VACUUM CLEANER

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3,019,462 VACUUM CLEANER

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Our invention relates to vacuum cleaners in general and more particularly to a vacuum cleaner for swimming pools 10 and the like and will be described in connection with such use.

Among the objects of our invention are:

(1) To provide a novel and improved vacuum cleaner:

(2) To provide a novel and improved vacuum cleaner, 15 which vacuum cleans without the necessary aid of brushes:

(3) To provide a novel and improved vacuum cleaner adapted for use on solid surfaces:

(4) To provide a novel and improved vacuum cleaner 20for swimming pools, which will permit of maintaining a rolling contact on both flat and curved surfaces of the pool being cleaned:

(5) To provide a novel and improved vacuum cleaner for swimming pools, which minimizes disturbance of sedi- 25 ment during use;

(6) To provide a novel and improved vacuum cleaner for swimming pools which sweeps with a flat, thin stream of water during the vacuuming operation;

(7) To provide a novel and improved vacuum cleaner 30 for swimming pools, which will minimize probability of clogging:

(3) To provide a novel and improved vacuum cleaner for swimming pools, which has greater suction effect than conventional type vacuum cleaners;

(9) To provide a novel and improved vacuum cleaner for swimming pools, which can clean in relatively sharp corners;

(10) To provide a novel and improved vacuum cleaner 40 for swimming pools, which will not mar the pool surfaces when in use;

(11) To provide a novel and improved vacuum cleaner for swimming pools, which exerts a gripping effect on the surface being cleaned, so as to resist the lifting force apt to be applied in use, by a float supported hose line:

(12) To provide a novel and improved vacuum cleaner for swimming pools, which can be used conveniently and effectively in vacuuming the vertical side walls as well as the bottom of a pool;

(13) To provide a novel and improved vacuum cleaner for swimming pools, which is of simple design and construction.

Additional objects of our invention will be brought out in the following description of a preferred embodi-55 ment of the same, taken in conjunction with the accompanying drawings, wherein:

FIG. 1 is a fragmentary plan view of the vacuum cleaner of the present invention;

FIG. 2 is a view in elevation of the vacuum cleaner $_{60}$ of FIG. 1;

FIG. 3 is a view in section taken in the plane 3-3 of FIG. 1;

FIG. 4 is a view looking into the vacuum cleaner through the open bottom thereof;

FIGS. 5 and 6 are related views depicting the theory underlying the mode of operation of the vacuum cleaner of the present invention; and

FIG. 7 is a view depicting the manner in which the vacuuming side walls of a pool as well as the bottom thereof.

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Referring to the drawings for details of our invention in its preferred form, the same comprises a substantial arcuate inverted trough-shaped housing 1 including front and rear substantially arcuate walls 3 and 5 terminating in free ends, and a central inwardly directed bulge 11 defining a connecting chamber 13. The front and rear walls of the arcuate housing approach each other slightly toward the ends thereof to produce a slight taper in the arcuate housing from the central portion thereof toward each end, while the bulge defining the connecting chamber, has an upwardly exposed opening 17, bordered at diametrically opposite points, by upstanding ears 21, 23.

The arcuate housing is provided with means adjacent each end and the middle, adapted to contact a supporting surface at three distinct points defining the corners of a symmetrical triangle 25 which includes substantially centrally thereof, within its boundaries, the bulge 11 defining the connecting chamber. Such surface engaging means preferably take the form of rollers 27, two of which are each mounted in a rearwardly extending bracket 29 preferably cast integral with the arcuate housing, adjacent an end of the housing, and including spaced notched axle mountings 31 in which a roller may be adjustably positioned. For this purpose, the roller is provided with an axle having a head 35 at one end, and clamping nut 37 threaded at its other end for securing the roller in any selected adjustment thereof.

The notched axle mountings are located sufficiently close to the rear edges of the brackets, that the rollers, when mounted therein, will protrude beyond. When such rollers are fabricated of rubber, they will then also function as bumpers, and thus will forestall marring or damaging of the pool surface.

The remaining surface engaging means may also constitute a roller 27 of like character, mounted in a bracket 43 extending forwardly from the front wall of the arcuate housing, and like the other brackets, including integral notched axle mountings 47, 49 for adjustably mounting this roller. This roller, like the others, protrudes beyond the extremity of its mounting bracket whereby it, too, will function as a bumper to protect the surfaces of a pool against marring or thrust damage.

Pivotally secured to the upstanding ears 21, 23 is a connection 53 for a hose, 55, said connection having a spherical shaped open end 57 nestling in the bulge opening 17, and extending angularly from an intermediate location on the hose connection, is a handle bracket 59 of arcuate crossection, provided with longitudinally spaced mounting holes 61 for bolting a handle 63 to such bracket. With a handle thus attached, the pivotal mounting of the hose connection, permits of an angular swing of the handle of the order of 90 degrees in a vertical plane through the center of the arcuate housing, without disturbing the flow passage from the arcuate housing through the hose connection.

Of particular importance to the present invention, is the provision of a flexible blade 67, 69 of rubber or the like depending from the lower edge of the front and rear walls respectively of the arcuate housing. In crossection, each of these blades is formed with a heavy channeled upper rim 71 adapted to snugly fit over the lower edge of the arcuate wall to which it is applied, whereby it becomes securely fastened to its associated wall, and 65 more so by reason of the curvature of the mounting wall. The resulting friction grip enables removal and replacement of blades, if desired, and without the aid of tools.

The lower rim or lip 75 of each blade is preferably vacuum cleaner of the present invention is adapted for 70 slightly tapered and connected to the channel mounting rim 71 of the blade by a relatively thin web 77 to impart considerable flexibility to the blade.

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The relatively heavy mounting rim 71 of the front wall blade functions additionally as a bumper in protecting the surfaces of the swimming pool against angular thrust of the vacuum cleaner, and such bumper function is extended to the extreme ends of the arcuate housing by folding an extension 79 of the channel portion only of this blade around the exposed edge of the front wall of the arcuate housing at each end thereof, the folded extension in each case being removably secured by wedging it against the proximate free end of the rear wall of the 10 arcuate housing.

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The lips of the blades should preferably lie in a plane just slightly below the surface contact plane of the rollers, to assure surface contact of the blades throughout their lengths when resting on a flat surface, and this can be assured by the adjusting of the individual rollers.

A vacuum cleaner constructed in accordance with the foregoing description, in addition to offering an unobstructed flow passage to minimize clogging, imparts to the same, a mode of operation quite different from the con- 20 ventional type of vacuum cleaner which usually utilizes a brush to effect a mechanical sweeping action. With such conventional type, the suction effect is divided and acts simultaneously in both the forward and rearward direc-Inasmuch as the suction effect in the rearward di- 25 tion. rection is largely ineffective during forward motion of the cleaner by reason of the fact the liquid enters over areas just vacuumed and away from any residual sediment which might be raised, and in like manner, the effect in the forward direction is largely ineffective during movement of 30 the vacuum cleaner on a return stroke, the efficiency of the conventional brush type vacuum cleaner will be relatively low.

By referring to FIGURES 5 and 6, it will be noted that during a forward stroke of the vacuum cleaner of the present invention, both blades will bend or flex toward the rear. In this condition, the effect of the suction developed within the arcuate housing, will be to draw the rear wall blade into tighter sealing engagement with the surface over which the cleaner is being moved, while at 40the same time, exerting a lifting effect on the forward blade to cause a wide, thin stream of water to flow at high velocity underneath the forward blade and into the vacuum cleaner, such thin, high velocity flow serving to hydraulically sweep the sediment from the surface being 45 cleaned, into the vacuum cleaner and from there into the hose which may be connected to the filter of the pool system or discharged elsewhere.

On the return stroke of the vacuum cleaner, the opposite effect occurs, in that both blades will then be turned under in the opposite direction, the front wall blade being then held by the suction effect, in tighter sealing engagement with the surface being cleaned while the rear wall blade will be lifted slightly to cause a wide, thin stream of water at high velocity underneath this blade and into the vacuum cleaner.

Thus with one of the blades always tightly sealed to the surface, the suction effect is essentially uni-directional with resulting greater efficiency and minimized disturbance of sediment.

To enhance the ability of the cleaner of the present invention to vacuum clean in relatively tight corners, the free ends of the blades are permitted to approach each other, but not to the extent of coming into end to end contact, thus leaving a narrow opening \$3 at each end of the housing. Thus, sediment may be drawn in at the extreme ends of the arcuate housing at all times, and inasmuch as either end may be worked into any corner of a conventional swimming pool, it will be apparent then that the utilized for this purpose.

The three point contact for the cleaner will assure stable support of the same, regardless of surface curvatures encountered in use, and inasmuch as the blades substantially extend between such points of support along two sides of 75 of the defined three point surface contact.

the triangle, the blades in most any position which the cleaner is likely to be during use, will maintain effective contact, and this can be assured to a greater degree by extending these blades slightly below the contact plane of the rollers as previously indicated.

Thus the vacuum cleaner will effectively vacuum over curved surfaces, whether convex or concave, and in a swimming pool, this is of importance not only where the side walls join the bottom, but particularly, where the deep section merges into the shallow section.

Particularly when operating under water, the vacuum cleaner of the present invention develops a suction grip upon the surface being cleaned, attributable to the greater reduction in pressure occurring within the housing. Thus the vacuum cleaner is adapted to effectively resist separation from such surface in response to lifting forces apt to be developed by a float supported hose line leading from the hose connection to the pool filter unit and conventionally employed when cleaning a pool.

The pivotal mounting of the handle in the manner indicated, will assure such three point stable support at all times, while affording the operator considerable leeway in maneuvering the cleaner along the surface of a pool, whether such cleaner be operated along the bottom of the pool or along one of its side walls; either type of operation being permitted by the pivotal mounting described above and clearly illustrated in FIG. 7 of the drawings.

While specifically described with reference to its use for cleaning swimming pools, the vacuum cleaner of the present invention may be employed as a general purpose vacuum cleaner.

From the foregoing description of our invention it will be apparent that the same is subject to modification and alteration without departing from the underlying principles involved. The many features involved need not always be employed in combination, as some of the features lend themselves to independent use. Accordingly, while we have illustrated and described our preferred embodiment in considerable detail, we do not desire to be limited in our protection to such details as we have illustrated and described except as may be necessitated by the appended claims.

We claim:

1. A vacuum cleaner comprising a substantially arcuate inverted trough-shaped housing including front and rear substantially arcuate walls, surface engaging means at each end of said arcuate housing in proximity to said rear arcuate wall, and surface engaging means intermediate said end surface engaging means and in proximity to said front arcuate wall to provide a three point surface contact defining a triangular area, all of said surface engaging means being adapted to support said housing and maintain the lower edges of said walls thereon in substantially predetermined spaced relation to an underlying surface, a hose connection to said housing at a point 55 within said triangular area, a flexible blade depending from each to said substantially arcuate walls to at least the plane of the defined three point surface contact.

2. A vacuum cleaner for swimming pools or the like comprising a substantially arcuate inverted trough-shaped 60 housing including front and rear substantially arcuate walls terminating in free ends and a central inwardly directed bulge defining a connecting chamber, said bulge having an upwardly exposed opening, surface engaging 65 means at each end of said arcuate housing and surface engaging means intermediate said end surface engaging means to provide a three point surface contact defining a triangular area including said bulge, all of said surface engaging means being adapted to support said housing vacuum cleaner of the present invention may be efficiently 70 and maintain the lower edges of said walls thereon in substantially predetermined spaced relation to an underlying surface, a hose connection to said housing at said bulge opening, and a flexible blade depending from each of said substantially arcuate walls to at least the plane

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3. A vacuum cleaner for swimming pools or the like comprising a substantially arcuate inverted trough-shaped housing including front and rear substantially arcuate walls terminating in free ends and a central inwardly directed bulge defining a connecting chamber, said bulge having an upwardly exposed opening bordered at opposite points by upstanding ears, surface engaging means at each end of said arcuate housing in proximity to said rear arcuate wall, and surface engaging means intermediate said end surface engaging means and in proximity 10 minating at their ends in proximity to but out of contact to said front arcuate wall to provide a three point surface contact defining a triangular area including said bulge, all of said surface engaging means being adapted to support said housing and maintain the lower edges of said walls thereon in substantially predetermined spaced 15 relation to an underlying surface, a hose connection having a spherical shaped open end nestled in the bulge opening and pivotally secured to said upstanding ears, a handle coupled to said hose connection, and a flexible blade depending from each of said substantially arcuate 20 walls and terminating at their ends in proximity to but out of contact with one another to define a narrow end slit to said inverted trough-shaped housing at each end of said housing.

4. A vacuum cleaner for swimming pools or the like 25 comprising a substantially arcuate inverted trough-shaped housing including front and rear substantially arcuate walls terminating in free ends and a central inwardly directed bulge defining a connecting chamber, said bulge having an upwardly exposed opening bordered at opposite 30 points by upstanding ears, surface engaging means at each end of said arcuate housing in proximity to said rear arcuate wall, and surface engaging means intermediate said end surface engaging means and in prox-35 6

imity to said front arcuate wall to provide a three point surface contact defining a triangular area including said bulge, each of said surface engaging means including a roller of shock absorbing material and exposed to function also as bumper, a hose connection having a spherical shaped open end nestled in the bulge opening and pivotally secured to said upstanding ears, a handle coupled to said hose connection, and a flexible blade depending from each of said substantially arcuate walls and terwith one another to define a narrow end slit opening into said inverted trough-shaped housing at each of said housing, each of said flexible blades having a heavy channeled upper rim for frictionally anchoring such blade over the lower edge of an arcuate wall where it may also function as a bumper.

References Cited in the file of this patent UNITED STATES PATENTS

716,313	Thurman Dec. 16, 1902				
869,542	Bergens Oct. 29, 1907				
954,541	Raymond et al Apr. 12, 1910				
1,208,165	Kent Dec. 12, 1916				
1,849,663	Finnell Mar. 15, 1932				
2,241,771	Ell May 13, 1941				
2,610,351	Lilly Sept. 16, 1952				
2,616,118	Meyerhoefer Nov. 4, 1952				
2,658,228	Meyerhoefer May 10, 1953				
2,677,144	Parry May 4, 1954				
	FOREIGN PATENTS				
229,521	Great Britain Feb. 26, 1925				

229,521	Great Britain	Feb.	26,	1925
1,039,738	Germany	Sept.	25,	1958