No. 684,918. Patented Oct. 22, 1901.

L. H. DAVIS.

OIL CARRYING PROJECTILE.

(Application filed Feb. 14, 1901.)

(No Model.)

Fig. 1.

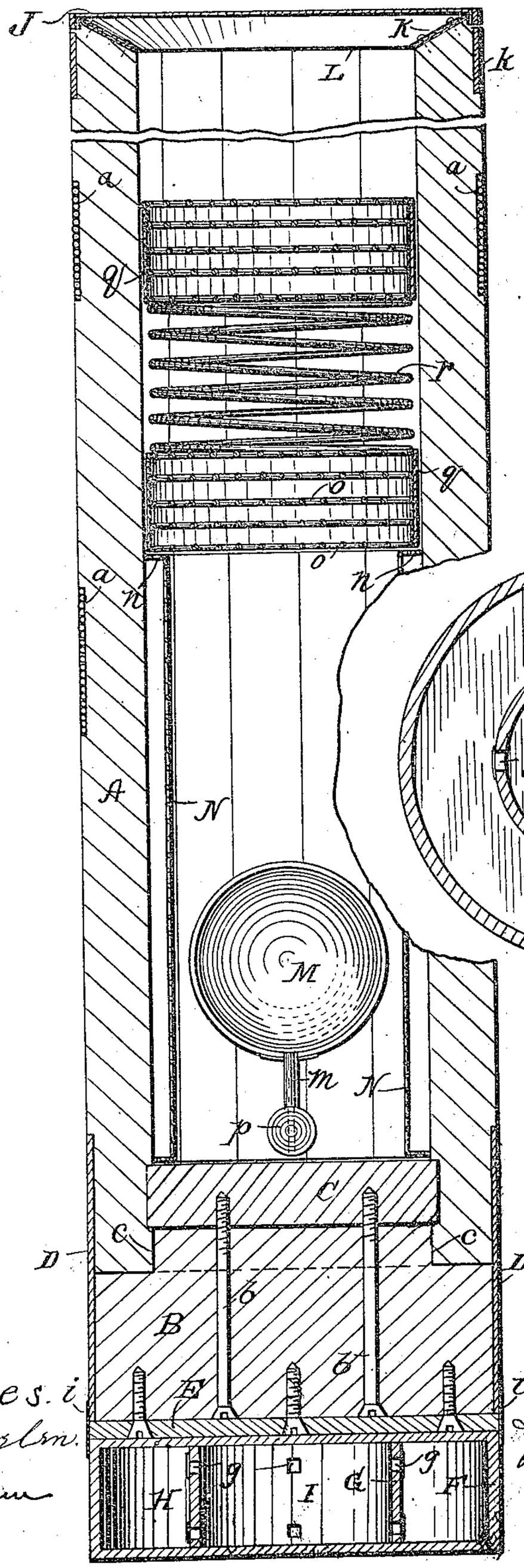

Fig. 2.

Witnesses.
H. R. Edelen.
H. R. Kerkam

Inventor.
Lemuel H. Davis,
by Philip Hamm.
his attorney.

UNITED STATES PATENT OFFICE.

LEMUEL H. DAVIS, OF GERMANTOWN, PENNSYLVANIA.

OIL-CARRYING PROJECTILE.

SPECIFICATION forming part of Letters Patent No. 684,918, dated October 22, 1901.

Application filed February 14, 1901. Serial No. 47,234. (No model.)

To all whom it may concern:

Be it known that I, LEMUEL H. DAVIS, a resident of Germantown, Philadelphia county, Pennsylvania, have invented a new and useful Improvement in Oil-Carrying Projectiles, which invention is fully set forth in the following specification.

This invention relates to the construction of projectiles for carrying oil to any desired distance from a vessel and for distributing the oil upon the surface of the water for the purpose of abating the violence of the waves in the path which the vessel has to traverse or which menace it in any direction. Devices of this character have been proposed heretofore wherein the action of explosives and time-fuses is relied upon to burst the shell at the desired moment and scatter the contents thereof over the water. Apart from uncertainty in operation of such devices there is always great danger attending the proximity of explosives with such inflammable material as oil. The marine risks in carrying such articles would be very great, and in use the danger of explosion in the gun or of ignition in the air, causing flames to be blown back against the vessel or even of setting fire to the oil on the surface of the water in the vessel's path, practically forbids the use of this class of projectiles. A device of this character must be certain and efficient in action. It must (without too great cost) be so constructed as to withstand the explosive charge of the gun from which it is fired. It should be buoyant and so designed as to distribute the oil gradually, and thus derive the maximum benefit therefrom.

The present invention and its advantages can best be explained in connection with the accompanying drawings, wherein—

Figure 1 represents a longitudinal section of a projectile constructed in accordance with the invention. Fig. 2 is a cross-section of the cushion or buffer at the base of the projectile.

The improvements hereinafter described (or some of them) may be embodied in a projectile intended to be discharged from a gun or in a rocket, the term "projectile" being used in a generic sense.

To serve the various requirements that must be met, the body A of the shell is constructed of staves of selected wood, preferably cedar, put together, as shown, to form a cylindrical shell. At suitable intervals, as shown at *a*, the shell is rabbeted to receive a winding of wire, preferably embedded in shellac. At the lower end the body is provided with a head C, set into an annular recess in the body, and against this head is secured, by means of screws *b*, a wooden base-block B of considerable thickness. The diameter of this block is equal to the external diameter of the body A, so that its density is interposed between the shock of explosion and the body of the shell. It is also shouldered at *c*, so as to extend a certain distance within the body and support it laterally.

Surrounding the block B and the lower part of body A (which are rabbeted for that purpose) is a steel hoop or sleeve D. After the latter is put in place a steel disk E is screwed to the under side of block B. The entire surface of the projectile may be coated with paraffin and plumbago or other suitable composition. This construction is designed to give great strength (combined with lightness) to the base of the projectile, where there is the greatest danger of bursting, and also to diminish the shock transmitted to the body of the projectile from the explosion of the propelling charge. As a further safeguard I place at the base of the projectile a buffer or cushion, the object being to give the projectile a gradually-accelerating instead of an abrupt impulse. This cushion consists, as shown, of an outer wall F, of rubber, and an inner wall G, forming between them an annular air-chamber H. The central space I is an exhaust or vacuum chamber. At intervals, as *g*, openings are formed in wall G, these openings being covered with material which will rupture under the force of compression of air in chamber H, so that the initial energy of compression will expend itself in part in breaking into and filling chamber I. The cushion may be lightly attached to the projectile, as by strips of glued paper *i*, so as to drop off after the discharge. The mouth of the projectile is beveled inward, and over the beveled surface is placed a clamping-ring K, which holds in place a cover L of impervious but rupturable material. Moderately thick strong paper will answer,

its surface being protected by a coating of glue or other suitable material from the disintegrating action of the oil. It is preferred to coat the whole interior of the projectile with glue. J represents a metal or other cap which serves for temporary protection and is to be removed when the projectile is used. During the flight of the projectile there is no great strain on the cover; but upon impact which checks the flight of the projectile the forward momentum of its contents will break the cover L. The weight of the materials is such that the loaded cartridge will have a specific gravity slightly less than water, and will therefore float, mouth upward, the major part being immersed. Under the action of the waves it will tilt from side to side, gradually spilling the oil. The water entering to displace the oil will float the latter toward the mouth of the projectile until it has emptied itself. The upper end of the projectile is surrounded by a steel hoop or sleeve *k*. It is of prime importance to protect the projectile from bursting against internal as well as against external pressure. When the flight of the projectile begins, there is a great pressure of oil toward the base thereof, and in order that the energy of this compression may not exert destructive force on the shell I provide a pressure-relieving device in the form of a vacuum-chamber whose walls, or a part thereof, will be broken by the force of the external explosion and internal compression. As shown, this device is in the form of a bulb M, of glass, thin metal, or alloy or other suitable material. It has a hollow stem *m*, through which the air can be exhausted, and to the latter is attached a lead or other clamping seal *p*, which serves also as a weight to sink the bulb to the bottom of the projectile. There are many ways in which this bulb can be formed and sealed. In the lower part of the projectile and surrounding the bulb M is a cylinder N, of wire-gauze, having its upper and lower ends *n* turned outward to form flanges. This serves as a protection to the bulb from injurious contact with the walls of the projectile.

On the upper flanges *n* rests loosely a series of wire-gauze disks *o*, five being shown, though the number may be greater or less. They are all connected to a sleeve *q*, fitting loosely in the projectile. Above this is a second series of foraminous disks similar to the first, but separated therefrom by a coiled wire *r* or other suitable means, forming a clear space between the two series. These disks serve to retard the outflow of oil, and their number may be such as to give the rate of discharge desired, or they may be entirely omitted.

As already stated, reliance is placed on the forward rush of the contents on impact to rupture the cover L. If this should not suffice, the pressure of the water as the projectile moves through it would effect that result, and it is to increase the effectiveness of this pressure that the mouth of the projectile is beveled. To insure breakage, it is desirable that the support of the oil (which does not quite fill the vessel) should be withdrawn, and for that reason the space *r* is provided behind the first series of disks *o*, so that the oil in retreating from the cover will not have to pass through all the perforated disks. If these means fail to insure rupture of the cover in every case, the latter may be attached to the projectile by an adhesive that softens and gives way upon contact with water.

Obviously the construction herein described may be applied to a projectile in the form of a rocket, though in that case as the propelling force is gradually developed there is less shock from the discharge, and the buffer or cushion would be inapplicable and unnecessary.

What I claim is—

1. An oil-carrying projectile comprising a cylindrical body, a head set into the lower part of the body, and a thick wooden base-block against which the head and the end of the body part rest.

2. An oil-carrying projectile comprising a body formed of wooden staves having metal reinforcing-bands, a head set into the lower part of the body, and a wooden base-block supporting the body and head.

3. An oil-carrying projectile comprising a cylindrical wooden body, a head set into the lower part thereof, a base-block having a circular shoulder entering the head and supporting both head and body, and a metal sleeve encircling the lower part of the body and the base-block.

4. A buoyant oil-carrying projectile comprising a cylindrical body and a solid base for receiving the impulse of the explosion-charge, and having a cover of paper or similar material rupturable upon impact.

5. A buoyant oil-carrying projectile comprising a cylindrical body heaviest at the base so as to float in an upright position, and covered at its mouth by material rupturable upon impact.

6. An oil-carrying projectile having its mouth beveled inward, and provided with a rupturable cover across the narrow part of the mouth.

7. An oil-carrying projectile provided at its base with a cushion or buffer comprising a vacuum-chamber having walls or portions thereof adapted to rupture upon the explosion of the charge.

8. The combination with the oil-carrying projectile, of the cushion at the base thereof comprising an annular air-chamber, surrounding a vacuum-chamber, and separated therefrom by walls rupturable under the force of the explosion.

9. The combination with the oil-carrying shell of a pressure-relieving device within and near the base thereof.

10. The combination with the oil-carrying

shell, of a vacuum bulb or chamber within the same, the walls of said chamber being rupturable under a force less than that which will burst the shell.

11. The combination with the oil-carrying shell, of a vacuum-bulb formed wholly or partly of material which will rupture under a force less than that which will break the shell, a hollow stem, and a sealing-clamp of heavy material.

12. The combination with the oil-carrying projectile having a rupturable cover, of a series of foraminous disks placed loosely within the projectile.

13. The combination with the oil-carrying projectile having a rupturable cover, of two series of foraminous disks separated so as to leave a clear space between them.

14. The combination with the oil-carrying projectile, of the vacuum-bulb within the same, and a cylinder of wire-gauze surrounding said bulb.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

LEMUEL H. DAVIS.

Witnesses:
PHILIP MAURO,
REEVE LEWIS.