Jan. 23, 1951 H. E. MILLS 2,539,151

OVEN DOOR HINGE

Filed June 30, 1947 2 Sheets-Sheet 1

FIG. 1

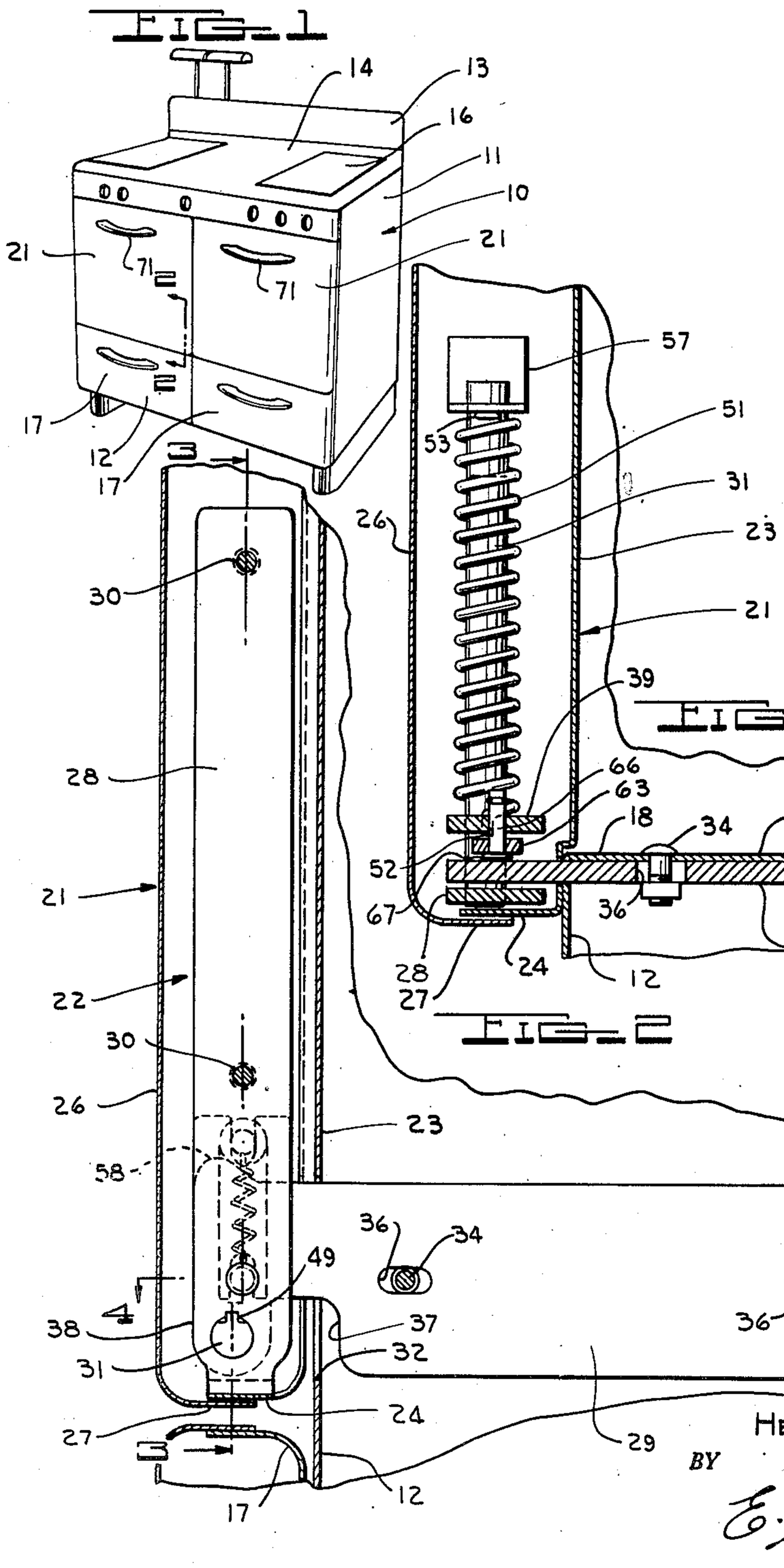

FIG. 4

FIG. 2

INVENTOR.
HERBERT E. MILLS
BY
E. J. Balluff
ATTORNEY

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H. E. MILLS

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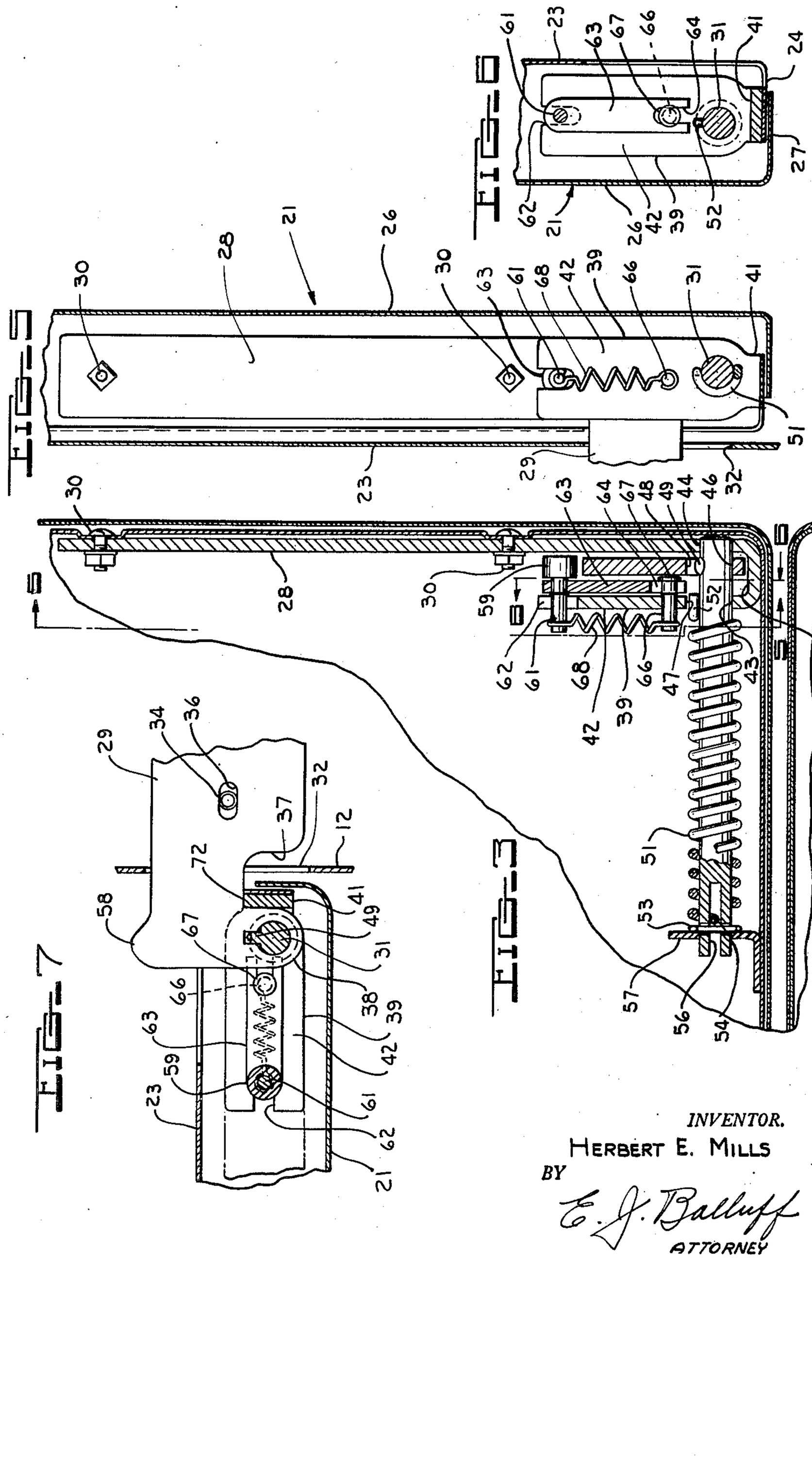

INVENTOR.

HERBERT E. MILLS

BY

E. J. Balluff

ATTORNEY

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OVEN DOOR HINGE

Herbert E. Mills, Detroit, Mich., assignor to Mills Engineering Company, Detroit, Mich., a partnership

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9 Claims. (Cl. 126—194)

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This invention relates to hinges for doors and has particular relation to a hinge especially applicable for use in connection with the doors of ovens for stoves or ranges used for cooking purposes in homes and elsewhere.

An object of the invention is to provide an oven door hinge that is simple, inexpensive and reliable, and which can be manufactured and assembled or serviced in the easiest possible manner.

Another object of the invention is to provide a simple door hinge for ovens which will permit an oven door to be easily opened or closed and which will automatically hold an oven door either in open or closed position or, if desired, in a slightly open position.

Other and further objects of the invention will be apparent by reference to the accompanying drawings of which there are two sheets, which by way of illustration show a preferred embodiment and the principles thereof and what I now consider to be the best mode in which I have contemplated applying these principles. Other embodiments of the invention embodying the same or equivalent principles may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims. I also contemplate that of the several different features of my invention, certain ones thereof may be advantageously employed in some applications separate and apart from the remainder of the features.

In the drawings:

Fig. 1 illustrates a perspective view of a domestic range or stove having a plurality of ovens having doors in connection with which the oven door hinge embracing the principles of the invention is employed;

Fig. 2 is a vertical sectional view of a portion of the stove illustrated by Fig. 1, showing an end view of the hinge mechanism embracing the principles of this invention; Fig. 2 is taken in a plane normal to the front of the stove illustrated by Fig. 1, substantially in the plane of line 2—2 thereof looking in the direction of the arrows;

Fig. 3 is a vertical sectional view through the structure disclosed by Fig. 2 taken substantially in the plane of line 3—3 of Fig. 2;

Fig. 4 is a horizontal sectional view through the structure disclosed by Fig. 2 taken substantially in the plane of line 4—4 in Fig. 2;

Fig. 5 is a vertical sectional view through the

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structure illustrated by Fig. 3 taken substantially in the plane of line 5—5 in Fig. 3;

Fig. 6 is a fragmentary vertical sectional view of the hinge structure as the latter might appear in the plane of line 6—6 in Fig. 3; and

Fig. 7 is another fragmentary view of the hinge structure showing the oven door with which the hinge is employed in open position. The view of the structure disclosed by Fig. 7 is comparable to that disclosed by Fig. 2 except that in Fig. 7 the door is open, whereas in Fig. 2 the door is closed.

In the structure disclosed by Fig. 1 the numeral 10 indicates a conventional stove or range such as is now generally employed in homes and elsewhere for cooking purposes. The stove 10 may be provided with any suitable source of heat such as electricity, gas, etc., equipment for applying such heat for cooking purposes being included within the stove and not being specifically shown. The stove 10, as illustrated, is provided with end walls 11, a front wall 12, a back wall 13 and a top wall 14. Within the top wall 14 and beneath burner cover plates 16 disposed thereon are conventional burners of any suitable type to be employed when the covers 16 are opened or removed for the purpose of cooking or heating upon the top of the stove. The front wall 12 is provided with drawers 17 which may be employed either for utility purposes or for broilers or for both or any other suitable purpose. Above the drawers 17 are openings 18 providing access to one or more ovens 19 formed in the stove 10 and accessible through the front wall 12. The ovens 19 may be employed either for cooking or warming purposes. The ovens and broilers are provided with suitable heating elements of any desired type not shown.

The openings 18 leading to the ovens 19 are adapted to be closed by oven doors 21 either or both of which may employ hinges such as the hinges embracing the principles of this invention.

One of such hinges indicated at 22 is illustrated by Figs. 2 to 7. The oven door 21 with which the hinge 22 is employed comprises an inner door panel 23 having a continuous peripheral outwardly extending door flange indicated at 24. The outer panel of the door 21 is indicated by the numeral 26, this panel being likewise provided with a peripheral flange indicated at 27 which extends inwardly around the major portion of the flange 24. Internally of the panels 23 and 26, the space therein provides a compartment for heat insulating material which may be employed if desired. The two panels may be held

together to provide a unitary door structure in any suitable manner not shown.

The hinge 22 includes hinge bars 28 and 29 disposed in pivotal relation to one another upon a shaft 31. The bar 29 is disposed horizontally with respect to the stove 10 and projects inwardly of the front wall 12 of the stove through a slot or opening 32 formed in the wall 12. Preferably the bar 29 projects inwardly along the outside surface of a lining member 33 which provides a wall of the oven 19 and is secured to the lining by bolts 34 which project through openings in the lining and elongated slots 36 formed in the bar 29. The slots 36 provide room for adjusting the bar 29 relative to the front wall of the stove so as to provide a good fit between the door 21 and the front wall of the stove. Preferably two of the hinges 22 are provided for each oven door 21 and the bars 29 for the hinges are preferably secured to the lining 33 somewhat below the floor of the oven so that when the oven door is open the surface of the inner door panel 23 will be at about the same level as the lower wall or floor of the oven.

The outer end of the bar 29 is provided with a notch 37 formed in the lower edge thereof adjacent the outer end of the bar, thus providing at the outer end of the bar a downwardly and laterally extending projection 38 through an opening in which the shaft 31 projects.

The bars 28 forming the other part of each hinge 22 are secured by bolts 30 inside the door 21 to the flange 24 of the inner panel 23 at the opposite vertical edges of each door. Each bar 28 has a return bend indicated at 39 formed at the end thereof adjacent the shaft 31, the return bend 39 comprising a portion 41 projecting laterally from the bar 28 and a portion 42 projecting rearwardly from the end of portion 41 in spaced and parallel relation to the main portion of the bar. The return bend 39 projects around the outer end of the bar 29 with the laterally bent portion 41 spanning the end of the bar and the laterally extending projection 38 thereof. The shaft 31 projects through openings 43 and 44 formed in the parallel portions of the bar 28 and through an opening 46 formed in the laterally extending portion 38 of the bar 29. Openings 43 and 46 have slots 47 and 48 respectively formed radially outwardly therefrom and shaft 31 is formed to provide a key 49 operatively associated with slot 48 to prevent the rotation of the shaft 31 with respect to the bar 29. The shaft 31 is rotatably mounted in openings 43 and 44 in such manner that the bar 28 will rotate freely upon the shaft 31. Beyond the return bend end of the bar 28 the shaft 31 projects inwardly a considerable distance within the oven door through the convolutions of a coil or torsional spring 51 having a laterally bent end 52 disposed within the slot 47. In order to retain the end 52 in the slot 47 the torsional spring 51 is adapted to be compressed slightly by a cotter pin 53 extending through openings formed across the end of the shaft 31 and against which an inwardly bent portion 54 is seated in a slot 56 formed across the end of the shaft. Beyond the cotter pin 53 the end of the shaft 31 is held in position by a bracket 57 provided with an opening through which the shaft 31 extends. The bracket 57 is secured in any suitable manner to the flange 24 of the inner door panel 23.

The upper outer end of the bar 29 may be formed to provide a cam 58 adapted to be operatively engaged by a roller 59 rotatably mounted

upon the end of a pin 61 which is slidably disposed in a slot 62 formed in the upper and outer end of the return bend 39 of the bar 28. Between the roller 59 and the return bend 39 is a follower bar 63 in one end of which the pin 61 is secured rigidly in an opening formed therein. The opposite end of the follower bar 63 is provided with a slot 64 similar to the slot 62 and this slot also receives a pin 66 having a head 67 engaging an edge of the bar 63 adjacent the slot 64. The pin 66 is rigidly secured in an opening formed in the return bend 39 in such position as to permit the movement of pin 61 and the bar 63 relative thereto within the slots 62 and 64. A coil spring 68 secured at opposite ends to the ends of pins 61 and 66 tends to urge the pin 61 and the follower bar 63 toward the pin 66.

The follower 59 being carried by the pin 61 hence tends to be resiliently held in such position as to engage the cam 58 during the closing movement of the door 21 and to ride upwardly upon the surface of the cam in opposition to the spring 68 when the door is further moved toward closed position. However, before the door 21 does reach a position in which it is normally closed against the front wall 12, the follower 59 passes beyond the highest point on the cam 58 and thereafter the spring 68 pulls the follower 59 downwardly against the inner surface of the cam, thence tightening the door 21 against the front wall 12 and thereby resiliently retaining the door in closed position.

Considering the oven door 21 to be provided with two of the oven door hinges 22, the oven door may be opened simply by pulling upon a door handle 71 secured at the top of the oven door, and thereafter the door may be urged downwardly into open position as is illustrated in Fig. 7. Such downward movement of the door tightens the coil spring 51 more tightly around the shaft 31 due to the fact that the end 52 of the spring rotates with the oven door while the shaft 31 is held against rotation within the end of the bar 29. It will be noted from Fig. 7 that as the door 21 is rotated into open position, the portion 41 of the return bend 39 rotates around the end of the laterally extending projection 38 and engages the surface of the bar 29 at the inner extremity of the notch 37, thus providing a stop indicated at 72. The stop 72 prevents further rotation of the door and thus holds the door in open position in which the inner door panel 23 is approximately aligned with the floor of the oven 19. The spring 51 is constructed and calibrated in such manner as to practically balance the weight of the door when the door is opened so that little effort is required either to open or to close the door.

Assuming the cam and cam follower mechanism to be employed with each of the door hinges 22, it will be apparent that such mechanism will have no effect whatever upon the operation of the door until the door has almost reached its closed position. Under such circumstances the follower 59 will engage the cam 58 and will ride upwardly upon the surface of the cam thereby increasing the tension of the spring 68. Such increase in the tension of the spring 68 is sufficient to stop the closing movement of the door and if desired, to hold the door in a slightly open position. Such position of the door is desirable in the event a broiler is employed in one of the drawers 17 and the stove is provided with a thermostatic control for the oven. With the door slightly open a sufficient amount of heat

will be allowed to escape from the oven to prevent the oven control from shutting off the heat for the broiler and as a consequence thereof the broiler will be able to function continuously if such is desired. From this slightly open position the door may be closed simply by pushing on the handle 71 hard enough to cause the follower 59 to ride over the top of the cam 58, and thereafter the follower 58 will tend to hold the door 21 in closed position against the inner surface of the cam 58.

While I have illustrated and described preferred embodiments of my invention, it is understood that these are capable of modification, and I therefore do not wish to be limited to the precise details set forth, but desire to avail myself of such changes and alterations as fall within the purview of the following claims.

I claim:

1. In a stove having an oven formed therein and a door for closing said oven, a hinge for said oven door comprising a bar adapted to be secured to said stove adjacent said oven, said bar being adapted to project outwardly of said stove and having an end projecting laterally with respect to said bar, a second bar adapted to be secured to said door for said oven, said second bar having a return bend formed at one end thereof, said laterally projecting end being disposed within said return bend, a shaft disposed in aligned openings formed in said ends, said bars being disposed at right angles to one another when said door is in closed position and said return bend being rotatable into engagement with said laterally projecting end to provide a stop for said door when said door is opened.

2. In a stove having an oven formed therein and a door for closing said oven, a hinge for said oven door comprising a bar adapted to be secured to said stove adjacent said oven, said bar being adapted to project outwardly of said stove and having an end projecting laterally with respect to said bar, a second bar adapted to be secured to said door for said oven, said second bar having a return bend formed at one end thereof, said laterally projecting end being disposed within said return bend, a shaft disposed in aligned openings formed in said ends, said bars being disposed at right angles to one another when said door is in closed position and said return bend being rotatable into engagement with said laterally projecting end to provide a stop for said door when said door is opened, a cam projecting from said first mentioned bar in opposite relation to said laterally projecting end and a resilient cam follower mounted on said second bar for engagement with said cam just prior to the closing of said door for resiliently opposing the closing of said door.

3. In a stove having an oven formed therein and a door for closing said oven, a hinge for said oven door comprising a bar adapted to be secured to said stove adjacent said oven, said bar being adapted to project outwardly of said stove and having an end projecting laterally with respect to said bar, a second bar adapted to be secured to said door for said oven, said second bar having a return bend formed at one end thereof, said laterally projecting end being disposed within said return bend, a shaft disposed in aligned openings formed in said ends, said bars being disposed at right angles to one another when said door is in closed position and said return bend being rotatable into engagement with said laterally projecting end to provide a stop for said door when said door is opened, and a spring disposed about said shaft and secured at one end to said shaft and at the other end to one of said bars for resiliently opposing the movement of said return bend into engagement with said laterally projecting end.

4. In a stove having an oven formed therein and a door for closing said oven, a hinge for said oven door comprising a bar adapted to be secured to said stove adjacent said oven, said bar having an end adapted to project outwardly of said stove, a second bar adapted to be secured to said door for said oven, said second bar having a return bend formed at one end thereof, said outwardly projecting end being disposed within said return bend, a shaft disposed in aligned openings formed in said ends, said bars being disposed at right angles to one another when said door is in closed position and being disposed in a different relative position when said door is opened, a torsional spring disposed about said shaft, one end of said spring being fixed relative to said shaft at an end of said shaft extending laterally from said bars, the other ends of said shaft and said spring being secured to said first mentioned and second bars respectively, said spring being arranged with respect to said shaft to increase the energy stored therein during the opening of said door and to apply said energy to the closing of said door.

5. An oven door hinge as defined in claim 4 in which said aligned openings in said return bend and said first mentioned bar are provided with laterally extending slots, and a key formed on said shaft and insertable through said return bend slot into operative position to said slot in said first mentioned bar, said torsional spring being disposed about said shaft with the end thereof secured to said second bar being disposed within said return bend slot.

6. In a stove having an oven formed therein and a door for closing said oven, a hinge for said oven door comprising a bar adapted to be secured to said stove adjacent said oven, said bar having an end adapted to project outwardly of said stove, a second bar adapted to be secured to said door for said oven, said second bar having a return bend formed at one end thereof, said outwardly projecting end being disposed within said return bend, a shaft disposed in aligned openings formed in said ends, said bars being disposed at right angles to one another when said door is in closed position and being disposed in a different relative position when said door is opened, a spring associated with said shaft, said shaft and spring being fixed relative to each other at one end of each and secured at the other ends thereof to different ones of said bars, said spring being positioned with respect to said shaft to increase the energy stored in said spring during the opening of said door and to apply said energy to the closing of said door, a cam follower resiliently mounted on one of said bars and a cam formed on the other bar and disposed in the path of said follower, the relative movements of said cam and follower being adapted to oppose the opening and closing movements of said door at different angular positions in said movements of said door, said cam and follower being positioned relative to the movements of said door to oppose the initiation of said opening movement and the completion of said closing movement.

7. In a stove having an oven formed therein and a door for closing said oven, a hinge for said oven door comprising a bar adapted to be secured

to said stove adjacent said oven, said bar having an end adapted to project outwardly of said stove, a second bar adapted to be secured to said door for said oven, said second bar having a return bend formed at one end thereof, said outwardly projecting end being disposed within said return bend, a shaft disposed in aligned openings formed in said ends, said bars being disposed at right angles to one another when said door is in closed position, and being disposed in a different relative position when said door is opened, a spring disposed about said shaft and secured at one end to said shaft and at the other end to one of said bars for resiliently opposing the opening of said door, a cam follower resiliently mounted on one of said bars and a cam formed on the other bar and disposed in the path of said follower, the relative movements of said cam and follower being adapted to oppose the opening and closing movements of said door at different angular positions in said movements of said door, said cam and follower being positioned relative to the movements of said door to oppose the initiation of said opening movement and the completion of said closing movement.

8. An oven door hinge as defined in claim 7 in which said cam follower comprises a roller operatively associated with said cam, a pair of spaced pins extending through spaced openings formed in said return bend, said roller being rotatably mounted on one of said pair of spaced pins, a follower bar disposed between said return bend and said roller, said one of said pins being secured in an opening formed in said follower bar, the other of said pins being secured in one of said openings formed in said return bend, said follower bar and said return bend being provided with slots permitting the movement of said pins toward and away from one another, and a spring connected between said pins for resiliently urging said pins toward one another and said roller against said cam.

9. In a stove having an oven formed therein and a door for closing said oven, a hinge for said oven door comprising a bar adapted to be secured to said stove adjacent said oven, said bar being

adapted to project outwardly of said stove and having an end projecting laterally with respect to said bar, a second bar adapted to be secured to said door for said oven, said second bar having a return bend formed at one end thereof, said laterally projecting end being disposed within said return bend, a shaft disposed in aligned openings formed in said ends, said bars being disposed at right angles to one another when said door is in closed position, said return bend being rotatable into engagement with said laterally projecting end to provide a stop for said door when said door is opened, a spring associated with said shaft, said shaft and spring being fixed relative to each other at one end of each and secured at the other ends thereof to different ones of said bars, said spring being positioned with respect to said shaft to increase the energy stored in said spring during the opening of said door and to apply said energy to the closing of said door, a cam follower resiliently mounted on one of said bars and a cam formed on the other bar and disposed in the path of said follower, the relative movements of said cam and follower being adapted to oppose the opening and closing movements of said door at different angular positions in said movements of said door, said cam and follower being positioned relative to the movements of said door to oppose the initiation of said opening movement and the completion of said closing movement.

HERBERT E. MILLS.

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