

Nov. 22, 1960

F. M. NASH

2,961,098

SURFACE SKIMMER FOR SWIMMING POOLS

Filed Nov. 1, 1957

FIG_1

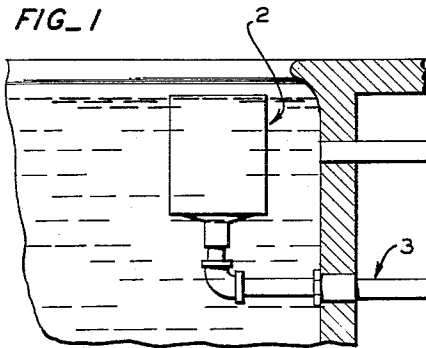


FIG_3

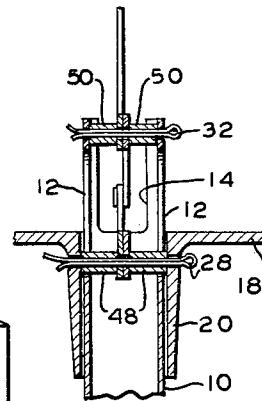


FIG_4

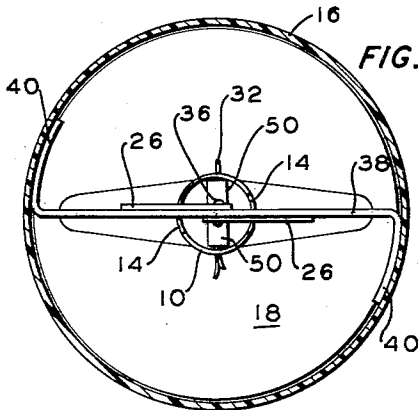


FIG_2

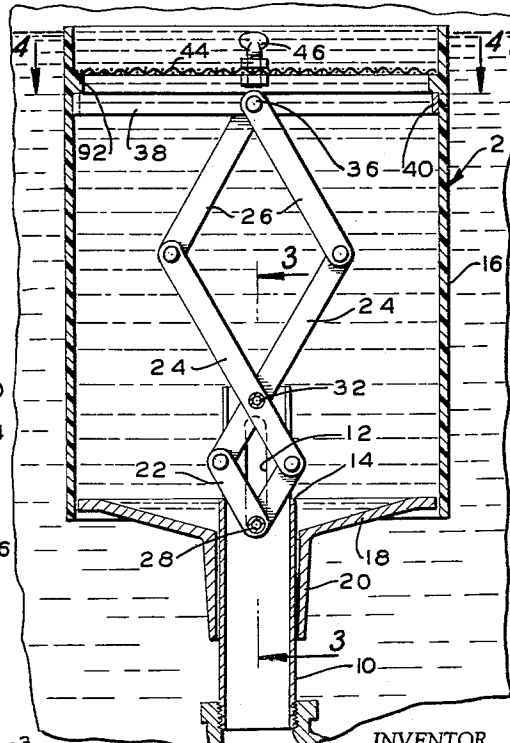
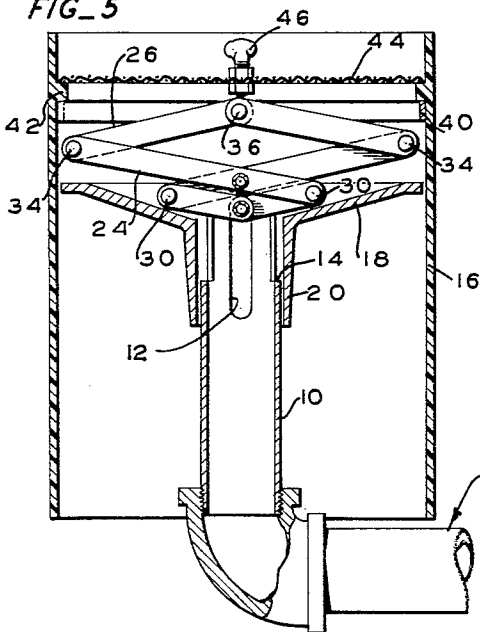


FIG_5



INVENTOR.
FLOYD M. NASH
BY *Naylor & Neale*
ATTORNEYS

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2,961,098

SURFACE SKIMMER FOR SWIMMING POOLS

Floyd M. Nash, Berkeley, Calif., assignor to Jacuzzi Bros., Inc., Richmond, Calif., a corporation of California

Filed Nov. 1, 1957, Ser. No. 693,938

8 Claims. (Cl. 210-241)

The present invention relates to devices for freeing water surfaces of debris and scum, and in particular, to such devices as will operate by taking in surface water and straining or otherwise cleaning it.

Surface skimmers have found their most frequent application in swimming pools where, during operation of the pool pumping system, a part of the surface water is constantly being strained before joining the main recirculating water load for movement through a filter unit and return to the pool. The straining device is usually disposed near or at the water surface, either in fixed relation to the swimming pool walls or, more frequently, floating on the water surface.

Most swimming pool water recirculating installations comprise means which cause variation of the recirculating load, e.g. gradual clogging of the filter, and the amount passing through the strainer similarly will vary. But many conventional skimmers, and the float supported ones in particular, prove to be of inadequate flexibility when the volume of water which they are made to strain increases above a certain point. They are not devised to adjust themselves to the demand and function unsatisfactorily at certain relatively high rates of flow. The subject invention is meant to remedy this deficiency by embodying a skimmer with a self-adjusting mechanism adapted for efficient use with a wide variety of flow rates.

One object of this invention is to provide an overflow skimmer which is quickly and efficiently self-adjusting to variation of the water intake by the recirculating installation.

Another object of this invention is to provide an overflow skimmer which is simple to install, and which can be cleaned easily.

Other objects and advantages of the present invention will be apparent from the following description when taken in conjunction with the accompanying drawings, and in which:

Figure 1 is a view of a swimming pool water recirculation and filter installation (simplified) embodying the subject overflow skimmer.

Figure 2 is a vertical sectional view of the subject overflow skimmer, the same being shown half scale in size.

Figure 3 is a partial sectional view taken along lines 3-3 of Figure 2.

Figure 4 is a sectional view taken along lines 4-4 of Figure 2.

Figure 5 is a vertical sectional view of the subject overflow skimmer showing the latter in a different position than Figure 2.

With reference to the drawings in detail, overflow skimmer 2 is adapted to the intake of an auxiliary suction line 3 of pump 6. Line 3 may contain a flow regulating valve 4. The pressure line of pump 6 discharges into filter unit 8 from where the water is returned to the pool through line 9. It will be appreciated that another line, not shown, is normally provided between the bottom of the pool and

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the suction side of the pump, i.e. all of the pool water filtered does not pass through skimmer 2 and line 3.

The upper extremity 10 of pump suction pipe 3 has been incised for the purpose of forming two diametrically opposed and identical slots 12 and also two diametrically opposed and identical U-shaped recesses 14. Open-ended cylinder 16 forming the lateral enclosure of the skimmer and separate circular bottom plate 18 are movable relatively to each other and to pipe section 10, a clearance being provided between cylinder 16 and plate 18, and another clearance existing between hollow plate stem 20 and pipe section 10, stem 20 being integral with plate 18 and adapted to slide along pipe section 10. The three above-identified elements, namely, cylinder 16, plate 18 inclusive of stem 20, and pipe section 10 are interconnected by a movement amplifying mechanism having a scissor type lever action and comprising six lever elements of three different sizes, to wit, a pair of short lower lever members 22, a pair of long intermediate lever members 24, and a pair of medium length upper lever members 26. These lever members are joined end to end for pivotal and lateral movement by pins 28, 30, 32, 34 and 36.

The described lever mechanism is situated within a plane diametral to pipe section 10 and maintained in anchored relation to said pipe section by cotter pin 32, appropriate diametrically opposed apertures having been drilled through the walls of pipe section 10 to allow the insertion of pin 32 somewhat above slots 12. The mechanism is further linked to plate 18 by means of cotter pin 28 which is inserted through diametrically opposed openings drilled through stem 20 and extends through slots 12. Pin 36 connects the lever mechanism to transverse bar 38 embodying two arcuate end extensions 40. These extensions are made to freely engage beneath horizontal ring 42 which is fixedly attached to the upper inner surface of cylinder 16, said ring itself supporting freely a circular straining surface 44 provided with a handle 46.

Cotter pins 28 and 32 are provided, respectively, with protective sleeves 48 and 50 which serve to inhibit any lateral shifting or cocking of the lever system on said pins.

With reference to the operation of the mechanism proper, it is pointed out that the only fixedly positioned linkage connection is cotter pin 32, inasmuch as it connects the lever mechanism with fixed pipe section 10. When plate 18 is made to rise, cotter pin 28 rises accordingly within slots 12. The accompanying lateral and upward movement of pins 30 is unhampered by pipe section 10 due to recesses 14 provided in said pipe. It will be appreciated that the upward movement of plate 18 will result in a more pronounced downward movement of cylinder 16 brought about by the ratio of the lengths of levers 24 to levers 22.

The functioning of the straining device can be described as follows: when no water is taken in, i.e. when the pump is not operating, the upper edge of cylinder 16 is located slightly above the water surface. At that time, the container is filled with water due to seepage through the clearances between cylinder 16 and plate 18 and between stem 20 and pipe 10. When the pump is energized, the water level within the container drops, causing the plate 18 to rise in response to the pressure difference between the pressures operative on its upper and lower surfaces. This results in a downward movement of cylinder 16 to bring the edge thereof below the surface of the water and cause more water to spill over the edge of the cylinder. If the additional spill-over is at a rate greater than the rate of removal of the water by the pump, the water level build-up within cylinder 16 decreases the pressure differential on plate 18, causing the latter to drop downwardly and the cylinder to move upwardly to decrease the rate

of spill-over. Very shortly an equilibrium condition is reached in which the surface water skimmed into the cylinder matches the rate of draw-off by the pump. At this point, the cylinder 16 and plate 18 remain substantially stationary as long as the pump draw-off rate remains substantially constant. Upon energization of the pump, and upon initiation of back-washing of the filter unit, as well as on other occasions, there is a period of hunting action by the plate and cylinder until this equilibrium condition is reached, but this hunting period is cut short by the strainer, or screen, 44 which has a dampening action due to its engagement with, and resistance to movement through, the water.

The skimmer can be properly termed a balance skimmer in that the weight supported by the beam 38 tends to be balanced by the weight of the plate 18 under the operational conditions described. Stated otherwise, the conjoint movement of the cylinder and plate is such, under any given operational condition of the pump, as to tend to equalize the water pressures and forces applied to a submerged element, i.e. plate 18.

The described skimmer is such as to be automatically adjustable in the manner described so that the skimming depth, i.e. rate of water spill-over, equals the withdrawal rate of the pump. In practice, the skimmer operatively accommodates itself to a 3-4 inch range of change in pool water level.

In an operative device manufactured according to the foregoing disclosure, the skimmer elements have the following characteristics:

The cylinder, made of acrylic cast tube having a density of 75.5 lbs./cu. ft., measured 9 in. in length, 6 in. in inner width (I.D.) and weighed 14 oz., including ring 42, also of acrylic resin, which was bonded to the cylinder, and chrome-plated screen 44 supported by the ring.

The brass plate and stem weighed 1 lb. 14 oz. and had a density of 546 lbs./cu. ft., and a clearance of $\frac{1}{64}$ of an inch was provided between the plate and the cylinder. A similar clearance was provided between the suction pipe and stem of the plate.

The lever elements and beam 38 were also made of brass.

Figure 2 shows the positional condition of the elements of the skimmer when the pump is inactive. After standing for a brief period of time in this position, the space within the lateral enclosure member, or cylinder, 16 becomes filled with water. Thus, both the cylinder 16 and the plate 18 are immersed in water. By referring to the weight and dimensional data given in column 3, lines 31-40, of the specification, it will be appreciated that the relatively light cylinder 16 would (assuming it corresponds in the weight, dimensional and material particulars given) weigh 14 ounces minus the weight of the water displaced by the wall of the cylinder, ring 42 and screen 44. The plate 18, being formed of denser material, would weigh approximately 30 ounces less the weight of the water displaced by it. There is only one point in the linkage system which is positionally fixed, and that is the pin 32 which is connected to the fixedly positioned tube 10. Hence, the effective weight of the immersed cylinder 16 tends to spread the longer portions of links 24 apart, while the effective weight of the movable plate 18 tends to bring the shorter portions of the links 24 together, with the weight relation between the plate and the cylinder and between the shorter and longer portions of the links 24 being such that the cylinder is balanced with its upper edge normally just above the surface of the water.

While a preferred embodiment of the invention has been disclosed in the above description, it is to be understood that the invention covers all modifications and adaptations within the spirit and scope of the appended claims.

What is claimed is:

1. A skimmer device adapted to be attached to a liquid outlet pipe means at a vertically disposed inlet end thereof

and embodying a compound receptacle, said receptacle comprising an open top lateral enclosure member disposed in slidable relation to said outlet pipe means, a bottom member separate from said enclosure member and adapted for vertical telescopic displacement therein, said bottom member being also in slidable relation to said liquid outlet pipe means, said receptacle furthermore comprising mechanical lever means in attached relation to said outlet means, said enclosure member and said bottom member, respectively, and adapted to impart to said enclosure member a limited vertical downward movement when said bottom member is caused to rise within said enclosure member and a limited vertical upward movement when said bottom member is caused to descend within said enclosure member, the enclosure member and bottom member being so proportioned in weight and the lever means being so proportioned in length that the enclosure member is overbalanced and lifted by the bottom member when the water levels inside and outside the enclosure are at substantially the top of the enclosure.

2. The combination set forth in claim 1, including strainer means for the removal of debris from the outflowing liquid.

3. A skimmer device adapted to be attached to the vertical end of liquid outlet pipe means and comprising a vertical lateral enclosure member, a separate bottom member slidable in said enclosure member and slidably related to said outlet pipe means, said pipe means communicating through said bottom member with the space defined by said enclosure member, and mechanical lever means connecting said enclosure member and said bottom member, and adapted to impart to said enclosure member a vertical downward movement when said bottom member is caused to rise therein and to impart to said enclosure member a vertical upward movement when said bottom member is caused to descend therein, the enclosure member and bottom member being so proportioned in weight and the lever means being so proportioned in length that the enclosure member is overbalanced and lifted by the bottom member when the water levels inside and outside the enclosure are at substantially the top of the enclosure.

4. The combination of claim 3 with strainer means for the removal of debris from the outflowing liquid.

5. In input communication with a liquid outlet pipe, an overflow device which is self-adjusting for variable flow rates embodying a compound receptacle, said receptacle comprising an open top lateral enclosure member and a separate bottom member vertically slidable therein, said members being conjointly movable relative to said pipe, and means interconnecting said enclosure member and said bottom member adapted to lower said enclosure member relative to said bottom member for increased water inlet to said outlet pipe when said bottom member is caused to rise, the enclosure member and bottom member being so proportioned in weight and said means being so dimensionally proportioned that the enclosure member is overbalanced and lifted by the bottom member when the water levels inside and outside the enclosure are at substantially the top of the enclosure.

6. The combination set forth in claim 5 including strainer means for the removal of debris from the liquid flowing into said receptacle.

7. For a swimming pool having a pump-connected outlet conduit provided with a vertically disposed and stationary inlet portion; a surface skimmer comprising an annular plate concentrically and slidably disposed with respect to said inlet portion, an open ended cylinder concentrically and slidably disposed with respect to said plate, said plate having a liquid leakage clearance fit with respect to said inlet portion and said cylinder having a liquid leakage clearance fit with respect to said plate, a vertically disposed scissors type multi-lever system having an intermediate pivotal fulcrum connection with said inlet portion, a lower pivotal connection with said plate, and an upper pivotal connection with said cylinder, said

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lever system being so arranged that the weight of said plate imparts an upward thrust to said cylinder, said cylinder and plate being proportioned in weight and the components of said multi-lever system being proportioned in length to cause the upper end of said cylinder to be disposed slightly above the surface of the pool water when said pump is inactive and to cause the upper end of said cylinder to be disposed slightly below the surface of said pool water in skimming relation therewith when said pump is activated and is withdrawing water from said outlet conduit.

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8. The surfac skimmer of claim 7 including a strainer screen removably disposed in said cylinder adjacent the upper end thereof.

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