Correspondence.

Hotter in Utah than in Siberia.

To the Editor of the Scientific American:

In your issue of July 20 there appeared an article headed, "The Great Heat of Siberia," wherein you state that, according to the report of Mr. Geo. Kennan, it is, in summer time, "about as hot a country as there is on the face of the globe." And in his report Mr. K. states the temperature to have varied "day after day from 90° to 103° in the shade."

I thought I would take this opportunity to inform you, and through you the public, that Americans need not go to either Africa or Siberia in order to see the thermometer climb up to 103° in the shade. For if this is the maximum temperature of those countries, they cannot begin "to hold a candle" to either Southern Utah or Arizona. It was only yesterday when in this "Dixie" land of ours (as a portion of Southern Utah is called) we enjoyed the comfortable or uncomfortable temperature of 113° in the shade of a great tree and in a free draught (according to Signal Service instructions and according to a Signal Service thermometer). During the month of June this same thermometer registered a temperature varying from 83° to 107° and an average of 101½°.

During the present month, as far as it has gone, it registered from 91° to 113°.

During the last ten days it stood as follows:

July 18	100½°	July 23	103°
" 19	103°	" 24	104°
" 20	107°	" 25	107°
" 21	105°	" 26	112°
" 22	106°	" 27	113°

Maximum temperature by Signal Service thermometer.

Last evening, at 6 o'clock, I laid my own thermometer out in the sunlight for experiment, and it went up to 130°, while it indicated 102° during the whole afternoon in my rooms.

To-day I again laid it out in the sunshine at 2 o'clock in the afternoon, when it went up to 162°. The metal portion of the thermometer, which is designed to protect the bulb, but does not touch it, was hot enough to burn one's fingers, and so is every piece of metal which is left out in the sunshine any length of time. This latter instrument is a confectioner's thermometer, and will register 400°, and is laid in wood.

It is true that the present season has been the hottest by three degrees for several years, and by at least one degree for many years past; but when this place was first settled 119° to 120° was the usual midsummer heat, so I am told. This latter temperature may be found to-day in Fort Yuma, Arizona, and on some of the deserts between there and here the temperature generally runs up to 124° in the shade and higher, so I am informed. But in spite of all this heat a case of sunstroke was never heard of in this region of the country. Several people have perished on the above mentioned deserts for want of water, but in the settlements nobody is ever very seriously inconvenienced, although a good many *think* they are suffering terribly from the heat. This uncomfortable feeling is, however, mostly due to fat pork, grease, butter, and similar blood-heating articles of food. This place (St. George) is situated in a valley about one thousand meters above the level of the sea. All fruits and vegetables in A 1 condition, and grapes are two weeks ahead of other years.

HERMANN FASCHER.

St. George, Utah, July 28, 1889.

P. S.—Thermometer at Signal Service station to-day went up to 115¼°. H. F.

A Simple Relief for Lung Troubles.

It has long been known that pine needle pillows would alleviate persons afflicted with lung troubles, and a Florida editor relates an incident in support of the fact as follows: During a visit to the home of a most estimable lady living on Indian River, this editor was told of a discovery that had been made which may prove a boon to sufferers from lung or bronchial troubles. This lady having heard that there was peculiar virtue in a pillow made from pine straw, and having none of that material at hand, made one from fine, soft, pine shavings, and had the pleasure of noting immediate benefit. Soon all the members of the household had pine shavings pillows, and it was noticed that all coughs, asthmatic or bronchial troubles abated at once after sleeping a few nights on these pillows. An invalid suffering with lung trouble derived much benefit from sleeping upon a mattress made from pine shavings. The material is cheap and makes a very pleasant and comfortable mattress, the odor of the pine permeating the entire room and absorbing or dispelling all unpleasant odors.

Artificial Silk.

Science and industry are ever combining to copy nature, and even dare to attempt improvements on her processes. The Champ de Mars contains many illustrations of this; but perhaps the boldest and most curious attempt of this kind is to be seen in the manufacture of artificial silk. Near the end of the Machinery Hall, that end by the Avenue du Suffren, and quite close to the elevator which raises passengers to the traveling bridges, there is an exhibit showing the manufacture of silk without any aid from silkworms, and on a system which appears to be entirely novel and is certainly of wonderful simplicity. The silk industry has seen great vicissitudes and has had to suffer many cruel troubles from disease, both of the worms and of the trees they feed upon, but up to the present we believe that it has been spared the struggles of competition. If this new process should prove to be what it promises, a new and dangerous rival to the silk trade will have to be reckoned with.

The composition of silk may be briefly described as follows: It is a relatively strong, brilliant material, the produce of the digestive juices of the worm acting on the leaves of the mulberry that constitute its food. The cellulose of the leaf is triturated by the worm and transformed by its special organism into a peculiar substance, transparent, and somewhat resembling horn. This is called kerotine, and it fills two glands, from which it exudes in the form of two threads, which unite as soon as they leave the body of the worm; but this material no longer possesses the chemical composition of cellulose. It is largely combined with a new element characteristic of animal tissues—nitrogen. The silk fiber thus discharged forms a continuous thread, which often reaches the great length of 350 meters, the diameter of the fiber being only eighteen thousandths of a millimeter.

It was reserved for the present generation of inventors to devise a means of imitating by science the mechanical and chemical functions of the silkworm.

An old student of the Ecole Polytechnique, M. Le Comte de Chardonnet, set himself some time ago to try and solve the problem. He took as his material pure cellulose, a material, as we have seen, entirely different to that of which natural silk is composed. Cellulose is, as is well known, the basis of vegetable tissues, and particularly of wood; thus all soft woods appeared to be well adapted for the purpose, in fact, any material suitable for the production of a good quality of paper, white wood, cotton waste, etc, appeared fitted for the production of artificial silk; paper pulp is, in fact, the starting point of the industry. This first operation to which the pulp is subjected is that of nitration, which transforms it into pyroxile; this is done by steeping the pulp in a perfectly defined mixture of sulphuric acid and nitric acid. After thorough washing and drying, the nitrated cellulose is formed into collodion by dissolving it in a mixture of 38 parts of ether and 42 parts of alcohol. The collodion thus made is drawn into fiber by the mechanical means which we shall describe presently; but the thread requires further and very important preparation. The fiber, as it issues from the apparatus that imitates the glands of the silkworm, is one of the most inflammable of substances, and in that state would be absoluely useless. An absolute process of denitration is therefore a necessity. Of this operation we can say nothing, because it is kept a secret by the inventor. Its object is, of course, to extract from the filament the greater part of the nitric acid that it contains, and it would be curious to know if the nitrogen that does remain after the process is in the same proportion as that contained in natural silk.

However this may be, the thread after treatment ceases to be inflammable to any marked extent, but it may, if desired, be rendered still less liable to burn. After the denitration process the filament becomes gelatinous, and other substances can be incorporated with it. Thus, when in this state, it can be impregnated with incombustible material, such as ammonia phosphate, and it is at this stage that the filament can be dyed to any desired color. This latter operation cannot precede the denitration process, as all the color would be taken out during that operation.

The mode of manufacture is very simple, and in the exhibition three apparatus are shown in operation to the public. The first of these is only a model to illustrate the principle. The chief feature consists of a glass tube reduced at the upper end to a capillary passage. It is through this passage that the filament of collodion is forced out under pressure. As it issues the fiber is in a pasty state, and would have no consistency if it did not consolidate immediately. This solidification is secured by means of a second glass tube, which surrounds the first one and extends beyond it. Connected to it is a small pipe which supplies a current of water that bathes the collodion filament and sets it so that it can be secured by pincers and drawn out without breaking; it is afterward led to a spool on which it is wound.

The second apparatus, which is more complete, contains a number of such glass tubes, and illustrates the method by which two or more filaments can be drawn out and twisted so as to form one thread. The third machine is arranged for practical work. The dissolved collodion is contained in a copper receiver, having a capacity of about 15 liters. In this receiver it is subjected to a pressure of from 8 to 10 atmospheres that forces the liquid through a horizontal tube, to which are connected 72 capillary tubes, each with their surrounding water casings. In this manner 72 filaments of artificial silk are produced simultaneously, and these can be spun into threads of various thickness, three such filaments being twisted as a minimum and ten as a maximum. To effect this there is placed parallel to the horizontal tube a rack carrying a series of bronze blades that serve to guide the filaments; the twisted threads are wound upon bobbins running on spindles mounted parallel to the horizontal tube. A frame carrying as many pincers as there are capillary tubes can be put in movement by means of a cord, and if any of the threads are broken these pincers take hold of the filament and join up the broken parts. This apparatus is inclosed in a hermetically sealed glass case, through which a current of air is continually forced by means of a fan. This air is warmed to assist in drying the filaments; but it becomes cool at the exit and deposits the vapors of ether and alcohol.

The circulating water, which is employed to harden the filaments, is discharged into a receiver. It contains a large percentage of the volatile products which can be recovered by distillation, and in this way only about 20 per cent of the ether and 10 per cent of the alcohol are lost. One tube can produce from 3 dwt. to 5 dwt. of filaments per hour, or a length of nearly 1¾ miles. The apparatus works continuously, and with but little attention, and if by any chance one of the capillary openings becomes sealed, it can be cleared by applying heat. Under the conditions in which the machine is exhibited at work, the artificial silk can be sold at from 15 fr. to 20 fr. the kilo., while real silk cost from 45 fr. to 120 fr. the kilo. The manufactured product resembles very closely the natural one, it is smooth and brilliant, and the filament has a strength about two-thirds that of silk. Woven into a tissue it appears stronger and less liable to cut, this property being due to the fact that it is not charged with destructive materials which appear to be always used in dying silk, such as zinc or lead. These foreign matters are probably introduced solely for the purpose of weighting the silk; but there is no object for similar adulteration of the artificial product, because the metallic preparations employed cost as much as the collodion thread.

According to M. De Chardonnet, the density of his product lies between that of raw and finished silk. Its resistance to a tensile strain varies from 15 tons to 22 tons per square inch. (Copper breaks under a load of about 18 tons, and iron under 23 tons.) The elasticity is about the same as that of natural silk, and the inventor claims that it has a superior brilliancy. M. De Chardonnet exhibits a number of stuffs woven wholly with the artificial silk, as well as others mixed with natural silk and other textile materials. The results are really very remarkable. Among other objects, he shows a chasuble of artificial silk, which will bear very close examination.

Artificial silk is not yet manufactured on an industrial scale, but it appears that this will very shortly be done, and while it is impossible to foretell with certainty what will be the commercial results of this curious invention, it is impossible to resist the conclusion that it is highly practicable, and that it even contains the elements of great future success.—*Engineering.*

Important Patent Cases Decided.

Two important decisions were lately rendered by Judge Wallace, in the United States Circuit Court. The first was in the famous paper bag patent controversy, involving the right to the patent for the square-bottom paper bags. The Union Paper Bag Company and James M. Waterbury were the litigants, and Judge Wallace decided against Mr. Waterbury. The right to this patent is estimated as next in importance to that of the telephone, and involves over a million of dollars. George Harding and F. F. Chambers represented the plaintiff, and F. H. Betts and A. H. Walker the defendant.

The other decision was against the Third avenue surface road for using the patent of Henry Root for a cable grip without compensation to the patentee. Judge Wallace granted a permanent injunction to Root, restraining the company from using the grip. Frost & Coe were the company's attorneys, and George Harding represented the plaintiff.

Work of Electricity.

There are now in use in the United States more than 5,650 central electric stations for light and power. There are 210,000 arc lights and 2,600,000 incandescent lamps. There were fifty-nine electrical railways in operation in March last, and eighty-six roads in process of construction. The increase of capital in electrical investments during 1888 was nearly $70,000,000. These are very significant figures, and they point unmistakably to the course of future inventions and discoveries.