May 14, 1968 J. A. DICKEN, JR 3,383,148

PROTECTIVE DEVICE FOR DISHWASHER DOOR

Filed Aug. 15, 1966

FIG. 1

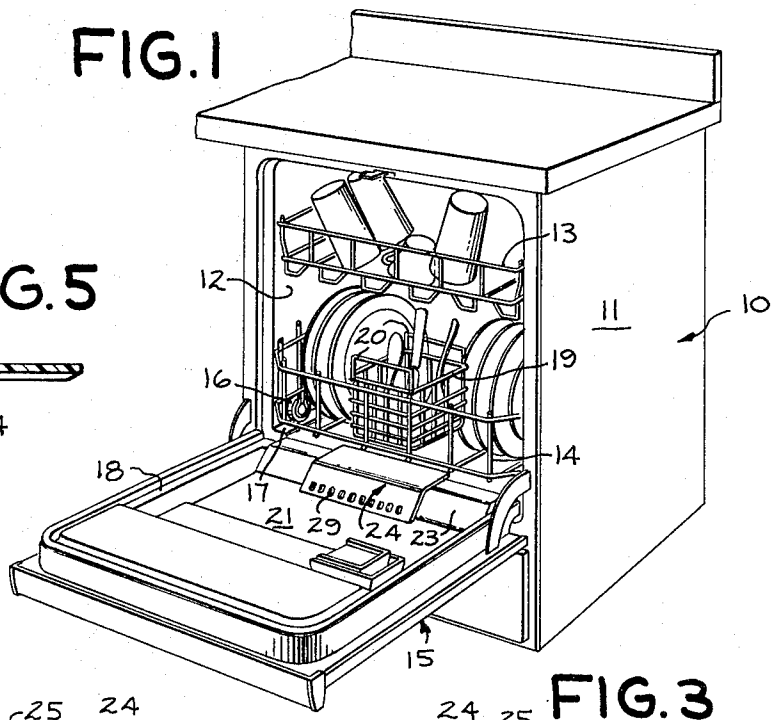


FIG. 5

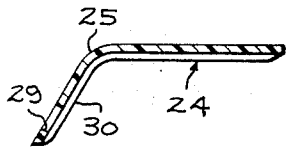


FIG. 4

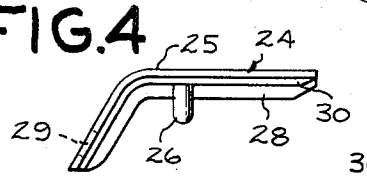
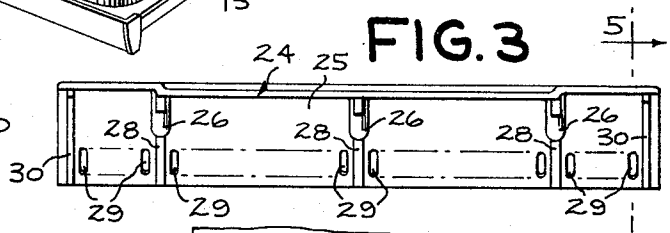


FIG. 3



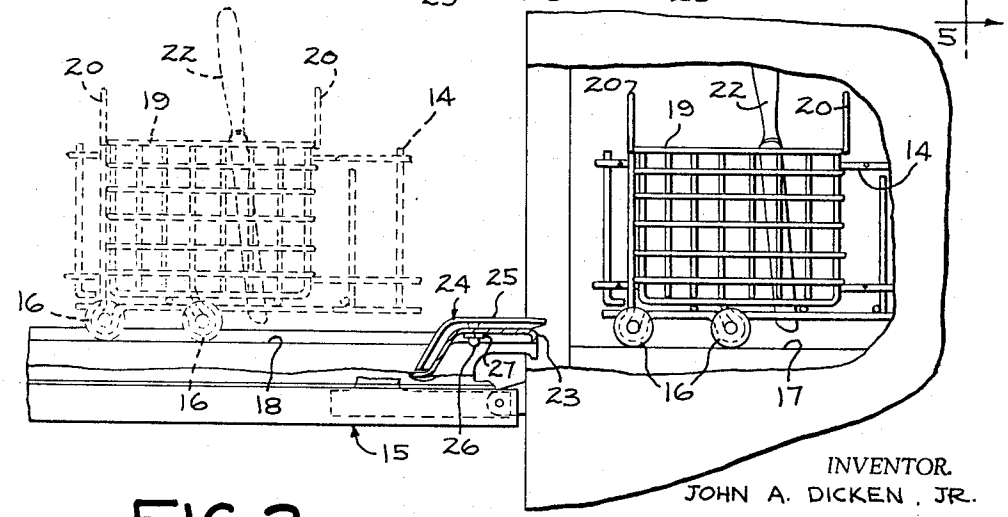


FIG. 2

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United States Patent Office 3,383,148
Patented May 14, 1968

3,383,148

PROTECTIVE DEVICE FOR DISHWASHER DOOR

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Filed Aug. 15, 1966, Ser. No. 572,567
6 Claims. (Cl. 312—311)

ABSTRACT OF THE DISCLOSURE

An automatic dishwasher having a front drop-door with a plastic coating on its inner surface pivotal between a vertical closed position and a horizontal open position, and having a lower dish-and-silverware rack which is rolled out from within the wash chamber onto the open horizontal door. A shield upon the inner surface of the door to prevent the abrasion and laceration of the plastic coating as a result of its contact with articles carried by the rack as the rack is moved out from within the wash chamber.

This invention relates generally to automatic dishwashers and, more specifically, to a protective device to prevent damage to the plastic coating on the inner surface of a dishwasher door.

Many manufacturers of automatic dishwashers employ cold-rolled steel for such structural members as the dishwasher tub, cabinet and door. Because this material will oxidize and deteriorate under the influence of moisture and elevated temperatures as are present in dishwashers, various coatings have been employed to protect the material from moisture. One of the most suitable materials is polyvinyl chloride plastisol which not only provides moisture protection but further provides, due to its resiliency, a cushioning effect which minimizes chipping and marring of the dishes and other articles being washed. Polyvinyl chloride plastisol also provides some degree of sound insulation thus reducing the sound level of the machine during operation. However, polyvinyl chloride plastisol has the disadvantage of being susceptible to abrasion and laceration when subjected to contact with rough or sharp articles. For example, if the sharp edge of a steak knife or the sharp point of a fork tine is passed across the plastisol surface, the plastisol may be cut completely through to the cold-rolled steel. The cut then allows moisture to contact the steel, at the elevated temperature present in a dishwasher, which will eventually result in oxidation and deterioration of the metal beneath the plastisol coating. The integrity of plastisol must be maintained in order for it to perform suitably.

Although other causes may exist, the principal cause of abrasion or laceration is contact between knives and forks, disposed within the silverware basket, and the opened door when the dish-supporting rack is moved out of the wash chamber onto the door or into the wash chamber from the door. In most drop-door dishwashers, i.e., dishwashers having a door pivotal between a substantially vertical closed position and a substantially horizontal open position, the lower dish-supporting rack is provided with rollers which allows it to be rolled at least partially out of the wash chamber onto the upwardly facing inner surface of the opened door.

It has been found in practice that if a flat protective device is directly applied to the vinyl plastisol coating, moisture will find its way under the device and the continued presence of moisture and contact with the protective device will create blistering of the plastisol coating. The blisters will eventually burst or crack thus allowing the moisture to contact the steel in a manner similar to that achieved with an abrasion or laceration. As a result, the application of a protective device, of sufficient

area to provide suitable protection against abrasion or laceration, directly to the plastisol coating usually creates the identical problem it is intended to solve.

Accordingly, it is an object of the present invention to provide a protective device for a dishwasher door to protect the door against abrasive or lacerative injury to the vinyl plastisol coating on the door.

It is another object of the present invention to provide a protective device for a dishwasher door to prevent injury to the coating on the door particularly from silverware carried by the silverware basket.

It is a further object of the present invention to provide a protective device, of the type described, which minimizes blistering of the plastisol coating beneath the protective device.

Other objects will become evident as this description proceeds.

In accordance with one aspect of the present invention, there is provided a protective device for use in a dishwasher having a door pivotal between a substantially vertical closed position and a substantially horizontal open position. The dishwasher further includes a dish-supporting rack movable to a position over the door when the door is in its open position. A silverware basket is carried by the dish-supporting rack and the inner surface of the door is coated with a vinyl plastisol. At least a portion of the inner surface is in close proximity to the silverware basket when the dish-supporting rack is in its position over the door. The protective device comprises a shield portion having generally the configuration of the portion of the door to be protected. Spacer means are provided and are adapted to contact the inner surface of the door and maintain the shield portion spaced from the inner surface of the door. The spacer means has an area of contact with the door substantially less than the area of the shield portion. Securing means are provided to secure the shield portion and the spacer means relative to the door.

While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention, it is believed the invention will be better understood from the following description taken in connection with the accompanying drawing, in which:

FIGURE 1 is a perspective view of an automatic dishwasher employing the present invention;

FIGURE 2 is a fragmentary elevational view, partially cut away to show details, of the dishwasher of FIGURE 1;

FIGURE 3 is an elevational view of the preferred form of the protective device of the present invention;

FIGURE 4 is an end view of the protective device of FIGURE 3; and,

FIGURE 5 is a sectional view taken along line 5—5 of FIGURE 3.

Referring now to the drawing and particularly to FIGURE 1 thereof, there is illustrated an automatic dishwasher **10** having an outer cabinet **11** and an inner cabinet **12**. A wash chamber is defined within inner cabinet **12** and contains an upper dish-supporting rack **13** and a lower dish-supporting rack **14**. A door **15** is provided to allow access to the wash chamber so that articles may be placed therein or removed therefrom. Racks **13** and **14** are adapted to be at least partially withdrawn from the wash chamber out through the access opening when door **15** is in the open position. It is to be understood that door **15** has a substantially horizontal open position, as illustrated in FIGURES 1 and 2, and a substantially vertical closed position wherein the access opening is sealed to avoid the escape of wash fluids from the wash chamber.

Withdrawal of racks **13** and **14** may be provided in any

convenient fashion. For example, rack **13** may be provided with slide out mechanism (not specifically shown) as described and claimed by Norman L. Kendt in U.S. Patent 3,096,125, issued July 2, 1963, and assigned to the General Electric Company, assignee of the present invention. Since the exact mechanism provided is not critical to the present invention, it is not shown nor described in detail herein.

Lower rack **14** is provided with a plurality of rollers **16** which rest upon a track **17** formed in the sidewall of cabinet **12**. It is understood that a track **17** is provided at each side of the wash chamber and rollers **16** are provided at each of the four corners of rack **14**. Thus, the rack **14** is free to move relative to cabinet **11** into and out of the wash chamber with rollers **16** rolling along track **17**. Door **15** is provided with a pair of tracks **18**,one adjacent each edge of the door, which align themselves with the tracks **17** when door **15** is in its open position. Thus, rack **14** may be movable to a position over the door, as illustrated in dotted line in FIGURE 2, when the door is in its open position. The rollers **16** at the front of rack **14**, i.e., near door **15** are spaced from each other a distance sufficient so that the roller farthest from door **15** will ride along the track **17** while the other roller passes over the gap between tracks **17** and **18**. Similarly, one roller will ride along track **18** during the time which the other roller is passing over the gap.

As is the case with most domestic automatic dishwashers available today, a special receptacle such as silverware basket **19** is provided to receive and contain silverware within the wash chamber. Silverware basket **19** may be formed integrally with rack **14** or may be a separate element supported by rack **14**. In the embodiment described herein, sliverware basket **19** is a separate element and is provided with a pair of handles **20** which facilitate the removal of silverware basket **19** from rack **14** so that it may be transported to the kitchen table so that all the silverware may be loaded at the table. Housewives are normally instructed to insert the silverware into silverware basket **19** in the manner illustrated in FIGURES 1 and 2. It should be understood, however, that during the normal operation of dishwasher **10** a significantly larger number of pieces of silverware will be contained within silverware basket **19** than the number illustrated.

As discussed above, he door **15** and cabinets **11** and **12** are conventionally formed of cold-rolled steel. Outer cabinet **11** is usually painted to provide a protective, as well as a decorative, coating. The inner surfaces of the dishwasher, such as inner cabinet **12** and inner surface **21** of door **15**, are provided with a coating which will, under normal conditions of use, protect the underlying steel from deleterious affects of relatively high temperature and moisture. When the protective coating on cabinet **12** and inner surface **21** is a resilient plastic coating such as polyvinyl chloride plastisol, the abrasion and laceration problems discussed above may be encountered. These problems may be better understood by reference to FIGURE 2 wherein a relatively sharp knife **22** is shown supported by silverware basket **19**. As will be obvious to those skilled in the art, sliverware basket **19** must have an open grid bottom to allow the wash fluid to enter silverware basket **19** to effectuate a wash action on the silverware supported therein. Of course, it is also necessary to provide an open grid work bottom for silverware basket **19** to allow the wash fluid to drain from the silverware basket so that the articles therein may be suitably dried during the terminal portion of the operational cycle of dishwasher **10**. The size of the openings in the grid work bottom of silverware basket **19** are generally maintained as small as possible consistent with the admission of sufficient wash fluid to clean the articles therein. However, pointed steak knives or carving forks, which have generally two slender widely spaced tines, may pass partially through the openings in the bottom of the silverware basket. They may very likely project therebelow sufficiently to engage and lacerate the inner surface **21** of door **15** as silverware basket **19** passes thereover during removal from, or insertion into, the wash chamber.

Frequently, a dishwasher door will have a projection such as projection **23** near the bottom edge of the door. This projection is designed to cooperate with the marginal portion of the cabinet **12** along the bottom of the access opening to provide a seal so that water cannot escape during operation of the dishwasher when door **15** is closed. It is this projection **23** which is most susceptible to laceration and abrasion.

In accordance with the present invention, a protective device **24** is provided to prevent damage to the coating on the inner surface **21** of door **15**. Protective device **24** includes a shield portion **25** which has generally the same configuration of the portion of the door over which its is designed to lie. In the case of the structure shown in FIGURES 1 and 2, shield portion **25** has generally the configuration of projection **23**. Securing means, in the form of lugs **26**, are provided to project through openings in surface **21** of door **15**. Lugs **26** are adapted to receive self-threading nuts **27** on the opposite side of surface **21** so that protective device **24** may be secured to surface **21**. In the preferred form of the present invention, protective device **24** is formed of a molded plastic compound capable of withstanding the abrasive and lacerative effects of knives and forks as described above, and lugs **26** are molded integrally with shield portion **25** so that protective device **24** is an integral element.

As mentioned above, if shield portion **25** were applied directly to the plastisol coating on surface **21**, moisture would inevitably find its way under shield portion **25** and the continued presence of moisture and contact with the protective device would create blistering of the plastisol coating. In order to avoid this phenomenon, spacer means **28** are provided to maintain shield portion **25** in spaced relationship with inner surface **21**. Spacer means **28**, in the preferred form of the present invention, comprise relatively narrow elongated protrusions extending substantially the full dimension of the shield portion in the direction of their elongation. Also, inasmuch as the preferred form of the present invention finds protective device **24** formed from a molded plastic, spacer means **28** would be integrally molded with shield portion **25** and lugs **26**.

It is to be noted that spacer means **28** are in direct contact with the plastisol coating on inner surface **21**. However, the area of contact between spacer means **28** and inner surface **21** is substantially less than the area of shield portion **25**. The area of shield portion **25** is determined primarily by the size of silverware basket **19** and the area of inner surface **21** to be protected. In any event, the area of shield portion **25** is in the magnitude of 20 to 100 square inches. The assignee of the present invention employs a protective device, identical to that illustrated in the drawings, having a shield portion with an area of approximately 40 square inches. By contrast, the area of spacer means **28** in direct contact with inner surface **21** is less than 2 square inches in the device employed by the assignee of the present invention. Thus, the area of contact between spacer means and the inner surface of the door is substantially less than the area of the shield portion. It has been found in practice that with such minimal area of contact between the spacer means and the inner surface of the door, blistering will not occur. This is particularly true when the area of contact is of an elongated nature such as that provided by the elongated spacer means **28** illustrated in FIGURE 3.

Since the environment within an automatic dishwasher inherently involves food particles which have been removed from the soiled dishes, it is conceivable, and in fact likely, that such food particles will find their way into the space between shield portion **25** and inner sur-

face **21**. If wash fluid is prevented from thoroughly flushing out the space between shield portion **25** and inner surface **21**, these food particles may collect and in time will create obvious problems. Accordingly, the present invention contemplates providing a plurality of openings **29** which will allow wash fluid to enter the space between shield portion **25** and inner surface **21** to flush any collected food particles therefrom. Also, openings **29** allow free flow of air through the space to facilitate drying of the surfaces defining the space during the terminal portion of the operational cycle of dishwasher **10**. This drying effect further minimizes the possibility of blistering occurring at the points of contact between spacer means **28** and inner surface **21**.

If desired, stiffening ribs **30** may be provided adjacent the ends of shield portion **25** to enhance the rigidity of protective device **24**. It will be noted that ribs **30** are of shorter projection than spacer means **28** so that they do not contact inner surface **21**.

Thus it can be seen that the present invention provides a protective device for a dishwasher door to protect the door against abrasive or lacerative injury to the vinyl plastisol coating on the inner surface of the door. Particularly, the present invention provides a device to protect against damage by silverware carried in the silverware basket. Moreover, the present invention minimizes blistering of the plastisol coating beneath the protective device.

As will be evident from the foregoing description, certain aspects of the invention are not limited to the particular details of construction of the example illustrated, and it is contemplated that various other modifications or applications will occur to those skilled in the art. It is therefore intended that the appended claims shall cover such modifications and applications as do not depart from the true spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a dishwasher having a door pivotal between a substantially vertical closed position and a substantially horizontal open position, a dish-supporting rack movable to a position over said door when said door is in said open position, and a silverware basket carried by said dish-supporting rack, the inner surface of said door being coated with a plastic material susceptible to abrasion and laceration and having at least a portion thereof in close proximity to said silverware basket when said dish-supporting rack is in said position over said door, a protective device comprising:

(a) a shield portion having generally the configuration of said portion of said door,

(b) spacer means adapted to contact the inner surface of said door and maintain said shield portion spaced therefrom,

(c) said spacer means having an area of contact with said door substantially less than the area of said shield portion, and

(d) securing means to secure said shield portion and said spacer means relative to said door.

2. The invention of claim **1** wherein said shield portion has an upper edge and a lower edge when said door is in said closed position and said shield portion has a plurality of openings adjacent said upper edge to allow wash fluid to pass therethrough to flush out the space between said shield portion and the inner surface of said door.

3. The invention of claim **1** wherein said protective device is molded of plastic and said spacer means are integrally formed with said shield portion.

4. The invention of claim **1** wherein said spacer means comprises a plurality of relatively narrow elongated protrusions extending substantially the full dimension of said shield portion in the direction of their elongation.

5. The invention of claim **1** wherein said protective device is molded of plastic and said securing means comprise integrally formed protrusions adapted to project through openings in said door and further adapted to each receive a self-threading nut.

6. The invention of claim **1** wherein said shield portion has a plurality of openings adjacent one edge to allow wash fluid to pass therethrough to flush out the space between said shield portion and the inner surface of said door.

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