

## MISCELLANEOUS INVENTIONS.

Charles V. Petteys, acting assistant surgeon U. S. A., stationed at Fort Robinson, Nebraska, has invented a new and improved horse litter, the object of which is to provide for army use an improved travois or horse litter, of light draught, and adapted to be folded and packed in small space, and to be readily extended when required for use; also adapted to support the sick or wounded in comfortable horizontal position, and with the least possible jar or jolt while passing over rough ground.

Mr. James W. Ripley, of Columbia, Mo., has invented a fastening for packages of letters and like mail matter in the postal service. The object of this invention is to save time and material in securely fastening such packages. It consists of a plate having hooked end and button, in combination with a cord, for securing a package.

Mr. Samuel H. Gregg, of Crawfordsville, Ind., has patented an improved barbed fence wire. The object of this invention is to make a fence wire so as to enable it to be under proper tension at all seasons of the year, so as to avoid snapping caused by the too great tension from contraction in winter; and also to avoid sagging or looseness caused by the expansion and relaxation of tension in summer.

Mr. Henry R. Gillingham, of Baltimore, Md., has patented an improvement in locking devices for demijohns, bottles, etc., designed to prevent the wasteful, injurious, or unauthorized use of wines and liquors, and to provide greater security for poisons. It consists in providing the old rotary plug valve with a peculiar locking device specially adapted to a receptacle of this kind.

An improvement in egg testers has been patented by Mr. Walter S. Burnham, of Ashtabula, O. The invention consists in the combination, with a box or vessel having a mirror at the bottom, of a disk or plate provided with rim and holes.

An improved key for opening and closing the cocks of water pipes, gas pipes, etc., when placed below the surface of the ground, has been patented by Mr. Patrick H. Regan, of Nashville, Tenn. It is so constructed that it may be extended and contracted, as the depth of the pipe may require.

A radiator formed of a number of radiating sections, into which smaller tubes are inserted, so that the steam occupies the space between the inner tubes and outer sections, and the air can circulate through the inner tubes and around the outer sections, has been patented by Messrs. George P. York and William H. Wilson, of Westfield, N. Y.

Mr. Sanford L. Farrar, of Bath, Me., has invented an improved steam cooker, which consists in the arrangement of two kettles, one on top of the other, the upper one of which has a perforated movable bottom, gutter, and spout, and the lower one is provided with an escape passage, valve, perforated casing, water pipe, and studs, and contains a perforated movable kettle having a perforated removable bottom. The filling tube of the lower kettle is provided with a float and a graduated rod for indicating the quantity of water in the kettle.

An improvement in skates has been patented by Mr. John E. Parmenter, of Fort Pembina, Dakota Territory. The object of this invention is to furnish skates so constructed that they can be very easily and quickly attached to and detached from the boots, and which shall be neat, strong, and durable, and not liable to become accidentally unfastened.

## NEW CANDLESTICK.

We give herewith an engraving of a novel candlestick recently patented in this country and in Europe by Mr. A. J. Smith, of Ukiah City, Cal. The object of this invention is to provide a candlestick that will hold the candle evenly and firmly, and permit of burning the whole of it without waste.

The candlestick consists essentially of four parts—a base or bottom, a hollow standard forming a support for the upper portion of the stick, and at the same time answering the purpose of a match safe, a cap fitted to the match safe, and a sliding sleeve fitted to the cap, and having fingers for grasping the candle.

Fig. 1 shows the candlestick in actual use; in Fig. 2 the upper portion is removed, showing the match safe; and Fig. 3 is a detail view of the upper portion of the candlestick. The slide on the candlestick shown in Fig. 1 has six fingers for grasping the candle, that shown in Figs. 2 and 3 has but three fingers, and the slide is open upon one side to admit of its springing more or less to adapt itself to the part upon which it slides.

The inventor claims several important advantages for this candlestick, among which are the facility with which it may be cleaned, its economy in the use of candles, and its cheapness as an article of manufacture. It will be admitted that this is a marked improvement over the ordinary article. Any further particulars relating to this invention will be furnished by the inventor, who is willing to dispose of his American and English patents.

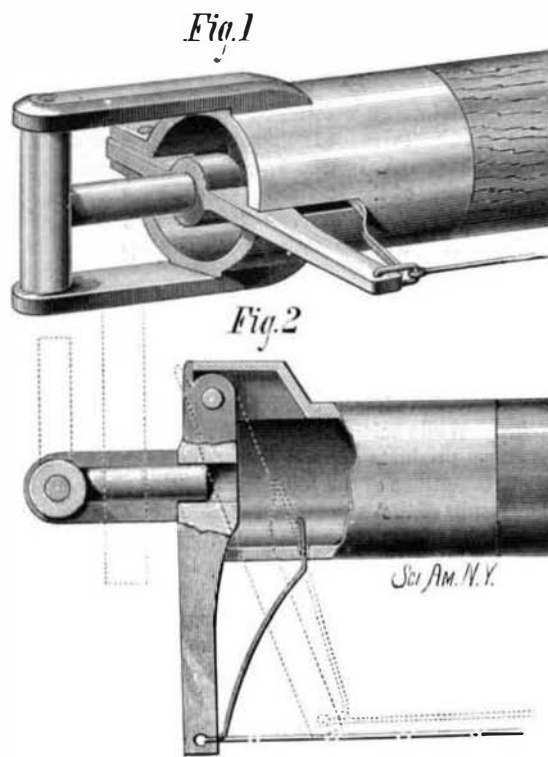
To NEUTRALIZE the sting of a gnat or mosquito, French sportsmen rub the part affected with a little *cerumen*, that is, the wax of their ear, extracted by the little finger.

## NEW HORSE DETACHER.

It is estimated that the percentage of persons killed while riding after horses is fifty times greater than that of travelers killed by railway accidents. Although this statement may appear incredible, it has been carefully verified by competent persons. These accidents occur from various causes, one of the most frequent being the result of the animals becoming frightened and rushing headlong at a runaway pace.

The invention shown in the accompanying engraving is intended to prevent a large class of such accidents by permitting the horses to escape.

The "ever-ready horse detacher," as the inventor calls it, is very simple and capable of instantly detaching the horses. The device is applied to the ends of the whiffletrees, and under ordinary circumstances holds the ends of the traces or tugs in the usual way.

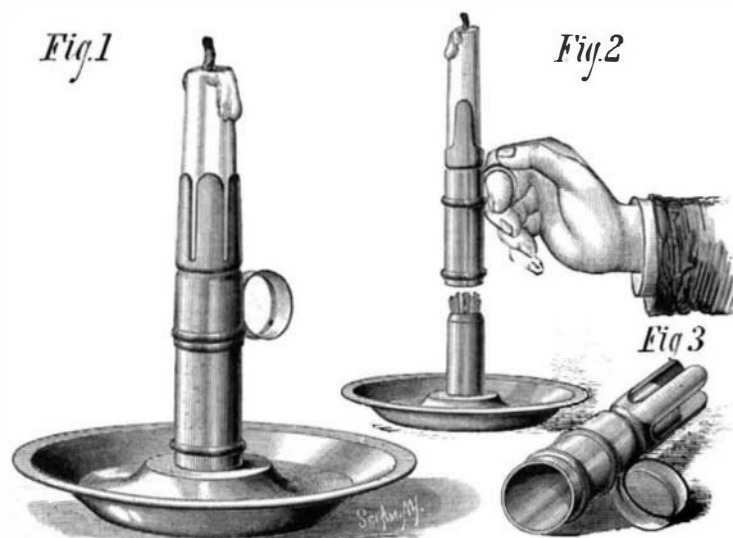


## KITCHEN'S HORSE DETACHER.

A clear idea of the construction of the detacher will be obtained from Fig. 1, which shows a ferrule having two projecting arms, between which is pivoted a bar carrying a tongue extending through the eye of the tug and received by a socket formed in a lever pivoted in the ferrule, and pushed outward by a spring which prevents it from becoming accidentally loosened. To the free end of the lever is connected a cord running to the center of the whiffletree, through a ring thence upward to the box within easy reach of the driver. In case of accident the lever is drawn backward by the cord, as indicated in dotted lines in the sectional view, Fig. 2. This releases the tongue that holds the tugs and permits the horses to escape.

## Destruction of Cast Iron Gas Mains.

A curious case of deterioration of cast iron gas pipes has recently been observed at Saarbrücken. The pipes in question had been laid for ten years, and when removed were



## NOVEL CANDLESTICK.

found converted into a soft substance which could be cut with a knife, and, on analysis, was found to contain only 52 per cent of metallic iron. The pipes were laid in channels cut in soft sandstone, filled in with ashes from locomotives. The coal which produced these ashes was from the Saarbrücken basin, and was relatively rich in sulphur. The destruction of the pipes was most probably due to the action of the sulphur contained in the ashes, combined with the oxygen of the atmosphere. This view is supported by the fact that the substance into which the pipes had been changed

contained one and one-third per cent of sulphuric acid. A large number of pipes were completely destroyed, and had to be renewed.

## Compressed Steel.

Application was lately made before the British Judicial Committee of the Privy Council by Sir Joseph Whitworth, F.R.S., for a prolongation of the English letters patent granted to him on the 24th of November, 1865, for his invention of certain improvements in casting iron and steel, and in apparatus employed for that purpose. The invention, which is very well known, is described, technically, as "consisting in forming and employing moulds of steel, in combination with pressing plungers, in such manner that fluid steel when in such moulds is subjected to very high degrees of pressure." The term of the letters patent expires on the 24th of November. The evidence of Sir Joseph Whitworth was taken before the learned Registrar—Mr. Henry Reeve, C.B.—on the 21st of July last, and was read at length to their lordships. Sir Joseph, having formally spoken as to the utility and novelty of his invention, deposed that before 1865 no such thing as compressed steel was known in the market. Before 1865 there was no getting steel that had the requisite amount of ductility and soundness. Steel of a certain amount of hardness could be got, but not of ductility. For guns, ductility was indispensable; but when ductility was required air cells were liable to be formed. He caused a large ingot of steel to be split open in order to examine the character of the metal. He found the upper part of it full of air cells, and consequently unsound. It was the best steel in the market, Bessemer steel. From these difficulties he directed his attention to improving the manufacture of steel. For many years he devoted his thoughts to it and made constant experiments. Before the letters patent were granted he had made at least 2,500 experiments.

He believed that the use of steel barrels, both for rifled small arms and for rifled guns, was attributable to his adoption of that metal for guns. He knew of no other manufacturer who had advocated the use of steel for firearms. He compared "Damascus metal," so called, with his own. The former burst with 105 grains charge; the latter did not burst at all. The fluid compressed steel was thus very much the stronger metal. His invention consisted practically in employing moulds of steel in which fluid steel was subjected to a very high pressure. Any gases retained in the fluid metal were pressed out, and the particles of the metal were thus forced into the closest possible connection. A pressure of not less than six tons on the square inch was required. The want of steel sufficiently strong to be used with this test delayed his operations for many years. The ordinary steel in the market could not stand the test. At last he made what was known as the 8,000 ton press. His invention was also applicable to cast iron, but it was more advantageous to compress steel than cast iron. Compressed steel was made down to 30 tons strength and 40 per cent ductility.

The demand for the fluid compressed steel was gradually increasing, and accidents had been materially reduced. It was not until 1869—four years after the patent was granted—that he was able to complete his works and apparatus so as to enable him to produce steel in useful quantities. The petitioner then gave intricate evidence as to the accounts kept by the firm as to the profits or losses of the invention.

In support of the petition, Sir John Hawkshaw, Mr. Barlow, C.E., Mr. Hotchkiss, of America, patentee of the revolving cannon; Mr. Wright, engineer-in-chief to the Royal Navy; Mr. Davis, works manager of the Torpedo Department at Woolwich Arsenal; and Mr. Purdey, the gunsmith, were called and gave evidence.

About the year 1863 the business of Sir Joseph Whitworth's then firm was purchased by a company in which he held by far the largest number of shares, and which company became eventually "The Whitworth Company (Limited)." The latter company carried on the business of the firm until the end of 1868, when, having the intention of eventually forming a company of another character which should afford special advantages to those of his workmen who were industrious and well conducted, he purchased all the business and again became the sole proprietor. In 1874 he formed a company called "Sir Joseph Whitworth & Co. (Limited)," of which, as before, he was by far the largest proprietor. It was so constituted that whenever any deserving workman in the employ of the company or firm desired to take shares and so invest his savings, he might do so under conditions that would be specially advantageous to him. The petitioner then described the various modes by which his invention had been brought before the public,

and he contended that he had not hitherto received any adequate remuneration for the labor, time, thought, and capital he had expended. Inasmuch as the great merit of his invention and the necessity of having a metal of great strength and ductility had been demonstrated, Sir Joseph Whitworth prayed her Majesty in Council to grant him a prolongation of the terms of his letters patent.

Mr. Aston, in closing the case, contended that Sir Joseph Whitworth, the petitioner, had done as much as possible to bring his invention before the public and to give them the

benefit of it. The question, therefore, was whether Sir Joseph, as patentee or manufacturer, had been sufficiently rewarded for the invention; and he argued that looking at the expense and trouble involved, and Sir Joseph Whitworth's well-known efforts to educate and improve the workpeople in his trade, a prolongation of the patent was justified.

Mr. Gorst, on the part of the Crown, admitted the great value of Sir Joseph Whitworth's invention, and only directed their lordships' attention to the accounts submitted to them in order to guide them as to whether or not the patentee had, as yet, profited sufficiently by his invention.

Their lordships, in the result, prolonged the patent for five years, on the usual and formal understanding that the Government and its contractors might use the invention without the payment of any royalty or charge.

**Fast Torpedo Boats.**

Messrs. Yarrow & Co., of the Isle of Dogs, have just completed two torpedo boats for the French Government, which they lately delivered at Brest. As a record of a long run for boats of this class—by far the longest that has ever been made yet—it may be mentioned that they steamed the whole distance of slightly over 500 miles, that they were under way 34 hours, and that a mean speed was maintained of 15 miles an hour. The consumption of coal was eight tons, which amount the boats are designed to carry without requiring a fresh supply. This gives 525 lb. per hour, or 35 lb. per mile. The above data are important as showing that long distances can be accomplished by small craft of the kind, provided an excessive speed is not required. Should a speed of 23 statute miles an hour be wanted, the consumption of fuel would be at the rate of 17 cwt. per hour, or 83 lb. per mile. The vessels were subsequently tried on their arrival at Brest for three hours' continuous running at full speed, and were also tested for their turning powers, and in every respect they were found to exceed the best performances of any torpedo boat in the French navy.

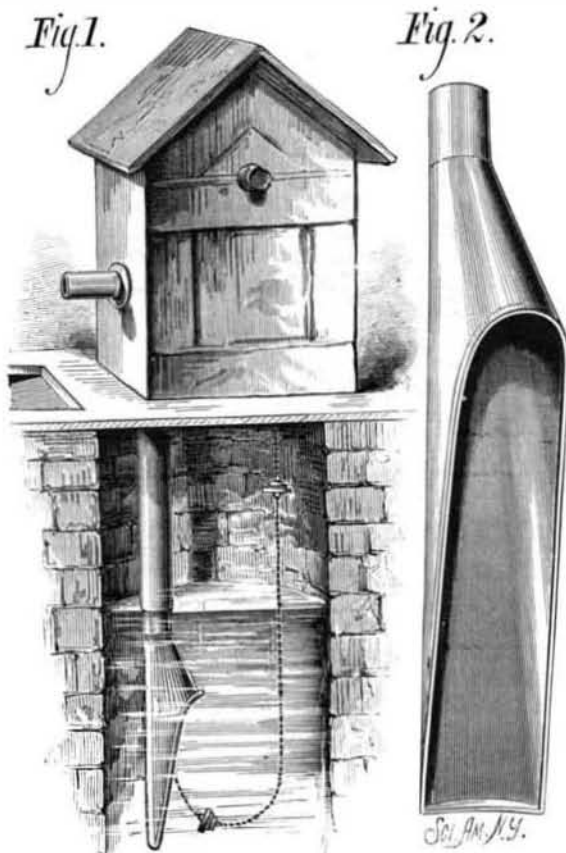
**THE ST. LOUIS BRIDGE.**

The great bridge over the Mississippi river at St. Louis, shown in the accompanying engraving, which is the largest arched bridge in the world, with its spans of 520 and 515 feet, was designed by Captain James B. Eads as Chief Engineer, and the superstructure was made from his designs and erected by the Keystone Bridge Company. The tubes of the arches are composed of six rolled cast steel staves forced into a cylindrical envelope of steel, the lengths of sections between the joints being about twelve feet, and the depth of the arched rib between the centers of two concentric tubes about the same. The two lines of tubes are braced together, and the ends of contiguous sections are united by couplings, made in two parts, with projections turned on the inner surface to fit into corresponding grooves on the ends of the tubes. The connecting pin for lateral struts, diagonals, and lateral bracing between the several arches is tapered and driven tightly into the joint, the whole connection being made water-tight.

The engraving of the bridge will give the reader an excellent idea of its general design and magnitude. The method of erecting the superstructure was described in this journal during the progress of the work. The arches were built outward simultaneously from the abutments and from each side of the piers, being supported by means of direct guys, composed of two lines of main cables of forty-two square inches section, passing over towers to anchorages on the shore, and by guys balanced over towers on the piers. The towers stood on hydraulic rams, which were caused by automatic gauges to rise and fall, to compensate for changes of temperature in the arches and cables.

**IMPROVEMENT IN CHAIN PUMPS.**

Mr. John P. Ryan, of Sardis, Miss., has recently patented an improvement in chain pumps which relates especially to the funnel connected with the lower end of the chain tube. The funnel, as will be seen by reference to Fig. 2, is of a peculiar form, well calculated to guide the buttons carried by the chain into the water tube; it has a straight wall and a flaring cut-away side, and a neck which is threaded and adapted to the lower end of the iron water tube. The straight wall of the funnel stands in the path of the chain and prevents it from swinging beyond the foot of the water tube and guides it easily and smoothly, so that little power is required to drive the pump. It is not necessary where this device is used to employ a lower chain guide wheel, as it would only add to the expense of the pump and increase friction, so that more power would be required to work it.



**RYAN'S IMPROVED PUMP.**

The inventor states that he uses but three buttons to twenty-five feet of chain, and that the pump will easily draw twice as much water as the ordinary chain pump.

**Fireless Locomotives.**

The fireless locomotives invented and used in New Orleans, La., and heretofore described by us, with engravings, are now being extensively introduced on the street railways in England and France. At a recent session of the Mechanical Engineers, London, Mr. Crampton and M. Bergeron both spoke very highly of the performance of the engines at work in and near Paris, and the opinion seemed to be general that the fireless locomotive offered an excellent solution of the problem of street tramway working. It also removes the objections to mechanical power in docks and on quays where hitherto horses have been used in deference to the laws relating to fires on such premises. Several modifications in

detail were suggested, more particularly with reference to the necessity for raising the working parts of the engine as high as possible from the ground, the arrangement adopted by Mr. Brown, of Winterthur, being referred to as suitable.

There is no doubt that the principle involved is likely to become largely adopted, though the engine itself as at present designed will probably be very materially modified in this country. The advantages claimed for the engine were summed up as follows: "No danger of explosions in the street, or of accidents to the boiler; no red glimmer from the fire during the night; no burning cinders dropped on the road; no cases of fire or other accidents caused by the engine; no noise produced by the valves, blow-off cocks, or blast; no smoke, soot, or disagreeable smell of burnt gases; no stoppages resulting from the burning out of fire-bars, cracking of plates, leakage of tubes, or other causes, and to all may be added that which is the most important of all, namely, the economy which can be realized."

**John Miers.**

The venerable John Miers, long known as the patriarch of British botanists, died in London, on November 17th, in his 91st year. He was born in London, August 25, 1789, was educated as an engineer, and after leaving school devoted himself to the study of mineralogy and chemistry. In 1825 he published his "Travels in Chile and La Plata." Soon afterward he proceeded to Brazil, where he resided eight years, and made extensive collections of plants and insects. After his final return to England he was elected a fellow of the Linnæan Society in 1839, and of the Royal Society in 1843, acting for a time on the council of both societies. Besides many separate papers he published two large works, "Illustrations of South American Plants" and "Contributions to Botany," in which he exhibited a marked tendency to multiply genera and species. He was one of the few botanists who remained faithful to a belief in the fixity of specific type, rejecting the modern evolutionary ideas. He served on the jury of the Brazilian sections of the Universal Expositions of 1862 and 1867, and was decorated by the Emperor Dom Pedro II. with the commandership of the Order of the Rose. Mr. Miers left his botanical collections to the British Museum.

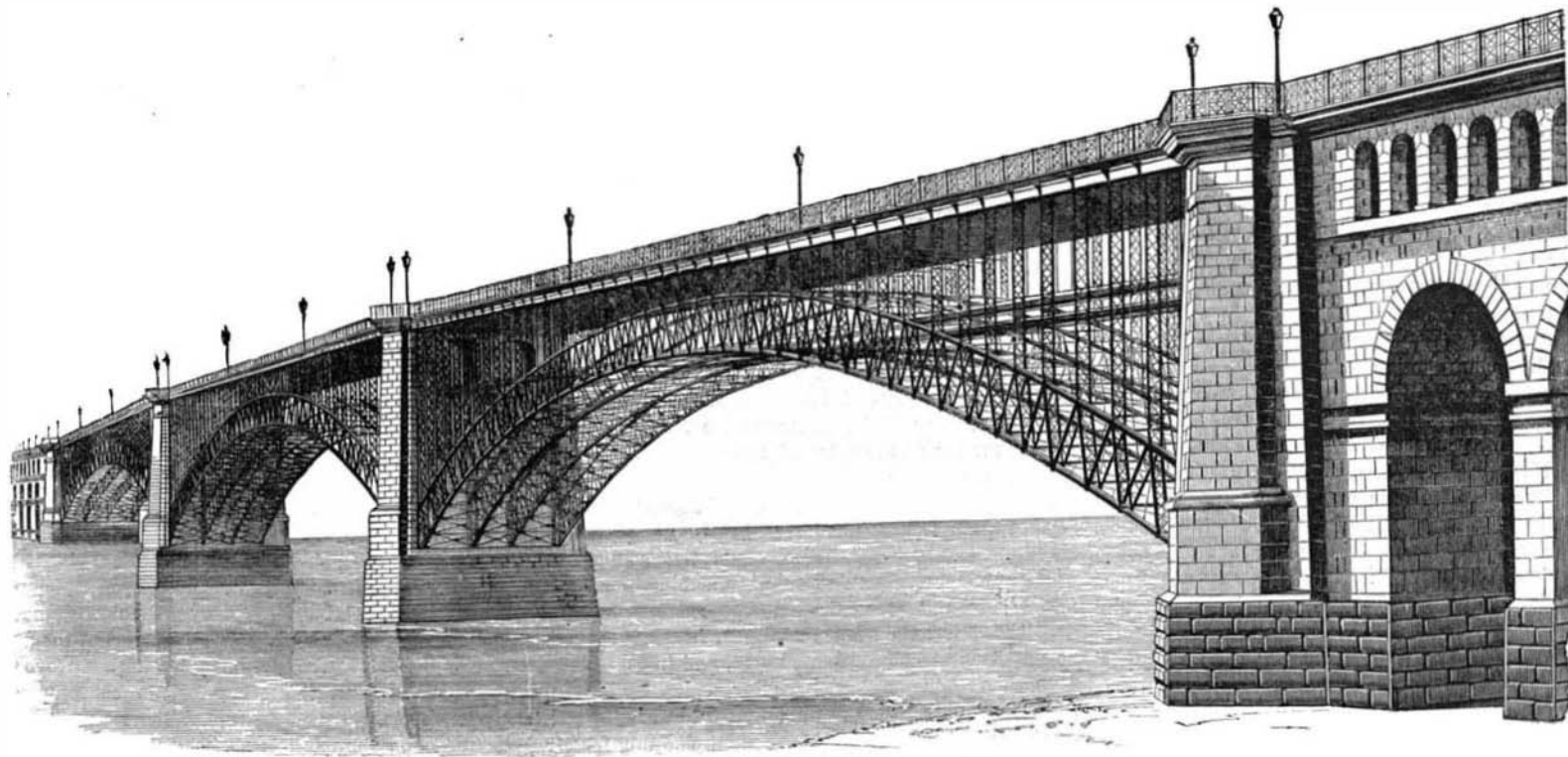
**Jean Charles Chenu.**

The eminent French naturalist, Dr. Jean Charles Chenu, died recently at the age of 71. His first publication was a treatise on cholera morbus (1835); his second, an essay on thermo-mineral waters (1840). He next applied himself to the preparation of his great folio work, "Conchological Illustrations, or, Description and Figures of All Known Shells, Living or Fossil, with the New Genera and the Latest Discovered Species" (1842-47). In 1852 he became librarian of the School of Military Medicine, made the campaign of the Crimea in connection with the ambulance service, and was director general of ambulances during the siege of Paris (1870-71). Besides many other works, he was author of an "Encyclopedia of Natural History" (31 vols., 1850-61), of treatises on the medical history of the Crimean and Italian wars, and elementary handbooks of ornithology, natural history (1846), and conchology and palæontology (2 vols., 1862, with 5,000 illustrations). He was made a Commander of the Legion of Honor in July, 1871.

**The Navigation of the Siberian Polar Sea.**

Professor Nordenskjöld's earlier conclusions with regard to the navigability of the sea north of Siberia, and the practicability of a commercial route that way, seem to have been considerably modified. His opinion now is:

1. That a voyage from the Atlantic to the Pacific Ocean,



**ILLINOIS AND ST. LOUIS BRIDGE.**