blow of the drop, and are consequently thrown into the scrap heap. With sterling, none are wasted, for the extreme tenacity of the alloy allows it to be bent into any shape, however intricate, without the slightest deterioration. Polishing is effected by grinding, burnishing and afterwards buffing, leaving the work perfectly brilliant and lustrous. From sixty to eighty gross of spoons and forks are made at the above mentioned works weekly, meeting, as we understand, with a ready market.

For articles subject to the oxidizing influence of the atmosphere, such as harness trimming, reflectors for locomotive lamps, badges, etc., this metal is especially appropriate. In fact, the number of uses to which it may be put in the future seems unlimited, for it appears equally adapted to be made into twenty inch cannon or ladies' jewelry. It can be cast in molds, or wrought, while its remarkable strength, combined with its flexibility, renders its durability unquestionable.

THE WHISTLING LANTERN—WHO IS THE REAL INVENTOR?

In the SCIENTIFIC AMERICAN of May 25th 1872, we published an interesting account of a "New Sensitive Singing Flame," being a communication from Professor W. E. Geyer, of the Stevens Institute of Technology, to the *American Journal of Science*. In that communication, Professor Geyer describes his experiment as an improvement upon the well known singing flame of Philip Barry, which latter is, produced by placing a piece of ordinary wire gauze on the ring of a retort stand, about four inches above the burner, and lighting the gas above the gauze. At the least noise, this flame roars and sinks down, and acts in a very curious manner. Professor Geyer stated that his improvement consisted in simply covering Barry's flame with a moderately large tube, resting loosely on the gauze. "A luminous flame," he says, "six to eight inches long is thus obtained, which is very sensitive, especially to high and sharp sounds. If now the gauze and tube be raised, the flame gradually shortens and appears less luminous, until at last it becomes violently agitated, and sings with a loud uniform tone, which may be maintained for any length of time. Under these conditions, external sounds have no effect upon it. The sensitive musical flame is produced by lowering the gauze until the singing just ceases. It is in this position that the flame is most remarkable. At the slightest sharp sound, it instantly sings, continuing to do so as long as the disturbing cause exists, but stopping at once with it. So quick are the responses that, by rapping the time of a tune, or whistling or playing it, provided the tones are high enough, the flame faithfully sounds at every note. By slightly raising or lowering the jet, the flame can be made less or more sensitive, so that a hiss in any part of the room, the rattling of keys, even in the pocket, turning on the water at the hydrant, folding up a piece of paper, or even moving the hand over the table, will excite the sound. On pronouncing the word 'sensitive,' it sings twice; and in general, it will interrupt the speaker at almost every 's' or other hissing sound."

So much for the discovery of Professor Geyer, which is certainly very interesting.

On September 10th, 1872, under the title of "The Whistling Lantern, a new Safety Lamp for Miners," we gave the substance of a paper, read in August last, by Dr. A. K. Irvine, of Glasgow, Scotland, before the Iron and Steel Institute, in which, before reaching the description of the constitution of his lantern, he describes the general principle on which it operates. He stated that, "when a mixture of any inflammable gas or vapor with air in explosive proportions passes through and is ignited upon the surface of a disk of wire gauze of such mesh as to prevent the passage of flame, and a suitable tube or chimney is placed above and surrounds, at its lower end, the disk, preventing the admission to the chimney except through the wire gauze, a musical sound is produced, varying in pitch, etc., with the size of flame and dimensions of the chimney. In this, as in other flames singing in tubes, the sound is caused by the vibration of the flame, determined or intensified by the current up the chimney, and communicated to the column of air or gaseous fluid within the chimney, whose length commands and times the rapidity of the vibrations so as to produce a given note, just as the flutter of the air originating at the *embouchure* of an organ pipe is commanded by the length of the pipe."

It will be observed that the formation and operation of this flame is substantially the same as in the experiment of Professor Geyer.

After some further observations upon other sensitive flames, Dr. Irvine goes on to describe some of the *practical uses* to which he had applied the improved flame. He had made lamps, he said, "for giving light, which, while the atmosphere is not contaminated by fire damp or other inflammable gas, burn in the usual way, but which, as soon as such a gas mixed with air in explosive proportions enters it, appeals to the ear by a loud musical sound, as well as to the eye by its effects on the appearance of the flame in the lamp—just as in the Davy. In one form of the lamp, which is more particularly adapted for the use of the viewer, the air is made to enter near the top of the lamp, obviating the necessity of turning the lamp on its side, as is frequently necessary with the Davy when but a thin layer of the fire damp is floating at the ceiling of the mine. In another form, the lamp is adapted to the use of the working miner, and a superior light is obtained by the use of paraffin oil. In a third form, specially constructed with the object of being a warning apparatus as well as a stationary light, the sound is given forth when an atmosphere of gas and air under the explosive point enters it. Another application of this singing flame was its use as a *fog horn*, which, on account of its portability, simplicity, and cheapness, might take the place of a costly apparatus, and would be highly suitable for railway junctions or other situations of danger. *All the above apparatus were made to sound during the reading of the paper*, and elicited much applause."

The *Gas Light Journal* states that this discovery will, in consequence of the wide circulation of the SCIENTIFIC AMERICAN, be sown broadcast over the civilized world; and our contemporary is fearful that Dr. Irvine will receive the exclusive credit, which, it thinks, would be an injustice on our part towards Professor Geyer: which is very strange reasoning. But the fears of our contemporary, we think, are groundless.

The position of the SCIENTIFIC AMERICAN in respect to the new discovery is, simply, that it has published the accounts of the new flame, as given by the authors themselves, from which it appears that the priority in date of Professor Geyer's publication is a matter of record.

In regard to the application of the discovery to practical purposes, the credit thereof appears to belong alone to Dr. Irvine, who has adapted it to the use of miners, in the form of a paraffin oil lantern, and has brought it out in several other practical forms, such as fog horns, ship signals, railway junction alarms, etc. In Professor Geyer's paper, no allusion is made to the practical uses of the flame, nor does it appear from that document that he had ever tried to produce it except within loose tubes, for experimental purposes.

SOUP AND SAVANTS.

The old and familiar proverb "Too many cooks spoil the broth" will have to be amended by substituting for the word "cooks" the word "doctors;" at least, so it would seem from the accounts which come to us through some of our transatlantic exchanges. All our readers of course know of Liebig's world-renowned process of procuring the extract of meat. This extract has become an article of great and constantly growing importance. By means of this process, it has been made possible to bring (to countries where, owing to dense population and other causes, meats are scarce and dear) a large portion of the most nutritious qualities, in a concentrated form, of the meat of cattle slaughtered in countries where there is such abundance of it that has not heretofore been worth saving, the cattle being destroyed for their hides and tallow alone. An engineer named Gilbert, under the advice and counsel of Liebig, prepared this extract in South America, whence it was imported to Munich, where it was not allowed to go in the market until subjected to the scrutiny of the eminent chemist who was the inventor of it. Under this careful management, it acquired a great celebrity, was much recommended by the highest authorities, and it was liked and believed in by the people who used it. The soup or broth prepared from this extract was found to be not only harmless, but nutritious and palatable both for the sick and the well.

But among other enterprising savants, one Dr. Müller, perhaps actuated by motives such as occasionally influence some of our savants on this side of the water, has been drawing certain inferences from certain experiments which he has been making, which, if he is to be believed, ought to lead every person who has a due regard for his inner man to utterly discard broth, now, henceforth, and for ever. It has no nutritive qualities, says he. It is only an excitant, and its exciting qualities are due to certain salts of potash to be found in it. One of the experiments given, performed by M. Kemmerich, seems to be conclusive that horse beef broth in large quantities is not good for rabbits. The extract from a pound of horse beef, injected into a rabbit's stomach, killed the creature.

But without going into these experiments, or commenting further upon the subject, we hold, as an "opinion as is an opinion," that the people will continue to eat broth, no matter how many doctors try to spoil it.

LEATHER BELTING---FACTS FOR THE DETERMINATION OF THE QUALITY OF THE LEATHER.

Mr. W. Eitner, a technical chemist at Prague, Bohemia, has communicated to the German press a very elaborate investigation of the above subject, interesting to every mechanic and engineer, of which we translate the following summary:

The author commences by saying that the value of a belt depends mostly upon the quality of the material, and not upon the manner of its manufacture; but it is by no means easy to judge of the quality of the leather, owing to the fact that its appearance varies according to the manner of its preparation. Moreover, although certain kinds may be a criterion by which we can form an opinion on others, all kinds cannot be judged of in this way, as inferior leather may be made to look like leather of good quality. The quality, therefore, cannot be determined by the outward appearance, because a good looking surface is easily made to hide a defective tanning, which can always be recognized by making a vertical cut with a sharp knife.

Belt leather may be divided into two classes, according to the manner of its manufacture: 1. Leather tanned with concentrated tan bark extracts. 2. Leather which, after having been superficially treated with such extracts, has been finally tanned in the old manner (in tan pits). The first method, termed sweet tanning, may be called tanning in the quick way, as it is completed in from three to four months; while the second method, termed sour tanning, requires eight, twelve or sixteen months, according to the thickness of the hide. These figures refer only to belt leather; other kinds of leather require different periods of time. The sweet tanned leather appears on the cut surface as a homogeneous mass, presenting no variety of parts or structure. When viewed with a magnifying glass, it may be seen that it is formed of exceedingly fine fibers similar to the cut edge of felt. Cutting the surface of sour tanned leather, however, reveals two different characteristics. Between the fibers, which are of a bright color, there is a dark, somewhat brilliant ground mass, which appears granular; the larger and darker this part is, the better the leather. This texture is the sign of excellent leather, which is solid, compact and elastic, and also possesses a certain degree of pliancy and flexibility, which are required in belt leather. If, from such leather, a round piece be cut out, well hammered and placed again upon the hole, it should, if it does not exactly fit into it, not have become perceptibly larger; this is a sign of its compactness and elasticity, which are only found in very well tanned products. Leather of this kind can be readily cut, requiring not more force than is necessary for cutting bread two days old; the direction in which it was cut should not be recognizable. When perfectly tanned by the sour process, or when tanned solely with extracts, there are always fine fibers, which lay in the direction of the cut (similarly to the fibers of cloth); these give on cutting a surface bright and brilliant in appearance; on the other side, the leather appears darker and dull, and permits us better to recognize the texture. This appearance is due to the prevalence of the fiber and the less quantity of the granular matter, which imparts to the leather greater solidity, density and resistance to exterior influences.

If it is generally advantageous to employ sour tanned leather for belts, it is especially so for belts for heavy machinery, or for belts to be used in damp places. They possess the very desirable property of non-expansion; they need not to be stretched, they do not tear, and they are very durable. We are far from asserting that bands made from sweet tanned leather are good for nothing; on the contrary, they are advantageously used for light straps, and they can be made of double thickness if used in place of a single sour tanned belt. Besides these two principal kinds of leather for belts, there are several medium kinds, produced by combining the two methods, etc. Leather tanned with extracts can be made to somewhat resemble sour tanned, and leather tanned with bark can be made to resemble the sweet tanned product. However, no kind of leather can be termed good if not thoroughly tanned, and its value is determined by the completeness of this operation. For this reason, its easy recognition is of great importance. Mr. Eitner describes a means by which it may be readily and with certainty ascertained whether a certain kind of leather has been properly tanned or not. The method is based upon the fact that the glutinous tissue is swelled by acids, whereby the fiber increases considerably in volume, being converted into a glutinous and transparent mass. This change does not take place if the tissue is completely impregnated with the tanning material; but, if the glutinous substance is only superficially coated with tannin (whereby, however, the leather attains the appearance of being well tanned), the said substance would invariably be converted by the acid into thick, transparent and glutinous fiber; and this change will take place with more or less rapidity according as the material has been less or more tanned. If a strip of properly tanned leather half an inch thick is placed in a glass test tube containing strong acetic acid, no change will be visible upon its cut surface, except that it will grow somewhat darker, as every substance does when wet; but the texture will remain unaltered. It is quite different with an imperfectly tanned product, in which the slightest defects manifest themselves in such a manner as to be recognizable at once, especially as the surface is magnified by the round shape of the test tube, In acetic acid, the imperfectly tanned parts grow first darker the glutinous tissue swells and is altered in the manner described; at the two edges, too dark, non-transparent stripes may be recognized. These are properly tanned leather. If the tanning is partial, some swelling takes place, if not momentarily, in the course of twenty-four hours.

As a material for tanning hides, young oak bark is best. Leather tanned with such bark is distinguished by a light brown color, and a dark brown surface where cut. Leather prepared with pine bark always exhibits on being cut a light reddish brown color, and is rarely perfectly tanned, owing to the fact that pine bark contains less tannin than oak bark. By using oak bark, six, twelve, or eighteen months are required to thoroughly tan a hide, and twice the time is required in using pine bark; and as hides are never left in the pit for so long a time, leather tanned with pine bark is always more or less imperfect. Leather tanned with valonia is easily recognizable by its dull, grayish brown, sometimes olive brown, color. Such leather is always brittle at first, and becomes more so in time. Leather prepared with extracts, of which hemlock extract (from the *pinus canadensis*) is mostly used, shows always a dark color, with a tinge of red.

Germany and Belgium produce the best belts. Belgian bands even surpass German bands, as, in the dressing, French elegance is combined with the thoroughness of German tanning. French factories produce also very good belts; but, although they are always well dressed, they are not always thoroughly tanned. Austria furnishes a medium product. English belts are highly esteemed and are vastly superior to American goods, which must be classed with medium German leather. America exports large quantities of leather to Europe, where it is manufactured into belts, which are mostly sold as English goods. In tests undertaken for the purpose of ascertaining the tensile strength of different belts, made in the presence of Mr. Eitner, it was found that those from Belgium and Germany ranked first; English belts of the most renowned establishments were greatly inferior, but still better than American belts.