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M. W. BOWEN

2,417,908

TUB HAVING A WATER INLET PROVIDED WITH A VACUUM BREAKER

Filed May 1, 1943

2 Sheets-Sheet 1

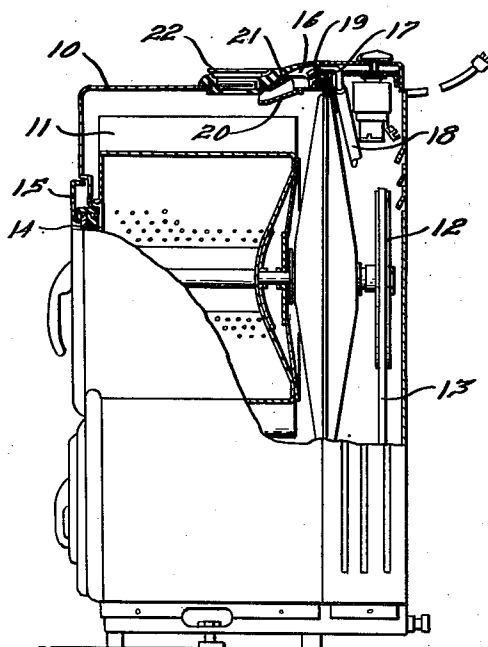


FIG. 1.

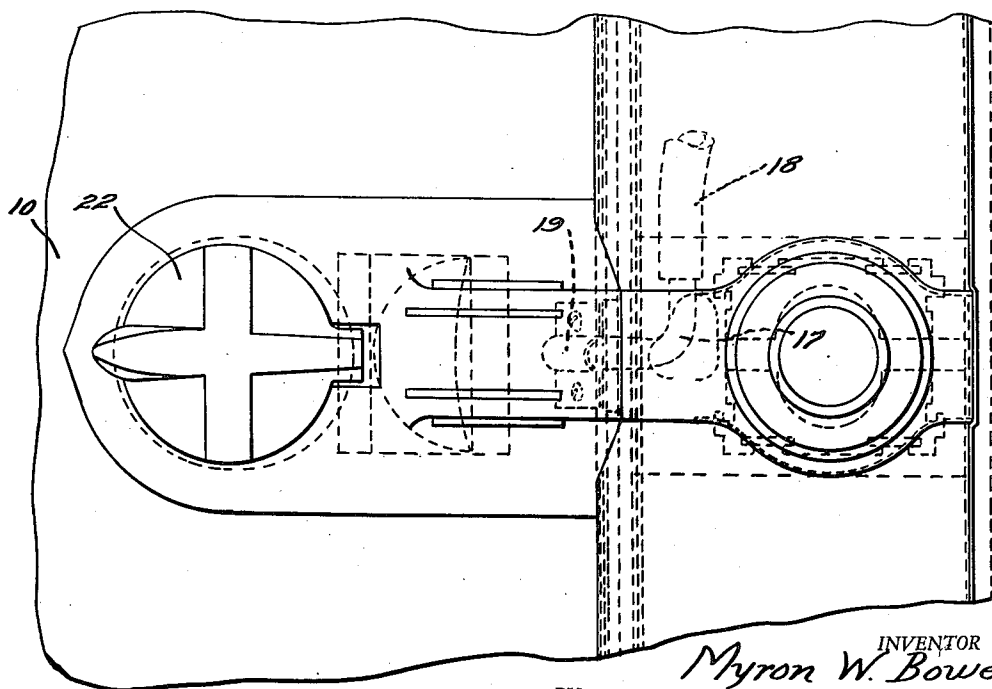


FIG. 2.

BY

INVENTOR
Myron W. Bowen
Maurice W. Gress
ATTORNEY

March 25, 1947.

M. W. BOWEN

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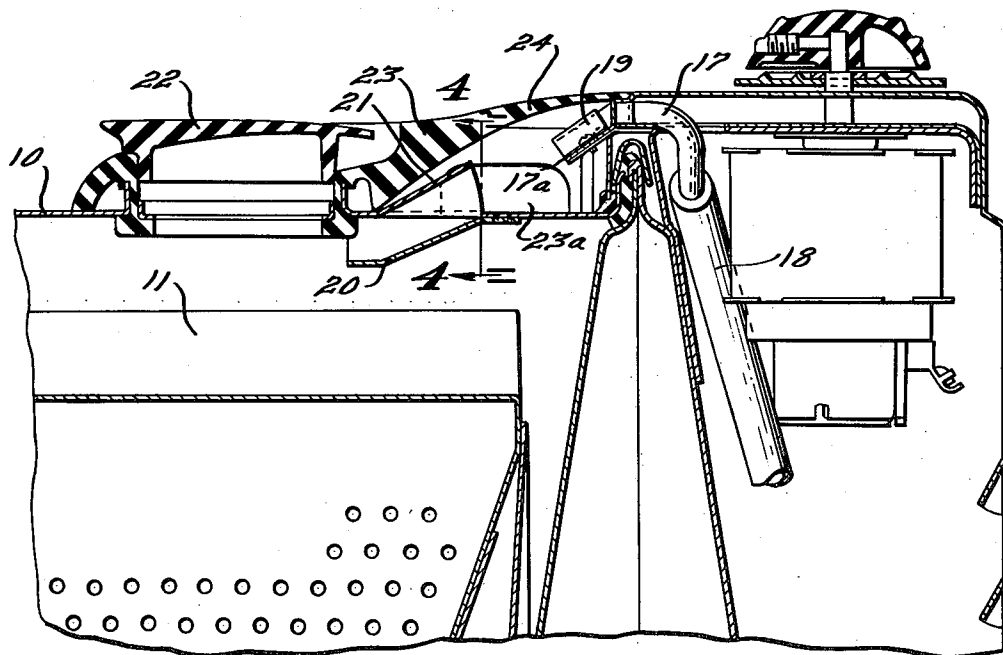


FIG. 3.

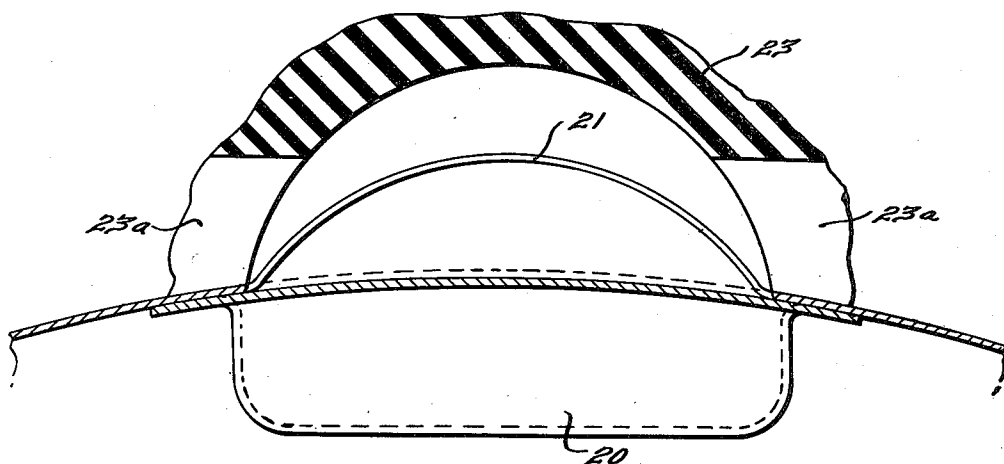


FIG. 4.

BY

INVENTOR
Myron W. Bowen
Maurice W. Green.
ATTORNEY

UNITED STATES PATENT OFFICE

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TUB HAVING A WATER INLET PROVIDED
WITH A VACUUM BREAKER

Myron W. Bowen, Niles, Mich., assignor to Bendix Home Appliances, Inc., South Bend, Ind.,
a corporation of Delaware

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8 Claims. (Cl. 68—58)

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This invention relates to a water inlet for automatic washing machines and is intended to supply a water inlet with vacuum breaker features, preventing the return of dirty water or other fluid into a water supply system in case of drop in pressure. The arrangement illustrated is intended for use in the inlet water system of a washing machine.

It sometimes happens that there is a sufficient drop in pressure in a water supply system to cause dirty water or other fluids to be pulled into the system if an outlet is sufficiently close. In many cities, ordinances have been passed with mandatory provisions requiring that a positive vacuum breaker be employed where a water outlet is so positioned as to feed water where there might be danger of returning dirty water to the system. The provisions of such ordinances are sometimes applied, in the interest of safety, when the possibility of any return of water to the system is very remote, thus placing a burden on manufacturers to provide positive vacuum breaker equipment.

It has been common practice to provide a water inlet for an automatic washing machine of the type shown herein about midway the height of the tub and adjacent the door; and as shown in Patent No. 2,211,459 issued to Francis M. Dawson on August 13, 1940, a so-called "vacuum breaker" may be installed which makes it entirely safe to place the water inlet at the center of the tub, as above stated. Although this type of vacuum breaker is entirely satisfactory in that it performs the function of breaking the suction and prevents siphoning or return of water to the supply system, it adds several parts to the machine and requires special installation as an additional unit.

The positioning of the water inlet near the center of the tub and adjacent the center opening in the cylinder makes possible what is generally termed a "spray rinse," the incoming water being sprayed to contact the clothes directly on entry. The so-called "deep water rinse," wherein the water rises from below to cover the clothes, is in some respects preferred. However, an inlet to the bottom of the tub to accomplish this result would add still more complications from the standpoint of vacuum breaker requirements.

It is therefore the primary object of the present invention to provide a water inlet and vacuum breaker unit particularly adapted for use with a washing machine and applicable, when so used, to produce a so-called "deep rinse," where

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incoming water does not contact the clothes directly on entry.

It is a further object to provide a water inlet and vacuum breaker unit of a construction which forms a part of the tub structure and requires few additional parts in manufacture.

The above and other objects of the invention will appear more fully from the following more detailed description and by reference to the drawings forming a part hereof, and wherein:

Figure 1 is a view, partly in section, of a washing machine with the water inlet attached thereto;

Figure 2 is an enlarged plan view of the portion of the top of the machine where the water inlet unit is attached;

Figure 3 is a cross-section through the top portion of the tub and through the water inlet unit, the section being taken longitudinally of the horizontally-mounted tub; and

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

Referring to the drawings and particularly to Figure 1, there is shown an automatic washing machine of the horizontal-cylinder type, the machine, as far as general principles of operation except as to water inlet, being substantially like that shown in Chamberlin et al. Patent No. 2,165,884 issued July 11, 1939, and in Dodge Patent No. 2,173,603 issued September 19, 1939.

In Figure 1, a tub 10 has a cylinder 11 mounted for rotation therein, the cylinder being driven from the rear of the tub 10 through a pulley 12 and a belt 13 from a source of power located in the base of the machine and not shown in the drawings. The cylinder 11 is perforated around its circumference as shown and has a central opening 14 at the front thereof, a door 15 being provided at the front of the tub 10 adjacent the central opening 14. Articles to be washed are placed inside the cylinder 11, the tub 10 containing water and soap, and the cylinder is rotated first at a speed suitable for washing the clothes and later in the cycle of operations, all as more fully described in the above-referred-to patents, the cylinder is subsequently rotated at a higher speed as a centrifuge for the purpose of removing water. The machine is so constructed as to automatically proceed through a cycle of operations including the addition of water to the tub for washing and rinsing and the draining of water therefrom.

For the purpose of adding water, the construction hereindisclosed employs a water inlet unit designated generally by the numeral 16 at

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the top portion of the tub 10, as shown in Figure 1. A tube 17 is employed, which is shown secured to a hose 18, the end 17a of the tube 17 being suitably fastened by a clip 19. A member providing a downwardly-extending lip 20 is secured, by welding or other means, to the inner side of the tub wall at the top of the horizontally-positioned tub to form an inwardly-extending portion providing a tangential entry into the top of the tub, and an upwardly-and-outwardly-extending lip 21 is formed as an integral part of the top wall of the tub. The lip 21 is bent or struck outwardly and away from the tub wall and is arcuate in transverse cross-section and is disposed in such relation to the lip 20 so as to confront or partially overlap the same, all as shown in Figures 1 and 4.

Figure 3 shows an enlarged cross-section similar to that shown in Figure 1, and the several parts above referred to are also shown thereon in more detail. Adjacent the overlapping lip members 20 and 21 a soap door 22 is positioned in a cover member 23, which cover has an extension 24 (seen best in Figure 3) covering both the overlapping lip portions 20 and 21 and the tube 17. The tube 17 is positioned by the clip 19 a distance away from lip 21 so that its direction of outlet will direct the water under the outwardly-extending lip 21 and between the lips 20 and 21, thus injecting the water into the top of the tub. The overlapping of the two lip members 20 and 21 provides a sufficiently effective closure together with the cover 23 which has side openings 23a, thus allowing the space or gap between the end of the tube 17 and the edge of the lip 21 to be subjected to atmospheric pressure. Therefore, water flowing into the top of the tub through the outlet tube 17 and the inlet formed by the lips 20 and 21 will be required to jump the gap between the end of the tube and the edge of lip 21, and if there is a momentary drop in pressure in the supply system there can be no siphoning of water back from the tub, since the outlet end of the tube 17 is well above any possible water level and there will be an immediate discontinuance of flow in case water stops flowing from the tube, it being impossible because of the gap to create a reversal of flow from the machine.

The foregoing statements are true even though the tub be assumed as full, since it will overflow on the outside tub wall through the openings 23a. The lower edge 17a of tube 17 is preferably one inch or more above the wall of the tub at its highest point. The discharge into the top of the machine is well above the perforated cylinder 11 and definitely not directed perpendicular to the cylinder but in a generally tangential direction relative thereto and at an acute angle with the tub wall and the surface of the clothes cylinder; and it is also important that the direction of this flow is directly under the soap door 22, thus providing water to clear the soap and carry it down into the machine with the water. The overlapping of the two lips 20 and 21 provides a satisfactory closure above the rotating cylinder and effectively prevents any back-flow of water induced by cylinder rotation out the top of the tub.

With this arrangement of water inlet, the siphoning of water back into the system is positively safeguarded in a manner which will satisfy the most rigid of requirements. Also, because of the fact that the incoming water, although directed from the highest point in the tub, is not directed onto the clothes in the cyl-

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inder but carried for the most part downwardly outside the cylinder, the result is a so-called "deep water rinse," as distinguished from a "spray rinse."

The top view of Figure 2 and the cross-section of Figure 4 show the general construction and arrangement of the several parts. It will be possible to provide several variations in construction, particularly with reference to the possibility of forming either the lip 20 or 21 as an integral part of the tub itself, and such modification is contemplated. In general, although I have described the invention as applied to a specific installation, it is understood that various modifications may be made within the scope of the following claims.

I claim:

1. In a washing machine of the type having a substantially cylindrical tub positioned with its cylindrical wall and axis in a generally horizontal direction with a rotatable clothes cylinder mounted therein and surrounded by said tub wall, a water inlet for said tub having a vacuum breaker to prevent reverse flow of water from said tub, said vacuum breaker comprising a lower inwardly and downwardly extending lip under an opening in the wall at the top of said tub and positioned to spray water toward the central portion of said rotatable clothes cylinder, an upper outwardly and upwardly extending lip overlapping said inwardly and downwardly extending lip and oppositely positioned relative thereto and substantially parallel therewith, and a water tube having an outlet end thereof spaced above the wall of said tub and spaced from said outwardly and upwardly extending lip to form a gap but positioned to direct a stream of water across said gap under said outwardly and upwardly extending lip and over said inwardly and downwardly extending lip and onto the central portion of said rotatable clothes cylinder.

2. In a washing machine of the type having a substantially cylindrical tub positioned with its cylindrical wall and axis in a generally horizontal direction with a rotatable clothes cylinder mounted therein and surrounded by said tub wall and a soap inlet in the wall of said tub above the central portion of said rotatable clothes cylinder, a water inlet for said tub having a vacuum breaker to prevent reverse flow of water from said tub, said vacuum breaker comprising a lower inwardly and downwardly extending lip under an opening in the wall at the top of said tub adjacent said soap inlet and positioned to discharge water toward the central portion of said rotatable clothes cylinder and under said soap inlet, an upper outwardly and upwardly extending lip overlapping said inwardly and downwardly extending lip and oppositely positioned relative thereto and substantially parallel therewith, and a water tube having an outlet end thereof spaced above said tub wall and spaced from said outwardly and upwardly extending lip to form a gap but positioned to direct a stream of water across said gap under said outwardly and upwardly extending lip and over said inwardly and downwardly extending lip and under said soap inlet and onto the central portion of said rotatable clothes cylinder.

3. A water inlet for the wall of a tub providing vacuum breaker features to prevent reverse flow of water from said tub comprising inwardly- and outwardly-disposed overlapping lip portions in said tub wall to provide a water entry passage-way directed through the wall of said tub at an

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acute angle with the said tub wall, and a water tube having an outlet end spaced a distance outside said wall to form a gap between the entrance of said passageway and said outlet end of said tube but positioned to direct a stream of water across said gap and under said outwardly disposed lip and into said tub.

4. In combination with a washing machine having a rotatable member and a tub with a wall spaced from and surrounding said rotatable member and a soap inlet in the wall of said tub, a water inlet for said tub designed to prevent reverse flow of water from said tub comprising a lower inwardly and downwardly extending lip under an opening in the wall of said tub adjacent said soap inlet and positioned to discharge water under said soap inlet, and outwardly and upwardly extending upper lip overlapping said inwardly and downwardly extending lip and oppositely positioned relative thereto and substantially parallel therewith, and a water tube having an outlet end thereof spaced outwardly from said tub wall and spaced from said outwardly and upwardly extending lip to form a gap but positioned to direct a stream of water across said gap under said outwardly and upwardly extending lip and over said inwardly and downwardly extending lip and under said soap inlet and into said tub.

5. A tub having water inlet means providing a vacuum breaker to prevent reverse flow of water from said tub, comprising: a wall of said tub provided with an integral lip struck outwardly therefrom and including an edge spaced from the plane of said wall to provide a water entry opening through said wall, a member on the inner side of said wall confronting said lip and extending inwardly and away from said wall and cooperating with said lip to provide a passageway extending through said wall at an acute angle, and a water supply tube having an outlet end on the outer side of said wall and spaced from the entrance of said passageway to form an air gap between the entrance of said passageway and said outlet end of said water supply tube, said outlet end of said water supply tube being positioned to direct a stream of water across said air gap and into said passageway.

6. A tub having water inlet means providing a vacuum breaker to prevent reverse flow of water from said tub, comprising: a wall of said tub provided with a lip member extending outwardly and away therefrom and disposed wholly on the outer side thereof and terminating at one end in the plane of said wall and having an edge at its opposite end spaced from the plane of said wall to provide a water entry opening, and an oppositely disposed member extending inwardly and away from said wall in confronting relation to said lip member and disposed wholly on the inner side of said wall and terminating at one end in the plane of said wall and having an edge at its opposite end spaced from the plane of said wall to provide a water discharge opening, said members and wall being arranged to provide a passageway extending through said wall at an acute angle to the plane of said wall, and a water supply tube having an outlet end on the outer side of said wall and spaced from the entry opening of said passageway to form an air gap between said entry opening and said outlet end of said water supply tube, said outlet end of said

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water supply tube being positioned to direct a stream of water across said air gap into said passageway.

7. A tub having water inlet means providing a vacuum breaker to prevent reverse flow of water from said tub, comprising: a wall of said tub; means providing a water inlet passageway extending diagonally through said wall, said means including a portion disposed wholly on the outer side of said wall and extending outwardly and away with respect to the plane of said wall in one direction, said portion originating substantially in the plane of said wall and having an edge remote from its point of origin positioned transverse to said wall and defining a water entry opening for said passageway, and another portion overlapping with said first-mentioned portion disposed wholly on the inner side of said wall and extending inwardly and away with respect to the plane of said wall in the opposite direction, said other portion originating substantially in the plane of said wall and having an edge remote from its point of origin defining a water discharge opening for said passageway; and a water supply tube having an outlet end on the outer side of said wall terminating in spaced relation above said water entry opening to form an air gap between said water entry opening and said outlet end of said water supply tube, said outlet end of said water supply tube being positioned to direct a stream of water across said air gap into said passageway.

8. In a washing machine of the type having a tub containing a clothes receptacle movable about a transverse axis in said tub, water inlet means for said tub providing a vacuum breaker to prevent reverse flow of water from said tub, comprising: inwardly and outwardly extending overlapping lip portions in a wall of said tub in a plane above the axis of said receptacle, said lip portions being substantially parallel and spaced apart longitudinally to provide a water entry passageway directed through said tub wall at an acute angle with respect to the general plane of said tub wall; and a water supply tube having an outlet end on the outer side of said tub wall spaced from said lip portions to form an air gap between the entrance of said passageway and said outlet end of said water supply tube, said outlet end of said water supply tube being positioned to direct a stream of water across said air gap and into said passageway.

MYRON W. BOWEN.

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