Correspondence.

Fast Railway Time.

To the Editor of the Scientific American:

You speak of the Canada-Atlantic Railway—Coteau to Ottawa, 78 miles, at 50 miles per hour—running probably the fastest train in America. I inclose you a time-table of a train on the Pennsylvania Railroad, leaving Jersey City daily at 4:08 P.M., and arriving at Trenton 5:10, making the run of 56 miles in 62 minutes, or 54 miles an hour.

S. CASTNER.

203 Walnut Street, Philadelphia.

Storage of Wind Power.

To the Editor of the Scientific American:

I have been much interested of late in the question of the storage of wind power, and have studied the feasibility of the several methods proposed, but it seems to me that they lack practical utility for the masses of the people.

I would suggest that wind power be utilized in compressing air into a small cylinder capable of withstanding great pressure, and that the power stored in the cylinder should be used for the purpose of locomotion, as to propel a light vehicle to accommodate one or two persons. It seems to me that the first cost of this apparatus ought not to exceed much the cost of a team; and if two cylinders were employed, one could be used to propel the vehicle while the other was being filled at home.

By this means horse power could be dispensed with for this purpose, and the masses of people could be supplied with a first class means of locomotion, whereas now comparatively few *good* horses are to be found.

F. A. R.

Brewster, Mass., Oct. 29, 1883.

Lucilia Macellaria.

To the Editor of the Scientific American:

In the number of your journal for October 13 (SUPPLEMENT 406, page 6486), in which a copy of my letter and one of Professor C. V. Riley, to the National Museum, were printed, in which are several inaccuracies, which are very important to be corrected; and as the letter of mine of October 6, 1882, which I sent with the fly to the Smithsonian Institution by express, appeared one year after I sent it in the National Museum, and as the correction I sent to the Professor, after I had seen it in print in your journal, probably would not be made public before a year had passed, I send this line, which you will be so kind as to publish in your paper.

The Professor let me say: "The head of the fly is black," when I said "that the heads are of a bronze color, with a yellow stripe in the middle." Scientifically I had better said that the eyes are of a bronze and the face of a yellow (orange) color. The ones I sent to the Smithsonian Institution by express must have died before they reached the Professor, as the ones I have, some of their eyes are now black, some are brown, and the faces are of a dead, dirty yellow color. Therefore the name *Lucilia macellaria*, Fabricus, cannot be the proper one.

2. "The pain was described by the patient as dropping, tearing, boring."

3. I did not say the flies laid their eggs in the ear of the horse, but said, "The flies laid their eggs in the slushs (slough, prepuce of man) of horses." A teamster told me that he rubbed pennyroyal oil in the slushes of his horses when they passed through the timber bottom, between Alton and St. Louis. The flies only laid their eggs in the moist secretion from the mucous skin, never in an oily wax secretion, as the ears secrete, as this will kill the eggs.

4. I said: "When I dropped the maggots on the soil, they screwed themselves in it," whence we have the popular name screw-worms.

5. "A case was reported from La Cygne, Kansas," not Georgia.

FRED HUMBERT, M.D., F.C.S.

Alton, Ill., October 24, 1883.

The Tehuantepec Ship Railway.

As the result of an interview with Chief Engineer E. L. Corthell, we give the following as the latest official information concerning the plans and prospects of the Tehuantepec Ship Railway.

Martin Van Brocklin, the company's resident engineer, has lately returned from the Isthmus, and with a dozen assistants is busily engaged in working up the notes of his survey, which was commenced on the 20th of last March and completed on August 17. This survey is remarkable in being the first complete connected instrumental survey ever made across the Isthmus. All preceding schemes have been based upon a patchwork of partial surveys and general reconnoissance. Mr. Corthell remarked that the results of this work are very gratifying. To use his own words: "We are happily disappointed in these surveys; they are better than our most sanguine anticipations." A personal examination of the profile shows a line, for the greatest part of the way, that would be classified as "light work" even in a prairie country; the heavy work is all practically concentrated toward the Pacific end, and the deepest cutting, which is about 175 feet, is short in length, and admirably adapted by its position for furnishing the rocky material required for the construction of a sheltering mole or breakwater in the harbor.

The total length of the line from Minatitlan on the Gulf side to Salina Cruz on the Pacific is 153 miles. For 60 miles out of Minatitlan the country traversed is an alluvial plain, with abundant timber and a fertile soil; the next 20 miles is a gradual ascent up a wide valley to the foot of the main divide; within the next 33 miles comes all the heavy grading, but no exceptionally difficult work is encountered. The remaining 40 miles to Salina Cruz are over a level plain.

The maximum grade will not exceed one per cent, and this grade is limited to a distance of four miles on the Atlantic side and eight miles on the Pacific side of the divide. The alignment is remarkably good, considering the purpose of the road and the country passed through, and Engineer Van Brocklin and the company are both to be congratulated.

Some radical changes have been made in the system proposed for transferring the ships from the water to their position upon the railway, and in the transporting cradle itself. The cross section of the cradle now shows a strongly built iron girder, supported by spiral springs, upon four sets of wheels running on four rails; the wheels are about 26 inches in diameter, and spaced 3 feet apart longitudinally. One of the original stumbling blocks was the difficulty of adjusting the cradle to the various outlines of the hulls to be transported. This is now provided for by the addition of two small auxiliary girders, one on each side of the hull, each lying in the line of the main girder and hinged to it at the inner end; the outer ends of these auxiliary girders carry pivoted bearing blocks, and by the medium of an elevating screw passing into the main girder these blocks can be accurately fitted to the hull by raising the outer ends of the small girders.

For placing the ships upon the railway, a vertical hydraulic lift is to be used with an accumulator of enormous power, the designs for which are now being worked up in the company's office. The ship will be run directly over the cradle, and cradle and ship lifted bodily to the level of the railway. This plan is to replace the incline originally contemplated.

Complete estimates of cost, and both general and detail plans, are now being prepared as rapidly as possible; these are all to be finished by October 23, when Captain Eads, together with Colonel James Andrews, Honorable A. G. Cochrane, and Resident Engineer Van Brocklin will sail for Liverpool. Leading English capitalists have been anxiously awaiting the presentation of accurate surveys and estimates; and as the party take these with them, it is expected that a company will be formed immediately upon their arrival in England for building the ship railway.

In connection with this subject we might mention that the use of Captain Eads' name has been solicited by certain English capitalists and engineers in a project for building a ship railway across the Isthmus of Suez. It is said that such a railway could be completed in two years for the sum of $25,000,000.—*Engineering News.*

The Wheelman's Horse.

Although the day will never come when the horse, the noblest animal next to man, will be dispensed with as man's comrade in out door pleasures, it is curious to see how already new inventions are taking the place of the equine servant for both pleasure and use. Electric motors and cable grips and dummy engines are preparing to drag all the horse cars; traction engines, road engines, steam plows, mowers, and steam thrashers are harvesting, planting, breaking down macadamized roads, hauling, leveling, mowing, by iron steeds that require no food except while in the act of work. Even at short distances and for menial service the day is perhaps not far off when ash carts and garbage carts may have their bottled electricity under the box, that will propel them in their rounds. For pleasure journeys it was once believed the horse would always stand first; what could be found to approach that union of mind and matter, that intelligent propulsion by keenly responsive muscle and nerve, that is found on the back of a high mettled horse?

The bicycler and tricycler, or, as it is now the fashion to say, the wheelmen, claim to have come very near this joy of motion. When the steely cobweb of his wheel spins under him, obedient to the slightest hint of his calf-heel muscle, the cycler can for a season cover long distances without fatigue, and in a degree only second to horseback riding may enjoy exercise without exertion. The weight of his trunk is latent from the lower limbs, and there is no concussion of the foot on the ground as in walking; both these are savings of vital force. In reasonable cycling there is said to be no strain upon the organs of respiration; in racing or any severe trial of speed, the objection to cycling is that the lungs are contracted and the chest bent forward.

The wheel has put down all the early incredulity, even the calculation by a man of science that it was positively impossible for any person to propel himself on the best road at a greater pace and for a longer period than was possible by the simple act of walking. While it is indisputable that the walking develops and brings into play (especially if the pedestrian has learned to walk with his arms as well as his legs) far more activity and variety of muscle than the "wheel," it is also fully proved that a longer distance and greater refreshment by the open air can be attained by the bicycler and tricycler with no sense of fatigue at all, if he knows how and how far to ride.

Dr. B. W. Richardson, who sets down cycling as indisputably the best exercise for intellectual workers, says: "If I walk ten miles in three hours, at a fair pace, I am tired; my ankles feel weak, my feet sore, my muscles weary, so that after the effort I am unfitted for any mental work until recruited by a long rest. If I go the same distance on the tricycle, on the same kind of road, I find that an hour and a half is the fullest time required for the distance, and instead of being ankle wearied and foot sore, with a sense of fatigue, I am agreeably refreshed by the exercise, *and ready for study and other mental* occupation." Dr. Richardson takes the occasion, however, in a paper which is the leading attraction in *Longman's Magazine* for October, "Cycling as an Intellectual Pursuit," to mark the extreme where a pleasure excursion begins to be a pleasure exertion, and a damaging exertion too.

With a machine reduced in weight to twenty-six pounds, and propelled on a good track nearly twenty miles an hour, the temptation to overdo matters is extreme. "Young and old, male and female, weak and strong, are all going wrong on this mania about records." A middle aged man starts a tricycle; he can do eight to ten miles without fatigue, throws off his gout, works well, sleeps well. Then he begins to beat his record; gets over his thirty to forty miles in a day, perspires freely, and the next day comes a smart touch of his old enemy, his nerves are broken down, and he will be shaky and uncertain in his resolutions and movements for some time to come. Younger riders are also overdoing it.

"To make one hundred miles a day on ordinary roads on a bicycle is now considered commonplace among practiced riders; on a tricycle—which was held the slower vehicle—one rider, Mr. Marrott, has gone two hundred and nineteen miles, and an English lady, Miss Allen, has accomplished one hundred and fifty-three miles within twenty-four hours. Cycling necessitates temperate habits; hard drinking cyclists will go to the hospital and to their graves as fast as their machines can carry them." What Dr. Richardson calls the ventilation of the body, by hours of free inhalation of the open air, is certainly made easier for most folks by these cheaper steel rivals of the horse.

Under the limitations he suggests, and cautions against over training and over taxing, which all lead to vascular and nervous disturbances, to hypertrophy of muscles, and to undue absorption and anxiety in the sport itself, with these dangers provided for by the temperate use of the wheel, he can afford, as can all cyclists, to calculate the knowledge, as well as pleasure and health, that will come to men and women by these latest inventions in steel steeds.

The fable of the centaurs calls for new designs. In their moments of common activity and accord the horse and his rider have been enthusiastically called the two most intelligent and finished creations that God has made. Let the man on the horse "give to the torso originality and will, give to the rest of the body the combined attributes of promptness and vigor, and you have a being of sovereign force, thinking and acting, courageous and rapid, free and controlled." Now, much of this poetry can be cast in a foundry; modern invention has now put into the "cycles," bi, tri, or by whatever name they may be called, the same combinations with the rider's will. No prejudice against the horse, however; for through all "cycles" he is likely to remain the favorite companion on the road.—*Philadelphia Ledger.*

Use of Standard Gauges.

A writer in the *Industrial World* says that "to provide a set of standard gauges for use in machine shop work, whether of the ring or the plug form, or of the inside and outside caliper type, is an exceedingly good thing, but the task still remains of leading up to and compelling their intelligent and skillful use. This is sometimes a far more trying thing than to find the money needed for their purchase, for that usually depends upon one man or two only, while the use of the standards must be taught to all concerned, both good and bad together, so far as their readiness to apprehend such things is concerned."

One great trouble of the general introduction of close gauges in the machine shop is the adherence to the old-fashioned trust to sight, and the trial of the spread of the calipers on a flat rule. There can be no exactness in measurement for fits when the eye and the straight rule is the guide. There is only one sense of exact measurement of dimensions in the exact fitting required in the machine shop, and that is the measurement—or the test—by feeling. This testing ought to be a portion of the drill of the machinist's apprentice—possibly of the machinist himself, who has passed the novitiate and is a journeyman. Nothing could be better for such practice than a handling of standard gauge plugs, and a passing of them between the jaws of fixed caliper gauges

A Recording Telephone.

Mr. St. George, the inventor of a telephonic system recently brought out, has devised a means of recording a telephonic conversation by the aid of photography. A circular plate of glass is coated with collodion, and made sensitive as a photographic plate. This is placed in a dark chamber having a small slit, through which a pencil of light can fall upon the sensitive surface of the glass. The vibrating telephone plate actuates a shutter which varies the thickness of the luminous pencil correspondingly to the vibrations after a plan introduced by Professor Graham Bell, if we mistake not. The pencil falling on the photographic plate prints a dark line on it whose thickness is proportional to the vibrations of the telephone plate. The plate is revolved by clockwork like the barrel of a phonograph, and the record is afterward chemically fixed.

Emulsions of Petroleum and their Value as Insecticides.

BY C. V. RILEY, OF WASHINGTON, D. C.

The value of petroleum for the destruction of insects has long been recognized, and I have for years been endeavoring to solve the question of its safe and ready use for this purpose without injury to plants. The paper contains the results of extended experiments carried on under my direction by several of my assistants, and particularly by Prof. W. S. Barnard, Mr. Jos. Voyle, of Gainesville, Fla., Mr. Clifford Richardson, assistant chemist of the Department of Agriculture, and Mr. H. G. Hubbard, who has for over a year been devoting his time to practical tests in orange groves at Crescent City, Fla.

Passing over the ordinary methods of oil emulsions by phosphates, lactophosphates, and hypophosphites of lime, and various mucilaginous substances, experience shows that, for the ordinary practical purposes of the farmer and fruit grower, soap and milk are among the most available substances for the production of petroleum emulsions.

Ordinary bar soap scraped and rubbed into paste at the rate of 20 parts soap, 10 parts water, 30 parts kerosene, and 1 part of fir balsam, will make, when diluted with water, an emulsion stable enough for practical purposes, as the slight cream, which in time rises to the surface, or the flakiness that often follows, is easily dissipated by a little shaking. Soap emulsions, are, however, less satisfactory and efficient than those made with milk. Emulsions with milk may be made of varying strength, but one of the most satisfactory proportions is 2 parts of refined kerosene to 1 part of sour milk. This must be thoroughly churned (not merely shaken) until a butter is formed which is thoroughly stable and will keep indefinitely in closed vessels and may be diluted *ad libitum* with water when needed for use. The time required to bring the butter varies with the temperature, and both soap and milk emulsions are facilitated by heating the ingredients. Ordinary condensed milk may also be used by thoroughly stirring and beating it in an equal or varying quantity of kerosene.

The diluted emulsion when prepared for use should be finely sprayed upon the insects to be killed, its strength varying for different insects or plants and its effect enhanced when brought forcibly in contact with the insects.

Of mucilaginous substances, that obtained from the root of *Zamia integrifolia*, a plant quite common in parts of Florida, and from the stems of which the Florida arrowroot is obtained, has proved useful as an emulsifier.

These petroleum emulsions have been used with success by Dr. J. C. Neal, of Archer, Fla., against the cotton worm without injury to the plant, but their chief value depends on their efficacy against the different scale insects which affect citrus plants. Experience so far shows that such plants do not suffer from its judicious use, but that it must be applied with much more care to most deciduous fruit trees in order not to injure them.—*Proc. Amer. Assoc.*

Spontaneous Combustion.

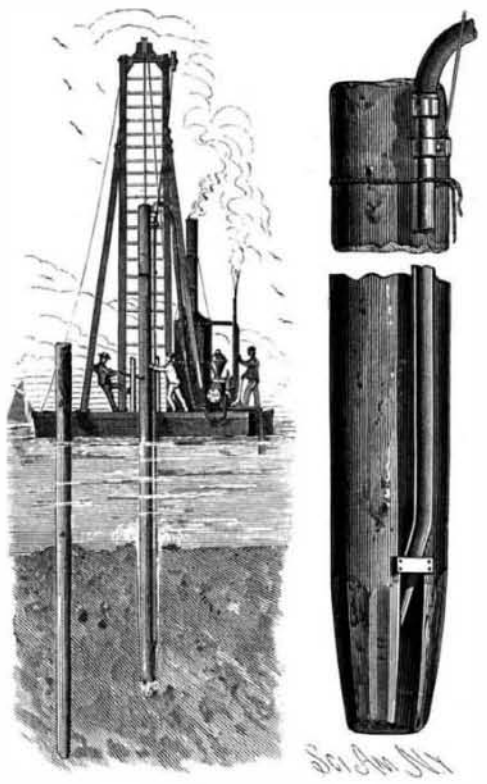
A correspondent of the *Textile Record* says: A fire occurred in a cotton mill at Chester under the following circumstances: A pile of dyed warps was put on the floor of the size house directly after being taken from the drying cylinders. The warps were still warm. Toward morning the watchman noticed smoke issuing from this pile, and upon close examination the warps were found to be on fire. The fire was easily extinguished, but some $360 worth of warps were found to be ruined. The writer visited the mill to study the cause of this fire, and he learned from the superintendent that the heap of warps consisted principally of blue warps with some sized white warps and two bundles of brown warps, the latter being at the bottom of the pile. The superintendent stated that he uses very little tallow in the size for the white and blue warps, but a much larger quantity in the size for the brown warps. He further said that a fire occurred some time ago under similar circumstances in the same place. This former fire was attributed to carelessness of the watchman. We incline to believe that the cause of both the above fires was the combination of tallow and water on the brown warps together with the heat in the warps taken directly from the cylinders, and the pressure of the warps piled on top of the bundles of brown warp. To substantiate this, on examination it was found the brown warps at the bottom of the pile were much more burned than the rest, and that the scorching diminished toward the outside of the pile. Moral: "Never pile up sized warps where taken from the drying cylinder before they have become perfectly cold and dry."

Water Test.

A French periodical, *La Culture*, gives the following simple method for testing the purity of water. In an ordinary quart bottle three parts filled with water dissolve a spoonful of pure white sugar, cork it well, and put it in a warm place. If at the end of forty-eight hours the water becomes turbid and milky, there can be no doubt of its impurity; but if it remain limpid, it may be considered safely drinkable.

HYDRAULIC PILE DRIVER.

The lower end of the pile is provided with a longitudinal groove, which gradually increases in depth toward its lower end, and terminates at the end of the pile. A pipe is so bent that it fits closely against the side of the pile and the bottom of the groove, and its lower end is flush with the bottom of the pile. The pipe is held in place by a block nailed on the pile and across the pipe at its bend, and a rope is passed around the upper end of the pipe and the pile. On the upper end of the pipe is a screw collar, on which a hose coupling can be screwed. Just below the collar is a band having a ring to which is attached a rope passing to a windlass or



HYDRAULIC PILE DRIVER.

other hoisting device. When water is forced through the pipe, the earth is washed away from the end and the pile sinks. After it has been sunk to the proper depth the pipe is pulled up by means of the rope, and is then used with another pile. Driving piles by this plan is easily effected, rapid, and gives satisfactory results.

This invention has been patented by Messrs. J. W. Surprenant and J. E. Ferguson, of Astoria, Oregon.

A NOVEL RUSSIAN BOAT.

Our engraving, which is reproduced from a Russian illustrated paper, represents a peculiar form of boat similar in some respects to the catamaran. It consists of two independent hulls, in the center of each of which is an opening in which the traveler thrusts his feet. When standing, he propels himself by the aid of a long two-bladed paddle, and

A NOVEL RUSSIAN BOAT.

regulates the distance between the two boats by manipulating the ropes which lead from each bow to the middle of the paddle. When tired he brings the boats alongside one another, places the cross bars in position, elevates his umbrella for a sail, and thus skims swiftly over the water.

THE herring fisheries of Scotland employ nearly 500,000 people, one-seventh of the population. The boats represent a money value of $3,600,000. The annual yield of cured fish has risen from 99,000 barrels early in the century to 1,290,000, and has trebled in fifty years, while in the same period the value of the nets has increased 75 per cent.

Suggestions to Inventors.

One of our subscribers, a lady, residing in a "thriving portion of the rural West," where the population largely patronize the reaper, sewing machine, and barbed wire manufacturers, sends us the following suggestions:

Practical needle women need another improvement in the sewing machine. The family sewing machine of to-day gives only the two thread stitch; the cheap sewing machines of twenty years ago gave only the one thread, or chain, stitch. Now, the chain stitch is desirable in some cases as an ornamental stitch; it is useful also in cases in which the seamstress expects the seam to be only temporary, and finds the two thread stitch too difficult to rip. We therefore want a machine which can be made to form the lock stitch and the chain stitch, alternately. The most difficult point about the invention will lie in the simplicity of the means used to bring about the change in the stitch. If it could be as easy to cause the machine to change from two thread stitch to one thread stitch as it is to put a hemmer or a ruffler on the machine, the invention would be practical and therefore successful.

A Western farmer asks why a horse hedge trimmer has not yet been invented. If an ordinary mower could be made into a hedge cutter by changing detachable parts, it would be widely used. Thousands of farms on the Illinois prairies are inclosed by Osage orange hedges, which are yearly trimmed with shears.

The Pulse of Animals.

The health of animals as well as that of human beings may often be guessed at very shrewdly by simply feeling their pulse. In a horse a good and strong but quiet pulse beats forty times a minute, in an ox fifty to fifty-five, in sheep and pigs not less than seventy nor more than eighty for ordinary health. It may be felt wherever a large artery crosses a bone. In the horse it is generally felt on the cord which crosses over the bone of the lower jaw in front of its curved position, or in the bony ridge above the eye; and in cattle over the middle of the first rib. In sheep it is, perhaps, easiest to place the hand on the left side, where the beating of the heart may be felt. A rapid, hard, and full pulse in stock points to inflammation and high fever; a rapid, small, and weak pulse also to fever, but to fever accompanied by a poor and weak state of the subject. A very slow pulse in stock will often be found to indicate brain disease, while a jumping and irregular pulse shows something wrong with the heart.—*London Graphic.*

The Java Earthquake and the Telephone.

It has been before observed that earthquakes and volcanic eruptions have a disturbing effect on telegraph lines, setting up powerful earth currents in them, and rendering communication difficult. Recent advices from Mr. Weaver, the Superintendent of the Oriental Telephone Company at Singapore, also announce the fact that during the recent earthquake of Java and eruptions of the volcano of Krakatoa, the telephone lines in Singapore were unworkable, owing to a deafening roar which drowned the voice. Only shouting could be heard on the lines because of the noise, which resembled that of a distant waterfall. On one line, in which a small subaqueous cable about a mile in length, from Singapore to Ishore, formed part of the circuit, the roar was mingled with occasional reports like that of a pistol. The volcano of Krakatoa is situated on the island of that name in the Staits of Sunda, between the southern end of Sumatra and the northern end of Java. It is about 500 miles south of Singapore, with a corner of Sumatra intervening. The noises in question were heard during the eruption on August 27 last, but can hardly be considered, says *Engineering*, as due to acoustical effects, notwithstanding the violence of the eruption. The cause is perhaps rather to be sought in the disturbance of the terrestrial magnetic field or in the electric state of the atmosphere by the terrific explosion. The first signs of the eruption were noticed on August 25, when shocks or earthquakes were felt as far as Batavia, and a fine ash began to fall, intermingled with redhot stones. The waters of the straits then began to boil, their temperature rising some 20° C., and great blocks of lava fell on the neighboring coasts of Java and Sumatra. On the 26th the earthquakes became more pronounced, and at noon the Maka-Meru, the largest of the craters, began to break forth into flame. The Goumang-Gunter and the smaller craters then joined in, until forty-five neighboring craters were in action. Torrents of sulphurous mud and lava burst out, and at intervals tremendous explosions were heard, followed by showers of stone and ashes. The clouds were heavily charged with electricity, and lightnings played vividly. Next day the shocks and eruptions increased, accompanied by tidal waves. The island of Krakatoa, a cut of which we gave in the SCIENTIFIC AMERICAN last week, disappeared, and the destruction was frightful

WITHIN three years the number of sawmills in Arkansas has increased from 319 to over 1,200.