

TITLE OF THE INVENTION
DROP-IN TYPE COOKING STOVE

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001]

The present invention relates to a drop-in type cooking stove equipped with a cooking stove main body and a top plate covering the cooking stove main body from above. An outwardly bent flange is formed on the upper edge of the peripheral wall portion of the cooking stove main body, and the outwardly bent flange is engaged with the aperture rim portion of a cooking stove aperture to hold the cooking stove main body by suspending the cooking stove main body from a counter top in the state in which the cooking stove main body is dropped down into the cooking stove aperture formed by opening the counter top.

2. Description of the Related Art

[0002]

The size of a cooking stove aperture formed by opening a counter top are various, and the selectable kinds of drop-in type cooking stoves at the time of buying a new one is restricted by the size of the cooking stove aperture. In this case, if the cooking stove main body is formed to be comparatively small in order to drop down the cooking stove main body into a small cooking stove aperture, and if the outwardly bent flange on the upper edge of the cooking stove main body is formed to be wide in order to be engaged with the aperture rim portion of a large cooking stove aperture, then the cooking stove can cope with cooking stove apertures of various sizes. However, if such a cooking stove main body is dropped down into a comparatively large cooking stove aperture, a large gap is produced between the peripheral wall portion of the cooking stove main body and the internal wall surface of the cooking stove aperture, and there is a possibility that the position of the cooking stove main body greatly shifts in the cooking stove aperture.

[0003]

It has conventionally been known to fix a cooking stove main body into a cooking stove aperture by screwing fixing bolts from the inside of the cooking stove

main body into the peripheral wall portion of the cooking stove main body to screw the bolts in such a way that the tips of the bolts abut against the internal wall surface of the cooking stove aperture in order to prevent the positional shifts of the cooking stove main body. However, if the projection lengths of the fixing bolts from the peripheral wall portion of the cooking stove main body are long, the bolts easily incline by the reaction force of abutting when the tips of the fixing bolts abut against the internal wall surface of the cooking stove aperture. Consequently, it becomes difficult to firmly fix the cooking stove main body with the fixing bolts when the space between the peripheral wall portion of the cooking stove main body and the internal wall surface of the cooking stove aperture is larger than a predetermined limit.

[0004]

Accordingly, it has conventionally been known to make spacers intervene between the tips of fixing bolts screwed into the peripheral wall portion of a cooking stove main body and the internal wall surface of a cooking stove aperture (see, for example, Japanese Patent Application Laid-Open Publication No. 2006-125795). In the configuration mentioned above, when the fixing bolts are screwed, the spacers are pushed to be moved toward the internal wall surface of the cooking stove aperture by the fixing bolts, and the fixing bolts finally abut against the internal wall surface of the cooking stove aperture with the spacers put between them. Consequently, the projection lengths of the fixing bolts from the peripheral wall portion of the cooking stove main body are shortened by the widths of the spacers. As a result, even if the space between the peripheral wall portion of the cooking stove main body and the internal wall surface of the cooking stove aperture is large, no inclination of the fixing bolts is caused, and the cooking stove main body can firmly be fixed.

[0005]

By the way, drop-in type cooking stoves have recently been marketed in each of which the top plate is fixed to the cooking stove main body to discourage a user from attempting to remove the top plate to thereby tamper with the equipment. In such a drop-in type cooking stove, the fixing bolts screwed into the peripheral wall portion of the cooking stove main body cannot be operated from the inside, and the

cooking stove main body cannot be fixed.

SUMMARY

[0006]

In view of the situation described above, the present invention has an advantage of providing a drop-in type cooking stove which has a top plate fixed to the cooking stove main body that can be firmly fixed even if the space between the internal wall surface of a cooking stove aperture formed in the counter top by opening it and the peripheral wall portion of the cooking stove main body is large.

[0007]

A drop-in type cooking stove according to an aspect of the present invention is made up of: a cooking stove main body; a top plate covering the cooking stove main body from above. The cooking stove main body has formed a flange outwardly bent along an upper edge of a peripheral wall portion of the cooking stove main body so that the cooking stove main body is engaged with an aperture rim portion of a cooking stove aperture formed in a counter top. The cooking stove main body is engaged in a state in which the cooking stove main body is dropped down into the cooking stove aperture, whereby the cooking stove main body is held in suspension by the counter top. The top plate is fixed to the cooking stove main body. The drop-in type cooking stove is further made up of: a spacer abutting against an outer surface of the peripheral wall portion of the cooking stove main body; and a fixing bolt threaded into a threaded hole from an outside. The threaded hole is formed through an outer end part of the spacer, the outer end part lying opposite to an inner end part of the spacer that abuts against the outer surface of the peripheral wall portion of the cooking stove main body, such that the cooking stove main body is fixed in position inside the cooking stove aperture by bringing a head of the fixing bolt into abutment against an inner wall surface of the cooking stove aperture.

[0008]

According to the aspect of the present invention, the fixing bolt is threaded into the threaded hole in the outer end part of the spacer from the outside, and consequently the fixing bolt can be operated from the lower part of the counter top to

make the head of the fixing bolt abut against the internal wall surface of the cooking stove aperture. Consequently, even if the top plate is fixed to the cooking stove main body and the space between the peripheral wall portion of the cooking stove main body and the internal wall surface of the cooking stove aperture is large, the cooking stove main body can firmly be fixed.

[0009]

Moreover, in another aspect of the present invention, preferably, a projecting part swelling outward is formed in the peripheral wall portion of the cooking stove main body. The outwardly bent flange has formed therethrough an engaging hole. A concave portion engaging with the projecting part is formed in the inner end part of the spacer, and a claw portion adapted for insertion into the engaging hole from a lower side for positional seizure therein is formed at an upper end of the outer end part of the spacer. According to this arrangement, by pushing up the inner end part of the spacer in the state in which the claw portion is inserted into the engaging hole to be seized therein, the concave portion of the inner end part is engaged with the projecting part in the peripheral wall portion of the cooking stove main body, and the spacer is led to be temporarily clamped to the cooking stove main body in an independent state of the spacer. Accordingly, the fixing bolt can be operated without holding the spacer with a hand, and workability is improved.

[0010]

By the way, the projecting part in the peripheral wall portion of the cooking stove main body has conventionally been provided for preventing a heat transfer quantity to the counter top from increasing owing to the surface contact of the peripheral wall portion to the internal wall surface of the cooking stove aperture when the cooking stove main body is dropped down into a cooking stove aperture of almost the same size as that of the cooking stove main body. The structure mentioned above for temporarily clamping the spacer by utilizing such a projecting part is very rational.

[0011]

Advantages of the invention will be set forth in the description which follows, and in part will be obvious from the description, or may be learned by practice of the invention. Advantages of the invention may be realized and

obtained by means of the instrumentalities and combinations particularly pointed out hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012]

The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate embodiments of the invention, and together with the general description given above and the detailed description of the embodiments given below, serve to explain the principles of the invention, in which drawings:

FIG. 1 is a plan view of a drop-in type cooking stove according to an embodiment of the present invention;

FIG. 2 is a plan view of the cooking stove main body of the drop-in type cooking stove of the embodiment;

FIG. 3A is a sectional view of the principal part showing the state in which the cooking stove main body of the drop-in type cooking stove of the embodiment is fixed with a spacer;

FIG. 3B is a sectional view of the principal part showing the state in which the cooking stove main body is fixed without using any spacers; and

FIG. 4 is a perspective view of the spacer.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0013]

An embodiment of the present invention will be explained with reference to the drawings.

[0014]

FIG. 1 shows a state in which a drop-in type cooking stove is incorporated in a counter top 1 of a built-in kitchen. The drop-in type cooking stove is equipped with a box-shaped cooking stove main body 2 (see FIG. 3A) having an upper surface formed as an opened surface, a top plate 3 covering the cooking stove main body 2 from above, and two burners 4 on the left and the right sides.

[0015]

An outwardly bent flange 21 is formed along the upper edge of the

peripheral wall portion of the cooking stove main body 2. Then, the outwardly bent flange 21 is engaged with the aperture rim portion of a cooking stove aperture 11, which is formed in the counter top 1 by opening it, to hold the cooking stove main body 2 by suspending it from the counter top 1 in a state in which the cooking stove main body 2 is dropped down into the cooking stove aperture 11.

[0016]

As shown in FIG. 3A, the top plate 3 is composed of the top plate main body 31, formed by a thick plate made of a heat-resistant glass or a metal, packing 32, mounted on the peripheral parts of apertures formed in the top plate main body 31 by opening it at two positions on the left and the right sides of the top plate main body 31, and two drip pans 33 placed on the packing 32 on the left and the right sides to cover the apertures. A burner use aperture 33a is formed at the central part of each of the drip pans 33, and the top end of the mixing tube 41 of each of the burners 4 installed in the cooking stove main body 2 is inserted into the burner use aperture 33a. Each of the burners 4 is equipped with the burner main body 42 having a diameter larger than that of the burner use aperture 33a and being exposed above the drip pan 33, and a pipe portion 43 vertically formed at the central part of the under surface of the burner main body 42 is fitted to the top end of the mixing tube 41. Moreover, a trivet 5, composed of a plurality of trivet claws 52 attached to an annular trivet frame 51, is placed on each of the drip pans 33 to enclose the burner main body 42. Furthermore, two operation knobs 6 for the burners 4 on the left and the right sides are provided on the front side part of the top plate main body 31.

[0017]

Each of the drip pans 33 is clamped with screws 34 to the upper end of a fixing piece 22 provided to stand on the bottom of the cooking stove main body 2 within the downward projection plane of the burner main body 42. Thereby, the top plate 3 is fixed to the cooking stove main body 2. Moreover, because the screws 34 are blindfolded by the burner main body 42, the top plate 3 cannot easily be removed. Then, the top plate 3 is fixed to the cooking stove main body 2 at the shipment stage thereof, and the cooking stove main body 2 is dropped down into the cooking stove aperture 11 with the top plate 3 attached thereto.

[0018]

Now, the sizes of the cooking stove apertures 11 are variously large and small. Accordingly, the cooking stove main body 2 is formed in a size capable of being inserted into a small cooking stove aperture, and, on the other hand, the outwardly bent flange 21 is formed to be wide on the left and the right sides and the rear side thereof as shown in FIG. 2 in order to be capable of being engaged with the aperture rim portion of a large cooking stove aperture. Thus, the cooking stove is made to be capable of coping with variously large and small cooking stove apertures 11. By the way, the cooking stove main body 2 is dropped down into the cooking stove aperture 11 in such a way that the front side peripheral wall portion of the cooking stove main body 2 comes close to the front side internal wall surface of the cooking stove aperture 11 independently of the size of the cooking stove aperture 11. Consequently, the front side outwardly bent flange 21 is formed to be narrow.

[0019]

On the peripheral wall portion on each of the left and the right sides of the cooking stove main body 2, there are formed a couple of threaded holes 23 on the front and the rear sides, and a couple of projecting parts 24 swelling outward on the front and the rear sides, the projecting parts 24 being at positions shifted from those of the threaded holes 23 into the front and rear direction. By the way, the projecting parts 24 have conventionally been provided for preventing the increase of a heat transfer quantity to the counter top 1 owing to the surface contact of the peripheral wall portion with the internal wall surface of the cooking stove aperture 11 when the cooking stove main body 2 is dropped down into the cooking stove aperture 11 of almost the same size as that of the cooking stove main body 2.

[0020]

When the size of the cooking stove aperture 11 is comparatively small, fixing bolts 7 are previously threaded from the outside into the threaded holes 23 of the peripheral wall portion of the cooking stove main body 2. Then, after the cooking stove main body 2 has been dropped down into the cooking stove aperture 11, a builder crawls into the lower part of the counter top 1 to operate the fixing bolts 7 to make the heads 71 of the fixing bolts 7 abut against the internal wall surface of the cooking stove aperture 11 as shown in FIG. 3B. According to this arrangement, even if the top plate 3 is fixed to the cooking stove main body 2 and the fixing bolts 7

cannot be operated from above, the cooking stove main body 2 can be fixed into the cooking stove aperture 11.

[0021]

If the cooking stove aperture 11 is large and the distance between the peripheral wall portion of the cooking stove main body 2 and the internal wall surface of the cooking stove aperture 11 is long, it is also considered to fix the cooking stove main body 2 by using long bolts. However, if the bolt projection lengths beyond the peripheral wall portion of the cooking stove main body 2 increase, the bolts easily get inclined owing to the reaction force of the abutting when the heads of the bolts abut against the internal wall surface of the cooking stove aperture 11. Consequently, when the space between the peripheral wall portion of the cooking stove main body 2 and the internal wall surface of the cooking stove aperture 11 becomes equal to or more than a predetermined limit (for example, 50 mm or more), it becomes difficult to firmly fix the cooking stove main body 2 with the fixing bolts 7.

[0022]

Accordingly, if the cooking stove aperture 11 is large, the cooking stove main body 2 is fixed by using a couple of spacers 8 situated on the front and the rear sides and abutting against the outer surface of the peripheral wall portion on each of the left and the right sides of the cooking stove main body 2. As shown in FIGS. 3A and 4, each of the spacers 8 is made of a sheet metal and is formed in a box having an upward aperture. A concave portion 81, which engages with a corresponding one of the projecting parts 24 of the peripheral wall portion of the cooking stove main body 2, is formed on the inner end part of each of the spacers 8, which end part abuts against the peripheral wall portion of the cooking stove main body 2. Moreover, on that outer end part of the spacer 8 which lies opposite to the inner end part thereof, there are formed a central threaded hole 82 and a couple of projecting parts 83 on the front and the rear sides to prevent the outer end part from getting into surface contact with the inner wall surface of the cooking stove aperture 11. Furthermore, a couple of outwardly bent claw portions 84 are formed on the upper end of the outer end part. Moreover, rectangular engaging holes 25, corresponding to the claw portions 84 of each of the spacers 8, are formed in the

outwardly bent flange 21 on each of the left and the right sides of the cooking stove main body 2. Then, each of the spacers 8 are configured in such a way that, when the inner end part of the spacer 8 is pushed up in a state in which the claw portions 84 of the spacer 8 are inserted into the engaging holes 25 from the lower side for positional seizure therein, the concave portion 81 in the inner end part of the spacer 8 engages with the corresponding projecting part 24 on the peripheral wall portion of the cooking stove main body 2. In this manner, the spacer 8 is temporarily clamped to the cooking stove main body 2 in an independent state.

[0023]

At the time of installing the cooking stove, after having dropped down the cooking stove main body 2 into the cooking stove aperture 11, a builder crawls into the lower part of the counter top 1, and then the spacers 8 are temporarily clamped to the cooking stove main body 2 as described above in such a state that each of the fixing bolts 7 has been threaded into the threaded holes 82. Next, the builder operates the fixing bolts 7 from the lower part of the counter top 1, and makes the heads 71 of the fixing bolts 7 abut against the internal wall surface of the cooking stove aperture 11 as shown in FIG. 3A.

[0024]

By using the spacers 8 in this manner, even if the space between the peripheral wall portion of the cooking stove main body 2 and the internal wall surface of the cooking stove aperture 11 is large, there will occur no inclination of the fixing bolts 7, and the cooking stove main body 2 can firmly be fixed. Then, because the fixing bolts 7 are threaded from the outside into the threaded holes 82 in the outer end parts of the spacers 8, the cooking stove main body 2 can be fixed by operating the fixing bolts 7 from the lower part of the counter top 1 even if the top plate 3 is fixed to the cooking stove main body 2. Furthermore, because the spacers 8 are temporarily clamped to the cooking stove main body 2 in an independent state, the fixing bolts 7 can be operated without holding the spacers 8 with a hand, and workability is improved. Moreover, when the heads 71 of the fixing bolts 7 abut against the internal wall surface of the cooking stove aperture 11, the spacers 8 are pressed against the peripheral wall portion of the cooking stove main body 2 by the reaction force of the abutting, and the cooking stove main body 2 is surely fixed.

[0025]

Moreover, the present embodiment is configured to temporarily clamp the spacers 8 by engaging the concave portions 81 of the spacers 8 with the projecting parts 24 of the cooking stove main body 2, which projecting parts 24 are provided for suppressing the heat transfer to the counter top 1. This configuration is very rational.

[0026]

Now, although the threaded hole 82 is formed at the central part in the vertical direction of the outer end part of each of the spacers 8 in the embodiment described above, the position of the threaded hole 82 may be shifted to an upper position to provide a corresponding fixing bolt 7 at a height shown by a virtual line in FIG. 3A. This configuration enables the cooking stove to cope with a thin counter top 1 and advantageous.

[0027]

In the above, the embodiment of the present invention has been described with reference to the drawings, but the present invention is not limited to this embodiment. For example, the end faces of the heads 71 of the fixing bolts 7 are flat surfaces in the embodiment, the end faces of the heads 71 may be formed to be convex surfaces, such as conically-shaped surfaces. The end faces of the heads 71 thereby eat into the internal wall surface of the cooking stove aperture 11 to more firmly fix the cooking stove main body 2 thereto.

[0028]

Moreover, although the spacers 8 of the embodiment described above are each made of a sheet metal, each of the spacers 8 can also be made of a die-cast product or a resin block. Furthermore, the spacers 8 abut against the outer surface of the peripheral wall portion on each of the left and the right sides of the cooking stove main body 2 in the embodiment described above, the spacers 8 may be made to abut against the outer surface of the peripheral wall portion on each of the front and the rear sides of the cooking stove main body 2.

[0029]

Moreover, although the embodiment concerns the application of the present invention to a drop-in type gas cooking stove using the burners 4 as heat

sources, the present invention can similarly be applied to also a drop-in type electric cooking stove using an electric heater or an electromagnetic induction coil as a heat source.

[0030]

Additional advantages and modifications will readily occur to those skilled in the art. Therefore, the invention in its broader aspects is not limited to the specific details and representative embodiments shown and described herein. Accordingly, various modifications may be made without departing from the spirit or scope of the general inventive concept as defined by the appended claims and their equivalents.

WHAT IS CLAIMED IS:

1. A drop-in type cooking stove, comprising:
 - a cooking stove main body;
 - a top plate covering the cooking stove main body from above;
 - the cooking stove main body having formed a flange outwardly bent along an upper edge of a peripheral wall portion of the cooking stove main body so that the cooking stove main body is engaged with an aperture rim portion of a cooking stove aperture formed in a counter top, the cooking stove main body being engaged in a state in which the cooking stove main body is dropped down into the cooking stove aperture, whereby the cooking stove main body is held in suspension by the counter top, the top plate being fixed to the cooking stove main body,
 - the drop-in type cooking stove further comprising:
 - a spacer abutting against an outer surface of the peripheral wall portion of the cooking stove main body; and
 - a fixing bolt threaded into a threaded hole from an outside, the threaded hole being formed through an outer end part of the spacer, the outer end part lying opposite to an inner end part of the spacer that abuts against the outer surface of the peripheral wall portion of the cooking stove main body, such that the cooking stove main body is fixed in position inside the cooking stove aperture by bringing a head of the fixing bolt into abutment against an inner wall surface of the cooking stove aperture;
 - wherein:
 - a projecting part swelling outward is formed in the peripheral wall portion of the cooking stove main body in order to prevent a heat transfer quantity to the counter top from increasing owing to the surface contact of the peripheral wall portion to the internal wall surface of the cooking stove aperture when the cooking stove main body is dropped down into a cooking stove aperture of almost the same size as that of the cooking stove main body;
 - the outwardly bent flange has formed therethrough an engaging hole;
 - a concave portion engaging with the projecting part is formed in the inner end part of the spacer; and
 - a claw portion adapted for insertion into the engaging hole from a lower side for positional seizure therein is formed at an upper end of the outer end part of the spacer.