

March 14, 1967

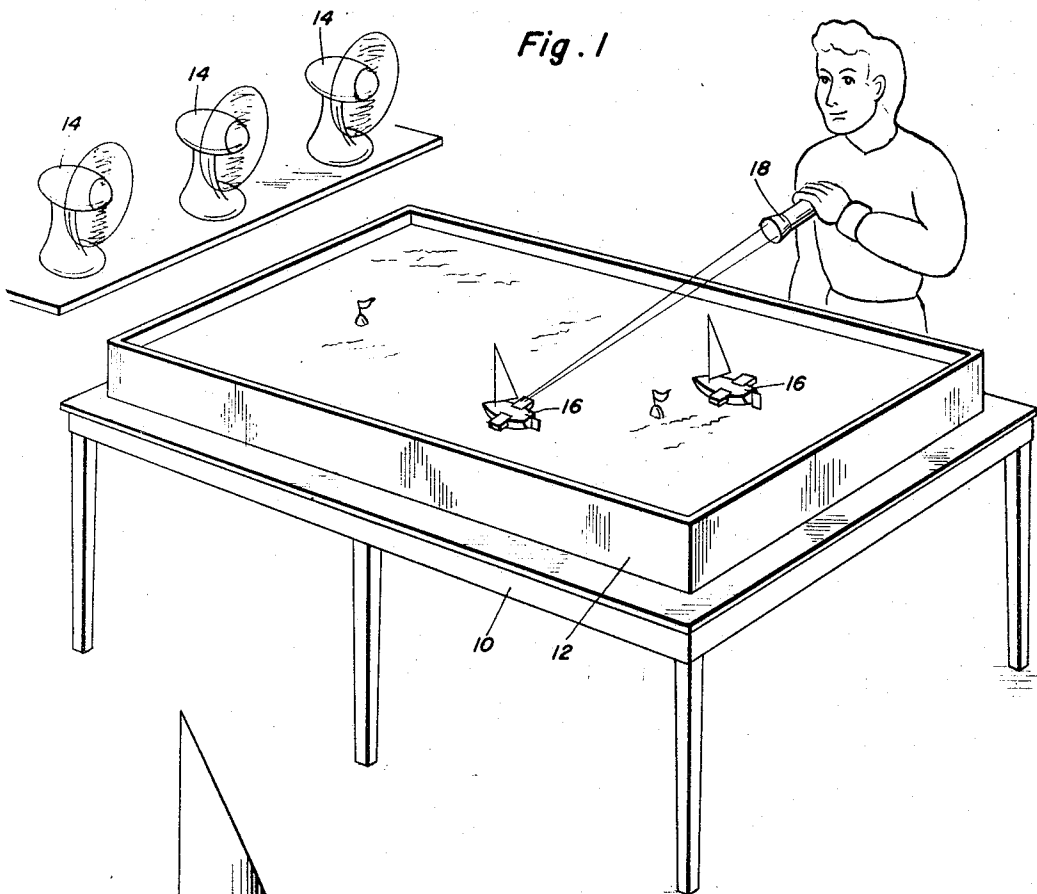
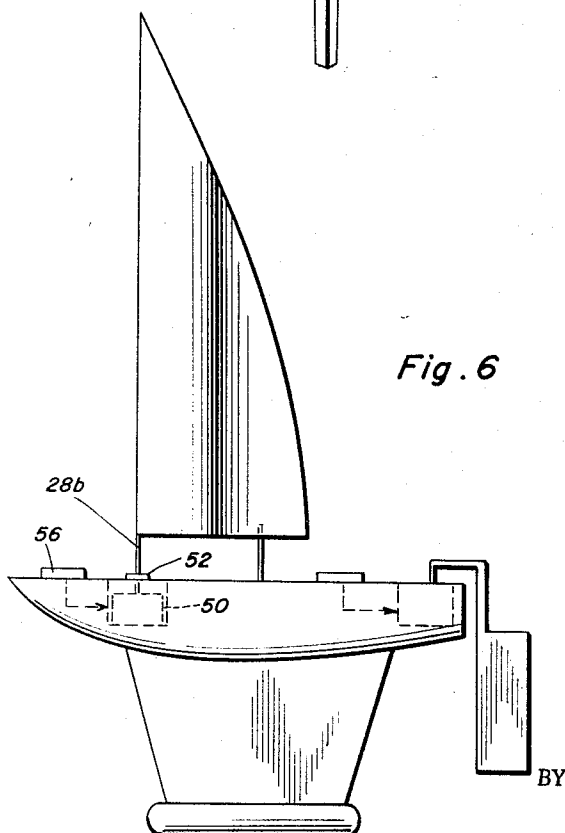
A. W. HOLT

3,308,577

MINIATURE SAILING GAME CONTROLLED BY PHOTOCELLS

Filed May 20, 1964

2 Sheets-Sheet 1



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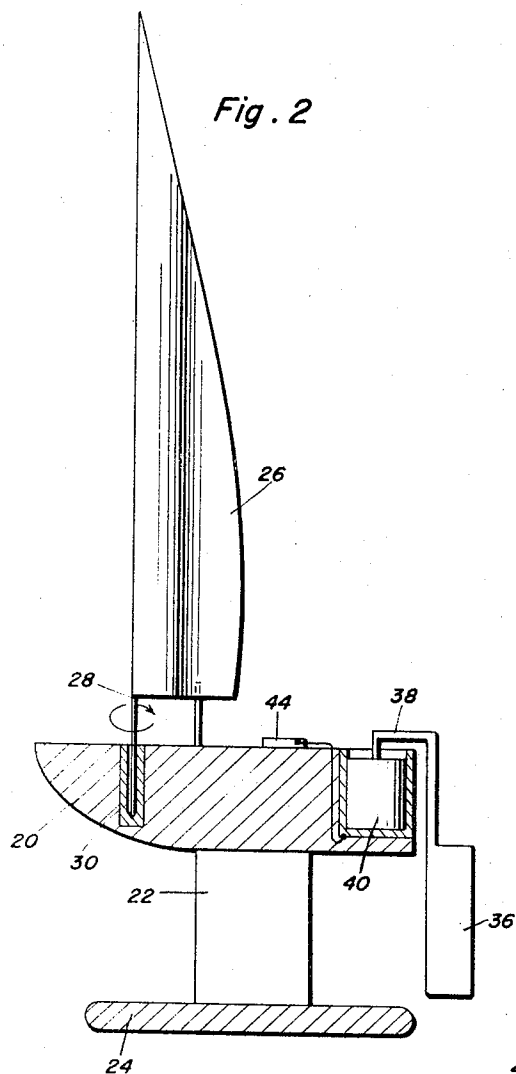
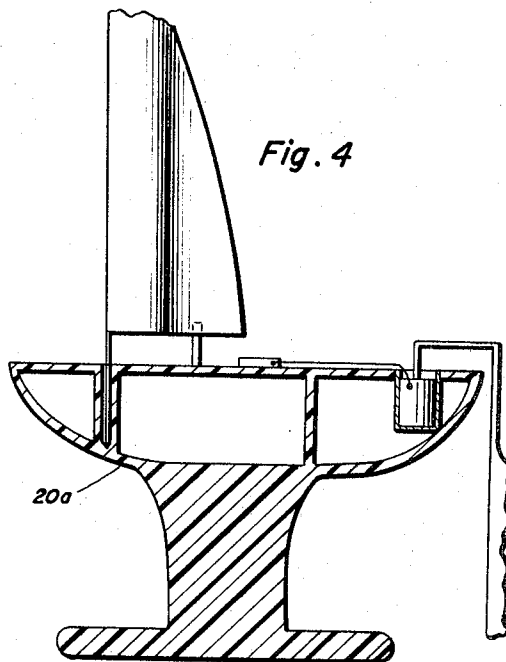
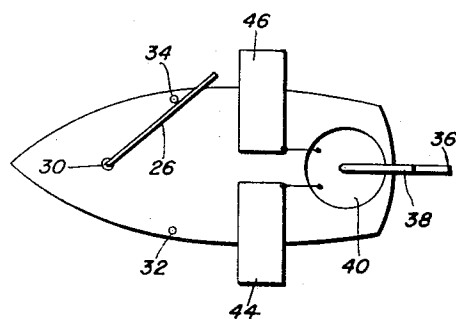
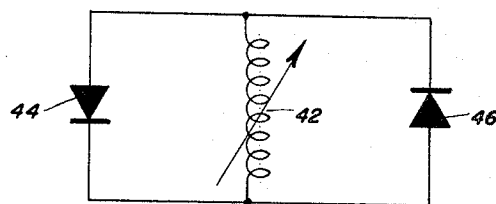
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MINIATURE SAILING GAME CONTROLLED BY PHOTOCELLS

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2 Sheets-Sheet 2



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MINIATURE SAILING GAME CONTROLLED
BY PHOTOCELLS

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This invention relates to amusement devices and particularly to a miniature sailing set by which "sailors" may compete in simulated regattas or other competitions which closely emulate the corresponding actual competitions.

In sailing full scale vessels sets of skills are learned and/or developed enabling sailors to take great advantage of prevailing winds and other local conditions. In many respects these skills not only depend upon a knowledge and familiarity of the class of vessels, their reactions and capabilities, but also the agility, balance and physical aptitude of the sailors.

My invention is concerned with a game set including small sailboats, a wind source, a vessel containing water for flotation of the boats, and remote means for participants to control the sailboats. It is not possible to introduce the requirements of physical aptitude, balance and the like into a small scale game which simulates sailing competition; however, I have devised methods of requiring skills corresponding to many of the other sailing skills (mentioned above) of the participants. I wish to point out that the skills required in satisfactorily participating in competition with my invention correspond to actual sailing skills, but they are not the same. For example, in one of the simpler forms of my invention the small sailboats have sails capable of swinging between port and starboard positions under the influence of the wind, whereas in sailing an ordinary sailboat the sailor physically controls his sail.

Accordingly, an object of my invention is to provide a miniature sailing set or assembly by which participants in competition or other sport can exercise control over their respective small vessels in a manner which bears a close similarity to actual sailing skills, particularly with regard to execution of maneuvers and end results.

A typical sailing assembly exemplifying my invention includes a suitable tank, e.g., a plastic container having water for the flotation of small (e.g., one or two inches long) sailboats. The water need not be more than an inch or two deep, and I have used a table tennis table to support a plastic container approximately the full five by nine feet with gratifying results. The boats are of unique construction (described later), and the ambient air about the boats is set in motion by means of one or more electric fans. With boats of such small size a gentle breeze from a fan some distance away scales to an appreciable wind in sailing full-size sailboats.

As mentioned before my sailboats are very small. A typical boat has a hull provided with a keel, a mast, a rudder, and remotely actuated and controlled means to actuate the rudder. These means consist preferably of a small galvanometer motor. The rudder is attached to the galvanometer motor in a way that when the galvanometer armature turns, the rudder is also turned. This provides hydrodynamic control over the course of the boat. The galvanometer motor is actuated by a light source (e.g., a profocused flashlight) held by the "sailor" who may direct the beam of light upon the sensitive surface or surfaces of one or more photo voltaic cells attached to the boat and operatively connected with the galvanometer motor. Thus, the light energizes the photocell or photocells and these provide an electrical

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signal of a strength sufficient to operate the motor and turn the rudder.

Keeping in mind that the boats are very small and light, the mast and sail must be to the same small scale, and yet the sail must have enough area to propel the boat and must have maneuverability sufficient to enable the sailor to tack. Otherwise the boat could not be sailed upwind as is required in sailing full-size sailboats. I obtained best results by using a thin metal mast (a sewing needle, for example) loosely supported in a hull-mounted socket. The sail is rigidly attached to the mast and can be made of stiff plastic, paper, cloth, etc. Thus, the sail and mast can pivot as a unit between port and starboard stops under the influence of the wind. In use, then, the position of the rudder is controlled by the source of light held by the sailor, while boat propulsion is accomplished by the wind impinging on the sail.

Another object of my invention is to provide a miniature sailing assembly substantially as described above.

A further object of my invention is to provide a miniature sailboat having a rudder whose position is remotely controlled by a light source which projects a beam of light onto a silicon solar cell or other suitable photocell.

Other objects and features will become apparent in following the description of the illustrated form of the invention.

FIGURE 1 is a perspective view of my sailing assembly arranged for use.

FIGURE 2 is an enlarged longitudinal sectional view of one form of my sailboat.

FIGURE 3 is a top view of the sailboat.

FIGURE 4 is a longitudinal sectional view of a hollow plastic form of my sailboat.

FIGURE 5 is a schematic showing the photocell-galvanometer motor circuit.

FIGURE 6 is a side view showing another modification of my sailboat.

As discussed before, my invention deals primarily with recreation or amusement devices; however, it has serious overtones based upon the art, science and sport of sailing. While my game set does not provide for physical agility and balance required of sailors, it does require corresponding judgments. For example, prevailing winds are (or can be) scaled to those of actual sailing by taking the boat size and other factors into consideration. Thus, boat response to rudder control is correlated to prevailing wind for the game participant to sail around a course, or tack, etc.

FIGURE 1 shows a table 10 supporting a water vessel 12 which can contain regatta (or other) devices as markers (not shown). The water vessel can be a special plastic container, a child's plastic swimming pool, or any other suitable vessel capable of holding one or two inches of water. Electric fans 14 provide a gentle prevailing wind over and about the surface of the vessel. It has been found that better results are obtained when the fans are farther distant from vessel 12 than shown in the drawing. Also, I have had considerable variety in the wind direction and behavior by using flow straighteners and/or diverters with the fans. Many actual wind and weather conditions can be simulated both on the sailboats 16 and the water surface.

Attention is now directed to my sailboats which are remotely controlled by a beam of light. I am aware of many prior remotely-controlled boats using radio equipment. My sailboats are entirely too small and light to support a radio receiver including its battery. Instead, my boats (like conventional sailboats) rely on the wind for propulsion, and rely upon the energy of a sailor-directed beam of light to control the boat. As

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shown in FIGURE 1, a flashlight 18 serves the purpose.

One form of my sailboat (FIGURES 2, 3 and 5) is made of a solid balsa wood hull 20 having a thin aluminum keel 22 provided with a cast lead ballast 24 at its lower edge. Sail 26 is attached to mast 28, and the lower end of the mast is supported in a bearing pressed in the hull. The bearing can be an upwardly opening socket 30 as shown or of other design. My earlier model sailboats used an ordinary sewing needle as mast 28, and I tried many sail materials including cloth, aluminum foil, plastic and others. I found that a rigid sail combined with a loose fit of the mast in the socket provided one of the more favorable combinations. Also, with a rigid sail I could use port and starboard sail stops 32 and 34 (FIGURE 3) to limit the turning motion of the sail and its mast.

Rudder 36 is attached to tiller 38, and the tiller is either cemented (or otherwise secured) to the hand (armature) of a D'Arsonval galvanometer 40 recessed within hull 20. Alternatively, tiller 38 can be a replacement for the hand of the galvanometer. Regardless of the construction detail of the tiller, the galvanometer motor will be the same. It is the motor of a classic Weston type galvanometer having a fixed permanent magnet field, and a movable coil armature 42 (FIGURE 5) to which the galvanometer hand is secured. The galvanometer motor 40 (FIGURE 2) used in several of my sailboats is one-half inch in diameter using one milli-ampere of current.

Motor 40 is energized by the signals provided by photodiodes 44 and 46. These can be silicon solar cells or any of the many available other photocells. The two cells can be connected in parallel with the galvanometer motor 40 (shown in FIGURE 5) or in other ways. When connected as shown, the port photocell 44 provides a positive signal when a light beam falls upon its sensitive surface, causing the tiller to move in one direction. When light (e.g., the beam of flashlight 18) impinges on cell 46, the positive signal that is generated drives the tiller in the opposite direction. Thus, the energy required to turn the tiller is transduced from the light beam of the flashlight (or the equivalent) held and directed by a participant.

FIGURE 4 shows a modification of my sailboat, wherein the hull 20a is made of hollow plastic construction. Apart from a difference in hull material and its shape, the boat of FIGURE 4 can be substantially identical to the boat of FIGURE 2. There is an advantage in using plastic. It does not absorb water, whereas I had to paint the balsa wood hull to prevent it from taking on too much water.

The sailboat in FIGURE 6 differs from the others in the following way. Instead of having the mast supported for free motion in a bearing socket, mast 28b is secured to the armature of a second galvanometer motor 50 at the forward part of the boat hull. The mast 28b is supported by a thrust bearing 52 secured to the hull deck to accept the vertical thrust (weight of the mast and sail). The mast is turned by the armature of galvanometer motor 50, and the motor is energized to turn right or left by photocells 56 (only one shown) connected to the motor just as the circuit connections shown in FIGURE 5. When two motors are used (FIGURE 6) i.e., one to turn the sail mast and the other to turn the tiller, a single light source can be used, or two sources (one in each hand) can be used. I can also select cells which respond more acutely to a color (e.g., red light) for the tiller motor (or the mast motor) and use a corresponding light source (e.g., by color filters). Then one set of cells will respond to one light source and the other set to the other source.

Numerous other modifications can be made without departing from the protection of the following claims. For example, I have shown two photocells for each gal-

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vanometer motor. The output of one cell drives the motor in one direction, and the output of the other cell drives the motor in the opposite direction. If desired, one cell can be used by having the motor armature spring-returned to a rest position.

I claim:

1. In a game set relating to sailing, wherein the set includes a body of water over which there are air currents and a focused light source adapted to be manually directed, the improvement comprising a miniature sailboat provided with a buoyant hull, a sail, a mast to which said sail is attached, means movably connecting said mast to said hull to enable said mast and sail to move to selected positions, and a rudder pivoted to said hull, photosensitive means including a photocell arranged to energize an electric motor, and the motor being mechanically connected with said rudder to pivot said rudder and thereby hydrodynamically control the sailboat as it is propelled by the air currents impinging on the sail, said photosensitive means responding to the manually directed focused light, means to exercise aerodynamic control over the course of the boat by adjusting said mast, the last-mentioned means including a second motor drivingly connected to said mast, and a photocell electrically connected with said second motor to actuate the second motor.

2. In a sailing game set which includes a body of water, a manually directed light source, a sailboat having a hull, a mast pivoted to said hull, a sail attached to said mast, a blower to provide artificially induced air currents across the surface of the water thereby simulating a prevailing wind scaled to the size of the sailboat, said sailboat including means responsive to the remote manually directed light source for steering the sailboat in a manner to simulate skills used in full scale sailing by requiring the sailboat to present its sail in different selected relationships to the artificially induced air currents, said steering means including a rudder, an electric motor having an armature to which said rudder is physically connected in a manner such that said rudder is turned by the movement of said armature, a photocell responsive to impingement of light from said manually directed light source to provide an electrical current, said photocell being mounted on said sailboat to receive said light, and an electrical conductor connecting said photocell to said motor to energize the motor.

3. The subject matter of claim 2 and a second motor and a second photocell connected operatively to the second motor to energize the second motor in response to light impinging upon the second photocell, and mechanical means connecting the mast of the sailboat to the second motor so that the position of the mast and its connected sail is adjusted as a function of the actuation of the second motor, thereby placing the sailboat under remote control by means of the rudder and also by means of positive adjustment of the sail in cooperation with the direction and intensity of the artificially induced wind.

4. The subject matter of claim 3 wherein said first mentioned and second photocells respond to different color light sources thereby enabling the control of the rudder and of the sail to be maintained separate by the use of two light sources rich in the respective colors.

References Cited by the Examiner

UNITED STATES PATENTS

1,616,948	2/1927	Boucher	46—93
1,981,908	11/1934	Dugan	46—93
2,364,233	12/1944	Morey	46—93
2,838,876	6/1958	Smith	46—244

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