more vegetation than all other animals, including mankind, do; yet such is undoubtedly the case; and man finds that although he can cope with any of these insects individually, their vast numbers render them formidable enough to often render famine imminent.

But if we remember that not one of these races of insects exists which is not food for some other insect, bird, or animal, we have the clew to the remedy for their ravages. Keep the power of the eaters and the eaten properly balanced, and their mischief will cease to terrify.

SARATOGA SPRINGS.

This popular summer resort seems to have lost none of its prestige, judging from the crowds of people who have visited it during the present season. Its hotels are filled, its numerous springs still flow abundantly, and their waters are eagerly sought for by those who are sick, or imagine themselves so, and those who, being well, desire to remain so.

In our recent visit to this watering-place, although we must confess its attractions are many, and its hotels conducted in model style, we were led to entertain some doubts as to whether more benefit than harm is derived from the profuse and indiscriminate drinking of the water by visitors who are accustomed to hear of the generous rivalry that goes on respecting the virtues of the various springs. The celebrated Congress Spring, though declared to be weak in comparison to former years, still maintains its supremacy, and this famous water can be purchased in London, Paris, Calcutta, and Hong Kong. The Empire Spring sends forth a clear, delicious, and healing water, superior in its medicinal effects upon some diseases to the Congress. The new "Hathorn" is a fine spring, recently discovered, and is already very popular. Since the last year this water has cleared up, and no longer irritates the intestines of its habitual drinkers. The "High Rock," the "Star," and the "Excelsior" are also excellent springs, and deserve to be noticed favorably.

But the greatest natural curiosity among them is what is called the "Geyser" Spring, discovered last winter by the proprietor of a bolt factory directly underneath the center of the building. Noticing traces of mineral water at this point, he caused a boring to be made to the depth of 150 feet, where he struck water in a stratum of bird'seye limestone. This remarkable stream spouts intermittently but rapidly to a hight of twenty feet into the building which has been transformed into a bottling establishment.

An analysis by Professor Chandler shows this water to be particularly rich in mineralingredients. It contains chloride of sodium, chloride of potassium, bromide of sodium, iodide of sodium, fluoride of calcium, bicarbonate of lithia, bicarbonate of soda, bicarbonate of magnesia, bicarbonate of lime, bicarbonate of strontia, bicarbonate of baryta, bicarbonate of of iron, and sulphate of potassa, with traces of phosphate of soda, biborate of soda, alumina, and silica. The water is agreeable to the taste of those who like it. It is a powerful cathartic in its action, and the spring is considered one of the best ever discovered. It takes a long time, however, to obtain a widely extended popularity for any of these springs; hence the waters are always freely given to those who will come for them. Yet, although the waters are free to all comers, he that hath no money, though invited to come, will find no rooms at Saratoga. The hotels are crammed with visitors, and private houses are called into requisition to hold such as the hotels cannot accommodate, the prices visitors are willing to pay being such as to tempt people in moderate circumstances to accept the inconvenience for the sake of gain.

But to go back to the use of the waters by old and young, sick and well, alike. At the mineral springs in various parts of Europe the waters are generally taken under the direction of physicians. In this country few of the frequentors of such places act under advice, but proceed to swill down the waters of first one spring and then of another without regard to quantity or quality or adaptability to their physical condition, apparently going it blind in the hope of being benefited before they get away.

Now this is entirely wrong, these waters are strong solutions of mineral salts, of greater or less therapeutic power, and it is just as rash and senseless to drink them in this manner, as it would be to rush into an apothecary's shop and, shunning all the violently active poisons, to go the rounds of his bottles and jars, taking a sip from one and a pinch from another, without regard to their probable effect.

An instance in point occurred while we were at Saratoga this season. An old gentleman, afflicted with a heart disease, drank in rapid succession some ten or a dozen glasses of the "Washington" spring water, the tonic power of which is well known. His circulation was so accelerated thereby that his heart could not endure the increase of labor demanded, and he fell dead upon the piazza of the hotel.

We have no doubt that, while these waters are of immense value, as remedies for general debility, and various forms of disease, many are injured rather than benefited by their use, simply because they use them without proper discrimination, which can only be obtained through competent medical advice.

NINETY DEGREES IN THE SHADE.

The above expression, with the numeral adjective changed according to circumstances, is very commonly met with, and yet as giving anything but an approximate index to the real temperature of the air it is of little value.

The indefinite character of the phrase creeps in at the last word. Ask almost anybody what they mean by "in the shade," and they will tell you "out of the sunshine."

Now in two different places in this office the thermometer will often vary by a number of degrees when both are out of the sunshine. This variation cannot certainly be attributed to differences in the temperature of the air at the points where the thermometers hang, since there is free and rapid circulation throughout the entire building. Directly opposite the room where the writer now sits is a large brick building, against which the sun shines during the afternoon. The radiation of heat from this building is such that the thermometer will sometimes stand several degrees higher with the shades raised than with them down.

It is evident, therefore, that if the exact temperature of the air be sought, it is not enough to place a thermometer out of the sun. It should be placed in a total heat shadow where it may be read by reflected or diffused light, but be protected, as nearly as may be, from the effect of all heat except that of the air itself.

A common error in regard to thermometers may be mentioned here. It is thought by many that when air is blown over the bulb of a thermometer it will indicate a lower temperature. This notion grows out of the fact that the body feels cooler in a breeze than in still air. The latter result is due solely to the facts that the power of air to convey heat from a body hotter than itself is increased by free circulation, and that evaporation, the great cooler, is also greatly promoted thereby. Neither of these facts apply to the thermometer, since the mercury in the bulb of that instrument, if properly placed, is of the same temperature as the air, and no evaporation, under ordinary circumstances, takes place therefrom. But wet the bulb with water even a degree or two higher in temperature than the mercury; the result will be that after an instant or so the mercury will commence falling, and will mark a lower temperature than that of the air in which it stands. The effect will be still more remarkable if ammonia or ether be used instead of water.

This experiment illustrates the effect of wind upon the thermometer when the bulb is wet. But when the bulb is dry, a precisely reverse effect is produced, although much less in degree. Tyndall shows, in his lectures on heat, that the friction of even the gentlest zephyr upon a fixed body generates a perceptible amount of heat therein. Therefore if air at rest causes a given expansion in the mercury column, when in motion it will cause an increased expansion from the heat generated by friction. Of course this increase is very small. In fact it is less than can be perceived upon the column itself, and can only be determined by the most refined methods. The fact remains, however, that if there be more it cannot be less, which is sufficient for our present purpose.

When we hear of the thermometer standing at one hundred in the shade at any point north of Philadelphia we are always inclined to doubt that the indication is a fair exponent of the temperature for anything more than the immediate vicinity of the instrument. We very much doubt that in any locality on the continent north of the fortieth parallel the thermometer ever indicated one hundred degrees in open air when shielded not only from the sun's rays but from the radiation of surrounding bodies.

THE ACTION OF WATER ON LEAD, TIN, AND COPPER.

Mr. Paul Casamajor, an accomplished chemist in the sugar refinery of Messrs. Havemeyer & Co., has been making some original experiments upon this vexed question which we find published in the *American Chemist*, and the importance of the subject leads us to make an abstract of the results of his researches. The presence of lead in Croton water, after standing in the lead pipes for the night, has been incontestably shown by Professor Chandler. Mr. Casamajor also proves that it is often present in the tin-lined boilers, and accounts for its presence there by the voltaic action resulting from the contact of the lead in the lining, or in the connecting pipes with the copper of the boiler. To prove this he took pieces of lead and copper and put them in contact in two flasks which he left in the dark at the temperatures of 75° Fah. and 150° Fah., for forty hours. In both instances the surface of the lead was corroded, and that metal was found to be in solution in the water. It therefore becomes a serious question what influence the imperfect lining of boilers may exert. It is essential that so much lead is used in their construction, instead of block tin, that every one of them is a galvanic battery, producing more or less lead poisoning. This fact has been overlooked, and while many families have taken the precaution to remove all lead pipes, they have forgotten to inquire into the composition of the kitchen boiler. On this point Mr. Casamajor remarks: "These results leave no doubt on the hurtful effect of exposing drinking water to the simultaneous action of both lead and copper. The effect of an untinned copper boiler must be felt on the cold water as well as on the hot, as all the lead pipes are in communication with the copper boilers by metallic conductors. Whether an untinned copper boiler may not even have an injurious effect on the water of a neighboring house is an inquiry before which we must pause."

The next point to be examined was how far lead and tin react upon each other when placed in contact in water at 75° and 150° Fah. To ascertain this he instituted experiments similar to those previously described.

"At the end of twenty-four hours the flasks were examined and replaced in the dark. The lead in contact with tin was slightly tarnished, while that of the other flask (tin in water alone) remained perfectly bright. At the end of six days the tarnish of the lead in contact with tin persisted, but did not seem to have increased. This is apparently due to this circumstance, that a voltaic couple of tin and lead in aqueduct water is very weak, tin being slightly more positive than lead. Under the influence of the weak current at first produced, the lead, being more electro-negative, becomes slightly oxidized, until the coat of oxide presents such a resistance to further action that the two metals are put on a par, and no current is afterwards produced. The lead of the other flask, which had now been in water for over a week, was as bright as when first put in the water." Mr. Casamajor was unable to detect the least trace of lead in the flask where the lead or tin had been left in contact. And his experiments would seem to throw great doubts upon the assertions frequently made that tin and lead mutually act upon each other and poison the water. A great objection to tin-incased lead pipe and tin-lined lead pipe has been that in places where there was a fracture or where the surfaces came in contact under water a voltaic current was produced and some of the lead was carried into solution. Mr. Casamajor's experiments do not confirm this theory, but, on the contrary, he could find no lead whatever, although he put the metals in the most favorable conditions for accomplishing the reaction, if any could be expected. Lead and copper in contact under water at once react upon each other, but lead and tin appear to be neutral after the formation of the first coating. It would be gratifying to have these experiments confirmed, as a good deal of disquieting doubt has been cast upon the security that was supposed to be offered by the tin-lined and tin-incased lead pipe. In reference to the danger of leaving water in contact with lead alone there appears to be no doubt in the mind of any person. And this danger is greatly increased by the presence of nitrates and chlorides in the water. Lead is a subtile poison, and too much care cannot be taken to prevent its presence in water that is required for domestic use.

THE USES OF SOLUBLE GLASS.

Although liquid quartz, or soluble glass has been known for more than fifty years it does not, even at the present day, have half the applications in the arts of which it is capable. It was accidentally discovered by Prof. Fuchs, of Munich, while engaged in searching for a method by which to prepare pure silicic acid, and was afterwards very thoroughly studied by him, and all of its properties made known.

It is a very simple thing to make either in the dry or the wet way, and the choice of the methods depends upon the quantity to be prepared. Pulverized flint stones or quartz pebbles, or fine sand, can be dissolved in a solution of caustic soda or potash, when boiled under a pressure of 7 or 8 atmospheres. Infusorial earth or Tripoli is also admirably adapted for this purpose. In the dry way it is usual to fuse 45 pounds of quartz, 30 pounds of potash, and 3 pounds of charcoal powder; or 45 pounds of quartz, 23 pounds of calcined soda, and 3 pounds of charcoal.

For certain purposes it is also customary to make a glass of soda and potash combined. This mass fuses easily, and is readily soluble in hot water. As the solution absorbs carbonic acid from the air it must be kept well sealed.

Soluble glass is sold in liquid form of a given strength, usually 33 degrees, meaning 67 parts of water and 33 parts of the dry powder. When required for use it is necessary to dilute it, as the above concentration is too strong for most purposes.

There was at one time a proposition to boil gold quartz in the alkali of the West, and thus to bring it into solution by which the metal would settle and the liquid quartz could be converted into building stone or employed for any other purpose for which it is adapted. The quantities to be dealt with —the great amounts of soda required for the operation—appear to have stood in the way of the practical application of this method, but theoretically it was perfectly feasible.

It would not be easy to detail all of the uses to which soluble glass has been applied, but it may not be out of place to recapitulate some of them: To protect wood from the action of water, air, and fire; in fresco paintings on walls; to repair stone buildings; to make artificial stone; for cementing broken glass; to make hydraulic cement; to protect metals from rust; as a solvent for corallin; to mix with mineral colors; as a solvent for various substances; as a lubricator; to preserve the elasticity of leather bands on machinery; for painting on paper hangings and calicoes; to give glass the appearance of enamel; as a detergent; as a reagent in the laboratory; to impregnate petroleum barrels, beer casks, butter tubs, and milk pails, so as to render them tight; for glazing clay pots as a substitute for lead; and the manufacture of of artificial gems. Its chief value is in the restoration of stone buildings, in fresco painting, and to render fabrics uninflammable. As a means of preserving iron from rust, and as an external application to wooden buildings, it has been attended with so many failures as to throw doubt upon its practical value for these purposes. Its usefulness on leather belting we also deem extremely doubtful, although it has been recently asserted to keep such belts soft. It is an article that ought to be manufactured on a large scale and more generally used.

WHO DISCOVERED NITRO-GLYCERIN.

It is somewhat remarkable that the date of the discovery of nitro-glycerin should be a matter of dispute after all that has been published on the subject. The honor is sometimes ascribed to Professor Williamson (1853), and again to M. Nobel, the Swedish engineer who has done so much towards making its properties known; and to the late Professor Pelouze is also given the credit. In the transactions of the Turin Academy of Sciences for July 5, 1847, may be found a memoir on fulminates, and the action of nitric acid on certain organic compounds, by Professor A. Sobreso. In this paper the author gives an account of long and dangerous researches made by him on this subject.

He states how he prepared nitro-glycerin, mentions the properties of the new compound, and gives its principal reactions and its poisonous effects on the animal system. Professor Pelouze, in 1865, gave full credit to M. Sobreso at a meeting of the French Institute, and it is therefore somewhat remarkable that any question of priority could now arise.

M. Sobreso, at the time he made the researches (in 1847) was Professor of Applied Chemistry in Turin, and there is no doubt about his being entitled to the honor of having discovered nitro-glycerin.

COMPRESSED AIR AS A MOTOR FOR SUBTERRANEAN RAILWAYS.

BY J. DUTTON STEELE, C.E.

[Read before the American Institute of Civil Engineers.]

It is scarcely necessary for me to state that compressed air may be used in all respects as steam, and worked in the same engines; that its chief characteristics are perfect ventilation and cleanliness, and that it may be carried in pipes long distances without loss from condensation, and similar causes, to which steam is liable. At Mont Cenis the air pipes must be as much as five miles in length, and the loss of pressure is not such as to impair the working of the drills, but I am without accurate information as to its extent. At Hoosac they are one and a half miles long, and the loss is two pounds to the square inch. At Nesquehoning they are one third of a mile in length, and there is no appreciable loss of pressure. In all these cases the air is worked at about fifty pounds per square inch; and the difference in pressure at the steam valves, when the power is generated, and the air after it is compressed, may be taken at about ten per cent when the best compressors are used. It will then be seen that the loss of power from the friction of the compressing machinery, and from the movement of air in the pipes, is not of a very serious character, and, if the pipes are tight, the pressure is well maintained while the machinery is standing.

With this brief reference to the leading characteristics of compressed air as a motor I will proceed to consider its possible application to subterranean railways; and in doing so will assume as a basis for discussion, that we have a double track railway ten miles in length, with moderate curvature and reasonable grades, and an air pipe along its center of ten or twelve inches in diameter, with compressing machinery at either end driven by steam of sufficient capacity to maintain a pressure in the pipes of any given standard.

Let us also assume that we have an endless wire rope passing along the center of each track, supported upon pulleys, and that it can be kept tight; and to compensate for its expansion and contraction, by changes of temperature, that it is passed around movable pulleys of large diameter at stated intervals, say every half mile. These durable pulleys may be arranged in vertical plains, so that one of each pair may move in its pedestal, and be weighted to take up the slack, while those in the top, which receive the rope at the level of the rails, are fixed upon their axles and provided with cranks for the application of power. I would next propose that at each of these main pulley stations, a stationary engine be placed to move them; each engine drawing its power from the air-main in the center of the road. We should then have a drawing rope moved by twenty stationary engines distributed along the line, acting in unison, connected by telegraph signals, and working under the same pressure.

There is no doubt as to the unity of action in such engines: their connection by means of the drawing rope would be perfect, and their speed would be regulated by governors; they would require but little attention, and their exhaust would produce the most perfect ventilation. If it is conceded that we may thus obtain a satisfactory motion in air-drawing ropes, either of one continuous rope, or of ropes in sections (and I apprehend either is practicable), it only remains to transfer that motion to the cars.

In this connection and explanation of the principle in view, I would invite your attention to the new tramways now building in Europe for the transportation of ore and fuel in the mining and manufacturing districts. They consist of endless wire ropes supported upon pulleys, which are fixed to strong posts and elevated more or less above the surface, with the moving power at the end; upon these wire ropes, boxes or cars are suspended at intervals, which contain the load, and which move with the rope, and are passed without difficulty over the pulleys, the opposite rope taking back the empty cars.

Many of these wire tramways are now in use, some of them as much as four miles in length, and so satisfactory in their operation that as much as one hundred miles are said to be under construction in England.

It will be observed that the hight of the suspended load produces the necessary friction for transmitting the motion of the rope to the cars, and that they are passed with ease over the pulleys. The rope, as proposed for a subterranean railway, is in a better position for such use than in the wire tramway, and if it is possible to make use of the load, as a means of transmitting the motion to the cars in the latter, there should be no difficulty in doing the same thing in the former. Let us then suppose brakes dropped from the cars upon the driving ropes, so as to transfer only so much of the weight of the cars to the rope as may be necessary to communicate the motion, we would then have, by the use of the breaks on the rope and brakes upon the wheels, the means of stopping and starting the car at pleasure. The grades upon which such a system may be worked, will be about the same as with locomotives: and the advantage of air over steam as a motor, will be found in its perfect ventilation and cleanliness; the nearly uniform pressure under which the several engines can be worked; and the distribution along the line of the power which is generated at the ends. But the air in the mains may be used for other purposes, with profit and advantage, such as driving printing presses and other light machinery to aid the industry of large cities, and, wherever used, pure air and a reduction of the liability to fire will be the result.

In submitting these general views, I have avoided as much as possible mechanical details, which those who may take an interest in the subject will have no difficulty in supplying. They are speculations as to growing wants in advancing cities, and if they aid in ever so small a degree in giving direction to the stronger mental currents which these wants will attract, the writer will be compensated for the little thought he has given to the subject.

COMPRESSED AIR, AMMONIA, AND RUBBER VS. MULE POWER.

New Orleans, with all its other attractions, is fast becoming a home for new inventions, especially those relating to motive powers. The city rests on a dead level, and so easy is it there to propel railroad cars, that the whole team consists of a single mule, which answers all requirements admirably. Any one would naturally suppose that this is about as good and economical a motive power as could be employed. But genius will assert itself, and, according to the New Orleans *Republican*, "the death knell of the mule is already sounded."

The first improvement over the mule, proposed by the inventive geniuses of New Orleans, was to place tanks on the cars, within which air was compressed to a pressure of 300 pounds to the square inch. To run the car, you simply turned a faucet, and away it went from one end of the town to the other, and back. This style of pneumatic car was tried not long ago in New Orleans with success, a stock company formed, and everything for a time looked lovely.

But another genius soon improved upon the improvement, and got up a plan to drive the car by substituting compressed ammonia for the common air. This car is said to have been run with so much success, that the pneumatic stock immediately went down, and the ammonia began to rise.

But before the full effect of the ammonia had been experienced, still another genius enters the field and astounds the Southern community by the announcement of a third motive power, far cheaper and better than either of the two systems before made known.

This remarkable motor is nothing more nor less than *india-rubber*. It is the discovery, says the *Republican*, of "Mr. Solomon Jones, a gentleman of a mechanical turn of mind, who has heretofore distinguished himself by the invention of the most intricate and remarkable descriptions of machinery. He had, in his experiments, his attention called to the wonderful power possessed by india-rubber when contracting after having been stretched.

"After a long series of experiments, he discovered that the Para rubber was capable of stretching ten feet for every one of its ordinary length, and that the retractile power was enormous. He made a system of turnings, windings, and twists of this rubber power, which would enable him to place it under any car without altering its present build, and which would give him a power capable of propelling that car through the streets at a rate always at the command of the man in charge, and capable of lasting the wear and tear of constant service for years.

"His machinery was very simple, the rubber was wound upon a drum, and the drum once let loose the car commenced to move at a speed more than could be desired were it not that it is under perfect command from a simple system of cogs working under the leverage power in the hands of the conductor. His model was sent to Washington to the Patent Office, and although it was not all he could wish, as he was compelled to use a common gas-pipe rubber in place of the prepared material he proposes to use, it passed the rigid scrutiny of that office, famous for the care and strictness of its examinations, and a patent was issued to him, in connection with Mr. Bernard Terfloth, one of our well-known mechanics, for this new invention.

"For street cars two bands of the rubber, two and a half inches in diameter and fifty-six feet in length each, will be used. Each piece will be attached to a separate drum, and as the stretch of the rubber will be ten feet for one, five hundred and sixty feet will be run off the drum before it becomes necessary to use its fellow-drum. In running off this five hundred and twenty feet, a distance of 14,175 feet, over two miles, will be traversed by the cars; the other drum is then called into requisition, and while it is propelling the car the exhausted drum is wound up by the same leverage which the conductor uses to stop and control the car; the only trouble the conductor has is to throw the lever off the drum in motion, a simple operation, which can be reversed in a minute if it becomes necessary to stop the cars.

"This invention is not by any means intended to be confined to the propulsion of street cars; it is intended to be adapted to everything now monopolized by steam. It can be made useful in the household or the factory to run sewing machines, and our citizens will soon have an opportunity of seeing it tested working fans in one of our churches. Its remarkable cheapness, and the economy with which it can be used, make it all the more desirable.

"The Mobile city railroad companies are preparing to accommodate their cars to the new invention, and the death-knell of the mule is already sounded there, and perhaps in a few months we shall be able to witness the astonishing spectacle of our own cars running the streets by india-rubber power.

"The inventor holds his patent, we understand, at the service of Northern and Western railroad men, and will give them rights at remarkably low rates. A New Orleans inventor is not by any means an anomaly, but our sharp and shrewd mechanics have held themselves too closely to business heretofore, and we welcome Mr. Jones' enterprise as creditable to the city and the State."

SCIENTIFIC INTELLIGENCE.

EXPERIMENTS WITH THE DIAMOND.

According to Morren, the diamond heated to bright redness in a current of illuminating gas becomes covered with a deposit of graphitic carbon, which can be partially rubbed off, and can be entirely removed by polishing; if it be afterwards cautiously heated to redness on platinum foil, it recovers its original luster and weight.

In hydrogen gas the diamond can be heated nearly to the point of fusion of platinum without undergoing any change; it rather increases than diminishes in luster. In carbonic acid it loses slightly in polish and weight, and the resulting gas contains carbonic oxide and oxygen; the carbonic acid is not decomposed by the diamond, but by the white hot platinum, and the loss of weight in the diamond is due to partial oxidation.

The diamond not only burns in oxygen gas, but in the air when heated to redness before the oxyhydrogen flame; it takes fire and burns like coal, but goes out when the heat is intermitted. It then becomes white like ground glass, and does not blacken, nor swell up, nor splinter, unless previously cracked. The unconsumed portion exhibits under the microscope innumerable triangular facets, evidently derived from actahedra. Diamonds with native lenticular faces and such as are used for glass cutting, look, after having been strongly heated in the air, as if they were composed of so many prisms inclosed in triangles. Whether black diamonds would exhibit the same behavior under similar circumstances has not been determined, as no experiments have thus far been made upon them.

PRESERVATION OF MEAT.

Mr. Georges, in Montevideo, S.A., preserves meat by immersing it in a liquid composed of 85 per cent water, and a mixture of glycerin with acid sulphite of soda and hydrochloric acid, and afterwards strewing dry sulphite of soda upon it, and sealing hermetically in cans. After the lapse of a year the flesh was perfectly fresh. Before using, it must be rinsed with dilute vinegar, and left exposed for a short time in the air. Meat thus prepared costs, in Paris, five cents a pound, and is said to be a valuable article of food. Meat can also be kept perfectly sweet by being immersed in melted paraffine, and when required for use only needs to be greatly heated to melt off the covering of paraffine, which can be saved for further use.

PLATING COPPER AND BRASS WITH ZINC.

According to Böttger, copper and brass can be easily coated with zinc by immersing them in a boiling bath of sal ammoniac containing zinc foil or powder. The deposit of zinc made in this way is brilliant, and adheres firmly to the copper and brass. Whether iron could be coated or galvanized in the same way is not stated by the author, though the use of sal ammoniac in the ordinary process is well understood.

METHOD FOR PURIFYING ILLUMINATING GAS.

E. Pelouze modifies the Lamming mass now generally employed for the purpose of purifying illuminating gas, by adding sulphuric acid. He sprinkles the purifiers containing oxide of iron and sawdust, with water, to which 20 per cent of sulphuric acid, of specific gravity 1·53 (53° B.), has been added, and after the mass has dried up sufficiently, passes the gas through. After use it is necessary to restore the sulphuric acid, and to remove the sulphate of ammonia that may have been formed. It is said that napthalin is not removed from the gas by this method.

A mixture of oxide of iron and sawdust thus prepared would serve an excellent purpose as a disinfecting agent to be added to the earth in the earth closet, in stables, cess pools, and the like, but where it has to come in contact with metals care must be taken not to have free sulphuric acid present.

Ordinary copperas or sulphate of iron and sawdust, with native hematite, or bog-iron ore, would also make a valuable disinfecting mixture, and would be cheap.

SYNTHESIS OF ACETIC ACID.

Berthelot has succeeded in making vinegar from acetylene, one of the products of the distillation of coal, and a frequent constituent of illuminating gas. He accomplished this in one way by first producing alcohol from illuminating gas and subsequently oxidizing the alcohol into vinegar in the usual way. The process is curious scientifically but not practicable on a large scale. The most important method proposed by Berthelot is to dilute acetylene with twenty times its volume of air, and allow it to stand for six months at ordinary temperature exposed to the light in a closed jar over a solution of caustic potash—it then changes spontaneously into acetic acid—

$$C_4\ H_2 + O_2 + H_2\ O_2 = C_4\ H_4\ O_4$$

Only one half the hydrocarbon of the acetylene is thus transformed, the other half being converted into a resinous mass. It would certainly be a great triumph of modern science to be able to make alcohol and vinegar out of illuminating gas, as that would save us the loss of sugar, and suggest a good many refuse articles that could be made useful by distillation. Perhaps some of the natural gas springs of the world could be turned to good account in such an industry.

WESTERN papers chronicle the death of "the first white child born in Ohio," at the age of eighty years. A rather backward infant that.