in the time required for making the ordinary capital B with the pen. The number of motions required for spelling out word "Indestructibility" would require only twenty one motions, and it contains seventeen letters.

A system that could be more easily memorized might be devised, but it could not be executed so rapidly. With the alphabet we have given, it would be possible, after a little practice, to converse at the rate of one hundred words per minute, and as the motions are concealed by the position of the hands, eavesdroppers, if we may employ that term, would be counted out.

When a double letter is required, it is distinguished from other letters for which it might be mistaken by the touches being repeated more slowly. Thus, E, which is made by a single pressure of the first finger of the right hand will, when doubled, resemble C, which is made by two pressures of the same finger, unless the pressures are made full and slow.

Numbers may be spelled out, therefore no provision is made for them.

A slight twist of the wrist indicates the close of a word, and a brief hand-shake announces the close of a communication; pauses are not indicated, but ready made, as in speaking.

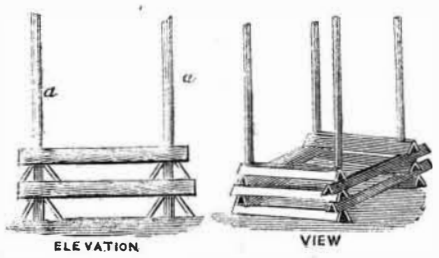
The position shown in the engraving is that adopted while persons are standing side by side, as in walking. In conversations, when persons are seated, the persons face each other, and the wrists cross; and in the reclining position, when persons face each other, conversation is practicable and easy.

The physical effort necessary to converse by this method is not nearly so great as in the ordinary sign language, a great advantage to sick mutes, who frequently are unable through failing strength to make their wants known.

We think our readers will agree with us that this is a very simple and ingenious method, and worthy the attention of those who are engaged in the care and instruction of deaf and blind mutes.

SEASONING BOARDS.

A correspondent of the *Building News* recommends the piling of floor boards as illustrated in the accompanying diagram. Four long poles are planted in the ground, and the boards are placed at an angle against them as shown. By



planting posts at short intervals between the corners many more boards can be stacked in the same space. This method gives a much freer circulation of air than the ordinary method, and consequently the drying proceeds with greater rapidity.

Sound and Electric Figures.

What are termed sound figures may be produced in various ways. One way is to fix a plate of glass at its center with Burgundy pitch to an upright support on a stand, then to dust the plate with fine dry sand or other suitable powder, such as lycopodium. If now the plate be made to vibrate by drawing over its edge a violin bow, or some horse-hair tightly stretched from the two ends of a cane well rosined, the dust will in due time arrange itself into certain forms, lines, or figures. The same will occur by tying over a broad-mouthed glass or goblet with bladder that has been moistened and allowed to dry to a drum-like surface, and dusted with lycopodium or very fine sand, and then put upon a piano. Certain lines are soon visible after the instrument has been played upon, particularly when one chord only has been struck, so as to lessen the vibration. The blowing of a cornet, using one key, or the tuning of one note of any instrument, near the stretched membrane, will cause it to vibrate, and the dust to arrange itself into form. Thus these experiments clearly exhibit the effects of sound; and by due study of the dust lines we may see what sound, one long passed, has been. A somewhat similar application of this experiment has recently been made by a German philosopher to the study of the nature of electrical discharges between metallic conductors. It is found that when an electric discharge takes place between a horizontal plate of metal powdered with lycopodium, forming the positive pole, and a ball or point placed below it, the dust remains attached to the plate on a well-determined area.—*Septimus Piesse.*

Good Cider Vinegar.

Take ten gallons of apple juice fresh from the press, and suffer it to ferment fully, which may be in about two weeks, or sooner if the weather is warm; and then add eight gallons like juice, new, for producing a second fermentation; in two weeks more add another like new quantity, for producing a third fermentation. This third fermentation is material. Now stop the bunghole with an empty bottle, with the neck downward, and expose it to the sun for some time. When the vinegar is come, draw off one half into a vinegar cask, and set it in a cool place above ground, for use when clear. With the other half in the first cask, proceed to make more vinegar in the same way. Thus one cask is to make in, the other to use from. When making the vinegar, let there be a moderate degree of heat, and free access of external air.

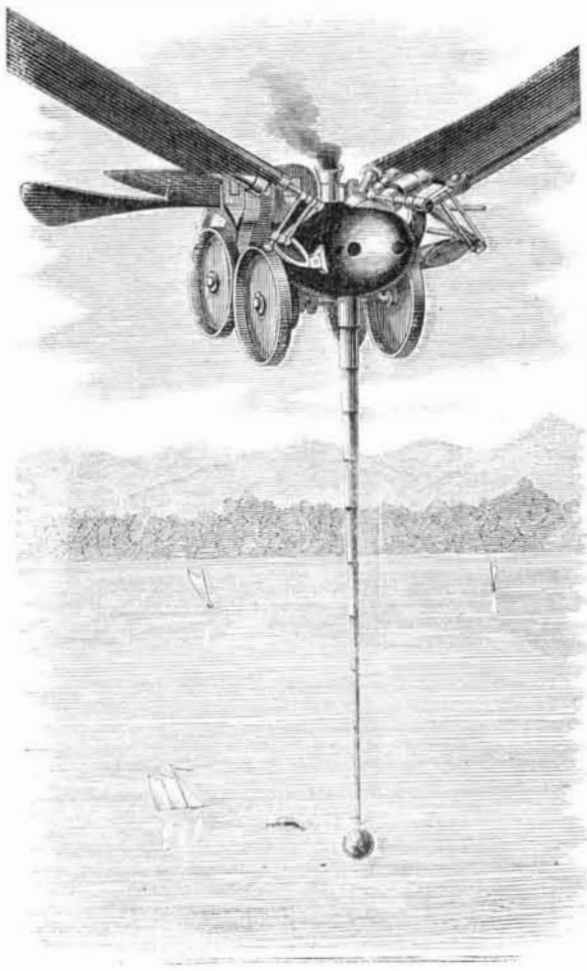
AERIAL NAVIGATION.

NUMBER FIVE.

We give herewith an account of an aerial steam machine designed by Joseph M. Kaufmann, a Glasgow engineer, an account of which we condense from *Engineering* of March 6, 1868. Only about two ninths of the wings, which are long and narrow, are represented in our engraving. From this remark the reader will understand they were of great length, and we may add that they were pointed somewhat like the wing of a swallow.

The actual machine, which the model was constructed to represent, was designed to be of the following dimensions:

From stem to stern, 12 feet; from stem to tip of tail, 14 feet 11 inches; greatest depth, 4 feet 6 inches; greatest width, 5 feet 1 inch; length of each wing, 35 feet; area of each wing, 221 square feet; length over the "gies," 17 feet 3 inches; Length of pendule, 40 feet; weight at end of pendule, 85 lbs.; total weight of machine, 7,000 lbs.; nominal power, 40-H. P.; intended speed, 40 miles per hour, the tank or tender taking a supply of oil and water sufficient for five hours.



As will be inferred from the engraving, it is intended that progress should be gained by flapping the wings, these wings being driven in such a manner that their motion resembles that of the wings of a bird as closely as possible. It is intended that when the machine is rising, the wings should make 120 strokes per minute. The pendule, which can be raised and lowered as desired, is for the purpose of keeping the machine in a horizontal position. The machine represented is exclusively for flying over land, and it is furnished with wheels on which it can run when on the ground; Mr. Kaufmann states, however, that by a few simple alterations it can be made available for traveling over water, and in case of its alighting be converted into a boat furnished with paddle wheels.

The model, to which we have already referred, weighed, complete, 42 lbs.; and during the experiments with it, its boiler, owing to its small size, was not fired, steam being supplied from an independent boiler. The model was made entirely to prove the correctness of the inventor's theory, and to ascertain if the connections to the wings could be made strong enough to withstand the violent twisting and bending strains to which they are exposed. In the model the motive power consists of a single vertical steam cylinder fitted with a piston in the usual way, the piston rod carrying a cross-head which is coupled by links directly to the wing beams. The wing beams are fitted to shafts which run for about three fourths the length of the machine. To these shafts are also connected the "regulators" by which the feathering motion of the wings is governed. Each wing is secured in four places, and has its center of oscillation directly opposite its working beam. The "gies" can be moved alternately so as to steer the machine either to the right or left without disturbing its horizontal position.

During the trial the model was securely fastened down and loaded with a considerable weight to prevent it from moving, it being at the same time raised on supports so that its wheels were clear of the ground. Steam at a pressure of 150 lbs. was then turned on, when the wings made a short series of furious flaps; but, through imperfect workmanship, the left wing suddenly gave way about two feet from its base, when the other wing, being subjected to extra strain, failed also. Mr. Kaufmann states that these accidents were in a great measure caused by the wings having been lengthened three feet previous to the trial, and being thus exposed to a greater strain than they were constructed to resist. The wings having been removed the machine was put to the final test of being run at a speed of 1,500 double strokes per minute, and it was found to be quite uninjured by this experiment. Altogether, Mr. Kaufmann considers the trials to have been satisfactory, and since the trial referred to he has been engaged in the construction of a larger machine on the same principle, but having the beams worked, through gearing and eccentrics, by a horizontal engine. This machine is also to be fitted with shifting aero-planes, and is to be accompanied by a tank-car with accommodation for two persons. It is intended that this machine should rise into the air after a short race on *terra firma*, drawing behind it the tank-carriage; it is to be of 120-horse power, and is to weigh 8,000 lbs. complete. The tender is to carry ten hours' supply of fuel and three hours' supply of water; and with this tender and three cars the machine is intended to make fifty-six miles per hour.

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

The Fossil Man of Onondaga--Opinion of an Anatomist.

MESSRS. EDITORS:—I have read with a good deal of interest the accounts I have seen in your excellent paper of the "stone giant," or the fossil man, found on the farm of a Mr. Newell, by some laborers while engaged in digging a well.

Many of the accounts I have seen in the papers are fanciful and wholly imaginary. At first we were told it was a veritable petrifaction, and a full description of the same was given. Next we were informed that it was an "image," the work of the Jesuits; then again it was the work of a Canadian, made in 1868, from Onondaga plaster. Recently I saw an extract from the Syracuse *Journal*, in which was an article signed by James Hall, State geologist, and S. B. Woolworth, Secretary of the Regents of the University, in which it is maintained that it cannot be a petrifaction, because the soft parts of an animal are never petrified, decomposition taking place so rapidly. Now, Messrs. Editors, the above-named gentlemen may be men of science, in their way; they ought to be, occupying the places they do; but it is plain they are not anatomists, or they would never make the above statement.

Decomposition is ordinarily the fate of all animal substances, hard as well as soft. But we have many well-authenticated instances of human bodies, buried in certain localities, becoming petrified. It is not more than four or five years ago that we had an account in the New York papers of the removal of a man, or his body rather, that had been buried six or eight years, when it was found that complete petrification had taken place. No part had even begun to decompose except the end of the nose, and that was very slight.

Besides, I can show Messrs. Hall and Woodworth, if they will call upen me, the half of a human heart petrified, plainly and distinctly to be seen, as any one acquainted with anatomy will admit at once.

I have many other similar petrifactions in my possession. None of these could, for a moment, be supposed the work of the cunning Jesuits or of a shrewd Canadian, hid in the earth to surprise somebody—but were picked up, some in Pennsylvania and some in Wisconsin—each partaking of the nature of rock common in the region where it was found.

The same thing, no doubt, is true of the plaster man of Onondaga. As plaster or gypsum is common in that region, petrifactions in that locality would, of course partake of the nature of gypsum. I have never seen the stone giant above referred to, but it would take more than I have yet seen to convince me that it is not a fossil man.

Dr. Westcott's communication in your last issue takes the most common-sense view of the subject of anything I have seen. One good anatomist is a better judge of the nature of the curiosity in question than a thousand State geologists or Regents of the University.

Don't let us set a shoemaker to repairing a watch—every man is a judge of his own trade. GEO. W. STONE, M.D.

Warren Center, Pa.

The New English Method of Setting Tires.

MESSRS. EDITORS:—The article headed "A New Method of Setting Tires," in the SCIENTIFIC AMERICAN, under date of Nov. 6, and which you describe as being patented in England, and as to the utility and serviceability of which you seem to have some doubts, has come to my notice.

I not only share your doubts about its general utility, but I assert that its theory is all wrong. It is, in my opinion, an imposition upon the common sense of any intelligent wheelright, and hundreds of them will bear me out in this assertion. It is a violation of the common laws of nature; this alone would be sufficient to condemn the whole thing.

The nature of iron is such that heat will expand and cold will contract it. How could nature come to the assistance of man any way more favorable, especially in that class of machines which combine wood with more or less iron.

What is more simple or requires less time, than to measure the tire, weld it, and allow a certain amount of draw, according to the size and condition of the wheel? Every intelligent blacksmith knows exactly how to govern himself in order not to let the action of the tire be too great in its contraction. I say the contraction should not be too great, as it would strain the wheel out of its natural position, and more or less injure its strength by giving it a constrained dish, which we carefully seek to avoid.

Now this new method makes necessary a procedure which is entirely injurious to the strength and stability of a sound wheel; namely, the unnatural contraction by force of the wheel in order to set the tire. A well put up wheel can only be contracted as far as its elasticity will admit, and to do this

it would require more power and consequent expense than would be profitable.

Now admitting it could be done as easy and speedily as you can turn over your hand, would that make it any better? No; Sirs. It would only turn out an imperfect and crippled wheel, and we would never get through resetting the tire on the same wheel done by this method, as the reaction of the wheel against the tire would help to loosen it.

Now as to the expense of labor saving, the old method, or the one we work by at present, will also have the advantage in my opinion.

The inventor of this new method surely cannot be a practical wheelwright, or if he is he does not understand the action of the force which the axletree of a vehicle exerts upon its wheel.

A wheel has almost as much (and sometimes more) strain to bear from the horizontal force (caused by the weight) as from the perpendicular. Now the dish in a wheel is to the effect to resist the horizontal force which is brought to bear upon the hind part of the hub, and the more dish the greater is the resistance.

An arch would illustrate this principle well. It is a fixed fact that the more crowned or rounded an arch is constructed the greater weight it can bear. So it is with a wagon wheel. Its dish should be regulated according to the weight it has to carry. Now how can a wheel be expected to stand up to its load when the dish is strained into it. Would not the reaction of the spokes favor the horizontal strain of the axle against the hub and destroy the wheel?

I could enumerate a great many more minor objections which I have to this new method, but I think I have said enough to convince any one of its entire fallacy, both scientifically and naturally.

I don't mean to say that the apparatus with which the inventor conducts his work and sets the tire, is beneath any notice. Not at all. It must be a very ingenious contrivance and well worthy of attention, if he can set a tire cold upon a wheel and do a good job. E. QUAST.

Freedom, Mo.

Railroad Accidents by High Wind.

MESSRS. EDITORS:—Occasional accidents by trains lifted by gales of wind and thrown from the track, may render a simple safeguard desirable. A recent case of this kind occurred at Boston Corners, on the Harlem Railroad. A high velocity makes the train more subject to this action of the wind than slow motion; for revolution or motion at a great velocity detracts from the weight of bodies, as a spinning top, leaning in any direction, plainly shows. This is more obvious even if the rapidly vertically revolving heavy top, or wheel, is supported only at one end of the horizontal axle, and kept in suspense till slackening of the speed permits it to drop. Locomotives are known to have leapt at a high speed horizontally across the chasm of open drawbridges, etc. The bending of the iron rails under a passing locomotive or car at low speed, may be considerable at slow motion, but imperceptible at high speed. Pieces of a bursting grindstone or fly wheel, or of an exploding boiler, or in a gunpowder explosion, are almost invariably hurled upwards. The boomerang of the New Zealander practically applies the same fact. Whatever the explanation of the phenomenon, the facts are established beyond controversy, that a great velocity of bodies detracts from their weight.

The prevention of the above railroad accidents may be found in slacking speed at places particularly exposed to the fury of a sweeping gale. R. H.

How to Braze a Band Saw.

MESSRS. EDITORS:—I send you a method of brazing band saws, which may be of some use to some of your numerous readers.

The tools required are a small portable forge, brazing clamps, etc., and a straight edge, 4 or 3 ft. long, also some small brass wire, and powdered borax. Take the saw and cut it to the proper length, scarf the ends from one half to three fourths of an inch, then put the saw in the clamp (I would say that I use a very small and simple clamp in the shape of a double vise), keeping the back of the saw out of the jaws of the vise, or clamps, and apply the straight edge to the back, as it is very necessary to braze it straight. Make the fire in as small a compass as possible, place the clamps directly over the center of the fire, and then put on three pieces of brass wire, bent in the shape of the letter U, so that they will pinch the laps together; put on as much borax as will stay on the saw; cover the whole with a piece of charcoal; let the brass melt so it will flow over the saw, before taking it off the fire, and cool very slow so as not to make the braze brittle. File off what brass remains on the saw, and it is ready for use.

I send you a piece of saw that has been in use several months, and has never broke in the braze.

RUSSELL WHITNEY.

Fitchburg, Mass.

[The sample sent is good evidence that the method described by our correspondent is an excellent one.—EDS.

The Choking of Gas Mains by Naphthaline.

MESSRS. EDITORS:—In my last communication, I endeavored to substantiate the view, that the destruction of the wood-preserving establishment, in Brooklyn, occurring on the 26th of October, must have been caused by the obstruction of the pipes, leading from the still into the chamber containing the timber, with naphthaline. In glancing over Colburn's "Gas Works of London," I find the following passage, which bears relation to the subject, and which I therefore quote here: "We ought here to notice the presence of the vapor of naphthaline in gas, and which begins indeed, to deposit in thin, micaceous-looking scales of exceeding lightness, almost at the moment when the gas leaves the purifiers. Indeed, large patches of naphthaline flakes may often, if not generally, be found on the undersides of the lids of the purifiers themselves, and this singular substance will often choke the largest main so as to almost entirely prevent the passage of the gas. A blast of steam turned into the mains will disperse the obstruction, but a sort of chimney-sweeping contrivance, called a 'cat,' is oftener employed to open the great routes of communication between the gas works and the consumers. Fortunately, too, naphthaline is seldom deposited at any considerable distance from the works, and it can generally be cleared out without going off the premises." ADOLPH OTT.

New York city.

Improvements in Farm Implements.

MESSRS. EDITORS:—During the summer you requested any of your readers to suggest improvements in farm implements, or anything else that was practically useful. In accordance with that request, allow me to make the following suggestions:

The only objection to our corn planters is that they drop the seed in a *lump*. There are two objections to this. First, the greatest enemy a plant can have is one or more of its kind growing close to it, thereby using the same nutriment. The second is, that the plants cannot be weeded or hoed as conveniently as if separated to a proper distance. I therefore suggest that inventors make a planter to drop the seed at least three inches apart in a line, thus: . 3 . 3 . A machine to do this properly will supersede all others as well as the old, yet, so far, best plan of hand dropping.

There is a great want of some practical, effective, and cheap plan of attaching three horses to one plow. It is much needed in deep or trench plowing, which, in conjunction with draining, must be resorted to in old and high-priced lands to make them pay.

We also want some of those English steam plows (it is a disgrace to inventors that we do so), with attachments, to do the mowing, harvesting, and thrashing. We can then furnish England cheaper wheat for her plows.

We want an arrangement to water beef cattle and other stock in the cars in transit from shipping points to Eastern markets. This will be a much better sanitary measure than excluding good, healthy, and cheap beef from the southwest. It seems as if the breeder of fancy stock feared the competition of Western stock, which would certainly cheapen beef for millions of operatives. The road that first adopts this plan will receive the preference over all others. This plan is in use on many of the English roads where the distances cattle are carried are short, and the climate mild compared to that of this country.

I suggested the present horse corn cutter some years ago, and now it is nearly perfect. JAS. HARKNESS.

St. Louis, Mo.

Filing and Setting Mill Saws.

MESSRS. EDITORS:—I have noticed recently several articles upon filing saws, hand and cross-cut, but nothing about mill saws.

I have been running and superintending saw mills several years, both circular and sash saws, and my experience is, that a bevel-pointed tooth is the best for general use. In filing, I hold the file at an angle of 10 degrees on the bottom or front of the tooth, and square or flat on top; changing sides or hands every alternate tooth, then bending or setting the tooth point outward sufficient to keep the saw clear. This method obviates the necessity of swaging, which is a great saving in time and labor.

I have gained much information from the SCIENTIFIC AMERICAN, but have never written you before.

Eufaula, Ala. JAMES R. POSTON.

Valuable Testimonial Letters.

MESSRS. MUNN & CO., *Gentlemen:*—Your esteemed favor of the 10th, inclosing certificates of allowance of English and French patents on my high and low-water detector, was received on Thursday.

The very satisfactory manner in which cases are prepared by your Patent Agency, and your facilities for obtaining American and foreign patents is certainly all the inventor could desire. On the 11th day of August, 1857, my first patent was issued from the U. S. Patent Office, through your Agency, since which time I have obtained *thirteen* American and *eight* foreign patents; *sixteen* of which were obtained through the Scientific American Patent Agency. In every instance I have found your drawings and tracings artistically executed, specifications able and full, and claims broad; and in no case have you failed to obtain a patent on my petition.

In conclusion, I began to assure you, that it will always be a pleasure to me to be able to advance your interests as patent attorneys and mechanical journalists, knowing as I do, that the inventors' interests will always be safe in your hands.

Very respectfully, your obedient servant,

G. B. MASSEY.

New York city, Nov. 12, 1869.

A Voice from the West.

Gentlemen: I was agreeably surprised to-day on receiving a letter from you stating that my patent was allowed. You have done your work nobly and well. I can but return you my sincere thanks for your promptitude and energy in conducting my case, and I must confess you have converted me into a walking advertisement for your interests in this wooden city of ours.

Your valuable journal and I have been companions for the last five years, and now I cannot live without it. It has grown with me from boyhood, and I've always found it instructive and entertaining in my journey through life.

Chicago, Ill., Nov. 13, 1869. J. F. DUFFY.

For the Scientific American.

OXYGEN AS A SOURCE OF HEAT AND LIGHT.

BY ADOLPH OTT.

Heat and light, in their application to the manifold purposes of life, are subjects of vast importance. As regards heat, an inexpensive process for producing high degrees is much in need; and with respect to light, it is a brighter and cheaper form of artificial light that is not liable to charge the air with carbonic acid which is wanted.

The brilliancy of illumination, as well as the high degrees of temperature afforded by the combustion of various gases in oxygen has, for many years past, led to zealous attempts to produce this gas at a cheap rate. There is, indeed, no want of oxygen; it exists in immense quantities. The atmosphere surrounding our globe consists of one fifth in bulk of this gas, and eight ninths of the weight of water, of which there is also no scarcity, is oxygen. But, in spite of all efforts bestowed upon the opening of these magazines for the uses referred to, the problem of the cheap separation of oxygen has only lately been solved.

This discovery is due to two enterprising Frenchmen, Messrs. Tessié du Motay and Maréchal; and it first excited attention at the time of the late Exhibition at Paris. Two substances, one a mineral, the other a product of manufacture—peroxide of manganese and chlorate of potash—have ordinarily been the source of oxygen; this gas can be evolved from them with ease; however, this process is too costly for use in the industrial arts. Besides this, various methods for producing oxygen have been proposed up to the year 1867. The one best known is, perhaps, that of Boussingault, which is founded upon the regeneration of the binoxide of barium. However, this process is now abandoned, chiefly on account of the cost of the crude material.

Some years ago, Messrs. Saint Claire Deville and Debray were requested by the Russian Government to search for a better process for separating platinum from its ores. This metal can only be fused before the oxy-hydrogen flame, and there being large quantities of oxygen needed, a new mode of generating it, had to be sought for. The one proposed is based upon the property of the sulphate of zinc—a by-product of the cells of galvanic batteries—to split up into oxide of zinc, sulphurous acid and oxygen, when subjected to a red heat.

The separation of these two gases is easily effected, since the one is absorbed by water while the other is not. The production of oxygen from the source referred to is very regular and unattended with danger; moreover, it is economical as compared with those commonly employed by chemists; in the experiments of Deville and Debray, the cubic meter (35·316 cubic feet) of oxygen when prepared from chlorate of potash could not be obtained for less than ten francs (two dollars in gold); from manganese for not less than four francs, and in the last-described process, the price of one cubic meter amounted to only one franc and a half. By the discovery of Messrs. Tessié du Motay and Maréchal the cubic meter of pure oxygen may now be produced for less than four cents, gold; at least it is sold to the gas companies in Paris for twenty-five centimes (five cents, gold) per cubic meter. We are consequently in possession of a process by which oxygen can be got at only one fiftieth of the cost of that ordinarily employed by chemists in their laboratories!

The process of the French chemists is founded upon the fact that the manganate of soda at a red heat gives off a part of its oxygen when steam is passed through it, and that it re-absorbs oxygen when atmospheric air is passed through it. This process may be represented by the following formula:

2 (Mn O_3 Na O) (manganate of soda) + 2 H O (water) = Mn_2 O_3 (oxide of manganese) + 2 Na O, H O (hydrated soda) + 3O (oxygen).

According to this formula, the manganate of soda is capable of producing fourteen and a half per cent of oxygen in weight, and since the oxygen is 737 times lighter than water, from one hundred pounds of the crude product there can be generated 1,348 gallons of oxygen, or something over five hundred cubic meters.

With regard to the application of oxygen for illuminating purposes, it was first made in the square fronting the Hôtel de Ville, one of the finest government buildings in Paris. This experiment, which lasted for about two months, not only met with perfect satisfaction, but also procured the patronage of his Majesty Napoleon III., who, for a second trial upon a still larger scale, ordered the court of the Tuileries to be illuminated by means of the oxy-hydric light. The grounds of that palace comprise in themselves an area of 30,000 square meters; besides, it has been introduced into one of the most spacious theaters of Paris, "La Gaité," in the Alcazar, and in various stores and workshops.

The light itself is produced by directing a jet of a mixture of oxygen and hydrogen or oxygen and street gas upon cones of zircone, a white earthy body, which has proved far superior to either lime or magnesia, that serves in the Hare, Drummond, or Calcium light.

As regards the lighting power, it is seven times greater than that produced by an equal quantity of street gas; indeed, the streets may be so brilliantly lighted with it that a newspaper can be read with perfect ease in a street car. Dr. Miller states that the oxy-hydrogen light can be seen at a distance, in a right line, of 112 miles. Navigable rivers might be cheaply and perfectly lighted their whole length;