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THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 412,

For the Week ending November 24, 1883.

Price 10 cents. For sale by all newsdealers.

TRIAL OF THE HASKELL MULTICHARGE GUN.

This gun—described and illustrated in the SCIENTIFIC AMERICAN SUPPLEMENT of August 11, 1883—is now being tested by a board of army and navy officers at Sandy Hook. It is a breech-loader, weighs 25 tons, is 25 feet long, and has a bore 6 inches in diameter. Arranged longitudinally along the bottom are four pockets, which connect with the bore by passages 4 inches in diameter, placed at an angle of 55 degrees. Each pocket is 23 inches deep, and at its greatest diameter measures 11¾ inches. All the interior of the gun—bore and pockets—is made of steel.

The principle upon which the gun works is, briefly, as follows: The shot, which may be two, three, or even four diameters in length, is banded with copper to take the rifling, there being fifteen grooves having one twist in 12 feet and a depth of six one-hundredths of an inch; and after it has been placed in the gun, disks of sole leather and copper, greased, are inserted behind it in order that the close fit thus insured may prevent the gas resulting from the first explosion from getting in front of the shot. The first charge, in the breech, is of slow-burning powder, and is designed merely to start the projectile on its journey. As the shot passes the first pocket passage, the heated gases rush in and ignite the powder, which is of a quicker burning kind. The speed is proportionately increased. The same thing occurs with the second, third, and fourth pockets, the powder increasing in its burning qualities with each successive discharge. The shot issues with a velocity resulting from the combined efforts of all the powder; and although a greater quantity has been burned than would be either possible or expedient in the ordinary method of loading, the gun has been subjected to no strain likely to prove hurtful.

The aim of the gun is to deliver the shot from the muzzle with the same, or nearly the same, pressure behind it that it had at the start, and the following readings of pressures will show how nearly this was accomplished: breech, 20,200 pounds per square inch; first pocket, 19,000; second pocket, 20,200; third pocket, 19,000; fourth, 20,500. It is believed that further experiments will give even more uniform results. Various grades of powder are now being tested in order to find that most suitable to the conditions. The following table gives the weight of shot and of the several charges of powder, the pressures, and the velocities at 100 feet from the muzzle:

No. of round.	Weight of shot.	Charges of powder in pounds.				Pressure in pounds per square inch.					Velocity in feet per second at 100 feet.
		Breech.	1st pocket.	2d pocket.	3d pocket.	Breech.	1st pocket	2d pocket.	3d pocket.	4th pocket.	
24	110	15	20	22	22	21,800	20,200	24,000	21,600	25,100	1.814
25	110	15	20	22	22	21,300	20,600	22,800	21,800	25,000	1.802
26	151	13	17	17	17	19,000	19,800	19,000	19,800	18,000	1,449
27	155	14	18	18	18	21,600	19,600	20,100	20,400	19,600	1.486
28	110	16	22	20	20	23,200	24,000	19,600	22,000	21,400	1,864
29	155	14	20	20	20	19,600	19,600	20,400	21,000	20,700	1,558
30	110	17	23	23	23	23,600	26,600	21,400	25,500	29,000	1,924

In rounds No. 26, 27, and 29 the shots were four diameters, and the resulting pressures and velocities are remarkable. Considering the weights of powder and shot, the pressures and velocities are in advance of any yet obtained from a single charge 6-inch gun.

It will be of interest in this connection to note some of the best results obtained by English practice after long study regarding the size, form, hardness, and density of the powder, the dimensions of the powder chamber in the gun, and the space occupied by the charge, and the careful noting of the pressures exerted in different parts of the seat of the charge. According to Sir Frederick Abel, in his presidential address before the Society of Chemical Industry, the following results are given, which, although not exceptional now, are much in advance of the best obtained two years ago:

"From a 9-inch gun a 200 pound shot is propelled by the discharge of 320 pounds of powder with a velocity of over 2,000 feet per second, with the development of only 16 tons pressure on the square inch; from a 10·4 inch gun a 462 pound shot is propelled by 310 pounds of powder with the same velocity and with the development of the same pressure; from a 12-inch gun a 714 pound shot is propelled by 400 pounds of powder with a velocity of nearly 2,200 feet per second, and a development of 18·8 tons pressure."

These results are better than those of former years in regard to diminution of pressure, its uniformity in different parts of the bore, and high velocity. Large cylindrical or prismatic powder of normal composition is used.

REPAIRING SUSPENSION BRIDGE CABLES.

The suspension bridge at Pittsburgh, Pa., was built some twenty-four years ago, and a recent examination of the cables near their moorings showed them to be much corroded, and consequently reduced in strength. The cables are 7¼ inches in diameter, and when placed in position their ends were covered with a preparation of boiled tar and then protected by concrete masonry. The belief that tar is a good protector of iron has long been cast aside, because, through atmospheric influences, the tar develops tar water, which has a disastrous effect upon iron. Some of the pieces of wire taken out were dotted with little holes where the rust had gnawed away the material, and wires which should stand a strain of 1,200 pounds gave way at 200.

When this state of affairs was ascertained, Mr. F. Collingwood, of the Brooklyn Bridge, was intrusted with the work of repair. Each cable was carefully overhauled and the tar scraped off. When a defective piece was found, it was cut out and a new piece spliced in. The splicing was a difficult and delicate job, for although it was easy to join the ends it required care and judgment to subject the new piece to the right strain, so that it would bear its portion of the load. Slack wires would only add to the weight without helping to carry it. Each splice was put in with a grip machine, and the amount of strain was kept uniform by nice tests. In one large cable 175 wires had to be spliced, in another 31, in another 75, in another 5, and in another 31, while there are yet three to be examined. In the larger cables there are 600 wires and in the smaller 200.

The work is very tedious, as only a few men can work at a time. After the repairs have been made the wires are covered with linseed oil, which is allowed to dry, when a thorough application of white lead is put on. The wires are then drawn together by bands of small wire 7 inches apart. The bundle thus formed is wrapped with wire one-sixteenth of an inch thick, and it requires about 300 feet of this wire to wrap one foot of cable. The work is then finished by coating with ordinary white lead.

When building the bridge the moorings were so cased in masonry that they could not be examined. This added to the cost and labor of making the repairs. In case it should be necessary to repaint or repair the cables in the future, the masonry has been replaced by a water tight brick tunnel provided with iron water shedders, and covered with iron plates that can be lifted when admittance is desired.

Technical Education in the Carriage Trade.

At the recent convention of the Carriage Builders' National Association, by far the largest meeting ever held of members of this trade, the related subjects of apprentices and technical schools for boys received a large share of attention. The absence of any regular apprentice system in the trade was deprecated, but the idea of establishing and enlarging the field of possible usefulness of technical schools was generally approved. There has been for some time such a school in New York, under the auspices of the Association, of the results of which a satisfactory report was made. "Certificates of progress" and some minor prizes are here given, and also one "grand prize" is to be awarded at the present term, consisting of a three months' residence in Paris, and tuition during that period in the celebrated Dupont School of Carriage Draughting; all expenses of such residence, tuition, and traveling to be defrayed from a fund specially raised for that purpose at the Cincinnati Convention in 1881. The general studies at this school have been: 1. Linear designing, including scale and full size drawing. 2. Geometry applied to carriage construction, including the principles of the "French Rule." 3. Carriage body making. 4. Construction of carriage gearings. 5. Wheel making. 6. Principles involved in the suspension of carriages.

In order, however, to enlarge the sphere of usefulness of this technical school, the committee in charge have decided to adopt what has been known as the "Chautauqua" system, whereby classes may be organized in various parts of the country, and their instruction carried on by correspondence, according to a regular system. Lesson papers, with directions and schemes for elementary drawing, are to be sent out, and after these are returned they will be corrected and sent back, with further instructions from the teacher. Therefore, says the chairman of the committee, "we are now ready to teach any apprentice or artisan in the land all the mysteries of mechanical drawing"—as related to the carriage trade, of course. This proposed action was heartily approved by the members of the convention, and liberal subscriptions were made on the spot to enable it to be thoroughly carried out.

James Marion Sims.

This distinguished physician and surgeon died very suddenly of heart disease at his home in this city on November 13. He was born in Lancaster district, South Carolina, January 25, 1813. He graduated from the South Carolina College at Columbia in 1832, and then studied medicine at Charleston, S. C., and at the Jefferson Medical College in Philadelphia, from which he graduated in 1835. He immediately began practice in Montgomery County, Ala. He soon obtained eminence as a surgeon. He came to New York in 1853. Two years later, through his efforts, a Woman's Hospital Association was formed. Still later he brought about the establishment of the Woman's Hospital at Forty-ninth Street and Lexington Avenue. In 1861 he visited Europe, and in Paris operated successfully in the hospitals before the eminent surgeons of that city. He received many honors. He was President of the American Medical Association.

In a private hospital established by him in Montgomery, Ala., he began a course of experiments in regard to vesico-vaginal fistula, then regarded as incurable, which resulted successfully. He had introduced the use of sutures of silver wire instead of the silken and other sutures formerly in use, and he afterward extended the employment of metallic sutures to all departments of general surgery. He also perfected all the mechanical appliances required for the successful treatment of the above-mentioned disease, and invented the famous "Sims speculum."

AN atmosphere containing 14 per cent of carbolic acid has been found to be a guard against explosions of fire damp.