

sity at 15° C. of 0.980. This new composition has been termed "twentieth century gum," and among its advantages over ordinary rubber are first, saving in the cost of reproducing the plant; second, saving in the cost of exportation; third, saving in material used in purifying establishments; fourth, saving in fuel; fifth, in machinery; and sixth, saving in time.

Paris Exposition Notes.

It is estimated that 150,000 Americans will visit Paris sometime while the Exposition is open. These figures are said to be based upon the number of residents now abroad and the capacity of the transatlantic steamers. It seems very high, however, and probably 100,000 will be much nearer the mark.

The Experiment Station exhibit at the Paris Exposition is most interesting. The various agricultural colleges and experiment stations in the association have contributed materials, charts, pieces of apparatus, models, etc. The collections of photographs and publications is a most imposing one and the photographs are displayed in portfolios; there being 750 in all. Some of the apparatus is very interesting, such as electrical devices for determining the salt content, temperature, and moisture content in soils. The California Station furnished an olive exhibit including fifty samples of olive oil. The Alabama Station, on the other hand, presented a collection of mounted specimens of cotton. Several pieces of original apparatus for investigation in vegetable physiology are shown. The dairy exhibit is the largest. In 1889 our agricultural experiment stations also made an exhibit at Paris, but the exhibit was small and unimportant compared with the present one.

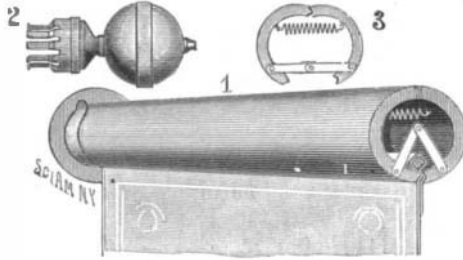
One of the interesting features of the Paris Exposition is the elevated moving sidewalk. This is modeled somewhat after that of Chicago, but the idea is carried out on a more extended scale; the line forms a complete circuit, running along the side of the Champ de Mars, the Quai d'Orsay, the Esplanade des Invalides, and the Avenue de la Motte-Picquet, the total length of its course being 3,500 meters. The platform is supported on an elevated structure, to which access is given from a number of stations located within the Exposition grounds. The substructure supports three platforms, one fixed and two movable, these having a speed of 8 and 4 kilometers per hour. This arrangement permits an easy passage from one to the other, and a more or less extended survey of the grounds may be made, a fine view being obtained from this elevated point. The tour is made in 26 or 52 minutes, and the fixed rate is 50 centimes. To enable the platform to pass around the curves, the different sections are dovetailed into each other by large circular portions, forming a kind of horizontal hinge. Each of the platforms carries an I-beam running along under the center; these rest upon a series of rollers placed at intervals, operated by electric motors. Upon the shaft of the motor is mounted a large roller for the high-speed platform and a roller of one-half the diameter for the slow speed. The friction of the platform is sufficient to cause its adhesion to the rollers. The platform was put into operation on April 14 and has proved a great success, as by its means an easy passage through the grounds is afforded, as well as a series of interesting views.

The great 25-ton crane which is mounted in one of the main dynamo rooms of the Paris Exposition presents many points of interest. It is of great height, being 20 meters from the ground to the highest point; it takes the form of an immense tower, formed of iron beams and braced by horizontal and oblique cross-pieces. It rolls upon a track laid along the whole length of the building, and is used to mount the large dynamos and engines of this section. The track is 6 meters wide, and is made up of two rails placed close together, leaving a space between the flanges, which is occupied by a series of short cross-pieces which constitute a rack. With this the pinion of the crane engages, the transmission being made by a stout shaft which leads from a motor placed midway up the crane. The middle space underneath the tower is large enough to afford a wide passageway, and the railroad track which has been laid to bring in the pieces of the machines passes under it, leaving still a considerable space. The tower supports a platform at the top, whose height is 12½ meters from the ground. On this is a circular crown of rollers arranged to carry the horizontal beam of the crane, which may thus take a circular motion around a pin in the center. Upon the center of this beam, which is constructed of trelliswork, are placed the motors, which separate the carriage by chains which pass over a series of pulleys. The length of the horizontal beam is 25 meters and the carriage mounted upon it will describe a radius of 11 meters. It will lift 25 tons to a height of 12½ meters. The rate of lifting is 0.04 meters per second, and the carriage travels at 0.20 meters per second; the crane is moved as a whole at the same rate. It rolls upon 8 wheels on each side. This crane has been constructed by Jules Leblanc, of Paris.

A NEW CURTAIN-HANGER.

The subject of the annexed illustration is an improved curtain pole, to which a portière or curtain may be attached without the use of the rings or pins ordinarily employed. Fig. 1 is a perspective view of the curtain-pole. Fig. 2 represents a socket employed when the pole is supported on brackets. Fig. 3 is an end view, showing the pole in position to receive a curtain. The pole has been patented by Almon S. Venen and Albert L. MacLeod, of Forest Grove, Ore.

The pole is formed of two hollow semi-cylindrical sections, hinged together at their upper ends to permit the lower ends to swing apart. Retractable springs



A NEW AND IMPROVED CURTAIN-HANGER.

serve to draw the two sections of the pole together. In order to hold the sections in distended position, toggle-links are employed, one of which is provided with a lug, which limits the downward movement of the toggles.

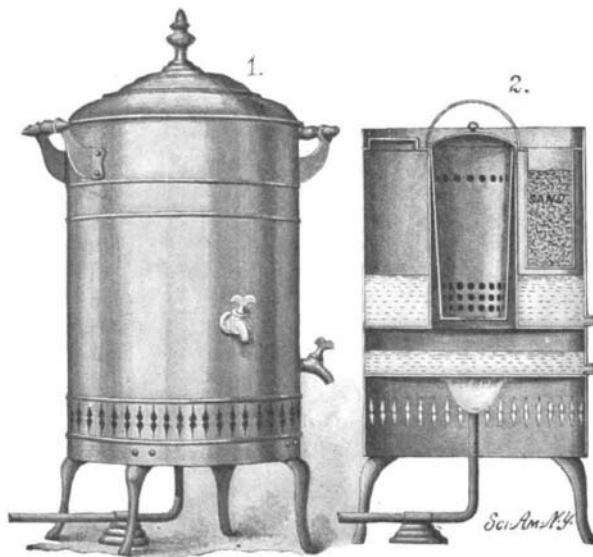
The upper end of the curtain is wrapped around a strip of wood and passed into the open pole. By forcing the links up, the retractile springs will draw the two sections of the pole together, as shown in Fig. 1.

When the pole is supported on brackets extended inward from the casing, the sections are held from accidental separation by means of a socket (Fig. 2) consisting of spring-fingers, to which an ornamental end piece is attached.

A STERILIZER FOR RAZORS AND SURGICAL INSTRUMENTS.

An apparatus for antiseptically cleaning the instruments used by barbers, dentists and surgeons, is of primary importance, for the reason that the germs in septic or infected tissues are but too easily transferred to healthy tissues by the very instruments which are used in maintaining that healthy condition. Undoubtedly the ideal sterilizing antiseptic is a moist vapor or liquid at boiling-temperature, which immediately acts upon bacteria without in any way injuring the instruments. A simple sterilizer built upon this principle has been devised by Dr. J. A. Cronkhite, of the J. A. Cronkhite Manufacturing Company, 405½ South Broadway, Los Angeles, Cal.

Dr. Cronkhite's sterilizer comprises a casing formed with a heating-chamber in its bottom. Above the heating-chamber is a tank which contains an antiseptic solution, the vapors of which pass upward into a central vapor-chamber which is surrounded by a water-chamber, and which is designed to receive a conical, removable instrument-cup. In order that the



THE CRONKHITE INSTRUMENT STERILIZER.

Instruments may be subjected to the action of the vapors given off by the heated antiseptic solution, the cup is provided with orifices in its sides.

Since it is often desirable to subject the instruments to the action of a sand bath, the inventor has arranged in the top of the water-chamber surrounding the vapor-chamber, a sand-vessel, into which the instruments are inserted to be mechanically cleaned before they are placed in the sterilizing receptacle.

In operation, the cover of the apparatus is removed, the sterilizing receptacle is filled with the instruments and hung in the vapor-chamber. The burners in the heating-chambers being ignited, the antiseptic solution is heated, and the hot, rising vapors sterilize the instruments, and also heat the water in the water-cham-

ber, and hence the sand in the sand-vessel. Hypodermic syringes and the like can be directly sterilized by withdrawing a small quantity of the heated antiseptic solution and using it in any suitable manner.

The water-chamber places at the dentist's command the supply of hot water which he finds so indispensable in his work.

Automobile News.

Coke will be used as a fuel for an English motor carriage.

A Chicago firm is using an automobile provided with a steel fender.

In the Paris-Roubaix race a serious accident occurred. Two competitors on motor tricycles collided and dashed into a crowd of two thousand persons. Twenty persons were knocked down, some of them having their bones broken and many others were bruised.

Two of the largest traction engines in the world and eight steel carriages, for use in the mining district of Siberia are reported to have been shipped from San Leandro, Cal. There has also been planned a carrying service across the desert in China in competition with the trade now done by means of camels, and it is expected to have 50 engines and 3,000 wagons actively engaged within a year.

A French military paper states that Col. Renard has invented a light motor for the purpose of traction on land and sea, says The Engineer. A grant was therefore made of \$4,000 in order to enable Col. Renard to adapt it for the traction of a military convoy by road. In this he has been successful, and in connection with it he has invented a stiff spiral coupling for the wagons by means of which as many as thirty wagons can be hauled by the motor, and yet be kept exactly in its wake, however winding the road may be. Col. Renard's invention will be tested at the army maneuvers this year on the plateau of Beauce.

The Russian Minister of War is desirous of purchasing a freight automobile to be propelled either by steam or kerosene, and if any manufacturer will ship two sets of carriages, one for steam and the other for kerosene, to St. Petersburg, the War Department will pay the freight and duty on both, and purchase the one best suited for its purpose, while the other one will be returned. The carriages must reach St. Petersburg by June, 1900. Full data as to weight, price, rapidity of movement, etc., should be sent to the Chief of the Staff of the Ministry of War. Owing to the fact that large orders may be given to supply the Russian army this matter is an important one.

The question of regulating the speed and circulation of automobiles has occupied the attention of the Paris authorities for some time past. The regulations which now exist have not given entire satisfaction, and the Minister of Public Works has decided to draw up a new set of rules, these to be established by a commission which has been appointed for the purpose, composed of experienced automobilists and engineers. The questions to be considered will be mainly those of speed, audible signals and the police measures to be taken relative to circulation, as well as the placing of certain distinctive marks, plates, etc., upon the vehicles. The commission includes Messrs. de Zuylen, president of the Automobile Club of France; Bailly, president of the Touring Club; Forestier, inspector general of routes; Pierre Giffard, etc. The commission has been well chosen, and out of its eleven members eight are members of the Automobile Club, and are experienced conductors.

A collection of military automobiles is to be shown at the Paris Exposition. The committee in charge of the section including the armament and material for the artillery has taken up the idea some time since, and from among the different vehicles used in the army a number of types have been chosen, to which this form of locomotion seemed to be best adapted. A number of constructors were called upon to furnish models of the different types, and a collection of twelve automobiles will be seen, of which two are operated by steam, one by petroleum, and nine by gasoline. These include a heavy tractor for use in artillery and engineering service, a medical wagon containing an equipment of surgical apparatus, medicines, etc., besides a folding tent for conducting operations. A telegraph wagon will contain a complete outfit of apparatus for field use, and another vehicle will be shown for transporting telegraphic materials. An automobile for the military postal service will also be seen. Among others are an omnibus for the transportation of personnel, a vehicle for the commanding officer, a rapid automobile and a smaller vehicle for the use of officers, a moto-cycle for the transmission of dispatches, etc. They have been built by a number of prominent constructors, such as Panhard & Levassor, the Société Scotte, Peugeot, De Dion, etc. The greater number of these automobiles will be painted a uniform gray color, which is that adopted for the army vehicles. The exhibit will be made in the Army and Marine Palace, fronting on the Seine near the Champ de Mars.

Science Notes.

Mr. Herbert Spencer, the eminent philosopher, celebrated his eightieth birthday on April 27.

Some of the railways in the South are offering special excursion rates to various points on its lines where the total eclipse of the sun may be seen. These rates are given only to passengers who go in parties of ten.

Prof. Percival Lowell and Prof. Todd have left New York with astronomical material to observe the eclipse of the sun in Algeria. Owing to the fineness of the climate of Algeria, it is a particularly good locality to observe the eclipse. There is an observatory in Algeria, the director of which recently went to Paris to take measurements with M. Lœwey in order to observe the eclipse.

In a communication made to the Société d'Ethnographie by M. Verrier, the question of the origin of the Boers has been considered. It appears that in 1652 Van Biebeck was sent by the Dutch East India Company to found a supply station at the Cape, which then changed its name from the Cape of Tempests to that of Cape of Good Hope. In 1680, there was at the Cape 600 whites of Dutch origin. When, in 1685, Louis XIV. revoked the edict of Nantes, 300 French families demanded the hospitality of the East India Company; they were sent to the Cape, where they were well received by the colonists and supplied with land and stock. They became incorporated into the colony and the Dutch language was employed exclusively. The present Boers are descendants of this colony, spreading over the territory of the Cape, Natal, Orange Free State, and Transvaal.

The Canadian government has established refrigerators for the storage of fresh bait in co-operation with associations of fishermen along the coast. Complaint arises season after season that bait is scarce just when it is most urgently needed, yet such bait can, as a rule, be obtained in abundance early in the season when the men are not in need of it. An appropriation of \$25,000 has enabled the Department of Agriculture to remedy the difficulty. The Dominion government assists the fishermen's bait association to the extent of 50 per cent of the cost of building the freezers and by the payment of a portion of the cost of operating the freezers. Each local association is required to receive, freeze, and store for each shareholder a quantity of bait up to 400 pounds for each share held and to furnish it during the fishing season as it is needed. Each fisherman pays a nominal charge for freezing and storage, and the association has the option of storing surplus bait and of disposing of it on terms agreed upon by the association.

A number of experiments have been made in Australia upon the temperature of growing plants by comparison with the temperature of the surrounding air, using either wet bulbs or ordinary thermometers. The following figures have been obtained for bamboo stalks: Exterior air, 72.8° and 76.5° (Fahrenheit) as maxima and minima; bamboo, 75.8° and 89.3°. For the stalk of the banana trees, air, 63.8° and 86.1°; stalk, 75.4° and 90°. The cactus flower shows temperatures of 10° and 15° above air. Experiments were made with the cocoanut. Two of these were kept in a room for ten days, and at the end of that time they showed a temperature of 6.3° below that of the surrounding air. They were planted on the eleventh day in the shade, and germination commenced. During eighteen days the temperature remained constant, but after this time it rose rapidly and gave air, 70.6°; soil, 56.6°; nut, 83°. The same botanist has made a number of observations upon the growth of bamboo. In 37 observations he found an elongation of 47.5 centimeters in 24 hours. In 69 cases, 35 centimeters, and in 111 cases, 30 centimeters. The maximum elongation for 24 hours has been 60 centimeters, showing a rapid rate of growth.

The soil of the greater portion of the grain region of Russia and Siberia is well known in that country as the "Chernozem" or "black earth," says Bradstreet's. It is a broad belt of prairie, 600 to 700 miles in average width, beginning in Hungary and extending northeastward to the Ural Mountains, and then eastward into Siberia to unknown boundaries. On the north and the west are the "gray forest lands," and on the south and west are salt and alkaline districts and sandy wastes, and finally the Caucasus and the Ural Mountains. By both chemical and mechanical analyses the soil is shown to be remarkably similar to that of our own prairies, also commonly known by the similar term of "black loam." The depth is, on an average, probably a little greater than that of our prairie soil. From a chemical standpoint the soils of the two regions are similarly characterized (1) by an exceptionally large amount of thoroughly humified organic matter; (2) by the presence of an unusual proportion of phosphoric acid; and (3) by a great amount, comparatively, of lime, potash and other alkalis. These soils are, therefore, alkaline, while many others, especially of forest regions, are acid. It is well known that the substances thus more abundant in these soils than in others are just those usually needed by the wheat plant.

Engineering Notes.

A naphtha pipe line 160 miles long has been laid by the Trans-Caucasus Railway Company.

The value of Transvaal mining machinery is not far from \$47,000,000. Most of the machinery (about \$40,000,000 worth) is on the Witwatersrand.

A wrought iron gas main, 23,015 feet long and 3 inches in diameter, is in use between Phoenixville and Royersford, Pa. The gas is conveyed under pressure of 20 pounds.

The harbor of Port Arthur, in Manchuria, is to be excavated and a new harbor is to be built. The present channel will also be made deeper. Dredging will be done by hydraulic dredges.

A compressed air drill has proved very successful working under water on the sunken battleship of the Russian navy. The machine works as well when drilling with granite and hard substances as it does above water.

A house fell in Venice on April 21, causing the death of two people. This has naturally raised the question of the stability of buildings of this curious city. Twenty years ago one of the church towers fell down, and since then three new buildings have collapsed. In the present instance it is supposed that the clearing away of mud from the adjoining canal by means of a dredger was the cause of the accident. The drainage of Venice is fast becoming an important sanitary problem.

According to The London Engineer, the alloys used in Japanese bronzes contain a large percentage of lead, which improves the patina. The following are the constituent elements of three kinds of modern Japanese bronze: 1. Copper, 81.62 per cent; tin, 4.61 per cent; lead, 10.21 per cent. 2. Copper, 76.60; tin, 4.38; zinc, 6.53; lead, 11.38. 3. Copper, 88.55; tin, 2.42; zinc, 3.20; and lead, 4.72 per cent. Sometimes a little antimony is added just before casting, as shown by the following analysis: Cu = 68.25, Sn = 5.47, Zn = 8.88, Pb = 17.06, and Sb = 0.34 per cent.

The British Admiralty has accepted the tender of Messrs. Swan & Hunter, of Wallsend, for the new floating dock for the naval station at Hamilton, Bermuda. This dock is designed by Messrs. Clark & Standfield, who designed the United States naval dock for Algiers, La., and the Havana naval dock. It will be 545 feet long, 100 feet wide, 33 feet of depth water on blocks, and will lift 17,000 tons. It is to be built within twelve months, tested, and then towed to its destination. Its cost is to be \$920,000, as against \$810,000 for the Algiers dock, the latter sum included towage and insurance.

During the year 1899 21,080 patents were applied for, compared with 20,080 in 1898 and 18,347 in 1897. Of these, 7,430 were awarded after examination by the Patent Office, the corresponding number during last year having been 5,570, says The Electrician. Thus, while the number of applications only increased by 3.7 per cent, the number of successful applications increased by 33.4 per cent. During the year, 5,171 patents have expired or become void, and the total number of patents in force is 22,198. The increase in the number of patents awarded is chiefly marked in the case of electrical apparatus and machinery. Two hundred and sixty-five patents were awarded in this class in 1898, and 439 in 1899. Patents granted to foreigners are also on the increase. United States leads the way with 722, England follows with 554, France 474, Austria-Hungary 372, Sweden and Norway 90, and Russia 85.

The German Nautical Almanac, which appears for the first time in 1900, publishes the following figures, showing the progress of the merchant marine in that country. On the first of January, 1889, this was made up of 1,223 steamers and 2,482 sailing vessels, manned by 43,144 men, and gaging 2,317,523 tons. The steamers inscribed at Hamburg in 1888 numbered 688 and gaged 767,000 tons, against 348,000 in 1898, showing that the figure has doubled. The Hamburg American Company had, in 1899, 19 steamers, which transported 2,400,000 cubic meters of freight and 75,000 passengers. The company has since formed three new lines, one of which goes to New York, touching at Boulogne. At Genoa it has established a line between Italy and Argentine Republic, and has launched in one year 9 vessels, representing 77,168 tons. The German East African Company has 12 vessels, and the Waermann Company 20. The German Australian Line has 75 vessels, and has established a branch upon the Yang-tse-Kiang and along the coast of China. The German Levant Company has 20 vessels, whose transportation for 1891 amounted to 8,000,000 marks, and for 1898 20,000,000. There are also several small lines at the same port. The port of Bremen has 225 steamers and 139 sailing vessels; among the principal lines are the North German Lloyd, which has 62 steamers with 400,000 tons. In 1886 it had 30 steamers, with 99,000 tons. This line possesses the "Kaiser Wilhelm der Grosse," the most rapid of the German vessels. The Hausa Line has 38 vessels, and the Neptune 42. The Argo Company connects with London, having 30 vessels. The port of Lubeck has a total of 25 steamers, that of Flensburg 17; Keil has 14 and Stettin 81.

Electrical Notes.

A high-speed electric railway is to be built between Brussels and Antwerp, a distance of 28 miles.

Cables have been laid from Cape Town to St. Helena and from St. Helena to the Ascension Islands, and from there to St. Vincent, consequently there is a complete cable route to South Africa by way of Maderia and St. Vincent.

The locomotives on the Northern Pacific Railroad are equipped with electric headlights, and incandescent lights are also provided on the under side of the running boards and beneath the boiler, thus enabling the engineer and firemen to examine any part of the machinery with ease.

A telegraph line from Syria to Hedjaz is contemplated. This will give access to that portion of Arabia, thus bringing Mecca and Medina into communication with the world. The line will follow the old pilgrimage route to Mahomet's shrine at Mecca; the total length of the line is said to be 931 miles.

The London fire brigade is to have installed and maintained for two years wireless telegraphy instruments to connect the fire station at Streatham Green and a temporary sub-station in Streatham. It seems a very curious use for wireless telegraphy when ordinary fire alarms or telephones would answer the purpose.

A number of years ago a telegraph cable was laid in the bed of the Amazon River to connect the various towns along that stream with Para. The driftwood, etc., brought down by the stream broke and interfered with the workings of the cable to such an extent that it has been in use only a short time since it was laid. A land line is now being built and 180 miles have been completed. The difficulty of building a telegraph line through the Amazon forests is enormous, and it would not be surprising if this proves to be the most expensive telegraph line in the world.

The electrophone appears to be rapidly coming into favor in England. Already there are many places in the leading thoroughfares of London, where one can enter, and by the payment of a small fee, be switched on for a quarter of an hour to any of the principal theaters, music halls, etc. Now the Duke and Duchess of York have had their residence, York House, connected by electrophone with the leading theaters, concert halls, and so forth, so that their Royal Highnesses may listen to the entertainments and also enjoy the operatic performances at Covent Garden.

A method of testing the comparative efficiency of heat insulators was lately described in the "Proceedings" of the Royal Society. The authors are Messrs. C. G. Lamb and W. G. Wilson. The following results were obtained:—Air (no baffle plates), 0.000200 conductivity; pine sawdust, 0.000242; pine shaving 0.000162; brown paper (crumpled up), 0.000167; hair felt (broken up), 0.000145; hair felt in two sheets, 1/2 inch thick each, 0.000106; dry asbestos, 0.000297; charcoal, 0.000150; sand, 0.000740; rice husks, 0.000150; kapok (a heat insulator), 0.000144; kapok (loose), 0.000122; silicate cotton 0.000151.

The address of Sir William Henry Preece on "The Relations between Electricity and Engineering," which is published in the current issue of the SUPPLEMENT, contains abundant food for thought. He says there are four great principles underlying the practical application of electricity; the first, the establishment of a magnetic field; second, the establishment of an electric field; third, the disturbance or undulation of the ether; and fourth, the work done by the generation and maintenance of electric currents in material systems. He gives some very interesting facts in his lecture, such as the following: He has recommended aluminium wire for use in the interior of Africa where transportation is so costly. The same conductivity can be obtained as with copper with half the weight and at a less price, and a line can be put up which is telegraphically ten times better than of iron for less money.

A remarkable case of death by lightning occurred last Easter Monday during a football match in England. When the rain poured down many of the spectators took refuge in the grand stand. Suddenly the building was struck by lightning the electric fluid splintered the flag staff from top to bottom in its progress. One young man was killed instantly, and some thirty others were severely injured. The hat of the young man who was killed was partially burned, the crown was torn off, and the lining wrenched out. His hair was burned off, and the metal collar stud he was wearing at the time was completely melted, making a superficial wound in his neck. He was badly scorched about the body, and down his right leg, the trouser of which was torn, and the right boot split and burned. He had several coins in his right trousers pocket all of which were fused into one solid lump of metal. Curiously enough the gentleman standing beside him experienced no effects of the shock. Needless to say the building was not equipped with a lightning conductor, such a provision probably being considered as unnecessary in this case since the stand was not very tall.