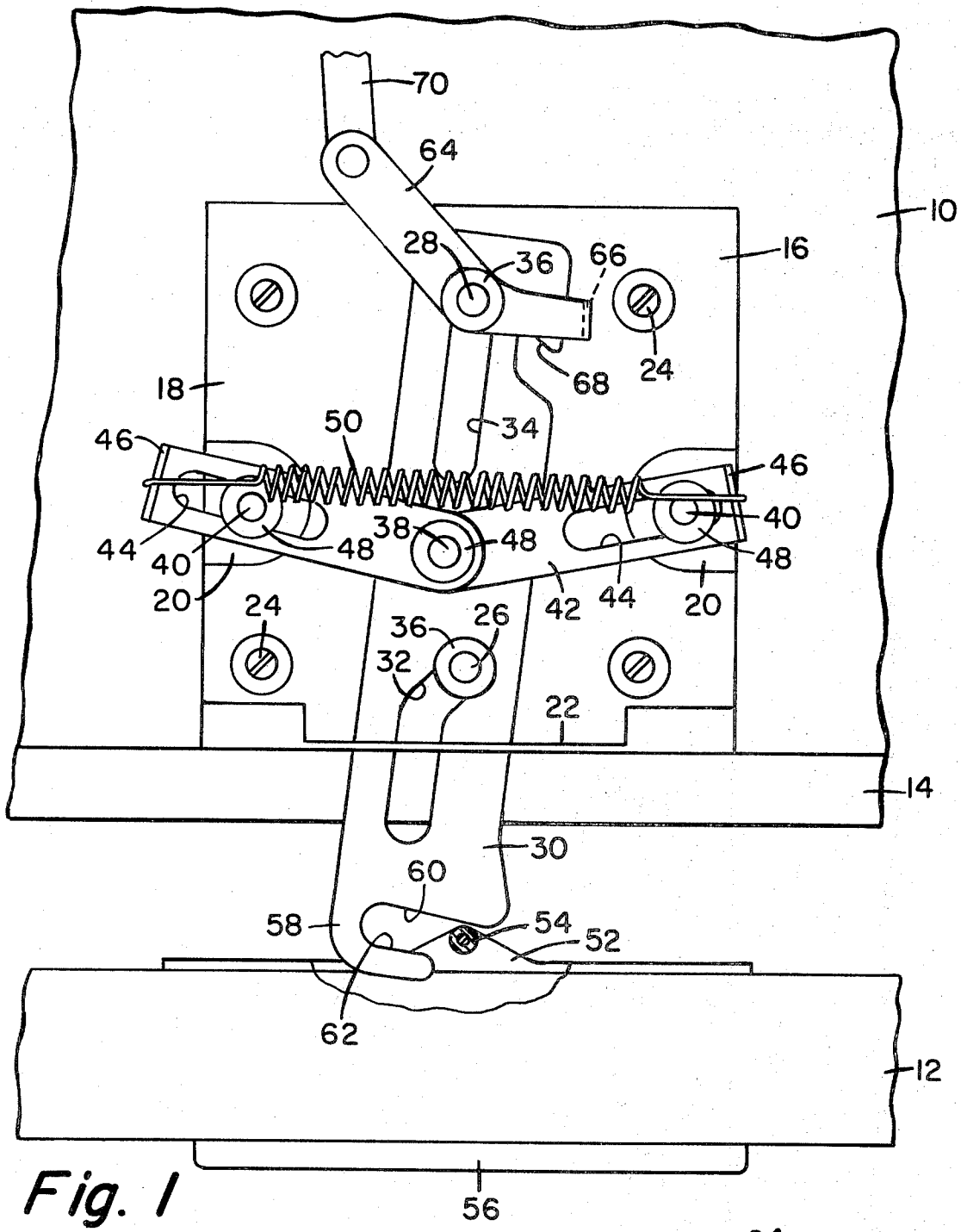


Fig. 1

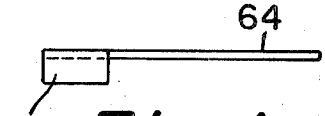


Fig. 1a

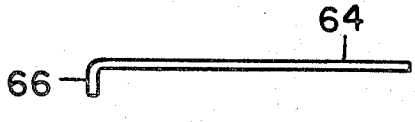


Fig. 1b

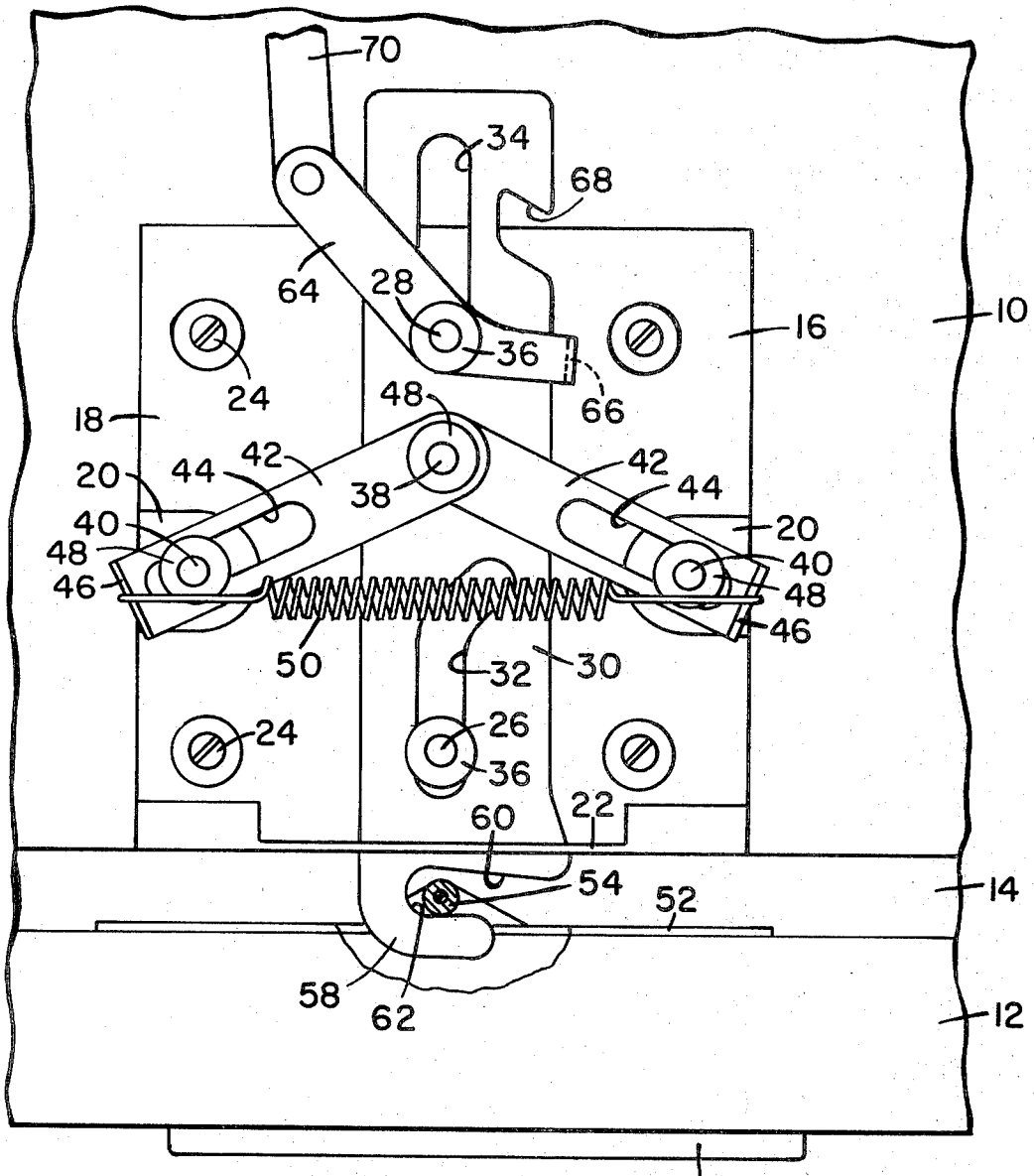

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Fig. 2

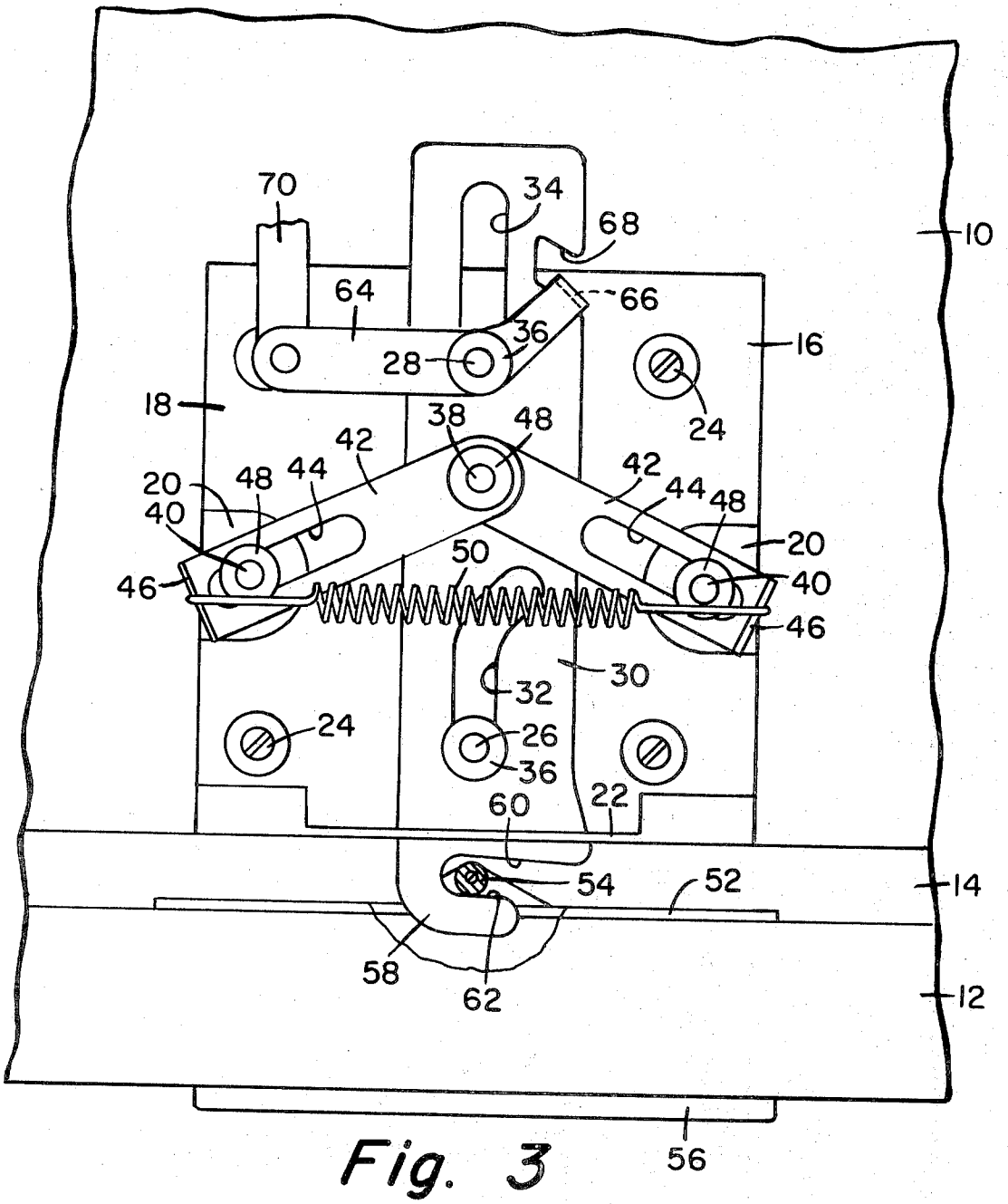

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Fig. 3

LOCKABLE OVEN DOOR LATCH

BACKGROUND OF THE INVENTION

The present invention resides in the field of latch mechanisms for domestic appliances, and more particularly to a lockable positive-action latch mechanism for the oven door of a self-cleaning oven.

In the past it has been common practice to merely spring-load the hinges on an oven door and thereby overcome the gravitational effect due to the weight of the door so as to facilitate the ease of opening and closing the same. A separate locking mechanism was also provided, such as shown in U.S. Pat. Nos. 3,757,084, 3,474,226, and 3,462,584, which locking mechanism was energized to lock the oven door in a closed position only when the oven was switched to its "clean" cycle. Manually operable safety latches were also utilized such as shown in U.S. Pat. Nos. 3,390,909, 3,350,542, 3,317,701, 3,313,918 and 3,189,375. These latches were not completely fool proof, however, since it was necessary for the operator-housewife to manually activate the locks to their closed position, which was not necessarily always accomplished.

Although the known systems offered a positive oven door lock when the oven was in its clean cycle, the lock did not necessarily contribute to the sealing of the oven door and prevent smoking during such cleaning cycle since they did not tend to pull the door tightly closed. Further, since the lock was not engaged at all during a normal bake cycle, the only force retaining the oven door in its closed position was supplied by the spring-loaded hinges. Accordingly very little edge sealing about the door was accomplished when the door was merely in its closed position for baking, and therefore steam, moisture and other by-products of baking had a tendency to escape from the oven into the kitchen.

The present invention not only obviates the problem heretofore encountered with the inadequate or incomplete sealing of the oven chamber about the oven door, but also provides a simple easily-lockable positive-action oven door latch mechanism for retaining the oven door in a seal-tight closed position which is automatically actuated upon the opening and closing of the oven door.

SUMMARY OF THE INVENTION

The present invention sets forth a completely new concept in an oven door latch which is not only automatically operated upon the opening and closing of the oven door, but also which provides a continuous closing force upon the oven door, when in its closed position, so as to maintain a sealing contact between the oven door and gasket material about the oven opening. Further, the latch mechanism which is readily operable merely through the manual opening and closing of the oven door, may be easily locked in its closed position to prevent the oven door from being opened when the oven is in its clean cycle.

The latch mechanism of the present invention is preferably secured to a supporting member immediately above the oven cavity and adjacent the front wall surrounding the cavity opening. The latch mechanism includes a latch arm having a forward hook-like portion which projects through a slot in the front wall of the oven for cooperatively engaging a door latch roller affixed to the inner surface of the oven door. The latch

arm is spring-biased in an outward or forward position by means of a pair of pivot arms when the oven door is in an opened position, and is biased in a rearward or inward position by such arms when the oven door is in a closed position. A lock arm is pivotally mounted such that upon actuation it will operatively engage a recess in the latch arm, when in its rearward or retracted position, to prevent such latch arm from moving forwardly and accordingly lock the oven door in a closed position.

When it is desired to close the oven door from its opened position wherein the latch arm is in its extended or outward position, the door is swung or pivoted about its lower hinges toward a closed position relative to the oven cavity. As an upper portion of the door approaches its closed position, a door latch roller strikes a guide surface on a forward portion of the latch arm and urges the arm rearwardly against the spring-loaded pivot arms, which initially tend to bias the latch arm outwardly. As the oven door continues toward the closed position, the latch roller forces the arm longitudinally inwardly against the spring biasing and the arm is simultaneously cammed from a horizontally-skewed position to a substantially perpendicular position relative to a vertical plane passing through the front wall of the oven, so that a hook portion on the forward end of the latch arm captures the door roller as the door is moved into its closed position. Further, the spring loaded pivot arms are also moved rearwardly during the closing of the oven door so as to then urge the latching member in a rearward position, and accordingly retain the closed oven door in sealing arrangement with gasket material about the cavity opening. The pressure applied by the spring-loaded pivot arms tends to mate the oven door and the oven gasket to form an improved seal which reduces or materially eliminates smoking or steaming heretofore occasioned with conventional closing devices. The improved seal also reduces outer door temperatures, particularly important when the oven is in its "clean" cycle.

When the oven door is in its closed and sealed position with the latch arm in its rearward position, the locking arm may be independently actuated to operatively engage a recess formed in a rear portion of the latch arm to thereby prevent the latch arm from moving forward, and thus effectively lock the oven door in a closed position. The locking arm may be actuated by any suitable means, however the solenoid actuated latching system disclosed in U.S. Pat. No. 3,757,084 is considered to be a preferred method of actuating the locking arm, such as is required for safety during the "clean" cycle of the oven. When it is desired to open the oven door and the locking arm has been released from the recess in the latch arm, the oven door is merely pulled open by a conventional handle means, and the captured latch roller on the oven door pulls the latch arm outwardly by means of the hooked nose portion against the rearward-biasing of the spring-loaded pivot arms. As the latch arm moves outwardly it is cammed from a substantially perpendicular position to a relatively skewed position thus releasing the latch roller on the oven door. Further, since the pivot arms are moved outwardly past a "dead center" position, they then tend to spring-bias the latch arm in its outward position until such time as it is again urged inwardly through contact with the latch roller upon closing the oven door.

It thus has been an object of the present invention to obviate the sealing problems heretofore encountered with known oven door closing devices and provide an easily operable, positive-action oven door latching system which not only seals the oven door, but also which may be readily locked in a closed position by independently operated means.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmental top plan view of an oven door latch assembly embodying the present invention shown in an open position.

FIG. 1*a* is an end elevational view of the locking arm shown in FIG. 1.

FIG. 1*b* is a side elevational view of the locking arm shown in FIG. 1.

FIG. 2 is a fragmental plan view similar to that shown in FIG. 1, but with the latch mechanism in a closed position.

FIG. 3 is a fragmental plan view of the latch mechanism shown in FIG. 2, but showing the latch arm being locked in its closed position by means of the locking arm.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to FIGS. 1, 2 and 3, a fragmental portion of a supporting surface above an oven cavity is shown at 10, a fragmental portion of an oven door is shown at 12, and gasket material lining the outer wall about the oven cavity is shown at 14. A mounting plate 16, having a base portion 18, opposed boss portions 20, and a forward vertical flange portion 22, is secured to the support surface 10 such as by metal screws 24. A pair of guide pins 26, 28 extend upwardly from the base portion 18 of mounting plate 16 in such a manner that a straight line passing through such pins will substantially perpendicularly intersect a vertical plane passing through forward flange portion 22. A latch arm 30, having a forward angular cam slot 32 and a rearward guide slot 34 for receiving guide pins 26, 28 respectively, is removably mounted on base portion 18 by means of suitable washers and mounting clips 36.

A pivot pin 38 extends upwardly from latch 30 intermediate cam slot 32 and guide slot 34. In addition a weld pin 40 extends upwardly from each of the opposed boss portions 20 on opposite sides of the latch arm 30. A pair of pivot arms 42, each having an outer guide slot 44 and a raised end flange 46, are pivotally connected at their inner ends to pivot pin 38 by means of washers and suitable clips or the like 48. The outer end of each pivot arm slidably receives one of said weld pins 40 within its guide slot 44, and the arms are retained on such pins by suitable washers and clips or the like 48. A tensioned spring member 50 is secured at its opposite ends to the raised end flange 46 of each pivot arm 42 so as to spring-bias the outer ends of said pivot arms toward each other, and accordingly longitudinally bias latch arm 30.

The oven door 12 is provided with a bracket 52 having a door latch roller 54 mounted thereon. Both the bracket and the door are provided with an opening so as to operatively receive the nose portion of the latch member therein during the closing and latching of the door. The door may be provided with a conventional handle 56 for opening and closing the door and accordingly unlatching and latching the same respectively.

The forward portion of the latch arm 30 extends through an opening in the forward vertical flange portion 22 and is provided with a hook-like nose portion 58 having a forwardly facing door roller-contacting surface 60 and a rearwardly facing door roller-contacting surface 62 for operative engagement with latch roller 54.

Guide pin 28 is provided with an annular locking arm 64 pivotally mounted thereon. One end of the locking arm 64 has a downwardly extending flange 66 which is adapted to project within a locking recess 68 formed in latch arm 30 adjacent its inner end portion. The locking arm 64 is pivoted into and out of locking engagement with recess 68 by means of a coupling link 70 connected thereto, which in turn may be actuated in the same manner as coupling link 30 of U.S. Pat. No. 3,757,084.

In operation, with the oven door 12 in its opened position, the latch arm 30 will be in its outward or extended position as shown in FIG. 1. That is, due to the fact that pivot pin 38 is forward of a "dead center" line drawn between weld pins 40, pivot arms 42 function to urge latch arm 30 in its outward position through the biasing of spring member 50. Further, due to the sliding action of angular cam slot 32 relative to guide pin 26, the forward or nose portion 58 of latch arm 30 is horizontally skewed relative to a vertical plane passing through the forward flange portion 22 of the mounting plate 16. The forward or outward movement of the latch arm 30 is limited by the rearward portion of cam slot 32 and guide slot 34 contacting guide pins 26 and 28 respectively.

As the oven door 12 is pivoted about conventional lower hinge members into a vertical closed position relative to the forward opening of the oven cavity, door latch roller 54 initially strikes the forwardly facing contacting surface 60 of latch arm 30. As the door proceeds toward its closed position, the latch arm is moved longitudinally rearwardly against the biasing of spring 50 and pivot arms 42, with cam slot 32 sliding rearwardly along guide pin 26 and guide slot 34 sliding rearwardly along guide pin 28. However, due to the angular bend in cam slot 32, the latch arm 30 is cammed into a substantially perpendicular relationship to a vertical plane passing through the forward flange 22 so that hook portion 58 moves into operable engagement with roller 54 and in effect captures the door latch roller within the hooked recess.

As the latch arm 32 is moved rearwardly through the action of roller 54 on surface 60 as the oven door 12 is being closed, pivot pin 38 moves rearwardly of the "dead center" line connecting weld pins 40, and accordingly spring-biased pivot arms 42 tend to urge the latch arm 30 rearwardly as shown in FIG. 2. Thus, with the door in a closed and latched position, the spring member 50 exerts a constant force through surface 62 of hook portion 58 of latch member 30 to maintain the oven door 12 in an improved sealing relationship with gasket material 14 about the oven cavity.

Although the ultimate rearward movement of latch arm 30 would be limited by the forward ends of cam slot 32 and guide slot 34 engaging pins 26 and 28 respectively, as a practical matter, the arm 30 does not reach this limit due to the thickness and resiliency of the gasket material 14 maintaining the improved sealing for eliminating smoking and steaming during baking operations. As shown in FIG. 2, the door latch roller 54

is in substantial linear alignment with guide pins **26** and **28** when in a closed position, whereas the nose portion **58** of latch arm **30** projects within an opening formed within the oven door **12** behind latch roller **54** so as to functionally engage the roller and pull the same into a seal-tight closed position through the rearwardly facing roller contacting surface **62.**

When the oven is to be placed in a "clean" cycle, coupling arm **70** is actuated through any suitable means such as the solenoid energized locking system of U.S. Pat. No. 3,757,084 to pivot locking arm **64** about guide pin **28** so that downwardly projecting flange **66** is positioned within locking recess **68** formed in latch arm **30.** Accordingly, with the locking arm **64** in its operative locking position as shown in FIG. **3,** the latching mechanism is locked in its rearward position and therefore it is impossible to open the oven door while the oven is in its clean cycle. However, once the locking arm is deenergized, the oven door may be easily opened merely by pulling on handle **56** which causes arm **30** to be pulled outwardly by means of roller **54** acting upon contacting surface **62.** As the latch arm **30** is moved outwardly against the rearward spring biasing of pivot arms **42,** angular cam slot **32** slides along guide pin **26** to angularly offset or skew the latch arm **30** to the left as shown in FIG. **1,** thereby releasing door latch roller **54** so that the door may be moved to a full open position. Further, as the arm **38** is moved outwardly the pivot arms **42** pass their dead center position so as to then springbias the latch arm toward its outward position where it will be readily available to again receive the door latch roller when it is desired to again reclose the oven cavity.

Although I have now disclosed the now preferred embodiment of my invention, it will be apparent to those skilled in the art that various changes and modifications may be made thereto without departing from the spirit and scope thereof as defined in the appended claims.

I claim:

1. A latch mechanism for retaining an oven door in a closed and sealed relationship with an oven cavity which comprises, a latch arm longitudinally slidably moveable between forward and rearward positions, latch means on said oven door being operatively engageable by said latch arm, means for laterally moving said latch arm simultaneously with its longitudinal movement for engaging and confining said latch means on said oven door within a nose portion of said latch arm, and means for urging said latch arm forwardly when in its forward position and thereby maintain the latch arm in a ready position to receive the latch means on said oven door for closure, and for urging said latch arm rearwardly when in its rearward position so as to apply a continuous closing force to said oven door through said latch means for maintaining the oven door in a closed and sealed position.

2. A latch mechanism as defined in claim **1** wherein said means for laterally moving said latch arm simultaneously with its longitudinal movement includes an angular cam slot formed in said latch arm, and guide pin means extending upwardly therethrough for slidably guiding the cam slot during the longitudinal movement of said latch arm.

3. A latch mechanism as defined in claim **1** wherein said latch means on said oven door includes a door latch roller mounted on said door, and said latch arm is provided with a forward hook-like nose portion having a forwardly facing door roller contacting surface for initially engaging said door latch roller upon the closing of said door, and having a rearwardly facing door roller contacting surface for operatively engaging said door latch roller to retain said door in a closed and sealed position.

4. A latch mechanism as defined in claim **1** wherein said means for urging said latch arm forwardly and backwardly includes a pair of pivot arms each pivotally connected at one end to said latch arm intermediate its longitudinal extent, an opposite outer end of each said pivot arm being pivotally and slidably mounted on pin means positioned on opposite sides of said latch arm, and spring-tensioned means connecting the opposite outer end portions of said pivot arms together for urging such end portions toward one another.

5. A latch mechanism as defined in claim **1** including a locking recess formed in said latch arm, a pivotally mounted locking arm, flange means on one end of said locking arm for operative positionment within said locking recess to lock said latch arm in its rearward position and thus lock the oven door in a closed position, and coupling means for pivoting said locking arm into and out of operable relationship with said locking recess.

6. Positive action latch mechanism for retaining an oven door in a closed and sealed relationship relative to the opening of an oven cavity which comprises, a supporting surface above said oven cavity, an oven door pivotally mounted at its lower end for movement into a substantially vertical plane for closing the forward opening of an oven cavity, a door latch roller mounted on said oven door, a mounting plate secured to said support surface, a pair of guide pins extending upwardly from said mounting plate, a latch arm having slot means for receiving said guide pins, said latch arm being mounted on said guide pins for relative longitudinal movement with respect thereto, a pair of pivot arms each pivotally connected to said latch arm intermediate its longitudinal extent, pin means positioned on opposite longitudinal sides of said latch arm, each said pivot arm having a guide slot extending therethrough and operatively receiving one of said pin means for sliding movement with respect thereto, spring means connecting outer end portions of each of said pivot arms together so as to urge such ends towards one another and alternately spring-bias said latch arm in a forward and rearward position, and said latch arm having a hook-like nose portion for operatively engaging said door latch roller on said oven door and for retaining said oven door in a closed and sealed relationship with gasket material surrounding the outer wall of said oven cavity.

7. Latch mechanism as defined in claim **6** wherein said slot means includes an angular cam slot for imparting lateral movement to the nose portion of said latch arm during the longitudinal movement thereof so as to slidably engage said door latch roller with said nose portion and maintain the oven door in a closed and sealed relationship with the oven cavity.

8. A latch mechanism as defined in claim **6** including means for lockably retaining said latch arm in a rearward position so as to prevent the manual opening of said oven door when said latch arm is in a locked position.

9. A latch mechanism as defined in claim 6 wherein said hook-like nose portion has an outwardly facing roller-contacting surface which initially contacts said door latch roller upon the closing of said oven door and thereby initiates the rearward movement of said latch arm, and said spring means and pivot arms providing means for continuing to urge said latch arm rearwardly and thereby maintain a closing pull on said oven door through the hook-like nose portion of said latch arm.

10. A latch mechanism as defined in claim 6 including a locking arm pivotally connected to one of said guide pins, a locking recess formed in one edge of said latch arm, a flange portion on said locking arm for operative positionment within said locking recess, and means for pivoting said locking arm for positioning said flange within said locking recess to prevent said latch arm from being moved forwardly and thereby locking said oven door in a closed and sealed position.

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