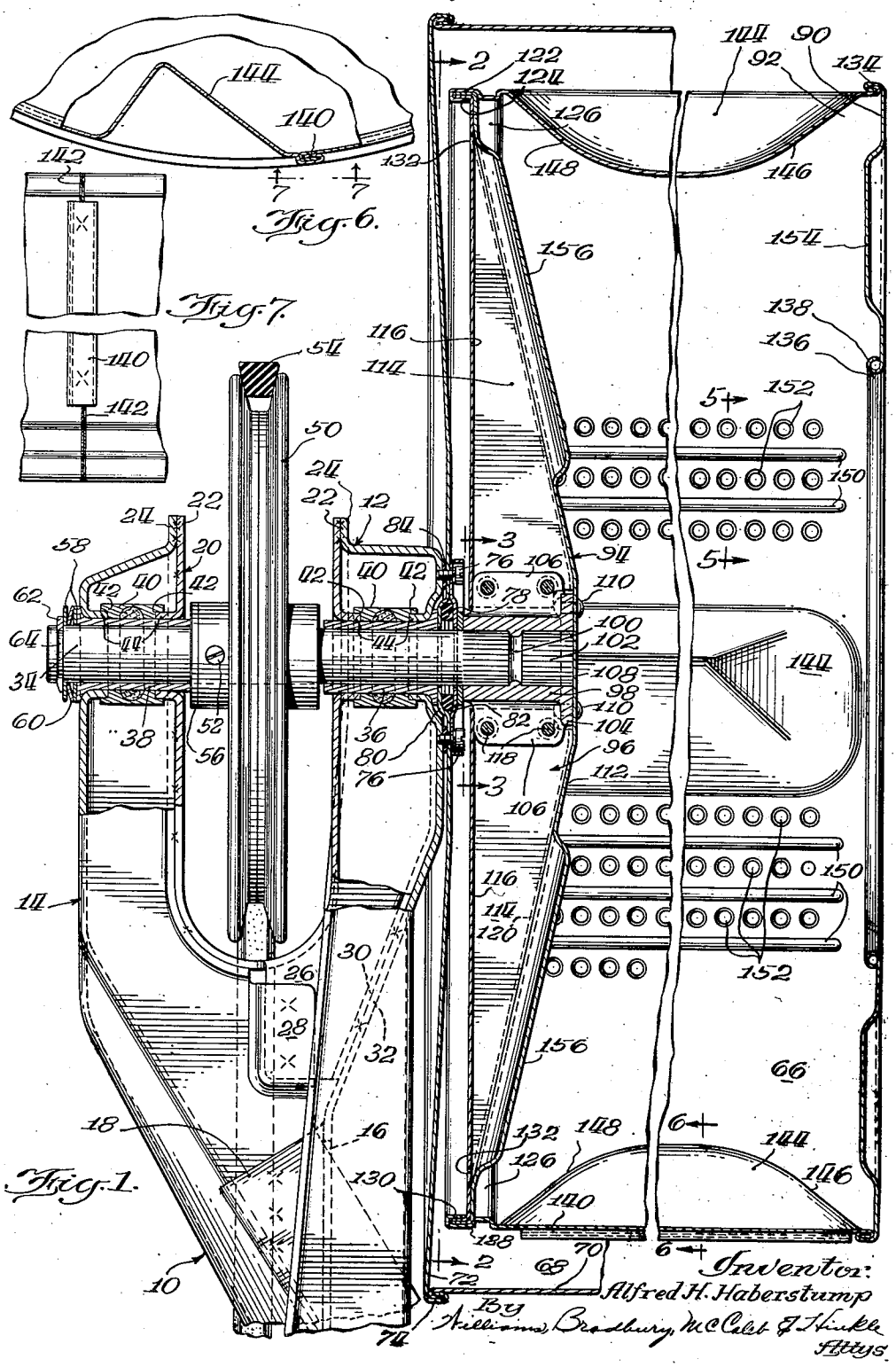
Sept. 10, 1940. A. H. HABERSTUMP 2,214,131

CYLINDER CONSTRUCTION FOR WASHING MACHINES OR THE LIKE

Filed May 15, 1937 3 Sheets-Sheet 1



Sept. 10, 1940. A. H. HABERSTUMP 2,214,131

CYLINDER CONSTRUCTION FOR WASHING MACHINES OR THE LIKE

Filed May 15, 1937 3 Sheets-Sheet 2

Fig. 2.

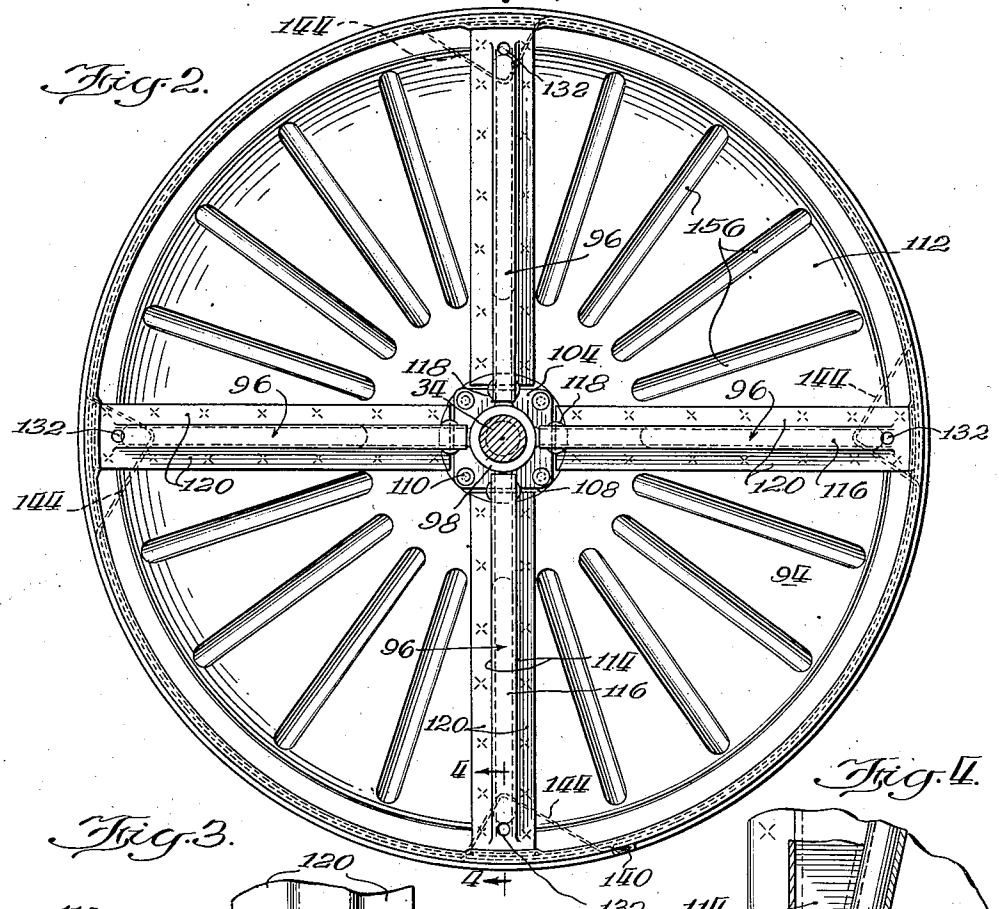


Fig. 3.

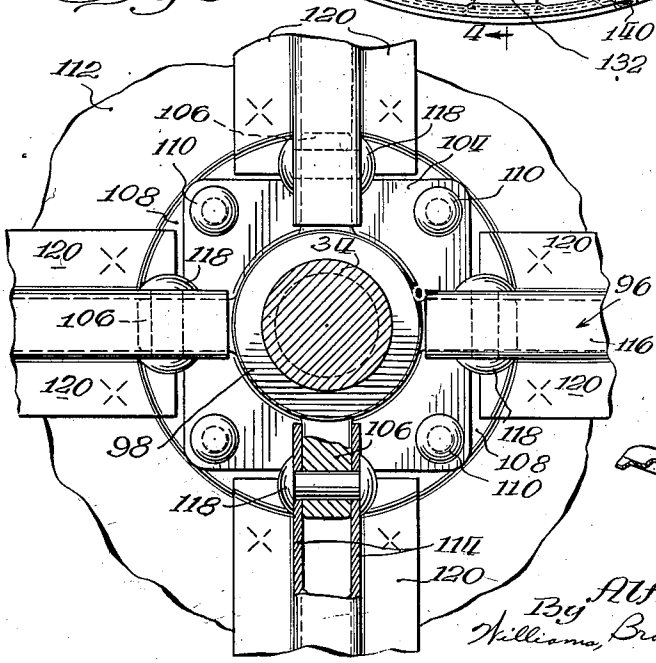


Fig. 4.

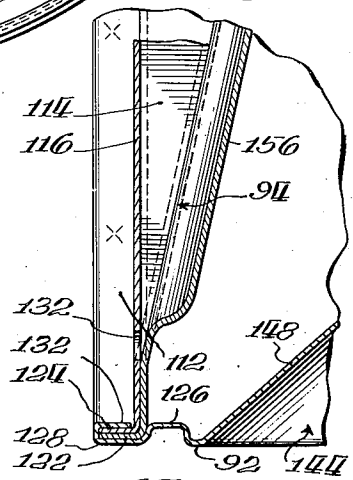


Fig. 5.



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Filed May 15, 1937 3 Sheets-Sheet 3

Fig. 8.

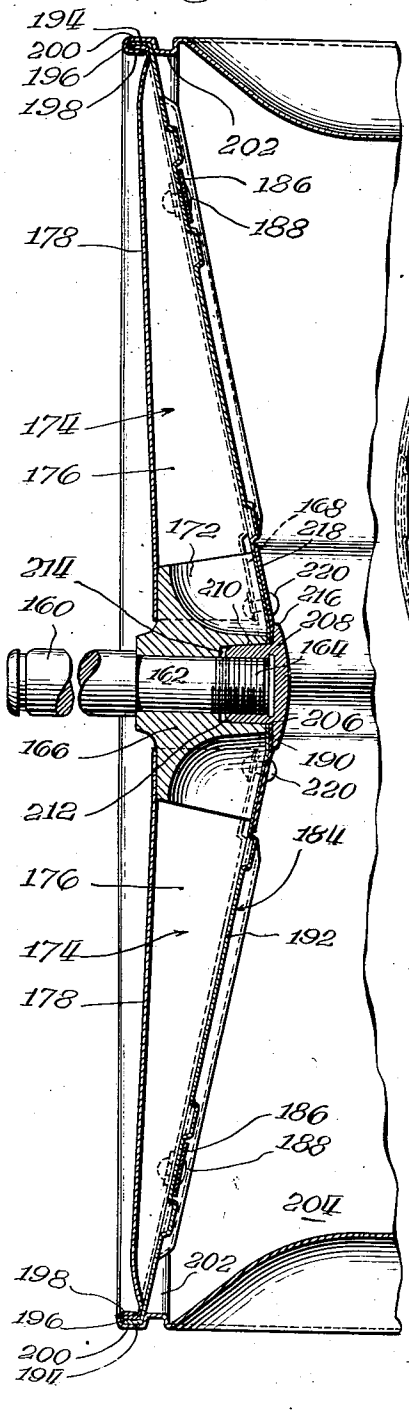


Fig. 9.

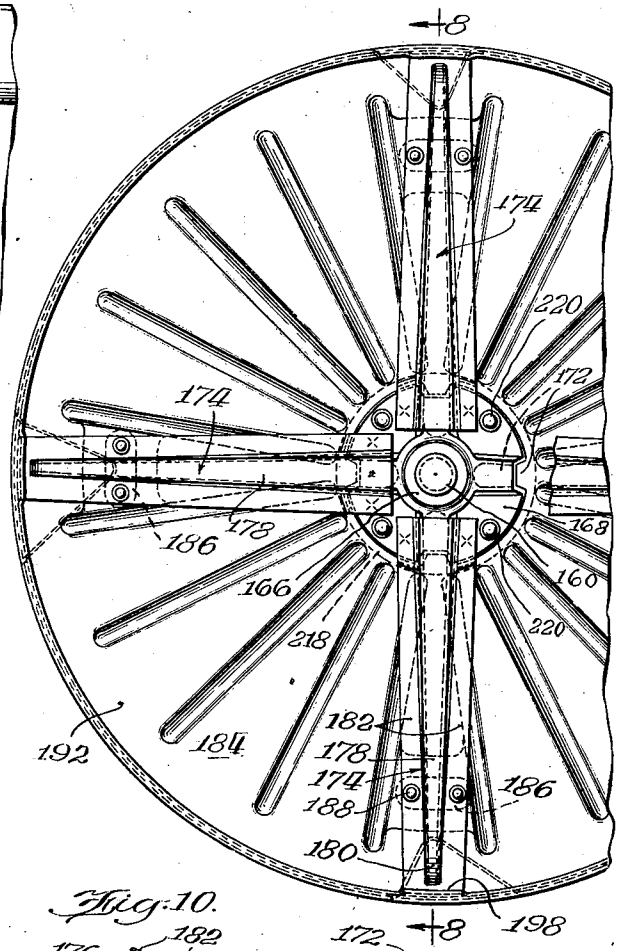
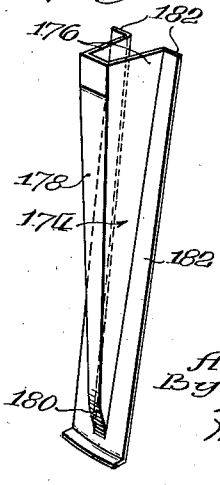


Fig. 10.



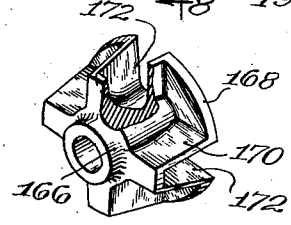


Fig. 11.

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UNITED STATES PATENT OFFICE

2,214,131

CYLINDER CONSTRUCTION FOR WASHING MACHINES OR THE LIKE

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Application May 15, 1937, Serial No. 142,752

10 Claims. (Cl. 68—142)

The present invention relates to cylinders for washing machines and the like of the type comprising a cylinder mounted for rotation on a substantially horizontal axis and surrounded by an imperforate tub adapted to contain a suitable treating liquid. The goods to be treated are disposed within the cylinder which is perforated to expose the goods to the liquid as it is rotated.

It has been found desirable for reasons of economy in construction and because of the ease with which goods may be placed within and removed from the cylinder that the latter be attached to a shaft mounted in cantilever fashion in bearings carried by a suitable support. For instance, the support may be constructed after the manner disclosed and claimed in my copending application Serial No. 135,955, filed April 9, 1937. The cylinder of the washing machine of the type described is subjected to considerable stress, especially when the goods are not evenly distributed therein. This is particularly true when the cylinder is rotated at high speeds for extracting the liquid from the goods.

It is the primary object of the present invention to provide a new and improved cylinder capable of withstanding stresses imposed thereon for a considerable period of time and which may be constructed by convenient fabricating processes.

A more specific object of the present invention is to provide a new and improved cylinder comprising a plurality of panels adapted firmly to be secured to spoke members by seaming and welding operations, whereby the cylinder is made structurally strong and in a simple manner.

A further object of the invention is to provide an improved arrangement for securing the cylinder to the shaft upon which it is mounted for rotation.

Cylinders of the type to which the present invention is directed are customarily provided with internal baffles which improve the efficiency of the washing action and the distribution of goods within the cylinder. When operated over a period of years these baffles, when formed by stamping the central panel of the cylinder, are often battered out of shape by the constant pounding of the goods. In order to construct the cylinder at a low cost and to keep down the operating costs it should be made as light as possible. On the other hand, if made too light it may be easily battered.

It is a further object of this invention to provide a new and improved cylinder baffle construction which resists deformation.

Another and further object of the invention is to provide the central panel of the cylinder with axial ridges which add both to the structural strength of the cylinder and the efficiency of operation of the washing action.

Other and further objects and advantages of the invention will become apparent as the following description proceeds. In the course of this description reference is had to the accompanying drawings, in which:

Fig. 1 is a fragmentary longitudinal axial section through a washing machine provided with a cylinder constructed in accordance with the present invention;

Fig. 2 is a transverse section through the tub and cylinder, taken along the line 2—2 of Fig. 1;

Fig. 3 is an enlarged view, partially in section, of a portion of the structure shown in Fig. 2, illustrating the details of the mounting of the spokes and rear panel to the hub;

Fig. 4 is an enlarged fragmentary longitudinal section, taken along the line 4—4 of Fig. 2, showing the details of the baffle construction and the construction of the joint securing together the spoke, rear panel and center panel of the cylinder;

Fig. 5 is a fragmentary transverse section, taken along the line 5—5 of Fig. 1, showing details of the center panel;

Fig. 6 is an enlarged fragmentary transverse section, taken along the line 6—6 of Fig. 1, showing further details of construction of the baffle and the method of securing the ends of the center panel together;

Fig. 7 is a fragmentary plan view of the center panel end joint shown in section in Fig. 6;

Fig. 8 is a fragmentary longitudinal section through a modified form of washing machine cylinder;

Fig. 9 is a fragmentary rear elevation of the cylinder shown in Fig. 8;

Fig. 10 is a perspective view of a spoke used in the construction of the modified form of cylinder, and

Fig. 11 is a perspective view, partly in section, of the hub shown in Figs. 8 and 9.

Referring first to Fig. 1, it may be noted that the supporting means 10 for the cylinder has been illustrated in part only and that the usual surrounding cabinet and actuating apparatus for the cylinder have been omitted entirely. It should be understood, however, that the cylinder may be used with any of the washing machines or similar apparatus known to those skilled in the art. The support illustrated may be con-

structed after the manner disclosed in my above mentioned copending application, but as far as the description of the present invention is concerned, it is deemed sufficient to state that the support comprises a rectangular base (not shown) front bearing support 12 and a generally diagonal supporting a substantially triangular vertical and relatively narrow rear bearing support 14. The latter extends downward through a central aperture 16 in the front support to a point of attachment near the front end of the base directly below the front end of the cylinder.

The diagonal support 14 is preferably integrally secured, as by welding, to right-angled flanges 18 on opposite sides and bottom of the aperture 16. The upper vertical portions of both the front and rear bearing supports 12 and 14 are welded to a substantially U-shaped intermediate support 20 provided with peripheral flanges 22 adapted to be welded to complementary flanges 24 formed on the front and rear supports. The intermediate support is further provided with a right-angled flange 26 adapted to be welded to opposed ears 28 formed integral with the rear support 14. The flange 26 is provided with transverse flanges 30 adapted to be welded to a diagonal upper central portion 32 of the front bearing support 12.

A cylinder shaft 34 is mounted for rotation on a substantially horizontal axis in a pair of bearings 36 and 38 mounted in the front and rear supports, respectively. The bearings are held in place by bearing sleeves 40 each provided with opposed internal shoulders 42 into which fit complementary annular shoulders 44 formed by internally flanging the apertures through which the cylinder shaft extends.

The shaft is adapted to be rotated by a suitable prime mover (not shown) driving a pulley 50 secured to the shaft by means such as a set screw 52 through a belt 54. The pulley is secured to the shaft intermediate the front and rear supports in the space provided by the U-shaped intermediate member 20 and it is provided with a bearing surface 56 adapted to engage the front end of the rear bearing 38, whereby the shaft is prevented from moving more than a predetermined distance to the rear.

The shaft is prevented from moving more than a predetermined distance in the forward direction by resilient movement-restricting means comprising a pair of washers 58 having disposed between them a resilient concave washer 60. One of the washers 58 is adapted to bear against the rear end of bearing 38 and the other is maintained in position by a C washer 62 mounted in an annular groove 64 formed at the rear end of the shaft.

Before proceeding with a description of the washing machine cylinder 66 forming the subject-matter of the present invention, it may be well to mention that the cylinder is mounted for rotation within a substantially imperforate cylindrical receptacle 68 commonly called a tub and which will be so referred to hereinafter. In practice the tub is filled with a predetermined amount of liquid for treating the goods placed within the cylinder. The liquid may be supplied thereto through a suitable inlet and likewise drained therefrom from a suitable outlet. As far as the present invention is concerned, it does not matter whether the supply and drainage of liquid to the tub be accomplished manually or otherwise.

The tub 68 consists of a centrally apertured front panel (not shown), a center panel 70, and a rear panel 72. Panels 70 and 72 are joined together by an annular lock seam 74 of usual construction and the previously mentioned front panel may be similarly secured to the center panel. The tub structure may be rigidly mounted upon the base by a vertical support (not shown) adapted to be secured to the front panel of the tub and by a plurality of screw bolts 76 adapted to be threaded into the upper end of the front bearing support 12. Leakage of liquid from the tub along the shaft is prevented by a sealing ring 78 held in place adjacent an annular shoulder 80 formed centrally of the rear panel 72 by means of an annular shouldered collar 82 held in place in turn by the aforementioned screw bolts 76. Leakage of liquid between the exterior wall of the rear panel and the front support 12 is prevented by a gasket 84 also held in place by the screw bolts 76.

The cylinder 66 is fabricated from a front panel 90, a center panel 92, a rear panel 94 and a plurality of radial spokes 96, all made of a light, non-corrosive metal such as zinc and joined together in a manner hereinafter to be described in detail to form a light but strong cylindrical receptacle. The rear panel 94 and the spokes 96 are secured to a hub 98 also made of zinc and die cast upon the front end of shaft 34. The hub is prevented from moving axially by an annular groove 100 formed near the front end of the shaft and from rotating relative to the shaft by knurling 102 formed on the surface of the shaft coextensive with the length of the hub.

The front end 104 of the hub is made substantially square, as may be noted from Figs. 2 and 3, and it is provided with four radially extending projections 106 of rectangular cross-section. These are located centrally of the sides of the square end 104 and extend a short distance beyond the sides.

The rear panel is provided with a central circular transverse portion 108 rigidly secured to the front end 104 of the hub by four rivets 110 located at the corners of the front end. The rear panel is generally conical in shape as it is provided with an outwardly and rearwardly extending annular wall portion 112 having an axial length substantially equal to that of the hub.

The rear panel is also secured to the spokes 96, preferably by welding. The spokes are substantially triangular in form, as viewed in side elevation, and have a substantially U-shaped cross-section defined by walls 114 and bottom 116. The space between the side walls is made just large enough so that the spokes fit snugly around the projections 106 to which they are fixedly secured by pairs of rivets 118.

The forward ends of the side walls 114 of the spokes are provided with transverse flanges 120 abutting against the rear or inner side of the conical portion of the rear panel. These flanges provide a ready means for welding the spokes to the rear panel.

The peripheral portion of the rear panel 94 and the outer ends of the spokes are provided with axial rearwardly extending flanges 122 and 124, respectively, whereby these two members may be easily and securely fastened to the center panel 92. Before assembly the rear panel and spokes are flanged as described above and shown in Figs. 1 and 4, and the center panel is provided with a strengthening annular U-shaped groove 126 near its rear end. Thereafter, when the parts are assembled on the cylinder hub, the portion 128 of the center panel between the rear end

thereof and the groove 126 is given a reverse bend, as indicated at 130, by a well-known seaming operation to form a unitary lock joint. The joint may be and preferably is welded at relatively close points around its length to aid in securing the parts together and in making the joint substantially liquid-tight.

In order to provide for the escape of any liquid that may enter into the hollow spoke structure formed by the spokes and rear panel, the outermost ends of the spokes are perforated, as indicated at 132.

The front panel 90 is secured to the center panel by an ordinary lock seam joint 134. The front panel is a unitary stamping provided with a central aperture 136 corresponding in location to a similar aperture (not shown) in the front wall of the tub 68 and through which goods are adapted to be inserted within and removed from the cylinder. To prevent tearing of the goods as they are placed within the cylinder, the aperture 136 is provided with a peripheral bead 138.

The center panel is made of a flat strip of sheet material that is rolled into cylindrical form and secured at its ends by a lock joint 140 extending over nearly the entire width of the panel, as shown in Figs. 6 and 7. The side portions of the center panel not included in the lock joint 140 are brought into abutting engagement and soldered together, as indicated at 142.

The distribution of goods within the cylinder and the washing action are aided by providing the center panel with internal equally spaced baffles 144 formed integrally therewith by a suitable stamping operation. In order to prevent the continued battering of the baffles by the goods within the cylinder from deforming the outer surface of the panel, the baffles are formed so that they extend substantially to the annular groove 126 and to the front panel. The baffles have a generally triangular transverse section, as may be noted from Fig. 2, and the front and rear ends 146 and 148 thereof slope at substantially 45 degrees to the horizontal, as shown in Figs. 1 and 4. Thus, the forces created by impact of the goods on the baffles are transmitted directly to the relatively heavy and rigid portions of the cylinder defined by the front and rear joints rather than to the panel surface itself. Thus, the outward bulging of the center panel resulting in prior constructions, is eliminated.

In order further to increase the rigidity of the cylinder and the efficiency of the washing action, the center panel is provided with a series of axially extending inwardly projecting ridges 150. These ridges extend substantially the width of the center panel and are located between successive series of perforations 152 that are usually provided in the center panel. From Fig. 5 it may be noted that the ridges are comparatively shallow and that the perforations are made by first punching holes in the panel and then counter-punching them.

The front and rear panels are made more rigid by providing them with a series of radially extending opposed ridges 154 and 156, respectively. These ridges also add somewhat to the efficiency of the washing action.

In the assembly of the cylinder the hub 98 is first die cast upon the end of the cylinder shaft 34. The front and rear panels and spokes are then stamped into the shapes illustrated. The center panel is first stamped and rolled and secured at its ends, as described above, to form a cylindrical panel. Thereafter the spokes and rear panel are secured to the hub and to each other by riveting and welding. The center panel is then secured to the rear panel and spokes by the previously described seaming and welding operations and finally the front panel is secured to the center panel by another seaming operation. The completed cylinder may then be mounted on the frame by inserting the shaft through the front and rear bearings and securing it against axial movement by the pulley and locking means previously described.

In operation the cylinder is rotated at low and high speeds for washing and drying the goods in well known manner by suitable means acting through the belt and pulley. The construction is well adapted to withstand the usual, and unusual stresses as well, because of its rigid construction. It is light and, consequently, takes less power to operate and may be easily handled both in fabrication and when it must be removed from the washing machine for repairs or any other reason.

The baffle construction prevents outward bulging of the center panel and consequently adds to the life of the cylinder. The provision of the axially extending ridges 150 on the center panel adds to the rigidity and acts as a "washboard" to increase the efficiency of the washing action.

In the modified form of construction shown in Figs. 8 to 11, the hub construction has been modified so that the cylinder shaft may be detached from the cylinder and removed from its supporting means without the necessity of disturbing the tub surrounding the cylinder. This is accomplished by removably mounting the cylinder hub on the shaft in such manner that it can be easily detached merely by rotating the shaft and holding the cylinder stationary, or vice versa.

Referring first to Fig. 8, it may be noted that the cylinder shaft 160 is made with a constant diameter with exception of a reduced forward end 162 provided with threads 164 and adapted to support the hub 166. The hub may be forged or cast in the form shown in Fig. 11, from which it may be seen to comprise a substantially circular front portion 168 provided with rearwardly extending hollow projections 170. These projections are open at their front and outer edges and the hollow space indicated by reference numeral 172 may be seen to be substantially sector shaped in form (see Fig. 8). The projections 170 are equally spaced from one another and are adapted to receive surrounding spokes 174 having a substantially U-shaped cross-section adapted substantially to surround three sides of the projections 170.

The spokes comprise substantially triangular side walls 176 and a bottom 178 having its outer end arched, as indicated at 180, to give it additional rigidity. The side walls are provided with transverse flanges 182 which are adapted to be secured to the front portion of the hub by welding, as shown in Fig. 9, and to the inner side of the conical rear panel 184 by a reinforcing strip 186 and rivets 188 passing through aligned apertures formed in the strip, rear panel and spoke flanges.

The rear panel 184 is similar in construction with the rear panel of the previously described modification and is provided with a central transverse portion 190, an outwardly and rearwardly extending annular portion 192 having an axial length substantially equal to that of the hub 166. The outer end of the rear panel is provided with an axial rearwardly extending peripheral flange

194 adapted to abut against a similar flange 196 formed at the outer ends of each spoke.

The rear panel and spokes are held in assembled relation to each other not only by the reinforcing strip and rivets mentioned before, but by a reverse bend 198 formed at the end of a side portion 200 projecting rearwardly from an annular depression 202 formed near the rear end of a center panel 204.

In order removably to mount the shaft 160 in the hub 166, the transverse central portion 190 of the rear panel is apertured as indicated at 206 in order that a round-headed nut 208 may be inserted therethrough into threaded engagement with the threaded portion 164 of the shaft. The nut 208 is provided with a circular tapered portion 210 adapted to fit closely against a similarly tapered side wall 212 of a hole 214 formed at the front end of the hub 166. The nut 208 is provided with a flanged annular extension 216 extending radially therefrom and adapted, when the bolt is threaded in place, to hold the rear panel in place therebetween and the front end of the hub. Additional rigidity is given to this portion of the structure by providing an annular reinforcing collar 218 adapted to be positioned adjacent the front side of the rear panel and the flanged portion 216 of the nut. The rear panel and the annular reinforcing collar 218 are secured to the hub by four rivets 220 extending therethrough and through the front portion 168 of the hub.

In the assembly the spokes and rear panel are first placed adjacent each other on the hub and thereafter are welded together and riveted to each other and to the hub in an obvious manner. The various parts through which the rivets extend are not drilled until after the assembly has been made, in order that they may be properly aligned without undue difficulty. The assembly of the center and front panels to the rear panel and spokes is accomplished in the same manner as previously described and it is not deemed necessary to repeat that description here. After the cylinder has been completely assembled it is ready to be attached to the shaft. This is accomplished by threading the nut 208 on the shaft after the reduced front end 162 of the latter has been inserted into the hub. When the apparatus is assembled for the first time at the factory the shaft may be secured in place as just described previous to the assembly of the cylinder on the support into the bearings of which it may be inserted in the same manner as the previously described modification. However, after the washing machine has been assembled once with the stationary tub surrounding the rotatable cylinder, then the shaft may be removed from the assembly without necessity of disturbing the tub assembly. This may be accomplished merely by holding the cylinder stationary and rotating the shaft, or vice versa, by means of which the nut 208 and shaft are rotated relative to each other to unloosen the one from the other. Once loosened, the nut 208 may be held stationary and the shaft rotated to complete the detaching operation.

It should be apparent from the above description that the threads 164 and the complementary threaded portion of the nut should be designed for the proper direction of rotation of the cylinder; that is, they should be so designed that as the cylinder is rotated the inertia forces will tend to tighten the nut on the shaft.

While only two modifications of the present invention have been described, it should be apparent to those skilled in the art that it is susceptible of other changes. It is intended that the accompanying claims shall cover not only the modifications described, but all those within the skill of those familiar with the art.

I claim:

1. A rotatable cylinder including in combination a generally conical end panel having an outwardly extending peripheral flange, a hub, means securing said panel to said hub with the inner side thereof adjacent the hub, a plurality of radial tongue-like extensions on said hub, a plurality of spokes of generally triangular form and U-shaped cross section adapted to fit closely around said extensions and secured to said rear panel, flanges formed at the outer ends of said spokes, a center circumferential panel provided with a reverse bend extending around both said flanges for securing them together, and a front panel secured to said center panel.

2. A rotatable cylinder including in combination an end panel formed generally in the shape of a truncated cone, a hub, means securing said hub to the inner side of said panel, a plurality of radial tongue-like extensions on said hub, spokes of generally triangular form and U-shaped cross section having their base portions fitting around said tongues, means securing said spokes to said rear panel, abutting outwardly extending flanges formed on said spokes and rear panel, a center circumferential panel formed with a reverse bend extending around said flanges and welded thereto, and a front panel secured to said center panel.

3. A rotatable cylinder including in combination a rear panel formed generally in the shape of a truncated cone, a hub having an axial length substantially the length of said conical panel, means securing said hub to said panel, a plurality of radial tongue-like extensions on said hub, spokes of generally triangular form and U-shaped cross section having their base portions fitting closely about said extensions, means including transverse flanges on the wall portions of said spokes welded to said rear panel for securing said spokes to said panel, rearwardly extending flanges formed on said spokes and rear panel, a center circumferential panel provided with a reverse bend extending around said last-mentioned flanges, whereby it serves to secure said spokes and panel together and is itself secured to the latter, and a front panel secured to said center panel.

4. A cylinder of the type adapted to be secured to one end of a shaft rotatable along a predetermined axis including in combination, a hub member secured to the end of said shaft, an integral sheet of material having a flat central portion secured to the front of said hub and an annular portion extending radially and rearwardly to form a substantially conical rear panel, a plurality of tongue-like extensions formed on said hub, spokes of generally triangular form and U-shaped cross section secured to said panel and fitting closely about said extensions, rearwardly extending flanges at the ends of said spokes, a peripheral rearwardly extending flange on said rear panel, said flanges abutting against each other, a center circumferential panel having a reverse bend extending around and welded at spaced points to said flanges, and a front panel secured to said center panel.

5. In a cylinder of the type described, the combination including a flanged rear panel, and a

center circumferential panel having an annular inwardly extending groove adjacent the rear panel and a reverse bend extending around said flange, said center panel having integral inwardly stamped baffles extending substantially to said groove, and said baffles comprising an end wall extending diagonally toward said groove.

6. In a cylinder of the class described, end construction comprising a generally conical end panel having an outwardly extending peripheral flange, a hub provided with a plurality of radial tongue-like extensions, spokes having a substantially triangular shape the bases of which have openings the same shape and size as said extensions and which fit around said extensions and the apices of which are provided with flanges abutting said first mentioned flanges, and a center circumferential panel having a peripheral reverse bend extending around said flanges for securing said parts together, said flanges being also welded together to form a substantially liquid-tight joint.

7. In a cylinder of the class described, end construction comprising a rear panel of integral sheet material formed substantially in the shape of a truncated cone, a hub, means securing the truncated portion of said cone to said hub with the inner side thereof abutting the end of the hub, a plurality of radial tongue-like extensions on said hub, a plurality of spokes of a generally triangular form and U-shaped cross sections, said spokes surrounding said extensions and secured to said rear panel, a peripheral rearwardly extending flange formed on said rear panel, flanges formed on the ends of said spokes adapted to abut against said first mentioned flange, and a center circumferential panel provided with a peripheral reverse bend extending around said flanges for securing them together, said flanged and reverse bend portions being welded at equidistant points to form a substantially liquid-tight joint.

8. In a cylinder of the class described, the combination including a hub, a rear panel, a plurality of spokes extending from said hub and secured to said rear panel, said spokes being substantially U-shaped in cross-section and secured with their open sides adjacent the rear panel to form substantially hollow spokes, and drain openings at the outer ends of said spokes.

9. In apparatus of the class described, a washing machine cylinder having its end wall secured to a cast hub having imbedded therein a shaft projecting from said wall and adapted to serve as a support for said cylinder and a plurality of radial reinforcing spokes secured at their inner ends to said hub substantially throughout the length thereof and secured at their outer portions to said end wall.

10. In an end-mounted cylinder of the type described, the combination including a driving shaft, a hub carried at one end of the driving shaft, a generally conical rear panel having an axial length substantially equal to that of the hub and secured thereto with the hub and shaft on the concave side of the panel, a plurality of generally triangular spokes having their wider ends secured to the full length of the hub and extending radially from the hub along the concave face of the panel, a center circumferential panel joined at its rear edge to the spokes and the rear panel around the circumference thereof, said center panel having integrally stamped baffles extending substantially the width thereof and comprising end walls extending diagonally toward its front and rear edges, and a front panel secured around its circumference to the front edge of the center panel and having a central opening therein.

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