ORDNANCE IN THE LONDON EXHIBITION.

From a long article on the subject of ordnance in the London *Engineer*, we take the following extracts :—

When Mr., now Sir William, Armstrong first turned his attention to guns it was as a mechanical engineer, and it was the same with Mr. Whitworth. Whatever those gentlemen have accomplished has been in the way of improved construction only. If there be any invention in the Armstrong gun it is in the invention of Captain Blakely, or, to go further back, of Professor Treadwell, of the United States, or even, perhaps, that of Mr. Peter Rothwell Jackson, of Salford. Captain Blakely proposed, and, luckily, patented the use of coils shrunk successively upon an inner tube of cast iron, brass, or steel, as early as 1855, or two years before the then Mr. Armstrong had taken up the plan. In the United States, however, Professor Daniel Treadwell not only made cannon nearly twenty years ago, with welded coils shrunk successively upon an inner tube, in some cases of wrought iron and in others of steel, but he published a pamphlet on the subject, one which, dated 1845, is still in existence, and in the hands of military men in London. But on the 6th November, 1834, Mr. Jackson, of Salford, patented a mode of constructing cylinders for hydraulic presses by successfully shrinking wrought iron or steel hoops upon a thin cast iron cylinder. Mr. Jackson in the same year made a press the cast iron portion of which was 19½-inches bore and ⅞-inch thick, and successively shrunk on three series of wrought-iron hoops, each 2-inches in thickness, thus making the walls of the cylinder 6⅞-inches in total thickness. This press has been in use ever since, and Mr. Jackson has informed us that it will bear a strain of 10 tuns per square inch, or 3,000 tuns in all. The hoops are not coils, it is true, but plain rings, and it is only in this respect that the mode of construction differs from that of Captain Blakely, whose patent completely forestalls the Armstrong system, except only in the injudicious practice, pursued at Woolwich and Elswick, of making the inner tube of wrought iron instead of steel. Mr. Jackson was anxious, twenty-eight years ago, to apply his system to the construction of heavy guns, but his friend, the late Mr. J. G. Bodmer, who has met with no success in introducing his own plans to the notice of government, dissuaded him from the attempt.

With these facts, therefore, we cannot magnify our present class of rifled ordnace into anything like a great or recent invention. The Armstrong and Whitworth guns in the Exhibition are remarkable chiefly for the excellence of their workmanship, and to this is due the great range and precision which they have attained. They are at the same time costly, and, in some important respects, faulty in construction. This, although perhaps sufficiently known to our readers already, will be shown presently.

It is to be regretted that Mr. Whitworth did not send a sample of his 12-pounder breech-loader, as it was with a gun of this description that, in an official trial on the 2nd of April, 1861, results very much superior to those afforded by the same class of Armstrong gun were obtained. As we have noticed the construction of the 12-pounder Armstrong, it is as well to give its maximum performance ; and, as this was obtained in a trial with the Whitworth gun, the practice with both may properly be given together.

According to the report of the Ordnance Select Committee, the trials took place April 2, 1861, the following being the data and results :

Armstrong breech-loading 12-pounder, No. 6, weight 8 cwt. 2 qr. 11 lb., length 7ft. 6in.

No. of rounds.	Charge lb.	Elevation, deg.	Mean range yards.	Mean deflection to right yards.	Mean time of flight sec.
Five	1¼	2	1,130	4	3·4 sec.
Five	1½	2	1,256	5	3·6 "
Five	1½	5	2,146	9	6·8 "
Five	1¾	5	2,358	11	7·3 "
Five	1½	10	3,568	12	9·8 "
Five	1¾	10	3,908	17	12·9 "

Whitworth breech-loading 12-pounder, No. 1, weight 9 cwt. 3 qr., length 8ft. 8in. hexagonal bore rifled to make one turn in 4ft. 7in.

No. of rounds.	Charge lb.	Elevation, deg.	Mean range yards.	Mean deflection to right yards.	Mean time of flight sec.
Five	1½	2	1,198	1⅔	3·5 sec.
Five	1¾	2	1,289	1⅔	3·4 "
Five	1½	5	2,367	1⅓	6·9 "
Five	1⅔	5	2,471	1⅔	7·0 "
Five	1½	10	4,222	3	10·2 "
Five	1¾	10	4,399	6⅔	13·1 "

It will thus be seen that Mr. Whitworth's gun gave the best results. This was due to the mechanical fit of his projectiles to the bore of his gun, no forcing or stripping of a lead-coated shot, like Armstrong's, being involved.

The Whitworth Rifle and Ordnance Company, of Sackville street, Manchester, exhibit a handsome 1-pounder muzzle-loading rifled cannon, mounted on carriage ; a 6-pounder muzzle-loading rifled cannon also mounted ; a 6-pounder breech-loading rifled cannon without carriage ; a 12-pounder brass rifled field-piece ; a 32-pounder and a 70-pounder rifled ship's cannon. All these guns have bores hexagonal in cross section, the projectiles being planed to correspond. The pitch of the rifling is, in all cases, 20 diameters of the bore. Mr. Whitworth, we believe, employs mild steel, or "homogeneous metal," for the inner tubes of his larger guns, those of smaller bore being made wholly of "homogeneous iron," so called. In making his larger guns Mr. Whitworth takes a tube of this material, and turns it so as to have an external taper of about an inch. Upon this a series of hoops of fibrous iron, as employed by Mr. P. R. Jackson, are forced on cold by hydrostatic pressure. Each hoop is about 20-inches long on the gun. All the hoops are put on with the greatest amount of pressure they will bear without injury. A second series of hoops, breaking joint with the first, is forced on over them, and thus the larger guns are made up. For the hoops next the breech Mr. Whitworth has sometimes used puddled steel. It is Mr. Whitworth's opinion, frequently declared, that large guns may be made wholly of "homogeneous metal," a material which is practically identical in everything, except cheapness, with the mild steel we have so long advocated for guns.

The standard charges of powder in the Whitworth guns are generally one-sixth the weight of the projectile, the Armstrong charges being only one-eighth of the weight of the shot. The average ranges obtained with the Whitworth 12-pounder at 2°, 5°, and 10° of elevation, have been already given. With a 12-lb. shot, and 1¾lb. of powder, the average range, at 20° elevation, is 7,000 yards, and at 35°, 10,000 yards, or nearly six statute miles. Mr. Whitworth also exhibits one of the flat-fronted projectiles which were fired through the armor plates and side of the *Trusty* during official trials at the Nore. Besides these are hexagonal shot and shell, ranging from 1 lb. to 70 lb. weight.

The largest gun in the Exhibition is that made by the Mersey Iron and Steel Company, of Liverpool, and named the Prince Alfred. This is a wrought iron, muzzle-loading rifled gun, forged hollow by a process patented six years ago by Mr. William Clay. The gun is 12 feet long, 35-inches in diameter at the breech, 18-inches at the muzzle, 10¼-inch bore, and weighs 10 tuns. The rifling consists of twelve shallow grooves, making one turn in 30 feet. Before being rifled it was fired with a 140 lb. ball, and 30 lb. powder, against a target of 4½-inches iron plates, backed with timber and sand. The plate was indented 6-inches, but not actually penetrated and is exhibited along with the gun, as is also (or was for a short time) the 4½-inch plate, shattered in 1856 by the 13-inch Mersey gun, firing a 280-lb. shot. The Mersey Company also exhibit Col. Clay's 12-pounder breech-loading rifled gun, of 3-inch bore, with 15 shallow grooves. This piece, it is stated, has been fired 19 times a minute, with a great escape of gas, we do not doubt, at the breech, which is not such as is likely to give a good fit.

The next largest gun is that of Herr Krupp's, of 9 inch bore, and weighing 9 tuns, a single mass of cast steel, and by far the largest gun of that material ever made. It is, however, hardly more than a steel forging, bored and rough-turned, for, although open at both ends, no breech-loading arrangement is shown, nor has the bore been rifled. Herr Krupp also exhibits a 100-pounder, a 68-pounder, a 40-pounder, a 25-pounder, and a 25-pounder steel gun, each in the same stage of finish as the 9-inch gun. He also sends a 4-pounder muzzle-loading rifled cast steel gun.

Captain Blakely exhibits a 200-pounder cast iron gun, strengthened on his principle, and weighing 7 tuns. It is a muzzle-loading gun, with an 8½-inch bore, rifled with three grooves on Commander Scott's "centrical system." The makers of the gun are Messrs. Fawcett, Preston & Co., of Liverpool. The gun is hardly as well strengthened as we should suppose Captain Blakely would have it, if called to a contest with the heavy Armstrong gun, yet there can be no doubt that the wrought-iron coiled jacket extending from the trunnions to the base ring affords great additional strength, shrunk on as it is with a considerable degree of tension. Captain Blakely's system, besides its imitation by Sir William Armstrong, has been adopted by the Spanish, and to some extent by the French governments. The Confederates have also purchased many Blakely guns, and the Federals have employed the same plan for strengthening cast-iron guns, which, thus jacketed, are known as "Parrott guns," from the name of the maker, Mr. R. P. Parrott, of West Point. Captain Blakely also exhibits a 9-pounder cast steel gun with 8 grooves.

Mr. Lancaster exhibits an oval-bore cast-iron gun of the 95 cwt. class, doubtless a 68 pounder originally. It is stated to have fired 604 rounds at angles of above 12° of elevation. A smaller oval-bore gun is exhibited with it. The initial velocity of the shot from the large Lancaster guns, where the charge is one-fourth the weight of the projectile, is given as 1,650 feet per second.

Commander Scott, R. N., exhibits the muzzle of a 32-pounder, as rifled on his centrical system.

Mr. P. M. Parsons, of Arthur street East, exhibits a wrought-iron gun with a novel arrangement for loading at the breech.

Mr. Bessemer exhibits a 24-pounder gun in the rough, and another of the same rate in the finished state. That in the rough is a solid forging of Bessemer steel, forged from an ingot 18-inches square and weighing 28 cwt. Both are examples, on a small scale, of the ordnance which we have so long advocated as the cheapest and strongest for the purposes of modern warfare. The material may be produced actually at a less cost than wrought iron in the same shape, while the former has nearly double the strength of the best Lowmoor iron, and, being completely fusible, may be obtained in perfect soundness and homogeneity. It is to be regretted that Mr. Bessemer has not yet found it convenient to give a demonstration, on the largest scale, of the capabilities of his material for ordnance, but the time when it will be conclusively tested cannot be far distant. He exhibits some improved projectiles, which we have noticed on former occasions.

Altogether the Exhibition is particularly full in respect of ordnance, the examples shown illustrating a wonderful improvement in construction, or, more strictly, in workmanship, over any known eleven years ago.

The first number of the Scientific American was issued August 28, 1845 ; it contained engravings and short notices of the long railway carriage now so commonly used, the iron steamship *Great Britain*, Signor Muzio Muzzi's traveling balloon, and also the noble head of George Washington. Its contents are a medley of poetry, crude science, rational religion and miscellaneous items. The editor announced, in his opening address, that he was called upon from the South and West to undertake such an important work. We suppose it safe to say that not more than five hundred copies were issued of the first number. It is now the most widely circulated journal of the kind in the world.

Changeable Fire-Screen.—Draw a landscape on paper, with India ink, representing a winter scene, or mere outline, the foliage is to be painted with muriate of cobalt for the green, acetate of cobalt for blue, and muriate of copper for yellow, which, when dry, will all be invisible. Put the screen to the fire, and the gentle warmth will occasion the flowers, &c., to display themselves in their natural colors, and winter be changed to spring. When it cools, the colors disappear, and the effect can be reproduced at pleasure.

There are seventy rivers in Canada in which salmon is caught. About 10,000 barrels of this fish are exported annually from the Bay of Chaleur.

English bar and bolt iron is selling at Liverpool for £5 10 (about $27) per tun. The best Staffordshire is selling at £7.

Scotch pig iron is selling at Glasgow at about $13 per tun.

Improved Fire Alarm.

Samuel D. Cooper, of this city, has invented and patented an apparatus for an instantaneous alarm to the inmates, on the first beginning of a fire in any part of a building. A bell of suitable size is so arranged in relation to a hammer and coiled spring that the unwinding of the spring will ring the bell. Wires lead from the apparatus to every room in the building, where they are so connected with strings that when a fire occurs the wires will be released, in their turn releasing the spring, when the bell will be rung for a long time with great violence, awakening a person in the room, or indeed any one in any part of the building.

The apparatus is not complicated and will be understood by an examination of the engravings, of which Fig. 1 is a front view, and Fig. 2 a view of the interior with the back plate removed. A is the bell, and B the hammer attached to an arm on the rock shaft, C. This shaft has at its lower end an arm, *d*, which enters a slot in the end of the rod, *e*. The rod, *e*, is pressed outward by cams, *f f f*, and withdrawn by a spiral spring wound around it. This reciprocating motion, it will be seen, rocks the shaft and rings the bell. The cams, *f f f*, are upon the shaft of a spur wheel which meshes into the teeth of the wheel, G, and this wheel has upon its shaft a drum around which a cord, *h*, is wound; the cord passing also around the drum, I, of the coiled spring.

The wheel, G, is turned by means of a key which fits upon the end of its axle, winding the cord, *h*, around its drum, and coiling the spring in the drum, I, more closely upon its fixed shaft. Upon the withdrawal of the key the spring would immediately begin to uncoil and ring the bell, were the several parts left free to move, but a simple stop is provided in the form of a bolt, *j*, which passes through the lower edge of the case, and enters between the cams, *f f*, thus preventing the wheel with which they are connected from turning, and holding all the parts in a fixed position. The bolt, *j*, is attached to a spring, *k*, which tends to withdraw it from between the cams, *f f*, but the spring is held in place by a cord, *l*, that is drawn vertically across the middle of the face pate, and attached to a knob at the top.

For each room in the building a slide, M, is provided. Each of these slides has cast upon it an arm, *n*, which passes through a long slot in the face plate into the interior of the case, and is connected rigidly with a rod, *o*. The rods, *o o*, have spiral springs wound around them tending to force the slides, M, toward the middle of the case, but the rods extend outward through the edges of the case, and are held in this extended position by the wires, *p p*, which are conducted to their respective rooms in the manner of ordinary bell wires. When the wire reaches its room, it has attached to its end a stout cord, which is carried once or twice round a belaying pin, and is then connected with a thread or small twine which is made very inflammable. The thread is led around the ceiling, and down by the sides of the doors and windows, and secured by winding its end upon a button provided for the purpose.

If a fire occurs in the room, it burns off the prepared thread, allowing the cord to unwind from its belaying pin, thus releasing the wire, *p*, and permitting the slide, M, to be thrown inward by the spiral spring upon the rod, *o*. As the slide, M, flies inward the knife-blade edge upon its end cuts the string, *l*, releasing the spring, *k*, which withdraws the bolt, *j*, from between the cams, *f f*, thus permitting these cams to revolve and sound the alarm upon the bell, A.

As the slide, M, darts forward, it uncovers a plate on which are words indicating the room in which the fire is burning.

The bell makes an intolerable noise, but if it is desired to have a still louder alarm, provision is made for exploding a bomb with a report louder than that of a musket. The bomb is made of paper filled with gunpowder and overlaid with strong twine, and thus constructed causes no damage by its explosion. It is suspended in the vicinity of the apparatus, and has a fuse leading from it to a match which is inserted in a cylinder provided for it in the face plate. A friction wheel is connected with the spring so as to rub against the match when the spring is released and thus fire the bomb.

The apparatus should be placed in some room which is constantly occupied, and when a fire occurs not only will it be immediately announced, but its location will be indicated; thus preventing any delay in finding the origin of alarm. This apparatus will be found as useful in vessels as in houses, and may be extended to the several buildings of large establishments. It is so simple that any bell hanger may put it up, and the expense, we are assured, will not exceed one dollar per room.

A patent for this invention was granted, through the Scientific American Patent Agency, August 6, 1861, and further information in relation to it may be obtained by addressing the inventor at 10 and 12 Pell street, New York City.

Fig. 1

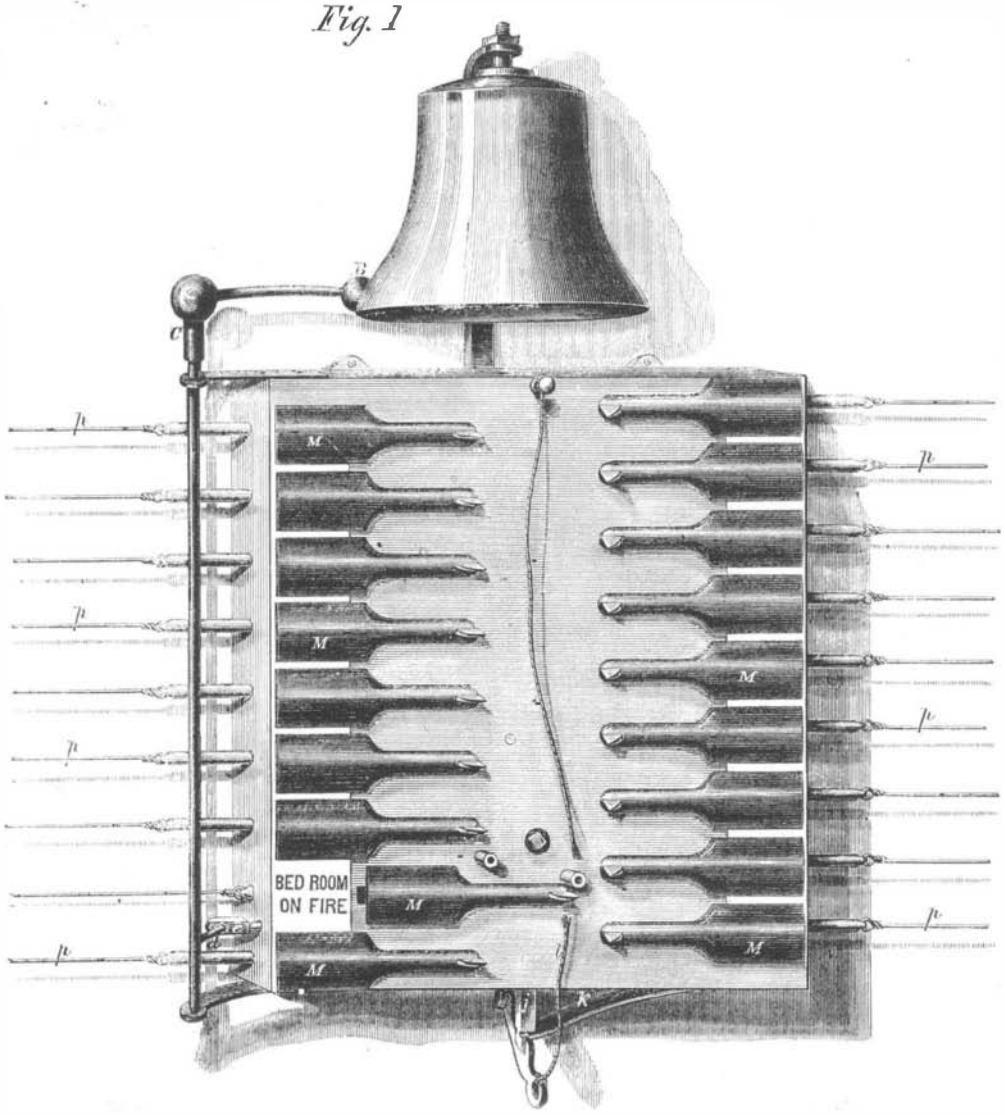
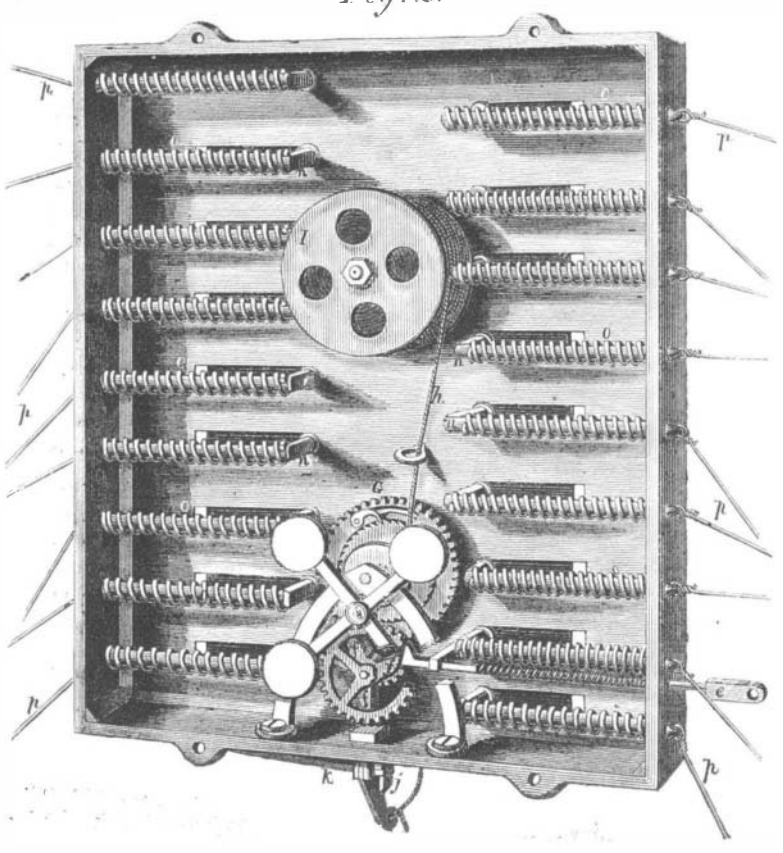


Fig. 2.



COOPER'S FIRE ALARM.

The Scientific American has been published seventeen years. During this long period its columns have sent forth a great abundance of the most valuable information. Thousands of receipts have been given which have been of great benefit to its readers, and would benefit thousands of others if they could be brought to light once more. This we now propose to do, beginning with the first number of the new volume, and continuing them from time to time until much, if not all, of this useful matter is once more reproduced and brought to life. Many a one of our readers has been greatly benefited by some one of these receipts.