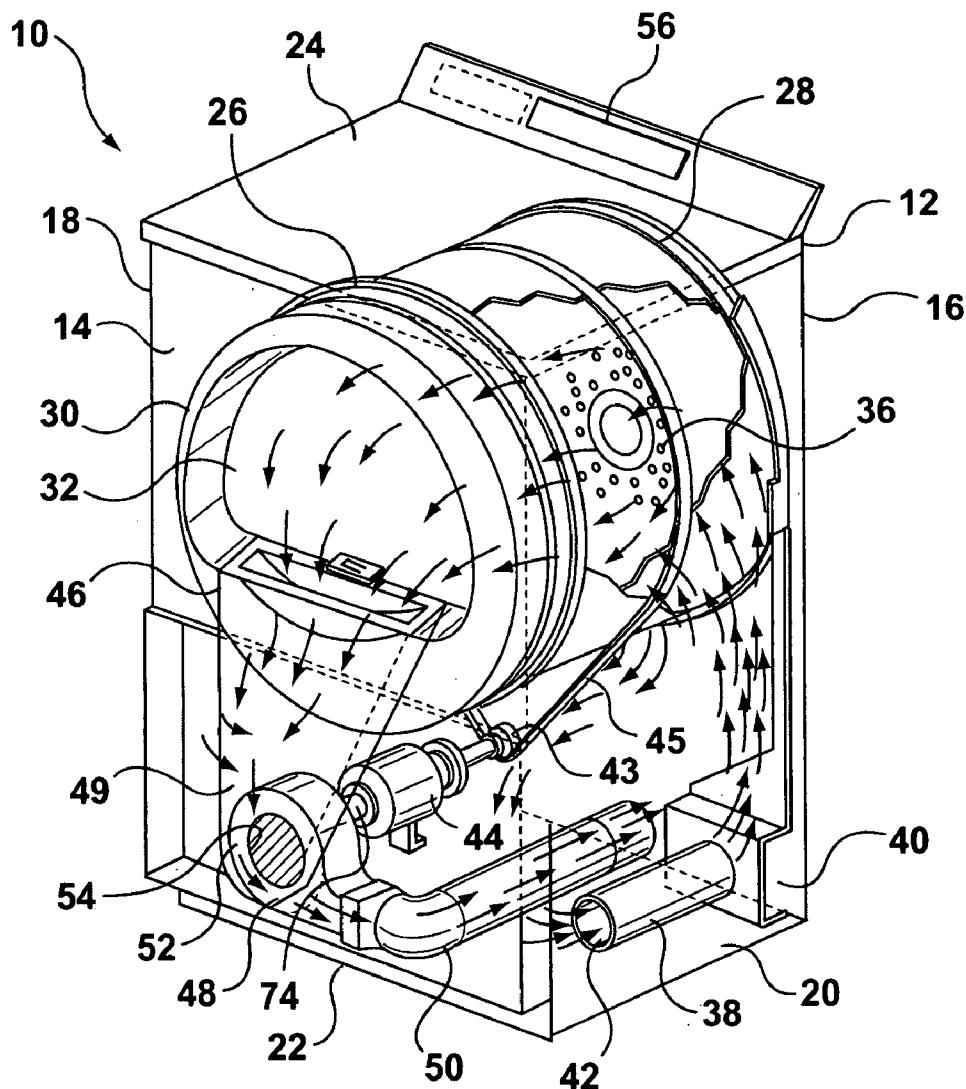




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Jul. 28, 2006	(CA)	2,554,497
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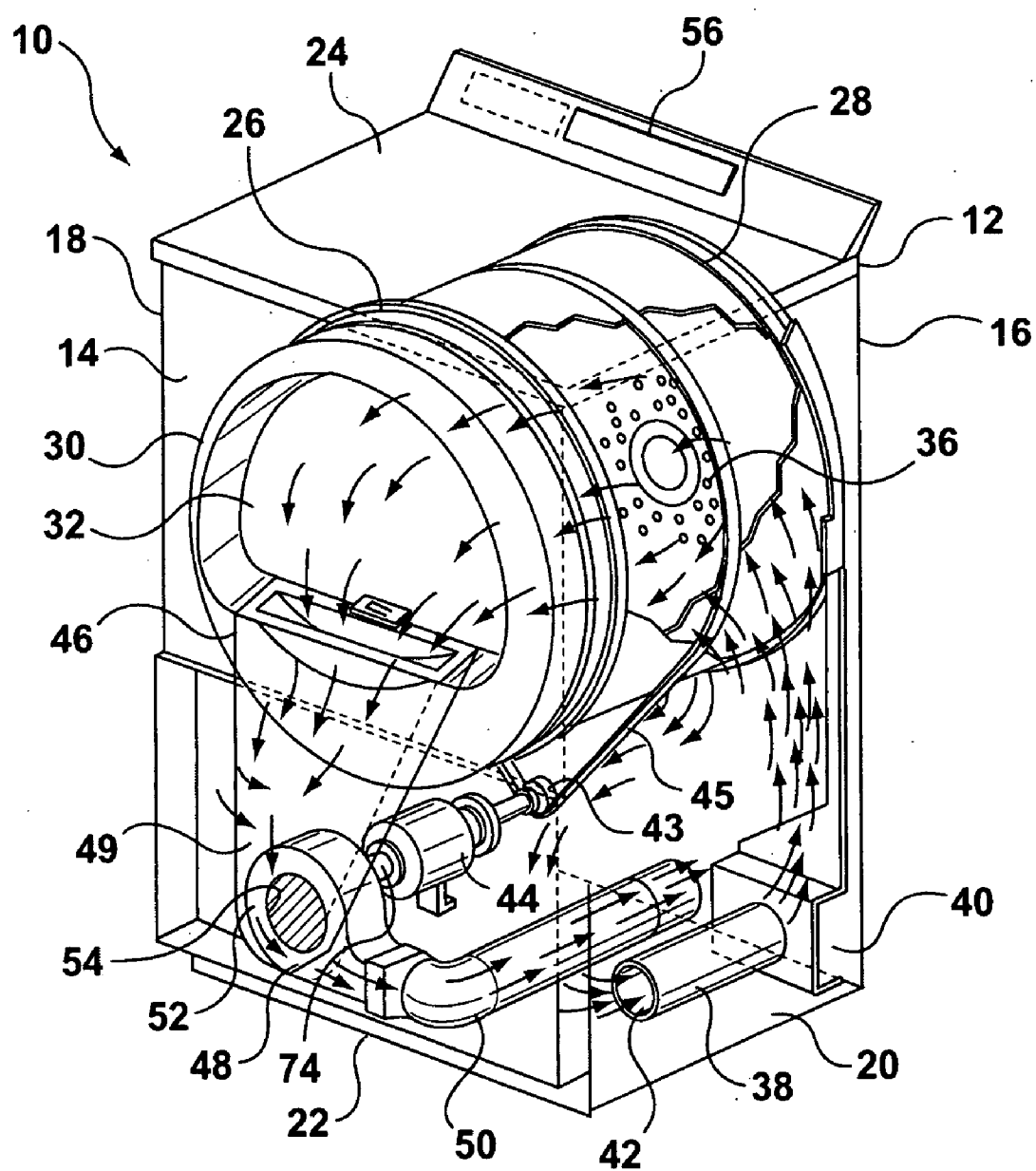


FIG. 1

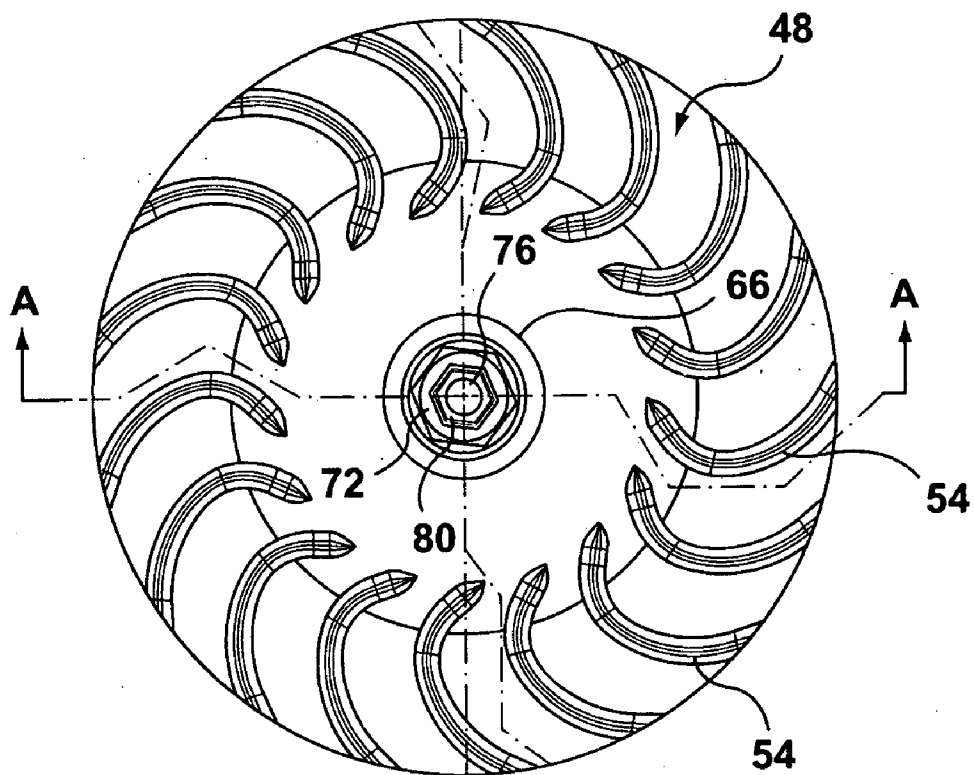


FIG. 2

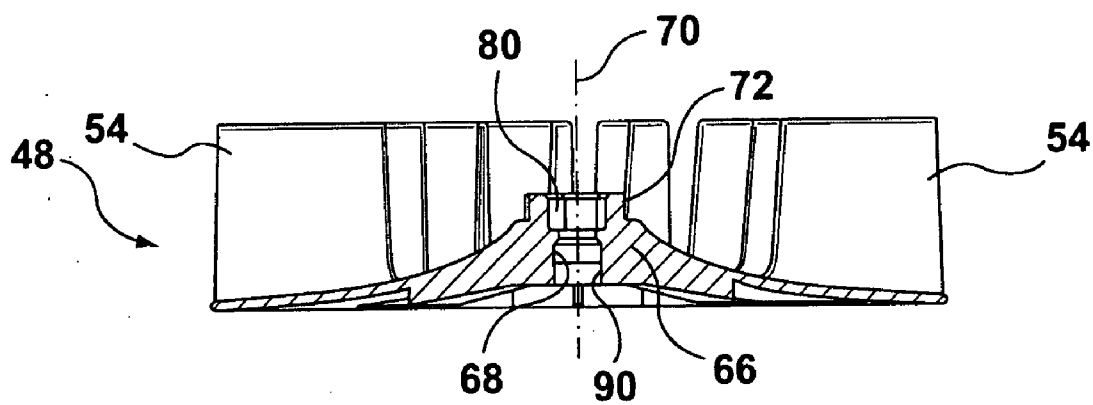


FIG. 3

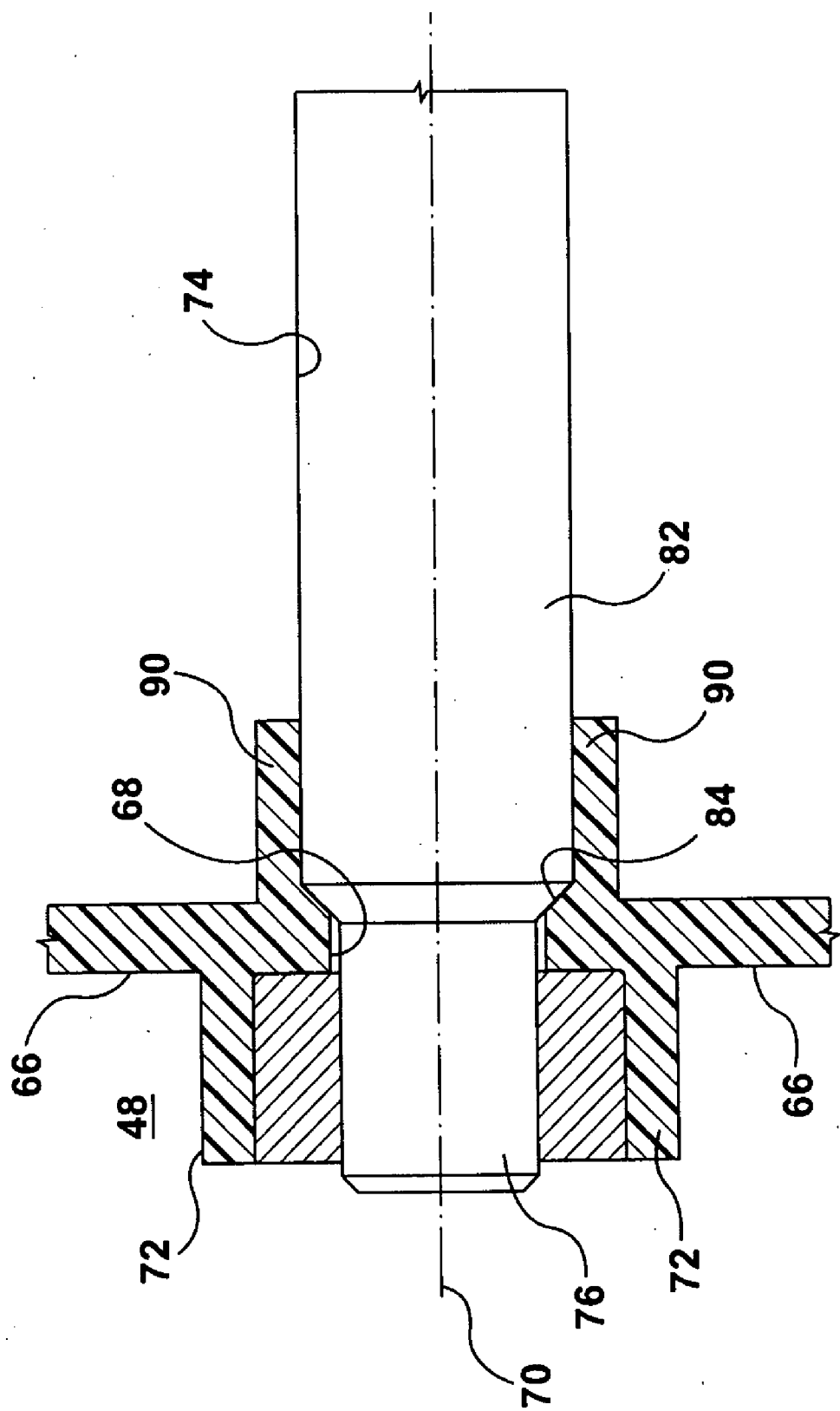


FIG. 4

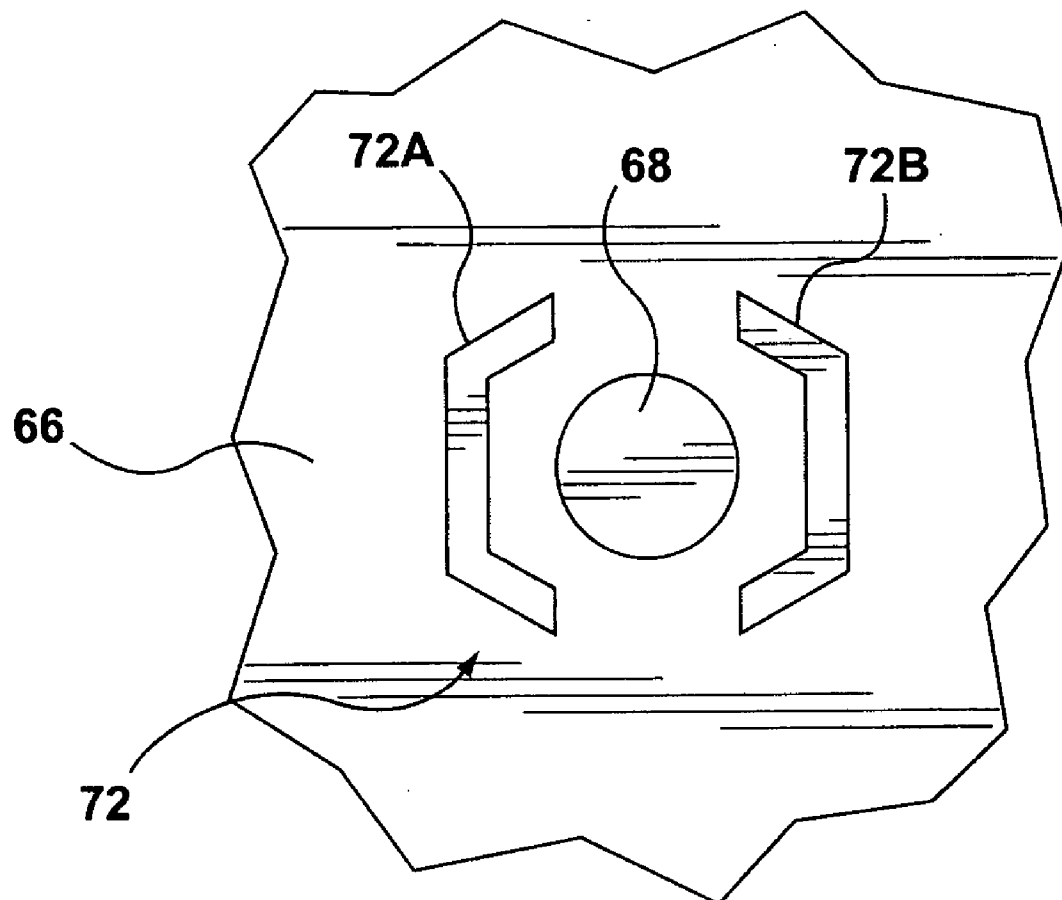


FIG. 5

BLOWER WHEEL ATTACHMENT FOR CLOTHES DRYER

FIELD OF THE INVENTION

[0001] The present invention relates to an appliance for drying clothing articles, and, more particularly, to an improved attachment of the blower wheel to a drive motor shaft in a clothes dryer.

BACKGROUND OF THE INVENTION

[0002] Clothes dryers used for drying articles of clothing typically have a rotating drum into which the articles of clothing are inserted. The drum is rotated by a motor and transmission interconnecting a shaft of the motor to the drum. This transmission typically comprises a pulley attached to the shaft of the motor and a belt entrained about the pulley and the drum. Heated air is moved through the drum, as the drum is rotated, to dry the articles in the drum. Air is moved through the drum by a blower wheel or centrifugal fan that moves air through ducting typically located in the air exhaust for the dryer drum. The blower wheel is driven by connection with the shaft of the motor.

[0003] In a current blower wheel attachment, utilized in clothes dryers manufactured by MABE Canada Inc., for attaching the blower wheel to the shaft of the motor the shaft of the motor has a flat on its end portion that extends through a central opening in the hub of the blower wheel. The blower wheel also has a screw opening on the hub offset from the central opening of the hub. A clip having an aperture with a matching flat is inserted over the flat of the motor shaft. The other end of the clip has a second opening through which a screw passes into the screw opening in the hub of the centrifugal fan. In this manner, the centrifugal fan is caused to rotate by the interconnection of the hub and the flat of the shaft by the clip. Completing this interconnection is a labour intensive step during the manufacturing process of the clothes dryer.

[0004] U.S. Pat. No. 2,557,201 discloses a centrifugal fan in which a nut is threaded onto a coupling socket that is in turn secured by a locating screw to the shaft of a motor. The arrangement discloses an attachment that is also relatively labour intensive.

[0005] U.S. Pat. No. 4,086,707 discloses a blower assembly where the radial or centrifugal fan is secured to a motor shaft by a sleeve bearing, washer and a lock washer fitted into a recess found on the end of the motor shaft. This attachment requires numerous parts.

[0006] U.S. patent publication 2004/0221477 A1 discloses a blower wheel attachment to the shaft of a motor which incorporates a nut threaded onto the end of the shaft of the motor. The attachment of this nut requires torquing the nut to the proper force so that the nut (will not become disengaged during normal operation.

BRIEF DESCRIPTION OF THE INVENTION

[0007] The present invention relates to a blower wheel attachment for attaching a centrifugal fan or a blower wheel to a threaded shaft end portion of an electric motor used in a clothes dryer. In particular, the present invention utilizes a nut that is held in place by the blower wheel so that the nut may be tightened to the shaft end portion as the motor rotates. The blower wheel has a hub with a central opening surrounding a center axis of the blower wheel. The blower

wheel comprises at least one first wall portion extending outwardly from the hub adjacent the central opening to at least partially surround the center axis. The nut is simply inserted and then held within the at least one first wall portion of the blower wheel so as to secure the nut to the threaded shaft end portion by simply rotating the fan relative to the shaft end portion. When the motor operates, due to the predetermined orientation of the threads on the threaded shaft end portion, the nut is torqued sufficiently and is always tightened. As a result, the nut translates the rotation of the shaft into rotation of the fan.

[0008] In accordance with the invention there is provided a blower wheel attachment comprising a blower wheel, an electric motor and a nut. The blower wheel comprises a plurality of radial fan blades and a hub having a central opening surrounding a center axis of the blower wheel. The blower wheel comprises at least one first wall portion extending outwardly from the hub adjacent the central opening to at least partially surround the center axis. The electric motor has a shaft with a threaded shaft end portion extending through the central opening and the at least one first wall portion. The threaded shaft end portion has threads arranged in a predetermined orientation. The nut is held within the at least one first wall portion and secured to the threaded shaft end portion to cause the blower wheel to rotate with the rotation of the shaft of the motor.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] For a better understanding of the nature and objects of the present invention reference may be had by way of example to the accompanying diagrammatic drawings in which:

[0010] FIG. 1 is a perspective view of an exemplary clothes dryer that may benefit from the present invention; and,

[0011] FIG. 2 is a front view of the blower wheel, central nut and motor shaft;

[0012] FIG. 3 is a sectional view of the blower wheel taken along lines A-A of FIG. 2;

[0013] FIG. 4 is an enlarged partial sectional view of a hub portion of the blower wheel, the nut and the threaded end portion of the motor shaft; and,

[0014] FIG. 5 is a view of an alternative embodiment for the hub of the centrifugal fan.

DETAILED DESCRIPTION OF THE INVENTION

[0015] FIG. 1 shows a perspective view of an exemplary clothes dryer 10 that may benefit from the present invention. The clothes dryer includes a cabinet or a main housing 12 having a front panel 14, a rear panel 16, a pair of side panels 18 and 20 spaced apart from each other by the front and rear panels, a bottom panel 22, and a top cover 24. Within the housing 12 is a drum or container 26 mounted for rotation around a substantially horizontal axis. A motor 44 rotates the drum 26 about the horizontal axis through, for example, a pulley 43 and a belt 45. The drum 26 is generally cylindrical in shape and has an imperforate outer cylindrical rear wall 28 and a front flange or wall 30 defining an opening 32 to the drum. The front wall 30 and opening 32 are normally closed by a door (not shown). Clothing articles and other fabrics are loaded into the drum 26 through the opening 32. A plurality of tumbling ribs or baffles (not shown) are

provided within the drum 26 to lift the articles and then allow them to tumble back to the bottom of the drum as the drum rotates. The rear wall 28 is rotatably supported within the main housing 12 by a suitable fixed bearing. The rear wall 28 includes a plurality of holes 36 that receive hot air that has been heated by a heater such as a combustion chamber 38 and a rear duct 40. The combustion chamber 38 receives ambient air via an inlet 42. Although the exemplary clothes dryer 10 shown in FIG. 1 is a gas dryer, it could just as well be an electric dryer without the combustion chamber 38 and the rear duct 40. For an electric dryer, electrical heating elements may be located in a heater housing between the rear panel 16 and the rear wall 28. The heated air is drawn from the drum 26 by a blower wheel 48 which is also driven by the motor 44. The blower wheel 48 comprises an outer housing 52 and inner radial fan blades 54 adapted to direct air about the periphery of the blower wheel. The air passes through a screen filter 46 which traps any lint particles. As the air passes through the screen filter 46, it enters a trap duct 49 and is moved by blower wheel 48 out of the clothes dryer through an exhaust duct 50. After the clothing articles have been dried, they are removed from the drum 26 via the opening 32.

[0016] An electronic interface and display panel 56 allows the user to program operation of the dryer and further allows for monitoring progress of respective cycles of operation of the dryer.

[0017] Referring to FIGS. 1 through 4 an embodiment of the present invention is shown wherein the blower wheel 48 comprises centrifugal fan blades 54 spaced from a hub 66 of the blower wheel 48. The hub 66 has a central opening 68 that surrounds a center axis 70 for the blower wheel 48. The rotation of the blower wheel 48 and the shape of the fan blades 54 direct air about the periphery of the blower wheel 48.

[0018] The blower wheel 48 has a first continuous wall portion 72 which is shown in the shape of a hexagon. This first wall portion 72 extends outwardly from the hub 66 adjacent the central opening 68 so as to surround the center axis 70 of the blower wheel 48. As shown in FIGS. 2 and 3, a nut 80 is held within the first wall portion 72. The nut 80 has a shape that corresponds to the shape of the wall portion 72 (hexagonal shape). The nut 80 is held in the embodiment shown by interference fit with the first wall portion 72. It should be understood that a tight or loose interference fit may be employed and further, joining of these two pieces such as by welding or cementing may form an alternative embodiment. However, in the embodiment shown, the blower wheel 48 comprises a plastic material and the hexagonal nut 80 further comprises a metal, which dissimilar materials, do not readily lend themselves to welding.

[0019] In the embodiment shown, the electric motor 44 has a shaft 74 which is connected to the blower wheel 48 by the nut 80 (see FIG. 4). It should be understood that in an alternative embodiment, two electric motors may be employed by the clothes dryer. One motor to drive the rotation of the rotating drum 26 and the other motor to drive the blower wheel 48. The shaft 74 has a threaded end portion 76 that extends through the central opening 68 of the hub 66 and also extends into or through the first wall portion 72. The threaded shaft end portion 76 has threads arranged in a pre-determined orientation whereby the nut 80 is automatically tightened against the threads of the shaft 74 by rotation of the shaft 74 during motor 44 operation. As a result, the nut 80 is tightened on the threads of the threaded shaft portion 76 during initial rotation of the shaft 74 and the nut 80

thereafter causes the blower wheel 48 to rotate with the rotation of the shaft 24 during motor 44 operation.

[0020] As best seen in FIG. 4, the shaft 74 has an intermediate portion 82 of diameter larger than the threaded shaft end portion 76. As a result shoulder 84 is located between the intermediate portion 82 and the threaded shaft end portion 76. The blower wheel 48 further comprises at least one second wall portion 90 extending from the hub 66 adjacent the central opening 68 on a side of a blower wheel 48 opposite to that side supporting the first wall portion 72. Consequently, the second wall portion 90 together with the hub 66 provides a seat in which the shoulder 84 and the intermediate portion 82 of the shaft 74 may engage as the nut 80 is tightened against the threaded shaft end portion 76.

[0021] Referring to FIG. 5, there is shown an alternative embodiment for the first wall portion 72. In this embodiment the first wall portion 72 is discontinuous and comprises two wall portions 72A and 72B. It should be understood that in an alternative embodiment multiple wall portions may be arranged so that they become a series of spaced apart ribs extending around the central opening 68 from the hub 66. The purpose of the first wall portion 72 or the at least one first wall portion 72 shown in FIG. 5 remains the same namely to hold the nut 80 within the wall portions 72A and 72B. Also, it should be understood that the second wall portion 90 shown in FIG. 4 may also be discontinuous and thereby comprise multiple wall portions.

[0022] While the invention has been described in terms of various specific embodiments, those skilled in the art will recognize that the invention can be practiced with modifications within the spirit and scope of the present invention as disclosed herein.

What is claimed is:

1. A blower wheel attachment comprising:

a blower wheel comprising a plurality of radial fan blades and a hub having a central opening surrounding a center axis of the blower wheel, and the blower wheel comprising at least one first wall portion extending outwardly from the hub adjacent the central opening to at least partially surround the center axis;

an electric motor having a shaft with a threaded shaft end portion extending through the central opening and the at least one first wall portion, the threaded shaft end portion having threads arranged in a predetermined orientation;

a nut held within the at least one first wall portion and secured to the threaded shaft end portion causing the blower wheel to rotate with rotation of the shaft of the motor.

2. The blower wheel attachment of claim 1 wherein the nut is tightened on the threads of the threaded shaft portion during initial rotation of the shaft.

3. The blower wheel attachment of claim 1 wherein the at least one first wall portion has a hexagonal shape.

4. The blower wheel attachment of claim 1 wherein the at least one first wall portion and nut are shaped to provide an interference fit therebetween to hold the nut relative to the at least one first wall portion.

5. The blower wheel attachment of claim 1 wherein the shaft has an intermediate portion of diameter larger than that of the threaded shaft end portion thereby providing a shoulder between the intermediate portion and the threaded shaft end portion, and the blower wheel has at least one second wall portion extending from the hub adjacent the central opening on a side of the blower wheel opposite to that supporting the at least one first wall portion, and the should-

der and the intermediate portion of the shaft being seated against the hub within the at least one second wall portion.

6. A domestic clothes dryer comprising:

a cabinet;

a drum mounted for rotation within the cabinet;

a blower wheel assembly for moving air through the drum, said blower wheel assembly comprising:

a blower wheel comprising a plurality of radial fan blades and a hub having a central opening surrounding a center axis of the blower wheel, and the blower wheel comprising at least one first wall portion extending outwardly from the hub adjacent the central opening to at least partially surround the center axis;

an electric motor having a shaft with a threaded shaft end portion extending through the central opening and the at least one first wall portion, the threaded shaft end portion having threads arranged in a predetermined orientation;

a nut held within the at least one first wall portion and secured to the threaded shaft end portion causing the blower wheel to rotate with rotation of the shaft of the motor.

7. The domestic clothes dryer of claim 6 wherein the nut is tightened on the threads of the threaded shaft portion during initial rotation of the shaft.

8. The domestic clothes dryer of claim 6 wherein the at least one first wall portion has a hexagonal shape.

9. The domestic clothes dryer of claim 6 wherein the at least one first wall portion and nut are shaped to provide an interference fit therebetween to hold the nut relative to the at least one first wall portion.

10. The domestic clothes dryer of claim 6 wherein the shaft has an intermediate portion of diameter larger than that of the threaded shaft end portion thereby providing a shoulder between the intermediate portion and the threaded shaft end portion, and the blower wheel has at least one second wall portion extending from the hub adjacent the central opening on a side of the blower wheel opposite to that supporting the at least one first wall portion, and the shoulder and the intermediate portion of the shaft being seated against the hub within the at least one second wall portion.

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