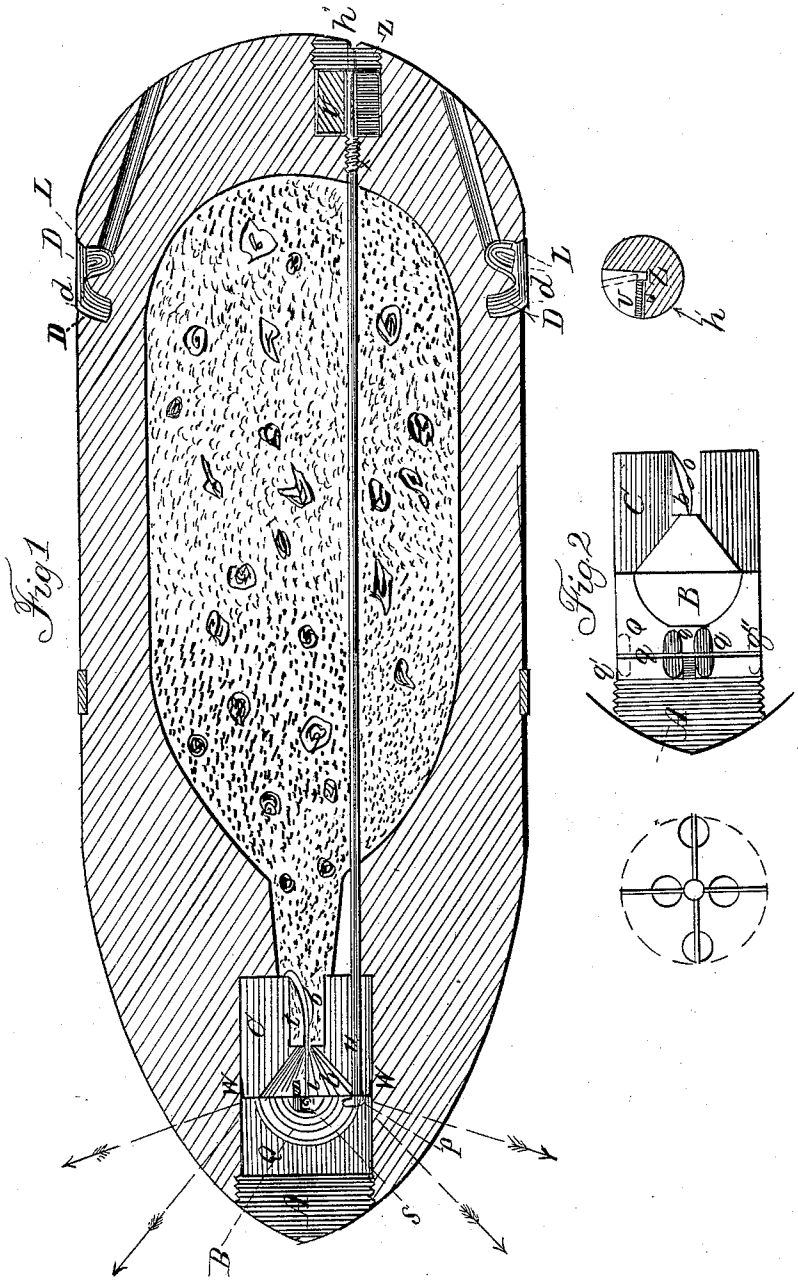
J. L. HENRY.

Shell-Fuse.

No. 38,797

Patented June 2, 1863.



UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN CONCUSSION-FUSE FOR EXPLOSIVE PROJECTILES.

Specification forming part of Letters Patent No. **38,797**, dated June 2, 1863.

To all whom it may concern:

Be it known that I, J. L. HENRY, late of the Regular United States Army, have invented certain Improvements in Projectiles for Cannon; and I do hereby declare the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The nature of my invention consists in the construction of the "plunger" in concussion-shells, and in the devices for retaining it in its normal position or "seat," and for releasing it therefrom when fired, for reasons well known.

Figure 1 is a section through the axis of my construction of such shells, (the method of banding shown being secured in my patent dated July 8, 1862,) having the plunger B in its seat C, and all the devices for retaining it and releasing it, except that shown in Fig. 2, referred to hereinafter.

The form I have given the plunger here is cylindro or sphero conical, its conic part *b* resting in a corresponding seat formed in the cylinder *c*, which is wedged, *w*, in the shell permanently. A "friction-tape," *o*, is attached to the inner end of the cylinder, and also to the central point of the inner terminus of the conic part of the plunger. A bit of twine, *t*, is attached to these two parts in the same manner. Its use will be mentioned farther on.

To retain the plunger in its seat, an elbow-stop, *s*, is firmly fixed in the cylinder in which a pin, *i*, in the plunger rests, permitting, however, the plunger to freely turn about its axis in its seat in a direction opposite to that of rotation imparted to the shell (and the cylinder-seat) by the rifles of the gun. This stop, however, is not sufficient of itself to retain the plunger securely in its seat, for it not only may turn in its seat, as stated, till freed from this check, but it might also rotate from its seat around this stop as a center, as indicated in the dotted segment *z*; hence I use in connection with this another stop, *r*, upon the end of a stiff wire, *u*, which takes into a suitable notch in the plunger. It is plain that the plunger cannot now move until released from both of these stops, which is done as follows: The wire *u*, passing through the cylinder *c* and shell, screws tightly in the rear thereof, as shown at *x*, extends nearly to the outer surface of the shell, and has a valve, *v*, firmly fixed to it, which neatly fits in a chamber having a rotary latitude of movement for the valve of about sixty degrees. A suitable plug, *z*, screwing into place from the rear of the shell, completes the formation of said chamber. It will be perceived on firing that the gas will enter through a small hole, *p'*, in this plug, behind the valve and force it to turn (with the wire) to the extent marked by the chamber—*i. e.*, about sixty degrees—and in so doing the stop *r* on the wire will no longer assist in retaining the plunger in its seat, and but for the other stop, *s*, would be free to fly therefrom. The rotation of the shell (due to the rifles) being acquired after this first stop is removed, its effect will be to cause the partial rotation of the plunger in its seat in the opposite direction, (by virtue of its inertia,) and will thus disengage itself from the second stop *s*. The plunger being now retained in its seat by the twine *t* only, will (on the shell's striking) be free to fly, having to break the twine only, (or its equivalent,) and in so doing will ignite the friction-tape (or explode a cap properly attached to its rear end) and explode the shell. If the rotation of the shell alone were depended on to release the plunger from one or two stops it might fail, since to prevent accidents from rough handling, &c., a spring or frictional device would have to be used in connection with the stops to prevent the accidental partial turning necessary to release it, and as the precise degree of this friction (allowing nothing but the rotation due to rifles to disengage it from its stop) would, perhaps, be difficult to determine, I have preferred to depend on nothing but certainty, and therefore have availed myself of the assistance of the wire stop operated only by the gas, no accident being competent to do so.

In Fig. 2 I have shown another method for retaining and releasing the plunger. Balls *q*, strung upon wires *q'*, which are firmly fixed, serve to keep the plunger in place when the shell receives its rotary motion. These balls will move outward to their positions, as indicated in dotted curves *q''*, thus leaving the plunger free, as before. It is plain that four balls will insure two always at the center, while the other two (by accidental rotation) might be at the periphery; but the precise de-

tails in arranging this device can best be determined by experiment and theory combined.

Of course the chamber Q in which the plunger moves may be as large as desired, though the relative dimensions shown will answer.

The plunger, its tape, &c., are fitted to the cylinder *c*, and the cylinder is put in place and wedged or otherwise fastened. The screw-plug A is then inserted and the shell is ready for use. I will remark that if a "time-fuse" be desirable to use in connection with this plunger, a tape could easily be arranged circularly around the cylindrical seat-piece, at its outer end, near its periphery, so as to ignite the time-fuse by the partial rotary movement of the plunger in its seat when released, as described.

It is plain that a piston may replace the valve on the wire *u*, and the gas would force it directly forward to release a stop on the plunger. In this case there will be no screw on the wire *u*, but merely a tight fit instead.

I think it is evident that the two great desiderata in concussion-shells are accomplished by the foregoing construction—*i. e.*, certain security against accidental explosion and certain explosion at the time desired, however obliquely the shell may strike—and the friction-tape obviates non-explosion in those cases where a cap would fail from corrosion when left long on the nipple of the common direct-moving plunger.

The flexible band is much thicker at the part D, which is turned at an angle with the remaining part which lies over the gas-chamber L. This thick part is firmly forced into a groove around the projectile near its base, and its ends meeting need not be united. If cast of soft brass, or the like, plaster-of-paris molds will answer, and by clipping it in two at a joint it may be easily sprung on. A face, *d*, is turned on it to neatly fit the bore, and from this (which is slightly above the general surface) the band inclines downward back to the bevel on the shot, against which it rests flush with the shot. When fired, the part over the chamber only rises to fill the rifles and bore, and this is the only change it undergoes.

The gas-chambers L are beneath that part only of the expansive portion of the band, and must be of just such dimensions as to contain sufficient gas, and no more, to force the band's rear peripheries into the rifles; otherwise bad results would ensue. The right to use gas-chambers beneath any kind of band is secured in my patent before named. This, then, together with that, secures every essential feature shown in my present drawings, constituting a complete shell or shot.

Having described my invention, what I desire to claim is—

1. The employment of a conical plunger, B, as described, in combination with an enlarged chamber, Q, and suitable concave seat, for the purpose of allowing a very wide lateral range of motion of the said plunger in case of an oblique impact of the shell.

2. The method of holding the plunger safely in its seat by means of the rotating rod *u*, with its catch or stop *r* and rear valve attachment, *v*, whereby it may be released only by the pressure of the discharge upon the said valve in the base of the shell, substantially as described.

3. The additional holding device of a hook or elbow stop, *s*, fixed in the cylindrical seat-piece C, and a pin, *i*, in the plunger, or, as an equivalent thereof, the use of the centrifugal balls *q* for the purpose of retaining the plunger securely until released by the rotation of the projectile due to the rifling of the gun, substantially as described.

4. The employment of a friction-tape, *o*, in connection with the conical plunger, in the manner and for the purpose set forth.

5. The combination, with the conical plunger and friction-tape, the twine or check-string *t*, to prevent the released plunger from straining and igniting the primer before the shell impinges, substantially as described.

6. In concussive shells, a chamber for the plunger of such dimensions as that the plunger may move freely, not only directly forward, as usual, but also sidewise, and perform its function even before reaching the sides of its chamber, in case of side impact, substantially as described.

7. The use of two sets of "stops," the one rigid, the other to yield on impact, as and for the purposes set forth.

J. L. HENRY.

Witnesses:
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JOSEPH PECK.