Correspondence.

Oil, Gas and Water from an Artesian Well.

To the Editor of the SCIENTIFIC AMERICAN:

Under promotion of this club and with the purpose of developing a water supply for this city the first one of three artesian wells has about been completed. It presents conditions which are believed to be novel and of general interest.

The well is 2,487 feet deep and flows about 300,000 gallons of water each twenty-four hours, the initial pressure being 65 pounds and the temperature 120 degrees Fah. There is a double casing from the top to a depth of 2,200 feet, one being 4½ inches (and through it only the water flows) and the other 6 inches in diameter. The 4½ inch pipe then continues to the top of the water-bearing stratum, about 2,400 feet. The water as it appears is strongly mixed with natural gas which readily ignites, so that apparently water and flame flow from the same opening. Scientific analysis shows that the water is impregnated with mineral properties in the proportion as shown below per gallon:

Sodium chloride	226·71 grains.
Sodium carbonate	69·50 "
Calcium bicarbonate	4·31 "
Other solids	2·25 "
Total per gallon	302·77 "

The water has been turned directly into the mains of the public water supply system of the city, and readily furnishes a fine fire pressure, besides filling the standpipe 100 feet high on a neighboring elevation. The gas in the water is a matter of some embarrassment, and it is a problem with us as to how to dispose of it.

Another point of especial interest is that, at a depth of 1,050 feet, a flow of petroleum oil was struck, which has been of the greatest trouble in prosecuting the work, the entire boring plant having been twice consumed by fire on account of it. The flow is remarkable in that it has appeared with a persistent and uncontrollable natural or artesian flow of about 70 gallons a day, and this has continued for nearly a year. A rupture having occurred in the 6 inch pipe, the oil has found it, and now flows between the inner and outer casing of the well with a velocity very much accelerated by the high temperature of the inner pipe.

What to do with the oil and with the gas, and how readily to separate the latter from the water and to utilize the same, are problems which very much puzzle us amateurs, and if they are such as interest the scientific, we would be glad of any suggestion from you or your readers. We think we have one of the most remarkable deep artesian wells in the world.

COMMERCIAL CLUB.

Corsicana, Texas, June 12, 1895.

Cost of Power at Niagara.

The company which has undertaken to develop electricity at Niagara, on a large scale, for manufacturing and other purposes, has acquired more real estate there than it needs for its own use, in order to furnish sites to such of its customers as wish to establish their business close to the source of their mechanical power supply. But the public has been led to expect that in addition to serving local interests, the company would also furnish electricity to places scores, if not hundreds, of miles away, and there has been much speculation as to the feasibility of carrying such plans into effect. Owing to her proximity to the Falls and her great size and industrial activity, Buffalo has been regarded as the first center of population, removed from Niagara, to be provided for. It is not yet quite clear whether that city feels that it is enjoying a privilege or conferring a favor in letting the power company invade its precincts. Perhaps she has not determined that point herself. The matter is evidently still under consideration. In reply to some inquiries from representative Buffalonians, the Power Company recently offered the following terms:

It would let the municipality or a private corporation come to Niagara, take water from the Power Company's canals at the rate of $10 a horse power, and manufacture its own electricity; or it would furnish power off the turbine shafts at $13, or electricity at the power house at $18. But if the Power Company undertook to do anything of this sort, it would not contract to deliver less than 10,000 horse power. Hence Buffalo must agree to take at least that much or none at all. The Niagara people would not accept a franchise to operate a line to and in Buffalo for a shorter time than that for which its own bonds have been issued. No price is given for electricity delivered at a central station in the suburbs of that city, fifteen miles from the Falls, so that the company's own estimate of the probable waste and cost of transmission is still withheld.

There would be four kinds of losses: (1) In transforming at the power house up to a high voltage, (2) on the line, (3) in transforming down at Buffalo, and (4) in distribution over street lines to consumers. These could not well amount to less than 20 or 30 per cent altogether, and they might, perhaps, reach 50 or 60 per cent. But if, for example, they amounted to just one-half, the $18 rate at the generator shaft would mean $36 to the consumer, without adding anything either for interest on the cost of the transmission plant or for operating expenses. This, however, is probably an extravagant estimate. The prices actually given, by the way, are for a twenty-four hour daily supply. Some establishments require power, however, for only ten or eleven hours. Whether it would pay to put in storage batteries to utilize the surplus is a question which their managers must naturally consider.

Richard Hammond writes to the Buffalo Courier to say that steam power, on a scale of 1,000 horse power for ten hours daily, can be generated in Buffalo, where coal is very cheap, for $21 per horse power. The Power Company, however, denies this, and estimates the cost at $32, besides quoting various experts as estimating the cost on a twenty-four hour basis at between $45 and $60. In some other cities, where coal is more expensive, it is said to be from $60 to $75. If, after this discussion, Buffalo decided neither to buy on the terms offered nor to let the Power Company bring in its own lines and supply the market, more distant cities may possibly be deterred by her example from patronizing the Niagara concern; but as the latter supplies its local customers with electricity at $20 per horse power, in large quantities, there may be a greater industrial development at the Falls than would otherwise result. —New York Tribune.

Electrical Notes.

Benjamin Franklin on Torpedo Fish.—An interesting letter of Benjamin Franklin on the stroke of the so-called torpedo fish is preserved in the electrical department of the Armour Institute, Chicago. It was written during Franklin's second mission to England, while he was engaged in devising means for protecting the powder magazine at Purfleet from lightning. He was very busy at this time and was, besides, involved in a bitter political quarrel with Lord Hillsborough, the Secretary of State for the Colonies; but he, nevertheless, found time to study torpedo fishes and their effects.

The letter is indorsed: "Franklin's Instructions to Try if the Stroke of the Torpedo be Electrical," and is, in full, as follows:

It has long been supposed that the Stroke given by the Torpedo was the Effect of sudden violent muscular Motion. It is now suspected to be an Effect of the Electric or some similar subtil Fluid which that Fish has the Power of acting upon and agitating at Pleasure.

To discover whether it be the Effect of a subtil Fluid, or of Muscular Motion, let the Fish be touch'd with the usual Conductors of Electricity, viz.:—Iron, or other Metals; and with the known Non-Conductors, dry Wood, Glass, Wax, etc. If the Stroke be communicated thro' the First and not the Latter, there is so far a Similarity with the electric Fluids, and at the same Time a Proof that the Stroke is not an Effect of mere muscular Motion.

Let it be observed whether the Stroke is sometimes given on the near Approach of a conducting Body without actual Contact; if so, that is another similar Circumstance.—Then observe whether in that case any Snap is heard; and in the Dark any Light or Spark is seen between the Fish and the approaching Body. If not, there the Fluids differ.

Let a Number of Persons stand on the Ground, join Hands, and let One touch the Fish, so as to receive the Stroke. If all feel it, then let him be laid with his Belly on the Plate of the Metal; let one of the Persons so joining Hands touch that Plate, while the farthest from the Plate with a Rod of Metal touch the Back of the Fish; and then observe whether the Force of the Stroke seems to be the same to all in Circuit as it was before, or stronger.

Repeat the last Experiment with this Variation. Let two of the Persons in the Circuit hold each an uncharged electric Phial, the Knobs at the Ends of their Wires touching. After the Stroke, let it be observed whether those Wires will attract or repel like Bodies, and whether a cork Ball suspended by a long silk String, so as to hang between the Wires at a small Distance from the Knobs of each will be attracted and repelled, alternating to and from each Knob; if so, the Back and Belly of the Fish are at the Time of the Stroke in different States of Electricity.

London, August 12, 1772. B. FRANKLIN.

The Slavianoff Electric Welding Process.—The Slavianoff system of electric welding, or the Slavianoff smelting system, as its inventor calls it, is coming into extended use in Europe, and has been for some time in successful operation in the celebrated Perm Gun Works in Russia. It is said to be an improvement on the well known Thomson and Benardos systems. Its principle depends upon the employment of a bath and the development of hydrogen at the negative pole, surrounding the part to be welded. The gas thus forms a high resistance to the current at this point, producing a corresponding amount of heat, which is communicated to the negative pole. A supply of molten metal, of the same character as the object to be welded, is supplied to the fractured part. This is accomplished by using the object operated upon as one electrode and a bar of the same metal as the other. During the welding this bar is gradually melted down and constantly supplies metal to the fracture as it is needed. A spring and solenoid automatically regulate the feed.

The Slavianoff process is, it is said, applicable to all ordinary metals. Some remarkable work has already been done by it at the Perm works. Some of the fractures repaired without difficulty were such as would have offered almost insuperable obstacles to any other known system. One of these was a bell about six feet in height and in its greatest diameter that was cracked from top to bottom. Another was an immense roll from a rolling mill broken in two near the center.

Measuring Specific Inductive Power.—A new method for measuring specific inductive power has been described by Mr. Nodon and Prof. Pellat. They employed two metallic spheres of small capacity, placed some distance apart and connected with an induction coil, and a third, movable, sphere grounded through a telephone. This third sphere is placed between the other two, its position being determined by the point at which no sound is heard through the telephone.

The dielectric to be tested is placed between one of the stationary spheres and the movable one, and the latter is moved toward the dielectric until the telephone again becomes silent. The distance between the first and second positions of the movable sphere will then be proportional to the specific inductive power of the dielectric. In using the apparatus a material whose inductive capacity is known is first used; the unknown substance is tested from this or a standard. The two specific inductive capacities will be directly proportional to the distances found in the two tests.

Electricity from Heat.—M. Desire Korda, a French electrician, has recently made a thermo-chemical galvanic cell, using ordinary gas retort carbon and a few cubic centimeters of barium peroxide. The salt is simply placed upon a flat piece of the carbon and the latter is heated to redness in a gas flame. A violent effervescence takes place and carbonic acid is given off. A voltmeter, whose terminals are connected by means of platinum wires with the carbon and the salt respectively, shows a deflection indicating a difference of potential of about one volt.

If cupric oxide, resting upon a layer of potassium carbonate, be used instead of the barium peroxide, a voltage of 1·1 is indicated.

Dynamo and Steam Engine Efficiency.—Prof. Unwin complained, in a recent lecture, that electrical engineers were in the habit of comparing the efficiency of the dynamo with that of the steam engine, greatly to the discredit of the latter. It is a common saying, he adds, that the efficiency of a dynamo is from 90 to 95 per cent, while that of the steam engine is only about 10 per cent; but this comparison is an unfair one, and shows a lack of comprehension of one of the two fundamental laws of thermodynamics, namely, the law of the motivity of heat. Heat energy is undirected energy and only a fraction of it is convertible into mechanical energy. Working, as it must, with only this available fraction, the steam engine is not an inefficient machine. The task of the dynamo is simpler. Electricity is directed energy in a wholly convertible form, and it is, therefore, only necessary to transform one kind of directed energy into another. In order to do this, only a small fraction need be wasted. Prof. Unwin says further that the electrical engineer is to blame for his ingratitude, as without the steam engine the dynamo would be but a useless mass of metal and wire.

Silvering Glass.

A simplified process for silvering glass is thus described by MM. Auguste and Louis Lumiere, in the Journal de Physique. Take 100 parts by volume of a 10 per cent solution of nitrate of silver, and add, drop by drop, a quantity of ammonia, just sufficient to dissolve the precipitate formed, avoiding any excess of ammonia. Make up the volume of the solution to ten times the amount by adding distilled water. The reducing solution used is the formaldehyde of commerce. The 40 per cent solution is diluted to a 1 per cent solution. The glass to be silvered is polished with chamois leather, and the bath is made up immediately before use by mixing two parts by volume of the silver solution with one of formaldehyde. The solution must be poured over the surface without stopping. After the lapse of five or ten minutes, at a temperature between 15 degrees and 19 degrees C., all the silver in the solution will be found to have been deposited on the glass in a bright layer, which is then washed in running water. It is then varnished, if the glass side is to be used; or polished, if the free surface is required for reflection. This method does not require the scrupulous care necessary with other methods.

The American Cotton Crop.

On June 1, the visible supply of cotton in this country for 1895 was 9,520,085 bales. This is 2,212,820 bales more than were indicated by the crop at this time last year. These figures indicate that the entire crop this season will be no less than 9,800,000 bales, an amount that has never, heretofore, been approached.