B. B. HOTCHKISS.

Projectile.

No 112,144. Patented Feb 28, 1871.

Fig. 1.

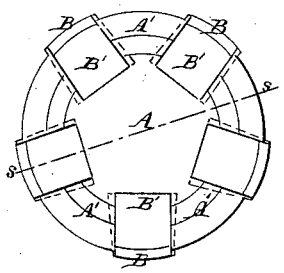


Fig. 2.

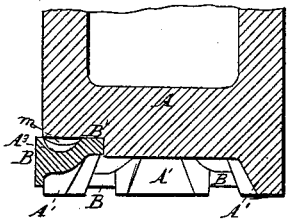


Fig. 3.

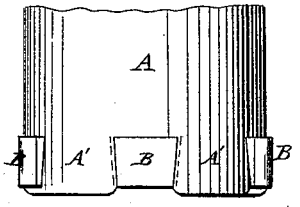


Fig. 4.

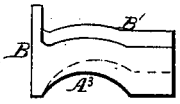


Fig. 5.

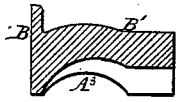


Fig. 6.

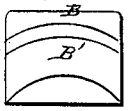


Fig. 7.

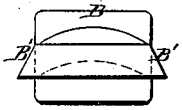


Fig. 8.

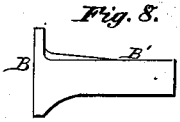


Fig. 9.

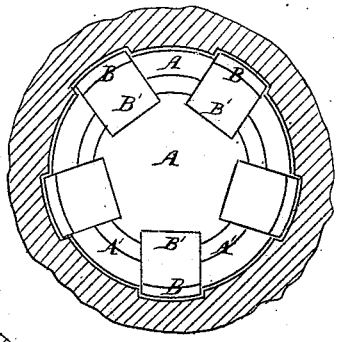


Fig. 10.

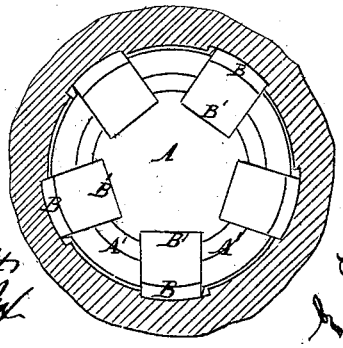
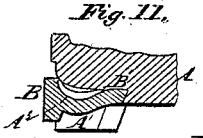


Fig. 11.



Witnesses:

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Oscar C. Hyde

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Unted States Patent Office.

B. B. HOTCHKISS, OF NEW YORK, N. Y.

Letters Patent No. 112,144, dated February 28, 1871.

IMPROVEMENT IN PROJECTILES FOR ORDNANCE.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, B. B. HOTCHKISS, of the city and county of New York, in the State of New York, have invented certain new and useful Improvements in Projectiles for Rifled Ordnance; and I do hereby declare that the following is a full and exact description thereof.

My invention relates to the construction and arrangement of the parts which enter the rifled grooves in the gun, and to means for properly confining such parts and for producing a proper expansive motion thereof.

The main body of the projectile is of cast-iron or other rigid material not adapted to change its form. This is first cast complete, after which certain parts are attached, which are composed of brass or other slightly-plastic or yielding material, of such size as to be introduced into the gun through the muzzle with ease, because they do not tightly fit the gun, and are expanded in the act of firing so as to fit tightly and hold the projectile centered in the bore, while they also cause it to assume the proper rifle motion.

I propose to term my projectile "the expanding-button projectile."

I will first proceed to describe what I consider the best means of carrying out my invention, and will afterward designate the points which I believe to be new.

The accompanying drawings form a part of this specification.

Figure 1 is a rear view of all the features of my invention;

Figure 2 is a central section; and

Figure 3 is a side elevation of the same.

All these figures show the parts in the condition after the packing has been secured upon the projectile, but before the projectile has been fired. The remaining figures show the changes made in securing the packing to the main body of the projectile, and also in the act of firing.

Figure 4 is a view of one of the packing pieces as they are cast previous to being secured in the main body;

Figure 6 is an end view of the same; and

Figure 5 is a central longitudinal section.

Figure 7 is an end view corresponding to fig. 6, but showing the inner end of the piece flattened to spread and lock it in the projectile, as will be explained below.

Figure 8 is a side view of the same piece, after being flattened and expanded over its whole surface by the intense force of the discharge.

Figure 9 represents the entire rear of the projectile, with a section of the adjacent parts of the gun, before firing. The windage, or space between the projectile and the inner surfaces of the gun, is represented as somewhat greater than is usually practiced, in order the better to exhibit the operation of the expansive action.

Figure 10 represents the same after the ignition of the powder and the intense pressure thereby developed has flattened the several pieces of packing and caused them not only to lock very tightly in the main part of the projectile, but also to extend outward and press against the bottom of the grooves in the gun, while leaving a great portion of the interior of the gun untouched.

Figure 11 shows a slight modification, which gives a wedging effect in addition to the other peculiarities.

Similar letters of reference indicate corresponding parts in all the figures.

A is the body of the projectile. Its diameter corresponds with the bore of the gun from which it is to be fired, leaving only the ordinary five-one-hundredths of an inch, or whatever other allowance is deemed expedient for the looseness or open space between the projectile and the inner surface of the bore proper.

The projectile may be of any length which may be found expedient. It may be hollow, and adapted to contain explosive material, with any provision at the front for igniting, or for penetrating iron-clads, or for any other purpose.

My invention relates entirely to the provision for packing.

In what is generally known as the French system of construction of projectiles for rifled ordnance the main body of the projectile is made smooth and cylindrical, and a number of projections, corresponding to the several grooves in the gun, is provided on the external surface of the projectile, and are denominated "buttons."

My invention provides analogous parts, corresponding in number and position to the grooves in the gun, and approximately corresponding in size to the depth and breadth of the several grooves. They may extend longitudinally of the grooves to a greater or lesser extent, as may be preferred.

The drawings represent several modifications of the form in this respect. Each extends inward, as indicated by B', and is firmly secured in the corresponding recesses in the body of the projectile.

The cast-iron between the buttons, marked A', should extend rearward a little beyond the extreme edge of the buttons, in order to protect the buttons when the projectiles are roughly handled, are stood up, or are dropped heavily on a pavement or other hard substance. Some of the advantages of my invention may, however, be realized without this provision.

In the act of firing the force of the powder, acting

on the rear of the projectile, tends to "upset" and to spread, and to expand radially the entire projectile, and while the cast-iron parts are too rigid to be materially affected even by the severe force of the burning powder, the brass parts, being softer, yield to the force, and the buttons expand so as to tightly fill the groove.

Each button B and its wing B′ form a separate and independent brass casting. These parts are confined by dovetailing two ways; that is to say, each part cannot escape rearwise from the projectile, by reason of the cavity or recess in which it is fitted contracting in that direction. Neither can it escape radially from the projectile, by reason of the cavity or recess contracting in that direction.

The construction of these portions is very important, and must be studied with a careful reference to the drawings. Referring to fig. 3, it will be seen that the sides of the recesses in each of the packing-pieces B B′ are narrower at the extreme rear than at the front of each packing-piece. The packing-piece being made to fill the recess with tolerable tightness, it follows that it cannot escape rearwise from the projectile, being retained by the inclined or dovetailing sides of the cavity in that direction. The packing is introduced readily by forcing it in from the outside or periphery toward the center—a movement which the form of the cavity does not prevent.

Now, to prevent its escaping radially, it is necessary to make the recess also dovetailing in the radial direction; and it is also necessary that the packing-piece B′ shall widen at its inner end after it has been inserted. I adapt a peculiar means for effecting this widening. By making the under face of the packing-piece A^3 c concave or guttered, as represented, it allows of being introduced in the manner above described by forcing it radially inward from the periphery toward the center or axis of the projectile, and then, after having been thus introduced in a narrow condition, by reason of its concave or "eaves-troughed" form, I flatten the concave (and thus expand the inner end of the wing B′) with a heavy hammer, either directly or through the medium of a proper "set," or by applying to it a strong pressure by means of a hydraulic press or otherwise.

This flattening of the inner end causes the material at that point to widen and to entirely fill the recess there provided for it. It follows that the packing-piece B B′, after being thus introduced, with its inner end narrowed, by being concaved, and after being thus widened at the inner end by flattening or compressing so as to fill the space, is firmly locked at that point, and is able to resist all the strains to which it is subsequently exposed, either by the force of the powder or by the centrifugal force, or by all the forces combined.

In all the forms of my projectile it will be observed that the packing-pieces do not lie close to the bottom of the recess, except at the extreme inner portions of the wings B′.

There is a space, *m*, under the packing-piece. When the force of the powder is applied to the rear of the projectile it flattens this portion, thus filling up the cavity *m* by bringing the brass of the packing-piece into intimate contact with the bottom of the recess. This movement expands the button more perfectly, but it will expand with some effect if no such cavity is left.

With brass or bronze of medium hardness the entire packing-piece B B′ may be made a uniform casting, and may be allowed to expand directly into the grooves of the gun without injury.

The material in all cases should be such as will mold or adapt itself to the grooves of the gun and form a tight fit, and the several wings should be so nearly uniform that they will expand so nearly alike as to hold the axis of the projectile directly in the center of the bore.

Many modifications of the form of my invention may be made by any good mechanic without departing from the principles of my invention.

It is practicable, as shown in fig. 11, to render available a wedging force, allowing the packing-piece to be slid forward a little on the main body, by the discharge of the gun, and thus to expand the button B B′ radially by virtue of the wedge principle, as well as by the other changes of form referred to.

It will be observed that the spaces provided for the packing-pieces to thus drive forward are narrow corresponding to the packing-pieces, and that they are separated by stout portions of the rigid iron body, so that each is directly supported thereby to resist wringing or turning around on the body. The immediate proximity of the support to the point where the force is received by the packing gives a great advantage when this form is used.

It is possible to operate with some success with my invention where the buttons are of less width than the grooves in the gun; but in such case the entire groove will not be filled by the button. It is also practicable to operate with a button of greater width than the grooves in the gun; but in such cases the buttons should be correspondingly formed, either at the time of their manufacture, or by subsequent chipping or filing, or other treatment, so as to allow the projectile to enter the gun easily.

Having now fully described my invention,

What I claim as new, and desire to secure by Letters Patent, is as follows—

The means herein described for expanding packing to a definitely-fixed limit by pieces which are and remain firmly connected at one end to the main body, the same consisting of the buttons extending inward at or near the rear ends, and sliding forward on the periphery in grooves which are not only inclined or wedge-like, but have square shoulders at their forward ends, as specified.

In testimony whereof I have hereunto set my name in presence of two subscribing witnesses.

B. B. HOTCHKISS.

Witnesses:

WM. C. DEY,

C. C. LIVINGS.