United States Patent

[11] 3,586,011

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[54] **DISH WASHER**
6 Claims, 9 Drawing Figs.

[52] **U.S. Cl.** **134/57,** 134/95, 134/103, 134/115, 134/183
[51] **Int. Cl.** **B08b 3/02**
[50] **Field of Search** ..... 134/56 D, 57 D, 57 DL, 58 D, 58 DL, 94, 95, 103, 115, 182, 183, 200

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Primary Examiner—Robert L. Bleutge
Attorney—Holman, Glascock, Downing and Seebold

ABSTRACT: The washing chamber of a dishwashing machine is divided in two zones, one for dishes, glasses and the like, the other for metallic saucepans and the like; the jets of solution in both zones are fed from the same source, and the jets in the first zone are closed automatically when the temperature of the solution reaches a certain degree, so that the solution is successively sprayed at a higher temperature and higher pressure only on the metallic saucepans.

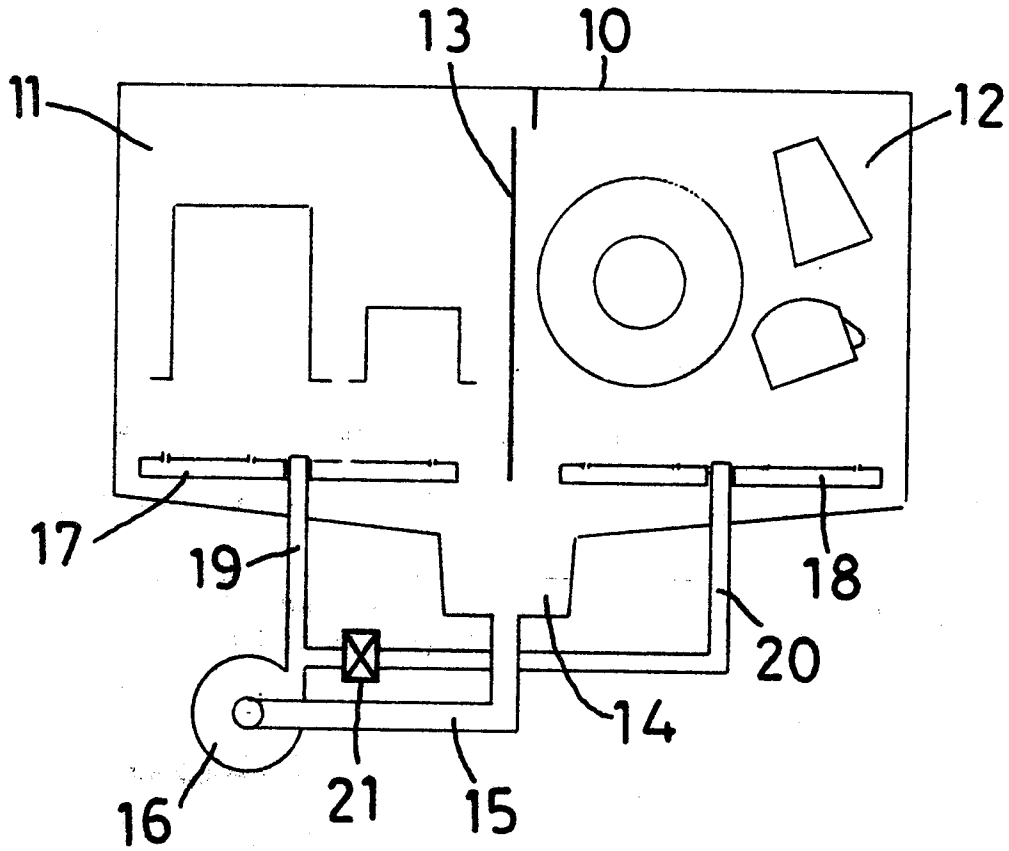


Fig.1

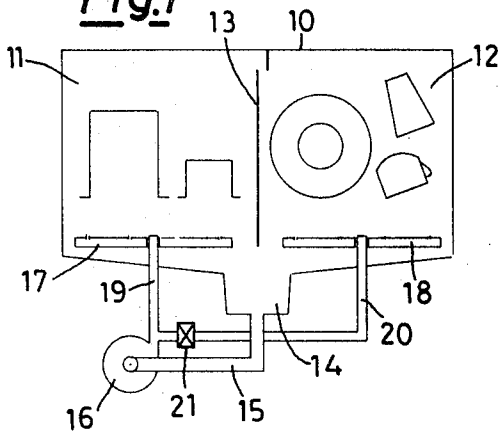


Fig.3

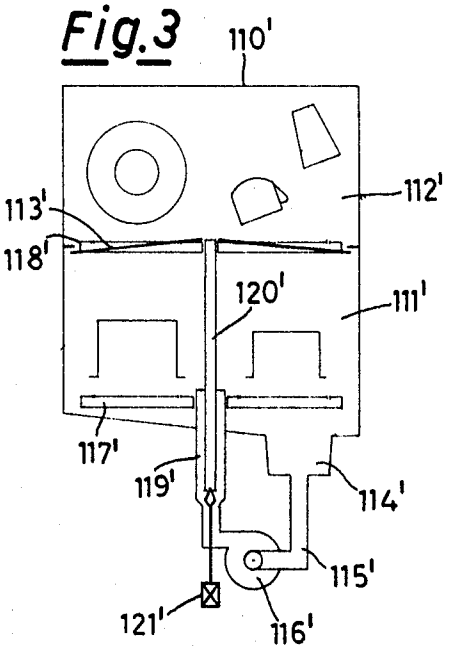
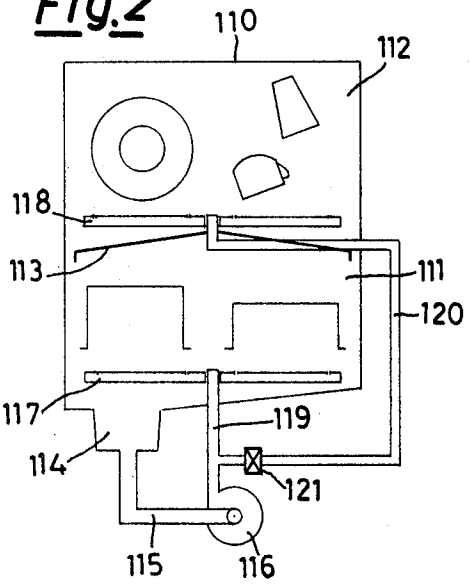


Fig.2



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Fig.4

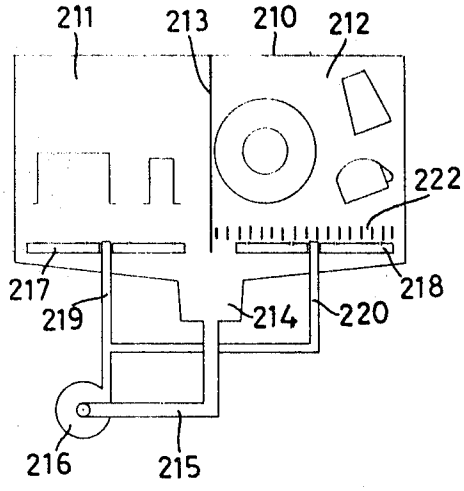


Fig.5

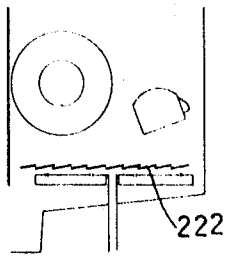


Fig.6

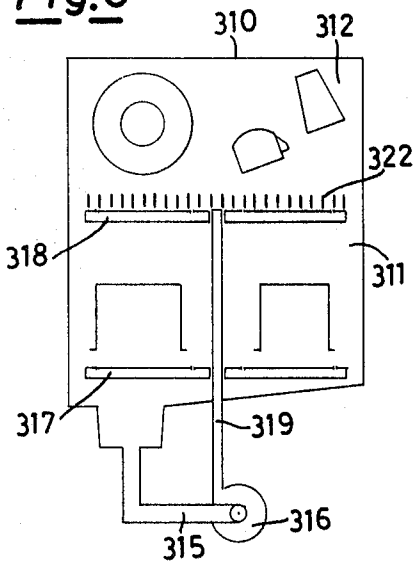
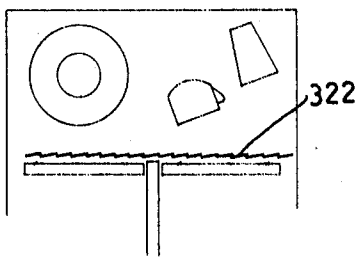


Fig.7



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Fig.8

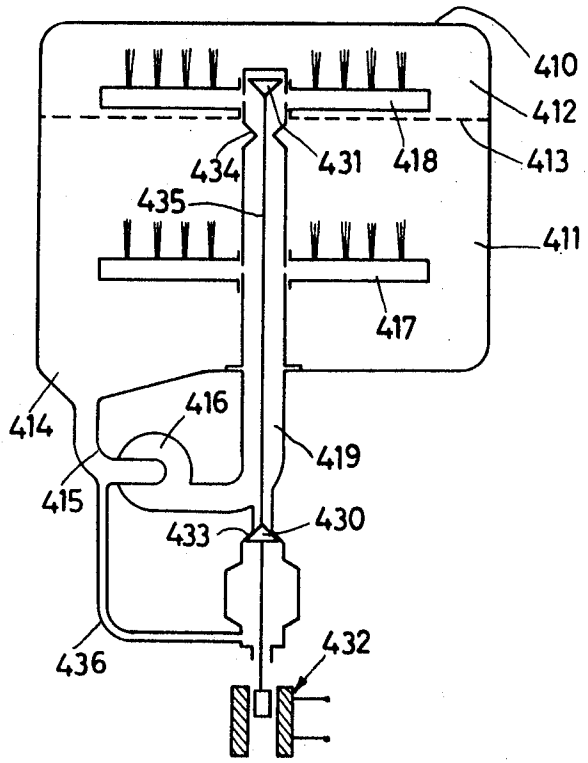
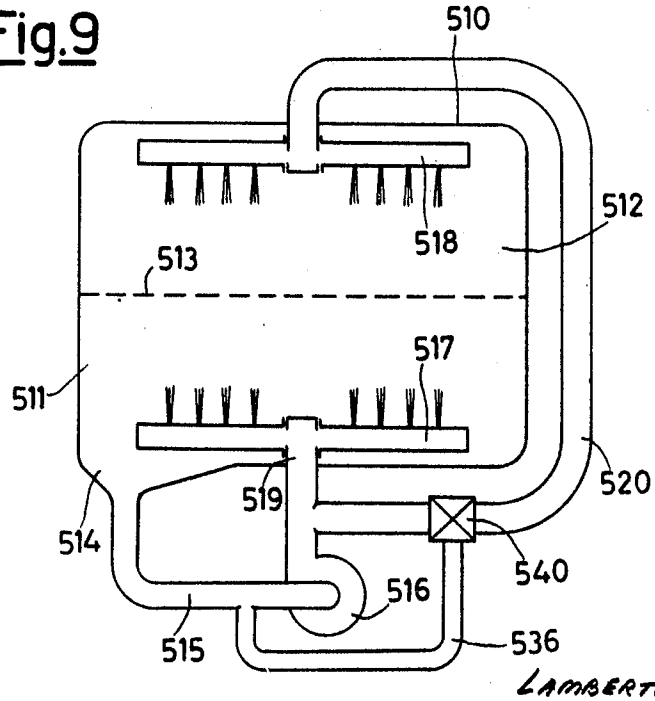


Fig.9



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DISH WASHER

This invention relates to a dish washer able to wash in a differentiated manner according to the nature of the dishes. In particular the machine according to this invention permits crockery of the type comprising plates, tumblers, cups and general delicate articles of porcelain, ceramic and glass on the one hand, and saucepans, cutlery and metallic articles on the other hand, to be washed at different temperatures in keeping with the nature of the articles themselves.

It is known that in conventional dishwashers a single basket is provided suitably arranged for the loading both of porcelain, ceramic and similar articles, and metallic articles, in order to use rationally, both the available washing space and the washing efficiency of the spray jets at the same time.

It is also known that because of the difference in resistance to wash action of the articles loaded in the basket, it has been necessary to adopt compromise solutions with regard to the temperature of the wash spray solution, concentration of detergent in it and mechanical force of the washing jets. In fact the most delicate articles such as glass only stand up with difficulty to strong impacts and excessive thermal shock caused by successive washing and rinsing which often cause breakage or cracking.

When chemical action of the detergent is added to the temperature effect, there easily arises color fading in articles such as ceramic or porcelain decorated plates.

It is thus clear that the temperature of the wash solution may not supercede a certain limit, which is normally about 65° C. On the other hand saucepans for the most part require a more energetic action of washing because of the particular nature of the dirt (incrustations, residual carbon deposits due to excess heat), which is strongly anchored to the saucepan surfaces.

In general it can be said that with the above-mentioned solutions comprising compromise of temperature, detergent concentration and mechanical jet action, a satisfactory and adequate wash is obtained for articles such as plates, tumblers and cups, i.e. those into which foods are placed or from which they are consumed, while the degree of wash is insufficient for cooking receptacles.

Machines have also been tried in which mechanical wash action has been increased by increasing the power of jets and similar solutions, but without obtaining the results expected. From the point of view of the detergent, there is an optimum concentration in the wash solution beyond which there is no corresponding increase in wash efficiency. Even resorting to more energetic detergents has been shown to be useless, as it results in a deterioration of colors and decorative designs on ceramic objects and the like. In other solutions the special arrangement has been adopted of providing two loading baskets, one for delicate articles such as plates, tumblers cups and the like, and another for saucepans.

However the temperature and detergent concentration in the wash solution have been maintained unchanged for the above-mentioned reasons, and the mechanical force of the jets acting on the saucepans has been increased.

Finally machines have already been proposed with two separate wash chambers for the delicate objects and saucepans respectively, with suitable connecting pipework controlled by values controlled by a program selector, so as to carry out the wash as required, either alone in one of the two chambers or in both chambers simultaneously. In this latter case the chambers can be connected in series or in parallel. This system gives a certain economy of operation in that it allows a single wash chambers to be put into operation and to reuse the wash water discharged from one chamber for a further wash cycle in the other chamber. But even this solution does not take account of the substantially different requirements of delicate articles on the one hand and saucepans on the other, the temperature and detergent concentration in the wash solution being maintained unchanged.

The dishwasher according to this invention substantially eliminates the disadvantages cited above and gives satisfactory

washing both of delicate articles and saucepans. For this object the present invention comprises two separate zones in a dishwasher into which the delicate articles such as plates, tumblers, cups and the like, and saucepans are loaded respectively, each of said two zones being provided with at least one sprayer and interception means which interrupt the feed of wash solution to the separate zone containing said delicate articles on attaining a preset temperature while continuing heating at the wash solution and its feed to the separate zone containing said saucepans. Consequently with the dishwasher according to the invention it is possible to carry out a wash of the normal type satisfactory for delicate articles, and then to subject the saucepans to a wash of more intense action with the wash solution at a higher temperature while at the same time excluding said more delicate articles from the direct action of the wash solution at higher temperature.

It should further be observed that according to this invention said delicate articles can be contacted by steam from the wash solution of higher temperature and hence be subjected to partial sterilization.

The main advantage of this invention is that of subjecting saucepans to the action of a wash solution at a temperature higher than that normally provided and hence to a more energetic thermochemical action on the residues and dirt anchored to the saucepan.

A further important advantage is that the result described in the preceding paragraph is attained simply and economically by a single wash circuit. A further advantage which will be clear following the description is that the separation of the two said zones is reduced to a minimum, its only purpose being to impede contact between the hotter detergent solution and the delicate articles.

A further advantageous prerogative of the invention provides for means for adjusting the pressure down stream of the pump feeding the wash solution, simultaneously with said means for intercepting the feed of the solution to the zone containing the delicate articles. In particular in a preferred embodiment a bypass is provided between the suction and delivery of the pump, suitably dimensioned and controlled by a value whose movement opens and closes communication between said bypass and the pump delivery to the spray swivels.

Further objects and advantages of the dishwasher according to the invention will better appear from the description which follows of certain preferred embodiments illustrated by way of example in the accompanying drawings in which:

FIG. **1** is a simplified diagrammatic view of the wash chamber and the wash circuit of the dishwasher according to the invention;

FIG. **2** is a view analogous to FIG. **1** of another embodiment of the dishwasher;

FIG. **3** is a view analogous to FIG. **2** of a further embodiment;

FIGS. **4** and **5** show another embodiment in two different conditions of the interception means;

FIGS. **6** and **7** are views analogous to FIGS. **4** and **5** of a still further embodiment of the dishwasher according to the present invention;

FIG. **8** shows diagrammatically the wash chamber and the means for feeding and adjusting the wash solution;

FIG. **9** shows a variation of the embodiment of FIG. **8**.

It is to be observed that in the various embodiments shown in the drawings, all those parts of the dishwasher which are conventional and without interest in the understanding of the present invention have been omitted for clarity.

Referring first to FIG. **1**, a wash tank **10** of a dishwasher is shown whose internal cavity is subdivided into two zones **11** and **12** by a separation baffle **13** that can be suitably secured to the housing of the tank **10**. The collection sump **14** for the detergent solution is provided in the base of the tank, and its discharge line comprises a conduit **15** connected to the suction of a circulation and wash pump **16**.

Each zone 11 and 12 is provided with at least one sprayer, 17 and 18 respectively, having spray nozzles for wash solution which direct jets of solution on to the articles contained in the corresponding zone.

The rotating sprayers 17 and 18 are fed by the pump 16 by way of two delivery conduits 19 and 20.

The conduit 20 which feeds wash solution to the zone 12 containing the more delicate articles such as plates, tumblers, cups and the like, is provided with an interception member namely a valve 21 which cuts off the feed to the one 12 at any desired moment during the wash cycle.

The machine of FIG. 1 operates in the following way:

After having loaded the various objects to be washed in their corresponding zones on a suitable support and basket and after a possible prewash phase and heating, the actual wash is commenced simultaneously in the two zones, by feeding detergent solutions to the rotating swivels 17 and 18 through two conduits 19 and 20.

After a certain period of time necessary for washing the more delicate articles, determined for example by the action of a thermostat, the temperature of the detergent solution during this period reaching about 60° C., the valve 21 is operated so cutting off feed to the zone 12 and simultaneously the temperature of the solution is increased to about 85° C. using suitable conventional means, while washing continues of the saucepans contained in zone 11.

After termination of this wash period and after discharge of the wash solution the normal cycle of rinsing etc. is resumed in each zone.

It is clear that in this way the initial wash phase provides for the elimination of residues and dirt which are less firm, while the second period provides a more energetic action directed solely against the firmer and more resistant dirt.

FIG. 2, in which corresponding reference numerals increased by 100 to indicate parts corresponding to FIG. 1 have been used, illustrates another embodiment in which the two zones 111 and 112 are superimposed and the baffle 113 is horizontal instead of vertical.

In this case the articles contained in zone 112, are struck only by steam from the detergent solution sprayed into the underneath zone 111 during said second wash period.

The embodiment illustrated in FIG. 3 is analogous to that of FIG. 2 (corresponding parts being indicated by equal numerals furnished with a prime), with the exception that the two feed conduits 119' and 120' are coaxial, the valve 121' is arranged so as to intercept feed to the conduit 120', and the baffle 113' is incorporated in the swivel 118'.

This embodiment may be advantageous in view of the compactness of the dishwasher.

FIGS. 4 and 5 show a further embodiment (parts equal to those of FIG. 1 being indicated by equal numbers increased by 200) in which a louver member 222 is substituted for the interception valve 21, and which in the position shown in FIG. 4 permits spraying of the articles contained in the chamber 212, while in the condition shown in FIG. 5 it intercepts said spraying.

Similarly the FIGS. 6 and 7 (in which parts similar to those of FIG. 5 are indicated with equal numerals increased by 100) show a similar embodiment in which however the zones 311 and 312 are superimposed.

In this case the lower interception member 322 functions also as a baffle and the feed conduit from the pump 316 is single, serving both sprayers.

It is clear that the interception member, whether this be the valve 21, 121 or 121' of FIGS. 1, 2 or 3, or the louver member 222 or 322 of FIGS. 4, 5 or 6, 7, is controlled for intercepting the feed of wash solution to the zone containing delicate articles at the appropriate moment during the wash cycle by means of any suitable control member but in all ways as a function of the temperature which the wash solution has reached at that moment, for example by means of the timer programmer of the dishwasher or a thermostat.

In FIG. 8 (in which the same reference numerals as in FIG. 1 but increased by 400 are used) the dishwasher comprises a wash tank 410 whose internal cavity is subdivided into two zones 411 and 412 by a separation baffle 413 suitably secured preferably to the housing of the tank 410. The base of the tank is provided with the collection sump 414 for the wash solution, the discharge line from which consists of a conduit 415 connected to the suction of a circulation and wash pump 416.

Each zone 411, 412 is provided with at least one rotating swivel sprayer, 417 and 418 respectively, having spray nozzles for wash solution, which direct jets of solution on to the articles contained in the corresponding zone. The sprayers 417 and 418 are fed by way of a conduit 419 in which a double valve is seated comprising two mobile members 430 and 431 controlled by an electromagnet. The two members 430 and 431 are seatable on seats 433 and 434 and are linked by a stem 435 so that they operate simultaneously. Further a bypass 436 is provided in the conduit 415. In the condition shown in FIG. 8 both the sprayers 417 and 418 are being fed, and the member 430 closes the entrance to the bypass 436, which consequently does not form part of the flow circuit for the wash solution. When at an appropriate point in the wash cycle the feed to the sprayer acting in zone 412 is interrupted by closing the valve member 431 against the seat 434, then the bypass is opened by withdrawal of the valve member 430 from the seat 433 and part of the wash solution from the pump is returned upstream. It is clear that by suitably sizing the bypass 436 the pressure is reduced to the most suitable value for washing the pans alone.

In the embodiment of FIG. 9 in which like members to FIG. 8 are indicated with like reference numerals increased by 100, a three-way valve placed in the feed line 520 to the upper swivel 518 substitutes the members 430 and 431, and its third way is connected to the bypass 536, the other end of which is connected to the suction of the pump 516. In this case when feed to the swivel 518 is intercepted and hence to the zone 512, all the corresponding wash solution feed is passed through the bypass 536 because of which the feed pressure through the conduit 519 remains unaltered.

A further variation not illustrated in the drawings comprises a basket divided into two zones for the purpose already mentioned by a separation baffle, at least one sprayer rotatable about its own axis being rigid with each zone, the feed line to the sprayer rigid with the zone containing plates, tumblers and the like being provided with an interception member in the same manner as previously described.

An advantage worth noting from the economical and constructional point of view is that the baffles and louver interception members can be constructed of any suitable material, for example plastics material resistant to the conditions arising during wash.

It should also be observed that the separation baffle between the two wash zones, particularly, when it is horizontal, must not divide the two zones hermetically in order to permit drainage of water from the upper zone and circulation of ventilation air.

What we claim is:

1. A dishwasher, both domestic and industrial, in which the wash chamber is subdivided by a baffle into two wash zones for the loading of delicate crockery such as plates, earthenware and the like and the loading of cooking pans respectively, each of said zones being provided with at least one sprayer, the sprayers being fed by a single wash pump, and in which an interception member is provided controlled by a thermostat which senses the temperature of the wash solution in order to exclude the flow of solution heated above a predetermined temperature to the delicate crockery in said corresponding zone.

2. A dishwasher as claimed in claim 1, in which said pump feeds said sprayers through parallel tubes and said interception member is situated in the tube which feeds the sprayer or sprayers provided for the zone intended for washing delicate crockery.

3. A dishwasher as claimed in claim 1, in which each sprayer of the zone for washing delicate crockery is provided with an interception member which moves between two positions, in one of which it intercepts the jets of solution issuing from the sprayer.

4. The dishwasher as claimed is claim 1, in which said baffle only partially divides the wash chamber.

5. The dishwasher as claimed in claim 1, in which means are provided downstream of the wash solution feed and circulation pump for adjusting the delivery pressure of the solution.

6. The dishwasher as claimed in claim 5, in which said adjusting means comprise a bypass with its extremities connected respectively to the upstream and downstream sides of said wash solution feed and circulation pump, and a controlled valve for opening and closing communication between the delivery of said pump and the corresponding extremity of said bypass.

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 3,586,011

DATED : June 22, 1971

INVENTOR(S) : Lamberto Mazza

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

[30] Foreign Priority Data:

Italian Appln. No. 19925 A/68 filed August 7, 1968

Italian Appln. No. 25681 A/68 filed December 28, 1968

Signed and sealed this 6th day of May 1975.

(SEAL)
Attest:

RUTH C. MASON
Attesting Officer

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