Dec. 29, 1959 C. M. BLUMENFELD 2,919,027

SWIMMING POOL CLEANING APPARATUS

Filed April 11, 1958

4 Sheets-Sheet 1

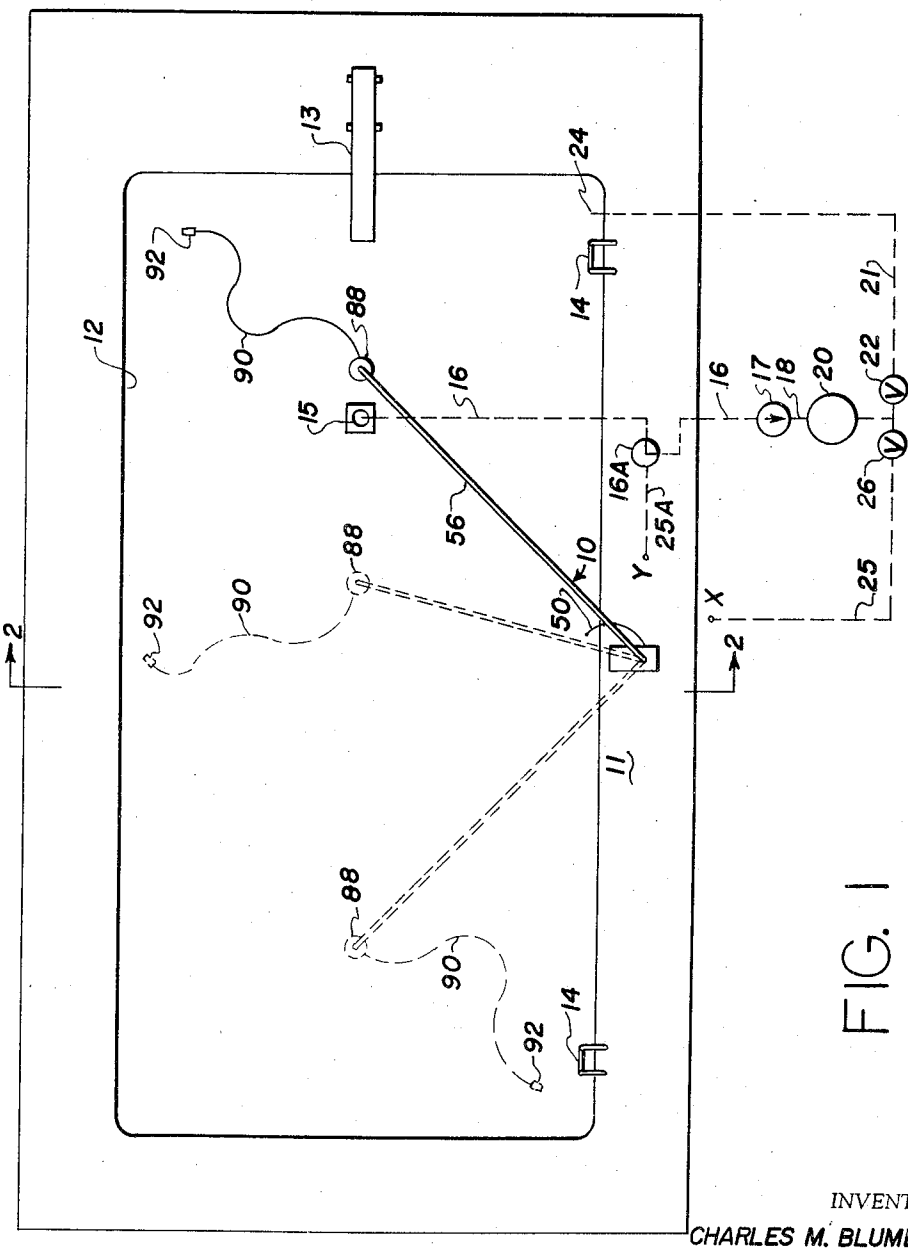


FIG. 1

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FIG. 2

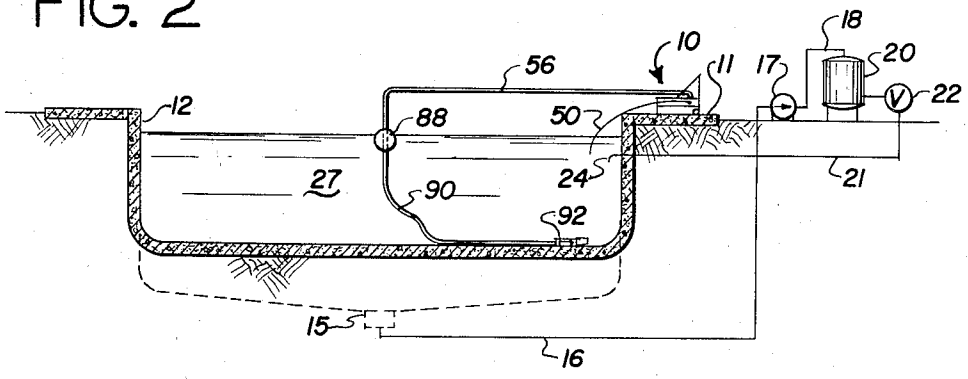


FIG. 6

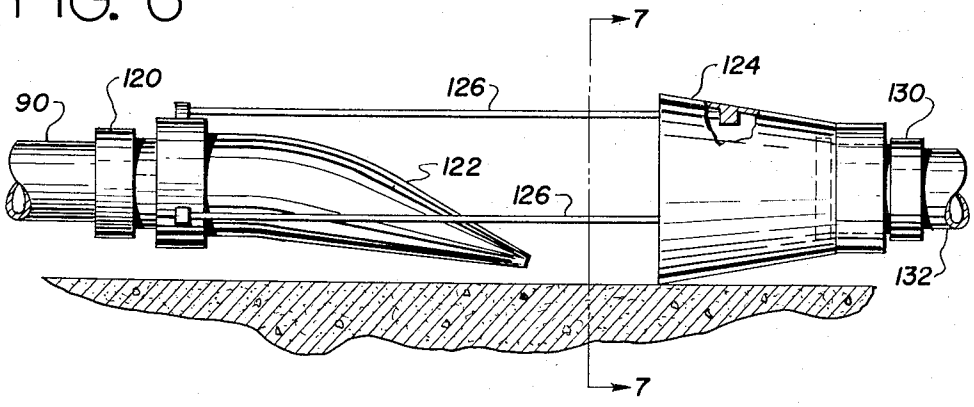
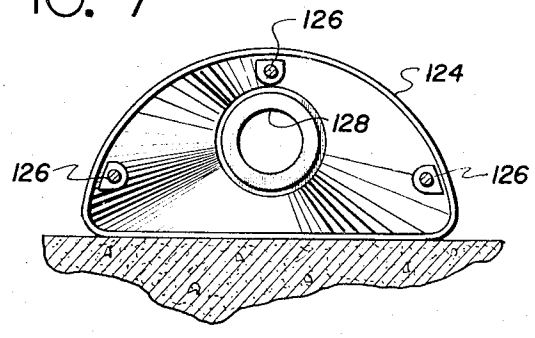


FIG. 7



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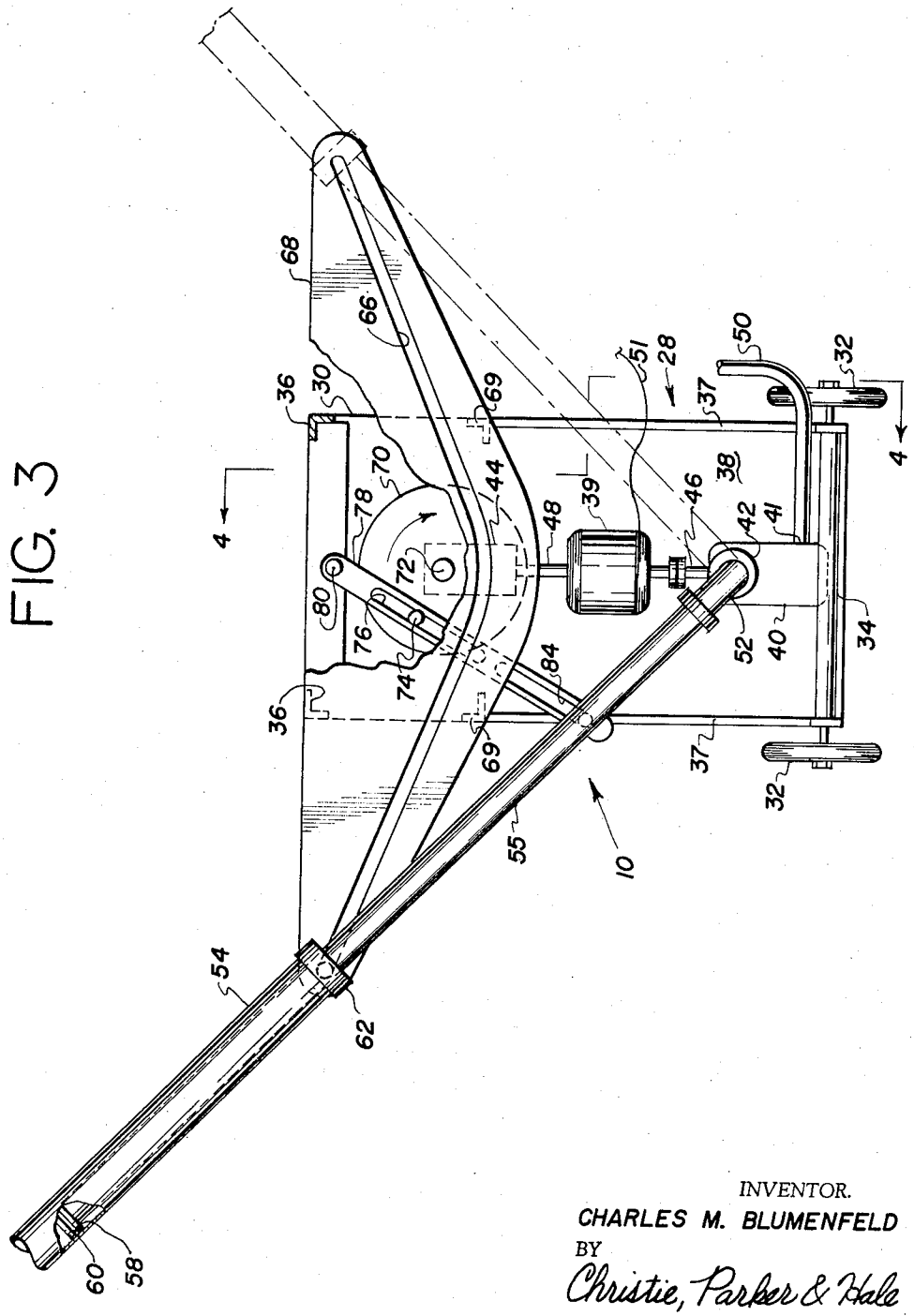
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SWIMMING POOL CLEANING APPARATUS

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FIG. 3



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FIG. 4

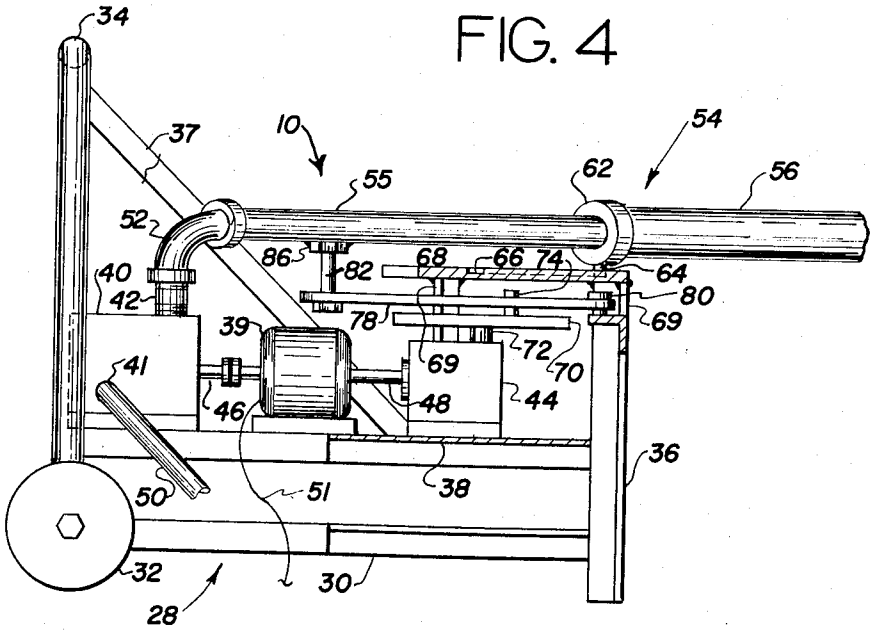
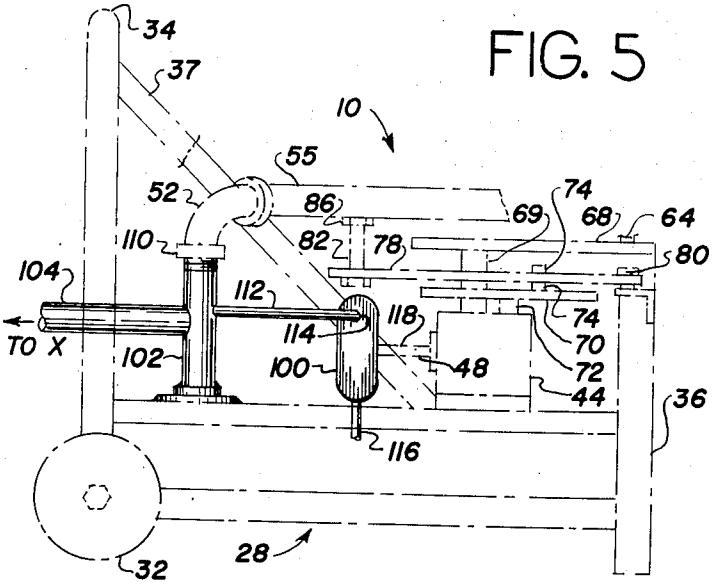


FIG. 5



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2,919,027

SWIMMING POOL CLEANING APPARATUS

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Application April 11, 1958, Serial No. 727,912

6 Claims. (Cl. 210—169)

This invention relates to apparatus for cleaning swimming pools.

The cleaning of sediment from the bottom of swimming pools is required at regular intervals, and at the present time, represents a considerable maintenance cost. The present method involves the use of a manually operated suction head to pick up sediment off the bottom of the pool. This method is effective, but it requires one or two men several hours to do a thorough job on the average size residential swimming pool. Since the cleaning operation must be done approximately once a month, it is an appreciable expense in pool maintenance.

This invention provides an automatic cleaning device for removing sediment from the swimming pools without requiring supervision of an operator. The device of this invention can be set to start the cleaning operation, and left for any length of period required to complete the job. Thus, one man can set a plurality of the devices in pools located considerable distances apart and leave the devices running without any supervision. The same man can later pick up the devices after the pools are clean. In this way a one man crew can service many pools almost simultaneously, which is not possible with the presently available techniques.

Briefly, this invention contemplates swimming pool cleaning apparatus which includes a water filtering system, and an elongated conduit which is free at one end. The other end of the conduit is connected to a source of water under pressure, and means are provided for disposing the free end of the conduit adjacent the swimming pool bottom so that sediment on the bottom of the pool is stirred up as water flows out the free end of the conduit. The apparatus also includes means for circulating the water with stirred up sediment through the filtering system as water flows through the conduit.

In the preferred form of the invention, the conduit is a flexible hose and includes a jet or nozzle on its free end so the free end of the conduit is randomly displaced over the bottom of the pool due to the reaction of the water squirting from the jet. An elongated arm with one end disposed over the central portion of the swimming pool supports the hose or conduit. The other end of the arm is connected to a mechanical oscillator mounted on one of the swimming pool banks. The oscillator gently sweeps the arm and conduit over the pool area. The support arm is extendable and retractable, and means are provided for automatically extending and retracting the arm as it is swept back and forth by the oscillator, so the end of the arm over the pool follows a substantially rectilinear path.

One form of the invention uses a suction line with one end connected to travel with the free end of the jetting hose and with the other end connected to the filtering system so that water fed to the filter is picked up in the vicinity of the jet where a maximum of sediment is stirred up in the water.

These and other aspects of the invention will be more

fully understood from the following detailed description taken in conjunction with the drawings in which:

Fig. 1 is a schematic plan view of the cleaning device mounted on the bank of a swimming pool;

Fig. 2 is a sectional view taken on line 2—2 of Fig. 1;

Fig. 3 is a fragmentary enlarged plan view of the cleaning device shown in Fig. 1;

Fig. 4 is a sectional view taken on line 4—4 of Fig. 3;

Fig. 5 is an elevational view of a modification of the cleaning device shown in Fig. 4;

Fig. 6 is a fragmentary side elevation of a modified nozzle used in the invention; and

Fig. 7 is a view taken on line 7—7 of Fig. 6.

Referring to Figs. 1 and 2, the cleaning apparatus **10** of this invention is mounted on the side bank **11** of a swimming pool **12**, which includes the usual diving board **13**, ladders **14**, and sump drain **15**. The sump drain is connected through a sump pipe **16** and three-way valve **16A** to the inlet of a filter pump **17**, which has its outlet connected by a pipe **18** to the inlet of a filter **20**. The outlet of the filter **20** is connected by a pipe **21** through a first valve **22** to a clean water discharge **24** at the deep end of the pool. A line **25**, which terminates at a point X is connected through a second valve **26** to line **21** between the first valve and the filter pump. A line **25A**, which terminates at a point Y is adapted to be connected to the filter pump inlet when the three-way valve is turned 90° in a clockwise direction from the position shown in Fig. 1. As shown in Fig. 2, the swimming pool is filled with water **27**.

Referring to Figs. 3 and 4, the cleaning apparatus includes a cart 28 made up of a horizontal and rectangular frame **30** at one end of which is mounted a pair of wheels **32**. An upwardly extending handle **34** is rigidly attached to the end of the cart on which the wheels are mounted, and a separate downwardly extending leg **36** is mounted at each of the corners at the other end of the frame **30** to provide a level support when the cart is positioned as shown in Fig. 4. The handle **34** is reinforced by a separate diagonal brace **37** connected at one end to the handle and its other end to an intermediate portion of the frame edge. The cart is readily portable by simply tilting the frame about the axis of the wheels to lift the legs off the ground.

A horizontal base plate **38** is rigidly attached to the frame and supports an electric motor **39**, a water jetting pump **40** having an inlet **41** and an outlet **42**, and a gear box **44**. The electric motor drives the water pump through a shaft **46**, and also drives a horizontal input shaft **48** of the gear box.

The pump inlet is connected to one end of a water intake hose **50**, the other end of which extends down into the water of the pool. Power is supplied to the electric motor through electric lead **51**. A 90° swivel joint **52** is connected to the pump outlet. The swivel joint is of conventional make, such as that supplied by the Barco Manufacturing Company, and is free to rotate 360° about a vertical axis (as viewed in Fig. 4). The discharge end of the swivel joint is connected to the inlet end of an elongated horizontal hollow support arm **54**, which includes a relatively small diameter section **55** connected directly to the swivel joint, and a larger diameter section **56** which makes a sliding fit over the smaller section. As shown most clearly in Fig. 3, the outer end of the smaller diameter section includes an enlarged annular boss **58** which makes a sliding seal inside the inner end of the larger diameter section of the support arm. An annular O-ring **60** around the boss seals the annular space between the boss and the interior of the larger section of the support arm.

A collar **62** on the inner end of the larger section of

the support arm makes a sliding fit around the intermediate portion of the smaller section. A downwardly extending pin **64** is rigidly attached at its upper end to the collar **62**, and has its lower end disposed in a curved groove **66** formed in the upper surface of a horizontal guide plate **68** supported by vertical posts **69** welded to the frame of the cart. A horizontal circular rotatable table **70** is attached to the upper end of a vertical output shaft **72** of the gear box **44** under the guide plate, and is adapated to rotate in a clockwise direction as shown in Fig. 3. A vertical drive pin **74** is attached at its lower end to the rotary table, and extends up through a first longitudinal slot **76** formed in one end of an elongated lever arm **78** attached at that end by a pivot **80** to the frame of the cart. A vertical bolt **82** is disposed through a second longitudinal slot **84** at the other end of the lever arm, and is threaded into a nut **86** welded to the underside of the smaller section of the support arm.

As shown most clearly in Fig. 2, the outer end of the support arm is bent at a 90° angle to extend vertically down through an annular buoy **88** secured to the downwardly extending part of the support arm at water level. The lower end of the support arm extends a substantial distance below the buoy into the water to provide additional stability for the arm. The upper end of a flexible hose **90** is attached to the end of the support arm below the buoy, and a nozzle **92** is attached to the free end of the hose.

The operation of the cleaning device of this invention is as follows:

The cleaning unit is set up on the side of the pool as shown in Figs. 1 and 2. The intake hose **50** is placed in the water, and the jetting pump motor **39** on the cart is turned on. The recirculation pump for the filtering system is also turned on, first valve **22** opened, and second valve **26** closed. Water jetting out of the nozzle causes it to trace a random path over the bottom of the pool as shown in dotted lines in Fig. 1.

The motor **39** on the cart also actuates the gear box so the rotary table is turned in a clockwise direction as shown in Fig. 3. The drive pin **74** on the rotary table travels in the first longitudinal slot **76** of the lever arm **78**, causing the lever arm to oscillate back and forth through an angle of about 90°. The movement of the unpivoted end of the lever arm causes the bolt **82** on the smaller section of the support arm to travel longitudinally in the second slot **84** of the lever arm and in turn oscillates the support arm about the swivel joint **52** through an angle of about 90°. This movement of the support arm causes the traveling pin **64** on the collar of the larger section of the support arm to travel in groove **66** of the horizontal guide plate. As the support arm swings from the extreme left position shown in Fig. 3 to the extreme right position shown in dotted lines of Fig. 3, the length of the support arm is telescoped to a minimum when the support arm is over the center of the pool, and extended to a maximum when the arm is in either of the extreme right or left positions. Thus, the outer end of the support arm traces a substantially rectilinear path for the length of the pool insuring uniform coverage of the pool by the nozzle.

The water jetting from the nozzle stirs up sediment on the bottom of the pool, and the water containing the stirred up sediment is taken off at the drain **15**, circulated through the recirculation pump **17**, the filter **20**, and returned to the pool through discharge **24**. The device can be left running unattended for an unlimited period of time, and the sediment will be picked up and deposited in the pool filter.

If desired, the electric motor on the cart as shown in Fig. 4 can be replaced by a water turbine **100** as shown in Fig. 5, and the pump replaced by a stand pipe **102** having an inlet **104** connected to pipe **25** at point X (see Fig. 1). First valve **22** is closed, and second valve **26** is opened. A primary outlet **110** of the stand pipe is

connected to the swivel joint **52**, and a secondary outlet **112** of the stand pipe is connected to an inlet **114** of the water turbine. Water is discharged from the turbine through an outlet **116**. The water turbine has a drive shaft **118** which powers the input shaft **48** of the gear box **44**. The remainder of the elements of the cleaning device are identical with those described with respect to Figs. 1 through 4, and the operation of the unit shown in Fig. 5 is identical with that previously described, except that the jetting pump and electric motor are replaced by the water turbine. The arrangement of Fig. 5 has the advantage of economy, provided that the filter pump for the swimming pool is capable of delivering sufficient water to operate both the nozzle and the water turbine.

In another embodiment of the invention, the pump inlet hose **50** of the apparatus of Figs. 1 through 4 is connected to point X (see Fig. 1) of line **25**. Second valve **26** is opened, and first valve **22** is closed, so that the discharge from the filter is circulated back through the pump on the cart, thereby increasing the jet action from the nozzle, or permitting the use of a smaller jetting pump and motor on the cart.

Figs. 6 and 7 show a modified arrangement of the nozzle for stirring and picking up sediment off of the pool bottom. The free end of the jetting hose **90** is connected through a swivel **120** to a downwardly projecting nozzle **122**. A generally concave and flat bottom scoop **124** is spaced from and attached to the nozzle and swivel by three elongated rods **126** (see Fig. 7) so the larger portion of the scoop opens toward the nozzle. A central intake **128** in the scoop is connected through a swivel **130** to one end of an elongated and flexible pick-up hose **132**, the other end of which (not shown) is connected to point Y of line **25A** and to the inlet of a filter pump **17** through the three-way valve (see Fig. 1), which is turned at 90° in a clockwise direction from the position shown in Fig. 1.

In the operation of the nozzle arrangement of Figs. 6 and 7, the three-way valve is set so that the filter pump picks up water through the scoop. Water jetting from the nozzle lifts sediment off the pool bottom and directs it toward the scoop. The swivels on the nozzle and the scoop permit the hose **90** and the pick-up hose **122** to move about freely even though the scoop and nozzle maintain the position shown in Fig. 7, i.e., the flat edge of the scoop being on the pool bottom. The arrangement of Figs. 6 and 7 provides a more efficient removal of sediment, because the water passed through the filter is selected from the immediate vicinity of the nozzle where turbidity due to sediment is at a maximum. Also, preferably, valves **22** and **26** are set so the discharge from the filter is fed into the jetting pump on the cart.

I claim:

1. Apparatus for cleaning sediment out of a swimming pool, the apparatus comprising a filter pump having an inlet and outlet, a filter connected in series with the filter pump, an elongated support arm disposed over the pool, a mechanical oscillator, means connecting the arm to the oscillator, a water turbine having a drive shaft and a water inlet and outlet, means connecting the filter pump outlet to the water turbine inlet, means coupling the turbine drive shaft to the oscillator so the arm is swept back and forth over the pool as the turbine is driven, an elongated flexible hose free at one end and for a substantial distance adjacent its free end and supported by the arm over the water, means connecting the other end of the hose to the filter pump outlet, means for supporting the hose a substantial distance from the free end with the free end of the hose adjacent the swimming pool bottom so that sediment on the bottom of the pool is stirred up as water flows out the free end of the hose and so the free end of the hose is moved by the reaction of water flowing from it, and means for circulating the water with stirred up

sediment through the filter as water flows through the hose.

2. Apparatus for cleaning sediment out of a swimming pool, the apparatus comprising a pump having an inlet and outlet, a filter connected in series with the pump, an elongated support arm which is extendable and retractable longitudinally, the support arm being disposed over the pool, a mechanical oscillator, means connecting the arm to the oscillator, a water turbine having a drive shaft and a water inlet and outlet, means connecting the pump outlet to the water turbine inlet, means coupling the turbine drive shaft to the oscillator so the arm is swept back and forth laterally over the pool as the turbine is driven, an elongated flexible hose free at one end and supported by the arm over the water a substantial distance from its free end with the free end of the hose adjacent the swimming pool bottom, means connecting the other end of the hose to the pump outlet to supply water to the hose so that sediment on the bottom of the pool is stirred up as water flows out the free end of the hose and so the free end of the hose is moved by the reaction of the water flowing from it, means responsive to oscillations of the arm to extend and retract the arm, and means for circulating the water with stirred up sediment through the filter as water flows through the hose.

3. Apparatus for cleaning sediment out of a pool of liquid, the apparatus comprising a movable buoyant support adapted to float in the pool, an elongated, stiff and laterally movable conduit disposed over the surface of the pool and carried by the buoyant support, an elongated and downwardly extending hose connected at one end to the conduit so a discharge end of the hose is disposed in the vicinity of the bottom of the pool, the hose being flexible for a substantial portion of its length in the water, means for supplying liquid under pressure to the conduit so that liquid flows from the discharge end of the hose and causes it to move due to reaction and so that sediment in the pool is stirred up by water flowing out of the hose, and means for removing from the pool liquid with stirred up sediment.

4. Apparatus according to claim 3 in which the conduit is pivotable about an upright axis.

5. Apparatus according to claim 4 which includes means for extending and retracting the conduit as it is moved laterally.

6. Apparatus for cleaning sediment out of a pool of liquid, the apparatus comprising a movable buoyant support adapted to float in the pool, an elongated laterally movable conduit disposed over the surface of the pool and carried by the buoyant support, an elongated and downwardly extending hose disposed so a discharge end of the hose is in the vicinity of the bottom of the pool, the hose being flexible for a substantial portion of its length in the water, means connecting the other end of the hose to the conduit, means for supplying liquid under pressure to the conduit of the hose so that liquid flows from the discharge end of the hose, and means for automatically moving the conduit laterally to and fro over the pool as liquid flows through the conduit so that the discharge end of the hose is moved over the bottom of the pool and so that sediment in the pool is stirred up by the water flowing out of the hose, and means for removing from the pool liquid with stirred up sediment.

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CERTIFICATE OF CORRECTION

Patent No. 2,919,027 December 29, 1959

Charles M. Blumenfeld

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 6, line 16, for "conduit of" read -- conduit and --.

Signed and sealed this 26th day of July 1960.

(SEAL)
Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents