

[54] **DEVICE FOR CLEANING CEILING TILE**

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[51] Int. Cl. **A47I 25/00**

[58] Field of Search 15/77, 88, 102; 134/122, 134/182, 183, 111; 118/301, 326

[56] **References Cited**

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[57] **ABSTRACT**

A device for cleaning ceiling tile or the like which includes a support and a housing mounted thereon, the support containing essentially pump and electric drive motor, filter, solenoid valves, control switches, connecting tubing and wiring; and housing containing essentially upper and lower guides for conducting the ceiling tile through the device which are adjustable to accommodate different thicknesses of tile and different lengths of tile, a system of spray nozzles which cause the cleaning liquid to impinge on the surface of the tile, a means for collecting the cleaning liquid, a means for keeping the back of the tile dry, a means for wiping dry the surface of the cleaned tile, a means for preventing cleaning liquid spray from escaping from the tile entrance and exit openings.

6 Claims, 8 Drawing Figures

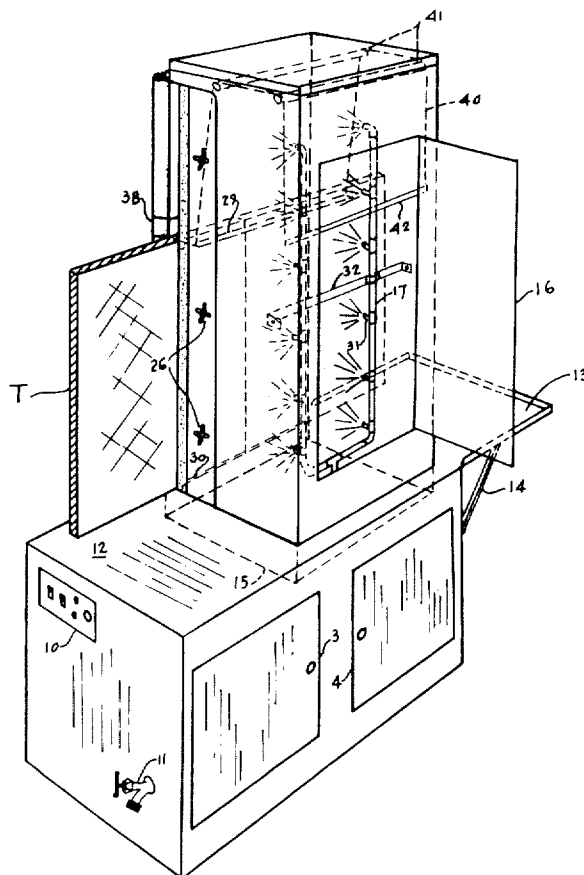
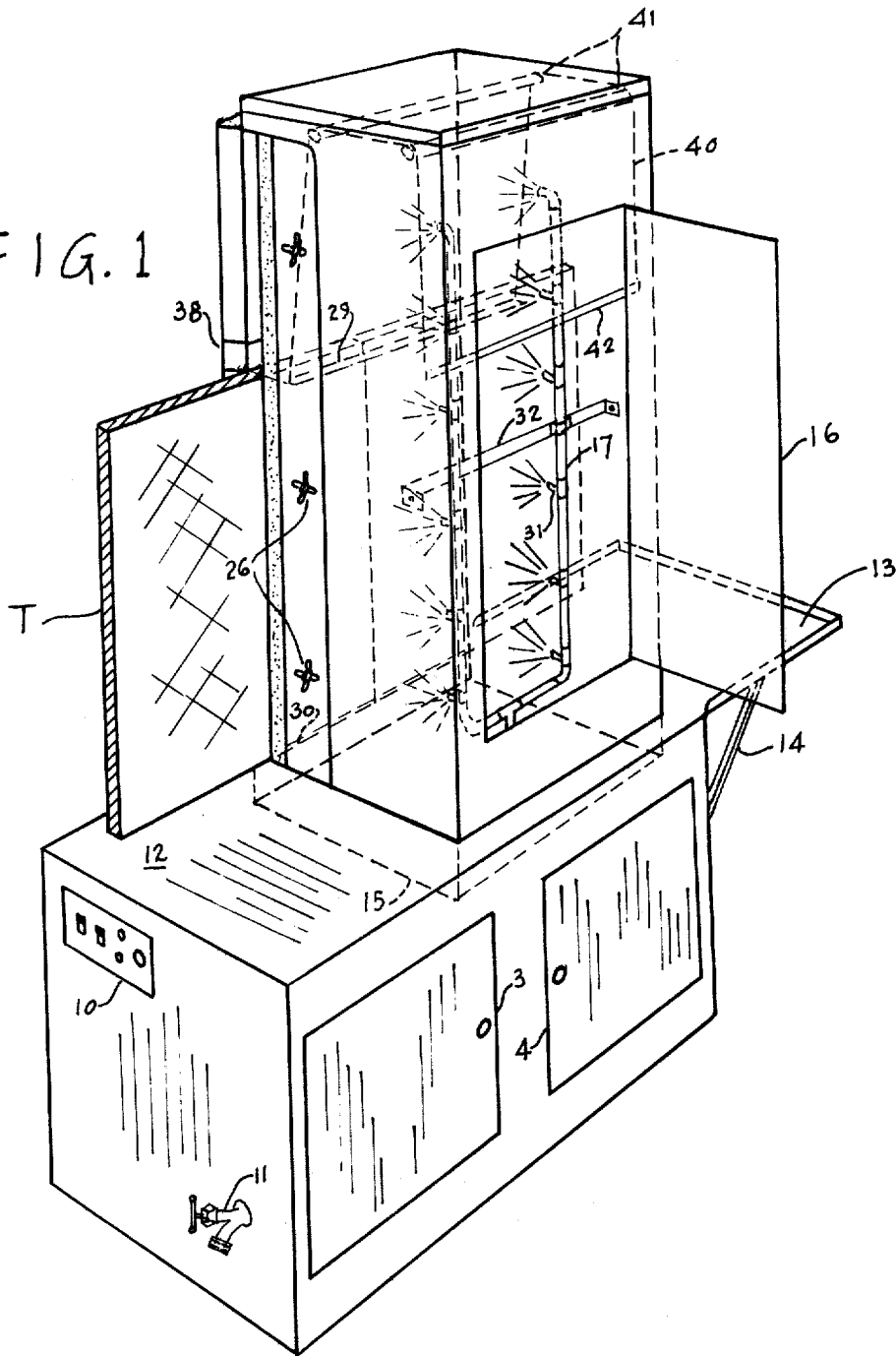


FIG. 1



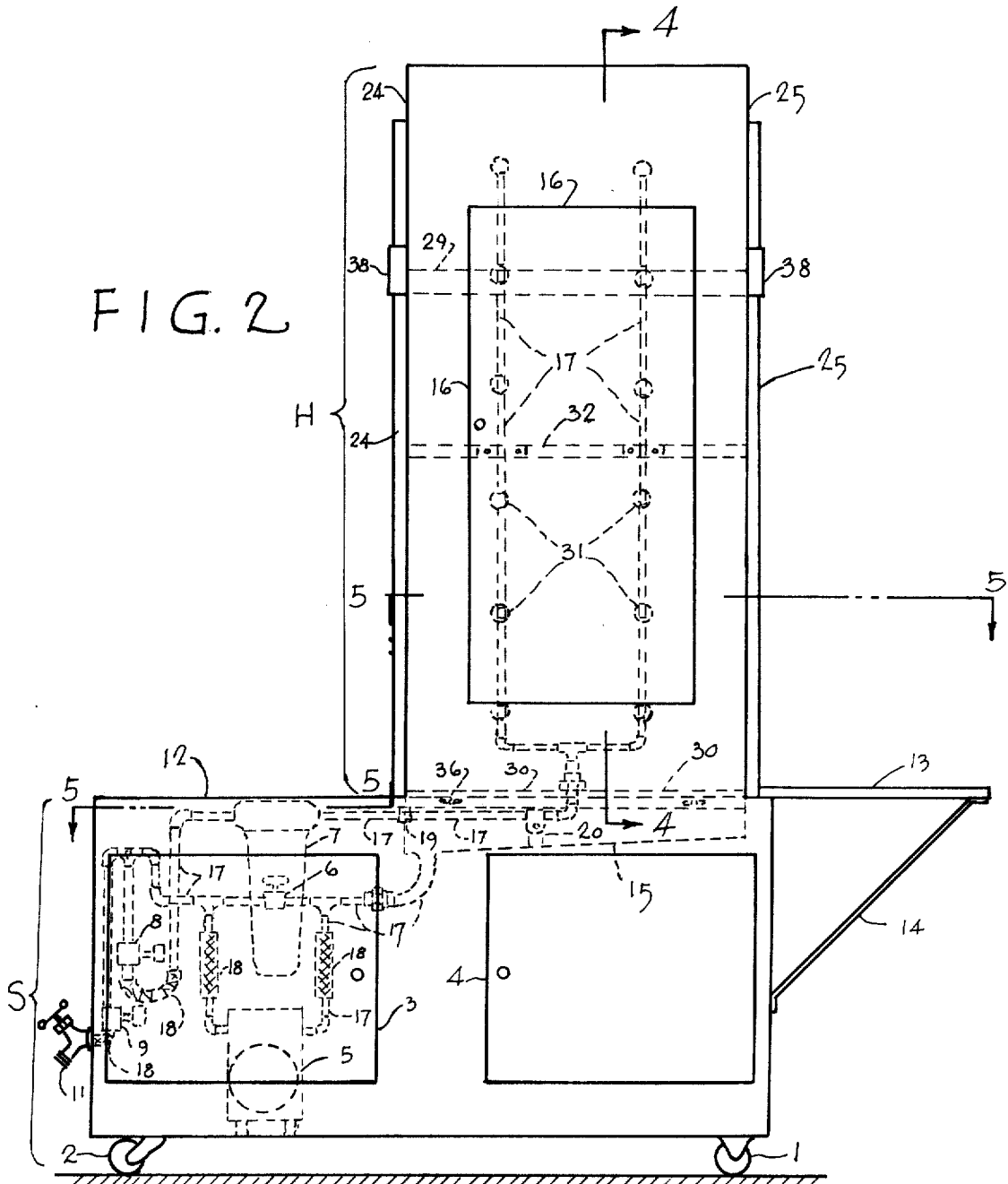


FIG. 3

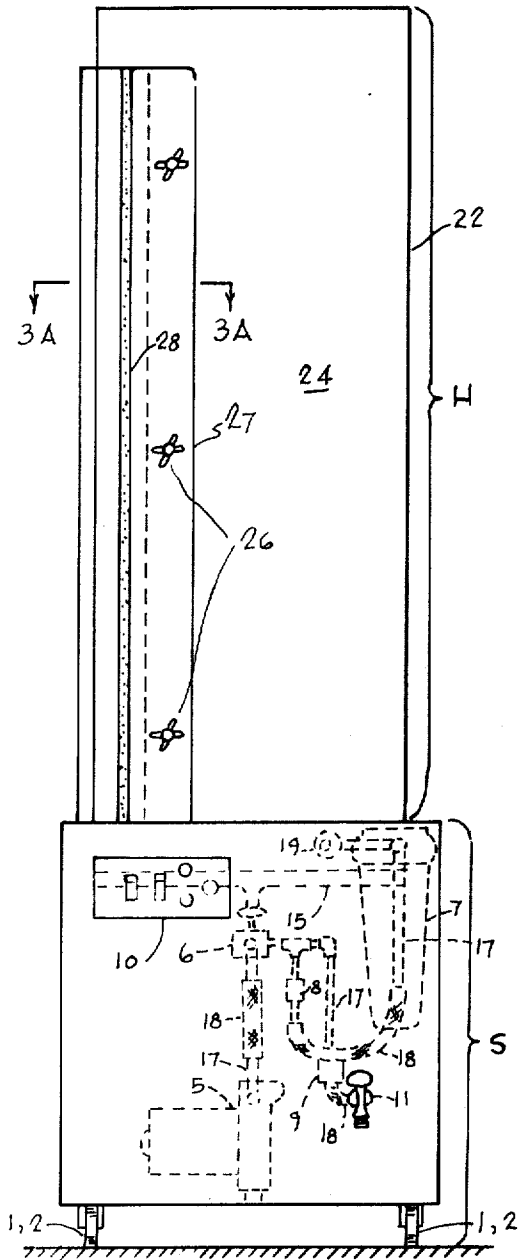
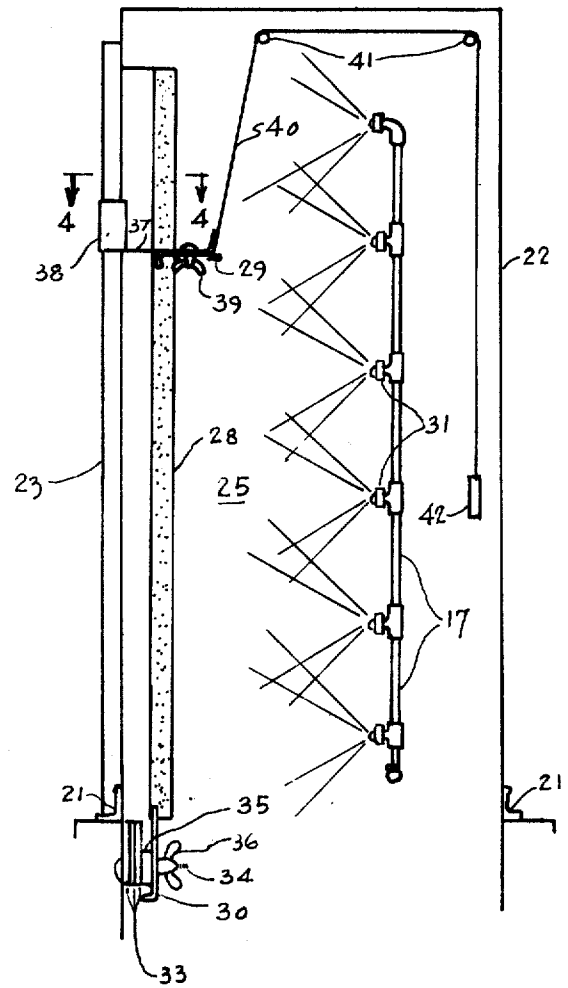


FIG. 4



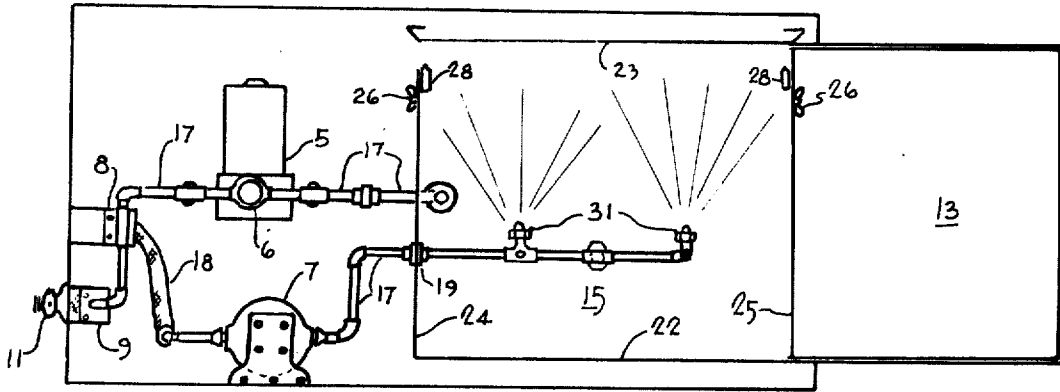


FIG. 5

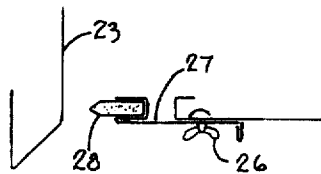


FIG. 3A

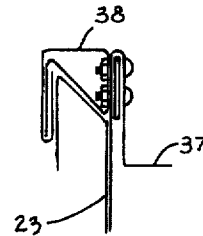


FIG. 4A



FIG. 6

DEVICE FOR CLEANING CEILING TILE

CROSS REFERENCES

U.S. Pat. No. 3,694,847, 10/3/72, Hetman et al.

SUMMARY OF THE INVENTION

This invention relates to an improvement in devices for cleaning removable ceiling tile or the like which is in widespread use in the so called "hung ceiling". In hospitals, nursing homes, offices, etc the present practice is to remove the soiled ceiling tiles, clean them by hand and replace them. Since hand cleaning is time consuming and often not satisfactory, the soiled tiles are frequently discarded and new tiles installed.

Our device permits the soiled tile to be manually fed through it where the tile is cleaned by impinging spray of a detergent cleaning liquid and dried by wiper-seals. In hospitals, nursing homes, etc, the cleaning liquid may contain a germicide. Since many tiles are made so that only the visible surface is washable and the backing is often made of fibreglass, fibre, compressed paper, compo board or the like, the device is so designed that only the washable surface is subjected to the cleaning liquid. The device saves considerable time, energy and labor and the results are superior to hand cleaning.

DRAWINGS

FIG. 1 is a perspective view of the ceiling tile washing device embodying the invention, with the housing door open to reveal some internal details and tiles shown in the entry and exit positions;

FIG. 2 is a front elevation of the device;

FIG. 3 is a left end elevation of the device;

FIG. 4 is a sectional view along line 4—4 of FIG. 2;

FIG. 5 is a sectional view along 5—5—5—5 of FIG. 2;

FIG. 6 is a flat face view of a spacer, several of which are shown in FIG. 4;

FIG. 3A is a sectional view along line 3A—3A through the wiper-seal assembly as shown on FIG. 3; and

FIG. 4A is a sectional view along line 4A—4A of FIG. 4 showing an end of the upper guide assembly and method of retention.

DETAILED DESCRIPTION

Referring to the drawings in detail, and particularly FIGS. 1 and 2 the ceiling tile washing device consists essentially of a support assembly S, and a housing assembly H.

The support assembly S, is structurally sound and is made up of a framework of commercial shapes and formed sheet metal appropriately fastened together. It is mounted on fixed wheels 1 and casters 2. The sides are made of non-corrosive sheet metal appropriately bent and flanged to provide stiffness and rigidity. Access to the mechanism compartment is provided by opening hinged door 3 and hinged door 4 provides access to a storage compartment.

Mounted in the mechanism compartment are an electric motor driven pump 5, a pump by-pass regulating valve 6, a liquid filter 7, solenoid valves 8 and 9, a control panel 10, and a drain valve 11. A flat working surface is provided by a top 12 and a shelf 13 with supports 14. The top 12 is flanged downward to provide stiffness and to engage the sides of the mechanism compartment. The shelf 13 is flanged upward on three sides

for stiffness and also forms a drip lip, should any liquid be spilled thereon. The fourth side is arranged to drain into the catch basin 15.

The cleaning solution which is made up of water and a detergent, the detergent in the case of hospitals and nursing homes may be a germicidal type, is introduced into the catch basin 15 by pouring from any convenient container such as a bucket through the open door 16 in the housing. The catch basin 15 is sloped so as to cause flow into the drain opening where it is led to the inlet of the electric motor driven pump 5 by means of rigid tubing 17 and flexible tubing 18 made up with appropriate fittings. The high pressure cleaning liquid is conducted from the pump outlet through additional rigid tubing 17 and flexible tubing 18 with appropriate fittings to solenoid valves 8 and 9. The outlet of solenoid valve 9 is connected by appropriate tubing to drain valve 11. The outlet of solenoid valve 8 is connected to the inlet of the liquid filter 7 by appropriate rigid tubing 17 and flexible tubing 18. Rigid tubing leads from the outlet of the liquid filter 7 through a bulkhead fitting 19 and terminating in a union 20. A pump by-pass regulating valve 6 is provided across the inlet and outlet of the pump 5 to afford pressure control. The control panel 10 contains an off-on switch for the pump motor. A second switch is a single pole double throw which energizes solenoid valve 8 when in one position and energizes solenoid valve 9 when in the other. Two electric service receptacles and an electric supply receptacle are incorporated into the control panel 10. The necessary electric wiring completes the essential parts of the support assembly S.

The housing assembly H is mounted on the support assembly S and is supported by structural angles 21 (FIG. 4) which rest on the top of the support S. The four sides of the housing 22, 23, 24, 25 (FIGS. 2 and 4) extend into and engage the catch basin 15 of the support S.

As seen in FIGS. 2 and 4, the housing is made up of four vertical sides 22, 23, 24, 25 and a top, is structurally sound and made of corrosion resistant sheet metal. The front side 22 contains a hinged access door 16. The two side panels 24 and 25 are slotted at the rear near the rear panel 23. It is through these slots that the ceiling tiles are entered and ejected.

Referring to FIGS. 3 and 4, it will be seen that side panels 24 and 25 have mounted on them wiper-seal assemblies which consist of formed corrosion resistant sheet 27 and inserts 28 cemented into the channel of the formed metal 27. The inserts 28 are made of sponge rubber or similar material. These wiper-seal assemblies have slotted holes by which they are mounted on the side panels 24 and 25 by bolts and wing nuts 26. The slots provide adjustment for the different thicknesses of ceiling tile and also provide the required pressure for preventing the cleaning liquid which is sprayed on the washable face of the tile from escaping from the housing at the tile face. On ejection of the tile this wiper-seal also acts to wipe dry the cleaned face of the tile.

The tile can be inserted at either side and is pushed manually through the housing with the washable face forward. It is guided through the device by upper guide 29 and lower guide 30 so that the back side of the tile is kept in contact with the housing rear panel 23. The housing rear panel 23 is flared backward at each side opposite the slots to facilitate entry of the tile.

The housing assembly (as seen in FIG. 2) also contains a manifold made up of rigid tubing 17 and appropriate elbows and tees. It is connected to the support assembly tubing at union 20 through which it is supplied with filtered high pressure cleaning liquid. The manifold has attached to it spray nozzles 31, which direct the cleaning fluid onto the washable face of the tile. This manifold spray assembly is held in place by support 32.

The lower guide 30 is made to accommodate different thicknesses of tile. This is accomplished by spacers 33 (FIG. 4) which can be placed on studs 34 which are fastened to the housing rear panel 23. Spacers 33 should be added or removed so that the lower guide 30 will just touch or provide a slight pressure on the face of the tile to be cleaned when the wing nuts 36 are tightened. FIG. 6 shows a flat face view of a spacer 33.

Incorporated as part of the lower guide 30 are collars 35 (FIG. 4) located where the studs penetrate. This is a very important part of the device, since if by chance the cleaning liquid were to get between the lower guide 30 and the tile such liquid would be drained into the catch basin 15 (FIG. 3) through the space created by the collars 35. The backing of many tiles are made of fibreglass, fibre, compressed paper, compo board of the like which loses its strength and shape if wetted. Furthermore, if the backing were to become wetted, this moisture could cause rusting of the framework which supports the tile in the ceiling and in addition could cause the tile to become rust stained.

In order to accommodate various lengths of tile (heights as inserted in the device) the upper guide 29 (FIG. 4) is adjustable relative to the lower guide 30. There is a shelf like member 37 which is held against the housing rear panel 23 by sliding shoes 38 at each side. This permits the complete upper guide assembly to be raised or lowered to accommodate the length of tile to be cleaned. The sliding shoes 38 are designed so that the friction between them and the housing rear panel 23 is sufficient to maintain any given position of the upper guide assembly. The upper guide 29 is attached to the shelf-like member 37 by bolts and wing nuts 39. The upper guide is slotted at the bolts and wingnuts 39 to provide the upper guide to be adjusted to just touch or provide a slight pressure on the face of the tile.

Fastened permanently to the shelf like member 37 is an impervious membrane of vinyl, Teflon or the like 40 extending the entire width of the inside of the housing. It passes over two rollers 41 and terminates in a weight 42. The purpose of this membrane is two fold; first, to prevent cleaning liquid from the sprays 31 to get behind the upper guide assembly where it could wet the back of the tile and secondly, to provide a barrier for preventing the sprayed cleaning liquid to escape from the openings at either side between the sponge rubber 28 of the wiper-seals and the housing rear panel 23 when the upper guide assembly is set below the maximum height.

OPERATION

The desired cleaning fluid is introduced into the catch basin 15 through open door 16 by means of a bucket or other container. The lower guide is adjusted to just accommodate the tile thickness by adding or removing spacers 33 and tightening wing nuts 36. The upper guide assembly is slid up or down to accommo-

date the tile length. The tile is placed between the upper 29 and lower 30 guides with the washable face to the spray nozzles 31, the back of the tile against the housing rear panel 23. The upper guide 29 is adjusted so as to just touch or provide a slight pressure on the face of the tile and then locking with wing nuts 39. The wiper-seal assembly 27 should be adjusted relative to each housing side panel 24 and 25 so that the sponge rubber inserts 28 provide a slight pressure on the face of the tile and then held by tightening wing nuts 26. With the double throw switch on the control panel 10 set on RUN which closes solenoid valve 9 and opens solenoid valve 8 and the motor switch set to OFF, plug in the electric supply. Close the housing door 16 and turn the motor switch to ON. The cleaning liquid will issue from the spray nozzles 31 and impinge on the face of the tile thereby cleaning it and the dirty cleaning liquid will be collected in the catch basin 15. Other soiled tiles of the same dimension can be introduced from either side, the cleaned tiles emerging from the opposite side. The wiper-seals 28 will insure that the surface of the clean tile will emerge essentially dry. Regulating valve 6 may be adjusted to give maximum effectiveness.

The pump motor should be shut off when not cleaning tile. The system may be drained by throwing the double throw switch to DRAIN which opens solenoid valve 9 and closes solenoid valve 8 and opening drain valve 11. Starting the pump will cause the cleaning liquid to issue from the drain valve.

We claim:

1. A device for cleaning ceiling tiles or the like comprising:

- a. support means having
- b. housing means thereon,
- c. upper and lower guide means for guiding ceiling tile along the support means and through openings in two sides of the housing means,
- d. means carried by the support means for cleaning the ceiling tile with liquid as it is guided through the housing means,
- e. said cleaning means including means for supplying cleaning liquid under pressure to only one side of the ceiling tile,
- f. means for varying the pressure of the cleaning liquid supplied against said one side of the ceiling tile,
- g. said cleaning means also including wiper means mounting within the housing means for retaining the cleaning liquid inside said device and for removing cleaning liquid from the ceiling tile as it is removed from the housing means,
- h. barrier means extending the entire width of the inside of the housing means to contain cleaning liquid inside the housing means and on only one side of the ceiling tile,
- i. collar means connected to the lower guide means to form drain slots for containing cleaning liquid on only one side of the ceiling tile,
- j. means for collecting cleaning liquid used in cleaning the tile,
- k. filter means for cleaning the cleaning liquid present in the collecting means,
- l. means for regulating the amount of cleaning liquid in said device, and
- m. means for circulating the cleaning liquid from the filter means through the means for supplying clean-

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ing liquid under pressure against one side of the ceiling tile.

2. The device of claim 1 wherein said means for supplying cleaning liquid under pressure comprises spray nozzles which cause cleaning liquid to impinge against one side of the ceiling tile.

3. The device of claim 1 wherein said device is mounted on wheels.

4. The device of claim 1 which further includes means near the rear of said housing means for regulating the size of openings in the housing means for accommodating varying size ceiling tiles.

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5. The device of claim 4 in which the means for regulating the size of openings in the housing means comprises spacing means for separately varying the width and height of said openings.

6. The device of claim 5 in which the barrier means is an impervious membrane which passes over rollers located near the top of the housing means, one end of said membrane being attached to means for regulating the height of the openings in the housing means and the other end of said membrane being weighted and positioned near the front of said housing means.

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