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POWER-PROPELLED BOAT.

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This invention relates to boats and water-craft that may be propelled in water, especially toy boats, and has reference particularly to simplified means for propelling them.

An object of the invention is to provide a power-propelling means of such simple construction as to permit operation and control thereof by the unskilled and not require machinery that might be a source of trouble and cost for repairs.

Another object is to provide an improved and inexpensive toy boat, and especially propelling means therefor, of such construction as to be adapted to be safely operated by children, and which may be educational, attractive and amusing.

A further object is to provide simple and inexpensive means for the propulsion of boats in water which shall include a vibratory boiler requiring water for operation and designed to be automatically supplied with water in operation, to relieve the operator of trouble incidental to supplying the requirements.

A still further object is to provide a very simple and inexpensive toy boat that may be retailed at low cost, and which in operation shall imitate the sounds produced by the explosions in internal combustion engines, especially when discharging in water, and which may be inexpensively operated and not liable to become deranged or require repairs, but which shall be durable and economical in use.

With the above-mentioned and other objects in view, the invention consists in certain novel propelling apparatus having an improved conduit arranged in a novel manner for expelling or receiving water, and a novel boiler adapted to operate to cause alternate in-flow and out-flow of water whereby to force a boat forward in water; and, the invention consists also further in the parts and combinations and arrangements of parts as hereinafter particularly described and further set forth in the claims appended hereto.

Referring to the drawings,—Figure 1 is a side elevation of a boat constructed substantially in accordance with the invention and provided with the novel propelling means; Fig. 2 is a longitudinal vertical sectional elevation of the boat and propelling apparatus; Fig. 3 is a top plan of the boat partially broken away; Fig. 4 is a trans-

verse sectional elevation approximately on the line IV—IV on Fig. 2; Fig. 5 is a vertical longitudinal central section of a boiler of preferred type adapted for carrying out the objects of the invention; Fig. 6 is a transverse section on the line VI—VI on Fig. 5; and Fig. 7 is a transverse section of a heater and fuel for heating the boiler, the plane of the section corresponding approximately to the line IV—IV on Fig. 2.

In the various figures of the drawings similar reference characters indicate corresponding elements or features of construction herein referred to particularly in the detail description following.

The construction, application, and the mode of operation of the invention is, for the purpose of disclosure of the invention, shown as it relates to a boat which may be of small size as a toy, the boat illustrated in this case including a hull comprising bottom portions 1 and 2 composed of thin sheet metal having median portions pressed out to form sides 3 and 4 and a bottom of a hollow keel, the hull comprising also upper side portions 6 and 7, a bow 8 and a stern 9. The rear end of the keel is closed and a rudder 10 is connected thereto, the rudder preferably being composed of bend-able sheet metal, so that it may be set to guide the boat in either a straight course or a circle. The upper portion of the hull preferably has a band or belt 11 struck up to laterally stiffen the top of the hull and improve the appearance thereof.

A deck is separately made of sheet metal and comprises a main and forward arch portion 12 and a flat or nearly flat stern portion 13, there being an opening or hatchway between said two portions, the metal at the edge of the opening being turned inward to form a frame 15. The marginal portion of the deck is fitted to the top edge of the hull and has a flange 16 thereon that extends downward over the upper portion of the hull. The rearward end of the deck portion 12 has a stiffening flange 17 integral therewith. The deck may be secured to the hull by various means, preferably a suitable number of fingers 18 integral with the upper edge of the hull that are received in slots 19 in the deck and bent upon the top of the deck. Preferably the forward portion of the deck has a longitudinal slot therein for ventilation and to permit sounds to pass through the deck.

The propelling means or "engine" as preferably constructed comprises a conduit which may consist of a metal pipe or tube 21 that is arranged in the hollow keel and has an upwardly extending terminal portion 22 beyond the end of the keel, the forward end of the tube having a stand-pipe 23 integrally connected therewith and extending upward a suitable distance in the hull, the upper end of the stand-pipe having a true bore slightly tapered. A novel boiler is provided which comprises a substantially flat bottom 24 and a low side wall 25 thereon having a ledge 25' at its top upon which a suitable gasket 26 is arranged. The body portion of the boiler preferably is composed of stamped sheet metal, and a separate thinner sheet metal top plate 27 is arranged upon the gasket and secured in place by means of a flange 28 formed of the side wall metal turned over tightly upon the plate, this mode of fastening being preferable to soldering the plate to the ledge. The plate 27 is composed of thin sheet metal, so as to operate somewhat like a diaphragm, and to improve its qualification for vibratory action the central portion is gently beaten on its inner side to slightly expand the metal and cause a bulge portion 29 which is scarcely perceptible to the eye yet causes the metal to spring outwardly after having been pressed or drawn inwardly. The interior of the boiler preferably has a stop device to limit the inward movement of the top plate 27, especially when roughly handled, and the device may be cheaply made by pressing up a portion of the bottom 24 to form a hollow rib 30 under the middle portion of the top plate. A nipple 31 is tightly secured in the bottom 24 and is removably inserted in the stand-pipe 23, permitting the boiler to be turned slightly towards either side of the boat to balance the boat in case it is so desired, or to list the boat if desired.

A suitable heater is provided which requires a holder on the bottom of the hull, and in the present case the holder is composed of sheet metal stamped out of the deck when making the opening 14, so that a base plate 32 is provided which is arranged back of the stand-pipe 23 and soldered or otherwise secured upon the pipe 21, the base plate having upstanding side guides 33 and 34 and an end stop 35. A reservoir or fuel holder is provided which comprises a bottom 36 and a side wall 37 thereon, and a top plate 38 upon the wall and having an aperture 39 therein from which a flame or heat may escape below the boiler for heating water therein. A figure 40 is secured to the top plate 38 to constitute a handle for the heater and preferably represents a human operator of the boat.

In the present case a block or piece of

non-liquid or solid fuel 41 is arranged in the fuel holder which when ignited will slowly burn and supply the required heat, but obviously the heat may be produced from other forms of fuel if desired.

In the factory it is customary to supply the boiler with water which is retained therein by placing a stopper in the conduit terminal portion 22 to be removed after placing the boat in water for operation.

In practical use, the boiler being filled with water and heat produced under the boiler, the water in the boiler becomes heated and produces steam which is forced into the standpipe 23 and into contact with cold water therein and in the pipe 21. The steam on coming into contact with the cold water rapidly condenses, thus causing vacuum in the boiler and conduit with the result that water is drawn in and meets the hot water in the boiler in which reaction occurs, so that while partial vacuum exists the heated water expands and drives out the water from the pipe or conduit, being followed by hot vapor or steam which condenses when coming into contact with the cold water as before. The complete cycle is repeated indefinitely until the heat becomes exhausted. The water in which the boat is floating is drawn from all angles slowly into the terminal portion 22 of the conduit so as to not affect the movement of the boat, but the charge of water is forcibly expelled in solid stream into the body of water, which forces the boat forward. During the operations the pulsations cause the boiler top to vibrate, as a diaphragm, producing the desired sounds similar to the exhaust of steam from an engine or exhaust from an explosion engine, and the intermittent discharges from the terminal portion 22 of the conduit suggest the exhaust of explosion engines when discharging in water. When it is desired to discontinue operations a stopper is to be placed in the conduit while under water, to retain water in the conduit and the boiler ready for subsequent operation.

What is claimed as new is:

1. A power-propelled boat having a pipe secured thereto and extending upward therein and also rearwardly and out of the boat, and a boiler connected at one end adjustably to and solely supported by the higher portion of the pipe, to permit lateral movement of the opposite end of the boiler, the boiler being provided with a heater.

2. A power-propelled boat having a shallow boiler therein comprising a water-holding pan and a vibratory top plate, the pan having a stop rib therein below the top plate, and a pipe connected to the pan part of the boiler adjacent to one end thereof and extending under the boiler rearwardly and out of the boat, with means to heat the pan part of the boiler.

3. A power-propelled boat having a pipe fixedly secured thereto and extending upward therein and also rearwardly and out of the boat, and a vibratory boiler having a nipple at one end thereof connected to the higher portion of the pipe, permitting lateral adjustment of the body of the boiler in the boat, the boiler being provided with a heater.

4. A power-propelled boat including a hull provided therein with a fixed stand-pipe having an open top, a boiler provided with a nipple fixed thereto at one end thereof and tightly connected detachably and adjustably to the top of the stand-pipe and therewith bodily supporting the boiler, to permit lateral adjustment of the body of the boiler; a heater in the hull below the boiler, and a pipe connected with the lower portion of the stand-pipe and extending rearwardly along the bottom of the hull and out beyond the hull.

5. A power-propelled boat including a hull having a hollow keel, a pipe secured in the keel and extending out of the stern end thereof and thence slightly upwardly, the pipe having a stand-pipe connected therewith that extends upward in the hull, a boiler having a nipple secured to the bottom thereof and having also a vibratory top, the nipple being tightly inserted in the top of the stand-pipe and therewith supporting the boiler, and a laterally flexible rudder blade secured to the stern end of the keel above the pipe.

6. In a toy boat, the combination of a hull having a hollow keel integral with the hull, a tube fixedly secured in the keel and extending rearward and having an open end, a stand-pipe fixedly connected to the forward portion of the tube, and a vibratory boiler arranged in the hull and provided

with a supporting nipple having connection with the stand-pipe to permit shifting of the boiler laterally.

7. In a toy boat, the combination of a hull having a hollow keel integral with the hull, a pipe fixedly secured in the keel and extending rearward and out of the keel and also upward in the hull, a vibratory boiler arranged in the hull and having rotatively adjustable connection at its forward end with the higher portion of the pipe, to permit lateral shifting of the boiler and a base plate arranged upon the bottom of the hull and covering portions of the keel and the pipe to support and guide a heater below the boiler.

8. In a toy boat, the combination of a metal hull and a hollow keel integrally connected to the bottom of the hull, the top of the hull having fingers integral therewith, a metal deck part seated upon the hull and having a flange embracing the upper portion of the hull and having also slots receiving said fingers, the fingers being bent over upon said deck part, said deck part having an arched portion and a hatchway behind the arched portion to receive a portable heater device, a vibratory steam-boiler arranged below the arched portion of the deck part, a conduit connected with the steam-boiler and extending downward into and rearward through the hollow keel, a flexible rudder blade secured to the rear end of the keel, and a heater device removably arranged upon the bottom of the hull below the steam-boiler and provided with a handle representing a human operator that extends upward through said hatchway.

In testimony whereof, we affix our signatures on the 21st day of June 1924.

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