Dec. 1, 1970 C. D. RAIA 3,543,321

METHOD AND APPARATUS FOR WASHING FLOOR COVERINGS INCLUDING CARPETS, RUGS AND THE LIKE

Filed Oct. 2, 1968 3 Sheets-Sheet 1

Fig. 1.

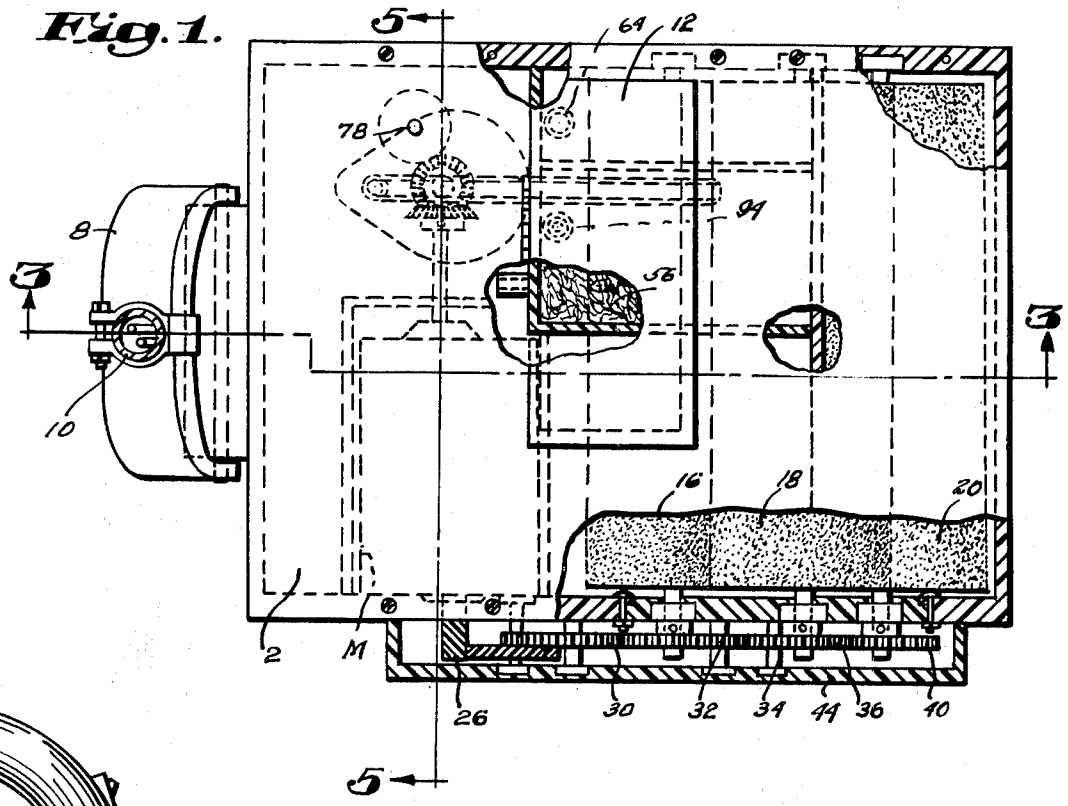
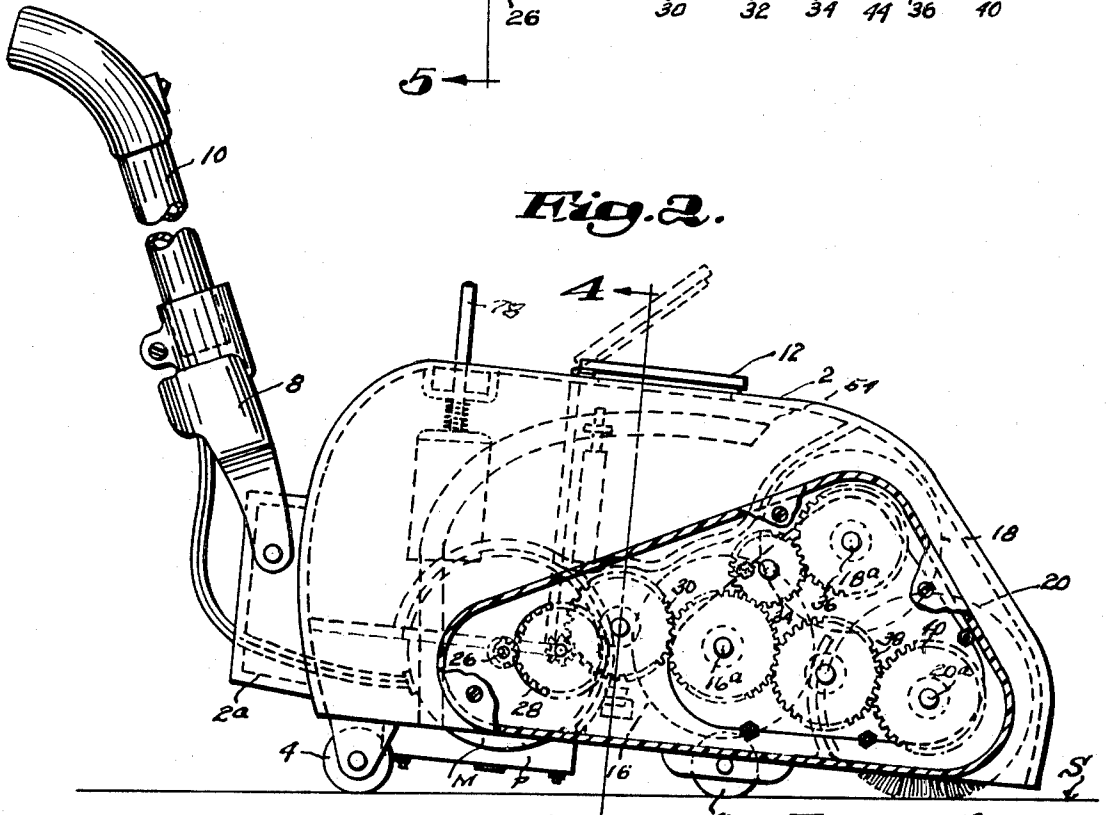


Fig. 2.



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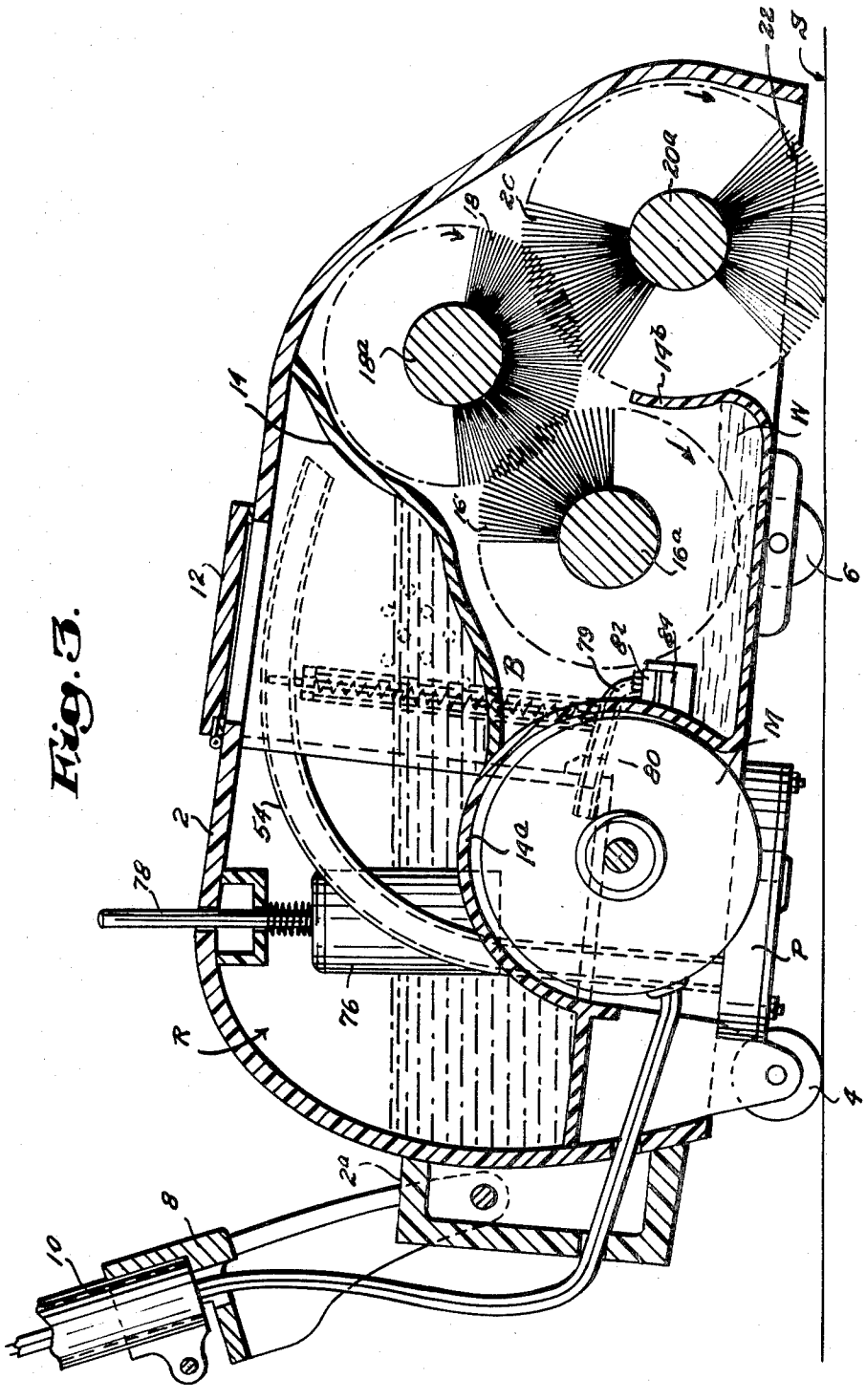


Fig. 3.

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Fig. 4.

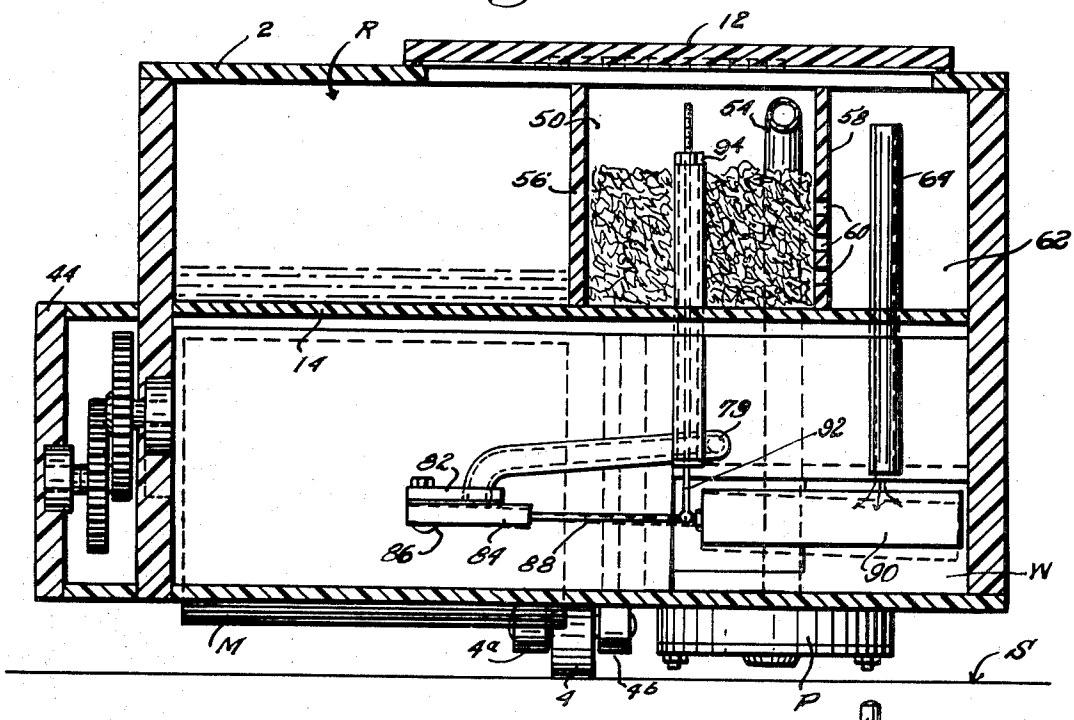
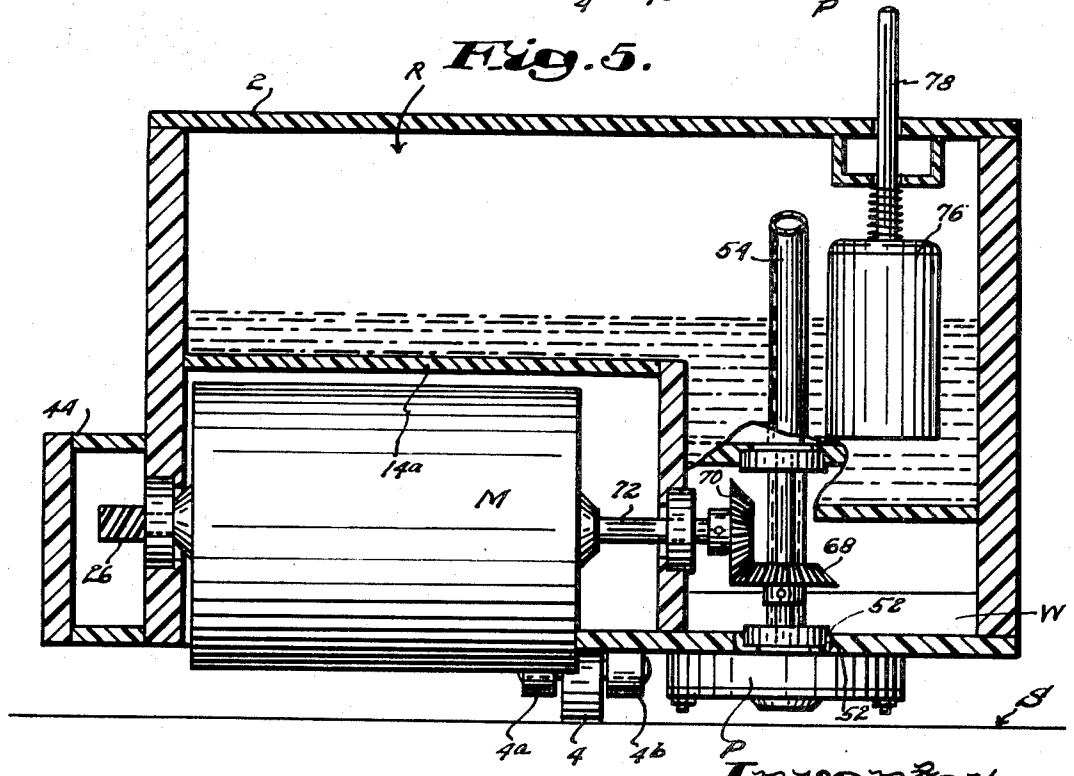


Fig. 5.



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3,543,321

METHOD AND APPARATUS FOR WASHING FLOOR COVERINGS INCLUDING CARPETS, RUGS AND THE LIKE

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Int. Cl. A47l *11/292, 11/34*
U.S. Cl. 15—50 1 Claim

ABSTRACT OF THE DISCLOSURE

Wash water is releasably contained in a reservoir tank and allowed to flow in metered amounts into a brush compartment which includes a wash water receptacle. The brush compartment encloses three brushes including a carrier brush which is partially immersed in wash water in a wash water receptacle. A second transfer brush is mounted in a raised position and is constantly supplied with small quantities of wash water from the carrier brush. The transfer brush transfers wash water to a third cleaning brush. The cleaning brush is in rolling contact with a floor covering to be cleaned. Dirt, lint and other foreign material is wetted and dissolved and particles of solubilized dirt and lint are picked up by the cleaner brush and transferred to the transfer brush and then to the carrier brush which deposits the dirt and lint in the wash water. Dirty wash water is constantly pumped out of the wash water receptacle into a filtering chamber where filtered wash water is allowed to overflow and recycled to the wash water receptacle. The metered amount of wash water released from the reservoir tank is regulated to substantially replace the amounts of wash water dispensed from the cleaning brush onto the floor covering.

This invention relates to a method and apparatus for washing rugs, carpets and various other floor covering surfaces.

It is a chief object of the invention to provide an improved method and apparatus for cleaning rugs, carpets and other floor coverings in an efficient and rapid manner utilizing quantities of cleaning fluid which are supplied from a reservoir in accordance with amounts used up in the cleaning operation.

Another object of the invention is to provide a novel method of applying wash water wherein a plurality of brushes are mounted for movement in rolling contact with one another and with bristles of the brushes occurring in intermingling relationship.

Another object of the invention is to provide a portable carpet washing apparatus which includes an efficient pumping and filtering system whereby a quantity of wash water may be maintained in a relatively clean filtered condition and reused for extended periods.

The nature of the invention and its other objects and novel features will be more fully understood and appreciated from the following description of a preferred embodiment of the invention selected for purposes of illustration and shown in the accompanying drawings, in which;

FIG. 1 is a plan view of the washing machine apparatus of the invention.

FIG. 2 is a side elevational view with a portion of the gear drive uncovered.

FIG. 3 is a cross section taken on the line 3—3 of FIG. 1.

FIG. 4 is a cross section taken on the line 4—4 of FIG. 2.

FIG. 5 is a cross section taken on the line 5—5 of FIG. 1.

Referring more in detail to the drawings, the apparatus illustrated comprises one preferred embodiment of means for carrying out a method of washing in which regulated quantities of wash water are continuously recirculated while being utilized in a carpet cleaning operation. In general, the method is based on the concept of containing a quantity of wash water in a reservoir or tank and releasing metered amounts of the wash water into a wash water receptacle to take the place of wash water used up in a cleaning operation.

The wash water thus furnished to the wash water receptacle is employed to carry out a cleaning operation in which a carrier roll picks up wash water from the wash water receptacle and delivers the wash water to a transfer roll which in turn transfers wash water to a cleaning roll. The carrier roll and the transfer roll are in rolling contact with the bristles in intermingling relationship. Likewise, the transfer roll and the cleaning roll are in contact with the bristles in intermingling relationship.

Wash water is applied by the cleaning roll to the floor covering surface where dirt, lint and other foreign material is wet or dissolved. The cleaning roll, rotating at high speed, picks up dirt and lint which are carried over to the transfer roll and then transferred to the carrier roll. This dirt and lint is then released from the carrier roll into the wash water in the wash water receptacle in which the carrier brush is immersed. A pump constantly circulates dirty water from the receptacle upwardly into a filtering chamber and filtered, clean wash water is collected in an overflow chamber and allowed to flow back into the wash water receptacle.

Considering more in detail the preferred embodiment of washing means shown, numeral **2** denotes a portable casing mounted on wheels for rolling movement over a rug, carpet or other form of floor covering or surface which is desired to be cleaned. Numeral **4** denotes a rear wheel and numeral **6** refers to a pair of spaced front wheels which may be supported in some suitable manner as for example, in hangers **4***a* and **4***b* recessed at the bottom of the casing.

At the rear side of the casing **2** is an extension part **2***a* in which is mounted a pivoted yoke **8**. The yoke **8** supports a handle **10** which may be utilized to move the casing along a desired path of travel over a carpet surface S to be cleaned. At the upper side of the case **2** is a hinged cover **12** which can be opened as suggested in dotted lines in FIG. 2 to provide for introducing a liquid cleaning material such as a mixture of wash water and detergent into the casing.

Extending between two opposite sides of the casing **2** is a partition **14** which forms an upper fluid reservoir R and a lower brush compartment B. The partition **14** includes a motor housing section **14A** which as shown in FIG. 3 is shaped to extend around the motor M. The partition section **14A** also has a portion which extends forwardly as shown in FIG. 3 to form a wash water receptacle **14B** in which a metered quantity of wash water may be received from the reservoir R and contained as hereinafter described.

Mounted in the brush compartment B are three power-driven cylindrically shaped brushes supported for rotation about horizontal axes of rotation and arranged in rolling contact with one another as shown in FIG. 3. The three brushes include a carrier brush **16**, a transfer brush **18** and a cleaner brush **20**. These brushes are fixed on respective shaft members **16***a*, **18***a* and **20***a*.

As will be observed from an inspection of FIG. 3, brush **16** is supported in a position such that its bristles may be partially immersed in a body of wash water W in the wash water receptable **14***b*. Brush **18** is located somewhat above brush **16** in a position such that its

bristles may extend into the bristles of brush **16** in intermingling relationship. Similarly the brush **20** is located ahead of the brushes **16** and **18**. The bristles of this brush **20** are not in contact with the bristles of brush **16**, but they are in contact with the bristles of brush **18** in intermingling relationship. In addition, the bristles of brush **20** are also arranged to project downwardly through an opening **22** forming in the bottom of case **2** so that a brushing contact with floor surface S may be realized when the casing is advanced.

Brushes **16**, **18** and **20** are mounted on shafts rotatably supported in bearings as shown, and as a means of actuating the brushes **16**, **18** and **20**, I have provided a gear train which is adapted to be driven by an output shaft of a motor M carrying a worm gear **26**. The gear train includes gears **28**, **30**, **32**, **34**, **36**, **38** and **40** which may be supported, for example, on respective shafts as shown in FIG. 1. These gears are preferably enclosed by a housing portion **44**.

It will be observed that by means of this gearing described, brush **16** may be driven in a clockwise direction as viewed in FIG. 3 and also brushes **18** and **20** are driven in a clockwise direction as viewed in FIG. 3. Therefore, when the brushes are rotating in the manner described, brush **16** will pass through the body of wash water W and carry wash water around into contact with the bristles of brush **18** with the bristles of brush **16** becoming intermingled with the bristles of brush **18** throughout a substantial radial distance as indicated in FIG. 3. Wash water thus carried to the transfer roll is then transfered to the bristles of the brush **20** and brush **20** deposits the wash water onto the surface S wetting the fibres and dissolving or solubilizing dirt particles and other foreign material.

It should be understood that these brushes may be driven at a relatively high speed, for example, at speeds of 600 to 1200 r.p.m., and it will be appreciated that a substantial amount of wash water is applied to the surface S as the brush passes along, and the fibres of the carpet are raised up and wetted. Dirt, lint and foreign material in a wetted state is picked up from the fibres by the bristles of roll **20** as it moves out of contact with the surface S and this dirt and lint material is moved through a limited arc of rotation which is opposite in direction to arc of rotation of brush **18** at this point. As a result of this, transfer roll **18** collects dirt and lint from brush **20** and transfers it to brush **16** during a limited arc of rotation which is opposite to the direction of rotation of brush **16**. From brush **16** dirt and lint is deposited in the wash water W in the wash water receptacle.

Wash water containing dirt, lint and other foreign material thus deposited is continuously pumped out of the wash water receptacle W into a filtering chamber **50** by means of a pump P which is solidly secured at the bottom of the casing **2** in a sealed manner as suggested in FIGS. 4 and 5. The pump P receives dirty wash water through an opening **52** and pumps the water through a pipe **54** which extends upwardly and forwardly as illustrated in FIG. 3. The end of conduit **54** extends into a filter chamber **50** in a position to discharge dirty wash water onto the top of a body of filtering material **56** which may consist of a mass of fibrous material or other suitable filtering substance.

At one side of the filtering chamber **56** is a perforated wall section **58** through which are formed holes as **60** and through these holes filtered wash water passes into an overflow chamber **62** for cleaned wash water. Overflow pipe **64** is arranged to receive clean wash water and discharge it by gravity back into the water receptacle W.

The pump P may be driven in any convenient manner, as for example, by gears **68** and **70** operated through a shaft **72** extending from one end of motor M. The quantity of wash water which is present in the casing body for carrying out the cleaning method may be indicated by

means of a float member **76** and a spindle **78** which projects through the top of the casing **2** and which may bear a scale or gradations thereon.

I may also provide valve means for metering the quantity of wash water which may be released from the reservoir R into the water receptacle **14***b* to take the place of water which is dispensed in cleaning. This may be accomplished, for example, by means of a conduit pipe **79** which extends through the wall portion **80** as shown in FIG. 3. The opposite end of the pipe **79** projects into the water receptacle and is formed with a valve assembly **82** having a valve closure element **84** pivotally attached at **86**. A spindle **88** extends away from the valve **84** as shown in FIG. 4 and supports at its outer end a float **90**. The float **90** is positioned by means of a valve adjustment rod **92** contained in a screw adjustment sleeve **94** which projects upwardly through the filter chamber **50**. By changing the setting of the screw adjustment, the float arrangement may be varied to change the opening of the valve through which wash water may be delivered into the wash water receptacle.

From the foregoing description it will be evident that I have disclosed an efficient and rapid method and means for carrying out a rug or carpet cleaning operation. While I have shown preferred forms of the invention, it will be understood that various changes and modifications may be resorted to within the scope of the appended claim.

I claim:

1. A washing apparatus for cleaning a floor covering comprising a casing, a plurality of power driven brushes arranged in the casing in rotating intermingling contact and receptacle means for supplying wash water to one of the brushes while in rolling contact with the said floor covering, said power driven brushes including a carrier brush immersed in the wash water receptacle, a transfer brush located in rolling contact with the carrier brush and located above the waste water receptacle, and a cleaning brush located ahead of the carrier brush and in rolling contact with the transfer brush, said cleaning brush being arranged in the casing in a position to project downwardly through the bottom of the casing into brushing contact with the said floor covering, each of said brushes being rotatable in the same direction, and the said cleaning brush and carrier brush being spaced apart an appreciable distance whereby dirt particles picked up by the cleaning brush from the weted floor covering are moved in a limited arc of rotation through which the bristles of the said transfer brush are travelling in an opposite direction to the direction of the transfer brush and whereby dirt particles deposited on the bristles of the transfer brush are transferred to bristles of the carrier brush during a limited arc of rotation in which bristles of the carrier brush are moving in an opposite direction to the direction of travel of the carrier brush.

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U.S. Cl. X.R.

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