This invention relates to hinge mechanisms and, in particular, to a hinge mechanism which is adapted to releasably engage a hinged member.

Specifically, the invention constitutes an improvement over the hinge mechanism described in United States Patent 2,842,117 of July 8, 1958, which is issued to the same assignee as the assignee of the present application.

The hinge mechanism of the present invention has particular application to use in cooking stoves for the purpose of supporting the oven door. As is well known, the interior of the oven of cooking stoves requires periodic cleaning and the presence of the door, when in the open position, renders the interior of the oven somewhat less accessible than might be desired. Accordingly, several attempts have been made to provide removable doors so that the interior of the oven is readily accessible for cleaning purposes.

It is, therefore, an object of the present invention to provide a hinge mechanism which will positively engage and secure a door or other hinged member to the movable blade of a hinge for normal operation of the hinged member and which, when desired, can be readily manipulated so as to disengage the hinged member from the movable hinge blade so that the door or hinged member may be removed.

The invention will be described by way of reference to the accompanying drawings in which a preferred embodiment is illustrated and in which like reference numbers refer to like parts in the several views of which:

FIGURE 1 is a side elevation of the hinge mechanism taken in section through the oven door and the stove body;

FIGURE 2 is a view similar to FIGURE 1 showing the hinge mechanism fully engaged with the hinged member and with the hinged member in the partly open position;

FIGURE 3 is a view similar to FIGURE 2 with the hinged member in the closed position, and

FIGURE 4 is a section taken along line 4--4 of FIGURE 2.

Referring now to the drawings and, in particular, to FIGURE 1, it may be seen that the stove body indicated generally at 10 is provided with a front wall 11 seen in cross-section which is provided with an aperture 12 through which a part of the stationary portion of the hinge and a portion of the movable part of the hinge projects.

When the hinge mechanism which is the subject of the present invention is used to hinge an oven door to a stove, the wall 11 will constitute the peripheral rim of the opening, leading to the interior of the oven. In other environmental circumstances, however, the wall 11 may be a portion of any stationary supporting structure to which it is desired to secure a hinged member.

The stationary part of the hinge, as seen in FIGURE 1, comprises a first fixed hinge blade 13 which is rigidly secured to the stove body by means of bolts 13a as shown in FIGURE 1. The blade 13 is provided with an upwardly, outwardly and then downwardly extending arm portion 14, the upwardly extending portion bearing reference numeral 14a, the outwardly extending arm portion bearing reference numeral 14c and the downwardly extending portion bearing reference numeral 14d. At the extreme downward end of the downwardly extending portion 14c there is provided a pivot point in the form of a rivet 15 by means of which the movable hinge blade 17 of the hinge is pivotally mounted to the fixed hinge blade 13. The centre line or axis of the rivet 15 constitutes the hinge line of the oven door as well as the pivot point of the movable hinge blade about the fixed hinge blade and this axis is indicated by the dot in the centre of the rivet 15 which bears the reference numeral 16.

It will, of course, be obvious to one skilled in the art, that in pivotally mounting a hinged member to a stationary member, the normal practice will require the use of more than one hinge. In this event, of course, hinges similar to the one shown in the drawings will be arranged in such as manner that the point 16 on all the hinges will lie in a common line and the hinge line, therefore, will extend through the rivet 15 of the several hinges.

Since all of the hinges, according to this invention, will be similar, it is considered necessary to only describe one of them in detail and to only illustrate one in the drawings.

The movable blade 17 of the hinge comprises a first portion 17a which normally lies outside the wall 11 of the stove body 10 and a second portion 17b which lies within the body 10 of the stove. The portion 17b is provided, adjacent one end, with a stub shaft or pin 18 which extends normally from the surface of the portion 17a and which, when the hinged member is in the fully open position, will engage a lug 19 and the co-operation between these two parts will constitute a stop limiting the movement of the door in one direction. The end of the portion 17b carrying the stub 18 also carries a hook 20 to which is secured a coil tension spring 21 which serves to bias the movable blade 17 of the hinge mechanism and the hinged member is carried thereby towards the position shown in FIGURE 3.

Further, the portion 17b of the movable blade of the hinge is provided with a cam surface 22 which is engaged by a cam follower 23 mounted on an arm 24 pivoted at 25 to the portion 13 of the stationary hinge part. The arm 24 is spring biased by means of a compression coil spring 26 acting against a bracket 26a attached to a position in which the cam follower 23 engages the cam surface. By this means the closing of the door is resisted and retarded thereby countering the force of the spring 21 so that the door does not slam closed with undue violence. The cam surface 22 is provided with a projection 27 which, when it engages the cam follower 23, will hold the door in the partly open position which is known as the "brol" position. Further closing of the door will cause the cam follower 23 to ride over the projection 27 and the force of the spring 26 on the arm 24 will cause the cam follower 23 to ride on the surface 22a of the cam surface 22. In this position the cam engaging on surface 22a will assist the action of the spring 21 in holding the door closed and will thereby promote the accomplishment of an efficient seal between the oven door and the front wall 11 of the stove body 10.

In FIGURE 1 the oven door is indicated generally by the reference character 30 and may be seen to comprise an outer wall 31 which is spaced from but secured to a parallel inner wall 32. The inner wall 32 is commonly provided with a centrally raised portion 33 which, when the oven door is closed, lies within the opening of the oven door to promote the efficient sealing of the opening.

Lying within the space between the outer wall 31 and the inner wall 32, and rigidly incorporated into the door 30, is an attachment structure 34. The attachment structure includes, adjacent the edge of the door 30, a U-shaped
channel member 34b which, adjacent one of its ends, is provided with a pin 35 which extends between the two parallel side walls of the U-shaped channel member 34b. Adjacent the other end of the channel member 34b there is provided a lug 36 which extends away from the pin 35 and which is provided, on that edge remote from the hinge mechanism (when the door is presented to the hinge mechanism) with a cam surface 37 which extends from the tip 36a of the lug 36 to a stop surface 38 as may be seen in FIGURE 1.

The inner wall 32 of the door 30 is provided with an aperture 39 which leads to the interior of the U-shaped channel member which, of course, is so positioned that the open end of the U faces the hinge mechanism when the door is presented to the hinge.

Dealing now with the movable blade 17 of the hinge and, in particular, with portion 17a thereof, it will be seen that this portion of the movable blade 17 is provided with an arm 40 which extends substantially radially of the pivot point of the movable blade about the fixed blade and which is provided with a notch 41 opening radially outwardly in the outer end of the arm. This notch 41 is adapted to seat over the pin 35 when the end of the arm 40 is inserted through the opening 39 in the inner wall 32 of the door 30 so that the arm 40 enters the U-shaped channel member 34b.

Between the notch 41 and the pivot point 16 there is provided a movable catch pin 45 carried on a pivoted catch member 42 which is rotatably mounted on the hinge member 17 by pivot pin 45. An arcuate slot 44 is provided in the hinge member 17 and through this slot extends the movable catch pin 45 which is secured to the catch plate or member 42 which extends at right angles to it through the arcuate slot 44.

The movable catch member or plate 42 is, in addition, provided with a normally extending tab 46 which extends in the opposite direction to the movable catch pin 45 and which, therefore, extends away from the movable blade 17 of the hinge and constitutes a handle for the actuation and manipulation of the movable catch member 42.

Having described the construction of the component parts in some detail it is believed now appropriate to discuss the manner in which the door may be assembled on the hinge mechanism and, subsequently, removed.

In FIGURE 1 the door 30 is shown in a position partly engaged with the movable hinge blade 17. Clearly, the door as shown in FIGURE 1 may be in the process of being applied or, alternatively, may be in the process of being moved. In either event, the notch 41 on the arm 40 of the movable hinge blade 17 is engaged with the fixed catch pin 35 carried by the hinged member and this engagement constitutes a first point of attachment between the hinged member and the movable hinge blade 17.

In the event that the door is in the process of being removed it is merely necessary to lift the door 30 in a vertical and outward direction to disengage the fixed catch pin 35 from the notch 41 and to completely remove the door.

In the event that the door is being engaged with the movable hinge member 17 it would then be necessary, as the next step, to move the door in an arcuate manner about the fixed catch pin 35 as a pivot in such a manner as to bring the lug 36 into the relative position with respect to the movable catch pin 45 as is shown in FIGURE 2.

When the door has been pivoted about the fixed catch pin 35 so that it lies in an attachment position substantially parallel to a line drawn between the fixed catch pin 35 and the pivot point 16, the surface 34a of the U-shaped channel member 34b abuts against the edge of the arm 40 as shown in FIG. 2. This abutment between surface 34a and the arm 40 limits rotation of the attachment structure 34 and hence the oven door 30 in a counter-clockwise direction relative to the movable hinge blade 17 (as viewed in FIG. 1), and constitutes a second point of attachment between the hinged member and the movable hinge blade. The handle 46 of the movable catch plate 42 will then be grasped and this movable catch plate then moved in a clockwise direction about its pivot 43. This will bring the movable catch pin 45 into engagement with the cam surface 37, by passing it around the arcumity 36a of the lug 36 until the movable catch pin 45 abuts the stop surface 38 adjacent to the cam surface 37.

Once the movable catch pin 45 is in engagement with the cam surface 37 and in abutment with the stop surface 38 this engagement will constitute the third point of attachment between the hinged member and the movable hinge blade and the door will be firmly, positively and securely attached to the movable hinge member 17 for normal operation of a hinged member relative to a supporting structure.

In the engaged position shown in FIGURE 2 the handle portion 46 of the movable catch member 42 lies flush with the inner surface of the inner wall 32 and is, therefore, quite out of the way for the normal operation of the door. The handle portion 46 of the movable catch plate 42 is, in conjunction with that portion of the movable catch plate 42 to which it is attached heavier than the movable catch pin 45 and the portion of the catch plate 42 which lies on the side of the pivot 45 remote from the handle 46 so that even in the absence of any frictional engagement, gravity will hold the catch plate in the position shown in FIGURE 2 during the normal operation of the door.

When it is desired to remove the door from the hinge the door is first opened in the manner shown in FIGURE 2 and the handle 46 is raised to rotate the movable catch plate in a counter-clockwise direction so that the movable catch pin 45 disengages the lug 36. In this position, as seen in FIGURE 1, the pin 45 engages the surface 47 of portion 14a of the stationary hinge part so as to prevent the movable hinge blade 17 from moving in a clockwise direction beyond the position shown in FIGURE 1. This movement will, of course, be urged by the spring 21 and the action of the spring 21 will jam the pin 45 into engagement with the surface 47 of the portion 14a of the stationary hinge part 13. Thus, the movable hinge part 17 will be maintained in a position which prevents the notch 41 to the door 30 so that the door may be readily re-engaged on the hinge.

It is also to be noted that accidental disengagement of the pin 45 from the surface 47 of the stationary part 14a of the hinge is prevented due to the fact that the handle 46 of the movable catch plate 42 would engage a projecting portion (not shown) of the front wall a of the stove 10 if the catch plate 42 were to be rotated in a clockwise direction from engagement with the surface 47. Thus, the movable catch plate 42, when in the position shown in FIGURE 1, cannot be moved from that position without deliberately first rotating the movable hinge part 17 in a counter-clockwise direction to enable the handle 46 to clear the projecting portion of the front wall a of the stove 10.

Thus, the movable catch pin, when at the end of this arcuate path which disengages the lug 36 constitutes a stop limiting the movement of the movable hinge blade in the other direction relative to the direction in which the lug 19 limits it movement.

Referring now to FIGURE 3 the door 30 is shown in the closed position and here it may be seen that the movable catch pin 45, when in the position engaging the lug 36, is clear of the surface 47 of the stationary part 14a and does not obstruct the operation of the hinge.

Referring now to FIGURE 4 the U-shaped channel member 34b in this figure, is shown as being, instead, of L-shaped section, one of the walls of the U-shaped portion being omitted at 34a. In place of the wall which normally lies in this position a sheet metal bracket 50
is provided and secured in position by spot welding at 51 to a sheet metal flange 52 lying within the oven door. The bracket 50 extends along a path parallel to the flange 52 but in spaced relationship thereto by a substantial portion of its length and over this length it is indicated by the reference character 53. At a point indicated by reference character 54 the bracket bends away from the flange 52 towards the extreme edge 55 of the door and, at point 56, it is secured thereto by means such as spot welding.

The bracket 50 is provided with an aperture through which the fixed catch pin 35 may extend and the fixed catch pin is, accordingly, supported first at its point of attachment with the bracket 34 and, secondly, in the aperture where it passes through the bracket 50.

The channel member 340 is secured to the flange 52 by means of a rivet, bolt or other suitable means at the point indicated by the reference character 57.

The invention has been described in detail with reference to a preferred embodiment disclosed in the accompanying drawings. The description of this preferred embodiment is by way of example only and is to be construed in an illustrative sense rather than in a limiting sense. Minor modifications of the construction are contemplated within the spirit of the invention and the scope of the subjoined claim.

What I claim as my invention is:

A hinge mechanism comprising a first fixed hinge blade adapted to be secured to a stationary supporting structure, a second movable hinge blade pivotally mounted on the first hinge blade so that it pivots in its own plane, a hinged member, attachment structure rigidly incorporated into the hinged member, the attachment structure being adapted to be mounted on the second movable hinge blade, the second movable hinge blade having an arm extending substantially radially of the pivot point of the second movable hinge blade about the first fixed hinge blade, the end of said arm remote from said pivot point having a notch opening radially outwardly of the pivot point, the attachment structure having a fixed catch pin adapted to seat in said notch, the arm of the second movable hinge blade carrying a pivoted catch member intermediately between said pivot point and the notch, the catch member pivoting in a plane parallel to and immediately adjacent the plane of the second movable hinge blade, a movable catch pin on the pivoted catch member extending at right angles to the second movable hinge blade and capable of being moved in an arcuate path, the attachment structure having a lug extending away from the fixed catch pin, the attachment structure when the fixed catch pin is seated in the notch being rotatable about said fixed catch pin into an attachment position relative to the second movable hinge blade wherein the lug lies substantially along the arm of the second movable hinge blade, the attachment structure having projection means extending transversely across the plane of the movable blade, said projecting means abutting against the second movable hinge blade when the attachment structure is in the attachment position, said abutment limiting in one direction rotation of the attachment structure relatively to the second movable hinge blade, rotation in the reverse direction being preventable by the movable catch pin when the movable catch pin is in a first position on its arcuate path wherein the movable catch pin is less distant from the notch than the lug is from the fixed catch pin, and in which first position the pin contacts an edge of the lug facing in the said reverse direction, the movable catch pin being moveable to a second position more distant from the notch than the lug is from the fixed catch pin, in which second position the movable catch pin does not prevent rotation of the lug in the reverse direction.

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