United States Patent

Howard

[15] **3,665,525**

[45] **May 30, 1972**

[54] AUTOMATICALLY EXTENSIBLE AND RETRACTABLE SWIMMING POOL CLEANER WITH HOUSING IN BOND BEAM

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[73] Assignee: **Marine Swimming Pool Equipment Co.,** North Hollywood, Calif.

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[52] **U.S. Cl.** **4/172.15,** 134/168, 210/169

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

[58] **Field of Search** 4/172, 172.15, 172.17; 134/168, 167; 210/169

[56] **References Cited**

UNITED STATES PATENTS

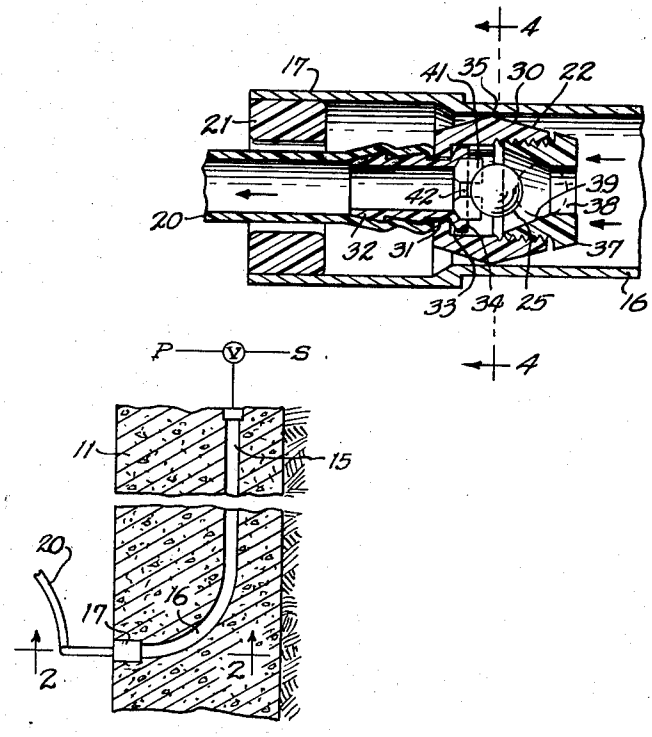
3,278,949	10/1966	Whitaker	4/172.15
3,433,237	3/1969	Gelinas	134/168
3,464,068	9/1969	Whitaker	4/172.15
3,530,511	9/1970	Berg et al.	4/172.15
3,575,729	4/1917	Howard	4/172.15

Primary Examiner—Henry K. Artis
Attorney—Lynn H. Latta

[57] **ABSTRACT**

A pool cleaner of the type utilizing scouring jet hoses automatically extensible from tubular housings when subjected to pressurized water flow, and retractable in response to reversal from pressure to suction, wherein the housings are contained in the bond beam of the pool and connected to the pool by short radius bends, the rear ends of the hoses being pistons which are pivotally attached thereto so as to traverse said bends without binding therein.

9 Claims, 4 Drawing Figures



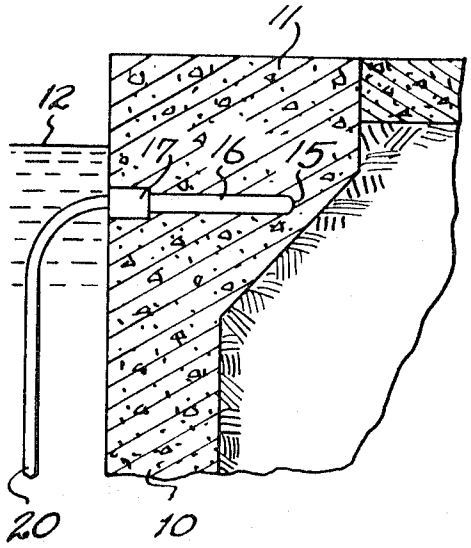
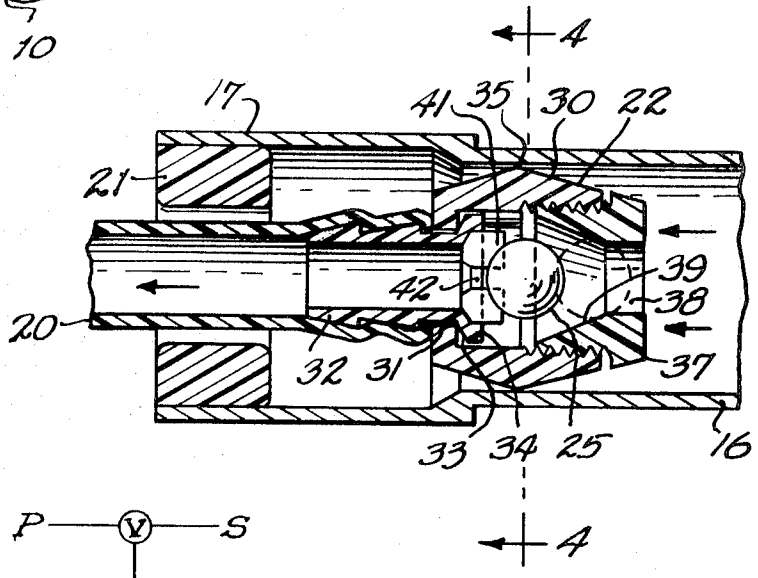


FIG. 2

FIG. 3



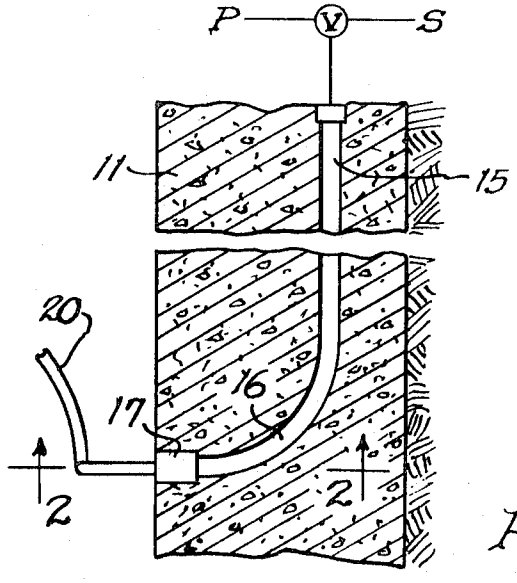


FIG. 1

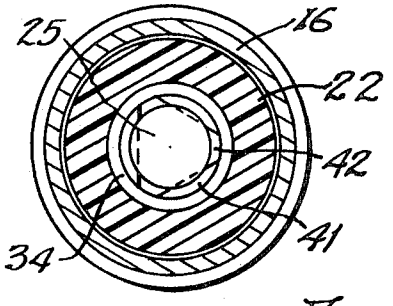


FIG. 4

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AUTOMATICALLY EXTENSIBLE AND RETRACTABLE SWIMMING POOL CLEANER WITH HOUSING IN BOND BEAM

BACKGROUND OF THE INVENTION

Automatically extensible and retractable jet hose type cleaners have been known and in use for a number of years past, and are disclosed in the following patents:

Whittaker U.S. Pat. No. 3,278,949

Howard et al U.S. Pat. No. 3,530,511

The installation of such cleaning apparatus has required excavation and placement of the housing tubes externally of the pool wall, regardless of whether the tubes ere extended in a straight line radially outwardly from the pool, or connected to the pool by 90° bends, with the bodies of the tubes extending parallel to the pool wall. In such installations, it has hitherto been found necessary to utilize a radius of two feet or more in the bends in order to allow the rear ends of the hoses, with their attached pistons, to freely slide around the bends. This locates the bodies of the housing tubes in the ground, outside the pool wall, requiring excavation around the outside of the pool in order to install the housing tubes.

OBJECTS OF THE INVENTION

The invention provides for installation of the housing tubes wholly within the bond beam which defines the rim of the pool, thus making it possible to install the plumbing for the cleaning apparatus without the necessity for excavation externally of the pool wall.

Objects of the invention are:

1. to avoid excavation outside the pool wall;
2. to encase the housing tubes in cement so as to protect them from corrosion arising from soil electrolysis;
3. to avoid the necessity for extra space outside the pool perimeter for installation of the cleaning apparatus, where the area available for pool construction is limited.

DESCRIPTION

Other objects will become apparent in the following specifications and appended drawings, wherein:

FIG. 1 is a fragmentary horizontal sectional view of a swimming pool and cleaner installation embodying the invention;

FIG. 2 is a vertical sectional view of the same taken on line 2—2 of FIG. 1;

FIG. 3 is a detailed axial sectional view of a portion of FIG. 2, on an enlarged scale; and

FIG. 4 is a cross-sectional view of the piston, taken on the line 4—4 of FIG. 3.

Referring now to the drawing in detail, I have shown therein, as an example of one form in which the invention may be embodied, a swimming pool including a lateral wall **10** which is thickened at its upper extremity to provide a bond beam **11** defining the pool rim, a body of water **12** being contained within the wall **10**.

The cleaning apparatus comprises a plurality of hose housings **15** extending longitudinally in bond beam **11** and each having at one end a 90° bend **16** terminating in a receptacle **17** having an open end flush with the inner surface of bond beam **11** and communicating with the body of water **12**. Each housing **15** contains a respective cleaning hose **20** which extends through a bearing bushing **21** in the open end of receptacle **17** and is adapted to be projected therethrough into the pool for cleaning action. On the rear end of hose **20** is a piston **22** adapted to move longitudinally in housing **15** in response to water pressure or suction applied thereto respectively by a pressure source P (discharge of pool circulation pump) or suction source S (inlet of pump or a separate suction unit such as the ejector of Howard et al U.S. Pat. No. 3,530,511). When circulation controls V (such as disclosed in said Howard et al patent) are actuated to establish a pressurized flow of water from source P against piston **22**, a positive differential of pressure thus established against the piston **22** over the pressure in pool water **12**, will become effective to project the cleaning hose **15** into the pool until it is arrested by abutment of piston **22** against bearing bushing **21**, whereupon the pressurized flow will pass through hose **15** and against the internal surface of the pool with a scouring action for the duration of a cleaning cycle ending when the controls are actuated to cut off the pressurized flow and apply suction (negative differential) from source S to the housing **15** behind the piston **22**. A check valve **25** inside the piston **22** will then close to prevent reverse flow through hose **20** and to cause the full pressure differential of pool water **12** over the sub-atmospheric pressure at suction source S, to be applied to piston **22** to withdraw the hose **15** into housing **15**.

In the terminal stage of hose projection and the initial stage of hose withdrawal, piston **22** will travel freely around the bend **16** without binding therein. This is made possible by a ball and socket pivotal connection between piston **22** and hose **20**. Piston **22** comprises a barrel-shaped annular body **30** having at one end an internal collar **31** defining an opening through which is extended a hose nipple **32** which is secured in the end of hose **20**. Collar **31** provides an annular seat against which a frusto-conical shoulder **33** on a head **34** on the end of nipple **32**, is adapted to seat when the piston is subjected to pressure flow, thereby to prevent any substantial leakage around the hose nipple from within piston **22**. Piston body **30** is barrel shaped, having an external surface consisting of two frusto conical surfaces tapering to minimum diameter at the respective ends of the piston and intersecting at or near the mid-length of the piston to define a peripheral land **35** of maximum diameter and of minimum axial width, which is fitted in the bore of housing **15**, **16** with just sufficient clearance to permit the piston to freely slide in the housing in response to pressure differentials in the water flow. The tapering of the external surface of the piston toward its respective ends makes it possible for the piston to pivot around the nipple head **34** in order to follow the short radius curvature of housing bend **16**, without binding or substantial increase in resistance to its sliding movement. Frusto-conical shoulder **34** is pivotally slidable against the seat provided by the edge of collar **31**, so as to allow the pivotal movement of the piston while maintaining a substantial seal between the piston **22** and nipple **32**.

Threaded into the end of piston body **30** in opposed relation to nipple head **32**, is a valve seat ring **37** defining an inlet port **38** and a frusto-conical valve seat **39**. Ball valve **25** is retained between valve seat **39** and an annular array of fingers **41** projecting axially from nipple head **34**, the fingers **41** being spaced circumferentially to provide passages **42** for flow of water past the ball **40** into hose **20** during a cleaning cycle, and providing abutments to hold the ball **40** in open relation to nipple head **34**.

In operation of the apparatus, when the controls are actuated to provide a pressure flow from source P into housing **15**, the pressure differential will be effective against the area of piston **22** outwardly of the bore of nipple **32**, to project the hose **20** from the housing **15**, **16** into the pool, wherein it will droop into contact with the bottom of the pool as indicated in FIGS. **1** and **2**. Upon contact of piston **22** with bushing **21** it will seal the receptacle **17** against any substantial leakage from the housing around the hose **20** into the pool, so that substantially the full pressure flow will pass through the hose and be discharged from its forward end to provide a scouring jet which will scrub sedimentary particles from the pool bottom and propel them into suspension in the water **12** to be drawn off through the pool's skimmer.

At the end of a cleaning cycle, upon reversal of the controls so as to disconnect the housing **15** from pressure source P and connect it to suction source S, sub-atmospheric pressure will be established in housing **15**, **16** and atmospheric pressure against the surface of water **12** will then establish a pressure differential acting against the forward side of piston **22** through bearing bushing **21**. At the same time, water pressure in hose **20** will act against ball valve **25** to move it into seating engagement with seat **39** to close the rear end of hose **20**,

preventing reverse flow through the hose and causing the pressure differential to be effective against the full cross-sectional area of piston 22.

I claim:

1. In a swimming pool having a bond beam defining its rim and having means for circulating a pressure flow of water and for providing a suction source, in combination:

a tubular housing including a body portion extending longitudinally of said bond beam and a bend connecting a forward end of said housing to the pool interior beneath its water level;

a clearing hose normally housed in said housing;

a piston pivotally coupled to the rear end of said hose and slidable in said housing in response to pressure differentials therein, so as to project and retract said hose in response to positive and negative differentials in said housing respectively, pivotal movement of said piston relative to said hose facilitating travel of the piston through said bend;

said piston having a port through which water can flow from said housing through said hose to provide a cleaning jet in response to positive pressure in said housing.

2. The combination defined in claim 1;

said piston having maximum diameter intermediate its ends, with a periphery fitted in said housing for response to pressure differentials, and tapering from said maximum diameter to minimum diameters at its respective ends, to facilitate travel of the piston through said bend.

3. The combination defined in claim 2;

said piston having dual frusto-conical external surfaces intersecting at their major diameter to provide said periphery fitted in said housing.

4. The combination defined in claim 1;

and a check valve in said piston operable to open for flow from the housing into the hose and to close to prevent reverse flow, whereby to amplify the negative dif-ferential for retraction of the hose.

5. The combination defined in claim 4;

said check valve comprising a ball;

a valve seat ring secured in the rear end of said piston, said ring defining said port and having a frusto-conical internal surface flaring forwardly to provide a valve seat for engagement by said valve ball;

and circumferentially spaced abutment fingers in the forward end of the piston, operable to hold the ball in an open position permitting flow through the piston into the hose.

6. The combination defined in claim 1;

said piston comprising an annular body having a front end opening defined by an internal collar providing an annular seat;

a hose nipple secured in the rear end of said hose, extending through said opening and having at its rear end an annular head with a frusto-conical shoulder engaged against said seat to provide the pivotal coupling between said hose and said piston.

7. The combination defined in claim 6;

said annular body being barrel shaped with a periphery of maximum diameter intermediate said ends, fitted in said housing to provide differential pressure response and tapering to minimum diameters at its ends to facilitate tilting within said housing for free travel through said bend.

8. The combination defined in claim 7, further including:

a valve comprising a valve seat ring secured in the rear end of said annular body and providing a forwardly facing annular valve seat;

and a ball caged between said valve seat and said nipple head and adapted to engage said seat to prevent rearward flow from said hose into said housing.

9. The combination defined in claim 8;

said nipple head having circumferentially spaced abutment fingers for engagement by said ball to hold it in an open position permitting flow from said port between said fingers into said hose in response to positive pressure differential in said housing.

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