made of steel which have been well forged will always keep truer and keep their original sizes better in hardening, and be less liable to break in hardening, than articles which are made of the steel in the state it leaves the manufacturer; for instance, if a very long screw tap, or reamer, etc., be required for any special purpose, it will be well to take a piece of steel sufficiently large to admit of being forged to the required dimensions. If for a long screw tap, three quarters of an inch in diameter, seven eighths round-bar steel swaged down at a cherry-red heat to three-quarters and a sixteenth will suffice (the one-sixteenth is allowed for turning); but if the edges of seven-eighths square steel be hammered down so as to form eight squares and then swaged down to three-quarters and a sixteenth, it will prove even better for the purpose than the seven-eighths round-bar steel, it must be obvious that if similar methods be adopted with larger articles, they will be less liable to break in hardening.—*Ede on Steel.*

Correspondence.

The Editor are not responsible for the opinions expressed by their correspondents.

The Chicago Artesian Well.

MESSRS. EDITORS:—In two or three numbers of your paper I have read notices of this truly great and wonderful work, which, though originated and prosecuted upon theories outside of old fashioned mundane science, has proved more successful than any thing of the kind ever attempted in this country. The history of the work, as detailed by its principal agent, Geo. A. Shufeldt, Jr., is briefly this: A gentleman named Abraham James, claiming to act by spiritual impressions, pointed out the locality where the well is now flowing, and insisted that at a certain depth artesian water could be had by boring. Upon the strength of his representations the work was commenced, and water in large quantities, and, for deep well water, of very pure quality, was struck within a few feet of the depth he had designated, and flows out at considerable hight above the surface, at the rate of 1,200,000 gallons per day. As Chicago, before this proof was given, was not known by most people to be situated over the bottom of a geological "basin," the whole matter is considered by its projectors a signal proof of spiritual intelligence and communication. But the work being finished,—no matter by what authority,—its details show clearly, that instead of its being wonderful that an artesian well is obtained there, it is one of the most beautiful *proofs* of the truth of the common theory of such wells; and to demonstrate this is the object of this paper.

It is supposed by Agassiz and others that the first rocks which appeared above the primeval ocean upon this continent—and perhaps on the earth—are those which constitute the Laurentian Range, bordering Lake Superior and running outwardly to the Atlantic. What we know is—for the rocks testify to it—that on the outward slope of this range, along the Mississippi river and its eastern branches, as we go downward geographically, or hydrostatically, we go *upward* geologically; that is, the different stratas of deposited rock—many of which outcrop along the river's bank—all lie like the tiles upon the roof of a house, overlapping and running under each other; but—to follow out the figure, the eave of the house is the highest; and, of course, the water falling upon it would run under instead of over the stratas.

The first deposit upon the Laurentian (which is an igneous rock thrown up by internal convulsions), is what has been called by some the St. Peter's Sandstone. This commences on the St. Croix river, one of the principal eastern branches of the Mississippi, at about one hundred miles south of the lake, and fifty or more from the ridge which forms the watershed between the lake and all the eastern branches of the upper part of that river. For thirty miles along the St. Croix this stone forms its banks, into which it has cut its way in ages past to a depth of one hundred feet or more, leaving nearly perpendicular precipices upon each side.

This stone is impervious to water, and is probably the foundation stone of all that part of northern Wisconsin which abounds in tumarack, cedar, and cranberry marshes. It is covered with a thick deposit of drift, forming low hills of loose, pebbly soil, between which are the swamps and lakes, and some alluvial deposits. Following down the Mississippi river, this sandstone, which is called by the Iowa State Geologists the Potsdam Sandstone, is last seen near the north line of that State, and there dips under the lower Magnesian limestone, which in about forty miles dips under another thin bed of sandstone, over which soon commences the thick and extended deposits of the Galena, or lead-bearing limestone, the latter the principal rock of the river bluffs for over one hundred miles. A little north of the latitude of Chicago commences a bed of Hudson river shale, which is overtopped by a thick deposit of Niagara limestone, which disappears under ground at a point on the river exactly west of Chicago. From this point the geological deposits going south and east rise with great rapidity up to the coal measures of central Illinois, through various stratas of limestone, mostly of a fine building quality.

Now what I wish to show is, that the drill of the Chicago well penetrated through all these stratas, which were not wanting, until it reached and went through the St. Peter's sandstone, and struck the water which fell upon the earth along the Southern Laurentian slope, and has run beneath that bed of rock, ready to spout from any hole which reaches it. This, if true, would account for the great purity of the water as compared with other artesian fountains, as it has encountered on its way no soluble mineral substances, and was originally strained through the sand drift of upper Wisconsin.

The diary, kept apparently with great care during the boring of the second well, shows plainly that after going down about three hundred feet, through various limestones and marble, the drill struck the Niagara limestone, which forms the surface rock on the Mississippi, directly west of Chicago. It is described as a grey limestone, one hundred feet thick, with layers of flint. This description tallies exactly with the character of the stone exposed in the bluffs at this place. Underneath this was found a bed of shale, the same in character as that which lies below the limestone here, but which is still partially above the bed of the river. This proved to be about one hundred and fifty feet thick (here it has been bored into a great distance, but not through). From the bottom of this shale downward, the character of the rock is not so well defined in the diary. The Galena and lower beds of limestone seem to be wanting, and the drill appears to have reached the still lower sandstones, under which the water is stored.

The conclusions which I draw from the above are, 1st, That artesian water can be obtained at any point in this region by going deep enough to penetrate the St. Peter's or Potsdam sandstone; and 2d, That along the Mississippi river, as low down as the latitude of Chicago, it can be had at a depth several hundred feet less than at that place. C. B.

Lyons, Iowa.

The Cave of the Puy de Dome.

MESSRS. EDITORS:—In your issue of Nov. 9th, I notice a communication from "M. A. D.," requiring a solution of a natural phenomenon existing in the south of France. As you intimate, the facts are scarcely correct, as represented by "M. A. D." They are these: In the locality mentioned a spring issues from underneath a deposit of lava, which is remarkably cold, sometimes even covered with ice, in the hottest part of the summer; and in the winter has a temperature exceeding that of the air surrounding. Now there is nothing very extraordinary about this spring, excepting its excessive coldness (exhibited by the production of ice) in excessively hot weather, and this wonderful quality so much dwelt on and exaggerated possibly, by the guides who conduct tourists to the mountain (Puy de Dome), admits of a very simple explanation to the educated man, though a great mystery to the uneducated natives, and to some of those who ought to know better. This explanation consists in the fact that the rock through which the waters of this spring percolate, is of a very porous texture; in the hot weather a very rapid and abundant evaporation takes place, which reduces the temperature and causes the water to escape at or near the point of freezing. At my visit there, there was no ice in the spring, though I was assured that the occurrence sometimes took place. Under the circumstances, it is possible, and I believed the assertion for that reason, and not because one is told so. In the winter, in cold weather, as a matter of course, the water would be warmer, and in certain states of the atmosphere would give off vapor, as other springs do under the same circumstances. This vapor is magnified into steam, and the double contrariety of cold in summer and heat in winter makes a pretty wonder for the uninstructed villager or traveler. Possibly the wonderful evidences of intense volcanic action to be seen here, predisposes one to be rather too credulous as to mysterious phenomena. HENRY STEWART.

Norristown, Pa.

Treatment of Kerosene Lamps.

MESSRS. EDITORS:—In your issue of Nov. 2, page 275, your correspondent "Experimenter" has given advice, which I cannot but think detrimental to the safety of the Kerosene burning public. He states that "if the wick fits the tube, it is impossible to drive the flame down into the lamp by blowing into the chimney," and further, recommends that method of extinguishing the lamp. Now your correspondent must be more fortunate in the possession of a good and perfect burner than nine-tenths of the people, for nine-tenths of all the burners used are made with *vent holes* along the side of the tubes, or in close proximity thereto, much larger in area, and much nearer the explosive mixture in the lamp than by way of the tube, with never so loose a wick as usually used.

The theory of lamp explosions, as I understand it, is this: First, Kerosene of itself is not explosive, nor is the gas which rises from it, but it is the admixture of that gas with a large body of air that makes it dangerous. Kerosene, or coal oil, is a dense body, which gasifies slowly, requiring, during the process of combustion in lamps as used, air to take the place of the oil consumed; this air, passing down by the heated tube through the *vent* holes, as before stated, becomes warm, and by its heat eliminating a certain amount of gas, small in proportion to its own incoming body. The prolonged burning of the lamp, say for four or five hours, reduces the quantity of oil, enlarges the space for the explosive gaseous mixture, and imparts also a great heat to the contents of the lamp, which then gives forth vapor more freely, so as finally to produce the proportion of one part gas to nine of air, which I take it is the maximum point. This heat also increases the volume inside the lamp, causing this dangerous mixture to exude by these same vents, close beneath the flame, then catching from some deflection of the flame or its proximity thereto, explodes the lamp while standing on the table, and more often still when carried in the hand, or in going down stairs. Thus it will be seen that to blow the flame *down* is to invite destruction, unless the burner is properly constructed, as comparatively few are. The proper method is to draw the wick into the tube by means of the ratchet, which, while avoiding danger, will prevent any odor arising from the oil in the wick. PENROSE CHAPMAN.

Brunswick, Me.

Artesian Wells---Why the Water Flows---Is it Centrifugal Force?

MESSRS. EDITORS:—A correspondent has published in a recent number of your journal, a theory of the nature of spouting water, in which he attributes the discharge of the water to the centrifugal motion of the earth—the tendency of matter to fly from the center. I have heard this opinion advanced before, and the existence of perennial springs, on the Adelsburg mountains in Switzerland, and in other places, adduced as evidence in support of the theory, but I do not believe it to be founded on fact.

I bored the Chicago Artesian; they are 711 feet in depth; they commenced filling with water at a distance of ten feet from the surface, and continued full of water all the way down. Why did not the centrifugal force throw this water out? and why was no water discharged until the drill had penetrated a particular subterranean stream? Before this point was reached there was plenty of water in the wells, and we could pump out an abundant supply; and this is true of hundreds of other artesian wells scattered throughout the country, they do not discharge the water above the surface, but plenty of it can be obtained by pumping. Why does not the centrifugal force throw the water out of these wells? And why do they not all become flowing wells, as would be the case if the theory were true? Or, in case of dry wells, why does this force not throw out the stones and chippings of the drill as well as the water? For these reasons I am inclined to adhere to the opinion that water, in flowing wells, comes from a higher source, and that the crust of the earth is everywhere penetrated by these underground streams to an extent of which at present we have no conception. For the benefit of another of your correspondents I here state that the temperature of the water in our wells is 57° Fah., and is uniform winter and summer. It was incidentally mentioned in your paper that the flow was intermittent: this is not the case; but it is without change in quantity or force all the year round. The form of the overflow resembles the white plume of a soldier, and is extremely beautiful. GEO. A. SHUFELDT, JR.

The Philosophy of the Soap Bubble.

MESSRS. EDITORS:—On page 291, No. 19, current volume of your famous journal I find a communication from Mr. Alfred O. Pope, detailing his experiment by which he imagines he has proved Sir David Brewster's theory regarding the color of soap bubbles. I do not find fault with the experiment, but with the deductions drawn from it. He does not tell us how his experiments prove that secretions were formed and until he demonstrates that they were formed he has not proved Brewster's theory. All admit that the thicker the film of the bubble the brighter the colors will be. Oleate of soda and glycerin in solution make a thicker film than a solution of common soap. Consequently, when the liquid begins to flow down the sides of the bubble and collect in drops at the bottom the top gets thinner and the colors then become paler and there being a constant change in the thickness of the film all over the bubble there is as constant a change of color until a deep blue or black makes its appearance at the top of the bubble which becomes so thin that the cohesive force is overcome by the weight of the sides and bottom, and the bubble bursts. CHEMIST.

Cincinnati, Nov. 5, 1867

Recipe for Making Boots Water Tight.

MESSRS. EDITORS:—As the cold, muddy weather of fall is approaching, it may be of interest to many of your readers to know how to preserve their boots and make them at the same time pliable and water proof. It can be done in this way: In a pint of best winter-strained lard oil, dissolve a piece of paraffine the size of a hickory nut, aiding the solution with a gentle heat, say 130° or 140° F. The readiest way to get pure paraffine is to take a piece of paraffine candle. Rub this solution on your boots about once a month; they can be blacked in the meantime. If the oil should make the leather too stiff, decrease the proportion of paraffine, and *vice versa.*

I have used this for eight years past, and boots have lasted me two winters, the uppers always remaining soft, and never cracking. I have tried beeswax, rosin, tar, etc., but never found any other preparation half so good. C.

Dayton, Ohio.

ARTIFICIAL RUBIES, not mere copies in glass, but made veritably out of the same substance—alumina—of which the natural gems are composed, have been produced by M. Ebelsman of the Sevres Porcelain Works, near Paris. The process consists in employing a solvent, which shall dissolve the mineral or its constituent, and may thus, either upon its renewal or by a diminution of its solvent powers, permit the mineral to aggregate in a crystalline state. Certain proportions of alumina, magnesia, oxide of chromium, or oxide of iron, and fused boracic acid, are placed in a crucible made of refractory alumina enclosed in a second one, the whole being exposed to a high heat. The materials are first dissolved in the boracic acid, then as the heat continues, the latter evaporates, the alumina and coloring matter combine, crystallize, and present the exact appearance of the spinel ruby. In this way crystals of the same form, hardness, color, composition, specific gravity and effect on light, as the cymophane, and other precious stones are prepared.

WINE CONTAINING ZINC.—Dr. Wittstein has recently found that most European wines contain zinc in the form of salts, its presence being due to the fact that the isinglass used in purifying the wine is adulterated with about 2½ per cent of oxide of zinc.