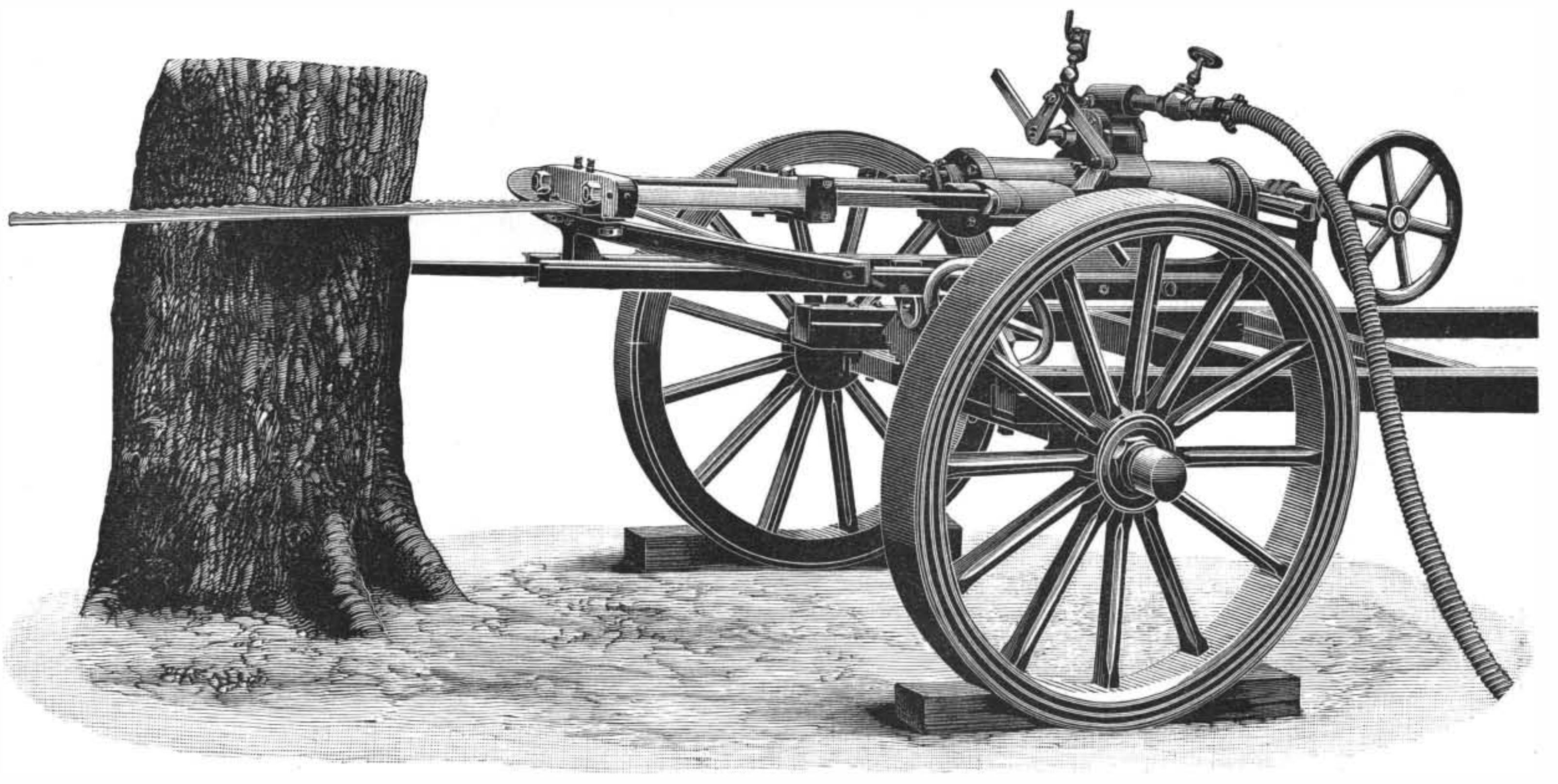
STEAM TREE-FELLING AND CROSS-CUTTING MACHINERY.

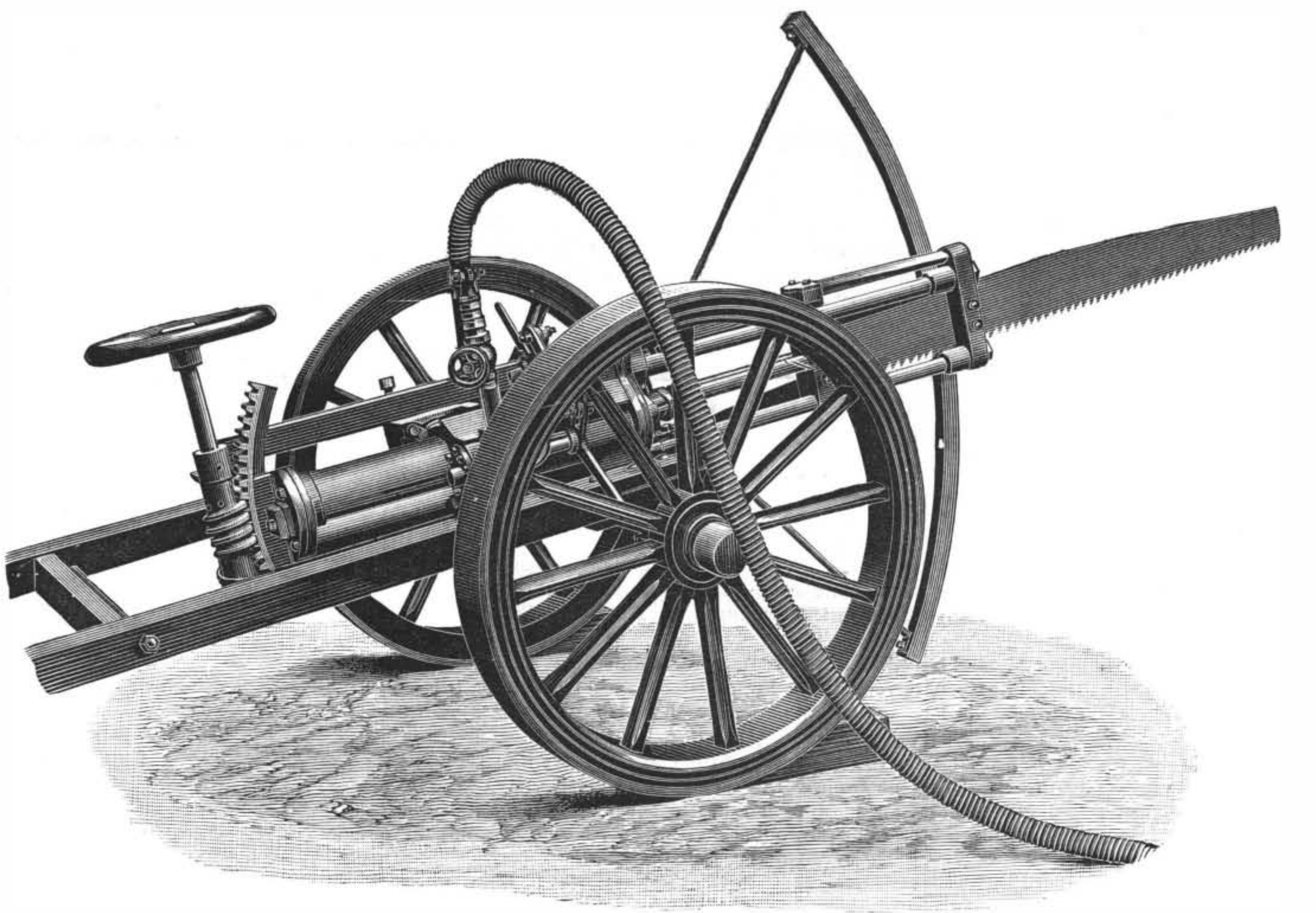
This arrangement of mechanism, by Mr. Allen Ransome, of London, was recently illustrated in *Engineering*, to which we are indebted for our engravings and the following particulars :

The machines have a long stroke, which obviates the difficulty of the teeth clogging, and are mounted upon a strong axle, supported on a pair of wheels of such a diameter as to enable the saw to cut through a tree at a height of about three feet from the ground. This skeleton carriage is fitted with a pair of shafts, to which a horse can be harnessed for transporting the machine in the forest, and which also facilitates the movement of the saw from tree to tree by hand.

The entire machine can be partially rotated on its axis, so that, by simply turning a hand wheel, the saw can be set to cut in a vertical direction, or at any angle between the horizontal and vertical positions. It generally happens that when a large tree falls it does not lie flat, as its branches hold the upper part of the trunk off the ground, and so, in order to cross-cut trees lying in such positions square, it is necessary to incline the saw somewhat from a direct vertical line, which is readily done by the adjustment last described. Again, in order to cross cut through a highlying trunk, it is necessary to elevate the saw, or, on the other hand, in the case of a low-lying log, to depress it. To effect this, slotted stays are attached to each shaft, the lower ends of the stays being pivoted to short stakes driven into the ground. A strong bolt passing through each shaft takes into the slot in each stay, to which it can be instantly set fast by means of a nut furnished with a handle, and thus, by raising or depressing the shafts, the saw can be set at the required elevation to suit logs lying in any position.

The above-described improvements render the machine not only much more convenient to work and adjust, but suit it for dealing with trees of very large sizes. When found desirable to fell a tree close to the ground, the machine can be readily detached from its carriage and the frame laid on the ground. Another improvement relates to steam cross-cut saws, which are fixed at the entrance of the mill for cross-cutting logs as they are being brought in to any required lengths. When a heavy log is being dragged into the mill, it is extremely difficult to arrest its progress exactly in the position required in front of the saw, while to shift it endwise even a few inches by hand is a work of considerable labor and time. To obviate this, Mr. Ransome's saw is mounted upon a short bed or gantry, the upper surface of which is level with the floor. This bed, fixed in a position parallel to the log, is provided with a powerful square thread screw, which passes through a nut attached to the under side of the machine. At one end of the screw is a large hand wheel, overhanging the gantry, and thus, by turning this wheel, the saw blade can be readily brought opposite to the exact spot at which it is desired to cross-cut the log.





IMPROVED STEAM TREE-SAWING MACHINE.

Edible Chrysanthemums.

Chrysanthemums, those handsome autumn flowers that are so highly esteemed by us for their beauty, are valued in Japan for an entirely different reason. The Japanese, in fact, do not raise chrysanthemums as ornamental plants, but cultivate them as edible ones. It is the flowers that are employed by amateurs. Those are eaten as a salad after being steeped in water and then boiled.

In Japan, the flowers of the chrysanthemums constitute a truly popular dish, and during the months of November and December bunches of them, washed and carefully displayed, may be seen in the stores of all the dealers in vegetables. Almost all the varieties are edible, strictly speaking, but those to which preference is usually given are the ones with small deep yellow flower heads, and which are not so pretty as the varieties cultivated for ornament.

Tempering Springs by Electricity.

Electricity as an aid to gun making is, it is said, in successful use at the gun factory of St. Etienne. The particular use to which it is there put is in the tempering of springs. These consist of steel wire wound spirally, and a current of 23 amperes at 45 volts is passed through. Rapid heating results, and when the required temperature has been reached, the current is broken and the spring falls into a trough of water. One workman can temper 2,400 springs per day by this method.

Natural History Notes.

Albino Animals in Old Mines.—In connection with the recent resumption of mining along the famous "blue lead," near Bangor, Cal., a most peculiar discovery was made. Among the mines now being worked is the old Potter mine, which has been rechristened the Bishop mine, after its present owner. When this mine was first reopened, a young man entered a dry slope leading to a second shaft, the existence of which was unknown, owing to a thick growth of brush and trees about it, and had nearly reached the shaft when he noticed a large number of flies buzzing about him in a very troublesome manner. He made several slaps at them, and accidentally caught one. On examining it by the aid of his lantern he was nearly startled into letting it escape by reason of its uncanny appearance. It was absolutely white, with the exception of its eyes, which were red and unusually large and prominent. Scarcely had the explorer recovered from his surprise at the white flies, when he was startled by the whirring sound of a rattlesnake's tail. Looking carefully around, he saw the eyes of the reptile, and threw a rock in the direction of them. The rattling promptly ceased, and a mass of white, glistening convolutions writhed into view from behind a protruding bowlder. A couple more rocks dispatched the reptile, which proved to be a rattler over four feet in length. One of the rocks thrown had detached a good part of the snake's rattles, so its age could not be ascertained, but it must have been an old individual. The color of the snake was pure white.

Prof. Harlow Ballard, of Buffalo, N. Y., who was visiting Bangor in search of mineral specimens, secured the snake and several specimens of the white flies, which he preserved and shipped to the East. The professor is of the opinion that the flies are the offspring of some imprisoned in the slope years ago by the rising of the water in the lower workings. The old and partially filled shaft allowed air but no light to enter the slope, while the stream flowing into the slope may have provided them with food.

The snake, he thinks, may have been carried down by the water while very young, as it is scarcely possible that it is thirty years old, which it would have been had it remained there ever since the mine was flooded. What the reptile ate during its long captivity is among the mysteries. Since the reopening of the Bishop mine the white flies have entirely disappeared, and a few which Prof. Ballard kept in a small glass case resumed the colors of ordinary house flies within a week after exposure to the light.

The Longevity of Birds.—Ornithologists have not yet definitely solved the question as to whether birds are not, of all animals, those that have relatively the longest existence. The following are a few examples of the longevity of birds, borrowed from the *Revue de l'Art Veterinaire*, published in Russia: It is established that swans live to be three hundred years old. Knauer, in his *Naturhistoriker*, claims to have seen a large number of falcons a hundred and fifty years of age. Eagles and kites likewise live for a long time. Knauer tells of the death, in 1819, at Berlin, of a sea eagle that had been captured in 1715, that is to say, a hundred and four years previously, and which was then already some years of age. A white-headed kite, taken in Austria in 1706, died in the poultry yard of the palace of Schonbrunn, near Vienna, in 1824, after passing a hundred and eighteen years in captivity. Sea and marsh birds survive several human generations. Ducks and cuckoos are likewise very long-lived. It is claimed that ravens often reach the age of a hundred years. Magpies, which live to a very advanced age at liberty, do not exceed twenty-five years in the confinement of a cage. It is not rare to see domestic cocks of fifteen years, and with care they reach twenty. The limit of the existence of pigeons is ten years; the smallest species live from eight to eighteen years. Nightingales will not endure more than ten years of captivity. Canaries reared in a cage live twelve or fifteen years, but in their native islands they reach an age of several dozens of years.

Ants and Mites.—The curious habit which ants have of harboring in their nests a variety of other insects is a well known fact. The reason for this singular exercise of hospitality is by no means always apparent; in some cases, however, it does appear to be fairly clear, particularly in the case of certain mites (Gamasids), whose habits and customs are treated of by Mr. A. D. Michael in the recently published part of the *Proceedings* of the Zoological Society of London. The author of this paper investigated a number of ants' nests in Corsica and in the neighborhood of Innsbruck, and in many of these nests there occurred various species of Gamasids, whose relation to their host formed the subject of the inquiry dealt with in the paper. The nests of a small yellow ant, *Tetramorium cœspitosum* var. *meridionale*, were infested with two kinds of Gamasids. One species, which Mr. Michael describes as new, under the name of *Lœlaps equitans*, was not only found in the nests, but also upon the ants themselves; and, when the nests were disturbed, the mites, being slow of foot, leaped on to the head of a passing ant, and were borne off to a place of safety. The ants appeared to have not the slightest objection to this familiarity on the part of their guests; on the contrary, indeed, for they carried off the mites without making the least attempt to dislodge their riders, and ants are not as a rule the most peacefully disposed of animals. In the case of another species of ant, the care taken of the Gamasids was even more remarkable. When danger threatened the colony, the ants carried off both the mites and their young, just as they carry off their own young. After a careful series of experiments, Mr. Michael comes to the conclusion that the mites repay the hospitality shown to them by removing the bodies of deceased ants, which they utilize as food.

The Galls of Tree Leaves.—Mr. Laboulbene, as the result of his researches on the cause of the production of galls upon the leaves of trees, finds that these singular excrescences are not capable of being produced by the action of stings, incisions, or the introduction of drops of formic or other acids, nor through the effect of the presence of foreign bodies, or even of the eggs of non-galligenous insects. On the contrary, he has been able to establish the fact that galls develop when certain insects called *galligens* deposit their eggs upon the leaf. There exist two causes of production; one, and the principal of which, is the result of the vesicatory action of a liquid emitted by a special gland, and the other the vivification of bacteria analogous to those cultivated by Mr. Pasteur.

Wingless Female Lepidoptera.—Mr. G. A. Poujade, in *La Nature* for December 26, 1891, gives an admirable summary of the natural history of the European species of Lepidoptera without wings, in the course of a series of articles upon the influence of artificial light upon insects. He calls attention to a most interesting observation by Giraud, made as far back as 1865, and which has seldom been repeated, to the effect that the wingless females of *Hibernia* and *Cheimatobia* were found around the lanterns in the Bois de Boulogne, where they were supposed to have been either attracted by the light or the abundance of male insects which had been so attracted, and had climbed up the lampposts and had taken their position upon the glass sides of the lamp. The more natural explanation seems to us that these females had been carried by light-attracted males while in the act of copulation and had been deserted on the glass side of the lamps. It would be very interesting to know whether similar observations have ever been made in this country in districts where the canker worm is abundant.—*Insect Life.*

History of the Discovery of the Sexuality of Plants.—At one of the last sessions of the Society of Botanists of Brandebourg, Mr. F. Moewes recalled the fact that the knowledge of the sexuality of plants had recently seen its bicentenary jubilee.

In fact, it is two hundred years ago that the physician and botanist, Rod. Jak. Camerarius, professor at Tubingen, separated two female types of the French mercury (*Mercurialis annua*, L.) from a group of plants of the same nature growing in a garden, and remarked that they presented hollow seeds only. His report upon the subject, published in the ephemerides of the Leopoldine Academy, bears the date of December 28, 1691. This was the first experimental research by which Camerarius demonstrated that plants are reproduced, like animals, by means of sexual organs. Until then, only confused notions existed upon the subject. No one had thought of submitting the question to the test of experiment. Camerarius recognized that the stamens constituted the male organs and the pistil the female organ. This is shown by the title of his memoir, which appeared in 1794: "De Sexu Plantarum Epistola."

A hundred years after Camerarius' remarkable discovery, there appeared a book treating of this same sexuality in plants, upon which it threw a new and brilliant light. Like its senior, it was not appreciated by the scientists of the epoch. Although Camerarius had, from 1691 to 1698, shown the necessity of the intervention of pollen in the act of fecundation of plants and of the production of the seed, or, to employ an expression of Goethe, that plants abandon themselves in the bosom of the flower to the sports of love, the special destination of the various parts of the plant remained always an enigma. Yet flowers, with their peculiar properties, their wealth of bright colors derived visibly from the green of the leaves, the surprising variety of their forms, and the odors with which they perfume the air, must have especially attracted the attention of the learned world. It was not till 1793 (it will, therefore, soon be a century) that a schoolmaster, Regent Christian Conrad Sprengel, of Spandau, rent this veil in his turn by demonstrating with a rare penetration, truly bordering on genius, the functional role of the organs of the flower, and principally of the party-colored petals.

The facts brought to light by him, and which now form part of the uncontested patrimony of science, appeared to him so surprising that he entitled his book, "The Mystery of Nature Unveiled in the Framework and Fecundation of Plants." The discovery of Sprengel, who, let us say by the way, recommended the botanists of his time to study plants *in vivo*, in the very midst of nature, instead of being content with an examination, in the closet, of dead and withered specimens contained in a herbarium, was of so high importance for the scientific explanation of the function of the various floral organs that it is hard to explain how Sprengel's work, still so remarkable to-day and always so interesting to study, could have passed so completely unnoticed. However incredible it may appear, it is none the less true that this genial book remained completely ignored until 1862, when it was brought to light again by Darwin, who was then occupied with the question, and whose genius was to develop so powerfully this field of investigation.

The Treatment and Feed for Sick Horses.

F. T. McMahon, veterinary surgeon to the Chicago City Railway Company, the Chicago Fire Department, etc., communicates to the *Street Railway Review* a lengthy article on the treatment of sick horses, from which we copy. The principal substances from which we select articles of diet for the sick horse, says the writer, are bran, carrots, oatmeal, linseed, etc.

Bran stands decidedly foremost as the food most generally in use for the invalid horse; it acts as a laxative; is frequently tempting to the appetite, and is easy of digestion. There is no part of general treatment more universal than offering this substance as a change of food. Is the horse very weary, and his powers of digestion weakened in consequence, we induce him to take a warm bran mash, which comfortably distends the stomach, and satisfies any craving for food, thereby enabling him readily to lie down and rest his enfeebled system, until repose restores its wonted vigor. Does he show slight symptoms of cold or fever, a warm bran mash is a convenient plan of steaming, and consequently soothing, the irritable mucous membranes of the air passages; it is a substitute for the more stimulating diet he is accustomed to, and gently promotes the activity of the digestive apparatus; it is also a convenient medium for the exhibition of certain simple remedies, to be mentioned hereafter. Is he incapacitated by lameness, a lower diet than that with which he is indulged when in full work is judicious, and bran is selected. Is it necessary to administer purgative medicine, a bran mash or two renders the bowels more susceptible of its action, and a smaller portion of the drug is therefore required to produce the desired effect, there being, at the same time, less risk of painful spasms accompanying its operation. Bran mashes may be given hot or cold—cold are perhaps quite as grateful to the horse; but the nibbling of the hot mash in catarrhal affections is particularly beneficial, from the necessary inhalation of the steam arising therefrom.

Of all the roots by which horses are tempted, the carrot, as a rule, is the favorite, and perhaps the most beneficial one. It is said to be somewhat diuretic in its effect, and to exercise a salubrious influence on the skin. Certain it is, when cut and offered frequently by the hand of the groom, a sick horse is coaxed into eating it when disinclined to partake of other nourishment, and the greatest benefit results. For the ailing horse, then, carrots are most valuable as an article of diet, and a few may be given with advantage even to the horse in healthy condition.

Oatmeal is most nutritious, and, as a food for the convalescent horse, is most valuable; the bruising process the grain has undergone breaks the husk, and renders it more easily acted upon by the digestive powers. It is usually given in the form of a gruel, as which it is one of the most essential articles of diet for the infirmary. It is also a ready mode of supplying the tired, thirsty horse with nourishment after exertion, when he returns to the stable.

Linseed is decidedly included in the sick diet roll. It is nutritious, and from its oleaginous nature, soothing to the frequently irritable mucous membrane of the alimentary canal, and hence to be particularly recommended in the treatment of sore throats; nor is its bland effect local only, its more general influence is particularly observable in affections of the kidneys. It may be given either boiled, forming, when cool, a gelatinous mass, mixed in that state with bran, or the liquid after boiling may be offered as a drink.

Grass, hay tea, etc., are also very useful in the treatment of disease, and should be used in connection with the other remedies.

Professor Cooke's Saltpeter Remedy.

Dissolve one tablespoonful of saltpeter in a pail of water. A pint poured around each hill of cucumbers or squashes is very good for the plants and very bad for the bugs, both striped and black, which burrow at night in the earth about the plants. Cut worms are also said to dissolve like earth treated with saltpeter. This is a remedy which would certainly be very useful to the plants, and if, as is claimed, it destroys or keeps away insect marauders, it will prove most valuable. This saltpeter solution is useful to any plant which is attacked by insects which at any time burrow in the ground. It does not appear to be wholly certain, however, that it is as efficacious an insecticide as could be wished.

Oxygen and Pure Water for Health.

In a lecture on the advantages of vegetarianism in malarial climates, by Doctor J. H. Kellogg, he speaks of the necessity of an abundance of oxygen and pure water to insure good health.

There are no purifying agents for the blood like pure air and pure water. Oxygen is a general house cleaner, it saturates the blood, and thus reaches every part of the system, while water is just as good and necessary for cleansing the tissues on the inside of the body as it is for keeping the outside of the body clean. The notion that many people have of purifying the blood by putting something into it is absurd—as though impure substances could have any purifying effect. Would soiled clothing be much improved by being washed in a decoction of burdock root or sarsaparilla? Let one with blue lips and pallid face start out briskly for a run, and in a short time he comes in with rosy lips, bright eyes and an altogether different countenance. The oxygen which he has been taking in has served to wash out the effete matter and burn it up, and he is a new man. Then take plenty of exercise in the open air, live in well-ventilated rooms, eat simple, wholesome food, and drink freely of pure water, and you will need no other blood purifier.

REMARKABLE EXPERIMENTS WITH LIQUEFIED AIR AND LIQUEFIED OXYGEN AND OTHER LIQUEFIED GASES.

Professor Dewar recently delivered a lecture at the Royal Institution dealing with the above subject, in the presence of a large auditory, with Lord Kelvin, president of the Royal Society, in the chair. We follow the report given in the *Engineer*.

Professor Dewar began by thanking those who had presented the Royal Institution with the machinery and appliances which would enable him to show the experiments of that evening, and at that early stage of the proceedings he felt bound to thank his two assistants, Mr. R. N. Lenox and Mr. J. W. Heath, for their arduous work for some time past in preparing for the demonstrations of that evening, in the course of which he should use up a hundredweight of liquid ethylene, which had been weeks in manufacture from alcohol and strong sulphuric acid, and compressed in the laboratory. He was thus enabled to go farther than in his lecture at the Faraday Centenary. The apparatus before them in the theater was supplied by means of pipes from the laboratory with liquid ethylene and with liquid nitrous oxide; the latter was used to cool the apparatus in the first instance.

He first filled a test tube with liquid oxygen, of which he said that he should probably use a pint in the course of the evening. They would notice that it was not clear, but looked milky, from the presence of some impurity, of which impurity he would say no more, as he did not know its cause. He would, however, pass the liquid through filtering paper as one would filter water, and they could see that it came through quite clear; on throwing an image of the test tube and its contents upon the screen, the liquid oxygen was seen to be of a cold pale blue color. It was boiling violently at the temperature of the air, with a hissing noise, and giving off clouds of, apparently, white smoke, due to the freezing of the moisture in the adjacent air of the theater. Liquid oxygen boils at —180° below the zero of the Centigrade scale, as determined by thermo-electrical measurements.

Here a liter of liquid oxygen was placed in a flask, and deposited on the lecture table, from which flask Professor Dewar took some now and then, when required in the experiments. He then drew attention to the following table:

Boiling Points—Below the Freezing Point of Water.

	Boiling point Below F. P. of W.	Boiling point. At 5 to 10 mm. pres.
Carbonic acid	— 80 deg. C.	— 116 deg C.
Nitrous oxide	— 90	— 125
Ethylene	— 103	— 142
Oxygen	— 184	— 211
Nitrogen	— 198·1	— 225 solid.
Air	— 192·2	— 207 solid.
Carbonic oxide	— 193	— 211
Nitric oxide	— 153	— 176
Marsh gas	— 164	— 201 solid.

Professor Dewar next showed that liquid oxygen is a non-conductor of electricity, and that a spark one-tenth of a millimeter long, from a coil machine which would give a long spark in air, would not pass through the liquid. It gave a flash now and then, when a bubble of the oxygen vapor in the boiling liquid came between the terminals. Thus liquid oxygen is a high insulator.

As to its absorption spectrum, the lines A and B of the solar spectrum are due to oxygen, and he showed that they came out strongly when the liquid was interposed in the path of the rays from the electric lamp. Dr. Janssen had recently been making prolonged and careful experiments on Mont Blanc, and he found that these oxygen lines disappeared more and more from the solar spectrum as he reached higher altitudes. The lines at all elevations come out more strongly when the sun is low, because the rays then have to traverse greater thicknesses of the earth's atmosphere.

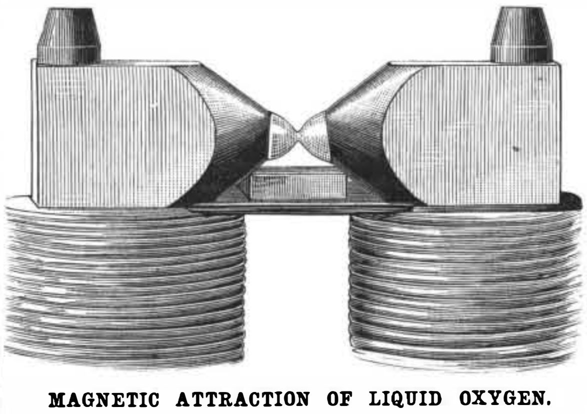
Here Professor Dewar, by means of liquid oxygen, and its evaporation accelerated by a high exhaustion pump, liquefied some common air in an open test tube, at the ordinary pressure of the atmosphere. It came down clearer and "smoked" less than did the liquid oxygen; it also boiled more quietly. This liquefying of common air, he said, is useful, as by its evaporation they would be able to get lower temperatures in the future than had hitherto been reached.

He then spoke of Michael Faraday's experiments in 1849 on the action of a magnet on gases placed between its poles, and in subsequent experiments he employed the magnet, now historical, which had been used by Faraday. He also drew attention to the following table, in which + means "magnetic," and — means "negative."

Magnetic Relations of Gases—Faraday.

	In Air.	In Carbonic Acid.	In Hydrogen.	In Coal Gas.
Air	0	+	+ weak	+
Nitrogen	—	—	— strong	—
Oxygen	+	+	+ strong	+ strong
Carbonic acid	—	0	—	— weak
Carbonic oxide	—	—	—	— weak
Nitric oxide	— weak	+	+	
Ethylene	—	—	—	— weak
Ammonia	—	—	—	
Hydrochloric acid	—	—	— weak	

Professor Dewar stated that Becquerel was before Faraday in experimenting upon this subject. Becquerel allowed charcoal to absorb gases, and then examined the properties of each gas. He thus discovered the magnetic properties of oxygen to be



MAGNETIC ATTRACTION OF LIQUID OXYGEN.

strong, even in relation to a solution of ferrous chloride, as set forth in the following table:

Specific Magnetism, Equal Weights—Becquerel.

Iron	+	1,000,000
Oxygen	+	377
Ferrous chloride solu. sp. gr. 1·4334	+	140
Air	+	88
Water	—	3

Professor Dewar then took a cup made of rock salt, and put in it some liquid oxygen, for the liquid does not touch rock salt, but remains in it in a spheroidal state. The cup and its contents were placed between and a little below the poles of the magnet. Whenever the circuit was completed, the liquid oxygen rose from the cup and connected the two poles, as represented in the cut, which is copied from a photograph of the phenomenon. Then it boiled away, sometimes more on one pole than the other, and when the circuit was broken it fell off the pole in drops back into the cup. He also showed that the pole of the magnet would draw up liquid oxygen out of a tube. The magnetic property of liquid oxygen, he said, is about 1,000 as compared with 1,000,000, the magnetic power of iron. The cooling of a body, he added, increased its magnetic power. Thus, cotton wool, cooled by liquid oxygen, was strongly attracted by the magnet, and a crystal of ferrous sulphate, similarly cooled, stuck to one of the poles of the magnet.

The lecturer remarked that fluorine is so much like oxygen in its properties that he ventured to predict that it will turn out to be a magnetic gas.

Common air, he stated, liquefies at a much lower temperature than does oxygen, and one would expect the oxygen to come down before the nitrogen, as stated in some text books, but unfortunately it is not true. They liquefy together. In evaporating, however, the nitrogen boils off before the oxygen. Here he poured two or three ounces of liquid air into a large test tube, and a smouldering splinter of wood dipped into the mouth of the tube was not re-ignited; the bulk of the nitrogen was nearly five minutes in boiling off, after which a smouldering splinter dipped into the mouth of the test tube burst into flame.

Professor Dewar then poured out a wineglassful of liquefied common air, and presented it to the chairman, cautioning him to hold the glass only by the lower portion of the stem.

Between the poles of the magnet, all the liquefied air went to the poles; there was no separation of the oxygen and nitrogen. Liquid air has the same high insulating power as liquid oxygen. The lecturer remarked that the phenomena presented by liquefied gases present an unlimited field for investigation by many workers. At such low temperatures they seemed to be drawing near what might be called "the death of matter;" liquid oxygen, for instance, had no action upon a piece of phosphorus dropped into it; and once he thought, and publicly stated, that at such temperatures all chemical action ceased. That statement he now withdrew, for he had found that a photographic plate standing in liquid oxygen could be acted upon by energy coming from outside, and at a temperature of —200° C. was sensitive to light.

His friend, Mr. McKendrick, had tried the effect of these low temperatures upon the spores of microbe organisms, by submitting putrefied blood, milk, and such like substances for one hour to a temperature of — 182° C.; they afterward went on putrefying. Seeds, also, withstood the action of a similar amount of cold. He thought, therefore, that the experiments had proved that the idea of Lord Kelvin uttered some years ago was possibly true, when he suggested that the first life might have been brought to the newly cooled earth upon a seed-bearing meteorite. He lastly drew attention to the following estimates by different scientific men as to the cold of stellar space: The temperature of space, Herschel, — 150°; Hopkins, — 38·5°; Fourier, — 50°; Pouillet, — 142°; Pictet, — 274°; Rankine, nothing.

Care and Management of Tools.

The following points on the management of a machine shop, which are extracted from an article in the *Tradesman*, will prove of value to those interested in this subject.

For much of the boring done in a machine shop, the upright drill, with the automatic feed, can be used to very great advantage; it has been found much more convenient than a boring lathe, and fully as efficient. A machine of this class should not be used for ordinary rough drilling; this may be performed upon a lighter and cheaper machine. For light drilling, a small, quick-running drill press, with hand feed, is suitable. By the use of universal chucks, and drills of uniform diameter throughout, including the shanks, the necessity of having a set of drills for each drill press is avoided.

Every machine shop should be provided with a tool room, but this does not necessarily imply that all of the tools should be kept there or returned each time after being used; this, in many cases, incurs a great loss of time. This rule should be observed in the case of large, valuable tools which are seldom used, but it does not apply in the case of small drills, cold chisels, wrenches, etc.; the tool room should, however, have duplicates of all tools used in the shop.

So far as possible, a regular system should be observed in the sizes of nuts, bolts and tap bolts, so that solid wrenches can be used upon them. Whenever tools require repairing, by dressing, tempering or otherwise, they should be returned to the tool room, and it should be the duty of the tool keeper to have such tools repaired and put in order without delay and returned to their places, so that there will always be a supply on hand. The old method, which allows the workman to carry the tool to the blacksmith shop and there wait until it is put in order, involves an unwarrantable waste of time.

The tool keeper must necessarily be a first-class machinist and tool maker, capable of replacing any and every tool used in the shop, and this is true even where the tools are mainly purchased, as special tools are unavoidably required occasionally in every shop. Ordinarily, every workman is supposed to keep his own tools ground and in good condition for work, but it is undoubtedly more economical to have certain tools, such as twist drills, reamers, etc., kept in order by the tool maker.

Joining Band Saws.

The following directions for joining band saws are given by the Defiance Machine Works: Bevel each end of the saw the length of two teeth. Make a good joint. Fasten the saw in brazing clamps with the back against the shoulder, and wet the joints with solder water, or with a creamy mixture made by rubbing a lump of borax in about a teaspoonful of water on a slate. Put in the joint a piece of silver solder the full size thereof, and clamp with tongs heated to a light red (not white) heat. As soon as the solder fuses, blacken the tongs with water, and take them off. Remove the saw, hammer it, if necessary, and file down to an even thickness, finishing by draw-filing lengthwise.

COAL is mined in Turkey, in Heraclea and Koslu, both on the Black Sea and about 100 miles from Constantinople. The mines at Heraclea are controlled by the Ottoman government; the Koslu mines by a private firm, Kurtschi & Co. The coal obtained is inferior in quality to the English mineral, especially to the Cardiff and Newcastle coal.