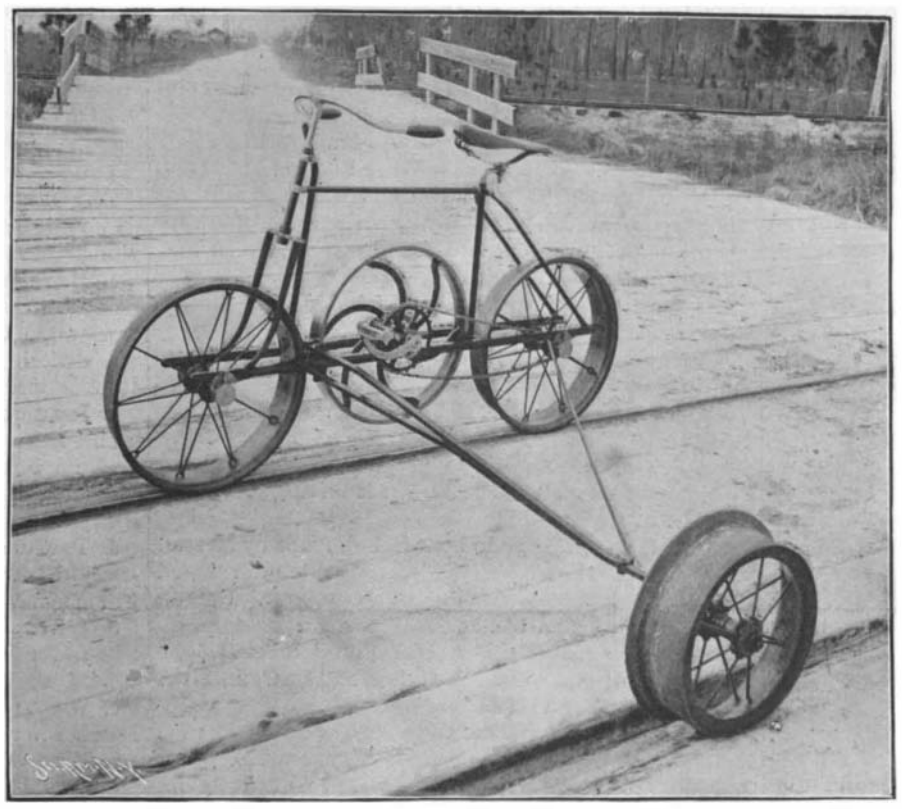
AN IMPROVED PROPELLING MECHANISM.

The accompanying illustrations represent improved means for the propulsion of bicycles, railway velocipedes, and hand cars, showing also the position and appearance of the mechanism when adapted to the bicycle and velocipede car. The improvement forms the subject of a patent recently issued to James J. Thompson, of Jacksonville, Fla., of which the object is to increase the power of propulsion of either class of cars or bicycle, by utilizing power generated through the instrumentality of a flywheel, and at the same time proportionately lessen the muscular exertion on the part of the operator. The sectional view represents the mechanism and its working, the device being attached to the frame bar for use on either style of car, or to the tubular frame of the bicycle. The hubs of the cranks, secured to the crank shaft, are journaled in ball bearings adjustable in hangers, and a large gear secured to the crank shaft meshes with the smaller gear of a compound gear revolving on ball bearings. The larger of the compound gears meshes with a small gear on the hub of the flywheel, revolving freely on ball bearings on the crank shaft. A sprocket wheel on the crank shaft connects in the usual way by an endless chain with a sprocket on the driven wheel.

By rotating the crank shaft, as in driving the ordinary bicycle, the gears are made to also revolve the flywheel, and power is thus accumulated. For hand cars, motion is obtained by the use of the ordinary lever and rods connecting it with the cranks, which, by their simultaneous action, convert the reciprocal motion of the lever into the rotary motion of the cranks. The flywheel is made to revolve many times oftener than the crank shaft through the medium of the compound gears, and, when once the power is properly adjusted, it is a simple matter to gear the speed of the bicycle to any pitch desired, and of either class of cars sufficiently to maintain the same upon the track with safety. At no period in the revolution of the cranks is there a diminution of power applied to the crank shaft through the lack of leverage force, as the increased momentum gained in the flywheel develops power sufficient to eliminate the effects of lost motion and drives the cranks on over dead centers, thus perpetuating the constant speed or progress of the car or bicycle, that would otherwise be retarded by sacrificing a sufficient amount of the speed power in rotating the cranks to the initial point of leverage.

Velocipede and hand cars equipped with this mechanism are also provided with patent roller bearing axle boxes, in the chamber of which the wheel axle of the car is made to revolve freely without friction. One of our views is a reproduction from a photograph taken of a velocipede car upon the track in actual service equipped with this mechanism, and another is a side view representing the mechanism in place on a bicycle.

BICYCLE WITH THOMPSON'S PROPELLING MECHANISM.



RAILWAY VELOCIPEDE WITH THOMPSON'S PROPELLING MECHANISM.

A Novel Headlight.

An Englishman has invented an automatic headlight. In going around curves headlights on locomotives, being stationary, throw the light straight ahead, instead of throwing it so that it covers the track, where, of course, the light should be all the time. The automatic headlight is suspended on two pivots, one on top and one on the bottom, so that it can swing freely. From the bottom of the headlight two chains run to the ends of an arm which is connected by a rod that runs to the pilot wheels' truck. When the pilot wheels strike a curve, the outside wheel forges slightly ahead, and this moves the rod and chain enough to move the headlight so that the reflection is cast directly ahead on the track. Out of the total of 1,650 railroad accidents in 1895, about 875 were due to derailments, usually on curves. There is no doubt that a certain percentage of these accidents could have been avoided by the use of an automatic headlight.

THE STRANDING OF THE STEAMSHIP ST. PAUL OF THE AMERICAN LINE.

The news of the stranding of the steamship St. Paul, the newest representative of the American Line, has been made known far and wide through the columns of the daily press. Starting from Southampton, England, on January 15, for America, the ship was making a fast passage across. When partly across, the Campania, of the Cunard Line, appeared on the scene, and for many hours the two ships were in company with each other. The claim made for the St. Paul and for her sister ship, the St. Louis, is that they are remarkably fast in a seaway, it being generally conceded that the larger Campania is faster in smooth water. For some reason both ships got far south of their reckoning, and approaching the American coast in a dense fog, headed straight for the New Jersey coast at Long Branch, fifteen or twenty miles south of their proper position. The lead was kept going on both ships, but in spite of the frequent soundings, the St. Paul, at 1:47 A. M., January 25, ran aground on the beach at Long Branch, near the Iron Pier, while the Campania, some three miles to the south, barely escaped a like fate.

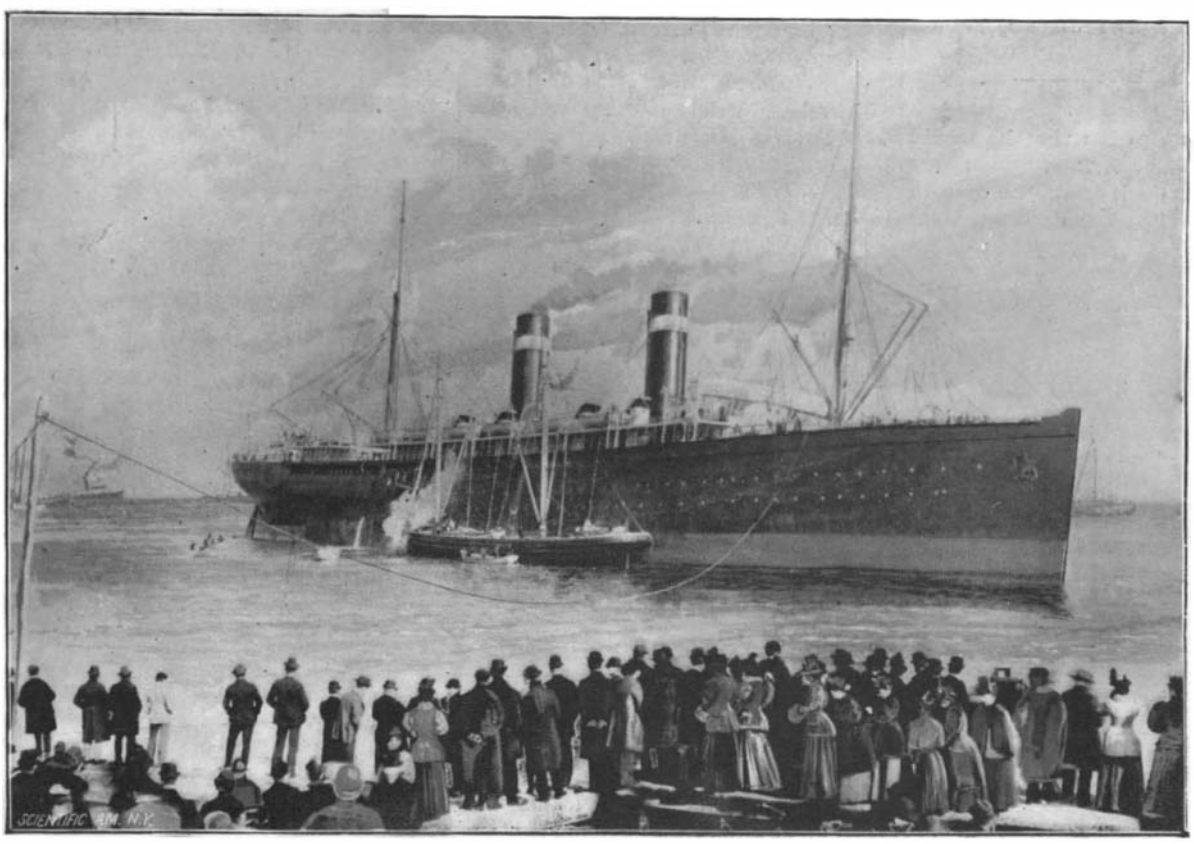
The wreckers were at once notified of the disaster and have made strenuous efforts to pull the ship off, but the want of sufficiently high tide has militated against their efforts.

We present our readers with a view of the stranded ship as she lay almost broadside on to the beach. Long Branch is one of the great summer resorts of New Yorkers and is within easy reach of the city. The trains running there have done a heavy business in the transportation to Long Branch of people desirous of seeing the stranded vessel. Thousands have gone there, and the place, ordinarily deserted at this season, has presented a scene of life and animation very foreign to the seashore in the month of January.

A telephone station was established on the ship, so as to keep her in constant communication with the outer world. As she lay on the beach, the wire of the telephone line, running from a pole on shore to the ship rail, has been her only connection with the land. It seemed a curious illustration of fin-de-siécle advancement, the establishment of a telephone station on a wrecked ship. There was no loss of life or property. The ship struck so gently that the passengers were not awakened.

We have already fully described and illustrated the St. Paul. She appeared to be on her way to making some fine transatlantic records and may do so in the coming season. She is fitted throughout with the most elaborate improvements for comfort and safety. Her staterooms in their arrangement and size are a distinct advance on those of other ships. One excellent feature is the arrangement of rooms opening into each other, so that friends or members of the same party occupying rooms opening on adjoining corridors can open the door between them and have thorough ventilation all day.

Our illustrations show some of the most interesting features of a cabin on the St. Paul and St. Louis, the most novel being the air mattresses. If there is any place where a person requires every appliance for comfort it is in a ship's stateroom, and in supplying their new vessels with air mattresses the American Line has made a distinct advance over the old time practices. The air mattress presents the features of being always in condition, never wearing into hills and



THE STEAMSHIP ST. PAUL STRANDED OFF LONG BRANCH.

hollows; it is always cool and is the most cleanly type of bed that has ever been devised. All these qualities go to make it the acme of luxury in the sleeping way. By inflating to different degrees of softness anyone's "personal coefficient" is met.

The mattress consists of a sack of air-tight rubber cloth with the back and front stayed together in a number of places corresponding to the tufting of ordinary mattresses. The outer covering is of strong cotton duck heavily coated with rubber and vulcanized. To inflate it a foot bellows is supplied. Our cut shows the operation of inflating as in progress in one of the American Line staterooms. The bellows is connected to the valve of the mattress by a long India rubber tube; a few strokes of the bellows inflates it, the tube is removed, the valve screwed down, and the mattress is ready for use. It may not need another pumping for a year or more. Sometimes a mattress is pumped up hard, and the occupant lying on it has the air withdrawn until the exact pressure to suit his or her ideas is reached.

For marine use the mattresses are fitted with life lines, a single mattress being a life preserver, capable of sustaining as many people as can find room to grasp the lines. The same company supplies a neck collar, which is simply sprung around the neck, and which makes drowning an impossibility for the wearer. This collar goes on without any tying, its elasticity holding it in place.

One of our cuts shows this collar, and next to it mattresses designed for camp use, one with and one without a pillow attached. Other cuts show double mattresses and pillows, hassocks, chair seats, and cushions, and give an idea only of the variety of goods of this kind supplied by the Mechanical Manufacturing Company. Their address is 146 Franklin Street, Boston, Mass. One of their recent achievements is the providing of an entire church with air pew cushions, making devotion in the old Puritan town more luxurious than would ever have accorded with the ideas of the Pilgrim fathers.

One important feature about air mattresses is that they do not require making over. With hair mattresses this is a periodical necessity. For household use this feature is of value, and on ships using them by the hundred the stateroom stewards are saved much work by being exempted from the necessity of working over and beating into condition mattresses which get worn down and out of shape.

Trolley Road in Rome.

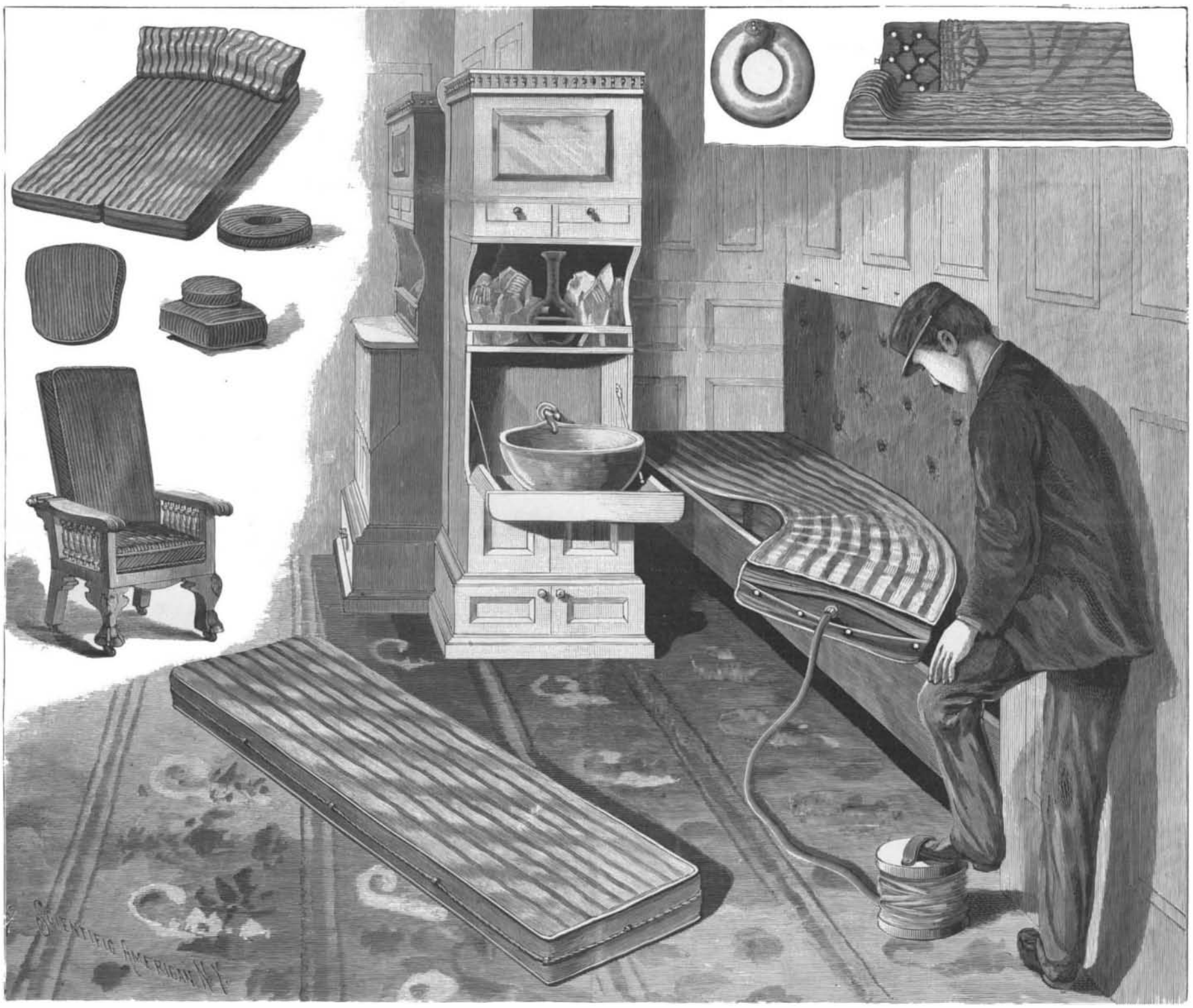
The new electric tramway which connects the main railway station of Rome with the center of the city is proving a great success as a means of rapid communication between the high and the low parts of the city, although it has had many difficulties to contend with.

The local authorities wisely refused to allow their principal streets to be desecrated by the poles and wires of an overhead system of traction; so the route chosen was very difficult, on account of the steep gradients encountered in several places, as well as some very sharp corners. It starts from the Piazza S. Silvestro and goes up the Via di Capo le Case and then through the Ludovisian Quarter to the Piazza di Termini. It consists of a double track nearly two miles long, and the general arrangements are the same as on the Havre tramways. Where telegraph and telephone wires cross the tramway, guard wires of steel are suspended to stop their fall and prevent them touching the trolley wire, if by any chance they broke. They are certainly not beautiful, but they are essential to the public safety. The trolley wire is supported by double bracket standards; where the track makes sharp bends cables attached to the walls are necessary to pull it out into the required curve, the wire coinciding really with the sides of the inscribed polygon. In some places the incline is over eight per cent, so special brakes are necessary. Both hand and foot brakes are used, one acting on the wheels directly and the other on the rails.

In addition there is an electric emergency brake, which will stop the car in a few yards, even when going quickly down hill. The principle of it consists in short-circuiting the motors, which are then driven as dynamos by the momentum of the car, which is thus rapidly stopped. The cars weigh seven tons when empty, and when loaded their carrying capacity is stated as forty; but there are often more than fifty passengers on them. Their weight is about ten tons. They start every five minutes and take thirteen or fourteen minutes to perform the whole journey, the maximum speed allowed being nine miles an hour. The cars are well lit, and an elaborate system of electric bells enables each passenger from his seat to communicate with the motorman.

The motors are worked by current brought from the Electric Lighting Company, who possess the famous Tivoli-Rome transmission plant. At Tivoli, on the slope of the Sabine Hills, the power developed in large turbines is converted into electric energy by alternators, and is conveyed at high pressure by four cables across the Campagna, a distance of eighteen miles, to a transformer house just outside the Porta Pia, where the pressure is reduced before it is distributed to various subcenters in the city. As the current is alternating, it is transformed into continuous by means of high speed dynamo motors. It is then used to charge accumulators and give a constant 550 volt supply to the trolley wire.

The General Electric Company, of the United States, did the overhead work and the equipment of the cars. —The Builder, London.



THE CABIN OF THE ST. PAUL—PERFECTION AIR MATTRESSES AND LIFE PRESERVERS.

EVERGREEN privet (Ligustrum ovalifolium) thrives in most climates. This is one of the plants so useful for making a rapid growing hedge, and for cover for game, as well as for ornament in the mixed shrubbery as bush plants. It has all but completely shut out the ordinary deciduous small-leaved forms, and to a certain extent, adds the Garden, the oblong evergreen forms. In some localities it loses its leaves only partially during winter. In ordinary winters it remains evergreen in most localities.

Science Notes.

Tea-Leaf Smoking.—According to Cassell's Saturday Magazine, it has become a fashionable distraction in England to smoke green tea in the form of cigarettes. A large number of the adepts of this new pastime, says the English journal, are highly educated women. A physician who has had occasion to treat patients for extreme nervousness and insomnia due to this practice states that among them there is a well known female writer whose novels are widely read and who habitually smokes from twenty to thirty tea cigarettes while working.

"At the home of a well known lady whom I am attending," says he, "tea cigarettes are always passed around after dinner, and I know three celebrated actresses who give tea smoking parties twice a week. A number of literary ladies at Kensington have formed a small club for the same purpose. One of my patients spends nearly two pounds a week to satisfy her mania. This habit, moreover, is spreading to such an extent that certain tobacco dealers are now offering packages of tea cigarettes to the public."

Psychophotography.—That real images of objects are formed upon the human retina and persist temporarily seems to be proved by a series of experiments made by Mr. W. Ingles Rogers and described by him in the Amateur Photographer for November 22, 1895. Mr. Rogers took a shilling and looked at it intently in ordinary daylight for fully a minute, with the idea of fixing the image of it distinctly upon the retina. He then drew a yellow screen over the window of the room in which he sat, so as to exclude all actinic light, and, placing a photographic plate in a certain position, fixed his eyes upon the center of it, at the same time allowing nothing but the image of the coin to occupy his mind. He remained looking at the plate for forty-three minutes and afterward developed it, with the result that an outline of the coin was clearly shown upon it. The second experiment, made in the presence of three trustworthy witnesses whose testimony accompanies Mr. Rogers' communication, was still more remarkable in its result. In this case a postage stamp was substituted for the shilling. This was gazed at in a strong light for one minute. It was then removed and a plate put in its place and looked at for twenty minutes. The resulting "psychogram," which is reproduced in the Amateur Photographer, lacked detail, but sufficient was shown to prove that the picture of an object impressed upon the retina can send out vibrations that will result in the production of an image upon a sensitized plate.

The Power of Guns.—One might be accused of romancing were he to assert that a gun is of several million horse power, and yet nothing is more exact, as we shall demonstrate. The Italian 100 ton gun (model of 1879), with a 550 pound charge of powder, throws a projectile weighing 2,020 pounds at an initial velocity of 1,715 feet per second. It communicates to it, therefore, a live power or kinetic force of 92,597,000 foot pounds. The thrust exerted by the gases due to the ignition of the powder lasts less than a hundredth of a second. The result is that during the active period of the work of the powder in the gun, the mean power is greater than 87 million foot pounds per hundredth of a second, say 8,700 million foot pounds per second. This represents a power of 12 million kilowatts or 17 million horse power.

There is unfortunately another side to this picture. Although large guns are extraordinarily powerful, their active life is essentially ephemeral, since, after a hundred shots, they are generally out of service. They have then worked actively one second!

The same calculation applied to modern guns that throw 2,200 pound projectiles, and communicate thereto an initial velocity of 1,970 feet a second, demonstrates, further, that such guns, during less than a hundredth of a second each time, develop a formidable power of 13,050,000,000 foot pounds per second, say 24,000,000 horse power.

Taking Impressions of Plants.—The following simple method of taking impressions of plants is due to Mr. Bertot, of the French Academy of Sciences. A sheet of paper is first lightly oiled on one side, and then folded in four, so that the oil may filter through the pores, and the plant may not come into direct contact with the liquid. The plant is placed between the leaves of the second folding, and in this position is pressed, through other paper, all over with the hand, so as to cause a small quantity of oil to adhere to the surface. Then it is taken out and placed carefully upon white paper, another sheet is placed above (as two impressions can be taken out at once) and the plant is pressed as before. Upon now removing it, an invisible image remains on the paper. Over this is sprinkled powdered black lead, which causes the image to appear. With an assortment of pigments, the natural colors of plants may be reproduced. To obtain fixity, resin is mixed with the color in small quantity. The impression becomes fixed when it is exposed to a heat sufficient to melt the resin.

Prevention of the Freezing of Gas Pipes.—It has been thought up to the present that the freezing of gas pipes in winter is due solely to the aqueous vapor carried along, and which, under the influence of the cold, is first condensed and then congealed, so as to obstruct the pipes. An attempt has been made to overcome this inconvenience by drying the gas through the action of concentrated sulphuric acid. But during the course of last winter it was found that, despite such precaution, there occurred numerous cases of freezing that had to be attributed to the congelation of the benzole. It, therefore, became necessary to seek another process which should prove efficacious in both cases at once. A process of this kind, recently patented by the Deutsche Continental Gas Gesellschaft, of Dessau, consists in injecting into the gas upon its exit from the gasometer a determinate quantity of vapor of alcohol. If, under the action of cold, the aqueous vapor and benzol condense, it will be the same with the alcohol, the introduction of which into the mixture will lower the point of congelation, and hence prevent the obstruction of the conduits.

The experiments made last winter demonstrated that the influence of the alcoholic vapor makes itself felt at a distance of two and a half miles from the gasometer. On the contrary, it disappears as soon as the gas passes through a wet meter. So the inventors advise the installation of a small injector alongside of the meter in factories, railway stations, etc., in order to permit of adding alcoholic vapor anew to the gas. The proportion of alcohol necessary is 5 grammes of impure 95° alcohol to the cubic meter of gas. In extremely cold weather the proportion of alcohol may be raised to 6 or 7 grammes. The addition of this small quantity of alcohol has no influence upon the calorific or illuminating power of the gas.

AN IMPROVED BICYCLE LAMP BRACKET.

The illustration represents a simple and durable lamp bracket patented by James E. Bean, readily attached to and removed from a bicycle without disconnecting the lamp and the bracket. The improvement is being introduced by United States Manufacturing Company, Fond du Lac, Wis. In the illustration, B represents the bracket, which is held in place by a strong spring catch at its lower end, but may be readily removed, leaving only the small clip, A, attached under the axle nut. The catch is very strong, and may be made as tight as the user desires, so that it will never shake off or get loose.

THE UNITED STATES DETACHABLE LAMP BRACKET.

Treasure Houses in New York.

"If the New York dry goods district should be destroyed to-night," said a business man to a representative of the Sun, "every great insurance company in the world would fail." Doubtless there is some exaggeration in such an opinion, but there are $900,000,000 worth of insurable goods in the comparatively small down-town area known as the dry goods district, to say nothing of buildings, furniture, and fixtures. London and perhaps Paris are the only other cities in the world that equal New York as treasure houses of manufactured goods.

A single wholesale and retail house in the fashionable shopping district of Broadway contains $11,000,000 worth of goods. Another house in Twenty-third Street contains $6,000,000 worth. There must be scores of business houses containing from $1,000,000 to $5,000,000 worth of goods. The goods stored in three or four business districts would more than pay the national debt. The goods in the great clothing district run up into the hundreds of millions. The little jewelry district down-town is one of the richest urban areas in the world. Silverware, gold, and jewels valued at hundreds of millions are stored in the district centered about Union Square. The samples of a single hat house brought at auction in a recent year $70,000. Some of the most precious articles in proportion to bulk are stored in the drug and chemical and perfumery houses in the region south of Fulton Street and east of William. The book publishing district, now stringing itself along from Astor Place to Twenty-fifth Street, is stocked with many million dollars' worth of books. Single buildings with their contents and the land they occupy are worth more than the assessed value of many a rural county in this State.

New York Section of the American Chemical Society.

The regular monthly meeting of the Chemical Society will be held on Friday, February 7, at 8:30 P. M., in the chemical lecture room of the College of the City of New York. The usual informal dinner will precede the meeting and will be at the Hotel Bartholdi, Broadway and Twenty-third Street, at 6:30 o'clock.

American Trade in Venezuela.

If any appreciable increase in the imports from the United States into Venezuela is perceptible, it is simply due to recent and better facilities for the distribution of merchandise, and is confined to such articles as heretofore imported—flour, lard, hams, kerosene, "blended" butter, lumber, some kinds of hardware, common glassware, etc.; but the essential feature of our trade—the general introduction of our manufactured goods—is still wanting.

The stereotyped complaints about the independence of our manufacturers at first impels the belief that they do not want this Latin-American trade, but I am beginning no doubt the sincerity and validity of this criticism, invariably advanced by foreign merchants having their chief houses in Europe, and controlling nearly all branches of trade. If my suspicions are well founded, these statements are made to deceive the small native merchant and compel the purchase of such goods as it may be to the interest of the foreigner to further, which almost invariably means European. His present control of the market enables him to dictate both the place whence and the kind of goods he will import and sell, without regard to native taste, which, thus far, he has cultivated in one direction. Until some purely American houses are established in Venezuela, aided by a friendly native sympathy and sentiment, we cannot hope to make great inroads in the sale of manufactured goods.

An important item of importation is fine table butter, which is now almost wholly supplied by Denmark, and costs, delivered at Hamburg, about 30 cents, put up in tin cans of one-half pound and upward, hermetically sealed. I am convinced if some dairy near New York were to make an effort to secure part of this trade, it would prove successful and profitable. American butter as at present packed—with no view to its preservation in this climate—is justly in bad odor. To obtain the trade of an article of such universal consumption, is at least a good subject for investigation.

Until within three or four years, comparatively little cutlery was imported from the United States. Since then some improvement is visible, and it is within the power of our manufacturers to increase their sales in this line.

The largest native dealer in cutlery and hardware showed me through his warehouse, explaining the needs of the trade and wherein Germans, English, and Americans excelled, and expressed an earnest desire to make closer connections with American manufacturers, and his willingness to send them samples of various goods, believing that when once thoroughly acquainted with Venezuelan trade our people could obtain a greater share than they have at present secured. This opinion I fully share.

In brief, we have made a beginning in the sale of knives, forks, hatchets, axes, hammers, and files (the latter preferred to all others), while crowbars, shovels, spades, hoes, scissors, etc., are almost exclusively purchased in England and Germany, in addition to everything bought in the United States.

The machete, of which tens of thousands are sold annually, are all bought in England. The machete is simply a very large and broad knife, slightly varying in size, but usually about 18 to 22 inches long and 2 to 3 inches broad, with which the Latin-American cannot dispense, and which he applies to more uses than one can conceive.

VENEZUELAN MANUFACTURES.

Venezuela is solely an agricultural country. Its factories are few, often of the crudest kind and devoted to the manufacture of the most pressing native wants, such as sole leather, soap, candles, matches, cigarettes, rum, native shoes (alpargatas), hats, and sugar.

The manufacture of sole leather seems to have acquired an impetus and support, for which its large consumption and the high duty thereon seems responsible. Puerto Cabello supports two tanneries, one electric, the other employing the usual improved methods. The output of the latter is about 27,800 pounds per week, with the prospect of the plant being enlarged and the output increased. French and English machinery is employed. I am not aware of any tannery in the country manufacturing uppers. As Venezuela exports large quantities of goat and deer skins and hides, suitable for uppers, the suggestion is made that it might prove profitable if some large tannery in the United States would establish a branch in this country for this purpose, with American machinery and conducted on American principles. The duty on manufactured leather being $4 per kilogramme (2·2 pounds), and on the unmanufactured 50 cents per kilogramme, the poor people are practically debarred from its general use, and confine themselves, for ordinary wear, to the native alpargata, a modified scriptural sandal composed of a solid piece of sole leather, shaped for the foot, with a woven cotton upper, having an outlet for the big toe, a piece of similar material secured to the leather heel, and then passed over and fastened to the upper part of the heel of the foot.

The importation of sugar being prohibited, all large cane plantations have their sugar mills, with more or less advanced processes for placing the product on the