

May 21, 1946.

R. HERMANN

2,400,643

COOKER

Filed Feb. 10, 1943

3 Sheets-Sheet 1

FIG. 4

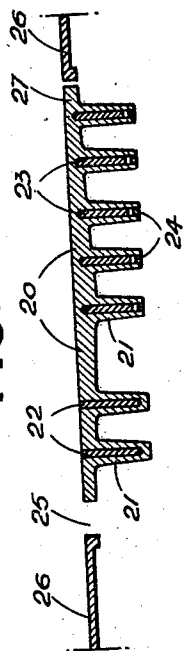


FIG. 3

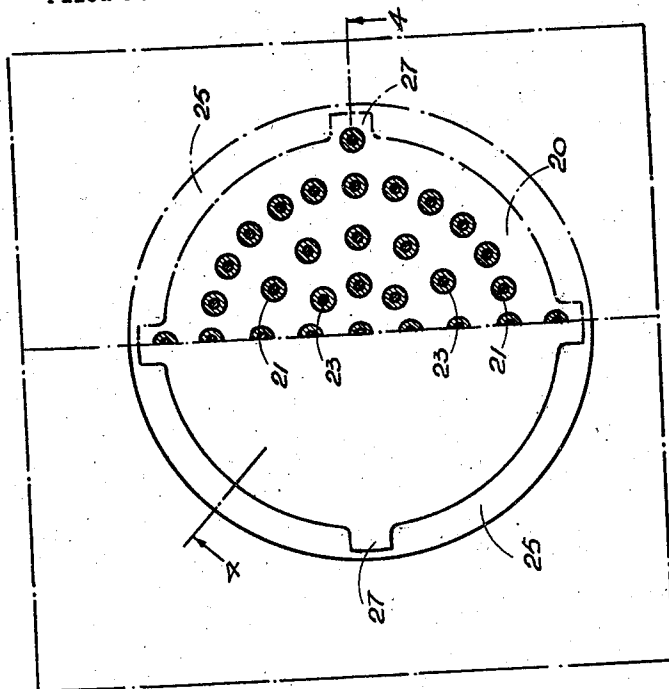


FIG. 2

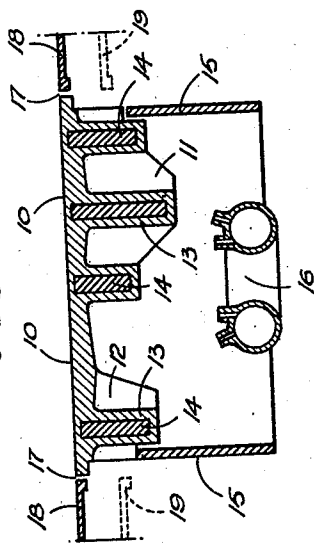
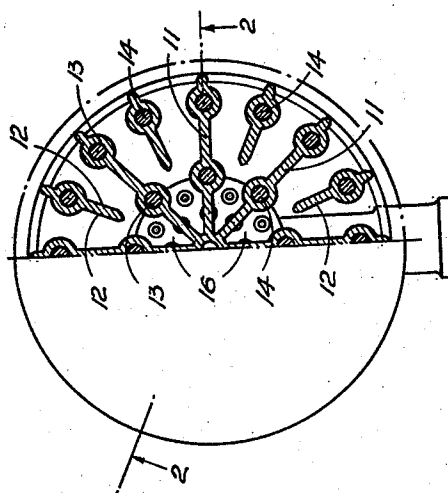


FIG. 1



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FIG. 8

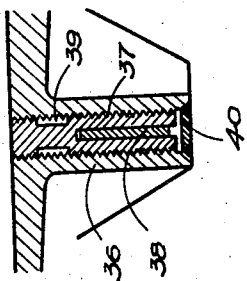


FIG. 12

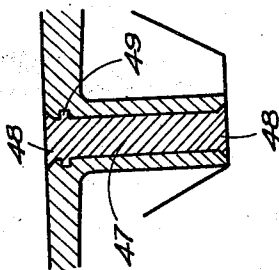


FIG. 7

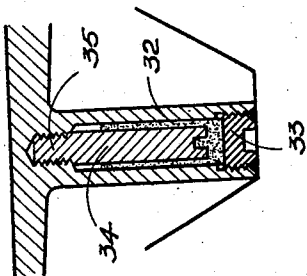


FIG. 11

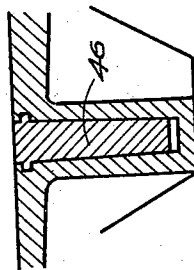


FIG. 6

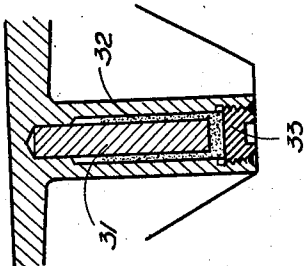


FIG. 10

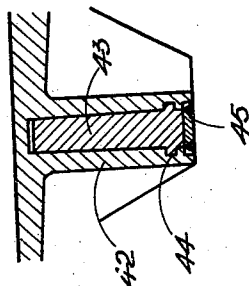


FIG. 5

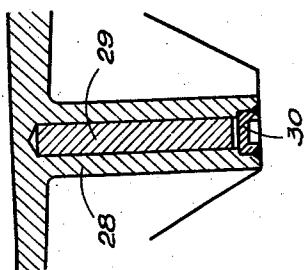
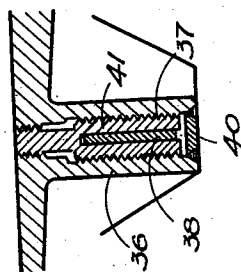


FIG. 9



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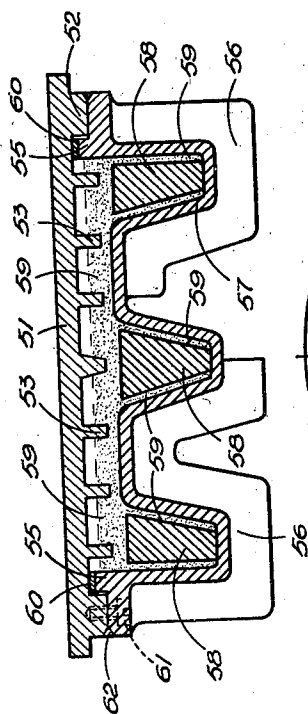


FIG. 14

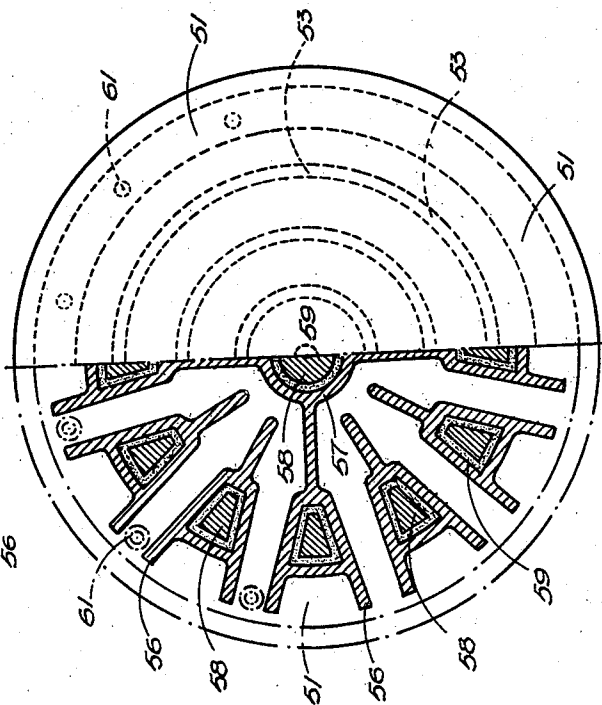


FIG. 13

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UNITED STATES PATENT OFFICE

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COOKER

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Application February 10, 1943, Serial No. 475,429
In Great Britain February 12, 1942

6 Claims. (Cl. 126—220)

This invention relates to improvements in cookers.

In the ordinary gas cooker which is in general use the top or hot-plate comprises a number of gas rings or burners arranged below skeleton supports for sauce pans or other cooking utensils. The utensils are heated directly by the flames and hot products of combustion from the burners and tests show that the efficiency of this method of heating is between 40 and 50 per cent. Part of the loss is due to the fact that the rate of heat transference from a gaseous medium to a solid medium is comparatively low and the products of combustion are only in contact with the surface of the utensil for a relatively short period of time as they flow over it.

Cookers are also known in which the burners are arranged below imperforate plates or rings on which the utensils are placed but the plates or rings are made of cast iron to resist corrosion by the products of combustion and cast-iron is a comparatively poor conductor of heat and there is a considerable heat loss between the burner and the utensil.

Similar imperforate plates or rings of cast-iron are used in solid fuel cookers, the plates or rings in some cases having depending ribs or fins over which the hot products of combustion from the fire flow but as the plates or rings are made of cast iron there is the same heat loss.

One object of my invention is to provide a hot plate in which the overall efficiency is substantially increased, and another object is to provide an efficient hot plate having a solid top similar to that of a cooking range for supporting the cooking utensils.

According to my invention a heated ring or plate to receive a cooking utensil comprises an imperforate or substantially imperforate plate or disc having depending fins, ribs or studs and having incorporated in it material of a higher heat conductivity than the material of which the plate is made.

The fins or ribs and the lower surface of the plate provide a very large surface for the reception of heat from a burner or burners below the plate and the heat is transferred by the material of high heat conductivity to the upper surface of the plate from which it is transferred by direct conduction and radiation to a utensil placed on the plate.

The plate will usually be made of cast-iron which is highly resistant to corrosion by the products of combustion but has a relatively low heat conductivity while the material of higher heat

conductivity may be copper or aluminium, or it may be a metal, metal alloy or salt having a melting point lower than the normal working temperature of the plate and enclosed within a space or spaces in the plate.

These and other features of my invention are described below in more detail with reference to the accompanying drawings in which a number of practical forms of my invention are illustrated by way of example.

In these drawings:

Figure 1 is a plan in half section of a gas-heated hot-plate in accordance with my invention.

Figure 2 is a vertical section on the line 2—2 of Figure 1.

Figure 3 is a plan of an alternative arrangement.

Figure 4 is a vertical section on the line 4—4 of Figure 3.

Figures 5 to 12 are fragmentary sections showing various ways of providing inserts of high heat conductivity in a cast-iron plate.

Figure 13 is a plan in half section of another form of hot-plate.

Figure 14 is a vertical section of the plate shown in Figure 13.

In the arrangement shown in Figures 1 and 2, 10 is a cast-iron hot plate having a flat top to receive a cooking utensil and having on its under surface integral depending radial ribs or fins. To avoid having a large mass of metal at the centre alternate ribs 11 extend to the centre of the plate while the intermediate ribs 12 terminate short of the centre. The ribs are thickened at certain points to form substantially cylindrical studs 13 each of which encloses an insert 14 of a metal of high heat conductivity such as copper or aluminium. These inserts are cast into the plate by placing them in the mould and casting the iron around them so that they become integral parts of the plate. The length of the inserts is such that they extend from adjacent the lower ends of the studs to or adjacent to the upper surface of the plates. The spacing and dimensions of the ribs and of the studs and inserts are preferably so selected that there is a substantially uniform distribution of heat over the surface of the plate.

The plate is supported by portions of the outer ends of certain of the ribs 11 and 12 resting on a ring 15 surrounding the gas burner 16 by which the plate is heated. There is preferably a gap 17 between the peripheral edge of the plate and the cooker-top 18 to avoid direct conduction of

heat from the plate to the top but the top will be heated to a certain extent by the products of combustion from the burner so that utensils placed on it will be kept hot. The upper surface of the plate may be flush with the cooker top which will then be in the relative position shown in full lines in Figure 2, or it may be set above the cooker top which will then be in the relative position shown in dotted lines at 19.

In the arrangement shown in Figures 3 and 4 a cast-iron plate 20 is formed with a series of integral spaced depending studs 21 in each of which is fitted an insert of high heat conductivity. As shown on the left of Figure 4 the studs are drilled vertically from the upper surface of the plate and inserts 22 of copper or aluminium are pressed, driven or screwed in. Alternatively the copper or aluminium may be inserted in the form of powder which is subsequently sintered together under heat. Instead of the bores being drilled in the studs they may be formed in the casting operation.

As shown on the right of Figure 4 the studs 21 are drilled upwardly from the bottom and after the inserts 23 are fitted the openings are closed by steel or iron plugs 24 welded in place to protect the lower ends of the inserts.

A substantial gap 25 for the escape of products of combustion is provided between the plate and the cooker top 26 except at spaced points where the plate has radially projecting lugs 27 which may serve to support it.

Figure 5 shows on a larger scale a stud 28 having a bore into which an insert 29 of copper or aluminium is pressed or driven, the lower end of the bore being closed by a ferrous plug 30 welded in place.

In Figure 6 the bore in the stud is of larger diameter than the insert 31 except at its upper end and the annular space around the insert is partially filled with sodium 32 or with a metal alloy or salt having a lower melting point than the normal working temperature of the plate. The lower end of the bore is closed by a plug 33 screwed and welded in place.

Figure 7 shows a modification in which the upper end of the insert 34 is threaded at 35 into the reduced upper end of the bore in the stud.

The arrangements shown in Figures 6 and 7 avoid risk of separation of the copper or aluminium inserts from the iron due to their different co-efficients of expansion or to growth of the cast-iron and at the same time ensure rapid conduction of heat through the plate.

Figure 8 shows an arrangement in which the bore in the stud 36 extends through to the upper surface of the plate and is internally screw-threaded, and an insert 37 of copper or aluminium is screwed into the bore, its upper end being flush with the upper surface of the plate. The lower end of the insert is slotted transversely and a wedge 38 is driven into the slot to expand the insert into close contact with the bore. A reduced part or neck is formed in the insert at 39 to allow for unequal expansion of the insert and stud. The lower end of the bore is closed by a ferrous plug 40 welded in place. The upper end of the bore may be countersunk and the upper end of the insert rivetted over into it.

Figure 9 shows a very similar arrangement but the upper end of the insert 41 is reduced in diameter to give uniform heat distribution on the surface of the plate, both parts of the insert being screwed with a thread of the same pitch.

Figure 10 shows an arrangement in which a

stud 42 is bored from its lower end with a tapered cylindrical bore into which a copper or aluminium insert 43 is driven. An annular groove 44 is formed around the bore near its lower end into which the copper or aluminium is forced to form a key. A ferrous plate 45 is welded to the bottom of the stud to protect the insert.

Figure 11 shows an arrangement which is similar to Figure 10 but the bore is drilled from the upper surface of the plate and the upper end of the insert 46 is flush with the plate.

Figure 12 shows an arrangement in which the bore and insert extend right through the plate and the stud. The top and bottom ends of the bore are countersunk and the ends of the insert 47 are rivetted over into them as shown at 48. The bore may also have an annular groove 49 into which the metal of the insert is forced.

In all the constructions in which the upper ends of the inserts extend to the upper surface of the plate that surface is preferably ground flat after the inserts have been fitted.

The hot plate shown in Figures 13 and 14 is a hollow member made in two parts. The upper part is a flat cast-iron plate 51 having a peripheral depending flange 52 and a series of shallow depending ribs or studs 53. The lower part has a peripheral horizontal flange 54 adapted to co-operate with the flange 52 and on the inside of that an upstanding annular flange 55 defining a shallow circular well. On the underside of this lower part are a number of integral radial ribs 56 each of which is enlarged at one point and is made hollow to form a trough 57 opening into the well. A block 58 of copper or aluminium and of complementary shape but smaller dimensions is located in each trough and the space around these blocks and the well are filled with sodium 59 or with another metal alloy or salt which is liquid at the normal working temperature of the plate. The depending ribs or studs 53 extend into the filling in the well so that heat taken up by the blocks 58 and by the filling in the troughs and well is rapidly transferred to the upper surface of the plate. The filling does not completely occupy the whole of the space within the plate, a small margin being left for expansion. The space within the plate is sealed by a washer 60 between the flange 55 and the upper part of the plate, and to facilitate assembly the two parts are first secured together by screws 61 and then their peripheral meeting edges are welded together at 62.

In all forms of the plate the fins, ribs or studs depending from it may be so designed that they provide draught-inducing passages for the products of combustion from the burner or burners, and if the plate has an annular depending peripheral wall openings are provided at suitable points for the escape of the products of combustion. Channels on the underside of the cooker top may lead to a chimney or ventilator.

A cooker top may conveniently consist of three or four heated plates in accordance with my invention mounted in a flat metal top with a centrally located pilot flame having flash tubes leading to the burners for lighting them.

I claim:

1. A device for positioning in the top of a stove for supporting a utensil to be heated, comprising a plate having a flat upper surface and a plurality of spaced integral members depending therefrom, and a plurality of vertically-elongated solid metallic inserts formed of a material of

higher heat conductivity than the plate disposed within the plate and the depending members.

2. A device according to claim 1, in which the upper ends of the inserts are flush with the upper surface of the plate.

3. A device according to claim 1, in which the inserts are disposed wholly within the plate and the depending members.

4. A device according to claim 1, in which the plate has a plurality of vertically-elongated apertures therein within which the inserts are positioned by a drive fit.

5. A device according to claim 1, in which the

plate has a plurality of vertically-elongated internally screw-threaded apertures therein within which the inserts are screw-threaded.

5 6. A device according to claim 1, in which the plate has a plurality of vertically-elongated apertures within which the inserts are positioned and which are respectively of greater diameter and length than the inserts therein, and a heat conducting material which is liquid at the normal
10 operating temperature of the plate within the aperture.

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