DYNAMITE THROWN FROM CANNON BY POWDER.

On the 22d of April a trial was made in the vicinity of New York of firing dynamite from a 12 pound Rodman gun with a charge of powder. The system employed by the inventor, Mr. F. H. Snyder, to whom we are indebted for the following particulars, consists in the insertion of a buffer combination between the powder and the dynamite, so that the buffer will take up the shock without exploding the dynamite.

The trials were made in the presence of a number of spectators, and following, as they do, so closely upon the trials of the pneumatic dynamite gun, have excited great interest, particularly on account of the simple manner in which the problem has been met.

By referring to the accompanying illustrations, it will be seen that no extra appliances whatever are required as regards the gun. The dynamite can be loaded in ordinary guns, such as exist at the present day, and is fired in the usual manner with powder. The great advantages of such a system are obvious, since it conforms in every respect with the practice of firing solid shot, and is equally applicable to naval and land operations. In our illustration Fig. 1 represents an ordinary gun with the naval projectile in position. The latter consists essentially of the dynamite compartment, B, and the wooden shank, A, provided with wings, C, to guide it when it strikes the water.

In addition to this, and constituting the principal features of the invention, are the means provided for reducing the shock when the gun is fired. These consist, in the first place, of the sabot shown in Fig. 2. This is built up in three sections of wood or *papier mache*, W and S, between which are located leather washers with overlapping sides, L. In front of the third section, W, is placed a convex disk of copper, F, which bears against the former at its outer edge, the copper in turn butting against a plug, X. The whole is bolted together, all the disks, however, fitting loosely on the bolt. This arrangement acts both as a gas check and as a buffer, the washers, L L, performing the first office, and the copper disk the latter. This will be understood by stating that the copper disc is of smaller diameter than the bore of the gun; thus, when the latter is fired the shock is taken up by the disk, which becomes flattened out, thereby overcoming the inertia of the projectile gently.

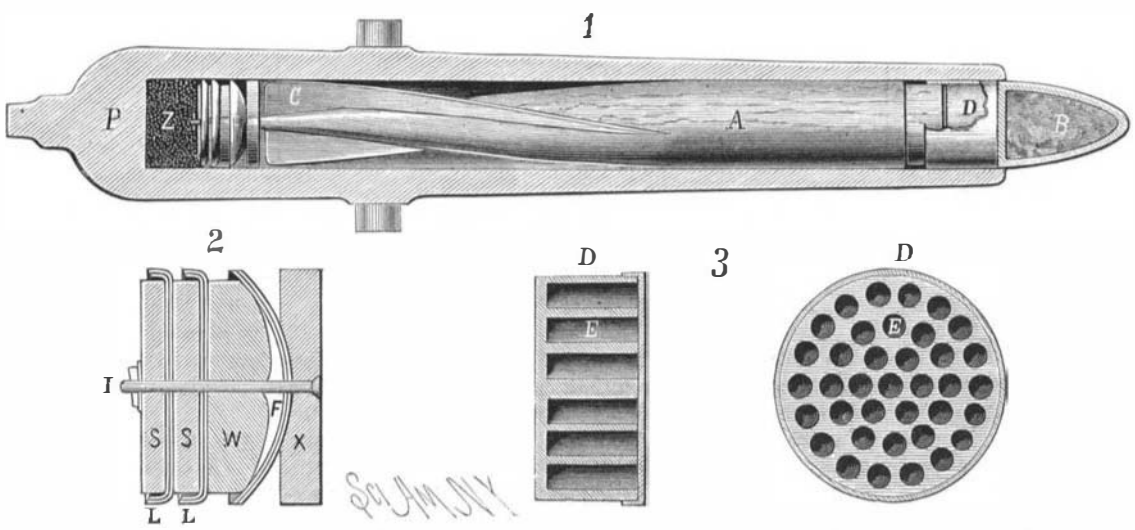
There is, however, still another provision made to reduce the shock of a sudden discharge, which consists in placing a cushion between the end of the shank, A, and the dynamite chamber, B. The latter is formed into a hollow cylinder at its rear end, passing over the shank, A, like a sleeve. Into this hollow cylinder there is placed the buffer, D, shown enlarged in Fig. 3. This is made of India rubber, and has a series of holes, E, running longitudinally nearly through, a cap fitting over the end to close the holes. When the projectile is in position the end of the shank lies against the bottom of the India rubber buffer, and the cap of the latter in its turn against the dynamite compartment, the shank, A, being recessed a short distance behind the sleeve so as to allow free motion. When the gun is fired the shock is partly taken up, not only by the rubber, but also by the air which is confined in the holes, E, and which cannot escape, the device making a very efficient cushion, which experiment has shown to be all that is necessary.

For land purposes the projectile is considerably shorter than the one shown in the illustration; it is cut off close behind the dynamite compartment, and lies well down in the gun. Thus, for an 8 inch gun the naval projectile has a length of about 9 feet, while the land projectile is about 3 feet. In the experiments lately made, projectiles were fired from a Rodman 12 pounder, 4·62 inch bore, in which quick burning "FF sporting powder" was used, and which threw a charge of 5 pounds of dynamite three-quarters of a mile; the dynamite buried itself several feet in soft mud without exploding. Subsequently, when firing a naval projectile, the latter ricocheted a long distance before sinking, thus proving itself capable of striking a ship at the water line with certainty

Another important point observed is the fact that the recoil of the gun is greatly diminished by the interposition of the cushions, which property will commend itself particularly in naval guns.

As yet no official tests have been made of the system, but the United States Government has invited thei nventor to make a trial of it, which will take place at Sandy Hook as soon as arrangements can be made.

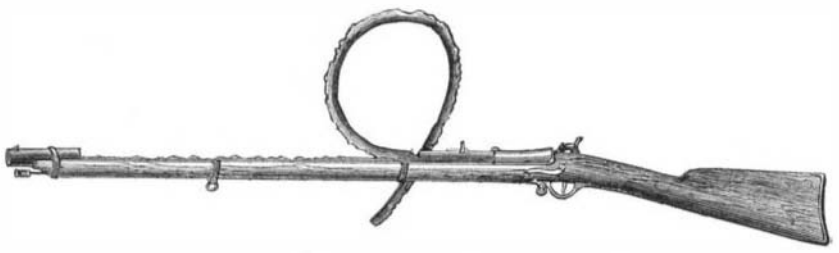
The simplicity of the system must commend itself, requiring no change in the cannon, and entailing but a small cost in the other appliances used. As a weapon of destruction in warfare, dynamite is as yet an almost unknown force, but if a charge can in this way be thrown five miles many old ideas will have to be discarded.



DYNAMITE CARTRIDGE THROWN FROM CANNON BY POWDER.

THE BURSTING OF GUN BARRELS.

We give below some extracts from a letter of Mr. Munn Davis, of Nebraska, who writes us upon the subject of the bursting of gun barrels, and criticises some articles which have been published upon this subject in some of the sporting papers and in *Harper's Weekly* by Mr. W. McK. Heath,



THE BURSTING OF GUN BARRELS.

of Philadelphia. Mr. Heath has been making some experiments, and he has spent many words in describing them. But the point which is of most interest, and which would render his experiments of any value, he seems carefully to have avoided, namely, the cause of the bursting of gun barrels. He passes over the subject with a single sweep of the pen, and says that it is the jamming of the projectile against some obstruction in the muzzle of the barrel. This may be all very true, but it scarcely explains anything, and least of all the real action which takes place

Fig. 1.

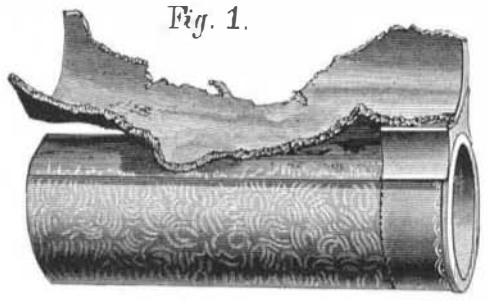
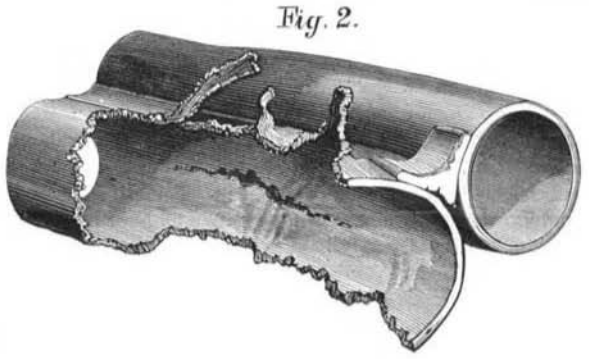


Fig. 2.



THE BURSTING OF GUN BARRELS.

in the barrel before and during the explosion. Mr. Heath's experiments have consisted in discharging guns which had been obstructed at the muzzle by all sorts of different substances, such as mud, sand, water, snow, stuck bullets, etc., and of whatever value the experiments may prove to be, they show one fact very conclusively—that it makes little odds whether a barrel be obstructed with a bullet or simply with wet sand; in either case the result may be equally destructive.

If Mr. Heath's theory is true that the bursting is due to simple jamming of the projectile against the obstruction, we do not see how he explains what has become of the air which filled the space between the projectile and the obstruction before the discharge, nor how he accounts for that total wreck of firearms which we so often hear of. Mr. Davis, in his communication, has elucidated this point, we think, in an experience which he relates, and in which case the bursting must have been due, not to the jamming of the bullet against the obstruction, for this does not seem to have occurred, but to the almost instantaneous compression of the air in the barrel between the cartridge and obstruction. He says:

"During the summer of 1871 I saw in Topeka, Kansas, among a lot of government arms that were being overhauled and cleaned, a "needle gun" which had been burst by a "stuck" ball about four inches from the muzzle. The upper part of the barrel had been blown up and back, the rupture commencing at the rear end of the "stuck" ball; the end of the broken section had struck the barrel itself at a point immediately in front of the back sight, and with such force as to dent it about one-sixteenth of an inch in depth, and had then glanced off to the right side and continued its course downward some three or four inches below the lower line of the stock. The "stuck" ball was still in the gun, and showed *no signs* of having been struck by the projectile, except that in one place it was slightly battered over the jagged edge of the ruptured barrel. If it was not the compressed *air* which caused this break, what force was it which could split the barrel from the rear end of the "obstruction" to the point of indenture, just in front of the back sight, a distance of about fifteen inches? The accompanying sketch shows the appearance of the gun at the time." Fig. 1.

"I also send a fragment, 2½ inches long, taken from the muzzle of a Piper breech-loading shotgun, the right barrel of which burst from a mud obstruction at the muzzle. The barrels are Damascus steel, and have a patent appliance at breech and muzzle, by which they are said to be "re-enforced." It is evident in this case that the shot struck the "obstruction," and then "wedged" to such an extent as to cause the rupture, as you will readily perceive the black line of lead still sticking to the barrel."

"In most breech-loading shotguns the diameter of the shell chamber is perceptibly larger than that of the remainder of the barrel, and it is customary to use a No. 8 wad in loading a 10 gauge brass shell. This gives what is commonly called a "force" wad, *i. e.*, a wad which will fit tightly the entire length of the barrel; and, to a common thinker, it seems as though the wad over the shot would be sufficient to remove the "obstruction," provided it was not jammed into the barrels so tight as to prevent the escape of air. Some think the break is caused by the shot jamming against the "obstruction," and indeed this seems to be the case with the Piper gun."

"A few days since I took occasion to test the matter, with the following results: Procuring an old muzzle-loading shotgun (No. 14 gauge), I loaded each barrel with four drachms of Hazard gunpowder (FG) and two No. 12 Ely Bros.' pink edged wads. In the right barrel two of the same kind and size wads were placed about two inches below the muzzle, and in the left barrel I put one wad down about the same distance from the muzzle, and on top of it some *mud*, crowding it against one side of the barrel so as to leave clear about half the space. The gun was then discharged, and the "obstructions" in both barrels were blown clear without injury to either barrel. The piece was loaded again in the same manner as before, and mud put in the muzzle of each barrel, but a small aperture was made through the "obstruction" in the left barrel. The result of the discharge this time, however, was the bursting of the right barrel, where the obstruction was solid, while the left barrel, in which the obstruction had a small aperture, remained intact. The effect upon the right barrel may be seen in the illustration, Fig. 2. *There was no shot in either barrel.*"

"On different occasions I have fired a rifle when the ball was so tightly lodged about ten or twelve inches from the muzzle that it was impossible to move it with the rammer, and I did on one occasion fire a *ramrod* from a shotgun when the wad had "turned," and thus wedged it in the barrel so that it could not be moved, but have never had a gun burst in my hands yet."

A 30 inch barrel probably has over 24 inches of air space between the charge and the obstruction.

The sudden compression of this air not only wedges the obstruction tighter, which prevents the escape of the air, but will generate an immense pressure, by compression, liberation of latent heat of compression, and the escape of the products of combustion by windage, of from three to four thousand pounds per square inch, before the charge could reach the obstruction.

This great pressure is made up from say 60 or more volumes of air instantly compressed into one volume, which will give about 450 pounds. The heat liberated by this amount of compression is theoretically over 5,000° Fah., which will add a thousand pounds more to the pressure. This is upon the supposition that there is no windage or leakage of the products of combustion of the charge past the bullet or wad, which however is not to be admitted.

The windage during the first few inches of the movement