N. SCHOLFIELD.

Bomb Lance.

No 15,577. Patented Aug 19, 1856.

Fig. 1.

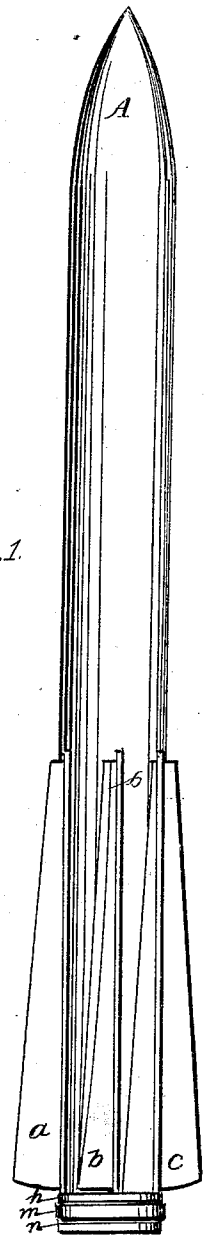
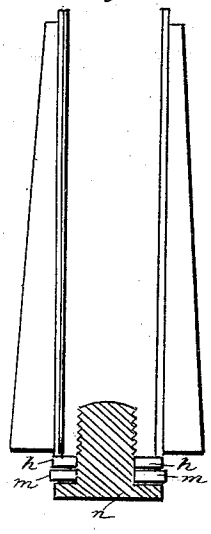


Fig. 2.

Fig. 3.



UNITED STATES PATENT OFFICE.

N. SCHOLFIELD, OF NORWICH, CONNECTICUT.

IMPROVEMENT IN PROJECTILES.

Specification forming part of Letters Patent No. **15,577**, dated August 19, 1856.

To all whom it may concern:

Be it known that I, NATHAN SCHOLFIELD, of Norwich, in New London county, and State of Connecticut, have invented a new and Improved Mode of Constructing and Applying Wings to Govern the Direction of Projectiles; and I do hereby declare that the following is a full, clear, and exact description of the construction and action of the same, reference being had to the accompanying drawings, making part of this specification.

Figure 1 is a view of a projectile fitted with the wings.

The projectile is cylindrical in form, but pointed at the anterior extremity, A.

a b c are wings, made of thin sheet-brass or very light tin, with one edge, *d*, Fig. 2, folded around a piece of stiff wire, *e f*, of small size, which, extending beyond the sheet in each direction, forms the journals *e* and *f*, by which they are connected to recesses in the surface of the projectile, and are allowed to fold down on the surface or to rise up and assume radial positions thereon. These wings, instead of plane, present slightly curved surfaces, such that, when folded down on the surface of the projectile, as the wing *b*, the posterior end of the wing may coincide with the surface of the projectile or seat to which it is fitted, while its anterior extremity, *b*, is in some degree raised above.

The wings are made much wider in the rear than forward, and are fitted so as to open freely from the surface of the projectile to planes perpendicular thereto, in which position they are prevented from moving farther by the edges of the grooves in which their axes are fitted.

h is a ring or collar of metal, (shown in section at Fig. 3,) and is perforated to receive the journals of the wings, while holes are drilled for the journals at the forward extremities at the ends of the grooves just beneath the surface of the projectile.

m is a ring of leather or other suitable material, accurately fitted to the bore of the gun or ordnance from which it is to be projected, while there is allowed a certain amount of windage on the cylindrical part of the projectile.

n is a screw designed to secure the two rings described above in their place.

In placing this projectile in the gun the wings are folded down at the rear end, and as it passes in the forward parts of the wings press slightly by their elasticity on the surface of the bore in consequence of their partial elevation forward, when their rear ends are closed down; and when projected therefrom by the force of the powder, as soon as relieved they are partially opened forward, when, by the rapid flight of the projectile through the air, they are suddenly expanded as wings to guide and preserve its parallelism, and by the slight curve given to the wings to insure their expansion a motion of rotation about its axis is imparted by the action of the curved surfaces of the wings on the air, and thus the most perfect and unerring aim of the projectile is secured.

I deem four wings to be the most proper number to be applied, and in a projectile ten inches long and one inch in diameter the wings may be four inches in length, three-eighths of an inch wide at the rear, and one-eighth inch at the forward end.

The wings may have plane instead of curved surfaces, and still produce nearly the same effect by giving them positions slightly diagonal on the cylindric surface of the projectile, having the forward journals of the wings set slightly aside, and in such positions that when they have begun to open a current of air parallel to the axis of the projectile will press on the under side of the wing and tend to open it fully.

With this construction, if the swinging edge of the wing is allowed to set free or to be slightly raised by a spring, so that the air can pass underneath, then by its rush through the air the wings will be opened, when by a pressure of air on the closing side of the wings a rotary motion of the projectile is produced, as before.

If it is desired for any cause to avoid the rotary motion, this may be done by the same wings set in pairs opening in opposite directions. These would preserve the parallelism of the projectile, but would neutralize the tendency to a motion of rotation.

Spiral or other springs may be used to open the wings.

These wings are applicable to missiles of any kind with a cylindric or prismatic form,

or with forms approaching nearly to this character, and may be used for the heaviest ordnance, for large or small shot and bombs for military purposes, and also for killing whales.

The advantages of the application will appear from the following: The metal composing a spherical shot of any given diameter will, when put into a cylindric form of half that diameter, be equal in length to two and two-thirds of the same diameter. This would be projected from a gun of half the caliber of the former, containing, when properly proportioned with extra proportional strength, about one-third the weight of metal of the former, but allowing for and guarding against the effects of recoil on the discharge, supposing the weight of metal shall be equal to two-thirds of the former. The weight of powder may be something less for this than for a spherical shot of the same metal. The resistance of the atmosphere, if its forward end is a hemisphere, is only one-fourth of the former, or perhaps a little less, for the resistance of the air on bodies moving through it increases in a little higher ratio than the penetrating surface, and by giving the projectile a proper pointed form the resistance would be reduced about one-half more, so that the proper direct resistance suffered by the projectile would be but about one-eighth of that of the same metal in a spherical shape; but the resistance arising from friction would be somewhat increased with the surface, from which it is evident that the range of the shot would be greatly increased as well as its accuracy, and its efficiency in penetrating any obstacle would be increased in a very high ratio, so that no practical bulwark, however strong, would be able to resist the action of large shot.

The common musket with this shot would be more efficient in a long distance than the best rifle. Heavy bombs could be thrown to a much greater distance and with more certain aim. The bomb for killing whales would weigh about twenty-five per cent. less than such as are now used for that purpose carrying the same amount of powder, as in this we should dispense with the shank and its appendages to guide the bomb, placing these wings on the cylindric surface of the bomb itself, and also save expense in fitting up, and the bomb might be projected effectually and do execution to a much greater distance, for in this a large part of the atmospherical resistance is avoided by dispensing with the shank, which has an enlargement at its rear extremity, increasing greatly its resistance. Consequently, a whale-bomb fitted with these wings, and of a given capacity for powder, will weigh less, will require a much smaller charge to project, will cause less recoil in the gun, will do efficient execution at a much greater distance, and can be fitted more cheaply than the whale-bombs now used.

I do not claim the use of the folding wings on a projectile to guide and govern its direction, as these have been before used when thrown up by springs; neither do I claim their spiral position on the projectile; but

What I do claim as my invention, and for which I solicit Letters Patent, is—

1. The construction of the guiding-wings for a projectile to be fired from a gun of thin sheets of metal, having one of their edges folded around a piece of wire, or its equivalent, to form journals, on which the wings may turn as joints.

2. Applying these wings, either curved or plane, on the cylindric surface of a projectile, and either parallel to its axis or diagonally, in such form and position that the said wings may be closed down on the cylindric surface, or on grooves thereon fitted to receive them, and by the action mainly of the air on the wings as the projectile is discharged they shall be opened or expanded, substantially as above described.

3. The application of wings, as above described, either with slight springs to force them from close contact with their seats when left free, so as to allow the air to act thereon to perfect their expansion, or by having a free passage for air beneath the wings, and giving them a slight inclination diagonally on the cylindric surface and without springs.

4. The construction and application of these wings slightly curved, composed of metal possessing sufficient elasticity to resume their curved form after being changed therefrom, so that if, while its rear end rests on its seat, the forward end of the wing is elevated therefrom when free, then, if this end is also pressed down to its seat, it shall be raised again by its elasticity when left free from pressure, so that the action of the air on the exposed curve of the wings will force them open to their greatest capacity after being discharged from a gun.

NATHAN SCHOLFIELD.

Witnesses:
CHAS. JAS. LYNMAN,
LEVI H. GODDARD.