Correspondence.

The Elm Leaf Beetle.

To the Editor of the Scientific American:

With this I send you some "bugs" which suddenly appeared in myriads in our section of New Jersey, viz., Morris Co. Although an old resident, I have never seen anything like them before in our county. On my place they first appeared in a room elevated twenty-five feet, about fourteen feet square, and which contains a large water tank, which supplies my house and grounds. This room has been carefully closed during the winter, to prevent freezing of the water. Now, where did these insects come from?

From the water in the big tank? That seems to me to be impossible. The only water that goes into the tank is rain water, and through a large filter of charcoal and gravel. I think it hardly possible that they could have originated there.

Did they hibernate during the winter, entering during the warm months to remain torpid until the warm spring sun should bring them to renewed life? H. C. OHLEN.

P. S.—Should any of the "bugs" reach you alive, you will find them very lively. I have handled them freely and find that they are perfectly harmless.

I will suggest that perhaps they may be a new species of fire fly, or perhaps an unusual development of species already known. H. C. O.

New York, May 26, 1883.

Prof. Riley gives us the following reply:

The insect sent by your correspondent, Mr. H. C. Ohlen, of New York city, with his favor of the 26th ult., and which was found in large numbers in a room of a house in Morris Co., N. J., is the imported elm leaf beetle, *Galeruca xanthomelæna*, which is so destructive to our elm trees in the Atlantic States. It is possible that the specimens hibernated in the room where they were found, or they have entered the same lately; at any rate they certainly did not come from the water tank kept in said room. There are no doubt elm trees near by, and upon investigation the beetles and their larvæ will be found feeding upon the leaves. This pest seems to be more than usually common this season, and will no doubt do a good deal of damage to the elm trees if not checked by their natural enemies or by artificial remedies.

The species belongs to the family Chrysomelidæ, or leaf beetle, and there is an account of its natural history in the *American Entomologist*, vol. iii., pp. 291–292.

C. V. RILEY, *Entomologist.*

Washington, June 2, 1883.

RECENT DECISIONS RELATING TO PATENTS.

By the Secretary of the Interior.

In considering a foreign invention in its relation to an American invention, to determine the "first inventor," not the actual date of the former, but the date when it was patented or described in a printed publication, is the point to be kept in view.

In this connection the invention is patented in England, not at the date of the provisional specification, but when the completed specification is filed.

Testimony which would show a date of actual invention in a foreign country earlier than the date when the completed specification was filed would be immaterial in an interference.

By the Commissioner of Patents.

Where the only purpose of the reissue application is to broaden the claims, it must clearly appear that there was a mistake or error in the original preparation of the case, and that the applicant took immediate steps to have the same corrected.

By a failure to take immediate steps toward correcting a patent the patentee acquiesces in the terms of the grant and dedicates the invention to the public use. It has been intimated by the Supreme Court that they regard two years as the natural limit of delay in such cases in analogy to the provisions of law respecting the public use of an invention.

Chimney Flues and Fire Places.

The frequent destruction of buildings by fires caused by imperfect hot air flues, poorly constructed chimneys, and defective fire places impels attention to the lack of safe methods of building brick work in these portions of dwellings and other buildings. It has been found, by investigation after a fire has occurred, that carelessness, haste, or parsimoniousness on the part of the architect, the builder, or the owner, had been really responsible for the damage. There are plenty of recorded instances where fires have started because of the presence of a combustible in the chimney flue, as a flooring joist passing through the wall of the chimney and forming a part of the inner face of the flue. In one instance the builder's excuse was that the beam was on the upper floor and at least ten feet from a fire on the floor below, and was therefore out of danger. But a stove was placed so that its delivery flue came within eighteen inches of the exposed beam, and a fire was the ultimate result after an entire winter's charring of the beam.

There are instances of a division wall for a chimney flue being laid of only half a brick thickness—the brick width—and the mortar so carelessly applied as to leave chinks between the brick courses. The ledges and projecting obstructions left in unpargeted chimney flues afford inviting places for the deposit of soot and other light substances carried up with the smoke in its upward flight. Occasionally these accumulations take fire, and when a downward blowing gust occurs, the fine particles, all aglow, may be driven through the unprotected interstices of the unrendered brick wall to start a fire between floor and ceiling, or in the vertical space between plaster and studding.

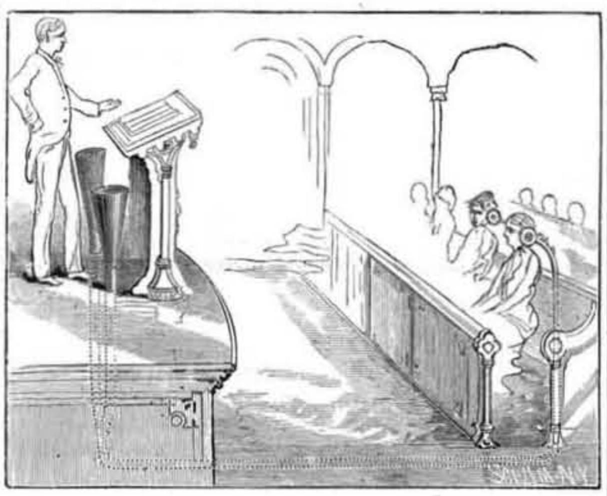
The Building News (English) takes up this matter of imperfect chimney building, and suggests, among other precautions, the lining of chimney flues with tubes of fire brick and the filling of the angles between the circular tubing and the square section of the chimney with solid brick work. To some extent this system is in use in this country, vitrified drain tile being employed for the purpose.

The News advocates the thorough pargeting, or plaster coating, of the interior of all chimney flues, where this fireproof tubing is not used, so as to stop up all possible crevices that may have been left by the carelessness of the masons. Chimney walls ought, also, to be carried up nine inches thick to a height of six feet above any fire, as the passage of heat through a brick wall is very perceptible, even if there is not a strong draught. Angles in the course of chimney flues should be of unusual thickness of brick, and be thoroughly plastered, as they present a face to the impact of the heated gases in their upward tendency.

Whatever other precautions are required, it is certain that wood or other combustible substances should not be brought in contiguity with the chimney or the fire place. The present revival of the old fashioned fire place makes these cautions peculiarly significant. Quite recently the owner of a new house, which had a "low down" fire place for wood burning, discovered that the stone slab forming the fire bottom and hearth was supported on cross beams of spruce as a foundation, leaving only three inches, or less, of a heat conducting material between the fire and the wood. These conditions, so favorable to a destructive fire, were remedied at once.

MAKING THE DEAF TO HEAR.

The wife of a clergyman in New Jersey was recently provided with an apparatus whereby, for the first time in more than a score of years, she was enabled to hear her husband's



sermon. The perfect success which attended the experiment makes us think that others who are troubled with deafness might find the device very desirable.

Two cones of tin, about two feet long, fifteen inches diameter at one end and four inches at the other, were placed one on either side of the preacher's desk, the larger end up. A fine wire cloth covered the smaller end, and this end was extended down through the floor. Thence a four inch pipe, gradually diminished to three inches, extended to the cellar, where the two pipes were joined in a single one of three inches, and this carried a distance of thirty feet under the floor of the church. Here the three inch pipe was reduced to two inches, and extended upward through the floor and the seat of the pew. Another reduction in size to a diameter of one inch was here effected, and then a flexible tube connected it with a nickel plated ear piece at the proper height. The introduction of the wire cloth serves to obviate the roaring sound, which would otherwise be annoying. Our engraving is taken from the apparatus as arranged and recently put up in the church.

Labor and Food.

The human body never ceases to work. Even in the most profound slumber some of the functions of life are going on, as, for instance, breathing, the circulation of the blood, digestion, when there is food in the stomach; and it follows that some part of the nervous system is therefore awake and attending to business all the day and night long. In the act of living, some of the substance of the body is being constantly consumed. The amount of work done by the heart in one day in propelling the blood is now estimated as equal to the work of a steam engine in raising 125 tons one foot high, or one ton 125 feet high. We lose in weight by working. Weigh a man after several hours' hard labor, and he will be found two or three, and, in extreme cases, several pounds lighter. If we do not wish to become bankrupt, we must replace by food the amount we have lost by labor. Hunger and thirst are the instincts which prompt us to do this. They are like automatic alarm clocks, which stop the engine at various points to take on fuel and water. In a healthy man as much is taken in as is required to maintain the weight of the body against loss. Nature keeps the account. On one side is so much food spent in work; on the other, so much received into the stomach for digestion. They should balance like the accounts of an honest book-keeper. In an unhealthy person the instinct of hunger becomes disordered and does not sound the alarm, and so the person goes on working without eating until he becomes pauperized; or the instinct works too frequently, and he eats too much and clogs the vital machinery. A calculation of the business done in the body reveals the fact that for a hard working person about 8½ pounds of food and drink are used up daily; some bodies use more and some less, but this is the average. The profit which the body gets on this transaction has been calculated, and may interest our readers. The energy stored up in the 8½ pounds of food ought to raise 3,400 tons one foot high. Most of this energy, however, is expended in keeping the body warm and its functions active. About one-tenth can be spent in our bodily movements or in work. The profit, then, on the process is about ten per cent. This is enough to raise 340 tons one foot high each day. A profit which is quite enough for earning a good living if rightly expended, and it is probably more than most make; but all ought to strive to reach this point if possible.

The Basic Process.

The presence of phosphorus in iron is fatal to the conversion of iron by the Bessemer process, when it exists in any appreciable proportion. But by the basic process phosphoric iron is perfectly manageable. Its simplicity is one of its best features. Instead of a lining of silicious mortar, or paste, as in the Bessemer process, dolomite, or magnesian limestone, is used in the cupolas and also in the converters. Lime is added to the fused mass in the converters while the charge is undergoing its burning-out process. The basic process is in use in England, France, Germany, and Russia with excellent results. Germany has large deposits of ore, but the metal is so highly charged with phosphorus that they are valueless for conversion into steel by the Bessemer process. Yet by the basic process, Germany is producing about 350,000 tons of steel annually.

A correspondent of the *Industrial World* writes of experiments recently made near Harrisburg, Pa., in the production of basic steel. He says:

For the past three months the Pennsylvania Steel Company has been making arrangements with its old two-converter plant at the works near Harrisburg, Pa., to thoroughly test the value of the Thomas-Gilchrist process for the manufacture of steel, otherwise known as the basic process. The preparations were completed, and on the 7th of May last molten pig iron was run into the converter, and the first heat of basic steel ever made in the United States was a great success. The pig, which was made from equal proportions of mill cinder and Cumberland County, Pa., iron ore, contained 2⅛ per cent of phosphorus, 2½ per cent of manganese, and 1 per cent of silicon; and the basic steel contained only 0·04 per cent of phosphorus, 0·275 per cent of manganese, and 0·29 per cent of carbon. The samples of the basic steel that were tested gave results that were exceedingly satisfactory, and the steel from the heats that have subsequently been made showed that the quality of the steel was equal and, in a number of respects, superior to the steel previously made at the works by the Bessemer process.

That the basic process is cheaper than the Bessemer method is proved by foreign practice. In France basic steel can be produced nine dollars per ton less than Bessemer, and in England from four to five dollars per ton less. It is said, also, that at the steel works of La Creuzot, France, the basic process has been adapted to the open hearth furnace, with excellent results.

The bed of the furnace is made of magnesian lime stone and the roof is of silica bricks. A charge of phosphoric pig iron is introduced into the furnace, the furnace being heated in the usual manner, and common iron gradually dissolved in the bath. A quantity of lime is added from time to time, and the slag is removed with a rake. The silicon entirely disappears, and nearly all the phosphorus is removed. The operation lasts about twelve hours, and about fifteen tons of steel are produced.

Malaria.

The Italian Minister of War has published a statistical map, based on the official reports from the different provincial governments about malaria, by which the extent and the intensity of this disease can be estimated. Italy counts 69 provinces, 6 of which only are completely free of this pest; in 21 provinces its ravages are most severe. It has been calculated that more than 40,000 soldiers every year have to pay their tribute to this terrible scourge. Malaria causes to the State an annual expense of two million dollars through the necessity of maintaining a number of hospitals expressly for malaria patients. The damage to the national wealth cannot be calculated, but is immense; hundreds of thousands of working people in their best age are seized by the disease, and large tracts of else fertile country have to be left uncultivated. A very remarkable feature is the progress and the greater violence of the disease since the construction of railways, which circumstance is ascribed to the necessary earth-cuttings and the baring of stagnant waters. There are in fact some lines along which the strongest, healthiest workmen or officials stationed there are unable to resist the attacks of fever; the consequence is that the requisite working staff can be kept up with great difficulty, in spite of the exceptional high pay allowed to the men.

A Cause of Boiler Explosions.

According to M. Treves, some occasionally mysterious explosions of steam boilers, when apparently in good structural and working order, may be thus explained: Supposing that work is to be suspended either for the night or for any long interval, after a stated hour, and that a boiler is commonly driven under an average pressure of 80 pounds or 90 pounds of steam; some time before the hour of closing, the stoker lets his fire slacken, fills up the boiler, and leaves off with perhaps 50 pounds or 60 pounds on the gauge. Next morning, or after the interval, he finds the pressure gauge standing at 20 pounds or 30 pounds, with a good supply of water. Consequently, in order to save the heat stored in the boiler, he begins to fire up, without thinking of the danger which may lurk in the water that has been boiling all night. The stoker never thinks of putting in more water, because the gauge is all right, and thus prepares the essential preliminaries of a "mysterious" explosion.

The water that has been standing above the boiling point for hours has lost its power of ebullition, because the air which it formerly contained has long been driven off; and in this dead condition it is capable of absorbing heat without the power of delivering it up in the form of steam. The water thus becomes superheated, and at the moment of any mechanical agitation—such as the opening of the steam valve, or the introduction of fresh water—it may instantaneously flash into steam with explosive force. It has been abundantly proved that, apart from gross defects of construction, condition, or management, superheating of the water has of late years been the only intelligible cause of the greater number of boiler explosions. The remedy for this danger is fortunately simple, and resides in the employment of any effective means for preventing the "sleep" of water in boilers by keeping up a constant ebullition.

A good device for this purpose is to prolong the water feed pipe by a T; the horizontal branch being about 6 inches above the bottom of the boiler. The under part of this tube is to be provided with open conical nipples ranged along the whole length of the pipe, which will extend from end to end of the boiler. Before firing up, therefore, the stoker should force air through the feed pipe so fitted until a pressure gauge on the pump shows a higher reading than the quiescent steam gauge. The nipples are then full of air, and ready to act as the generating centers of ebullition, whereupon the fire may be pushed as briskly as desired without risk of explosion. This suggestion emanates from MM. Donny and Gernez, and is recommended by M. Treves as an economical embodiment of a universally accepted theory.

A QUADRICYCLE FOR LAND AND WATER.

The accompanying engraving represents an ingenious vehicle for traveling by land or water, recently patented by Mr. H. S. Blanchard, of Cairo, Ill. The inventor has chosen the form of a swan as being the most graceful and appropriate for the purpose, although he does not confine himself to that form. A light frame work of wood or iron is covered with sheet metal, waterproof canvas, or other material. From the body of the vessel arises a standard supporting an awning which, by means of adjustable guys and a ball and socket joint, may be fixed at any angle to be used either as a shelter from the sun or storm, or as a sail.

But the principal means of propulsion are paddles and rotating floats worked by the feet of the rider, who sits on a seat forming a part of the steering lever or helm. From near the top of the standard, curved arms project outside of the vessel, having suspended and supported on the water ellipsoidal floats which steady the vessel on the water and aid in supporting it on the land. As a protection from injury the floats may be surrounded with wire netting, as shown in the engraving. These floats, as well as the vessel itself, are filled with cases of cork or other buoyant material to insure floating even if the outer case is injured.

Propulsion is secured by the action of hinged floats connected with a platform treadle which carries cone floats, to the rear ends of which the operating paddles are hinged. As the platform is rocked is one direction the cones are advanced forward, the paddles floating horizontally. By the reverse motion the paddles turn against the broad ends of the cones and present their surfaces to the water. A double crank shaft may also be connected with the foot platform and treadle, so as to rotate floats at either side of the vessel as another means of propulsion.

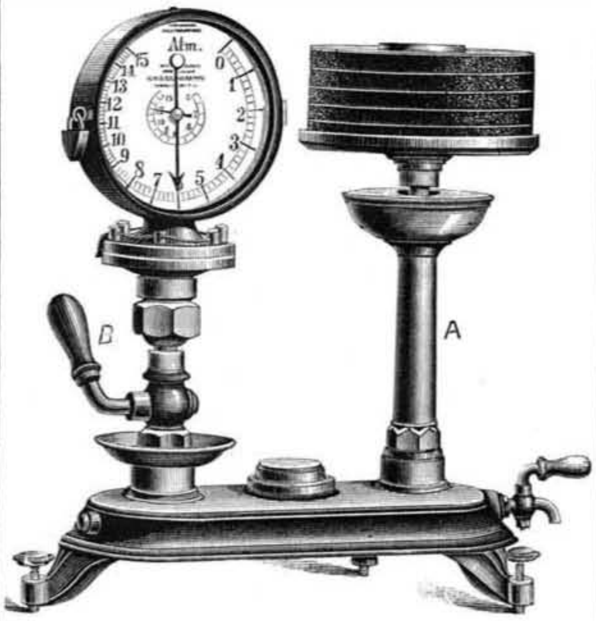
If the vessel is to be moved on land the buoys may serve as supports and as wheels; or the outer ones may be removed and those connected with the crank shaft be used as a means of propulsion, the buoy in front being used as a guide wheel.

BLANCHARD'S QUADRICYCLE.

A RAILROAD was opened last month between Tiflis, the capital of Transcaucasia, and Baku, one of the ports on the Caspian Sea. It is intended to connect this last with the Black Sea. This road reduces communication from five days to fifteen hours between Tiflis and Baku. It is the greatest commercial achievement yet of Alexander III.'s reign.

PRESSURE GAUGE TESTING APPARATUS.

The use of standard pressure gauges and pumps for testing and adjusting other gauges and dividing the dials exactly has several inconveniences. Pumps are difficult to keep in good order and to start, if they have been for some time out of use. The standard spring gauges employed for controlling others may become incorrect, and often indicate different pressures when two of them are placed beside each other on the same pipe. Mercurial gauges are certainly the most accurate instruments for measuring pressures, but cannot be used for high pressures on account of their very great height. They have become already inconvenient for the present medium pressures, without taking into account that the friction of the mercury, which increases with the pressure, necessitates a calculation in order to obtain the correct indications. These inconveniences have led Mr. Ruchholz to design the testing apparatus represented by the illustration with a view to remedy them. One person is sufficient to work it at any time, while the space occupied is small, and the employment of a standard pressure gauge for the purpose of comparison is avoided, the pressure on the spring of the gauge to be tested being produced by dead weights acting through the medium of a suitable liquid, such as pure glycerine.



PRESSURE GAUGE TESTING APPARATUS.

The apparatus consists of a base which contains a pipe that connects the two uprights which rise from it, and are also hollow. A is a cylinder bored true internally and receiving a steel piston ground to fit. The cock, B, is threaded to receive the gauge to be tested.

The piston carries a tray, on which weights can be placed, and is so proportioned that a pressure of one atmosphere per square inch is given by the piston itself, while each weight represents an additional atmosphere. When used the apparatus is placed upon a firm table and adjusted by the set screws in its feet till the cylinder occupies a perfectly vertical position, which is indicated by the spirit level fixed upon the middle of the base plate. After taking the piston out, glycerine is poured into the cylinder till the liquid flows out of the upper end of the cock, which is left open, when the gauge to be tested is screwed on, and a further certain quantity of glycerine poured into the cylinder. The apparatus having been thus filled, the piston, which must be kept perfectly clean, is inserted into the cylinder. The pointer of the gauge must then indicate one atmosphere, and maintain its position while the piston is lightly rotated, this rotation being necessary in order to annul the slight friction of the glycerine against the inclosing surfaces. The weights are then gently placed upon the tray, and the latter is each time rotated in order to obtain the exact position of the pointer.

If the piston should come in contact with the bottom of the cylinder after a certain time, or before the desired pressure is obtained, the cock, B, is closed in order to keep the gauge at the pressure prevailing at the time. The weights and piston are then drawn out so that a further sufficient supply of glycerine can be poured into the cylinder. When this is done, the piston is reinserted, and the same number of weights placed on the tray as when the cock was closed. The latter is then opened, and further weights may be placed on the piston. In this way very high pressures can be obtained.

When the testing or dividing of the dial is finished the disks are gradually removed and the piston withdrawn, and when the pointer has arrived at zero the cock is closed and the gauge unscrewed. The glycerine is finally drawn off by means of a small tap placed at one end of the base plate.

Colored Varnishes for Tin.

The *Gewerbeblatt* gives the following: Thirty grammes of acetate of copper are ground to a fine powder in a mortar, then spread out in a thin layer on a porcelain plate and left for a few days in a moderately warm place. By this time the water of crystallization and most of the acetic acid will have escaped. The light brown powder that is left is triturated with some oil of turpentine in a mortar and then stirred into 100 grammes of fine fatty copal varnish warmed to 60°R. (16·7° Fah.). If the acetate of copper was exceedingly fine, the greater part of it will dissolve by a quarter hour's stirring. The varnish is then put in a glass (bottle) and placed for a few days in a warm place, shaking frequently. The small quantity of acetate of copper that settles can be used in making the next lot.

This varnish is dark green, but when applied to tin it requires four or five coats to get a fine green luster; but two coats are sufficient, if it is heated in a drying closet or on a uniformly heated plate, to produce a great variety of shades of gold. A greenish gold, a yellow or dark yellow gold, then an orange, and finally a reddish brown shade is obtained according to the time and temperature. The colors are superior in brilliancy to those obtained with the English gold varnish, and have the advantage of permanency in the light. If a good copal varnish is used in making this polychromatic varnish, or lac, the tin can be hammered or pressed.

The production of golden colors depends on the reduction of cupric oxide to cuprous oxide (protoxide to suboxide), which, in small quantity, dissolves in the copal varnish with a golden color. The more the heat the greater the reduction, and hence the darker the color. Success depends on applying it evenly and warming uniformly.

Time by Telegraph.

Mr. James Hamblet, Manager of the Telegraphic Time Service in connection with the Western Union Telegraph Company of this city, has patented an improved method of synchronizing clocks, and he is now prepared to furnish clocks with the apparatus included, and correct them each and every hour by signals from the standard clock of the Time Service, from which the signals are transmitted to all the principal watch makers and others in this city.

The problem of correcting clocks throughout cities and towns by electricity has been heretofore supposed to be unattainable; by Mr. Hamblet's system, with a good clock at a central station, provided with the proper mechanism to send a single beat not to exceed one second in duration, exactly at the beginning of each hour, and inexpensive clocks located in places within convenient reach of a local system of telegraph wires, a successful distribution of uniform time may easily and cheaply be maintained.

The clocks that are used for this purpose may independently be regulated to run within a minute or two in a week, and when we remember that the clocks are corrected each hour, making 168 parts into which the two minutes are divided, it will be seen that correct time can easily be assured.

For some time past we have had in operation in the SCIENTIFIC AMERICAN office one of Mr. Hamblet's clocks, which is connected by telegraph as above indicated, and the improvement gives us much satisfaction.

THE Italians propose to have a world's fair of their own next year in Rome.