face, was of the most satisfactory character. Every line came out just as it had been computed, and the work was complimented on all sides."

A Good Adhesive Material.

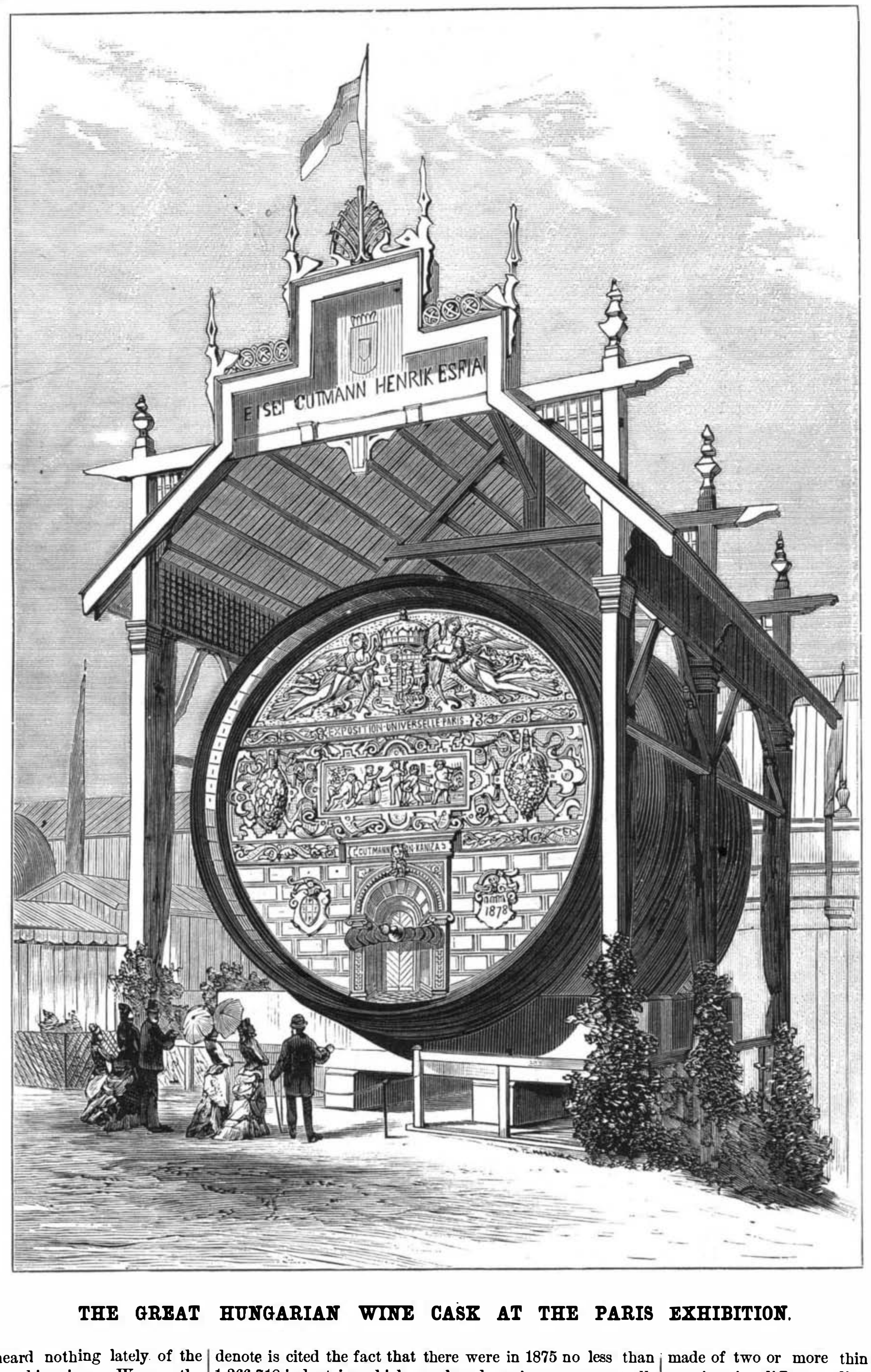
Water, 1 ounce methylated spirit, 2 ounces; dextrine, 2 tablespoonfuls. Mix the water and spirit; stir in the dextrine, making a smooth paste, and place the vessel you make it in in hot water till a clear brown solution results.

THE GREAT HUNGARIAN WINE CASK.

The great cask of Heidelberg contained 140,000 liters of wine, at the Paris Exhibition of 1878 one was exhibited which is nearly as large, having a capacity of 100,000 liters. The great cask has been sold to a Frenchman, for whom it was made by Mr. Gutmann, of Nozy Kanizsa. It measures 3·65 meters in diameter and 4·30 meters in length.

The staves, which are oak planks from the forests of Hungary, are of 20 to 25 centimeters in thickness, and are held together by 18 iron hoops, the ends of which are firmly riveted together. The door is fastened by a system of screws, and closes the cask, and is similar to manhole covers in boilers. The cask is supported by five logs, each of which is derived from an oak perhaps a thousand years old. This immense cask, with its appendages, would furnish wood enough to stock a small wood yard. It is varnished, and the end in which the large bronze faucet is inserted is carved like a piece of fine parlor furniture. The lower part is laid out to resemble stone masonry. On the left hand side there is a motto praising perseverance and diligence; an escutcheon on the right hand side bears the date 1878. The middle portion of the head is beautifully carved, containing in its center a group drinking and distributing wine. The upper portion bears the Hungarian crown above the Hungarian escutcheon.

This large cask has become the property of a manufacturer of champagne, of Epernay, Mr. Mercier. He will use it for fermenting and storing his wine.



THE GREAT HUNGARIAN WINE CASK AT THE PARIS EXHIBITION.

Big Grape Vines.

California has, probably, 20 vines, each of which produces more than 500 lbs. of grapes as an average crop. Among these are vines at Coloma and Blakes, and near Montecito and Stockton—representing the Sierra Nevada, the coast mountains north of San Francisco, the San Joaquin Valley, the southern coast, the level of the sea, and an elevation of 2,000 feet above it. The Stockton vine, a mile southeast of the town, in the yard of Mr. Phelps' house, is a foot in diameter, and has this year produced 5,000 lbs. (2½ tons), according to the *Independent*. We have heard nothing lately of the yield of the Montecito and Coloma big vines. We saw the latter in 1867 when young, and it then bore 1,500 bunches of grapes. The Montecito vine grew from a cutting of the old big vine at the same place, set out in 1795 and cut down in 1875, when 80 years old. It had a diameter of 15 inches, covered an arbor 114 feet long by 78 wide, and averaged three tons in its annual yield. The big vine at Blakes separates, at the surface of the ground, into two stems, each six inches in diameter. The vine at Coloma is an Isabella; the other three are of the Mission variety.—*San Francisco Alta.*

Men and Machinery.

A census of the industries and handicrafts of Germany, the results of which for Prussia have been drawn up by Dr. Engel, the well known Berlin statistician, shows that in the year 1875 they numbered 1,667,104. Of these, 1,623,591, or 97 per cent, were in the hands of individuals employing at the most five persons, the number employing more than five persons being only 43,513. These 43,513 large industrial undertakings, however, employed 1,379,959 persons—that is, 38 per cent of the whole number of persons engaged in industry, while the remaining 2,246,959 persons were employed in the small industrial undertakings. Dr. Engel finds, on comparing these figures with the corresponding data of 1861, that only those classes of industries have absorbed since then more workmen at the expense of smaller industries of the same kind which from the nature of the work employ large or numerous machines. In other kinds of industry this process of absorption is not marked. This fact is given as an answer to the Socialists, who complain of the tyranny of capital, and assert that it is swallowing up the small industries. In further support of the answer the above figures denote is cited the fact that there were in 1875 no less than 1,266,718 industries which employed no journeymen at all.—*London Times.*

New Inventions.

Messrs Wilson & Keagle, of Center Point, Iowa, recently obtained a United States patent for a Novel Lamp for illuminating large out-door areas, such as skating rinks, depots, wharves, etc., and a Canadian patent has just been issued to them for the same invention.

An improved Station Indicator has been patented by Mr. John Casey, of Jersey City, N. J. This is an improved device, for application to street cars and other railroad cars, to indicate the different cross streets and the stations as they will be successively reached. It is simple and reliable.

An improved Piano Violin has been patented by Mr. Fradelshon Harris, of Louisiana, Mo. This is an improved musical instrument which combines the gamut of the violin with that of the violoncello or bass viol, so as to enable a single performer to simultaneously execute, by means of keys, both parts, which have been heretofore allotted to these separate instruments.

Mr. William Howe, of Brooklyn, N. Y., has patented an improved Folding Hammock Supporter that may be readily carried about and readily set up in position for use; and it consists of three folding sections—a base section and two inclined side sections—that are stiffened by lateral rods and pivoted to supporting legs. The side sections and legs swing on the base section into folded or upright position, the side sections being secured in the latter position on the base section by means of locking devices.

Mr. Rudolf Sieg, of New Orleans, La., has devised an improved Diffusion Apparatus for extracting saccharine matter from sugar cane and other sugar producing substances.

Messrs. Peter Schultes and Christian Walter, of Mendota, Ill., have patented an improved Folding Leg for Sofa Bedsteads. It may be locked securely into position lengthwise along the frame of the swinging section of the sofa bed or lounge, or at right angles thereto, it being rigidly secured so as to prevent rattling and shaking when in use.

An improved Cigar Press has been patented by Mr. J. W. Sursa, of Venice, Ill. It consists of a bench adapted to receive one set of moulds, and provided with means for enabling moulds of different sizes to be used, and furnished with a cam shaft, with which the required amount of pressure is brought to bear on the moulds.

Mr. William T. Keefer, of Newcastle, Pa., has patented a cheap and convenient Device for Stretching and Holding Clothes Lines, and for other similar purposes. The stretching is accomplished by means of a lever, which is retained in position by a rack and pawl. Clothes line props are dispensed with, and the matter of putting up the clothes line is greatly facilitated.

Mr. John C. Banks, of Carlisle, Ky., has devised an improved Filter. This invention relates to that form of filter which is provided with an automatic device for opening a valve to allow the sediment to readily pass away. The weight of the water not only closes the valve, but opens it also.

Messrs. E. D. Smith, C. C. Matson, and P. R. Martin, of Utica, Ill., have patented an improved Toe Weight for Horses, which consists of a weight adapted to rest on the hoof, pivoted to the toe at an angle coincident to that of the hoof, which can be adjusted to the middle of the hoof or to either side, as may be desired.

An improvement in Letters and Numbers for Signs has been patented by Mr. Joseph A. Bruce, of Brooklyn, N. Y. The letters and numbers are made of two or more thin layers of wood with the grain running in different directions, and provided with plates of transparent or opaque glass set in the openings. In some cases the glass is covered with an ornamental scroll work.

Mr. James C. Wright, of Louisville, Ky., has devised an improved form of Counter or Shelving for use in stores or shops, for the purpose of holding clothing and other goods, the construction being such that space is economized, the goods more easily protected, better displayed, and more conveniently accessible, and may also be more quickly removed in the case of fire than when placed on counters and shelves of the usual construction.

Mr. Sylvester Byrne, of Boston, Mass., has devised an improved Washing Machine for heavy fabrics, such as stair cloths, blankets, sheets, rugs, mattress covers, sheetings, and similar articles, which may, by being passed first in one direction, then in the opposite direction through the machine, be cleaned rapidly.

Technical Education and Mechanical Training.

BY OROSCO C. WOOLSON, C. E.

I submit the opinion that there should not be that wide difference of feeling and want of sympathy between the so-called practical man and the so-called scientific man.

What is more discouraging to a man of sound sense and determined energy than to know that he has men about him who are continually pulling in opposite directions? Yet how perfectly cognizant are we that such negativeness, if I may use the expression, does exist, and that, too, among the educated as well as the uneducated classes.

Want of harmony in thought and action is one of the great evils standing in the way of young men becoming good and efficient engineers.

It is impossible for one man to comprehend everything, yet the purely scientific man disregards many things in the construction and proportioning of parts, which the practical man will consider indispensable, not from any particular theory of his own, but from an innate sense of that which is correct. The why and the wherefore he may not be able to explain, yet in actual practice he is right.

These differences among sections of our profession will grow less conspicuous with the advance of education, science, and art. And, however unconscious we may be of the fact, yet we are surely becoming more familiar with each other, just in proportion as we cultivate and interchange ideas with those with whom we are in daily contact, and who are mutually willing to profit by instruction. I feel the good time is coming when the mass of mechanics and miners will be both scientific and practical in a very large sense.

Many of our teachers are not sufficiently practical, otherwise they would point out and explain, more fully than they do, many very scientific and mysterious phenomena, thus educating the mind of the student to recognize if not fully to comprehend them, and in this way not only preparing him to theorize more correctly, but also enabling him to avoid laying himself open to the derision which often follows in case the theorist is proved in error.

The reading and understanding of drawings and the surveying and comprehending of machinery may, perhaps, be compared to the studying and speaking of languages; and in order to illustrate what I wish to convey I will state that a mere theoretical engineer will copy or perhaps construct an elaborate machine on paper, in which full lines and dotted, right lines and circles, are as familiar to him as reading and writing. He can explain the minutest detail of the machine, and how it should go together and how be taken apart: yet place him beside the same machine as it stands completed, and he is bewildered. He can explain to you nothing, it may be, save the general construction, and his ideas of its practical construction are as clear as they would be on the compiling, setting the type, and binding of Homer's Iliad, all of which he may possibly have read, though he never knew absolutely how the work was put together.

On the other hand, show the aforesaid drawing to the hard-fisted mechanic, and it would be as unintelligible to him as Latin or Greek, for to him there is a confusion of many lines worse than any German text; but place him with the machine itself and he feels at home, and will explain to you its construction, dissecting any part in a straightforward mechanical manner, provided the machine has been designed practically and with care.

I call to mind an experience I once had in Chicago, Ill., in which city I was putting in some heavy foundations for machinery soon after the great fire. At that time every man who could work was pressed into service; men were getting high wages, and were constantly striking for either higher figures or fewer hours of labor. Hundreds of mechanics came from other cities, and circumstances conspired to make men arrogant and independent. Many of the men were rough characters, with whom it was necessary to deal firmly, otherwise they would not half work; and not only that, for had they had their own way a very bad example would have been set to those who were disposed to act fairly.

I soon found I had some half dozen in my force that were of the rough sort; one even went so far as to attempt to take my life. This attack aroused my blood, and from that moment onward I never relaxed my will to show them my determination not only not to take the lead, but that they must and should follow my instructions. The result was that long before I was through with that set of men, I could never lift my hand to do anything without their anticipating me; and of all the men I have since been in charge of, I can recall none that were more willing to do my bidding.

Always take the first lift yourself; by so doing you soon impress your men that to be appreciated they must be prompt, which is one of the main elements of success.

Young engineers, make it a point to put your "shoulder to the wheel" first, and soon the laborer will find that you have only to wish, and you are obeyed. I repeat it, don't irritate your men. A boy often receives a fair common school education, and goes into a shop; but by the time his apprenticeship is over, and he is prepared, so far as practical knowledge is concerned, to enter a technical school, his fine sensibilities are blunted, if not gone entirely. In very rare instances will a boy be found who can commence his schooling again with the right enthusiasm.

A condition necessary for obtaining admission to a technical school should be a certain time spent in studying works of practical utility. This desideratum would bring to the school young men of greater determination than are at present to be found in those establishments.

Masters of shops and foundries would object to taking a boy in their employ without obliging him to stay a specified time. This term will certainly be long enough to enable a master to derive some benefit from the boy to compensate the former for the bad and spoiled work of the latter. At the expiration of this period the boy will be so far developed that, should he choose to enter a technical school, he will be better fitted to imbibe those professional tenets which go to polish the engineer; and let the scholar ever bear in mind that the higher the polish the better will he withstand, in after years, the corrosive attacks necessarily incident to his career.

At all times it is a matter of serious consideration for one to choose the proper shops in which to place a boy, in order that he may have ingrafted into his mind those thoroughly practical ideas which will serve him advantageously in the future.

One of the greatest evils that can befall a youth who has the ambition to become prominent in the engineering profession, is to be placed in contact with, to say nothing of being under the tutorage of, an impracticable man, one who is full to overflowing with little whims, who is slack in discipline, who is wanting in dignity, who is never prompt, and who is incapable of placing before his men a class of work which can be understood and appreciated by the public at large.

To procure for a boy, or young man, a thoroughly practical education, first make a close investigation as to the best shops in which to apprentice him. Then pick out the foreman mechanic, whose high qualifications have secured him his important position in the works; place your boy under his charge, and you may rest assured that when the boy has served his term of apprenticeship he will have received a far better knowledge of his trade than if he had been allowed to select a shop for himself, and serve a short apprenticeship, without having received any practical instruction.

Under proper supervision a boy will generally profit both himself and his employer. Reverse the case, and the young man will almost invariably turn out to be a miserable botch and a nuisance, wherever he may chance to be employed.

[The above is extracted from a more lengthy paper published in the *Engineering and Mining Journal* by the author, Mr. Orosco C. Woolson, inspecting engineer on the New York Elevated Railroad. Mr. Woolson has also recently obtained a patent on a flexible railway system, designed to obviate the noise and vibration on our city elevated railroad structures.—ED.]

Driven Wells.

The introduction of driven wells is becoming more general, as the knowledge of their utility and ease of construction become better known. A paper was prepared by Mr. Palmer to be read before the New York State Association, but the author of it did not arrive till the convention had adjourned, so he communicated it to the *National Fireman's Journal*, from which we make the following extract:

At Cortland, N. Y., driven or tube wells for fire purposes are made in the following manner: A wrought iron pipe six inches in diameter is perforated with 864 ⅜ inch holes in rows running lengthwise of the pipe, extending from one end along the pipe about four feet. Care must be taken not to weaken the pipe, and at the same time the combined capacity of the perforation must be somewhat in excess of that of the pipe, to secure a copious supply of water. Into the end of the pipe thus perforated a conical cast iron point is riveted. The point is cast with a shoulder at its base, and the end opposite the apex is inserted into the end of the pipe thus perforated, like a plug or stopper, until the end of the pipe rests against the shoulder, which is made to be flush with the sides of the pipe. This section of the pipe should be 18 or 20 feet long, so as to bring the coupling and joint above the water line in the earth, to facilitate repairs of the joint. The couplings are sometimes spoiled in driving and have to be renewed, before the upper or last section of pipe is added. Great care must be taken to make the well tube and all its joints air tight. A cast iron head is then screwed into the coupling at the other end of the pipe, so that it rests finally upon the end of the pipe, and so as not to bear upon the thread of the coupling in driving. Several wrought or steel nipples are fastened into this head, and a long spanner is used to screw the head firmly to its place in the pipe, and also to turn the tube in the earth to facilitate driving.

With the pipe thus prepared a well is made by digging to water. Into this excavation the pipe is placed in a perpendicular position, point downwards. It is then driven with an ordinary pile driver, using an ordinary wooden weight or hammer. Water is usually reached at a depth of 10 to 16 feet below the surface. The wells are from 22 to 26 feet deep. The sand and mud may be removed from the inside of the well with a sand bucket or dump. A charge of 4 or 5 lbs. of gunpowder is sometimes exploded inside the tube at the bottom of the well, with great benefit. It serves to open the perforations in the pipe which may have become closed in driving, opens up the water courses in the earth, and stirs up the sediment, so that it may readily be taken out of the well by pumping.

Gunpowder is exploded in the bottom of these wells by inclosing it in a water tight metal can, to which a piece of small lead pipe is soldered communicating with the interior of the can. Through this pipe, which must be long enough to bring the open end thereof above the water where the can is submerged, the powder is exploded by means of a fuse or by electricity.

Wells thus constructed have been thoroughly tested. A third class Silsby steam fire engine played upon a fire for seven consecutive hours, throwing two streams through two lines of hose and ⅞ inch nozzles, with no diminution in the volume of water supplied. This well would have supplied the same volume for one year or a longer period. One important advantage which these wells possess is that they never freeze up. The village of Cortland has 12 of them in successful operation, and more are being constructed each year. They now cost from $150 to $175 a piece, ready for use. There are also two gang wells and three dug wells, made and used for fire purposes. The gang wells are made by driving five 1¼ inch tubes made of gas pipe, with points and perforations substantially as heretofore described, to the required depth, namely 20 to 26 feet. These tubes are siamesed by means of elbows, and united in a sort of hydrant, make a serviceable well for fire purposes, but inferior to those constructed with a single 6 inch pipe. The greater number of joints render it more difficult to make them air tight, there is more friction in the tubes, and they are not so readily freed from sand and grit.

Our dug wells (three in number) are superior to the driven wells made by either method, both in the copiousness of the supply and the clearness of the water from grit, but they cost about three times as much each. The best of these has a curbing of stone masonry laid up to the water line without cement and contracted towards the top. In form it resembles a champagne bottle with the neck slightly elongated.

These wells were dug in the primitive way, the sides being curbed with timbers to prevent caving; the earth was brought to the surface in a bucket by means of a windlass. The water was pumped from the pit by a pulsometer, which was claimed to have a capacity of 900 gallons per minute.

A more scientific method would be to sink a caisson containing air tight compartments, from the inside of which the water may be excluded by atmospheric pressure, by pumping air into the caisson under sufficient pressure to exclude the water therefrom while the digging progresses on the inside.

Undoubtedly a good well may also be constructed by driving a five or six inch metal tube, perforated near the bottom and open at the lower end, which may be armed by a steel ring, to protect the tube and facilitate driving. Bits, augers, chisels and sand buckets may be used to loosen and remove the earth from the inside of the tube, which may be driven in the manner heretofore described. The advantages of this method are, that it is not covered by a patent, the character of the strata penetrated may at all times be definitely known, and obstructions in the way of driving can be removed with greater certainty. When the tube is driven to a sufficient depth, and the earth removed from the inside, a plug may be forced down the tube to close the lower end, a conical perforated sheet metal or wire cloth screen may be inserted in the tube to filter the water if desired.

The earth about Cortland is a loose alluvial gravel, mixed with sand and interspersed with cobbles and bowlders. These materials appear to have been deposited in the bed of a lake or stream, rising to within ten to twelve feet of the surface, and forming a subterranean reservoir containing a copious supply of water, which is only slightly obstructed in its flow through this former formation.

Driven wells are impracticable, except when the earth is porous and permeated by copious subterranean reservoirs or streams.

In compact and tenacious clays, unless layers of loose porous earth or gravel are sandwiched between the strata of clay, a practical driven tube well is an impossibility (with no exception that we are aware of), for the reason that, though a dense clay may contain subterranean pools and streams which may be intercepted by driving a tube into the earth; nevertheless, where the earth is so compact as to exclude the air, and thereby relieve the water contained therein from the pressure of the atmosphere surrounding the earth, the water cannot be made to rise in the well tube responsive to the vacuum created therein by the operation of a pump attached to the upper end thereof, and no supply of water can be obtained therefrom by pumping with a suction pump any more than cider can be drawn from an air tight cask without vent to admit the air into the interior of the cask.

Subject to these conditions, tube wells may be so constructed as to afford a ready and economical means of supplying water for the extinguishment of fires.

To Remove Fusel Oil and Clarify Liquors.

A powder is prepared consisting of 30 parts of pure starch, 150 parts of powdered albumen, and 15 parts of sugar of milk. About 7 ozs. of this powder will be sufficient for 2 gallons of liquor, which, when well shaken and allowed to stand for settling, may be decanted free from fusel oil and perfectly clear.

REMEDY FOR COLOR BLINDNESS.—*La France Médicale* states that M. Delbœuf has found that if a person afflicted with Daltonism looks through a layer of fuchsine in solution, his infirmity disappears. A practical application of this discovery has been made by M. Joval, by interposing between two glasses a thin layer of gelatin previously tinted with fuchsine. By regarding objects through such a medium all the difficulties of color blindness are said to be corrected.