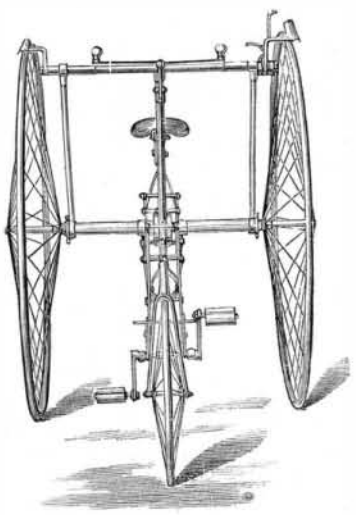
Heat and Magnetism.

L. Pilleux has lately called attention to the heating of iron during its magnetization. The fact had been previously observed by D. Tommasi in some researches, which are not yet published, upon the comparative study of the chemical properties of ordinary iron and of magnetized iron. In order to obtain a constant magnetic intensity, he employed an electromagnet of a single branch in place of an ordinary magnet. When the current, even if it was produced by a weak battery, had traversed the coil for some hours, the magnetized bar became perceptibly warm. He at first attributed the heating of the iron to the heating of the coil; but he was greatly astonished, one day, when he had removed the bar in order to clean it and had forgotten to interrupt the current, to find that the coil was not heated at all.—*Les Mondes.*

IMPROVED TRICYCLES.

In the "Leicester Safety" tricycle the rider is placed upon a saddle vertically above the pedals, and can therefore



THE "LEICESTER SAFETY" TRICYCLE.

employ the effectual downward thrust so approved of by the medical profession. He has before him a safety bar upon which he may rest his hands, from which he may steer and apply the brakes, and which also serves to prevent his falling forward when moving down hill. The tricycle is a front steerer, which adds still more to its safety in the descent of hills. The gearing has the advantages of backward and forward double driving combined in one central endless chain passing from the pedal crank to the axle. Steering is effected by the front wheel, which, from the construction of the entire machine, must always have a large percentage of the rider's weight pressing upon it to insure its efficacy. Behind the rider, to prevent all possibility of a fall backward, is a bar or tail, which adds also to safety in mounting and dismounting. The brakes act upon the tires of the driving wheels by a movement of the wrists, the right or left being applied as desired, or both together, while the steering can be effected at the same time, and without moving either hand from the safety bar.

In order to provide a tricycle for use in India and other countries where native labor is abundant, and the climate such that a European finds all outdoor exercise impossible, a tricycle has been devised to be propelled by cooly power, which our engraving clearly shows. The brake is applied to a drum on the gearing box. The standard size of the driving wheels is 48 inches, and these can be geared either level or slightly down; for hilly countries the latter is recommended. It is made single to seat one European, driven by one cooly, or in a double form to seat two Europeans, propelled by two coolies. The native driver sits behind, pedaling and steering the machine, which becomes, as a matter of fact, a cheap kind of carriage, requiring no horses, and no stabling or coach house.

A Place where They Have no Flies.

A correspondent of *Science* says: I remember, years ago, seeing a dried specimen of the house fly sent to Boston in a letter, as a great rarity there—the only one the sender had seen in a year's residence in Manila. As this is one of the constant accompaniments of man, and a sure sign of his presence or vicinity, I was at a loss to account for its absence. It is not even found in the sugar yards in any great numbers. I now see why it should be so rare, viz., because it could not of itself pass over the six hundred miles of the windy China sea; and the few which might be transported on vessels, if they got ashore from their distant anchorage, would be prevented from multiplying by their numerous enemies—bats, spiders, birds, lizards, and other reptiles. Some days I would not see one, and rarely more than two, around the table. Were they common, with the other insect pests, life would be almost unendurable in these islands.

IT is now proposed to make nails from Bessemer steel. It is claimed that when made at half the weight of iron, the nail is stiff enough to be driven into the hardest wood, and tough enough to clinch.

Progress of Quarrying.

The Compendium of the Tenth Census, recently issued, contains some figures which will serve to give an idea of the magnitude of the quarrying interests of the country, which in 1880 gave employment to 39,723 men, 8,059 horses, and 851 mules; had 339 machines for quarrying, 2,290 machines for hoisting, 1,308 machines for dressing, and used $192,175 worth of explosives. The capital invested is given at $25,414,497, and the value of the product in the census year at $18,356,055, there being 1,525 quarries in all. Marble and limestone lead the list with 65,523,965 cubic feet, followed by the sandstone quarries with 24,776,930 cubic feet; crystalline silicious rocks, with 5,188,998 cubic feet; and slate, with 457,267 squares, or 4,572,670 cubic feet.

Professor Henry in Bronze.

Story's bronze statue of Professor Henry, for which Congress appropriated $15,000, will be unveiled April 19 in the center of a small triangle at the northwest of the Smithsonian building, Washington. It is seven feet high, and stands on a top and base of Quincy grey granite, with a center of red Beach granite, which adds eight feet to the height of the statue. The name Joseph Henry is cut on the red granite in plain Roman letters, forming the only inscription. The Professor is represented as standing in a meditative mood, with one hand resting on a support, and wears an academic gown. The face and figure were modeled in Italy from photographs and a cast of his face and bust made by the late Clark Mills. President Porter will make the oration.

Nickel for Galvanoplastic Purposes.

Nothing is easier, says the *Central Zeitung fur Optik und Mechanik*, than to cover metals with a thin film of nickel by electric deposition. If we wished to make a very much thicker deposit various difficulties stood in the way, which have but recently been overcome by Boudraux and his son in Paris.

It is generally known that if we attempt to precipitate nickel upon a plaster cast, or wax mould, covered with graphite, as we do copper in electrotyping, as soon as the nickel has attained a certain thickness it cracks loose from the mould and rolls up. This phenomenon is explained as being due to the absorption of hydrogen (occlusion) by the crystalline nickel, which is very porous in comparison with ordinary cast nickel, and is able to occlude 160 times its own volume of hydrogen in twelve hours, when it forms the negative pole of quite a strong galvanic battery.

The above named Parisians have removed this obstacle and are now able to precipitate nickel electrolytically to any desired thickness. At the Paris electrical exhibition they exhibited electrotypes, and art reproductions, which were not plated on the articles but upon casts taken therefrom, the nickel being more than a millimeter thick. An electrotype has several important advantages over mere nickel plating, the most important of which is that by the former all the fine lines and the delicacy of expression are preserved while they are more or less destroyed by nickel plating.

Nickel offers three times as much resistance to mechanical pressure as copper, while the density of the two metals is nearly the same (copper 8·90, nickel 8·57), so that a copy of any work of art when made of nickel can be made much thinner than if made of copper, and yet have the same strength with much less weight. Copies in nickel can be backed to any desired thickness by depositing copper on them by the galvanic current.

The highly valued qualities of nickel are these: It is as hard as steel, less oxidizable than silver, it is not acted upon by sulphides, it can be stretched, and is tenacious, it does not melt easily, and the prices are daily going down.

Nickel would be very useful for stereotype plates from which a great many impressions are to be taken, as for postage stamps, bank notes, etc. Nickel stereotypes would have special value for color printing, because many kinds of colored ink attack copper (vermilion, for example) and destroy the plates, while their own brilliancy is also affected by the copper faced type and plates.—*Deut. Industrie Zeitung.*

IMPROVED FIRE ESCAPE.

We give an engraving of a light, portable, and simple device for receiving persons jumping from upper portions of buildings in case of fire. The apparatus consists of a blanket made of two or more thicknesses of strong canvas provided with coil spring supports and sustained by a folding adjustable frame of wood.

The frame has four legs pivoted together near the middle, and the canvas blanket is secured to a rectangular frame formed of wooden rods linked together at the ends and provided with rings capable of receiving the upper ends of the legs.

JOLLEY'S FIRE ESCAPE.

The blanket has pockets containing coil springs, which are attached by their outer ends to the rods forming the frame of the blanket. These springs serve to assist the blanket in resisting the shock of the person falling into it. The legs of the escape are made adjustable to adapt it to a rough or sloping surface, and a ladder is provided to enable persons to reach the ground from the blanket. The fire escape is very light and portable, readily set up, and affords a yielding surface upon which people may jump without injury.

This invention has been patented by Dr. William F. Jolley, of Middlesex, N. Y., who may be addressed for further information.

Use of Hand Tools in the Schools.

Speaking of the refusal of the Massachusetts House of Representatives to pass to a third reading the measure which authorizes instruction in the elementary use of hand tools as a part of the public school course, the Boston *Journal* says: If the true aim of the school is in reality the preparation for active life, that aim cannot be accomplished by exclusive brain development, for even in the most clerical pursuits the hand must often come to the brain's assistance, and with practical skill be employed in practical uses.

How many of our graduates can drive a nail? How many can split firewood in the easiest way? How many can saw, plane, bore, glue, make a box? Many of our youth in the schools to-day, who seem to lose their ordinary wits when a book is placed before them, would become master workmen with tools, if once given the opportunity of their use; and even the most studious scholars would rather gain than lose with this power over inanimate things which is won by the knowledge of the use of tools. Besides the advantage of manual skill, it has been shown by experience that intellectual training is assisted by a carefully arranged and systematic instruction in this branch of industrial science.

Undue attention to purely mental studies is diverted, the intelligence is aroused, and a healthful and revivifying change is brought about by active occupation. The testimony of physicians has shown the advantage to pupils, physically, in the use of tools. If the course of study is already crowded with different branches, there could easily be formed plans of either omitting a not indispensable study or of adapting the scheme of recitations to the addition of the tool practice. Results in Europe and in this country have proved that this course of elementary training is in nowise a burden, but a benefit to instruction in the regular old time branches. As the educational science advances, new ideas work an improvement upon old methods. It is the spirit of the age to ennoble manual labor, and to teach the young to look upon citizenship through labor as a right beyond the right of birth or wealth. If instruction in the hand working trades can assist in inculcating this true spirit of democracy, it is certainly the privilege of schools to supply the elements of instruction.

THE "COOLY" TRICYCLE.

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Naphthaline for Agricultural and Therapeutical Uses.

That a coal tar product should find use among farmers and pharmacists, as well as in surgery and dyeing, seems at first somewhat remarkable. Although naphthaline is found in coal tar, it is formed in even greater quantity when naphtha is subjected to a high temperature, and hence is abundantly produced by the process employed in enriching water gas for illuminating purposes.

E. Fischer, of Strassburg, says, in the *Pharmaceutische Centralhalle* of Feb. 22, that one of the most striking characters of naphthaline is the fact that it is not injurious to man and the higher animals, whether breathed as gas or used in substance, externally or internally, while it has a very different action on the lower organisms, both vegetable and animal (fungi, insects, etc.), for they are not able to endure the action of the gas for any length of time.

These, however, are the very properties that a good antiseptic ought to possess. The most common impurity in naphthaline is phenol (carbolic acid), and this, of course, may make it dangerous to man.

To distinguish chemically pure naphthaline from that which contains phenol, a small quantity of it is mixed with very dilute caustic soda solution, boiled a short time, then cooled and filtered. If there was any phenol in the naphthaline it will be found in the filtrate, where it can be detected by acidifying slightly and adding bromine water. A white precipitate, or opalescence, due to bromophenol will be formed if this impurity is present.

Experiments were made on dogs by rubbing their coats with powdered naphthaline all over. The sides and floor of the cage were strewed with it, yet they remained healthy and lively for days. Many persons dislike the smell of naphthaline at first, and in some it causes headache, but they very soon become accustomed to it, as was found in the surgical clinic at Strassburg, where much naphthaline has been used within a few months. Besides, the unpleasant odor can be almost entirely concealed by adding a little oil of bergamot to the naphthaline powder.

The advantages offered by naphthaline as an antiseptic consist: 1. In the simplicity of its application. 2. In its absolute freedom from poisonous qualities, which is such a contrast to carbolic acid, iodoform, and other antiseptics. 3. In the low price, which must be taken into account in charity practice, in the country, and in the field. Ohlgard & Co., of Kehl on the Rhine, make chemically pure naphthaline, which sells for 1 mark per kilo., about 11 cents per pound.

Since naphthaline has been used in larger quantities in the surgical polyclinic at Strassburg, it has been observed that the annoyance from vermin has decreased in a remarkable degree, and now there is scarcely a trace to be found of the fleas that were once so numerous there. It has likewise been employed against the other vermin, head lice, body lice, and especially the itch maggots (*acari*), and it was found that they, too, were destroyed by naphthaline.

If flies, mosquitoes, spiders, etc., are exposed to the action of naphthaline vapors, in a short time they become stupefied, and then die.

Naphthaline has been used for many years as a protection against moths, both in museums, especially in the insect collections, as well as by fur dealers and in domestic uses, and it might be employed in an analogous manner in summer against other insects.

Naphthaline is used successfully in garrisons to get the upper hand of insects, particularly bed bugs. It has been used with very good success as an antiseptic in the surgical clinics at Strassburg.

It seems to have a very energetic action upon the lower organisms of vegetable origin. It kills mould fungi; fruit and vegetables do not mould in an atmosphere of naphthaline. Since these vapors do not hurt men, even if breathed for a long time and in large quantities, it might be used for scarlet fever and diphtheria in children by strewing it abundantly over the floor of the sick room and through the beds of the patients. This precaution has no influence upon the course of the disease, except that it does not spread, as it very frequently did formerly.

Fischer made some very interesting experiments in France, Germany, and Spain upon the use of naphthaline for exterminating phylloxera. It is not necessary to use chemically pure naphthaline for this purpose, as the crude article answers as well. In the London market crude naphthaline costs about $6.25 per ton (2,200 lb.), and in Cologne it is worth $11.25 per ton packed in barrels. These prices permit of its use on a large scale. The first experiments were made April, 1882, upon a vineyard at Bordeaux which had been almost totally ruined by the phylloxera. They generally do their chief damage by destroying the tender rootlets of the vine. Hence the roots of the affected vines were first exposed by digging a ditch along them. The ditch was then partly filled either with naphthaline or a mixture of naphthaline and earth, and then covered with earth. The naphthaline which is in contact with the roots volatilizes slowly; its vapors are as destructive to the phylloxera as to other insects, while the plants themselves receive no injury worthy of mention. About 1 kilo. (2⅕ lb) of naphthaline was applied to each vine. As early as June following the vines that had been treated thus exhibited a good growth. In September they were taken up to examine the condition of the roots. All of the plants, about seventy-five in number, had already put forth new roots, which were perfectly free from phylloxera. The new roots were six or eight inches long, had numerous fine fibers attached, and they were so numerous that it must be acknowledged that these vines had been rescued from the pest.

The roots of many other vines that had not received this treatment with naphthaline had absolutely no sound roots of this year's growth. On uncovering the roots to which it had been applied, a considerable quantity of naphthaline was found there yet in September, a proof that it volatilizes very slowly, and hence its action is very prolonged. It is probable that naphthaline will prove a means of entirely destroying the phylloxera.

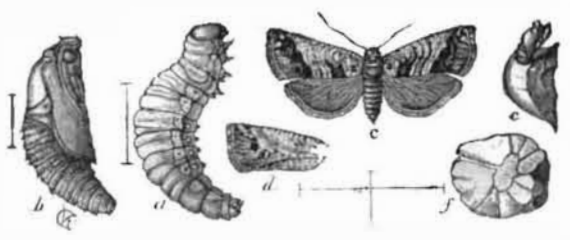
The best method of applying it is to dig a trench six or eight inches deep around the vine, about a hand's breadth distant from it, then put in about a kilo. of naphthaline, and cover it up, stamping it down well, which prevents rapid evaporation.

Naphthaline can also be employed as a prophylactic in regions threatened by phylloxera and also in transporting grape vines. Those which are merely threatened, but not yet attacked, would only require about one-fourth as much naphthaline, say one-half pound. For transporting vines, the tight vessels in which they have to be shipped can be disinfected by strewing naphthaline in them, which would destroy any phylloxera that might be present in the atmosphere.

JUMPING SEEDS AND GALLS.

BY PROF. C. V. RILEY.

Having recently received some fresh specimens of so-called "Mexican jumping seeds," or "Devil's beans," as they are popularly called, I took occasion, while they were yet active, to exhibit them to the Biological Society of Washington, with some remarks, of which I herewith give the substance: These seeds are somewhat triangular, or of the shape of convolvulus seeds, there being two flat sides meeting at an obtuse triangle, and a convex one which has a medial carina. They not only roll from one side to another, but actually move by jerks and jumps, and will, when very active, jump at least a line from any object they may be resting on. The actual jumping power has been doubted by some writers, but I have often witnessed it.



Carpocapsa saltitans: *a*, larva; *b*, pupa; *c*, moth, enlarged, the natural lengths indicated in hair line; *d*, wing of a pale variety; *e*, a seed showing pupa skin protruding; *f*, a seed showing hole of exit of the moth—both natural size. (After Riley.)

To the uninitiated these movements of a hard seed seem little less than miraculous. They are induced by a plump, whitish lepidopterous larva, which occupies about one-fifth of the interior, the occupied seed being in fact but a hollow shell with an inner lining of silk which the larva has spun. The larva looks very much like the common apple worm, and belongs in fact to the same genus. It resembles that species further in remaining for a long time in the full grown larva state before transforming, so that the seeds will keep up their motion throughout most of the winter months. When about to transform, which is usually in the months of January and February, it cuts a neat circular hole in the convex side of its house, fills the same neatly with a plug of silk, spins a loose tube, and transforms to the pupa state, the moth soon afterward pushing its way out from the little door prepared for it.

The moth was first described in 1857 as *Carpocapsa saltitans*, by Prof. J. O. Westwood,* and afterward as *Carpocapsa dehaisiana* by Mr. H. Lucas.†

In regard to the plant on which these seeds occur there is much yet to learn, and I quote what Mr. G. W. Barnes, President of the San Diego Society of Natural History, wrote me in 1874 concerning it, in the hope that some of the botanists present may recognize it: "Arrow-weed (*Yerba de flecha*).—This is the name the shrub bears that produces the triangular seeds that during six or eight months have a continual jumping movement. The shrub is small, from four to six feet in height, branchy, and in the months of June and July yields the seeds, a pod containing three to five seeds. These seeds have each a little worm inside. The leaf of the plant is very similar to that of the "Garambullo," the only difference being in the size, this being a little larger. It is half an inch in length and a quarter of an inch in width, a little more or less. The bark of the shrub is ash colored, and the leaf is perfectly green during all the seasons. By merely stirring coffee or any drink with a small branch of it, it acts as an active cathartic. Taken in large doses it is an active poison, speedily causing death unless counteracted by an antidote."

In a recent letter he states that he is informed that the region of Mamos, in Sonora, is the only place where the plant grows; that the tree is about four feet high, and is a species of laurel with the leaves of a dark varnished green. "It bears the seeds only once in two years. The tree is called *Brincador* (jumper), and the seeds are called *Brincaderos*. The seeds are more quiet in fair weather, and lively on the approach of a storm."

Prof. Westwood mentions the fact that the plant is known by the Mexicans as "Colliguaja"; and Prof. E. T. Cox, formerly State Geologist of Indiana, now living on the Pacific Coast, informs me that the shrub has a wood something like hazel or wahoo; that the leaf is like a broad and short willow leaf. He confirms the statement as to its poisonous character: that a stick of the shrub when used by the natives to stir their "penola" (ground corn meal parched) purges; and that the shrub is used to poison arrow heads.

The plant is undoubtedly euphorbiaceous.

The peculiarity about this insect is that it is the only one of its order, so far as we know, which possesses this babit, and it is not easy to conceive of what benefit this habit can be other than the possible protection afforded by working into sheltered situations.

The true explanation of the movements of the larva by which the seed is made to jump was first given by me in the Transactions of the St. Louis Academy of Sciences, for December 6, 1875 (vol. iii., p. c. and ci.).

The jumping power exhibited in this "seed" is, however, trifling compared with that possessed in a little gall, and also caused by an insect. This gall, about the size of a mustard seed, and looking very much like a miniature acorn, is found in large numbers on the underside of the leaves of various oaks of the white oak group, and has been reported from Ohio, Indiana, Missouri, and California. It falls from a cavity in the leaves, very much as an acorn falls from its cup, and is sometimes so abundant that the ground beneath an infested tree is literally covered. It is produced by a little black cynips, which was described as *Cynips saltatorius* by Mr. Henry Edwards. The bounding motion is doubtless caused by the larva which lies curved within the gall, and very much on the same principle that the common cheese skipper (*Piophila casei*) is known to spring or skip. Dr. W. H. Mussey, of Cincinnati, in a communication to the Natural History Society of that city, December, 1875, states the fact that such is the case, though members of the California Academy who have written on the subject assert that the motion is made by the pupa, which I think very improbable. At all events, the bounding motion is great, as the little gall may be thrown two or three inches from the earth; and there are few things more curious than to witness, as I have done, a large number of these tiny galls in constant motion under a tree. They cause a noise upon the fallen leaves that may be likened to the pattering of rain.

* Proc. Ashmolean Soc. of Oxford, 1857, t. iii., pp. 137-8; then Trans. Lond. Ent. Soc., ser. 2, 1858, t. iv., p. 27; also Gard. Chron., 1859, Nov. 12, p. 909.

† "Note sur les grains d'une Euphorbiacee de Mexique sautant au dessus du sol par les vibrations d'une larve de l'ordre des Lepidopteres vivant en dedans."—Ann. Soc. Ent. de France, ser 3, t. vi.; Bull., pp. 10, 33, 44, 1859; t. vii., p. 561-6.

Various Items.

Prof. Lackie in a recent paper read before the Royal Society, London, maintains that the scientific method of acquiring languages is to learn them in the same way that a child learns, conversationally; and this method should be employed in teaching Latin, Greek, Hebrew, as well as the modern languages. We are under the impression that this idea has been heretofore suggested.—The Royal Swedish Geographical Society has granted its gold medal to Mr. Stanley for African discoveries.—The Dutch Academy has given its gold medal, valued at $200, to M. De Heen, for a work in five sections, relating to the "Physical and Chemical Properties of Simple and Compound Bodies."—M. Marx, an observer in Russia, has found what is believed to be cosmical matter, consisting of iron, nickel, and cobalt, in his pluviometer. This deposit was found after a heavy gale accompanied by snow and rain. It was observed near the time of the November meteors.—Baron Nordenskiold, the Arctic discoverer, is about to undertake an expedition to Greenland. He is to be accompanied by a complete scientific staff, and it is expected that his explorations will result in the acquisition of interesting knowledge. By the way, the Baron is reported to have applied to the Dutch Government, asking the payment to him of a reward of 25,000 gilders, equal to about $10,000, which was offered by the Dutch, about three centuries ago, to whoever would discover a "Northeast passage." The Baron thinks that he has done so. He certainly succeeded in going through from the west to the east by way of the Arctic regions, but it took him two summers to accomplish the voyage. It is a question whether that can be considered a "Northeast passage," which requires the ship to be frozen up through a long Arctic winter, and has been made only in one direction. Furthermore, the reward was addressed to the people then living, and it is questionable whether it would pass to future generations. In some of the States of this country it only requires six years to outlaw a claim. Three hundred years after date seems a long time in which to file an application. We are inclined to think there is some question whether the Baron will ever get the reward.—Mt. Etna is again in active eruption, and is throwing up quantities of red-hot lava which at night time is very luminous. There has been one very violent earthquake shock. This mountain, it will be remembered, is in the Island of Sicily, is 10,835 feet high, and for the last twenty-five hundred years has been celebrated for frequent eruptions. It is a veritable fountain of fire.—In a paper read before the Paris Academy of Sciences, M. Dareste states that he has been enabled to produce monstrosities of poultry by violently shaking hens' eggs before hatching.

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