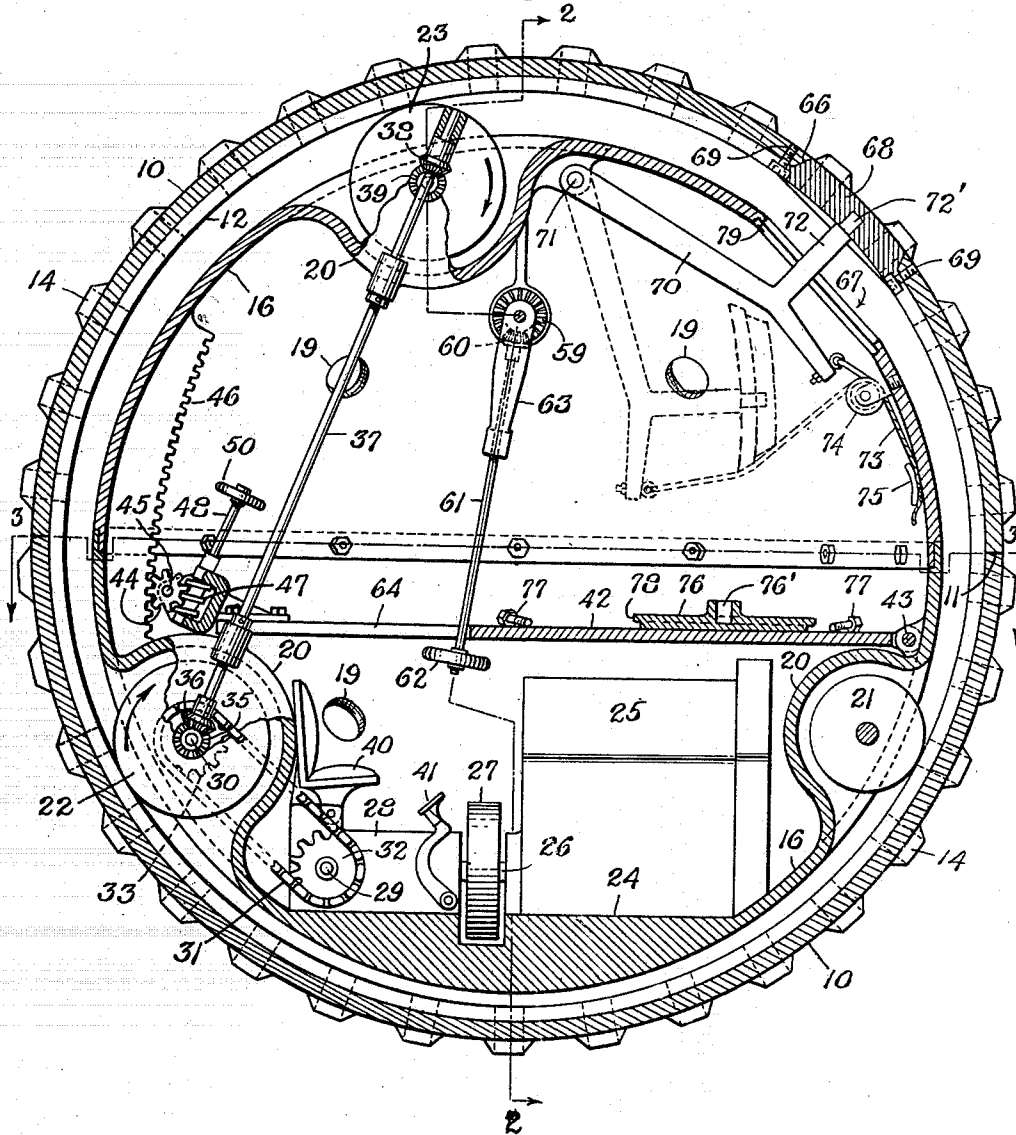


A. J. PARÉ.
ENGINE OF WARFARE.
APPLICATION FILED MAY 1, 1917.

1,265,496.

Patented May 7, 1918.
3 SHEETS—SHEET 1.

Fig. 1.



Inventor:
Anseme J. Paré,
by *Highborn Quincy May*
Attorneys.

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Fig. 2

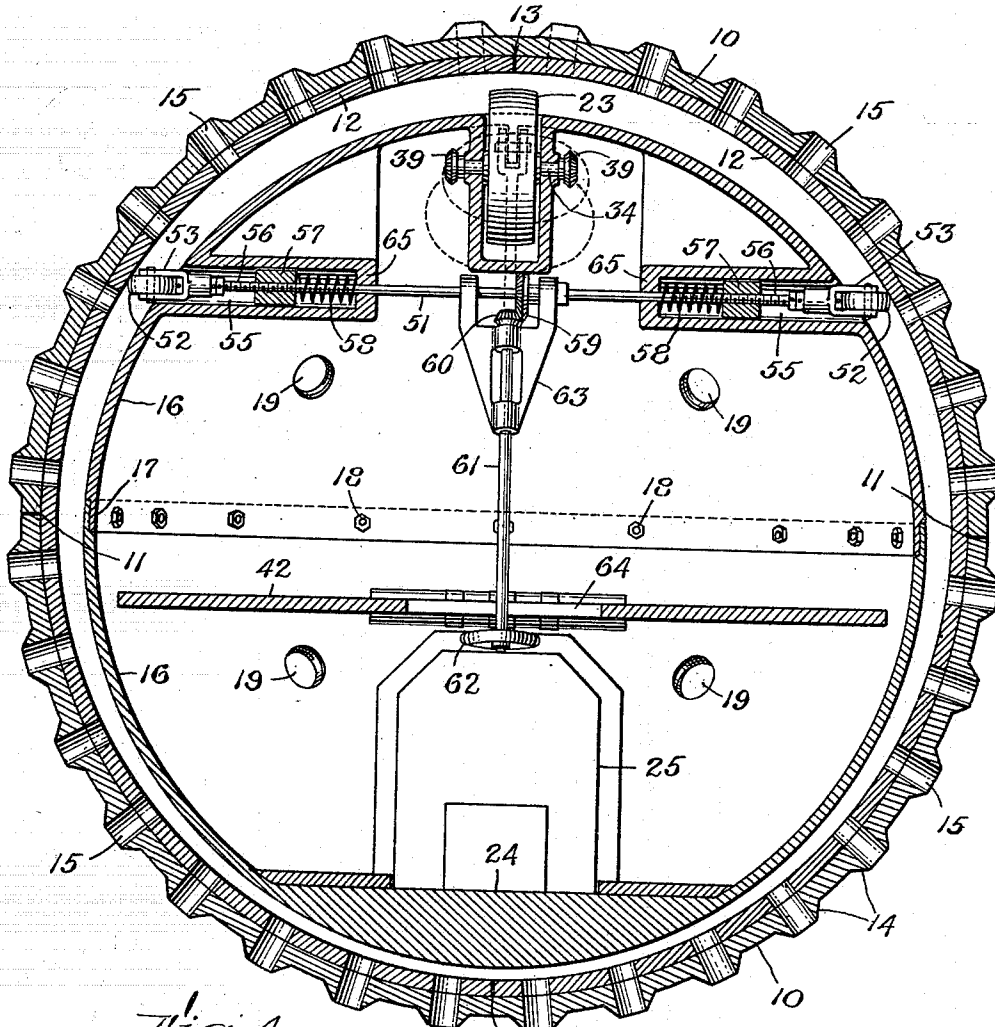


Fig. 4

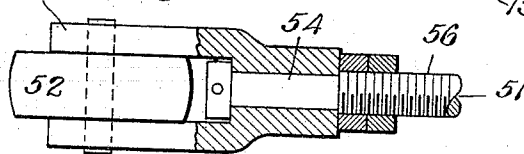
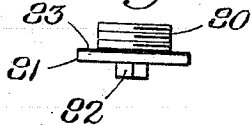


Fig. 5



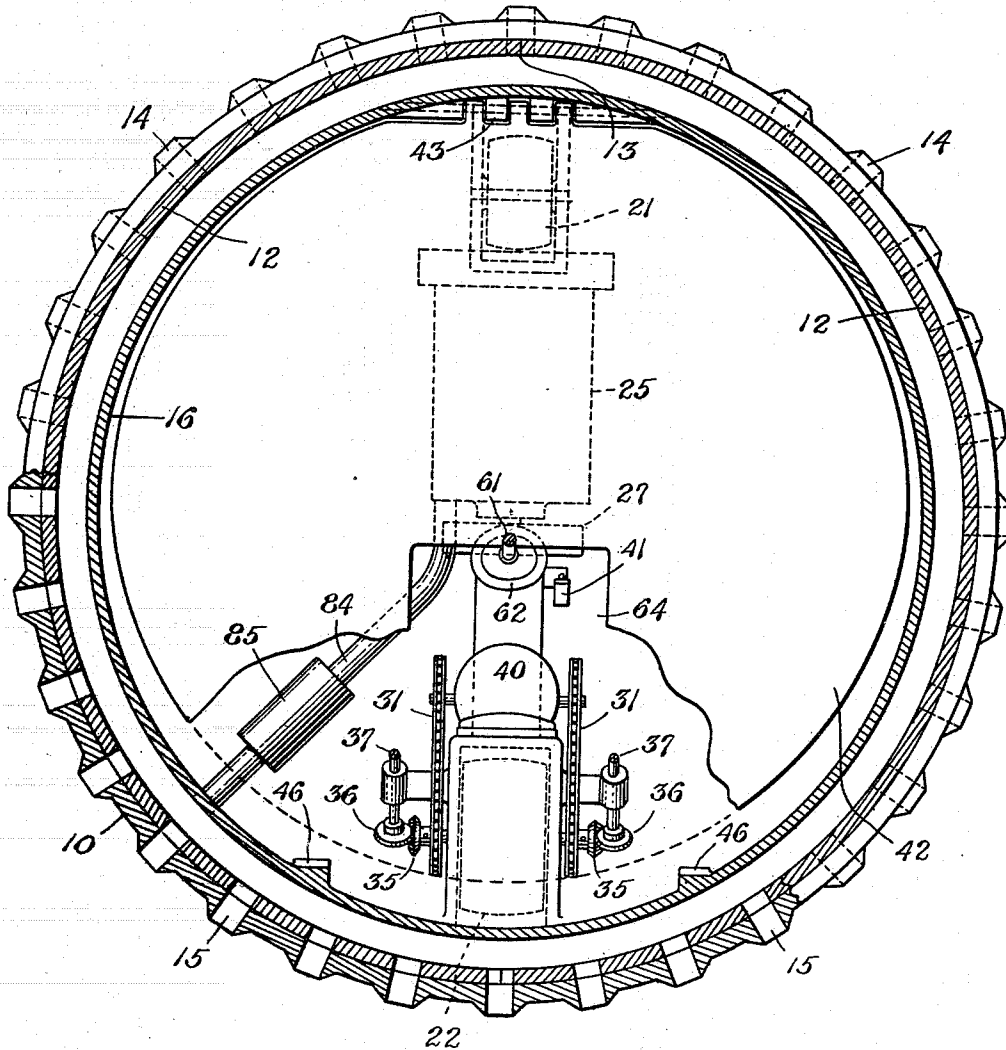
Inventor:
Arsene J. Pare',
by *High Brown Lundy May*
Attorneys.

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3 SHEETS—SHEET 3.

Fig. 3



Inventor:
Arsene J. Paré,
by Hugh Brown Quincy May
Attorneys.

UNITED STATES PATENT OFFICE.

ARSENE J. PARÉ, OF BROCKTON, MASSACHUSETTS.

ENGINE OF WARFARE.

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To all whom it may concern:

Be it known that I, ARSENE J. PARÉ, a citizen of the United States, residing at Brockton, in the county of Plymouth and State of Massachusetts, have invented new and useful Improvements in Engines of Warfare, of which the following is a specification.

The object of the present invention is to provide a self-propelled and armored engine of warfare. The invention is embodied in two spherical metallic shells, one within the other, the inner shell being provided with wheels arranged to roll upon the internal surface of the outer shell, and containing a motor and driving mechanism for driving one or more of said wheels. The load carried by the inner shell is unequally distributed with relation to the center, with the result that the inner shell tends constantly to assume a normal position with the greater part of the load at the bottom, and as the driving wheel or wheels rotate and tend to revolve the inner shell from said normal position the outer shell responds to the tendency of the inner shell to return to said normal position. The outer shell is thus revolved, and the engine is caused to travel forward or backward according to the direction of rotation of the driving wheels.

The invention includes steering mechanism that is arranged to shift the inner shell laterally in relation to the outer shell, the inner shell being substantially smaller than the internal diameter of the outer shell to provide the necessary space for such shifting. As the inner shell is shifted from right to left the load carried by the inner shell causes the outer shell to change its course to the left until the inner shell is shifted back to a median position. On the other hand if the steering mechanism be adjusted to shift the inner shell to the right relatively to the outer shell the latter will traverse a curved path toward the right until the inner shell is shifted back to said median position.

The engine is capable of traveling on land or in water. When traveling on land it may be used for destroying objects such as hydrants, telegraph poles, poles for supporting trolley wires, railway cars, and small frame buildings, by collision. The engine is of such size as to contain a crew of men and

both shells are provided with openings through which projectiles may be fired when the openings of the inner shell are in line with some of the openings of the outer shell.

When it is desired to traverse a body of water as for instance a river or pond the openings of the inner shell may be closed to make the latter watertight.

On the accompanying drawings:

Figure 1 represents a sectional view in a vertical plane of a structure embodying the present invention. The plane of this section may be said to extend fore and aft.

Fig. 2 represents a vertical section through the structure intersected by line 2—2 of Fig. 1 looking forward.

Fig. 3 is a horizontal section through the structure intersected by line 3—3 of Fig. 1.

Fig. 4 is a sectional view of a swivel connection of the steering mechanism.

Fig. 5 is a view of the plugs used for closing the port holes in the inner shell.

The same reference characters indicate the same parts wherever they occur.

The outer spherical shell, as shown, is made of two layers of metal, the outer layer comprising two hemispherical portions 10, 10 that meet in edge-to-edge relation to form a joint at 11. The inner layer of the outer shell comprises two hemispherical sections 12, 12 that meet in edge to edge relation to form a joint at 13. The inner and outer layers are arranged so that the plane of joint 13 is at right angles to the plane of joint 11. When the two layers of the outer shell are bolted one to another they reinforce each other and relieve the joints of any undue strain. Aside from this structural detail the outer shell is to all intents and purposes a spherical unit.

The external surface of the outer shell is provided with knobs or protuberances 14 to avoid slipping on moist ground. The outer shell is provided with a multiplicity of perforations 15 distributed uniformly throughout its periphery, and said perforations, as shown, are coincidental with the protuberances 14. The perforations afford ventilation when the structure is on land, and afford openings or port holes through which projectiles may be fired.

The inner shell is self-leveling and comprises two hemispherical sections 16, 16, the

edges of which are lapped as indicated at 17, and fastened to each other by bolts 18. The external diameter of the inner shell is substantially less than the internal diameter of the outer shell, to permit shifting the inner shell laterally in relation to the outer shell for steering purposes. The inner shell is provided with port holes 19 which afford ventilation when the structure is on land and through which projectiles may be fired when said portholes coincide with some of the many perforations or portholes 15 in the outer shell. The firing of projectiles is possible whenever the structure is standing still, provided one or more of the port holes 19 are in registration with perforations 15.

The inner shell is provided with housings 20 for wheels 21, 22, and 23. In the present instance there are three wheels, two of which are driven by suitable propelling mechanism hereinafter described. The wheel housings 20 are provided with watertight shaft-bearings to prevent water from entering the inner shell. That part of the inner shell that is intended to remain at or near the bottom is made comparatively thick for ballast as indicated at 24, and the internal surface of said portion is made flat to provide a suitable base for a propelling motor 25 and for other elements of the propelling mechanism. The crank shaft of the motor is indicated at 26 and the fly wheel is indicated at 27. A case for transmission gearing is indicated at 28. For present purposes it will not be necessary to show or describe the gearing that is inclosed in the case 28 and it will be sufficient to state that such gearing transmits rotation from motor shaft 26 to a traverse shaft 29. Wheel 22 is affixed to a shaft 30, and the latter is driven by shaft 29 through suitable connections, which in the present instance include two sprocket chains 31, 31. These chains are driven by sprocket wheels such as that indicated at 32 in Fig. 1, and run over sprocket wheels such as that indicated at 33.

Rotation is transmitted from shaft 30 to the shaft 34 upon which wheel 23 is fixed, and for this purpose shaft 30 is provided with bevel gears 35, 35. These gears drive bevel gears 36, 36, the latter being affixed to the lower ends of transmission shafts 37, 37. Bevel gears such as that indicated at 38 in Fig. 1 are affixed to shafts 37 respectively, near the upper ends of the latter, and drive bevel gears 39. The latter gears are affixed to shaft 34.

The weight of the inner shell and of the elements carried thereby is so disposed that said shell tends normally to assume a position in which the propelling motor would be at the bottom, but when the wheels 22 and 23 are driven in the direction indicated by arrows in Fig. 1 the inner shell as a whole would turn in a counter-clockwise di-

rection, thus carrying the heaviest part of the inner shell toward the front, or to the right, according to Fig. 1. The extent of such turning of the inner shell would be determined by the degree of power required to cause the outer shell to roll, the heaviest part of the inner shell being thus maintained in advance of the center of gravity by the driving wheels, which roll upon the internal surface of the outer shell.

A seat for the attendant of the motor 25 is indicated at 40, and a clutch controlling treadle is indicated at 41. A movable platform 42 is mounted above the motor, and its forward portion is supported by a hinge 43. This platform constitutes a floor on which other occupants of the shell may stand while firing projectiles. The rear portion of the platform is supported by pinions such as that indicated at 44, said pinions being affixed to a shaft 45 and arranged to coact with racks 46. A worm 47 carried by a shaft 48 coacts with one of the pinions 44, and shaft 48 is provided with a hand-wheel 50 whereby the pinions may be rotated to traverse the racks 46 in an upward and downward direction to adjust the platform 42 to the desired angle. The functions of the racks and pinions is to adjust the platform approximately to a horizontal plane when the inner shell is tilted from its normal position.

The steering of the structure is accomplished by mechanism that is arranged to shift the inner shell laterally with relation to the outer shell, the latter tending normally to travel a straight course when the load is equally distributed on both sides of the central longitudinal vertical plane, but tending to travel to the right or left of a straight course whenever the greater part of the load is shifted to the right or left of said plane. The lateral position of the inner shell is determined by a rotatable screw-shaft 51 that is carried by the inner shell and arranged to extend transversely. Rollers 52, 52 are mounted in holders 53 and arranged to roll upon the internal surface of the outer shell. The holders are attached to the end portions of shaft 51 by swivel connections as indicated at 54 in Fig. 4, said connections permitting rotation of the shaft relatively to the holders. The holders are prevented from turning by engagement with the walls of sockets 55, 55 formed in the inner shell. The screw-ports 56 of shaft 51 coact with nuts 57, the latter being arranged in the said sockets and being held against rotation by the walls of the sockets. Helical compression springs 58, 58 are arranged to exert their stress in opposite directions against nuts 57, and constitute cushioning means whereby shocks and impacts encountered by the outer shell will be absorbed to relieve the inner shell. The operating mechanism for turning the shaft

51 comprises bevel gears 59 and 60, a shaft 61, and a hand-wheel 62, the latter being arranged within reach of the attendant of the propelling motor 25. Shaft 61 is mounted in suitable bearings provided by a swinging hanger 63 and the latter is hung upon shaft 51. Platform 42 is cut away as indicated at 64 to afford access to the propelling motor and to afford clearance for the steering shaft 61. The springs 58 exert their stress in opposite directions against portions 65 of the inner shell and the lateral position of the latter is determined by the point at which the spring stresses are equal. The pitch direction of the two screw portions 56 is the same, and consequently when shaft 51 is turned in one direction both nuts 57 will be moved toward the right or left as the case may be, and the inner shell will be shifted accordingly. The shaft 51 does not move endwise with relation to the outer shell, but the inner shell moves laterally in relation to said shaft. If the outer shell should run against an obstacle and be deflected laterally, or if a projectile should strike it with sufficient force to move it laterally the shock would be taken up by the springs 58.

The two shells are provided with openings large enough to afford entrance to and exit from the inner shell. Such opening of the outer shell is indicated at 66 in Fig. 1, and the opening of the inner shell is indicated at 67. A closure for opening 66 is indicated at 68, said closure being capable of moving toward the center of the shell, and being fastened in place by bolts 69. When the openings 66 and 67 move into registration with each other as shown by Fig. 1 the closure 68 may be put in place or detached, as the case may be, and for the purpose of handling it I have provided the inner shell with a swinging holder 70. This holder is mounted upon a pivot stud 71 and is provided with a stem 72 that is arranged to project through opening 67 when in use. The closure 68 is formed with a socket on its inner side, to receive the reduced end portion 72' of the stem 72, Fig. 1 showing the holder in solid lines as having been moved to take the closure 68. One end of a rope 73 is attached to holder 70 and the inner shell is provided with a pulley 74 over which the rope may be drawn to swing the holder to the position represented by solid lines. An anchoring device 75 for the rope is affixed to the inner shell at a convenient point, to sustain the holder 70 temporarily.

The element 76 shown as resting on platform 42 is a closure for the opening 67 of the inner shell. This closure is provided with a socket 76' adapted to receive the end portion 72' of the swinging holder. Closure 76 would be held in place by bolts such as those represented at 77.

Assuming that both the closures were fas-

tened to their respective shells, and that the engine as a whole were traveling, the swinging holder 70 would be retracted into the inner shell and lashed to prevent it from swinging and striking the other parts of the structure or the occupants. On the other hand, assuming that the closures were brought into registration with each other, and that it were desired to remove them from their respective openings the holder 70 would be used as follows: An attendant would draw rope 73 toward the anchoring device 75 to move the end portion 72' into the socket 76' of the inner closure. The holder would thus be made available to sustain the closure 76 while unscrewing the bolts 77 to release the closure. Rope 73 would then be paid out to enable the holder to descend with the closure 76 mounted thereon. It would then be necessary to remove closure 76 from the holder in order to use the latter to take the closure 68 from its shell. Opening 67 of the inner shell is sufficiently large to enable closure 68 to pass through it, and both closures may be deposited upon the platform 42.

Closure 76 is provided with a flange 78 that is adapted to be lapped in relation to a flange 79 that defines the opening 67, and suitable soft packing material may be provided to make the joint watertight. The port holes 19 of the inner shell may be made watertight by inserting closures such as that shown by Fig. 5. This closure comprises a screw-plug portion 80, a flange 81, and a polygonal boss 82 adapted to receive a wrench. The port holes 19 are formed with internal screw-threads adapted to coact with the external screw-threads of the plug-portion 80. The flange 81 is adapted to be pressed against the rim of a port hole and the joint may be made watertight by providing a washer or gasket of suitable material. Such washer or gasket is indicated at 83.

By means of the closures for the port holes, and that for the opening 67, the inner shell may be made sufficiently watertight.

The propelling motor represented conventionally at 25 is intended to be a motor of the internal combustion type, and the exhaust pipe therefor is indicated at 84 (Fig. 3). A muffler is indicated conventionally at 85. The outer end of pipe 84 extends through the wall of the inner shell, so that the exhaust gases from the motor will be permitted to escape through the openings 15 of the outer shell and will not foul the air within the inner shell.

I claim:

1. An engine of warfare, comprising two spherical shells, one within the other, the inner shell being self-leveling and having wheels arranged to roll on the internal surface of the outer shell, and being capable of lateral movement relatively to the outer

shell, propelling mechanism carried by the inner shell and arranged to drive one or more of said wheels, and means for shifting the inner shell laterally to steer the course of the outer shell.

2. An engine of warfare, comprising two spherical shells, one within the other, the inner shell having wheels arranged to roll on the internal surface of the outer shell and being capable of lateral movement relatively to the outer shell, propelling mechanism carried by the inner shell and arranged to drive one or more of said wheels, and mechanism carried by the inner shell and arranged to bear against confronting portions of the internal surface of the outer shell to shift said inner shell laterally to steer the course of the outer shell.

3. An engine of warfare, comprising two spherical shells, one within the other, the inner shell having wheels arranged to roll on the internal surface of the outer shell and being capable of lateral movement relatively to the outer shell, propelling mechanism carried by the inner shell and arranged to drive one or more of said wheels, and steering mechanism carried by the inner shell, said steering mechanism including cushioning means and adjusting elements arranged to coact therewith to shift said inner shell laterally in relation to the outer shell, said cushioning means being arranged to absorb shocks sustained by the outer shell.

4. An engine of warfare comprising a spherical shell, propelling mechanism arranged within said shell, said mechanism including wheels arranged to roll on the internal surface of said shell, and means arranged to shift said propelling mechanism laterally to steer the course of said shell.

5. An engine of warfare, comprising two shells, one within the other, the outer shell being spherical and having a multiplicity of perforations distributed uniformly throughout its entire periphery and adapted to serve as portholes, and the inner shell being self-leveling and having portholes adapted to coincide with some of the perforations in the outer shell, the inner shell having wheels arranged to roll on the internal surface of the outer shell, and propelling mechanism in-

closed in said inner shell and arranged to drive one or more of said wheels.

6. An engine of warfare, comprising a spherical shell, a frame within said shell, wheels arranged to roll on the internal surface of said shell, said frame being arranged to be sustained by said wheels, propelling mechanism carried by said frame and arranged to drive one or more of said wheels, a platform carried by said frame and movable relatively thereto, and means arranged to adjust said platform and sustain it at various angles relatively to said frame.

7. An engine of warfare, comprising two shells, one within the other, the outer shell being spherical and having perforations distributed uniformly throughout its periphery and adapted to serve as portholes, the inner shell being self-leveling and having portholes adapted to coincide with some of the perforations in the outer shell, and detachable watertight closures for said portholes, wheels arranged to roll on the internal surface of the outer shell, and propelling mechanism arranged within the inner shell to drive one or more of said wheels, said inner shell being watertight when said closures are in operative position.

8. An engine of warfare, comprising a spherical outer shell having a man hole and a detachable closure therefor, an inner shell within said outer shell, a swinging holder pivoted to the inner shell and engaged with said closure to shift the latter to and from its operative position, said holder being accessible within said shell and said closure being removable inwardly with said holder, said inner shell having wheels arranged to roll on the internal surface of said outer shell, propelling mechanism carried by said inner shell and arranged to drive one or more of said wheels, and hoisting means carried by said inner shell and arranged to lift said holder and move said closure to its operative position, said closure having a socket and said holder being adapted to enter said socket.

In testimony whereof I have affixed my signature.

ARSENE J. PARÉ

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."