

A CHEAP AND EFFICIENT TYPEWRITER.

The respect commanded by a typewritten letter, as well as the greater legibility obtained by means of a writing machine, has induced many tradesmen whose correspondence is sufficiently large, to purchase an expensive typewriter. But the cost of the machines commonly used in large offices places them beyond the purse of the average tradesman. The want of a cheap, yet efficient machine, which will perform the service of a more costly typewriter, has been filled by the Simplex Typewriter Company, of 644 First Avenue, New York city, with the introduction of a very simple and ingenious apparatus, which has been patented here and in Europe.

The typewriter in question, as our illustration shows, consists of a table upon which are mounted a type carriage, sliding in guides, a rack, and a roller to feed the paper.

The carriage consists of a base plate upon which is centrally pivoted a printing wheel, provided with rubber keys carried on the ends of radial spring fingers. The type at the lower surface of these spring fingers is inked directly from removable pads, thus dispensing with the cumbersome ribbon.

In operation, the particular key to be used is depressed together with the carriage, and the wheel is rotated to bring the key to the front of the carriage. Here the key falls into a recess into contact with the paper, and is automatically locked during the printing operation.

The elevation of the depressed carriage and the spacing are effected by a very simple automatic device carried on the carriage. The device comprises merely a dog, which engages the rack on the table and which is controlled by a retractile spring. When a key and the carriage are depressed during the printing, the dog engages a rack tooth, forces the carriage to the right, and assumes a nearly horizontal position. When the carriage rises, after the pressure is relieved, the dog, under the action of the retractile spring, shifts forward ready to enter the next tooth when the carriage is again depressed.

Novel features of the invention, besides the new principle of operation, are the automatic spacing and locking mechanisms. The recess in the base plate by which the wheel is locked as a key falls into it, holds the wheel exactly in place during the printing operation. In many typewriters of a somewhat similar nature, no means are provided for arresting the wheel as a key comes into proper position.

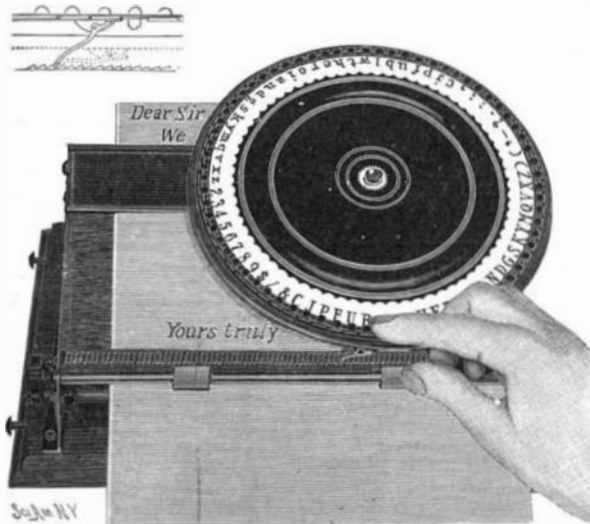
The speed of the machine is essentially that of the ordinary typewriter, plus the additional movement required to swing a key to the locking point. It will be seen that the typewriter possesses the essential features of every writing machine; a key for each letter, sight-writing, self-spacing, and roller feed, without the intricacies of the usual mechanism.

THE NORTH GERMAN LLOYD LINER "KAISERIN MARIA THERESIA."

The latest evidence of the activity of the two great German Atlantic transportation companies is the arriv-

hauling of the interior fittings and furnishings. With her great length, her powerful engines and thoroughly up-to-date appointments the "Kaiserin Maria Theresia" is to all intents and purposes a new ship.

The alterations were effected at Stettin, Germany, where the "Spree" was docked in the large floating dry-dock, cut cleanly in two amidships, the two halves of the hull pulled apart for a distance of 66 feet, and an entirely new section of hull built into the gap. The after part of the hull below the water line had to be taken apart, and the framing and plating entirely



AN INEXPENSIVE FORM OF TYPEWRITER.

remodeled to accommodate the twin propellers which took the place of the old single propeller. New twin-screw four-cylinder engines were installed, the boiler plant was entirely renewed and, indeed, the whole engine and fireroom was brought up to modern practice, while entirely new upper and promenade decks were added. The vessel now has a length over all of 540 feet, with a beam of 52 feet, and a depth of 37 feet. She has a gross registered tonnage of 7,800 tons and a displacement of 13,600 tons. It will be noticed that she is a remarkably long vessel for her beam, the ratio of her length to breadth being 1 to 10.5. In this respect she is not unlike the steamers of the White Star Company which is the only company that has steadily adhered to the plan of building those big ocean steamers with an extremely long and narrow hull, the "Oceanic," the latest of these ships, having a ratio of beam to length of 1 to 10.4.

In the accommodation for passengers the "Kaiserin Maria Theresia" follows the general system of location, furnishing and decoration which characterizes the boats of the North German Lloyd Company. She has accommodation for 330 passengers in the first cabin, 140 in the second cabin and 400 in the steerage, while the crew numbers 290. The first cabin passengers are carried amidships, the second cabin aft, and the steerage forward. The dining room is situated amidships on

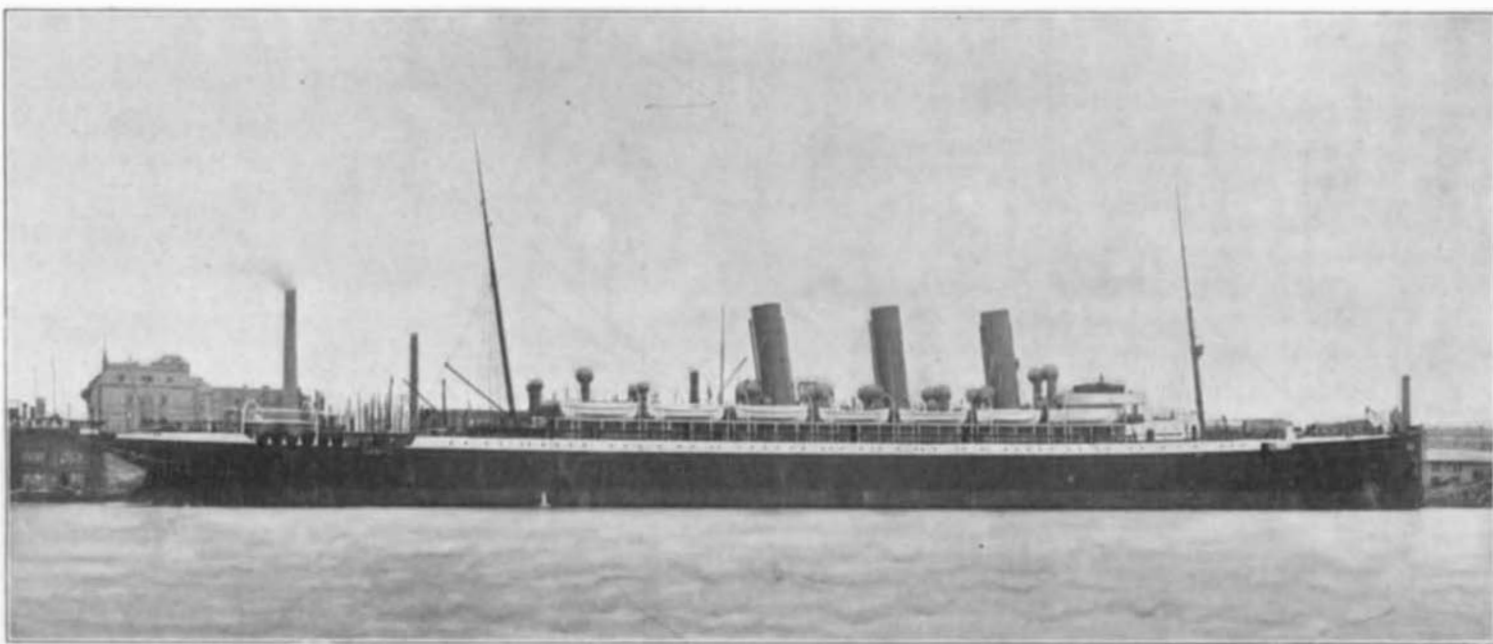
offers an unobstructed walk of 310 feet, and is protected throughout its whole length by an awning deck

The hull of the steamer is divided into eleven watertight compartments which extend to the upper deck; and a commendable feature is the ample provision of boats of the largest size. The ship is driven by two triple-expansion engines of 17,000 indicated horse power, which will give the vessel a sea speed of about 19½ knots an hour. This, although considerably less than the speed of the "Kaiser Wilhelm," is well up to the average speed of modern passenger ships of this class, and is about the rate of speed aimed at and secured in the "Oceanic" of the White Star line. Each of the engines has four steam cylinders working on four cranks, which are arranged according to the principles of the Schlick-Yarrow-Tweedy system, which is designed to avoid vibration and is working with admirable results in several of the latest trans-Atlantic ships. The diameter of the cylinders is 43½ inches, 67 inches, 77 inches and 77 inches, the common stroke being 63 inches. The propellers, which are three-bladed, are of bronze, with a diameter of 18 feet 4½ inches; the whole of the shafting is hollow and is built of nickel steel. In addition to the main engines there are thirty-eight auxiliary engines which number among them 66 steam cylinders to be supplied with steam. The boiler plant consists of nine double boilers, 18 feet 7 inches in length by 15 feet 4 inches in diameter, and four single boilers 10 feet 3 inches in length, and 15 feet 4 inches in diameter. There are sixty-six furnaces in all with a combined total heating surface of 50,700 square feet, and a total grate surface of 1,531 square feet. The steam pressure is 156 pounds to the square inch. The boilers are collected in three separate groups each of which is provided with a smokestack 11 feet 7 inches in diameter, and reaching to a height of 92 feet above the grate bars.

The broadside view of the "Kaiserin Maria Theresia," which is herewith presented, shows her to have just about the right amount of sheer, striking in this respect a happy mean between the two straight lines of the "Teutonic" and the excessive sheer of the "Kaiser Wilhelm." The appearance of the ship is also aided by the judicious placing of the masts and funnels. In many respects she is not unlike the unfortunate "Kaiser Frederich," built by Schichau, of Elbing, which, it will be remembered, was returned to the builders on account of failure to make the contract speed.

The New Element, Victorium.

Sir William Crookes has recently given an account to the Royal Society of his discovery of the new element which he calls victorium. It has a pale brown color and dissolves easily in acids. Its oxide is less basic than that of yttrium but more so than the greater part of the earths of the terbium group. The chemical properties of victorium differ in many respects from those of yttrium, but generally speaking it may be said to occupy an intermediate position between this element and terbium. It is admitted that



NORTH GERMAN LLOYD LINER "KAISERIN MARIA THERESIA."

Length, 540 feet. Beam, 52 feet. Depth, 37 feet. Displacement, 13,600 tons. Speed, 19½ knots.

al in the port of New York of the handsome North German Lloyd liner which forms the subject of the accompanying engraving. Our readers will remember that in the issue of the SUPPLEMENT of January 7, last year, we published a set of interesting engravings showing the process of lengthening and reconstructing the North German Lloyd liner "Spree." The new "Kaiserin Maria Theresia" is the old "Spree," vastly improved by the introduction of 66 feet of the hull amidships, and modernized by the substitution of twin screws for the old single screw, and by a thorough over-

the main deck, and is supplemented by two small dining rooms adjoining it. The main dining room is decorated on its walls and ceiling with paintings of Empress Maria Theresa, her husband, the Emperor Franz I., and Emperor Joseph II., and also of the members of the Imperial family. There are also several views of old Vienna at the time of the Empress. The paintings of the smaller dining rooms represent historical subjects from old Vienna and the lands of the Austrian crown belonging to the Empress. There is a promenade deck for the use of the first cabin passengers which

the oxide of victorium has the formula Ve^2O^3 , its atomic weight is not far from 117. The photograph of the spectrum given by the oxide shows certain definite lines which have not been observed with any other body. The spectrum is obtained by the incandescence of the body in a vacuum tube; the light given off has been analyzed by a spectroscopic of great precision and the exposure upon a photographic plate shows a series of interesting rays in the ultra-violet region. In order to examine the negative an apparatus has been constructed which will measure to the 1-100,000 inch.

Science Notes.

According to M. Casimir de Candolle (Arch. Sci. Phys. et. Nat.), grains of wheat which have been immersed in mercury for four years are still capable of germination, and have been found to produce normal plants.

The ideal specific gravity of petroleum spirit for motor carriage purposes is 0.680 at a temperature of 60° F. A depression of 30° F. causes an additional 15° to the specific gravity, and a corresponding rise necessitates a similar reduction from 0.680.

Six thousand barrels of whiskey are to be shipped from a bonded warehouse at Baltimore, they having reached the limit of their free storage without duty, having been in bond within a few months of eight years, for which time, by provision of the law, this commodity may be stored without being subjected to the internal revenue tax of \$1.10 per gallon. It will be shipped across the ocean and stored in warehouses in England and Germany, and will be nearly all shipped back if the demand arises. The ocean voyage increases its excellence, and its market value, and it may return within a year to supply the heavy demand and give a return that pays, over the cost that it represents to produce the article.

The observatory on Ben Nevis, being the highest peak of the British Isles, 4,407 feet above the sea level, presents, as regards its observations, some peculiarities not found in those taken at ordinary altitudes. Observations have been made during clear weather on the one hand, and during foggy weather on the other hand. This has been done for thirteen years. The results are briefly as follows: In continuous clear weather it practically never rains on the mountain at all. In continuous foggy weather on the other hand, the average daily rainfall is almost exactly one inch. There is a large and continuous excess of barometric pressure in clear weather over that in foggy weather. The observatory at Ben Nevis, furnishes a record of the meteorology of the clouds. The fog which characterizes the climate of the mountain is nothing but cloud under another name, and in this respect the observatory is unique.

The effects of the great dynamite explosions at Avigliana (near Turin), on January 16, are described by Dr. M. Baratta in a privately printed pamphlet, says Nature. About 400 kilogrammes of nitro-glycerine and 12,000 kilogrammes of dynamite and gun-cotton were blown up. The first and stronger explosion, though it lasted little more than a second, presented three maxima of intensity, due probably to the successive explosions of magazines a hundred meters from that in which the nitro-glycerine was stored. Owing to the situation of the manufactory, the zone of greatest damage was very small; that in which windows were almost totally destroyed extended to a distance of 5½ kilometers; doors and windows were made to rattle as far as Crescentino (60 kilometers distant); and the sound of the explosion was heard at Pavia (140 kilometers), Varzi (145 kilometers) and Lugano (160 kilometers).

B. Lidforss has made some interesting observations on the attractive force exercised by the secretion of the stigma on the pollen-tube, chiefly on *Narcissus tazetta*. No distinct influence on the growth of the pollen-tubes was exhibited by artificially prepared organic acids—formic, acetic, lactic, succinic, tartaric, malic, or citric—nor by amides, glucosides, or tannins; but the almost immediate effect of introducing into the medium a few grains of diastase was to cause a deflection of all the pollen-tubes toward the grains. The constituent of the diastase which produced this effect appeared to be the proteid. The classes of substances which attract pollen-tubes are chiefly two, carbo-hydrates and proteids, the most important food-materials of plants. This indicates that the movements of the apex of the pollen-tube are simply a search for food-material. Similar results were obtained with other plants.—Ber. Deutsch. Bot. Gesell.

The recent excavations at the Argive Heræum in Greece have been most important. The sanctuary lies on the northeastern site of the Argive plain, between the ancient cities of Mycenæ and Tiryns and opposite the city of Argos. It was discovered in 1831, and some tentative excavations were made in 1836 and continued in 1854, but the whole was finally excavated in 1892-1895 by the American Archaeological Institute, and the school of Athens under the direction of Dr. Chas. Waldstein, now Slade Prof. of Fine Art at Cambridge. The whole of the great temple was laid bare and the excavations also revealed traces on the upper slope of an earlier temple built before the Homeric age and burnt in 423 B. C., the whole pavement having been found together with traces of civilization leading back to a period of 2,000 years or more B. C. Of the second temple there was found only the base, but also sufficient remains of columns to enable a complete architectural restoration to be made; while higher up, says The British Architect, the polygonal pavement of the upper temple was discovered together with portions of the wall, so that the outline of its plan may be determined and even a fair restoration of the structure carried out.

The Typewriter and the Eye.

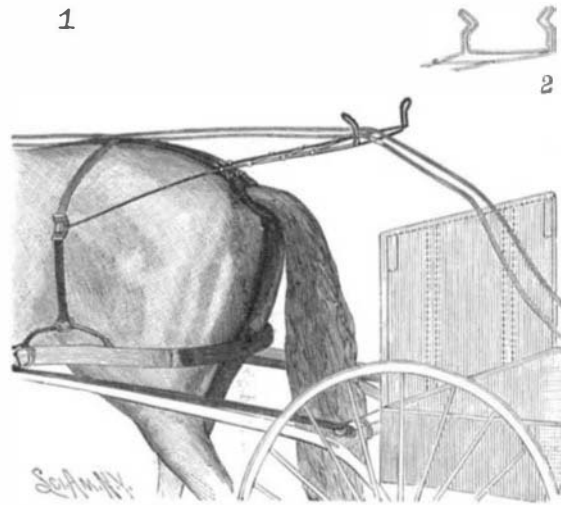
There is the general opinion among oculists that the eye is much relieved by the general introduction of typewritten matter. A recent medical work upon diseases of the eye gives a great many proofs in substantiation of this opinion. The characters are so large on the keys that there is no appreciable strain upon the vision, and when dexterity is attained the eyes can scarcely be said to be used at all. A vast strain is taken off the eye by writing with the typewriter instead of the pen, but the advantages of reading the type writing matter are even more important from a medical point of view, and the strain upon the hands is also slight. It is said that a person can work for eight consecutive hours, with slight interruptions, without the hands being conscious of fatigue. In using the typewriter the additional labor of focusing the eyes calls the muscles into undue use and the result is that many defects of vision which would not probably be discovered under normal conditions are brought to the front.

A REIN SUPPORT AND GUARD FOR HORSE HARNESS.

The accompanying engraving represents a simple device, patented by John T. West, of Bowling Green, Ky., for supporting the reins of a horse at such a height from the crupper that they cannot become entangled with the harness, or with the tail of the horse.

The device comprises essentially a spring-wire frame provided with guide-fingers at its rear end for the reins, and with divergent arms at its forward end for attachment to the crupper and hip-straps. Fastening pins, carried by the frame at each side, are designed to engage sockets in the back-strap or crupper.

The rein-guard, the inventor assures us, can be removed and replaced in a few seconds. The rear end



A REIN SUPPORT AND GUARD FOR HORSE HARNESS.

of the wire-frame projects just over the tail of the horse and supports the reins in such a position that they cannot sink. Carelessly as the driver may hold the reins, they will always be supported in proper position by the guard, without any possibility of their becoming entangled with the tail of the horse. The guard weighs but eight ounces.

Japanese Swords.

Mr. Gilbertson gives some interesting details as to the process of manufacture of the celebrated Japanese sabers. The blades of these sabers are formed of a metal prepared from magnetic iron ores and ferruginous sand. The steel is produced in the form of thin laminæ, and the workman commences by fixing one of these to the end of an iron rod which serves as a handle. To this are soldered other sheets until the mass has a length of 6 to 8 inches, a width of 2 inches and a thickness of ¼ to ½ inch. This bar, brought to a white heat, is doubled upon itself and hammered until it has taken its original dimensions. This process is repeated fifteen times. Four similar bars are then soldered together, doubled upon themselves, resoldered and heated, this operation being repeated five times. By this process the superposed layers of metal becomes so thin that a saber is estimated to contain at least one million sheets of metal. Sometimes alternate layers of iron and steel are soldered together, and thus the blade presents a veined appearance. When the blade is finished the surface is scraped and the end formed to receive the handle; it is then ground to shape. To finish the blade, it is covered with a mixture of clay, fine sand and powdered charcoal. Formerly the clay was taken from Mount Inari, and the workmen first went through a form of invocation to the tutelary divinity, to ask permission to take the necessary material. When the layer is nearly dry, an ornamental design is traced by short strokes which penetrates to the surface of the metal. It is then heated over a fire arranged for the purpose, and when the proper temperature is reached, which can only be determined by long experience, the blade is plunged into a bath of water or oil. The saber is then sharpened, and for those of the best quality this operation is said to require fifty days' work.

Engineering Notes.

The British War Office has purchased some small steel shields to cover the vital parts about the heart. It is said they weigh about 7 pounds and turn bullets at 700 yards. It seems curious that on the very threshold of the twentieth century that we again resort to armor. The principle, however, is an excellent one, and a helmet with a vizor and a heart guard would be a great protection in the present conditions of war fare.

The colored people of Omaha have petitioned the City Council to get possession of the armor-clad car used by President Lincoln during the war time, and to restore it to such a condition as to prevent further deterioration and make it available as a relic. The car is owned by the Union Pacific Railroad and is kept in the yards at Omaha. It was built at Alexandria, Va., in 1864, says The Railroad Review, and was made bullet-proof by means of boiler plates placed on the sides of the car.

A railroad school for candidates for men in training for appointments in the regular permanent railroad service in the operating department of the Prussian State railroads has recently been opened at Berlin, and six hours of instruction is given each week for a regular course. Twenty-seven different subjects are embraced, and much attention is given to railway accounts as a larger part of the students are candidates for the grade of railway clerks. All of the students must have had a certain prescribed education, and many of them are graduates of technical schools.

An inclined railway plane has been built up the face of the Palisades at Weehawken, N. J., for the transportation of trucks. The distance is only 290 feet and the incline is a very steep one. The road will be operated by three 2-inch steel cables, one acting as a safety rope in case of accident. There are also safety tracks attached to the machinery in the power house by which the cars will be attached to the cables; as one ascends, the other descends. Each car will carry four trucks and horses, and is capable of lifting 20 tons. It is somewhat similar to the incline in Hoboken, but is much steeper.

The Association of Engineering Societies consists of eleven societies including the San Francisco, Montana, Minneapolis, St. Paul, Detroit, St. Louis, Louisiana, Cincinnati, Cleveland, Buffalo and Boston. The engineering societies are bonded into an association for their mutual good and for the publication of The Journal of the Association of Engineering Societies. The aggregate membership of the societies composing the association is now very large and has virtually made good the loss caused by the withdrawal of the Western Society of Engineers. The assessment per member has steadily declined from \$4.92 in 1894, to \$1 in 1899.

In 1870, from July 24 to August 4, a period of eleven days, Germany was able to convey in 1,520 railroad trains 19,299 officers, 556,000 soldiers, 161,881 horses and 16,883 cannon and baggage wagons to the seat of war. So great has been the progress made by Germany during the intervening thirty years, that she could at the present time transport the same number of men and the same quantity of war material to the scene of action from two to four days, which shows the enormous strategical importance of the railway. A great French military authority considers that by means of seven double-track railway lines, 1,440,000 men could be transported to the frontiers of Germany in twenty-four hours, and in 207 trains on each of the seven lines. This would be a total of 1,449 trains. Germany is not far behind France in this ability to mobilize troops, and 1,440 trains bearing 1,440,000 men can be dispatched from Berlin within twenty-four hours to any district of the empire, so that the two great neighboring powers could mobilize great armies and begin war simultaneously with its declaration.

Some interesting railway statistics for last year, published a Japanese vernacular contemporary, show that the number of special trains run numbered 18,089, representing a decrease of 9,288 as compared with the preceding year. Most of these special trains were for the transportation of material used in the construction of new lines, and 205 special military trains were run in connection with the grand military maneuvers held in the provinces of Settau, Kawachi, and Izumi. The number of trains derailed during the year amounted to 122, and the number of the carriages derailed 250. Collisions numbered, 39; interruptions of traffic, 1,331; obstacles laid on the lines, 45; mistakes of pointsmen, 87; and irregular use of the staff, 65. The people killed by trains numbered 261, and those injured 180, showing an increase of 12 in the killed and of 58 in the injured. Most of the people killed, however, committed suicide; the passengers affected by railway accidents being 18 injured and 13 killed. Twenty-four passengers were injured through their own carelessness. Nine railway employes were injured in accidents, and 22 were killed and 56 injured by self-negligence. The number of passengers carried reached 32,000,000 and the goods carried 8,800,000 tons. The traffic receipts amounted to 10,189,738 yen.