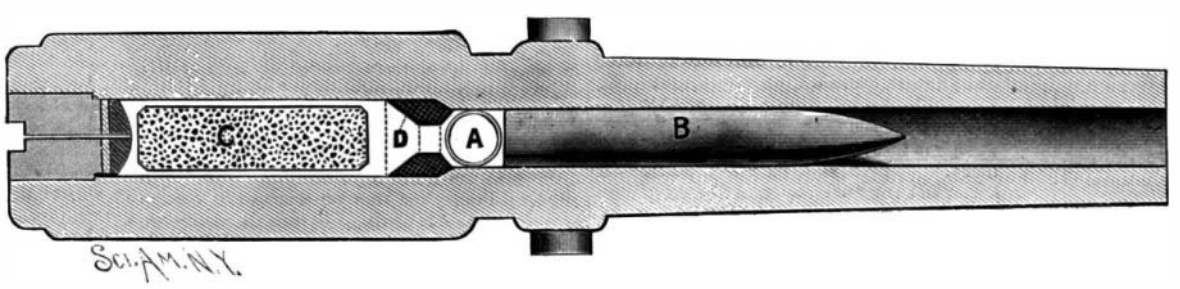
The Strength of the Limpet.

Some interesting results of a naturalist's inquiries are sent to the London *Daily News* by Mr. J. Lawrence-Hamilton, who says that, in proportion to its size, the limpet is probably the strongest of known animals, excepting the Mediterranean *Venus verrucosa*, a cockle-like creature, which pulls 2,071 times its own weight when out of its shell. "At Folkestone, by means of accurate appliances," says Mr. Lawrence-Hamilton, "I found that the common seashore limpet, which, deprived of its shell, weighed a minute fraction less than half an ounce, required, when pulled according to its plane of adhesion, a force exceeding 62 lb. to remove it from its powerful grip upon the local littoral low tide rock, or upward of 1,984 times its own dead weight. The superficial area of the base of this individual limpet measured 2·4 square inches. Taking the atmospheric pressure at 14·7 lb. to the square inch, this would even then only account for 35·28 lb., or little more than half the power exercised in the air by this sea snail, which, acting upon immersed objects in the water, would, of course, have pulled a much greater weight than that of 62 lb. Thus, in the air, a limpet pulled up to 33 lb., but subsequently, in spite of its previous fatigue, when covered by the incoming tide, it then took upward of 54 lb. to remove it. I doubt whether the limpet's adhesive force has anything to do with the question of atmospheric pressure. In other experiments, even bits of rock came away sticking to the limpet's embrace. An ancient Greek author compared this animal's adhesion to the ardent attachment of an ugly old woman to a handsome youth. In carrying out my experiments upon the limpets, I was ably assisted by the eminent practical scientific naturalist, the Hon. Walter Rothschild." The same correspondent says: "The force required to open an oyster appears to be 1,319½ times the weight of the shell-less creature."

A NEW GUN FOR FIRING HIGH EXPLOSIVES.

We give an illustration of a new method of loading and constructing ordnance, lately patented by Mr. L. Gathmann, a Chicago manufacturer. The object of this invention is to facilitate the throwing of large masses of high explosives a long distance, to effect which highly compressed carbonic acid gas is placed in a cylindrical case, A, between the projectile, B, and the powder charge, C, this non-combustible gas being designed to protect the shell from heat and also act as a cushion, thereby protecting the projectile filled with high explosives from any severe shock. The invention further consists in placing a ring, D, against a specially constructed shoulder in an enlarged powder chamber. This ring, D, is made of celluloid and has a center opening considerably smaller than the inner bore of the cannon. In discharging such ordnance the ring, D, is designed to retard, in the first moment, a great amount of the powder pressure, so that the full force cannot act at once upon the projectile, but will give a slowly starting and gradually accelerating propulsion. The opening of the ring quickly enlarges, being made of strong but very inflammable material, and before the projectile leaves the muzzle of the gun the ring almost entirely disappears. By this method the action of the gunpowder is converted in the first moment into a pushing power on the projectile, without, however, losing any of its force, it being designed that the shell or projectile shall get as much pressure before leaving the muzzle of the gun as if the ring, D, and case, A, were not inserted. The shell of the projectile or torpedo can be made very light, as it is thus protected from shock and heat, thereby giving room for large quantities of high explosives. By this method it is claimed that eight inch ordnance can throw a shell containing over one hundred pounds of the most powerful explosives a further distance than has heretofore been possible, so that one shot properly directed would sink any ironclad afloat. During the last few years large sums of money have been expended by foreign powers in perfecting torpedo boat service, but the most perfect torpedo of to-day yet leaves much to be desired. By this invention it is claimed that a torpedo containing almost any desired amount of explosives can be thrown several miles. Pneumatic guns have heretofore taken the lead in this field, but they have thus far been adapted for only a short range fire, while, if this invention fulfills the requirements claimed by the inventor, all modern ordnance can be converted into guns for firing high explosives.



SECTION OF GATHMANN'S GUN FOR FIRING HIGH EXPLOSIVES.

A NEW TARGET PISTOL.

It is more difficult to tell why the majority of boys are naturally so fond of shooting than it is to say why parents are so averse to the practice. Certainly, shooting, especially target shooting, is a pleasant and profitable pastime, as it affords discipline for the mind and eye, exercise for the muscles, training for the nerves, gives opportunity for the display of skill, and provokes healthy and stimulating rivalry.

The record of any Fourth of July is sufficient to show that firearms, even of the cheaper sort, are not safe in the hands of children and youth. This remark might properly apply to air guns also, as they are far from being safe in careless hands.

HARMLESS PISTOL.

Inventive genius has lately produced a device which is as practical as harmless. It is not only safe as far as the operator himself is concerned, but it is incapable of harming spectators or surrounding objects. The harmless pistol consists simply of a barrel, a spiral spring placed in the barrel, a stock and a trigger. The principal novelty lies in the projectile, which consists of a rod of wood having upon one end a soft rubber cup and upon the opposite end a metallic ferrule provided with a flange, which is engaged by the trigger when the projectile is inserted in the pistol barrel. This projectile is called the "vacuum tipped arrow," on account of its ability to adhere to the target when forcibly projected by the spring of the pistol.

The target consists of a varnished sheet of cardboard, provided with the usual conventional ring and figures. The best effects are secured when the target is placed against the wall with a slight padding, such as a folded newspaper, interposed between the target and the wall. As a permanent arrangement, the addition of three or four sheets of blotting paper to the back of the target, with a retaining sheet of pasteboard, all fastened together by means of paper fasteners, has been recommended.

Reducing His Salary Saved Him.

A contemporary relates the following in support of small salaries: A Philadelphia clerk says his life was saved by having his salary reduced. He was employed as bookkeeper at $1,200 a year, but for some cause was thrown out, and afterward went to work for $750. "At that time," he says, "I was thin and weak and couldn't walk a mile to save a dollar. At any rate, I thought I couldn't. But when my income was so fearfully reduced I found it absolutely necessary to economize, and I did so by walking home from my work, a distance of about five miles. It pretty nearly killed me at first. Then I began to enjoy it. Within three months I was walking both ways, and I've kept it up ever since. Ten miles a day, summer and winter, unless during a hard storm, and look at me. One hundred and eighty pounds, the appetite of an ostrich, and not a day's sickness in ten years."

THE first canal grain receipts of the season arrived at New York May 6, in the steam canal boat William Spencer. She had 7,100 bushels of wheat, and made the passage from Buffalo in seven days and five hours.

Valuable Instructions for Engineers.

The Eclipse Pump Manufacturing Co., Cincinnati, have published the following valuable instructions to engineers. To young and inexperienced persons the directions given are of practical value and should be heeded.

1. The first duty of an engineer, when he enters his boiler room in the morning, is to ascertain how many gauges of water there are in his boilers. Never unbank or replenish the fires until this is done. Accidents have occurred, and many boilers have been entirely ruined from neglect of this precaution.

2. In case of low water, immediately cover the fire with ashes, or, if no ashes are at hand, use fresh coal. Do not turn on the feed under the circumstances, nor tamper with or open the safety valve. Let the steam outlets remain as they are.

3. In case of foaming, close the throttle and keep closed long enough to show true level of water. If that level is sufficiently high, feeding and blowing will usually suffice to correct the evil. In the case of violent foaming, caused by dirty water, or change from salt to fresh, or *vice versa*, in addition to the action above stated, check draught and cover fires with fresh coal.

4. When leaks are discovered, they should be repaired as soon as possible.

5. Blow down under a pressure not exceeding twenty pounds, at least once in two weeks—every Saturday night would be better. In case the feed becomes muddy, blow out six or eight inches every day. When surface blow cocks are used, they should be often opened for a few minutes at a time.

6. After blowing down, allow the boiler to become cool before filling again. Cold water pumped into hot boilers is very injurious from sudden contraction.

7. Care should be taken that no water comes in contact with the exterior of the boiler, either from leaky joints or other causes.

8. In tubular boilers the hand holes should be often opened, and all collections removed from over the fire. Also, when boilers are fed in front and blow off through the same pipe, the collection of mud or sediment in the rear end should be often removed.

9. Raise the safety valve cautiously and frequently, as they are liable to become fast in their seats and useless for the purpose intended.

10. Should the gauge at any time indicate the limit of pressure allowed by the inspector, see that the safety valves are blowing off. In case of difference notify the inspector.

11. Keep gauge cocks clear and in constant use. Glass gauges should not be relied on altogether.

12. Under all circumstances keep the gauges, cocks, etc., clean and in good order, and things generally in and about the engine and boiler room in a neat condition.

Blowing up a Masonry Wall.

At a recent meeting of the Institute of Marine Engineers, Mr. Joseph Thomas described the method used in removing the old dock wall at the new entrance of the Royal Albert Dock. The basin, which it was found necessary to enlarge, was surrounded on all sides by walls 38 feet deep, 20 feet wide at the bottom, and 5 feet at the top, made of concrete, composed of six parts gravel and one part Portland cement, equal to granite in hardness and strength. The ground was made up to the level of these walls and quays, and warehouses formed thereon.

Several schemes were proposed for carrying out the undertaking, which were explained by Mr. Thomas, but the plan adopted and carried out with every success consisted in using explosives fired by electricity. The effect of closing the circuit was remarkable. The entire visible length of wall was instantaneously lifted in the air in a perfect line about 6 feet, a crackling roar, a cloud of brownish smoke, and a violent surface displacement of the water in the immediate neighborhood of the wall was the only visible effect of the vast forces let loose below. So instantaneous was the effect that the chairman of the dock company, who closed the circuit, declared the wall fell to pieces before his hand struck the switch.

POISON IN CELERY.—Dr. Charles M. Cresson, of Philadelphia, states that he has more than once found the typhoid bacilli in the juice that he has squeezed out of celery grown near Philadelphia.—*Annals of Hygiene.*