

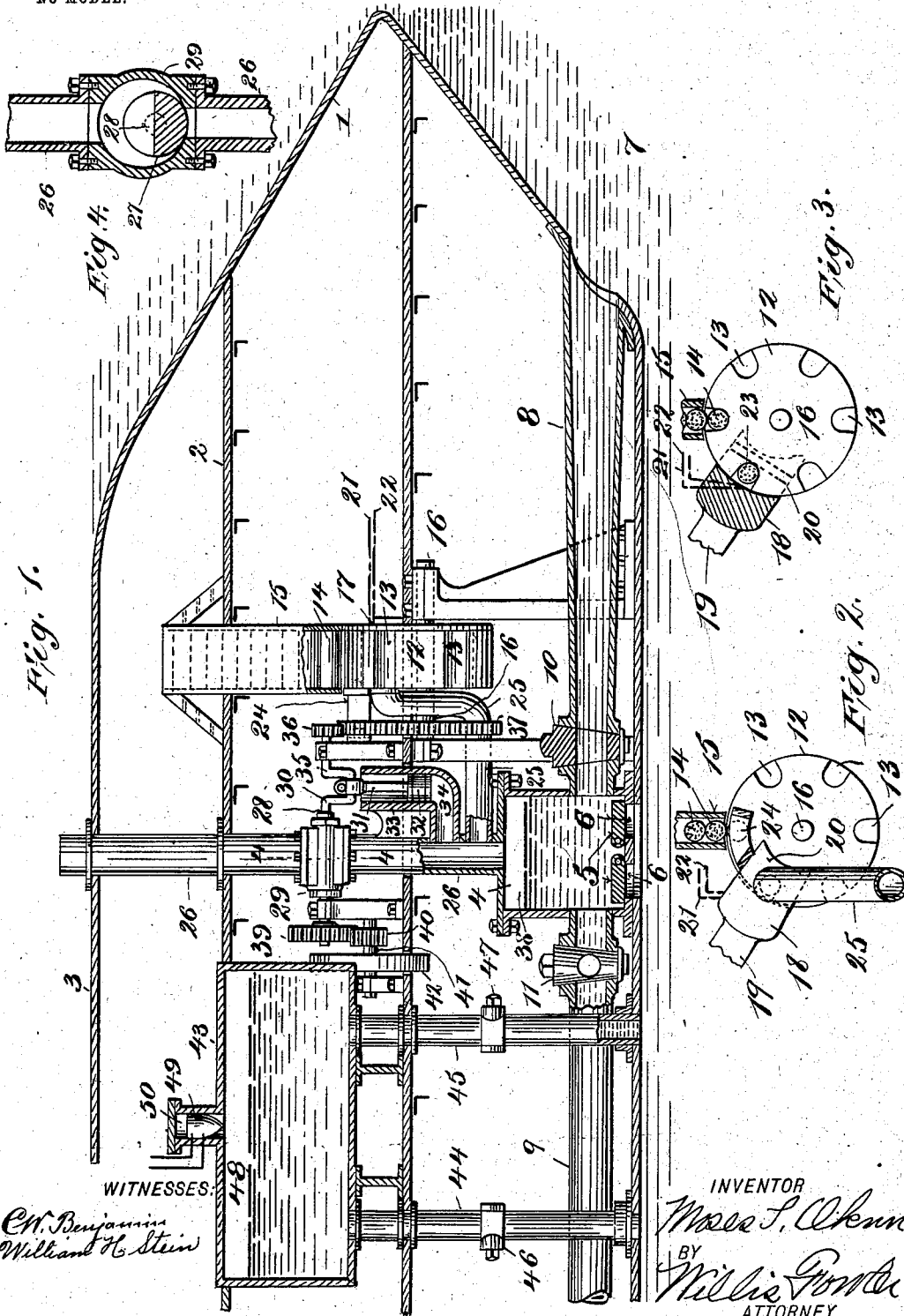
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M. S. OKUN.
MEANS FOR PROPELLING BOATS.

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NO MODEL.



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MEANS FOR PROPELLING BOATS.

SPECIFICATION forming part of Letters Patent No. 730,042, dated June 2, 1903.

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To all whom it may concern:

Be it known that I, MOSES S. OKUN, a citizen of the United States, residing in the borough of Manhattan, New York city, county and State of New York, have invented certain new and useful Improvements in Means for Propelling Boats, of which the following is such a full, clear, and exact description as will enable any one skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to apparatus for propelling boats, particularly of the submarine class; and the principal objects of the invention are to provide a simple and efficient motive power the material and mechanism for producing which will occupy comparatively little space in the vessel and at the same time will give the vessel a large traveling radius.

Other objects of the invention are to provide novel means for propelling the boat and to readily reverse its direction of movement, and also to provide means for sinking the boat and submerging it in the water to conceal it and for raising it in the water when it is desired.

To these ends my invention consists in the various novel and peculiar arrangements and combinations of the several parts of the apparatus, all as hereinafter fully described, and then pointed out in the claims.

I have illustrated a type of my invention in the accompanying drawings, wherein—

Figure 1 is a longitudinal vertical section of one end of a submarine boat embodying my improvements. A sufficient portion of the boat is shown to illustrate the application of my improvements, the hull of the boat being constructed substantially alike at each end in order that it may be propelled in one direction or the other without turning the boat around. Fig. 2 is a side view of the explosive charging and exploding device, shown as detached. Fig. 3 is a vertical sectional view of the same. Fig. 4 is an enlarged central vertical sectional view of the exhaust and its valve, the plane of the section being on line 4 4, Fig. 1.

Referring to the drawings, in which like numbers of reference designate like parts throughout, 1 indicates the hull of the boat, the

upper deck 2 of which is completely inclosed and housed by the covering 3, which at all points is made water-tight the same as the hull of the boat. Within the boat is an expansion-chamber 4, which is made of a suitable size and shape and is provided at its lower end with inwardly-opening valves 5, each of which controls a water-induction port 6, through which the exterior water 7, in which the boat moves, is admitted under certain conditions to the expansion-chamber. From the expansion-chamber 4 extends in opposite directions ejection-tubes 8 and 9, which open at the respective ends of the boat, so as to connect freely with the exterior water. These tubes gradually enlarge in cross-section as they approach their outer ends and are provided with a cock 10 and 11, respectively, for opening or closing such tubes, according to whether the tube is to be used or not. The tube 9 is shown as being out of use, as the cock 11 is closed, while the tube 8 is open and in communication with the expansion-chamber 4 and the exterior water 7.

The revolving cartridge cylinder or carrier 12 has suitably-shaped peripheral recesses or chambers 13 for receiving the cartridges 14, which are fed from a magazine 15 to the chambers as the cylinder is rotated by its shaft 16 in a manner hereinafter described. The cartridge-cylinder 12 is shown as having six cartridge-chambers 13 arranged at equidistant points on the periphery of the cylinder, against the outer end of which is placed a fixed plate 17, while at a suitable point is fixed rigidly a thick abutment 18, which is mounted in place upon the stationary arm 19 and has its inner face curved to conform to the curvature of the periphery of the cylinder, and from each side of this plate 18 projects a plate 20, which fits closely against the sides of the cylinder 12 in order that the abutment with its side plates may serve to close each open chamber 13 as the same comes under this part and at which time the cartridge is exploded in the chamber by means of a suitable electric exploding device having a circuit 21 22 connecting it with the electric battery at a suitable point. In order to prevent the cartridge from moving out of the end of the chamber 13 as it is passed from beneath the magazine 15 to the

exploding device 23, a guard-piece 24 is secured in position, as shown in Fig. 2.

From a suitable point on the side plate 20 of the part 18 there extends a pipe 25, which leads to the pipe 26, which opens into the top of the expansion-chamber 4, so that at the time a cartridge is exploded in this chamber the end of such chamber is in free communication with the pipe 26, and thus with the expansion-chamber, through means of the connecting-pipe 25. The pipe 26, through which the expanding gases are supplied to the chamber 4, is extended upwardly through the vessel and at a point some little distance above the housing 3, and it may at its upper end be provided with a telescopic section, the idea being to always have the pipe 26 in free communication with the exterior air. This pipe 26 is provided with an exhaust-valve 27, which consists in a half of a cylinder mounted upon a shaft 28 eccentrically in a cylindrical valve-chamber 29, which is of considerably greater diameter than the diameter of the cylinder of which the valve 27 constitutes a part. This valve is adjusted and mounted so that the periphery of the same seats itself across the bore of the pipe 26, as shown in Fig. 4, and serves to keep the pipe closed during one-half of each revolution of the valve 27. The valve 27 is rotated by the shaft 28, which is provided with a crank 30, to which is connected the upper end of a piston-rod 31, carried by a piston 32, which works in a vertical cylinder 33, the upper end of which is open, while the lower end is connected by a pipe 34 with the main pipe 26, which leads into the top of the expansion-chamber 4. The valve-shaft 28 is continued beyond the crank 30 as shaft 35 and carries a fixed pinion 36, which meshes with a gear-wheel 37, fixed upon the shaft 16 of the cartridge-cylinder 12.

It will now be understood that with the various parts so adjusted as to close the exhaust 26 by the valve 27 each time a cartridge 14 is exploded the gases from the exploded charge pass by way of the pipe 25 through the pipe 26 into the top of the expansion-chamber 4, which is almost entirely filled with a body of water 38. The exhaust at this time being closed, the explosive force of the gases are exerted upon the surface of the body of water 38, and the latter is therefore forced with great power from the chamber 4 and expelled through the ejection-tube 8 into the body of water 7, against which the jet of water thus expelled acts to force the boat ahead in the direction opposite to that in which the stream of water is ejected. At about the same time the expanding gases drive the body of water 8 from the expansion-chamber 4. Such gases also act upon the piston 32 in the cylinder 33 and force the same upwardly, thereby rotating the shaft 28 of the valve 27 and gradually opening the valve, at the same time rotating the cartridge-cylinder 12 through means of the

shaft 35, pinion 36, gear-wheel 37, and shaft 16, serving to bring a new cartridge from the magazine into position to be exploded and expelling the old cartridge from beneath the exploding device. As soon as the exhaust-valve 27 is open the expanding gases escape from the chamber 4 by way of the pipe 26 into the exterior air, and the pressure being thus relieved from the expansion-chamber 4 the exterior water opens automatically both of the valves 5 and rushing up through the ports 6 again substantially fills the chamber 4. When this is accomplished, the rotation of the valve-shaft 28 has caused the exhaust-valve 27 to be closed and the exploding device to be actuated, and the operation just described is again repeated, and by a succession of such operations the boat is propelled through the water, either when it is floating upon the surface thereof or when it is completely submerged. The refilling of the expansion-chamber 4 with the water is effected by the direct communication through the ports 6 in the bottom thereof in order to give the external water as direct an introduction as possible, and thereby cause the tank to be filled rapidly.

The boat may be reversed in its direction of movement by closing the cock 10 and opening 11, whereupon the water will be ejected from the tube 9 instead of 8 and the boat will be caused to travel in the opposite direction.

The valve-shaft 28 upon the other end thereof is provided with a gear-wheel 39, which drives a pinion 40, fixed on a shaft 41, upon which is made fast a fly-wheel 42, and this serves to give a smoother operation to the apparatus, which when put in motion by the explosion of the first cartridge automatically continues its motion so long as the cartridges are fed to the cylinder 12.

The boat is lowered in the water and submerged by filling the submerging-tank 43 with water through the pipes 44 and 45, provided with cocks 46 and 47, respectively, and connecting through the bottom of the boat with the exterior water 7. By opening the cocks 46 and 47 and at the same time permitting the air to escape from the tank 43 the water will gradually pass up through the pipes 44 and 45 and fill the tank, as shown at 48. The tank is of such capacity that sufficient water may be taken therein for its weight to sink and completely submerge the boat. The boat may be submerged to a greater or less degree, depending upon the amount of water taken into the tank. The boat is raised in the water by expelling the water 48 from the tank 43, and this is done by exploding in the upper part of the tank a cartridge 49 in a chamber 50, so that the expansion of the gases of explosion will drive the water 48 from the tank through the pipes 44 and 45 and into the exterior water, and after this occurs the cocks 46 and 47 are closed. The boat being thus gradually relieved of the weight of the body of water 48

is caused to rise in the water in which it moves and will remain afloat so long as the water is shut out from the tank 43.

It will be noted that the apparatus which I have herewith set forth is of a very compact form, occupying a comparatively small space, and is also of a comparatively light weight, and it is, moreover, of a simple construction. In addition to the advantages arising from these features of the invention it also has the important advantage of not consuming any of the oxygen of the air contained within the boat, and, furthermore, there is no tendency to discharge impure air from the apparatus into the air contained in the vessel.

I wish to be understood as not limiting my invention to the particular forms of construction of the various parts thereof as herewith set forth, as it is evident that different changes may be made in the various parts of the apparatus without, however, departing from the spirit of the invention.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination of a boat, propelling mechanism comprising an expansion-chamber, means for supplying water to said chamber, an ejection-tube leading from said chamber to the exterior of the boat and through which the water is ejected into the body of water in which the boat moves, a device for periodically exploding a charge of explosive material, and means for introducing the gases from such charge when exploded to said expansion-chamber to forcibly expel the water therefrom and through said ejection-tube, substantially as and for the purpose set forth.

2. The combination of a boat, propelling mechanism comprising an expansion-chamber, means for supplying water to said chamber, an ejection-tube leading from said chamber to the exterior of the boat and through which the water is ejected into the body of water in which the boat moves, a device for periodically exploding a charge of explosive material, and means for introducing the gases from such charge when exploded to said expansion-chamber to forcibly expel the water therefrom and through said ejection-tube, the said expansion-chamber being provided with an exhaust which communicates with the exterior air, and mechanism for opening said exhaust after each expulsion of the water from the expansion-chamber to permit the recharging of said chamber with water, substantially as and for the purpose set forth.

3. The combination of a boat, propelling mechanism comprising an expansion-chamber, means for supplying water to said chamber, an ejection-tube leading from said chamber to the exterior of the boat and through which the water is ejected into the body of water in which the boat moves, a device for periodically exploding a charge of explosive material, and means for introducing the gases

from such charge when exploded to said expansion-chamber to forcibly expel the water therefrom and through said ejection-tube, the said expansion-chamber having an exhaust communicating with the exterior air and provided with a valve, mechanism for opening said exhaust-valve after each expulsion of the water from the expansion-chamber and said mechanism being operated by the pressure of the gas in said expansion-chamber, substantially as and for the purpose set forth.

4. The combination of a boat, propelling mechanism comprising an expansion-chamber, means for supplying water to said chamber, an ejection-tube leading from said chamber to the exterior of the boat and through which the water is ejected into the body of water in which the boat moves, a device for periodically exploding a charge of explosive material, and means for introducing the gases from such charge when exploded to said expansion-chamber to forcibly expel the water therefrom and through said ejection-tube, the said expansion-chamber having an exhaust communicating with the exterior air and provided with a valve, mechanism for opening said exhaust-valve after each expulsion of the water from the expansion-chamber and said mechanism being operated by the pressure of gas in said expansion-chamber, substantially as and for the purpose set forth.

5. The combination of a boat, propelling mechanism comprising an expansion-chamber, means for supplying water to said chamber, an ejection-tube leading from said chamber to the exterior of the boat and through which the water is ejected into the body of water in which the boat moves, a device for periodically exploding a charge of explosive material, and means for introducing the gases from such charge when exploded to said expansion-chamber to forcibly expel the water therefrom and through said ejection-tube, the said expansion-chamber having an exhaust communicating with the exterior air and provided with a valve, a cylinder communicating with said expansion-chamber and provided with a piston connected with and controlling said exhaust-valve, whereby after each expulsion of the water from the expansion-chamber the gas in said chamber acts upon said piston to open the exhaust-valve, substantially as and for the purpose set forth.

6. The combination of a boat, propelling mechanism comprising an expansion-chamber, means for supplying water to said chamber, an ejection-tube leading from said chamber to the exterior of the boat and through which the water is ejected into the body of water in which the boat moves, a device for periodically exploding a charge of explosive material, and means for introducing the gases from such charge when exploded to said expansion-chamber to forcibly expel the water therefrom and through said ejection-tube,

mechanism for recharging said exploding device and said mechanism being actuated for recharging by the expansion of gas in the expansion-chamber, substantially as and for the purpose set forth.

7. The combination of a boat, propelling mechanism comprising an expansion-chamber, means for supplying water to said chamber, an ejection-tube leading from said chamber to the exterior of the boat and through which the water is ejected into the body of water in which the boat moves, a device for periodically exploding a charge of explosive material, and means for introducing the gases from such charge when exploded to said expansion-chamber to forcibly expel the water therefrom and through said ejection-tube, the said expansion-chamber having an exhaust communicating with the outer air and provided with a valve, mechanism for simultaneously opening the exhaust-valve and recharging said exploding device, said mechanism being actuated by the expansion of gas in the expansion-chamber, substantially as and for the purpose set forth.

8. The combination of a boat, propelling mechanism comprising a water-receiving chamber provided with means for automatically supplying thereto the water after each expulsion of the water therefrom, an ejection-tube leading from said chamber and connecting with the exterior water in which the boat moves and gradually enlarging in diameter toward its outer end, and means for expelling the water from said chamber through the ejection-tube substantially as and for the purpose set forth.

9. The combination of a boat, propelling mechanism comprising an expansion-chamber, means for supplying water to said chamber, an ejection-tube leading from said chamber to the exterior of the boat and through which the water is ejected into the body of water in which the boat moves, a revolving cartridge-cylinder provided with suitable cartridge-chambers, a magazine for supplying cartridges to the chambers in the cylinder as it is revolved, an exploding device for exploding the cartridge at a suitable point in the revolution of the cartridge-cylinder, pipe connections for conveying the gases of explosion from the point where the cartridge is exploded to the upper part of said expansion-chamber, an exhaust for said expansion-chamber and a valve controlling the same, and connections between said valve and the cartridge-cylinder whereby the exhaust-valve is closed at a time a cartridge is exploded, substantially as and for the purpose set forth.

10. The combination of a boat, propelling mechanism comprising an expansion-chamber, means for supplying water to said chamber, an ejection-tube leading from said cham-

ber to the exterior of the boat and through which the water is ejected into the body of water in which the boat moves, a revolving cartridge-cylinder provided with suitable cartridge-chambers, a magazine for supplying cartridges to the chambers in the cylinder as it is revolved, an exploding device for exploding the cartridge at a suitable point in the revolution of the cartridge-cylinder, pipe connections for conveying the gases of explosion from the point where the cartridge is exploded to the upper part of said expansion-chamber, an exhaust-valve for said expansion-chamber and a valve controlling the same, a cylinder provided with a piston and having one end thereof in communication with the upper end of said expansion-chamber whereby the expanding gases may act upon said piston, connections between the said piston, the said exhaust-valve and the said cartridge-chamber, whereby the said piston actuates both, substantially as and for the purpose set forth.

11. The combination of a boat, propelling mechanism comprising an expansion-chamber, means for supplying water to said chamber, an ejection-tube leading from said chamber to the exterior of the boat and through which the water is ejected into the body of water in which the boat moves, a device for periodically exploding a charge of explosive material, means for introducing the gases from the exploded charge to said expansion-chamber to expel the water therefrom through the ejection-tube, the said device for exploding a charge being operated by the gases from the previously-exploded charge, substantially as and for the purpose set forth.

12. The combination of a boat, propelling mechanism comprising an expansion-chamber, means for supplying water to said chamber, an ejection-tube leading from said chamber to the exterior of the boat and through which the water is ejected into the body of water in which the boat moves, a device for periodically exploding a charge of explosive material, and means for introducing the gases from such charge when exploded to said expansion-chamber to forcibly expel the water therefrom and through said ejection-tube, mechanism for recharging said exploding device and said mechanism being actuated for recharging by the expansion of gases in the expansion-chamber, and the new charge exploded by the gases resulting from the previously-exploded charge, substantially as and for the purpose set forth.

In testimony whereof I have hereunto set my hand in the presence of the two subscribing witnesses.

MOSES S. OKUN.

Witnesses:

WILLIS FOWLER,
WILLIAM H. STEIN.