C. W. WHITE.

PROJECTILE.

APPLICATION FILED MAR. 20, 1916.

1,226,732.

Patented May 22, 1917.

3 SHEETS—SHEET 1.

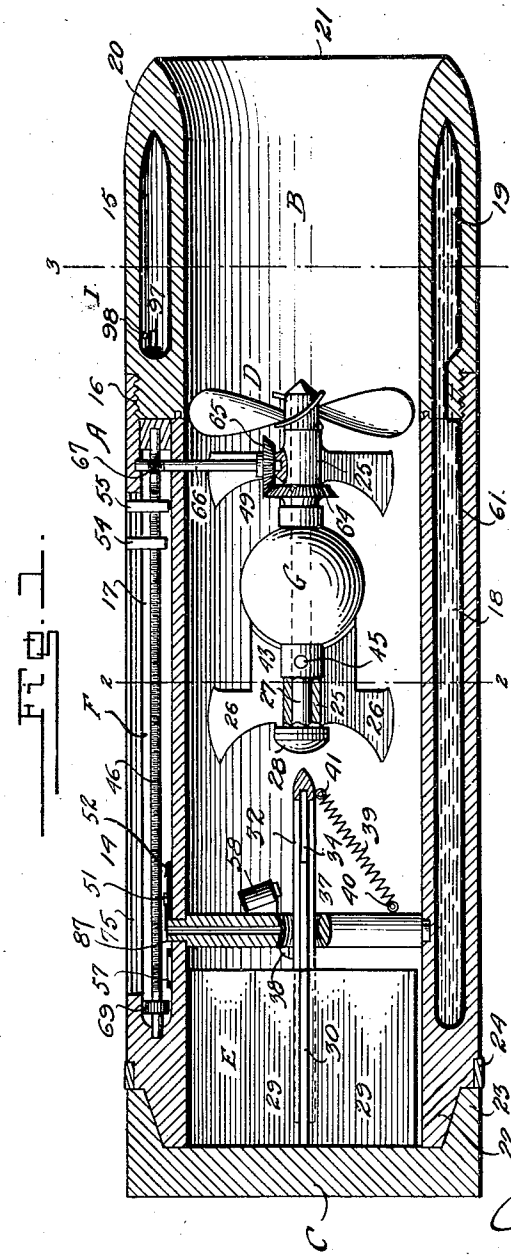


Fig. 1.

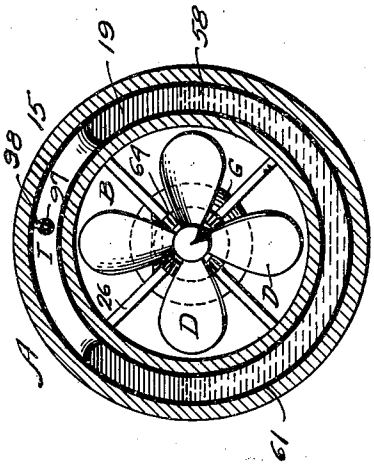


Fig. 3.

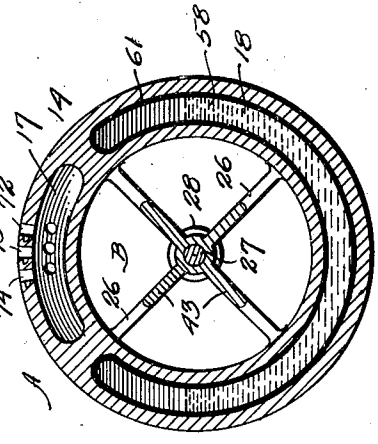


Fig. 2.

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3 SHEETS—SHEET 2.

Fig. 4.

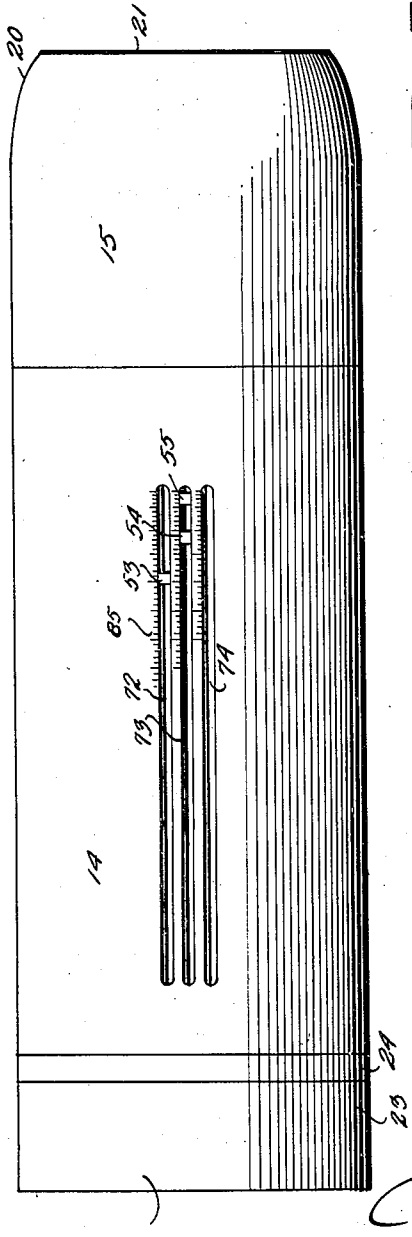


Fig. 6.

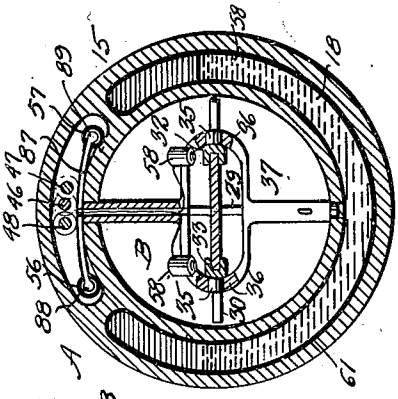
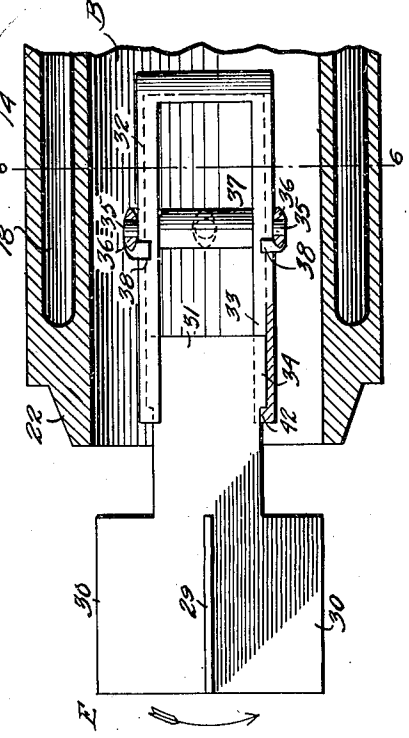


Fig. 5.



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3 SHEETS—SHEET 3.

Fig. 7.

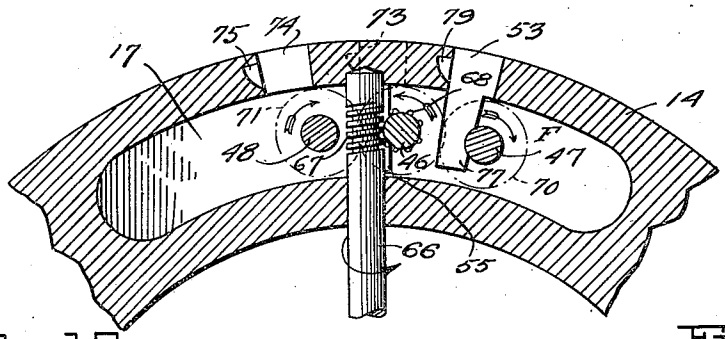


Fig. 10.

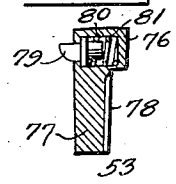


Fig. 8.

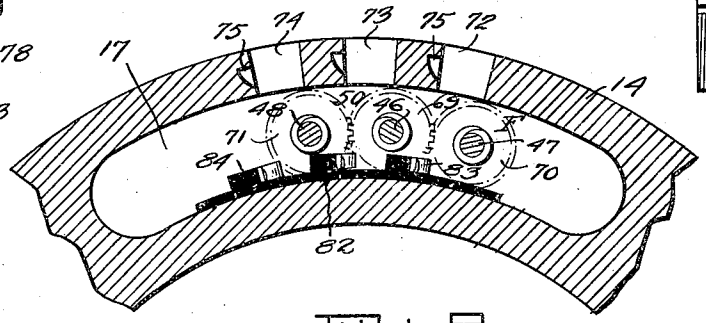


Fig. 11.

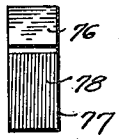


Fig. 9.

Fig. 13.

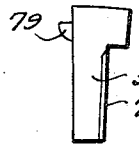


Fig. 12.

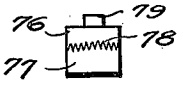


Fig. 14.

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PROJECTILE.

1,226,732. Specification of Letters Patent. Patented May 22, 1917.

Application filed March 20, 1916. Serial No. 85,320.

To all whom it may concern:

Be it known that I, CLARENCE W. WHITE, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Projectiles, of which the following is a specification.

My present invention relates to projectiles used in warfare, and more particularly of that character adapted to explode or emit a death-dealing force during or after flight.

The principal objects of my invention are to provide a projectile which will make ready the explosive or other death-dealing force, during flight; a projectile which can be handled and transported without danger of premature explosion; a projectile which may be set to change its course during flight, enabling the gunner to more effectively "place" the projectile for destructive work; a projectile embodying means by which the charge may be set off after the projectile has traveled a predetermined distance, said means capable of being set at any time before flight without danger of premature explosion; a projectile capable of great destructive work, which is comparatively light in weight and which will travel a greater distance in proportion to the charge used for firing it from the gun or mortar, than projectiles now in common use; and a projectile which will maintain a more uniform course with respect to the axis of the bore of the gun, than do projectiles now in common use.

Another object of my invention is to provide a projectile which may utilize water, H_2O, as explosive, converted to gas by electrolysis.

Other objects of my invention will appear in the following detailed description, taken in connection with the accompanying drawings, forming a part of this specification, and in which drawings:

Figure 1 is a central vertical longitudinal sectional view through a projectile constructed according to my invention.

Fig. 2 is a sectional view on the line 2—2 of Fig. 1.

Fig. 3 is a sectional view on the line 3—3 of Fig. 1.

Fig. 4 is a top plan view of the projectile.

Fig. 5 is a central horizontal sectional view through the rear portion of the projectile, showing the cap removed, and a rudder extended therefrom.

Fig. 6 is a sectional view on the line 6—6 of Fig. 5.

Fig. 7 is an enlarged transverse sectional view through the upper portion of the projectile, showing a form of rudder control mechanism.

Fig. 8 is a similar view showing further details of said mechanism.

Fig. 9 is a plan view associated with Figs. 7 and 8.

Fig. 10 is a longitudinal sectional view through a traveler associated with the means shown in Fig. 7.

Fig. 11 is a side elevation of said traveler.

Fig. 12 is a bottom plan view of the same.

Fig. 13 is an elevation of a traveler, somewhat longer than that shown in Fig. 10.

Fig. 14 is a diagrammatic view of electrical circuits forming a part of my invention.

In the drawings, where similar characters refer to similar parts throughout the several views, A designates a main body portion in the form of a cylindrical shell, the axial way B of which is open at the front to the atmosphere, to permit of the passage of air or other fluid therethrough, and provided with a removable cap C for the rear end. D a fluid-operated wheel, such as a wind-wheel, rotatably mounted in way B; E a rudder; F means for operating said rudder by rotation of said wheel D; G an electric generator operable by wheel D; H means for making ready the charge; and I, means for setting off the charge.

Referring first to the main body portion A, it is preferably built up of elongated portion 14, and forward portion 15, joined together as by screw-threaded engagement, indicated at 16. These sections 14 and 15 form the wall of body A, which wall is hollow. For instance, the sections 14 may be provided with a hollow 17 to accommodate a portion of the means F, hereinbefore mentioned, and a hollow 18 for the charge, or death-dealing force. The hollow 19 of forward portion 15 is open to the hollow 18, so that gas or other explosive material may find its way to the upper portion of said forward sections, about the means I, for setting off the charge. The forward portion of section 15 may be tapered, as at 20, to an edge 21, in the form of a circle, to afford less resistance in passage of the projectile through the air, and tending to direct the air, or other fluid, to pass through way B.

Section 14 may be provided with a reduced portion 22, receiving the flange 23 of cap C, which is removable, and closes the rear end of way B. Flange 23 may abut against the usual copper band 24. It is to be observed that, in the advancing of the projectile from the gun or mortar, the force acts upon cap C, firing the projectile from the gun. As soon as the force imparted to the cap C is overcome by the air pressure in way B, cap C drops from the body portion A, and the air or other fluid is permitted to pass freely through way B.

One of the principal objects of my invention is to embody in connection with a projectile, a fluid-operated wheel such as the wind-wheel D, in one embodiment of my invention, this wheel is revolubly mounted, as by bearings 25, supported by spiders 26 extending from the internal wall of body A, and a shaft 27 on which said wheel D is mounted, said shaft 27 engaging a suitable thrust bearing 28 toward the rear of the projectile. Thus, as fluid, such as air, passes through way B, the wheel D is rapidly revolved, imparting movement to the shaft 27.

At the rear portion of body A, the rudder E is provided, and this rudder may be of any suitable type, in the example shown, embodying upright vanes 29 and horizontal vanes 30, joined to each other at right angles, the vanes 30 extending forwardly, as at 31, beyond the vanes 29. As a part of means F, the rudder E is supported by a suitable U-shaped frame 32, having internally disposed, longitudinally extending grooves 33 into which project extensions 34 on the portion 31 of the rudder. This frame 32 is provided with trunnions 35, resting in bearings 36 of a suitable upright support 37, pivotally carried by the internal walls of body A. Thus, the rudder is permitted to swing laterally, and also to oscillate in a vertical plane about the axis of trunnions 35. The bearings 36 carry suitable stops 38, engaging the frame 32, to the rear of the axis of trunnions 35, limiting the upward movement of the rudder, and a spring 39 is provided, secured to support 37, as at 40, and to the forward end of the frame 32 as at 41, having a tendency to hold the frame 32 in engagement with the stops 38. The frame 32 is provided with suitable abutments 42, at its rear end, and when the cap C drops from the body A the fluid engaging the forward edge of the vanes, forces it rearwardly until the extensions 34 engage the abutments 42 limiting any further rearward movement. The rudder is then positioned exteriorly of, and to the rear of body A where it may effectively act upon the air current for changing the direction of flight of the projectile.

Mounted on the shaft 27 is the generator G, supported in any suitable manner, such as by the brackets 43, said generator being provided with the usual terminals 44 and 45. This generator is adapted to furnish current for various purposes to be hereinafter described.

Referring again to means F, it may comprise a plurality of shafts extending longitudinally of the body A, and supported thereby, in the example shown, disposed within the hollow 17, such as the shafts 46, 47 and 48; means 49 for imparting movement of wheel D to said shafts; means 50 for causing shafts 46, 47 and 48 to move in unison; electric switching means 51 and 52; suitable travelers 53, 54 and 55, any number of which may be provided; electromagnets 56, 57 and 58 which may be energized by generator G; and, suitable wiring to be hereinafter set forth.

It is to be appreciated that the hollows 18 and 19 may contain any suitable charge or death-dealing force, and in the present embodiment of my invention, I prefer to utilize water indicated at 58, which serves as an electrolyte for the means H which, in the example shown, includes the electrodes 59 and 60, passing through a lining of insulation 61 within the hollows 18 and 19; an electric conductor 62 between electrodes 59 and the one pole 45 of generator G; and, an electric conductor 63 between the other electrode 60 and the other pole 44 of the generator. Thus, as wheel D rotates and operates the armature of generator G, the water 58 is decomposed by electrolysis into hydrogen and oxygen gases of substantially the proportion of 66-28/100 parts of hydrogen to 33-72/100 parts of oxygen, which accumulates at the upper portion of hollow 19 about the means I for setting off the charge. While I have herein described a specific material from which an explosive gas may be generated, it is to be understood that I do not wish myself limited to the specific use of such liquid, nor to the making of such material into an explosive force, by electrolysis, since mechanical means may be substituted, deriving its power from the wheel D for making ready the charge, without departing from the spirit of my invention.

Referring now to the operation of means F, the motion-transmitting means 49 may comprise a bevel gear 64 rigid with shaft 27; a bevel gear 65 comeshing with gear 64, and rigid with a shaft 66 revolubly supported by bearing 25, and the walls of section 14, this shaft 66 extending into the hollow 17; a worm 67 carried by shaft 66; and comeshing pinion 68, on the shaft 46. The means 50 may comprise a gear 69 rigid with shaft 46, and comeshing with gears 70 and 71, rigid with the shafts 47 and 48, respectively. Assuming that the shaft 66 rotates in the direction indicated by the arrow in Fig. 7, the three shafts 46, 47 and 48 will

be rotated as indicated by arrows. Shaft 46 will be provided with right-hand threads, while the shafts 47 and 48 will be provided with left-hand threads, these threads being adapted to move the travelers 53, 54 and 55 toward the rear of the projectile, as wheel D is rotated.

In the upper portion of the shell A is provided a plurality of slots 72, 73 and 74, above the screw-threaded shafts, each slot being provided with a groove 75, in one wall thereof. The travelers 53 and 54 comprise a head 76 to fit in either of the slots 72, 73 or 74; and extension 77 which may be disposed laterally of any of the shafts 46, 47 and 48, said extensions 77 being provided with diagonal threads 78, clearly shown in Fig. 11; and a bolt 79 slidable in a recess 80 of head 76, and normally held in a projecting position exteriorly of the traveler, as by spring 81. The switch means 51 is disposed below the shafts 46, 47 and 48 in such a manner that, as one of the travelers is caused to move toward the rear of the projectile, it engages one of the switch points so as to close a circuit, as hereinafter described, operating certain mechanisms for controlling the movement of the projectile. Referring more specifically to Fig. 9, the switch means 51 may comprise the switch 82 in operative relation to shaft 46; switch 83 in operative relation to shaft 47, and switch 84 in operative relation to shaft 48. Each of the slots 72, 73 and 74 are provided with graduations 85 so disposed that the operator may select a certain portion of any particular slot, in which to insert one of the travelers, that, during flight, as the wheel D revolves, one of these switches of means 51 will be actuated to change the direction of movement of the projectile during flight. For instance, the electro-magnets 58, clearly shown in Fig. 6, are disposed in close proximity to the frame 32, one terminal of each electro-magnet being grounded, while the other terminals are in conducting communication, as by wire 85, with the switch point 86 of switch 82. Therefore, if switch 82 is closed, as by means of traveler 54 engaging the movable switch point, these electro-magnets 58 will be energized, drawing the forward portion of frame 32 upwardly, against action of spring 39 and the projectile will change from its regular course, moving downwardly more rapidly.

The upper portion of support 37 is provided with a T-head 87, one extension 88 of which is in close proximity to the core of magnet 56, while the other extension 89 is in close proximity to the core of magnet 57. One terminal of each electro-magnet 56 and 57 is grounded, as indicated in Fig. 14, while one terminal of electro-magnet 56 is in conducting communication, as by wire 90 with the switch point 91 of switch 84. One terminal of electro-magnet 57 is in conducting communication, as by wire 92 with the one point 93 of switch 83. All other terminals of switches 82, 83 and 84 are in conducting communication, as by wire 95 with one pole of generator G. The other pole, 44, of said generator is grounded as at 96. Thus, as the traveler 53 moves toward the rear of the projectile, during flight, and engages the movable point of switch 83, a circuit is completed through electro-magnet 57, which draws upon the extension 89 of T-head 87, causing the rudder to move in the direction indicated by arrow in Fig. 5, causing the projectile to turn to the right.

As before stated, the traveler shown in Fig. 13, which is that designated 55 in Fig. 4, is similar to that shown in Fig. 10 but relatively longer. It is designed for coöperation with the switch 52, one point of which is in conducting communication with the generator G, while the other point is in conducting communication with an electrode 97, forming a part of means I, and cooperating with an electrode 98 grounded on the shell section 15. The switch 52 is so disposed that it will not be operated by either of the travelers 53 or 54, but traveler 55 being relatively longer will cause the switch to become closed as said traveler moves toward the rear of the projectile. It is to be observed that traveler 55 may be also set with respect to the graduations so that the charge within the hollow 19 may be ignited after the projectile has traveled a predetermined distance. In other words, the traveler 55, in combination with means I serves as time mechanism for setting off the charge.

The operation of the projectile is as follows: It may be transported and handled, without danger of premature explosion either with, or without the charge contained within the hollow wall of the cylindrical shell. The gunner having determined the range, and the direction of movement it is desired to impart to the projectile, after reaching a predetermined distance, inserts travelers within the slots at the upper portion of the shell, according to the graduations thereon. Any number of travelers may be inserted in the slots to give various movements to the shell. Cap C being placed upon the rear end portion of the shell, it is placed within the gun and fired. During flight the cap C drops off and the inrush of fluid through way B operates wheel D, as hereinbefore described setting into operation the various mechanisms. Inasmuch as there is a stream of fluid passing through the shell, it is to be appreciated that the projectile will travel in a more uniform course with respect to the axis of the bore of the gun, than projectiles now in common use where it encounters the air, with the pointed end foremost, presenting considerable surface for resistance to movement.

While I have herein described electrical means for operating the rudder, it is to be understood that any suitable mechanical means may be substituted therefor, and I do not wish myself limited to the specific mechanism shown.

Changes in details may be made without departing from the spirit or scope of my invention; but,

I claim:

1. A projectile comprising in combination, a shell, water in said shell, a fluid-operated wheel carried by said shell, and means operated by said wheel for converting said water into explosive gases by electrolysis.

2. A projectile comprising in combination, a shell, water in said shell, a fluid-operated wheel carried by said shell, and electro-means operable by said wheel for converting said water into gas.

3. A projectile comprising in combination, a shell, water in said shell, a fluid-operated wheel carried by said shell, electro-means operable by said wheel for converting said water into gas, and time mechanism for setting off said gas.

4. A projectile comprising in combination, a shell, water in said shell, a fluid-operated wheel carried by said shell, electro-means operable by said wheel for converting said water into gas, and time mechanism operable by said wheel for setting off said gas.

5. A projectile comprising in combination, a cylindrical shell, the wall of which is hollow and its axial way open to the atmosphere, means in the hollow of said wall of said shell from which a charge may be made, and means operable by fluid passing through the said way of said shell at a high rate of speed, acting upon said last-mentioned means to make the charge.

6. A projectile comprising in combination, a cylindrical shell, the wall of which is hollow and its axial way open to the atmosphere, means in the hollow of the wall of said shell from which an explosive charge may be made, and means operable by fluid passing through the said way of said shell at a high rate of speed, acting upon said last-mentioned means to make the explosive charge.

7. A projectile comprising in combination, a cylindrical shell, the wall of which is hollow and its axial way open to the atmosphere, means in the hollow of the wall of said shell from which an explosive charge may be made, means operable by fluid passing through the said way of said shell at a high rate of speed acting upon said last-mentioned means to make the explosive charge, and time mechanism for setting off the charge.

8. A projectile comprising in combination, a shell, water in said shell, and means operable during flight of the projectile for converting said water into explosive gases by electrolysis.

9. A projectile comprising in combination, a cylindrical shell, the wall of which is hollow and its axial way open to the atmosphere, liquid in the hollow of the wall of said shell, convertible into an explosive, and means operable by fluid passing through the said way of said shell at a high rate of speed acting upon said liquid to convert it into an explosive.

10. A projectile comprising in combination, a cylindrical shell, the wall of which is hollow and its axial way open to the atmosphere, a liquid in the hollow of the wall of said shell, convertible into an explosive, means operable by fluid passing through the said way of said shell at a high rate of speed, acting upon said liquid to convert it into an explosive, and time mechanism for setting off said explosive.

11. A projectile comprising in combination, a cylindrical shell, the wall of which is hollow and its axial way open to the atmosphere, a liquid in the hollow of the wall of said shell, convertible into an explosive, and means operable by fluid passing through the said way of said shell at a high rate of speed, acting upon said liquid to convert it into an explosive, said means including a fan wheel revolubly mounted in and coaxial with the said way of said shell.

12. A projectile comprising in combination, a shell, a rudder carried thereby, a wheel carried by said shell and exposed to encounter fluid in its trajectory to be operated thereby, and means operable by movement of said wheel to alter the position of said rudder.

13. A projectile comprising in combination, a cylindrical shell with its axial way open to the atmosphere, a rudder in the said way, a fluid-operated wheel in the said way, and means operable by movement of said wheel to alter the position of said rudder.

14. A projectile comprising in combination, a cylindrical shell with its axial way open to the atmosphere, a removable closure for the rear end of said way, a rudder in said way, a fluid-operated wheel in said way, and means operable by movement of said wheel to alter the position of said rudder.

CLARENCE WILBUR WHITE.