standard velocity of about 2,750 feet per second is secured in the larger guns. With this high velocity it is possible to secure great energy and penetration with a gun that is relatively of small size and weight. Thus the 6-inch gun with a velocity of 2,750 feet per second has an energy of 5,340 foot-tons, as against 2,537 foot-tons for the old pattern English naval gun, which had a velocity of 1,913 feet per second. It will thus be seen that the energy of the new guns per ton-weight of the gun is vastly greater than that of the earlier patterns.

We have chosen the 6-inch gun for illustration. This weapon, like all those manufactured by this firm, is of the wire-wound type. The breech-plug is opened or closed by the horizontal movement of a hand-lever. The same action rotates, locks, or unlocks the breech-block, swings it in or out of the gun round the pivot on which it is mounted, and causes the percussion and electric striker to make or break contact at the required positions during the working of the mechanism. The arrangement consists of a link, one end of which is so pivoted on a pin projecting from the rear face of the breech-plug that the link works in a plane parallel to the breech face of the gun, while the other end is pivoted to a short crank mounted on the block carrier, and around the boss of this crank are formed "skew gear" teeth. The hand-lever for actuating the breech mechanism is pivoted on the block carrier, and moves in a plane at right angles to the breech face of the gun. Around the boss of the hand lever is fitted a skew gear wheel, which gears with the skew teeth formed on the boss of the crank. The whole is arranged and proportioned in such a manner that when the breech is closed, the hand lever lies close up to the breech face of the gun. This arrangement of centers and pivots, together with the relative lengths of the link and crank, provides great power when opening or closing the breech. On swinging the hand lever away from the gun, so as to open the breech, the crank moves the link past the locking center a short distance without causing any perceptible movement of the block. The further movement of the hand-lever causes the crank to turn, and by means of the link rotates the block, at first very slowly (thus obtaining great power) and then more rapidly, until it becomes unscrewed. The carrier then moves with the lever, swinging the block clear of the gun.

A loading-tray is provided, which is automatically moved across the breech face, and raised into the loading position when the breech is being opened, and lowered when it is closing. The firing gear is arranged for firing by electric or percussion tubes, and is operated by the movement of the hand-lever and link. It is so arranged that the first movement of the hand-lever, when unlocking the breech, acts on the firing gear and makes the gun absolutely safe before the breech-plug commences to unscrew. By the continuous movement of the link the empty tube or primer is automatically ejected.

The casemate mounting for these two quick-firing guns only differs in slight details. It consists of a steel top carriage, resting on balls, running on ball-bearings on a steel pivot. The cradle in which the gun slides is a cylinder; attached to the cradle are three cylinders, one to overcome the recoil, and the other two (one on each side of the recoil cylinder) contain the springs for running the gun up to the firing position after the recoil. The connection between these three cylinders and the gun is made by arms projecting from the breech-ring. The whole weight of the moving parts, gun, cradle, and carriage, is taken on the balls above referred to, so that the training is very easy. The elevating and training operations are performed by the rotation of two hand wheels, conveniently placed with regard to the shoulder-piece against which the gunner leans. These two hand wheels are worked on the left side of the mounting, which has also an auxiliary hand wheel on the right side, so that, if necessary, two men can conveniently train the gun. Subjoined we give a table of the weight, velocity, penetration, etc., of the various guns built by this firm.

VICKERS, SONS & MAXIM GUNS.

TYPE OF GUN.	Diameter of Bore.	Length of Bore.	Total Length of Gun.	Diameter of Chamber.	Length of Chamber.	Maximum Pressure in Chamber.	Weight of Charge.	Weight of Projectile.	Total Weight of Gun, including Breech Mechanism.	Muzzle Velocity in Feet per Second.	Muzzle Energy in Foot-Tons.	Penetration of Wrought Iron Plate at Muzzle by Gavre's Formula.	Penetration of Steel Plate at Muzzle by Gavre's Formula.	Rounds per Minute.
	in.	in.	in.	in.	in.	tons	lb. oz. gr.	lb.	tons cwt. qrs. lb			in.		
37 mm. 30 cal.	1.457	43.5	73.75	1.44	2.64	13	0 1 11 0	1.0	0 4 0 22	1800	92.5	1.9	1.5	300
37 mm. 42.5 cal.	1.457	62.0	94.0	1.6	3.78	14	0 3 0	1.25	0 5 1 26	2350	48	3.3	2.6	300
47 mm. 40 cal.	1.85	73.72	77.95	2.04	12.93	13	0 9 0	3.3	0 4 0 0	2125	103	4 5	3.5	30
47 mm. 47.2 cal.	1.85	87.34	91.5	2.04	12.93	13	0 11 0	3.3	0 4 2 6	2400	132	5 3	4.1	30
57 mm. 42.3 cal.	2.244	95.0	104.4	2.45	10.2	15	0 15 0	6 0	0 6 2 0	2300	220	6 2	4.8	24
57 mm. 50 cal. Naval	2.244	112.2	116.4	2.8	14.2	15	1 4 0	6.0	0 8 0 0	2500	260	7	5.4	28
76.2 mm. 45 cal. Naval	3.0	135.0	138.0	3.5	19.0	16	2 9 0	12.5	0 14 2 14	2600	586	9.2	7.1	20
76.2 mm. 50 cal. Field	3.0	150.0	153.0	3.5	19.0	16	2 9 0	12.5	0 15 3 0	2700	632	9.7	7.5	20
76.2 mm. 23.5 cal. Mountain	3.0	70.5	75.55	3.4	9.6	14	1 0 0	12.5	0 5 2 23	1700	250.4	...	...	20
75 mm. 10.7 cal.	2.953	31.6	36.85	3.0	4.575	8	0 6 11 0	12.5	0 2 0 13	918	73	...	...	14
101.6 mm. 45 cal.	4.0	180.0	186.1	5.0	21.2	17	6 0 0	25.0	1 13 0 0	2700	1,263	11.6	9.0	15
101.6 mm. 50 cal.	4.0	200.0	206.0	5.0	21.2	17	6 0 0	25.0	1 16 0 0	2800	1,359	12.3	9.5	15
12 cm. 40 cal.	4.724	188.98	193.28	5.1	25.5	16	8 8 0	45.0	2 10 0 0	2494	1,940	13.3	10.3	12
12 cm. 45 cal.	4.724	212.58	217.0	5.5	25.75	17	9 0 0	45.0	2 14 0 0	2600	2,109	14.1	10.9	12
15.24 cm. 40 cal.	6.0	240.0	249.2	6.8	32.5	16	19 0 0	100.0	6 15 0 0	2530	4,437	18.5	14.4	8
15.24 cm. 45 cal.	6.0	270.0	279.2	8.5	33.0	17	25 0 0	100.0	7 8 0 0	2775	6,340	21.1	16.4	8
20.3 cm.† 45 cal.	8.0	360.0	371.7	10.0	43.0	17	52 0 0	210.0	18 16 2 0	2750	11,012	26.0	20.2	5
23.36 cm.† 45 cal.	9.2	414.0	426.8	13.5	67.0	17	94 8 0	380.0	26 16 0 0	2750	19,927	34.3	26.6	...
25.4 cm.† 42 cal.	10.0	405.15	420.0	11.5	61.35	17	100 0 0	450.0	28 4 0 0	2580	20,811	32.3	25.0	...
31.48 cm.† 40 cal.	12.0	480.0	496.5	17.5	87.2	17	207 0 0	850 0	50 7 0 0	2750	44,573	45.9	35 5	...

†Now under construction.
All these guns use smokeless powder.

A Swedish Edition of "Magic: Stage Illusions and Scientific Diversions, Including Trick Photography."

We have received the first number of "Magiens Värld," a Swedish edition of our "Magic: Stage Illusions and Scientific Diversions, including Trick Photography." It is gratifying to note the interest which this volume has caused among magicians and publishers abroad, and we are not at all surprised that there should be a translation of this book. This work is published in Swedish by Messrs. Fahlcrantz & Company, of Stockholm, Sweden, and it is published by arrangement and with our consent. The translation is made by D. S. Hector, and we are unable to state whether there will be any additional material or not, but the entire book will be published, including all the illusions. We wish the Swedish publishers great success with their new undertaking.

A MEDAL AWARDED TO THE SCIENTIFIC AMERICAN.

A token of appreciation is always doubly welcome when no steps are taken to obtain it. We have been greatly gratified by the action of the jury on "Imprimerie et Industries de Livre" of the Brussels International Exposition in awarding the SCIENTIFIC AMERICAN a diploma of merit and a silver medal. We made no exhibit at the Exposition, and without our knowledge Col. George W. Roosevelt, United States consul at Brussels, kindly entered our paper for competition, and it was given the award named above. The medal is two and three-quarter inches in diameter. The

SILVER MEDAL AWARDED TO THE SCIENTIFIC AMERICAN AT BRUSSELS, 1897.

obverse is three figures modeled in high relief. The reverse has two lions rampant supporting a shield surmounted by a coronet, while underneath is the legend "L'Union fait la force" and the space for the name of the recipient. The sculptor was M. Jules Labue. The diploma has a female figure in the Barque of Progress whose attention is directed by another female figure to the Exposition building in the background.

American Commission Houses in Germany.

There is a movement on foot to incorporate a company under the laws of Germany, which will be prepared to erect suitable buildings for the display and sale of American products, provided manufacturers and dealers in America show a disposition to aid and encourage such an enterprise. This proposed company will construct buildings as desired by special interests, at an agreed rental, and will also be prepared to contract with the owners of merchandise to handle and sell their goods upon commission, and guarantee the payment of all bills of goods sold by them or their agents.

Germany appreciates our standing as a nation, and, I believe, would be willing to meet us half way in a fair exchange of commodities. Would it not be well for a number of our manufacturers to send over a representative to make a thorough investigation of the field, with a view to making arrangements with parties here for the housing and handling of their various products? The city of Cologne, from its favorable location, would make an excellent distributing point for all kinds of merchandise. It is a city of nearly 350,000 people, with railway and steamship facilities unexcelled in Europe. Docks and wharves of solid masonry extend for miles along the river banks. There are four railroad depots, the central station being one of the finest in the world, built and equipped at a cost of about $8,500,000. The chief custom house of the province is also located here. During the year 1897, there arrived at the harbor of Cologne 5,869 steamers, tow boats, and sailing vessels, carrying a total of 558,533 tons. There were shipped from this harbor during the same time 209,766 tons, in 4,765 vessels of all kinds. I am informed that the amount of goods and other merchandise received and shipped by railway in 1897 amounted to nearly 2,000,000 tons, and the value of the freight receipts aggregated $2,801,970.

JOHN A. BARNES, Consul.

Cologne, August 17, 1898.

Alpine Accidents.

The Alps have been this year the theater of the sensational fatalities which have become associated with the dangerous and fascinating pastime of Alpine climbing since the days of the beginning of this sport in the fifties. Within a few weeks five persons have lost their lives uselessly in this diversion. Dr. John Hopkinson, one of the most distinguished of England's men of science, with his son and two daughters, was killed while climbing the Petite Dent de Veisivi, a peak of 10,463 feet in one of the side valleys running up from the central valley of the Rhone. A few weeks later Prof. Masse, a well known surgeon of Berlin, met his death while climbing a peak of 12,000 feet—the Piz Palü.

The death of the Hopkinson family is particularly distressing. Dr. Hopkinson was an experienced Alpine climber, and the peak presented so few difficulties that he dispensed with the aid of a guide. Foolhardy mountain climbing is the cause of most of the serious accidents; and, while it is perfectly true that fatal accidents have happened where guides have been taken along, still there are many accidents which have happened to the unattended which might have been prevented had the services of a skilled guide been engaged. The Hopkinson family were all roped together, and a fatal slip of one of them set in motion the awful machinery for the catastrophe. A single misstep like that which occurred to Mr. Hadow in 1865, which caused the death of Lord Francis Douglas, Hudson himself, and the guide on the Matterhorn during the descent, after the top of the peak had been reached, may have been responsible for this last tragedy. It seems as though, even when the party are roped together with several guides, there is no guarantee of safety, and the ascent of even comparatively safe peaks without guides may be regarded as dangerous in the extreme.

The accident to Prof. Masse was of a different nature. In crossing a crevasse the ice bridge gave way, with the result that Prof. Masse fell down perpendicularly, dragging the guide after him, while his friend Dr. Borchard and the Tyrolean guide had to support the weight of the entire party. Eventually, the guide who was at the end of the rope, having discovered that the bottom of the crevasse was not far off, cut himself loose and scrambled out with the help of his ice ax; but when he came to the rescue of Prof. Masse, he found that the latter's death had been caused by the rope which he himself had insisted upon being tied under his shoulders. The consequence was that the rope was pulled taut and the professor's circulation was suspended.

An Exhibition of Snakes.

A curious exhibition will begin in New York on November 12. It is termed the International Snake Exhibition and will open in Grosvenor Hall, East Fifty-second Street, New York. Scientists who are interested in snakes will undoubtedly bring specimens. Mr. R. L. Ditmars, former Assistant Curator of the American Museum of Natural History, who has studied the habits of snakes for many years, is attending to the arrangements for the show. The exhibition will be unique as to size. There have been small displays of snakes in museums and at the World's Fair, but never a comprehensive exhibition. Certificates of merit will be issued for meritorious exhibits. Stuffed snakes and snakes preserved in alcohol will also be shown. It is expected that there will be one hundred and fifty to two hundred varieties of reptiles on exhibition.

WE learn from The Fort Wayne Medical Journal Magazine for September that, at a recent examination before the medical board of Louisiana, Dr. Emma Wakefield, a young negress, passed a successful examination. She is the first woman in the State of Louisiana to study medicine, and the **first negress in America to receive a medical diploma.**

The World's Production of Wine.

According to the Moniteur Vinicole, the world's wine production for 1896 and 1897, by countries, was as follows:

Countries.	1897. Gallons.	1896. Gallons.
France	854,713,420	1,179,811,520
Algiers	115,402,560	107,001,000
Tunis	2,377,800	2,509,900
Italy	685,836,780	569,958,660
Spain	510,338,000	471,068,600
Portugal	66,050,000	86,657,600
Azores, Canary and Madeira Islands	6,605,000	8,454,400
Austria	49,556,000	66,050,000
Hungary	31,704,000	43,593,000
Germany	55,482,000	82,166,200
Russia	66,050,000	76,618,000
Switzerland	33,025,000	39,630,000
Turkey and Cyprus	49,556,000	80,581,000
Greece	31,704,000	56,803,000
Bulgaria	28,797,800	35,931,200
Servia	24,306,400	29,062,000
Roumania	85,544,000	198,150,000
United States	30,303,740	17,965,600
Mexico	1,585,200	1,849,400
Argentine Republic	38,044,800	42,007,800
Chile	73,976,000	45,706,600
Brazil	10,303,800	12,549,500
Cape Colony	5,151,900	2,377,800
Persia	660,500	845,440
Australia	2,404,220	4,955,600
Total production	2,843,478,920	3,262,103,820

If these statistics are authentic, the wine production of the world decreased immensely during 1897, which hardly seems true. France, Hungary, Russia, Roumania, and Australia all contributed to the decrease, while the output in the United States greatly exceeded that of the previous year.

English Trolley Lines.

Within the next few months there will be several new electric trolley tramways opened for traffic in England. So far as length, etc., are concerned, the lines are of no particular importance, but from other points of view they are important, for upon their success or failure may depend the equipment of many miles of way. The lines to which we refer are mainly short experimental sections, two or three miles long, which are being equipped on the overhead trolley system by municipal authorities, who are desirous of changing the complete town tramways over to mechanical power, but are not altogether convinced as to the best form of traction to adopt. The corporations of Liverpool, Glasgow, Sheffield, Bradford, Hull, are all equipping short lines with the trolley. At Liverpool cars from America and Germany will be put in operation, and in addition to these a special design of car is to be made in the neighborhood of Liverpool, so that nothing may be left undone to have everything right in this respect. In each of the other towns mentioned the preparation of track, erection and equipment of power house, and so forth is being pushed forward energetically. At Plymouth also the municipality is at work in the same direction, while at Halifax and Middlesbrough lines are in so forward a state that any week may now see their completion.

Most of these towns have in a greater or lesser degree had recourse to American plant, either for inside or outside work, much to the disappointment of the English contractor. But it seems that more than usual importance attaches to a line which has just been completed between the towns of Kidderminster and Stourport, on account of the fact that the plant and machinery are all of English make and the undertaking has been from first to last carried out by an English firm, i. e., the Brush Electrical Engineering Company, of London. The power plant comprises Babcock & Wilcox boilers, "Universal" type, single crank compound type steam engines, direct-coupled six-pole generators with Mordey's new chord winding and notched armature. The switchboard is split up into the usual panels, main station, generator, feeder, and Board of Trade. The track is single throughout, of 3 feet 6 inches gage. The power station is a mile from Kidderminster and three and a half miles from Stourport, making the line four and a half miles long. Owing to certain difficulties on the route, the Dickinson side trolley is employed. A main feeder cable goes to Kidderminster, and also one to Stourport. The cars, which have Brill cantilever type trucks, are fitted with two 15 B. H. P. four-pole motors of the ironclad type. The line is the first of many similar tramways to be equipped by the British Electric Traction Company, which is stated to have over $15,000,000 of such undertakings in progress —either negotiating or constructing.

Owing to the numerous delays which arise in complying with the various legislative requirements when applying for tramway powers, many schemes are being promoted as light electric railways, and in this way the powers are secured much more promptly. Opposition to the overhead wire is not dead yet, for quite recently one or two good schemes have been abandoned purely on account of the opposition raised on this score. The London County Council has long pledged itself to resist the overhead wire, and this has led to several schemes, which are now under consideration, for districts which are just outside the London County Councils jurisdiction area.

SPIRIT SLATE WRITING AND KINDRED PHENOMENA.—V.

BY W. E. ROBINSON.

There is still another style of slate writing which is used to good advantage by some mediums. It consists of two slates hinged together, making a double slate. It has two holes in the frame opposite to the hinges, through which a tape or cord can be run and tied and sealed to the slates. (Fig. 11.) The writing is

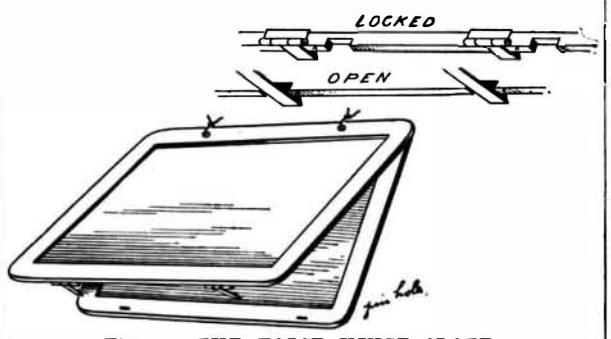

Fig. 11.—THE FALSE HINGE SLATE.

placed upon the inside, owing to the fact that a half of each hinge is screwed to one slate; the other half is made fast to a little projecting piece in which there is a slight notch. These projecting pieces enter corresponding holes in the other slate, in which there is concealed a spring bolt, which engages these catches of the hinge. When it is desired to open the slate for the purpose of writing upon it, the bolt is lifted back by means of a pin pushed through a hole in the end of the frame, as indicated in the engraving.

The following is a method by which writing can be made to appear on a slate on which a person has

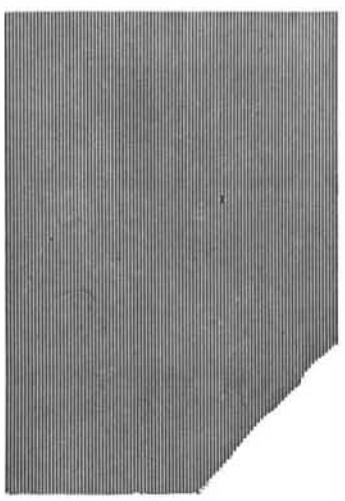

Fig. 12.—THE INTERRUPTED FLAP.

placed his initials in one corner. The slate is then placed with that side downward on the table, and shortly afterward, on turning it over, it is found completely covered with writing, and the signature of the visitor proves there has been no exchange of the slate. The method of obtaining this effect is unique. The writing is already on the slate, but hidden from view by the false flap, but with the corner missing from it. (Fig. 12.) The cleverness of the trick is in this corner. After the medium closes both slates, he says he will just draw a chalk mark down in the corner of the slate, wherein the gentleman is to place his signature. He

Fig. 13.—READING QUESTIONS BY MEANS OF MIRRORS.

really draws the chalk mark on the slate proper, but close to the edge of the missing corner of the flap, thus disguising the line of demarkation between the slate and the flap, and after the flap is dropped into the slate, of course, this mark of the signature still remains.

Another interesting test is as follows: A person writes a question on the slate, and places it face down on the table when the medium is not looking. The latter now takes his seat at the table, places one hand on the slate, as also does the skeptic; the other hand is placed on the medium's forehead. With the disengaged hand the medium now proceeds to write on the upper surface of the slate. When he has finished, the communication is read, and it is found to be a correct answer to the question on the opposite side of the slate. To perform this seeming impossibility, the medium has to employ a table containing a trap smaller than the frame of the slate. When the slate is placed on the table, the medium shifts it over this trap and the trap is then open, and by means of mirrors in the body of the table the writing is reflected to the very place where the medium is sitting, and it is easy to then give an answer to the question. Fig. 13 shows the nature of the device. Double mirrors are used, in order to cause the reverse writing on the mirror to be again reversed.

With this trick the present series of articles comes to a close. There has been so much interest exhibited by our readers in these exposés of slate writing that the publishers of the SCIENTIFIC AMERICAN have decided to publish the entire manuscript in book form. Only a portion of it has been published in the five articles which have been devoted to it. The work will be published within a month, and it will contain a large number of other tricks used by mediums to deceive their audiences. It will include, in addition to all of the slate writing devices which have been illustrated, many which we have not shown. There will also be chapters on mind reading of all kinds and kindred phenomena, mental magic, table lifting and spirit rapping, spiritualistic ties, post tests, handcuffs, spirit collars, seances, etc. A number of new stage illusions will also be given.

Our New Cruiser "Albany."

The Navy Department is anxious to get the protected cruiser "Albany" in American waters, and an examination is being made to ascertain whether there would be any impropriety in asking the British government to release the vessel before the war is officially ended. Spain may possibly object to favorable action on the request by Great Britain, taking the ground that while hostilities have ceased by agreement, the war is still technically in progress. The "Albany" is not entirely completed, but she is in a condition to make the voyage across the Atlantic. The "Albany" was built by the Armstrong Company at their shipyard on the Tyne for the Brazilian navy, and she was christened "Almirante Abreuil." The United States government purchased her from Brazil before the war with Spain, and she was renamed the "Albany." Her sister ship is the "Amazonas," which did such satisfactory work at Santiago and elsewhere under her new name "New Orleans." Our government did not wish to purchase the "Albany," because she was not nearly finished, but Brazil would not sell the "Amazonas" unless the other vessel was also taken. The "Albany" will make a welcome addition to our navy.

The Current Supplement.

The current SUPPLEMENT, No. 1192, contains a large number of interesting papers. The front page shows a spirited portrait of Emperor William in the uniform designed by himself for his journey to Palestine. "The Uniform of the French Army" describes the latest accouterments of the soldier, which are regarded by military authorities as being eminently satisfactory. "The Graphophone at Omdurman" illustrates the use of this instrument in the heart of Africa. "Lightning on a Kite Wire" describes some interesting experiments which have been carried out by the officers of the Weather Bureau. "Portland Cement Industry of the World" is an important paper by Bernard L. Green. "German Blacksmith's Art" describes the manufacture of wrought iron gates, lamps, etc. That the Germans excel in blacksmith work has been abundantly shown by the magnificent gates which gave access to the German section in the Liberal Arts building in Chicago, at the Fair in 1893. "Inebriety and its Cure Among the Ancients" is a curious article by William L. Brown. Prof. Weldon's paper, read before the British Association, is concluded in this number, and the "Advance of Psychology," by Prof. J. McKeen Cattell, is also given in this issue.

Contents.

(Illustrated articles are marked with an asterisk.)