

A New Fire Escape.

At a recent meeting of the Engineers' Club of Philadelphia, Mr. John E. Codman exhibited drawings of and described Nicholson's fire escape, which consists of a fireproof brick tower, octagonal externally and cylindrical internally, with central shaft about 18 inches diameter, around which is formed a winding passage, of a U-shaped section, 2 feet 3 inches in width, with smooth or glazed surface, and inclined at angle of 35°, with retarding curves of less gradient. Fireproof doors would connect with each floor and roof, and a vestibule with the surface of the ground below. It is intended that those escaping shall assume a sitting posture on entering the spiral and slide to the bottom, and it is claimed to be safer than other escapes for those unaccustomed to ladders, or weakened by fright or excitement.

IMPROVEMENT IN STEAMBOATS.

Every boatman knows that the angle and depth at which the wheels of steamers strike the water affect very greatly their speed and power of propulsion, involving as a consequence the questions of time and consumption of fuel. The loading and unloading of a vessel alter the dip of the paddle; the heavier the load the greater the dip and angle, destroying the effective power of the engine. To remedy this difficulty many devices have been planned, the best of which are only partially effective, all more or less complicated, and the additional machinery being very liable to get out of order. The most common plan for side-wheel boats is the feathering wheel, which makes each paddle strike the water at right angles, but when deep in the water the power is applied at a great disadvantage, and too much of the wheel submerged for effective use.

A wheel large in proportion to the size of the boat and capacity is generally accepted as a solution of the difficulty; the vessel being constructed so that the load will not sink her below a line of effective working power. In stern-wheel boats the load is mainly carried on the bow, so that they do not run on an even keel, and the resistance of the water through which they plow their way is greatly increased. Other craft of this kind raise and lower the wheels by several devices not applicable to large and powerful boats.

Mr. Robert L. Stevens, of Albany, Oregon, has recently patented a device which raises and lowers the wheels of either side or stern-wheel boats, so that whether the vessel be loaded or unloaded the paddle will strike at the most effective angle and depth, securing the greatest speed with a minimum of power, while the driving engines are not interfered with. This is effected by a series of screw shafts arranged for simultaneous movement by the driving engine, and they do not detract from the strength of the wheel or boat. The arrangement is not complicated, and adds but comparatively little to the weight.

The advantages of this improvement are many. The wheels and engines of large boats can be made smaller and driven faster, economizing weight and fuel, the destructive jar of an overloaded boat and its powerful engine obviated, increasing the durability of both. They can be deeply loaded without changing the paddles to a smaller diameter, as is often done on the Mississippi. They can be built deeper and longer, doubling or tripling their capacity in deep rivers. With light loads they can run up the shallow rivers at full speed, and thus avoid expensive transfers of freight, and their draught only limited by the depth of the rivers in which they ply. For example, a vessel drawing twelve feet of water when loaded with 1,000 tons, could start from New Orleans, leave portions of her freight at the great centers of commerce, and with a light load left, say 150 tons, and drawing three and a half feet or less, mount the swift and shallow tributaries of the Mississippi, carrying freight directly to its destination instead of transferring it to a steamer of lighter draught.

The paddle wheel and its shaft are supported at the stern of the vessel, as shown in the engraving, by boxes which are formed with side flanges entering grooves formed in fixed posts, so that the boxes are free to be raised and lowered. Screw shafts, supported at the top and bottom, pass through the internally threaded flanges of the boxes, so that the boxes with the wheel and shaft are sustained by the screws. On the lower ends of the screws, at each side, there are bevel gear wheels meshing with similar gears on shafts that are fitted longitudinally of the vessel at each side.

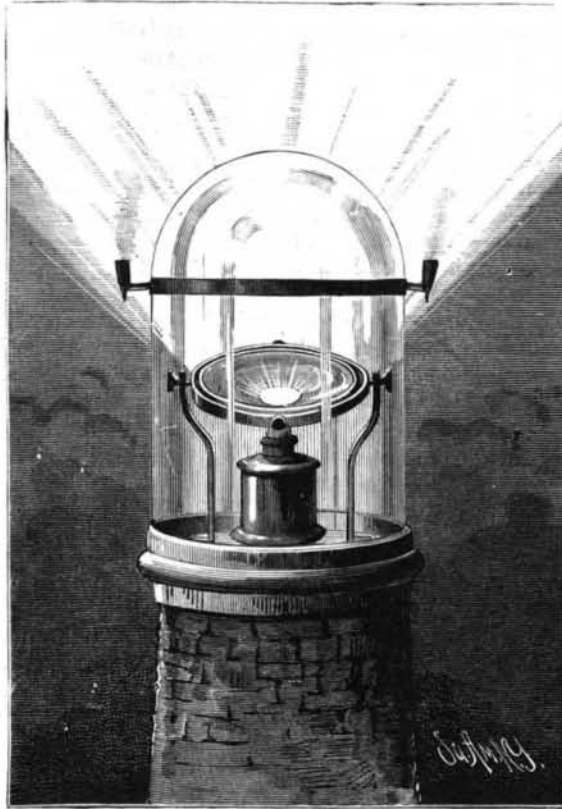
The cylinders are hung for oscillation on trunnions, and the slides are connected to the cylinders so as to retain their proper relative position. A screw is fitted in connection with a nut on each slide for swinging the slide and cylinder and sustaining them. All of the screws are connected for simultaneous operation. The movement being in an arc

from the trunnions, the screws and bevel gearing are proportioned to obtain the variation in movement. To allow vertical movement of the boxes the piston and eccentric rods are fitted with right and left hand screw turn buckles, so that the rods can be lengthened and shortened.

The invention can be applied in connection with side paddlewheels and beam engines by changing the relative position of the parts.

IMPROVEMENT IN LIGHTHOUSE LANTERNS.

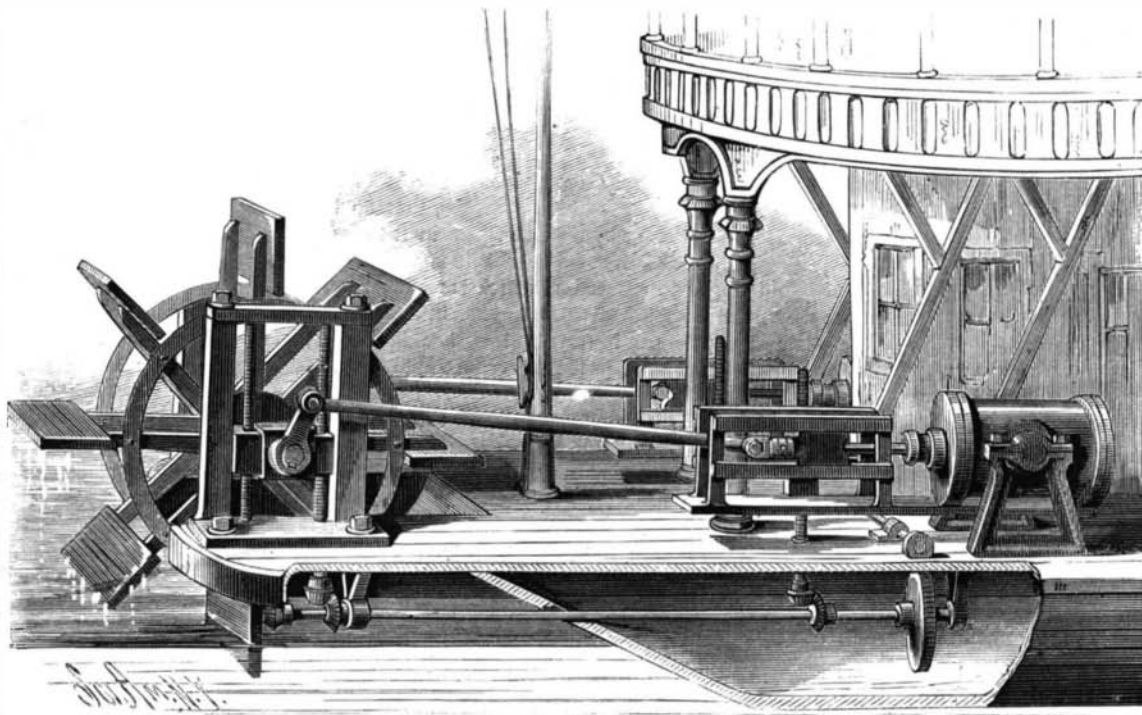
The engraving represents a novel lighthouse lantern recently patented by Mr. Oliver Cook, of Darien (Rowayton P. O.), Conn.

**COOK'S LIGHTHOUSE LANTERN.**

The lantern is provided with a glass dome or cover, and a concave ring reflector in a gimbal, provided with clamping screw pivots to hold it in any desired position.

The tower of the lighthouse is constructed in the ordinary manner, and supports the lantern, the sides of which are made of glass, secured to a frame attached to the top of the tower. The top of the lantern or lamp chamber is made of glass, arched in the form of a dome, and supported by the lantern frame. The glass dome may be made in one piece or in sections, as may be desired. The lamp is of the ordinary description. The reflector is a circular concave disk with a hole through its center, through which the flame of the lamp projects.

The pivots of the gimbal are screws which permit of clamping the rings of the gimbal in place when the reflector is adjusted in the proper position to throw the light vertically or at any desired inclination.

**STEVENS' IMPROVEMENT IN STEAMBOATS.**

By this construction the light may be thrown upward against the clouds, and will be reflected by the clouds so that it can be seen at a much greater distance than is possible when the light is thrown from the lantern in a horizontal direction. The adjustment of the reflector depends upon the state of the air. The gas from the lamp escapes from the lantern through two or more elbow pipes. The lower arms of these pipes incline slightly downward, so that any rain

that may fall into the open upper ends of the pipes cannot flow into the lantern, but will escape through small tubes connected with the pipes at their angles. The air to support combustion is admitted through openings in the bottom of the lantern.

This invention was suggested to the inventor by seeing the lights of New York city reflected from the clouds fifty miles distant from his home.

This style of lantern will enable vessels coming in from the sea to get the bearing of the harbors in dangerous weather much sooner than they could with the old form of lighthouse.

These lights could be made to flash, or they may be colored to distinguish them from other lights.

RECENT INVENTIONS.

Mr. Josiah Wormuth, of Kinney's Four Corners, N. Y., has patented an improvement in the class of farm fences in which the rails or boards forming the panels are supported by means of wires attached to the posts. Boards, rails, or poles are used to form the panels, and instead of posts set in holes dug in the ground the inventor uses stakes which are sharpened to adapt them for driving, greatly facilitate the erection of the fence or its removal from one place to another. The invention relates particularly to the manner of applying and securing the wires to the posts or stakes. In addition to forming the eyes to receive the rails, the larger loops depend below the rails so that the weight of the rails causes a direct downward pull on the nails, and the pull or strain is mainly lateral, so far as relates to the lower nail of a pair. The result is, that the nails and wire are subjected to less strain, so that the nails retain their hold in the post longer, and the wire may be of smaller size, and will remain intact or unbroken for a longer time.

A novel toilet fan has been patented by Mr. James C. Stirrat, of Brooklyn (E. D.), N. Y. The object of this invention is to provide a new and improved fan which can also be used as a new and very amusing toy. The invention consists in a fan made of a circular or polygonal sheet of pasteboard, metal, or other suitable material, suitably ornamented, and pivoted on the fan stick or handle so as to revolve freely on its pivot. It is provided with a central ring, and a series of radial lines dividing it into a number of equal or unequal spaces, which may contain advertisements, etc., or they may contain mottoes, verses, names, letters, etc., or pictures of animals, nursery scenes, etc. It will afford children and others much amusement to revolve the fan and observe to which space the pointer points when the fan stops.

Mr. Amant H. Ohmann-Dumesnil, of St. Louis, Mo., has invented an improved device for holding stair carpet in such a manner that it can be removed or replaced and fastened conveniently and quickly. The invention consists of a latch provided on its under side with one or more studs or pins and pivoted to a prismatic or beveled plate or block which is secured to the riser and tread at the angle formed by the same, the carpet being placed over this block and held in place by the latch, which is closed down upon the block, the pins passing through the carpet into apertures in the block, the latch being locked by a spring or a pivoted catch.

An improvement in lead pencil holders has been patented by Mr. Edward Weisenborn, of Hoboken, N. J. The object of this invention is to facilitate and cheapen the manufacture of lead pencil holders of that class in which the lead is held by a spring-pressed divided point.

Mr. Henry H. Welch, of Cincinnati, O., has patented an improved car switch, manipulator which is especially adapted to street car switches. The object of the invention is to enable the driver of the car, by means of suitable attachments to the front of the car, to operate the switch.

Mr. Frank N. Forster, of Buffalo, N. Y., has patented an improvement in tanks for storing petroleum, the object being to protect the tanks from the effects of lightning. It is well known that a rising quantity of gases attracts lightning; this inventor has, therefore, taken all possible precaution to prevent the escape of gases from the oil tank. If considerable quantities of gas accumulate in the tank and the pressure increases, a valve is opened by the pressure, and the gases are conducted to places some distance from the tank. If

the gas should become ignited, the valve prevents any return of the flames into the tank.

An improved chain-work for jewelry, formed of interlocking spiral wires and crossbars in every other coil, the side edges of the crossbars and wires being folded over the body of the chain-work, so that soldering is rendered unnecessary, and polished crossbars may be employed, has been patented by Mr. Emile Vieille, of Providence, R. I.

Mr. Lawrence W. Chadwick, of Shenandoah Iron Works, Va., has patented an improved sectional steam boiler, composed of several horizontal water and steam chambers set one above the other within a casing or shell closely fitting against their edges and supported and connected by vertical and horizontal water circulating pipes and T's, the chambers having vertical openings through them, that serve as flues for the passage of the products of combustion; and it consists, also, in combination with the chambers and tubes, of a fireplace, water front, and of novel pipe coupling devices.

An improvement in car couplings has been patented by Mr. Samuel A. V. Hartwell, of Valley Center, Kan. The invention consists of the combination of a draw-head having a sliding cap for regulating the size of the coupling entrance, a notched coupling pin for adjusting the link, and a flat link having grooved ends.

Mr. Noah Jacobsohn, of New York city, has patented an underground street, the object of which is to facilitate the removal of street sweepings and refuse garbage, ashes, snow, etc., and to provide a road for the vehicles for removing these sweepings, garbage, etc., whereby the streets can be easily and economically kept clean. The invention consists in an underground road or street occupying a part or the entire width of the street, and having a roof of grating flush with the ordinary street, through which the sweepings, snow, garbage, etc., are swept or dumped into the cars or carts on a track of the underground road.

An improved spark arrester has been patented by Mr. David Wiser, of Plymouth, Ind. This invention is an improvement upon the spark arresters described and claimed in Letters Patent Nos. 165,907 and 210,828, which were granted to the same inventor July 20, 1875, and December 10, 1878, respectively. The improvement renders the device more adaptable to smoke stacks which are straight. The spark arrester will return to the fire box a considerable portion of the smoke and gases, where they will be consumed and utilized as fuel.

Mr. Frederick Shriver, of Grand Rapids, Mich., has patented a steam generator which has the base burning feature embodied in it, and which is designed for low pressure heating purposes and for domestic work, and which has no tube or crown sheet to protect by a fixed water line. The invention consists of an upright boiler of U-shaped cross section, having a double shell inclosing the water space, curved in such a manner that one shell or wall forms the exterior of the boiler and the walls of the interior central fuel reservoir, while the other and concentric shell forms the walls of the interior smoke flue of the boiler, through which pass the heat and products of combustion, thereby forming an interior and an exterior water chamber connected with each other.

An improved car coupling has been patented by Mr. John Cochran, Jr., of Millwood, Mo. The car coupling is constructed with wide bumper heads, with two pairs of links, a pair of pins, slotted sliding bars, connected with a pin of each pair, and pivoted lifting bars connected with the slotted sliding bars and swinging trip blocks, whereby the cars will be coupled automatically as they are run together.

Mr. Frederick A. Fargo, of Pine Woods, N. Y., has patented a hop picker's measure or box that may be easily taken apart for stowing away in small space and for transportation, and easily set up for use.

The Anthracite Product of 1881.

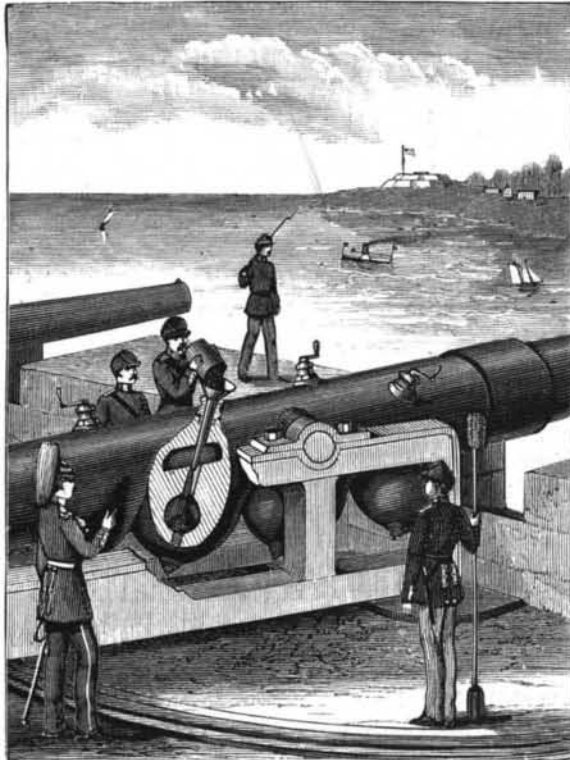
The official report of the anthracite tonnage of the Pennsylvania railroads for the past year shows a traffic of 28,500,016 tons, an increase of 5,032,774 tons as compared with the previous year. Of this amount the Philadelphia and Reading Railroad carried 6,940,823 tons, the Lehigh Valley Railroad 5,721,869 tons, the Central Railroad of New Jersey 4,085,423 tons, the Delaware, Lackawanna and Western Railroad 4,338,968 tons, the Delaware and Hudson Canal Company 3,211,496 tons, the Pennsylvania Railroad 2,211,363 tons, the Pennsylvania Coal Company 1,475,385 tons, the New York, Lake Erie and Western Railroad 405,230 tons. Of the total production, 48.96 per cent was from the Wyoming region, 18.58 per cent from the Lehigh region, and 32.46 per cent from the Schuylkill region. The stock of coal on hand at tide water shipping points was 497,024 tons.

A Characteristic of American Life.

In the summer of 1835 a barefooted boy was on his way to Honesdale, Pa., walking the tow-path of the Delaware and Hudson Canal. When four miles from Port Jervis, and still forty miles from his destination, he was overtaken by a canal boat. He was asked to jump aboard the boat and ride, which he did. On the boat was a Scotch family, just landed in America, who were on their way to the Pennsylvania coal fields. One of its members was a boy the same age of the young pedestrian, eleven years. A strong friendship grew up between the two boys by the time they reached Honesdale. The Scotch family went on to Carbondale, the center of the Lackawanna coal field. The boy who had been given the ride in the boat obtained employment on the canal. His friend, the Scotch boy, worked in the mines for a short time as mule boy. Both he and the former barefoot boy rose in the company's service. The Scotch boy of forty-six years ago is Thomas Dickson, President of the Delaware and Hudson Canal Company. His friend, the other boy, is Col. F. Young, General Manager of the company, and President of its Albany and Susquehanna Railroad system.—Sun.

THE MULTICHARGE CANNON FOR COAST AND HARBOR DEFENSE.

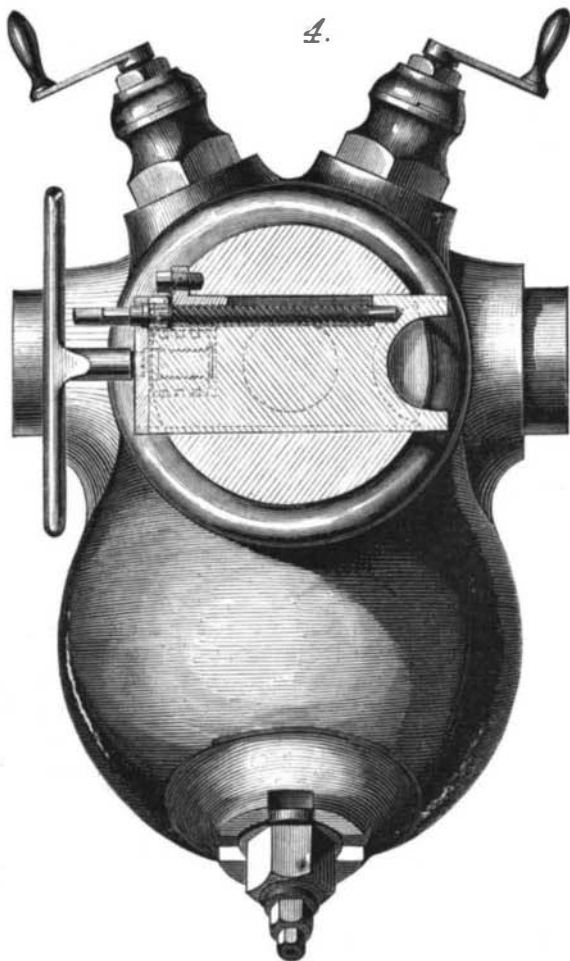
It would seem to be the rule in military as well as in other arts, that radical improvements are more apt to be made by non-professionals than by those whose lives are devoted to the particular art or service improved. The latter perfect the means and methods which they are educated to use; they do not revolutionize them. It is the outside inventor who sees where radically novel changes can be advantageously made. Freedom from professional bias is often, in-



LOADING THE LYMAN-HASKELL GUN.

deed, a prerequisite for successful effort in invention. And it may be that the professional prejudice which the inventor of striking boldness and originality is sure to encounter is one of the conditions of a thoroughly practical development of his ideas.

When the stress of war was upon the country, twenty years ago, the attention of our inventive minds was largely directed to the production and development of military and naval devices, some of which, like the revolving turret, the breech loading rifle, and the magazine gun, had been dormant, so to speak, for years. Other ideas, equally revolu-



SECTION OF BREECH OF LYMAN-HASKELL GUN.

tionary in character, were suggested by the needs of the time, but the war was happily ended before they could be developed. Among these was the idea of increasing the efficiency of firearms, particularly heavy guns, by what is now known as the accelerating principle. Since then the original idea of Mr. Lyman has been developed and practically applied by Mr. Haskell, in the multicharge cannon, the construction and mounting of which are illustrated in the accompanying engravings, an invention which promises to work as radical changes and improvements in military and

naval operations as were effected by those other American inventions—magazine guns, torpedoes, revolving forts, iron-clads, and the rest.

In the contest between the increasing weight and power of cannon and the resisting strength of more and more heavily armored defenses, two radically different lines of effort have been followed. Within the profession, capacity in guns to hurl heavy projectiles at great velocity has been sought for by increasing the size and strength of the gun; by chambering the breech to make room for a large volume of powder to be exploded, and by moulding the powder to secure accelerating combustion, slow at first to start the projectile, then more and more rapid to burn all the powder and attain the maximum pressure while the projectile was passing through the gun. By these improvements it has been found possible to increase the charge of powder to one-fifth the weight of the projectile, enabling a properly constructed gun to deliver a shot with such force and velocity as to cause it to penetrate somewhat more than as many inches of iron as the diameter of the bore of the gun measures. Under the most favorable conditions the heaviest armstrong gun (100-tons) has penetrated nearly one and a half calibers, or about two feet of wrought iron, with a caliber of seventeen inches. Increase of efficiency is secured on the accelerating principle by devices for firing successive charges of powder behind the ball while the ball is passing through the gun. In this way the projectile is thrown by the explosive force of more than its weight of powder, or five to ten times as much as can be burnt behind a ball by the conventional method.

The inventors claim that, notwithstanding the greatly increased charge of powder under the new principle, the maximum pressure within the gun is not increased. By the old method almost all the strain is upon the metal about the breech of the gun, while by the new the strain is distributed along the entire length of the gun. As a natural consequence of the increased charge a longer and heavier projectile can be employed, and the increased velocity with which it leaves the gun enables it to penetrate iron armor to a depth from four to ten times the caliber of the gun, according to the number of accelerating charges.

Two official tests of the efficiency of multicharge guns have been made before boards of officers of the army and navy, some of the experiments being made for range, others for penetration, and still others for initial velocity. On every point the reports show a decided superiority in favor of the multicharge guns, compared with other guns of equal or greater weight. So marked is the superiority of the accelerating principle that General John W. Newton, U. S. A., calculates that a 10-inch accelerating gun would be as efficient as the 81 ton (16-inch) Armstrong gun, and nearly as efficient as the 100-ton (17-inch) Armstrong, while the latter would be surpassed in inefficiency by a 12-inch Lyman-Haskell gun. In the matter of cost and the expedition with which guns of a required penetration could be furnished the advantage seems to be as markedly on the side of the multicharge guns.

A still further advantage is promised by the new system in the relatively smaller cost of mounting, whether on land or water. The cost of a Duilio, carrying a 100-ton gun—the most powerful vessel afloat—would suffice for the building and arming of several small swift steamers armed with cheaper and lighter but equally efficient accelerating guns, while the larger craft would present a much better mark to hit than her smaller adversaries. In like manner a few properly mounted accelerating guns of ten or twelve miles range, commanding any of our harbors, would make them practically inaccessible to the most powerful war ships that could be floated.

In the SCIENTIFIC AMERICAN, of November 12, 1881, was described the casting of a 6-inch Lyman and Haskell gun at the foundry of the Reading Iron Company. The gun will be finished next spring. It will be twenty-five feet long, and will throw a shot weighing 150 pounds, with a total charge of 130 pounds of powder, or more than four times the weight of powder used with a shot of the same weight in the best guns now in use. A longitudinal section of this gun, showing the supplementary powder pockets, appears in Fig. 2.

The gun will be loaded with 18 pounds of hexagonal powder in the breech, and 28 pounds of finer powder in each of the pockets. The breech charge is intended to overcome the inertia of the ball without straining the gun. As the ball passes the openings to the several pockets the heated gases fire the supplementary charges, increasing the velocity of the projectile to 4,000 feet a second when it leaves the muzzle of the gun, or more than double the velocity attainable by guns of ordinary construction, a velocity sufficient, it is calculated, to carry the projectile twelve miles, or to enable it to penetrate two feet of wrought iron at a distance of 200 yards. The explosion takes place in tough steel backed by strong cast iron. The manner of charging the breech chamber and the several pockets is shown in the smaller cuts.

Touching the practicability of the methods of loading and firing guns on this principle, as developed by Messrs. Lyman & Haskell, we have the testimony of General Newton to the effect that no doubts are entertained by experts that the gas check can be made perfectly efficient, while, in his opinion, the loading of the pockets can be made as expeditious as the loading of the breech.

The contractors for the construction of the gun we have illustrated are Messrs. Pancoast & Tarr, agents in this city for the Reading Iron Company.