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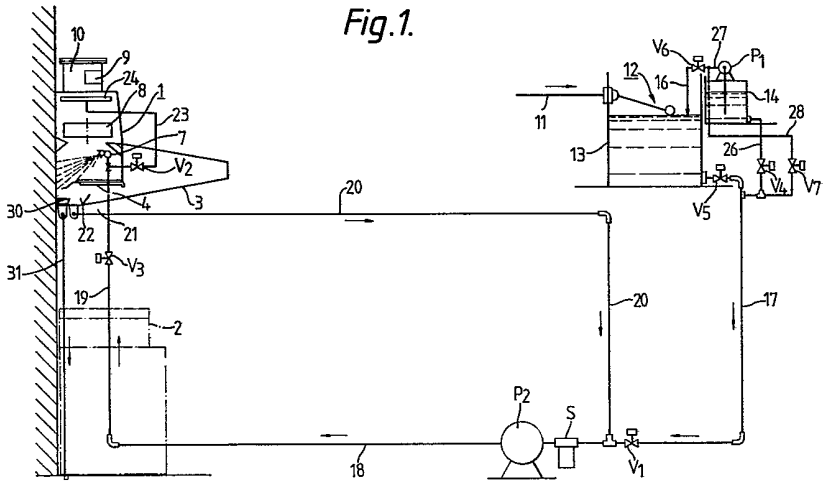
(54) Improvements in or relating to extractors

(57) Apparatus for supplying a mixture of water and detergent from a spray nozzle (7) of an extractor for extracting and cleaning hot fumes generated during use of a cooking appliance (2) comprises a main tank (13), a ballcock (12) for supplying water to the main tank (13), a detergent tank (14), means (P_1) for feeding detergent from the detergent tank (14) to the main tank (13), whereby, in use, the water and the detergent are mixed in the main tank (13) to make the water saturated with the detergent, a feed pipe (17) connected to the main tank (13), a delivery pipe (18) connected to the feed pipe (17), a pump (P_2) being provided in the delivery pipe (18), and means (19) for supplying the mixture of water and detergent from the delivery pipe (18) to the spray nozzle (7).

Fig.1.



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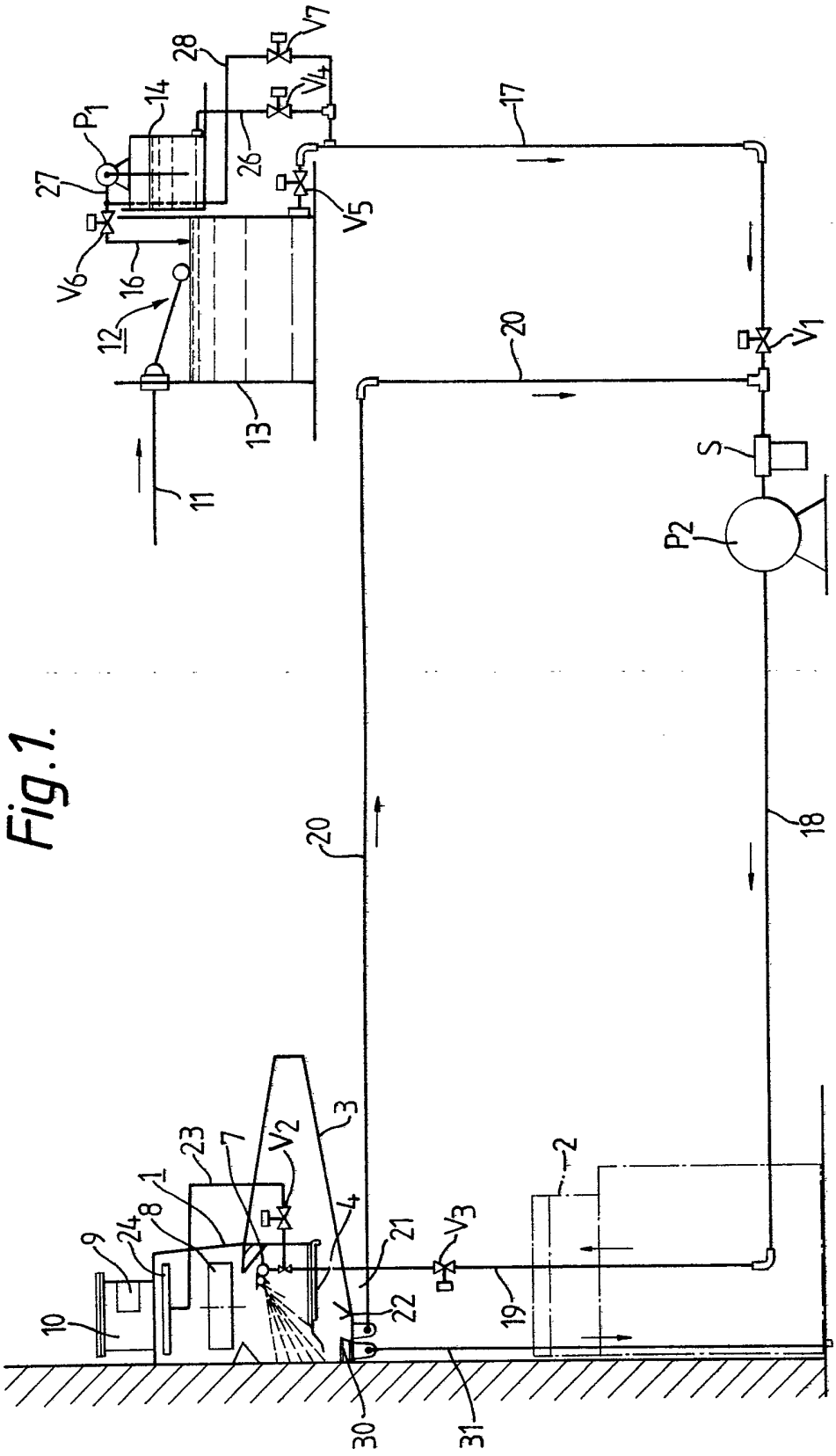
P1
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Fig.1.

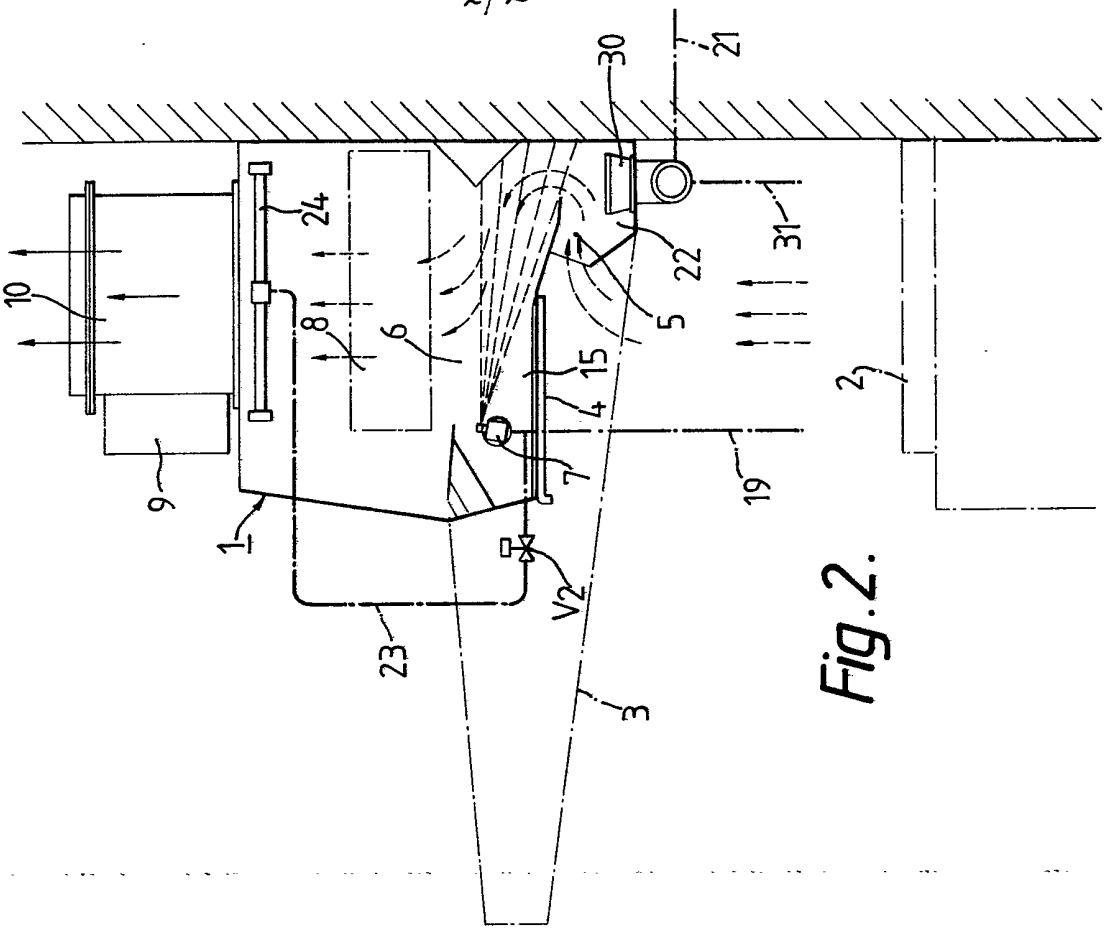

Fig.2.

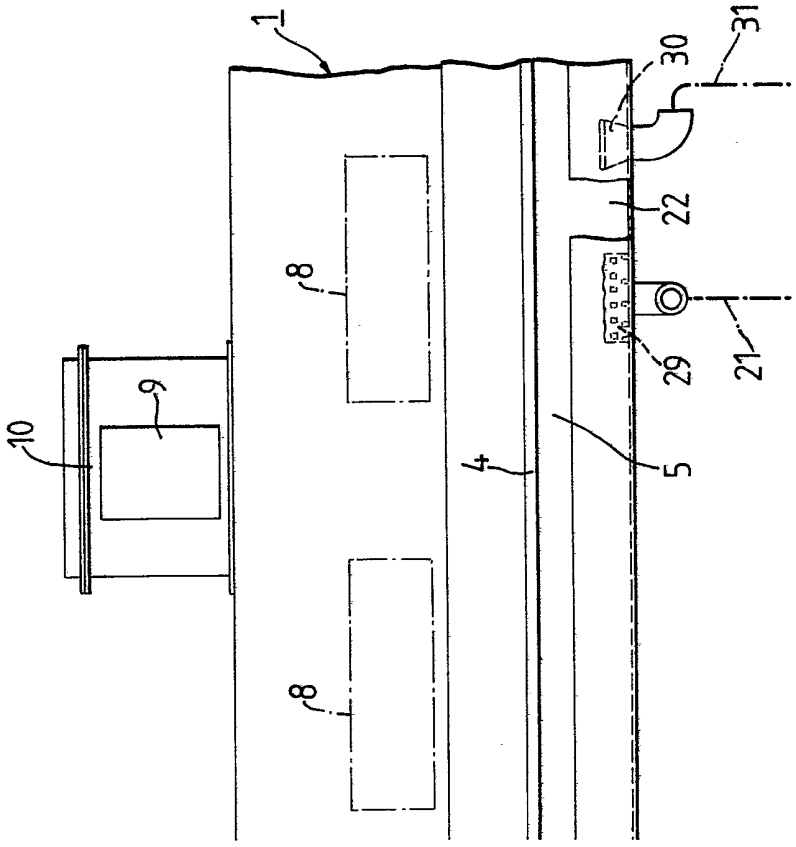

Fig.3.

SPECIFICATION

Improvements in or relating to extractors

THIS INVENTION relates to improvements in or relating to extractors, and, in particular, to an extractor in which hot exhaust smoke or air containing oils and fats emitted by a heat-generating cooking appliance, such as a range or fryer, is sucked through an intake port located for example in the lower region of the extractor main body, a mixture of water and detergent is sprayed from a spray nozzle through the hot exhaust air, means such as a rotary baffle are used to remove waterdrops containing oils and fats from the exhaust air and then cleaned air is discharged into the atmosphere.

In a previously proposed extractor, the apparatus which automatically feeds a mixture of water and detergent to an exhaust air cleaning spray nozzle provided in the extractor has a complex construction. The apparatus comprises a complex array of piping, valves and other components which are disposed in a control box separately from the extractor body itself. In use, a mixture of water and detergent is automatically supplied to the spray nozzle through a circulation pipeline, a water screen is formed in the hot exhaust air by spraying the water, the hot exhaust air is cooled and cleaned through removal of oils, fats and moisture therefrom by means of a rotary baffle, the used water is allowed to drain and is then recovered by means of a circulation water feeder and continuously fed to the spray nozzle.

This previously proposed extractor has the disadvantage that the water feeder is complex and therefore expensive and difficult to install and operate.

Accordingly, it is an object of the present invention to enable the provision of an extractor whereby the above disadvantages may be overcome or at least mitigated.

According to a first aspect of the present invention there is provided an extractor for extracting and cleaning fumes generated during use of a cooking appliance, which extractor comprises means for aspirating fumes from the region of a cooking appliance, a spray nozzle, means for supplying a mixture of water and detergent from the spray nozzle into the path of the fumes, which supply means comprises a reservoir, means for supplying water to the reservoir, means for supplying detergent to the reservoir and means for delivering a mixture of the water and the detergent from the spray nozzle of the extractor, means for recovering water and detergent from the fumes and means for discharging the extracted cleaned fumes into the atmosphere.

According to a second aspect of the present invention there is provided apparatus for supplying a mixture of water and detergent from a spray nozzle of an extractor, which supply apparatus comprises a reservoir, means for supplying water to the reservoir, means for supplying detergent to the reservoir and means for delivering a mixture of the water and the detergent from a spray nozzle of an extractor.

According to a third aspect of the present invention there is provided apparatus for supplying a mixture of water and detergent from a spray nozzle of an extractor for extracting and cleaning hot fumes generated during use of a cooking appliance, which supply apparatus comprises a main tank, a ballcock for supplying water to the main tank, a detergent tank, means for feeding detergent from the detergent tank to the main tank, whereby, in use, the water and the detergent are mixed in the main tank to make the water saturated with the detergent, a feed pipe connected to the main tank, a delivery pipe connected to the feed pipe, a pump being provided in the delivery pipe, and means for supplying the mixture of water and detergent from the delivery pipe to the spray nozzle.

Thus, the main tank can be installed in the kitchen in such a way that it does not disturb the installation of cooking appliances.

The present invention enables the provision of a comparatively inexpensive and simple to use extractor system.

For a better understanding of the present invention, and to show how the same may be put into effect, reference will now be made, by way of example, to the accompanying drawings, in which:

FIGURE 1 is a schematic side view of an extractor system in accordance with the invention,

FIGURE 2 is an enlarged view from the other side of the extractor main body, and

FIGURE 3 is a partial front view of the extractor main body.

An extractor main body 1 is disposed immediately above a heat-generating cooking appliance 2, such as a range, fryer, griddle, broiler or oven in a hotel or restaurant kitchen. Below the main body 1 a hood 3 is arranged to draw in the hot, oil and fat bearing fumes or smoke generated during use of the appliance 2. A drawer type sliding door 4 is provided on an opening formed in the body 1 inside the hood 3. Above the door 4 is disposed a filtering chamber 6 for filtering the hot exhaust air which ascends through a circuitous air passage 5. A spray nozzle from which a detergent and water mixture is sprayed into the hot exhaust air to cool and clean the air is disposed at one side of the filtering chamber 6. A rotary baffle 8 is disposed above the nozzle to remove droplets of water and emulsified fats from the hot exhaust air. An exhaust flue 10 provided with a fire damper 9 is in communication with the upper side of the rotary baffle 8 which rotates at a high speed due to exhaust air current. The dehumidified and cleaned air is taken into the exhaust flue 10 and discharged into the atmosphere through a duct is connected to the exhaust flue and is provided with a suction fan. The fire damper 9 remains open under normal operating conditions but automatically closes in the event of fire or power failure to mimimise fire damage or hazards.

A main tank 13 for supplying the detergent-water mixture to the spray nozzle and a detachable detergent tank 14 are provided elsewhere in the kitchen or

cooking area and are preferably at a high level, for example, at about the same level as the spray nozzle 7 as shown. A ball-cock 12 is provided in the main tank 13 and a water feed pipe 11 for supplying mains or other water is connected to the tank. Detergent is supplied from the detergent tank 14 to the main tank 13 by means of a detergent supply pump P_1 through a detergent feed pipe 16 provided with a solenoid valve V_6. The detergent-water mixture is obtained when the detergent thus supplied and the mains or other water which is supplied through the water feed pipe are mixed in the main tank 13.

A detergent-water mixture feed pipe 17 is connected to the main tank 13. A solenoid valve V_1 which automatically opens and closes under the control of a timer is provided in this feed pipe 17 on the supply side. A strainer S and a delivery pipe 18 in which a pump P_2, which may be self-priming, is provided are connected to the delivery side of the feed pipe 17. A solenoid valve V_3 is provided in the vertical feed pipe 19 of the delivery pipe 18 and the feed pipe 19 is connected to the spray nozzle 7. A relatively small amount of detergent can be added to the water supplied to the main tank 13 so that a detergent-water mixture can be fed to the spray nozzle 7 at low cost. Altternatively, detergent alone can be directly supplied fom the detergent tank 14 so as to improve the efficiency of cleaning of the hot exhaust air or the extractor.

To enable the provision of direct detergent feed, a detergent supply pipe 26 running from the detergent tank 14 and having a solenoid valve V_4 which opens and closes under the control of the timer is connected to the detergent-water mixture feed pipe 17. A solenoid valve V_5 which also opens and closes under the control of the timer is provided in the feed pipe 17 near the detergent-water mixture delivery point from the main tank 13. When detergent is to be directly supplied to the feed pipe 17 from the detergent tank 14 through the detergent supply pipe 26, the solenoid valve V_5 closes while the solenoid valve V_4 opens.

Alternatively, detergent stored in the detergent tank 14 can be supplied directly through the feed pipe 17 by means of the detergent supply pump P_1 as follows. A detergent feed pipe 28 having a solenoid valve V_7 is connected to the feed pipe 27 connecting the detergent supply pump P_1 and the solenoid valve V_6. The detergent feed side of this feed pipe 28 is connected to the feed pipe 17 to which the detergent feed side of the detergent supply pipe is also connected. When the detergent stored in the detergent tank 14 is to be suplied to the feed pipe 17 through the feed pipe 28, the solenoid valves V_4, V_5 and V_6 close and the solenoid valve V_7 opens so that the detergent supply pump P_1 is driven. Detergent is thus supplied to the feed pipe 17 through the feed pipe 28 under the (constant) pump pressure.

The pipe connecting the solenoid valve V_1 and the strainer S branches to form a circulation pipe 20 for the detergent-water mixture. The return side 21 of the circulation pipe 20 is connected to a reservoir strainer 29 which is provided in the lower region of a reservoir 22 for the detergent-water mixture recovered from the spray nozzle 7. An overflow/drain cock 30 is disposed adjacent the reservoir strainer 29.

Furthermore, a branch pipe 23 having a solenoid valve V_2 is connected to the feed side of the delivery pipe 18. This branch pipe 23 is connected to a shower type spray nozzle 24 which is located above the rotary baffle 8. The detergent-water mixture is sprayed from the spray nozzle 24 into the extractor main body 1 for cleaning purposes by opening the solenoid valve V_2.

When the extractor is in automatic operation mode, air is forced out of the main body 1 by means of the suction fan installed in the exhaust flue 10. Next, the solenoid valves V_1, V_3 and V_5 are opened in response to the timer so that the detergent-water mixture is fed from the main tank 13 by means of the detergent supply pump P_2 until the water reaches the spray nozzle 7 through the feed pipe 17, delivery pipe 18, and feed pipe 19. The detergent-water mixture sprayed from the nozzle 7 is directed towards the hot exhaust air which is forced to ascend through the circuitous passage 5 by the suction fan installed in the duct. The hot exhaust air is thus cleaned when passing through the screen of preferably detergent saturated water. At the same time, oils, fats and moisture contained in the hot exhaust air are removed by the detachable rotary baffle 8 which is turned by the flow of ascending air. The cleaned air is discharged into the atmosphere from the exhaust flue 10 and through the duct. During the cleaning operation, the detergent-water mixture sprayed from the spray nozzle 7 is recovered in the reservoir 22. The supernatant portion of this recovered water is discharged from the drain pipe 31 by opening the overflow/drain cock 30. A hot exhaust air cleaning circulation cycle is established as the detergent supply pump P_2 is driven to circulate the detergent-water mixture through the delivery pipe 18, spray nozzle 7, circulation pipe 20 and reservoir 22 after the supply of the detergent-water mixture from the main tank 13 is stopped by closing the solenoid valve V_1 under the control of the timer. Thus, the detergent-water mixture recovered in the reservoir 22 is sucked into the circulation pipe 20 from the return side 21. The water so recovered is fed under pressure from the strainer S and pump P_2 to the spray nozzle 7 through the delivery pipe 18 and feed pipe 19. From the spray nozzle 7 the detergent-water mixture is sprayed through the hot exhaust air as has been previously described and the air is cleaned. The water used is again received by the reservoir 22 from which the water is fed under pressure to the spray nozzle 7 through the reservoir strainer 29, return section 21, circulation pipe 20, strainer S, pump P_2, delivery pipe 18, and feed pipe 19. The detergent-water mixture is thus used economically.

In summary, detergent is supplied by the pump P_1 from the detergent tank 14 into the main tank 13 and, at the same time, a detergent-water mixture is obtained in the main tank 13 where the detergent is mixed with water such as mains water. From the main tank 3 the detergent-water mixture is fed to the spray nozzle 7. The ballcock 12 in the main tank 13 controls the flow rate of the detergent supplied from the detergent tank 14 (for example by direct control of the solenoid valve V_6) and that of the water supplied to the main tank 1 in accordance with the amount of the detergent-water mixture consumed with the result that the detergent-water mixture is automatically fed

at the correct constant rate because the level thereof is kept at a predetermined value. The manufacturing cost is relatively low for an automatic detergent-water mixture feeder for the hot exhaust air cleaning spray nozzle of an extractor and the operation of the automatic feeer is relatively simple.

CLAIMS

1. An extractor for extracting and cleaning fumes generated during use of a cooking appliance, which extractor comprises means for aspirating fumes from the region of a cooking appliance, a spray nozzle, means for supplying a mixture of water and detergent from the spray nozzle into the path of the fumes, which supply means comprises a reservoir, means for supplying water to the reservoir, means for supplying detergent to the reservoir and means for delivering a mixture of the water and the detergent from the spray nozzle of the extractor, means for recovering water and detergent from the fumes and means for discharging the extracted cleaned fumes into the atmosphere.

2. An extractor according to Claim 1, wherin the means for supplying water to the reservoir comprises a ballcock which is connectbale to a mains water supply.

3. An extractor according to Claim 1 or 2, wherein the means for supplying detergent to the reservoir comprises a further reservoir and a pump for pumping detergent from the further reservoir to the reservoir.

4. An extractor according to any one of the preceding claims, wherein the means for supplying a mixture of water and detergent from the spray nozzle further comprises means for recovering a mixture of water and detergent which has been sprayed from the spray nozzle and means for delivering the recovered mixture from the spray nozzle.

5. An extractor according to any one of the preceding claims, wherein the means for delivering a mixture of water and detergent from the spray nozzle comprises a pump and/or a gravity feed arrangement.

6. An extractor according to any one of the preceding claims, wherein the means for supplying a mixture of water and detergent from the spray nozzle comprises means for supplying only detergent from the spray nozzle.

7. An extractor according to Claims 3 and 6, wherein the means for suppling only detergent from the spray nozzle comprises means for disconnecting the spray nozzle from the reservoir and for connecting the spray nozzle to the outlet of the said pump, for pumping detergent from the further reservoir to the reservoir.

8. An extractor according to Claims 5 and 6, wherin the means for supplying only detergent from the spray nozzle comprises means for disconnecting the spray nozzle from the reservoir and for connecting the further reservoir to the inlet of the said pump, for delivering a mixture of water and detergent from the spray nozzle.

9. An extractor according to any of the preceding claims, which extractor further comprises a further nozzle and means for supplying a mixture of water and detergent from the further nozzle.

10. An extractor, substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.

11. Apparatus for supplying a mixture of water and detergent from a spray nozzle of an extractor, which supply apparatus comprises a reservoir, means for supplying water to the reservoir, means for supplying detergent to the reservoir and means for delivering a mixture of the water and the detergent from a spray nozzle of an extractor.

12. Apparatus according to Claim 11, wherein the means for supplying water to the reservoir comprises a ballcock which is connectable to a mains water supply.

13. Apparatus according to Claim 11 or 12, wherein the means for supplying detergent to the reservoir comprises a further reservoir and a pump for pumping detergent from the further reservoir to the reservoir.

14. Apparatus according to any one of Claims 11 to 13, which apparatus further comprises means for recovering a mixture of water and detergent which has been sprayed from the nozzle and means for delivering the recovered mixture from the spray nozzle.

15. Apparatus according to any one of Claims 11 to 14, wherein the means for delivering a mixture of water and detergent from the spray nozzle comprises a pump and/or a gravity feed arrangement.

16. Apparatus according to any one of Claims 11 to 15, which apparatus comprises means for supplying only detergent from the spray nozzle.

17. Apparatus according to Claims 13 and 16, wherein the means for supplying only detergent from the spray nozzle comprises means for disconnecting the spray nozzle from the reservoir and for connecting the spray nozzle to the outlet of the said pump, for pumping detergent from the further reservoir to the reservoir.

18. Apparatus according to Claims 15 and 16, wherein the means for supplying only detergent from the spray nozzle comprises means for disconnecting the spray nozzle from the reservoir and for connecting the further reservoir to the inlet of the said pump, for delivering a mixture of water and detergent from the spray nozzle.

19. Apparatus according to any one of Claims 11 to 18, which apparatus further comprises means for supplying a mixture of water and detergent from a further nozzle of the extractor.

20. Apparatus forsupplying a mixture of water and detergent from a spray nozzle of an extractor for extracting and cleaning hot fumes generated during use of a cooking appliance, which supply apparatus comprises a main tank, a ballcock for supplying water to the main tank, a detergent tank, means for feeding detergent from the detergent tank to the main tank, whereby, in use, the water and the detergent are mixed in the main tank to make the water saturated with the detergent, a feed pipe connected to the main tank, a delivery pipe connected to the feed pipe, a pump being provided in the delivery pipe, and means for supplying the mixture of water and detergent from the delivery pipe to the spray nozzle.

21. Apparatus for supplying a mixture of water and detergent from a spray nozzle of an extractor, sustantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.

22. An extractor whenever comprising apparatus in accordance with any one of Claims 11 to 21.

23. Anynovel feature or combination of features described herein.

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