(No Model.)

# J. R. HAWLEY.

## PROJECTILE.

No. 384,574. Patented June 12, 1888.

Fig. 1.

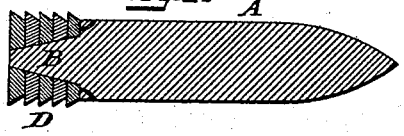


Fig. 2.

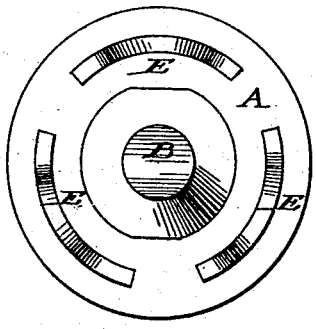


Fig. 3.

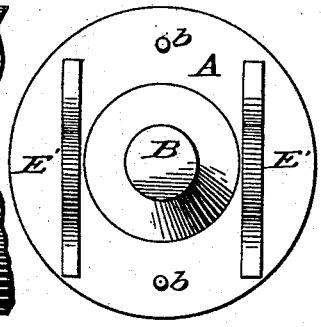


Fig. 4.

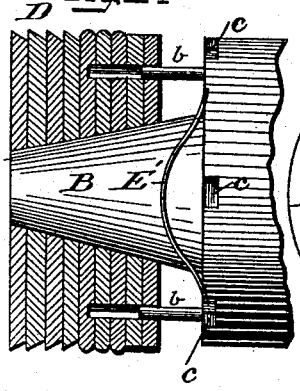


Fig. 5.

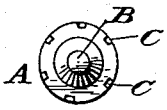


Fig. 6.


Fig. 7.

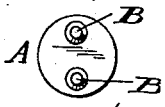


Fig. 8.

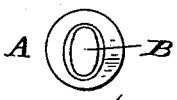


Fig. 9.

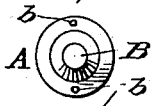


Fig. 10.

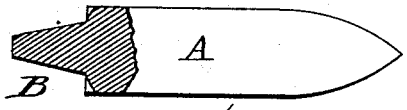


Fig. 11.

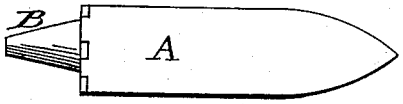


Fig. 12.


Witnesses
F. L. Ourand.
Frank Brauner.

Inventor.
Joseph R. Hawley,
By his Attorney.
Wallace A. Barrett.

# UNITED STATES PATENT OFFICE.

JOSEPH R. HAWLEY, OF HARTFORD, CONNECTICUT.

## PROJECTILE.

SPECIFICATION forming part of Letters Patent No. 384,574, dated June 12, 1888.

Application filed April 26, 1887. Serial No. 236,203. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH R. HAWLEY, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Projectiles, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to projectiles for ordnance or small arms; and it consists in the construction and combination of parts hereinafter pointed out and claimed.

The object of the invention is to produce a projectile with a sabot which will take the rifling of the gun with certainty; also, to provide the projectile with a mechanism which will throw off the sabot after the gun is fired.

In the drawings, Figure 1 is a longitudinal section of a projectile and sabot embodying the general features of my sabot. Fig. 2 is a rear view of a projectile having springs to throw off the sabot, and Fig. 3 is a similar view showing a modified spring. Fig. 4 is a broken section, partly in elevation, of the rear portion of a projectile with sabot and spring. Figs. 5 to 9 are rear views of certain modifications, hereinafter referred to. Fig. 10 is a section, and Fig. 11 an elevation, of a bullet with sabot detached. Fig. 12 is a detail of a spring.

The projectile A has a projection, B, at the rear. This projection may be round, oval, or polygonal in cross-section, and may be of uniform diameter throughout its length, but preferably tapers so that the rear end of the projecting part is considerably less in diameter than the part connected with the bullet or projectile proper.

As shown in Fig. 7, there may be a plurality of these projections, or, as in Figs. 4 and 9, there may be a single projection, B, and a number of pins, *b*, extending from the base of the projectile.

Washers D D, of leather or equivalent material, (such as compressed paper,) are passed over the projection B from the rear. These washers are a little larger in diameter than the bore of the gun in the rifling, so that the edges of the disks will be compressed to fit the rifling of the gun. The edges of the washers may be beveled or rounded, if desired. The washers should fit snugly to the projection B of the projectile. Where the projection is polygonal or oval, the holes in the washers will correspond. The pins *b*, where such are used, will enter holes in some one or more of the washers next the base of the projectile proper.

Instead of or in addition to the pins *b*, slots *c* may be made in the rear shoulder of the projectile with which the face of the washer next the base of the projectile will engage.

The object of the pins and slots is to cause close engagement between the washers and base of the shell or projectile, so that the washers, when they take the grooves of the rifle, will cause the projectile to partake of their own rotary motion.

With light projectiles the packing of leather washers on a conical projection is sufficient to secure a rotation of the projectile with the washers.

It will be readily understood that a slight distortion of the projection B will cause it to engage firmly with the washers, and thus the projectile will be rotated by the washers engaging the rifling when the gun is fired.

In order to cause the sabot composed of the leather washers to drop from the projectile after the projectile leaves the gun, a spring or series of springs may be interposed between the sabot and the base of the projectile. These springs may be curved, as at E, Fig. 2, or may be simply bars extending partly across the base of the projectile, as at E', Figs. 3 and 4. Many forms of springs suited to the purpose will at once suggest themselves. A spring with a number of offsets is shown at E², Fig. 12.

One or both ends of the spring may rest in a recess in the base of the projectile just sufficiently to hold the spring in place when the sabot is attached. (See Fig. 4.) When the gun is fired, the explosion of powder in rear of the sabot drives the sabot forward snugly against the base of the projectile, flattening the interposed spring. The pressure also drives the forward washer into the slots *c* in the base of the bullet and compacts the washers together. The leather washers take the rifling with great evenness, and not only serve to rotate the bullet, but also clean the bore very effectively. When the projectile leaves the gun, there is a backward pressure of air on the washers D, and this tendency is increased

by the slots *c* tending to throw the sabot off from the tail of the projectile. Where the form of projectile is such as to require it, the springs are added to throw off the sabot. As many springs and such strength of spring may be used as are needed to accomplish the result desired.

The slots *c* may in some instances be extended as inclined perforations in the body of the projectile.

I claim—

1. The combination, with a projectile having a rear extension and slots in its base, of a centrally-perforated leather washer mounted on the projection, the front face of the washer toward the base of the projectile, so that the slots furnish apertures for the entrance of air between the projectile and washer to throw off the washer during the flight of the projectile, substantially as described.

2. The combination, with a projectile and its sabot, of an interposed spring to detach the sabot after the projectile is fired.

3. A projectile having a rear projection and a series of washers thereon, and a spring between the washers and projectile, all arranged and combined substantially as set forth.

4. A projectile having a tapering rearward extension from its base, a series of washers on said projection, slots and pins connecting the washers and projectile to cause the washers and projectile to rotate together, and a spring interposed between the washers and base of the projectile to throw off the sabot after the projectile is fired, all in combination substantially as described.

5. The combination, with a projectile having air-passages in its base, of a series of washers mounted on a projection at the rear of the projectile, the front washer resting against the base, with its outer edge in proximity to the air-passages, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOS. R. HAWLEY.

Witnesses:

JOHN N. WALKER,

HARRIS P. HURST.