

[54] **SUBMARINE TYPE, SELF-PROPELLED
SUCTION SWEEPER**

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[51] Int. Cl. **E04h 3/20**

[58] Field of Search **15/1.7, 387, 389, 340**

[56] **References Cited**

UNITED STATES PATENTS

983,988	2/1911	Foster et al.	15/387 X
3,229,315	1/1966	Watson	15/1.7

FOREIGN PATENTS OR APPLICATIONS

781,510	2/1935	France	15/387
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[57] **ABSTRACT**

A suction type, fluid operated sweeper for sweeping and pumping the water out of a swimming pool or the like and to a water filtering and/or cleaning unit. The sweeper moves along the bottom of the pool and a suction hose extends upwardly therefrom to draw water through the sweeper for depositing it in the water cleaning unit outside of the pool. The water passing through the sweeper, due to the action of the suction, is utilized to drive the propelling means for the sweeper to cause the sweeper to ambulate along the bottom of the pool.

14 Claims, 6 Drawing Figures

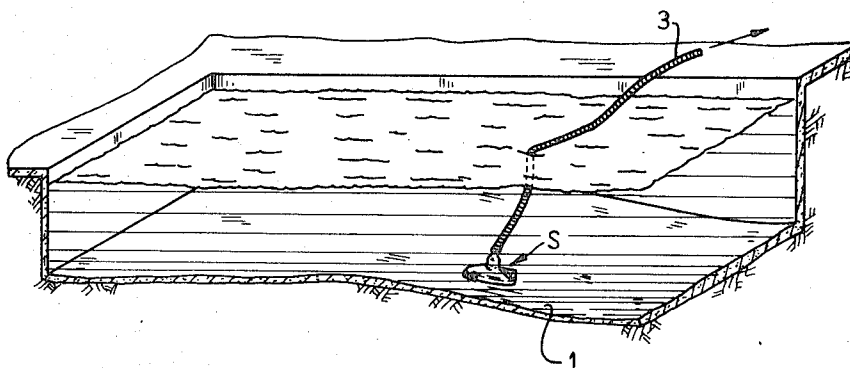


FIG. 1

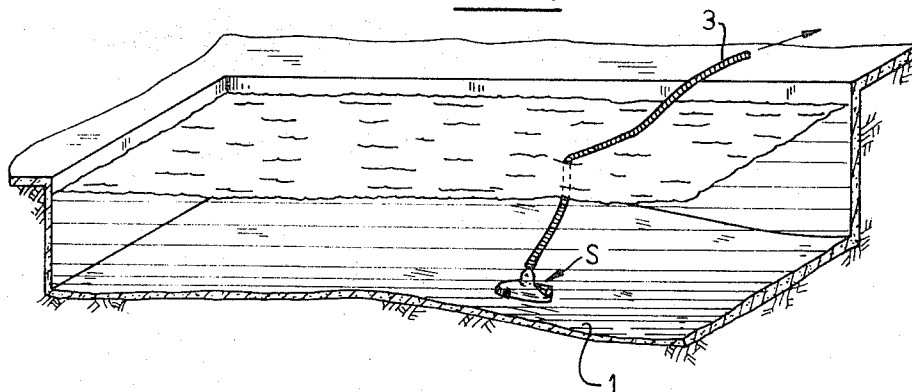
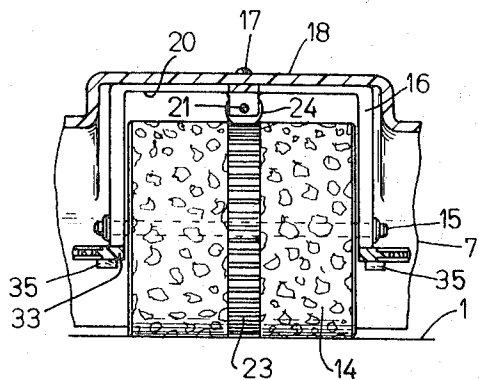


FIG. 5

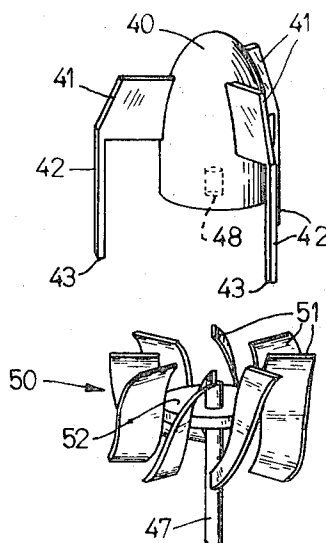


FIG. 6

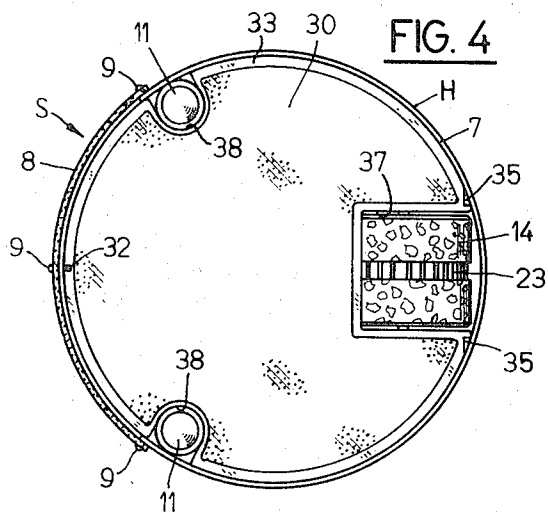
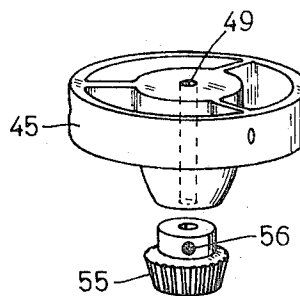
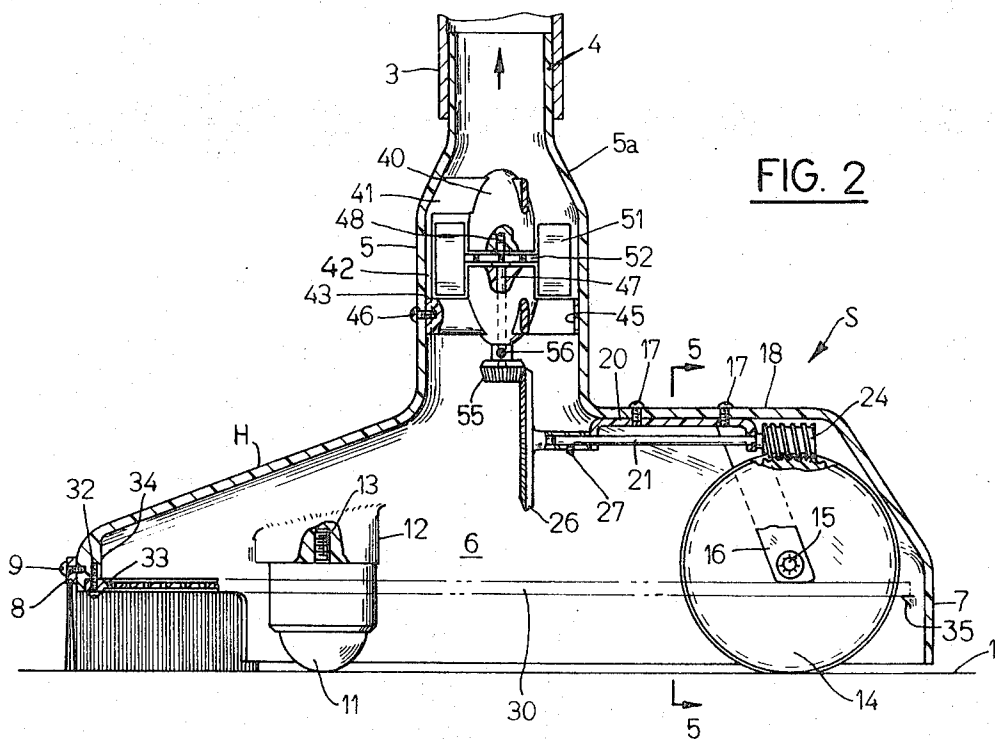
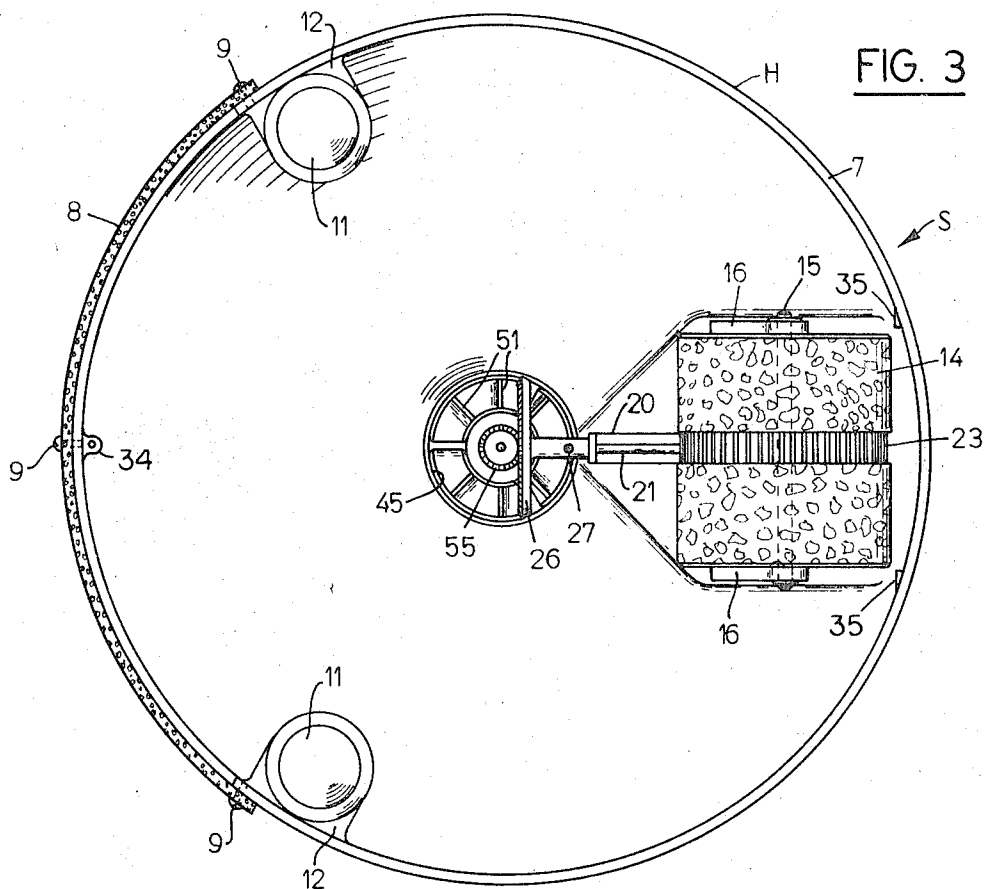


FIG. 4





SUBMARINE TYPE, SELF-PROPELLED SUCTION SWEEPER

BACKGROUND OF THE INVENTION

The present invention pertains to vacuum sweeper for sweeping and pumping water from the bottom of a pool or the like. The water is drawn through the sweeper by means of suction applied to the sweeper by a suction pump outside the pool.

Devices of this general type have been proposed in the past, but have had several shortcomings. For example, the swimming pool cleaner shown in U.S. Pat. Nos. 3,439,368 issued Apr. 22, 1969 and 3,551,930 issued Jan. 5, 1971 both to R.R. Myers, utilize an electronic motor as the source of power for propelling the cleaner along the bottom of the pool. Consequently, an electrical supply is necessary for the motor including a floatation unit for supporting the cord above the cleaner. In addition, a cleaner bag is utilized with the cleaner for propulsion therewith as a unit. Consequently, the cleaner is extremely costly and consists of a number of parts which also require considerable maintenance and repair.

Another example of prior art swimming pool cleaning means is shown in the U.S. Pat. No. 3,008,159 issued Nov. 14, 1969 to Del Vecchio. While that "fluid operated sweeper" taught the idea of utilizing the water passing through an impeller chamber as a motive source for driving the impeller, that device was of the hand propelled type whereby the operator manipulated a handle for providing the sweeping over the bottom of the pool.

SUMMARY OF THE INVENTION

The present invention provides a suction type sweeper for a swimming pool or the like and having a suction conduit connected to a water pump outside the pool for sucking the water through the sweeper and to a filtering unit or the like where the water is cleaned. The invention contemplates forcing the water through a water motor or impeller carried by a mobile sweeper and further contemplates a transmission between the water driven impeller and the support wheels of the sweeper whereby the force of the water being sucked through the sweeper also acts to drive the sweeper along the bottom of the pool.

Furthermore, the sweeper, in addition to the driving wheel, has a pair of caster wheels and the sweeper is round in horizontal plan view, so that the sweeper can follow a hap-hazard course along the bottom of the pool and eventually clean the entire pool in an automatic manner.

A more specific object of the present invention relates to providing an improved water motor for such a suction sweeper and including an impeller which can be easily fabricated and installed in the sweeper and furthermore easily removed therefrom for cleaning and repair. The invention furthermore contemplates a power transmission from the water driven impeller to the driving wheel of the sweeper and which can be easily assembled and removed.

These and other objects and advantages of the present invention will appear hereinafter as this disclosure progresses, reference being made to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view, partially in section, of a swimming pool in which a sweeper provided by the present invention is shown in more or less schematic form;

FIG. 2 is a vertical, cross sectional view through the sweeper shown in FIG. 1, but on a considerably enlarged scale;

FIG. 3 is a bottom view of the sweeper shown in FIG. 2, but with the screen removed therefrom for clarity in the drawing;

FIG. 4 is a view similar to FIG. 3, but on a smaller scale and also showing the screen in place.

FIG. 5 is a sectional view taken generally along the line 5-5 in FIG. 2 and showing the mounting of the driving wheel; and

FIG. 6 is a perspective exploded view of the water motor means as shown in FIG. 2, but on an enlarged scale.

DESCRIPTION OF A PREFERRED EMBODIMENT

The sweeper S provided by the present invention is adapted to be propelled along the bottom 1 of the pool and a suction conduit 3 is attached to the upper end 4 (FIG. 2) of the sweeper and is connected to a conventional fluid suction pump (not shown) outside the pool whereby water is drawn from the pool, through the sweeper, and through the conduit 3 to a cleaning system not shown.

As shown more clearly in FIG. 2, the sweeper includes a generally circular housing H formed preferably of plastic and having an integrally formed and upwardly extending water motor casing 5 which communicates with the interior 6 of the housing and which is also integrally formed and communicates with the upper portion 4 to which the suction conduit 3 is attached by being snugly slipped over the upper end thereof. The housing includes a downwardly extending circular skirt 7 which is adapted to be positioned just above the floor 1 of the swimming pool or other area to be cleaned. Attached to at least a circumferential portion of the housing is a brush 8 which is fastened to the housing by the screw means 9. It will be noted that the brush is adapted to engage the bottom 1 of the pool so as to impart a cleaning or scrubbing action to the pool bottom and thereby facilitate pick-up of the foreign matter in the water as it passes through the sweeper.

The sweeper also has a pair of caster wheels 11 which are mounted in the integrally cast projections 12 of the interior of the housing by the screw means 13 which threadably engage in the portions 12. The casters 11 themselves may be conventional and are of the rolling ball type.

A relatively large traction wheel 14 is mounted on its shaft 15 which in turn is journaled in a bifurcated bracket 16 which in turn is rigidly but detachably fastened by screw means 17 to the top, relatively flat surface 18 of the housing. Also integrally formed with the brackets 16 and preferably made of plastic is a bracket portion 20 which journals a drive shaft 21. It will be noted that the central portion of the drive roller 14 is formed as a gear 23 which is in constant mesh with the driving worm 24 fixed to the shaft 21 at one end thereof. At the other end of shaft 21 is a large bevelled

gear 26 which is removably attached to shaft 21 by the set screw 27. Power is supplied to the large bevelled gears 26 by means to presently be described.

A screen 30, generally circular in shape so as to conform to the interior shape of the housing is removably fastened within the housing and a distance spaced from the bottom of the pool 1 by screw means 32. More specifically, the plastic rim 33 of the screen bears against mounting shoulder 34 formed integrally inside of the housing and the screw 32 extends through the rim 33 and is threadably engaged in the housing, as shown in FIG. 2. The screen is held at the other side of the housing by simply being first inserted in the housing and placed on the upwardly facing shoulders 35 (FIGS. 2, 4 and 5). The screen has openings 37 and 38 (FIG. 4) which accommodate the wheels 14 and 11, respectively, passing therethrough. In this manner, the screen acts to prevent large pieces of foreign matter such as balls or the like from passing through the impeller, now to be described.

It will be noted that the water motor casing 5 has an upper inwardly inclined surface 5a against which a bearing member 40 is mounted. More specifically, the member 40 has several radially extending spacer means 41 integrally formed therewith including a downwardly extending leg portion 42. The portions 41 are adapted to bear snugly against the interior of the inclined housing 5a, while the lower ends 43 of the legs 42 rest on another bearing means in the form of a locating collar 45, which in turn is held firmly within the casing 5 by the screws 46. The screws 46 extend through the casing 5 and into threadable engagement with the locating ring 45. The locating ring 45 has a central aperture 49 which acts as a bearing for the impeller shaft 47 now to be described.

The impeller shaft 47 is mounted at its upper end in the central aperture 48 of the bearing member 40. An impeller designated generally as 50 includes a plurality of circumferentially spaced blades 51 which are secured intermediate their length and at their inner edge of the disc 52, the disc 52 is in turn rigidly fixed to the shaft 47. The blades 51 extend generally radially and are slightly curved in opposite directions at their upper and lower ends. The blades are also arranged at an inclined or skewed angle (FIG. 6) in respect to the impeller axis so that when water is drawn upwardly through the impeller by means of the suction in conduit 3, the impeller is rotatably driven together with its shaft 47 and a bevelled gear 55 fixed to the lower end by a set screw 56 to the shaft 47.

The legs 42 of the bearing member 40 act to maintain the proper distance between the bearing member 40 and the bearing means or locating ring 45 so that the impeller does not bind against other parts and instead the impeller can be driven freely by the water rushing past it.

It should also be noted that the entire water motor assembly can be easily dismantled. In order to do this, the screw 32 of the screen would first be removed and the screen then removed from the housing. The power transmission bracket 20 is then removed simply by removing screw 17, and gears 24 and 26, at each end of the shaft 21 are removed along with the bracket 20. The screws 46 can then be removed and the entire water motor can be simply withdrawn from the casing, that is to say, the locating ring 45, the shaft 47, and its

impeller and the bearing 40 can all be removed and easily disassembled.

The present invention provides an economically produced suction sweeper for swimming pools or the like and which utilizes the water being drawn through the sweeper by suction to drive the water motor which in turn provides the power for propelling the sweeper. The entire unit can be easily disassembled for cleaning and repair.

I claim:

1. A suction type, mobile sweeper for a swimming pool or the like comprising a housing having an open bottom which is adapted to be moved along the surface of the pool whose water is to be cleaned, said housing also having a water motor casing which terminates in a tubular suction conduit attaching portion, a water motor including a rotatable impeller located in said tubular portion of said water motor casing, a traction wheel rotatably journaled within the housing for supporting said housing for movement over the surface of said pool, and power transmitting means between said impeller and said traction wheel whereby suction is applied to said housing to thereby cause water from the pool to flow through said housing and through said water motor, said blades of said impeller being axially skewed with respect to the impeller axis and circumferentially spaced apart and fixed to said shaft and extending radially therefrom, whereby when water is drawn upwardly through said impeller, said impeller is driven by said water thereby driving said traction wheel through said power transmitting means.

2. The sweeper set forth in claim 1 further characterized in that said water motor means includes a pair of bearing means removably mounted within said motor casing, and an impeller assembly including a shaft rotatably journaled in said bearing means and having a plurality of impeller blades fixed thereto, and said power transmitting means includes gear and shaft means connected between said impeller shaft and said traction wheel.

3. The sweeper set forth in claim 2 including a removable screen located within said housing and having an opening for accommodation of said traction wheel.

4. The sweeper set forth in claim 1 further characterized in that said housing is of generally circular shape in plan view and has a downwardly depending skirt, brush means secured around at least a circumferential portion of said skirt and engageable with the surface over which the sweeper traverses.

5. The sweeper set forth in claim 2 further characterized in that said housing is of generally circular shape in plan view and has a downwardly depending skirt, brush means secured around at least a circumferential portion of said skirt and engagable with the surface over which the sweeper traverses.

6. A sweeper as set forth in claim 1 further characterized in that said power transmitting means includes a bracket, a drive shaft secured in said bracket, a gear fixed to each end of said drive shaft, and means for removably securing said bracket within said housing whereby said bracket, shaft and gears can be removed from said housing as a unit.

7. A sweeper as set forth in claim 2 further characterized in that said power transmitting means includes a bracket, a drive shaft secured in said bracket, a gear fixed to each end of said drive shaft, and means for re-

movably securing said bracket within said housing whereby said bracket, shaft and gears can be removed from said housing as a unit.

8. A suction type, mobile sweeper for a swimming pool or the like comprising a housing having an open bottom which is adapted to be moved along the surface of the pool to be cleaned, said housing being of generally circular shape in plan view and having a downwardly depending skirt, and brush means secured around at least a circumferential portion of said skirt and engagable with the surface over which the sweeper traverses, said housing also having an upwardly extending water motor casing with terminates in a suction conduit attaching portion; a water motor in said casing and including a rotatable impeller having a shaft, spaced apart bearing members in said casing and removably secured therein, said shaft supported in and between said bearing members; a traction wheel rotatably journaled within the housing for supporting said housing for movement in the pool, and power transmitting means including gear and power shaft means between said impeller and said traction wheel whereby when suction is applied to said housing to thereby cause water from the pool to flow through said housing and past said water motor, said impeller is driven by said water thereby driving said traction wheel through said power transmitting means.

9. The sweeper as claimed in claim 8 including a bracket removably secured in said housing, said power shaft means being secured in said bracket for removal therewith.

10. A suction type, mobile sweeper for a swimming pool or the like comprising a housing having an open bottom which is adapted to be moved along the surface of the pool whose water is to be cleaned, said housing also having a water motor casing which terminates in a suction conduit attaching portion, a water motor including a pair of bearing means removably mounted within said water motor casing, and an impeller assembly including a shaft rotatably journaled in said bearing means and having a plurality of impeller blades fixed thereto, a traction wheel rotatably journaled within the housing for supporting said housing for movement over the surface of said pool, and power transmitting means between said impeller assembly shaft and said traction wheel, said power transmitting means including gear and shaft means connected between said impeller shaft

and said traction wheel, whereby when suction is applied to said housing to thereby cause water from the pool to flow through said housing and through said water motor, said impeller assembly shaft is driven by said water thereby driving said traction wheel through said power transmitting means, and a removable screen located within said housing and having an opening for accommodation of said traction wheel.

11. The sweeper set forth in claim 10 further characterized in that said housing is of generally circular shape in plan view and has a downwardly depending skirt, brush means secured around at least a circumferential portion of said skirt and engagable with the surface over which the sweeper traverses.

12. A suction type, mobile sweeper for a swimming pool or the like comprising a housing having an open bottom which is adapted to be moved along the surface of the pool whose water is to be cleaned, said housing also having a water motor casing which terminates in a suction conduit attaching portion, a water motor including a rotatable impeller located in said water motor casing, a traction wheel rotatably journaled within the housing for supporting said housing for movement over the surface of said pool, and power transmitting means between said impeller and said traction wheel whereby when suction is applied to said housing to thereby cause water from the pool to flow through said housing and through said water motor, said impeller is driven by said water thereby driving said traction wheel through said power transmitting means, said housing being of generally circular shape in plan view and having a downwardly depending skirt, and brush means secured around at least a circumferential portion of said skirt and engagable with the surface over which the sweeper traverses.

13. The sweeper set forth in claim 11 further characterized in that said blades of said impeller assembly are axially skewed and circumferentially spaced blades fixed to said shaft and extending radially therefrom.

14. The sweeper set forth in claim 13 further characterized in that said housing is of generally circular shape in plan view and has a downwardly depending skirt, brush means secured around at least a circumferential portion of said skirt and engagable with the surface over which the sweeper traverses.

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