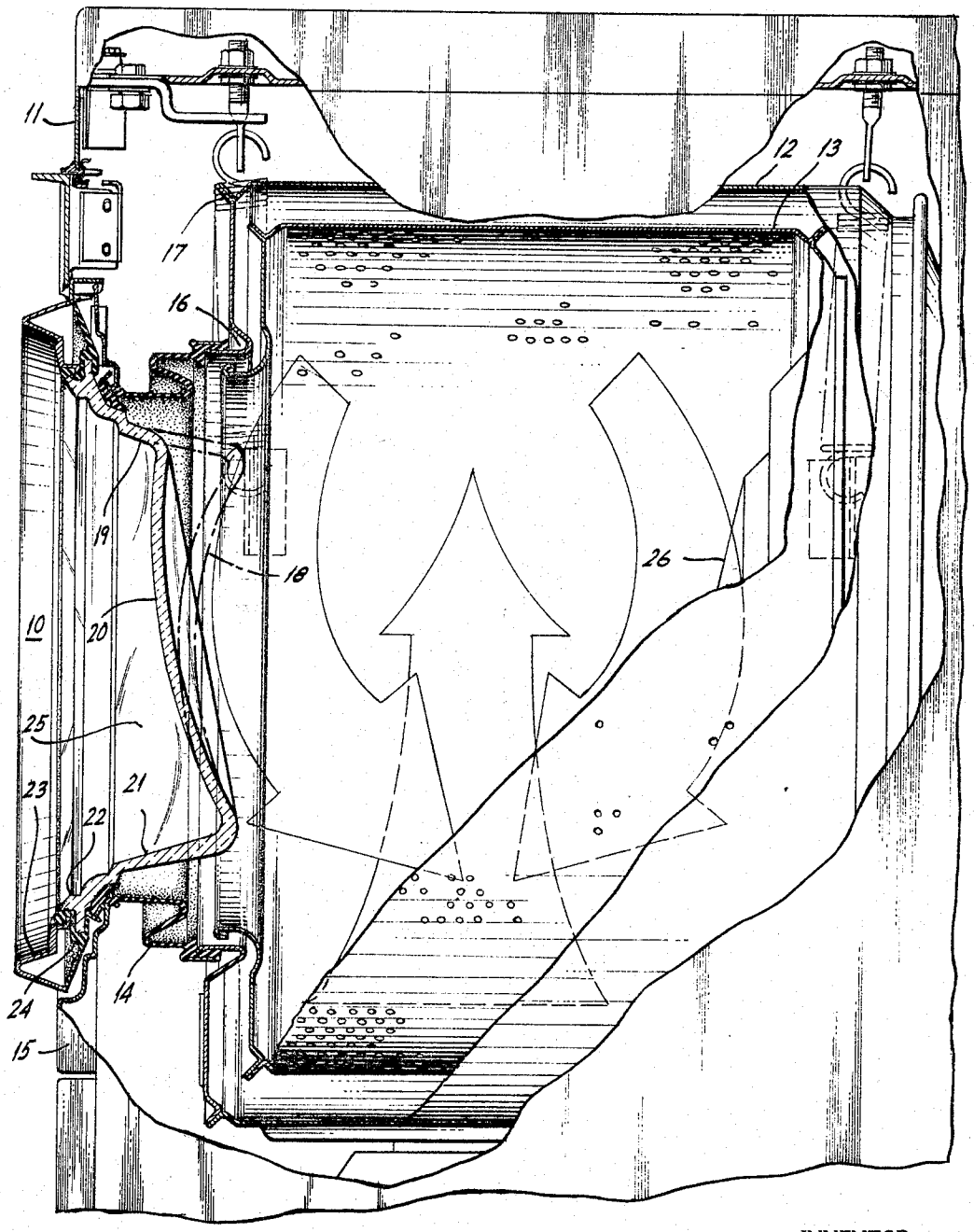
Oct. 4, 1966 G. J. DEISS 3,276,229

WASHING MACHINE WITH CLOTHES DEFLECTING DOOR

Filed Sept. 18, 1964




INVENTOR.
GEORGE J. DEISS

BY Frank D Fraser

ATTORNEY

United States Patent Office

3,276,229

Patented Oct. 4, 1966



3,276,229

# WASHING MACHINE WITH CLOTHES DEFLECTING DOOR

George J. Deiss, Philadelphia, Pa., assignor to Philco Corporation, Philadelphia, Pa., a corporation of Delaware

Filed Sept. 18, 1964, Ser. No. 397,447
2 Claims. (Cl. 68—139)

This invention relates to a wshing machine of the tumbling and spin drying type.

Machines of this type are loaded with fabrics, to be washed and spin dried, through a large loading door in front, which gives access to a resiliently suspended tub and to a drum rotatable therein about a generally horizontal axis. A major central portion of the door is usually made of glass in order that the housewife may observe the tumbling process performed behind this door. From the door frame, which is stationary, a flexible sleeve usually leads into the tub and drum, which are resiliently suspended in accordance with the preferred modern construction of domestic washers. In an effort to reduce entanglement of clothes with this flexible sleeve it is usual to construct the door, and particularly its window portion, in inwardly projecting form, substantially filling the inside of the flexible sleeve except for some small clearance to allow relative movement of the sleeve and door.

It is the objective of the invention to improve the washing characteristics of such machines, while preventing entanglement in this area. The invention arose in connection with a testing program in which various forms of windowed doors were tested in order to make sure, among other things, that the front of the machine presents an attractive appearance and that the structure is strong, while being light. It was noted, with some surprise, that there was minimal entanglement and that the results of the washing process become particularly good, and the capacity of the washer particularly large, when a door was used which had a central portion, preferably the window pane, lying in an inclined position, with a surface facing inwardly and upwardly of the machine. The precise reasons for the improvements have not as yet been determined, but a tentative explanation is stated hereinafter.

In order to explain the structure and operation of a machine characterized by the use of the new, inclined door glass, a drawing is appended hereto the sole figure of which is a central vertical section through a washing machine comprising this new arrangement.

The washer has loading door **10** in front panel **11** of a stationary cabinet, said cabinet having tub **12** suspended therein behind this door. Tumbling drum **13** is disposed in the tub, this drum being rotatable by means of a bearing and drive structure partly indicated at right. The aforementioned sleeve **14** extends from cabinet door frame **15** toward and into a front opening in tub **12**, defined by rim **16**. The two rims or frames **15**, **16** are generally coaxial, but limited motion is allowed for tub frame **16**, relative to cabinet frame **15**, as the suspension of the tub is resilient, being effected for instance by springs **17**. The aforesaid sleeve **14** closes and seals the space between said relatively movable frames **15** and **16**, and presents more or less horizontal inside surfaces. Tumbling fabrics have sometimes been caught or entangled on lower portions of such surfaces, and it has therefore been usual to provide a loading door and window which projects inwardly to a region approximately flush with the vertical front of tub **12** or drum **13**, as is indicated by broken lines **18**.

According to the invention a characteristically different profile of the door and window is used, which has a narrow upper rim portion **19** projecting inwardly only a minor portion of the length of sleeve **14**, while having an inclined major central portion or plate element **20** and a relatively wide lower rim portion **21** extending substantially all the way along the extent of sleeve **14**, in the normal position of this sleeve shown in the drawing. The front surface of central plate or window pane **20** faces forwardly-downwardly, and its rear surface faces rearwardly-upwardly, as shown.

A sleeve-like peripheral window portion or rim extends forwardly from the inclined surface portion **20** and includes said narrow upper and wide lower portions **19**, **21**. This rim can terminate in a plain, circular front edge **22**, attached to an annular metallic rim structure **23**. A resilient gasket, for instance as indicated at **24**, can be secured to this front edge for tight and silent closure of the door against cabinet door frame **15**. Desirably the central and inclined plate element or window pane **20** of the new structure is slightly curved, as indicated. This makes it possible to provide maximum strength while using a glass plate of minimum thickness and weight. This plate is molded of glass forming a body integral with top and bottom portions **19**, **21** and with a rim **25** interconnecting these portions. Edge portion **22** of the glass rim is secured to metallic door structure **23**, which is suitably provided with hinge and lock devices, not shown.

In operation door **10** is closed, as shown. Drum **13** is rotated by a drive unit, not shown, so as to cause fabrics continuously to tumble, that is, repeatedly to perform cycles wherein they ride up on one side of the rotating drum (see the rising arrow) and then drop down by gravity when they have reached the top of the drum (see the downwardly pointing arrows). The results of the washing process are dependent on the exact way of performing this tumbling. For instance it is well known that the rotating speed of the drum must be controlled within narrow limits for this purpose.

It has now been found that the results of the washing process are favorably influenced by the change from former window shape **18** to new window shape **10**, **20**. Exact reasons and details are not presently known, but an explanation can probably be outlined as follows. The fabrics, mixed with air and splashing water, have a tendency when falling down within the rotating drum to expand somewhat, as allowed by the space within this drum, thereby presenting constantly added and changing fabric surfaces to the washing fluids. This spreading-out tendency of the fabrics is suggested by the progressive outward spreading of the space between the downward arrows shown in the drawing. The new window structure **10**, **20**, the major inside surface of which is inclined inwardly-downwardly from its top, allows relatively free forward spreading of the tumbling articles in the general region of top edge **19**, thereby providing added tumbling and washing space, while fully avoiding entanglement of fabrics with sleeve **14** near bottom edge **21**. It has been found that by virtue of this new window design the capacity of the washer can be increased appreciably (for instance by about five to ten percent), without any loss in performance of the washer.

This improvement can be explained further with reference to the back of the drum, which contains bearing structures or the like and which conventionally has an inwardly projecting surface, shown at **26**. As a result of the new front design the tumbling and dropping mixture of fabrics, water and air (downward arrows) is subjected to substantially identical expanding and deflecting influences in front and back of the tumbling drum. Each falling mass of fabrics initially undergoes substantially

uniform expansion toward both ends of the drum, as is indicated by the outwardly inclined portions of the downwardly directed arrows. This is followed by substantially uniform reversal or deflection, as shown by the lower and inwardly inclined portions of said arrows. Cyclically, the process is repeated by raising the fabrics again as indicated by the rising arrow.

New and characteristic operation is thus provided by the invention. At the same time the overall dimensions of the machine are allowed to remain small, as is desired since in many cases the cabinet must fit into crowded spaces of laundry rooms or kitchens. By virtue of the new door or window design the distance from top edge 19 to back inside surface 26 can typically be ten to twenty percent larger than in former constructions, with no increase in weight or cost of the door window structure and with a gain rather than any loss of appearance or utility. The new structure also improves the machine in that it greatly minimizes reflections of light from the front surface of the window.

While only a single washing process and a single washer structure have been described, the details thereof are not to be construed as limitative of the invention. The invention contemplates all those variations and modifications which come within the scope of the appended claims.

I claim:

1. A washing machine comprising a drum arranged for rotation about a horizontal axis to tumble fabrics therein; a tub surrounding said drum; a cabinet wherein said tub is resiliently suspended, said cabinet, tub and drum having generally coaxial front openings spaced along said axis for loading and unloading the drum; a flexible sleeve interconnecting the front openings of the cabinet and the tub; and a front door for closing the front opening of said cabinet, said door having the major central portion thereof centered on said axis and projecting, when the door is closed, into a position spaced a small distance radially inwardly from said sleeve, the so projecting central portion of the door having substantially the entire rear surface thereof presenting concavity inwardly toward the drum, said rear surface further being so inclined to said horizontal axis that its upper part is disposed between the front of the drum and the front of the cabinet and its lower part is disposed substantially at the front of the drum.

2. A machine as described in claim 1 wherein said portion of the door is made of glass.




**References Cited by the Examiner**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 2,015,443 | 9/1935 | Still | 68—139 X |
| 2,058,278 | 10/1936 | Watson | 68—139 X |
| 2,685,188 | 8/1954 | Landon | 68—139 X |
| 2,836,046 | 5/1958 | Smith | 68—24 |

FOREIGN PATENTS

| | | |
|---|---|---|
| 209,313 | 7/1957 | Australia. |
| 841,902 | 6/1952 | Germany. |
| 1,287,987 | 2/1962 | France. |


WILLIAM I. PRICE, *Primary Examiner.*